WATERBURY PUBLIC SCHOOLS

Committee Meeting Agenda/Minutes

Committee:	BOE Building & School Facilities Committee		
Location:	**Date of Meeting:**	**Start Time:**	**Finish Time:**
Waterbury Arts Magnet School Media Center 16 South Elm Street	Thursday January 15, 2026	4:45 p.m.	Click or tap here to enter text.

Team Norms:

1. All meetings will start on time
2. All team members will agree to stay on specific agenda topics
3. A specific agenda will be set for all meeting

Commissioners Present:	Staff Present:
Click or tap here to enter text.	Click or tap here to enter text.

AGENDA			MINUTES
	Agenda Item	**Time Allotted**	• **Motion** • **Motion by/seconded by** • **Vote tally**
1.	Approval of SCG-042, Review of Final Plans, for the Driggs Elementary School Limited Use Elevator Project (151-0315 LUE) ~ *N. Albini.*		Click or tap here to enter text.
2.	Approval of SCG-042, Review of Final Plans, for the Woodrow Wilson School Limited Use Elevator Project (151-0316 LUE) ~ *N. Albini.*		Click or tap here to enter text.
3.	Adjournment		Click or tap here to enter text.

Additional notes/minutes: Click or tap here to enter text.

Minutes prepared by: Click or tap here to enter text.

DRIGGS ELEMENTARY SCHOOL
- ELEVATOR ADDITION

77 WOODLAWN TERRACE
WATERBURY, CT

STATE PROJECT NO. 151-0315 LUE

ISSUE FOR BID: xx/xx/2026

Building Official:		
(Print Name)	(Signature)	(Date)
Fire Marshal:		
(Print Name)	(Signature)	(Date)
Section 504 Official:		
(Print Name)	(Signature)	(Date)
Health Inspector:		
(Print Name)	(Signature)	(Date)

ARCHITECT
FRIAR ARCHITECTURE
21 TALCOTT NOTCH ROAD
FARMINGTON, CONNECTICUT

CIVIL ENGINEER
ALFRED BENESCH & CO.
120 HEBRON AVENUE, FLOOR 2
GLASTONBURY, CT 06033

MEP/FP ENGINEER
CONSULTING ENGINEERING SERVICES
811 MIDDLE STREET
MIDDLETOWN, CT 06457

STRUCTURAL ENGINEER
MICHAEL HORTON ASSOC.
780 EAST MAIN STREET
BRANFORD, CT 06405

MAYOR
HONORABLE PAUL K PERNEREWSKI JR.

SUPERINTENDENT OF SCHOOLS
DR. DARREN SCHWARTZ

INDEX OF DRAWINGS

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A6.1	LARGE SCALE ELEVATOR & DETAILS
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E1.1	ELECTRICAL POWER NEW WORK PLANS
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FP0.0	FIRE PROTECTION ABBERVIATIONS, NOTES & SYMBOLS
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MECHANICAL	
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M0.1	MECHANICAL SPEFICIATIONS
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M1.1	MECHANICAL NEW WORK PLANS



SITE LOCATION MAP

SET NUMBER

CODE INFORMATION

Date of Original Construction: 1965 Renovation: 2026

1. GROUP CLASSIFICATION
   (Primary) EDUCATION (E)
   (Incidental) -

2. SPRINKLER PROTECTION
   ____ Entire Building
   X Limited Area

3. CODES TO WHICH THIS PROJECT WAS DESIGNED — Dated:

2021	International Building Code *	2021	International Residential Code *
2021	International Mechanical Code *	2021	International Existing Building Code *
2021	International Plumbing Code *	2017	Accessible and Usable Buildings and Facilities (ICC A117.1-2017)*
2021	International Energy Conservation Code *	2020	National Electrical Code (NFPA 70)*
2019	Installation of Sprinkler Systems (NFPA 13)	2021	International Fire Code *
2021	Life Safety Code (NFPA 101) *	2021	International Swiming Pool & Spa Code *
2021	Fire Code (NFPA 1) *		

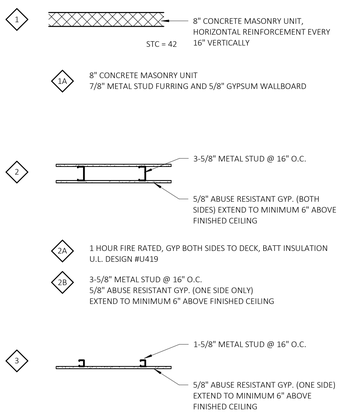
* With Connecticut Amendments and General Statute requirements

4. THRESHOLD BUILDING CONDITIONS X Yes ____ No

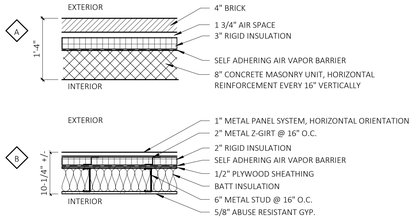
5. BUILDING AREAS FOR GRANT CALCULATIONS (ENTIRE FACILITY)

EXISTING UNRENOVATED CONSTRUCTION	44,126 SF
EXISTING RENOVATED CONSTRUCTION	1,166 SF
EXISTING BEING DEMOLISHED	-
TOTAL EXISTING CONSTRUCTION	45,292 SF
TOTAL NEW CONSTRUCTION	170 SF
TOTAL FACILITY	45,462 SF

INTERIOR WALL TYPES



EXTERIOR WALL TYPES



TYPICAL NOTES

1. ALL ACOUSTICAL WALL ASSEMBLIES ARE TO BE SEALED TOP AND BOTTOM, TERMINATE AT THE UNDERSIDE OF THE FLOOR ABOVE OR THE ROOF ABOVE, TYPICAL.
2. ALL FIRE RATED WALLS ARE TO BE SEALED TOP AND BOTTOM, TERMINATE AT THE UNDERSIDE OF THE FLOOR ABOVE OR THE ROOF ABOVE, TYPICAL.
3. ALL INTERIOR WALLS ARE TO BE SEALED TOP AND BOTTOM, TERMINATE AT THE UNDERSIDE OF THE FLOOR ABOVE OR THE ROOF ABOVE, TYPICAL.
4. FOR BOND BEAMS, REINFORCING AND OR SHEAR WALLS, REFER TO STRUCTURAL DRAWINGS, TYPICAL.
5. SEAL ALL THRU WALL PENETRATIONS TO MAINTAIN CONSISTENT FIRE, SMOKE AND STC RATINGS. ALL PENETRATIONS INCLUDING BUT NOT LIMITED TO ALL ELECTRICAL (CONDUITS & BOXES), MECHANICAL (DUCTS, PIPES), PLUMBING AND FIRE PROTECTION PIPING. SEE WALL TYPES FOR ASSOCIATED RATINGS AND SEE SEALANT SPECIFICATIONS FOR TYPES.
6. CONTRACTOR TO VERIFY THAT ALL FIRE ASSEMBLIES ARE CONSTRUCTED IN ACCORDANCE WITH APPROVED LISTED ASSEMBLIES PER CURRENT U.L. FIRE RESISTANCE DIRECTORY.
7. MOISTURE RESISTANT GYPSUM BOARD IS TO BE USED IN LIEU OF ABUSE RESISTANT GYPSUM BOARD ON ALL INTERIOR FACES OF TOILET ROOMS.
8. ALL INTERIOR GYPSUM WALL PARTITIONS TO HAVE ABUSE RESISTANT GYPSUM BOARD CONSTRUCTION EXTENDING 1'-0" ABOVE CEILING HEIGHT. STANDARD GYPSUM BOARD SHALL BE USED ABOVE CEILING AND EXTENDING TO DECK ABOVE. EXCEPT WHERE NOTED OTHERWISE.
9. NOT ALL WALL TYPES SHOWN ARE USED IN PROJECT. REFER TO FLOOR PLAN.

ABBREVIATIONS

ABOVE FINISH FLOOR	A.F.F.	COLUMN	COL	FEET, FOOT	FT.	OFFICE	OFF.
ABOVE FINISH GRADE	A.F.G.	CONFERENCE	CONF.	FINISH, FINISHED	FIN.	ON CENTER	O.C.
ACOUSTIC TILE	AC.,A.C.T.	CONTROL OR		FIRE DAMPER	FD.	OPPOSITE HAND	O.H.
AIR CONDITIONING	A.C.	CONSTRUCTION JOINT	C.J.	FIRE EXTINGUISHER/FIRE BLANKET	FEB	OPENING	OPG.
AIR HANDLING UNIT	A.H.U.	CONTINUOUS	CONT.	CABINET		OUTSIDE DIAMETER	O.D.
ALTERNATE	ALT.	CONTRACTOR	CONTR.	FIRE EXTINGUISHER CABINET	FEC	PAINTED	PTD.
ALUMINUM	ALUM.	CORRIDOR	CORR.	FIRE EXTINGUISHER & BRACKET	FE	PAIR	PR.
ANCHOR, ANCHORAGE	ANCH.	COURSE / COURSES	CRS.	FIRE RETARDANT	FR.	PAPER TOWEL DISPENSER	P.T.D.
ANCHOR BOLTS	ABL.	DAMPPROOFING	DAMPR.	FIREPROOFING	FPRFG.	PERPENDICULAR	PERP.
ANGLE	ANG	DEGREE	DEG.	FIXTURE	FIXT.	PLASTER	PLAS.
ANODIZED	ANOD.	DEMOLITION	DEMO.	FLASHING	FLASH. FL.	PLASTIC LAMINATE	P.LAM.
APPROVED	APPD.	DEPARTMENT	DEPT.	FLOOR DRAIN	FD.	PLATE	PL.
ARCHITECTURAL / ARCHITECT	ARCH.	DETAIL	DET.	FLOOR FINISH	FLR. FIN.	PLUMBING	PLBG.
ASBESTOS	ASB.	DIAMETER	DIA.	FOOTING	FTG.	PLYWOOD	PLYWD.
ASPHALT	ASPH.	DIMENSION	DIM.	FOUNDATION	FDN.	PRECAST	P.C.
ASSEMBLY	ASSY.	DISTANCE	DIST.	FUME HOOD	F.H.	PREFABRICATED	PREFAB.
ASSISTANT	ASST	DOOR	DR.	FURNISH / FURNISHED	FURN.	PRESSURE TREATED	PROJ. PT.
AT	@	DOUBLE	DBL.	FURRED / FURRING	FURR	PROJECT, PROJECTION POINT	P.T.
AUTOMATIC	AUTO.	DOUBLE HUNG	D.H.	INCH OR INCHES	IN.	QUANTITY	QTY.
BEAM	BM.	DOWN	DN.	INCLUDE / INCLUDING	INCL.	QUARRY TILE	Q.T.
BEARING	BRG.	DOWNSPOUT	D.S.	INFORMATION	INFO.	RADIUS	RAD.
BETWEEN	BET.	DRAWING	DWG.	INSIDE DIAMETER	I.D.	RAIN WATER LEADER	RWL.
BEVEL / BEVELED	BEV.	DRINKING FOUNTAIN	D.F.	INSULATION	INSUL.	RECEIVING	RECV.
BITUMINOUS	BIT.	EACH	EA.	INTERIOR	INT.	REFRIGERATOR	REF.
BLOCK	BLK.	ELECTRIC / ELECTRICAL ELECTRICAL	ELEC.	JOINT	JT.	REINFORCED / REINFORCING	REINF.
BLOCKING	BLKG.	WATER COOLER	EWC.	KICK PLATE	KP.	REQUIRED	REQ'D.
BOARD	BD.	ELEVATION	EL.	LABORATORY	LAB.	REVISION / REVISED	REV.
BOTTOM OF	B/O	ELEVATOR	ELEV.	LAVATORY	LAV.	RISER	R
BOTTOM	BTM.	EXISTING FIRE EXTINGUISHER	EXFE	LIGHTING	LTG.	ROOF DRAIN	R.D.
BUILDING	BLDG.	EMERGENCY	EMG.	MACHINE	MACH.	ROOM	RM.
BUILT-UP ROOF	B.U.R.	EQUAL	EQ.	MAINTENANCE	MAINT.	SANITARY NAPKIN DISPENSER	S.N.D.
CABINET UNIT HEATER	C.U.H.	EQUIPMENT	EQUIP.	MANUFACTURER	MFR.	SANITARY NAPKIN	S.N.R.
CAPACITY	CAP.	EXISTING	EXIST.	MARKER BOARD	MBD.	SCHEDULE	SCHED.
CEILING	CLG.	EXISTING TO REMAIN	ETR.	MASONRY	MAS.	SCUPPER	SC.
CEILING HEIGHT	CLG.HGT.	EXPANSION JOINT	E.J.	MASONRY OPENING	M.O.	SECTION	SECT.
CEMENT	CEM.	EXTERIOR INSULATION	EXT. EIFS.	MATERIAL	MATL.	SEISMIC JOINT	S.J.
CENTER	CTR.	FINISH SYSTEM		MAXIMUM	MAX.	SERVICE SINK	S.S.
CENTERLINE	CL			MECHANICAL	MECH.	SHEET	SHT.
CERAMIC	CT			METAL	MET.	SHOWER/EYEWASH	S/E
CHALKBOARD	C.BD.			MEZZANINE	MEZZ.	SIMILAR	SIM.
CHANNEL	CH.			MINIMUM	MIN.	SOAP DISPENSER	S.D.
CLOSET	CLOS.			MISCELLANEOUS	MISC.	SOUND TRANSMISSION CLASS	S.T.C.
						SPECIFICATIONS	SPEC.

SPLASH BLOCK	S.B.		
SQUARE	SQ.		
SQUARE INCH (S)	SQ.IN.		
SQUARE YARD (S)	SQ.YD.		
SQUARE FEET (FOOT)	S.F.		
STAINLESS STEEL	ST. STL.		
STANDARD	STD.		
STEEL	STL.		
STORAGE	STOR.		
STRUCTURAL	STRUCT.		
STRUCTURAL GLAZED FACING TILE	SGFT.		
STRUCTURAL STEEL	STRUCT. STL.		
SUSPEND, SUSPENSION	SUSP.		
SURFACE	SURF.		
SYSTEM	SYS.		
TACKBOARD	TBD.		
TELEPHONE	TEL.		
TEMPERATURE / TEMPORARY	TEMP.		
TOUNGE & GROOVE	T & G		
THRESHOLD	THLD.		
THICK	THK.		
TOILET	TLT		
TOP OF	T/O		
TREAD	T.		
TYPICAL	TYP.		
UNDERWRITER'S LABS	U.L.		
UNIT HEATER	U.H.		
UNIT VENTILATOR	U.V.		
UNLESS NOTED OTHERWISE	U.N.O.		
URINAL	UR.		
VENT THROUGH ROOF	V.T.R.		
VERIFY IN FIELD	V.I.F.		
VERTICAL	VERT.		
VINYL ASBESTOS TILE	V.A.T.		
VINYL COMPOSITION TILE	V.C.T.		
WATER CLOSET	W.C.		
WATERPROOFING	W.P.		
WELDED WIRE FABRIC	W.W.F.		
WEIGHT	WT.		
WHITE BOARD	WBD.		
WITH	W/		
WOOD	WD.		

INTERIOR ABBREVIATIONS

ACID CABINET	ACID	PRIVACY CURTAIN	PC
ACOUSTICAL WALL PANEL	AWP	PAINTED CONCRETE FLOOR	PCF
BUTCHER BLOCK COUNTERTOP	BB	PROJECTION SCREEN	PJS
BASE CABINET	BC	PLASTIC LAMINATE	PL
CARPET (TILE AND/OR BROADLOOM)	C	PHENOLIC RESIN COUNTERTOPS	PR
CUBICAL CURTAIN	CC	PORCELAIN TILE	PT
CEMENTITIOUS TOPPING	CMT	PAPER TOWEL DISPENSER	PTD
CERAMIC TILE BASE	CTB	QUARRY TILE	QT
COUNTER	CTR	QUARRY TILE BASE	QTB
CERAMIC WALL TILE	CWT	RUBBER BASE	RB
DECORATIVE WALL PANEL	DCPL	REFRIGERATOR	REF
DISPLAY CASE	DC	RUBBER TILE	RT
DISTILLER	DST	RUBBER STAIR TREAD/RISERS	RST
DISHWASHER (GLASSWARE)	DW	SEALED CONCRETE	SC
ENTRY MAT	EM	STAINED CONCRETE	STCT
ENTRY GRILLE	EG	STAGE CURTAIN	STGC
EPOXY PAINT	EP	EMERGENCY SHOWER/EYEWASH	SF
EXPLOSION PROOF REFRIGERATOR	EPR	SPORTS FLOOR	SF
EPOXY RESIN FLOORING	ER	SOLID SURFACE	SS
EPOXY RESIN COUNTERTOP	ERS	SAFETY SHEET GOOD	SSG
EPOXY TERRAZZO	ET	STAINLESS STEEL COUNTERTOP	STS
EXISTING TO REMAIN	ETR	SHEET VINYL FLOORING	SV
FIRE EXTINGUISHER/FIRE BLANKET CABINET	FEB	SOLID VINYL SHEET GOOD	SVS
FIRE EXTINGUISHER CABINET	FEC	SOLD VINYL TILE	SVT
FIRE EXTINGUISHER & BRACKET	FE	TACKBOARD	TBD
FOLIO CABINET	FC	TERRAZZO FLOORING	TF
FLAMMABLE CABINET	FLAM	TACK STRIP	TS
GLAZED BLOCK BASE	GBB	UPPER WALL CABINET	UC
GOGGLE CABINET	GC	UNDER COUNTER REFRIGERATOR	UCR
GROUT	GT	VENEER CABINETRY	V
HORIZONTAL BLINDS	HB	VINYL BASE	VB
HIGH PRESSURE WALL PANEL	HPWP	VINYL COMPOSITE TILE	VCT
HANDRAILS, RAILINGS & STRINGERS	HR	VERTICAL SLIDING WHITEBOARD	VS MBD
ICE MAKER	ICE	VINYL TILE	VT
INTELLIGENT BOARD	INTBD	VINYL WALL COVERING	VWC
LINOLEUM	L	WALL BASE	WB
LOCKER	LK	WALL COVERING	WC
LUXURY RESILIENT FLOORING	LRF	WOOD	WD
LINOLEUM SHEET FLOORING	LS	WOOD CASEWORK	WDC
LINOLEUM TILE	LT	WOOD TALL CABINETS	WDT
LUXURY VINYL TILE	LVT	WOOD UPPER CABINETS	WDU
METAL CABINETRY	MC	WALK-OFF MAT	WM
MARKERBOARD	MBD	WALL PROTECTION/PADDING	WP
MULTI-COLORED INTERIOR COATING	MCIC	WINDOW SHADES	WS
METAL PANEL	MP		
MOTORIZED SHADE	MS		
MICROWAVE	MW		
PAINT	P		

ARCHITECTURAL SYMBOLS

ARCHITECTURAL MATERIALS

ACOUSTICAL TILE		PLASTER	
ALUMINUM		PLYWOOD (SMALL)	
BATT INSULATION		RIGID INSULATION	
BITUMINOUS		ROUGH WOOD (CONTINUOUS)	
BRASS OR BRONZE		ROUGH WOOD (INTERUPTED)	
CARPET		RUBBLE	
CAST STONE		SHEATHING INSUL.	
CERAMIC TILE		SLATE, FLAGGING, SOAPSTONE	
C.M.U.		STEEL	
CONCRETE		STRUCTURAL CLAY	
EARTH		STRUCT. GLAZED FACING TILE	
FACE BRICK		TERRA-COTTA	
FACE GRAIN		TERRAZZO	
FINISHED WOOD			
FIRE BRICK			
GLASS BLOCK			
GLAZED BRICK			
GLAZING			
GRAVEL			
GYSUM BOARD			
MARBLE			
METAL LATH			
METAL (SMALL)			

ELEVATIONS

BRICK	
CONCRETE BLOCK	
CERAMIC TILE	
GLASS	
METAL PANEL CORRUGATED	
SLATE, FLAGGING, SOAPSTONE	
FLAT METAL PANEL	

MOUNTING HEIGHTS

ELECTRICAL MOUNTING HEIGHTS

ALL MOUNTING HEIGHTS TO BE COORDINATED WITH BLOCK COURSING AS OCCURS. CONSULT ARCHITECT IF EXISTING CONDITIONS DIFFER

ALL DIMENSIONS ARE TO THE CENTER OF DEVICE UNLESS OTHERWISE NOTED.
SEE ELECTRICAL DRAWINGS FOR TYPES AND LOCATIONS.

RECEPTACLES : 18" A.F.F. (AT LOCATIONS ABOVE CASEWORK, MOUNT BOTTOM OF RECEPTACLE AT 2" ABOVE BACKSPLASH. AT LOCATIONS BELOW CASEWORK, MOUNT AT 24" A.F.F.)

WIREMOLD: 24" A.F.F. (AT LOCATIONS ABOVE CASEWORK, MOUNT BOTTOM OF WIREMOLD AT 2" ABOVE BACKSPLASH)

EXTERIOR RECEPTACLES: 24" A.F.G. (20" A.F.F.)

SWITCHES: 48" A.F.F.

BOILER EMERGENCY SWITCHES: 60" A.F.F.

DATA/PHONE OUTLETS: 18" A.F.F.

TV OUTLETS: 18" A.F.F. OR 18" BELOW FINISHED CEILING*
*FIELD VERIFY CEILING HEIGHTS WITH COORDINATION DRAWINGS

WALL PHONE: 48" A.F.F. TO CENTER OF EARPIECE

SECURITY KEYPAD: 48" A.F.F.

MICROPHONE WALL JACK: 48" A.F.F.

FIRE ALARM PULL STATION: 48" A.F.F.

FIRE ALARM VISUAL/AUDIO INDICATING UNITS: 6'-8" TO BOTTOM OF UNIT

AREA OF REFUGE CALL STATION: 48" A.F.F.

EMERGENCY SHUT-OFF SWITCH / PUSH BUTTON: 48" A.F.F.

EMERGENCY CALL SWITCH: 36" A.F.F.

EMERGENCY CALL BELL / LIGHT: +/- 7'-6" A.F.F., CENTER ABOVE DOOR

WALL MOUNTED EXIT SIGNS: 7'-6" A.F.F

WALL MOUNTED CLOCKS AND SPEAKERS: +/- 7'-6" A.F.F.

NOTES

CONSTRUCTION NOTES

1. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH ALL NATIONAL, STATE AND LOCAL CODES AND ORDINANCES.
2. DO NOT SCALE DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING CLARIFICATION OF DIMENSIONS FROM THE ARCHITECT BEFORE CONTINUING WITH CONSTRUCTION.
3. CONTRACT DRAWINGS MAY VARY FROM ACTUAL FIELD CONDITIONS. CONTRACTOR SHALL CORRECT DIMENSIONS OF ALL MATERIALS TO CARRY OUT OF THE INTENT OF THE CONTRACT DRAWINGS. VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS IN FIELD BEFORE ORDERING ANY MATERIALS. CONTRACTOR SHALL NOTIFY ARCHITECT PROMPTLY OF ANY CRITICAL DISCREPANCIES BEFORE PROCEEDING WITH WORK.
4. ALL NEW WORK SHALL BE IMPLEMENTED SO AS TO PROVIDE A SMOOTH AND CONTINUOUS SURFACE WITH ALL EXISTING CONDITIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK NECESSARY TO ACHIEVE THIS REQUIREMENT, EVEN THROUGH PROCEDURES ARE NOT DETAILED FOR EACH SPECIFIC CONDITION OR COMBINATION OF CONDITIONS. QUALITY OF WORKMANSHIP, MATERIALS AND FINISHES SHALL BE EQUAL TO THE LEVEL ESTABLISHED FOR SIMILAR CONSTRUCTION, EXCEPT WHERE EXISTING APPEARANCE IS TO BE MATCHED TO ACHIEVE CONTINUITY.
5. CUTTING AND PATCHING SHALL BE THE RESPONSIBILITY OF THE TRADE WHOSE WORK RESULTS IN THE NEED FOR CUTTING AND PATCHING UNLESS A SPECIFIC CONTRACTOR IS CALLED OUT ON THE DRAWINGS. ALL HOLES LEFT BY REMOVING MECHANICAL, PLUMBING AND ELECTRICAL EQUIPMENT, ETC. SHALL BE PATCHED.
6. UNLESS OTHERWISE NOTED OR DIMENSIONED, NEW PARTITIONS SHALL BE CENTERED ON BUILDING COLUMN GRID OR WINDOW MULLIONS.
7. CONTRACTOR SHALL PROVIDE WOOD BLOCKING AT WALLS AS REQUIRED TO SUPPORT SHELVES, CABINETS TV BRACKETS AND RELATED ITEMS.
8. WHERE REQUIRED, SEISMIC BRACING SHALL BE PROVIDED AT SUSPENDED CEILINGS. SEE A9.X.
9. ALL EGRESS DOORS SHALL BE NON-LOCKING IN DIRECTION OF TRAVEL.
10. ALL PARTITIONS ARE TO EXTEND TO UNDERSIDE OF DECK ABOVE.

GENERAL NOTES

1.) DIMENSION CRITERIA

A. FROM FACE TO METAL STUD TO FACE OF METAL STUD
B. FROM FACE TO METAL STUD TO FACE OF CONCRETE MASONRY UNIT
C. FROM FACE TO CONCRETE MASONRY UNIT TO FACE OF CONCRETE MASONRY UNIT

2.) SEE FLOOR PLANS A1.1-A1.9 FOR FIRE EXTINGUISHER LOCATIONS.

3.) REFER TO SHEET R1.2 FOR WALL TYPES

architecture interior design master planning
FRIAR
21 Talcott Notch Road friar.com
Farmington, CT 06032 860.678.1291

STATE OF CONNECTICUT — SUSAN R. BEGIN — No. 12359 — LICENSED ARCHITECT

PROFESSIONAL SEAL

STATE OF CONNECTICUT — FRIAR ARCHITECTURE, INC. — NO. 113 — CORPORATE PRACTICE of ARCHITECTURE

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

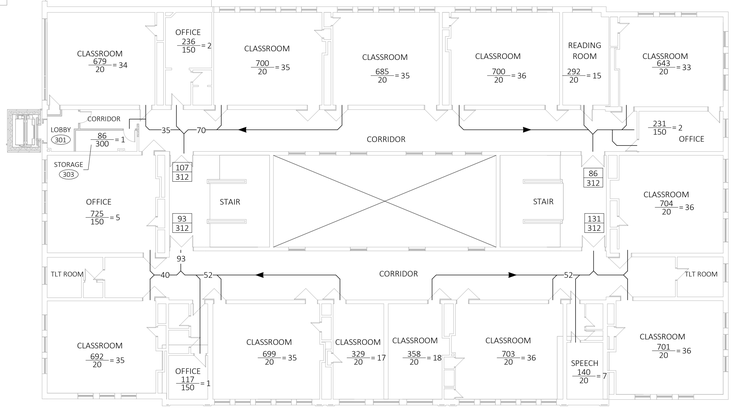
REVISIONS

NO.	DATE	DESCRIPTION
	xx/xx/2026	ISSUE FOR BID

REFERENCE SHEET

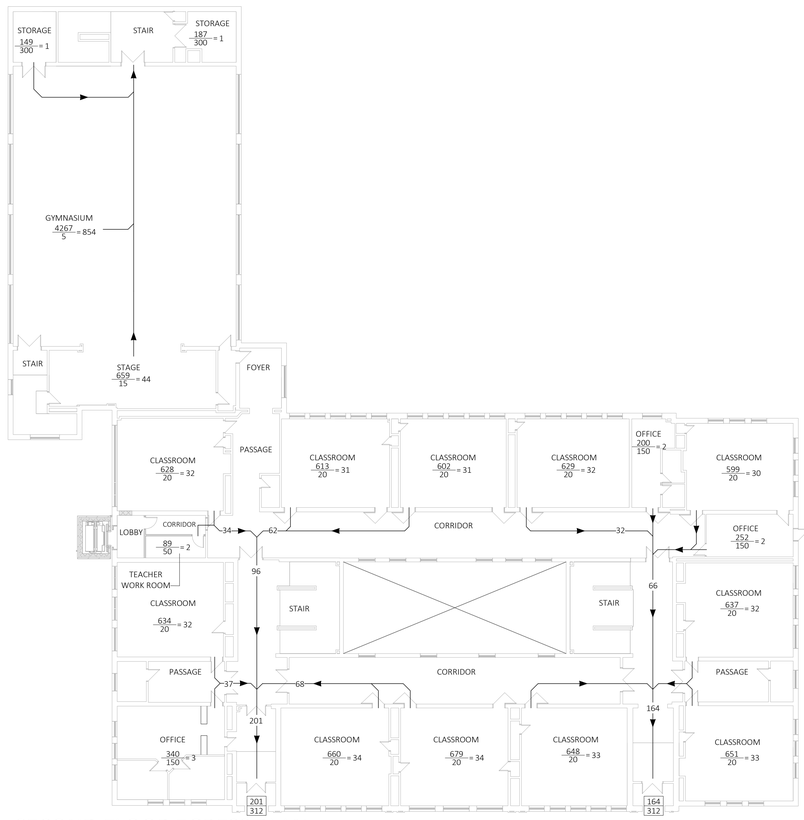
DATE: 1/15/2026
SCALE 3/4" = 1'-0"
PROJ. #: 2022_049A
DRAWN: BKH
CHECKED: JMY

SHEET NO.
R1.1



3 THIRD FLOOR EGRESS PLAN

SCALE: 1/16" = 1'-0"



2 SECOND FLOOR EGRESS PLAN

SCALE: 1/16" = 1'-0"



1 FIRST FLOOR EGRESS PLAN

SCALE: 1/16" = 1'-0"

EGRESS PLAN LEGEND

101 — ROOM NUMBER

ROOM OCCUPANCY LOAD

725/20 = 37 — AREA IN SQUARE FEET / OCCUPANCY LOAD FACTOR

EXIT CAPACITY

100/342 — ACTUAL EGRESS OCCUPANCY OF DOOR OR STAIR / MAXIMUM ALLOWABLE EGRESS OCCUPANCY OF DOOR OR STAIR

BR — Balance Exit. Minimum number of exits required per 1018.0

BD — Balance Exit. Exit required due to dead end corridor

BA — Balance Exit. Exit as required for Assembly space.

BT — Balance Exit. Exit as required due to travel distance.

15 → DIRECTION OF TRAVEL WITH ACCUMULATED OCCUPANCY LOAD

* – – – – – – – – – – – – – – – * MAXIMUM TRAVEL DISTANCE FROM FURTHEST POINT

– – – – – – – – – – – – – – – – SMOKE PARTITION (TIGHT TO DECK ABOVE)

——— — — ——— BUILDING PROPERTY LINE

——— · ——— · ——— 1 HOUR RATED WALL (TIGHT TO DECK ABOVE)

——— · · ——— · · ——— 2 HOUR RATED WALL (TIGHT TO DECK ABOVE)

NOTES:

1. A VALUE OF 0.2 INCHES OF WIDTH PER OCCUPANT HAS BEEN USED TO CALCULATE DOOR AND CORRIDOR EGRESS CAPACITY. IN ALL CASES, THE ACTUAL CLEAR OPENING OF THE DOOR AND ACTUAL CLEAR WIDTH OF THE CORRIDOR IS USED.
2. A VALUE OF 0.3 INCHES OF WIDTH PER OCCUPANT HAS BEEN USED TO CALCULATE STAIRWAY EGRESS CAPACITY. IN ALL CASES, THE ACTUAL CLEAR WIDTH BETWEEN STRINGERS IS USED.

architecture interior design master planning
FRIAR
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

STATE OF CONNECTICUT — JOYCE R. FRIAR — No. 12358 — LICENSED ARCHITECT

PROFESSIONAL SEAL

STATE OF CONNECTICUT — FRIAR ARCHITECTURE, INC. — NO. 113 — CORPORATE PRACTICE of ARCHITECTURE

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

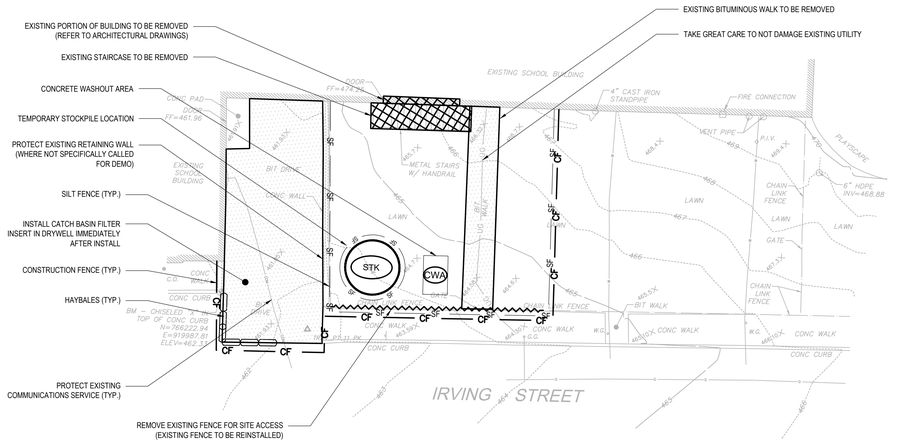
REVISIONS

NO.	DATE	DESCRIPTION
	xx/xx/2026	ISSUE FOR BID

EGRESS PLANS

DATE: 1/15/2026
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PROJ. #: 2022_049A
DRAWN: BKH
CHECKED: JMY

SHEET NO.
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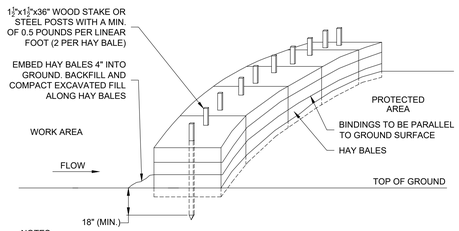
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TRAV_PT 12 PK

DEMOLITION AND EROSION CONTROL LEGEND

EXISTING PROPERTY LINES	×	SITE ITEM TO BE REMOVED	CWA — TEMPORARY CONCRETE WASHOUT
SF SF SF SF — SILT FENCE BARRIER	P	TREE PROTECTION	
TSBB — HAY BALE BARRIER	CE	CONSTRUCTION ENTRANCE	STK — TEMPORARY STOCKPILE
LOD LOD — LIMIT OF DISTURBANCE		FENCE/WALL DEMOLITION	
CF CF — CONSTRUCTION FENCE		BUILDING DEMOLITION	BITUMINOUS PAVEMENT DEMOLITION
CATCH BASIN FILTER INSERT			

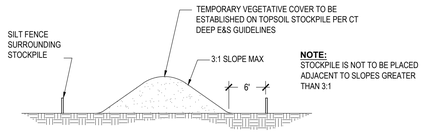


NOTES:

1. HAY BALES SHALL BE MADE OF HAY OR STRAW WITH 40 POUND MIN. WEIGHT AND 120 POUND MAX. WEIGHT HELD TOGETHER BY TWINE OR WIRE.
2. PLACE HAY BALES ON CONTOUR AND WING THE LAST HAY BALES UP SLOPE SO THAT THE TOP OF THE LAST SEVERAL HAY BALES ARE HIGHER THAN THE LINE OF HAY BALES.
3. DRIVE FIRST STAKE IN EACH BALE TOWARD THE PREVIOUSLY LAID BALE TO FORCE THEM TOGETHER.
4. PUT ONE HAY BALE PERPENDICULAR ALONG HAY BALE BARRIER EACH 100 FEET.

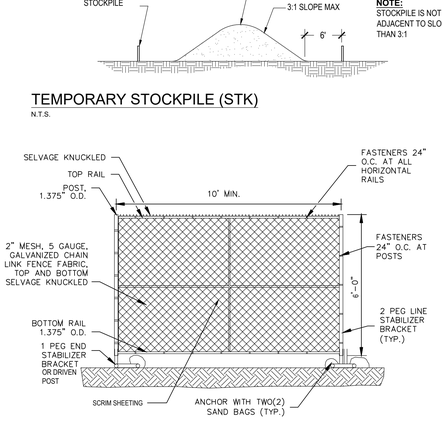
HAY BALE BARRIER (HB)

N.T.S.



TEMPORARY STOCKPILE (STK)

N.T.S.



NOTES:

1. EACH STABILIZER BRACKET SHALL BE SECURED WITH TWO (2) SANDBAGS, MIN. 50 POUNDS EACH.
2. PANELIZED CONSTRUCTION FENCE SHALL ONLY BE USED AT CONSTRUCTION SITE ENTRANCE AREAS, AREAS REQUIRING FREQUENT RELOCATION OF FENCING, OR WHERE PAVED AREAS PROHIBIT INSTALLATION OF DRIVEN FENCE POSTS.

CONSTRUCTION FENCE

N.T.S.

SITE PREPARATION NOTES:

1. CONTRACTOR SHALL NOTIFY "CALL BEFORE YOU DIG" (1-800-922-4455) AND VERIFY UTILITY MARK-OUT WITH THE OWNER PRIOR TO THE INITIATION OF ANY SITE DISTURBANCE.
2. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR VERIFICATION OF THE LOCATION AND NATURE OF ALL SUBSURFACE UTILITIES AT THE PROJECT WHICH MAY BE AFFECTED BY THE WORK. COORDINATE WITH RESPECTIVE UTILITY OWNERS AND PERFORM VERIFICATION OF TYPE, LOCATION, AND INVERTS AS REQUIRED.
3. PROTECT ALL IMPROVEMENTS NOT INCLUDED WITHIN THE LIMITS OF WORK. ANY IMPROVEMENT WHICH IS DAMAGED SHALL BE REPAIRED OR REPLACED IN-KIND TO THE OWNER'S SATISFACTION.
4. DURING DEMOLITION, PROTECT ALL ADJACENT CURBING, SIDEWALKS, RAMPS, ABOVE-GRADE AND BELOW-GRADE UTILITIES, DRAINAGE STRUCTURES, LIGHT BASES, AND OTHER IMPROVEMENTS POTENTIALLY AFFECTED BY THE WORK. CLEARLY DELINEATE THE LIMITS OF WORK AND MARK, BARRICADE, OR OTHERWISE IDENTIFY THOSE IMPROVEMENTS THAT ARE TO BE PROTECTED AND/OR AVOIDED. ANY IMPROVEMENT WHICH IS DAMAGED SHALL BE REPAIRED OR REPLACED IN-KIND TO THE OWNER'S SATISFACTION.
5. THE LOCATIONS OF EXISTING SITE FEATURES AS SHOWN HAVE BEEN OBTAINED FROM MAPS, SURVEYS, FIELD INSPECTIONS, AND OTHER AVAILABLE INFORMATION. THEY MUST BE CONSIDERED APPROXIMATE BOTH TO LOCATION, SIZE, AND AS-BUILT CONDITION AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ACTUAL FIELD CONDITIONS.
6. THE DIMENSIONS SHOWN ON THE PLANS, INCLUDING THE INTENDED DIMENSIONS OF THE WORK, MAY VARY FROM ACTUAL EXISTING CONDITIONS IN THE FIELD. THE CONTRACTOR SHALL TAKE APPROPRIATE MEASUREMENTS TO VERIFY ALL DIMENSIONS SHOWN ON THE DRAWINGS AS WELL AS OTHER DIMENSIONS HE MAY DEEM APPROPRIATE TO FACILITATE THE COMPLETION OF THE WORK. NOTIFY THE ENGINEER OF ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH THAT PORTION OF THE WORK.
7. IMPLEMENTING WORKER SAFETY AND/OR HEALTH PROTOCOLS THAT ADDRESS COMPLIANCE WITH RULES, LAWS, AND REGULATIONS PERTAINING TO CONSTRUCTION SAFETY AND/OR THE POTENTIAL AND/OR ACTUAL RISK OF EXPOSURE TO SITE-SPECIFIC PHYSICAL OR CHEMICAL HAZARDS IS SOLELY THE RESPONSIBILITY OF THE CONTRACTOR.
8. PRIOR TO THE TERMINATION, ABANDONMENT, OR REMOVAL OF ANY UTILITY, VERIFY THAT APPLICABLE NOTIFICATIONS HAVE BEEN MADE TO THE UTILITY OWNER/OPERATOR AND THAT THE UTILITY HAS BEEN PROPERLY TERMINATED, CAPPED, OR PLUGGED AS REQUIRED.
9. PROVIDE PAVEMENT SAWCUT AT THE EDGE OF EACH PAVEMENT REMOVAL AREA TO ESTABLISH A CLEAN EDGE WHERE NEW WORK WILL MEET EXISTING PAVEMENT. SAWCUT SHALL BE A MINIMUM OF 12 INCHES FROM EDGE OF PAVEMENT REMOVAL.
10. UNLESS OTHERWISE INDICATED, ALL DISTURBED AREAS SHALL BE RESTORED WITH SIX (6) INCHES OF LOAM, SEEDED, FERTILIZED, AND MULCHED. PROVIDE ADDITIONAL EROSION CONTROLS AS REQUIRED.
11. ALL SIDEWALK CLOSURES AND MEASURES FOR TEMPORARY PEDESTRIAN ACCESS, SIDEWALKS, CROSSINGS, AND BIKE LANES SHALL MEET THE APPROVAL OF THE CITY OF WATERBURY.

EROSION AND SEDIMENTATION CONTROL NARRATIVE:

PER STATE OF CONNECTICUT
ALL APPLICABLE PRACTICES RECOMMENDED BY THE 2024 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL AS AMENDED.

DESCRIPTION

THE PROJECT CONSISTS OF PROVIDING ADA ACCESSIBILITY TO THE BUILDING IN THE NORTHERN PARKING LOT AND CONSTRUCTING AN ELEVATOR ADDITION ON THE SOUTHERN BUILDING WALL WITH A CONCRETE WALK FOR ACCESS.

DESIGN AND CRITERIA

NOTE: THE CONTRACTOR SHALL NAME ONE INDIVIDUAL AS HIS SEDIMENT AND EROSION CONTROL SUPERVISOR WHOSE PRIMARY RESPONSIBILITY WILL BE THE MAINTENANCE OF ALL ON-SITE EROSION CONTROL MEASURES. HE WILL KEEP A DAILY LOG OF HIS ACTIVITIES AND AN UPDATED SCHEDULE OF PROPOSED CONSTRUCTION ACTIVITIES. THE LOG WILL BE MADE AVAILABLE TO INSPECTORS.

A. GEOTEXTILE SILT FENCE (SF) - SHALL BE NON-WOVEN MATERIAL, MINIMUM 36" HIGH AND FASTENED TO WOOD STAKES. SILT FENCE SHALL BE INSTALLED WITH END RUNS TURNED UP GRADE AT 45 DEGREES FOR A DISTANCE OF 10 FEET (SEE DETAIL THIS SHEET).

B. TEMPORARY SEEDING (TS)

1. CONTRACTOR SHALL SCARIFY THE SOIL TO A DEPTH OF 2" BEFORE APPLYING FERTILIZER, LIMESTONE AND SEED.
2. SEED MAY BE APPLIED BY HAND OR MECHANICALLY. SEED APPLICATION SHALL BE UNIFORM. SEED RATE SHALL BE IN ACCORDANCE WITH THE 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL AS AMENDED (INCREASE SEEDING RATES BY 10% WHEN HYDROSEEDING, LIMESTONE, FERTILIZER AND SEED MAY BE APPLIED IN SLURRY.)
3. CONTRACTOR SHALL MULCH AREA (MS) IMMEDIATELY FOLLOWING SEEDING. (NOTE: IN THE EVENT SEEDING OPERATIONS ARE NOT FEASIBLE DUE TO SEASONAL RESTRICTIONS OR EXTENDED INCLEMENT WEATHER PATTERNS, THE CONTRACTOR SHALL INSTALL AN EROSION CONTROL BLANKET OVER EXPOSED SOILS.)

C. PERMANENT SEEDING (PS)

1. CONTRACTOR SHALL APPLY TOPSOIL AND FINE GRADE ALL AREAS BEFORE THE APPLICATION OF PERMANENT SEED. APPLY LIMESTONE AND FERTILIZER AS NEEDED, IN ACCORDANCE WITH SOIL TESTS.
2. REMOVE ALL SURFACE STONES ½ INCH AND LARGER. REMOVE ALL OTHER DEBRIS AND RAKE SEED BED.
3. APPLY SEED WITHIN 7 DAYS AFTER ESTABLISHING FINAL GRADES. SEE PLANTING PLAN.

D. STRAW BALE BARRIER (HB) - SHALL BE MADE OF STRAW WITH 40 POUNDS MINIMUM WEIGHT AND 120 POUNDS MAXIMUM WEIGHT, HELD TOGETHER BY TWINE OR WIRE. (SEE DETAIL THIS SHEET.)

E. CONSTRUCTION ENTRANCE (CE) - SHALL BE AN ANGULAR STONE PAD, A MINIMUM OF 12' WIDE AND 50' LONG. (SEE DETAIL THIS SHEET.)

F. EROSION CONTROL BLANKET (ECB) - EROSION MAT SHALL BE PLACED ON ALL EXPOSED CUT/FILL SLOPES STEEPER THAN 3:1 (INCLUDING SWALES & DITCHES) TO PROTECT AGAINST RAINFALL AND HOLD MOISTURE CONTENT TO ENHANCE VEGETATION GROWTH IN SEEDED AREAS. MAT (OR BLANKETS) SHALL BE STRAW OR STRAW/COCONUT FIBER COMBINATION SEWN TOGETHER WITH LIGHTWEIGHT NETTING. USE NORTH AMERICAN GREEN. S150 - SLOPES UP TO 3:1, SC150-SLOPES FROM 3:1 UP TO 2:1 OR GREATER. TEMPORARY HAY MULCH TO BE APPLIED TO AREAS LESS THAN 3:1 SLOPE AND ALL AREAS TO BE LEFT BARREN OVER THE WINTER, MULCH RATE TO BE 70 POUNDS/1000 S.F.

APPLICATION/GENERAL PROCEDURES

SOIL EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSTALLED PRIOR TO ANY SITE DISTURBANCE, AND DEVELOPMENT WILL PROCEED ACCORDING TO A SPECIFIC CONSTRUCTION SEQUENCE. THE OBJECTIVE IS TO MAXIMIZE THE REDUCTION OF SEDIMENT-LADEN RUNOFF THROUGH IMPLEMENTATION OF CONVENTIONAL SOIL SEDIMENTATION AND EROSION CONTROL PRACTICES CURRENTLY RECOMMENDED BY THE 2024 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL

A. EARTHWORK WILL BE SCHEDULED FOR PERIODS WHEN SOIL SATURATION IS LOW AND SOIL LOSS HAZARD IS AT A MINIMUM.

B. SUSPEND EARTHWORK FOR MAJOR STORM EVENTS AND IMPLEMENT ADDITIONAL SEDIMENTATION AND EROSION CONTROL MEASURES AS NECESSARY.

C. THERE SHALL BE NO CUTS OR FILL LEFT EXPOSED FOR LONGER THAN 30 DAYS. THE ESTABLISHED PROCEDURE OF TEMPORARILY SEEDING AND/OR COVER WITH EROSION PROTECTION (MAT OR STRAW) SHALL BE FOLLOWED TO INSURE MINIMAL SOIL LOSS.

D. THE DISCHARGE OF UNTREATED STORMWATER TO ANY ADJACENT ROADWAYS, DRAINAGE INLETS, OR PROPERTIES IS NOT ALLOWED.

***NOTE:** POST SPACING AND EMBEDMENT VARIES BASED ON THE FABRIC MANUFACTURER'S REQUIREMENTS.

ELEVATION SECTION

SILT FENCE BARRIER (SF)

N.T.S.

TEMPORARY STOCKPILE (STK)

N.T.S.

TEMPORARY CONCRETE WASHOUT AREA (CWA)

N.T.S.

NOTES:

1. CONSTRUCT WASHOUT AREA LARGE ENOUGH TO ENSURE MATERIALS WILL BE CONTAINED WHERE WASTE CONCRETE CAN SOLIDIFY IN PLACE AND EXCESS WATER CAN SAFELY EVAPORATE.
2. WASHOUT AREA SHALL BE LARGE ENOUGH TO RETAIN ALL LIQUID AND WASTE CONCRETE MATERIALS FROM WASHOUT OPERATION.
3. WEEKLY INSPECTIONS OF WASHOUT AREAS SHALL BE CONDUCTED TO ASSESS THE HOLDING CAPACITY AND FUNCTIONALITY OF THE WASHOUT AREA.

EROSION AND SEDIMENT CONTROL NOTES:

1. THIS PLAN IS FOR EROSION AND SEDIMENTATION (E&S) CONTROL ONLY. SEE OTHER PLANS FOR THE SCOPE OF CONSTRUCTION WORK.
2. THE MEASURES SPECIFIED HEREON ARE THE MINIMUM REQUIREMENTS FOR E&S CONTROL AND ARE SHOWN IN GENERAL SIZE AND LOCATION ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ALL E&S CONTROL MEASURES ARE CONFIGURED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION OF SOILS AND PREVENT THE TRANSPORT OF SEDIMENTS AND OTHER POLLUTANTS TO ANY RESOURCE AREAS. ALL EROSION CONTROLS SHALL BE INSTALLED PRIOR TO ANY SITE WORK. CONTROLS SHOULD BE INSPECTED WEEKLY AND AFTER EACH RAINFALL. EXCAVATED MATERIAL SHOULD NOT BE DISPOSED OF IN THE WETLAND AREA. PROVIDE ADDITIONAL E&S MEASURES AS REQUIRED TO CONTROL EROSION AND SILTATION THROUGHOUT THE DURATION OF THE CONSTRUCTION AS CONDITIONS DICTATE AND/OR AS DIRECTED BY THE OWNER OR THE ENGINEER.
3. MONITOR AND INSPECT ALL E&S MEASURES IN AN ONGOING MANNER THROUGHOUT THE WORK AND TAKE CORRECTIVE MEASURES, AS REQUIRED, TO MINIMIZE EROSION OF SOILS AND PREVENT THE TRANSPORT OF SEDIMENTS AND OTHER POLLUTANTS TO ANY RESOURCE AREAS.
4. ANY EROSION AND SEDIMENTATION MEASURE IMPLEMENTED BEYOND THAT SHOWN HEREON SHALL CONFORM TO APPLICABLE SECTIONS OF THE STATE OF CONNECTICUT'S 2024 "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL."
5. ANY STOCKPILED MATERIAL SHALL BE SUBJECT TO EROSION CONTROL MEASURES THAT INCLUDE A MINIMUM OF SILT FENCE OR HAY BALE BARRIER. COVER STOCKPILES IF SIGNIFICANT RAINFALL IS PREDICTED.
6. PROVIDE TEMPORARY SEEDING WITH MULCH ON ALL EXPOSED SOIL AREAS WHERE WORK WILL BE SUSPENDED FOR LONGER THAN 30 DAYS. APPLY SEED AND MULCH WITHIN THE FIRST 7 DAYS OF SUSPENDING WORK. WHEN SEEDING IS NOT POSSIBLE DUE TO SEASONAL WEATHER CONDITIONS OR OTHER FACTORS, PROVIDE TEMPORARY STRUCTURAL SOIL PROTECTION SUCH AS MULCH, WOODCHIPS, EROSION CONTROL MATTING, OR COMPOST.
7. ALL TEMPORARY SLOPES IN EXCESS OF 3 (HORIZONTAL) TO 1 (VERTICAL) SHALL BE STABILIZED WITH EROSION CONTROL MATTING OR APPROVED EQUIVALENT.
8. NO RUNOFF SHALL BE ALLOWED TO ENTER ANY STORMWATER SYSTEM OR EXIT THE SITE PRIOR TO TREATMENT FOR SEDIMENT REMOVAL.
9. THE CONTRACTOR SHALL MAINTAIN A CLEAN CONSTRUCTION SITE AND SHALL NOT ALLOW THE ACCUMULATION OF RUBBISH OR CONSTRUCTION DEBRIS. ALL TRASH SHALL BE CLEANED ON A DAILY BASIS AND THE SITE SHALL BE LEFT IN A NEAT CONDITION AT THE END OF EACH WORK DAY.
10. TAKE ALL NECESSARY PRECAUTIONS TO AVOID THE SPILLAGE OF FUEL OR OTHER POLLUTANTS AND ADHERE TO ALL APPLICABLE POLICIES AND REGULATIONS RELATED TO SPILL PREVENTION, CONTROL, AND RESPONSE.
11. FOR DUST CONTROL, PERIODICALLY MOISTEN EXPOSED SOIL SURFACES WITH WATER AND MAINTAIN ADEQUATE MOISTURE LEVELS.
12. SWEEP ADJACENT ROADWAYS IF MUD OR SOIL IS TRACKED ON TO THEM, OR AS DIRECTED BY THE ENGINEER.
13. ALL SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE INSTALLED BY THE PERMITTEE AND INSPECTED BY THE TOWN ENGINEER AND/OR THE WETLANDS ENFORCEMENT OFFICER / DULY AUTHORIZED AGENT; ADDITIONAL OR SUPPLEMENTAL CONTROLS MAY BE REQUIRED. THE PERMITTEE SHALL MAINTAIN THE CONTROLS DURING AND AFTER CONSTRUCTION AND REMOVE THEM UPON SITE STABILIZATION OF THE AFFECTED AREA.
14. AN ANTI-TRACKING APRON SHALL BE INSTALLED AT THE SITE ACCESS DRIVE AT A LOCATION APPROVED BY THE TOWN ENGINEER, WITH 6 INCHED OF CRUSHED STONE (SIZED 1 ½" TO 3") UNDERLAIN WITH CONSTRUCTION FRAME SPREAD TO THE TRAVELED WIDTH AND 40 FEET IN LENGTH OR WITH APRON MATS. THE APRON SHALL BE MAINTAINED AT ALL TIMES.
15. THE PERMITTEE AND THEIR CONTRACTOR SHALL MEET WITH AGENCY STAFF, INCLUDING BUT NOT LIMITED TO THE WETLANDS ENFORCEMENT OFFICER / DULY AUTHORIZED AGENT AND TOWN ENGINEER, TO REVIEW THE CONDITIONS OF THIS APPROVAL AND THE CONSTRUCTION PROGRAM TO BE UTILIZED TO IMPLEMENT THE APPROVED REGULATED ACTIVITY.
16. THE WETLANDS ENFORCEMENT OFFICER / DULY AUTHORIZED AGENT SHALL BE NOTIFIED IN WRITING FORTY-EIGHT (48) HOURS PRIOR TO THE START OF CONSTRUCTION.
17. DURING THE DURATION OF THIS APPROVAL, THE CHAIRMAN OF THE AGENCY OR THE WETLANDS ENFORCEMENT OFFICER / DULY AUTHORIZED AGENT SHALL HAVE PERMISSION TO ENTER UPON THE SUBJECT PROPERTY AT REASONABLE TIMES FOR THE PURPOSE OF VIEWING AND INSPECTING THE CONDUCT OF THE APPROVED REGULATED ACTIVITY.
18. NO WORK OTHER THAN MAINTENANCE OF SEDIMENT AND EROSION CONTROL SHALL BE PERFORMED DURING SIGNIFICANT RAINFALL OF ONE (1) INCH OR MORE WITHIN A TWENTY-FOUR (24) HOUR PERIOD. ALL WORK SHALL BE PERFORMED BETWEEN 8:00 AM AND 5:00 PM, MONDAY THROUGH FRIDAY. NO WORK MAY BE CONDUCTED ON LEGAL HOLIDAYS OR WEEKENDS WITHOUT THE EXPRESSED APPROVAL OF THE AGENCY.
19. UPON COMPLETION OF THE REGULATED ACTIVITY APPROVED HEREIN, THE PERMITTEE SHALL NOTIFY THE WETLANDS ENFORCEMENT OFFICER / DULY AUTHORIZED AGENT FOR A FINAL INSPECTION AND CONFIRMATION OF SATISFACTORY COMPLETION AND COMPLIANCE WITH THE APPROVED SITE PLANS AND ALL STANDARD AND SPECIAL SUPPLEMENTAL CONDITIONS, REQUIREMENTS AND MODIFICATIONS OF THIS APPROVAL.

SUGGESTED CONSTRUCTION SEQUENCE:

1. CONDUCT A PRE-CONSTRUCTION MEETING WITH THE OWNER AND ENGINEER PRIOR TO ANY CONSTRUCTION ACTIVITY.
2. INSTALL PERIMETER E&S CONTROLS AND REQUEST PRE-CONSTRUCTION INSPECTION FROM THE ENGINEER.
3. REMOVE EXISTING PAVEMENT.
4. PERFORM BULK EARTHWORK OPERATIONS.
5. BEGIN CONSTRUCTION OF BUILDING ADDITION FOUNDATION.
6. CONSTRUCT CURBING, WALKS, AND TOP COURSE OF BITUMINOUS PAVEMENT.
7. AT THE CONCLUSION OF CONSTRUCTION, COMPLETE THE INSTALLATION OF POST-CONSTRUCTION SITE STABILIZATION MEASURES AS SHOWN ON THE DRAWINGS.
8. ONCE SITE IS FULLY STABILIZED REMOVE ALL EROSION CONTROLS.

TEMPORARY E&S MEASURES MAINTENANCE SCHEDULE

E&S MEASURE	MAINTENANCE MEASURES	SCHEDULE
FILTER INSERTS IN DRAINAGE SYSTEM	CLEAN CATCH BASIN GRATE, REMOVE SEDIMENT/DEBRIS FROM FILTER INSERTS	WEEKLY & WITHIN 24 HOURS AFTER STORM GENERATING A DISCHARGE
HAY BALES/ SILT FENCE BARRIER	REPAIR/REPLACE WHEN FAILURE OBSERVED, REMOVE SILT WHEN ACCUMULATION REACHES APPROX. HALF HEIGHT OF BARRIER	WEEKLY & WITHIN 24 HOURS AFTER STORM GENERATING A DISCHARGE
CONSTRUCTION ENTRANCE	SWEEP PAVED ROADWAY ADJACENT TO SITE ENTRANCE AS NECESSARY, REFRESH STONE AS NECESSARY, REMOVE SILTED GRAVEL	WEEKLY
MOISTEN EXPOSED SOILS	PERIODICALLY MOISTEN EXPOSED SOIL SURFACES WITH WATER ON UNPAVED TRAVELWAYS AND KEEP TRAVELWAYS DAMP	DAILY

FRIAR
architecture interior design master planning
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

PROFESSIONAL SEAL

benesch
Alfred Benesch & Company
200 Glastonbury Blvd., Suite 201
Glastonbury, Connecticut 06033
860-633-8341

CONSULTANT

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

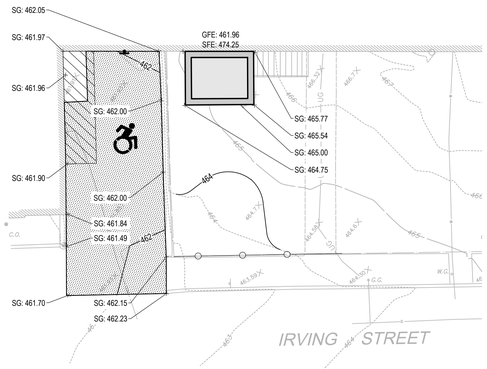
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DEMOLITION & SITE PREPARATION PLAN

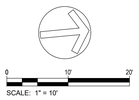
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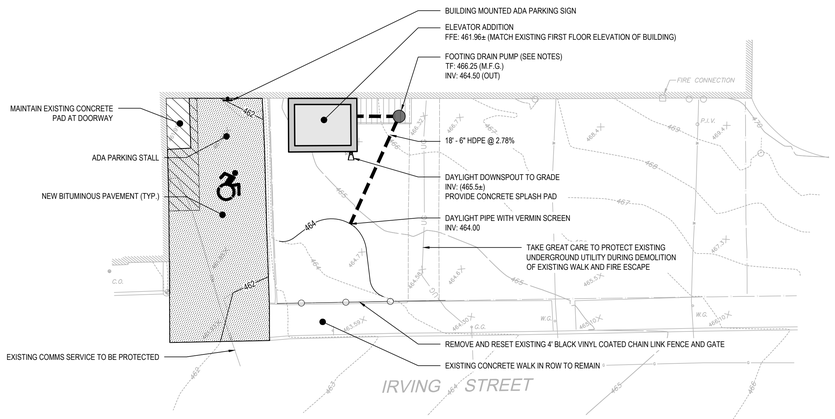
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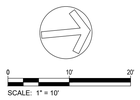
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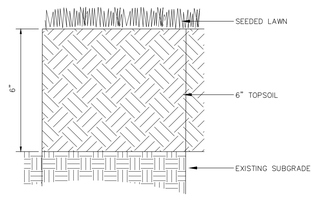
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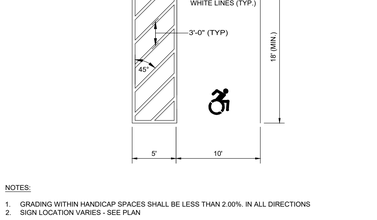
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SCALE: 1" = 10'



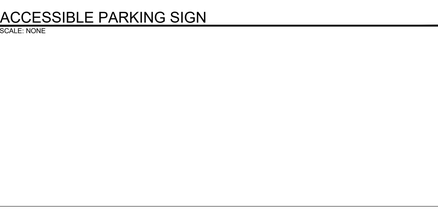
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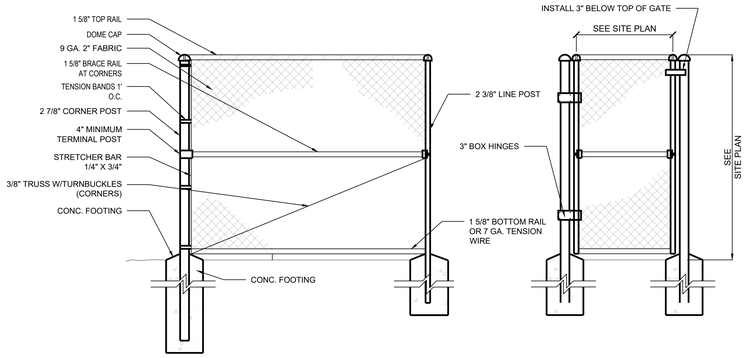
NOTES:

1. GRADING WITHIN HANDICAP SPACES SHALL BE LESS THAN 2.00% IN ALL DIRECTIONS
2. SIGN LOCATION VARIES - SEE PLAN

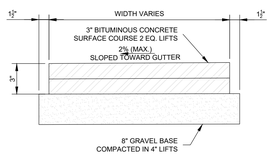
ACCESSIBLE PARKING STALL
SCALE: NONE



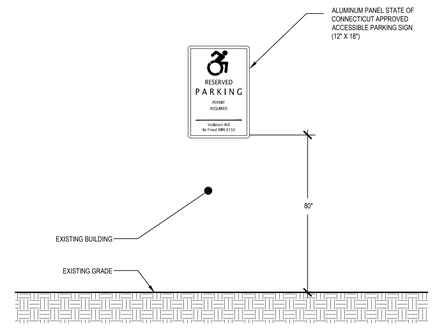
STORM TRENCH
SCALE: NONE



4' CHAIN LINK FENCE & GATE
SCALE: NONE



BITUMINOUS DRIVE AND SIDEWALK
SCALE: NONE



ACCESSIBLE PARKING SIGN
SCALE: NONE

ACCESSIBILITY NOTES:

1. SLOPES ALONG THE ACCESSIBLE ROUTE SHALL BE LESS THAN 1:20 (5%) AND THE CROSS SLOPES SHALL NOT EXCEED 1:50 (2%). CHANGES IN LEVELS SHALL NOT BE GREATER THAN ¼ INCH.
2. LANDINGS SHALL NOT HAVE A SLOPE GREATER THAN 1:50 (2%) IN ANY DIRECTION.
3. SLOPES WITHIN THE ACCESSIBLE PARKING SPACE SHALL NOT EXCEED 1:50 (2%) IN ANY DIRECTION.

MATERIALS NOTES:

1. MATERIALS AND CONSTRUCTION PROCEDURES SHALL COMPLY WITH CT DOT FORM 819, THE CITY OF WATERBURY REGULATIONS AND THE PROJECT MANUAL.
2. ALL LOCATIONS WHERE EXISTING CURBING, BITUMINOUS CONCRETE ROADWAY OR CONCRETE ROADWAY OR CONCRETE SIDEWALK ABUT NEW CONSTRUCTION, THE EDGE OF THE EXISTING CURB OR PAVEMENT SHALL BE SAW CUT TO PROVIDE A CLEAN, SMOOTH EDGE. TACK COAT EXPOSED EDGES OF EXISTING CONCRETE PRIOR TO PLACEMENT OF NEW BITUMINOUS CONCRETE PAVEMENT.
3. MANUFACTURED ITEMS SHALL BE INSTALLED, CONNECTED AND CLEANED ACCORDING TO THE MANUFACTURERS DIRECTIONS.
4. EXPANSION AND SCORE JOINTS FOR NEW CONCRETE WALKS SHALL BLEND TO MATCH EXISTING PATTERNS. CONTRACTOR TO ARRANGE TIMELY ON-SITE CONFERENCES WITH LANDSCAPE ARCHITECT TO APPROVE LAYOUT OF JOINT PATTERNS.
5. PROVIDE EXPANSION JOINTS FOR NEW CONCRETE PAVING AT ALL CURBS, TREE GRATES, BUILDING WALLS, SITE WALLS, STAIRS, LIGHT POLE BASES, MANHOLES, GRATES/VAULTS, EXISTING CONCRETE PAVING, STOP LIGHTS, FIRE HYDRANTS AND ALL OTHER FIXED MATERIALS. MAXIMUM DISTANCE BETWEEN EXPANSION JOINTS SHALL NOT EXCEED 20 FEET.

LAYOUT NOTES:

1. NEW PAVEMENT TO MEET LINE & GRADE OF EXISTING PAVEMENTS.
2. ALL LINES AND DIMENSIONS ARE PARALLEL OR PERPENDICULAR TO THE LINES FROM WHICH THEY ARE MEASURED.
3. FIELD ADJUSTMENTS MUST BE APPROVED BY THE OWNER'S REPRESENTATIVE AND APPROPRIATE MUNICIPAL OFFICIALS PRIOR TO CONSTRUCTION.
4. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE VERTICAL AND HORIZONTAL POSITION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
5. A DIGITAL CAD FILE CAN BE PROVIDED TO THE CONTRACTOR FOR THE LAYOUT OF SITE IMPROVEMENTS IN THE FIELD.

PUMP STATION NOTES:

PUMP STATION TO BE DEFERRED DESIGN SUBMITTED FOR ENGINEER REVIEW AS A SHOP DRAWING. PUMP STATION TO BE DESIGNED BY UNITED CONCRETE PRODUCTS OR SIMILAR VENDOR. PACKAGE SHALL INCLUDE: WET WELL, VALVES, FLOATS, CONTROLS, REMOTE ACCESS, ETC.

DESIGN PARAMETERS:

- TDH: COORDINATE WITH MEP PLANS
- WET WELL SHALL HOLD MINIMUM 200 GALLONS BELOW THE INLET INVERT
- FORCE MAIN WILL BE APPROXIMATELY 57' AND WILL BE SIZE AS APPROPRIATE FOR THE PUMPS
- SYSTEM SHALL INCLUDE DUPLEX PUMPS ACCESSIBLE VIA A RAIL SYSTEM
- THE PUMP STATION SHALL HAVE A FRAME AND COVER THAT IS FLUSH WITH FINISHED GRADE

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PROFESSIONAL SEAL

benesch
Alfred Benesch & Company
200 Glastonbury Blvd., Suite 201
Glastonbury, Connecticut 06033
860-633-8341

CONSULTANT

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
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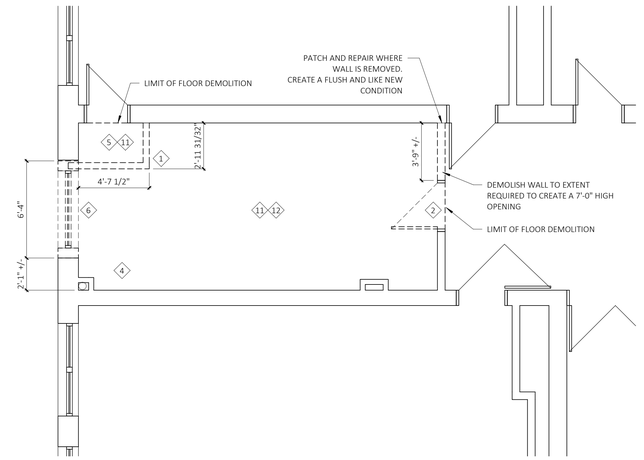
REVISIONS

NO.	DATE	DESCRIPTION

SITE PLAN

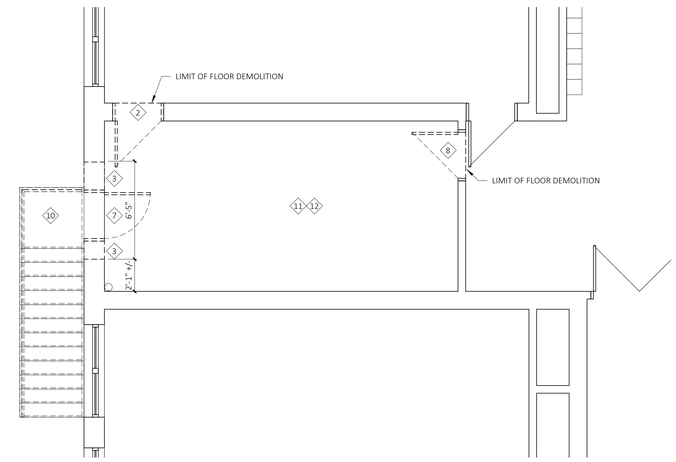
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SCALE 1" = 10'
PROJ. #: 2022_049A
DRAWN: GSL
CHECKED: WGW

SHEET NO.
C2.0



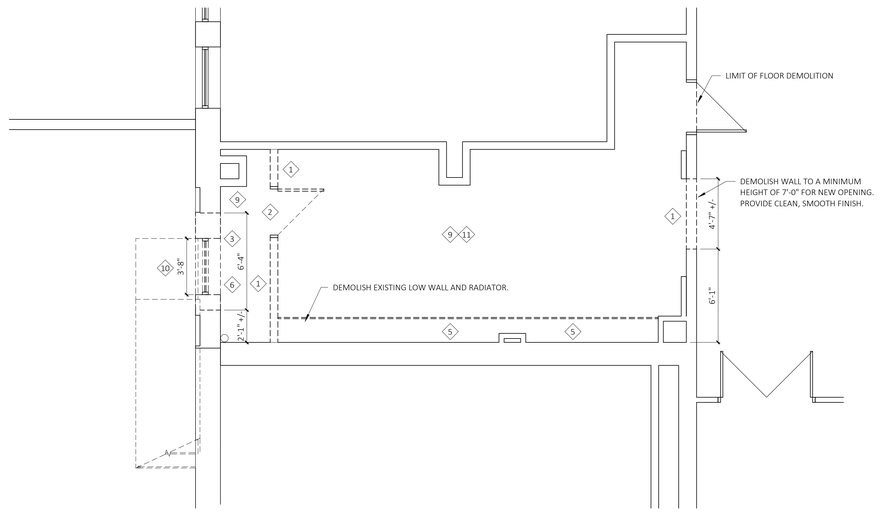
3 THIRD FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



2 SECOND FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



1 FIRST FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

GENERAL DEMOLITION NOTES

1. ANY DEMOLITION WORK ASSOCIATED WITH NEW WORK THAT IS NOT SPECIFICALLY NOTED ON THIS PLAN SHALL BE THE RESPONSIBILITY OF THE DEMOLITION CONTRACTOR.
2. DEMOLISHED MATERIAL SHALL BE CONSIDERED TO BE THE PROPERTY OF THE CONTRACTOR AND SHALL BE COMPLETELY REMOVED FROM THE JOB SITE.
3. SHUT OFF, CAP AND OTHERWISE PROTECT EXISTING PUBLIC UTILITY LINES IN ACCORDANCE WITH THE REQUIREMENTS OF THE PUBLIC AGENCY HAVING JURISDICTION.
4. COMPLETELY REMOVE ITEMS SCHEDULED TO BE SO DEMOLISHED AND REMOVE, LEAVING SURFACES CLEAN, SOLID AND READY TO RECEIVE NEW MATERIALS AND SPECIFIED ELSEWHERE.
5. USE MEANS NECESSARY TO PREVENT DUST FROM BECOMING A NUISANCE TO THE USER.
6. THIS DRAWING DOES NOT DEPICT THE FULL EXTENT OF DEMOLITION. ADDITIONAL ITEMS SCHEDULED FOR DEMOLITION MAY BE FOUND ON OTHER DRAWINGS. CONSTRUCTION MANAGER IS RESPONSIBLE FOR THE COORDINATION OF THIS WORK WITH ALL PARTIES INVOLVED.
7. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH ALL NATIONAL, STATE, LOCAL CODES & ORDINANCES.
8. ALL EXISTING (FREESTANDING) FURNITURE ITEMS IN ALL ROOMS UNDER SCOPE OF WORK TO BE REMOVED BY OWNER.
9. DEMOLITION CONTRACTOR MUST VERIFY LOCATIONS OF ALL EXISTING STRUCTURAL, MECHANICAL, PLUMBING & ELECTRICAL ELEMENTS PRIOR TO START OF DEMOLITION.
10. REMOVE ALL INTERIOR WALLS SHOWN DOTTED, ALONG WITH ALL ASSOCIATED TACK BOARDS, CHALK BOARDS, MARKER BOARDS, ETC. EXERCISE CAUTION SO AS NOT TO DISTURB OR DAMAGE ADJACENT SURFACES SCHEDULED TO REMAIN.
11. REMOVE ALL PLUMBING FIXTURES INCLUDING SINKS, WATER CLOSETS, URINALS, SLOP SINKS AND DRINKING FOUNTAINS WITHIN DEMOLITION AREAS. REMOVE AND CAP ALL PLUMBING LINES BEHIND FINISHED WALL AND FLOOR SURFACES. REFER TO PLUMBING DEMOLITION DRAWINGS FOR RELATED INFORMATION.
12. REMOVE ALL DOORS AND DOOR FRAMES SHOWN IN FULLY DEMOLISHED PARTITIONS ONLY, UNLESS NOTED OTHERWISE.
13. REMOVE ALL RADIATION UNITS, H.V.A.C. RUNS, MECHANICAL UNITS, INFORMATION.
14. EMOVE ALL ELECTRICAL LIGHTING FIXTURES, ELECTRICAL RUNS, ASSOCIATED DEVICES. REFER TO ELECTRICAL DEMOLITION DRAWINGS FOR RELATED INFORMATION.
15. REFER TO SITE PLANS FOR SITE DEMOLITION NOTES.
16. REFER TO ALL DRAWINGS FOR ADDITIONAL INFORMATION.
17. REMOVE ALL EXISTING FLOOR SYSTEMS I.E. VINYL TILE, SHEET VINYL, CERAMIC TILE, MASTIC, MUD SET, ETC. AT ALL AREAS WHERE A NEW FLOOR IS SCHEDULED. REF. FINISH PLANS & SCHEDULE. PREP FLOORS TO RECEIVE NEW FINISHES.
18. ALL EXISTING LAY IN CEILING PANELS TO BE REMOVED BY THE ABATEMENT CONTRACTOR WHERE NEW CEILINGS ARE SCHEDULED. REFER TO ASBESTOS ABATEMENT PLANS AND REFLECTED CEILING PLANS.
19. REMOVE ALL CEILING GRIDS (CORRIDOR CEILING GRID TO BE REMOVED BY THE ABATEMENT CONTRACTOR), GYPSUM CEILINGS AND SUSPENSION SYSTEMS AT ALL AREAS WHERE NEW CEILINGS ARE SCHEDULED. REFER TO REFLECTED CEILING PLANS.
20. REMOVE ALL EXISTING BUILT-IN MILLWORK SHOWN DOTTED INCLUDING SINKS, ASSOCIATED PLUMBING & ELECTRICAL BACK TO SOURCE OR PANEL AS REQ'D.
21. ALL WINDOW SYSTEMS SCHEDULED FOR DEMOLITION TO BE REMOVED BY THE ABATEMENT CONTRACTOR.
22. THE DEMOLITION PLANS ARE DIAGRAMMATIC AND INTENDED TO SHOW THE GENERAL EXTENT OF THE WORK ONLY.
23. THE CONTRACTOR SHALL INCLUDE ALL DEMOLITION WORK REQUIRED TO ACCOMPLISH THE INTENT OF THE PLANS AND SPECIFICATIONS.
24. ALL DEMOLISHED ITEMS SHALL BE REMOVED FROM BUILDING /SITE UNLESS OTHERWISE NOTED. COORDINATE WITH OWNER FOR DELIVERY OF ITEMS NOTED TO REMAIN OWNERS PROPERTY. THE PROJECT SITE/ BUILDING SHALL BE CLEANED OF DEBRIS ON A DAILY BASIS. CONSTRUCTION MANAGER WILL COORDINATE AND INSTRUCT WHICH
25. CONTRACTOR SHALL BE RESPONSIBLE FOR SHORING AND SUPPORT (TEMPORARY OR PERMANENT) FOR ALL PORTIONS OF CONSTRUCTION DURING DEMOLITION AND CONSTRUCTION.
26. ALL ABANDONED MECHANICAL / ELECTRICAL / PLUMBING LINES SHALL BE CAPPED OFF BEHIND FINISHES, UNLESS OTHERWISE NOTED. REFER TO MECHANICAL / ELECTRICAL / PLUMBING DRAWINGS FOR ADDITIONAL DEMO. INFORMATION.
27. GENERAL TRADES CONTRACTOR SHALL SAWCUT ALL MASONRY OR CONCRETE OPENINGS INDICATED. MASONRY SHALL BE TOOTHED IN AND / OR RETURNED TO FINISHED OPENING ALL OPENINGS WHERE EXISTING CONSTRUCTION HAS BEEN REMOVED, AND WHICH ARE NOT NOTED TO REMAIN, SHALL BE FILLED AND /OR PATCHED TO MATCH THE ADJACENT EXISTING OR NEW FINISH, INCLUDING ANY FIRE RATINGS REQUIRED.
28. ALL AREAS OF FLOORS, WALLS AND CEILINGS DISTURBED BY DEMOLITION SHALL BE FILLED, PATCHED OR OTHERWISE REFINISHED TO MATCH EXISTING OR NEW FINISH AS DESIGNATED, INCLUDING ALL REQUIRED RATINGS.
29. CONTRACTOR MUST VERIFY LOCATIONS OF ALL EXISTING STRUCTURAL, MECHANICAL, PLUMBING & ELECTRICAL ELEMENTS PRIOR TO START OF DEMOLITION.
30. COORDINATE DEMOLITION EFFORTS WITH ASBESTOS ABATEMENT WORK.
31. EXISTING CONDITIONS SHALL BE STUDIED PRIOR TO BIDDING TO FAMILIARIZE YOURSELF WITH THE BUILDING AND INTENTIONS OF THE FINAL WORK AND THE REQUIRED DEMOLITION, INCLUDING ALL MECH., ELECT., PLUMB., TECH., STRUCTURAL AND GENERAL CONSTRUCTION ITEMS REQUIRING REMOVAL.
32. NO ELECTRICAL, TECHNOLOGY WIRING OR PNEUMATIC LINES ARE TO BE ABANDONED IN PLACE.
33. REFER TO SPECS FOR CUTTING & PATCHING, FLOOR PREP AND SELECTIVE DEMOLTION.

DEMOLITION LEGEND: KEYED INTO PLAN

1. REMOVE EXISTING WALL
2. REMOVE DOOR AND FRAME
3. REMOVE EXTERIOR MASONRY WALL CONSTRUCTION
4. REMOVE SINK AND ASSOCIATED PIPING BACK TO SOURCE. REFER TO GENERAL DEMOLITION NOTE 4 FOR PLUMBING INFORMATION
5. REMOVE SHELVING. SUPPLIES TO BE REMOVED BY OWNER.
6. REMOVE EXISTING WINDOW SYSTEM IN ITS ENTIRETY AND ASSOCIATED HARDWARE.
7. REMOVE EXISTING DOOR, HARDWARE, FRAME AND TRANSOM WINDOW IN IT'S ENTIRETY.
8. REMOVE EXISTING DOOR AND HARDWARE. MAINTAIN EXISTING FRAME AND PATCH WHERE HARDWARE HAS BEEN REMOVED.
9. REMOVE EXISTING CEILING, GRID AND ASSOCIATED FIXTURES. REFER TO MEP DRAWINGS FOR ADDITIONAL INFORMATION.
10. REMOVE EXISTING METAL FIRE ESCAPE AND ASSOCIATED HARDWARE. REPAIR MASONRY FACADE.
11. REMOVE EXISTING FLOORING, BASEBOARD AND ANY ASSOCIATED SUBSTRATE AND PREPARE SLAB FOR NEW FLOORING.
12. EXISTING HARD CEILING TO REMAIN. REMOVE EXISTING CEILING FIXTURES.

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NO. 113
CORPORATE PRACTICE of ARCHITECTURE

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
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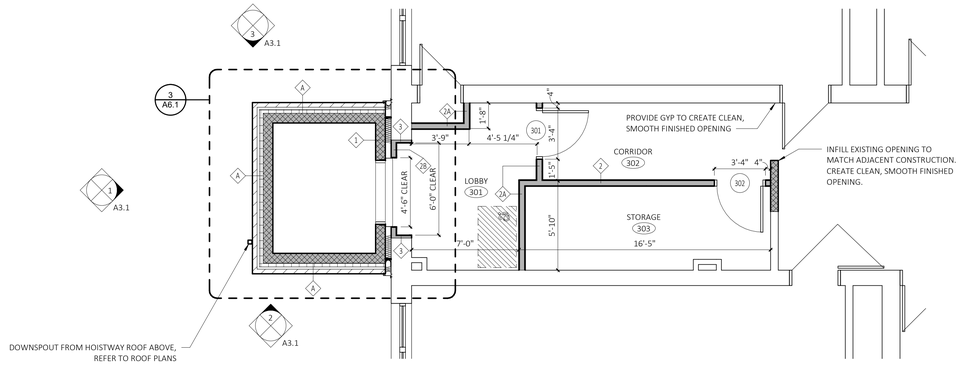
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DEMOLITION FLOOR PLANS

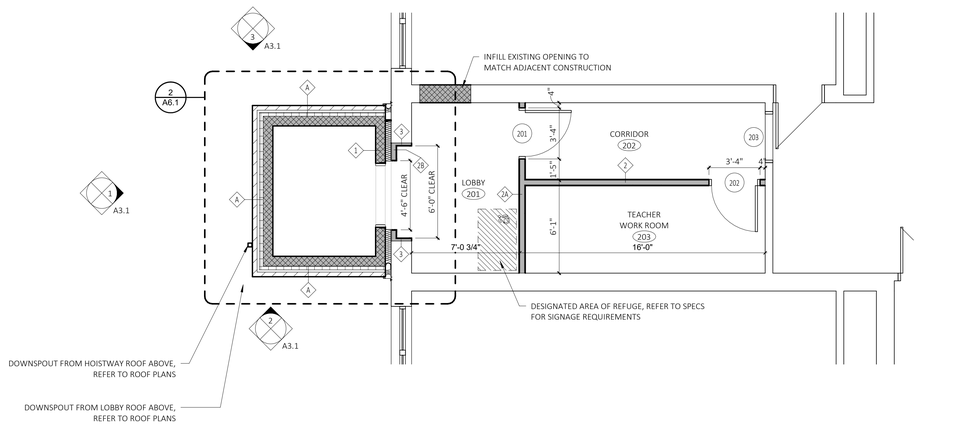
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PROJ. #: 2022_049A
DRAWN: BKH
CHECKED: JMY

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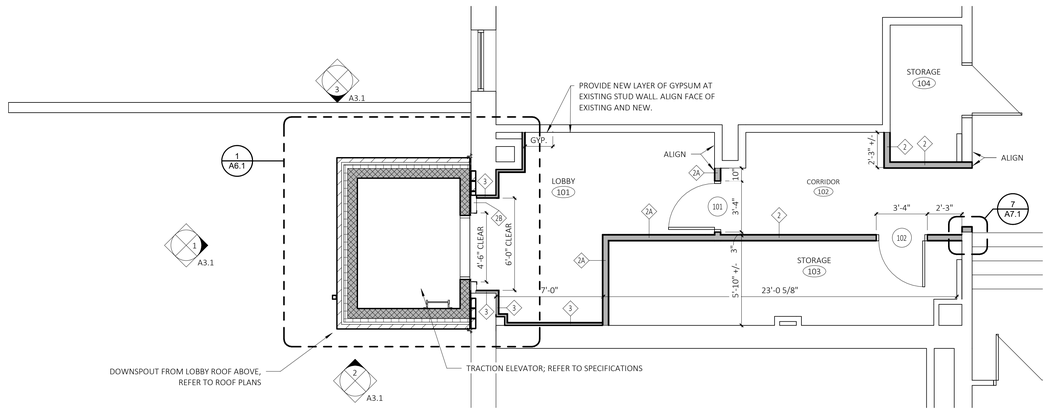
3 THIRD FLOOR PLAN

SCALE: 1/4" = 1'-0"



2 SECOND FLOOR PLAN

SCALE: 1/4" = 1'-0"



1 FIRST FLOOR PLAN

SCALE: 1/4" = 1'-0"

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NEW WORK FLOOR PLANS

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PROJ. #:	2022_049A
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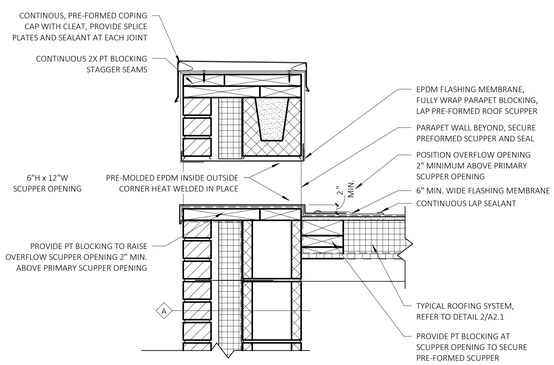
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A1.1

LEGEND

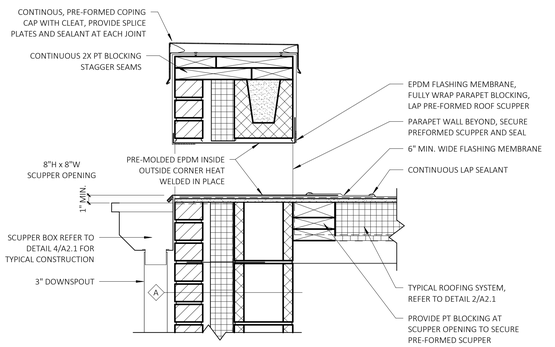
REFER TO SHEETS A2.1 FOR ROOF DETAILS & TYPICAL ROOF DETAILS

- TAPERED RIGID INSULATION — SLOPE = 1/4:12 TYPICAL
- CRICKET WITH PITCH TO DRAIN. SLOPE = 1/2:12 TYPICAL
- DS — ROOF DOWNSPOUT LOCATION. PROVIDE SPLASH BLOCK @ ALL DOWNSPOUT ENDS, TYPICAL
  SPLASH BLOCK: BASIS OF DESIGN - 30" PRECAST CONCRETE SPLASH BLOCK AS MANUFACTURED BY MODERN PRECAST, INC. PROVIDE ROOF PROTECTION AS REQUIRED BY ROOF SYSTEM MANUFACTURER.
- SC — ROOF SCUPPER (THROUGH THE WALL), REFER TO ROOF DETAILS 6/A2.1
- OSC — OVERFLOW ROOF SCUPPER (THROUGH THE WALL), REFER TO ROOF DETAILS 7/A2.1
- EJ — ROOF EXPANSION JOINT, REFER TO DETAIL 8/A2.1
- FACE OF BUILDING BELOW
- X / A2.X — ROOF DETAIL LOCATION, REFER TO SHEET NO. A2.1 FOR ROOF DETAILS



7 OVERFLOW THROUGH WALL SCUPPER DETAIL

SCALE: 1 1/2" = 1'-0"



6 THROUGH WALL SCUPPER DETAIL

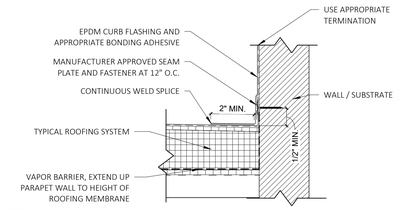
SCALE: 1 1/2" = 1'-0"

5 HOISTWAY PARAPET DETAIL

SCALE: 1 1/2" = 1'-0"

4 SCUPPER BOX / CONDUCTOR HEAD

SCALE: 1 1/2" = 1'-0"

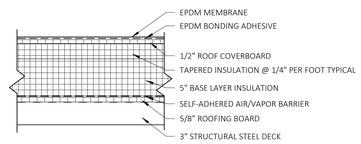


NOTES:

1. REFER TO ROOF MANUFACTURERS WEBSITE FOR MOST CURRENT INFORMATION.
2. REFER TO ROOF MANUFACTURERS DETAIL FOR WELD WIDTH.
3. REFER TO ROOF MANUFACTURERS DETAIL FOR MEMBRANE SECUREMENT AT CORNERS.
4. BONDING ADHESIVE REQUIRED BETWEEN MEMBRANE AND INSULATION FOR FULLY ADHERED SYSTEMS.
5. WHEN REINFORCEMENT OF EPDM MEMBRANE IS EXPOSED, REFER TO ROOF MANUFACTURERS DETAIL FOR CUT EDGE SEALANT APPLICATION.
6. PROVIDE 6" WIDE 22GA. CONTINUOUS METAL STRAPPING BETWEEN STUDS.

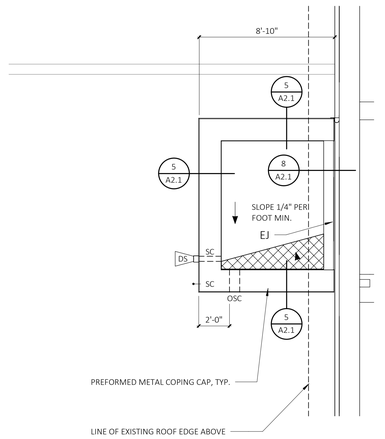
3 BASE OF WALL FLASHING

SCALE: 1 1/2" = 1'-0"



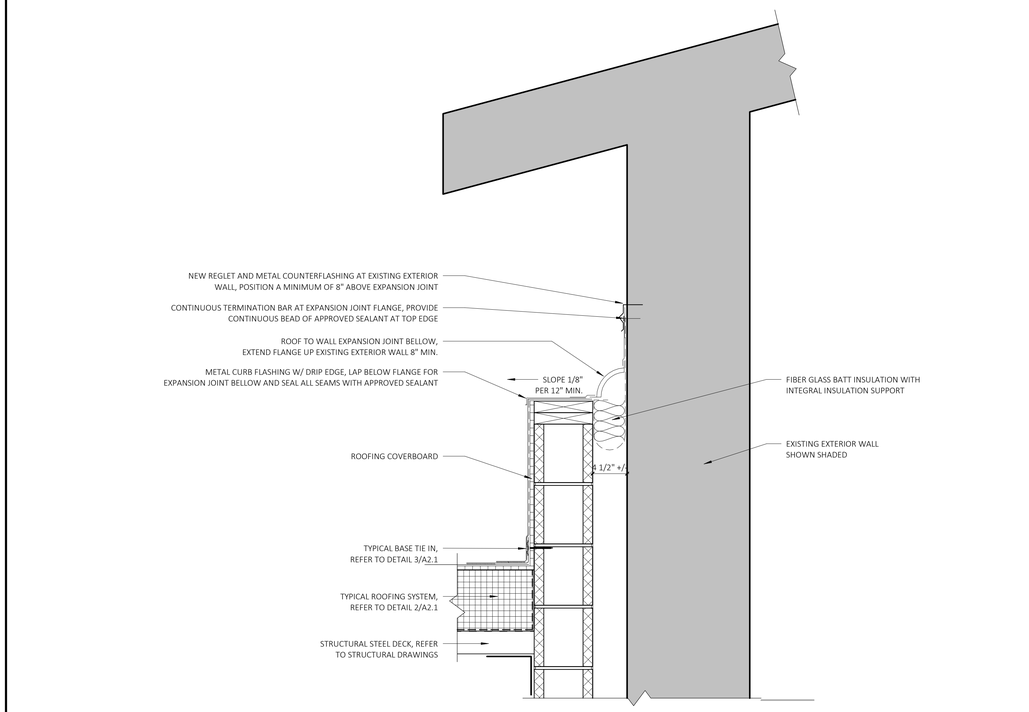
2 TYPICAL ROOFING SYSTEM

SCALE: 1 1/2" = 1'-0"



1 ROOF PLAN

SCALE: 1/4" = 1'-0"



8 HOISTWAY TIE IN TO EXISTING EXTERIOR WALL

SCALE: 1 1/2" = 1'-0"

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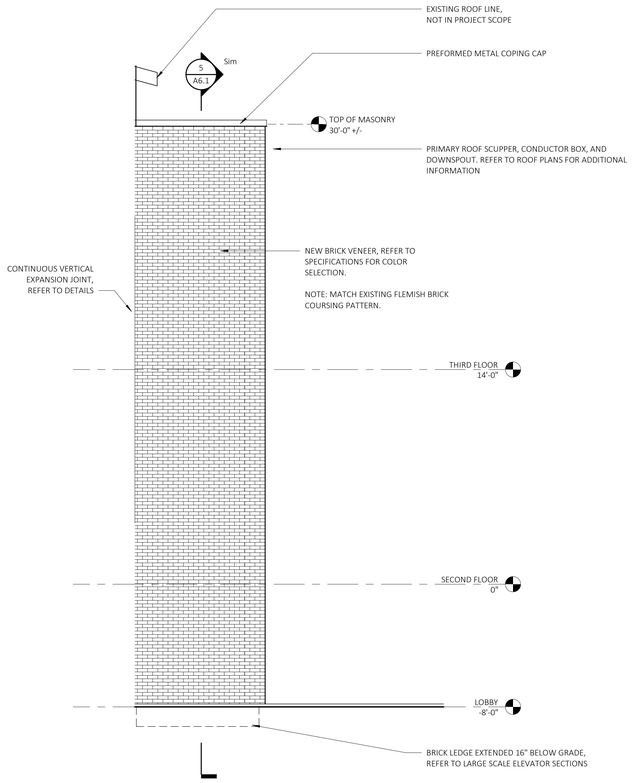
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ROOF PLAN & DETAILS

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PROJ. #: 2022_049A
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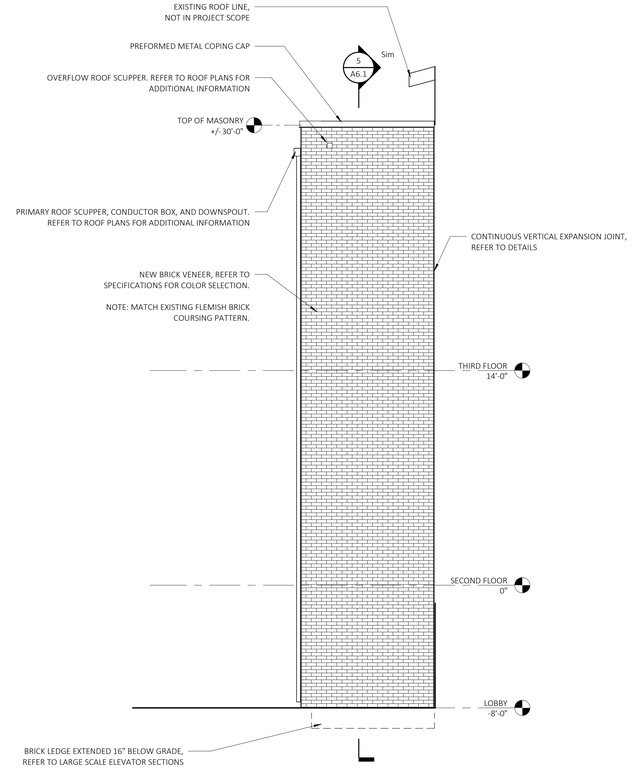
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3 SOUTH ELEVATION

SCALE: 1/4" = 1'-0"

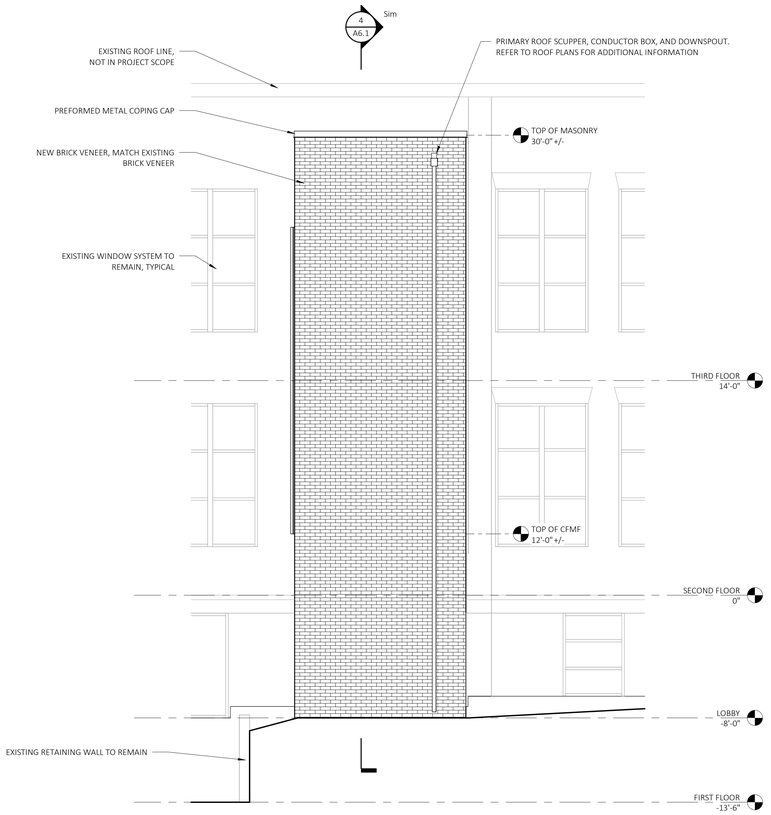
NOTE: ALL ELEVATION HEIGHTS TO BE FIELD VERIFIED PRIOR TO START OF NEW CONSTRUCTION.



2 NORTH ELEVATION

SCALE: 1/4" = 1'-0"

NOTE: ALL ELEVATION HEIGHTS TO BE FIELD VERIFIED PRIOR TO START OF NEW CONSTRUCTION.



1 EAST ELEVATION

SCALE: 1/4" = 1'-0"

NOTE: ALL ELEVATION HEIGHTS TO BE FIELD VERIFIED PRIOR TO START OF NEW CONSTRUCTION.

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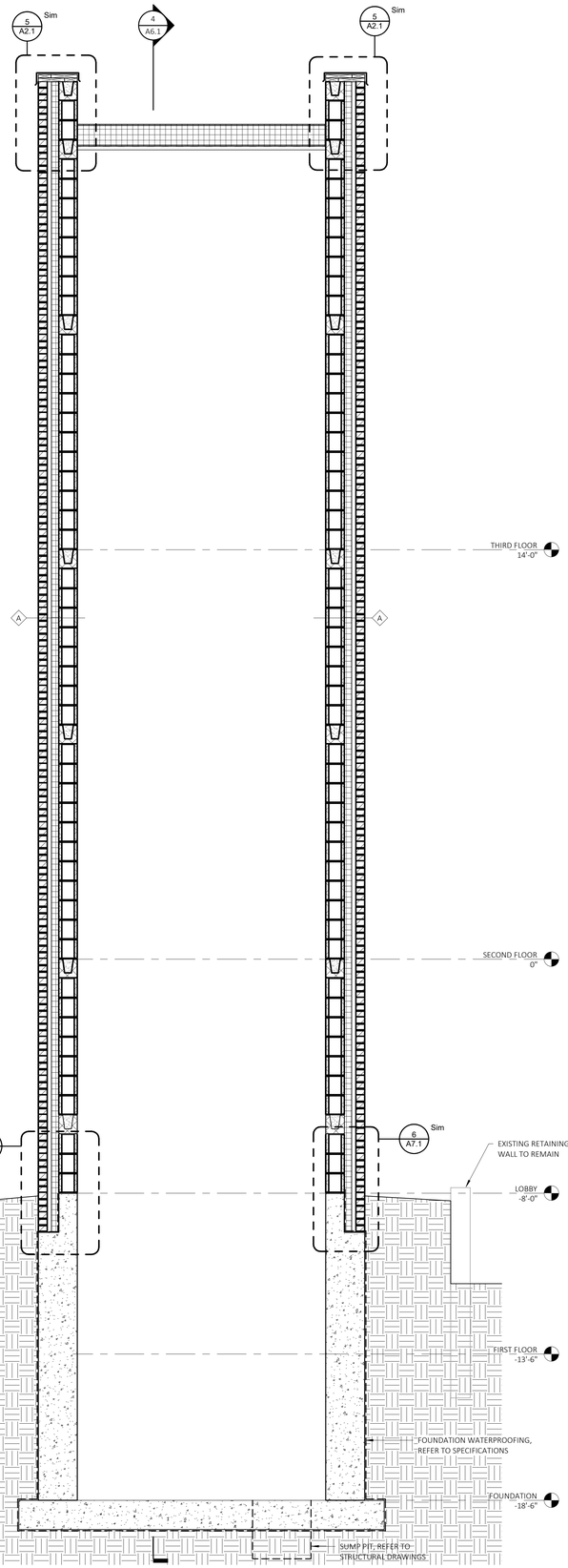
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BUILDING ELEVATIONS

DATE:	1/15/2026
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CHECKED:	JMY

SHEET NO.

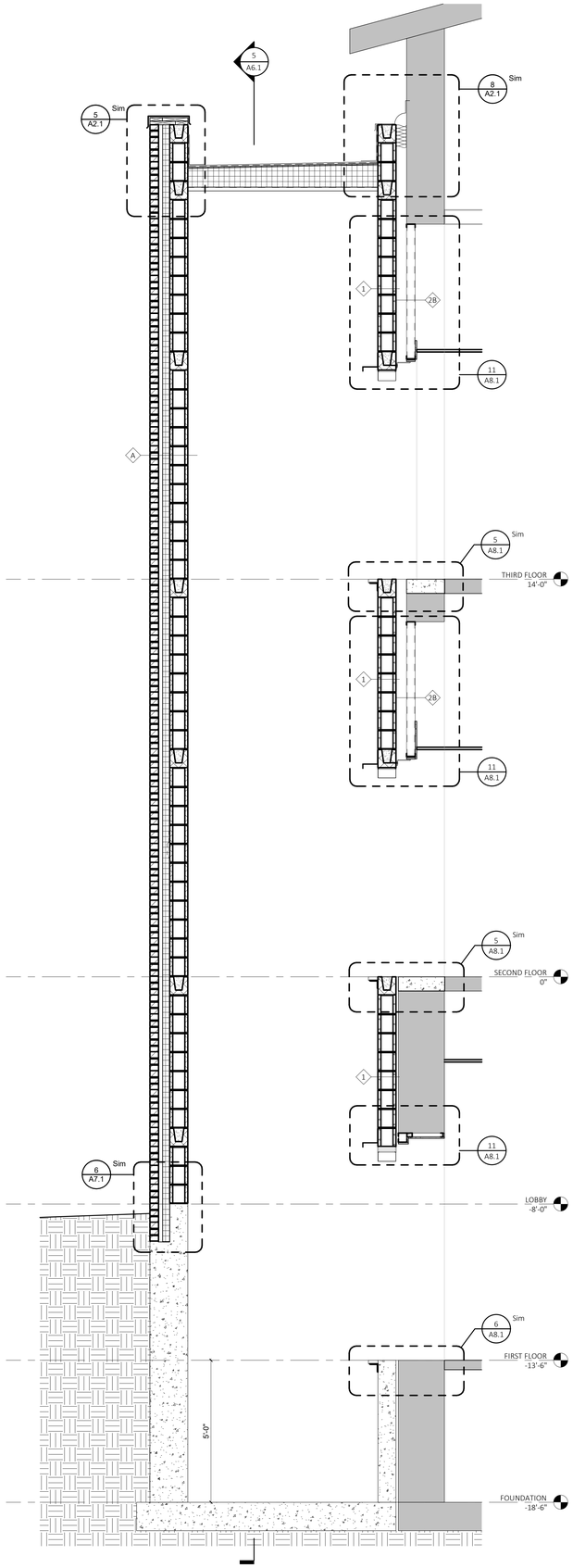
A3.1



5 ELEVATOR A - LONGITUDINAL SECTION

SCALE: 1/2" = 1'-0"

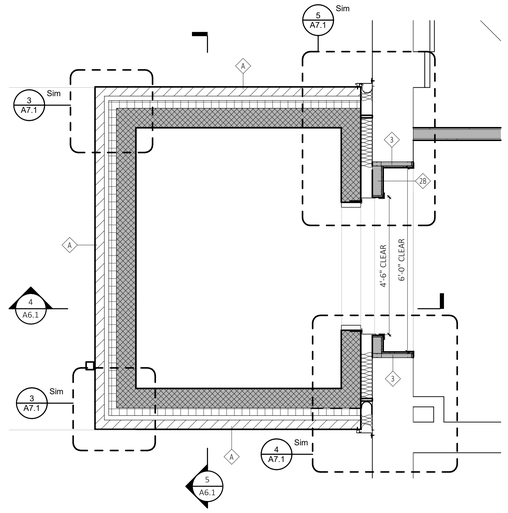
NOTE: ALL EXISTING ELEVATION/FLOOR HEIGHTS TO BE FIELD VERIFIED PRIOR TO START OF NEW CONSTRUCTION. NOTIFY ARCHITECT OF ANY DISCREPANCIES.



4 ELEVATOR A - TRANSVERSE SECTION

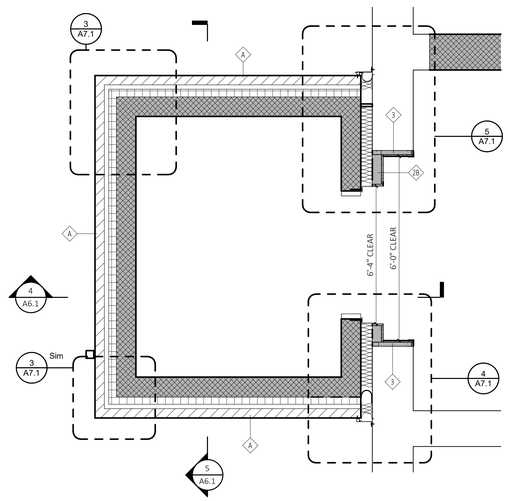
SCALE: 1/2" = 1'-0"

NOTE: ALL EXISTING ELEVATION/FLOOR HEIGHTS TO BE FIELD VERIFIED PRIOR TO START OF NEW CONSTRUCTION. NOTIFY ARCHITECT OF ANY DISCREPANCIES.



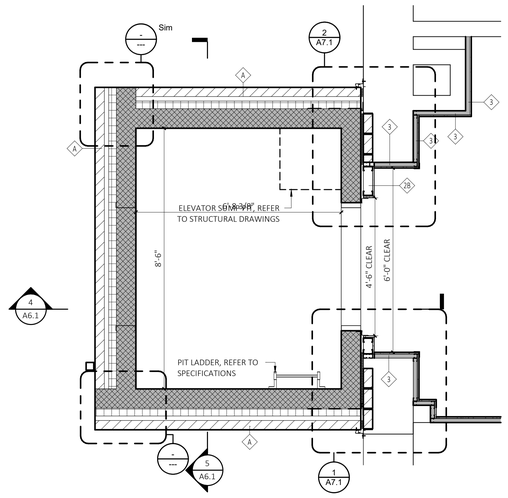
3 LARGE SCALE ELEVATOR - THIRD FLOOR

SCALE: 1/2" = 1'-0"



2 LARGE SCALE ELEVATOR - SECOND FLOOR

SCALE: 1/2" = 1'-0"



1 LARGE SCALE ELEVATOR - FIRST FLOOR

SCALE: 1/2" = 1'-0"

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friar.com
860.678.1291

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PROFESSIONAL SEAL

STATE OF CONNECTICUT · FRIAR ARCHITECTURE, INC. · NO. 113 · CORPORATE PRACTICE of ARCHITECTURE

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

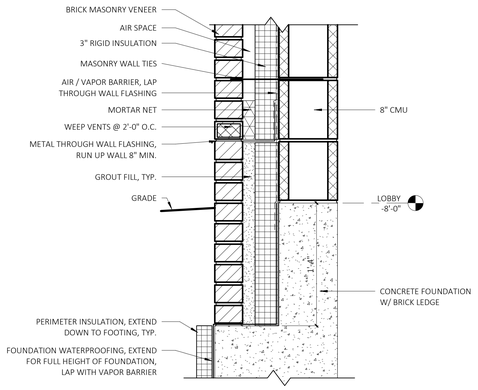
NO.	DATE	DESCRIPTION
	xx/xx/2026	ISSUE FOR BID

LARGE SCALE ELEVATOR & DETAILS

DATE:	1/15/2026
SCALE	1/2" = 1'-0"
PROJ. #:	2022_049A
DRAWN:	BKH
CHECKED:	JMY

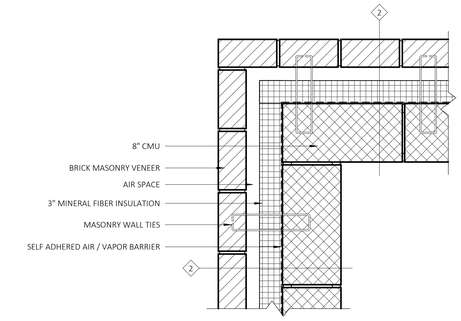
SHEET NO.

A6.1



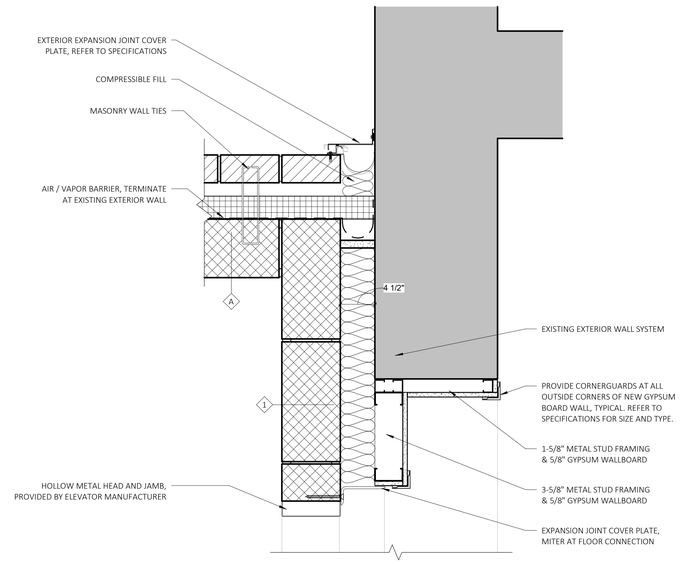
6 HOISTWAY BASE OF WALL DETAIL

SCALE: 1 1/2" = 1'-0"



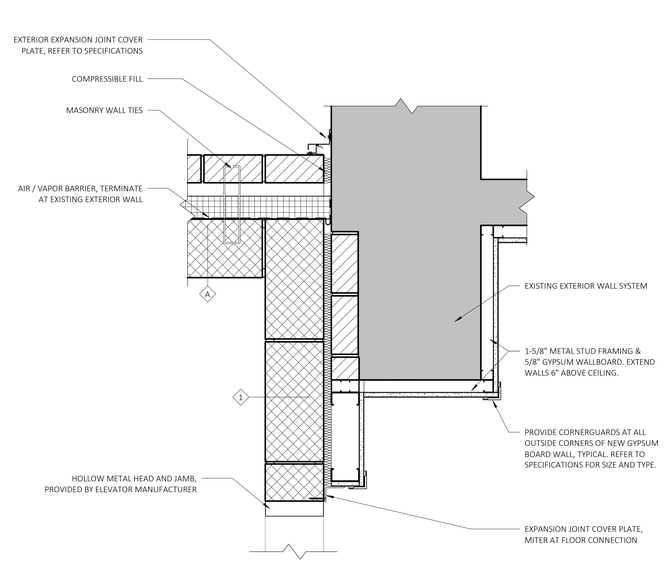
3 PLAN DETAIL AT HOISTWAY CORNER

SCALE: 1 1/2" = 1'-0"



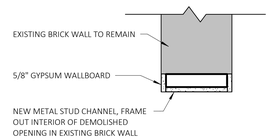
5 FIRST AND SECOND FLOOR HOISTWAY CORNER 2

SCALE: 1 1/2" = 1'-0"



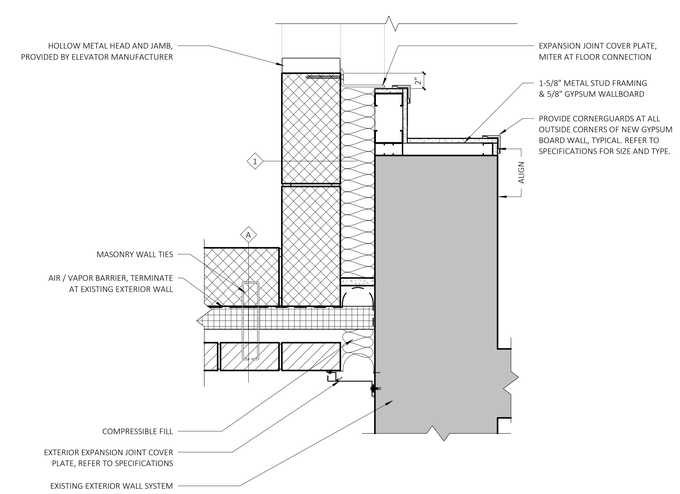
2 PLAN DETAIL @ BASEMENT CORNER 2

SCALE: 1 1/2" = 1'-0"



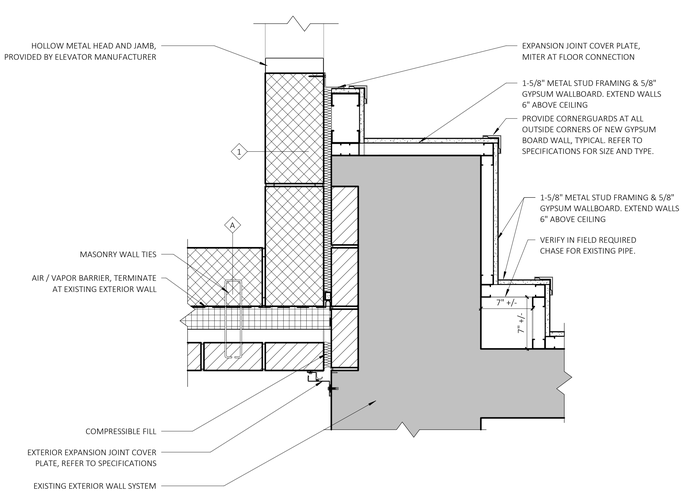
8 FIRST FLOOR SOFFIT DETAIL

SCALE: 1 1/2" = 1'-0"



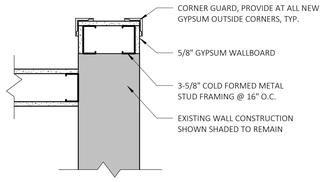
4 FIRST AND SECOND FLOOR HOISTWAY CORNER

SCALE: 1 1/2" = 1'-0"



1 PLAN DETAIL @ BASEMENT CORNER

SCALE: 1 1/2" = 1'-0"



7 PLAN DETAIL @ BASEMENT CORRIDOR

SCALE: 1 1/2" = 1'-0"

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DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

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Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

NO.	DATE	DESCRIPTION
	xx/xx/2026	ISSUE FOR BID

PLAN & SECTION DETAILS

DATE: 1/15/2026
SCALE 1 1/2" = 1'-0"
PROJ. #: 2022_049A
DRAWN: BKH
CHECKED: JMY

SHEET NO.
A7.1

DOOR SCHEDULE (WORKING VIEW)

OPENING NUMBER	DOOR: SINGLE DOOR	DOOR: DOUBLE DOOR	DOOR: WIDTH	DOOR: HEIGHT	DOOR: THICKNESS	DOOR: DEGREE OF SWING	DOOR: SEE DWG: DOOR MATERIAL	FRAME: SEE DETAILS ON DWG: FRAME MATERIAL	FRAME: HEAD DETAIL	FRAME: JAMB DETAIL	FRAME: THRESHOLD DETAIL	SOUND DOOR & GASKETING	ACCESS CONTROLLED OPERATION	FIRE RATING: U.L. RATING (IN MINUTES)	FIRE RATING: GASKETS AND SMOKE SEALS	HARDWARE - SEE SPECIFICATIONS: FIRE CODE: PANIC RELEASE HARDWARE	FIRE CODE: POSITIVE LATCHING	FIRE CODE: AUTOMATIC CLOSING	FIRE CODE: ELECT. MAG. DOOR RELEASE	DISABLED REQUIREMENTS: PUSH/PULL	DISABLED REQUIREMENTS: U HANDLE / LEVER HANDLE	DISABLED REQUIREMENTS: MOP, KICK & ARMOR PLATES	DISABLED REQUIREMENTS: TACTILE WARNING	DISABLED REQUIREMENTS: ACCESSIBLE THRESHOLD	ELECTRICAL / SECURITY	HARDWARE SET NUMBER
101	Yes		3'-0"	7'-0"	1 3/4"	90	HM-2	HMF-1	10/A8.1	9/A8.1			Yes	45		Yes	Yes	Yes	Yes			Yes				Yes	
102	Yes		3'-0"	7'-0"	1 3/4"	90	HM-1	HMF-1	10/A8.1	9/A8.1											Yes	Yes					
201	Yes		3'-0"	7'-0"	1 3/4"	90	HM-2	HMF-1	10/A8.1	9/A8.1				45	yes	Yes	Yes	Yes	Yes		Yes	Yes					
202	Yes		3'-0"	7'-0"	1 3/4"	90	HM-1	HMF-1	10/A8.1	9/A8.1											Yes						
301	Yes		3'-0"	7'-0"	1 3/4"	90	HM-2	HMF-1	10/A8.1	9/A8.1			Yes	45	Yes	Yes	Yes	Yes	Yes		Yes	Yes					
302	Yes		3'-0"	7'-0"	1 3/4"	90	HM-1	HMF-1	10/A8.1	9/A8.1											Yes						

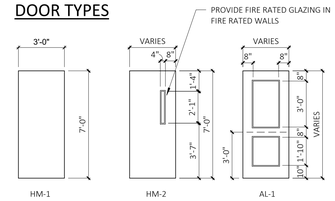
* NEW WORK

AR ACOUSTIC RATED

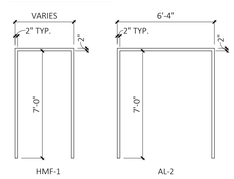
SCD SOUND CONTROL DOOR

SG SMOKE GASKETED

DOOR TYPES

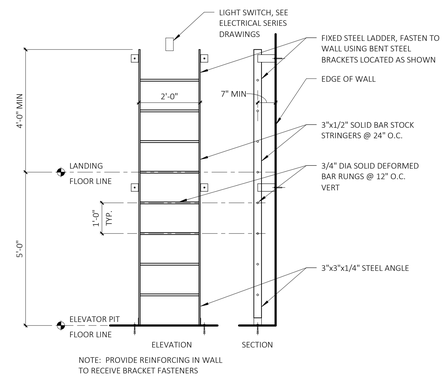


FRAME TYPES



GLAZING NOTES:

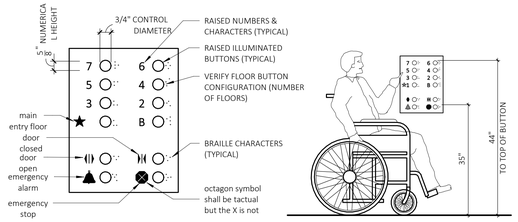
- SAFETY GLAZING SHALL BE PROVIDED IN HAZARDOUS LOCATIONS AND LABLED AS REQUIRED PER IBC SECTION 2406.
- ALL FIRE RATED DOORS, SIDELIGHTS AND BORROWED LIGHTS TO CONTAIN FIRE RATED / IMPACT SAFETY RATED CERAMIC COATED GLAZING REFER TO SPECIFICATION.
- ALL EXTERIOR DOORS / FRAMES TO CONTAIN INSULATING TEMPERED GLAZING TYP.
- ALL INTERIOR NON-RATED DOORS / FRAMES / SIDE LIGHTS AND BORROWED LIGHTS TO CONTAIN TEMPERED GLASS AS SPECIFIED TYP.



NOTE: PROVIDE REINFORCING IN WALL TO RECEIVE BRACKET FASTENERS

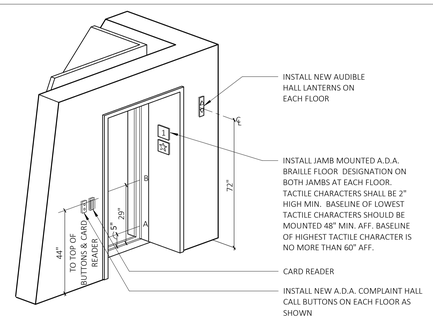
4 ELEVATOR PIT DETAIL - FIXED

SCALE: 1/2" = 1'-0"



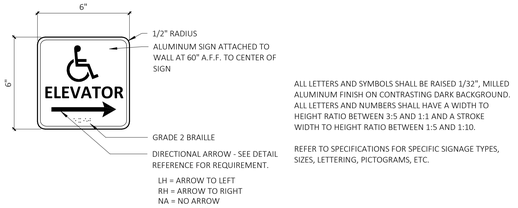
3 ELEVATOR-CONTROL PANEL DIAGRAM

SCALE: 12" = 1'-0"



2 EXTERIOR CONTROL PANEL WITH READER

SCALE: 12" = 1'-0"

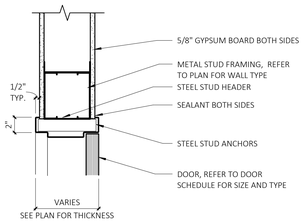


ALL LETTERS AND SYMBOLS SHALL BE RAISED 1/32", MILLED ALUMINUM FINISH ON CONTRASTING DARK BACKGROUND. ALL LETTERS AND NUMBERS SHALL HAVE A WIDTH TO HEIGHT RATIO BETWEEN 3:5 AND 1:1 AND A STROKE WIDTH TO HEIGHT RATIO BETWEEN 1:5 AND 1:10.

REFER TO SPECIFICATIONS FOR SPECIFIC SIGNAGE TYPES, SIZES, LETTERING, PICTOGRAMS, ETC.

1 ELEVATOR-SIGNAGE

SCALE: 3" = 1'-0"



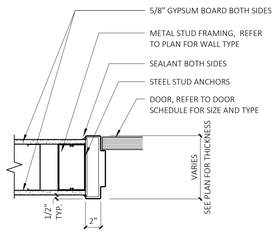
10 STUD-HEAD DETAIL INTERIOR

SCALE: 1 1/2" = 1'-0"

NOT USED

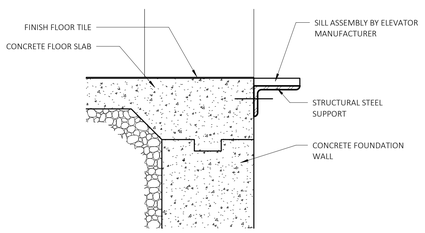
7 NOT USED

SCALE: 1 1/2" = 1'-0"



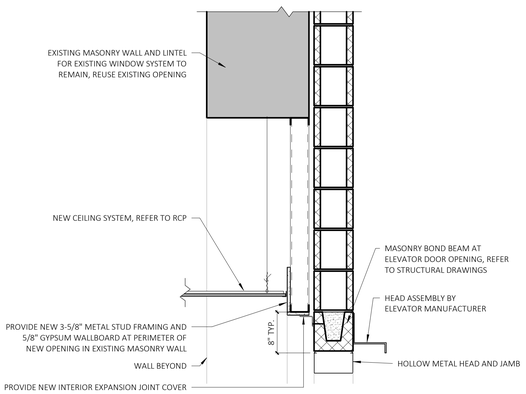
9 STUD-JAMB DETAIL INTERIOR

SCALE: 1 1/2" = 1'-0"



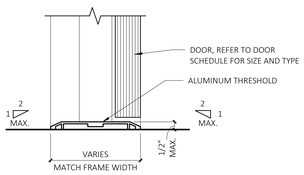
6 SLAB ON GRADE SILL DETAIL

SCALE: 1 1/2" = 1'-0"



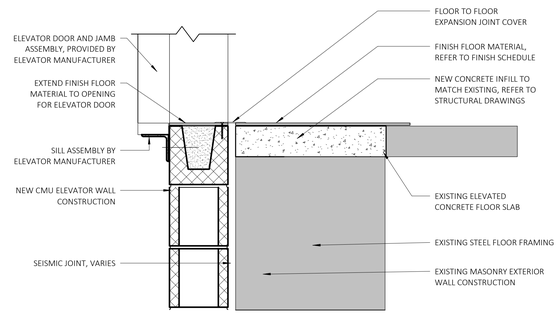
11 TYPICAL ELEVATOR HEAD DETAIL

SCALE: 1" = 1'-0"



8 THRESHOLD-ALUMINUM

SCALE: 3" = 1'-0"



5 ELEVATED SLAB SILL DETAIL

SCALE: 1 1/2" = 1'-0"

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Farmington, CT 06032
friar.com
860.678.1291

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DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

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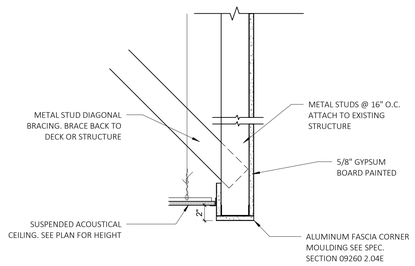
NO.	DATE	DESCRIPTION
	xx/xx/2026	ISSUE FOR BID

DOOR ELEVATIONS AND DETAILS

DATE: 1/15/2026
SCALE As indicated
PROJ. #: 2022_049A
DRAWN: BKH
CHECKED: JMY

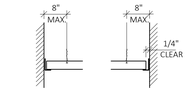
SHEET NO.

A8.1

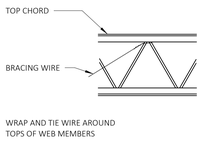


6 SOFFIT DETAIL

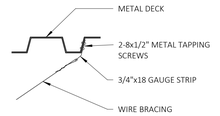
SCALE: 1 1/2" = 1'-0"



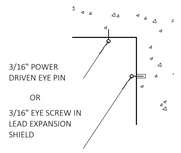
RUNNERS AT WALLS



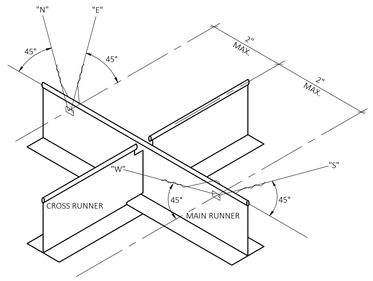
BRACE @ OPEN WEB JOIST



BRACE AT METAL DECK



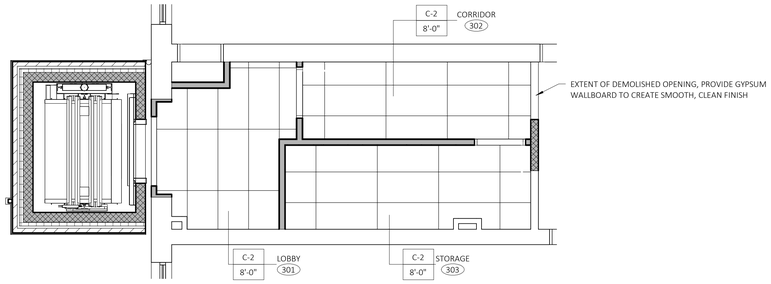
BRACE @ EXISTING CONCRETE



NOTES:
1. #12 GAUGE WIRE BRACING IN PLANE OF EACH RUNNER. VERTICAL ANGLE = 45°
2. HANGER WIRES "N" AND "S" ARE IN THE SAME VERTICAL PLANE AS THE MAIN RUNNER. HANGER WIRES "E" AND "W" ARE IN THE VERTICAL PLANE PERPENDICULAR TO THE MAIN RUNNER.

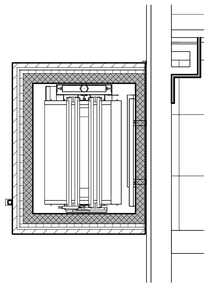
5 TYPICAL SEISMIC BRACING DETAILS

SCALE: 1/8" = 1'-0"



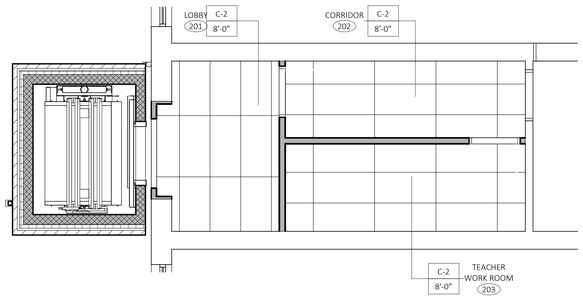
4 THIRD FLOOR REFLECTED CEILING PLAN

SCALE: 1/4" = 1'-0"



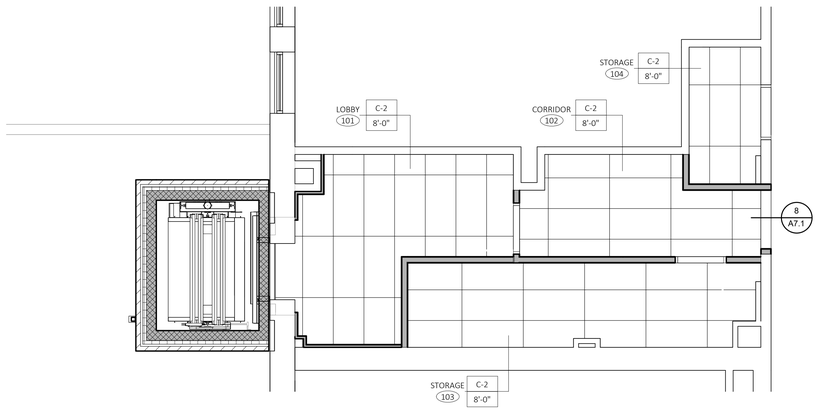
2 VESTIBULE REFLECTED CEILING PLAN

SCALE: 1/4" = 1'-0"



3 SECOND FLOOR REFLECTED CEILING PLAN

SCALE: 1/4" = 1'-0"



1 FIRST FLOOR REFLECTED CEILING PLAN

SCALE: 1/4" = 1'-0"

REFLECTED CEILING LEGEND

- C-X / X'-X" — CEILING TYPE AND HEIGHT SYMBOL; CEILING TYPE; CEILING HEIGHT
- NEW, EXISTING OR RELOCATED RECESSED 2 X 4 LIGHT FIXTURE. REFER TO ELEC. DWGS.
- NEW, EXISTING OR RELOCATED RECESSED 2 X 2 LIGHT FIXTURE. REFER TO ELEC. DWGS.
- SUPPLY DIFFUSER. REFER TO MECHANICAL DRAWINGS FOR TYPES AND SIZES.
- RETURN DIFFUSER. REFER TO MECHANICAL DRAWINGS FOR TYPES AND SIZES.
- ACCESS PANEL REQUIRED AT ALL MECHANICAL EQUIPMENT. REFER TO MECHANICAL DRAWINGS
- SPRINKLER HEAD
- D — DRY SPRINKLER HEAD
- UPRIGHT SPRINKLER HEAD
- S — SPEAKER
- S — SMOKE DETECTOR
- H — HEAT DETECTOR
- EXIT SIGN WITH DIRECTIONAL CHEVRON, AS REQ'D. SEE ELEC. DWGS. FOR SPECIFIC TYPES.

CEILING TYPE SCHEDULE

NOTE: NOT ALL CEILING TYPES ARE USED. SEE PLANS & SPECIFICATIONS.

C-1	2x2 SUSPENDED ACOUSTICAL PANEL IN GRID
C-2	2X4 SUSPENDED ACOUSTICAL PANEL IN GRID
ES	NO CEILING - EXPOSED STRUCTURE
EP	NO CEILING - PAINT ALL EXPOSED STRUCTURE & UTILITIES
EX	EXISTING CEILING TO REMAIN

GENERAL NOTES

A. THIS PLAN INDICATES DIRECTIONAL LAYOUT OF CEILING GRIDS. REFER TO CEILING TYPE SCHEDULE.
B. IN ALL AREAS OF NEW & EXISITNG SUSPENDED ACOUSTICAL CEILINGS, THE SPRINKLER LINES SHALL BE INSTALLED CONCEALED. REFER TO FIRE PROTECTION DRAWINGS FOR SPRINKLER HEAD LOCATIONS AND RELATED INFORMATION.
C. REFER TO ELECTRICAL DRAWINGS FOR LIGHTING FIXTURE TYPES, REQUIRED WORK AND FOR OTHER CEILING MOUNTED EQUIPMENT NOT INDICATED ON THESE DRAWINGS.
D. REFER TO MECHANICAL DRAWINGS FOR DIFFUSER TYPES, REQUIRED WORK AND FOR OTHER CEILING MOUNTED EQUIPMENT NOT INDICATED ON THESE DRAWINGS.
E. REFER TO DETAIL X/AX.X FOR SEISMIC BRACING DETAILS FOR NEW SUSPENDED CEILINGS.
F. CUT NEW CEILING TILES AS REQUIRED FOR INSTALLATION AROUND NEW OR EXISTING VENT PIPING, EXHAUST DUCTS, SPRINKER HEADS, CONDUIT, ETC.

NOTE: FIELD VERIFY ALL CEILING HEIGHTS PRIOR TO INSTALLATION OF NEW GRIDS. COORDINATE WITH INSTALLATION OF NEW LIGHTING FIXTURES, SPRINKLER PIPING, DUCTWORK AND EXISTING STRUCTURE. NOTIFY ARCHITECT OF ANY CONFLICTS PRIOR TO INSTALLING NEW GRID.

architecture interior design master planning
FRIAR
21 Talcott Notch Road friar.com
Farmington, CT 06032 860.678.1291

STATE OF CONNECTICUT — SUSAN R. FRIAR — No. 12359 — LICENSED ARCHITECT

PROFESSIONAL SEAL

STATE OF CONNECTICUT — FRIAR ARCHITECTURE, INC. — NO. 113 — CORPORATE PRACTICE of ARCHITECTURE

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

NO.	DATE	DESCRIPTION

REFLECTED CEILING

DATE:	1/15/2026
SCALE	As indicated
PROJ. #:	2022_049A
DRAWN:	BKH
CHECKED:	JMY

SHEET NO.

A9.1

FINISH SCHEDULE

ROOM NUMBER / AREA DESIGNATION	ROOM NAME OR AREA NAME	FLOOR	BASE	WALL				CABINETS			MISCELLANEOUS						REMARKS
				NORTH	SOUTH	EAST	WEST	COUNTER / BACKSPLASH	BASE / TALL CABINETS	UPPER CABINETS	DOOR FRAMES	TACKBOARDS	MARKERBOARDS	TOILET PARTITIONS	WINDOW TREATMENTS	LOCKERS	
101	LOBBY	VCT-1	WB-1	P-1	P-1	P-1	P-1	-	-	-	P-2	-	-	-	-	-	
102	CORRIDOR	VCT-1	WB-1	P-1	P-1	P-1	P-1	-	-	-	P-2	-	-	-	-	-	
103	STORAGE	VCT-1	WB-1	P-1	P-1	P-1	P-1	-	-	-	P-2	-	-	-	-	-	
104	STORAGE	VCT-1	WB-1	P-1	P-1	P-1	P-1	-	-	-	P-2	-	-	-	-	-	
201	LOBBY	VCT-1	WB-1	P-1	P-1	P-1	P-1	-	-	-	P-2	-	-	-	-	-	
202	CORRIDOR	VCT-1	WB-1	P-1	P-1	P-1	P-1	-	-	-	P-2	-	-	-	-	-	
203	TEACHER WORK ROOM	VCT-1	WB-1	P-1	P-1	P-1	P-1	-	-	-	P-2	-	-	-	-	-	
301	LOBBY	VCT-1	WB-1	P-1	P-1	P-1	P-1	-	-	-	P-2	-	-	-	-	-	
302	CORRIDOR	VCT-1	WB-1	P-1	P-1	P-1	P-1	-	-	-	P-2	-	-	-	-	-	
303	STORAGE	VCT-1	WB-1	P-1	P-1	P-1	P-1	-	-	-	P-2	-	-	-	-	-	

FINISH LEGEND

VINYL COMPOSITION TILE

VCT-1: MANUFACTURER: TARKETT
COLLECTION: VCT II
COLOR: PURE WHITE 480
SIZE: 12"x12"
INSTALL: QUARTER TURN

WALL BASE

WB-1: MANUFACTURER: JOHSONITE/TARKETT
COLOR: CHARCOAL
STYLE: COVE
SIZE: 6"H

PAINT

P-1: MANUFACTURER: SHERWIN WILLIAMS
COLOR: PASSIVE - SW 7064
FINISH: EGGSHELL
LOCATION: FIELD

P-2: MANUFACTURER: SHERWIN WILLIAMS
COLOR: GRIZZLE GRAY SW 7068
FINISH: SEMI-GLOSS
LOCATION: DOORFRAMES

VIEW FROM TABLE 803.9/ 2012 IBC
INTERIOR WALL AND CEILING FINISH REQUIREMENTS BY OCCUPANCY

GROUP	SPRINKLERED			NONSPRINKLERED		
	VERTICAL EXITS & EXIT PASSAGEWAYS	EXIT ACCESS CORRIDORS & OTHER EXITWAYS	ROOMS AND ENCLOSED SPACES	VERTICAL EXITS & EXIT PASSAGEWAYS	EXIT ACCESS CORRIDORS & OTHER EXITWAYS	ROOMS AND ENCLOSED SPACES
A-1 & A-2	B	B	C	A	A	B
A-3, A-4, A-5	B	B	C	A	A	C
B, E, M	B	C	C	A	B	C

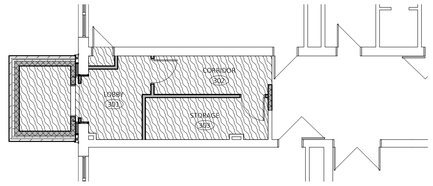
INTERIOR WALLS AND CEILING FINISHES SHALL BE CLASSIFIED IN ACCORDANCE WITH ASTM E 84.

FINISH FLOOR LEGEND:

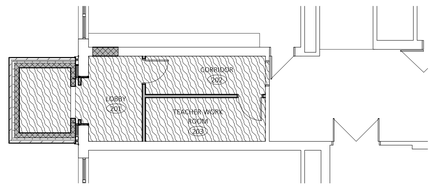
VINYL COMPOSITION TILE
VCT

FLOOR FINISH NOTES:

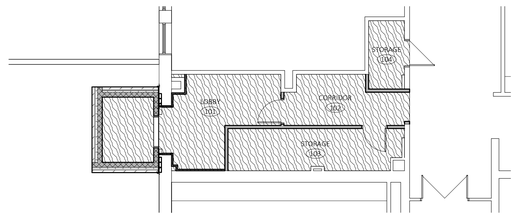
1. REFER TO FINISH SCHEDULE SHEETS FOR COLOR DESIGNATIONS.
2. ALL FLOOR FINISHES TO EXTEND TO MEET WALL AND/OR BASE OF CASEWORK.
3. FINISH PLAN SHOULD BE USED IN CONJUNCTION WITH FINISH SCHEDULE. SHOULD THERE BE ANY DISCREPANCY BETWEEN OTHER DRAWINGS IN THE SET, THE HIGHER QUALITY FINISH SHALL BE PROVIDED.



3 THIRD FLOOR FINISH PLAN
SCALE: 1/8" = 1'-0"



2 SECOND FLOOR FINISH PLAN
SCALE: 1/8" = 1'-0"



1 FIRST FLOOR / ELEVATOR LOBBY FINISH PLAN
SCALE: 1/8" = 1'-0"

architecture interior design master planning
FRIAR
21 Talcott Notch Road friar.com
Farmington, CT 06032 860.678.1291

STATE OF CONNECTICUT JOYCE R. FRIAR No. 12358 LICENSED ARCHITECT

PROFESSIONAL SEAL

STATE OF CONNECTICUT FRIAR ARCHITECTURE, INC. NO. 113 CORPORATE PRACTICE of ARCHITECTURE

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

NO.	DATE	DESCRIPTION
	xx/xx/2026	ISSUE FOR BID

FINISH PLAN & SCHEDULE

DATE: 1/15/2026
SCALE As indicated
PROJ. #: 2022_049A
DRAWN: BKH
CHECKED: JMY

SHEET NO.
A12.1

GENERAL NOTES

GENERAL

1. GOVERNING CODE: 2022 CONNECTICUT STATE BUILDING CODE, (2021 INTERNATIONAL BUILDING CODE).

1. DESIGN LOADS: CITY OF WATERBURY

3. ROOF LOAD:

ROOF SNOW LOAD CRITERIA:
Pg = 35 PSF
Ce = 1.0
Is = 1.1
Ct = 1.0
Pf = 26.95 PSF

WITH INCREASES FOR SNOW DRIFTING, UNBALANCES AND SLIDING PER SECTION 1608 (2021 IBC).

MINIMUM ROOF SNOW LOAD = 30 PSF

ROOF DEAD LOAD = 20 PSF

a. WIND LOAD CRITERIA: SECTION 1609 (2021 IBC)
ULTIMATE WIND SPEED V_{ult} = 130 MPH
NOMINAL DESIGN WIND V_{ASD} = 101 MPH
RISK CATEGORY:III , Iw = 1.0
EXPOSURE CLASSIFICATION "B".

MINIMUM WIND LOAD ON PRIMARY STRUCTURE = 16 PSF

WIND LOADS ON SECONDARY ELEMENTS SHALL CONFORM WITH ASCE 7-16.

COMPONENT AND CLADDING DESIGN WIND PRESSURES:

ROOF ZONE 1: POSITIVE: 16.00 PSF
NEGATIVE: -57.31 PSF

ROOF ZONE 2: POSITIVE: 16.00 PSF
NEGATIVE: -75.66 PSF

ROOF ZONE 3: POSITIVE: 16.00 PSF
NEGATIVE: -103.13 PSF

WALL ZONE 4: POSITIVE: 36.00 PSF
NEGATIVE: -39.07 PSF

WALL ZONE 5: POSITIVE: 36.00 PSF
NEGATIVE: -48.19 PSF

ROOF OVERHANG ZONE 2: -70.21 PSF
ROOF OVERHANG ZONE 3: -97.56 PSF

DESIGN WIND PRESSURE IS COMPUTED BASED ON ULTIMATE WIND SPEED USING 10 SQUARE FOOT OF AREA.

b. SEISMIC LOAD CRITERIA FOR ADDITION AS PER SECTION 1613 (2021 IBC) WITH:
RISK CATEGORY = III
SEISMIC IMPORTANCE FACTOR, Ie = 1.25
Ss = 0.193g, S1 = 0.054g
SOIL SITE CLASS = D (ASSUMED)
SPECTRAL RESPONSE COEFFICIENTS, Sds = 0.206G, Sd1 = 0.086g
SEISMIC DESIGN CATEGORY, B
BASIC SEISMIC-FORCE-RESISTING SYSTEM: BEARING WALL, INTERMEDIATE REINFORCED MASONRY SHEAR WALLS
SEISMIC RESPONSE COEFFICIENT, Cs = 0.073S
DESIGN BASE SHEAR, V = Cs x W
RESPONSE MODIFICATION FACTOR, R = 3.5
ANALYSIS PROCEDURE USED: EQUIVALENT LATERAL FORCE PROCEDURE

c. DESIGN BEARING PRESSURE ON 8 INCHES OF COMPACTED STRUCTURAL FILL OR CRUSHED STONE OVER NATURALLY DEPOSITED GLACIAL TILL STRATUM: 6000 PSF

4. SHOULD ANY OF THE DETAILED INSTRUCTIONS SHOWN ON THE PLANS CONFLICT WITH THE GENERAL STRUCTURAL NOTES, THE SPECIFICATIONS, OR WITH EACH OTHER, THE STRICTEST PROVISION SHALL GOVERN.

5. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE BUILDING IS FULLY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO INSURE THE SAFETY OF THE BUILDING AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, SHEETING, TEMPORARY BRACING, GUYS OR TIEDOWNS WHICH MIGHT BE NECESSARY. SUCH MATERIAL SHALL REMAIN THE CONTRACTOR'S PROPERTY AFTER COMPLETION OF THE PROJECT.

a. THE CONTRACTOR SHALL PROVIDE SHORING CALCULATIONS AND SHORING DRAWINGS, INDICATING THE WORK TO BE PROVIDED, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT.

6. THE STRUCTURE UTILIZES SHEAR WALLS TO PROVIDE LATERAL STABILITY. THEREFORE, TEMPORARY BRACING, GUYS, ETC. MUST BE MAINTAINED UNTIL ALL MASONRY SHEAR WALLS HAVE BEEN ERECTED AND ATTACHED TO STEEL FRAMING.

7. LOADS, OPENINGS AND STRUCTURE IN ANY WAY RELATED TO REQUIREMENTS OF OTHER (NON-STRUCTURAL) DISCIPLINES ARE SHOWN FOR BIDDING PURPOSES ONLY. THE CONTRACTOR SHALL OBTAIN FROM THE HEATING AND VENTILATING, ELECTRICAL, PLUMBING AND OTHER SUBCONTRACTORS THE FINAL APPROVED SIZE AND LOCATION OF ALL OPENINGS AND WORK TO BE PROVIDED FOR THEIR TRADE IN ROOFS, FLOORS AND WALLS, WHETHER SHOWN OR NOT SHOWN ON STRUCTURAL DRAWINGS. CONTRACTOR SHALL BE RESPONSIBLE FOR TRANSMISSION OF REQUIREMENTS, LOCATIONS AND DETAILS TO STRUCTURAL SUBCONTRACTORS. EXCESS COST RELATED TO VARIATION IN MECHANICAL REQUIREMENTS ARE NOT TO BE BORNE BY THE OWNER.

8. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO FOLLOW ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION.

9. SHOP DRAWINGS ARE TO BE CHECKED BY THE CONTRACTOR AND SUBCONTRACTOR AND BEAR CHECKER'S INITIALS BEFORE BEING SUBMITTED TO THE ARCHITECT FOR APPROVAL.

10. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES AND EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.

11. ALL SECTIONS AND DETAILS SHALL BE CONSIDERED TYPICAL AND APPLY FOR THE SAME AND SIMILAR SITUATIONS THROUGHOUT THE BUILDING, UNLESS OTHERWISE SPECIFICALLY NOTED.

12. CONTRACTOR SHALL REVIEW ALL ARCHITECTURAL AND STRUCTURAL DRAWINGS PRIOR TO SUBMITTING THEIR BID FOR REFERENCE TO ALL NOTES ON ARCHITECTURAL DRAWINGS REFERRING TO "SEE STRUCTURAL DRAWINGS". IF THE SIZE OF ELEMENTS AND DETAILING OF MEMBERS IS NOT INDICATED, THE CONTRACTOR SHALL CONTACT THE ARCHITECT TO REQUEST THE MISSING INFORMATION IN PREPARATION OF THEIR BID. THESE REFERENCED ITEMS SHALL BE PART OF THE BASE BID.

13. IN CASES OF DISCREPANCIES BETWEEN CONTRACT DOCUMENTS AND SUBMITTED SHOP DRAWINGS, THE CONTRACT DOCUMENTS SHALL GOVERN INSTALLATION OF MATERIALS.

14. WOOD BLOCKING THAT IS NOT PART OF THE PRIMARY STRUCTURAL FRAME IS NOT OWNED BY MHAI. THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER IS RESPONSIBLE FOR COORDINATING THE PARTIES THAT OWN THE BLOCKING, INCLUDING THE CONNECTION OF THE BLOCKING TO ANY SUPPORTING MATERIAL. THIS INCLUDES BUT IS NOT LIMITED TO: BLOCKING BELOW MECHANICAL EQUIPMENT, BLOCKING FOR ROOFING ATTACHMENT, AND BLOCKING FOR WINDOW SYSTEM CONNECTIONS

CONTRACTOR'S DELEGATED DESIGN

1. CONTRACTOR SHALL RETAIN THE SERVICES OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF CONNECTICUT TO PERFORM THE DESIGN OF THE FOLLOWING:

1. RAILINGS, LADDERS, STAIR STRINGERS, AND STAIR LANDING DESIGN AND THEIR CONNECTIONS
2. TEMPORARY SHORING OF EXISTING STRUCTURAL MEMBERS.
3. ALL NON-STRUCTURAL EQUIPMENT ATTACHMENT TO SUPPORTING STRUCTURE. THIS INCLUDES BUT IS NOT LIMITED TO MECHANICAL CURB ATTACHMENTS, HANGING CONNECTIONS OF MEP ITEMS, ETC.

2. ALL CALCULATIONS SHALL BE SIGNED AND SEALED BY THE ENGINEER AND SUBMITTED FOR REVIEW.

FOUNDATIONS

1. BACKFILLING SHALL BE ACCOMPLISHED TO EQUAL HEIGHTS ON BOTH SIDES OF FOUNDATION WALLS TO PREVENT MOVEMENTS DUE TO UNBALANCED EARTH PRESSURE. WHERE EARTH IS ON ONE SIDE ONLY, BACKFILLING AND COMPACTION SHALL NOT START UNTIL FLOOR SLAB OR ADEQUATE BRACING IS PROVIDED FOR WALL SUPPORT (EXCEPT AT RETAINING WALLS).

2. ALL FOOTINGS ARE TO REST ON 8 INCHES OF COMPACTED STRUCTURAL FILL OR CRUSHED STONE OVER NATURALLY EPOSITED GLACIAL TILL STRATUM, AS DEFINED IN THE SPECIFICATIONS, OR CONTROLLED COMPACTED FILL, REGARDLESS OF LEVATIONS SHOWN ON DRAWINGS. FOOTING BOTTOM ELEVATIONS SHALL NOT BE HIGHER THAN INDICATED ON THE OUNDATION PLAN, NOR LESS THAN 3'-6" BELOW FINISH GRADES.

3. IF FILL MATERIALS ARE ENCOUNTERED AT FOOTING BEARING ELEVATIONS, ALL FILL MATERIAL SHALL BE EXCAVATED AND DISPOSED OF LEGALLY OFF-SITE. THE OVER EXCAVATION SHALL BE BACKFILLED WITH CONTROLLED COMPACTED FILL TO THE BOTTOM OF FOOTING ELEVATION AS REQUIRED.

4. ALL CONTROLLED COMPACTED BACKFILL UNDER FOOTINGS AND WITHIN THE FOOTPRINT OF THE STRUCTURE SHALL BE COMPACTED TO 95% OF THE MODIFIED OPTIMUM DENSITY.

5. BOTTOM OF ALL EXTERIOR FOOTINGS SHALL BE AT LEAST 3'-6" BELOW FINISHED GRADE. PRIOR TO PROCEEDING WITH FOOTING EXCAVATION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF FINISH GRADES AND BOTTOM OF EXTERIOR FOOTING ELEVATIONS TO MAINTAIN THE 3'-6" FROST PROTECTION.

6. ALL SOIL SURROUNDING AND UNDER ALL FOOTINGS SHALL BE PROTECTED FROM FREEZING AND FROST ACTION DURING THE COURSE OF CONSTRUCTION.

7. FOOTING BOTTOMS SHALL STEP AT THE RATE OF 1 UNIT VERTICAL TO 2 UNITS HORIZONTAL WITH A MAXIMUM VERTICAL STEP OF 2'-0".

8. WHERE SUBSURFACE PIPING PASSES THROUGH FOUNDATION WALLS, THE TOP OF THE FOOTINGS SHALL BE AT LEAST 8" BELOW THE INVERT ELEVATION OF THE PIPING AND CONDUITS. COORDINATE ALL INVERTS WITH MECHANICAL, PLUMBING, FIRE PROTECTION, ELECTRICAL, SITE AND SITE UTILITY DRAWINGS.

9. WHERE FOOTINGS ARE IN CLOSE PROXIMITY OF SUBSURFACE PIPING OR CONDUIT, BOTTOM OF FOOTINGS SHALL BE AT LEAST 8" BELOW INVERT ELEVATION OF PIPING OR CONDUITS.

10. KEEP FOUNDATION EXCAVATIONS FREE OF WATER AT ALL TIMES.

11. USE LEAN CONCRETE (f'c=1500) OR CONTROLLED COMPACTED FILL FOR OVER-EXCAVATION OF FOOTINGS.

12. PLACEMENT OF ALL COMPACTED FILL MATERIALS MUST BE UNDER SUPERVISION OF AN APPROVED TESTING LABORATORY (SEE SPECIFICATIONS). CONCRETE FOUNDATIONS SHALL NOT BE PLACED UNTIL SUBGRADE HAS BEEN CHECKED IN PLACE AND APPROVED BY TESTING LABORATORY.

13. EXISTING ON-SITE EXCAVATED MATERIALS SHALL NOT BE ACCEPTABLE BACKFILL MATERIAL BELOW BUILDING FOUNDATIONS, SLABS ON GRADE, OR FOR BACKFILLING OF FOUNDATION WALLS, OR WITHIN 2 FEET OF PAVEMENT GRADES UNLESS APPROVED BY THE GEOTECHNICAL ENGINEER OF RECORD.

14. SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS OF BRICK OR CONCRETE MASONRY BLOCK SHELF ELEVATIONS IN THE FOUNDATION WALLS.

15. THE FOUNDATION DESIGN OF THE STRUCTURE HAS BEEN PREPARED BASED ON THE SOIL BORINGS, SOILS REPORT AND RECOMMENDATIONS PROVIDED BY THE GEOTECHNICAL ENGINEER, FREEMAN COMPANIES, DATED DECEMBER 16, 2025. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REVIEW THE MATERIAL PRIOR TO PREPARING THEIR BID TO ASSURE THEY UNDERSTAND THE SOIL CONDITIONS AND THE RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER.

16. FOUNDATION DESIGN SITE PREPARATION: THE FOUNDATION DESIGN AS INDICATED ON THE STRUCTURAL DRAWINGS HAS BEEN BASED ON THE FOLLOWING SITE PREPARATION. THE SITE HAS BEEN PREPARED BY THE EXCAVATION AND REMOVAL FROM THE SITE OF ALL EXISTING FILL AND CONTAMINATED SOILS. THE FOUNDATION DESIGN IS BASED ON THE CONTROLLED BACKFILLING OF THE SITE EXCAVATION WITH CONTROLLED FILL COMPACTED TO AT LEAST 95% OF THE MODIFIED OPTIMUM DENSITY IN ACCORDANCE WITH ASTM D1557.

17. PROVIDE CONTINUOUS BENTONITE WATERSTOPS BETWEEN THE TOP OF FOOTING AND BOTTOM OF ALL WALLS WHERE THE SLAB ON GRADE IS BELOW THE FINISH GRADE. PLACE THE WATERSTOP WITH A MINIMUM OF 2" CLEAR FROM THE FACE OF WALL, OR PER THE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS. ATTACH WATERSTOP TO THE CONCRETE PER THE MANUFACTURERS WRITTEN INSTALLATION INSTRUCTIONS.

CONCRETE

MATERIALS:

CONCRETE SHALL MEET THE REQUIREMENTS OF THE EXPOSURE CATEGORY LISTED BELOW PER ACI 318 CHAPTER 19, AND SHALL HAVE THE MAXIMUM WATER TO CEMENT RATIO, TARGET AIR CONTENT AND DEVELOP STRENGTH IN 28 DAYS AS FOLLOWS:

LOCATION	EXPOSURE CATEGORY	STRENGTH (PSI)	MAXIMUM WATER TO CEMENT RATIO	TARGET AIR CONTENT
FOUNDATIONS	F2	4500	0.45	6%

1. ALL DETAILING, FABRICATION AND ERECTION OF REINFORCING BARS MUST FOLLOW ACI 318-19.

2. CONTRACTOR IS RESPONSIBLE FOR FOLLOWING ACI GUIDELINES FOR HOT AND COLD WEATHER CONCRETE AND SHALL SUBMIT PROCEDURES FOR RECORD PRIOR TO COMMENCING WORK.

3. REINFORCING STEEL SHALL BE ASTM A615, GRADE 60.

4. NO TACK WELDING OF REINFORCING WILL BE PERMITTED

5. UNLESS NOTED OTHERWISE, ALL LAP SPLICES SHALL BE CLASS B, IN ACCORDANCE WITH ACI 318-19.

6. NO CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 0.1% CHLORIDE BY WEIGHT OF ADMIXTURES SHALL BE USED IN THE CONCRETE.

7. BOTTOM OF ALL EXTERIOR FOOTINGS SHALL BE AT LEAST 3'-6" BELOW FINISHED GRADE. PRIOR TO PROCEEDING WITH FOOTING FORMWORK, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF BOTTOM OF EXTERIOR FOOTING ELEVATIONS WITH THE FINISH GRADES AND MAINTAINING THE 3'-6" FROST PROTECTION. WHERE SUBSURFACE PIPING PASSES THROUGH FOUNDATION WALLS, THE TOP OF FOOTINGS SHALL BE AT LEAST 8" BELOW THE INVERT ELEVATION OF THE PIPING AND CONDUITS. COORDINATE ALL INVERTS WITH MECHANICAL, PLUMBING, FIRE PROTECTION, ELECTRICAL, SITE AND SITE UTILITY DRAWINGS. PIPING OR CONDUITS SHALL NOT PASS THROUGH COLUMNS OR PIERS.

8. ALL HORIZONTAL STEEL SHOWN IN SECTIONS AND DETAILS SHALL BE CONTINUOUS, UNLESS OTHERWISE NOTED. ALL LAPS SHALL BE CLASS A@> SPLICES IN ACCORDANCE WITH ACI 318.

9. AT INTERSECTIONS OF REINFORCED CONCRETE WALLS, PROVIDE CORNER DOWELS OF SAME SIZE AND AT THE SAME SPACING AS THE SMALLER HORIZONTAL REINFORCING. DOWELS SHALL HAVE A CLASS B LAP WITH HORIZONTAL REINFORCING IN EACH DIRECTION.

10. PROVIDE DRILLED AND EPOXIED DOWELS OF SAME SIZE TO MATCH NEW REINFORCING WHERE NEW CONSTRUCTION ABUTS EXISTING CONCRETE CONSTRUCTION. LENGTH SHALL BE THE REQUIRED EMBEDMENT DEPTH PER THE ANCHOR BOLT/EPOXY MANUFACTURER PLUS A CLASS B LAP SPLICE FOR THE SIZE OF BAR.

11. PROVIDE CORROSION RESISTANT ACCESSORIES IN ALL EXPOSED CONSTRUCTION.

12. SEE ARCHITECTURAL, MECHANICAL, PLUMBING, FIRE PROTECTION, ELECTRICAL, SITE, SITE UTILITY AND EQUIPMENT DRAWINGS FOR CONCRETE PADS, SLEEVES, OPENINGS, RECESSES, AND BUILT-IN WORK IN CONCRETE ELEMENTS.

13. THE CONTRACTOR SHALL FURNISH, LOCATE AND INSTALL ALL ACCESSORIES FOR PROPER ANCHORAGE OF WOOD AND METAL FRAMING, WOOD BLOCKING, BRICK WORK AND MASONRY UNITS. THEY SHALL BE SOLELY RESPONSIBLE FOR FURNISHING, LOCATING AND ENSURING PROPER QUANTITY OF ALL FASTENING DEVICES.

14. ALL CONCRETE TO REMAIN EXPOSED TO VIEW SHALL RECEIVE A SMOOTH RUBBED FINISH (SEE SPECIFICATIONS).

15. ALL CONCRETE CORNERS WITH BOTH SIDES EXPOSED TO VIEW SHALL BE SQUARE UNLESS OTHERWISE SHOWN OR NOTED. THE EDGE SHALL BE RUBBED, PRODUCING A SMOOTH, DENSE SURFACE WITHOUT PITS OR IRREGULARITIES.

16. PROVIDE CONTINUOUS VERTICAL DOVETAIL SLOTS AT 16 INCH CENTERS HORIZONTALLY FOR ALL CONCRETE WALLS ABUTTING A MASONRY WALL OR MASONRY VENEER, UNLESS OTHERWISE NOTED.

17. PROVIDE CLEARANCE FROM EDGE OF REINFORCING TO EDGE OF CONCRETE AS FOLLOWS:

FOOTINGS (AGAINST EARTH)	3"
BEAMS (LONGITUDINAL REINFORCING)	2"
COLUMNS AND PIERS (VERTICAL REINFORCING)	2"
WALLS, EXTERIOR FACE (#5 AND SMALLER)	1 1/2"
WALLS, EXTERIOR FACE (#6 AND LARGER)	2"
SLABS (INTERIOR)	3/4"
SLABS (EXTERIOR)	1 1/2"
SLABS ON GRADE (W.W.F.)	1/3 X THK. FROM TOP SURFACE

18. PROVIDE THE FOLLOWING AT OPENINGS IN ALL CONCRETE WALLS AND FRAMED SLABS, UNLESS OTHERWISE INDICATED:
1-#5 AT EACH FACE ON EACH SIDE OF OPENING, EXTENDING 2'-0" BEYOND OPENING.

1-#5 X 4'-0" LONG AT EACH FACE DIAGONALLY AT EACH CORNER.

19. REINFORCING STEEL SHOP DRAWINGS SHALL INDICATE THE SEQUENCE IN WHICH LAYERS OF CROSSING REINFORCING SHOULD BE PLACED, IN ORDER TO PRODUCE THE CORRECT OUTERMOST LAYER AS INDICATED ON THE DRAWINGS.

20. SHOP DRAWINGS SHALL INDICATE LOCATIONS OF ALL WALL CONTROL AND CONSTRUCTION JOINTS.

21. ALL REINFORCING, THREADED RODS OR BOLTS INDICATED TO BE DRILLED AND EPOXIED SHALL UTILIZE HILTI HIT-HY200 ADHESIVE OR APPROVED EQUAL.

STRUCTURAL STEEL

MATERIALS:

STRUCTURAL STEEL ALL W SHAPES	ASTM A 36 ASTM A 992, GR.50
STRUCTURAL STEEL TUBING	ASTM A500, GRADE C
STRUCTURAL STEEL PIPE	ASTM A53, GRADE B
BOLTS	ASTM A325
ANCHOR BOLTS	ASTM F1554, GRADE 36
WELDING ELECTRODE	ASTM E 70
WELDABLE REBAR	ASTM A706, GRADE 60

1. DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION, AISC 360-10. ALL REACTIONS SHOWN ON PLAN HAVE BEEN DEVELOPED USING ALLOWABLE STRESS DESIGN.

2. WELDING SHALL CONFORM TO THE CODE FOR "ARC AND GAS WELDING IN BUILDING CONSTRUCTION" OF THE AMERICAN WELDING SOCIETY. ALL WELDING SHALL BE DONE BY A CERTIFIED WELDER.

3. ALL LOOSE BEAM LINTELS SHALL HAVE 8" MINIMUM BEARING. SEE ARCHITECTURAL JAMB DETAILS FOR LENGTHS.

4. FOR MISCELLANEOUS STEEL NOT SPECIFICALLY DETAILED ON STRUCTURAL DRAWINGS, REFER TO ARCHITECTURAL DRAWINGS.

5. CONNECTIONS:
CONNECTIONS SHALL BE MADE USING 3/4" DIAMETER ASTM A325 BOLTS (SNUG TIGHT OR SLIP CRITICAL) OR WELDS, UNLESS NOTED OTHERWISE. IF TENSION CONTROL BOLTS ARE USED, CONNECTIONS SHALL BE DESIGNED FOR SLIP CRITICAL BOLT ALLOWABLE LOAD VALUES USING CLASS A FAYING SURFACE.

USE LARGER OF 1/4" FILLET WELDS OR MINIMUM SIZE PER AISC REQUIREMENTS WHERE NO WELD SIZE IS SHOWN ON DRAWINGS.

WELDS IN EXCESS OF 24" IN LENGTH SHALL BE 3" STITCH WELDS AT 8" ON CENTERS, UNLESS SPECIFICALLY SHOWN ON DRAWINGS TO BE CONTINUOUS.

6. NO WELDING OR FINAL BOLTING SHALL BE DONE UNTIL AS MUCH OF THE STRUCTURE THAT WILL BE STIFFENED THEREBY HAS BEEN PROPERLY ALIGNED.

7. SEQUENCE OF PLACING WELDS SHALL BE SUCH AS TO AVOID DISTORTION OF MEMBERS.

8. SUBSTITUTION OF STRUCTURAL STEEL MEMBERS IS PERMITTED TO FACILITATE DELIVERY AT NO ADDITIONAL COST TO THE OWNER. SUBSTITUTED MEMBERS MUST BE OF THE SAME NOMINAL DEPTH AS THE MEMBER ORIGINALLY INDICATED AND HAVE A WEIGHT GREATER THAN THAT INDICATED. BEAM FLANGES MUST NOT INFRINGE ON ADJACENT ARCHITECTURAL ELEMENTS.

9. PROVIDE 8" X 8" X 5/8" BEARING PLATES FOR ALL WALL BEARING BEAMS UNLESS NOTED OTHERWISE. ALL PLATES SHALL HAVE A MINIMUM OF (2)-3/4" DIAMETER X 5" LONG WELDED STUDS ON THE BOTTOM TO SET IN CONCRETE OR MASONRY WALLS.

10. EXISTING STEEL SURFACES TO RECEIVE FIELD WELDS SHALL BE THOROUGHLY CLEANED UNTIL FREE FROM PAINT, RUST, GREASE, ETC.

11. PROVIDE 1/4" CLOSURE PLATES WITH FULL SEAL WELDS FOR ALL TUBE OR PIPE HOLLOW STEEL SECTIONS, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

12. PROVIDE AN ELEVATOR HOIST BEAM AT EACH ELEVATOR. THE BEAM SHALL BE A W8X21 MINIMUM. COORDINATE WITH THE ARCHITECTURAL DRAWINGS. THE BEARING PLATE ON MASONRY WALLS SHALL BE A PLATE 3/4"X6"X12" MINIMUM WITH (2)-3/4" DIAMETER ANCHOR BOLTS SET INTO GROUTED MASONRY.

13. CONTRACTOR IS RESPONSIBLE FOR PROVIDING NEW STEEL FRAMES, AS DETAILED ON THE STRUCTURAL DRAWINGS, AT ALL NEW FLOOR AND ROOF OPENINGS REQUIRED BY ARCHITECTURAL, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS IN BOTH NEW AND EXISTING STRUCTURES. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE CONTRACT DOCUMENTS AND INCLUDE THESE FRAMES IN THEIR BID PRICE. THESE NEW STEEL FRAMES FOR OPENINGS ARE IN ADDITION TO THE FRAMES SPECIFICALLY INDICATED ON THE DRAWINGS FOR SPECIFIC SUPPORT CONDITIONS.

14. CONSTRUCTION MANAGER IS RESPONSIBLE TO COORDINATE THE MECHANICAL CURB DIMENSIONS FOR MECHANICAL EQUIPMENT BETWEEN THE MECHANICAL CONTRACTOR AND STRUCTURAL STEEL FABRICATOR. THE STRUCTURAL STEEL SHALL BE LOCATED ON THE CENTERLINE OF MECHANICAL CURB.

15. STEEL CONTRACTOR SHALL PROVIDE SKETCHES FOR ALL CORRECTIVE FIELD WORK WHICH SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR APPROVAL. ALL SKETCHES SHALL BE SIGNED AND SEALED BY THE STEEL FABRICATORS CONNECTIONS ENGINEER.

16. ALL THREADED RODS OR BOLTS INDICATED TO BE DRILLED AND EPOXIED SHALL UTILIZE HILTI HIT-HY200 ADHESIVE OR APPROVED EQUAL.

METAL ROOF DECK

1. MATERIALS:
TYPICAL METAL DECK SHALL BE 3" GALVANIZED DEEP RIB TYPE WITH NESTING SIDE SEAMS OF GAGE INDICATED ON THE DRAWINGS.

2. ATTACHMENT:
METAL DECK SHALL BE POWER ACTUATED FASTENED AND SUPPORTING STEEL WITH HILTI X-EDN19 OR EQUAL SPACED NOT MORE THAN 12" ON CENTER WITH A 36/4 FASTENING PATTERN, UNLESS OTHERWISE NOTHER ON THE DRAWINGS.

SCREW METAL ROOF DECK TO STEEL MEMBER PARALLEL TO SPAN OF DECK USING HILTI X-EDN19 FASTENERS SPACE AT 12" ON CENTER. **WELDING OF THE ROOF DECK IS PROHIBITED.**

INTERMEDIATE SIDE CONNECTIONS SHALL BE MADE WITH #10 SELF TAPPING SCREWS. THE MAXIMUM SPACING OF SIDE LAP CONNECTIONS SHALL BE 1'-6" WITH A MINIMUM OF (4) SCREWS PER SPAN. FOR 3" DECK USE A MINIMUM OF (6) SCREWS PER SPAN.

3. HANGING LOADS:

IT IS ACCEPTABLE TO HANG PIPING OR CONDUIT 1" DIAMETER OR LESS FROM DECKING USING APPROVED FASTERNERS.

ALL PIPING GREATER THAN 1 IN., DUCTWORK, LIGHTING, AND FINISHES INCLUDING CEILINGS AND CEILING CLOUDS MUST BE HUNG FROM STUCTURAL FRAMING. AT LOCATIONS WHERE THE EQUIPMENT CANNOT BE HUNG DIRECTLY OFF THE STRUCTURAL FRAMING, THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SECONDARY SUPPORT SYSTEM BETWEEN THE STRUCTURAL FRAMING MEMBERS. THIS SYSTEM MUST BE ENGINEERED FOR THE EQUIPMENT WEIGHTS BEING SUPPORTED. PROVIDE SIGNED AND SEALED SHOP DRAWINGS FOR REVIEW, THAT INCLUDE THE ATTACHMENT OF THE SYSTEM TO THE SUPPORTING FRAMING.

CONCRETE MASONRY

MATERIALS:

HOLLOW LOAD BEARING UNITS: ASTM C 90
(NET AREA COMPRESSIVE STRENGTH OF CMU UNIT = 2000PSI)
MORTAR: (TYPE S) ASTM C 270
(COMPRESSIVE STRENGTH OF MASONRY ASSEMBLY, f'm = 2000 PSI)
GROUT FOR REINFORCED MASONRY: ASTM C 476
(COMPRESSIVE STRENGTH AT 28 DAYS = 2500 PSI)
GROUT FOR REINFORCED MASONRY: ASTM C 476
SOLID LOAD BEARING UNITS: (GRADE N-I) ASTM C 145
CONCRETE BRICK: (GRADE N-I) ASTM C 55

1. WALLS INDICATED ON STRUCTURAL DRAWINGS ARE FOR REFERENCE ONLY. SEE ARCHITECTURAL DRAWINGS FOR LOCATION, THICKNESS AND COMPOSITION OF MASONRY WALLS.

2. ALL MASONRY WALLS SHALL CONTAIN THE FOLLOWING REINFORCING:
1 -#5 VERTICAL BAR AT 32" ON CENTER.

2 -#6 VERTICAL BARS AT BOTH SIDES OF DOOR, WINDOW AND MECHANICAL OPENINGS.

2 -#5 HORIZONTAL BAR MINIMUM ABOVE AND BELOW ALL WINDOW AND MECHANICAL OPENINGS AND ABOVE ALL DOOR OPENINGS. PROVIDE ADDITIONAL BARS ABOVE DOORS, WINDOWS AND MECHANICAL OPENINGS AS REQUIRED IN ACCORDANCE WITH LINTEL SCHEDULE ON ARCHITECTURAL DRAWINGS.

2 -#5 HORIZONTAL AT TOP OF ALL WALLS, AT BOND BEAMS CONNECTED TO FLOORS AND ROOFS, AND AT 6' O.C. HORIZONTAL MAXIMUM.

2 -#6 VERTICAL BARS AT ENDS OF ALL WALLS, AND EACH SIDE OF CONTROL JOINTS.

STANDARD LADUR TYPE DESIGN DUR-O-WAL HORIZONTAL REINFORCING @ 16" O.C. VERTICAL. SIDE WIRE SIZE SHALL BE #9 GAGE WIRE.

3. PROVIDE VERTICAL DOWELS FROM CONCRETE WALLS INTO ALL CMU WALLS. SIZE AND SPACING OF THE DOWELS SHALL MATCH THE VERTICAL REINFORCING AS SPECIFIED IN THESE GENERAL NOTES, UNLESS OTHERWISE NOTED ON THE DRAWINGS. DOWEL LENGTHS SHALL BE THE REQUIRED CONCRETE DEVELOPMENT LENGTH PLUS THE REQUIRED BAR LAP SPLICE LENGTH FOR MASONRY AS SPECIFIED IN THESE GENERAL NOTES.

4. ALL VERTICAL WALL REINFORCING SHALL BE CONTINUOUS FOR THE FULL HEIGHT OF MASONRY WALLS, INCLUDING THROUGH CONTINUOUS MASONRY BOND BEAMS UNLESS OTHERWISE INDICATED.

5. ALL GROUTING OF MASONRY WALLS SHALL BE ASSUMED TO BE COMPLETED BY LOW LIFT GROUTING METHODS. IF THE CONTRACTOR PROPOSES TO UTILIZE HIGH LIFT GROUTING METHODS THEY SHALL SUBMIT THEIR PROPOSED HIGH LIFT GROUTING PROCEDURE FOR REVIEW PRIOR TO STARTING ANY GROUTING ON THE PROJECT SITE.

6. PROVIDE BOND BEAM OR STEEL LOOSE LINTEL ABOVE WINDOWS, DOORS AND MECHANICAL OPENINGS. IN EXISTING HOLLOW CMU WALLS, PROVIDE MINIMUM L3X3 ½ X 3/8 FOR EACH 4 INCHES OF CMU WITH A MINIMUM 8 INCHES OF BEARING.

7. BOND BEAM LINTELS SHALL BE CONSTRUCTED USING SOLID BOTTOM "U" BLOCK MASONRY UNITS.

8. CELLS CONTAINING REINFORCING BARS AND ALL CELLS BELOW GRADE SHALL BE GROUTED SOLID. ALL OTHER CELLS SHALL REMAIN HOLLOW EXCEPT WHERE NOTED. THE CONTRACTOR SHALL NOT RUN CONDUIT OR PIPE IN CELLS CONTAINING REINFORCING.

9. ALL BOLTS OR ANCHORS SHALL BE SOLIDLY EMBEDDED IN MORTAR OR GROUT. IF BOND BEAM IS NOT LOCATED AT BOLT OR ANCHOR ELEVATION, PROVIDE LATH AND FILL CELL LOCALLY TO PROVIDE SUBSTRATE FOR BOLT OR ANCHOR. GROUT CELL ABOVE ALL MASONRY ANCHORS.

10. ALL COLUMNS WITHIN SHEAR WALLS AND EXTERIOR WALLS SHALL BE SOLIDLY EMBEDDED IN GROUT.

11. GROUT SOLID MASONRY FOR FULL HEIGHT OF WALL BELOW EACH LOOSE LINTEL AND PROVIDE #4 VERTICAL IN NEW OR EXISTING CORE.

12. GROUT SOLID MASONRY FOR TWO COURSES BELOW EACH BEAM BEARING EXCEPT AS NOTED.

13. USE 1 COURSE (8") OF SOLID MASONRY OR GROUTED SOLID MASONRY BELOW EACH STEEL JOIST BEARING EXCEPT AS NOTED.

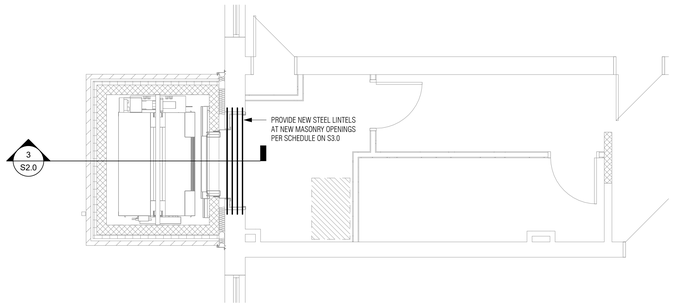
14. PROVIDE CONTINUOUS GROUTED BOND BEAM WHERE MASONRY ANCHORS CONNECT CONCRETE MASONRY TO STEEL FRAMING. GROUT CELL ABOVE ANCHOR.

15. HOLLOW UNITS SHALL BE LAID WITH FULL MORTAR COVERAGE ON HORIZONTAL AND VERTICAL FACE SHELLS, EXCEPT THAT WEBS SHALL ALSO BE BEDDED IN ALL COURSES OF BEARING AND SHEAR WALLS, PIERS, COLUMNS AND PILASTERS, AND IN THE STARTING COURSE ON FOOTINGS AND SOLID FOUNDATION WALLS, AND WHERE ADJACENT TO CELLS OR CAVITIES WHICH ARE TO BE REINFORCED AND/OR FILLED WITH GROUT.

16. MORTAR PROTRUSIONS EXTENDING INTO CELLS OR CAVITIES TO BE REINFORCED AND/OR GROUTED SHALL BE REMOVED.

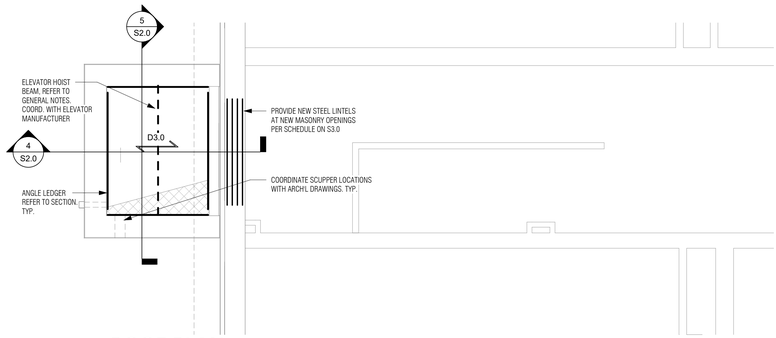
17. ALL MASONRY WALLS SHALL BE BRACED AT THE TOP WHERE MASONRY ENDS AT THE UNDERSIDE OF FLOOR OR ROOF CONSTRUCTION. REFER TO TYPICAL DETAILS.

18. IN MASONRY WALLS, NO CHASES, RISERS, CONDUITS, OR TOOTHING OF MASONR



3 THIRD FLOOR PLAN

SCALE: 1/4" = 1'-0"

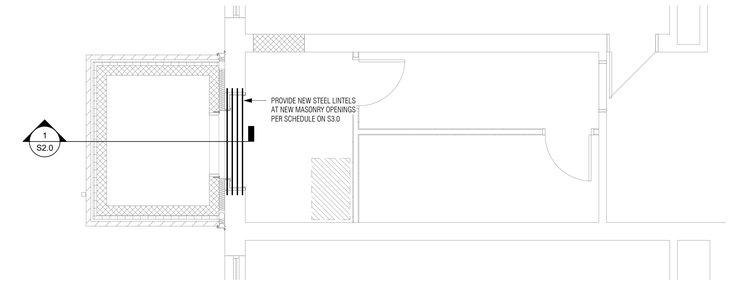


4 ROOF PLAN

SCALE: 1/4" = 1'-0"

ROOF CONSTRUCTION NOTES:

1. D3.0 INDICATES: 3.0" - 20 GAUGE DEEP RIB ROOF DECK. REFER TO GENERAL NOTES FOR FASTENING REQUIREMENTS.
2. REFER TO DRAWING S-401 FOR ALL ROOF FRAMES AT OPENINGS. COORDINATE ALL OPENING LOCATIONS WITH ARCHITECTURAL AND MECHANICAL DRAWINGS.
3. REFER TO MECHANICAL AND ARCHITECTURAL DRAWINGS FOR ALL OPENING, DRAINS AND EQUIPMENT. PROVIDE FRAMES PER TYPICAL DETAILS
4. CONTRACTOR TO FIELD VERIFY ALL EXISTING FRAMING SIZES, SPACING AND LOCATIONS PRIOR TO SUBMITTING SHOP DRAWINGS

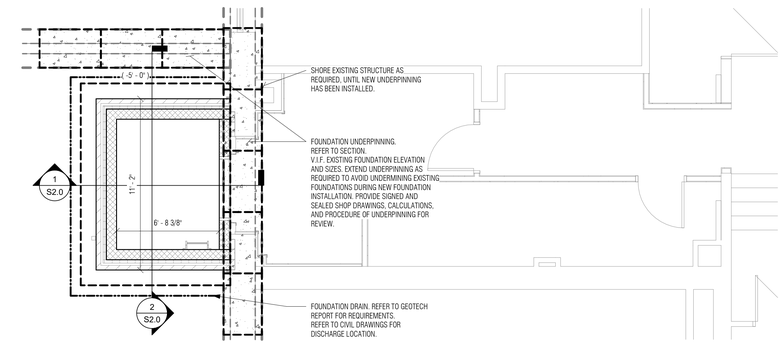


2 SECOND FLOOR PLAN

SCALE: 1/4" = 1'-0"

FLOOR FRAMING NOTES

1. CONTRACTOR TO FIELD VERIFY ALL EXISTING FRAMING SIZES, SPACING AND LOCATIONS PRIOR TO SUBMITTING SHOP DRAWINGS
2. PROVIDE NEW STEEL LINTELS AT NEW OPENINGS IN EXISTING CMU AND BRICK WALLS PER TYPICAL SCHEDULE ON S3.0.



1 FIRST FLOOR PLAN

SCALE: 1/4" = 1'-0"

FOUNDATION NOTES:

1. TOP OF FOOTING ELEVATION (X'-X") GIVEN FROM EXISTING TOP OF SLAB ON GRADE ELEVATION (0'-0"). BOTTOM OF EXISTING FOOTING ELEVATION (X'-X") GIVEN FROM DATUM ELEVATION (0'-0")
2. REFER TO GEOTECHNICAL REPORT FOR SUBGRADE PREPERATION REQUIREMENTS.
3. CONTRACTOR TO VERIFY IN FIELD ALL FOUNDATION DIMENSIONS, LOCATIONS, AND ELEVATIONS PRIOR TO SUBMITTING SHOP DRAWINGS AND BEGINNING CONSTRUCTION.

ZERO DATUM FOR ALL ELEVATIONS GIVEN ON STRUCTURAL DRAWINGS IS T/EXISTING SLAB ON GRADE = 0'-0" V.I.F.

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friar.com
860.678.1291

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MHAI
Michael Horton Associates Inc.
Consulting Structural Engineers
780 East Main Street Branford, Connecticut 06405
(203) 481-8600 www.mha-eng.com

CONSULTANT

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

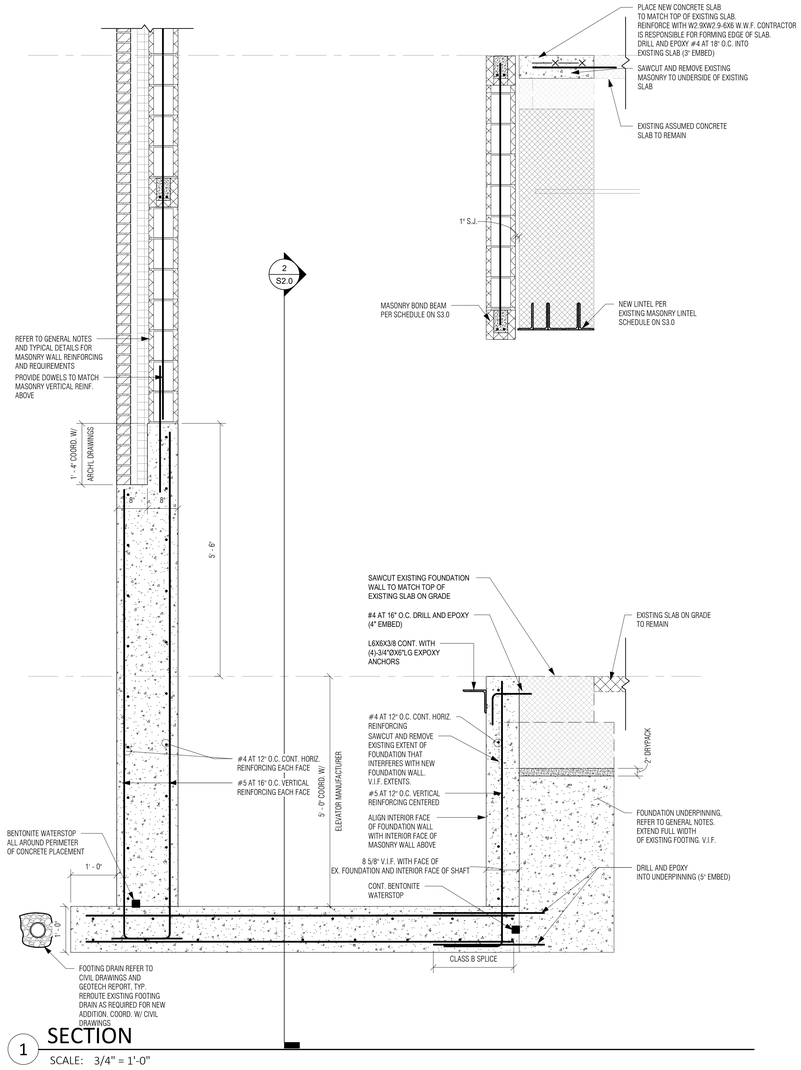
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NEW WORK FLOOR PLANS

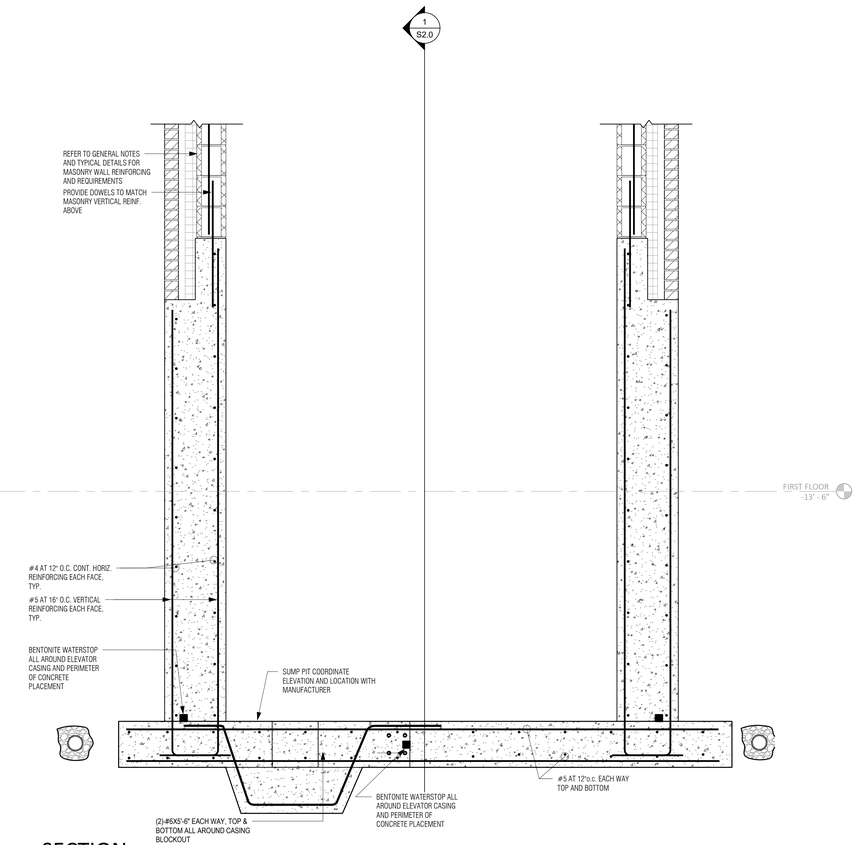
DATE: 1/15/2026
SCALE As indicated
PROJ. #: 2022_049A
DRAWN: AC
CHECKED: JS

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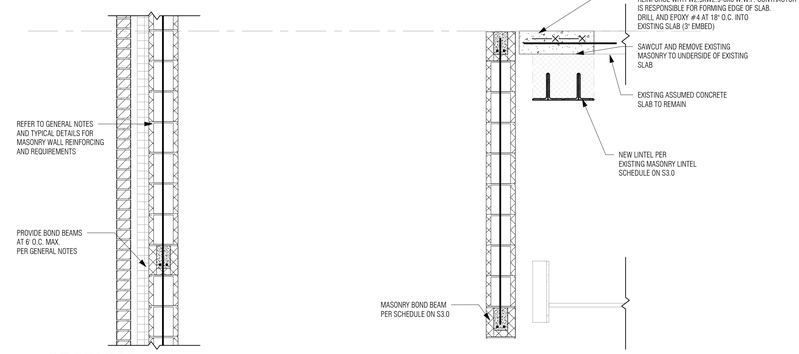
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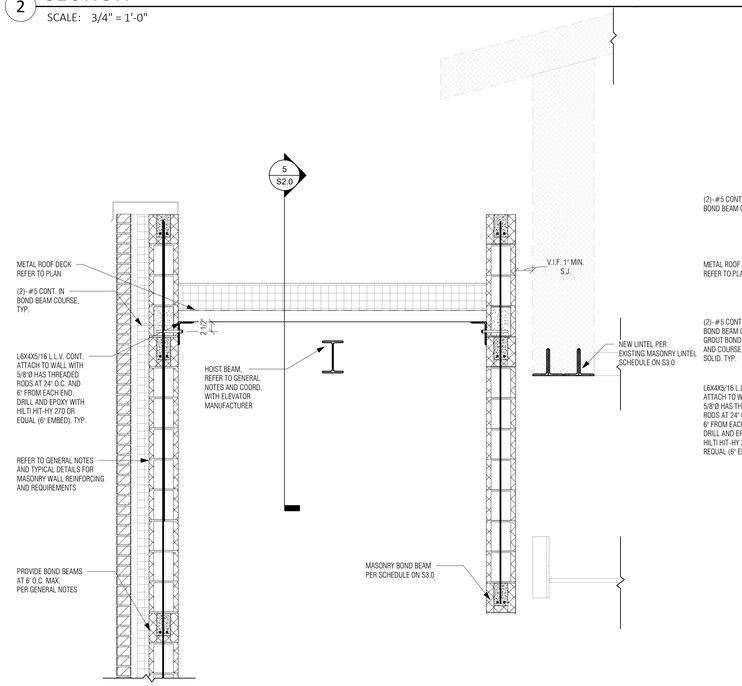
1 SECTION
SCALE: 3/4" = 1'-0"



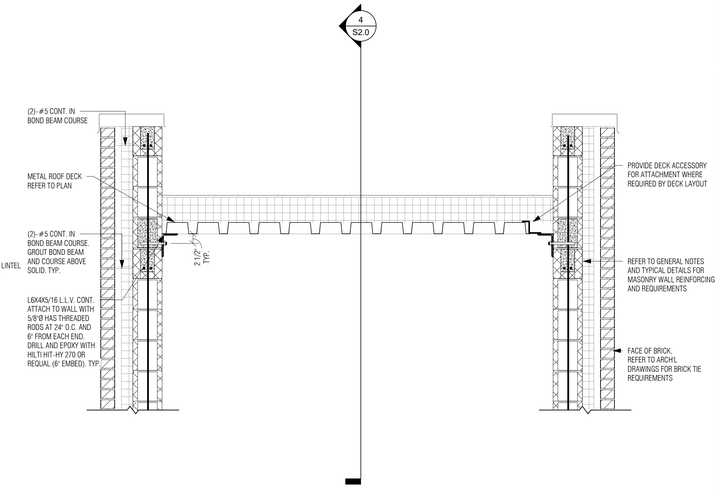
2 SECTION
SCALE: 3/4" = 1'-0"



3 SECTION
SCALE: 3/4" = 1'-0"



4 SECTION
SCALE: 3/4" = 1'-0"



5 SECTION
SCALE: 3/4" = 1'-0"

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CONSULTANT

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STATE PROJECT NUMBER
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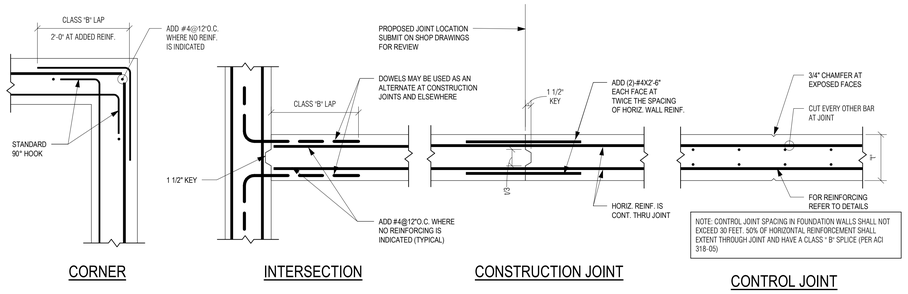
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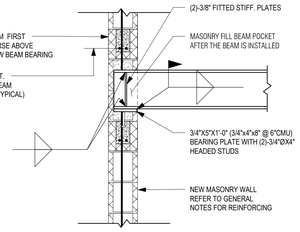
NO.	DATE	DESCRIPTION

FOUNDATION, FLOOR, AND ROOF SECTIONS

DATE:	1/15/2026
SCALE	3/4" = 1'-0"
PROJ. #:	2022_049A
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SHEET NO.
S2.0





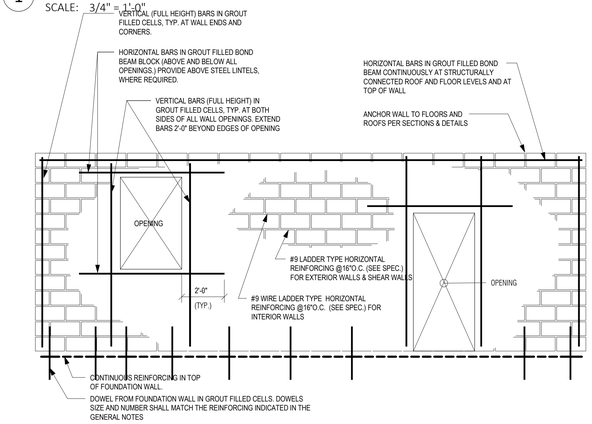
LAP SCHEDULE		
SIZE	4500 PSI	
	TOP	OTHERS
#3	24"	19"
#4	32"	25"
#5	40"	31"
#6	48"	37"
#7	70"	54"
#8	80"	62"
#9	91"	70"

MASONRY LINTEL SCHEDULE_			
MARK	CMU	OPENING WIDTH	LINTEL
	10" & 12" BLOCK	6'-1" TO 12'-0"	(2)-#6 CONT. TOP AND BOTTOM
	10" & 12" BLOCK	UP TO 6'-0"	(2)-#5 CONT.
	8" BLOCK	UP TO 5'-0"	(2)-#5 CONT.
	8" BLOCK	5'-1" TO 10'-0"	(2)-#6 CONT. TOP AND BOTTOM
	6" BLOCK	UP TO 6'-0"	(1)-#5 CONT.
	INTERIOR 4" MASONRY	UP TO 6'-0"	L5X3 1/2X5/16 (4" MIN. BEARING)
	INTERIOR 4" MASONRY	6'-0" TO 10'-0"	L7X4X3/8 (4" MIN. BEARING)

NOTE:
1. PROVIDE LINTELS WHERE NEEDED. NOT SHOWN ON THE DRAWINGS
2. ALL EXTERIOR STEEL SHALL BE HOT DIPPED GALVANIZED
3. COORDINATE ALL OPENINGS WITH ARCHT & MECH DRAWINGS.
4. GROUT ALL JAMBS SOLID PER TYPICAL CMU WALL REINF. DETAILS.

1 TYPICAL WALL REINFORCING DETAIL

SCALE: 3/4" = 1'-0"



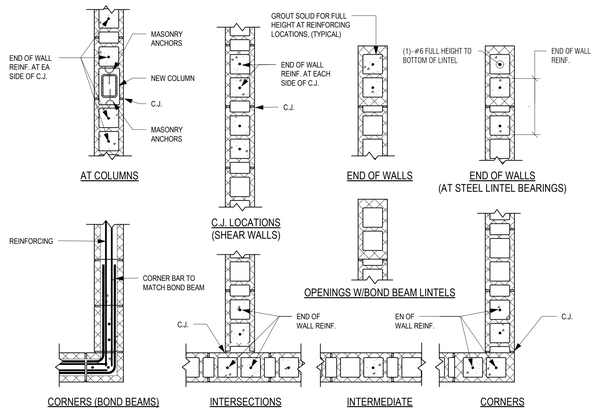
NOTE: REFER TO CONCRETE MASONRY GENERAL NOTES ON DRAWING FOR WALL REINFORCING REQUIREMENTS.

2 TYPICAL BEAM BEARING PLATE AT NEW CMU

SCALE: 3/4" = 1'-0"

EXISTING MASONRY LINTEL SCHEDULE			
MARK	CMU	OPENING WIDTH	LINTEL
	EXISTING 20" ASSEMBLY	UP TO 9'-6"	(5)-L7X4X3/8 L.L.V. (MIN. 8" BEARING)
	EXISTING 16" ASSEMBLY	UP TO 9'-6"	(4)-L7X4X3/8 L.L.V. (MIN. 8" BEARING)
	EXISTING 12" BLOCK	UP TO 9'-6"	(3)-L7X4X3/8 L.L.V. (MIN. 8" BEARING)
	EXISTING 8" BLOCK	UP TO 9'-6"	(2)-L7X4X3/8 L.L.V. (MIN. 8" BEARING)
	EXISTING INTERIOR 4" MASONRY	UP TO 6'-0"	L5X3 1/2X5/16 (4" MIN. BEARING)
	EXISTING INTERIOR 4" MASONRY	6'-0" TO 10'-0"	L7X4X3/8 (4" MIN. BEARING)

NOTE:
1. PROVIDE LINTELS WHERE NEEDED. NOT SHOWN ON THE DRAWINGS
2. ALL EXTERIOR STEEL SHALL BE HOT DIPPED GALVANIZED
3. COORDINATE ALL OPENINGS WITH ARCHT & MECH DRAWINGS.
4. GROUT CORES SOLID BELOW LINTEL BEARING FULL HEIGHT TO UNDERSIDE OF LINTEL.
5. LINTELS FOR EXISTING 8" AND 12" CMU WERE DESIGNED BASED ON A BEARING WALL SUPPORTING 15' OF ROOF, WITH 8' OF CMU ABOVE LINTEL. CONTRACTOR TO CONTACT STRUCTURAL ENGINEER, MICHAEL HORTON ASSOCIATES, INC. FOR ALL FIELD CONDITIONS WITH BEARING WALLS SUPPORTING MORE THAN 15' OF ROOF ABOVE AND ALL OPENINGS LARGER THAN THOSE IN THE LINTEL SCHEDULE.



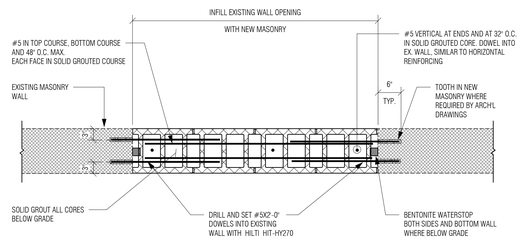
NOTES:
1. REINFORCING DETAILS APPLY TO ALL CMU WALLS. FOR ACTUAL REINFORCING REQUIREMENTS, REFER TO GENERAL NOTES ON DRAWINGS
2. PROVIDE DOWELS FROM CONCRETE FOUNDATIONS TO CMU WALL ABOVE. SIZE AND NUMBER TO MATCH WALL REINFORCING.

3 TYPICAL CMU WALL REINFORCEMENT DETAIL

SCALE: 3/4" = 1'-0"

4 TYPICAL CMU REINFORCING PLAN DETAILS

SCALE: 3/4" = 1'-0"



5 TYPICAL MASONRY WALL INFILL

SCALE: 3/4" = 1'-0"

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NO.	DATE	DESCRIPTION

TYPICAL DETAILS

DATE:	1/15/2026
SCALE	3/4" = 1'-0"
PROJ. #:	2022_049A
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CHECKED:	JS

SHEET NO.

S3.0

ELECTRICAL ABBREVIATIONS

A/AMP	AMPERE
AC	ALTERNATING CURRENT
AFCI	ARC FAULT CIRCUIT INTERRUPTER
ACU	AIR CONDITIONING UNIT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	AMPS INTERRUPTING CURRENT
AL	ALUMINUM
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BSMT	BASEMENT
C	CONDUIT
CATV	CABLE TELEVISION
CB	CIRCUIT BREAKER
CKT	CIRCUIT
COMP	COMPRESSOR
CP	CONDENSATE PUMP
CT	CURRENT TRANSFORMER
CU	CONDENSING UNIT OR COPPER
CUH	CABINET UNIT HEATER
D	DRYER
DEG.	DEGREE
DIA	DIAMETER
DN	DOWN
DWG	DRAWING
EF	EXHAUST FAN
ELEC	ELECTRICAL
ELEV	ELEVATOR
EM	EMERGENCY
EMT	ELECTRIC METALLIC TUBING
EP	EMERGENCY PANEL
EUH	ELECTRIC UNIT HEATER
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
F	FAHRENHEIT
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FC	FOOT CANDLE
FCU	FAN COIL UNIT
G	GROUND
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
HP	HORSE POWER
HPS	HIGH PRESSURE SODIUM
HR	HOUR
HZ	HERTZ
IG	ISOLATED GROUND
IN	INCHES
JB	JUNCTION BOX
KCMIL	THOUSAND CIRCULAR MILS
KVA	KILOVOLT AMPERE
KW	KILOWATT
MAX	MAXIMUM
MAU	MAKE-UP AIR UNIT
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCCB	MOLDED CASE CIRCUIT BREAKER
MH	METAL HALIDE OR MANHOLE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
NA	NOT APPLICABLE
NEC	NATIONAL ELECTRIC CODE
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
P	POLE
PE	PRIMARY ELECTRIC SERVICE
PF	POWER FACTOR
PH	PHASE
PNL	PANEL
PVC	POLYVINYL CHLORIDE CONDUIT
REF	REFRIGERATOR
RGS	RIGID GALVANIZED STEEL CONDUIT
RM	ROOM
RTU	ROOFTOP UNIT
SE	SECONDARY ELECTRICAL SERVICE
SPEC	SPECIFICATION
SWBD	SWITCHBOARD
SPD	SURGE PROTECTION DEVICE
TELE	TELECOMMUNICATIONS/TELEPHONE
TV	TELEVISION
T/TX	TRANSFORMER
TYP	TYPICAL
UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
V	VOLTS
VA	VOLT AMPERE
VAC	VOLTS ALTERNATING CURRENT
VIF	VERIFY IN FIELD
W	WATT OR WIRE
WA	WASHER
WG	WIRE GUARD
WP	WEATHERPROOF

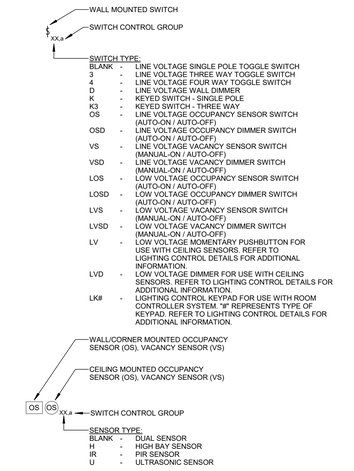
PHASED WORK ABBREVIATIONS

EX	EXISTING TO REMAIN
RL	EXISTING TO BE RELOCATED
RE	EXISTING TO BE REMOVED
RD	NEW LOCATION OF RELOCATED DEVICE
RN	REMOVE AND REPLACE WITH NEW

FIRE ALARM LEGEND

SYMBOL	DESCRIPTION
EQUIPMENT	
EAS	EMERGENCY 2-WAY COMMUNICATION SYSTEM AREA CALL STATION. REFER TO 2-WAY COMMUNICATION SYSTEM WIRING DIAGRAM FOR ADDITIONAL INFORMATION.
EMS	EMERGENCY 2-WAY COMMUNICATION SYSTEM MASTER STATION. REFER TO 2-WAY COMMUNICATION SYSTEM WIRING DIAGRAM FOR ADDITIONAL INFORMATION.
FACP	FIRE ALARM CONTROL PANEL
INITIATING DEVICES	
S	CEILING MOUNTED SMOKE DETECTOR
(S)	CEILING MOUNTED SMOKE DETECTOR WIRED TO ELEVATOR RECALL SYSTEM
H	CEILING MOUNTED HEAT DETECTOR WITH TEMPERATURE RATING OF 135 DEGREES UNLESS OTHERWISE NOTED
(H)	HEAT DETECTOR FOR ELEVATOR RECALL CONTROLS
NOTIFICATION	
XX	WALL MOUNTED COMBINATION SPEAKER / STROBE LIGHT WITH A MULTI-CANDELA STROBE. MOUNT AT 6'-8" AFF. WG= PROVIDE WITH WIREGUARD. "XX"=CANDELA RATING
XX	WALL MOUNTED STROBE-ONLY UNIT WITH A MULTI-CANDELA STROBE. MOUNT AT 6'-8" AFF. WG= PROVIDE WITH WIREGUARD. "XX"=CANDELA RATING
INTERFACE MODULES	
MM	FIRE ALARM MONITOR MODULE
CM	FIRE ALARM CONTROL MODULE
RM	FIRE ALARM RELAY MODULE

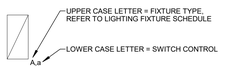
LIGHTING SWITCH AND SENSOR TAGS



NOTES:

1. FIXTURE(S) SHALL BE CONTROLLED BY SWITCH OR RELAY LOCATED IN THE ROOM UNLESS OTHERWISE NOTED ON PLAN.
2. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION ON WIRING AND SWITCHING.
3. WALL MOUNTED SWITCHES SHALL BE MOUNTED AT 42" AFF UNLESS OTHERWISE NOTED. COORDINATE WITH ARCHITECT.
4. SET ALL OCCUPANCY TYPE SENSORS TO AUTO-ON, AUTO-OFF MODE. SET ALL VACANCY TYPE SENSORS TO MANUAL-ON, AUTO-OFF MODE.
5. REFER TO CONTROL SCHEME NOTES AND CONTROL SCHEDULE FOR ADDITIONAL INFORMATION.
6. REFER TO SYMBOL LIST FOR ADDITIONAL LIGHTING CONTROL DEVICES.
7. WHERE SWITCHES ARE NOT TAGGED WITH CONTROL LETTER ON PLANS, ALL FIXTURES IN ASSOCIATED ROOM SHALL BE CONTROLLED SIMULTANEOUSLY VIA CONTROLS SPECIFIED.

LIGHTING FIXTURE TAGS



NOTES

1. FIXTURE CONTROL DESIGNATION REFERS TO ZONE/SWITCH/RELAY CONTROL OF FIXTURES CONTROLLED BY COMMON:
   A. SWITCH FOR LIGHTING IN ROOM, CORRIDOR, OPEN AREA.
   B. ZONE RELAY IN LOCAL LIGHTING CONTROL PANEL OR LIGHTING CONTROL RELAY PANEL.
   C. ALL CONTROL DEVICES (SWITCHES, CONTROL PANELS, OCCUPANCY/VACANCY SENSORS..ETC) WITH CONTROL DESIGNATIONS REFERS TO COMMON CONTROL OF THE SAME ZONE/SWITCH/RELAY CONTROL.
2. WHERE CONTROL DESIGNATION IS NOT SHOWN, ALL FIXTURES IN ASSOCIATED ROOM OR SPACE SHALL BE CONTROLLED SIMULTANEOUSLY VIA THE CONTROL DEVICES INDICATED ON PLANS.
3. WHERE EMERGENCY AND NORMAL FIXTURES ARE CONTROLLED FROM THE SAME ZONE/SWITCH/CONTROL RELAY, UL 924 EMERGENCY BYPASS RELAYS SHOWN WITH SAME CONTROL DESIGNATION BYPASS THAT ZONE/SWITCH/CONTROL RELAY. REFER TO EMERGENCY LIGHTING CIRCUIT SCHEMATICS FOR ADDITIONAL WIRING INFORMATION.
4. UNSWITCHED LIGHTING BRANCH CIRCUIT WIRING IS SHOWN TO A SINGLE FIXTURE IN EACH COMMON CONTROL ZONE. UNLESS OTHERWISE INDICATED, PROVIDE 2#12,#12G,3/4"C FOR SWITCHED WIRING TO ALL COMMON CONTROL FIXTURES.
5. PROVIDE LOW VOLTAGE DIMMING CONTROL WIRING AS INDICATED IN LIGHTING CONTROL DETAILS FOR DIMMABLE LIGHT FIXTURES IN COMMON CONTROL ZONES/SWITCHES/RELAY CONTROL.
6. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL WIRING AND CONTROL INFORMATION.
7. REFER TO LIGHTING CONTROL RELAY PANEL SCHEDULES WHERE APPLICABLE FOR ADDITIONAL CONTROL INFORMATION.

ELECTRICAL SYMBOLS

SYMBOL	DESCRIPTION
	SURFACE MOUNTED PANELBOARD
	RECESSED PANELBOARD
J	DISCONNECT SWITCH
J	FUSED DISCONNECT SWITCH
J	COMBINATION STARTER AND DISCONNECT SWITCH
	MOTOR STARTER OR CONTACTOR
S M	MANUAL MOTOR STARTER
M	MOTOR (REFER TO MOTOR CIRCUIT SCHEDULE FOR POWER REQUIREMENTS)
T	TRANSFORMER
SPD	SURGE PROTECTIVE DEVICE
VFD	VARIABLE FREQUENCY DRIVE
	BRANCH CIRCUIT WIRING, CONCEALED IN WALLS OR CEILINGS
	HOMERUN TO PANELBOARD
	SWITCHED BRANCH CIRCUIT WIRING
J J	JUNCTION BOX
	SIMPLEX WALL MOUNTED RECEPTACLE, 18" AFF UNLESS OTHERWISE NOTED
	DUPLEX WALL MOUNTED RECEPTACLE, 18" AFF UNLESS OTHERWISE NOTED
XX"	DUPLEX WALL MOUNTED RECEPTACLE MOUNTED AT XX" ABOVE FINISHED FLOOR
MECH	DUPLEX GFCI-TYPE WALL MOUNTED RECEPTACLE FOR MECHANICAL AND UTILITY ROOMS. MOUNT 48" ABOVE FINISHED FLOOR
	DOUBLE DUPLEX WALL MOUNTED RECEPTACLE, 18" AFF UNLESS OTHERWISE NOTED
a a	RECEPTACLE, MOUNT 6" ABOVE COUNTER OR CASEWORK
GFI GFI	RECEPTACLE WITH GROUND FAULT CIRCUIT INTERRUPTION
WP WP	RECEPTACLE WITH WEATHERPROOF COVER
	SPECIAL PURPOSE HARDWIRED CONNECTION: WIRING AS INDICATED
CR	CARD READER INFRASTRUCTURE FOR ELEVATOR. PROVIDE COMPATIBLE SINGLE GANG BOX WITH MUD RING @ 42" AFF WITH 3/4"C STUBBED ABOVE AN ACCESSIBLE CEILING. CONTRACTOR SHALL ENGAGE CITY'S SECURITY VENDOR AS A SUB-CONTRACTOR FOR INSTALLING A COMPLETE SYSTEM THAT MEETS THE CITY'S CURRENT STANDARDS AND ALIGNS WITH THE EXISTING ACCESS CONTROL SYSTEM IN THE BUILDING. CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE REQUIRED WIRING INTERCONNECTIONS AND INTEGRATION WITH THE ELEVATOR CONTROLLER AND EXISTING BUILDING ACCESS CONTROL SYSTEM. COORDINATE EXACT LOCATION OF CARD READER WITH ARCHITECT AND OWNER PRIOR TO ROUGH-IN.
PA	PUBLIC ADDRESS SYSTEM SPEAKER, WALL MOUNTED.
PA	PUBLIC ADDRESS TALKBACK SWITCH
	DATA OUTLET
VES	VIDEO INTERCOM DOOR STATION. PROVIDE MANUFACTURER RECOMMENDED BACKBOX AT 42" AFF WITH 3/4"C STUBBED ABOVE AN ACCESSIBLE CEILING. COORDINATE MOUNTING HEIGHT AND LOCATION WITH ARCHITECT. REFER TO INTERCOM SYSTEM DETAIL FOR ADDITIONAL INFORMATION.
VMS	VIDEO INTERCOM MASTER STATION. PROVIDE MANUFACTURER RECOMMENDED BACKBOX OR DESK STAND WITH 3/4"C STUBBED ABOVE AN ACCESSIBLE CEILING. COORDINATE LOCATION WITH ARCHITECT. REFER TO INTERCOM SYSTEM DETAIL FOR ADDITIONAL INFORMATION.

LIGHTING SYMBOLS

SYMBOL	DESCRIPTION
	EXTERIOR BUILDING MOUNTED LIGHTING FIXTURE
	EXTERIOR BUILDING MOUNTED EMERGENCY LIGHTING FIXTURE
	RECESSED LIGHTING FIXTURE
	RECESSED EMERGENCY LIGHTING FIXTURE
	INDUSTRIAL OR STRIP TYPE FIXTURE
	RECESSED DOWNLIGHT FIXTURE
	RECESSED DOWNLIGHT EMERGENCY FIXTURE
	WALL MOUNTED LIGHTING FIXTURE
	WALL MOUNTED EMERGENCY LIGHTING FIXTURE
	WALL MOUNTED EXIT SIGN, DOUBLE FACED
	WALL MOUNTED EXIT SIGN
	CEILING MOUNTED EXIT SIGN
NLC	NORMAL LIGHTING CONTROLLER FOR LOW-VOLTAGE CONTROL SYSTEM. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION.
PP	POWER PACK FOR STANDALONE CONTROLS. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION.

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Farmington, CT 06032
friar.com
860.678.1291

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MICHAEL T. BOUCHARD
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PROFESSIONAL ENGINEER

PROFESSIONAL SEAL

CES
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811 Middle Street
Middletown CT 06457
860.632.1682
ceseng.com
CES #2025564.00

CONSULTANT

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER

151-0315 LUE

REVISIONS

NO.	DATE	DESCRIPTION

ELECTRICAL ABBREVIATIONS, NOTES AND SYMBOLS

DATE: 1/15/2026
SCALE NTS
PROJ. #: 2022_049A
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CHECKED: MFC

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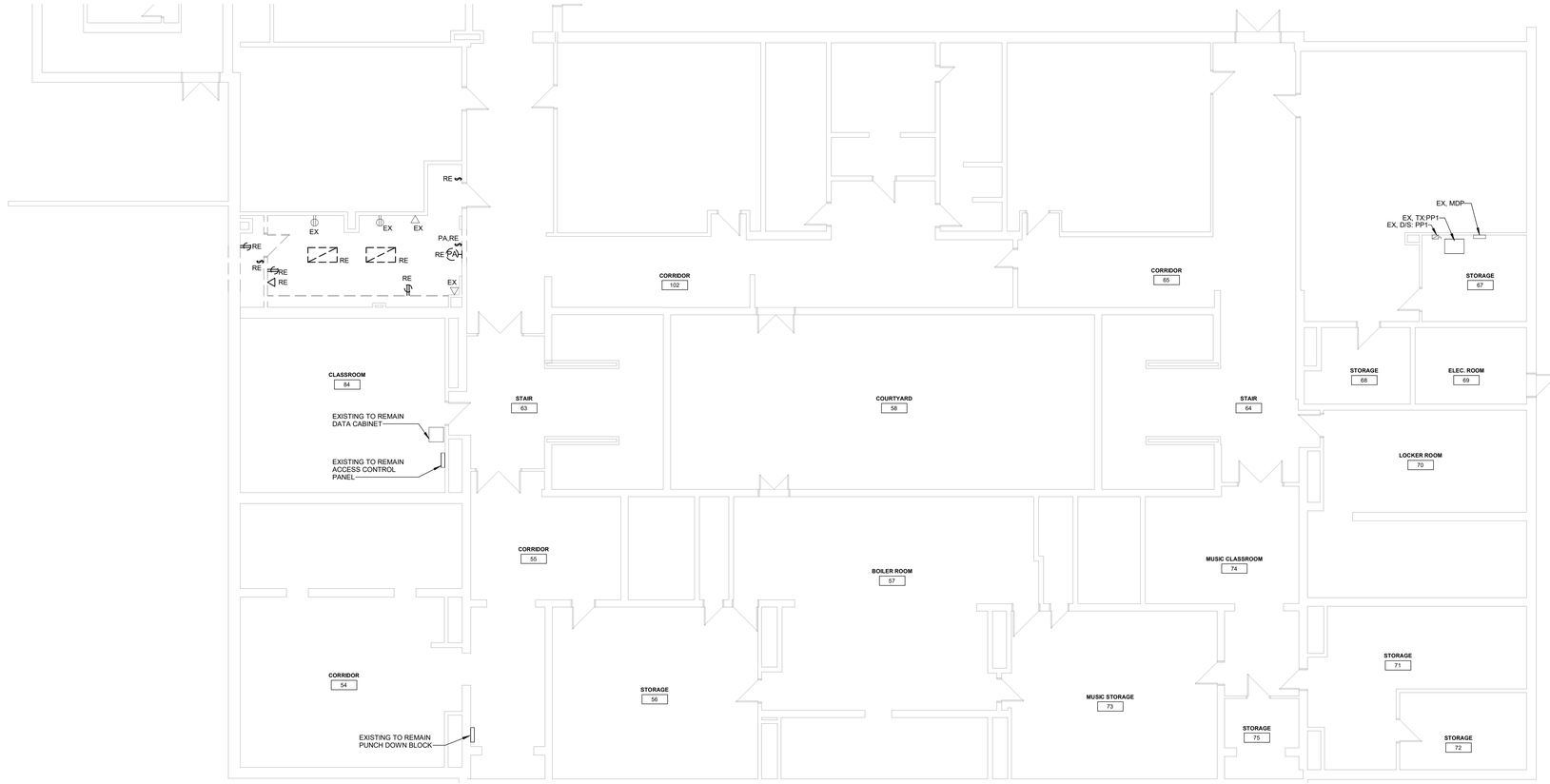
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ELECTRICAL DEMOLITION NOTES

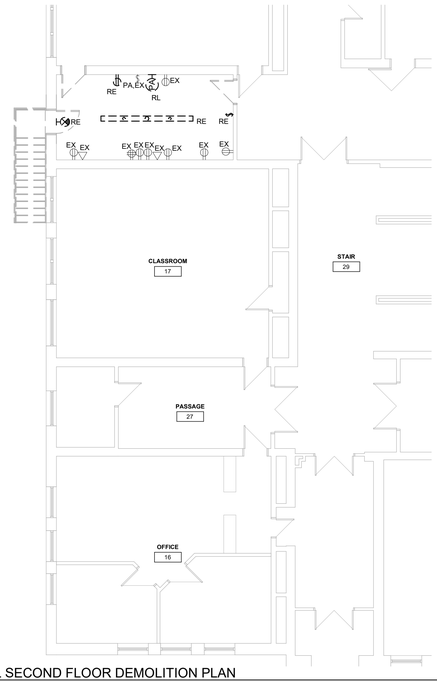
1. ELECTRICAL DEMOLITION PLANS ARE DIAGRAMMATIC AND NOT INTENDED TO DEPICT THE ENTIRE SCOPE OF ELECTRICAL DEMOLITION. CONTRACTOR SHALL FIELD VERIFY THE LOCATION OF EXISTING DEVICES. ADDITIONAL DEMOLITION AND MODIFICATION WORK NOT SHOWN SHOULD BE ANTICIPATED.
2. REFER TO DRAWING E0.0 FOR SYMBOL LIST AND OTHER ABBREVIATIONS.
3. DEMOLITION OF EXISTING TELECOMMUNICATIONS DEVICES SHALL INCLUDE REMOVAL OF CONNECTORS, FACEPLATE, BACKBOX, CONDUIT AND WIRING BACK TO SOURCE.
4. DEMOLITION OF EXISTING LIGHTING FIXTURES SHALL ALSO INCLUDE REMOVAL OF ASSOCIATED SWITCHES AND SWITCHED WIRING UNLESS OTHERWISE NOTED IN NEW WORK PLANS. LOCATIONS OF ALL SWITCHES SHALL BE FIELD VERIFIED PRIOR TO DEMOLITION.
5. REFER TO MECHANICAL/PLUMBING DEMOLITION DRAWINGS FOR EXISTING MECHANICAL AND PLUMBING EQUIPMENT TO BE REMOVED. FOR THIS EQUIPMENT, DISCONNECT AND REMOVE WIRING BACK TO SOURCE AND REMOVE ASSOCIATED STARTERS, DRIVES AND DISCONNECT SWITCHES AT EQUIPMENT LOCATIONS.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSAL OF ALL ITEMS TO BE REMOVED IN A SAFE, LEGAL AND RESPONSIBLE MANNER.
7. CONTRACTOR SHALL MODIFY EXISTING CIRCUITS, WHEN EXISTING DEVICES ARE REMOVED, AS REQUIRED TO MAINTAIN CIRCUIT CONTINUITY.
8. PRIOR TO SUBMITTING BID, VISIT SITE AND IDENTIFY EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT WORK TO BE PERFORMED. NO COMPENSATION WILL BE GRANTED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY IDENTIFIED BY EXPERIENCED OBSERVERS. INCLUDE IN THE BID ALL DEMOLITION WORK REQUIRED.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR STORAGE AND HANDLING OF EXISTING TO BE RELOCATED EQUIPMENT AND DEVICES.
10. EXISTING FIRE ALARM SYSTEM SHALL BE MODIFIED IN AREA OF WORK AND BE MAINTAINED OUTSIDE OF AREA OF WORK. MAINTAIN OPERATION OF THE EXISTING FIRE ALARM SYSTEM DURING DEMOLITION. DEVICES ARE TO BE REMOVED BACK TO NEXT DEVICE OUTSIDE THE AREA OF WORK. EXTEND CIRCUITS WITH WIRING TO MATCH EXISTING CLASS AND STYLE TO MAINTAIN CONTINUITY OF CIRCUITS UPSTREAM AND DOWNSTREAM OF THE WORK AFFECTED BY DEMOLITION. PROTECT EXISTING DEVICES DURING CONSTRUCTION. TAKE DEVICES OFF-LINE IF NECESSARY. COORDINATE BYPASSING AND REACTIVATION OF THESE DEVICES WITH OWNER. PROVIDE TESTING AND REPROGRAMMING OF SYSTEM, AND COORDINATE ACCEPTANCE TESTING WITH THE LOCAL AHJ.
11. PANELBOARDS THAT ARE EXISTING TO REMAIN SHALL HAVE THEIR DIRECTORY UPDATED TO INDICATE CIRCUITS THAT ARE EXISTING TO REMAIN. CIRCUITS THAT HAVE BEEN REMOVED AS PART OF DEMOLITION SHALL BE INDICATED IN THE REVISED DIRECTORY AS SPARES.

KEYNOTES - ELECTRICAL DEMOLITION

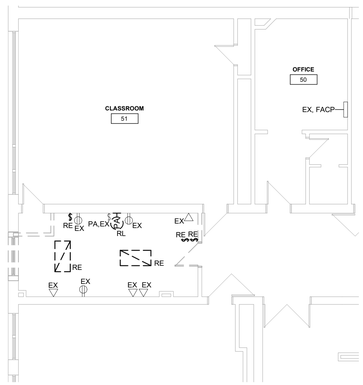
Key Value	Keynote Text



1 ELECTRICAL FIRST FLOOR DEMOLITION PLAN
1/8" = 1'-0"



2 ELECTRICAL SECOND FLOOR DEMOLITION PLAN
1/8" = 1'-0"



3 ELECTRICAL THIRD FLOOR DEMOLITION PLAN
1/8" = 1'-0"

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MICHAEL T. BOUCHARD
31062
LICENSED
PROFESSIONAL ENGINEER

PROFESSIONAL SEAL

CES
Consulting Engineering Services, Inc.
811 Middle Street
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860.632.1682
ceseng.com
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CONSULTANT

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

NO.	DATE	DESCRIPTION

ELECTRICAL DEMOLITION PLANS

DATE:	1/15/2026
SCALE	As indicated
PROJ. #:	2022_049A
DRAWN:	CALO
CHECKED:	MFC

SHEET NO.

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ELECTRICAL POWER NOTES

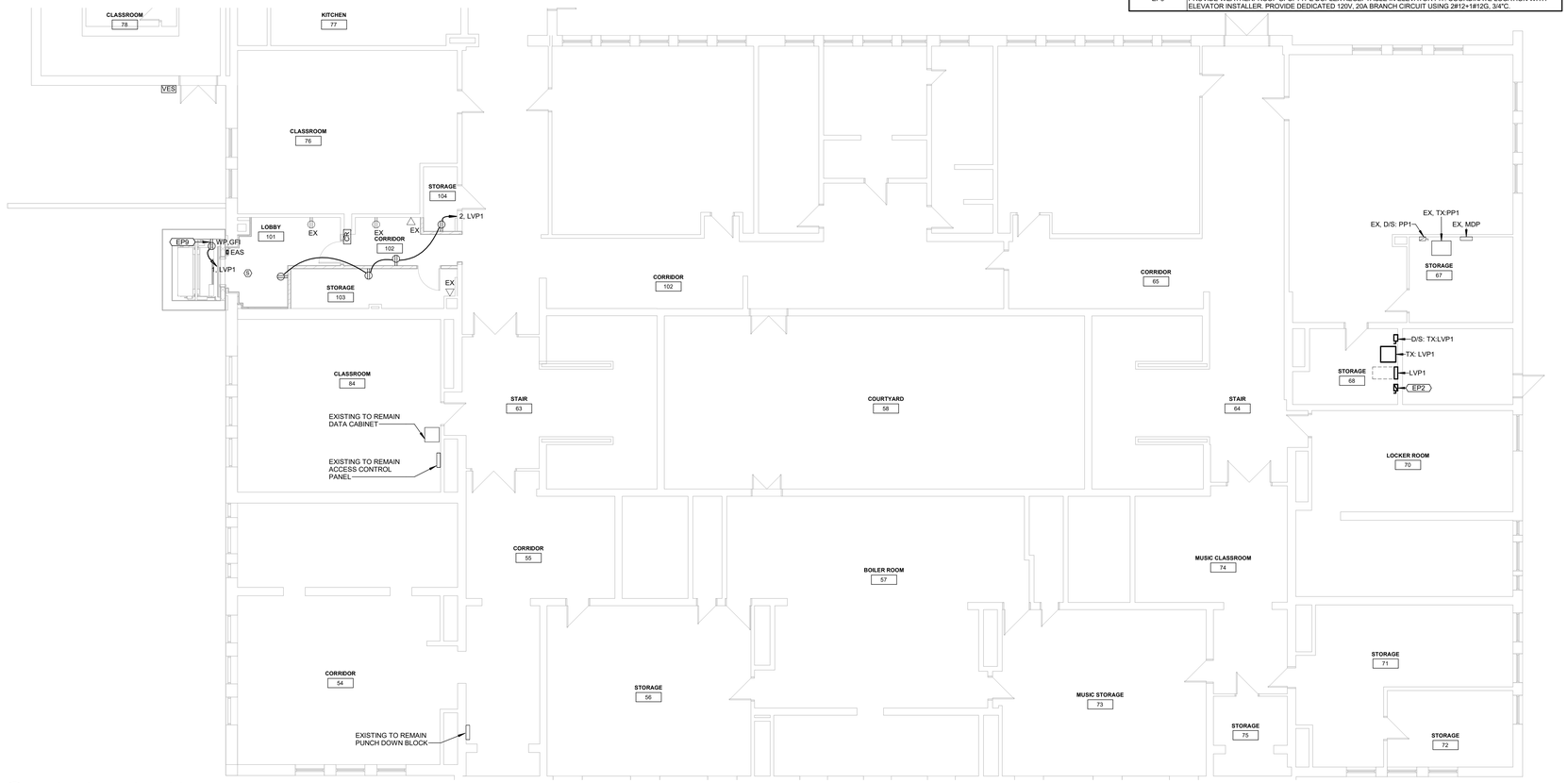
1. REFER TO DRAWING **E6.0** FOR MOTOR/ EQUIPMENT CIRCUIT SCHEDULE.
2. RECEPTACLES LOCATED WITHIN 6' FROM WATER SOURCES SHALL BE GFCI TYPE.
3. 15A AND 20A, 120V AND 250V NON-LOCKING TYPE RECEPTACLES MOUNTED BELOW 5'-6" AFF SHALL BE LISTED TAMPER-RESISTANT TYPE IN ACCORDANCE WITH NEC 406.12.

ELECTRICAL GENERAL NOTES

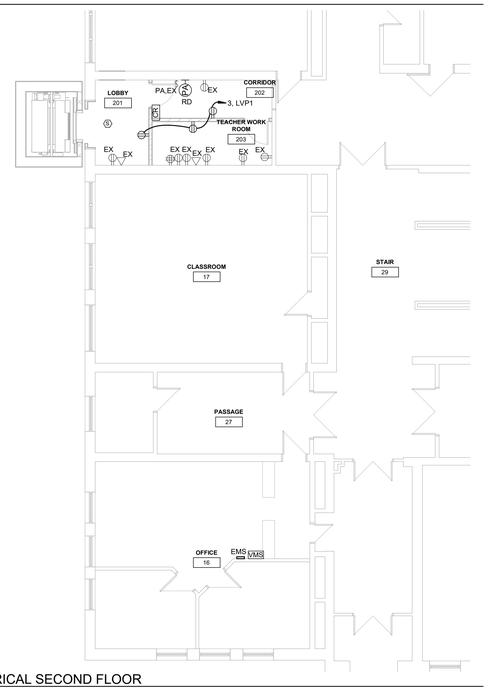
1. BRANCH CIRCUITS AND FEEDER CIRCUITS SHALL BE CONCEALED IN WALLS AND ABOVE CEILINGS WHERE POSSIBLE. INCLUDING HOMERUNS TO PANELBOARDS. BRANCH CIRCUITS AND FEEDERS SHALL NOT BE ROUTED IN OR UNDER SLAB UNLESS SPECIFICALLY INDICATED ON ELECTRICAL FLOOR PLANS OR DETAILS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. BRANCH CIRCUITS SHALL BE 2#12,#12G.,3/4"C., TO NEW 20A/1P CIRCUIT BREAKER IN PANEL INDICATED UNLESS NOTED OTHERWISE.
3. 120V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 100' IN LENGTH SHALL BE 2#10,#10G., 3/4"C. UNLESS NOTED OTHERWISE.
4. 120V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 165' IN LENGTH SHALL BE 2#8,#10G., 3/4"C. UNLESS NOTED OTHERWISE.
5. 277V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 250' IN LENGTH SHALL BE 2#10,#10G., 3/4"C. UNLESS NOTED OTHERWISE.
6. DEVICES SHALL BE LABELED WITH SOURCE PANEL AND CIRCUIT NUMBER(S).
7. REFER TO ARCHITECTS REFLECTED CEILING PLAN FOR EXACT LOCATION OF CEILING MOUNTED ELECTRICAL DEVICES. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION OF WALL MOUNTED ELECTRICAL DEVICES.
8. PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF PENETRATIONS THROUGH FIRE WALLS OR SMOKE BARRIERS AS REQUIRED. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALLS.
9. COORDINATE LOCATIONS OF ELECTRICAL DEVICES AND CONTROLS WITH RESPECT TO LOCATIONS OF CASEWORK AND EQUIPMENT PRIOR TO ROUGH-IN.
10. WHEN DEVICES ARE SHOWN ON PLANS OFFSET FROM ONE ANOTHER, DEVICES SHALL BE MOUNTED IN LINE, CENTERED ON WALL.
11. SHARED NEUTRAL WIRING IS NOT ACCEPTABLE, UNLESS NOTED OTHERWISE ON DRAWINGS. PROVIDE A DEDICATED NEUTRAL WIRE FOR EACH CIRCUIT, WHERE APPLICABLE.
12. DRAWINGS ARE DIAGRAMMATIC ONLY. DO NOT SCALE ELECTRICAL DRAWINGS. FIELD CONDITIONS AND ARCHITECTURAL ELEVATIONS AND DIMENSIONS SHALL GOVERN EXACT LOCATION AND MOUNTING HEIGHTS OF ELECTRICAL DEVICES AND RACEWAYS.
13. FINISHES AND COLOR OF ELECTRICAL WIRING DEVICES, EXPOSED RACEWAY, LIGHT FIXTURES, AND OTHER ELECTRICAL DEVICES SHALL BE DETERMINED BY THE ARCHITECT.
14. ELECTRICAL WORK SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE (OTHER THAN ROOF DECK).
15. THE ELECTRICAL CONTRACTOR SHALL PERFORM CORES REQUIRED FOR ELECTRICAL WORK.
16. BUILDING WIRE AND CABLE NOT IN RACEWAY SHALL BE PLENUM RATED.
17. PROVIDE SURFACE MOUNTED RACEWAY FOR NEW DEVICES LOCATED ON EXISTING TO REMAIN CMU OR MASONRY WALLS, UNLESS OTHERWISE NOTED. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS REGARDING SURFACE MOUNTED RACEWAY APPLICATIONS AND WIRING METHODS.

KEYNOTES - ELECTRICAL POWER

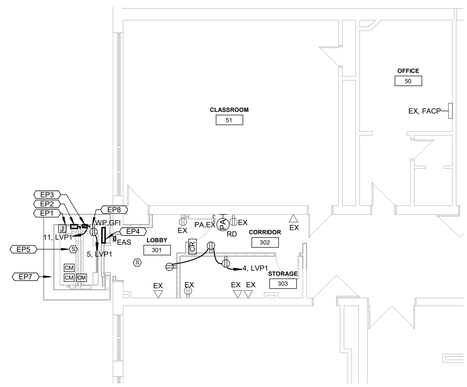
Key Value	Keynote Text
EP1	PROVIDE 3/4"C. WITH (2) POTS PHONE LINES TO LOCAL I.T. ROOM FOR ELEVATOR COMMUNICATIONS. PROVIDE FINAL CONNECTIONS TO ELEVATOR CONTROLLER. COORDINATE EXACT POINT OF CONNECTION WITH ELEVATOR CONTRACTOR.
EP2	ELEVATOR MAIN POWER FEED. PROVIDE WIRING AND CONDUIT PER ELECTRICAL RISER DIAGRAM. PROVIDE POWER FROM SPECIALTY ELEVATOR DISCONNECT SWITCH IN STORAGE 68 TO A SECOND DISCONNECT SWITCH LOCATED IN ELEVATOR SHAFT - IN A LOCATION APPROVED BY BOTH AHJ AND ELEVATOR INSTALLER. THE DISCONNECT SWITCH WITHIN SHAFT SHALL BE THE SAME AMPERAGE AS THE SPECIALTY SHUNT-TRIP DISCONNECT SWITCH, AND NON-FUSED. PROVIDE FINAL CONNECTIONS FROM THE DISCONNECT SWITCH TO THE ELEVATOR CONTROLLER. EXACT LOCATION SHALL BE COORDINATED WITH ELEVATOR INSTALLER.
EP3	ELEVATOR CAB LIGHTING CIRCUIT. PROVIDE 2#12+1#12G, 3/4"C., FROM INDICATED CIRCUIT TO A 30A/2P DISCONNECT SWITCH, FUSED AT 20A LOCATED IN THE ELEVATOR SHAFT - IN A LOCATION APPROVED BY BOTH AHJ AND ELEVATOR INSTALLER. PROVIDE FINAL CONNECTIONS FROM THE DISCONNECT SWITCH TO THE ELEVATOR CONTROLLER. EXACT LOCATION SHALL BE COORDINATED WITH ELEVATOR INSTALLER.
EP4	ELEVATOR CONTROLLER LOCATED AT TOP OF SHAFT. CONTROLLER PROVIDED WITH CONDUIT ENTRY PROVISIONS, COMMUNICATIONS AND CODE REQUIRED ELEVATOR CONTROLS. COORDINATE CONDUIT ENTRY, WIRING REQUIREMENTS AND ALL REQUIRED TERMINATIONS WITH ELEVATOR INSTALLER.
EP5	SMOKE DETECTOR TO COMMUNICATE WITH ELEVATOR RECALL FUNCTIONALITY - PER FIRE ALARM RISER DIAGRAM.
EP7	FIRE ALARM CONTROL MODULES TO COMMUNICATE WITH ELEVATOR CONTROLLER. PROVIDE QUANTITY AS REQUIRED BY ELEVATOR MANUFACTURER. PROVIDE FINAL CONNECTIONS TO CONTROLLER.
EP8	PROVIDE GFCI-TYPE DUPLEX RECEPTACLE ADJACENT TO THE ELEVATOR CONTROLLER. PROVIDE DEDICATED 120V, 20A BRANCH CIRCUIT USING 2#12+1#12G, 3/4"C.
EP9	PROVIDE WEATHERPROOF GFCI-TYPE DUPLEX RECEPTACLE IN ELEVATOR PIT. COORDINATE LOCATION WITH ELEVATOR INSTALLER. PROVIDE DEDICATED 120V, 20A BRANCH CIRCUIT USING 2#12+1#12G, 3/4"C.



1 ELECTRICAL FIRST FLOOR
1/8" = 1'-0"



2 ELECTRICAL SECOND FLOOR
1/8" = 1'-0"



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REVISIONS

NO.	DATE	DESCRIPTION

ELECTRICAL POWER NEW WORK PLANS

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PROJ. #: 2022_049A
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E1.1

ELECTRICAL LIGHTING NOTES

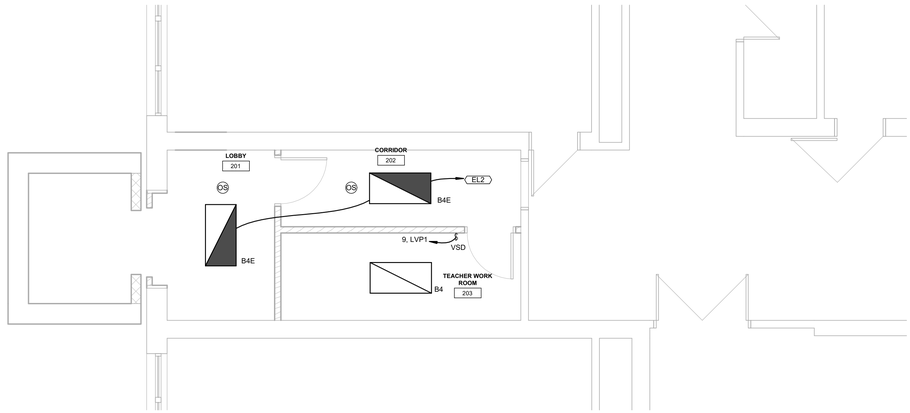
1. REFER TO DRAWING **E0.0** FOR LIGHTING FIXTURE SCHEDULE.
2. EXIT SIGNS AND EMERGENCY BATTERY UNITS SHALL BE WIRED TO LINE SIDE OF LOCAL LIGHTING BRANCH CIRCUIT, AHEAD OF ALL SWITCHING DEVICES.
3. EMERGENCY LIGHTING RELAY LOCATIONS ARE SHOWN DIAGRAMMATICALLY. CONTRACTOR SHALL INSTALL RELAYS ABOVE NEAREST ACCESSIBLE CEILING, OR IN NEAREST STORAGE ROOM/ UTILITY SPACE, AND SHALL COORDINATE LOCATION WITH OTHER TRADES. REFER TO EMERGENCY LIGHTING WIRING SCHEMATICS FOR ADDITIONAL INFORMATION.
4. REFER TO DRAWINGS **E0.0** FOR TYPICAL LIGHTING CONTROL WIRING SCHEMATICS.
5. LIGHT FIXTURES CONTROLLED WITH DIMMING SHALL BE PROVIDED WITH DIMMING WIRES. PROVIDE DIMMING ADAPTOR/CONVERTERS (0-10V TO TRIAC/ELV) FOR NON 0-10V DIMMING PROTOCOL LIGHT FIXTURES AS REQUIRED TO BE COMPATIBLE WITH THE 0-10V DIMMING CONTROL SYSTEM.

ELECTRICAL GENERAL NOTES

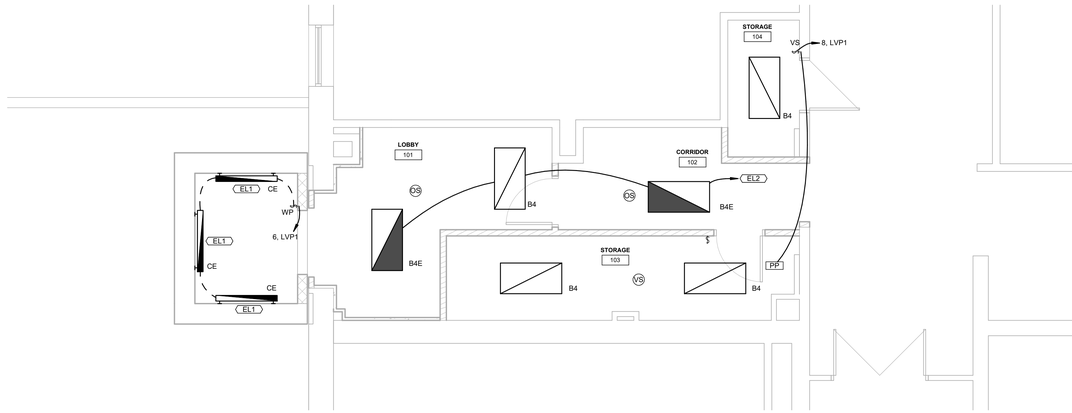
1. BRANCH CIRCUITS AND FEEDER CIRCUITS SHALL BE CONCEALED IN WALLS AND ABOVE CEILINGS WHERE POSSIBLE, INCLUDING HOMERUNS TO PANELBOARDS. BRANCH CIRCUITS AND FEEDERS SHALL NOT BE ROUTED IN OR UNDER SLAB UNLESS SPECIFICALLY INDICATED ON ELECTRICAL FLOOR PLANS OR DETAILS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. BRANCH CIRCUITS SHALL BE 2#12,#12G, 3/4"C. , TO NEW 20A/1P CIRCUIT BREAKER IN PANEL INDICATED UNLESS NOTED OTHERWISE.
3. 120V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 100' IN LENGTH SHALL BE 2#10,#10G., 3/4"C. UNLESS NOTED OTHERWISE.
4. 120V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 165' IN LENGTH SHALL BE 2#8,#10G., 3/4"C. UNLESS NOTED OTHERWISE.
5. 277V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 250' IN LENGTH SHALL BE 2#10,#10G., 3/4"C. UNLESS NOTED OTHERWISE.
6. DEVICES SHALL BE LABELED WITH SOURCE PANEL AND CIRCUIT NUMBER(S).
7. REFER TO ARCHITECTS REFLECTED CEILING PLAN FOR EXACT LOCATION OF CEILING MOUNTED ELECTRICAL DEVICES. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION OF WALL MOUNTED ELECTRICAL DEVICES.
8. PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF PENETRATIONS THROUGH FIRE WALLS OR SMOKE BARRIERS AS REQUIRED. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALLS.
9. COORDINATE LOCATIONS OF ELECTRICAL DEVICES AND CONTROLS WITH RESPECT TO LOCATIONS OF CASEWORK AND EQUIPMENT PRIOR TO ROUGH-IN.
10. WHEN DEVICES ARE SHOWN ON PLANS OFFSET FROM ONE ANOTHER, DEVICES SHALL BE MOUNTED IN LINE, CENTERED ON WALL.
11. SHARED NEUTRAL WIRING IS NOT ACCEPTABLE, UNLESS NOTED OTHERWISE ON DRAWINGS. PROVIDE A DEDICATED NEUTRAL WIRE FOR EACH CIRCUIT, WHERE APPLICABLE.
12. DRAWINGS ARE DIAGRAMMATIC ONLY. DO NOT SCALE ELECTRICAL DRAWINGS. FIELD CONDITIONS AND ARCHITECTURAL ELEVATIONS AND DIMENSIONS SHALL GOVERN EXACT LOCATION AND MOUNTING HEIGHTS OF ELECTRICAL DEVICES AND RACEWAYS.
13. FINISHES AND COLOR OF ELECTRICAL WIRING DEVICES, EXPOSED RACEWAY, LIGHT FIXTURES, AND OTHER ELECTRICAL DEVICES SHALL BE DETERMINED BY THE ARCHITECT.
14. ELECTRICAL WORK SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE (OTHER THAN ROOF DECK).
15. THE ELECTRICAL CONTRACTOR SHALL PERFORM CORES REQUIRED FOR ELECTRICAL WORK.
16. BUILDING WIRE AND CABLE NOT IN RACEWAY SHALL BE PLENUM RATED.
17. PROVIDE SURFACE MOUNTED RACEWAY FOR NEW DEVICES LOCATED ON EXISTING TO REMAIN CMU OR MASONRY WALLS, UNLESS OTHERWISE NOTED. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS REGARDING SURFACE MOUNTED RACEWAY APPLICATIONS AND WIRING METHODS.

KEYNOTES - ELECTRICAL LIGHTING

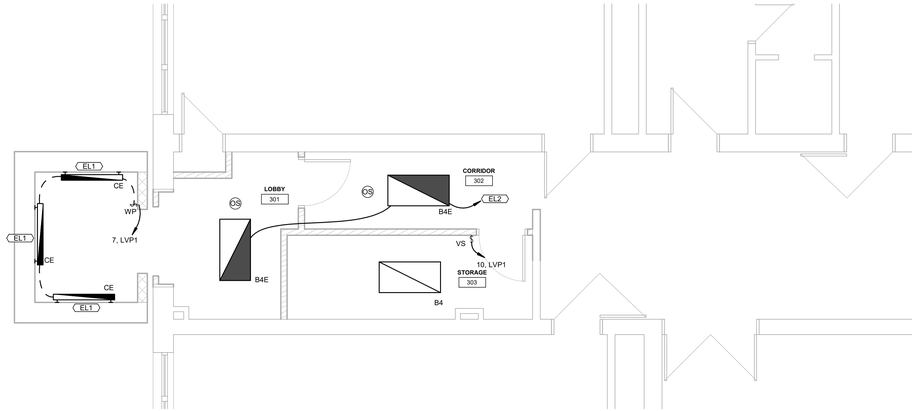
Key Value	Keynote Text
EL1	PROVIDE LIGHT FIXTURES AS SPECIFIED PER LIGHTING FIXTURE SCHEDULE. LIGHT FIXTURES SHALL BE PROVIDED WITH WIREGUARD ACCESSORY. INSTALL LIGHT FIXTURES IN ELEVATOR PIT AND TOP OF SHAFT AT LOCATIONS COORDINATED WITH THE ELEVATOR INSTALLER AND INSPECTOR, AS REQUIRED TO ACHIEVE A MINIMUM OF 19 FOOTCANDLES. CONTRACTOR SHALL TAKE LIGHT MEASUREMENTS PRIOR TO FINAL INSTALLATION OF THESE LIGHT FIXTURES TO ENSURE REQUIRED ILLUMINATION LEVELS ARE BEING ACHIEVED. COORDINATE LIGHT FIXTURE LOCATION WITH ELEVATOR EQUIPMENT AND ALL ASSOCIATED APPURTENANCES.
EL2	WIRE NEW LIGHT FIXTURES TO EXISTING LIGHTING CIRCUIT AND ASSOCIATED CONTROLS IN ADJACENT CORRIDOR. PROVIDE 2#12, #12G IN 3/4" CONDUIT AS REQUIRED.



2 ELECTRICAL LIGHTING SECOND FLOOR
1/4" = 1'-0"



1 ELECTRICAL LIGHTING FIRST FLOOR
1/4" = 1'-0"



3 ELECTRICAL LIGHTING THIRD FLOOR
1/4" = 1'-0"

architecture
interior design
master planning
FRIAR
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

MICHAEL F. BOUCHARD
STATE OF CONNECTICUT
31062
LICENSED PROFESSIONAL ENGINEER

PROFESSIONAL SEAL

CES
Consulting Engineering Services, Inc.
811 Middle Street
Middletown CT 06457
860.632.1682
ceseng.com
CES #2025564.00

CONSULTANT

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

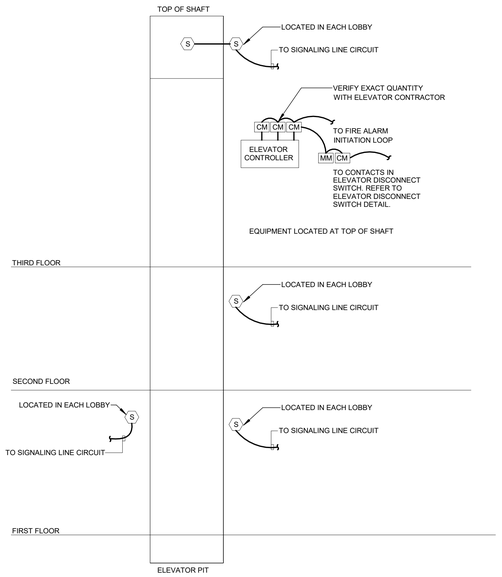
REVISIONS

NO.	DATE	DESCRIPTION

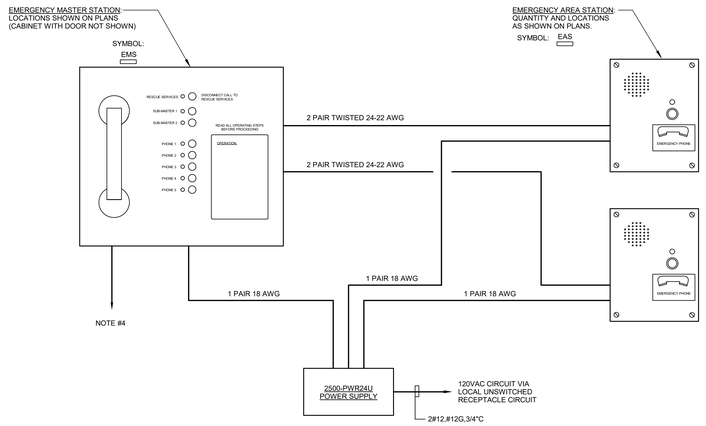
ELECTRICAL LIGHTING NEW WORK PLANS

DATE: 1/15/2026
SCALE As indicated
PROJ. #: 2022_049A
DRAWN: CALO
CHECKED: MFC

SHEET NO.
E1.2



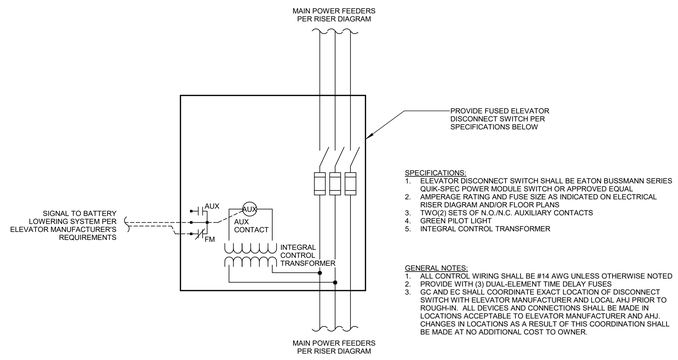
3 ADDRESSABLE FIRE ALARM SYSTEM ELEVATOR RECALL RISER
NTS



NOTES:

1. PROVIDE FLUSH MOUNTED JUNCTION BOXES AS REQUIRED FOR EQUIPMENT SHOWN ON FLOOR PLANS. MASTER STATION TO INCLUDE STEEL DOOR WITH VIEWING WINDOW AND TWIST LOCK CLOSURE FOR FIREMAN'S LOCK.
2. REFER TO DRAWINGS FOR EXACT QUANTITIES AND LOCATIONS. TYPICAL WIRING SHOWN.
3. REFER TO SPECIFICATIONS FOR PRODUCT MANUFACTURERS AND ADDITIONAL REQUIRED EQUIPMENT.
4. DEDICATED OUTSIDE TELEPHONE LINE TO REPORT TO LOCAL EMERGENCY DISPATCH DEPARTMENT. 2-WAY VOICE COMMUNICATION SHALL BE PROVIDED. WIRING BY DIV.27 CONTRACTOR.
5. COORDINATE VOICE NETWORK TYPE WITH OWNER, PROVIDE VOIP OR CELLULAR GATEWAY KIT DEVICE IF REQUIRED.
6. PROVIDE WITH REQUIRED INSTRUCTION, TACTILE AND PHOTO - LUMINESCENT ILLUMINATED SIGNAGE.

2 EMERGENCY 2-WAY COMMUNICATION SYSTEM DETAIL
NTS



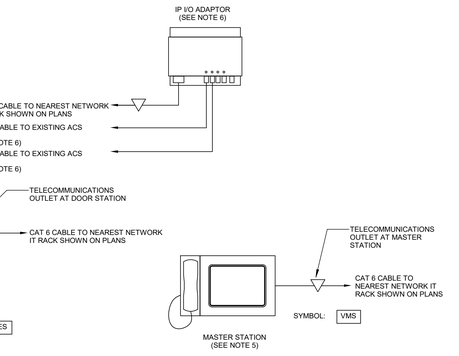
SPECIFICATIONS:

1. ELEVATOR DISCONNECT SWITCH SHALL BE EATON BUSSMANN SERIES QUIK-SPEC POWER MODULE SWITCH OR APPROVED EQUAL
2. AMPERAGE RATING AND FUSE SIZE AS INDICATED ON ELECTRICAL RISER DIAGRAM AND/OR FLOOR PLANS
3. TWO(2) SETS OF N.O./N.C. AUXILIARY CONTACTS
4. GREEN PILOT LIGHT
5. INTEGRAL CONTROL TRANSFORMER

GENERAL NOTES:

1. ALL CONTROL WIRING SHALL BE #14 AWG UNLESS OTHERWISE NOTED
2. PROVIDE WITH (3) DUAL-ELEMENT TIME DELAY FUSES
3. GC AND EC SHALL COORDINATE EXACT LOCATION OF DISCONNECT SWITCH WITH ELEVATOR MANUFACTURER AND LOCAL AHJ PRIOR TO ROUGH-IN. ALL DEVICES AND CONNECTIONS SHALL BE MADE IN LOCATIONS ACCEPTABLE TO ELEVATOR MANUFACTURER AND AHJ. CHANGES IN LOCATIONS AS A RESULT OF THIS COORDINATION SHALL BE MADE AT NO ADDITIONAL COST TO OWNER.

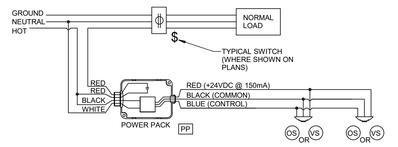
1 ELEVATOR DISCONNECT SWITCH DETAIL
NTS



NOTES:

1. BASIS OF DESIGN: "IX SERIES" BY AIPHONE CORP.
   A. VIDEO MASTER STATION MODEL IS "IX-MV7-H"
   B. AUDIO/VIDEO DOOR STATION MODEL IS "IX-DVF"
   C. IP PROGRAMMABLE RELAY ADAPTOR MODEL IS "IXW-MA"
2. TYPICAL REQUIREMENTS SHOWN, REFER TO DRAWINGS FOR LOCATIONS AND TYPES OF DEVICES.
3. INTERCOM DOOR STATIONS TO REPORT TO MASTER STATIONS AS LISTED BELOW.
   A. DOOR STATION WHERE SHOWN ON PLANS - MASTER STATION IN MAIN OFFICE
4. COORDINATE EXACT MOUNTING HEIGHT AND LOCATION OF DOOR STATIONS WITH ARCHITECTURAL ELEVATIONS.
5. COORDINATE DESKTOP LOCATION FOR MASTER STATIONS WITH THE OWNER, PROVIDE DESKTOP STAND. NEATLY TRAIN ALL EXPOSED CABLING.
6. SELECTIVE DOOR RELEASE RELAYS ARE PROGRAMMABLE TO RESPOND TO INCOMING DOOR STATION WHEN DOOR RELEASE IS ACTIVATED AT A MASTER STATION. FUNCTION IS SPECIFIC TO THE DOOR STATION AND FOLLOWS THE CALL TO ANY MASTER STATION. TYPICAL INTERCONNECTION BETWEEN INTERCOM DOOR RELEASE RELAY AND ACS SYSTEM SHOWN. PROVIDE RELAYS AS REQUIRED FOR SELECTIVE DOOR RELEASE AT ACS PANELS. MOUNT RELAY IN SUITABLE NEMA 1 ENCLOSURE AT ACS PANEL.

7 IP-BASED VIDEO INTERCOM SYSTEM DETAIL
NTS

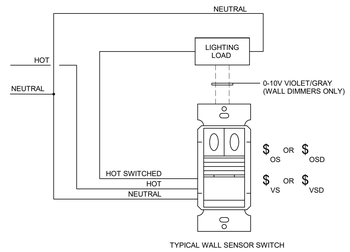


SEQUENCE OF OPERATIONS:

1. OCCUPANCY SENSOR - AUTO-ON WHEN OCCUPANCY IS DETECTED BY CEILING SENSOR(S). REFER TO FLOOR PLANS FOR QUANTITY AND LOCATIONS.
2. VACANCY SENSOR - MANUAL-ON BY THE TOGGLE SWITCH
3. AUTO-OFF AFTER 20 MINUTES OF UNOCCUPIED SPACE.
4. REFER TO LIGHTING CONTROL SPECIFICATION FOR ADDITIONAL INFORMATION.

CEILING OCCUPANCY/VACANCY SENSOR WITH AUXILIARY RELAY

6 TYPICAL STANDALONE OCCUPANCY SENSOR DETAIL
NTS



TYPICAL WALL SENSOR SWITCH

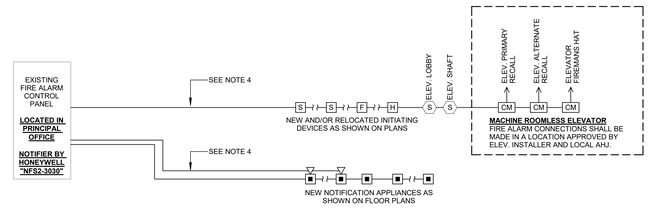
NOTES:

1. REFER TO MANUFACTURERS WIRING DIAGRAM FOR EXACT WIRING DETAIL.
2. WIRE IN SERIES WITH THREE-WAY SWITCH, WHERE INDICATED ON PLANS.
3. PROVIDE 0-10V WIRING FROM WALL DIMMERS, WHERE INDICATED ON PLANS.
4. LIGHTING SHALL TIME OUT AFTER 20 MINUTES.
5. REFER TO LIGHTING CONTROL SPECIFICATION FOR ADDITIONAL INFORMATION.

TYPICAL SPECIFICATIONS:

1. "OS" OCCUPANCY SENSOR SWITCH: (SET TO AUTO-ON, AUTO-OFF MODE)
2. "OSD" OCCUPANCY SENSOR 0-10V DIMMER: (SET TO AUTO-ON, AUTO-OFF MODE)
3. "VS" VACANCY SENSOR SWITCH: (SET TO MANUAL-ON, AUTO-OFF MODE)
4. "VSD" VACANCY SENSOR 0-10V DIMMER: (SET TO MANUAL-ON, AUTO-OFF MODE)

5 TYPICAL LINE VOLTAGE SENSOR SWITCH DETAIL
NTS



NOTES

1. PROVIDE ADDITIONAL BATTERIES, TERMINAL CABINETS, CONTROL CARDS, EXPANSION MODULES, AMPLIFIERS (FOR VOICE SYSTEMS) AND OTHER ACCESSORIES TO ACCOMMODATE NEW DEVICES AS REQUIRED BY MANUFACTURER. NEW COMPONENTS MUST BE BY SAME MANUFACTURER AS EXISTING.
2. PROVIDE TESTING AND REPROGRAMMING OF EXISTING CONTROL PANEL TO ACCOMMODATE NEW DEVICES.
3. PROVIDE ALL NECESSARY SYNCHRONIZATION OF NEW STROBES.
4. PROVIDE WIRING OF SAME CLASS/STYLE AS EXISTING FIRE ALARM WIRING USED IN BUILDING. CONNECT TO EXISTING NAC & SLC CIRCUITS MADE AVAILABLE DURING DEMOLITION. PROVIDE METAL-CLAD CABLING WHEN CONCEALED AND WIRE IN RACEWAY WHERE EXPOSED.
5. MAINTAIN OPERATION OF THE EXISTING FIRE ALARM SYSTEM DURING DEMOLITION. DEVICES ARE TO BE REMOVED BACK TO NEXT DEVICE OUTSIDE THE AREA OF WORK. EXTEND CIRCUITS WITH WIRING TO MATCH EXISTING CLASS AND STYLE TO MAINTAIN CONTINUITY OF CIRCUITS UPSTREAM AND DOWNSTREAM OF THE WORK AFFECTED BY DEMOLITION. PROTECT EXISTING DEVICES DURING CONSTRUCTION. TAKE DEVICES OFF-LINE IF NECESSARY. COORDINATE BYPASSING AND REACTIVATION OF THESE DEVICES WITH OWNER. PROVIDE TESTING AND REPROGRAMMING OF THE EXISTING SYSTEM. NOTE: EXISTING DEVICES MAY BE REQUIRED TO REMAIN UNTIL NEW DEVICES ARE INSTALLED, TESTED AND FUNCTIONAL.
6. REFER TO FLOOR PLANS FOR QUANTITY AND LOCATION OF DEVICES.
7. CONTRACT WITH THE SERVICES OF A FACTORY AUTHORIZED DEALER OF THE EXISTING SYSTEM TO PROVIDE ALL EQUIPMENT, SUPERVISION, FINAL CONNECTIONS, PROGRAMMING AND TESTING OF THE SYSTEM. EXISTING SYSTEM IS **MAINTAINED BY "ITS", CONTACT INFORMATION IS 800-487-6290**

4 PARTIAL FIRE ALARM RISER DIAGRAM
NTS

FRIAR
architecture
interior design
master planning
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

STATE OF CONNECTICUT
MICHAEL T. BOUCHARD
31062
LICENSED
PROFESSIONAL ENGINEER

PROFESSIONAL SEAL

CES
Consulting Engineering Services, Inc.
811 Middle Street
Middletown CT 06457
860.632.1682
ceseng.com
CES #2025564.00

CONSULTANT

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

NO.	DATE	DESCRIPTION

ELECTRICAL DETAILS

DATE: 1/15/2026
SCALE NTS
PROJ. #: 2022_049A
DRAWN: CALO
CHECKED: MFC

SHEET NO.
E5.0

DRY TYPE TRANSFORMER SCHEDULE

COPPER CONDUCTORS

SIZE	KVA	PRIMARY AMPS	SECONDARY AMPS	480 VOLT OVERCURRENT	208 VOLT (NOTE 4) OVERCURRENT	480 VOLT FEEDER	208/120 VOLT FEEDER	GEC (NOTE 5)	SSBJ (NOTE 6)
T1	30	36	83	50A, 3P	100A, 3P	3#6 & 1#10G - 1"C	4#3 - 1 1/4"C	1#6 - 3/4"C	1#6

TRANSFORMER NOTES:

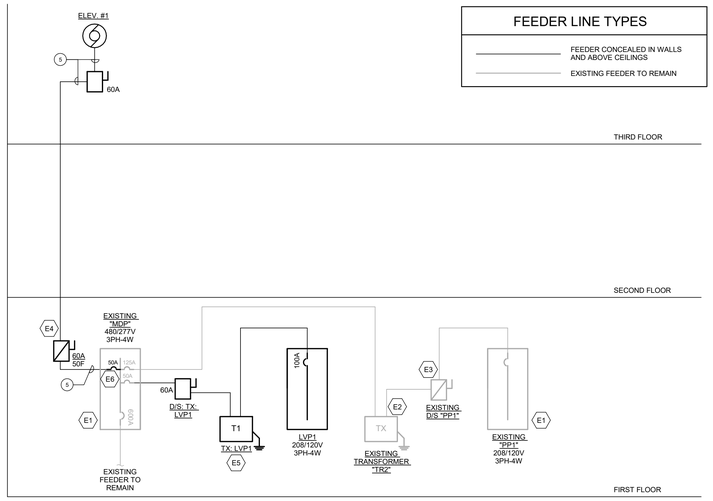
1. BOND NEUTRAL TRANSFORMER SECONDARY TO THE TRANSFORMER GROUND BAR AND CASE WITH SYSTEM BONDING JUMPER.
2. USE NEAREST AVAILABLE EFFECTIVELY GROUNDED WATER PIPE, STRUCTURAL STEEL AND/OR DRIVEN GROUND ROD IN ACCORDANCE WITH N.E.C. 250-81 AND 250-83 FOR THE SEPARATELY DERIVED SYSTEM GROUNDING ELECTRODE.
3. ALL CONDUCTOR SIZES ARE FOR COPPER CONDUCTORS. N.E.C. TABLE 310.15(B)(16).
4. SECONDARY OVERCURRENT PROTECTION SHALL BE LOCATED WITH IN (10) FEET OF THE TRANSFORMER SECONDARY TERMINALS EITHER IN A PANELBOARD (MAIN BREAKER), AN INDIVIDUALLY MOUNTED CIRCUIT BREAKER, OR A FUSIBLE DISCONNECT SWITCH.
5. GROUNDING ELECTRODE CONDUCTOR TO BE RUN FROM GROUND BAR IN TRANSFORMER TO THE GROUNDING ELECTRODE FOR THE SEPARATELY DERIVED SYSTEM.
6. SYSTEM BONDING JUMPER/SUPPLY SIDE BONDING JUMPER TO BE INSTALLED BETWEEN THE TRANSFORMER GROUND BAR AND CASE AND BETWEEN THE GROUND BAR IN THE FIRST SUPPLY SIDE DISCONNECTING MEANS (PANELBOARD, ENCLOSED CIRCUIT BREAKER OR FUSIBLE DISCONNECT SWITCH) AND TRANSFORMER GROUND BAR. INSTALL MULTIPLE SUPPLY SIDE BONDING JUMPERS OF THE SIZE LISTED, (1) IN EACH FEEDER RACEWAY.
7. 600 KCMIL CONDUCTORS SHALL BE PROVIDED WITH MAC ADAPTERS AS REQUIRED TO COORDINATE WITH BREAKER LUG SIZES.

ELECTRICAL RISER DIAGRAM KEY NOTES

- E1 EXISTING TO REMAIN PANELBOARD.
- E2 EXISTING TO REMAIN TRANSFORMER.
- E3 EXISTING TO REMAIN DISCONNECT SWITCH.
- E4 SPECIALTY ELEVATOR DISCONNECT SWITCH WITH VOLTAGE MONITORING CONTACTS, PER ELECTRICAL DETAILS. REFER TO FLOOR PLANS ON SHEET E1.1 FOR ADDITIONAL INFORMATION.
- E5 REFER TO TRANSFORMER SCHEDULE FOR FEEDER SIZES.
- E6 PROVIDE NEW 50A, 3 POLE BREAKER IN EXISTING "MDP" PANELBOARD.

FEEDER LINE TYPES

- FEEDER CONCEALED IN WALLS AND ABOVE CEILINGS
- EXISTING FEEDER TO REMAIN



1 PARTIAL ELECTRICAL RISER DIAGRAM
NTS

ELECTRICAL FEEDER SCHEDULE

COPPER CONDUCTORS

CIRCUIT SYMBOL	CONDUCTORS (1 PH, 2W) WITH GROUND	CONDUIT SIZE	CONDUCTORS (1 OR 3 PH, 3 WIRE) WITH GROUND	CONDUIT SIZE	CONDUCTORS (3 PH, 4 WIRE) WITH GROUND	CONDUIT SIZE	OVERCURRENT RATING
1	2#12 & 1#12G	3/4"	3#12 & 1#12G	3/4"	4#12 & 1#12G	3/4"	15A
2	2#12 & 1#12G	3/4"	3#12 & 1#12G	3/4"	4#12 & 1#12G	3/4"	20A
2.5	2#10 & 1#10G	3/4"	3#10 & 1#10G	3/4"	4#10 & 1#10G	3/4"	25A
3	2#10 & 1#10G	3/4"	3#10 & 1#10G	3/4"	4#10 & 1#10G	3/4"	30A
3.5	2#8 & 1#10G	1"	3#8 & 1#10G	1"	4#8 & 1#10G	1"	35A
4	2#8 & 1#10G	1"	3#8 & 1#10G	1"	4#8 & 1#10G	1"	40A
4.5	2#8 & 1#10G	1"	3#8 & 1#10G	1"	4#8 & 1#10G	1"	45A
5	2#8 & 1#10G	1"	3#8 & 1#10G	1"	4#8 & 1#10G	1"	50A
6	2#6 & 1#10G	1"	3#6 & 1#10G	1"	4#6 & 1#10G	1"	60A
7	2#4 & 1#8G	1 1/4"	3#4 & 1#8G	1 1/4"	4#4 & 1#8G	1 1/4"	70A
8	2#4 & 1#8G	1 1/4"	3#4 & 1#8G	1 1/4"	4#4 & 1#8G	1 1/4"	80A
9	2#3 & 1#8G	1 1/4"	3#3 & 1#8G	1 1/4"	4#3 & 1#8G	1 1/4"	90A
10	2#3 & 1#8G	1 1/4"	3#3 & 1#8G	1 1/4"	4#3 & 1#8G	1 1/4"	100A

NOTES:

1. CONDUIT SIZES ARE BASED ON THE NEC ANNEX C TABLES FOR EMT/SCH.40 WITH THHN/THWN CONDUCTORS. CONDUCTOR SIZES USED IN CONDUIT CALCULATION ARE BASED ON THE SIZE OF THE HOT CONDUCTORS OF CIRCUIT. EXAMPLE: 40A 3PH, 4W CONDUIT SIZE IS BASED ON 4#8 + 1#8G + 1#8 'SPACE'. FOR ACTUAL WIRE INSTALL USE QUANTITY AND SIZES WITHIN SCHEDULE.
2. UNLESS OTHERWISE INDICATED, CONDUCTOR SIZING SHALL MATCH THE SIZE INDICATED ABOVE FOR THE APPLICABLE OVERCURRENT DEVICE. PROVIDE LARGER CIRCUIT WHERE INDICATED.
3. PROVIDE MINIMUM SIZE CONDUIT INDICATED IN THE SPECIFICATIONS OR ON THE DRAWINGS.
4. FOR SINGLE PHASE FEEDERS, PROVIDE A 3-WIRE CIRCUIT UNLESS DEVICE SERVED DOES NOT HAVE PROVISIONS FOR A NEUTRAL. FOR THREE PHASE FEEDERS, PROVIDE A 4-WIRE CIRCUIT UNLESS DEVICE SERVED DOES NOT HAVE PROVISIONS FOR A NEUTRAL.
5. PROVIDE TYPE OF RACEWAY OR CABLE AS INDICATED IN THE SPECIFICATIONS OR ON THE DRAWINGS.
6. REFER TO PANELBOARD SCHEDULES AND ONE-LINE RISER DIAGRAM DRAWINGS FOR CONDUCTOR AND CONDUIT SIZE REQUIREMENTS.
7. ALL CONDUCTOR SIZES ARE BASED ON 75°C (167°F), ALL EQUIPMENT CONNECTED TO WIRES SHALL BE RATED OR 75°C (167°F)
8. 600 KCMIL CONDUCTORS SHALL BE PROVIDED WITH MAC ADAPTERS AS REQUIRED TO COORDINATE WITH BREAKER LUG SIZES.
9. THIS SCHEDULE DOES NOT INCLUDE CONDUCTOR INCREASE IN SIZE DUE TO VOLTAGE DROP. CONTRACTOR IS RESPONSIBLE TO MEASURE OR ESTIMATE THE ROUTING PRIOR TO ANY INSTALLATION AND MEET THE MAXIMUM VOLTAGE DROP REQUIREMENTS. (2% VOLTAGE DROP FOR FEEDERS AND 3% VOLTAGE DROP FOR BRANCH CIRCUITS.)

Branch Panel: LVP1

Location: STORAGE 68 | **Volts:** 120/208 Wye | **A.I.C. Rating:** 22k
Supply From: TX: LVP1 | **Phases:** 3 | **Bus Material:** CU
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 100 A
Enclosure: Type 1 | **MCB Rating / MLO:** 100A/3P MCB

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RCPT: ELEVATOR PIT	20 A	1	0.18	0.72					1	20 A	RCPT: STORAGE, ELEV. LOBBY	2
3	RCPT: LOBBY, STORAGE, CORRIDOR	20 A	1			0.54	0.54			1	20 A	RCPT: STORAGE, CORRIDOR, LOBBY	4
5	RCPT: ELEVATOR TOP OF SHAFT	20 A	1					0.18	0.11	1	20 A	LTG: ELEVATOR PIT	6
7	LTG: ELEVATOR TOP OF SHAFT	20 A	1	0.11	0.19					1	20 A	LTG: BASEMENT STORAGE	8
9	LTG: WORK ROOM 1ST FLOOR	20 A	1			0.06	0.06			1	20 A	LTG: STORAGE 2ND FLOOR	10
11	ELEVATOR CAB LIGHTING	20 A	1					0.50	1.70	3	20 A	UH-01	12
13					1.70					--	--	--	14
15	SPARE	20 A	1			0.00	1.70			--	--	--	16
17	SPARE	20 A	1					0.00	0.00	1	20 A	SPARE	18
19	SPARE	20 A	1	0.00	0.00					1	20 A	SPARE	20
		Phase Load:		2.89 kVA		2.90 kVA		2.49 kVA					
		Phase...		24.6 A		24.7 A		20.7 A					
		Total Load:		8.29 kVA									
Notes:		**Total Amps:**		23 A									

LIGHTING FIXTURE SCHEDULE

TYPE	BASIS OF DESIGN MANUFACTURER / MODEL	VOLTAGE	SOURCE	FIXTURE DESCRIPTION - BASIS OF DESIGN
B2E	MANUFACTURER/ SERIES: COLUMBIA LIGHTING PART NUMBER: CFP22-LSCS-ELL14-PLRTS	UNV	4381LM, 35W 3500K LED	2X2 SURFACE MOUNTED LED FIXTURE WITH EXTRUDED ALUMINUM FRAME. FROSTED/TEXTURED OUTER LENS, AND INTEGRAL EMERGENCY BATTERY PACK. SWITCHABLE LUMEN TECHNOLOGY THAT ALLOWS EASY FIELD-ADJUSTABLE LIGHTING OUTPUT (LOW/MED/HIGH). 0-10V DIMMING TO 10%. 80+ CRI. LUMEN MAINTENANCE OF 54,000 HOURS AT L70. MOUNTING AS APPROPRIATE FOR CEILING TYPE INDICATED ON ARCHITECTURAL PLANS.
B4	MANUFACTURER/ SERIES: COLUMBIA LIGHTING PART NUMBER: CFP24-LSCS	UNV	6011LM, 49W 3500K LED	2X4 SURFACE MOUNTED LED FIXTURE WITH EXTRUDED ALUMINUM FRAME AND FROSTED/TEXTURED OUTER LENS. SWITCHABLE LUMEN TECHNOLOGY THAT ALLOWS EASY FIELD-ADJUSTABLE LIGHTING OUTPUT (LOW/MED/HIGH). 0-10V DIMMING TO 10%. 80+ CRI. LUMEN MAINTENANCE OF 54,000 HOURS AT L70. MOUNTING AS APPROPRIATE FOR CEILING TYPE INDICATED ON ARCHITECTURAL PLANS.
B4E	MANUFACTURER/ SERIES: COLUMBIA LIGHTING PART NUMBER: CFP24-LSCS-ELL14-PLRTS	UNV	6011LM, 49W 3500K LED	SAME AS TYPE "B4" EXCEPT WITH INTEGRAL EMERGENCY BATTERY PACK.
CE	MANUFACTURER/ SERIES: COLUMBIA LIGHTING PART NUMBER: MPS4-35HL-CW-ED1U-ELL14	UNV	5800LM, 41.7W 3500K LED	4' LONG WALL AND SURFACE MOUNTED UTILITY STRIP FIXTURE WITH STEEL HOUSING, CURVED ACRYLIC LENS, AND INTEGRAL EMERGENCY BATTERY PACK. 0-10V DIMMING TO 1%. 80+ CRI. LUMENT MAINTENANCE OF 60,000 HOURS AT L80. PROVIDE WIREGUARD ACESSORIES EQUAL "MPSWG4" WHEN LOCATED IN ELEVATOR PIT AND TOP OF SHAFT.

NOTES:

1. LIGHT FIXTURES IN THE SCHEDULE SHALL BE CONSIDERED BASIS OF DESIGN. EQUAL FIXTURE SUBSTITUTIONS ARE ACCEPTABLE FOR ALL FIXTURES IN THE LIGHTING FIXTURE SCHEDULE. UNLESS INDICATED OTHERWISE, EQUAL FIXTURE APPROVAL SHALL BE AS JUDGED BY THE ENGINEER AND THE ARCHITECT. IN ADDITION TO THE REQUIREMENTS LISTED IN THE LIGHTING FIXTURE SCHEDULE AND IN THE SPECIFICATIONS, THE PROPOSED EQUAL FIXTURES SHALL:
   A. BE THE SAME GENERAL SIZE, STYLE AND SHAPE, INCLUDING BUT NOT LIMITED TO LENS CONSTRUCTION AND SHADING.
   B. BE OF EQUAL QUALITY CONSTRUCTION AND FINISH.
   C. BE SUPPLIED WITH ALL REQUIRED ACCESSORIES TO MATCH THE SPECIFIED (BASIS OF DESIGN) FIXTURE.
   D. PROVIDE THE SAME DISTRIBUTION, EFFICACY AND SOURCE LUMEN OUTPUT.
   E. HAVE THE SAME LISTINGS AS THE BASIS OF DESIGN FIXTURE, INCLUDING DLC AND ENERGY STAR QUALIFICATIONS.
2. ALL FIXTURES SHALL BE UL LISTED.
3. ALL NECESSARY MOUNTING HARDWARE, HANGERS, BRACKETS, RAILS, YOKES, CANOPIES, STEMS, CHAINS, ROW JOINERS, ETC. SHALL BE FURNISHED AND INSTALLED.
4. REFER TO ARCHITECTURAL DRAWINGS FOR SPECIFIC DETAILS, ARRANGEMENT, MOUNTING HEIGHTS, SUSPENSION LENGTHS, CEILING CONSTRUCTION, ETC. ALL COLORS AND FINISHES SHALL BE SELECTED BY ARCHITECT.
5. FIXTURES SHALL BE SEISMICALLY SUPPORTED AS REQUIRED BY THE APPLICABLE BUILDING CODE. FIXTURES SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE AND SHALL BE INDEPENDENT OF DUCTS, PIPES, CEILINGS AND THEIR SUPPORTING MEMBERS. FIXTURES SHALL BE SUPPORTED WITH A MINIMUM OF 2 SUPPORTS.
6. WIRE EMERGENCY FIXTURES AND EXIT SIGNS AHEAD OF SWITCHED LEGS.
7. MINIMUM MOUNTING HEIGHT OF FIXTURES IN MECHANICAL AND ELECTRICAL SPACES IS 8'-6" AFF. COORDINATE MOUNTING HEIGHT IN FIELD WITH EQUIPMENT IN ROOM SUCH THAT LIGHTING IS NOT OBSTRUCTED BY DUCTWORK, PIPING AND CONDUIT. PROVIDE NECESSARY CHAIN-MOUNTING HARDWARE TO SUSPEND FIXTURES WHERE REQUIRED.
8. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
9. WHERE EXIT SIGNS ARE SHOWN AS WALL MOUNTED ABOVE A DOOR, MOUNT SUCH THAT THE BOTTOM OF THE SIGN IS NO MORE THAN 3" ABOVE THE DOOR FRAME, UNLESS INDICATED OTHERWISE ON PLANS.
10. UNLESS OTHERWISE NOTED, PENDANT FIXTURE MOUNTING HEIGHTS IN FINISHED SPACES SHALL BE AS FOLLOWS:
    A. CEILING HEIGHT 9'-0" OR LOWER: 7'-6" TO BOTTOM OF FIXTURE
    B. CEILING HEIGHT 9'-6" TO 11'-0": 8'-0" TO BOTTOM OF FIXTURE
    C. CEILING HEIGHT 11'-0" TO 12'-0": 9'-6" TO BOTTOM OF FIXTURE
    D. MINIMUM PENDANT LENGTH SHALL BE 1'-6"
    E. CONSULT WITH ARCHITECT AND ENGINEER FOR OTHER CEILING HEIGHTS.

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friar.com 860.678.1291

STATE OF CONNECTICUT MICHAEL T. BOUCHARD 31062 LICENSED PROFESSIONAL ENGINEER
PROFESSIONAL SEAL

CES Consulting Engineering Services, Inc.
811 Middle Street Middletown CT 06457
860.632.1682 ceseng.com
CES #2025564.00
CONSULTANT

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

NO.	DATE	DESCRIPTION

ELECTRICAL SCHEDULES AND DIAGRAMS

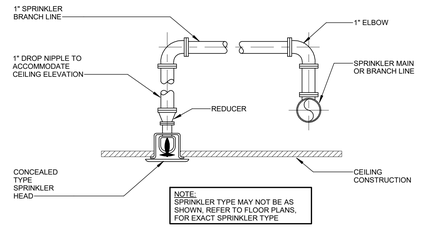
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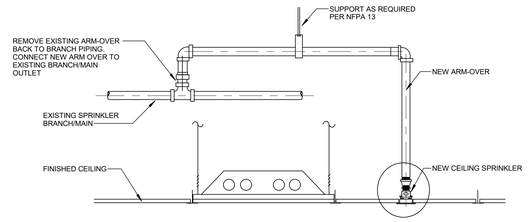
COMMERCIAL SPRINKLER HEAD SCHEDULE

SYMBOL	K-FACTOR	STANDARD (SR) OR QUICK RESPONSE (QR)	UPRIGHT	PENDENT	RECESSED	CONCEALED PENDENT	HORIZONTAL SIDEWALL	WITH GUARD	ABOVE CEILING	DRY	INSTITUTIONAL	EXTENDED COVERAGE	UL-LISTED	FM-APPROVED	MANUFACTURER & MODEL	MAXIMUM LISTED COVERAGE AREA L x W (FT)	MINIMUM REQUIRED PRESSURE (PSI)	GENERAL LOCATION OF SPRINKLER HEADS (REFER TO DRAWINGS FOR ACTUAL LOCATIONS)	NOTE: *ALL FINISHES ARE SUBJECT TO APPROVAL BY ARCHITECT. FINISH*	CLASSIFICATION
◉	5.6	QR				∘							∘	∘	VIKING MODEL# VK462	15 x 15	7 PSI	SPACES & CORRIDORS WITH HUNG CEILINGS	COVER PLATE FACTORY-PAINTED WHITE.	LIGHT & ORDINARY HAZARD

NOTES:
1. ALL TYPES OF SPRINKLER HEADS SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.
2. PROVIDED SPRINKLER GUARDS IN MECHANICAL ROOMS, ELECTRICAL & TELECOM (I.T.) CLOSETS, UPS ROOMS AND ALL ROOMS WHERE SPRINKLERS MAY BE SUBJECT TO ACCIDENTAL DAMAGE.
3. ALL SPRINKLER HEADS THROUGHOUT SHALL BE OF ORDINARY TEMPERATURE RATING (135 - 170 DEG. F.), WITH THE FOLLOWING EXCEPTIONS:
   A. SPECIFIED IN TABLE BELOW AS INTERMEDIATE OR HIGH TEMPERATURE RATING.
   B. SPRINKLER HEADS LOCATED CLOSE TO KITCHEN EQUIPMENT, HEATERS, STEAM PIPE OR LOW-PRESSURE BLOW-OFF VALVE SHALL BE OF THE TEMPERATURE RATING AS REQUIRED BY APPLICABLE EDITION OF NFPA - 13. DRAWINGS, PREPARED BY THE FIRE PROTECTION CONTRACTOR SHALL BE COORDINATED WITH THE HVAC CONTRACTOR AND ALL HVAC EQUIPMENT WHICH CAN AFFECT THE RATING OF THE SPRINKLER HEADS. SPRINKLER HEADS SHALL BE CLEARLY IDENTIFIED ON THE SHOP DRAWINGS PRIOR TO SUBMISSION FOR APPROVAL.
4. ALL SPRINKLER HEAD SYMBOLS NOT SHOWN ON PLANS. REFER TO "GENERAL LOCATION" COLUMN FOR ESTIMATING.
5. SPRINKLER SELECTIONS ARE BASED ON PRODUCTS MANUFACTURED BY VIKING. RELIABLE AND/OR TYCO PRODUCTS SHALL BE CONSIDERED APPROVED EQUAL PRODUCTS AND ARE SUBJECT TO THE APPROVAL OF THE ENGINEER AND ARCHITECT.
6. SPRINKLER CONTRACTOR SHALL COORDINATE THE LOCATIONS OF SPRINKLER HEADS WITH STRUCTURAL ELEMENTS AND HVAC DUCTWORK.



1 ARMOVER DETAIL
NTS



5 ARMOVER CONNECTION TO EXISTING OUTLET
NTS

PIPING LEGEND

SYMBOL	DESCRIPTION
FP-STP	STANDPIPE PIPING
FP-PA	PREACTION SPRINKLER PIPING
DR	DRAIN PIPING
WET	SPRINKLER MAIN (WET)
DRY	SPRINKLER MAIN (DRY)
	PIPE RISE
	PIPE DROP
	PIPE TEE TOWARDS (UP IN PLAN)
	PIPE TEE AWAY (DOWN IN PLAN)
	PIPE DROP AND RUN
	DIRECTION OF FLOW
	BLIND FLANGE
	END CAP
	REDUCER (ECCENTRIC)
	REDUCER (CONCENTRIC)
	FLEXIBLE CONNECTION

SPRINKLER PIPE SIZE SCHEDULE

NUMBER OF SPRINKLER HEADS	PIPE SIZE
1 - 2	1"
3	1 1/4"
4 - 5	1 1/2"
6 - 10	2"
SPRINKLER LOOP	REFER TO NOTE BELOW

NOTE:
PIPES SIZES SHOWN ARE BASED ON DESIGN PIPING LAYOUTS ONLY. ACTUAL PIPE SIZES SHALL BE DETERMINED BY CONTRACTORS HYDRAULIC CALCULATIONS BASED ON THE CONTRACTORS INSTALLATION DRAWINGS. CONTRACTOR SHALL ALLOW FOR THIS AND INCLUDE THIS IN THE CONTRACT PRICE.

SPRINKLER SYMBOL LEGEND

SYMBOL	DESCRIPTION
◉	CONCEALED PENDANT SPRINKLER

GENERAL NOTES

1. THESE GENERAL NOTES ARE APPLICABLE TO ALL FIRE PROTECTION DRAWINGS.
2. DRAWINGS ARE DIAGRAMMATIC AND SHOW THE GENERAL INTENT OF WORK, SEE DETAILS, RISERS, AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
3. THE DRAWINGS INDICATE A SUGGESTED SPRINKLER HEAD LAYOUT AND THAT EACH AREA IS COVERED BY SPRINKLER PROTECTION AS REQUIRED BY ALL APPLICABLE [STATE] BUILDING AND FIRE CODES. THE SPRINKLER QUANTITIES SHALL NOT BE COUNTED AS A TAKE OFF OR AS EXACT LOCATIONS. EXACT SPACING, DENSITY, AND LOCATION REQUIREMENTS SHALL BE AS DICTATED BY NFPA 13. FINAL LOCATIONS OF SPRINKLER HEADS SHALL BE COORDINATED WITH THE ARCHITECT.
4. FIRE PROTECTION CONTRACTOR SHALL PROVIDE HYDRAULIC CALCULATIONS. HYDRAULIC CALCULATIONS SHALL INCLUDE A SAFETY FACTOR OF (10 %). COMBINED INSIDE AND OUTSIDE HOSE STREAM ALLOWANCE FOR HYDRAULIC CALCULATIONS SHALL BE [100] [250] GPM.
5. THE CONTENT OF THESE DRAWINGS IS INTENDED TO SATISFY THE BUILDING CODE REQUIREMENTS FOR CONSTRUCTION DOCUMENTS. WHEN STAMPED AND SEALED BY THE ENGINEER OF RECORD, THEY ARE INTENDED TO BE USED AS PART OF THE BUILDING PERMIT APPLICATION ONLY.
6. FIRE SUPPRESSION SYSTEM SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW AND APPROVED PRIOR TO CONSTRUCTION. PROVIDE A COMPLETE SHOP DRAWING SUBMITTAL INCLUSIVE OF ALL INFORMATION REQUIRED BY STATE BUILDING CODE, NFPA 13 AND THE CONSTRUCTION DOCUMENTS.
7. PREPARE A COMPLETE RECORD SUBMITTAL INCLUSIVE OF ALL FIELD CHANGES AND ALL INFORMATION REQUIRED BY THE STATE BUILDING CODE AND CONSTRUCTION DOCUMENTS.
8. SHOP DRAWINGS AND RECORD DRAWING SUBMITTALS SHALL BE PREPARED BY THE CONTRACTORS QUALIFIED DESIGNER AND SHALL INDICATE THE DESIGNER'S NICET CERTIFICATION NUMBER OR PROFESSIONAL ENGINEERING SEAL AND SIGNATURE.
9. THE ENGINEER OF RECORD WILL NOT SIGN AND SEAL SHOP DRAWINGS OR RECORD DRAWINGS PREPARED BY THE CONTRACTOR. WHERE THE AUTHORITY HAVING JURISDUCTION REQUIRES SHOP DRAWING OR RECORD DRAWING SUBMITTALS TO BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER, THE SUBMITTALS SHALL BE PREPARED BY A QUALIFIED PROFESSIONAL ENGINEER RETAINED BY THE CONTRACTOR.
10. THE SHOP DRAWINGS, SUPPLEMENTAL CALCULATIONS AND MATERIAL SUBMITTALS SHALL BE REVIEWED AND APPROVED BY THE ENGINEER OF RECORD PRIOR TO SUBMITTAL TO THE STATE DIVISION OF ENGINEERING AND BUILDINGS.
11. INSTALLATION OF SPRINKLERS SHALL BE BASED ON THE DESIGN CRITERIA BELOW

SPRINKLER SYSTEM DESIGN CRITERIA - NFPA 13

AREA	OCCUPANCY CLASSIFICATION	DENSITY (GPM/SF)	AREA OF APPLICATION (SF)	MAX. AREA PER SPRINKLER (SF)
LOBBY	***LIGHT HAZARD***	***0.10***	***1500***	***225***

ABBREVIATIONS

A	ABOVE
AFF	ABOVE FINISHED FLOOR
ATS	AUTOMATIC TRANSFER SWITCH
C	CLOUD
CR	CORROSION RESISTANT
D	DRY
DCV	DOUBLE CHECK VALVE
EC	EXTENDED COVERAGE
ELEV	ELEVATION
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FD	FIRE DEPARTMENT
FDC	FIRE DEPARTMENT CONNECTION
FHV	FIRE HOSE VALVE
FP	FIRE PROTECTION
FPC	FIRE PUMP CONTROLLER
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FS	FLOW SWITCH
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
HD	TOTAL DEVELOPED HEAD
HTC	HIGH TEMPERATURE CLASSIFICATION
HVC	HOSE VALVE CABINET
ITC	INTERMEDIATE TEMPERATURE CLASSIFICATION
JP	JOCKEY PUMP
JPC	JOCKEY PUMP CONTROLLER
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
NTS	NOT TO SCALE
OS&Y	OUTSIDE STEM AND YOKE
PA	PREACTION
PAC	PREACTION ALARM VALVE CABINET
PD	PRESSURE DROP
PIV	PRESSURE INDICATOR VALVE
PRV	PRESSURE REDUCING VALVE
PS	PRESSURE SWITCH
PSI	POUNDS PER SQUARE INCH
RE	EXISTING TO BE REMOVED
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
RPM	REVOLUTIONS PER MINUTE
SS	SUPERVISORY SWITCH
TS	TAMPER SWITCH
TYP	TYPICAL
UD	UNDER DUCT
V	VOLTS
VEL	VELOCITY
WG	WIRE GUARD

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friar.com
860.678.1291

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CES
Consulting Engineering Services, Inc.
811 Middle Street
Middletown CT 06457
860.632.1682
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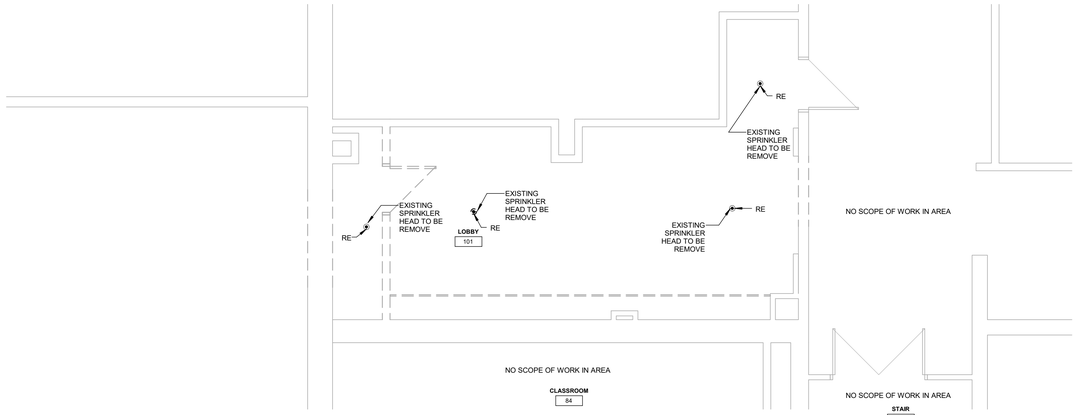
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FIRE PROTECTION ABBREVIATIONS, NOTES AND SYMBOLS

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1 FIRE PROTECTION FIRST FLOOR DEMOLITION PLAN
1/4" = 1'-0"

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friar.com
860.678.1291

STATE OF CONNECTICUT
MICHAEL T. BOUCHARD
31082
LICENSED
PROFESSIONAL ENGINEER

PROFESSIONAL SEAL

CES
Consulting Engineering Services, Inc.
811 Middle Street
Middletown CT 06457
860.632.1682
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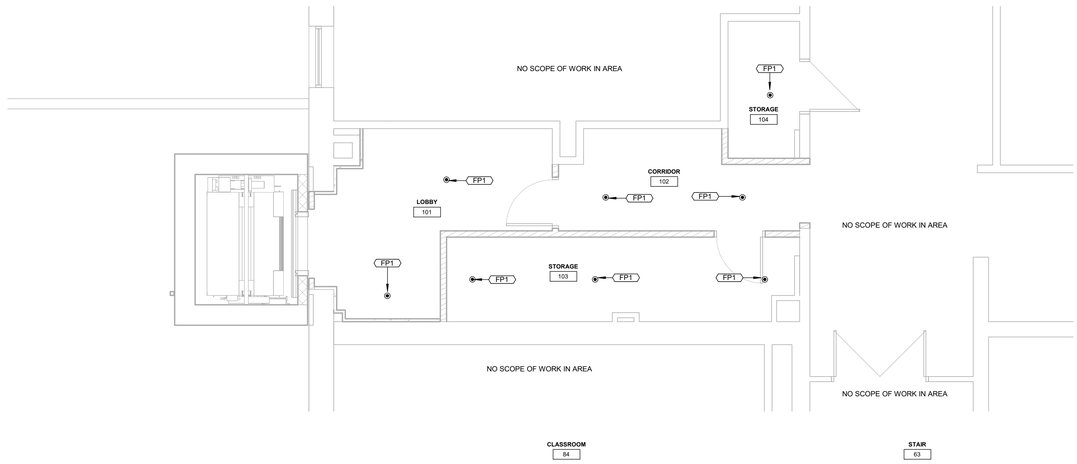
FIRE PROTECTION DEMOLITION PLANS

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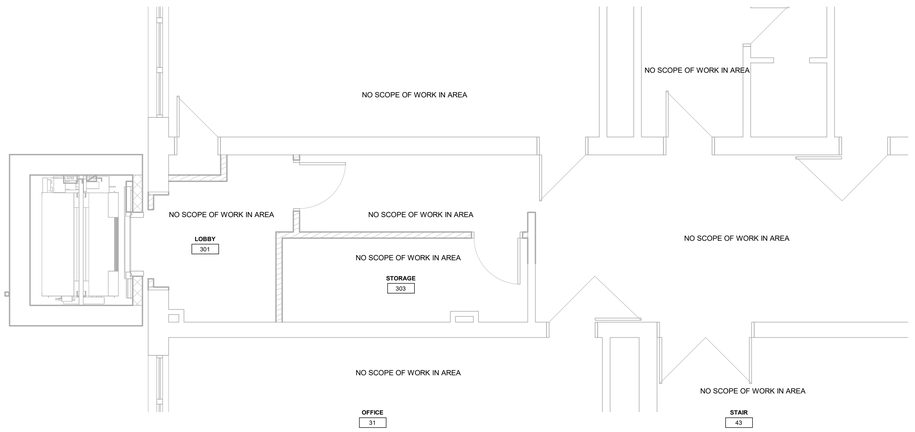
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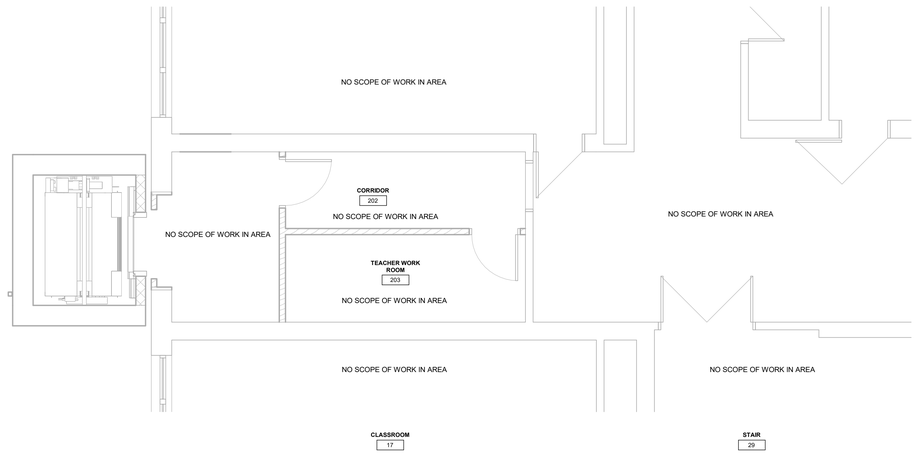
KEYNOTES - FIRE PROTECTION	
Key Value	Keynote Text
FP1	CONNECT NEW SPRINKLER HEADS TO EXISTING SYSTEM IN LOCATION SHOWN ON PLAN. WHERE APPLICABLE RE-USE EXISTING TAPS FROM SPRINKLER OR PROVIDE NEW BRANCH PIPING AND FITTINGS.



1 FIRE PROTECTION FIRST FLOOR
1/4" = 1'-0"



3 FIRE PROTECTION THIRD FLOOR
1/4" = 1'-0"



2 FIRE PROTECTION SECOND FLOOR
1/4" = 1'-0"

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FIRE PROTECTION NEW WORK PLANS

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GENERAL NOTES

1. GENERAL NOTES, SYMBOLS, AND DETAILS ARE APPLICABLE TO DRAWINGS WITHIN DIVISION 23.
2. DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO INDICATE CAPACITY, SIZE, APPROXIMATE LOCATION AND GENERAL ARRANGEMENT. COORDINATE LOCATIONS OF SYSTEMS AND COMPONENTS.
3. COORDINATE ROOF AND WALL PENETRATIONS WITH WORK OF OTHER SECTIONS AND WITH FLASHING REQUIREMENTS. COORDINATE SLAB PENETRATIONS WITH WORK OF OTHER SECTIONS.
4. RUN DUCTS AND PIPING CONCEALED UNLESS SPECIFIED OTHERWISE NOTED.
5. INSTALL SENSORS (TEMPERATURE, HUMIDITY, CO2, THERMOSTATS) AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED BY ARCHITECT. MOUNTING HEIGHT AFF SHALL COMPLY WITH ADA AND SHALL BE MOUNTED LEVEL WITH ADJACENT SWITCHES (IE LIGHT SWITCHES).
6. COORDINATE WORK OF THIS SECTION WITH THAT OF OTHER SECTIONS AND WITH ALL TRADES INVOLVED. PROVIDE OFFSETS IN PIPING AND DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS.
7. NOT ALL ACCESS DOORS HAVE BEEN SHOWN ON THE PLANS. PROVIDE ACCESS PANELS THROUGH BUILDING ASSEMBLIES TO SERVICE AND MAINTAIN EQUIPMENT UNLESS SUCH EQUIPMENT IS INSTALLED IN EXPOSED LOCATIONS OR ABOVE LAY-IN CEILINGS. COORDINATE THE LOCATION OF ACCESS DOORS AND PANELS AND VERIFY THE QUANTITY, SIZE, AND LOCATIONS AFTER THE SYSTEMS AND EQUIPMENT REQUIRING ACCESS HAVE BEEN INSTALLED AND PRIOR TO THE CLOSURE OF THE AFFECTED CEILINGS AND BUILDING ASSEMBLIES. SUBMIT ACCESS PANEL LOCATIONS FOR REVIEW.
8. AT SUBSTANTIAL COMPLETION, THE FOLLOWING ITEMS, NEW OR EXISTING, SHALL BE FULLY AND REASONABLY ACCESSIBLE: HVAC CONTROL BOXES, JUNCTION BOXES, VALVES, DDC CONTROL BOXES, ELECTRICAL PANELS, FILTERS, BELTS, WATER COILS, DISCONNECT SWITCHES AND ELEMENTS OF EQUIPMENT REQUIRING MAINTENANCE. "FULLY AND REASONABLY ACCESSIBLE" SHALL BE DEFINED AS NATIONAL ELECTRIC CODE REQUIRED CLEARANCE FOR POWERED EQUIPMENT AND CAPABLE OF BEING ACCESSED OR SERVICED WITHOUT REMOVING, MODIFYING OR DISTORTING OTHER COMPONENTS OF THE WORK. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCE FOR ALL EQUIPMENT.
9. SUPPORT EQUIPMENT, PIPING AND DUCTWORK FROM BUILDING STRUCTURE OR WITH STEEL SUPPORTS AND PLATFORMS AS REQUIRED. PROVIDE VIBRATION ISOLATION FOR ROTATING EQUIPMENT, DUCTWORK, AND PIPING IN ACCORDANCE WITH THE SPECIFICATIONS.
10. CONTROL WIRING METHODS SHALL COMPLY WITH NEC, AND DIVISION 26 SPECIFICATIONS.
11. VERIFY EQUIPMENT CONNECTIONS WITH MANUFACTURER'S DRAWINGS. VERIFY AND PROVIDE FITTINGS TO TRANSITION TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE DIMENSIONS BEFORE FABRICATION.

DRAWING SYMBOLS

SYMBOL	DESCRIPTION
1 / A101 SIM	CALLOUT
	CENTERLINE
	CONNECT TO EXISTING
	DISCONNECT FROM EXISTING
	KEYNOTE TAG
1	REVISION NUMBER
XXX-#	EQUIPMENT TAG
Ref / 1	ELEVATION MARK
	LINE BREAK
	EXISTING LINETYPE
	NEW WORK LINETYPE
	FUTURE WORK LINETYPE
	DEMO WORK LINETYPE

CONTROLS GENERAL NOTES

1. GENERAL
   - A. SEQUENCES OUTLINED SHALL BE PERFORMED BY DIRECT DIGITAL CONTROL FIELD PANELS (DDCFPS) AND LOCALLY MOUNTED DIRECT DIGITAL UNIT CONTROLLERS CONNECTED TO A CENTRAL BUILDING AUTOMATION SYSTEM, UNLESS OTHERWISE SPECIFIED. SYSTEM ARCHITECTURE SHALL BE BASED ON A PEER-TO-PEER DISTRIBUTED CONTROL SYSTEM NETWORK. SYSTEM SHALL INTEGRATE OPEN COMMUNICATION PROTOCOL CONTROLLERS. ALL DDCFP AND LOCAL CONTROLLERS SHALL BE CAPABLE OF INDEPENDENT OPERATION REGARDLESS OF THE STATUS OF THE BAS WORKSTATION.
   - B. BMS (BUILDING MANAGEMENT SYSTEM), BAS (BUILDING AUTOMATION SYSTEM) AND DDC (DIRECT DIGITAL CONTROLS) MAY BE USED INTERCHANGEABLY AND SHARE THE SAME MEANING.
   - C. ADDRESS IDENTIFIERS FOR POINTS AND VARIABLES SHALL BE COORDINATED WITH OWNER.
   - D. ABILITY TO REVIEW MEASURED DATA, CONTROL SETPOINTS AND FUNCTIONS SHALL BE PROVIDED AT BAS WORKSTATION AND ON LAPTOP SERVICE TOOL.
   - E. COORDINATE SENSOR LOCATIONS WITH DUCTWORK AND PIPING SHOP DRAWINGS AND INDICATE PROPOSED LOCATIONS ON SUBMITTALS. PROVIDE MANUFACTURER'S RECOMMENDED UPSTREAM AND DOWNSTREAM PIPE OR DUCT DIAMETERS FOR FLOW SENSING ELEMENTS.
   - F. PROVIDE COMMUNICATIONS INTERFACE INCLUDING SOFTWARE BETWEEN THE BAS AND EACH EQUIPMENT MANUFACTURER SUPPLIED CONTROL PANEL. BAS SHALL BE CAPABLE OF READING AND DISPLAYING ALL DATA USED BY THE EQUIPMENT MANUFACTURER CONTROL PANEL. SOFTWARE INTERFACE SHALL BE THROUGH LONMARK OR BACNET COMPLIANT PROTOCOL WHERE THE BAS IS REQUIRED TO CONTROL THE OPERATION OF THE EQUIPMENT. PROVIDE COMPLETE INPUT AND OUTPUT INTERFACE.
   - G. FAIL SAFE POSITIONS INDICATED ARE POSITIONS THAT DEVICES WILL GO TO WHEN THE ASSOCIATED EQUIPMENT IS DE-ENERGIZED.
2. WIRING
   - A. PROVIDE CONTROLS, LOW VOLTAGE CONTROL WIRING, HARDWARE POINTS (ANALOG IN, ANALOG OUT, BINARY IN, BINARY OUT) AND ACCESSORIES AS REQUIRED TO PERFORM THE CONTROL SEQUENCES INDICATED. ADDITIONALLY, PROVIDE HARDWARE POINTS INDICATED REGARDLESS THAT SUCH POINTS MAY NOT BE REQUIRED TO PERFORM THE CONTROL SEQUENCES INDICATED.
   - B. POWER WIRING SHALL COMPLY WITH REQUIREMENTS OF DIVISION 26 SECTIONS.
   - C. PROVIDE NORMAL, [AND STANDBY] [AND EMERGENCY POWER] WIRING TO CONTROL DEVICES, INCLUDING CONTROL PANELS, WORKSTATION AND HOST COMPUTERS.
   - D. ELECTRICAL CIRCUITS FOR CONTROLS SHALL BE DEDICATED ONLY TO THE BUILDING AUTOMATION CONTROL SYSTEM AND COMPONENTS. WIRING FROM AND INCLUDING DEDICATED CIRCUIT BREAKERS TO THE POINT OF USE SHALL BE PROVIDED.
3. SAFETIES:
   - A. SAFETY DEVICES SUCH AS FREEZESTATS, SMOKE DETECTION, AND HIGH STATIC PRESSURE SWITCHES SHALL BE MANUAL RESET AND SHALL PERFORM ASSOCIATED SHUTDOWN/FAILSAFE ACTIONS VIA HARDWIRING. SOFTWARE SHALL NOT BE USED TO EXCLUSIVELY PERFORM ANY SHUTDOWN/FAILSAFE ACTIONS FROM SAFETY DEVICES. FOR EXAMPLE, FREEZESTATS SHALL SHUT OFF FAN, FULLY OPEN COIL VALVE, AND CLOSE OUTSIDE AIR DAMPER VIA HARDWIRING WITHOUT RELYING ON ANY SOFTWARE FUNCTIONS. SOFTWARE SHUTDOWN/FAILSAFE SHALL BE PROVIDED AS A REDUNDANT BACKUP TO THE REQUIRED HARDWIRED SHUTDOWNS.
   - B. DEVICES SUCH AS CUH AND UH SHALL OPERATE ON A SOFT PERMISSIVE, ONLY ALLOWING FANS TO START AND CONTROL VALVES TO OPEN WHEN SYSTEM IS IN HEATING MODE, USE OF AQUASTATS IS NOT ACCEPTABLE.
   - C. SAFETY DEVICES SHALL FUNCTION AND SHUT DOWN THE ASSOCIATED EQUIPMENT WHEN THE MANUAL SWITCHES ARE IN BOTH THE HAND AND AUTO POSITIONS.
4. ROOM SENSORS
   - A. FOR REGULARLY OCCUPIED SPACES, PROVIDE WALL MOUNTED ROOM SENSORS WITH INTEGRAL LCD DISPLAY AND USER INTERFACE TO DISPLAY AND ADJUST SETPOINT, MODE AND STATUS.
   - B. FOR CORRIDORS, RESTROOMS, VESTIBULES, STORAGE ROOMS, JANITOR CLOSETS, ELECTRICAL CLOSETS, DATA CLOSETS/ROOMS, AND MECHANICAL ROOMS, PROVIDE WALL MOUNTED, BRUSHED CHROME, WALL PLATE TYPE SENSORS.
5. SETPOINTS:
   - A. SETPOINTS AND TIME DELAYS SHALL BE ADJUSTABLE BY THE OPERATOR THROUGH THE BAS WORKSTATION AND THROUGH LAPTOP SERVICE TOOL CONNECTED TO DDCFPS AND CONTROLLERS WITHOUT HARDWARE OR SOFTWARE REVISIONS. UNLESS OTHERWISE NOTED, ROOM TEMPERATURE SETPOINTS SHALL BE ADJUSTABLE AT THE LOCAL ROOM TEMPERATURE SENSOR.
   - B. INITIAL SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS:
     - a. OFFICES, CIRCULATION SPACES & TOILET ROOMS:

OCCUPIED COOLING	75 DEGREES F
OCCUPIED HEATING	72 DEGREES F
UNOCCUPIED COOLING	80 DEGREES F
UNOCCUPIED HEATING	65 DEGREES F

     - b. UTILITY ROOMS (ELECTRICAL ROOMS, MECH. ROOMS & PENTHOUSES):

COOLING OR VENTILATION	85 DEGREES F (24 HOURS)
HEATING	60 DEGREES F MIN (24 HOURS)

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31062
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PROFESSIONAL ENGINEER

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811 Middle Street
Middletown CT 06457
860.632.1682
ceseng.com
CES #2025564.00

CONSULTANT

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

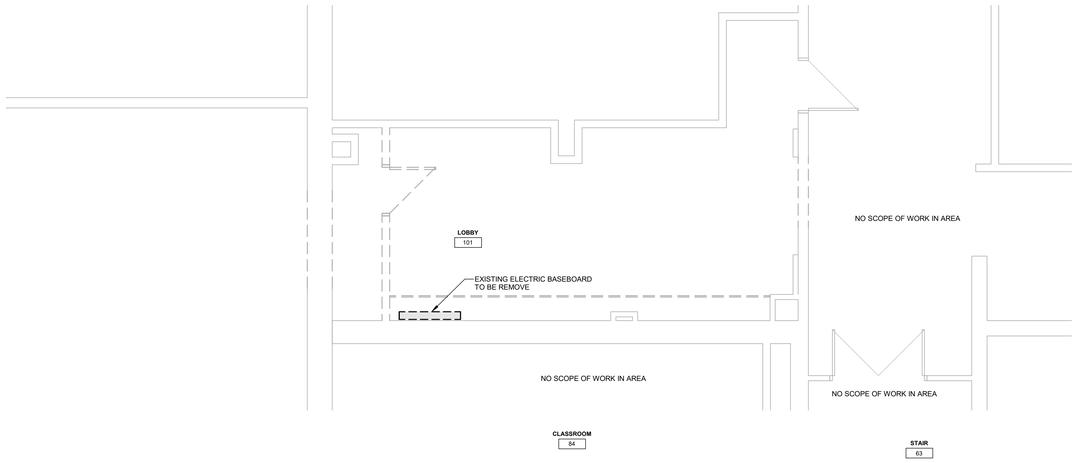
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MECHANICAL ABBREVIATIONS, NOTES AND SYMBOLS

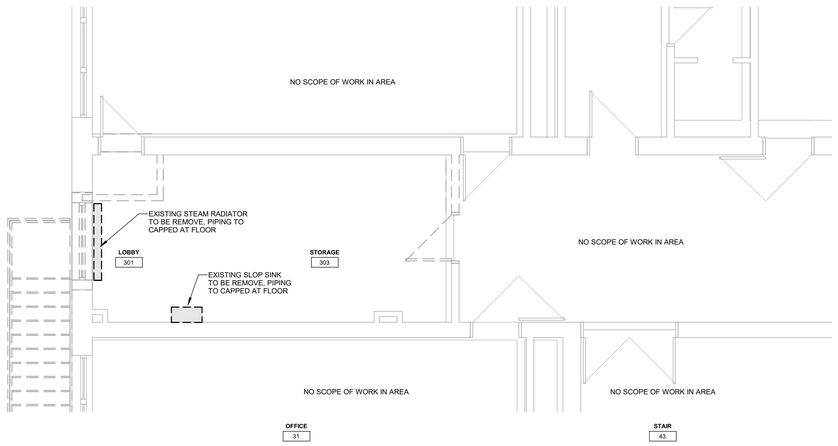
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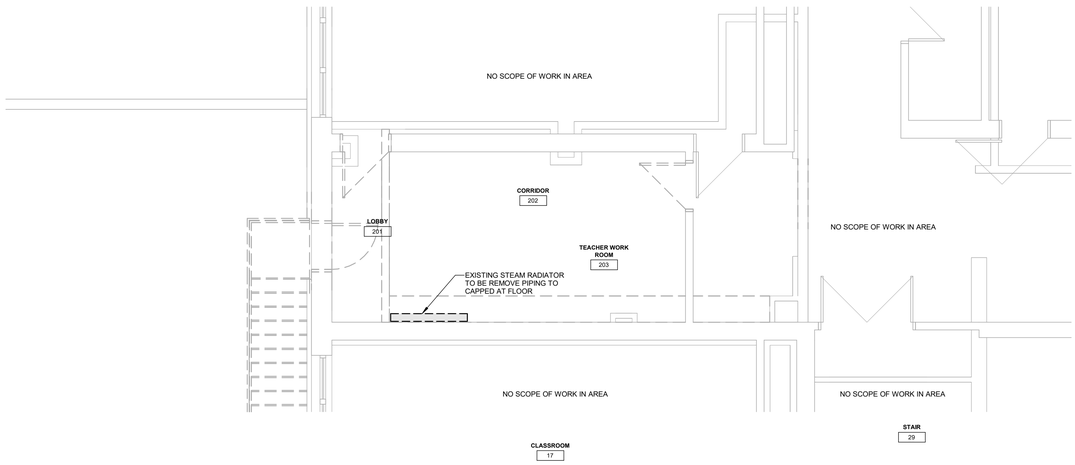
M0.0



1 MECHANICAL DUCTWORK FIRST FLOOR DEMOLITION PLAN
1/4" = 1'-0"



3 MECHANICAL DUCTWORK THIRD FLOOR DEMOLITION PLAN
1/4" = 1'-0"



2 MECHANICAL DUCTWORK SECOND FLOOR DEMOLITION PLAN
1/4" = 1'-0"

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DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

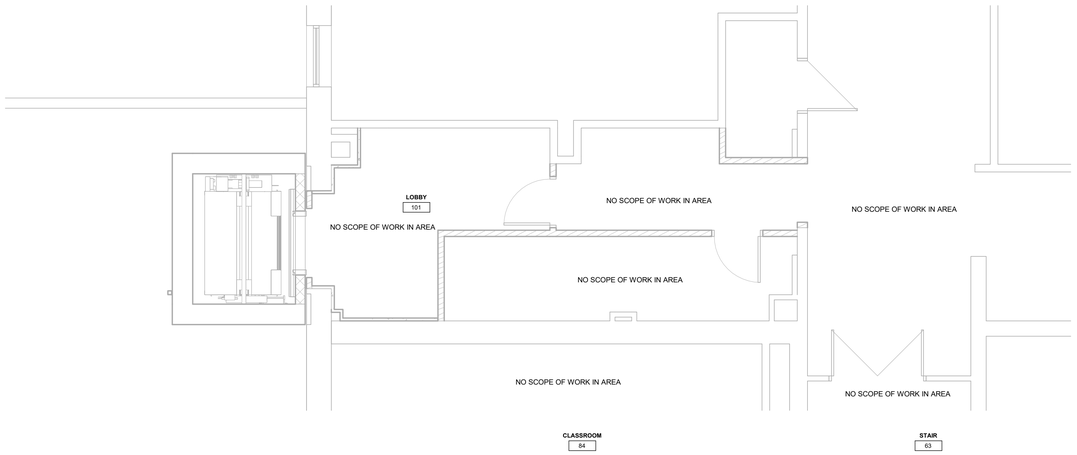
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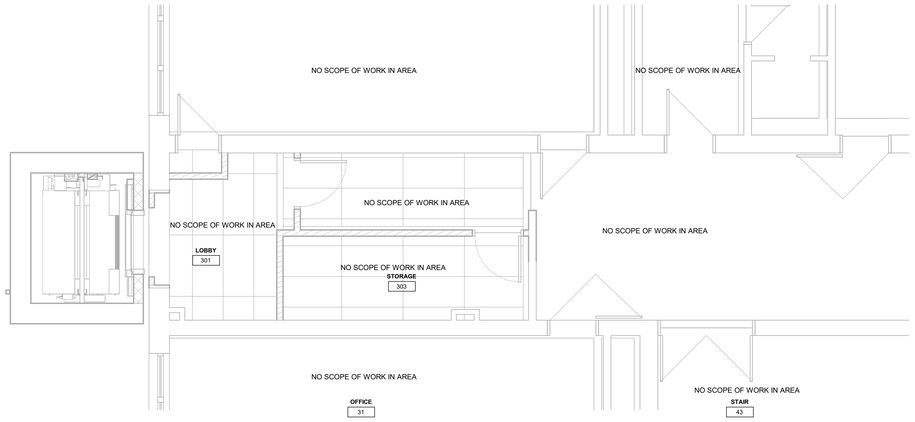
MECHANICAL DEMOLITION PLANS

DATE: 1/15/2026
SCALE 1/4" = 1'-0"
PROJ. #: 2022_049A
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1/7/2026 8:58:23 AM

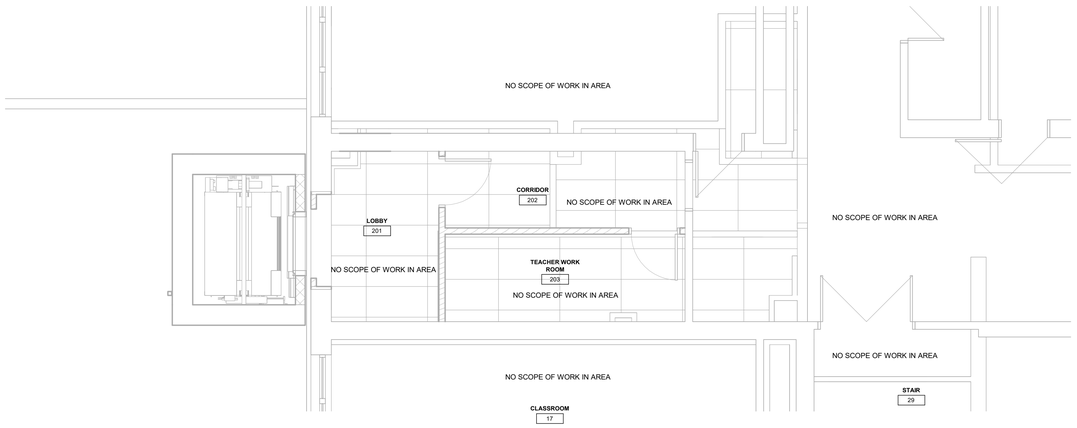
SHEET NO.
MD1.1



1 MECHANICAL DUCTWORK FIRST FLOOR LOWER
1/4" = 1'-0"



3 MECHANICAL DUCTWORK THIRD FLOOR
1/4" = 1'-0"



2 MECHANICAL DUCTWORK SECOND FLOOR
1/4" = 1'-0"

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DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

NO.	DATE	DESCRIPTION

MECHANICAL NEW WORK PLANS

DATE: 1/15/2026
SCALE 1/4" = 1'-0"
PROJ. #: 2022_049A
DRAWN: TLR
CHECKED: MFC
1/7/2026 8:58:24 AM

SHEET NO.
M1.1

WOODROW WILSON ELEMENTARY SCHOOL
ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CONNECTICUT

STATE PROJECT NO. 151-0316 LUE

ISSUE FOR BID: xx/xx/2026

Building Official:		
(Print Name)	(Signature)	(Date)
Fire Marshal:		
(Print Name)	(Signature)	(Date)
Section 504 Official:		
(Print Name)	(Signature)	(Date)
Health Inspector:		
(Print Name)	(Signature)	(Date)

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FRIAR ARCHITECTURE
21 TALCOTT NOTCH ROAD
FARMINGTON, CONNECTICUT

CIVIL ENGINEER
ALFRED BENESCH & CO.
120 HEBRON AVENUE, 2ND FLOOR
GLASTONBURY, CT 06033

STRUCTURAL ENGINEER
MICHAEL HORTON ASSOCIATES, INC.
780 EAST MAIN STREET
BRANFORD, CT 06405

MEP/FP ENGINEER
CONSULTING ENGINEERING SERVICES
811 MIDDLE STREET
MIDDLETOWN, CT 06457

MAYOR
HONORABLE PAUL K. PERNEREWSKI, JR

SUPERINTENDENT OF SCHOOLS
DR. DARREN SCHWARTZ

INDEX OF DRAWINGS

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R1.3	THIRD FLOOR EGRESS PLAN
CIVIL	
C1.0	DEMOLITION & SITE PREPARATION PLAN
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M0.1	MECHANICAL SPECIFICATIONS
M1.1	MECHANICAL NEW WORK PLANS



SITE LOCATION MAP

SET NUMBER

CODE INFORMATION

Date of Original Construction: 1950 Renovation: 2026

1. GROUP CLASSIFICATION
   (Primary): EDUCATION (E)
   (Incidental):

2. SPRINKLER PROTECTION
   ____ Entire Building
   X Limited Area

3. CODES TO WHICH THIS PROJECT WAS DESIGNED — Dated:

2021 International Building Code *	2021 International Residential Code *
2021 International Mechanical Code *	2021 International Existing Building Code *
2021 International Plumbing Code *	2017 Accessible and Usable Buildings and Facilities (ICC A117.1-2017)*
2021 International Energy Conservation Code *	2020 National Electrical Code (NFPA 70)*
2019 Installation of Sprinkler Systems (NFPA 13)	2021 International Fire Code *
2021 Life Safety Code (NFPA 101) *	2021 International Swiming Pool & Spa Code *
2021 Fire Code (NFPA 1) *	

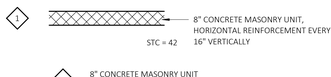
* With Connecticut Amendments and General Statute requirements

4. THRESHOLD BUILDING CONDITIONS X Yes ____ No

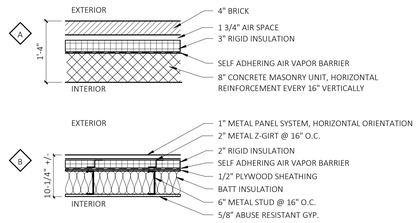
5. BUILDING AREAS FOR GRANT CALCULATIONS (ENTIRE FACILITY)

EXISTING UNRENOVATED CONSTRUCTION	44,455 SF
EXISTING RENOVATED CONSTRUCTION	225 SF
EXISTING BEING DEMOLISHED	
TOTAL EXISTING CONSTRUCTION	44,680 SF
TOTAL NEW CONSTRUCTION	166 SF
TOTAL FACILITY	44,846 SF

INTERIOR WALL TYPES



EXTERIOR WALL TYPES



TYPICAL NOTES

1. ALL ACOUSTICAL WALL ASSEMBLIES ARE TO BE SEALED TOP AND BOTTOM, TERMINATE AT THE UNDERSIDE OF THE FLOOR ABOVE OR THE ROOF ABOVE, TYPICAL.
2. ALL FIRE RATED WALLS ARE TO BE SEALED TOP AND BOTTOM, TERMINATE AT THE UNDERSIDE OF THE FLOOR ABOVE OR THE ROOF ABOVE, TYPICAL.
3. ALL INTERIOR WALLS ARE TO BE SEALED TOP AND BOTTOM, TERMINATE AT THE UNDERSIDE OF THE FLOOR ABOVE OR THE ROOF ABOVE, TYPICAL.
4. FOR BOND BEAMS, REINFORCING AND OR SHEAR WALLS, REFER TO STRUCTURAL DRAWINGS, TYPICAL.
5. SEAL ALL THRU WALL PENETRATIONS TO MAINTAIN CONSISTENT FIRE, SMOKE AND STC RATINGS. ALL PENETRATIONS INCLUDING BUT NOT LIMITED TO ALL ELECTRICAL (CONDUITS & BOXES), MECHANICAL (DUCTS, PIPES), PLUMBING AND FIRE PROTECTION PIPING. SEE WALL TYPES FOR ASSOCIATED RATINGS AND SEE SEALANT SPECIFICATIONS FOR TYPES.
6. CONTRACTOR TO VERIFY THAT ALL FIRE ASSEMBLIES ARE CONSTRUCTED IN ACCORDANCE WITH APPROVED LISTED ASSEMBLIES PER CURRENT U.L. FIRE RESISTANCE DIRECTORY.
7. MOISTURE RESISTANT GYPSUM BOARD IS TO BE USED IN LIEU OF ABUSE RESISTANT GYPSUM BOARD ON ALL INTERIOR FACES OF TOILET ROOMS.
8. ALL INTERIOR GYPSUM WALL PARTITIONS TO HAVE ABUSE RESISTANT GYPSUM BOARD CONSTRUCTION EXTENDING 1'-0" ABOVE CEILING HEIGHT. STANDARD GYPSUM BOARD SHALL BE USED ABOVE CEILING AND EXTENDING TO DECK ABOVE. EXCEPT WHERE NOTED OTHERWISE.
9. NOT ALL WALL TYPES SHOWN ARE USED IN PROJECT. REFER TO FLOOR PLAN.

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PROFESSIONAL SEAL

STATE OF CONNECTICUT — FRIAR ARCHITECTURE, INC. — NO. 113 — CORPORATE PRACTICE of ARCHITECTURE

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION

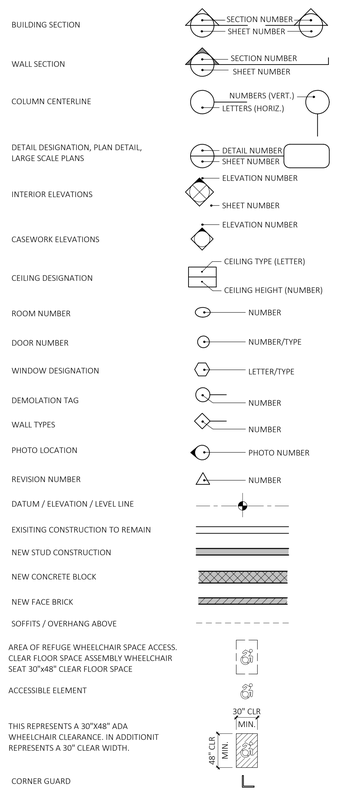
ABBREVIATIONS

ABOVE FINISH FLOOR	A.F.F.	COLUMN	COL	FEET, FOOT	FT.	OFFICE	OFF.	SPLASH BLOCK	S.B.
ABOVE FINISH GRADE	A.F.G.	CONFERENCE	CONF.	FINISH, FINISHED	FIN.	ON CENTER	O.C.	SQUARE	SQ.
ACOUSTIC TILE	AC.,A.C.T.	CONTROL OR		FIRE DAMPER	FD.	OPPOSITE HAND	O.H.	SQUARE INCH (S)	SQ.IN.
AIR CONDITIONING	A.C.	CONSTRUCTION JOINT	C.J.	FIRE EXTINGUISHER/FIRE BLANKET	FEB	OPENING	OPG.	SQUARE YARD (S)	SQ.YD.
AIR HANDLING UNIT	A.H.U.	CONTINUOUS	CONT.	CABINET		OUTSIDE DIAMETER	O.D.	SQUARE FEET (FOOT)	S.F.
ALTERNATE	ALT.	CONTRACTOR	CONTR.	FIRE EXTINGUISHER CABINET	FEC	PAINTED	PTD.	STAINLESS STEEL	ST. STL.
ALUMINUM	ALUM.	CORRIDOR	CORR.	FIRE EXTINGUISHER & BRACKET	FE	PAIR	PR.	STANDARD	STD.
ANCHOR, ANCHORAGE	ANCH.	COURSE / COURSES	CRS.	FIRE RETARDANT	FR.	PAPER TOWEL DISPENSER	P.T.D.	STEEL	STL.
ANCHOR BOLTS	ABL	DAMPPROOFING	DAMPR.	FIREPROOFING	FPRFG.	PERPENDICULAR	PERP.	STORAGE	STOR.
ANGLE	ANG	DEGREE	DEG.	FIXTURE	FIXT.	PLASTER	PLAS.	STRUCTURAL	STRUCT.
ANODIZED	ANOD.	DEMOLITION	DEMO.	FLASHING	FLASH. FL.	PLASTIC LAMINATE	P.LAM.	STRUCTURAL GLAZED	
APPROVED	APPD.	DEPARTMENT	DEPT.	FLOOR DRAIN	FD.	PLATE	PL.	FACING TILE	SGFT.
ARCHITECTURAL / ARCHITECT	ARCH.	DETAIL	DET.	FLOOR FINISH	FLR. FIN.	PLUMBING	PLBG.	STRUCTURAL STEEL	STRUCT. STL.
ASBESTOS	ASB.	DIAMETER	DIA.	FOOTING	FTG.	PLYWOOD	PLYWD.	SUSPEND, SUSPENSION	SUSP.
ASPHALT	ASPH.	DIMENSION	DIM.	FOUNDATION	FDN.	PRECAST	P.C.	SURFACE	SURF.
ASSEMBLY	ASSY.	DISTANCE	DIST.	FUME HOOD	F.H.	PREFABRICATED	PREFAB.	SYSTEM	SYS.
ASSISTANT	ASST	DOOR	DR.	FURNISH / FURNISHED	FURN.	PRESSURE TREATED	PROJ. PT.	TACKBOARD	TBD.
AT	@	DOUBLE	DBL.	FURRED / FURRING	FURR	PROJECT, PROJECTION POINT	P.T.	TELEPHONE	TEL.
AUTOMATIC	AUTO.	DOUBLE HUNG	D.H.	INCH OR INCHES	IN.	QUANTITY	QTY.	TEMPERATURE / TEMPORARY	TEMP.
BEAM	BM.	DOWN	DN.	INCLUDE / INCLUDING	INCL.	QUARRY TILE	Q.T.	TOUNGE & GROOVE	T & G
BEARING	BRG.	DOWNSPOUT	D.S.	INFORMATION	INFO.	RADIUS	RAD.	THRESHOLD	THLD.
BETWEEN	BET.	DRAWING	DWG.	INSIDE DIAMETER	I.D.	RAIN WATER LEADER	RWL.	THICK	THK.
BEVEL / BEVELED	BEV.	DRINKING FOUNTAIN	D.F.	INSULATION	INSUL.	RECEIVING	RECV.	TOILET	TLT
BITUMINOUS	BIT.	EACH	EA.	INTERIOR	INT.	REFRIGERATOR	REF.	TOP OF	T/O
BLOCK	BLK.	ELECTRIC / ELECTRICAL ELECTRICAL	ELEC.	JOINT	JT.	REINFORCED / REINFORCING	REINF.	TREAD	T.
BLOCKING	BLKG.	WATER COOLER	EWC.	KICK PLATE	KP.	REQUIRED	REQ'D.	TYPICAL	TYP.
BOARD	BD.	ELEVATION	EL.	LABORATORY	LAB.	REVISION / REVISED	REV.	UNDERWRITER'S LABS	U.L.
BOTTOM OF	B/O	ELEVATOR	ELEV.	LAVATORY	LAV.	RISER	R	UNIT HEATER	U.H.
BOTTOM	BTM.	EXISTING FIRE EXTINGUISHER	EXFE	LIGHTING	LTG.	ROOF DRAIN	R.D.	UNIT VENTILATOR	U.V.
BUILDING	BLDG.	EMERGENCY	EMG.	MACHINE	MACH.	ROOM	RM.	UNLESS NOTED OTHERWISE	U.N.O.
BUILT-UP ROOF	B.U.R.	EQUAL	EQ.	MAINTENANCE	MAINT.	SANITARY NAPKIN DISPENSER	S.N.D.	URINAL	UR.
CABINET UNIT HEATER	C.U.H.	EQUIPMENT	EQUIP.	MANUFACTURER	MFR.	SANITARY NAPKIN	S.N.R.	VENT THROUGH ROOF	V.T.R.
CAPACITY	CAP.	EXISTING	EXIST.	MARKER BOARD	MBD.	SCHEDULE	SCHED.	VERIFY IN FIELD	V.I.F.
CEILING	CLG.	EXISTING TO REMAIN	ETR.	MASONRY	MAS.	SCUPPER	SC.	VERTICAL	VERT.
CEILING HEIGHT	CLG.HGT.	EXPANSION JOINT	E.J.	MASONRY OPENING	M.O.	SECTION	SECT.	VINYL ASBESTOS TILE	V.A.T.
CEMENT	CEM.	EXTERIOR INSULATION	EXT. EIFS.	MATERIAL	MATL.	SEISMIC JOINT	S.J.	VINYL COMPOSITION TILE	V.C.T.
CENTER	CTR.	FINISH SYSTEM		MAXIMUM	MAX.	SERVICE SINK	S.S.	WATER CLOSET	W.C.
CENTERLINE	CL			MECHANICAL	MECH.	SHEET	SHT.	WATERPROOFING	W.P.
CERAMIC	CT			METAL	MET.	SHOWER/EYEWASH	S/E	WELDED WIRE FABRIC	W.W.F.
CHALKBOARD	C.BD.			MEZZANINE	MEZZ.	SIMILAR	SIM.	WEIGHT	WT.
CHANNEL	CH.			MINIMUM	MIN.	SOAP DISPENSER	S.D.	WHITE BOARD	WBD.
CLOSET	CLOS.			MISCELLANEOUS	MISC.	SOUND TRANSMISSION CLASS	S.T.C.	WITH	W/
						SPECIFICATIONS	SPEC.	WOOD	WD.

INTERIOR ABBREVIATIONS

ACID CABINET	ACID	PRIVACY CURTAIN	PC
ACOUSTICAL WALL PANEL	AWP	PAINTED CONCRETE FLOOR	PCF
BUTCHER BLOCK COUNTERTOP	BB	PROJECTION SCREEN	PJS
BASE CABINET	BC	PLASTIC LAMINATE	PL
CARPET (TILE AND/OR BROADLOOM)	C	PHENOLIC RESIN COUNTERTOPS	PR
CUBICAL CURTAIN	CC	PORCELAIN TILE	PT
CEMENTITIOUS TOPPING	CMT	PAPER TOWEL DISPENSER	PTD
CERAMIC TILE BASE	CTB	QUARRY TILE	QT
COUNTER	CTR	QUARRY TILE BASE	QTB
CERAMIC WALL TILE	CWT	RUBBER BASE	RB
DECORATIVE WALL PANEL	DCPL	REFRIGERATOR	REF
DISPLAY CASE	DC	RUBBER TILE	RT
DISTILLER	DST	RUBBER STAIR TREAD/RISERS	RST
DISHWASHER (GLASSWARE)	DW	SEALED CONCRETE	SC
ENTRY MAT	EM	STAINED CONCRETE	STCT
ENTRY GRILLE	EG	STAGE CURTAIN	STGC
EPOXY PAINT	EP	EMERGENCY SHOWER/EYEWASH	SF
EXPLOSION PROOF REFRIGERATOR	EPR	SPORTS FLOOR	SF
EPOXY RESIN FLOORING	ER	SOLID SURFACE	SS
EPOXY RESIN COUNTERTOP	ERS	SAFETY SHEET GOOD	SSG
EPOXY TERRAZZO	ET	STAINLESS STEEL COUNTERTOP	STS
EXISTING TO REMAIN	ETR	SHEET VINYL FLOORING	SV
FIRE EXTINGUISHER/FIRE BLANKET CABINET	FEB	SOLID VINYL SHEET GOOD	SVS
FIRE EXTINGUISHER CABINET	FEC	SOLD VINYL TILE	SVT
FIRE EXTINGUISHER & BRACKET	FE	TACKBOARD	TBD
FOLIO CABINET	FC	TERRAZZO FLOORING	TF
FLAMMABLE CABINET	FLAM	TACK STRIP	TS
GLAZED BLOCK BASE	GBB	UPPER WALL CABINET	UC
GOGGLE CABINET	GC	UNDER COUNTER REFRIGERATOR	UCR
GROUT	GT	VENEER CABINETRY	V
HORIZONTAL BLINDS	HB	VINYL BASE	VB
HIGH PRESSURE WALL PANEL	HPWP	VINYL COMPOSITE TILE	VCT
HANDRAILS, RAILINGS & STRINGERS	HR	VERTICAL SLIDING WHITEBOARD	VS MBD
ICE MAKER	ICE	VINYL TILE	VT
INTELLIGENT BOARD	INTBD	VINYL WALL COVERING	VWC
LINOLEUM	L	WALL BASE	WB
LOCKER	LK	WALL COVERING	WC
LUXURY RESILIENT FLOORING	LRF	WOOD	WD
LINOLEUM SHEET FLOORING	LS	WOOD CASEWORK	WDC
LINOLEUM TILE	LT	WOOD TALL CABINETS	WDT
LUXURY VINYL TILE	LVT	WOOD UPPER CABINETS	WDU
METAL CABINETRY	MC	WALK-OFF MAT	WM
MARKERBOARD	MBD	WALL PROTECTION/PADDING	WP
MULTI-COLORED INTERIOR COATING	MCIC	WINDOW SHADES	WS
METAL PANEL	MP		
MOTORIZED SHADE	MS		
MICROWAVE	MW		
PAINT	P		

ARCHITECTURAL SYMBOLS



ARCHITECTURAL MATERIALS

ACOUSTICAL TILE		PLASTER	
ALUMINUM		PLYWOOD (SMALL)	
BATT INSULATION		RIGID INSULATION	
BITUMINOUS		ROUGH WOOD (CONTINUUS)	
BRASS OR BRONZE		ROUGH WOOD (INTERUPTED)	
CARPET		RUBBLE	
CAST STONE		SHEATHING INSUL.	
CERAMIC TILE		SLATE, FLAGGING, SOAPSTONE	
C.M.U.		STEEL	
CONCRETE		STRUCTURAL CLAY	
EARTH		STRUCT. GLAZED FACING TILE	
FACE BRICK		TERRA-COTTA	
FACE GRAIN		TERRAZZO	
FINISHED WOOD			
FIRE BRICK			
GLASS BLOCK			
GLAZED BRICK			
GLAZING			
GRAVEL			
GYSUM BOARD			
MARBLE			
METAL LATH			
METAL (SMALL)			

ELEVATIONS

BRICK	
CONCRETE BLOCK	
CERAMIC TILE	
GLASS	
METAL PANEL CORRUGATED	
SLATE, FLAGGING, SOAPSTONE	
FLAT METAL PANEL	

MOUNTING HEIGHTS

ELECTRICAL MOUNTING HEIGHTS

ALL MOUNTING HEIGHTS TO BE COORDINATED WITH BLOCK COURSING AS OCCURS. CONSULT ARCHITECT IF EXISTING CONDITIONS DIFFER

ALL DIMENSIONS ARE TO THE CENTER OF DEVICE UNLESS OTHERWISE NOTED.
SEE ELECTRICAL DRAWINGS FOR TYPES AND LOCATIONS.

RECEPTACLES : 18" A.F.F. (AT LOCATIONS ABOVE CASEWORK, MOUNT BOTTOM OF RECEPTACLE AT 2" ABOVE BACKSPLASH. AT LOCATIONS BELOW CASEWORK, MOUNT AT 24" A.F.F.)

WIREMOLD: 24" A.F.F. (AT LOCATIONS ABOVE CASEWORK, MOUNT BOTTOM OF WIREMOLD AT 2" ABOVE BACKSPLASH)

EXTERIOR RECEPTACLES: 24" A.F.G. (20" A.F.F.)

SWITCHES: 48" A.F.F.

BOILER EMERGENCY SWITCHES: 60" A.F.F.

DATA/PHONE OUTLETS: 18" A.F.F.

TV OUTLETS: 18" A.F.F. OR 18" BELOW FINISHED CEILING*
*FIELD VERIFY CEILING HEIGHTS WITH COORDINATION DRAWINGS

WALL PHONE: 48" A.F.F. TO CENTER OF EARPIECE

SECURITY KEYPAD: 48" A.F.F.

MICROPHONE WALL JACK: 48" A.F.F.

FIRE ALARM PULL STATION: 48" A.F.F.

FIRE ALARM VISUAL/AUDIO INDICATING UNITS: 6'-8" TO BOTTOM OF UNIT

AREA OF REFUGE CALL STATION: 48" A.F.F.

EMERGENCY SHUT-OFF SWITCH / PUSH BUTTON: 48" A.F.F.

EMERGENCY CALL SWITCH: 36" A.F.F.

EMERGENCY CALL BELL / LIGHT: +/- 7'-6" A.F.F., CENTER ABOVE DOOR

WALL MOUNTED EXIT SIGNS: 7'-6" A.F.F

WALL MOUNTED CLOCKS AND SPEAKERS: +/- 7'-6" A.F.F.

NOTES

CONSTRUCTION NOTES

1. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH ALL NATIONAL, STATE AND LOCAL CODES AND ORDINANCES.
2. DO NOT SCALE DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING CLARIFICATION OF DIMENSIONS FROM THE ARCHITECT BEFORE CONTINUING WITH CONSTRUCTION.
3. CONTRACT DRAWINGS MAY VARY FROM ACTUAL FIELD CONDITIONS. CONTRACTOR SHALL CORRECT DIMENSIONS OF ALL MATERIALS TO CARRY OUT OF THE INTENT OF THE CONTRACT DRAWINGS. VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS IN FIELD BEFORE ORDERING ANY MATERIALS. CONTRACTOR SHALL NOTIFY ARCHITECT PROMPTLY OF ANY CRITICAL DISCREPANCIES BEFORE PROCEEDING WITH WORK.
4. ALL NEW WORK SHALL BE IMPLEMENTED SO AS TO PROVIDE A SMOOTH AND CONTINUOUS SURFACE WITH ALL EXISTING CONDITIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK NECESSARY TO ACHIEVE THIS REQUIREMENT, EVEN THROUGH PROCEDURES ARE NOT DETAILED FOR EACH SPECIFIC CONDITION OR COMBINATION OF CONDITIONS. QUALITY OF WORKMANSHIP, MATERIALS AND FINISHES SHALL BE EQUAL TO THE LEVEL ESTABLISHED FOR SIMILAR CONSTRUCTION, EXCEPT WHERE EXISTING APPEARANCE IS TO BE MATCHED TO ACHIEVE CONTINUITY.
5. CUTTING AND PATCHING SHALL BE THE RESPONSIBILITY OF THE TRADE WHOSE WORK RESULTS IN THE NEED FOR CUTTING AND PATCHING UNLESS A SPECIFIC CONTRACTOR IS CALLED OUT ON THE DRAWINGS. ALL HOLES LEFT BY REMOVING MECHANICAL, PLUMBING AND ELECTRICAL EQUIPMENT, ETC. SHALL BE PATCHED.
6. UNLESS OTHERWISE NOTED OR DIMENSIONED, NEW PARTITIONS SHALL BE CENTERED ON BUILDING COLUMN GRID OR WINDOW MULLIONS.
7. CONTRACTOR SHALL PROVIDE WOOD BLOCKING AT WALLS AS REQUIRED TO SUPPORT SHELVES, CABINETS TV BRACKETS AND RELATED ITEMS.
8. WHERE REQUIRED, SEISMIC BRACING SHALL BE PROVIDED AT SUSPENDED CEILINGS. SEE A9.X.
9. ALL EGRESS DOORS SHALL BE NON-LOCKING IN DIRECTION OF TRAVEL.
10. ALL PARTITIONS ARE TO EXTEND TO UNDERSIDE OF DECK ABOVE.

GENERAL NOTES

1.) DIMENSION CRITERIA

A. FROM FACE TO METAL STUD TO FACE OF METAL STUD
B. FROM FACE TO METAL STUD TO FACE OF CONCRETE MASONRY UNIT
C. FROM FACE TO CONCRETE MASONRY UNIT TO FACE OF CONCRETE MASONRY UNIT

2.) SEE FLOOR PLANS A1.1-A1.9 FOR FIRE EXTINGUISHER LOCATIONS.

3.) REFER TO SHEET R1.2 FOR WALL TYPES

REFERENCE SHEET

DATE:	12/31/2025
SCALE	3/4" = 1'-0"
PROJ. #:	2022-049A
DRAWN:	BKH
CHECKED:	JMY

SHEET NO.
R1.1

EGRESS PLAN LEGEND

101 — ROOM NUMBER

ROOM OCCUPANCY LOAD

725 / 20 = 37 — AREA IN SQUARE FEET / OCCUPANCY LOAD FACTOR

EXIT CAPACITY

100 / 342 — ACTUAL EGRESS OCCUPANCY OF DOOR OR STAIR / MAXIMUM ALLOWABLE EGRESS OCCUPANCY OF DOOR OR STAIR

BR — Balance Exit. Minimum number of exits required per 1018.0

BD — Balance Exit. Exit required due to dead end corridor

BA — Balance Exit. Exit as required for Assembly space.

BT — Balance Exit. Exit as required due to travel distance.

15 → DIRECTION OF TRAVEL WITH ACCUMULATED OCCUPANCY LOAD

* – – – – – – – – – – – – – – – * MAXIMUM TRAVEL DISTANCE FROM FURTHEST POINT

SMOKE PARTITION (TIGHT TO DECK ABOVE)

BUILDING PROPERTY LINE

1 HOUR RATED WALL (TIGHT TO DECK ABOVE)

2 HOUR RATED WALL (TIGHT TO DECK ABOVE)

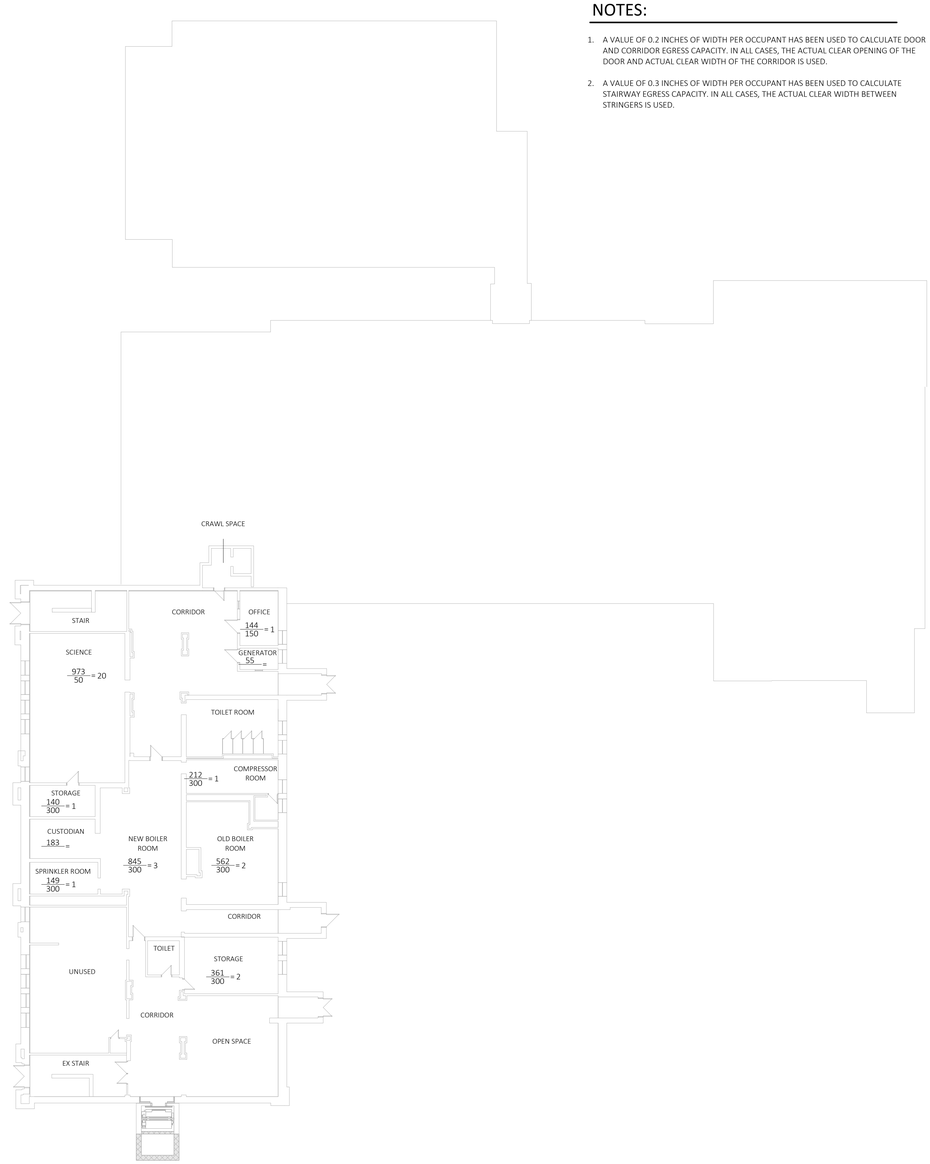
NOTES:

1. A VALUE OF 0.2 INCHES OF WIDTH PER OCCUPANT HAS BEEN USED TO CALCULATE DOOR AND CORRIDOR EGRESS CAPACITY. IN ALL CASES, THE ACTUAL CLEAR OPENING OF THE DOOR AND ACTUAL CLEAR WIDTH OF THE CORRIDOR IS USED.
2. A VALUE OF 0.3 INCHES OF WIDTH PER OCCUPANT HAS BEEN USED TO CALCULATE STAIRWAY EGRESS CAPACITY. IN ALL CASES, THE ACTUAL CLEAR WIDTH BETWEEN STRINGERS IS USED.



2 SECOND FLOOR EGRESS PLAN

SCALE: 1/16" = 1'-0"



1 FIRST FLOOR EGRESS PLAN

SCALE: 1/16" = 1'-0"

architecture
interior design
master planning
FRIAR
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

STATE OF CONNECTICUT — JOYCE R. FRIAR — No. 12358 — LICENSED ARCHITECT

PROFESSIONAL SEAL

STATE OF CONNECTICUT — FRIAR ARCHITECTURE, INC. — NO. 113 — CORPORATE PRACTICE of ARCHITECTURE

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS		
NO.	DATE	DESCRIPTION

FIRST & SECOND FLOOR EGRESS PLAN

DATE: 12/31/2025
SCALE As indicated
PROJ. #: 2022-049A
DRAWN: BKH
CHECKED: JMY

SHEET NO.
R1.2

EGRESS PLAN LEGEND

101 — ROOM NUMBER

ROOM OCCUPANCY LOAD

725 / 20 = 37 — AREA IN SQUARE FEET / OCCUPANCY LOAD FACTOR

EXIT CAPACITY

100 / 342 — ACTUAL EGRESS OCCUPANCY OF DOOR OR STAIR / MAXIMUM ALLOWABLE EGRESS OCCUPANCY OF DOOR OR STAIR

BR — Balance Exit. Minimum number of exits required per 1018.0

BD — Balance Exit. Exit required due to dead end corridor

BA — Balance Exit. Exit as required for Assembly space.

BT — Balance Exit. Exit as required due to travel distance.

15 → DIRECTION OF TRAVEL WITH ACCUMULATED OCCUPANCY LOAD

* – – – – – – – – – – – – * MAXIMUM TRAVEL DISTANCE FROM FURTHEST POINT

SMOKE PARTITION (TIGHT TO DECK ABOVE)

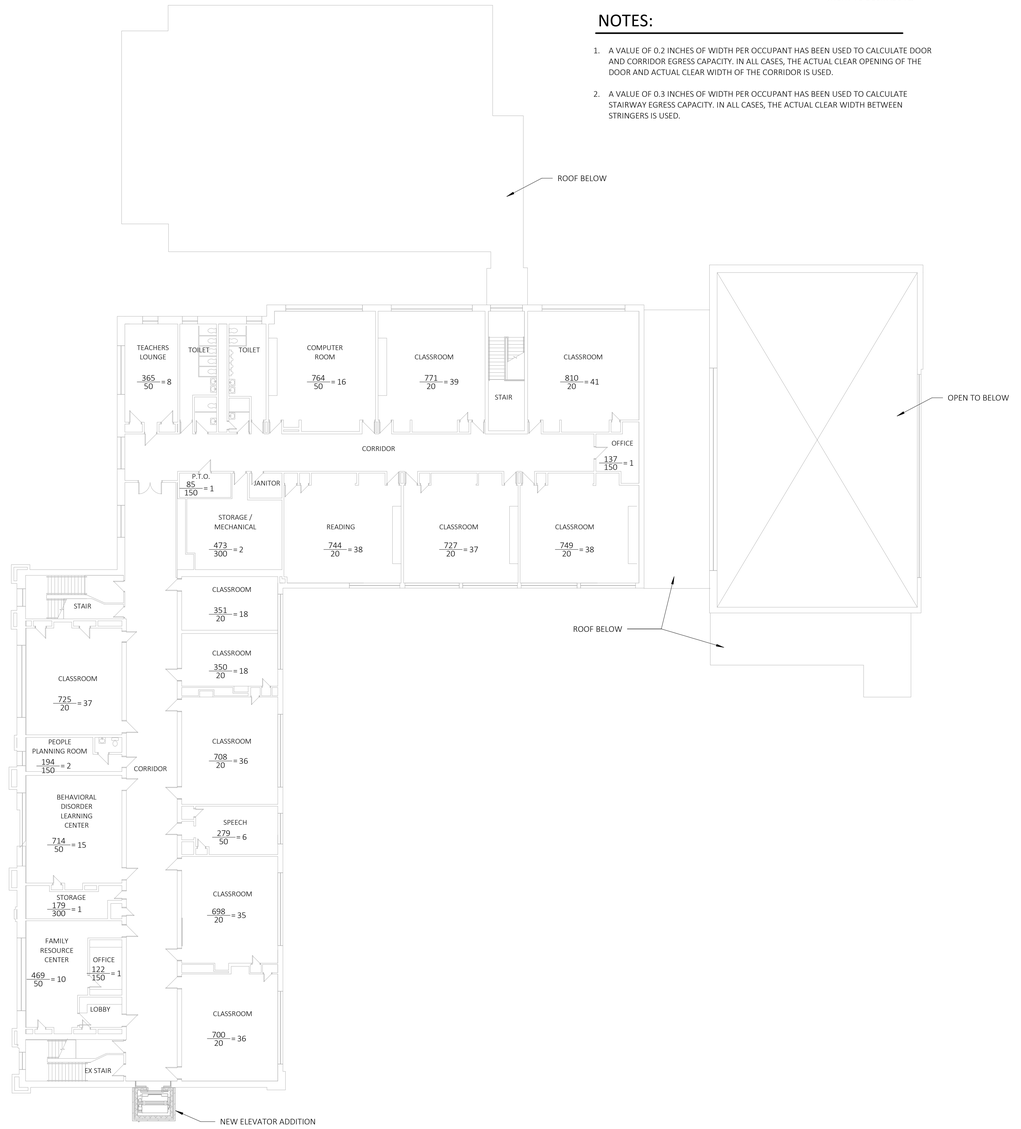
BUILDING PROPERTY LINE

1 HOUR RATED WALL (TIGHT TO DECK ABOVE)

2 HOUR RATED WALL (TIGHT TO DECK ABOVE)

NOTES:

1. A VALUE OF 0.2 INCHES OF WIDTH PER OCCUPANT HAS BEEN USED TO CALCULATE DOOR AND CORRIDOR EGRESS CAPACITY. IN ALL CASES, THE ACTUAL CLEAR OPENING OF THE DOOR AND ACTUAL CLEAR WIDTH OF THE CORRIDOR IS USED.
2. A VALUE OF 0.3 INCHES OF WIDTH PER OCCUPANT HAS BEEN USED TO CALCULATE STAIRWAY EGRESS CAPACITY. IN ALL CASES, THE ACTUAL CLEAR WIDTH BETWEEN STRINGERS IS USED.



1 THIRD FLOOR LEVEL EGRESS PLAN

SCALE: 1/16" = 1'-0"

FRIAR
architecture
interior design
master planning
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

STATE OF CONNECTICUT — BRUCE R. FRIAR — No. 12358 — LICENSED ARCHITECT

PROFESSIONAL SEAL

STATE OF CONNECTICUT — FRIAR ARCHITECTURE, INC. — NO. 113 — CORPORATE PRACTICE of ARCHITECTURE

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

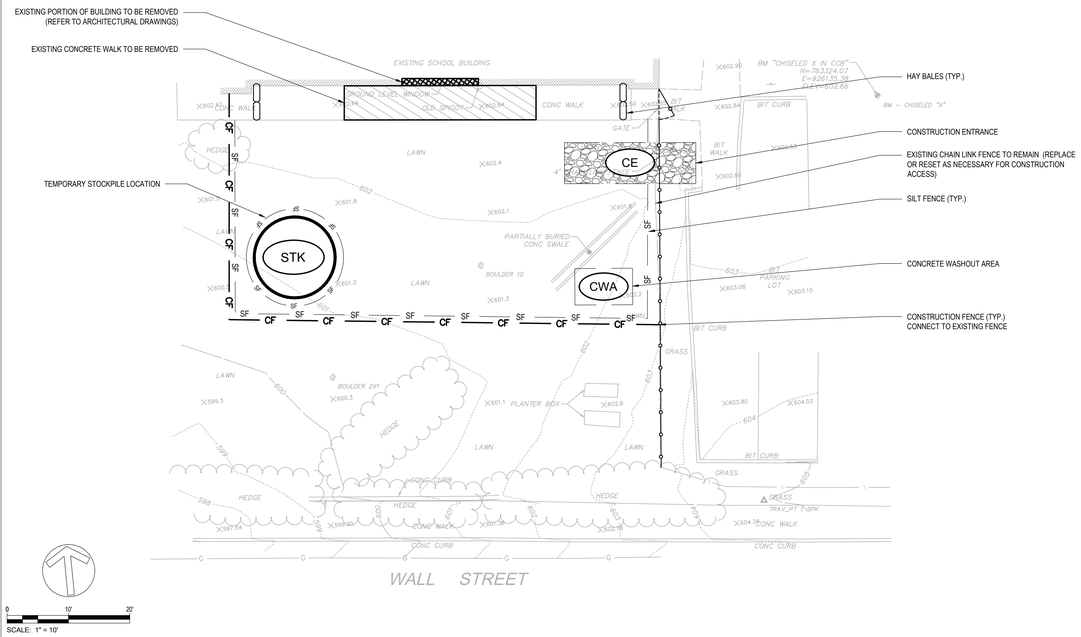
REVISIONS

NO.	DATE	DESCRIPTION

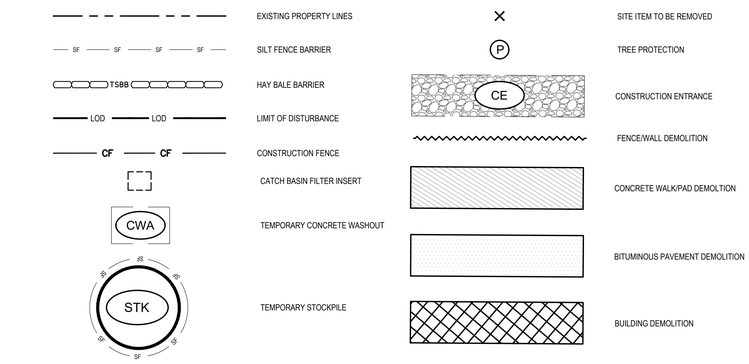
THIRD FLOOR EGRESS PLAN

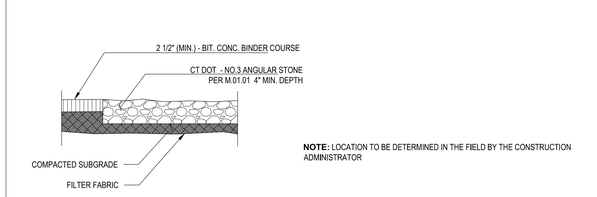
DATE: 12/31/2025
SCALE As indicated
PROJ. #: 2022-049A
DRAWN: BKH
CHECKED: JMY

SHEET NO.
R1.3



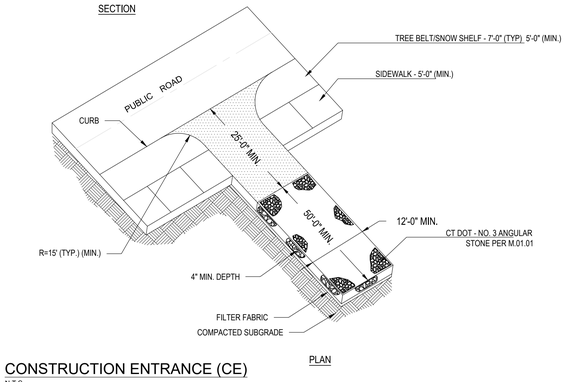
DEMOLITION AND EROSION CONTROL LEGEND





SECTION

NOTE: LOCATION TO BE DETERMINED IN THE FIELD BY THE CONSTRUCTION ADMINISTRATOR

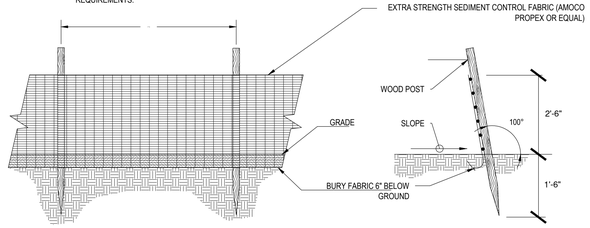


PLAN

CONSTRUCTION ENTRANCE (CE)

N.T.S.

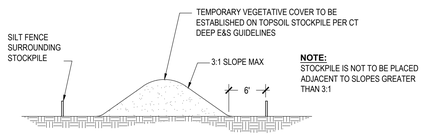
***NOTE:** POST SPACING AND EMBEDMENT VARIES BASED ON THE FABRIC MANUFACTURER'S REQUIREMENTS.



ELEVATION SECTION

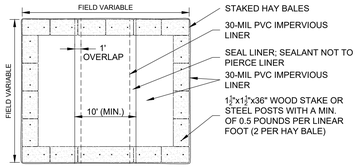
SILT FENCE BARRIER (SF)

N.T.S.

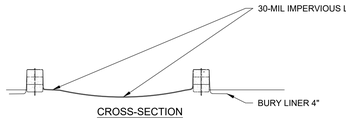


TEMPORARY STOCKPILE (STK)

N.T.S.



PLAN VIEW



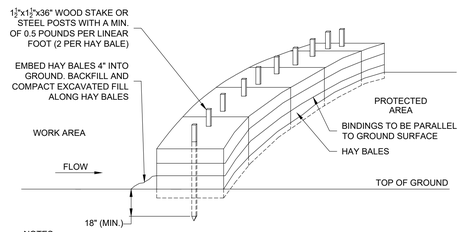
CROSS-SECTION

NOTES:

1. CONSTRUCT WASHOUT AREA LARGE ENOUGH TO ENSURE MATERIALS WILL BE CONTAINED WHERE WASTE CONCRETE CAN SOLIDIFY IN PLACE AND EXCESS WATER CAN SAFELY EVAPORATE.
2. WASHOUT AREA SHALL BE LARGE ENOUGH TO RETAIN ALL LIQUID AND WASTE CONCRETE MATERIALS FROM WASHOUT OPERATION.
3. WEEKLY INSPECTIONS OF WASHOUT AREAS SHALL BE CONDUCTED TO ASSESS THE HOLDING CAPACITY AND FUNCTIONALITY OF THE WASHOUT AREA.

TEMPORARY CONCRETE WASHOUT AREA (CWA)

N.T.S.

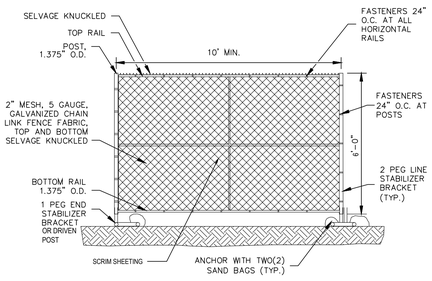


NOTES:

1. HAY BALES SHALL BE MADE OF HAY OR STRAW WITH 40 POUND MIN. WEIGHT AND 120 POUND MAX. WEIGHT HELD TOGETHER BY TWINE OR WIRE.
2. PLACE HAY BALES ON CONTOUR AND WING THE LAST HAY BALES UP SLOPE SO THAT THE TOP OF THE LAST SEVERAL HAY BALES ARE HIGHER THAN THE LINE OF HAY BALES.
3. DRIVE FIRST STAKE IN EACH BALE TOWARD THE PREVIOUSLY LAID BALE TO FORCE THEM TOGETHER.
4. PUT ONE HAY BALE PERPENDICULAR ALONG HAY BALE BARRIER EACH 100 FEET.

HAY BALE BARRIER (HB)

N.T.S.



NOTES:

1. EACH STABILIZER BRACKET SHALL BE SECURED WITH TWO (2) SANDBAGS, MIN. 50 POUNDS EACH.
2. PANELIZED CONSTRUCTION FENCE SHALL ONLY BE USED AT CONSTRUCTION SITE ENTRANCE AREAS, AREAS REQUIRING FREQUENT RELOCATION OF FENCING, OR WHERE PAVED AREAS PROHIBIT INSTALLATION OF DRIVEN FENCE POSTS.

CONSTRUCTION FENCE

N.T.S.

EROSION AND SEDIMENT CONTROL NOTES:

1. THIS PLAN IS FOR EROSION AND SEDIMENTATION (E&S) CONTROL ONLY. SEE OTHER PLANS FOR THE SCOPE OF CONSTRUCTION WORK.
2. THE MEASURES SPECIFIED HEREON ARE THE MINIMUM REQUIREMENTS FOR E&S CONTROL AND ARE SHOWN IN GENERAL SIZE AND LOCATION ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ALL E&S CONTROL MEASURES ARE CONFIGURED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION OF SOILS AND PREVENT THE TRANSPORT OF SEDIMENTS AND OTHER POLLUTANTS TO ANY RESOURCE AREAS. ALL EROSION CONTROLS SHALL BE INSTALLED PRIOR TO ANY SITE WORK. CONTROLS SHOULD BE INSPECTED WEEKLY AND AFTER EACH RAINFALL. EXCAVATED MATERIAL SHOULD NOT BE DISPOSED OF IN THE WETLAND AREA. PROVIDE ADDITIONAL E&S MEASURES AS REQUIRED TO CONTROL EROSION AND SILTATION THROUGHOUT THE DURATION OF THE CONSTRUCTION AS CONDITIONS DICTATE AND/OR AS DIRECTED BY THE OWNER OR THE ENGINEER.
3. MONITOR AND INSPECT ALL E&S MEASURES IN AN ONGOING MANNER THROUGHOUT THE WORK AND TAKE CORRECTIVE MEASURES, AS REQUIRED, TO MINIMIZE EROSION OF SOILS AND PREVENT THE TRANSPORT OF SEDIMENTS AND OTHER POLLUTANTS TO ANY RESOURCE AREAS.
4. ANY EROSION AND SEDIMENTATION MEASURE IMPLEMENTED BEYOND THAT SHOWN HEREON SHALL CONFORM TO APPLICABLE SECTIONS OF THE STATE OF CONNECTICUT'S 2024 "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL."
5. ANY STOCKPILED MATERIAL SHALL BE SUBJECT TO EROSION CONTROL MEASURES THAT INCLUDE A MINIMUM OF SILT FENCE OR HAY BALE BARRIER. COVER STOCKPILES IF SIGNIFICANT RAINFALL IS PREDICTED.
6. PROVIDE TEMPORARY SEEDING WITH MULCH ON ALL EXPOSED SOIL AREAS WHERE WORK WILL BE SUSPENDED FOR LONGER THAN 30 DAYS. APPLY SEED AND MULCH WITHIN THE FIRST 7 DAYS OF SUSPENDING WORK. WHEN SEEDING IS NOT POSSIBLE DUE TO SEASONAL WEATHER CONDITIONS OR OTHER FACTORS, PROVIDE TEMPORARY STRUCTURAL SOIL PROTECTION SUCH AS MULCH, WOODCHIPS, EROSION CONTROL MATTING, OR COMPOST.
7. ALL TEMPORARY SLOPES IN EXCESS OF 3 (HORIZONTAL) TO 1 (VERTICAL) SHALL BE STABILIZED WITH EROSION CONTROL MATTING OR APPROVED EQUIVALENT.
8. NO RUNOFF SHALL BE ALLOWED TO ENTER ANY STORMWATER SYSTEM OR EXIT THE SITE PRIOR TO TREATMENT FOR SEDIMENT REMOVAL.
9. THE CONTRACTOR SHALL MAINTAIN A CLEAN CONSTRUCTION SITE AND SHALL NOT ALLOW THE ACCUMULATION OF RUBBISH OR CONSTRUCTION DEBRIS. ALL TRASH SHALL BE CLEANED ON A DAILY BASIS AND THE SITE SHALL BE LEFT IN A NEAT CONDITION AT THE END OF EACH WORK DAY.
10. TAKE ALL NECESSARY PRECAUTIONS TO AVOID THE SPILLAGE OF FUEL OR OTHER POLLUTANTS AND ADHERE TO ALL APPLICABLE POLICIES AND REGULATIONS RELATED TO SPILL PREVENTION, CONTROL, AND RESPONSE.
11. FOR DUST CONTROL, PERIODICALLY MOISTEN EXPOSED SOIL SURFACES WITH WATER AND MAINTAIN ADEQUATE MOISTURE LEVELS.
12. SWEEP ADJACENT ROADWAYS IF MUD OR SOIL IS TRACKED ON TO THEM, OR AS DIRECTED BY THE ENGINEER.
13. ALL SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE INSTALLED BY THE PERMITTEE AND INSPECTED BY THE TOWN ENGINEER AND/OR THE WETLANDS ENFORCEMENT OFFICER / DULY AUTHORIZED AGENT; ADDITIONAL OR SUPPLEMENTAL CONTROLS MAY BE REQUIRED. THE PERMITTEE SHALL MAINTAIN THE CONTROLS DURING AND AFTER CONSTRUCTION AND REMOVE THEM UPON SITE STABILIZATION OF THE AFFECTED AREA.
14. AN ANTI-TRACKING APRON SHALL BE INSTALLED AT THE SITE ACCESS DRIVE AT A LOCATION APPROVED BY THE TOWN ENGINEER, WITH 6 INCHED OF CRUSHED STONE (SIZED 1 ½" TO 3") UNDERLAIN WITH CONSTRUCTION FRAME SPREAD TO THE TRAVELED WIDTH AND 40 FEET IN LENGTH OR WITH APRON MATS. THE APRON SHALL BE MAINTAINED AT ALL TIMES.
15. THE PERMITTEE AND THEIR CONTRACTOR SHALL MEET WITH AGENCY STAFF, INCLUDING BUT NOT LIMITED TO THE WETLANDS ENFORCEMENT OFFICER / DULY AUTHORIZED AGENT AND TOWN ENGINEER, TO REVIEW THE CONDITIONS OF THIS APPROVAL AND THE CONSTRUCTION PROGRAM TO BE UTILIZED TO IMPLEMENT THE APPROVED REGULATED ACTIVITY.
16. THE WETLANDS ENFORCEMENT OFFICER / DULY AUTHORIZED AGENT SHALL BE NOTIFIED IN WRITING FORTY-EIGHT (48) HOURS PRIOR TO THE START OF CONSTRUCTION.
17. DURING THE DURATION OF THIS APPROVAL, THE CHAIRMAN OF THE AGENCY OR THE WETLANDS ENFORCEMENT OFFICER / DULY AUTHORIZED AGENT SHALL HAVE PERMISSION TO ENTER UPON THE SUBJECT PROPERTY AT REASONABLE TIMES FOR THE PURPOSE OF VIEWING AND INSPECTING THE CONDUCT OF THE APPROVED REGULATED ACTIVITY.
18. NO WORK OTHER THAN MAINTENANCE OF SEDIMENT AND EROSION CONTROL SHALL BE PERFORMED DURING SIGNIFICANT RAINFALL OF ONE (1) INCH OR MORE WITHIN A TWENTY-FOUR (24) HOUR PERIOD. ALL WORK SHALL BE PERFORMED BETWEEN 8:00 AM AND 5:00 PM, MONDAY THROUGH FRIDAY. NO WORK MAY BE CONDUCTED ON LEGAL HOLIDAYS OR WEEKENDS WITHOUT THE EXPRESSED APPROVAL OF THE AGENCY.
19. UPON COMPLETION OF THE REGULATED ACTIVITY APPROVED HEREIN, THE PERMITTEE SHALL NOTIFY THE WETLANDS ENFORCEMENT OFFICER / DULY AUTHORIZED AGENT FOR A FINAL INSPECTION AND CONFIRMATION OF SATISFACTORY COMPLETION AND COMPLIANCE WITH THE APPROVED SITE PLANS AND ALL STANDARD AND SPECIAL SUPPLEMENTAL CONDITIONS, REQUIREMENTS AND MODIFICATIONS OF THIS APPROVAL.

SUGGESTED CONSTRUCTION SEQUENCE:

1. CONDUCT A PRE-CONSTRUCTION MEETING WITH THE OWNER AND ENGINEER PRIOR TO ANY CONSTRUCTION ACTIVITY.
2. INSTALL CONSTRUCTION ENTRANCE(S) AND PLACE CATCH BASIN FILTER INSERTS IN EXISTING CATCH BASINS.
3. INSTALL PERIMETER E&S CONTROLS AND REQUEST PRE-CONSTRUCTION INSPECTION FROM THE ENGINEER.
4. REMOVE EXISTING PAVEMENT.
5. PERFORM BULK EARTHWORK OPERATIONS.
6. BEGIN CONSTRUCTION OF BUILDING ADDITION FOUNDATION.
7. CONSTRUCT CURBING, WALKS, AND TOP COURSE OF BITUMINOUS PAVEMENT.
8. AT THE CONCLUSION OF CONSTRUCTION, COMPLETE THE INSTALLATION OF POST-CONSTRUCTION SITE STABILIZATION MEASURES AS SHOWN ON THE DRAWINGS.
9. ONCE SITE IS FULLY STABILIZED REMOVE ALL EROSION CONTROLS.

TEMPORARY E&S MEASURES MAINTENANCE SCHEDULE

E&S MEASURE	MAINTENANCE MEASURES	SCHEDULE
FILTER INSERTS IN DRAINAGE SYSTEM	CLEAN CATCH BASIN GRATE, REMOVE SEDIMENT/DEBRIS FROM FILTER INSERTS	WEEKLY & WITHIN 24 HOURS AFTER STORM GENERATING A DISCHARGE
HAY BALES/ SILT FENCE BARRIER	REPAIR/REPLACE WHEN FAILURE OBSERVED, REMOVE SILT WHEN ACCUMULATION REACHES APPROX. HALF HEIGHT OF BARRIER	WEEKLY & WITHIN 24 HOURS AFTER STORM GENERATING A DISCHARGE
CONSTRUCTION ENTRANCE	SWEEP PAVED ROADWAY ADJACENT TO SITE ENTRANCE AS NECESSARY, REFRESH STONE AS NECESSARY, REMOVE SILTED GRAVEL	WEEKLY
MOISTEN EXPOSED SOILS	PERIODICALLY MOISTEN EXPOSED SOIL SURFACES WITH WATER ON UNPAVED TRAVELWAYS AND KEEP TRAVELWAYS DAMP	DAILY

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architecture interior design master planning
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

PROFESSIONAL SEAL

benesch
Alfred Benesch & Company
200 Glastonbury Blvd., Suite 201
Glastonbury, Connecticut 06033
860-633-8341

CONSULTANT

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 Birch Street
Waterbury, CT 06704

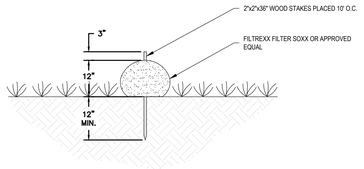
STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

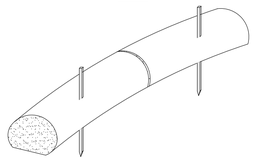
NO.	DATE	DESCRIPTION

DEMOLITION & SITE PREPARATION PLAN

DATE: 01/15/2026	SHEET NO.
SCALE 1" = 10'	
PROJ. #: 2022_049A	
DRAWN: GSL	C1.0
CHECKED: WGW	

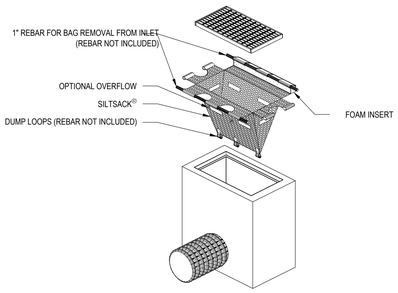


SECTION



FILTER SOCK

N.T.S.



'SILTSACK' SEDIMENT CONTROL DEVICE, TERRAFIX GEOSYNTHETICS INC. TORONTO, ONTARIO, CA WWW.TERRAFIXGEO.COM (OR EQUAL)

SILT SACK DETAIL (SS)

N.T.S.

SITE PREPARATION NOTES:

1. CONTRACTOR SHALL NOTIFY "CALL BEFORE YOU DIG" (1-800-922-4455) AND VERIFY UTILITY MARK-OUT WITH THE OWNER PRIOR TO THE INITIATION OF ANY SITE DISTURBANCE.
2. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR VERIFICATION OF THE LOCATION AND NATURE OF ALL SUBSURFACE UTILITIES AT THE PROJECT WHICH MAY BE AFFECTED BY THE WORK. COORDINATE WITH RESPECTIVE UTILITY OWNERS AND PERFORM VERIFICATION OF TYPE, LOCATION, AND INVERTS AS REQUIRED.
3. PROTECT ALL IMPROVEMENTS NOT INCLUDED WITHIN THE LIMITS OF WORK. ANY IMPROVEMENT WHICH IS DAMAGED SHALL BE REPAIRED OR REPLACED IN-KIND TO THE OWNER'S SATISFACTION.
4. DURING DEMOLITION, PROTECT ALL ADJACENT CURBING, SIDEWALKS, RAMPS, ABOVE-GRADE AND BELOW-GRADE UTILITIES, DRAINAGE STRUCTURES, LIGHT BASES, AND OTHER IMPROVEMENTS POTENTIALLY AFFECTED BY THE WORK. CLEARLY DELINEATE THE LIMITS OF WORK AND MARK, BARRICADE, OR OTHERWISE IDENTIFY THOSE IMPROVEMENTS THAT ARE TO BE PROTECTED AND/OR AVOIDED. ANY IMPROVEMENT WHICH IS DAMAGED SHALL BE REPAIRED OR REPLACED IN-KIND TO THE OWNER'S SATISFACTION.
5. THE LOCATIONS OF EXISTING SITE FEATURES AS SHOWN HAVE BEEN OBTAINED FROM MAPS, SURVEYS, FIELD INSPECTIONS, AND OTHER AVAILABLE INFORMATION. THEY MUST BE CONSIDERED APPROXIMATE BOTH TO LOCATION, SIZE, AND AS-BUILT CONDITION AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ACTUAL FIELD CONDITIONS.
6. THE DIMENSIONS SHOWN ON THE PLANS, INCLUDING THE INTENDED DIMENSIONS OF THE WORK, MAY VARY FROM ACTUAL EXISTING CONDITIONS IN THE FIELD. THE CONTRACTOR SHALL TAKE APPROPRIATE MEASUREMENTS TO VERIFY ALL DIMENSIONS SHOWN ON THE DRAWINGS AS WELL AS OTHER DIMENSIONS HE MAY DEEM APPROPRIATE TO FACILITATE THE COMPLETION OF THE WORK. NOTIFY THE ENGINEER OF ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH THAT PORTION OF THE WORK.
7. IMPLEMENTING WORKER SAFETY AND/OR HEALTH PROTOCOLS THAT ADDRESS COMPLIANCE WITH RULES, LAWS, AND REGULATIONS PERTAINING TO CONSTRUCTION SAFETY AND/OR THE POTENTIAL AND/OR ACTUAL RISK OF EXPOSURE TO SITE-SPECIFIC PHYSICAL OR CHEMICAL HAZARDS IS SOLELY THE RESPONSIBILITY OF THE CONTRACTOR.
8. PRIOR TO THE TERMINATION, ABANDONMENT, OR REMOVAL OF ANY UTILITY, VERIFY THAT APPLICABLE NOTIFICATIONS HAVE BEEN MADE TO THE UTILITY OWNER/OPERATOR AND THAT THE UTILITY HAS BEEN PROPERLY TERMINATED, CAPPED, OR PLUGGED AS REQUIRED.
9. PROVIDE PAVEMENT SAWCUT AT THE EDGE OF EACH PAVEMENT REMOVAL AREA TO ESTABLISH A CLEAN EDGE WHERE NEW WORK WILL MEET EXISTING PAVEMENT. SAWCUT SHALL BE A MINIMUM OF 12 INCHES FROM EDGE OF PAVEMENT REMOVAL.
10. UNLESS OTHERWISE INDICATED, ALL DISTURBED AREAS SHALL BE RESTORED WITH SIX (6) INCHES OF LOAM, SEEDED, FERTILIZED, AND MULCHED. PROVIDE ADDITIONAL EROSION CONTROLS AS REQUIRED.
11. ALL SIDEWALK CLOSURES AND MEASURES FOR TEMPORARY PEDESTRIAN ACCESS, SIDEWALKS, CROSSINGS, AND BIKE LANES SHALL MEET THE APPROVAL OF THE CITY OF WATERBURY.

EROSION AND SEDIMENTATION CONTROL NARRATIVE:

PER STATE OF CONNECTICUT
ALL APPLICABLE PRACTICES RECOMMENDED BY THE 2024 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL AS AMENDED.

DESCRIPTION

THE PROJECT CONSISTS OF PROVIDING ADA ACCESSIBILITY TO THE BUILDING IN THE NORTHERN PARKING LOT AND CONSTRUCTING AN ELEVATOR ADDITION ON THE SOUTHERN BUILDING WALL WITH A CONCRETE WALK FOR ACCESS.

DESIGN AND CRITERIA

NOTE: THE CONTRACTOR SHALL NAME ONE INDIVIDUAL AS HIS SEDIMENT AND EROSION CONTROL SUPERVISOR WHOSE PRIMARY RESPONSIBILITY WILL BE THE MAINTENANCE OF ALL ON-SITE EROSION CONTROL MEASURES. HE WILL KEEP A DAILY LOG OF HIS ACTIVITIES AND AN UPDATED SCHEDULE OF PROPOSED CONSTRUCTION ACTIVITIES. THE LOG WILL BE MADE AVAILABLE TO INSPECTORS.

A. GEOTEXTILE SILT FENCE (SF) - SHALL BE NON-WOVEN MATERIAL, MINIMUM 36" HIGH AND FASTENED TO WOOD STAKES. SILT FENCE SHALL BE INSTALLED WITH END RUNS TURNED UP GRADE AT 45 DEGREES FOR A DISTANCE OF 10 FEET (SEE DETAIL THIS SHEET).

B. TEMPORARY SEEDING (TS)

1. CONTRACTOR SHALL SCARIFY THE SOIL TO A DEPTH OF 2" BEFORE APPLYING FERTILIZER, LIMESTONE AND SEED.
2. SEED MAY BE APPLIED BY HAND OR MECHANICALLY. SEED APPLICATION SHALL BE UNIFORM. SEED RATE SHALL BE IN ACCORDANCE WITH THE 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL AS AMENDED (INCREASE SEEDING RATES BY 10% WHEN HYDROSEEDING. LIMESTONE, FERTILIZER AND SEED MAY BE APPLIED IN SLURRY.)
3. CONTRACTOR SHALL MULCH AREA (MS) IMMEDIATELY FOLLOWING SEEDING. (NOTE: IN THE EVENT SEEDING OPERATIONS ARE NOT FEASIBLE DUE TO SEASONAL RESTRICTIONS OR EXTENDED INCLEMENT WEATHER PATTERNS, THE CONTRACTOR SHALL INSTALL AN EROSION CONTROL BLANKET OVER EXPOSED SOILS.)

C. PERMANENT SEEDING (PS)

1. CONTRACTOR SHALL APPLY TOPSOIL AND FINE GRADE ALL AREAS BEFORE THE APPLICATION OF PERMANENT SEED. APPLY LIMESTONE AND FERTILIZER AS NEEDED, IN ACCORDANCE WITH SOIL TESTS.
2. REMOVE ALL SURFACE STONES ½ INCH AND LARGER. REMOVE ALL OTHER DEBRIS AND RAKE SEED BED.
3. APPLY SEED WITHIN 7 DAYS AFTER ESTABLISHING FINAL GRADES. SEE PLANTING PLAN.

D. STRAW BALE BARRIER (HB) - SHALL BE MADE OF STRAW WITH 40 POUNDS MINIMUM WEIGHT AND 120 POUNDS MAXIMUM WEIGHT, HELD TOGETHER BY TWINE OR WIRE. (SEE DETAIL THIS SHEET.)

E. CONSTRUCTION ENTRANCE (CE) - SHALL BE AN ANGULAR STONE PAD, A MINIMUM OF 12' WIDE AND 50' LONG. (SEE DETAIL THIS SHEET.)

F. EROSION CONTROL BLANKET (ECB) - EROSION MAT SHALL BE PLACED ON ALL EXPOSED CUT/FILL SLOPES STEEPER THAN 3:1 (INCLUDING SWALES & DITCHES) TO PROTECT AGAINST RAINFALL AND HOLD MOISTURE CONTENT TO ENHANCE VEGETATION GROWTH IN SEEDED AREAS. MAT (OR BLANKETS) SHALL BE STRAW OR STRAW/COCONUT FIBER COMBINATION SEWN TOGETHER WITH LIGHTWEIGHT NETTING. USE NORTH AMERICAN GREEN. S150 - SLOPES UP TO 3:1, SC150-SLOPES FROM 3:1 UP TO 2:1 OR GREATER. TEMPORARY HAY MULCH TO BE APPLIED TO AREAS LESS THAN 3:1 SLOPE AND ALL AREAS TO BE LEFT BARREN OVER THE WINTER, MULCH RATE TO BE 70 POUNDS/1000 S.F.

APPLICATION/GENERAL PROCEDURES

SOIL EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSTALLED PRIOR TO ANY SITE DISTURBANCE, AND DEVELOPMENT WILL PROCEED ACCORDING TO A SPECIFIC CONSTRUCTION SEQUENCE. THE OBJECTIVE IS TO MAXIMIZE THE REDUCTION OF SEDIMENT-LADEN RUNOFF THROUGH IMPLEMENTATION OF CONVENTIONAL SOIL SEDIMENTATION AND EROSION CONTROL PRACTICES CURRENTLY RECOMMENDED BY THE 2024 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL.

A. EARTHWORK WILL BE SCHEDULED FOR PERIODS WHEN SOIL SATURATION IS LOW AND SOIL LOSS HAZARD IS AT A MINIMUM.

B. SUSPEND EARTHWORK FOR MAJOR STORM EVENTS AND IMPLEMENT ADDITIONAL SEDIMENTATION AND EROSION CONTROL MEASURES AS NECESSARY.

C. THERE SHALL BE NO CUTS OR FILL LEFT EXPOSED FOR LONGER THAN 30 DAYS. THE ESTABLISHED PROCEDURE OF TEMPORARILY SEEDING AND/OR COVER WITH EROSION PROTECTION (MAT OR STRAW) SHALL BE FOLLOWED TO INSURE MINIMAL SOIL LOSS.

D. THE DISCHARGE OF UNTREATED STORMWATER TO ANY ADJACENT ROADWAYS, DRAINAGE INLETS, OR PROPERTIES IS NOT ALLOWED.

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FRIAR
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

PROFESSIONAL SEAL

benesch
Alfred Benesch & Company
200 Glastonbury Blvd., Suite 201
Glastonbury, Connecticut 06033
860-633-8341

CONSULTANT

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 Birch Street
Waterbury, CT 06704

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

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EROSION & SEDIMENTATION CONTROL NOTES & DETAILS

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SHEET NO.
C1.1

ACCESSIBILITY NOTES:

1. SLOPES ALONG THE ACCESSIBLE ROUTE SHALL BE LESS THAN 1:20 (5%) AND THE CROSS SLOPES SHALL NOT EXCEED 1:50 (2%). CHANGES IN LEVELS SHALL NOT BE GREATER THAN ¼ INCH.
2. LANDINGS SHALL NOT HAVE A SLOPE GREATER THAN 1:50 (2%) IN ANY DIRECTION.
3. SLOPES WITHIN THE ACCESSIBLE PARKING SPACE SHALL NOT EXCEED 1:50 (2%) IN ANY DIRECTION.

MATERIALS NOTES:

1. MATERIALS AND CONSTRUCTION PROCEDURES SHALL COMPLY WITH CT DOT FORM 819, THE CITY OF WATERBURY REGULATIONS AND THE PROJECT MANUAL.
2. ALL LOCATIONS WHERE EXISTING CURBING, BITUMINOUS CONCRETE ROADWAY OR CONCRETE ROADWAY OR CONCRETE SIDEWALK ABUT NEW CONSTRUCTION, THE EDGE OF THE EXISTING CURB OR PAVEMENT SHALL BE SAW CUT TO PROVIDE A CLEAN, SMOOTH EDGE. TACK COAT EXPOSED EDGES OF EXISTING CONCRETE PRIOR TO PLACEMENT OF NEW BITUMINOUS CONCRETE PAVEMENT.
3. MANUFACTURED ITEMS SHALL BE INSTALLED, CONNECTED AND CLEANED ACCORDING TO THE MANUFACTURERS DIRECTIONS.
4. EXPANSION AND SCORE JOINTS FOR NEW CONCRETE WALKS SHALL BLEND TO MATCH EXISTING PATTERNS. CONTRACTOR TO ARRANGE TIMELY ON-SITE CONFERENCES WITH LANDSCAPE ARCHITECT TO APPROVE LAYOUT OF JOINT PATTERNS.
5. PROVIDE EXPANSION JOINTS FOR NEW CONCRETE PAVING AT ALL CURBS, TREE GRATES, BUILDING WALLS, SITE WALLS, STAIRS, LIGHT POLE BASES, MANHOLES, GRATES/VAULTS, EXISTING CONCRETE PAVING, STOP LIGHTS, FIRE HYDRANTS AND ALL OTHER FIXED MATERIALS. MAXIMUM DISTANCE BETWEEN EXPANSION JOINTS SHALL NOT EXCEED 20 FEET.

LAYOUT NOTES:

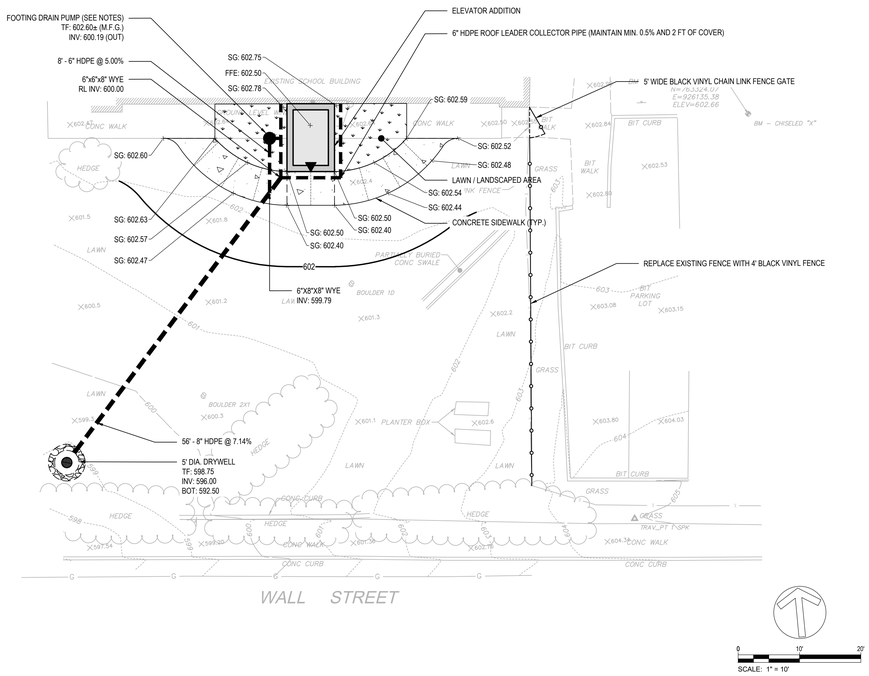
1. NEW PAVEMENT TO MEET LINE & GRADE OF EXISTING PAVEMENTS.
2. ALL LINES AND DIMENSIONS ARE PARALLEL OR PERPENDICULAR TO THE LINES FROM WHICH THEY ARE MEASURED.
3. FIELD ADJUSTMENTS MUST BE APPROVED BY THE OWNER'S REPRESENTATIVE AND APPROPRIATE MUNICIPAL OFFICIALS PRIOR TO CONSTRUCTION.
4. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE VERTICAL AND HORIZONTAL POSITION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
5. A DIGITAL CAD FILE CAN BE PROVIDED TO THE CONTRACTOR FOR THE LAYOUT OF SITE IMPROVEMENTS IN THE FIELD.

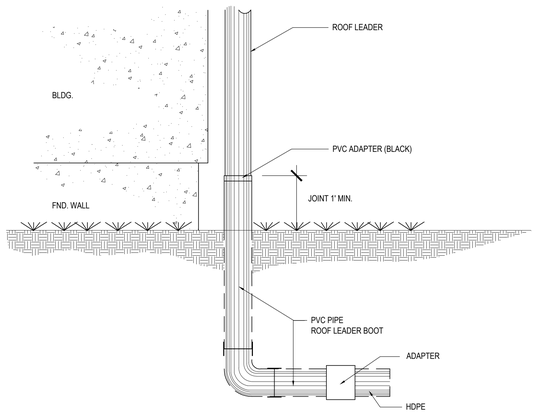
PUMP STATION NOTES:

PUMP STATION TO BE DEFERRED DESIGN SUBMITTED FOR ENGINEER REVIEW AS A SHOP DRAWING. PUMP STATION TO BE DESIGNED BY UNITED CONCRETE PRODUCTS OR SIMILAR VENDOR. PACKAGE SHALL INCLUDE: WET WELL, VALVES, FLOATS, CONTROLS, REMOTE ACCESS, ETC.

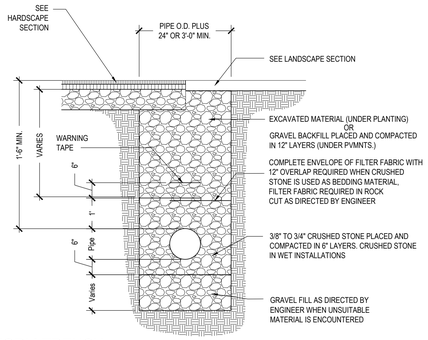
DESIGN PARAMETERS:

- TDH: COORDINATE WITH MEP PLANS
- WET WELL SHALL HOLD MINIMUM 200 GALLONS BELOW THE INLET INVERT
- FORCE MAIN WILL BE APPROXIMATELY 57' AND WILL BE SIZE AS APPROPRIATE FOR THE PUMPS
- SYSTEM SHALL INCLUDE DUPLEX PUMPS ACCESSIBLE VIA A RAIL SYSTEM
- THE PUMP STATION SHALL HAVE A FRAME AND COVER THAT IS FLUSH WITH FINISHED GRADE

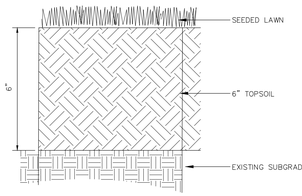




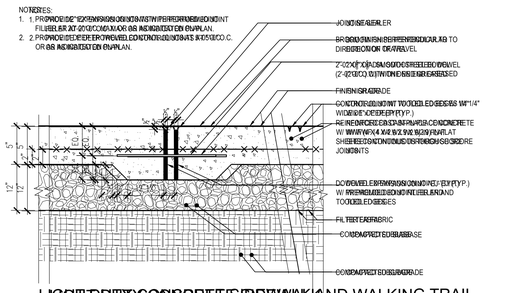
ROOF LEADER BOOT
SCALE: NONE



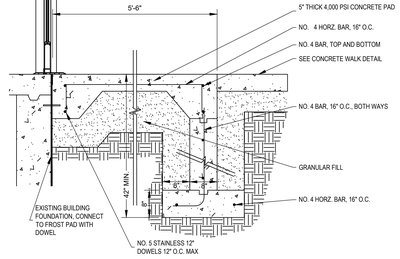
STORM TRENCH
SCALE: NONE



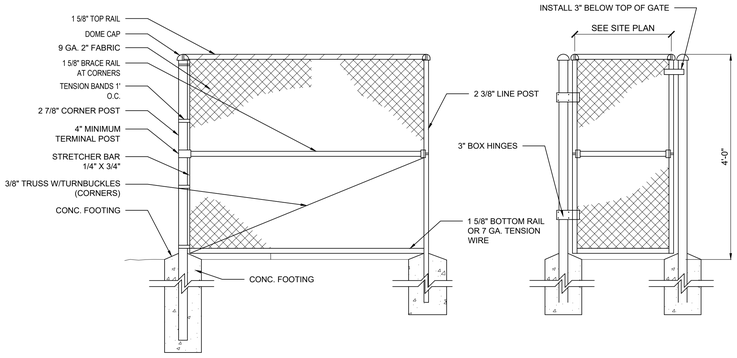
LAWN
SCALE: NONE



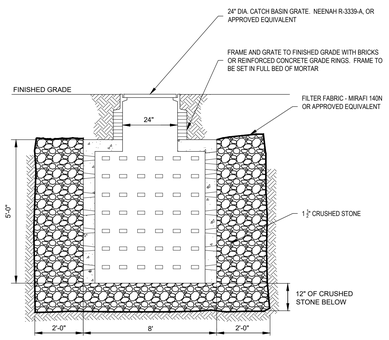
LIGHT DUTY CONCRETE SIDEWALK AND WALKING TRAIL
SCALE: 1"=1'-0"



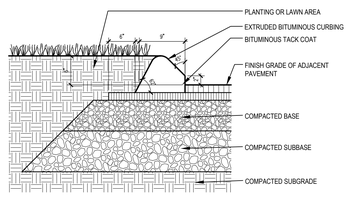
FROST PAD
SCALE: NONE



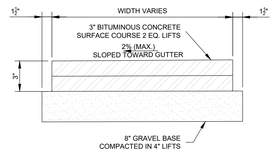
4' CHAIN LINK FENCE & GATE
SCALE: NONE



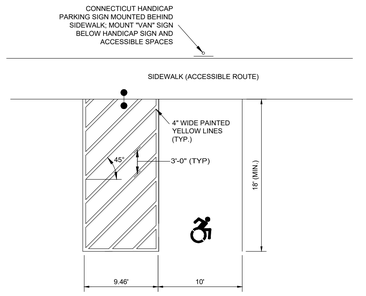
DRYWELL
SCALE: NONE



6" BITUMINOUS CURBING
SCALE: NONE



BITUMINOUS DRIVE AND SIDEWALK
SCALE: NONE



NOTES:

1. GRADING WITHIN HANDICAP SPACES SHALL BE LESS THAN 2.00% IN ALL DIRECTIONS
2. SIGN LOCATION VARIES - SEE PLAN

ACCESSIBLE PARKING STALL
SCALE: NONE

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21 Talcott Notch Road
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friar.com
860.678.1291

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PROFESSIONAL SEAL

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Alfred Benesch & Company
200 Glastonbury Blvd., Suite 201
Glastonbury, Connecticut 06033
860-633-8341

CONSULTANT

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

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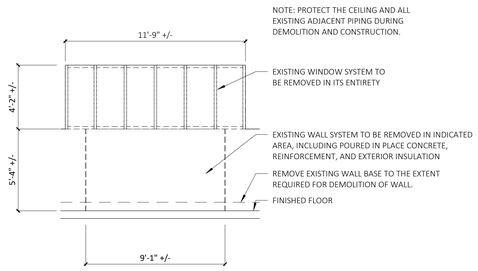
C2.0

DEMOLITION LEGEND: KEYED INTO PLAN

1. REMOVE COMPLETE WINDOW SYSTEM
2. REMOVE EXTERIOR MASONRY WALL CONSTRUCTION
3. REMOVE FLOORING AND WALL BASE TO THE EXTENT REQUIRED FOR DEMOLITION OF WALL. WHERE NECESSARY, REMOVE TO FULL TILE (NOT PARTIAL).

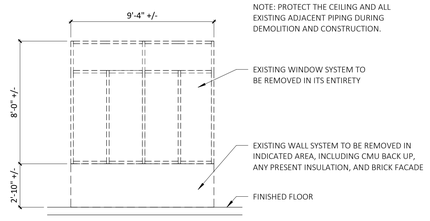
GENERAL DEMOLITION NOTES

1. ANY DEMOLITION WORK ASSOCIATED WITH NEW WORK THAT IS NOT SPECIFICALLY NOTED ON THIS PLAN SHALL BE THE RESPONSIBILITY OF THE DEMOLITION CONTRACTOR.
2. DEMOLISHED MATERIAL SHALL BE CONSIDERED TO BE THE PROPERTY OF THE CONTRACTOR AND SHALL BE COMPLETELY REMOVED FROM THE JOB SITE.
3. SHUT OFF, CAP AND OTHERWISE PROTECT EXISTING PUBLIC UTILITY LINES IN ACCORDANCE WITH THE REQUIREMENTS OF THE PUBLIC AGENCY HAVING JURISDICTION.
4. COMPLETELY REMOVE ITEMS SCHEDULED TO BE SO DEMOLISHED AND REMOVE, LEAVING SURFACES CLEAN, SOLID AND READY TO RECEIVE NEW MATERIALS AND SPECIFIED ELSEWHERE.
5. USE MEANS NECESSARY TO PREVENT DUST FROM BECOMING A NUISANCE TO THE USER.
6. THIS DRAWING DOES NOT DEPICT THE FULL EXTENT OF DEMOLITION. ADDITIONAL ITEMS SCHEDULED FOR DEMOLITION MAY BE FOUND ON OTHER DRAWINGS. CONSTRUCTION MANAGER IS RESPONSIBLE FOR THE COORDINATION OF THIS WORK WITH ALL PARTIES INVOLVED.
7. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH ALL NATIONAL, STATE, LOCAL CODES & ORDINANCES.
8. ALL EXISTING (FREESTANDING) FURNITURE ITEMS IN ALL ROOMS UNDER SCOPE OF WORK TO BE REMOVED BY OWNER.
9. DEMOLITION CONTRACTOR MUST VERIFY LOCATIONS OF ALL EXISTING STRUCTURAL, MECHANICAL, PLUMBING & ELECTRICAL ELEMENTS PRIOR TO START OF DEMOLITION.
10. REMOVE ALL INTERIOR WALLS SHOWN DOTTED, ALONG WITH ALL ASSOCIATED TACK BOARDS, CHALK BOARDS, MARKER BOARDS, ETC. EXERCISE CAUTION SO AS NOT TO DISTURB OR DAMAGE ADJACENT SURFACES SCHEDULED TO REMAIN.
11. REMOVE ALL PLUMBING FIXTURES INCLUDING SINKS, WATER CLOSETS, URINALS, SLOP SINKS AND DRINKING FOUNTAINS WITHIN DEMOLITION AREAS. REMOVE AND CAP ALL PLUMBING LINES BEHIND FINISHED WALL AND FLOOR SURFACES. REFER TO PLUMBING DEMOLITION DRAWINGS FOR RELATED INFORMATION.
12. REMOVE ALL DOORS AND DOOR FRAMES SHOWN IN FULLY DEMOLISHED PARTITIONS ONLY, UNLESS NOTED OTHERWISE.
13. REMOVE ALL RADIATION UNITS, H.V.A.C. RUNS, MECHANICAL UNITS, INFORMATION.
14. EMOVE ALL ELECTRICAL LIGHTING FIXTURES, ELECTRICAL RUNS, ASSOCIATED DEVICES. REFER TO ELECTRICAL DEMOLITION DRAWINGS FOR RELATED INFORMATION.
15. REFER TO SITE PLANS FOR SITE DEMOLITION NOTES.
16. REFER TO ALL DRAWINGS FOR ADDITIONAL INFORMATION.
17. REMOVE ALL EXISTING FLOOR SYSTEMS I.E. VINYL TILE, SHEET VINYL, CERAMIC TILE, MASTIC, MUD SET, ETC. AT ALL AREAS WHERE A NEW FLOOR IS SCHEDULED. REF. FINISH PLANS & SCHEDULE. PREP FLOORS TO RECEIVE NEW FINISHES.
18. ALL EXISTING LAY IN CEILING PANELS TO BE REMOVED BY THE ABATEMENT CONTRACTOR WHERE NEW CEILINGS ARE SCHEDULED. REFER TO ASBESTOS ABATEMENT PLANS AND REFLECTED CEILING PLANS.
19. REMOVE ALL CEILING GRIDS (CORRIDOR CEILING GRID TO BE REMOVED BY THE ABATEMENT CONTRACTOR), GYPSUM CEILINGS AND SUSPENSION SYSTEMS AT ALL AREAS WHERE NEW CEILINGS ARE SCHEDULED. REFER TO REFLECTED CEILING PLANS.
20. REMOVE ALL EXISTING BUILT-IN MILLWORK SHOWN DOTTED INCLUDING SINKS, ASSOCIATED PLUMBING & ELECTRICAL BACK TO SOURCE OR PANEL AS REQ'D.
21. ALL WINDOW SYSTEMS SCHEDULED FOR DEMOLITION TO BE REMOVED BY THE ABATEMENT CONTRACTOR.
22. THE DEMOLITION PLANS ARE DIAGRAMMATIC AND INTENDED TO SHOW THE GENERAL EXTENT OF THE WORK ONLY.
23. THE CONTRACTOR SHALL INCLUDE ALL DEMOLITION WORK REQUIRED TO ACCOMPLISH THE INTENT OF THE PLANS AND SPECIFICATIONS.
24. ALL DEMOLISHED ITEMS SHALL BE REMOVED FROM BUILDING /SITE UNLESS OTHERWISE NOTED. COORDINATE WITH OWNER FOR DELIVERY OF ITEMS NOTED TO REMAIN OWNERS PROPERTY. THE PROJECT SITE/ BUILDING SHALL BE CLEANED OF DEBRIS ON A DAILY BASIS. CONSTRUCTION MANAGER WILL COORDINATE AND INSTRUCT WHICH
25. CONTRACTOR SHALL BE RESPONSIBLE FOR SHORING AND SUPPORT (TEMPORARY OR PERMANENT) FOR ALL PORTIONS OF CONSTRUCTION DURING DEMOLITION AND CONSTRUCTION.
26. ALL ABANDONED MECHANICAL / ELECTRICAL / PLUMBING LINES SHALL BE CAPPED OFF BEHIND FINISHES, UNLESS OTHERWISE NOTED. REFER TO MECHANICAL / ELECTRICAL / PLUMBING DRAWINGS FOR ADDITIONAL DEMO. INFORMATION.
27. GENERAL TRADES CONTRACTOR SHALL SAWCUT ALL MASONRY OR CONCRETE OPENINGS INDICATED. MASONRY SHALL BE TOOTHED IN AND / OR RETURNED TO FINISHED OPENING ALL OPENINGS WHERE EXISTING CONSTRUCTION HAS BEEN REMOVED, AND WHICH ARE NOT NOTED TO REMAIN, SHALL BE FILLED AND /OR PATCHED TO MATCH THE ADJACENT EXISTING OR NEW FINISH, INCLUDING ANY FIRE RATINGS REQUIRED.
28. ALL AREAS OF FLOORS, WALLS AND CEILINGS DISTURBED BY DEMOLITION SHALL BE FILLED, PATCHED OR OTHERWISE REFINISHED TO MATCH EXISTING OR NEW FINISH AS DESIGNATED, INCLUDING ALL REQUIRED RATINGS.
29. CONTRACTOR MUST VERIFY LOCATIONS OF ALL EXISTING STRUCTURAL, MECHANICAL, PLUMBING & ELECTRICAL ELEMENTS PRIOR TO START OF DEMOLITION.
30. COORDINATE DEMOLITION EFFORTS WITH ASBESTOS ABATEMENT WORK.
31. EXISTING CONDITIONS SHALL BE STUDIED PRIOR TO BIDDING TO FAMILIARIZE YOURSELF WITH THE BUILDING AND INTENTIONS OF THE FINAL WORK AND THE REQUIRED DEMOLITION, INCLUDING ALL MECH., ELECT., PLUMB., TECH., STRUCTURAL AND GENERAL CONSTRUCTION ITEMS REQUIRING REMOVAL.
32. NO ELECTRICAL, TECHNOLOGY WIRING OR PNEUMATIC LINES ARE TO BE ABANDONED IN PLACE.
33. REFER TO SPECS FOR CUTTING & PATCHING, FLOOR PREP AND SELECTIVE DEMOLTION.
34. ALL DIMENSIONS ARE TO BE FIELD VERIFIED.



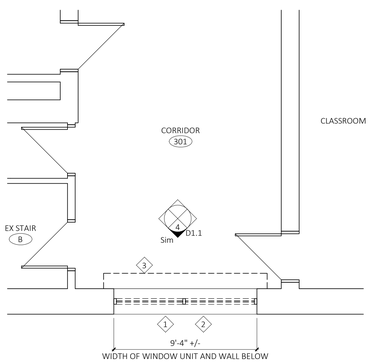
5 DEMO ELEVATION - FIRST FLOOR

SCALE: 1/4" = 1'-0"



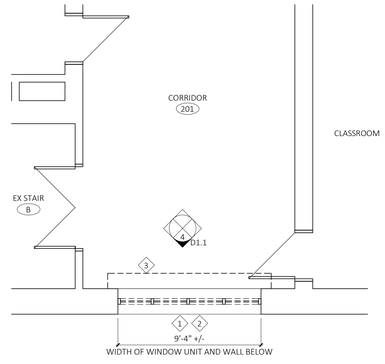
4 DEMO ELEVATION - SECOND AND THIRD FLOOR

SCALE: 1/4" = 1'-0"



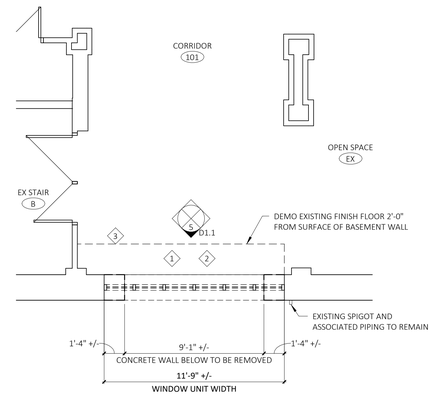
3 THIRD FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



2 SECOND FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



1 FIRST FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

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FRIAR ARCHITECTURE, INC.
NO. 113
CORPORATE PRACTICE of ARCHITECTURE

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION
	XX/XX/2025	ISSUE FOR BID

DEMOLITION PLANS

DATE: 12/31/2025
SCALE As indicated
PROJ. #: 2022-049A
DRAWN: BKH
CHECKED: JMY

SHEET NO.
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WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

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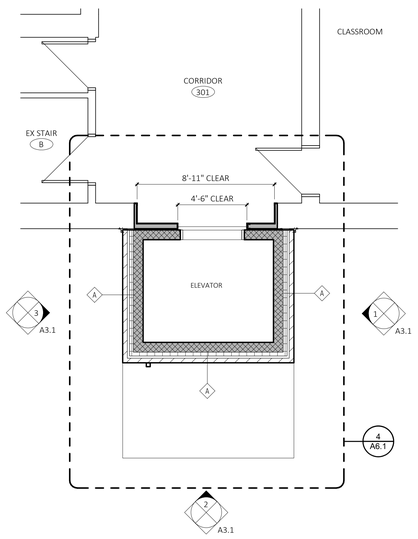
REVISIONS

NO.	DATE	DESCRIPTION
	XX/XX/2025	ISSUE FOR BID

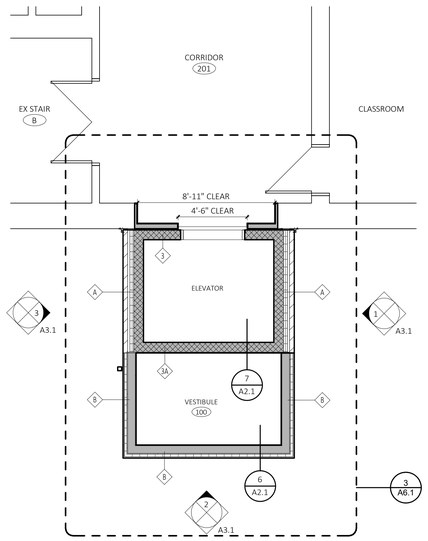
NEW WORK FLOOR PLANS

DATE:	12/31/2025
SCALE	1/4" = 1'-0"
PROJ. #:	2022-049A
DRAWN:	BKH
CHECKED:	JMY

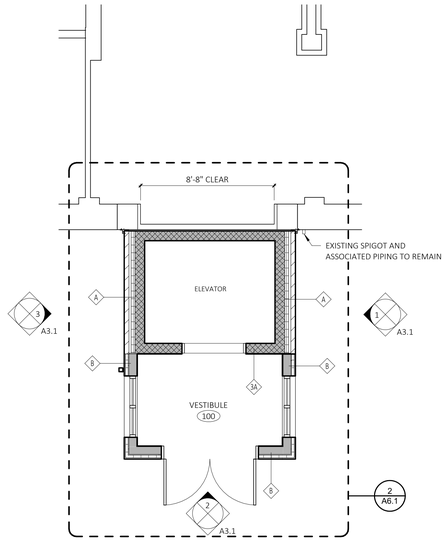
SHEET NO.
A1.1



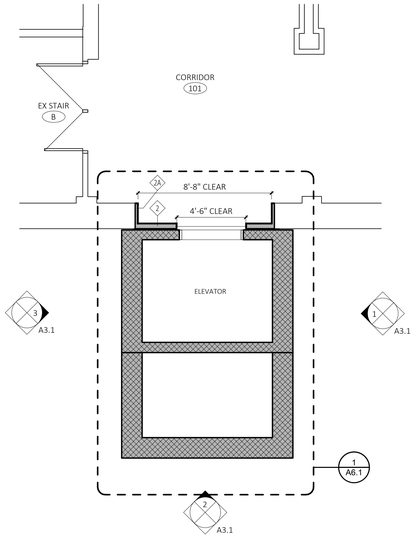
4 THIRD FLOOR NEW WORK PLAN
SCALE: 1/4" = 1'-0"



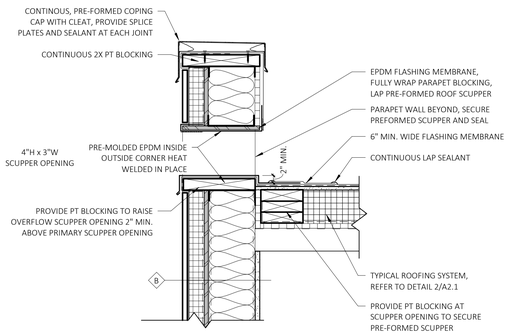
3 SECOND FLOOR NEW WORK PLAN
SCALE: 1/4" = 1'-0"



2 VESTIBULE NEW WORK PLAN
SCALE: 1/4" = 1'-0"

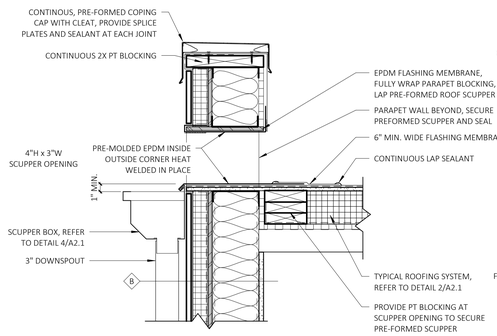


1 FIRST FLOOR NEW WORK PLAN
SCALE: 1/4" = 1'-0"



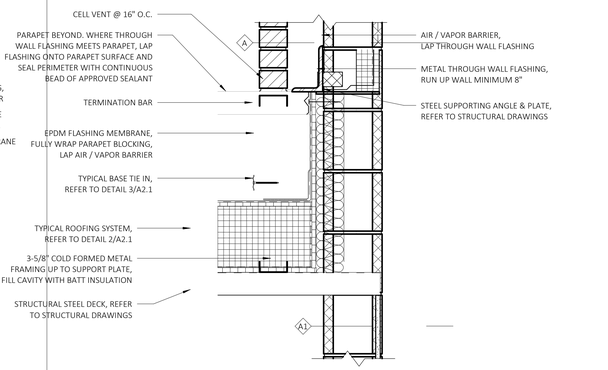
12 OVERFLOW THROUGH WALL SCUPPER (STUD)

SCALE: 1 1/2" = 1'-0"



11 THROUGH WALL SCUPPER (STUD)

SCALE: 1 1/2" = 1'-0"



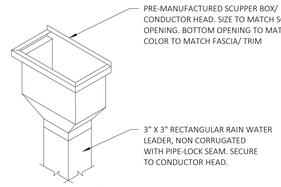
7 BRICK SUPPORT @ LOBBY ROOF

SCALE: 1 1/2" = 1'-0"

LEGEND

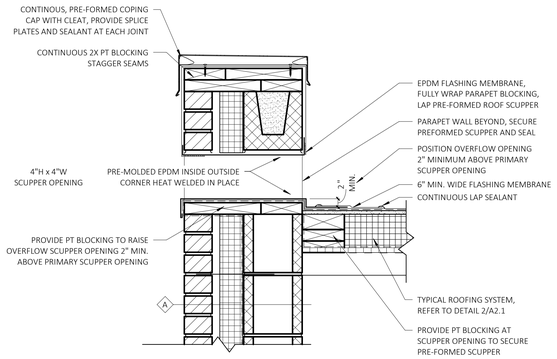
REFER TO SHEETS A2.1 FOR ROOF DETAILS & TYPICAL ROOF DETAILS

- TAPERED RIGID INSULATION SLOPE = 1/4:12 TYPICAL
- CRICKET WITH PITCH TO DRAIN SLOPE = 1/2:12 TYPICAL
- DS — ROOF DOWNSPOUT LOCATION. PROVIDE SPLASH BLOCK @ ALL DOWNSPOUT ENDS, TYPICAL. SPLASH BLOCK: BASIS OF DESIGN - 30" PRECAST CONCRETE SPLASH BLOCK AS MANUFACTURED BY MODERN PRECAST, INC. PROVIDE ROOF PROTECTION AS REQUIRED BY ROOF SYSTEM MANUFACTURER.
- SC — ROOF SCUPPER (THROUGH THE WALL), REFER TO ROOF DETAIL 9/A2.1 & 11/A2.1
- OSC — OVERFLOW ROOF SCUPPER (THROUGH THE WALL), REFER TO ROOF DETAILS 10/A2.1 & 12/A2.1
- EJ — ROOF EXPANSION JOINT, REFER TO DETAIL 8/A2.1
- FACE OF BUILDING BELOW
- X / A2.X — ROOF DETAIL LOCATION REFER TO SHEET NO. A2.1



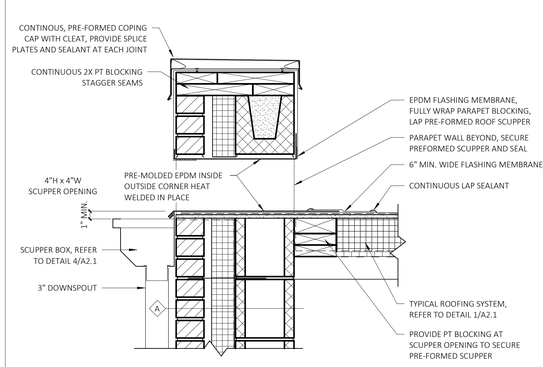
4 SCUPPER BOX / CONDUCTOR HEAD

SCALE: 1 1/2" = 1'-0"



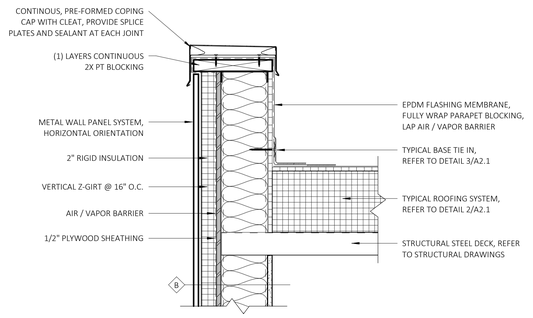
10 OVERFLOW THROUGH WALL SCUPPER DETAIL

SCALE: 1 1/2" = 1'-0"



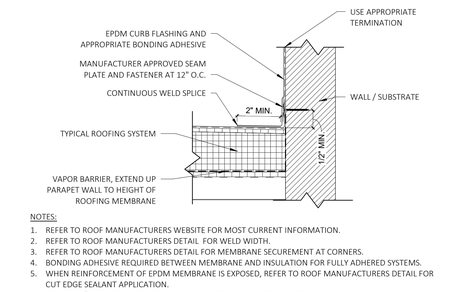
9 THROUGH WALL SCUPPER DETAIL

SCALE: 1 1/2" = 1'-0"



6 LOBBY PARAPET DETAIL

SCALE: 1 1/2" = 1'-0"

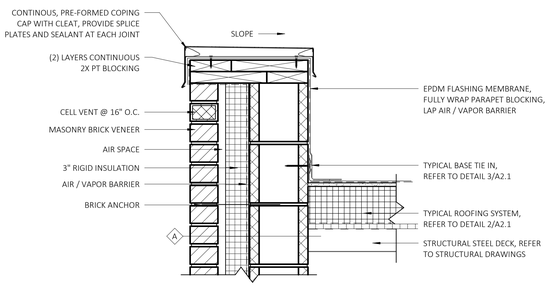


NOTES:

1. REFER TO ROOF MANUFACTURERS WEBSITE FOR MOST CURRENT INFORMATION.
2. REFER TO ROOF MANUFACTURERS DETAIL FOR WELD WIDTH.
3. REFER TO ROOF MANUFACTURERS DETAIL FOR MEMBRANE SECUREMENT AT CORNERS.
4. BONDING ADHESIVE REQUIRED BETWEEN MEMBRANE AND INSULATION FOR FULLY ADHERED SYSTEMS.
5. WHEN REINFORCEMENT OF EPDM MEMBRANE IS EXPOSED, REFER TO ROOF MANUFACTURERS DETAIL FOR CUT EDGE SEALANT APPLICATION.
6. PROVIDE 6" WIDE 22GA. CONTINUOUS METAL STRAPPING BETWEEN STUDS.

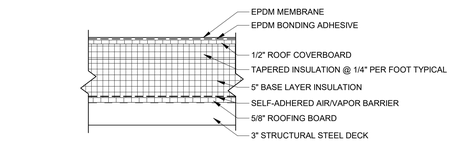
3 BASE OF WALL FLASHING

SCALE: 1 1/2" = 1'-0"



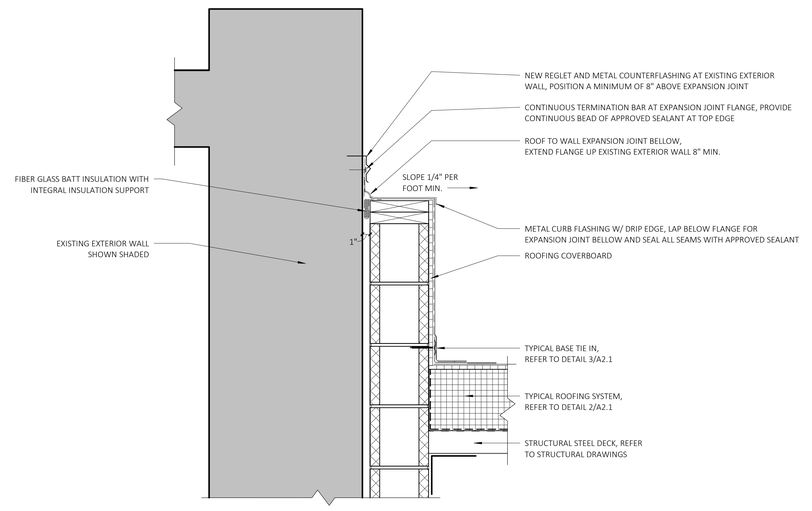
5 PARAPET DETAIL @ HOISTWAY

SCALE: 1 1/2" = 1'-0"



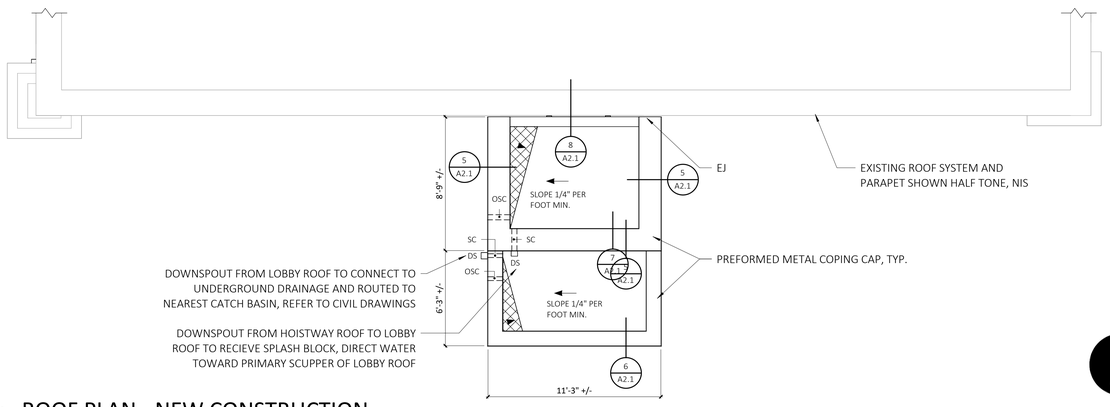
2 TYPICAL ROOFING SYSTEM

SCALE: 1 1/2" = 1'-0"



8 HOISTWAY TIE IN TO EXISTING EXTERIOR WALL

SCALE: 1 1/2" = 1'-0"



1 ROOF PLAN - NEW CONSTRUCTION

SCALE: 1/4" = 1'-0"

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PROFESSIONAL SEAL

STATE OF CONNECTICUT — FRIAR ARCHITECTURE, INC. — NO. 113 — CORPORATE PRACTICE of ARCHITECTURE

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

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ROOF PLAN & DETAILS

DATE:	12/31/2025
SCALE	As indicated
PROJ. #:	2022-049A
DRAWN:	BKH
CHECKED:	JMY

SHEET NO.

A2.1

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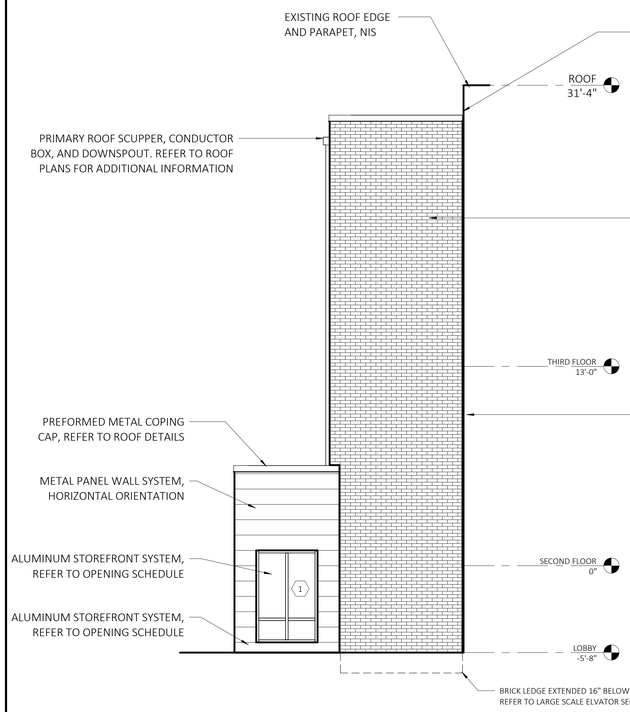
WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

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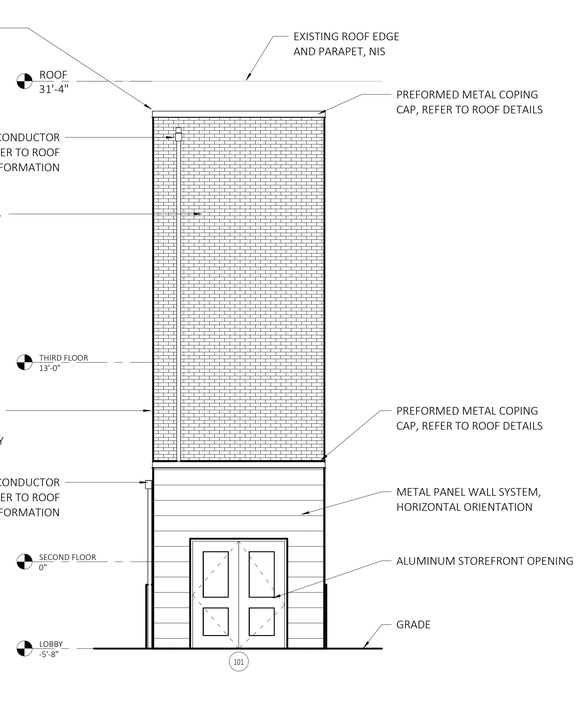
STATE PROJECT NUMBER
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REVISIONS

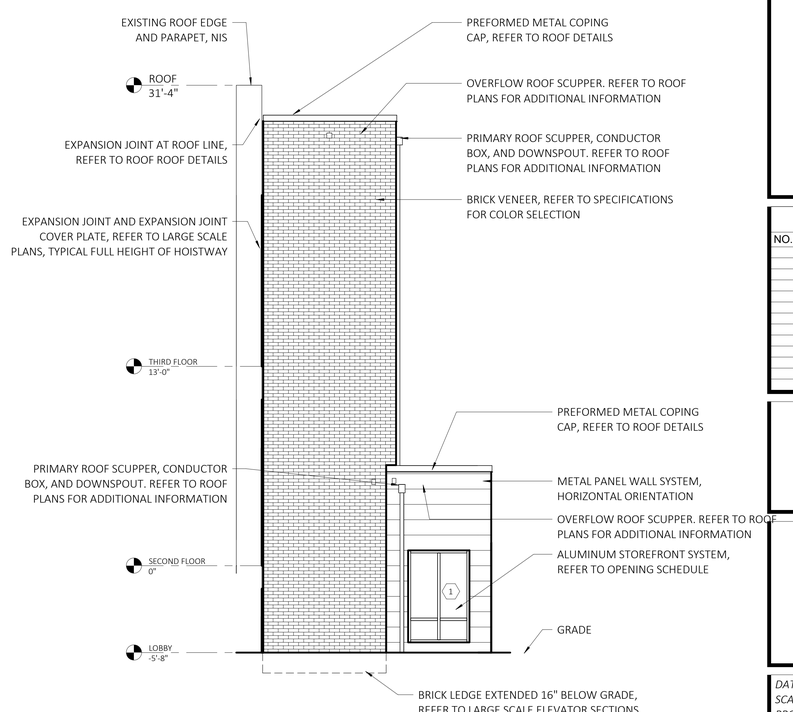
NO.	DATE	DESCRIPTION



1 EAST ELEVATION
SCALE: 1/4" = 1'-0"



2 SOUTH ELEVATION
SCALE: 1/4" = 1'-0"

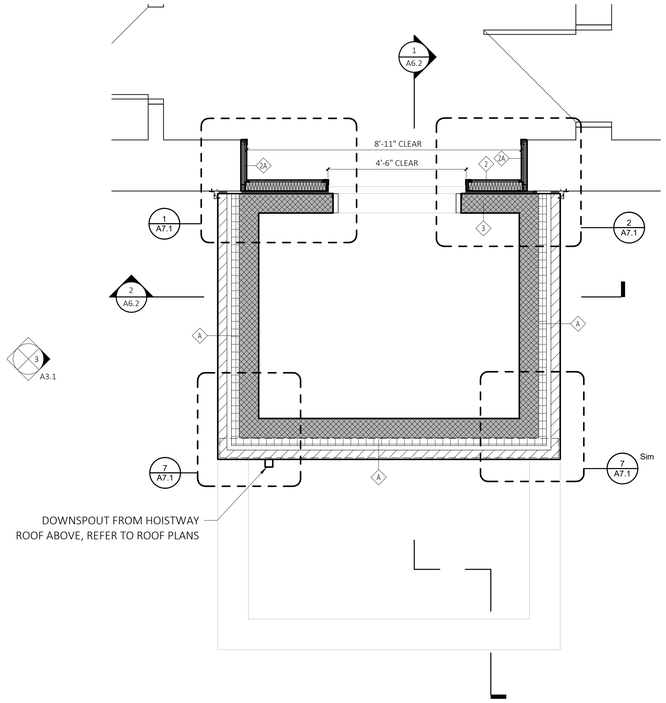


3 WEST ELEVATION
SCALE: 1/4" = 1'-0"

BUILDING ELEVATIONS

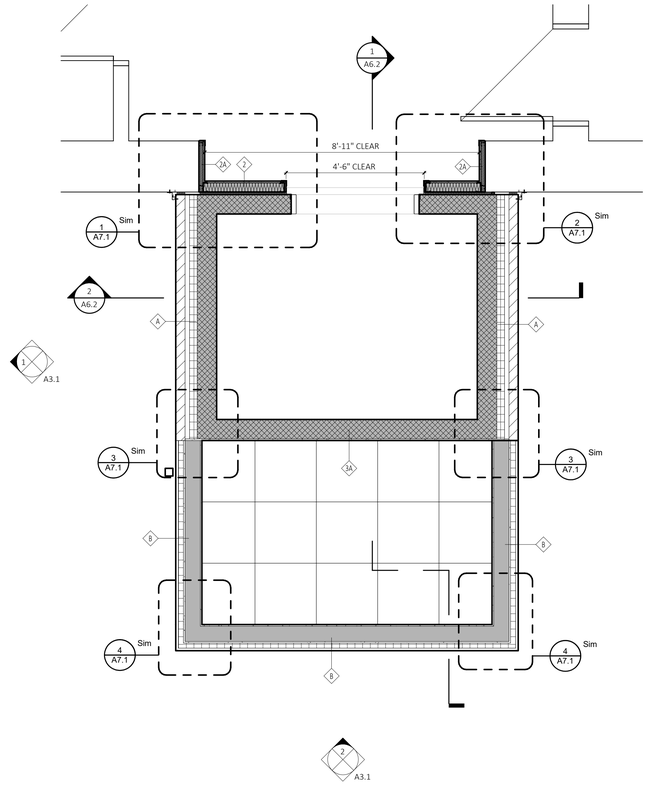
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PROJ. #:	2022-049A
DRAWN:	BKH
CHECKED:	JMY

SHEET NO.
A3.1



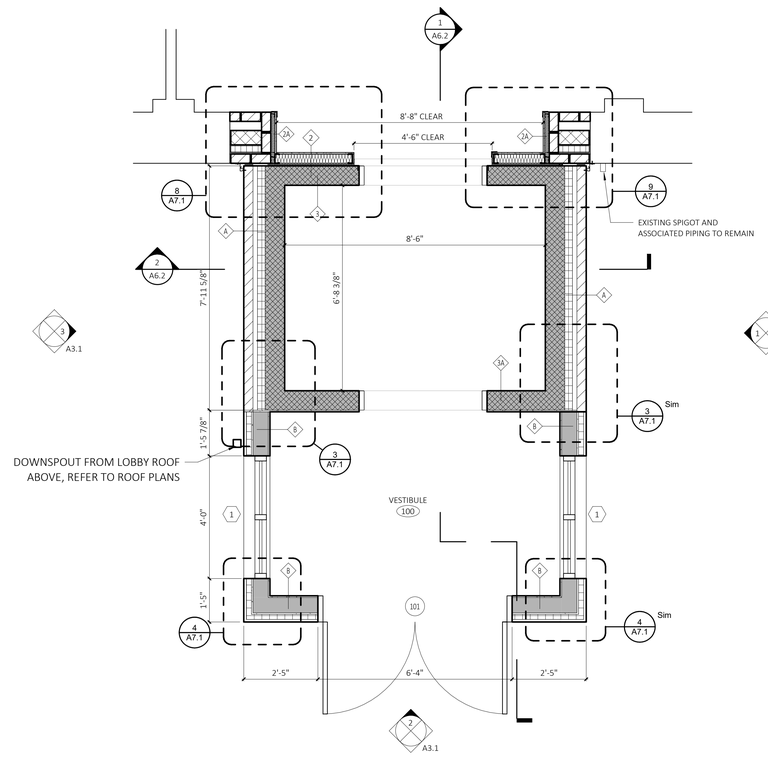
4 LARGE SCALE ELEVATOR - THIRD FLOOR

SCALE: 1/2" = 1'-0"



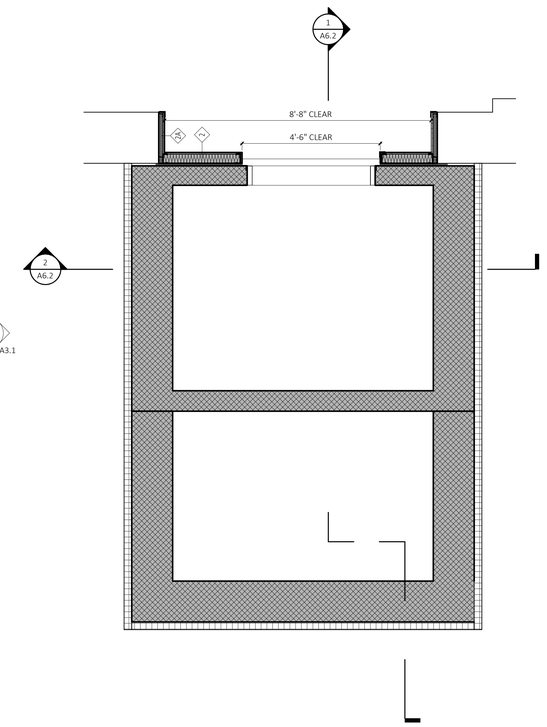
3 LARGE SCALE ELEVATOR - SECOND FLOOR

SCALE: 1/2" = 1'-0"



2 LARGE SCALE ELEVATOR - LOBBY

SCALE: 1/2" = 1'-0"



1 LARGE SCALE ELEVATOR - FIRST FLOOR

SCALE: 1/2" = 1'-0"

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CORPORATE PRACTICE of ARCHITECTURE

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WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

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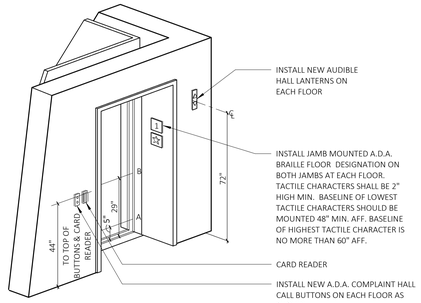
REVISIONS

NO.	DATE	DESCRIPTION

LARGE SCALE ELEVATOR PLANS

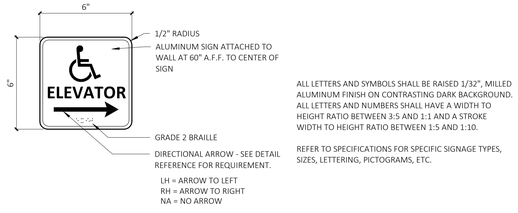
DATE: 12/31/2025
SCALE 1/2" = 1'-0"
PROJ. #: 2022-049A
DRAWN: BKH
CHECKED: JMY

SHEET NO.
A6.1



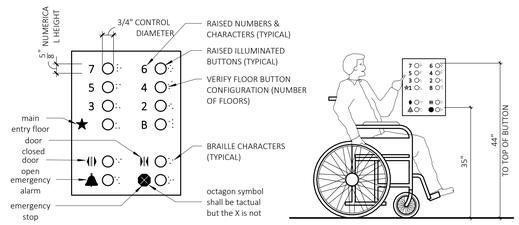
7 EXTERIOR CONTROL PANEL WITH READER

SCALE: 12" = 1'-0"



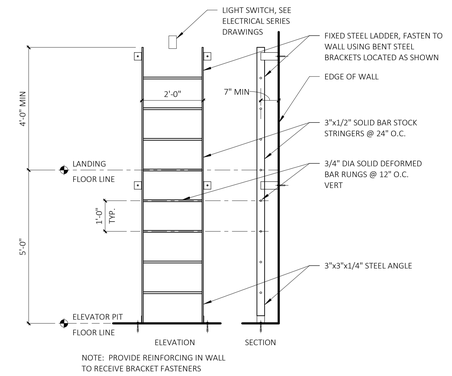
6 ELEVATOR-SIGNAGE

SCALE: 3" = 1'-0"



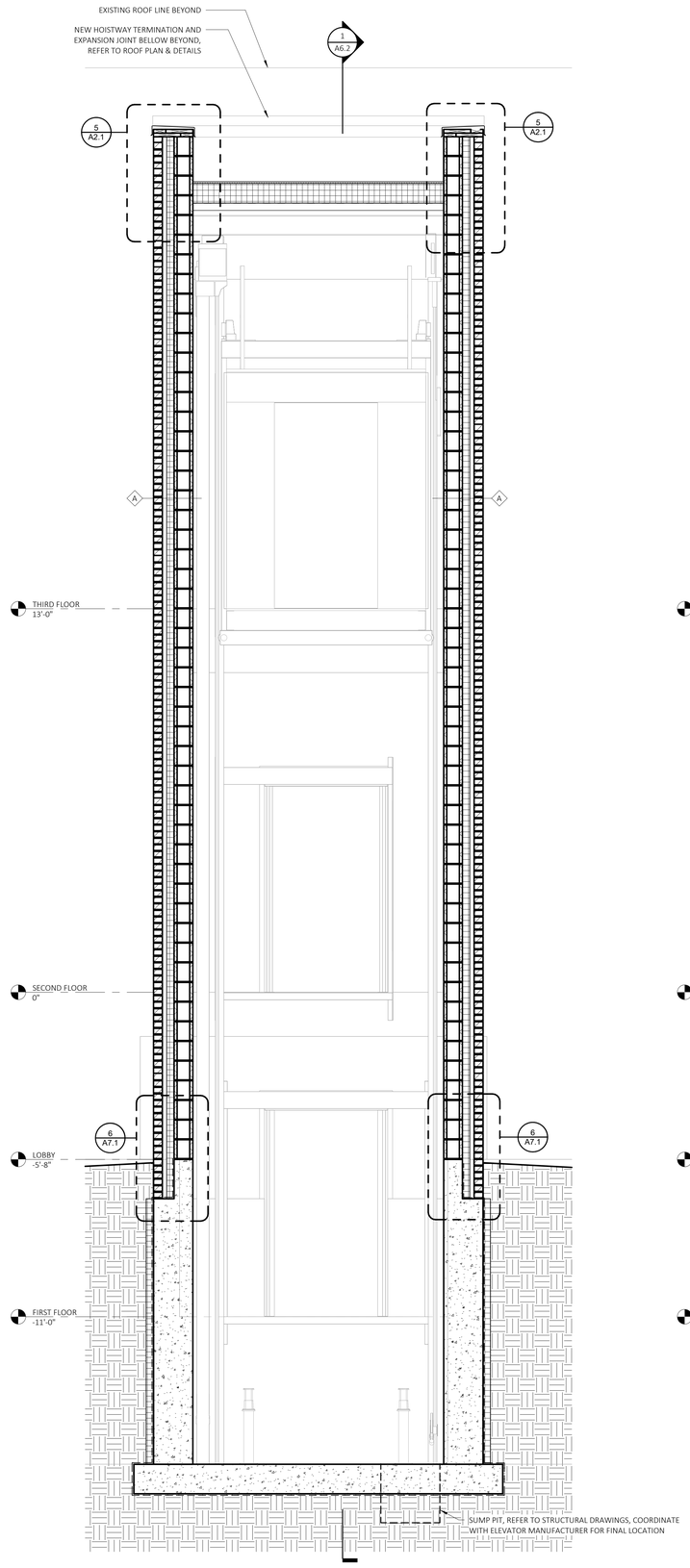
5 ELEVATOR-CONTROL PANEL DIAGRAM

SCALE: 12" = 1'-0"



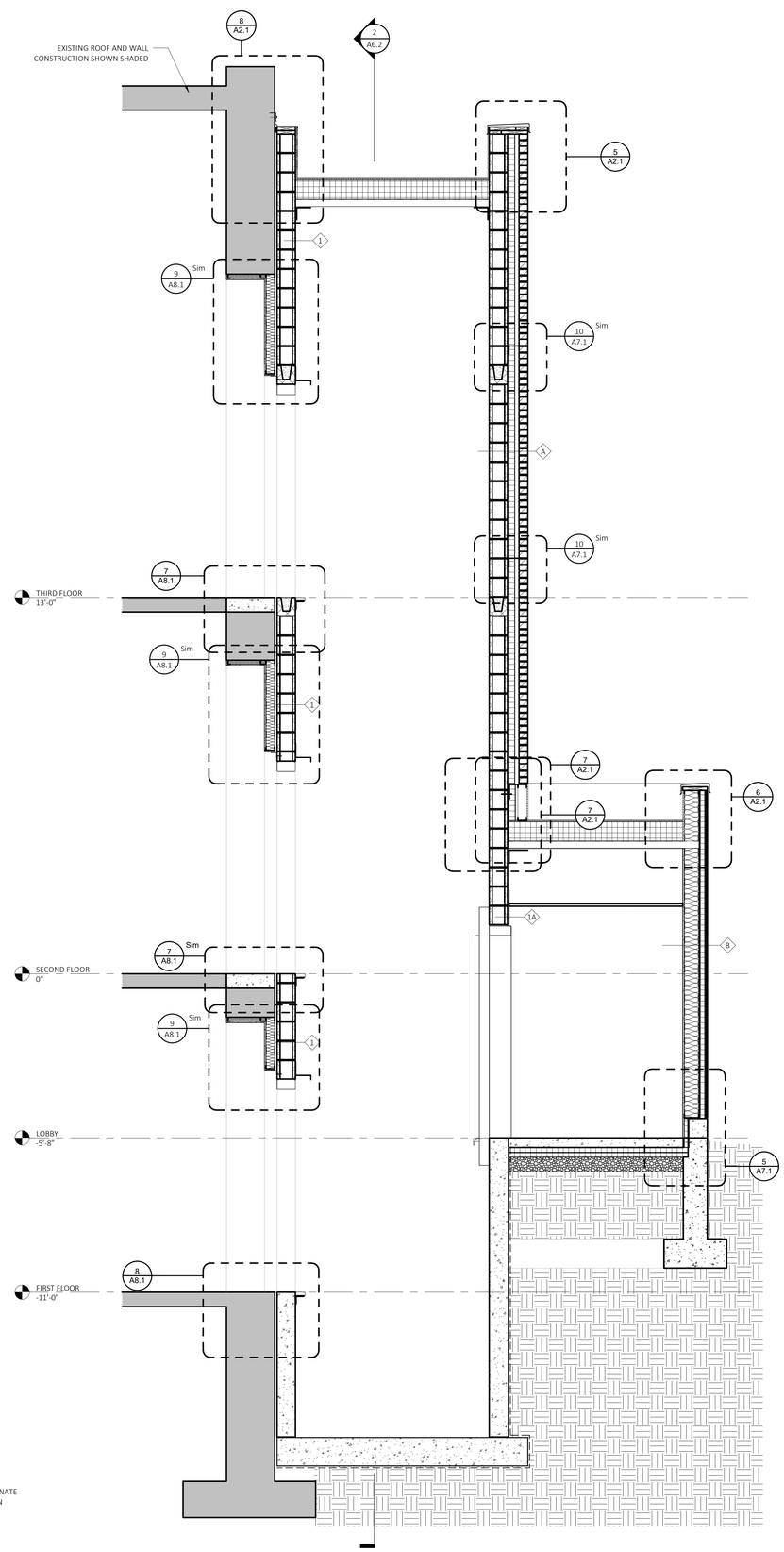
4 ELEVATOR PIT DETAIL - FIXED

SCALE: 1/2" = 1'-0"



2 ELEVATOR A - TRANSVERSE SECTION

SCALE: 1/2" = 1'-0"



1 ELEVATOR A - LONGITUDINAL SECTION

SCALE: 1/2" = 1'-0"

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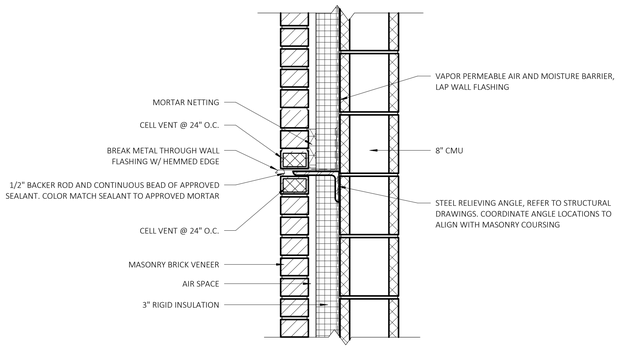
REVISIONS

NO.	DATE	DESCRIPTION

LARGE SCALE ELEVATOR SECTIONS & DETAILS

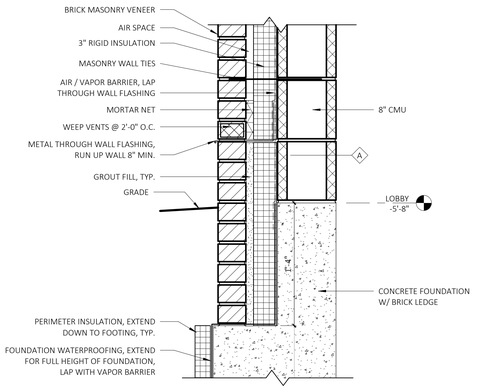
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CHECKED:	JMY

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A6.2



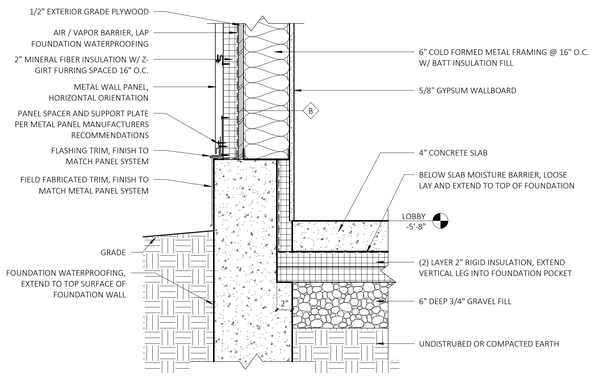
10 RELIEVING ANGLE DETAIL

SCALE: 1 1/2" = 1'-0"



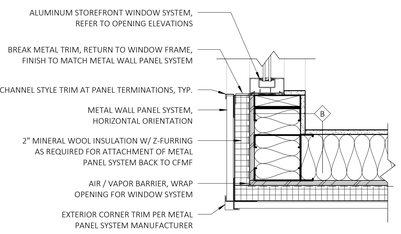
6 BASE OF WALL - ELEVATOR HOISTWAY

SCALE: 1 1/2" = 1'-0"



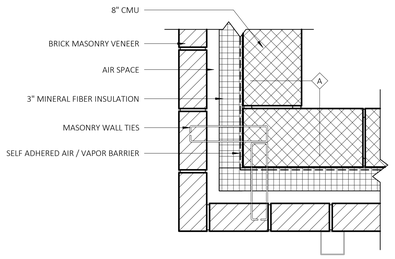
5 BASE OF WALL DETAIL - LOBBY

SCALE: 1 1/2" = 1'-0"



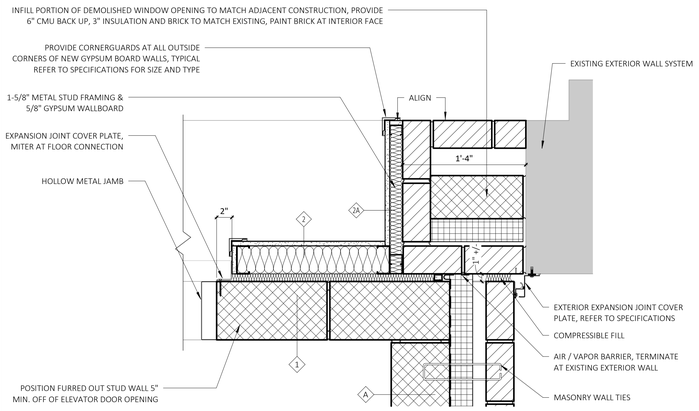
4 PLAN DETAIL @ LOBBY CORNER

SCALE: 1 1/2" = 1'-0"



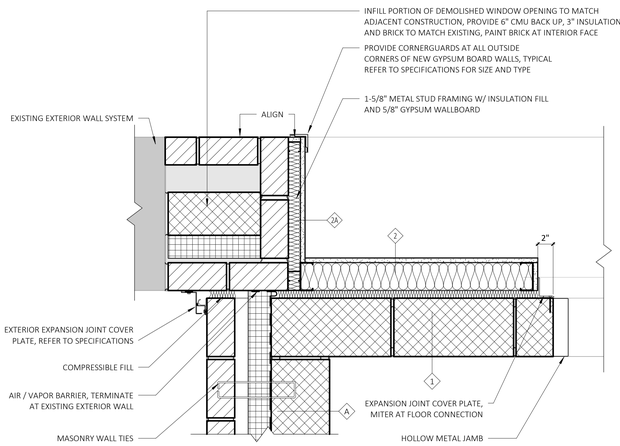
7 PLAN DETAIL @ HOISTWAY OUTSIDE CORNER

SCALE: 1 1/2" = 1'-0"



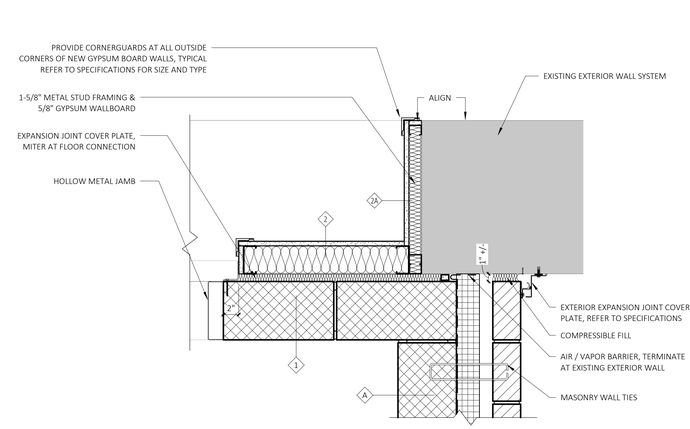
9 PLAN DETAIL @ HOISTWAY EAST CORNER - FIRST FLOOR

SCALE: 1 1/2" = 1'-0"



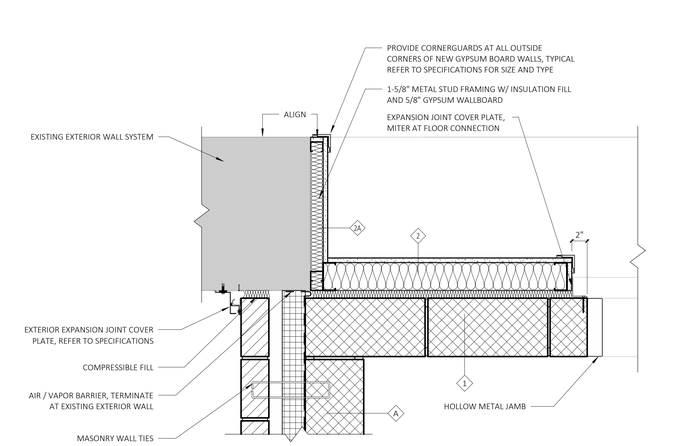
8 PLAN DETAIL @ HOISTWAY WEST CORNER - FIRST FLOOR

SCALE: 1 1/2" = 1'-0"



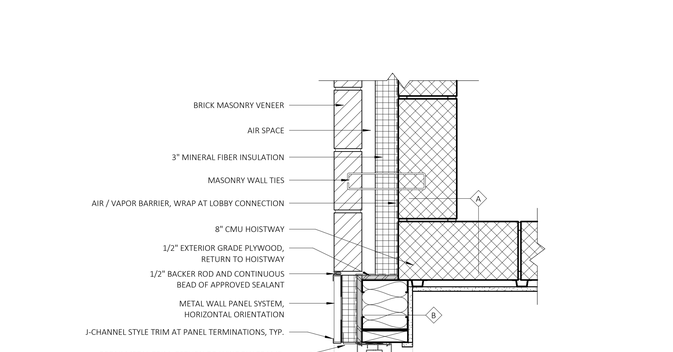
2 PLAN DETAIL @ HOISTWAY EAST CORNER - UPPER FLOORS

SCALE: 1 1/2" = 1'-0"



1 PLAN DETAIL AT HOISTWAY WEST CORNER - UPPER FLOORS

SCALE: 1 1/2" = 1'-0"



3 PLAN DETAIL @ LOBBY / HOISTWAY CONNECTION

SCALE: 1 1/2" = 1'-0"

architecture
interior design
master planning
FRIAR
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

STATE OF CONNECTICUT
SCOTT R. BIGELOW
No. 12359
LICENSED ARCHITECT

PROFESSIONAL SEAL

STATE OF CONNECTICUT
FRIAR ARCHITECTURE, INC.
NO. 113
CORPORATE PRACTICE of ARCHITECTURE

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION

PLAN, SECTION & CEILING DETAILS

DATE:	12/31/2025
SCALE	1 1/2" = 1'-0"
PROJ. #:	2022-049A
DRAWN:	BKH
CHECKED:	JMY

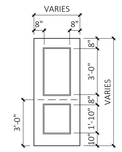
SHEET NO.

A7.1

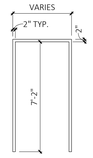
DOOR SCHEDULE (WORKING VIEW)

OPENING NUMBER	SHEET NUMBER	DOOR: SINGLE DOOR	DOOR: DOUBLE DOOR	DOOR: WIDTH	DOOR: HEIGHT	DOOR: THICKNESS	DOOR: HANDING	DOOR: DEGREE OF SWING	DOOR: SEE DWG: DOOR MATERIAL	FRAME: SEE DETAILS ON DWG: FRAME MATERIAL	FRAME: HEAD DETAIL	FRAME: JAMB DETAIL	FRAME: THRESHOLD DETAIL	SOUND DOOR & GASKETTING	ACCESS CONTROLLED OPERATION	FIRE RATING: U.L. RATING (IN MINUTES)	FIRE RATING: GASKETS AND SMOKE SEALS	HARDWARE - SEE SPECIFICATIONS: FIRE CODE: PANIC RELEASE HARDWARE	FIRE CODE: POSITIVE LATCHING	FIRE CODE: AUTOMATIC CLOSING	FIRE CODE: ELECT. MAG. DOOR RELEASE	DISABLED REQUIREMENTS: PUSH/PULL	DISABLED REQUIREMENTS: U HANDLE / LEVER HANDLE	DISABLED REQUIREMENTS: MOP, KICK & ARMOR PLATES	DISABLED REQUIREMENTS: TACTILE WARNING	DISABLED REQUIREMENTS: ACCESSIBLE THRESHOLD	ELECTRICAL / SECURITY	HARDWARE SET NUMBER	* NEW WORK AR ACOUSTIC RATED SCD SOUND CONTROL DOOR SG SMOKE GASKETED
101			Yes	6'-0"	7'-0"	1 3/4"		90	AL-1	ALF-1	6/A8.1	4/A8.1	5/A8.1					Yes	Yes	Yes			Yes			Yes	Yes		CARD READER ACCESS

DOOR TYPES



FRAME TYPES



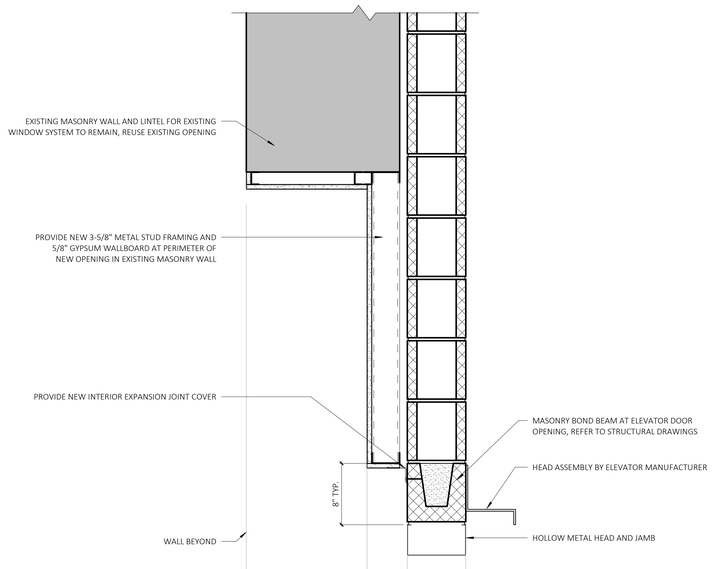
- ALL EXTERIOR DOORS / FRAMES TO CONTAIN INSULATING TEMPERED GLAZING TYP.
- ALL INTERIOR NON-RATED DOORS / FRAMES / SIDE LIGHTS AND BORROWED LIGHTS TO CONTAIN TEMPERED GLASS AS SPECIFIED TYP.

GLASS TYPE SCHEDULE

TYPE 1	1" INSULATED
TYPE 2	1" INSULATED SECURITY GLAZING
TYPE 3	1" INSULATED SPANDREL
TYPE 4	1/4" FULLY TEMPERED
TYPE 5	60 MIN. FIRE RATED
TYPE 6	120 MIN. FIRE RATED
TYPE 7	ALUMINUM PANEL
TYPE 8	FIRE RATED GLASS FOR DOORS; REFER TO DOOR SCHEDULE FOR RATING REQS.
TYPE 9	1" INSULATED, FROSTED
TYPE 10	INSULATED BULLET RESISTANT
	INDICATES 1" INSULATED ALUMINUM PANEL
	INDICATES 1" INSULATED SECURITY GLAZING
	INDICATES 1" INSULATED SPANDREL

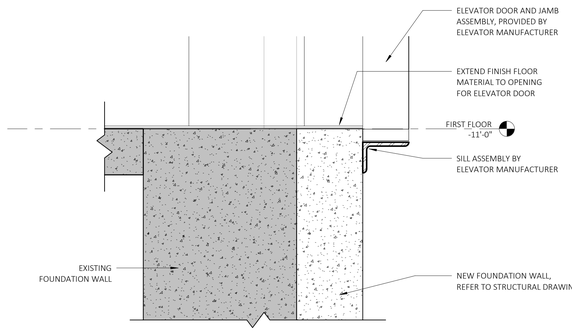
FRAME TYPE SCHEDULE

TYPE 1	2" X 4-1/2" STOREFRONT



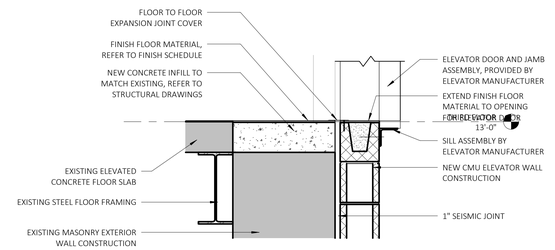
9 TYPICAL ELEVATOR HEAD DETAIL

SCALE: 1 1/2" = 1'-0"



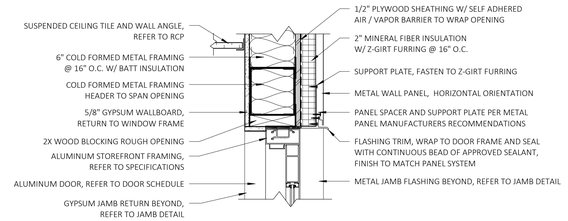
8 ELEVATOR SILL DETAIL @ FOUNDATION

SCALE: 1 1/2" = 1'-0"



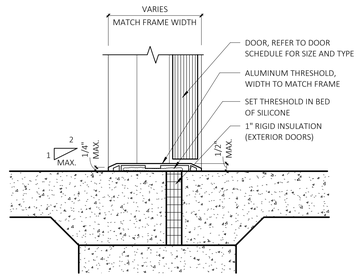
7 ELEVATOR SILL DETAIL @ ELEVATED SLAB

SCALE: 1" = 1'-0"



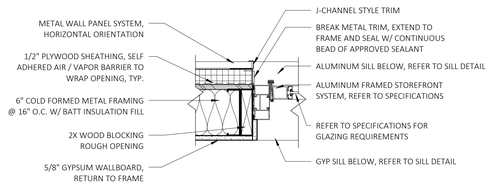
6 TYPICAL DOOR HEAD DETAIL

SCALE: 1 1/2" = 1'-0"



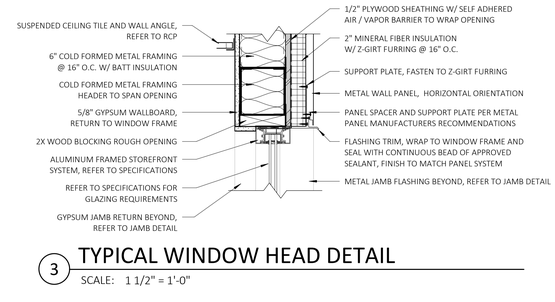
5 THRESHOLD-EXTERIOR INSULATED

SCALE: 3" = 1'-0"



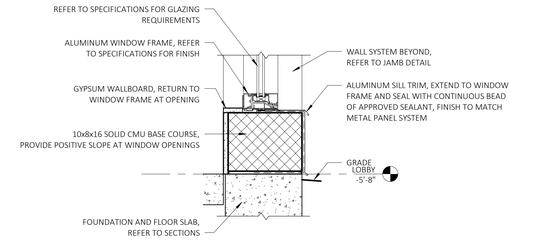
4 TYPICAL DOOR JAMB DETAIL

SCALE: 1 1/2" = 1'-0"



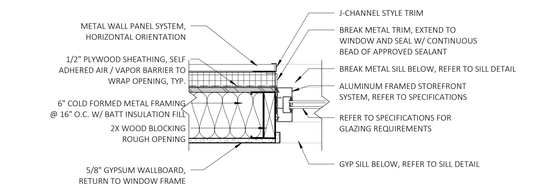
3 TYPICAL WINDOW HEAD DETAIL

SCALE: 1 1/2" = 1'-0"



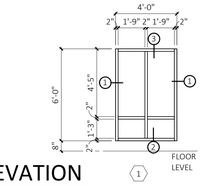
2 TYPICAL WINDOW SILL DETAIL

SCALE: 1 1/2" = 1'-0"



1 TYPICAL WINDOW JAMB DETAIL

SCALE: 1 1/2" = 1'-0"



TYPICAL WINDOW ELEVATION

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21 Talcott Notch Road friar.com
Farmington, CT 06032 860.678.1291

PROFESSIONAL SEAL

STATE OF CONNECTICUT — BRIDGE R. FRIAR — No. 12358 — LICENSED ARCHITECT

STATE OF CONNECTICUT — FRIAR ARCHITECTURE, INC. — NO. 113 — CORPORATE PRACTICE of ARCHITECTURE

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

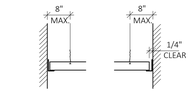
NO.	DATE	DESCRIPTION

WINDOW & DOOR ELEV, DETAILS, AND SCHEDULE

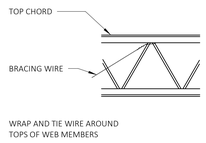
DATE:	12/31/2025
SCALE	As indicated
PROJ. #:	2022-049A
DRAWN:	BKH
CHECKED:	JMY

SHEET NO.

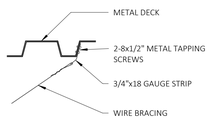
A8.1



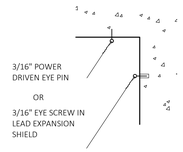
RUNNERS AT WALLS



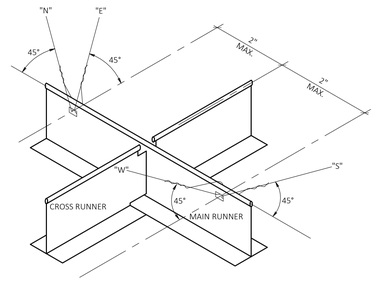
BRACE @ OPEN WEB JOIST



BRACE AT METAL DECK



BRACE @ EXISTING CONCRETE



NOTES:
1. #12 GAUGE WIRE BRACING IN PLANE OF EACH RUNNER. VERTICAL ANGLE = 45°
2. HANGER WIRES "N" AND "S" ARE IN THE SAME VERTICAL PLANE AS THE MAIN RUNNER. HANGER WIRES "E" AND "W" ARE IN THE VERTICAL PLANE PERPENDICULAR TO THE MAIN RUNNER.

5 TYPICAL SEISMIC BRACING DETAILS

SCALE: 1/8" = 1'-0"

REFLECTED CEILING LEGEND

- C-X / X'-X" — CEILING TYPE AND HEIGHT SYMBOL; CEILING TYPE; CEILING HEIGHT
- NEW, EXISTING OR RELOCATED RECESSED 2 X 4 LIGHT FIXTURE. REFER TO ELEC. DWGS.
- NEW, EXISTING OR RELOCATED RECESSED 2 X 2 LIGHT FIXTURE. REFER TO ELEC. DWGS.
- SUPPLY DIFFUSER. REFER TO MECHANICAL DRAWINGS FOR TYPES AND SIZES.
- RETURN DIFFUSER. REFER TO MECHANICAL DRAWINGS FOR TYPES AND SIZES.
- ACCESS PANEL REQUIRED AT ALL MECHANICAL EQUIPMENT. REFER TO MECHANICAL DRAWINGS
- RADIANT PANEL. REFER TO MECHANICAL DRAWINGS FOR TYPES AND SIZES.
- SPRINKLER HEAD
- D — DRY SPRINKLER HEAD
- UPRIGHT SPRINKLER HEAD
- S — SPEAKER
- S — SMOKE DETECTOR
- H — HEAT DETECTOR
- EXIT SIGN WITH DIRECTIONAL CHEVRON, AS REQ'D. SEE ELEC. DWGS. FOR SPECIFIC TYPES.

CEILING TYPE SCHEDULE

NOTE: NOT ALL CEILING TYPES ARE USED. SEE PLANS & SPECIFICATIONS.

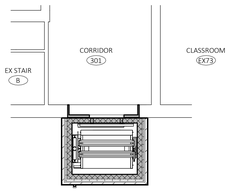
C-1	2x2 SUSPENDED ACOUSTICAL PANEL IN GRID
ES	NO CEILING - EXPOSED STRUCTURE
EP	NO CEILING - PAINT ALL EXPOSED STRUCTURE & UTILITIES
EX	EXISTING CEILING TO REMAIN

GENERAL NOTES

A. THIS PLAN INDICATES DIRECTIONAL LAYOUT OF CEILING GRIDS. REFER TO CEILING TYPE SCHEDULE.
B. IN ALL AREAS OF NEW & EXISITNG SUSPENDED ACOUSTICAL CEILINGS, THE SPRINKLER LINES SHALL BE INSTALLED CONCEALED. REFER TO FIRE PROTECTION DRAWINGS FOR SPRINKLER HEAD LOCATIONS AND RELATED INFORMATION.
C. REFER TO ELECTRICAL DRAWINGS FOR LIGHTING FIXTURE TYPES, REQUIRED WORK AND FOR OTHER CEILING MOUNTED EQUIPMENT NOT INDICATED ON THESE DRAWINGS.
D. REFER TO MECHANICAL DRAWINGS FOR DIFFUSER TYPES, REQUIRED WORK AND FOR OTHER CEILING MOUNTED EQUIPMENT NOT INDICATED ON THESE DRAWINGS.
E. REFER TO DETAIL X/AX.X FOR SEISMIC BRACING DETAILS FOR NEW SUSPENDED CEILINGS.
F. CUT NEW CEILING TILES AS REQUIRED FOR INSTALLATION AROUND NEW OR EXISTING VENT PIPING, EXHAUST DUCTS, SPRINKER HEADS, CONDUIT, ETC.

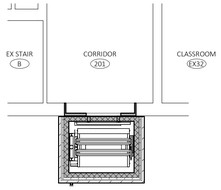
NOTE: FIELD VERIFY ALL CEILING HEIGHTS PRIOR TO INSTALLATION OF NEW GRIDS. COORDINATE WITH INSTALLATION OF NEW LIGHTING FIXTURES, SPRINKLER PIPING, DUCTWORK AND EXISTING STRUCTURE. NOTIFY ARCHITECT OF ANY CONFLICTS PRIOR TO INSTALLING NEW GRID.

WORK NOTES (KEYED INTO PLANS)



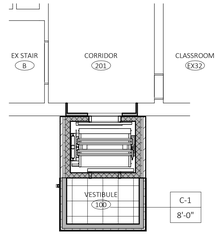
4 THIRD FLOOR REFLECTED CEILING PLAN

SCALE: 1/8" = 1'-0"



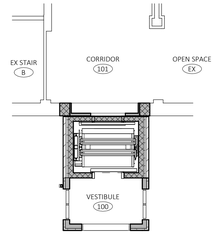
3 SECOND FLOOR REFLECTED CEILING PLAN

SCALE: 1/8" = 1'-0"



2 LOBBY REFLECTED CEILING PLAN

SCALE: 1/8" = 1'-0"



1 FIRST FLOOR REFLECTED CEILING PLAN

SCALE: 1/8" = 1'-0"

architecture interior design master planning
FRIAR
21 Talcott Notch Road Farmington, CT 06032
friar.com 860.678.1291

STATE OF CONNECTICUT — SUSAN R. FRIAR — No. 12259 — LICENSED ARCHITECT

PROFESSIONAL SEAL

STATE OF CONNECTICUT — FRIAR ARCHITECTURE, INC. — NO. 113 — CORPORATE PRACTICE of ARCHITECTURE

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION

REFLECTED CEILING

DATE: 12/31/2025
SCALE As indicated
PROJ. #: 2022-049A
DRAWN: BKH
CHECKED: JMY

SHEET NO.

A9.1

FINISH SCHEDULE

ROOM NUMBER / AREA DESIGNATION	ROOM NAME OR AREA NAME	FLOOR	BASE	WALL				CABINETS			MISCELLANEOUS						REMARKS
				NORTH	SOUTH	EAST	WEST	COUNTER / BACKSPLASH	BASE / TALL CABINETS	UPPER CABINETS	DOOR FRAMES	TACKBOARDS	MARKERBOARDS	TOILET PARTITIONS	WINDOW TREATMENTS	LOCKERS	
	ELEVATOR	LVT-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
100	VESTIBULE	EM-1	WB-2	P-1	P-1	P-1	P-1	-	-	-	P-3	-	-	-	-	-	
101	CORRIDOR	LVT-1	WB-1	-	P-1 / P-2	-	-	-	-	-	-	-	-	-	-	-	P-1 / P-2 TO MATCH EXISTING ADJACENT LOCATION ON SOUTH WALL
201	CORRIDOR	QT-1	WB-1	-	P-1 / P-2	-	-	-	-	-	-	-	-	-	-	-	P-1 / P-2 TO MATCH EXISTING ADJACENT LOCATION ON SOUTH WALL
301	CORRIDOR	QT-1	WB-1	-	P-1 / P-2	-	-	-	-	-	-	-	-	-	-	-	P-1 / P-2 TO MATCH EXISTING ADJACENT LOCATION ON SOUTH WALL

FINISH LEGEND

LUXURY VINYL TILE

LVT-1: MANUFACTURER: SHAW CONTRACT
COLLECTION: VERTICAL LAYERS
STYLE: UNVEIL
COLOR: TINTED 01535
SIZE: 9X36
INSTALL: ASHLAR
LOCATION: BASEMENT

ENTRY MAT

EM-1: MANUFACTURER: TARKETT
COLLECTION: ASSERTIVE SERIES
STYLE: ASSERTIVE ACTION
COLOR: CHROMIUM 26201
SIZE: 24"x24"
INSTALL: ASHLAR
LOCATION: VESTIBULE

QUARRY TILE

QT-1: MANUFACTURER: DALTILE
COLLECTION: QUARRY TILE
STYLE: MATTE
COLOR: RED BLAZE 0Q40
GROUT: MAPEI - ALABASTER 01
SIZE: 6" x 6"
INSTALL: ASHLAR
LOCATION: FIRST AND SECOND FLOOR

WALL BASE

WB-1: MANUFACTURER: JOHSONITE/TARKETT
COLOR: BLACK
STYLE: COVE
SIZE: 6"H

WB-2: MANUFACTURER: JOHSONITE/TARKETT
COLOR: BLACK
STYLE: STRAIGHT
SIZE: 6"H

PAINT

P-1: MANUFACTURER: SHERWIN WILLIAMS
COLOR: EXTRA WHITE - SW 7006
FINISH: EGGSHELL
LOCATION: TOP HALF AND FIELD

P-2: MANUFACTURER: BENJAMIN MOORE
COLOR: BLUEBERRY 2063-30
FINISH: EGGSHELL
LOCATION: BOTTOM HALF

P-3: MANUFACTURER: SHERWIN WILLIAMS
COLOR: EXTRA WHITE - SW 7006
FINISH: SEMI-GLOSS
LOCATION: DOORFRAMES

FINISH FLOOR LEGEND:

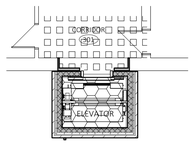
LUXURY VINYL TILE
LVT

QUARRY TILE
QT

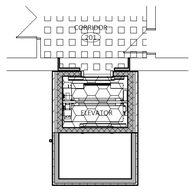
ENTRY MAT
EM

FLOOR FINISH NOTES:

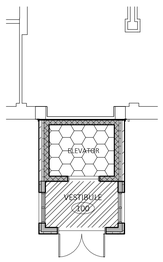
1. REFER TO FINISH SCHEDULE SHEETS FOR COLOR DESIGNATIONS.
2. ALL FLOOR FINISHES TO EXTEND TO MEET WALL AND/OR BASE OF CASEWORK.
3. FINISH PLAN SHOULD BE USED IN CONJUNCTION WITH FINISH SCHEDULE. SHOULD THERE BE ANY DISCREPANCY BETWEEN OTHER DRAWINGS IN THE SET, THE HIGHER QUALITY FINISH SHALL BE PROVIDED.



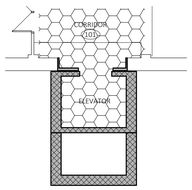
4 3_THIRD FLOOR FINISH
SCALE: 1/8" = 1'-0"



3 2_SECOND FLOOR FINISH
SCALE: 1/8" = 1'-0"



2 VESTIBULE NEW WORK FINISH PLAN
SCALE: 1/8" = 1'-0"



1 1_FIRST FLOOR FINISH
SCALE: 1/8" = 1'-0"

VIEW FROM TABLE 803.9/ 2012 IBC
INTERIOR WALL AND CEILING FINISH REQUIREMENTS BY OCCUPANCY

GROUP	SPRINKLERED			NONSPRINKLERED		
	VERTICAL EXITS & EXIT PASSAGEWAYS	EXIT ACCESS CORRIDORS & OTHER EXITWAYS	ROOMS AND ENCLOSED SPACES	VERTICAL EXITS & EXIT PASSAGEWAYS	EXIT ACCESS CORRIDORS & OTHER EXITWAYS	ROOMS AND ENCLOSED SPACES
A-1 & A-2	B	B	C	A	A	B
A-3, A-4, A-5	B	B	C	A	A	C
B, E, M	B	C	C	A	B	C

INTERIOR WALLS AND CEILING FINISHES SHALL BE CLASSIFIED IN ACCORDANCE WITH ASTM E 84.

architecture
interior design
master planning
FRIAR
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

STATE OF CONNECTICUT
JOYCE R. RUSS
No. 12358
LICENSED ARCHITECT

PROFESSIONAL SEAL

STATE OF CONNECTICUT
FRIAR ARCHITECTURE, INC.
NO. 113
CORPORATE PRACTICE of ARCHITECTURE

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION

FINISH PLAN

DATE: 12/31/2025
SCALE As indicated
PROJ. #: 2022-049A
DRAWN: BKH
CHECKED: JMY

SHEET NO.
A12.1

GENERAL NOTES

GENERAL

1. GOVERNING CODE: 2022 CONNECTICUT STATE BUILDING CODE, (2021 INTERNATIONAL BUILDING CODE).

1. DESIGN LOADS: CITY OF WATERBURY

3. ROOF LOAD:
   ROOF SNOW LOAD CRITERIA:
   P_g = 35 PSF
   C_e = 1.0
   I_s = 1.1
   C_t = 1.0
   P_f = 26.95 PSF

   WITH INCREASES FOR SNOW DRIFTING, UNBALANCES AND SLIDING PER SECTION 1608 (2021 IBC).

   MINIMUM ROOF SNOW LOAD = 30 PSF

   ROOF DEAD LOAD = 20 PSF

   a. WIND LOAD CRITERIA: SECTION 1609 (2021 IBC)
   ULTIMATE WIND SPEED V_{ult} = 130 MPH
   NOMINAL DESIGN WIND V_{ASD} = 101 MPH
   RISK CATEGORY III, I_w = 1.0
   EXPOSURE CLASSIFICATION "B".

   MINIMUM WIND LOAD ON PRIMARY STRUCTURE = 16 PSF

   WIND LOADS ON SECONDARY ELEMENTS SHALL CONFORM WITH ASCE 7-16.

   COMPONENT AND CLADDING DESIGN WIND PRESSURES:

   ROOF ZONE 1: POSITIVE: 16.00 PSF
   NEGATIVE: -57.31 PSF

   ROOF ZONE 2: POSITIVE: 16.00 PSF
   NEGATIVE: -75.66 PSF

   ROOF ZONE 3: POSITIVE: 16.00 PSF
   NEGATIVE: -103.13 PSF

   WALL ZONE 4: POSITIVE: 36.00 PSF
   NEGATIVE: -39.07 PSF

   WALL ZONE 5: POSITIVE: 36.00 PSF
   NEGATIVE: -48.19 PSF

   ROOF OVERHANG ZONE 2: -70.21 PSF
   ROOF OVERHANG ZONE 3: -97.56 PSF

   DESIGN WIND PRESSURE IS COMPUTED BASED ON ULTIMATE WIND SPEED USING 10 SQUARE FOOT OF AREA.

   b. SEISMIC LOAD CRITERIA FOR ADDITION AS PER SECTION 1613 (2021 IBC) WITH:
   RISK CATEGORY = III
   SEISMIC IMPORTANCE FACTOR, Ie = 1.25
   S_S = 0.193g, S1 = 0.054g
   SOIL SITE CLASS = D (ASSUMED)
   SPECTRAL RESPONSE COEFFICIENTS, S_{DS} = 0.206G, S_{D1} = 0.086g
   SEISMIC DESIGN CATEGORY, B
   BASIC SEISMIC-FORCE-RESISTING SYSTEM: BEARING WALL, INTERMEDIATE REINFORCED MASONRY SHEAR WALLS
   SEISMIC RESPONSE COEFFICIENT, C_S = 0.0735
   DESIGN BASE SHEAR, V = C_S x W
   RESPONSE MODIFICATION FACTOR, R = 3.5
   ANALYSIS PROCEDURE USED: EQUIVALENT LATERAL FORCE PROCEDURE

   c. DESIGN BEARING PRESSURE ON 8 INCHES OF COMPACTED STRUCTURAL FILL OR CRUSHED STONE OVER NATURALLY DEPOSITED GLACIAL TILL STRATUM: 6000 PSF

   OR

   DESIGN BEARING PRESSURE ON 6 INCHES OF CRUSHED STONE OVER BEDROCK: 6000 PSF

4. SHOULD ANY OF THE DETAILED INSTRUCTIONS SHOWN ON THE PLANS CONFLICT WITH THE GENERAL STRUCTURAL NOTES, THE SPECIFICATIONS, OR WITH EACH OTHER, THE STRICTEST PROVISION SHALL GOVERN.

5. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE BUILDING IS FULLY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO INSURE THE SAFETY OF THE BUILDING AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, SHEETING, TEMPORARY BRACING, GUYS OR TIEDOWNS WHICH MIGHT BE NECESSARY. SUCH MATERIAL SHALL REMAIN THE CONTRACTOR'S PROPERTY AFTER COMPLETION OF THE PROJECT.

   a. THE CONTRACTOR SHALL PROVIDE SHORING CALCULATIONS AND SHORING DRAWINGS, INDICATING THE WORK TO BE PROVIDED, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT.

6. THE STRUCTURE UTILIZES SHEAR WALLS TO PROVIDE LATERAL STABILITY. THEREFORE, TEMPORARY BRACING, GUYS, ETC. MUST BE MAINTAINED UNTIL ALL MASONRY SHEAR WALLS HAVE BEEN ERECTED AND ATTACHED TO STEEL FRAMING.

7. LOADS, OPENINGS AND STRUCTURE IN ANY WAY RELATED TO REQUIREMENTS OF OTHER (NON-STRUCTURAL) DISCIPLINES ARE SHOWN FOR BIDDING PURPOSES ONLY. THE CONTRACTOR SHALL OBTAIN FROM THE HEATING AND VENTILATING, ELECTRICAL, PLUMBING AND OTHER SUBCONTRACTORS THE FINAL APPROVED SIZE AND LOCATION OF ALL OPENINGS AND WORK TO BE PROVIDED FOR THEIR TRADE IN ROOFS, FLOORS AND WALLS, WHETHER SHOWN OR NOT SHOWN ON STRUCTURAL DRAWINGS. CONTRACTOR SHALL BE RESPONSIBLE FOR TRANSMISSION OF REQUIREMENTS, LOCATIONS AND DETAILS TO STRUCTURAL SUBCONTRACTORS. EXCESS COST RELATED TO VARIATION IN MECHANICAL REQUIREMENTS ARE NOT TO BE BORNE BY THE OWNER.

8. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO FOLLOW ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION.

9. SHOP DRAWINGS ARE TO BE CHECKED BY THE CONTRACTOR AND SUBCONTRACTOR AND BEAR CHECKER'S INITIALS BEFORE BEING SUBMITTED TO THE ARCHITECT FOR APPROVAL.

10. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES AND EXISTING CONDITIONS BEFORE PROCEEDING WITH ANY WORK.

11. ALL SECTIONS AND DETAILS SHALL BE CONSIDERED TYPICAL AND APPLY FOR THE SAME AND SIMILAR SITUATIONS THROUGHOUT THE BUILDING, UNLESS OTHERWISE SPECIFICALLY NOTED.

12. CONTRACTOR SHALL REVIEW ALL ARCHITECTURAL AND STRUCTURAL DRAWINGS PRIOR TO SUBMITTING THEIR BID FOR REFERENCE TO ALL NOTES ON ARCHITECTURAL DRAWINGS REFERRING TO "SEE STRUCTURAL DRAWINGS". IF THE SIZE OF ELEMENTS AND DETAILING OF MEMBERS IS NOT INDICATED, THE CONTRACTOR SHALL CONTACT THE ARCHITECT TO REQUEST THE MISSING INFORMATION IN PREPARATION OF THEIR BID. THESE REFERENCED ITEMS SHALL BE PART OF THE BASE BID.

13. IN CASES OF DISCREPANCIES BETWEEN CONTRACT DOCUMENTS AND SUBMITTED SHOP DRAWINGS, THE CONTRACT DOCUMENTS SHALL GOVERN INSTALLATION OF MATERIALS.

14. WOOD BLOCKING THAT IS NOT PART OF THE PRIMARY STRUCTURAL FRAME IS NOT OWNED BY MHAI. THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER IS RESPONSIBLE FOR COORDINATING THE PARTIES THAT OWN THE BLOCKING, INCLUDING THE CONNECTION OF THE BLOCKING TO ANY SUPPORTING MATERIAL. THIS INCLUDES BUT IS NOT LIMITED TO: BLOCKING BELOW MECHANICAL EQUIPMENT, BLOCKING FOR ROOFING ATTACHMENT, AND BLOCKING FOR WINDOW SYSTEM CONNECTIONS

CONTRACTOR'S DELEGATED DESIGN

1. CONTRACTOR SHALL RETAIN THE SERVICES OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF CONNECTICUT TO PERFORM THE DESIGN OF THE FOLLOWING:

   1. RAILINGS, LADDERS, STAIR STRINGERS, AND STAIR LANDING DESIGN AND THEIR CONNECTIONS
   2. TEMPORARY SHORING OF EXISTING STRUCTURAL MEMBERS.
   3. ALL NON-STRUCTURAL EQUIPMENT ATTACHMENT TO SUPPORTING STRUCTURE. THIS INCLUDES BUT IS NOT LIMITED TO MECHANICAL CURB ATTACHMENTS, HANGING CONNECTIONS OF MEP ITEMS, ETC.

2. ALL CALCULATIONS SHALL BE SIGNED AND SEALED BY THE ENGINEER AND SUBMITTED FOR REVIEW.

FOUNDATIONS

1. BACKFILLING SHALL BE ACCOMPLISHED TO EQUAL HEIGHTS ON BOTH SIDES OF FOUNDATION WALLS TO PREVENT MOVEMENTS DUE TO UNBALANCED EARTH PRESSURE. WHERE EARTH IS ON ONE SIDE ONLY, BACKFILLING AND COMPACTION SHALL NOT START UNTIL FLOOR SLAB OR ADEQUATE BRACING IS PROVIDED FOR WALL SUPPORT (EXCEPT AT RETAINING WALLS).

2. ALL FOOTINGS ARE TO REST ON 8 INCHES OF COMPACTED STRUCTURAL FILL OR CRUSHED STONE OVER NATURALLY EPOSITED GLACIAL TILL STRATUM, AS DEFINED IN THE SPECIFICATIONS, OR CONTROLLED COMPACTED FILL, REGARDLESS OF LEVATIONS SHOWN ON DRAWINGS. FOOTING BOTTOM ELEVATIONS SHALL NOT BE HIGHER THAN INDICATED ON THE OUNDATION PLAN, NOR LESS THAN 3'-6" BELOW FINISH GRADES.

3. IF FILL MATERIALS ARE ENCOUNTERED AT FOOTING BEARING ELEVATIONS, ALL FILL MATERIAL SHALL BE EXCAVATED AND DISPOSED OF LEGALLY OFF-SITE. THE OVER EXCAVATION SHALL BE BACKFILLED WITH CONTROLLED COMPACTED FILL TO THE BOTTOM OF FOOTING ELEVATION AS REQUIRED.

4. ALL CONTROLLED COMPACTED BACKFILL UNDER FOOTINGS AND WITHIN THE FOOTPRINT OF THE STRUCTURE SHALL BE COMPACTED TO 95% OF THE MODIFIED OPTIMUM DENSITY.

5. BOTTOM OF ALL EXTERIOR FOOTINGS SHALL BE AT LEAST 3'-6" BELOW FINISHED GRADE. PRIOR TO PROCEEDING WITH FOOTING EXCAVATION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF FINISH GRADES AND BOTTOM OF EXTERIOR FOOTING ELEVATIONS TO MAINTAIN THE 3'-6" FROST PROTECTION.

6. ALL SOIL SURROUNDING AND UNDER ALL FOOTINGS SHALL BE PROTECTED FROM FREEZING AND FROST ACTION DURING THE COURSE OF CONSTRUCTION.

7. FOOTING BOTTOMS SHALL STEP AT THE RATE OF 1 UNIT VERTICAL TO 2 UNITS HORIZONTAL WITH A MAXIMUM VERTICAL STEP OF 2'-0".

8. WHERE SUBSURFACE PIPING PASSES THROUGH FOUNDATION WALLS, THE TOP OF THE FOOTINGS SHALL BE AT LEAST 8" BELOW THE INVERT ELEVATION OF THE PIPING AND CONDUITS. COORDINATE ALL INVERTS WITH MECHANICAL, PLUMBING, FIRE PROTECTION, ELECTRICAL, SITE AND SITE UTILITY DRAWINGS.

9. WHERE FOOTINGS ARE IN CLOSE PROXIMITY OF SUBSURFACE PIPING OR CONDUIT, BOTTOM OF FOOTINGS SHALL BE AT LEAST 8" BELOW INVERT ELEVATION OF PIPING OR CONDUITS.

10. KEEP FOUNDATION EXCAVATIONS FREE OF WATER AT ALL TIMES.

11. USE LEAN CONCRETE (f'_c=1500) OR CONTROLLED COMPACTED FILL FOR OVER-EXCAVATION OF FOOTINGS.

12. PLACEMENT OF ALL COMPACTED FILL MATERIALS MUST BE UNDER SUPERVISION OF AN APPROVED TESTING LABORATORY (SEE SPECIFICATIONS). CONCRETE FOUNDATIONS SHALL NOT BE PLACED UNTIL SUBGRADE HAS BEEN CHECKED IN PLACE AND APPROVED BY TESTING LABORATORY.

13. EXISTING ON-SITE EXCAVATED MATERIALS SHALL NOT BE ACCEPTABLE BACKFILL MATERIAL BELOW BUILDING FOUNDATIONS, SLABS ON GRADE, OR FOR BACKFILLING OF FOUNDATION WALLS, OR WITHIN 2 FEET OF PAVEMENT GRADES UNLESS APPROVED BY THE GEOTECHNICAL ENGINEER OF RECORD.

14. SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS OF BRICK OR CONCRETE MASONRY BLOCK SHELF ELEVATIONS IN THE FOUNDATION WALLS.

15. THE FOUNDATION DESIGN OF THE STRUCTURE HAS BEEN PREPARED BASED ON THE SOIL BORINGS, SOILS REPORT AND RECOMMENDATIONS PROVIDED BY THE GEOTECHNICAL ENGINEER, FREEMAN COMPANIES, DATED DECEMBER 16, 2025. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REVIEW THE MATERIAL PRIOR TO PREPARING THEIR BID TO ASSURE THEY UNDERSTAND THE SOIL CONDITIONS AND THE RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER.

16. FOUNDATION DESIGN SITE PREPARATION: THE FOUNDATION DESIGN AS INDICATED ON THE STRUCTURAL DRAWINGS HAS BEEN BASED ON THE FOLLOWING SITE PREPARATION. THE SITE HAS BEEN PREPARED BY THE EXCAVATION AND REMOVAL FROM THE SITE OF ALL EXISTING FILL AND CONTAMINATED SOILS. THE FOUNDATION DESIGN IS BASED ON THE CONTROLLED BACKFILLING OF THE SITE EXCAVATION WITH CONTROLLED FILL COMPACTED TO AT LEAST 95% OF THE MODIFIED OPTIMUM DENSITY IN ACCORDANCE WITH ASTM D1557.

17. PROVIDE CONTINUOUS BENTONITE WATERSTOPS BETWEEN THE TOP OF FOOTING AND BOTTOM OF ALL WALLS WHERE THE SLAB ON GRADE IS BELOW THE FINISH GRADE. PLACE THE WATERSTOP WITH A MINIMUM OF 2" CLEAR FROM THE FACE OF WALL, OR PER THE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS. ATTACH WATERSTOP TO THE CONCRETE PER THE MANUFACTURERS WRITTEN INSTALLATION INSTRUCTIONS.

SLAB ON GRADE

1. ALL SLABS ON GRADE SHALL BEAR ON A 15 MIL, CLASS A, VAPOR RETARDER OVER A MINIMUM OF 4 INCHES OF 3/4" COMPACTED PROCESSED AGGREGATE FILL, OVER A MINIMUM OF 6 INCHES OF COMPACTED GRAVEL FILL.

   a. ALL JOINTS OF THE VAPOR RETARDER SHALL BE SEALED WITH TAPE. TURN THE VAPOR BARRIER UP AT ALL TERMINATIONS AGAINST FOUNDATION WALLS AND SEAL JOINT BY CONTINUOUSLY TAPING.

2. IF FILL MATERIALS ARE ENCOUNTERED SLAB SUBGRADE ELEVATIONS, ALL FILL MATERIAL SHALL BE EXCAVATED AND DISPOSED OF LEGALLY OFF-SITE. THE OVER EXCAVATION SHALL BE BACKFILLED WITH CONTROLLED COMPACTED FILL TO THE BOTTOM OF THE SLAB SUBGRADE AS REQUIRED. ALL CONTROLLED COMPACTED BACKFILL UNDER SLABS WITHIN THE FOOTPRINT OF THE STRUCTURE SHALL BE COMPACTED TO 95% OF THE MODIFIED OPTIMUM DENSITY.

3. EXISTING ON-SITE EXCAVATED MATERIALS SHALL NOT BE ACCEPTABLE BACKFILL MATERIAL BELOW BUILDING SLABS ON GRADE UNLESS APPROVED BY THE GEOTECHNICAL ENGINEER OF RECORD.

4. SAWCUT CONTRACTION JOINTS ARE TO BE CREATED IN SLABS ON GRADE. REFER TO ACI 360, CHAPTER 6 FOR REQUIREMENTS. JOINTS SHALL BE SAW CUT 1/8" WIDE AND TO A DEPTH EQUAL TO 1/4 OF THE SLAB THICKNESS. LOCATE JOINTS A MAXIMUM OF 12'-0" ON CENTER IN EACH DIRECTION, IN ADDITION TO THOSE LOCATIONS INDICATED ON PLAN.

5. SAWCUT CONTRACTION JOINTS SHOULD BE CONTINUOUS ACROSS INTERSECTING JOINTS, NOT STAGGERED OR OFFSET. THE ASPECT RATIO OF SLAB PANELS SHOULD BE A MAXIMUM OF 1.5 TO 1. L AND T SHAPED PANELS SHOULD BE AVOIDED.

6. CONSTRUCTION JOINTS AS REQUIRED SHALL BE KEYED AND DOWELED AND LOCATED AT INTERVALS OF A MAXIMUM OF 75 FEET ON CENTER.

7. SEE ARCHITECTURAL DRAWINGS FOR LOCATION AND SIZE OF DEPRESSED AREAS IN CONCRETE SLABS AND FOR CONCRETE PADS. MAINTAIN FULL SLAB THICKNESS IN DEPRESSED AREAS, UNLESS OTHERWISE SHOWN.

8. SEE ARCHITECTURAL DRAWINGS FOR LOCATION OF ALL MASONRY WALLS FOR WHICH NO FOOTING IS SHOWN. SEE DETAILS FOR SLAB REINFORCING REQUIREMENTS AT ALL WALL LOCATIONS.

9. CONTRACTOR SHALL CONSOLIDATE ALL SLAB CONCRETE USING VIBRATIONAL METHODS IN CONFORMANCE WITH ACI 309, AGUIDE FOR CONSOLIDATION OF CONCRETE.

10. ALL CONDUIT AND PIPING ARE TO BE PLACED BELOW THE SLAB VAPOR BARRIER. ANY STUB-UPS SHOULD BE TAPED WITH APPROVED TAPE.

CONCRETE

MATERIALS:

CONCRETE SHALL MEET THE REQUIREMENTS OF THE EXPOSURE CATEGORY LISTED BELOW PER ACI 318 CHAPTER 19, AND SHALL HAVE THE MAXIMUM WATER TO CEMENT RATIO, TARGET AIR CONTENT AND DEVELOP STRENGTH IN 28 DAYS AS FOLLOWS:

LOCATION	EXPOSURE CATEGORY	STRENGTH (PSI)	MAXIMUM WATER TO CEMENT RATIO	TARGET AIR CONTENT
FOUNDATION WALLS AND MAT FOUNDATION	F2	4500	0.45	6%
SLAB ON GRADE	F0	3500	N/A	N/A

1. ALL DETAILING, FABRICATION AND ERECTION OF REINFORCING BARS MUST FOLLOW ACI 318-19.

2. CONTRACTOR IS RESPONSIBLE FOR FOLLOWING ACI GUIDELINES FOR HOT AND COLD WEATHER CONCRETE AND SHALL SUBMIT PROCEDURES FOR RECORD PRIOR TO COMMENCING WORK.

3. REINFORCING STEEL SHALL BE ASTM A615, GRADE 60.

4. NO TACK WELDING OF REINFORCING WILL BE PERMITTED

5. UNLESS NOTED OTHERWISE, ALL LAP SPLICES SHALL BE CLASS B, IN ACCORDANCE WITH ACI 318-19.

6. NO CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 0.1% CHLORIDE BY WEIGHT OF ADMIXTURES SHALL BE USED IN THE CONCRETE.

7. BOTTOM OF ALL EXTERIOR FOOTINGS SHALL BE AT LEAST 3'-6" BELOW FINISHED GRADE. PRIOR TO PROCEEDING WITH FOOTING FORMWORK, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF BOTTOM OF EXTERIOR FOOTING ELEVATIONS WITH THE FINISH GRADES AND MAINTAINING THE 3'-6" FROST PROTECTION. WHERE SUBSURFACE PIPING PASSES THROUGH FOUNDATION WALLS, THE TOP OF FOOTINGS SHALL BE AT LEAST 8" BELOW THE INVERT ELEVATION OF THE PIPING AND CONDUITS. COORDINATE ALL INVERTS WITH MECHANICAL, PLUMBING, FIRE PROTECTION, ELECTRICAL, SITE AND SITE UTILITY DRAWINGS. PIPING OR CONDUITS SHALL NOT PASS THROUGH COLUMNS OR PIERS.

8. ALL HORIZONTAL STEEL SHOWN IN SECTIONS AND DETAILS SHALL BE CONTINUOUS, UNLESS OTHERWISE NOTED. ALL LAPS SHALL BE CLASS AB@ SPLICES IN ACCORDANCE WITH ACI 318.

9. AT INTERSECTIONS OF REINFORCED CONCRETE WALLS, PROVIDE CORNER DOWELS OF SAME SIZE AND AT THE SAME SPACING AS THE SMALLER HORIZONTAL REINFORCING. DOWELS SHALL HAVE A CLASS B LAP WITH HORIZONTAL REINFORCING IN EACH DIRECTION.

10. PROVIDE DRILLED AND EPOXIED DOWELS OF SAME SIZE TO MATCH NEW REINFORCING WHERE NEW CONSTRUCTION ABUTS EXISTING CONCRETE CONSTRUCTION. LENGTH SHALL BE THE REQUIRED EMBEDMENT DEPTH PER THE ANCHOR BOLT/EPOXY MANUFACTURER PLUS A CLASS B LAP SPLICE FOR THE SIZE OF BAR.

11. PROVIDE CORROSION RESISTANT ACCESSORIES IN ALL EXPOSED CONSTRUCTION.

12. SEE ARCHITECTURAL, MECHANICAL, PLUMBING, FIRE PROTECTION, ELECTRICAL, SITE, SITE UTILITY AND EQUIPMENT DRAWINGS FOR CONCRETE PADS, SLEEVES, OPENINGS, RECESSES, AND BUILT-IN WORK IN CONCRETE ELEMENTS.

13. THE CONTRACTOR SHALL FURNISH, LOCATE AND INSTALL ALL ACCESSORIES FOR PROPER ANCHORAGE OF WOOD AND METAL FRAMING, WOOD BLOCKING, BRICK WORK AND MASONRY UNITS. THEY SHALL BE SOLELY RESPONSIBLE FOR FURNISHING, LOCATING AND ENSURING PROPER QUANTITY OF ALL FASTENING DEVICES.

14. ALL CONCRETE TO REMAIN EXPOSED TO VIEW SHALL RECEIVE A SMOOTH RUBBED FINISH (SEE SPECIFICATIONS).

15. ALL CONCRETE CORNERS WITH BOTH SIDES EXPOSED TO VIEW SHALL BE SQUARE UNLESS OTHERWISE SHOWN OR NOTED. THE EDGE SHALL BE RUBBED, PRODUCING A SMOOTH, DENSE SURFACE WITHOUT PITS OR IRREGULARITIES.

16. PROVIDE CONTINUOUS VERTICAL DOVETAIL SLOTS AT 16 INCH CENTERS HORIZONTALLY FOR ALL CONCRETE WALLS ABUTTING A MASONRY WALL OR MASONRY VENEER, UNLESS OTHERWISE NOTED.

17. PROVIDE CLEARANCE FROM EDGE OF REINFORCING TO EDGE OF CONCRETE AS FOLLOWS:

FOOTINGS (AGAINST EARTH)	3"
BEAMS (LONGITUDINAL REINFORCING)	2"
COLUMNS AND PIERS (VERTICAL REINFORCING)	2"
WALLS, EXTERIOR FACE (#5 AND SMALLER)	1 1/2"
WALLS, EXTERIOR FACE (#6 AND LARGER)	2"
SLABS (INTERIOR)	3/4"
SLABS (EXTERIOR)	1 1/2"
SLABS ON GRADE (W.W.F.)	1/3 X THK. FROM TOP SURFACE

18. PROVIDE THE FOLLOWING AT OPENINGS IN ALL CONCRETE WALLS AND FRAMED SLABS, UNLESS OTHERWISE INDICATED:
   1-#5 AT EACH FACE ON EACH SIDE OF OPENING, EXTENDING 2'-0" BEYOND OPENING.

   1-#5 X 4'-0" LONG AT EACH FACE DIAGONALLY AT EACH CORNER.

19. REINFORCING STEEL SHOP DRAWINGS SHALL INDICATE THE SEQUENCE IN WHICH LAYERS OF CROSSING REINFORCING SHOULD BE PLACED, IN ORDER TO PRODUCE THE CORRECT OUTERMOST LAYER AS INDICATED ON THE DRAWINGS.

20. SHOP DRAWINGS SHALL INDICATE LOCATIONS OF ALL WALL CONTROL AND CONSTRUCTION JOINTS.

21. ALL REINFORCING, THREADED RODS OR BOLTS INDICATED TO BE DRILLED AND EPOXIED SHALL UTILIZE HILTI HIT-HY200 ADHESIVE OR APPROVED EQUAL.

STRUCTURAL STEEL

MATERIALS:

STRUCTURAL STEEL	ASTM A 36
ALL W SHAPES	ASTM A 992, GR.50
STRUCTURAL STEEL TUBING	ASTM A500, GRADE C
STRUCTURAL STEEL PIPE	ASTM A53, GRADE B
BOLTS	ASTM A325
ANCHOR BOLTS	ASTM F1554, GRADE 36
WELDING ELECTRODE	ASTM E 70
WELDABLE REBAR	ASTM A706, GRADE 60

1. DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION, AISC 360-10. ALL REACTIONS SHOWN ON PLAN HAVE BEEN DEVELOPED USING ALLOWABLE STRESS DESIGN.

2. WELDING SHALL CONFORM TO THE CODE FOR "ARC AND GAS WELDING IN BUILDING CONSTRUCTION" OF THE AMERICAN WELDING SOCIETY. ALL WELDING SHALL BE DONE BY A CERTIFIED WELDER.

3. ALL LOOSE BEAM LINTELS SHALL HAVE 8" MINIMUM BEARING. SEE ARCHITECTURAL JAMB DETAILS FOR LENGTHS.

4. FOR MISCELLANEOUS STEEL NOT SPECIFICALLY DETAILED ON STRUCTURAL DRAWINGS, REFER TO ARCHITECTURAL DRAWINGS.

5. CONNECTIONS:
   CONNECTIONS SHALL BE MADE USING 3/4" DIAMETER ASTM A325 BOLTS (SNUG TIGHT OR SLIP CRITICAL) OR WELDS, UNLESS NOTED OTHERWISE. IF TENSION CONTROL BOLTS ARE USED, CONNECTIONS SHALL BE DESIGNED FOR SLIP CRITICAL BOLT ALLOWABLE LOAD VALUES USING CLASS A FAYING SURFACE.

   USE LARGER OF 1/4" FILLET WELDS OR MINIMUM SIZE PER AISC REQUIREMENTS WHERE NO WELD SIZE IS SHOWN ON DRAWINGS.

   WELDS IN EXCESS OF 24" IN LENGTH SHALL BE 3" STITCH WELDS AT 8" ON CENTERS, UNLESS SPECIFICALLY SHOWN ON DRAWINGS TO BE CONTINUOUS.

6. NO WELDING OR FINAL BOLTING SHALL BE DONE UNTIL AS MUCH OF THE STRUCTURE THAT WILL BE STIFFENED THEREBY HAS BEEN PROPERLY ALIGNED.

7. SEQUENCE OF PLACING WELDS SHALL BE SUCH AS TO AVOID DISTORTION OF MEMBERS.

8. SUBSTITUTION OF STRUCTURAL STEEL MEMBERS IS PERMITTED TO FACILITATE DELIVERY AT NO ADDITIONAL COST TO THE OWNER. SUBSTITUTED MEMBERS MUST BE OF THE SAME NOMINAL DEPTH AS THE MEMBER ORIGINALLY INDICATED AND HAVE A WEIGHT GREATER THAN THAT INDICATED. BEAM FLANGES MUST NOT INFRINGE ON ADJACENT ARCHITECTURAL ELEMENTS.

9. PROVIDE 8" X 8" X 5/8" BEARING PLATES FOR ALL WALL BEARING BEAMS UNLESS NOTED OTHERWISE. ALL PLATES SHALL HAVE A MINIMUM OF (2)-3/4" DIAMETER X 5" LONG WELDED STUDS ON THE BOTTOM TO SET IN CONCRETE OR MASONRY WALLS.

10. EXISTING STEEL SURFACES TO RECEIVE FIELD WELDS SHALL BE THOROUGHLY CLEANED UNTIL FREE FROM PAINT, RUST, GREASE, ETC.

11. PROVIDE 1/4" CLOSURE PLATES WITH FULL SEAL WELDS FOR ALL TUBE OR PIPE HOLLOW STEEL SECTIONS, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

12. PROVIDE AN ELEVATOR HOIST BEAM AT EACH ELEVATOR. THE BEAM SHALL BE A W8X21 MINIMUM. COORDINATE WITH THE ARCHITECTURAL DRAWINGS. THE BEARING PLATE ON MASONRY WALLS SHALL BE A PLATE 3/4"X8"X12" MINIMUM WITH (2)-3/4" DIAMETER ANCHOR BOLTS SET INTO GROUTED MASONRY.

13. CONTRACTOR IS RESPONSIBLE FOR PROVIDING NEW STEEL FRAMES, AS DETAILED ON THE STRUCTURAL DRAWINGS, AT ALL NEW FLOOR AND ROOF OPENINGS REQUIRED BY ARCHITECTURAL, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS IN BOTH NEW AND EXISTING STRUCTURES. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE CONTRACT DOCUMENTS AND INCLUDE THESE FRAMES IN THEIR BID PRICE. THESE NEW STEEL FRAMES FOR OPENINGS ARE IN ADDITION TO THE FRAMES SPECIFICALLY INDICATED ON THE DRAWINGS FOR SPECIFIC SUPPORT CONDITIONS.

14. CONSTRUCTION MANAGER IS RESPONSIBLE TO COORDINATE THE MECHANICAL CURB DIMENSIONS FOR MECHANICAL EQUIPMENT BETWEEN THE MECHANICAL CONTRACTOR AND STRUCTURAL STEEL FABRICATOR. THE STRUCTURAL STEEL SHALL BE LOCATED ON THE CENTERLINE OF MECHANICAL CURB.

15. STEEL CONTRACTOR SHALL PROVIDE SKETCHES FOR ALL CORRECTIVE FIELD WORK WHICH SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR APPROVAL. ALL SKETCHES SHALL BE SIGNED AND SEALED BY THE STEEL FABRICATORS CONNECTIONS ENGINEER.

16. ALL THREADED RODS OR BOLTS INDICATED TO BE DRILLED AND EPOXIED SHALL UTILIZE HILTI HIT-HY200 ADHESIVE OR APPROVED EQUAL.

METAL ROOF DECK

1. MATERIALS:
   TYPICAL METAL DECK SHALL BE 3" GALVANIZED DEEP RIB TYPE WITH NESTING SIDE SEAMS OF GAGE INDICATED ON THE DRAWINGS.

2. ATTACHMENT AT STRUCTURAL STEEL:
   METAL DECK SHALL BE POWER ACTUATED FASTENED AND SUPPORTING STEEL WITH HILTI X-EDN19 OR EQUAL SPACED NOT MORE THAN 12" ON CENTER WITH A 36/4 FASTENING PATTERN, UNLESS OTHERWISE NOTHER ON THE DRAWINGS.

   SCREW METAL ROOF DECK TO STEEL MEMBER PARALLEL TO SPAN OF DECK USING HILTI X-EDN19 FASTERNERS SPACE AT 12" ON CENTER. **WELDING OF THE ROOF DECK IS PROHIBITED.**

   INTERMEDIATE SIDE CONNECTIONS SHALL BE MADE WITH #10 SELF TAPPING SCREWS. THE MAXIMUM SPACING OF SIDE LAP CONNECTIONS SHALL BE 1'-6" WITH A MINIMUM OF (4) SCREWS PER SPAN. FOR 3" DECK USE A MINIMUM OF (8) SCREWS PER SPAN.

   ATTACHMENT AT COLD FORM METAL FRAMING:

   METAL DECK SHALL BE SCREWED TO SUPPORTING CFMF WITH #14 SELF TAPPING SCREWS OR EQUAL SPACED WITH (2)-SCREWS AT 12" O.C. MAXIMUM, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

   SCREW METAL ROOF DECK TO COLD FORM MEMBER PARALLEL TO SPAN OF DECK USING #14 SELF TAPPING OR EQUAL SPACED AT 6" ON CENTER. **WELDING OF THE ROOF DECK IS PROHIBITED.**

   INTERMEDIATE SIDE CONNECTIONS SHALL BE MADE WITH #10 SELF TAPPING SCREWS. THE MAXIMUM SPACING OF SIDE LAP CONNECTIONS SHALL BE 1'-6" WITH A MINIMUM OF (4) SCREWS PER SPAN. FOR 3" DECK USE A MINIMUM OF (8) SCREWS PER SPAN.

3. HANGING LOADS:

   IT IS ACCEPTABLE TO HANG PIPING OR CONDUIT 1" DIAMETER OR LESS FROM DECKING USING APPROVED FASTERNERS.

   ALL PIPING GREATER THAN 1 IN., DUCTWORK, LIGHTING, AND FINISHES INCLUDING CEILINGS AND CEILING CLOUDS MUST BE HUNG FROM STUCTURAL FRAMING. AT LOCATIONS WHERE THE EQUIPMENT CANNOT BE HUNG DIRECTLY OFF THE STRUCTURAL FRAMING, THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SECONDARY SUPPORT SYSTEM BETWEEN THE STRUCTURAL FRAMING MEMBERS. THIS SYSTEM MUST BE ENGINEERED FOR THE EQUIPMENT WEIGHTS BEING SUPPORTED. PROVIDE SIGNED AND SEALED SHOP DRAWINGS FOR REVIEW, THAT INCLUDE THE ATTACHMENT OF THE SYSTEM TO THE SUPPORTING FRAMING.

CONCRETE MASONRY

MATERIALS:

HOLLOW LOAD BEARING UNITS: ASTM C 90
(NET AREA COMPRESSIVE STRENGTH OF CMU UNIT = 2000PSI)
MORTAR: (TYPE S) ASTM C 270
(COMPRESSIVE STRENGTH OF MASONRY ASSEMBLY, f'm = 2000 PSI)
GROUT FOR REINFORCED MASONRY: ASTM C 476
(COMPRESSIVE STRENGTH AT 28 DAYS = 2500 PSI)
GROUT FOR REINFORCED MASONRY: ASTM C 476
SOLID LOAD BEARING UNITS: (GRADE N-I) ASTM C 145
CONCRETE BRICK: (GRADE N-I) ASTM C 55

1. WALLS INDICATED ON STRUCTURAL DRAWINGS ARE FOR REFERENCE ONLY. SEE ARCHITECTURAL DRAWINGS FOR LOCATION, THICKNESS AND COMPOSITION OF MASONRY WALLS.

2. ALL MASONRY WALLS SHALL CONTAIN THE FOLLOWING REINFORCING:
   1-#5 VERTICAL BAR AT 32" ON CENTER.

   2-#6 VERTICAL BARS AT BOTH SIDES OF DOOR, WINDOW AND MECHANICAL OPENINGS.

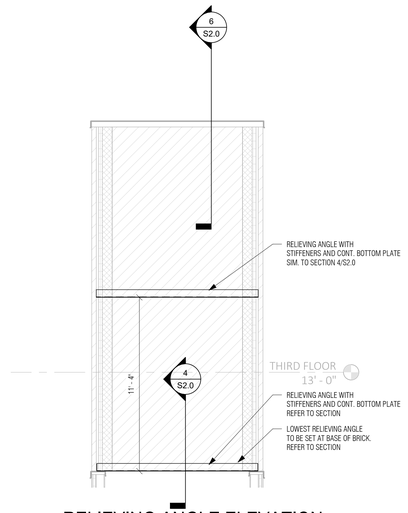
   2-#5 HORIZONTAL BAR MINIMUM ABOVE AND BELOW ALL WINDOW AND MECHANICAL OPENINGS AND ABOVE ALL DOOR OPENINGS. PROVIDE ADDITIONAL BARS ABOVE DOORS, WINDOWS AND MECHANICAL OPENINGS AS REQUIRED IN ACCORDANCE WITH LINTEL SCHEDULE ON ARCHITECT

HEADER SCHEDULE

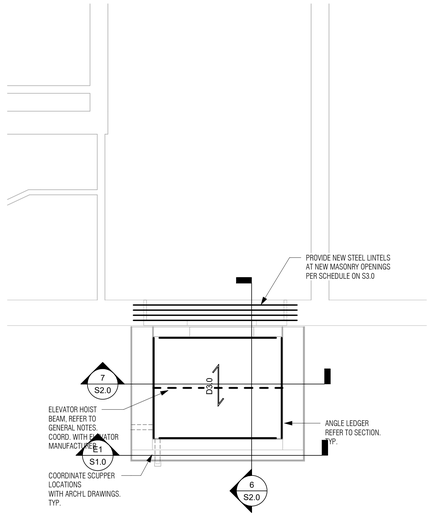
HEADER SIZE		BEARING	OPENING WIDTH
(2)-600T150-43 (50KSI) + (2)-800S200-54		(2)-600S200-43 (50)	0'-0" - 4'-0"
(2)-600T150-54 (50 KSI) + (2)-1000S200-68 (50 KSI) (WITH WEB STIFFENERS) PROVIDE CONNECTOR OF HEADER TO JAMB RATED FOR 2540 LBS (ASD CAPACITY)		(2)-600S200-54 (50) PROVIDE CONNECTOR AT TOP OF JAMB TO TRACK RATED FOR 673LBS (ASD CAPACITY)	4'-1"- 9'-3"

HEADER SCHEDULE NOTES:

1. HEADER SCHEDULE APPLIES TO ALL EXTERIOR BEARING WALLS, UNLESS OTHERWISE NOTED ON PLAN.
2. PROVIDE HEADER PER SCHEDULE AT ALL OPENINGS, WHERE A HEADER IS NOT NOTED ON PLAN.



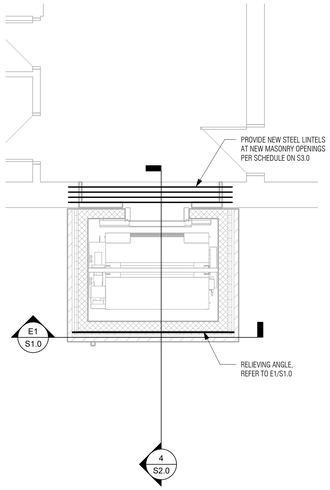
E1 RELIEVING ANGLE ELEVATION
1/4" = 1'-0"



4 ROOF PLAN
1/4" = 1'-0"

ROOF CONSTRUCTION NOTES:

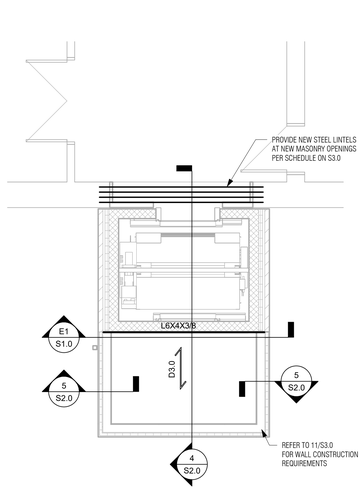
1. D3.0 INDICATES: 3.0" - 20 GAUGE DEEP RIB ROOF DECK. REFER TO GENERAL NOTES FOR FASTENING REQUIREMENTS.
2. REFER TO DRAWING S-601 FOR ALL ROOF FRAMES AT OPENINGS. COORDINATE ALL OPENING LOCATIONS WITH ARCHITECTURAL AND MECHANICAL DRAWINGS.
3. REFER TO MECHANICAL AND ARCHITECTURAL DRAWINGS FOR ALL OPENING, DRAINS AND EQUIPMENT. PROVIDE FRAMES PER TYPICAL DETAILS
4. CONTRACTOR TO FIELD VERIFY ALL EXISTING FRAMING SIZES, SPACING AND LOCATIONS PRIOR TO SUBMITTING SHOP DRAWINGS



3 THIRD FLOOR
1/4" = 1'-0"

FLOOR FRAMING NOTES

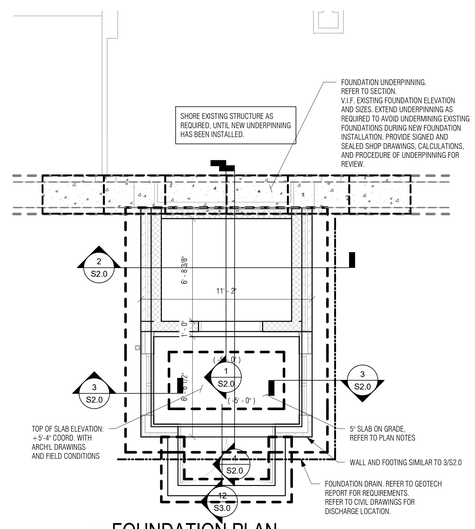
1. CONTRACTOR TO FIELD VERIFY ALL EXISTING FRAMING SIZES, SPACING AND LOCATIONS PRIOR TO SUBMITTING SHOP DRAWINGS
2. PROVIDE NEW STEEL LINTELS AT NEW OPENINGS IN EXISTING CMU AND BRICK WALLS PER TYPICAL SCHEDULE ON S3.0.



2 SECOND FLOOR AND VESTIBULE ROOF
1/4" = 1'-0"

FLOOR AND VESTIBULE ROOF FRAMING NOTES

1. CONTRACTOR TO FIELD VERIFY ALL EXISTING FRAMING SIZES, SPACING AND LOCATIONS PRIOR TO SUBMITTING SHOP DRAWINGS
2. PROVIDE NEW STEEL LINTELS AT NEW OPENINGS IN EXISTING CMU AND BRICK WALLS PER TYPICAL SCHEDULE ON S3.0.
3. D3.0 INDICATES: 3.0" - 20 GAUGE DEEP RIB ROOF DECK. REFER TO GENERAL NOTES FOR FASTENING REQUIREMENTS.
4. REFER TO DRAWING S-601 FOR ALL ROOF FRAMES AT OPENINGS. COORDINATE ALL OPENING LOCATIONS WITH ARCHITECTURAL AND MECHANICAL DRAWINGS.
5. REFER TO MECHANICAL AND ARCHITECTURAL DRAWINGS FOR ALL OPENING, DRAINS AND EQUIPMENT. PROVIDE FRAMES PER TYPICAL DETAILS
6. CONTRACTOR TO FIELD VERIFY ALL EXISTING FRAMING SIZES, SPACING AND LOCATIONS PRIOR TO SUBMITTING SHOP DRAWINGS



1 FOUNDATION PLAN
1/4" = 1'-0"

FOUNDATION NOTES:

1. FLOOR CONSTRUCTION: 5" NORMAL WEIGHT CONCRETE SLAB REINF. WITH 6X6-W2.9XW2.9 W.W.F. (CHAIRED) REFER TO GENERAL NOTES FOR SUBGRADE REQUIREMENTS.
2. TOP OF FOOTING ELEVATION (X'-X") GIVEN FROM EXISTING TOP OF SLAB ON GRADE ELEVATION (0'-0"). BOTTOM OF EXISTING FOOTING ELEVATION (X'-X") GIVEN FROM DATUM ELEVATION (0'-0")
3. REFER TO GEOTECHNICAL REPORT FOR SUBGRADE PREPARATION REQUIREMENTS.
4. CONTRACTOR TO VERIFY IN FIELD ALL FOUNDATION DIMENSIONS, LOCATIONS, AND ELEVATIONS PRIOR TO SUBMITTING SHOP DRAWINGS AND BEGINNING CONSTRUCTION.

ZERO DATUM FOR ALL ELEVATIONS GIVEN ON STRUCTURAL DRAWINGS IS T/EXISTING SLAB ON GRADE= 0'-0" V.I.F.

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architecture
interior design
master planning
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

PROFESSIONAL SEAL

MHAI
Michael Horton Associates Inc.
Consulting Structural Engineers
780 East Main Street Branford, Connecticut 06405
(203) 481-8600 www.mha-eng.com

CONSULTANT

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

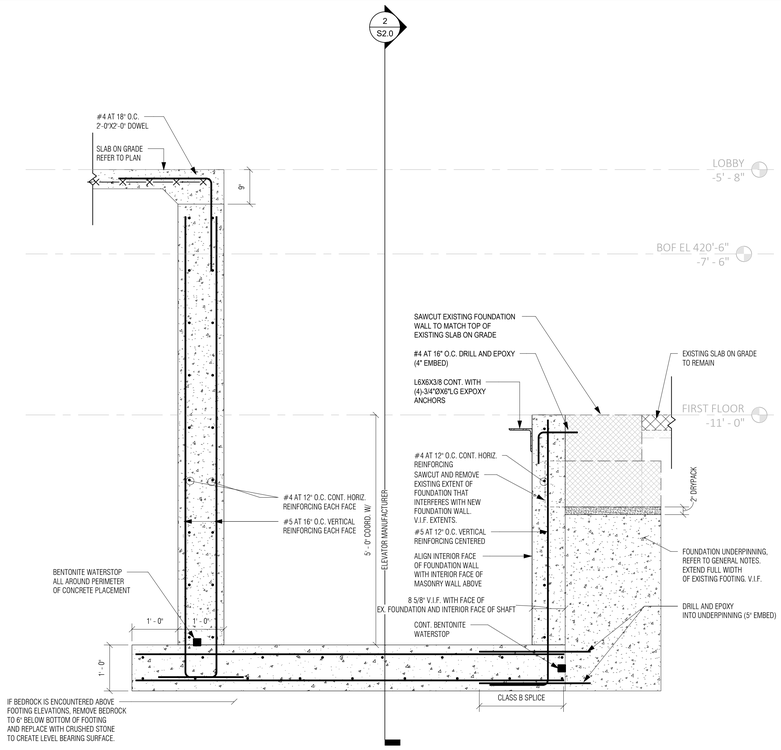
REVISIONS

NO.	DATE	DESCRIPTION

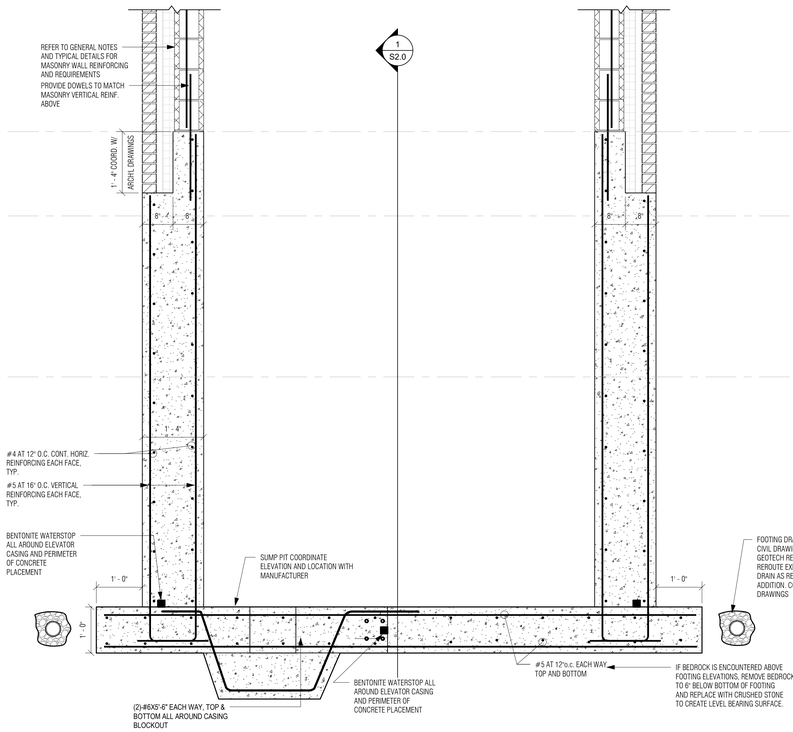
NEW WORK FLOOR PLANS

DATE:	1/15/2026
SCALE	As indicated
PROJ. #:	2022-049A
DRAWN:	AC
CHECKED:	JS

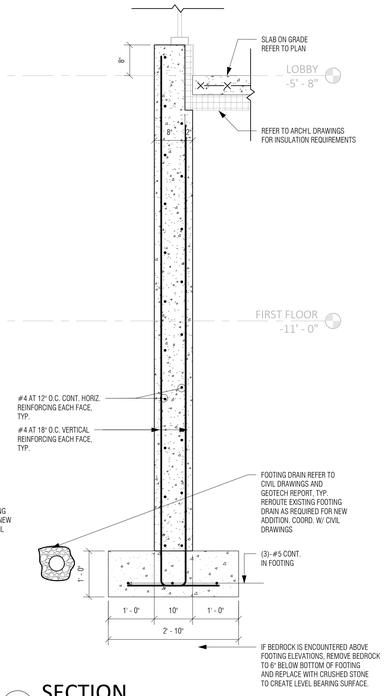
SHEET NO.
S1.0



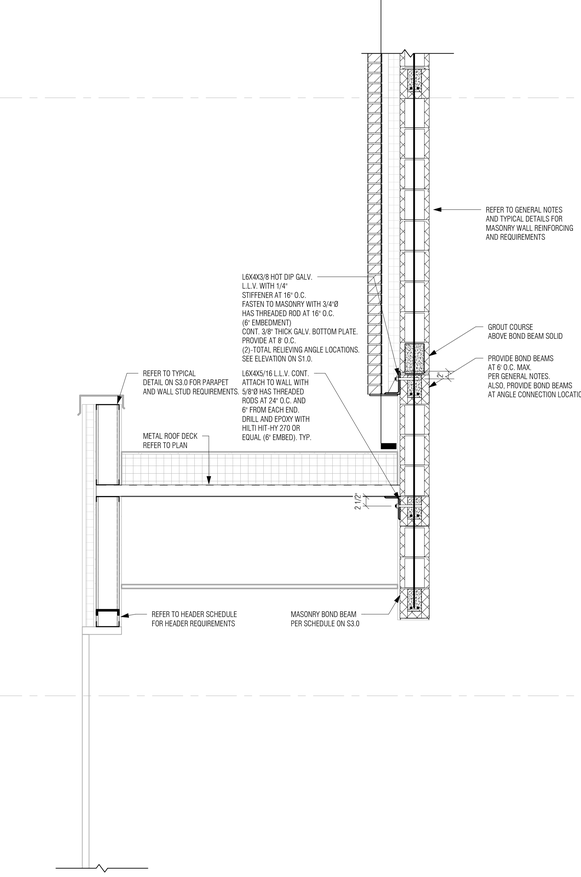
1 SECTION
SCALE: 3/4" = 1'-0"



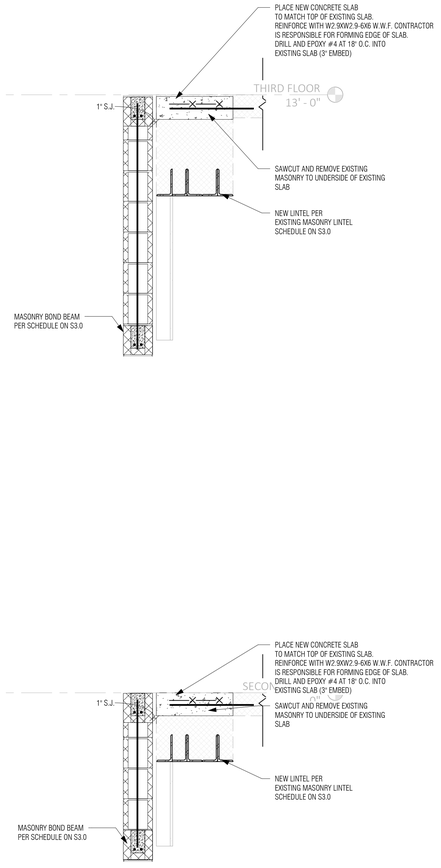
2 SECTION
SCALE: 3/4" = 1'-0"



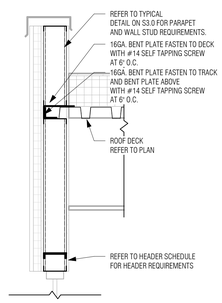
3 SECTION
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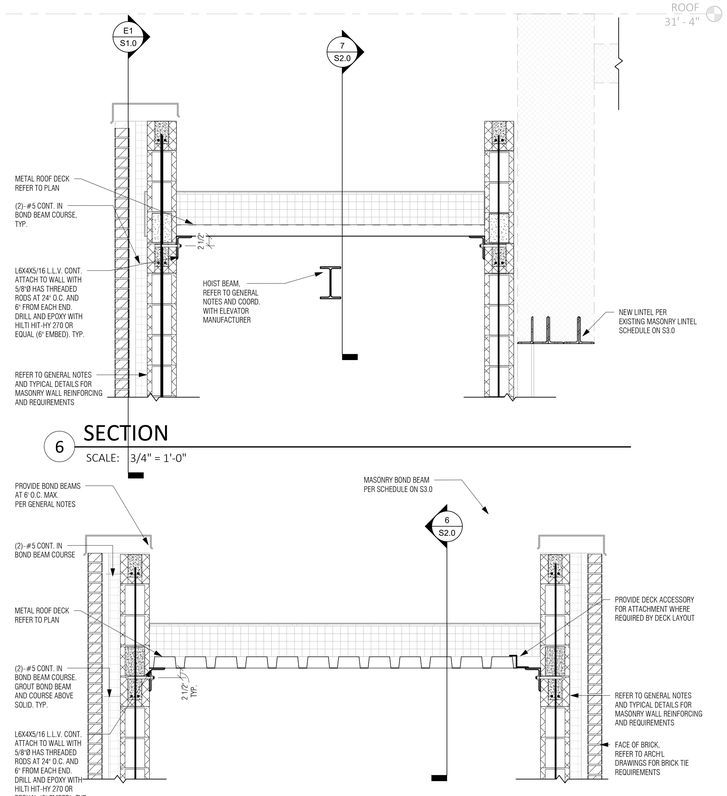


4 SECTION
SCALE: 3/4" = 1'-0"



5 SECTION
SCALE: 3/4" = 1'-0"





6 SECTION
SCALE: 3/4" = 1'-0"

7 SECTION
SCALE: 3/4" = 1'-0"

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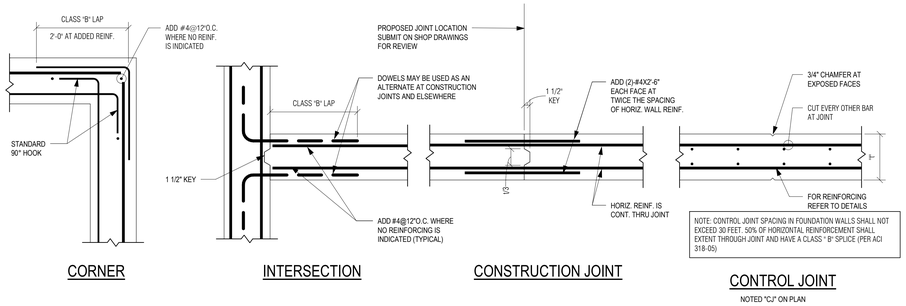
REVISIONS

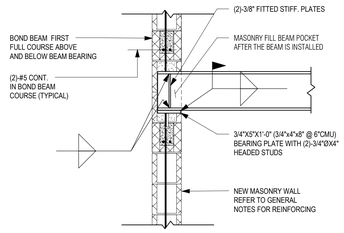
NO.	DATE	DESCRIPTION

FOUNDATION, FLOOR, AND ROOF SECTIONS

DATE:	1/15/2026
SCALE	3/4" = 1'-0"
PROJ. #:	2022-049A
DRAWN:	AC
CHECKED:	JS

SHEET NO.
S2.0





LAP SCHEDULE

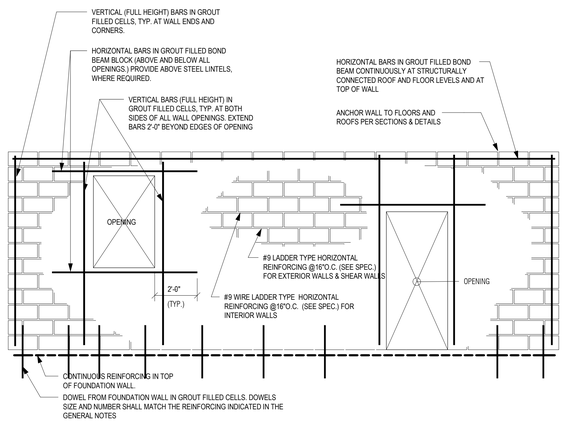
SIZE	4500 PSI	
	TOP	OTHERS
#3	24"	19"
#4	32"	25"
#5	40"	31"
#6	48"	37"
#7	70"	54"
#8	80"	62"
#9	91"	70"

MASONRY LINTEL SCHEDULE

MARK	CMU	OPENING WIDTH	LINTEL
	10" & 12" BLOCK	6'-1" TO 12'-0"	(2)-#6 CONT. TOP AND BOTTOM
	10" & 12" BLOCK	UP TO 6'-0"	(2)-#5 CONT.
	8" BLOCK	UP TO 5'-0"	(2)-#5 CONT.
	8" BLOCK	5'-1" TO 10'-0"	(2)-#6 CONT. TOP AND BOTTOM
	6" BLOCK	UP TO 6'-0"	(1)-#5 CONT.
	INTERIOR 4" MASONRY	UP TO 6'-0"	L5X3 1/2X5/16 (4" MIN. BEARING)
	INTERIOR 4" MASONRY	6'-0" TO 10'-0"	L7X4X3/8 (4" MIN. BEARING)

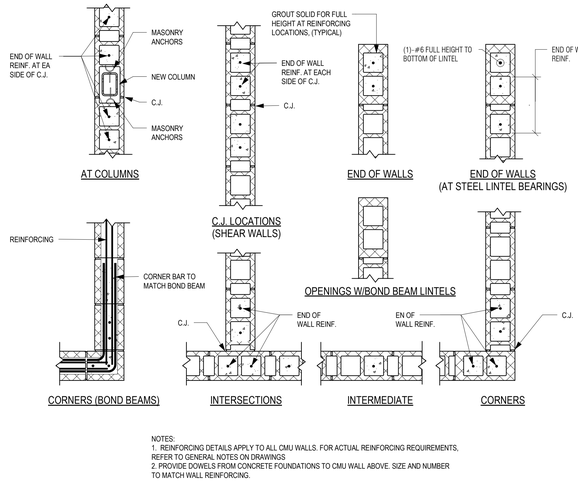
NOTE:
1. PROVIDE LINTELS WHERE NEEDED. NOT SHOWN ON THE DRAWINGS
2. ALL EXTERIOR STEEL SHALL BE HOT DIPPED GALVANIZED
3. COORDINATE ALL OPENINGS WITH ARCH'T & MECH DRAWINGS.
4. GROUT ALL JAMBS SOLID PER TYPICAL CMU WALL REINF. DETAILS.

1 TYPICAL WALL REINFORCING DETAIL
SCALE: 3/4" = 1'-0"



NOTE: REFER TO CONCRETE MASONRY GENERAL NOTES ON DRAWING FOR WALL REINFORCING REQUIREMENTS.

2 TYPICAL BEAM BEARING PLATE AT NEW CMU
SCALE: 3/4" = 1'-0"



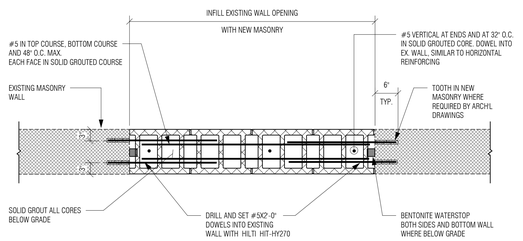
NOTES:
1. REINFORCING DETAILS APPLY TO ALL CMU WALLS. FOR ACTUAL REINFORCING REQUIREMENTS, REFER TO GENERAL NOTES ON DRAWINGS
2. PROVIDE DOWELS FROM CONCRETE FOUNDATIONS TO CMU WALL ABOVE. SIZE AND NUMBER TO MATCH WALL REINFORCING.

EXISTING MASONRY LINTEL SCHEDULE

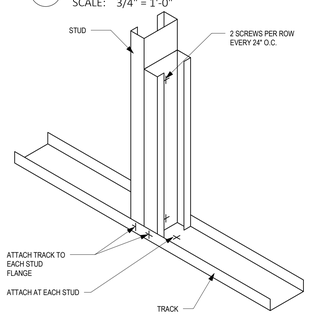
MARK	CMU	OPENING WIDTH	LINTEL
	EXISTING 20" ASSEMBLY	UP TO 9'-6"	(5)-L7X4X3/8 L.L.V. (MIN. 8" BEARING)
	EXISTING 16" ASSEMBLY	UP TO 9'-6"	(4)-L7X4X3/8 L.L.V. (MIN. 8" BEARING)
	EXISTING 12" BLOCK	UP TO 9'-6"	(3)-L7X4X3/8 L.L.V. (MIN. 8" BEARING)
	EXISTING 8" BLOCK	UP TO 9'-6"	(2)-L7X4X3/8 L.L.V. (MIN. 8" BEARING)
	EXISTING INTERIOR 4" MASONRY	UP TO 6'-0"	L5X3 1/2X5/16 (4" MIN. BEARING)
	EXISTING INTERIOR 4" MASONRY	6'-0" TO 10'-0"	L7X4X3/8 (4" MIN. BEARING)

NOTE:
1. PROVIDE LINTELS WHERE NEEDED. NOT SHOWN ON THE DRAWINGS
2. ALL EXTERIOR STEEL SHALL BE HOT DIPPED GALVANIZED
3. COORDINATE ALL OPENINGS WITH ARCH'T & MECH DRAWINGS.
4. GROUT CORES SOLID BELOW LINTEL BEARING FULL HEIGHT TO UNDERSIDE OF LINTEL
5. LINTELS FOR EXISTING 8" AND 12" CMU WERE DESIGNED BASED ON A BEARING WALL SUPPORTING 15' OF ROOF, WITH 8' OF CMU ABOVE LINTEL. CONTRACTOR TO CONTACT STRUCTURAL ENGINEER, MICHAEL HORTON ASSOCIATES, INC. FOR ALL FIELD CONDITIONS WITH BEARING WALLS SUPPORTING MORE THAN 15' OF ROOF ABOVE AND ALL OPENINGS LARGER THAN THOSE IN THE LINTEL SCHEDULE.

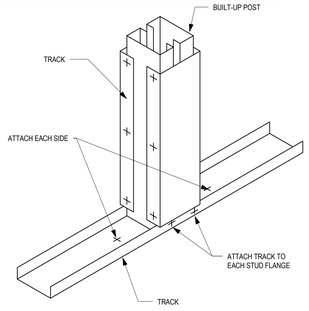
3 TYPICAL CMU WALL REINFORCEMENT DETAIL
SCALE: 3/4" = 1'-0"



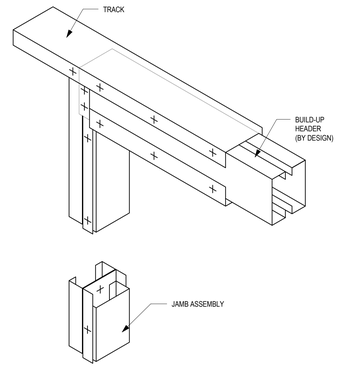
4 TYPICAL CMU REINFORCING PLAN DETAILS
SCALE: 3/4" = 1'-0"



LOAD BEARING WALL

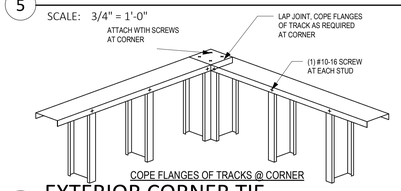


LOAD BEARING WALL
NOTE: FASTEN BUILT-UP MEMBER TOGETHER AT 12" O.C. MAX



TOP OF WALL CONDITION
NOTE: FASTEN BUILT-UP MEMBER TOGETHER AT 12" O.C. MAX

5 TYPICAL MASONRY WALL INFILL
SCALE: 3/4" = 1'-0"



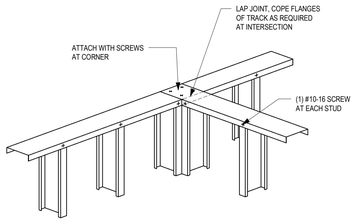
COPE FLANGES OF TRACKS @ CORNER

6 BACK TO BACK STUD DETAIL
SCALE: 3/4" = 1'-0"

7 BUILD-UP POST
SCALE: 3/4" = 1'-0"

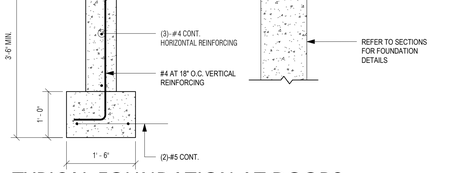
8 BEARING HEADER
SCALE: 3/4" = 1'-0"

9 EXTERIOR CORNER TIE
SCALE: 3/4" = 1'-0"

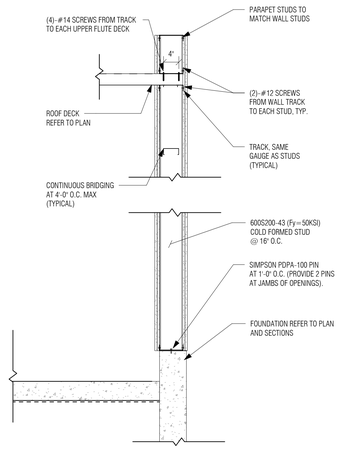


COPE FLANGES OF TRACKS @ INTERSECTION

10 INTERIOR CORNER TIE
SCALE: 3/4" = 1'-0"



12 TYPICAL FOUNDATION AT DOORS
SCALE: 3/4" = 1'-0"



11 TYPICAL EXTERIOR SINGLE STORY LOAD BEARING WALL
SCALE: 3/4" = 1'-0"

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PROFESSIONAL SEAL

MHAI
Michael Horton Associates Inc.
Consulting Structural Engineers
780 East Main Street Branford, Connecticut 06405
(203) 481-8600 www.mha-eng.com

CONSULTANT

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION

TYPICAL DETAILS

DATE: 1/15/2026
SCALE 3/4" = 1'-0"
PROJ. #: 2022-049A
DRAWN: AC
CHECKED: JS

SHEET NO.
S3.0

ELECTRICAL ABBREVIATIONS

A/AMP	AMPERE
AC	ALTERNATING CURRENT
AFCI	ARC FAULT CIRCUIT INTERRUPTER
ACU	AIR CONDITIONING UNIT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	AMPS INTERRUPTING CURRENT
AL	ALUMINUM
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BSMT	BASEMENT
C	CONDUIT
CATV	CABLE TELEVISION
C/B	CIRCUIT BREAKER
CKT	CIRCUIT
COMP	COMPRESSOR
CP	CONDENSATE PUMP
CT	CURRENT TRANSFORMER
CU	CONDENSING UNIT OR COPPER
CUH	CABINET UNIT HEATER
D	DRYER
DEG.	DEGREE
DIA	DIAMETER
DN	DOWN
DWG	DRAWING
EF	EXHAUST FAN
ELEC	ELECTRICAL
ELEV	ELEVATOR
EM	EMERGENCY
EMT	ELECTRIC METALLIC TUBING
EP	EMERGENCY PANEL
EUH	ELECTRIC UNIT HEATER
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
F	FAHRENHEIT
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FC	FOOT CANDLE
FCU	FAN COIL UNIT
G	GROUND
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
HP	HORSE POWER
HPS	HIGH PRESSURE SODIUM
HR	HOUR
HZ	HERTZ
IG	ISOLATED GROUND
IN	INCHES
JB	JUNCTION BOX
KCMIL	THOUSAND CIRCULAR MILS
KVA	KILOVOLT AMPERE
KW	KILOWATT
MAX	MAXIMUM
MAU	MAKE-UP AIR UNIT
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCCB	MOLDED CASE CIRCUIT BREAKER
MH	METAL HALIDE OR MANHOLE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
NA	NOT APPLICABLE
NEC	NATIONAL ELECTRIC CODE
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
P	POLE
PE	PRIMARY ELECTRIC SERVICE
PF	POWER FACTOR
PH	PHASE
PNL	PANEL
PVC	POLYVINYL CHLORIDE CONDUIT
REF	REFRIGERATOR
RGS	RIGID GALVANIZED STEEL CONDUIT
RM	ROOM
RTU	ROOFTOP UNIT
SE	SECONDARY ELECTRICAL SERVICE
SPEC	SPECIFICATION
SWBD	SWITCHBOARD
SPD	SURGE PROTECTION DEVICE
TELE	TELECOMMUNICATIONS/TELEPHONE
TV	TELEVISION
T/TX	TRANSFORMER
TYP	TYPICAL
UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
V	VOLTS
VA	VOLT AMPERE
VAC	VOLTS ALTERNATING CURRENT
VIF	VERIFY IN FIELD
W	WATT OR WIRE
WA	WASHER
WG	WIRE GUARD
WP	WEATHERPROOF

PHASED WORK ABBREVIATIONS

EX	EXISTING TO REMAIN
RL	EXISTING TO BE RELOCATED
RE	EXISTING TO BE REMOVED
RD	NEW LOCATION OF RELOCATED DEVICE
RN	REMOVE AND REPLACE WITH NEW

FIRE ALARM LEGEND

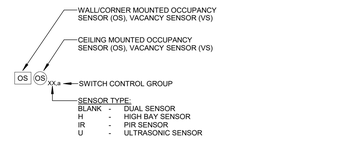
SYMBOL	DESCRIPTION
EQUIPMENT	
EAS	EMERGENCY 2-WAY COMMUNICATION SYSTEM AREA CALL STATION. REFER TO 2-WAY COMMUNICATION SYSTEM WIRING DIAGRAM FOR ADDITIONAL INFORMATION.
EMS	EMERGENCY 2-WAY COMMUNICATION SYSTEM MASTER STATION. REFER TO 2-WAY COMMUNICATION SYSTEM WIRING DIAGRAM FOR ADDITIONAL INFORMATION.
FACP	FIRE ALARM CONTROL PANEL
INITIATING DEVICES	
S	CEILING MOUNTED SMOKE DETECTOR
S	CEILING MOUNTED SMOKE DETECTOR WIRED TO ELEVATOR RECALL SYSTEM
H	CEILING MOUNTED HEAT DETECTOR WITH TEMPERATURE RATING OF 135 DEGREES UNLESS OTHERWISE NOTED
H	HEAT DETECTOR FOR ELEVATOR RECALL CONTROLS
NOTIFICATION	
XX	WALL MOUNTED COMBINATION SPEAKER / STROBE LIGHT WITH A MULTI-CANDELA STROBE. MOUNT AT 6'-8" AFF. WG= PROVIDE WITH WIREGUARD. "XX"=CANDELA RATING
XX	WALL MOUNTED STROBE-ONLY UNIT WITH A MULTI-CANDELA STROBE. MOUNT AT 6'-8" AFF. WG= PROVIDE WITH WIREGUARD. "XX"=CANDELA RATING
INTERFACE MODULES	
MM	FIRE ALARM MONITOR MODULE
CM	FIRE ALARM CONTROL MODULE
RM	FIRE ALARM RELAY MODULE

LIGHTING SWITCH AND SENSOR TAGS



SWITCH TYPE:

BLANK	-	LINE VOLTAGE SINGLE POLE TOGGLE SWITCH
3	-	LINE VOLTAGE THREE WAY TOGGLE SWITCH
4	-	LINE VOLTAGE FOUR WAY TOGGLE SWITCH
D	-	LINE VOLTAGE WALL DIMMER
K	-	KEYED SWITCH - SINGLE POLE
K3	-	KEYED SWITCH - THREE WAY
OS	-	LINE VOLTAGE OCCUPANCY SENSOR SWITCH (AUTO-ON / AUTO-OFF)
OSD	-	LINE VOLTAGE OCCUPANCY DIMMER SWITCH (AUTO-ON / AUTO-OFF)
VS	-	LINE VOLTAGE VACANCY SENSOR SWITCH (MANUAL-ON / AUTO-OFF)
VSD	-	LINE VOLTAGE VACANCY DIMMER SWITCH (MANUAL-ON / AUTO-OFF)
LOS	-	LOW VOLTAGE OCCUPANCY SENSOR SWITCH (AUTO-ON / AUTO-OFF)
LOSD	-	LOW VOLTAGE OCCUPANCY DIMMER SWITCH (AUTO-ON / AUTO-OFF)
LVS	-	LOW VOLTAGE VACANCY SENSOR SWITCH (MANUAL-ON / AUTO-OFF)
LVSD	-	LOW VOLTAGE VACANCY DIMMER SWITCH (MANUAL-ON / AUTO-OFF)
LV	-	LOW VOLTAGE MOMENTARY PUSHBUTTON FOR USE WITH CEILING SENSORS. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION.
LVD	-	LOW VOLTAGE DIMMER FOR USE WITH CEILING SENSORS. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION.
LK#	-	LIGHTING CONTROL KEYPAD FOR USE WITH ROOM CONTROLLER SYSTEM. "#" REPRESENTS TYPE OF KEYPAD. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION.



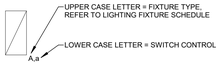
SENSOR TYPE:

BLANK	-	DUAL SENSOR
H	-	HIGH BAY SENSOR
IR	-	PIR SENSOR
U	-	ULTRASONIC SENSOR

NOTES:

1. FIXTURE(S) SHALL BE CONTROLLED BY SWITCH OR RELAY LOCATED IN THE ROOM UNLESS OTHERWISE NOTED ON PLAN.
2. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION ON WIRING AND SWITCHING.
3. WALL MOUNTED SWITCHES SHALL BE MOUNTED AT 42" AFF UNLESS OTHERWISE NOTED. COORDINATE WITH ARCHITECT.
4. SET ALL OCCUPANCY TYPE SENSORS TO AUTO-ON. AUTO-OFF MODE. SET ALL VACANCY TYPE SENSORS TO MANUAL-ON, AUTO-OFF MODE.
5. REFER TO CONTROL SCHEME NOTES AND CONTROL SCHEDULE FOR ADDITIONAL INFORMATION.
6. REFER TO SYMBOL LIST FOR ADDITIONAL LIGHTING CONTROL DEVICES.
7. WHERE SWITCHES ARE NOT TAGGED WITH CONTROL LETTER ON PLANS, ALL FIXTURES IN ASSOCIATED ROOM SHALL BE CONTROLLED SIMULTANEOUSLY VIA CONTROLS SPECIFIED.

LIGHTING FIXTURE TAGS



NOTES

1. FIXTURE CONTROL DESIGNATION REFERS TO ZONE/SWITCH/RELAY CONTROL OF FIXTURES CONTROLLED BY COMMON:
   A. SWITCH FOR LIGHTING IN ROOM, CORRIDOR, OPEN AREA.
   B. ZONE RELAY IN LOCAL LIGHTING CONTROL PANEL OR LIGHTING CONTROL RELAY PANEL.
   C. ALL CONTROL DEVICES (SWITCHES, CONTROL PANELS, OCCUPANCY/VACANCY SENSORS, ETC) WITH CONTROL DESIGNATIONS REFERS TO COMMON CONTROL OF THE SAME ZONE/SWITCH/RELAY CONTROL.
2. WHERE CONTROL DESIGNATION IS NOT SHOWN, ALL FIXTURES IN ASSOCIATED ROOM OR SPACE SHALL BE CONTROLLED SIMULTANEOUSLY VIA THE CONTROL DEVICES INDICATED ON PLANS.
3. WHERE EMERGENCY AND NORMAL FIXTURES ARE CONTROLLED FROM THE SAME ZONE/SWITCH/CONTROL RELAY, UL 924 EMERGENCY BYPASS RELAYS SHOWN WITH SAME CONTROL DESIGNATION BYPASS THAT ZONE/SWITCH/CONTROL RELAY. REFER TO EMERGENCY LIGHTING CIRCUIT SCHEMATICS FOR ADDITIONAL WIRING INFORMATION.
4. UNSWITCHED LIGHTING BRANCH CIRCUIT WIRING IS SHOWN TO A SINGLE FIXTURE IN EACH COMMON CONTROL ZONE. UNLESS OTHERWISE INDICATED, PROVIDE 2#12,#12G,3/4"C FOR SWITCHED WIRING TO ALL COMMON CONTROL FIXTURES.
5. PROVIDE LOW VOLTAGE DIMMING CONTROL WIRING AS INDICATED IN LIGHTING CONTROL DETAILS FOR DIMMABLE LIGHT FIXTURES IN COMMON CONTROL ZONES/SWITCHES/RELAY CONTROL.
6. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL WIRING AND CONTROL INFORMATION.
7. REFER TO LIGHTING CONTROL RELAY PANEL SCHEDULES WHERE APPLICABLE FOR ADDITIONAL CONTROL INFORMATION.

ELECTRICAL SYMBOLS

SYMBOL	DESCRIPTION
	SURFACE MOUNTED PANELBOARD
	RECESSED PANELBOARD
	DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
	COMBINATION STARTER AND DISCONNECT SWITCH
	MOTOR STARTER OR CONTACTOR
S M	MANUAL MOTOR STARTER
M	MOTOR (REFER TO MOTOR CIRCUIT SCHEDULE FOR POWER REQUIREMENTS)
T	TRANSFORMER
SPD	SURGE PROTECTIVE DEVICE
VFD	VARIABLE FREQUENCY DRIVE
	BRANCH CIRCUIT WIRING, CONCEALED IN WALLS OR CEILINGS
	HOMERUN TO PANELBOARD
	SWITCHED BRANCH CIRCUIT WIRING
J J	JUNCTION BOX
	SIMPLEX WALL MOUNTED RECEPTACLE, 18" AFF UNLESS OTHERWISE NOTED
	DUPLEX WALL MOUNTED RECEPTACLE, 18" AFF UNLESS OTHERWISE NOTED
XX"	DUPLEX WALL MOUNTED RECEPTACLE MOUNTED AT XX" ABOVE FINISHED FLOOR
MECH	DUPLEX GFCI-TYPE WALL MOUNTED RECEPTACLE FOR MECHANICAL AND UTILITY ROOMS. MOUNT 48" ABOVE FINISHED FLOOR
	DOUBLE DUPLEX WALL MOUNTED RECEPTACLE, 18" AFF UNLESS OTHERWISE NOTED
a a	RECEPTACLE, MOUNT 6" ABOVE COUNTER OR CASEWORK
GFI GFI	RECEPTACLE WITH GROUND FAULT CIRCUIT INTERRUPTION
WP WP	RECEPTACLE WITH WEATHERPROOF COVER
	SPECIAL PURPOSE HARDWIRED CONNECTION: WIRING AS INDICATED
CR	CARD READER INFRASTRUCTURE FOR ELEVATOR. PROVIDE COMPATIBLE SINGLE GANG BOX WITH MUD RING @ 42" AFF WITH 3/4"C STUBBED ABOVE AN ACCESSIBLE CEILING. CONTRACTOR SHALL ENGAGE CITY'S SECURITY VENDOR AS A SUB-CONTRACTOR FOR INSTALLING A COMPLETE SYSTEM THAT MEETS THE CITY'S CURRENT STANDARDS AND ALIGNS WITH THE EXISTING ACCESS CONTROL SYSTEM IN THE BUILDING. CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE REQUIRED WIRING INTERCONNECTIONS AND INTEGRATION WITH THE ELEVATOR CONTROLLER AND EXISTING BUILDING ACCESS CONTROL SYSTEM. COORDINATE EXACT LOCATION OF CARD READER WITH ARCHITECT AND OWNER PRIOR TO ROUGH-IN.
VES	VIDEO INTERCOM DOOR STATION. PROVIDE MANUFACTURER RECOMMENDED BACKBOX AT 42" AFF WITH 3/4"C STUBBED ABOVE AN ACCESSIBLE CEILING. COORDINATE MOUNTING HEIGHT AND LOCATION WITH ARCHITECT. REFER TO INTERCOM SYSTEM DETAIL FOR ADDITIONAL INFORMATION.
VMS	VIDEO INTERCOM MASTER STATION. PROVIDE MANUFACTURER RECOMMENDED BACKBOX OR DESK STAND WITH 3/4"C STUBBED ABOVE AN ACCESSIBLE CEILING. COORDINATE LOCATION WITH ARCHITECT. REFER TO INTERCOM SYSTEM DETAIL FOR ADDITIONAL INFORMATION.

LIGHTING SYMBOLS

SYMBOL	DESCRIPTION
	EXTERIOR BUILDING MOUNTED LIGHTING FIXTURE
	EXTERIOR BUILDING MOUNTED EMERGENCY LIGHTING FIXTURE
	RECESSED LIGHTING FIXTURE
	RECESSED EMERGENCY LIGHTING FIXTURE
	INDUSTRIAL OR STRIP TYPE FIXTURE
	RECESSED DOWNLIGHT FIXTURE
	RECESSED DOWNLIGHT EMERGENCY FIXTURE
	WALL MOUNTED LIGHTING FIXTURE
	WALL MOUNTED EMERGENCY LIGHTING FIXTURE
	WALL MOUNTED EXIT SIGN
	CEILING MOUNTED EXIT SIGN
PP	POWER PACK FOR STANDALONE CONTROLS. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION.

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friar.com
860.678.1291

STATE OF CONNECTICUT
MICHAEL T. BOUCHARD
31062
LICENSED
PROFESSIONAL ENGINEER

PROFESSIONAL SEAL

CES
Consulting Engineering Services, Inc.
811 Middle Street
Middletown CT 06457
860.632.1682
ceseng.com
CES #2025563.00

CONSULTANT

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION

ELECTRICAL ABBREVIATIONS, NOTES AND SYMBOLS

DATE: 1/15/2026
SCALE NTS
PROJ. #: 2022-049A
DRAWN: CALO
CHECKED: MFC
1/7/2026 9:53:15 AM

SHEET NO.

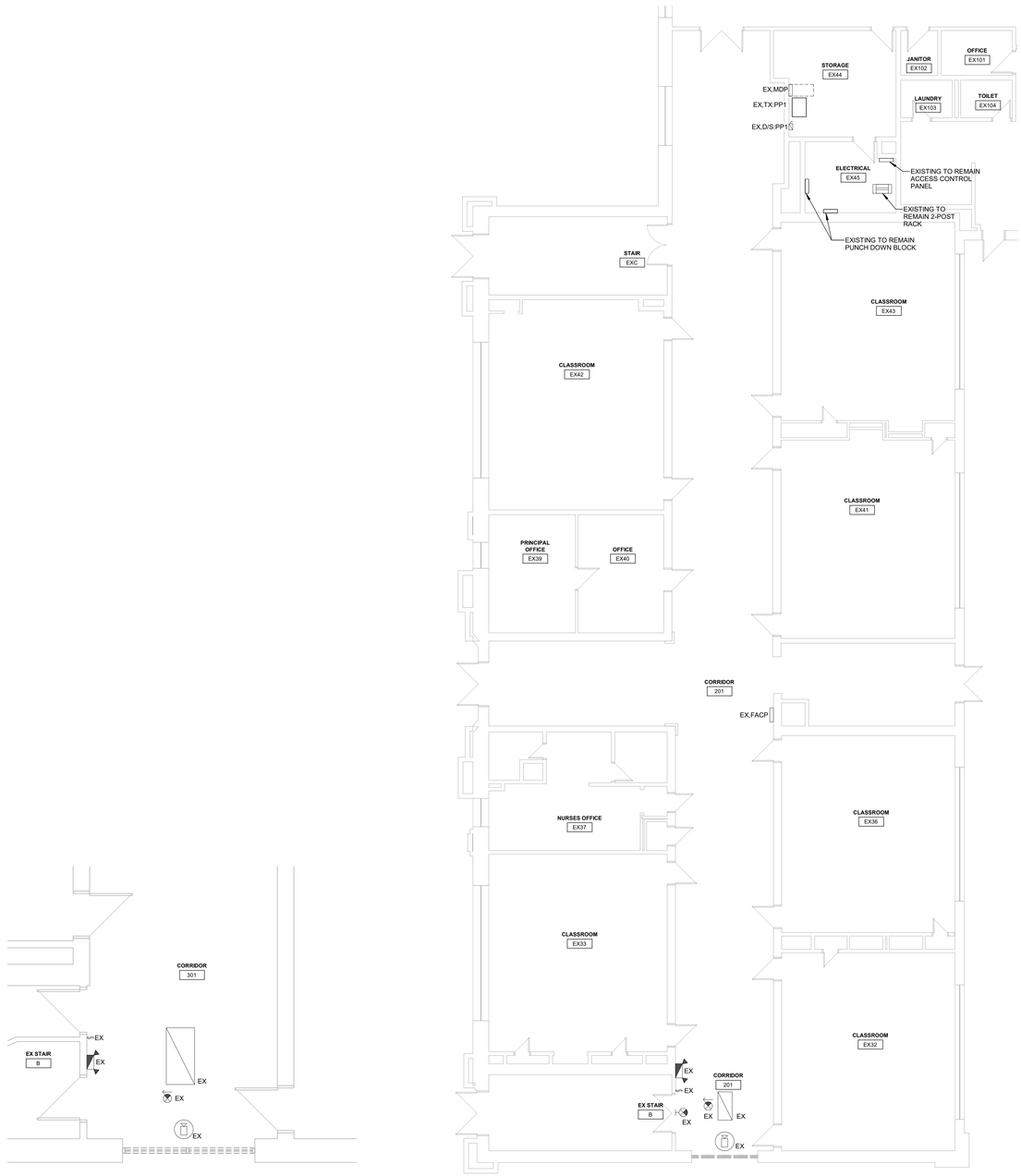
E0.0

ELECTRICAL DEMOLITION NOTES

1. ELECTRICAL DEMOLITION PLANS ARE DIAGRAMMATIC AND NOT INTENDED TO DEPICT THE ENTIRE SCOPE OF ELECTRICAL DEMOLITION. CONTRACTOR SHALL FIELD VERIFY THE LOCATION OF EXISTING DEVICES. ADDITIONAL DEMOLITION AND MODIFICATION WORK NOT SHOWN SHOULD BE ANTICIPATED.
2. REFER TO DRAWING E0.0 FOR SYMBOL LIST AND OTHER ABBREVIATIONS.
3. REFER TO MECHANICAL/PLUMBING DEMOLITION DRAWINGS FOR EXISTING MECHANICAL AND PLUMBING EQUIPMENT TO BE REMOVED. FOR THIS EQUIPMENT, DISCONNECT AND REMOVE WIRING BACK TO SOURCE AND REMOVE ASSOCIATED STARTERS, DRIVES AND DISCONNECT SWITCHES AT EQUIPMENT LOCATIONS.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSAL OF ALL ITEMS TO BE REMOVED IN A SAFE, LEGAL AND RESPONSIBLE MANNER.
5. CONTRACTOR SHALL MODIFY EXISTING CIRCUITS, WHEN EXISTING DEVICES ARE REMOVED, AS REQUIRED TO MAINTAIN CIRCUIT CONTINUITY.
6. PRIOR TO SUBMITTING BID, VISIT SITE AND IDENTIFY EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT WORK TO BE PERFORMED. NO COMPENSATION WILL BE GRANTED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY IDENTIFIED BY EXPERIENCED OBSERVERS. INCLUDE IN THE BID ALL DEMOLITION WORK REQUIRED.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR STORAGE AND HANDLING OF EXISTING TO BE RELOCATED EQUIPMENT AND DEVICES.
8. EXISTING FIRE ALARM SYSTEM SHALL BE MODIFIED IN AREA OF WORK AND BE MAINTAINED OUTSIDE OF AREA OF WORK. MAINTAIN OPERATION OF THE EXISTING FIRE ALARM SYSTEM DURING DEMOLITION. DEVICES ARE TO BE REMOVED BACK TO NEXT DEVICE OUTSIDE THE AREA OF WORK. EXTEND CIRCUITS WITH WIRING TO MATCH EXISTING CLASS AND STYLE TO MAINTAIN CONTINUITY OF CIRCUITS UPSTREAM AND DOWNSTREAM OF THE WORK AFFECTED BY DEMOLITION. PROTECT EXISTING DEVICES DURING CONSTRUCTION. TAKE DEVICES OFF-LINE IF NECESSARY. COORDINATE BYPASSING AND REACTIVATION OF THESE DEVICES WITH OWNER. PROVIDE TESTING AND REPROGRAMMING OF SYSTEM, AND COORDINATE ACCEPTANCE TESTING WITH THE LOCAL AHJ.
9. PANELBOARDS THAT ARE EXISTING TO REMAIN SHALL HAVE THEIR DIRECTORY UPDATED TO INDICATE CIRCUITS THAT ARE EXISTING TO REMAIN. CIRCUITS THAT HAVE BEEN REMOVED AS PART OF DEMOLITION SHALL BE INDICATED IN THE REVISED DIRECTORY AS SPARES.

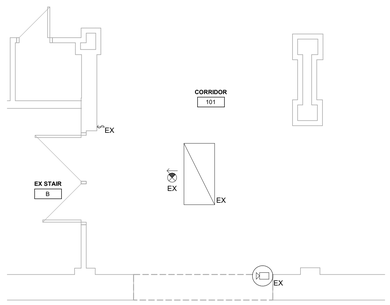
KEYNOTES - ELECTRICAL DEMOLITION

Key Value	Keynote Text



3 ELECTRICAL THIRD FLOOR DEMOLITION PLAN
1/4" = 1'-0"

2 ELECTRICAL SECOND FLOOR DEMOLITION PLAN
1/8" = 1'-0"



1 ELECTRICAL FIRST FLOOR DEMOLITION PLAN
1/4" = 1'-0"

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REVISIONS

NO.	DATE	DESCRIPTION

ELECTRICAL DEMOLITION PLANS

DATE:	1/15/2026
SCALE	As indicated
PROJ. #:	2022-049A
DRAWN:	CALO
CHECKED:	MFC
1/7/2026 9:53:17 AM	

SHEET NO.
ED1.1

ELECTRICAL POWER NOTES

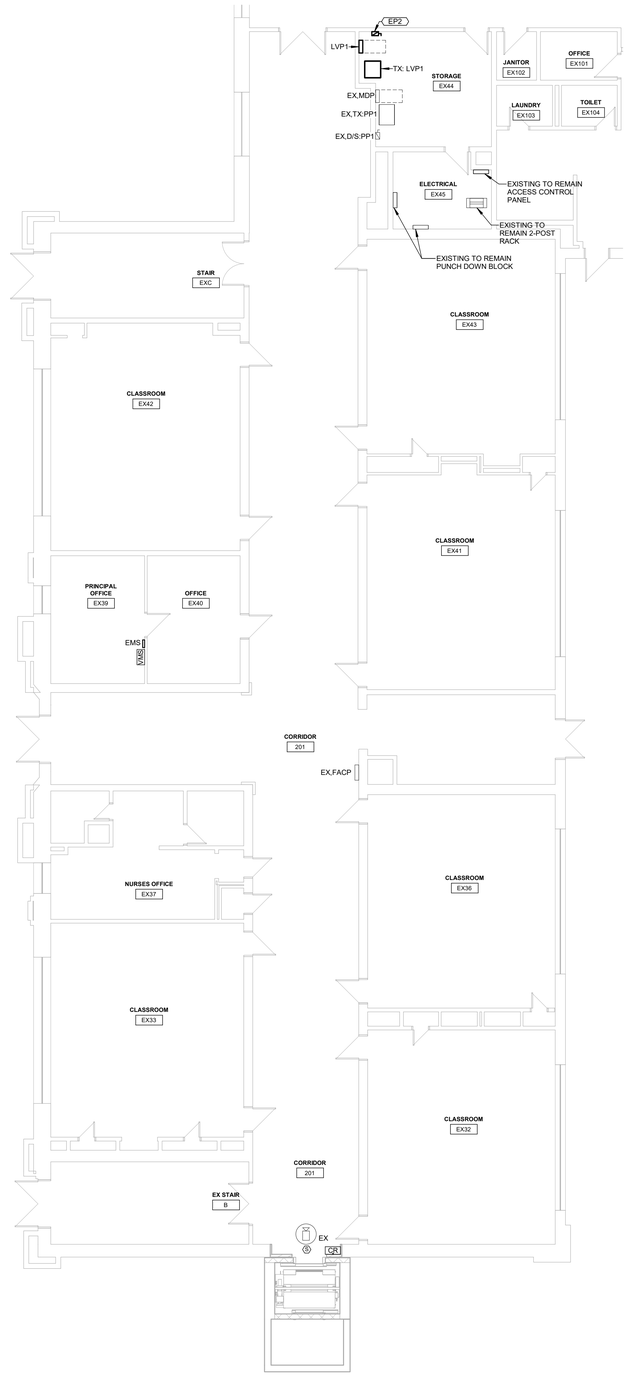
1. REFER TO DRAWING **E6.0** FOR MOTOR/ EQUIPMENT CIRCUIT SCHEDULE.
2. RECEPTACLES LOCATED WITHIN 6' FROM WATER SOURCES SHALL BE GFCI TYPE.
3. 15A AND 20A, 120V AND 250V NON-LOCKING TYPE RECEPTACLES MOUNTED BELOW 5'-6" AFF SHALL BE LISTED TAMPER-RESISTANT TYPE IN ACCORDANCE WITH NEC 406.12.

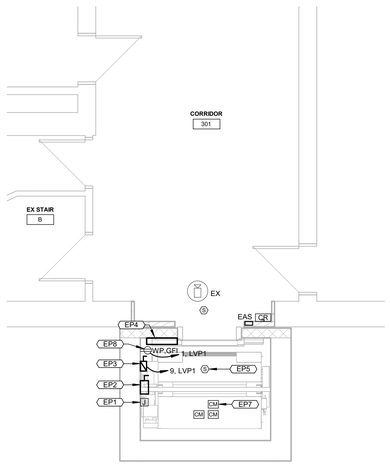
ELECTRICAL GENERAL NOTES

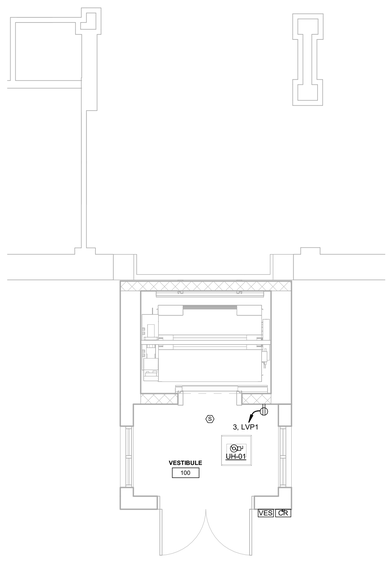
1. BRANCH CIRCUITS AND FEEDER CIRCUITS SHALL BE CONCEALED IN WALLS AND ABOVE CEILINGS WHERE POSSIBLE, INCLUDING HOMERUNS TO PANELBOARDS. BRANCH CIRCUITS AND FEEDERS SHALL NOT BE ROUTED IN OR UNDER SLAB UNLESS SPECIFICALLY INDICATED ON ELECTRICAL FLOOR PLANS OR DETAILS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. BRANCH CIRCUITS SHALL BE 2#12,#12G,.3/4"C., TO NEW 20A/1P CIRCUIT BREAKER IN PANEL INDICATED UNLESS NOTED OTHERWISE.
3. 120V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 100' IN LENGTH SHALL BE 2#10,#10G., 3/4"C. UNLESS NOTED OTHERWISE.
4. 120V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 165' IN LENGTH SHALL BE 2#8,#10G., 3/4"C. UNLESS NOTED OTHERWISE.
5. 277V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 250' IN LENGTH SHALL BE 2#10,#10G., 3/4"C. UNLESS NOTED OTHERWISE.
6. DEVICES SHALL BE LABELED WITH SOURCE PANEL AND CIRCUIT NUMBER(S).
7. REFER TO ARCHITECTS REFLECTED CEILING PLAN FOR EXACT LOCATION OF CEILING MOUNTED ELECTRICAL DEVICES. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION OF WALL MOUNTED ELECTRICAL DEVICES.
8. PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF PENETRATIONS THROUGH FIRE WALLS OR SMOKE BARRIERS AS REQUIRED. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALLS.
9. COORDINATE LOCATIONS OF ELECTRICAL DEVICES AND CONTROLS WITH RESPECT TO LOCATIONS OF CASEWORK AND EQUIPMENT PRIOR TO ROUGH-IN.
10. WHEN DEVICES ARE SHOWN ON PLANS OFFSET FROM ONE ANOTHER, DEVICES SHALL BE MOUNTED IN LINE, CENTERED ON WALL.
11. SHARED NEUTRAL WIRING IS NOT ACCEPTABLE, UNLESS NOTED OTHERWISE ON DRAWINGS. PROVIDE A DEDICATED NEUTRAL WIRE FOR EACH CIRCUIT, WHERE APPLICABLE.
12. DRAWINGS ARE DIAGRAMMATIC ONLY. DO NOT SCALE ELECTRICAL DRAWINGS. FIELD CONDITIONS AND ARCHITECTURAL ELEVATIONS AND DIMENSIONS SHALL GOVERN EXACT LOCATION AND MOUNTING HEIGHTS OF ELECTRICAL DEVICES AND RACEWAYS.
13. FINISHES AND COLOR OF ELECTRICAL WIRING DEVICES, EXPOSED RACEWAY, LIGHT FIXTURES, AND OTHER ELECTRICAL DEVICES SHALL BE DETERMINED BY THE ARCHITECT.
14. ELECTRICAL WORK SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE (OTHER THAN ROOF DECK).
15. THE ELECTRICAL CONTRACTOR SHALL PERFORM CORES REQUIRED FOR ELECTRICAL WORK.
16. BUILDING WIRE AND CABLE NOT IN RACEWAY SHALL BE PLENUM RATED.
17. PROVIDE SURFACE MOUNTED RACEWAY FOR NEW DEVICES LOCATED ON EXISTING TO REMAIN CMU OR MASONRY WALLS, UNLESS OTHERWISE NOTED. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS REGARDING SURFACE MOUNTED RACEWAY APPLICATIONS AND WIRING METHODS.

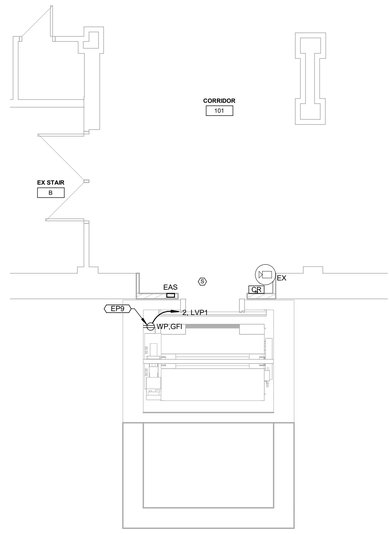
KEYNOTES - ELECTRICAL POWER

Key Value	Keynote Text
EP1	PROVIDE 3/4"C. WITH (2) POTS PHONE LINES TO LOCAL I.T. ROOM FOR ELEVATOR COMMUNICATIONS. PROVIDE FINAL CONNECTIONS TO ELEVATOR CONTROLLER. COORDINATE EXACT POINT OF CONNECTION WITH ELEVATOR CONTRACTOR.
EP2	ELEVATOR MAIN POWER FEED. PROVIDE WIRING AND CONDUIT PER ELECTRICAL RISER DIAGRAM. PROVIDE POWER FROM SPECIALTY ELEVATOR DISCONNECT SWITCH IN STORAGE EX44 (PER PLANS) TO A SECOND DISCONNECT SWITCH LOCATED IN ELEVATOR SHAFT - IN A LOCATION APPROVED BY BOTH AHJ AND ELEVATOR INSTALLER. THE DISCONNECT SWITCH WITHIN SHAFT SHALL BE THE SAME AMPERAGE AS THE SPECIALTY SHUNT-TRIP DISCONNECT SWITCH, AND NON-FUSED. PROVIDE FINAL CONNECTIONS FROM THE DISCONNECT SWITCH TO THE ELEVATOR CONTROLLER, EXACT LOCATION SHALL BE COORDINATED WITH ELEVATOR INSTALLER.
EP3	ELEVATOR CAB LIGHTING CIRCUIT. PROVIDE 2#12+1#12G, 3/4"C. FROM INDICATED CIRCUIT TO A 30A/2P DISCONNECT SWITCH, FUSED AT 20A LOCATED IN THE ELEVATOR SHAFT - IN A LOCATION APPROVED BY BOTH AHJ AND ELEVATOR INSTALLER. PROVIDE FINAL CONNECTIONS FROM THE DISCONNECT SWITCH TO THE ELEVATOR CONTROLLER, EXACT LOCATION SHALL BE COORDINATED WITH ELEVATOR INSTALLER.
EP4	ELEVATOR CONTROLLER LOCATED AT TOP OF SHAFT. CONTROLLER PROVIDED WITH CONDUIT ENTRY PROVISIONS, COMMUNICATIONS AND CODE REQUIRED ELEVATOR CONTROLS. COORDINATE CONDUIT ENTRY, WIRING REQUIREMENTS AND ALL REQUIRED TERMINATIONS WITH ELEVATOR INSTALLER.
EP5	SMOKE DETECTOR TO COMMUNICATE WITH ELEVATOR RECALL FUNCTIONALITY - PER FIRE ALARM RISER DIAGRAM.
EP7	FIRE ALARM CONTROL MODULES TO COMMUNICATE WITH ELEVATOR CONTROLLER. PROVIDE QUANTITY AS REQUIRED BY ELEVATOR MANUFACTURER. PROVIDE FINAL CONNECTIONS TO CONTROLLER.
EP8	PROVIDE GFCI-TYPE DUPLEX RECEPTACLE ADJACENT TO THE ELEVATOR CONTROLLER. PROVIDE DEDICATED 120V, 20A BRANCH CIRCUIT USING 2#12+1#12G, 3/4"C.
EP9	PROVIDE WEATHERPROOF GFCI-TYPE DUPLEX RECEPTACLE IN ELEVATOR PIT. COORDINATE LOCATION WITH ELEVATOR INSTALLER. PROVIDE DEDICATED 120V, 20A BRANCH CIRCUIT USING 2#12+1#12G, 3/4"C.









4 ELECTRICAL THIRD FLOOR PLAN
1/4" = 1'-0"

3 ELECTRICAL SECOND FLOOR PLAN
1/8" = 1'-0"

2 ELECTRICAL LOBBY PLAN
1/4" = 1'-0"

1 ELECTRICAL FIRST FLOOR PLAN
1/4" = 1'-0"

architecture
interior design
master planning
FRIAR
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

STATE OF CONNECTICUT
MICHAEL T. BOUCHARD
31062
LICENSED
PROFESSIONAL ENGINEER

PROFESSIONAL SEAL

CES
Consulting Engineering Services, Inc.
811 Middle Street
Middletown CT 06457
860.632.1682
ceseng.com
CES #2025563.00

CONSULTANT

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION

ELECTRICAL POWER NEW WORK PLANS

DATE: 1/15/2026
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1/7/2026 9:53:15 AM

SHEET NO.
E1.1

ELECTRICAL LIGHTING NOTES

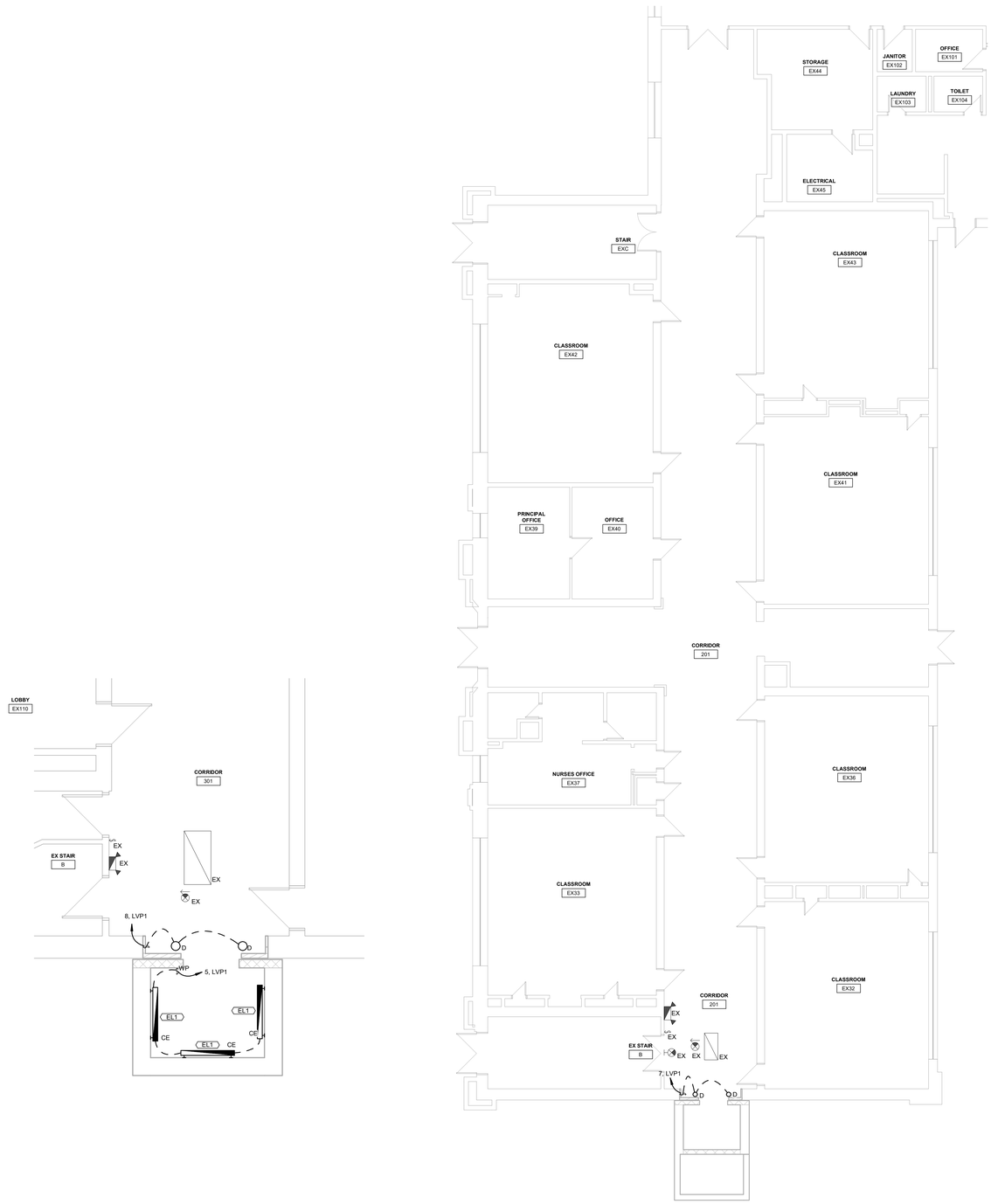
1. REFER TO DRAWING **E6.0** FOR LIGHTING FIXTURE SCHEDULE.
2. EXIT SIGNS AND EMERGENCY BATTERY UNITS SHALL BE WIRED TO LINE SIDE OF LOCAL LIGHTING BRANCH CIRCUIT, AHEAD OF ALL SWITCHING DEVICES.
3. EMERGENCY LIGHTING RELAY LOCATIONS ARE SHOWN DIAGRAMMATICALLY. CONTRACTOR SHALL INSTALL RELAYS ABOVE NEAREST ACCESSIBLE CEILING, OR IN NEAREST STORAGE ROOM/ UTILITY SPACE, AND SHALL COORDINATE LOCATION WITH OTHER TRADES. REFER TO EMERGENCY LIGHTING WIRING SCHEMATICS FOR ADDITIONAL INFORMATION.
4. REFER TO DRAWINGS **E6.0** FOR TYPICAL LIGHTING CONTROL WIRING SCHEMATICS.
5. LIGHT FIXTURES CONTROLLED WITH DIMMING SHALL BE PROVIDED WITH DIMMING WIRES. PROVIDE DIMMING ADAPTOR/CONVERTERS (0-10V TO TRIAC/ELV) FOR NON 0-10V DIMMING PROTOCOL LIGHT FIXTURES AS REQUIRED TO BE COMPATIBLE WITH THE 0-10V DIMMING CONTROL SYSTEM.

ELECTRICAL GENERAL NOTES

1. BRANCH CIRCUITS AND FEEDER CIRCUITS SHALL BE CONCEALED IN WALLS AND ABOVE CEILINGS WHERE POSSIBLE, INCLUDING HOMERUNS TO PANELBOARDS. BRANCH CIRCUITS AND FEEDERS SHALL NOT BE ROUTED IN OR UNDER SLAB UNLESS SPECIFICALLY INDICATED ON ELECTRICAL FLOOR PLANS OR DETAILS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. BRANCH CIRCUITS SHALL BE 2#12,#12G, 3/4"C., TO NEW 20A/1P CIRCUIT BREAKER IN PANEL INDICATED UNLESS NOTED OTHERWISE.
3. 120V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 100' IN LENGTH SHALL BE 2#10,#10G., 3/4"C. UNLESS NOTED OTHERWISE.
4. 120V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 165' IN LENGTH SHALL BE 2#8,#10G., 3/4"C. UNLESS NOTED OTHERWISE.
5. 277V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 250' IN LENGTH SHALL BE 2#10,#10G., 3/4"C. UNLESS NOTED OTHERWISE.
6. DEVICES SHALL BE LABELED WITH SOURCE PANEL AND CIRCUIT NUMBER(S).
7. REFER TO ARCHITECTS REFLECTED CEILING PLAN FOR EXACT LOCATION OF CEILING MOUNTED ELECTRICAL DEVICES. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION OF WALL MOUNTED ELECTRICAL DEVICES.
8. PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF PENETRATIONS THROUGH FIRE WALLS OR SMOKE BARRIERS AS REQUIRED. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALLS.
9. COORDINATE LOCATIONS OF ELECTRICAL DEVICES AND CONTROLS WITH RESPECT TO LOCATIONS OF CASEWORK AND EQUIPMENT PRIOR TO ROUGH-IN.
10. WHEN DEVICES ARE SHOWN ON PLANS OFFSET FROM ONE ANOTHER, DEVICES SHALL BE MOUNTED IN LINE, CENTERED ON WALL.
11. SHARED NEUTRAL WIRING IS NOT ACCEPTABLE, UNLESS NOTED OTHERWISE ON DRAWINGS. PROVIDE A DEDICATED NEUTRAL WIRE FOR EACH CIRCUIT, WHERE APPLICABLE.
12. DRAWINGS ARE DIAGRAMMATIC ONLY. DO NOT SCALE ELECTRICAL DRAWINGS. FIELD CONDITIONS AND ARCHITECTURAL ELEVATIONS AND DIMENSIONS SHALL GOVERN EXACT LOCATION AND MOUNTING HEIGHTS OF ELECTRICAL DEVICES AND RACEWAYS.
13. FINISHES AND COLOR OF ELECTRICAL WIRING DEVICES, EXPOSED RACEWAY, LIGHT FIXTURES, AND OTHER ELECTRICAL DEVICES SHALL BE DETERMINED BY THE ARCHITECT.
14. ELECTRICAL WORK SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE (OTHER THAN ROOF DECK).
15. THE ELECTRICAL CONTRACTOR SHALL PERFORM CORES REQUIRED FOR ELECTRICAL WORK.
16. BUILDING WIRE AND CABLE NOT IN RACEWAY SHALL BE PLENUM RATED.
17. PROVIDE SURFACE MOUNTED RACEWAY FOR NEW DEVICES LOCATED ON EXISTING TO REMAIN CMU OR MASONRY WALLS, UNLESS OTHERWISE NOTED. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS REGARDING SURFACE MOUNTED RACEWAY APPLICATIONS AND WIRING METHODS.

KEYNOTES - ELECTRICAL LIGHTING

Key Value	Keynote Text
EL1	PROVIDE LIGHT FIXTURES AS SPECIFIED PER LIGHTING FIXTURE SCHEDULE. LIGHT FIXTURES SHALL BE PROVIDED WITH WIREGUARD ACCESSORY. INSTALL LIGHT FIXTURES IN ELEVATOR PIT AND TOP OF SHAFT AT LOCATIONS COORDINATED WITH THE ELEVATOR INSTALLER AND INSPECTOR, AS REQUIRED TO ACHIEVE A MINIMUM OF 19 FOOTCANDLES. CONTRACTOR SHALL TAKE LIGHT MEASUREMENTS PRIOR TO FINAL INSTALLATION OF THESE LIGHT FIXTURES TO ENSURE REQUIRED ILLUMINATION LEVELS ARE BEING ACHIEVED. COORDINATE LIGHT FIXTURE LOCATION WITH ELEVATOR EQUIPMENT AND ALL ASSOCIATED APPURTENANCES.
EL2	WIRE NEW LIGHT FIXTURES TO NEW RECEPTACLE CIRCUIT WITHIN ELEVATOR LOBBY. REFER TO SHEET E1.1 FOR ADDITIONAL INFORMATION.



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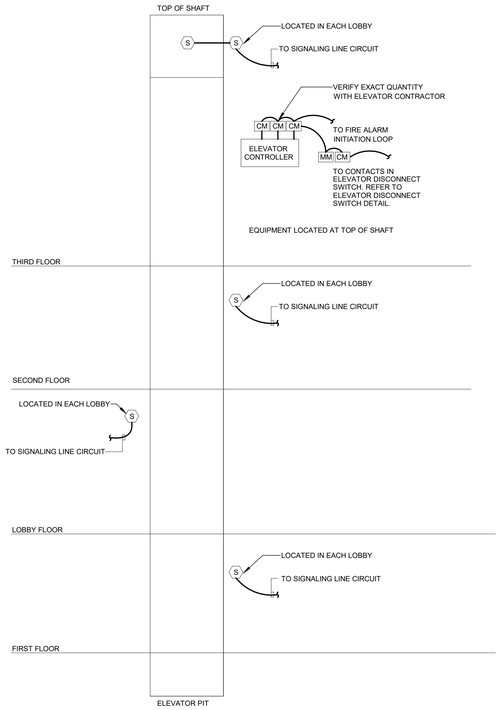
REVISIONS

NO.	DATE	DESCRIPTION

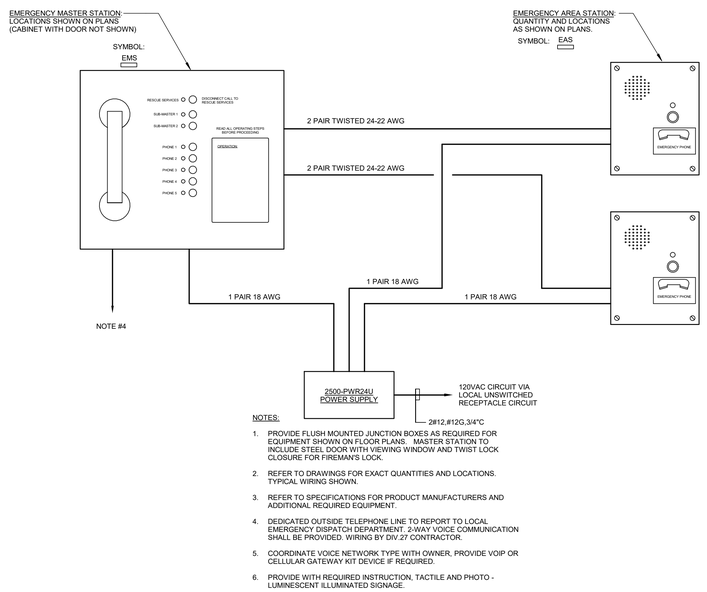
ELECTRICAL LIGHTING NEW WORK PLANS

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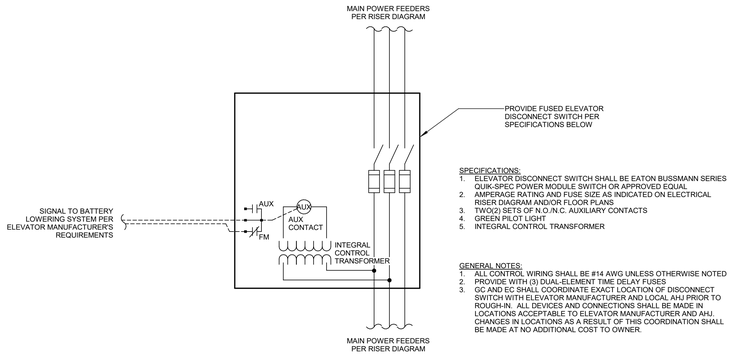


3 ADDRESSABLE FIRE ALARM SYSTEM ELEVATOR RECALL RISER
NTS



NOTES:
1. PROVIDE FLUSH MOUNTED JUNCTION BOXES AS REQUIRED FOR EQUIPMENT SHOWN ON FLOOR PLANS. MASTER STATION TO INCLUDE STEEL DOOR WITH VIEWING WINDOW AND TWIST LOCK CLOSURE FOR FIREMAN'S LOCK.
2. REFER TO DRAWINGS FOR EXACT QUANTITIES AND LOCATIONS. TYPICAL WIRING SHOWN.
3. REFER TO SPECIFICATIONS FOR PRODUCT MANUFACTURERS AND ADDITIONAL REQUIRED EQUIPMENT.
4. DEDICATED OUTSIDE TELEPHONE LINE TO REPORT TO LOCAL EMERGENCY DISPATCH DEPARTMENT. 2-WAY VOICE COMMUNICATION SHALL BE PROVIDED. WIRING BY DIV.27 CONTRACTOR.
5. COORDINATE VOICE NETWORK TYPE WITH OWNER, PROVIDE VOIP OR CELLULAR GATEWAY KIT DEVICE IF REQUIRED.
6. PROVIDE WITH REQUIRED INSTRUCTION, TACTILE AND PHOTO - LUMINESCENT ILLUMINATED SIGNAGE.

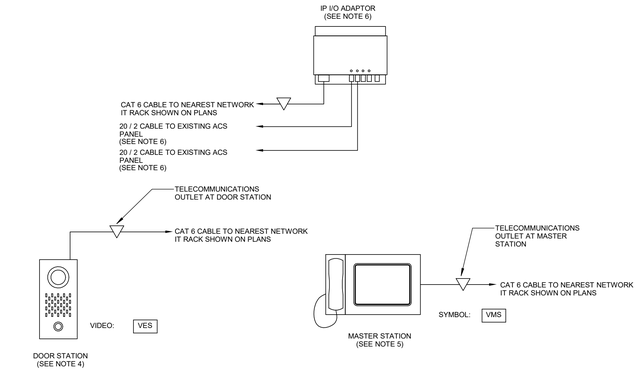
2 EMERGENCY 2-WAY COMMUNICATION SYSTEM DETAIL
NTS



SPECIFICATIONS:
1. ELEVATOR DISCONNECT SWITCH SHALL BE EATON BUSSMANN SERIES QUIK-SPEC POWER MODULE SWITCH OR APPROVED EQUAL
2. AMPERAGE RATING AND FUSE SIZE AS INDICATED ON ELECTRICAL RISER DIAGRAM AND/OR FLOOR PLANS
3. TWO(2) SETS OF N.O./N.C. AUXILIARY CONTACTS
4. GREEN PILOT LIGHT
5. INTEGRAL CONTROL TRANSFORMER

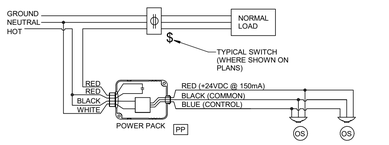
GENERAL NOTES:
1. ALL CONTROL WIRING SHALL BE #14 AWG UNLESS OTHERWISE NOTED
2. PROVIDE WITH (3) DUAL-ELEMENT TIME DELAY FUSES
3. GC AND EC SHALL COORDINATE EXACT LOCATION OF DISCONNECT SWITCH WITH ELEVATOR MANUFACTURER AND LOCAL AHJ PRIOR TO ROUGH-IN. ALL DEVICES AND CONNECTIONS SHALL BE MADE IN LOCATIONS ACCEPTABLE TO ELEVATOR MANUFACTURER AND AHJ. CHANGES IN LOCATIONS AS A RESULT OF THIS COORDINATION SHALL BE MADE AT NO ADDITIONAL COST TO OWNER.

1 ELEVATOR DISCONNECT SWITCH DETAIL
NTS



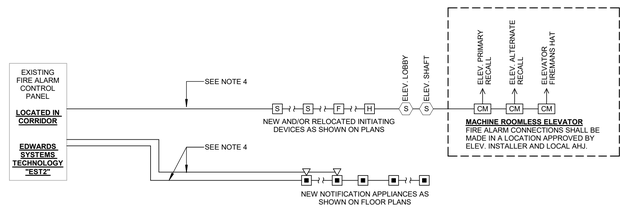
NOTES:
1. BASIS OF DESIGN: "IX SERIES" BY AIPHONE CORP.
   A. VIDEO MASTER STATION MODEL IS "IX-MV7-H"
   B. AUDIO/VIDEO DOOR STATION MODEL IS "IX-DVF"
   C. IP PROGRAMMABLE RELAY ADAPTOR MODEL IS "IXW-MA"
2. TYPICAL REQUIREMENTS SHOWN. REFER TO DRAWINGS FOR LOCATIONS AND TYPES OF DEVICES.
3. INTERCOM DOOR STATIONS TO REPORT TO MASTER STATIONS AS LISTED BELOW.
   A. DOOR STATION WHERE SHOWN ON PLANS - MASTER STATION IN MAIN OFFICE
4. COORDINATE EXACT MOUNTING HEIGHT AND LOCATION OF DOOR STATIONS WITH ARCHITECTURAL ELEVATIONS.
5. COORDINATE DESKTOP LOCATION FOR MASTER STATIONS WITH THE OWNER, PROVIDE DESKTOP STAND. NEATLY TRAIN ALL EXPOSED CABLING.
6. SELECTIVE DOOR RELEASE RELAYS ARE PROGRAMMABLE TO RESPOND TO INCOMING DOOR STATION WHEN DOOR RELEASE IS ACTIVATED AT A MASTER STATION. FUNCTION IS SPECIFIC TO THE DOOR STATION AND FOLLOWS THE CALL TO ANY MASTER STATION. TYPICAL INTERCONNECTION BETWEEN INTERCOM DOOR RELEASE RELAY AND ACS SYSTEM SHOWN. PROVIDE RELAYS AS REQUIRED FOR SELECTIVE DOOR RELEASE AT ACS PANELS. MOUNT RELAY IN SUITABLE NEMA 1 ENCLOSURE AT ACS PANEL.

6 IP-BASED VIDEO INTERCOM SYSTEM DETAIL
NTS



SEQUENCE OF OPERATIONS:
1. AUTO-ON WHEN OCCUPANCY IS DETECTED BY CEILING SENSOR(S). REFER TO FLOOR PLANS FOR QUANTITY AND LOCATIONS.
2. AUTO-OFF AFTER 20 MINUTES OF UNOCCUPIED SPACE.
3. MANUAL ON-OFF CONTROL OF ALL FIXTURES BY KEY SWITCHES, WHERE INDICATED ON PLANS.
4. REFER TO LIGHTING CONTROL SPECIFICATION FOR ADDITIONAL INFORMATION.

5 TYPICAL STANDALONE OCCUPANCY SENSOR DETAIL
NTS



NOTES
1. PROVIDE ADDITIONAL BATTERIES, TERMINAL CABINETS, CONTROL CARDS, EXPANSION MODULES, AMPLIFIERS (FOR VOICE SYSTEMS) AND OTHER ACCESSORIES TO ACCOMMODATE NEW DEVICES AS REQUIRED BY MANUFACTURER. NEW COMPONENTS MUST BE BY SAME MANUFACTURER AS EXISTING.
2. PROVIDE TESTING AND REPROGRAMMING OF EXISTING CONTROL PANEL TO ACCOMMODATE NEW DEVICES.
3. PROVIDE ALL NECESSARY SYNCHRONIZATION OF NEW STROBES.
4. PROVIDE WIRING OF SAME CLASS/STYLE AS EXISTING FIRE ALARM WIRING USED IN BUILDING. CONNECT TO EXISTING NAC & SLC CIRCUITS MADE AVAILABLE DURING DEMOLITION. PROVIDE METAL-CLAD CABLING WHEN CONCEALED AND WIRE IN RACEWAY WHERE EXPOSED.
5. MAINTAIN OPERATION OF THE EXISTING FIRE ALARM SYSTEM DURING DEMOLITION. DEVICES ARE TO BE REMOVED BACK TO NEXT DEVICE OUTSIDE THE AREA OF WORK. EXTEND CIRCUITS WITH WIRING TO MATCH EXISTING CLASS AND STYLE TO MAINTAIN CONTINUITY OF CIRCUITS UPSTREAM AND DOWNSTREAM OF THE WORK AFFECTED BY DEMOLITION. PROTECT EXISTING DEVICES DURING CONSTRUCTION. TAKE DEVICES OFF-LINE IF NECESSARY. COORDINATE BYPASSING AND REACTIVATION OF THESE DEVICES WITH OWNER. PROVIDE TESTING AND REPROGRAMMING OF THE EXISTING SYSTEM. NOTE: EXISTING DEVICES MAY BE REQUIRED TO REMAIN UNTIL NEW DEVICES ARE INSTALLED, TESTED AND FUNCTIONAL.
6. REFER TO FLOOR PLANS FOR QUANTITY AND LOCATION OF DEVICES.
7. CONTRACT WITH THE SERVICES OF A FACTORY AUTHORIZED DEALER OF THE EXISTING SYSTEM TO PROVIDE ALL EQUIPMENT, SUPERVISION, FINAL CONNECTIONS, PROGRAMMING AND TESTING OF THE SYSTEM. EXISTING SYSTEM IS **MAINTAINED BY "FSI", CONTACT INFORMATION IS 203-934-8644**

4 PARTIAL FIRE ALARM RISER DIAGRAM
NTS

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21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

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SHEET NO.
E5.0

DRY TYPE TRANSFORMER SCHEDULE

COPPER CONDUCTORS

SIZE	KVA	PRIMARY AMPS	SECONDARY AMPS	480 VOLT OVERCURRENT	208 VOLT (NOTE 4) OVERCURRENT	480 VOLT FEEDER	208/120 VOLT FEEDER	GEC (NOTE 5)	SSBJ (NOTE 6)
T1	30	36	83	50A, 3P	100A, 3P	3#6 & 1#10G - 1"C	4#3 - 1 1/4"C	1#6 - 3/4"C	1#6

TRANSFORMER NOTES:

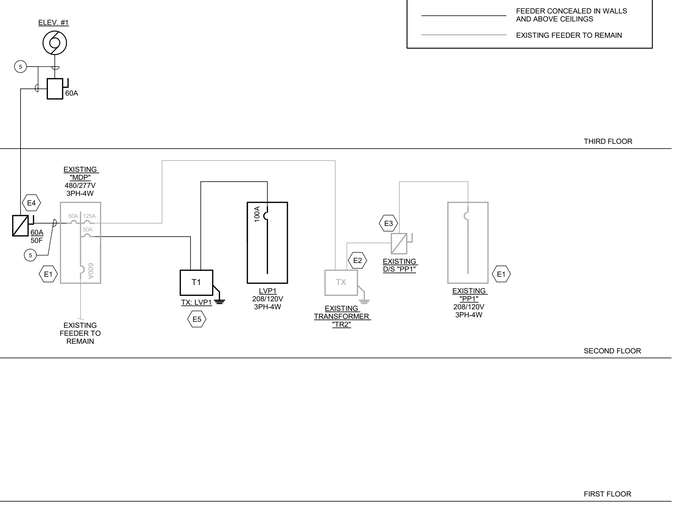
1. BOND NEUTRAL TRANSFORMER SECONDARY TO THE TRANSFORMER GROUND BAR AND CASE WITH SYSTEM BONDING JUMPER.
2. USE NEAREST AVAILABLE EFFECTIVELY GROUNDED WATER PIPE, STRUCTURAL STEEL AND/OR DRIVEN GROUND ROD IN ACCORDANCE WITH N.E.C. 250-81 AND 250-83 FOR THE SEPARATELY DERIVED SYSTEM GROUNDING ELECTRODE.
3. ALL CONDUCTOR SIZES ARE FOR COPPER CONDUCTORS. N.E.C. TABLE 310.15(B)(16).
4. SECONDARY OVERCURRENT PROTECTION SHALL BE LOCATED WITH IN (10) FEET OF THE TRANSFORMER SECONDARY TERMINALS EITHER IN A PANELBOARD (MAIN BREAKER), AN INDIVIDUALLY MOUNTED CIRCUIT BREAKER, OR A FUSIBLE DISCONNECT SWITCH.
5. GROUNDING ELECTRODE CONDUCTOR TO BE RUN FROM GROUND BAR IN TRANSFORMER TO THE GROUNDING ELECTRODE FOR THE SEPARATELY DERIVED SYSTEM.
6. SYSTEM BONDING JUMPER/SUPPLY SIDE BONDING JUMPER TO BE INSTALLED BETWEEN THE TRANSFORMER GROUND BAR AND CASE AND BETWEEN THE GROUND BAR IN THE FIRST SUPPLY SIDE DISCONNECTING MEANS (PANELBOARD, ENCLOSED CIRCUIT BREAKER OR FUSIBLE DISCONNECT SWITCH) AND TRANSFORMER GROUND BAR. INSTALL MULTIPLE SUPPLY SIDE BONDING JUMPERS OF THE SIZE LISTED, (1) IN EACH FEEDER RACEWAY.
7. 600 KCMIL CONDUCTORS SHALL BE PROVIDED WITH MAC ADAPTERS AS REQUIRED TO COORDINATE WITH BREAKER LUG SIZES.

ELECTRICAL RISER DIAGRAM KEY NOTES

- (E1) EXISTING TO REMAIN PANELBOARD.
- (E2) EXISTING TO REMAIN TRANSFORMER.
- (E3) EXISTING TO REMAIN DISCONNECT SWITCH.
- (E4) SPECIALTY ELEVATOR DISCONNECT SWITCH WITH VOLTAGE MONITORING CONTACTS, PER ELECTRICAL DETAILS. REFER TO FLOOR PLANS ON SHEET E1.1 FOR ADDITIONAL INFORMATION.
- (E5) REFER TO TRANSFORMER SCHEDULE FOR FEEDER SIZES.

FEEDER LINE TYPES

- FEEDER CONCEALED IN WALLS AND ABOVE CEILINGS
- EXISTING FEEDER TO REMAIN



1 PARTIAL ELECTRICAL RISER DIAGRAM
NTS

ELECTRICAL FEEDER SCHEDULE

COPPER CONDUCTORS

CIRCUIT SYMBOL	CONDUCTORS (1 PH, 2W) WITH GROUND	CONDUIT SIZE	CONDUCTORS (1 OR 3 PH, 3 WIRE) WITH GROUND	CONDUIT SIZE	CONDUCTORS (3 PH, 4 WIRE) WITH GROUND	CONDUIT SIZE	OVERCURRENT RATING
(1)	2#12 & 1#12G	3/4"	3#12 & 1#12G	3/4"	4#12 & 1#12G	3/4"	15A
(2)	2#12 & 1#12G	3/4"	3#12 & 1#12G	3/4"	4#12 & 1#12G	3/4"	20A
(2.5)	2#10 & 1#10G	3/4"	3#10 & 1#10G	3/4"	4#10 & 1#10G	3/4"	25A
(3)	2#10 & 1#10G	3/4"	3#10 & 1#10G	3/4"	4#10 & 1#10G	3/4"	30A
(3.5)	2#8 & 1#10G	1"	3#8 & 1#10G	1"	4#8 & 1#10G	1"	35A
(4)	2#8 & 1#10G	1"	3#8 & 1#10G	1"	4#8 & 1#10G	1"	40A
(4.5)	2#8 & 1#10G	1"	3#8 & 1#10G	1"	4#8 & 1#10G	1"	45A
(5)	2#8 & 1#10G	1"	3#8 & 1#10G	1"	4#8 & 1#10G	1"	50A
(6)	2#6 & 1#10G	1"	3#6 & 1#10G	1"	4#6 & 1#10G	1"	60A
(7)	2#4 & 1#8G	1 1/4"	3#4 & 1#8G	1 1/4"	4#4 & 1#8G	1 1/4"	70A
(8)	2#4 & 1#8G	1 1/4"	3#4 & 1#8G	1 1/4"	4#4 & 1#8G	1 1/4"	80A
(9)	2#3 & 1#8G	1 1/4"	3#3 & 1#8G	1 1/4"	4#3 & 1#8G	1 1/4"	90A
(10)	2#3 & 1#8G	1 1/4"	3#3 & 1#8G	1 1/4"	4#3 & 1#8G	1 1/4"	100A

NOTES:

1. CONDUIT SIZES ARE BASED ON THE NEC ANNEX C TABLES FOR EMT/SCH.40 WITH THHN/THWN CONDUCTORS. CONDUCTOR SIZES USED IN CONDUIT CALCULATION ARE BASED ON THE SIZE OF THE HOT CONDUCTORS OF CIRCUIT. EXAMPLE: 40A 3PH, 4W CONDUIT SIZE IS BASED ON 4#8 + 1#8G + 1#8 'SPACE'. FOR ACTUAL WIRE INSTALL USE QUANTITY AND SIZES WITHIN SCHEDULE.
2. UNLESS OTHERWISE INDICATED, CONDUCTOR SIZING SHALL MATCH THE SIZE INDICATED ABOVE FOR THE APPLICABLE OVERCURRENT DEVICE. PROVIDE LARGER CIRCUIT WHERE INDICATED.
3. PROVIDE MINIMUM SIZE CONDUIT INDICATED IN THE SPECIFICATIONS OR ON THE DRAWINGS.
4. FOR SINGLE PHASE FEEDERS, PROVIDE A 3-WIRE CIRCUIT UNLESS DEVICE SERVED DOES NOT HAVE PROVISIONS FOR A NEUTRAL. FOR THREE PHASE FEEDERS, PROVIDE A 4-WIRE CIRCUIT UNLESS DEVICE SERVED DOES NOT HAVE PROVISIONS FOR A NEUTRAL.
5. PROVIDE TYPE OF RACEWAY OR CABLE AS INDICATED IN THE SPECIFICATIONS OR ON THE DRAWINGS.
6. REFER TO PANELBOARD SCHEDULES AND ONE-LINE RISER DIAGRAM DRAWINGS FOR CONDUCTOR AND CONDUIT SIZE REQUIREMENTS.
7. ALL CONDUCTOR SIZES ARE BASED ON 75°C (167°F). ALL EQUIPMENT CONNECTED TO WIRES SHALL BE RATED OR 75°C (167°F)
8. 600 KCMIL CONDUCTORS SHALL BE PROVIDED WITH MAC ADAPTERS AS REQUIRED TO COORDINATE WITH BREAKER LUG SIZES.
9. THIS SCHEDULE DOES NOT INCLUDE CONDUCTOR INCREASE IN SIZE DUE TO VOLTAGE DROP. CONTRACTOR IS RESPONSIBLE TO MEASURE OR ESTIMATE THE ROUTING PRIOR TO ANY INSTALLATION AND MEET THE MAXIMUM VOLTAGE DROP REQUIREMENTS. (2% VOLTAGE DROP FOR FEEDERS AND 3% VOLTAGE DROP FOR BRANCH CIRCUITS.)

Branch Panel: LVP1

Location: STORAGE EX44 | **Volts:** 120/208 Wye | **A.I.C. Rating:** 22k
Supply From: TX: LVP1 | **Phases:** 3 | **Bus Material:** CU
Mounting: Surface | **Wires:** 4 | **Bus Rating:** 100 A
Enclosure: Type 1 | **MCB Rating / MLO:** 100A/3P MCB

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RCPT: ELEVATOR PIT	20 A	1	0.18	0.18					1	20 A	RCPT: ELEVATOR TOP OF SHAFT	2
3	RCPT: ELEVATOR LOBBY EXTERIOR	20 A	1			0.18	0.15			1	20 A	LTG: ELEVATOR PIT	4
5	LTG: ELEVATOR TOP OF SHAFT	20 A	1					0.15	0.13	1	20 A	LTG: ELEVATOR LOBBY BASEMENT	6
7	LTG: ELEVATOR LOBBY FIRST FL	20 A	1	0.13	0.13					1	20 A	LTG: ELEVATOR LOBBY SECOND FL	8
9	ELEVATOR CAB LIGHTING	20 A	1			0.50	1.70			3	20 A	UH-01	10
11	SPARE	20 A	1					0.00	1.70	--	--	--	12
13	SPARE	20 A	1	0.00	1.70					--	--	--	14
15	SPARE	20 A	1			0.00	0.00			1	20 A	SPARE	16
17	SPARE	20 A	1					0.00	0.00	1	20 A	SPARE	18
19	SPARE	20 A	1	0.00	0.00					1	20 A	SPARE	20
		Phase Load:		2.32 kVA		2.53 kVA		1.98 kVA					
		Phase:		19.7 A		21.5 A		16.5 A					
		Total Load:		6.82 kVA									
Notes:		**Total Amps:**		18.94 A									

MOTOR / EQUIPMENT CIRCUIT SCHEDULE

EQUIPMENT	OCPD	PANEL	LOAD					LOCAL DISC. SW	MOTOR STARTER			WIRING	REMARKS
			HP	MCA	KW	PH	VOLT		SIZE	TYPE	LOCATION		
UH-01	20A-3P	LVP1	-	14.4	-	3	208	30A-3P	-	SPC	AT UNIT	3#12, #12G, 3/4"C	

GENERAL NOTES:

1. DISCONNECT SWITCHES SHALL BE HEAVY-DUTY TYPE AND SHALL BE LOCATED AT EQUIPMENT LOCATION UNLESS OTHERWISE NOTED.
2. ABBREVIATIONS:
   - MAN: MANUAL STARTER (TOGGLE SWITCH WITH THERMAL OVERLOADS)
   - FVNR: COMBINATION FULL VOLTAGE NON-REVERSING STARTER/ DISCONNECT SWITCH
   - VFD: VARIABLE FREQUENCY DRIVE, FURNISHED BY DIV. 23, WIRED BY DIV. 26. PROVIDE POWER WIRING FROM SOURCE PANELBOARD TO VFD AND FROM VFD TO MOTOR(S). COORDINATE EXACT LOCATION IN FIELD WITH DIV.23.
   - DIV.21: EQUIPMENT FURNISHED BY DIVISION 21 FIRE PROTECTION CONTRACTOR
   - DIV.22: EQUIPMENT FURNISHED BY DIVISION 22 PLUMBING CONTRACTOR
   - DIV.23: EQUIPMENT FURNISHED BY DIVISION 23 HVAC CONTRACTOR
   - SPC: SINGLE POINT CONNECTION (STARTERS INTEGRAL TO EQUIPMENT). COORDINATE EXACT POINT OF CONNECTION IN FIELD.
3. OVERCURRENT PROTECTION DEVICES (OCPD) SHALL BE MOLDED CASE CIRCUIT BREAKERS UNLESS NOTED WITH AN "F" FOR FUSE.
4. DISCONNECT SWITCHES AND STARTERS SHALL BE NEMA 3R RATED WHEN LOCATED OUTSIDE.
5. REFER TO PANEL SCHEDULES FOR SOURCE PANEL/ CIRCUIT INFORMATION.
6. REFER TO ELECTRICAL AND MECHANICAL PLANS FOR EXACT LOCATIONS OF EQUIPMENT.
7. STARTERS SHALL BE SQUARE D CLASS 8536 OR APPROVED EQUAL.

LIGHTING FIXTURE SCHEDULE

TYPE	BASIS OF DESIGN MANUFACTURER / MODEL	VOLTAGE	SOURCE	FIXTURE DESCRIPTION - BASIS OF DESIGN
B2E	MANUFACTURER/ SERIES: COLUMBIA LIGHTING PART NUMBER: CFP22-LSCS-ELL14-PLRTS	UNV	4381LM, 35W 3500K LED	2X2 SURFACE MOUNTED LED FIXTURE WITH EXTRUDED ALUMINUM FRAME, FROSTED/TEXTURED OUTER LENS, AND INTEGRAL EMERGENCY BATTERY PACK. SWITCHABLE LUMEN TECHNOLOGY THAT ALLOWS EASY FIELD-ADJUSTABLE LIGHTING OUTPUT (LOW/MED/HIGH) 0-10V DIMMING TO 10%. 80+ CRI. LUMEN MAINTENANCE OF 54,000 HOURS AT L70. MOUNTING AS APPROPRIATE FOR CEILING TYPE INDICATED ON ARCHITECTURAL PLANS.
CE	MANUFACTURER/ SERIES: COLUMBIA LIGHTING PART NUMBER: MPS4-35HL-CW-ED1U-ELL14	UNV	5800LM, 41.7W 3500K LED	4' LONG WALL AND SURFACE MOUNTED UTILITY STRIP FIXTURE WITH STEEL HOUSING, CURVED ACRYLIC LENS, AND INTEGRAL EMERGENCY BATTERY PACK. 0-10V DIMMING TO 1%. 80+ CRI. LUMENT MAINTENANCE OF 60,000 HOURS AT L80. PROVIDE WIREGUARD ACESSORIES EQUAL "MPSWG4" WHEN LOCATED IN ELEVATOR PIT AND TOP OF SHAFT.
D	MANUFACTURER/ SERIES: PRESCOLITE PART NUMBER: LBSES-8RD-CS9-XX	UNV	1750LM, 20W 3500K LED	SURFACE MOUNT LED DOWNLIGHT WITH CAST ALUMINUM LOW PROFILE TRIM AND INTEGRAL DIFFUSE POLYCARBONATE LENS. 0-10V DIMMING. 90CRI. LUMEN MAINTENANCE OF 54,000 HOURS AT L80. MOUNTING AS APPROPRIATE FOR CEILING TYPE INDICATED ON ARCHITECTURAL PLANS.
WPE	MANUFACTURER/ SERIES: BEACON PART NUMBER: QSP32-24L-30-3K7-3-UNV-XX-PC-SCP-20F-EH	UNV	3374LM, 30W 3000K LED	EXTERIOR WALL PACK FIXTURE WITH DIE CAST ALUMINUM HOUSING WITH INTEGRAL EMERGENCY BATTERY PACK. IP66 RATED. 0-10V DIMMING. PROVIDE ALL NECESSARY ACCESSORIES FOR A COMPLETE SYSTEM. MOUNTING AS APPROPRIATE FOR LOCATION INDICATED ON PLANS.

NOTES:

1. LIGHT FIXTURES IN THE SCHEDULE SHALL BE CONSIDERED BASIS OF DESIGN. EQUAL FIXTURE SUBSTITUTIONS ARE ACCEPTABLE FOR ALL FIXTURES IN THE LIGHTING FIXTURE SCHEDULE, UNLESS INDICATED OTHERWISE. EQUAL FIXTURE APPROVAL SHALL BE AS JUDGED BY THE ENGINEER AND THE ARCHITECT. IN ADDITION TO THE REQUIREMENTS LISTED IN THE LIGHTING FIXTURE SCHEDULE AND IN THE SPECIFICATIONS, THE PROPOSED EQUAL FIXTURES SHALL:
   A. BE THE SAME GENERAL SIZE, STYLE AND SHAPE, INCLUDING BUT NOT LIMITED TO LENS CONSTRUCTION AND SHADING.
   B. BE OF EQUAL QUALITY CONSTRUCTION AND FINISH.
   C. BE SUPPLIED WITH ALL REQUIRED ACCESSORIES TO MATCH THE SPECIFIED (BASIS OF DESIGN) FIXTURE.
   D. PROVIDE THE SAME DISTRIBUTION, EFFICACY AND SOURCE LUMEN OUTPUT.
   E. HAVE THE SAME LISTINGS AS THE BASIS OF DESIGN FIXTURE, INCLUDING DLC AND ENERGY STAR QUALIFICATIONS.
2. ALL FIXTURES SHALL BE UL LISTED.
3. ALL NECESSARY MOUNTING HARDWARE, HANGERS, BRACKETS, RAILS, YOKES, CANOPIES, STEMS, CHAINS, ROW JOINERS, ETC. SHALL BE FURNISHED AND INSTALLED.
4. REFER TO ARCHITECTURAL DRAWINGS FOR SPECIFIC DETAILS, ARRANGEMENT, MOUNTING HEIGHTS, SUSPENSION LENGTHS, CEILING CONSTRUCTION, ETC. ALL COLORS AND FINISHES SHALL BE SELECTED BY ARCHITECT.
5. FIXTURES SHALL BE SEISMICALLY SUPPORTED AS REQUIRED BY THE APPLICABLE BUILDING CODE. FIXTURES SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE AND SHALL BE INDEPENDENT OF DUCTS, PIPES, CEILINGS AND THEIR SUPPORTING MEMBERS. FIXTURES SHALL BE SUPPORTED WITH A MINIMUM OF 2 SUPPORTS.
6. WIRE EMERGENCY FIXTURES AND EXIT SIGNS AHEAD OF SWITCHED LEGS.
7. MINIMUM MOUNTING HEIGHT OF FIXTURES IN MECHANICAL AND ELECTRICAL SPACES IS 8'-6" AFF. COORDINATE MOUNTING HEIGHT IN FIELD WITH EQUIPMENT IN ROOM SUCH THAT LIGHTING IS NOT OBSTRUCTED BY DUCTWORK, PIPING AND CONDUIT. PROVIDE NECESSARY CHAIN-MOUNTING HARDWARE TO SUSPEND FIXTURES WHERE REQUIRED.
8. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
9. WHERE EXIT SIGNS ARE SHOWN AS WALL MOUNTED ABOVE A DOOR, MOUNT SUCH THAT THE BOTTOM OF THE SIGN IS NO MORE THAN 3" ABOVE THE DOOR FRAME, UNLESS INDICATED OTHERWISE ON PLANS.
10. UNLESS OTHERWISE NOTED, PENDANT FIXTURE MOUNTING HEIGHTS IN FINISHED SPACES SHALL BE AS FOLLOWS:
    A. CEILING HEIGHT 9'-0" OR LOWER: 7'-6" TO BOTTOM OF FIXTURE
    B. CEILING HEIGHT 9'-6" TO 11'-0": 8'-0" TO BOTTOM OF FIXTURE
    C. CEILING HEIGHT 11'-0" TO 12'-0": 9'-6" TO BOTTOM OF FIXTURE
    D. MINIMUM PENDANT LENGTH SHALL BE 1'-6"
    E. CONSULT WITH ARCHITECT AND ENGINEER FOR OTHER CEILING HEIGHTS.

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21 Talcott Notch Road Farmington, CT 06032
friar.com 860.678.1291

STATE OF CONNECTICUT MICHAEL T. BOUCHARD 31082 LICENSED PROFESSIONAL ENGINEER
PROFESSIONAL SEAL

CES Consulting Engineering Services, Inc.
811 Middle Street Middletown CT 06457
860.632.1682
ceseng.com
CES #2025563.00
CONSULTANT

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION

ELECTRICAL SCHEDULES AND DIAGRAMS

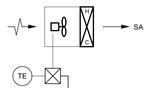
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ELECTRIC UNIT HEATER SCHEDULE

GENERAL				PERFORMANCE						ELECTRICAL			REMARKS			
TAG	MANUFACTURER	MODEL	LOCATION	KW	STAGES	MBH	CFM	FAN SPEED	LAT (°F)	AMPS	VOLTAGE	PHASE	TYPE	RATINGS	FEATURES	INSTALL
UH-01	QMARK	CDF-548	ELEVATOR LOBBY	3	1	10.2	300	1400	92	14.4	208	3	1	1	ALL	ALL

REMARKS - TYPE	REMARKS - RATINGS	REMARKS - FEATURES	REMARKS - INSTALL
1. RECESS CEILING MOUNTED	1. LAT AT 60°F INLET AIR TEMPERATURE	1. DISCONNECT SWITCH 2. INTEGRAL SINGLE STAGE THERMOSTAT 3. 120 VOLT CONTROL 4. BUILT-IN FAN AUTO-ON SWITCH 5. MANUAL RESET OVERTEMPERATURE CUT-OUT	1. CEILING MOUNTED COORDINATE LOCATION WITH ARCHITECTURAL CEILING GRID 2. 120 VOLT SINGLE STAGE WALL MOUNTED THERMOSTAT



SPACE TEMPERATURE SENSOR (WALL MOUNTED)

SEQUENCE OF OPERATION

GENERAL

1. PROVIDE STAND-ALONE CONTROLS. PROVIDE LOW-VOLTAGE THERMOSTAT CONTROLS. REFER TO ELECTRICAL DRAWINGS.

OPERATION

1. IF THE SPACE TEMPERATURE DROPS BELOW SETPOINT THE UNIT SHALL ACTIVATE. IF THE SPACE TEMPERATURE SETPOINT IS SATISFIED, THE UNIT SHALL DEACTIVATE.
2. UNIT'S BUILT-IN TEMPERATURE HIGH-LIMIT CUT-OFF AUTOMATICALLY SHUTS OFF CURRENT IN THE EVENT OF OVERHEATING AND REACTIVATES UNIT WHEN TEMPERATURE RETURNS TO NORMAL

1 UNIT HEATER - ELECTRIC
NTS

GENERAL NOTES

1. GENERAL NOTES, SYMBOLS, AND DETAILS ARE APPLICABLE TO DRAWINGS WITHIN DIVISION 23.
2. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED, AND AS REQUIRED BY CODES.
3. DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO INDICATE CAPACITY, SIZE, APPROXIMATE LOCATION AND GENERAL ARRANGEMENT. COORDINATE LOCATIONS OF SYSTEMS AND COMPONENTS.
4. COORDINATE ROOF AND WALL PENETRATIONS WITH WORK OF OTHER SECTIONS AND WITH FLASHING REQUIREMENTS. COORDINATE SLAB PENETRATIONS WITH WORK OF OTHER SECTIONS.
5. RUN DUCTS AND PIPING CONCEALED UNLESS SPECIFIED OTHERWISE NOTED.
6. INSTALL SENSORS (TEMPERATURE, HUMIDITY, CO2, THERMOSTATS) AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED BY ARCHITECT. MOUNTING HEIGHT AFF SHALL COMPLY WITH ADA AND SHALL BE MOUNTED LEVEL WITH ADJACENT SWITCHES (IE LIGHT SWITCHES).
7. COORDINATE WORK OF THIS SECTION WITH THAT OF OTHER SECTIONS AND WITH ALL TRADES INVOLVED. PROVIDE OFFSETS IN PIPING AND DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS.
8. NOT ALL ACCESS DOORS HAVE BEEN SHOWN ON THE PLANS. PROVIDE ACCESS PANELS THROUGH BUILDING ASSEMBLIES TO SERVICE AND MAINTAIN EQUIPMENT UNLESS SUCH EQUIPMENT IS INSTALLED IN EXPOSED LOCATIONS OR ABOVE LAY-IN CEILINGS. COORDINATE THE LOCATION OF ACCESS DOORS AND PANELS AND VERIFY THE QUANTITY, SIZE, AND LOCATIONS AFTER THE SYSTEMS AND EQUIPMENT REQUIRING ACCESS HAVE BEEN INSTALLED AND PRIOR TO THE CLOSURE OF THE AFFECTED CEILINGS AND BUILDING ASSEMBLIES. SUBMIT ACCESS PANEL LOCATIONS FOR REVIEW.
9. AT SUBSTANTIAL COMPLETION, THE FOLLOWING ITEMS, NEW OR EXISTING, SHALL BE FULLY AND REASONABLY ACCESSIBLE: HVAC CONTROL BOXES, JUNCTION BOXES, VALVES, DDC CONTROL BOXES, ELECTRICAL PANELS, FILTERS, BELTS, WATER COILS, DISCONNECT SWITCHES AND ELEMENTS OF EQUIPMENT REQUIRING MAINTENANCE. "FULLY AND REASONABLY ACCESSIBLE" SHALL BE DEFINED AS NATIONAL ELECTRIC CODE REQUIRED CLEARANCE FOR POWERED EQUIPMENT AND CAPABLE OF BEING ACCESSED OR SERVICED WITHOUT REMOVING, MODIFYING OR DISTORTING OTHER COMPONENTS OF THE WORK. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCE FOR ALL EQUIPMENT.
10. SUPPORT EQUIPMENT, PIPING AND DUCTWORK FROM BUILDING STRUCTURE OR WITH STEEL SUPPORTS AND PLATFORMS AS REQUIRED. PROVIDE VIBRATION ISOLATION FOR ROTATING EQUIPMENT, DUCTWORK, AND PIPING IN ACCORDANCE WITH THE SPECIFICATIONS.
11. CONTROL WIRING METHODS SHALL COMPLY WITH NEC, AND DIVISION 26 SPECIFICATIONS.
12. VERIFY EQUIPMENT CONNECTIONS WITH MANUFACTURER'S DRAWINGS. VERIFY AND PROVIDE FITTINGS TO TRANSITION TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE DIMENSIONS BEFORE FABRICATION.

DRAWING SYMBOLS

SYMBOL	DESCRIPTION
1 A101 SIM	CALLOUT
℄	CENTERLINE
	CONNECT TO EXISTING
	DISCONNECT FROM EXISTING
	KEYNOTE TAG
1	REVISION NUMBER
XXX-#	EQUIPMENT TAG
Ref 1	ELEVATION MARK
	LINE BREAK
	EXISTING LINETYPE
	NEW WORK LINETYPE
	FUTURE WORK LINETYPE
	DEMO WORK LINETYPE

CONTROLS GENERAL NOTES

1. GENERAL
   - A. SEQUENCES OUTLINED SHALL BE PERFORMED BY DIRECT DIGITAL CONTROL FIELD PANELS (DDCFPS) AND LOCALLY MOUNTED DIRECT DIGITAL UNIT CONTROLLERS CONNECTED TO A CENTRAL BUILDING AUTOMATION SYSTEM, UNLESS OTHERWISE SPECIFIED. SYSTEM ARCHITECTURE SHALL BE BASED ON A PEER-TO-PEER DISTRIBUTED CONTROL SYSTEM NETWORK. SYSTEM SHALL INTEGRATE OPEN COMMUNICATION PROTOCOL CONTROLLERS. ALL DDCFP AND LOCAL CONTROLLERS SHALL BE CAPABLE OF INDEPENDENT OPERATION REGARDLESS OF THE STATUS OF THE BAS WORKSTATION.
   - B. BMS (BUILDING MANAGEMENT SYSTEM), BAS (BUILDING AUTOMATION SYSTEM) AND DDC (DIRECT DIGITAL CONTROLS) MAY BE USED INTERCHANGEABLY AND SHARE THE SAME MEANING.
   - C. ADDRESS IDENTIFIERS FOR POINTS AND VARIABLES SHALL BE COORDINATED WITH OWNER.
   - D. COORDINATE SENSOR LOCATIONS WITH DUCTWORK AND PIPING SHOP DRAWINGS AND INDICATE PROPOSED LOCATIONS ON SUBMITTALS. PROVIDE MANUFACTURER'S RECOMMENDED UPSTREAM AND DOWNSTREAM PIPE OR DUCT DIAMETERS FOR FLOW SENSING ELEMENTS.
2. WIRING
   - A. PROVIDE CONTROLS, LOW VOLTAGE CONTROL WIRING, HARDWARE POINTS (ANALOG IN, ANALOG OUT, BINARY IN, BINARY OUT) AND ACCESSORIES AS REQUIRED TO PERFORM THE CONTROL SEQUENCES INDICATED. ADDITIONALLY, PROVIDE HARDWARE POINTS INDICATED REGARDLESS THAT SUCH POINTS MAY NOT BE REQUIRED TO PERFORM THE CONTROL SEQUENCES INDICATED.
   - B. POWER WIRING SHALL COMPLY WITH REQUIREMENTS OF DIVISION 26 SECTIONS.
   - C. PROVIDE NORMAL, [AND STANDBY] [AND EMERGENCY POWER] WIRING TO CONTROL DEVICES, INCLUDING CONTROL PANELS, WORKSTATION AND HOST COMPUTERS.
   - D. ELECTRICAL CIRCUITS FOR CONTROLS SHALL BE DEDICATED ONLY TO THE BUILDING AUTOMATION CONTROL SYSTEM AND COMPONENTS. WIRING FROM AND INCLUDING DEDICATED CIRCUIT BREAKERS TO THE POINT OF USE SHALL BE PROVIDED.
3. SAFETIES:
   - A. SAFETY DEVICES SUCH AS FREEZESTATS, SMOKE DETECTION, AND HIGH STATIC PRESSURE SWITCHES SHALL BE MANUAL RESET AND SHALL PERFORM ASSOCIATED SHUTDOWN/FAILSAFE ACTIONS VIA HARDWIRING. SOFTWARE SHALL NOT BE USED TO EXCLUSIVELY PERFORM ANY SHUTDOWN/FAILSAFE ACTIONS FROM SAFETY DEVICES. FOR EXAMPLE, FREEZESTATS SHALL SHUT OFF FAN, FULLY OPEN COIL VALVE, AND CLOSE OUTSIDE AIR DAMPER VIA HARDWIRING WITHOUT RELYING ON ANY SOFTWARE FUNCTIONS. SOFTWARE SHUTDOWN/FAILSAFE SHALL BE PROVIDED AS A REDUNDANT BACKUP TO THE REQUIRED HARDWIRED SHUTDOWNS.
   - B. DEVICES SUCH AS CUH AND UH SHALL OPERATE ON A SOFT PERMISSIVE, ONLY ALLOWING FANS TO START AND CONTROL VALVES TO OPEN WHEN SYSTEM IS IN HEATING MODE. USE OF AQUASTATS IS NOT ACCEPTABLE.
   - C. SAFETY DEVICES SHALL FUNCTION AND SHUT DOWN THE ASSOCIATED EQUIPMENT WHEN THE MANUAL SWITCHES ARE IN BOTH THE HAND AND AUTO POSITIONS.
4. ROOM SENSORS
   - A. FOR CORRIDORS, RESTROOMS, VESTIBULES, STORAGE ROOMS, JANITOR CLOSETS, ELECTRICAL CLOSETS, DATA CLOSETS/ROOMS, AND MECHANICAL ROOMS, PROVIDE WALL MOUNTED, BRUSHED CHROME, WALL PLATE TYPE SENSORS.
5. SETPOINTS:
   - A. SETPOINTS AND TIME DELAYS SHALL BE ADJUSTABLE BY THE OPERATOR THROUGH THE BAS WORKSTATION AND THROUGH LAPTOP SERVICE TOOL CONNECTED TO DDCFPS AND CONTROLLERS WITHOUT HARDWARE OR SOFTWARE REVISIONS. UNLESS OTHERWISE NOTED, ROOM TEMPERATURE SETPOINTS SHALL BE ADJUSTABLE AT THE LOCAL ROOM TEMPERATURE SENSOR.
   - B. INITIAL SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS:
     - a. OFFICES, CIRCULATION SPACES & TOILET ROOMS:

OCCUPIED COOLING	75 DEGREES F
OCCUPIED HEATING	72 DEGREES F
UNOCCUPIED COOLING	80 DEGREES F
UNOCCUPIED HEATING	65 DEGREES F

     - b. UTILITY ROOMS (ELECTRICAL ROOMS, MECH. ROOMS & PENTHOUSES):

COOLING OR VENTILATION	85 DEGREES F (24 HOURS)
HEATING	60 DEGREES F MIN (24 HOURS)

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Farmington, CT 06032
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860.678.1291

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CES
Consulting Engineering Services, Inc.
811 Middle Street
Middletown CT 06457
860.632.1682
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WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION

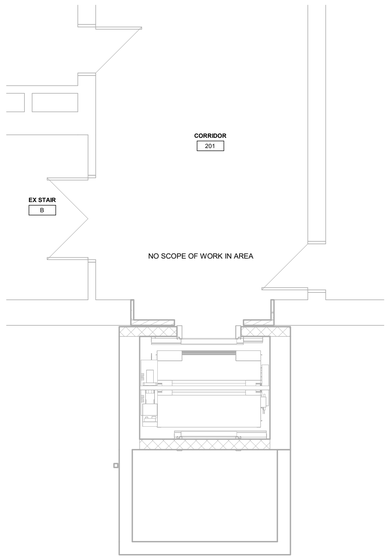
MECHANICAL ABBREVIATIONS, NOTES AND SYMBOLS

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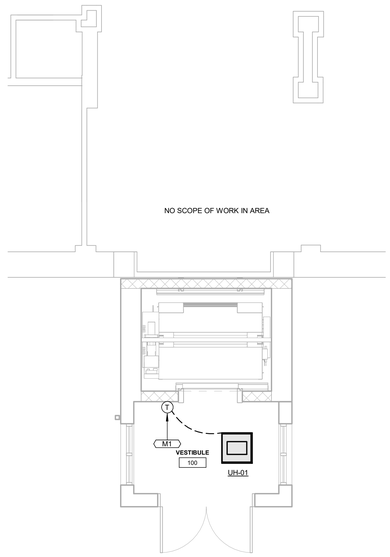
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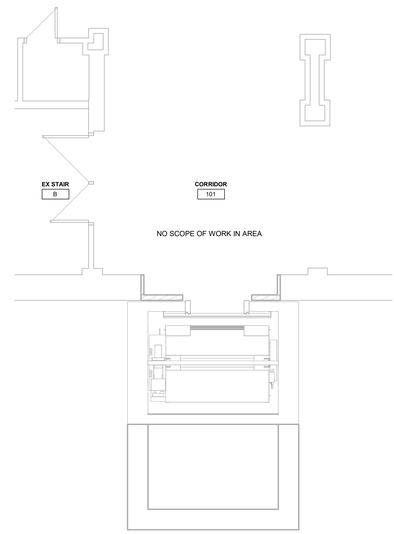
KEYNOTES - MECHANICAL DUCTWORK	
Key Value	Keynote Text
M1	THERMOSTAT SERVING UH-01 TO BE WALL MOUNTED. REFER TO ARCHITECTURAL DRAWINGS FOR FIXTURE MOUNTING HEIGHTS AND COORDINATE EXACT MOUNTING LOCATION WITH OTHER TRADES



3 MECHANICAL DUCTWORK SECOND FLOOR PLAN
1/4" = 1'-0"



2 MECHANICAL DUCTWORK LOBBY PLAN
1/4" = 1'-0"



1 MECHANICAL DUCTWORK FIRST FLOOR PLAN
1/4" = 1'-0"

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MICHAEL T. BOUCHARD
31082
LICENSED
PROFESSIONAL ENGINEER

PROFESSIONAL SEAL

CES
Consulting Engineering Services, Inc.
811 Middle Street
Middletown CT 06457
860.632.1682
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WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION

MECHANICAL NEW WORK PLANS

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CITY OF WATERBURY

DRIGGS ELEMENTARY SCHOOL & WOODROW WILSON ELEMENTARY SCHOOL

ELEVATOR ADDITIONS

Driggs Elementary: 77 Woodlawn Terrace

Woodrow Wilson Elementary: 235 Birch Street

WATERBURY, CONNECTICUT

JANUARY 15, 2026

CONTRACT AND SPECIFICATIONS

City Project No.: XX-XX

State Project No.: Driggs Elementary: 151-0315 LUE; Wilson Elementary: 151-0316 LUE

Building Official:		
(Print Name)	(Signature)	(Date)
Fire Marshal:		
(Print Name)	(Signature)	(Date)
Section 504 Official:		
(Print Name)	(Signature)	(Date)
Health Inspector:		
(Print Name)	(Signature)	(Date)

Mayor: Honorable Paul K. Pernerewski, Jr.

Superintendent of Schools: Dr. Darren Schwartz

Chief Opera9ng Officer: Nicholas J. Albini

Architect: Friar Architecture, Inc.

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HBMI Report – Woodrow Wilson Elementary School

Geotechnical Engineering Recommendations – Driggs Elementary School

Geotechnical Engineering Recommendations – Woodrow Wilson Elementary School

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02 83 33.13 – Lead Paint (Driggs)

02 83 33.13 – Lead Paint (Wilson)

02 84 11 – Polychlorinated Biphenyl (PCB) Abatement (Driggs)

02 84 11 – Polychlorinated Biphenyl (PCB) Abatement (Wilson)

Abatement Plan – Driggs
Abatement Plan – Wilson

DIVISION 03 -- CONCRETE
03 30 00 - Cast-in-Place Concrete
03 32 00 - Site Cast-in-Place Concrete
DIVISION 04 -- MASONRY
04 20 00 - Unit Masonry
DIVISION 05 -- METALS
05 12 00 - Structural Steel Framing
05 50 00 - Metal Fabrications
DIVISION 06 -- WOOD, PLASTICS, AND COMPOSITES
06 10 53 - Miscellaneous Rough Carpentry
06 16 00 - Sheathing - USG
DIVISION 07 -- THERMAL AND MOISTURE PROTECTION
07 13 00 - Sheet Waterproofing
07 21 00 - Thermal Insulation
07 27 00 - Air Barriers
07 42 13 - Metal Wall Panels
07 53 23 - Ethylene-Propylene-Diene-Monomer Roofing (EPDM) - Elevate
07 62 00 - Sheet Metal Flashing and Trim
07 71 23 - Manufactured Gutters and Downspouts
07 84 00 - Firestopping
07 92 00 - Joint Sealants
07 95 13 - Expansion Joint Cover Assemblies
DIVISION 08 -- OPENINGS
08 06 71 – Driggs Hardware Schedule
08 06 71 – Wilson Hardware Schedule
08 71 00 – Driggs Door Hardware
08 71 00 – Wilson Door Hardware
08 11 13 - Hollow Metal Doors and Frames
08 14 16 - Flush Wood Doors
08 43 13 - Aluminum-Framed Storefronts
08 80 00 - Glazing
DIVISION 09 -- FINISHES
09 21 16 - Gypsum Board Assemblies
09 22 16 - Non-Structural Metal Framing
09 51 00 - Acoustical Ceilings
09 65 00 - Resilient Flooring

09 91 23 - Interior Painting

DIVISION 10 -- SPECIALTIES

10 14 23 - Panel Signage

10 14 26 - Post and Panel Signage

10 26 00 - Wall and Door Protection

DIVISION 11 – EQUIPMENT (NOT USED)

DIVISION 12 – FURNISHINGS (NOT USED)

DIVISION 13 -- SPECIAL CONSTRUCTION (NOT USED)

DIVISION 14 -- CONVEYING EQUIPMENT

14 21 00 - Electric Traction Elevators

DIVISION 21 -- FIRE SUPPRESSION (NOT USED)

DIVISION 22 -- PLUMBING

22 04 00 - General Conditions for Plumbing Trades

22 04 10 - General Conditions for Plumbing Demolition

22 05 17 - Sleeves and Sleeve Seals for Plumbing Piping

22 05 23 - General-Duty Valves for Plumbing Piping

22 05 29 - Hangers and Supports for Plumbing Piping and Equipment

22 05 53 - Identification for Plumbing Piping and Equipment

22 07 00 - Plumbing Insulation

22 10 05 - Plumbing Piping

22 40 00 - Plumbing Fixtures and Specialties

DIVISION 23 -- HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

23 04 00 - General Conditions for Mechanical Trades

23 05 29 - Hangers and Supports for HVAC Piping, Ductwork and Equipment

23 05 53 - Identification for HVAC Piping and Equipment

23 05 93 - Testing, Adjusting, and Balancing for HVAC

23 07 00 - HVAC Insulation

23 31 00 - HVAC Ducts and Casings

23 33 00 - Air Duct Accessories

DIVISION 25 -- INTEGRATED AUTOMATION

DIVISION 26 -- ELECTRICAL

26 04 00 - General Conditions for Electrical Trades

26 05 01 - Electrical Demolition

26 05 03 - Equipment Wiring Connections

26 05 19 - Electrical Power Conductors and Cables

26 05 26 - Grounding and Bonding for Electrical Systems

26 05 29 - Hangers and Supports for Electrical Systems

26 05 33 - Raceway and Boxes for Electrical Systems

26 05 53 - Identification for Electrical Systems

26 09 23 - Lighting Control Devices
26 24 16 - Panelboards
26 27 26 - Wiring Devices
26 28 13 - Fuses
26 28 19 - Enclosed Switches
26 51 00 - Lighting

DIVISION 27 -- COMMUNICATIONS

27 05 29 – Hangers and Supports for Communications Systems
27 05 33 – Raceway and Boxes for Communication Systems
27 51 29 – Emergency 2-Way Communication System

DIVISION 28 -- ELECTRONIC SAFETY AND SECURITY

28 05 29 - Hangers and Supports for Electronic Safety and Security
28 05 33 - Raceway and Boxes for Electronic Safety and Security
28 31 00 - Fire Detection and Alarm

DIVISION 31 -- EARTHWORK

31 23 10 - Earthwork

DIVISION 32 -- EXTERIOR IMPROVEMENTS

32 12 16 - Bituminous Concrete Pavement
32 16 23 - Curbing
32 17 23 - Pavement Markings
32 31 13 – Chain Link Fences and Gates

DIVISION 33 -- UTILITIES

33 40 00 – Storm Drainage System

DIVISION 34 -- TRANSPORTATION

DIVISION 40 -- PROCESS INTEGRATION

DIVISION 46 -- WATER AND WASTEWATER EQUIPMENT

END OF SECTION

Building Official:		
(Print Name)	(Signature)	(Date)
Fire Marshal:		
(Print Name)	(Signature)	(Date)
Section 504 Official:		
(Print Name)	(Signature)	(Date)
Health Inspector:		
(Print Name)	(Signature)	(Date)

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

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CURRENT PREVAILING WAGE RATES

IN COMPLIANCE WITH SECTION 31-53 OF THE CONNECTICUT GENERAL STATUTES (C.G.S.)

ANNUAL ADJUSTMENT OF WAGE RATES WILL BE AS REQUIRED PER C.G.S. SECTION 31-55a

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CONNECTICUT DEPARTMENT OF LABOR

Partner of the American Job Center Network

THIS IS A PUBLIC WORKS PROJECT

Covered by the

PREVAILING WAGE LAW

CT General Statutes Section 31-53

If you have QUESTIONS regarding your wages
CALL (860) 263-6790

Section 31-55 of the CT State Statutes requires every contractor or subcontractor performing work for the state to post in a prominent place the prevailing wages as determined by the Labor Commissioner.

Sec. 31-53b. Construction safety and health course. New miner training program. Proof of completion required for mechanics, laborers and workers on public works projects. Enforcement. Regulations. Exceptions. (a) Each contract for a public works project entered into on or after July 1, 2009, by the state or any of its agents, or by any political subdivision of the state or any of its agents, described in subsection (g) of section 31-53, shall contain a provision requiring that each contractor furnish proof with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268.

(b) Any person required to complete a course or program under subsection (a) of this section who has not completed the course or program shall be subject to removal from the worksite if the person does not provide documentation of having completed such course or program by the fifteenth day after the date the person is found to be in noncompliance. The Labor Commissioner or said commissioner's designee shall enforce this section.

(c) Not later than January 1, 2009, the Labor Commissioner shall adopt regulations, in accordance with the provisions of chapter 54, to implement the provisions of subsections (a) and (b) of this section. Such regulations shall require that the ten-hour construction safety and health courses required under subsection (a) of this section be conducted in accordance with federal Occupational Safety and Health Administration Training Institute standards, or in accordance with Federal Mine Safety and Health Administration Standards or in accordance with 29 CFR 1910.268, as appropriate. The Labor Commissioner shall accept as sufficient proof of compliance with the provisions of subsection (a) or (b) of this section a student course completion card issued by the federal Occupational Safety and Health Administration Training Institute, or such other proof of compliance said commissioner deems appropriate, dated no earlier than five years before the commencement date of such public works project.

(d) This section shall not apply to employees of public service companies, as defined in section 16-1, or drivers of commercial motor vehicles driving the vehicle on the public works project and delivering or picking up cargo from public works projects provided they perform no labor relating to the project other than the loading and unloading of their cargo.

(P.A. 06-175, S. 1; P.A. 08-83, S. 1.)

History: P.A. 08-83 amended Subsec. (a) by making provisions applicable to public works project contracts entered into on or after July 1, 2009, replacing provision re total cost of work with reference to Sec. 31-53(g), requiring proof in certified payroll form that new mechanic, laborer or worker has completed a 10-hour or more construction safety course and adding provision re new miner training program, amended Subsec. (b) by substituting "person" for "employee" and adding "or program", amended Subsec. (c) by adding "or in accordance with Federal Mine
Safety and Health Administration Standards" and setting new deadline of January 1, 2009, deleted former Subsec. (d) re "public building", added new Subsec. (d) re exemptions for public service company employees and delivery drivers who perform no labor other than delivery and made conforming and technical changes, effective January 1, 2009.

STATUTE 31-55a

- SPECIAL NOTICE -

To: All State and Political Subdivisions,Their Agents, and Contractors

Connecticut General Statute 31-55a - Annual adjustments to wage rates by contractors doing state work.

Each contractor that is awarded a contract on or after October 1, 2002, for (1) the construction of a state highway or bridge that falls under the provisions of section 31-54 of the general statutes, or (2) the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project that falls under the provisions of section 31-53 of the general statutes shall contact the Labor Commissioner on or before July first of each year, for the duration of such contract, to ascertain the prevailing rate of wages on an hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done, and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee, effective each July first.

- The prevailing wage rates applicable to any contract or subcontract awarded on or after October 1, 2002 are subject to annual adjustments each July 1st for the duration of any project which was originally advertised for bids on or after October 1, 2002.
- Each contractor affected by the above requirement shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
- It is the ***contractor's*** responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's Web Site. The annual adjustments will be posted on the Department of Labor Web page: www.ctdol.state.ct.us. For those without internet access, please contact the division listed below.

- The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project. All subsequent annual adjustments will be posted on our Web Site for contractor access.

Any questions should be directed to the Contract Compliance Unit, Wage and Workplace Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at (860)263-6790.

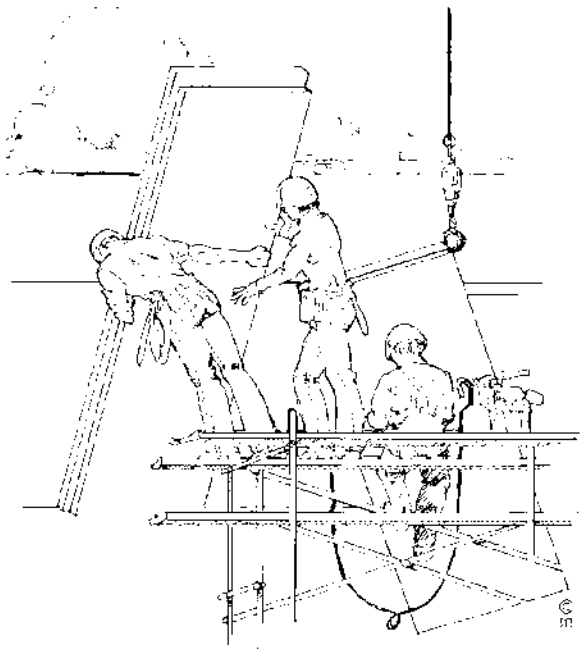
~NOTICE~

TO ALL CONTRACTING AGENCIES

Please be advised that Connecticut General Statutes Section 31-53, requires the contracting agency to certify to the Department of Labor, the total dollar amount of work to be done in connection with such public works project, regardless of whether such project consists of one or more contracts.

Please find the attached "Contracting Agency Certification Form" to be completed and returned to the Department of Labor, Wage and Workplace Standards Division, Public Contract Compliance Unit.

✎ Inquiries can be directed to (860) 263-6790.



CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION
CONTRACT COMPLIANCE UNIT

CONTRACTING AGENCY CERTIFICATION FORM

I, _____, acting in my official capacity as _____,
authorized representative title

for _____, located at _____,
contracting agency address

do hereby certify that the total dollar amount of work to be done in connection with

_____, located at _____,
project name and number address

shall be $_____, which includes all work, regardless of whether such project

consists of one or more contracts.

CONTRACTOR INFORMATION

Name:_____

Address:_____
Authorized Representative:_____
Approximate Starting Date: _____

Approximate Completion Date:_____

_____ _____
Signature Date

Return To: Connecticut Department of Labor
Wage & Workplace Standards Division
Contract Compliance Unit
200 Folly Brook Blvd.
Wethersfield, CT 06109

Date Issued: _____

CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

CONTRACTORS WAGE CERTIFICATION FORM

I,_____ of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

_____
Street

_____
City

and all of its subcontractors will pay all workers on the

_____
Project Name and Number

_____
Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

_____
Signed

Subscribed and sworn to before me this _____ day of _____,_____.

_____
Notary Public

Return to:

Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

Rate Schedule Issued (Date): _____

[New] In accordance with Section 31-53b(a) of the C.G.S. each contractor shall provide a copy of the OSHA 10 Hour Construction Safety and Health Card for each employee, to be attached to the first certified payroll on the project.

In accordance with Connecticut General Statutes, 31-53
Certified Payrolls with a statement of compliance
shall be submitted monthly to the contracting agency.

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

WEEKLY PAYROLL

Connecticut Department of Labor
Wage and Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

CONTRACTOR NAME AND ADDRESS:
Landon Corporation, 15 Connecticut Avenue, Northford, CT 06472

SUBCONTRACTOR NAME & ADDRESS
XYZ Corporation
2 Main Street
Yantic, CT 06389

WORKER'S COMPENSATION INSURANCE CARRIER
Travelers Insurance Company
POLICY # #BAC8888928
EFFECTIVE DATE: 1/1/09
EXPIRATION DATE: 12/31/09

PAYROLL NUMBER: 1
Week-Ending Date: 9/26/09
PROJECT NAME & ADDRESS: DOT 105-296, Route 82

PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/ FEMALE AND RACE*	WORK CLASSIFICATION / Trade License Type & Number - OSHA 10 Certification Number	DAY AND DATE: S 20	M 21	T 22	W 23	TH 24	F 25	S 26	Total ST Hours / Total O/T Hours	BASE HOURLY RATE / TOTAL FRINGE BENEFIT PLAN CASH	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS: FICA	FEDERAL WITH-HOLDING	STATE WITH-HOLDING	LIST OTHER	GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY
Robert Craft 81 Maple Street Willimantic, CT 06226		M/C	Electrical Lineman E-1 1234567 Owner OSHA 123456		8	8	8	8	8		HOURS WORKED EACH DAY S-TIME 40 O-TIME	$ 30.75 Base Rate $ 8.82 Cash Fringe	1. $ 5.80 2. $ 3. $ 2.01 4. $ 5. $ 6. $	$1,582.80				P-xxxx	$1,582.80	#123 $ xxx.xx
Ronald Jones 212 Elm Street Norwich, CT 06360	65%	M/B	Electrical Apprentice OSHA 234567		8	8	8	8	8		S-TIME 40 O-TIME	$ 19.99 Base Rate $ 16.63 Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $	$1,464.80	xx.xx	xxx.xx	xx.xx	G-xxx	$1,464.80	#124 $xxx.xx
Franklin T. Smith 234 Washington Rd. New London, CT 06320 SECTION B		M/H	Project Manager			8					S-TIME 8 O-TIME	$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $	$1,500.00	xx.xx	xx.xx	xx.xx	M-xx.x		#125 xxx.xx
											S-TIME O-TIME	$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $							

7/13/2009
WWS-CP1

*IF REQUIRED

*SEE REVERSE SIDE

PAGE NUMBER 1 OF 2

OSHA 10 ~ATTACH CARD TO 1ST CERTIFIED PAYROLL

***FRINGE BENEFITS EXPLANATION (P):**

Bona fide benefits paid to approved plans, funds or programs, except those required by Federal or State Law (unemployment tax, worker's compensation, income taxes, etc.).

Please specify the type of benefits provided:

1) Medical or hospital care Blue Cross 4) Disability _____

2) Pension or retirement _____ 5) Vacation, holiday _____

3) Life Insurance Utopia 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

For the week ending date of 9/26/09,

I, Robert Craft of XYZ Corporation, (hereafter known as

Employer) in my capacity as Owner (title) do hereby certify and state:

Section A:

1. All persons employed on said project have been paid the full weekly wages earned by them during the week in accordance with Connecticut General Statutes, section 31-53, as amended. Further, I hereby certify and state the following:

a) The records submitted are true and accurate;

b) The rate of wages paid to each mechanic, laborer or workman and the amount of payment or contributions paid or payable on behalf of each such employee to any employee welfare fund, as defined in Connecticut General Statutes, section 31-53 (h), are not less than the prevailing rate of wages and the amount of payment or contributions paid or payable on behalf of each such employee to any employee welfare fund, as determined by the Labor Commissioner pursuant to subsection Connecticut General Statutes, section 31-53 (d), and said wages and benefits are not less than those which may also be required by contract;

c) The Employer has complied with all of the provisions in Connecticut General Statutes, section 31-53 (and Section 31-54 if applicable for state highway construction);

d) Each such employee of the Employer is covered by a worker's compensation insurance policy for the duration of his employment which proof of coverage has been provided to the contracting agency;

e) The Employer does not receive kickbacks, which means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided directly or indirectly, to any prime contractor, prime contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a prime contractor in connection with a subcontractor relating to a prime contractor; and

f) The Employer is aware that filing a certified payroll which he knows to be false is a class D felony for which the employer may be fined up to five thousand dollars, imprisoned for up to five years or both.

2. OSHA–The employer shall affix a copy of the construction safety course, program or training completion document to the certified payroll required to be submitted to the contracting agency for this project on which such employee's name first appears.

Robert Craft (Signature) owner (Title) 10/2/09 Submitted on (Date)

Section B: Applies to CONNDOT Projects ONLY

That pursuant to CONNDOT contract requirements for reporting purposes only, all employees listed under Section B who performed work on this project are not covered under the prevailing wage requirements defined in Connecticut General Statutes Section 31-53.

Robert Craft (Signature) owner (Title) 10/2/09 Submitted on (Date)

Note: CTDOL will assume all hours worked were performed under Section A unless clearly delineated as Section B WWS-CP1 as such. Should an employee perform work under both Section A and Section B, the hours worked and wages paid must be segregated for reporting purposes.

*****THIS IS A PUBLIC DOCUMENT*****
*****DO NOT INCLUDE SOCIAL SECURITY NUMBERS*****

Information Bulletin
Occupational Classifications

The Connecticut Department of Labor has the responsibility to properly determine *"job classification"* on prevailing wage projects covered under C.G.S. Section 31-53(d).

Note: This information is intended to provide a sample of some occupational classifications for guidance purposes only. It is not an all-inclusive list of each occupation's duties. This list is being provided only to highlight some areas where a contractor may be unclear regarding the proper classification. If unsure, the employer should seek guidelines for CTDOL.

Below are additional clarifications of specific job duties performed for certain classifications:

- ***ASBESTOS WORKERS***

Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.

- ***ASBESTOS INSULATOR***

Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.

- ***BOILERMAKERS***

Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.

- ***BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS. STONE MASONS, TERRAZZO WORKERS, TILE SETTERS***

Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.

- ***CARPENTERS, MILLWRIGHTS. PILEDRIVERMEN. LATHERS. RESILEINT FLOOR LAYERS, DOCK BUILDERS, DIKERS, DIVER TENDERS***

Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs. Installation of insulated material of all types whether blown, nailed or attached in other ways to walls, ceilings and floors of buildings. Assembly and installation of modular furniture/furniture systems. Free-standing furniture is not covered. This includes free standing: student chairs, study top desks, book box desks, computer furniture, dictionary stand, atlas stand, wood shelving, two-position information access station, file cabinets, storage cabinets, tables, etc.

- **LABORER, CLEANING**

• The clean up of any construction debris and the general (heavy/light) cleaning, including sweeping, wash down, mopping, wiping of the construction facility and its furniture, washing, polishing, and dusting.

- **DELIVERY PERSONNEL**

• If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages are not required. If the delivery personnel are involved in the distribution of the material to multiple locations within the construction site then they would have to be paid prevailing wages for the type of work performed: laborer, equipment operator, electrician, ironworker, plumber, etc.

• An example of this would be where delivery of drywall is made to a building and the delivery personnel distribute the drywall from one "stockpile" location to further sub-locations on each floor. Distribution of material around a construction site is the job of a laborer or tradesman, and not a delivery personnel.

- ***ELECTRICIANS***

Install, erect, maintenance, alteration or repair of any wire, cable, conduit, etc., which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes, including the Installation or maintenance of telecommunication, LAN wiring or computer equipment, and low voltage wiring. ****License required per Connecticut General Statutes: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9.***

- ***ELEVATOR CONSTRUCTORS***

Install, erect, maintenance and repair of all types of elevators, escalators, dumb waiters and moving walks. ****License required by Connecticut General Statutes: R-1,2,5,6.***

- ***FORK LIFT OPERATOR***

Laborers Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine (9) feet only.

Power Equipment Operator Group 9 - operates forklift to assist any trade, and to assist a mason to a height over nine (9) feet.

- ***GLAZIERS***

Glazing wood and metal sash, doors, partitions, and 2 story aluminum storefronts. Installs glass windows, skylights, store fronts and display cases or surfaces such as building fronts, interior walls, ceilings and table tops and metal store fronts. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers, which require equal composite workforce.

- ***IRONWORKERS***

Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which require equal composite workforce.

- ***INSULATOR***

• Installing fire stopping systems/materials for "Penetration Firestop Systems": transit to cables, electrical conduits, insulated pipes, sprinkler pipe penetrations, ductwork behind radiation, electrical cable trays, fire rated pipe penetrations, natural polypropylene, HVAC ducts, plumbing bare metal, telephone and communication wires, and boiler room ceilings.

- ***LABORERS***

Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), decorative security fence (non-metal).

installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.

- ***PAINTERS***

Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic art work and drywall hhg for any and all types of building and residential work.

- ***LEAD PAINT REMOVAL***

• Painter's Rate
1. Removal of lead paint from bridges.
2. Removal of lead paint as preparation of any surface to be repainted.
3. Where removal is on a Demolition project prior to reconstruction.

• Laborer's Rate
1. Removal of lead paint from any surface NOT to be repainted.
2. Where removal is on a *TOTAL* Demolition project only.

- ***PLUMBERS AND PIPEFITTERS***

Installation, repair, replacement, alteration or maintenance of all plumbing, heating, cooling and piping. ****License required per Connecticut General Statutes: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2 S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4.***

- ***POWER EQUIPMENT OPERATORS***

Operates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers or motor graders, etc. Repairs and maintains equipment. ****License required, crane operators only, per Connecticut General Statutes.***

- ***ROOFERS***

Covers roofs with composition shingles or sheets, wood shingles, slate or asphalt and gravel to waterproof roofs, including preparation of surface. (demolition or removal of any type of roofing and or clean-up of any and all areas where a roof is to be relaid.)

- ***SHEETMETAL WORKERS***

Fabricate, assembles, installs and repairs sheetmetal products and equipment in such areas as ventilation, air-conditioning, warm air heating, restaurant equipment, architectural sheet metal work, sheetmetal roofing, and aluminum gutters. Fabrication, handling, assembling, erecting, altering, repairing, etc. of coated metal material panels and composite metal material panels when used on building exteriors and interiors as soffits, facia, louvers, partitions, canopies, cornice, column covers, awnings, beam covers, cladding, sun shades, lighting troughs, spires, ornamental roofing, metal ceilings, mansards, copings, ornamental and ventilation hoods, vertical and horizontal siding panels, trim, etc. The sheet metal classification also applies to the vast variety of coated metal material panels and composite metal material panels that have evolved over the years as an alternative to conventional ferrous and non-ferrous metals like steel, iron, tin, copper, brass, bronze, aluminum, etc. Fabrication, handling, assembling, erecting, altering, repairing, etc. of architectural metal roof, standing seam roof, composite metal roof, metal and composite bathroom/toilet partitions, aluminum gutters, metal and composite lockers and shelving, kitchen equipment, and walk-in coolers. To include testing and air –balancing ancillary to installation and construction.

- ***SPRINKLER FITTERS***

Installation, alteration, maintenance and repair of fire protection sprinkler systems. ****License required per Connecticut General Statutes: F-1,2,3,4.***

- ***TILE MARBLE AND TERRAZZO FINISHERS***

Assists and tends the tile setter, marble mason and terrazzo worker in the performance of their duties.

- **TRUCK DRIVERS**

~How to pay truck drivers delivering asphalt is under REVISION~

Truck Drivers are requires to be paid prevailing wage for time spent "working" directly on the site. These drivers remain covered by the prevailing wage for any time spent transporting between the actual construction location and facilities (such as fabrication, plants, mobile factories, batch plant, borrow pits, job headquarters, tool yards, etc.) dedicated exclusively, or nearly so, to performance of the contract or project, which are so located in proximity to the actual construction location that it is reasonable to include them. ****License required, drivers only, per Connecticut General Statutes.***

For example:

• Material men and deliverymen are not covered under prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.
• Hauling material off site is not covered provided they are not dumping it at a location outlined above.
• Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

➢ *Any questions regarding the proper classification should be directed to:*
Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6790.

Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES

⇨ Please Note: If the "Benefits" listed on the schedule for the following occupations includes a letter(s) (+ a or + a+b for instance), refer to the information below.

Benefits to be paid at the appropriate prevailing wage rate for the listed occupation.

If the "Benefits" section for the occupation lists only a dollar amount, disregard the information below.

Bricklayers, Cement Masons, Cement Finishers, Concrete Finishers, Stone Masons
(Building Construction) and
(Residential- Hartford, Middlesex, New Haven, New London and Tolland Counties)

a. Paid Holiday: Employees shall receive 4 hours for Christmas Eve holiday provided the employee works the regularly scheduled day before and after the holiday. Employers may schedule work on Christmas Eve and employees shall receive pay for actual hours worked in addition to holiday pay.

Elevator Constructors: Mechanics

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day, plus the Friday after Thanksgiving.

b. Vacation: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

Glaziers

a. Paid Holidays: Labor Day and Christmas Day.

Power Equipment Operators
(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year's Day, Good Friday, Memorial day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday. Holidays falling on Saturday may be observed on Saturday, or if the employer so elects, on the preceding Friday.

Ironworkers

a. Paid Holiday: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

Laborers (Tunnel Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

Roofers

a. Paid Holidays: July 4th, Labor Day, and Christmas Day provided the employee is employed 15 days prior to the holiday.

Sprinkler Fitters

a. Paid Holidays: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

Truck Drivers

(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas day, and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

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FREEMAN COMPANIES

LAND DEVELOPMENT | ENGINEERING DESIGN | CONSTRUCTION SERVICES

Hazardous Building Materials Inspection Report

Driggs Elementary School – Elevator Addition Areas
77 Woodlawn Terrace
Waterbury, Connecticut 06710



December 8, 2025
Freeman File No.: 2025-0111

Prepared for:

Friar Architecture
21 Talcott Notch Road
Farmington, Connecticut, 06032

Prepared by:

Freeman Companies, LLC
36 John Street
Hartford, Connecticut 06106

December 8, 2025 sent via email to Jamie M. Young <jmy@friar.com>

Jamie M. Young
Project Manager
Friar Architecture
21 Talcott Notch Road
Farmington, Connecticut, 06032

RE: Hazardous Building Materials Inspection Report
Project Name: Driggs Elementary School – Elevator Addition Areas
Location: 77 Woodlawn Terrace, Waterbury, Connecticut 06710
Freeman Companies Project #: 2025-0111

Dear Mr. Young:

In accordance with our proposal, Freeman Companies, LLC (Freeman), conducted a pre-renovation asbestos inspection and lead-based paint screen, and an inventory of materials potentially containing Polychlorinated biphenyls (PCBs), for the Driggs Elementary School located at 77 Woodlawn Terrace in Waterbury, Connecticut The purpose of the survey was to inventory and/or sample suspect materials for potential to contain hazardous materials prior to a planned renovation of the structure.

The inspection was conducted November 26 and December 3, 2025.

We thank you for the opportunity to provide you with our consulting services. If you have any questions regarding this report or its contents, please contact the undersigned.

Sincerely,

Freeman Companies, LLC



Michelle Rudy
Hazardous Building Materials Manager
mrudy@freemancos.com
(860) 558-5393

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1.0 INTRODUCTION

1.1 General Information

Freeman Companies, LLC (Freeman) was retained by the City of Waterbury to conduct a pre-renovation Hazardous Building Material Survey (HBMI) at Driggs Elementary School located at 77 Woodlawn Terrace in Waterbury, Connecticut (Site). The pre-renovation survey consisted of a comprehensive asbestos inspection, a screen for lead in paint, and an inventory for materials with potential to contain PCBs. The inspection was conducted by inspector Michelle Rudy on November 26 and December 3, 2025. Ms. Rudy is a Connecticut Department of Public Health (DPH) licensed asbestos and lead paint inspector.

The criteria used to evaluate the survey results include, but are not limited to, guidelines recommended by the:

- American Conference of Governmental Industrial; Hygienists (ACGIH)
- Asbestos Hazard Emergency Response Act (AHERA)
- The U.S. Environmental Protection Agency (EPA)
- National Emissions Standards for Hazardous Air Pollutants (NESHAP)
- United States Occupational Safety and Health Administration (OSHA)
- Toxic Substances Control Act (TSCA)
- American National Standards Institute (ANSI)
- Connecticut Department of Energy and Environmental Protection (DEEP)
- Connecticut Department of Public Health (DPH)

1.2 Inspection Area Description

The building is a two-story structure with a full, finished basement level, built in 1965. The elevator addition will go on the outside of the original structure. The structure is primarily brick. The foundation is concrete. The pipes that were observed in the study area were uninsulated or insulated with fiberglass. Interior walls were observed to be constructed with brick and sheetrock. Floors are concrete and covered with various resilient finishes, such as vinyl tile, and linoleum. The majority of windows are metal with wood trim, and the majority of doors are wood or metal.

1.3 Scope of Inspection

Freeman was contracted to perform a pre-renovation Hazardous Building Materials Investigation (HBMI), including a comprehensive asbestos inspection, lead paint screen, and an inventory of materials with the potential to contain PCBs. Areas inspected included all materials and surfaces that will be disturbed or removed during the renovation, according to the architect's demolition plans. Potential fire door insulation could not be accessed without creating undue damage and must be assumed to contain asbestos or tested when demolition is underway.

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2.0 ASBESTOS SURVEY

2.1 Introduction

Asbestos Containing Materials (ACM) are defined, for purposes of this report, as materials containing equal to or greater than 1% asbestos. Suspect ACM is generally not defined by existing regulations, except that fiberglass and foam insulation for piping and ductwork do not have to be sampled to determine non-ACM status. As there has never been a complete ban on the import and sale of asbestos, all materials, old and new, that will be affected by planned renovations, were sampled, with the exception of glass, spray-foam, wood and metal.

The intent of the asbestos survey was to determine if suspect materials are considered ACM. The asbestos inspection was conducted to satisfy the EPA NESHAP final rule as amended November 20, 1990. The EPA NESHAP final rule requires the identification and removal of all regulated ACM in an area of renovation or demolition if the work will impact the ACM.

2.2 Methodology

The asbestos survey was conducted in conformance with the EPA NESHAP regulation 40 CFR Part 61. As required by OSHA, the EPA, and the DPH, sampling was performed by EPA Asbestos Hazard Emergency Response Act (AHERA)-accredited and DPH-certified asbestos inspectors. Sampling was performed using a wet technique to prevent airborne fiber release and in accordance with the protocols specified in EPA 40 CFR Part 763. Samples were placed in appropriately labeled containers that were sealed and submitted for analysis to Hayes Microbial of Midlothian, Virginia, a Connecticut-licensed laboratory.

The samples were submitted for petrographic analysis using the EPA-endorsed Polarized Light Microscopy with Dispersion Staining (PLM/DS) method. The percentage of asbestos present in each sample was determined by the visual area estimation technique. Samples that were initially determined to have less than 1% asbestos are generally subject to additional analysis by the EPA Point Count Method, which is required if the samples are to be presumed non-ACM. The alternative is to assume the presence of ACM. Samples were requested to be analyzed by the “stop on first positive” method. In this method, the presence of ACM is assumed for the entire group of samples, once confirmed for the first sample in the group.

Note that the PLM Method can fail to detect asbestos fibers present in non-friable, organically bound materials (vinyl floor tiles, mastic adhesives, caulking, roofing materials) because the fibers used in these materials are typically "small", present in relatively low concentrations, and hard to extract from the material matrix. For this reason, the laboratory analysts may recommend, depending upon the visual observation of the sample, that when the standard PLM method fails to detect asbestos in these materials, that the sample be further analyzed using the Transmission

Electron Microscopy (TEM) EPA Non-Organically Bound (NOB) Method by destroying the interfering matrix materials and isolating any asbestos fibers that may be present.

2.3 Asbestos Standards

The EPA determines all materials containing asbestos in a concentration of greater than 1% to be ACM. The State of Connecticut has a more stringent standard in that all materials containing asbestos in a concentration of equal to or greater than 1% are considered ACM.

According to EPA memo C112, all materials in which asbestos was detected in concentrations of less than 1%, must be subject to a "point count" analysis to prove that the material is non-ACM. If a point count is not performed, the material must be assumed to be ACM.

2.4 Asbestos Survey Results

A total of 34 samples were collected of 17 homogeneous suspect materials identified during the survey. The laboratory analyzed 33 of the 34 samples, based on the "stop on first positive" method. No additional samples were analyzed via PLM point count or sent for additional analysis by the EPA TEM NOB method.

The following materials were found to contain equal to or greater than 1% asbestos and are ACM:

- Black transom window glazing compound (Floor 2)

The following materials are assumed to contain asbestos pending further investigation:

- Potential fire door insulation (Floors 1, 2, 3)

No materials were found to contain asbestos in concentrations less than 1%.

Please see Table 1 for a detailed list of materials tested, locations, quantities, where applicable, and analytical results. The laboratory report may be found in Appendix A. See Figures 1 and 2 for demolition plans.

3.0 LEAD PAINT SURVEY

3.1 Introduction

Lead-based paint (LBP) is defined as having a lead content equal to or greater than 1.0 milligrams per square centimeter (mg/cm^2) or equal to or greater than 0.5% weight in building painted surfaces. Lead-containing paint is defined as paint containing any measurable lead content.

The intent of the lead paint screening survey was to determine if selected surfaces potentially affected by the upcoming renovations contain measurable amounts of lead for purposes of worker protection or contain LBP for purposes of waste characterization.

3.2 Methodology

Freeman used the X-ray Fluorescence Analyzer (XRF) method to determine if surfaces contain lead in the paint. The XRF testing was conducted with a SciAps X-550Pb, serial # 3102. Three calibration readings were taken, prior to the start of work and after the completion of the survey, to ensure quality control. The calibration readings must be between 0.7 and 1.3 mg/cm^2 for the study to be considered valid.

Random sampling of representative painted surfaces scheduled to be disturbed during the renovation/demolition was conducted to determine whether the materials were coated with lead-containing paint or LBP. It is not the intent to test all painted components, but to identify on a broad scale the impact of lead paint as it relates to disposal and worker protection. Building debris containing components with equal to or greater than 1.0 mg/cm^2 of lead by XRF requires waste classification analysis. Component and surface locations are identified by side designations represented by the letters “A”, “B”, “C”, and “D”. The “A” side is considered the street side of the building with the “B”, “C”, and “D” sides following in a clockwise order.

3.3 Lead Paint Standards

- 29 CFR Part 1926.62. OSHA Lead in Construction Requires engineering controls, personal protective equipment, worker decontamination, medical surveillance, worker training, and recordkeeping when workers are exposed to lead in concentrations above the established "action level" of 30 micrograms of lead per cubic meter of air.

  This regulation pertains to lead-containing paint, in addition to LBP. This action is taken because OSHA regulates lead in construction based on airborne exposures and it cannot be ensured that lead paint with concentrations of lead less than 1.0 mg/cm^2 or 0.5% dry weight will not result in exposures exceeding the OSHA standard during disruption of these materials during the proposed demolitions. Contractors need to be

made aware of the presence of lead-containing paint and LBP so that they may take appropriate actions to train and inform their workforce, select and install engineering controls, and provide personal protective equipment to prevent occupational exposure to lead-based paint.

40 CFR Part 261.24 Table 1. Resource Conservation and Recovery Act (RCRA) Hazardous Waste Regulations and Connecticut State Regulation Section 22a-449(c) regulates the disposal of hazardous waste. If components with LBP are scheduled to be disposed of, they must undergo TCLP testing. The waste may be combined with general construction debris, which will dilute the total concentration of lead in the waste stream. Waste which contains concentrations of lead in excess of 5 milligrams per liter (5 mg/L) as measured by Toxicity Characteristic Leaching Procedure (TCLP) must be disposed of as hazardous waste. If all concentrations of lead by XRF testing are below 1.0 mg/cm^2, TCLP sampling is not necessary, according to the State of Connecticut, and the waste may be disposed as general construction debris, if not otherwise regulated.

3.4 Lead Paint Survey Results

Concentrations of lead greater than 1.0 mg/cm^2 by XRF analysis (LBP) were detected on the following surfaces:

- Blue brick wall (Basement Closet)
- Green wood window casing (Basement Closet)
- Gray brick wall (Basement)
- Gray brick walls (Floor 3)
- Gray wood window casing (Floor 3)

If components are found to have lead-containing paint that is less than the concentration that defines LBP, they must be handled according to OSHA regulations but may be disposed of as general construction debris. Measurable concentrations of less than 1.0 mg/cm^2 lead by XRF analysis were detected on the following surfaces:

- Gray upper brick wall (Basement)
- Gray brick wall (Floor 2)
- White plaster upper wall (Floor 3)

Please see Table 2 for a complete list of building components tested by XRF, locations and results. See Figure 1 for demolition plans.

4.0 INVENTORY OF MATERIALS WITH POTENTIAL TO CONTAIN PCBs

4.1 Introduction

Potential PCB-containing source materials are considered in this section. Source materials are defined as building materials manufactured to contain PCBs. These materials most commonly include caulks and glazing compounds but may be found in other materials as well. PCBs in source materials may leach out of the material and into the surrounding substrate, such as brick or concrete.

4.2 Methodology

PCBs have been identified as a particular concern in caulks, glazing compounds, paints and roofing, as well as other materials; however, testing is not mandated. This survey considers the suspect components listed in 40 CFR Part 761, though the list is not exhaustive, to determine potential PCB-containing materials.

4.3 PCB Standards

The disposal of items with PCB is regulated by TSCA pursuant to 40 CFR Part 761 depending on the determination of the type of PCB waste as follows:

- PCB Bulk Product Waste is waste derived from products manufactured to contain PCBs in a non-liquid state at concentrations of 50 mg/kg or greater such as caulks, paint, and sealants.

- PCBs at a concentration of 1 mg/kg are reportable to the State of Connecticut and must be disposed as Connecticut Regulated Waste.

- PCB Remediation Waste is waste containing PCBs as a result of a spill or release from any of the following:

    - Materials disposed of prior to April 18, 1978, at concentrations ≥50 mg/kg PCBs
    - Materials at any concentration where the original source was ≥500 mg/kg PCBs
    - Materials at any concentration where the original source was ≥50 mg//kg PCBs
    - Materials which are currently at any concentration if the PCBs were spilled or released from a source not authorized for use.

  PCB remediation waste includes substrates such as brick and concrete into which PCBs have leached from source materials such as paints or caulks. If the bulk product waste, such as caulk, is not separated from the remediation waste, such as the surrounding brick, the mixture may be disposed of together as a bulk

product waste in a non-TSCA regulated landfill. This strategy results from the EPA guidance document titled *Polychlorinated Biphenyl (PCB) Guidance Reinterpretation*.

If source materials are tested and found to have PCBs in concentrations greater than 50 mg/kg, then testing of surrounding substrate materials is required to determine if a release has occurred. When source materials are found to be above 50 mg/kg and substrate materials are found to be at or above 1 mg/kg, removal of both source material and affected substrate is mandated. In the State of Connecticut all PCBs in any concentration must be removed It is currently not required by federal or state regulations to do an initial test of source materials for PCBs, but disposal is regulated as above. Therefore, the inventoried materials may be left in place during the demolition and renovation process and not removed from the substrate in order that the substrate be considered a bulk product waste and not a remediation waste subject to disposal in a TSCA-regulated landfill.

Most landfills accepting bulk product waste require a TCLP for the composite waste stream(s) containing PCBs. If less than 10 µg/l leaches out of the solution, the materials containing or suspected to contain PCBs may be disposed of as Bulk Product Waste. If 10 µg/l or more leaches out of the solution, the waste stream must be disposed of in a TSCA regulated facility.

4.4 Potential PCB-Containing Material Inventory Results

Five materials were identified that have the potential to contain PCBs, including caulks, window glazing compound and paints. See Table 3 for a complete inventory of materials and locations. See Figure 1 for demolition floorplans.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Asbestos

Asbestos was assumed in potential fire door insulation and detected by laboratory analysis in transom window glazing compound.

In accordance with the OSHA regulations in 29 CFR Part 1926.1101 and 1910.1001, all potential contractors bidding on work must first be informed of the results of this survey. In addition, notification regarding the presence of the ACM must be provided to all employees and tenants who occupy an area containing ACM.

In accordance with NESHAP regulations in 40 CFR Part 61 Subpart M, building owners must remove all ACM from a facility (or area of a facility) before any activity begins that would break up, dislodge, or similarly disturb the ACM. Disturbance of asbestos-containing material can only be done by trained and licensed individuals and contractors. In this case, the materials may be removed from the site without disturbance by keeping the window and potentially the

doors intact. The materials may be removed intact by any persons but must still be disposed of as asbestos containing waste.

Any material that was identified as negative for asbestos may be removed at will and disposed of as standard construction debris as long as it does not disturb any ACM or is not otherwise regulated. In addition, any new building materials that have not previously been identified shall be assumed to contain asbestos until the material has been properly tested.

5.2 Lead

LBP was found on select brick walls and window trim. DEEP requires lead waste characterization sampling for building materials containing lead-based paint that will become a waste material as a result of demolition or renovation activities. This should be done after the demolition occurs in order to avoid destructive testing. The waste may be combined with general construction debris, which will dilute the concentration of lead in the total waste stream. An exception is material with a metal substrate which may be recycled in a facility that accepts LBP.

Measurable levels of lead too low to meet the definition of lead-based paint were found throughout the study area in both schools. During any renovation process in which measurable levels of lead are detected, safe work procedures must be implemented by properly lead trained or informed workers employed by contractors to address worker protection, lead exposure controls, waste stream management, and ambient air quality monitoring. Specifically, contractors will be required to comply with all applicable OSHA regulations including 29 CFR 1926.62, "Lead Exposure in Construction: Interim Final Rule" and 29 CFR 1926.59, "Hazard Communication for the Construction Industry".

5.3 PCBs

The removal and disposal of items with PCBs in concentrations assumed to be equal to or greater than 50 mg/kg is regulated by TSCA pursuant to federal regulations in 40 CFR 761. As such, demolition debris with PCB materials is regulated as PCB Bulk Product Waste. All materials inventoried as suspect material, but not tested, should be disposed of, together with their substrate, as PCB Bulk Product Waste as a precaution. The combined waste stream must be subject to a PCB TCLP test for purposes of informing the landfill of the waste stream characteristics. Though the materials were not tested for PCBs, if they are disposed of together with the surrounding substrate, they may be disposed of in a non-municipal landfill not regulated by TSCA.

All materials determined or assumed to contain PCBs should be handled by the contractor with the appropriate caution, including but not limited to proper PPE, engineering controls, and disposal methods.

6.0 REPORT LIMITATIONS CRITERIA

While Freeman followed industry standards during the inspection, we do not warrant that all suspect hazardous building materials were identified in or on the facility and shall not be held liable related to future abatement costs related to hazardous materials that are either not discovered or appropriately characterized. This is due in part to inherent problems with every building inspection, such as, but not limited to:

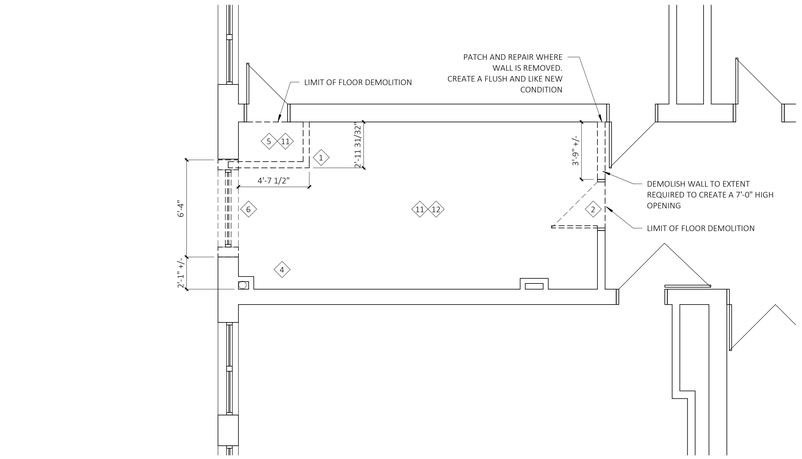
- Seemingly homogeneous materials that are not in fact homogeneous;
- Seemingly representative locations that are not in fact representative;
- Layered materials that are not uniformly present or are isolated;
- Materials that are present and accessible but were not considered to be suspect
- Material that is present in locations that are unsafe or otherwise difficult to access.

Client acknowledges that Freeman's inspection is inherently limited and all hazardous materials may only become apparent during the course of future demolition. During the course of future demolition work, it is likely that additional hazardous materials or materials suspected of being hazardous will be identified. Such materials should be assumed to be hazardous unless appropriate evaluation, sampling, and/or analysis demonstrate otherwise. Contracts, specifications, and plans should advise contractors to conduct controlled demolition work and stop immediately should any hazardous building materials be encountered during the course of their work.

This report is intended for the sole use of the Client and may not be used or relied upon by others without the written consent of the Client. The scope of work conducted in performing this service for the Client may not be appropriate to satisfy the needs of other Parties, and the use or re-use of this document or the findings, conclusions, or recommendations is at the risk of said user.

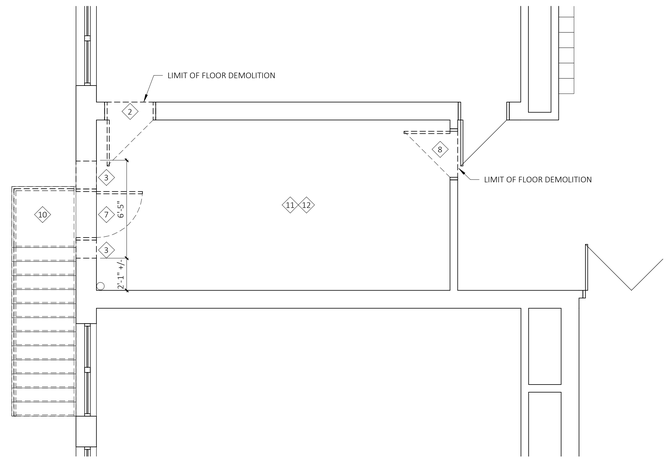
FIGURES

Figure 1



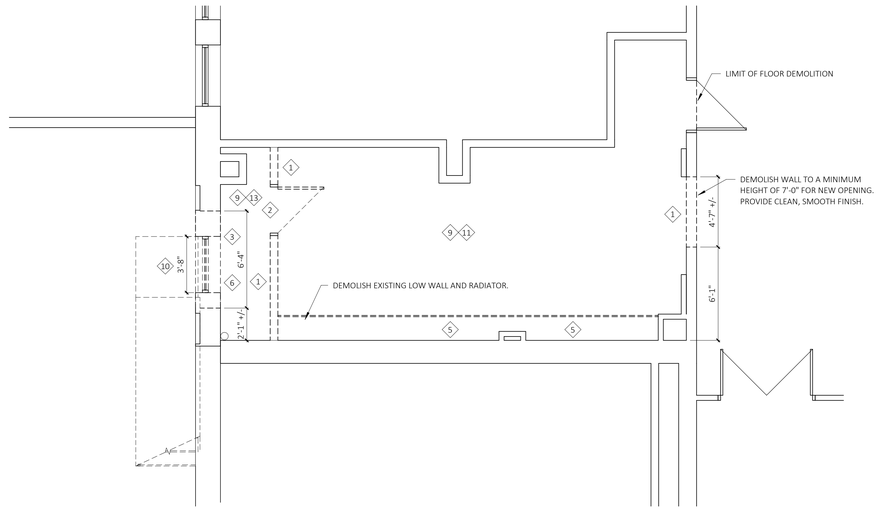
3 THIRD FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



2 SECOND FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



1 FIRST FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

GENERAL DEMOLITION NOTES

1. ANY DEMOLITION WORK ASSOCIATED WITH NEW WORK THAT IS NOT SPECIFICALLY NOTED ON THIS PLAN SHALL BE THE RESPONSIBILITY OF THE DEMOLITION CONTRACTOR.
2. DEMOLISHED MATERIAL SHALL BE CONSIDERED TO BE THE PROPERTY OF THE CONTRACTOR AND SHALL BE COMPLETELY REMOVED FROM THE JOB SITE.
3. SHUT OFF, CAP AND OTHERWISE PROTECT EXISTING PUBLIC UTILITY LINES IN ACCORDANCE WITH THE REQUIREMENTS OF THE PUBLIC AGENCY HAVING JURISDICTION.
4. COMPLETELY REMOVE ITEMS SCHEDULED TO BE SO DEMOLISHED AND REMOVE, LEAVING SURFACES CLEAN, SOLID AND READY TO RECEIVE NEW MATERIALS AND SPECIFIED ELSEWHERE.
5. USE MEANS NECESSARY TO PREVENT DUST FROM BECOMING A NUISANCE TO THE USER.
6. THIS DRAWING DOES NOT DEPICT THE FULL EXTENT OF DEMOLITION. ADDITIONAL ITEMS SCHEDULED FOR DEMOLITION MAY BE FOUND ON OTHER DRAWINGS. CONSTRUCTION MANAGER IS RESPONSIBLE FOR THE COORDINATION OF THIS WORK WITH ALL PARTIES INVOLVED.
7. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH ALL NATIONAL, STATE, LOCAL CODES & ORDINANCES.
8. ALL EXISTING (FREESTANDING) FURNITURE ITEMS IN ALL ROOMS UNDER SCOPE OF WORK TO BE REMOVED BY OWNER.
9. DEMOLITION CONTRACTOR MUST VERIFY LOCATIONS OF ALL EXISTING STRUCTURAL, MECHANICAL, PLUMBING & ELECTRICAL ELEMENTS PRIOR TO START OF DEMOLITION.
10. REMOVE ALL INTERIOR WALLS SHOWN DOTTED, ALONG WITH ALL ASSOCIATED TACK BOARDS, CHALK BOARDS, MARKER BOARDS, ETC. EXERCISE CAUTION SO AS NOT TO DISTURB OR DAMAGE ADJACENT SURFACES SCHEDULED TO REMAIN.
11. REMOVE ALL PLUMBING FIXTURES INCLUDING SINKS, WATER CLOSETS, URINALS, SLOP SINKS AND DRINKING FOUNTAINS WITHIN DEMOLITION AREAS. REMOVE AND CAP ALL PLUMBING LINES BEHIND FINISHED WALL AND FLOOR SURFACES. REFER TO PLUMBING DEMOLITION DRAWINGS FOR RELATED INFORMATION.
12. REMOVE ALL DOORS AND DOOR FRAMES SHOWN IN FULLY DEMOLISHED PARTITIONS ONLY, UNLESS NOTED OTHERWISE.
13. REMOVE ALL RADIATION UNITS, H.V.A.C. RUNS, MECHANICAL UNITS, INFORMATION.
14. EMOVE ALL ELECTRICAL LIGHTING FIXTURES, ELECTRICAL RUNS, ASSOCIATED DEVICES. REFER TO ELECTRICAL DEMOLITION DRAWINGS FOR RELATED INFORMATION.
15. REFER TO SITE PLANS FOR SITE DEMOLITION NOTES.
16. REFER TO ALL DRAWINGS FOR ADDITIONAL INFORMATION.
17. REMOVE ALL EXISTING FLOOR SYSTEMS I.E. VINYL TILE, SHEET VINYL, CERAMIC TILE, MASTIC, MUD SET, ETC. AT ALL AREAS WHERE A NEW FLOOR IS SCHEDULED. REF. FINISH PLANS & SCHEDULE. PREP FLOORS TO RECEIVE NEW FINISHES.
18. ALL EXISTING LAY IN CEILING PANELS TO BE REMOVED BY THE ABATEMENT CONTRACTOR WHERE NEW CEILINGS ARE SCHEDULED. REFER TO ASBESTOS ABATEMENT PLANS AND REFLECTED CEILING PLANS.
19. REMOVE ALL CEILING GRIDS (CORRIDOR CEILING GRID TO BE REMOVED BY THE ABATEMENT CONTRACTOR), GYPSUM CEILINGS AND SUSPENSION SYSTEMS AT ALL AREAS WHERE NEW CEILINGS ARE SCHEDULED. REFER TO REFLECTED CEILING PLANS.
20. REMOVE ALL EXISTING BUILT-IN MILLWORK SHOWN DOTTED INCLUDING SINKS, ASSOCIATED PLUMBING & ELECTRICAL BACK TO SOURCE OR PANEL AS REQ'D.
21. ALL WINDOW SYSTEMS SCHEDULED FOR DEMOLITION TO BE REMOVED BY THE ABATEMENT CONTRACTOR.
22. THE DEMOLITION PLANS ARE DIAGRAMMATIC AND INTENDED TO SHOW THE GENERAL EXTENT OF THE WORK ONLY.
23. THE CONTRACTOR SHALL INCLUDE ALL DEMOLITION WORK REQUIRED TO ACCOMPLISH THE INTENT OF THE PLANS AND SPECIFICATIONS.
24. ALL DEMOLISHED ITEMS SHALL BE REMOVED FROM BUILDING /SITE UNLESS OTHERWISE NOTED. COORDINATE WITH OWNER FOR DELIVERY OF ITEMS NOTED TO REMAIN OWNERS PROPERTY. THE PROJECT SITE/ BUILDING SHALL BE CLEANED OF DEBRIS ON A DAILY BASIS. CONSTRUCTION MANAGER WILL COORDINATE AND INSTRUCT WHICH
25. CONTRACTOR SHALL BE RESPONSIBLE FOR SHORING AND SUPPORT (TEMPORARY OR PERMANENT) FOR ALL PORTIONS OF CONSTRUCTION DURING DEMOLITION AND CONSTRUCTION.
26. ALL ABANDONED MECHANICAL / ELECTRICAL / PLUMBING LINES SHALL BE CAPPED OFF BEHIND FINISHES, UNLESS OTHERWISE NOTED. REFER TO MECHANICAL / ELECTRICAL / PLUMBING DRAWINGS FOR ADDITIONAL DEMO. INFORMATION.
27. GENERAL TRADES CONTRACTOR SHALL SAWCUT ALL MASONRY OR CONCRETE OPENINGS INDICATED. MASONRY SHALL BE TOOTHED IN AND / OR RETURNED TO FINISHED OPENING ALL OPENINGS WHERE EXISTING CONSTRUCTION HAS BEEN REMOVED, AND WHICH ARE NOT NOTED TO REMAIN, SHALL BE FILLED AND /OR PATCHED TO MATCH THE ADJACENT EXISTING OR NEW FINISH, INCLUDING ANY FIRE RATINGS REQUIRED.
28. ALL AREAS OF FLOORS, WALLS AND CEILINGS DISTURBED BY DEMOLITION SHALL BE FILLED, PATCHED OR OTHERWISE REFINISHED TO MATCH EXISTING OR NEW FINISH AS DESIGNATED, INCLUDING ALL REQUIRED RATINGS.
29. CONTRACTOR MUST VERIFY LOCATIONS OF ALL EXISTING STRUCTURAL, MECHANICAL, PLUMBING & ELECTRICAL ELEMENTS PRIOR TO START OF DEMOLITION.
30. COORDINATE DEMOLITION EFFORTS WITH ASBESTOS ABATEMENT WORK.
31. EXISTING CONDITIONS SHALL BE STUDIED PRIOR TO BIDDING TO FAMILIARIZE YOURSELF WITH THE BUILDING AND INTENTIONS OF THE FINAL WORK AND THE REQUIRED DEMOLITION, INCLUDING ALL MECH., ELECT., PLUMB., TECH., STRUCTURAL AND GENERAL CONSTRUCTION ITEMS REQUIRING REMOVAL.
32. NO ELECTRICAL, TECHNOLOGY WIRING OR PNEUMATIC LINES ARE TO BE ABANDONED IN PLACE.
33. REFER TO SPECS FOR CUTTING & PATCHING, FLOOR PREP AND SELECTIVE DEMOLTION.

DEMOLITION LEGEND: KEYED INTO PLAN

1. REMOVE EXISTING WALL
2. REMOVE DOOR AND FRAME
3. REMOVE EXTERIOR MASONRY WALL CONSTRUCTION
4. REMOVE SINK AND ASSOCIATED PIPING BACK TO SOURCE. REFER TO GENERAL DEMOLITION NOTE 4 FOR PLUMBING INFORMATION
5. REMOVE SHELVING. SUPPLIES TO BE REMOVED BY OWNER.
6. REMOVE EXISTING WINDOW SYSTEM IN ITS ENTIRETY AND ASSOCIATED HARDWARE.
7. REMOVE EXISTING DOOR, HARDWARE, FRAME AND TRANSOM WINDOW IN IT'S ENTIRETY.
8. REMOVE EXISTING DOOR AND HARDWARE. MAINTAIN EXISTING FRAME AND PATCH WHERE HARDWARE HAS BEEN REMOVED.
9. REMOVE EXISTING CEILING, GRID AND ASSOCIATED FIXTURES. REFER TO MEP DRAWINGS FOR ADDITIONAL INFORMATION.
10. REMOVE EXISTING METAL FIRE ESCAPE AND ASSOCIATED HARDWARE. REPAIR MASONRY FACADE.
11. REMOVE EXISTING FLOORING, BASEBOARD AND ANY ASSOCIATED SUBSTRATE AND PREPARE SLAB FOR NEW FLOORING.
12. EXISTING HARD CEILING TO REMAIN. REMOVE EXISTING CEILING FIXTURES.
13. PREP EXISTING BRICK....

architecture interior design master planning
FRIAR
21 Talcott Notch Road friar.com
Farmington, CT 06032 860.678.1291

PROFESSIONAL SEAL

CONSULTANT

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER

151-0315 LUE

REVISIONS

NO.	DATE	DESCRIPTION
	xx/xx/2026	ISSUE FOR BID

PROGRESS SET

NOT FOR CONSTRUCTION

DEMO FLOOR PLANS

DATE: 12/05/2025
SCALE As indicated
PROJ. #: 2022_049A
DRAWN: BKH
CHECKED: JMY
11/25/2025 1:47:52 PM

SHEET NO.

D1.1

TABLES

Table 1 – Summary of Asbestos Analytical Results

Sample Numbers	Material Description	Sample Location(s) (Remainder of Locations Present for ACM only)	Approximate Quantity	Analytical Result
1A, B	Tan 2' x 4' fiberboard suspended ceiling tile	Basement	N/A	ND
2A, B	Gray sheetrock	Basement	N/A	ND
3A, B	White joint compound	Basement	N/A	ND
4A, B	Black vinyl cove base	Basement	N/A	ND
5A, B	White glue for 4A, B	Basement	N/A	ND
6A, B	Beige mottled 12" x 12" floor tile	Basement	N/A	ND
7A, B	Brown glue for 6A, B	Basement	N/A	ND
8A, B	Red brick	Basement	N/A	ND
9A, B	White brick mortar	Basement	N/A	ND
10A, B	Red with marbled white, linoleum sheet floor	Floor 2	N/A	ND
11A, B	Black tar paper under 10A, B	Floor 2	N/A	ND
12A, B	Brown vinyl cove base	Floor 2	N/A	ND
13A, B	Tan glue for 12A, B	Floor 2	N/A	ND
14A, B	White window caulk	Floor 3	N/A	ND
15A, B	Brown window caulk	Exterior	N/A	ND
16A, B	White concrete windowsill	Exterior	N/A	ND
26A, B	**Black transom window glazing compound**	**Floor 2**	**1 window**	**5% Chrysotile**

Bold shaded values represent samples with concentrations of asbestos greater than or equal to 1% or inaccessible materials assumed to contain asbestos.

N/A – Not Applicable, ND – None Detected, SF – Square Feet, LF – Linear Feet

Table 2a – Lead Paint Analytical Results

Room/Area	Component	Side	Paint Color	Substrate	Paint Condition	Results (mg/cm^2)
(Opening Calibration)						1.1
(Opening Calibration)						1.1
(Opening Calibration)						1.1
Basement	Closet wall	A	Blue	Brick	Defective	7.9
Basement	Closet window casing	A	Green	Wood	Defective	4.6
Basement	Wall	B	Gray	Sheetrock	Intact	ND
Basement	Wall	C	Gray	Brick	Intact	8.8
Basement	Upper wall	D	Gray	Brick	Intact	0,1
Floor 2	Wall	A	Gray	Brick	Intact	0.1
Floor 3	Wall	A	Gray	Brick	Intact	>10
Floor 3	Wall	B	Gray	Brick	Intact	ND
Floor 3	Wall	D	Gray	Brick	Intact	>10
Floor 3	Window casing	A	Gray	Wood	Intact	1.2
Floor 3	Chase	A/B	Gray	Sheetrock	Intact	ND
(Closing Calibration)						1.1
(Closing Calibration)						1.1
(Closing Calibration)						1.0

Bold shaded values represent samples with greater than 1.0 mg/cm^2

Bolded values represent samples with lead in concentrations of less than 1.0 mg/cm^2

N/A – Not Applicable, ND – Not Detected

Table 3 – Inventory of Materials with Potential to Contain PCBs

Material Description	Locations Present
White window caulk	Floor 3
Black transom window glazing compound	Floor 2
Brown window caulk	Exterior
Painted brick walls	Floors 1, 2, 3
Painted wood window/door casings	Floors 1, 2, 3

APPENDICES

Appendix A

Laboratory Results

HAYES
MICROBIAL CONSULTING

Company: Freeman Companies, LLC
Address: 36 John Street
Hartford, CT 06106

N

EDEX - PAK PO
2-01-2025

730 1533

ASBESTOS
25060020

Job Number: 2025-0111	Job Name: Driggs & Wilson Elevators
Collector: Michelle Rudy	Mobile: 860.558.5393 Email: mrudy@freemancos.com
Date Collected: 11/26/25	Note:

Analysis Type		Analysis Methods	Turnaround Times					
PLM	Bulk	EPA 600*	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Point Count	400 Point*, 1000 Point*	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Vermiculite	EPA 600*, Cincinnati Method	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Soil	EPA 600*, CARB 435	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
TEM	Air	EPA AHERA, NIOSH 7402	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Bulk	Chatfield	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Wipe	ASTM D6480-05	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Microvac	ASTM D5755-09	-	Same Day	1 Day	2 Day	3 Day	5 Day
PCM	Air	NIOSH 7400	3 Hour	Same Day	1 Day	2 Day	3 Day	5 Day

#	Group	Number	Sample Name	Analysis Type	Turnaround	Volume / Area	Stop (+)
1	1	1A,B	Tan 2'×4' fiberboard ceiling tile	PLM Bulk	3 Day		+
2	2	2A,B	Gray sheetrock				
3	3	3A,B	White joint compound				
4	4	4A,B	Black vinyl coveblase				
5	5	5A,B	White glue for 4A,B				
6	6	6A,B	Beige mottled 12"×12" floor tile				
7	7	7A,B	Brown glue for 6A,B				
8	8	8A,B	Red brick				
9	9	9A,B	White brick mortar				
10	10	10A,B	Red w/white marble linoleum flooring				
11	11	11A,B	Black tar paper under 10A,B				
12	12	12A,B	Brown vinyl cove base				
13	13	13A,B	Tan glue for 12A,B				
14	14	14A,B	White window caulk				
15	15	15A,B	Brown window caulk				
32 16	16	16A,B	White concrete window sill				

Released by:	Date:	Received By:	Date:
Michelle Rudy	11/26/25	JM	11/28/25

HAYES MICROBIAL CONSULTING

Company: Freeman
Address:

N

ET. FEDEX - PAK PO
TE: 12-01-2025

4711 1730 1533

ASBESTOS

25060020

Job Number: 2025-D111	Job Name: Driggs & Wilson Elevators
Collector: Michelle Rudy	Mobile: Email:
Date Collected: 11/26/25	Note:

Analysis Type		Analysis Methods	Turnaround Times					
PLM	Bulk	EPA 600*	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Point Count	400 Point*, 1000 Point*	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Vermiculite	EPA 600*, Cincinnati Method	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Soil	EPA 600*, CARB 435	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
TEM	Air	EPA AHERA, NIOSH 7402	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Bulk	Chatfield	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Wipe	ASTM D6480-05	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Microvac	ASTM D5755-09	-	Same Day	1 Day	2 Day	3 Day	5 Day
PCM	Air	NIOSH 7400	3 Hour	Same Day	1 Day	2 Day	3 Day	5 Day

#	Group	Number	Sample Name	Analysis Type	Turnaround	Volume / Area	Stop (+)
1	17	17 A, B, C	White skimcoat plaster	PLM Bulk	3 Day		4
2	18	18 A, B	Gray ceramic tile grout/thinset				
3	19	19 A, B	Yellow brick				
4	20	20 A, B	Gray brick mortar				
5	21	21 A, B	Black 6" vinyl cove base				
6	22	22 A, B	Tan glue for 21 A, B				
7	23	23 A, B	Brown window caulk				
8	24	24 A, B	Red brick				
9	25	25 A, B	White brick mortar				
10							
11							
12							
13							
14							
15							
16							

(51)

Released by: CMRudy	Date: 11/26/25	Received By: JM	Date: 11/28/25

Michelle Rudy
Freeman Companies, LLC
36 John Street
Hartford, CT 06106
(860) 558-5393

2025-0111
Driggs & Wilson Elevators

#25060020

Asbestos PLM Bulk

EPA 600/R-93/116; EPA 40 CFR Appendix E to Subpart E of Part 763

#	Sample	Material Description	Non-Fibrous	Non-Asbestos Fibers	Asbestos Fibers
1	1A - Tan 2'x4' Fiberboard Ceiling Tile	Heterogenous / Ceiling Tile / White/Brown	20%	65% Cellulose Fibers 15% Mineral/Glass wool	**None Detected**
2	1B - Tan 2'x4' Fiberboard Ceiling Tile	Heterogenous / Ceiling Tile / White/Brown	20%	65% Cellulose Fibers 15% Mineral/Glass wool	**None Detected**
3	2A - Gray Sheetrock	Heterogenous / Drywall / White	95%	5% Cellulose Fibers	**None Detected**
4	2B - Gray Sheetrock	Heterogenous / Drywall / White	95%	5% Cellulose Fibers	**None Detected**
5	3A - White Joint Compound	Homogenous / Joint Compound / White	100%		**None Detected**
6	3B - White Joint Compound	Homogenous / Joint Compound / White	100%		**None Detected**
7	4A - Black Vinyl Cove Base	Homogenous / Cove Base / Black	100%		**None Detected**
8	4B - Black Vinyl Cove Base	Homogenous / Cove Base / Black	100%		**None Detected**
9	5A - White Glue for 4A, B	Homogenous / Adhesive / Cream	100%		**None Detected**
10	5B - White Glue for 4A, B	Homogenous / Adhesive / Cream	100%		**None Detected**
11	6A - Beige Mottled 12"x12" Floor Tile	Homogenous / Floor Tile / Tan	100%		**None Detected**
12	6B - Beige Mottled 12"x12" Floor Tile	Homogenous / Floor Tile / Tan	100%		**None Detected**
13	7A - Brown Glue for 6A, B	Homogenous / Adhesive / Yellow	100%		**None Detected**
14	7B - Brown Glue for 6A, B	Homogenous / Adhesive / Yellow	100%		**None Detected**
15	8A - Red Brick	Homogenous / Brick / Red	100%		**None Detected**

Collected: **Nov 26, 2025** Received: **Dec 1, 2025** Reported: **Dec 2, 2025**

HAYES MICROBIAL CONSULTING

Project Analyst: Megan Audia, Megan Audia Date: **12 - 02 - 2025**

Reviewed By: Brian Keith, Date: **12 - 02 - 2025**

3005 East Boundary Terrace, Suite F. Midlothian, VA. 23112 (804) 562-3435 contact@hayesmicrobial.com

Michelle Rudy
Freeman Companies, LLC
36 John Street
Hartford, CT 06106
(860) 558-5393

2025-0111
Driggs & Wilson Elevators

#25060020

Asbestos PLM Bulk

EPA 600/R-93/116; EPA 40 CFR Appendix E to Subpart E of Part 763

#	Sample	Material Description	Non-Fibrous	Non-Asbestos Fibers	Asbestos Fibers
16	8B - Red Brick	Homogenous / Brick / Red	100%		**None Detected**
17	9A - White Brick Mortar	Heterogenous / Mortar / Off-White	100%		**None Detected**
18	9B - White Brick Mortar	Homogenous / Mortar / Off-White	100%		**None Detected**
19	10A - Red w/White Marble Linoleum Flooring	Heterogenous / Vinyl Tile / Red	65%	35% Cellulose Fibers	**None Detected**
20	10B - Red w/White Marble Linoleum Flooring	Heterogenous / Vinyl Tile / Red	65%	35% Cellulose Fibers	**None Detected**
21	11A - Black Tar Paper Under 10A, B	Homogenous / Felt / Black	35%	65% Cellulose Fibers	**None Detected**
22	11B - Black Tar Paper Under 10A, B	Homogenous / Felt / Black	35%	65% Cellulose Fibers	**None Detected**
23	12A - Brown Vinyl Cove Base	Homogenous / Cove Base / Brown	100%		**None Detected**
24	12B - Brown Vinyl Cove Base	Homogenous / Cove Base / Brown	100%		**None Detected**
25	13A - Tan Glue for 12A, B	Homogenous / Adhesive / Cream	100%		**None Detected**
26	13B - Tan Glue for 12A, B	Homogenous / Adhesive / Cream	100%		**None Detected**
27	14A - White Window Caulk	Homogenous / Caulk / White	100%		**None Detected**
28	14B - White Window Caulk	Homogenous / Caulk / White	100%		**None Detected**
29	15A - Brown Window Caulk	Homogenous / Caulk / Brown	100%		**None Detected**
30	15B - Brown Window Caulk	Homogenous / Caulk / Brown	100%		**None Detected**
31	16A - White Concrete Window Sill	Heterogenous / Cementitious / Off-White	100%		**None Detected**

Collected: **Nov 26, 2025** Received: **Dec 1, 2025** Reported: **Dec 2, 2025**

HAYES MICROBIAL CONSULTING

Project Analyst: Megan Audia, Megan Audia Date: **12 - 02 - 2025**

Reviewed By: Brian Keith, Date: **12 - 02 - 2025**

Michelle Rudy
Freeman Companies, LLC
36 John Street
Hartford, CT 06106
(860) 558-5393

2025-0111
Driggs & Wilson Elevators

#25060020

Asbestos PLM Bulk

EPA 600/R-93/116; EPA 40 CFR Appendix E to Subpart E of Part 763

#	Sample	Material Description	Non-Fibrous	Non-Asbestos Fibers	Asbestos Fibers
32	16B - White Concrete Window Sill	Heterogenous / Cementitious / Off-White	100%		**None Detected**
33	17A - White Skim Coat Plaster	Homogenous / Skim Coat / White	100%		**None Detected**
34	17B - White Skim Coat Plaster	Homogenous / Skim Coat / White	100%		**None Detected**
35	17C - White Skim Coat Plaster	Homogenous / Skim Coat / White	100%		**None Detected**
36	18A - Gray Ceramic Tile Grout/Thin Set	Heterogenous / Grout / Gray	100%		**None Detected**
37	18B - Gray Ceramic Tile Grout/Thin Set	Heterogenous / Grout / Gray	100%		**None Detected**
38	19A - Yellow Brick	Homogenous / Brick / Yellow	100%		**None Detected**
39	19B - Yellow Brick	Homogenous / Brick / Yellow	100%		**None Detected**
40	20A - Gray Brick Mortar	Heterogenous / Mortar / Gray	100%		**None Detected**
41	20B - Gray Brick Mortar	Heterogenous / Mortar / Gray	100%		**None Detected**
42	21A - Black 6" Vinyl Cove Base	Homogenous / Cove Base / Black	100%		**None Detected**
43	21B - Black 6" Vinyl Cove Base	Homogenous / Cove Base / Black	100%		**None Detected**
44	22A - Tan Glue for 21A, B	Homogenous / Adhesive / Cream	100%		**None Detected**
45	22B - Tan Glue for 21A, B	Homogenous / Adhesive / Cream	100%		**None Detected**
46	23A - Brown Window Caulk	Homogenous / Caulk / Brown	100%		**None Detected**
47	23B - Brown Window Caulk	Homogenous / Caulk / Brown	100%		**None Detected**

Collected: **Nov 26, 2025** Received: **Dec 1, 2025** Reported: **Dec 2, 2025**

HAYES MICROBIAL CONSULTING

Project Analyst: Megan Audia, Megan Audia Date: **12 - 02 - 2025**

Reviewed By: Brian Keith, Date: **12 - 02 - 2025**

Michelle Rudy
Freeman Companies, LLC
36 John Street
Hartford, CT 06106
(860) 558-5393

2025-0111
Driggs & Wilson Elevators

#25060020

Asbestos PLM Bulk

EPA 600/R-93/116; EPA 40 CFR Appendix E to Subpart E of Part 763

#	Sample	Material Description	Non-Fibrous	Non-Asbestos Fibers	Asbestos Fibers
48	24A - Red Brick	Homogenous / Brick / Red	100%		**None Detected**
49	24B - Red Brick	Homogenous / Brick / Red	100%		**None Detected**
50	25A - White Brick Mortar	Heterogenous / Mortar / Gray	100%		**None Detected**
51	25B - White Brick Mortar	Heterogenous / Mortar / Gray	100%		**None Detected**

Collected: **Nov 26, 2025** Received: **Dec 1, 2025** Reported: **Dec 2, 2025**

HAYES MICROBIAL CONSULTING

Project Analyst: Megan Audia, Megan Audia — Date: **12 - 02 - 2025**

Reviewed By: Brian Keith, — Date: **12 - 02 - 2025**

HAYES MICROBIAL CONSULTING

Company: Freeman Companies, LLC
Address: 36 John Street
Hartford, CT 06106

N

FEDEX - ENV SO
12-5-2025

0 1544

ASBESTOS
25060776

Job Number: 2025-0111.07
Collector: Michelle Rudy
Date Collected: 12/3/25

Job Name: Driggs School, Additional Samples

Mobile: (860)5585393
Email: mrudy@freemancos.com
Note:

Analysis Type		Analysis Methods	Turnaround Times					
PLM	Bulk	EPA 600*	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Point Count	400 Point*, 1000 Point*	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Vermiculite	EPA 600*, Cincinnati Method	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Soil	EPA 600*, CARB 435	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
TEM	Air	EPA AHERA, NIOSH 7402	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Bulk	Chatfield	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Wipe	ASTM D6480-05	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Microvac	ASTM D5755-09	-	Same Day	1 Day	2 Day	3 Day	5 Day
PCM	Air	NIOSH 7400	3 Hour	Same Day	1 Day	2 Day	3 Day	5 Day

#	Group	Number	Sample Name	Analysis Type	Turnaround	Volume / Area	Stop (+)
1	26	26A, B	Black transom window glazing compound	PLM Bulk	1 Day	—	+
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

2

Released by: MRudy
Date: 12/3/25
Received By: MBA
Date: 12/5/25

Michelle Rudy
Freeman Companies, LLC
36 John Street
Hartford, CT 06106
(860) 558-5393

2025-011:07
Driggs School, Additional Samples

#25060776

Asbestos PLM Bulk
EPA 600/R-93/116; EPA 40 CFR Appendix E to Subpart E of Part 763

#	Sample	Material Description	Non-Fibrous	Non-Asbestos Fibers	Asbestos Fibers
1	26A - Black | Transom Window Glazing Compound	Homogenous / Bulk Material / Black	95%		5% Chrysotile
2	26B - Black | Transom Window Glazing Compound	Homogenous / Bulk Material / Black			(Not Analyzed, Positive Stop)

Appendix B

Licenses and Certifications

State of Connecticut

Lookup Detail View

Name

Name
FREEMAN COMPANIES LLC

License Information

lookup

License Type	License Number	Expiration Date	Granted Date	License Name	License Status		Licensure Actions or Pending Charges
Lead Consultant Contractor	2097	07/31/2026	07/31/2014	FREEMAN COMPANIES LLC	ACTIVE	CURRENT	None

Generated on: 7/30/2025 9:29:31 AM

State of Connecticut

Lookup Detail View

Name

Name
MICHELLE I RUDY

License Information

lookup

License Type	License Number	Expiration Date	Granted Date	License Name	License Status		Licensure Actions or Pending Charges
Asbestos Consultant-Insp/Mgmt Planner	354	01/31/2026	02/18/2020	MICHELLE I RUDY	ACTIVE	CURRENT	None

Generated on: 4/8/2025 1:32:36 PM

CERTIFICATE OF ACHIEVEMENT

This certifies that

Michelle Rudy

has successfully completed the

8 Hour Asbestos Site Inspector/Management Planner Refresher Training
Asbestos Accreditation Under TSCA Title II
40 CFR Part 763



Training held via Live Webinar

Exam Score: 92%

conducted by:
ATLAS Technical Consultants, LLC
73 William Franks Drive
West Springfield, MA 01089
(413) 781-0070

Principal Instructor: Thomas Dion

August 21, 2025
Date of Course

August 21, 2026
Expiration Date

Regional Training Director: Judith LaVallee

MPAR-3716
Certificate Number

August 21, 2025
Examination Date

State of Connecticut

Lookup Detail View

Name

Name
MICHELLE I RUDY

License Information

lookup

License Type	License Number	Expiration Date	Granted Date	License Name	License Status		Licensure Actions or Pending Charges
Lead Inspector Risk Assessor	2197	01/31/2026	09/18/2007	Michelle I. Rudy	ACTIVE	CURRENT	None

Generated on: 4/8/2025 1:34:58 PM

CERT#: L-600-Virtual.1470

CHEMSCOPE TRAINING DIVISION

LEAD INSPECTOR/RISK ASSESSOR REFRESHER 8-HOUR TRAINING CERTIFICATE

Michelle Rudy

102 Henderson Street, Bristol CT

Has attended an 8-hour course on the subject discipline on 01/15/2025 and has passed a written examination.

The above individual has successfully completed the above training course approved in accordance with the Department of Public Health Standards established pursuant to Section 20-477 of the Connecticut General Statutes. Course topics include all required topics of State of Connecticut DPH and EPA.

Under civil and criminal penalties of law for the making or submission of false or fraudulent statements or representations (U.S.C. 1001 and 15 U.S. C. 2615), I certify that this training complies with all applicable requirements of Title IV of TSCA, 40 CFR part 745 and any other applicable Federal, State or local requirements.

Examination Score: 100%
Exam Date: 01/15/2025
Expiration Date: 01/15/2026

Daniel Sullivan
Training Manager

Chem Scope, Inc.
15 Moulthrop Street
North Haven CT 06473
Phone: 203.865.5605
www.chem-scope.com

State of Connecticut, Department of Public Health

Approved Environmental Laboratory

THIS IS TO CERTIFY THAT THE LABORATORY DESCRIBED BELOW HAS BEEN APPROVED BY THE STATE DEPARTMENT OF PUBLIC HEALTH PURSUANT TO APPLICABLE PROVISIONS OF THE PUBLIC HEALTH CODE AND GENERAL STATUTES OF CONNECTICUT, FOR MAKING THE EXAMINATIONS, DETERMINATIONS OR TESTS SPECIFIED BELOW WHICH HAVE BEEN AUTHORIZED IN WRITING BY THAT DEPARTMENT.

HAYES MICROBIAL CONSULTING

LOCATED AT 3005 E Boundary Terrace, Suite F **IN** Midlothian, VA 23112

AND REGISTERED IN THE NAME OF T. Brian Keith

THIS CERTIFICATE IS ISSUED IN THE NAME OF T. Brian Keith **WHO HAS BEEN DESIGNATED BY THE REGISTRANT TO BE IN CHARGE OF THE LABORATORY WORK COVERED BY THIS CERTIFICATE OF APPROVAL AS FOLLOWS:**

Examination For:
Asbestos in Bulk Materials (PLM)

SEE CERTIFIED PARAMETER LIST FOR SPECIFIC TESTS APPROVED

EFFECTIVE DATE January 25, 2023

THIS CERTIFICATE EXPIRES March 31, 2025 **AND IS REVOCABLE FOR CAUSE BY THE STATE DEPARTMENT OF PUBLIC HEALTH**

DATED AT HARTFORD, CONNECTICUT, THIS 25th **DAY OF** January, 2023

Registration # PH-0198

Lori J. Mathieu

Lori J. Mathieu
Public Health Branch Chief

Rev. Feb. 2023

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FREEMAN COMPANIES

LAND DEVELOPMENT | ENGINEERING DESIGN | CONSTRUCTION SERVICES

Hazardous Building Materials Inspection Report

Wilson Elementary School – Elevator Addition Areas
235 Birch Street
Waterbury, Connecticut 06704



December 3, 2025
Freeman File No.: 2025-0111

Prepared for:

Friar Architecture
21 Talcott Notch Road
Farmington, Connecticut, 06032

Prepared by:

Freeman Companies, LLC
36 John Street
Hartford, Connecticut 06106

December 3, 2025 sent via email to Jamie M. Young <jmy@friar.com>

Jamie M. Young
Project Manager
Friar Architecture
21 Talcott Notch Road
Farmington, Connecticut, 06032

RE: Hazardous Building Materials Inspection Report
Project Name: Wilson Elementary School – Elevator Addition Areas
Location: Wilson Elementary School – 235 Birch Street, Waterbury, Connecticut 06704
Freeman Companies Project #: 2025-0111

Dear Mr. Young:

In accordance with our proposal, Freeman Companies, LLC (Freeman), conducted a pre-renovation asbestos inspection and lead-based paint screen, and an inventory of materials potentially containing Polychlorinated biphenyls (PCBs), for the Wilson Elementary School located at 235 Birch Street in Waterbury, Connecticut The purpose of the survey was to inventory and/or sample suspect materials for potential to contain hazardous materials prior to a planned renovation of the structure.

The inspection was conducted November 26 and December 3, 2025.

We thank you for the opportunity to provide you with our consulting services. If you have any questions regarding this report or its contents, please contact the undersigned.

Sincerely,

Freeman Companies, LLC

Michelle Rudy
Hazardous Building Materials Manager
mrudy@freemancos.com
(860) 558-5393

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1.0 INTRODUCTION

1.1 General Information

Freeman Companies, LLC (Freeman) was retained by the City of Waterbury to conduct a pre-renovation Hazardous Building Material Survey (HBMI) at Wilson Elementary School located at 235 Birch Street in Waterbury, Connecticut (Site). The pre-renovation survey consisted of a comprehensive asbestos inspection, a screen for lead in paint, and an inventory for materials with potential to contain PCBs. The inspection was conducted by inspector Michelle Rudy on November 26 and December 3, 2025. Ms. Rudy is a Connecticut Department of Public Health (DPH) licensed asbestos and lead paint inspector.

The criteria used to evaluate the survey results include, but are not limited to, guidelines recommended by the:

- American Conference of Governmental Industrial; Hygienists (ACGIH)
- Asbestos Hazard Emergency Response Act (AHERA)
- The U.S. Environmental Protection Agency (EPA)
- National Emissions Standards for Hazardous Air Pollutants (NESHAP)
- United States Occupational Safety and Health Administration (OSHA)
- Toxic Substances Control Act (TSCA)
- American National Standards Institute (ANSI)
- Connecticut Department of Energy and Environmental Protection (DEEP)
- Connecticut Department of Public Health (DPH)

1.2 Inspection Area Description

The building is a two-story structure with a full, finished basement level, built in 1950. The elevator addition will go on the outside of the original structure. The structure is primarily brick. The foundation is concrete. Interior walls were observed to be constructed with brick and brick with a skim coat plaster on top. Floors are ceramic tiles on the upper floors and concrete in the Basement level. The basement floor was clad with laminate floor strips. The majority of windows are metal with metal, concrete and brick trim, and there are no doors associated with the renovation area.

1.3 Scope of Inspection

Freeman was contracted to perform a pre-renovation Hazardous Building Materials Investigation (HBMI), including a comprehensive asbestos inspection, lead paint screen, and an inventory of materials with the potential to contain PCBs. Areas inspected included all materials and surfaces that will be disturbed or removed during the renovation, according to the architect's demolition plans.

FREEMAN COMPANIES

2.0 ASBESTOS SURVEY

2.1 Introduction

Asbestos Containing Materials (ACM) are defined, for purposes of this report, as materials containing equal to or greater than 1% asbestos. Suspect ACM is generally not defined by existing regulations, except that fiberglass and foam insulation for piping and ductwork do not have to be sampled to determine non-ACM status. As there has never been a complete ban on the import and sale of asbestos, all materials, old and new, that will be affected by planned renovations, were sampled, with the exception of glass, spray-foam, wood and metal.

The intent of the asbestos survey was to determine if suspect materials are considered ACM. The asbestos inspection was conducted to satisfy the EPA NESHAP final rule as amended November 20, 1990. The EPA NESHAP final rule requires the identification and removal of all regulated ACM in an area of renovation or demolition if the work will impact the ACM.

2.2 Methodology

The asbestos survey was conducted in conformance with the EPA NESHAP regulation 40 CFR Part 61. As required by OSHA, the EPA, and the DPH, sampling was performed by EPA Asbestos Hazard Emergency Response Act (AHERA)-accredited and DPH-certified asbestos inspectors. Sampling was performed using a wet technique to prevent airborne fiber release and in accordance with the protocols specified in EPA 40 CFR Part 763. Samples were placed in appropriately labeled containers that were sealed and submitted for analysis to Hayes Microbial of Midlothian, Virginia, a Connecticut-licensed laboratory.

The samples were submitted for petrographic analysis using the EPA-endorsed Polarized Light Microscopy with Dispersion Staining (PLM/DS) method. The percentage of asbestos present in each sample was determined by the visual area estimation technique. Samples that were initially determined to have less than 1% asbestos are generally subject to additional analysis by the EPA Point Count Method, which is required if the samples are to be presumed non-ACM. The alternative is to assume the presence of ACM. Samples were requested to be analyzed by the “stop on first positive” method. In this method, the presence of ACM is assumed for the entire group of samples, once confirmed for the first sample in the group.

Note that the PLM Method can fail to detect asbestos fibers present in non-friable, organically bound materials (vinyl floor tiles, mastic adhesives, caulking, roofing materials) because the fibers used in these materials are typically "small", present in relatively low concentrations, and hard to extract from the material matrix. For this reason, the laboratory analysts may recommend, depending upon the visual observation of the sample, that when the standard PLM method fails to detect asbestos in these materials, that the sample be further analyzed using the Transmission

Electron Microscopy (TEM) EPA Non-Organically Bound (NOB) Method by destroying the interfering matrix materials and isolating any asbestos fibers that may be present.

2.3 Asbestos Standards

The EPA determines all materials containing asbestos in a concentration of greater than 1% to be ACM. The State of Connecticut has a more stringent standard in that all materials containing asbestos in a concentration of equal to or greater than 1% are considered ACM.

According to EPA memo C112, all materials in which asbestos was detected in concentrations of less than 1%, must be subject to a "point count" analysis to prove that the material is non-ACM. If a point count is not performed, the material must be assumed to be ACM.

2.4 Asbestos Survey Results

A total of 19 samples were collected of 9 homogeneous suspect materials identified during the survey. The laboratory analyzed each of the 19 samples, based on the "stop on first positive" method. No additional samples were analyzed via PLM or were sent for additional analysis by the EPA TEM NOB method.

No materials were found to contain equal to or greater than 1% asbestos indicating ACM.

No visible materials are assumed to contain asbestos pending further investigation:

No materials were found to contain asbestos in concentrations less than 1%:

Please see Table 1 for a detailed list of materials tested, locations, quantities, where applicable, and analytical results. The laboratory report may be found in Appendix A. See Figures 1 and 2 for demolition plans.

3.0 LEAD PAINT SURVEY

3.1 Introduction

Lead-based paint (LBP) is defined as having a lead content equal to or greater than 1.0 milligrams per square centimeter (mg/cm^2) or equal to or greater than 0.5% weight in building painted surfaces. Lead-containing paint is defined as paint containing any measurable lead content.

The intent of the lead paint screening survey was to determine if selected surfaces potentially affected by the upcoming renovations contain measurable amounts of lead for purposes of worker protection or contain LBP for purposes of waste characterization.

3.2 Methodology

Freeman used the X-ray Fluorescence Analyzer (XRF) method to determine if surfaces contain lead in the paint. The XRF testing was conducted with a SciAps X-550Pb, serial # 3102. Three calibration readings were taken, prior to the start of work and after the completion of the survey, to ensure quality control. The calibration readings must be between 0.7 and 1.3 mg/cm^2 for the study to be considered valid.

Random sampling of representative painted surfaces scheduled to be disturbed during the renovation/demolition was conducted to determine whether the materials were coated with lead-containing paint or LBP. It is not the intent to test all painted components, but to identify on a broad scale the impact of lead paint as it relates to disposal and worker protection. Building debris containing components with equal to or greater than 1.0 mg/cm^2 of lead by XRF requires waste classification analysis. Component and surface locations are identified by side designations represented by the letters “A”, “B”, “C”, and “D”. The “A” side is considered the street side of the building with the “B”, “C”, and “D” sides following in a clockwise order.

3.3 Lead Paint Standards

- 29 CFR Part 1926.62. OSHA Lead in Construction Requires engineering controls, personal protective equipment, worker decontamination, medical surveillance, worker training, and recordkeeping when workers are exposed to lead in concentrations above the established "action level" of 30 micrograms of lead per cubic meter of air.

  This regulation pertains to lead-containing paint, in addition to LBP. This action is taken because OSHA regulates lead in construction based on airborne exposures and it cannot be ensured that lead paint with concentrations of lead less than 1.0 mg/cm^2 or 0.5% dry weight will not result in exposures exceeding the OSHA standard during disruption of these materials during the proposed demolitions. Contractors need to be made aware of the presence of lead-containing paint and LBP so that they may take appropriate actions to train and inform their workforce, select and install engineering controls, and provide personal protective equipment to prevent occupational exposure to lead-based paint.

  40 CFR Part 261.24 Table 1. Resource Conservation and Recovery Act (RCRA) Hazardous Waste Regulations and Connecticut State Regulation Section 22a-449(c) regulates the disposal of hazardous waste. If components with LBP are scheduled to be disposed of, they must undergo TCLP testing. The waste may be combined with general construction debris, which will dilute the total concentration of lead in the waste stream.

Waste which contains concentrations of lead in excess of 5 milligrams per liter (5 mg/L) as measured by Toxicity Characteristic Leaching Procedure (TCLP) must be disposed of as hazardous waste. If all concentrations of lead by XRF testing are below 1.0 mg/cm^2, TCLP sampling is not necessary, according to the State of Connecticut, and the waste may be disposed as general construction debris, if not otherwise regulated.

3.4 Lead Paint Survey Results

Concentrations of lead greater than 1.0 mg/cm^2 by XRF analysis (LBP) were detected on the following surfaces:

- Pink brick upper wall (Basement)

If components are found to have lead-containing paint that is less than the concentration that defines LBP, they must be handled according to OSHA regulations but may be disposed of as general construction debris. Measurable concentrations of less than 1.0 mg/cm^2 lead by XRF analysis were detected on the following surfaces:

- Pink concrete lower wall (Basement)
- Blue concrete windowsill (Floor 2)
- White plaster upper wall (Floor 2)
- Blue concrete windowsill (Floor 3)
- White plaster upper wall (Floor 3)

Please see Table 2 for a complete list of building components tested by XRF, locations and results. See Figure 1 for demolition plans.

4.0 INVENTORY OF MATERIALS WITH POTENTIAL TO CONTAIN PCBs

4.1 Introduction

Potential PCB-containing source materials are considered in this section. Source materials are defined as building materials manufactured to contain PCBs. These materials most commonly include caulks and glazing compounds but may be found in other materials as well. PCBs in source materials may leach out of the material and into the surrounding substrate, such as brick or concrete.

4.2 Methodology

PCBs have been identified as a particular concern in caulks, glazing compounds, paints and roofing, as well as other materials; however, testing is not mandated. This survey considers the suspect components listed in 40 CFR Part 761, though the list is not exhaustive, to determine potential PCB-containing materials.

FREEMAN COMPANIES

4.3 PCB Standards

The disposal of items with PCB is regulated by TSCA pursuant to 40 CFR Part 761 depending on the determination of the type of PCB waste as follows:

- PCB Bulk Product Waste is waste derived from products manufactured to contain PCBs in a non-liquid state at concentrations of 50 mg/kg or greater such as caulks, paint, and sealants.

- PCBs at a concentration of 1 mg/kg are reportable to the State of Connecticut and must be disposed as Connecticut Regulated Waste.

- PCB Remediation Waste is waste containing PCBs as a result of a spill or release from any of the following:

    - Materials disposed of prior to April 18, 1978, at concentrations ≥50 mg/kg PCBs
    - Materials at any concentration where the original source was ≥500 mg/kg PCBs
    - Materials at any concentration where the original source was ≥50 mg//kg PCBs
    - Materials which are currently at any concentration if the PCBs were spilled or released from a source not authorized for use.

    PCB remediation waste includes substrates such as brick and concrete into which PCBs have leached from source materials such as paints or caulks. If the bulk product waste, such as caulk, is not separated from the remediation waste, such as the surrounding brick, the mixture may be disposed of together as a bulk product waste in a non-TSCA regulated landfill. This strategy results from the EPA guidance document titled *Polychlorinated Biphenyl (PCB) Guidance Reinterpretation*.

If source materials are tested and found to have PCBs in concentrations greater than 50 mg/kg, then testing of surrounding substrate materials is required to determine if a release has occurred. When source materials are found to be above 50 mg/kg and substrate materials are found to be at or above 1 mg/kg, removal of both source material and affected substrate is mandated. In the State of Connecticut all PCBs in any concentration must be removed It is currently not required by federal or state regulations to do an initial test of source materials for PCBs, but disposal is regulated as above. Therefore, the inventoried materials may be left in place during the demolition and renovation process and not removed from the substrate in order that the substrate be considered a bulk product waste and not a remediation waste subject to disposal in a TSCA-regulated landfill.

Most landfills accepting bulk product waste require a TCLP for the composite waste stream(s) containing PCBs. If less than 10 µg/l leaches out of the solution, the materials containing or suspected to contain PCBs may be disposed

of as Bulk Product Waste. If 10 µg/l or more leaches out of the solution, the waste stream must be disposed of in a TSCA regulated facility.

4.4 Potential PCB-Containing Material Inventory Results

Two materials were identified that have the potential to contain PCBs, including caulk and paint. See Table 3 for a complete inventory of materials and locations.

See Table 3 for detailed descriptions and locations of materials. See Figure 1 for demolition floorplans.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Asbestos

Asbestos was not found on any tested materials.

In accordance with the OSHA regulations in 29 CFR Part 1926.1101 and 1910.1001, all potential contractors bidding on work must first be informed of the results of this survey. In addition, notification regarding the presence of the ACM must be provided to all employees and tenants who occupy an area containing ACM.

Any material that was identified as negative for asbestos may be removed at will and disposed of as standard construction debris as long as it does not disturb any ACM or is not otherwise regulated. In addition, any new building materials that have not previously been identified shall be assumed to contain asbestos until the material has been properly tested.

5.2 Lead

LBP was found on Basement brick walls. DEEP requires lead waste characterization sampling for building materials containing lead-based paint that will become a waste material as a result of demolition or renovation activities. This should be done after the demolition occurs in order to avoid destructive testing. The waste may be combined with general construction debris, which will dilute the concentration of lead in the total waste stream. An exception is material with a metal substrate which may be recycled in a facility that accepts LBP.

Measurable levels of lead too low to meet the definition of lead-based paint were found throughout the study area in both schools. During any renovation process in which measurable levels of lead are detected, safe work procedures must be implemented by properly lead trained or informed workers employed by contractors to address worker protection, lead exposure controls, waste stream management, and ambient air quality monitoring. Specifically, contractors will be required to comply with all applicable OSHA regulations including 29 CFR 1926.62, "Lead

Exposure in Construction: Interim Final Rule" and 29 CFR 1926.59, "Hazard Communication for the Construction Industry".

5.3 PCBs

The removal and disposal of items with PCBs in concentrations equal to or greater than 50 mg/kg is regulated by TSCA pursuant to federal regulations in 40 CFR 761. As such, demolition debris with PCB materials is regulated as PCB Bulk Product Waste. All materials inventoried as suspect material, but not tested, should be disposed of, together with their substrate, as PCB Bulk Product Waste as a precaution. The combined waste stream must be subject to a PCB TCLP test for purposes of informing the landfill of the waste stream characteristics. Though the materials were not tested for PCBs, if they are disposed of together with the surrounding substrate, they may be disposed of in a non-municipal landfill not regulated by TSCA.

The removal and disposal of items with PCBs in concentrations equal to or greater than 1 mg/kg, but less than 50 mg/kg are regulated by the State of Connecticut. These materials are considered Connecticut Regulated Waste. Transport of this type of waste in Connecticut requires a permit from DEEP. It may not be disposed of within the State; however, once out of the State, the material may be disposed of as general construction debris.

All materials determined or assumed to contain PCBs should be handled by the contractor with the appropriate caution, including but not limited to proper PPE, engineering controls, and disposal methods.

6.0 REPORT LIMITATIONS CRITERIA

While Freeman followed industry standards during the inspection, we do not warrant that all suspect hazardous building materials were identified in or on the facility and shall not be held liable related to future abatement costs related to hazardous materials that are either not discovered or appropriately characterized. This is due in part to inherent problems with every building inspection, such as, but not limited to:

- Seemingly homogeneous materials that are not in fact homogeneous;
- Seemingly representative locations that are not in fact representative;
- Layered materials that are not uniformly present or are isolated;
- Materials that are present and accessible but were not considered to be suspect
- Material that is present in locations that are unsafe or otherwise difficult to access.

Client acknowledges that Freeman's inspection is inherently limited and all hazardous materials may only become apparent during the course of future demolition. During the course of future demolition work, it is likely that additional hazardous materials or materials suspected of being hazardous will be identified. Such materials should be assumed to be hazardous unless appropriate evaluation, sampling, and/or analysis demonstrate otherwise.

Contracts, specifications, and plans should advise contractors to conduct controlled demolition work and stop immediately should any hazardous building materials be encountered during the course of their work.

This report is intended for the sole use of the Client and may not be used or relied upon by others without the written consent of the Client. The scope of work conducted in performing this service for the Client may not be appropriate to satisfy the needs of other Parties, and the use or re-use of this document or the findings, conclusions, or recommendations is at the risk of said user.

FIGURES

Figure 1

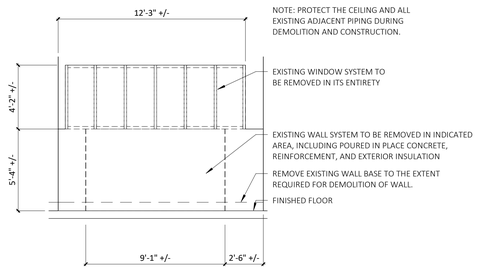
DEMOLITION LEGEND:

KEYED INTO PLAN

1. REMOVE COMPLETE WINDOW SYSTEM
2. REMOVE EXTERIOR MASONRY WALL CONSTRUCTION
3. REMOVE FLOORING AND WALL BASE TO THE EXTENT REQUIRED FOR DEMOLITION OF WALL. WHERE NECESSARY, REMOVE TO FULL TILE (NOT PARTIAL).

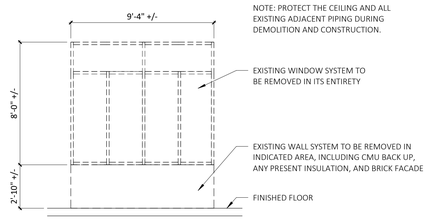
GENERAL DEMOLITION NOTES

1. ANY DEMOLITION WORK ASSOCIATED WITH NEW WORK THAT IS NOT SPECIFICALLY NOTED ON THIS PLAN SHALL BE THE RESPONSIBILITY OF THE DEMOLITION CONTRACTOR.
2. DEMOLISHED MATERIAL SHALL BE CONSIDERED TO BE THE PROPERTY OF THE CONTRACTOR AND SHALL BE COMPLETELY REMOVED FROM THE JOB SITE.
3. SHUT OFF, CAP AND OTHERWISE PROTECT EXISTING PUBLIC UTILITY LINES IN ACCORDANCE WITH THE REQUIREMENTS OF THE PUBLIC AGENCY HAVING JURISDICTION.
4. COMPLETELY REMOVE ITEMS SCHEDULED TO BE SO DEMOLISHED AND REMOVE, LEAVING SURFACES CLEAN, SOLID AND READY TO RECEIVE NEW MATERIALS AND SPECIFIED ELSEWHERE.
5. USE MEANS NECESSARY TO PREVENT DUST FROM BECOMING A NUISANCE TO THE USER.
6. THIS DRAWING DOES NOT DEPICT THE FULL EXTENT OF DEMOLITION. ADDITIONAL ITEMS SCHEDULED FOR DEMOLITION MAY BE FOUND ON OTHER DRAWINGS. CONSTRUCTION MANAGER IS RESPONSIBLE FOR THE COORDINATION OF THIS WORK WITH ALL PARTIES INVOLVED.
7. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH ALL NATIONAL, STATE, LOCAL CODES & ORDINANCES.
8. ALL EXISTING (FREESTANDING) FURNITURE ITEMS IN ALL ROOMS UNDER SCOPE OF WORK TO BE REMOVED BY OWNER.
9. DEMOLITION CONTRACTOR MUST VERIFY LOCATIONS OF ALL EXISTING STRUCTURAL, MECHANICAL, PLUMBING & ELECTRICAL ELEMENTS PRIOR TO START OF DEMOLITION.
10. REMOVE ALL INTERIOR WALLS SHOWN DOTTED, ALONG WITH ALL ASSOCIATED TACK BOARDS, CHALK BOARDS, MARKER BOARDS, ETC. EXERCISE CAUTION SO AS NOT TO DISTURB OR DAMAGE ADJACENT SURFACES SCHEDULED TO REMAIN.
11. REMOVE ALL PLUMBING FIXTURES INCLUDING SINKS, WATER CLOSETS, URINALS, SLOP SINKS AND DRINKING FOUNTAINS WITHIN DEMOLITION AREAS. REMOVE AND CAP ALL PLUMBING LINES BEHIND FINISHED WALL AND FLOOR SURFACES. REFER TO PLUMBING DEMOLITION DRAWINGS FOR RELATED INFORMATION.
12. REMOVE ALL DOORS AND DOOR FRAMES SHOWN IN FULLY DEMOLISHED PARTITIONS ONLY, UNLESS NOTED OTHERWISE.
13. REMOVE ALL RADIATION UNITS, H.V.A.C. RUNS, MECHANICAL UNITS, INFORMATION.
14. EMOVE ALL ELECTRICAL LIGHTING FIXTURES, ELECTRICAL RUNS, ASSOCIATED DEVICES. REFER TO ELECTRICAL DEMOLITION DRAWINGS FOR RELATED INFORMATION.
15. REFER TO SITE PLANS FOR SITE DEMOLITION NOTES.
16. REFER TO ALL DRAWINGS FOR ADDITIONAL INFORMATION.
17. REMOVE ALL EXISTING FLOOR SYSTEMS I.E. VINYL TILE, SHEET VINYL, CERAMIC TILE, MASTIC, MUD SET, ETC. AT ALL AREAS WHERE A NEW FLOOR IS SCHEDULED. REF. FINISH PLANS & SCHEDULE. PREP FLOORS TO RECEIVE NEW FINISHES.
18. ALL EXISTING LAY IN CEILING PANELS TO BE REMOVED BY THE ABATEMENT CONTRACTOR WHERE NEW CEILINGS ARE SCHEDULED. REFER TO ASBESTOS ABATEMENT PLANS AND REFLECTED CEILING PLANS.
19. REMOVE ALL CEILING GRIDS (CORRIDOR CEILING GRID TO BE REMOVED BY THE ABATEMENT CONTRACTOR), GYPSUM CEILINGS AND SUSPENSION SYSTEMS AT ALL AREAS WHERE NEW CEILINGS ARE SCHEDULED. REFER TO REFLECTED CEILING PLANS.
20. REMOVE ALL EXISTING BUILT-IN MILLWORK SHOWN DOTTED INCLUDING SINKS, ASSOCIATED PLUMBING & ELECTRICAL BACK TO SOURCE OR PANEL AS REQ'D.
21. ALL WINDOW SYSTEMS SCHEDULED FOR DEMOLITION TO BE REMOVED BY THE ABATEMENT CONTRACTOR.
22. THE DEMOLITION PLANS ARE DIAGRAMMATIC AND INTENDED TO SHOW THE GENERAL EXTENT OF THE WORK ONLY.
23. THE CONTRACTOR SHALL INCLUDE ALL DEMOLITION WORK REQUIRED TO ACCOMPLISH THE INTENT OF THE PLANS AND SPECIFICATIONS.
24. ALL DEMOLISHED ITEMS SHALL BE REMOVED FROM BUILDING /SITE UNLESS OTHERWISE NOTED. COORDINATE WITH OWNER FOR DELIVERY OF ITEMS NOTED TO REMAIN OWNERS PROPERTY. THE PROJECT SITE/ BUILDING SHALL BE CLEANED OF DEBRIS ON A DAILY BASIS. CONSTRUCTION MANAGER WILL COORDINATE AND INSTRUCT WHICH
25. CONTRACTOR SHALL BE RESPONSIBLE FOR SHORING AND SUPPORT (TEMPORARY OR PERMANENT) FOR ALL PORTIONS OF CONSTRUCTION DURING DEMOLITION AND CONSTRUCTION.
26. ALL ABANDONED MECHANICAL / ELECTRICAL / PLUMBING LINES SHALL BE CAPPED OFF BEHIND FINISHES, UNLESS OTHERWISE NOTED. REFER TO MECHANICAL / ELECTRICAL / PLUMBING DRAWINGS FOR ADDITIONAL DEMO. INFORMATION.
27. GENERAL TRADES CONTRACTOR SHALL SAWCUT ALL MASONRY OR CONCRETE OPENINGS INDICATED. MASONRY SHALL BE TOOTHED IN AND / OR RETURNED TO FINISHED OPENING ALL OPENINGS WHERE EXISTING CONSTRUCTION HAS BEEN REMOVED, AND WHICH ARE NOT NOTED TO REMAIN, SHALL BE FILLED AND /OR PATCHED TO MATCH THE ADJACENT EXISTING OR NEW FINISH, INCLUDING ANY FIRE RATINGS REQUIRED.
28. ALL AREAS OF FLOORS, WALLS AND CEILINGS DISTURBED BY DEMOLITION SHALL BE FILLED, PATCHED OR OTHERWISE REFINISHED TO MATCH EXISTING OR NEW FINISH AS DESIGNATED, INCLUDING ALL REQUIRED RATINGS.
29. CONTRACTOR MUST VERIFY LOCATIONS OF ALL EXISTING STRUCTURAL, MECHANICAL, PLUMBING & ELECTRICAL ELEMENTS PRIOR TO START OF DEMOLITION.
30. COORDINATE DEMOLITION EFFORTS WITH ASBESTOS ABATEMENT WORK.
31. EXISTING CONDITIONS SHALL BE STUDIED PRIOR TO BIDDING TO FAMILIARIZE YOURSELF WITH THE BUILDING AND INTENTIONS OF THE FINAL WORK AND THE REQUIRED DEMOLITION, INCLUDING ALL MECH., ELECT., PLUMB., TECH., STRUCTURAL AND GENERAL CONSTRUCTION ITEMS REQUIRING REMOVAL.
32. NO ELECTRICAL, TECHNOLOGY WIRING OR PNEUMATIC LINES ARE TO BE ABANDONED IN PLACE.
33. REFER TO SPECS FOR CUTTING & PATCHING, FLOOR PREP AND SELECTIVE DEMOLTION.
34. ALL DIMENSIONS ARE TO BE FIELD VERIFIED.



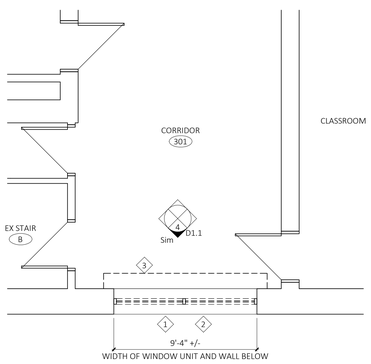
5 DEMO ELEVATION - FIRST FLOOR

SCALE: 1/4" = 1'-0"



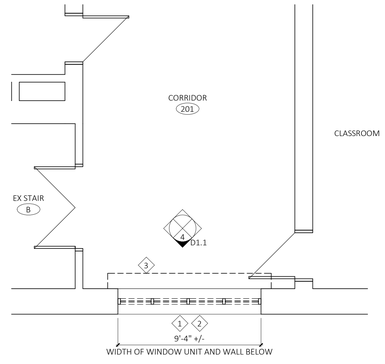
4 DEMO ELEVATION - SECOND AND THIRD FLOOR

SCALE: 1/4" = 1'-0"



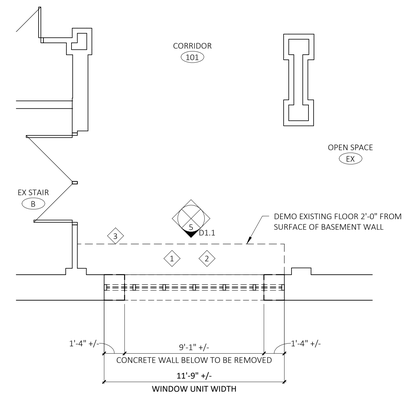
3 THIRD FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



2 SECOND FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



1 FIRST FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

architecture
interior design
master planning
FRIAR
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

PROFESSIONAL SEAL

CONSULTANT

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION
	XX/XX/2025	ISSUE FOR BID

PROGRESS SET

NOT FOR CONSTRUCTION

DEMOLITION PLANS

DATE: 12/05/2025
SCALE As indicated
PROJ. #: 2022-049A
DRAWN: Author
CHECKED: Checker
11/25/2025 1:46:54 PM

SHEET NO.
D1.1

TABLES

Table 1 – Summary of Asbestos Analytical Results

Sample Numbers	Material Description	Sample Location(s) (Remainder of Locations Present for ACM only)	Approximate Quantity	Analytical Result
17A, B, C	White skim coat plaster over brick	Floor 2	N/A	ND
18A, B	Gray ceramic tile setting	Floor 2	N/A	ND
19A, B	Yellow brick	Floor 2	N/A	ND
20A, B	Gray brick mortar	Floor 2	N/A	ND
21A, B	Black 6” vinyl cove base	Basement	N/A	ND
22A, B	Tan glue for 21A, B	Basement	N/A	ND
23A, B	Brown window caulk	Exterior	N/A	ND
24A, B	Red brick	Exterior	N/A	ND
25A, B	Gray brick mortar	Exterior	N/A	ND

Bold shaded values represent samples with concentrations of asbestos greater than or equal to 1% or inaccessible materials assumed to contain asbestos.

N/A – Not Applicable, ND – None Detected, SF – Square Feet, LF – Linear Feet

Table 2a – Lead Paint Analytical Results

Room/Area	Component	Side	Paint Color	Substrate	Paint Condition	Results (mg/cm^2)
(Opening Calibration)						1.1
(Opening Calibration)						1.1
(Opening Calibration)						1.1
Basement	**Upper wall**	**A**	**Pink**	**Brick**	**Defective**	**9.8**
Basement	Lower wall	A	Pink	Concrete	Defective	0.2
Floor 2	Windowsill	A	Blue	Concrete	Intact	0.5
Floor 2	Lower wall	A	Blue	Brick	Intact	ND
Floor 2	Upper wall	A	White	Plaster	Intact	0.4
Floor 3	Windowsill	A	Blue	Concrete	Intact	0.6
Floor 3	Lower wall	A	Blue	Brick	Intact	ND
Floor 3	Upper wall	A	White	Plaster	Intact	0.4
(Closing Calibration)						1.1
(Closing Calibration)						1.1
(Closing Calibration)						1.0

Bold shaded values represent samples with greater than 1.0 mg/cm^2

Bolded values represent samples with lead in concentrations of less than 1.0 mg/cm^2

N/A – Not Applicable, ND – Not Detected

Table 3a – Inventory of Materials with Potential to Contain PCBs

Material Description	Locations Present
Brown Window Caulk	Exterior
Painted brick upper wall	Basement

APPENDICES

Appendix A

Laboratory Results

HAYES
MICROBIAL CONSULTING

Company: Freeman Companies, LLC
Address: 36 John Street
Hartford, CT 06106

N

EDEX - PAK PO
2-01-2025

730 1533

ASBESTOS
25060020

Job Number: 2025-0111	Job Name: Driggs & Wilson Elevators
Collector: Michelle Rudy	Mobile: 860.558.5393 Email: mrudy@freemancos.com
Date Collected: 11/26/25	Note:

Analysis Type		Analysis Methods	Turnaround Times					
PLM	Bulk	EPA 600*	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Point Count	400 Point*, 1000 Point*	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Vermiculite	EPA 600*, Cincinnati Method	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Soil	EPA 600*, CARB 435	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
TEM	Air	EPA AHERA, NIOSH 7402	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Bulk	Chatfield	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Wipe	ASTM D6480-05	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Microvac	ASTM D5755-09	-	Same Day	1 Day	2 Day	3 Day	5 Day
PCM	Air	NIOSH 7400	3 Hour	Same Day	1 Day	2 Day	3 Day	5 Day

#	Group	Number	Sample Name	Analysis Type	Turnaround	Volume / Area	Stop (+)
1	1	1A,B	Tan 2'×4' fiberboard ceiling tile	PLM Bulk	3 Day		+
2	2	2A,B	Gray sheetrock				
3	3	3A,B	White joint compound				
4	4	4A,B	Black vinyl coveblase				
5	5	5A,B	White glue for 4A,B				
6	6	6A,B	Beige mottled 12"×12" floor tile				
7	7	7A,B	Brown glue for 6A,B				
8	8	8A,B	Red brick				
9	9	9A,B	White brick mortar				
10	10	10A,B	Red w/white marble linoleum flooring				
11	11	11A,B	Black tar paper under 10A,B				
12	12	12A,B	Brown vinyl cove base				
13	13	13A,B	Tan glue for 12A,B				
14	14	14A,B	White window caulk				
15	15	15A,B	Brown window caulk				
32 16	16	16A,B	White concrete window sill				

Released by:	Date:	Received By:	Date:
Michelle Rudy	11/26/25	JM	11/28/25

HAYES MICROBIAL CONSULTING

Company: Freeman
Address:

N

ET. FEDEX - PAK PO
TE: 12-01-2025

4711 1730 1533

ASBESTOS

25060020

Job Number: 2025-D111	Job Name: Driggs & Wilson Elevators
Collector: Michelle Rudy	Mobile: Email:
Date Collected: 11/26/25	Note:

Analysis Type		Analysis Methods	Turnaround Times					
PLM	Bulk	EPA 600*	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Point Count	400 Point*, 1000 Point*	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Vermiculite	EPA 600*, Cincinnati Method	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
	Soil	EPA 600*, CARB 435	3 Hour*	Same Day*	1 Day	2 Day	3 Day	5 Day
TEM	Air	EPA AHERA, NIOSH 7402	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Bulk	Chatfield	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Wipe	ASTM D6480-05	-	Same Day	1 Day	2 Day	3 Day	5 Day
	Microvac	ASTM D5755-09	-	Same Day	1 Day	2 Day	3 Day	5 Day
PCM	Air	NIOSH 7400	3 Hour	Same Day	1 Day	2 Day	3 Day	5 Day

#	Group	Number	Sample Name	Analysis Type	Turnaround	Volume / Area	Stop (+)
1	17	17 A, B, C	White skimcoat plaster	PLM Bulk	3 Day		4
2	18	18 A, B	Gray ceramic tile grout/thinset				
3	19	19 A, B	Yellow brick				
4	20	20 A, B	Gray brick mortar				
5	21	21 A, B	Black 6" vinyl cove base				
6	22	22 A, B	Tan glue for 21 A, B				
7	23	23 A, B	Brown window caulk				
8	24	24 A, B	Red brick				
9	25	25 A, B	White brick mortar				
10							
11							
12							
13							
14							
15							
16							

(51)

Released by: CMRudy	Date: 11/26/25	Received By: JM	Date: 11/28/25

Michelle Rudy
Freeman Companies, LLC
36 John Street
Hartford, CT 06106
(860) 558-5393

2025-0111
Driggs & Wilson Elevators

#25060020

Asbestos PLM Bulk

EPA 600/R-93/116; EPA 40 CFR Appendix E to Subpart E of Part 763

#	Sample	Material Description	Non-Fibrous	Non-Asbestos Fibers	Asbestos Fibers
1	1A - Tan 2'x4' Fiberboard Ceiling Tile	Heterogenous / Ceiling Tile / White/Brown	20%	65% Cellulose Fibers 15% Mineral/Glass wool	**None Detected**
2	1B - Tan 2'x4' Fiberboard Ceiling Tile	Heterogenous / Ceiling Tile / White/Brown	20%	65% Cellulose Fibers 15% Mineral/Glass wool	**None Detected**
3	2A - Gray Sheetrock	Heterogenous / Drywall / White	95%	5% Cellulose Fibers	**None Detected**
4	2B - Gray Sheetrock	Heterogenous / Drywall / White	95%	5% Cellulose Fibers	**None Detected**
5	3A - White Joint Compound	Homogenous / Joint Compound / White	100%		**None Detected**
6	3B - White Joint Compound	Homogenous / Joint Compound / White	100%		**None Detected**
7	4A - Black Vinyl Cove Base	Homogenous / Cove Base / Black	100%		**None Detected**
8	4B - Black Vinyl Cove Base	Homogenous / Cove Base / Black	100%		**None Detected**
9	5A - White Glue for 4A, B	Homogenous / Adhesive / Cream	100%		**None Detected**
10	5B - White Glue for 4A, B	Homogenous / Adhesive / Cream	100%		**None Detected**
11	6A - Beige Mottled 12"x12" Floor Tile	Homogenous / Floor Tile / Tan	100%		**None Detected**
12	6B - Beige Mottled 12"x12" Floor Tile	Homogenous / Floor Tile / Tan	100%		**None Detected**
13	7A - Brown Glue for 6A, B	Homogenous / Adhesive / Yellow	100%		**None Detected**
14	7B - Brown Glue for 6A, B	Homogenous / Adhesive / Yellow	100%		**None Detected**
15	8A - Red Brick	Homogenous / Brick / Red	100%		**None Detected**

Collected: **Nov 26, 2025** Received: **Dec 1, 2025** Reported: **Dec 2, 2025**

HAYES MICROBIAL CONSULTING

Project Analyst: Megan Audia, Megan Audia Date: **12 - 02 - 2025**

Reviewed By: Brian Keith, Date: **12 - 02 - 2025**

3005 East Boundary Terrace, Suite F. Midlothian, VA. 23112 (804) 562-3435 contact@hayesmicrobial.com

Michelle Rudy
Freeman Companies, LLC
36 John Street
Hartford, CT 06106
(860) 558-5393

2025-0111
Driggs & Wilson Elevators

#25060020

Asbestos PLM Bulk

EPA 600/R-93/116; EPA 40 CFR Appendix E to Subpart E of Part 763

#	Sample	Material Description	Non-Fibrous	Non-Asbestos Fibers	Asbestos Fibers
16	8B - Red Brick	Homogenous / Brick / Red	100%		**None Detected**
17	9A - White Brick Mortar	Heterogenous / Mortar / Off-White	100%		**None Detected**
18	9B - White Brick Mortar	Homogenous / Mortar / Off-White	100%		**None Detected**
19	10A - Red w/White Marble Linoleum Flooring	Heterogenous / Vinyl Tile / Red	65%	35% Cellulose Fibers	**None Detected**
20	10B - Red w/White Marble Linoleum Flooring	Heterogenous / Vinyl Tile / Red	65%	35% Cellulose Fibers	**None Detected**
21	11A - Black Tar Paper Under 10A, B	Homogenous / Felt / Black	35%	65% Cellulose Fibers	**None Detected**
22	11B - Black Tar Paper Under 10A, B	Homogenous / Felt / Black	35%	65% Cellulose Fibers	**None Detected**
23	12A - Brown Vinyl Cove Base	Homogenous / Cove Base / Brown	100%		**None Detected**
24	12B - Brown Vinyl Cove Base	Homogenous / Cove Base / Brown	100%		**None Detected**
25	13A - Tan Glue for 12A, B	Homogenous / Adhesive / Cream	100%		**None Detected**
26	13B - Tan Glue for 12A, B	Homogenous / Adhesive / Cream	100%		**None Detected**
27	14A - White Window Caulk	Homogenous / Caulk / White	100%		**None Detected**
28	14B - White Window Caulk	Homogenous / Caulk / White	100%		**None Detected**
29	15A - Brown Window Caulk	Homogenous / Caulk / Brown	100%		**None Detected**
30	15B - Brown Window Caulk	Homogenous / Caulk / Brown	100%		**None Detected**
31	16A - White Concrete Window Sill	Heterogenous / Cementitious / Off-White	100%		**None Detected**

Collected: **Nov 26, 2025** Received: **Dec 1, 2025** Reported: **Dec 2, 2025**

HAYES MICROBIAL CONSULTING

Project Analyst: Megan Audia, Megan Audia Date: **12 - 02 - 2025**

Reviewed By: Brian Keith, Date: **12 - 02 - 2025**

Michelle Rudy
Freeman Companies, LLC
36 John Street
Hartford, CT 06106
(860) 558-5393

2025-0111
Driggs & Wilson Elevators

#25060020

Asbestos PLM Bulk

EPA 600/R-93/116; EPA 40 CFR Appendix E to Subpart E of Part 763

#	Sample	Material Description	Non-Fibrous	Non-Asbestos Fibers	Asbestos Fibers
32	16B - White Concrete Window Sill	Heterogenous / Cementitious / Off-White	100%		**None Detected**
33	17A - White Skim Coat Plaster	Homogenous / Skim Coat / White	100%		**None Detected**
34	17B - White Skim Coat Plaster	Homogenous / Skim Coat / White	100%		**None Detected**
35	17C - White Skim Coat Plaster	Homogenous / Skim Coat / White	100%		**None Detected**
36	18A - Gray Ceramic Tile Grout/Thin Set	Heterogenous / Grout / Gray	100%		**None Detected**
37	18B - Gray Ceramic Tile Grout/Thin Set	Heterogenous / Grout / Gray	100%		**None Detected**
38	19A - Yellow Brick	Homogenous / Brick / Yellow	100%		**None Detected**
39	19B - Yellow Brick	Homogenous / Brick / Yellow	100%		**None Detected**
40	20A - Gray Brick Mortar	Heterogenous / Mortar / Gray	100%		**None Detected**
41	20B - Gray Brick Mortar	Heterogenous / Mortar / Gray	100%		**None Detected**
42	21A - Black 6" Vinyl Cove Base	Homogenous / Cove Base / Black	100%		**None Detected**
43	21B - Black 6" Vinyl Cove Base	Homogenous / Cove Base / Black	100%		**None Detected**
44	22A - Tan Glue for 21A, B	Homogenous / Adhesive / Cream	100%		**None Detected**
45	22B - Tan Glue for 21A, B	Homogenous / Adhesive / Cream	100%		**None Detected**
46	23A - Brown Window Caulk	Homogenous / Caulk / Brown	100%		**None Detected**
47	23B - Brown Window Caulk	Homogenous / Caulk / Brown	100%		**None Detected**

Collected: **Nov 26, 2025** Received: **Dec 1, 2025** Reported: **Dec 2, 2025**

HAYES MICROBIAL CONSULTING

Project Analyst: Megan Audia, Megan Audia Date: **12 - 02 - 2025**

Reviewed By: Brian Keith, Date: **12 - 02 - 2025**

Michelle Rudy
Freeman Companies, LLC
36 John Street
Hartford, CT 06106
(860) 558-5393

2025-0111
Driggs & Wilson Elevators

#25060020

Asbestos PLM Bulk
EPA 600/R-93/116; EPA 40 CFR Appendix E to Subpart E of Part 763

#	Sample	Material Description	Non-Fibrous	Non-Asbestos Fibers	Asbestos Fibers
48	24A - Red Brick	Homogenous / Brick / Red	100%		**None Detected**
49	24B - Red Brick	Homogenous / Brick / Red	100%		**None Detected**
50	25A - White Brick Mortar	Heterogenous / Mortar / Gray	100%		**None Detected**
51	25B - White Brick Mortar	Heterogenous / Mortar / Gray	100%		**None Detected**

Note: Sample numbers 17A, B through 25 A, B were collected at Wilson Elementary School. The remainder were collected at Driggs School.

Appendix B

Licenses and Certifications

State of Connecticut

Lookup Detail View

Name

Name
FREEMAN COMPANIES LLC

License Information

lookup

License Type	License Number	Expiration Date	Granted Date	License Name	License Status		Licensure Actions or Pending Charges
Lead Consultant Contractor	2097	07/31/2026	07/31/2014	FREEMAN COMPANIES LLC	ACTIVE	CURRENT	None

Generated on: 7/30/2025 9:29:31 AM

State of Connecticut

Lookup Detail View

Name

Name
MICHELLE I RUDY

License Information

lookup

License Type	License Number	Expiration Date	Granted Date	License Name	License Status		Licensure Actions or Pending Charges
Asbestos Consultant-Insp/Mgmt Planner	354	01/31/2026	02/18/2020	MICHELLE I RUDY	ACTIVE	CURRENT	None

Generated on: 4/8/2025 1:32:36 PM

CERTIFICATE OF ACHIEVEMENT

This certifies that

Michelle Rudy

has successfully completed the

8 Hour Asbestos Site Inspector/Management Planner Refresher Training
Asbestos Accreditation Under TSCA Title II
40 CFR Part 763



Training held via Live Webinar

Exam Score: 92%

conducted by:
ATLAS Technical Consultants, LLC
73 William Franks Drive
West Springfield, MA 01089
(413) 781-0070

Principal Instructor: Thomas Dion

August 21, 2025
Date of Course

August 21, 2026
Expiration Date

Regional Training Director: Judith LaVallee

MPAR-3716
Certificate Number

August 21, 2025
Examination Date

State of Connecticut

Lookup Detail View

Name

Name
MICHELLE I RUDY

License Information

lookup

License Type	License Number	Expiration Date	Granted Date	License Name	License Status		Licensure Actions or Pending Charges
Lead Inspector Risk Assessor	2197	01/31/2026	09/18/2007	Michelle I. Rudy	ACTIVE	CURRENT	None

Generated on: 4/8/2025 1:34:58 PM

CERT#: L-600-Virtual.1470

CHEMSCOPE TRAINING DIVISION

LEAD INSPECTOR/RISK ASSESSOR REFRESHER 8-HOUR TRAINING CERTIFICATE

Michelle Rudy

102 Henderson Street, Bristol CT

Has attended an 8-hour course on the subject discipline on 01/15/2025 and has passed a written examination.

The above individual has successfully completed the above training course approved in accordance with the Department of Public Health Standards established pursuant to Section 20-477 of the Connecticut General Statutes. Course topics include all required topics of State of Connecticut DPH and EPA.

Under civil and criminal penalties of law for the making or submission of false or fraudulent statements or representations (U.S.C. 1001 and 15 U.S. C. 2615), I certify that this training complies with all applicable requirements of Title IV of TSCA, 40 CFR part 745 and any other applicable Federal, State or local requirements.

Examination Score: 100%
Exam Date: 01/15/2025
Expiration Date: 01/15/2026

Daniel Sullivan
Training Manager

Chem Scope, Inc.
15 Moulthrop Street
North Haven CT 06473
Phone: 203.865.5605
www.chem-scope.com

State of Connecticut, Department of Public Health

Approved Environmental Laboratory

THIS IS TO CERTIFY THAT THE LABORATORY DESCRIBED BELOW HAS BEEN APPROVED BY THE STATE DEPARTMENT OF PUBLIC HEALTH PURSUANT TO APPLICABLE PROVISIONS OF THE PUBLIC HEALTH CODE AND GENERAL STATUTES OF CONNECTICUT, FOR MAKING THE EXAMINATIONS, DETERMINATIONS OR TESTS SPECIFIED BELOW WHICH HAVE BEEN AUTHORIZED IN WRITING BY THAT DEPARTMENT.

HAYES MICROBIAL CONSULTING

LOCATED AT 3005 E Boundary Terrace, Suite F **IN** Midlothian, VA 23112

AND REGISTERED IN THE NAME OF T. Brian Keith

THIS CERTIFICATE IS ISSUED IN THE NAME OF T. Brian Keith **WHO HAS BEEN DESIGNATED BY THE REGISTRANT TO BE IN CHARGE OF THE LABORATORY WORK COVERED BY THIS CERTIFICATE OF APPROVAL AS FOLLOWS:**

Examination For:
Asbestos in Bulk Materials (PLM)

SEE CERTIFIED PARAMETER LIST FOR SPECIFIC TESTS APPROVED

EFFECTIVE DATE January 25, 2023

THIS CERTIFICATE EXPIRES March 31, 2025 **AND IS REVOCABLE FOR CAUSE BY THE STATE DEPARTMENT OF PUBLIC HEALTH**

DATED AT HARTFORD, CONNECTICUT, THIS 25th **DAY OF** January, 2023

Registration # PH-0198

Lori J. Mathieu

Lori J. Mathieu
Public Health Branch Chief

Rev. Feb. 2023

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Date: December 16, 2025

To: Jamie Young
Friar Architecture
and
Nicholas Albini
City of Waterbury



From: Chris Tonzi, P.E.
Freeman Cos., LLC

Subject: Geotechnical Engineering Recommendations
Driggs Elementary School – New Elevator Addition
77 Woodlawn Terrace
Waterbury, Connecticut

FC File No.: 2025-0111:06

Geotechnical Scope

Prior to drilling, CBYD was notified by the driller. On November 21, 2025, a private utility locator (CorBuilt) was engaged by Freeman to conduct scans of the proposed drilling area using ground-penetrating radar and electro-magnetic induction. The scans did not indicate the likely presence of buried utilities in the area that was drilled.

On November 22, 2025, Freeman's subcontracted driller, Soiltesting Inc., completed one test boring (D-1) and one additional auger probe at the project site. Both explorations were performed in an unpaved location on the east side of the school, near where the new elevator is planned. The explorations were observed and logged by a Freeman geotechnical engineer. Figure 1 presents the Subsurface Exploration Location Plan.

The test boring and probe were advanced using hollow stem augers. Standard Penetration Tests (SPTs) were performed to evaluate the soils encountered and to collect samples for evaluation.

At the test boring location, about 6½ feet of fill was encountered over naturally-deposited dense glacial till soils. The strata encountered were consistent with published geologic mapping and our experience.

The test boring was advanced to about 14 feet below grade (fbg) where refusal was met. One auger probe was performed at an offset location to evaluate refusal depth encountered in the boring. The auger probe also met refusal at 14 fbg. The test boring log is attached.

Groundwater was not encountered during the explorations.

Geotechnical Design Implications

- Based on the project drawings provided (Sheet A6.3), it appears that excavation will need to extend about 6 to 7 feet below the lower level floor slab to facilitate elevator pit construction. Based on our observations, we estimate that we drilled from a ground surface elevation about 4 feet above the lower floor slab, so the boring and probe extended about 3 to 4 feet below what will be needed to facilitate construction.
- Footings will bear in the naturally-deposited glacial till stratum.
- The elevation of the bottom of the existing adjacent footing should be confirmed and evaluated relative to the elevation of the proposed bottom of the elevator pit footings. Underpinning the existing footings may be required.

Geotechnical Design Recommendations

- The soils encountered in our explorations have adequate bearing capacity to support the proposed elevator on shallow spread footings and/or a concrete pad.
    - We recommend a maximum allowable bearing capacity of 6,000 psf (pounds per square foot).
    - The minimum footing width should be 2½ feet.
    - Estimated settlement at the design bearing capacity is less than ½ inch.

- We recommend that footings and the pit slab-on-grade bear on a base course of at least 8 inches of compacted Structural Fill or Crushed Stone to protect the subgrade from potential construction-induced disturbance.
    - Imported Structural Fill should meet the gradation of CTDOT's Form 819 M.02.06 (Gradation C; 1½-in. minus), except that the percentage passing the #200 sieve can be up to 12%.
    - Imported Crushed Stone should meet the gradation of CTDOT's Form 819 Table M.01.02-2 (No. 6; ¾-in. minus).

- Footing drains are recommended around the perimeter of the elevator pit. Footing drains should be placed near the bottom of the perimeter footing, be at least four inches in diameter and be surrounded by at least 6 inches of crushed stone and a non-woven geotextile filter fabric. Discharge should be by gravity if possible.

- New foundation walls should be designed as retaining walls using at-rest lateral earth pressures. See Figure 2 attached.
    - Assuming cast-in-place concrete on a granular base, the coefficient for sliding should be 0.60.

- Backfill against the new foundation walls should consist of Pervious Structure Backfill, meeting the definition for CTDOT's Form 819 M.02.06 (Gradation A; 3½-in. minus).

- The following engineering properties of soils are recommended for use in design.

Table 1
Earth Material Engineering Properties for Design

Soil Type	Density (pcf)	Friction Angle Phi (degrees)	Cohesion (psi)
Misc. Fill	125	32	0
Glacial Till	140	36	0
Pervious Structural Backfill & Structural Fill Form 819 M.02.05	130	35	0

Geotechnical Construction Recommendations

- Regarding both the fill and the naturally-deposited glacial till soils:
  - They are likely to contain cobbles and boulders;
  - They will be difficult to reuse due to their high silt content;
  - They will not be suitable for reuse as either Structural Fill or Pervious Structure Backfill; and
  - Excavated subgrades may be easily disturbed if allowed to become wet.

- If imported Structural Fill is utilized as a base course for footings and the pit slab, it should placed directly above the naturally-deposited glacial till and compacted to at least 95% of maximum density as determined by proctor testing per ASTM D1557.

- If imported Crushed Stone is utilized as a base course for footings and the pit slab, it should consist of angular clean gravel with a maximum size of ¾-inch. A layer of non-woven geotextile separation fabric should be placed between the Crushed Stone and the underlying naturally-deposited glacial till. The Crushed Stone should be compacted to a firm unyielding surface.

- Pervious Structure Backfill should be compacted to at least 90% of maximum density as determined by proctor testing per ASTM D1557.

- Construction dewatering can be managed using pumps and open sumps. Site grades around the excavation should be constructed to deter stormwater from entering the excavation.

- Excavation geometry to facilitate construction should follow OSHA 29 CFR 1926.

Test Boring Log

Driller:	Soiltesting Inc.			Hole No.:	D-1
Inspector:	C. Tonzi	Town:	Waterbury	Stat./Offset:	--/--
Engineer:	C. Tonzi	Project No.:	2025-0111.06	Northing:	766258
Start Date:	11-22-25	Route No.:	--	Easting:	919974
Finish Date:	11-22-25	Bridge No.:	--	Surface Elevation:	--

Project Description: Driggs Elementary School Elevator

Casing Size/Type: 4-in. ID Auger	Sampler Type/Size: 1-3/8 inch ID	Core Barrel Type: --
Hammer Wt.: -- Fall: --in.	Hammer Wt.: 140 Fall: 30in.	

Groundwater Observations: @Not Encountered

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						Topsoil	Topsoil 4"	
	S-1	1 2 3 5	24	12		Misc Fill	Dark brown SILT, little c-f sand, trace m-f gravel	
	S-2	4 5 3 30	24	8			Dark brown to orange-brown SILT, some c-f sand, trace c-f gravel	
5	S-3	4 10 19 31	24	14			Orange brown to light brown c-f SAND, some c-f gravel, little silt	
	S-4	54 46 50/4"	16	12		Glacial Till	Light brown c-f SAND, some c-f gravel, little silt	
10	S-5	15 25 26 32	24	12			Brown c-f GRAVEL, some silt, little c-f sand	
							Auger refusal	
15							END OF BORING 14ft	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 14ft Rock: --ft No. of Soil Samples: 5 No. of Core Runs: --	NOTES: Auger probe offset approximate 7ft north; met with auger refusal at 14ft.	Sheet 1 of 1 SM-001-M REV. 1/02



LEGEND:

D-1 TEST BORING

NOTES:

1. BASE PLAN BY FREEMAN COMPANIES USING AN AERIAL IMAGE FROM GOOGLE EARTH
2. BORING LOCATION WAS TAPED FROM EXISTING FEATURES AND IS CONSIDERED APPROXIMATE
3. REFER TO THE TEXT AND APPENDICES FOR ADDITIONAL INFORMATION

GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

SUBSURFACE EXPLORATION LOCATION PLAN

DRIGGS ELEMENTARY SCHOOL ELEVATOR
77 WOODLAWN TERRACE
WATERBURY, CONNECTICUT

FREEMAN COMPANIES
LAND DEVELOPMENT | ENGINEERING DESIGN | CONSTRUCTION SERVICES
FREEMAN COMPANIES, LLC
36 JOHN STREET
HARTFORD, CT 06106
WWW.FREEMANCOS.COM
TEL:(860)251-9550
TOLL FREE:(800)604-5141
FAX:(860)986-7161
ELEVATE YOUR EXPECTATIONS

No.	Date	Description

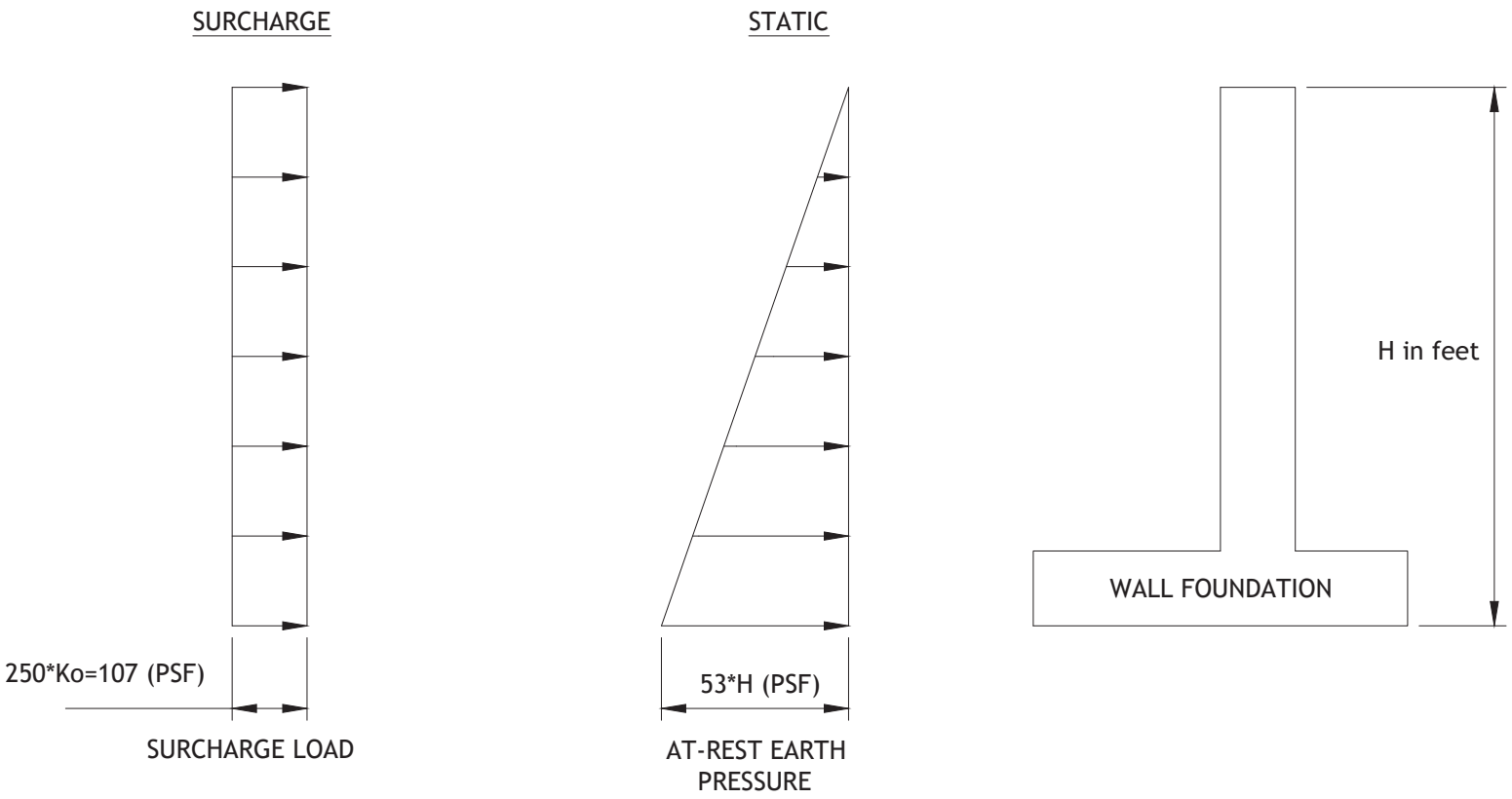
REVISIONS

DRAWN:	T.T.
CHECKED:	A.M.
APPROVED:	C.T.
SCALE:	1"=40'
PROJECT NO.:	2025-0111.06
DATE:	12/15/2025

SHEET NO.

FIGURE 1

THESE DRAWINGS SHALL NOT BE UTILIZED BY ANY PERSON, FIRM OR CORPORATION WITHOUT THE SPECIFIC WRITTEN PERMISSION OF FREEMAN COMPANIES, LLC



NOTES:

1. APPLIES TO WALLS THAT ARE RESTRAINED FROM MOVEMENT AND ASSUMES AT-REST EARTH PRESSURES.
2. THE WALL SHOULD BE DRAINED BY PERVIOUS STRUCTURE BACKFILL (FORM 819 M.02.05) WITH A UNIT WEIGHT OF 130 PCF AND DRAINAGE BEHIND THE WALL. HYDROSTATIC PRESSURE IS NOT INCLUDED.
3. THESE PRESSURE DISTRIBUTIONS ASSUME HORIZONTAL BACKFILL BEHIND THE WALL. DESIGN FOR SLOPE ABOVE THE WALL IF PRESENT. IGNORE PASSIVE RESISTANCE IN FRONT OF FOOTING.
4. SLIDING:COEFFICIENT OF FRICTION BETWEEN CIP FOOTING AND BASE= 0.60

FREEMAN COMPANIES
LAND DEVELOPMENT · ENGINEERING DESIGN · CONSTRUCTION SERVICES
36 JOHN STREET
HARTFORD, CT 06106
WWW.FREEMANCOS.COM
TEL:(860)251-9550
FAX:(860)986-7161
ELEVATE YOUR EXPECTATIONS

LATERAL AT-REST EARTH PRESSURES
PROPOSED ELEVATOR PIT
DRIGGS ELEMENTARY SCHOOL
WATERBURY, CONNECTICUT

DRAFTED:	T.T.
CHECKED:	A.M.
APPROVED:	C.T.
SCALE:	N.T.S.
FC PROJECT NO.:	2025-0111:06
DATE:	12/16/2025

SHEET NO.:

FIGURE 2

Freeman Companies, LLC

Date: December 16, 2025

To: Jamie Young
Friar Architecture
and
Nicholas Albini
City of Waterbury



From: Chris Tonzi, P.E.
Freeman Cos., LLC

Subject: Geotechnical Engineering Recommendations
Woodrow Wilson Elementary School – New Elevator Addition
235 Birch Street
Waterbury, Connecticut

FC File No.: 2025-0111:05

Geotechnical Scope

Prior to drilling, CBYD was notified by the driller. On November 21, 2025, a private utility locator (CorBuilt) was engaged by Freeman to conduct scans of the proposed drilling area using ground-penetrating radar and electro-magnetic induction. The scans did not indicate the likely presence of buried utilities in the area that was drilled.

On November 22, 2025, Freeman's subcontracted driller, Soiltesting Inc., completed one test boring (W-1) and two additional auger probes at the project site. Explorations were performed in an unpaved location on the south side of the school, near where the new elevator is planned. The explorations were observed and logged by a Freeman geotechnical engineer. Figure 1 presents the Subsurface Exploration Location Plan.

The test boring and probes were advanced using hollow stem augers. Standard Penetration Tests (SPTs) were performed to evaluate the soils encountered and to collect samples for evaluation.

At the test boring location, about 5 feet of fill was encountered over naturally-deposited sandy silt. Published geologic mapping and our experience lead us to believe that dense glacial till soils are present below the sandy silt. Bedrock is mapped as Waterbury Gneiss and Schist beneath the site.

The test boring was advanced to about 6½ feet below grade (fbg) where refusal was met. Two auger probes were performed offset locations, about 6 feet northwest and 6 feet southeast of the test boring locations. The purpose of the probes was to evaluate the refusal depth encountered in the boring. The auger probes met refusal at 8½ and 9½ fbg. The test boring log is attached.

Groundwater was not encountered during the explorations.

Geotechnical Design Implications

- Based on the project drawings provided (Sheet A6.2), it appears that excavation will need to extend about 6 to 7 feet below the lower-level floor slab to facilitate elevator pit construction. Based on our observations, we estimate that we drilled from a ground surface elevation about 5 to 6 feet above the lower floor slab, so the boring and probes needed to extend to a depth of about 12 feet. Drilling refusal was met at depths of only 6½ to 9½ feet.
- Based on the shallow refusals, we infer that boulders or shallow bedrock (or both) will be encountered during excavation for the elevator pit. Plans and specifications should reflect this and the earthwork contractor should be prepared to excavate rock as needed. *Additional exploration, including rock coring, could help to determine whether the refusals encountered were on boulders or bedrock and help to assess the quality of the rock relative to the likely need for its excavation.*
- Footings will bear either in the naturally-deposited glacial till stratum or on bedrock.
- The elevation of the bottom of the existing adjacent footing should be confirmed and evaluated relative to the elevation of the proposed bottom of the elevator pit footings. Underpinning the existing footings may be required, if they were founded on glacial till.

Geotechnical Design Recommendations

- The materials encountered in our explorations have adequate bearing capacity to support the proposed elevator on shallow spread footings and/or a concrete pad.
    - Assuming footings will bear on glacial till, we recommend a maximum allowable bearing capacity of 6,000 psf (pounds per square foot).
    - The minimum footing width should be 2½ feet.
    - Estimated settlement at the design bearing capacity is less than ½ inch.

- If the excavated subgrade is bedrock, footings and the mat can be cast directly on bedrock. If the excavated surface is unlevel, a lean concrete mud mat can be placed on top of the bedrock. Alternatively, Crushed Stone can be placed as a leveling base course.

- If the excavated subgrade is glacial till, we recommend that footings and the pit slab-on-grade bear on a base course of at least 8 inches of compacted Structural Fill or Crushed Stone to protect the subgrade from potential construction-induced disturbance.
    - Imported Structural Fill should meet the gradation of CTDOT's Form 819 M.02.06 (Gradation C; 1½-in. minus), except that the percentage passing the #200 sieve can be up to 12%.
    - Imported Crushed Stone should meet the gradation of CTDOT's Form 819 Table M.01.02-2 (No. 6; ¾-in. minus).

- Footing drains are recommended around the perimeter of the elevator pit. Footing drains should be placed near the bottom of the perimeter footing, be at least four inches in diameter and be surrounded by at least 6 inches of crushed stone and a non-woven geotextile filter fabric. Discharge should be by gravity if possible.

- New foundation walls should be designed as retaining walls using at-rest lateral earth pressures. See Figure 2 attached.
    - Assuming cast-in-place concrete on a granular base, the coefficient for sliding should be 0.60.

- Backfill against the new foundation walls should consist of Pervious Structure Backfill, meeting the definition for CTDOT's Form 819 M.02.06 (Gradation A; 3½-in. minus).

- The following engineering properties of soils are recommended for use in design.

Table 1
Earth Material Engineering Properties for Design

Soil Type	Density (pcf)	Friction Angle Phi (degrees)	Cohesion (psi)
Misc. Fill	125	32	0
Glacial Till	140	36	0
Pervious Structural Backfill & Structural Fill Form 819 M.02.05	130	35	0

Geotechnical Construction Recommendations

- Regarding both the fill and the naturally-deposited sandy silt and glacial till soils:
  - They are likely to contain cobbles and boulders;
  - They will be difficult to reuse due to their high silt content;
  - They will not be suitable for reuse as either Structural Fill or Pervious Structure Backfill; and
  - Excavated subgrades may be easily disturbed if allowed to become wet.

- If imported Structural Fill is utilized as a base course for footings and the pit slab, it should placed directly above the naturally-deposited glacial till and compacted to at least 95% of maximum density as determined by proctor testing per ASTM D1557.

- If imported Crushed Stone is utilized as a base course for footings and the pit slab, it should consist of angular clean gravel with a maximum size of ¾-inch. A layer of non-woven geotextile separation fabric should be placed between the Crushed Stone and the underlying naturally-deposited glacial till. The Crushed Stone should be compacted to a firm unyielding surface.

- Pervious Structure Backfill should be compacted to at least 90% of maximum density as determined by proctor testing per ASTM D1557.

- Construction dewatering can be managed using pumps and open sumps. Site grades around the excavation should be constructed to deter stormwater from entering the excavation.

- Excavation geometry to facilitate construction should follow OSHA 29 CFR 1926.

Driller:	Soiltesting Inc.	**Test Boring Log**		Hole No.:	W-1
Inspector:	C. Tonzi	Town:	Waterbury	Stat./Offset:	--/--
Engineer:	C. Tonzi	Project No.:	2025-0111.05	Northing:	763315
Start Date:	11-22-25	Route No.:	--	Easting:	926062
Finish Date:	11-22-25	Bridge No.:	--	Surface Elevation:	--
Project Description:	Wilson Elementary School Elevator				
Casing Size/Type:	4-in. ID Auger	Sampler Type/Size:	1-3/8 inch ID	Core Barrel Type:	--
Hammer Wt.:	-- Fall: --in.	Hammer Wt.:	140 Fall: 30in.		
Groundwater Observations:	@Not Encountered				

Depth (ft)	SAMPLES: Sample Type/No.	SAMPLES: Blows on Sampler per 6 inches	SAMPLES: Pen. (in.)	SAMPLES: Rec. (in.)	SAMPLES: RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						Topsoil	Topsoil 3"	
						Misc Fill		
	S-1	9 6 16 32	24	6			Bottom 3": Fractured Rock	
							[Cobbles to 5ft]	
5						Sandy Silt		
	S-2	14 15 15 50/1"	19	10			Brown SILT, little c-f SAND, little Fractured Rock	
							END OF BORING 6.6ft	
10								
15								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 6.5ft Rock: --ft No. of Soil Samples: 2 No. of Core Runs: --	NOTES: Auger refusal at 6.5ft; Auger Probe 1A offset 6' NW towards building corner and auger refused at 9.5ft; Auger Probe 1B offset SE 6' towards the street/parking lot and auger refused at 8.5ft.	Sheet 1 of 1 SM-001-M REV. 1/02



LEGEND:

W-1 TEST BORING

NOTES:

1. BASE PLAN BY FREEMAN COMPANIES USING AN AERIAL IMAGE FROM GOOGLE EARTH
2. BORING LOCATION WAS TAPED FROM EXISTING FEATURES AND IS CONSIDERED APPROXIMATE
3. REFER TO THE TEXT AND APPENDICES FOR ADDITIONAL INFORMATION

GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

SUBSURFACE EXPLORATION LOCATION PLAN

WILSON ELEMENTARY SCHOOL ELEVATOR
235 BIRCH STREET
WATERBURY, CONNECTICUT

FREEMAN COMPANIES
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36 JOHN STREET
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No.	Date	Description

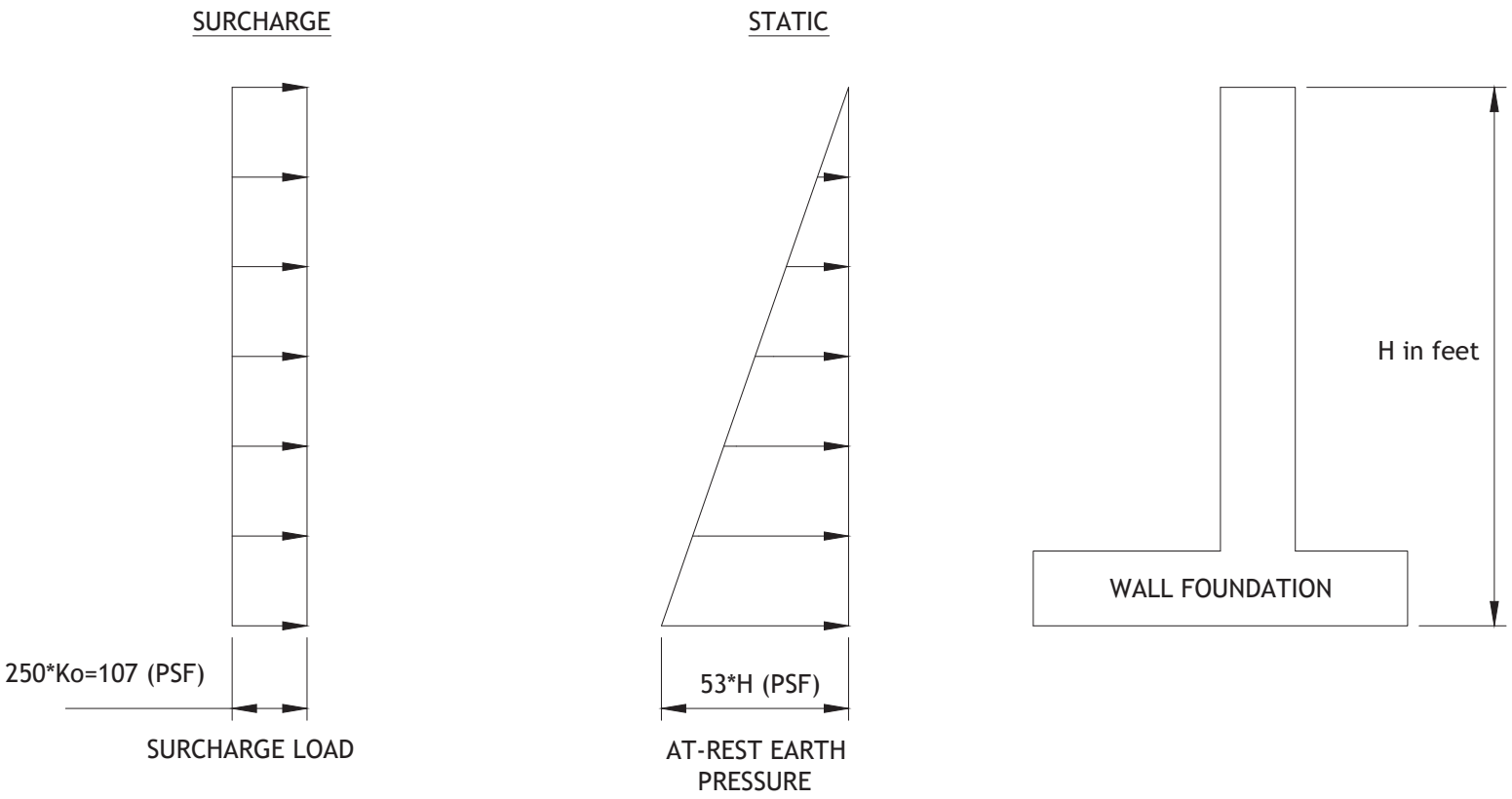
REVISIONS

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FIGURE 1

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NOTES:

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DRAFTED:	T.T.
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SCALE:	N.T.S.
FC PROJECT NO.:	2025-0111:05
DATE:	12/16/2025

SHEET NO.:

FIGURE 2

Freeman Companies, LLC

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SECTION 01 10 00
SUMMARY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Project information
   2. Work covered by Contract Documents.
   3. Access to site.
   4. Coordination with occupants.
   5. Work restrictions.
   6. Specification and drawing conventions.

B.
   1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.03 PROJECT INFORMATION

A. Project Name: 2022-049A Driggs & Wilson Elevator Additions
   1. Project Locations:
      a. Driggs Elementary School: 77 Woodlawn Terrace, Waterbury CT 06710
      b. Woodrow Wilson Elementary School: 235 Birch Street, Waterbury CT 06704

B. Owner's Name: The City of Waterbury

C. Architect's Name: Friar Architecture, Inc.
   1. Address: 21 Talcott Notch Road, Farmington, CT 06032

D. The Project consists of the construction of the installation of a new elevator hoistway adjacent to the existing school, an elevator vestibule and interior elevator lobby, the existing site and M/E/P/FP system in the immediate area of the new hoistway, lobby, and corridor.

1.04 CONTRACT DESCRIPTION

1.05 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

C. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
      b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

D. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.06 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated
   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
   2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.07 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.
   1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours 8:00 a.m. to 5:00 p.m., Monday through Friday, except as otherwise indicated.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
   1. Notify Owner not less than seven days in advance of proposed utility interruptions.
   2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
   1. Notify Owner not less than three days in advance of proposed disruptive operations.

E. Nonsmoking Building: Smoking is not permitted on the Owner’s property.

F. Controlled Substances: Use of tobacco products and other controlled substances on the Project site is not permitted.

G. Employee Identification: Provide identification tags for Contractor personnel working on the Project site. Require personnel to utilize identification tags at all times.

H. Employee Screening: Comply with Owner's requirements regarding drug and background screening of Contractor personnel working on the Project site.
   1. Maintain list of approved screened personnel with Owner's Representative.

1.08 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
   2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:
   1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
   2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
   3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.09 CONTRACTOR USE OF SITE AND PREMISES

A. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

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SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:
   1. Document 00 2600 "Contract Modification Procedures" for requirements for substitution requests prior to award of Contract.
   2. Section 01 6000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.03 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
   1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
   2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

1.04 ACTION SUBMITTALS

A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Substitution Request Form: Use form the form provided in the Project Manual, or an alternate form that is presented to the Architect prior to approval and use.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
      b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
      d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
      e. Samples, where applicable or requested.
      f. Certificates and qualification data, where applicable or requested.
      g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
      h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.

i. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven <7> days of receipt of a request for substitution. The Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within [fifteen] <15> days of receipt of request, or seven <7> days of receipt of additional information or documentation, whichever is later.
   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.05 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.06 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.07 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than [fifteen] <15> days prior to time required for preparation and review of related submittals.
   1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
      a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
      b. Requested substitution provides sustainable design characteristics that specified product provided for compliance with IgCC requirements.
      c. Requested substitution provides sustainable design characteristics that specified product provided for compliance with ASHRAE 189.1 requirements.
      d. Substitution request is fully documented and properly submitted.
      e. Requested substitution will not adversely affect Contractor's construction schedule.
      f. Requested substitution has received necessary approvals of authorities having jurisdiction.
      g. Requested substitution is compatible with other portions of the Work.
      h. Requested substitution has been coordinated with other portions of the Work.
      i. Requested substitution provides specified warranty.

j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within [fifteen] <15> days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
   a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
   b. Requested substitution does not require extensive revisions to the Contract Documents.
   c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   d. Requested substitution provides sustainable design characteristics that specified product provided for compliance with IgCC requirements.
   e. Requested substitution provides sustainable design characteristics that specified product provided for compliance with ASHRAE 189.1 requirements.
   f. Substitution request is fully documented and properly submitted.
   g. Requested substitution will not adversely affect Contractor's construction schedule.
   h. Requested substitution has received necessary approvals of authorities having jurisdiction.
   i. Requested substitution is compatible with other portions of the Work.
   j. Requested substitution has been coordinated with other portions of the Work.
   k. Requested substitution provides specified warranty.
   l. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

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SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:
   1. Section 01 2500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
   2. Section 01 3100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.03 MINOR CHANGES IN THE WORK

A. Architect will issue through General Contractor supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on web-based Project management software.

1.04 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: General Contractor will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Work Change Proposal Requests issued by General Contractor are not instructions either to stop work in progress or to execute the proposed change.
   2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include costs of labor and supervision directly attributable to the change.
      d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
      e. Quotation Form: Use form provided as part of web-based Project management software.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to General Contractor.
   1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
   2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01 2500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form provided as part of web-based Project management software.

1.05 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, General Contractor will issue a Change Order for signatures of Owner and Contractor on AIA Document G701
AIA Document G701CMa form provided as part of web-based Project management software.

1.06 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: General Contractor may issue a Construction Change Directive on AIA Document G714 AIA Document G714CMa form provided as part of web-based Project management software. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
   1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.07 WORK CHANGE DIRECTIVE

A. Work Change Directive: General Contractor may issue a Work Change Directive on form provided as part of web-based Project management software. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
   1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

SECTION 01 29 00
PAYMENT PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:
   1. Document 00 4373 "Proposed Schedule of Values Form" for requirements for furnishing proposed schedule of values with bid.
   2. Section 01 2600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
   3. Section 01 3200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.03 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.04 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
   1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
   2. Submit the schedule of values to Architect at earliest possible date, but no later than [seven] <7> days before the date scheduled for submittal of initial Applications for Payment.
   3. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
   4. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 01 1000 "Summary."

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
   1. Identification: Include the following Project identification on the schedule of values:
      a. Project name and location.
      b. Owner's name.
      c. Owner's Project number.
      d. Name of Architect.
      e. Architect's Project number.
      f. Contractor's name and address.
      g. Date of submittal.
   2. Arrange schedule of values consistent with format of AIA Document G703.
   3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:

a. Related Specification Section or division.
b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
1) Labor.
2) Materials.
3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of [five] <5> percent of the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
a. Differentiate between items stored on-site and items stored off-site.
6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
7. Purchase Contracts: Provide a separate line item in the schedule of values for each Purchase contract. Show line-item value of Purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
8. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.
9. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
10. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
11. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling [five] <5> percent of the Contract Sum and subcontract amount.
12. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.05 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and Construction Manager and paid for by Owner.

B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Submit Application for Payment to Architect by the last day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
1. Submit draft copy of Application for Payment [seven] <7> days prior to due date for review by Architect.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
   1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
   2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
   3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
   4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
   1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
   2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
   3. Provide summary documentation for stored materials indicating the following:
      a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
      b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
      c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

G. Transmittal: Submit [three] <3> signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment, subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
   1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
   2. When an application shows completion of an item, submit conditional final or full waivers.
   3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
   5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. List of subcontractors.
   2. Schedule of values.

3. Contractor's construction schedule (preliminary if not final).
4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
5. Products list (preliminary if not final).
6. Sustainable design action plans, including preliminary project materials cost data.
7. Schedule of unit prices.
8. Submittal schedule (preliminary if not final).
9. List of Contractor's staff assignments.
10. List of Contractor's principal consultants.
11. Copies of building permits.
12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
13. Initial progress report.
14. Report of preconstruction conference.
15. Certificates of insurance and insurance policies.
16. ***Performance and payment bonds.***
17. Data needed to acquire Owner's insurance.

J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
      a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 01 7700 "Closeout Procedures."
   2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
   2. Certification of completion of final punch list items.
   3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   4. Updated final statement, accounting for final changes to the Contract Sum.
   5. AIA Document G706.
   6. AIA Document G706A.
   7. AIA Document G707.
   8. Evidence that claims have been settled.
   9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
   10. Final liquidated damages settlement statement.
   11. Proof that taxes, fees, and similar obligations are paid.
   12. Waivers and releases.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
   1. General coordination procedures.
   2. Coordination drawings.
   3. RFIs.
   4. Digital project management procedures.
   5. Web-based Project management software package.
   6. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:
   1. Section 01 3200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
   2. Section 01 7300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   3. Section 01 7700 "Closeout Procedures" for coordinating closeout of the Contract.

1.03 DEFINITIONS

A. BIM: Building Information Modeling.

B. RFI: Request for Information. Request from Owner, General Contractor, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.04 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
   1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
   2. Number and title of related Specification Section(s) covered by subcontract.
   3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within [15] days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
   1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in each built facility. Keep list current at all times.

1.05 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination of Multiple Contracts: Each contractor shall cooperate with Project coordinator, who shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
   1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors and direction of Project coordinator to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Contractor's construction schedule.
   2. Preparation of the schedule of values.
   3. Installation and removal of temporary facilities and controls.
   4. Delivery and processing of submittals.
   5. Progress meetings.
   6. Preinstallation conferences.
   7. Project closeout activities.
   8. Startup and adjustment of systems.

1.06 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
   1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Coordinate the addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 3300 "Submittal Procedures."

C. Coordination Drawing Process: Prepare coordination drawings in the following manner:
1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.
4. Fire Sprinkler Installer will locate piping and equipment, using red color. Fire Sprinkler Installer shall forward drawing files to Electrical Installer.
5. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
6. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
7. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Architect to review and resolve conflicts on the coordination drawings.

D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format:
   a. Same digital data software program, version, and operating system as original Drawings.
   b. DWG, Current Year Version, operating in Microsoft Windows operating system.
2. File Submittal Format: Submit or post coordination drawing files using PDF format.
3. BIM File Incorporation: General Contractor will incorporate Contractor's coordination drawing files into BIM established for Project.
   a. General Contractor will perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
   a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
   b. Contractor shall execute a data licensing agreement in the form of Agreement included in this Project Manual.

1.07 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.

2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Project name.
   2. Owner name.
   3. Owner's Project number.
   4. Name of Architect and General Contractor.
   5. Architect's Project number.
   6. Date.
   7. Name of Contractor.
   8. RFI number, numbered sequentially.
   9. RFI subject.
   10. Specification Section number and title and related paragraphs, as appropriate.
   11. Drawing number and detail references, as appropriate.
   12. Field dimensions and conditions, as appropriate.
   13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
   14. Contractor's signature.
   15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
       a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716 or Form bound in Project Manual.
   1. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow [seven] days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
   1. The following Contractor-generated RFIs will be returned without action:
      a. Requests for approval of submittals.
      b. Requests for approval of substitutions.
      c. Requests for approval of Contractor's means and methods.
      d. Requests for coordination information already indicated in the Contract Documents.
      e. Requests for adjustments in the Contract Time or the Contract Sum.
      f. Requests for interpretation of Architect's actions on submittals.
      g. Incomplete RFIs or inaccurately prepared RFIs.
   2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect or General Contractor of additional information.
   3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 2600 "Contract Modification Procedures."
      a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and General Contractor in writing within [5] days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
   1. Project name.
   2. Name and address of Contractor.

3. Name and address of Architect.
4. RFI number, including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's and General Contractor's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within [seven] days if Contractor disagrees with response.

1.08 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Architect's Data Files Not Available: Architect will not provide Architect's digital data files for Contractor's use during construction.

B. Web-Based Project Management Software Package: If requested by the Owner, provide, administer, and use Contractor's web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.

1. Web-based Project management software includes, at a minimum, the following features:
   a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
   b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
   c. Document workflow planning, allowing customization of workflow between project entities.
   d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
   e. Track status of each Project communication in real time, and log time and date when responses are provided.
   f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
   g. Processing and tracking of payment applications.
   h. Processing and tracking of contract modifications.
   i. Creating and distributing meeting minutes.
   j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
   k. Management of construction progress photographs.
   l. Mobile device compatibility, including smartphones and tablets.
2. Provide up to [seven] Project management software user licenses for use of Owner, Owner's Commissioning Authority, Contractor, Architect, and Architect's consultants. Provide [eight] <8> hours of software training at Architect's office for web-based Project software users.
3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.

C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
   1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
   2. Name file with submittal number or other unique identifier, including revision identifier.
   3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.09 PROJECT MEETINGS

A. General: General Contractor will schedule and conduct meetings and conferences at Project site unless otherwise indicated.
   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of [seven] <7 > days prior to meeting.
   2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
   3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Contractor, and Architect, within [three] <5> days of the meeting.

B. Preconstruction Conference: Contractor will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than [15] days after execution of the Agreement.
   1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Contractor, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
   2. Agenda: Discuss items of significance that could affect progress, including the following:
      a. Responsibilities and personnel assignments.
      b. Tentative construction schedule.
      c. Phasing.
      d. Critical work sequencing and long lead items.
      e. Designation of key personnel and their duties.
      f. Lines of communications.
      g. Use of web-based Project software.
      h. Procedures for processing field decisions and Change Orders.
      i. Procedures for RFIs.
      j. Procedures for testing and inspecting.
      k. Procedures for processing Applications for Payment.
      l. Distribution of the Contract Documents.
      m. Submittal procedures.
      n. Sustainable design requirements.
      o. Preparation of Record Documents.
      p. Use of the premises and existing building.
      q. Work restrictions.
      r. Working hours.
      s. Owner's occupancy requirements.
      t. Responsibility for temporary facilities and controls.
      u. Procedures for moisture and mold control.
      v. Procedures for disruptions and shutdowns.
      w. Construction waste management and recycling.

x. Parking availability.
y. Office, work, and storage areas.
z. Equipment deliveries and priorities.
aa. First aid.
bb. Security.
cc. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, Contractor, and Owner's Commissioning Authority of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   a. Contract Documents.
   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Sustainable design requirements.
   i. Review of mockups.
   j. Possible conflicts.
   k. Compatibility requirements.
   l. Time schedules.
   m. Weather limitations.
   n. Manufacturer's written instructions.
   o. Warranty requirements.
   p. Compatibility of materials.
   q. Acceptability of substrates.
   r. Temporary facilities and controls.
   s. Space and access limitations.
   t. Regulations of authorities having jurisdiction.
   u. Testing and inspecting requirements.
   v. Installation procedures.
   w. Coordination with other work.
   x. Required performance results.
   y. Protection of adjacent work.
   z. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Contractor will schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than [90] days prior to the scheduled date of Substantial Completion.
   1. Conduct the conference to review requirements and responsibilities related to Project closeout.
   2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Contractor, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
   3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
      a. Preparation of Record Documents.
      b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
      c. Procedures for completing and archiving web-based Project software site data files.
      d. Submittal of written warranties.
      e. Requirements for completing sustainable design documentation.
      f. Requirements for preparing operations and maintenance data.
      g. Requirements for delivery of material samples, attic stock, and spare parts.
      h. Requirements for demonstration and training.
      i. Preparation of Contractor's punch list.
      j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
      k. Submittal procedures.
      l. Coordination of separate contracts.
      m. Owner's partial occupancy requirements.
      n. Installation of Owner's furniture, fixtures, and equipment.
      o. Responsibility for removing temporary facilities and controls.
   4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Contractor will schedule and conduct progress meetings at least weekly or biweekly intervals as required by the Owner.
   1. Coordinate dates of meetings with preparation of payment requests.
   2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority, Contractor, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
   3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
      a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
         1) Review schedule for next period.
      b. Review present and future needs of each entity present, including the following:
         1) Interface requirements.

2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Status of sustainable design documentation.
6) Deliveries.
7) Off-site fabrication.
8) Access.
9) Site use.
10) Temporary facilities and controls.
11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.
15) Status of RFIs.
16) Status of Proposal Requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Startup construction schedule.
   2. Contractor's Construction Schedule.
   3. Construction schedule updating reports.
   4. Daily construction reports.
   5. Material location reports.
   6. Site condition reports.
   7. Unusual event reports.

B. Related Requirements:
   1. Section 01 2900 "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.
   2. Section 01 4000 "Quality Requirements" for schedule of tests and inspections.

1.02 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.
   1. Float time is per the discretion of the Owner and to be coordinated with the Owner by the Construction Manager.
   2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
   3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of labor and equipment necessary for completing an activity as scheduled.

1.03 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
   1. Working electronic copy of schedule file.
   2. PDF file.

3. No paper documents are to be provided unless specifically requested by the Architect or Owner.

B. Startup construction schedule.
   1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
   1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports to contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
   1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
   2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
   3. Total Float Report: List of activities sorted in ascending order of total float.
   4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Daily Construction Reports: Submit at weekly intervals or at the Construction Manager’s discretion.

G. Material Location Reports: Submit at monthly intervals or at the Construction Manager’s discretion.

H. Site Condition Reports: Submit at time of discovery of differing conditions.

I. Unusual Event Reports: Submit at time of unusual event.

J. Qualification Data: For scheduling consultant.

1.04 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 3100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
   1. Review software limitations and content and format for reports.
   2. Verify availability of qualified personnel needed to develop and update schedule.
   3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and potential partial Owner occupancy.
   4. Review delivery dates for Owner-furnished products.
   5. Review schedule for work of Owner's separate contracts.
   6. Review submittal requirements and procedures.
   7. Review time required for review of submittals and resubmittals.
   8. Review requirements for tests and inspections by independent testing and inspecting agencies.

9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.05 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from entities involved.
   2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

1.06 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
   1. Use Microsoft Project, Primavera, Meridian Prolog or equivalent for current Windows operating systems.

B. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion and anticipated Final Completion.
   1. Contract completion date to not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat building roof area as a separate numbered activity for each main element of the Work. Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than [20] days, unless specifically allowed by Architect.
   2. Submittal Review Time: Include review and resubmittal times indicated in Section 01 3300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
   3. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
   4. Punch List and Final Completion: Include not more than [30] days for completion of punch list items and Final Completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 1000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
   2. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
      a. Subcontract awards.
      b. Submittals.
      c. Purchases.
      d. Fabrication.
      e. Sample testing.
      f. Deliveries.
      g. Installation.

3. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

F. Contractor's Construction Schedule Updating: At bi-weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

G. Recovery Schedule: When periodic update indicates the Work is [5] or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

H. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, and other parties identified by Contractor with a need-to-know schedule responsibility.

1.07 STARTUP CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within [seven] <7> days of date established for commencement of the Work.

1.08 REPORTS

A. Weekly Construction Reports: Prepare a weekly construction report recording the following information concerning events at Project site:
1. Approximate count of personnel at Project site.
2. Material deliveries.
3. High and low temperatures and general weather conditions, including presence of rain or snow.
4. Accidents.
5. Meetings and significant decisions.
6. Unusual events.
7. Stoppages, delays, shortages, and losses.
8. Orders and requests of authorities having jurisdiction.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

SECTION 01 32 33
PHOTOGRAPHIC DOCUMENTATION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for the following:
   1. Preconstruction photographs.
   2. Periodic construction photographs.
   3. Final Completion construction photographs.

B. Related Requirements:
   1. Section 01 7700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.

1.02 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within [seven] <7> days of taking photographs.
   1. Submit photos by uploading to web-based Project management software site or via emailed. Include copy of key plan indicating each photograph's location and direction.
   2. Identification: Provide the following information with each image description in web-based Project management software site:
      a. Name of Project.
      b. Name and contact information for photographer.
      c. Name of Architect and Contractor.
      d. Date photograph was taken.
      e. Description of location, vantage point, and direction.
      f. Unique sequential identifier keyed to accompanying key plan.

C. Printed Photographs: not required unless specifically requested by either the Owner or Architect for a validated and approved reason.

1.03 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who has been proven to be able to provide clear, non-blurry photographs of construction-related activities. A professional photographer is not required but images provided do need to be clear, non-blurry and show accurately the condition they are intending to portray.

1.04 FORMATS AND MEDIA

A. Digital Photographs: Provide color images in JPG or PDF format, produced by a digital camera with minimum sensor size of [12] megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.

B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

C. File Names: Name media files with project number, date, and specific Project area where taken and sequential numbering suffix.

1.05 CONSTRUCTION PHOTOGRAPHS

A. Photographer: Engage a qualified photographer to take construction photographs.

B. General: Take photographs with maximum depth of field and in focus.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

C. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect and/or General Contractor.
   1. Take a suitable number of photographs to show existing conditions before starting the Work.

D. Periodic Construction Photographs: Take a suitable number of photographs coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

E. Final Completion Construction Photographs: Take a suitable number of photographs after date of Substantial Completion for submission as Project Record Documents. The architect will inform the photographer of desired vantage points and confirm that the provided amount and quality of photographs taken are acceptable.

F. Additional Photographs: Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for in the allowance for construction photographs.
   1. Three days' notice will be given, where feasible.
   2. Circumstances that could require additional photographs include, but are not limited to, the following:
      a. Immediate follow-up when on-site events result in construction damage or losses.
      b. Substantial Completion of a major phase or component of the Work.
      c. Extra record photographs at time of final acceptance.
      d. Owner's request for special publicity photographs.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Submittal schedule requirements.
   2. Administrative and procedural requirements for submittals.

B. Related Requirements:
   1. Section 01 2900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
   2. Section 01 3100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
   3. Section 01 3200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
   4. Section 01 3233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and Final Completion construction photographs.
   5. Section 01 4000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
   6. Section 01 7700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
   7. Section 01 7823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.

1.03 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's and General Contractor's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's and General Contractor's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.04 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and General Contractor and additional time for handling and reviewing submittals required by those corrections.
   1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
   2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's and Contractor’s final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled date of fabrication.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.05 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:
1. Project name.
2. Date.
3. Name of Architect.
4. Name of Contractor.
5. Name of firm or entity that prepared submittal.
6. Names of subcontractor, manufacturer, and supplier.
7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
8. Category and type of submittal.
9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

B. Options: Clearly and boldly identify options requiring selection by Architect or Architect’s consultants.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect and General Contractor on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Paper Submittals: paper submittals are not to be submitted unless specifically requested by the Owner, Architect, or General Contractor. If paper copies are required, the required quantity will be formally requested.

E. Electronic Submittals: Prepare submittals as a single combined multi-page PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

F. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

1.06 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
   1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
      a. Architect, through Contractor, will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
   2. Web-Based Project Management Software: If required by the Owner, prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
   3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
   4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of the need to review multiple submittals concurrently for coordination.
      a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   1. Initial Review: Allow [15] days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   3. Resubmittal Review: Allow [15] days for review of each resubmittal.
   4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow [21] days for initial review of each submittal.
      a. The types of sequential reviews include submittals where the Architect’s consultants need to review the data first and then provide back to the Architect for selection of colors, finishes, etc.
      b. Examples of these types of submittals include but are not limited to light fixtures, any electrical equipment requiring a finish color selection, etc.

D. Resubmittals: Make resubmittals in the same form and number of copies as initial submittal.
   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
   3. Resubmit submittals until they are marked with approval notation from Architect's and Contractor’s action stamp.

4. Resubmittals with annotations marked by the Architect or Architect's consultants more than twice in a row per submittal without adequate correction by contractor or subcontractor will result in billed time to the contractor using the Architect's or Architect's consultants standard hourly rates.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.07 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each submittal to show which products and options are applicable.
   3. Include the following information, as applicable:
      a. Manufacturer's catalog cuts.
      b. Manufacturer's product specifications.
      c. Standard color charts.
      d. Statement of compliance with specified referenced standards.
      e. Testing by recognized testing agency.
      f. Application of testing agency labels and seals.
      g. Notation of coordination requirements.
      h. Availability and delivery time information.
   4. For equipment, include the following in addition to the above, as applicable:
      a. Wiring diagrams that show factory-installed wiring.
      b. Printed performance curves.
      c. Operational range diagrams.
      d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
   5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. The Architect's nor the Architect's Consultant's drawings will be provided for the use of shop drawings.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Identification of products.
      b. Schedules.
      c. Compliance with specified standards.
      d. Notation of coordination requirements.
      e. Notation of dimensions established by field measurement.
      f. Relationship and attachment to adjoining construction clearly indicated.
      g. Seal and signature of professional engineer if specified.
   2. PDF digital print "sheet" file Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 24" x 36".

C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
   a. Project name and submittal number.
   b. Generic description of Sample.
   c. Product name and name of manufacturer.
   d. Sample source.
   e. Number and title of applicable Specification Section.
   f. Specification paragraph number and generic name of each item.
3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
4. Web-Based Project Management Software: If required by the Owner. prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
5. Paper Transmittal: Include paper transmittal, including complete submittal information indicated when submitting a physical sample.
6. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
7. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit [three] <3> full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through General Contractor, will return submittal with options selected.
8. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured, and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit [three] <3> sets of Samples. Architect will retain [one] <1> Sample sets; remainder will be returned. Retain one returned Sample set as a project record Sample.
      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least [three] <3> sets of paired units that show approximate limits of variations.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates:
1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:
1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

1.08 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note all corrections and field dimensions. Mark with approval stamp before submitting to Architect and Owner.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp with indication in web-based Project management software. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
    1. Architect will not review submittals received from Contractor that do not have their stamp confirming review and approval to Contract Documents.

1.09 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return.
    1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action, as follows:
        a. Authorizing purchasing, fabrication, delivery, and installation:
            1) "No Exceptions Taken", or language with same legal meaning.
            2) "Make Corrections Noted", or language with same legal meaning.
                (a) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
            3) "Revise and Resubmit", or language with same legal meaning.
            4) “Submit Specified Item”, or language with same legal meaning.
            5) “Rejected and Resubmit”, Not Authorizing fabrication, delivery, and installation and resubmission required.
        b. Architect's consultants' actions on items submitted for information:
            1) Items for which no action was taken:
                (a) "Received" - to notify the Contractor that the submittal has been received for record only.
            2) Items for which action was taken:
                (a) "Reviewed" - no further action is required from Contractor.

B. Informational Submittals: Architect will review each submittal and will not return it or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will return without review submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

1.10 REFERENCE STANDARDS

A. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Commissioning Authority, General Contractor, or authorities having jurisdiction are not limited by provisions of this Section.

1.02 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of [five] <5> previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
   1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

E. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) in accordance with 29 CFR 1910.7, by a testing agency accredited in accordance with NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."

H. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

I. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and

completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.03 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.04 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
   1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
   2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
   1. Specification Section number and title.
   2. Entity responsible for performing tests and inspections.
   3. Description of test and inspection.
   4. Identification of applicable standards.
   5. Identification of test and inspection methods.
   6. Number of tests and inspections required.
   7. Time schedule or time span for tests and inspections.
   8. Requirements for obtaining samples.
   9. Unique characteristics of each quality-control service.

F. Reports: Prepare and submit certified written reports and documents as specified.

G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.05 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
   1. Date of issue.
   2. Project title and number.

3. Name, address, telephone number, and email address of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement of whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement of whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

1.06 QUALITY ASSURANCE

A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
   1. Requirements of authorities having jurisdiction supersede requirements for specialists.

G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
   1. Contractor's Responsibilities:
      a. Provide test specimens representative of proposed products and construction.
      b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
      c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
      d. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
      e. When testing is complete, remove test specimens and test assemblies; do not reuse products on Project.
   2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, through General Contractor, with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

1.07 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
   1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
   2. Payment for these services will be made from testing and inspection allowances specified in Section 01 2100 "Allowances," as authorized by Change Orders.

3. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
   1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
   2. Engage a qualified testing agency to perform quality-control services.
      a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.
   3. Notify testing agencies at least [24] hours in advance of time when Work that requires testing or inspection will be performed.
   4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
   5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
   6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Notify Architect, Commissioning Authority, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
   3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
   4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
   5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   1. Access to the Work.

2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
2. Distribution: Distribute schedules to Owner, Architect, Commissioning Authority, General Contractor, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.08 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections attached to this Section, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect, Commissioning Authority, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Owner with copy to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection logs for Architect's, Commissioning Authority's, and Contractor’s reference during normal working hours.
   1. Submit log at Project closeout as part of Project Record Documents.

3.02 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 7300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

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SECTION 01 42 00
REFERENCES

PART 1 GENERAL

1.01 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms, including "requested," "authorized," "selected," "required," and "permitted," have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms, including "shown," "noted," "scheduled," and "specified," have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.02 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
   1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
   1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.03 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations, List: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; (see FGIA).
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; www.concrete.org.
9. ACP - American Clean Power; (Formerly: American Wind Energy Association); www.cleanpower.org.
10. ACPA - American Concrete Pipe Association; www.concretepipe.org.
11. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
12. AF&PA - American Forest & Paper Association; www.afandpa.org.
13. AGA - American Gas Association; www.aga.org.
14. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
15. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
16. AI - Asphalt Institute; www.asphaltinstitute.org.
17. AIA - American Institute of Architects (The); www.aia.org.
18. AISC - American Institute of Steel Construction; www.aisc.org.
19. AISI - American Iron and Steel Institute; www.steel.org.
20. AITC - American Institute of Timber Construction; (see PLIB).
21. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
22. AMPP - Association for Materials Protection and Performance; www.ampp.org.
23. ANSI - American National Standards Institute; www.ansi.org.
24. AOSA/SCST - Association of Official Seed Analysts (The)/Society of Commercial Seed Technologists (The); www.analyzeseeds.com.
25. APA - APA - The Engineered Wood Association; www.apawood.org.
26. APA - Architectural Precast Association; www.archprecast.org.
27. API - American Petroleum Institute; www.api.org.
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASA - Acoustical Society of America; www.acousticalsociety.org.
30. ASCE - American Society of Civil Engineers; www.asce.org.
31. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (see ASCE).
32. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
33. ASME - ASME International; American Society of Mechanical Engineers (The)
34. ASSE - ASSE International; (American Society of Sanitary Engineering); www.asse-plumbing.org.
35. ASSP - American Society of Safety Professionals; www.assp.org.
36. ASTM - ASTM International; www.astm.org.
37. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
38. AVIXA - Audiovisual and Integrated Experience Association; www.avixa.org.
39. AWI - Architectural Woodwork Institute; www.awinet.org.
40. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
41. AWPA - American Wood Protection Association; www.awpa.com.
42. AWS - American Welding Society; www.aws.org.
43. AWWA - American Water Works Association; www.awwa.org.
44. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.

45. BIA - Brick Industry Association (The); www.gobrick.com.
46. BICSI - BICSI, Inc.; www.bicsi.org.
47. BIFMA - Business and Institutional Furniture Manufacturer's Association; www.bifma.org.
48. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
49. BWF - Badminton World Federation; www.bwfbadminton.com.
50. CARB - California Air Resources Board; www.arb.ca.gov.
51. CDA - Copper Development Association Inc.; www.copper.org.
52. CE - Conformite Europeenne (European Commission); www.ec.europa.eu/growth/single-market/ce-marking.
53. CEA - Canadian Electricity Association; www.electricity.ca.
54. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
55. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
56. CGA - Compressed Gas Association; www.cganet.com.
57. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
58. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
59. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
60. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
61. CPA - Composite Panel Association; www.compositepanel.org.
62. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
63. CRRC - Cool Roof Rating Council; www.coolroofs.org.
64. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
65. CSA - CSA Group; www.csagroup.org.
66. CSI - Cast Stone Institute; www.caststone.org.
67. CSI - Construction Specifications Institute (The); www.csiresources.org.
68. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
69. CTA - Consumer Technology Association; www.cta.tech.
70. CTI - Cooling Technology Institute; www.coolingtechnology.org.
71. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
72. DHA - Decorative Hardwoods Association; www.decorativehardwoods.org.
73. DHI - Door and Hardware Institute; www.dhi.org.
74. ECIA - Electronic Components Industry Association; www.ecianow.org.
75. EIMA - EIFS Industry Members Association; www.eima.com.
76. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
77. EOS/ESD - EOS/ESD Association, Inc.; Electrostatic Discharge Association; www.esda.org.
78. ESTA - Entertainment Services and Technology Association; www.esta.org.
79. EVO - Efficiency Valuation Organization; www.evo-world.org.
80. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
81. FGIA - Fenestration and Glazing Industry Alliance; https://fgiaonline.org.
82. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
83. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
84. FM Approvals - FM Approvals LLC; www.fmapprovals.com.
85. FM Global - FM Global; www.fmglobal.com.
86. FRSA - Florida Roofing and Sheet Metal Contractors Association, Inc.; www.floridaroof.com.
87. FSA - Fluid Sealing Association; www.fluidsealing.com.
88. FSC - Forest Stewardship Council U.S.; www.fscus.org.
89. GA - Gypsum Association; www.gypsum.org.
90. GS - Green Seal; www.greenseal.org.

91. HI - Hydraulic Institute; www.pumps.org.
92. HMMA - Hollow Metal Manufacturers Association; (see NAAMM).
93. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
94. IAS - International Accreditation Service; www.iasonline.org.
95. ICC - International Code Council; www.iccsafe.org.
96. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
97. ICPA - International Cast Polymer Association (The); www.theicpa.com.
98. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
99. IEC - International Electrotechnical Commission; www.iec.ch.
100. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
101. IES - Illuminating Engineering Society; www.ies.org.
102. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
103. IGMA - Insulating Glass Manufacturers Alliance; (see FGIA).
104. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.org.
105. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
106. Intertek - Intertek Group; www.intertek.com.
107. ISA - International Society of Automation (The); www.isa.org.
108. ISFA - International Surface Fabricators Association; www.isfanow.org.
109. ISO - International Organization for Standardization; www.iso.org.
110. ITU - International Telecommunication Union; www.itu.int.
111. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
112. LPI - Lightning Protection Institute; www.lightning.org.
113. MBMA - Metal Building Manufacturers Association; www.mbma.com.
114. MCA - Metal Construction Association; www.metalconstruction.org.
115. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
116. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
117. MHI - Material Handling Industry; www.mhi.org.
118. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
119. MPI - Master Painters Institute; www.paintinfo.com.
120. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry, Inc.; www.msshq.org.
121. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
122. NACE - NACE International; (National Association of Corrosion Engineers International); (see AMPP).
123. NADCA - National Air Duct Cleaners Association; www.nadca.com.
124. NAIMA - North American Insulation Manufacturers Association; www.insulationinstitute.org.
125. NALP - National Association of Landscape Professionals; www.landscapeprofessionals.org.
126. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
127. NBI - New Buildings Institute; www.newbuildings.org.
128. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
129. NCMA - National Concrete Masonry Association; www.ncma.org.
130. NEBB - National Environmental Balancing Bureau; www.nebb.org.
131. NECA - National Electrical Contractors Association; www.necanet.org.
132. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
133. NEMA - National Electrical Manufacturers Association; www.nema.org.
134. NETA - InterNational Electrical Testing Association; www.netaworld.org.
135. NFHS - National Federation of State High School Associations; www.nfhs.org.
136. NFPA - National Fire Protection Association; www.nfpa.org.
137. NFPA - NFPA International; (see NFPA).

138. NFRC - National Fenestration Rating Council; www.nfrc.org.
139. NGA - National Glass Association; www.glass.org.
140. NHLA - National Hardwood Lumber Association; www.nhla.com.
141. NLGA - National Lumber Grades Authority; www.nlga.org.
142. NOFMA - National Oak Flooring Manufacturers Association; (see NWFA).
143. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
144. NRCA - National Roofing Contractors Association; www.nrca.net.
145. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
146. NSF - NSF International; www.nsf.org.
147. NSI - Natural Stone Institute; www.naturalstoneinstitute.org.
148. NSPE - National Society of Professional Engineers; www.nspe.org.
149. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
150. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
151. NWFA - National Wood Flooring Association; www.nwfa.org.
152. NWRA - National Waste & Recycling Association; www.wasterecycling.org.
153. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
154. PDI - Plumbing & Drainage Institute; www.pdionline.org.
155. PLASA - PLASA; www.plasa.org.
156. PLIB - Pacific Lumber Inspection Bureau; www.plib.org.
157. PVCPA - Uni-Bell PVC Pipe Association; www.uni-bell.org.
158. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
159. RFCI - Resilient Floor Covering Institute; www.rfci.com.
160. RIS - Redwood Inspection Service; (see WWPA).
161. SAE - SAE International; www.sae.org.
162. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
163. SDI - Steel Deck Institute; www.sdi.org.
164. SDI - Steel Door Institute; www.steeldoor.org.
165. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (see ASCE).
167. SIA - Security Industry Association; www.securityindustry.org.
168. SJI - Steel Joist Institute; www.steeljoist.org.
169. SMA - Screen Manufacturers Association; www.smainfo.org.
170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
171. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
172. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
173. SPIB - Southern Pine Inspection Bureau; www.spib.org.
174. SPRI - Single Ply Roofing Industry; www.spri.org.
175. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
176. SSINA - Specialty Steel Industry of North America; www.ssina.com.
177. SSPC - SSPC: The Society for Protective Coatings; (see AMPP).
178. STI/SPFA - Steel Tank Institute/Steel Plate Fabricators Association; www.steeltank.com.
179. SWI - Steel Window Institute; www.steelwindows.com.
180. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
181. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
182. TCNA - Tile Council of North America, Inc.; www.tcnatile.com.
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.kbcdco.tema.org.
184. TIA - Telecommunications Industry Association (The); www.tiaonline.org.
185. TMS - The Masonry Society; www.masonrysociety.org.
186. TPI - Truss Plate Institute; www.tpinst.org.

187. TPI - Turfgrass Producers International; www.turfgrasssod.org.
188. TRI - Tile Roofing Industry Alliance; www.tileroofing.org.
189. UL - Underwriters Laboratories Inc.; www.ul.org.
190. UL LLC - UL LLC; www.ul.com.
191. USAV - USA Volleyball; www.usavolleyball.org.
192. USGBC - U.S. Green Building Council; www.usgbc.org.
193. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
194. WA - Wallcoverings Association; www.wallcoverings.org.
195. WCLIB - West Coast Lumber Inspection Bureau; (see PLIB).
196. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
197. WDMA - Window & Door Manufacturers Association; www.wdma.com.
198. WI - Woodwork Institute; www.woodworkinstitute.com.
199. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
200. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
   1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
   2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
   3. ICC - International Code Council; www.iccsafe.org.
   4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
   1. CPSC - U.S. Consumer Product Safety Commission; www.cpsc.gov.
   2. DOC - U.S. Department of Commerce; www.commerce.gov.
   3. DOD - U.S. Department of Defense; www.defense.gov.
   4. DOE - U.S. Department of Energy; www.energy.gov.
   5. DOJ - U.S. Department of Justice; www.ojp.usdoj.gov
   6. DOS - U.S. Department of State; www.state.gov.
   7. EPA - United States Environmental Protection Agency; www.epa.gov.
   8. FAA - Federal Aviation Administration; www.faa.gov.
   9. GPO - U.S. Government Publishing Office; www.gpo.gov.
   10. GSA - U.S. General Services Administration; www.gsa.gov.
   11. HUD - U.S. Department of Housing and Urban Development; www.hud.gov.
   12. LBNL - Lawrence Berkeley National Laboratory; Energy Technologies Area; www.lbl.gov/.
   13. NIST - National Institute of Standards and Technology; www.nist.gov.
   14. OSHA - Occupational Safety & Health Administration; www.osha.gov.
   15. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
   16. USACE - U.S. Army Corps of Engineers; www.usace.army.mil.
   17. USDA - U.S. Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
   18. USDA - U.S. Department of Agriculture; Rural Utilities Service; www.usda.gov.
   19. USP - U.S. Pharmacopeial Convention; www.usp.org.
   20. USPS - United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the standards and

regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from U.S. Government Publishing Office; www.govinfo.gov.
2. DOD - U.S. Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.dsp.dla.mil/Specs-Standards/.
3. DSCC - Defense Supply Center Columbus; (see FS).
4. FED-STD - Federal Standard; (see FS).
5. FS - Federal Specification; Available from DLA Document Services; www.dsp.dla.mil/Specs-Standards/.
    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from U.S. General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
6. MILSPEC - Military Specification and Standards; (see DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (see USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. BEARHFTI; California Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; (see BHGS).
2. BHGS; State of California Bureau of Household Goods and Services; (Formerly: California Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation); www.bhgs.dca.ca.gov.
3. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.oal.ca.gov/publications/ccr/.
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/Main-Page.aspx.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; https://tfsweb.tamu.edu/.

1.04 REFERENCE STANDARDS

A. MBMA - Metal Roofing Systems Design Manual; 2012.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

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SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary sanitary facilities.

B. Temporary Controls: Barriers, enclosures, and fencing.

C. Security requirements.

D. Vehicular access and parking.

E. Waste removal facilities and services.

F. Project signage

G. Lay-down and material storage areas.

1.02 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

1.03 INFORMATIONAL SUBMITTALS

A. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage, including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.

1. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

B. Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of the work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air filtration system discharge.
4. Other dust-control measures.
5. Waste management plan.

1.04 QUALITY ASSURANCE

A. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

B. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.05 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

1.06 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Use of permanent HVAC system.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Retain first option in subparagraph below for LEED-NC or LEED-CI Credit EQ 3.1 or insert another number. This requirement is only part of an Indoor Air Quality (IAQ) Management Plan required by this Credit for the construction and pre-occupancy phases of the building.
   3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures".

C. Air Filtration Units: HEPA primary and secondary filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

1.07 TEMPORARY UTILITIES

A. General: Install temporary service or connect to existing service.

B. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
   1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
      a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
      b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
   2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
   3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

C. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
   1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

D. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
   2. Install lighting for Project identification sign

1.08 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Use of building facilties is strictly prohibited.

C. Maintain daily in clean and sanitary condition.

1.09 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.10 FENCING

A. Construction: Contractor's option.

B. Provide 6 foot (1.8 m) high fence around location of elevator addition and associated site work as required to keep building occupants away from any potential danger, debris, and other construction activities.

1.11 INTERIOR ENCLOSURES

A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:

1.12 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Provide means of removing mud from vehicle wheels before entering streets.

E. Coordinate all construction personnel parking with Owner to determine authorized parking areas. Do not park in any handicapped or parking spaces close to the building which are strictly reserved for building occupants.

1.13 WASTE REMOVAL

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

C. Provide containers with lids. Remove trash from site daily.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.14 SUPPORT FACILITIES INSTALLATION

A. General: Comply with following:
   1. Personnel will be permited to use permanent facilities, under conditions acceptable to Owner.

B. Project Signs: Provide project signs as indicated per the attachment with this specification section. Provide one sign per school location. Unauthorized signs are not permitted.
   1. Temporary signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to project.

a. Provide temporary, directional signs for construction personnel and visitors.

2. Maintain and touchup signs so they are legible at all times.

C. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

1.15 SECURITY AND PROTECION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Division 01 Section "Summary."

B. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

C. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

D. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
3. Insulate partitions to control noise transmission to occupied areas.
4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
5. Protect air-handling equipment.
6. Provide walk-off mats at each entrance through temporary partition.

1.16 LAY-DOWN AND MATERIAL STORAGE AREAS.

A. Coordinate lay-down and storage locations directly with the Owner. Access and regular building maintenance and operations must be maintained at all times.

B. Potential area for lay-down space and materials storage is behind the Library in the north-west side of the property.

1.17 OPERATION, TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

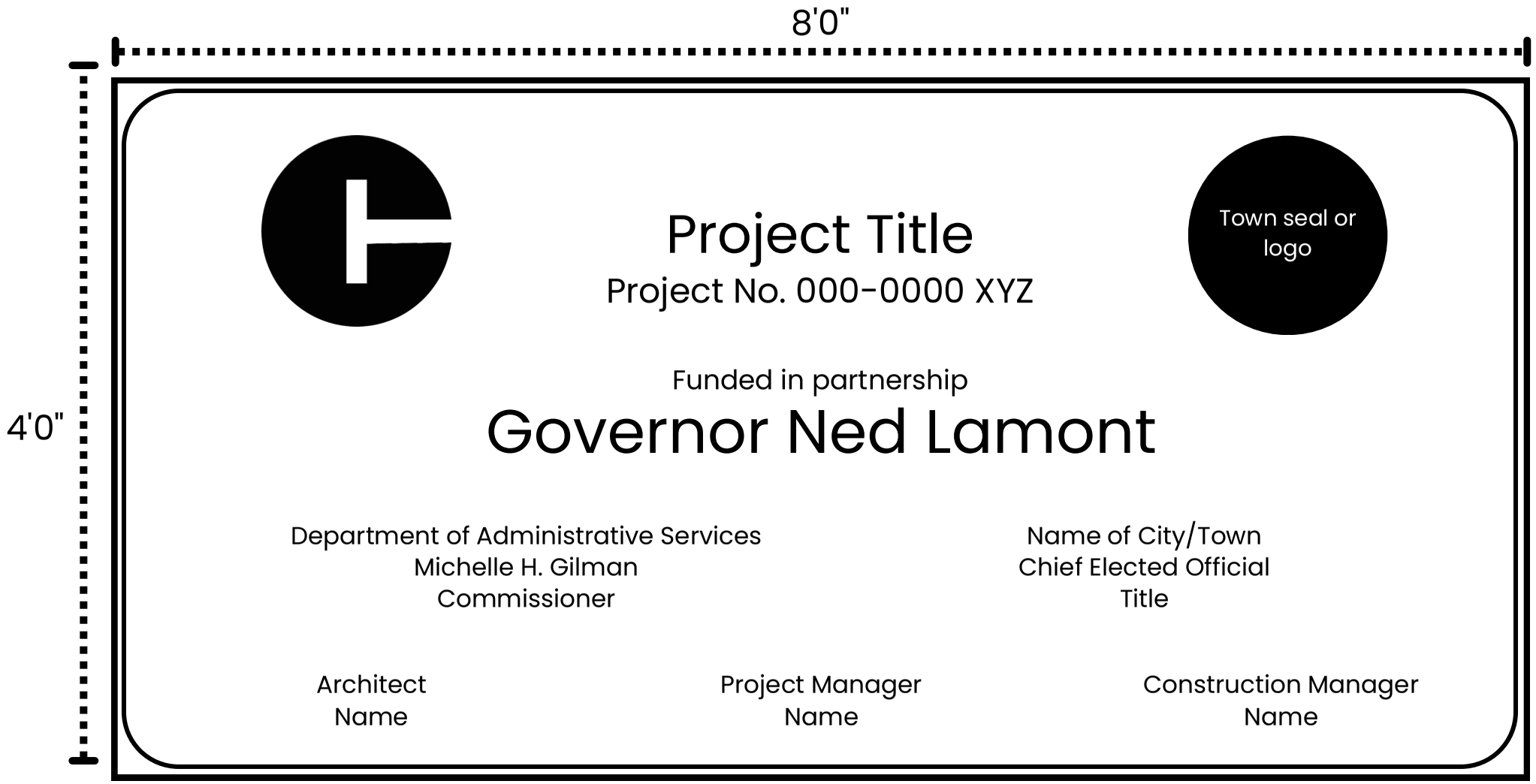
1.

2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

Form DAS-3021 Project Sign Template



Sign Panel: ¾" MDO-EXT-APA plywood supported with two 4x4 treated wood columns; secured 4' into grade; top of sign at 8'-0" above grade.
Colors: All letters and symbols are to be Connecticut blue (Hex #3371e7 / C 90 M 48 Y 0 K 0). The background will be white enamel. Back of plywood and support structure shall be painted matte black.
Typeface: Poppins is preferred; Arial is acceptable
Location: The sign must be located to be clearly visible to the public.
Timing: Install at the start of construction and remove at construction completion.

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SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENTATION CONTROLS PART 1 GENERAL

SUMMARY

1.01 SECTION INCLUDES:

A. Installation of temporary erosion and sedimentation control measures
B. Maintenance of temporary erosion and sedimentation control measures.
C. Monitoring of site condition and installation of supplemental temporary erosion and sedimentation control measures.
D. Sediment removal and disposal
E. Removal of temporary erosion and sedimentation control measures.
F. Monitoring, documentation, and recordkeeping.
G. Final cleanup.

1.02 EROSION AND SEDIMENT CONTROL TECHNIQUES INCLUDE, BUT ARE IN NO WAY LIMITED TO, SILT FENCE, HAY BALES, DRAINAGE STRUCTURE INSERTS/FILTERS, AND APPURTENANCES WHICH WILL ENSURE THAT EROSION AND SEDIMENT POLLUTION WILL BE EITHER ELIMINATED OR MAINTAINED WITHIN ACCEPTABLE LIMITS.

1.03 THE MEASURES SPECIFIED HEREIN ARE THE MINIMUM REQUIREMENTS WHICH CONTRACTOR SHALL COMPLY TO CONTROL EROSION AND SILTATION THROUGHOUT EXECUTION OF THE WORK. CONTRACTOR SHALL PROVIDE ADDITIONAL WORK IF NECESSARY TO CONTROL EROSION AND SILTATION THROUGHOUT THE DURATION OF THE CONSTRUCTION AS CONDITIONS DICTATE, OR AS DIRECTED BY ENGINEER.

1.04 CONTRACTOR SHALL COORDINATE WORK BETWEEN ALL CONTRACTORS, SECTIONS, AND TRADES REQUIRED FOR THE PROPER COMPLETION OF THE WORK.

1.05 CONTRACTOR IS RESPONSIBLE FOR ALL HEALTH AND SAFETY.

SUBMITTALS

2.01 SUBMIT MATERIAL SPECIFICATIONS AND SHOP DRAWINGS FOR ALL MATERIALS FURNISHED UNDER THIS SECTION.

REFERENCES

3.01 REFERENCE HEREIN TO ANY TECHNICAL SOCIETY, ORGANIZATION, GROUP OR REGULATION ARE MADE IN ACCORDANCE WITH THE FOLLOWING ABBREVIATIONS AND, UNLESS OTHERWISE NOTED OR SPECIFIED, ALL WORK UNDER THIS SECTION SHALL CONFORM TO THE LATEST EDITION AS APPLICABLE.

3.02 REGULATIONS OF CONNECTICUT STATE AGENCIES (RCSA)

A. 22a-315-10 through 19, Soil and Water Conservation

3.03 CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION (DEEP)

A. Connecticut Guidelines for Soil Erosion and Sediment Control, DEEP Bulletin 34, State of Connecticut Council on Soil and Water Conservation, 2002.

3.04 STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION (CONNDOT)

A. Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 817, 2016 and any supplements.

PERMIT CONDITIONS

4.01 CONTRACTOR AND SUBCONTRACTORS ARE BOUND TO COMPLY WITH ANY PROJECT-RELATED PERMITS OBTAINED BY OWNER OR ENGINEER FOR THE WORK OF THE PROJECT. SUCH PERMITS WILL AFFECT PERFORMANCE OF THE WORK, AND CONTRACTOR AND SUBCONTRACTORS ARE BOUND TO COMPLY WITH REQUIREMENTS OF SUCH PERMIT AND REPRESENTATIONS CONTAINED IN PERMIT APPLICATION AS THOUGH CONTRACTOR AND SUBCONTRATOR WERE THE PERMITTEE/PERMIT-HOLDER. REQUIREMENTS AND CONDITIONS SET FORTH IN OWNER OR ENGINEER- OBTAINED PROJECT-RELATED PERMITS AND PERMIT APPLICATIONS SHALL BE BINDING ON CONTRACTOR JUST AS ANY SPECIFICATION WOULD BE.

QUALITY CONTROL

5.01 CONTRACTOR SHALL BE RESPONSIBLE FOR THE TIMELY INSTALLATION AND MAINTENANCE OF ALL SEDIMENTATION CONTROL DEVICES NECESSARY TO PREVENT THE EROSION OF SOIL OR MOVEMENT OF SEDIMENT FROM CONSTRUCTION ACTIVITIES TO OFF-SITE AREAS VIA SURFACE RUNOFF OR UNDERGROUND DRAINAGE SYSTEMS. MEASURES IN ADDITION TO THOSE SHOWN ON THE DRAWINGS NECESSARY TO PREVENT THE MOVEMENT OF SEDIMENT OFF SITE SHALL BE INSTALLED, MAINTAINED, REMOVED, AND CLEANED UP AT THE EXPENSE OF CONTRACTOR.

5.02 WHERE ADDITIONAL EROSION AND SEDIMENTATION CONTROL MEASURES ARE REQUIRED BEYOND WHAT IS INDICATED ON THE DRAWINGS OR HEREIN, COMPLY WITH APPLICABLE SECTIONS OF THE CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL, DEEP BULLETIN 34, STATE OF CONNECTICUT COUNCIL ON SOIL AND WATER CONSERVATION, 2002.

5.03 IF APPLICABLE, COMPLY WITH APPLICABLE PROVISIONS OF THE CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION (DEEP) GENERAL PERMIT FOR THE DISCHARGE OF STORMWATER AND DEWATERING WASTEWATERS FROM CONSTRUCTION ACTIVITIES, (DEEP-WPED-GP-015), LATEST REVISION THEREOF. CONDITIONS OF SUCH GENERAL PERMIT, OTHER CONDITIONS OF APPROVAL OR AUTHORIZATIONS, AND ASSOCIATED STORMWATER POLLUTION CONTROL PLAN (SWPCP) SHALL BECOME PART OF THE CONTRACT DOCUMENTS.

5.04 ENGINEER HAS THE AUTHORITY TO ORDER IMMEDIATE, ADDITIONAL, TEMPORARY CONTROL MEASURES TO PREVENT CONTAMINATION OF ADJACENT STREAMS OR OTHER WATERCOURSES, OR OTHER AREAS OF WATER IMPOUNDMENT AND DAMAGE BY EROSION.

5.05 IF ENGINEER OBSERVES CONSTRUCTION PROCEDURES AND OPERATIONS THAT JEOPARDIZE EROSION CONTROL PROVISIONS, ENGINEER WILL NOTIFY CONTRACTOR. IF SUCH CONSTRUCTION PROCEDURES AND OPERATIONS ARE NOT CORRECTED PROMPTLY, ENGINEER MAY SUSPEND THE PERFORMANCE OF ANY OR ALL CONSTRUCTION UNTIL CORRECTIONS HAVE BEEN MADE, AND SUCH SUSPENSION SHALL NOT BE THE BASIS OF ANY CLAIM BY CONTRACTOR FOR ADDITIONAL COMPENSATION, NOR FOR AN EXTENSION OF TIME TO COMPLETE THE WORK.

5.06 SHOULD CONSTRUCTION MATERIALS BE WASHED AWAY OR OTHERWISE RENDERED INEFFECTIVE IN THE OPINION OF ENGINEER DURING THE PROGRESSION OF THE WORK, CONTRACTOR SHALL REPLACE THE INSTALLATIONS AT NO ADDITIONAL COST TO THE OWNER.

COORDINATION WITH PERMANENT EROSION CONTROL PROVISIONS

6.01 COORDINATE TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES WITH PERMANENT EROSION CONTROL FEATURES TO THE EXTENT PRACTICAL TO ENSURE ECONOMICAL, EFFECTIVE AND CONTINUOUS EROSION CONTROL THROUGHOUT CONSTRUCTION AND POST-CONSTRUCTION PERIODS.

PART 2 PRODUCTS

7.01 HAY BALES

7.02 HAY BALES SHALL BE MADE OF CUT HAY WITH FORTY (40) POUNDS MINIMUM WEIGHT AND 120 POUNDS MAXIMUM WEIGHT. BALES SHALL BE FREE OF ROTTEN OR DEGRADED HAY, SIGNIFICANT SPLITS OR VOIDS. HAY BALES SHALL BE HELD TOGETHER WITH A MINIMUM OF TWO BANDS MADE OF EITHER WIRE OR HEAVY TWINE.

7.03 STAKES TO ANCHOR THE BALES SHALL BE A MINIMUM OF 36 INCHES (914.4 MM) LONG AND MADE OF HARDWOOD WITH A MINIMUM DIMENSION OF 1½-INCH BY 1½-INCH NORMAL SIZE. METAL STAKES MAY BE USED INSTEAD OF WOODEN STAKES. METAL STAKES SHALL BE ROUND, "U," "T," "L," OR "C" SHAPED WITH A MINIMUM WEIGHT OF 0.5 POUNDS PER FOOT.

7.04 REPLACE INDIVIDUAL HAY BALES UPON LOSS OF 30% OF ORIGINAL MASS OR VOLUME, WHICHEVER IS LESS.

SILT FENCE

8.01 WOVEN POLYPROPYLENE GEOTEXTILE HAVING A MINIMUM WEIGHT OF 3.1 OUNCES PER SQUARE YARD CONFORMING TO THE FOLLOWING:

A. Mechanical and Physical Properties of Silt Fence Geotextile

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Weight	ASTM D 3776	oz/yd2	5.6
Grab Tensile Strength	ASTM D 4632	Pounds	60
Grab Elongation (Max percent)	ASTM D 4632	Percent (%)	15–30
Trapezoidal Tear	ASTM D 4533	Pounds	30
Puncture	ASTM D 4833	Pounds	30
Mullen Burst	ASTM D 3786	psi	150–200
Permittivity	ASTM D 4491	Sec-1	0.15
Flow Rate	ASTM D 4491	gal/min/ft2	15–20
Apparent Opening Size	ASTM D4751	(U.S. Sieve)	30–35
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70

8.02 SILT FENCE SHALL BE CONSTRUCTED OF A MINIMUM THIRTY-SIX (36) INCH WIDE CONTINUOUS WOVEN GEOTEXTILE. THE MATERIAL SHALL HAVE A HIGH SEDIMENT FILTRATION CAPACITY, HIGH SLURRY FLOW AND

A. minimum clogging characteristics. Edges of the fabric shall be finished to prevent the outer fibers from pulling away from the geotextile. Geotextile shall be free of defects or flaws that significantly affect its physical and/or filtering properties.

PART 1 GENERAL

8.03 FABRIC SHALL BE SECURELY FASTENED TO STAKES A MINIMUM OF 42 INCHES (1066.8 MM) LONG AND MADE OF HARDWOOD WITH A MINIMUM DIMENSION OF 1½ INCH BY 1½ INCH NORMAL SIZE SUCH THAT A 6 TO 8 INCH (203.2 MM) LENGTH OF FABRIC IS UNATTACHED AT THE BOTTOM FOR ANCHORAGE IN SOIL. METAL STAKES MAY BE USED INSTEAD OF WOODEN STAKES. METAL STAKES SHALL BE ROUND, "U," "T," "L," OR "C" SHAPED WITH A MINIMUM WEIGHT OF 0.5 POUNDS PER FOOT. STAKES SHALL BE SPACED NOT GREATER THAN TEN FEET APART. WHEN REQUIRED, WIRE OR ANOTHER TYPE OF SUPPORT SHALL BE CONSTRUCTED BETWEEN THE GEOTEXTILE FABRIC AND THE POSTS TO IMPROVE THE LOAD CARRYING CAPACITY OF THE SILT FENCE.

CATCH BASIN INSERT

9.01 MANUFACTURED "BAG TYPE" CATCH BASIN INSERT OF WOVEN POLYPROPYLENE GEOTEXTILE WITH INTEGRAL LIFTING LOOPS OR STRAPS CONFORMING TO THE FOLLOWING:

A. Mechanical and Physical Properties of Catch Basin Insert

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Grab Tensile Strength	ASTM D 4632	Pounds	315
Grab Elongation (Max percent)	ASTM D 4632	Percent (%)	30
Trapezoidal Tear	ASTM D 4533	Pounds	40x50 (min)
Puncture	ASTM D 4833	Pounds	135 (min)
Mullen Burst	ASTM D 3786	psi	420 (min)
Permittivity	ASTM D 4491	gal/min/sq ft	0.7
Flow Rate	ASTM D 4491	gal/min/ft2	50-200
Apparent Opening Size	ASTM D4751	(U.S. Sieve)	20-40
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	80 (min)

NOTE: CATCH BASIN INSERTS FOR CATCH BASINS WITH CURB OPENINGS SHALL BE EQUIPPED WITH INTEGRAL CURB DEFLECTOR.

PART 3 EXECUTION

11.01 GENERAL

11.02 REFERENCE STANDARDS

A. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile; 2021a.

11.03 INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES AS SHOWN ON THE DRAWINGS PRIOR TO ANY SITE DISTURBANCE.

11.04 NO WORK SHALL BE STARTED UNTIL EROSION CONTROL SCHEDULES AND INSTALLATION HAVE BEEN ACCEPTED BY ENGINEER.

11.05 ENGINEER HAS THE AUTHORITY TO CONTROL THE SURFACE AREA OF EACH MATERIAL EXPOSED BY CONSTRUCTION OPERATIONS AND TO DIRECT CONTRACTOR TO IMMEDIATELY PROVIDE PERMANENT OR TEMPORARY POLLUTION CONTROL MEASURES TO PREVENT CONTAMINATION OF ADJACENT WATERCOURSES OR OTHER AREAS OF WATER

A. impoundment. Every effort shall be made by Contractor to prevent erosion on the site and abutting properties or areas.

11.06 CONTRACTOR SHALL CONSTRUCT ALL PERMANENT EROSION AND SEDIMENT CONTROL FEATURES AT THE EARLIEST PRACTICAL TIME AS OUTLINED IN THE ACCEPTED SCHEDULE. TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE USED TO CORRECT CONDITIONS THAT DEVELOP DURING CONSTRUCTION, WHICH WERE UNFORESEEN, BUT ARE NEEDED PRIOR TO INSTALLATION OF PERMANENT CONTROL FEATURES, OR THAT ARE NEEDED TEMPORARILY TO CONTROL EROSION OR SEDIMENTATION WHICH DEVELOPS DURING CONSTRUCTION OPERATIONS.

11.07 CONTRACTOR SHALL LIMIT AS NECESSARY THE SURFACE AREA OF THE EARTH MATERIAL EXPOSED TO SUFFICIENTLY MAINTAIN AND PROTECT THE SLOPES TO PREVENT POLLUTION. WHERE EROSION IS LIKELY TO BE A PROBLEM, CLEARING AND GRUBBING OPERATIONS SHALL BE SCHEDULED AND PERFORMED SO THAT GRADING OPERATIONS AND PERMANENT EROSION AND SEDIMENT CONTROL FEATURES CAN FOLLOW IMMEDIATELY THEREAFTER, IF CONDITIONS PERMIT; OTHERWISE, TEMPORARY CONTROL MEASURES WILL BE REQUIRED BETWEEN SUCCESSIVE CONSTRUCTION STAGES.

11.08 EROSION CONTROL MEASURES SHALL BE MAINTAINED BY CONTRACTOR, AND HE SHALL REMOVE SUCH INSTALLATIONS ONLY UPON COMPLETION OF THE WORK AND THE SITE IS STABILIZED OR WHEN AUTHORIZED TO DO SO BY ENGINEER.

11.09 CONTRACTOR SHALL OPERATE ALL EQUIPMENT AND PERFORM ALL CONSTRUCTION OPERATIONS SO AS TO MINIMIZE POLLUTION. CONTRACTOR SHALL CEASE ANY OF HIS OPERATIONS, WHICH WILL INCREASE POLLUTION DURING RAINSTORMS.

11.10 FAILURE BY CONTRACTOR TO CONTROL EROSION, POLLUTION, AND SILTATION SHALL BE CAUSE FOR THE ENGINEER TO EMPLOY OUTSIDE ASSISTANCE TO PROVIDE THE NECESSARY CORRECTIVE MEASURES. THE COST OF SUCH ASSISTANCE, INCLUDING ENGINEERING COSTS, WILL BE CHARGED TO CONTRACTOR AND APPROPRIATE DEDUCTIONS MADE TO CONTRACTOR'S PAYMENT.

HAY BALES

12.01 HAY BALES SHALL BE POSITIONED AS INDICATED ON THE DRAWINGS AND/OR AS NECESSARY TO PREVENT OFF SITE MOVEMENT OF SEDIMENT PRODUCED BY, OR AS A RESULT OF, CONSTRUCTION ACTIVITIES, OR AS DIRECT BY THE ENGINEER.

12.02 HAY BALES SHALL BE UTILIZED ON ALL CATCH BASINS AND DRAINAGE FACILITIES ON THE PROJECT SITE TO PREVENT THE ENTRY OF SEDIMENTS OR OTHER DEBRIS. MAINTAIN SUCH PROTECTION THROUGHOUT EXECUTION OF THE WORK UNTIL SUCH DRAINAGE FACILITIES HAVE BEEN ABANDONED/REMOVED.

12.03 BALES SHALL BE PLACED LENGTHWISE WITH ENDS OF ADJACENT BALES TIGHTLY ABUTTING ONE ANOTHER TO FORM A CONTINUOUS BARRIER. BALES SHALL BE ENTRENCHED TO A DEPTH OF 4 INCHES (101.6 MM) AND BACKFILLED, WITH THE BACKFILL PLACED TOWARD THE POTENTIAL SOURCE OF RUNOFF AND SEDIMENT. ALL BALES SHALL BE INSTALLED SO THAT BINDINGS ARE ORIENTED AROUND THE SIDES RATHER THAN ALONG THE TOPS AND BOTTOMS. EACH BALE SHALL BE ANCHORED WITH A MINIMUM OF TWO STAKES, DRIVING THE FIRST STAKE IN EACH BALE TOWARDS THE PREVIOUSLY LAID BALE TO DRIVE THE BALES TOGETHER. STAKES MUST BE DRIVEN A MINIMUM OF 18 INCHES (457.2 MM) INTO THE GROUND. LOOSE HAY SHALL BE INSERTED BETWEEN BALES AS REQUIRED TO PREVENT WATER FROM ESCAPING BETWEEN THE BALES.

GEOTEXTILE SILT FENCE

13.01 INSTALL A FILTER FABRIC SILT FENCE PRIOR TO CONSTRUCTION AND REMOVE AFTER FULL SURFACE RESTORATION HAS BEEN ACHIEVED. INSTALL SILT FENCE AS INDICATED ON THE DRAWINGS AND/OR AS NECESSARY TO PREVENT OFF SITE MOVEMENT OF SEDIMENT PRODUCED BY, OR AS A RESULT OF, CONSTRUCTION ACTIVITIES.

13.02 INSTALL AS FOLLOWS:

A. Hand shovel excavate a small trench a minimum of six inches wide by six inches deep on the upslope side of the desired fence line location.

B. Unroll the siltation fence system, position the post in the back of the trench (downhill side), and hammer the post at least 12 inches (304.8 mm) into the original ground.

C. Fabric rolls shall be spliced at posts. The fabric shall be overlapped six inches, folded over and securely fastened to posts.

D. Lay the bottom 6 inches (152.4 mm) of the fabric into the trench to prevent undermining by storm water run-off.

E. Backfill the trench and compact. Compaction is necessary to prevent the run-off from eroding the backfill.

F. For slope and swale installations, extend the ends of the trench sufficiently up slope such that the bottom end of the fence will be higher than the top of the lowest portion of the fence.

CATCH BASIN INLET SEDIMENT CONTROL

14.01 INSTALL CATCH BASIN INLET SEDIMENT CONTROL DEVICES IN EACH EXITING CATCH BASIN AS LONG AS IT REMAINS IN USE IN ACCORDANCE WITH MANUFACTURER'S GUIDELINES AT THE LOCATIONS SHOWN ON THE DRAWINGS.

14.02 A CATCH BASIN SEDIMENT FILTER SHALL BE INSTALLED AND CHANGED/CLEANED PER THE MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE (INSERT NAME), DURING CONSTRUCTION.

14.03 NEW CATCH BASINS SHALL HAVE A FILTER INSTALLED IMMEDIATELY UPON COMPLETION OF CONSTRUCTION. IN ADDITION, A HAY BALE, OR SIMILAR, BARRIER SHALL BE INSTALLED AROUND THE NEW BASIN AND MAINTAINED IN PLACE UNTIL BINDER IS PLACED OR DISTURBED AREAS DRAINING TO IT ARE STABILIZED.

14.04 CATCH BASINS WITH CURB OPENINGS SHALL HAVE FILTER FABRIC COVERING THE OPENING AND THE EDGES OF THE FABRIC SHALL BE SECURED. A FILTER BOOM SHALL ALSO BE PLACED OVER THE OPENING.

INSPECTIONS AND MAINTENANCE

15.01 CONTRACTOR IS RESPONSIBLE TO MAINTAIN THE SEDIMENT AND EROSION CONTROL FEATURES AT ALL TIMES THROUGHOUT THE PROJECT DURATION AND UNTIL THE COMPLETION CERTIFICATION AND APPROVAL HAS BEEN ISSUED.

15.02 REGULAR EROSION AND SEDIMENT CONTROL SYSTEM INSPECTIONS SHALL BE CONDUCTED BY CONTRACTOR THROUGHOUT THE PROJECT DURATION. AT A MINIMUM, CONTRACTOR SHALL CONDUCT DAILY INSPECTIONS AND MAINTAIN EROSION CONTROL SYSTEMS IN GOOD OPERATING CONDITION. REPORT THE RESULTS OF THE INSPECTION AND THE RECOMMENDED MAINTENANCE AND/OR REPAIR REQUIREMENTS TO ENGINEER.

15.03 IN THE EVENT THAT THE SEDIMENTATION AND EROSION CONTROL MEASURES EMPLOYED BY CONTRACTOR PROVE TO BE INADEQUATE AS DETERMINED BY THE ENGINEER, CONTRACTOR SHALL ADJUST OPERATIONS TO THE EXTENT NECESSARY TO PREVENT EROSION AND SEDIMENT TRANSPORT.

15.04 SURFACE WATER SHALL BE PUMPED TO MAINTAIN EXCAVATIONS FREE OF WATER. COMPLY WITH APPLICABLE REQUIREMENTS OF THE CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION, SPECIFICALLY THOSE REQUIREMENTS RELATED TO THE MANAGEMENT OF STORMWATER AND DEWATERING WASTEWATERS ASSOCIATED WITH CONSTRUCTION ACTIVITIES.

15.05 HAY BALES AND/OR SILT FENCES.

A. Remove accumulated sediment once it builds up to one-half of the height of the bale or fabric.

B. Replace damaged or degraded bales as necessary or when directed by the Engineer.

C. Replace damaged fabric, or patch with a 2-ft minimum overlap. Overlaps may only be made at fence posts.

D. Make other repairs as necessary to ensure that the bales/fence is filtering all runoff.

15.06 CLEAN CATCH BASIN INLET SEDIMENT CONTROL DEVICES IN ACCORDANCE WITH MANUFACTURER'S GUIDELINES.

15.07 ANY CATCH BASINS THAT COLLECT SEDIMENT AS A RESULT OF CONTRACTOR'S WORK SHALL BE THOROUGHLY CLEANED OUT BY CONTRACTOR.

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SECTION 01 57 14
TEMPORARY DUST CONTROL

SECTION INCLUDES

1.01 SECTION 015714 TEMPORARY DUST CONTROL

A. Furnishing and spreading water on the subgrade, or in other areas of a Project Site or associated off-site areas, for the purpose of controlling dust emissions.

B. The requirements set forth in this section of the specifications apply to all phases and areas of construction.

C. Contractor is responsible for all health and safety.

REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Regulations of Connecticut State Agencies (RCSA)
   1. RCSA Section 22a-174-1 through 43, Abatement of Air Pollution.

C. ASTM International (ASTM)
   1. ASTM D98, Standard Specification for Calcium Chloride. PART 2 PRODUCTS

MATERIALS

A. Only water is approved for dust control. No asphalt or petroleum-based products may be utilized for dust control.
   1. Water used shall be clean, non-polluted water obtained from sources approved by Engineer. PART 3 EXECUTION

GENERAL

A. Dust control shall be the responsibility of Contractor and dust control operations shall meet the requirements of the State of Connecticut Department of Environmental Protection.

B. Construction sequencing shall be organized and conducted in a manner to leave existing pavement or ground coverings in place until just prior to earth excavation for the purpose of minimizing the migration of dust beyond the Project Limits into the surrounding area.

C. Engineer reserves the right to conduct active dust monitoring using visual methods and may utilize particulate measurement equipment during the course of the work. If the amount of fugitive dust and/or particulate generated during the work is deemed unacceptable in the Engineer’s judgment or exceeds baseline Project Site conditions at Engineer’s monitoring locations, Engineer may require Contractor to stop work and implement corrective measures. No claim for delay will be considered for work stoppage based upon the results of Engineer’s active dust monitoring results.

D. Stockpiled materials from which particle have the potential of becoming airborne shall be securely covered with a temporary waterproof covering made of polyethylene, polypropylene, hypalon, or approved equal. The covers must be in place at all times when work with the stockpiles is not occurring.

E. Subcontractor shall sweep all adjacent roads and neighboring parking lots and driveways that are impacted by the work. Whenever dirt is tracked from the site it shall be cleaned as necessary to prevent it from becoming a nuisance or hazard. At a minimum, adjacent streets shall be swept once per week.

WATER

A. The application of water shall be under the control of Engineer at all times. It shall be applied only at the locations, and at such times, and in the amount as may be directed by Engineer. Quantities of water wasted or applied without authorization will not be paid for.

B. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding or pollution.

C. Contractor shall have available and maintain in an operable condition at all times, sufficient equipment for the purpose of applying water for dust control.

D. Watering equipment shall consist of pipelines, tanks, tank trucks, distributors, pumps, meters, hose or other devices, approved by Engineer, which are capable of applying a uniform spread of water over the surface. A suitable device for a positive shut-off and for regulating the flow of water shall be located so as to permit positive operator control.

E. Applications of water for dust suppression include, but are not necessarily limited to, the following:
   1. Demolition activities, material handling, material processing, and loading.
   2. Earthwork.
   3. Open excavation faces and dust-prone areas of the work.
   4. Temporary access roads and roadway surfaces within and around the Project Site.

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. The Work of This Section Includes: Administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:
   1. Section 01 1000 "Summary" for Contractor requirements related to Owner-furnished products.
   2. Section 01 2500 "Substitution Procedures" for requests for substitutions.
   3. Section 01 4200 "References" for applicable industry standards for products specified.
   4. Section 01 7700 "Closeout Procedures" for submitting warranties.

1.02 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products unless otherwise indicated.
   3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
   1. Evaluating Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:

1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
2. Data indicating compliance with the requirements specified in "Comparable Products" Article.

E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 01 3300 "Submittal Procedures."

F. Substitution: Refer to Section 01 2500 "Substitution Procedures" for definition and limitations on substitutions.

1.03 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
1. Resolution of Compatibility Disputes between Multiple Contractors:
a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products will be used.

1.04 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

C. Storage:
1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.06 PRODUCT WARRANTIES

A. Warranties specified in other Sections are to be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of Owner or endorsed by manufacturer to Owner.
   2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of Owner or endorsed by manufacturer to Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
   3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 7700 "Closeout Procedures."

PART 2 PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," Architect will make selection.
   5. Descriptive, performance, and reference standard requirements in Specifications establish salient characteristics of products.
   6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
      a. Submit additional documentation required by Architect through General Contractor to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by Architect, whose determination is final.

B. Product Selection Procedures:
   1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
      a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
3. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
    a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
    b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
4. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
    a. For approval of products by unnamed manufacturers, comply with requirements in Section 01 2500 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
    1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 2500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.02 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
    1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
    2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
    3. Evidence that proposed product provides specified warranty.
    4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
    5. Samples, if requested.

B. Submittal Requirements, Single-Step Process: When acceptable to Architect, incorporate specified submittal requirements of individual Specification Section in combined submittal for

comparable products. Approval by Architect of Contractor's request for use of comparable product and of individual submittal requirements will also satisfy other submittal requirements.

PART 3 EXECUTION (NOT USED)

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SECTION 01 73 00
EXECUTION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering.
   3. Installation.
   4. Cutting and patching.
   5. Coordination of Owner's portion of the Work.
   6. Progress cleaning.
   7. Starting and adjusting.
   8. Protection of installed construction.
   9. Correction of the Work.

B. Related Requirements:
   1. Section 01 1000 "Summary" for coordination of items to be salvaged and reinstalled and limits on use of Project site.
   2. Section 01 3300 "Submittal Procedures" for submitting surveys.
   3. Section 01 7700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
   4. Section 02 4100 "Selective Demolition" for demolition and removal of selected portions of the building.

1.02 PREINSTALLATION MEETINGS

A. The contractor is to conduct as many preinstallation meetings as required to ensure that all sub-contractors are aware that the building is a public building and needs to remain safe and in operation during construction.

B. Cutting and Patching Conference: Conduct conference at Project site.
   1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect and Contractors of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
      a. Contractor's superintendent.
      b. Trade supervisor responsible for cutting operations.
      c. Trade supervisor(s) responsible for patching of each type of substrate.
      d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.
   2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

C. Layout Conference: Conduct conference at Project site.
   1. Prior to constructing new elevator, stair, interior partitions, and structural columns, review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect and Contractors of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:
      a. Contractor's superintendent.
      b. Contractor's personnel responsible for performing Project surveying and layout.

2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
3. Review requirements for including layouts on Shop Drawings and other submittals.
4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 PRODUCTS – NOT USED.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
   1. Examine existing roofing exterior penetrations of mechanical, plumbing, and any electrical systems to verify actual locations of connections before roofing replacement.
   2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

B. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect through General Contractor in accordance with requirements in Section 01 3100 "Project Management and Coordination."

3.03 INSTALLATION

A. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

B. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.

C. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

D. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels. Any tools utilizing open flames are strictly prohibited.

E. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.

F. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

3.04 CUTTING AND PATCHING

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of Work as required to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 01 1000 "Summary."

F. Cutting: Cut in-place construction by sawing, grinding, and similar operations using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations. Absolutely no torch or open flame cutting is to be used.

G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
   3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
      a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
   4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

3.05 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
   1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
   2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
   3. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces in accordance with written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 7419 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.06 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

3.07 CORRECTION OF THE WORK

A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
   1. Aluminum and plastic beverage containers.
   2. Corrugated cardboard.
   3. Wood pallets.
   4. Clean dimensional wood.
   5. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.

E. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

F. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.

G. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

H. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: List of items to be salvaged from the existing building for relocation in project or for Owner.

B. Section 01 6000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

1.03 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Submit Waste Management Plan within 10 calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner; submit projection of all trash and waste that will require disposal and alternatives to landfilling.

C. Waste Management Plan: Include the following information:
   1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
   2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).

D. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
   1. Submit Report on a form acceptable to Owner.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01 1000 for list of items to be salvaged from the existing building for relocation in project or for Owner.

B. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

C. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Prebid meeting.
   2. Preconstruction meeting.
   3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

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SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final Completion procedures.
   3. List of incomplete items.
   4. Submittal of Project warranties.
   5. Final cleaning.

B. Related Requirements:
   1. Section 01 2900 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
   2. Section 01 3233 "Photographic Documentation" for submitting Final Completion construction photographic documentation.
   3. Section 01 7823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.

1.02 DEFINITIONS

A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.04 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.05 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Advise Owner of pending insurance changeover requirements.

C. Obtain and submit releases permitting Owner unrestricted use of the work and access to services and utilities. Include occupancy permits, operating certificates and similar releases.

D. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.

E. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.

F. Coordinate first subparagraph below with Division 08 door hardware Sections. Revise if Owner makes final changeover or if key-control system manufacturer delivers keys directly to Owner.

G. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

H. Complete startup testing of systems.

I. Submit test/adjust/balance records.

J. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

K. Advise Owner of changeover in heat and other utilities.

L. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

M. Delete both subparagraphs below if Project does not include these items or if they are delayed until final acceptance.

N. Complete final cleaning requirements, including touchup painting.

O. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

P. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

Q. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of [10] days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect, and General Contractor will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
   1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
   2. Results of completed inspection will form the basis of requirements for Final Completion.

1.06 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
   1. Submit a final Application for Payment in accordance with Section 01 2900 "Payment Procedures."
   2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list will state that each item has been completed or otherwise resolved for acceptance.
   3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
   4. Submit Final Completion photographic documentation.
   5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment and systems.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect, and Contractor will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
   1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.07 LIST OF INCOMPLETE ITEMS

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize roof area by wing or space below.
   2. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Architect.
      d. Name of Contractor.
      e. Page number.
   3. Submit list of incomplete items in the following format:
      a. MS Excel Electronic File: Architect will return annotated file.
      b. PDF Electronic File: Architect will return annotated file.
      c. Web-Based Project Software Upload: If required by Owner, utilize software feature for creating and updating list of incomplete items (punch list).

1.08 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

D. Warranties in Paper Form:
   1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
   1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 EXECUTION

3.01 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
   1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
      a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
      b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
      c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
      d. Remove tools, construction equipment, machinery, and surplus material from Project site.
      e. Remove snow and ice to provide safe access to building.
      f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
      g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
      h. Sweep concrete floors broom clean in unoccupied spaces.
      i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
      j. Remove labels that are not permanent.
      k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
         1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
      l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
      m. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
      n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
      o. First subparagraph below describes a major work item that requires coordination with other closeout procedures.
      p. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
         1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning.
      q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
      r. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste-disposal requirements in Section 01 5000 "Temporary Facilities and Controls” and Section 01 7419 "Construction Waste Management and Disposal."

3.02 CORRECTION OF THE WORK

A. Complete repair and restoration operations required by "Correction of the Work" Article in Section 01 7300 "Execution" before requesting inspection for determination of Substantial Completion.

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SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory manuals.
   2. Emergency manuals
   3. Operation manuals for systems, subsystems and equipment
   4. Product maintenance manuals.
   5. Systems and equipment maintenance manuals

B. Related Requirements:
   1. Section 01 3300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.03 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.04 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

B. Format: Submit operation and maintenance manuals in the following format:
   1. Submit by emailing to PDF to Architect and Owner.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion.
   1. Correct or revise each manual to comply with Architect's and Owner's comments. Submit copies of each corrected manual within [15] days of receipt of Architect's and Owner's comments.

D. Comply with Section 01 7700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.05 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
   1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
   2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
   1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
      a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
      b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
   2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
   3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
   4. Supplementary Prepared on 8-1/2-by-11-inch white bond paper.
   5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
      a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
      b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.06 REQUIREMENTS FOR EMERGENCY, OPERATION AND MAINTENANCE MANUALS

A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
   1. Title page.
   2. Table of contents.
   3. Manual contents.

B. Title Page: Include the following information:
   1. Subject matter included in manual.
   2. Name and address of Project.
   3. Name and address of Owner.
   4. Date of submittal.
   5. Name and contact information for Contractor.
   6. Name and contact information for Architect.
   7. Cross-reference to related systems in other operation and maintenance manuals.

C. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

D. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

E. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

F. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

G. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.07 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

1.08 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Operating standards.
3. Operating procedures.
4. Operating logs.
5. Wiring diagrams.
6. Control diagrams.
7. Piped system diagrams.
8. Precautions against improper use.
9. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:
   1. Product name and model number. Use designations for products indicated on Contract Documents.
   2. Manufacturer's name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.
   6. Limiting conditions.
   7. Performance curves.
   8. Engineering data and tests.
   9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:
   1. Startup procedures.
   2. Equipment or system break-in procedures.
   3. Routine and normal operating instructions.
   4. Regulation and control procedures.
   5. Instructions on stopping.
   6. Normal shutdown instructions.
   7. Seasonal and weekend operating instructions.
   8. Required sequences for electric or electronic systems.
   9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

1.09 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   4. Material and chemical composition.
   5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
   2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Building demolition excluding removal of hazardous materials and toxic substances.

B. Selective demolition of building elements for alteration purposes.

C. Salvage of existing items to be reused or recycled.

1.03 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS: Site fences, security, protective barriers, and waste removal.

C. Section 01 57 13 - Temporary Erosion and Sediment Control.

D. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

1.04 DEFINITIONS

A. Demolition: Dismantle, raze, destroy or wreck any building or structure or any part thereof.

B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.

C. Remove and Salvage: Detach or dismantle items from existing construction in a manner to prevent damage. Clean, package, label and deliver salvaged items to Owner in ready-for-reuse condition.

D. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.

E. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise `indicated to be salvaged or reinstalled.

F. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.05 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.06 PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at Project site.
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.

3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Engineering Survey: Submit engineering survey of condition of building.

C. Site Plan: Indicate:
1. Areas for temporary construction and field offices.

D. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

E. Schedule of Selective Demolition Activities: Indicate the following:
1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and other tenants' on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

F. Closeout Submittals: Inventory: Submit a list of items that have been removed and salvaged.

1.08 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is located elsewhere in the Project Manual for review and use. Examine report to become aware of locations where hazardous materials are present.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.

1.09 COORDINATION

A.

PART 2 PRODUCTS

2.01 PRODUCTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
   1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

3.02 UTILITY SERVICES AND MECHANICAL / ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. Arrange to shut off utilities with utility companies.
   2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
   3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
      a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
      b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
      c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
      d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
      e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
      f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
      g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.03 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
   1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.04 DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
   5. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
   8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   9. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:
   1. Clean salvaged items.

D. Removed and Reinstalled Items:
   1. Clean and repair items to functional condition adequate for intended reuse.
   2. Pack or crate items after cleaning and repairing. Identify contents of containers.

3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

3.06 DEBRIS AND WASTE REMOVAL

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
   4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

E.

F. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

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SECTION 02 41 23
SITE DEMOLITION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.

1.02 SUMMARY

A. Section includes:
   1. General Site Demolition.
   2. Demolition of site structures, pavement, curbing, and similar site improvements.
   3. Filling of voids and excavations resulting from site demolition.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.03 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).
   1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. State of Connecticut.
   1. State of Connecticut Solid Waste Management Regulations, Section 22a-209 including any amendments thereto.

1.04 DEFINITIONS

A. Demolition: Any operation including the dismantling or wrecking of a structure, assembly, appurtenance, or any portion thereof, including major and minor components, parts, and systems. Demolition shall be inclusive of the removal, handing, processing, segregation, loading, and proper off-site disposition of materials. Demolition shall be interpreted as complete and total removal unless otherwise indicated. The term Remove shall be synonymous with Demolition.

B. Bulky Waste: Land clearing debris and non-contaminated or hazardous waste material resulting directly from demolition activities other than Clean Fill, including such materials as tree stumps, tree tops, concrete, wood, brick, plaster, roofing materials, wallboard, metals, carpeting,
   1. insulation, furniture, and furnishings. Bulky Waste shall include Construction and Demolition Debris and Construction and Demolition Waste.

1.05 SAFETY

A. Conduct the work of this Section in conformance with applicable regulations, including those relating to warning signs, excavation safety, sheeting, shoring, and stabilization.

B. Provide and maintain barricades, signs, lights, etc., required for the protection of personnel, materials and property. Temporary barricades, etc. shall conform all applicable codes and regulations, and shall be lighted at night with lanterns, flares and reflectorized paint as required for safety. Adapt barricades, signs, lights, etc. to evolving site conditions throughout the progress of the work.

C. Provide other safety devices as required, including adaptation of such safety devices to changing site conditions, to prevent unauthorized entry to construction areas and open excavations. Provide warning signs and other temporary construction safety devices necessary for proper completion of the work in compliance with applicable safety regulations.

D. Contractor shall properly design and furnish all labor, materials, equipment, and tools necessary to construct permanent or temporary excavation support systems, including, but not necessarily limited to, sheet piling, trench shields, trench boxes, timber trench shoring, pneumatic/hydraulic shoring, steel sheeting or sheeting using other materials, sloping, and benching.

E. Any time an excavation is to remain open, at a minimum, provide full enclosure with safety barriers and fencing, warning signs, and additional safety control measures as appropriate for the condition.

1.06 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

B. Utility Mark-out
   1. Prior to commencing work, comply with utility mark-out requirements of the Call-Before-You-Dig System (1-800-922-4455).
   2. Verify the location of all subsurface utilities marked through the Call-Before-You-Dig System.
   3. Not all subsurface facilities or structures will be identified through the Call-Before-You- Dig System. Confirm the location of other subsurface utilities and other subsurface facilities or structures prior to commencing work. Field-mark utilities as required.

C. Utility Coordination
   1. Inform all utility owners of the necessity of test pit work. Provide reasonable advance notice to allow for coordination.
   2. Coordinate the excavation of all test pits with the respective utility owners having facilities in the vicinity of the test pit location.
   3. If so desired by the respective utility owners, all or part of the work under this Section may be accomplished by their crews and/or supervised by them.

1.07 REGULATORY REQUIREMENTS

A. Comply with all applicable federal, state, and local safety and health requirements regarding all aspects of the work. Do not proceed until all permits or other approvals are secured.

B. Contractor is bound to comply with any project-related permits or approval obtained by Owner, including all requirements of such permit and representations contained in permit application as though Contractor were the permittee. Requirements and conditions set forth in Owner-obtained project-related permits and permit applications shall be binding on Contractor just as any Specification would be.

C. Do not close or obstruct roadways, sidewalks, hydrants, or other infrastructure without permits or authorization from local municipal authorities or other authorities having jurisdiction.

PART 2 PRODUCTS – NOT USED PART 3 EXECUTION

2.01 IDENTIFICATION OF EXISTING FEATURES

A. Prior to commencing construction activities, Contractor shall identify and delineate those areas or specific improvements that are not to be disturbed. Areas or specific improvements within the Limits of Work/Contract Limits and general work areas which are not to be disturbed shall be clearly marked or fenced. Monuments and markers shall be protected before construction operations commence. Contractor’s personnel shall be knowledgeable of the purpose for marking and/or protecting designated areas, specific improvements, monuments, and markers at the Project Site.

2.02 PROTECTION OF EXISTING FEATURES

A. General
   1. All areas or specific improvements, including but not limited to vegetation, utilities, poles, wires, fences, curbs, monuments/property-line markers, and other structures, which must be preserved in place without being temporarily or permanently relocated shall be carefully supported and otherwise protected from damage by Contractor.
   2. As excavation/demolition work approaches underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools.

B. Pavements
   1. On paved surfaces to remain, Contractor shall not use or operate heavy equipment, other power-operated equipment, or store tools, equipment, or materials which may mar, cut, or otherwise damage such surfaces. If there is no alternative to the operation of heavy equipment, other power-operated equipment, or storage of tools, equipment, or materials on paved surfaces to remain, Contractor shall take all measures necessary to protect such surfaces.
   2. All surfaces, which have been damaged by Contractor's operations, shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of construction operations. Such restoration shall meet the approval of Engineer and may include repair or complete replacement at Contractor's expense.

C. Planted Areas
   1. All planted areas, including lawn/turf areas and landscaped areas, which have been damaged by Contractor's operations, shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of construction operations.

D. Utilities
   1. Locate and identify existing utilities that are to remain and protect them from damage. Provide protection as required such as marking, blocking, bracing, stabilizing, supporting, and retaining.
   2. For utility termination, removal, or abandonment, refer to Section 02 4113 – Utility Demolition and Abandonment.
   3. Before excavating near any utility, notify the utility owner, coordinate protective work, and comply with the utility owners' requirements.
   4. All utility services shall be supported by suitable means so that the services shall not fail when tamping and settling occurs.
   5. Where known utilities are encountered, notify Engineer and document location and type of utility before proceeding with work in such area.
   6. When uncharted or incorrectly charted utilities are encountered, stop work and notify Engineer. Cooperate with the utility owners in maintaining their utilities in operation prior to resuming work.

E. Retaining Structures: Provide bracing, shoring, sheeting, sheet piling, underpinning or other retaining structures necessary to guard against any movement or settlement of existing or new construction, utility systems, paving, or other improvements. Contractor assumes responsibility for the strength and adequacy of retaining structures, and for the safety and support of construction, utilities or paving, and for any movement, settlement or damage thereto.

2.03 SITE DEMOLITION

A. Conduct site demolition as shown on the Drawings.

B. Conduct site demolition operations in a manner that will prevent damage to adjacent structures, utilities, pavements and other facilities to remain.

C. Remove from the site and properly dispose of all materials resulting from site demolition operations.

2.04 DUST CONTROL

A. Implement fugitive dust suppression to prevent unacceptable levels of dust resulting from site demolition operations or other activities required by the Contract Documents. It shall be the Contractor's responsibility to supervise fugitive dust control measures and to monitor airborne particulate matter. Comply with applicable provisions of Section 01 5714 – Temporary Dust Control.

2.05 REPLACEMENT

A. In case of damage, Contractor shall notify the appropriate party so that proper steps may be taken to repair any and all damage done. When the Owner does not wish to make the repairs themselves, all damage shall be repaired by Contractor, or, if not promptly done by him, Engineer may have the repairs made at the expense of Contractor.

B. Contractor shall patch, repair and/or replace all adjacent materials and surfaces damaged through the prosecution of work at no expense to Owner. All repair and replacement work shall match the existing in-kind. Final acceptance of said work shall be at the sole judgment of Owner.

SECTION 02 82 13.31 NON-DISTURBANCE ASBESTOS REMOVAL AND DISPOSAL

PART 1 - GENERAL

1.0 GENERAL REQUIREMENTS

A. The Contractor shall have a Competent Person in control on the job site with authority to take prompt corrective measures at all times during removal work. This person must comply with applicable Federal, State and Local regulations which mandate work practices, and be capable of performing the work of this contract. The Contractor performing removal must be licensed by the State of Connecticut Department of Public Health as an Asbestos Abatement Contractor.

B. The Contractor shall supply all labor, materials, equipment, services, insurance (with specific coverage for asbestos), and incidentals which are necessary or required to perform the work in accordance with applicable governmental regulations and these specifications.

C. The Owner will retain the services of a State of Connecticut Licensed Asbestos Project Monitor for protection of the Owners' interests and those using the building.

1.1 SCOPE OF WORK

Below is a brief description of the estimated quantities of asbestos containing materials to be abated. These quantities are for informational purposes only and are based on the best information available at the time of the specification preparation. The Asbestos Abatement/Remediation Contractor shall satisfy himself as to the actual quantities and the labor, equipment and materials necessary to complete the abatement/remediation project. Accordingly, minor variations (+/- 20%) in quantities of ACM or limited quantities of newly discovered ACM within the project outline area are considered as having no impact on contract price and time requirements of this contract. Nothing in this section may be interpreted as limiting the extent of work otherwise required by this contract and related document

The following materials are to be properly abated under the supervision of a Competent Person.

- Window glazing compound on transom window (Floor 2) – Approximately 10 Linear Feet
  Note: Entire transom window may be cut free of the lower frame, removed without disturbing the window glazing compound, wrapped in 2 layers of 6-mil poly and disposed of as asbestos containing material. This material also contains assumed PCBs and must be handled and disposed of in accordance with Specification Section 02.8411 Polychlorinated Biphenyl (PCB) Abatement

- Assumed fire door insulation (Floors 1, 2, 3) – 3 doors (excludes newer A-side entry door on Floor 2)
  Note: Material may be tested after removal or removed intact, wrapped in 2 layers of 6-mil poly and disposed of as asbestos containing material.

1.2 WORK HOURS & COORDINATION

A. Coordinate the schedule in any given area with The Waterbury Public Schools and Construction Manager. Minimize the time between removal and time of renovation work.

1.3 DEFINITIONS

Agency - The authoritative force, usually at the state level, or their representative.

Asbestos-Containing Material (ACM) - Any material containing equal to or greater than one percent asbestos.

Asbestos Abatement - the removal, encapsulation, enclosure, renovation, repair, demolition or other disturbance of asbestos-containing materials, but does not include activities which are related to (A) the removal or repair of asbestos cement pipe and are performed by employees of a water company as defined in Section 25-32a of the Connecticut General Statutes or (B) the removal of nonfriable asbestos-containing material found exterior to a building or structure other than material defined as regulated asbestos- containing material in 40 CFR 61, the national emission standards for hazardous air pollutants, as amended from time to time

Competent Person - In addition to the definition in 29 CFR 1926.32(f), one who is in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f)

High-efficiency particulate air (HEPA) A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles 0.3 microns in diameter.

Owner – The Waterbury Public Schools

Leak-tight - Solids or liquids cannot escape or spill out. It also means dust-tight.

Regulated Area - Area established by the Competent Person to demarcate areas where airborne concentrations of asbestos exceed, or there is a reasonable Permissible Exposure Limit.

1.4 REFERENCES

A. The current issue of each document shall govern. Where conflict among requirements or with these specifications exists, the more stringent requirements shall apply.

1. Occupational Safety and Health Administration (OSHA) 29 CFR 1926.1101 – Asbestos 29 CRF 1926.62- Lead in Construction

2. Environmental Protection Agency (EPA) 40 CFR 61, Subpart M - National Emission Standards for Hazardous Air Pollutants; Asbestos NESHAP Revision; Final Rule.

3. State of Connecticut, Department of Public Health Regulations (DPH) Section 19a-332a-1 through 19a-332a-16 - Standards for Asbestos Abatement. Section 19a-332a-17 through 19a-332a-23 - Licensure and Training.

1.5 SUBMITTALS AND NOTICES

A. Prior to commencement of asbestos abatement work, submit to the A/E and Construction Administrator and receive approval and/or acknowledgment of following:

1. Asbestos worker & Competent Person training documentation

B. Within 35 days following the date when the waste trailer leaves the job site, submit to the A/E and Construction Administrator:

1. Completed waste shipment record for disposal of asbestos-containing material

1.6 PERSONNEL PROTECTION

A. Workers may forgo protective clothing, respirators, and wash station as the work will be performed without disturbing the asbestos.

B. The Competent Person may forgo a negative exposure assessment as the work will be performed without disturbing the asbestos.

1.7 WORKER TRAINING REQUIREMENTS

A. The Competent Person shall have successfully completed AT LEAST a 2-hour asbestos awareness training course and refresher training shall be current for the calendar year.
B. Workers shall have successfully completed AT LEAST a 2-hour asbestos awareness training course and refresher training shall be current for the calendar year.

C. Workers, at minimum, shall have successfully completed an OSHA lead awareness training course with certificate dated within the current year. See specification section 028333.13 Lead Paint for more information.

PART2 - PRODUCTS

2.1 MATERIALS

A. Polyethylene sheeting and disposal bags shall be six (6) mil.

B. Labels and signs shall conform to applicable regulations.

2.2 TOOLS AND EQUIPMENT

A. Disposal dumpsters shall be lined with a minimum of two (2) layers of six (6) mil polyethylene sheeting and 1 layer of polypropylene burlap.

PART3 - EXECUTION

3.0 ESTABLISHING THE REGULATED AREA

A. Regulated areas must clearly demarcate with cones, barricades and/or warning tape, the area of work, including a 10' buffer zone to prevent contact with the general public.

B. Post warning signs meeting the specifications of OSHA 29 CFR1910 and 29 CFR 1926.1101 at each Regulated Area.

C. In addition, signs shall be posted at all approaches to Regulated Areas so that an employee may read the sign and take the necessary protective steps before entering the area.

3.1 REMOVAL PROCEDURES

A. Window sash with asbestos-containing window glazing compound and assumed fire doors may be removed intact with the use of 2 layers of 6-mil poly drop cloths to contain any residual window caulk or door insulation in an abundance of caution in the case that the glazing compound is accidentally disturbed. Windows must be wrapped in 2-layers of poly sheeting and meet all waste disposal requirements outlined below.

3.2 WASTE DISPOSAL

A. Disposal of asbestos-containing and/or asbestos contaminated material shall occur at an authorized site and must be in compliance with the requirements of, and authorized by the Office of Solid Waste Management, Department of Environmental Protection, State of Connecticut, or other designated agency having jurisdiction over solid waste disposal.

B. Asbestos warning signs must be attached to containers used to transport asbestos- containing waste. Warning signs shall be posted during loading and unloading of disposal containers. The signs must be posted so that they are plainly visible.

E. Label containers of asbestos-containing waste material or wrapped asbestos-containing waste material using warning labels specified by OSHA 29 CFR 1926.1101. Label asbestos- containing waste material destined for off-site transport with the name of the waste generator and the location where the waste was generated.

F. Disposal dumpsters shall be lined with 2 layers of 6 mil polyethylene sheeting. Disposal dumpster liners must be sealed leak-tight prior to leaving the job site.

3.6 CONTRACTOR PERSONAL AIR MONITORING RESPONSIBILITY

A. Personal air sampling is not necessary for a non-disturbance removal

B. A written initial asbestos exposure assessment is not necessary for a non-disturbance removal

3.7 AIR MONITORING DURING ABATEMENT

A. Air monitoring during abatement is not necessary for a non-disturbance removal.

3.8 CLEARANCE CRITERIA

A. A State of Connecticut licensed Asbestos Project Monitor shall conduct a final visual of all work areas at the completion of abatement to determine completion of the scope of work to ensure that no visible dust or debris remains in the work area, and discern whether disposal requirements are met.

END OF SECTION 02 8213.31

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SECTION 02 83 33.13 LEAD PAINT

PART 1 – GENERAL

This specification relates to any possible disturbance of lead paint including controls needed to limit occupational and environmental exposure to lead hazards.

1.1 GENERAL CONDITIONS

A. Determining lead content in paint was a part of the scope of work for this project as the building was built before the nationwide ban of lead-based paint in 1978. Therefore, waste disposal characterization requirements apply.

B. For purposes of worker protection, it is assumed that lead in paint below the concentrations of lead defined as “lead-based paint” is present sporadically throughout the work area. Because minute levels of lead may be present in concentrations less than what is defined as “lead-based paint”, certain worker protection laws enacted by the Occupational Safety and Health Administration (OSHA) apply.

B. Any renovation or demolition activities performed will potentially disturb lead-painted materials; therefore, all personnel performing those activities must comply with the worker protection procedures specified in this document.

1.2 LEAD-BASED PAINT SCOPE OF WORK

A. Lead-based paint was found on the following non-metal surfaces slated for demolition:

- Blue brick wall (Floor 1 Closet) – Approximately 50 Square Feet of wall to be removed
- Green wood window casing (Floor 1 Closet) – 1 window casing
- Gray brick wall (Floor 1) – Approximately 30 Linear Feet of wall to be disturbed
- Gray brick walls (Floor 3) – Approximately 50 Square Feet of wall to be removed
- Gray wood window casing (Floor 3) – 1 window casing

B. All listed materials with lead-based paint to be removed must be handled and disposed of in accordance with this specification and also assumed to contain PCBs in quantities above 50 mg/kg. See Specification Section 02 8411 Polychlorinated Biphenyl (PCB) Abatement for more information on handling and disposal requirements.

C. All metal materials must be disposed of in a recycling facility that accepts lead-based paint as a precaution. Most recycling facilities accept lead-based paint.

1.3 APPLICABLE REGULATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

CFR 29 Part 1910	Occupational Safety and Health Standards
CFR 29 Part 1926	Safety and Health Regulations for Construction
CFR 40 Part 148	Hazardous Waste Injection Restrictions
CFR 40 Part 261.24	Toxicity Characteristic
CT Section 19a-111.1-11.	Lead Poisoning and Prevention
City of Hartford.	Lead Safe Reporting Requirement (attached)

B. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local regulations pertaining to the protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations, and shall hold the government harmless for failure to comply with any applicable safety or health regulation on the part of himself, his employees, or his subcontractors.

1.4 DEFINITIONS

A. Action Level - Employee exposure, without regard to use of respirations, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period. As used in this section, ”30 micrograms per cubic meter of air" refers to the action level.

B. Area Monitoring - Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations which may reach the breathing zone of personnel potentially exposed to lead.

C. Physical Boundary - Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area."

D. Certified Industrial Hygienist (CIH) - As used in this section, refers to an Industrial Hygienist employed by the Contractor and is certified by the American Board of Industrial Hygiene in comprehensive practice.

E. Change Rooms and Shower Facilities - Rooms within the designated physical boundary around the lead control area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross- contamination.

F. Competent Person - A person capable of identifying lead hazards in the work area and is authorized by the contractor to take corrective action.

G. Decontamination Room - Room for removal of contaminated personal protective equipment (PPE).

H. Eight-Hour Time Weighted Average (TWA) - Airborne concentration of lead averaged over an 8-hour workday to which an employee is exposed.

I. High Efficiency Particulate Air (HEPA) Filter Equipment - HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3-micron size particles.

J. Lead - Metallic lead, inorganic lead compounds, and organic lead soaps. Excluded from this definition are other organic lead compounds.

K. Lead Control Area - An enclosed area or structure with full containment to prevent the spread of lead dust, paint chips, or debris of lead-containing paint removal operations. The lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.

L. Lead Permissible Exposure Limit (PEL) - Fifty micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1910.1025. If an employee is exposed for more than 8 hours in a workday, the PEL shall be determined by the following formula. PEL (micrograms/cubic meter of air) = 400/No. of hrs worked per day

M. Personnel Monitoring - Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1910.1025. Samples shall be representative of the employee's work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 150 mm to 225 mm (6 to 9 inches) and the center at the nose or mouth of an employee.

1.5 WORKER PROTECTION

A. Before exposure to lead-contaminated dust, provide workers with a comprehensive medical examination as required by 29 CFR 1926.62 (l) (1) (i) & (ii). The examination shall not be required if adequate records show that employees have been examined as required by 29 CFR 1926.62(l) without the last year.

B. Medical Records: Maintain complete and accurate medical records of employees in accordance with 29 CFR 1910.20.

C. Training: Train each employee disturbing lead paint and/or performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment, in accordance with 29 CFR 1926.62.

D. Respiratory Protection Program:

1. Furnish each employee required to wear a negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least every year thereafter in accordance with 29 CFR 1910.134.

2. Establish and implement a respiratory protection program as required by 29 CFR 1910.134, 29 CFR 1910.1025, and 29 CFR 1926.62.

E. Hazard Communication Program: Establish and implement a Hazard Communication Program as required by 29 CFR 1910.1200.

F. Safety and Health Compliance:

1. In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of federal, state, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials Submit matters regarding interpretation of standards to the Owner for resolution before starting work.

2. Where specification requirements and the referenced documents vary, the most stringent requirements shall apply.

1.6 SUBMITTALS

A. Submit the following:

B. Manufacturer's Catalog Data:

1. Vacuum filters

2. Respirators

C. Statements and Certifications:

1. Qualifications of Competent Person

2. Training Certification: Submit training certificates that meet OSHA 1926.62 requirements.

3. Testing Laboratory: Submit the name, address, and telephone number of the testing laboratory selected to perform the monitoring, testing, and reporting of airborne concentrations of lead. Provide proper documentation that persons performing the analysis have been judged proficient by successful participation within the last year in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program. The laboratory shall be accredited by the American Industrial Hygiene Association (AIHA). Provide AIHA documentation along with date of accreditation/reaccreditation.

D. Current negative exposure assessment – either from data obtained during the current work or from a job with similar tasks done within the previous year.

PART 2 - PRODUCTS

SECTION NOT USED

PART 3 - EXECUTION

3.1 AREA AND PERSONNEL PROTECTION

A. Personnel Protection:

1. Personnel shall wear and use protective clothing and equipment as specified herein. Personal protection, in the form of impermeable (Tyvek® or similar material) disposable coveralls and NIOSH approved respirators, is required for all workers, supervisors, and visitors entering the work area during the removal and cleaning operations.

2. Each worker shall be supplied with a minimum of two (2) complete Tyvek® or similar material disposable uniforms every day. Removal workers shall not be limited to two (2) uniforms, and the Contractor will be required to supply additional uniforms as is necessary. Under no circumstances will anyone entering the removal area be allowed to reuse a contaminated uniform. In addition to uniforms for the workers, the De-leading Contractor shall also supply uniforms for the Consultant and other personnel who are authorized to inspect the worksite.

3. Workers are to be provided with respiratory protection equipment. The respirators are to be sanitized and maintained in accordance with the manufacturer's specifications. Appropriate respirator selection will be dependent upon the work to be performed and the level of exposure, as determined by the Contractor's personal monitoring program.

4. Eating, smoking, or drinking is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been given appropriate training and protective equipment.

B. Warning Signs: Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

C. Monitoring During Work:

1. The contractor shall perform personal and area monitoring. Sufficient area monitoring shall be conducted at the physical boundary to ensure unprotected personnel are not exposed above 30 micrograms per cubic meter ($\mu g/m^3$) of air at all times. If the outside boundary lead levels are at or exceed 30 micrograms per cubic meter of air, work shall be stopped, and the Competent person shall immediately correct the condition(s) causing the increased levels and notify the Owner's representative immediately.

2. Monitoring of airborne concentrations of lead shall be in accordance with 29 CFR 1910.1025.

3. PPE and work area boundaries shall be maintained until a negative exposure assessment has been established.

4. A negative exposure assessment from a previous job with similar working conditions is acceptable provided that it was done no more than one year from the date of the project dates.

3.2 CLEANUP

A. Maintain surfaces of the lead control area free of accumulations of paint chips and dust.

B. Restrict the spread of dust and debris; keep waste from being distributed over the work area.

C. Do not dry sweep or use compressed air to clean up the area.

D. At the end of each shift and when the paint removal operation has been completed, clean the area of visible paint contamination by vacuuming with a HEPA filtered vacuum.

E. Personnel Exiting Procedures: Whenever personnel exist the lead-controlled area, they shall perform the following procedures and shall not leave the workplace wearing any clothing or equipment worn during the workday:

1. Vacuum themselves off.

2. Remove protective clothing in the decontamination room and place them in an approved impermeable disposal bag.

3. Shower if applicable or use hand wash station.

4. Change to clean clothes prior to leaving the physical boundary designated around the lead- contaminated job site.

3.3 CLEANUP AND DISPOSAL REQUIREMENTS

A. Cleanup and Testing

1. Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area.

2. Do not dry sweep or use compressed air to clean up the area.

3. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner and wet mopping the area.

4. Collect lead-contaminated paint chips, scrap and debris, as well as removed components containing LBP, bags, containers, equipment, and lead-contaminated clothing, which may produce airborne concentrations of lead particles.

5. All equipment used by workers inside the work area shall be wet wiped or bagged for later decontamination before removal from work area.

6. All paint chips and contaminated work materials generated by this project must be subjected to a Toxicity Characteristic Leaching Procedure (TCLP) analysis for lead to determine if the material must be disposed of as hazardous waste or if it may be disposed of as general construction debris. The threshold for determination of hazardous waste is 5 mg/L of lead that has leached out of the solution.

B. Waste Storage and Disposal

1. General

a. Handle, store, transport, and dispose lead or lead-contaminated waste at an EPA and State of Connecticut approved hazardous waste treatment, storage, or disposal facility off Government property in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

b. The Contractor shall comply with the requirements for small quantity generators that generate between one hundred (100) kg and one thousand (1000) kg of hazardous waste in a month or

accumulates no more than one thousand (1000) kg of hazardous waste on-Site at any one time and stores waste for no greater than ninety (90) days).

2. Waste Storage

a. Store removed paint, lead-contaminated clothing and equipment, and lead-contaminated dust and cleaning debris into U.S. Department of Transportation (49 CFR 178) approved 55-gallon drums.

b. Label the containers with hazard warning labels in accordance with 29 CFR 1926.62. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled.

c. The Lead Abatement Contractor must comply with hazardous waste containerization requirements including but not limited to maintaining the containers in good condition, keeping containers closed and locked while in storage, properly labeling and dating containers, and using containers which are DEEP approved for over the road use.

d. The Owner's representative or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.

e. The Lead Abatement Contractor shall develop a written inspection schedule to inspect any containers of hazardous waste at least weekly.

f. The Lead Abatement Contractor must designate an emergency coordinator who will be responsible for coordinating emergency response measures. Basic emergency information must be listed in writing and posted on-Site. This information must include the name and number of the emergency coordinator.

g. The Lead Abatement Contractor must develop a written contingency plan for the Site, which describes actions personnel will take in response to fires or other emergencies that may result in a release of hazardous waste constituents. The plan must meet certain content requirements and copies of the plan must be submitted to certain local emergency response officials.

h. The Lead Abatement Contractor must provide written notification to local fire departments and/or police regarding the location, nature, and duration of the lead-removal project, and regarding the type and quantity of hazardous waste that may be stored at the Site.

i. The Lead Abatement Contractor must train their employees in hazardous waste management. They must maintain certain documentation regarding their training program, including the names, job titles, and job descriptions of the employees involved with hazardous waste management, a

written description of the training that is given, and records documenting that employees have been trained. Annual updates of training must also be given.

j. The Lead Abatement Contractor may not store hazardous waste on-Site for greater than ninety (90) days without a TSDF permit.

k. Before leaving the Site for the last time, the Lead Abatement Contractor must remove any remaining hazardous waste and must decontaminate any equipment, storage areas, structures, soil, etc. contaminated as a result of the removal or storage of the hazardous waste generated at the Site.

3. Waste Disposal

a. The Lead Abatement Contractor shall apply for a temporary EPA identification number. Hazardous waste manifests must be utilized which bear this I.D. number.

b. The Contractor shall ensure that all hazardous waste generated is sent off-Site to permitted hazardous waste treatment, storage, or disposal facilities (TSDF).

c. The Lead Abatement Contractor shall use DEEP permitted transporters for transport of hazardous waste.

d. Submit written evidence that the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA and state or local regulatory agencies. Submit one copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR 262.

4. Alternative Disposal Requirements

a. Metal objects coated with lead in paint may be segregated and recycled in a facility that accepts lead in based paint in lieu of disposal as hazardous waste.

b. Materials that contain both asbestos and hazardous levels of lead in paint, such as, but not limited to lead-painted plaster, must be segregated and disposed as combined asbestos and lead paint waste at an appropriate facility that is qualified to accept both hazardous lead waste and ACM (see Section 02 8211 for additional disposal requirements).

END OF SECTION 02 8333.13

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SECTION 02 83 33.13 LEAD PAINT

PART 1 – GENERAL

This specification relates to any possible disturbance of lead paint including controls needed to limit occupational and environmental exposure to lead hazards.

1.1 GENERAL CONDITIONS

A. Determining lead content in paint was a part of the scope of work for this project as the building was built before the nationwide ban of lead-based paint in 1978. Therefore, waste disposal characterization requirements apply.

B. For purposes of worker protection, it is assumed that lead in paint below the concentrations of lead defined as “lead-based paint” is present sporadically throughout the work area. Because minute levels of lead may be present in concentrations less than what is defined as “lead-based paint”, certain worker protection laws enacted by the Occupational Safety and Health Administration (OSHA) apply.

B. Any renovation or demolition activities performed will potentially disturb lead-painted materials; therefore, all personnel performing those activities must comply with the worker protection procedures specified in this document.

1.2 LEAD-BASED PAINT SCOPE OF WORK

A. Lead-based paint was found on the following non-metal surfaces slated for demolition:

- Pink brick upper wall (Basement) – Approximately 25 Square Feet of wall to be removed

B. All listed materials with lead-based paint to be removed must be handled and disposed of in accordance with this specification and also assumed to contain PCBs in quantities above 50 mg/kg. See Specification Section 02 8411 Polychlorinated Biphenyl (PCB) Abatement for more information on handling and disposal requirements.

C. All metal materials must be disposed of in a recycling facility that accepts lead-based paint as a precaution. Most recycling facilities accept lead-based paint.

1.3 APPLICABLE REGULATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

CFR 29 Part 1910.....Occupational Safety and Health Standards
CFR 29 Part 1926.....Safety and Health Regulations for Construction
CFR 40 Part 148 .....Hazardous Waste Injection Restrictions
CFR 40 Part 261.24 .....Toxicity Characteristic
CT Section 19a-111.1-11.....Lead Poisoning and Prevention
City of Hartford.....Lead Safe Reporting Requirement (attached)

B. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local regulations pertaining to the protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations, and shall hold the government harmless for failure to comply with any applicable safety or health regulation on the part of himself, his employees, or his subcontractors.

1.4 DEFINITIONS

A. Action Level - Employee exposure, without regard to use of respirations, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period. As used in this section, ”30 micrograms per cubic meter of air" refers to the action level.

B. Area Monitoring - Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations which may reach the breathing zone of personnel potentially exposed to lead.

C. Physical Boundary - Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area."

D. Certified Industrial Hygienist (CIH) - As used in this section, refers to an Industrial Hygienist employed by the Contractor and is certified by the American Board of Industrial Hygiene in comprehensive practice.

E. Change Rooms and Shower Facilities - Rooms within the designated physical boundary around the lead control area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross- contamination.

F. Competent Person - A person capable of identifying lead hazards in the work area and is authorized by the contractor to take corrective action.

G. Decontamination Room - Room for removal of contaminated personal protective equipment (PPE).

H. Eight-Hour Time Weighted Average (TWA) - Airborne concentration of lead averaged over an 8-hour workday to which an employee is exposed.

I. High Efficiency Particulate Air (HEPA) Filter Equipment - HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3-micron size particles.

J. Lead - Metallic lead, inorganic lead compounds, and organic lead soaps. Excluded from this definition are other organic lead compounds.

K. Lead Control Area - An enclosed area or structure with full containment to prevent the spread of lead dust, paint chips, or debris of lead-containing paint removal operations. The lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.

L. Lead Permissible Exposure Limit (PEL) - Fifty micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1910.1025. If an employee is exposed for more than 8 hours in a workday, the PEL shall be determined by the following formula. PEL (micrograms/cubic meter of air) = 400/No. of hrs worked per day

M. Personnel Monitoring - Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1910.1025. Samples shall be representative of the employee's work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 150 mm to 225 mm (6 to 9 inches) and the center at the nose or mouth of an employee.

1.5 WORKER PROTECTION

A. Before exposure to lead-contaminated dust, provide workers with a comprehensive medical examination as required by 29 CFR 1926.62 (l) (1) (i) & (ii). The examination shall not be required if adequate records show that employees have been examined as required by 29 CFR 1926.62(l) without the last year.

B. Medical Records: Maintain complete and accurate medical records of employees in accordance with 29 CFR 1910.20.

C. Training: Train each employee disturbing lead paint and/or performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment, in accordance with 29 CFR 1926.62.

D. Respiratory Protection Program:

1. Furnish each employee required to wear a negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least every year thereafter in accordance with 29 CFR 1910.134.

2. Establish and implement a respiratory protection program as required by 29 CFR 1910.134, 29 CFR 1910.1025, and 29 CFR 1926.62.

E. Hazard Communication Program: Establish and implement a Hazard Communication Program as required by 29 CFR 1910.1200.

F. Safety and Health Compliance:

1. In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of federal, state, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials Submit matters regarding interpretation of standards to the Owner for resolution before starting work.

2. Where specification requirements and the referenced documents vary, the most stringent requirements shall apply.

1.6 SUBMITTALS

A. Submit the following:

B. Manufacturer's Catalog Data:

1. Vacuum filters

2. Respirators

C. Statements and Certifications:

1. Qualifications of Competent Person

2. Training Certification: Submit training certificates that meet OSHA 1926.62 requirements.

3. Testing Laboratory: Submit the name, address, and telephone number of the testing laboratory selected to perform the monitoring, testing, and reporting of airborne concentrations of lead. Provide proper documentation that persons performing the analysis have been judged proficient by successful participation within the last year in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program. The laboratory shall be

accredited by the American Industrial Hygiene Association (AIHA). Provide AIHA documentation along with date of accreditation/reaccreditation.

D. Current negative exposure assessment – either from data obtained during the current work or from a job with similar tasks done within the previous year.

PART 2 - PRODUCTS

SECTION NOT USED

PART 3 - EXECUTION

3.1 AREA AND PERSONNEL PROTECTION

A. Personnel Protection:

1. Personnel shall wear and use protective clothing and equipment as specified herein. Personal protection, in the form of impermeable (Tyvek® or similar material) disposable coveralls and NIOSH approved respirators, is required for all workers, supervisors, and visitors entering the work area during the removal and cleaning operations.

2. Each worker shall be supplied with a minimum of two (2) complete Tyvek® or similar material disposable uniforms every day. Removal workers shall not be limited to two (2) uniforms, and the Contractor will be required to supply additional uniforms as is necessary. Under no circumstances will anyone entering the removal area be allowed to reuse a contaminated uniform. In addition to uniforms for the workers, the De-leading Contractor shall also supply uniforms for the Consultant and other personnel who are authorized to inspect the worksite.

3. Workers are to be provided with respiratory protection equipment. The respirators are to be sanitized and maintained in accordance with the manufacturer's specifications. Appropriate respirator selection will be dependent upon the work to be performed and the level of exposure, as determined by the Contractor's personal monitoring program.

4. Eating, smoking, or drinking is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been given appropriate training and protective equipment.

B. Warning Signs: Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

C. Monitoring During Work:

1. The contractor shall perform personal and area monitoring. Sufficient area monitoring shall be conducted at the physical boundary to ensure unprotected personnel are not exposed above 30 micrograms per cubic meter (µg/m^3) of air at all times. If the outside boundary lead levels are at or exceed 30 micrograms per cubic meter of air, work shall be stopped, and the Competent person shall immediately correct the condition(s) causing the increased levels and notify the Owner's representative immediately.

2. Monitoring of airborne concentrations of lead shall be in accordance with 29 CFR 1910.1025.

3. PPE and work area boundaries shall be maintained until a negative exposure assessment has been established.

4. A negative exposure assessment from a previous job with similar working conditions is acceptable provided that it was done no more than one year from the date of the project dates.

3.2 CLEANUP

A. Maintain surfaces of the lead control area free of accumulations of paint chips and dust.

B. Restrict the spread of dust and debris; keep waste from being distributed over the work area.

C. Do not dry sweep or use compressed air to clean up the area.

D. At the end of each shift and when the paint removal operation has been completed, clean the area of visible paint contamination by vacuuming with a HEPA filtered vacuum.

E. Personnel Exiting Procedures: Whenever personnel exist the lead-controlled area, they shall perform the following procedures and shall not leave the workplace wearing any clothing or equipment worn during the workday:

1. Vacuum themselves off.

2. Remove protective clothing in the decontamination room and place them in an approved impermeable disposal bag.

3. Shower if applicable or use hand wash station.

4. Change to clean clothes prior to leaving the physical boundary designated around the lead- contaminated job site.

3.3 CLEANUP AND DISPOSAL REQUIREMENTS

A. Cleanup and Testing

1. Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area.

2. Do not dry sweep or use compressed air to clean up the area.

3. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner and wet mopping the area.

4. Collect lead-contaminated paint chips, scrap and debris, as well as removed components containing LBP, bags, containers, equipment, and lead-contaminated clothing, which may produce airborne concentrations of lead particles.

5. All equipment used by workers inside the work area shall be wet wiped or bagged for later decontamination before removal from work area.

6. All paint chips and contaminated work materials generated by this project must be subjected to a Toxicity Characteristic Leaching Procedure (TCLP) analysis for lead to determine if the material must be disposed of as hazardous waste or if it may be disposed of as general construction debris. The threshold for determination of hazardous waste is 5 mg/L of lead that has leached out of the solution.

B. Waste Storage and Disposal

1. General

a. Handle, store, transport, and dispose lead or lead-contaminated waste at an EPA and State of Connecticut approved hazardous waste treatment, storage, or disposal facility off Government property in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

b. The Contractor shall comply with the requirements for small quantity generators that generate between one hundred (100) kg and one thousand (1000) kg of hazardous waste in a month or accumulates no more than one thousand (1000) kg of hazardous waste on-Site at any one time and stores waste for no greater than ninety (90) days).

2. Waste Storage

a. Store removed paint, lead-contaminated clothing and equipment, and lead-contaminated dust and cleaning debris into U.S. Department of Transportation (49 CFR 178) approved 55-gallon drums.

b. Label the containers with hazard warning labels in accordance with 29 CFR 1926.62. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled.

c. The Lead Abatement Contractor must comply with hazardous waste containerization requirements including but not limited to maintaining the containers in good condition, keeping containers closed and locked while in storage, properly labeling and dating containers, and using containers which are DEEP approved for over the road use.

d. The Owner's representative or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.

e. The Lead Abatement Contractor shall develop a written inspection schedule to inspect any containers of hazardous waste at least weekly.

f. The Lead Abatement Contractor must designate an emergency coordinator who will be responsible for coordinating emergency response measures. Basic emergency information must be listed in writing and posted on-Site. This information must include the name and number of the emergency coordinator.

g. The Lead Abatement Contractor must develop a written contingency plan for the Site, which describes actions personnel will take in response to fires or other emergencies that may result in a release of hazardous waste constituents. The plan must meet certain content requirements and copies of the plan must be submitted to certain local emergency response officials.

h. The Lead Abatement Contractor must provide written notification to local fire departments and/or police regarding the location, nature, and duration of the lead-removal project, and regarding the type and quantity of hazardous waste that may be stored at the Site.

i. The Lead Abatement Contractor must train their employees in hazardous waste management. They must maintain certain documentation regarding their training program, including the names, job titles, and job descriptions of the employees involved with hazardous waste management, a written description of the training that is given, and records documenting that employees have been trained. Annual updates of training must also be given.

j. The Lead Abatement Contractor may not store hazardous waste on-Site for greater than ninety

(90) days without a TSDF permit.

k. Before leaving the Site for the last time, the Lead Abatement Contractor must remove any remaining hazardous waste and must decontaminate any equipment, storage areas, structures, soil, etc. contaminated as a result of the removal or storage of the hazardous waste generated at the Site.

3. Waste Disposal

a. The Lead Abatement Contractor shall apply for a temporary EPA identification number. Hazardous waste manifests must be utilized which bear this I.D. number.

b. The Contractor shall ensure that all hazardous waste generated is sent off-Site to permitted hazardous waste treatment, storage, or disposal facilities (TSDF).

c. The Lead Abatement Contractor shall use DEEP permitted transporters for transport of hazardous waste.

d. Submit written evidence that the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA and state or local regulatory agencies. Submit one copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR 262.

4. Alternative Disposal Requirements

a. Metal objects coated with lead in paint may be segregated and recycled in a facility that accepts lead in based paint in lieu of disposal as hazardous waste.

b. Materials that contain both asbestos and hazardous levels of lead in paint, such as, but not limited to lead-painted plaster, must be segregated and disposed as combined asbestos and lead paint waste at an appropriate facility that is qualified to accept both hazardous lead waste and ACM (see Section 02 8211 for additional disposal requirements).

END OF SECTION 02 83 33.13

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SECTION 02 8411 – NON-LIQUID POLYCHLORINATED BIPHENYL (PCB) ABATEMENT

PART 1 - GENERAL

1.0 RELATED DOCUMENTS

A. General provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.1 SCOPE OF WORK

A. Work includes demolition of various materials with concentrations assumed to contain/that contain PCBs greater than 50 mg/kg. This demolition waste, along with the extent of substrate that contains PCBs in quantities greater than 1 mg/kg, shall be disposed of as PCB Bulk Product Waste.

B. The Contractor shall be aware of all conditions of the project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work.

C. All Work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent shall apply.

1.2 DESCRIPTION OF WORK

A. Work includes removal of PCBs assumed to contain concentrations greater than 50 mg/kg. This material must be disposed of as PCB-bulk product waste. This material includes the following:

- White window caulk (Floor 3) Approximately 25 Linear Feet
- Black transom window glazing compound (Floor 2) – Approximately 10 Linear Feet Note: this material also contains asbestos and must be removed and disposed of as both assumed PCBs and asbestos. See Section 02 8213.31 Non-Disturbance Asbestos Removal for more information on how to properly remove and dispose of this asbestos containing material.
- Brown window/door caulk (Exterior) – Approximately 75 Linear Feet
- Painted brick walls (Floors 1, 3) – Approximately 100 Square Feet of wall to be removed Note: this material also contains lead-based paint and must be removed and disposed of as both assumed PCBs and lead-based paint. See Section 8333.13 Lead Paint for more information on how to properly remove and dispose of this paint.
- Painted wood window casings (Floors 1, 3) – 2 window casings
  Note: this material also contains lead-based paint and must be removed and disposed of as both assumed PCBs and lead-based paint. See Section 8333.13 Lead Paint for more information on how to properly remove and dispose of this paint.

1.3 PERMITS AND COMPLIANCE

A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of Workers, authorized visitors to the site, persons, and property adjacent to the Work.

B. Perform PCB-related Work in accordance with CT Hazardous Waste Management Regulations (Regulations of Connecticut State Agencies ("RCSA") Sections 22a-449(c)-100 through -119) and federal regulations 40 CFR 761, and 29 CFR 1926, as specified herein. Where more stringent requirements are specified, adhere to the more stringent requirements.

C. The Contractor must maintain current licenses or registrations pursuant to DEEP and EPA regulations for all Work related to this Project, including the removal, handling, transport, and disposal of hazardous and industrial waste.

D. Failure to adhere to the Project Documents shall constitute a breach of the Contract and the Owner shall have the right to and may terminate the Contract provided, however, the failure of the Owner to so terminate shall not relieve the Contractor from future compliance.

1.4 SUBMITTALS

A. Pre-Work Submittals: Within 7 days prior to the pre-construction conference, the Contractor shall submit 3 copies of the documents listed below:

1. Progress Schedule:
   a. Show the complete sequence of abatement activities and the sequencing of Work within each building or building section.
   b. Show the dates for the beginning and completion of each major element of Work including substantial completion dates for each Work Area, building, or phase.

2. Abatement Work Plan: Provide plans that clearly indicate the following:
   a. All Work Areas/containments numbered sequentially.
   b. Entrances and exits to the Work Areas/containments.
   c. Type of abatement activity/technique for each Work Area/containment.
   d. Proposed location and construction of storage facilities and field office.

3. Disposal Site/Landfill Permit from applicable regulatory agency.
4. Letter identifying the presence of PCB bulk product waste, with Acknowledgement by the landfill.

5. Results of any PCB analysis including any relevant PCB bulk samples, PCB substrate and soil samples, and PCB TCLP for assumed PCB Bulk Product Waste.

B. On-Site Submittals: Refer to Part 3.1.B for all submittals, documentation, and postings required to be maintained on-site during abatement activities.

C. Project Close-out Submittals: Within 30 days after project completion, the Contractor shall submit one copy of the closeout-out submittals listed below to Owner for review and approval prior to the Contractors final payment.

1. Copy of all waste disposal manifests and disposal logs.

2. Daily progress log.

3. Copy of any Contractor's Acknowledgment Statement Forms as required by the Owner.

4. Disposal Site/Landfill Permit from applicable regulatory agency.

5. Copy of PCB notification with acknowledgement from the disposal facility/landfill, if applicable.

1.5 PRE-CONSTRUCTION CONFERENCE

A. Prior to start of preparatory Work under this Contract, the Contractor shall attend a pre-construction conference attended by the Owner and the Owner's On-site representative (Project Monitor).

B. Agenda for this conference shall include but not necessarily be limited to:

1. Contractor's scope of Work, Work plan, and schedule to include number of workers and shifts.

2. Contractor's safety and health precautions including protective clothing and equipment and decontamination procedures.

3. Project Monitor 's duties, functions, and authority.

4. Contractor's Work procedures including:

a. Methods of job site preparation and removal methods.

b. Disposal procedures.

c. Cleanup procedures.

d. Emergency procedures.

5. Contractor's required pre-work and on-site submittals, documentation, and postings.

6. Temporary utilities.

7. Storage of removed PCB materials.

8. Waste disposal requirements and procedures.

1.6 APPLICABLE STANDARDS AND REGULATIONS

A. The Contractor shall comply with the following codes and standards, except where more stringent requirements are shown or specified:

B. Federal Regulations:

1. 29 CFR 1910.1200, "Hazard Communication" (OSHA)

2. 29 CFR 1910.134, "Respiratory Protection" (OSHA)

3. 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA)

4. 29 CFR 1926, "Construction Industry" (OSHA)

5. 40 CFR 761, "PART 761—POLYCHLORINATED BIPHENYLS (PCBs)" (EPA)

6. 49 CFR 171-173, Transportation Standards (DOT)

C. Connecticut State Regulations:

1. CT Hazardous Waste Management Regulations - RCSA Sections 22a-449(c)-100 through-119

2. CT Hazardous Waste Transporter Permits - RCSA Section 22a-449 (c)-11

D. Standards and Guidance Documents:

1. American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection

1.7 PROJECT MONITORING

A. The Owner shall engage the services of a Project Monitor regarding the performance of the PCB abatement Project and provide direction as required throughout the entire abatement Project period.

B. The Contractor is required to ensure cooperation of its personnel with the Project Monitor for the sampling and Project Monitoring functions described in this section. The Contractor shall comply with all direction given by the Project Monitor during the course of the Project.

C. The Project Monitor's duties include, but are not limited to:

1. The Project Monitor shall be on-site as needed during the course of abatement.

2. The Project Monitor shall have the authority to direct the actions of the Contractor verbally and in writing to ensure compliance with the Project documents and all regulations. The Project Monitor shall have the authority to Stop Work when gross Work practice deficiencies or unsafe practices are observed.
   a. Such Stop Work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.
   b. Standby time required to resolve the situation shall be at the Contractor's expense.

3. The Project Monitor shall provide the following services:
   a. Inspection of the Contractor's Work, practices, and procedures, including temporary protection requirements, for compliance with all regulations and Project specifications.
   b. Monitor the progress of the Contractor's Work and report any deviations from the schedule to the Owner.
   c. Monitor, verify, and document all waste load-out operations.
   d. The Project Monitor shall maintain a log on site that documents all project related and Consultant and Contractor actions, activities, and occurrences.
   e. The Project Monitor shall take air, swipe, wipe, or bulk samples upon the Owner's request.

4. The following inspections shall be conducted by the Project Monitor. Additional inspections shall be conducted as required by Project conditions. Progression from one phase of Work to the next by the Contractor is only permitted with the written approval of the Project Monitor.
   a. Pre-Construction Inspection: The purpose of this inspection is to verify the existing conditions of the Work Areas and to document these conditions.
   b. Pre-Commencement Inspection: This inspection shall take place only after the Work Area is fully prepped for removal.
   c. Work Inspections: The purpose of this inspection is to monitor the Work practices and procedures employed on the Project and to monitor the continued integrity of the containment system. Inspections within the removal areas shall be conducted by the Project Monitor during all preparation, removal, and cleaning activities at least twice every Work shift. Additional inspections shall be conducted as warranted.

d. Visual Clearance Inspection: The purpose of this inspection is to verify that: all materials in the scope of work have been properly removed; no visible PCB material debris/residue remains.

e. Punch List Inspection: The purpose of this inspection is to verify the Contractor's certification that all Work has been completed as contracted and the existing condition of the area prior to its release to the Owner.

5. The Owner may, at its discretion, choose to conduct air sampling. If air samples collected during abatement indicate any airborne PCB concentration(s) above the OSHA PEL of 0.5 mg/m3 or EPA recommended thresholds, work shall be stopped immediately, and Work methods shall be altered to reduce the airborne PCB concentration(s).

1.8 PROJECT SUPERVISOR

A. The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:

1. The Project Supervisor shall be trained in PCB removal and hazardous waste management in CT, via a 40-hour HAZWOPER/Supervisor training course.

2. The Project Supervisor shall have a minimum of one year of experience as a supervisor.

3. The Project Supervisor must be able to read and write English fluently, as well as communicate in the primary language of the Workers.

B. If the Project Supervisor is not on-site at any time whatsoever, all Work shall be stopped. The Project Supervisor shall remain on-site until the Project is complete. The Project Supervisor cannot be removed from the Project without the written consent of the Owner. The Project Supervisor shall be removed from the Project if so requested by the Owner.

C. The Project Supervisor shall maintain a Daily Project Log that includes the Waste Disposal Log required by section 4.03 of the specifications.

D. The Project Supervisor shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Project Monitor.

1.9 TRAINING

A. As required by applicable regulations, prior to assignment to PCB Work, a responsible person shall instruct each employee with regard to the hazards of PCB, safety and health precautions, and the use and requirements of protective clothing and equipment.

1.10 RESPIRATORY PROTECTION

A. Establish a respirator program as required by ANSI Z88.2 and 29 CFR 1910.134. Provide respirator training.

B. Select respirators from those approved by the Mine Safety and Health Administration (MSHA), and the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to the OSHA requirements in 29 CFR 1910.134.

C. Respirators shall be individually fit-tested to personnel under the direction of an Industrial Hygienist on a yearly basis. Fit-tested respirators shall be permanently marked to identify the individual fitted, and use shall be limited to that individual.

D. The Contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the work day.

E. Any authorized visitor, Worker, or supervisor found in the Work Area not wearing the required respiratory protection shall be removed from the Project site and not be permitted to return.

1.11 DELIVERY AND STORAGE

A. Deliver all materials to the job site in original packages with containers bearing manufacturer's name and label.

B. Store all materials at the job site in a suitable and designated area.

1. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.

2. Protect materials from unintended contamination and theft.

3. Storage areas shall be kept clean and organized.

C. Remove damaged or deteriorated materials from the job site. Materials contaminated with PCB shall be disposed of as PCB material as specified herein.

1.12 TEMPORARY UTILITIES

A. Where available, obtain power from Owner's existing system. Otherwise provide power from other sources (i.e. generator).

1. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.

2. Provide wiring and receptacles as required by the Environmental Consultant for air sampling equipment.

B. Utilize domestic water service, if available, from Owner's existing system.

PART 2 – PRODUCTS

2.1 PROTECTIVE CLOTHING

A. Provide personnel utilized during the Project with disposable protective whole-body clothing, head coverings, and foot coverings. Provide disposable plastic or rubber gloves, suitable to prevent PCB skin contact, to protect hands.

B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing abatement Work.

C. Eye protection and hard hats shall be provided and made available for all personnel entering any Work Area.

D. Authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the Work Area.

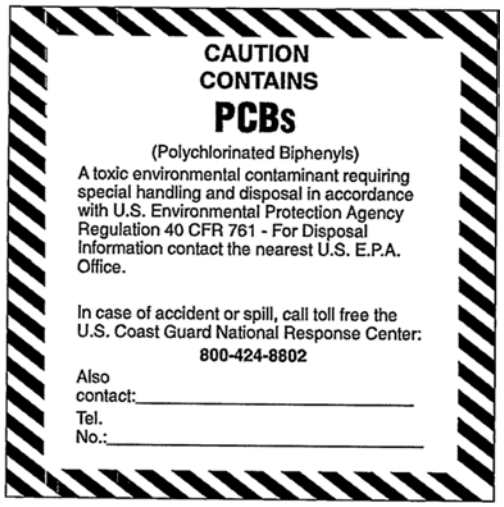
2.2 SIGNS AND LABELS, CONTAINERS

A. Disposal of mixed PCB and asbestos-containing waste must be disposed of as Hazardous Waste, as the presence of PCBs is assumed for asbestos-containing caulking.

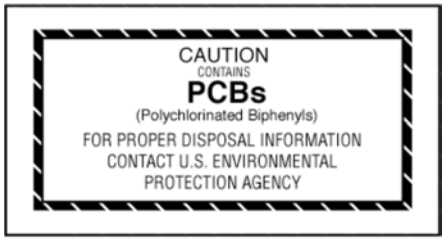
B. All solid waste material, containment system components, used PPE, and other solid wastes generated during the Work shall be placed directly in appropriate waste receptacles immediately upon removal from its in-situ position. Suitable waste receptacles may consist of roll-off containers or DOT-approved 55-gallon drums.

C. Provide warning signs and barrier tapes at all approaches to PCB Work Areas. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.

D. Provide the appropriate “Large PCB Marking” or “Small PCB Marking” (ML or MS per 40 CFR 761) as shown below, of sufficient size to be clearly legible, for display on waste containers (bags, boxes, roll offs or drums) which will be used to contain or transport PCB contaminated material, in accordance with 40 CFR 761. In addition, U.S. Department of Transportation (DOT) 49 CFR Parts 171 and 172 requires the name and UN number of the material to be on the bags or drums, and, if shipped in bulk (roll offs, Gaylord boxes, etc.) the bulk container must also be labeled: Polychlorinated Biphenyl, solid mixture UN 3432.



ML



MS

E. The PCB materials are also CT Hazardous Waste, and must have a label stating the following on each container :

HAZARDOUS WASTE--Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority, or the U.S. Environmental Protection Agency.

Generator's Name and Address_____
Generator's EPA Identification Number_____
Manifest Tracking Number _____

F. Provide 6 mil plastic disposal bags with PCB caution labels.

1. The “Small PCB Label” (MS per 40 CFR 761) may be used as shown above. Bags shall also be labeled with U.S. DOT required markings per 49 CFR 172, Polychlorinated biphenyl, solid mixture UN 3432.

2. Labeled PCB waste containers or bags shall not be used for non-PCB waste or trash. Any material placed in labeled containers or bags, whether turned inside-out or not shall be handled and disposed of as PCB waste.

2.3 DAILY PROJECT LOG

A. Provide a Daily Project Log. The log shall contain on title page the Project name, name, address and phone number of Owner; name, address and phone number of Environmental Consultant; name, address and phone number of Abatement Contractor; emergency numbers including, but not limited to local Fire/Rescue department.

B. All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted.

C. The Project Supervisor shall document all Work performed daily and note all inspections.

2.4 SCAFFOLDING, LIFTS AND LADDERS

A. Provide all scaffolding and/or staging as necessary to accomplish the Work of this Contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding and ladders shall comply with all applicable OSHA construction industry standards. Alternatively, materials my be accessed by lift.

B. Provide scaffolding and ladders as required by the Environmental Consultant for the purposes of performing required inspections.

2.5 SHIPPING CONTAINERS AND PACKAGING

A. Provide packaging in accordance with 49 CFR 173 Packaging Group 9, such as 30 or 55 gallon capacity fiber, plastic, or metal drums, Gaylord Boxes or other Intermediate Bulk Containers (IBCs), or non- siftable bulk containers, capable of being sealed air and water tight if PCB waste has the potential to damage or puncture disposal bags. Affix PCB caution labels on lids of drums, and opposite sides of drums or bulk containers, as well as the ends of bulk containers.

2.6 EQUIPMENT AND MATERIALS

A. All dry vacuuming performed under this contract shall be performed with High Efficiency Particulate Air (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.

B. Any power tools used to drill, cut into, or otherwise disturb PCB material shall be manufacturer equipped with HEPA-filtered local exhaust ventilation.

C. All polyethylene (plastic) sheeting used on the Project (including but not limited to sheeting used for critical and isolation barriers, fixed objects, walls, floors, ceilings, waste container) shall be at least 6 mil fire retardant sheeting.

PART 3 – EXECUTION

3.1 GENERAL REQUIREMENTS

A. Should visible PCB debris be observed outside the Work Area, immediately stop Work, notify the Owner; institute emergency procedures as directed. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.

B. The following submittals, documentation, and postings shall be maintained on-site by the Contractor during abatement activities at a location approved by the Abatement Project Monitor:

1. Project documents (specifications and drawings.)

2. Applicable regulations.

3. Material Safety Data Sheets of supplies/chemicals used on the Project.

4. Approved Abatement Work Plan.

5. List of emergency telephone numbers.

6. Waste Disposal Log.

7. Daily Project Log.

C. The following documentation shall be maintained on-site by the Abatement Project Monitor during abatement activities:

1. Project Monitor Daily Log.

2. PCB Survey Report.

3.2 WORK AREA PREPARATION

A. PCB caution signs shall be posted at all approaches to the PCB Work Area. Post all emergency exits as emergency exits only on the Work Area side, post with PCB caution signs on the non-Work Area side. Provide all non-Work Area stairs and corridors accessible to the PCB Work Area with warning tapes at the base of stairs and beginning of corridors. Warning tapes shall be in addition to caution signs.

B. Access to areas of work shall be regulated to prevent unauthorized visitors.

C. Personal/Equipment Decontamination Room or Area: An existing room or area that is adjacent to the work area shall be used for the decontamination of personnel and equipment. The room or area shall be covered by an impermeable drop cloth on the floor or horizontal working surface. The room or area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment. Work clothing must be cleaned with a HEPA vacuum before it is removed. All equipment and surfaces of waste containers must be cleaned prior to removing them from the decontamination room or area. All personnel must enter and exit the PCB work area through the decontamination room or area.

D. Work Area Preparation for Exterior Removal:

1. All ground surfaces exterior to the work area shall have a layer of 6 mil fire retardant plastic sheeting, attached to the building face and laid down on the surface below the exterior abatement work area, at least 10 feet wide or to the furthest point of gravity fall for dislodged debris by methods used, whichever is further. For work at the second story and above, extend 6 mil fire retardant plastic sheeting as necessary. For work above third story, by sidewalk, street, or property boundary, scaffolding sides shall be covered in 6-mil fire retardant plastic sheeting.

2. All operable windows within the work area and 25 ft. from all sides of the work area shall be closed.

3. HVAC equipment shall remain inoperable for the duration of the project.

E. Work Area Preparation for Interior Removal:

1. HVAC equipment shall remain inoperable for the duration of the project.

2. All floor areas adjacent to the work area shall have a layer of 6 mil fire retardant plastic sheeting, attached to the interior wall and laid down on the surfaces below the abatement work area, at least 5 feet wide or to the furthest point of gravity fall for dislodged debris by methods used, whichever is further.

3. All movable objects shall be removed from the immediate work area. All non-movable objects shall be covered with one layer of 6 mil fire retardant plastic sheeting and sealed at the edges.

4. All operable windows within the work area shall be closed.

5. Temporary dust barriers consisting of a minimum of 6-mil fire-retardant plastic sheeting shall be at installed at hallways, corridors, doorways, and other openings to the work area not used for passage during removals) to establish work area containment enclosure.

6. A 6-mil fire retardant plastic sheeting overlapping curtained doorway shall be installed at the entrance to the work area.

7. For all work areas with use of electromechanical tools for PCB removals, HEPA filtered negative air ventilation units must be installed in work area and operate continuously during removal operations to establish negative pressure. A minimum of 4 air changes per hour must be maintained within the work area during removals and cleanings until work area clearance is obtained from the Project Monitor.

3.3 REMOVAL OF PCB MATERIALS - GENERAL

A. PCB-containing materials shall be removed in accordance with the Contract Documents and the approved PCB Work Plan.

B. Use tools that generate the least amount of dust and will still complete the PCB caulk removal. See current EPA regulations and recommendations regarding tools and protective measures to be used for PCB caulk removals.

C. Grinding electromechanical tools (e.g. angle grinders, masonry groove cutters, circular saws, and slot mills, etc.) are not allowed to be used for exterior open-air PCB caulk removals.

D. For exterior removals, take appropriate precautions (e.g. install windscreens) to prevent dust and debris from migrating due to windy conditions.

E. Remove accessible caulk that could be disturbed before cutting building components, such as window frames.

F. All removed PCB material shall be placed into 6 mil plastic disposal bags or other suitable container upon detachment from the substrate. Large components with PCB material or PCB residue shall be wrapped in one layer of 6 mil plastic sheeting. Sharp components likely to tear disposal bags shall be placed in fiber drums or boxes and then wrapped with sheeting.

G. Power or pressure washers are not permitted for PCB removal or clean-up procedures. Porous substrates must be scrubbed with detergent and rinsed with water that is not released to the environment, but is instead collected on rags, sponges or HEPA vacuumed with a wet-vac and drummed for waste characterization and disposal.

H. Non-porous surfaces must be decontaminated by double alternating wash with detergent and rinse with hexane or other suitable solvent.

I. All construction and demolition debris determined by the Environmental Consultant to be in contact with the PCB caulk shall be handled and disposed of as PCB bulk product waste.

J. All PCB waste must be located at or near the point of generation, under the control of the Project Supervisor.

K. Personal protective equipment, including respirators, shall be utilized and worn during all removal operations until the Work Area is cleared by the Project Monitor.

L. Following completion of gross abatement and after all accumulations of PCB waste materials have been containerized, the decontamination procedures in Section 3.4 shall be followed.

M. Dry sweeping and any other methods that raise dust shall be prohibited.

3.4 EQUIPMENT AND AREA DECONTAMINATION

A. When removal of PCB materials is completed, the decontamination process shall consist of vacuuming (with a HEPA filter), wet wiping/mopping and a repeated vacuuming (with a HEPA filter)

of the entire work area. All surfaces in and around the work area must be free of dust generated during the work.

B. Decontaminate all tools and equipment before removal from the work area.

C. If dust or debris has migrated to areas of the building other than the immediate work area, those areas shall be incorporated into the work area and thoroughly decontaminated to ensure all visible dust generated by the activity is eliminated.

D. Uncontaminated dust barriers and other protective sheeting shall be placed in disposable construction bags and disposed of as normal trash.

E. Visually inspect the area for any remaining dust or debris. Vacuum (with HEPA filter) and wet wipe until space is clean. Dispose of vacuum contents as PCB waste.

F. Upon completion of decontamination and removing temporary dust barriers, a final inspection shall be performed by the Contractor and Abatement Project Monitor. As a result of any visual inspection by the Abatement Project Monitor, the Contractor will clean or reclean the affected areas at no additional expense to the Owner.

3.5 CLEANUP VERIFICATION SAMPLING

A. No verification sampling is required for this project as PCBs are assumed rather than tested.

B. Non-porous substrates such as window and door frames are scheduled for replacement and may be discarded as assumed bulk product waste. No verification sampling will be performed on the non- porous substrates scheduled for removal.

PART 4 - DISPOSAL OF PCB WASTE

4.1 TRANSPORTATION AND DISPOSAL SITE

A. The Contractor's Hauler and Disposal Site shall be approved by the Owner. If the waste stream contains PCBs greater than 50 mg/kg, for any permitted out-of-state landfill not specifically authorized for disposal of PCBs, written notice must be provided 15 days prior to the first shipment of the same waste stream that the waste may contain PCBs greater than 50 mg/kg, in accordance with 40 CFR 761.62. The letter shall be acknowledged via a disposal facility representative’s signature, printed name and title. If the facility is permitted to accept PCB waste, no letter is required. Documentation of a PCB TCLP with results of less than 10 µg/L must be provided to the landfill for all bulk product waste disposal.

B. The Contractor shall give twenty-four (24) hour notification prior to removing any waste from the site. Waste shall be removed from the site only during normal working hours unless otherwise specified. No waste may be taken from the site unless the Contractor and Environmental Consultant are present and the Environmental Consultant authorizes the release of the waste as described

herein.

C. All waste generated as part of the PCB project shall be removed from the site within ten (10) calendar days after successful completion of all PCB abatement work.

D. The Hauler, with the Contractor and the Environmental Consultant, shall inspect all material in the transport container prior to taking possession and signing the Hazardous Waste Manifests.

E. Disposal dumpsters shall be lined with 2 layers of 6 mil polyethylene sheeting and 1 layer of polypropylene burlap. Disposal dumpster liners must be sealed leak-tight prior to leaving the job site.

F. The waste containers shall remain staged at the Site with a secure impermeable cover in-place until the materials are transported from the Site to be delivered to the designated waste disposal facility.

G. Drum staging area shall be designated prior to initiation of the abatement work and approved by the Consultant. If this area is located outside of the building, the area (or areas) shall be surrounded by a chain-link fence with a minimum height of six feet. The fence shall be labled withPCB warning signs.

H. The Contractor shall be responsible for all packaging, labeling, transport, disposal, and recordkeeping associated with PCB Bulk Product Waste in accordance with all federal, state, and local regulations.

I. The Contractor shall ensure that the person transporting the waste holds a valid permit issued in accordance with appropriate federal, state, and local regulations.

J. The Contractor shall provide to the transporter at the time of transfer appropriate shipping records or uniform waste manifests as required by the federal, state, and local regulations with a copy to the Owner and Consultant.

K. The Contractor shall maintain proper follow-up procedures to assure that waste materials have been received by the designated waste site in a timely manner, and in accordance with all federal, state and local regulations.

4.2 WASTE STORAGE CONTAINERS

A. All waste containers shall be fully enclosed and lockable (i.e. enclosed dumpster, trailer, etc.).

B. The container shall be plasticized and sealed with two layers of six-mil plastic. Once on site, it shall be kept locked at all times, except during load out. The waste container shall not be used for storage of equipment or contractor supplies.

C. While on-site, the container shall be labeled with PCB Warning Labels

D. The container is not permitted to be loaded unless it is properly plasticized, has the appropriate

danger signage affixed, and has the permit number appropriately stenciled on the container. .

E. The Owner may initiate random checks at the Disposal Site to ensure that the procedures outlined herein are complied with.

4.3 HAZARDOUS WASTE MANIFESTS

A. A Uniform Hazardous Waste Manifest shall be utilized solely as the waste Manifest for transportation. A hauler billing form or bill of lading may be used if the hauler needs an independent record but shall not be used as a shipping document.

B. The Manifest shall be completed by the Contractor and verified by the Environmental Consultant that all the information and amounts are accurate, and the proper signatures are in place.

C. The Manifest shall have the appropriate signatures of the Owner's Representative (the Generator) and the Hauler representative prior to any waste being removed from the site.

D. Copies of the completed Manifest shall be retained by the Environmental Consultant and shall remain on site for inspection.

E. Upon arrival at the Disposal Site, the Manifest shall be signed by the Disposal Facility operator to certify receipt of PCB materials covered by the manifest.

F. The Disposal Facility operator shall return the original Manifest to the Owner's Representative (the Generator) as required within 45 days.

G. The Contractor shall utilize a Waste Disposal Log. This log shall be maintained by the Project Supervisor and shall be kept on site at all times.

H. Originals of all waste disposal manifests disposal logs shall be submitted by the Contractor to the Owner with the final close-out documentation.

END OF SECTION 02 84 11

SECTION 02 8411 – NON-LIQUID POLYCHLORINATED BIPHENYL (PCB) ABATEMENT

PART 1 - GENERAL

1.0 RELATED DOCUMENTS

A. General provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.1 SCOPE OF WORK

A. Work includes demolition of various materials with concentrations assumed to contain/that contain PCBs greater than 50 mg/kg. This demolition waste, along with the extent of substrate that contains PCBs in quantities greater than 1 mg/kg, shall be disposed of as PCB Bulk Product Waste.

B. The Contractor shall be aware of all conditions of the project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work.

C. All Work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent shall apply.

1.2 DESCRIPTION OF WORK

A. Work includes removal of PCBs assumed to contain concentrations greater than 50 mg/kg. This material must be disposed of as PCB-bulk product waste. This material includes the following:

- Brown window caulk (Exterior) – Approximately 150 Linear Feet
- Painted brick upper wall (Floor 1) – Approximately 25 Square Feet
  Note: this material also contains lead-based paint and must be removed and disposed of as both assumed PCBs and lead-based paint. See Section 8333.13 Lead Paint for more information on how to properly remove and dispose of this paint.

1.3 PERMITS AND COMPLIANCE

A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of Workers, authorized visitors to the site, persons, and property adjacent to the Work.

B. Perform PCB-related Work in accordance with CT Hazardous Waste Management Regulations (Regulations of Connecticut State Agencies ("RCSA") Sections 22a-449(c)-100 through -119) and federal regulations 40 CFR 761, and 29 CFR 1926, as specified herein. Where more stringent requirements are specified, adhere to the more stringent requirements.

C. The Contractor must maintain current licenses or registrations pursuant to DEEP and EPA regulations for all Work related to this Project, including the removal, handling, transport, and disposal of hazardous and industrial waste.

D. Failure to adhere to the Project Documents shall constitute a breach of the Contract and the Owner shall have the right to and may terminate the Contract provided, however, the failure of the Owner to so terminate

shall not relieve the Contractor from future compliance.

1.4 SUBMITTALS

A. Pre-Work Submittals: Within 7 days prior to the pre-construction conference, the Contractor shall submit 3 copies of the documents listed below:

1. Progress Schedule:
   a. Show the complete sequence of abatement activities and the sequencing of Work within each building or building section.
   b. Show the dates for the beginning and completion of each major element of Work including substantial completion dates for each Work Area, building, or phase.

2. Abatement Work Plan: Provide plans that clearly indicate the following:
   a. All Work Areas/containments numbered sequentially.
   b. Entrances and exits to the Work Areas/containments.
   c. Type of abatement activity/technique for each Work Area/containment.
   d. Proposed location and construction of storage facilities and field office.

3. Disposal Site/Landfill Permit from applicable regulatory agency.

4. Letter identifying the presence of PCB bulk product waste, with Acknowledgement by the landfill.

5. Results of any PCB analysis including any relevant PCB bulk samples, PCB substrate and soil samples, and PCB TCLP for assumed PCB Bulk Product Waste.

B. On-Site Submittals: Refer to Part 3.1.B for all submittals, documentation, and postings required to be maintained on-site during abatement activities.

C. Project Close-out Submittals: Within 30 days after project completion, the Contractor shall submit one copy of the closeout-out submittals listed below to Owner for review and approval prior to the Contractors final payment.
1. Copy of all waste disposal manifests and disposal logs.

2. Daily progress log.

3. Copy of any Contractor's Acknowledgment Statement Forms as required by the Owner.

4. Disposal Site/Landfill Permit from applicable regulatory agency.

5. Copy of PCB notification with acknowledgement from the disposal facility/landfill, if applicable.

1.5 PRE-CONSTRUCTION CONFERENCE

A. Prior to start of preparatory Work under this Contract, the Contractor shall attend a pre-construction conference attended by the Owner and the Owner's On-site representative (Project Monitor).

B. Agenda for this conference shall include but not necessarily be limited to:

1. Contractor's scope of Work, Work plan, and schedule to include number of workers and shifts.

2. Contractor's safety and health precautions including protective clothing and equipment and decontamination procedures.

3. Project Monitor 's duties, functions, and authority.

4. Contractor's Work procedures including:

   a. Methods of job site preparation and removal methods.

   b. Disposal procedures.

   c. Cleanup procedures.

   d. Emergency procedures.

5. Contractor’s required pre-work and on-site submittals, documentation, and postings.

6. Temporary utilities.

7. Storage of removed PCB materials.

8. Waste disposal requirements and procedures.

1.6 APPLICABLE STANDARDS AND REGULATIONS

A. The Contractor shall comply with the following codes and standards, except where more stringent requirements are shown or specified:

B. Federal Regulations:

1. 29 CFR 1910.1200, "Hazard Communication" (OSHA)

2. 29 CFR 1910.134, "Respiratory Protection" (OSHA)

3. 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA)

4. 29 CFR 1926, "Construction Industry" (OSHA)

5. 40 CFR 761, “PART 761—POLYCHLORINATED BIPHENYLS (PCBs)” (EPA)

6. 49 CFR 171-173, Transportation Standards (DOT)

C. Connecticut State Regulations:

1. CT Hazardous Waste Management Regulations - RCSA Sections 22a-449(c)-100 through-119

2. CT Hazardous Waste Transporter Permits - RCSA Section 22a-449 (c)-11

D. Standards and Guidance Documents:

1. American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection

1.7 PROJECT MONITORING

A. The Owner shall engage the services of a Project Monitor regarding the performance of the PCB abatement Project and provide direction as required throughout the entire abatement Project period.

B. The Contractor is required to ensure cooperation of its personnel with the Project Monitor for the sampling and Project Monitoring functions described in this section. The Contractor shall comply with all direction given by the Project Monitor during the course of the Project.

C. The Project Monitor's duties include, but are not limited to:

1. The Project Monitor shall be on-site as needed during the course of abatement.

2. The Project Monitor shall have the authority to direct the actions of the Contractor verbally and in writing to ensure compliance with the Project documents and all regulations. The Project Monitor shall have the authority to Stop Work when gross Work practice deficiencies or unsafe practices are observed.
   a. Such Stop Work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.
   b. Standby time required to resolve the situation shall be at the Contractor's expense.

3. The Project Monitor shall provide the following services:
   a. Inspection of the Contractor's Work, practices, and procedures, including temporary protection requirements, for compliance with all regulations and Project specifications.
   b. Monitor the progress of the Contractor's Work and report any deviations from the schedule to the Owner.
   c. Monitor, verify, and document all waste load-out operations.
   d. The Project Monitor shall maintain a log on site that documents all project related and Consultant and Contractor actions, activities, and occurrences.
   e. The Project Monitor shall take air, swipe, wipe, or bulk samples upon the Owner's request.

4. The following inspections shall be conducted by the Project Monitor. Additional inspections shall be conducted as required by Project conditions. Progression from one phase of Work to the next by the Contractor is only permitted with the written approval of the Project Monitor.
   a. Pre-Construction Inspection: The purpose of this inspection is to verify the existing conditions of the Work Areas and to document these conditions.
   b. Pre-Commencement Inspection: This inspection shall take place only after the Work Area is fully prepped for removal.
   c. Work Inspections: The purpose of this inspection is to monitor the Work practices and procedures employed on the Project and to monitor the continued integrity of the containment system. Inspections within the removal areas shall be conducted by the Project Monitor during all preparation, removal, and cleaning activities at least twice every Work shift. Additional inspections shall be conducted as warranted.
   d. Visual Clearance Inspection: The purpose of this inspection is to verify that: all materials in the scope of work have been properly removed; no visible PCB material debris/residue remains.

e. Punch List Inspection: The purpose of this inspection is to verify the Contractor's certification that all Work has been completed as contracted and the existing condition of the area prior to its release to the Owner.

5. The Owner may, at its discretion, choose to conduct air sampling. If air samples collected during abatement indicate any airborne PCB concentration(s) above the OSHA PEL of 0.5 mg/m3 or EPA recommended thresholds, work shall be stopped immediately, and Work methods shall be altered to reduce the airborne PCB concentration(s).

1.8 PROJECT SUPERVISOR

A. The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:

1. The Project Supervisor shall be trained in PCB removal and hazardous waste management in CT, via a 40-hour HAZWOPER/Supervisor training course.

2. The Project Supervisor shall have a minimum of one year of experience as a supervisor.

3. The Project Supervisor must be able to read and write English fluently, as well as communicate in the primary language of the Workers.

B. If the Project Supervisor is not on-site at any time whatsoever, all Work shall be stopped. The Project Supervisor shall remain on-site until the Project is complete. The Project Supervisor cannot be removed from the Project without the written consent of the Owner. The Project Supervisor shall be removed from the Project if so requested by the Owner.

C. The Project Supervisor shall maintain a Daily Project Log that includes the Waste Disposal Log required by section 4.03 of the specifications.

D. The Project Supervisor shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Project Monitor.

1.9 TRAINING

A. As required by applicable regulations, prior to assignment to PCB Work, a responsible person shall instruct each employee with regard to the hazards of PCB, safety and health precautions, and the use and requirements of protective clothing and equipment.

1.10 RESPIRATORY PROTECTION

A. Establish a respirator program as required by ANSI Z88.2 and 29 CFR 1910.134. Provide respirator training.

B. Select respirators from those approved by the Mine Safety and Health Administration (MSHA), and the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to the OSHA requirements in 29 CFR 1910.134.

C. Respirators shall be individually fit-tested to personnel under the direction of an Industrial Hygienist on a yearly basis. Fit-tested respirators shall be permanently marked to identify the individual fitted, and use shall

be limited to that individual.

D. The Contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the work day.

E. Any authorized visitor, Worker, or supervisor found in the Work Area not wearing the required respiratory protection shall be removed from the Project site and not be permitted to return.

1.11 DELIVERY AND STORAGE

A. Deliver all materials to the job site in original packages with containers bearing manufacturer's name and label.

B. Store all materials at the job site in a suitable and designated area.

1. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.

2. Protect materials from unintended contamination and theft.

3. Storage areas shall be kept clean and organized.

C. Remove damaged or deteriorated materials from the job site. Materials contaminated with PCB shall be disposed of as PCB material as specified herein.

1.12 TEMPORARY UTILITIES

A. Where available, obtain power from Owner's existing system. Otherwise provide power from other sources (i.e. generator).

1. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.

2. Provide wiring and receptacles as required by the Environmental Consultant for air sampling equipment.

B. Utilize domestic water service, if available, from Owner's existing system.

PART 2 – PRODUCTS

2.1 PROTECTIVE CLOTHING

A. Provide personnel utilized during the Project with disposable protective whole-body clothing, head coverings, and foot coverings. Provide disposable plastic or rubber gloves, suitable to prevent PCB skin contact, to protect hands.

B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing abatement Work.

C. Eye protection and hard hats shall be provided and made available for all personnel entering any

Work Area.

D. Authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the Work Area.

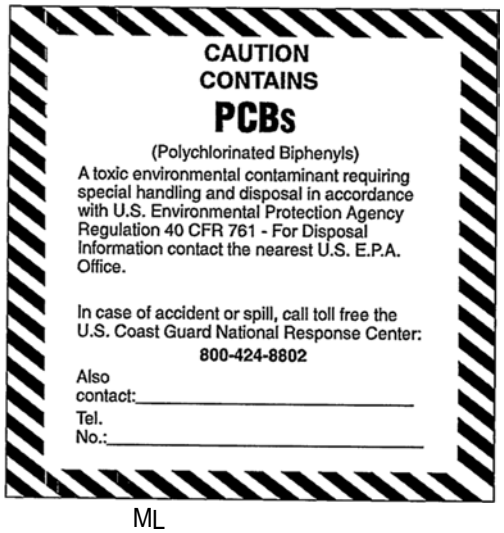
2.2 SIGNS AND LABELS, CONTAINERS

A. Disposal of mixed PCB and asbestos-containing waste must be disposed of as Hazardous Waste, as the presence of PCBs is assumed for asbestos-containing caulking.

B. All solid waste material, containment system components, used PPE, and other solid wastes generated during the Work shall be placed directly in appropriate waste receptacles immediately upon removal from its in-situ position. Suitable waste receptacles may consist of roll-off containers or DOT-approved 55-gallon drums.

C. Provide warning signs and barrier tapes at all approaches to PCB Work Areas. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.

D. Provide the appropriate “Large PCB Marking” or “Small PCB Marking” (ML or MS per 40 CFR 761) as shown below, of sufficient size to be clearly legible, for display on waste containers (bags, boxes, roll offs or drums) which will be used to contain or transport PCB contaminated material, in accordance with 40 CFR 761. In addition, U.S. Department of Transportation (DOT) 49 CFR Parts 171 and 172 requires the name and UN number of the material to be on the bags or drums, and, if shipped in bulk (roll offs, Gaylord boxes, etc.) the bulk container must also be labeled: Polychlorinated Biphenyl, solid mixture UN 3432.



ML



MS

E. The PCB materials are also CT Hazardous Waste, and must have a label stating the following on

each container :

HAZARDOUS WASTE--Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority, or the U.S. Environmental Protection Agency.

Generator's Name and Address_____
Generator's EPA Identification Number_____
Manifest Tracking Number _____

F. Provide 6 mil plastic disposal bags with PCB caution labels.

1. The “Small PCB Label” (MS per 40 CFR 761) may be used as shown above. Bags shall also be labeled with U.S. DOT required markings per 49 CFR 172, Polychlorinated biphenyl, solid mixture UN 3432.

2. Labeled PCB waste containers or bags shall not be used for non-PCB waste or trash. Any material placed in labeled containers or bags, whether turned inside-out or not shall be handled and disposed of as PCB waste.

2.3 DAILY PROJECT LOG

A. Provide a Daily Project Log. The log shall contain on title page the Project name, name, address and phone number of Owner; name, address and phone number of Environmental Consultant; name, address and phone number of Abatement Contractor; emergency numbers including, but not limited to local Fire/Rescue department.

B. All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted.

C. The Project Supervisor shall document all Work performed daily and note all inspections.

2.4 SCAFFOLDING, LIFTS AND LADDERS

A. Provide all scaffolding and/or staging as necessary to accomplish the Work of this Contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding and ladders shall comply with all applicable OSHA construction industry standards. Alternatively, materials my be accessed by lift.

B. Provide scaffolding and ladders as required by the Environmental Consultant for the purposes of performing required inspections.

2.5 SHIPPING CONTAINERS AND PACKAGING

A. Provide packaging in accordance with 49 CFR 173 Packaging Group 9, such as 30 or 55 gallon capacity fiber, plastic, or metal drums, Gaylord Boxes or other Intermediate Bulk Containers (IBCs), or non- siftable bulk containers, capable of being sealed air and water tight if PCB waste has the potential to damage or puncture disposal bags. Affix PCB caution labels on lids of drums, and opposite sides of drums or bulk containers, as well as the ends of bulk containers.

2.6 EQUIPMENT AND MATERIALS

A. All dry vacuuming performed under this contract shall be performed with High Efficiency Particulate Air (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.

B. Any power tools used to drill, cut into, or otherwise disturb PCB material shall be manufacturer equipped with HEPA-filtered local exhaust ventilation.

C. All polyethylene (plastic) sheeting used on the Project (including but not limited to sheeting used for critical and isolation barriers, fixed objects, walls, floors, ceilings, waste container) shall be at least 6 mil fire retardant sheeting.

PART 3 – EXECUTION

3.1 GENERAL REQUIREMENTS

A. Should visible PCB debris be observed outside the Work Area, immediately stop Work, notify the Owner; institute emergency procedures as directed. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.

B. The following submittals, documentation, and postings shall be maintained on-site by the Contractor during abatement activities at a location approved by the Abatement Project Monitor:

1. Project documents (specifications and drawings.)

2. Applicable regulations.

3. Material Safety Data Sheets of supplies/chemicals used on the Project.

4. Approved Abatement Work Plan.

5. List of emergency telephone numbers.

6. Waste Disposal Log.

7. Daily Project Log.

C. The following documentation shall be maintained on-site by the Abatement Project Monitor during

abatement activities:

1. Project Monitor Daily Log.

2. PCB Survey Report.

3.2 WORK AREA PREPARATION

A. PCB caution signs shall be posted at all approaches to the PCB Work Area. Post all emergency exits as emergency exits only on the Work Area side, post with PCB caution signs on the non-Work Area side. Provide all non-Work Area stairs and corridors accessible to the PCB Work Area with warning tapes at the base of stairs and beginning of corridors. Warning tapes shall be in addition to caution signs.

B. Access to areas of work shall be regulated to prevent unauthorized visitors.

C. Personal/Equipment Decontamination Room or Area: An existing room or area that is adjacent to the work area shall be used for the decontamination of personnel and equipment. The room or area shall be covered by an impermeable drop cloth on the floor or horizontal working surface. The room or area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment. Work clothing must be cleaned with a HEPA vacuum before it is removed. All equipment and surfaces of waste containers must be cleaned prior to removing them from the decontamination room or area. All personnel must enter and exit the PCB work area through the decontamination room or area.

D. Work Area Preparation for Exterior Removal:

1. All ground surfaces exterior to the work area shall have a layer of 6 mil fire retardant plastic sheeting, attached to the building face and laid down on the surface below the exterior abatement work area, at least 10 feet wide or to the furthest point of gravity fall for dislodged debris by methods used, whichever is further. For work at the second story and above, extend 6 mil fire retardant plastic sheeting as necessary. For work above third story, by sidewalk, street, or property boundary, scaffolding sides shall be covered in 6-mil fire retardant plastic sheeting.

2. All operable windows within the work area and 25 ft. from all sides of the work area shall be closed.

3. HVAC equipment shall remain inoperable for the duration of the project.

E. Work Area Preparation for Interior Removal:

1. HVAC equipment shall remain inoperable for the duration of the project.

2. All floor areas adjacent to the work area shall have a layer of 6 mil fire retardant plastic sheeting, attached to the interior wall and laid down on the surfaces below the abatement work area, at

least 5 feet wide or to the furthest point of gravity fall for dislodged debris by methods used, whichever is further.

3. All movable objects shall be removed from the immediate work area. All non-movable objects shall be covered with one layer of 6 mil fire retardant plastic sheeting and sealed at the edges.

4. All operable windows within the work area shall be closed.

5. Temporary dust barriers consisting of a minimum of 6-mil fire-retardant plastic sheeting shall be at installed at hallways, corridors, doorways, and other openings to the work area not used for passage during removals) to establish work area containment enclosure.

6. A 6-mil fire retardant plastic sheeting overlapping curtained doorway shall be installed at the entrance to the work area.

7. For all work areas with use of electromechanical tools for PCB removals, HEPA filtered negative air ventilation units must be installed in work area and operate continuously during removal operations to establish negative pressure. A minimum of 4 air changes per hour must be maintained within the work area during removals and cleanings until work area clearance is obtained from the Project Monitor.

3.3 REMOVAL OF PCB MATERIALS - GENERAL

A. PCB-containing materials shall be removed in accordance with the Contract Documents and the approved PCB Work Plan.

B. Use tools that generate the least amount of dust and will still complete the PCB caulk removal. See current EPA regulations and recommendations regarding tools and protective measures to be used for PCB caulk removals.

C. Grinding electromechanical tools (e.g. angle grinders, masonry groove cutters, circular saws, and slot mills, etc.) are not allowed to be used for exterior open-air PCB caulk removals.

D. For exterior removals, take appropriate precautions (e.g. install windscreens) to prevent dust and debris from migrating due to windy conditions.

E. Remove accessible caulk that could be disturbed before cutting building components, such as window frames.

F. All removed PCB material shall be placed into 6 mil plastic disposal bags or other suitable container upon detachment from the substrate. Large components with PCB material or PCB residue shall be wrapped in one layer of 6 mil plastic sheeting. Sharp components likely to tear disposal bags shall be placed in fiber drums or boxes and then wrapped with sheeting.

G. Power or pressure washers are not permitted for PCB removal or clean-up procedures. Porous substrates must be scrubbed with detergent and rinsed with water that is not released to the environment, but is instead collected on rags, sponges or HEPA vacuumed with a wet-vac and drummed for waste characterization and disposal.

H. Non-porous surfaces must be decontaminated by double alternating wash with detergent and rinse with hexane or other suitable solvent.

I. All construction and demolition debris determined by the Environmental Consultant to be in contact with the PCB caulk shall be handled and disposed of as PCB bulk product waste.

J. All PCB waste must be located at or near the point of generation, under the control of the Project Supervisor.

K. Personal protective equipment, including respirators, shall be utilized and worn during all removal operations until the Work Area is cleared by the Project Monitor.

L. Following completion of gross abatement and after all accumulations of PCB waste materials have been containerized, the decontamination procedures in Section 3.4 shall be followed.

M. Dry sweeping and any other methods that raise dust shall be prohibited.

3.4 EQUIPMENT AND AREA DECONTAMINATION

A. When removal of PCB materials is completed, the decontamination process shall consist of vacuuming (with a HEPA filter), wet wiping/mopping and a repeated vacuuming (with a HEPA filter) of the entire work area. All surfaces in and around the work area must be free of dust generated during the work.

B. Decontaminate all tools and equipment before removal from the work area.

C. If dust or debris has migrated to areas of the building other than the immediate work area, those areas shall be incorporated into the work area and thoroughly decontaminated to ensure all visible dust generated by the activity is eliminated.

D. Uncontaminated dust barriers and other protective sheeting shall be placed in disposable construction bags and disposed of as normal trash.

E. Visually inspect the area for any remaining dust or debris. Vacuum (with HEPA filter) and wet wipe until space is clean. Dispose of vacuum contents as PCB waste.

F. Upon completion of decontamination and removing temporary dust barriers, a final inspection shall be performed by the Contractor and Abatement Project Monitor. As a result of any visual inspection by the Abatement Project Monitor, the Contractor will clean or reclean the affected areas at no additional expense to the Owner.

3.5 CLEANUP VERIFICATION SAMPLING

A. No verification sampling is required for this project as PCBs are assumed rather than tested.

B. Non-porous substrates such as window and door frames are scheduled for replacement and may be discarded as assumed bulk product waste. No verification sampling will be performed on the non- porous substrates scheduled for removal.

PART 4 - DISPOSAL OF PCB WASTE

4.1 TRANSPORTATION AND DISPOSAL SITE

A. The Contractor's Hauler and Disposal Site shall be approved by the Owner. If the waste stream contains PCBs greater than 50 mg/kg, for any permitted out-of-state landfill not specifically authorized for disposal of PCBs, written notice must be provided 15 days prior to the first shipment of the same waste stream that the waste may contain PCBs greater than 50 mg/kg, in accordance with 40 CFR 761.62. The letter shall be acknowledged via a disposal facility representative's signature, printed name and title. If the facility is permitted to accept PCB waste, no letter is required. Documentation of a PCB TCLP with results of less than 10 µg/L must be provided to the landfill for all bulk product waste disposal.

B. The Contractor shall give twenty-four (24) hour notification prior to removing any waste from the site. Waste shall be removed from the site only during normal working hours unless otherwise specified. No waste may be taken from the site unless the Contractor and Environmental Consultant are present and the Environmental Consultant authorizes the release of the waste as described herein.

C. All waste generated as part of the PCB project shall be removed from the site within ten (10) calendar days after successful completion of all PCB abatement work.

D. The Hauler, with the Contractor and the Environmental Consultant, shall inspect all material in the transport container prior to taking possession and signing the Hazardous Waste Manifests.

E. Disposal dumpsters shall be lined with 2 layers of 6 mil polyethylene sheeting and 1 layer of polypropylene burlap. Disposal dumpster liners must be sealed leak-tight prior to leaving the job site.

F. The waste containers shall remain staged at the Site with a secure impermeable cover in-place until the materials are transported from the Site to be delivered to the designated waste disposal facility.

G. Drum staging area shall be designated prior to initiation of the abatement work and approved by the Consultant. If this area is located outside of the building, the area (or areas) shall be surrounded by a chain-link fence with a minimum height of six feet. The fence shall be labled with PCB warning signs.

H. The Contractor shall be responsible for all packaging, labeling, transport, disposal, and recordkeeping associated with PCB Bulk Product Waste in accordance with all federal, state, and local regulations.

I. The Contractor shall ensure that the person transporting the waste holds a valid permit issued in accordance with appropriate federal, state, and local regulations.

J. The Contractor shall provide to the transporter at the time of transfer appropriate shipping records or uniform waste manifests as required by the federal, state, and local regulations with a copy to the Owner and Consultant.

K. The Contractor shall maintain proper follow-up procedures to assure that waste materials have been received by the designated waste site in a timely manner, and in accordance with all federal, state and local regulations.

4.2 WASTE STORAGE CONTAINERS

A. All waste containers shall be fully enclosed and lockable (i.e. enclosed dumpster, trailer, etc.).

B. The container shall be plasticized and sealed with two layers of six-mil plastic. Once on site, it shall be kept locked at all times, except during load out. The waste container shall not be used for storage of equipment or contractor supplies.

C. While on-site, the container shall be labeled with PCB Warning Labels

D. The container is not permitted to be loaded unless it is properly plasticized, has the appropriate danger signage affixed, and has the permit number appropriately stenciled on the container. .

E. The Owner may initiate random checks at the Disposal Site to ensure that the procedures outlined herein are complied with.

4.3 HAZARDOUS WASTE MANIFESTS

A. A Uniform Hazardous Waste Manifest shall be utilized solely as the waste Manifest for transportation. A hauler billing form or bill of lading may be used if the hauler needs an independent record but shall not be used as a shipping document.

B. The Manifest shall be completed by the Contractor and verified by the Environmental Consultant that all the information and amounts are accurate, and the proper signatures are in place.

C. The Manifest shall have the appropriate signatures of the Owner's Representative (the Generator) and the Hauler representative prior to any waste being removed from the site.

D. Copies of the completed Manifest shall be retained by the Environmental Consultant and shall remain on site for inspection.

E. Upon arrival at the Disposal Site, the Manifest shall be signed by the Disposal Facility operator to certify receipt of PCB materials covered by the manifest.

F. The Disposal Facility operator shall return the original Manifest to the Owner's Representative (the Generator) as required within 45 days.

G. The Contractor shall utilize a Waste Disposal Log. This log shall be maintained by the Project Supervisor and shall be kept on site at all times.

H. Originals of all waste disposal manifests disposal logs shall be submitted by the Contractor to the Owner with the final close-out documentation.

END OF SECTION 02 84 11

Figure 1. Abatement Plan

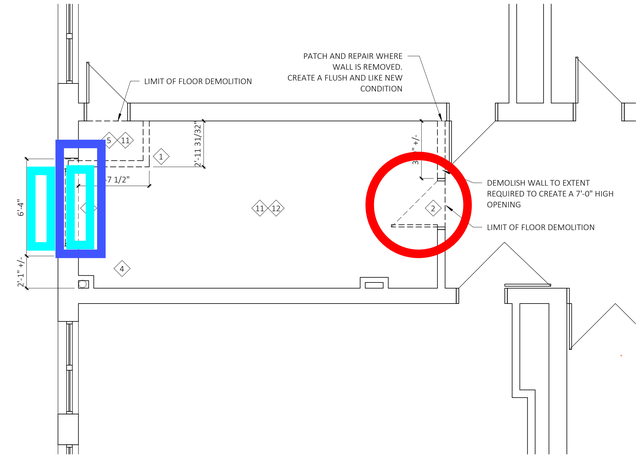
Contractor to remove and properly dispose of fire doors with presumed asbestos non-disturbance

Contractor to remove and properly dispose of lead-painted / assumed PCB brick walls and wood window casings to be demolished

Contractor to utilize lead-based paint precautions as detailed in Specification Section 02 8333.13 where wall demolition will disturb lead-based paint

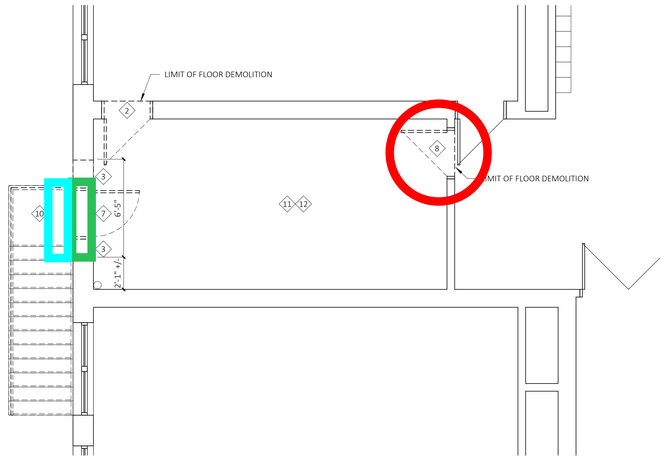
Contractor to remove and properly dispose of all assumed interior and exterior PCB door/ window caulk

Contractor to remove and properly dispose of transom window sash with asbestos and assumed PCB window glazing compound non-disturbance



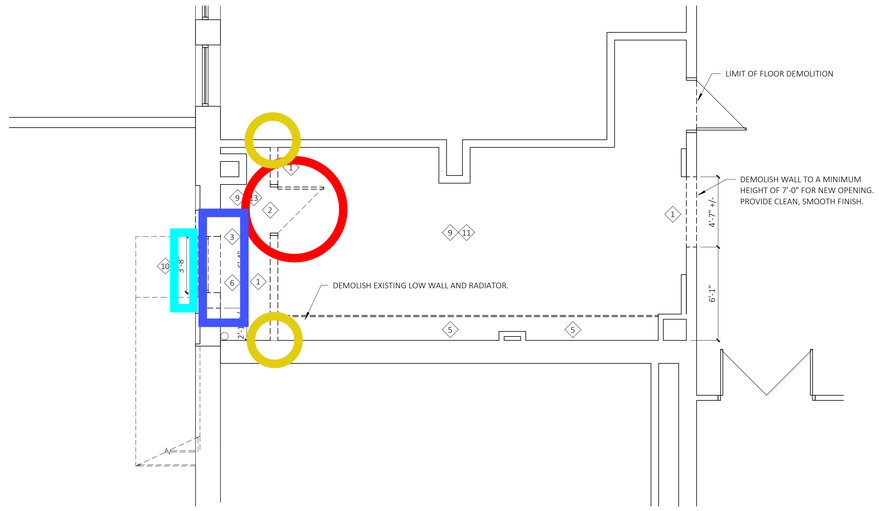
3 THIRD FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



2 SECOND FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



1 FIRST FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

GENERAL DEMOLITION NOTES

1. ANY DEMOLITION WORK ASSOCIATED WITH NEW WORK THAT IS NOT SPECIFICALLY NOTED ON THIS PLAN SHALL BE THE RESPONSIBILITY OF THE DEMOLITION CONTRACTOR.
2. DEMOLISHED MATERIAL SHALL BE CONSIDERED TO BE THE PROPERTY OF THE CONTRACTOR AND SHALL BE COMPLETELY REMOVED FROM THE JOB SITE.
3. SHUT OFF, CAP AND OTHERWISE PROTECT EXISTING PUBLIC UTILITY LINES IN ACCORDANCE WITH THE REQUIREMENTS OF THE PUBLIC AGENCY HAVING JURISDICTION.
4. COMPLETELY REMOVE ITEMS SCHEDULED TO BE SO DEMOLISHED AND REMOVE, LEAVING SURFACES CLEAN, SOLID AND READY TO RECEIVE NEW MATERIALS AND SPECIFIED ELSEWHERE.
5. USE MEANS NECESSARY TO PREVENT DUST FROM BECOMING A NUISANCE TO THE USER.
6. THIS DRAWING DOES NOT DEPICT THE FULL EXTENT OF DEMOLITION. ADDITIONAL ITEMS SCHEDULED FOR DEMOLITION MAY BE FOUND ON OTHER DRAWINGS. CONSTRUCTION MANAGER IS RESPONSIBLE FOR THE COORDINATION OF THIS WORK WITH ALL PARTIES INVOLVED.
7. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH ALL NATIONAL, STATE, LOCAL CODES & ORDINANCES.
8. ALL EXISTING (FREESTANDING) FURNITURE ITEMS IN ALL ROOMS UNDER SCOPE OF WORK TO BE REMOVED BY OWNER.
9. DEMOLITION CONTRACTOR MUST VERIFY LOCATIONS OF ALL EXISTING STRUCTURAL, MECHANICAL, PLUMBING & ELECTRICAL ELEMENTS PRIOR TO START OF DEMOLITION.
10. REMOVE ALL INTERIOR WALLS SHOWN DOTTED, ALONG WITH ALL ASSOCIATED TACK BOARDS, CHALK BOARDS, MARKER BOARDS, ETC. EXERCISE CAUTION SO AS NOT TO DISTURB OR DAMAGE ADJACENT SURFACES SCHEDULED TO REMAIN.
11. REMOVE ALL PLUMBING FIXTURES INCLUDING SINKS, WATER CLOSETS, URINALS, SLOP SINKS AND DRINKING FOUNTAINS WITHIN DEMOLITION AREAS. REMOVE AND CAP ALL PLUMBING LINES BEHIND FINISHED WALL AND FLOOR SURFACES. REFER TO PLUMBING DEMOLITION DRAWINGS FOR RELATED INFORMATION.
12. REMOVE ALL DOORS AND DOOR FRAMES SHOWN IN FULLY DEMOLISHED PARTITIONS ONLY, UNLESS NOTED OTHERWISE.
13. REMOVE ALL RADIATION UNITS, H.V.A.C. RUNS, MECHANICAL UNITS, INFORMATION.
14. EMOVE ALL ELECTRICAL LIGHTING FIXTURES, ELECTRICAL RUNS, ASSOCIATED DEVICES. REFER TO ELECTRICAL DEMOLITION DRAWINGS FOR RELATED INFORMATION.
15. REFER TO SITE PLANS FOR SITE DEMOLITION NOTES.
16. REFER TO ALL DRAWINGS FOR ADDITIONAL INFORMATION.
17. REMOVE ALL EXISTING FLOOR SYSTEMS I.E. VINYL TILE, SHEET VINYL, CERAMIC TILE, MASTIC, MUD SET, ETC. AT ALL AREAS WHERE A NEW FLOOR IS SCHEDULED. REF. FINISH PLANS & SCHEDULE. PREP FLOORS TO RECEIVE NEW FINISHES.
18. ALL EXISTING LAY IN CEILING PANELS TO BE REMOVED BY THE ABATEMENT CONTRACTOR WHERE NEW CEILINGS ARE SCHEDULED. REFER TO ASBESTOS ABATEMENT PLANS AND REFLECTED CEILING PLANS.
19. REMOVE ALL CEILING GRIDS (CORRIDOR CEILING GRID TO BE REMOVED BY THE ABATEMENT CONTRACTOR), GYPSUM CEILINGS AND SUSPENSION SYSTEMS AT ALL AREAS WHERE NEW CEILINGS ARE SCHEDULED. REFER TO REFLECTED CEILING PLANS.
20. REMOVE ALL EXISTING BUILT-IN MILLWORK SHOWN DOTTED INCLUDING SINKS, ASSOCIATED PLUMBING & ELECTRICAL BACK TO SOURCE OR PANEL AS REQ'D.
21. ALL WINDOW SYSTEMS SCHEDULED FOR DEMOLITION TO BE REMOVED BY THE ABATEMENT CONTRACTOR.
22. THE DEMOLITION PLANS ARE DIAGRAMMATIC AND INTENDED TO SHOW THE GENERAL EXTENT OF THE WORK ONLY.
23. THE CONTRACTOR SHALL INCLUDE ALL DEMOLITION WORK REQUIRED TO ACCOMPLISH THE INTENT OF THE PLANS AND SPECIFICATIONS.
24. ALL DEMOLISHED ITEMS SHALL BE REMOVED FROM BUILDING /SITE UNLESS OTHERWISE NOTED. COORDINATE WITH OWNER FOR DELIVERY OF ITEMS NOTED TO REMAIN OWNERS PROPERTY. THE PROJECT SITE/ BUILDING SHALL BE CLEANED OF DEBRIS ON A DAILY BASIS. CONSTRUCTION MANAGER WILL COORDINATE AND INSTRUCT WHICH
25. CONTRACTOR SHALL BE RESPONSIBLE FOR SHORING AND SUPPORT (TEMPORARY OR PERMANENT) FOR ALL PORTIONS OF CONSTRUCTION DURING DEMOLITION AND CONSTRUCTION.
26. ALL ABANDONED MECHANICAL / ELECTRICAL / PLUMBING LINES SHALL BE CAPPED OFF BEHIND FINISHES, UNLESS OTHERWISE NOTED. REFER TO MECHANICAL / ELECTRICAL / PLUMBING DRAWINGS FOR ADDITIONAL DEMO. INFORMATION.
27. GENERAL TRADES CONTRACTOR SHALL SAWCUT ALL MASONRY OR CONCRETE OPENINGS INDICATED. MASONRY SHALL BE TOOTHED IN AND / OR RETURNED TO FINISHED OPENING ALL OPENINGS WHERE EXISTING CONSTRUCTION HAS BEEN REMOVED, AND WHICH ARE NOT NOTED TO REMAIN, SHALL BE FILLED AND /OR PATCHED TO MATCH THE ADJACENT EXISTING OR NEW FINISH, INCLUDING ANY FIRE RATINGS REQUIRED.
28. ALL AREAS OF FLOORS, WALLS AND CEILINGS DISTURBED BY DEMOLITION SHALL BE FILLED, PATCHED OR OTHERWISE REFINISHED TO MATCH EXISTING OR NEW FINISH AS DESIGNATED, INCLUDING ALL REQUIRED RATINGS.
29. CONTRACTOR MUST VERIFY LOCATIONS OF ALL EXISTING STRUCTURAL, MECHANICAL, PLUMBING & ELECTRICAL ELEMENTS PRIOR TO START OF DEMOLITION.
30. COORDINATE DEMOLITION EFFORTS WITH ASBESTOS ABATEMENT WORK.
31. EXISTING CONDITIONS SHALL BE STUDIED PRIOR TO BIDDING TO FAMILIARIZE YOURSELF WITH THE BUILDING AND INTENTIONS OF THE FINAL WORK AND THE REQUIRED DEMOLITION, INCLUDING ALL MECH., ELECT., PLUMB., TECH., STRUCTURAL AND GENERAL CONSTRUCTION ITEMS REQUIRING REMOVAL.
32. NO ELECTRICAL, TECHNOLOGY WIRING OR PNEUMATIC LINES ARE TO BE ABANDONED IN PLACE.
33. REFER TO SPECS FOR CUTTING & PATCHING, FLOOR PREP AND SELECTIVE DEMOLTION.

DEMOLITION LEGEND: KEYED INTO PLAN

1. REMOVE EXISTING WALL
2. REMOVE DOOR AND FRAME
3. REMOVE EXTERIOR MASONRY WALL CONSTRUCTION
4. REMOVE SINK AND ASSOCIATED PIPING BACK TO SOURCE. REFER TO GENERAL DEMOLITION NOTE 4 FOR PLUMBING INFORMATION
5. REMOVE SHELVING. SUPPLIES TO BE REMOVED BY OWNER.
6. REMOVE EXISTING WINDOW SYSTEM IN ITS ENTIRETY AND ASSOCIATED HARDWARE.
7. REMOVE EXISTING DOOR, HARDWARE, FRAME AND TRANSOM WINDOW IN IT'S ENTIRETY.
8. REMOVE EXISTING DOOR AND HARDWARE. MAINTAIN EXISTING FRAME AND PATCH WHERE HARDWARE HAS BEEN REMOVED.
9. REMOVE EXISTING CEILING, GRID AND ASSOCIATED FIXTURES. REFER TO MEP DRAWINGS FOR ADDITIONAL INFORMATION.
10. REMOVE EXISTING METAL FIRE ESCAPE AND ASSOCIATED HARDWARE. REPAIR MASONRY FACADE.
11. REMOVE EXISTING FLOORING, BASEBOARD AND ANY ASSOCIATED SUBSTRATE AND PREPARE SLAB FOR NEW FLOORING.
12. EXISTING HARD CEILING TO REMAIN. REMOVE EXISTING CEILING FIXTURES.
13. PREP EXISTING BRICK....

FREEMAN
ELEVATE YOUR GROUND GAME

FRIAR
architecture interior design master planning
21 Talcott Notch Road friar.com
Farmington, CT 06032 860.678.1291

PROFESSIONAL SEAL

CONSULTANT

DRIGGS ELEMENTARY SCHOOL ELEVATOR ADDITION

77 Woodlawn Terrace
Waterbury, CT 06710

STATE PROJECT NUMBER
151-0315 LUE

REVISIONS

NO.	DATE	DESCRIPTION
	xx/xx/2026	ISSUE FOR BID

PROGRESS SET
NOT FOR CONSTRUCTION

DEMO FLOOR PLANS

DATE: 12/05/2025
SCALE As indicated
PROJ. #: 2022_049A
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Figure 1. Abatement Plan

Contractor to remove and properly dispose of lead-painted / assumed PCB brick wall to be demolished

Contractor to remove and properly dispose of all assumed exterior PCB window caulk

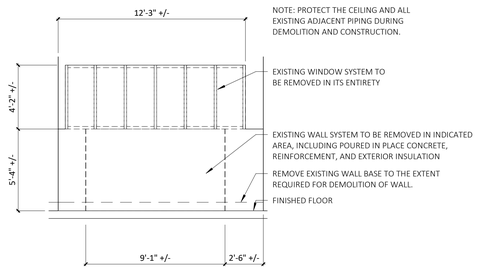
DEMOLITION LEGEND: KEYED INTO PLAN

1. REMOVE COMPLETE WINDOW SYSTEM
2. REMOVE EXTERIOR MASONRY WALL CONSTRUCTION
3. REMOVE FLOORING AND WALL BASE TO THE EXTENT REQUIRED FOR DEMOLITION OF WALL. WHERE NECESSARY, REMOVE TO FULL TILE (NOT PARTIAL).

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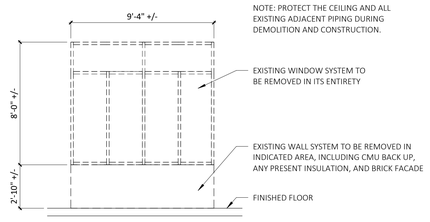
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33. REFER TO SPECS FOR CUTTING & PATCHING, FLOOR PREP AND SELECTIVE DEMOLTION.
34. ALL DIMENSIONS ARE TO BE FIELD VERIFIED.



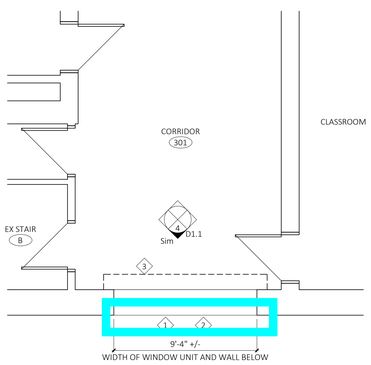
5 DEMO ELEVATION - FIRST FLOOR

SCALE: 1/4" = 1'-0"



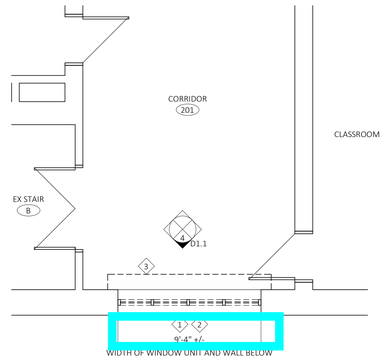
4 DEMO ELEVATION - SECOND AND THIRD FLOOR

SCALE: 1/4" = 1'-0"



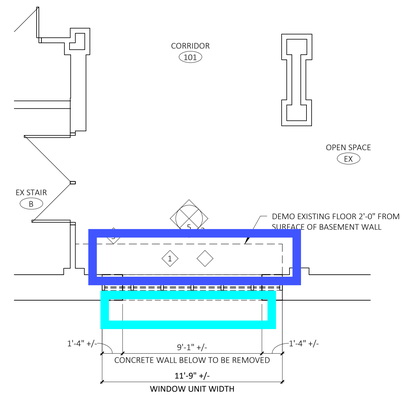
3 THIRD FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



2 SECOND FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



1 FIRST FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

architecture
interior design
master planning
FRIAR
21 Talcott Notch Road
Farmington, CT 06032
friar.com
860.678.1291

PROFESSIONAL SEAL

CONSULTANT

WILSON ELEMENTARY SCHOOL ELEVATOR ADDITION

235 BIRCH STREET
WATERBURY, CT 06704

STATE PROJECT NUMBER
151-0316 LUE

REVISIONS

NO.	DATE	DESCRIPTION
	XX/XX/2025	ISSUE FOR BID

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NOT FOR CONSTRUCTION

DEMOLITION PLANS

DATE: 12/05/2025
SCALE As indicated
PROJ. #: 2022-049A
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SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.

B. Related Sections:

1. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
2. Division 32 Section "Concrete Paving" for concrete pavement and walks.

1.03 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings

1. Submit shop drawings of all members to be furnished. Detail drawings of the members and their connections shall follow standard practice as set forth in the AISC "Manual of Structural Steel Detailing" (Second Edition). In particular, welding shall be shown, using standard AWS welding symbols. Show on detail drawings the paint to be used.
2. Shop drawings will not be accepted for review by the Engineer unless there is substantial evidence that the General Contractor or Construction Manager on the project has reviewed the submittal for compliance with the contract documents and has addressed questions to be responded to by the Contractor. All coordination items with other trades and submittals are to be performed and the submittal marked accordingly before submission. Failure to provide the above will result in the submittal being returned and not reviewed.
3. Contractor shall perform review and schedule shop drawing submittals to permit a minimum of 15 calendar days for review by the Engineer. Shop Drawings will be returned to the Architect for their required review and processing.
4. Shop drawings will not be reviewed unless accompanied by erection drawings which locates and identifies the members. Copies or reproductions of contract drawings will not be accepted or reviewed as shop drawings.
5. Shop drawings shall be submitted in the form of an electronic file (PDF).
6. The following is the definitions for the Shop Drawing stamp disposition:

   No Exceptions Taken - Re-submission is not required unless document is revised.

   Make Corrections Noted - If checked, fabrication may be undertaken. Contractor is responsible for making noted corrections. Re-submission of record copies are required.

Revise and Resubmit - If checked, fabrication may not be undertaken. Resubmit corrected copies for final review, with all changes clouded.

Rejected - Resubmit for review.

Reviewed – Reviewed for general compliance with the structural Contract Documents. Proprietary items or items designed by Others are reviewed only and shall not be approved by MHAI. Resubmission is not required.

Corrections or comments made on shop drawings during this review do not relieve the Contractor from compliance with the requirements of the project drawings and specifications. This check is only for the review of general conformance with the information given in the Contract Documents. The Contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes, techniques and sequence of construction, coordinating his work with that of other trades, and performing his work in accordance with OSHA requirements and other sections of the Project Specifications.

C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

D. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

F. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Steel reinforcement and accessories.
4. Fiber reinforcement.
5. Waterstops.
6. Curing compounds.
7. Floor and slab treatments.
8. Bonding agents.
9. Adhesives.
10. Vapor retarders.
11. Semi-rigid joint filler.
12. Repair materials.

G. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates.

H. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

I. Field quality-control reports.

J. Minutes of pre-installation conference.

K. Environmental Product Declaration (EPD): Submit in accordance with the following.

1. Critically reviewed life cycle analysis having at least a cradle-to-gate scope with the below criteria:

a. Commercial-product-specific; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.

2. Submit a Type -3 EPD for each unique mix design.

3. Submit a Type -3 EPD for each Supplemental Cementitious Material (SCM).

4. For products delivered in multiple shipments to the jobsite, a Type-3 EPD must be provided for each separate shipment from a different point of production, or from a different supplier.

5. Global Warming Potential (GWP):

a. For concrete mixes, all GWP information submitted shall be in the form of $kgCO_2eq$ per cubic yard.

b. For SCM, all GWP information submitted shall be in the form of $kgCO_2eq$ per metric ton and shall not exceed 60 $kgCO_2eq$ per metric ton.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete. Sections 1 through 5 and Section 7, "Lightweight Concrete."

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

F. Concrete Testing Service: Owner will engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

G. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    a. Contractor's superintendent.
    b. Independent testing agency responsible for concrete design mixtures.
    c. Ready-mix concrete manufacturer.
    d. Concrete subcontractor.
    e. Special concrete finish subcontractor.
2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
    1. Plywood, metal, or other approved panel materials.
    2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
        a. High-density overlay, Class 1 or better.
        b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
        c. Structural 1, B-B or better; mill oiled and edge sealed.
        d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
    1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
    1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.

2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.

3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.02 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

C. Deformed-Steel Wire: ASTM A 496/A 496M.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.03 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.04 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150 Type I/II, gray

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source[with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials].

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Lightweight Aggregate: ASTM C 330, 3/4-inch at typical slabs and 3/8-inch at stair pan slabs nominal maximum aggregate size.

D. Water: ASTM C 94/C 94M and potable.

E. Ground Glass Pozzolan (GGP): ASTM C1866

2.05 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2. Retarding Admixture: ASTM C 494/C 494M, Type B.

3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.06 WATERSTOPS

A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Carlisle Coatings & Waterproofing, Inc.; MiraSTOP.
   b. CETCO; Volclay Waterstop-RX.
   c. Concrete Sealants Inc.; Conseal CS-231.
   d. Greenstreak; Swellstop.
   e. Henry Company, Sealants Division; Hydro-Flex.
   f. JP Specialties, Inc.; Earth Shield Type 20.

2.07 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Carlisle Coatings & Waterproofing, Inc.; Blackline 400.
   b. Fortifiber Building Systems Group; Moistop Ultra 15.
   c. Grace Construction Products, W. R. Grace & Co.; Florprufe 120.
   d. Raven Industries Inc.; Vapor Block 15.
   e. Stego Industries, LLC; Stego Wrap 15 mil Class A.

2.08 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

2.09 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

D. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.010 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.011 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

E. Recycled Content: Provide cast-in-place concrete such that the total weight of cementitious material is comprised of 15% - 50% post-consumer recycled content by using Supplemental Cementitious Materials (SCM).

1. The cement replacement rate will be at the discretion of the concrete supplier and approved by the engineer based on the following:

a. Seasonal temperatures

b. Performance requirements of the hardened concrete

c. Maximum allowable GWP of the concrete

2. For cement replacement exceeding 30%, consideration shall be given to allow for 56-day strength acceptance when the project schedule permits.

2.012 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings and foundation walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4500 psi at 28 days.

2. Maximum Water-Cementitious Materials Ratio: 0.45.

3. Slump Limit: 4 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.

4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

2.013 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement per CRSI's "Manual of Standard Practice."

2.014 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete per ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.

2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.

2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Do not chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

2. Install dovetail anchor slots in concrete structures as indicated.

3.03 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.04 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.05 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.06 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.

3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

5. Space vertical joints in walls 30 feet maximum. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth depth of concrete thickness slabs for typical slabs and a maximum of 1” for with embedded piping for radiant heat:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.

3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install diamond dowel and support assemblies at joints where indicated.

3.07 WATERSTOPS

A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.08 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.

2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.09 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.010 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.011 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after

loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.

b. Continuous water-fog spray.

c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.

b. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3.012 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.013 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match

before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.014 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.

2. Verification of use of required design mixture.

3. Concrete placement, including conveying and depositing.

4. Curing procedures and maintenance of curing temperature.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.

   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.

6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C 31/C 31M.

   a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

   b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

   a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.

   b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive

strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.

END OF SECTION

SECTION 04 20 00
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Common brick.

C. Mortar and grout.

D. Reinforcement and anchorage.

E. Flashings.

F. Lintels.

G. Accessories.

H. Masonry-cell fill

1.02 PRODUCTS INSTALLED BY NOT FURNISHED UNDER THIS SECTION

A. Steel lintels in unit masonry

B. Steel shelf angles for supporting unit masonry

C. Cavity wall insulation

1.03 RELATED REQUIREMENTS

A. Section 07 21 00 - Thermal Insulation: Insulation for cavity spaces.

B. Section 07 27 00 - Air Barriers: Air barriers applied to exterior face of backing sheathing or unit masonry substrate.

C. Section 07 62 00 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.

D. Section 07 84 00 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.

E. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.04 REFERENCE STANDARDS

A. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

B. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2022.

C. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale); 2023.

D. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2023.

E. ASTM C90 - Standard Specification for Dry-Cast Loadbearing Concrete Masonry Units; 2024a.

F. ASTM C91/C91M - Standard Specification for Masonry Cement; 2025.

G. ASTM C150/C150M - Standard Specification for Portland Cement; 2024.

H. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2024.

I. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2024.

J. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2025a.

K. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.

L. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

M. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2024.

N. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.

O. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.

P. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).

Q. UL (FRD) - Fire Resistance Directory; Current Edition.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.06 ACTION SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for each type of product including but not limited to masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Shop Drawings for the following:
   1. Masonry units: show sizes, profiles, coursing and locations of special shapes.
   2. Reinforcing steel: Detail bending, lap lengths and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
   3. Fabricated flashing: Detail corner units, end dam units and other special applications.

D. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
   1. Include calculations or selections from the manufacturer's prescriptive design tables that indicate compliance with the applicable building code and project conditions.

E. Samples for initial selection:
   1. Brick
   2. Colored mortar

F. Samples for Verification: For each type and color of the following:
   1. Brick
   2. Pigmented mortar. Make samples using same sand and mortar ingredients to be used on project.
   3. Accessories embedded in masonry.

G. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.07 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency

B. Material Certificates: For each type and size of the following:
   1. Masonry units
      a. Include material test reports substantiating compliance with requirements.
      b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
      c. For exposed brick, include test report for efflorescence according to ASTM C 67.
      d. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
   2. Integral water repellent used in CMUs
   3. Cementitious materials. Include name of manufacturer, brand name, and type.
   4. Mortar admixtures.

5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Joint reinforcement.
9. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

C. Fire Rated Assemblies: Comply with applicable code for UL (FRD) Assembly No. ____.

1.09 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

B. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

F. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.11 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.

2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.02 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

2.03 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.04 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

B. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
   1. Provide bullnose units for outside corners unless otherwise indicated.

C. CMUs: ASTM C 90.
   1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
   2. Density Classification: Lightweight unless otherwise indicated.
   3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

2.05 BRICK UNITS

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
   1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
   2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
   3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
   4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Clay Face Brick: Facing bick complying with ASTM C 216

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Glen-Gerry (Basis of Design)
   2. Belden Brick; _____: www.beldenbrick.com/#sle.
   3. Watsontown Brick Company
   4. Taylor Clay Products Inc.
   5. Substitutions: See section 01 60 00 - Product Requirements.

D. Grade SW; solid units. Type FBX
   1. Nominal size: As indicated on drawings.
   2. Unit Compressive strength: Provide units with minimum average net-area compressive strength of 3000 psi.
   3. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested according to ASTM C 67.
   4. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
   5. Color and Texture: Basis of Design: Glen Gerry: Smooth Red

2.06 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold weather construction. Provide natural color or white cement as required to produce motar color indicated; color as required to produce approved color sample.
   1. Not more than 0.10 percent alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

D. The use of masonry cement is not permitted.

E. Grout Aggregate: ASTM C404.

F. Colored Cement Products: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
   1. Colored Portland Cement-Lime Mix:
      a. Manufacturers: Subject to compliance with requirements, undefined:
         1) Flamingo Brixment; Portland & Lime Blend.
         2) Lafarge North America Inc.
         3) Lehigh Hanson; HeidelbergCement Group.
      b. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
      c. Pigments shall not exceed 10 percent of portland cement by weight.

G. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.

H. Water: Clean and potable.

I. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Euclid Chemical Company (The); Accelguard 80.
      b. GCP Applied Technologies; Morset.
      c. Sonneborn Products, BASF; Trimix-NCA.

2.07 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.Manufacturers:

B. Products: Subject to compliance with requirements, provide one of the following: Manufacturers:
   1. Heckmann Building Products Inc.; No 376 Rebar Positioner
   2. Hohmann & Barnard, Inc.; #RB or #RB-Twin rebar positioner: www.h-b.com/#sle.
   3. WIRE-BOND; O-Ring or Double O-Ring Rebar Positioner: www.wirebond.com/#sle.

C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.
   1. Interior Walls: Hot-dip galvanized carbon steel.
   2. Exterior Walls: Hot-dip galvanized carbon steel.
   3. Wire Size for Side Rods: 0.148-inch diameter.
   4. Wire Size for Cross Rods: 0.148-inch 0.187-inch diameter.
   5. Wire Size for Veneer Ties: 0.187-inch diameter.
   6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
   7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

D. Masonry-Joint Reinforcement for Single Wythe Masonry: ASTM A951/A951M.
   1. Type: Ladder with single pair of side rods.
      a. Heckmann Building Products Inc.; #1100 Ladder Type.
      b. Hohmann & Barnard, Inc.; #220 Ladder Mesh.

c. Wire-Bond; Series 200 Core Clear Ladder Type.

E. Masonry-Joint Reinforcement for Multiple Wythe: ASTM A951/A951M.
1. Adjustable (two-piece) Type: Truss or ladder. With one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum horizontal play of 1/16 inch and maximum vertical adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face. Ties have hooks or clips to engage a continuous horizontal wire in the facing wythe.
2. Pintle Ties: Units consisting of wire tie section with 1-1/4-inch vertical adjustment, with wire tie length as required to extend 1-1/2-inches into veneer.
3. Products: Subject to compliance with requirements, provide one of the following:
a. Hohmann & Barnard, Inc.; #270 Ladder Eye-Wire.
b. Wire-Bond; Series 800 Cavity Ladder Double Hook and Eye.

2.08 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

C. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
1. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.

D. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
1. Where wythes do not align, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
2. Wire: Fabricate from 3/16-inch- diameter, hot-dip galvanized steel wire.

E. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Furnish 1-3/4-inch wide channel slots, formed from 12 gauge steel sheet, galvanized after fabrication, to the Structural Steel Contractor.
a. Products: Subject to compliance with requirements, provide one of the following:
1) Heckmann Building Products Inc.; #130 Weld on Channel Slot.
2) Hohmann & Barnard, Inc.; #360 Gripstay Channel.
b. Wire-Bond; #1302 Channel Slot.
2. Connector Section: Dovetail tabs, 1-inch wide, for inserting into channel slots; formed from 14 gauge, steel sheet, galvanized after fabrication; with 3/16" diameter vee wall tie.
a. Products: Subject to compliance with requirements, provide one of the following:
1) Heckmann Building Products Inc.; #129 Channel Slot Triangular Ties.
2) Hohmann & Barnard, Inc.; #363 Flexible Gripstay Anchor.
3) Wire-Bond; #2103 Channel Slot Triangular Tie.
b. Structural Performance Characteristics: Capable of withstanding a minimum 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05-inch.

F. Partition Top Anchors: 0.105-inch- thick metal plate with a 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

G. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.
2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch- thick steel sheet, galvanized after fabrication.
3. Fabricate wire ties from 0.187-inch- diameter, hot-dip galvanized-steel wire unless otherwise indicated.
4. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a rib-stiffened, sheet metal anchor section with screw holes top and bottom, with projecting tabs having holes for inserting vertical legs of wire tie formed to fit anchor section.
    a. Manufacturers: Subject to compliance with requirements, undefined:
        1) Heckmann Building Products, Inc.
        2) Hohmann & Barnard, Inc.
        3) Wire-Bond.

2.09 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:
1. Stainless Steel Flashing: ASTM A666/A666M, Type 304, soft temper; __ gauge, 0.016 inch (__ mm) thick; finish 2B to 2D.
2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
3. Metal Drip Edges: Extend at least 3-inches into wall and 1/2-inch out from wall, with outer edge bent down 30 degrees and hemmed 3/8-inch.

B. Flexible Flashing: Use the following unless otherwise indicated:
1. Products: Subject to compliance with requirements, provide one of the following:
    a. Carlisle Coatings & Waterproofing Inc.; CCW-705-TWF Thru-Wall Flashing.
    b. Grace Construction Products; W.R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
    c. Henry; Blueskin TWF.
    d. Tremco Incorporated; ExoAir TWF.
2. Membrane Asphaltic Flashing Materials:
    a. Rubberized Asphalt Flashing: Self-adhering polymer modified asphalt sheet; 40 mils (0.040 inch) (1.0 mm) minimum total thickness; 8 mil (0.20 mm) cross-laminated polyethylene bonded to adhesive rubberized asphalt, with a removable release liner.
        1) Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

C. Application: Unless otherwise indicated, use the following:
1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge.
4. Where flashing is fully concealed, use metal flashing or flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings:
1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

F. Termination Bars for Flexible Flashing: Stainless steel; 0.019 inch by 1-1/2 inches with a 3/8 inch sealant flange at top. Compatible with membrane and adhesives.

G. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
   1. Control Joints and Brick Expansion Joints: Provide compressible filler, 3/8-inch thick and 3-inches wide.
      a. Products: Subject to compliance with requirements, provide one of the following, or equal:
         1) Hohmann & Barnard, Inc.; NS Closed Cell Neoprene Sponge.
         2) Wire-Bond; #3300 Expansion Joint.
   2. Horizontal Soft Joints: Provide compressible filler, 3/8-inch thick and 3-inches wide, with adhesive coating on one side.
      a. Products: Subject to compliance with requirements, provide one of the following, or equal:
         1) Hohmann & Barnard, Inc.; NS Closed Cell Neoprene Sponge.
         2) Wire-Bond; #3300 Expansion Joint.
   3. Sponge Wrapping at Seismic Bracing: Provide compressible filler as indicated for Control Joints, except 1/2-inch thick.
   4. Premolded Joint Filler at Steel Columns: Provide compressible filler as indicated for Control Joints.

B. Grout Screen: Fabricated from monofilament polypropylene mesh to prevent grout falling through, without interfering with mortar bond.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Advanced Building Products Inc.; Grout Catch.
      b. Heckman Building Products, Inc.; Grout Stop.
      c. Hohmann & Barnard, Inc.; MGS.
      d. Wire-Bond; Grout Stop 3612.

C. Preformed Control-Joint Gaskets: Made from PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
   1. Products: Subject to compliance with requirements, provide one of the following, or equal:
      a. Hohmann & Barnard, Inc.; #VS Series - PVC Control Joint.
   2. Wire-Bond; PVC Control Joint.

D. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

E. Weep/Cavity Vent Products: Use the following unless otherwise indicated:
   1. Type: Cellular Plastic Weep Vent: One-piece, flexible extrusion made from UV-resistant polypropylene co-polymer, full height and width of head joint and depth of 1/8-inch less than depth of outer wythe..
   2. Color(s): As selected by Architect from manufacturer's full range.
   3. Manufacturers:
      a. Advanced Building Products, Inc; Mortar Maze Cell Vent: www.advancedbuildingproducts.com/#sle.
      b. Hohmann & Barnard, Inc; QV Quadro-Vent: www.h-b.com/#sle.
      c. WIRE-BOND; Cell Vent: www.wirebond.com/#sle.
      d. Heckmann Building Products, Inc.; No. 85 Cell Vent.

e. Substitutions: See Section 01 60 00 - Product Requirements.

F. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity
1. Manufacturers: Subject to compliance with requirements, undefined:
a. Advanced Building Products, Inc; Mortairvent: www.advancedbuildingproducts.com/#sle.
b. Mortar Net Solutions; DriPlane: www.mortarnet.com/#sle.
c. CavClear/Archovations, Inc.
d. Hohmann & Barnard, Inc.
e. Keene Building Products.
f. Substitutions: See Section 01 60 00 - Product Requirements.
2. Configuration: Provide one of the following:
a. Strips, full depth of cavity and 10 inches high, with dovetail-shaped notches 7 inches deep that prevent clogging with mortar droppings.
b. Strips, not less than 3/4 inch thick and 10 inches high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.

G. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.11 MASONRY-CELL FILL

A. Lightweight-Aggregate Fill: ASTM C 331/C 331M.

2.12 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
1. Manufacturers: Subject to compliance with requirements, undefined:
a. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
b. PROSOCO, Inc.

2.13 LINTELS

A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.14 MORTAR AND GROUT MIXING

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime mortar.
4. For reinforced masonry, use portland cement-lime mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
1. Masonry below grade and in contact with earth: Type M.

2. For reinforced masonry, use Type M Type S.
3. Exterior, above-grade, load-bearing: Type N.
4. Exterior, non-loadbearing masonry: Type N.
5. Interior, loadbearing masonry: Type N.
6. Interior, non-loadbearing masonry: Type O may be used instead of Type N.

D. Pigmented Mortar: Use colored cement product.
1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Color: As selected by Architect from manufacturer's full range for each material.
3. Application: Use pigmented mortar for exposed mortar joints with the following units:
a. Clay face brick.

E. Grout for Unit Masonry: Comply with ASTM C476
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
a. Use fine grout for 6-inch thick concrete masonry wythes.
b. Use course grout for 8-inch thick or greater concrete masonry wythes.
2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3.
4. Verify that substrates are free of substances that impair mortar bond.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

D. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
1. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.03 PREPARATION

A. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.04 COURSING

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Establish lines, levels, and coursing indicated. Protect from displacement.

C. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

D. Concrete Masonry Units:
   1. Bond: Running.
   2. Unless otherwise indicated, lay exposed masonry in running bond
   3. bond pattern indicated on Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

E. Brick Units:
   1. Bond: Running.

F. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

G. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

H. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

I. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

J. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

K. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

L. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. Install compressible filler in joint between top of partition and underside of structure above.
   2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
   3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.05 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.

3.06 FLASHING, WEEPS HOLES AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:
   1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
   2. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 16 inches or 6 inches above cavity drainage material, whichever is greater.
   3. At lintels and shelf angles, extend flashing a minimum of 8 inches into masonry at each end. At heads and sills, extend flashing 8 inches at ends and turn up not less than 2 inches to form end dams.
   4. Install termination bar at top edge of flashing and apply manufacturer's rubberized asphalt based termination mastic continuously at the top edge of the termination bar.
   5. At heads and sills, extend flashing as specified above unless otherwise indicated but turn up ends not less than 2 inches to form a pan.
   6. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
      a. Install prefabricated inside and outside corners as required at inside and outside corners of wall conditions.
   7. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
   1. Use specified weep/cavity vent products to form weep holes.
   2. Space weep holes 24 inches o.c. unless otherwise indicated.

E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.07 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:
   1. Bed face shells in mortar and make head joints of depth equal to bed joints.
   2. Bed webs in mortar in all courses of piers, columns, and pilasters.
   3. Bed webs in mortar in grouted masonry, including starting course on footings.
   4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.08 CAVITY WALLS

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. Bond wythes of cavity walls together as follows:
1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties.
c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.
2. Masonry-Veneer Anchors: Comply with requirements for anchoring masonry veneers.

C. Bond wythes of cavity walls together using bonding system indicated on Drawings.

D. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

E. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

F. Apply air barrier to face of backup wythe to comply with Section 072700 "Self-Adhering Water-Resistive Air Barrier Membrane.

3.09 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Anchor masonry veneers to wall framing and concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:
1. Fasten screw-attached and seismic anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed tie sections in masonry joints.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally, with not less than one anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.
5. Provide seismic veneer anchors with continuous wire at concrete masonry veneer.

3.10 MASONRY-CELL FILL

A. Pour lightweight-aggregate fill into cavities to fill void spaces. Maintain inspection ports to show presence of fill at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of fill to one story high, but not more than 20 feet.

3.11 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
   1. Space reinforcement not more than 16 inches o.c.
   2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
   3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.12 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
   1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally.

3.13 LINTELS

A. Install loose steel lintels over openings.

B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.

C. Provide or masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

D. Maintain minimum 8 inch (____ mm) bearing on each side of opening unless noted otherwise.

3.14 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

D. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

3.15 GROUTED COMPONENTS

3.16 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

C. Form control joints in concrete masonry as follows:
1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
2. Install control joints in interior concrete masonry partitions where indicated, and as follows. During wall layout, verify locations of all control joints with Architect.
   a. Spacing of control joints in straight walls not to exceed 20 feet horizontally.
   b. Install control joints at intersections of walls and column enclosures.

D. Form expansion joints in brick as follows:
1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
2. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."
3. Spacing in brick veneer not to exceed 24 feet.
4. Spacing in concrete masonry veneer not to exceed 18 feet.

E. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.
1.

F. Install sponge wrapping and premolded joint filler where masonry abuts steel seismic bracing and steel columns.

3.17 TOLERANCES

A. Dimensions and Locations of Elements:
1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:
1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.

4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.18 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

B. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

C.
1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.

F. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.19 REPAIRING, POINTING AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
   3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
   5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
   6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
   7. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.20 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

SECTION 05 1200
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Sections:

1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other metal items not defined as structural steel.

1.03 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.04 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering design by a qualified professional engineer licensed in the State of Connecticut, to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.
2. Use ASD; data are given at service-load level.

1.05 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
5. Submit shop drawings of all members to be furnished. Detail drawings of the members and their connections shall follow standard practice as set forth in the AISC "Manual of Structural Steel Detailing" (Second Edition). In particular, welding shall be shown, using standard AWS welding symbols. Show on detail drawings the paint to be used.
6. Shop drawings will not be accepted for review by the Engineer unless there is substantial evidence that the Construction manager on the project has reviewed the submittal for compliance with the contract documents and has addressed questions to be responded to by the Contractor. All coordination items with other trades and submittals are to be

performed and the submittal marked accordingly before submission. Failure to provide the above will result in the submittal being returned and not reviewed.

7. Contractor shall perform review and schedule shop drawing submittals to permit a minimum of 10 calendar days for review by the Engineer. Shop Drawings will be returned to the Architect for their required review and processing.
8. Shop drawings will not be reviewed unless accompanied by erection drawings which locates and identifies the members. Copies or reproductions of contract drawings will not be accepted or reviewed as shop drawings.
9. Shop drawings shall be submitted electronically in PDF format. Refer to section 01 33 00 SUBMITTAL PROCEDURES for additional requirements.
10. The following is the definitions for the Shop Drawing stamp disposition:

    No Exceptions Taken - Re-submission is not required unless document is revised.

    Make Corrections Noted - If checked, fabrication may be undertaken. Contractor is responsible for making noted corrections. Re-submission of record copies are required.

    Revise and Resubmit - If checked, fabrication may not be undertaken. Resubmit corrected copies for final review, with all changes clouded.

    Rejected - Resubmit for review.

    Corrections or comments made on shop drawings during this review do not relieve the Contractor from compliance with the requirements of the project drawings and specifications. This check is only for the review of general conformance with the information given in the Contract Documents. The Contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes, techniques and sequence of construction, coordinating his work with that of other trades, and performing his work in accordance with OSHA requirements and other sections of the Project Specifications.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
   1. Power source (constant current or constant voltage).
   2. Electrode manufacturer and trade name, for demand critical welds.
D. Qualification Data: For qualified Installer and fabricator. Welding certificates.
E. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
F. Mill test reports for structural steel, including chemical and physical properties.
G. Product Test Reports: For the following:
   1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
   2. Direct-tension indicators.
   3. Tension-control, high-strength bolt-nut-washer assemblies.
   4. Shear stud connectors.
   5. Shop primers.
   6. Nonshrink grout.
   7. Structural Thermal Break for bolted structural steel connections

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P2.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

E. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.

2. AISC 341 and AISC 341s1.

3. AISC 360.

4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.

2. Clean and relubricate bolts and nuts that become dry or rusty before use.

3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.08 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

C. Tolerances: Structural steel fabricator shall coordinate with the requirements for tolerances as required by the selected building finish systems, and to construct to those tolerances if they are stricter than the AISC standards.

PART 2 PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 35 percent.

B. W-Shapes: ASTM A 992.

C. Channels, Angles: ASTM A 36.

D. Plate and Bar: ASTM A 36.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

1. Finish: Black except where indicated to be galvanized.

G. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.

H. Steel Forgings: ASTM A 668/A 668M.

I. Welding Electrodes: Comply with AWS requirements.

2.02 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436 , Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.

C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436 Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip or mechanically deposited zinc coating.

2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating finish.

D. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

E. Unheaded Anchor Rods: ASTM F 1554, Grade 36

1. Configuration: Straight.

2. Nuts: ASTM A 563 heavy-hex carbon steel.

3. Plate Washers: ASTM A 36 carbon steel.

4. Washers: ASTM F 436, Type 1, hardened carbon steel.

5. Finish: Plain

F. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 heavy-hex carbon steel.

2. Plate Washers: ASTM A 36 carbon steel.

3. Washers: ASTM F 436, Type 1, hardened carbon steel.

4. Finish: Plain or Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

G. Threaded Rods: ASTM A 36.

1. Nuts: ASTM A 563 heavy-hex carbon steel.

2. Washers: ASTM A 36/A 36M carbon steel.

3. Finish: Plain.

H. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

2.03 PRIMER

A. Primer: Comply with Division 09 painting Sections and Division 09 Section "High-Performance Coatings."

B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

C. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.04 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.05 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning.

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.

H. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches (250 mm) o.c. unless otherwise indicated.

I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members..

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.06 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Slip critical.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.07 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.08 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.

2.09 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.03 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges." Level and plumb individual members of structure within specified AISC tolerances, unless stricter tolerances are otherwise required by finish building systems being provided on the project. Contractor is responsible to coordinate all construction tolerances, and to construct to the tolerances as required with all the selected building finish systems supported by or adjacent to the structural steel.

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.04 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened for all shop connections and TC bolts for field connections unless noted as Slip Critical on drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.

3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.05 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.

b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

c. Ultrasonic Inspection: ASTM E 164.

d. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.

2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.06 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION

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SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This section includes the following:
   1. Steel framing and supports for mechanical and electrical equipment
   2. Shop fabricated steel and aluminum items.
   3. Steel framing and supports for applications where framing and supports are not specified elsewhere in other Sections.
   4. Support angles for elevator door sills.
   5. Miscellaneous steel trim including steel angle corner guards.
   6. Metal ladders
   7. Downspout boots

B. Products furnished, but not installed, under this Section include the following:
   1. Loose steel lintels.
   2. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. Related Sections include the following:
   1. Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items indicated to be built into unit masonry.
   2. Section 142123.16 "Machine Room-Less Electric Traction Elevator"

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.

D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

E. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.

H. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).

1.04 PERFORMANCE REQUIREMENTS

A. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: For the following:
   1. Paint Products
   2. Grout

C. Shop Drawings: Show fabrication and installation details for metal fabrications.
   1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
   2. Provide templates for anchors and bolts specified for installation under other Sections.
   3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer licensed in the State of Connecticut responsible for their preparation.

D. Shop Drawings: Show fabrication and installation details for metal fabrications.
   1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
   2. Provide templates for anchors and bolts specified for installation under other Sections.
   3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer licensed in the State of Connecticut responsible for their preparation.

E. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.

F. Welding certificates.

G. Qualification Data: For professional engineer.

1.06 QUALITY ASSURANCE

A. Design _____ under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

B. Welder Qualifications: Welding processes and welding operators qualified in accordance with:
   1. AWS D1.1, "Structural Welding Code--Steel."
   2. AWS D1.3, "Structural Welding Code--Sheet Steel."
   3. AWS D1.6, "Structural Welding Code--Stainless Steel."

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1.08 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.01 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Rolled Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

D. Steel Tubing: ASTM A 500/A 500M.

E. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), black finish.

F. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 240/A 240M or ASTM A 666, Type 304.

G. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

2.02 FABRICATED ITEMS

A. Joist Hangers: Strap anchors, fabricated with sheet steel, 18 gauge, 0.0478 inch (1.21 mm) minimum base metal thickness; galvanized finish.

B. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.

C. Lintels: As detailed; prime paint finish.

D. Elevator Hoistway Divider Beams: Beam sections; prime paint finish.

2.03 DOWNSPOUT BOOTS

A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots and on-body cleanout and cover with neoprene gaskets.
   1. Configuration: Angular.
   2. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
   3. Finish: Manufacturer's standard factory applied powder coat finish.
   4. Color: To be selected by Architect from manufacturer's standard range.
   5. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, and rubber coupling.

2.04 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners at exterior walls. Select fasteners for type, grade, and class required.
   1. Provide stainless-steel fasteners for fastening aluminum.
   2. Provide stainless-steel fasteners for fastening stainless steel.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.

D. Anchor Bolts: ASTM F 1554, Grade 36.
   1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

E. Eyebolts: ASTM A 489.

F. Machine Screws: ASME B18.6.3.

G. Lag Bolts: ASME B18.2.1.

H. Wood Screws: Flat head, ASME B18.6.1.

I. Plain Washers: Round, ASME B18.22.1.

J. Lock Washers: Helical, spring type, ASME B18.21.1.

K. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

L. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
   1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
   2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.05 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

C. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in steel, complying with SSPC-Paint 20.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.06 FABRICATION

A. General: Shear and punch metals cleanly and accurately. Remove burrs and ease exposed edges. Form bent-metal corners to smallest radius possible without impairing work.

B. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

C. Welding: Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. At exposed connections, finish welds and surfaces smooth, with contour of welded surface matching those adjacent.

D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

F. On units indicated to be cast into concrete or built into masonry, provide welded-steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

I. Fabricate loose lintels from steel angles and shapes. Size to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches.

J. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

K. Fabricate ladders for locations shown, complying with ANSI A14.3, welded-steel construction.
   1. For elevator pit ladders, comply with ASME A17.1/CSA B44.

2.07 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
   1. Furnish inserts if units are installed after concrete is placed.

2.08 MISCELLANOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
   1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

2.09 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.10 STEEL AND IRON FINISHES

A. Hot-dip galvanize steel fabrications at exterior locations.

B. Prepare uncoated ferrous metal surfaces to comply with SSPC-SP 3 and paint with a fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
   1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.11 STAINLESS-STEEL FINSHES

A. Remove tool and die marks and stretch lines or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Bright, Directional Satin Finish: No. 4.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Obtain approval prior to site cutting or making adjustments not scheduled.

D. Provide anchorage devices and fasteners where needed to secure items to in-place construction.

E. Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation, with edges and surfaces level, plumb, true, and free of rack.

F. Fit exposed connections accurately together to form hairline joints or, where indicated, with uniform reveals and spaces for sealants and joint fillers.

G. Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

H. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.02 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.03 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPCPA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

SECTION 06 10 53
MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Fire retardant treated wood materials.

B. Communications and electrical room mounting boards.

C. Concealed wood blocking, cants, nailers, and supports.

1.03 RELATED REQUIREMENTS

A. Section 061600 - Sheathing

B. Section 075323 - Ethylene-Propylene-Diene-Monomer Roofing (EPDM)

1.04 REFERENCE STANDARDS

A. ASTM D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2024).

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

C. AWPA U1 - Use Category System: User Specification for Treated Wood; 2025.

D. PS 1 - Structural Plywood; 2023.

E. PS 20 - American Softwood Lumber Standard; 2025.

1.05 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   1. NeLMA: Northeastern Lumber Manufacturers' Association.
   2. NLGA: National Lumber Grades Authority.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
   2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
   3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
   4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

C. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Post-installed anchors.

1.07 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

C. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
   2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
      a. Factory mark each piece of lumber with grade stamp of grading agency.
      b. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
      c. Dress lumber, S4S, unless otherwise indicated.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No.2 or Standard Grade.
   2. Boards: Standard or No.3.

D. Parapet Caps: 1-1/2 inch (38 mm) thick, laminated strand lumber.
   1. Comply with AWPA U1 use category 2.

2.03 CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: PS 1, A-D plywood, or medium density fiberboard; 3/4 inch (19 mm) thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.04 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.

B. Fire Retardant Treatment: General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
   1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Treat exterior rough carpentry items.
      c. Do not use treated wood in direct contact with ground.
   2. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature, low hygroscopic type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
      a. Kiln dry wood after treatment to a maximum moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
      b. Interior rough carpentry items are to be fire retardant treated.
      c. Treat rough carpentry items as indicated.
      d. Do not use treated wood in applications exposed to weather or where the wood may become wet.

2.05 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
   1. Blocking.
   2. Nailers.
   3. Cants.
   4. Furring.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of the following species:
   1. Hem-fir (north); NLGA.

C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.06 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged**,** fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.07 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.

D. Wood Screws: ASME B18.6.1

E. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

F. Lag Bolts: ASME B18.2.1.

G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nut and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspection agency.

1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

PART 3 EXECUTION

3.01 PREPARATION

A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches (100 mm) and seal.

B. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

D. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

E. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

F. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

G. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

H. Do not splice structural members between supports unless otherwise indicated.

I. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

J. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.

K. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

L. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
2. ICC-ES evaluation report for fastener.

M. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.03 WOOD BLOCKING AND NAILER INSTALLATION

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

F. Provide the following specific nonstructural framing and blocking:
1. Cabinets and shelf supports.
2. Wall brackets.
3. Wall-mounted door stops.
4. Chalkboards and marker boards.

G. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.04 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring vertically at 24 inches o.c.

3.05 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

3.06 INSTALLATION OF CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.

3.07 PROTECTION

A. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

3.08 CLEANING

A. Waste Disposal: See Section 01 74 19 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

SECTION 06 16 00
SHEATHING - USG

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Sheathing.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2024.

C. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

C. Shop Drawings: For air-barrier and water-resistant glass-mat gypsum sheathing assemblies.
   1. Show locations and extent of sheathing, accessories, and assemblies specific to Project conditions.
   2. Include details for sheathing joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
   3. Include details of interfaces with other materials that form part of air barrier.

D. Qualification Data: For Installer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Store products above ground in dry ventilated space to protect against moisture. Support stacked products to prevent deformation and allow air circulation.

C. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Products:Subject to compliance with requirements, provide one of the following:
   1. USG Corporation; _____: www.usg.com/#sle.
   2. National Gypsum Company

B. Source Limitations: Furnish products produced by single manufacturer and obtained from single supplier.

2.02 SHEATHING

A. Glass-mat-faced gypsum wall sheathing, comply with ASTM C1177/C1177M.
   1. Thickness: 5/8 inch (15.9 mm).
   2. Size: 48 by 96 inches (1220 by 2440 mm), vertical installation, nominal.
   3. Type: X
   4. Edges: Square.
   5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

2.03 ACCESSORIES

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
   1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
   1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof and floor framing meet deflection criteria noted in drawings, as recommended by manufacturer and local building code requirements.

B. Examine substrates and adjoining construction.

C. Replace damaged framing before installation of cementitious panel subfloor. Proceed with installation only after unsatisfactory conditions corrected.

3.02 PREPARATION

A. Coordinate installation of roof and floor deck construction, framing of openings, and other assembly installation.

B. Coordinate installation of rough carpentry members specified in other sections.

3.03 INSTALLATION

A. Select material sizes to minimize waste.

B. Reuse and clearly separate scrap for use on-site as accessory components, including shims, bracing, and blocking.

C. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

D. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

E. Securely attach to substrate by fastening as indicated, complying with the following:
   1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
   2. ICC-ES evaluation report for fastener.

F. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.

G. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using screws.

H. Wall Sheathing with Integrated Water-Resistive Barrier and Air Barrier: Secure to studs in accordance with manufacturer's installation instructions.

1. Install with water-resistive and air barrier on exterior side of sheathing.
2. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
3. Do not install directly over masonry surfaces; use furring strips or framing.
4. Apply manufacturer's standard seam sealants and transition membranes.

I. Coordinate wall sheathing installation with flashing and joint-sealant installation, so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

J. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.04 GYPSU SHEATING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.
1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
3. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.
1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.

D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

3.06 CLEANING

A. Waste Disposal: See Section 01 74 19 - Construction Waste Management and Disposal.
1. Comply with applicable regulations.
2. Do not burn scrap on project site.
3. Do not burn pressure treated scraps.

B. Clean material debris, shavings, and sawdust prior to Substantial Completion of project.

3.07 PROTECTION

A. Cover sheathing panels by exterior cladding or other weather-resistive barrier. Do not expose panels to elements for more than 12 months after installation. If exposure anticipated past 12 months, apply joint treatments, weather-resistive barrier, or air barrier according to manufacturer's recommendations.

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SECTION 07 13 00
SHEET WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Composite sheet membrane applied prior to rebar and concrete placement.

B. Self-adhered modified bituminous sheet membrane.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete substrate.

B. Section 07 21 00 - Thermal Insulation: Insulation used for protective cover.

1.03 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016 (Reapproved 2021).

B. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 2022.

C. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2025.

D. ASTM D5385/D5385M - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes; 2025.

E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

F. NRCA (WM) - The NRCA Waterproofing Manual; 2021.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for each type of product.
   1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
   2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

C. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

D. Samples: For each exposed product and for each color and texture specified, including the following products:
   1. 8-by-8-inch square of waterproofing and flashing sheet.
   2. 4-by-4-inch square of drainage panel.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application and until liquid or mastic accessories have cured.

B. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
   1. Do not apply waterproofing in snow, rain, fog, or mist.

C. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer's Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.
   2. Warranty Period for Material Only: Ten years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 SHEET WATERPROOFING APPLICATIONS

A. Self-Adhered Modified Bituminous Sheet Membrane
   1. Location: Foundations.
   2. Cover with protection board.

2.02 SHEET WATERPROOFING MATERIALS

A. Composite Sheet Membrane Applied Prior to Rebar and Concrete Placement:
   1. Type: SBS rubberized asphalt compound, integrally laminated to a blue, high-density polyethylene film.
   2. Thickness: 32 mil, 0.032 inch (0.81 mm), nominal.
   3. Sheet Width: 39-3/8 inches (1.0 m), minimum.
   4. Tensile Strength: 2,400 psi (16.5 MPa), minimum, measured in accordance with ASTM D412.
   5. Elongation: 800 percent, minimum, measured in accordance with ASTM D412.
   6. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.

B. Self-Adhered Modified Bituminous Sheet Membrane: Minimum 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil-thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
   1. Thickness: 60 mil, 0.060 inch (1.5 mm), minimum.
   2. Sheet Width: 36 inches (0.914 m), minimum.
   3. Tensile Strength:
      a. Membrane: 250 psi (___ MPa), minimum, measured in accordance with ASTM D412 Method A, using die C and at spindle-separation rate of 2 inches (50 mm) per minute.
   4. Elongation at Break: 300 percent, minimum, measured in accordance with ASTM D412.
   5. Water Vapor Permeance: 0.05 perm (2.9 ng/(Pa s sq m)), maximum, measured in accordance with ASTM E96/E96M.
   6. Low Temperature Flexibility: Unaffected when tested in accordance with ASTM D1970/D1970M at minus 20 degrees F (minus 29 degrees C), 180 degree bend on 1 inch (25 mm) mandrel.
   7. Water Absorption: 0.2 percent increase in weight, maximum after 48-hour immersion at 70 deg F; in accordance with ASTM D570.
   8. Hydrostatic Pressure Resistance: Membrane resists leakage for at least one hour from pressure equivalent to 200 feet (61 m) head of water applied in accordance with test method ASTM D5385/D5385M.
   9. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836/C 836M.
   10. Puncture Resistance: 40 lbf minimum; ASTM E 154/E 154M.
   11. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

12. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.
13. Products:
    a. Carlisle Coatings & Waterproofing Inc; MiraDRI 860/861: www.carlisleccw.com/#sle.
    b. GCP Applied Technologies; Bituthene 4000: www.gcpat.com/#sle.
    c. Henry Company; Blueskin WP 200: www.henry.com/#sle.
    d. W. R. Meadows, Inc; MEL-ROL LOW TEMP: www.wrmeadows.com/#sle.
    e. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 AUXILIARY MATERIALS

A. Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
   1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne primer recommended for substrate by sheet-waterproofing material manufacturer.

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.

E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.

F. Protection Board: Rigid insulation; see Section 07 21 00.

G. Termination Bars: Aluminum bars, approximately 1 by 1/8 inch, predrilled at 9-inch centers, compatible with membrane and adhesives.

H. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced on one side with plastic film, nominal thickness 1/4 inch, with compressive strength of not less than 8 psi per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per ASTM C 272/C 272M.

2.04 MOLDED-SHEET DRAINAGE PANELS

A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel with Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 21 gpm per ft..
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Carlisle Coatings & Waterproofing Inc; CCW MiraDRAIN 6200
      b. GCP Applied Technologies Inc. (formerly Grace Construction Products); Hydroduct 220
      c. Henry Company; Henry DB 220.
      d. Meadows, W.R., Inc.; Mel-Drain 5035.
   2. Drainage Core: Three-dimensional, non-biodegradable, molded-plastic-sheet material designed to effectively conduct water to foundation drainage system under maximum soil pressures.
      a. Minimum Compressive Strength: 15,000 psi when tested according to ASTM D-1621.
      b. Maximum Flow Rate: 16 gpm/foot at 1 hydraulic gradient and 3,600 psf normal pressure when tested according to ASTM D 4716.
      c. Film Backing: Plastic, protective-film, backing sheet attached to surface facing building wall.

3. Filter Fabric: Non-woven geotextile fabric of polypropylene (PP) or polyester fibers, or combination of both.
    a. Weight: 4.0 oz./sq. yd., per ASTM D 3776.
    b. Water Flow Rate: 150 gpm/sq.ft. minimum, per ASTM D 4491.
    c. Grab Tensile Strength: 80 lbs. minimum, per ASTM D 4632.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions are acceptable prior to starting work.

B. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of waterproofing.
    1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
    2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263.

C. Verify that items penetrating surfaces to receive waterproofing are securely installed.

D. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.

E. Do not proceed with work until unsatisfactory conditions have been corrected.
    1. Commencement of work indicates acceptance of substrates.

3.02 PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
    1. Install sheet strips of width according to manufacturer's written instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.

F. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
    1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
        a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.

G. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.03 INSTALLATION - MEMBRANE

A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and per recommendations in ASTM D 6135.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
   1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.

D. Roll out membrane, and minimize wrinkles and bubbles.

E. Self-Adhering Membrane: Remove release paper layer, and roll out onto substrate with a mechanical roller to provide full contact bond.

F. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.

G. Seal edges of sheet-waterproofing terminations with mastic.

H. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.

I. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.

J. Immediately install protection course with butted joints over waterproofing membrane.
   1. Board insulation may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

K. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

L. Overlap edges and ends, minimum 3 inches (76 mm), seal permanently waterproof by method recommended by manufacturer, and apply uniform bead of sealant to joint edge.

M. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.

N. Weather lap joints on sloped substrate in direction of drainage, and seal joints and seams.

O. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.

P. Seal membrane and flashings to adjoining surfaces.

3.04 INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
   1. For vertical applications, install board insulation before installing drainage panels.

B. Place protection board directly against drainage panel; butt joints, and scribe and cut boards around projections, penetrations, and interruptions.

C. Adhere protection board to substrate with compatible adhesive.

3.05 INSTALLATION - INSULATION DRAINAGE PANEL

A. Install insulation drainage panels over waterproofed surfaces. Cut and fit to within 3/4 inch of projections and penetrations.

B. Ensure that drainage channels are aligned and free of obstructions.

C. On vertical surfaces, set insulation drainage panels in adhesive or tape applied according to manufacturer's written instructions.

D. On horizontal surfaces, loosely lay insulation drainage panels according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.06 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests.

B. Manufacturer's Field Service: Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.

3.07 PROTECTION, REPAIR AND CLEANING

A. Protect waterproofing from damage and wear during remainder of construction period.

B. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation at cavity wall construction, perimeter foundation wall, and underside of floor slabs.

B. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.

C. Batt insulation for filling crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

A. Section 07 5323 - Ethylene-Propylene-Diene-Monomer Roofing (EPDM)

1.03 REFERENCE STANDARDS

A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.

B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2024.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

D. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2024c.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

D. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.05 DELIVERY, STORAGE AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:
   1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
   3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.

B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.

C. Insulation Inside Masonry Cavity Walls: Expanded polystyrene (EPS) board.

D. Insulation in Metal Framed Walls: Batt insulation with no vapor retarder.

2.02 FOAM BOARD INSULATION MATERIALS

A. Expanded Polystyrene (EPS) Board Insulation: Comply with ASTM C578.

1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
3. Products:
   a. Atlas Molded Products, a Division of Atlas Roofing Corporation; ThermalStar EPS Wall Insulation Board: www.atlasmoldedproducts.com/#sle.
   b. Diversifoam Products; _____: www.diversifoam.com/#sle.
   c. InsulFoam LLC; InsulFoam _____: www.insulfoam.com/#sle.

B. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
1. Type and Compressive Resistance: Type X, 15 psi (104 kPa), minimum.
2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
4. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.0 (0.88), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
5. Products:
   a. DuPont de Nemours, Inc; Styrofoam Brand _____: building.dupont.com/#sle.
   b. Kingspan Insulation LLC; GreenGuard GG25-LG XPS Insulation Board: www.kingspan.com/#sle.
   c. Owens Corning Corporation; FOAMULAR Type ___ Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/#sle.

2.03 MINERAL FIBER BLANKET INSULATION MATERIALS

A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 50 or less, when tested in accordance with ASTM E84.
3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
4. Thickness: As indicated orr as required to fill depth of partition.
5. Facing: Unfaced.
6. Products:
   a. CertainTeed Corporation; _____: www.certainteed.com/#sle.
   b. Johns Manville; _____: www.jm.com/#sle.
   c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: www.ocbuildingspec.com/#sle.

2.04 ACCESSORIES

A. Insulation for Miscellaneous Voids:
1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

B. Adhesive: Type recommended by insulation manufacturer for application. Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

C. Comply with insulation manufacturer's written instructions applicable to products and applications.

D. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

E. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

F. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Install boards horizontally on foundation perimeter.
   1. Butt edges and ends tightly to adjacent boards and to protrusions.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
   1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application.
   2. Apply insulation standoffs to each spindle to create cavity width indicated on Drawings between concrete substrate and insulation.
   3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
   4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.03 BOARD INSTALLATION AT CAVITY WALLS

A. Install boards to fit snugly between wall ties.

B. Install boards horizontally on walls.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

D. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
   1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

3.04 BOARD INSTALLATION UNDER CONCRETE SLABS

A. Place insulation under slabs on grade after base for slab has been compacted.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

D. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
   1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

E. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
   1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.05 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
   4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
   1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.

3.06 BATT INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.07 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

B. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

SECTION 07 27 00
AIR BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air barriers.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Air barrier under exterior cladding.

B. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with air barriers.

1.03 DEFINITIONS

A. Air Barrier: Airtight barrier made of material that is virtually air impermeable but water vapor permeable, both to amount as specified, with sealed seams and sealed joints to adjacent surfaces.

1.04 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

B. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

C. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on material characteristics, performance criteria, and limitations.

1.06 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:
   1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.

PART 2 PRODUCTS

2.01 AIR BARRIER MATERIALS (AIR IMPERMEABLE AND WATER VAPOR PERMEABLE)

A. Air Barrier Sheet, Self-Adhered:
   1. Air Permeance: 0.004 cfm/sq ft (0.02 L/(s sq m)), maximum, when tested in accordance with ASTM E2178.
   2. Water Vapor Permeance: 10 perms (572 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F (23 degrees C).
   3. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 90 days of weather exposure.
   4. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.
   5. Seam and Perimeter Tape: As recommended by sheet manufacturer.

2.02 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Air Barrier and Adjacent Substrates: As indicated or in compliance with air barrier manufacturer's installation instructions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready for work of this section.

B. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.

C. Do not proceed with this work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's installation instructions.

B. Air Barriers: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.

D. Self-Adhered Sheets:
1. Prepare substrate in accordance with sheet manufacturer's installation instructions; fill and tape joints in substrate and between dissimilar materials.
2. Lap sheets shingle fashion to shed water and seal laps airtight.
3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that laps are firmly adhered with no gaps or fishmouths.
4. Use same material, or other material approved by sheet manufacturer, to seal to adjacent substrates, and as flashing.
5. At wide joints, provide extra flexible membrane allowing joint movement.

E. Openings and Penetrations in Exterior Air Barriers:
1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches (125 mm) onto air barrier and at least 6 inches (150 mm) up jambs; mechanically fasten stretched edges.
2. At openings with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches (100 mm) wide; do not seal sill flange.
3. At openings with nonflanged frames, seal air barrier to each side of framing at opening using flashing at least 9 inches (230 mm) wide, and covering entire depth of framing.
4. At head of openings, install flashing under air barrier extending at least 2 inches (50 mm) beyond face of jambs; seal air barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to air barrier surface.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Coordination of ABAA Tests and Inspections:
1. Provide testing and inspection required by ABAA QAP.
2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.

3. Cooperate with ABAA testing agency.
4. Allow access to air barrier work areas and staging.
5. Do not cover air barrier work until tested, inspected, and accepted.

3.05 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

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SECTION 07 42 13
METAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured metal panels for concealed-fastener, lap-seam exterior wall panels, with insulation, related flashings, and accessory components.

1.02 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
   1. Physical characteristics of components shown on shop drawings.
   2. Storage and handling requirements and recommendations.
   3. Installation instructions and recommendations.

C. Shop Drawings:
   1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
   2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

D. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.
   1. Include Samples of trim and accessories involving color selection.

E. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:
   1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

F. Informational Submittals
   1. Qualification Data: For Installer.
   2. Product Test Reports: For each product, for tests performed by a qualified testing agency.
   3. Sample Warranties: For special warranties.

G. Closeout Submittals:
   1. Maintenance Data: For metal panels to include in maintenance manuals.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing products specified in this section with minimum three years of documented experience. An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Prevent contact with materials that may cause discoloration or staining of products.

D. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

E. Retain strippable protective covering on metal panels during installation.

1.06 FIELD CONDITIONS

A. Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.07 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including rupturing, cracking, or puncturing.
      b. Deterioration of metals and other materials beyond normal weathering.
   2. Warranty Period: Two years from date of Substantial Completion.

C. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
   1. Wind Loads: As indicated on Drawings.
   2. Other Design Loads: As indicated on Drawings.
   3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:
   1. Test-Pressure Difference: 1.57 lbf/sq. ft..

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
   1. Test-Pressure Difference: 6.24 lbf/sq. ft..

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.02 MANUFACTURERS

A. Concealed-Fastener, Lap-Seam Metal Wall Panels: Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and a flat pan between panel edges; with flush joint between panels.

C. Basis of Design Product: Subject to compliance with requirements, provide PAC-CLAD; Petersen Aluminum Corporation; Flush wall panels or comparable product by one of the following:
   1. ATAS International, Inc: www.atas.com/#sle.
   2. Centria, a Nucor Company: www.centria.com/#sle.
   3. Drexel Metals Inc: www.drexmet.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

D. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
   1. Thickness: 0.040 inch.
   2. Surface: Smooth, flat finish.
   3. Exterior Finish: Two-coat fluoropolymer.
   4. Color: As selected by Architect from manufacturer's full range.

E. Panel Coverage: 12 inches.

F. Panel Height: 1.0 inch.

2.03 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
   1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
   2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

2.04 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Two-Coat Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch (0.023 mm); color and gloss as selected by Architect from manufacturer’s standard line.

2.05 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
   1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
   2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
   3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
   4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
   5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
   6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
      a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.06 ACCESSORIES

A. Support for Cladding and Continuous Insulation: Thermal clips.
   1. Thermally-broken clips that provide attachment support for girts, angles, channels, and other cladding support framing.
   2. Fasteners: As recommended by clip manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
   1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
   2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
      a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
      b. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
      c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

B. Protect surrounding areas and adjacent surfaces from damage during execution of this work.

3.03 INSTALLATION

A. Install panels on walls in accordance with manufacturer's instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Shim or otherwise plumb substrates receiving metal panels.
   2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
   3. Install screw fasteners in predrilled holes.
   4. Locate and space fastenings in uniform vertical and horizontal alignment.
   5. Install flashing and trim as metal panel work proceeds.
   6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
   7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
   8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:
   1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
   1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.

2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Flash and seal panels with weather closures at perimeter of all openings.

E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.04 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Remove site cuttings from finish surfaces.

C. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

D. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

3.05 PROTECTION

A. Protect metal wall panels until completion of project.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

SECTION 07 53 23
ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING (EPDM)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. EPDM membrane roofing system and accessories.

B. Cover board.

C. Insulation.

D. Vapor retarder.

E. Deck sheathing.

1.02 RELATED REQUIREMENTS

A. Section 061053 - Miscellaneous Rough Carpentry

1.03 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D1079 for definition of terms related to roofing work not otherwise defined in section.

1.04 REFERENCE STANDARDS

A. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2022.

B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).

C. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board; 2020.

D. ASTM C473 - Standard Test Methods for Physical Testing of Gypsum Panel Products; 2024.

E. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

F. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2024.

G. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2025.

H. ASTM D1079 - Standard Terminology Relating to Roofing and Waterproofing; 2024.

I. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016 (Reapproved 2023).

J. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2020.

K. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2025.

L. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

M. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2015, with Editorial Revision (2022).

N. ASTM D4811/D4811M - Standard Specification for Nonvulcanized (Uncured) Rubber Sheet Used as Roof Flashing; 2016 (Reapproved 2023).

O. ASTM D5147/D5147M - Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material; 2018.

P. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

Q. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

R. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2024c.

S. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

T. FM 4470 - Examination Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction; 2022.

U. NRCA (RM) - The NRCA Roofing Manual; 2025.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Provide membrane manufacturer's printed data showing roofing system components comply with specified requirements and with membrane manufacturer's requirements and recommendations for system type specified; include data for each product used in conjunction with roofing membrane, including insulation and fasteners.
   2. Provide documentation showing roofing system is UL classified or FM approved where UL or FM requirements are specified; include data itemizing classified or approved system components.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

D. Manufacturer's Instructions: Indicate installation of components; where instructions allow installation options, clearly indicate which option to use.

E. Installer's qualification statement.

F. Executed warranty.

G. Specimen Warranty: Submit before starting work.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of this section with minimum five years of documented experience installing specified system and having the following:
   1. Current Elevate Master Contractor status.
   2. Capability to provide payment and performance bond to Owner.

B. Documents at Project Site: Maintain at project site one copy of manufacturer's installation instructions.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.

B. Store materials clear of ground and moisture with weather-protective covering.

C. Keep combustible materials away from ignition sources.

D. Protect foam insulation from direct exposure to sunlight.

1.08 FIELD CONDITIONS

A. Do not apply roofing membrane during unsuitable weather or when ambient conditions conflict with manufacturer's installation instructions.

B. Schedule applications so no partially completed sections of roof are left exposed at end of workday.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Comply with warranty procedures required by manufacturer, including notifications, scheduling, and inspections.

C. Manufacturer Warranty: Full system warranty; 30-year Platinum limited warranty covering membrane, roof insulation, and membrane accessories.
   1. Liability Limit: No dollar limitation.
   2. Scope of Coverage: Repair leaks in roofing system caused by:
      a. Ordinary wear and tear of elements.
      b. Manufacturing defects in Elevate brand materials.
      c. Defective workmanship used to install materials.
      d. Damage due to winds up to 80 mph (129 km/hr).
      e. Hail up to 2 inches (50 mm) in diameter.
   3. Not Covered:
      a. Intentional damage.

D. Metal Roof Edging System Warranty: Include edge metals in membrane manufacturer's full system warranty.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Membrane Roofing System:
   1. Holcim Elevate RubberGard Platinum (Basis of Design)
   2. John Manville NR 90 MIL-FIT
   3. Carslisle Syntec Systems Sure Seal

B. Insulation: Same manufacturer as roof membrane.

C. Metal Roof Edging: Same manufacturer as roof membrane.

D. Source Limitations: Furnish products produced by single manufacturer.

2.02 EPDM MEMBRANE ROOFING SYSTEM

A. Description: EPDM single-ply membrane.
   1. Membrane Attachment: Fully adhered.
   2. Deck Slope: Flat; provide slope of 1/4 inch per foot (1:48) by means of tapered insulation.
   3. Provide roofing system to withstand wind speed in accordance with local building code and authorities having jurisdiction (AHJ).
   4. Provide assembly having Underwriters Laboratories, Inc. (UL) Class B fire hazard classification.

B. Components, from Top of Roof Down:
   1. Membrane: Thickness as specified below.
   2. Cover Board: High-density polyisocyanurate; 1/2 inch (12 mm) thick; adhered.
   3. Insulation:
      a. Maximum Board Thickness: 3 inches (75 mm); use as many layers as necessary; stagger joints in adjacent layers.
      b. Tapered: Minimum slope as indicated on drawings; provide minimum 30 (RSI-value) at thinnest point; place tapered layer on top.
      c. Total System R-value (RSI-value): 30 (5.2 in.), minimum.
      d. Top Layer: Polyisocyanurate foam board, noncomposite; cold adhesive attached.
      e. Intermediate Layer: Polyisocyanurate foam board, noncomposite; _____.

f. Bottom Layer: Polyisocyanurate foam board, noncomposite; mechanically fastened.
g. Crickets: Tapered insulation of same type as specified for top layer; slope as indicated on drawings.

4. Vapor Retarder: Self-adhering membrane.
5. Deck Sheathing: Gypsum-based board, 1/2 inch (12 mm) thick; mechanically fastened.

2.03 MEMBRANE MATERIALS

A. Roofing and Flashing Membrane: Cured synthetic single-ply membrane composed of EPDM with the following properties:
1. Reinforcement: None; membrane complying with ASTM D4637/D4637M, Type I.
2. Membrane and Flashing Color: Black.
3. Thickness: 90 mils, 0.09 inch (2.2 mm)
4. Nominal Thickness Tolerance: Plus/minus 10 percent.
5. Sheet Width: Provide widest available sheets to minimize field seaming.
6. Basis of Design Products: Subject to compliance with requirements, provide Elevate; RubberGard Platinum EPDM Membrane. or comparable product by one of the following:
a. Carlisle SynTec Incorporated
b. Johns Manville; a Berkshire Hathaway company

B. Flashing Membrane: Self-curing, nonreinforced membrane composed of nonvulcanized EPDM rubber, complying with ASTM D4811/D4811M, Type II, with the following properties:
1. Thickness: 55 mils, 0.055 inch (1.4 mm).

C. Self-Adhesive Flashing Membrane: Semi-cured 45-mil, 0.045-inch (1.1 mm) EPDM membrane laminated to 35-mil, 0.035-inch (0.9 mm) EPDM tape adhesive.

D. Self-Adhesive Lap Splice Tape: 35 mil (0.9 mm) EPDM based, formulated for compatibility with EPDM membrane and high-solids primer.

E. Splice Adhesive: Manufacturer's recommended synthetic polymer-based, formulated for compatibility with EPDM membrane and metal surfaces.

F. Bonding Adhesive: Manufacturer's recommended bonding adhesive, formulated for compatibility with EPDM membrane and other substrate materials, including masonry, wood, and insulation facings.

G. Lap Sealant: Manufacturer's recommended lap sealant formulated for compatibility with primers and flashings.

H. AP Sealant: Manufacturer's recommended single-component, polyurethane, nonsag, moisture-curing sealant.

I. Seam Edge Treatment: Manufacturer's recommended EPDM rubber-based sealant, formulated for sealing exposed membrane edges at seams.

J. Water Block Seal: Manufacturer's recommended butyl rubber sealant for use between two surfaces, not exposed.

K. Metal Plates and Strips Used for Fastening Membrane and Insulation: Steel with galvalume coating; comply with FM 4470 criteria for corrosion resistance.

L. Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches (33 mm) wide by 0.1 inch (2.5 mm) thick.

M. Control and Expansion Joint Covers:
1. As shown on drawings
a. Construction Specialties, Inc; Roof Covers: www.c-sgroup.com/#sle.
b. EMSEAL Joint Systems, Ltd; Emseal RoofJoint: www.emseal.com/#sle.
c. GAF;: www.gaf.com/#sle.

2.04 COVER BOARDS

A. High-Density Polyisocyanurate Cover Board: Water-resistant, high-density, closed-cell polyisocyanurate core with coated glass mat facers complying with ASTM C1289, Type II, Class 4 and the following characteristics:
   1. Thermal Value: R-value (RSI-value) of 2.5 (0.44), when tested in accordance with ASTM C518 and ASTM C177.
   2. Surface Water Absorption by Volume: 3 percent, maximum, when tested in accordance with ASTM C209.
   3. Compressive Strength: Grade 1, 120 psi (Grade 1, 830 kPa), when tested in accordance with ASTM D1621.
   4. Density: 5 pcf (80 kg/cu m), when tested in accordance with ASTM D1622.
   5. Mold Growth Resistance: Zero growth, when tested in accordance with ASTM D3273 for minimum of four weeks.

2.05 INSULATION

A. Polyisocyanurate Board Insulation: Closed-cell polyisocyanurate foam laminated to facers, complying with ASTM C1289, Type II, Class 1, with the following additional characteristics:
   1. Compressive Strength: 20 psi (138 kPa) when tested in accordance with ASTM D1621.
   2. Ozone Depletion Potential: Zero; made without CFC- or HCFC-blowing agents.

B. Insulation Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty; use only fasteners furnished by roof membrane manufacturer.

C. Adhesive for Insulation Attachment: Type as required by roof membrane manufacturer for roofing system and warranty; use only adhesives furnished by roof membrane manufacturer.

2.06 VAPOR RETARDER MATERIALS

A. Self-Adhering Membrane Vapor Retarder: SBS-modified bitumen adhesive, factory-laminated to tri-laminate woven, high-density polyethylene top surface with release liner.
   1. Thickness: 30 mils, 0.03 inch (0.762 mm), minimum.
   2. Low-Temperature Flexibility: 0.0325 inch (0.826 mm) at minus 30 degrees F (minus 34 degrees C) when tested in accordance with ASTM D5147/D5147M.
   3. Air Permeance: 0.004 cfm/sq ft (0.02 L/sec/sq m), maximum, when tested in accordance with ASTM E2178.
   4. Water Vapor Permeance: 0.04 perm (2.5 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M using Procedure B - Water Method.
   5. Water Penetration Resistance around Nails: Pass, when tested in accordance with ASTM D1970/D1970M.

2.07 DECK SHEATHING

A. Gypsum-Based Deck Sheathing: Noncombustible, water-resistant gypsum core with embedded glass mat facers, complying with ASTM C1177/C1177M, with the following additional characteristics:
   1. Water Absorption: 10 percent maximum, when tested in accordance with ASTM C473.
   2. Spanning Capability: Recommended by manufacturer for following minimum flute spans:
      a. Sheathing Thickness 1/2-inch (12 mm): Flute span 5 inches (127 mm), minimum.
   3. Surface Burning Characteristics: Flame spread index of 0, smoke developed index of 0, when tested in accordance with ASTM E84.
   4. Combustibility: Noncombustible, when tested in accordance with ASTM E136.
   5. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.
   6. Mold Growth Resistance: Zero growth, when tested in accordance with ASTM D3273 for minimum of four weeks.

2.08 METAL ACCESSORIES

A. Parapet Copings: Formed metal coping with galvanized steel anchor and support cleats for capping parapet wall; watertight, maintenance free, without exposed fasteners; butt-type joints with concealed splice plates; mechanically fastened as indicated; Elevate PTCF.
   1. Wind Performance:
      a. At least minimum required when tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-3.
   2. Material and Finish: 24-gauge, 0.024-inch (0.06 mm) thick galvanized steel with Kynar 500 finish in manufacturer's standard color; matching concealed joint splice plates; factory-installed protective plastic film.
   3. Dimensions:
      a. Wall Width: As indicated on drawings.
      b. Length: 144 inches (3650 mm), minimum.
   4. Anchor or Support Cleats: 20-gauge, 0.036-inch (0.9 mm) thick prepunched galvanized cleat with 12-inch (305 mm) wide stainless steel spring mechanically locked to cleat at 72 inches (1820 mm) on center.
   5. Fasteners: Factory-provided corrosion-resistant fasteners, with drivers; no exposed fasteners permitted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine roof deck to determine deck is sufficiently rigid to support installers and mechanical equipment so deflection will not strain or rupture roof components or deform deck.

B. Verify surfaces and site conditions are ready to receive work. Correct defects in substrate before commencing with roofing work.

C. Examine roof substrate to verify adequate slope to drains.

D. Verify specifications and drawing details are workable and not in conflict with roofing manufacturer's recommendations and instructions; start of work constitutes acceptable project conditions and requirements.

3.02 PREPARATION - GENERAL

A. Take appropriate measures to ensure fumes from adhesive solvents are not drawn into building through air intakes.

B. Before proceeding, ensure roof surface is clean, dry, and smooth and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease, and other materials that may damage membrane.

C. Fill surface voids in immediate substrate greater than 1/4-inch (6.4 mm) wide with fill material insulation approved by insulation and membrane manufacturers.

D. Wood Nailers: Provide wood nailers at perimeters and other locations where indicated on drawings.

E. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
   1. Protect from spills and overspray from bitumen, adhesives, sealants, and coatings.
   2. Protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within range of windborne overspray.
   3. Protect finished areas of roofing system from roofing-related work traffic and traffic by other trades.

3.03 PREPARATION - METAL DECK

A. Install deck sheathing on metal deck.

1. Lay with long side at right angle to flutes; stagger end joints; provide support at ends.
2. Cut and install deck sheathing to provide smooth and flat surface.
3. Mechanically fasten deck sheathing to roof deck in accordance with roofing manufacturer's instructions.

3.04 INSTALLATION - GENERAL

A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for specified roofing system. Where manufacturer provides no instructions or recommendations, follow NRCA (RM) written requirements and industry standards. Comply with federal, state, and local regulations.

B. Obtain relevant instructions and maintain copies at project site for duration of installation period.

C. Provide temporary closures to ensure moisture does not damage completed roofing. Use flashings, terminations, and temporary closures to provide watertight installation.

3.05 INSTALLATION - VAPOR RETARDER

A. Before installing insulation, install vapor retarder directly over deck.

B. Install vapor retarder in accordance with manufacturer's written instructions.

C. Ensure penetrations and edge conditions are sealed to prevent moisture and air drive into roofing system.

3.06 INSTALLATION - INSULATION

A. Install insulation in accordance with manufacturer's written instructions.

B. Install only as much insulation as can be covered with completed roofing system before end of day's work or before onset of inclement weather.

C. Lay roof insulation in courses parallel to roof edges.

D. Neatly and tightly fit insulation to penetrations, projections, and nailers, with gaps not greater than 1/4 inch (6 mm). Fill gaps greater than 1/4 inch (6 mm) with acceptable insulation. Do not leave roofing membrane unsupported over space greater than 1/4 inch (6 mm).

E. Mechanical Fastening: Using specified fasteners and insulation plates, engage fasteners through insulation into deck to depth and in pattern required by membrane manufacturer.

F. Cold Adhesive Attachment: Apply in accordance with membrane manufacturer's instructions and recommendations; apply pressure to individual roof insulation boards to obtain maximum adhesive contact.

3.07 INSTALLATION - COVER BOARD

A. Install in accordance with membrane manufacturer's instructions and recommendations.

3.08 INSTALLATION - SINGLE-PLY MEMBRANE

A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax before attachment or splicing. Refer to membrane manufacturer's guidelines for minimum relaxation time.

B. Lay out membrane pieces so field and flashing splices are installed to shed water.

C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.

D. Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer's recommended bonding material, application rate, and procedures.

E. Edge Securement: Secure membrane at locations where membrane terminates or goes through angle change greater than 2 in 12 inches (1:6) using mechanically-fastened reinforced

perimeter fastening strips, plates, or metal edging as indicated in drawings, or as recommended by roofing manufacturer.

1. Exceptions: Round pipe penetrations less than 18 inches (457 mm) in diameter and square penetrations less than 4 inches (102 mm) wide.

3.09 INSTALLATION - FLASHING AND ACCESSORIES

A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.

B. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on drawings, with horizontal leg of edge member over membrane, and flashing over metal onto membrane.

1. Follow roofing manufacturer's instructions.
2. Remove protective plastic surface film immediately before installation.
3. Install water block sealant under membrane anchorage leg.
4. Flash with manufacturer's recommended flashing sheet.
5. Where single flashing application does not completely cover metal flange, install additional flashing piece to cover metal edge.
6. If roof edge includes gravel stop and sealant is not applied between laps in metal edging, install additional piece of self-adhesive flashing membrane over metal lap to top of gravel stop; apply seam edge treatment at intersections of two flashing sections.
7. When roof slope is greater than 1 inch per foot (25 mm per 300mm), apply seam edge treatment along back edge of flashing.

C. Scuppers: Set in sealant and secure to structure; flash as recommended by manufacturer.

D. Roofing Expansion Joints: Install as shown on drawings and as recommended by roofing manufacturer.

E. Install weathertight flashing at walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces.

1. Extend flashing minimum 8 inches (200 mm) above membrane surface unless otherwise noted on drawings.
2. Use longest practical flashing pieces.
3. Evaluate substrate and overlay; adjust installation procedure in accordance with membrane manufacturer's recommendations.
4. Complete splices between flashing and main roof sheet with specified splice adhesive before adhering flashing to vertical surfaces.

F. Flash penetrations passing through membrane; make flashing seals directly to penetration.

1. Pipes, Round Supports, and Similar Items: Flash with specified premolded pipe flashings wherever practical; otherwise, use specified self-curing elastomeric flashing.
2. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2 inches (50 mm) deep, with at least 1-inch (25 mm) clearance from penetration; fill with manufacturer's pourable sealer and slope to shed water.
3. Structural Steel Tubing: If corner radii are greater than 1/4 inch (6 mm) and longest side of tube does not exceed 12 inches (305 mm), flash as for pipes; otherwise, provide standard curb with flashing.
4. Flexible and Moving Penetrations: Provide weathertight gooseneck set in sealant and secured to deck, flashed as recommended by manufacturer.

3.10 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Inspection by Manufacturer: Provide final inspection of roofing system by technical representative employed by roofing system manufacturer to inspect installation for warranty purposes, not a sales person.

C. Perform corrections necessary for issuance of warranty.

3.11 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Clean contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.

C. Remove leftover materials, trash, debris, and equipment from project site and surrounding areas.

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SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, downspouts, exterior penetrations, and other items indicated in Schedule.

B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications

1.03 REFERENCE STANDARDS

A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).

B. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2024).

C. CDA A4050 - Copper in Architecture - Handbook; Current Edition.

D. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sheet Metal Flashing and Trim:

B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch (0.61 mm) thick base metal, shop pre-coated with PVDF coating.
   1. Color: As selected by Architect from manufacturer's standard colors.

2.02 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18-inch (450 mm) long legs; seam for rigidity, seal with sealant.

F. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.

2.03 GUTTERS AND DOWNSPOUTS

A. Downspouts: Rectangular profile.

B. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 10 years in accordance with SMACNA (ASMM).

C. Accessories: Profiled to suit gutters and downspouts.
   1. Downspout Supports: Brackets.

D. Downspout Boots: Steel.
   1. Re

E. Downspout Extenders: Same material and finish as downspouts.

F. Seal metal joints.

2.04 FLASHING

A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.05 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers.

B. Primer Type: Zinc chromate.

C. Concealed Sealants: Non-curing butyl sealant.

D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

E. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch (0.38 mm).

3.03 INSTALLATION

A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

B. Apply plastic cement compound between metal flashings and felt flashings.

C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

D. Secure gutters and downspouts in place with concealed fasteners.

E. Connect downspouts to downspout boots, and grout connection watertight.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.05 SCHEDULE

A. Through-Wall Flashing in Masonry:
   1. Material: Galvanized Steel.

B. Gutters and Downspouts:

C. Scuppers:

D. Coping, Cap, Parapet, Sill and Ledge Flashings:

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SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

1.02 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2024.

C. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2024.

D. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems; 2024.

E. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2024.

F. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2023a, with Editorial Revision (2024).

G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

H. ITS (DIR) - Directory of Listed Products; Current Edition.

I. FM (AG) - FM Approval Guide; Current Edition.

J. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

K. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.

L. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

M. UL (DIR) - Online Certifications Directory; Current Edition.

N. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Schedule of Firestopping: List each type of penetration and fire rating of the penetrated assembly.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations.

D. Sustainable Design Submittal: Submit VOC content documentation for nonpreformed materials.

E. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Manufacturer's qualification statement.

H. Installer's qualification statement.

1.04 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.

1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.

2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
1. Trained by manufacturer.
2. Verification of minimum three years documented experience installing work of this type.
3. Verification of at least five satisfactorily completed projects of comparable size and type.

1.05 MOCK-UPS

A. Install one firestopping assembly representative of each fire rating design required on project.
1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
2. Where firestopping is intended to fill a linear opening, install at least 1 linear foot (0.305 linear m) of firestopping.

B. Obtain approval of authorities having jurisdiction (AHJ) before proceeding.

C. If accepted, mock-up will represent minimum standard for this work.

D. If accepted, mock-up may remain as part of this work. Remove and replace mock-ups not accepted.

1.06 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Firestopping Manufacturers:
1. 3M Fire Protection Products; _____: www.3m.com/firestop/#sle.
2. Hilti, Inc; _____: www.hilti.com/#sle.
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Firestopping Materials: Any materials meeting requirements.

B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.

C. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.

B. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to

ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.

C. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
   1. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.04 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.
   1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

3.04 FIELD QUALITY CONTROL

A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174 and ASTM E2393.

B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING

A. Clean adjacent surfaces of firestopping materials.

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SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

1.03 REFERENCE STANDARDS

A. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).

B. ASTM C834 - Standard Specification for Latex Sealants; 2017 (Reapproved 2023).

C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2024.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).

E. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2023.

F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2025.

G. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.

H. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.

I. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:

1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
2. List of backing materials approved for use with the specific product.
3. Backing material recommended by sealant manufacturer.
4. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
5. Substrates the product should not be used on.
6. Substrates for which use of primer is required.
7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
8. Sample product warranty.
9. Certification by manufacturer indicating that product complies with specification requirements.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

E. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation; see Section 01 61 16.

F. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

G. Installation Plan: Submit at least four weeks prior to start of installation.

H. Installation Log: Submit filled-out log for each length or instance of sealant installed.

I. Manufacturer's qualification statement.

J. Installer's qualification statement.

K. Executed warranty.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

B. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
   1. Adhesion Testing: In accordance with ASTM C794.
   2. Compatibility Testing: In accordance with ASTM C1087.
   3. Stain Testing: In accordance with ASTM C1248; required only for stone substrates.
   4. Allow sufficient time for testing to avoid delaying the work.
   5. Deliver sufficient samples to manufacturer for testing.
   6. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.

C. Installation Plan: Include schedule of sealed joints, including the following:
   1. Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgment that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
   2. Installation Log Form: Include the following data fields, with known information filled out.
      a. Unique identification of each length or instance of sealant installed.
      b. Location on project.
      c. Substrates.
      d. Sealant used.
      e. Stated movement capability of sealant.
      f. Primer to be used, or indicate no primer is used.
      g. Size and actual backing material used.
      h. Date of installation.
      i. Name of installer.
      j. Actual joint width; provide space to indicate maximum and minimum width.
      k. Actual joint depth to face of backing material at centerline of joint.
      l. Air temperature.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

C. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints:
      a. Do not seal exterior joints unless indicated on drawings as sealed.
      b. Seal the following joints:
         1) Wall expansion and control joints.
         2) Joints between doors, windows, and other frames or adjacent construction.
         3) Joints between different exposed materials.
   2. Interior Joints:
      a. Do not seal interior joints indicated on drawings as not sealed.
      b. Seal the following joints:
         1) Joints between door frames and window frames and adjacent construction.
         2) In sound-rated wall and ceiling assemblies, seal joints between wall assemblies and ceiling assemblies; between wall assemblies and other construction; between ceiling assemblies and other construction.
         3) In Sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, and piping penetrations..
   3. Do Not Seal:
      a. Intentional weep holes in masonry.
      b. Joints indicated to be covered with expansion joint cover assemblies.
      c. Joints where sealant is specified to be furnished and installed by manufacturer of product to be sealed.
      d. Joints where sealant installation is specified in other sections.

B. Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.

C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
   1. Wall and Ceiling Joints in Nonwet Areas: Acrylic emulsion latex sealant.
   2. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.

D. Sound-Rated Assemblies: Walls and ceilings identified as STC-rated, sound-rated, or acoustical.

2.02 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; see Section 01 61 16.

2.03 NONSAG JOINT SEALANTS

A. Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 50 percent, minimum.
   2. Nonstaining to Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.
   3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
   4. Color: Match adjacent finished surfaces.
   5. Products:
      a. Dow; DOWSIL 790 Silicone Building Sealant: www.dow.com/#sle.
      b. Pecora Corporation; Pecora 890 NST (Non-Staining Technology): www.pecora.com/#sle.
      c. Sika Corporation, Sikasil 728NS: www.usa.sika.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

B. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Color: To be selected by Architect from manufacturer's standard range.
   3. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
   4. Products:
      a. Pecora Corporation; DynaTrol II: www.pecora.com/#sle.
      b. Sika Corporation; Sikaflex-1A: usa.sika.com/#sle.
      c. W. R. Meadows, Inc; POURTHANE NS: www.wrmeadows.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

C. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multicomponent; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface.
   1. Movement Capability: Plus and minus 35 percent, minimum.
   2. Color: To be selected by Architect from manufacturer's standard range.
   3. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).

D. Type ___ - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, nonstaining, nonbleeding, nonsagging; not intended for exterior use.
   1. Color: To be selected by Architect from manufacturer's standard range.
   2. Grade: ASTM C834; Grade 0 Degrees F (Minus 18 Degrees C).
   3. Products:
      a. Pecora Corporation; AC-20 +Silicone: www.pecora.com/#sle.
      b. Sherwin-Williams Company; 950A Siliconized Acrylic Latex Caulk: www.sherwin-williams.com/#sle.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

E. Type ___ - Acrylic Latex Sealant: ASTM C834; for use as acoustical sealant and in firestopping systems for expansion joints and through penetrations.
   1. Color: To be selected by Architect from manufacturer's standard range.
   2. Fire Rated System: Complies with UL 263 and ASTM E119 with UL fire resistance classifications.
   3. Products:
      a. Pecora Corporation; AC-20 FTR (Fire and Temperature Rated): www.pecora.com/#sle.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 SELF-LEVELING JOINT SEALANTS

A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Color: To be selected by Architect from manufacturer's standard range.
   3. Products:
      a. Sherwin-Williams Company; Stampede 1SL Polyurethane Sealant: www.sherwin-williams.com/#sle.
      b. Sherwin-Williams Company; Stampede 2SL Polyurethane Sealant: www.sherwin-williams.com/#sle.
      c. Sika Corporation; Sikaflex-1c SL: usa.sika.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 ACCESSORIES

A. Sealant Backing Materials, General: Materials placed in joint before applying sealants; assists sealant performance and service life by developing optimum sealant profile and preventing three-sided adhesion; type and size recommended by sealant manufacturer for compatibility with sealant, substrate, and application.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.

D. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Provide joint sealant installations complying with ASTM C1193.

C. Install acoustical sealant application work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

E. Install bond breaker backing tape where backer rod cannot be used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

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SECTION 07 95 13
EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Expansion joint cover assemblies for floor, wall, and soffit surfaces.

1.02 RELATED REQUIREMENTS

A. Section 04 20 00 - Unit Masonry: Placement of joint cover assembly frames in masonry.

B. Section 07 62 00 - Sheet Metal Flashing and Trim: Roof expansion and control joint covers.

C. Section 07 92 00 - Joint Sealants: Sealing expansion and control joints using gunnable and pourable sealants.

1.03 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

C. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2020.

D. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2024.

E. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Installation Templates: For frames and anchors to be embedded in concrete or masonry, furnish templates to relevant installers; include installation instructions and tolerances.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.

C. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Expansion Joint Cover Assemblies:
   1. Construction Specialties, Inc; _____: www.c-sgroup.com/#sle.
   2. MM Systems Corp; _____: www.mmsystemscorp.com/#sle.
   3. Nystrom, Inc; _____: www.nystrom.com/#sle.

2.02 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

A. Interior Joints Subject to Seismic Movement:
   1. Manufacturers:
      a. Inpro Architectural Products; 801 Series Expansion Joint Cover
      b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Exterior Wall Joints Subject to Seismic Movement:
   1. Manufacturers:
      a. Inpro Architectural Products; 651 Series Expansion Joint Cover

C. Exterior Roof Bellows with Metal Flange Expansion Joint Covers:
   1. Manufacturers:
      a. Johns Manville; Expand-O-Flash Curb to Wall Expansion Joint Cover

2.03 EXPANSION JOINT COVER ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
   1. Joint Dimensions and Configurations: As indicated on drawings.
   2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
   3. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
   4. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

B. Floor Joint Covers: Coordinate with indicated floor coverings.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.

B. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

2.05 ACCESSORIES

A. Resilient Fire Barrier: For use with metal expansion joint covers and elastomeric seals, with fire rating in accordance with surrounding construction performance capabilities.
   1. Application: Floor.
   2. Fire Resistance Rating: 2-hour, in accordance with ASTM E1966 and UL 2079.
   3. Joint Opening: 1 inch (25.4 mm), nominal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

3.02 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Align work plumb and level, flush with adjacent surfaces.

C. Rigidly anchor to substrate to prevent misalignment.

SECTION 080671 – DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section references specification sections relating to commercial door hardware for the following:

1. Swinging doors.
2. Sliding Doors.
3. Other doors to the extent indicated.

B. Commercial door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical and access control door hardware.
3. Electromechanical and access control door hardware power supplies, back-ups and surge protection.
4. Automatic operators.
5. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.
b. Manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

D. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service

representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1.6 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Refer to “PART 3 – EXECUTION” for required specification sections.

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set

should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.

2. The supplier is responsible for handing and sizing all products.

3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Products listed in the hardware sets shall be supplied by and in accordance with the requirements described in the specification section as noted for each item.

1. Section 08 71 00 – Door Hardware.

C. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. SU - Securitron
4. RU - Corbin Russwin
5. OT - Other
6. RO - Rockwood
7. RF - Rixson

Hardware Sets

Set: 1.0

Doors: 100

2	Continuous Hinge	CFM__HD1 PT		PE	
2	Electric Power Transfer	EL-CEPT	630	SU	⚡
1	Mullion	CR910KM CT6R		RU	
1	Rim Exit Device, Exit Only	ED5200 EO M110 M92 MELR	630	RU	⚡
1	Rim Exit Device, Nightlatch	ED5200 K157ET M110 M92 MELR CT6R	630	RU	⚡
2	High Security Cyl	cylinder/core to match existing		OT	
2	Door Pull	BF152	US32D	RO	
2	Surface Closer	DC6210 A4	689	RU	
2	Drop Plate/Bracket	as required	689	RU	

1	Alum Gasketing	by alum door manufacturer	OT	
1	Rain Guard	346C	PE	
2	Sweep	18061CNB	PE	
1	Threshold	2005AT	PE	
2	Harness, Frame	QC-C1500P	MK	
2	Harness, Door	QC-C__P	MK	
1	Card Reader	by security	OT	
2	Position Switch	DPS-M-BK	SU	

Notes: Door normally closed and secure. Presenting valid credential at card reader retracts latch in exit devices, allowing ingress. In the event of power failure, door remains closed and secure. Free egress provided at all times.

Set: 2.0

Doors: 102, 302

3	Hinge, Full Mortise, Hvy Wt	T4A3786	US26D	MK	
1	Storeroom Lock	ML2057 NSA CT6R	626	RU	
1	High Security Cyl	cylinder/core to match existing		OT	
1	Surface Closer	DC6200 A1	689	RU	
1	Kick Plate	K1050 10" CSK BEV	US32D	RO	
1	Armor Plate	K1050 34" high CSK BEV	US32D	RO	
1	Wall Stop	409	US26D	RO	
3	Silencer	608-RKW		RO	

Set: 3.0

Doors: 101, 201, 301

3	Hinge, Full Mortise, Hvy Wt	T4A3786	US26D	MK	
1	Electric Power Transfer	EL-CEPT	630	SU	
1	Rim Exit Device, Nightlatch	ED5200 K157ET M110 M92 MELR CT6R	630	RU	
1	High Security Cyl	cylinder/core to match existing		OT	
1	Surface Closer	DC6200 A1	689	RU	
1	Gasketing	S88BL		PE	
1	Harness, Frame	QC-C1500P		MK	
1	Harness, Door	QC-C__P		MK	
1	Card Reader	by security		OT	
1	Position Switch	DPS-M-BK		SU	

Notes: Operation:
*Door normally closed and secured.

*Upon use of mechanical key or presentation of authorized credentials latch to retract allowing authorized entry.
*Built in request to exit switch to allow authorized egress.
*Door position switches to monitor status of door.
*Upon loss of power door to remain locked.
*Always free egress.

Set: 4.0

Doors: 202

3	Hinge, Full Mortise, Hvy Wt	T4A3786	US26D	MK
1	Classroom Lock	ML2055 NSA CT6R	626	RU
1	High Security Cyl	cylinder/core to match existing		OT
1	Surface Closer	DC6200 A1	689	RU
1	Wall Stop	409	US26D	RO
1	Gasketing	S88BL		PE

Set: EX

Doors: 203

1	High Security Cyl	cylinder/core to match existing		OT

Notes: Provide new cylinder as required. Balance of hardware is existing to remain

END OF SECTION 080671

SECTION 080671 – DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

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3. Electromechanical and access control door hardware power supplies, back-ups and surge protection.
4. Automatic operators.
5. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.
b. Manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

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D. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service

representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1.6 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Refer to “PART 3 – EXECUTION” for required specification sections.

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a

hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.

2. The supplier is responsible for handing and sizing all products.

3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Products listed in the hardware sets shall be supplied by and in accordance with the requirements described in the specification section as noted for each item.

1. Section 08 71 00 – Door Hardware.

C. Manufacturer's Abbreviations:

1. PE - Pemko
2. SU - Securitron
3. RU - Corbin Russwin
4. OT - Other
5. RO - Rockwood
6. MK - McKinney

Hardware Sets

Set: 1.0

Doors: 101

2	Continuous Hinge	CFM__HD1 PT		PE
2	Electric Power Transfer	EL-CEPT	630	SU
1	Mullion	CR910KM CT6R		RU
1	Rim Exit Device, Exit Only	ED5200 EO M110 M92 MELR	630	RU
1	Rim Exit Device, Nightlatch	ED5200 K157ET M110 M92 MELR CT6R	630	RU
2	High Security Cyl	cylinder/core to match existing		OT
2	Door Pull	BF152	US32D	RO
2	Surface Closer	DC6210 A4	689	RU
2	Drop Plate/Bracket	as required	689	RU
1	Alum Gasketing	by alum door manufacturer		OT
1	Rain Guard	346C		PE

2	Sweep	18061CNB	PE
1	Threshold	2005AT	PE
2	Harness, Frame	QC-C1500P	MK
2	Harness, Door	QC-C__P	MK
1	Card Reader	by security	OT
2	Position Switch	DPS-M-BK	SU

Notes: Door normally closed and secure. Presenting valid credential at card reader retracts latch in exit devices, allowing ingress. In the event of power failure, door remains closed and secure. Free egress provided at all times.

END OF SECTION 080671

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SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hollow metal frames for wood doors.

B. Fire-rated hollow metal doors and frames.

C. Hollow metal borrowed lites glazing frames.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.

B. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.

C. Section 09 91 23 - Interior Painting: Field painting.

D. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2024.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2024.

F. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

G. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

H. ITS (DIR) - Directory of Listed Products; Current Edition.

I. NAAMM HMMA 840 - Guide Specifications for Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2024.

J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.

K. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

L. UL (DIR) - Online Certifications Directory; Current Edition.

M. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 COORDINATION

A. Coordinate anchorage installation for hollow metal frames. Furnish setting drawings, templates, and directions for installing achorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to project side in time for installation.

1.05 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Construction Manager, Architect, electrical contractor, security systems supplier and hardware installers whose work interfaces with or affects hollow metal doors and frames.
2. Review requirements for type of cut-out and back-box as part of the door and frame assembly.
3. Document proceedings, including receipt of samples and approved shop drawings of security contact devices which accurately represent the installation of the device, back-box, and conduit terminations required.
4. Distribute an installation book, including all manuals and instructions.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: For each type of product.
1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

C. Shop Drawings:
1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

D. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

E. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.
1. Provide additional protection to prevent damage to factory finished units

C. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

D. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

E. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames: Subjust to compliance with requirements, provide products by one of the following:
1. Ceco Door, an Assa Abloy Group company; _____: www.assaabloydss.com/#sle.

2. Curries, an Assa Abloy Group company; _____: www.assaabloydss.com/#sle.
3. De La Fontaine; HC - Honeycomb Core: www.delafontaine.com/#sle.
4. Steelcraft, an Allegion brand; ____: www.allegion.com/#sle.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
2. Accessibility: Comply with ICC A117.1 and ADA Standards.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

C. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

D. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.03 HOLLOW METAL DOORS

A. Type As indicated in the Door Schedule , Fire-R:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 2 - Heavy-duty.
b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
c. Model 2 - Seamless.
d. Door Face Metal Thickness: 18 gauge, 0.042 inch (1.0 mm), minimum. Uncoated, cold-rolled steel sheet
2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
a. Attach fire rating label to each fire rated unit.
4. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
5. Door Face Sheets: Flush.
6. Door Finish: Factory primed and field finished.
7. Core: Vertical steel stiffner with fiberglass insulation.
8. Fire Rated Core: Mineral fiber.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Door Frames, Fire-Rated: Knock-down type.
1. Fire Rating: Same as door, labeled.
2. Frame Metal Thickness: 14 gauge, 0.067 inch (1.7 mm), minimum. Uncoated steel sheet.
3. Frame Finish: Factory primed and field finished.
4. Sidelite Frames: Fabricated from the same thickness material as adjacent door frame.

5. Construction: Face welded.

C. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.
   1. Hollow metal frames of uncoated steel sheet, minimum thickness of 0.053 inch.
   2. Construction: Face welded.

2.05 ACCESSORIES

A. Door Window Frames: Door window frames with glazing securely fastened within door opening.
   1. Size: As indicated on drawings.
   2. Frame Material: 18 gauge, 0.0478 inch (1.21 mm), galvanized steel.

B. Glazing: As specified in Sections 088000 and 088813, factory installed.

C. Jamb Anchors:
   1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
   2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
   3. Postinstalled Expansion Type for In-Place Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

D. Floor Anchors:Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
   1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

E. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

F. Mullions: Join to adjacent members by welding or rigid mechanical anchors.

G. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.06 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with minimum A60 metallic coating.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
   1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow- metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M. Comply with Division 04 Section “Unit Masonry.”

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

I. Glazing: Comply with Division 08 Section "Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.07 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:
   1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
   2. Fire Door Cores: As required to provide fire-protection ratings indicated.
   3. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
   4. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
   5. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
   6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
   7. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
   1. Sidelite Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
   2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
   4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
   5. Jamb Anchors: Provide number and spacing of anchors as follows:
      a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
         1) Two anchors per jamb up to 60 inches high.
         2) Three anchors per jamb from 60 to 90 inches high.
         3) Four anchors per jamb from 90 to 120 inches high.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
   1) Three anchors per jamb up to 60 inches high.
   2) Four anchors per jamb from 60 to 90 inches high.
   3) Five anchors per jamb from 90 to 96 inches high.

6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
8. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
9. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
   a. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
   b. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
   c. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.
10. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with manufacturer’s standard gauges and sizes, but not less than the following minimum sizes.
   a. Hinges: Minimum 10 gauge by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
   b. Lock Face, Flush and Surface Bolts, Closers, and Concealed Holders: Minimum 14 gauge.
   c. Pull Plates and Bar: Minimum 16 gauge.
11. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
   a. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
   b. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
   c. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
   d. Provide loose stops and moldings on inside of hollow-metal work.
   e. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.08 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
   1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

D. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

E. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

F. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

C. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    a. At fire-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. In-Place Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

D. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Fire-Rated Doors: Install doors with clearances according to NFPA 80, and the following:
a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
c. Between Bottom of Door and Top of noncombustible Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of noncombustible Finish Floor (No Threshold): Maximum 3/4 inch.
e. Between Bottom of Door and all other Finish Floor Coverings: Maximum 1/2 inch.

E. Install fire rated units in accordance with NFPA 80.

F. Coordinate frame anchor placement with wall construction.

G. Install door hardware as specified in Section 08 71 00.

H. Comply with glazing installation requirements of Section 08 80 00and with hollow-metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

I. Coordinate installation of electrical connections to electrical hardware items.

J. Touch up damaged factory finishes.

3.04 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

C. Remove grout and other bonding material from hollow-metal work immediately after installation.

D. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

E. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

F. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in Division 09 Section “Painting.”

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid-core doors with wood-veneer faces.

B. Factory finishing flush wood doors.

C. Factory fitting flush wood doors to frames and factory machining for hardware.

1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Doors and Frames.

B. Division 08 Section " Glazing" for glazed frames in flush wood doors

C. Division 08 Section "Door Hardware"

D. Division 26 Electrical Sections

E. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

A. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.

B. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2021, with Errata (2022).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.

C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
   1. Provide a schedule of wood doors using same reference numbers for details, openings, and door types as those indicated in the Door Schedule.
   2. Indicate dimensions and locations of mortises and holes for hardware.
   3. Indicate dimensions and locations of cutouts.
   4. Indicate location of security door contacts; coordinate with security systems requirements.
   5. Indicate fire-protection ratings for fire-rated doors.
   6. Indicate factory finish requirements.

D. Samples for Initial Selection: For factory-finished doors.

E. Samples for Verification:
   1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.
   2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
      a. Provide samples for each species of veneer and solid lumber required.
      b. Finish veneer-faced door samples with same materials proposed for factory-finished doors.
   3. Frames for light openings, 6 inches long, for each material, type, and finish required.

F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

G. Warranty: Sample of special warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC- accredited certification body.

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination.”
   1. Meet with Construction Manager, Architect, electrical contractor, security systems supplier, and installers whose work interfaces with or affects flush wood doors.Review requirements for type of cut-out and back-box as part of the wood door and frame assembly.
   2. Review requirements for type of cut-out and back-box as part of the wood door and frame assembly.
   3. Document proceedings, including receipt of samples and approved shop drawings of security contact devices which accurately represent the installation of the device, back-box, and conduit terminations required.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with requirements of referenced standard and manufacturer's written instructions.specified quality standard.

B. Accept doors on site in manufacturer's packaging, and inspect for damage.

C. Package doors individually in plastic bags and wrap bundles of doors in plastic sheeting.

D. Mark each door on bottom rail with opening number used on Shop Drawings.

E. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Warranty Period for Solid-Core Interior Doors: Life of installation.

C. Warranty shall include installation and finishing that may be required due to repair or replacement of defective doors, distribution, glass and glazing and removal of defective doors.
   a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
   a. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
   2. Failures include, but are not limited to, the following:

D. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Masonite
   2. Oshkosh Architectural Door Company
   3. VT Industries, Inc; ____: www.vtindustries.com/#sle.

2.02 FLUSH WOOD DOORS, GENERAL

A. Doors: See drawings for locations and additional requirements.

1. Quality Standard: Quality Standard: In addition to requirements specified, comply with AWI "Architectural Woodwork Standards.Custom Grade, Heavy Duty performance, in accordance with WDMA I.S. 1A.
   a. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
2. Certified Wood: Flush wood doors shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
3. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
4. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
5. Particleboard-Core Doors:
   a. Particleboard: ANSI A208.1, Grade LD-2.
   b. Blocking: Provide all wood blocking in particleboard-core doors as needed to allow secure application of all hardware.

2.03 VENEERED-FACED DOOR FOR TRANSPARENT FINISH

A. Veneer Facing for Transparent Finish: Grade: Custom (Grade A faces) White Maple, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
   1. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet (3 m) of each other when doors are closed.

2.04 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Five piles

C. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.

D. Stiles: 1-3/8 inch laminated strand lumber (LSL) with veneer band to match veneer face.

E. Crossbands: Engineered fiber

F. Top and bottom railes: 1-1/8 inch LSL or hardwood

G. Doors with glazed opening cutouts that exceed more than 40% of the door area shall have structural composite lumber cores (AWI SLC core) to maintain the Life Time Warranty.

H. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

I. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

J. Blocking: Provide blocking in all doors to allow for secure application of all hardware.

K. Provide edge clearances in accordance with the quality standard specified.

2.05 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.
   1. Wood Species: Same species as door faces.

2. Profile: Flush rectangular beads.
3. At 20-minute, fire-rated, wood-core doors, provide wood mouldings and metal glazing clips approved for such use.

B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048- inch- thick, cold-rolled steel sheet; with powder-coated finish; and approved for use in doors of fire- protection rating indicated.
1. Color: As selected by Architect from manufacturer’s full range.
2. Cutting of fire rated doors in field is not permitted.

C. All cutouts for glazed openings in all wood doors must be a minimum of 6 inches from the edge of the door and/or other cutouts for locks, closers or other hardware.

2.06 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI- WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

C. Openings: Cut and trim openings through doors in factory.
1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Furnished and installed by Division 08 Section “Glazing.”

D. Prepare doors to receive security systems hardware in accordance with final security systems shop drawings and templates provide by security systems supplier.
1. Include an integral ½-inch diameter wire tube in doors to receive electrified locksets, exit devices, mortised electrical locksets, or electric strikes in the inactive leaf of pairs of doors to accommodate wiring associated with the power transfer hinges, knuckles, and electrified hardware within the door.

E. Drill all pilot holes for butt hinges and lock fronts at the factory.

2.07 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Transparent Finish:
1. Grade: Premium.
2. Finish: AWI's "Architectural Woodwork Standards" System 11, catalyzed polyurethane.
3. Staining: As selected by Architect from manufacturer’s full range.
4. Effect: Open grain finish.
5. Sheen: Satin.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

D. Examine doors and installed door frames before hanging doors.
   1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Reject doors with defects.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Hardware: For installation, comply with requirements in Division 06 Section “Miscellaneous Rough Carpentry” and Division 08 Section "Door Hardware."

B. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
   1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
      a. Comply with NFPA 80 for fire-rated doors.
   2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
   3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

F. Light openings.
   1. Install wood-veneered beads for light openings in flush wood doors using 16 gauge finish nails spaced at 3-inch from end of each molding and at 6-inch spacing. Fill all nail holes with wood putty to match molding.

G. Use machine tools to cut or drill for hardware.

H. Coordinate installation of doors with installation of frames and hardware.

3.03 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

C. Adjust closers for full closure.

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SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Aluminum doors and frames.

C. Weatherstripping.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

B. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.

C. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.

B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

E. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

F. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, material descriptions, profiles, finishes, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
   1. Include plans, elevations, sections, full-size details and attachments to other work.
   2. Include details for draining moisture occuring with the assembly to the exterior.
   3. Include full size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
      a. Joinery, including concealed welds.

b. Anchorage.
c. Expansion provisions.
d. Glazing.
e. Flashing and drainage.

4. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
5. Include point-to-point wiring diagrams showing the following:
   a. Power requirements for each electrically operated door hardware.
   b. Location and types of switches, signal device, conduit sizes, and number and size of wires.

D. Samples for Initial Selection: For units with factory applied color finishes.

E. Samples for Verification: Submit one sample in manufacturer's standard sizes illustrating finished aluminum surface, glass, infill panels, glazing materials.

F. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
1. Joinery, including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

G. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

H. Informational Submittals:
1. Qualification Data: For Installer.
2. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.
3. Sample Warranties: For special warranties.

I. Closeout Submittals:
1. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
   a. Structural failures, including, but not limited to, excessive deflection.
   b. Noise or vibration created by wind and thermal and structural movements.

c. Water penetration through fixed glazing and framing areas.
d. Failure of operating components.

2. Warranty Period: 10 years from date of Substantial Completion.

C. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.02 BASIS OF DESIGN -- SWINGING DOORS

A. Entrance Doors, Various Stile Widths:

1. Basis of Design: Subject to compliance with requirements, provide EFCO Corporation; D518 Heavy Duty Entrance Door (Exterior Entrance Door) or comparable product by one of the following:.
   a. Kawneer North America, an Arconic company.
   b. U.S. Aluminum; a brand of C.R. Laurence.

B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.

1. Door Construction: 2-inch overall thickness, with minimum 0.188-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: Wide stile; 5-inch nominal width.
   a. Accessible Doors: Smooth surfaced for width of door in area within 10-inches above floor or ground plane.
3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
   a. Provide nonremovable glazing stops on outside of door.
4. Door Frames: Provide EFCO Corporation; Series 402 framing at all exterior doors.
5. Provide an integral 1/2-inch diameter wire tube in doors to receive electrified locksets, panic bars, mortised electric locksets, or electric strikes in the inactive leaf of pairs of doors to accommodate wiring associated with power transfer hinges, knuckles, and electrified hardware within the door.

2.03 ALUMINUM-FRAMED STOREFRONT

A. Basis-of-Design Product: Subject to compliance with requirements, provide EFCO Corporation; Series 403T (Exterior) and Series 402NT (Interior) or comparable product by one of the following:

1. Kawneer North America, an Arconic company.
2. U.S. Aluminum; a brand of C.R. Laurence.

B. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.

1. Glazing Position: Centered (front to back).
2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
3. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.

4. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
5. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
6. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
7. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

C. Performance Requirements
1. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.
2. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
    a. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
    b. Failure also includes the following:
        1) Thermal stresses transferring to building structure.
        2) Glass breakage.
        3) Noise or vibration created by wind and thermal and structural movements.
        4) Loosening or weakening of fasteners, attachments, and other components.
        5) Failure of operating units.
3. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
    a. Member Deflection: At design wind pressure, as follows:
        1) Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans of up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
        2) Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
4. Structural: Test according to ASTM E 330/E 330M as follows:
    a. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.
    b. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
    c. Test Durations: As required by design wind velocity, but not less than 10 seconds.
5. Water Penetration Resistance on Manufactured Assembly under static pressure: No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested in accordance with ASTM E331 at minimum static-air-pressure

differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

6. Air Infiltration at Fixed Framing and Glass Area: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 6.27 psf (300 Pa) static-air-pressure difference.
7. Air Infiltration at Entrace doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft. tested in accordance with ASTM E283.
8. Seismic Performance: Aluminum-framed entrances and storefronts shall withstand the effects of earthquake motions determined according to the Connecticut State Building Code, as determined by the Fabricator's design engineer.
9. Energy Performance: Certify and label energy performance according to NFRC as follows:
   a. Thermal Transmittance (U-factor): Fixed glazing and framing areas as a system shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
   b. Condensation Resistance: Fixed glazing and framing areas as a system shall have an NFRC- certified condensation resistance rating of no less than 55 as determined according to NFRC 500.
10. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
    a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.04 COMPONENTS

A. Aluminum Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   1. Exterior Framing Construction: Thermally improved.
   2. Interior Vestibule Framing Construction: Nonthermal.
   3. Glazing System: Retained mechanically with gaskets on four sides.
   4. Glazing Plane: Center.
   5. Depth of Frame: Not less than 4-1/2".
   6. Face of Frame: Not less than 2".
   7. Finish: Color anodic finish.
   8. Fabrication Method: Field-fabricated stick system.
   9. Glazing Stops: Flush.
   10.
   11. Steel Reinforcement: As required by manufacturer.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Glazing: See Section 08 80 00.
   1. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
   2. Bond-Breaker Tape: Manufacturer's standard TFE-fluorcarbon or polyethylene material to which sealants will not develop adhesion.

2.05 MATERIALS

A. Extruded Bars, Rods, Profiles and Tubes: ASTM B221 (ASTM B221M).

B. Sheet and Plate: ASTM B209/B209M.

C. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.

D. Structural Profiles: ASTM B 308/B 308M.

E. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

F. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

G. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.

H. Fasteners and accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
   1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
   2. Reinforce members as required to receive fastener threads.
   3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

I. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements. Manufacturer's standard compression types; replaceable, molded or extruded, of profile hardness required to maintain watertight seal.

J. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

K. Joint Sealants: For installation at perimeter of aluminum-framed systems, furnished and installed by Section 079200 "Joint Sealants."

L. Spray Foam Sealant: For installation at perimeter of aluminum-framed systems, furnished and installed by Section 079201 "Spray Foam Sealants."

M. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

2.06 FINISHES

A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils (0.018 mm) thick or thicker.

B. Color: Black.

2.07 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: For hardware other than that furnished by this Section, as specified in Section 087100 "Door Hardware" and in the hardware sets include in the Door and Hardware Schedule.

B. Cylinders: As specified in Section 087100 "Door Hardware."

C. Weatherstripping: Manufacturer's standard replaceable components; provide on all exterior doors.
   1. Compression Type: Made of ASTM D 2000 molded neoprene or ASTM D 2287 molded PVC.
   2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

D. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

E. Silencers: BHMA A156.16, Grade 1.

2.08 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Storefront Framing: Fabricate components for assembly using screw-spline system.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
1. At interior and exterior doors, provide compression weather stripping at fixed stops.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

C. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.03 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure nonmovement joints.

E. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

F. Provide alignment attachments and shims to permanently fasten system to building structure.

G. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

H. Provide thermal isolation where components penetrate or disrupt building insulation.

I. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.

J. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

K. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

L. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

M. Seal perimeter and other joints watertight unless otherwise indicated. Installation of perimeter joint sealants by Section 079200 "Joint Sealants," to produce weather- tight installation.

N. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

O. Set thresholds in bed of sealant and secure.

P. Install hardware using templates provided.

Q. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

R. Install glazing as specified in Section 088000 "Glazing."

S. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
   1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
   2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

T. Metal Protection:
   1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
   2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3.04 TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
   1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
   2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
   3. Alignment:
      a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
      b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
      c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
   4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.05 ADJUSTING

A. Adjust operating hardware and sash for smooth operation as recommended by manufacturer.

1. For entrance doors indicated to be accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3-inches from the latch, measured to the leading door edge.

3.06 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Clean aluminum surfaces immediately after installing aluminum-framed systems. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean glass immediately after installation. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove non-permanent labels. and clean surfaces.

3.07 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Protect aluminum framed surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, and other contaminants. If contaminating substances do contact surfaces, remove contaminants immediately according to manufacturer's written recommendations.

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SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Hollow Metal Doors and Frames”.
2. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
3. Division 08 Section “Fire-Rated Steel Framed Entrances”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.

4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

    a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
    b. Complete (risers, point-to-point) access control system block wiring diagrams.
    c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

2.2 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.

d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.

5. Manufacturers:

a. Hager Companies (HA) - BB Series, 5-knuckle.
b. McKinney (MK) - TA/T4A Series, 5-knuckle.
c. dormakaba BEST (ST) - F/FBB Series, 5-knuckle.

2.3 CONTINUOUS HINGES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:.

a. Hager Companies (HA).
b. Pemko (PE).
c. dormakaba BEST (ST).

2.4 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

    a. Pemko (PE) - EL-CEPT Series.
    b. Securitron (SU) - EL-CEPT Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:

    a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
    b. McKinney (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

    a. McKinney (MK) - QC-C Series.
    b. dormakaba BEST (ST) - WH Series.

2.5 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Pulls shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
6. Manufacturers:

    a. Burns Manufacturing (BU).
    b. Hiawatha, Inc. (HI).
    c. Rockwood (RO).

2.6 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Restricted Keyway.

C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Field verify and key cylinders to match Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

F. Construction Keying: Provide construction master keyed cylinders.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.7 MORTISE LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:

a. ASSA ABLOY ACCENTRA (YA) - 8800FL Series.

b. Corbin Russwin Hardware (RU) - ML2000 Series.
c. Sargent Manufacturing (SA) - 8200 Series.

2.8 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.9 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Electromechanical exit devices shall have the following functions and features:

a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
c. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.
d. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.
e. Five-year limited warranty for electromechanical features.

2. Manufacturers:

a. ASSA ABLOY ACCENTRA (YA) - 7000 Series.
b. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
c. Sargent Manufacturing (SA) - 80 Series.

2.10 SURFACE DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.

1. Manufacturers:

a. Corbin Russwin Hardware (RU) - DC6000 Series.
b. Norton Rixson (NO) - 8500 Series.
c. Sargent Manufacturing (SA) - 1431 Series.

2.11 SURFACE MOUNTED CLOSER HOLDERS

A. Electromagnetic Door Holders: ANSI A156.15, Grade 1 electromagnetic door holder/releases with a minimum 25 to 40 pounds holding power and fail-safe operation; power failure releases door to close.

1. Manufacturers:

a. Norton Rixson (RF) - 900 Series.
b. Sargent Manufacturing (SA) - 1560 Series.

2.12 ARCHITECTURAL TRIM AND ACCESSORIES

A. Door Protective Trim:

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:

a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:

a. Burns Manufacturing (BU).
b. Hiawatha, Inc. (HI).
c. Rockwood (RO).

2.13 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

a. Burns Manufacturing (BU).
b. Hiawatha, Inc. (HI).
c. Rockwood (RO).

2.14 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. National Guard Products (NG).
2. Pemko (PE).
3. Reese Enterprises, Inc. (RE).

2.15 ELECTRONIC ACCESSORIES

A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

a. Alarm Controls (AK) - CP1-1026 Series.
b. Securitron (SU) - DPS Series.

2.16 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.17 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

Refer to Section 080671, Door Hardware Sets, for hardware sets.

END OF SECTION 087100

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SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
2. Division 08 Section “Fire-Rated Steel Framed Entrances”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.

5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

    a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
    b. Complete (risers, point-to-point) access control system block wiring diagrams.
    c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

2.2 CONTINUOUS HINGES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:.

a. Hager Companies (HA).
b. Pemko (PE).

c. dormakaba BEST (ST).

2.3 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

a. Pemko (PE) - EL-CEPT Series.
b. Securitron (SU) - EL-CEPT Series.
c. dormakaba BEST (ST) EPT-12C Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:

a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
b. McKinney (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

a. McKinney (MK) - QC-C Series.
b. dormakaba BEST (ST) - WH Series.

2.4 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.

4. Pulls shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
6. Manufacturers:

    a. Burns Manufacturing (BU).
    b. Hiawatha, Inc. (HI).
    c. Rockwood (RO).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Restricted Keyway.

C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.

D. High Security Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders certified to UL437, including pick and drill resistance. Pick resistance to incorporate two or more independent locking mechanisms including a pin tumbler device with five or six pin chambers, mushroom-shaped driver pins, and sidebar locking mechanism operated independently from the six top pin tumbler device. Drill resistance to incorporate cylinder housing with fixed case-hardened inserts protecting the pin tumbler shear line, cylinder plugs with case-hardened inserts protecting both the pin tumbler shear line and the side bar, mushroom-shaped stainless steel driver pins, and stainless steel side pins. Cylinders to be factory keyed.

1. New high security key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.

2. Manufacturers:

E. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.

2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

F. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

G. Construction Keying: Provide construction master keyed cylinders.

H. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.6 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.7 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the

proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.

4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Electromechanical exit devices shall have the following functions and features:

    a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
    b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
    c. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.
    d. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.
    e. Five-year limited warranty for electromechanical features.

2. Manufacturers:

    a. ASSA ABLOY ACCENTRA (YA) - 7000 Series.
    b. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
    c. Sargent Manufacturing (SA) - 80 Series.

2.8 SURFACE DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.

1. Manufacturers:

a. Corbin Russwin Hardware (RU) - DC6000 Series.
b. Norton Rixson (NO) - 8500 Series.
c. Sargent Manufacturing (SA) - 1431 Series.

2.9 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. National Guard Products (NG).
2. Pemko (PE).
3. Reese Enterprises, Inc. (RE).

2.10 ELECTRONIC ACCESSORIES

A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

a. Securitron (SU) - DPS Series.

2.11 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.12 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a

hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Refer to Section 080671, Door Hardware Sets, for hardware sets.

END OF SECTION 087100

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior doors.

B. Glazing compounds.

1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.

B. Section 08 14 16 - Flush Wood Doors: Glazed lites in doors.

1.03 REFERENCE STANDARDS

A. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2025.

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: For each glass product and glazing material indicated.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Samples: For the following products, in the form of 12-inch- square Samples for glass.
   1. Fire-resistive (safety) glazing products.

E. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

F. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

G. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

H. Product Test Reports: For each of the following types of glazing products:
   1. Coated float glass.
   2. Insulating glass.
   3. Glazing sealants.

I. Warranties: Special warranties specified in this Section.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this project who are certified under the National Glass Association's Certified Glass installer program.

B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.07 DELIVERY AND STORAGE

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.08 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
   1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
   1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Laminated Security Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glass Manufacturers:
   1. Guardian Glass, LLC; _____: www.guardianglass.com/#sle.
   2. Pilkington North America Inc; _____: www.pilkington.com/na/#sle.
   3. Vitro Architectural Glass (formerly PPG Glass); _____: www.vitroglazings.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 GLASS PRODUCTS

A. Fully Tempered Float Glass: Provide float glass based glazing unless otherwise indicated.
   1. Kind FT - Fully Tempered Type: Complies with ASTM C1048. Condition A (uncoated) unless otherwise indicated, Type 1, Class 1 (clear) or Class 2 (tinted), Quality Q3
      a. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

B. Fire-Rated Safety Glazing Products
   1. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252, including hose stream test.

2. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257, including hose stream test.
3. Laminated Ceramic Glazing (Fire Rated Safety Glazing): Proprietary Category II safety glazing product in the form of two lites of clear ceramic glazing material laminated together to produce a laminated lite of 5/16-inch nominal thickness; polished on both surfaces, transparent; weighing 4 lb/sq. ft.; complying with testing requirements in 16 CFR 1201 for Category II materials, and as follows:
    a. Fire-Protection Rating: 45, 60, W60, and 90 minutes as indicated for the assembly in which glazing material is installed, and permanently labeled to be in compliance with ASTM E-119.
    b. Products: Subject to compliance with requirements, provide one of the following:
        1) Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite Plus.
        2) SAFTI *FIRST*; Pyran Platinum L.
        3) Schott North America, Inc.; Pyran Platinum L.
        4) Vetrotech Saint-Gobain; Keralite FR-L.

2.03 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:
1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
    a. Dow Corning Corporation; 795.
    b. GE Advanced Materials - Silicones; SilPruf SCS2000.
    c. Pecora Corporation; 895.
    d. Tremco Incorporated; Spectrem 2.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
    a. Use O Glazing Substrates: Coated glass and aluminum coated with a high-performance coating.
6. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
    a. Product: Subject to compliance with requirements, provide the following:
        1) Dow Corning Corporation; DOW CORNING® 995 SILICONE STRUCTURAL SEALANT.
    b. Application: For use in exterior aluminum framing systems with insulated, laminated security glazing.

7. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire- protection ratings indicated.

2.04 ACCESSORIES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
   1. AAMA 804.3 tape, where indicated.
   2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
   3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
   1. Type 1, for glazing applications in which tape acts as the primary sealant.
   2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.05 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire- resistance rating.

2.06 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.02 INSTALLATION, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge

damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.03 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.04 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.05 CLEANING

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

F. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

G. Remove nonpermanent labels immediately after glazing installation is complete.

H. Clean glass and adjacent surfaces after sealants are fully cured.

I. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.06 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

3.07 SCHEDULES

A. Refer to drawings for glazing types.

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Interior Gypsum wallboard.

C. Joint treatment and accessories.

1.03 RELATED REQUIREMENTS

A. Section 061600 - Sheathing

B. Section 09 22 16 - Non-Structural Metal Framing.

1.04 REFERENCE STANDARDS

A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).

B. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2025.

C. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2022.

D. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.

E. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2024.

F. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2024.

G. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

H. GA-216 - Application and Finishing of Gypsum Panel Products; 2024.

I. UL (FRD) - Fire Resistance Directory; Current Edition.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of gypsum board assemblies with size, location, and installation of service utilities.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

C. Sequencing: Install service utilities in an orderly and expeditious manner.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: For each type of product.

C. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

D. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.

C.

1.08 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIR

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2.02 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.03 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

B. Fire-Resistance-Rated Assemblies: Provide completed assemblies with the following characteristics:
   1. Fire-Resistance-Rated Partitions: UL listed assembly No. _____; ___ hour rating.
   2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.04 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. American Gypsum Company; ____: www.americangypsum.com/#sle.
   2. CertainTeed Corporation; ____: www.certainteed.com/#sle.
   3. Georgia-Pacific Gypsum; ____: www.gpgypsum.com/#sle.
   4. USG Corporation; ____: www.usg.com/#sle.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Thickness:
      a. Vertical Surfaces: 5/8 inch (16 mm).
      b. Ceilings: 5/8 inch (16 mm).
   3. Paper-Faced Products:
      a. American Gypsum Company; FireBloc Type X Gypsum Wallboard: www.americangypsum.com/#sle.
      b. CertainTeed Corporation; Type X Drywall: www.certainteed.com/#sle.

c. Georgia-Pacific Gypsum; ToughRock Fireguard X: www.gpgypsum.com/#sle.

4. Mold-Resistant, Paper-Faced Products:
   a. American Gypsum Company; M-Bloc Type X: www.americangypsum.com/#sle.
   b. CertainTeed Corporation; M2Tech 5/8" Type X Moisture & Mold Resistant Drywall: www.certainteed.com/#sle.
   c. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard: www.gpgypsum.com/#sle.

C. Abuse Resistant Wallboard:
1. Application: High-traffic areas indicated.
2. Surface Abrasion: Meets or exceeds Level 2, when tested in accordance with ASTM C1629/C1629M.
3. Indentation: Meets or exceeds Level 1, when tested in accordance with ASTM C1629/C1629M.
4. Soft Body Impact: Meets or exceeds Level 2, when tested in accordance with ASTM C1629/C1629M.
5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
6. Type: Fire-resistance-rated Type X, UL or WH listed.
7. Thickness: 5/8 inch (16 mm).
8. Edges: Tapered.
9. Paper-Faced Products:
   a. American Gypsum Company; M-Bloc AR Type X: www.americangypsum.com/#sle.
   b. CertainTeed Corporation; Extreme Abuse Resistant Drywall with M2Tech: www.certainteed.com/#sle.
   c. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold Guard Abuse-Resistant: www.gpgypsum.com/#sle.

2.05 GYPSUM BOARD ACCESSORIES

A. Finishing Accessories: ASTM C1047, extruded aluminum alloy (6063 T5) or galvanized steel sheet ASTM A924/A924M G90, rolled zinc, plastic or paper-faced galvanized-steel sheet.
1. Shapes: As detailed or required for finished appearance.
   a. Cornerbead
   b. LC-Bead: J-shaped; exposed long flange receives joint compound
   c. U-Bead: J-shaped; exposed short flange does not receive joint compound
   d. Expansion (control) joint

B. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Paper Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners, except as otherwise indicated.
2. Joint Compound for interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for succcessive coats.
   a. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
   b. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
      1) Use setting-type compound for installing paper-faced metal trim accessories.
   c. Fill Coat: For second coat, use drying-type, all-purpose compound.
   d. Finish Coat: For third coat, use drying-type, all-purpose compound.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated
1. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch (0.84 to 2.84 mm) in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

B. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

C. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

C. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

D. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

F. Form control and expansion joints with space between edges of adjoining gypsum panels.

G. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

H. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

I. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.03 APPLYING INTERIOR GYPS

A. Install interior gypsum board in the following locations:
   1. Type X: As indicated on Drawings.
   2. Abuse-Resistant Type: As indicated on Drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:
1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Place control joints consistent with lines of building spaces and as indicated.

C. Corner Beads: Install at external corners, using longest practical lengths.

D. Interior Trim: Install in the following locations:
1. Cornerbead: Use at outside corners unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.

3.05 JOINT TREATMENT

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
2. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.

a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).

3.06 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

3.07 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Clean _____.

3.08 PROTECTION

A. Protect installed gypsum board assemblies from subsequent construction operations.

B. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

C. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

D. Remove and replace panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Non-load bearing steel framing systems for interior metal partition, ceiling, and soffit framing.

1.03 RELATED REQUIREMENTS

A. Section 05 40 00 - Cold-Formed Metal Framing for interior load bearing wall studs; floor joists, roof rafters and ceiling joists; and roof trusses.

1.04 REFERENCE STANDARDS

A. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing; 2020.

B. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020 (Reapproved 2024).

C. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations for each type of product.

C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

D. Product Certificates: For each type of code-compliance certification for studs and tracks.

PART 2 PRODUCTS

2.01 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
   1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
   2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.

B. Studs and Tracks: ASTM C 645.
   1. Minimum Base-Metal Thickness: 0.0329 inch.
   2. Depth: As indicated on Drawings.

2.02 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.
   1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide the following:
   1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that rough-in utilities are in proper location.

C. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

A. Install non-structural members in accordance with ASTM C754.
   1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

F. Extend partition framing to structure where indicated and to ceiling in other locations.

G. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

H. Align and secure top and bottom runners at 24 inches (600 mm) on center.

I. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

J. Align stud web openings horizontally.

K. Secure studs to tracks using crimping method. Do not weld.

L. Fabricate corners using a minimum of three studs.

M. Install double studs at wall openings, door and window jambs, not more than 2 inches (50 mm) from each side of openings.

N. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.

3.03 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Single-Layer Application: 16 inches o.c. unless otherwise indicated.

C. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

D. Install studs so flanges within framing system point in same direction.

E. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
   1. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

a. Install two studs at each jamb unless otherwise indicated.
b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.

2. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
   a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

F. Direct Furring:
1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

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SECTION 09 30 00
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.

1.03 REFERENCE STANDARDS

A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2024.

B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2023.

C. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2023.

D. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2019.

E. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2024).

F. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.

G. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018 (Reapproved 2023).

H. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

I. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

J. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

K. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2025.

L. TCNA (HB-GP) - Handbook for Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs Installation; 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

D. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches (457 by 457 mm) in size illustrating pattern, color variations, and grout joint size variations.

E. Certificate: Certify products of this section meet or exceed specified requirements.

F. Master Grade Certificate: Submit for each type of tile, signed by the tile manufacturer and tile installer.

G. Installer's qualification statement.
   1. Submit documentation of National Tile Contractors Association (NTCA) or Tile Contractors' Association of America (TCAA) accreditation; www.tile-assn.com/#sle
   2. Submit documentation of Natural Stone Institute Accreditation.

H. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

B. Installer Qualifications: Natural Stone Institute (NSI) Accredited Commercial B Contractor, light commercial: www.naturalstoneinstitute.org/#sle.

1.07 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Construct tile mock-up incorporating components specified for location.

C. Locate where directed by Architect.

D. Mock-up may remain as part of work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F (10 degrees C) and below 100 degrees F (38 degrees C) during installation and curing of setting materials.

1.10 MANUFACTURERS

A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
   1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingrediants of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Tile:
   1. American Olean Corporation: www.americanolean.com/#sle.
   2. Architessa: www.architessa.com/#sle.

3. Dal-Tile Corporation: www.daltile.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Setting Materials:
1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
2. Bostik Inc: www.bostik.com/#sle.
3. Mapei Corporation: www.mapei.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

C. Grout:
1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
2. Bostik Inc: www.bostik.com/#sle.
3. Mapei Corporation: www.mapei.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 TILE

A. Quarry Tile, Type QT-1: ANSI A137.1 standard grade.
1. Moisture Absorption: Over 3.0 but not more than 5.0 percent as tested in accordance with ASTM C373.
2. Size: 6 by 6 inch (152 by 152 mm), nominal.
3. Thickness: 1/2 inch (12.7 mm), nominal.
4. Edges: Cushioned.
5. Surface Finish: Matte glazed.
6. Color: As indicated on drawings.
7. Pattern: As indicated on drawings.

2.03 SETTING MATERIALS

A. Provide setting and grout materials from same manufacturer.

B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
1. Products:
a. Custom Building Products: www.custombuildingproducts.com/#sle.
b. LATICRETE International, Inc; TRI-LITE: www.laticrete.com/#sle.
c. Mapei Corporation; Adesilex P10 Mosaic & Glass Tile: www.mapei.com/#sle.
d. Substitutions: See Section 01 60 00 - Product Requirements.

C. Medium-Bed, Latex-Portland Cement Mortar (LHT): Comply with requirements in ANSI A118.4 and A118.15.
1. Products:
a. Custom Building Products: www.custombuildingproducts.com/#sle.
b. LATICRETE International, Inc: www.laticrete.com/#sle.
c. Mapei Corporation: www.mapei.com/#sle.

2.04 GROUTS

A. Provide setting and grout materials from same manufacturer.

B. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
1. Applications: Use where indicated on drawings and where no other type of grout is indicated.
2. Use 1/2" grout joints per manufacturers recomm.
a. Match grout joints for existing adjacent quarry tile.
3. Color: As selected by Architect from manufacturer's full line.

2.05 MAINTENANCE MATERIALS

A. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved by manufacturer of tile-setting materials for installations indicated.
   1. Products:
      a. Custom Building Products
      b. Rust-Oleum Corporation
      c. Stonetech, a Division of LATICRETE International, Inc

B. Grout Release: Temporary, water-soluable pre-grout coating.
   1. Products:
      a. Custom Building Products
      b. LATICRETE International, Inc
      c. Mapei

2.06 ACCESSORY MATERIALS

A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
   1. Fabric-Reinforced, Fluid-Applied Product: System consisting of liquid-latex rubber and fabric reinforcement.
   2. Crack Resistance: No failure at 1/8 inch (3.2 mm) gap, minimum.
   3. Fluid or Trowel Applied Type:
      a. Thickness: 20 mils (0.5 mm), maximum.
      b. Products:
         1) TEC Specialty Products LLC; TEC Crack Defense Pro Crack Isolation Membrane: www.tecspecialty.com/#sle.
         2) LATICRETE International, Inc; LATICRETE FRACTURE BAN SC: www.laticrete.com/#sle.
         3) Mapei Corporation; Mapelastic CI: www.mapei.com/#sle.
         4) Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive tile.

B. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH).
   1. Test as Follows:
      a. Alkalinity (pH): ASTM F710.
      b. Internal Relative Humidity: ASTM F2170.
      c. Moisture Vapor Emission: ASTM F1869.
   2. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

3.03 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108/A118/A136, manufacturer's instructions, and TCNA (HB) or TCNA (HB-GP) recommendations, as applicable.

B. Lay tile to pattern indicated on drawings. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Sound tile after setting. Replace hollow sounding units.

G. Keep control and expansion joints free of mortar, grout, and adhesive.

H. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

I. Grout tile joints unless otherwise indicated on drawings. Use standard grout unless otherwise indicated on drawings.

J. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - MEDIUM-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, on ground, with standard grout, unless otherwise indicated on drawings.

B. Joint widths: Install tile on floors with the following joint widths:
   1. Quarry Tile: 3/8 inch

3.05 CLEANING

A. Clean tile and grout surfaces on completion of placement and grouting, clean all
   1. Remove latex-Portland cement grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

B. When recommneded by tile manufacturer, apply coat of neutral protective cleaning to completed floors. Protect installed tile work with kraft paper or other heavy covering during construction perior to prvent staining, damage, and wear.

C. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

D. Remove coverings at Substantial completion for final review by Architect. Reinstall protective coverings following review and correction of punch list items as required.

3.06 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

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SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.03 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.

C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019 (Reapproved 2025).

D. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.

E. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2024a.

F. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning.

C. Product Data: Provide data on suspension system components and acoustical units.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
   1. Acoustical Panels: Set of 6-inch- square Samples of each type, color, pattern, and texture.
   2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each type, finish, and color.

E. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Ceiling suspension-system members.
   2. Method of attaching hangers to building structure.
   3. Minimum Drawing Scale: 1/8 inch = 1 foot.

F. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.

G. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

H. Maintenance Data: For finishes to include in maintenance manuals.

I. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.07 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.08 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, and partition assemblies.

1.09 WARRANTY

A. Special Warranty for Acoustical Panel Ceilings and Suspension Systems: Manufacturer's standard form in which manufacturer agrees to replace acoustical panel ceilings and suspension systems that fail in materials or workmanship within specified warranty period.
   1. Failure of ceiling panels includes sagging and warping, and growth of mold, mildew and stain causing bacteria.
   2. Failure of suspension systems includes rusting.
   3. Warranty does not cover damages that may occur from vibrations, fire, water, freezing temperatures, accident or any form of abuse or exposure to abnormal conditions.
   4. Warranty Period: 30 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer. Acoustic Tiles/Panels:
   1. Basis of Design: Subject to compliance with requirements, provide Armstrong World Industries, Inc; Canyon #1491 or comparable product by one of the following: www.armstrongceilings.com/#sle.
      a. American Gypsum
      b. CertainTeed Corporation

2.02 PERFORMANCE REQUIREMENTS

A. Flame-spread Index: Class A according to ASTM E 1264.

B. Smoke-Developed Index: 50 or less.

C. Seismic Performance: Ceiling systems designed to withstand the effects of earthquake motions determined according to ASCE 7 for Seismic Design Category D, E, or F and complying with the following:

2.03 ACOUSTICAL UNITS

A. Acoustical Panel Standard - Provide manufacturer's standard panels according to ASTM E1264, Class A and designated by type, form, pattern, acoustical rating and light reflectance unless otherwise indicated.

B. Acoustical Panels, Type IV: mineral base with membrane-faced overlay:
   1. Classification: ASTM E1264 Type IV.
      a. Form: 2, water felted.
      b. Pattern: "E" - lightly textured.
   2. Size: Refer to plans: 24 by 24 inches (610 by 610 mm) or 24 by 48 inches.
   3. Thickness: 5/8 inch (16 mm).
   4. Light Reflectance: Not less than 0.80, determined in accordance with ASTM E1264.
   5. Noise Reduction Coefficient (NRC): Not less than 0.60, determined in accordance with ASTM E1264.
   6. Ceiling Attenuation Class (CAC): Not less than 35, determined in accordance with ASTM E1264.
   7. Panel Edge: Square.
   8. Tile Edge: Square.
      a. Joint: Square.
   9. Color: White.
   10. Suspension System: Exposed grid.
   11. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.04 SUSPENSION SYSTEM(S)

A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.

B. Exposed Suspension System: Wide Face, capped, double-web, steel suspension system: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or Hot-dip galvanized steel grid with steel cap. G30 coating designation; with prefinished 15/16 inch wide metal caps on flanges
   1. Application(s): Seismic.
   2. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
   3. Profile: Tee; 15/16 inch (24 mm) face width.
   4. Finish: Baked enamel.
   5. Color: White.
   6. Products:
      a. Basis of Design: Subject to compliance with requirements, provide Armstrong World Industries, Inc; Prelude XL: www.armstrongceilings.com/#sle or or comparable product by one of the following:
      b. Certainteed Architectural; 15/16" EZ Stab Classic System: www.certainteed.com/ceilings-and-walls/#sle.
      c. USG Corporation; Donn Brand ZXLA 15/16 inch Acoustical Suspension System: www.usg.com/ceilings/#sle.

2.05 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:
   1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
   2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.

C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Hold-Down Clips: Manufacturer's standard clips to suit application.

E. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.

F. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

H. Perimeter Moldings: Same metal and finish as grid.

I. Metal Edge Trim for Suspension Systems: Rolled form, sheet metal edge moldings and trim: Type and profile indciated or if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed sheet metal of same material, finish and color as that used for exposed flanges of suspension system runners.

J. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
   1. Color: White.
   2. Products:
      a. Basis of Design: Subject to compliance with requirements, provide Armstrong World Industries, Inc; AXIOM Classic: www.armstrongceilings.com/#sle or comparable product by one of the following:
         1) CertainTeed Corporation
         2) USG Corporation

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

C. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated and comply with layout shown on reflected ceiling plans.

D. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

3.03 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.

B. Suspend ceiling hangers from building's structural members and as follows:
   1.
   2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
   4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
   6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
   7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
   8. Do not attach hangers to steel deck tabs.
   9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
   10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
   11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
   1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
   2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
   3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.

1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
3. Install hold-down clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.

G. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

H. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
1. Use longest practical lengths.

I. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

J. Seismic Suspension System, Seismic Design Categories D, E, F: Hang suspension system with grid ends attached to the perimeter molding on two adjacent walls; on opposite walls, maintain a 3/4 inch (19 mm) clearance between grid ends and wall.

K. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

L. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

M. Support fixture loads using supplementary hangers located within 6 inches (152 mm) of each corner, or support components independently.

N. Do not eccentrically load system or induce rotation of runners.

3.04 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:
1. Make field cut edges of same profile as factory edges.

3.05 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Installation accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.

C. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2025.

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

C. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2025.

D. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021 (Reapproved 2025).

E. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

F. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

G. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

H. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2018.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions for each type of product indicated.

C. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts. Indicate floor patterns.
   1. Indicate floor patterns details and floor transition locations and types.

D. Verification Samples: Submit one full size samples, 12 by 12 inch (304.8 by 304.8 mm) in size illustrating color and pattern that matches existing VCT in classroom areas indicated on finish floor plan.
   1. Match existing finishes. Initial selection made by Contractor from manufacturer's full range and samples provided to Architect for final review and approval.

E. Sustainable Design Submittal: Submit VOC content documentation for flooring and adhesives.

F. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

G. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.

H. Manufacturer's Qualification Statement.

I. Installer's Qualification Statement.

J. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
   1. For each type of floor tile to include in maintenance manuals.

K. Maintenance Materials:
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Furnish extra VCT materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
      a. Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.
   3. Furnish extra Resilient Base and Transitions, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
      a. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of product installed.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.

B. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.
   1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required. Provide one Master Installer for each product specified.

C. Preconstruction Testing Service: Engage a qualified independent testing agency to perform testing indicated below.
   1. ASTM F 2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes.
   2. ASTM F 3191, Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to flooring installation including, but not limited to, the following:
   1. Review substrate conditions, moisture and pH test results, manufacturer’s installation instructions, and warranty requirements.
   2. Document proceedings, including required corrective measures.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials (floor tile and installation materials) in dry spaces protected from the weather.

C. Maintain temperature in storage area between 50 degrees F (10 degrees C) and 90 degrees F (72 degrees C).

D. Protect and store floor tiles on flat and level surface..

E. Do not double stack pallets.

1.07 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

B. Maintain temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 85 deg F, in spaces to receive floor tile during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

C. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 85 deg F.

D. Close spaces to traffic during floor covering installation.

E. Close spaces to traffic for 48 hours after floor covering installation.

F. Install resilient products after other finishing operations, including painting, have been completed.

1.08 WARRANTY

A. Manufacturer Warranty: Written warranty, signed by manufacturer agreeing to repair or replace resilient flooring and adhesives that fails in performance, materials, or workmanship within specified warranty period.
   1. Warranty Period: Commencing from date of Substantial Completion:'
      a. Vinyl Composition Tile: Five years.
   2. Exclusions from warranty include the following:
      a. Problems caused by moisture, hydrostatic pressure, or alkali in the subfloor.
      b. Damage to flooring products from high heels or spiked shoes.

B. Installer Warranty: Written warranty, signed by Installer agreeing to repair or replace resilient flooring, installed according to manufacturer's written recommendations, that fails in performance, materials, or workmanship within specified warranty period.
   1. Warranty Period: One year from date of Substantial Completion.
   2. Exclusions from warranty include the following:
      a. Problems caused by moisture, hydrostatic pressure, or alkali in the subfloor.
      b. Damage to flooring products from high heels or spiked shoes.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm

B. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organice Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.02 TILE FLOORING

A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness. Subject to compliance with requirements.
   1. Manufacturers:
      a. Armstrong Flooring; www.armstrongflooring.com/#sle.
      b. Johnsonite, a Tarkett Company; www.johnsonite.com/#sle.

c. Or approved equal.
2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified. Through-pattern tile.
3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
4. Size: 12 by 12 inch (305 by 305 mm).
   a. Match existing finishes. Initial selection made by Contractor from manufacturer's full range and samples provided to Architect for final review and approval.
5. VOC Content Limits: As specified in Section 01 61 16.
6. Thickness: 0.125 inch (3.2 mm).
7. Color:
   a. As indicated on Finish Legend

2.03 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TS, rubber, vulcanized thermoset; style as scheduled.
1. Manufacturers:
   a. Johnsonite, a Tarkett Company; www.johnsonite.com/#sle.
   b. Roppe Corporation; www.roppe.com/#sle.
   c. Mannington Commercial; www.manningtoncommercial.com#sle.
   d. Or approved Equal.
2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
3. Height: 6"
4. Thickness: 0.125 inch (3.2 mm).
5. Length: Roll
6. Color:
   a. As indicated on Finish Legend
7. Inside and outside corners: Preformed

2.04 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
1. VOC Content Limits: As specified in Section 01 61 16.

C. Adhesive for Vinyl Flooring:
1. Manufacturers:
   a. Basis of Design: Manufacturer recommended adhesive .
      1) Or approved equal

D. Transition Strips: Same material as resilient base
1. Manufacturers:
   a. Johnsonite, a Tarkett Company
   b. Roppe Corporation
   c. Mannington Commercial; www.manningtoncommercial.com#sle.
   d. Or approved equal.
2. Color:
   a. Match resilient base: As indicated on Finish Legend
3. Style:
   a. Match existing style. Initial selection made by Contractor from manufacturer's full range and samples provided to Architect for final review and approval.
4. Length: In longest equal length section possible for installation location.
   a. Contractor to field verify to determine adaptor style for application.

5. Locations:
    a. Between new VCT and existing flooring systems

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
1. Test as Follows:
    a. Alkalinity (pH): ASTM F710.
    b. Internal Relative Humidity: ASTM F2170.
    c. Moisture Vapor Emission: ASTM F1869.
2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is fully cured.

D. Clean substrate.

E. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Adhesive-Applied Installation:
1. Spread only enough adhesive to permit installation of materials before initial set.
2. Fit joints and butt seams tightly.
3. Set flooring in place, press with heavy roller to attain full adhesion.

D. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

C. Install square tile to match installation method in existing classroom.

D. Allow minimum 1/2 full size tile width at room or area perimeter.

3.05 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.

B. Miter internal corners. Wrap external corners, without overstretching..

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.06 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage immediately after installation.

B. Clean in accordance with manufacturer's written instructions.

3.07 PROTECTION

A. Protect floor tile from mars, marks, indentations, and other damage from construction operations in accordance with manufacturer's written instructions.

B. Prohibit traffic on resilient flooring in accordance with manufacturer's written instructions.

SECTION 09 68 13
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016 (Reapproved 2021).

B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2025.

C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

D. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

E. Manufacturer's Qualification Statement.

F. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.

B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Tile Carpeting:
   1. Tandus Centriva
   2. Mannington Commercial; _____: www.manningtoncommercial.com#sle.
   3. Mohawk Group; ____: www.mohawkgroup.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Tile Carpeting, Type EM-1: Tufted, manufactured in one color dye lot.
   1. Tile Size: 24" by 24" inch (600 mm), nominal.
   2. Color: As indicated on Drawings.
   3. Pattern: As indicated on Drawings.
   4. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
   5. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").

2.03 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.

B. Edge Strips: Embossed aluminum, _____ color.

C. Adhesives:
   1. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified; in lieu of labeled product, independent test report showing compliance is acceptable.

D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
   1. Test as Follows:
      a. Alkalinity (pH): ASTM F710.
      b. Internal Relative Humidity: ASTM F2170.
      c. Moisture Vapor Emission: ASTM F1869.
   2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

C. Vacuum clean substrate.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install carpet tile in accordance with manufacturer's instructions.

C. Blend carpet from different cartons to ensure minimal variation in color match.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.

F. Trim carpet tile neatly at walls and around interruptions.

G. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

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SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Interior painting and coating systems.

C. Scope:
   1. Finish surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
      a. Interior:
         1) Concrete Masonry Units: Concrete, split face, scored, smooth, high density, low density, and fluted.
         2) Metal: Aluminum and galvanized.
         3) Drywall: Walls, ceilings, gypsum board, and similar items.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Floors, unless specifically indicated.
   6. Glass.
   7. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; Current Edition.

B. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2020.

C. SCAQMD 1113 - Architectural Coatings; 1977, with Amendment (2016).

D. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

E. SSPC-SP 2 - Hand Tool Cleaning; 2024.

F. SSPC-SP 13/NACE No.6 - Surface Preparation of Concrete; 2018.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Product characteristics.
   2. Surface preparation instructions and recommendations.
   3. Primer requirements and finish specification.
   4. Storage and handling requirements and recommendations.
   5. Application methods.
   6. Clean-up information.

C. Samples: Submit four paper draw down samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
   1. Match existing finishes. Initial selection made by Contractor from manufacturer's full range and samples provided to Architect for final review and approval.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Applicator's qualification statement.

F. Maintenance Data: Submit coating maintenance manual including finish schedule showing where each product/color/finish was used, product technical data sheets, safety data sheets (SDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gal (4 L) of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the type of work specified approved by manufacturer.

1.06 MOCK-UP

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

B. Provide one accent wall as directed by Architect to demonstrate color and finish.

C. Locate where directed by Architect.

D. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, product name, product code, color designation, VOC content, batch date, environmental handling, surface preparation, application, and use instructions.

C. Paint Materials: Store at a minimum of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

D. Handling: Maintain a clean, dry storage area to prevent contamination or damage to materials.

1.08 FIELD CONDITIONS

A. Do not apply materials when environmental conditions are outside the ranges required by manufacturer.

B. Follow manufacturer's recommended procedures for producing the best results, including testing substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 fc (860 lux) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. **Basis of Design Products**: Subject to compliance with requirements, provide Sherwin-Williams Company (The) products indicated; www.sherwin-williams.com/#sle.
   1. Or approved Equal.

B. Comparable Products: Products of approved manufacturers will be considered in accordance with 016000 - Product Requirements, and the following:

1. Products that meet or exceed performance and physical characteristics of basis of design products.

2.02 PAINTING AND COATINGS

A. General:
   1. Provide factory-mixed coatings unless otherwise indicated.
   2. Do not reduce, thin, or dilute coatings or add materials to coatings unless specifically indicated in manufacturer's instructions.

B. Volatile Organic Compound (VOC) Content:
   1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
      a. SCAQMD 1113 Rule
      b. CARB (SCM).
      c. Ozone Transport Commission (OTC) Phase II Model Rule, Architectural and Industrial Maintenance Coatings; www.otcair.org.
      d. Architectural coatings VOC limits of State in which the project is located.
      e. USGBC LEED Rating System; www.usgbc.org.
   2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site, or other method acceptable to authorities having jurisdiction.

C. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

2.03 PAINT SYSTEMS - INTERIOR

A. Masonry CMU Walls: Concrete, split face, scored, smooth, high density, low density, and fluted.
   1. Latex Systems:
      a. **Basis-of-Design:** Egg-Shel Finish Scuff Resistant Waterbase Enamel:
         1) 1st Coat: Sherwin-Williams PrepRite Block Filler, B25W25: www.sherwin-williams.com/#sle.
            (a) 75 to 125 sq ft/gal (1.8 to 3.1 sq m/L).
         2) 2nd and 3rd Coat: Sherwin-Williams Scuff Tuff Interior Waterbased Enamel, Eg-Shel, S24-50 Series: www.sherwin-williams.com/#sle.
            (a) 4 mils wet, 1.2 mils dry per coat.
      b. Or approved Equal.
   2. Color and Finish:
      a. As indicated on Finish Legend

B. Metal: Aluminum and galvanized.
   1. Latex Systems:
      a. **Basis-of-Design:** Semi-Gloss Finish: *(Doorframes)*
         1) 1st Coat: Sherwin-Williams Pro Industrial All Surface Enamel Latex Primer, www.sherwin-williams.com/#sle.
            (a) 5 mils wet, 2 mils dry per coat.
         2) 2nd and 3rd Coat: Sherwin-Williams Scuff Tuff Interior Enamel, Semi-Gloss www.sherwin-williams.com/#sle.
            (a) 2 to 4 mils dry per coat.
      b. Or approved Equal.
   2. Color and Finish:
      a. As indicated on Finish Legend

C. Drywall: Walls, ceilings, gypsum board, and similar items.
   1. Latex Systems:

a. **Basis-of-Design:** Eg-Shel Finish Scuff Resistant Waterbase Enamel: *(Walls and Soffits)*
   1) 1st Coat: Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28W2600: www.sherwin-williams.com/#sle
      (a) 4 mils wet, 1.5 mils dry per coat.
   2) 2nd and 3rd Coat: Sherwin-Williams Scuff Tuff Interior Waterbased Enamel, Matte, S24-50 Series: www.sherwin-williams.com/#sle.
      (a) 4 mils wet, 1.2 mils dry per coat.
b. Or approved Equal.
c. Or approved Equal.

2. Color and Finish:
   a. As indicated on Finish Legend.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove mildew from impervious surfaces by scrubbing with solution of water and bleach. Rinse with clean water and allow surface to dry.

D. Masonry: Remove efflorescence and chalk.

E. Gypsum Board: Fill minor defects with filler compound; sand smooth and remove dust prior to painting.

F. Concrete Floors and Traffic Surfaces: Prepare concrete in accordance with SSPC-SP 13/NACE No.6.

G. Aluminum: Remove surface contamination and oil; wash with solvent according to SSPC-SP 1.

H. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
   2. Prepare surface according to SSPC-SP 2.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions.

C. Apply coatings at spread rate required to achieve manufacturer's recommended dry film thickness.

3.04 PRIMING

A. Apply primer to all surfaces unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

B. Primers specified in painting schedules may be omitted on items factory primed or factory finished items if acceptable to topcoat manufacturers.

3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Clean surfaces immediately of overspray, splatter, and excess material.

C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.06 PROTECTION

A. Protect finished coatings from damage until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

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SECTION 10 14 23
PANEL SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior panel signage.

B. Exterior panel signage

1.02 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's product literature for each type of panel sign, indicating styles, font, foreground and background colors, locations, and overall dimensions of each sign.

C. Shop Drawings:
   1. Include dimensions, locations, elevations, materials, text and graphic layout, attachment details, and schedules.
   2. Schedule: Provide information sufficient to completely define each panel sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
      a. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
      b. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
      c. Submit for approval by Owner through Architect prior to fabrication.

D. Samples: Submit one sample of each type of sign, of size similar to that required for project, indicating sign style, font, finish, and method of attachment.

E. Verification Samples:
   1. Match existing finishes. Initial selection made by Contractor from manufacturer's full range and samples provided to Architect for final review and approval.

F. Signage schedule in manufacturer's format for verification of text/copy.

G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

H. Manufacturer's qualification statement.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

C. Obtain signs from one source and a single manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

C. Store under cover and elevated above grade.

D. Store tape adhesive at normal room temperature.

1.06 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain minimum ambient temperature during and after installation.

1.07 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Deterioration of finishes beyond normal weathering.
      b. Deterioration of embedded graphic image.
      c. Separation or delamination of sheet materials and components.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Interior panel signage:
   1. Takeform: Vivid; www.takeform.net/#sle.
   2. Or approved equal.

B. Exterior panel signage:
   1. Takeform: Transit; www.takeform.net/#sle.
   2. Or approved equal.

2.02 REGULATORY REQUIREMENTS

A. Accessibility Requirements: Comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

2.03 PRODUCTS

A. Interior panel signage:
   1. Standards:
      a. It is the intent the manufacturer provides signs that match the existing signage including wall mounted panel signs that are code compliant. All signs shall have a matching appearance. All sign types shall include mounting templates and installation hardware appropriate for the application.
      b. Type Styles: Copy shall be a true, clean, accurate reproduction of typeface(s) specified. Upper and lower case or all caps shall be as indicated to match existing. Letter spacing to be normal and interline spacing shall be set by manufacturer.
      c. Arrows, symbols and logo art: To be provided in style, sizes, colors and spacing as shown in drawings.
      d. Grade II Braille utilizing perfectly round, clear insertion beads.
      e. Color and Finishes: Match existing finishes. Initial selection made by Contractor from manufacturer's full range and samples provided to Architect for final review and approval.
         1) Finishes are to meet federal ADA and all state and local requirements.
   2. Signage System:
      a. The signage shall be a direct print acrylic sign system with applied graphics including all tactile requirements in adherence to ADA specifications.
      b. Signage shall be capable of accepting direct prints including colors, patterns, graphic images and photography. Prints shall be second surface to protect from scratches, fading or other damage.

c. All signs, including work station and room ID's, overheads and flag mounts, directionals and directories shall have a matching appearance and constructed utilizing the same manufacturing process to ensure a consistent look throughout.
d. The entire sign shall be 65% post industrial waste and 100% recyclable under Code 7.
e. Match existing system. Initial selection made by Contractor from manufacturer's full range and samples provided to Architect for final review and approval.

3. Materials:
a. Signage shall be fabricated of acrylic, .375” thick, comprised of two layers. Edges shall be smooth without chips, burrs, sharp edges or marks. The direct print shall be second surface to prevent scratching, fading or other damage.
b. Acrylic shall be non-glare optically clear with a P99 finish assuring no loss of clarity or composition of the print.
c. Tactile lettering shall be precision machined, raised 1/32", matte PETG and subsurface colored for scratch resistance.
d. The signage shall utilize an acrylic sphere for Grade II Braille inserted directly into a scratch resistant, acrylic face. Braille dots are to be pressure fit in high tolerance drilled holes. Braille dots shall be half hemispherical domed and protruding a minimum 0.025".
e. The signage shall utilize a pressure activated adhesive. The adhesive shall be nonhazardous and shall allow for flexing and deflection of the adhered components due to changes in temperature and humidity without bond failure.
f. Signage shall have an acrylic shim plate. The shim shall lift the sign off the wall to facilitate cleaning and painting without sign removal.
g. All signs shall be provided with appropriate mounting hardware. All hardware shall have a polished anodized finish, architectural in appearance and suitable for the mounting surface.

4. Colors, Patterns, Imagery and Artwork:
a. Vendor shall provide an online library of images including patterns, graphics and photography. The library shall be organized by idea or theme to facilitate the selection of images appropriate for the project.
b. All images shall have a minimum resolution of 300 dpi.
c. Standard tactile colors shall match manufacturer's ADA standard color selection.
d. Match existing signage finishes. Initial selection made by Contractor from manufacturer's full range and samples provided to Architect for final review and approval.

5. Mounting & Installation:
a. Tape Adhesive: Double-sided tape, permanent adhesive.
b. Or approved equal to match existing mounting type.

B. Exterior panel signage:
1. Standards:
a. It is the intent that the manufacturer provide signs including wall mounted panels that are code compliant. All signs shall have a matching appearance. All sign types shall include mounting templates and installation hardware appropriate for the application.
b. All signs shall be structurally engineered to resist wind loads and thermal movements without distortions or excessive deflections.
c. Type Styles: Copy shall be a true, clean, accurate reproduction of typeface(s) specified. Upper and lower case or all caps shall be as indicated to match existing. Letter spacing to be normal and interline spacing shall be set by manufacturer.
d. Arrows, symbols and logo art: To be provided in style, sizes, colors and spacing as shown in drawings.
e. Grade II Braille utilizing perfectly round, clear insertion beads.

f. Color and Finishes: Match existing finishes. Initial selection made by Contractor from manufacturer's full range and samples provided to Architect for final review and approval.
   1) Finishes are to meet federal ADA and all state and local requirements.

2. Materials:
   a. Sign Faces:
      1) Faces shall be direct printed ACM. Panels with a laminated image shall not be acceptable.
      2) Signs shall be fabricated of ACM, 6mm in thickness. ACM shall be rigid and flat and shall be unaffected by wide fluctuations in temperature and humidity. Edges shall be smooth without chips, burrs, sharp edge or marks. The direct print shall be first surface with a protective top-coat to prevent damage from moisture, UV, scratches and strong cleaning agents. Colors and general appearance shall be unaffected for 7 years.
      3) Signs shall resist graffiti. Markings and spray paint shall remove with commercially available cleaners.
      4) Signs shall have an ASTM E84, Class A flame spread fire rating.
      5) Signs shall comply with ASTM 2247 for water resistance, ASTM D1735-08 for water fog and ASTM 02842 for water absorption assuring no degradation of panel, image or overlay.
      6) Signs shall comply with ASTM standards for temperature, humidity and freeze-thaw cycles.

3. Colors, Patterns, Imagery and Artwork:
   a. Vendor shall provide a choice of sign families each with a unique graphic and color palette. The pre-designed options shall facilitate the selection of graphics and finishes appropriate for the project.
   b. Match existing signage finishes. Initial selection made by Contractor from manufacturer's full range and samples provided to Architect for final review and approval.

4. Mounting & Installation:
   a. Adhesive Mount
      1) Signs shall utilize adhesive that is waterproof, low odor, low VOC and suitable for use from -30°F - 120°F.
   b. Screw Mount
      1) Signs shall utilize low profile stainless steel screws to mount signs flush to wall.
   c. Button with Standoff Mount
      1) Signs shall utilize clear anodized aluminum stand-offs and buttons. The buttons shall be tamper-proof and secure signs to wall utilizing stand-offs to stand the sign off the wall, providing a clean and attractive appearance.
   d. Or approved equal to match existing mounting type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

3.02 INSTALLATION

A. General: Installation locations shall be in accordance with ADA specifications. Locate signs where indicated using mounting methods in compliance with manufacturer's written instructions:

1. The signage contractor shall coordinate installation schedules with the Owner and/or Construction Manager.
2. Installation shall be performed by manufacturer's personnel trained and certified in manufacturer's methods and procedures.
3. The signage contractor shall submit a CAD generated location plan noting the location of all signage and cross referenced to message schedule or plots for architect's approval.
4. Installer to conduct a pre-installation survey prior to manufacturing to verify copy and sign location. Each location shall be noted using a low tack vinyl reproduction of actual sign. Full scale renderings of directories and directionals shall also be provided. Any location discrepancy or message issues shall be submitted to architect for review.
5. Signs shall be level, plumb, and at heights indicated with sign surfaces free from defects.
6. Upon completion of the work, signage contractor shall remove unused or discarded materials, containers and debris from site.
7. Install in accordance with manufacturer's instructions.
8. Install with horizontal edges level.

B. Locate panel signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

C. Protect from damage until substantial completion; repair or replace damaged items.

3.03 STANDARDS MANUAL

A. Manufacturer shall provide a comprehensive standards manual in both paper and PDF format. The manual shall include all renderings, drawings, location plan, message schedule, insert templates, mounting detail and reorder information.

B. Manufacturer shall provide an editable template, in electronic format acceptable to the owner, for each sign type.

3.04 SIGNAGE SCHEDULE

A. LOCATED AT END OF SECTION.

DRIGGS SIGNAGE SCHEDULE

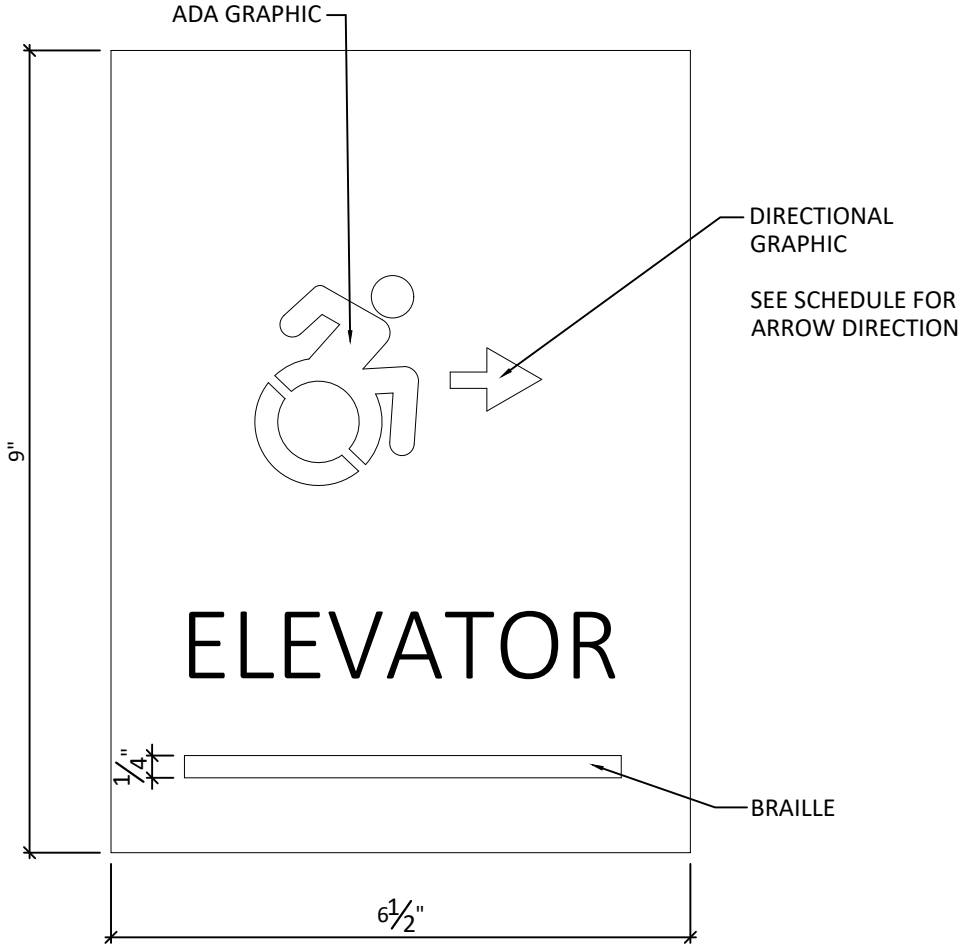
ARCHITECTURAL ROOM #	FLOOR LEVEL	SIGN TEXT - 1	SIGN TEXT - 2	SIGN TEXT - 3	SIGN TYPE	QUANTITY
ENTRY DOOR	FIRST FLOOR	PUSH	FOR ASSISTANCE	-	4	1
ENTRY DOOR	FIRST FLOOR	ELEVATOR	NOTICE	W/ WHEELCHAIR PICTOGRAM	2	1
ENTRY DOOR	FIRST FLOOR	ELEVATOR	NOTICE	W/ WHEELCHAIR PICTOGRAM	2	1
CAFETERIA	FIRST FLOOR	ELEVATOR	DIRECTIONAL ARROW RIGHT	W/ WHEELCHAIR PICTOGRAM	1	1
STAIR	FIRST FLOOR	ELEVATOR	DIRECTIONAL ARROW RIGHT	W/ WHEELCHAIR PICTOGRAM	1	1
CORRIDOR	FIRST FLOOR	ELEVATOR	DIRECTIONAL ARROW UP	W/ WHEELCHAIR PICTOGRAM	1	1
LOBBY	FIRST FLOOR	ELEVATOR	AREA OF REFUGE	W/ WHEELCHAIR PICTOGRAM	3	1
LOBBY	FIRST FLOOR	ELEVATOR	USE STAIRS IN CASE OF FIRE	FIRE AND STAIR PICTOGRAM	5	1
ENTRY DOOR	SECOND FLOOR	PUSH	FOR ASSISTANCE	-	4	1
CORRIDOR	SECOND FLOOR	ELEVATOR	DIRECTIONAL ARROW UP	W/ WHEELCHAIR PICTOGRAM	1	2
CORRIDOR	SECOND FLOOR	ELEVATOR	DIRECTIONAL ARROW LEFT	W/ WHEELCHAIR PICTOGRAM	1	1
STAIR	SECOND FLOOR	ELEVATOR	DIRECTIONAL ARROW LEFT	W/ WHEELCHAIR PICTOGRAM	1	1
STAIR	SECOND FLOOR	ELEVATOR	DIRECTIONAL ARROW RIGHT	W/ WHEELCHAIR PICTOGRAM	1	1
LOBBY	SECOND FLOOR	ELEVATOR	AREA OF REFUGE	W/ WHEELCHAIR PICTOGRAM	3	1
LOBBY	SECOND FLOOR	ELEVATOR	USE STAIRS IN CASE OF FIRE	FIRE AND STAIR PICTOGRAM	5	1

DRIGGS SIGNAGE SCHEDULE

ARCHITECTURAL ROOM #	FLOOR LEVEL	SIGN TEXT - 1	SIGN TEXT - 2	SIGN TEXT - 3	SIGN TYPE	QUANTITY
STAIR	THIRD FLOOR	ELEVATOR	DIRECTIONAL ARROW LEFT	W/ WHEELCHAIR PICTOGRAM	1	1
STAIR	THIRD FLOOR	ELEVATOR	DIRECTIONAL ARROW RIGHT	W/ WHEELCHAIR PICTOGRAM	1	1
CORRIDOR	THIRD FLOOR	ELEVATOR	DIRECTIONAL ARROW UP	W/ WHEELCHAIR PICTOGRAM	1	2
LOBBY	THIRD FLOOR	ELEVATOR	AREA OF REFUGE	W/ WHEELCHAIR PICTOGRAM	3	1
LOBBY	THIRD FLOOR	ELEVATOR	USE STAIRS IN CASE OF FIRE	FIRE AND STAIR PICTOGRAM	5	1

WILSON SIGNAGE SCHEDULE

ARCHITECTURAL ROOM #	FLOOR LEVEL	SIGN TEXT - 1	SIGN TEXT - 2	SIGN TEXT - 3	SIGN TYPE	QUANTITY
LOBBY	FIRST FLOOR	ELEVATOR	USE STAIRS IN CASE OF FIRE	FIRE AND STAIR PICTOGRAM	5	1
ENTRY DOOR	SECOND FLOOR	ELEVATOR	NOTICE	-	2	2
CORRIDOR	SECOND FLOOR	ELEVATOR	DIRECTIONAL ARROW LEFT	W/ WHEELCHAIR PICTOGRAM	1	1
CORRIDOR	SECOND FLOOR	ELEVATOR	DIRECTIONAL ARROW UP	W/ WHEELCHAIR PICTOGRAM	1	1
CORRIDOR	SECOND FLOOR	ELEVATOR	DIRECTIONAL ARROW RIGHT	W/ WHEELCHAIR PICTOGRAM	1	1
EXTERIOR	SECOND FLOOR	ELEVATOR	DIRECTIONAL ARROW LEFT	W/ WHEELCHAIR PICTOGRAM	1	1
ENTRY DOOR	EXTERIOR LOBBY	PUSH	FOR ASSISTANCE	-	4	1
LOBBY	SECOND FLOOR	ELEVATOR	USE STAIRS IN CASE OF FIRE	FIRE AND STAIR PICTOGRAM	5	1
CORRIDOR	THIRD FLOOR	ELEVATOR	DIRECTIONAL ARROW UP	W/ WHEELCHAIR PICTOGRAM	1	1
CORRIDOR	THIRD FLOOR	ELEVATOR	DIRECTIONAL ARROW RIGHT	W/ WHEELCHAIR PICTOGRAM	1	1
LOBBY	THIRD FLOOR	ELEVATOR	USE STAIRS IN CASE OF FIRE	FIRE AND STAIR PICTOGRAM	5	1



TYPE - 1

BASIS OF DESIGN - VIVID BUILDING REQUIRED SIGN TYPE ST V1AE04

DATE: 01/15/2026
REV:

SIGNAGE

LAYOUT

STATE PROJECT NO. 151-0315 LUE
STATE PROJECT NO. 151-0316 LUE

WATERBURY DRIGGS AND WILSON ELEMENTARY SCHOOLS ELEVATOR

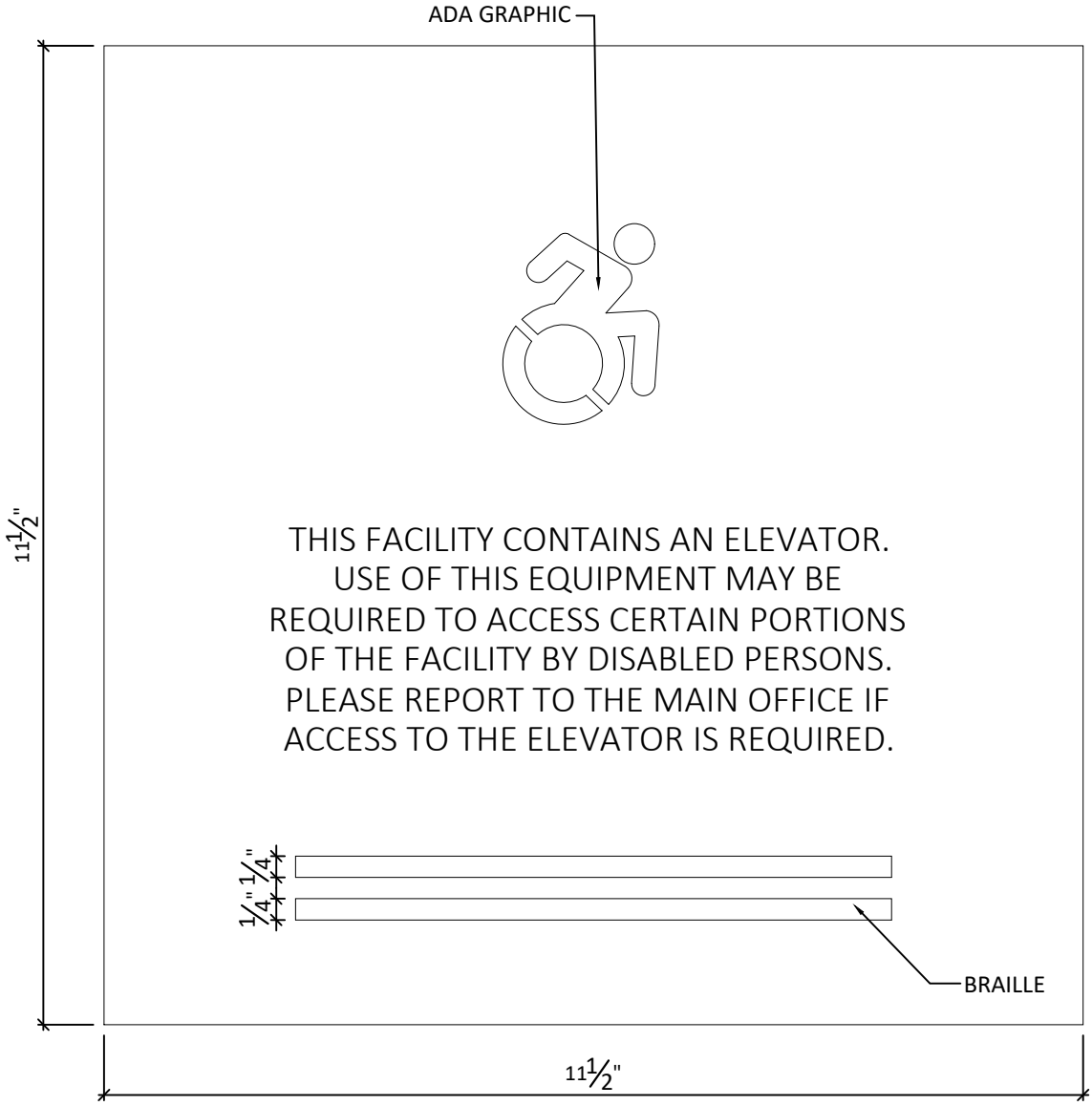
77 WOODLAWN TERRACE
WATERBURY, CT 06710

235 BIRCH STREET
WATERBURY, CT 06704

FRIAR
21 Talcott Notch Road
Farmington, CT 06032

SHEET NO.

101423-1



TYPE - 2

BASIS OF DESIGN - TRANSIT STATIONARY NOTICE SIGN TYPE TR-11.5X11.5A

DATE: 01/15/2026
REV:

SIGNAGE

LAYOUT

STATE PROJECT NO. 151-0315 LUE
STATE PROJECT NO. 151-0316 LUE

WATERBURY DRIGGS AND WILSON ELEMENTARY SCHOOLS ELEVATOR

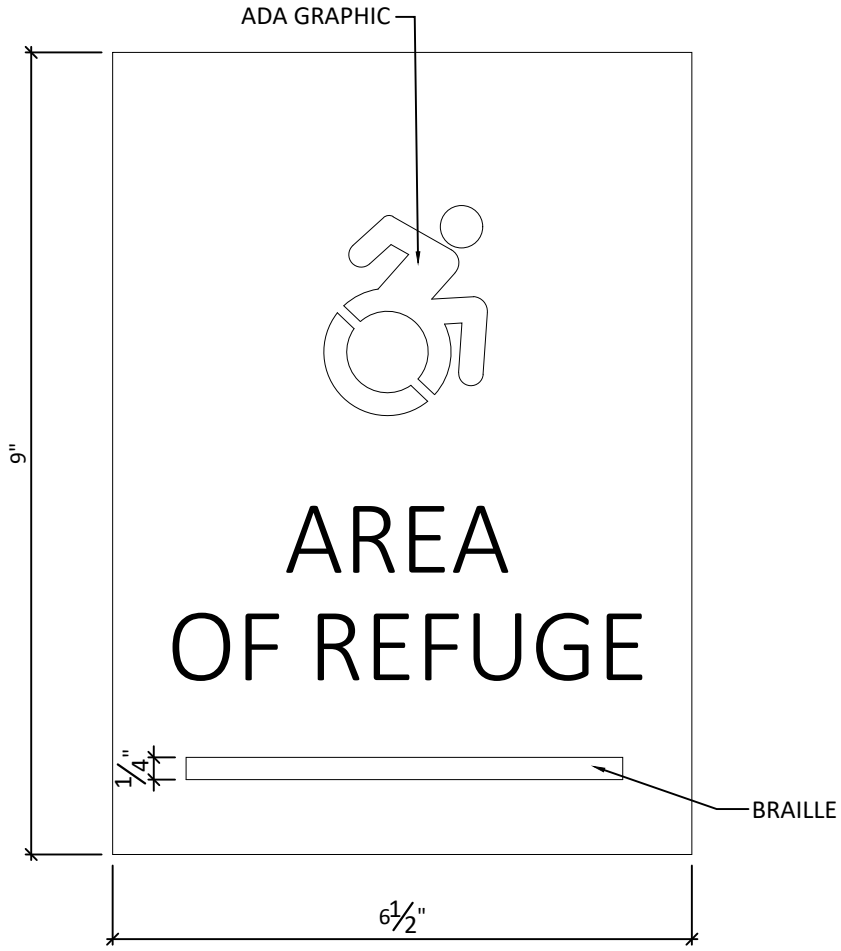
77 WOODLAWN TERRACE
WATERBURY, CT 06710

235 BIRCH STREET
WATERBURY, CT 06704

FRIAR
21 Talcott Notch Road
Farmington, CT 06032

SHEET NO.

101423-2



TYPE - 3

BASIS OF DESIGN - VIVID BUILDING REQUIRED SIGN TYPE ST V1AE04

DATE: 01/15/2026
REV:

SIGNAGE

LAYOUT

STATE PROJECT NO. 151-0315 LUE
STATE PROJECT NO. 151-0316 LUE

WATERBURY DRIGGS AND WILSON ELEMENTARY SCHOOLS ELEVATOR

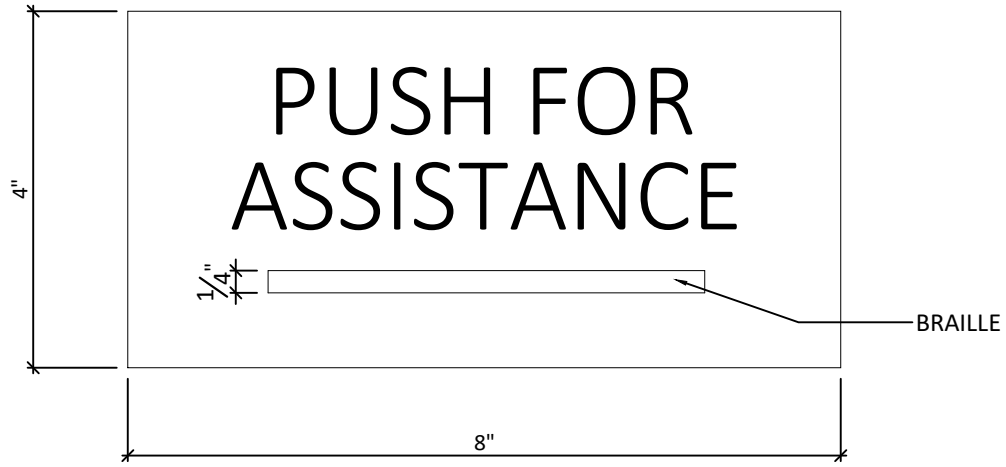
77 WOODLAWN TERRACE
WATERBURY, CT 06710

235 BIRCH STREET
WATERBURY, CT 06704

FRIAR
21 Talcott Notch Road
Farmington, CT 06032

SHEET NO.

101423-3



TYPE - 4

BASIS OF DESIGN - VIVID BUILDING REQUIRED SIGN TYPE ST V1AH14

DATE: 01/15/2026
REV:

SIGNAGE

LAYOUT

STATE PROJECT NO. 151-0315 LUE
STATE PROJECT NO. 151-0316 LUE

WATERBURY DRIGGS AND WILSON
ELEMENTARY SCHOOLS ELEVATOR

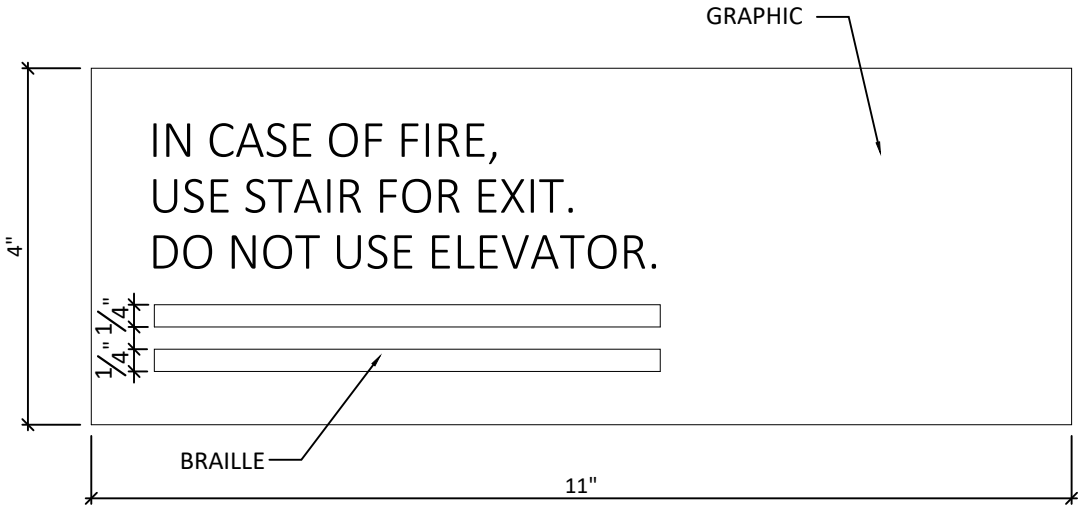
77 WOODLAWN TERRACE
WATERBURY, CT 06710

235 BIRCH STREET
WATERBURY, CT 06704

FRIAR
21 Talcott Notch Road
Farmington, CT 06032

SHEET NO.

101423-4



TYPE - 5

BASIS OF DESIGN - VIVID BUILDING REQUIRED SIGN TYPE N.5 CS11X4-T

DATE: 01/15/2026
REV:

SIGNAGE

LAYOUT

STATE PROJECT NO. 151-0315 LUE
STATE PROJECT NO. 151-0316 LUE

WATERBURY DRIGGS AND WILSON ELEMENTARY SCHOOLS ELEVATOR

77 WOODLAWN TERRACE
WATERBURY, CT 06710

235 BIRCH STREET
WATERBURY, CT 06704

FRIAR
21 Talcott Notch Road
Farmington, CT 06032

SHEET NO.

101423-5

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SECTION 10 14 26
POST AND PANEL SIGNAGE

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.

B. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

D. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.

E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

F. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.

G. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

H. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.02 SUMMARY

A. Section Includes:
   1. Non-illuminated post and panel signs.

1.03 COORDINATION

A. Furnish templates and tolerance information for placement of sign-anchorage devices embedded in permanent construction by other installers.

1.04 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For post and panel/pylon signage.
   1. Include fabrication and installation details and attachments to other work.
   2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
   3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.

C. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.05 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.07 FIELD CONDITIONS

A. Field Measurements: Verify locations of embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.08 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Deterioration of finishes beyond normal weathering.
      b. Deterioration of embedded graphic image.
      c. Separation or delamination of sheet materials and components.
   2. Warranty Period: Five years from date of Substantial Completion. PART 2 PRODUCTS

1.09 PERFORMANCE REQUIREMENTS

A. Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
   1. Temperature Change: 120 degrees Fahrenheit (48.89 degrees Celsius), ambient; 180 degrees Fahrenheit (82.22 degrees Celsius), material surfaces.

B. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs.

1.10 POST AND PANEL/PYLON SIGNS

A. Post and Panel Sign: Sign of single-panel configuration; with smooth, uniform surfaces and support assembly; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
   1. Laminated, Aluminum-Sheet Sign Panels: Aluminum sheet laminated to both sides of acrylic core sheet with painted edges.
      a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.
      b. Surface-Applied Graphics: Applied vinyl film.
   2. Posts: Galvanized Steel Pipe.
      a. Shape: Round.
      b. Size: 2-3/8” OD Pipe (Sch 40).
      c. Installation Method: Direct burial with concrete footing.
      d. Finish and Color: Black
      e. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. (366 g
         1) /sq. m) zinc.
            (a) Polymer coating over metallic coating.
   3. Text and Typeface: typeface as indicated by manufacturer's designation and variable content as scheduled.

1.11 MATERIALS

A. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Aluminum Extrusions: ASTM B221 (((ASTM B221M))), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Copper Sheet: ASTM B 152/B 152M.

D. Steel Materials:
   1. Metallic-Coated Steel Sheet: ASTM A653/A653M, G90 (Z275) coating, either commercial or forming steel.
   2. Bolts for Steel Framing: ASTM A307 or ASTM A 325 (ASTM A 325M) as necessary for design loads and connection details.
   3. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.

E. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated and suitable for exterior applications.

F. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

1.12 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
   1. Use concealed fasteners and anchors unless indicated to be exposed.
   2. For exterior exposure, furnish stainless-steel or hot-dip galvanized devices unless otherwise indicated.
   3. Exposed Metal-Fastener Components, General:
      a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
      b. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant, Allen-head or one-way-head slots unless otherwise indicated.
   4. Inserts: Furnish inserts to be set by other trades into concrete or masonry work.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

C. Anchoring Materials:
   1. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for exterior applications.
   2. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
   3. Water-Resistant Product: At exterior locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

1.13 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
   1. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in locations concealed from view after final assembly.
   2. Mill joints to tight, hairline fit. Form joints exposed to weather to resist water penetration and retention.
   3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
   4. Conceal fasteners and anchors unless indicated to be exposed; locate exposed fasteners where they will be inconspicuous.
   5. Internally brace signs for stability and for securing fasteners.

B. Sign Message Panels: Construct sign-panel surfaces to be smooth and to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.59 mm) measured diagonally from corner to corner.
   1. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.

2. Increase panel thickness or reinforce with concealed stiffeners or backing materials as needed to produce surfaces without distortion, buckles, warp, or other surface deformations.
3. Continuously weld joints and seams unless other methods are indicated; grind, fill, and dress welds to produce smooth, flush, exposed surfaces with welds invisible after final finishing.

C. Post Fabrication: Fabricate posts designed to withstand wind pressure indicated for Project location and of lengths required for installation method indicated for each sign.
1. Aluminum Posts: 2-3/8” OD Pipe (Sch 40), coated, extruded-aluminum tubing unless otherwise indicated, with brackets or slots to engage sign panels. Include post caps, fillers, spacers, junction boxes, access panels, reinforcement where required for loading conditions, and related accessories required for complete installation.
2. Direct Burial: Fabricate posts 36 inches (914.4 mm) longer than height of sign to permit direct burial and embedment in concrete foundations or concrete-filled postholes.

1.14 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

1.15 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, Class I, 0 inch (0.02 mm) or thicker.

B. Color Anodic Finish: AAMA 611, Class I, 0 inch (0.02 mm) or thicker.

1.16 METALLIC-COATED STEEL FINISHES

A. Surface Preparation: Clean surfaces of oil and other contaminants. Use cleaning methods that do not leave residue. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint, complying with SSPC-Paint 20, to comply with ASTM A780/A780M.

B. Baked-Enamel or Powder-Coat Finish: After cleaning and pretretaing, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils (0 inch (0.05 mm)).

1.17 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, and prepare for coating according to coating manufacturer's written instructions.
1. For Baked-Enamel or Powder-Coat Finish: After cleaning, apply a conversion coating compatible with the organic coating to be applied over it.

B. Factory Prime Finish: After surface preparation and pretreatment, apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer.

C. Baked-Enamel or Powder-Coat Finish: After cleaning and pretretaing, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils (0 inch (0.05 mm)).

PART 3 EXECUTION

2.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs.

C. Verify that anchor inserts are correctly sized and located to accommodate signs.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

2.02 INSTALLATION

A. General: Install signs using installation methods indicated and according to manufacturer's written instructions.
   1. Install signs level, plumb, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Install signs so they do not protrude or obstruct according to accessibility standard.
   3. Before installation, verify that sign components are clean and free of materials or debris that would impair installation.
   4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

2.03 INSTALLING POSTS

A. Vertical Tolerance: Set posts plumb within a tolerance of 1/16 inch (1.59 mm) in 3 feet (91.44 cm).

B. Direct-Burial Method and Concrete Footing:
   1. Excavation: Excavate posthole to dimensions indicated. Reconstruct subgrade that is not firm, undisturbed, or compacted soil, or that is damaged by freezing temperatures, frost, rain, accumulated water, or construction activities by excavating an additional 12 inches (304.8 mm), backfilling with satisfactory soil or well-graded aggregate, and compacting to original subgrade elevation.
   2. Setting in Earth: Set post in position, support to prevent movement.
   3. Setting in Cast-in-Place Concrete: Set post in position, support to prevent movement, and place concrete for concrete foundation as indicated.
   4. Setting in Preformed Hole in Concrete Foundation: Form or core drill holes in concrete foundation not less than 3/4 inch (19.05 mm) larger than outside dimension of post for installing posts in concrete. Set post in position, shim to prevent movement, and fill annular space between post and hole with nonshrink, nonmetallic grout, mixed and placed to comply with manufacturer's written instructions.
      a. Leave anchorage joint exposed with 1/8-inch anchoring material sloped away from post.

2.04 FINISH AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

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SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The contractor, subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary"

1.02 SECTION INCLUDES

A. Corner guards.

1.03 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Corner guards fabricated from rolled metal sections or bent plate.

B. Section 08 71 00 - Door Hardware: Standard protection plates and trim.

C. Section 09 21 16 - Gypsum Board Assemblies: Placement of supports in stud wall construction.

D. Section 09 22 16 - Non-Structural Metal Framing: Placement of supports in stud wall construction.

1.04 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Include construction details, material descriptions, impact strength, fire-test-response characteristics, finishes, physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.

C. Shop Drawings: For each impact-resistant wall protection unit showing locations and extent. Include sections, details, and attachments to other work.

D. Samples for Initial Selection: For each type of impact-resistant wall protection unit indicated.

E. Samples for Verification: For each type of exposed finish required.
   1. Corner Guards: 12 inches long. Include examples of joinery, corners, top caps, and field splices.

F. Qualification Data: For qualified Installer.

G. Material Certificates: For each impact-resistant material, from manufacturer.

H. Material Test Reports: For each impact-resistant material.

I. Warranty: Special warranty included in this Section.

J. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.
   1. Include recommended methods and frequency of maintenance for maintaining optimum condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Corner-Guard Covers: Full-size covers of maximum length equal to 2 percent of each type, color, and texture of units installed, but no fewer than two, full size units.

B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain impact-resistant wall protection units from single source from single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection units and are based on the specific system indicated. Refer to Division 01 Section "Quality Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Preinstallation Conference: Conduct conference at Project site.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store impact-resistant wall protection units in original undamaged packages and containers inside well- ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
2. Store plastic wall protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
   a. Store corner-guard covers in a vertical position.

1.09 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F for not less than 72 hours before beginning installation and for the remainder of the construction period.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures.
   b. Deterioration of plastic and other materials beyond normal use.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Adhesive: As recommended by impact-resistant plastic wall protection manufacturer and with a VOC content of 70g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.02 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less
2. Smoke-Developed Index: 450 or less

2.03 MANUFACTURERS

2.04 PRODUCT TYPES

A. Corner Guards - Surface Mounted:
   1. Basis of Design Product: Subject to compliance with requirements, provide InPro Corporation; Tape-One Corner Guard or a comparable product by one of the following:
      a. Construction Specialties Inc
      b. Korogard Wall Protection Systems; a division of RJF International Corporation
   2. Fabricated as one piece from 0.080 inch rigid vinyl; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.
   3. Width of Wings: 1-1/2 ____ inches (____ mm).
   4. Color: As selected from manufacturer's standard colors.
   5. Height: 60" in Classroom and full height in Corridors

2.05 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Fabricate impact-resistant wall protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.

C. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of work.

B. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
   1. For impact-resistant wall protection units attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

3.02 PREPARATION

A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.03 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Install corner guards at all outside corners of new gypsum board partitions.

C. Position corner guard above wall base.

3.04 CLEANING

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

C. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.

SECTION 14 21 00
ELECTRIC TRACTION ELEVATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electric traction elevator systems.

B. Maintenance contract.

1.02 RELATED REQUIREMENTS

A. Section 09 68 16 - Sheet Carpeting.

B. Section 26 05 33.13 - Conduit for Electrical Systems: Electrical conduit requirements.

C. Section 26 05 83 - Wiring Connections: Wiring connection requirements.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

C. AISC 360 - Specification for Structural Steel Buildings; 2022, with Errata (2025).

D. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).

E. ASME A17.1 - Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters with Automatic Transfer Devices; 2022.

F. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks Includes Inspection Procedures for Electric Traction and Winding Drum Elevators, Hydraulic Elevators, Inclined Elevators, Limited-Use/Limited-Application Elevators, Private Residence Elevators, Escalators, Moving Walks, Dumbwaiters, and Material Lifts; 2023.

G. ASME QEI-1 - Standard for the Qualification of Elevator Inspectors; 2024.

H. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

I. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2025.

J. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

K. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

L. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2024.

M. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

N. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

O. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2025.

P. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).

Q. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.

R. ITS (DIR) - Directory of Listed Products; Current Edition.

S. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

T. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

U. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.

V. PS 1 - Structural Plywood; 2023.

W. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate work with other installers to provide necessary conduits for proper installation of wiring, including but not limited to the following:
      a. Elevator equipment devices remote from elevator hoistway.
      b. Fire alarm panel from controller cabinet.

B. Preinstallation Meeting: Convene meeting at least one week prior to start of this work.
   1. Review schedule of installation, proper procedures and conditions, and coordination with related work.

C. Construction Use of Elevator: Not permitted.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Submit data on following items:
   1. Signal and operating fixtures, operating panels, and indicators.
   2. Car design, dimensions, layout, and components.
   3. Car and hoistway door and frame details.
   4. Electrical characteristics and connection requirements.

C. Shop Drawings: Include appropriate plans, elevations, sections, diagrams, and details on following items:
   1. Elevator Equipment and Machines: Size and location of driving machines, power units, controllers, governors, and other components.
   2. Hoistway Components: Size and location of car machine beams, guide rails, buffers, ropes, and other components.
   3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
   4. Clearances and over-travel of car and counterweight.
   5. Locations in hoistway of traveling cables and connections for car lighting, telephone, and _____.
   6. Location and sizes of hoistway and car doors and frames.
   7. Calculated heat dissipation of elevator equipment.
   8. Applicable seismic design data; certified by a licensed Professional Structural Engineer.
   9. Interface with building security system.
   10. Electrical characteristics and connection requirements.
   11. Indicate arrangement of elevator equipment and allow for clear passage of equipment through access openings.

D. Samples: Submit samples illustrating car interior finishes, car and hoistway door and frame finishes, and handrail material and finish in the form of cut sheets, finish color selection brochures, or _____.

E. Designer's qualification statement.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

I. Testing agency's qualification statement.

J. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

K. Initial maintenance contract.

L. Maintenance Contract: Submit proposal to Owner for standard one year continuing maintenance contract agreement in accordance with ASME A17.1 and requirements as indicated, starting on date initial maintenance contract is scheduled to expire.
   1. Indicate in proposal the services, obligations, conditions, and terms for agreement period and for renewal options.

M. Operation and Maintenance Data:
   1. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
   2. Operation and maintenance manual.
   3. Schematic drawings of equipment and wiring diagrams of installed electrical equipment with list of corresponding symbols to identify markings on machine room and hoistway apparatus.

N. Specimen warranty.

O. Executed warranty.

1.06 QUALITY ASSURANCE

A. Maintain one copy of each quality standard document on site.

B. Designer Qualifications: Design guide rails under direct supervision of a licensed Professional Structural Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.

D. Installer Qualifications: Supervisor along with trained elevator installation personnel on staff of elevator equipment manufacturer.

E. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

F. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of type specified in this section.

G. Products Requiring Fire Resistance Rating: Listed and classified by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.

H. Products Requiring Electrical Connection: Listed and classified by UL (DIR) or testing agency acceptable to authorities having jurisdiction as suitable for the purpose indicated in construction documents.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 1-year manufacturer warranty for elevator operating equipment and devices. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Electric Traction Elevators: **Basis of Design**: TK Elevator; MRL Evolution 200: www.tkelevator.com/#sle.
   1. Otis Elevator Company; Gen3 Core: www.otis.com/#sle.
   2. Schindler Elevator Corporation; Schindler 3100: www.us.schindler.com/#sle.
   3. KONE; KONE MonoSpace 300 DX

B. Substitutions: See Section 01 60 00 - Product Requirements.

C. Source Limitations: Provide elevator and associated equipment and components produced by the same manufacturer as the other elevator equipment used for this project and obtained from a single supplier.

2.02 ELECTRIC TRACTION ELEVATORS

A. Electric Traction Passenger Elevator, Single:
   1. Electric Traction Elevator Equipment:
      a. Gearless Traction Machine: Single wrapped traction driving sheave, with dual brake.
   2. Drive System:
      a. Synchronous alternating current (AC) motors and variable voltage variable frequency (VVVF) drive.
   3. Operation Control Type:
      a. Selective Collective Automatic Operation Control.
   4. Service Control Type:
      a. Standard service control only.
   5. Interior Car Height: 93 inch (2362 mm).
   6. Electrical Power: 480 volts; alternating current (AC); three phase; 60 Hz.
   7. Rated Net Capacity: 2500 pounds (1135 kgs).
   8. Rated Speed: 200 feet per minute (1.0 m per second).
   9. Hoistway Size: As indicated on drawings.
   10. Interior Car Platform Size: As indicated on drawings
   11. Elevator Pit Depth: 60 inch (1524 mm).
   12. Overhead Clearance at Top Floor: 151 inch (3835 mm).
   13. Travel Distance: As indicated on drawings.
   14. Number of Stops: As indicated on drawings.
   15. Number of Openings: 1 Front; 1 Rear.
   16. Traction Machine Location: Top of hoistway shaft.

2.03 COMPONENTS

A. Elevator Equipment:
   1. Motors, Controllers, Controls, Buttons, Wiring, Devices, and Indicators: Comply with NFPA 70 requirements.
   2. Guide Rails, Cables, Counterweights, Sheaves, Buffers, Attachment Brackets, and Anchors: Design criteria for components includes safety factors in accordance with applicable requirements of Elevator Code, ASME A17.1.
   3. Buffers:
      a. Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Predefined buffer stands for 4' and 5' pit depths.
   4. Lubrication Equipment:
      a. Provide grease fittings for periodic lubrication of bearings.
      b. Grease Cups: Automatic feed type.
      c. Lubrication Points: Visible and easily accessible.

B. Electrical Equipment:
   1. Motors: PMAC.
   2. Boxes, Conduit, Wiring, and Devices: Comply with NFPA 70 requirements.
      a. See Sections 26 05 33.13 and 26 05 83 for additional information.
   3. Spare Conductors: Provide ten percent in extra conductors and two pairs of shielded audio cables in traveling cables.
   4. Include wiring and connections to elevator devices remote from hoistway. See Section 26 05 83.

2.04 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).

B. Accessibility Requirements: Comply with ADA Standards.

C. Perform structural steel design, fabrication, and installation in accordance with AISC 360.

D. Perform welding of steel in accordance with AWS D1.1/D1.1M.

E. Fabricate and install door and frame assemblies in accordance with NFPA 80 and complying with requirements of authorities having jurisdiction (AHJ).

F. Perform electrical work in accordance with NFPA 70.

G. Comply with venting or pressurization of hoistway design in accordance with HVAC system requirements and authorities having jurisdiction (AHJ).

H. Suspension means to provide not less than FT-1 fire rated PU material when tested to the vertical burn test meeting UL 62 and UL 1581.

2.05 OPERATION CONTROLS

A. Elevator Controls: Provide landing operating panels and landing indicator panels.
   1. Landing Operating Panels: Metallic type, one for originating "Up" and one for originating "Down" calls, one button only at terminating landings; with illuminating indicators.
   2. Landing Indicator Panels: Illuminating.
   3. Comply with ADA Standards for elevator controls.

B. Interconnect elevator control system with building security, fire alarm, card access, smoke alarm, and building management control systems.

C. Door Operation Controls:
   1. Program door control to open doors automatically when car arrives at floor landing.
   2. Render "Door Close" button inoperative when car is standing at dispatch landing with doors open.
   3. Door Safety Devices: Moveable, retractable safety edges, quiet in operation; equipped with photo-electric light rays.

2.06 OPERATION CONTROL TYPE

A. Single Automatic (Push Button) Operation Control: Applies to car in single elevator shaft.
   1. Refer to description provided in ASME A17.1.
   2. Set system operation so that momentary pressure of landing button dispatches car from other landing to that landing.
   3. Allow call registered by momentary pressure of landing button at any time to remain registered until car stops in response to that landing call.
   4. If elevator car door is not opened within predetermined period of time after car has stopped at terminal landing, allow car to respond to call registered from other landing.

2.07 EMERGENCY POWER

A. Elevator Emergency Power Supply: Supplied by battery backup; provide elevator system components as required for emergency power characteristics.

B. Emergency Lighting: Comply with ASME A17.1 elevator lighting requirements.

C. Provide operational control circuitry for adapting the change from normal to emergency power.

D. Upon transfer to emergency power, advance one elevator at a time to a preselected landing, stop car, open doors, disable operating circuits, and hold in standby condition.

2.08 MATERIALS

A. Rolled Steel Sections, Shapes, Rods: ASTM A36/A36M.

B. Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel), with matte finish.

C. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

D. Stainless Steel Sheet: ASTM A666/A666M, Type 304; No. 4 Brushed finish unless otherwise indicated.

E. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.

F. Extruded Aluminum: ASTM B221 (ASTM B221M), natural anodized finish unless otherwise indicated.

G. Plywood: PS 1, Structural I, Grade C-D or better, sanded.

H. Tempered Glass: 3/8 inch (9.5 mm) minimum thickness, fully tempered in compliance with ASME A17.1, 16 CFR 1201, ANSI Z97.1, and ASTM C1048 tempered glass requirements.

I. Carpet Flooring: See Section 09 68 16.

J. Plastic Laminate: NEMA LD 3, Type HGS, color as selected by Architect from manufacturer's standard line of colors.

2.09 CAR AND HOISTWAY ENTRANCES

A. Elevator, _____:
   1. Car and Hoistway Entrances:
      a. Framed Opening Finish and Material: Brushed stainless steel.
      b. Car Door Material: Stainless steel, with rigid sandwich panel construction.
      c. Hoistway Door Material: Stainless steel, with rigid sandwich panel construction.
      d. Door Type: Single leaf.
      e. Door Operation: Side opening, two speed.
      f. Door Width: 42 inch (1.067 m).
      g. Door Height: 84 inch (2.134 m).
      h. Sills: Extruded aluminum.

B. Sills/Thresholds: Configure to align with frame return and coordinate with floor finish.

C. Gasketing: Provide acoustic-type gasketing at hoistway doors and frames to eliminate audible noise due to car activities in the hoistway and air pressure differential between hoistway and landing floors.

2.10 CAR EQUIPMENT AND MATERIALS

A. Elevator Car, Typical:
   1. Car Operating Panel: Provide main and auxiliary; flush-mounted applied face plate, with illuminated call buttons corresponding to floors served with "Door Open/Door Close" buttons, "Door Open" button, "Door Close" button, and alarm button.
      a. Panel Material: Stainless steel; one per car.
      b. Car Floor Position Indicator: Above door with illuminating position indicators.

c. Locate alarm button where it is unlikely to be accidentally actuated; not more than 54 inch (1372 mm) above car finished floor.

2. Ventilation: Single-speed fan with grille in ceiling.
3. Flooring: Carpeting.
4. Front Return Panel: Match material of car door.
5. Door Wall: Plastic laminate on plywood.
6. Hand Rail: Stainless steel, at three side walls. Provide open clearance space 1-1/2 inch (38 mm) wide to face of wall.
   a. Round, Metal Tube: 1-1/2 inch (38 mm) diameter.
   b. Stainless Steel Finish: No. 4 Brushed.
7. Ceiling:
   a. Canopy Ceiling: Plastic laminate on plywood.
   b. Panel Finish: Finish as selected from manufacturers standard line.
   c. Lighting: As selected from manufacturer's standard line.

B. Car Accessories:
1. Certificate Frame: Stainless steel frame glazed with clear tempered glass, and attached with tamper-proof screws.
2. Protective Pads: Canvas cover, padded with impact-resistant fill material, sewn with piping edges; fire resistant in compliance with ASME A17.1; brass grommets for supports, covering side and rear walls and front return, with cut-out for control panel; provide one set for each elevator.
   a. Color: Grey.
   b. Provide at least 4 inch (102 mm) clearance from bottom of pad to finished floor.
   c. Pad Supports: Stainless steel studs, and mounted from ceiling frame.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting this work.

B. Verify that hoistway and pit are ready for work of this section.

C. Verify hoistway shaft and openings are of correct size and within tolerance.

D. Verify location and size of machine foundation and position of machine foundation bolts.

E. Verify that electrical power is available and of correct characteristics.

3.02 INSTALLATION

A. Coordinate this work with installation of hoistway wall construction.

B. Install system components, and connect equipment to building utilities.

C. Provide conduit, electrical boxes, wiring, and accessories; see Sections 26 05 33.13 and 26 05 83.

D. Mount machines and motors on vibration and acoustic isolators.
1. Place on structural supports and bearing plates.
2. Securely fasten to building supports.
3. Prevent lateral displacement.

E. Install hoistway, elevator equipment, and components in accordance with approved shop drawings.

F. Install guide rails to allow for expansion and contraction movement of guide rails.

G. Accurately machine and align guide rails, forming smooth joints with machined splice plates.

H. Install hoistway door sills, frames, and headers in hoistway walls; grout sills in place, set hoistway floor entrances in alignment with car openings, and align plumb with hoistway.

I. Structural Metal Surfaces: Clean surfaces of rust, oil, or grease; wipe clean with solvent; prime with two coats.

J. Adjust equipment for smooth and quiet operation.

3.03 TOLERANCES

A. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1 and ASME A17.2.

B. Car Movement on Aligned Guide Rails: Smooth movement, without any objectionable lateral or oscillating movement or vibration.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Testing and inspection performed at discretion of regulatory agencies certified in accordance with ASME QEI 1.
   1. Schedule tests with agencies and notify Owner and Architect.
   2. Obtain permits as required to perform tests.
   3. Document regulatory agency tests and inspections in accordance with requirements.
   4. Perform tests required by regulatory agencies.
   5. Furnish test and approval certificates issued by authorities having jurisdiction (AHJ).

3.05 ADJUSTING

A. Adjust for smooth acceleration and deceleration of car to minimize passenger discomfort.

B. Adjust with automatic floor leveling feature at each floor landing to reach 1/4 inch (6.4 mm) maximum from flush with sill.

3.06 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Remove protective coverings from finished surfaces.

C. Clean surfaces and components in accordance with manufacturers written instructions.

3.07 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of equipment to Owner's designated representative.

B. Demonstration: Demonstrate operation of system to Owner's personnel.
   1. Use operation and maintenance data as reference during demonstration.
   2. Briefly describe function, operation, cleaning, and maintenance of each component.

C. Training: Train Owner's personnel on cleaning and operation and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training.
   3. Location: At project site, unless otherwise indicated.

3.08 PROTECTION

A. Do not permit construction traffic within car after cleaning.

B. Protect installed products until Date of Substantial Completion.

C. Touch up, repair, or replace damaged products and materials before Date of Substantial Completion.

3.09 MAINTENANCE

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements relating to initial maintenance service.

B. Provide Initial Maintenance Contract of elevator system and components in accordance with ASME A17.1 and requirements as indicated for twelve months from Date of Substantial Completion.

C. Submit proposal for continuation of Maintenance Contract in accordance with ASME A17.1 and requirements as indicated for installed elevator equipment.

D. Perform maintenance contract services using competent and qualified personnel under the supervision and direct employ of the elevator manufacturer or installer.

E. Maintenance contract services shall not be assigned or transferred to any agent or other entity without prior written consent of Owner.

F. Examine system components bi-monthly.

G. Include systematic examination, adjustment, and lubrication of elevator equipment.

H. Perform work without removing cars from use during peak traffic periods.

I. Provide emergency call back service during regular working hours throughout period of this maintenance contract.

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SECTION 21 04 00
GENERAL CONDITIONS FOR FIRE SUPPRESSION TRADES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. This section applies to certain sections of Division 26, "Electrical," and this section applies to all sections of Division 21, "Fire Protection" of this project specification unless specified otherwise in the individual sections.

C. The Drawings of other trades (Architectural, Food Service, Structural, Landscape, Civil, Mechanical, Plumbing, Electrical, Communications and Fire Alarm) shall be examined for coordination and familiarity of work with other Contractors. Any duplication or omission of provisions in this project should be brought to the attention of the Owners prior to Bidding.

1.02 DESCRIPTION

A. The General Conditions and Supplementary General Conditions are a part of this Division and are to be considered a part of this Contract.

B. Where items of the General Conditions and Supplementary General Conditions are repeated in other Sections of the Specifications, it is merely intended to qualify or to call particular attention to them. It is not intended that any other parts of the General Conditions and Supplementary General Conditions shall be assumed to be omitted if not repeated therein. This Section applies equally and specifically to all Contractors supplying labor and/or equipment and/or materials as required under each Section of this Division. Where conflicts exist between the drawings and the specifications or between this section of the specifications and other sections, the more stringent or higher cost option shall apply.

1.03 INTENT

A. It is the intent of the Specifications and Drawings to call for finished work, tested and ready for operation.

B. Any apparatus, appliance, material or work not shown on drawings but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation as determined by good trade practice even if not particularly specified, shall be furnished, delivered and installed under their respective Divisions without any additional expense to the Owner.

C. Minor details not usually shown or specified but necessary for proper installation and operation shall be included in the work as though they were hereinafter shown or specified.

D. Work under each Section shall include giving written notice to the Owner and Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that work under each Section includes the cost of all required items for the accepted, satisfactory functioning of the entire system without extra compensation.

1.04 DEFINITIONS

A. “Approved equal” also known as “alternative” mean any product which in the opinion of the Engineer is equal in quality, arrangement, appearance, and performance, to the product specified.

B. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Engineer," "requested by the Engineer," and similar phrases.

C. “Finished” refers to all rooms and areas to be specified to receive architectural treatment as indicated on the drawings. All rooms and areas not covered, including underground tunnels and areas above ceilings shall be considered not finished, unless otherwise noted.

D. “Furnish” or “supply” shall mean purchase, deliver to, and off-load at the job site, ready to be installed including where appropriate all necessary interim storage and protection.

E. No Exceptions Taken – reviewed and determined to be in general conformance with contract documents.

F. Indicated: The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

G. “Install” shall mean set in place complete with all mounting facilities and connections as necessary ready for normal use or service.

H. "Lead Free" shall mean not more than .25% in the wetted surface area.

I. “Product” shall mean any item of equipment, material, fixture, apparatus, appliance or accessory installed under this Division.

J. “Provide” shall mean furnish (or supply) and install as necessary.

K. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

L. Remove: The term “remove” means “to disconnect from its present position, remove from the premises and to dispose of in a legal manner.”

M. Special Warranties: The term “Special Warranties” are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

N. Standard Product Warranties: The term “Standard Product Warranties” are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

O. “Subcontractor” means specifically the subcontractor working under this Division. Other Contractors are specifically designated “Fire Protection Subcontractor”, “General Contractor” and so on. Note: Take care to ascertain limits of responsibility for connecting equipment which requires connections by two or more trades.

P. Substitutions: Requests for changes in products, materials, equipment, and methods of construction proposed by the Contractor are considered requests for "substitutions."

Q. “Wiring” shall mean cable assembly, raceway, conductors, fittings and any other necessary accessories to make a complete wiring system.

1.05 DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. Consult the Architectural Drawings and Details for exact location of fixtures and equipment; where same are not definitely located, obtain this information from the Architect. (Do not scale the drawings)

B. Work under each Section shall closely follow Drawings in layout of work; check Drawings of other Divisions to verify spaces in which work will be installed. Maintain maximum headroom; where space conditions appear inadequate, Owner and Engineer shall be notified before proceeding with installations.

C. The Owner may, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades and/or for proper execution of the work.

D. Where variances occur between the Drawings and Specifications or within either of the Documents, the item or arrangement of better quality shall be included in the Contract price. The Owner and Engineer shall decide on the item and the manner in which the work shall be installed.

1.06 SURVEYS AND MEASUREMENTS

A. Before submitting his Bid, the Contractors shall visit the site and become thoroughly familiar with all existing conditions under which work will be installed. This Contract includes all modifications of existing systems required for the installation of new equipment. This Contract includes all necessary offsets, transitions and modifications required to install all new equipment in existing spaces. All new and existing equipment and systems shall be fully operational under this Contract before the job is considered complete. The Contractors shall be held responsible for any assumptions he makes, any omissions or errors he makes as a result of his failure to become fully familiar with the existing conditions at the site and the Contract Documents.

B. The Contractor shall base all measurements, both horizontal and vertical, from established benchmarks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.

C. Should the Contractor discover any discrepancies between actual measurements and those indicated which prevent following good practice or which interfere with the intent of the Drawings and Specifications, the Engineer will be notified, and work will not proceed until instructions from the Engineer are received.

1.07 CODES AND STANDARDS

A. Reference Standard Compliance

1. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories Inc. (UL), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.
2. Independent Testing Organization Certificate: In lieu of the label or listing indicated above, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

B. The Following Codes and Standards listed below apply to all Fire Protection work. Wherever Codes and/or Standards are mentioned in these Specifications, the latest applicable edition or revision shall be followed:

Building Code Including all Supplements

Fire Safety Code Including all Supplements.

Construction Standards and Guidelines

Building Standards Guidelines – Compliance for High Performance Buildings

The International Building Code

The International Mechanical Code

The International Fire Protection Code

The International Energy Conservation Code

NFPA 13, Standard for Installation of Sprinkler Systems

NFPA 70, the National Electrical Code

NFPA 101, the Life Safety Code

ASHRAE 90.1 and International Energy Conservation Code

C. The following Standards shall be used where referenced by the following abbreviations:

AIA	American Institute of Architects
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
CISPI	Cast Iron Soil Pipe Institute
EJMA	Expansion Joint Manufacturing Association
EPA	Environmental Protection Agency
FM	Factory Mutual
FSSC	Federal Specification
HIS	Hydraulic Institute Standards
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
ISO	Insurance Services Office
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSC	National Safety Council
OSHA	Occupational Safety and Health Administration
UL	Underwriters' Laboratories

D. All materials furnished and all work installed shall comply with the rules and recommendations of the NFPA, the requirements of the local utility companies, the recommendations of the fire insurance rating organization having jurisdiction and the requirements of all Governmental departments having jurisdiction.

E. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus and Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether shown on Drawings and/or specified or not.

1.08 PERMITS AND FEES

A. The Contractor shall give all necessary notices, obtain all permits; and pay all Government and State sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with the work, file all necessary Drawings, prepare all documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction, obtain all required certificates of inspection for his work, and deliver a copy to the Owner and Engineer before request for acceptance and final payment for the work.

1.09 EQUIPMENT SUBSTITUTIONS

A. Certain manufacturers of material, apparatus or appliances are indicated in the drawings and specifications for this project. These items have been used as the basis of design, and as a convenience in fixing the minimum standard of workmanship, finish and design that is required. If the Contractors uses an “approved equal” alternative to the basis of design, and if the features of that alternative have an impact on other components of the Project, the Contractor shall include the necessary adjustments in those components, whether for architectural, structural, mechanical, electrical, fire protection, or any other elements, plus any adjustments for difference in performance.

B. Where one name only is used and is followed by the words “or approved equal”, the Contractor must use the item named or he is required to apply for a substitution. Where one name only is used, the Contractor must use that item named.

C. Where no specific make of material, apparatus or appliance is mentioned, any first-class product made by a reputable manufacturer may be submitted for Architect and Engineer review.

D. Where the Contractor proposes to use an item that is different from the basis of design in the Drawings and specifications, and that will require the redesign of the structure, partitions, foundations, piping, wiring or any other component of the mechanical, plumbing, electrical, or architectural layout, the Contractor shall provide the necessary redesign of those components.

E. Where the Contractor proposes to deviate (provide an equivalent or request for substitution) from the basis of design scheduled equipment or materials as hereinafter specified or shown on the drawings, they are required to submit a requested for substitution in writing. The Contractor shall state in their request whether it is a substitution, equivalent or a non-approved equivalent to that specified and the amount of credit or extra cost involved. A copy of said request shall be included in the Base Bid with manufacturer’s equipment cuts. The Base Bid shall be based on using the materials and equipment as specified with no exceptions.

F. If an alternative or substitute item results in a difference in quantity and arrangement of piping, ductwork, valves, pumps, insulation, wiring, conduit, and equipment from that specified or indicated on the Drawings, the Contractor shall furnish and install any such additional equipment required by the system, at no additional cost to the Owner including any costs added to other trades due to the equivalent change from the basis of design detailed in the drawings or included within the specifications.

G. Equipment, material or devices submitted for review as an “equivalent” shall meet the following requirements:
   1. The equivalent shall have the same construction features such as, but not limited to:
      a. Material thickness, gauge, weight, density, etc.
      b. Welded, riveted, bolted, etc., construction.
      c. Finish, undercoating, corrosion protection.

2. The equivalent shall perform with the same or better operating efficiency.
3. The equivalent shall be locally represented by the manufacturer for service, parts and technical information.
4. The equivalent shall bear the same labels of performance certification as is applicable to the specified item, such as UL or NEMA labels.

H. Equipment, material or devices submitted for review as a “substitution” shall meet the following requirements:

I. Substitution Request Submittal: Requests for substitution will be considered if received in writing 14 days before the bid date. Requests received later than 14 days before the bid date may be considered or rejected at the discretion of the Engineer/Owner. Once the Contractor submits a complete request for substitution as determined by the engineer, the engineer reserves the right to request the time necessary to evaluate the request for substitution and review it with the Owner.
1. Submit three (3) copies of each request for substitution for consideration.

J. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
1. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
2. Samples, where applicable or requested.
3. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
4. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
5. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
6. Cost information, including a proposal of the net change, if any in the Contract Sum.
7. Certification by the Contractor that the substitution proposed is equal to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
8. Engineer's Action: Within one week of receipt of the request for substitution, the Engineer will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance of a product substitution will be in the form of an Addendum.
9. Other Conditions: The Contractor's substitution request will be received and considered by the Engineer when one or more of the following conditions are satisfied, as determined by the Engineer; otherwise, requests will be returned without action except to record noncompliance with these requirements.
    a. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
    b. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be

provided as a result of failure to pursue the Work promptly or coordinate activities properly.

c. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

1.10 SUBMITTAL PROCEDURES

A. Provide Submittals in accordance with the requirements of Division 01 and as indicated in the following.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
   1. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Engineer will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
   2. If an intermediate submittal is necessary, process the same as the initial submittal.
   3. Allow two weeks for reprocessing each submittal.
   4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

D. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block. Submittals shall be arranged in order of specification sections.
   1. Include the following information on the label for processing and recording action taken.
      a. Project name.
      b. Date.
      c. Name and address of Engineer.
      d. Name and address of Contractor.
      e. Name and address of subcontractor.
      f. Name and address of supplier.
      g. Name of manufacturer.
      h. Number, title and paragraph of appropriate Specification Section.
      i. Drawing number and detail references, as appropriate.

E. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer using a transmittal form. Submittals received from sources other than the Contractor will be returned without action. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and

limitations. Include Contractor's certification that information complies with Contract Document requirements.

F. Except for submittals for record, information or similar purposes, the Engineer will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility.

G. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, to indicate the action taken.

1.11 SHOP DRAWINGS

A. Submit neatly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. The Contractor shall submit for review detailed shop drawings of all equipment and material specified in each section and coordinated sprinkler layouts. No material or equipment may be delivered to the job site or installed until the Contractor has received shop drawings for the particular material or equipment which have been properly reviewed. Shop drawings shall be submitted within 60 days after award of Contract before any material or equipment is purchased. The Contractor shall submit for review copies of all shop drawings to be incorporated in the Fire Protection Contract. Refer to Division 01 for the quantity of copies required for submission. Where quantities are not specified, provide seven (7) copies for review.

C. Provide shop drawings for all devices specified under equipment specifications for all systems. Shop drawings shall include manufacturers' names, catalog numbers, cuts, diagrams, dimensions, identification of products and materials included, compliance with specified standards, notation of coordination requirements, notation of dimensions established by field measurement and other such descriptive data as may be required to identify and accept the equipment. A complete list in each category (example: all fixtures), of all shop drawings, performance cuts, material lists, etc., shall be submitted to the Engineer at one time. No consideration will be given to a partial shop drawing submittal.

D. When a submittal could involve more than one trade, e.g., valves, piping, etc., the submitted shall be separated by traded involved, ie. HVAC, plumbing, electrical, etc.

E. Where multiple quantities or types of equipment are being submitted, provide a cover sheet (with a list of contents) on the submittal identifying the equipment or material being submitted.

F. The Contractor shall furnish all necessary templates, patterns, etc., for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as required.

G. "No Exception Taken" rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are reviewed, review does not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Drawings and Specifications. Verify available space prior to submitting shop drawings. Review of shop drawings shall not apply to quantity of material.

H. After shop drawings have been reviewed, with no exceptions taken, no further changes will be allowed without the written consent of the Engineer.

I. Shop drawing submittal sheets which may show items that are not being furnished shall have those items crossed off to clearly indicate which items will be furnished.

J. Bidders shall not rely on any verbal clarification of the Drawings and/or Specifications. Any questions shall be referred to the Engineer in writing at least five (5) working days prior to Bidding to allow for issuance of an Addendum.

K. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.12 COORDINATION DRAWINGS

A. Prepare coordination drawings drawn in the latest [AutoCAD] [Revit] version in accordance with Division 01 to a minimum scale of 1/4"=1'-0" detailing major elements, components, and systems of fire protection equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. The Contractor shall indicate the proposed locations of piping, conduit, ductwork, equipment, and materials. Include the following:
   a. Clearances for servicing and maintaining equipment and space for equipment disassembly required for periodic maintenance.
   b. Equipment connections and support details.
   c. Exterior wall and foundation penetrations.
   d. Fire-rated wall and floor penetrations.
   e. Sizes and locations of required concrete pads and bases.

B. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.

C. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

D. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

E. The Contractor and each subcontractor shall sign and date each coordination drawing prior to submission.

F. Work shall not be performed until coordination drawings have been approved by the architect and engineer.

G. Electronic copies of the MEP floor plans are available to use as a basis for preparing coordination drawings and can be provided by the Engineer. The cost for these floor plans is a lump sum fee of $ 1,000.00. If the Contractor elects to obtain the Engineers electronic files an Electronic Drawing File Release Form must be submitted with payment. This form must be signed by the Contractor, Owner, and Architect. Upon receipt of a signed copy of the Electronic Drawing File Release Form, and payment, the Engineer will provide copies of the electronic files for the Contractor’s use. A copy of the Electronic Drawing File Release Form is appended to the end of this specification section.

1.13 COORDINATION WITH OTHER DIVISIONS

A. All work shall be carried out in conjunction with other trades and full cooperation shall be given in order that all work may proceed with a minimum of delay and interference. Particular emphasis is placed on timely installation of major apparatus and furnishing other Contractors, especially the Contractor or Construction Manager, with information as to openings, chases, sleeves, bases, inserts, equipment locations, panels, etc., required by other trades.

B. The Contractors are required to examine all of the Project Drawings and mutually arrange work so as to avoid interference with the work of other trades. In general, ductwork, HVAC piping, sprinkler piping and drainage lines take precedence over water, gas and electrical conduits.

The Engineer shall make final decisions regarding the arrangement of work which cannot be agreed upon by the Contractors.

C. Where the work of the Contractor will be installed in close proximity to or will interfere with work of other trades, the Contractors will cooperate in working out space conditions to make a satisfactory adjustment.

D. If the work under a Section is installed before coordinating with other Divisions or Sections or so as to cause interference with work of other Sections, the necessary changes to correct the condition shall be made by the Contractor causing the interference without extra charge to the Owner.

1.14 WORKMANSHIP

A. Service Support: The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

B. Modification of References: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears.

C. The Contractor shall furnish the services of an experienced superintendent who shall be constantly in charge of the installation of the work together with all skilled workmen, fitters, metal workers, welders, helpers and laborers required to unload, transfer, erect, connect, adjust, start, operate and test each system.

D. Unless otherwise specifically indicated on the Drawings or Specifications, all equipment and materials shall be installed with the acceptance of the Engineer and in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

E. All labor for installation of Fire Protection systems shall be performed by experienced, skilled tradesmen under the supervision of a licensed journeyman foreman. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, workmanlike manner. The Engineer reserves the right to reject any work which, in his opinion, has been installed in a substandard, dangerous or unserviceable manner. The Contractor shall replace said work in a satisfactory manner at no extra cost to the Owner.

1.15 SHUTDOWNS

A. When installation of a new system requires the temporary shutdown of an existing operating system, the connection of the new system shall be performed at such time as designated by the Owner.

B. The Engineer and the Owner shall be notified in writing of the estimated duration of the shutdown period at least ten (10) days in advance of the date the work is to be performed.

C. Work shall be arranged for continuous performance whenever possible. The Contractor shall provide all necessary labor, including overtime if required, to assure that existing operating services will be shut down only during the time actually required to make necessary connections.

1.16 TEMPORARY UTILITIES

A. General: Provide new materials and equipment; if acceptable to the Engineer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not

overload facilities or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

C. First Aid Supplies: Comply with governing regulations.

D. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

E. Utilities: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer and will not be accepted as a basis of claims for a Change Order.

F. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

G. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

H. Termination and Removal: Unless the Engineer requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

1.17 PROJECT PHASING

A. Work under each Section shall include all necessary temporary connections, equipment, piping, heating, temperature control work, fire stopping, water heaters, labor, and material as necessary to accommodate the phasing of Construction as developed by the General Contractor or Construction Manager and approved by the Owner. All existing systems that pass-thru an area of the building shall remain operational during all phases of construction. No extra compensation shall be granted the Contractor for work required to maintain existing systems operational or to accommodate the construction phasing of the project.

1.18 PROTECTION OF MATERIALS AND EQUIPMENT

A. Work under each Section shall include protecting the work and material of all other Sections from damage by work or workmen and shall include making good all damage thus caused.

B. The Contractor shall be responsible for work and equipment until the facility has been accepted by the Owner. Protect work against theft, injury or damage and carefully store material and equipment received on site which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.

C. Work under each Section includes receiving, unloading, uncrating, storing, protecting, setting in place and completely connecting equipment supplied under each Section. Work under each Section shall also include exercising special care in handling and protecting equipment and

fixtures and shall include the cost of replacing any of the equipment and fixtures which are missing or damaged.

D. Equipment and material stored on the job site shall be protected from the weather, vehicles, dirt and/or damage by workmen or machinery. Ensure that all electrical or absorbent equipment or material is protected from moisture during storage.

1.19 ADJUSTING AND TESTING

A. After all the equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests so as to assure the Engineer that they are in proper adjustment and in satisfactory, permanent operating condition.

B. Where requested by the Engineer, a factory-trained service representative shall inspect the installation and assist in the initial startup and adjustment to the equipment. The period of these services shall be for such time as necessary to secure proper installation and adjustments. After the equipment is placed in permanent operation, the service representative shall supervise the initial operation of the equipment and instruct personnel responsible for operation and maintenance of the equipment. The service representative shall notify the Contractor in writing that the equipment was installed according to manufacturer's recommendations and is operating as intended by the manufacturer.

1.20 CLEANING

A. The Contractor shall thoroughly clean and flush all piping and equipment of all foreign substances, oils, burrs, solder, flux, etc., inside and out before being placed in operation.

B. If any part of a system should be stopped or damaged by any foreign matter after being placed in operation, the system shall be disconnected, cleaned and reconnected wherever necessary to locate and/or remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.

C. During the course of construction, all pipes shall be capped in an acceptable manner to ensure adequate protection against the entrance of foreign matter.

D. Upon completion of all work under the Contract, the Contractor shall remove from the premises all rubbish, debris and excess materials left over from his work. Any oil or grease stains on floor areas caused by the Contractor shall be removed and floor areas left clean.

E. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
   1. Remove labels that are not permanent labels.
   2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
   3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
   4. Wipe surfaces of fire protection equipment. Remove excess lubrication and other substances.

F. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove and dispose of ALL waste materials, packaging material, skids etc. from the site and dispose of in a lawful manner in accordance with municipal, state and federal regulations.

G. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

1.21 OPERATING AND MAINTENANCE

A. Upon completion of all work and tests, the Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period specified under each applicable Section of this Division. During this period, he shall fully instruct the Owner or the Owner's representative in the operation, adjustment and maintenance of all equipment furnished. The Contractor shall give at least seven (7) days notice to the Owner and the Engineer in advance of this period.

B. The Contractor shall include the maintenance schedule for the principal items of equipment furnished under this Division.

C. The Contractor shall physically demonstrate procedures for all routine maintenance of all equipment furnished under each respective Section to assure accessibility to all devices.

D. An authorized manufacturer's representative shall attest in writing that the equipment has been properly installed prior to startup of any major equipment. The following equipment will require this inspection: pumps; controls, water heaters, compressors, boilers etc. These letters shall be bound into the operating and maintenance books.

E. Refer to individual trade Sections for any other particular requirements related to operating instructions.

F. Demonstration shall be recorded on (2) USB Flash drives and be turned over to the Owner.

1.22 OPERATING AND MAINTENANCE MANUALS

A. Prepare operating and maintenance manuals in accordance with the requirements of Division 01 and as follows. The Contractor shall prepare six (6) copies of a complete maintenance and operating instructions manual, bound in booklet form. Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 3-ring vinyl-covered binders, with pocket folders for folded sheet information and designation partitions with identification tabs. Mark appropriate identification on front and spine of each binder.

B. Manual shall include the following:
   1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
   2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
   3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   4. Servicing and operating instructions including lubrication charts and schedules.
   5. Emergency and safety instructions.
   6. Spare parts list.
   7. Copies of warranties.
   8. Wiring diagrams.
   9. Recommended "turn around" cycles.
   10. Inspection procedures.
   11. Approved Shop Drawings and Product Data.
   12. Equipment Start-up Reports.

C. Include in the manual, a tabulated equipment schedule for all equipment. Schedule shall include pertinent data such as: make, model number, serial number, voltage, normal operating current, belt size, bearing number, etc. Schedule shall include maintenance to be done and frequency.

D. Maintenance and instruction manuals shall be submitted to the Owner at the same time as the seven (7) day notice is given prior to the instruction period.

1.23 DEMONSTRATION AND TRAINING

A. Training of Owner Personnel:
   1. Contractor shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed.
   2. Training shall be of sufficient length to allow the trained staff to train their peers and to demonstrate the training sessions were effective.
   3. Training as required throughout these specifications shall be videotaped. Hire the services of a Professional Videographer. Videotaping via handheld devices is not acceptable.
   4. Duration of Training: Contractor shall provide training on each piece of equipment according to the following schedule:

System	Minimum Training Hours	Required number of people
DIVISION 21 – FIRE SUPPRESSION		
Section 210533 – Heat Tracing for Fire Suppression Piping	8	2
Section 211313 – Wet Pipe Sprinkler Systems	8	2
Section 211316 – Dry Pipe Sprinkler Systems	8	2
Section 211326 – Deluge Fire Suppression Systems	8	2
Section 211336 – Pre-Action Fire Suppression Systems	8	2
Section 211346 – Clean-Agent Fire Suppression Systems	8	2
Section 213000 – Fire Pumps	8	2

B. Training shall be provided for fundamental preventative maintenance, service, cleaning, and troubleshooting. All training materials (agenda, hand-outs, etc.) shall be submitted to the Owner for review and approval at least two weeks in advance of scheduled training. Training materials shall be digital (x5 copies via thumb drive) and hard copy (x2 copies) format.

1.24 ACCEPTANCES

A. The equipment, materials, workmanship, design and arrangement of all work installed under the Fire Protection Sections shall be subject to the review of the Engineer.

B. Within 30 days after the awarding of a Contract, the Fire Protection Contractor shall submit to the Engineer, for review, a list of manufacturers of equipment proposed for the work under the Fire Protection Sections. The intent to use the exact manufacturers and models specified does not relieve the Contractor of the responsibility of submitting such a list.

C. If extensive or unacceptable delivery time is expected on a particular item of equipment specified, the Contractor shall notify the Owner and Engineer, in writing, within 30 days of

award of the Contract. In such instances, equipment substitutions may be made pending acceptance by the Engineer or the Owner's representative.

D. Where any specific material, process or method of construction or manufactured article is specified by reference to the catalog number of a manufacturer, the Specifications are to be used as a guide and are not intended to take precedence over the basic duty and performance specified or noted on the Drawings. In all cases, the Fire Protection Contractor shall verify the duty specified with the specific characteristics of the equipment offered for review. Equipment characteristics are to be used as mandatory requirements where the Contractor proposes to use an acceptable equivalent.

E. If material or equipment is installed before it is reviewed and/or approved, the Contractor shall be liable for its removal and replacement at no extra charge to the Owner if, in the opinion of the Engineer, the material or equipment does not meet the intent of, or standard of quality implied by, the Drawings and Specifications.

F. Failure on the part of the Engineer to reject shop drawings or to reject work in progress shall not be interpreted as acceptance of work not in conformance with the Drawings and/or Specifications. Work not in conformance with the Drawings and/or Specifications shall be corrected whenever it is discovered.

G. Contractor shall meet all of the testing and acceptance criteria specified in NFPA 13, NFPA 14 and NFPA 20, as applicable, including completing and submitting signed copies of the following documentation:
   1. Contractor's Material and Test Certificate for Underground Piping: All documentation required by NFPA 13, including but not limited to the following.
      a. Verification of flushing of underground piping at flow rate capable of producing a velocity of 10 ft/sec and in accordance with NFPA 13, the authority having jurisdiction, and water company requirements.
      b. Verification of performance of hydrostatic pressure test in accordance with NFPA 13.
      c. Verification of performance of a forward flow test of the backflow preventer in accordance with NFPA 13.
   2. Contractor's Material and Test Certificate for Aboveground Piping: All documentation required by NFPA 13, including but not limited to the following:
      a. Dry pipe operating test, where applicable.
      b. Testing of all alarm valves and flow indicators.
      c. Testing of all pressure reducing valves, where applicable.
      d. Verification of performance of a forward flow test of the backflow preventer in accordance with NFPA 13.
      e. Verification of performance of hydrostatic pressure test in accordance with NFPA 13.
      f. Verification of performance of pneumatic pressure test in accordance with NFPA 13.
   3. Contractor's Material and Test Certificate for Fire Pump Systems
      a. Verification of performance of hydrostatic pressure test in accordance with NFPA 20.
      b. Verification of flushing piping in accordance with NFPA 20.
      c. Verification of completion of all field acceptance tests required by NFPA 20.
   4. Contractor's Material and Test Certificate for Private Fire Service Mains Feeding Fire Pump(s)
      a. Verification of flushing, hydrostatic and leakage tests in accordance with NFPA 20.

1.25 RECORD DRAWINGS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

B. Maintain a clean, undamaged set of blue or black line white prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Items to be indicated include but are not limited to:
   1. Dimensional change
   2. Revision to drawing detail
   3. Location and depth of underground utility
   4. Revision to pipe routing
   5. Revision to electrical circuitry
   6. Actual equipment location
   7. Pipe size and routing
   8. Location of concealed internal utility
   9. Changes made by Change Order
   10. Details not on original Contract Drawing
   11. Information on concealed elements which would be difficult to identify or measure later.

C. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

D. Mark new information that is important to the Owner but was not shown on Contract Drawings or Shop Drawings.

E. Note related Change Order numbers where applicable.

F. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

G. These shall be clearly marked for Record Drawings on a clean set of reproducible paper copies at the completion of the work and turned over to the Owner.

H. Final record documents shall be prepared in the latest [AutoCAD] [Revit] version and CD Rom of all drawings, and a clean set of reproducible paper copies shall be turned over to the Owner at the completion of the work.

1.26 WARRANTIES AND BONDS

A. The following general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties are to be included:
   1. General close-out requirements included in Division 01.
   2. Specific requirements for warranties for the Work and products and installation that are specified to be warranted, are included in the individual Sections of Divisions-02 through -50.
   3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

B. Disclaimers and Limitations: Manufacturer’s disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

C. Separate Prime Contracts: Each prime Contractor is responsible for warranties related to its own Contract.

1.27 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Submit written warranties to the Engineer prior to the date certified for Substantial Completion. If the Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Engineer.

H. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Engineer within fifteen days of completion of that designated portion of the Work.

I. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Engineer for approval prior to final execution.
   1. Refer to individual Sections of Divisions-02 through -50 for specific content requirements, and particular requirements for submittal of special warranties.

J. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

K. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
   1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
   2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.

3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.28 GUARANTEES

A. The Contractor shall guarantee all material and workmanship under these Specifications and the Contract for a period of one (1) year from the date of final acceptance by Owner. During this guarantee period, all defects developing through faulty equipment, materials or workmanship shall be corrected or replaced immediately by this Contractor without expense to the Owner. Such repairs or replacements shall be made to the Engineer's satisfaction.

B. Contractor shall provide name, address, and phone number of all contractors and subcontractors and associated equipment they provided.

1.29 PROJECT CLOSE-OUT

A. Contractor shall submit annual maintenance proposal to the Architect/Engineer for review and approval as part of the close out documents.

B. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents in accordance with Division 01.

C. Deliver tools, spare parts, extra stock, and similar items.

D. Complete start-up testing of systems, including measuring and documenting all required startup checklist requirements documented in installation and maintenance instructions by the equipment manufacturer, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

E. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

F. Field Observation Procedures: On receipt of a request for an Engineers Field Observation, the Engineer will advise the Contractor of unfulfilled requirements. The Engineer will advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
   1. The Engineer will repeat the Field Observation when requested and assured that the Work has been substantially completed.
   2. Results of the completed list of unfulfilled items will form the basis of requirements for final acceptance.

END OF SECTION

Electronic Drawing File Release Form

DELIVERY OF ELECTRONIC FILES FOR: _____
Project Name

In accepting and utilizing any drawings or other data on any form of electronic media generated and provided by the Design Professional, the Contractor covenants and agrees that all such drawings and data are instruments of service of the Design Professional, who shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.

The Contractor further agrees not to use these drawings and data, in whole or in part, for any purpose or project other than the project which is the subject of this Agreement. The Client agrees to waive all claims against the Design Professional resulting in any way from any unauthorized changes or reuse of the drawings and data for any other project by anyone other than the Design Professional.

In addition, the Contractor agrees, to the fullest extent permitted by law, to indemnify and hold the Design Professional harmless from any damage, liability or cost, including reasonable attorneys' fees and costs of defense, arising from any changes made by anyone other than the Design Professional or from any reuse of the drawings and data without the prior written consent of the Design Professional.

Under no circumstances shall transfer of the drawings and other instruments of service on electronic media for use by the Client be deemed a sale by the Design Professional, and the Design Professional makes no warranties, either express or implied, of merchantability and fitness for any particular purpose.

_____ _____
Contractor's Signature Date

_____
Company - Title

_____ _____
Architects' Signature Date

_____
Firm - Title

_____ _____
Owner's Signature Date

_____
Company - Title

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SECTION 21 04 01
GENERAL CONDITIONS FOR FIRE SUPPRESSION SYSTEM DEMOLITION

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. This section applies to certain sections of Division 26, "Electrical," and this section applies to all sections of Division 21, "Fire Suppression" of this project specification unless specified otherwise in the individual sections.

1.02 DESCRIPTION

A. The General Conditions and Supplementary General Conditions are a part of this Division and are to be considered a part of this Contract.

B. Where items of the General Conditions and Supplementary General Conditions are repeated in other Sections of the Specifications, it is merely intended to qualify or to call particular attention to them. It is not intended that any other parts of the General Conditions and Supplementary General Conditions shall be assumed to be omitted if not repeated therein. This Section applies equally and specifically to all Contractors supplying labor and/or equipment and/or materials as required under each Section of this Division. Where conflicts exist between the drawings and the specifications or between this section of the specifications and other sections, the more stringent or higher cost option shall apply.

1.03 INTENT

A. It is the intent of the specifications and drawings to call for complete demolition of fire suppression systems with exception of items specifically marked as existing to remain. Drawings are diagrammatic and do not show all pieces and parts to be demolished. Unless otherwise noted all fire suppression systems in building shall be demolished.

B. Any work not shown on drawings but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation as determined by good trade practice even if not particularly specified, shall be furnished, delivered and installed under their respective Divisions without any additional expense to the Owner.

C. Minor details not usually shown or specified but necessary for proper demolition shall be included in the work as though they were hereinafter shown or specified.

D. Work under each Section shall include giving written notice to the Owner and Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that work under each Section includes the cost of all required items for the accepted, satisfactory functioning of the entire system without extra compensation.

1.04 DEFINITIONS

A. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Engineer," "requested by the Engineer," and similar phrases.

B. “Finished” refers to all rooms and areas to be specified to receive architectural treatment as indicated on the drawings. All rooms and areas not covered, including underground tunnels and areas above ceilings shall be considered not finished, unless otherwise noted.

C. “Furnish” or “supply” shall mean purchase, deliver to, and off-load at the job site, ready to be installed including where appropriate all necessary interim storage and protection.

D. Indicated: The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

E. “Install” shall mean set in place complete with all mounting facilities and connections as necessary ready for normal use or service.

F. “Product” shall mean any item of equipment, material, fixture, apparatus, appliance or accessory installed under this Division.

G. “Provide” shall mean furnish (or supply) and install as necessary.

H. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

I. Remove: The term “remove” means “to disconnect from its present position, remove from the premises and to dispose of in a legal manner.”

J. “Subcontractor” means specifically the subcontractor working under this Division. Other Contractors are specifically designated “Plumbing Subcontractor”, “General Contractor” and so on. Note: Take care to ascertain limits of responsibility for connecting equipment which requires connections by two or more trades.

K. “Wiring” shall mean cable assembly, raceway, conductors, fittings and any other necessary accessories to make a complete wiring system.

1.05 DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. Consult the Architectural Drawings and Details for exact location of fixtures and equipment; where same are not definitely located, obtain this information from the Architect. (Do not scale the drawings)

B. Where variances occur between the Drawings and Specifications or within either of the Documents, the item or arrangement of better quality, shall be included in the Contract price. The Owner and Engineer shall decide on the item and the manner in which the work shall be installed.

1.06 CODES AND STANDARDS

A. The Following Codes and Standards listed below apply to all fire suppression work. Wherever Codes and/or Standards are mentioned in these Specifications, the latest applicable edition or revision shall be followed:

1. Applicable State Building Code
2. The International Building Code
3. International Fire Code
4. NFPA 101 Life Safety
5. NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations

B. The following Standards shall be used where referenced by the following abbreviations:
1. ACGIH - American Conference of Governmental Industrial Hygienists
2. AGA - American Gas Association
3. AIA - American Institute of Architects
4. ANSI - American National Standards Institute
5. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
6. ASME - American Society of Mechanical Engineers
7. ASTM - American Society of Testing and Materials
8. AWS - American Welding Society
9. AWWA - American Water Works Association
10. CSA - Canadian Standards Association
11. EPA - Environmental Protection Agency
12. FM - Factory Mutual
13. FSSC - Federal Specification
14. HIS - Hydraulic Institute Standards
15. IRI - Industrial Risk Insurers
16. ISO - Insurance Services Office
17. NBS - National Bureau of Standards
18. NEMA - National Electrical Manufacturers Association
19. NFPA - National Fire Protection Association
20. NSC - National Safety Council
21. NSF - National Sanitation Foundation
22. OSHA - Occupational Safety and Health Administration
23. PDI - Plumbing and Drainage Institute
24. SBI - Steel Boiler Industry (Division of Hydronics Institute)
25. STI - Steel Tank Institute
26. UL - Underwriters' Laboratories

C. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus and Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether shown on Drawings and/or specified or not.

1.07 PERMITS AND FEES

A. The Contractor shall give all necessary notices, obtain all permits; and pay all Government and State sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with the work, file all necessary Drawings, prepare all documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction, obtain all required certificates of inspection for his work, and deliver a copy to the Owner and Engineer before request for acceptance and final payment for the work.

1.08 COORDINATION WITH OTHER DIVISIONS

A. All work shall be carried out in conjunction with other trades and full cooperation shall be given in order that all work may proceed with a minimum of delay and interference.

B. The Contractors are required to examine all of the Project Drawings and mutually arrange work so as to avoid interference with the work of other trades. The Engineer shall make final decisions regarding the arrangement of work which cannot be agreed upon by the Contractors.

1.09 SHUTDOWNS

A. When demolition requires the temporary shutdown of an existing operating system, the shutdown shall be performed at such time as designated by the Owner.

B. The Engineer and the Owner shall be notified in writing of the estimated duration of the shutdown period at least ten (10) days in advance of the date the work is to be performed.

C. Work shall be arranged for continuous performance whenever possible. The Contractor shall provide all necessary labor, including overtime if required, to assure that existing operating services will be shut down only during the time actually required to make necessary connections.

1.10 TEMPORARY UTILITIES

A. General: Provide new materials and equipment. If acceptable to the Engineer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

C. First Aid Supplies: Comply with governing regulations.

D. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

E. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

F. Termination and Removal: Unless the Engineer requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

1.11 PROJECT PHASING

A. Work under each Section shall include all necessary temporary connections, equipment, piping, sprinklers, fire alarm equipment and testing, fire stopping, connection of necessary fire suppression system equipment, labor, and material as necessary to accommodate the phasing of Construction as developed by the General Contractor or Construction Manager and approved by the Owner. All existing systems that pass-thru an area of the building or are required to be maintained in a phased fashion during construction shall remain operational during all phases of construction. No extra compensation shall be granted the

Contractor for work required to maintain existing systems operational or to accommodate the construction phasing of the project.

1.12 PROTECTION OF MATERIALS AND EQUIPMENT

A. Work under each Section shall include protecting the work and material of all other Sections from damage by work or workmen and shall include making good all damage thus caused.

B. The Contractor shall be responsible for work until the facility has been accepted by the Owner. Protect work against theft, injury or damage.

1.13 CLEANING

A. Upon completion of all work under the Contract, the Contractor shall remove from the premises all rubbish, debris and excess materials left over from his work. Any oil or grease stains on floor areas caused by the Contractor shall be removed and floor areas left clean.

B. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove and dispose of ALL waste materials, packaging material, skids etc. from the site and dispose of in a lawful manner in accordance with municipal, state and federal regulations.

C. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

1.14 PROJECT CLOSE-OUT

A. Field Observation Procedures: On receipt of a request for an Engineers Field Observation, the Engineer will advise the Contractor of unfulfilled requirements. The Engineer will advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer will repeat the Field Observation when requested and assured that the Demolition Work has been substantially completed.
2. Results of the completed list of unfulfilled items will form the basis of requirements for final acceptance.

1.15 DEMOLITION

A. Demolition work shall be performed in a neat and orderly fashion. After piping, equipment, etc., has been removed, neatly cap remaining piping.

B. Before submitting his Bid, the Contractor shall visit the site with Architectural and Fire Suppression Plans in hand and shall inspect all existing systems to determine the extent of demolition work involved. Particular attention is drawn to the removal of existing walls or portions of existing walls. In those areas, all exposed and concealed piping, equipment, etc., running across or through affected areas shall be removed as required. Piping shall then be either capped, or, if required for the proper continuing operation of an existing system to remain, piping shall be rerouted around the affected areas and reconnected as required.

C. In general, it shall be the responsibility of the Contractor to remove demolished equipment, piping, etc., from the site and properly dispose of it. If the Owner shall so request, however, the Contractor shall turn over demolished equipment, etc., to the Owner for the Owner’s use.

D. Cut, remove and legally dispose of selected fire suppression system equipment, components, and materials as indicated, including but not limited to removal of fire suppression system piping, sprinklers, and other fire suppression system items made obsolete by the new Work.

E. Location of existing systems and equipment shown on the drawings is based on the best available information. The Contractor shall verify dimensions and locations of existing systems and equipment in the field and adjust as necessary.

F. Certain items of existing equipment and piping may be indicated for removal or relocation. Items noted for removal shall be disconnected and disposed of by the Contractor or turned over to the Owner if the Owner so requested. If instructed to dispose of items, the Contractor shall remove the items from the premises and dispose of them in a safe, legal and responsible manner and location. Items noted for relocation are intended for reuse in another location as designated on the Drawings. It shall be the responsibility of the Contractor to remove the material from its present location, store the material in a safe place and reinstall the material in its new location. Questions regarding the suitability of the material or equipment shall be brought to the attention of the Owner and Engineer in writing.

G. Demolition work shall be performed in accordance with SMACNA IAQ Guidelines for Occupied Buildings Under Construction.

1.16 SCAFFOLDING, RIGGING, HOISTING

A. The Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for the demolition of any equipment under this Division. Remove same from premises when no longer required.

1.17 TEMPORARY OPENINGS

A. The Contractor shall ascertain from an examination of the Drawings whether any special temporary openings in the building will be required for the removal of demolished items called for under this Division and shall notify the Owner or the Construction Manager accordingly. In the event of failure of the Contractor to give sufficient notice in time to arrange for these openings during construction, the Contractor shall assume all costs of providing such openings thereafter.

PART 2 MATERIALS

2.01 Not used.

PART 3 EXECUTION

3.01 Not used.

END OF SECTION

SECTION 21 05 23
GENERAL-DUTY VALVES FOR FIRE SUPPRESSION PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Two-piece ball valves with indicators.
2. Bronze butterfly valves with indicators.
3. Iron butterfly valves with indicators.
4. Check valves.
5. Bronze OS&Y gate valves.
6. Iron OS&Y gate valves.
7. NRS gate valves.
8. Indicator posts.
9. Trim and drain valves.

B. Related Sections:
1. Division 01 – General Requirements.
2. Division 21 – Fire Suppression

1.02 DEFINITIONS

A. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

B. NRS: Nonrising stem.

C. OS&Y: Outside screw and yoke.

D. SBR: Styrene-butadiene rubber.

1.03 REFERENCES

A. ASME Compliance:
1. ASME B16.1 – Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250
2. ASME B1.20.1 – Pipe Threads, General Purpose, Inch
3. ASME B31.9 – Building Service Piping

B. AWWA Compliance
1. AWWA C606 – Grooved and Shouldered Joints

C. NFPA Compliance:
1. NFPA 13 – Standard for the Installation of Sprinkler Systems
2. NFPA 14 – Standard for the Installation of Standpipe and Hose Systems
3. NFPA 20 – Standard for the Installation of Stationary Pumps for Fire Protection
4. NFPA 24 – Standard for the Installation of Private Fire Service Mains and Their Appurtenances

D. FM Global
1. FM Approval Guide

E. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 67 - Butterfly Valves.
2. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
3. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
4. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
5. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

6. MSS SP 125 - Check Valves: Gray Iron and Ductile Iron, In-Line, Spring-Loaded, Center-Guided

F. Underwriter's Laboratory
1. UL Certification Database
2. UL 1091 – Standard for Safety Butterfly Valves for Fire-Protection Service
3. UL 312 – Standard for Safety Check Valves for Fire-Protection Service
4. UL 262 – Standard for Safety Gate Valves for Fire-Protection Service
5. UL 789 – Standard for Indicator Posts for Fire-Protection Service

1.04 SUBMITTALS

A. Division 01 – General Requirements: Requirements for submittals.

B. Product Data: Submit manufacturer's catalog information for each type of valve.

C. Manufacturer's Installation Instructions: Submit manufacturer's installation instructions for each type of valve. Submit hanging and support methods, joining procedures.

1.05 CLOSEOUT SUBMITTALS

A. Division 01 - General Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of valves.

C. Operation and Maintenance Data: Submit operation and maintenance instructions, spare parts lists, exploded assembly views.

1.06 QUALITY ASSURANCE

A. All valves shall be UL listed and FM approved for use in water based fire suppression systems.

1.07 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing work of this section with minimum 3 years experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - General Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

C. Provide temporary protective coating on cast iron and steel valves.

D. Maintain valve end protection.

E. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

F. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

G. Protect flanges and specialties from moisture and dirt.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Division 01 – General Requirements: Environmental conditions affecting products on site.

B. Do not install valves underground when bedding is wet or frozen.

1.10 WARRANTY

A. Division 01 – General Requirements: Requirements for warranties.

B. Furnish [two] [five] [_____] [year] [standard] manufacturer warranty for valves excluding packing.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

A. UL Listed: Valves shall be listed in UL's "Online Certifications Directory" under the headings listed below and shall bear UL mark:
   1. Main Level: HAMV - Fire Main Equipment.
      a. Level 1: HCBZ - Indicator Posts, Gate Valve.
      b. Level 1: HLOT - Valves.
      c. Level 3: HLUG - Ball Valves, System Control.
      d. Level 3: HLXS - Butterfly Valves.
      e. Level 3: HMER - Check Valves.
      f. Level 3: HMRZ - Gate Valves.
   2. Main Level: VDGT - Sprinkler System & Water Spray System Devices.
      a. Level 1: VQGU - Valves, Trim and Drain.

B. FM Global Approved: Valves shall be listed in its "Approval Guide," under the headings listed below:
   1. Automated Sprinkler Systems:
      a. Indicator posts.
      b. Valves.
         1) Gate valves.
         2) Check valves.
            a) Single check valves.
         3) Miscellaneous valves.

C. Source Limitations for Valves: Obtain valves for each valve type from single manufacturer.

D. ASME Compliance:
   1. ASME B16.1 for flanges on iron valves.
   2. ASME B1.20.1 for threads for threaded-end valves.
   3. ASME B31.9 for building services piping valves.

E. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

F. NFPA Compliance: Comply with NFPA 24 for valves.

G. Valve Pressure Ratings: Not less than the minimum pressure rating indicated or higher as required by system pressures.

H. Valve Sizes: Same as upstream piping unless otherwise indicated.

I. Valve Actuator Types:
   1. Worm-gear actuator with handwheel for quarter-turn valves, except for trim and drain valves.
   2. Handwheel: For other than quarter-turn trim and drain valves.
   3. Handlever: For quarter-turn trim and drain valves NPS 2 and smaller.

2.02 TWO-PIECE BALL VALVES WITH INDICATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Apollo Valves.
   2. NIBCO Inc.

3. Milwaukee Valve Company, Ltd.
4. Victaulic Company.
5. Substitutions: [Division 01 – General Requirements] [Not allowed]

B. Description:
1. UL 1091, except with ball instead of disc and FM Global standard for indicating valves (butterfly or ball type), Class Number 1112.
2. Minimum Pressure Rating: 175 psig .
3. Body Design: Two piece.
4. Body Material: Forged brass or bronze.
5. Port Size: Full or standard.
6. Seats: PTFE.
7. Stem: Bronze or stainless steel.
8. Ball: Chrome-plated brass.
9. Actuator: Worm gear or traveling nut.
10. Supervisory Switch: Internal or external.
11. End Connections for Valves NPS 1 through NPS 2: Threaded ends.
12. End Connections for Valves NPS 2-1/2: Grooved ends.

2.03 BRONZE BUTTERFLY VALVES WITH INDICATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Fivalco Inc.
2. Globe Fire Sprinkler Corporation.
3. Milwaukee Valve Company, Ltd.
4. Substitutions: [Division 01 – General Requirements] [Not allowed]

B. Description:
1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 1112.
2. Minimum: Pressure rating: 175 psig .
3. Body Material: Bronze.
4. Seat Material: EPDM.
5. Stem Material: Bronze or stainless steel.
6. Disc: [Bronze] [Stainless steel][with EPDM coating].
7. Actuator: Worm gear or traveling nut.
8. Supervisory Switch: Internal or external.
9. Ends Connections for Valves NPS 1 through NPS 2: Threaded ends.
10. Ends Connections for Valves NPS 2-1/2: Grooved ends.

2.04 IRON BUTTERFLY VALVES WITH INDICATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Apollo Valves.
2. NIBCO Inc.

3. Grinnell
4. Stockham
5. Milwaukee Valve Company, Ltd.
6. Tyco Fire Products LP.
7. Victaulic Company.
8. Substitutions: [Division 01 – General Requirements] [Not allowed]

B. Description:
1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 112.
2. Minimum Pressure Rating: 175 psig .
3. Body Material: Cast or ductile iron[with nylon, EPDM, epoxy, or polyamide coating].
4. Seat Material: EPDM.
5. Stem: Stainless steel.
6. Disc: Ductile iron, [nickel plated] [and EPDM or SBR coated].
7. Actuator: Worm gear or traveling nut.
8. Supervisory Switch: Internal or external.
9. Body Design: [Lug or wafer] [Grooved-end connections].

2.05 CHECK VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Apollo Valves.
2. Grinnell
3. Stockham
4. Victaulic Company.
5. Viking Corporation.
6. Substitutions: [Division 01 – General Requirements] [Not allowed]

B. Description:
1. Standard: UL 312 and FM Global standard for swing check valves, Class Number 1210.
2. Minimum Pressure Rating: 175 psig .
3. Type: Single swing check.
4. Body Material: Cast iron, ductile iron, or bronze.
5. Clapper: Bronze, ductile iron, or stainless steel[with elastomeric seal].
6. Clapper Seat: Brass, bronze, or stainless steel.
7. Hinge Shaft: Bronze or stainless steel.
8. Hinge Spring: Stainless steel.
9. End Connections: Flanged, grooved, or threaded.

2.06 BRONZE OS&Y GATE VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Apollo Valves.
2. Milwaukee Valve Company, Ltd.
3. NIBCO Inc.
4. United Brass Works, Inc.
5. Zurn Industries, LLC.
6. Substitutions: [Division 01 – General Requirements] [Not allowed].

B. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig .
3. Body and Bonnet Material: Bronze or brass.
4. Wedge: One-piece bronze or brass.
5. Wedge Seat: Bronze.
6. Stem: Bronze or brass.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Threaded.

2.07 IRON OS&Y GATE VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Cast Iron Pipe Company.
2. Clow Valve Company; a subsidiary of McWane, Inc.
3. Hammond Valve.
4. Kennedy Valve Company; a division of McWane, Inc.
5. Mueller Co.
6. NIBCO Inc.
7. Victaulic Company.
8. WATTS.
9. Zurn Industries, LLC.
10. Grinnell
11. Stockham
12. Substitutions: [Division 01 – General Requirements] [Not allowed].

B. Description:
1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig .
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron, or bronze[with elastomeric coating].
5. Wedge Seat: Cast or ductile iron, or bronze[with elastomeric coating].
6. Stem: Brass or bronze.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: [Flanged] [Grooved] [Threaded].

2.08 NRS GATE VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Cast Iron Pipe Company.
2. Clow Valve Company; a subsidiary of McWane, Inc.
3. Kennedy Valve Company; a division of McWane, Inc.
4. Mueller Co.
5. NIBCO Inc.
6. Victaulic Company.
7. Zurn Industries, LLC.
8. Stockham
9. Substitutions: [Division 01 – General Requirements] [Not allowed].

B. Description:
1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig .
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron[with elastomeric coating].
5. Wedge Seat: Cast or ductile iron, or bronze[with elastomeric coating].
6. Stem: Brass or bronze.
7. Packing: Non-asbestos PTFE.
8. Retain "Supervisory Switch" Subparagraph below only if switch is not specified elsewhere.
9. Supervisory Switch: External.
10. End Connections: [Flanged] [Grooved] [Threaded].

2.09 INDICATOR POSTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Cast Iron Pipe Company.
2. Clow Valve Company; a subsidiary of McWane, Inc.
3. Kennedy Valve Company; a division of McWane, Inc.
4. Mueller Co.
5. NIBCO Inc.
6. Substitutions: [Division 01 – General Requirements] [Not allowed].

B. Description:
1. Standard: UL 789 and FM Global standard for indicator posts.
2. Type: [Underground] [Pit] [Wall].
3. Base Barrel Material: [Cast or ductile iron] [PVC].
4. Extension Barrel: Cast or ductile iron.
5. Cap: Cast or ductile iron.
6. Operation: [Wrench] [Handwheel].

2.10 TRIM AND DRAIN VALVES

A. Angle Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Apollo Valves.
b. Fire Protection Products, Inc.
c. NIBCO Inc.
d. United Brass Works, Inc.
e. Substitutions: [Division 01 – General Requirements] [Not allowed].
2. Description:
a. Pressure Rating: [175 psig] [250 psig (1720 kPa)] [300 psig (2070 kPa)].
b. Body Material: Brass or bronze.
c. Ends: Threaded.
d. Stem: Bronze.
e. Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

B. Globe Valves:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Apollo Valves.
      b. NIBCO Inc.
      c. United Brass Works, Inc.
      d. Substitutions: [Division 01 – General Requirements] [Not allowed].
   2. Description:
      a. Pressure Rating: [175 psig] [250 psig (1720 kPa)] [300 psig (2070 kPa)].
      b. Body Material: Bronze with integral seat and screw-in bonnet.
      c. Ends: Threaded.
      d. Stem: Bronze.
      e. Disc Holder and Nut: Bronze.
      f. Disc Seat: Nitrile.
      g. Packing: Asbestos free.
      h. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

A. Division 01 – General Requirements: Verification of existing conditions before starting work.

B. Verify piping system is ready for valve installation.

C. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

D. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

E. Examine threads on valve and mating pipe for form and cleanliness.

F. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

G. Do not attempt to repair defective valves; replace with new valves.

3.02 INSTALLATION

A. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

B. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

C. Install 1 inch gate or ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.

D. Install valves having threaded connections with unions at each piece of equipment arranged to allow easy access, service, maintenance, and equipment removal without system shutdown. Provide separate support where necessary.

E. Install valves in horizontal piping with stem at or above the pipe center.

F. Install valves with stems upright or horizontal, not inverted.

G. Install valves in position to allow full stem movement.

H. Install valves with clearance for installation of insulation and allowing access.

I. Provide access where valves and fittings are not accessible. [Coordinate size and location of access doors with Division 08 - Openings.]

J. Install valve tags. Comply with requirements in Section 210553 "Identification for Fire-Suppression Piping and Equipment" for valve tags and schedules and signs on surfaces concealing valves; and the NFPA standard applying to the piping system in which valves are installed. Install permanent identification signs indicating the portion of system controlled by each valve.

END OF SECTION

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SECTION 21 05 29
HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Hangers, supports, and anchors for fire protection equipment, tanks, and piping systems.
2. Supplementary steel for support or attachment of fire protection tanks, equipment, and piping to general construction elements of the project.
3. Pipe hangers and supports.
4. Hanger rods.
5. Inserts.
6. Flashing.
7. Formed steel channel.
8. Equipment bases and supports.

B. Related Sections:
1. Division 03 – Concrete
2. Division 07 – Thermal and Moisture Protection
3. Division 09 – Finishes
4. Division 21 – Fire Suppression

1.02 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B31.1 - Power Piping.
2. ASME B31.5 - Refrigeration Piping and Heat Transfer Components.
3. ASME B31.9 - Building Services Piping.

B. ASTM International:
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems
4. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
5. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

C. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.

D. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

E. U.S. General Service Administration
1. Federal Specification A-A-1192A – Commercial Item Description, Hanger, Pipe
2. Federal Specification WW-H-171E – Hangers and Supports, Pipe

F. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 – Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation
2. MSS SP 69 – Pipe Hangers and Supports - Selection and Application

G. National Fire Protection Association

1. NFPA 13 – Standard for the Installation of Sprinkler Systems
2. NFPA 14 – Standard for the Installation of Standpipe and Hose Systems

H. Underwriters Laboratories Inc.:
1. UL 263 - Fire Tests of Building Construction and Materials.
2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
3. UL 1479 - Fire Tests of Penetration Firestops.
4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
5. UL - Fire Resistance Directory.

1.03 SUBMITTALS

A. Division 01 - General Requirements: Requirements for submittals

B. Product Data: Submit manufacturers catalog data including load capacity for all items specified in this section.

C. Shop Drawings:
1. Submit shop drawings of Contractor-fabricated piping support structures, pipe racks, and anchors.
2. Suspended Piping: Indicate point loads and support locations, along with applicable details keyed to layouts.
3. Support Frames, Piping, Tank, and Equipment Supports, and Anchorage: Indicate point loads and support locations, along with engineers' calculations and details keyed to the layouts pertaining to supports, support frames, and anchorages.
4. Supplementary Steel: Show details of fabrication and installation. Indicate materials, thicknesses, gauges, sizes, dimensions, methods of joining and fastening, welds, finishes, details of reinforcement and embedment, attachments, anchorages, miscellaneous metal items incidental to basic fabrication shown, provisions for work of other trades, and other pertinent information.
5. Calculations: Submit structural calculations for anchors, hangers, supports, support frames and necessary supplementary steel for supports, anchors, and attachment of equipment and pipes to general construction. Calculations shall be prepared, stamped, and signed by a registered professional structural engineer licensed in the state where the project is located.

D. Manufacturer's Installation Instructions: Submit special procedures and assembly of components.

E. As-built Drawings: Submit as-built drawings and calculations indicating final install locations of all hangers and supports.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years of experience.

B. Installer: Company specializing in performing Work of this section with minimum 3 years of experience.

1.06 PRE-INSTALLATION MEETINGS

A. Division 01 - General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Division 01- General Requirements.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.08 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.09 WARRANTY

A. Division 01 - General Requirements.

PART 2 PRODUCTS

2.01 SUPPORTS AND ANCHORAGE

A. Provide pipe and equipment hangers and supports in accordance with the following:
   1. When supports and anchorages for tanks, equipment, conduit, and piping are not shown on the drawings, the Contractor shall be responsible for their design.
   2. Supports and anchorages shall resist forces due to hydraulic testing and seismic forces as specified in the applicable building code for the ground motion accelerations corresponding to the project location.
   3. Supports and anchorages shall not introduce stresses in the piping caused by thermal expansion or contraction.
   4. Connections to structural framing shall not introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.

B. The following engineered support systems shall be designed, stamped, and signed by a registered professional structural engineer licensed in the state where the project is located:
   1. Supports, floor and roof-mounted tanks, and supports for suspended tanks and equipment.
   2. Support frames, such as pipe racks or stanchions, for piping and equipment which provide support from below.
   3. Tank equipment and piping support frame anchorage to supporting slab or structure.

2.02 SUPPORTS, GENERAL

A. Manufacturers:
   1. Anvil, an ASC Engineered Solution
   2. B-Line Systems
   3. Superstrut
   4. Substitutions: [Division 01 – General Requirements] [Not allowed].

B. Fabricate support members from welded standard structural shapes, pipe, and plate. Carry the necessary rollers, hangers, and accessories as required. Piping less than 4-inch pipe size may be supported from or by prefabricated roll-formed channels as specified in this section with necessary accessories to adequately support piping system.

C. Supports and Accessories: Preformed roll-formed channels and accessories with matching compatible accessories as shown, as specified, and as required.

D. Dissimilar Metal Protection:
   1. Cushion Clamp Assembly
      a. Materials:

1) Clamp: 1008-1018 Carbon Steel
2) Cushion: High Strength TPE
3) Locknut: Nylon Insert

b. Service Temperature: -65˚F to 275˚F
c. Approvals: UL 2043 Fire Test for Heat and Visible Smoke Release 25/50 Flame Spread/Smoke Development Index

2. Cushion Strip
a. Materials: thermoplastic elastomer
b. Service Temperature: -50°F to 275°F
c. Approvals: UL 2043 Fire Test for Heat and Visible Smoke Release 25/50 Flame Spread/Smoke Development Index

2.03 PIPE ATTACHMENTS

A. Manufacturers:
1. Anvil, an ASC Engineered Solution
2. B-Line Systems
3. Superstrut
4. Substitutions: [Division 01 – General Requirements] [Not allowed].

B. Pipe Clamps:
1. Size Range: 1⁄2" through 30"
2. Material: Carbon steel
3. Finish: Plain or Hot-Dip Galvanized (Hot Dip Galvanized comes with zinc plated hardware)
4. Service: Recommended for suspension of cold pipe lines or hot lines where no insulation is required.
5. Maximum Temperature: Plain 750° F, Galvanized 450° F
6. Approvals: Complies with Federal Specification A-A-1192A and WW-H-171-E, MSS SP-69 and MSS SP-58. UL, ULC Listed and FM Approved (Sizes 3⁄4" - 8").

C. Adjustable Clevis Hangers for Insulated Horizontal Steel Piping:
1. Size range ¾” to 8”.
2. Material: Carbon Steel.
3. Finish: Zinc Plated or Hot-Dip Galvanized
4. Service: Recommended for the suspension of stationary pipes.
5. Maximum Temperature: Plain 650° F, Galvanized and Epoxy 450° F
6. Approvals: Complies with Federal Specification A-A-1192A and WW-H-171-E, MSS SP-69 and MSS SP-58. FM Approved (Sizes ¼" through 8"), UL and ULC Listed (Sizes ¾" through 8").
7. Provide with insulation protection shield.

D. Adjustable Clevis Hangers – Uninsulated Horizontal Steel Piping:
1. Size range ¾” to 8”.
2. Material: Carbon Steel.
3. Finish: Zinc Plated or Hot-Dip Galvanized
4. Service: Recommended for the suspension of stationary pipes.
5. Maximum Temperature: Plain 650° F, Galvanized and Epoxy 450° F
6. Approvals: Complies with Federal Specification A-A-1192A and WW-H-171-E, MSS SP-69 and MSS SP-58. FM Approved (Sizes ¼" through 8"), UL and ULC Listed (Sizes ¾" through 8").

E. Adjustable Swivel Ring Hangers
1. Size Range: ¾" through 8"

2. Material: Carbon steel
3. Finish: Strap is Pre-Galvanized Zinc Material. Nut is Zinc Plated.
4. Service: Recommended for suspension of non-insulated stationary pipe line.
5. Maximum Temperature: 450° F
6. Approvals: Complies with Federal Specification A-A-1192A and WW-H-171-E, and MSS SP-58. UL Listed and FM Approved (Sizes ¼" - 8").

F. U-bolts
1. Size Range: ¾" through 36"
2. Material: Carbon steel U-bolt and four finished hex nuts
3. Finish: Plain, Zinc Electro-Galvanized or, Hot-Dip Galvanized
4. Service: Recommended for support, or guide of heavy loads
5. Approvals: Complies with Federal Specification A-A-1192A and WW-H-171-E, MSS SP-69 and MSS SP-58.

G. Riser Clamps, Steel Pipe: 3/4-inch to 20-inch, Anvil Fig. 261.
1. Size Range: ¼" through 24"
2. Material: Carbon steel
3. Finish: Plain, Hot-Dip Galvanized with Zinc Plated Bolts & Nuts, Epoxy Coated or Painted.
4. Service: For support of stationary pipe risers
5. Maximum Temperature: Plain 650° F, Galvanized and Epoxy 450° F
6. Approvals: Complies with Federal Specification A-A-1192A and WW-H-171-E, MSS SP-69 and MSS SP-58. UL, ULC Listed (Sizes 1¾" - 8").

2.04 STANCHIONS AND SUPPORTS

A. Manufacturers:
1. Anvil, an ASC Engineered Solution
2. B-Line Systems
3. Superstrut
4. Substitutions: [Division 01 – General Requirements] [Not allowed].

B. Pipe Saddle Support With U-Bolt
1. Size Range: 4" through 36" pipe
2. Material: Cast iron stanchion saddle with steel yoke and nuts. 14" through 36" carbon steel saddle with steel yoke. 4" through 12" steel saddle available on special request.
3. Finish: Plain or Zinc Plated (Hot-Dip Galvanized optional)
4. Service: Stanchion type support with additional stability provided by U-bolt attachment to pipe.
5. Approvals: Complies with Federal Specification A-A-1192A, MSS SP-69 and MSS SP-58,.

C. Adjustable Pipe Saddle with U-Bolt Anvil Fig. 265 (Formerly Afcon Fig. 708)
1. Size Range: 4" through 36"
2. Material: Cast iron saddle, steel yoke and nuts, steel locknut nipple and special cast iron reducer. (14" through 36" carbon steel saddle with steel yoke. 4" through 12" steel saddle available upon special request)
3. Finish: Plain or Zinc Plated (Hot-Dip Fasteners not available. Nipple Reducer Assembly cannot be Hot-Dipped.)
4. Service: Stanchion type support where vertical adjustment is required, plus the additional stability provided by U-bolt attachment to pipe.
5. Approvals: Complies with Federal Specification A-A-1192A and WW-H-171-E, MSS SP-69 and MSS SP-58.

D. Pipe Stanchion

1. Material: Carbon steel
2. Finish: Plain or Hot-Dip Galvanized
3. Maximum Temperature: Plain 650° F, Galvanized 450˚ F

2.05 PIPE RACKS

A. Manufacturers:
   1. Anvil, an ASC Engineered Solution
   2. B-Line Systems
   3. Superstrut
   4. Unistrut
   5. Substitutions: [Division 01 – General Requirements] [Not allowed].

B. Supports and Accessories: Preformed roll-formed channels and accessories with electrochromate or equal finish and matching compatible accessories as shown, as specified, and as required.

C. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

2.06 INSULATION PROTECTION SHIELDS

A. Manufacturers:
   1. Anvil, an ASC Engineered Solution
   2. B-Line Systems
   3. Superstrut
   4. Substitutions: [Division 01 – General Requirements] [Not allowed].

B. Select protection shields based on actual outside diameter of pipe plus insulation. Use protection shields at hanger or roller assemblies on cold water piping and where hangers are installed around insulation.

C. Size range: ½” to 24” pipe with up to 2” thick insulation.

D. Material: Galvanized carbon steel.

E. Approvals: Complies with MSS SP-69 and MSS SP-58.

2.07 BUILDING ATTACHMENTS

A. Manufacturers:
   1. Anvil, an ASC Engineered Solution
   2. B-Line Systems
   3. Superstrut
   4. Substitutions: [Division 01 – General Requirements] [Not allowed].

B. Beam Clamps
   1. Material: Forged steel
   2. Finish: Plain or Zinc Plated
   3. Service: For suspension of heavy loads from beams with flange widths to 15" and flange thickness to 1.031.
   4. Approvals: Complies with Federal Specification A-A-1192A and WW-H-171-E, MSS SP-69 and MSS SP-58.

C. Wall Supports
   1. Pipe Sizes 3 inches and Smaller: Cast iron hook.
   2. Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
   3. Approvals: Complies with Federal Specification A-A-1192A and WW-H-171-E, MSS SP-69 and MSS SP-58.

2.08 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded as required by application.

2.09 INSERTS

A. Manufacturers:
   1. HiltiInc.
   2. Anvil International
   3. Eaton
   4. 3M
   5. Substitutions: Refer to Division 01 – General Requirements.

B. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

C. Approvals: UL, ULC Listed and FM Approved.

PART 3 EXECUTION

3.01 EXAMINATION

A. Division 01 - General Requirements.

3.02 PREPARATION

A. Obtain permission from Architect/Engineer before using powder-actuated anchors.

B. Obtain permission from Architect/Engineer before drilling or cutting structural members.

3.03 GENERAL

A. Install in accordance with NFPA 13, NFPA 14, ASME B31.1, ASME B31.5, ASME 31.9, ASTM F708, or MSS SP 58.

B. Install all support systems as detailed and in accordance with manufacturer’s recommendations. Provide pipe racks, pipe stands, trapeze hangers, etc., as required and as detailed on the drawings.

C. Where Fire Suppression Piping and Equipment is required to be protected from earthquakes, refer to Section 21 05 48 Vibration and Seismic Controls for Fire Suppression Piping and Equipment for additional requirements.

D. Provide adjustable hangers complete with inserts, adjusters, bolts, nuts, swivels, all-thread rods, etc., for all pipes, except where specified otherwise. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Size hangers to clear insulation for piping services conveying liquids less than 70ºF.

F. Support fire protection piping independently of other piping.

G. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods. Do not use tape for isolation.

H. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

I. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.

J. Hanger Spacing:
   1. Provide hangers at minimum spacing in accordance with NFPA 13 installation standards.
   2. Support all piping within 2 feet of change of direction on both sides of fitting.
   3. Place hangers within 12 inches of each horizontal elbow.

K. All pipe hangers and supports shall be sized in accordance with the manufacturer's guidelines to support the piping based on final layout coordinated by the contractor.

L. Design hangers for pipe movement without disengagement of supported pipe.

M. Coordination: Where mechanical piping, tubing, etc., and electrical conduit, wiremold, wireways, etc., follow common routings, coordinate routing. Allow sufficient clearance to adequately operate, access, and maintain all devices without dismantling racks.

N. Prime coat exposed steel hangers and supports. Refer to Division 09 – Finishes. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

O. Provide clearance in hangers and from structure and other equipment for installation of insulation. Provide supplemental angles, channels and formed steel supports to support piping, equipment, etc. from building's structure. Piping, equipment, etc. shall not be supported from the roof deck.

3.04 VERTICAL PIPING

A. Support risers at each floor of penetration.

B. Riser clamps shall be directly under fitting or welded to pipe.

C. Provide structural steel supports at the base of pipe risers. Size supports to carry all forces exerted by piping system when systems are in operation.

D. Support riser piping independently of connected horizontal piping.

3.05 STANCHIONS AND SUPPORTS

A. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment. Refer to Division 03 – Concrete

B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports of steel members, formed steel channel or steel pipe and fittings. Brace and fasten with flanges bolted to structure.

3.06 PIPE RACKS

A. Provide racks as shown with additional elements to adequately support piping.

3.07 INSULATED HORIZONTAL PIPING:

A. Install hangers outside of insulation.

B. On piping 1 1/2-inch and larger, provide insulation protection shields at each hanger location.

C. Insulation Protection:
   1. Where piping is insulated, provide protection shields, 12 inches long and under piping insulation at all points of suspension.
   2. Band shields firmly to insulation to prevent slippage.

3.08 BUILDING ATTACHMENTS:

A. Where possible, support all piping and equipment from structural members, beams, and joists.

B. Provide structural steel angles, channels, or other members to support piping and equipment where structures do not occur as required for proper support.

C. Arrange supports to prevent eccentric loading of joists and joist girders. Locate supports at joist panel points or provide web reinforcing as required.

D. Provide transverse and longitudinal bracing as required by code to provide a stabilized piping system. Bracing shall not introduce stresses in the piping system caused by thermal expansion or contraction.

E. Do not fasten or attach to unfilled steel roof deck structure.

F. Attach to concrete-filled steel floor deck structure for loads up to 400 pounds. Loads larger than 400 pounds shall be designed per code. Submit structural calculations stamped and signed by a registered professional structural engineer licensed in the state of Oregon, showing that the concrete-filled floor deck has sufficient capacity to support the load at the points of anchorage.

3.09 INSERTS

A. Install inserts for placement in concrete forms.

B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.

D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut [above] [flush with top of] [recessed into and grouted flush with] slab.

3.10 FIELD QUALITY CONTROL

A. Refer to Division 01 - Quality Requirements and Execution and Closeout Requirements.

3.11 CLEANING

A. Refer to Division 01 - Execution and Closeout Requirements:

3.12 PROTECTION OF FINISHED WORK

A. Refer to Division 01 Execution and Closeout Requirements

3.13 SCHEDULES

Maximum Distance Between Hangers (ft-in.)					
Nominal Pipe Size (in.)	Steel pipe except threaded lightwall	Steel pipe - threaded lightwall	Copper tube	CPVC	Ductile-iron pipe
3/4	N/A	N/A	8-0	5-6	N/A
1	12-0	12-0	8-0	6-0	N/A
1 1/4	12-0	12-0	10-0	6-6	N/A
1 1/2	15-0	12-0	10-0	7-0	N/A
2	15-0	12-0	12-0	8-0	N/A
2 1/2	15-0	12-0	12-0	9-0	N/A
3	15-0	12-0	12-0	10-0	15-0
3 1/2	15-0	N/A	15-0	N/A	N/A
4	15-0	N/A	15-0	N/A	15-0
5	15-0	N/A	15-0	N/A	N/A
6	15-0	N/A	15-0	N/A	15-0
8	15-0	N/A	15-0	N/A	15-0

NA: Not applicable.

END OF SECTION

SECTION 21 05 53
IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Pipe markers.

C. Underground pipe warning tape

D. Ceiling grid markers

1.02 RELATED REQUIREMENTS

A. Division 09 – Finishes: Identification painting.

B. Division 21 – Fire Suppression

1.03 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:
   1. ASME A13.1 - Scheme for the Identification of Piping Systems

B. American Society for Testing Materials
   1. ASTM D709 - Standard Specification for Laminated Thermosetting Materials

C. American National Standards Institute
   1. ANSI Z535.1 – Safety Color Code

D. National Fire Protection Association
   1. NFPA 13 – Standard for the Installation of Sprinkler Systems
   2. NFPA 14 – Standard for the Installation of Standpipe and Hose Systems
   3. NFPA 20 – Standard for the Installation of Stationary Pumps for Fire Protection
   4. NFPA 170 – Standard for Fire Safety and Emergency Symbols

1.04 SUBMITTALS

A. See Division 01 – General Requirements, for submittal procedures.

B. Product Data: Provide manufacturer’s catalog literature for each product required.

C. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

E. Project Record Documents: Record actual locations of tagged valves.

1.05 QUALITY ASSURANCE

A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Identification products shall be provided by the following manufacturers:
   1. ARGO
   2. Brimar Industries, Inc.
   3. Craftmark Pipe Markers
   4. Kolbi Pipe Marker Co.
   5. Seton Identification Products
   6. Substitutions: See Division 01 - General Requirements.

B. All identification products shall be by a single manufacturer.

2.02 METAL NAMEPLATES

A. Description: 0.20 Aluminum minimum
1. Unless otherwise indicated, letter color shall be white and background color shall be red.
2. Letter height shall be as required by applicable NFPA standards.
3. Conform to NFPA standards listed in PART 1, as applicable.
4. Weatherproof
5. Corrosion resistant wire or chain

2.03 PLASTIC NAMEPLATES

B. Description: Laminated three-layer plastic with engraved letters.
1. Unless otherwise indicated, letter color shall be white and background color shall be red.
2. Letter height shall be as required by applicable NFPA standards.
3. Plastic: Conform to ASTM D709.
4. Conform to NFPA standards listed in PART 1, as applicable.
5. Weatherproof
6. Corrosion resistant wire or chain

2.04 PIPE MARKERS

A. Comply with ASME A13.1.

B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.05 UNDERGROUND PIPE WARNING TAPE

A. Detectable Underground Warning Tape: Bright colored continuously printed, 2 mil clear film laminated to ½ mil Aluminum Foil Center Core. Suitable for direct burial. Designed for detectability by non-ferrous locator. Minimum widths as follows:
1. 2” width for burial depths of up to 12”
2. 3” width for burial depth of 12” to 18”
3. 6” width for burial depth of 18” to 24”

B. Provide with a continuous printed message similar to “Caution Water Line Buried Below”.

2.06 CEILING GRID MARKERS

A. Description: 10 mil self-stick vinyl -7/8” diameter markers. Color coded.

B. Color code as follows:
1. Fire Protection Valves: Red.

PART 3 EXECUTION

3.01 GENERAL

A. Provide all signage as required by NFPA 13, NFPA 14, and NFPA 25.

B. Install identifying devices after completion of testing and installation of coverings and painting.

C. Identification signs shall be secured with corrosion-resistant wire or chain.

D. Install plastic pipe markers in accordance with manufacturer's instructions.

E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

F. Install detectable underground warning tape 6 to 8 inches below finished grade, directly above buried pipe.

G. Provide identification and labels with language in accordance with NPFA 13.

3.02 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Division 09 – Finishes, for stencil painting.

3.03 IDENTIFICATION OF VALVES.

A. All control valves, drain valves, venting, and test connections shall be provided with permanently marked nameplate.

B. The control valve sign shall identify the portion of the building served.

C. Systems that have more than one control valve that must be closed to work on a system or space shall have a sign referring to existence and location of other valves.

3.04 ANTIFREEZE SYSTEMS.

A. Where antifreeze systems are remote from the system riser, a placard shall be mounted on the system riser that indicates the number and location of all remote antifreeze systems supplied by that riser.

B. A placard shall be placed on the antifreeze system main valve that indicates the manufacturer, type, and brand of the antifreeze solution, the concentration by volume of the antifreeze solution used, and the volume of the antifreeze solution used in the system.

3.05 LOW POINT DRAINS

A. Systems with low point drains shall have a sign at the dry pipe or preaction valve indicating the number of low point drains and the location of each individual drain.

3.06 FIRE DEPARTMENT CONNECTION SIGNS

A. Each fire department connection to sprinkler systems shall be designated by a sign having raised or engraved letters at least 1 in. in height on plate or fitting reading service design — for example, AUTOSPKR., OPEN SPKR., AND STANDPIPE. Plate shall be minimum 18” by 18” in size.

B. The sign shall also indicate the pressure required at the inlets to deliver the greatest system demand. The pressure shall not be required where the system demand pressure is less than 150 psi.

C. Where a fire department connection serves only a portion of a building, the sign shall indicate the portions of the building served.

3.07 FIRE PUMP TEST HEADER

A. Fire pump test header shall be designated by a sign having raised or engraved letters at least 1 in. in height on plate or fitting reading service design — for example, FIREPUMP TEST HEADER. Plate shall be minimum 18” by 18” in size.

B. The sign shall also indicate the flow and pressure required at the inlets to deliver the greatest system demand.

3.08 FORWARD FLOW TEST HEADER

A. Forward flow test header shall be designated by a sign having raised or engraved letters at least 1 in. in height on plate or fitting reading service design — for example, FORWARD FLOW TEST HEADER. Plate shall be minimum 18” by 18” in size.

3.09 OUTSIDE ALARM DEVICES.

A. Identification signs shall be provided for outside alarm devices. The sign should be located near the device in a conspicuous position and should be worded as follows:
   1. SPRINKLER FIRE ALARM
   2. WHEN BELL RINGS CALL
   3. FIRE DEPARTMENT OR POLICE

3.10 FIRE PUMPS

A. Where a fire pump is provided, a sign shall be located in the vicinity of the pump indicating the minimum pressure and flow required at the pump discharge flange to meet the system demand.

3.11 STANDPIPE AND HOSE SYSTEMS

A. Where sprinkler system piping supplied by a combined system is supplied by more than one standpipe (“loop” or “dual feed” design), a sign shall be located at each dual or multiple feed connection to the combination system standpipe to indicate that in order to isolate the sprinkler system served by the control valve, an additional control valve or valves at other standpipes shall be shut off.
   1. The sign also shall identify the location of the additional control valves.

B. Where a main or sectional system control valve is located in a closed room or concealed space, the location of the valve shall be indicated by a sign in an approved location on the outside of the door or near the opening to the concealed space.

C. Where hose connections are not located in exit stairways, signs shall be provided in accordance with NFPA 170 to identify the location of the hose connection in an approved manner.
   1. Valve cabinets, where provided, shall be marked to indicate the contents.
   2. Letters shall be red with a white background and shall be 2 ½ in. in height.

3.12 HYDRAULIC DESIGN INFORMATION SIGN (HYDRAULIC DATA NAMEPLATE)

A. Contractor shall provide a permanently marked nameplate for each hydraulically designed area.

B. Signs shall be placed at each alarm valve, dry pipe valve, preaction valve, or deluge valve.

C. The sign(s) shall include the following information:
   1. Location of the design area or areas served.
   2. Size (area) of design area, or number of sprinklers in the design area served.
   3. Discharge densities over the design area or areas served.
   4. Required flow and residual pressure demand at the base of the riser or fire pump where applicable.
   5. Occupancy classification or commodity classification and maximum permitted storage height and configuration
   6. Hose stream allowance included in addition to the sprinkler demand.
   7. Name of the installing contractor

3.13 GENERAL INFORMATION SIGN.

A. Contractor shall provide a general information sign used to determine system design basis and information relevant to the inspection, testing, and maintenance requirements required by NFPA 25.
   1. Sign shall be permanently marked nameplate.
   2. Signs shall be placed at each system control riser, antifreeze loop, and auxiliary system control valve.

B. The sign shall include the following information:
   1. Name and location of the facility protected.

2. Occupancy classification
3. Commodity classification
4. Presence of high-piled and/or rack storage
5. Maximum height of storage planned.
6. Aisle width planned.
7. Encapsulation of pallet loads
8. Presence of solid shelving
9. Flow test data.
10. Presence of flammable/combustible liquids
11. Presence of hazardous materials
12. Presence of other special storage
13. Location of venting valve
14. Location of auxiliary drains and low point drains on dry pipe and preaction systems
15. Original results of main drain flow test
16. Original results of dry pipe and double interlock preaction valve test
17. Name of installing contractor or designer
18. Indication of presence and location of antifreeze or other auxiliary systems
19. Where injection systems are installed to treat MIC or corrosion, the type of chemical, concentration of the chemical, and where information can be found as to the proper disposal of the chemical.

C. Combination hydraulic design information and general information signs are permitted.

3.14 APPLICATIONS

A. Identify pumps, and tanks devices with nameplates. Identify small devices with tags.

B. Identify control panels and major control components outside panels with nameplates.

C. Identify piping, concealed or exposed, with [plastic pipe markers] [plastic tape pipe markers]. [Use tags on piping 3/4 inch diameter and smaller.]
1. Identify service and flow direction.
2. Install in clear view and align with axis of piping.
3. Locate identification not to exceed 20 feet on straight runs including risers and drops.
4. For concealed piping identification shall be located not to exceed 10 feet.
5. Locate identification adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

D. Identify underground utilities with detectable underground warning tape.

E. Provide ceiling grid markers to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

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SECTION 21 13 13
WET-PIPE SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes wet-pipe sprinkler system, system design, installation, and certification.

B. Related Sections:
1. Division 01 – General Requirements
2. Division 21 – Fire Suppression
3. Division 26 – Electrical

1.02 REFERENCES

A. America National Standards Institute
1. ANSI/ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250
2. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300
3. ANSI/ASME B16.4 - Gray Iron Threaded Fittings Classes 125 And 250
4. ANSI/ASTM A47 - Ferritic Malleable Iron Castings
5. ANSI/AWWA A21.10 - Ductile-Iron and Gray-Iron Fittings
6. ANSI/AWWA C110 – Ductile-Iron and Gray-Iron Fittings
7. ANSI/AWWA C111 - Rubber-Gasket Joints For Ductile-Iron Pressure Pipe And Fittings
8. ANSI/AWWA C151 - American National Standard For Ductile-Iron Pipe, Centrifugally Cast, For Water

B. American Society for Testing and Materials
1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
2. ASTM A135 - Electric-Resistance-Welded Steel Pipe
3. ASTM A234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
4. ASTM A536 - Ductile Iron Castings
5. ASTM A795 - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use
6. ASTM D1784 Specification for Rigid Poly(Vinyl Chloride)(PVC) Compounds and Chlorinated Poly(Vinyl Chloride)(CPVC) Compounds.
7. ASTM F402 Practice for Safe Handling of Solvent Cements, Primers and Cleaners Used for Joining Thermoplastics Pipe and Fittings.
8. ASTM F437 Specification for Threaded Chlorinated Poly(Vinyl Chloride) CPVC Plastic Pipe Fittings, Schedule 80.
9. ASTM F438 - Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40
10. ASTM F439 - Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
11. ASTM F442 - Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR–PR)
12. ASTM F493 - Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings

C. Factory Mutual:
1. FM - Factory Mutual Approval Guide.

D. National Fire Protection Association:
1. NFPA 13 – Standard for the Installation of Sprinkler Systems.

2. NFPA 13R – Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies.
3. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.
4. NFPA 24 – Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
5. NFPA 25 Standard for the Inspection, Testing and Maintenance of Water Based Extinguishing Systems.
6. NFPA 90A Standard for the Installation of Air Conditioning and Ventilating Systems.

E. National Sanitation Foundation/America National Standards Institute
1. NSF/ANSI Standard 14 Plastic Piping Components and Related Materials.
2. NSF/ANSI Standard 61 Drinking Water System Components – Health Effects.

F. Plastic Pipe Institute

G. Underwriters Laboratory:
1. UL - Fire Resistance Directory.
2. UL 1887 Fire Test of Plastic Sprinkler Pipe for Flame and Smoke Characterization.
3. UL 1821 Outline of Proposed Investigation for Thermoplastic Sprinkler Pipe and Fittings for Fire Protection Service.

1.03 SYSTEM DESCRIPTION

A. This project is comprised of alterations and renovations to the existing sprinkler system. Field verify existing conditions prior to submitting shop drawings, including but not limited to location of the existing sprinklers, locations and sizes of existing sprinkler piping, and available static pressure, residual pressure, and flow at the base of the riser. Revise sprinkler piping as required to support the new layout of sprinklers, including upsizing of existing piping where required hydraulically.

B. Perform a flow test to be used for hydraulic calculations; do not use the flow test data on the drawing for the hydraulic calculations. Provide hydraulic calculations. Hydraulic calculations shall include a safety factor of 10%. Combined inside and outside hose stream allowance for hydraulic calculations shall be [100] [250] gpm. Maximum velocity shall be 18 fps.

C. Provide a wet pipe system hydraulically designed in accordance with NFPA 13 and acceptable the Authority Having Jurisdiction. Perform a flow test to be used for hydraulic calculations; do not use the flow test data on the drawing for the hydraulic calculations. Provide hydraulic calculations. Hydraulic calculations shall include a safety factor of 10%. Combined inside and outside hose stream allowance for hydraulic calculations shall be [100] [250] gpm. Maximum velocity shall be 18 fps.

D. System to provide coverage for [entire building.] [building areas noted.]

E. Provide system to NFPA Standard occupancy requirements as noted on the drawings.

Hydraulic data and water supply information shall be as noted on the drawings.

F. Contractor shall perform a water flow test to verify available incoming water flow rate and pressure.

G. Interface system with building fire alarm system.

H. The sprinkler locations and piping arrangements indicated on the contract documents are diagrammatic. It is the responsibility of the contractor to fully coordinate sprinkler and piping locations with all other trades.

I. Field verify existing conditions. If it is determined that the existing swing joint assemblies are supplied by ½" tee outlets inform Architect/Engineer for direction on how to proceed with work.]

J. Sprinklers installed in a light hazard classification occupancy shall be a listed quick response type.

K. Provide fire department connections as indicated on Drawings and in accordance with the requirements of the local fire department.

1.04 SUBMITTALS

A. Division 01 – General Requirements: Submittal procedures.

B. Where the terms “authorities having jurisdiction” is used, within this Specification, it shall include the Insurance Underwriter and all regulatory agencies having vested interest in this project.

C. Shop Drawings:
1. Submit fire protections shop drawings drawn to a minimum scale of ¼”=1’-0”. Indicate pipe materials used, joining methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
2. Submit hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories. Indicate system controls.
3. Submit manufacturer’s data for the following:
   a. Piping
   b. Sprinklers
   c. Air compressor/pressure maintenance devices
   d. Hangers and supports
   e. Accelerators
   f. Alarm valves
   g. Piping specialties
   h. Fire department connections
   i. System controls.
4. Sprinkler drawings and calculations shall bear the seal of a Professional Engineer licensed in the State where the project is located. Seal and signature shall not be copied and shall be provided as an original drawing and each calculation.
5. Sprinklers shall be as shown on drawings and submittals and shall be specifically identified with the applicable style or series designation as published in the appropriate agency listing or approval. Trade names or other abbreviated designations are not permitted.

D. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

E. After successful review by Engineer, submit sprinkler layout shop drawings, product data, and hydraulic calculations to the authority having jurisdiction, the Fire Marshall, and the Owner's insurance underwriter for approval. Submit proof of approval.

F. Grooved joint couplings and fittings shall be shown on shop drawings and product submittals and shall be identified with the applicable style or series designation.

G. Manufacturer’s Certificate: Certify that system has been tested and meets or exceeds specified requirements and code requirements.

1.05 CLOSEOUT SUBMITTALS

A. Division 01 – General Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

C. Operation and Maintenance Data: Submit components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.06 QUALITY ASSURANCE

A. Workmanship and Qualifications: Materials and equipment shall be installed in accordance with NFPA and applicable local codes and ordinances, by a state licensed sprinkler system Contractor. Equipment shall be installed to conform to the referenced NFPA standards as applicable, and devices used shall be listed and approved by Underwriters laboratories (UL) and Factory Mutual (FM) unless otherwise indicated.

B. Codes and Standards: Work shall be equal or superior to that required by codes, regulations, ordinances, and laws imposed by the jurisdictional authorities, including those of state codes, the State Fire Marshall, local ordinances and OSHA. Nothing in the Specifications permit violations of such directives, and where conflict occurs, the directive shall govern, except where superior work is specified or indicated.

C. In addition to complying with the above codes and regulations, comply with the requirements of the following:
   1. NFPA Standard 13.
   2. [NFPA Standard 13R]
   3. NFPA Standard 24.
   4. State Building and Fire Codes.
   5. Local Jurisdictional Authorities.

D. Grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

E. Valves: Bear UL and/or FM label or marking. Provide manufacturer’s name and pressure rating marked on valve body.

F. Items of similar class shall be the products of the same manufacturer. All valves, accessory items, etc., shall be from the same source.

G. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

H. Installer: Company specializing in performing work of this Section with minimum five years experience.

I. Design sprinkler system under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State where the project is located.

1.07 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.08 PRE-INSTALLATION MEETINGS

A. Division 01 – General Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Product storage and handling requirements.

B. Deliver and store products in shipping containers, with labeling in place.

C. Equipment, valves, gages and etc., shall be covered and protected during the execution of the work. All equipment and piping shall be protected from freezing. Labeling to remain in place.

D. All unloading, hauling, and handling of materials shall be the responsibility of the Sprinkler Contractor.

1.10 WARRANTY

A. Division 01 – General Requirements: Product warranties and product bonds.

1.11 EXTRA MATERIALS

A. Division 01 – General Requirements: Spare parts and maintenance products.

B. Furnish extra sprinklers under provisions of the referenced NFPA standards and as indicated below.

PART 2 PRODUCTS

2.01 SPRINKLERS

A. Manufacturers:
   1. Viking.
   2. Tyco.
   3. Victaulic.
   4. Grinnell Corp.
   5. Reliable Sprinkler Corp.
   6. Substitutions: Division 01 – General Requirements

B. Sprinklers shall be in accordance with the schedule indicated on the plans.

C. Sprinkler bodies shall be die-cast brass, with hex shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation.

D. Where sprinklers will be installed in close proximity to heat sources and special locations, as identified in NFPA 13, temperature ratings shall be in accordance with the requirements of NFPA 13

E. Spare Sprinklers: Furnish spare automatic sprinklers in accordance with the requirements of NFPA 13. Sprinklers shall be in a suitable container and shall be representative of, and in proportion to, the number of each type and temperature rating of the sprinklers installed. Furnish no less than two special sprinkler wrenches, or at least one wrench for each container or sprinkler box, whichever is greater.

F. In areas where sprinkler heads are subject to physical damage, provide sprinkler guard assembly over head, finish to match sprinkler finish. This shall include but not be limited to the following locations.
   1. Sprinklers in elevator shafts.
   2. Sprinklers under lower rakes of stairways.
   3. Sprinklers in electrical rooms, boiler rooms and other mechanical rooms.
   4. Sprinklers installed 7’-0” or less above finished floors.
   5. Sprinklers in gymnasium/fitness center areas.

2.02 BURIED PIPING

A. Ductile Iron Pipe: ANSI/AWWA C151, cement lined.
   1. Fittings: ANSI/AWWA C110, standard thickness.
   2. Joints: ANSI/AWWA C111, rubber gasket.

2.03 ABOVE GROUND PIPING

A. Steel Pipe: ASTM A53, ASTM A795 or ASTM A135; Schedule 40 steel. Schedule 10 steel pipe shall be allowed for pipe sizes 1 ¼" diameter and larger when roll grooved mechanical couplings are used.
   1. Fittings:
      a. Cast Iron Fittings: ANSI/ASME B16.1, flanges and flanged fittings; ANSI/ASME B16.4, screwed fittings.
      b. Malleable Iron Fittings: ANSI/ASME B16.3, screwed Class 150 and 300 type. Threads shall conform to ANSI/ASTM A47.
      c. Grooved Mechanical Fittings: ANSI A21.10/AWWA C-110 ductile iron; ASTM A536 Grade 65-45-12 ductile iron; ASTM A234 Grade WPB; or factory fabricated from carbon steel pipe conforming to ASTM A53; with grooves or shoulders designed to accept grooved end couplings. Fittings shall be of the same manufacturer as the adjoining couplings. Grooved Mechanical Couplings: ASTM A536 Grade 65-45-12, ductile iron housing, elastomer gasket with nuts and bolts to secure roll grooved pipe and fittings.
         1) Rigid Type Couplings: Housings cast with offsetting, angle-pattern bolt pads to provide rigidity and system support and hanging in accordance with NFPA-13.
            a) 1-1/4" through 4": Factory assembled for direct stab installation without field disassembly.
         2) Flexible Type Couplings: Use in locations where vibration attenuation and stress relief are required, and for seismic considerations in accordance with the manufacturer's instructions.

B. CPVC Pipe:
   1. Manufacturers
      a. Lubrizol Advanced Materials
      b. Georg Fischer Harvel, LLC.
      c. NIBCO INC.
      d. Tyco Fire Protection Products
      e. The Viking Corporation
      f. IPEX INC.
      g. Substitutions – Division 01 – General Requirements
   2. Pipe shall meet or exceed the requirements of ASTM F442 material designation CPVC 4120-06 in standard dimension ratio (SDR) 13.5. Additionally, the pipe must be marked with the following pressure ratings:
      a. 320 PSI @ 73° F
      b. 175 PSI @ 150° F
      c. 100 PSI @ 180° F
   3. Fittings shall meet or exceed the requirements of ASTM F437 (schedule 80 threaded), ASTM F438 (schedule 40 socket) or ASTM F439 (schedule 80 socket).
   4. All socket type joints shall be assembled with solvent cements that meet or exceed the requirements of ASTM F493. Safe handling of solvent cements shall be in accordance with ASTM F402. Solvent cement shall be certified by NSF International for use with potable water and approved for use by the manufacturers.
   5. Both pipe and fittings shall be Listed by Underwriters Laboratories for use in automatic fire sprinkler systems and shall bear the logo of the Listing Agency. See UL Fire Protection Equipment Directory, categories VIWT and HFYH.
   6. Ancillary products (including, but not limited to fire stops, thread sealants, leak detectors, etc.) coming into contact with pipe and fittings must be chemically compatible with CPVC pipe and fittings

2.04 ALARM CHECK VALVES

A. Manufacturers:
   1. Viking.
   2. Tyco.
   3. Victaulic.
   4. Grinnell Corp.
   5. Reliable Sprinkler Corp.
   6. Substitutions: Division 01 – General Requirements.

B. Wet Pipe Alarm Valve:
   1. Check type valve with nitrile rubber seat o-ring aluminum bronze clapper with EPDM seal to automatically actuate electrically and hydraulically operated alarms, with pressure retard chamber and variable pressure trim. Valve internal components shall be replaceable without removing valve from the installed position.
   2. Provide retard chamber as part of wet alarm valve trim to allow for pressure fluctuations. Provide other trim as required by the manufacturer.
   3. Alarm check valve assembly shall allow discharge of one or more sprinklers to activate electric and hydraulic alarms.

2.05 FIRE HOSE CABINETS

A. Manufacturers:
   1. Crocker.
   2. Potter Roemer.
   3. Allenco.
   4. Substitutions: Division 01

B. Hose Cabinets:
   1. Style: Recessed mounted unless otherwise indicated.. Fire rated when installed in fire rated assemblies.
   2. Tub: 18 gage thick steel, prepared for pipe and accessory rough in.
   3. Door: 20 gage thick steel, [with solid door panel,] hinged, positive latch device.
   4. Finish: Enameled, color as selected by Architect.

C. Hose: 1-1/2 inch diameter, 100 feet long, of latex lined, linen hose; mildew and rot-resistant.

D. Nozzle: Chrome plated brass; combination fog, straight stream, and adjustable shut-off.

2.06 VALVES

A. Manufacturers:
   1. ARGCO
   2. Crocker.
   3. Potter Roemer.
   4. American Fire SupplySubstitutions: Division 01 – General Requirements.

B. Hose Station Valve: Angle type, brass with chrome plated finish, 1-1/2 inch nominal size

C. Hose Connection Valve: Angle type; brass with chrome plated finish; 2-1/2 inch size, thread to match fire department hardware, 300 psi working pressure, with threaded cap and chain of chrome plated finish.
   1. Hose Connection Valve Cabinets:
      a. Style: Recessed mounted. Fire rated when installed in fire rated assemblies.
      b. Tub: 1 gage thick steel, prepared for pipe and accessory rough in.
      c. Door: 12 gage thick steel, [flush,] hinged, positive latch device.
      d. Finish: Enameled, color as selected.
   2.

D. Roof Hose Valve Connection:
   1. Type: Freestanding type with ductile iron pedestal and brass finish.
   2. Outlets: Two-way with thread size to suit Fire Department hardware; threaded dust cap and drain of matching material and finish
   3. Drain: 3/4 inch automatic ball drip to drain
   4. Label per NFPA 13.
   5. Provide with roof hydrant control valve, thru the wall type. Provide with indicator plate to determine position of gate valve located below roof. Valve shall be UL listed and FM approved.

E. Pressure Reducing Hose Valve:
   1. Cast brass valve with rising stem, internal parts of brass and chrome silicon. Red aluminum hand wheel.
   2. 2-1/2 inch size, thread to match fire department hardware.
   3. Reduces pressure under flow and no flow conditions.
   4. Static pressure rated up to 400 PSI.
   5. Flow rated up to 500 GPM.
   6. Low torque manual open/close requires less than 15 ft/lbs.
   7. 4 Pressure gauge taps on both inlet and outlet sides.
   8. Color coded pressure adjustment indicator.
   9. Built in automatic check valve.
   10. Built in supervisory switch.
   11. UL Listed, complies with NFPA-13.
   12. Provide with threaded cap and chain of chrome plated finish.

F. Drain Valves:
   1. Compression Stop: Bronze with hose thread nipple and cap.
   2. Ball Valve: Brass with cap and chain, 3/4 inch hose thread.
   3. Ball Drip Valve: Brass two piece ball type check valve.

G. Valves shall be either UL listed or FM approved for use on fire protection systems.

2.07 PIPING SPECIALTIES

A. Manufacturers:
   1. Potter-Roemer.
   2. System Sensor.
   3. Victaulic.
   4. Viking.
   5. Substitutions: Division 01 – General Requirements.

B. Electric Alarm: Electrically operated red enameled [chrome plated] gong with pressure alarm switch, 120 volt with weatherproof back box.

C. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two form C contacts; rated 10 amp at 120 volt.

D. Valve Tamper Supervisory Switch: Two form C contacts; rated 10 amp at 120 volt. UL listed and FM approved. Up to 2” – Potter Model PCVS-1. Over 2" switch shall be Potter Model OSYSU-2.

E. Pressure Switch: ½ inch male pressure connection to alarm valve riser and actuated by any flow of water in excess of one sprinkler. Maximum pressure rating 175 psi, weather-proof with tamper resistant screws, rated 10 amps at 120 volt.

F. Pressure Gage: Rated for 300 psi use, 3-1/2” in diameter.

2.08 FIRE DEPARTMENT CONNECTION

A. Refer to plans for type of fire department connection. Provide with polished brass identification plate. Confirm with local fire marshal provided fire department connection is desired.

B. Clapper design shall allow for one or both inlets to be pressurized during operation.

C. Provide polished polished brass alloy caps and chains for protection of the 2-1/2” inlets.

D. The fire department connection shall be constructed of cast brass with brass clapper, brass swivel couplings and a brass hinge pin. The fire department connection shall be labeled in raised letters on the body in accordance with NFPA 13.

E. Fire department connection threads shall match the local fire departments standard.

F. Drain: 3/4 inch automatic drip, install at low point after check valve, pipe to building exterior.

G. Provide a 90-degree elbow with drain connection at each fire department connection to allow for drainage in areas exposed to the building exterior to prevent freezing.

2.09 FORWARD FLOW TEST HEADER

A. Manufacturers:
1. Potter-Roemer.
2. Crocker
3. American Fire Supply.
4. Substitutions: Division 01 – General Requirements.

A. Cast brass body with back, angle or end inlet as indicated on plans. Size of inlet, and sizes and number of outlets as indicated on plans.

B. Brass NRS hose gate valves with loose bonnets, 3” female, NPT inlet x 2-1/2” Male hose thread outlet, with caps and chains.

2.10 FIRE PUMP TEST HEADER

A. Manufacturers:
1. Potter-Roemer.
2. Crocker
3. American Fire Supply.
4. Substitutions: Division 01 – General Requirements.

B. Cast brass body with back, angle or end inlet as indicated on plans. Size of inlet, and sizes and number of outlets as indicated on plans.

C. Brass NRS hose gate valves with loose bonnets, 3” female, NPT inlet x 2-1/2” Male hose thread outlet, with caps and chains.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate work of this Section with other affected work.

B. Prepare piping connections to equipment with grooved joint couplings, flanges, or unions.

3.02 WATER SUPPLY TREATMENT.

A. Evaluate water supplies and environmental conditions for the existence of microbes and conditions that contribute to microbiologically influenced corrosion (MIC). Where conditions are found that contribute to MIC, notify the engineer and owner(s) and a plan shall be developed to treat the system using one of the following methods:
1. Install a water pipe that will not be affected by the Mic microbes.
2. Treat all water that enters the system using an approved biocide.

3. Implement an approved plan for monitoring the interior conditions of the pipe at established time intervals and locations.
4. Install corrosion monitoring station and monitor at established intervals.

3.03 INSTALLATION

A. Install equipment in accordance with manufacturer's instructions.

B. Install fire protection systems in accordance with the referenced NFPA standards.

C. Impairments to the existing water supplies shall be minimized. Work shall be complete before making the final connections to the existing water supplies. Notify the owners representative before impairing any fire protection equipment.

D. Maintain a clean and orderly site during the installation of the sprinkler system. Materials shall not be stored in the halls or other public areas.

E. Cutting, welding and other hot work shall not be permitted without permission from the building owner. Provide a fire watch for one hour after all welding.

F. The required tests shall be witnessed by the Fire Marshall, authority having jurisdiction, Owner's insurance underwriter and Architect/Engineer.

G. Provide the indicated backflow preventer assembly at sprinkler system water source connection. The backflow preventer shall be installed per the manufacturer's recommendations and in accordance to the requirements of the AHJ and/or the water utility.

H. Locate fire department connection with sufficient clearance from walls, obstructions, etc., to allow full swing of fire department wrench handle. Coordinate the location of the fire department connection with the local fire officials. Installation shall conform to the local fire officials' requirements.

I. Locate alarm bell as indicated on drawings, at the elevation as shown on the Architectural elevations. Where the alarm bell location is not shown on the drawings or on the Architectural elevations, coordinate the location with the Architect.

J. Center sprinklers in ceiling tile as indicated on drawings.

K. Sprinkler Bulb protector must remain in place until the sprinkler is completely installed. Remove the bulb protector by hand after installation and before the system is placed in service. Do not use any tools to remove the bulb protector.

L. Do not install sprinklers that have been dropped, damaged, or show a visible loss of fluid.

M. Coordinate flow switches, tamper switches, and all other sprinkler devices with the fire alarm system.

N. Install pipe runs to minimize obstruction to other work.

O. Install piping in concealed spaces above finished ceilings.

P. Hydrostatically test entire system.

3.04 INSTALLATION – PIPE AND FITTINGS, UNDERGROUND

A. Install pipe and fittings in accordance with manufacturer's recommendations.

B. The depth of cover shall be not less than 30", except that the depth of cover where piping is below asphalt, concrete, and similar construction shall be minimum 36.

C. The depth of cover shall be measured from the top of the pipe to finished grade, and due consideration shall always be given to future or final grade and nature of soil.

D. Pipes shall bear throughout their full length and shall not be supported by the bell ends only or by blocks.

E. Tees, plugs, caps, bends, reducers, valves, and hydrant branches shall be restrained against movement by using thrust blocks in accordance with the referenced NFPA standards.

F. On steep grades, mains shall be additionally restrained to prevent slipping.

G. Pipe shall be restrained at the bottom of a hill and at any turns, lateral or vertical.

H. Backfilling.
   1. Underground piping shall not be buried until piping has been flushed and hydrostatically pressure tested in accordance with the acceptance requirements indicated below.
   2. Backfill shall be tamped in layers or puddled under and around pipes to prevent settlement or lateral movement and shall contain no ashes, cinders, refuse, organic matter, or other corrosive materials.
   3. Rocks shall not be placed in trenches.
   4. Frozen earth shall not be used for backfilling.
   5. In trenches cut through rock, tamped backfill shall be used for at least 6 in. under and around the pipe and for at least 2 ft above the pipe.

I. Acceptance requirements
   1. Underground piping shall be flushed in accordance with the requirements of the referenced NFPA standards.
   2. Piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested, in accordance with the referenced NFPA standards, at 200 psi or 50 psi in excess of the system working pressure, whichever is greater, and shall maintain that pressure ±5 psi for 2 hours.

3.05 INSTALLATION – PIPE AND FITTINGS ABOVE GROUND

A. Pipe and fitting shall be installed per the manufacture's installation requirements. Furnish materials necessary to meet these requirements including but not limited to hangers, support, insulation, shields, sleeves and power supplies.

B. For CPVC Piping, Installation practices such as pipe support spacing, bracing, allowance for thermal expansion/contraction, solvent welding and handling and storage shall be in accordance with the manufacturer's instructions and the UL Listing which includes installation limitations.
   1. Fire Sprinkler Contractor must submit documentation that verifies personnel assigned to this project prior to beginning construction who have successfully completed formal CPVC fire sprinkler systems training conducted by a fire sprinkler systems trainer authorized by the CPVC pipe and fitting manufacturer. Personnel's training documentation must be current and have been updated within the past two (2) years.

C. Locate piping in concealed spaces above finished ceilings unless noted otherwise.

D. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

E. Install piping to conserve building space, to not interfere with use of space and other work.

F. Install piping to not interfere with electrical equipment.

G. Group piping whenever practical at common elevations.

H. Install pipe sleeve at piping penetrations through partitions, walls, and floors. Seal pipe and sleeve penetrations to maintain fire resistance equivalent to fire separation.

I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

J. Grooved joint couplings and fittings shall be installed in accordance with the manufacturer's written installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be verified as

suitable for the intended service prior to installation. Gaskets shall be molded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved joint products. The manufacturer's representative shall periodically visit the jobsite and review installation. Contractor shall remove and replace any joints deemed improperly installed.

K. Pitch piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level. Provide auxiliary drains for the trapped piping sections in accordance with NFPA 13.

L. Auxiliary Drains.
   1. Auxiliary drains shall be provided where a change in piping direction prevents drainage of system piping through the main drain valve.
   2. Where the capacity of isolated trapped sections of pipe is 50 gal or more, the auxiliary drain shall consist of a valve not smaller than 1 in., piped to an accessible location.
   3. Where the capacity of isolated trapped sections of pipe is more than 5 gal and less than 50 gal, the auxiliary drain shall consist of a valve 3⁄4 in. or larger and a plug or a nipple and cap.
   4. Where the capacity of trapped sections of pipes in wet systems is less than 5 gal, one of the following arrangements shall be provided:
      a. An auxiliary drain shall consist of a nipple and cap or plug not less than 1⁄2 in. in size.
      b. An auxiliary drain shall not be required for trapped sections less than 5 gal where the system piping can be drained by removing a single pendent sprinkler.
      c. Where flexible couplings or other easily separated connections are used, the nipple and cap or plug shall be permitted to be omitted.
   5. Tie-in drains shall not be required on wet pipe systems and preaction systems protecting nonfreezing environments.

M. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Division 09.

N. Do not penetrate building structural members unless indicated.

O. Where more than one piping system material is specified, install compatible system components and joints. Install flanges, union, and couplings at locations requiring servicing.

P. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

Q. Provide dielectric fittings whenever joining two dissimilar metals.

R. Provide surge restrainers on all end of branches and arm overs in excess of 12-inches.

S. Provide minimum one air vent connection on wet pipe system utilizing metallic piping, in accordance with NFPA 13, at the high point of the system. Where the system includes multiple risers, provide minimum one high point air vent connection for each riser. Where portions of the system or of individual risers are configured such that venting from a single location would not effectively vent the entire system/riser, provide additional air vent connections at the high point of each individual section of piping accordingly.

3.06 INSTALLATION STANDPIPE/HOSE CONNECTIONS

A. Install in accordance with NFPA 14.

B. Install cabinets plumb and level. Secure to adjacent surfaces. Establish top of cabinet (inside horizontal) surface such that hose valve shall be mounted not less than 3 feet and not more than 5 feet above finished floor level. Coordinate exact mounting height with architectural plans.

C. Install hose station valve in cabinet at 60 inches above floor. Install hose-connection valve under hose station valve and not closer than 4 inches from side or bottom of cabinet.

D. Where static pressure exceeds 100 psi at any hose station, furnish pressure reducing valve to prevent pressure on hose exceeding 90 psi.

E. [Install and connect to fire pump system in accordance with Section 21 30 00 – Fire Pumps and NFPA 20.]

F. Install two way fire department outlet on roof in accordance with NFPA 14.

3.07 INTERFACE WITH OTHER PRODUCTS

A. Verify signal devices are installed and connected to fire alarm system.

3.08 PROTECTION OF INSTALLED CONSTRUCTION

A. Division 01: Protecting installed construction.

B. Apply masking tape or paper cover to protect concealed sprinklers, cover plates, and sprinkler escutcheons. Remove after painting. Replace painted sprinklers with new.

3.09 IDENTIFICATION

A. Provide and apply signs to control, drain, test and alarm valves to identify their purpose and function.

B. Provide and permanently attach hydraulic calculations data nameplate at the controlling valve for the sprinkler system. Provide lettering size and style from NFPA's suggested styles.

3.10 TESTING

A. Piping: The complete system shall be subject to a pressure test, and to such other tests as the authorities having jurisdiction may require. The pressure test shall be a hydrostatic pressure of 200 pounds per square inch for a period of two hours. The above ground piping and attached appurtenances shall show no pressure loss or leaks, refer to NFPA Standard 13 Hydrostatic tests. Before applying specified test pressure, all air must be expelled from the system. Testing shall be completed prior to permanent sealing of walls and partitions.

B. For CPVC Piping, pressure test shall not be done until after solvent-welded joints have cured per the manufacturer's installation instructions. The system shall be hydrostatically tested per the manufacturer's installation instructions and the requirements of the applicable NFPA Standard (NFPA 13, or 13R) and per the local Codes/Rules/Regulations for the jurisdiction installed in.

C. Upon satisfactory completion of all tests, submit three copies of the Standard Contractors Material and Test Certificate to the Owner.

3.11 CLEANING

A. Division 01: Final cleaning.

B. Flush entire piping system of foreign matter.

C. Below grade piping shall be flushed in accordance with the requirements of NFPA 24.

3.12 MAINTENANCE

A. Maintenance shall be in accordance with the Standard for Inspection, Testing and Maintenance of Water Based Extinguishing Systems as defined by NFPA 25.

END OF SECTION

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SECTION 23 04 00
GENERAL CONDITIONS FOR MECHANICAL TRADES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to all Divisions 23 Sections.

B. This section applies to certain sections of Division 26, "Electrical," and this section applies to all sections of Division 23, "Mechanical" of this project specification unless specified otherwise in the individual sections.

C. The Drawings of other trades (Architectural, Food Service, Structural, Landscape, Civil, Mechanical, Fire Protection and Plumbing) shall be examined for coordination and familiarity of work with other Contractors. Any duplication or omission of provisions in this project should be brought to the attention of the Owners prior to Bidding.

1.02 DESCRIPTION

A. The General Conditions and Supplementary General Conditions are a part of this Division and are to be considered a part of this Contract.

B. Where items of the General Conditions and Supplementary General Conditions are repeated in other Sections of the Specifications, it is merely intended to qualify or to call particular attention to them. It is not intended that any other parts of the General Conditions and Supplementary General Conditions shall be assumed to be omitted if not repeated therein. This Section applies equally and specifically to all Contractors supplying labor and/or equipment and/or materials as required under each Section of this Division. Where conflicts exist between the drawings and the specifications or between this section of the specifications and other sections, the more stringent or higher cost option shall apply.

1.03 INTENT

A. It is the intent of the Specifications and Drawings to call for finished work, tested and ready for operation. Provide all parts necessary for the intended use, fully complete and operational, and installed in professional manner in accordance with the design intent.

B. Any apparatus, appliance, material or work not shown on drawings but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and ready for operation as determined by good trade practice even if not particularly specified, shall be furnished, delivered and installed under their respective Divisions without any additional expense to the Owner.

C. Minor details not usually shown or specified but necessary for proper installation and operation shall be included in the work as though they were hereinafter shown or specified.

D. Work under each Section shall include giving written notice to the Owner and Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary

items of work omitted. In the absence of such written notice, it is mutually agreed that work under each Section includes the cost of all required items for the accepted, satisfactory functioning of the entire system without extra compensation.

1.04 DEFINITIONS

A. No Exceptions Taken – reviewed and determined to be in general conformance with contract documents.

B. “Approved equal” mean any product which in the opinion of the Engineer is equal in quality, arrangement, appearance, and performance to the product specified.

C. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Engineer," "requested by the Engineer," and similar phrases.

D. “Finished” refers to all rooms and areas to be specified to receive architectural treatment as indicated on the drawings. All rooms and areas not covered, including underground tunnels and areas above ceilings shall be considered not finished, unless otherwise noted.

E. “Furnish” or “supply” shall mean purchase, deliver to, and off-load at the job site, ready to be installed including where appropriate all necessary interim storage and protection.

F. Indicated: The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

G. “Install” shall mean set in place complete with all mounting facilities and connections as necessary ready for normal use or service.

H. “Product” shall mean any item of equipment, material, fixture, apparatus, appliance or accessory installed under this Division.

I. “Provide” shall mean furnish (or supply) and install as necessary.

J. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

K. Remove: The term “remove” means “to disconnect from its present position, remove from the premises and to dispose of in a legal manner.”

L. Special Warranties: The term “Special Warranties” are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

M. Standard Product Warranties: The term “Standard Product Warranties” are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

N. “Subcontractor” means specifically the subcontractor working under this Division. Other Contractors are specifically designated “Plumbing Subcontractor”, “General Contractor” and so on. Note: Take care to ascertain limits of responsibility for connecting equipment which requires connections by two or more trades.

O. Substitutions: Requests for changes in products, materials, equipment, and methods of construction proposed by the Contractor are considered requests for "substitutions."

P. “Wiring” shall mean cable assembly, raceway, conductors, fittings and any other necessary accessories to make a complete wiring system.

1.05 CONTRACT DOCUMENTS

A. The two dimensional drawings govern the construction. They show the design intent and are part of the Contract Documents. BIM models are not part of contract documents. They are developed for convenience only.

B. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. Consult the Architectural Drawings and Details for exact location of fixtures and equipment; where same are not definitely located, obtain this information from the Architect. (Do not scale the drawings)

C. Work under each Section shall closely follow Drawings in layout of work; check Drawings of other Divisions to verify spaces in which work will be installed. Maintain maximum headroom; where space conditions appear inadequate, Owner and Engineer shall be notified before proceeding with installations.

D. The Owner may, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades and/or for proper execution of the work.

1.06 DISCREPANCIES IN DOCUMENTS

A. Where variances occur between the Drawings and Specifications or within either of the Documents, the item or arrangement of better quality, shall be included in the Contract price. The Owner and Engineer shall decide on the item and the manner in which the work shall be installed.

B. Where Drawings or Specifications conflict or are unclear, submit clarification request in writing before Award of Contract. Otherwise, Architect's interpretation of Contract Documents shall be final, and no additional compensation shall be permitted due to discrepancies or un-clarities thus resolved.

C. Where Drawings or Specifications do not coincide with manufacturers' recommendations or with applicable codes and standards, submit clarification request in form of an RFI before installation. Otherwise, make changes in installed work required for compliance with manufacturer instructions or codes and standards within Contract Price.

D. Where insufficient information exists in the documents to precisely describe a certain component or subsystem, or the routing of a component or its coordination with other building elements, where notification required by Paragraph (B) above has not been submitted, provide the specific component or subsystem with all parts necessary for the

intended use, fully complete and operational, and installed in professional manner either concealed or exposed in accordance with the design intent.

E. Where discrepancies exist between the mechanical, plumbing, fire protection, and electrical drawings in regards to what trade owns disconnects or starters, the discrepancy shall be brought to the Architect's attention in accordance with paragraph (B) above. If the scope is not resolved prior to the Award of Contract, Division 26 shall provide such items.

1.07 CODES AND STANDARDS

A. Reference Standard Compliance

1. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories Inc. (UL), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.
2. Independent Testing Organization Certificate: In lieu of the label or listing indicated above, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

B. Wherever Codes and/or Standards are mentioned in these Specifications, the latest applicable edition or revision of the local building or life safety code shall be followed.

C. The following Standards shall be used where referenced by the following abbreviations:

AABC	Associated Air Balance Council
ACGIH	American Conference of Governmental Industrial Hygienists
ADC	Air Diffusion Council
AGA	American Gas Association
AIA	American Institute of Architects
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASSE	American Society of Sanitary Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CGA	Compressed Gas Association
CSA	Canadian Standards Association

CISPI	Cast Iron Soil Pipe Institute
EJMA	Expansion Joint Manufacturing Association
EPA	Environmental Protection Agency
FM	Factory Mutual
FSSC	Federal Specification
HIS	Hydraulic Institute Standards
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
ISO	Insurance Services Office
MCAA	Mechanical Contractors Association of America
NBS	National Bureau of Standards
NEBB	National Environmental Balancing Bureau
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NOFI	National Oil Fuel Institute
NSC	National Safety Council
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
PDI	Plumbing and Drainage Institute
SBI	Steel Boiler Industry (Division of Hydronics Institute)
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
STI	Steel Tank Institute
UL	Underwriters' Laboratories

D. All materials furnished and all work installed shall comply with the rules and recommendations of the NFPA, the requirements of the local utility companies, the recommendations of the fire insurance rating organization having jurisdiction and the requirements of all Governmental departments having jurisdiction.

E. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus and Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether shown on Drawings and/or specified or not.

1.08 PERMITS AND FEES

A. The Contractor shall give all necessary notices, obtain all permits; and pay all Government and State sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with the work, file all necessary Drawings, prepare all documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction, obtain all required certificates of inspection for his work, and deliver a copy to the Owner and Engineer before request for acceptance and final payment for the work.

1.09 EQUIPMENT EQUIVALENTS AND SUBSTITUTIONS

A. Certain manufacturers of material, apparatus or appliances are indicated in the drawings and specifications for this project. These items have been used as the basis of design, and as a convenience in fixing the minimum standard of quality, finish and design that is

required. If the Contractors uses an “approved equal” alternative to the basis of design, and if the features of that alternative have an impact on other components of the Project, the Contractor shall include the necessary adjustments in those components, whether for architectural, structural, mechanical, electrical, fire protection, or any other elements, plus any adjustments for difference in performance.

B. Where no specific make of material, apparatus or appliance is mentioned, any first-class product made by a reputable manufacturer may be submitted for Architect and Engineer review.

C. Where the Contractor proposes to use an item that is different from the basis of design in the Drawings and specifications, and that will require the redesign of the structure, partitions, foundations, piping, wiring or any other component of the mechanical, electrical, or architectural layout, the Contractor shall provide the necessary redesign of those components.

D. Where the Contractor proposes to deviate (provide an equivalent or request for substitution) from the basis of design scheduled equipment or materials as hereinafter specified or shown on the drawings, they are required to submit a requested for substitution in writing. The Contractor shall state in their request whether it is a substitution, equivalent or a non approved equivalent to that specified and the amount of credit or extra cost involved. A copy of said request shall be included in the Base Bid with manufacturer’s equipment cuts. The Base Bid shall be based on using the materials and equipment as specified with no exceptions.

E. If an alternative or substitute item results in a difference in quantity and arrangement of structure, piping, ductwork, valves, pumps, insulation, wiring, conduit, and equipment from that specified or indicated on the Drawings, the Contractor shall furnish and install any such additional equipment required by the system, at no additional cost to the Owner including any costs added to other trades due to the equivalent change from the basis of design detailed in the drawings or included within the specifications.

F. Equipment, material or devices submitted for review as a “substitution” shall meet the following requirements:

G. Substitution Request Submittal: Requests for substitution will be considered if received in writing 14 days before the bid date. Requests received later than 14 days before the bid date may be considered or rejected at the discretion of the Engineer/Owner. Once the Contractor submits a complete request for substitution as determined by the engineer, the engineer reserves the right to request the time necessary to evaluate the request for substitution and review it with the Owner.

H. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

1. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
2. Samples, where applicable or requested.

3. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
4. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
5. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
6. Cost information, including a proposal of the net change, if any in the Contract Sum.
7. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
8. Engineer's Action: Within one week of receipt of the request for substitution, the Engineer will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance of a product substitution will be in the form of an Addendum.
9. Other Conditions: The Contractor's substitution request will be received and considered by the Engineer when one or more of the following conditions are satisfied, as determined by the Engineer; otherwise requests will be returned without action except to record noncompliance with these requirements.
    a. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
    b. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
    c. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

1.10 SUBMITTAL PROCEDURES

A. Provide Submittals in accordance with the requirements of Division 1 and as indicated in the following.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
   1. Allow ten business days for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Engineer will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
   2. If an intermediate submittal is necessary, process the same as the initial submittal.
   3. Allow ten business days for reprocessing each submittal.
   4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

D. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block. Submittals shall be arranged in order of specification sections.
   1. Include the following information on the label for processing and recording action taken.
      a. Project name.
      b. Date.
      c. Name and address of Engineer.
      d. Name and address of Contractor.
      e. Name and address of subcontractor.
      f. Name and address of supplier.
      g. Name of manufacturer.
      h. Number, title and paragraph of appropriate Specification Section.
      i. Drawing number and detail references, as appropriate.

E. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer using a transmittal form. Submittals received from sources other than the Contractor will be returned without action. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

F. Except for submittals for record, information or similar purposes, the Engineer will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility.

G. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, to indicate the action taken.

1.11 SHOP DRAWINGS

A. Submit neatly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. The Contractor shall submit for review detailed shop drawings of all equipment and material specified in each section and coordinated ductwork layouts. No material or equipment may be delivered to the job site or installed until the Contractor has received shop drawings for the particular material or equipment which have been properly reviewed. Shop drawings shall be submitted within 60 days after award of Contract before any material or equipment is purchased. The Contractor shall submit for review all shop drawings to be incorporated in the Mechanical Contract.

C. Provide shop drawings for all devices specified under equipment specifications for all systems. Shop drawings shall include manufacturers' names, catalog numbers, cuts, diagrams, dimensions, identification of products and materials included, compliance with specified standards, notation of coordination requirements, notation of dimensions established by field measurement and other such descriptive data as may be required to identify and accept the equipment. A complete list in each category (example: all fixtures), of all shop drawings, catalog cuts, material lists, etc., shall be submitted to the Engineer at one time. No consideration will be given to a partial shop drawing submittal.

D. When a submittal could involve more than one trade, e.g., valves, piping, etc., the submitted shall be separated by traded involved, ie. HVAC, plumbing, fire protection, etc.

E. Where multiple quantities or types of equipment are being submitted, provide a cover sheet (with a list of contents) on the submittal identifying the equipment or material being submitted.

F. The Contractor shall furnish all necessary templates, patterns, etc., for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as required.

G. "No Exception Taken" rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are reviewed, review does not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Drawings and Specifications. Verify available space prior to submitting shop drawings. Review of shop drawings shall not apply to quantity of material.

H. After shop drawings have been reviewed, with no exceptions taken, no further changes will be allowed without the written consent of the Engineer.

I. Shop drawing submittal sheets which may show items that are not being furnished shall have those items crossed off to clearly indicate which items will be furnished.

J. Bidders shall not rely on any verbal clarification of the Drawings and/or Specifications. Any questions shall be referred to the Engineer in writing at least five (5) working days prior to Bidding to allow for issuance of an Addendum.

K. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

L. All submittals shall be made in electronic PDF format with searchable OCR (Optical Character Recognition) format. This excludes scanned and faxed materials.

1.12 COORDINATION DRAWINGS AND BIM MODEL

A. Coordination drawings are required for all mechanical and electrical trades. The content and procedures described in Division 01 shall be followed, with the additional requirements specifically for the mechanical and electrical trades as described in this Section. If a BIM model is not used on this project, the below requirements shall be accomplished in CAD.

B. Prepare coordination drawings accordance with Division 1, at 1 to 1 (full) scale prepared at ¼" = 1' -0" detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. The Contractor shall indicate the proposed locations of piping, conduit, ductwork, equipment, and materials. Include the following:
    a. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
    b. Equipment connections and support details.
    c. Exterior wall and foundation penetrations.
    d. Fire-rated wall and floor penetrations.
    e. Sizes and locations of required concrete pads and bases.

C. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.

D. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

E. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

F. The Contractor and each subcontractor shall sign and date each coordination drawing prior to submission.

G. Work shall not be performed until coordination drawings have been approved by the architect and engineer.

H. Electronic copies of the MEP floor plans and/or BIM model are available to use as a basis for preparing coordination drawings and can be provided by the Engineer. If the Contractor elects to obtain the Engineers electronic files an Electronic Drawing File Release Form must be submitted. This form must be signed by the Contractor, Owner, and Architect. Upon receipt of a signed copy of the Electronic Drawing File Release Form, the Engineer will provide copies of the electronic files for the Contractor's use. A copy of the Electronic Drawing File Release Form is appended to the end of this specification section

I. Review by Engineer of coordination drawings is limited to confirming that requirements for coordination and preparation of plans have been complied with by the Contractor and shall not diminish responsibility under this Contract for final coordination of installation and maintenance clearances of all systems and equipment with Architectural, Structural, Mechanical, Electrical and other related work.

1.13 COORDINATION WITH OTHER DIVISIONS

A. All work shall be carried out in conjunction with other trades and full cooperation shall be given in order that all work may proceed with a minimum of delay and interference. Particular emphasis is placed on timely installation of major apparatus and furnishing other Contractors, especially the Contractor or Construction Manager, with information as to openings, chases, sleeves, bases, inserts, equipment locations, panels, etc., required by other trades.

B. The Contractors are required to examine all of the Project Drawings and mutually arrange work so as to avoid interference with the work of other trades. In general, ductwork, HVAC piping, sprinkler piping and drainage lines take precedence over water, gas and electrical conduits. The Engineer shall make final decisions regarding the arrangement of work which cannot be agreed upon by the Contractors.

C. Where the work of the Contractor will be installed in close proximity to or will interfere with work of other trades, the Contractors will cooperate in working out space conditions to make a satisfactory adjustment.

D. If the work under a Section is installed before coordinating with other Divisions or Sections or so as to cause interference with work of other Sections, the necessary changes to correct the condition shall be made by the Contractor causing the interference without extra charge to the Owner.

E. The two dimensional drawings are diagrammatic. They indicate general arrangements of mechanical systems and other work, and are intended to convey sufficient information for skilled contractors and tradespeople to furnish and install complete systems. They are not intended to be absolutely precise; they are not intended to specify or to show every offset, fitting, and component. The purpose of the drawings is to indicate a systems concept, the main components of the systems, and the approximate geometrical relationships. Based on the systems concept, the main components, and the approximate geometrical relationships, provide all other components and materials to

make the systems fully complete, coordinated with other systems and the structure and space available, and operational. Similarly, the drawings do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structure and other trades in order to avoid interferences and to meet ceiling heights and other Architectural requirements. Establish and provide offsets, changes in direction, and exact routings to coordinate all systems. Where conflicts or potential conflicts exist and engineering guidance is desired, submit a “Request for Information” (RFI).

F. Controls contractor shall coordinate and sequences of operation with all other trades as necessary to provide a complete and functioning system.

1.14 QUALITY CONTROL

A. Service Support: The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

B. Modification of References: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears.

C. The Contractor shall furnish the services of an experienced superintendent who shall be constantly in charge of the installation of the work together with all skilled tradespeople, fitters, metal workers, welders, helpers and laborers required to unload, transfer, erect, connect, adjust, start, operate and test each system.

D. Unless otherwise specifically indicated on the Drawings or Specifications, all equipment and materials shall be installed with the acceptance of the Engineer and in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

E. All labor for installation of mechanical systems shall be performed by experienced, skilled tradespeople under the supervision of a licensed journeyman foreman. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, professional manner. The Engineer reserves the right to reject any work which, in their opinion, has been installed in a substandard, dangerous or unserviceable manner. The Contractor shall replace said work in a satisfactory manner at no extra cost to the Owner.

1.15 SHUTDOWNS

A. When installation of a new system requires the temporary shutdown of an existing operating system, the connection of the new system shall be performed at such time as designated by the Owner.

B. The Engineer and the Owner shall be notified in writing of the estimated duration of the shutdown period at least ten (10) days in advance of the date the work is to be performed.

C. Work shall be arranged for continuous performance whenever possible. The Contractor shall provide all necessary labor, including overtime if required, to assure that existing

operating services will be shut down only during the time actually required to make necessary connections.

1.16 TEMPORARY UTILITIES

A. General: Provide new materials and equipment; if acceptable to the Engineer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

C. First Aid Supplies: Comply with governing regulations.

D. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

E. Utilities: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer, and will not be accepted as a basis of claims for a Change Order.

F. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

G. Temporary Heat-Cool-Dehumidification: Provide temporary services required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate temporary services to produce the ambient condition required and minimize consumption of energy. The building’s permanent HVAC systems shall not be used for these purposes.

H. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

I. Termination and Removal: Unless the Engineer requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of

interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

1.17 EQUIPMENT ACCESS

A. Appliances, controls devices, heat exchangers and HVAC system components that utilize energy shall be accessible for inspection, service, repair and replacement without disabling the function of a fire-resistance-rated assembly or removing permanent construction, other appliances, venting systems or any other piping or ducts not connected to the *appliance* being inspected, serviced, repaired or replaced. A level working space not less than 30 inches deep and 30 inches wide (762 mm by 762 mm) shall be provided in front of the control side to service an *appliance*.

1.18 PROJECT PHASING

A. Work under each Section shall include all necessary temporary connections, equipment, piping, heating, temperature control work, fire stopping, water heaters, labor, and material as necessary to accommodate the phasing of Construction as developed by the General Contractor or Construction Manager and approved by the Owner. All existing systems that pass-thru an area of the building shall remain operational during all phases of construction. No extra compensation shall be granted the Contractor for work required to maintain existing systems operational or to accommodate the construction phasing of the project.

1.19 PROTECTION OF MATERIALS AND EQUIPMENT

A. Work under each Section shall include protecting the work and material of all other Sections from damage by work or workpeople and shall include making good all damage thus caused.

B. The Contractor shall be responsible for work and equipment until the facility has been accepted by the Owner. Protect work against theft, injury or damage and carefully store material and equipment received on site which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.

C. Work under each Section includes receiving, unloading, uncrating, storing, protecting, setting in place and completely connecting equipment supplied under each Section. Work under each Section shall also include exercising special care in handling and protecting equipment and fixtures, and shall include the cost of replacing any of the equipment and fixtures which are missing or damaged.

D. Equipment and material stored on the job site shall be protected from the weather, vehicles, dirt and/or damage by tradespeople or machinery. Insure that all electrical or absorbent equipment or material is protected from moisture during storage.

1.20 ADJUSTING AND TESTING

A. After all the equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests so as to assure the Engineer that they are in proper adjustment and in satisfactory, permanent operating condition.

B. Where requested by the Engineer, a factory-trained service representative shall inspect the installation and assist in the initial startup and adjustment to the equipment. The period of these services shall be for such time as necessary to secure proper installation and adjustments. After the equipment is placed in permanent operation, the service representative shall supervise the initial operation of the equipment and instruct personnel responsible for operation and maintenance of the equipment. The service representative shall notify the Contractor in writing that the equipment was installed according to manufacturer's recommendations and is operating as intended by the manufacturer.

1.21 CLEANING

A. The Contractor shall thoroughly clean and flush all piping, ducts and equipment of all foreign substances, oils, burrs, solder, flux, etc., inside and out before being placed in operation.

B. If any part of a system should be stopped or damaged by any foreign matter after being placed in operation, the system shall be disconnected, cleaned and reconnected wherever necessary to locate and/or remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.

C. During the course of construction, all ducts and pipes shall be capped in an acceptable manner to insure adequate protection against the entrance of foreign matter.

D. Upon completion of all work under the Contract, the Contractor shall remove from the premises all rubbish, debris and excess materials left over from his work. Any oil or grease stains on floor areas caused by the Contractor shall be removed and floor areas left clean.

E. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Remove labels that are not permanent labels.
2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

F. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove and dispose of ALL waste materials, packaging material, skids etc. from the site and dispose of in a lawful manner in accordance with municipal, state and federal regulations.

G. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

1.22 OPERATING AND MAINTENANCE

A. Upon completion of all work and tests, the Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period specified under each applicable Section of this Division. During this period, the contractor shall fully instruct the Owner or the Owner’s representative in the operation, adjustment and maintenance of all equipment furnished. The Contractor shall give at least seven (7) days notice to the Owner and the Engineer in advance of this period.

B. The Contractor shall include the maintenance schedule for the principal items of equipment furnished under this Division.

C. The Contractor shall physically demonstrate procedures for all routine maintenance of all equipment furnished under each respective Section to assure accessibility to all devices.

D. An authorized manufacturer’s representative shall attest in writing that the equipment has been properly installed prior to startup of any major equipment. The following equipment will require this inspection: pumps; air conditioning equipment, controls, air handling equipment, compressors, boilers etc. These letters shall be bound into the operating and maintenance books.

E. Refer to individual trade Sections for any other particular requirements related to operating instructions.

F. Demonstration shall be recorded on USB Flash drive turned over to the Owner. Video recording shall be done in a professional manner with quality video (1080p resolution) and clear audible sound.

1.23 OPERATING AND MAINTENANCE MANUALS

A. Prepare operating and maintenance manuals in accordance with the requirements of Division 1 and as follows. The Contractor shall prepare up to six (6) copies of a complete maintenance and operating instructions manual, bound in booklet form. Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 3-ring vinyl-covered binders, with pocket folders for folded sheet information and designation partitions with identification tabs. Mark appropriate identification on front and spine of each binder.

B. Manual shall include the following:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.

2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing and operating instructions including lubrication charts and schedules.
5. Emergency and safety instructions.
6. Spare parts list.
7. Copies of warranties.
8. Wiring diagrams.
9. Recommended "turn around" cycles.
10. Inspection procedures.
11. Approved Shop Drawings and Product Data.
12. Equipment Start-up Reports.
13. Temperature control diagrams and written sequences of operations.
14. Balance reports.

C. Include in the manual, a tabulated equipment schedule for all equipment. Schedule shall include pertinent data such as: make, model number, serial number, voltage, normal operating current, belt size, filter quantities and sizes, bearing number, etc. Schedule shall include maintenance to be done and frequency.

D. Maintenance and instruction manuals shall be submitted to the Owner at the same time as the seven (7) day notice is given prior to the instruction period.

1.24 ACCEPTANCES

A. The equipment, materials, quality, design and arrangement of all work installed under the Mechanical Sections shall be subject to the review of the Engineer.

B. Within 30 days after the awarding of a Contract, the Mechanical Contractor shall submit to the Engineer, for review, a list of manufacturers of equipment proposed for the work under the Mechanical Sections. The intent to use the exact manufacturers and models specified does not relieve the Contractor of the responsibility of submitting such a list.

C. If extensive or unacceptable delivery time is expected on a particular item of equipment specified, the Contractor shall notify the Owner and Engineer, in writing, within 30 days of award of the Contract. In such instances, equipment substitutions may be made pending acceptance by the Engineer or the Owner’s representative.

D. Where any specific material, process or method of construction or manufactured article is specified by reference to the catalog number of a manufacturer, the Specifications are to be used as a guide and are not intended to take precedence over the basic duty and performance specified or noted on the Drawings. In all cases, the Mechanical Contractor shall verify the duty specified with the specific characteristics of the equipment offered for review. Equipment characteristics are to be used as mandatory requirements where the Contractor proposes to use an acceptable equivalent.

E. If material or equipment is installed before it is reviewed and/or approved, the Contractor shall be liable for its removal and replacement at no extra charge to the Owner if, in the opinion of the Engineer, the material or equipment does not meet the intent of, or standard of quality implied by, the Drawings and Specifications.

F. Failure on the part of the Engineer to reject shop drawings or to reject work in progress shall not be interpreted as acceptance of work not in conformance with the Drawings and/or Specifications. Work not in conformance with the Drawings and/or Specifications shall be corrected whenever it is discovered.

1.25 RECORD DRAWINGS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

B. Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Items to be indicated include but are not limited to:

1. Dimensional change
2. Revision to drawing detail
3. Location and depth of underground utility
4. Revision to pipe routing
5. Revision to electrical circuitry
6. Actual equipment location
7. Duct size and routing
8. Location of concealed internal utility
9. Changes made by Change Order
10. Details not on original Contract Drawing
11. Information on concealed elements which would be difficult to identify or measure later

C. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

D. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.

E. Note related Change Order numbers where applicable.

F. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

G. Final record documents shall be prepared in the latest electronic version and on USB Flash drive of all drawings and a clean set of reproducible paper copies shall be turned over to the Owner at the completion of the work.

1.26 WARRANTIES AND BONDS

A. The following general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties are to be included:
   1. General close-out requirements included in Division 1.
   2. Specific requirements for warranties for the Work and products and installation that are specified to be warranted, are included in the individual Sections of Divisions-2 through -50.
   3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

C. Separate Prime Contracts: Each prime Contractor is responsible for warranties related to its own Contract.

1.27 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Submit written warranties to the Engineer prior to the date certified for Substantial Completion. If the Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Engineer.

H. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Engineer within fifteen days of completion of that designated portion of the Work.

I. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Engineer for approval prior to final execution.

1. Refer to individual Sections of Divisions-2 through -50 for specific content requirements, and particular requirements for submittal of special warranties.

J. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

K. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.
3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.28 GUARANTEES

A. The Contractor shall guarantee all material and installation quality under these Specifications and the Contract for a period of one (1) year from the date of final acceptance by Owner. During this guarantee period, all defects developing through faulty equipment, materials or installation quality shall be corrected or replaced immediately by this Contractor without expense to the Owner. Such repairs or replacements shall be made to the Engineer's satisfaction.

B. Contractor shall provide name, address, and phone number of all contractors and subcontractors and associated equipment they provided.

1.29 PROJECT CLOSE-OUT

A. Submit specific warranties, quality bonds, maintenance agreements, final certifications and similar documents in accordance with Division 1.

B. Deliver tools, spare parts, extra stock, and similar items.

C. Complete start-up testing of systems, including measuring and documenting all required startup checklist requirements documented in installation and maintenance instructions by the equipment manufacturer, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

D. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

E. Field Observation Procedures: On receipt of a request for an Engineers Field Observation, the Engineer will advise the Contractor of unfulfilled requirements. The Engineer will advise the Contractor of construction that must be completed or corrected before the certificate will be issued. Contractor shall submit written response to each corrective item including specific photos prior to final Engineering inspection.

1. The Engineer will repeat the Field Observation when requested and assured that the Work has been substantially completed.
2. Results of the completed list of unfulfilled items will form the basis of requirements for final acceptance.

END OF SECTION

Electronic Drawing File Release Form

DELIVERY OF FILES FOR: _____
Project Name

In accepting and utilizing any drawings or other data on any form of electronic media generated and provided by the Design Professional, the Client covenants and agrees that all such drawings and data are instruments of service of the Design Professional, who shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.

The Client further agrees not to use these drawings and data, in whole or in part, for any purpose or project other than the project which is the subject of this Agreement. The Client agrees to waive all claims against the Design Professional resulting in any way from any unauthorized changes or reuse of the drawings and data for any other project by anyone other than the Design Professional.

In addition, the Client agrees, to the fullest extent permitted by law, to indemnify and hold the Design Professional harmless from any damage, liability or cost, including reasonable attorneys' fees and costs of defense, arising from any changes made by anyone other than the Design Professional or from any reuse of the drawings and data without the prior written consent of the Design Professional.

Under no circumstances shall transfer of the drawings and other instruments of service on electronic media for use by the Client be deemed a sale by the Design Professional, and the Design Professional makes no warranties, either express or implied, of merchantability and fitness for any particular purpose.

_____ _____
Client's Signature Date

_____
Company - Title

_____ _____
Architects' Signature Date

_____
Firm - Title

_____ _____
Owner's Signature Date

_____
Company - Title

SECTION 23 05 29
HANGERS AND SUPPORTS FOR HVAC PIPING, DUCTWORK AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct hangers and supports

B. Hanger rods.

C. Inserts.

D. Flashing.

E. Formed steel channel.

F. Equipment bases and supports.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.03 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME B31.1 - Power Piping.
   2. ASME B31.5 - Refrigeration Piping.
   3. ASME B31.9 - Building Services Piping.

B. ASTM International:
   1. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
   2. ASTM E814 - Standard Test Method for Fire Tests of Through Penetration Fire Stops.
   3. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
   4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

C. American Welding Society:
   1. AWS D1.1 - Structural Welding Code - Steel.

D. FM Global:
   1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

E. Manufacturers Standardization Society of the Valve and Fittings Industry:
   1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
   2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
   3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

F. Intertek Testing Services (Warnock Hersey Listed):
   1. WH - Certification Listings.

1.04 SUBMITTALS

A. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.

B. Product Data:
   1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

1.05 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel." and AWS D1.3, "Structural Welding Code--Sheet Steel."

B. Welding: Qualify procedures and personnel according to the following:
   1. AWS D1.1, "Structural Welding Code--Steel."
   2. AWS D1.2, "Structural Welding Code--Aluminum."
   3. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum 3 years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.08 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.09 WARRANTY

A. Furnish five year manufacturer warranty for pipe hangers and supports.

PART 2 PRODUCTS

2.01 DUCT HANGERS AND SUPPORTS

A. Shall be in accordance with SMACNA's 2005 "HVAC Duct Construction Standards - Metal and Flexible" except non-engineered wire hangers are not permitted. Engineered cable support systems may be used if they meet SMACNA, Ductmate or approved equal.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following::
   1. Gripple Inc.
   2. B-Line Systems, Inc.
   3. US Duct
   4. Nordfab

C. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

D. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

E. Strap and Rod Sizes: Comply with SMACNA's 2005 "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct.

F. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A1023.

G. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

H. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

I. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

J. Trapeze and Riser Supports:
1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate

2.02 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.03 THERMAL SHIELD INSERTS

A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield. Insert shall be capable of supporting weight of pipe, insulations and fluid without crushing.

B. Manufacturers:
1. Carpenter & Paterson, Inc.
2. ERICO/Michigan Hanger Co.
3. PHS Industries, Inc.
4. Pipe Shields, Inc.
5. Rilco Manufacturing Company, Inc.
6. Value Engineered Products, Inc.

C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.

D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.04 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated or stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Manufacturers:
1. B-Line Systems, Inc.; a division of Cooper Industries.
2. Empire Industries, Inc.
3. Hilti, Inc.
4. ITW Ramset/Red Head.
5. MKT Fastening, LLC.
6. Powers Fasteners.

2.05 MISCELLANEOUS MATERIALS

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

B. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

C. Equipment Supports: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

D. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

E. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
   1. Properties: Nonstaining, noncorrosive, and nongaseous.
   2. Design Mix: 5000-psi, 28-day compressive strength.

2.06 FORMED STEEL CHANNEL

A. Manufacturers:
   1. Allied Tube & Conduit Corp.
   2. B-Line Systems
   3. Midland Ross Corporation, Electrical Products Division
   4. Unistrut Corp.

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

PART 3 EXECUTION

3.01 DUCT HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's 2005 "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
   1. Where practical, install concrete inserts before placing concrete.
   2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
   3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
   4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
   5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's 2005 "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5- 2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

3.02 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.03 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

END OF SECTION

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SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Duct Markers.

D. Ceiling Tacks

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 09- Finishes.

1.03 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. ASME A13.1 - Scheme for the Identification of Piping Systems.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials.

1.04 SUBMITTALS

A. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

C. Product Data: Provide manufacturers catalog literature for each product required.

D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

E. Project Record Documents:

1. Valve Schedules: For each piping system. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
2. Equipment Schedules: For each item of equipment to be labeled. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

PART 2 PRODUCTS

2.01 TAGS

A. Manufacturers:

1. Advanced Graphic Engraving
2. Brady Corporation
3. Brimar Industries, Inc
4. Kolbi Pipe Marker Co
5. Seton Identification Products, a Tricor Company
6. Substitutions: See Division 01-General Requirements.

B. Metal Tags: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware. Brass wire-link, beaded chain or S-hook fasteners. Minimum 1-1/2 inch diameter with smooth edges.

2.02 DUCT MARKERS

A. Manufacturers:
1. Brimar Industries, Inc
2. Kolbi Pipe Marker Co
3. Seton Identification Products

B. General Requirements for Manufactured Duct Labels: Preprinted self-adhesive, premium grade vinyl, color-coded, with lettering indicating service, and showing flow direction.

C. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch printed with UV and chemical resistant inks.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

F. Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
2. Lettering Size: Prepared with letter sizes according to ASME A13.1, at least 1-1/2 incheshigh.

2.03 CEILING TACKS

A. Manufacturers:
1. Brimar
2. Craftmark

B. Seton Identification ProductsDescription: Steel with 3/4 inch diameter color coded head.

C. Color code as follows:
1. HVAC Equipment: Yellow.
2. Fire Dampers and Smoke Dampers: Red.
3. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 DUCT LABEL INSTALLATION

A. Install duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
2. Yellow: For hot-air supply ducts.
3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
4. ASME A13.1 Colors and Designs: For hazardous material exhaust.

B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.03 CEILING TACK INSTALLATION

A. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

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SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic, steam, and refrigerating systems.

C. Measurement of final operating condition of HVAC systems.

D. Sound measurement of equipment operating conditions.

E. Vibration measurement of equipment operating conditions.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.03 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. AABC (NSTSB) - AABC National Standards for Total System Balance

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems.

C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems;.

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing;.

1.04 SUBMITTALS

A. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.

B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Submit to Architect.
   2. Submit to the Commissioning Authority.
   3. Submit to Engineer of Record.
   4. Submit six weeks prior to starting the testing, adjusting, and balancing work.
   5. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
   6. Include at least the following in the plan:
      a. Preface: An explanation of the intended use of the control system.
      b. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      c. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      d. Identification and types of measurement instruments to be used and their most recent calibration date.
      e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      f. Final test report forms to be used.

g. Detailed step-by-step procedures for TAB work for each system and issue, including:
   1) Terminal flow calibration (for each terminal type).
   2) Diffuser proportioning.
   3) Branch/submain proportioning.
   4) Total flow calculations.
   5) Rechecking.
   6) Diversity issues.
h. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
i. Details of how TOTAL flow will be determined; for example:
   1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
   2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
j. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
k. Confirmation of understanding of the outside air ventilation criteria under all conditions.
l. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
m. Method of checking building static and exhaust fan and/or relief damper capacity.
n. Methods for making coil or other system plant capacity measurements, if specified.
o. Time schedule for TAB work to be done in phases (by floor, etc.).
p. Description of TAB work for areas to be built out later, if any.
q. Time schedule for deferred or seasonal TAB work, if specified.
r. False loading of systems to complete TAB work, if specified.
s. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
t. Interstitial cavity differential pressure measurements and calculations, if specified.
u. differential pressure measurements and calculations between the building and its exterior.
v. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
w. Procedures for formal progress reports, including scope and frequency.
x. Procedures for formal deficiency reports, including scope, frequency and distribution.

C. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.

D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
1. Submit under provisions of Division 01 – General Conditions.
2. Submit to the Commissioning Authority within two weeks after completion of testing, adjusting, and balancing.
3. Revise TAB plan to reflect actual procedures and submit as part of final report.

4. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and Engineer of Record and for inclusion in operating and maintenance manuals.
5. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
6. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
7. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
8. Units of Measure: Report data in both I-P (inch-pound) units.
9. Include the following on the title page of each report:
    a. Name of Testing, Adjusting, and Balancing Agency.
    b. Address of Testing, Adjusting, and Balancing Agency.
    c. Telephone number of Testing, Adjusting, and Balancing Agency.
    d. Project name.
    e. Project location.
    f. Project Architect.
    g. Project Engineer.
    h. Project Contractor.
    i. Project altitude.
    j. Report date.

E. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
1. AABC (NSTSB), AABC National Standards for Total System Balance.
2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
4. SMACNA (TAB)Maintain at least one copy of the standard to be used at project site at all times.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:
1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
2. Having minimum of three years documented experience.
3. Certified by one of the following:
    a. AABC, Associated Air Balance Council completion submit AABC National Performance Guaranty.

b. NEBB, National Environmental Balancing Bureau
c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
1. Systems are started and operating in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.
12. Hydronic systems are flushed, filled, and vented.
13. Pumps and fans are rotating correctly.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.

3.03 PREPARATION

A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
1. Require attendance by all installers and control providers whose work will be tested, adjusted, or balanced.

3.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 10 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

A. Field Logs: Maintain written logs including:
1. Running log of events and issues.
2. Discrepancies, deficient or uncompleted work by others.
3. Contract interpretation requests.
4. Lists of completed tests.

B. Ensure recorded data represents actual measured or observed conditions.

C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. Mark on the drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.

E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

H. Check and adjust systems approximately two seasons after final acceptance and submit report.

3.06 AIR SYSTEM PROCEDURE

A. Work with Control vendor to establish minimum setpoints necessary to satisfy contract documents. Iterative testing to determine these minimum setpoints will be expected to be in the submittals.

B. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

C. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

D. Measure air quantities at air inlets and outlets.

E. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

F. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

G. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

L. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

3.07 COMMISSIONING

A. See Division 01 General Requirements for additional requirements.

3.08 SCOPE

A. Test, adjust, and balance the following:
   1. Packaged Roof Top Heating/Cooling Units.
   2. Packaged Terminal Air Conditioning Units.
   3. Air Handling Units.

4. Dedicated Outdoor Air Units.
5. Fans.
6. Air Filters.
7. Air Terminal Units.
8. Air Inlets and Outlets.

3.09 MINIMUM DATA TO BE REPORTED

A. Air Moving Equipment:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Arrangement/Class/Discharge.
6. Air flow, specified and actual.
7. Return air flow, specified and actual.
8. Outside air flow, specified and actual.
9. Total static pressure (total external), specified and actual.
10. Inlet pressure.
11. Discharge pressure.
12. Sheave Make/Size/Bore.
13. Number of Belts/Make/Size.
14. Fan RPM.

B. Return Air/Outside Air:
1. Identification/location.
2. Design air flow.
3. Actual air flow.
4. Design return air flow.
5. Actual return air flow.
6. Design outside air flow.
7. Actual outside air flow.
8. Return air temperature.
9. Outside air temperature.
10. Required mixed air temperature.
11. Actual mixed air temperature.
12. Design outside/return air ratio.
13. Actual outside/return air ratio.

C. Exhaust Fans:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure (total external), specified and actual.
7. Inlet pressure.
8. Discharge pressure.
9. Sheave Make/Size/Bore.
10. Number of Belts/Make/Size.
11. Fan RPM.

D. Duct Traverses:
1. System zone/branch.

2. Duct size.
3. Area.
4. Design velocity.
5. Design air flow.
6. Test velocity.
7. Test air flow.
8. Duct static pressure.
9. Air temperature.
10. Air correction factor.

E. Duct Leak Tests:
1. Description of ductwork under test.
2. Duct design operating pressure.
3. Duct design test static pressure.
4. Duct capacity, air flow.
5. Maximum allowable leakage duct capacity times leak factor.
6. Test apparatus:
   a. Blower.
   b. Orifice, tube size.
   c. Orifice size.
   d. Calibrated.
7. Test static pressure.
8. Test orifice differential pressure.
9. Leakage.

F. Air Distribution Tests:
1. Air terminal number.
2. Room number/location.
3. Terminal type.
4. Terminal size.
5. Area factor.
6. Design velocity.
7. Design air flow.
8. Test (final) velocity.
9. Test (final) air flow.
10. Percent of design air flow.

END OF SECTION

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SECTION 23 07 00
HVAC INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. HVAC ductwork insulation, jackets, and accessories.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

B. Division 07 – Firestopping

C. Division 09- Finishes

D. Section 23 0553- Identification of HVAC Piping and Equipment

E. Section 23 3100- HVAC ducts and casings

F. Section 23 2113 – Hydronic Piping

1.03 REFERENCES STANDARDS (follow the most currently adopted amended version)

A. ASTM International:

1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
2. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
3. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
4. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.
5. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
6. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
7. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
8. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
9. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
10. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
11. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
12. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
13. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
14. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
15. ASTM C1071 - Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material).
16. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

17. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
18. ASTM D1785 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
19. ASTM D4637 - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane.
20. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
21. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.

B. Sheet Metal and Air Conditioning Contractors':
1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

C. Underwriters Laboratories Inc.:
1. UL 1978 - Standard for Safety for Grease Ducts.

1.04 SUBMITTALS

A. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.

B. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E84.

B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.

C. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

D. Duct insulation, Coverings, and Linings: Maximum 25/50 flame spread/smoke developed index, when tested in accordance with ASTM E84, using specimen procedures and mounting procedures of ASTM E 2231.

E. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

F. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of experience and approved by manufacturer.

1.06 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping. Store all insulation materials in a clean, dry environment.

1.08 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

1.09 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.10 SCHEDULING

A. Schedule insulation application after pressure and leak testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
   1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
   2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

2.02 MANUFACTURER

A. Manufacturers for Flexible Glass Fiber (FGF), Pre-Molded Glass Fiber (PGF) and Rigid Glass Fiber (RGF) Insulation Products:
   1. Knauf Insulation
   2. Johns Manville Corporation
   3. Owens-Corning.
   4. Substitutions: Division 01.

B. Manufacturers for Closed Cell Elastomeric (CCE) Insulation Products:
   1. Aeroflex. USA, Inc.
   2. Armacell, LLC (Interior- ArmaFlex, Exterior- ArmaTuff)
   3. K-Flex USA LLC
   4. Substitutions: Division 01.

C. Manufacturers for Fire Rated (FR) Insulation Products:
   1. 3M Fire Barrier Duct Wrap 615+.
   2. Morgan Theramal Ceramics Pyroscat DuctWrap XL.
   3. Unifrax FyreWrap Elite 1.5.
   4. Substitutions: Division 01.

D. Manufacturers for Jacketing (PVC):
   1. Johns Manville
   2. P.I.C. Plastics Inc.
   3. Proto Corporation
   4. Substitutions: Division 01.

2.03 DUCTWORK INSULATION

A. Flexible Glass Fiber (FGF) Insulation: ASTM C553 Type I, II, or III, ASTM C1290 Type III, in accordance to NFPA 90A and NFPA 90B for duct coverings, with ASTM C1136 foil scrim kraft (FSK).
   1. Thermal performance: 1.0 lb/ft^3, 7.4 ft^2 hr °F/btu minimum R-value for 2” thick at 75°F mean temperature per ASTM C177 and ASTM C518.

2. Operating temperature range: 40°F to 250°F.
3. Water vapor permeance: 0.02 perms maximum per ASTM E96.
4. Water vapor sorption: 5% by weight maximum per ASTM C1104.
5. Corrosiveness: Does not accelerate per ASTM C665.
6. Fungi growth: No fungi growth per ASTM C1338.

B. Rigid Glass Fiber (RGF) Insulation: Glass fiber board, ASTM C 612 Type 1A or 1B, in accordance to NFPA 90A and NFPA 90B for duct coverings, with ASTM C 1136 foil scrim kraft (FSK).
1. Thermal performance: 8.7 ft^2 hr °F/btu minimum R-value for 2” thick at 75°F mean temperature per ASTM C177 and ASTM C518.
2. Operating temperature range: 0°F to 450°F.
3. Water vapor permeance: 0.02 perms maximum per ASTM E96.
4. Water vapor sorption: 5% by weight maximum per ASTM C1104.
5. Corrosiveness: Does not accelerate per ASTM C665.
6. Fungi growth: No fungi growth per ASTM C1338.

C. Closed Cell Elastomertic (CCE) Insulation:
1. Thermal performance: 8.0 ft^2 hr °F/btu minimum R-value for 2” thick at 75°F mean temperature per ASTM C177 and ASTM C518.
2. Operating temperature range: -40°F to 220°F.
3. Water absorption: 0.2% by volume per ASTM C 209 or ASTM C1763.
4. Water vapor permeability: 0.08 perm-in per ASTM E 96.
5. Ultraviolet (UV) resistance: Excellent per ASTM G 53 or ASTM G 90.
6. Weatherability: Excellent per ASTM D 471.

D. Fire Rated (FR) Insulation:
1. Inorganic blanket encapsulated with scrim reinforced foil meeting UL 1978
2. Thermal Conductivity: 0.42 at 500°F.
3. Weight: 1.4 pound per square foot.
4. Surface Burning Characteristics: Maximum 0/0 flame spread/smoke developed index when tested in accordance with ASTM E84.

E. Technical Data:
1. Insulation shall pass when tested in accordance with the following:
   a. Non-combustibility per ASTM E136.
   b. Fire resistance (wall) per ASTM E119.
   c. Durability test per ASTM C518.
   d. Internal fire test per ASTM E2336.
   e. Fire engulfment (duct) per ASTM E814.
   f. ULC grease duct test protocol.
   g. Grease duct clearances per UL1978.
   h. Air duct ventilation enclosure per ISO6944.
2. Thermal performance: 6.3 ft^2 hr °F/btu minimum R-value for 1-1/2” thick at 75°F mean temperature per ASTM C177 and ASTM C518.

2.04 DUCTWORK JACKETS

A. Aluminum (ALM): Self-Adhesive Waterproofing Jacket: Minimum 12 mil thick, vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; UV resistant, zero permeability with textured aluminum-foil facing, impact and tear resistant.

2.05 DUCTWORK INSULATION ACCESSORIES

A. Vapor Retarder Tape:

1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

B. Vapor Retarder Lap Adhesive: Compatible with insulation.

C. Adhesive: Waterproof, ASTM E162 fire-retardant type.

D. Liner Fasteners: Galvanized steel, self-adhesive pad with head.

E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

F. Lagging Adhesive: Fire retardant type with maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

G. Impale Anchors: Galvanized steel, 12 gage self-adhesive pad.

H. Adhesives: Compatible with insulation.

I. Membrane Adhesives: As recommended by membrane manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Protect insulation from exposure to moisture prior to and after installation. All insulation other than flexible elastomeric that becomes wet shall be replaced at no cost to the project.

B. Verify piping, equipment and ductwork has been tested before applying insulation materials.

C. Verify piping, equipment and ductwork surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION - DUCTWORK SYSTEMS

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Protect insulation from exposure to moisture prior to and after installation. All insulation other than flexible elastomeric that becomes wet shall be replaced at no cost to the project.

D. Duct dimensions indicated on Drawings are finished inside dimensions.

E. Insulated ductwork conveying air below ambient temperature:
1. Provide insulation with vapor retarder jackets.
2. Finish with tape and vapor retarder jacket.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

F. Insulated ductwork conveying air above ambient temperature:
1. Provide with or without standard vapor retarder jacket.
2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

G. External Elastomeric Duct Insulation:
1. Adhere to clean oil-free surfaces with full coverage of adhesive.
2. Seal seams and butt joints with manufacturer’s recommended adhesive.
3. When application requires multiple layers, apply with joints staggered.
4. Insulate standing metal duct seams with insulation of like material and thickness as adjacent duct surface. Apply adhesive at joints with flat duct surfaces.

5. Lift ductwork off trapeze hangers and insert spacers.

H. Kitchen Exhaust Ductwork:
1. Cover duct by wrapping with insulation using overlap method and butt joint with collar method.
2. Overlap seams of each method by 3 inches.
3. Attach insulation using steel banding or by welded pins and clips.
4. Install insulation without sag on underside of ductwork. Use additional fasteners to prevent sagging.

I. Ducts Exterior to Building:
1. Install insulation according to external duct insulation paragraph above.
2. Provide external insulation with vapor retarder jacket. Cover with outdoor jacket finished with caulked aluminum jacket with seams located on bottom side of horizontal duct section.
3. Finish with aluminum duct jacket.
4. Calk seams at flanges and joints. Located major longitudinal seams on bottom side of horizontal duct sections.

J. Duct Acoustical Liner
1. Ductwork shall still be insulated per this specification even if the ductwork is acoustically lined. Acoustically lined ductwork does not negate the use of wrap as insulation.

K. Prepare duct insulation for finish painting. Refer to Division 09.

3.03 SCHEDULES

A. Ductwork Schedules
1. Items Not Insulated:
a. Fibrous-glass ducts.
b. Factory-insulated flexible ducts.
c. Factory-insulated plenums and casings.
d. Vibration-control devices.
e. Factory-insulated access panels and doors.
f. Stair pressurization supply ductwork.
g. Exhaust not connected to energy recovery system (unless indicated within tables below)
2. Provide insulation materials and thicknesses identified below. If more than one material is listed for a duct location, selection from materials listed is Division 23 option.

Heating and Cooling Supply and Heat/ Energy Recovery System Exhaust and Return Ducts Climate Zone 5				
Description	Minimum As-Installed R-Value	Insulation Type	Minimum Thickness (inches)	Jacketing
Exterior to building envelope	R-12.0	Closed Cell Elastomeric (CCE)	3.0	ALM

Heating and Cooling Supply and Heat/ Energy Recovery System Exhaust and Return Ducts Climate Zone 5				
Description	Minimum As-Installed R-Value	Insulation Type	Minimum Thickness (inches)	Jacketing
Concealed within thermal envelope of building	R-6.0	Flexible Glass Fiber (FGF)	2.0	FSK
Exposed in mechanical room	R-6.0	Rigid Glass Fiber (RGF)	2.0	FSK

Unconditioned Outside Air Intake Ducts and Exhaust/Relief Duct Inside Building Envelope Climate Zones 2 Through 8				
Description	Minimum As-Installed R-Value	Insulation Type	Minimum Thickness (inches)	Jacketing
For outside air intakes, all ductwork between the building envelope and the first system heating coil, cooling coil or air handling unit connection.	R-12.0	Flexible Glass Fiber (FGF)	3.0	FSK
		Rigid Glass Fiber (RGF)	3.0	FSK
For exhaust/relief ducts, all ductwork between the building envelope and first system isolation damper.	R-12.0	Flexible Glass Fiber (FGF)	3.0	FSK
		Rigid Glass Fiber (RGF)	3.0	FSK

3.04 DUCT LINER

A. See Section 23 3100 - HVAC Ducts and Casings, for duct liner specifications

END OF SECTION

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SECTION 26 04 00
GENERAL CONDITIONS FOR ELECTRICAL TRADES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. This section applies to certain sections of Division 08 “Openings”, Division 11 “Equipment”, Division 12 “Furnishings”, Division 21“Fire Protection, Division 22 “Plumbing”, Division 23 "Mechanical," Division 27 “Communications”, Division 33 “Utilities” and this section applies to all sections of Division 26, "Electrical" of this project specification unless specified otherwise in the individual sections.

C. The Drawings of other trades Architectural, Structural, Landscape, Civil, Mechanical, Fire Protection and Plumbing, Food Service, Communications, and Electronic Safety and Security shall be examined for coordination and familiarity of work with other Contractors. Any duplication or omission of provisions in this project should be brought to the attention of the Owners prior to Bidding.

D. The drawings of equipment suppliers shall be examined for coordination and familiarity of work with Owner’s equipment suppliers.

1.02 DESCRIPTION

A. The General Conditions and Supplementary General Conditions are a part of this Division and are to be considered a part of this Contract.

B. Where items of the General Conditions and Supplementary General Conditions are repeated in other Sections of the Specifications, it is merely intended to qualify or to call particular attention to them. It is not intended that any other parts of the General Conditions and Supplementary General Conditions shall be assumed to be omitted if not repeated therein. This Section applies equally and specifically to all Contractors supplying labor and/or equipment and/or materials as required under each Section of this Division, (Division 27 and Division 28). Where conflicts exist between the drawings and the specifications or between this section of the specifications and other sections, the more stringent or higher cost option shall apply.

C. It is the intent of this Section of the Specifications to establish a standard of quality and performance characteristics for basic materials and installation methods used in building electrical (communications and electronic safety and security) systems.

1.03 HIGH PERFORMANCE BUILDINGS GENERAL REQUIREMENTS

A. Implement practices and procedures to meet the project’s environmental goals, which include compliance with Connecticut Standard Guidelines Compliance Manual for High Performance Buildings, September 2011 with additional mandatory building project requirements for schools. Specific project goals which may impact this and the other sections of this specification include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; use of certified wood products;

construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this Section and other Sections of the contract documents, are implemented to the fullest extent. Substitutions or other changes to the work shall not be allowed if such changes substantially compromise the stated High Performance Building criteria.

B. Comply with Connecticut Standard Guidelines Compliance Manual for High Performance Buildings, September 2011 with additional mandatory building project requirements for schools and the Department of Administrative Services / Office of School Construction Grants High Performance School Construction Bulletin, September 2015.

1.04 INTENT

A. This contract is for all labor, materials and equipment required for installation. The system shall be complete and finished in all respects, tested and ready for operation. Work shall include calibration of equipment with factory settings. All materials, equipment and apparatus shall be new and of first class quality.

B. Any apparatus, appliance, material or work not shown on drawings but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation as determined by good trade practice even if not particularly specified, shall be furnished, delivered and installed under their respective Divisions without any additional expense to the Owner.

C. Minor details not usually shown or specified but necessary for proper installation and operation shall be included in the work as though they were hereinafter shown or specified.

D. Work under each Section shall include giving written notice to the Owner and Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that work under each Section has included the cost of all required items for the accepted, satisfactory functioning of the entire system without extra compensation.

E. Location of all existing systems and equipment shown on floor plans is based on the best available information. The Contractor shall verify all dimensions and locations of existing systems and equipment in the field and adjust as necessary.

F. Certain items of existing equipment may be indicated for removal or relocation. Items noted for removal shall be disconnected and turned over to the Owner or disposed of by the Contractor if the Owner so requests. If instructed to dispose of items, the Contractor shall remove the items from the premises and dispose of them in a safe, legal and responsible manner and location. Items noted for relocation are intended for reuse in another location as designated on the Drawings. It shall be the responsibility of the Contractor to remove the material from its present location, store the material in a safe place and reinstall the material in its new location. Questions regarding the suitability of the material or equipment shall be brought to the attention of the Owner and Engineer in writing.

G. Wherever a particular piece of equipment, device or material is specifically indicated on the Drawings by model number, type, series or other means, that specification shall take precedence over equipment or materials specified herein. For example: If a particular switch is specified on the Drawings, its specification takes precedence over switch specified herein.

1.05 DEFINITIONS

A. Word “Subcontractor” means specifically the subcontractor working under this Division. Other Contractors are specifically designated “Plumbing Subcontractor”, “General Contractor” and so on. Note: Take care to ascertain limits of responsibility for connecting equipment which requires connections by two or more trades.

B. Word “install” shall mean set in place complete with all mounting facilities and connections as necessary ready for normal use or service.

C. Words “furnish” or “supply” shall mean purchase, deliver to, and off-load at the job site, all ready to be installed including where appropriate all necessary interim storage and protection.

D. Word “provide” shall mean furnish (or supply) and install as necessary.

E. Word “finished” refers to all rooms and areas scheduled to be painted in Room Finish Schedule on the drawings. All rooms and areas not covered in Schedule, including underground tunnels and areas above ceilings shall be considered not finished, unless otherwise noted.

F. No Exceptions Taken – reviewed and determined to be in general conformance with contract documents.

G. Words “approved equal” mean any product which in the opinion of the Engineer is equal in quality, arrangement, appearance, and performance to the product specified.

H. Word “wiring” shall mean cable assembly, raceway, conductors, fittings and any other necessary accessories to make a complete wiring system.

I. Word “product” shall mean any item of equipment, material, fixture, apparatus, appliance or accessory installed under this Division.

J. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions."

K. Indicated: The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

L. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Engineer," "requested by the Engineer," and similar phrases.

M. Approve: The term "approved," where used in conjunction with the Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Engineer's duties and responsibilities as stated in General and Supplementary Conditions.

N. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

O. Remove: The term “remove” means “to disconnect from its present position, remove from the premises and to dispose of in a legal manner.”

P. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

Q. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.06 DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. Consult the Architectural Drawings and Details for exact location of fixtures and equipment; where same are not definitely located, obtain this information from the Architect. (Do not scale the drawings)

B. Work under each Section shall closely follow Drawings in layout of work; check Drawings of other Divisions to verify spaces in which work will be installed. Maintain maximum headroom; where space conditions appear inadequate, Owner and Engineer shall be notified before proceeding with installations.

C. The Owner may, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades and/or for proper execution of the work.

D. Where variances occur between the Drawings and Specifications or within either of the Documents, the item or arrangement of better quality, higher rating, or higher value shall be included in the Contract price. The Owner and Engineer shall decide on the item and the manner in which the work shall be installed.

1.07 SURVEYS AND MEASUREMENTS

A. Before submitting his Bid, the Contractors shall visit the site and become thoroughly familiar with all existing conditions under which his work will be installed. This Contract includes all modifications of existing systems required for the installation of new equipment. This Contract includes all necessary offsets, transitions and modifications required to install all new equipment in existing spaces. All new and existing equipment and systems shall be fully operational under this Contract before the job is considered complete. The Contractors shall be held responsible for any assumptions he makes, any omissions or errors he makes as a result of his failure to become fully familiar with the existing conditions at the site and the Contract Documents.

B. The Contractor shall base all measurements, both horizontal and vertical, from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.

C. Should the Contractor discover any discrepancies between actual measurements and those indicated which prevent following good practice or which interfere with the intent of the Drawings and Specifications, the Engineer will be notified and work will not proceed until instructions from the Engineer are received.

1.08 CODES AND STANDARDS

A. Reference Standard Compliance

1. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories Inc. (UL), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.
2. Independent Testing Organization Certificate: In lieu of the label or listing, indicated above submit a certificate from an independent testing organization, competent to perform testing, and approved by the engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

B. The Following Codes and Standards for the state and local jurisdiction where the project is located as listed below apply to all electrical work. Wherever Codes and/or Standards are mentioned in these Specifications, the latest applicable edition or revision shall be followed:

Connecticut State Building Code Including all Supplements

Connecticut State Fire Safety Code Including all Supplements

School Construction Standards and Guidelines

Building Standards Guidelines – Compliance for High Performance Buildings

The International Building Code

The International Mechanical Code

The International Plumbing Code

NFPA 70, the National Electrical Code

NFPA 101, the Life Safety Code (DELETE FOR MASSACHUSETS)

Model Energy Code

NECA - 1 Standard for Good Workmanship in Electrical Construction

ASHRAE 90.1 and International Energy Conservation Code

C. The following Standards shall be used where referenced by the following abbreviations:

AIA	American Institute of Architects
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
EPA	Environmental Protection Agency
FM	Factory Mutual
FSSC	Federal Specification
IEEE	Institute of Electrical and Electronics Engineers
NBS	National Bureau of Standards
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSC	National Safety Council
OSHA	Occupational Safety and Health Administration
UL	Underwriters' Laboratories

D. All materials furnished and all work installed shall comply with the rules and recommendations of the NFPA, the requirements of the local utility companies, the recommendations of the fire insurance rating organization having jurisdiction and the requirements of all Governmental departments having jurisdiction.

E. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus and Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether shown on Drawings and/or specified or not.

1.09 PERMITS AND FEES

A. The Contractor shall give all necessary notices, obtain all permits; and pay all Government and State sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with the work, file all necessary Drawings, prepare all documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction, obtain all required certificates of inspection for his work, and deliver a copy to the Owner and Engineer before request for acceptance and final payment for the work.

1.10 EQUIPMENT EQUIVALENTS AND SUBSTITUTIONS

A. Certain manufacturers of material, apparatus or appliances are indicated in the drawings and specifications for this project. These items have been used as the basis of design, and as a convenience in fixing the minimum standard of workmanship, finish and design

that is required. If the Contractors uses an “approved equal” alternative to the basis of design, and if the features of that alternative have an impact on other components of the Project, the Contractor shall include the necessary adjustments in those components, whether for architectural, structural, mechanical, electrical, fire protection, or any other elements, plus any adjustments for difference in performance.

B. Where one name only is used and is followed by the words “or approved equal”, the Contractor must use the item named or he is required to apply for a substitution. Where one name only is used, the Contractor must use that item named.

C. Where no specific make of material, apparatus or appliance is mentioned, any first-class product made by a reputable manufacturer may be submitted for Architect and Engineer review.

D. Where the Contractor proposes to use an item that is different from the basis of design in the Drawings and specifications, and that will require the redesign of the structure, partitions, foundations, piping, wiring or any other component of the mechanical, electrical, or architectural layout, the Contractor shall provide the necessary redesign of those components.

E. Where the Contractor proposes to deviate (provide an equivalent or request for substitution) from the basis of design scheduled equipment or materials as hereinafter specified or shown on the drawings, they are required to submit a requested for substitution in writing. The Contractor shall state in their request whether it is a substitution, equivalent or a non approved equivalent to that specified and the amount of credit or extra cost involved. A copy of said request shall be included in the Base Bid with manufacturer’s equipment cuts. The Base Bid shall be based on using the materials and equipment as specified with no exceptions.

F. If an alternative or substitute item results in a difference in quantity and arrangement of piping, ductwork, valves, pumps, insulation, wiring, conduit, and equipment from that specified or indicated on the Drawings, the Contractor shall furnish and install any such additional equipment required by the system, at no additional cost to the Owner including any costs added to other trades due to the equivalent change from the basis of design detailed in the drawings or included within the specifications.

G. Equipment, material or devices submitted for review as an “equivalent” shall meet the following requirements:

1. The equivalent shall have the same construction features such as, but not limited to:
    a. Material thickness, gauge, weight, density, etc.
    b. Welded, riveted, bolted, etc., construction
    c. Finish, undercoating, corrosion protection
2. The equivalent shall perform with the same or better operating efficiency.
3. The equivalent shall be locally represented by the manufacturer for service, parts and technical information.
4. The equivalent shall bear the same labels of performance certification as is applicable to the specified item, such as UL or NEMA labels.

H. Equipment, material or devices submitted for review as a “substitution” shall meet the following requirements:

1. Substitution Request Submittal: Requests for substitution will be considered if received in writing 14 days before the bid date. Requests received later than 14 days before the bid date may be considered or rejected at the discretion of the Engineer/Owner. Once the Contractor submits a complete request for substitution as determined by the engineer, the engineer reserves the right to request the time necessary to evaluate the request for substitution and review it with the Owner.
2. Submit three (3) copies of each request for substitution for consideration.
3. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
    a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
    b. Samples, where applicable or requested.
    c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
    d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
    e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
    f. Cost information, including a proposal of the net change, if any in the Contract Sum.
    g. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
    h. Engineer's Action: Within one week of receipt of the request for substitution, the Engineer will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance of a product substitution will be in the form of an Addendum.
    i. Other Conditions: The Contractor's substitution request will be received and considered by the Engineer when one or more of the following

conditions are satisfied, as determined by the Engineer; otherwise requests will be returned without action except to record noncompliance with these requirements.

1) The request is directly related to an "or equal" clause or similar language in the Contract Documents.
2) The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
3) A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

1.11 SUBMITTAL PROCEDURES

A. Provide Submittals in accordance with the requirements of Division 1 and as indicated in the following.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.

1. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Engineer will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
2. If an intermediate submittal is necessary, process the same as the initial submittal.
3. Allow two weeks for reprocessing each submittal.
4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

D. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Include the following information on the label for processing and recording action taken.
   a. Project name.
   b. Date.
   c. Name and address of Engineer.
   d. Name and address of Contractor.
   e. Name and address of subcontractor.
   f. Name and address of supplier.
   g. Name of manufacturer.
   h. Number and title of appropriate Specification Section.
   i. Drawing number and detail references, as appropriate.

E. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer using a transmittal form. Submittals received from sources other than the Contractor will be returned without action. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

F. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility.

G. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, to indicate the action taken.

1.12 SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. The Contractor shall submit for review detailed shop drawings of all equipment and material specified in each section and coordinated ductwork layouts. No material or equipment may be delivered to the job site or installed until the Contractor has received shop drawings for the particular material or equipment which have been properly reviewed. Shop drawings shall be submitted within 60 days after award of Contract before any material or equipment is purchased. The Contractor shall submit for review copies of all shop drawings to be incorporated in the Electrical Contract. Refer to the General Conditions and Supplementary General Conditions for the quantity of copies required for submission. Where quantities are not specified, provide seven (7) copies for review.

C. Provide shop drawings for all devices specified under equipment specifications for all systems including fire alarm, switchgear, clock, lighting, etc., or where called for elsewhere in the Specifications, or where scheduled on the drawings, or where called out on the drawings. Shop drawings shall include manufacturers' names, catalog numbers, cuts, diagrams, dimensions, identification of products and materials included, compliance with specified standards, notation of coordination requirements, notation of dimensions established by field measurement and other such descriptive data as may be required to identify and accept the equipment. A complete list in each category (example: all fixtures) of all shop drawings, performance cuts, material lists, etc., shall be submitted to the Engineer at one time. No consideration will be given to a partial shop drawing submittal.

D. Submittals shall be marked with the trade involved, i.e., Electrical, HVAC, Plumbing, Fire Protection, etc. when the submittal could involve more than one trade.

E. Where multiple quantities or types of equipment are being submitted, provide a cover sheet (with a list of contents) on the submittal identifying the equipment or material being submitted.

F. Failure to submit shop drawings in ample time for review shall not entitle the Contractor to an extension of Contract time. No claim for extension by reason of such default will be allowed, nor shall the Contractor be entitled to purchase, furnish and/or install equipment which has not been reviewed by the Engineer.

G. The Contractor shall furnish all necessary templates, patterns, etc., for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as required.

H. Acceptance rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are reviewed, review does not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Drawings and Specifications. Verify available space prior to submitting shop drawings.

I. Acceptance of shop drawings shall not apply to quantity nor relieve Contractor of his responsibility to comply with intent of Drawings and Specifications.

J. Acceptance of shop drawings is final and no further changes will be allowed without the written consent of the Engineer.

K. Acceptance of shop drawings does not relieve the Contractor from submitting, coordinating and implementing schedules, forms, worksheets and similar as required for owner/operator input and approval as specified herein and required for proper system operation.

L. Shop drawing submittal sheets which may show items that are not being furnished shall have those items crossed off to clearly indicate which items will be furnished.

M. Bidders shall not rely on any verbal clarification of the Drawings and/or Specifications. Any questions shall be referred to the Engineer in writing at least five (5) working days prior to Bidding to allow for issuance of an Addendum.

N. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.13 COORDINATION DRAWINGS

A. Prepare coordination drawings in accordance with Division 01 Section "PROJECT COORDINATION," to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of light fixtures, panelboards, conduits, cabinets, etc. Include the following:
2. Clearances for installing and maintaining insulation.
3. Clearances for servicing and maintaining equipment, including NEC requirements and space for equipment disassembly required for periodic maintenance.
4. Equipment connections and support details.
5. Exterior wall and foundation penetrations.
6. Fire-rated wall and floor penetrations.
7. Sizes and locations of required concrete pads and bases.

B. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.

C. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

D. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

E. Electronic copies of the MEP floor plans are available to use as a basis for preparing coordination drawings and can be provided by the Engineer. If the Contractor elects to obtain the Engineers electronic files an Electronic File Release Form must be submitted with payment. This form must be signed by the Contractor, Owner, and Architect. Upon receipt of a signed copy of the Electronic File Release Form, and payment, the Engineer will provide copies of the electronic files for the Contractor’s use. A copy of the Electronic File Release Form is appended to the end of this specification section

1.14 COORDINATION WITH OTHER DIVISIONS

A. All work shall be carried out in conjunction with other trades and full cooperation shall be given in order that all work may proceed with a minimum of delay and interference. Particular emphasis is placed on timely installation of major apparatus and furnishing other Contractors, especially the Contractor or Construction Manager, with information as to openings, chases, sleeves, bases, inserts, equipment locations, panels, etc., required by other trades.

B. The Contractors are required to examine all of the Project Drawings and mutually arrange work so as to avoid interference with the work of other trades. In general, ductwork, heating, condenser, chilled water piping, sprinkler piping and drainage lines take precedence over water, gas and electrical conduits. The Engineer shall make final decisions regarding the arrangement of work which cannot be agreed upon by the Contractors.

C. Where the work of the Contractor will be installed in close proximity to or will interfere with work of other trades, the Contractors will cooperate in working out space conditions to make a satisfactory adjustment.

D. If the work under a Section is installed before coordinating with other Divisions or Sections or so as to cause interference with work of other Sections, the necessary changes to correct the condition shall be made by the Contractor causing the interference without extra charge to the Owner.

E. Where work is installed prior to preparation and approval of the Coordination Drawings or in conflict with the approved Coordination drawings and if so directed in other Sections, the Contractor indicated shall prepare composite working drawings and sections clearly showing how the work is to be installed in relation to the work of other trades, at no extra charge to the Owner.

1.15 WORKMANSHIP

A. Service Support: The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

B. Modification of References: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears.

C. The Contractor shall furnish the services of an experienced superintendent who shall be constantly in charge of the installation of the work together with all skilled workmen, journeymen, electricians, helpers and laborers required to unload, transfer, erect, connect, adjust, start, operate and test each system.

D. Unless otherwise specifically indicated on the Drawings or Specifications, all equipment and materials shall be installed with the acceptance of the Engineer and in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

E. All labor for installation of electrical systems shall be performed by experienced, skilled tradesmen under the supervision of a licensed journeyman foreman. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, workmanlike manner. The Engineer reserves the right to reject any work which, in his opinion, has been installed in a substandard, dangerous or unserviceable manner. The Contractor shall replace said work in a satisfactory manner at no extra cost to the Owner.

1.16 SHUTDOWNS

A. When installation of a new system requires the temporary shutdown of an existing operating system, the connection of the new system shall be performed at such time as designated by the Owner.

B. The Engineer and the Owner shall be notified in writing of the estimated duration of the shutdown period at least ten (10) days in advance of the date the work is to be performed.

C. Work shall be arranged for continuous performance whenever possible. The Contractor shall provide all necessary labor, including overtime if required, to assure that existing operating services will be shut down only during the time actually required to make necessary connections.

1.17 TEMPORARY UTILITIES

A. General: Provide new materials and equipment; if acceptable to the Engineer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

C. First Aid Supplies: Comply with governing regulations.

D. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

E. Provide temporary lighting in all areas, throughout construction activities.

1. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer, and will not be accepted as a basis of claims for a Change Order.
2. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters, and main distribution switch gear.
    a. Except where overhead service must be used, install electric power service underground.
    b. Power Distribution System: Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
3. Temporary Telephones: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period.

F. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

G. Termination and Removal: Unless the Engineer requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

1.18 PROJECT PHASING

A. Work under each Section shall include all necessary temporary connections, equipment, conduit, wiring, fire alarm equipment and testing, lighting and emergency lighting, fire stopping, connection of necessary mechanical equipment, labor, and material as necessary to accommodate the phasing of Construction as developed by the General Contractor or Construction Manager and approved by the Owner. All existing systems that pass-thru an area of the building or are required to be maintained in a phased fashion during construction shall remain operational during all phases of construction. No extra compensation shall be granted the Contractor for work required to maintain existing systems operational or to accommodate the construction phasing of the project.

1.19 PROTECTION OF MATERIALS AND EQUIPMENT

A. Work under each Section shall include protecting the work and material of all other Sections from damage by work or workmen and shall include making good all damage thus caused.

B. The Contractor shall be responsible for work and equipment until the facility has been accepted by the Owner. Protect work against theft, injury or damage and carefully store material and equipment received on site which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.

C. Work under each Section includes receiving, unloading, uncrating, storing, protecting, setting in place and completely connecting equipment supplied under each Section. Work under each Section shall also include exercising special care in handling and protecting equipment and fixtures, and shall include the cost of replacing any of the equipment and fixtures which are missing or damaged.

D. Equipment and material stored on the job site shall be protected from the weather, vehicles, dirt and/or damage by workmen or machinery. Insure that all electrical or absorbent equipment or material is protected from moisture during storage.

1.20 ADJUSTING AND TESTING

A. After all the equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests so as to assure the Engineer that they are in proper adjustment and in satisfactory, permanent operating condition.

B. Where requested by the Engineer or specified in the contract documents, a factory-trained service representative shall inspect the installation and assist in the initial startup and adjustment to the equipment. The period of these services shall be for such time as necessary to secure proper installation and adjustments. After the equipment is placed in permanent operation, the service representative shall supervise the initial operation of the equipment and instruct the personnel responsible for operation and maintenance of the equipment. The service representative shall notify the Contractor in writing that the equipment was installed according to manufacturer's recommendations and is operating as intended by the manufacturer. Factory start-up reports shall be included in the operation and maintenance manuals under the appropriate equipment section.

1.21 CLEANING

A. The Contractor shall thoroughly clean all equipment of all foreign substances, oils, dust, dirt, etc., inside and out before final acceptance by the Engineer.

B. If any part of a system should be stopped or damaged by any foreign matter after being placed in operation, the system shall be disconnected, cleaned and reconnected wherever necessary to locate and/or remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.

C. During the course of construction, all conduits shall be capped in an acceptable manner to insure adequate protection against the entrance of foreign matter.

D. Upon completion of all work under the Contract, the Contractor shall remove from the premises all rubbish, debris and excess materials left over from his work.

E. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Remove labels that are not permanent labels.
2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces and panelboard interiors.
4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.

F. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's

property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove and dispose of ALL waste materials, packaging material, skids etc. from the site and dispose of in a lawful manner in accordance with municipal, state and federal regulations.

G. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

1.22 OPERATING AND MAINTENANCE

A. Upon completion of all work and tests, the Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period specified under each applicable Section of this Division. During this period, he shall fully instruct the Owner or the Owner's representative in the operation, adjustment and maintenance of all equipment furnished. The Contractor shall give at least seven (7) day notice to the Owner and the Engineer in advance of this period.

B. The Contractor shall include the maintenance schedule for the principal items of equipment furnished under this Division.

C. The Contractor shall physically demonstrate procedures for all routine maintenance of all equipment furnished under each respective Section to assure accessibility to all devices.

D. An authorized manufacturer's representative shall attest in writing that the equipment has been properly installed prior to startup of any major equipment. At a minimum, the following equipment will require this inspection: emergency generator, fire alarm system, nurse call system, paging systems, etc. These letters will be bound into the operating and maintenance books.

E. Refer to individual trade Sections for any other particular requirements related to operating instructions.

F. Demonstration shall be recorded on CD Rom with two (2) discs turned over to the Owner.

1.23 OPERATING AND MAINTENANCE MANUALS

A. Prepare operating and maintenance manuals in accordance with the requirements of Division 1 and as follows. The Contractor shall prepare six (6) copies of a complete maintenance and operating instructions manual, bound in booklet form. Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty, 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder.

B. Manual shall include the following:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.
5. Emergency instructions.
6. Spare parts list.
7. Copies of warranties.
8. Wiring diagrams.
9. Recommended "turn around" cycles.
10. Inspection procedures.
11. Shop Drawings and Product Data.
12. Equipment start-up reports.

C. Include in the manual, a tabulated equipment schedule for all equipment. Schedule shall include pertinent data such as: make, model number, serial number, voltage, normal operating current, belt size, filter quantities and sizes, bearing number, etc. Schedule shall include maintenance to be done and frequency.

D. Maintenance and instruction manuals shall be submitted to the Owner at the same time as the seven (7) day notice is given prior to the instruction period.

1.24 ACCEPTANCES

A. The equipment, materials, workmanship, design and arrangement of all work installed under the Electrical Sections shall be subject to the review of the Engineer.

B. Within 30 days after the awarding of a Contract, the Electrical Contractor shall submit to the Engineer, for review, a list of manufacturers of equipment proposed for the work under the Electrical Sections. The intent to use the exact makes specified does not relieve the Contractor of the responsibility of submitting such a list.

C. If extensive or unacceptable delivery time is expected on a particular item of equipment specified, the Contractor shall notify the Owner and Engineer, in writing, within 30 days of the awarding of the Contract. In such instances, deviations may be made pending acceptance by the Engineer or the Owner’s representative.

D. Where any specific material, process or method of construction or manufactured article is specified by reference to the catalog number of a manufacturer, the Specifications are to be used as a guide and are not intended to take precedence over the basic duty and performance specified or noted on the Drawings. In all cases, the Electrical Contractor shall verify the duty specified with the specific characteristics of the equipment offered for review. Equipment characteristics are to be used as mandatory requirements where the Contractor proposes to use an acceptable equivalent.

E. If material or equipment is installed before it is reviewed and/or approved, the Contractor shall be liable for its removal and replacement at no extra charge to the Owner if, in the opinion of the Engineer, the material or equipment does not meet the intent of, or standard of quality implied by, the Drawings and Specifications.

F. Failure on the part of the Engineer to reject shop drawings or to reject work in progress shall not be interpreted as acceptance of work not in conformance with the Drawings and/or Specifications. Work not in conformance with the Drawings and/or Specifications shall be corrected whenever it is discovered.

1.25 RECORD DRAWINGS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
3. Note related Change Order numbers where applicable.
4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
5. These shall be clearly marked for Record Drawings on a clean set of reproducible paper copies at the completion of the work and turned over to the Owner.
6. Final record documents shall be prepared in the latest AutoCad/Revit version and digital media for all drawings and a clean set of reproducible paper copies shall be turned over to the Owner at the completion of the work.

1.26 WARRANTIES AND BONDS

A. The following general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties are to be included:

1. General close-out requirements included in Section "Project Close-out."
2. Specific requirements for warranties for the Work and products and installation that are specified to be warranted, are included in the individual Sections of Divisions 02 through [50].
3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the

products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

C. Separate Prime Contracts: Each prime Contractor is responsible for warranties related to its own Contract.

1.27 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Submit written warranties to the Engineer prior to the date certified for Substantial Completion. If the Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Engineer.

H. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Engineer within fifteen days of completion of that designated portion of the Work.

I. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Engineer for approval prior to final execution.

1. Refer to individual Sections of Divisions 2 through [16][50] for specific content requirements, and particular requirements for submittal of special warranties.

J. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

K. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.
3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.28 GUARANTEES

A. The Contractor shall guarantee all material and workmanship under these Specifications and the Contract for a period of one (1) year from the date of final acceptance by Owner. During this guarantee period, all defects developing through faulty equipment, materials or workmanship shall be corrected or replaced immediately by this Contractor without expense to the Owner. Such repairs or replacements shall be made to the Engineers satisfaction.

B. Contractor shall provide name, address, and phone number of all contractors and subcontractors and associated equipment they provided

1.29 PROJECT CLOSE-OUT

A. Contractor shall submit annual maintenance proposal to the Architect/Engineer for review and approval as part of the close out documents.

B. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.

C. Deliver tools, spare parts, extra stock, and similar items.

D. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

E. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

F. Inspection Procedures: On receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer will repeat inspection when requested and assured that the Work has been substantially completed.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

END OF SECTION

Electronic File Release Form

DELIVERY OF ELECTRONIC FILES FOR: _____
Project Name

In accepting and utilizing any drawings or other data on any form of electronic media generated and provided by the Design Professional, the Client covenants and agrees that all such drawings and data are instruments of service of the Design Professional, who shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.

The Client further agrees not to use these drawings and data, in whole or in part, for any purpose or project other than the project which is the subject of this Agreement. The Client agrees to waive all claims against the Design Professional resulting in any way from any unauthorized changes or reuse of the drawings and data for any other project by anyone other than the Design Professional.

In addition, the Client agrees, to the fullest extent permitted by law, to indemnify and hold the Design Professional harmless from any damage, liability or cost, including reasonable attorneys' fees and costs of defense, arising from any changes made by anyone other than the Design Professional or from any reuse of the drawings and data without the prior written consent of the Design Professional.

Under no circumstances shall transfer of the drawings and other instruments of service on electronic media for use by the Client be deemed a sale by the Design Professional, and the Design Professional makes no warranties, either express or implied, of merchantability and fitness for any particular purpose.

_____ _____
Client's Signature Date

_____
Company - Title

_____ _____
Architects' Signature Date

_____
Firm - Title

_____ _____
Owner's Signature Date

_____
Company - Title

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SECTION 26 05 01
ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prior to beginning work, test the existing systems as appropriate and document all deficiencies affecting the work under this contract to the architect and owner. Provide a cost proposal for recommended solutions. Do not proceed with the corrective work until authorized by the owner or their appointed representatives.

B. Electrical demolition.

1.02 RELATED REQUIREMENTS

A. Division 01 – General Requirements.

B. Section 26 04 00 – General Conditions for Electrical Trades.

C. Division 02 - Existing Conditions

1.03 SUBMITTALS

A. Division 01 – General Requirements.

B. Section 26 04 00 – General Conditions for Electrical Trades.

C. Sustainable Design Documentation: Submit certification of removal and appropriate disposal of abandoned cables containing lead stabilizers.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. It is the Contractor’s responsibility to modify the existing Fire Alarm, Telecommunications, Paging, Intercom and Master Clock, and Security systems in a phased fashion and be maintained outside of the phased area of work. Maintain operation of the existing systems during phased demolition. Devices are to be removed back to the next device outside of the area of work. Extend circuits with wiring to match existing as required to maintain continuity of circuits upstream and downstream of the work affected demolition. Protect existing devices during construction. Take devices off-line if necessary, coordinate bypassing and reactivation of the devices with the Owner.

B. Demolition is to be performed in a selective, phased fashion and performed to maintain existing systems in areas remaining operational. It is the contractor’s responsibility to coordinate disruption of systems or circuits and to investigate all circuiting and devices scheduled for removal. Provide temporary measures to maintain existing systems and circuits as required. Refer to phasing plans and coordinate all phasing work with the CM/GC and Owner.

C. Verify field measurements and circuiting arrangements are as shown on Drawings.

D. Verify that abandoned wiring and equipment serve only abandoned facilities.

E. Demolition drawings are based on limited field observation and existing record documents where available.

F. Report discrepancies to Architect/Engineer before disturbing existing installation.

G. Beginning of demolition means installer accepts existing conditions.

H. Contractor shall modify existing circuits, when existing devices are removed, as required to maintain circuit continuity.

3.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings to be removed.

B. Coordinate utility service outages with utility company and the Owner.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Phased Construction: Provide temporary equipment, wiring, conduit, labor and materials as required to maintain operation of existing systems during all phases of construction.

E. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
1. Obtain permission from Owner at least 72 hours before partially or completely disabling system.
2. Make temporary connections to maintain service in areas adjacent to work area.

F. Existing Fire Alarm System: Maintain existing system in service until new system is complete and accepted by the Owner and Local Authorities. Disable system only to make switchovers and connections. Minimize outage duration.
1. Notify Owner and local authorities before partially or completely disabling system.
2. Make notifications at least 72 hours in advance.
3. Make temporary connections to maintain service in areas adjacent to work area.
4. Provide protective coverings for all inactive devices until testing and final acceptance and demolition.

G. Existing Telecommunications Systems: Maintain existing systems in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
1. Notify Owner at least 72 hours before partially or completely disabling system.
2. Notify telephone utility company at least 72 hours before partially or completely disabling system.
3. Make temporary connections to maintain service in areas adjacent to work area.

H. Existing security; paging; master clock; sound systems…etc. System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
1. Obtain permission from Owner at least 72 hours before partially or completely disabling system.
2. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:
1. PCB-containing electrical equipment, including transformers, capacitors, and switches.
2. PCB- and DEHP-containing lighting ballasts.
3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

F. Disconnect and remove abandoned panelboards and distribution equipment.

G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

I. Repair adjacent construction and finishes damaged during demolition and extension work.

J. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

K. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

A. Division 01 - General Requirements.

B. Clean and repair existing materials and equipment that remain or that are to be reused.

C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

D. Luminaires: Remove existing luminaires indicated for reuse within the project for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts, drivers, and broken electrical parts.

END OF SECTION

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SECTION 26 05 03
EQUIPMENT WIRING CONNECTIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes electrical connections to equipment.

1.02 RELATED SECTIONS

A. Division 01 – General Requirements

B. Section 260400 – General Conditions for Electrical Trades.

C. All of Division 26, Division 27, Division 28 Sections.

1.03 REFERENCE STANDARDS

A. National Electrical Manufacturers Association:
   1. NEMA WD 1 - General Requirements for Wiring Devices.
   2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.04 SUBMITTALS

A. See Division 01 - General Requirements

B. Product Data: Submit device manufacturer’s catalog information showing dimensions, configurations, and construction.

C. Provide manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with latest adopted version of applicable building code, including any addendum or supplements.

1.06 CLOSEOUT SUBMITTALS

A. See Division 01- General Requirements

B. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.07 COORDINATION

A. See Division 01 - General Requirements

B. Obtain and review shop drawings, product data, manufacturer’s wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

C. Determine connection locations and requirements.

D. Sequence rough-in of electrical connections to coordinate with installation of equipment.

E. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.01 ATTACHMENT PLUGS

A. Manufacturers:
   1. Hubbell.
   2. Leviton.
   3. Legrand / Pass & Seymour
   4. Substitutions: Division 01 - General Requirements.

B. Attachment Plug Construction: Conform to NEMA WD 1.

C. Configuration: NEMA WD 6; match receptacle configuration to outlet furnished for equipment.

D. Rating: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

2.02 FLEXIBLE CORD

A. Manufacturers:
1. General Cable.
2. Southwire Company.
3. Hubbell Incorporated.
4. Substitutions: Division 01 - General Requirements.

B. Cord Construction:
1. Type SO multi-conductor flexible cord with identified neutral and equipment grounding conductor, suitable for use in damp locations where required.
2. Rating: 600V, amperage to match full load or MCA rating of equipment being served, sized per NFPA 70, Article 400.5.
3. Conductor Identification:
   a. Neutral:
      1) White or gray colored braid.
      2) Colored tracer in the braid.
      3) White, gray, or light blue insulation.
      4) Ridges, grooves, or white stripes on the exterior of the cord.
   b. Equipment Grounding Conductor:
      1) Continuous green color.
      2) Continuous identifying marker distinguishing it from the other conductors.

C. Connectors:
1. Type: All steel fitting with gland nut, seal, and bushing for securing cable.
2. Suitable for use for passing cord thru enclosure or bulkhead.
3. Provide with suitable NEMA rating for application.

D. Strain Relief:
1. Type: Aluminum fitting with galvanized steel mesh, duct-tight
2. Suitable for size and type of flexible cord being used.

PART 3 EXECUTION

3.01 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify equipment is ready for electrical connection, for wiring, and to be energized.

3.02 EXISTING WORK

A. Remove exposed abandoned equipment wiring connections, including abandoned connections above accessible ceiling finishes.

B. Disconnect abandoned utilization equipment and remove wiring connections. Remove abandoned components when connected raceway is abandoned and removed. Install blank cover for abandoned boxes and enclosures not removed.

C. Extend existing equipment connections using materials and methods compatible with existing electrical installations, or as specified.

3.03 INSTALLATION

A. Make conduit connections to equipment using flexible metal conduit. Use liquidtight flexible metal conduit with watertight connectors in damp or wet locations.

B. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

C. Provide receptacle outlet and plate to accommodate connection to attachment plug.

D. Provide flexible cord and cord-cap for field-supplied attachment plug. Coordinate exact requirements with equipment supplier.

E. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

F. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

G. Install terminal block jumpers to complete equipment wiring requirements.

H. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

I. Coolers and Freezers: Coordinate the location of openings in freezer and cooler walls, floor, and ceilings with equipment supplier. Seal openings.

J. Install conduit and wiring for interconnection of motorized door operator and motorized fire door control stations, safety devices and accessories to complete equipment wiring requirements.

K. Install conduit and wiring for interconnection of specialty equipment (motorized divider partitions, scoreboards, motorized backboards, shot clocks, motorized shades…etc.) control stations, safety devices and accessories to complete equipment wiring requirements.

L. Install conduit and wiring for interconnection of receptacles, lighting and switches furnished with equipment (fume hoods, food service equipment, furnishings…etc.).

M. Install conduit and wiring for interconnection of alarm initiating devices, control panels and annunciators furnished with equipment.

N. Install conduit and wiring for interconnection of power supplies furnished by other divisions.

O. Install conduit and wiring for interconnection of fire alarm initiating devices, control panels, motors, disconnect switches, and card access equipment and furnished with elevator equipment.

3.04 ADJUSTING

A. See Division 01 – General Requirements.

B. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

3.05 EQUIPMENT CONNECTION SCHEDULE

A. Refer to drawings.

END OF SECTION

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SECTION 26 05 19
ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Armored cable.

C. Metal-clad cable.

D. Manufactured wiring systems.

E. Wiring connectors.

F. Electrical tape.

G. Heat shrink tubing.

H. Oxide inhibiting compound.

I. Wire pulling lubricant.

J. Cable ties.

1.02 RELATED REQUIREMENTS

A. Division 01 – General Requirements.

B. Division 07 – Thermal and Moisture Protection.

C. Section 26 0505 – Electrical Demolition: Disconnection, removal, and/or extension of existing electrical conductors and cables.

D. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

E. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

F. Section 28 3100 - Fire Detection and Alarm: Fire alarm system conductors and cables.

G. Section 31 2316 - Excavation.

H. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

I. Section 31 2323 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.

E. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2013.

F. FS A-A-59544 - Cable and Wire, Electrical (Power, Fixed Installation); Federal Specification; Revision A, 2008.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

H. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.

I. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF); 2007.

J. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.

K. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

M. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

N. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

O. UL 183 - Manufactured Wiring Systems; Current Edition, Including All Revisions.

P. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

Q. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

R. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

S. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Current Edition, Including All Revisions.

T. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

U. UL 719 – Nonmetallic-Sheathed Cables; Current Edition, Including All Revisions.

V. UL 854 – Service-Entrance Cables; Current edition, Including All Revisions.

W. UL 1277 - Electrical Power and Control Tray Cables with Optional Optical-Fiber Members; Current Edition, Including All Revisions.

X. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate the installation of direct burial cable with other trades to avoid conflicts with piping or other potential conflicts.
3. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Sustainable Design Documentation: Submit manufacturer's product data on conductor and cable showing compliance with specified lead content requirements.

D. Manufactured Wiring System Shop Drawings: Provide plan views indicating proposed system layout with components identified; indicate branch circuit connections.

E. Field Quality Control Test Reports.

F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 – General Requirements.
2. Extra Manufactured Wiring System Cable Assemblies: One of each configuration, 6 foot lengths.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Nonmetallic-sheathed cable is not permitted, unless noted otherwise.

D. Service entrance cable is not permitted, unless noted otherwise.

E. Armored cable is not permitted.

F. Metal-clad cable is permitted as follows:
1. Where not otherwise restricted, may be used:
a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
1) Maximum Length: 6 feet.
b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.

1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet to panelboard.

2. In addition to other applicable restrictions, may not be used:
   a. Life Safety or Critical Power.
   b. Homeruns from first device, such as lighting fixture, MEP equipment, wiring device to panelboards.
   c. Where not approved for use by the authority having jurisdiction.
   d. Where exposed to view.
   e. Where exposed to damage.
   f. For damp, wet, or corrosive locations.
   g. For isolated ground circuits, unless provided with an additional isolated/insulated grounding conductor.
   h. For patient care areas requiring redundant grounding, unless using HCFC Type cable.

G. Manufactured wiring systems are permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. For branch circuits where concealed under raised floors, where concealed above accessible ceilings for lighting.
         1) Exception: Provide single conductor building wire in raceway for circuit homerun from distribution box to panelboard.
      b. For general purpose, non-essential electrical systems in non-hazardous patient care areas of health care facilities, when provided with additional insulated grounding conductor for redundant grounding.

H. Mineral Insulated Cable permitted as follows:
   1. Rated Feeders requiring a 2-hour protective rating.
   2. Fire Alarm and Control Circuits requiring survivability rating.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Provide conductors and cables with lead content less than 300 parts per million.

D. Provide new conductors and cables manufactured not more than one year prior to installation.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

F. Comply with NEMA WC 70.

G. Comply with FS A-A-59544 where applicable.

H. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

I. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

J. Conductors for Grounding and Bonding: Also comply with Section 26 0526.

K. Conductors and Cables Installed in Cable Tray: Listed and labeled as suitable for cable tray use.

L. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.

M. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.

N. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
a. Exceptions:
1) 20 A, 120 V circuits longer than 100 feet 10 AWG minimum, and sized for voltage drop.
2) 20 A, 120 V circuits longer than 165 feet 8 AWG minimum, and sized for voltage drop.
3) 20 A, 277 V circuits longer than 250 feet: 10 AWG minimum, and sized for voltage drop.
2. Control Circuits: 14 AWG.

O. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

P. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
3. Color Code:
a. 480Y/277 V, 3 Phase, 4 Wire System:
1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.
4) Neutral/Grounded: Gray.
b. 208Y/120 V, 3 Phase, 4 Wire System:
1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.
4) Neutral/Grounded: White.
c. 240/120 V, 1 Phase, 3 Wire System:
1) Phase A: Black.
2) Phase B: Red.
3) Neutral/Grounded: White.
d. Equipment Ground, All Systems: Green.
e. Isolated Ground, All Systems: Green with yellow stripe.
f. Travelers for 3-Way and 4-Way Switching: Pink.
g. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
h. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:
1. Copper Building Wire:
a. Cerro Wire LLC.
b. Southwire Company
c. General Cable Technologies
d. Substitutions: See Section 01 - Product Requirements.

2. Aluminum Building Wire (only where specifically indicated):
   a. Encore Wire Corporation
   b. Southwire Company
   c. Stabiloy, a brand of General Cable Technologies Corporation
   d. Substitutions: See Section 01 - Product Requirements.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
1. Feeders and Branch Circuits:
   a. Size 10 AWG and Smaller: Solid.
   b. Size 8 AWG and Larger: Stranded.
2. Control Circuits: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
   a. Installed Underground: Type XHHW-2.
2. Aluminum Building Wire (only where specifically indicated): Type XHHW-2.

2.04 METAL-CLAD CABLE

A. Manufacturers:
1. AFC Cable Systems Inc.
2. Encore Wire Corporation
3. Southwire Company
4. General Cable Technologies
5. Substitutions: See Section 01 - Product Requirements.

B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

C. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.
2. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

F. Provide oversized neutral conductors where indicated or required.

G. Provide dedicated neutral conductor for each phase conductor where indicated or required.

H. Grounding: Full-size integral equipment grounding conductor.
1. Provide additional isolated/insulated grounding conductor where indicated or required.

I. Armor: Aluminum, interlocked tape.

J. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 0526.

C. Wiring Connectors for Splices and Taps:
1. Copper conductors 10 AWG and smaller: Install insulated spring wire connectors with plastic caps
2. Copper Conductors Size 8 AWG: Install solderless pressure connectors with insulating covers
3. Copper Conductors Size 6 AWG and larger: Install pressure connectors or split bolt connectors.

D. Wiring Connectors for Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
7. Conductors for Control Circuits: Use crimped terminals for all connections.

E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
1. Manufacturers:
a. 3M
b. Ideal Industries, Inc.
c. NSI Industries LLC.
d. Ilsco
e. Erico
f. Substitutions: See Division 01 – General Requirements.

H. Mechanical Connectors: Provide bolted type or set-screw type.
1. Manufacturers:
a. Burndy LLC.
b. Ilsco
c. Thomas & Betts Corporation
d. Substitutions: See Division 01 – General Requirements.

I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
1. Manufacturers:
a. Burndy LLC.
b. Ilsco
c. Thomas & Betts Corporation
d. Erico
e. Substitutions: See Division 01 – General Requirements.

J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

1. Manufacturers:
   a. Burndy LLC.
   b. Ilsco
   c. Thomas & Betts Corporation
   d. Substitutions: See Division 01 – General Requirements.

2.06 WIRING ACCESSORIES

A. Electrical Tape:
   1. Manufacturers:
      a. 3M
      b. Plymouth Rubber Europa
      c. Substitutions: See Division 01 – General Requirements.
   2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F .
   3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
   4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
   1. Manufacturers:
      a. 3M
      b. Burndy LLC.
      c. Thomas & Betts Corporation
      d. Substitutions: See Division 01 – General Requirements.

C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
   1. Manufacturers:
      a. Burndy LLC.
      b. Ideal Industries, Inc.
      c. Ilsco
      d. Substitutions: See Division 01 – General Requirements.

D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
   1. Manufacturers:
      a. 3M
      b. American Polywater Corporation
      c. Ideal Industries, Inc.
      d. Substitutions: See Division 01 – General Requirements.

E. Cable Ties: Material and tensile strength rating suitable for application.
   1. Manufacturers:
      a. Burndy LLC.
      b. Substitutions: See Section 01 - Product Requirements.
   2. Provide plenum rated cable ties.

PART 3 EXECUTION

3.01 EXISTING WORK

A. Remove exposed abandoned wire and cable, including abandoned wire and cable above accessible ceiling finishes. Patch surfaces where removed cables pass through building finishes.

B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.

C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.

D. Extend existing circuits using materials and methods compatible with existing electrical installations, or as specified.

E. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.02 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as shown on the drawings.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.03 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.04 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated and routing is not shown, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   5. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
   6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are shown as separate, combining them together in a single raceway is not permitted. Where combining branch circuit in a single raceway is indicated:
      a. Dedicated neutral conductors are considered current-carrying conductors.
      b. Increase size of conductors as required accounting for ampacity derating.
      c. Size raceways, boxes, etc. to accommodate conductors.
   7. Common Neutrals: Not allowed.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install nonmetallic-sheathed cable (Type NM-B) in accordance with NECA 121.

E. Install metal-clad cable (Type MC) in accordance with NECA 120.

F. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

G. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

H. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
   1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
   2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.

I. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
      c. Do not use direct-bearing set-screw type fittings for cables with aluminum armor.
      d. Secure at maximum interval of 5 ft.
      e. Install parallel and perpendicular to building lines.
      f. Bundle cables in common routes back to panelboards.
      g. Secure from structure using suitable J-hooks or plenum rated cable ties.

J. Install conductors with a minimum of 12 inches of slack at each outlet.

K. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.

L. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

M. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

N. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Do not remove conductor strands to facilitate insertion into connector.
   3. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

O. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
   1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
      b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
   2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
      b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
   3. Wet Locations: Use heat shrink tubing.

P. Insulate ends of spare conductors using vinyl insulating electrical tape.

Q. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

R. Identify conductors and cables in accordance with Section 26 0553.

S. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07.

T. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

U. Mineral Insulated Cable Installation:
   1. The wiring and cable shall be installed according to the manufacturers' recommendations, the instructions in the installation and specifications manual and the requirements of the UL Fire Resistance Directory listing.
   2. Provide brass glands, termination kits and fittings from the same manufacturer as the cable. Provide brass plates for entrance fittings to ferrous enclosures per the manufacturer's recommendations.

3.05 FIELD QUALITY CONTROL

A. See Division 01 – General Requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
   1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

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SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground bars.

E. Ground rod electrodes.

F. Chemically-enhanced ground electrodes.

G. Ground plate electrodes.

H. Ground enhancement material.

I. Ground access wells.

1.02 RELATED REQUIREMENTS

A. Division 01 – General Requirements

B. Division 03– Concrete.

C. Division 09 - Finishes.

D. Section 26 0400 – General Conditions for Electrical Trades

E. Section 26 0519 - Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
   1. Includes oxide inhibiting compound.

F. Section 26 0536 - Cable Trays for Electrical Systems: Additional grounding and bonding requirements for cable tray systems.

G. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

H. Section 26 4500 - Photovoltaic System: Additional grounding and bonding requirements for photovoltaic systems.

I. Section 26 4113 – Facility Lightning Protection.

J. Section 26 5100 - Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

K. Section 33 7900 - Site Grounding.

1.03 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction.

C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems.

E. NFPA 70 - National Electrical Code.

F. NFPA 99 - Health Care Facilities Code.

G. NFPA 780 - Standard for the Installation of Lightning Protection Systems.

H. UL 467 - Grounding and Bonding Equipment.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Verify exact locations of underground metal water service pipe entrances to building.
2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Field quality control test reports.

E. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

B. Do not use products for applications other than as permitted by NFPA 70 and product listing.

C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

E. Grounding System Resistance:
1. Achieve specified grounding system resistance under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.

F. Grounding Electrode System:
1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
   a. Provide continuous grounding electrode conductors without splice or joint.
   b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
2. Metal Underground Water Pipe(s):
   a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
   b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
   c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
3. Other Metal Piping:
   a. Provide connection to all metallic gas piping and miscellaneous metal piping of continuous lengths.
   b. Bond in accordance with NFPA 70.
   c. Size bonding conductor in accordance with NFPA 70.
4. Metal In-Ground Support Structure:
   a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
5. Concrete-Encased Electrode:
   a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
6. Ground Ring (Counterpoise):
   a. Provide a ground ring encircling the building or structure consisting of bare copper conductor not less than 2 AWG in direct contact with earth, installed at a depth of not less than 30 inches.
   b. Where location is not indicated, locate ground ring conductor at least 24 inches outside building perimeter foundation.
   c. Provide ground enhancement material around conductor where indicated.
   d. Provide connection from ground ring conductor to:
      1) Perimeter columns of metal building frame.
      2) Ground rod electrodes located as indicated.
      3) Building service equipment grounding bus..

7. Ground Rod Electrode(s):
   a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
   b. Space electrodes not less than 22 feet from each other and any other ground electrode.
   c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
   d. Provide ground enhancement material around electrode where indicated.
   e. Provide ground access well for each electrode.
8. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
9. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
   a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
   b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
   c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.
10. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.

G. Service-Supplied System Grounding:
1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.

H. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:
1. Provide grounding electrode system for each separate building or structure.
2. Provide equipment grounding conductor routed with supply conductors.
3. For each disconnecting means, provide grounding electrode conductor to connect equipment ground bus to grounding electrode system.
4. Do not make any connections and remove any factory-installed jumpers between neutral (grounded) conductors and ground.

I. Separately Derived System Grounding:
1. Separately derived systems include, but are not limited to:
   a. Transformers (except autotransformers such as buck-boost transformers).
   b. Uninterruptible power supplies (UPS), when configured as separately derived systems.
   c. Generators, when neutral is switched in the transfer switch.
2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.

3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
4. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.
5. Outdoor Source: Where the source of the separately derived system is located outside the building or structure supplied, provide connection to grounding electrode at source in accordance with NFPA 70.
6. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
7. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.

J. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
   a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
   b. Metal gas piping.
   c. Metal process piping.
8. Provide bonding for interior metal air ducts.
9. Provide bonding for metal building frame.
10. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.
11. Provide bonding and equipment grounding for pools and fountains and associated equipment in accordance with NFPA 70.
12. Provide redundant grounding and bonding for patient care areas of health care facilities in accordance with NFPA 70 and NFPA 99.

K. Isolated Ground System:

1. Where isolated ground receptacles or other isolated ground connections are indicated, provide separate isolated/insulated equipment grounding conductors.
2. Connect isolated/insulated equipment grounding conductors only to separate isolated/insulated equipment ground busses.
3. Connect the isolated/insulated equipment grounding conductors to the solidly bonded equipment ground bus only at the service disconnect or separately derived system disconnect. Do not make any other connections between isolated ground system and normal equipment ground system on the load side of this connection.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0519:
1. Use insulated copper conductors unless otherwise indicated.
a. Exceptions:
1) Use bare copper conductors where installed underground in direct contact with earth.
2) Use bare copper conductors where directly encased in concrete (not in raceway).
2. Factory Pre-fabricated Bonding Jumpers: Furnished with factory-installed ferrules; size braided cables to provide equivalent gage of specified conductors.

C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
a. Exceptions:
1) Use mechanical connectors for connections to electrodes at ground access wells.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
a. Exceptions:
1) Use exothermic welded connections for connections to metal building frame.
4. Manufacturers - Mechanical and Compression Connectors:
a. Advanced Lightning Technology (ALT)
b. Burndy LLC.
c. Harger Lightning & Grounding
d. Thomas & Betts Corporation
e. Substitutions: See Division 01 - General Requirements.
5. Manufacturers - Exothermic Welded Connections:
a. Burndy LLC.
b. Cadweld, a brand of Erico International Corporation
c. ThermOweld, a brand of Continental Industries, Inc.Substitutions: See Division 01 - General Requirements.

D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.

2. Size: As indicated.
3. Holes for Connections: As indicated or as required for connections to be made.
4. Manufacturers:
   a. Advanced Lightning Technology (ALT)
   b. Erico International Corporation
   c. Harger Lightning & Grounding
   d. ThermOweld, a brand of Continental Industries, Inc.
   e. Substitutions: See Division 01 - General Requirements.

E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.
4. Where rod lengths of greater than 10 feet are indicated or otherwise required, sectionalized ground rods may be used.
5. Manufacturers:
   a. Advanced Lightning Technology (ALT)
   b. Erico International Corporation
   c. Galvan Industries, Inc.
   d. Harger Lightning & Grounding
   e. Substitutions: See Division 01 - General Requirements.

F. Chemically-Enhanced Ground Electrodes:
1. Description: Copper tube factory-filled with electrolytic salts designed to provide a low-impedance ground in locations with high soil resistivity; straight (for vertical installations) or L-shaped (for horizontal installations) as indicated or as required.
2. Length: 10 feet.
3. Integral Pigtail: Factory-attached, sized not less than grounding electrode conductor to be attached.
4. Backfill Material: Grounding enhancement material recommended by electrode manufacturer.
5. Manufacturers:
   a. Advanced Lightning Technology (ALT)
   b. Erico International Corporation
   c. Harger Lightning & Grounding
   d. ThermOweld, subsidiary of Continental Industries
   e. Substitutions: See Division 01 - General Requirements.

G. Ground Plate Electrodes:
1. Material: Copper.
2. Size: 24 by 24 by 1/4 inches, unless otherwise indicated.
3. Manufacturers:
   a. Advanced Lightning Technology (ALT)
   b. Erico International Corporation
   c. Harger Lightning & Grounding
   d. ThermOweld, subsidiary of Continental Industries
   e. Substitutions: See Division 01 - General Requirements.

H. Ground Enhancement Material:
1. Description: Factory-mixed conductive material designed for permanent and maintenance-free improvement of grounding effectiveness by lowering resistivity.
2. Resistivity: Not more than 20 ohm-cm in final installed form.
3. Manufacturers:
   a. Erico International Corporation
   b. Harger Lightning & Grounding
   c. ThermOweld, subsidiary of Continental Industries

d. Substitutions: See Division 01 - General Requirements.

I. Ground Access Wells:
1. Description: Open bottom round or rectangular well with access cover for testing and inspection; suitable for the expected load at the installed location.
a. Areas Exposed to Light Vehicular Traffic: Rated for not less than 22,500 pounds vertical design load.
2. Size: As required to provide adequate access for testing and inspection, but not less than minimum size requirements specified.
a. Round Wells: Not less than 8 inches in diameter.
b. Rectangular Wells: Not less than 12 by 12 inches.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 10 inches.
4. Cover: Factory-identified by permanent means with word "GROUND".
5. Manufacturers:
a. Advanced Lightning Technology (ALT)
b. Erico International Corporation
c. Harger Lightning & Grounding
d. ThermOweld, subsidiary of Continental Industries
e. Substitutions: See Division 01 - General Requirements.

J. Oxide Inhibiting Compound: Comply with Section 26 0519.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as shown on the drawings.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Remove paint, rust, mill oils, surface contaminants at connection points.

3.03 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches deep in accordance with NFPA 70 or provide ground plates.
1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
2. Indoor Installations: Unless otherwise indicated, install with 4 inches of top of rod exposed.

D. Ground Plate Electrodes: Unless otherwise indicated, install ground plate electrodes at a depth of not less than 30 inches.

E. Make grounding and bonding connections using specified connectors.
1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.

3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

F. Install in accordance with IEEE 142.

G. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes to achieve specified resistance to ground.

H. Install grounding and bonding conductors concealed from view.

I. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

J. Install continuous grounding using underground cold water system, driven rods and building steel as grounding electrode. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.

K. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.

L. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.

M. Permanently attach equipment and grounding conductors prior to energizing equipment.

N. Common Ground Bonding with Lightning Protection System: Bond electric power system, grounding electrode system directly to lightning protection system earth connection at closest point to electric service grounding electrode. Use bonding conductor sized the same as system grounding conductor and install in conduit.

O. Identify grounding and bonding system components in accordance with Section 26 0553.

3.04 FIELD QUALITY CONTROL

A. See Division 01 - General Requirements.

B. Inspect and test in accordance with NETA ATS except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION

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SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for electrical equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Division 01 – General Requirements

B. Division 03 - Cast-in-Place Concrete: Concrete equipment pads.

C. Section 260400 – General Conditions for Electrical Trades

D. Section 260533 – Raceway and Boxes for Electrical Systems: Additional support and attachment requirements for conduits.

E. Section 260536 - Cable Trays for Electrical Systems: Additional support and attachment requirements for cable tray.

F. Section 262500 – Enclosed Bus Assemblies: Additional support and attachment requirements for busway.

G. Section 264500 - Photovoltaic Systems: Photovoltaic module mounting systems.

H. Section 265100 - Lighting: Additional support and attachment requirements for interior luminaires.

1.03 REFERENCE STANDARDS

A. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. See Division 01: General Requirements.

B. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components being installed.
   2. Coordinate the work with other trades and provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

C. Sequencing:
1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Division 03.

1.05 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

D. Installer's Qualifications: Include evidence of compliance with specified requirements.

E. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with latest adopted version of applicable building code, including any addendum or supplements.

C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.

D. Installer Qualifications for Field-Welding: As specified in Section 260400 General Requirements for Electrical Trades.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.

a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, fiberglass or approved equivalent unless otherwise indicated.
c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
1. Conduit Straps: One-hole or two-hole type; zinc plated steel.
2. Conduit Clamps: Bolted type unless otherwise indicated.
3. Manufacturers:
a. Cooper Crouse-Hinds, a division of Eaton Corporation
b. Erico International Corporation
c. O-Z/Gedney, a brand of Emerson Industrial Automation
d. Thomas & Betts Corporation
e. Substitutions: See Division 01 - General Requirements.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
1. Manufacturers:
a. Cooper Crouse-Hinds, a division of Eaton Corporation
b. Erico International Corporation
c. O-Z/Gedney, a brand of Emerson IndustrialAutomation
d. Thomas & Betts Corporation
e. Substitutions: See Division 01 - General Requirements.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Comply with MFMA-4.
2. Channel Material:
a. Indoor Dry Locations: Use galvanized steel.
b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
3. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.
4. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
5. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation
b. Thomas & Betts Corporation
c. Unistrut, a brand of Atkore International Inc.
d. Substitutions: See Division 01- General Requirements.
e. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch diameter.
b. Busway Supports: 1/2 inch diameter.
c. Single Conduit up to 1 inch trade size: 1/4 inch diameter.
d. Single Conduit larger than 1 inch trade size: 3/8 inch diameter.
e. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
f. Outlet Boxes: 1/4 inch diameter.
g. Luminaires: 1/4 inch diameter.

F. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any

attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.

1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
3. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
4. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation
    b. Erico International Corporation
    c. PHP Systems/Design
    d. Unistrut, a brand of Atkore International Inc.
    e. Substitutions: See Division 01 - General Requirements.

G. Anchors and Fasteners:

1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Sheet Metal: Use sheet metal screws.
8. Wood: Use wood screws.
9. Plastic and lead anchors are not permitted.
10. Powder-actuated fasteners may be used with:
    a. Permission by Architect.
    b. Permission by Structural Engineer.
    c. Use only threaded studs; do not use pins.
11. Hammer-driven anchors and fasteners are permitted as follows:
    a. Nails are permitted for attachment of nonmetallic boxes to wood frame construction (when specified).
    b. Staples are permitted for attachment of nonmetallic-sheathed cable to wood frame construction (when specified).
12. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    a. Comply with MFMA-4.
    b. Channel Material: Use galvanized steel.
    c. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch minimum base metal thickness.
    d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
13. Manufacturers - Mechanical Anchors:
    a. Hilti, Inc.
    b. ITW Red Head, a division of Illinois Tool Works, Inc.
    c. Powers Fasteners, Inc.
    d. Simpson Strong-Tie Company Inc.
    e. Substitutions: See Division 01 - General Requirements.
14. Manufacturers - Powder-Actuated Fastening Systems:
    a. Hilti, Inc.
    b. ITW Ramset, a division of Illinois Tool Works, Inc. Powers Fasteners, Inc.
    c. Simpson Strong-Tie Company Inc.

d. Substitutions: See Division 01 - General Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated, do not provide support from roof deck.

F. Do not penetrate, notch, or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 4 inch high concrete pad constructed in accordance with Division 03.
   5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Conduit Support and Attachment: Also comply with Section 26 05 33.

I. Cable Tray Support and Attachment: Also comply with Section 26 05 36.

J. Box Support and Attachment: Also comply with Section 26 05 33.

K. Transformer Supports: Also comply with Section 26 22 00.

L. Busway Support and Attachment: Also comply with Section 26 25 00.

M. Luminaire Support and Attachment: Also comply with Section 26 51 00.

N. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

O. Secure fasteners according to manufacturer's recommended torque settings.

P. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. Division 01 - Quality Requirements, for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Conduit Applications
2. General Requirements
3. Galvanized steel rigid metal conduit (RMC).
4. Flexible metal conduit (FMC).
5. Liquidtight flexible metal conduit (LFMC).
6. Electrical metallic tubing (EMT).
7. Rigid polyvinyl chloride (PVC) conduit.
8. Liquidtight flexible nonmetallic conduit (LFNC).
9. Surface metal raceway
10. Wireway
11. Boxes
12. Accessories.

B. Related Sections:
1. Section 260503 - Equipment Wiring Connections.
2. Section 260519 – Electrical Power Conductors and Cables.
3. Section 260526 - Grounding and Bonding for Electrical Systems.
4. Section 260529 - Hangers and Supports for Electrical Systems.
5. Section 260539 - Underfloor Raceways for Electrical Systems.
6. Section 260553 - Identification for Electrical Systems.
7. Section 262726 - Wiring Devices.
8. Section 270533 - Raceway and Boxes for Communications Systems.
9. Section 280533 - Raceway and Boxes for Electronic Safety and Security.

1.02 REFERENCES

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC);

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S);

C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A);

D. NECA 1 - Standard for Good Workmanship in Electrical Construction;

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT);

F. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit;

G. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC);

H. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable;

I. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit;

J. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit;

K. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing;

L. NEMA TC 13 - Electrical Nonmetallic Tubing (ENT);

M. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

N. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

O. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.

P. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

Q. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

R. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

S. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

T. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

U. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

V. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

W. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

X. UL 1653 - Electrical Nonmetallic Tubing; Current Edition, Including All Revisions.

Y. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit; Current Edition, Including All Revisions.

Z. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

AA. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

BB. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

CC. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.03 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
   5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for all conduits and fittings outlined in Part 2.

C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements.

Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

D. Shop Drawings:
   1. Indicate proposed arrangement for conduits to be installed within or under structural concrete slabs, where permitted.
   2. Include proposed locations of roof penetrations and proposed methods for sealing.

E. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs (where permitted), and conduits 2 inch trade size and larger.

F. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.

G. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

H. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Division 01 – General Requirements.
   2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Division 01 – General Requirements

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

D. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

1.08 COORDINATION

A. See Division 01 – General Requirements

B. Coordinate installation of outlet boxes for equipment connected under Section 260503.

C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

D. Electrical contractor is responsible to fully coordinate with the site and concrete contractors and all other trades when routing conduit underslab. Routing of conduit underslab may be acceptable, provided spacing of conduits is adequate for proper backfilling of area surrounding conduits. Adequate spacing shall mean using factory made conduit spacers that allow for a minimum of 3-inches for backfilling with sand or 3 times the pipe diameter for backfilling with a structural fill. Proposed conduit routing,

installation and methods and backfilling procedures shall be submitted to the Engineer for review prior to installation.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

C. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications listed below. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

1. Underground:
   a. Under Slab on Grade: Use schedule 40 rigid PVC conduit with galvanized steel rigid metal conduit sweeps. Provide cast metal boxes or nonmetallic handhole. Applications limited to:
      1) Panelboard feeders
      2) Floor boxes
      3) Free-standing equipment
   b. Exterior, Within Trench: Use schedule 40 or schedule 80 rigid PVC conduit with galvanized steel rigid metal conduit sweeps. Provide cast metal boxes or nonmetallic handhole.
   c. Exterior, Concrete Encased: Use Type EB rigid PVC conduit. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
2. Embedded Within Concrete:
   a. Within Slab on Grade: Floor box applications only.
   b. Within Slab Above Ground: Not permitted.
   c. Within Concrete Walls Above Ground: Use Type EB rigid PVC conduit. Provide flush mounted box rated for masonry applications.
3. Concealed Within Masonry Walls: Use electrical metallic tubing (EMT). Provide flush mounted boxes rated for masonry applications.
4. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT) or MC cable (where allowed).Provide flush mounted sheet-metal boxes.
5. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT) or MC cable (where allowed).
6. Interior, Damp or Wet Locations Provide:
   a. Electrical metallic tubing (EMT) with compression fittings
   b. Provide cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.
7. Exposed, Interior dry locations: Use electrical metallic tubing (EMT)
8. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
   a. Locations subject to physical damage include, but are not limited to:
      1) Where exposed below 8 feet, except within electrical and communication rooms or closets.
      2) Where exposed below 20 feet in warehouse areas.
9. steel rigid metal conduit

10. Hazardous (Classified) Locations: Use galvanized steel rigid metal conduit. Use sealing fittings appropriate for classification where installed.
11. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
    a. Maximum Length: 6 feet.
12. Connections to Vibrating Equipment:
    a. Dry Locations: Use flexible metal conduit or MC Cable.
    b. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
    c. Maximum Length: 6 feet unless otherwise indicated.
    d. Vibrating equipment includes, but is not limited to:
        1) Transformers.
        2) Motors.
        3) Pumps.
        4) Fans.
13. Exposed Dry Finished Locations: Provide surface metal raceway and fittings. Unless specified on drawings, requires design team approval for use of surface metal raceway in finished locations. Coordinate all vertical runs of surface raceway with the architect prior to installation.

2.02 GENERAL REQUIREMENTS

A. Fittings for Grounding and Bonding: Also comply with Section 260526.

B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Minimum Conduit Size, Unless Otherwise Indicated:
1. Branch Circuits: 3/4 inch trade size.
2. Branch Circuit Homeruns: 3/4 inch trade size.
3. Control Circuits: 1/2 inch trade size.
4. Flexible Connections to Luminaires: 3/4 inch trade size.
5. Underground, Interior: 1 inch trade size.
6. Underground, Exterior: 1 inch trade size.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
1. Allied Tube and Conduit.
2. Western Tube and Conduit.
3. Wheatland Tube Company.
4. Substitutions: See Division 01 – General Requirements.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
1. Manufacturers:
    a. Bridgeport Fittings Inc.
    b. O-Z/Gedney.
    c. Thomas & Betts Corporation.
    d. Substitutions: See Division 01 – General Requirements
2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
4. Material: Use steel or malleable iron.
5. Do not use die cast zinc fittings.

6. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

A. Manufacturers:
1. Allied Tube and Conduit.
2. Western Tube and Conduit.
3. Wheatland Tube Company.
4. Substitutions: See Division 01 – General Requirements.

B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

C. Fittings:
1. Manufacturers:
   a. Bridgeport Fittings Inc
   b. O-Z/Gedney, a brand of Emerson Industrial Automation
   c. Thomas & Betts Corporation
   d. Substitutions: See Division 01 – General Requirements
2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel.
   a. Do not use die cast zinc fittings.
4. Connectors and Couplings: Use threaded type or compression fittings only.

2.05 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers:
1. Carlon Electrical Products.
2. Allied Tube and Conduit.
3. AFC Cable Systems, Inc
4. Substitutions: See Division 01 – General Requirements.

B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

C. Fittings:
1. Manufacturers:
   a. Bridgeport Fittings Inc
   b. O-Z/Gedney, a brand of Emerson Industrial Automation
   c. Thomas & Betts Corporation
   d. Substitutions: See Division 01 – General Requirements
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel.
   a. Do not use die cast zinc fittings.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:
1. Carlon Electrical Products.
2. Allied Tube and Conduit.
3. AFC Cable Systems, Inc
4. Substitutions: See Division 01 – General Requirements

B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

C. Fittings:

1. Manufacturers:
   a. Bridgeport Fittings Inc
   b. O-Z/Gedney, a brand of Emerson Industrial Automation
   c. Thomas & Betts Corporation
   d. Substitutions: See Division 01 – General Requirements.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel
   a. Do not use die cast zinc fittings.

2.07 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
   1. Allied Tube and Conduit.
   2. Western Tube and Conduit.
   3. Wheatland Tube Company.
   4. Substitutions: See Division 01 – General Requirements

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc
      b. O-Z/Gedney, a brand of Emerson Industrial Automation
      c. Thomas & Betts Corporation
      d. Substitutions: See Division 01 – General Requirements
   2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Material: Use steel.
   4. Connectors and Couplings: Use compression (damp or wet location)or set-screw type elsewhere

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Manufacturers:
   1. Cantex Inc
   2. Carlon, a brand of Thomas & Betts Corporation
   3. JM Eagle
   4. Substitutions: See Division 01 – General Requirements

B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

C. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.09 LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC)

A. Manufacturers:
   1. AFC Cable Systems, Inc
   2. Electri-Flex Company
   3. International Metal Hose
   4. Substitutions: See Division 01 – General Requirements

B. Description: NFPA 70, Type LFNC liquidtight flexible nonmetallic conduit listed and labeled as complying with UL 1660.

C. Fittings:
1. Manufacturer: Same as manufacturer of conduit to be connected.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B; suitable for the type of conduit to be connected.

2.10 SURFACE METAL RACEWAY

A. Manufacturers:
1. Hubbell Wiring Devices.
2. Thomas & Betts Corp.
3. The Wiremold Co.
4. Substitutions: Division 01 - General Requirements.

Product Description: Sheet metal channel with fitted cover, suitable for use as surface metal raceway.

B. General:
1. System: Provide surface raceway systems for branch circuit and data network voice, video and other low-voltage wiring. Surface raceway system shall consist of raceway bases, covers, pre-divided raceway bases, dual covers, appropriate fittings and device mounting plates necessary for a complete installation.
2. Configuration: Raceways shall be one- or two-piece design with base and snap-on cover, or three-piece design with base and two snap-on covers which snap side by side on a common base. Base shall be dividable with a fixed barrier for up to 4 compartments. Raceway shall be available in widths of 3/4" to 10" and depths of 17/32" to 5" Provide raceways from a company that can provide custom sizes if required. Raceway covers shall be available in tamper-resistant form with screws on access plates and covers of fittings, but not on standard cover lengths. Raceways shall be multi-piece design with metal base and snap-on metal covers. Assembled base and cover is 5-3/4" wide by 2-1/8" high with a cross section area of 10.06 sq in. Base shall have 2 wiring channels, separated by 1 integral divider, large enough to accept standard power and communication devices without restricting capacity of the adjacent channel. The raceway base shall accept 2 covers that allow separation of services. The cover shall slightly curve and form the raceway sidewall. Provide the base with scored lines to facilitate sectioning of the raceway in 4" increments and include mounting holes, and tunnel knockouts in the divider wall that will facilitate the crossing over of services.
3. Fittings: Fittings shall include flat, internal and external elbows, couplings for joining raceway sections, wire clips, blank end fittings, and device mounting brackets and plates as applicable. Where required, provide tamper-resistant form, dividable with barriers and matching the size of the accompanying raceway base. Provide full capacity corner elbows and tee fittings to maintain a controlled 2" cable bend radius, meeting the specification for Fiber Optic and UTP cabling and exceeding the TIA/EIA-569-A requirements for communications pathways.
4. Device Brackets and Plates: Provide in sizes to match raceway width and with mounting holes located to ensure proper mounting of devices in up to 4 compartments. Device plates shall be available in any length from 6" to 60", with cutouts to accommodate various combinations of power and communications devices in up to 4 compartments. Provide 6" and 12" long device plates with a flange to overlap the joint of adjacent cover as applicable.
5. Communications Devices and Accessories: Raceway shall accommodate a complete line of connectivity outlets and modular inserts for UTP (including

Category 5, 5e, 6) STP (150 ohm) fiber optic, coaxial, and other cabling types with matching faceplates and bezels to facilitate mounting. Where indicated, provide connectivity outlets and modular inserts by Ortronics or approved equal.

C. Classification:
1. Raceway and system components shall be UL and CUL listed.
2. Surface raceways shall be suitable for use in dry interior locations only, as covered in Article 386 (Surface Metal Raceways) 388 (Surface Nonmetallic Raceways) of the National Electrical Code.
3. Surface metal raceways and fittings shall be listed by Underwriters Laboratories under File Number E4376, Listing and Classification Number RJBT and File Number E41751, Listing and Classification Number RJPR respectively.
4. Systems shall comply with UL Standard UL5 for Surface Metal Raceways.
5. Larger 2 and 3 channel non-metallic raceways shall be UL Listed under File Nos. E90378 Guide RJTX and E90377 Guide RJYT, respectively.

D. Surface Mounted Metal Raceways: V700 One-Piece Metal Raceway, G4000 Series Multi-Channel Steel Raceway, V2100 Single-Channel Metal Raceway by The Wiremold Company or approved equal.
1. Material: Galvanized steel, minimum thickness 0.040".
2. Finish: Factory-applied polyester topcoat applied over ivory base suitable for field-applied topcoat, color by Architect.
3. Steel Device Brackets and Plates: Steel overlap device plate for horizontal installation of devices. Plate shall overlap cover to conceal seam.
4. Plastic Overlapping Cover Bracket and Faceplate: Plastic device mounting bracket and trim plate for horizontal installation of devices. Plate shall overlap cover to conceal seam. Faceplate shall accept a variety of power and data/communication devices. Plastic shall be compatible with UL 94 for Plastic.
5. Adjustable Length Raceway Couplings: Provide raceway base sections with adjustable couplings. Each pair of couplings works in conjunction with the raceway base’s scored lines to allow less accurate field cuts. The coupling shall accommodate 4" of lateral movement and facilitate the ability of the raceway to maintain coordination with the wall framing as required. Each coupling shall provide a means of adding supplemental ground screws.
6. Fittings: Fittings shall include flat, internal and external elbows, tees, entrance fittings, wire clips, cover clips, couplings, support clips, and end caps. Covers for fittings shall overlap adjoining raceway covers a minimum of 3/8". Fittings shall be color matched to the raceway. Supply fittings with a base where applicable to eliminate mitering. Provide fittings with adjustable couplings that integrate with the raceway base. Provide a take-off fitting supporting dual services to adapt to existing flush wall boxes and other series of metallic raceways. Fittings shall have provisions to accept tamper resistant fasteners to fully secure the raceway.
a. Fiber Optic/UTP/STP Fittings: Corner elbows, tees, and entrance end fittings as required to maintain a controlled 2" nominal cable bend radius that meets the specifications for Fiber Optic and UTP/STP cabling and exceeds TIA 569 requirements for communications pathways.
b. Obstacle Avoidance and Offset Fittings: Provide fittings as required to bypass large and small obstacles and small offsets in supporting wall. Small obstacle avoidance fitting capable of being converted into a takeoff fitting to transition to other metallic raceways.
7. Device Brackets and Plates:
a. Forward Fittings: Provide device brackets to install single-gang devices horizontally in either channel within the raceway. Provide horizontal device brackets with a single gang face plate. Horizontal device mounting brackets shall be a single piece with integral auxiliary

grounding points. Device brackets and activation face plates shall allow the electrical or communications devices to face forward from the sidewall of the raceway.

b. Communications Devices and Accessories: Raceway shall accommodate a complete line of connectivity outlets and modular inserts for UTP (including Category 5, 5e, 6) STP (150 ohm) fiber optic, coaxial, and other cabling types with matching faceplates and bezels to facilitate mounting. Provide with complete line of preprinted station and port identification labels.

E. Multi-service in wall boxes:

1. Multi-Service In-Wall Boxes: WallSource™ Multi-Service Box by The Wiremold Company or approved equal.
   a. Provide construction box system for bringing power and low voltage devices to one location or to back feed surface wiring systems. System shall consist of in-the-wall boxes, mounting brackets, dividers, device mounting brackets, trim rings, and device plates for a complete installation in accordance with the Drawings.
   b. Material: 0.050" thick galvanized steel with gray or ivory suitable for field painting.
2. Classification and Use: Provide construction box system to be utilized in dry, interior locations only as defined by Article 300-15 of the National Electrical Code, as adopted by the National Fire Protection Association and approved by the American National Standards Institute. The box and system components shall be UL listed in accordance with UL 514A and UL514C. The device mounting bracket shall be molded from color matching UL approved resin.
3. Boxes: Each box shall include the box, dividers and mounting brackets. Dimensions of each shall be a minimum of 32 cubic inches per gang and shall be manufactured of 16-gage minimum thick steel. The box shall accommodate standard power and communication devices.
   a. The 2-gang box shall have knockouts located on top and bottom, 2-1/4" from the face to accommodate combinations of 1/2", 3/4", and 1" trade size conduits. Boxes of 4- or 6-gangs shall have knockouts to accommodate 1-1/2" trade size conduits.
   b. Box shall have a separate ground terminal provided in each gang.
   c. Box shall adjust for a flush installation with the finished wall. There shall be positive stops for surface mounting to 1/2", 5/8", 1" and 1-1/4" thick wallboard. Adjusting screws shall be located outside the box for adjustment prior to installation.
4. Device Mounting Brackets: Self-leveling device mounting bracket shall accommodate standard power devices, connectivity inserts, and Wiremold 5507 series faceplates. Mounting bracket shall be available to accommodate other manufacturer’s devices. Mounting bracket shall accommodate six power devices or 18 communications inserts. All faceplates, mounting brackets and trim rings shall be color matched.
5. Communication Devices and Accessories: Box shall accommodate a complete line of connectivity outlets and modular inserts for UTP (including Category 5, 5e, 6) STP (150 ohm) fiber optic, coaxial, and other cabling types with matching faceplates and bezels to facilitate mounting. Where indicated, provide connectivity outlets and modular inserts by Ortronics or approved equal.
6. Fiber Optic/UTP (including Category 5, 5e, 6) Radius: The depth of the box shall accommodate a 1-1/4" cable bend radius, which meets or exceeds the specifications for fiber optic and UTP cabling and TIA/EIA-569A requirements for

communications pathways. A 1" controlled radius storage loop shall be available.

7. Device Covers: Device cover plates in the following configurations shall be available: duplex device cover plates, single 1.40" and 1.59" diameter receptacle cover plates, switch plates, GFCI cover plates, Sentrex surge receptacle cover plates and other rectangular faced plates. Single gang cover plates shall be modular in design.
8. Support Bracket: Provide support bracket for mounting on 16" on center studs on boxes with more than two gangs.
9. Dividers: Dividers shall be removable without any tools.

F. Finish: Architect to select from manufacturers standard color palette.

2.11 WIREWAY

A. Manufacturers:
1. Carlon Electrical Products.
2. Thomas & Betts Corp.
3. Hoffman.
4. Substitutions: See Division 01 – General Requirements

B. Product Description: General purpose type wireway.

C. Knockouts: Manufacturer's standard.

D. Cover: Screw cover with full gaskets.

E. Connector: Slip-in.

F. Fittings: Lay-in type with removable top, bottom, and side; captive screws.

G. Finish: Rust inhibiting primer coating with gray enamel finish

2.12 BOXES

A. General Requirements:
1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Manufacturers:
a. Cooper Crouse-Hinds, a division of Eaton Corporation
b. Hubbell Incorporated; Bell Products
c. Hubbell Incorporated; RACO Products
d. Leviton
e. O-Z/Gedney, a brand of Emerson Industrial Automation
f. Thomas & Betts Corporation
g. Substitutions: See Division 01 – General Requirements
2. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
3. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.

4. Use cast iron boxes or cast aluminum boxes with threaded hubs where exposed galvanized steel rigid metal conduit is used.
5. Use cast aluminum boxes with threaded hubs where aluminum rigid metal conduit is used.
6. Use nonmetallic boxes where exposed rigid PVC conduit is used.
7. Use suitable concrete type boxes where flush-mounted in concrete.
8. Use suitable masonry type boxes where flush-mounted in masonry walls.
9. Use raised covers suitable for the type of wall construction and device configuration where required.
10. Use shallow boxes where required by the type of wall construction.
11. Do not use "through-wall" boxes designed for access from both sides of wall.
12. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
13. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
14. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
15. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
16. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.
17. Minimum Box Size, Unless Otherwise Indicated:
    a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep trade size.
    b. Communications Systems Outlets:
        1) Minimum 4 inch square by 2-1/8 inch trade size.
        2) Provide with single-gang drywall ring.
        3) Comply with Section 27 0533.
    c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep trade size.
18. Wall Plates: Comply with Section 26 2726.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches :

1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
    a. Indoor Clean, Dry Locations: Type 1, painted steel.
    b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches :
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
    b. Boxes 6 square feet and Larger: Provide sectionalized screw-cover or hinged-cover enclosures.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
    a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
    b. Back Panels: Painted steel, removable.
    c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.
    d. Provide with grounding stud.
    e. Provide with document pocket in cover.

5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
6. Manufacturers:
   a. Cooper B-Line, a division of Eaton Corporation
   b. Hoffman, a brand of Pentair Technical Products
   c. Hubbell Incorporated; Wiegmann Products
   d. Substitutions: See Division 01 – General Requirements

D. Boxes for Hazardous (Classified) Locations: Listed and labeled as complying with UL 1203 for the classification of the installed location.
1. Manufacturers:
   a. Appleton, a brand of Emerson Industrial Automation
   b. Cooper Crouse-Hinds, a division of Eaton Corporation
   c. Hubbell Incorporated; Killark Products
   d. Substitutions: See Division 01 – General Requirements
2. Provide outlet boxes and sealing fittings that comply with Article 501 of the NEC based on the classification of the area.

2.13 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).

D. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.

E. Mechanical Sleeve Seals
1. Manufacturers:
   a. Thunderline Link-Seal, Inc.
   b. NMP Corporation.
   c. PSI Link-Seal.
2. Substitutions: See Division 01 – General Requirements
3. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.
4. Use: Provide for all penetrations through foundation walls.

PART 3 EXECUTION

3.01 EXAMINATION

A. See Division 01 – General Requirements.

B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

C. Verify that field measurements are as shown on drawings.

D. Verify that mounting surfaces are ready to receive conduits.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 EXISTING WORK

A. Remove exposed abandoned raceway including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.

B. Remove concealed abandoned raceway to its source.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.

D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

E. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations or as specified.

F. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.03 INSTALLATION

A. Ground and bond raceway and boxes in accordance with Section 260526.

B. Fasten raceway and box supports to structure and finishes in accordance with Section 260529.

C. Identify raceway and boxes in accordance with Section 260553.

D. Arrange raceway and boxes to maintain headroom and present neat appearance.

E. Install products in accordance with manufacturer's instructions.

F. Perform work in accordance with NECA 1 (general workmanship).

G. Conduit Routing:
1. Unless dimensioned, conduit routing indicated is diagrammatic.
2. When conduit destination is indicated and routing is not shown, determine exact routing required.
3. Conceal all conduits unless specifically indicated to be exposed.
4. Unless otherwise approved, do not route conduits exposed:
   a. Across floors.
   b. Across roofs.
   c. Across top of parapet walls.
   d. Across building exterior surfaces.
   e. Interior finished spaces.
5. Conduits installed underslab or embedded in concrete (see section 2.1 where applicable) may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
6. Arrange conduit to maintain adequate headroom, clearances, and access.
7. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
8. Arrange conduit to provide no more than 150 feet between pull points.
9. Route conduits above water and drain piping where possible.
10. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
11. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
12. Maintain minimum clearance of 12 inches between conduits and surfaces exceeding 104 degrees F. This includes, but is not limited to:
    a. Heaters.
    b. Hot water piping.
    c. Flues.
13. Group parallel conduits in the same area together on a common rack.

H. Conduit Support:

1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
4. Use conduit strap to support single surface-mounted conduit.
5. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
6. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
7. Use conduit clamp to support single conduit from beam clamp or threaded rod.
8. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
9. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).
10. Use of spring steel conduit clips for support of conduits is not permitted.
11. Use of wire for support of conduits is not permitted.

I. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Where spare conduits stub up through concrete floors and are not terminated in a box or enclosure, provide threaded couplings equipped with threaded plugs 6” above finished floor.
7. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.

J. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Provide suitable mechanical sleeve seals where conduits penetrate exterior wall below grade.
7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
8. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve

integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.

9. Provide metal escutcheon plates for conduit penetrations exposed to public view.
10. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07 Section 07 8400.

K. Hazardous (Classified) Locations: Where conduits cross boundaries of hazardous (classified) locations, provide sealing fittings located as indicated or in accordance with NFPA 70.

L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:

1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where conduits are subject to earth movement by settlement or frost.

M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:

1. Where conduits pass from outdoors into conditioned interior spaces.
2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
3. Where conduits penetrate coolers or freezers.

N. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

O. Provide grounding and bonding in accordance with Section 260526.

P. Identify conduits in accordance with Section 260553.

Q. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2 inch size.

R. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

3.04 INSTALLATION – BOXES

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency power and normal power systems.

E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

H. Install gang box with plaster ring for single device outlets.

I. Box Locations:
1. Locate boxes to be accessible. Provide access panels in accordance with Division 08 as required where approved by the Architect.
2. Unless dimensioned, box locations indicated are approximate.
3. Locate boxes as required for devices installed under other sections or by others.
   a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262726.
   b. Communications Systems Outlets: Comply with Section 270533.
4. Locate boxes so that wall plates do not span different building finishes.
5. Locate boxes so that wall plates do not cross masonry joints.
6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
   a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
   b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260534.

J. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 260529.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
4. Install stamped steel bridges to fasten flush mounting outlet box between studs.
5. Install adjustable steel channel fasteners for hung ceiling outlet box.

K. Install boxes plumb and level.

L. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

M. Floor-Mounted Cabinets: Mount on properly sized 3 inch high concrete pad constructed in accordance with Division 03.

N. Install boxes as required to preserve insulation integrity.

O. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.

P. Nonmetallic Floor Boxes: Cut box flush with finished floor after concrete pour.

Q. Underground Boxes/Enclosures:
1. Install enclosure on gravel base, minimum 6 inches deep.
2. Flush-mount enclosures located in concrete or paved areas.
3. Mount enclosures located in landscaped areas with top at 1 inch above finished grade.
4. Provide cast-in-place concrete collar constructed in accordance with Division 03, minimum 10 inches wide by 12 inches deep, around enclosures that are not located in concrete areas.
5. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

R. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

S. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07.

T. Close unused box openings.

U. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

V. Provide grounding and bonding in accordance with Section 260526.

W. Identify boxes in accordance with Section 260553.

3.05 INTERFACE WITH OTHER PRODUCTS

A. Locate outlet boxes to allow luminaires positioned as indicated on reflected ceiling plan.

B. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.06 ADJUSTING

A. See Division 01 – General Requirements Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closures in unused openings in boxes.

3.07 CLEANING

A. See Division 01 – General Requirements

B. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

C. Clean exposed surfaces and restore finish.

3.08 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Floor marking tape.

F. Warning signs and labels.

1.02 RELATED REQUIREMENTS (follow the most currently adopted amended version)

A. See Division 01 – General Requirements

B. Division 09 - Finishes.

C. Section 260400 – General Conditions for Electrical Trades.

D. All of Divisions 26, 27 & 28.

1.03 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels.

C. NFPA 70 - National Electrical Code.

D. NFPA 70E - Standard for Electrical Safety in the Workplace

E. UL 969 - Marking and Labeling Systems.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Division 01- General Requirements

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

C. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.

D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.06 DELIVERY, STORAGE, AND HANDLING

A. See Division 01 – General Requirements

B. Accept identification products on site in original containers. Inspect for damage.

C. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

D. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.08 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature and humidity is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.

B. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Panelboards:
         1) Identify panel name.
         2) Identify ampere rating.
         3) Identify voltage and phase.
         4) Identify power source and circuit number. Include location when not within sight of equipment.
         5) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
         6) Use typewritten circuit directory to identify load(s) served for panelboards with a door, including spares and spaces
      b. Enclosed switches, circuit breakers, and motor controllers:
         1) Identify voltage and phase.
         2) Identify power source and circuit number. Include location when not within sight of equipment.
         3) Identify load(s) served. Include location when not within sight of equipment.
      c. Enclosed Contactors:
         1) Identify ampere rating.
         2) Identify voltage and phase.
         3) Identify configuration, e.g., E.O.E.H. (electrically operated, electrically held) or E.O.M.H. (electrically operated, mechanically held).
         4) Identify coil voltage.
         5) Identify load(s) and associated circuits controlled. Include location.
      d. Electricity Meters:
         1) Identify load(s) metered.
   2. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
   3. Use identification nameplate to identify equipment utilizing series ratings, where permitted, in accordance with NFPA 70.
   4. Use identification nameplate to identify switchboards and panelboards utilizing a high leg delta system in accordance with NFPA 70.

5. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
6. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
7. Use identification label or handwritten text using indelible marker on inside of door at each motor controller to identify nameplate horsepower, full load amperes, code letter, service factor, voltage, and phase of motor(s) controlled.
8. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
9. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
    a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches wide, painted in accordance with Division 09.
10. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70, including but not limited to the following.
    a. Service equipment.
    b. Industrial control panels.
    c. Motor control centers.
    d. Elevator control panels.
    e. Industrial machinery.
11. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
    a. Minimum Size: 3.5 by 5 inches.
    b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
    c. Service Equipment: Include the following information in accordance with NFPA 70.
        1) Nominal system voltage.
        2) Available fault current.
        3) Clearing time of service overcurrent protective device(s).
        4) Date label applied.
12. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
13. Use warning signs to identify electrical hazards for entrances to all buildings, vaults, rooms, or enclosures containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".
14. Use warning labels to identify electrical hazards for equipment, compartments, and enclosures containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".
15. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for equipment where multiple power sources are present with

the word message "DANGER; Hazardous voltage; Multiple power sources may be present; Disconnect all electric power including remote disconnects before servicing" or approved equivalent.

C. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
2. Identification for Communications Conductors and Cables: Comply with Section 270553.
3. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
4. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
   a. At each source and load connection.
   b. Within boxes when more than one circuit is present.
   c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
   d. In cable tray, at maximum intervals of 20 feet.
5. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.

D. Identification for Raceways:
1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet.
2. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet.
   a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches wide.
      1) Color Code:
         a) Emergency Power System: Red.
            (1) Life Safety Branch: YELLOW.
            (2) Critical Branch: RED.
            (3) Equipment Branch: GREEN.
         b) Fire Alarm System: Red.
      2) Field-Painting: Comply with Division 09.
      3) Vinyl Color Coding Electrical Tape: Comply with Section 260519.
3. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.
4. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
5. Use voltage markers to identify highest voltage present for wireways at maximum intervals of 20 feet.

E. Identification for Cable Tray: Comply with Section 260536.

F. Identification for Boxes:
1. Use voltage markers to identify highest voltage present.
2. Use voltage markers or color coded boxes to identify systems other than normal power system.

a. Color-Coded Boxes: Field-painted in accordance with Division 09 per the same color code used for raceways.
1) Emergency Power System: Red.
a) Life Safety Branch: YELLOW.
b) Critical Branch: RED.
c) Equipment Branch: GREEN.
2) Fire Alarm System: Red.
b. For exposed boxes in public areas, do not color code.

3. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
a. For exposed boxes in public areas, use only identification labels.

4. Use warning labels to identify electrical hazards for boxes containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".

G. Identification for Devices:
1. Identification for Communications Devices: Comply with Section 270553.
2. Wiring Device and Wallplate Finishes: Comply with Section 262726.
3. Factory Pre-Marked Wallplates: Comply with Section 262726.
4. Use identification label to identify fire alarm system devices.
a. For devices concealed above suspended ceilings, provide additional identification on ceiling tile below device location.

5. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.

6. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.
7. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.

H. Identification for Luminaires:
1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

I. Identification for Photovoltaic Systems: Comply with Section 264500.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Manufacturers:
a. Brimar Industries, Inc.
b. Kolbi Pipe Marker Co.
c. Seton Identification Products
d. Substitutions: Division 01 - General Requirements.

2. Materials:
a. Indoor Clean, Dry Locations: Use plastic nameplates.
b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.

3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.

4. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
5. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
6. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Manufacturers:
   a. Brady Corporation
   b. Brother International Corporation
   c. Panduit Corp.
   d. Substitutions: Division 01 - General Requirements.
2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
   a. Use only for indoor locations.
3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
   a. System designation where applicable:
      1) Emergency Power System: Identify with text "EMERGENCY".
      2) Life Safety Branch: Identify with text "LIFE SAFETY"
      3) Critical Branch: Identify with text "CRITICAL"
      4) Equipment Branch: Identify with text "EQUIPMENT"
      5) Fire Alarm System: Identify with text "FIRE ALARM".
   b. Equipment designation or other approved description.
   c. Other information as indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
   a. System Designation: 1 inch.
   b. Equipment Designation: 1/2 inch.
   c. Other Information: 1/4 inch.
   d. Exception: Provide minimum text height of 1 inch for equipment located more than 10 feet above floor or working platform.
5. Color:
   a. Normal Power System: White text on black background.
   b. Emergency Power System: White text on red background.
      1) Life Safety Branch: White text on YELLOW background.
      2) Critical Branch: White text on RED background.
      3) Equipment Branch: White text on GREEN background.
   c. Fire Alarm System: White text on red background.

D. Format for General Information and Operating Instructions:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/4 inch.
5. Color: Black text on white background unless otherwise indicated.
   a. Exceptions:
      1) Provide white text on red background for general information or operational instructions for emergency systems.

2) Provide white text on red background for general information or operational instructions for fire alarm systems.

E. Format for Caution and Warning Messages:
1. Minimum Size: 2 inches by 4 inches.
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/2 inch.
5. Color: Black text on yellow background unless otherwise indicated.

F. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Power source and circuit number or other designation indicated.
a. Include voltage and phase for other than 120 V, single phase circuits.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Black text on clear background.

G. Format for Control Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Load controlled or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Black text on clear background.

H. Format for Fire Alarm Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Designation indicated and device zone or address.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Red text on white background.
6.

2.03 WIRE AND CABLE MARKERS

A. Manufacturers:
1. Brady Corporation
2. HellermannTyton
3. Panduit Corp.
4. Substitutions: Division 01 - General Requirements.

B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
1. Do not use self-adhesive type markers.

C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

D. Legend: Power source and circuit number or other designation indicated.

E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
1. Do not use handwritten text.

F. Minimum Text Height: 1/8 inch.

G. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

A. Manufacturers:
   1. Brady Corporation
   2. Brimar Industries, Inc.
   3. Seton Identification Products
   4. Substitutions: Division 01 - General Requirements.

B. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

C. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

D. Minimum Size:
   1. Markers for Equipment: 1 1/8 by 4 1/2 inches.
   2. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
   3. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
   4. Markers for Junction Boxes: 1/2 by 2 1/4 inches.

E. Legend:
   1. Markers for Voltage Identification: Highest voltage present.
   2. Markers for System Identification:
      a. Emergency Power System: Text "EMERGENCY".
      b. Other Systems: Type of service.

F. Color: Black text on orange background unless otherwise indicated.

2.05 WARNING SIGNS AND LABELS

A. Manufacturers:
   1. Brimar Industries, Inc.
   2. Clarion Safety Systems, LLC.
   3. Seton Identification Products
   4. Substitutions: Division 01 - General Requirements.

B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

C. Warning Signs:
   1. Materials:
      a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
      b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
   2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
   3. Minimum Size: 7 by 10 inches unless otherwise indicated.

D. Warning Labels:
   1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
      a. Do not use labels designed to be completed using handwritten text.
      b. Provide polyester overlaminate to protect handwritten text.
   2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
   3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Inside of equipment door.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Branch Devices: Adjacent to device.
   6. Interior Components: Legible from the point of access.
   7. Conduits: Legible from the floor.
   8. Boxes: Outside face of cover.
   9. Conductors and Cables: Legible from the point of access.
   10. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
   1. Do not use adhesives on exterior surfaces except where substrate cannot be penetrated.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Secure rigid signs using stainless steel screws.

G. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

A. See Division 01 - General Requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

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SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. General Requirements
2. Line Voltage Switches
3. Line Voltage Dimmer Switches
4. Switch Plates.
5. Line Voltage Occupancy/Vacancy Sensor Switches
6. Class 2 Conductors and Cables

B. Related Sections:
1. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for electric connections specified by this section.
2. Section 26 05 19– Electrical Power Conductors and Cables.
3. Section 26 05 33 - Raceway and Boxes for Electrical Systems: Product requirements for raceway and boxes for placement by this section.
4. Section 26 05 53 - Identification for Electrical Systems: Product requirements for electrical identification items for placement by this section.
5. Section 26 24 16 - Panelboards.
6. Section 26 27 26 - Wiring Devices: Product requirements for wiring devices for placement by this section.

1.02 REFERENCES

A. National Electrical Manufacturers Association:
1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
2. NEMA FU 1 - Low Voltage Cartridge Fuses.
3. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contractors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
4. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.
5. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
6. NEMA ICS 6 - Industrial Control and Systems: Enclosures.
7. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
8. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
9. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2015.

B. 47 CFR 15 - Radio Frequency Devices; current edition.

C. ANSI C136.10 - American National Standard for Roadway and Area Lighting Equipment - Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing; 2010.

D. ANSI C136.24 - American National Standard for Roadway and Area Lighting Equipment - Nonlocking (Button) Type Photocontrols; 2004 (R2010).

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

F. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 773 - Plug-in, Locking Type Photocontrols for Use with Area Lighting; Current Edition, Including All Revisions.

I. UL 773A - Nonindustrial Photoelectric Switches for Lighting Control; Current Edition, Including All Revisions.

J. UL 916 - Energy Management Equipment; Current Edition, Including All Revisions.

K. UL 917 - Clock-Operated Switches; Current Edition, Including All Revisions.

L. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

M. IECC – International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SYSTEM DESCRIPTION

A. IECC (OR ASHRAE 90.1) compliant lighting controls to control all interior and exterior lighting:
   1. Standalone lighting controls in individual spaces consisting of some combination of occupancy sensors, vacancy sensors, photocells, power packs, low voltage switches and low voltage switches with dimming capability.
   2. Standalone microprocessor based controllers with distributed switching control using self-contained individually mounted lighting relays. Provides multiple modes of operation incorporating vacancy sensors, photocells and low voltage control stations.

B. Refer to lighting control details and riser diagrams on the drawings for additional information.

C. Provide automatic shutoff for lighting inside building, where required. Control shutoff by method conforming to [IECC] OR [ASHRAE 90.1].

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate the placement of wall switches with actual installed door swings and sidelights.
   3. Coordinate the placement of wall switch occupancy/vacancy sensors with actual installed door swings and sidelights.
   4. Coordinate the placement of occupancy/vacancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
   5. Coordinate the placement of photo sensors for daylighting controls with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
   6. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:
   1. Protect lighting control devices during construction.
   2. Clean lighting control devices once final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Division 01 - General Requirements.

B. Shop Drawings: Indicate dimensioned drawings of lighting control system components and accessories.
   1. One Line Diagram: Indicating system configuration, panels, number and type of switches or devices.
   2. Include typical wiring diagrams for each component.
   3. Floor Plan Layout Drawings: Manufacturers symbols are acceptable, provided that symbology between engineer's device legend and manufacturers symbols are cross-referenced.

C. Product Data: Submit manufacturer's standard product data for each system component. This shall include, but not be limited to: ratings, configurations, dimensions, sensor coverage ranges, colors, service condition requirements, and installation features.

D. Manufacturer's Installation Instructions: Submit for each system component.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

F. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other Sections and evidence that the control schemes identified herein and shown on the typical lighting control details are configured and operational as specified.
   1. Show interconnecting signal and control wiring and interfacing devices that prove compatibility of inputs and outputs.
   2. Provide documentation addressing each room/area control scheme specified with a description of how the submitted system complies.

1.06 CLOSEOUT SUBMITTALS

A. See Division 01 - General Requirements

B. Project Record Documents: Record the following information:
   1. Actual installed locations of components and settings for lighting control devices. Record circuiting and switching arrangements.
   2. Wiring diagrams reflecting field-installed conditions with identified and numbered system components and devices.

C. Operation and Maintenance Data:
   1. Submit replacement parts numbers.
   2. Submit manufacturer's published installation instructions and operating instructions.
   3. Recommended renewal parts list.
   4. Detailed information on device programming and setup.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience. Company shall provide 24/7 telephone support by qualified technicians.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

C. Installer Qualifications: Installer shall be one who is experienced in performing the work of this section, and who has specialized in installation of work similar to that required for this project.

D. Contractor shall ensure that lighting system control devices and assemblies are fully compatible and can be integrated into a system that operates as described in the lighting control notes on drawings and as described within this specification. Any incompatibilities between devices, assemblies, and system controllers shall be resolved between the

contractor and the system provider, as required to ensure proper system operation and maintainability.

E. Performance Requirements: Shall provide all system components that have been manufactured, assembled, and installed to maintain performance criteria stated by manufacturer without defects, damage, or failure.

F. Performance Testing Requirements
1. Manufacturer shall 100% test all equipment prior to shipment. Sample testing is not acceptable.

G. Code Requirements
1. System Control Unit and System Field Devices shall be UL listed and certified.
2. All system components shall be FCC / IC compliant.
3. All system components shall be installed in compliance with National Electrical Codes.
4. Building Codes: All units shall be installed in compliance with applicable, local building codes.

1.08 PRE-INSTALLATION MEETINGS

A. See Division 01 - General Requirements.

B. Convene minimum one week prior to commencing work of this section.

1.09 DELIVERY, STORAGE, AND HANDLING

A. See Division 01 - General Requirements.

B. Accept components on site in manufacturer’s packaging. Inspect for damage.

C. Protect components by storing in manufacturer’s containers indoor protected from weather.

1.10 WARRANTY

A. See Division 01 - General Requirements.

B. Furnish five year manufacturer warranty for all components.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES – GENERAL REQUIREMENTS

A. Manufacturers:
1. nLight
2. Hubbell
3. Crestron
4. Cristal Controls
5. Substitutions: See Division 01 – General Requirements.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

D. Products for Switching of Electronic Ballasts/Drivers: Tested and rated to be suitable for peak inrush currents specified in NEMA 410.

E. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

F. Refer to lighting control details on drawings for additional requirements and product specifications.

2.02 LINE VOLTAGE SWITCHES

A. Manufacturers:
   1. Hubbell Incorporated
   2. Leviton Manufacturing Co., Inc.
   3. Pass and Seymour/Legrand
   4. Substitutions: [Division 01 - General Requirements] [Not Permitted].

B. Line Voltage Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. Body and Handle finish: Color selection by Architect.

C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

D. Lighted Wall Switches: Industrial specification grade, 20 A, 120/277 V with illuminated standard toggle type switch actuator and maintained contacts; illuminated with load off; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

E. Pilot Light Wall Switches: Industrial specification grade, 20 A, 120/277 V with red illuminated standard toggle type switch actuator and maintained contacts; illuminated with load on; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

F. Locking Wall Switches: Industrial specification grade, 20 A, 120/277 V with lever type keyed switch actuator and maintained contacts; switches keyed alike; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

G. Momentary Contact Wall Switches: Industrial specification grade, 20 A, 120/277 V with toggle type three position switch actuator and momentary contacts; single pole double throw, off with switch actuator in center position.

H. Locking Momentary Contact Wall Switches: Industrial specification grade, 20 A, 120/277 V with lever type keyed three position switch actuator and momentary contacts; switches keyed alike; single pole double throw, off with switch actuator in center position.

2.03 LINE VOLTAGE DIMMER SWITCHES

A. Manufacturers:
   1. Leviton Manufacturing Company, Inc.
   2. Lutron Electronics Company, Inc; Maestro Series
   3. Pass & Seymour, a brand of Legrand North America, Inc.
   4. Substitutions: See Division 01 - General Requirements.

B. Line Voltage Dimmer Switches - General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.
   1. Body and Control finish: Color selection by Architect.

C. Control: Slide control type with separate on/off switch.

D. Power Rating, Unless Otherwise Indicated or Required to Control the Load Indicated on the Drawings:
   1. Incandescent: 600 VA.
   2. Magnetic Low-Voltage: 600 VA.
   3. Electronic Low-Voltage: 400 VA.
   4. Fluorescent: 600 VA.

E. Provide locator light, illuminated with load off.

F. Provide accessory wall switches to match dimmer appearance when installed adjacent to each other.

G. Refer to plans and lighting fixture schedule for dimming driver/ballast requirements.

2.04 SWITCH PLATES

A. Manufacturers:
   1. Hubbell Incorporated
   2. Leviton Manufacturing Co., Inc.
   3. Pass and Seymour/Legrand
   4. Substitutions: [Division 01 - General Requirements] [Not Permitted].
      a. Where low voltage keypads / switches or line voltage sensor switches are shown, provide switch plate by same manufacturer.

B. Product Description: Specification Grade.
   1. Material: [Plastic] [Stainless steel] [Galvanized steel].
   2. Color: By Architect.

2.05 CLASS 2 CONDUCTORS AND CABLES

A. General Requirements:
   1. Line Voltage Wiring: Comply with requirements of Division 26 Section "Electrical Power Conductors and Cables".
   2. Class 2 Low-Voltage Cable:
      a. Provide plenum-rated cable.
      b. UTP Cable: CAT 5, CAT 6, or as required by manufacturer:
         1) Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
         2) All cabling shall meet or exceed Commercial Building Telecommunications Cabling Standard ANSI/TIA/EIA 568-C.2
         3) Cabling shall use 23AWG minimum conductors.
         4) Pulling tension: The cable pulling tension shall not exceed 25 ft/lbs as indicated in TIA/EIA-568-A.
      c. Control Cable:
         1) Stranded copper cable, Type CMP.
            a) Multiple-Conductor.
            b) Twisted Pair.
            c) Shielded Twisted Pair
            d) Minimum AWG: Per manufacturer requirements, as shown on drawings and details.

PART 3 EXECUTION

3.01 EXAMINATION

A. Site Verification:
   1. Verify that wiring conditions, which have been previously installed under other sections or at a previous time, are acceptable for product installation in accordance with manufacturer’s instruction.

2. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
3. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
4. Verify that final surface finishes are complete, including painting.
5. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
6. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
7. Verify that conditions are satisfactory for installation prior to starting work.

B. Inspection: Inspect all material included in this contract prior to installation. Manufacturer shall be notified of unacceptable material prior to installation.

3.02 EXISTING WORK

A. Remove existing lighting control device wiring, including abandoned wiring above accessible ceilings. Cut cable flush with walls and floors, and patch surfaces.

B. Disconnect and remove abandoned lighting control equipment.

C. Maintain existing to remain lighting control system continuity outside the area of work. Extend existing lighting control system installations using materials and methods compatible with existing.

D. Clean and repair existing lighting control equipment to remain or to be re-installed.

3.03 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.04 INSTALLATION

A. The Electrical Contractor, as part of the work of this section, shall coordinate, receive, mount, connect, and place into operation all equipment. The Electrical Contractor shall furnish all conduit, wire, connectors, hardware, and other incidental items necessary for properly functioning lighting control as described herein and shown on the plans (including but not limited to System Field Devices, 0-10V dimming ballasts, fixed output ballasts, 0-10V LED drivers and communication wire). The Electrical Contractor shall maintain performance criteria stated by manufacturer without defects, damage, or failure.

B. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards, unless otherwise indicated. Install per manufacturer’s instructions.

C. Power: The contractor shall test that all branch load circuits are operational before connecting loads to sensor system load terminals, and then de-energize all circuits before installation.

D. Provide equipment at locations and in quantities indicated on Drawings. Provide any additional equipment required to provide control intent.

E. Install wiring in accordance with Section 260519 and paragraph 2.13.

F. Use only properly color coded, stranded wire. Install wire sizes as indicated on Drawings. Install wire in conduit in accordance with Section 260533 and paragraph 2.13.

G. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

H. Identify power wiring with circuit breaker number controlling load. When multiple circuit breaker panels are feeding into relay panel, label wires to indicate originating panel designation.

I. Label each low voltage wire with relay number at each switch or sensor. Refer to Section 26 05 53.

J. Coordinate locations of outlet boxes provided under Section 260533 as required for installation of lighting control devices provided under this section.

K. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.

L. Ensure that daylight sensor placement minimizes sensors view of electric light sources; ceiling mounted and fixture-mounted daylight sensors shall not have direct view of luminaries.

M. Prior to setting scenes or zones dependent on furniture placement, whiteboard locations, projection screen locations, lectern locations or similar, coordinate with the Owner, Architect and red-lined furniture plans. Make all required adjustments during construction.

N. Systems Integration:
   1. Equipment Integration Meeting:
      a. Facility Representative to coordinate meeting between Facility Representative, Lighting Control System Manufacturer and other related equipment manufacturers to discuss equipment and integration procedures prior to system startup

O. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

P. Install lighting control devices plumb and level, and held securely in place.

Q. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

R. Identify lighting control devices in accordance with Section 260553.

S. Unless otherwise indicated, install power packs/room controllers for lighting control devices within the same space above accessible ceiling or above access panel in inaccessible ceiling.

T. Where indicated, install separate compatible wall switches for manual control interface with lighting control devices or associated power packs.

3.05 SENSOR INSTALLATION:

A. Adjust sensitivity to cover area installed

B. Set time delay on sensors that are connect to the lighting control system to the minimum. Time delay to off shall be set to no longer than 20 minutes.

C. Provide vacancy sensor configurations as indicated on drawings.

D. Install sensors on vibration free stable surface.

E. Install atrium and skylight light sensor facing toward window or skylight.

F. Install interior light sensor in ceiling facing the floor.

G. Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage.

H. Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.

I. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors away from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

J. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on sensor lenses to block undesired motion detection.

K. Outdoor Photo Sensor Control Locations:
1. Where possible, locate outdoor photo controls with photo sensor facing north. If north facing photo sensor is not possible, install with photo sensor facing east, west, or down.
2. Locate outdoor photo controls so that photo sensors do not face artificial light sources, including light sources controlled by the photo control itself.
3. Install outdoor photo controls so that connections are weatherproof. Do not install photo controls with conduit stem facing up in order to prevent infiltration of water into the photo control.
4. Unless otherwise indicated, set outdoor photo sensor for dusk-to-dawn operation. Lighting shall turn on at dusk / off at dawn.

L. Daylighting Control Photo Sensor Locations:
1. Within the design intent, reasonably minor adjustments to locations may be made in order to optimize control and avoid conflicts or problems affecting proper detection of light levels.
2. Unless otherwise indicated, locate photo sensors for closed loop systems to accurately measure the light level controlled at the designated task location, while minimizing the measured amount of direct light from natural or artificial sources such as windows or pendant luminaires.
3. Unless otherwise indicated, locate photo sensors for open loop systems to accurately measure the level of daylight coming into the space, while minimizing the measured amount of lighting from artificial sources.
4. Refer to drawings and details for maintained light level settings.

3.06 MANUFACTURER'S FIELD SERVICES

A. Division 01 - General Requirements.

B. Manufacturer’s Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following field tests and inspections with the assistance of a factory-authorized service representative:
1. Operational Test: After installing wall stations and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
4. Test outdoor photo controls to verify proper operation, including time delays where applicable. Record test results in written report to be included with submittals.

5. Test daylighting controls to verify proper operation, including light level measurements and time delays where applicable. Record test results in written report to be included with submittals.

D. Lighting control devices will be considered defective if they do not pass tests and inspections.

3.07 FIELD QUALITY CONTROL

A. Division 01 - General Requirements.

B. Inspect each lighting control device for damage and defects.

C. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.08 ADJUSTING

A. Division 01 - General Requirements.

B. Test contactors and switches after installation to confirm proper operation.

C. Confirm correct loads are recorded on directory card in each panel.

D. Adjust daylighting controls under optimum lighting conditions after all room finishes, furniture, and window treatments have been installed to achieve desired operation as indicated or as directed by Architect. Record settings in written report to be included with submittals. Readjust controls calibrated prior to installation of final room finishes, furniture, and window treatments that do not function properly as determined by Architect.

3.09 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.10 COMMISSIONING

A. Division 01 - General Requirements.

3.11 DEMONSTRATION

A. Division 01 - General Requirements.

B. Demonstrate proper operation of lighting control devices to Architect and Owner, and correct deficiencies or make adjustments as directed.

C. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
2. Provide minimum of four hours of training.
3. Schedule training with Owner, provide at least 7 days notice to Architect/Engineer of training date.
4. Instructor: Qualified manufacturer’s representative familiar with the project and with sufficient knowledge of the installed lighting control devices.

D. Training shall include, but not be limited to, the following procedures:

1. Programming and adjusting time delay, default light levels and other functions of standalone wall sensors and low voltage room controller systems.
2. Programming and adjusting internal luminaire-level occupancy sensors and photocells, where such products exist in the project.

END OF SECTION

SECTION 26 22 00
DRY-TYPE TRANSFORMERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General purpose transformers.

B. K-Rated transformers for nonlinear loads.

C. Harmonic mitigating transformers.

D. Small power centers.

1.02 RELATED REQUIREMENTS

A. Related Sections:
1. Division 01 – General Requirements.
2. Section 260400 – General Conditions for Electrical Trades.
3. Section 260526 - Grounding and Bonding for Electrical Systems.
4. Section 260533 – Raceway and Boxes for Electrical Systems: Flexible conduit connections.
5. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
6. Section 262416 - Panelboards.

1.03 REFERENCE STANDARDS (Follow the most recently adopted standard)

A. CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers; Current Edition.

B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers.

C. IEEE C57.96 - Guide for Loading Dry-Type Distribution and Power Transformers.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction.

E. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers.

F. NEMA ST 20 - Dry-Type Transformers for General Applications.

G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 506 - Standard for Specialty Transformers; Current Edition, Including All Revisions.

K. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the work with placement of support framing and anchors required for mounting of transformers.
2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
3. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. Refer to Division 01 – General Requirements.

B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.
1. Vibration Isolators: Include attachment method and rated load and deflection.
2. Harmonic Mitigating Transformers: Include shielding information and harmonic treatment information.
3. Small Power Centers: Include panelboard bus ampacity, integrated short circuit ampere rating, and circuit breaker sizes and ampere ratings.

C. Shop Drawings: Provide dimensioned plan and elevation views of transformers and adjacent equipment with all required clearances indicated.
1. Small Power Centers: Include panel arrangements.

D. Source Quality Control Test Reports: Include reports for tests designated in NEMA ST 20 as design and routine tests.

E. Field Quality Control Test Reports.

F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Maintenance Data: Include recommended maintenance procedures and intervals.

C. Project Record Documents: Record actual locations of transformers.

1.07 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

D. Source Quality Control:
1. Factory test transformers according to NEMA ST 20.
2. Sound Level Tests: Perform factory test designated in NEMA ST 20 as "design" test on each production unit.

1.08 DELIVERY, STORAGE AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

C. Ambient Temperature: Do not exceed the following maximum temperatures during and after installation of transformers.
   1. Greater than 10 kVA: 104 degrees F (40 degrees C) maximum.
   2. Less than 10 kVA: 77 degrees F (25 degrees C) maximum.

1.09 WARRANTY

A. General: See Division 1 – Closeout Procedures.

B. Special Warranty: Submit a written warranty executed by the manufacturer, the Installer, and the Contractor, agreeing to repair or replace equipment specified herein that fails in materials or workmanship within the specified warranty period.

C. Warranty period shall be a minimum of (18) months from date of substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Transformers:
   1. Eaton Corporation.
   2. ABB/General Electric Company.
   3. Schneider Electric; Square D Products.
   4. Siemens Industry, Inc.
   5. Substitutions: See Division 01 - Product Requirements.

B. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

C. Source Limitations: Furnish transformers produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 TRANSFORMERS - GENERAL REQUIREMENTS

A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.

B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
   1. Altitude: Less than 3,300 feet (1,000 m).
   2. Ambient Temperature:
      a. Greater than 10 kVA: Not exceeding 104 degrees F (40 degrees C).
      b. Less than 10 kVA: Not exceeding 77 degrees F (25 degrees C).

C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.

D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.

E. Basic Impulse Level: 10 kV.

F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

G. Isolate core and coil from enclosure using vibration-absorbing mounts.

H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.03 GENERAL PURPOSE TRANSFORMERS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; KVA and voltage ratings as indicated on the drawings.

B. Insulation System and Allowable Average Winding Temperature Rise:
1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

C. Coil Conductors: Continuous copper windings with terminations brazed or welded.

D. Winding Taps:
1. Less than 3 kVA: None.
2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.

E. Energy Efficiency:
1. Comply with CFR 431, Subpart K.
2. Comply with the Department of Energy Efficiency Standards.

F. Sound Levels: Standard sound levels complying with NEMA ST 20.
1. 0-9 kVA: 40 dB.
2. 10-50 kVA: 45 dB.

G. Mounting Provisions:
1. Less than 15 kVA: Suitable for wall mounting.
2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.

H. Transformer Enclosure: Comply with NEMA ST 20.
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
   a. Indoor clean, dry locations: Type 1.
2. Construction: Steel.
   a. Less than 15 kVA: Totally enclosed, non-ventilated.
   b. 15 kVA and Larger: Ventilated.
3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
4. Provide lifting eyes or brackets.

I. Accessories:
1. Mounting Brackets: Provide manufacturer's standard brackets.
2. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that suitable concrete pads, support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.

C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install transformers in accordance with NECA 409 and IEEE C57.94.

D. Use flexible conduit, under the provisions of Section 260534, 2 feet (600 mm) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.

F. Mount wall-mounted transformers using integral flanges or accessory brackets furnished by the manufacturer.

G. Mount floor-mounted transformers on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Division 03.

H. Mount floor-mounted transformers using vibration isolators suitable for isolating the transformer noise from the building structure.

I. Mount trapeze-mounted transformers using suitable metal framing as recommended by the manufacturer. See Section 260529 for material requirements.

J. Provide seismic restraints where required by local codes.

K. Provide grounding and bonding in accordance with Section 260526.

L. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.

M. Where not factory-installed, install lugs sized as required for termination of conductors as shown on the drawings.

N. Where furnished as a separate accessory, install transformer weathershield per manufacturer's instructions.

O. Identify transformers in accordance with Section 260553.

P. Where transformer is remotely located from source panelboard:
   1. Provide nonfused safety switch within sight of transformer, where shown on plans.
   2. Provide labeling at transformer indicating location of source panelboard, and provide source overcurrent protection with lockable provisions, if safety switch is not shown on plans.

3.03 FIELD QUALITY CONTROL

A. See Division 01 – General Requirements

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS Sections 7.2.1.1 and 7.2.1.2. Tests and inspections listed as optional are not required.
   1. 167 kVA single phase, 500 kVA three phase and smaller:
      a. Perform turns ratio tests at all tap positions.

3.04 ADJUSTING

A. See Division 01 – General Requirements.

B. Measure primary and secondary voltages and make appropriate tap adjustments.

C. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

A. See Division 01 – General Requirements.

B. Clean dirt and debris from transformer components according to manufacturer's instructions.

C. Repair scratched or marred exterior surfaces to match original factory finish.

3.06 PROTECTION

A. Protect installed transformers from subsequent construction operations.

END OF SECTION

SECTION 26 24 16
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Power distribution panelboards.

B. Lighting and appliance panelboards.

C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

A. Division 01 – General Requirements.

B. Division 03 - Cast-in-Place Concrete: Concrete equipment pads.

C. Section 260526 - Grounding and Bonding for Electrical Systems.

D. Section 260529 - Hangers and Supports for Electrical Systems.

E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

F. Section 262200 - Low-Voltage Transformers: Small power centers with integral primary breaker, transformer, and panelboard.

G. Section 262813 - Fuses: Fuses for fusible switches and spare fuse cabinets.

1.03 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service..

B. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction.

D. NEMA FU 1 – Low Voltage Cartridge Fuses.

E. NECA 407 - Standard for Installing and Maintaining Panelboards.

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

G. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts.

H. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum).

I. NEMA PB 1 - Panelboards.

J. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

K. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems

L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

M. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

N. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

O. UL 67 - Panelboards; Current Edition, Including All Revisions.

P. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

Q. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

R. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

S. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

T. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.

U. UL 1699 - Arc-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.

C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
2. Include wiring diagrams showing all factory and field connections.
3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
4. Include documentation of listed series ratings upon request.

D. Source Quality Control Test Reports: Include reports for tests designated in NEMA PB 1 as routine tests.

E. Field Quality Control Test Reports.

F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

H. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Division 01 - Product Requirements, for additional provisions.
   2. Panelboard Keys: Two of each different key.
   3. See Section 262813 for requirements for spare fuses and spare fuse cabinets.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

A. Maintain ambient temperature within the following limits during and after installation of panelboards:
   1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
   2. Panelboards Containing Fusible Switches: Between -22 degrees F and 104 degrees F.

1.09 WARRANTY

A. General: See Division 1 – Closeout Procedures.

B. Special Warranty: Submit a written warranty executed by the manufacturer, the Installer, and the Contractor, agreeing to repair or replace equipment specified herein that fails in materials or workmanship within the specified warranty period.

C. Warranty period shall be 18 months from date of substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB/GE.

B. Eaton Corporation.

C. Schneider Electric; Square D Products.

D. Siemens Industry, Inc.

E. Substitutions: See Division 01 - Product Requirements.

F. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
      b. Panelboards Containing Fusible Switches: Between -22 degrees F and 104 degrees F

C. Short Circuit Current Rating:
   1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
   2. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
   3. Label equipment utilizing series ratings as required by NFPA 70.

D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
   2. Provide 200 percent rated neutral bus and lugs where indicated, where oversized neutral conductors are provided, or where panelboards are fed from K-rated transformers.
   3. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
   4. Provide separate isolated/insulated ground bus where indicated or where isolated grounding conductors are provided.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
   2. Outdoor Locations: Type 3R.
      a. Furnish thermostatically controlled electric heaters sized to prevent condensation under expected weather conditions at Project site. Furnish control power transformer and terminals for separate connection of heater power circuit.
      b.
   3. Boxes: Galvanized steel unless otherwise indicated.
      a. Provide wiring gutters sized to accommodate the conductors to be installed.
      b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
      c. Provide removable end walls for NEMA Type 1 enclosures.
      d. Provide painted steel boxes for surface-mounted panelboards where indicated, finish to match fronts.
   4. Fronts:

a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.

5. Lockable Doors: All locks keyed alike unless otherwise indicated.

J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

K. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided, list and label panelboards as a complete assembly including surge protective device.

L. Panelboard Contactors: Where panelboard contactors are indicated, provide electrically operated, mechanically held magnetic contactor complying with NEMA ICS 2.
1. Ampere Rating: Not less than ampere rating of panelboard bus.
2. Short Circuit Current Rating: Not less than the panelboard short circuit current rating.
3. Coil Voltage: As required for connection to control system indicated.

M. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
1. Where electronic circuit breakers equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.
2. Where accessory ground fault sensing and relaying equipment is used, equip companion overcurrent protective devices with ground-fault shunt trips.
a. Use zero sequence ground fault detection method unless otherwise indicated.
b. Provide test panel and field-adjustable ground fault pick-up and delay settings.
c. Provide zone selective interlocking capability where indicated, capable of communicating with other electronic trip circuit breakers and external ground fault sensing systems to control ground fault delay functions for system coordination purposes.

N. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

O. Selective Coordination:
1. Fusible branch circuit panelboards overcurrent protective devices shall be selectively coordinated with all supply side (fed from both the normal and emergency source) overcurrent protective devices. Provide recommended fuses from a single manufacturer to maintain published minimum ampere coordination ratios.

P. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.

Q. Load centers are not acceptable.

R. Provide the following features and accessories where indicated or where required to complete installation:
1. Feed-through lugs.
2. Sub-feed lugs.

2.03 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
1. Phase and Neutral Bus Material: Tin plated copper [Aluminum].
2. Ground Bus Material: Copper [Aluminum].
3. Terminations: 75°C.

D. Circuit Breakers:
1. Provide bolt-on type. .
2. Provide thermal magnetic circuit breakers unless otherwise indicated.
3. Provide electronic trip circuit breakers where indicated.

E. Circuit breakers rated 1000 amps or more on solidly grounded 480V systems shall include ground fault protection.

F. Circuit breakers rated 1200 amps and above shall have Long time, Short time, Instantaneous and Ground fault protection (LSI) functions. These functions shall similar to those functions found on a Square D PowerPact circuit breaker. Circuit breaker shall have energy reduction maintenance setting (ERMS) system. Provide the following;
1. Energy Reduction Maintenance Setting Switch (ERMS)
a. For the circuit breakers above 1200 amps, provide a maintenance OFF ON selector switch on the compartment door to switch the circuit breaker instantaneous tripping characteristics to an alternate setting temporarily during maintenance activity.
b. Provide a lock feature for the ERMS switch so that it may be locked in either the OFF or ON maintenance mode position.
c. Provide a blue LED indicating light to indicate trip unit is in the ERMS mode.

G. Enclosures:
1. Provide surface-mounted enclosures unless otherwise indicated.
2. Fronts: Provide trims to cover access to load terminals, wiring gutters, and other live parts, with exposed access to overcurrent protective device handles.
3. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
4. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
5. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Phase and Neutral Bus Material: Tin plated copper [Aluminum].
3. Ground Bus Material: Copper [Aluminum].
4. Terminations: 75°C.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
1. Provide surface-mounted or flush-mounted enclosures as indicated.
2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
3. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
4. Provide clear plastic circuit directory holder mounted on inside of door.

F. Provide column-width panelboards with accessory column-width cable trough and pullbox where indicated.

2.05 FUSIBLE BRANCH CIRCUIT PANELBOARDS

A. Manufacturers:
1. Fusible Panelboards shall be Cooper Bussmann™ Quik-Spec™ Coordination Panelboards type QSCP.
2. Substitutions will be accepted only if the below requirements are met and written approval is provided from the engineer:
a. The electrical contractor supplies a written request to the engineer three weeks prior to the project bid date
b. The electrical contractor provides product documentation to prove complete compliance with specification and all pertinent codes and standards requirements as specified in this section.

B. Panelboard overcurrent protective device interrupting ratings shall be fully rated for the maximum available fault current and have a UL Listed interrupting rating of 300kA and CSA Certified interrupting rating of 200kA with SPD. SPD protection for 480V, 3-phase shall have L-N=600, L-G=600, N-G=600, L-L =1000 and for 480Y L-N=1200, L-G=1200, N-G=1200, L-L=2000.

C. Construction:
1. Panelboard circuits 100A and less shall incorporate overcurrent protection and branch-circuit rated disconnecting means into a single integrated component.
2. Interiors shall be factory assembled.
3. Panelboard shall be equipped with a six-space spare fuse compartment for storing replacement branch circuit fuses. Spare fuse compartment shall be located behind locking panel door.
4. Bus bars shall be tin-plated copper with sufficient cross sectional area to meet UL 67 temperature rise requirements.
5. 200A/400A rated neutrals shall be standard.
6. Terminations: 75°C.
7. NEMA 1 panelboards shall be field convertible for top or bottom incoming feed.

D. Main Disconnect:
1. Permanently installed lockout means shall be provided on the main disconnect for lockout tagout procedures.
2. Main disconnect shall be quick-make, quick-break type.

E. Branch Fused Disconnects:

1. Device shall have visible circuit ON/OFF indication with colored and international symbol markings.
2. Device shall provide open fuse indication via permanently installed neon indicating light.
3. Device shall be UL and cUL Listed 600Vac/200kA or 125Vdc/100kA voltage/short-circuit current rating, load-break disconnect with amp ratings and number of poles as indicated on the panelboard schedule.
4. Fuse and disconnect assembly shall be a finger-safe component with trim installed.
5. Fuse and disconnect shall be mechanically interlocked so as not to allow fuse removal while fuse terminals are energized.
6. No special tools shall be required for fuse removal.
7. Devices shall have bolt-on style bus connectors.
8. Device housing shall be clearly marked with device amperage.
9. Permanently installed lockout means shall be provided on the device for lockout tagout procedures. Permanently installed means for locking device in the ON position shall also be provided.
10. Device shall provide fuse amp rating rejection at the following ampacities to ensure continued circuit protection at the specified circuit rating: 15A, 20A, 30A, 40A, 50A, 60A, 70A, 90A & 100A.

F. Main and Branch Circuit Overcurrent Protection
1. All overcurrent protective devices shall have a minimum UL Listed interrupting rating of 300kA and CSA Certified interrupting rating of 200kA.
2. Branch circuit overcurrent protection shall be 600Vac UL Listed minimum 300kA IR and CSA Certified minimum 200kA IR finger-safe fuse with Class J* performance characteristics.
3. Main overcurrent protective devices shall be 600Vac UL Listed minimum 300kA IR and CSA Certified minimum 200kA IR Class J time-delay fuses or Class J performance fuses.
4. Where panelboard main fuses are installed, fuses in panelboard branch circuits shall selectively coordinate with main fuses for all overcurrent ratings up to 200kA.

G. Panelboard Bus: Copper current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard.

H. Minimum Integrated Short Circuit Rating: Calculated based on primary transformer available SCR and as indicated on plans.

I. Enclosure:
1. NEMA 1 enclosures shall be surface or flush mount as indicated in associated schedules or drawings.
2. Boxes shall be a nominal 20 inches wide and 5-¾ inches deep with wire bending space per the National Electrical Code.
3. Panelboard trim shall be supplied with lockable door covering all disconnect handles.
4. Panelboard trim shall be dead-front construction covering all energized parts.
5. Door-in-door type trim shall be provided for NEMA 1 enclosures where it is specified in the associated schedules or drawings.
6. Front trim shall be lockable. All lock assemblies shall be keyed alike with like NEMA rated enclosures.

2.06 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:

1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
2. Interrupting Capacity:
   a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
      2) 14,000 rms symmetrical amperes at 480 VAC.
   b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   c. Series Rated Systems: Provide circuit breakers listed in combination with upstream devices to provide interrupting rating not less than the short circuit current rating indicated.
3. Conductor Terminations:
   a. Provide mechanical lugs unless otherwise indicated.
   b. Provide compression lugs where indicated.
   c. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
   b. Provide interchangeable trip units where indicated.
5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
6. Provide the following circuit breaker types where indicated:
   a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
   b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
   c. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
   d. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
   e. Current Limiting Circuit Breakers: Without using fusible elements, designed to limit the let-through energy to a value less than the energy of a one-half cycle wave of the symmetrical prospective current when operating within its current limiting range.
7. Provide listed switching duty rated circuit breakers with SWD marking for all branch circuits serving fluorescent lighting.
8. Provide listed high intensity discharge lighting rated circuit breakers with HID marking for all branch circuits serving HID lighting.
9. Do not use tandem circuit breakers.
10. Do not use handle ties in lieu of multi-pole circuit breakers.
11. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
12. Provide the following features and accessories where indicated or where required to complete installation:
    a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.

b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.
c. Auxiliary Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped or been turned off.
d. Under-voltage Release: For tripping circuit breaker upon predetermined drop in coil voltage with field-adjustable time delay to prevent nuisance tripping.
e. Alarm Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped.

2.07 SOURCE QUALITY CONTROL

A. See Division 01 – General Requirements.

B. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required supports in accordance with Section 260529.

F. Install panelboards plumb.

G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

I. Mount floor-mounted power distribution panelboards on properly sized 3 inch high concrete pad constructed in accordance with Division 03.

J. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.

K. Provide grounding and bonding in accordance with Section 260526.
1. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on isolated/insulated ground bus.
2. Terminate branch circuit isolated grounding conductors on isolated/insulated ground bus only. Do not terminate on solidly bonded equipment ground bus.

L. Install all field-installed branch devices, components, and accessories.

M. Provide fuses complying with Section 262813 for fusible switches as indicated.

N. Energy Reduction Maintenance Switch:

1. Installation of ERMS maintenance lockable selector switch and blue indicating light onto compartment door of the circuit breaker. Installation of the IO module and the IFE module in accordance with manufactures recommendations.
   a. Set point for the ERMS instantaneous is based on manufactures recommendations. For Square D Power Pact circuit breaker (Basis of design) the default programmed setting to the instantaneous (Ii) set point is 2xIn.

O. Install a permanent label indicating the panelboard or transformer where the power supply to the panel originates.

P. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

Q. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.

R. Set field-adjustable circuit breaker tripping function settings as indicated.

S. Set field-adjustable ground fault protection pickup and time delay settings as indicated.

T. Provide filler plates to cover unused spaces in panelboards.

U. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
   1. Emergency and night lighting circuits.
   2. Fire detection and alarm circuits.
   3. Communications equipment circuits.
   4. Intrusion detection and access control system circuits.
   5. Video surveillance system circuits.

V. Identify panelboards in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Division 01 - General Requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Fusible Switches: Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

D. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than 800 amperes. Tests listed as optional are not required.
   1. Perform insulation-resistance tests on all control wiring with respect to ground.
   2. Test functions of the trip unit by means of secondary injection.

E. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
   1. Perform inspections and tests listed in NETA ATS, Section 7.14. The insulation-resistance test on control wiring listed as optional is not required.

F. Test GFCI circuit breakers to verify proper operation.

G. Test AFCI circuit breakers to verify proper operation.

H. Test shunt trips to verify proper operation.

I. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.

J. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

A. See Division 01 – General Requirements.

B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

C. Adjust alignment of panelboard fronts.

D. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

A. See Division 01 – General Requirements.

B. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

C. Repair scratched or marred exterior surfaces to match original factory finish.

3.06 PROTECTION

A. Protect installed panelboards from subsequent construction operations.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Wall plates.

1.02 RELATED REQUIREMENTS

A. Division 01 – General Requirements

B. Division 09 - Finishes

C. Section 260400 – General Conditions for Electrical Trades

D. Section 260519 - Electrical Power Conductors and Cables.

E. Section 260526 - Grounding and Bonding for Electrical Systems.

F. Section 260503 – Equipment Wiring Connections.

G. Section 260533 – Raceways and Boxes for Electrical Systems.

H. Section 260553 - Identification for Electrical Systems.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Revision H.

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Revision G.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction.

D. NECA 130 - Standard for Installing and Maintaining Wiring Devices.

E. NEMA WD 1 - General Color Requirements for Wiring Devices.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

H. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

I. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

J. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

K. UL 1310 - Class 2 Power Units; Current Edition, Including All Revisions.

L. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

M. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

N. UL 1917 - Solid-State Fan Speed Controls; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.

3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:
1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Division 01 - General Requirements.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
1. Wall Dimmers: Include derating information for ganged multiple devices.
2. Surge Protection Receptacles: Include surge current rating, voltage protection rating (VPR) for each protection mode, and diagnostics information.

C. Samples: One for each type and color of device and wall plate specified.

D. Certificates for Surge Protection Receptacles: Manufacturer's documentation of listing for compliance with UL 1449.

E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

F. Operation and Maintenance Data:
1. Wall Dimmers: Include information on operation and setting of presets.
2. GFCI Receptacles: Include information on status indicators.
3. Surge Protection Receptacles: Include information on status indicators.

G. Project Record Documents: Record actual installed locations of wiring devices.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 - General Requirements, for additional provisions.
2. Screwdrivers for Tamper-Resistant Screws: Two for each type of screw.
3. Extra Keys for Locking Switches: Two of each type.
4. Extra Surge Protection Receptacles: Two of each type.
5. Extra Wall Plates: One of each style, size, and finish.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Products: Listed, classified, and labeled as suitable for the purpose intended.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

D. Provide tamper resistant receptacles for receptacles where indicated on the drawings.

E. Provide GFCI protection for receptacles installed within 6 feet of water source.

F. Provide GFCI protection for receptacles installed in dwelling unit kitchens.

G. Provide GFCI protection in other than dwelling units for all single-phase receptacles rated 150 volts to ground or less and all three-phase receptacles rated 150 volts to ground or less, 100 amperes of less in: Bathrooms, Kitchens and on Rooftops

H. Provide GFCI protection for receptacles serving electric drinking fountains.

I. Unless noted otherwise, do not use combination switch/receptacle devices.

2.02 RECEPTACLES

A. Manufacturers:
   1. Hubbell Incorporated
   2. Leviton Manufacturing Company, Inc.
   3. Pass & Seymour, a brand of Legrand North America, Inc.
   4. Substitutions: See Division 01 - General Requirements.
   5. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.
   3. Hospital Grade Receptacles: Listed as complying with UL 498 Supplement SD, with green dot hospital grade mark on device face.
   4. Body color:
      a. General Purpose Receptacles: color by Architect.
      b. Emergency, [Critical Branch], [Equipment Branch] receptacles: Red.

C. Convenience Receptacles:
   1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
   2. Automatically Controlled Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; controlled receptacle marking on device face per NFPA 70; single or duplex as indicated on the drawings.
   3. Isolated Ground Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, with ground contacts isolated from mounting strap; isolated ground triangle mark on device face; single or duplex as indicated on the drawings.
   4. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying

with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

5. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
6. Tamper Resistant and Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
7. Illuminated Convenience Receptacles: Hospital grade, 20A, 125V, NEMA 5-20R; illuminated face or indicator light to indicate power is being supplied to receptacle; single or duplex as indicated on the drawings.

D. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
   a. Provide test and reset buttons of same color as device.
2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
5. Tamper Resistant and Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

E. USB Charging Devices:
1. USB Charging Devices - General Requirements: Listed as complying with UL 1310.
   a. Charging Capacity - Two-Port Devices: 2.1 A, minimum.
   b. Charging Capacity - Four-Port Devices: 4.2 A, minimum.
2. USB Charging/Tamper Resistant Receptacle Combination Devices: Two-port USB charging device and receptacle, commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; rectangular decorator style.
3. USB Charging Noncombination Devices: Four-port; rectangular decorator style.

F. Locking Receptacles: Industrial specification grade, configuration as indicated on the drawings.
1. Standard Locking Convenience Receptacles: Single, 20A, 125V, NEMA L5-20R.
2. Special Purpose Locking Receptacles: refer to drawings and schedules for NEMA locking configuration.

G. Special Purpose Receptacles: Industrial specification grade, straight blade grounding devices.
1. Refer to drawings and schedules for NEMA configuration.

H. Clock Hanger Receptacles: Single, 15A, 125V, NEMA 5-15R.

2.03 WALL PLATES

A. Manufacturers:
   1. Hubbell Incorporated
   2. Leviton Manufacturing Company, Inc.
   3. Pass & Seymour, a brand of Legrand North America, Inc.
   4. Substitutions: See Division 01 - General Requirements.
   5. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

B. Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Screws: Metal with slotted heads finished to match wall plate finish.
   3. Provide screwless wallplates with concealed mounting hardware where indicated.

C. As selected by Architect

D. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

E. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

F. Brass Wall Plates: Brushed satin finish, factory-coated to inhibit oxidation.

G. Aluminum Wall Plates: Smooth satin finish, clear anodized, factory-coated to inhibit oxidation.

H. Chrome Wall Plates: Smooth finish, chrome plated steel.

I. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.

J. Premarked Wall Plates: Factory labeled as indicated; hot stamped for nylon wall plates and engraved for metal wall plates.

K. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.

L. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that floor boxes are adjusted properly.

F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 260533 as required for installation of wiring devices provided under this section.
   1. Mounting Heights: Unless otherwise indicated, as follows:
      a. Wall Switches: 48 inches above finished floor.
      b. Wall Dimmers: 48 inches above finished floor.
      c. Receptacles: 18 inches above finished floor or 6 inches above counter.
         1) Install convenience GFCI type receptacles 36 to 48 inches above roof deck. Or at designated heights as indicated on drawings.
   2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
   3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
   4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
   5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.

C. Install wiring devices in special application enclosures per manufacturer’s instructions, provide stainless steel cover plates.

D. Install wiring devices in accordance with manufacturer's instructions.

E. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

F. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

G. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

H. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper. When stranded conductors are used in lieu of solid, use insulated crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screw terminals.

I. For isolated ground receptacles, connect wiring device grounding terminal only to identified branch circuit isolated equipment grounding conductor. Do not connect grounding terminal to outlet box or normal branch circuit equipment grounding conductor.

J. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

K. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.

L. Install wiring devices plumb and level with mounting yoke held rigidly in place.

M. Install wall switches with OFF position down.

N. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

O. Do not share neutral conductor on branch circuits utilizing wall dimmers.

P. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

Q. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

R. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

S. Identify wiring devices in accordance with Section 260553.

3.04 FIELD QUALITY CONTROL

A. See Division 01 - General Requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI protected receptacle for proper tripping operation according to manufacturer's instructions.

F. Inspect each surge protection receptacle to verify surge protection is active.

G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

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SECTION 26 28 13
FUSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fuses.

B. Spare fuse cabinet.

1.02 RELATED REQUIREMENTS

A. See Division 01 – General Requirements

B. Section 260400 – General Conditions for Electrical Trades

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 260573 – Overcurrent Protective Device Coordination Study: Additional criteria for the selection of protective devices specified in this section.

E. Section 262413 - Switchboards: Fusible switches.

F. Section 262416 - Panelboards: Fusible switches.

G. Section 262500 – Enclosed Bus Assemblies: Fusible switches.

H. Section 262819 - Enclosed Switches: Fusible switches.

I. Section 262913 - Enclosed Controllers: Fusible switches.

J. Section 264500 - Photovoltaic System: Additional requirements for photovoltaic fuses.

1.03 REFERENCE STANDARDS

A. NEMA FU 1 - Low Voltage Cartridge Fuses; 2012.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.

D. UL 248-4 - Low-Voltage Fuses - Part 4: Class CC Fuses; Current Edition, Including All Revisions.

E. UL 248-8 - Low-Voltage Fuses - Part 8: Class J Fuses; Current Edition, Including All Revisions.

F. UL 248-10 - Low-Voltage Fuses - Part 10: Class L Fuses; Current Edition, Including All Revisions.

G. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

H. UL 248-15 - Low-Voltage Fuses - Part 15: Class T Fuses; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. See Division 01: General Requirements

B. Coordination:

1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
    a. Fusible Switches for Switchboards: See Section 262413.
    b. Fusible Switches for Panelboards: See Section 262416.
    c. Fusible Switches for Busway: See Section 262500.

d. Fusible Enclosed Switches: See Section 262819.
e. Fusible Switches for Enclosed Motor Controllers: See Section 262913.

2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
3. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain written direction before proceeding with work.

1.05 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.
1. Spare Fuse Cabinet: Include dimensions.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 - Product Requirements, for additional provisions.
2. Extra Fuses: One set(s) of three for each type and size installed.
3. Fuse Pullers: One set(s) compatible with each type and size installed.
4. Spare Fuse Cabinet Keys: Two.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Bussmann

B. Littelfuse, Inc.

C. Ferraz Shawmut

D. Substitutions: See Division 01- General Requirements.

2.02 APPLICATIONS

A. Service Entrance:
1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
2. Fusible Switches Larger than 600 Amperes: Class L, time-delay.

B. Feeders:
1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
2. Fusible Switches Larger than 600 Amperes: Class L, time-delay.

C. General Purpose Branch Circuits: Class RK1, time-delay.

D. Individual Motor Branch Circuits: Class RK1, time-delay.

E. In-Line Protection for Pole-Mounted Luminaires: Class CC, time-delay.

F. Primary Protection for Control Transformers: Class CC, time-delay.

2.03 FUSES

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.

C. Provide fuses of the same type, rating, and manufacturer within the same switch.

D. Comply with UL 248-1.

E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.

F. Voltage Rating: Suitable for circuit voltage.

G. Class R Fuses: Comply with UL 248-12.

H. Class J Fuses: Comply with UL 248-8.

I. Class L Fuses: Comply with UL 248-10.

J. Class T Fuses: Comply with UL 248-15.

K. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

L. Provide the following accessories where indicated or where required to complete installation:
   1. Fuseholders: Compatible with indicated fuses.
   2. Fuse Reducers: For adapting indicated fuses to permit installation in switch designed for fuses with larger ampere ratings.

2.04 SPARE FUSE CABINET

A. Description: Wall-mounted sheet metal cabinet with shelves and hinged door with cylinder lock, suitably sized to store spare fuses and fuse pullers specified.

B. Finish: Manufacturer's standard, factory applied grey finish unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.

B. Verify that mounting surfaces are ready to receive spare fuse cabinet.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Do not install fuses until circuits are ready to be energized.

B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

C. Install spare fuse cabinet where indicated.

D. Identify spare fuse cabinet in accordance with Section 260553.

END OF SECTION

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SECTION 26 28 19
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes fusible and nonfusible switches.

B. Related Sections:
1. Section 26 28 13 - Fuses.

1.02 REFERENCES

A. National Electrical Manufacturers Association:
1. NEMA FU 1 - Low Voltage Cartridge Fuses.
2. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

B. International Electrical Testing Association:
1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.03 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit switch ratings and enclosure dimensions.

1.04 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of enclosed switches and ratings of installed fuses.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

PART 2 PRODUCTS

2.01 FUSIBLE SWITCH ASSEMBLIES

A. Manufacturers:
1. General Electric.
2. Square D.
3. Siemens.
4. Eaton/Cutler Hammer.
5. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: NEMA KS 1, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position.

C. Fuse clips: Designed to accommodate NEMA FU 1 fuses.

D. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

E. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.

F. Furnish switches with entirely copper current carrying parts.

2.02 NONFUSIBLE SWITCH ASSEMBLIES

A. Manufacturers:
   1. General Electric.
   2. Square D.
   3. Siemens.
   4. Eaton/Cutler Hammer.
   5. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: NEMA KS 1, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position.

C. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R

D. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.

E. Furnish switches with entirely copper current carrying parts.

2.03 SWITCH RATINGS

A. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings.

B. Short Circuit Current Rating: UL listed for [10,000 rms symmetrical amperes when used with or protected by Class H or K fuses (30-600 ampere)] [200,000 rms symmetrical amperes when used with or protected by Class R or Class J fuses (30-600 ampere switches employing appropriate fuse rejection schemes)]. [200,000 rms symmetrical amperes when used with or protected by Class L fuses (800-1200 ampere)].

PART 3 EXECUTION

3.01 EXISTING WORK

A. Disconnect and remove abandoned enclosed switches.

B. Maintain access to existing enclosed switches and other installations remaining active and requiring access. Modify installation or provide access panel.

C. Clean and repair existing enclosed switches to remain or to be reinstalled.

3.02 INSTALLATION

A. Install enclosed switches plumb. Provide supports in accordance with Section 26 05 29.

B. Height:5 feet to operating handle.

C. Install fuses for fusible disconnect switches. Refer to Section 26 28 13 for product requirements.

D. Install engraved plastic nameplates in accordance with Section 26 05 53.

E. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

3.03 FIELD QUALITY CONTROL

A. Section [01 40 00 - Quality Requirements] [01 70 00 - Execution and Closeout Requirements]: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.5.

END OF SECTION

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SECTION 26 51 00
LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires.

B. Emergency lighting units.

C. Exit signs.

D. LED drivers.

E. LED Driver emergency power supply units.

F. Luminaire accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 0533 – Raceways and Boxes for Electrical Systems.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

C. Section 26 0923 - Lighting Control Devices: Automatic controls for lighting including occupancy sensors, outdoor motion sensors, time switches, outdoor photo controls, and daylighting controls.

D. Section 26 2726 - Wiring Devices: Manual wall switches and wall dimmers.

E. Lighting Fixture Schedule as indicated on drawings.

1.03 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; current edition.

B. IESNA LM-63-19: ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information.

C. IES LM-79-19: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products.

D. IES LM-80-21: Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

F. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.

G. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

H. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2015.

I. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012.

J. UL 844 - Luminaires for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

K. UL 924 Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

L. UL 1598 - Luminaires; Current Edition, Including All Revisions.

M. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
   2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
   3. Coordinate placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility, installed by other sections or others.
   4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. See Division 01 – General Requirements.

B. Shop Drawings:
   1. Indicate dimensions and components for each luminaire of the manufacturer.
   2. Provide photometric calculations where luminaires are proposed for substitution upon request.

C. Shop Drawings: For nonstandard or custom luminaires.
   1. Include plans, elevations, sections, and mounting and attachment details.
   2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Include diagrams for power, signal, and control wiring.

D. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
   1. Arrange in order of luminaire designation.
   2. Include data on features, accessories, and finishes.
   3. Include physical description and dimensions of luminaires.
   4. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
   5. Photometric data and adjustment factors based on laboratory tests, complying with IESNA LM-79 and IESNA LM-80.
      a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
      b. Testing Agency Certified Data: Photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
      c. TM-21 report for L70 rating at color temperature specified.
   6. LED drivers: Include wiring diagrams and list of compatible LED configurations.
   7. LED arrays: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
   8. LED driver Emergency Power Supply Units: Include a list of compatible LED configurations and associated lumen output.
   9. Air Handling Luminaires: Include air handling performance data.

E. Samples:
1. Provide one sample(s) of each specified luminaire upon request.
2. Provide one sample(s) of each custom luminaire.
3. Provide one sample(s) of each luminaire proposed for substitution upon request.
4. Provide one sample(s) of each product finish illustrating color and texture upon request.
5. Provide a mockup of selected luminaires upon request.
6. Submit two color chips 3 x 3 inch in size illustrating luminaire finish color where indicated in luminaire schedule.

F. Certificates for Dimming Drivers: Manufacturer's documentation of compatibility with dimming controls to be installed.

G. Field quality control reports.

H. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

I. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.06 EXTRA PRODUCTS

A. Provide [1] emergency lighting unit complete with all labor and materials required for installation as directed by the Local Authority Having Jurisdiction.

B. Provide [1] universal exit sign complete with all labor and materials required for installation as directed by the Local Authority Having Jurisdiction.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 – General Requirements.
2. Extra Lenses and Louvers: Two percent of total quantity installed for each type, but not less than one of each type.
3. LED Drivers: Furnish two of each driver type
4. Furnish one replacement battery for each battery type and size.

D. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.07 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 QUALIFICATION DATA: For testing laboratory providing photometric data for luminaires.

A. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

B. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Product Test Reports: For each luminaire, for tests performed by a qualified testing agency.

1.09 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.10 FIELD CONDITIONS

A. Maintain field conditions within the manufacturers required service conditions during and after installation.

1.11 WARRANTY

A. See Division 01 – General Requirements.

B. Section 26 0400 – General Requirements for Electrical Trades.

C. Unless otherwise noted in Lighting Fixture Schedule, Provide three year manufacturer warranty for all LED luminaires, including drivers.

D. Provide five year manufacturer warranty for batteries for emergency lighting units.

E. Provide ten year manufacturer warranty for batteries for self-powered exit signs.

F. Provide five year manufacturer warranty for LED Driver emergency power supply units.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in Lighting Fixture Schedule included on the drawings.

B. Substitutions: See Division 01- General Requirements, except where individual luminaire types are designated with substitutions not permitted and the following:
   1. Section 26 04 00 – Product Requirements and as follows:
      a. Approved equals to the basis of design fixture as listed in the Lighting Fixture Schedule shall be accepted for review with the proposed substitute fixture meeting the following minimum requirements:
         1) Be of the same general size, style and shape, including but not limited to lens construction and shading.
         2) Be of equal or better quality and construction.
         3) Be supplied with all required accessories to match the specified fixture.
         4) Be supplied with all remote drivers, power supplies and cabling lengths to meet specified performance and control.
         5) Provide the same or better distribution, efficiency, source lumen output, and L70 lumen depreciation metric.
      b. Provide point by point photometric calculations at the request of the Engineer for evaluation.
      c. The basis of design fixture listed in the Lighting Fixture Schedule lists part numbers, specifications, options, accessories and source output available at the time of design. Substitutions shall meet these requirements as scheduled.
      d. The evaluation of an approved equal shall be at the sole discretion of the Architect and Engineer.

2.02 INTERIOR LUMINAIRES

A. Manufacturers:
   1. Manufacturers represented by Apex Lighting.
   2. Manufacturers represented by Lighting Affiliates.
   3. Manufacturers represented by Illuminate.
   4. Manufacturers represented by Reflex Lighting.
   5. Substitutions: See paragraph 2.1, B.

B. Provide products that comply with requirements of NFPA 70.

C. Provide products that are listed and labeled as complying with UL 1598, where applicable.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Provide products complying with Federal Energy Management Program (FEMP) requirements.

F. Unless otherwise indicated, provide complete luminaires including lamp(s)/LED arrays and all sockets, drivers, reflectors, lenses, housings and other components required to position, energize and protect the lamp/LED array and distribute the light.

G. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

H. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

I. Recessed Luminaires:
   1. Ceiling Compatibility: Comply with NEMA LE 4.
   2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
   3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
   4. Air-Handling Recessed Luminaires: Suitable for air supply/return, heat removal, or combination as indicated.
      a. Luminaires for Air Supply/Return: Provide air control blades where indicated.
      b. Luminaires for Heat Removal: Provide heat removal dampers where indicated.

J. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.
   3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

K. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.03 EMERGENCY LIGHTING UNITS

A. Manufacturers:
   1. Manufacturers represented by Apex Lighting.
   2. Manufacturers represented by Lighting Affiliates.
   3. Manufacturers represented by Illuminate.
   4. Manufacturers represented by Reflex Lighting.
   5. Substitutions: See paragraph 2.1, B.

B. Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

C. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected LED arrays to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

D. Battery:
1. Sealed maintenance free lead calcium unless otherwise indicated.
2. Size battery to supply all connected lamps/LED arrays, including emergency remote heads where indicated.

E. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

F. Provide low voltage disconnect to prevent battery damage from deep discharge.

G. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

2.04 EXIT SIGNS

A. Manufacturers:
1. Manufacturers represented by Apex Lighting.
2. Manufacturers represented by Lighting Affiliates.
3. Manufacturers represented by Illuminate.
4. Manufacturers represented by Reflex Lighting.
5. Substitutions: See paragraph 2.1, B.

B. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
1. Number of Faces: Single or double as indicated or as required for the installed location.
2. Directional Arrows: Universal type for field adjustment sized so that they are clearly visible at a distance of 40 feet as required by local codes.
3. Mounting: Wall, ceiling or pendant as indicated. Provide universal mount exit signs where indicated.
4. Housing: Varies, refer to Lighting Fixture Schedule.
5. Face: Varies, refer to Lighting Fixture Schedule.

C. Self-Powered Exit Signs:
1. Product Description: UL 924 self-contained emergency lighting unit.
2. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected LED array to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
3. Battery: Sealed maintenance-free nickel cadmium unless otherwise indicated.
4. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
5. Provide low-voltage disconnect to prevent battery damage from deep discharge.
6. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

D. Self-Luminous Exit Signs: Internally illuminated by tritium gas sealed inside phosphor lined gas tubes, requiring no electrical power to operate, with a service life of 20 years unless otherwise indicated.

E. Photoluminescent Exit Signs: Powder-coated sheet aluminum with photoluminescent pigmented material.

F. Special Wording Signs: Provide with special wording as indicated.
1. Where indicated, provide with international symbol of accessibility complying with state and local codes.
2. Provide combination exit/special wording signs where indicated.

G. Accessories:
1. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
2. Provide compatible accessory wire guards where indicated.

2.05 MATERIALS

A. Parts:
1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.
4. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
5. Diffusers and Globes:
   a. Refer to Interior Lighting Fixture Schedule for types.
   b. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
   c. Glass: Annealed crystal glass unless otherwise indicated.
   d. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
6. Housings:
   a. Extruded-aluminum housing and heat sink unless otherwise indicated.
   b. Powder-coat finish unless otherwise indicated, color selection by Architect.
7. Factory-Applied Labels: Comply with UL 1598. Include recommended LED array. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when LED arrays are in place.
   a. Label shall include the following LED source characteristics:
      1) “USE ONLY” and include specific LED type.
      2) LED shape, size, wattage, and coating.
      3) CCT and CRI for all luminaires.

B. METAL FINISHES
1. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.06 LED DRIVERS

A. Manufacturers:
1. eldoLED.
2. Lutron Electronics Company.

3. Osram Sylvania.
4. Philips Lighting Electronics/Advance.
5. Substitutions: See Division 01- General Requirements, Product Requirements.
6. Manufacturer Limitations: Where possible, for each type of luminaire provide driver produced by a single manufacturer.
7. Where a specific manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.
8. Provide LED drivers compatible with the approved lighting control systems.

B. LED Drivers - General Requirements:
1. Minimum Efficiency: Provide LED drivers complying with all current applicable federal and state efficiency standards.
2. Electronic LED Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.
   a. Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 10 percent.
   b. Total Harmonic Distortion: Not greater than 20 percent.
   c. Power Factor: Not less than 0.95.

C. LED Drivers:
1. Product Description: LED dimming driver.
   a. 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers
   b. Digital (DALI Low Voltage Controlled) Dimming Drivers
   c. Digital Multiplex (DMX Low Voltage Controlled) Dimming Drivers
2. General:
   a. LED dimming shall be equal in range and quality to a commercial grade incandescent dimmer. Quality of dimming to be defined by dimming range, freedom from perceived flicker or visible stroboscopic flicker, smooth and continuous change in level (no visible steps in transitions), natural square law response to control input, and stable when input voltage conditions fluctuate over what is typically experience in a commercial environment. Demonstration of this compliance to dimming performance will be necessary for substitutions or prior approval.
   b. Ten-year expected life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
   c. Driver must limit inrush current.
      1) Base specification: Meet or exceed NEMA 410 driver inrush standard of 430 Amps per 10 Amps load with a maximum of 370 Amps (^2) – seconds.
      2) Preferred Specification: Meet or exceed 30mA(^2)s at 277VAC for up to 50 watts of load and 75A at 240us at 277VAC for 100 watts of load.
   d. Withstand up to a 1,000 volt surge without impairment of performance as defined by ANSI C62.41 Category A.
   e. No visible change in light output with a variation of plus/minus 10 percent line voltage input.
   f. Total Harmonic Distortion less than 20% percent and meet ANSI C82.11 maximum allowable THD requirements at full output. THD shall at no point in the dimming curve allow imbalance current to exceed full output THD.
   g. Driver must support automatic adaptation, allowing for future luminaire upgrades and enhancements and deliver improved performance:

1) Adjustment of forward LED voltage, supporting 3V through 55V.
2) Adjustment of LED current from 200mA to 1.05A at the 100 percent control input point in increments of 1mA
3) Adjustment for operating hours to maintain constant lumens (within 5 percent) over the 50,000 hour design life of the system, and deliver up to 20 percent energy savings early in the life cycle.

h. Driver must be able to operate for a (+/- 10%) supply voltage of 120V through 277VAC at 60Hz.

i. Driver should be UL Recognized under the component program and shall be modular for simple field replacement. Drivers that are not UL Recognized or not suited for field replacement will not be considered.

j. Driver shall include ability to provide no light output when the analog control signal drops below 0.5 V, or the DALI/DMX digital signal calls for light to be extinguished and shall consume 0.5 watts or less in this standby. Control deadband between 0.5V and 0.65V shall be included to allow for voltage variation of incoming signal without causing noticeable variation in fixture to fixture output.

3. Light Quality

a. Over the entire range of available drive currents, driver shall provide step-free, continuous dimming to black from 100 percent to 1 percent and 10% relative light output where indicated, or 100 – 10% light standard. Driver shall respond similarly when raising from 1% to 100%

b. Driver must be capable of configuring a linear or logarithmic dimming curve, allowing fine grained resolution at low light levels

c. Drivers to track evenly across multiple fixtures at all light levels, and shall have an input signal to output light level that allows smooth adjustment over the entire dimming range.

d. Driver and luminaire electronics shall deliver illumination that is free from objectionable flicker as measured by flicker index (ANSI/IES RP-16-10). At all points within the dimming range from 100-1 percent luminaire shall have:

1) LED dimming driver shall provide continuous step-free, flicker free dimming similar to incandescent source.
2) Base specification: Flicker index shall less that 5% at all frequencies below
3) 1000 Hz.
4) Preferred specification: Flicker index shall be equal to incandescent, less that 1% at all frequencies below 1000 Hz.

4. Control Input

a. 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers

1) Must meet IEC 60929 Annex E for General White Lighting LED drivers
2) Connect to devices compatible with 0 to 10V Analog Control Protocol, Class 2, capable of sinking 0.6 ma per driver at a low end of 0.3V. Limit the number of drivers on each 0-10V control output based on voltage drop and control capacity.
3) Must meet ESTA E1.3 for RGBW LED drivers

b. Digital (DALI Low Voltage Controlled) Dimming Drivers

1) Must meet IEC 62386

c. Digital Multiplex (DMX Low Voltage Controlled) Dimming Drivers

1) Must meet DMX / RDM: USITT DMX512A and ANSI E1.20 (Explore & Address)
2) Capable of signal interpolation and smoothing of color and intensity transitions

5. Driver: Approved by dimming system manufacturer as suitable for operation with control unit and suitable for LED source type and quantity specified for luminaire.

2.07 LED DRIVER EMERGENCY POWER SUPPLY UNITS

A. Manufacturers:
1. Manufacturers represented by Apex Lighting.
2. Manufacturers represented by Lighting Affiliates.
3. Manufacturers represented by Illuminate.
4. Manufacturers represented by Reflex Lighting.
5. Substitutions: See paragraph 2.1, B.
6. Manufacturer Limitations: Where possible, for each type of luminaire provide emergency power supply units produced by a single manufacturer.
7. Where a specific manufacturer or model is indicated elsewhere in the light fixture schedule or on the drawings, substitutions are not permitted unless explicitly indicated.

B. Description: Self-contained emergency power supply units suitable for use with indicated luminaires, complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

C. Compatibility:
1. LED Drivers: Compatible with LED driver and LED arrays.

D. Operation: Upon interruption of normal power source, solid-state control automatically switches connected lamp(s)/LED arrays to the emergency power supply for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

E. Battery: Sealed maintenance-free high-temperature nickel cadmium unless otherwise indicated.

F. Emergency Illumination Output: Refer to Lighting Fixture Schedule.

G. Diagnostics: Provide accessible and visible multi-chromatic combination test switch/indicator light to display charge, test, and diagnostic status and to manually activate emergency operation.

H. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status and field selectable audible alert.

I. Operating Temperature: From 32 degrees F (0 degrees C) to 122 degrees F (50 degrees C) unless otherwise indicated or required for the installed location.

J. Accessories:
1. Where not integral to fixture, provide compatible accessory remote combination test switch/indicator light mounted on ceiling adjacent to unit or as indicated.

2.08 LUMINAIRE FIXTURE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 “Hangers and Supports for Electrical Systems” for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with heavy duty swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage minimum.

D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

F. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

PART 3 EXECUTION

3.01 EXISTING WORK

A. Disconnect and remove abandoned luminaires, lamps, and accessories.

B. Extend existing luminaire, emergency lighting and exit sign installations using materials and methods compatible with existing installations, or as specified.

C. Clean and repair existing luminaires, emergency lighting units and exit signs to remain or to be reinstalled.

D. Relamp existing luminaires and test at substantial completion.

E. Test all existing battery units, repair or replace at substantial completion.

3.02 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.03 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.04 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 0533 as required for installation of luminaires, emergency lighting units and exit signs provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Suspended Ceiling Mounted Luminaires:
1. Do not use ceiling tiles to bear weight of luminaires.
2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
4. Secure pendant-mounted luminaires to building structure.

a. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.

5. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box, heavy-duty swivel hangers and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
6. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
7. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
8. See Division 09 - Finishes where suspended grid ceiling is specified for additional requirements.

G. Recessed Luminaires:
1. Install trims tight to mounting surface with no visible light leakage.
2. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
3. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
4. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
5. Install recessed luminaires to permit removal from below.

H. Suspended Luminaires:
1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet nominal length, with no more than 4 feet (1.2 m) between supports.
4. Install canopies tight to mounting surface.
5. Secure pendant-mounted luminaires to building structure.
a. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
6. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box, heavy-duty swivel hangers and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
7. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
8. Unless otherwise indicated, support pendants from swivel hangers.

I. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

J. Install accessories furnished with each luminaire.

K. Bond products and metal accessories to branch circuit equipment grounding conductor.

L. Air Handling Luminaires: Interface with air handling accessories furnished and installed under Section 23 3600.

M. Emergency Lighting Units:

1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
2. Install lock-on device on branch circuit breaker serving units.
3. Install plumb and adjust to align with building lines and with each other. Secure to prevent movement.

N. Exit Signs:
1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
2. Install lock-on device on branch circuit breaker serving units.
3. Install plumb and adjust to align with building lines and with each other. Secure to prevent movement.
4. Install suspended exit signs using pendants from swivel hangers. Install pendant lengths required to suspend sign at height indicated or as instructed by the Authority Having Jurisdiction.

O. LED Driver Emergency Power Supply Units:
1. For field-installed units, install inside luminaire unless otherwise indicated. Where installation inside luminaire is not possible, install on top of luminaire.
2. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal driver(s) in luminaire. Bypass local switches, contactors, or other lighting controls.
3. Install lock-on device on branch circuit breaker serving units.

P. Remote LED drivers: Install in accessible location as indicated or as required to complete installation, using conductors per manufacturer's recommendations not exceeding manufacturer's recommended maximum conductor length to luminaire.

Q. Identify luminaires connected to emergency power system in accordance with Section 26 0553.

R. Replace LED arrays that fail prematurely.

S. Install accessories furnished with each luminaire.

T. Connect luminaires to branch circuit using flexible conduit, except for emergency lighting which shall be in conduit completely.

U. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

V. Ground and bond interior luminaires in accordance with Section 26 05 26.

3.05 FIELD QUALITY CONTROL

A. See Division 01 – General Requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Test self-powered exit signs, emergency lighting units, and emergency power supply units to verify proper operation upon loss of normal power supply.

E. Correct wiring deficiencies and repair or replace damaged or defective products.

3.06 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Aim and position adjustable emergency lighting unit LED arrays to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.

C. Air-Handling Luminaires with Air Control Blades or Heat Removal Dampers: Adjust as indicated or as required for proper airflow as directed by Architect.

D. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.07 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

B. Clean photometric surfaces as recommended by the manufacturer.

3.08 CLOSEOUT ACTIVITIES

A. See Division 01- General Requirements

B. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

C. Just prior to Substantial Completion, replace all LED arrays that have failed.

3.09 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 27 05 29
HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for communications equipment, conduit, cable, boxes, and other communications work.

1.02 RELATED REQUIREMENTS

A. Division 01 – General Requirements

B. Division 03 - Cast-in-Place Concrete: Concrete equipment pads.

C. Section 260400 – General Conditions for Electrical Trades

D. Section 260529 – Hangers and Supports for Electrical Systems

E. Section 271000 – Structured Cabling

1.03 REFERENCE STANDARDS

A. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. See Division 01: General Requirements.

B. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components being installed.
   2. Coordinate the work with other trades and provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

C. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Division 03.

1.05 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

D. Installer's Qualifications: Include evidence of compliance with specified requirements.

E. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with latest adopted version of applicable building code, including any addendum or supplements.

C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.

D. Installer Qualifications for Field-Welding: As specified in Section 260400 General Requirements for Electrical Trades.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 Refer to Section 260529 – Hangers and Supports for Electrical Systems. All Part 2 Product requirements listed in this Section shall also apply to Division 27 Communications, except where specified otherwise herein.

2.02 J-HOOK SUPPORTS

A. Manufacturers:
1. Easton/Cooper B-Line – “BCH” Series
2. Caddy
3. Chatsworth
4. Substitutions: Division 01 - General Requirements

B. Product Description: Low-voltage and communication fasteners for routing of cabling from telecommunication room to work area outlet. J-hooks shall support all communications cabling in the project. Including, but not limited to, Category 6, 6A, fiber, speaker cabling, coaxial, security, and others.

C. Specifications:
1. Pre-galvanized steel finish
2. Static load capacity: 30 lbs
3. Quick latching cable retainer

D. Furnish with all required connectors, fasteners and accessories.

E. J-Hooks shall be sized to correctly support the number of cables, which pass through them. Under no circumstances shall cable quantity exceed 50 in any given support. Fill capacity shall be as required by code for conduit. That is to say that every J-Hook shall have a maximum of 40 percent fill capacity. Install additional supports as required.

PART 3 EXECUTION

3.01 Refer to Section 260529 – Hangers and Supports for Electrical Systems. All Part 3 Execution requirements listed in this Section shall also apply to Division 27 Communications, except where specified separately herein.

3.02 INSTALLATION – COMMUNICATIONS SYSTEM SUPPORT COMPONENTS

A. Backboxes for communications devices shall be permitted to be supported from a grid ceiling. A tile bridge shall be furnished for this purpose. Refer to Section 26 05 33.

B. Overhead speakers, plenum boxes, audiovisual equipment, and other devices weighing more than a standard electrical backbox shall be supported via a threaded rod fastened to the building structure.

C. J-hooks shall be furnished with cable-to-beam fasteners and shall be fastened to the building structure.

D. Separate J-hooks shall be furnished and installed for different systems. The following systems shall be routed in separate j-hook pathways:
   1. Data cabling
   2. Speaker cabling
   3. Security cabling

E. J-hook pathways shall be separated from power cabling by a minimum of 12 inches.

F. J-hook pathways shall be separated from the load side wiring of dimmer controls by a minimum of 24 inches.

END OF SECTION

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SECTION 27 05 33
RACEWAY AND BOXES FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Raceway and Boxes for Communications Systems.

B. Related Sections:
   1. Section 260400 – General Conditions for Electrical Trades.
   2. Section 260526 - Grounding and Bonding for Electrical Systems.
   3. Section 260533 - Raceway and Boxes for Electrical Systems.
   4. Section 260534 - Floor Boxes for Electrical Systems.
   5. Section 270529 - Hangers and Supports for Communications Systems.
   6. Section 270553 - Identification for Communications Systems.

1.02 REFERENCES

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC);

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S);

C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A);

D. NECA 1 - Standard for Good Workmanship in Electrical Construction;

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT);

F. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit;

G. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC);

H. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable;

I. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit;

J. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit;

K. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing;

L. NEMA TC 13 - Electrical Nonmetallic Tubing (ENT);

M. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

N. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

O. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.

P. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

Q. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

R. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

S. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

T. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

U. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

V. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

W. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

X. UL 1653 - Electrical Nonmetallic Tubing; Current Edition, Including All Revisions.

Y. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit; Current Edition, Including All Revisions.

Z. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

AA. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

BB. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

CC. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.03 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
2. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
3. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for all conduits and fittings outlined in Part 2.

C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

D. Shop Drawings:
1. Indicate proposed arrangement for conduits to be installed within or under structural concrete slabs, where permitted.
2. Include proposed locations of roof penetrations and proposed methods for sealing.

E. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs (where permitted), and conduits 2 inch trade size and larger.

F. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.

G. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

H. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 – General Requirements.
2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Division 01 – General Requirements

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

D. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

1.08 COORDINATION

A. See Division 01 – General Requirements

B. Coordinate installation of outlet boxes for equipment connected under Section 260503.

C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

D. Communications contractor is responsible to fully coordinate with the site and concrete contractors and all other trades when routing conduit underslab. Routing of conduit underslab may be acceptable, provided spacing of conduits is adequate for proper backfilling of area surrounding conduits. Adequate spacing shall mean using factory made conduit spacers that allow for a minimum of 3-inches for backfilling with sand or 3 times the pipe diameter for backfilling with a structural fill. Proposed conduit routing, installation and methods and backfilling procedures shall be submitted to the Engineer for review prior to installation.

PART 2 PRODUCTS

2.01 Refer to Section 260533 – Raceway and Boxes for Electrical Systems. All Part 2 Product requirements listed in this Section shall apply to Division 27 Communications.

PART 3 EXECUTION

3.01 Refer to Section 260533 – Raceway and Boxes for Electrical Systems. All Part 3 Execution requirements listed in this Section shall apply to Division 27 Communications.

END OF SECTION

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SECTION 27 51 29
EMERGENCY 2-WAY COMMUNICATION SYSTEMS

PART 1 GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections with DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

B. Attention is directed Section 26 0400 – GENERAL CONDITIONS FOR ELECTRICAL TRADES, which is hereby made a part of this Section of the Specifications.

1.02 SUMMARY

A. Section includes a complete emergency call system, including master station, call stations, wiring and accessories.

B. Related Sections:
1. Division 01 – General Requirements
2. Section 26 0400 – General Conditions for Electrical Trades
3. Section 27 0529 – Hangers and Supports for Communications Systems.
4. Section 27 0533 – Raceway and Boxes for Communications Systems.
5. Section 27 0553 – Identification for Communications Systems.
6. Section 27 1000 – Structured Cabling (for Ethernet cable requirements).

1.03 REFERENCE STANDARDS (follow the most currently adopted amended version)

A. NFPA 70 - National Electrical Code.

B. All system components, where applicable standards have been established, shall follow the recommendations of the Underwriters' Laboratories and the National Electrical Code, and must bear the UL label.

C. The system shall comply with the Americans with Disabilities Act sections 4.3.11.4 and 4.3.11.5.

1.04 SYSTEM DESCRIPTION

A. The Contractor shall furnish and install an emergency call system complete including, but not limited to, outlet boxes, conduit, wiring, telephones, Master Station, and Area Stations, and all other equipment necessary to provide a complete and operating Emergency Call System. Equipment furnished under this section shall be the standard product of a single manufacturer.

B. The base station is to be located at a central control point in the lobby adjacent to the fire alarm annunciator or as indicated by the local authority having jurisdiction.

C. Call station phones shall be located at the elevator lobbies on all floors above the level of egress as indicated on the drawings.

D. The base station must be capable of handling a minimum of five (5) call station phones. Visual indicators on the base station allow rescue personnel to know which call station phone needs assistance. The base station must allow rescue personnel to speak to all elevator lobby phones or individual elevator lobby phones.

E. The emergency communication hardware shall comply with the Americans with Disabilities Act (ADA). The call station phones shall have the ability to be programmed with up to 5 emergency phone numbers (base station counts as first number). Upon activation of the emergency push button, a call will be automatically placed to the base station. If no one answers at the Base station, the call station phone must dial a

secondary location outside of the building to activate two-way off-site person to person voice communications.

1.05 SUBMITTALS

A. Division 01 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate cable routing and connections.

C. Product Data: For each item of equipment.

D. Manufacturer's Installation Instructions.

E. Project Record Documents: Accurately record actual locations of devices and wiring.

F. Operation Data: Include instructions for routine operation of master and remote stations.

G. Maintenance Data: Include instructions for minor troubleshooting, preventive maintenance, and cleaning.

H. Submit project-specific riser diagram with locations and quantities of speakers and head-end devices.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this Section with minimum three years of documented experience.

B. Supplier Qualifications: Company authorized by manufacturer and specializing in supplying products specified in this Section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in installing the products specified in this Section with minimum three years documented experience.

D. Products: Listed, classified, and labeled as suitable for the purpose intended.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 CLOSEOUT SUBMITTALS

A. Division 01– General Requirements

B. Project Record Documents: Accurately record actual locations of devices and wiring.

C. Operation Data: Include instructions for routine operation of master and remote stations.

D. Maintenance Data: Include instructions for minor troubleshooting, preventive maintenance, and cleaning.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer’s instructions and recommendations. Protect from all possible damage. Sequence deliveries to avoid delays, but minimize on-site storage.

1.09 COORDINATION

A. Coordinate the installation of cable and equipment with other construction activities and the work of other sections.

1.10 WARRANTY

A. Contractor’s Warranty: Warranty the installation to be free of defect for a period of two (2) years.

B. Equipment Warranty: Each piece of equipment shall carry a two(2) year manufacturer's warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Emergency 2-Way Communication System:
1. Rath SmartRescue (Basis of Design)
2. Cornell
3. Housing Devices
4. Substitutions – See Division 1 – Product Requirements.

2.02 CONSTRUCTION:

A. The base station shall have a steel backbox and powder coated steel housing, for flush mounting, red coil cord, red emergency handset, be 120vac powered and include a rechargeable battery to maintain backup power for a minimum of 4 hours of talk time.

B. Provide battery backed-up power supply adequate to power the base station and up to five (5) call station phones.

C. The base station must include connections for up to two (2) elevator machine room phones.

D. The call station phones shall include a steel backbox and brushed stainless steel faceplate.

E. The call station phones must be in full compliance with Americans with Disabilities Act (ADA). Call station phones require a hands-free speakerphone with an LED to indicate status of call.

F. The call station phones must allow the programming in of a specific voice message indicating the location of the phone.

G. The call station phones must be programmable to check the status of the incoming telephone line every 10 minutes up to every 23 hours.

H. The base station must provide an audible and visual indicator that an call station phone has been activated.

2.03 Mounting:

A. The base station is to be flush mounted on a wall.

B. Call station phones shall be flush mounted on a wall.

2.04 Electrical:

A. The base station is to be powered by 120vac when used with supplied step down power supply.

B. Call station phones are to be powered by the central power supply at the base station.

C. Call station phones must have a battery backup capable of providing up to 4 hours of electrical backup in case of building power failure

D. Base station must have a battery backup capable of providing up to 4 hours of electrical backup in case of building power failure.

E. System shall be in compliance with all state and local electrical codes.

2.05 Communications:

A. Call station phones shall be an ADA compliant and vandal resistant speakerphone.

B. The base station must allow for calls to be placed on analog, digital, or VoIP communication lines.

C. Call station phones shall be hands-free and be a push-button-once to talk system. Once the button has been pushed, the call station phones will call the base station. If no answer at the base station, it will automatically call pre-programmed emergency numbers. The call station phones must be capable of being programmed with up to 5 emergency numbers (base station counts as first number).

D. Call station phones shall have location message capability. Call station phones must include a minimum 18 second recordable message, programmable to play 1 time or continuously until interrupted. Call station phones shall notify called party of the location of the elevator upon receipt of call.

E. Call station phones shall be capable of allowing the called party to replay the location message if necessary to ensure an understanding of the call station location.

F. If the building location does not have a 24/7 attendant on duty, the call station phones must dial a location outside of the building to activate two-way off-site person to person voice communications.

G. Once a call has been made (button pushed), the call can only be terminated by the called party.

H. Call station phones must have a red LED that will light up upon push of the button. The light shall be a solid color when the call station phones are activated, and will flash when call has been answered.

I. The call station phones must be capable of being programmed and re-programmed on-site and remotely.

2.06 Standard Base Station features:

A. Flush or surface mount.

B. Operating temperature of between -40˚F to +150˚F (-40˚ to + 65˚ C).

C. All or individual elevator call.

D. Battery backup.

2.07 Standard Call Station Phone features:

A. Five number programming.

B. Operating temperature of between -40˚F to +150˚F (-40˚ to + 65˚ C).

C. Location message.

D. Telephone line verification.

E. Battery backup (4 hours).

F. On-site or remote programmable.

G. 120vac or 24vac/dc power.

H. EEPROM memory to protect programming.

2.08 Graphics:

A. Base Station must include wording identifying the number of each Elevator Phone, instructions on how to operate the Base Station and light an LED when a particular Elevator Phone has been activated.

B. Call station phone wording must include “Emergency Phone”, the International Phone Symbol, and raised Braille lettering.

2.09 BATTERY BACKUP SYSTEM

A. Model: 2500-PWR24U or approved equal.

B. Provide a battery backup system that distributes continuous power to the Area of Refuge Call system in the event of a power failure.

C. The battery backup system shall monitor for:
1. AC power failure.
2. AC and DC surge suppression.
3. No/low battery indications.

D. The battery backup system shall include:
1. Two (2) 12VDC sealed lead-acid batteries (sized as required for min. of 4 hours talk time with all stations active).

E. Ratings:
1. Input voltage: 120VAC.
2. Output: 8.5 A @ 24 VDC.
3. Full operation capability: 4 hours.

F. System shall also include integral amplifier that processes audio signaling for the entire system:
1. Output: 5W.
2. Voltage: 24 VDC.

G. The Battery backup system shall be mounted in a separate enclosure. Location shall be wall mounted above an accessible ceiling at the base station location.

2.10 CABLING

A. All cable shall be as recommended by the manufacturer or an approved equivalent. All Area Station wiring must be home run with individually jacketed cable.

B. All cables run in underground conduits must be suitable for wet locations and appropriately grounded as per EIA and NEC recommendations. See wiring diagrams for details.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Verify field measurements are as shown on Drawings.

C. Verify that required utilities are available, in proper location, and ready for use.

D. Beginning of installation means installer accepts conditions.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Complete system shall be installed in strict accordance with manufacturer's recommendations.

C. All wiring shall be installed in raceways where routed through ceiling areas.

D. Base station and call station phone mounting shall be in accordance with the ADA.

E. Provide all necessary programming for a complete system, including programming of recorded voice messages and dial out numbers.

F. System wiring shall be in accordance with good engineering practices as established by the EIA and NEC. Wiring shall meet all established state and local electrical codes. All wiring shall test free from shorts and grounded as specified.

G. Coordinate with the Authority Having Jurisdiction and install fireman’s locking mechanism and cylinder.

3.03 FIELD QUALITY CONTROL

A. See Division 01 - General Requirements.

B. Provide the services of the manufacturer's technical representative to make final connections to units, prepare and start systems, and perform field inspection and testing.

C. Perform operational test on completed installation to verify proper operation.

D. Replace equipment, components, and wiring to eliminate audible noise, clicks, pops, or hum when system is in standby or operation.

3.04 ADJUSTING

A. Adjust controls and configuration switches for operation as indicated.

3.05 DOCUMENTATION

A. Provide copies of all manuals and two (2) sets of as-built documents, in hard copy and electronic format. As-built documentation shall include location and types of hardware provided and installed as well as the interconnection of each device.

3.06 TRAINING:

A. The Owner may assign personnel to participate with the contractor during installation. Without delaying the work, familiarize the Owner's personnel with the installation, equipment, and maintenance.

B. Provide training to personnel selected by the Owner on operation and basic maintenance of all systems and equipment.

C. Include 2 **hours** of training Owner’s staff.

END OF SECTION

SECTION 28 05 29
HANGERS AND SUPPORTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for communications equipment, conduit, cable, boxes, and other communications work.

1.02 RELATED REQUIREMENTS

A. Division 01 – General Requirements

B. Division 03 - Cast-in-Place Concrete: Concrete equipment pads.

C. Section 260400 – General Conditions for Electrical Trades

D. Section 260529 – Hangers and Supports for Electrical Systems

E. Section 281000 – Integrated Security Systems

F. Section 283100 – Fire Detection and Alarm

1.03 REFERENCE STANDARDS

A. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. See Division 01: General Requirements.

B. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components being installed.
   2. Coordinate the work with other trades and provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

C. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Division 03.

1.05 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

D. Installer's Qualifications: Include evidence of compliance with specified requirements.

E. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with latest adopted version of applicable building code, including any addendum or supplements.

C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.

D. Installer Qualifications for Field-Welding: As specified in Section 260400 General Requirements for Electrical Trades.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 Refer to Section 260529 – Hangers and Supports for Electrical Systems. All Part 2 Product requirements listed in this Section shall also apply to Division 28 Electronic Safety and Security, except where specified otherwise herein.

2.02 J-HOOK SUPPORTS

A. Manufacturers:
1. Easton/Cooper B-Line – “BCH” Series
2. Caddy
3. Chatsworth
4. Substitutions: Division 01 - General Requirements

B. Product Description: Low-voltage and communication fasteners for routing of cabling from telecommunication room to work area outlet. J-hooks shall support all communications cabling in the project. Including, but not limited to, Category 6, 6A, fiber, speaker cabling, coaxial, security, and others.

C. Specifications:
1. Pre-galvanized steel finish
2. Static load capacity: 30 lbs
3. Quick latching cable retainer

D. Furnish with all required connectors, fasteners and accessories.

E. J-Hooks shall be sized to correctly support the number of cables, which pass through them. Under no circumstances shall cable quantity exceed 50 in any given support. Fill capacity shall be as required by code for conduit. That is to say that every J-Hook shall have a maximum of 40 percent fill capacity. Install additional supports as required.

PART 3 EXECUTION

3.01 Refer to Section 260529 – Hangers and Supports for Electrical Systems. All Part 3 Execution requirements listed in this Section shall also apply to Division 28 Electronic Safety and Security, except where specified separately herein.

3.02 INSTALLATION – SECURITY SYSTEM SUPPORT COMPONENTS

A. Backboxes for communications devices shall be permitted to be supported from a grid ceiling. A tile bridge shall be furnished for this purpose. Refer to Section 26 05 33.

B. Overhead speakers, plenum boxes, audiovisual equipment, and other devices weighing more than a standard electrical backbox shall be supported via a threaded rod fastened to the building structure.

C. J-hooks shall be furnished with cable-to-beam fasteners and shall be fastened to the building structure.

D. Separate J-hooks shall be furnished and installed for different systems. The following systems shall be routed in separate j-hook pathways:
   1. Data cabling
   2. Speaker cabling
   3. Security cabling

E. J-hook pathways shall be separated from power cabling by a minimum of 12 inches.

F. J-hook pathways shall be separated from the load side wiring of dimmer controls by a minimum of 24 inches.

END OF SECTION

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SECTION 28 05 33
RACEWAY AND BOXES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Raceway and Boxes for Electronic Safety and Security Systems.

B. Related Sections:
   1. Section 260400 – General Conditions for Electrical Trades.
   2. Section 260526 - Grounding and Bonding for Electrical Systems.
   3. Section 260533 - Raceway and Boxes for Electrical Systems.
   4. Section 260534 - Floor Boxes for Electrical Systems.
   5. Section 280529 - Hangers and Supports for Electronic Safety and Security.
   6. Section 280553 - Identification for Electronic Safety and Security.

1.02 REFERENCES

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC);

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S);

C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A);

D. NECA 1 - Standard for Good Workmanship in Electrical Construction;

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT);

F. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit;

G. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC);

H. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable;

I. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit;

J. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit;

K. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing;

L. NEMA TC 13 - Electrical Nonmetallic Tubing (ENT);

M. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

N. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

O. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.

P. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

Q. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

R. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

S. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

T. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

U. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

V. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

W. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

X. UL 1653 - Electrical Nonmetallic Tubing; Current Edition, Including All Revisions.

Y. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit; Current Edition, Including All Revisions.

Z. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

AA. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

BB. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

CC. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.03 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
2. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
3. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

A. See Division 01 – General Requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for all conduits and fittings outlined in Part 2.

C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

D. Shop Drawings:
1. Indicate proposed arrangement for conduits to be installed within or under structural concrete slabs, where permitted.
2. Include proposed locations of roof penetrations and proposed methods for sealing.

E. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs (where permitted), and conduits 2 inch trade size and larger.

F. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.

G. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

H. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Division 01 – General Requirements.
2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Division 01 – General Requirements

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

D. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

1.08 COORDINATION

A. See Division 01 – General Requirements

B. Coordinate installation of outlet boxes for equipment connected under Section 260503.

C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

D. Security contractor is responsible to fully coordinate with the site and concrete contractors and all other trades when routing conduit underslab. Routing of conduit underslab may be acceptable, provided spacing of conduits is adequate for proper backfilling of area surrounding conduits. Adequate spacing shall mean using factory made conduit spacers that allow for a minimum of 3-inches for backfilling with sand or 3 times the pipe diameter for backfilling with a structural fill. Proposed conduit routing, installation and methods and backfilling procedures shall be submitted to the Engineer for review prior to installation.

PART 2 PRODUCTS

2.01 Refer to Section 260533 – Raceway and Boxes for Electrical Systems. All Part 2 Product requirements listed in this Section shall apply to Division 28 Electronic Safety and Security.

PART 3 EXECUTION

3.01 Refer to Section 260533 – Raceway and Boxes for Electrical Systems. All Part 3 Execution requirements listed in this Section shall apply to Division 28 Electronic Safety and Security.

END OF SECTION

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SECTION 28 31 00
FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections with DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

B. Attention is directed Section 26 0400 – GENERAL CONDITIONS FOR ELECTRICAL TRADES, which is hereby made a part of this Section of the Specifications.

1.02 SUMMARY

A. Section includes fire alarm control panels, automatic smoke and heat detectors, fire alarm signaling appliances, and auxiliary fire alarm equipment and power and signal wire and cable.

B. Related Sections:
1. Division 07 – Firestopping
2. Division 08 – Hardware (for magnetic door hold open devices)
3. Division 21 – Fire Protection (for flow detection devices)
4. Division 23 – HVAC (for smoke dampers and fire/smoke dampers)
5. Section 26 05 19 – Building Wire and Cable
6. Section 26 05 26 – Grounding and Bonding
7. Section 26 05 33 – Identification for Electrical Systems, for labeling and identification requirements.

C. Allowances: Refer to Division 01 Section “Allowances” for lump-sum allowance for additional fire alarm devices.

D. Alternates: Refer to Division 01 Section “Alternates” for description of Work of this Section affected by alternates.

E. Unit Prices: Administrative and procedural requirement for unit prices for fire alarm and carbon monoxide devices are specified in Division 1 Section “Unit Prices”.

1.03 REFERENCES

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; current edition.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. NFPA 72 - National Fire Alarm and Signaling Code

D. NFPA 101 - Life Safety Code

E. NFPA 601 - Standard for Security Services in Fire Loss Prevention

1.04 SYSTEM DESCRIPTION

A. This section of the specification includes testing and connection to the existing microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panel (FACP), auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

B. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for Local Protected Premises Signaling Systems except as modified and supplemented by this

specification. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.

1. The Secondary Power Source of the fire alarm control panel will be capable of providing at least 24 hours of backup power with the ability to sustain 5 minutes in alarm at the end of the backup period.

C. Basic Performance:

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on Class B circuits, unless otherwise indicated on drawings.
2. Notification Appliance Circuits (NAC) shall be wired Class B as part of an addressable device connected by the SLC Circuit, unless otherwise indicated on drawings.
3. All circuits shall be power-limited, per UL864 9th edition requirements.
4. A single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm when wire NFPA Style 6/7.
5. Alarm signals arriving at the main FACP shall not be lost following a primary power failure or outage of any kind until the alarm signal is processed and recorded.

1.05 SUBMITTALS

A. Division 01: Submittal procedures.

B. Shop Drawings: Indicate system wiring diagram showing each device and wiring connection; indicate annunciator layout, and design calculations.

C. Product Data: Submit catalog data showing electrical characteristics and connection requirements.

D. Test Reports: Indicate procedures and results for specified field testing and inspection.

E. Manufacturer's Field Reports: Indicate activities on site, adverse findings, and recommendations.

F. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

G. Submit complete fire alarm battery calculations, taking all devices within building into account.

1.06 CLOSEOUT SUBMITTALS

A. Division 01: Closeout procedures.

B. Project Record Documents: Record actual locations of fire alarm equipment.

C. Operation and Maintenance Data: Submit manufacturer’s standard operating and maintenance instructions.

1.07 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70 and NFPA 101.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

C. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three years documented experience.

D. Installer Qualifications: Company specializing in installing the products specified in this section with minimum three years documented experience, and certified by the State as fire alarm installer.

E. Products: Listed and classified by Underwriters Laboratories, Inc as suitable for the purpose specified and indicated.

1.08 MAINTENANCE SERVICE

A. Division 01: Maintenance service.

B. Furnish service and maintenance of fire alarm equipment for one year from Date of Substantial Completion.

1.09 EXTRA MATERIALS

A. Division 01: Spare parts and maintenance products.

B. Provide (1) addressable duct mounted smoked detectors, including all labor, material, and programming, to be located in the field as directed by the Local Authority having Jurisdiction.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from all possible damage. Sequence deliveries to avoid delays, but minimize on-site storage.

1.11 COORDINATION

A. Division 01: Pre-Installation conferencing.

B. Coordinate the installation of cable and equipment with other construction activities and the work of other sections.

C. Coordinate all connections to the building's HVAC system with the Division 23 contractor.

D. Coordinate all connections to the building's fire suppression system with the Division 21 contractor.

E. Coordinate all connections to door hardware with the Division 08 contractor.

1.12 WARRANTY

A. Contractor's Warranty: Warranty the installation to be free of defect for a period of two (2) years.

B. Equipment Warranty: Each piece of equipment shall carry a two(2) year manufacturer's warranty.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Existing Fire Alarm Manufacturer on Site (Basis of Design)

B. Substitutions: See Division 01 – Product Requirements

2.02 TRANSPONDERS

A. Transponders

1. Transponders shall be listed under UL category UOJZ as an independent, local fire alarm control unit as well as being listed as a critical component in a multiplex fire alarm system. Transponders shall be located where shown on the plans. The transponder shall serve as the interface between initiating fire devices, controlled signaling devices, and each FACP node. The supervised multiplex communication port shall be an integral part of the transponder.
2. Each transponder shall be provided with a local power supply, and shall provide all power necessary for its own operation, including standby power.
3. Transponders shall communicate with, and be controlled by, the host FACP via a 2-wire communications loop. The communications loop shall operate as an NFPA Class X signaling line circuit.

4. Transponders shall be used to house amplifiers, batteries and power supplies to allow true distributed processing and amplification.
5. Each transponder shall have the following indicators and operator controls:
   a. Alarm Acknowledge/Reset Switch
   b. Power LED
   c. System Alarm LED
   d. System Trouble LED
   e. Local Piezoelectric Signal
   f. Red Alarm per Initiating Device Circuit
   g. Green On/Off LED per Notification Appliance
   h. Circuit or Relay
6. Each transponder shall be capable of expansion of up to 24 field circuits of the following types in any mix:
   a. Initiating Device Circuits (IDC): IDCs may be added to the transponder in groups of 4 Style D (Class A) circuits. Each circuit shall be capable of monitoring up to 30 compatible 2-wire smoke detectors, and/or any number of contact type initiating devices.
   b. Fire alarm speaker circuits: Fire alarm speaker circuits may be added to the transponder in groups of up to 8 circuits. Each circuit shall be cable of supervising the field circuit, and of transmitting up to 30 watts of audio power.
   c. Auxiliary Control Relay Outputs: Auxiliary relay outputs may be added to the transponder in groups of eight individually controlled single Form-C circuits, or four dual Form-C circuits. All Auxiliary circuits shall be rated 2 A. @ 30 VDC.

B. Provide extra power supplies and transponders beyond those shown on the Drawings, where required by submitted manufacturer. If additional power supplies and transponders are required, the electrical contractor shall provide a dedicated 20A, 120VAC circuit to each of these devices. Circuit shall be powered via an optional standby 120/208V panelboard where applicable. Where building does not have an optional standby system, circuit shall be powered via the closest 120/208V panelboard. Conductors and raceway shall be provided in accordance with Division 26 Sections.

2.03 INITIATING DEVICES

A. Addressable Manual Pull Station
1. Product Description: Manual addressable double-action station with break-glass rod.
2. Mounting: Semi-Flush in finished spaces and Surface in unfinished spaces.
3. Type: Non-coded.
4. Backbox: Manufacturer's standard.
5. Provide manual station guards on EACH manual station within the building. Station guards equal to "Stopper II" with audible horn.

B. Addressable Heat Detector
1. Product Description: Addressable combination rate-of-rise and fixed temperature, spot heat detector.
2. Temperature Rating: 135 degrees F (57 degrees C).
3. Rate-of-Rise: 15 degrees F (8.3 degrees C).
4. The choice of alarm reporting as a fixed temperature detector or a combination of fixed and rate of rise shall be made in system software and be changeable at any time without the necessity of hardware replacement.
5. The detectors furnished shall have a listed spacing for coverage up to 2,500 square feet.

C. Addressable Photoelectric Ceiling Smoke Detector

1. Product Description: NFPA 72, addressable photoelectric type ceiling smoke detector with the following features:
   a. Adjustable sensitivity.
   b. Plug-in base
   c. Visual indication of detector actuation.
2. Mounting: 4 inch (102 mm) outlet box.
3. Furnish two-wire detector with common power supply and signal circuits.
4. The smoke detector shall be capable of providing three distinct outputs from the control panel. The outputs shall be from an input of smoke obscuration, a thermal condition or a combination of obscuration and thermal conditions.
5. Low profile, white case shall not exceed 2.5 inches of extension below the finish ceiling.

D. Addressable Carbon Monoxide Detector
1. Detectors shall meet UL2034 and UL2075.
2. Detectors shall be ceiling mounted.
3. Detectors shall be connected to the fire alarm system and shall have supervised circuits.
4. Detectors shall be addressable and may be in combination with a smoke detector.
5. Detectors shall be connected as a separate zone or programmed as a separate zone and shall only activate a supervisory signal at the main fire alarm control panel and at the remote annunciator panel.
6. Detectors shall not activate the building evacuation system.

E. Addressable Duct Smoke Detector
1. Product Description: NFPA 72, addressable photoelectric type with the following features:
   a. Auxiliary SPDT relay contact.
   b. Duct sampling tubes extending width of duct.
   c. Visual indication of detector actuation.
   d. Duct-mounted housing.
2. Furnish two-wire detector with common power supply and signal circuits.
3. Furnish and install a remote test switch for each duct smoke detector, flushed into nearest accessible ceiling.

F. Addressable Reflected Beam Smoke Detector
1. The intelligent single-ended reflected beam smoke detector shall connect with two wires to the fire alarm control panel signaling line circuit (SLC). The detectors shall consist of a transmitter/receiver unit and a reflector and shall send data to the panel representing the analog level of smoke density. The detector shall be capable of being tested remotely via a keyswitch.
2. Furnish and install a remote test switch for each beam smoke detector in locations indicated on drawings, or on wall nearest to beam detector mounted at 48” above finished floor.

G. Addressable Dry Contact Monitor Module
1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs.
2. The monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box.
3. The IDC zone shall be suitable for Style D/Class A or Style B/Class B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

4. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.

H. Addressable Control Module
1. Addressable control modules shall be provided to supervise and control the operation of one conventional circuit of compatible Notification Appliances, 24 VDC powered, polarized audio/visual notification appliances.
2. The control module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.
3. The control module NAC may be wired for Style Z or Style Y (Class A/B) with a current rating of 2 Amps for Style Z and 3 Amps for Style Y;
4. Audio/visual power shall be provided by a separate supervised circuit from the main fire alarm control panel or from a supervised UL listed remote supply.

I. Isolator Module: Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Class A or Class B branch. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building.
1. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit(disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
2. The isolator module shall not require address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
3. The isolator module shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

2.04 SIGNALING APPLIANCES

A. Speakers
1. The speaker shall be listed to UL 1480 for Fire Protective Signaling Systems. It shall be a dual-voltage transformer speaker capable of operation at 25.0 or 70.7 nominal Vrms. The speaker shall have a frequency range of 400 to 4,000 Hz and shall have an operating temperature between 32°F and 120°F. It shall mount to a 4 x 4 x 2 1/8-inch back box.
2. A universal mounting plate shall be used for mounting ceiling and wall speaker products. The notification appliance circuit and amplifier wiring shall terminate at the universal mounting plate.
3. Speakers shall be plug-in and shall have the ability to check wiring continuity via a shorting spring on the universal mounting plate. The shorting spring shall also provide tamper resistance via an open circuit if the device is removed. Speaker design shall isolate speaker components to reduce ground fault incidents.
4. The speaker shall have power taps (from ¼ watt to 2 watts) and voltage that are selected by rotary switches. All models shall have a maximum sound output of 86 dB at 10 feet and shall incorporate an open back construction.
5. All notification appliances shall be backward compatible.
6. Speakers shall receive a separate twisted pair from the fire alarm control panel for voice communications.
7. Combination speaker/strobe devices shall meet the requirements specified under “Strobes” in addition to these specifications.

B. Strobes
1. The strobe shall consist of a xenon flash tube with associated lens/reflector system and operate on either 12V or 24V. The strobe shall also feature

selectable candela output, providing options for 15 or 15/75 candela when operating on 12V and 15, 15/75, 30, 75, 110, or 115 when operating on 24V. The strobe shall comply with NFPA 72 and the Americans with Disabilities Act requirement for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range.

2. Strobe lights shall meet the requirements of the ADA, UL Standard 1971and be fully synchronized.

2.05 CONDUIT AND WIRE

A. Fire alarm cabling shall be wire in conduit, unless metal clad (MC) cable is specifically permitted to be installed by the Authority Having Jurisdiction, and is specified as an acceptable means of installation on the drawings.

B. Metal Clad (MC) Cable:
1. Type FPLP cable with galvanized interlocking steel with continuous red stripe.
2. NEC Article 760 rating for fire alarm control cables.
3. Install multiconductor cabling in accordance with NEC article 730.
4. Use permitted above accessible ceilings and concealed within walls to devices. Provide conduit and wire for final homeruns to control panels , transponders and power supplies.
5. Conductors shall comply with "Wire" paragraph below.

C. Conduit:
1. Conduit shall be in accordance with the National Electrical Code (NEC), local and state requirements.
2. Where possible, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.
4. Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
6. Conduit shall be 3/4 inch (19.1 mm) minimum.
7. All fire alarm junction boxes and raceways shall be identified and labeled in accordance with Section 26 05 33, "Identification for Electrical Systems".

D. Wire:
1. All fire alarm system wiring shall be new.
2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for initiating device circuits and signaling line circuits, and 14 AWG (1.63 mm) for notification appliance circuits.
3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).

5. Wiring used for the SLC multiplex communication loop shall be twisted and shielded and support a minimum wiring distance of 10,000 feet. The system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication loop.
6. All field wiring shall be completely supervised.
7. The fire alarm control panel shall be capable of t-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs).

E. Terminal Boxes, Junction Boxes and Cabinets: All boxes and cabinets shall be UL listed for their use and purpose.

F. Initiating circuits shall be arranged to serve like categories (manual, smoke, waterflow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.

G. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod.

PART 3 EXECUTION

3.01 EXAMINATION

A. Division 01: Coordination and project conditions.

B. Verify products and systems receiving devices are ready for installation.

3.02 INSTALLATION

A. Division 1 - Quality Control: Manufacturer's instructions.

B. Install manual station with operating handle 4 feet above finished floor.

C. Install audible and visual signal devices 6 feet 8 inches above finished floor.

D. Install 16 AWG minimum size conductors for fire alarm detection and signal circuit conductors, or as indicated on drawings.

E. Connect conduit and wire to door release devices, sprinkler flow switches, sprinkler valve tamper switches, fire suppression system control panels, duct smoke detectors and fire protection storage tank level sensor.

F. Automatic Detector Installation: Conform to NFPA 72E and NFPA 720 (remotely located from heating appliances as possible).

G. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

H. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

I. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas, or on existing block constructed walls with no means to fish wiring.

J. Locate intelligent CO detectors as far away from CO source (fossil fuel burning appliance) as practical to minimize false alarms while maintaining manufacturer spacing criteria and NFPA required coverage.

K. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Field technicians shall be NICET Level 1 (minimum) certified.

L. The factory trained technician shall install initial data and artwork at each interactive firefighter's display.

M. The factory trained technician shall design the graphic layout based on area diagrams and floor plans.

3.03 MANUFACTURER'S FIELD SERVICES

A. Division 01: Manufacturer's field services.

B. Include services of factory certified technician to supervise installation, adjustments, final connections, and system testing.

3.04 TEST

A. The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72 and the following:
1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
2. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
3. Verify activation of all waterflow switches.
4. Open initiating device circuits and verify that the trouble signal actuates.
5. Open and short signaling line circuits and verify that the trouble signal actuates.
6. Open and short notification appliance circuits and verify that trouble signal actuates.
7. Ground all circuits and verify response of trouble signals.
8. Check presence and audibility of tone at all alarm notification devices.
9. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.
10. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
11. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

B. Test carbon monoxide detectors and any associated alarms in accordance with NFPA 72H, NFPA 720, manufacturer's instructions and local fire department requirements.

3.05 FINAL INSPECTION/ ACCEPTANCE TESTING

A. Division 01 – Quality Control.

B. At the final inspection, a factory trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

C. Fire Alarm/Acceptance Testing Procedures:
1. The fire alarm testing shall be as the authority having jurisdiction shall dictate. This will be as determined by the AHJ and shall include, but not be limited to, the requirements as set below:
a. Protective Signaling Systems: All protective signaling systems shall meet with acceptance testing requirements of the applicable standards listed in NFPA 101 and NFPA 13.

b. Prior Test Notification: At least five (5) working days prior to testing, the Electrical Contractor shall notify (in writing) the following people of the proposed date the acceptance tests are to be performed:
   1) Authority Having Jurisdiction
   2) General Contractor or Construction Manager
   3) Engineer of Record
   4) Equipment Supplier Representative
   5) Sprinkler Contractor (if applicable)
   6) HVAC Contractor (if applicable)
   7) Elevator Contractor (if applicable)

D. Certificates of Compliance:
   1. A Fire Alarm System Inspection and Testing Certification and Description form shall be prepared for each system per the requirements listed in NFPA 72, Chapter 7.
   2. After the completion of the operational acceptance tests and sign-off of test witness (with stipulations noted), final copies of the Certificates shall be forwarded to the AHJ.

E. Tests:
   1. All tests shall be conducted in accordance with the Manufacturer’s Testing Recommendations.
   2. All testing equipment, apparatus (i.e. sound level decibel meter, 2-way radio communication, test devices, ladders, tools, lighting, etc.) and personnel shall be supplied by the Electrical Contractor.

3.06 INSTRUCTION

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation" to the Owner.

C. Manufacturers representative shall provide Owner with a minimum of four (4) hours of onsite training on system. This training shall be followed up with an additional four (4) hours of onsite instruction at the discretion of the Owner, at any time during the warranty period.

END OF SECTION