OMAHA PUBLIC SCHOOLS

TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE

3833 N 72ND STREET
OMAHA, NE 68134

06/17/2026

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ARCHITECT
MOLLY EVELYN MACKLIN
A-4892
6/17/26
STATE OF NEBRASKA

I, Molly Macklin, am the coordinating Professional on the TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE project.

DESIGNED: Designer
DRAWN: Author
CHECKED: Checker

ISSUE DATE: 06/17/2026
REVISIONS:

No.:	DATE:	BY:	DESCRIPTION:

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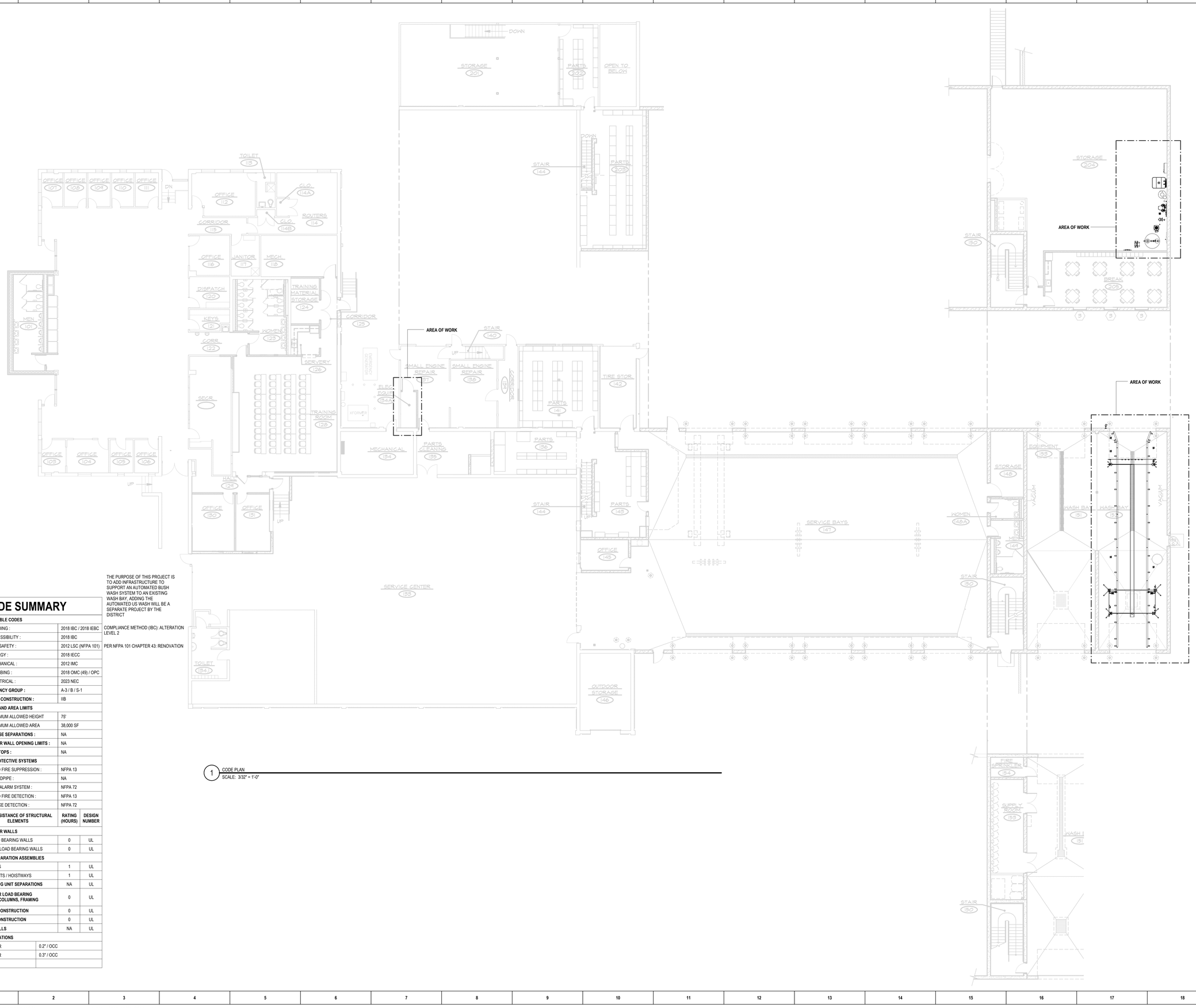
OMAHA PUBLIC SCHOOLS
TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
3833 N 72ND STREET
OMAHA, NE 68134

COVER SHEET

PROJECT NO.: 011343.001

0



THE PURPOSE OF THIS PROJECT IS TO ADD INFRASTRUCTURE TO SUPPORT AN AUTOMATED BUSH WASH SYSTEM TO AN EXISTING WASH BAY, ADDING THE AUTOMATED US WASH WILL BE A SEPARATE PROJECT BY THE DISTRICT

CODE SUMMARY

APPLICABLE CODES		
BUILDING :	2018 IBC / 2018 IEBC	COMPLIANCE METHOD (IBC): ALTERATION LEVEL 2
ACCESSIBILITY :	2018 IBC	
LIFE SAFETY :	2012 LSC (NFPA 101)	PER NFPA 101 CHAPTER 43: RENOVATION
ENERGY :	2018 IECC	
MECHANICAL :	2012 IMC	
PLUMBING :	2018 OMC (49) / OPC	
ELECTRICAL :	2023 NEC	
OCCUPANCY GROUP :	A-3 / B / S-1	
TYPE OF CONSTRUCTION :	IIB	
HEIGHT AND AREA LIMITS		
MAXIMUM ALLOWED HEIGHT	75'	
MAXIMUM ALLOWED AREA	38,000 SF	
MIXED USE SEPARATIONS :	NA	
EXTERIOR WALL OPENING LIMITS :	NA	
DRAFTSTOPS :	NA	
FIRE PROTECTIVE SYSTEMS		
AUTO FIRE SUPPRESSION :	NFPA 13	
STANDPIPE :	NA	
FIRE ALARM SYSTEM :	NFPA 72	
AUTO FIRE DETECTION :	NFPA 13	
SMOKE DETECTION :	NFPA 72	

FIRE RESISTANCE OF STRUCTURAL ELEMENTS	RATING (HOURS)	DESIGN NUMBER
EXTERIOR WALLS		
LOAD BEARING WALLS	0	UL
NON-LOAD BEARING WALLS	0	UL
FIRE SEPARATION ASSEMBLIES		
EXITS	1	UL
SHAFTS / HOISTWAYS	1	UL
DWELLING UNIT SEPARATIONS	NA	UL
INTERIOR LOAD BEARING WALLS, COLUMNS, FRAMING	0	UL
FLOOR CONSTRUCTION	0	UL
ROOF CONSTRUCTION	0	UL
FIRE WALLS	NA	UL

CALCULATIONS	
DOOR	0.2" / OCC
STAIR	0.3" / OCC

1 CODE PLAN
SCALE: 3/32" = 1'-0"

DESIGNED: Designer
DRAWN: Author
CHECKED: Checker

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TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
3833 N 72ND STREET
OMAHA, NE 68134

FIRST FLOORL CODE COMPLIANCE

PROJECT NO.: 011343.001

ACC01

GENERAL NOTES

A. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS SET FORTH IN THE CITY OF OMAHA STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (2026 EDITION WITH CURRENT REVISIONS) AND CURRENT CITY OF OMAHA PUBLIC WORKS DEPARTMENT STANDARD PLATES.

B. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SURFACE AND UNDERGROUND FACILITIES DURING ALL PHASES OF WORK. UNDERGROUND FACILITIES SHOWN ON THE DRAWINGS ARE FOR THE CONTRACTOR'S GUIDANCE ONLY. THE LOCATIONS OF ALL UNDERGROUND UTILITY FACILITIES ARE APPROXIMATE OR MAY NOT BE INDICATED IN THESE PLANS. UNDERGROUND FACILITIES, WHETHER INDICATED OR NOT, SHALL BE LOCATED AND FLAGGED BY THE UTILITIES AT THE REQUEST OF THE CONTRACTOR. THE CONTRACTOR SHALL CALL FOR THE UTILITY COMPANIES TO MARK OR FLAG THE LOCATION OF THEIR FACILITIES IN THE FIELD (1-800-331-5666 OR 811) 48 HOURS PRIOR TO DIGGING. CALL ALL APPLICABLE UTILITY COMPANIES. THE CONTRACTOR SHALL REPAIR, AT THEIR EXPENSE, ANY DAMAGES TO EXISTING FACILITIES CAUSED DIRECTLY OR INDIRECTLY BY THEIR OPERATIONS. IN ADDITION, THE CONTRACTOR SHALL NOTE THAT THERE MAY BE EXISTING UNDERGROUND FACILITIES THAT ARE NOT SHOWN ON THE PLANS. IT IS, THEREFORE, A REQUIREMENT OF THIS CONTRACT THAT THE CONTRACTOR FULLY INVESTIGATE ALL AREAS IN WHICH EXCAVATIONS WILL BE PERFORMED AND TAKE ALL REASONABLE MEASURES NECESSARY TO LOCATE ANY FACILITIES WHICH MAY NOT BE SHOWN ON THE PLANS.

C. BEFORE PROCEEDING, THE CONTRACTOR SHALL SATISFY THEMSELVES THAT A CONFLICT DOES NOT EXIST AND THAT THE UNDERGROUND WORK CAN BE PERFORMED AS SHOWN ON THE PLANS. IF, IN THE OPINION OF THE CONTRACTOR, A CONFLICT DOES EXIST, THEY SHALL IMMEDIATELY NOTIFY THE ENGINEER WHO WILL MAKE THE FINAL DETERMINATION FOR RESOLVING THE CONFLICT. THE CONTRACTOR WILL RECEIVE NO ADDITIONAL COMPENSATION FOR ANY DELAYS OR WORK RESULTING FROM A CONFLICT WHICH WAS NOT THOROUGHLY INVESTIGATED PRIOR TO PROCEEDING WITH THEIR WORK. THE CONTRACTOR MAY REQUEST ADDITIONAL COMPENSATION FOR ANY ADDITIONAL WORK PERFORMED TO DIRECTLY RESOLVE THE CONFLICT AS DIRECTED IN WRITING BY THE ENGINEER.

D. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES, STRUCTURES, PAVEMENT AND OTHER IMPROVEMENTS NOT SCHEDULED FOR REMOVAL OR OUTSIDE THE CONSTRUCTION LIMITS. ANY DAMAGE TO EXISTING UTILITIES AND/OR PAVED STREETS CAUSED BY CONSTRUCTION OPERATIONS SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

E. ELEVATIONS ARE REFERENCED TO THE NAVD88 DATUM.

F. THE CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS. THE CONTRACTOR SHALL PAY ALL PERMIT FEES, DUMP FEES AND OTHER ASSOCIATED FEES REQUIRED TO SUCCESSFULLY COMPLETE THE PROJECT AT NO ADDITIONAL COST TO THE OWNER.

G. THE CONTRACTOR SHALL SATISFACTORILY CLEAN THE AREA OF ALL RUBBISH, EXCESS MATERIAL, MUD AND DEBRIS AND ALL PARTS OF THE WORK AREA SHALL BE LEFT IN A NEAT AND PRESENTABLE CONDITION. ALL DISTURBED AREAS SHALL BE RESTORED TO A LEVEL AND SMOOTH SURFACE PRIOR TO ACCEPTANCE OF THE WORK. DEBRIS, ETC. SHALL BE DISPOSED OF AT AN APPROVED FACILITY IN A LEGAL MANNER.

H. THE CONTRACTOR SHALL PROPERLY DISPOSE OF ALL UNSUITABLE MATERIALS AND DEBRIS ENCOUNTERED IN/OR GENERATED BY THE REMOVAL OPERATIONS, INCLUDING CONCRETE, ASPHALT, OIL MAT, BRICK, ROCK, PIPES, ETC. NO UNSUITABLE MATERIAL, SUCH AS DETERMINED BY THE OWNERS REPRESENTATIVE, SHALL BE USED FOR BACKFILLING OR EMBANKMENT CONSTRUCTION. THE COST FOR DISPOSAL OF THE UNSUITABLE MATERIAL SHALL BE SUBSIDIARY TO THE PROJECT.

I. THE CONTRACTOR SHALL NOTIFY ALL ADJACENT PROPERTY OWNERS 48 HOURS PRIOR TO STARTING ANY WORK WHICH WILL AFFECT THEIR ACCESS. NOTIFICATION SHALL INCLUDE DURATION OF IMPACT, TELEPHONE NUMBER AND NAME OF PERSON TO CONTACT. COPY OF NOTIFICATION SHALL BE FURNISHED TO AND APPROVED BY THE OWNER PRIOR TO DISTRIBUTION TO PROPERTY OWNERS.

J. THE CONTRACTOR SHALL FURNISH AND MAINTAIN ALL NECESSARY BARRICADES, WARNING SIGNS, LIGHTS, FLASHERS, AND FLAG PERSONS AS REQUIRED BY THE "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES", TO PROVIDE FOR THE SAFETY OF WORKERS AND THE PUBLIC AT LARGE. TEMPORARY FENCING SHALL BE INSTALLED AROUND ANY OPEN AREAS OF THE SITE. THE COST OF TRAFFIC CONTROL DEVICES AND TEMPORARY FENCING SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT.

K. THE CONTRACTOR SHALL NOT START THE WORK UNTIL ALL PERMITS HAVE BEEN OBTAINED FROM THE JURISDICTIONAL AUTHORITIES. THE ENGINEER AND THE JURISDICTIONAL AUTHORITIES SHALL BE NOTIFIED BY THE CONTRACTOR 48 HOURS BEFORE START OF CONSTRUCTION.

L. WHERE ITEMS OF CONSTRUCTION ARE NOTED "IF REQUIRED" THE CONTRACTOR SHALL OBTAIN THE APPROVAL OF THE PROJECT ENGINEER BEFORE PROCEEDING WITH SUCH WORK.

M. THE CONTRACTOR SHALL PROVIDE THE NAME AND PHONE NUMBER OF THEIR REPRESENTATIVE TO BE CONTACTED (AS NECESSARY) DURING WORKING AND NON-WORKING HOURS.

N. A QUALIFIED SUPERINTENDENT, WHO IS ACCEPTABLE TO THE OWNER, SHALL BE PRESENT ON THE PROJECT SITE DURING CONSTRUCTION AND GIVE SUPERVISION TO THE WORK UNTIL ITS COMPLETION. THE SUPERINTENDENT SHALL HAVE FULL AUTHORITY TO ACT IN BEHALF OF THE CONTRACTOR, AND ALL DIRECTIONS GIVEN TO THE SUPERINTENDENT SHALL BE CONSIDERED GIVEN TO THE CONTRACTOR.

O. THE CONTRACTOR SHALL NOT ENCROACH ON PRIVATE PROPERTY OUTSIDE THE WORK AREAS WITHOUT WRITTEN PERMISSION FROM THE AFFECTED PROPERTY OWNER.

P. THE ENGINEER SHALL PROVIDE ALL EQUIPMENT AND LABOR NECESSARY FOR STAKING OF IMPROVEMENTS PRIOR TO THE CONTRACTOR BEGINNING CONSTRUCTION. THE CONTRACTOR SHALL REQUEST STAKING A MINIMUM OF 48 HOURS IN ADVANCE OF WHEN STAKING IS NEEDED.

Q. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING CONSTRUCTION STAKING.

R. ALL CONSTRUCTION ACTIVITIES, MATERIAL, AND EQUIPMENT SHALL BE KEPT WITHIN THE LIMITS OF CONSTRUCTION, EASEMENT OR RIGHT-OF-WAY SHOWN ON THE PLANS.

GENERAL DEMO NOTES

A. STORM WATER POLLUTION PREVENTION PLAN BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED PRIOR TO ANY REMOVALS.

B. REMOVE ALL TREES WITHIN THE CLEARING AND GRUBBING LIMITS, UNLESS OTHERWISE IDENTIFIED BY OWNER. TREE REMOVAL SHALL INCLUDE STUMP REMOVAL TO A DEPTH OF 3' BELOW EXISTING GRADE.

C. ALL DEBRIS RESULTING FROM CONSTRUCTION OPERATIONS SHALL BE HAULED OFF-SITE AND PROPERLY DISPOSED OF. MISCELLANEOUS STRUCTURES, CONCRETE, RUBBLE AND OTHER ITEMS SHALL BE REMOVED COMPLETELY.

D. IF APPLICABLE, THE CONTRACTOR SHALL LOCATE, REMOVE, AND CAP ANY EXISTING LAWN IRRIGATION VALVES, HEADS, PIPING, OR OTHER LAWN IRRIGATION APPURTENANCES THAT WILL BE AFFECTED BY CONSTRUCTION. THE CONTRACTOR SHALL CONSTRUCT ANY NEW PIPING, VALVES, OR ANY OTHER EQUIPMENT NECESSARY TO MAINTAIN THE EXISTING FUNCTIONALITY OF THE LAWN SPRINKLER SYSTEM TO REMAIN. THE CONTRACTOR SHALL ALSO ADJUST ANY EXISTING SPRINKLER HEADS TO PREVENT WATER FROM BEING THROWN AT BUILDINGS OR PAVED AREAS.

TESTING REQUIREMENTS

A. CONSTRUCTION MATERIALS TESTING AND INSPECTIONS SHALL BE AT THE FREQUENCIES PER THE CITY OF OMAHA MATERIALS & TESTING MANUAL FOR PUBLIC WORKS CONSTRUCTION 2025.

B. EARTHWORK COMPACTION TESTING REQUIREMENTS SHALL FOLLOW THE RECOMMENDATIONS OF THE CITY OF OMAHA.

C. TESTS AND INSPECTIONS NOT MEETING REQUIREMENTS SHALL BE CORRECTED AND RE-TESTED AT THE CONTRACTOR'S EXPENSE UNTIL THE WORK IS FOUND TO COMPLY WITH THE APPLICABLE REQUIREMENTS.

FILL COMPACTION REQUIREMENTS

ITEM	SELECT FILL
MAXIMUM LIFT THICKNESS	8 INCHES OR LESS IN LOOSE THICKNESS WHEN HEAVY, SELF-PROPELLED COMPACTION EQUIPMENT IS USED.
MINIMUM COMPACTION REQUIREMENTS	PRIOR TO PLACEMENT OF ANY FILL OR OTHER CONSTRUCTION MATERAIL, THE UPPER 8 INCHES OF SUBGRADE SHALL BE SCARIFIED AND COMPACTED TO A MINIMUM OF 95% OF MAXIMUM DRY DENSITY (ASTM D 698, STANDARD PROCTOR).
	SELECT FILL: 95% OF MAXIMUM DRY DENSITY (ASTM D 698, STANDARD PROCTOR).
	BACKFILL SOILS IN UTILITY TRENCHES (STRUCTURAL AREAS): 95% OF MAXIMUM DRY DENSITY (ASTM D 698, STANDARD PROCTOR).
	BACKFILL SOILS IN UTILITY TRENCHES (GREEN AREAS AND NON-STRUCTURAL AREAS): 95% OF MAXIMUM DRY DENSITY (ASTM D 698, STANDARD PROCTOR).
WATER CONTENT RANGE	-3% TO +3% OF OPTIMUM

GENERAL UTILITY NOTES

A. ALL EXISTING UTILITIES SHOWN ARE FROM PUBLIC RECORDS AND ARE FOR THE CONVENIENCE OF THE CONTRACTOR ONLY. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING EXACT LOCATION AND DEPTH PRIOR TO CONSTRUCTION.

B. ALL WATER LINE SHALL HAVE 5' MINIMUM COVER.

C. ALL VALVES, FITTINGS, AND WATER LINE DISINFECTION SHALL CONFORM TO LOCAL UTILITY COMPANY REQUIREMENTS.

D. ALL VALVES, BENDS, FITTINGS, AND THRUST BLOCKS SHALL BE INCLUDED IN THE UNIT PRICE FOR POTABLE WATER LINE.

E. ALL DIMENSIONS ARE FROM OUTSIDE WALL OF BUILDING.

F. COORDINATE LOCATION AND DEPTHS OF ALL SERVICE LINES WITH BUILDING MECHANICAL PLANS.

G. ALL WATER LINES SHALL BE CONSTRUCTED TO A POINT 5'-0" FROM THE EXTERIOR WALLS OF THE BUILDING. COORDINATE LOCATION AND DEPTHS WITH BUILDING MECHANICAL PLANS.

H. ALL WATER LINES SHALL BE CONSTRUCTED AND TESTED PER THE REQUIREMENTS OF THE ENTITY HAVING JURISDICTION OVER THESE IMPROVEMENTS.

I. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PRESSURE TESTING AND DISINFECTION.

J. TRACER WIRE SHALL BE INSTALLED ON ALL NEW WATER MAIN.

K. TRENCH BACKFILL SHALL BE FREE OF BRICK, STONE OR CONCRETE RUBBLE, AND ANY TRASH, DEBRIS, ORGANIC MATERIAL OR ANY OTHER MATERIAL DETERMINED BY THE ENGINEER TO BE UNSUITABLE. ALL UNSUITABLE MATERIAL SHALL BE DISPOSED OF OFF-SITE BY THE CONTRACTOR. THE COST OF THIS WORK SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT.

L. THE WATER MAIN TRENCH BACKFILL SHALL BE PLACED IN LIFTS NOT MORE THAN 8 INCHES IN LOOSE DEPTH AND SHALL BE COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR TEST FOR THE ENTIRE DEPTH OF THE TRENCH.

M. THE CONTRACTOR SHALL PROVIDE, PLACE AND MAINTAIN FENCING ALONG OPEN TRENCH AREAS TO ASSURE PROTECTION OF THE GENERAL PUBLIC AND TO SECURE ALL AREAS WITHIN THE CONSTRUCTION ZONE. THE FENCING SHALL BE A MINIMUM OF 48 INCHES IN HEIGHT. IT SHALL BE PLACED AND SECURED IN SUCH A MANNER TO GUARD AGAINST THE CREATION OF ENTRY POINTS AROUND OR THROUGH BY PERSONS AWARE OF SITE CONDITIONS OR DANGERS. THE FENCING MAY BE OF WIRE/LATH CONSTRUCTION OR SYNTHETIC FABRIC (SIMILAR TO SNOW FENCING) PROVIDED IT IS FREE OR BREAKS OR BREACHES. THE FENCING SHALL BE SECURED TO STEEL POSTS SET AT A MAXIMUM SPACING OF 8 FEET.

N. THE TRENCHES SHALL BE KEPT FREE OF WATER AT ALL TIMES AND THE TRENCH LIMITS SHALL BE MAINTAINED AS DETAILED BY THE PLANS. THE COST OF ALL DEWATERING AS MAY BE NECESSARY SHALL BE SUBSIDIARY TO THE CONSTRUCT SEWER PIPE PAYMENT ITEM.

O. TRENCHING SHALL BE PERFORMED IN SUCH A MANNER AS TO SAFELY AND EFFECTIVELY LIMIT THE TOP TRENCH WIDTH, MINIMIZING THE VOLUME OF EXCAVATED EARTH, AND PROVIDING THE MAXIMUM PROTECTION TO EXISTING PLANTINGS AND STRUCTURES.

P. CONTRACTOR SHALL MAINTAIN FUNCTIONALITY OF UTILITIES TO EXISTING BUILDING AT ALL TIMES. ALL UTILITY SYSTEMS SHALL REMAIN OPERATIONAL DURING THE CONSTRUCTION OF THE PROJECT.

GENERAL LAYOUT & PAVING NOTES

A. THE PORTLAND CEMENT CONCRETE FOR PAVEMENT SHALL BE OPW 4000 AIR-ENTRAINED MIX. DESIGN SHALL BE IN ACCORDANCE WITH TABLE 500.03 OF THE CITY OF OMAHA STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 2026 EDITION. THE PORTLAND CEMENT CONCRETE FOR SIDEWALK SHALL BE OPW 3500 AIR-ENTRAINED PER TABLE 500.03 OF THE ABOVE REFERENCED SPECIFICATIONS.

B. PAVEMENT JOINTS SHALL BE IN ACCORDANCE WITH THE CITY OF OMAHA STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 2026 EDITION.

C. CURING OF CONCRETE PAVING SHALL BE THE USE OF LIQUID MEMBRANE-FORMING COMPOUNDS CONFORMING TO ASTM DESIGNATION C309 AT A MINIMUM RATE OF 1 GALLON PER 100 SQUARE FEET PER THE CITY OF OMAHA STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 2026 EDITION.

D. PAVING DIMENSIONS ARE AS SHOWN ON THE PLANS. ALL DIMENSIONS ARE BACK-OF-CURB TO BACK-OF-CURB OR EDGE OF PAVEMENT TO EDGE OF PAVEMENT.

E. THE CONTRACTOR SHALL CONSTRUCT ALL PAVEMENTS TO CONFORM WITH THE FINISHED GRADES AS INDICATED ON THE PLANS. NO PONDING OF WATER SHALL BE ALLOWED.

F. PAVEMENT TESTING SHALL BE DONE IN ACCORDANCE WITH THE CITY OF OMAHA STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 2026 EDITION. AND CITY OF OMAHA MATERIALS AND TESTING MANUAL 2025 EDITION.

G. COMPACTED BACKFILL SHALL BE COMPLETED WITHIN 4 TO 7 WORKING DAYS AFTER CURB PLACEMENT.

H. WATER-REDUCING ADMIXTURE SHALL BE ADDED TO ALL HAND-PLACED AND FINISHED CONCRETE.

I. A DIAMOND EDGE SAW BLADE SHALL BE USED FOR CUTTING ALL REQUIRED CONTRACTION AND LONGITUDINAL PAVEMENT JOINTS.

J. CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC CONTROL AND ASSOCIATED SAFETY MEASURES. TWO-WAY TRAFFIC SHALL BE MAINTAINED ON STREETS AT ALL TIMES.

K. BUILDING FOOTPRINT SHOWN IS TO THE OUTSIDE OF BUILDING. CONTRACTOR SHALL VERIFY BUILDING FOOTPRINT WITH ARCHITECTURAL PLANS.

L. CONTRACTOR SHALL BE RESPONSIBLE FOR LAYOUT OF CONCRETE PAVEMENT JOINTING JOINTS. PAVEMENT JOINTS SHALL BE IN ACCORDINANCE WITH THE CITY OF OMAHA STANDARD PLATE 501-01 USING MATERIAL CONFORMING TO ASTM DESIGNATION 6690, STANDARD SPECIFICATION FOR JOINT AND CRACK SEALENTS, HOT-APPLIED.

GENERAL LANDSCAPE NOTES

A. THE CONTRACTOR SHALL COORDINATE THEIR OPERATIONS SO THAT THE SITE CAN BE SODDED AS SOON AS POSSIBLE FOLLOWING RE-SPREAD OF TOPSOIL.

B. CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER MAINTENANCE UNTIL SODDED AREA IS INSPECTED AND ACCEPTED BY THE ENGINEER.

C. ALL SODDING, INCLUDING FERTILIZING AND EROSION CONTROL, SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SET FORTH IN THE CITY OF OMAHA STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (2026 EDITION WITH CURRENT REVISIONS) AND CURRENT CITY OF OMAHA PUBLIC WORKS DEPARTMENT STANDARD PLATES.

D. AREAS DISTURBED BY CONSTRUCTION WHICH ARE NOT SHOWN WITH OTHER SURFACING SHALL BE SODDED USING SOD TO MATCH EXISTING GRASS.

E. ALL AREAS INDICATED ON THE PLANS TO BE SODDED SHALL BE SODDED WITH SOD TO MATCH THE EXISTING GRASS. SOD SHALL BE MOWED JUST BEFORE CUTTING AND SHALL BE GUARANTEED FOR A PERIOD OF ONE MONTH.

F. NEWLY SODDED AREAS SHALL BE WATERED TO MAINTAIN CONSISTENT SOIL MOISTURE AND ESTABLISH UNIFORM ROOT GROWTH FOR A PERIOD OF THIRTY DAYS.

G. THE CONTRACTOR SHALL MOW ALL NEW GRASS AREAS THROUGH 3 MOWING CYCLES.

H. DO NOT BEGIN WORK UNTIL ALL REQUIRED PERMITS ARE IN HAND AND APPROVED DRAWINGS REFLECTING THE REQUIREMENTS OF THE PERMITS ARE PHYSICALLY ON THE JOB SITE. REQUIRED PERMITS SHALL INCLUDE BUT NOT BE LIMITED TO THE LANDSCAPE PERMIT.

I. VERIFY ALL DIMENSIONS AND CONDITIONS PRIOR TO STARTING CONSTRUCTION AND IMMEDIATELY NOTIFY THE LANDSCAPE ARCHITECT OF ANY DISCREPANCIES.

J. VERIFY LOCATION OF ALL UTILITIES PRIOR TO BEGINNING CONSTRUCTION. CARE SHOULD BE TAKEN NOT TO DISTURB UTILITIES DURING CONSTRUCTION.

K. ALL WORK PERFORMED ON THIS PROJECT SHALL BE IN CONFORMANCE WITH THE CONTRACT DOCUMENTS AND ALL APPLICABLE CODES, STANDARDS, ORDINANCES, ETC.

L. ALL DEBRIS FROM CONSTRUCTION SHALL BE LAWFULLY DISPOSED OF OFF SITE.

DESIGNED: CLW
DRAWN: CLW
CHECKED: RMD

ISSUE DATE: JUNE 5, 2026
REVISIONS:
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ROBERT M. DVORAK — 10th — CIVIL — ENGINEER — NEBRASKA — 2026 — PROFESSIONAL ENGINEER

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OMAHA PUBLIC SCHOOLS
TRANSPORTATION NORTH BUS WASH INFASTRUCTURE
3833 72ND STREET
OMAHA, NE 68134

CIVIL INFO SHEET

PROJECT NO.: 011343.001

C 00

P:\011343\001_CAD\Civil\011343001-1.dwg
6/10/2026 8:23:34 AM Wade, Cassandra



LEGEND

- REMOVE CONCRETE PAVEMENT
- REMOVE SIDEWALK

NORTH

10 0 10

1 inch = 10 ft.

REF. NOTES (ⓧ)

1. REMOVE PAVEMENT, FULL DEPTH SAW CUT, SEE C101 FOR COORDINATES.
2. REMOVE SIDEWALK, FULL DEPTH SAW CUT, SEE C101 FOR COORDINATES.
3. PROTECT EXISTING TREES.
4. PROTECT EXISTING UTILITIES.
5. PROTECT EXISTING PAVEMENT.
6. PROTECT EXISTING SIDEWALK.

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Nebraska 811
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NOTE:
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CA0666

OMAHA PUBLIC SCHOOLS
TRANSPORTATION NORTH BUS WASH INFASTRUCTURE
3833 72ND STREET
OMAHA, NE 68134

REMOVAL PLAN

PROJECT NO.: 011343.001

C001

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6/5/2026 10:37:49 AM Wade, Cassandra



LEGEND

- 8" P.C.C. PAVEMENT
- 4" P.C.C. R.O.W. SIDEWALK
- SOD TO MATCH EXISTING GRASS

NORTH

10 0 10

1 inch = 10 ft.

REF. NOTES (◇)

1. CONSTRUCT 8" P.C.C. PAVEMENT, SEE 2/C201.
2. CONSTRUCT 4" P.C.C. R.O.W. SIDEWALK TO MATCH EXISTING, SEE 3/C201.
3. CONSTRUCT PAVEMENT AT BUILDING, SEE 1/C201.
4. DRILL AND TIE INTO EXISTING PAVEMENT WITH #5 X 2'-6" EPOXY COATED TIE BARS @3'-0" O.C. SEE 4/C201.
5. SOD AREA TO MATCH EXISTING GRASS TYPE.

LAYOUT COORDINATES (☒)

POINT #	NORTHING	EASTING
1	122229.97	138959.55
2	122219.97	138959.49
3	122229.91	138969.55
4	122219.91	138969.49
5	122229.26	139076.67
6	122229.24	139080.67
7	122229.21	139084.67
8	122229.20	139086.67
9	122219.20	139086.61
10	122219.21	139084.61
11	122219.24	139080.61
12	122219.26	139076.61

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ROBERT L. MOSER — CIVIL ENGINEER — 10th DISTRICT — NEBRASKA — 10 YEARS

Robert L. Moser 6/10/2026

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OMAHA PUBLIC SCHOOLS
TRANSPORTATION NORTH BUS WASH INFASTRUCTURE
3833 72ND STREET
OMAHA, NE 68134

LAYOUT & PAVING PLAN

PROJECT NO.: 011343.001

C101

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6/10/2026 8:28:15 AM Wash, Cassandra



LEGEND

XXXX	EXISTING CONTOUR
XXXX	PROPOSED CONTOUR
FFE	FINISH FLOOR ELEVATION
TP	TOP OF PAVEMENT ELEVATION
TG	TOP OF GRADE ELEVATION
*	MATCH EXISTING ELEVATION

NORTH

10 0 10

1 inch = 10 ft.

GRADING NOTE

A. CONTRACTOR SHALL NOTIFY ENGINEER AT LEAST 48 HOURS BEFORE ANY GRADING OPERATIONS SHALL BEGIN.

B. EXISTING CONTOURS BASED ON GIS AND PROVIDED OWNER INFORMATION. SPOT ELEVATIONS ARE ESTIMATED, CONTRACTOR IS TO MATCH EXISTING GRADE.

DESIGNED: CLW
DRAWN: CLW
CHECKED: RMD

ISSUE DATE: JUNE 9, 2026

REVISIONS:			
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ROBERT L. MOSER
NEBRASKA
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20260

Robert L. Moser
6/9/2026

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GRADING & DRAINAGE PLAN

PROJECT NO.: 011343.001

C102

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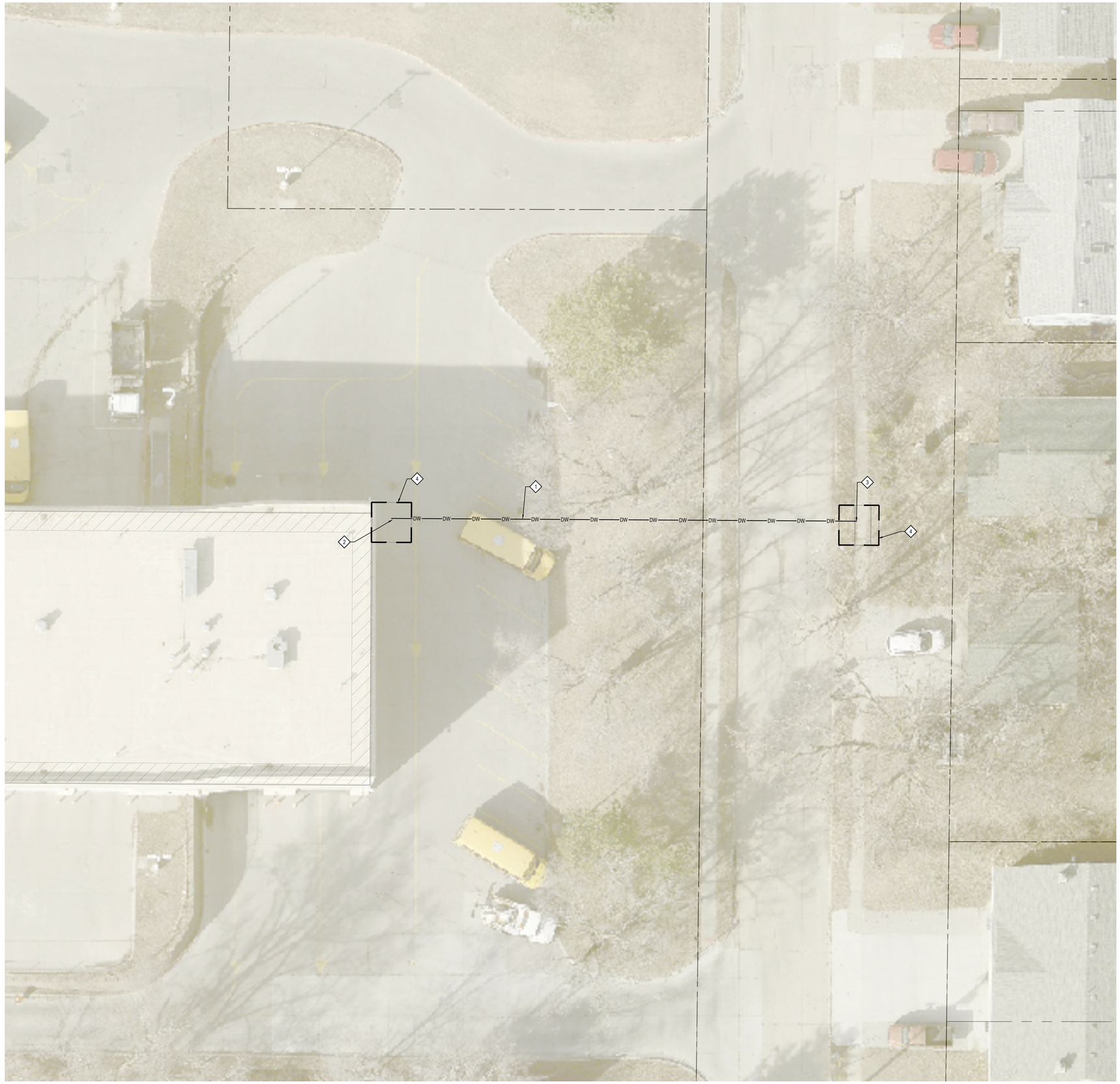

LEGEND

DW	DOMESTIC WATER LINE
	HORIZONTAL DIRECTIONAL DRILLING PIT

NORTH

10 0 10

1 inch = 10 ft.

REF. NOTES (◇)

1. BORE 2" DOMESTIC WATER LINE.
2. BUILDING CONNECTION, SEE MECHANICAL PLANS FOR DETAILS.
3. TAP INTO EXISTING WATER MAIN, CONFIRM LOCATION AND DEPTH WITH M.U.D. PRIOR TO CONSTRUCTION.
4. CONSTRUCT 10' X 10' HORIZONTAL DIRECTIONAL DRILLING PIT.

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UTILITY PLAN

PROJECT NO.: 011343.001

C103

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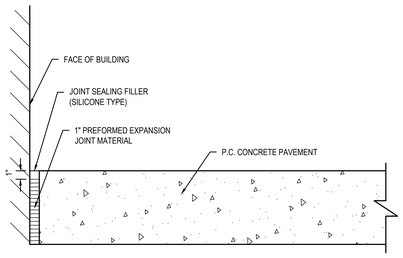
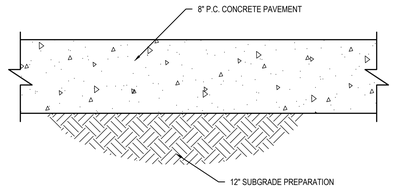
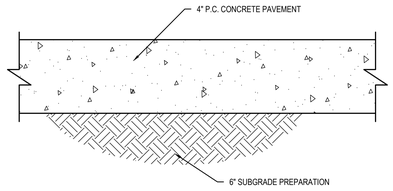


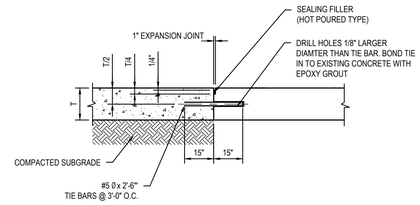
1 PAVEMENT AT BUILDING
SCALE: NONE



2 8" P.C.C. PAVEMENT SECTION
SCALE: NONE



3 4" P.C.C. SIDEWALK SECTION
SCALE: NONE



4 DRILL AND TIE
SCALE: NONE

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OMAHA, NEBRASKA
2026

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OMAHA PUBLIC SCHOOLS
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CIVIL DETAILS

PROJECT NO.: 011343.001

C201

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SYMBOL LEGEND

HVAC PIPING
- LPS — LOW PRESSURE STEAM
- LPR — LOW PRESSURE RETURN
- MPS — MEDIUM PRESSURE STEAM
- MPR — MEDIUM PRESSURE RETURN
- HPS — HIGH PRESSURE STEAM
- HPR — HIGH PRESSURE RETURN
- PC — PUMPED CONDENSATE
- HWS — HOT WATER SUPPLY
- HWR — HOT WATER RETURN
- HPWS — HEAT PUMP WATER SUPPLY
- HPWR — HEAT PUMP WATER RETURN
- GHWS — GLYCOL HOT WATER SUPPLY
- GHWR — GLYCOL HOT WATER RETURN
- BBD — BOILER BLOW DOWN
- ES — EXHAUST STEAM
- CWS — CHILLED WATER SUPPLY
- CWR — CHILLED WATER RETURN
- GCWS — GLYCOL CHILLED WATER SUPPLY
- GCWR — GLYCOL CHILLED WATER RETURN
- RL — REFRIGERANT LIQUID LINE
- RS — REFRIGERANT SUCTION LINE
- RDL — REFRIGERANT DISCHARGE
- CS — CONDENSER WATER SUPPLY
- CR — CONDENSER WATER RETURN
- HCWS — HOT/CHILLED WATER SUPPLY
- HCWR — HOT/CHILLED WATER RETURN
- CD — CONDENSATE DRAIN
- G — NATURAL GAS
- FOS — FUEL OIL SUPPLY
- FOR — FUEL OIL RETURN
- FOV — FUEL OIL VENT
- FOF — FUEL OIL FILL
- FOG — FUEL OIL GAGE
- LPG — LIQUEFIED PETROLEUM GAS

PLUMBING PIPING
- SANITARY DRAIN (ABOVE FLOOR)
- SANITARY DRAIN (BELOW FLOOR)
- GW — SANITARY GREASE WASTE
- ST/OST — STORM DRAIN
- ST/OST — STORM DRAIN (BELOW FLOOR)
- SANITARY VENT
- AW — ACID WASTE
- AV — ACID VENT
- DOMESTIC COLD WATER (DCW)
- DOMESTIC HOT WATER (DHW)
- DOMESTIC HOT WATER RECIRCULATING (DHWR)
- TW — TEPID WATER
- TWR — TEPID WATER RECIRCULATING
- DSCW — SOFTENED COLD WATER
- DSHW — SOFTENED HOT WATER
- W — BURIED EXTERIOR WATER
- DS — DISTILLED WATER
- DI — DEIONIZED WATER
- RO — REVERSE OSMOSIS WATER
- A — COMPRESSED AIR
- VAC — VACUUM
- OX — OXYGEN
- N — NITROGEN
- WAGD — WASTE AND ANESTHETIC GAS DISPOSAL
- MA — MEDICAL AIR

FIRE PROTECTION
- D — SPRINKLER DRAIN
- F — FIRE SUPPRESSION PIPING
- FIRE DEPARTMENT CONNECTION
- FS — FLOW SWITCH
- TS — TAMPER SWITCH

VALVES
- MANUAL BALANCING VALVE
- ISOLATION VALVE
- CHECK VALVE
- CONTROL VALVE (2 WAY)
- CONTROL VALVE (3 WAY)
- AUTO FLOW CONTROL VALVE
- HOSE END DRAIN VALVE
- PRESSURE REDUCING VALVE
- SOLENOID VALVE
- TEMP & PRESS RELIEF (OR) SAFETY VALVE-STEAM
- THERMOSTATIC MIXING VALVE

PIPING SPECIALTIES AND FITTINGS
- CO — WCO — CLEANOUT / WALL CLEANOUT
- GCO — GRADE CLEANOUT
- DGCO — DOUBLE - GRADE CLEANOUT
- VTR — PLUMBING VENT THRU ROOF
- FD_ — FLOOR DRAIN
- FS_ — FLOOR SINK
- RD_ — ROOF DRAIN
- ORD_ — OVERFLOW ROOF DRAIN
- TRENCH DRAIN
- MH — MANHOLE
- O — OXYGEN OUTLET
- V — VACUUM OUTLET
- A — AIR OUTLET
- N — NITROGEN OUTLET
- WA — WASTE AND ANESTHETIC GAS DISPOSAL OUTLET
- MA — MEDICAL AIR OUTLET
- PIPE CAP
- ELBOW UP
- ELBOW DOWN
- TEE
- TEE UP
- TEE DOWN
- STRAINER
- UNION
- AV — AIR VENT
- FLEXIBLE PIPE CONNECTION
- EXPANSION JOINT
- PIPE ANCHOR
- PIPE GUIDE
- THERMOMETER
- PRESSURE GAUGE
- HB — HOSE BIBB
- RHY — ROOF HYDRANT
- WH — WALL HYDRANT
- STEAM TRAP

MISCELLANEOUS SYMBOLS
- DEMO / EXISTING — DEMO TO EXISTING CONNECTION
- NEW / EXISTING — NEW TO EXISTING CONNECTION

HVAC DUCTWORK AND SPECIALTIES
- 18x10 — RECT DUCT-1ST FIG IS SIDE SHOWN
- 18 Ø — ROUND DUCT
- 18x10 — FLAT OVAL DUCT-1ST FIG IS SIDE SHOWN
- ACOUSTICAL DUCT LINER

HVAC DUCTWORK AND SPECIALTIES (CONT.)
- FLEXIBLE DUCTWORK CONNECTION
- VOLUME DAMPER
- TURNING VANES
- HIGH EFFICIENCY TAKEOFF
- HIGH EFFICIENCY TAKOFF WITH VOLUME DAMPER
- SUPPLY AND FRESH AIR DUCT UP
- SUPPLY AND FRESH AIR DUCT DOWN
- RETURN DUCT UP
- RETURN DUCT DOWN
- EXHAUST DUCT UP
- EXHAUST DUCT DOWN
- ROUND DUCT UP / DOUBLE LINE PIPE
- ROUND DUCT DOWN / DOUBLE LINE PIPE
- SIZE/TYPE FLOW — AIR TERMINAL (VERTICAL MOUNTING)
- SIZE/TYPE FLOW — ROUND AIR TERMINAL (HORIZONTAL MOUNTING)
- SIZE/TYPE FLOW — RECTANGULAR SUPPLY AIR TERMINAL (HORIZONTAL MOUNTING)
- SIZE/TYPE FLOW — RECTANGULAR RETURN AIR TERMINAL (HORIZONTAL MOUNTING)
- SIZE/TYPE FLOW — RECTANGULAR EXHAUST AIR TERMINAL (HORIZONTAL MOUNTING)
- AFS — AIR FLOW STATION
- MOTORIZED DAMPER-PARALLEL BLADE
- MOTORIZED DAMPER-OPPOSED BLADE
- GRAVITY DAMPER
- FIRE DAMPER-HORIZ FIRE SEPARATION
- SMOKE DAMPER
- FSD — FIRE/SMOKE DAMPER
- FLEXIBLE DUCT
- T — THERMOSTAT
- H — HUMIDISTAT
- T — TEMPERATURE SENSOR
- CO — CARBON MONOXIDE SENSOR
- CD — CARBON DIOXIDE SENSOR
- NOx — NITROGEN DIOXIDE SENSOR
- SENSOR WITH GUARD

REFERENCE LEGEND

DUCT SIZE
- X" ⌀ — DIAMETER
- X"xX" — WIDTH x HEIGHT
- X"/X" — WIDTH / HEIGHT

PIPE SIZE
- X" — PIPE SIZE (DIAMETER)

PLUMBING FIXTURES
- XXX-1 — PLUMBING FIXTURE DESIGNATION

ROOM / SPACE NUMBER
- ROOM NAME — ROOM NAME DESIGNATION
- 101 — ROOM NUMBER DESIGNATION

EQUIPMENT NUMBER
- XX-1 — EQUIPMENT NUMBER

REFERENCE DEMOLITION NOTE
- X — DEMOLITION DESIGNATION

REFERENCE NOTE
- X — REFERENCE DESIGNATION

PLAN DETAIL
- X / XXXX — DETAIL NUMBER / SHEET NUMBER

SECTION/ DETAIL
- SIM/OPP
- X / XXXX — SECTION/DETAIL NUMBER / SHEET NUMBER
- INDICATES DIRECTION OF VIEW

NEW COLUMN
- X — LETTER/NUMBER INDICATES NEW COLUMN LINE

EXISTING COLUMN
- X — LETTER/NUMBER INDICATES EXISTING COLUMN LINE

MATCHLINE
- AREA A
- AREA B

LEVEL
- LEVEL CALLOUT DESIGNATION
- NAME / ELEVATION
- ELEVATION DESIGNATION

TITLE MARKER
- GRAPHIC AREA FOR DRAWING
- DRAWING/DETAIL NUMBER
- 1 — VIEW NAME — TITLE
- SCALE: 1/8" = 1'-0" — SCALE OF THE DRAWING

NORTH ARROW
- NORTH

ABBREVIATIONS

A	COMPRESSED AIR
AC	AIR COMPRESSOR
ACC	AIR COOLED CONDENSER
ACCU	AIR COOLED CONDENSING UNIT
AD	AIR DOOR
AFCV	AUTO FLOW CONTROL VALVE
AHU	AIR HANDLING UNIT
AMP	AMPERE
APD	AIR PRESSURE DROP
ARU	AIR ROTATION UNIT
AS	AIR SEPARATOR
ASHP	AIR SOURCE HEAT PUMP
AV	ACID VENT
AW	ACID WASTE
B	BOILER
BC	BLOWER COIL
BD	BIDET
BFP	BACKFLOW PREVENTER
BFV	BUTTERFLY VALVE
BHP	BRAKE HORSEPOWER
BLKG	BLOCKING
BLV	BALANCING VALVE
BS	BRANCH SELECTOR BOX
BT	BATHTUB
BV	BALL VALVE
BW	BED/PAN WASHER
CH	CHILLER
CC	COOLING COIL
CD	CONDENSATE DRAIN
CFM	CUBIC FEET PER MINUTE
CI	CAST IRON
CMU	CONCRETE MASONRY UNITS
CR	CONDENSER WATER RETURN
CRAC	COMPUTER ROOM AIR CONDITIONER
CS	CONDENSER WATER SUPPLY
CSS	CLINICAL SERVICE SINKS
CT	COOLING TOWER
CU	CONDENSING UNIT - SPLIT SYSTEM
CUH	CABINET UNIT HEATER
CWR	CHILLED WATER RETURN
CWS	CHILLED WATER SUPPLY
CWP	CHILLED WATER PUMP
DB	DRY-BULB TEMPERATURE
DCW	DOMESTIC COLD WATER
DEG	DEGREE
DF	DRINKING FOUNTAIN
DGCO	DOUBLE GRADE CLEANOUT
DH	EMERGENCY DRENCH HOSES
DHW	DOMESTIC HOT WATER
DHWR	DOMESTIC HOT WATER RECIRCULATING
DHWP	DOMESTIC HOT WATER RECIRCULATING PUMP
DI	DEIONIZED WATER
DOAS	DEDICATED OUTDOOR AIR SYSTEM
DS	DISTILLED WATER
DSA	DUCT SOUND ATTENUATORS
DSCW	DOMESTIC SOFT COLD WATER
DSHW	DOMESTIC SOFT HOT WATER
DSHWR	DOMESTIC SOFT HOT WATER RECIRCULATING
DSS	DUCTLESS SPLIT SYSTEM
DST	DOMESTIC STORAGE TANK
DTW	DOMESTIC TEPID WATER
DTWR	DOMESTIC TEPID WATER RECIRCULATING
DWET	DOMESTIC WATER EXPANSION TANK
EA	EACH
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EDH	ELECTRIC DUCT HEATER
EEW	EMERGENCY EYE WASH
EEWS	EMERGENCY EYE WASH/SHOWER
EF	EXHAUST FAN
EFF	EFFICIENCY
EFW	EMERGENCY FACE WASH
EH	EXHAUST HOOD
ERV	ENERGY RECOVERY VENTILATOR
ES	EMERGENCY SHOWER
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
EUH	ELECTRIC UNIT HEATER
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EWT	ENTERING WATER TEMPERATURE
F	FIRE SUPPRESSION PIPING
F-	FURNACE
FC	FLUID COOLER
FCO	FLOOR CLEANOUT
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FLA	FULL LOAD AMPS
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL VENT
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FS	FLOOR SINK
FSD	FIRE/SMOKE DAMPER
FT	FINNED TUBE
G	GAS
GCWR	GLYCOL CHILLED WATER RETURN
GCWS	GLYCOL CHILLED WATER SUPPLY
GD	GARBAGE DISPOSAL
GDH	GAS DUCT HEATER
GHCR	GLYCOL HOT/CHILLED WATER RETURN
GHCS	GLYCOL HOT/CHILLED WATER SUPPLY
GHWR	GLYCOL HOT WATER RETURN
GHWS	GLYCOL HOT WATER SUPPLY
GI	GREASE INTERCEPTOR
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GV	GAS VENT
GWH	GAS WATER HEATER
H	HUMIDIFIER
HB	HOSE BIBB
HC	HEATING COIL
HCR	HOT/CHILLED WATER RETURN
HCS	HOT/CHILLED WATER SUPPLY
HP	HORSEPOWER
HP-	HEAT PUMP
HPR	HIGH PRESSURE RETURN
HPS	HIGH PRESURE STEAM
HRC	HEAT RECOVERY COIL
HVLS	HIGH VOLUME LOW SPEED
HWR	HOT WATER RETURN (HEATING)
HWS	HOT WATER SUPPLY (HEATING)
HWP	HOT WATER PUMP
HX	HEAT EXCHANGER
HY	HYDRANTS
IH	INTAKE HOOD
IRH	INFRARED RADIANT HEATER
KH	KITCHEN HOOD
KW	KILOWATT
KWH	KILOWATT HOURS
L	LAVATORY
LAT	LEAVING AIR TEMPERATURE
LPR	LOW PRESSURE RETURN
LPG	LIQUIFIED PETROLEUM GAS
LPS	LOW PRESSURE STEAM
LRA	LOCKED ROTOR AMPS
LS	LAUNDRY SINK
LV	LOUVER
LWT	LEAVING WATER TEMPERATURE
MAU	MAKE-UP AIR UNIT
MAX	MAXIMUM
MBH	1000 BTUH
MCA	MINIMUM CIRCUIT AMPS
MD	MOTORIZED DAMPER
MIN	MINIMUM
MOCP	MAXIMUM OVERCURRENT PROTECTION
MPR	MEDIUM PRESSURE RETURN
MPS	MEDIUM PRESSURE STEAM
MS	MOP SINK
N	NITROGEN
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NPCW	NONPOTABLE COLD WATER
NPHW	NONPOTABLE HOT WATER
NPHWR	NONPOTABLE HOT WATER RECIRCULATING
OA	OUTSIDE AIR
OB	OUTLET BOX
OI	OIL INTERCEPTOR
ORD	OVERFLOW ROOF DRAIN
OST	OVERFLOW STORM WATER
OX	OXYGEN
P	PUMP
PHC	PREHEAT COIL
PIV	POST INDICATING VALVE
PRV	PRESSURE REGULATING VALVE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH, GAUGE
PTAC	PACKAGED TERMINAL AIR CONDITIONER
RA	RETURN AIR
RCP	RADIANT CEILING PANEL
RD	ROOF AREA DRAINS
RF	RETURN FAN
RH	RELIEF HOOD
RHC	REHEAT COIL
RH	ROOF HYDRANT
RL	REFRIGERANT LIQUID LINE
RLA	RELIEF AIR
RLF	RELIEF FAN
RO	REVERSE OSMOSIS WATER
RPM	REVOLUTIONS PER MINUTE
RS	REFRIGERANT SUCTION LINE
RTU	ROOF TOP UNIT
RV	RELIEF VALVE
S	SINK
SA	SUPPLY AIR
SAN	SANITARY SEWER
SD	SMOKE DAMPER
SF	SUPPLY FAN
SFU	SANITARY FIXTURE UNIT
SH	SHOWER
SOI	SAND OIL INTERCEPTOR
SP	STATIC PRESSURE
SP	SUMP PUMP
SSS	SURGICAL SCRUB SINK
ST	STORM WATER
T	THERMOSTAT
TD	TRENCH DRAIN
TMV	THERMOSTATIC MIXING VALVE
TONS	TONS OF REFRIGERATION
TSP	TOTAL STATIC PRESSURE
UH	UNIT HEATER
UR	URINAL
V	VENT
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER
VEL	VELOCITY
VFD	VARIABLE FREQUENCY DRIVE
VRF	VARIABLE REFRIGERANT FLOW
VTR	VENT THRU ROOF
WB	WET BULB
WC	WATER CLOSETS
WCO	WALL CLEANOUT
WF	WASH FOUNTAINS
WFU	WATER FIXTURE UNITS
WH	WALL HYDRANT
WMB	WASHING MACHINE BOX
WPD	WATER PRESSURE DROP
WS	WATER SOFTENER
WSHP	WATER SOURCE HEAT PUMP
WWHP	WATER TO WATER HEAT PUMP
YH	YARD HYDRANT

GENERAL NOTES

A. ALL CONTRACTORS ARE RESPONSIBLE FOR REVIEWING ENTIRE SET OF DOCUMENTS TO DETERMINE THEIR FULL SCOPE OF WORK. CONTRACTOR SHALL NOT BE ALLOWED EXTRA COSTS DUE TO FAILURE TO REVIEW ENTIRE SET OF DOCUMENTS.

B. CONTRACTOR SHALL TAKE ALL MEASUREMENTS FOR WORK AND BE RESPONSIBLE FOR SAME. CONTRACTOR SHALL ADJUST FOR ACTUAL FIELD CONDITIONS AT NO ADDITIONAL EXPENSE TO OWNER. COORDINATE THE WORK AND SHOP DRAWINGS WITH ALL OTHER TRADES AFFECTED.

C. ALL PIPING IN CONCEALED LOCATIONS SHALL BE ROUTED AT RIGHT ANGLES AND PARALLEL TO BUILDING WALLS UNLESS OTHERWISE INDICATED.

D. ALL PLUMBING INSTALLATION SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY HAVING JURISDICTION.

REF. NOTES (◊)

PROJECT PLUMBING REFERENCED NOTES

SEE INDIVIDUAL SHEETS FOR REFERENCE NOTES.

PLUMBING SHEET LIST

P 00	PLUMBING INFO SHEET
P 01	SHEET SPECIFICATIONS - PLUMBING
P 02	SHEET SPECIFICATIONS - PLUMBING
P101	FLOOR PLAN - PLUMBING

DESIGNED:	KJW	ISSUE DATE:	06/17/2026
DRAWN:	KJW	REVISIONS:	
CHECKED:	JEK	No.:	DATE: BY: DESCRIPTION:

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PROFESSIONAL MECHANICAL ENGINEER
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OMAHA PUBLIC SCHOOLS
TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
3833 72ND STREET
OMAHA, NE 68134
PLUMBING INFO SHEET

PROJECT NO.: 011343.001

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SECTION 220000—GENERAL PLUMBING REQUIREMENTS

PART 1—GENERAL

1.1 DESCRIPTION OF WORK

A. This Division includes all labor, materials, equipment, tools, supervision, start-up services, Owner training, etc., including all incidental and related items, necessary to complete installation and successfully test and start up and operate the Plumbing systems indicated on the drawings, and as described in each Section of Division 220000 Specifications.

B. All work shall be completed in compliance with local codes, rules, and regulations. In the event that the plans conflict with any rules, regulation, or codes, the rules, regulations, and codes shall govern. Where the plans exceed code requirements, the plans shall govern.

C. The Contractor and his Subcontractors shall include all materials, labor, and necessary equipment in his bid.

1.2 DRAWINGS

A. The drawings are generally diagrammatic and show general location and arrangement of equipment, piping, and accessories. The contractor shall provide and install all necessary equipment, fittings, offsets and other components required to adapt to field conditions, interferences, and code requirements to deliver a complete and functional system.

B. Deviations from the drawings, with the exception of changes to field conditions, and do not effect system functionality, shall not be made without the written approval of the Engineer.

C. Architectural and Structural drawings take precedence in all matters pertaining to the building structure. Plumbing drawings take precedence in all matter pertaining to plumbing work and electrical drawings to electrical work. Where conflicts between trades exist, report conflicts or differences to the Architect and Engineer.

1.3 COORDINATION

A. The Contractor shall examine the plans and coordinate with other trades for scheduling of work.

B. Coordinate all penetrations with architectural and structural trades.

C. Refer to architectural plans for exact locations and heights of fixtures.

D. Refer to architectural plans for coordination of all ceiling mounted access panels for plumbing equipment that requires access.

E. All plumbing equipment and piping located above ceiling shall be installed to preserve ceiling heights listed on architect ceiling plans.

1.4 GUARANTEE

A. Contractor shall guarantee that all labor, materials and equipment are free from defects. Contractor shall agree to replace or repair any part of their project scope that becomes defective with one year from substantial completion and following final acceptance from the Owner.

1.5 PERMITS AND FEES

A. The Contractor shall be responsible for coordinating and obtaining all applicable agency approvals for utility connections and permits.

1.6 ACTION SUBMITTALS

A. Provide product submittals for all required specification sections. Submittals shall be submitted in PDF format.

B. Contractor shall review and mark with approval stamp before submitting to Architect.

1.7 FIELD CONDITIONS

A. Interruption of Existing Sanitary Waste and Domestic Water Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Owner's written permission.

PART 2—PRODUCTS (NOT USED)

PART 3—EXECUTION

3.1 PROTECTION AND HANDLING OF EQUIPMENT

A. The Contractor shall be responsible for ensuring all equipment and materials delivered to the site are protected from theft and damage until time of project turnover to the Owner.

B. All plumbing fixtures and piping shall be protected from damage and use after installation. No fixtures shall be used as temporary facilities unless the Contractor has received written permission from the Owner.

3.2 OPERATION AND MAINTANCE

A. Prior to final inspections, the Contractor shall provide training to the Owner on operation, adjustment, and maintenance on all installed equipment.

B. The Contractor shall prepare and turnover to the Owner a binder with all operation and maintained manuals for all equipment installed.

3.3 ACCESSIBILITY

A. All equipment installed shall fit within the designated space with adequate access for service and maintained and required by the manufacturer.

3.4 CLEANING AND PROTECTION

A. Each trade is responsible for maintain a clean and hazard free work area.

B. After each piece of equipment has been installed and tested, each system shall be cleaned and flushed.

C. Clean interior of piping. Remove dirt and debris as work progresses.

D. Protect sanitary waste, vent piping, and drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

E. Place plugs in ends of uncompleted piping at end of day and when work stops.

F. Repair damage to adjacent materials caused by installation of plumbing systems.

3.5 PAINTING

A. All exposed plumbing systems in finished areas shall be painted to match surrounding finishes. See architectural plans for finishes.

3.6 FIELD QUALITY CONTROL

A. Inspections:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
   a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
   b. Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
5. Piping and specialties should be considered defective if they do not pass tests and inspections

B. Prepare test and inspection reports. Reports shall be included with final Operation and Maintenance manual provided to owner.

END OF SECTION

SECTION 220517—SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1—GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2—PRODUCTS

2.1 SLEEVES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, with plain ends and integral welded waterstop collar.

B. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.

2.3 GROUT

A. Description: Nonshrink, for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3—EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Cut sleeves to length for mounting flush with both surfaces.
   a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.
2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

C. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.

D. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials.

3.2 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls, above grade:
   a. Piping, all sizes: Galvanized steel pipe sleeve
2. Concrete Slabs-on-Grade:
   a. Piping, all sizes: galvanized steel pipe sleeve
3. Concrete Slabs above Grade:
   a. Piping, all sizes: galvanized steel pipe sleeve
4. Interior Partitions:
   a. Piping, all sizes: galvanized steel pipe sleeve

END OF SECTION

SECTION 220523—VALVES FOR PLUMBING PIPING

PART 1—GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 Annex G.

PART 2—PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. NSF Compliance: NSF 61 Annex G and NSF 372 for valve materials for potable-water service.

B. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

C. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

D. Valve Sizes: Same as upstream piping unless otherwise indicated.

E. Valves in Insulated Piping:

1. Include 2-inch (50-mm) stem extensions.
2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

2.2 BRONZE BALL VALVES

A. Bronze Ball Valves, Two-Piece with Full Port, and Bronze or Brass Trim:

1. Description:
   a. Standard: MSS SP-110.
   b. CWP Rating: 600 psig (4140 kPa).
   c. Body Design: Two piece.
   d. Body Material: Bronze.
   e. Ends: Threaded and soldered.
   f. Seats: PTFE.
   g. Stem: Bronze or brass.
   h. Ball: Chrome-plated brass.
   i. Port: Full.

2.3 BRONZE SWING CHECK VALVES

A. Bronze Swing Check Valves with Bronze Disc, Class 125:

1. Description:
   a. Standard: MSS SP-80, Type 3.
   b. CWP Rating: 200 psig (1380 kPa).
   c. Body Design: Horizontal flow.
   d. Body Material: ASTM B 62, bronze.
   e. Ends: Threaded or soldered. See valve schedule articles.
   f. Disc: Bronze.

PART 3—EXECUTION

3.1 EXAMINATION

A. 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. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

3.3 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller:

1. Bronze Valves: May be provided with solder-joint or threaded ends.
2. Bronze ball valves, two-piece with full port and bronze or brass trim.

END OF SECTION

SECTION 220529—HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1—GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2—PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Galvanized Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
4. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
2. Standard: MFMA-4.
3. Channels: Continuous slotted steel channel with inturned lips.
4. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized steel.
6. Metallic Coating: Hot-dipped galvanized.

2.4THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.7 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. 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 (34.5-MPa), 28-day compressive strength.

PART 3—EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

L. Insulated Piping:

1. Attach clamps and spacers to piping.
   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90L): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
   b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

3.3 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/D1.1M 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 so contours of welded surfaces match adjacent contours.

3.4 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 (40 mm) .

3.5 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use galvanized steel pipe hangers and supports metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

G. Use thermal-hanger shield inserts for insulated piping and tubing.

H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
3. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24 (DN 65 to DN 600), from single rod if horizontal movement caused by expansion and contraction might occur.
4. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 (DN 50 to DN 1050) if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.

J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg CL) piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Welded-Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. C-Clamps (MSS Type 23): For structural shapes.
6. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
7. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
8. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
9. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
10. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
11. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).
12. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

M. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

N. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

O. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

P. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION

SECTION 220719—PLUMBING PIPING INSULATION

PART 1—GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

PART 2—PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," and "Indoor Piping Insulation Schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

D. Mineral-Fiber, Preformed Pipe Insulation:

1. Type I, 850 Deg F (454 Deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

E. PVC Jacket Adhesive: Compatible with PVC jacket.

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.03 metric perm) at 35-mil (0.9-mm) dry film thickness.
2. Service Temperature Range: 0 to 180 deg F (Minus 18 to plus 82 deg C).
3. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
4. Color: White.

D. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms (1.2 metric perms) at 0.0625-inch (1.6-mm) dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
3. Solids Content: 60 percent by volume and 66 percent by weight.
4. Color: White.

2.5 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2.6 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Width: 3 inches (75 mm).
2. Thickness: 11.5 mils (0.29 mm).
3. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Width: 2 inches (50 mm).
2. Thickness: 6 mils (0.15 mm).
3. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
4. Elongation: 500 percent.
5. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

2.7 SECUREMENTS

A. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

B. Wire: 1.6-mm (0.062-inch) soft-annealed, stainless steel.

PART 3—EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

I. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

J. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.

   For below-ambient services, apply vapor-barrier mastic over staples.
4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

C. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Insulation Installation on Fittings, Valves, Strainers, Flanges, Unions, and Instrumentation:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated, utilizing preformed fitting insulation and jackets with the same thickness as used for adjacent pipe. Fill joints and seams with insulating cement.
2. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.8 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

B. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Underground piping.
2. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.10 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. NPS 1 (DN 25) and Smaller: Insulation shall be one of the following:
   a. Flexible Elastomeric: 1/2 inch (13 mm) thick.
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) thick.
2. NPS 1-1/4 (DN 32) and Larger: Insulation shall be one of the following:
   a. Flexible Elastomeric: 1 inch (25 mm) thick.
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.

B. Domestic Hot Water:

1. Any size: Insulation shall be one of the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.

C. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet (3 m) of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F (16 Deg C):

1. All Pipe Sizes: Insulation shall be one of the following:
   a. Flexible Elastomeric: 1/2 inch thick.
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) thick.

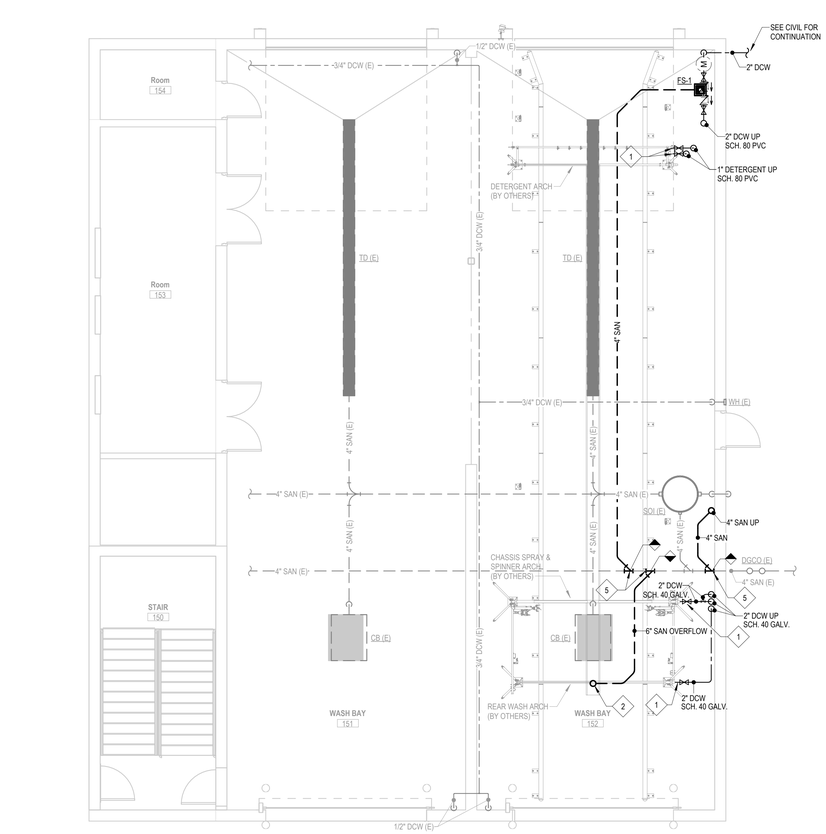
END OF SECTION

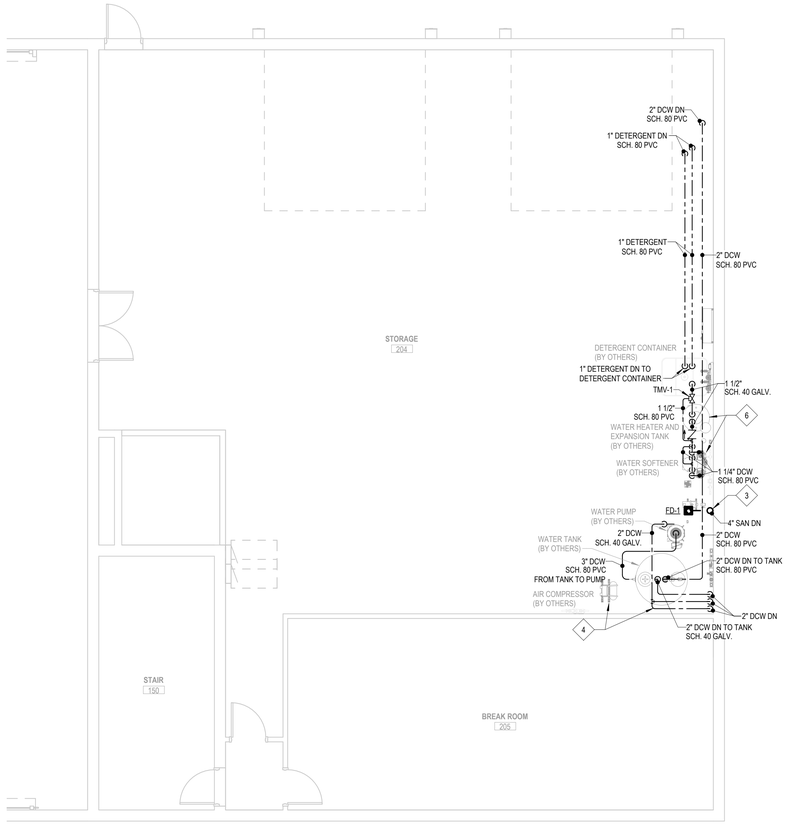
SECTION 221116—DOMESTIC WATER PIPING

PART 1—GENERAL (NOT REQUIRED)

PART 2—PRODUCTS

2





REF. NOTES (X):

1. COORDINATE SUPPLY PIPE CONNECTION TO BUS WASH ARCH WITH BUS WASH PROVIDER.
2. COORDINATE WITH BUS WASH PROVIDER ON EXACT LOCATION AND ROUTING OF OVERFLOW PIPE IN DRAIN PIT.
3. 2" VENT UP INCREASING TO 4" AT VENT THROUGH ROOF.
4. COORDINATE HIGH-PRESSURE AIR AND WATER PIPING WITH BUS WASH PROVIDER.
5. CONTRACTOR TO FIELD VERIFY LOCATION AND DEPTH OF EXISTING SANITARY SEWER PRIOR TO START OF WORK.
6. SEE BUS WASH PROVIDER PLANS FOR WATER HEATER AND WATER SOFTENER PIPING DETAILS.

GENERAL PLUMBING NOTES:

1. ALL BUS WASH EQUIPMENT SHOWN IN HALFTONE TO BE PROVIDED BY OTHERS. COORDINATE WITH BUS WASH PROVIDER REGARDING WORK WITHIN PLUMBING CONTRACTOR'S SCOPE.

1 FIRST FLOOR PLAN - PLUMBING
SCALE: 3/16" = 1'-0"

SCALE: 3/16" = 1'-0"
0" 4" 8" 12"

NORTH

2 SECOND FLOOR PLAN - PLUMBING
SCALE: 3/16" = 1'-0"

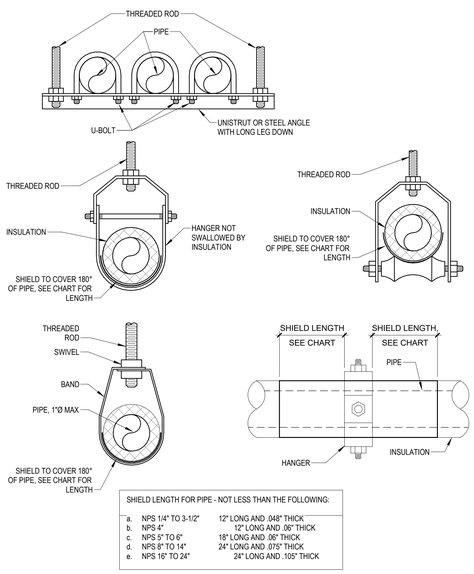
SCALE: 3/16" = 1'-0"
0" 4" 8" 12"

NORTH

PLUMBING FIXTURE SCHEDULE

MARK	DESCRIPTION	FIXTURE CONNECTIONS					MOUNTING HEIGHT	MANUFACTURER AND MODEL NUMBER		
		HOT WATER	COLD WATER	WASTE	VENT	OTHER		FIXTURE	ACCESSORY	REMARKS
FD-1	FLOOR DRAIN	---	---	4"	2"	---	FLOOR	JAY R. SMITH 2005Y	NICKEL BRONZE STRAINER - NB	---
FS-1	FLOOR SINK	---	---	4"	---	---	FLOOR	JAY R. SMITH 3200Y	POLISHED ALUMINUM DOME BOTTOM STRAINER -PDBS	---
TMV-1	THERMOSTATIC MIXING VALVE	1-1/2"	1-1/2"	---	---	---	IN-LINE	WATTS LF1170	---	1

NOTES: 1. SET MIXED WATER TEMPERATURE TO 104°F.

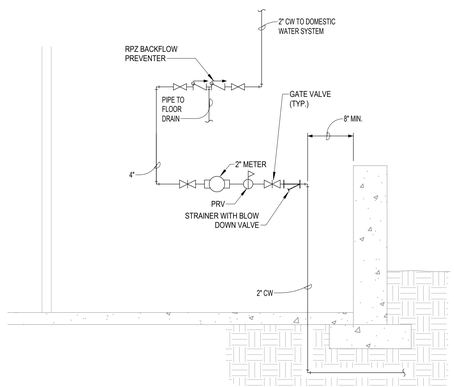


SHIELD LENGTH FOR PIPE - NOT LESS THAN THE FOLLOWING:

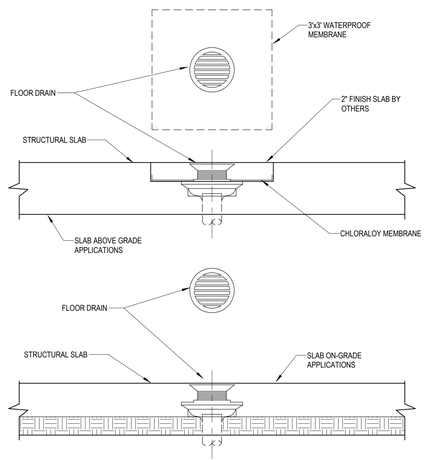
a.	NPS 1/4" TO 3-1/2"	12" LONG AND .048" THICK
b.	NPS 4"	12" LONG AND .06" THICK
c.	NPS 5" TO 6".	18" LONG AND .06" THICK
d.	NPS 8" TO 14"	24" LONG AND .075" THICK
e.	NPS 16" TO 24"	24" LONG AND .105" THICK

NOTE:
1. PIPES NPS 8" AND LARGER: INCLUDE WOOD OR REINFORCED CALCIUM-SILICATE-INSULATION INSERTS OF LENGTH AT LEAST AS LONG AS PROTECTIVE SHIELD.
2. THERMAL-HANGER SHIELDS: INSTALL WITH INSULATION SAME THICKNESS AS PIPING INSULATION.

3 PIPE HANGER DETAIL
SCALE: NOT TO SCALE



4 DOMESTIC WATER SERVICE PIPING SCHEMATIC
SCALE: NOT TO SCALE



5 FLOOR DRAIN DETAIL
SCALE: NOT TO SCALE

DESIGNED: KJW
DRAWN: KJW
CHECKED: JEK

ISSUE DATE: 06/17/2026
REVISIONS:
No.: DATE: BY: DESCRIPTION:

THIS DRAWING IS BEING MADE AVAILABLE BY SCHEMMER ON THIS PROJECT IN ACCORDANCE WITH STANDARD PROFESSIONAL SERVICES INDUSTRY PRACTICE. ALL LIABILITY RESPONSIBILITY DISCLAIMED TO ANY PARTY MODIFYING THIS DRAWING OR ANY PART ACCORDANCE WITH THE PROFESSIONAL SERVICES AGREEMENT.

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OMAHA PUBLIC SCHOOLS
TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
3833 72ND STREET
OMAHA, NE 68134
FLOOR PLAN - PLUMBING

PROJECT NO.: 011343.001

P101

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011343001-5-P101 FLOOR PLAN - PLUMBING

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Extruded-Tee Connections are not allowed.

F. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.3 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

3.4 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric nipples.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flange kits.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
   a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
3. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
4. NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.
5. NPS 3 to NPS 5 (DN 80 to DN 125): 10 feet (3 m) with 1/2-inch (13-mm) rod.

E. Install supports for vertical copper tubing every 10 feet (3 m).

F. Support piping and tubing not listed in this article according to MSS SP-58 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Tests:
   a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
   b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
   b. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   d. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
   e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
   f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

3.8 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
   c. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
   b. Adjust calibrated balancing valves to flows indicated.
5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
   a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
   b. Fill and isolate system according to either of the following:
      1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
      2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.
   c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
   d. Repeat procedures if biological examination shows contamination.
   e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.10 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Aboveground domestic water piping, all sizes, shall be one of the following:

1. Hard copper tube, ASTM B 88M, Type B (ASTM B 88, Type L); wrought-copper, solder-joint fittings; and soldered joints.

3.11 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball valves for piping NPS 2 (DN 50) and smaller. Use butterfly valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
2. Throttling Duty: Use ball valves for piping NPS 2 (DN 50) and smaller. Use butterfly valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
3. Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION

SECTION 221119—DOMESTIC WATER PIPING SPECIALTIES

PART 1—GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2—PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 and NSF 14.

B. Comply with NSF 372 for low lead.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa) unless otherwise indicated.

2.3 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:
1. Standard: ASSE 1013.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: 12 psig (83 kPa) maximum, through middle third of flow range.
4. Body: Bronze for NPS 2 (DN 50) and smaller.
5. End Connections: Threaded for NPS 2 (DN 50) and smaller.
6. Configuration: Designed for horizontal, straight-through flow.
7. Accessories:
   a. Valves: NPS 2 (DN 50) and Smaller: Ball type with threaded ends on inlet and outlet.
   b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

2.4 WATER PRESSURE-REDUCING VALVES

A. Water Regulators:
1. Standard: ASSE 1003.
2. Pressure Rating: Initial working pressure of 150 psig (1035 kPa).
3. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).
4. Valves for Booster Heater Water Supply: Include integral bypass.
5. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).

2.5 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Primary, Thermostatic, Water Mixing Valves:
1. Standard: ASSE 1017.
2. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
3. Type: Exposed-mounted, thermostatically controlled, water mixing valve.
4. Material: Bronze body with corrosion-resistant interior components.
5. Connections: Threaded inlets and outlet.
6. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
7. Valve Finish: Rough bronze.

2.6 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:
1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig (2760-kPa) minimum CWP.
3. Size: NPS 3/4 (DN 20).
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

PART 3—EXECUTION

3.1 INSTALLATION

A. Backflow Preventers: Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
3. Do not install bypass piping around backflow preventers.

B. Water Regulators: Install with inlet and outlet shutoff valves. Install pressure gauges on inlet and outlet.

C. Temperature-Actuated, Water Mixing Valves: Install with check stops or shutoff valves on inlets and with shutoff valve on outlet. Install cabinet-type units recessed in or surface mounted on wall as specified.

3.2 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping specialties adjacent to equipment and machines, allow space for service and maintenance.

3.3 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION

SECTION 221316—SANITARY WASTE AND VENT PIPING

PART 1—GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2—PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa).

2.2 PIPING MATERIALS

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service class(es).

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.4 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. CISPI, Hubless-Piping Couplings:
1. Standards: ASTM C 1277 and CISPI 310.
2. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.5 SPECIALTY PIPE FITTINGS

A. Transition Couplings:
1. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
2. Unshielded, Nonpressure Transition Couplings:
   a. Standard: ASTM C 1173.
   b. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
   c. End Connections: Same size as and compatible with pipes to be joined.
   d. Sleeve Materials:
      1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
      2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
      3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
3. Shielded, Nonpressure Transition Couplings:
   a. Standard: ASTM C 1460.
   b. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
   c. End Connections: Same size as and compatible with pipes to be joined.
4. Pressure Transition Couplings:
   a. Standard: AWWA C219.
   b. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
   c. Gasket Material: Natural or synthetic rubber.
   d. Metal Component Finish: Corrosion-resistant coating or material.

PART 3—EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.
1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
2. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Install piping to allow application of insulation.

I. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.
1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.
   a. Straight tees, elbows, and crosses may be used on vent lines.
3. Do not change direction of flow more than 90 degrees.
4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.
   a. Reducing size of waste piping in direction of flow is prohibited.

J. Lay buried building waste piping beginning at low point of each system.
1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
3. Maintain swab in piping and pull past each joint as completed.

K. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:
1. Building Sanitary Waste: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
2. Horizontal Sanitary Waste Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

L. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

3.2 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1.
1. Cut threads full and clean using sharp dies.
2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
   c. Do not use pipe sections that have cracked or open welds.

3.3 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:
1. Install transition couplings at joints of piping with small differences in ODs.
2. In Waste Drainage Piping: Unshielded, nonpressure transition couplings.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
1. Install galvanized steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install galvanized steel pipe support clamps for vertical piping in noncorrosive environments.
3. Vertical Piping: MSS Type 8 or Type 42, clamps.
4. Install individual, straight, horizontal piping runs:
   100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
   Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
5. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
6. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support horizontal piping and tubing within 12 inches (300 mm) of each fitting, valve, and coupling.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod.
4. Spacing for 10-foot (3-m) lengths may be increased to 10 feet (3 m). Spacing for fittings is limited to 60 inches (1500 mm).

F. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).

G. Support piping and tubing not listed above according to MSSSP-58 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect waste and vent piping to the following:
1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Comply with requirements for cleanouts and drains specified in Section 221319 "Sanitary Waste Piping Specialties."
6. Equipment: Connect waste piping as indicated.
   a. Provide shutoff valve if indicated and union for each connection.
   b. Use flanges instead of unions for connections NPS 2-1/2 (DN 65) and larger.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:
1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.6 FIELD QUALITY CONTROL

A. Test sanitary waste and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.
   a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced waste and vent piping until it has been tested and approved.
   a. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.
   a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa).
   b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
   c. Inspect joints for leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.7 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping, any size shall be any of the following:
1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

C. Aboveground, vent piping, any size shall be any of the following:
1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

D. Underground, soil, waste, and vent piping, any size shall be the following:
1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
2. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

END OF SECTION

SECTION 221319—SANITARY WASTE PIPING SPECIALTIES

PART 1—GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2—PRODUCTS

2.1 ASSEMBLY DESCRIPTIONS

A. Sanitary waste piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic sanitary waste piping specialty components.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains:
1. See plans for individual product requirements.

PART 3—EXECUTION

3.1 INSTALLATION

A. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage.
3. Set with grates depressed according to the following drainage area radii:
   a. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
   b. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.
   c. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.
4. Install floor-drain flashing collar or flange, so no leakage occurs between drain and adjoining flooring.
   a. Maintain integrity of waterproof membranes where penetrated.
5. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

END OF SECTION

DESIGNED:	KJW	ISSUE DATE:	06/17/2026
DRAWN:	KJW	REVISIONS:	
CHECKED:	JEK	No.: DATE: BY: DESCRIPTION:	

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OMAHA PUBLIC SCHOOLS
TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
3833 72ND STREET
OMAHA, NE 68134
SHEET SPECIFICATIONS - PLUMBING

PROJECT NO.: 011343.001

P 02

SYMBOL LEGEND

HVAC PIPING

- LPS — LOW PRESSURE STEAM
- LPR — LOW PRESSURE RETURN
- MPS — MEDIUM PRESSURE STEAM
- MPR — MEDIUM PRESSURE RETURN
- HPS — HIGH PRESSURE STEAM
- HPR — HIGH PRESSURE RETURN
- PC — PUMPED CONDENSATE
- HWS — HOT WATER SUPPLY
- HWR — HOT WATER RETURN
- HPWS — HEAT PUMP WATER SUPPLY
- HPWR — HEAT PUMP WATER RETURN
- GHWS — GLYCOL HOT WATER SUPPLY
- GHWR — GLYCOL HOT WATER RETURN
- BBD — BOILER BLOW DOWN
- ES — EXHAUST STEAM
- CWS — CHILLED WATER SUPPLY
- CWR — CHILLED WATER RETURN
- GCWS — GLYCOL CHILLED WATER SUPPLY
- GCWR — GLYCOL CHILLED WATER RETURN
- RL — REFRIGERANT LIQUID LINE
- RS — REFRIGERANT SUCTION LINE
- RDL — REFRIGERANT DISCHARGE
- CS — CONDENSER WATER SUPPLY
- CR — CONDENSER WATER RETURN
- HCWS — HOTCHILLED WATER SUPPLY
- HCWR — HOTCHILLED WATER RETURN
- CD — CONDENSATE DRAIN
- G — NATURAL GAS
- FOS — FUEL OIL SUPPLY
- FOR — FUEL OIL RETURN
- FOV — FUEL OIL VENT
- FOF — FUEL OIL FILL
- FOG — FUEL OIL GAGE
- LPG — LIQUEFIED PETROLEUM GAS

PLUMBING PIPING

- SANITARY DRAIN (ABOVE FLOOR)
- SANITARY DRAIN (BELOW FLOOR)
- GW — SANITARY GREASE WASTE
- STOST — STORM DRAIN
- STOST — STORM DRAIN (BELOW FLOOR)
- SANITARY VENT
- AW — ACID WASTE
- AV — ACID VENT
- DOMESTIC COLD WATER (DCW)
- DOMESTIC HOT WATER (DHW)
- DOMESTIC HOT WATER RECIRCULATING (DHWR)
- TW — TEPID WATER
- TWR — TEPID WATER RECIRCULATING
- DSCW — SOFTENED COLD WATER
- DSHW — SOFTENED HOT WATER
- W — BURIED EXTERIOR WATER
- DS — DISTILLED WATER
- DI — DEIONIZED WATER
- RO — REVERSE OSMOSIS WATER
- A — COMPRESSED AIR
- VAC — VACUUM
- OX — OXYGEN
- N — NITROGEN
- WAGD — WASTE AND ANESTHETIC GAS DISPOSAL
- MA — MEDICAL AIR

FIRE PROTECTION

- D — SPRINKLER DRAIN
- F — FIRE SUPPRESSION PIPING
- FIRE DEPARTMENT CONNECTION
- FS — FLOW SWITCH
- TS — TAMPER SWITCH

VALVES

- MANUAL BALANCING VALVE
- ISOLATION VALVE
- CHECK VALVE
- CONTROL VALVE (2 WAY)
- CONTROL VALVE (3 WAY)
- AUTO FLOW CONTROL VALVE
- HOSE END DRAIN VALVE
- PRESSURE REDUCING VALVE
- SOLENOID VALVE
- TEMP & PRESS RELIEF (OR) SAFETY VALVE-STEAM
- THERMOSTATIC MIXING VALVE

PIPING SPECIALTIES AND FITTINGS

- CO — WCO — CLEANOUT / WALL CLEANOUT
- GCO — GRADE CLEANOUT
- DGCO — DOUBLE - GRADE CLEANOUT
- VTR — PLUMBING VENT THRU ROOF
- FD- — FLOOR DRAIN
- FS- — FLOOR SINK
- RD- — ROOF DRAIN
- ORD- — OVERFLOW ROOF DRAIN
- TRENCH DRAIN
- MH — MANHOLE
- OXYGEN OUTLET
- VACUUM OUTLET
- AIR OUTLET
- NITROGEN OUTLET
- WASTE AND ANESTHETIC GAS DISPOSAL OUTLET
- MEDICAL AIR OUTLET
- PIPE CAP
- ELBOW UP
- ELBOW DOWN
- TEE
- TEE UP
- TEE DOWN
- STRAINER
- UNION
- AIR VENT
- FLEXIBLE PIPE CONNECTION
- EXPANSION JOINT
- PIPE ANCHOR
- PIPE GUIDE
- THERMOMETER
- PRESSURE GAUGE
- HB — HOSE BIBB
- RHY — ROOF HYDRANT
- WH — WALL HYDRANT
- STEAM TRAP

MISCELLANEOUS SYMBOLS

- DEMO / EXISTING — DEMO TO EXISTING CONNECTION
- NEW / EXISTING — NEW TO EXISTING CONNECTION

HVAC DUCTWORK AND SPECIALTIES

- 18x10 — RECT DUCT-1ST FIG IS SIDE SHOWN
- 18 Ø — ROUND DUCT
- 18x10 — FLAT OVAL DUCT-1ST FIG IS SIDE SHOWN
- ACOUSTICAL DUCT LINER

HVAC DUCTWORK AND SPECIALTIES (CONT.)

- FLEXIBLE DUCTWORK CONNECTION
- VOLUME DAMPER
- TURNING VANES
- HIGH EFFICIENCY TAKEOFF
- HIGH EFFICIENCY TAKOFF WITH VOLUME DAMPER
- SUPPLY AND FRESH AIR DUCT UP
- SUPPLY AND FRESH AIR DUCT DOWN
- RETURN DUCT UP
- RETURN DUCT DOWN
- EXHAUST DUCT UP
- EXHAUST DUCT DOWN
- ROUND DUCT UP / DOUBLE LINE PIPE
- ROUND DUCT DOWN / DOUBLE LINE PIPE
- SIZE/TYPE / FLOW — AIR TERMINAL (VERTICAL MOUNTING)
- SIZE/TYPE / FLOW — ROUND AIR TERMINAL (HORIZONTAL MOUNTING)
- SIZE/TYPE / FLOW — RECTANGULAR SUPPLY AIR TERMINAL (HORIZONTAL MOUNTING)
- SIZE/TYPE / FLOW — RECTANGULAR RETURN AIR TERMINAL (HORIZONTAL MOUNTING)
- SIZE/TYPE / FLOW — RECTANGULAR EXHAUST AIR TERMINAL (HORIZONTAL MOUNTING)
- AFS — AIR FLOW STATION
- MOTORIZED DAMPER-PARALLEL BLADE
- MOTORIZED DAMPER-OPPOSED BLADE
- GRAVITY DAMPER
- FIRE DAMPER-HORIZ FIRE SEPARATION
- SMOKE DAMPER
- FSD — FIRE/SMOKE DAMPER
- FLEXIBLE DUCT
- T — THERMOSTAT
- H — HUMIDISTAT
- S — TEMPERATURE SENSOR
- CO — CARBON MONOXIDE SENSOR
- CO2 — CARBON DIOXIDE SENSOR
- NOX — NITROGEN DIOXIDE SENSOR
- (X) — SENSOR WITH GUARD

REFERENCE LEGEND

- **DUCT SIZE** — X" Ø — DIAMETER; X"xX" — WIDTH x HEIGHT; X"/X" — WIDTH / HEIGHT
- **PIPE SIZE** — X" — PIPE SIZE (DIAMETER)
- **PLUMBING FIXTURES** — XXX-1 — PLUMBING FIXTURE DESIGNATION
- **ROOM / SPACE NUMBER** — ROOM NAME — ROOM NAME DESIGNATION; 101 — ROOM NUMBER DESIGNATION
- **EQUIPMENT NUMBER** — XX-1 — EQUIPMENT NUMBER
- **REFERENCE DEMOLITION NOTE** — X — DEMOLITION DESIGNATION
- **REFERENCE NOTE** — X — REFERENCE DESIGNATION
- **PLAN DETAIL** — X — DETAIL NUMBER; XXXX — SHEET NUMBER
- **SECTION/ DETAIL** — SIM/OPP — SECTION/DETAIL NUMBER; X — SHEET NUMBER; XXXX — INDICATES DIRECTION OF VIEW
- **NEW COLUMN** — X — LETTER/NUMBER INDICATES NEW COLUMN LINE
- **EXISTING COLUMN** — X — LETTER/NUMBER INDICATES EXISTING COLUMN LINE
- **MATCHLINE** — AREA A / AREA B
- **LEVEL** — LEVEL CALLOUT DESIGNATION; NAME / ELEVATION — ELEVATION DESIGNATION
- **TITLE MARKER** — GRAPHIC AREA FOR DRAWING; 1 — DRAWING/DETAIL NUMBER; VIEW NAME — TITLE; SCALE: 1/8" = 1'-0" — SCALE OF THE DRAWING
- **NORTH ARROW** — NORTH

ABBREVIATIONS

A	COMPRESSED AIR
AC	AIR COMPRESSOR
ACC	AIR COOLED CONDENSER
ACCU	AIR COOLED CONDENSING UNIT
AD	AIR DOOR
AFCV	AUTO FLOW CONTROL VALVE
AHU	AIR HANDLING UNIT
AMP	AMPERE
APD	AIR PRESSURE DROP
ARU	AIR ROTATION UNIT
AS	AIR SEPARATOR
ASHP	AIR SOURCE HEAT PUMP
AV	ACID VENT
AW	ACID WASTE
B	BOILER
BC	BLOWER COIL
BD	BIDET
BFP	BACKFLOW PREVENTER
BFV	BUTTERFLY VALVE
BHP	BRAKE HORSEPOWER
BLKG	BLOCKING
BLV	BALANCING VALVE
BS	BRANCH SELECTOR BOX
BT	BATHTUB
BV	BALL VALVE
BW	BEDPAN WASHER
CH	CHILLER
CC	COOLING COIL
CD	CONDENSATE DRAIN
CFM	CUBIC FEET PER MINUTE
CI	CAST IRON
CMU	CONCRETE MASONRY UNITS
CR	CONDENSER WATER RETURN
CRAC	COMPUTER ROOM AIR CONDITIONER
CS	CONDENSER WATER SUPPLY
CSS	CLINICAL SERVICE SINKS
CT	COOLING TOWER
CU	CONDENSING UNIT - SPLIT SYSTEM
CUH	CABINET UNIT HEATER
CWR	CHILLED WATER RETURN
CWS	CHILLED WATER SUPPLY
CWP	CHILLED WATER PUMP
DB	DRY-BULB TEMPERATURE
DCW	DOMESTIC COLD WATER
DEG	DEGREE
DF	DRINKING FOUNTAIN
DGCO	DOUBLE GRADE CLEANOUT
DH	EMERGENCY DRENCH HOSES
DHW	DOMESTIC HOT WATER
DHWR	DOMESTIC HOT WATER RECIRCULATING
DHWP	DOMESTIC HOT WATER RECIRCULATING PUMP
DI	DEIONIZED WATER
DOAS	DEDICATED OUTDOOR AIR SYSTEM
DS	DISTILLED WATER
DSA	DUCT SOUND ATTENUATORS
DSCW	DOMESTIC SOFT COLD WATER
DSHW	DOMESTIC SOFT HOT WATER
DSHWR	DOMESTIC SOFT HOT WATER RECIRCULATING
DSS	DUCTLESS SPLIT SYSTEM
DST	DOMESTIC STORAGE TANK
DTW	DOMESTIC TEPID WATER
DTWR	DOMESTIC TEPID WATER RECIRCULATING
DWET	DOMESTIC WATER EXPANSION TANK
EA	EACH
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EDH	ELECTRIC DUCT HEATER
EEW	EMERGENCY EYE WASH
EEWS	EMERGENCY EYE WASH/SHOWER
EF	EXHAUST FAN
EFF	EFFICIENCY
EFW	EMERGENCY FACE WASH
EH	EXHAUST HOOD
ERV	ENERGY RECOVERY VENTILATOR
ES	EMERGENCY SHOWER
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
EUH	ELECTRIC UNIT HEATER
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EWT	ENTERING WATER TEMPERATURE
F	FIRE SUPPRESSION PIPING
F-	FURNACE
FC	FLUID COOLER
FCO	FLOOR CLEANOUT
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FLA	FULL LOAD AMPS
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL VENT
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FS	FLOOR SINK
FSD	FIRE/SMOKE DAMPER
FT	FINNED TUBE
G	GAS
GCWR	GLYCOL CHILLED WATER RETURN
GCWS	GLYCOL CHILLED WATER SUPPLY
GD	GARBAGE DISPOSAL
GDH	GAS DUCT HEATER
GHCR	GLYCOL HOTCHILLED WATER RETURN
GHCS	GLYCOL HOTCHILLED WATER SUPPLY
GHWR	GLYCOL HOT WATER RETURN
GHWS	GLYCOL HOT WATER SUPPLY
GI	GREASE INTERCEPTOR
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GV	GAS VENT
GWH	GAS WATER HEATER
H	HUMIDIFIER
HB	HOSE BIBB
HC	HEATING COIL
HCR	HOTCHILLED WATER RETURN
HCS	HOTCHILLED WATER SUPPLY
HP	HORSEPOWER
HP-	HEAT PUMP
HPR	HIGH PRESSURE RETURN
HPS	HIGH PRESURE STEAM
HRC	HEAT RECOVERY COIL
HVLS	HIGH VOLUME LOW SPEED
HWR	HOT WATER RETURN (HEATING)
HWS	HOT WATER SUPPLY (HEATING)
HWP	HOT WATER PUMP
HX	HEAT EXCHANGER
HY	HYDRANTS
IH	INTAKE HOOD
IRH	INFRARED RADIANT HEATER
KH	KITCHEN HOOD
KW	KILOWATT
KWH	KILOWATT HOURS
L	LAVATORY
LAT	LEAVING AIR TEMPERATURE
LPR	LOW PRESSURE RETURN
LPG	LIQUIFIED PETROLEUM GAS
LPS	LOW PRESSURE STEAM
LRA	LOCKED ROTOR AMPS
LS	LAUNDRY SINK
LV	LOUVER
LWT	LEAVING WATER TEMPERATURE
MAU	MAKE-UP AIR UNIT
MAX	MAXIMUM
MBH	1000 BTUH
MCA	MINIMUM CIRCUIT AMPS
MD	MOTORIZED DAMPER
MIN	MINIMUM
MOCP	MAXIMUM OVERCURRENT PROTECTION
MPR	MEDIUM PRESSURE RETURN
MPS	MEDIUM PRESSURE STEAM
MS	MOP SINK
N	NITROGEN
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NPCW	NONPOTABLE COLD WATER
NPHW	NONPOTABLE HOT WATER
NPHWR	NONPOTABLE HOT WATER RECIRCULATING
OA	OUTSIDE AIR
OB	OUTLET BOX
OI	OIL INTERCEPTOR
ORD	OVERFLOW ROOF DRAIN
OST	OVERFLOW STORM WATER
OX	OXYGEN
P	PUMP
PHC	PREHEAT COIL
PIV	POST INDICATING VALVE
PRV	PRESSURE REGULATING VALVE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH, GAUGE
PTAC	PACKAGED TERMINAL AIR CONDITIONER
RA	RETURN AIR
RCP	RADIANT CEILING PANEL
RD	ROOF AREA DRAINS
RF	RETURN FAN
RH	RELIEF HOOD
RHC	REHEAT COIL
RH	ROOF HYDRANT
RL	REFRIGERANT LIQUID LINE
RLA	RELIEF AIR
RLF	RELIEF FAN
RO	REVERSE OSMOSIS WATER
RPM	REVOLUTIONS PER MINUTE
RS	REFRIGERANT SUCTION LINE
RTU	ROOF TOP UNIT
RV	RELIEF VALVE
S	SINK
SA	SUPPLY AIR
SAN	SANITARY SEWER
SD	SMOKE DAMPER
SF	SUPPLY FAN
SFU	SANITARY FIXTURE UNIT
SH	SHOWER
SOI	SAND OIL INTERCEPTOR
SP	STATIC PRESSURE
SP	SUMP PUMP
SSS	SURGICAL SCRUB SINK
ST	STORM WATER
T	THERMOSTAT
TD	TRENCH DRAIN
TMV	THERMOSTATIC MIXING VALVE
TONS	TONS OF REFRIGERATION
TSP	TOTAL STATIC PRESSURE
UH	UNIT HEATER
UR	URINAL
V	VENT
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER
VEL	VELOCITY
VFD	VARIABLE FREQUENCY DRIVE
VRF	VARIABLE REFRIGERANT FLOW
VTR	VENT THRU ROOF
WB	WET BULB
WC	WATER CLOSETS
WCO	WALL CLEANOUT
WF	WASH FOUNTAINS
WFU	WATER FIXTURE UNITS
WH	WALL HYDRANT
WMB	WASHING MACHINE BOX
WPD	WATER PRESSURE DROP
WS	WATER SOFTENER
WSHP	WATER SOURCE HEAT PUMP
WWHP	WATER TO WATER HEAT PUMP
YH	YARD HYDRANT

GENERAL DEMOLITION NOTES

A. THE DEMOLITION PLANS WERE PRODUCED BY DUPLICATING THE ORIGINAL DRAWINGS PROVIDED BY THE OWNER AND LIMITED FIELD VERIFICATION. DIMENSIONS AND EXISTING CONDITIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS. ITEMS WHICH ARE INTENDED TO BE REMOVED, RELOCATED, OR SALVAGED ARE SHOWN AS FULL-TONE LINES. ALL OTHER ITEMS ARE INTENDED TO REMAIN IN PLACE AND ARE SHOWN AS HALF-TONE.

B. DEMOLITION SHALL INCLUDE, BUT IS NOT LIMITED TO, THE ITEMS LISTED BELOW OR HERE-IN. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED RENOVATION AND NEW CONSTRUCTION WITH THE EXISTING BUILDING TO IDENTIFY THE TOTAL EXTENT OF THE DEMOLITION REQUIRED AND AS LISTED BELOW.

C. THE REMOVAL OF FIRE PROTECTION, HVAC, AND PLUMBING EQUIPMENT FROM FINISHED AREAS AND THROUGH WEATHER BARRIERS SHALL BE COORDINATED WITH ARCHITECTURAL PLANS AND DETAILS AS WELL AS NOTES ON THE MECHANICAL DRAWING TO ENSURE PROPER PATCHING AND REPAIR IS MADE TO THE BUILDING.

D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DEMOLITION AND REMOVAL OF ALL EXISTING COMPONENTS, MATERIALS, EQUIPMENT, AND APPURTENANCES TO BUILD, ERECT, INSTALL, OR ACCOMMODATE ALL NEW CONSTRUCTION WITH THE OWNER HAVING FIRST RIGHT OF REFUSAL ON ALL ITEMS.

E. ITEMS NOTED TO BE REMOVED AND SALVAGED OR REINSTALLED SHALL BE CAREFULLY REMOVED BY THE CONTRACTOR WITHOUT DAMAGE AND STORED OR REINSTALLED ON THE SITE AS DIRECTED. REMOVED OR SALVAGED ITEMS SHALL REMAIN THE PROPERTY OF THE OWNER.

F. COORDINATE THE DISCONNECTION OF ELECTRICAL MOTORS AND CONTROLS WITH ELECTRICAL CONTRACTOR PRIOR TO MECHANICAL REMOVALS.

G. IN THE EVENT THE CONTRACTOR ENCOUNTERS ON THE SITE, MATERIAL REASONABLY BELIEVED TO BE ASBESTOS, LEAD-BASED PAINT, OR ANY OTHER HAZARDOUS MATERIAL WHICH HAS NOT BEEN RENDERED HARMLESS, THE CONTRACTOR SHALL IMMEDIATELY STOP WORK IN THE AREA AFFECTED AND REPORT THE CONDITION TO THE OWNER AND ARCHITECT IN WRITING. THE WORK IN THE AFFECTED AREA SHALL NOT THEREAFTER BE RESUMED EXCEPT BY WRITTEN AGREEMENT OF THE OWNER AND ARCHITECT.

H. ANY UTILITY OR SYSTEMS DISRUPTION OR OUTAGES DURING DEMOLITION SHALL BE COORDINATED WITH THE OWNER AND GENERAL CONTRACTOR.

GENERAL NOTES

A. EXISTING CONDITIONS ARE BASED ON DRAWINGS PROVIDED BY THE OWNER AND LIMITED FIELD VERIFICATION. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS AND NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES OR VARIATIONS FROM THOSE SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL ADJUST TO ACTUAL FIELD CONDITIONS AT NO ADDITIONAL EXPENSE TO THE OWNER.

B. ALL CONTRACTORS ARE RESPONSIBLE FOR REVIEWING ENTIRE SET OF DOCUMENTS TO DETERMINE THEIR FULL SCOPE OF WORK. CONTRACTOR SHALL NOT BE ALLOWED EXTRA COSTS DUE TO FAILURE TO REVIEW ENTIRE SET OF DOCUMENTS.

C. CONTRACTOR SHALL TAKE ALL MEASUREMENTS FOR WORK AND BE RESPONSIBLE FOR SAME. CONTRACTOR SHALL ADJUST FOR ACTUAL FIELD CONDITIONS AT NO ADDITIONAL EXPENSE TO OWNER. COORDINATE THE WORK AND SHOP DRAWINGS WITH ALL OTHER TRADES AFFECTED.

D. SCREENED HALF-TONE LINES INDICATE EXISTING CONSTRUCTION TO REMAIN. FULL-TONE LINES INDICATED NEW OR RELOCATED CONSTRUCTION.

E. CONTRACTOR SHALL COORDINATE THE ROUTING OF ALL DUCTWORK WITH STRUCTURE, CEILING, LIGHTING, AND PIPING.

F. MAINTAIN MANUFACTURER'S REQUIRED CLEARANCE AROUND ALL EQUIPMENT TO ALLOW FOR MAINTENANCE ACCESS.

G. ALL PIPING IN CONCEALED LOCATIONS SHALL BE ROUTED AT RIGHT ANGLES AND PARALLEL TO BUILDING WALLS UNLESS OTHERWISE INDICATED.

H. DO NOT ROUTE DUCTWORK OR PIPING ABOVE ELECTRICAL PANELS. MAINTAIN ALL CODE REQUIRED CLEARANCES.

I. IN THE EVENT THE CONTRACTOR ENCOUNTERS ON THE SITE, MATERIAL REASONABLY BELIEVED TO BE ASBESTOS, LEAD-BASED PAINT, OR ANY OTHER HAZARDOUS MATERIAL WHICH HAS NOT BEEN RENDERED HARMLESS, THE CONTRACTOR SHALL IMMEDIATELY STOP WORK IN THE AREA AFFECTED AND REPORT THE CONDITION TO THE OWNER AND ARCHITECT IN WRITING. THE WORK IN THE AFFECTED AREA SHALL NOT THEREAFTER BE RESUMED EXCEPT BY WRITTEN AGREEMENT OF THE OWNER AND CONTRACTOR.

J. ANY UTILITY OR SYSTEM DISRUPTIONS OR OUTAGES DURING CONSTRUCTION SHALL BE COORDINATED WITH THE OWNER AND GENERAL CONTRACTOR.

REF. DEMO NOTES (X)

PROJECT MECHANICAL REFERENCED DEMOLITION NOTES

SEE INDIVIDUAL SHEETS FOR REFERENCE NOTES.

REF. NOTES (X)

PROJECT MECHANICAL REFERENCED NOTES

SEE INDIVIDUAL SHEETS FOR REFERENCE NOTES.

MECHANICAL SHEET LIST

M 00	MECHANICAL INFO SHEET
M 01	SHEET SPECIFICATIONS - MECHANICAL
M001	DEMOLITION FLOOR PLAN - MECHANICAL
M101	FLOOR PLAN - MECHANICAL

DESIGNED: KJW
DRAWN: KJW
CHECKED: JEK

ISSUE DATE: 06/17/2026

REVISIONS: No.	DATE:	BY:	DESCRIPTION:

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TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
3833 72ND STREET
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MECHANICAL INFO SHEET

PROJECT NO.: 011343.001

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SECTION 230000—GENERAL HVAC REQUIREMENTS

PART 1—GENERAL

1.1 DESCRIPTION OF WORK

A. This Division includes all labor, materials, equipment, tools, supervision, start-up services, Owner training, etc., including all incidental and related items, necessary to complete installation and successfully test and start up and operate the HVAC systems indicated on the drawings, and as described in each Section of Division 230000 Specifications.

B. All work shall be completed in compliance with local codes, rules, and regulations. In the event that the plans conflict with any rules, regulation, or codes, the rules, regulations, and codes shall govern. Where the plans exceed code requirements, the plans shall govern.

C. The Contractor and his Subcontractors shall include all materials, labor, and necessary equipment in his bid.

1.2 DRAWINGS

A. The drawings are generally diagrammatic and show general location and arrangement of equipment, ductwork, piping, and accessories. The contractor shall provide and install all necessary equipment, fittings, offsets and other components required to adapt to field conditions, interferences, and code requirements to deliver a complete and functional system.

B. Deviations from the drawings, with the exception of changes to field conditions, and do not effect system functionality, shall not be made without the written approval of the Engineer.

C. Architectural and Structural drawings take precedence in all matters pertaining to the building structure. HVAC drawings take precedence in all matter pertaining to HVAC work and electrical drawings to electrical work. Where conflicts between trades exist, report conflicts or differences to the Architect and Engineer.

1.3 COORDINATION

A. The Contractor shall examine the plans and coordinate with other trades for scheduling of work.

B. Coordinate all penetrations with architectural and structural trades.

C. Refer to architectural plans for exact locations and heights of fixtures.

D. Refer to architectural plans for coordination of all ceiling mounted access panels for HVAC equipment that requires access.

E. All HVAC equipment and piping located above ceiling shall be installed to preserve ceiling heights listed on architect ceiling plans.

1.4 GUARANTEE

A. Contractor shall guarantee that all labor, materials and equipment are free from defects. Contractor shall agree to replace or repair any part of their project scope that becomes defective with one year from substantial completion and following final acceptance from the Owner.

1.5 PERMITS AND FEES

A. The Contractor shall be responsible for coordinating and obtaining all applicable agency approvals for utility connections and permits.

1.6 ACTION SUBMITTALS

A. Provide product submittals for all required specification sections. Submittals shall be submitted in PDF format.

B. Contractor shall review and mark with approval stamp before submitting to Architect.

1.7 EQUIPMENT AND MATERIAL MANUFACTURERS

A. All equipment shall be provided with normally supplied accessories needed for complete installation.

B. All equipment shall be new and shall be standard products from the current manufacture product line offering.

C. If an alternate manufacturer to the basis of design is submitted and approved, the Contractor shall assume all costs required to adapt the system to the submitted piece of equipment, including, but not limited to: piping, sheet metal, electrical work, and building alterations. Alternate equipment shall conform to all space requirements and operating conditions.

PART 2—PRODUCTS (NOT USED)

PART 3—EXECUTION

3.1 PROTECTION AND HANDLING OF EQUIPMENT

A. The Contractor shall be responsible for ensuring all equipment and materials delivered to the site are protected from theft and damage until time of project turnover to the Owner.

B. All HVAC fixtures, ductwork, and piping shall be protected from damage and use after installation.

3.2 FIELD QUALITY CONTROL

A. Field Service: Engage a trained service representative to test and inspect all installed equipment, assemblies and installations.

B. Perform functional tests on all installed equipment.

C. Any equipment that does not pass tests and inspections shall be considered defective.

D. Prepare test and inspection reports. Reports shall be included in Operation and Maintenance Manual turned over to Owner.

3.3 OPERATION AND MAINTENANCE

A. Prior to final inspections, the Contractor shall provide training to the Owner on operation, adjustment, and maintenance on all installed equipment.

B. The Contractor shall prepare and turnover to the Owner a binder with all operation and maintained manuals for all equipment installed.

3.4 ACCESSIBILITY

A. All equipment installed shall fit within the designated space with adequate access for service and maintained and required by the manufacturer.

3.5 CLEANING

A. Each trade is responsible for maintaining a clean and hazard free work area.

B. After each piece of equipment has been installed and tested, each system shall be cleaned and flushed.

3.6 PAINTING

A. All exposed HVAC systems in finished areas shall be painted to match surrounding finishes. See architectural plans for finishes.

END OF SECTION

SECTION 230529—HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1—GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2—PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized, hot-dip galvanized, or electrogalvanized.
3. Nonmetallic Coatings: Plastic coated, or epoxy powder-coated.
4. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

2.3 MATERIALS

A. Carbon Steel: ASTM A 1011/A 1011M.

B. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

PART 3—EXECUTION

3.1 APPLICATION

A. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 90 kg (200 lb).

3.2 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

C. Install lateral bracing with pipe hangers and supports to prevent swaying.

D. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

E. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

F. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

3.3 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 (40 mm).

3.4 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and attachments for general service applications.

F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F (566 deg C), pipes NPS 4 to NPS 24 (DN 100 to DN 600), requiring up to 4 inches (100 mm) of insulation.
3. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
4. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).

G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).

H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. C-Clamps (MSS Type 23): For structural shapes.
6. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
7. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.

END OF SECTION

SECTION 231123—FACILITY NATURAL-GAS PIPING

PART 1—GENERAL (NOT USED)

a qualified testing agency, and marked for intended location and application.

PART 2—PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig (690 kPa) minimum unless otherwise indicated.
2. Service Regulators: 100 psig (690 kPa) minimum unless otherwise indicated.

B. Natural-Gas System Pressure within Buildings: More than 0.5 psig (3.45 kPa) but not more than 2 psig (13.8 kPa).

2.2 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.

2.3 PIPING SPECIALTIES

A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
3. Corrugated stainless-steel tubing with polymer coating.
4. Operating-Pressure Rating: 0.5 psig (3.45 kPa).
5. End Fittings: Zinc-coated steel.
6. Threaded Ends: Comply with ASME B1.20.1.
7. Maximum Length: 72 inches (1830 mm).

B. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller.
3. Strainer Screen: 60-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig (862 kPa).

2.4 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

2.5 MANUAL GAS SHUTOFF VALVES

A. General Requirements for Metallic Valves, NPS 2 (DN 50) and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig (862 kPa).
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch (25 mm) and smaller.
6. Service Mark: Valves 1-1/4 inches (32 mm) to NPS 2 (DN 50) shall have initials "WOG" permanently marked on valve body.

B. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Body: Bronze, complying with ASTM B 584.
2. Ball: Chrome-plated bronze.
3. Stem: Bronze; blowout proof.
4. Seats: Reinforced TFE; blowout proof.
5. Packing: Threaded-body packnut design with adjustable-stem packing.
6. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. CWP Rating: 600 psig (4140 kPa).
8. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
9. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.6 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 (DN 50) and smaller.

B. Appliance Pressure Regulators: Comply with ANSI Z21.18.

1. Body and Diaphragm Case: Die-cast aluminum.
2. Springs: Zinc-plated steel; interchangeable.
3. Diaphragm Plate: Zinc-plated steel.
4. Seat Disc: Nitrile rubber.
5. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
6. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
7. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
8. Maximum Inlet Pressure: 2 psig (13.8 kPa).

2.7 DIELECTRIC UNIONS

A. Dielectric Unions:

1. Description:
   a. Standard: ASSE 1079.
   b. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C).
   c. End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3—EXECUTION

3.1 INDOOR PIPING INSTALLATION

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Verify final equipment locations for roughing-in.

L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches (75 mm) long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

O. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

P. Connect branch piping from top or side of horizontal piping.

Q. Install unions in pipes NPS 2 (DN 50) and smaller, adjacent to each valve, at final connection to each piece of equipment.

R. Do not use natural-gas piping as grounding electrode.

S. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

3.2 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing or copper connector.

B. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

3.3 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.4 HANGER AND SUPPORT INSTALLATION

A. Install hangers for steel piping, with maximum horizontal spacing and minimum rod diameter, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

B. Support horizontal piping within 12 inches (300 mm) of each fitting.

C. Support vertical runs of steel piping to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.5 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Install piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches (1800 mm) of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.6 FIELD QUALITY CONTROL

A. Test, inspect, and purge natural gas according to NFPA 54 and authorities having jurisdiction.

B. Natural-gas piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.7 INDOOR PIPING SCHEDULE

A. Aboveground, branch piping NPS 1 (DN 25) and smaller shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be on of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

3.8 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for all pipe sizes shall be the following:

1. Two-piece, full-port, bronze ball valve with bronze trim.

END OF SECTION

DESIGNED:	KJW
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CHECKED:	JEK
ISSUE DATE:	06/17/2026
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OMAHA PUBLIC SCHOOLS
TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
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OMAHA, NE 68134
SHEET SPECIFICATIONS - MECHANICAL

PROJECT NO.: 011343.001

M 01

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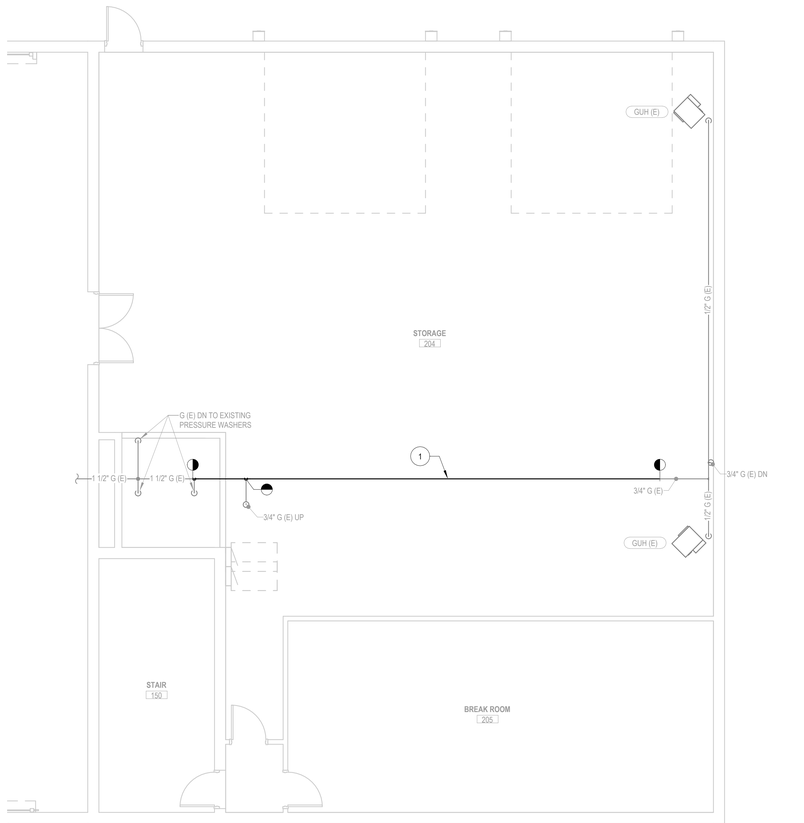
REF. DEMO NOTES (X):

1	REMOVE GAS PIPING UP TO EXISTING 1-1/2" PIPE AND CAP.



2 SECOND FLOOR PLAN - DEMO HVAC
SCALE: 3/16" = 1'-0"

SCALE: 3/16" = 1'-0"
0' 4' 8' 12'

NORTH

DESIGNED: KJW
DRAWN: KJW
CHECKED: JEK

ISSUE DATE: 06/17/2026
REVISIONS:

No.:	DATE:	BY:	DESCRIPTION:

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DEMOLITION FLOOR PLAN - MECHANICAL

PROJECT NO.: 011343.001

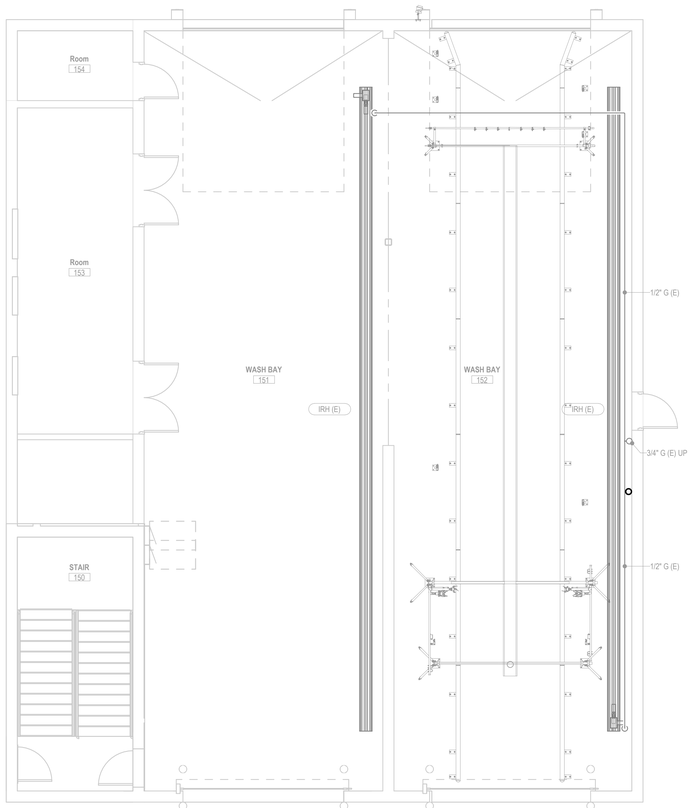
M001

REF. NOTES (X):

1	GAS FLUE UP THROUGH ROOF FROM WATER HEATER. SIZE AND INSTALL PER MANUFACTURER'S RECOMMENDATIONS.

GENERAL MECHANICAL NOTES:

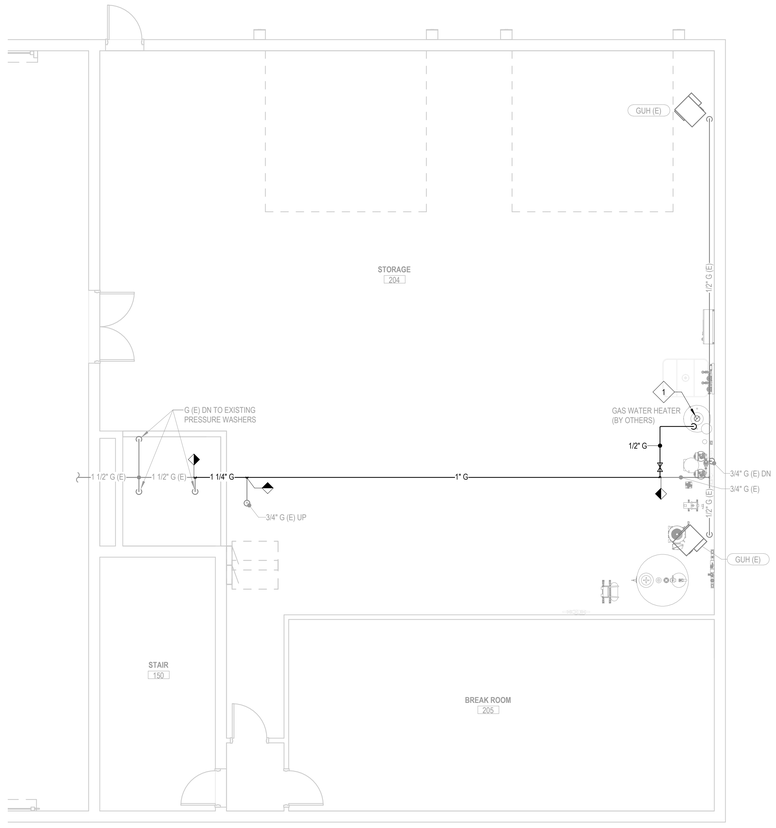
1. ALL BUS WASH EQUIPMENT SHOWN IN HALFTONE TO BE PROVIDED BY OTHERS. COORDINATE WITH BUS WASH PROVIDER REGARDING WORK WITHIN MECHANICAL CONTRACTOR'S SCOPE.



1 FIRST FLOOR PLAN - HVAC
SCALE: 3/16" = 1'-0"

SCALE: 3/16" = 1'-0"
0" 4" 8" 12"

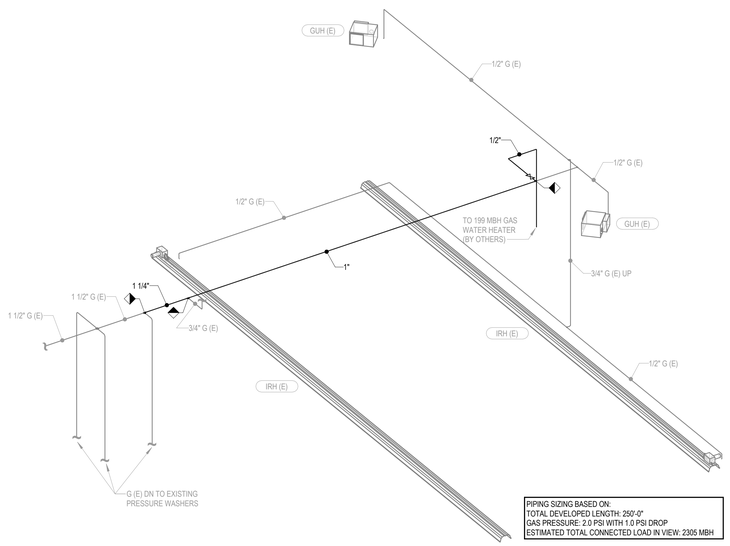
NORTH



2 SECOND FLOOR PLAN - HVAC
SCALE: 3/16" = 1'-0"

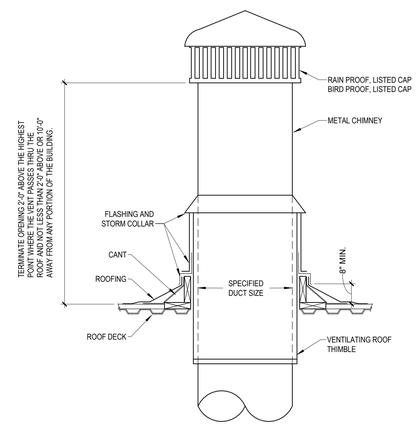
SCALE: 3/16" = 1'-0"
0" 4" 8" 12"

NORTH



PIPING SIZING BASED ON:
TOTAL DEVELOPED LENGTH: 250'-0"
GAS PRESSURE: 2.0 PSI WITH 1.0 PSI DROP
ESTIMATED TOTAL CONNECTED LOAD IN VIEW: 2305 MBH

3 3d RISER - GAS
NOT TO SCALE



NOTE:
GAS FLUE AND TERMINATION SHALL COMPLY WITH ALL LOCAL CODES AND MANUFACTURERS RECOMMENDATION.

4 GAS FLUE THRU ROOF DETAIL
SCALE: NOT TO SCALE

DESIGNED: KJW
DRAWN: KJW
CHECKED: JEK

ISSUE DATE: 06/17/2026
REVISIONS:

No.:	DATE:	BY:	DESCRIPTION:

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OMAHA PUBLIC SCHOOLS
TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
3833 72ND STREET
OMAHA, NE 68134
FLOOR PLAN - MECHANICAL

PROJECT NO.: 011343.001

M101

SYMBOL LEGEND

LIGHTING

- LUMINAIRE
- WALL MOUNTED LUMINAIRE
- WALL MOUNTED LUMINAIRE
- RECESSED LUMINAIRE
- SURFACE MOUNTED LUMINAIRE
- PENDANT MOUNTED LUMINAIRE
- STRIP / INDUSTRIAL LUMINAIRE
- WALL MOUNTED STRIP LUMINAIRE
- LUMINAIRE - NIGHT LIGHTING
- LUMINAIRE - EMERGENCY SYSTEM
- WALL WASH LUMINAIRE
- EMERGENCY BATTERY PACK LUMINAIRE
- REMOTE EMERGENCY HEAD
- TRACK LIGHTING
- EXIT LIGHT - WALL MOUNT WITH DIRECTIONAL ARROWS AS INDICATED, FILLED-IN QUARTERS INDICATE ILLUMINATION SIDES
- EXIT LIGHT - CEILING OR PENDANT MOUNT WITH DIRECTIONAL ARROWS AS INDICATED, FILLED-IN QUARTERS INDICATE ILLUMINATION SIDES
- EMERGENCY EXIT LIGHT COMBO
- POLE MOUNTED SITE LUMINAIRE
- CEILING FAN
- PHOTOCELL
- OCCUPANCY SENSOR
- ROOM CONTROLLER
- POWER PACK

WIRING DEVICES - SWITCHES

- S — SINGLE POLE SWITCH
- S_2 — TWO POLE SWITCH
- S_3 — THREE-WAY SWITCH
- S_4 — FOUR-WAY SWITCH
- S_D — DIMMER SWITCH
- S_K — KEY OPERATED SWITCH
- S_P — SINGLE POLE SWITCH WITH PILOT
- S_{TE} — THERMAL ELEMENT SWITCH
- S_T — TIMER SWITCH
- S_{FT} — FUSIBLE SWITCH (FUSETRON)
- S_X — LOW VOLTAGE MOMENTARY CONTACT SWITCH

WIRING DEVICES - RECEPTACLES

- SIMPLEX RECEPTACLE
- DUPLEX RECEPTACLE
- QUADRUPLEX RECEPTACLE
- EMERGENCY RECEPTACLE
- CONTROLLED RECEPTACLE
- SPECIAL PURPOSE RECEPTACLE, NEMA CONFIGURATION NOTED
- PLUG-IN STRIP - LENGTH AND QUANTITY OF OUTLETS AS SHOWN
- POWER POLE
- DROP CORD RECEPTACLE ASSEMBLY

CONDUIT AND BOXES

- JUNCTION BOX - CEILING MOUNT
- JUNCTION BOX - WALL MOUNT
- FB — FLOOR BOX
- FP — FLOOR POKE-THROUGH DEVICE
- WB — WALL AV BOX
- CONDUIT DOWN
- CONDUIT UP
- INDICATES BUSHED CONDUIT

POWER EQUIPMENT

- SAFETY SWITCH
- COMBINATION STARTER SAFETY SWITCH
- R — RELAY - CONTROL AS NOTED
- M — MOTOR CONNECTION
- PUSHBUTTON STATION
- M — METER SOCKET

PANELS AND CABINETS

- BRANCH CIRCUIT PANEL
- DISTRIBUTION PANEL
- SWITCHBOARD, SWITCHGEAR, MCC
- EQUIPMENT OR TERMINAL CABINET
- T — DRY TYPE TRANSFORMER

FIRE ALARM SYSTEM

- F — MANUAL PULL STATION
- FSC — STROBE
- FS — HORN
- FSHS — HORN STROBE
- FS — SPEAKER
- FSS — SPEAKER STROBE
- DH — MAGNETIC DOOR HOLDER
- S — SMOKE DETECTOR
- H — HEAT DETECTOR
- DS — DUCT SMOKE DETECTOR
- FS — FLOW SWITCH
- TS — SPRINKLER TAMPER SWITCH
- PS — POST INDICATING VALVE SWITCH
- REMOTE INDICATOR LIGHT

VOICE AND DATA

- VOICE OUTLET
- DATA OUTLET
- VOICE/DATA OUTLET
- WIRELESS ACCESS POINT

SOUND, TELEVISION, AND SECURITY

- SPEAKER
- HORN (PA, PUBLIC ADDRESS)
- IC — INTERCOM SPEAKER STATION
- SVC — VOLUME CONTROL STATION
- M — MICROPHONE JACK
- TELEVISION OUTLET
- CCTV CAMERA
- MS — MOTION SENSOR

NURSE CALL

- N — BEDSIDE STATION
- N_D — DOUBLE BED BEDSIDE STATION
- N_E — EMERGENCY PULL STATION
- N_S — STAFF STATION
- N_D — DUTY STATION
- N_P — PILLOW SPEAKER
- N — DOME LIGHT
- N_M — MASTER STATION

POWER DISTRIBUTION ONE LINE

- G — EMERGENCY GENERATOR
- FUSE
- DISCONNECT SWITCH
- FUSED DISCONNECT SWITCH
- DRAW OUT VACUUM CIRCUIT BREAKER
- PLUG-IN OR DRAWOUT CONNECTOR
- CIRCUIT BREAKER
- THERMAL OVERLOAD RELAY
- K1 — KIRK KEY INTERLOCK
- LIGHTNING SURGE ARRESTOR
- A — AMMETER
- V — VOLTMETER
- TRANSFORMER
- X:Y — CURRENT TRANSFORMER - (RATIO)

SYMBOL NOTES:

"C" INDICATES CEILING MOUNTED
"F" INDICATES FLOOR MOUNTED
"S" INDICATES SURFACE MOUNTED
"G" INDICATES GROUND FAULT INTERRUPTING
"IG" INDICATES ISOLATED GROUND
"AC" INDICATES MOUNTING 6" ABOVE COUNTERTOP OR BACKSPLASH
"WP" INDICATES WEATHERPROOF
"XP" INDICATES EXPLOSION PROOF
"U" INDICATES USB CHARGER
"R" INDICATES EXISTING DEVICE REMOVED AND RELOCATED
LOWER CASE LETTER BY SWITCHES AND FIXTURES INDICATE ASSOCIATED UNIT FOR SWITCHING

REFERENCE LEGEND

ROOM NUMBER
ROOM NAME — ROOM NAME DESIGNATION
101 — ROOM NUMBER DESIGNATION
150 SF — ROOM AREA DESIGNATION

SCHEDULED EQUIPMENT
XX — EQUIPMENT SIZE (WHERE APPLICABLE)
XXXX — EQUIPMENT NUMBER
XX-XX — PANEL & CIRCUIT NUMBER

NON-SCHEDULED EQUIPMENT
EQUIPMENT — EQUIPMENT NAME/NUMBER
XX-XX — PANEL & CIRCUIT NUMBER

REFERENCE DEMOLITION NOTE
DX — DEMOLITION DESIGNATION

REFERENCE NOTE
X — REFERENCE DESIGNATION

PLAN DETAIL
X — DETAIL NUMBER
XX-XX — SHEET NUMBER

SECTION/ DETAIL
SIM
X — SECTION/DETAIL NUMBER
XX-XX — SHEET NUMBER
INDICATES DIRECTION OF VIEW

NEW COLUMN
X — LETTER INDICATES NEW COLUMN LINE

EXISTING COLUMN
X — LETTER INDICATES EXISTING COLUMN LINE

MATCHLINE
AREA A
AREA B

LEVEL
LEVEL CALLOUT DESIGNATION
NAME
ELEVATION
ELEVATION DESIGNATION

TITLE MARKER
GRAPHIC AREA FOR DRAWING
DETAIL NUMBER
1 VIEW NAME — TITLE
SCALE: 1/8" = 1'-0" — SCALE OF THE DRAWING

NORTH ARROW
NORTH

ABBREVIATIONS

ACSR	ALUMINUM CONDUCTOR STEEL REINFORCED
AFF	ABOVE FINISH FLOOR
AIC	AMPS INTERRUPTING CAPACITY (SYM RMS)
AL	ALUMINUM
ALT	ALTERNATE
AMP	AMPERE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX	APPROXIMATE
AUTO	AUTOMATIC
AVG	AVERAGE
AWG	GAUGE
L	ANGLE
BKR	BREAKER
C OR CL	CENTER LINE
C OR CND	CONDUIT (ELECTRICAL SHEETS)
CKT	CIRCUIT
CLG	CEILING
COL	COLUMN
CONC	CONCRETE
CONF	CONFERENCE
CPT	CONTROL POWER TRANSFORMER
CUH	CABINET UNIT HEATER
DC	DIRECT CURRENT
DEG	DEGREE
DEMO	DEMOLITION
DIA	DIAMETER
DIM	DIMENSION
DISC	DISCONNECT
DIST	DISTRIBUTION
DN	DOWN
DWG	DRAWING
E	EAST
EA	EACH
EL OR ELEV	ELEVATION - GRADE OR BUILDING
ELEC	ELECTRIC OR ELECTRICAL
ELEV	ELEVATOR
EMD	ESTIMATED MAXIMUM DEMAND
EMI	ELECTROMAGNETIC INTERFERENCE
ENCL	ENCLOSURE
EQUIP	EQUIPMENT
EST	ESTIMATE
EWC	ELECTRIC WATER COOLER
EXIST	EXISTING
EXP	EXPOSED
EXT	EXTERIOR
FA	FIRE ALARM
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FAEP	FIRE ALARM EXTENDER PANEL
FLA	FULL LOAD AMPS
FLEX	FLEXIBLE
FLUOR	FLUORESCENT
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFI	GROUND FAULT CIRCUIT INTERRUPTER
HP	HORSE POWER
HR	HOUR
HTG	HEATING
HTR	HEATER
HZ	HERTZ
ID	INSIDE DIAMETER
IES	ILLUMINATING ENGINEERING SOCIETY
IN	INCH
INSUL	INSULATION
INT	INTERIOR
KCMIL KCM	KILO CIRCULAR MIL
KV	KILOVOLTS
KVA	KILOVOLT AMPERES
KVAR	KILOVOLT AMPERES REACTIVE
KW	KILOWATT
LBS	POUNDS
LRA	LOCKED ROTOR AMPS
LTG	LIGHTING
MAX	MAXIMUM
MECH	MECHANICAL
MCCB	MOLDED CASE CIRCUIT BREAKER
MFR	MANUFACTURER
MG	MOTOR GENERATOR
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
N	NORTH
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NO	NUMBER
NTS	NOT TO SCALE
OCPD	OVERCURRENT PROTECTIVE DEVICE
OD	OUTSIDE DIAMETER
OH	OVERHEAD
OPNG	OPENING
PH	PHASE
PIV	POST INDICATING VALVE
PNL	PANEL
PSI	POUNDS PER SQUARE IN.
QTY	QUANTITY
REC	RECEPTACLE
REFR	REFRIGERATOR
REINF	REINFORCEMENT
REQD	REQUIRED
RFI	RADIO FREQUENCY INTERFERENCE
S	SOUTH
SCHED	SCHEDULE
SCCR	SHORT CIRCUIT CURRENT RATING
SF	SQUARE FOOT (FEET)
SPD	SURGE PROTECTIVE DEVICE
SPDT	SINGLE POLE, DOUBLE THROW
SPEC	SPECIFICATIONS
SPKR	SPEAKER
SQ	SQUARE
STD	STANDARD
STL	STEEL
SW	SWITCH
SWBD	SWITCH BOARD
SYM	SYMMETRICAL
TEL	TELEPHONE
TEMP	TEMPERATURE
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORIES
UPS	UNINTERRUPTIBLE POWER SYSTEM
VFD	VARIABLE FREQUENCY DRIVE
VFC	VARIABLE FREQUENCY CONTROLLER
W	WEST
W/	WITH
W/O	WITHOUT
WHM	WATTHOUR METER
WT	WEIGHT
XFMR	TRANSFORMER

GENERAL DEMO NOTES

A. SEE ARCHITECTURAL SHEETS FOR EXACT AREAS AND WALLS AFFECTED BY THE DEMOLITION AND REMODEL.

B. ITEMS WHICH ARE INTENDED TO BE REMOVED, RELOCATED, OR SALVAGED ARE SHOWN AS FULL-TONE LINES ON DEMO PLANS. ALL OTHER ITEMS ARE INTENDED TO REMAIN IN PLACE AND ARE SHOWN AS HALF-TONE.

C. DEMOLITION SHOWN IS AS REQUIRED FOR THE COMPLETE PROJECT. THE CONTRACTOR SHALL COORDINATE THE DEMOLITION EFFORT PER THE PHASING PLANS. COORDINATE DEMOLITION WITH THE WORK OF OTHER TRADES. PROVIDE TEMPORARY POWER AND LIGHTS AS REQUIRED TO ALLOW THE WORK OF OTHER TRADES TO PROCEED OR AS REQUIRED TO ALLOW THE OWNER TO OCCUPY THE SPACE.

D. ALL OF THE EQUIPMENT AND DEVICES SHOWN ON THIS DRAWING ARE EXISTING. THE LOCATIONS OF THE EQUIPMENT AND DEVICES WERE OBTAINED FROM EXISTING DRAWING AND FIELD INVESTIGATION. THE LOCATIONS OF THE EXISTING EQUIPMENT AND DEVICES ARE SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR. ACCURACY OF THE INFORMATION SHOWN IS NOT GUARANTEED. THE CONTRACTOR IS RESPONSIBLE FOR THE VERIFICATIONS OF ALL EXISTING CONDITIONS PRIOR TO SUBMITTING BIDS. SITE VISITS PRIOR TO SUBMISSION OF BIDS NEED TO BE FULLY COORDINATED WITH THE OWNER.

E. CIRCUIT INFORMATION FOR ALL AFFECTED CIRCUITS SHALL BE VERIFIED PRIOR TO COMMENCING WORK. ACCURACY OF THE INFORMATION SHOWN AND INCLUDED ON THE PANEL SCHEDULES IS NOT GUARANTEED.

F. ALL LUMINAIRES, DEVICES, ASSOCIATED WIRING AND CONDUIT (NOT SHOWN) IN AREAS OF DEMOLITION SHALL BE REMOVED UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL DISCONNECT ALL CIRCUITS AT PANELBOARD, DISCONNECT CONDUIT AT FIRST JOINT DOWN STREAM OF PANEL BOARD AND REMOVE ALL COMPONENTS DOWN STREAM. CONTRACTOR SHALL FIELD VERIFY DEMOLITION REQUIREMENTS AS NECESSARY TO DEVELOP BID.

G. THE OWNER HAS THE RIGHT TO RETAIN ALL SALVAGEABLE MATERIAL. ANY MATERIAL THE OWNER CHOOSES NOT TO ACCEPT SHALL BE REMOVED FROM THE SITE AND PROPERLY DISPOSED OF BY THE CONTRACTOR. CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL OF ANY PCB BALLAST OR HAZARDOUS LAMPS.

H. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE LABELING OF SPARE OR ABANDONED CIRCUITS AND/OR CIRCUIT BREAKERS IN ALL PANELS AFFECTED BY THE DEMOLITION. SPARE CIRCUITS AND/OR CIRCUIT BREAKERS MAY BE REUSED FOR THE CIRCUITING OF THE NEW OR REMODELED AREA AS SPACE AND PANEL LOADING WILL ALLOW.

I. THE CONTRACTOR SHALL BE HELD FULLY RESPONSIBLE FOR THE PROPER RESTORATION OF ALL EXISTING SURFACES REQUIRING PATCHING, PLASTERING, PAINTING AND/OR OTHER REPAIR DUE TO THE DEMOLITION WORK DONE BY THE ELECTRICAL CONTRACTOR, UNDER THE TERMS OF THIS SPECIFICATION. CLOSE AND SEAL ALL OPENINGS, REPAIR ALL SURFACES, ETC., AS REQUIRED.

J. EXISTING FIRE ALARM DEVICES, EMERGENCY LIGHTS AND EXIT SIGNS SHALL BE COMPLETE AND OPERABLE AT ALL TIMES. PROVIDE TEMPORARY DEVICES IN AREAS BEING WORKED ON TO ALLOW FOR A WORKABLE SYSTEM DURING CONSTRUCTION.

K. PROVIDE MINIMUM [2] DAYS ADVANCE NOTICE OF OUTAGES. COORDINATE WITH OWNER FOR ALL ANTICIPATED OUTAGES. OWNER HAS FINAL APPROVAL ON TIME AND EXTENT OF POWER OUTAGE.

L. PROTECT EXISTING FURNITURE, CARPET AND OTHER APPURTENANCES FROM DAMAGE DURING THE COURSE OF CONSTRUCTION. REPLACE DAMAGED ITEMS FREE OF COST TO THE OWNER.

GENERAL NOTES

A. DRAWINGS DO NOT SHOW TOTAL NUMBER OF CONDUCTORS FOR CIRCUITS REQUIRED. PROVIDE THE NUMBER OF CONDUCTORS NEEDED TO COMPLETE INSTALLATION OF SPECIFIC EQUIPMENT FURNISHED. A GREEN GROUND CONDUCTOR, SIZED PER NEC, SHALL ALSO BE INCLUDED IN EACH CIRCUIT. ADJUST CONDUCTOR SIZES AS NEEDED TO LIMIT VOLTAGE DROP TO LEVELS RECOMMENDED BY NEC. THE CONTRACTOR SHALL ALSO COORDINATE INSPECTIONS WITH THE AHJ.

B. SEE ARCHITECTURAL SHEETS FOR REFLECTED CEILING PLANS.

C. ALL CIRCUITS SHALL HAVE SEPARATE NEUTRAL WIRES BUT CAN SHARE AN INSULATED GREEN GROUND WIRE IN MINIMUM 3/4" EMT CONDUIT.

D. NO BOXES SHALL BE MOUNTED BACK TO BACK.

E. CONTRACTOR TO SEAL ALL PENETRATIONS THROUGH FIRE OR FIRE/SMOKE RATED WALLS AND FLOORS.

F. ALL RACEWAYS SHALL BE SEALED AS REQUIRED BY AND IN ACCORDANCE WITH NEC PARAGRAPHS 230.8, 300.5(G) AND 300.7(A). ALL RACEWAYS SHALL BE SEALED AS REQUIRED BY NEC AND NFPA.

G. CABLE AND CONDUIT SHALL NOT INTERFERE WITH EQUIPMENT ACCESS.

H. ALL CABLING ABOVE CEILING SHALL BE PROPERLY SUPPORTED (NOT FROM CEILING SYSTEM).

I. CONTRACTOR SHALL COORDINATE FINAL PANEL DIRECTORIES WITH OWNER.

GENERAL LIGHTING NOTES

A. COORDINATE LOCATION OF SWITCH HEIGHTS WITH CASEWORK, FURNITURE AND EQUIPMENT LAYOUTS PRIOR TO ROUGH-IN. SEE ARCHITECTURAL CASEWORK ELEVATIONS FOR CABINET HEIGHTS AND LAYOUTS.

B. ALL OCCUPANCY SENSORS AND OCCUPANCY SENSOR SWITCHES SHALL BE DUAL TECHNOLOGY (INFRARED AND ULTRASONIC). OCCUPANCY SENSORS DO NOT SHOW RELAYS AND TOTAL WIRING REQUIRED FOR PROPER OPERATION. PROVIDE A COMPLETE AND FULLY FUNCTIONAL SYSTEM.

C. EMERGENCY, EXIT, AND NIGHT LIGHTS IN PATHS OF EGRESS SHALL BE CONNECTED TO AN UNSWITCHED HOT LEG OF CIRCUIT SHOWN UNLESS NOTED OTHERWISE.

D. LIGHTING CONTROL FOR ALL AREAS SHALL BE PROGRAMMED AS MANUAL-ON / AUTOMATIC-OFF UNLESS NOTED OTHERWISE. AUTOMATIC-ON / AUTOMATIC-OFF PERMITTED IN BATHROOMS, CORRIDORS, LOBBIES, SECURITY AREAS, AND AREAS WHERE MANUAL-ON WOULD ENDANGER OCCUPANT SAFETY AS DICTATED BY OWNER.

E. THE LIGHTING SUBMITTALS SHALL BE PREPARED AND SUBMITTED BY AN AUTHORIZED FACTORY REPRESENTATIVE OR THEY WILL BE REJECTED.

GEN. POWER & AUX SYSTEMS NOTES

A. ALL DEVICES SHOWN SHALL BE MOUNTED AT 18" A.F.F. UNLESS INDICATED OTHERWISE.

B. ALL PHONE/DATA JACKS SHOWN SHALL BE ROUGH-IN BOXES AND STUB UP 1" CONDUITS TO ABOVE ACCESSIBLE CEILING. PROVIDE PULL STRING WITH PLASTIC BUSHING. PHONE/DATA DEVICES, FACEPLATES, CABLES, INSTALLATION, AND TERMINATION BY OTHERS. ALL BOXES SHALL HAVE BOX SUPPORTS.

C. ALL AUXILIARY CABLE ABOVE CEILING SHALL BE PLENUM RATED WHERE REQUIRED.

D. CEILING MOUNTED DEVICES SHALL BE CENTERED IN CEILING TILE WHERE INSTALLED IN ACOUSTICAL TILE CEILING.

E. PROVIDE 120 VOLT POWER CIRCUIT(S) FOR AUXILIARY SYSTEMS AS REQUIRED FOR COMPLETE AND OPERATIONAL SYSTEMS.

F. PROVIDE NEW FIRE ALARM DEVICES AT LOCATIONS SHOWN, AND CONNECT TO EXISTING FIRE ALARM SYSTEM. ALL NEW FIRE ALARM DEVICES MUST BE UL LISTED AND LABELED FOR USE WITH THE EXISTING FIRE ALARM PANEL AND APPROVED BY THE FIRE ALARM PANEL MANUFACTURER. COORDINATE DEVICE MODEL AND INSTALLATION WITH EXISTING CONDITIONS. VERIFY FIRE ALARM HORN/STROBE SPACING REQUIREMENTS WITH MANUFACTURER AND NFPA REQUIREMENTS, AND ADD ADDITIONAL HORN/STROBE UNITS AS NEEDED.

REF. DEMO NOTES (DX)

PROJECT ELECTRICAL REFERENCED DEMOLITION NOTES

D1 DISCONNECT AND REMOVE EXISTING LUMINAIRES, ASSOCIATED SWITCHING TO REMAIN FOR CONTROL OF NEW LUMINAIRES.

REF. NOTES (X)

PROJECT ELECTRICAL REFERENCED NOTES

1 LUMINAIRES WITHIN BOUNDARY SHALL BE CONNECTED TO PANEL AND CIRCUIT SHOWN.
2 ALL ELECTRICAL METHODS AND MATERIALS SHALL BE SUITABLE FOR USE IN WET LOCATIONS.
3 CONNECT NEW LUMINAIRES TO EXISTING SWITCHING TO REMAIN.
20 PROPOSED CONDUIT ROUTING FOR MASTER CONTROL PANEL (MCP-1) FEEDER, INSTALL TIGHT TO STRUCTURE.
21 ALL ELECTRICAL METHODS AND MATERIALS SHALL BE SUITABLE FOR USE IN WET LOCATIONS.
22 CONNECT PHOTO EYE TO MAIN CONTROL PANEL (MCP-1) IN STORAGE 204. USE #12 AWG CONDUCTORS, QUANTITY AS DESCRIBED BY MANUFACTURER INSTRUCTIONS. USE 1/2" CONDUIT.
23 CONNECT TANK FILL SOLENOID TO MAIN CONTROL PANEL (MCP-1) IN STORAGE 204. USE #12 AWG CONDUCTORS, QUANTITY AS DESCRIBED BY MANUFACTURER INSTRUCTIONS. USE 1/2" CONDUIT.
24 CONNECT HIGH PRESSURE COAX VALVE TO MAIN CONTROL PANEL (MCP-1) IN STORAGE 204. USE #12 AWG CONDUCTORS, QUANTITY AS DESCRIBED BY MANUFACTURER INSTRUCTIONS. USE 1/2" CONDUIT.
25 CONNECT CHEMICAL SIDE & REAR SPRAY SOLENOID TO MAIN CONTROL PANEL (MCP-1) IN STORAGE 204. USE #12 AWG CONDUCTORS, QUANTITY AS DESCRIBED BY MANUFACTURER INSTRUCTIONS. USE 1/2" CONDUIT.
26 CONNECT TANK FLOAT LEVEL SWITCHES TO MAIN CONTROL PANEL (MCP-1) IN STORAGE 204. USE #12 AWG CONDUCTORS, QUANTITY AS DESCRIBED BY MANUFACTURER INSTRUCTIONS. USE 1/2" CONDUIT.
27 CONNECT RED/GREEN TRAFFIC LIGHT TO MAIN CONTROL PANEL (MCP-1) IN STORAGE 204. USE #12 AWG CONDUCTORS, QUANTITY AS DESCRIBED BY MANUFACTURER INSTRUCTIONS. USE 1/2" CONDUIT.

ELECTRICAL SHEET LIST

E 00 ELECTRICAL INFO SHEET
E 01 ELECTRICAL SPECIFICATIONS
E 02 ELECTRICAL SPECIFICATIONS
E001 FLOOR PLANS - DEMOLITION
E101 FLOOR PLANS - LIGHTING
E201 FLOOR PLANS - POWER
E601 LUMINAIRE & EQUIPMENT SCHEDULES

DESIGNED: JMM
DRAWN: NJP
CHECKED: JMM
ISSUE DATE: 06/17/2026
REVISIONS:

No.:	DATE:	BY:	DESCRIPTION:

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PROFESSIONAL ARCHITECTURAL ENGINEER
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OMAHA PUBLIC SCHOOLS
TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
3833 N 72ND STREET
OMAHA, NE 68134
ELECTRICAL INFO SHEET

PROJECT NO.: 011343.001

E 00

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6/17/2026 3:15:48 PM

011343001-7-E 00 ELECTRICAL INFO SHEET

DIVISION 26 - ELECTRICAL

SECTION 26-05-00 - COMMON RESULTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Sections Included: Refer to Table of Contents.

1.3 REFERENCES

A. National Electrical Contractors Association (NECA).
B. National Electrical Manufacturer's Association (NEMA).
C. National Electrical Testing Association (NETA).
D. National Fire Protection Association (NFPA).
1. NFPA 70 – National Electrical Code.

1.4 DEFINITIONS

A. See info sheet.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following products.
1. Lighting Control Devices.
2. Panelboards and Circuit Breakers.
3. Wiring Devices.
4. Enclosed Switches.
5. Lighting.
B. Shop Drawings: For each of the following products.
1. Lighting Control Devices.
2. Panelboards and Circuit Breakers.
3. Enclosed Switches.
C. Submittals shall be grouped and submitted by spec section or they will be rejected.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each of the following products.
1. Lighting Control Devices.
2. Panelboards and Circuit Breakers.
3. Wiring Devices.
4. Enclosed Switches.
5. Lighting.
B. A single submittal containing all O&M data submitted under Section 260500 "Common Results" preferred.

1.7 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. Keys: Two spares for each type of panelboard cabinet lock.
2. Circuit Breakers Including GFCI Types: Two spares for each panelboard.
3. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
4. Indicating Lights: Two of each type and color installed.
5. Auxiliary Contacts: Furnish one spare(s) for each size and type of magnetic controller installed.
6. Power Contacts: Furnish three spares for each size and type of magnetic contactor installed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store equipment indoors in clean, dry space with uniform temperature to prevent condensation. Protect controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.9 FIELD CONDITIONS

A. Environmental Limitations:
1. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.
b. Altitude: Not exceeding 6600 feet.
B. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.
C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
1. Notify Owner no fewer than seven days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Owner's written permission.
3. Comply with NFPA 70E.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace the following products that fail in materials or workmanship within a period of one year from date of substantial completion.
1. Panelboards and Circuit Breakers.
2. Enclosed Switches.
B. Special Warranty: Manufacturer's standard form in which Manufacturer agrees to repair or replace the following products that fail in materials or workmanship within specified warranty period from date of substantial completion. Full warranty shall apply for the entire warranty period.
1. Lighting Control Devices: Two years.
2. Lighting: Five years.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Source Limitations: Obtain electrical gear, components, and accessories, within same product category, from single manufacturer.
B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
D. Comply with NFPA 70.
E. All electrical materials shall be new. Use of reconditioned, remanufactured, or second-hand materials is not permitted without prior written approval from the Engineer.

2.2 EQUIPMENT MANUFACTURERS

A. Applies to the following products:
1. Panelboards and Circuit Breakers.
2. Enclosed Switches.
B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. ABB/GE.
2. Eaton.
3. Siemens.
4. Square D.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with the following standards for application and installation requirements, except where requirements on drawings or specifications are stricter:
1. NECA 1.
2. NEMA 101.
3. NFPA 70.

3.2 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Provide enclosures at installed locations with the following environmental ratings.
1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

3.3 FIELD QUALITY CONTROL

A. Perform standard NETA ATS tests and inspections for the following products:
1. Low-Voltage Power and Control Conductors and Cables.
2. Grounding and Bonding.
3. Panelboards.
4. Circuit Breakers (including GFCI).
C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections for the following products:
1. Lighting Control Devices.
D. Perform the following tests and inspections for wiring devices:
1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault-current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
E. Perform the following tests and inspections for lighting:
1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
F. Products will be considered defective if they do not pass tests and inspections.
G. Prepare test and inspection reports to record the following:
1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

3.4 STARTUP SERVICE

A. Complete startup checks according to manufacturer's written instructions for the following products:
1. Lighting.
a. Charge emergency power units and batteries minimum of one hour and depress switch to conduct short-duration test.
b. Charge emergency power units and batteries minimum of 24 hours and conduct one-hour discharge test.
B. Engage a factory-authorized service representative to perform startup service for the following products:
1. Lighting Control Devices.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting, lighting control devices, and relay-based lighting control to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the following products:
1. Lighting Control Devices.

3.7 SIGNS

A. Warning signs: Baked-Enamel Signs.
B. Warning signs shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
3. Entrances to dedicated Electrical Rooms: "DANGER - ELECTRICAL ROOM – NO STORAGE PERMITTED."

3.8 LABELS

A. Equipment Labels: Laminated acrylic sign.
B. Equipment to be labeled including existing to remain equipment :
1. Panelboards.
2. Enclosures and electrical cabinets.
3. Access doors and panels for concealed electrical items.
4. Emergency system boxes and enclosures.
5. Enclosed switches.
6. Push-button stations.
7. Monitoring and control equipment.

SECTION 26-05-19 - LOW-VOLTAGE POWER AND CONTROL CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Copper building wire rated 600 V or less.
2. Fire-alarm wire and cable.
3. Connectors, splices, and terminations rated 600 V and less.

PART2 - PRODUCTS

2.1 - COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
B. Standards:
1. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors. Minimum sizes as follows:
1. Power Circuits: No. 12 AWG.
2. Class 1 remote-control and signal circuits; No 14 AWG.
3. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
4. Class 3 low-energy, remote-control, alarm, and signal circuits; No 12 AWG.
D. Conductor Insulation:
1. Type THHN and Type THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.
E. VFD Cable: As shown on drawings.

2.2 FIRE-ALARM WIRE AND CABLE

A. Signaling Line Circuits: Twisted, shielded pair, not less than size as recommended by system manufacturer.
B. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.
1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.
2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.

2.3 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated.
B. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
1. Material: Copper.
2. Type: Two hole with long barrels.
3. Termination: Compression.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Copper: Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger. No. 12 AWG minimum.
B. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type XHHW-2, single conductors in raceway.
B. Feeders and Branch Circuits: Type THHN/THWN-2, single conductors in raceway.
C. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
D. Fire-alarm circuits and equipment control wiring associated with fire-alarm system shall be installed in a dedicated pathway system. This system shall not be used for any other wire or cable.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
B. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

3.4 INSTALLATION OF FIRE-ALARM WIRING

A. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
B. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes; cabinets; or equipment enclosures where circuit connections are made.
C. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

3.5 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

SECTION 26-05-26 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Comply with UL 467 for grounding and bonding materials and equipment

2.2 CONDUCTORS

A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
B. Bare Copper Conductors:
1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
C. Grounding Bus: As shown on drawings.

2.3 CONNECTORS

A. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
B. Bus-Bar Connectors: Compression type, copper, long-barrel, two-bolt connection to ground bus bar.
C. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
D. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
E. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.
F. Conduit Hubs: Mechanical type, terminal with threaded hub.
G. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
H. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
I. Water Pipe Clamps:
1. Mechanical type, two pieces with stainless-steel bolts.
a. Material: Bronze.
b. Listed for direct burial.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 5/8 by 96 inches.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
B. Conductor Terminations and Connections:
1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.
B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. Use exothermic welds for all below-grade connections.
3. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
C. Bonding Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
D. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.
E. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

SECTION 26-05-29 - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Steel slotted support systems.
2. Conduit and cable support devices.
3. Support for conductors in vertical conduit.
4. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.
1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
2. Material for Channel, Fittings, and Accessories: Galvanized steel.
3. Channel Width: 1-5/8 inches.
B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F 3125/F 3125M,Grade A325.
5. Toggle Bolts: All-steel springhead type.
6. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

A. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT and GRC as required by NFPA 70. Minimum rod size shall be 1/2 inch in diameter.
B. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
1. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

A. Raceway Support Methods: In addition to methods described in NECA 1, EMT and GRC may be supported by openings through structure members, according to NFPA 70.
B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

SECTION 26-05-33 - ABOVEGROUND RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Metal conduits and fittings.
2. Boxes, enclosures, and cabinets.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:
1. GRC: Comply with ANSI C80.1 and UL 6.
2. EMT: Comply with ANSI C80.3 and UL 797.
3. FMC: Comply with UL 1; zinc-coated steel.
4. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
B. Metal Fittings:
1. Comply with NEMA FB 1 and UL 514B.
2. Fittings, General: Listed and labeled for type of conduit, location, and use.
3. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
4. Fittings for EMT:
a. Material: Steel.
b. Type: Setscrew or compression.
C. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
D. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
E. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.
F. Floor Boxes and Poke-Thru Devices: As specified on drawings.
G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
J. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
K. Gangable boxes are prohibited.
L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Fiberglass.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Underground Conduit: Comply with Section 260543 "Underground Raceways and Boxes".
2. All Others: GRC.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
B. Indoors: Apply raceway products as specified below unless otherwise indicated:
1. Damp, Wet, or Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
a. Loading dock.
b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
c. Mechanical rooms.
d. Gymnasiums.
2. All Others: EMT or GRC.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
C. Embedded in Slab: Comply with Section 260543 "Underground Raceways and Boxes.
D. Minimum Raceway Size: 3/4-inch trade size.
E. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. GRC: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

3.2 INSTALLATION

A. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
B. Do not fasten conduits onto the bottom side of a metal deck roof.
C. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
D. Complete raceway installation before starting conductor installation.
E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
F. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
G. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
H. Support conduit within 12 inches of enclosures to which attached.
I. Stub-Ups to Above Recessed Ceilings:
1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
K. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
L. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
M. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
N. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
P. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
Q. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Conduit extending from interior to exterior of building.
4. Conduit extending into pressurized duct and equipment.
5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
6. Where otherwise required by NFPA 70.
R. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 36 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
S. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
T. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
U. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
V. Locate boxes so that cover or plate will not span different building finishes.
W. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
X. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
Y. Set metal floor boxes level and flush with finished floor surface.

3.3 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.
1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

SECTION 26-05-43 - UNDERGROUND RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Nonmetallic conduits and fittings.
2. Polymer concrete handholes and boxes with polymer concrete cover.

PART 2 - PRODUCTS

2.1 NONMETALLIC CONDUITS AND FITTINGS

A. Nonmetallic Conduit:
1. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
B. Nonmetallic Fittings:
1. Fittings RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
2. Solvents and Adhesives: As recommended by conduit manufacturer.

2.2 POLYMER CONCRETE HANDHOLES AND BOXES WITH POLYMER CONCRETE COVER

A. Description: Molded of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two.
B. Standard: Comply with SCTE 77. Comply with tier requirements in "Underground Enclosure Application" Article.
C. Color: Gray.
D. Configuration: Units shall be designed for flush burial and have open bottom unless otherwise indicated.
E. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
F. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
G. Cover Legend: Molded lettering, as indicated for each service.
H. Handholes 12 inches wide by 24 inches long and larger shall have factory-installed inserts for cable racks and pulling-in irons.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate layout and installation of underground conduits, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Notify Architect if there is a conflict between areas of excavation and existing structures or archaeological sites to remain.

3.2 RACEWAY APPLICATION

A. RNC unless otherwise indicated.
B. Stub-ups: GRC.
C. Minimum Raceway Size: 1-inch trade size.

3.3 UNDERGROUND ENCLOSURE APPLICATION

A. Handholes and Boxes for 600 V and Less:
1. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15 structural load rating.
2. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Polymer concrete units, SCTE 77, Tier 8 structural load rating.
3. Cover design load shall not exceed the design load of the handhole or box.

3.4 UNDERGROUND RACEWAY INSTALLATION

A. Where indicated on Drawings, install conduits, spacers, and accessories as shown.
B. Joints: Use solvent-cemented joints in duct and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent duct do not lie in same plane.
C. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.
D. Pulling Cord: Install 200-lbf-test nylon cord in empty ducts.
E. Raceways Embedded in Slabs:
1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from RNC to GRC before rising above floor.

3.5 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. As shown on drawings.

3.6 CLEANING

A. Clean and lubricant underground raceways.

SECTION 26-05-44 - SLEEVES AND SLEEVE SEALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:
1. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
C. Sleeves for Rectangular Openings:
1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:
a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
1. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
C. Design Mix: 5000-psi, 28-day compressive strength.
D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
b. Seal space outside of sleeves with mortar or

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
C. Secure nailing flanges to concrete forms.
D. Using grout, seal the space around outside of sleeve-seal fittings.

SECTION 26-05-53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Tapes and stencils.
4. Signs.
5. Paint for identification.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1 and IEEE C2.
B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
C. Comply with ANSI Z535.4 for safety signs and labels.
D. Comply with NFPA 70E requirements for arc-flash warning labels.
E. Address-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:
1. Black letters on an orange field.
2. Legend: Indicate voltage.
B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
2. Colors for 208/120-V Circuits:
a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.
d. Neutral: White with phase tracer.
3. Colors for 240-V Circuits:
a. Phase A: Black.
b. Phase B: Red.
c. Neutral: White with phase tracer.
4. Colors for 480/277-V Circuits:
a. Phase A: Brown.
b. Phase B: Orange.
c. Phase C: Yellow.
d. Neutral: Gray with phase tracer.
5. Color for Equipment Grounds: Green.

2.3 LABELS

A. Self-Adhesive Wraparound Labels: Preprinted, 3-mil-thick, vinyl flexible label with acrylic pressure-sensitive adhesive.
1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
2. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.
B. Self-Adhesive Labels: Polyester, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
1. Minimum Nominal Size:
a. 1-1/2 by 6 inches for raceway and conductors.
b. 3-1/2 by 5 inches for equipment.

2.4 TAPES AND STENCILS

A. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.
B. Tape and Stencil: 4-inch-wide black stripes on 10-inch centers placed diagonally over yellow background and are 12 inches wide. Stop stripes at legends.
C. Underground-Line Warning Tape:
1. Tape:
a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
b. Printing on tape shall be permanent and shall not be damaged by burial operations.
c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
2. Color and Printing:
a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
b. Inscriptions for Red-Colored Tapes: Per project.
c. Inscriptions for Orange-Colored Tapes: Per project.

2.5 SIGNS

A. Baked-Enamel Signs:
1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches.
B. Laminated Acrylic or Melamine Plastic Signs:
1. Engraved legend.
2. Thickness:
a. For signs up to 20 sq. in., minimum 1/16 inch thick.
b. For signs larger than 20 sq. in., 1/8 inch thick.
c. Engraved legend with black letters on white face.
d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.
e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
B. Install identifying devices before installing acoustical ceilings and similar concealment.
C. Verify identity of each item before installing identification products.
D. Apply identification devices to surfaces that require finish after completing finish work.
E. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
F. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit.
1. Secure tight to surface of conductor, cable, or raceway.
G. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
H. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
I. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.
J. Self-Adhesive Labels:
1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
K. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.
L. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.
M. Underground Line Warning Tape: As shown on drawings.
N. Baked-Enamel Signs and Laminated Acrylic Signs:
1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on minimum 1-1/2-inch-high sign; where two lines of text are required, use signs minimum 2 inches high.

3.3 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
C. Accessible Raceways, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.
1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage.
E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive wraparound labels or self-adhesive vinyl tape to identify the phase.
1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive wraparound labels with the conductor or cable designation, origin, and destination.
G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive wraparound labels with the conductor designation.
H. Auxiliary Electrical Systems Conductor Identification: Self-adhesive wraparound labels that is uniform and consistent with system used by manufacturer for factory-installed connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
I. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
J. Workspace Indication: Apply tape and stencil to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
K. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
L. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.
1. Apply to exterior of door, cover, or other access.
2. For equipment with multiple power or control sources, apply to door or cover of equipment.
M. Arc Flash Warning Labeling: Self-adhesive labels.
N. Operating Instruction Signs: Baked-enamel warning signs.

SECTION 26-09-23 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Ceiling-mounted occupancy and vacancy sensors.
2. Switchbox-mounted occupancy and vacancy sensors.

PART 2 - PRODUCTS

2.1 CEILING-MOUNTED OCCUPANCY AND VACANCY SENSORS

A. Description: As specified on drawings.

2.2 SWITCHBOX-MOUNTED OCCUPANCY AND VACANCY SENSORS

A. Description: As specified on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.
B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SENSOR INSTALLATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

3.3 WIRING INSTALLATION

A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power and Control Conductors and Cables." Minimum conduit size is 1/2 inch.
B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

A. Identify components and power and control wiring.
1. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

SECTION 26-24-16 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Distribution panelboards (Power Panels).
2. Lighting and appliance branch-circuit panelboards (Branch Panels).
3. Load centers.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

A. Comply with NEMA PB 1.
B. Power Panels: NEMA PB 1, distribution type.
C. Branch Panels: NEMA PB 1, lighting and appliance branch-circuit type.
D. Load Centers: Comply with UL 67.
E. Enclosures: Flush and Surface-mounted, dead-front cabinets.
1. Height: 84 inches maximum.
2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
3. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
4. Finishes:
a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
b. Back Boxes: Galvanized steel.
F. Mains: Circuit breaker or Lugs only.
G. Incoming Mains:
1. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.
H. Branch Overcurrent Protective Devices:
1. Power Panels: Plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
2. Branch Panels: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
3. Load Centers: Plug-in circuit breakers, replaceable without disturbing adjacent units.
I. Phase, Neutral, and Ground Buses:
1. Material: Tin-plated aluminum.
a. Plating shall run entire length of bus.
b. Bus shall be fully rated the entire length.
2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.
J. Conductor Connectors: Suitable for use with conductor material and sizes.
1. Material: Tin-plated aluminum or Hard-drawn copper, 98 percent conductivity.
2. Terminations shall allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
6. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
7. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
K. Service Equipment: Panelboards or load centers shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices.
L. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.
1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.
2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical.

2.2 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers:
a. Inverse time-current element for low-level overloads.
b. Instantaneous magnetic trip element for short circuits.
c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Electronic Trip Circuit Breakers:
a. RMS sensing.
b. Field-replaceable rating plug or electronic trip.
c. Digital display of settings, trip targets, and indicated metering displays.
d. Multi-button keypad to access programmable functions and monitored data.
e. Ten-event, trip-history log. Each trip event shall be recorded with type, phase, and magnitude of fault that caused the trip.
f. Integral test jack for connection to portable test set or laptop computer.
g. Field-Adjustable Settings: As shown on drawings.
3. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
4. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
5. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
6. Subfeed Circuit Breakers: Vertically mounted.
7. MCCB Features and Accessories:
a. Standard frame sizes, trip ratings, and number of poles.
b. Breaker handle indicates tripped status.
c. UL listed for reverse connection without restrictive line or load ratings.
d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
e. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
f. Rating Plugs: Three-pole breakers with ampere ratings greater than 150 amperes shall have interchangeable rating plugs or electronic adjustable trip units.
g. Multipole units enclosed in a single housing with a single handle.
h. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.

2.3 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
C. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.
1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.
B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.
D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
B. Install panelboards and accessories according to NEMA PB 1.1.
C. Equipment Mounting:
1. Attach panelboard to the vertical finished or structural surface behind the panelboard.
D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
E. Mount top of trim 90 inches above finished floor unless otherwise indicated.
F. Mount panelboard cabinet plumb and rigid without distortion of box.
G. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
H. Mount surface-mounted panelboards to steel slotted supports. Orient steel slotted supports vertically.
I. Install overcurrent protective devices and controllers not already factory installed.
1. Set field-adjustable, circuit-breaker trip ranges.
2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.
J. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
K. Install filler plates in unused spaces.
L. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

3.3 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
B. Set field-adjustable circuit-breaker trip ranges as indicated.

SECTION 26-27-26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Standard-grade receptacles, 125 V, 20 A.
2. GFCI receptacles, 125 V, 20 A.
3. Toggle switches, 120/277 V, 20 A.
4. Wall-box dimmers.
5. Wall plates.
6. Floor service fittings.
7. Poke-through assemblies.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Comply with NEMA WD 1.
B. Device Color:
1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Essential Electrical System: Red.
C. Wall Plate Color: For plastic covers, match device color.

2.2 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

A. Tamper-Resistant Duplex Receptacles, 125 V, 20 A:
1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498 and FS W-C-596.
4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

2.3 GFCI RECEPTACLES, 125 V, 20 A

A. Tamper-Resistant Duplex GFCI Receptacles, 125 V, 20 A:
1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Type: Non-feed through.
4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.
5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.
B. Tamper- and Weather-Resistant, GFCI Duplex Receptacles, 125 V, 20 A:
1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Type: Non-feed through.
4. Standards: Comply with UL 498 and UL 943 Class A.
5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

2.4 TOGGLE SWITCHES, 120/277 V, 20 A

A. Standards: Comply with UL 20 and FS W-S-896.

2.5 WALL-BOX DIMMERS

A. Description: As specified on drawings.

2.6 WALL PLATES

A. Single Source: Obtain wall plates from same manufacturer of wiring devices.
B. Single and combination types shall match corresponding wiring devices.
1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact Nylon or 0.035-inch-thick, satin-finished, Type 302 stainless steel.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.7 FLOOR SERVICE FITTINGS

A. Description: As specified on drawings

2.8 POKE-THROUGH ASSEMBLIES

A. Description: As specified on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
B. Coordination with Other Trades:
1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes, and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.
C. Conductors:
1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall comply with NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
a. Cut back and pigtail, or replace all damaged conductors.
b. Straighten conductors that remain and remove corrosion and foreign matter.
c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.
D. Device Installation:
1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.
F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
G. Dimmers:
1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan-speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device, listing conditions in the written instructions.
H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Identify each receptacle with panelboard identification and circuit number. Use machine printed, self-adhesive labels on face of plate, and durable wire markers or tags inside outlet boxes.

SECTION 26-28-16 - ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fusible switches.
2. Nonfusible switches.
3. Accessories.
4. Enclosures.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

A. Type HD, Heavy Duty, Three Pole, Single Throw, 240 or 600-V ac: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

2.2 NONFUSIBLE SWITCHES

A. Type GD, General Duty, Three Pole, Single Throw, 240-V ac: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
B. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

2.3 ACCESSORIES:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120-V ac.
5. Lugs: Mechanical type, suitable for number, size, and conductor material.
6. Service-Rated Switches: Labeled for use as service equipment.

2.4 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
B. Enclosure Finish: The enclosure shall be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1); gray baked enamel paint, electrodeposited on cleaned, phosphatized galvannealed steel (NEMA 250 Types 3R, 12); a brush finish on Type 304 stainless steel (NEMA 250 Type 4-4X stainless steel); copper-free cast aluminum alloy (NEMA 250 Types 7, 9).
C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.
D. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.
1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.2 INSTALLATION

A. Coordinate layout and installation of switches and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
C. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
D. Install fuses in fusible devices.

3.3 ADJUSTING

A. Adjust moving parts and operable components to function smoothly,and lubricate as recommended by manufacturer.

SECTION 26-51-19 - LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following types of LED luminaires:
1. Luminaires.
2. Luminaire supports.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. As specified in luminaire schedule.
B. Alternate Luminaires: Use of equivalent alternate luminaires must be approved by the Engineer. Approval will be based on appearance, wattage, luminous output, distribution pattern, CCT, type of construction, and materials of construction. Approval of equivalent alternate luminaires requires submittal of manufacturer's datasheets clearly marked to show intended options to be furnished and lighting calculations to enable comparison to Engineer's lighting design. Failure to meet these requirements will result in rejection of alternate luminaires.

2.2 LUMINAIRE SUPPORT

A. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
B. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.
C. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
D. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
C. Examine walls, roofs, canopy ceilings, and overhang ceilings for suitable conditions where luminaires will be installed.
D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3 INSTALLATION

A. Install luminaires level, plumb, and square with ceilings, walls, and finished grade unless otherwise indicated.
B. Install lamps in each luminaire.
C. Coordinate layout and installation of luminaires with other construction.
D. Supports:
1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
E. Flush-Mounted Luminaires:
1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.
F. Wall-Mounted Luminaires:
1. Attached to structural members in walls or attached to a backing plate attached to wall structural members.
a. 20 gauge: interior applications.
b. 10 gauge: exterior applications.
2. Do not attach luminaires directly to gypsum board.
G. Suspended Luminaires:
1. Ceiling Mount:
a. As specified in luminair schedule.
2. Pendant and Rods: Where longer than 48 inches, brace to limit swinging.
3. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
4. 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.
5. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.
H. Ceiling-Grid-Mounted Luminaires:
1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.

DESIGNED:	JMM	ISSUE DATE:	06/17/2026
DRAWN:	NJP	REVISIONS:	
CHECKED:	JMM	No.:	DATE: BY: DESCRIPTION:

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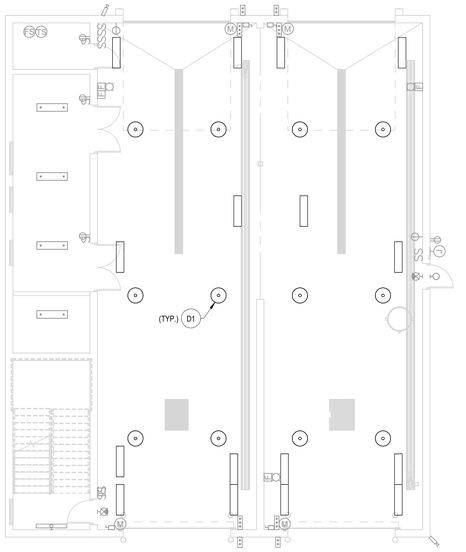
OMAHA PUBLIC SCHOOLS
TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
3833 N 72ND STREET
OMAHA, NE 68134
ELECTRICAL SPECIFICATIONS

PROJECT NO.: 011343.001

E 02

REF. DEMO NOTES (DX):

D1 DISCONNECT AND REMOVE EXISTING LUMINAIRES, ASSOCIATED SWITCHING TO REMAIN FOR CONTROL OF NEW LUMINAIRES.



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

NORTH

DESIGNED: JMM
DRAWN: NJP
CHECKED: JMM

ISSUE DATE: 06/17/2026

REVISIONS:

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TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
3833 N 72ND STREET
OMAHA, NE 68134
FLOOR PLANS - DEMOLITION

PROJECT NO.: 011343.001

E001

ALL LUMINAIRES SHOWN SHALL BE CIRCUITED AS OUTLINED IN THIS NOTE. UNLESS INDICATED OTHERWISE. PANELBOARD CIRCUITING IS DELINEATED WITH A DASH-DOT LINE BOUNDARY, WITH PANELBOARD NAMES AND CIRCUIT NUMBERS IDENTIFIED AT BOUNDARY LINE. REFER TO PANEL SCHEDULES FOR ADDITIONAL INFORMATION.
CIRCUITING AND LOW-VOLTAGE WIRING BETWEEN LUMINAIRES, OCCUPANCY SENSORS, PUSH BUTTON STATIONS, SWITCHES, POWER PACKS, ETC. OMITTED WHERE CONTROL SCHEME IS APPARENT OR DETAILED. CONTROL SHALL BE BY OCCUPANCY SENSOR / CONTROL DEVICE(S) IN SAME REGION / ZONE AS ASSOCIATED LUMINAIRES AND SHALL NOT TRANSCEND REGION / ZONE UNLESS NOTED OTHERWISE. (A REGION / ZONE IS A SPACE BOUND BY FLOORS, WALLS, AND CEILINGS. REGION / ZONE MAY BE FURTHER IDENTIFIED BY A DASHED LINE BOUNDARY, OR WITH A LOWERCASE LETTER FOR CLARITY).

PANELBOARD CIRCUITING

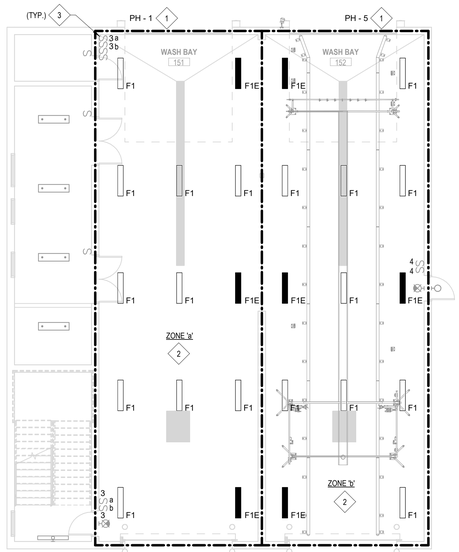
REGION / ZONE

REF. NOTES (X):

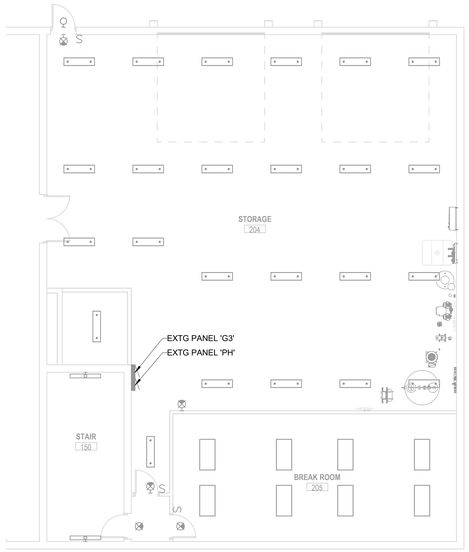
1 LUMINAIRES WITHIN BOUNDARY SHALL BE CONNECTED TO PANEL AND CIRCUIT SHOWN.

2 ALL ELECTRICAL METHODS AND MATERIALS SHALL BE SUITABLE FOR USE IN WET LOCATIONS.

3 CONNECT NEW LUMINAIRES TO EXISTING SWITCHING TO REMAIN.



1 FIRST FLOOR PLAN - LIGHTING
SCALE: 1/8" = 1'-0"



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

NORTH

DESIGNED: JMM
DRAWN: NJP
CHECKED: JMM

ISSUE DATE: 06/17/2026
REVISIONS:

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TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
3833 N 72ND STREET
OMAHA, NE 68134
FLOOR PLANS - LIGHTING

PROJECT NO.: 011343.001

E101

ALL POWERED RECEPTACLES, DEVICES, AND EQUIPMENT SHOWN SHALL BE CIRCUITED AS OUTLINED IN THIS NOTE, UNLESS INDICATED OTHERWISE. PANELBOARD CIRCUITING, INCLUDING IDENTIFYING SEPARATE PANELBOARDS' BRANCH CIRCUIT AREAS, IS DELINEATED WITH A DASH-DOT LINE BOUNDARY, WITH PANEL NAMES IDENTIFIED AT BOUNDARY LINE. CIRCUIT NUMBERS ARE IDENTIFIED ADJACENT TO RECEPTACLE, DEVICE, OR EQUIPMENT. REFER TO PANEL SCHEDULES FOR ADDITIONAL INFORMATION.

PANELBOARD CIRCUITING

REF. NOTES (X):

20 PROPOSED CONDUIT ROUTING FOR MASTER CONTROL PANEL (MCP-1) FEEDER. INSTALL TIGHT TO STRUCTURE.

21 ALL ELECTRICAL METHODS AND MATERIALS SHALL BE SUITABLE FOR USE IN WET LOCATIONS.

22 CONNECT PHOTO EYE TO MAIN CONTROL PANEL (MCP-1) IN STORAGE 204. USE #12 AWG CONDUCTORS, QUANTITY AS DESCRIBED BY MANUFACTURER INSTRUCTIONS. USE 1/2" CONDUIT.

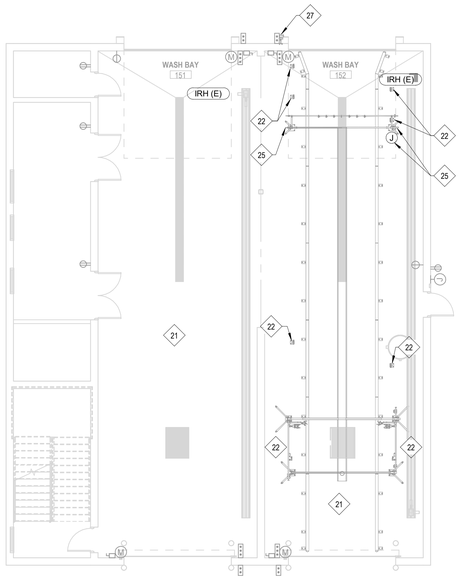
23 CONNECT TANK FILL SOLENOID TO MAIN CONTROL PANEL (MCP-1) IN STORAGE 204. USE #12 AWG CONDUCTORS, QUANTITY AS DESCRIBED BY MANUFACTURER INSTRUCTIONS. USE 1/2" CONDUIT.

24 CONNECT HIGH PRESSURE COAX VALVE TO MAIN CONTROL PANEL (MCP-1) IN STORAGE 204. USE #12 AWG CONDUCTORS, QUANTITY AS DESCRIBED BY MANUFACTURER INSTRUCTIONS. USE 1/2" CONDUIT.

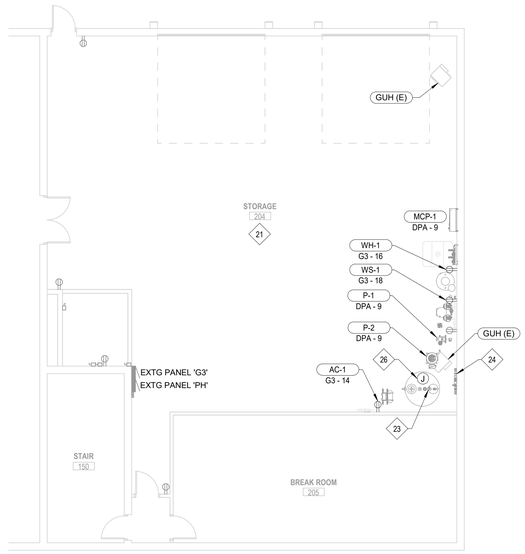
25 CONNECT CHEMICAL SIDE & REAR SPRAY SOLENOID TO MAIN CONTROL PANEL (MCP-1) IN STORAGE 204. USE #12 AWG CONDUCTORS, QUANTITY AS DESCRIBED BY MANUFACTURER INSTRUCTIONS. USE 1/2" CONDUIT.

26 CONNECT TANK FLOAT LEVEL SWITCHES TO MAIN CONTROL PANEL (MCP-1) IN STORAGE 204. USE #12 AWG CONDUCTORS, QUANTITY AS DESCRIBED BY MANUFACTURER INSTRUCTIONS. USE 1/2" CONDUIT.

27 CONNECT RED/GREEN TRAFFIC LIGHT TO MAIN CONTROL PANEL (MCP-1) IN STORAGE 204. USE #12 AWG CONDUCTORS, QUANTITY AS DESCRIBED BY MANUFACTURER INSTRUCTIONS. USE 1/2" CONDUIT.



1 FIRST FLOOR PLAN - POWER
SCALE: 1/8" = 1'-0"



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



3 OVERALL FLOOR PLAN - POWER
SCALE: 1/8" = 1'-0"

NORTH

DESIGNED: JMM
DRAWN: NJP
CHECKED: JMM

ISSUE DATE: 06/17/2026
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TRANSPORTATION NORTH BUS WASH INFRASTRUCTURE
3833 N 72ND STREET
OMAHA, NE 68134
FLOOR PLANS - POWER

PROJECT NO.: 011343.001

E201

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EQUIPMENT SCHEDULE

DEVICE	DEVICE DESCRIPTION	VOLTAGE	PH	KW	FLA	HP	STARTER / DISCONNECT TYPE	STARTER / DISCONNECT SIZE	STARTER / DISCONNECT FUSE	PLUG CONFIG	RECEPT CONFIG	FEEDER SIZE	NOTES
AC-1	AIR COMPRESSOR	120 V	1	-	-	-	PLUG		-	5-20P	5-20R	2#12, 1#12G - 3/4"C	3
MCP-1	MASTER CONTROL PANEL	208 V	3	-	-	-	INT	-	-	-	-	3#4/0, 1#4G - 2"C	2
P-1	PUMP	208 V	3	-	-	1	INT	-	-	-	-	3#12, 1#12G - 3/4"C	1
P-2	PUMP	208 V	3	-	-	60	INT	-	-	-	-	3#4/0, 1#4G - 2"C	1
WH-1	WATER HEATER	120 V	1	-	-	-	PLUG	-	-	5-20P	5-20R	2#12, 1#12G - 3/4"C	3
WS-1	WATER SOFTENER	120 V	1	-	-	-	PLUG	-	-	5-20P	5-20R	2#12, 1#12G - 3/4"C	3

GENERAL EQUIPMENT SCHEDULE NOTES:

A. THIS SCHEDULE DISPLAYS SIZING INFORMATION THAT IS GENERIC IN NATURE. SCHEDULE DOES NOT ITEMIZE ALL INSTANCES OF EQUIPMENT. CONTRACTOR SHALL REFER TO THE PLANS FOR FINAL QUANTITIES AND LOCATIONS.

B. MOUNT ALL DISCONNECTS AND STARTERS ON ASSOCIATED EQUIPMENT UNLESS SHOWN OTHERWISE. MAINTAIN WORKING CLEARANCES PER NEC; COORDINATE WITH MECHANICAL CONTRACTOR.

C. BCU = BOX COVER UNIT (COOPER #SSY / #STY OR EQUAL) WITH FUSE.

D. NFD OR FD = NON-FUSED OR FUSED DISCONNECT SWITCH.

E. CS/NFD, FD = COMBINATION STARTER/ NON OR FUSED DISCONNECT SWITCH.

F. INT = INTEGRAL DISCONNECT FURNISHED WITH EQUIPMENT.

G. FHPMC = FRACTIONAL HORSEPOWER MANUAL CONTROLLER.

H. IHPMC = INTEGRAL HORSEPOWER MANUAL CONTROLLER.

I. STE = THERMAL ELEMENT SWITCH. PROVIDE THERMAL UNIT.

J. EXP = DEVICE TO BE EXPLOSION-PROOF.

K. ALL SWITCHES, DISCONNECTS, ETC SHALL BE LOCKABLE.

L. ALL SWITCHES, DISCONNECTS, ETC SHALL BE NEMA 3R WHERE REQUIRED.

M. PROVIDE FUSES AS SHOWN; REVISE SIZES PER ACTUAL NAMEPLATE DATA.

N. STARTER ACCESSORIES:STARTER ACCESSORIES:
1. CONTROL TRANSFORMER
2. H-O-A SWITCH
3. RED RUN LIGHT
4. 2 NO CONTACTS; 2 NC CONTACTS

O. PROVIDE DUCT DETECTOR, SHUTDOWN RELAY, AND ACCESSORIES AS REQUIRED TO SHUTDOWN HVAC EQUIPMENT 2000 CFM OR HIGHER PER NFPA AND AHJ.

EQUIPMENT SCHEDULE NOTES:

1. PUMP SHALL BE CONNECTED THROUGH MASTER CONTROL PANEL (MCP-1). COORDINATE WITH MANUFACTURER REQUIREMENTS.
2. COORDINATE ALL ACCESSORY CONNECTIONS THROUGH MASTER CONTROL PANEL (MCP-1) IN ACCORDANCE WITH MANUFACTURER REQUIREMENTS.
3. PLUG AND CORD PROVIDED AS PART OF EQUIPMENT ACCESSORIES.

LUMINAIRE SCHEDULE

TYPE NO	DESCRIPTION / SPEC NO	TOTAL WATTS	VOLT	MOUNTING	NOTES
F1	1X4 SURFACE WRAP - 12000 LUMENS LITHONIA FEM L48 12000LM LPAFL WD MVOLT GZ10 40K 80CRI	75 VA	MVOLT	SURFACE / CABLE	1
F1E	1X4 SURFACE WRAP - 12000 LUMENS - EM BATTERY LITHONIA FEM L48 12000LM LPAFL WD MVOLT GZ10 40K 80CRI E10WMCP	75 VA	MVOLT	SURFACE / CABLE	1

LUMINAIRE SCHEDULE NOTES:

1. VERIFY CABLE / CHAIN LENGTH AND ADJUST ACCORDINGLY.

Extg Branch Panel: PH

Location: Space 10010 **Volts:** 208Y/120 **A.I.C. Rating:** UNKNOWN
Supply From: **Phases:** 3 **MLO / MCB:** MLO
Mounting: SURFACE **Wires:** 4 **FCB / MCB Rating:** 125 A

CKT	Circuit Description	Trip	P	A		B		C		P	Trip	Circuit Description	CKT
1	LIGHTS - HIGHBAYS (NOTE 1)	20 A	1	975	0					1	20 A	EXTG REC - EQUIP 153, SUPPLY 153	2
3	SPACE (NOTE 2)	--	1			--	0			1	20 A	EXTG SPARE	4
5	LIGHTS - HIGHBAYS (NOTE 1)	20 A	1					975	0	1	20 A	EXTG REC - EQUIPMENT 153	6
7	SPACE (NOTE 2)	--	1	--	0					1	20 A	EXTG REC - EQUIPMENT 153	8
9	EXTG LIGHTS - TOILETS	20 A	1			0	0			1	20 A	EXTG REC - EQUIP 153, EXTERIOR	10
11	EXTG LIGHTS - BREAK 205	20 A	1					0	0	1	20 A	EXTG REC - EQUIP 153, SUPPLY 153	12
13	EXTG LIGHTS - STORAGE 204	20 A	1	0	0					1	20 A	EXTG SPARE	14
15	EXTG HWCP-1	20 A	1			0	0			3	20 A	EXTG REC - WASH TROLLEY	16
17	EXTG EH-2, FIRE SPRINKLER	20 A	2					0	0	--	--	--	18
19	--	--	--	0	0					--	--	--	20
21	EXTG HOTSY	30 A	3			0	0			1	20 A	EXTG REC - STORAGE 204	22
23	--	--	--					0	0	1	20 A	EXTG REC - BREAK 205	24
25	--	--	--	0	0					1	20 A	EXTG SPARE	26
27	EXTG HOTSY	30 A	3			0	0			1	20 A	EXTG REC - BREAK 205	28
29	--	--	--					0	0	1	20 A	EXTG REC - BREAK 205	30
31	--	--	--	0	0					1	20 A	EXTG SPARE	32
33	EXTG RTU-1	25 A	3			0	0			2	30 A	EXTG WATER HEATER EWH-1	34
35	--	--	--					0	0	--	--	--	36
37	--	--	--	0	0					2	30 A	EXTG EH-1	38
39	EXTG EF-3	20 A	1			0	0			--	--	--	40
41	EXTG REC - ROOF, STORAGE 204	20 A	1					0	0	1	20 A	EXTG SPARE	42
		Total Load:		975 VA		0 VA		975 VA					
		Total Amps:		9 A		0 A		9 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
LTG	1950 VA	100.00%	1950 VA	**Total Est. Demand:**	1950 VA
				Total Est. Demand Current (100% Rated):	5 A
				Non-Cont. Current @ 100%:	0 A
				Continuous Current @ 125%:	7 A
				Total Est. Demand Current (80% Rated):	7 A

Legend:
FCB: Feeder Circuit Breaker
GFI: GFCI Circuit Breaker
LOCK: Lockable Circuit Breaker
MCB: Main Circuit Breaker
MCCB: Molded Case Circuit Breaker
MLO: Main Lug Only
EXTG: Existing Circuit Breaker

Notes:
PANELBOARD IS EXISTING SIEMENS TYPE P1. UPDATE PANEL SCHEDULE ACCORDINGLY.
1. PROVIDE NEW BREAKER AS SHOWN.
2. PROVIDE BLANK COVER FOR NEW SPACE.

Extg Branch Panel: G3

Location: Space 10010 **Volts:** 208Y/120 **A.I.C. Rating:** UNKNOWN
Supply From: **Phases:** 3 **MLO / MCB:** MLO
Mounting: SURFACE **Wires:** 4 **FCB / MCB Rating:** 125 A

CKT	Circuit Description	Trip	P	A		B		C		P	Trip	Circuit Description	CKT
1	EXTG LTG - 151	20 A	1	0	0					1	20 A	EXTG CAMERA POWER	2
3	EXTG RH-1A, RH-1B	20 A	1			0	0			1	20 A	EXTG CAMERA POWER	4
5	EXTG HOTSY	30 A	3					0	0	1	20 A	EXTG CAMERA POWER	6
7	--	--	--	0	0					1	20 A	EXTG LTG - 153	8
9	--	--	--			0	0			1	20 A	EXTG CO CONTROLS - WASH BAY	10
11	EXTG EF-1	15 A	3					0	0	1	20 A	EXTG REC - WASH BAY VACUUM	12
13	--	--	--	0	1920					1	20 A	AC-1 - STORAGE 204 (GFI, NOTE 1)	14
15	--	--	--			0	1500			1	20 A	WH-1 - STORAGE 204 (GFI, NOTE 1)	16
17	EXTG MAU-1	30 A	3					0	1500	1	20 A	WS-1 - STORAGE 204 (GFI, NOTE 1)	18
19	--	--	--	0	0					1	20 A	EXTG SPARE	20
21	--	--	--			0	0			1	20 A	EXTG SPARE	22
23	EXTG EF-2	20 A	1					0	0	3	20 A	EXTG SOUTH CAR WASH GARAGE DOOR	24
25	EXTG REC - BREAK 205	20 A	1	0	0					--	--	--	26
27	EXTG REC - WASH TROLLEY	20 A	3			0	0			--	--	--	28
29	--	--	--					0	0	3	20 A	EXTG NORTH CAR WASH GARAGE DOOR	30
31	--	--	--	0	0					--	--	--	32
33	EXTG SPACE	--	1			--	0			--	--	--	34
35	EXTG SPACE	--	1					--	0	1	20 A	EXTG CAMERA POWER	36
37	EXTG SPACE	--	1	--	0					1	20 A	EXTG SPARE	38
39	EXTG SPACE	--	1			--	0			1	20 A	EXTG SPARE	40
41	EXTG SPACE	--	1					--	--	1	--	EXTG SPACE	42
		Total Load:		1920 VA		1500 VA		1500 VA					
		Total Amps:		16 A		13 A		13 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQP_NON CONT	4920 VA	100.00%	4920 VA	**Total Est. Demand:**	4920 VA
				Total Est. Demand Current (100% Rated):	14 A
				Non-Cont. Current @ 100%:	14 A
				Continuous Current @ 125%:	0 A
				Total Est. Demand Current (80% Rated):	14 A

Legend:
FCB: Feeder Circuit Breaker
GFI: GFCI Circuit Breaker
LOCK: Lockable Circuit Breaker
MCB: Main Circuit Breaker
MCCB: Molded Case Circuit Breaker
MLO: Main Lug Only
EXTG: Existing Circuit Breaker

Notes:
PANELBOARD IS EXISTING SIEMENS TYPE P1. UPDATE PANEL SCHEDULE ACCORDINGLY.
1. PROVIDE NEW BREAKER AS SHOWN.

Extg Power Panel: DPA

Location: **Volts:** 208Y/120 **A.I.C. Rating:** UNKOWN
Supply From: **Phases:** 3 **MLO / MCB:** MLO
Mounting: SURFACE **Wires:** 4 **FCB / MCB Rating:** 400 A

CKT	Circuit Description	# of Poles	Trip Rating	Load	Remarks
1	EXTG TVSS	3	60 A	0 VA	-
2	EXTG PANEL SLS2	3	100 A	0 VA	-
3	EXTG PANEL PF	3	225 A	0 VA	-
4	EXTG PANEL PA	3	225 A	0 VA	-
5	EXTG SPACE PROVISION	3	100 A	0 VA	-
6	EXTG SPACE PROVISION	3	100 A	0 VA	-
7	EXTG SPACE PROVISION	3	100 A	0 VA	-
8	EXTG SPACE PROVISION	3	100 A	0 VA	-
9	MCP-1 - STORAGE 204 (NOTE 1)	3	225 A	63768 VA	-
10	EXTG SPACE PROVISION	3	225 A	0 VA	-
11	EXTG BLANK COVER	3	--	--	-
12	EXTG BLANK COVER	3	--	--	-
13	EXTG BLANK COVER	3	--	--	-
14	EXTG BLANK COVER	3	--	--	-
				63768 VA	
				177 A	

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
EQP_NON CONT	63768 VA	100.00%	63768 VA	**Total Est. Demand:**	63768 VA
				Total Est. Demand Current (100% Rated):	177 A
				Non-Cont. Current @ 100%:	177 A
				Continuous Current @ 125%:	0 A
				Total Est. Demand Current (80% Rated):	177 A

Legend:
FCB: Feeder Circuit Breaker
GFI: GFCI Circuit Breaker
LOCK: Lockable Circuit Breaker
MCB: Main Circuit Breaker
MCCB: Molded Case Circuit Breaker
MLO: Main Lug Only
EXTG: Existing Circuit Breaker

Notes:
POWER PANEL IS EXISTING SIEMENS TYPE P4. UPDATE PANEL SCHEDULE ACCORDINGLY.
1. PROVIDE NEW BREAKER AS SHOWN.

DESIGNED: JMM
DRAWN: NJP
CHECKED: JMM
ISSUE DATE: 06/17/2026
REVISIONS:
No.: DATE: BY: DESCRIPTION:

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PROJECT NO.: 011343.001

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