DORE + WHITTIER

OWNER

TOWN OF WILMINGTON
WILMINGTON PUBLIC SCHOOLS
121 GLEN ROAD
WILMINGTON, MA 01887
P: 978.658.3311

OWNER'S PROJECT MANAGER

LEFTFIELD
101 FEDERAL STREET, SUITE 1900
BOSTON, MA 02110
P: 617.737.6400

ARCHITECT

DORE & WHITTIER ARCHITECTS, INC.
260 MERRIMAC STREET
BUILDING 7, 2nd FLOOR
NEWBURYPORT, MA 01950
P: 978.499.2999

212 BATTERY STREET
BURLINGTON, VT 05401
P: 802.863.1428

TRAFFIC + SITE SURVEY CONSULTANT

NITSCH ENGINEERING
2 CENTER PLAZA #430
BOSTON, MA 02108
P: 617.338.0063

CIVIL + SITE CONSULTANT

CDW CONSULTANTS, INC.
4 CALIFORNIA AVENUE, SUITE 301
FRAMINGHAM, MA 01701
P: 508.875.2657

LANDSCAPE CONSULTANT

TERRAINK
7 CENTRAL STREET, SUITE 150
ARLINGTON, MA 02476
P: 781.316.1595

STRUCTURAL CONSULTANT

ENGINEERS DESIGN GROUP, INC.
389 MAIN ST., SUITE 401
MALDEN, MA 02148
P: 781.396.9007

HVAC + ELECTRICAL CONSULTANT

GGD CONSULTING ENGINEERS, INC.
375 FAUNCE CORNER ROAD, SUITE D
DARTMOUTH, MA 02747
P: 508.998.5700

PLUMBING + FIRE PROT. CONSULTANT

AKAL ENGINEERING, INC.
44 CENTRAL STREET, UNIT 4
BERLIN, MA 01503
P: 508.869.0403

TECHNOLOGY / AUDIO-VISUAL / SECURITY CONSULTANT

EDVANCE TECHNOLOGY DESIGN, INC.
300 BRICKSTONE SQUARE, SUITE 201
ANDOVER, MA 01810
P: 978.256.9900

CONSTRUCTION MANAGER

FONTAINE BROS., INC.
510 COTTAGE STREET
SPRINGFIELD, MA 01104
P: 413.781.2020
F: 413.734.1881

FOODSERVICE CONSULTANT

CRABTREE MCGRATH ASSOCIATES, INC.
161 WEST MAIN STREET
GEORGETOWN, MA 01833
P: 978.352.8500

GEOTECHNICAL CONSULTANT

LAHLAF GEOTECHNICAL CONSULTING, INC.
100 CHELMSFORD ROAD, SUITE 2
BILLERICA, MA 01862
P: 978.330.5912

GEOENVIRONMENTAL CONSULTANT

PEER CONSULTANTS, P.C.
67 SOUTH BEDFORD STREET, SUITE 400 WEST
BURLINGTON, MA 01803
P: 781.238.8880

ENVIRONMENTAL / HAZMAT CONSULTANT

UNIVERSAL ENVIRONMENTAL CONSULTANTS
12 BREWSTER ROAD
FRAMINGHAM, MA 01702
P: 508.628.5486

SUSTAINABLE DESIGN CONSULTANT

THE GREEN ENGINEER
23 BRADFORD STREET
CONCORD, MA 01742
P: 978.369.8978

ACOUSTICAL CONSULTANT

ACENTECH
33 MOULTON STREET
CAMBRIDGE, MA 02138
P: 617.499.8000

COST ESTIMATING

PM&C COST ESTIMATING
20 DOWNER AVE SUITE 5
HINGHAM, MA 02043
P: 781.740.8007

LOCATION MAP





VOLUME 1

SHEET NUMBER	SHEET NAME	MILESTONE
GENERAL		
G0.00	COVER SHEET	
GC1.00	CODE SUMMARY	
GC1.10	CODE PLANS	
GC1.11	CODE PLANS	
GD1.01	DEMOLITION - OVERALL PLANS	
GD1.02	DEMOLITION - OVERALL PLANS	
GD1.03	DEMOLITION - OVERALL PLANS	
GD1.04	DEMOLITION - BUILDING IMAGES	
GD1.05	DEMOLITION - BUILDING IMAGES	
GP1.10	PHASING PLANS	
SURVEY		
EX-1.0	EXISTING CONDITIONS PLAN	(ISSUED IN ERP1)
EX-1.1	EXISTING CONDITIONS PLAN	(ISSUED IN ERP1)
CIVIL		
C1.00	DEMOLITION AND EROSION CONTROL PLAN	(ISSUED IN ERP1)
C1.01	DEMOLITION AND EROSION CONTROL PLAN	(ISSUED IN ERP1)
C1.02	DEMOLITION AND EROSION CONTROL PLAN	(ISSUED IN ERP1)
C2.00	LAYOUT AND MATERIALS PLAN	(ISSUED IN ERP1)
C2.01	LAYOUT AND MATERIALS PLAN	(ISSUED IN ERP1)
C2.02	LAYOUT AND MATERIALS PLAN	(ISSUED IN ERP1)
C3.00	GRADING AND DRAINAGE PLAN	(ISSUED IN ERP1)
C3.01	GRADING AND DRAINAGE PLAN	(ISSUED IN ERP1)
C3.02	GRADING AND DRAINAGE PLAN	(ISSUED IN ERP1)
C4.00	UTILITIES PLAN	(ISSUED IN ERP1)
C4.01	UTILITIES PLAN	(ISSUED IN ERP1)
C4.02	UTILITIES PLAN	(ISSUED IN ERP1)
C5.00	CONSTRUCTION DETAILS	(ISSUED IN ERP1)
C5.01	CONSTRUCTION DETAILS	(ISSUED IN ERP1)
C5.02	CONSTRUCTION DETAILS	(ISSUED IN ERP1)
C5.03	CONSTRUCTION DETAILS	(ISSUED IN ERP1)
C5.04	CONSTRUCTION DETAILS	(ISSUED IN ERP1)
LANDSCAPE		
L0.01	TREE PROTECTION AND REMOVAL PLAN	(ISSUED IN ERP1)
L0.02	LAYOUT AND MATERIALS - SOUTHEAST	(ISSUED IN ERP1)
L1.00	LAYOUT AND MATERIALS - KEY PLAN, NOTES, AND LEGENDS	
L1.01	LAYOUT AND MATERIALS - WEST	
L1.02	LAYOUT AND MATERIALS - SOUTHEAST	
L1.03	ENLARGEMENT - K-2ND GRADE PLAYGROUND	
L1.04	ENLARGEMENT - PRE-K PLAYGROUND	
L1.05	ENLARGEMENT - COURTYARD AND OUTDOOR CLASSROOM	
L1.06	ENLARGEMENT - ARRIVAL COURT PLAZA	
L1.07	ENLARGEMENT - 3RD AND 5TH GRADE PLAYGROUND	
L1.08	SITE FURNISHINGS - WEST	
L1.09	SITE FURNISHINGS - NORTHEAST	
L1.10	SITE FURNISHINGS - SOUTHEAST	
L1.11	SECTION ELEVATIONS - SOUTHERN BASKETBALL COURT AND EASTERN SOCCER FIELD EDGES	
L2.00	GRADING - KEY PLAN, NOTES, AND LEGENDS	
L2.01	GRADING - WEST	
L2.02	GRADING - SOUTHEAST	
L3.00	PLANTING - KEY PLAN, NOTES, AND LEGEND	
L3.01	PROPERTY LINE SCREEN PLANTING - WEST	
L3.02	PROPERTY LINE SCREEN PLANTING - SOUTHEAST	
L3.03	SITE SHADE TREES AND TURFGRASS - WEST	
L3.04	SITE SHADE TREES AND TURFGRASS - SOUTHEAST	
L3.05	ENLARGEMENT - K-2ND AND PRE-K PLAYGROUNDS	
L3.06	ENLARGEMENT - ARRIVAL COURT PLAZA	
L4.01	DETAILS	
L4.02	DETAILS	
L4.03	DETAILS	
L4.04	DETAILS	
L4.05	DETAILS	
L4.06	DETAILS	
L4.07	DETAILS - SOIL CELLS	
L4.08	DETAILS - PLANTING	
IR-100	OVERALL UNDERDRAIN LAYOUT PLAN	(ISSUED IN ERP1)
IR-101	WEST UNDERDRAIN LAYOUT PLAN	(ISSUED IN ERP1)
IR-102	CENTRAL UNDERDRAIN LAYOUT PLAN	(ISSUED IN ERP1)
IR-103	EAST UNDERDRAIN LAYOUT PLAN	(ISSUED IN ERP1)
IR-200	UNDERDRAIN DETAILS	(ISSUED IN ERP1)
IR-300	IRRIGATION LAYOUT PLAN	
IR-301	IRRIGATION LAYOUT PLAN	
IR-400	IRRIGATION DETAILS	
STRUCTURAL		
S0.01	GENERAL NOTES	
S0.02	TYPICAL DETAILS	
S0.03	TYPICAL DETAILS	
S0.04	TYPICAL DETAILS	
S0.05	TYPICAL DETAILS	
S0.06	TYPICAL DETAILS	
S0.07	TYPICAL DETAILS	
S0.08	TYPICAL DETAILS	
S1.11	FOUNDATION PLAN - AREA A	
S1.12	FOUNDATION PLAN - AREA B	
S1.21	LEVEL 2 FRAMING PLAN - AREA A	
S1.22	LEVEL 2 FRAMING PLAN - AREA B	
S1.31	LEVEL 3 FRAMING PLAN - AREA A	
S1.32	LEVEL 3 FRAMING PLAN - AREA B	
S1.41	ROOF FRAMING PLAN - AREA A	
S1.42	ROOF FRAMING PLAN - AREA B	
S1.51	ROOF SCREEN FRAMING PLAN - AREA A	
S1.52	ROOF SCREEN FRAMING PLAN - AREA B	
S1.61	TRUSS ELEVATIONS	
S2.01	DETAILS	
S3.01	DETAILS	
S4.01	BRACED FRAME ELEVATIONS - AREA A	
S4.02	BRACED FRAME ELEVATIONS AND SHEAR WALLS - AREA B	
S4.03	SHEAR WALLS - AREA B	
S4.04	BRACED FRAME DETAILS	
S4.05	BRACED FRAME DETAILS	
ARCHITECTURAL		
AG0.01	ABBREVIATIONS SYMBOLS MATERIALS AND LEGEND	
AG0.02	WALL TYPES, NOTES AND DETAILS	
AG0.03	LEVEL 1, 2 AND 3 ACOUSTICAL SEPARATION DIAGRAMS	
AG0.04	ENTRY SIGN PLAN, ELEVATIONS, SECTIONS, DETAILS	
AG0.05	CONSTRUCTION MOCKUP	
A0.11	HORIZONTAL CONTROL PLAN - LEVEL 1 - AREA A	
A0.12	HORIZONTAL CONTROL PLAN - LEVEL 1 - AREA B	
A0.21	HORIZONTAL CONTROL PLAN - LEVEL 2 - AREA A	
A0.22	HORIZONTAL CONTROL PLAN - LEVEL 2 - AREA B	
A0.31	HORIZONTAL CONTROL PLAN - LEVEL 3 - AREA A	
A0.32	HORIZONTAL CONTROL PLAN - LEVEL 3 - AREA B	
A1.10	LEVEL 1 OVERALL PLAN	
A1.11	LEVEL 1 - AREA A	
A1.12	LEVEL 1 - AREA B	
A1.20	LEVEL 2 OVERALL PLAN	
A1.21	LEVEL 2 - AREA A	
A1.22	LEVEL 2 - AREA B	
A1.30	LEVEL 3 OVERALL PLAN	
A1.31	LEVEL 3 - AREA A	
A1.32	LEVEL 3 - AREA B	
A1.40	ENLARGED PLANS	
A1.50	TYPICAL PLAN DETAILS	
A1.51	PLAN DETAILS	
A1.52	PLAN DETAILS	
A1.53	PLAN DETAILS	
A1.54	PLAN DETAILS	
A1.55	PLAN DETAILS	
A1.56	PLAN DETAILS	
A1.60	PLAN DETAILS - INTERIOR	
A1.61	PLAN DETAILS - INTERIOR	
A1.62	PLAN DETAILS - INTERIOR	
A1.70	ENLARGED TOILET ROOM PLANS	
A1.71	ENLARGED TOILET ROOM PLANS	
A1.72	ENLARGED TOILET ROOM PLANS	
A1.73	ENLARGED TOILET ROOM PLANS	
A1.74	ENLARGED TOILET ROOM PLANS	
A1.75	ENLARGED TOILET ROOM PLANS	
A2.11	LEVEL 1 REFLECTED CEILING PLAN - AREA A	
A2.12	LEVEL 1 REFLECTED CEILING PLAN - AREA B	
A2.21	LEVEL 2 REFLECTED CEILING PLAN - AREA A	
A2.22	LEVEL 2 REFLECTED CEILING PLAN - AREA B	
A2.31	LEVEL 3 REFLECTED CEILING PLAN - AREA A	
A2.32	LEVEL 3 REFLECTED CEILING PLAN - AREA B	
A2.50	CEILING DETAILS	
A3.10	OVERALL ROOF PLAN	
A3.11	ROOF PLAN - AREA A	
A3.12	ROOF PLAN - AREA B	
A3.13	PARTIAL ROOF PLANS	
A3.50	ROOF DETAILS	
A4.00	EXTERIOR AXONS	
A4.10	OVERALL EXTERIOR ELEVATIONS	
A4.11	EXTERIOR ELEVATIONS	
A4.12	EXTERIOR ELEVATIONS	
A4.13	EXTERIOR ELEVATIONS	
A4.14	EXTERIOR ELEVATIONS	
A4.15	EXTERIOR ELEVATIONS	
A5.10	BUILDING SECTIONS	
A5.11	BUILDING SECTIONS	
A5.12	BUILDING SECTIONS	
A5.13	BUILDING SECTIONS	
A6.10	WALL SECTIONS	
A6.11	WALL SECTIONS	
A6.12	WALL SECTIONS	
A6.13	WALL SECTIONS	
A6.14	WALL SECTIONS	
A6.15	WALL SECTIONS	
A6.16	WALL SECTIONS	
A6.17	WALL SECTIONS	
A6.18	WALL SECTIONS	
A6.19	WALL SECTIONS	
A6.20	WALL SECTIONS	
A6.50	BASE OF WALL DETAILS	
A6.51	BASE OF WALL DETAILS	
A6.60	MID WALL DETAILS	
A6.61	MID WALL DETAILS	
A6.62	MID WALL DETAILS	
A6.63	MID WALL DETAILS	
A6.70	TOP OF WALL DETAILS	
A6.71	TOP OF WALL DETAILS	
A6.72	TOP OF WALL DETAILS	
A6.73	TOP OF WALL DETAILS	
A7.10	STAIR AND ELEVATOR PLANS AND SECTIONS	
A7.11	STAIR PLANS AND SECTIONS	
A7.12	STAIR PLANS AND SECTIONS	
A7.13	STAIR PLANS AND SECTIONS	
A7.14	STAIR PLANS AND SECTIONS	
A7.50	STAIR DETAILS	
A7.51	STAIR AND RAMP DETAILS	
A7.52	RAILING DETAILS	
A7.53	ELEVATOR AND MISC. DETAILS	
A8.10	DOOR SCHEDULE, DOOR AND BL TYPES	
A8.11	DOOR SCHEDULE AND DOOR TYPES	
A8.20	CURTAINWALL TYPES	
A8.30	WINDOW AND STOREFRONT TYPES	
A8.50	DOOR AND BL FRAME DETAILS	
A8.51	DOOR AND LOUVER DETAILS	
A8.60	WINDOW DETAILS	
A8.70	CURTAINWALL DETAILS	
A8.71	CURTAINWALL DETAILS	
A8.80	STOREFRONT DETAILS	
A9.11	LEVEL 1 FINISH PLAN - AREA A	
A9.12	LEVEL 1 FINISH PLAN - AREA B	
A9.21	LEVEL 2 FINISH PLAN - AREA A	
A9.22	LEVEL 2 FINISH PLAN - AREA B	
A9.31	LEVEL 3 FINISH PLAN - AREA A	
A9.32	LEVEL 3 FINISH PLAN - AREA B	
A9.50	INTERIOR DETAILS	
A9.51	INTERIOR DETAILS	
A9.52	INTERIOR DETAILS	
A9.60	INTERIOR SIGNAGE TYPES AND DETAILS	
A9.90	FINISH SCHEDULE - LEVEL 1	
A9.91	FINISH SCHEDULE - LEVEL 2 AND 3	
A10.11	LEVEL 1 EQUIPMENT PLANS - AREA A	
A10.12	LEVEL 1 EQUIPMENT PLANS - AREA B	
A10.21	LEVEL 2 EQUIPMENT PLANS - AREA A	
A10.22	LEVEL 2 EQUIPMENT PLANS - AREA B	
A10.31	LEVEL 3 EQUIPMENT PLANS - AREA A	
A10.32	LEVEL 3 EQUIPMENT PLANS - AREA B	
A10.50	CASEWORK PLANS AND ELEVATIONS	
A10.51	CASEWORK PLANS AND ELEVATIONS	
A10.52	CASEWORK PLANS AND ELEVATIONS	
A10.53	CASEWORK PLANS AND ELEVATIONS	
A10.54	CASEWORK PLANS AND ELEVATIONS	
A10.55	CASEWORK PLANS AND ELEVATIONS	
A10.56	CASEWORK PLANS AND ELEVATIONS	
A10.57	CASEWORK PLANS AND ELEVATIONS	
A10.58	CASEWORK PLANS AND ELEVATIONS	
A10.59	CASEWORK PLANS AND ELEVATIONS	
A10.60	CASEWORK PLANS AND ELEVATIONS	
A10.61	CASEWORK PLANS AND ELEVATIONS	
A10.62	CASEWORK PLANS AND ELEVATIONS	
A10.63	CASEWORK PLANS AND ELEVATIONS	
A10.64	CASEWORK PLANS AND ELEVATIONS	
A10.65	CASEWORK PLANS AND ELEVATIONS	
A10.66	CASEWORK PLANS AND ELEVATIONS	
A10.67	CASEWORK PLANS AND ELEVATIONS	
A10.71	INTERIOR ELEVATIONS	
A10.72	INTERIOR ELEVATIONS	
A10.73	INTERIOR ELEVATIONS	
A10.74	INTERIOR ELEVATIONS	
A10.80	MILLWORK DETAILS	
A10.81	MILLWORK DETAILS	
A10.82	MILLWORK DETAILS	
A10.90	CASEWORK SCHEDULE	
A10.91	CASEWORK SCHEDULE	

VOLUME 2

SHEET NUMBER	SHEET NAME	MILESTONE
FOODSERVICE		
FS1.12	LEVEL 1 - AREA B FOODSERVICE EQUIPMENT PLAN	
FS2.01	ENLARGED FOODSERVICE EQUIPMENT PLAN	
FS3.01	FOODSERVICE EQUIPMENT ROUGH-IN PLAN	
FS4.01	FOODSERVICE EQUIPMENT VENTILATION ROUGH-IN PLAN	
FIRE PROTECTION		
FP0.01	FIRE PROTECTION LEGENDS, NOTES & ABBREVIATIONS	
FP0.02	FIRE PROTECTION DETAILS	
FP1.11	FIRE PROTECTION LEVEL 1 - AREA A	
FP1.12	FIRE PROTECTION LEVEL 1 - AREA B	
FP2.11	FIRE PROTECTION LEVEL 2 - AREA A	
FP2.12	FIRE PROTECTION LEVEL 2 - AREA B	
FP3.11	FIRE PROTECTION LEVEL 3 - AREA A	
FP3.12	FIRE PROTECTION LEVEL 3 - AREA B	
PLUMBING		
P0.01	PLUMBING LEGEND AND SCHEDULES	
P1.00A	RADON PIPING AREA A	
P1.00B	RADON PIPING AREA B	
P1.01	UNDERSLAB PLUMBING- LEVEL 1 - AREA A	
P1.02	UNDERSLAB PLUMBING- LEVEL 1 - AREA B	
P1.11	PLUMBING- LEVEL 1 - AREA A	
P1.12	PLUMBING- LEVEL 1 - AREA B	
P1.21	PLUMBING- LEVEL 2 - AREA A	
P1.22	PLUMBING- LEVEL 2 - AREA B	
P1.31	PLUMBING- LEVEL 3 - AREA A	
P1.32	PLUMBING- LEVEL 3 - AREA B	
P1.33	PLUMBING KITCHEN	
P1.41	PLUMBING ROOF PLAN	
P2.01	PLUMBING WASTE AND VENT RISER DIAGRAM	
P2.02	PLUMBING DOMESTIC WATER RISER DIAGRAM	
P3.01	PLUMBING DETAILS	
P3.02	PLUMBING DETAILS 2	
MECHANICAL		
M0.11	LEGEND, NOTES & DETAILS I	
M0.12	DETAILS II	
M0.13	DETAILS III	
M0.14	DETAILS IV	
M0.15	DETAILS V	
M0.16	DETAILS VI	
M0.17	DETAILS VII	
M0.18	SCHEDULES I	
M0.19	SCHEDULES II	
M1.11	LEVEL 1 AREA A - DUCTWORK	
M1.12	LEVEL 1 AREA B - DUCTWORK	
M1.21	LEVEL 2 AREA A - DUCTWORK	
M1.22	LEVEL 2 AREA B - DUCTWORK	
M1.31	LEVEL 3 AREA A - DUCTWORK	
M1.32	LEVEL 3 AREA B - DUCTWORK	
M2.11	LEVEL 1 AREA A - PIPING	
M2.12	LEVEL 1 AREA B - PIPING	
M2.21	LEVEL 2 AREA A - PIPING	
M2.22	LEVEL 2 AREA B - PIPING	
M2.31	LEVEL 3 AREA A - PIPING	
M2.32	LEVEL 3 AREA B - PIPING & ENLARGED MECH RM	
M3.11	ROOF AREA A	
M3.12	ROOF AREA B	
M4.11	CONTROLS I	
M4.12	CONTROLS II	
M4.13	CONTROLS III	
M4.14	CONTROLS IV	
M4.15	CONTROLS V	
M4.16	CONTROLS VI	
M4.17	CONTROLS VII	
M4.18	CONTROLS VIII	
M4.19	CONTROLS IX	
VS1.11	VIBRATION & SEISMIC	
ELECTRICAL		
E0.01	ELECTRICAL SYMBOL LIST	
E0.02	LIGHTING FIXTURE SCHEDULE	
E0.03	ALCS RISER & DETAILS	
E0.04	ELECTRICAL SITE PLAN	
E0.05	ELECTRICAL SITE DETAILS	
E0.06	ELECTRICAL SITE DETAILS	
E1.11	LEVEL 1 AREA A - LIGHTING	
E1.12	LEVEL 1 AREA B - LIGHTING	
E1.21	LEVEL 2 AREA A - LIGHTING	
E1.22	LEVEL 2 AREA B - LIGHTING	
E1.31	LEVEL 3 AREA A - LIGHTING	
E1.32	LEVEL 3 AREA B LIGHTING	
E2.11	LEVEL 1 AREA A - POWER	
E2.12	LEVEL 1 AREA B - POWER	
E2.21	LEVEL 2 AREA A - POWER	
E2.22	LEVEL 2 AREA B - POWER	
E2.31	LEVEL 3 AREA A - POWER	
E2.32	LEVEL 3 AREA B - POWER	
E2.40	ROOF PLAN	
E3.00	ELECTRICAL ROOM PART PLANS	
E3.01	ELECTRICAL ONE LINE RISER	
E3.02	ELECTRICAL PANEL SCHEDULES	
E3.03	ELECTRICAL DETAILS	
E3.04	ELECTRICAL DETAILS	
E3.05	MECHANICAL EQUIPMENT SCHEDULE	
E3.06	PLUMBING EQUIPMENT SCHEDULE	
E3.07	KITCHEN SCHEDULE	
E3.08	TELECOM RISER DIAGRAM	
E3.09	BDA SYSTEM DIAGRAM	
E4.01	FIRE ALARM RISER	
E4.11	LEVEL 1 AREA A - FIRE ALARM	
E4.12	LEVEL 1 AREA B - FIRE ALARM	
E4.21	LEVEL 2 AREA A - FIRE ALARM	
E4.22	LEVEL 2 AREA B - FIRE ALARM	
E4.31	LEVEL 3 AREA A - FIRE ALARM	
E4.32	LEVEL 3 AREA B - FIRE ALARM	
TECHNOLOGY		
T0.01	SITE PLAN EXTERIOR CAMERAS TECHNOLOGY	
T1.11	LEVEL 1 - AREA A TECHNOLOGY	
T1.12	LEVEL 1 - AREA B TECHNOLOGY	
T1.21	LEVEL 2 - AREA A TECHNOLOGY	
T1.22	LEVEL 2 - AREA B TECHNOLOGY	
T1.31	LEVEL 3 - AREA A TECHNOLOGY	
T1.32	LEVEL 3 - AREA B TECHNOLOGY	
T1.41	ROOF - AREA A TECHNOLOGY	
T1.42	ROOF - AREA B TECHNOLOGY	
T2.01	DETAIL SHEET TECHNOLOGY	
T2.02	DETAIL SHEET TECHNOLOGY	
T2.03	DETAIL SHEET TECHNOLOGY	
T2.04	DETAIL SHEET TECHNOLOGY	
T2.05	DETAIL SHEET TECHNOLOGY	
T2.06	DETAIL SHEET TECHNOLOGY	
T2.07	DETAIL SHEET TECHNOLOGY	
T2.08	DETAIL SHEET TECHNOLOGY	
T2.09	DETAIL SHEET TECHNOLOGY	
T2.10	DETAIL SHEET TECHNOLOGY	
T2.11	DETAIL SHEET TECHNOLOGY	
T2.12	DETAIL SHEET TECHNOLOGY	

VOLUME 2

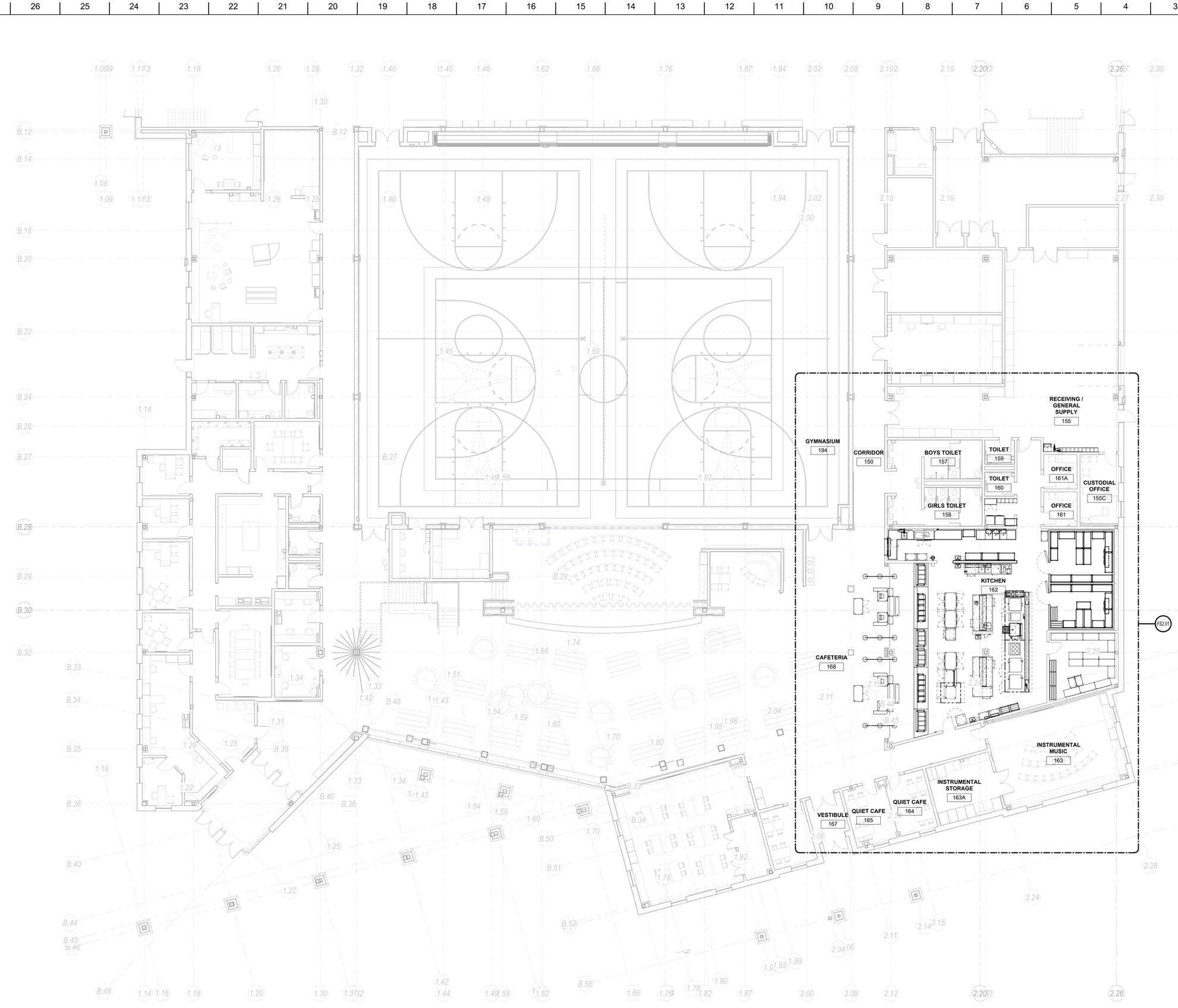
WILMINGTON ELEMENTARY SCHOOL

D&W PROJECT # 23-0847

320 SALEM STREET
WILMINGTON, MA 01887

06/19/2026

60% CONSTRUCTION DOCUMENTS



LEVEL 1 - AREA C FOODSERVICE EQUIPMENT PLAN

1/8" = 1'-0"

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

Crabtree McGrath ASSOCIATES, INC.
100 Conifer Hill Dr., Suite 510
Danvers, MA 01923
978-352-8500
crabtree-mcgrath.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM STREET
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

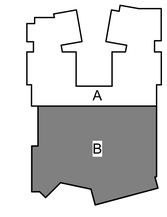
NO.	DATE	TITLE

ISSUE TITLE AND DATE:

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06.19.2026

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KEY PLAN



ORIENTATION AND SCALE:



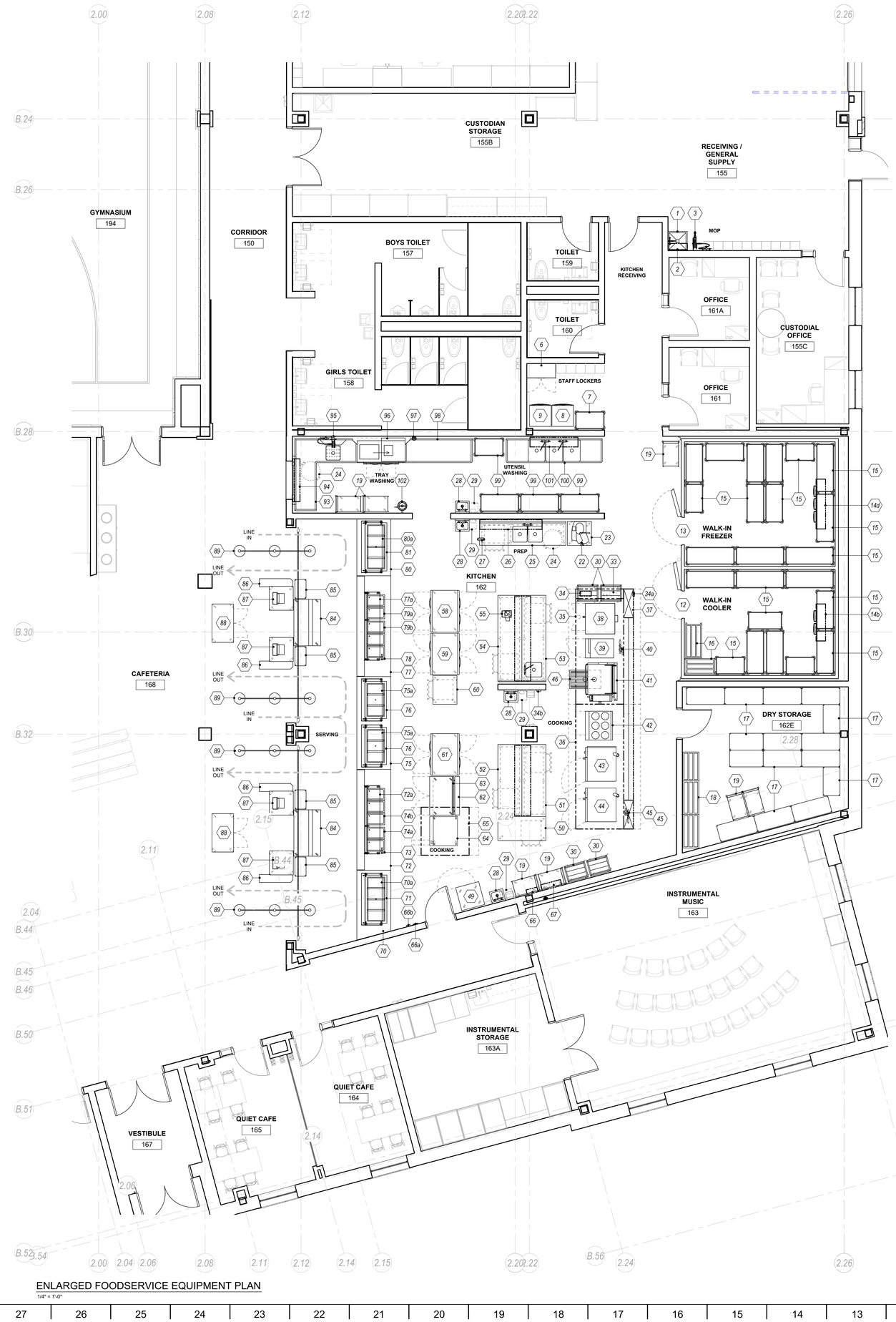
PROJECT NORTH

SHEET TITLE:
LEVEL 1 - AREA B FOODSERVICE EQUIPMENT PLAN

SHEET NUMBER:
FS1.12

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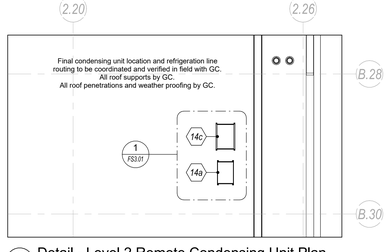


ENLARGED FOODSERVICE EQUIPMENT PLAN

1/4" = 1'-0"

SCHEDULE OF FOODSERVICE EQUIPMENT & CONNECTIONS

Item	Qty	Description	Plumbing	Electrical	Mechanical / Equipment Remarks
1	1	Mop Sink & Service Faucet (by PC)	1/2" H&CW; Drain in floor		Install mop sink (by PC) on sub-floor prior to finished floor. GC to install finished floor with sanitary coved base at exposed sides of mop sink
2	1	Mop Rack Utility Shelf			Requires wall blocking by GC in non-masonry walls
3	1	Hose Reel Assembly (35' Hose with Spray Gun)	1/2" H&CW		Requires wall blocking by GC in non-masonry walls
4	1	-Spare Number-			
5	1	-Spare Number-			
6	1	Detergent Storage Cabinet			Requires wall blocking by GC in non-masonry walls
7	1	Mobile Shelving Unit, Four-Tier			
8	1	Front Load Clothes Washer	1/2" H&CW; 1-1/4" IW to Standpipe	20 A circuit - 120/1 - C&P	
9	1	Front Load Clothes Dryer		30 A circuit - 120/240/1 - C&P	4" diameter dryer vent
10	1	-Spare Number-			
11	1	-Spare Number-			
12	1	Walk-in Cooler		1.1 KW - 120/1 (lights, temp. monitor/alarm, etc); Low voltage wiring from temperature monitor to BMS	Requires floor recess by GC
13	1	Walk-in Freezer		1.3 KW - 120/1 (lights, temp. monitor/alarm, etc); Low voltage wiring from temperature monitor to BMS; 20 A circuit - 120/1 DR (drain line heat trace)	Requires floor recess by GC
14a	1	Cooler Condensing Unit		9.7 A - 1.5 HP - 208/3	Located on Roof per Detail 1/FS2.01
14b	1	Cooler Evaporator Coil	1" IW (by KEC) to FD	1.8 A - 120/1; Low voltage wiring from evaporator coil controller to BMS; Low voltage wiring from coil leak sensor to refrigerant shut-off valve	Remote refrigeration from Item 14a
14c	1	Freezer Condensing Unit		15.4 A - 4.5 HP - 208/3	Located on Roof per Detail 1/FS2.01
14d	1	Freezer Evaporator Coil	1" IW (by KEC) to FD	13.7 A - 208/1; Low voltage wiring from evaporator coil controller to BMS; Low voltage wiring from coil leak sensor to refrigerant shut-off valve	Remote refrigeration from Item 14c
15	23	Mobile Shelving Unit, Four-Tier			
16	2	Dunnage Rack, Mobile			
17	15	Storage Shelving, Five-Tier			
18	3	Dunnage Rack			
19	7	Utility Cart			
20	1	-Spare Number-			
21	1	-Spare Number-			
22	1	Automatic Slicer		5.6 A - 120/1 - C&P	
23	1	Mobile Equipment Stand			
24	2	Waste Barrel (by Owner)			
25	1	Prep Table with Sinks	1/2" H&CW; (2) 2" IW to FS	(2) 20 A circuit - 120/1 wall mounted convenience DR	
26	1	Wall Shelf			Requires wall blocking by GC in non-masonry walls
27	1	Manual Can Opener			
28	4	Hand Sink	1/2" H&CW; 1-1/2" W		Requires wall blocking by GC in non-masonry walls
29	4	Waste Bin (by Owner)			
30	4	Pan Rack, Mobile			
31	1	-Spare Number-			
32	1	-Spare Number-			
33	1	Fire Suppression System		120/1: J-box for connection to building alarm system & equipment shutdown	Protection for Items 35 & 36; Mounted in hood utility cabinet
34	1	Demand Control Ventilation System		15 A circuit - 120/1 (see Note E-34/FS3.01)	Control for Items 35 & 36; System includes VFD for exhaust fan; Mounted in hood utility cabinet
34a	1	Ventilator Control Interface Screen		Cable from Item 34	Cable provided with system
34b	1	Room Temperature Sensor		Wiring from Item 34	
35	1	Exhaust Ventilator		Power to lights from Item 34	EXH: 2,475 CFM thru a 16" diameter collar @ -0.872" SP; MUA: 2,100 total CFM thru (6) 28" x 6" collars @ 0.101" SP; Coordinate support from structure above for hood hangers by KEC
36	1	Exhaust Ventilator		Power to lights from Item 34	EXH: 2,925 total CFM thru (2) 12" diameter collars @ -0.749" SP; MUA: 2,300 total CFM thru (6) 28" x 6" collars @ 0.120" SP; Coordinate support from structure above for hood hangers by KEC
37	1	Utility Distribution System (UDS)	3/4" HW; 1" CW	250 A circuit - 480/3; 150 A circuit - 208/3	All electrical connectors and flexible water connectors to associated equipment provided with system by KEC. (Field connections by Related Trades); Coved floor base (by GC) at UDS risers (both ends)
38	1	Double Convection Oven		(2) 14 A - 11.0 KW - 480/3 (from Item 37)	
39	1	Ten-Pan Convection Steamer	3/4" filtered CW (from Item 40); 3/4" CW (from Item 37); 1-1/2" IW to FS	94 A - 30.0 KW - 208/3 (from Item 37)	
40	1	Water Filter Assembly	3/4" CW (from Item 37)		Mounted in UDS riser
41	1	Forty-Gallon Tilting Braising Pan	1/2" H&CW (from Item 37)	19 A - 15.3 KW - 480/3 (from Item 37)	
42	1	Six-Burner Range with Oven		23.5 A - 17.0 - 480/3 (from Item 37)	
43	1	Double Combination Oven	3/4" filtered CW (from Item 37); 2" IW to FS	(2) 26.9 A - 22.4 KW - 480/3 (from Item 37)	Provided with heat shield on left end
44	1	Double Combination Oven	3/4" filtered CW (from Item 37); 2" IW to FS	(2) 26.9 A - 22.4 KW - 480/3 (from Item 37)	
45	2	Water Filter Assembly	3/4" CW (from Item 37)		Mounted in UDS riser
46	1	Floor Pan & Grate	4" W conn 7" BFF		Requires floor recess by GC
47	1	-Spare Number-			
48	1	-Spare Number-			
49	1	Mobile Hot Food Holding Cabinet		13.8 A - 120/1 - C&P	
50	1	Mobile Work Table			
51	1	Work Table with Overshelf		(3) 20 A circuit - 120/1 mounted DR by KEC (stub-up)	Mounted receptacles pre-wired by KEC to mounted J-Box below table undershelf
52	1	Work Table		(3) 20 A circuit - 120/1 mounted DR by KEC (stub-up)	Mounted receptacles pre-wired by KEC to mounted J-Box below table undershelf
53	1	Cook's Work Table with Sink and Overshelf	1/2" H&CW (stub-up); 2" IW to FS	(2) 20 A circuit - 120/1 mounted DR by KEC (stub-up)	Mounted receptacles pre-wired by KEC to mounted J-Box below table undershelf
54	1	Work Table		(3) 20 A circuit - 120/1 mounted DR by KEC (stub-up)	Mounted receptacles pre-wired by KEC to mounted J-Box below table undershelf
55	1	Food Processor		12 A - 120/1 - C&P (from mounted DR at Item 54)	
56	1	-Spare Number-			
57	1	-Spare Number-			
58	1	Refrigerator, Pass-Thru		6.4 A - 120/1 - C&P	
59	1	Hot Food Holding Cabinet, Pass-Thru		10.6 A - 208/1 - C&P (NEMA 6-20P)	
60	1	Mobile Work Table			
61	1	Refrigerator, Pass-Thru		6.4 A - 120/1 - C&P	
62	1	Stainless Steel Electrical Chase		20 A circuit - 120/1 mounted DR by KEC (stub-up); 50 A circuit - 208/3 mounted NEMA 15-50R by KEC (stub-up)	
63	1	Refrigerator, Worktop		3 A - 120/1 - C&P (from mounted DR at Item 62)	
64	1	Griddle with Mobile Stand		40 A - 208/3 - C&P (from mounted NEMA 15-50R at Item 62)	
65	1	Exhaust Ventilator		Power to lights from Item 66	EXH: 1,375 CFM thru a 12" diameter collar @ -0.774" SP; MUA: 1,100 total CFM thru (2) 28" x 10" collars @ 0.121" SP; Coordinate support from structure above for hood hangers by KEC
66	1	Demand Control Ventilation System		15 A circuit - 120/1 (see Note E-66/FS3.01)	Control for Item 65; System includes VFD for exhaust fan; Requires wall blocking by GC in non-masonry walls
66a	1	Ventilator Control Interface Screen		Cable from Item 66	Cable provided with system
66b	1	Room Temperature Sensor		Wiring from Item 66	
67	1	Fire Suppression System		120/1: J-box for connection to building alarm system & equipment shutdown	Protection for Item 65; Requires wall blocking by GC in non-masonry walls
68	1	-Spare Number-			
69	1	-Spare Number-			
70	1	Serving Counter		20 A circuit - 120/1 mounted DR by KEC (stub-up)	
70a	1	Self-Service Glass Display Case			
71	1	Refrigerated Cold Pan, Drop-in	1" IW to FS	5 A - 120/1 - C&P (from mounted DR at Item 70)	
72	1	Serving Counter		(2) 20 A circuit - 120/1 mounted DR by KEC (stub-up)	
72a	1	Full Service Glass Food Protector			
73	1	Fill Faucet	1/2" CW (stub-up)		
74a	2	Hot Food Wells, Drop-in (mounted in group of two)	1" IW to FS (both groups manifolded to one drain)	1.8 KW - 208/1 (stub-up) (total for group)	
74b	3	Hot Food Wells, Drop-in (mounted in group of three)	1" IW to FS (both groups manifolded to one drain)	2.7 KW - 208/1 (stub-up) (total for group)	
75	1	Serving Counter		(2) 20 A circuit - 120/1 mounted DR by KEC (stub-up)	
75a	2	Self-Service Glass Display Case			
76	2	Refrigerated Cold Pan, Drop-in	1" IW to FS	5 A - 120/1 - C&P (from mounted DR at Item 75)	
77	1	Serving Counter		(2) 20 A circuit - 120/1 mounted DR by KEC (stub-up)	
77a	1	Full Service Glass Food Protector			
78	1	Fill Faucet	1/2" CW (stub-up)		
79a	2	Hot Food Wells, Drop-in (mounted in group of two)	1" IW to FS (both groups manifolded to one drain)	1.8 KW - 208/1 (stub-up) (total for group)	
79b	3	Hot Food Wells, Drop-in (mounted in group of three)	1" IW to FS (both groups manifolded to one drain)	2.7 KW - 208/1 (stub-up) (total for group)	
80	1	Serving Counter		20 A circuit - 120/1 mounted DR by KEC (stub-up)	
80a	1	Self-Service Glass Display Case			
81	1	Refrigerated Cold Pan, Drop-in	1" IW to FS	5 A - 120/1 - C&P (from mounted DR at Item 80)	
82	1	-Spare Number-			
83	1	-Spare Number-			
84	2	Milk Cooler		3.3 A - 120/1 - C&P	
85	4	Snack Rack (by Owner's Vendor)			
86	4	Mobile Cashier Stand			
87	4	Cashier Terminal (by Owner)		120/1 - C&P; Data Cable	
88	2	Mobile Condiment Counter			
89	4	Portable Traffic Stanchions (set of three)			
91	1	-Spare Number-			
92	1	-Spare Number-			
93	1	Soiled Ware Table with Integral Pass-Thru Frame	2" W		Requires rough opening in wall by GC
94	1	Roll-Down Shutter			Requires wall blocking by GC in non-masonry walls
95	1	Hose Reel Assembly	1/2" H&CW		Requires wall blocking by GC in non-masonry walls
96	1	Warewasher, Conveyor Type, Ventless	1/2" HW; 1/2" filtered CW (50°F min, from Item 97); 1/2" CW (drain tempering); 1-1/4" IW to FS	35 A - 480/3 (Tank Heat); 26 A - 480/3 (Booster Heater); J-Box for wiring to table limit switch at Item 98	
97	1	Water Filter Assembly, Waswasher	3/4" CW (50°F min)		
98	1	Clean Ware Table		J-Box for wiring to table limit switch from Item 96	
99	4	Mobile Shelving Unit, Four-Tier			
100	1	Three-Compartment Sink	(2) 3/4" 120°F H&CW; (3) 2" W manifold thru GI by PC		
101	1	Wall Shelf			Requires wall blocking by GC in non-masonry walls
102	1	Eye/Face Wash, Wall Mounted	1/2" H&CW; 1-1/4" W		Includes thermostatic mixing valve



1 FS2.01 Detail - Level 2 Remote Condensing Unit Plan

1/8" = 1'-0"

SCHEDULE NOTES

1) UTILITIES SHOWN IN THESE SCHEDULES ARE SPECIFIC TO THE PRIME MANUFACTURER LISTED IN THE WRITTEN SPECIFICATION SECTION 114000. IF EQUIPMENT FROM AN ALTERNATE MANUFACTURER IS PROVIDED, IT IS THE RESPONSIBILITY OF THE KITCHEN EQUIPMENT CONTRACTOR TO COORDINATE AND SUBMIT TO THE PROJECT DESIGN TEAM FOR REVIEW.

2) UTILITIES LISTED ON THIS SCHEDULE FOR OWNER FURNISHED OR VENDOR SUPPLIED EQUIPMENT ARE ESTIMATES ASSUMED FOR ENGINEERING PURPOSES ONLY. IT IS THE RESPONSIBILITY OF THE OWNER TO PROVIDE EQUIPMENT CUT SHEETS OF THIS EQUIPMENT TO CRABTREE-MCGRATH ASSOCIATES PRIOR TO CONSTRUCTION.

3) INSTALLING SUB-CONTRACTORS MUST NOTIFY CRABTREE-MCGRATH ASSOCIATES IF A UTILITY REQUIREMENT LISTED ON THIS EQUIPMENT SCHEDULE IS NOT AVAILABLE.

4) REFER TO THE ABBREVIATIONS NOTES PROVIDED ON THIS SHEET FOR CLARIFICATION OF ABBREVIATIONS USED WITHIN THIS EQUIPMENT SCHEDULE.

PLAN NOTES

1) IT IS THE RESPONSIBILITY OF THE KITCHEN EQUIPMENT CONTRACTOR TO FIELD VERIFY THE DELIVERY PATH OF ALL EQUIPMENT WITHIN THEIR SCOPE WITH BUILDING CONDITIONS PRIOR TO ORDERING TO CONFIRM ALL EQUIPMENT FITS WITHIN THE DESIGNATED SPACE AS LOCATED ON PLANS.

2) KITCHEN EQUIPMENT CONTRACTOR SHALL COORDINATE WITH THE GENERAL CONTRACTOR AS NECESSARY FOR OPENINGS IN BUILDING, WALL LEAVE OUTS, DOOR WIDTHS AND HEADER HEIGHTS REQUIRED FOR DELIVERY AND INSTALLATION MEANS.

3) FINISHES TO ALL WALLS, FLOORS AND CEILINGS ARE TO BE PROVIDED BY THE GENERAL CONTRACTOR AS SPECIFIED BY THE PROJECT ARCHITECT TO MEET THE REQUIREMENTS OF THE LOCAL HEALTH DEPARTMENT.

4) REVISIONS TO THESE PLANS DUE TO FIELD CONDITIONS MUST BE SUBMITTED TO THE PROJECT DESIGN TEAM FOR REVIEW AND APPROVAL PRIOR TO PROCEEDING WITH CONSTRUCTION.

5) FLOORING MATERIAL SPECIFIED BY THE ARCHITECT MUST BE PROVIDED WITH A COVED BASE AT ALL WALLS TO INCLUDE THE INTERIOR AND EXTERIOR OF WALK-IN REFRIGERATED ROOMS.

6) ALL FOODSERVICE EQUIPMENT AND CUSTOM FABRICATED ITEMS MUST MEET THE STANDARDS OF THE NATIONAL SANITATION FOUNDATION AND SHALL BE LABELED ACCORDINGLY.

Abbreviations used:

A	Amperes	DR	Duplex receptacle	IW	Indirect Waste
AFF	Above finished floor	EC	Electrical contractor	KEC	Kitchen Equip. Contractor
ATC	Automatic Temp. Controls Contractor	EXH	Exhaust	KW	Kilowatt
		FD	Floor drain	MBTU	BTU per hour/1000
BFF	Below finished floor	FFD	Funnel floor drain	MC	Mechanical Contractor
BMS	Building Management System	FHW	Fahrenheit hot water	MUA	Make-up air
		FS	Floor sink	NIC	Not In Contract
BTC	Branch to connection	G	Gas	PC	Plumbing Contractor
C&P	Cord & plug provided	GC	General Contractor	QD	Quick disconnect
CFM	Cubic feet per minute	GI	Grease interceptor	SP	Static pressure (WG)
CR	Condensate return	HP	Horsepower	SR	Single receptacle
CW	Cold water	HW	Hot water	SS	Steam supply
DFA	Drop from above	H&CW	Hot & cold water	W	Waste (direct conn.)

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

Crabtree McGrath ASSOCIATES, INC.
100 Conifer Hill Dr., Suite 510
Danvers, MA 01923
978-352-8500
crabtree-mcgrath.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM STREET
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

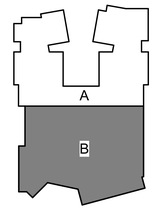
NO.	DATE	TITLE

ISSUE TITLE AND DATE:

60% CONSTRUCTION DOCUMENTS
06.19.2026

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KEY PLAN



ORIENTATION AND SCALE:



PROJECT NORTH

SHEET TITLE:

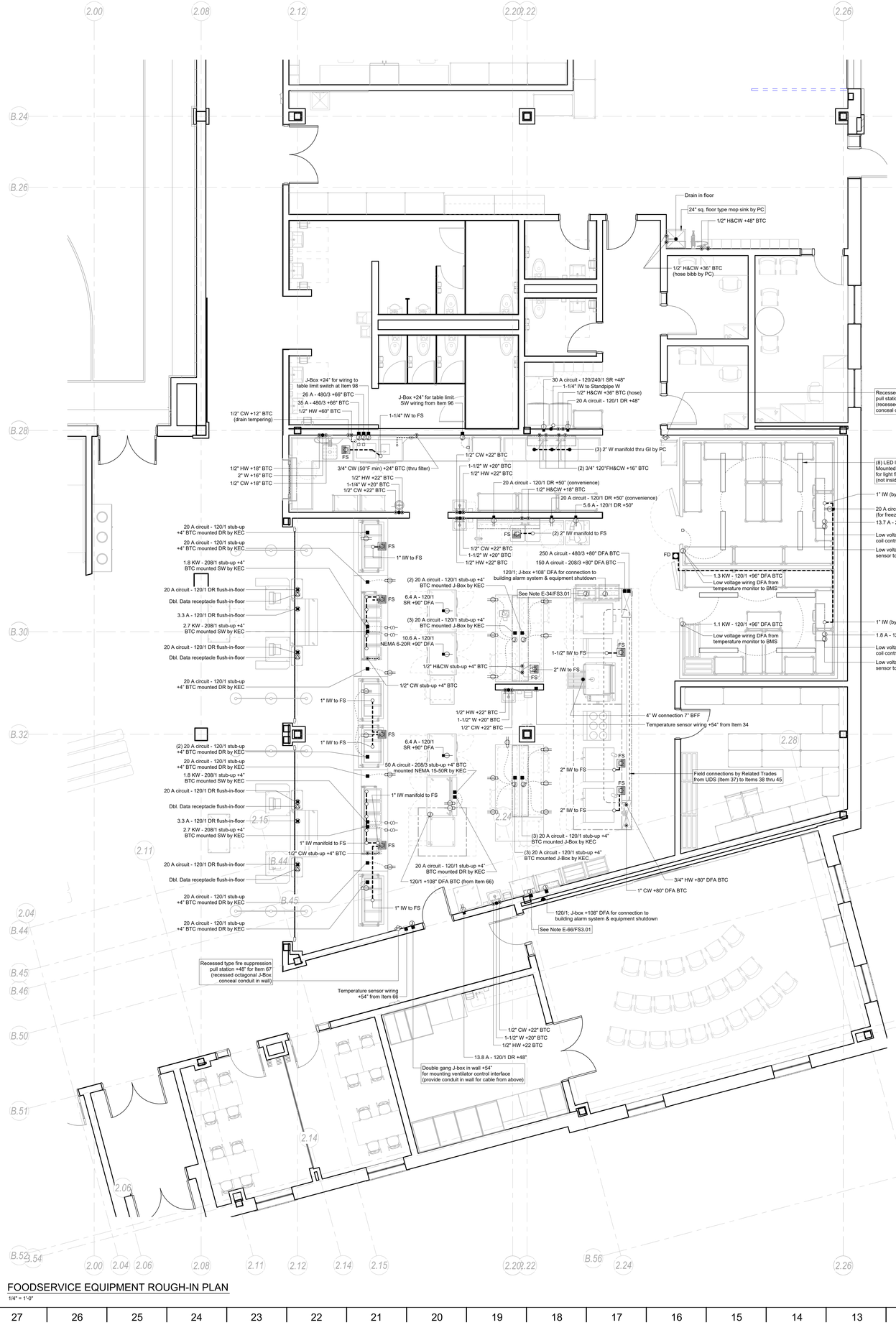
ENLARGED FOODSERVICE EQUIPMENT PLAN

SHEET NUMBER:

FS2.01

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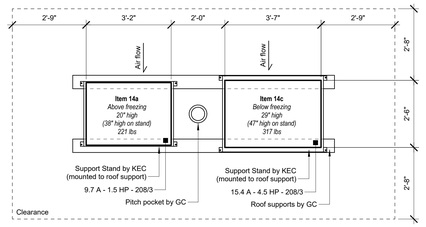


FOODSERVICE EQUIPMENT ROUGH-IN PLAN

1/4" = 1'-0"

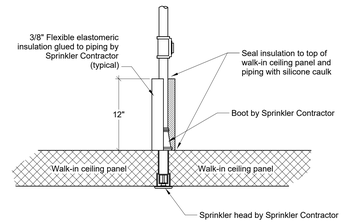
Mount on roof (Location to be coordinated)

Maximum refrigeration line run = 100' (including a 55' maximum vertical run)



1 FS3.01 Detail - Remote Condensing Units

NTS



Typical Detail - Refrigerated Room Fire Sprinkler

NTS

Notes:
1. All light fixtures to be furnished by KEC
2. Mounting light fixtures, all conduit and interwiring by EC
3. All conduit to be on exterior of walk-in by EC
4. All penetrations thru walk-in panels to be thoroughly sealed by EC

Typical Detail - Refrigerated Room Light Fixture

NTS

Note E-34

15 A circuit - 120/1 DFA for conn to ventilator control & hood lights at Items 35 & 36.
Microswitch wiring from fire suppression system (Item 33);
EC to provide CATS connection to remote touch screen (Item 34a - cable supplied with system);
EC to provide high voltage conns from VFD to EHX fan;
MC/ATC to provide wiring to temp sensors at hood;
MC/ATC to provide wiring to room temp sensors (Item 34b);
MC/ATC to provide wiring from building management system remote control

Note E-66

15 A circuit - 120/1 DFA for conn to ventilator control & hood lights at Item 65.
Microswitch wiring from fire suppression system (Item 67);
EC to provide CATS connection to remote touch screen (Item 66a - cable supplied with system);
EC to provide high voltage conns from VFD to EHX fan;
MC/ATC to provide wiring to temp sensors at hood;
MC/ATC to provide wiring to room temp sensors (Item 66b);
MC/ATC to provide wiring from building management system remote control

PLUMBING ROUGH-IN LEGEND	
	HOT WATER
	COLD WATER
	WASTE - DIRECT CONNECTED
	WASTE - INDIRECT
	GAS
	AREA FD (SUGGESTED LOCATION)
	FLOOR DRAIN
	FUNNEL FLOOR DRAIN
	FLOOR SINK
	FLOOR SINK (3/4 GRATE)
	FLOOR SINK (1/2 GRATE)
	FIELD CONNECTION
	FIELD PIPING (WASTE)
	FIELD PIPING (WATER)

ELECTRICAL ROUGH-IN LEGEND	
	DUPLEX RECEPTACLE
	DUPLEX RECEPTACLE (TABLE MOUNTED)
	SIMPLEX RECEPTACLE
	SIMPLEX RECEPTACLE (TABLE MOUNTED)
	SPECIAL PURPOSE RECEPTACLE
	FLOOR RECEPTACLE
	JUNCTION BOX
	DROP CORD
	ELECTRICAL CONDUIT
	FIELD CONNECTION
	SWITCH
	LIGHT FIXTURE
	FIRE PULL STATION
	FIELD WIRING

PLUMBING NOTES

1) DIMENSIONS ON THIS PLAN ARE PROVIDED FOR DESIGN INTENT. IT IS THE RESPONSIBILITY OF THE KITCHEN EQUIPMENT CONTRACTOR TO VERIFY AND COORDINATE ALL DIMENSIONS AND HEIGHTS LISTED IN THE FIELD WITH THE EQUIPMENT BEING PROVIDED.
2) PLUMBING CONTRACTOR IS RESPONSIBLE FOR ALL FINAL CONNECTIONS TO EQUIPMENT THAT REQUIRE A BRANCH TO CONNECTION (BTC), OR WHERE PLUMBING INTERCONNECTION IS INDICATED ON THE PLAN WITH A DASHED LINE.
3) PLUMBING CONTRACTOR IS RESPONSIBLE FOR REVIEWING ALL MANUFACTURER'S SHOP DRAWINGS AND EQUIPMENT CUT SHEETS SUBMITTED TO CONFIRM SCOPE REQUIREMENTS AND INSTALLATION EXPECTATIONS.
4) ALL FLOOR SINKS AND DRAINS MUST BE PROVIDED AND INSTALLED BY THE PLUMBING CONTRACTOR. AREA DRAINS, IF LOCATED LOCATED ON THESE PLANS, ARE TO BE CONSIDERED RECOMMENDED AREAS. IT IS THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO CONFIRM QUANTITIES AND LOCATIONS OF AREA DRAINS WITH THE LOCAL AUTHORITY HAVING JURISDICTION.
5) FLOOR SINKS LOCATED UNDER COUNTERS WITH LIMITED ACCESSIBILITY MUST BE INSTALLED 50% EXPOSED AND EASILY ACCESSIBLE FOR CLEANING. IF A FLOOR SINK CAN NOT BE INSTALLED 50% EXPOSED, THE UNDER SHELF OF THE CABINET MUST BE FULLY REMOVABLE OR BE PROVIDED WITH AN ACCESS PANEL LARGE ENOUGH TO REMOVE THE DRAIN GRATE FOR CLEANING.
6) CONDENSATE DRAIN LINES FROM WALK-IN REFRIGERATED ROOM EVAPORATOR COILS SHALL BE INSTALLED BY THE KITCHEN EQUIPMENT CONTRACTOR. DRAIN LINES MUST BE COPPER AND INSTALLED 1" OFF THE WALLS WITH A MINIMUM PITCH OF 1/2" PER FOOT. KITCHEN EQUIPMENT CONTRACTOR TO PROVIDE AND INSTALL A COPPER UNION WITHIN 24" OF THE CONNECTION TO THE EVAPORATOR COIL. FOR INSTALLATION OF DRAIN LINES IN A FREEZER, THE DRAIN SHALL EXIT THE FREEZER AT THE EARLIEST DISTANCE POSSIBLE. DRAIN PENETRATIONS THROUGH THE WALK-IN REFRIGERATED ROOM WALL PANEL MUST BE APPROPRIATELY SEALED TO INCLUDE A VAPOR SEAL AND PROVIDED WITH CHROME ESCUTCHEON PLATES AT ALL EXPOSED POINTS WHERE PIPING PENETRATES THE WALL. DRAINS MUST BE "P" TRAPPED OUTSIDE OF THE REFRIGERATED ROOM WALL TO AVOID ENTRANCE OF WARM AIR AND TERMINATED 1" ABOVE THE FLOOR DRAIN OR AS REQUIRED BY LOCAL CODE.
7) PLUMBING CONTRACTOR TO INSTALL UTILITIES CONCEALED IN WALLS AND STUB-OUT AT TERMINATION POINTS.
8) PLUMBING CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ALL DRAINS, FAUCETS, PIPING TRAPS, VALVES, SHUT-OFFS, GAUGES, WATER PRESSURE REDUCERS, REGULATORS AND BACKFLOW PREVENTION, ETC. AS REQUIRED BY LOCAL AUTHORITY HAVING JURISDICTION.
9) IT IS THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO FLUSH ALL WATER LINES PRIOR TO FINAL CONNECTION TO FOODSERVICE EQUIPMENT.
10) THE PLUMBING CONTRACTOR IS RESPONSIBLE FOR LOCATION OF GREASE TRAPS AS REQUIRED BY LOCAL AUTHORITY HAVING JURISDICTION. GREASE TRAPS MUST BE LOCATED IN A MANNER THAT DOES NOT INTERFERE WITH FOODSERVICE EQUIPMENT LAYOUT.

ELECTRICAL NOTES

1) DIMENSIONS ON THIS PLAN ARE PROVIDED FOR DESIGN INTENT. IT IS THE RESPONSIBILITY OF THE KITCHEN EQUIPMENT CONTRACTOR TO VERIFY AND COORDINATE ALL DIMENSIONS AND HEIGHTS LISTED IN THE FIELD WITH THE EQUIPMENT BEING PROVIDED.
2) ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR ALL FINAL CONNECTIONS TO EQUIPMENT THAT REQUIRES A BRANCH TO CONNECTION (BTC), OR WHERE INTER-WIRING IS INDICATED ON THE PLAN IN A DASHED LINE.
3) ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR REVIEWING ALL MANUFACTURER'S SHOP DRAWINGS AND EQUIPMENT CUT SHEETS SUBMITTED TO CONFIRM SCOPE REQUIREMENTS AND EXPECTATIONS.
4) ELECTRICAL PANELS PROVIDED SHALL BE DESIGNED WITH A MINIMUM OF 20% SPARE CAPACITY FOR FUTURE EXPANSION UNLESS OTHERWISE APPROVED BY THE OWNER.
5) ELECTRICAL CONTRACTOR TO INSTALL DROP CORDS AS LOCATED ON PLANS WITH THE CORD ADJUSTED TO HANG 78" ABOVE FINISH FLOOR. PLASTIC WIRE TIES ARE NOT ACCEPTABLE FOR THIS WORK. DROP CORDS MUST BE PROVIDED WITH STRAIN RELIEF.
6) ELECTRICAL CONNECTIONS ON THIS PLAN ARE PROVIDED AS IT RELATES SPECIFICALLY TO FOOD SERVICE EQUIPMENT. CONVENIENCE OUTLETS ARE PROVIDED IN SPECIFIC LOCATIONS AS REQUESTED BY OWNER. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL ANY OTHER ELECTRICAL OUTLETS AS REQUIRED TO MEET CODE REQUIREMENTS BY LOCAL AUTHORITY HAVING JURISDICTION.
7) WALK-IN REFRIGERATED ROOM LIGHT FIXTURES ARE TO BE PROVIDED BY THE KITCHEN EQUIPMENT CONTRACTOR. LIGHTS ARE TO BE MOUNTED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.
8) IT IS THE RESPONSIBILITY OF THE KITCHEN EQUIPMENT CONTRACTOR TO CONFIRM WITH THE WALK-IN REFRIGERATED ROOM MANUFACTURER THAT THE QUANTITY AND LOCATIONS OF THE LIGHTING LAYOUT WILL MEET 20 FOOT CANDLES OF LIGHT AT A DISTANCE OF 30" ABOVE FINISH FLOOR AS REQUIRED IN WALK-IN REFRIGERATED ROOMS BY THE NATIONAL FOOD CODE.
9) DRAIN PIPING WITHIN A WALK-IN FREEZER SHALL BE PROVIDED WITH A DRAIN LINE HEATER AND INSULATION. FINAL CONNECTION OF THE DRAIN LINE HEATER MUST BE PROVIDED BY THE ELECTRICAL CONTRACTOR.
10) ELECTRICAL CONTRACTOR TO INSTALL UTILITIES CONCEALED IN WALLS AND STUB-OUT AT TERMINATION POINTS.
11) ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL WIRING BETWEEN EXHAUST VENTILATORS, AND ASSOCIATED FAN SYSTEMS, CONTROL PANELS, MAGNETIC STARTERS, FIRE SUPPRESSION SYSTEMS, PULL STATIONS AND SWITCHES AS REQUIRED.
12) CONTROL AND POWER WIRING BETWEEN CONTROL PANELS AND GARBAGE DISPOSALS, WASTE PULPERS, TROUGH COLLECTORS ETC. ARE TO BE PROVIDED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.
13) ELECTRICAL CONTRACTOR MUST PROVIDE ELECTRICAL POWER TO ANY COOKING EQUIPMENT THROUGH A SHUNT TRIP SYSTEM.
14) FOOD PREPARATION AREAS MUST BE PROVIDED WITH 50 FOOT CANDLES OF LIGHTING AS REQUIRED BY THE NATIONAL FOOD CODE.
15) ELECTRICAL CONTRACTOR MUST VERIFY REMOTE FIRE SUPPRESSION PULL STATION LOCATIONS WITH THE LOCAL FIRE INSPECTOR PRIOR TO INSTALLATION.
16) FOODSERVICE EQUIPMENT CAN NOT BLOCK ACCESS TO GFI RECEPTACLES. CRABTREE-MCGRATH ASSOCIATES STRONGLY RECOMMENDS THAT THE ELECTRICAL CONTRACTOR PROVIDE GFI PROTECTION AT THE CIRCUIT BREAKER PANEL. THIS WILL ALSO LIMIT NUISANCE TRIPPING THAT IS COMMON WITH COMMERCIAL FOODSERVICE EQUIPMENT.

Abbreviations used:

A	Amperes	DR	Duplex receptacle	IW	Indirect Waste
AFF	Above finished floor	EC	Electrical contractor	KEC	Kitchen Equip. Contractor
ATC	Automatic Temp. Controls Contractor	EXH	Exhaust	KW	Kilowatt
		FD	Floor drain	MBTU	BTU per hour/1000
BFF	Below finished floor	FFD	Funnel floor drain	MC	Mechanical Contractor
BMS	Building Management System	FHW	Fahrenheit hot water	MUA	Make-up air
		FS	Floor sink	NIC	Not In Contract
BTC	Branch to connection	G	Gas	PC	Plumbing Contractor
C&P	Cord & plug provided	GC	General Contractor	QD	Quick disconnect
CFM	Cubic feet per minute	GI	Grease interceptor	SP	Static pressure (WG)
CR	Condensate return	HP	Horsepower	SR	Single receptacle
CW	Cold water	HW	Hot water	SS	Steam supply
DFA	Drop from above	H&CW	Hot & cold water	W	Waste (direct conn.)

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MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

Crabtree McGrath ASSOCIATES, INC.
100 Conifer Hill Dr., Suite 510
Danvers, MA 01923
978-352-8500
crabtree-mcgrath.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM STREET
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

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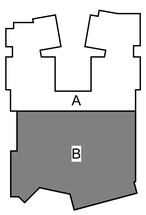
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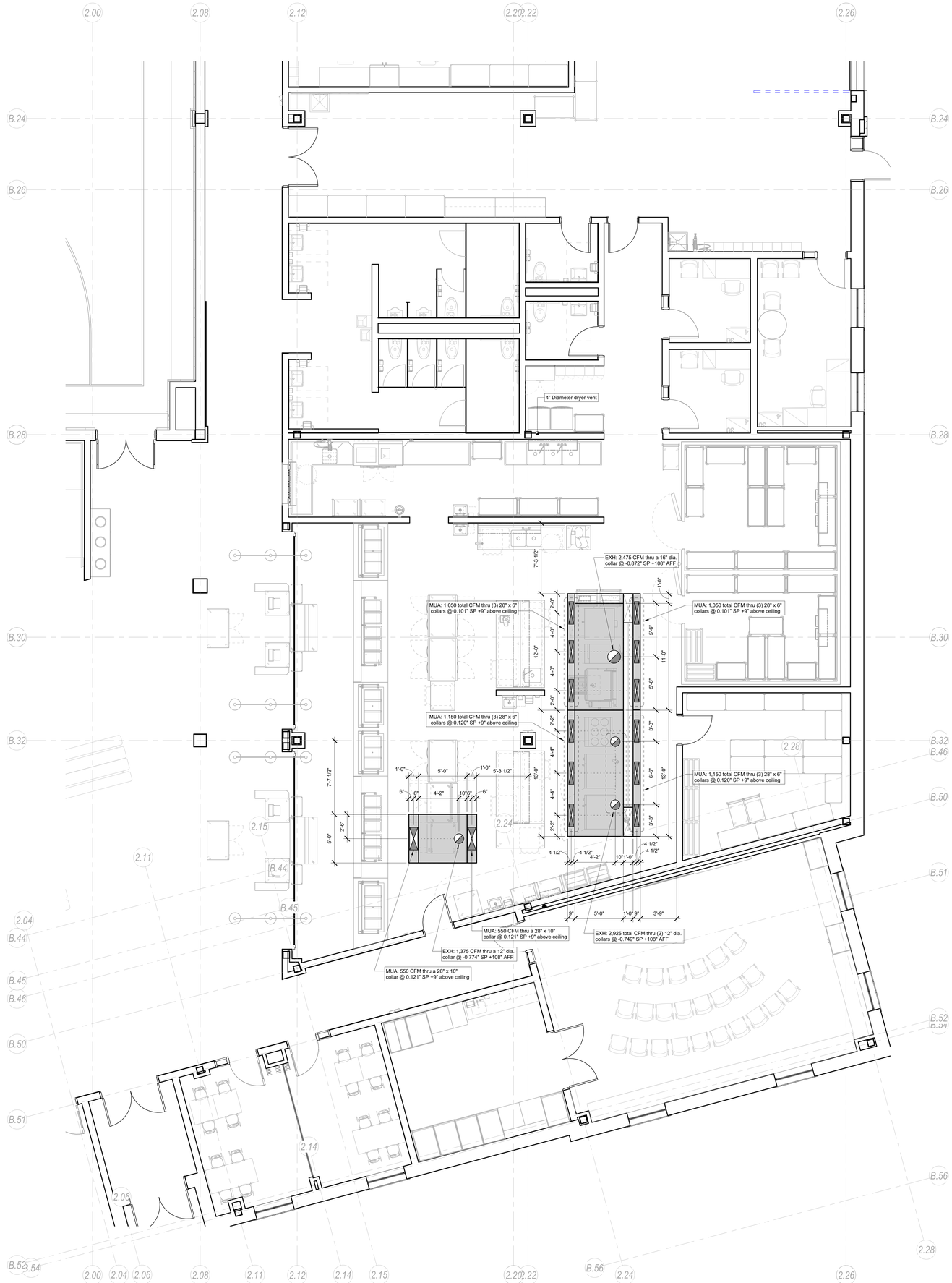
PROJECT NORTH

SHEET TITLE:
FOODSERVICE EQUIPMENT ROUGH-IN PLAN

SHEET NUMBER:
FS3.01

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FOODSERVICE EQUIPMENT VENTILATION ROUGH-IN PLAN

1/4" = 1'-0"

VENTILATION NOTES

1) DIMENSIONS ON THIS PLAN ARE PROVIDED FOR DESIGN INTENT. IT IS THE RESPONSIBILITY OF THE KITCHEN EQUIPMENT CONTRACTOR TO VERIFY AND COORDINATE ALL DIMENSIONS AND HEIGHTS LISTED IN THE FIELD WITH THE EQUIPMENT BEING PROVIDED.

2) EXHAUST HOODS MUST BE HUNG AND MOUNTED WITH THE BOTTOM OF THE HOOD AT 6'-6" ABOVE FINISH FLOOR. HVAC CONTRACTOR IS RESPONSIBLE FOR FINAL CONNECTIONS FROM THE EXHAUST HOOD COLLAR TO THE DUCTWORK. FINAL CONNECTIONS SHALL BE FULLY WELDED AND LIQUID TIGHT.

3) HVAC CONTRACTOR TO PROVIDE AND INSTALL ALL FANS, DUCTWORK AND CURBS AS REQUIRED FOR A COMPLETE AND FUNCTIONING VENTILATION SYSTEM. START-UP AND AIR BALANCING OF THESE SYSTEMS MUST BE COMPLETED BY THE HVAC CONTRACTOR.

Abbreviations used:

A	Amperes	DR	Duplex receptacle	IW	Indirect Waste
AFF	Above finished floor	EC	Electrical contractor	KEC	Kitchen Equip. Contractor
ATC	Automatic Temp. Controls Contractor	EXH	Exhaust	KW	Kilowatt
		FD	Floor drain	MBTU	BTU per hour/1000
BFF	Below finished floor	FFD	Funnel floor drain	MC	Mechanical Contractor
BMS	Building Management System	FHW	Fahrenheit hot water	MUA	Make-up air
		FS	Floor sink	NIC	Not In Contract
BTC	Branch to connection	G	Gas	PC	Plumbing Contractor
C&P	Cord & plug provided	GC	General Contractor	QD	Quick disconnect
CFM	Cubic feet per minute	GI	Grease interceptor	SP	Static pressure (WG)
CR	Condensate return	HP	Horsepower	SR	Single receptacle
CW	Cold water	HW	Hot water	SS	Steam supply
DFA	Drop from above	H&CW	Hot & cold water	W	Waste (direct conn.)

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MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

Crabtree McGrath ASSOCIATES, INC.
100 Conifer Hill Dr., Suite 510
Danvers, MA 01923
978-352-8500
crabtree-mcgrath.com

WILMINGTON
ELEMENTARY SCHOOL

320 SALEM STREET
WILMINGTON, MA 01887

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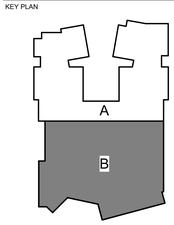
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PROJECT NORTH

SHEET TITLE:
FOODSERVICE EQUIPMENT VENTILATION ROUGH-IN PLAN

SHEET NUMBER:
FS4.01

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FIRE PROTECTION NOTES

1. FOLLOW THE LATEST REQUIREMENTS OF 2019 NFPA 13, THE MASSACHUSETTS STATE BUILDING CODE 10TH EDITION, INSURANCE UNDERWRITER'S, THOSE OF THE TOWN OF WILMINGTON, MA AND THOSE OF ANY OTHER CITY, STATE OR FEDERAL AGENCY HAVING JURISDICTION OVER THIS PROJECT.
2. PLANS INDICATE GENERAL SCOPE OF WORK. REFER TO CONTRACT DOCUMENTS AND SPECIFICATIONS FOR DETAILS ON ENTIRE SCOPE OF WORK. LOCATIONS OF SPRINKLER OUTLETS, BRANCH LINES AND FEED MAINS ARE DIAGRAMMATIC. THE DRAWINGS ARE NOT MEANT TO SHOW ALL OFFSETS AND PIPING ELEVATION CHANGES. THE CONTRACTOR SHALL VERIFY ALL NEEDED OFFSETS AND PIPE ELEVATIONS TO INSTALL THE PROPOSED SPRINKLER SYSTEM.
3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE WORK WITH THAT OF ALL OTHER TRADES. THE INSTALLING CONTRACTOR SHALL COORDINATE ALL WORK TO THE EXISTING AND/OR NEW FIELD CONDITIONS.
4. ANY INTERFERENCE SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE AND SHALL BE RESOLVED PRIOR TO THE INSTALLATION OF WORK. ANY SIZES OF NEW PIPING SHOWN ON THE PLAN ARE MEANT TO BE A GUIDE FOR ESTIMATING THE WORK.
5. THE CONTRACTOR SHALL PERFORM HYDRAULIC CALCULATIONS TO VERIFY PIPE SIZES ARE ADEQUATE TO PROVIDE THE NECESSARY SYSTEM DEMANDS.
6. THE SPRINKLER CONTRACTOR SHALL COORDINATE PIPE HEIGHTS WITH THE BEAM PENETRATIONS AND PIPE HEIGHTS REQUIRED THROUGHOUT TO ALLOW FOR PROPER AND ADEQUATE SYSTEM DRAINING ON ALL LEVELS. PROVIDE LOW POINT DRAINS AND DRUM DRIPS THROUGHOUT WHERE REQUIRED BY 2019 NFPA 13.
7. THE SPRINKLER CONTRACTOR SHALL PROVIDE AS PART OF THIS CONTRACT SPRINKLERS BELOW FIXED OBSTRUCTIONS 48" AND LARGER AS REQUIRED BY 2019 NFPA 13, 10.2.7.3.2. IT IS THE RESPONSIBILITY OF THE SPRINKLER CONTRACTOR TO PROVIDE THE REQUIRED SPRINKLERS AND ALL ASSOCIATED PIPING, FITTINGS, HANGERS, ETC. FOR A COMPLETE INSTALLATION.
8. THE SPRINKLER CONTRACTOR SHALL PROVIDE AS PART OF HIS CONTRACT AN INSPECTOR'S TEST STATION ON EACH SPRINKLER ZONE. THE INSPECTOR'S TEST STATION WILL BE LOCATED AT THE MOST HYDRAULICALLY REMOTE PART OF EACH ZONE AND SHALL BE IDENTIFIED ON THE SPRINKLER SHOP DRAWINGS.
9. REFER TO 2019 NFPA 13 TABLE 9.4.2.5(a) FOR TEMPERATURE RATING OF SPRINKLERS BASED ON DISTANCE FROM HEAT SOURCES SUCH AS HEATING DUCTS, DIFFUSERS AND UNIT HEATERS.
10. PROVIDE AUXILIARY DRAINS AT ALL LOW POINTS PER 2019 NFPA 13, SECTION 16.10.5.
11. SPRINKLER HEADS SHALL BE LOCATED IN THE CENTER OF THE CEILING TILES. WHEN THE CEILING TILE IS DIVIDED INTO SECTIONS BY GROOVED DEPRESSIONS, THE SPRINKLER HEAD SHALL BE LOCATED IN THE CENTER OF ONE OF THE PANELS.
12. COORDINATE LOCATION OF PIPING AND SPRINKLERS IN ELECTRIC AND NETWORK ROOMS. PIPING AND SPRINKLERS NOT TO BE LOCATED ABOVE ELECTRICAL EQUIPMENT.
13. COMPLETED AND SIGNED CONTRACTOR'S MATERIAL AND TEST CERTIFICATE(S) AS INDICATED IN 2019 NFPA 13 FIGURE 28.1, INCLUDING HYDROSTATIC TESTING, IN ACCORDANCE WITH 2019 NFPA 13 SECTION 28.2.1 WILL BE REQUIRED PRIOR TO RELEASE OF FINAL AFFIDAVITS.
14. REFER TO CIVIL UTILITY DRAWINGS, INCLUDING UTILITY PLANS AND DETAILS, AND WATER UTILITY SPECIFICATIONS FOR MATERIALS AND INSTALLATION OF BURIED ON SITE FIRE PROTECTION SERVICE MAINS.
15. SPRINKLER SYSTEMS SHALL BE HYDRAULICALLY DESIGNED AND CALCULATED BY THE FIRE PROTECTION CONTRACTOR. THE FIRE PROTECTION CONTRACTOR SHALL SUBMIT ALL REQUIRED HYDRAULIC CALCULATIONS TO PROVE THE HYDRAULICALLY MOST REMOTE AREAS ARE BEING PROTECTED PER SYSTEM AND OCCUPANCY HAZARD. FABRICATION DRAWINGS AND HYDRAULIC CALCULATIONS SHALL BE SUBMITTED TO THE AUTHORITY HAVING JURISDICTION AND INSURANCE UNDERWRITERS (IF REQUIRED) PRIOR TO SUBMITTING TO THE ARCHITECT FOR REVIEW. FABRICATION DRAWINGS AND HYDRAULIC CALCULATIONS SHALL BEAR THE SEAL OF REGISTRATION OF A QUALIFIED REGISTERED PROFESSIONAL FIRE PROTECTION ENGINEER. MAINTAIN A MINIMUM OF 10 PSI CUSHION BETWEEN REQUIRED PRESSURE AND AVAILABLE PRESSURE. COMPLY WITH ALL UNDERWRITERS' AND CODE AUTHORITIES REQUIREMENTS INCLUDING MAXIMUM WATER FLOW VELOCITY IN THE FIRE PROTECTION SYSTEM.

FIRE PROTECTION LEGEND

WS	WS	WET SPRINKLER PIPE
SD	SD	SPRINKLER DRAIN
SP	SP	STAND PIPE
FDC	FDC	FIRE DEPARTMENT CONNECTION
#		HYDRAULIC REFERENCE POINT
		UPRIGHT SPRINKLER HEAD
		CONCEALED PENDENT SPRINKLER HEAD
		PENDENT SPRINKLER HEAD
		INTERMEDIATE LEVEL PENDENT SPRINKLER HEAD
		UPRIGHT SPRINKLER HEAD BELOW DUCTWORK
DRY		CONCEALED PENDENT SPRINKLER HEAD DRY - INDICATES DRY TYPE SPRINKLER HEAD
V		CONCEALED PENDENT SPRINKLER HEAD (⍒) - INDICATES UP & DN TYPE SPRINKLER HEAD
		HORIZONTAL SIDEWALL SPRINKLER HEAD DRY - INDICATES DRY TYPE SPRINKLER HEAD
		HORIZONTAL EXTENDED COVERAGE SIDEWALL SPRINKLER HEAD DRY - INDICATES DRY TYPE SPRINKLER HEAD
AB	AB	ELECTRIC ALARM BELL
DC	DC	DRESSER COUPLING
	WTS	WATER TIGHT SLEEVE
⊗		RISER PIPE (THRU FLOOR OR CEILING)
	CAP	CAPPED PIPE
TS	OSY	OS&Y VALVE WITH SUPERVISORY TAMPER SWITCH
	CV	CHECK VALVE
FS	FS	FLOW SWITCH
	DCVA	DOUBLE CHECK VALVE ASSEMBLY
	FCVA	FLOOR CONTROL VALVE ASSEMBLY
	WRCV	WET RISER CHECK VALVE
	DACV	DRY ALARM CHECK VALVE
	FDC	FIRE DEPARTMENT CONNECTION
	FDV	FIRE DEPARTMENT VALVE
NS		NO SPRINKLERS
AP		ACCESS PANEL
	NTS	NOT TO SCALE
	TYP	TYPICAL
	AFF	ABOVE FINISHED FLOOR
	AFG	ABOVE FINISHED GRADE
	GC	GENERAL CONTRACTOR
	FPC	FIRE PROTECTION CONTRACTOR
	C&C	CUT & CAP
	UG	UNDERGROUND
	DS	DRY SPRINKLERS
	ZCV	ZONE CONTROL VALVE

SPRINKLER SYSTEM DESIGN CRITERIA

	ART CLASS ROOMS, CORRIDORS, LEARNING CENTER, OFFICE, SMALL GROUP, TEACH WELLNESS, LIBRARY, VESTIBULE, STRIDES, TOILETS, MUSIC, CHORUS, CAFETERIA, ETC.	ART STORAGE, CUST CLOSET, MECHANICAL PUMP ROOM, KITCHEN, MAIN ELECTRICAL ROOM,STORAGE ROOM, STE CLASSROOM, ETC.
CLASSIFICATION	LIGHT HAZARD	ORDINARY HAZARD GP-1
DENSITY	0.10 GPM/SQ.FT	0.15 GPM/SQ.FT
DESIGN AREA	1500 SQ.FT	1500 SQ.FT
MAX. COVERAGE	225 SQ.FT	130 SQ.FT
HOSE ALLOWANCE	100 GPM	250 GPM

FLOW TEST DATA

STATIC PRESSURE	82 PSI
RESIDUAL PRESSURE	78 PSI
FLOW	1070 GPM
DATE & TIME	10/20/2025, 11:00 AM @ 320 SALEM STREET, WILMINGTON, MA

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MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

AKAL Engineering Inc.
44 Central Street. Unit # 4
Berlin, MA. 01503
Telephone - (508) 869-0403
Fax - (508) 869-2891
www.akalengineering.com

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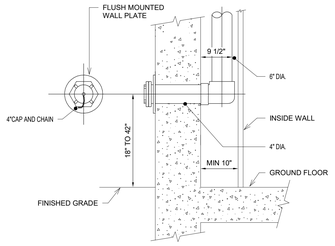
KEY PLAN

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SHEET TITLE:
FIRE PROTECTION LEGENDS, NOTES & ABBREVIATIONS

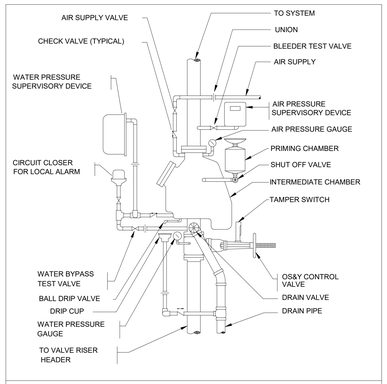
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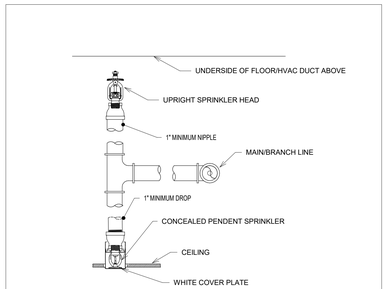
(15) FIRE DEPARTMENT CONNECTION - STORZ

NO SCALE



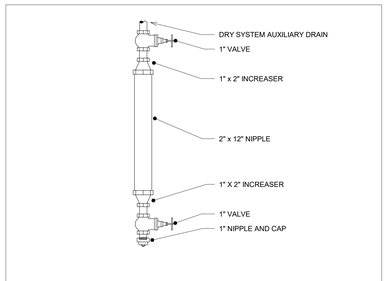
(16) DRY ALARM CHECK VALVE

NO SCALE



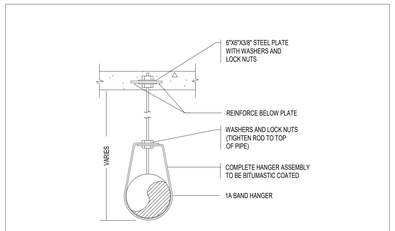
(17) UP & DOWN SPRINKLER CONNECTION

NO SCALE



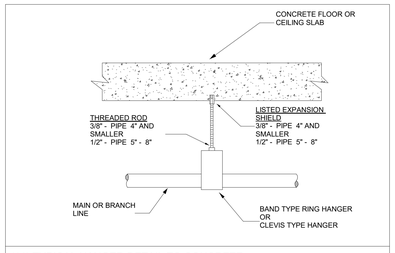
(18) DRY SYSTEM DRAIN CONNECTION

NO SCALE



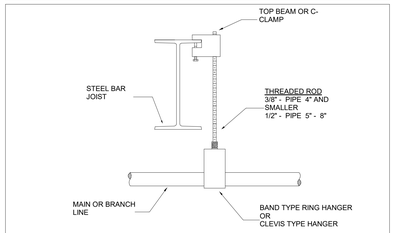
(10) UNDERSLAB HANGER DIAGRAM

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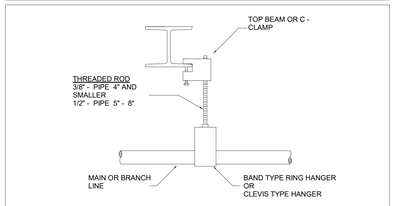
(11) TYPICAL HANGER DETAIL TO CONCRETE

NO SCALE



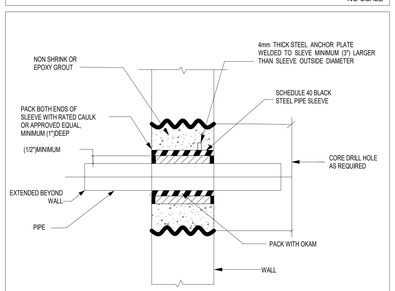
(12) TYPICAL HANGER DETAIL TO BAR JOIST

NO SCALE



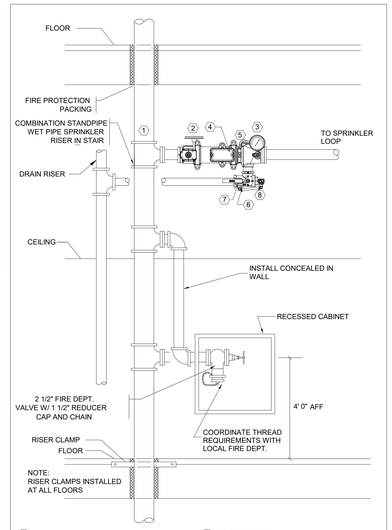
(13) TYPICAL HANGER DETAIL TO STEEL

NO SCALE



(14) PIPE SLEEVE THROUGH DETAIL

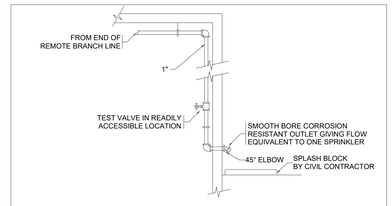
NO SCALE



① RISER
② BUTTERFLY VALVE W/SUPERVISORY SWITCH
③ PRESSURE GAUGE W/SHUT-OFF VALVE
④ WATER FLOW SWITCH
⑤ CHECK VALVE
⑥ INSPECTORS TEST / AUXILIARY DRAIN VALVE
⑦ 1" SIGHT GLASS
⑧ PRESSURE RELIEF VALVE SET AT 175 PSI

(6) FIRE DEPARTMENT AND FLOOR CONTROL VALVES

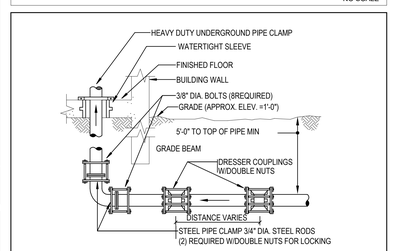
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NOTE: NOT LESS THAN 4 FEET OF EXPOSED TEST PIPE IN WARM ROOM BEYOND VALVE WHERE PIPE EXTENDS THROUGH WALL TO OUTSIDE.

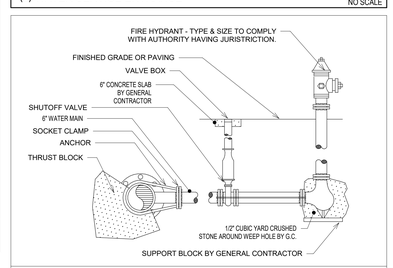
(7) INSPECTOR'S TEST CONNECTION (WET PIPE)

NO SCALE



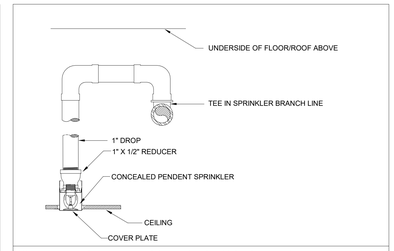
(8) WATER SERVICE ENTRANCE

NO SCALE



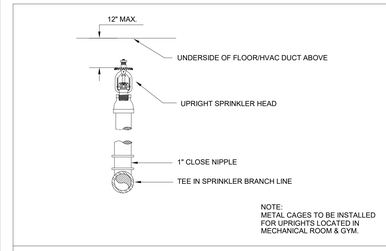
(9) FIRE HYDRANT

NO SCALE



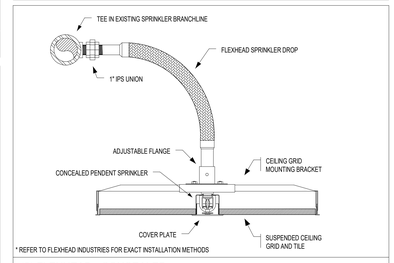
(1) PENDENT SPRINKLER CONNECTION (CONCEALED)

NO SCALE



(2) UPRIGHT SPRINKLER CONNECTION

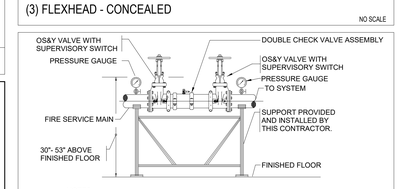
NO SCALE



* REFER TO FLEXHEAD INDUSTRIES FOR EXACT INSTALLATION METHODS

(3) FLEXHEAD - CONCEALED

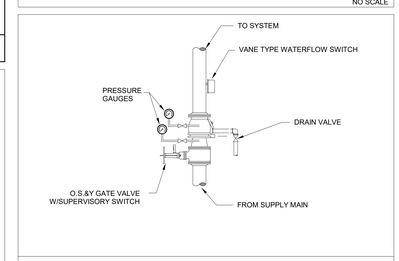
NO SCALE



NOTES:
1. FURNISH TO OWNER ONE TEST KIT AND SPARE PARTS KIT.
2. THIS CONTRACTOR SHALL ACT AS THE OWNERS AGENT IN SEEKING APPROVAL FROM ALL LOCAL AND STATE AUTHORITIES. THIS CONTRACTOR SHALL SUBMIT ALL PLANS, SPECS. AND APPLICATIONS REQUIRED FOR APPROVAL AND PAY ALL FEES.
3. SEE FLOOR PLANS FOR SIZES.
4. MAINTAIN 1'-0" CLEARANCE FROM WALL.
5. TEST AND CERTIFY EACH INSTALLATION.

(4) DOUBLE CHECK BACKFLOW PREVENTER DIAGRAM

NO SCALE



(5) WET RISER CHECK VALVE

NO SCALE

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WILMINGTON ELEMENTARY SCHOOL

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PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

NO.	DATE	TITLE

ISSUE TITLE AND DATE:

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KEY PLAN

ORIENTATION AND SCALE:

SHEET TITLE:
FIRE PROTECTION DETAILS

SHEET NUMBER:
FP0.02

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1 LEVEL 1 - AREA A
1/8" = 1'-0"

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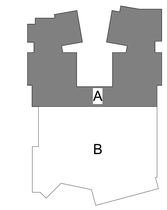
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KEY PLAN



ORIENTATION AND SCALE:

N
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

SHEET TITLE:
FIRE PROTECTION
LEVEL 1 - AREA A

SHEET NUMBER:
FP1.11

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REFER TO DRAWING FP1.11 FOR CONTINUATION

EXTERIOR DRAIN. PROVIDE SPLASH BLOCK.

PROVIDE SPRINKLER HEADS BELOW BLEACHERS (TYP.8)

PROVIDE SIDEWALL SPRINKLER HEADS (TYP.2)

6" SP RISER
2 1/2" FDV IN RECESSED CABINET
6" BUTTERFLY VALVE W/TAMPER

PROVIDE SPRINKLER HEAD BELOW THE LOWEST MIDDLE LANDING.

PROVIDE SPRINKLER HEADS BELOW THE STAIRCASE WITH WIREGUARD. (TYP.2)

6" CHECK VALVE W/BALL DRIP
4" STORZ CONNECTION
ELECTRIC ALARM BELL

8" FIRE PROTECTION PIPE FROM CITY LOOP. REFER TO SITE UTILITIES PLAN FOR CONTINUATION.

8" BACK FLOW PREVENTER

6" WET RISER CHECK VALVE
6" BUTTERFLY VALVE

2 1/2" DRY ALARM CHECK VALVE WITH COMPRESSER
2 1/2" BUTTERFLY VALVE W/TAMPER
PRESSURE SWITCH
LOW/HIGH AIR SWITCH

PROVIDE SIDEWALL SPRINKLER HEADS BELOW OVERHEAD DOOR (TYP.2)

6" CHECK VALVE W/BALL DRIP
4" STORZ CONNECTION
ELECTRIC ALARM BELL

OFFICES/CONFERENCE ROOM/ CORRIDOR/CLASSROOM/TOILET

LIGHT HAZARD
0.10 GPM / 1500 SF
QUICK RESPONSE-WET SYSTEM
HOSE ALLOWANCE 100 GPM

OPEN TO ABOVE
GYMNASIUM 194

PROVIDE WIREGUARDS FOR ALL SPRINKLER HEADS IN GYM AREA

PROVIDE WIREGUARDS FOR ALL SPRINKLER HEADS IN THIS AREA

PROVIDE PENDENT SPRINKLER HEADS (TYP.8)

NETWORK/TELECOM/ MAIN ELECTRICAL ROOM

ORDINARY HAZARD GP-1
0.15 GPM / 1500 SF
QUICK RESPONSE-WET SYSTEM
HOSE ALLOWANCE 250 GPM

STORAGE/KITCHEN/RECEIVING/ RECYCLING/TRASH

ORDINARY HAZARD GP-1
0.15 GPM / 1500 SF
QUICK RESPONSE-WET SYSTEM
HOSE ALLOWANCE 250 GPM

PROVIDE UPRIGHT SPRINKLER HEADS ABOVE WALK-IN FREEZER/COOLER (TYP.)

4" SP UP
4" BUTTERFLY VALVE W/TAMPER

4" SP UP
2 1/2" FDV IN RECESSED CABINET

REFER TO DWG. FP2.12 FOR SPRINKLER LAYOUT IN THIS AREA.

PROVIDE SPRINKLER HEAD BELOW STAIRCASE WITH WIREGUARD (TYP.)

(o) INDICATES UP & DOWN SPRINKLER HEADS (TYP.)

OPEN TO ABOVE
CAFETERIA 168

PROVIDE CUSTOM COLOR SPRINKLER HEADS. COLOR TO BE SELECTED BY THE ARCHITECT. (TYP.)

PROVIDE PENDENT SPRINKLER HEADS (TYP.6)

OFFICES/CAFETERIA/VESTIBULE

LIGHT HAZARD
0.10 GPM / 1500 SF
QUICK RESPONSE-WET SYSTEM
HOSE ALLOWANCE 100 GPM

EXTERIOR CANOPY/PROJECTIONS:- SPRINKLERS ARE NOT REQUIRED PER NFPA 13, 2019, SECTION 9.2.3, AS THE AREA IS OF NON COMBUSTIBLE CONSTRUCTION AND NO STORAGE ALLOWED.

EXTERIOR CANOPY/PROJECTIONS:- SPRINKLERS ARE NOT REQUIRED PER NFPA 13, 2019, SECTION 9.2.3, AS THE AREA IS OF NON COMBUSTIBLE CONSTRUCTION AND NO STORAGE ALLOWED.

1 LEVEL 1 - AREA B
1/8" = 1'-0"

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WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

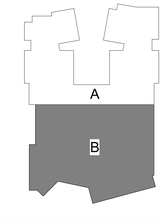
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KEY PLAN



ORIENTATION AND SCALE:



PROJECT NORTH

SHEET TITLE:

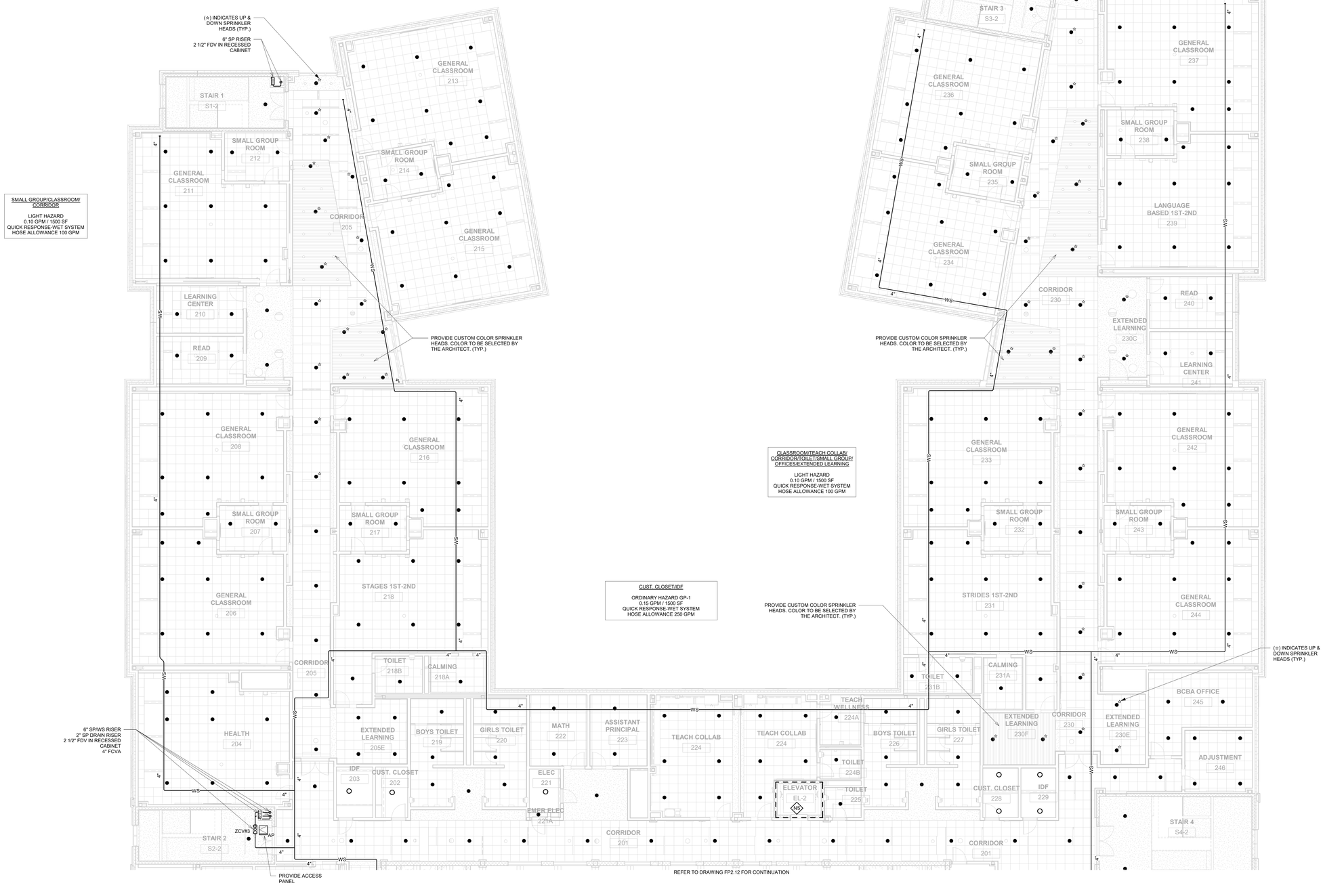
FIRE PROTECTION
LEVEL 1 - AREA B

SHEET NUMBER:

FP1.12

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1 LEVEL 2 - AREA A
1/8" = 1'-0"

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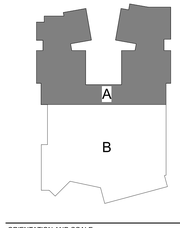
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KEY PLAN



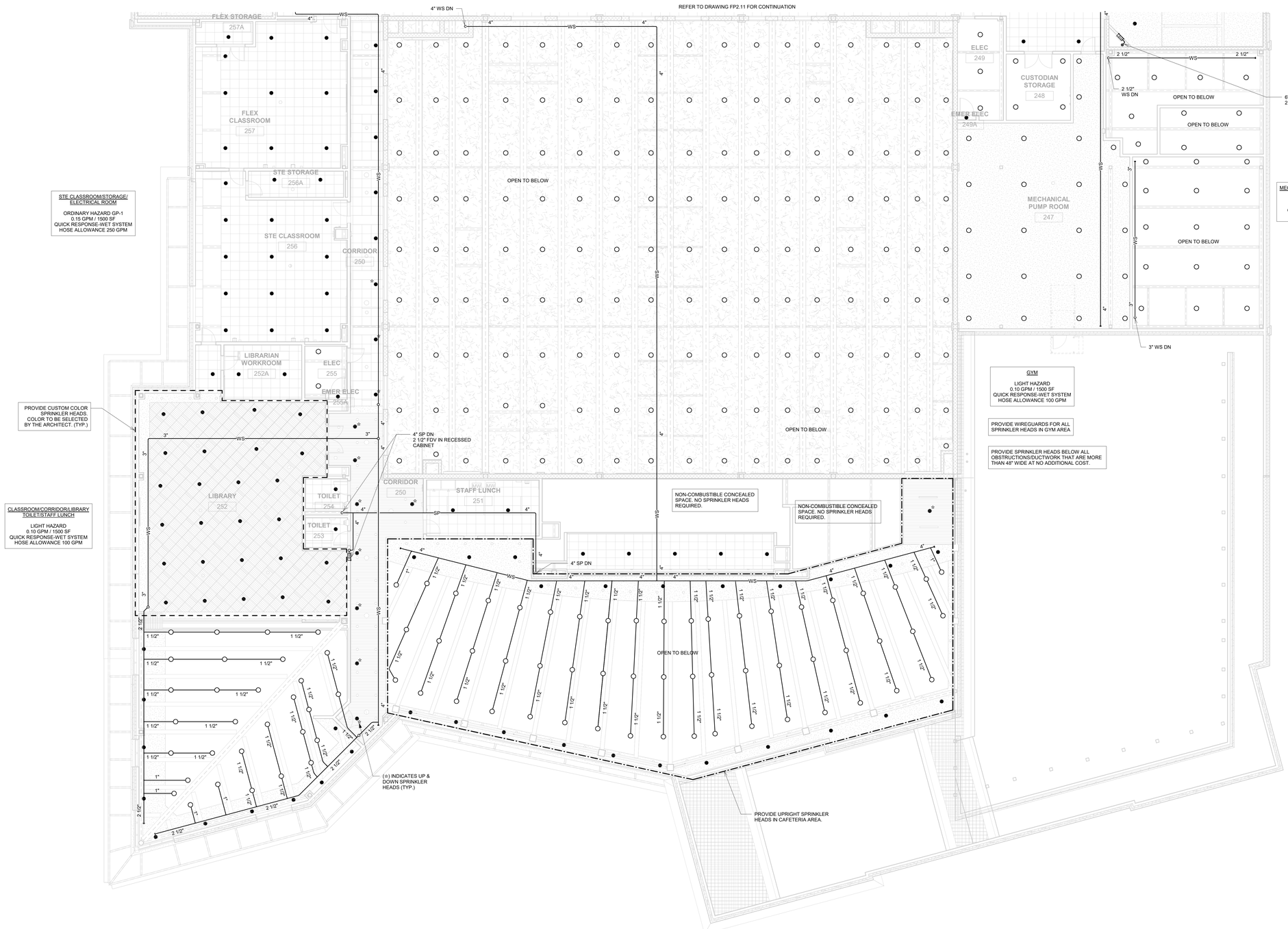
ORIENTATION AND SCALE:

N
TRUE NORTH
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE
PROJECT NORTH

SHEET TITLE:
FIRE PROTECTION
LEVEL 2 - AREA A

SHEET NUMBER:
FP2.11

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1 LEVEL 2 - AREA B
1/8" = 1'-0"

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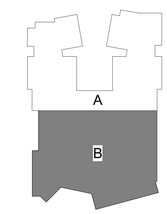
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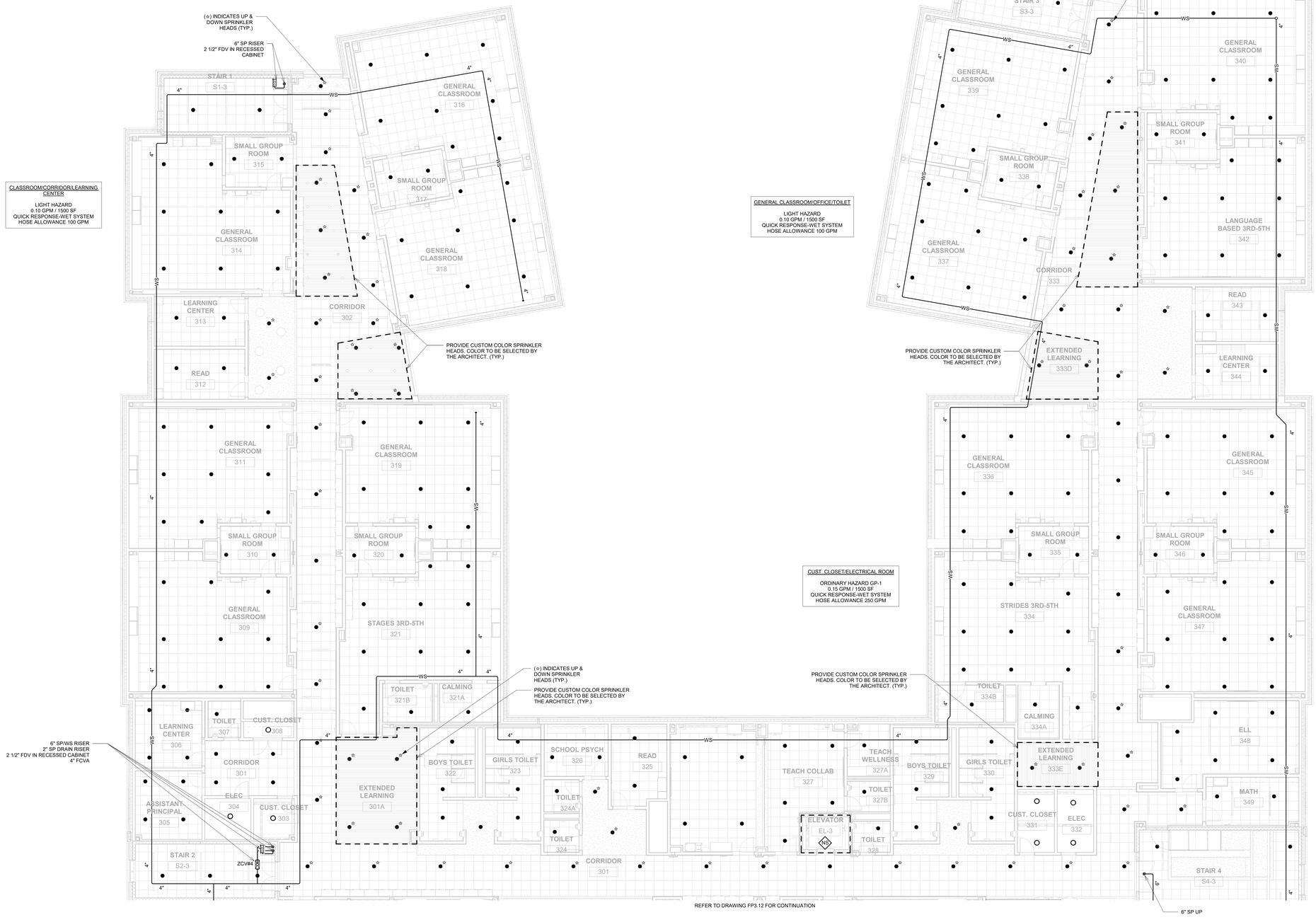
ORIENTATION AND SCALE:

N
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SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

SHEET TITLE:
FIRE PROTECTION
LEVEL 2 - AREA B

SHEET NUMBER:
FP2.12

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1 LEVEL 3 - AREA A
1/8" = 1'-0"

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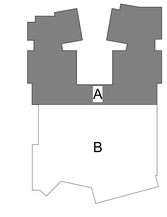
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KEY PLAN



ORIENTATION AND SCALE:



PROJECT NORTH

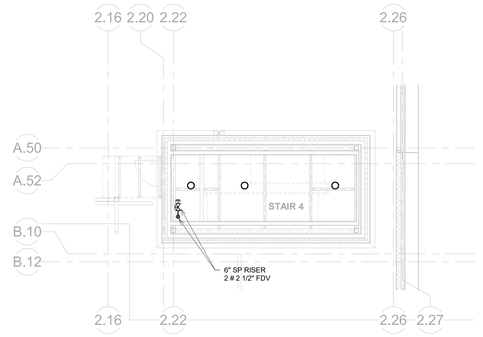
SHEET TITLE:

FIRE PROTECTION
LEVEL 3 - AREA A

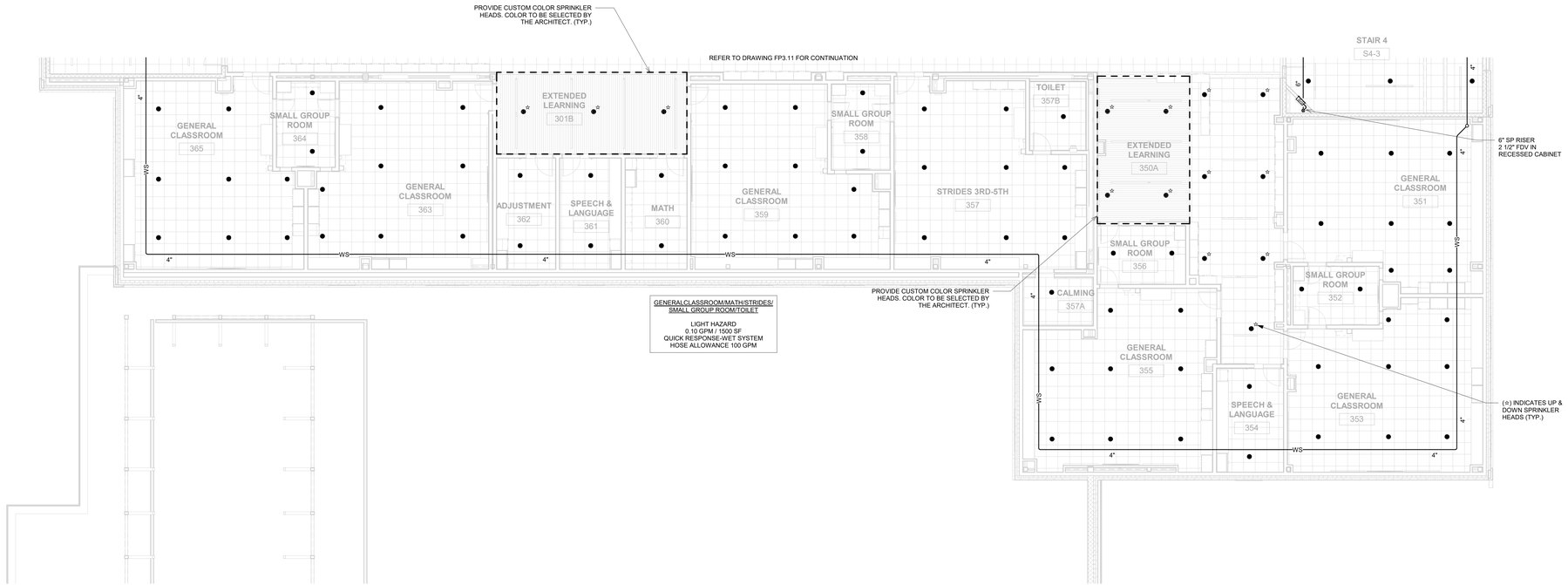
SHEET NUMBER:

FP3.11

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2 ROOF STAIR
1/8" = 1'-0"



GENERAL CLASSROOM/MATH/STRIDES/ SMALL GROUP ROOM/TOILET

LIGHT HAZARD
0.10 GPM / 1500 SF
QUICK RESPONSE-WET SYSTEM
HOSE ALLOWANCE 100 GPM

1 LEVEL 3 - AREA B
1/8" = 1'-0"

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PROJECT NUMBER: 23-0847

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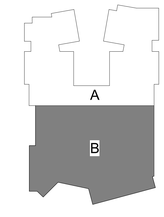
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KEY PLAN



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N
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

SHEET TITLE:

FIRE PROTECTION
LEVEL 3 - AREA B

SHEET NUMBER:

FP3.12

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LEGEND

	-	DOUBLE LINE INDICATES PIPING BELOW GRADE
SAN	SAN	SANITARY OR WASTE ABOVE GRADE
W	W	WASTE ABOVE GRADE
ST	ST	STORM PIPE
KW	KW	KITCHEN GREASE WASTE
KV	KV	KITCHEN VENT
V	V	VENT PIPNG BELOW GRADE
V	V	VENT PIPING ABOVE GRADE
AV	AV	ACID VENT PIPING
CW	CW	COLD WATER
HW	HW	HOT WATER
140HW	HW	HOT WATER AT 140°F
HWR	HWR	HOT WATER RETURN
HHWR	HHWR	HOT WATER HEATING RETURN
HHWS	HHWS	HOT WATER HEATING SUPPLY
NPCW	NPCW	NON-POTABLE COLD WATER SUPPLY
RWPS	RWPS	RAIN WATER PUMPED SUPPLY
RWRD	RWRD	RAIN WATER RETURN DRAIN
TWS	TWS	TEPID WATER SUPPLY
TWR	TWS	TEPID WATER RETURN
G	G	NATURAL GAS
OD	OD	OVERFLOW DRAIN
O/W	OW	OIL WATER WASTE
FCO	FCO	FLUSH FLOOR CLEANOUT
CO	CO	CLEANOUT
WCO	WCO	WALL CLEANOUT
UP	UP	PIPE RISES UP
DN	DN	PIPE DROPS DOWN
W&T	W&T	WASTE AND TRAP
		BALANCING VALVE AND CHECK VALVE IN HWR PIPING
SM	SM	SUBMETER IN PIPE
CA	CA	COMPRESSED AIR
VAC	VAC	VACUUM AIR
D-CA	D-CA	DENTAL COMPRESSED AIR
D-VAC	D-VAC	DENTAL VACUUM AIR

	BALANCING VALVE AND CHECK VALVE
HBV	SHUT-OFF BALL VALVE
	FLOOR DRAIN TRAP WITH VENT AND TRAP PRIMER CONNECTION.
	COMPRESSED AIR SHUT OFF VALVE
	GAS SHUT OFF VALVE
	PRESSURE REDUCING VALVE
TM	THERMOSTATIC MIXING VALVE
RD-	ROOF DRAIN
FD	FLOOR DRAIN
TP	TRAP PRIMER
SA	SHOCK ABSORBER (WATER HAMMER ARRESTOR (W/ BALL VALVE SHUT OFF VALVE)
	THERMOMETER
-	
P-	INDICATES PLUMBING FIXTURE (SEE SCHEDULE)
INV.	INVERT ELEVATION
VTR	VENT THRU ROOF
ATC	AUTOMATIC TEMPERATURE CONTROL CONTRACTOR
M.C	MECHANICAL CONTRACTOR
P.C.	PLUMBING CONTRACTOR
E.C.	ELECTRICAL CONTRACTOR
G.C.	GENERAL CONTRACTOR
K.C	KITCHEN CONTRACTOR
	EXPANSION LOOP W/ PIPE GUIDE
	WATER SUB METER
ETP	ELECTRIC TRAP PRIMER
A/P	ACCESS PANEL
T&P	TEMPERATURE AND PRESSURE RELIEF VALVE

ABBREVIATIONS

AFF	ABOVE FINISH FLOOR
ATF	AUTOMATIC TRANSMISSION FLUID
A/P OR AP	ACCESS PANEL (FURNISH BY P.C AND INSTALLED BY G.C)
AVTR	ACID WASTE VENT THROUGH ROOF
AQ	AQUASTAT
BWV	BACK WATER VALVE
CFH	CUBIC FEET PER HOUR
CO	CLEANOUT
CW	COLD WATER
CV	CHECK VALVE
CA	COMPRESSED AIR
DBFP	DOUBLE CHECK BACKFLOW PREVENTOR
DN	DOWN
DSN	DOWN SPOUT NOZZLE
EO	ENGINE OIL
EC	ENGINE COOLANT
EEH	EMERGENCY ELECTRIC HEATER
ETP	ELECTRIC TRAP PRIMER
FD	FLOOR DRAIN
FLEX	FLEXIBLE
FPHB	FROST PROOF HOSE BIBB
FS	FLOOR SINK
GM	GAS FLOW METER
HB	HOSE BIBB
HW	HOT WATER
HWH	HOT WATER HEATER
KV	KITCHEN VENT
KVTR	KITCHEN VENT THRU ROOF
LCW	LAB COLD WATER
LHW	LAB HOT WATER
LHWR	LAB HOT WATER RETURN
LI	LINT INTERCEPTOR
GMB	GAS MASTER BOX FOR VALVE
N.I.C.	NOT IN CONTRACT
OD	OVERFLOW DRAIN
OXY	OXYGEN
RD	ROOF DRAIN
RBFP	REDUCED PRESSURE BACKFLOW PREVENTOR
SA	SHOCK ABSORBER (WATER HAMMER ARRESTER)
SI	SOLID INTERCEPTOR
SM	WATER SUBMETER
ST	STORM PIPE
SV	GAS PIPE SLEEVE VENT
TP	TRAP PRIMER
TMV	THERMOSTATIC MIXING VALVE
TM-ES	THERMOSTATIC MIXING VALVE FOR EMERGENCY SHOWER
TM-EE	THERMOSTATIC MIXING VALVE FOR EMERGENCY EYE WASH
TWS	TEPID WATER SUPPLY
TWR	TEPID WATER -RECIRCULATION
T&P	TEMPERATURE AND PRESSURE VALVE
UEO	USED ENGINE OIL
UPS	UNINTERRUPTED POWER SUPPLY
WCO	WALL CLEANOUT
WHA	WATER HAMMER ARRESTER
WWF	WINDSHIELD WASHER FLUID
W & T	WASTE AND TRAP
V	VENT
V(ST)	STORM VENT PIPE
VB	VACUUM BREAKER
VAC	VACUUM
VTR	VENT THRU ROOF
AVTR	ACID WASTE VENT THRU ROOF

PLUMBING FIXTURE SCHEDULE

FIXTURE NUMBER	SYMBOL	DESCRIPTION	WASTE	VENT	COLD	HOT	REMARKS
P-1		WATER CLOSET	4"	2"	1 1/4"	-	
P-1A P-1B		WATER CLOSET (ADA)	4"	2"	1 1/4"	-	ADA COMPLIANT
P-2A		URINAL	4"	2"	3/4"	-	ADA COMPLIANT
P-3A P-3B		LAVATORY	1½"	1½"	½"	½"	ADA COMPLIANT, SENSOR ACTIVATED
P-3(2)		2 STATION LAVATORY	1½"	1½"	½"	½"	UNDER COUNTER MOUNTED
P-3(3)		3 STATION LAVATORY	1½"	1½"	½"	½"	
P-3(4)		4 STATION LAVATORY	1½"	1½"	½"	½"	
P-4		LAB SINKS	3"	1½"	½"	½"	SEE NOTE 1.
P-5		SINK	1½"	1½"	½"	½"	INTERGRAL BUBBLER W/ SINK FAUCET REQUIRED AT CHILD HEIGHT SINK
P-5A		SINK	1½"	1½"	½"	½"	P-5 TO BE ADA COMPLIANT.
P-6		DRINKING WATER COOLER	1½"	1½"	½"	-	ADA COMPLIANT WITH BOTTLE FEEDER
P-7		MOP SINK	3"	1½"	½"	½"	
P-8		LARGE SINK	2"	1½"	½"	½"	CONNECT DRAIN TO SOLID INTERCEPTOR SEE NOTE 1.
P-8A		ART ROOM SINK	2"	1½"	½"	½"	ADA COMPLIANT CONNECT DRAIN TO SOLID INTERCEPTOR SEE NOTE 1.
P-8B		UTILITY SINK	2"	1½"	½"	½"	
P-9		EMERGENCY EYE/ SHOWER					1¼" TEPID WATER SUPPLY
P-9A		PEDESTAL EYE WASH			3/4"	3/4"	FURNISH WITH TEMPERING VALVE- TM2A
P-11		WASHER OUTLET BOX	2"	1½"	½"	½"	STAND PIPE W/VENTED P-TRAP
P-11A		ICE MAKER OUTLET BOX			½"		
P-11B		REFRIGERATOR OUTLET BOX			½"		
FD1 FD2 FD1A		FLOOR DRIAN FLOOR DRIAN	2" 3"				PROVIDE TRAP PRIMER
FPHB					3/4"		ACCESS PANEL (FURNISH BY P.C AND INSTALLED BY G.C.)
HB					3/4"		HOSE BIBB
A/P							

NOTE:
1. SINK WILL BE PART OF THE CASEWORK BY OTHERS. P.C SHALL FURNISH AND INSTALL FAUCETS, DRAIN FITTINGS,
AND CONNECTION TO WATER, WASTE AND VENT. SEE SPECIFICATION

EXPANSION TANK (ET 1)

TAG NO.	SERVICE	MANUFACTURER AND MODEL NO. OR EQUAL	TYPE	TANK VOLUME (GAL)	MAX ACCEPT VOLUME (GAL)	REMARKS
ET 1	EWH-1	AMTROL ST-40VC	STAND MODEL	20	35	1

1. ASME TANK, NSF/ ANSI 61
ACCEPTABLE MANUFACTURER:
AMTROL, TACO, BELL & GOSSET OR APPROVED EQUAL.

CIRCULATION PUMP SCHEDULE (RP X)

TAG NO.	MANUFACTURER AND MODEL NO. OR EQUAL	SERVICE	TYPE	FLOW RATE (GPM)	HEAD (FT)	ELECTRICAL DATA				REMARKS
						AMPS	HP	VOLT	PHASE	
RP-1	TACO 0034E PLUS	HOT WATER RECIRCULATION	INLINE	15	20	0.76	1/4	115	1	1 , 2
RP-2	TACO 0024E PLUS	HOT WATER RECIRCULATION (140HWR)	INLINE	5	15	0.4	1/6	115	1	1 , 2

1. STAINLESS STEEL PUMP HOUSING, NSF /ANSI 61 CLASSIFIED.
2. ECM CONTROL

ACCEPTABLE MANUFACTURER:
GRUNDFOS, AMTROL, TACO, BELL & GOSSET OR APPROVED EQUAL.

STORAGE TYPE ELECTRIC WATER HEATER SCHEDULE (EWH X)

TAG NO.	MANUFACTURER AND MODEL NO. OR EQUAL	LOCATION	SERVICE	MIN. STORAGE (GAL)	FUEL TYPE	HEATER INPUT (kW)	RECOVERY RATE (GPH) AT 90° F RISE	EWT (°F)	LWT (°F)	ELECTRICAL DATA		REMARKS
										VOLT	PHASE	
EWH-1	A.O SMITH DSE-120	MECH ROOM	BUILDING	120	ELECT	90	369	50	140	480	3	1
EWH-2	A.O SMITH DSE-120	MECH ROOM	BUILDING	120	ELECT	90	369	50	140	480	3	1
EWH-3	A.O SMITH DVE-120	MECH ROOM	KITCHEN	120	ELECT	54	246	50	140	480	3	1

1 WATER HEATER SHALL BE CONSTRUCTED AND STAMPED IN ACCORDANCE WITH ASME STANDARD REQUIREMENT

ELEVATOR SUMP PUMP - SIMPLEX

TAG NO.	TYPE	MANUFACTURER AND MODEL NO. OR EQUAL	SERVICE	FLOW RATE (GPM)	HEAD (FT)	ELECTRICAL DATA			REMARKS	STAND BY POWER
						HP	AMPS	VOLT		
SP-1	SIMPLEX	ZOELLER G294	ELEVATOR PUMP	50	38	0.75	3	208 V-1PH	1,2	YES

1 PUMP FLOAT TO START/STOP PUMP.

2 OTHER EQUAL MANUFACTURES ARE STANCOR, LIBERTY PUMP.

SUB METER SCHEDULE

TAG NO.	SERVICE	TYPE	PIPE SIZE	LOCATION	MANUFACTURER/ MODEL	REMARKS
SM-1	DOMESTIC COLD WATER	ULTRA SONIC	4"	WATER SUPPLY ROOM	SPIRE METERING TECH. 280W-CI	1,2,3
SM-2	DOMESTIC HOT WATER	ULTRA SONIC	2 1/2"	WATER SUPPLY ROOM	SPIRE METERING TECH. 280W-CI	1,2,3
SM-3	KITCHEN HOT WATER	ULTRA SONIC	2 1/2"	KITCHEN MECH. ROOM	SPIRE METERING TECH. 280W-CI	1,2,3
SM-4	IRRIGATION	ULTRA SONIC	1.5"	WATER SUPPLY ROOM	SPIRE METERING TECH. 280W-CI	1,2,3

1 REFER TO SPECIFICATION SECTION.

2 PROVIDE FLANGE CONNECTION.

3 INSTALL PER THE MANUFACTURERS INSTRUCTION.

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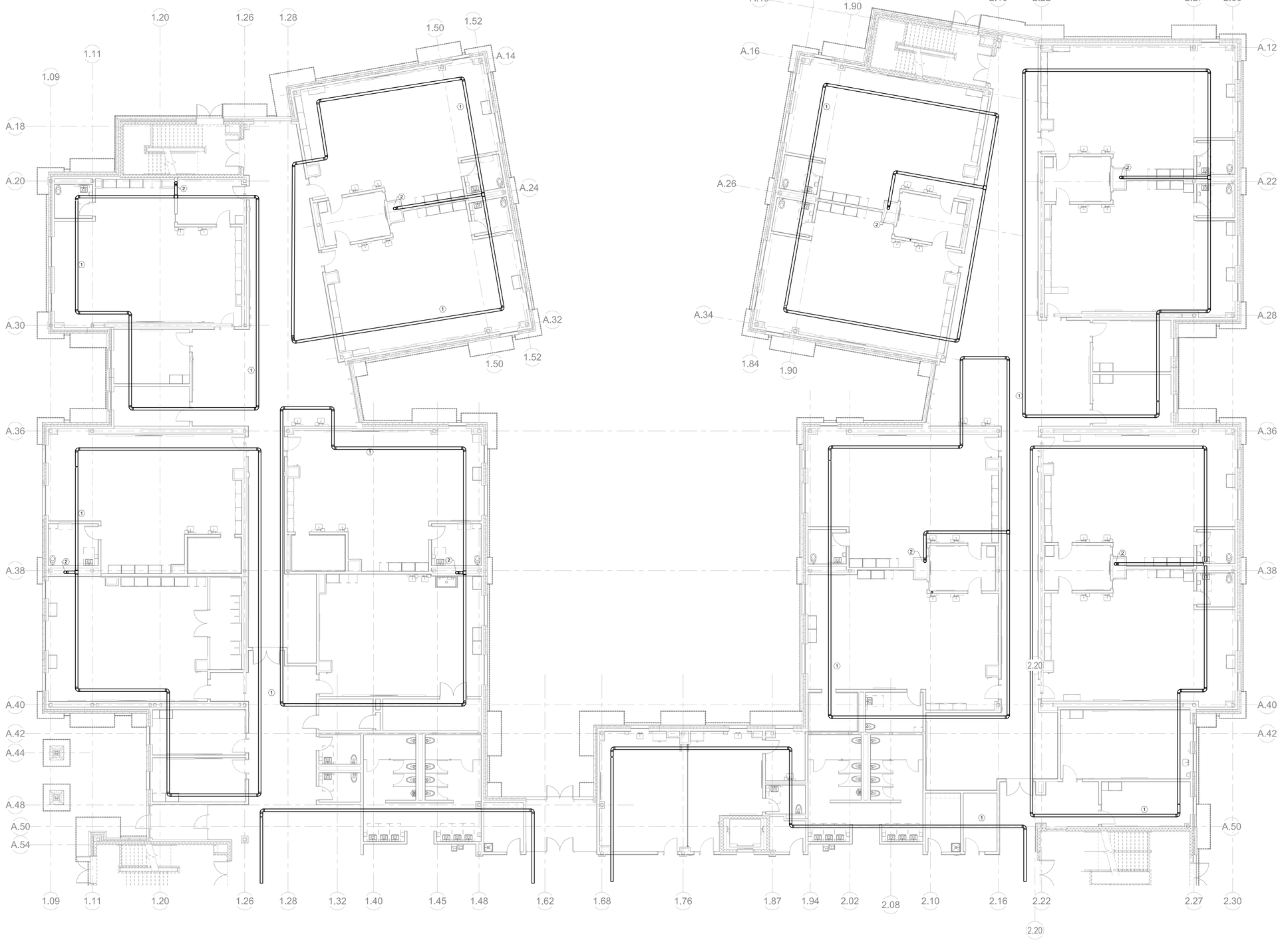
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PROJECT NORTH

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PLUMBING LEGEND AND SCHEDULES

SHEET NUMBER:
P0.01

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① 6" RADON PIPE
② 6" PIPE RISER FOR RADON VENTILATION UP.

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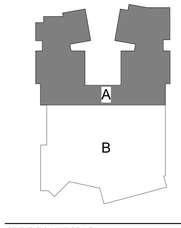
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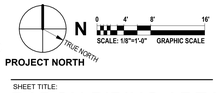
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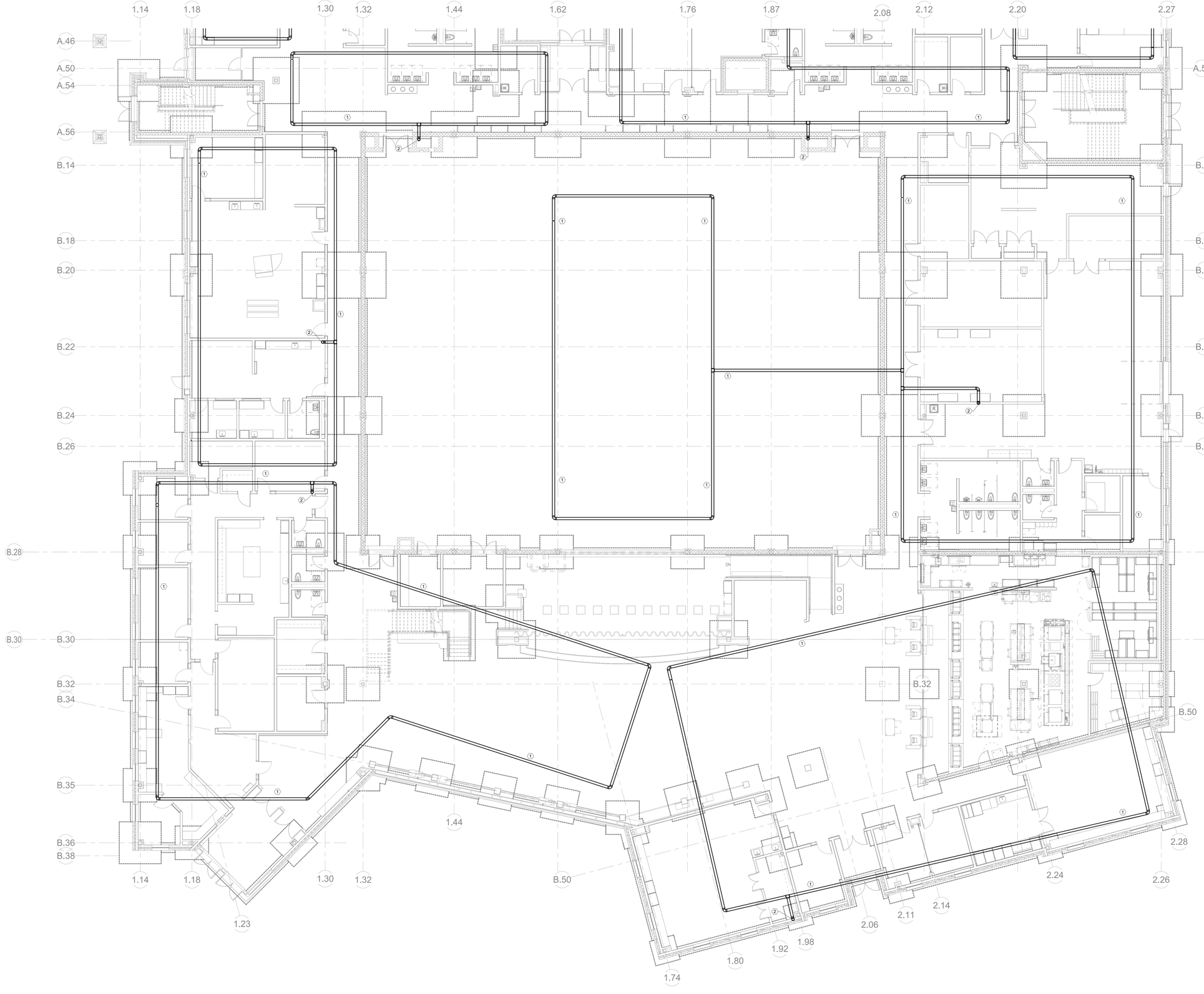


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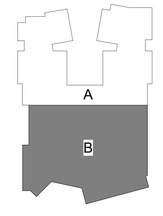
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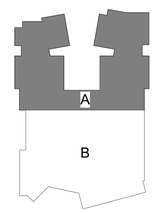
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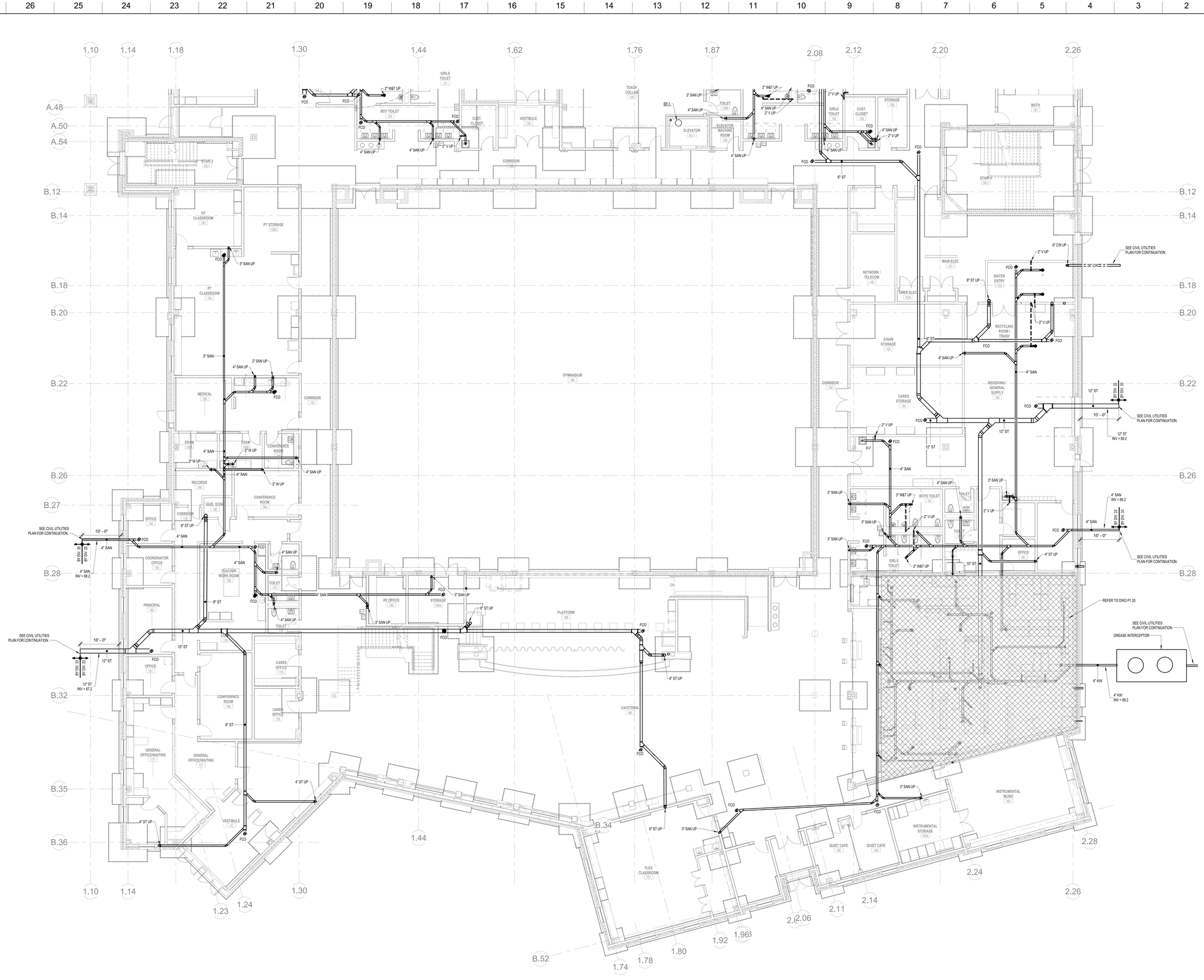
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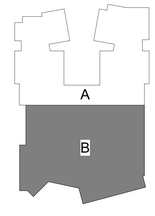
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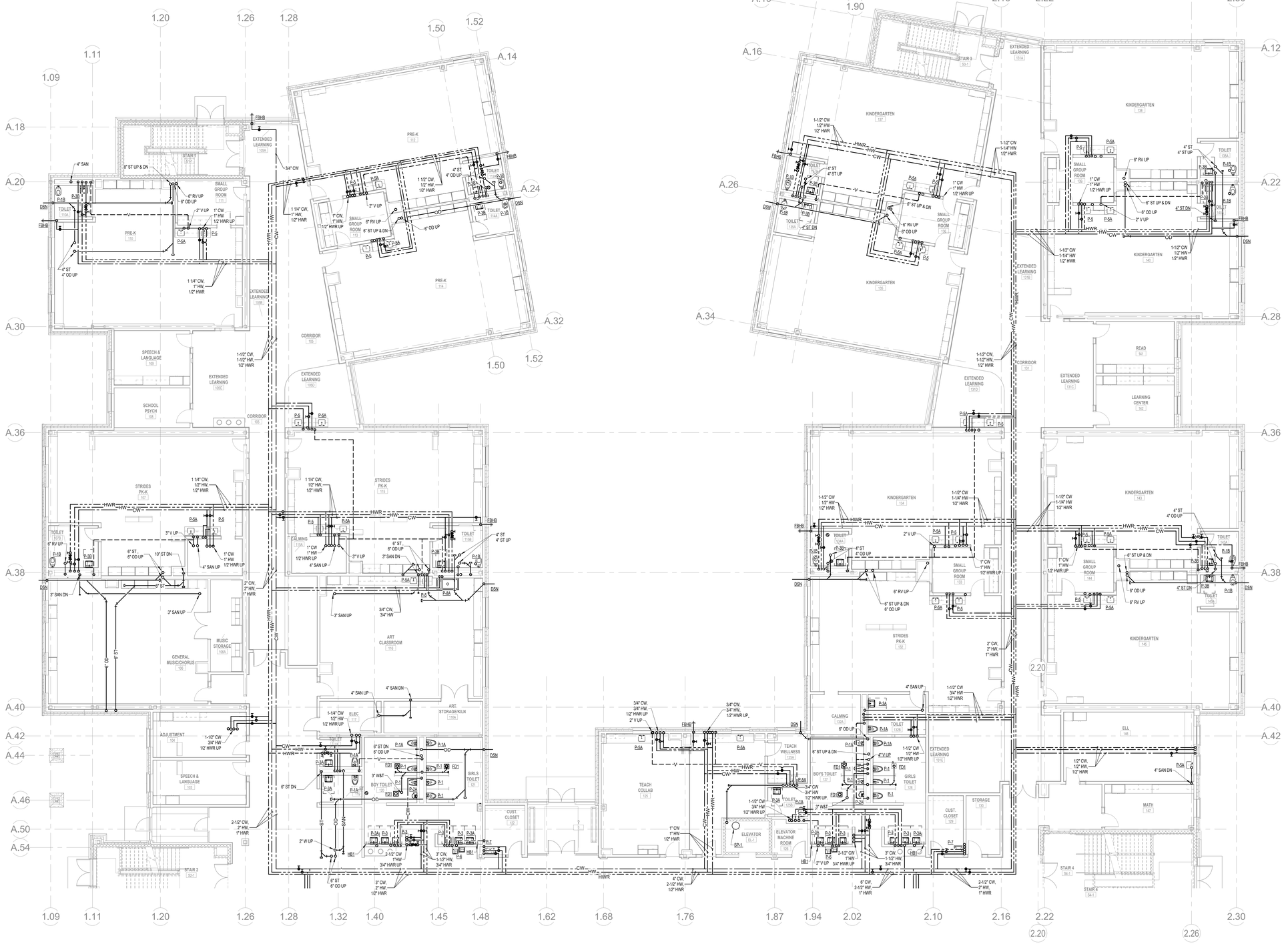
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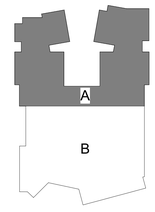
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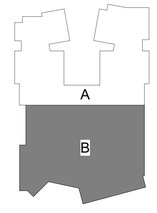
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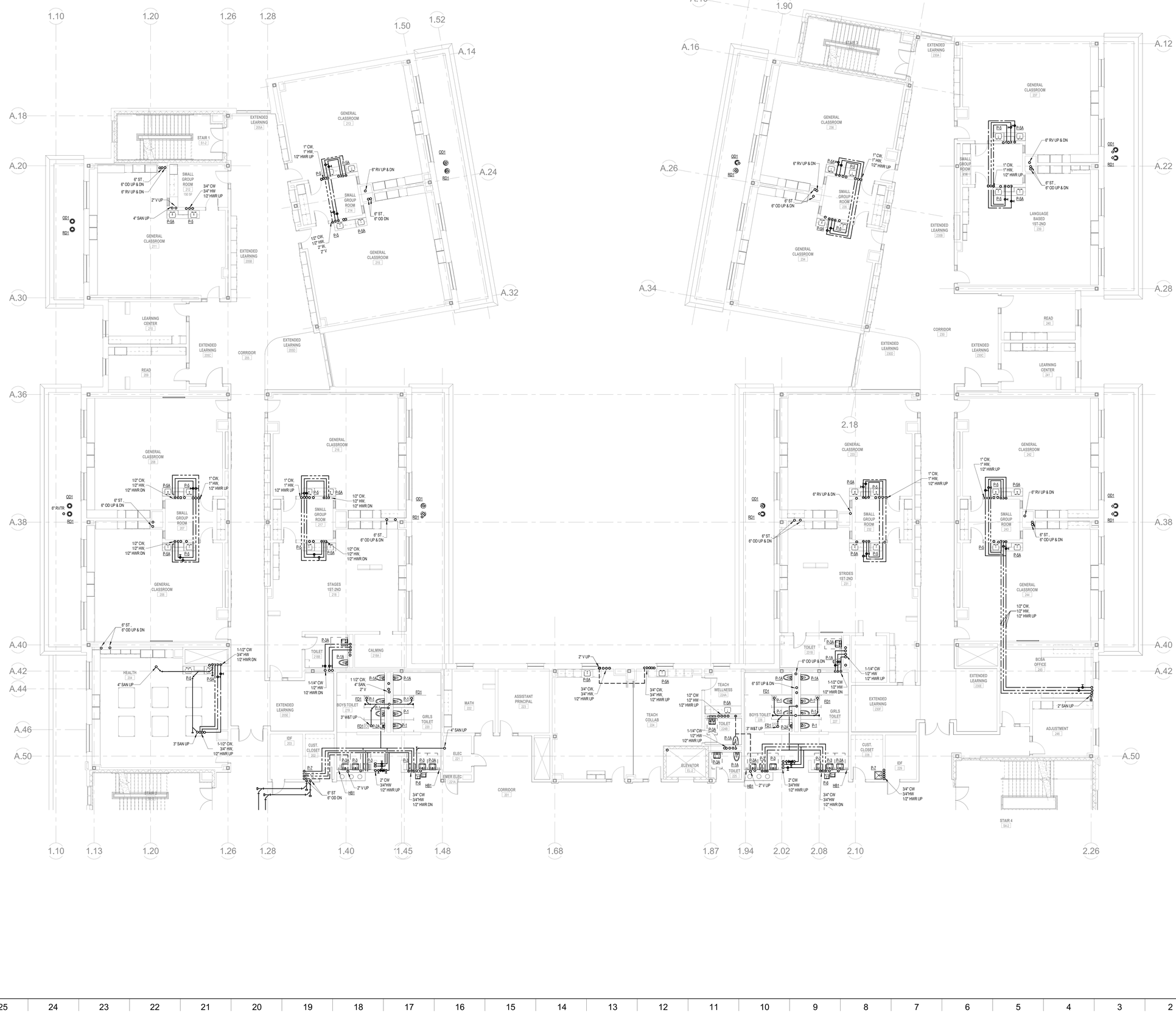
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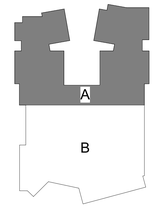
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WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

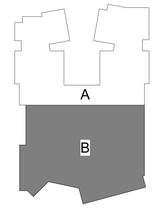
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ISSUE TITLE AND DATE:

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KEY PLAN



ORIENTATION AND SCALE:

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TRUE NORTH
PROJECT NORTH
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SCALE: 1/8"=1'-0" GRAPHIC SCALE

SHEET TITLE:
PLUMBING- LEVEL 2 - AREA B

SHEET NUMBER:
P1.22

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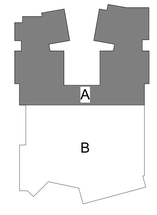
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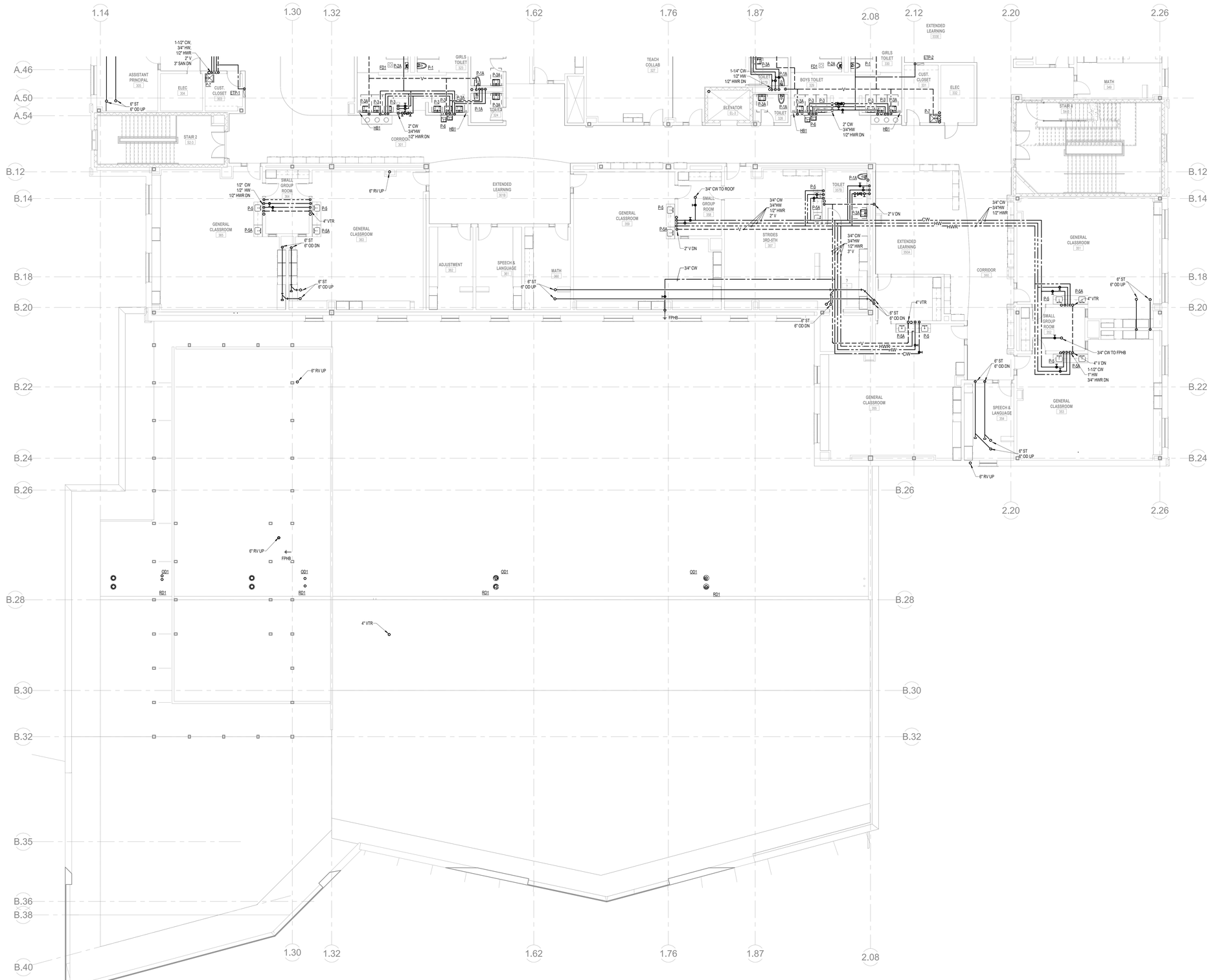


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TRUE NORTH
PROJECT NORTH

SHEET TITLE:
PLUMBING- LEVEL 3 - AREA A

SHEET NUMBER:
P1.31



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PROJECT NUMBER: 23-0847

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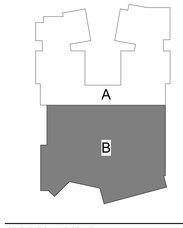
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KEY PLAN



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SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

SHEET TITLE:

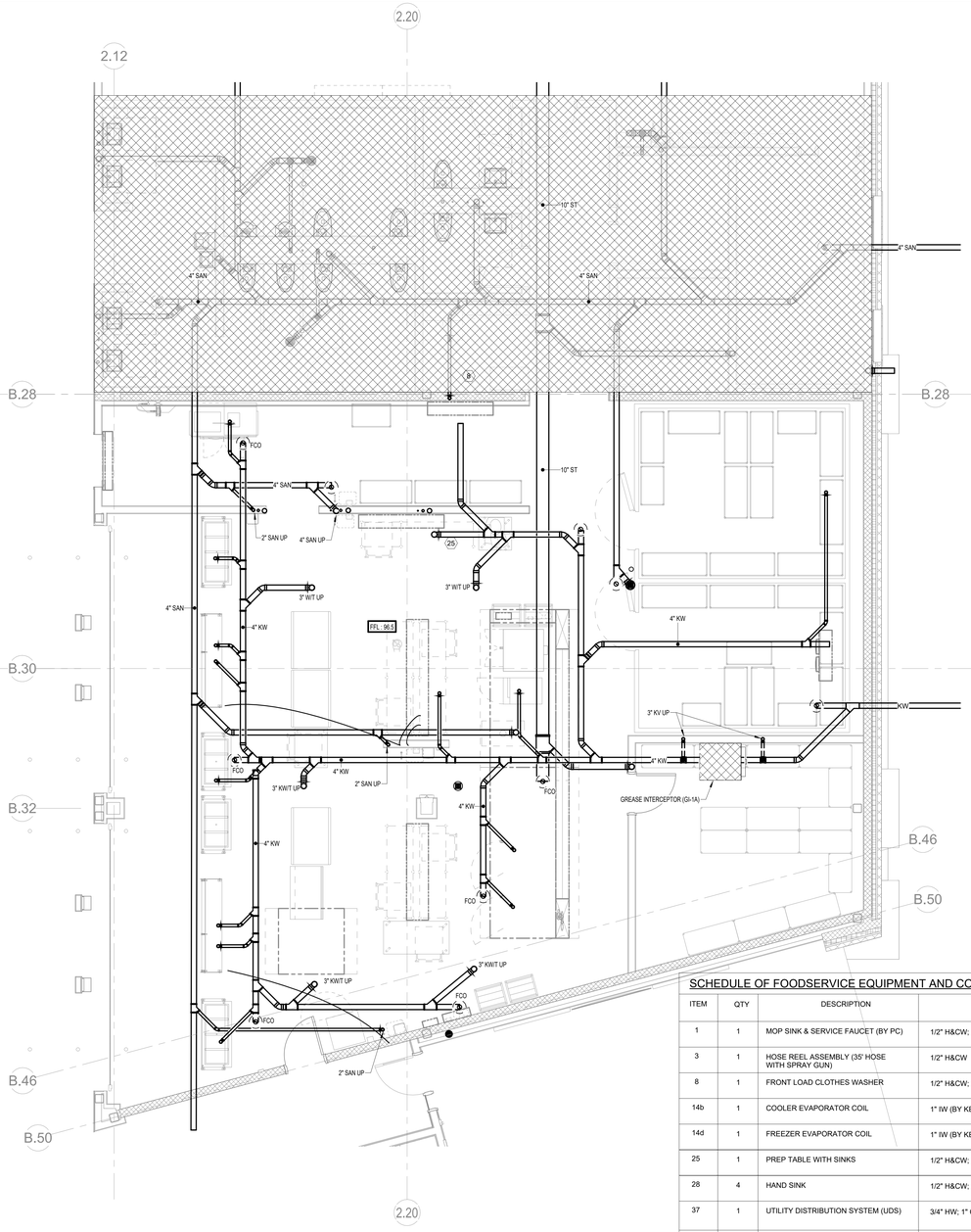
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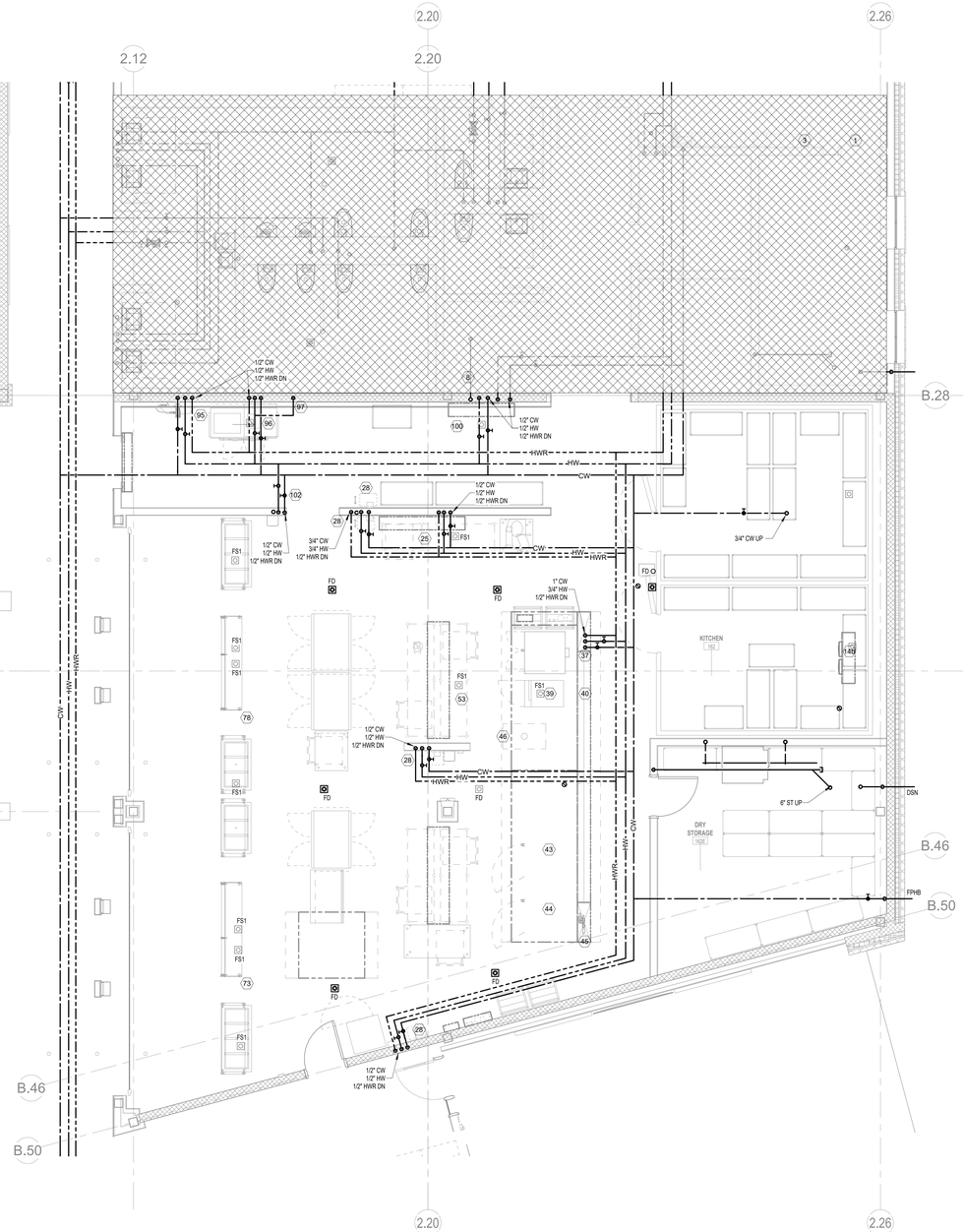
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SCHEDULE OF FOODSERVICE EQUIPMENT AND CONNECTIONS

ITEM	QTY	DESCRIPTION	PLUMBIMG	REMARK
1	1	MOP SINK & SERVICE FAUCET (BY PC)	1/2" H&CW; DRAIN IN FLOOR	
3	1	HOSE REEL ASSEMBLY (35' HOSE WITH SPRAY GUN)	1/2" H&CW	
8	1	FRONT LOAD CLOTHES WASHER	1/2" H&CW; 1-1/4" IW TO STANDPIPE	
14b	1	COOLER EVAPORATOR COIL	1" IW (BY KEC) TO FD	
14d	1	FREEZER EVAPORATOR COIL	1" IW (BY KEC) TO FD	
25	1	PREP TABLE WITH SINKS	1/2" H&CW; (2) 2" IW TO FS	
28	4	HAND SINK	1/2" H&CW; 1-1/2" W	
37	1	UTILITY DISTRIBUTION SYSTEM (UDS)	3/4" HW; 1" CW	
39	1	TEN-PAN CONVECTION STEAMER	3/4" FILTERED CW (FROM ITEM 40) 3/4" CW (FROM ITEM 37); 1-1/2" IW TO FS	
40	1	WATER FILTER ASSEMBLY	3/4" CW (FROM ITEM 37)	
41	1	FORTY-GALLON TILTING BRAINING PAN	1/2" H&CW (FROM ITEM 37)	
43	1	DOUBLE COMBINATION OVEN	3/4" FILTERED CW (FROM ITEM 37); 2" IW TO ITEM 33	
44	1	DOUBLE COMBINATION OVEN	3/4" FILTERED CW (FROM ITEM 37); 2" IW TO ITEM 33	
45	2	WATER FILTER ASSEMBLY	3/4" CW (FROM ITEM 37)	
46	1	FLOOR PAN & GRATE	4" W CONN 7" BFF	
53	1	COOK'S WORK TABLE WITH SINK AND OVERSHELF	1/2 " H&CW (STUB-UP); 2" IW TO FS	
71	1	REFRIGERATED COLD PAN, DROP-IN	1" IW TO FS	
73	1	FILL FAUCET	1/2" CW (STUB-UP)	
74a	2	HOT FOOD WELLS, DROP-IN (MOUNTED IN GROUP OF TWO)	1" IW TO FS	
74b	3	HOT FOOD WELLS, DROP-IN (MOUNTED IN GROUP OF THREE)	1" IW TO FS	
76	2	REFRIGERATED COLD PAN, DROP-IN	1" IW TO FS	
78	1	FILL FAUCET	1/2" CW	
79a	2	HOT FOOD WELLS, DROP-IN (MOUNTED IN GROUP OF TWO)	1" IW TO FS	
79b	3	HOT FOOD WELLS, DROP-IN (MOUNTED IN GROUP OF THREE)	1" IW TO FS	
81	1	REFRIGERATED COLD PAN, DROP-IN	1" IW TO FS	
95	1	HOSE REEL ASSEMBLY	1/2" H&CW	
96	1	WAREWASHER, CONVEYOR TYPE, VENTLESS	1-1/4" IW TO FS	
97	1	WATER FILTER ASSEMBLY, WASWASHER	1" IW TO FS	
100	1	THREE - COMPARTMENT SINK	(2) 3/4" 120 F H&CW; (3) 2" W MANIFOLD THRU GI BY PC	
102	1	EYE / FACE WASH, WALL MOUNTED	1/2" H&CW; 1-1/4" W	

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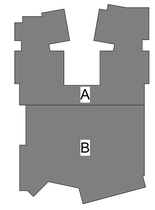
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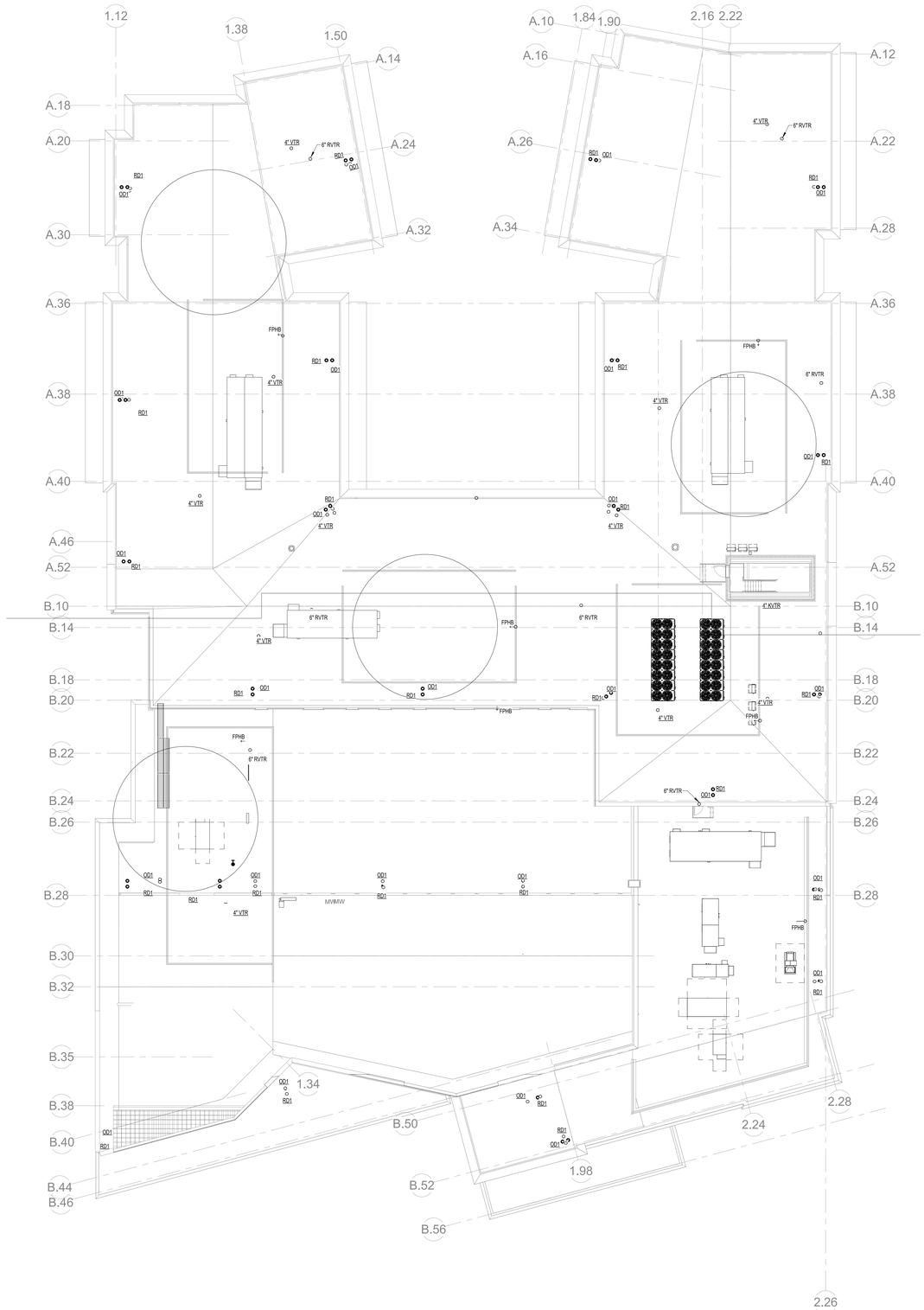
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PLUMBING KITCHEN

SHEET NUMBER:
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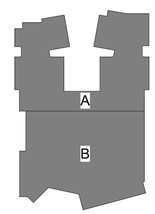
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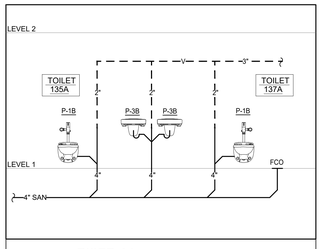
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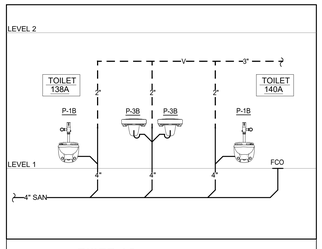
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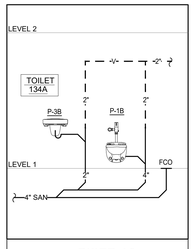
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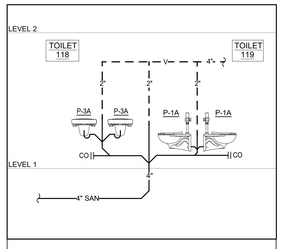
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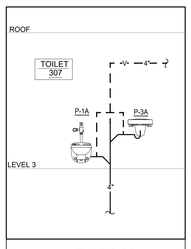
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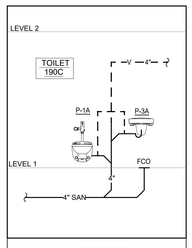
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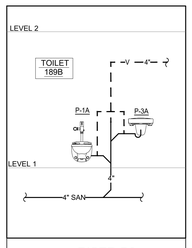
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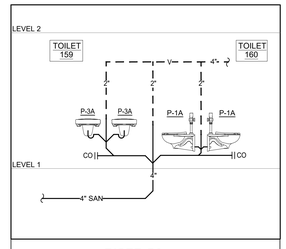
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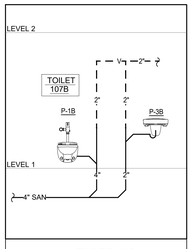
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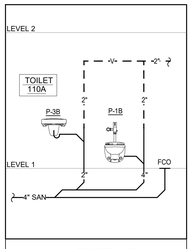
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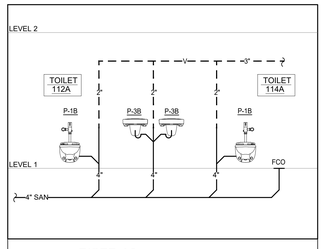
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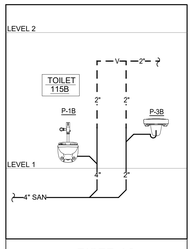
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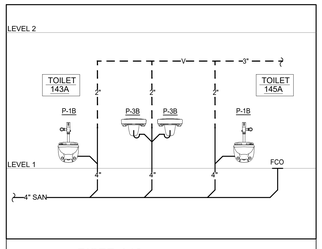
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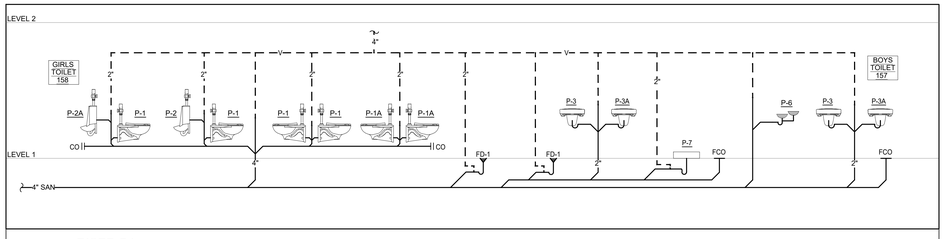
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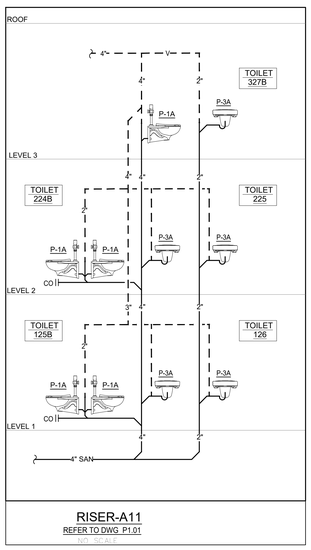
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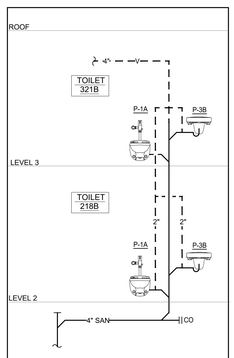
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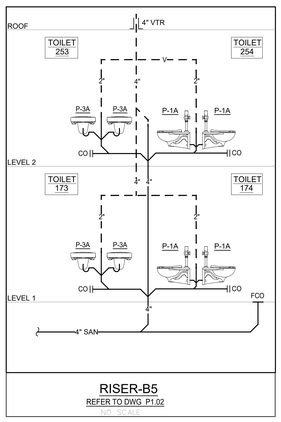
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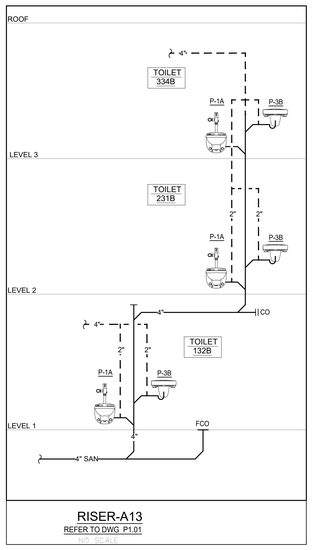
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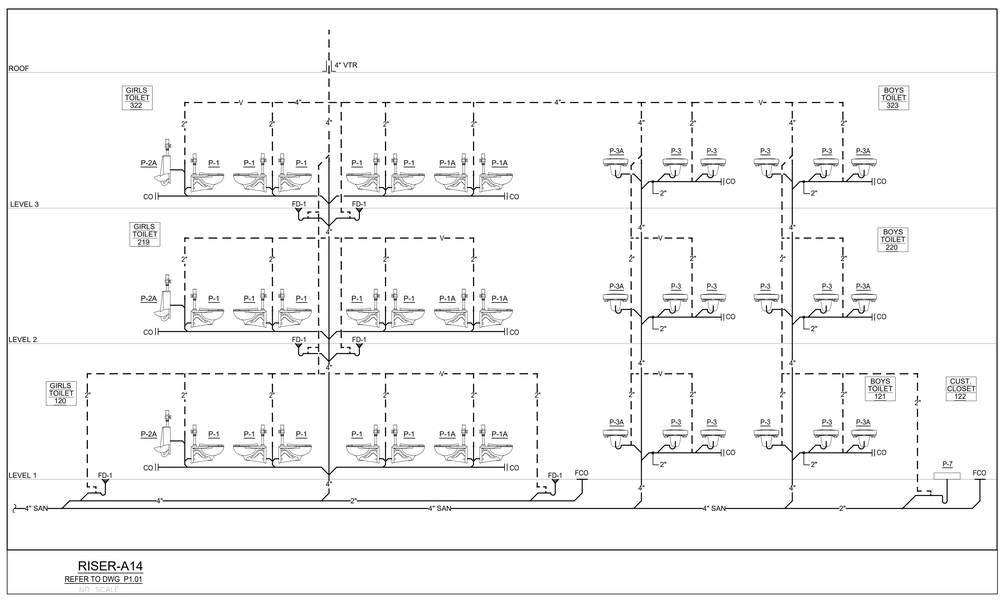
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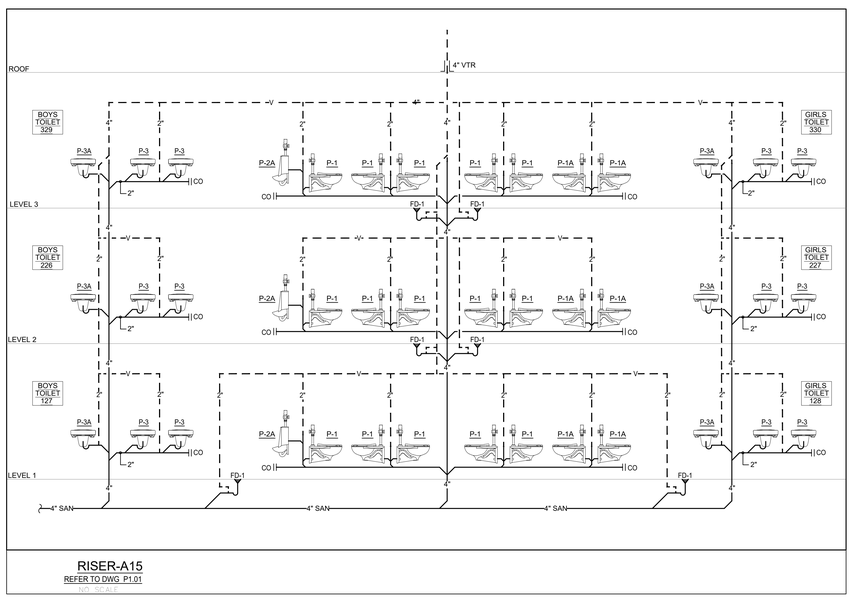
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SEAL AND SIGNATURE:

REVISIONS:

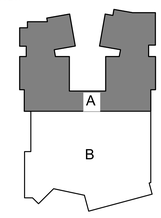
NO.	DATE	TITLE

ISSUE TITLE AND DATE:

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KEY PLAN



ORIENTATION AND SCALE:



PROJECT NORTH

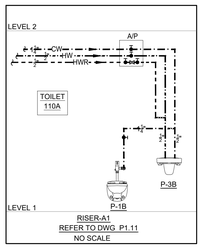
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PLUMBING WASTE AND VENT RISER DIAGRAM

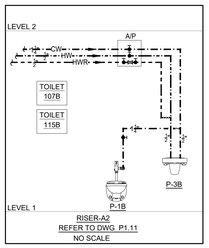
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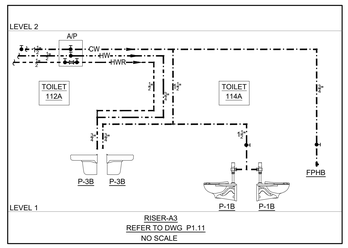
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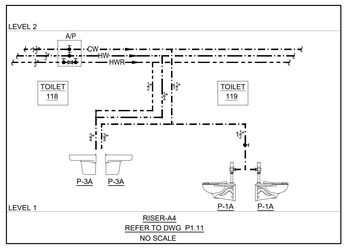
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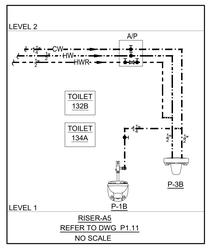
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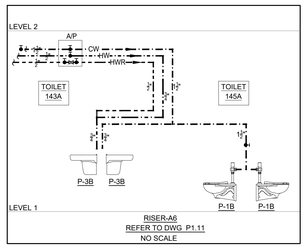
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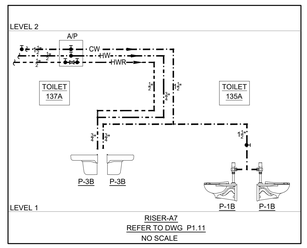
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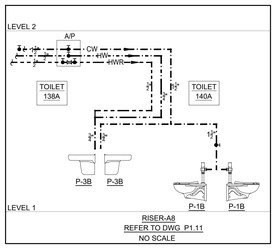
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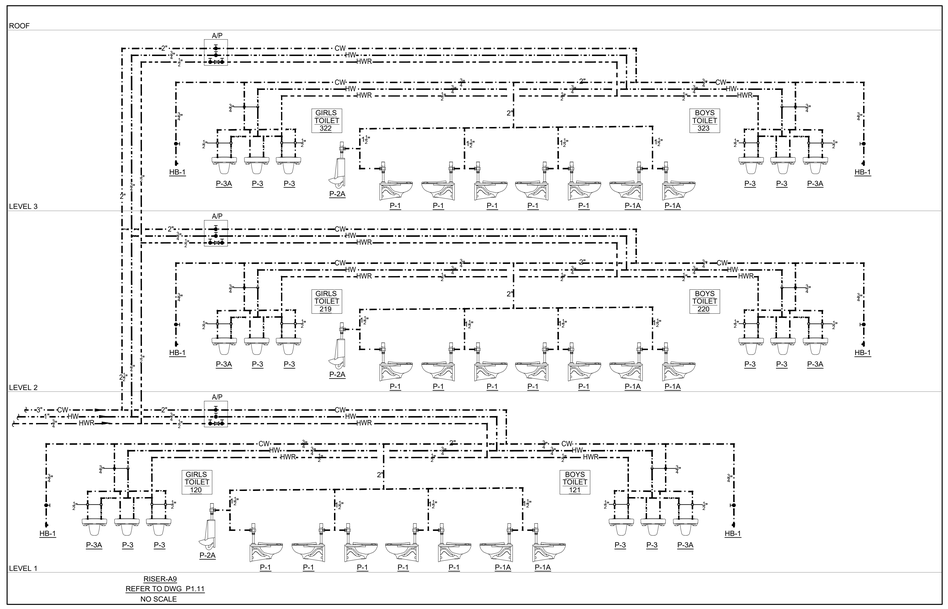
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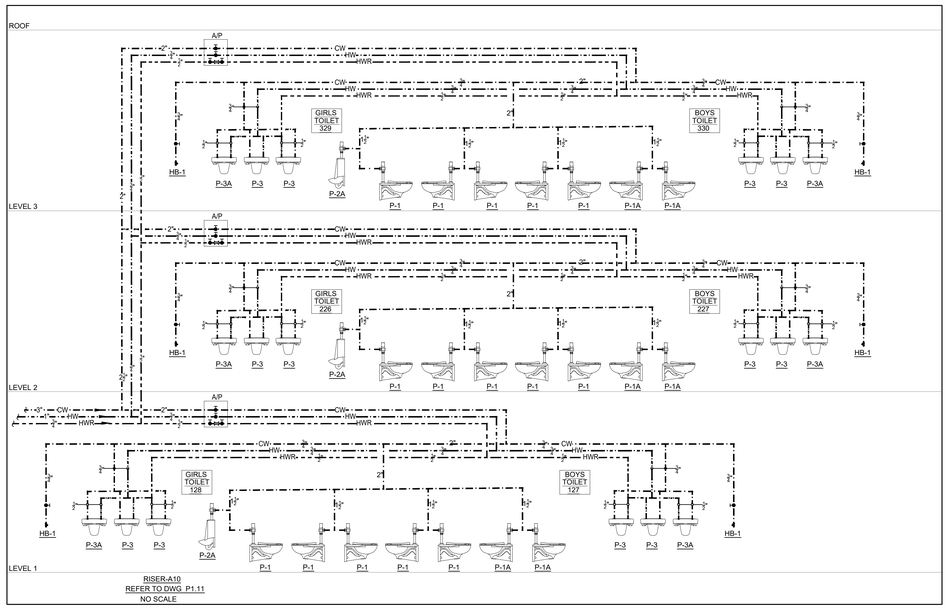
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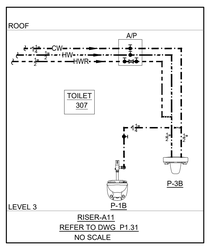
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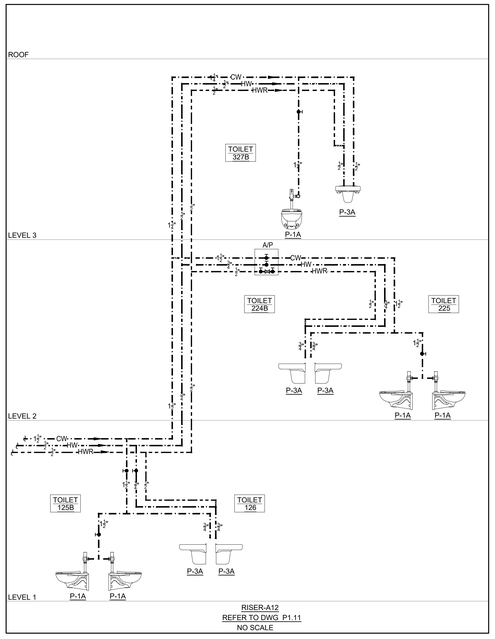
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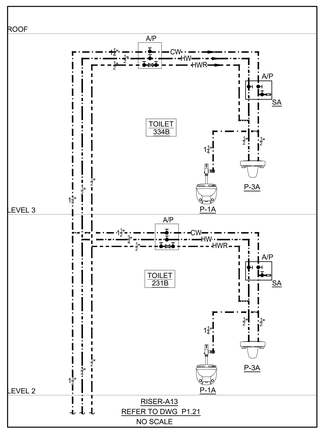
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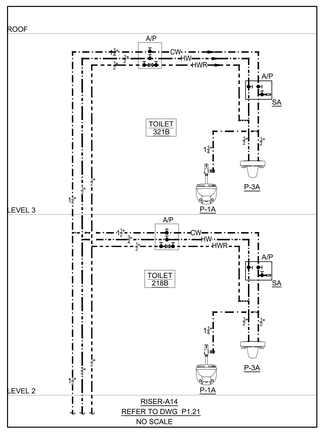
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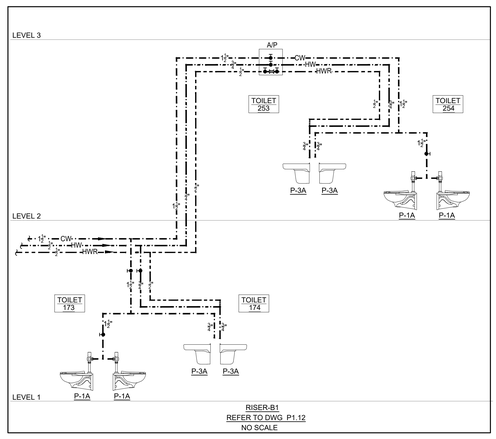
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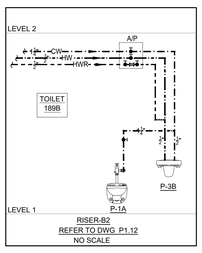
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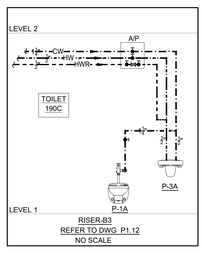
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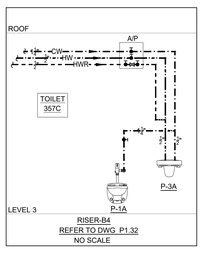
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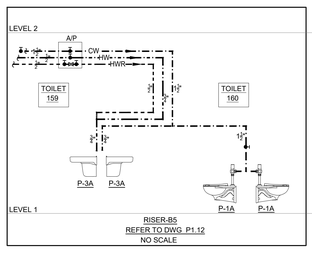
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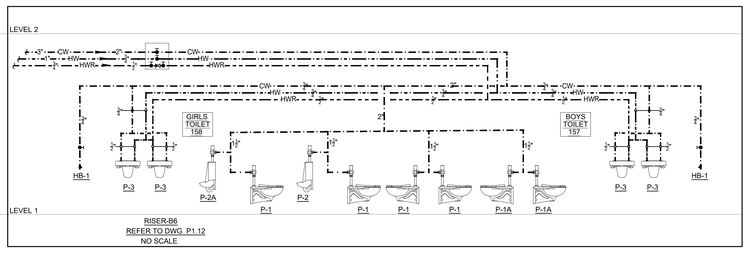
RISER-B3
REFER TO DWG P1.12
NO SCALE



RISER-B4
REFER TO DWG P1.32
NO SCALE



RISER-B5
REFER TO DWG P1.12
NO SCALE



RISER-B6
REFER TO DWG P1.12
NO SCALE

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

AKAL Engineering Inc.
44 Central Street. Unit # 4
Berlin, MA. 01503
Telephone - (508) 869-0403
Fax - (508) 869-2891
www.akalengineering.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

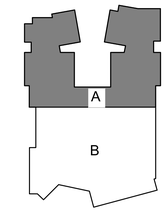
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KEY PLAN



ORIENTATION AND SCALE:



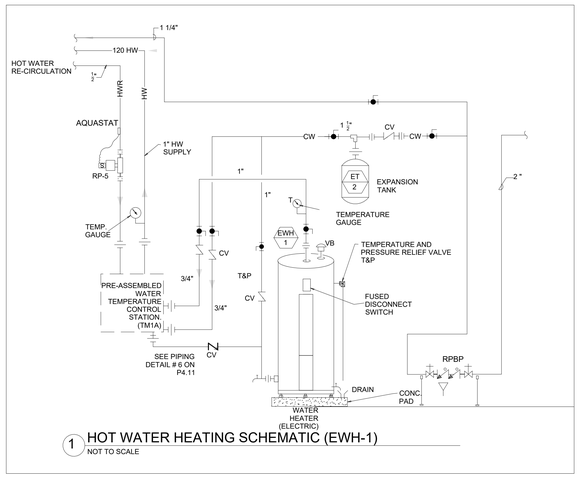
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PLUMBING DOMESTIC WATER RISER DIAGRAM

SHEET NUMBER:

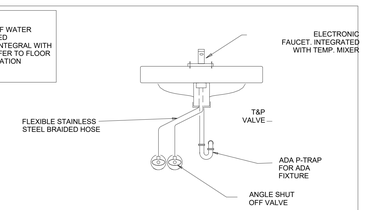
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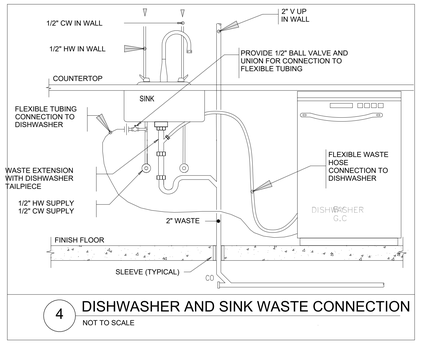
1 HOT WATER HEATING SCHEMATIC (EWH-1)
NOT TO SCALE

NOTE:
TYPICAL LAYOUT OF WATER HEATER CONNECTED TO P-3A FAUCET (INTEGRAL WITH MIXING VALVE). REFER TO FLOOR PLAN FOR EH1 LOCATION

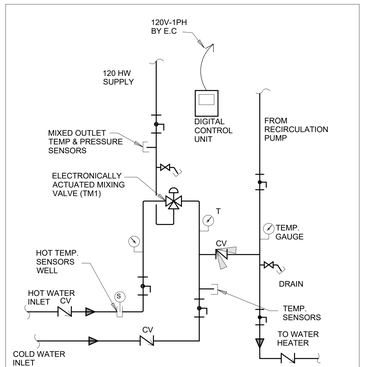


NOTE:
ALL LOW VOLTAGE WIRING SHALL BE HARD WIRED TO THE FAUCET (BY P.C). 120V POWER WIRING SHALL BE BY ELECTRICAL CONTRACTOR. COORDINATE WORK WITH ELECTRICAL DWG.

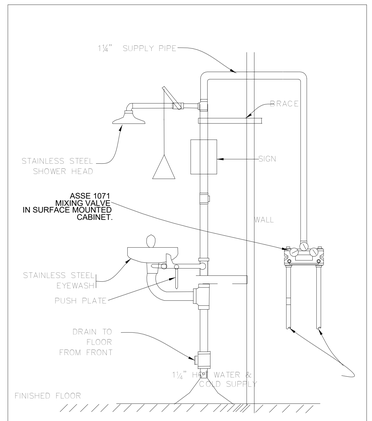
3 LAVATORY- (SINGLE AND MULTI LAV.)
NOT TO SCALE



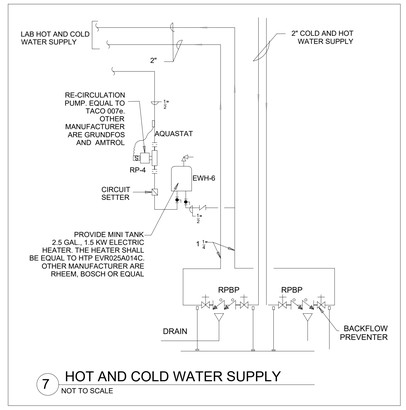
4 DISHWASHER AND SINK WASTE CONNECTION
NOT TO SCALE



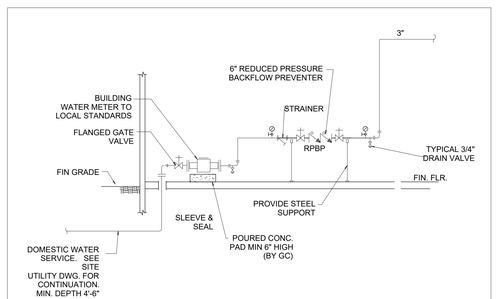
5 MAIN WATER TEMPRATURE CONTROL STATION
NOT TO SCALE



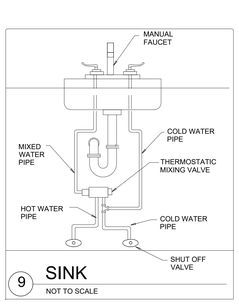
6 EMERGENCY EYEWASH- FLOOR MOUNTED
NOT TO SCALE



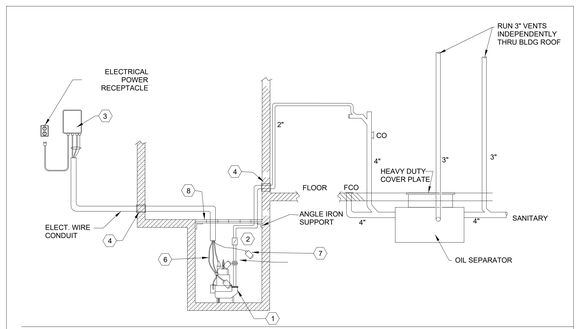
7 HOT AND COLD WATER SUPPLY
NOT TO SCALE



8 WATER SERVICE ENTERANCE
NOT TO SCALE



9 SINK
NOT TO SCALE



1. SUBMERSIBLE EFFLUENT PUMP IN ELEVATOR. SEE PUMP SCHEDULE
2. CHECK VALVE
3. CONTROL PANEL WITH BUILT-IN AUDIBLE AND VISUAL ALARM IN A EVENT PUMP RUN DUE TO HIGH LIQUID CONDITION. PROVIDE SILENCING BUTTON FOR AUDIBLE ALARM BUILT INTO PANEL. PANEL SHALL HAVE ADDITIONAL CONTACT FOR A REMOTE ALARM LOCATION
4. WATERTIGHT SLEEVE
5. 2" PUMP DISCHARGE TO HUB DRAIN
6. POWER CABLE, PROBE CABLE, AND HIGH LIQUID ALARM CABLE IN CONDUIT
7. HIGH LIQUID ALARM FLOAT WITH CLAMP DEVICE TO MOUNT TO PUMP DISCHARGE PIPING
8. OPEN GRATING WITH CUT-OUT FOR DISCHARGE & ELECTRICAL CONDUIT

10 ELEVATOR SUMP PUMP SYSTEM DETAIL
NOT TO SCALE

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
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KEY PLAN

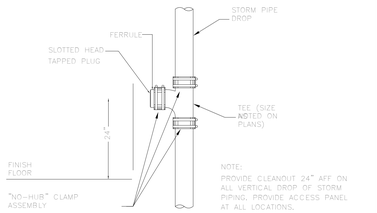
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GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

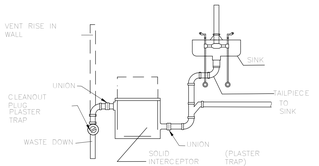
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PLUMBING DETAILS

SHEET NUMBER:
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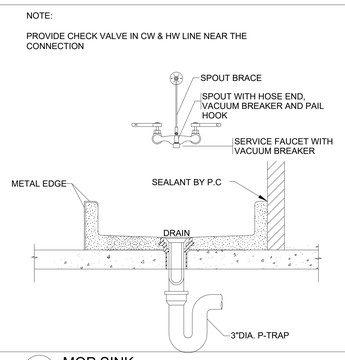
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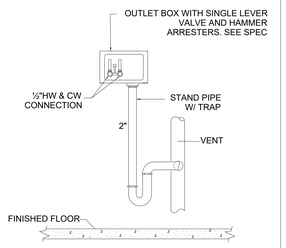
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NOT TO SCALE



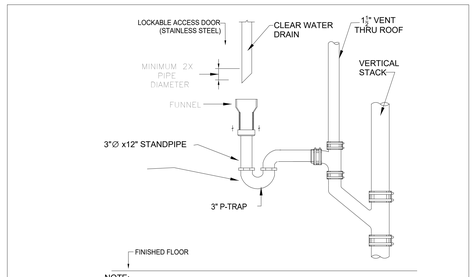
2 ART SINK PIPE CONN. DETAIL
NOT TO SCALE



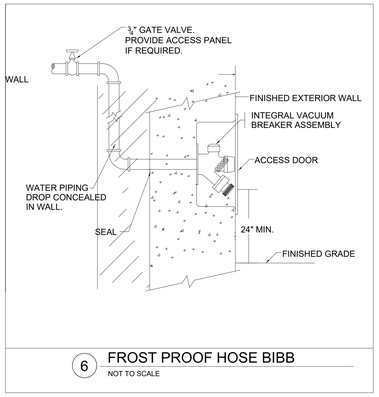
3 MOP SINK
NOT TO SCALE



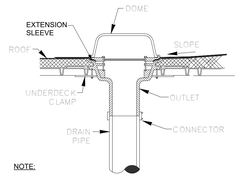
4 WASHING MACHINE SUPPLY
NOT TO SCALE



5 INDIRECT A/C DRAIN DETAIL
NOT TO SCALE



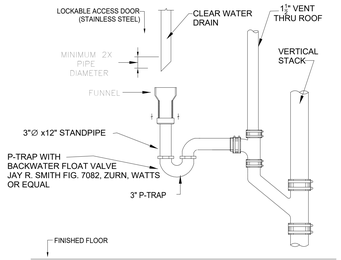
6 FROST PROOF HOSE BIBB
NOT TO SCALE



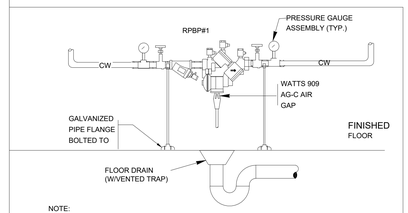
REGULAR ROOF DRAIN

7 ROOF DRAINS PIPING
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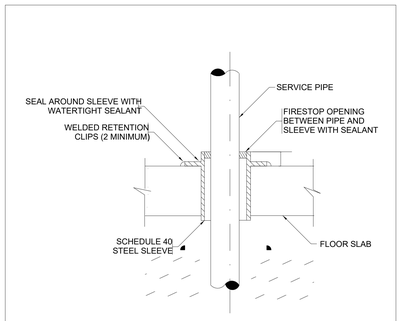
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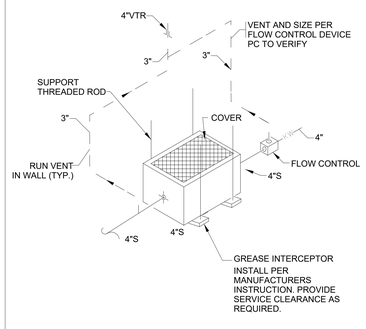
8 INDIRECT A/C DRAIN DETAIL
NOT TO SCALE



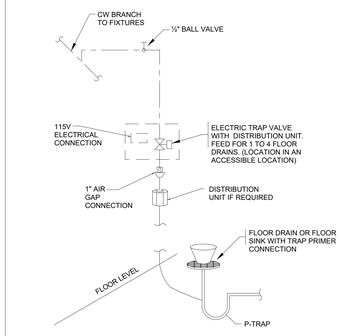
9 REDUCED PRESSURE BACKFLOW PREVENTOR MECHANICAL ROOM



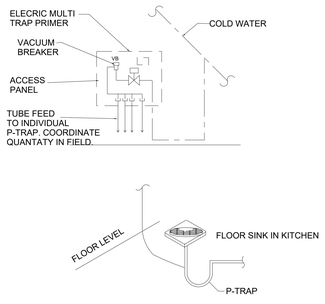
10 PIPE SLEEVE PENETRATION AT FLOOR
NOT TO SCALE



11 GREASE INTERCEPTOR PIPING DETAIL
NOT TO SCALE

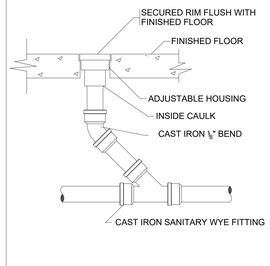


P-TRAP PRIMER (TYP. TO ALL FLOOR DRAINS)

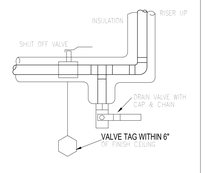


UNDERSLAB COPPER TUBE SHALL BE ENCASED IN PIPE SLEEVE. SEE NOTE 29 ON P0.01

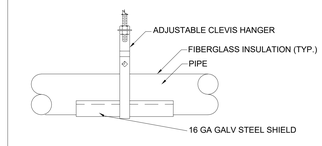
12 P-TRAP PRIMER (TYP. TO ALL FLOOR DRAINS)
NOT TO SCALE



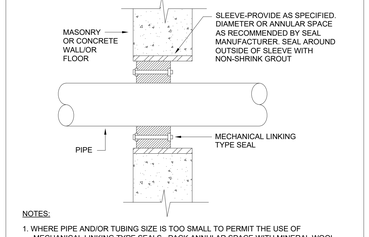
13 FLOOR CLEANOUT DETAIL
NOT TO SCALE



14 RISER CONTROL AND DRAIN VALVE
NOT TO SCALE

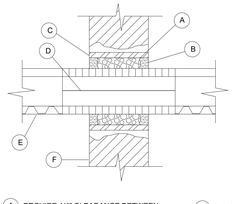


15 PIPE HANGER
NOT TO SCALE



NOTES:
1. WHERE PIPE AND/OR TUBING SIZE IS TOO SMALL TO PERMIT THE USE OF MECHANICAL LINKING TYPE SEALS, PACK ANNULAR SPACE WITH MINERAL WOOL AND SEAL PENETRATION WITH NON-SHRINK GROUT, EXTERIOR GRADE CAULK, OR APPROVED EQUAL. IN SUCH INSTANCES, MULTIPLE SMALL PIPE AND /OR TUBING IS PERMITTED TO PASS THROUGH A SINGLE HOLE FOR HOLE SIZES UP TO 2" INSIDE DIAMETER SUBJECT TO THE APPROVAL OF THE ENGINEER.

PIPE PENETRATION THROUGH EXTERIOR WALL DETAIL (NEW BLDG ONLY)
16 NOT TO SCALE



A PROVIDE 1/4" CLEARANCE BETWEEN PIPE SLEEVE OR CORE DRILLED HOLE AND PIPE. PACK CLEARANCE SPACE WITH SPECIFIED INSULATION

B PROVIDE SPECIFIED END SEALANT

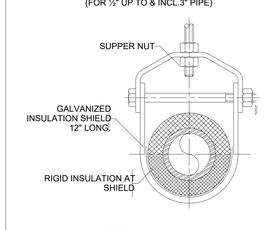
C SLEEVE-PROVIDE AS SPECIFIED. SLEEVE MAY BE OMITTED AND CORE DRILLED HOLE PROVIDED IN CONCRETE AS SPECIFIED. EXTEND FLOOR PIPE SLEEVES 2" ABOVE FLOOR.

D CALCIUM SILICATE OR APPROVED EQUAL INSULATION THRU PENETRATION AND EXTENDED 2" ON BOTH SIDES OF WALL OR FLOOR. PROVIDE METAL JACKET AS SPECIFIED OVER INSULATION

E SPECIFIED INSULATION

F WALL OR FLOOR (MAX 6" PENETRATION) SEE ALT DETAIL & PROJECT REQUIREMENTS FOR LARGER THAN 6" PENETRATION AT EXISTING BLDG.

17 PIPE PENETRATION THROUGH INTERIOR WALL/FLOOR DETAIL
NOT TO SCALE



NOTES:
1. SEE SPECIFICATION FOR HANGER SIZES.

17 PIPE HANGER SUPPORT
NOT TO SCALE

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999
VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428
AKAL Engineering Inc.
44 Central Street. Unit # 4
Berlin, MA. 01503
Telephone - (508) 869-0403
Fax - (508) 869-2891
www.akalengineering.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

NO.	DATE	TITLE

ISSUE TITLE AND DATE:
60% CONSTRUCTION DOCUMENTS
06/19/2026

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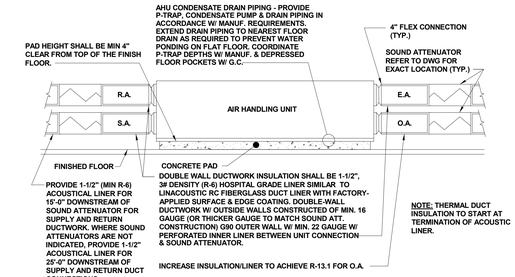
KEY PLAN

ORIENTATION AND SCALE:
N
TRUE NORTH
PROJECT NORTH

SHEET TITLE:
PLUMBING DETAILS 2

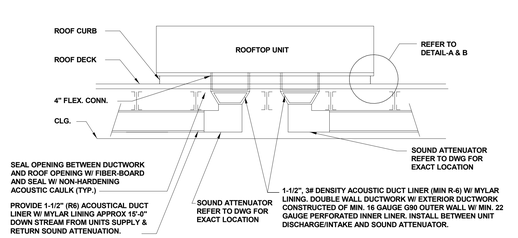
SHEET NUMBER:
P3.02

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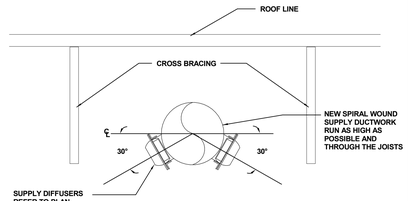
TYPICAL AIR HANDLING UNIT DETAIL

(NOT TO SCALE)



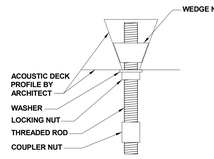
ROOFTOP UNIT DETAIL

(NOT TO SCALE)



DETAIL OF HIGH-BAY SPIRAL DUCT DIFFUSERS

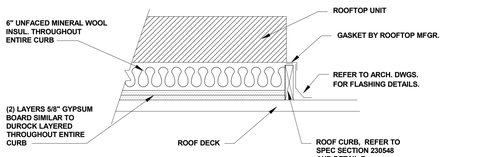
(NOT TO SCALE)



1. PROVIDE DOVETAIL RIB LOCKING HANGERS TO SUPPORT ALL PIPING, DUCTWORK AND OTHER MECHANICAL AND UTILITY COMPONENTS FROM ACOUSTICAL DECK.
2. THE LOCKING HANGERS SHALL BE INSERTED PARALLEL TO THE RIBS AND PLACED CONTINUOUSLY, SPACED EVERY 6-8" INCHES ACROSS THE WIDTH OF THE PROFILE.
3. HANGERS SHALL BE CAPABLE OF BEING UNLOCKED AND RELOCATED, INSERTED, OR REMOVED AND REUSED.
4. COMPONENTS SHALL INCLUDE WEDGE NUT SHAPED FOR APPROPRIATE DECK PROFILE 3/8" X 12" ALL THREAD, 3/8" WASHER, 3/8" LOCKING NUT AND 3/8" TO 3/8" COUPLER NUT.
5. HANGER TYPE SHALL BE COMPATIBLE WITH THE PROPOSED ARCHITECTURAL ACOUSTICAL DECK. REFER TO ARCHITECTURAL PLANS FOR ACOUSTIC DECK LOCATIONS.

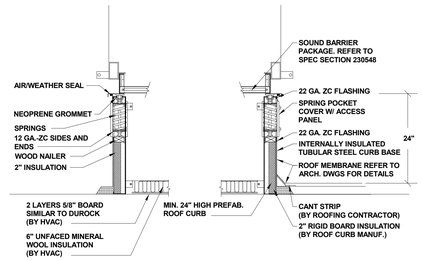
ACOUSTIC DECK HANGER DETAIL

(NOT TO SCALE)



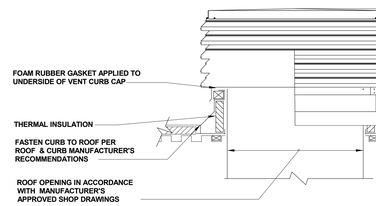
ROOFTOP CURB DETAIL A

(NOT TO SCALE)



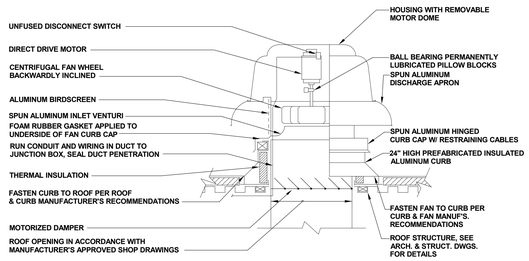
SPRING ROOF CURB DETAIL - DETAIL B

(NOT TO SCALE)



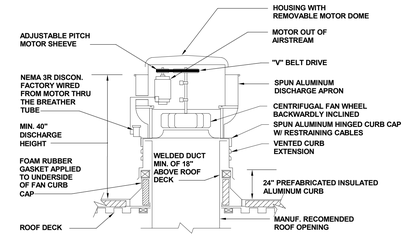
TYPICAL LOUVERED PENTHOUSE VENTILATION DETAIL

(NOT TO SCALE)



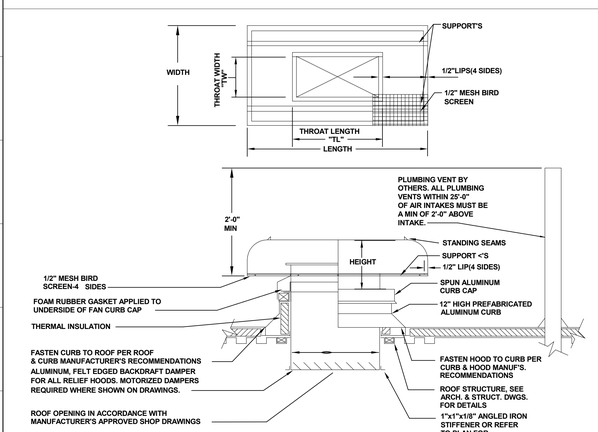
TYPICAL ROOF MOUNTED EXHAUST FAN DETAIL

(NOT TO SCALE)



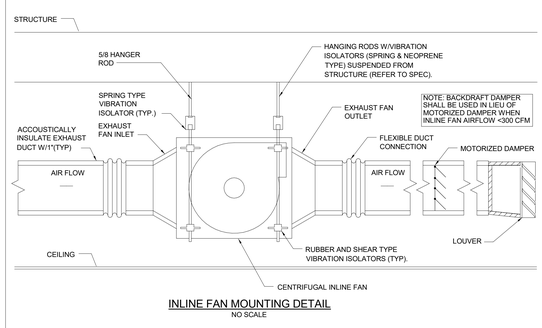
TYPICAL UPBLAST ROOF EXHAUST

(NOT TO SCALE)



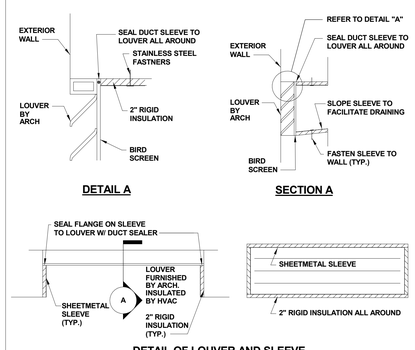
ROOF HOOD DETAIL

(NOT TO SCALE)



INLINE FAN MOUNTING DETAIL

NO SCALE



DETAIL A

SECTION A

DETAIL OF LOUVER AND SLEEVE

NOT TO SCALE

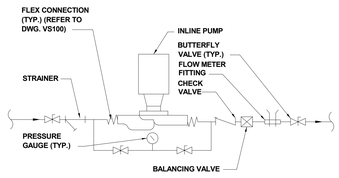
LEGEND

SYMBOL	ABBREV	DESCRIPTION
∅	DIA	DIAMETER
	HHWS	HEATING HOT WATER SUPPLY
	HHWR	HEATING HOT WATER RETURN
	CHWS	CHILLED WATER SUPPLY
	CHWR	CHILLED WATER RETURN
	RL	REFRIGERANT LIQUID
	RS	REFRIGERANT SUCTION
	HG	HOT GAS LINE
	D	DRAIN
		PRESSURE REDUCING VALVE
		GATE VALVE
		GLOBE VALVE
		CHECK VALVE
		BUTTERFLY VALVE
		BALL VALVE
		THREE-WAY CONTROL VALVE
		TWO-WAY CONTROL VALVE
		FLOW METERING ELEMENT
		CIRCUIT SETTER VALVE
		TRIPLE DUTY VALVE
		DRAIN VALVE
		PLUG VALVE
		SAFETY VALVE
		STRAINER
		UNION
		AUTOMATIC AIR VENT
		SAFETY RELIEF
		PIPE UP (ELBOW)
		PIPE DOWN (ELBOW)
		PRESSURE GAGE WITH GAGE COCK
		THERMOMETER
		BRANCH CONNECTION OUT OF TOP
		BRANCH CONNECTION OUT OF BOTTOM
		BRANCH CONNECTION OUT OF SIDE
		CAP ON END OF PIPE
		FLOW IN DIRECTION OF ARROW
T		TEMPERATURE, CARBON DIOXIDE, & HUMIDITY SENSOR
T		VRF/DCU MANUF'S TEMPERATURE & HUMIDITY SENSOR
C		CARBON DIOXIDE SENSOR (DUCT MOUNTED)
		SUPPLY AIR DUCT SECTION
		RETURN AIR DUCT SECTION
		EXHAUST AIR DUCT SECTION
		SUPPLY AIR
		RETURN/EXHAUST AIR
S	SD	SMOKE DAMPER
	MD	MOTORIZED DAMPER
	FD	FIRE DAMPER
	VD	VOLUME DAMPER
	BD	BACKDRAFT DAMPER
S	FSD	COMBINATION SMOKE AND FIRE DAMPER
S		SMOKE DETECTOR
	TYP.	TYPICAL
	HV	HEATING & VENTILATING UNIT
	RH	ROOF HOOD
	ET	EXPANSION TANK
	A.H.U.	AIR HANDLING UNIT
	R.T.U.	ROOF TOP UNIT
	EF	EXHAUST FAN
	UH	UNIT HEATER (CABINET OR HORIZONTAL)
	O.A.	OUTSIDE AIR
	CFM	CUBIC FEET PER MINUTE
	VEL	VELOCITY
	E.A.T.	ENTERING AIR TEMPERATURE
	L.A.T.	LEAVING AIR TEMPERATURE
	D.B.	DRY BULB
	W.B.	WET BULB
	E.D.B.	ENTERING DRY BULB
	E.W.B.	ENTERING WET BULB
	L.D.B.	LEAVING DRY BULB
	E.W.T.	ENTERING WATER TEMPERATURE
	L.W.B.	LEAVING WET BULB
	L.W.T.	LEAVING WATER TEMPERATURE
	ERR	ENTHALPY RECOVERY RATIO
	T.S.P.	TOTAL STATIC PRESSURE
	E.S.P.	EXTERNAL STATIC PRESSURE
	T.D.H.	TOTAL DYNAMIC HEAD
	P.D.	PRESSURE DROP
	C.P.	CONDENSATE PUMP
	RP	RADIANT PANEL
	A.S.	AIR SEPERATOR
	HP	HORSEPOWER
	CAF	COMBUSTION AIR FAN
	UH	UNIT HEATER
	V	VOLTS
	PH	PHASE
	MANUF	MANUFACTURER
	T'STAT	THERMOSTAT
	A.F.F.	ABOVE FINISHED FLOOR
	DG	DOOR GRILLE
	MAU	MAKE-UP AIR UNIT
	U.D.	UNDERCUT DOOR
	N.T.S.	(NOT TO SCALE)
	CO	CLEANOUT
	B	BOILER
	DD	DISPLACEMENT DIFFUSER
	H.V.A.C.	HEATING,VENTILATING AND AIR COND.
	A.T.C.	AUTOMATIC TEMP. CONTROL
	G.C.	GENERAL CONTRACTOR
	P.C.	PLUMBING CONTRACTOR
	E.C.	ELECTRICAL CONTRACTOR
	P	PUMP
	CH	CHILLER
	EUH	ELECTRIC UNIT HEATER
	EXH.	EXHAUST
	DCU	DUCTLESS COOLING UNIT
	DCUc	DUCTLESS COOLING UNIT CONDENSER (OUTDOOR)
	DCUe	DUCTLESS COOLING UNIT EVAPORATOR (INDOOR)
	R.A.	RETURN AIR
	HV	HEATING AND VENTILATING UNIT
	S.A.	SUPPLY AIR
	RHC	REHEAT COIL
	CLG.	CEILING
	O.C.	ON CENTER
	MSH	1000 BTUH
	WTD	WATER TEMPERATURE DROP
	CFH	CUBIC FEET PER HOUR
	FRPM	FAN RPM
	VFD	VARIABLE FREQUENCY DRIVE
	WPD	WATER PRESSURE DROP
	GFS	GLYCOL FEED STATION
	OED	OPEN ENDED DUCT
	WMS	WIRE MESH SCREEN
	WRU	WALL RADIATION UNIT
	HSAG	HIGH SPEED ABORT GATE

- ## / # — EQUIPMENT TYPE / EQUIPMENT NUMBER
- S-A / 12x12 / 500 — GRD DESIGNATION (REFER TO SCHEDULE) / GRD SIZE / GRD CFM
- DD-1 / 400 — DD DESIGNATION (REFER TO SCHEDULE) / DD CFM
- RP-1 / 4'-0" / 0.5 — TERMINAL DESIGNATION (REFER TO SCHEDULES) / TERMINAL LENGTH / TERMINAL GPM

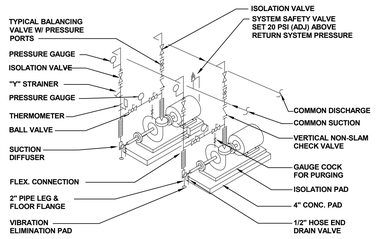
GENERAL NOTES

1. ALL DUCTWORK & PIPING ON THE CONTRACT DRAWINGS IS SHOWN DIAGRAMMATICALLY & DO NOT SHOW EVERY FITTING, OFFSET, ELBOW, TRANSITION, ETC. THE DRAWINGS ARE PROVIDED TO SHOW THE DESIGN INTENT & ROUTING OF ALL MAJOR SYSTEMS. THE HVAC CONTRACTOR SHALL FIELD VERIFY & COORDINATE WITH ALL TRADES & BUILDING COMPONENTS TO PROVIDE A COMPLETE & FUNCTIONING SYSTEM AS IT RELATES TO HVAC. THE HVAC CONTRACTOR SHALL PROVIDE ALL NECESSARY FITTINGS, TRANSITIONS, OFFSETS, ELBOWS, ETC. AS REQUIRED FOR A COMPLETE, OPERATIONAL & CODE COMPLIANT SYSTEM(S) UTILIZING INDUSTRY STANDARDS. EXACT LOCATION SHALL BE DETERMINED IN FIELD AFTER COORDINATING WITH OTHER WORK.
2. FOR TYPICAL PIPING DIAGRAMS AND CONNECTIONS AT EQUIPMENT, SEE DETAIL DRAWINGS.
3. EXACT LOCATION OF ALL CEILING DIFFUSERS, REGISTERS, AND GRILLES SHALL BE COORDINATED WITH ALL MECHANICAL EQUIPMENTS, & OTHER FIXTURES. REFER TO REFLECTED CEILING PLAN. CONTACT A&E IN WRITING PRIOR TO INSTALLATION IF AN ITEM IS NOT INDICATED ON REFLECTED CEILING PLAN.
4. FOR DETAILS OF ROOF CURBS, FLASHING, PIPING, AND VENTS THRU ROOF REFER TO ARCHITECTURAL DRAWINGS.
5. FOR LOCATION OF OPENINGS IN ROOF AND FLOORS REFER TO STRUCTURAL AND ARCHITECTURAL DRAWINGS.
6. AUTOMATIC VENTS, VALVES, ETC. THAT MUST BE SERVICED SHALL BE LOCATED IN ACCESSIBLE POSITIONS & ACCESS DOORS/PANELS PROVIDED WHERE REQUIRED.
7. THE GENERAL CONTRACTOR SHALL PROVIDE CONCRETE BASES A 4" MINIMUM HEIGHT. LOCATION AND DIMENSIONS ARE APPROXIMATE. PROVIDE TO SUIT EQUIPMENT & ALLOW A MIN. OF 6" ALL AROUND EQUIPMENT.
8. THE HVAC CONTRACTOR SHALL PROVIDE REMOVABLE PANELS AT LOCATIONS WHERE ACCESS TO VALVES, DAMPERS, FIRE DAMPERS, ETC. ARE REQUIRED.
9. ALL DUCTWORK SHALL HAVE JOINTS AND SEAMS FILLED WITH SEALANT FOR AIR TIGHT INSTALLATIONS.
10. PROVIDE SWING JOINTS AT ALL PIPING TAKEOFFS FROM MAINS (MINIMUM OF 3 ELBOWS), AND PROVIDE ISOLATION VALVES ON SUPPLY AND RETURN PIPING TAKEOFFS.
11. ALL AIR VENTS & PRESSURE GAUGES SHALL BE INSTALLED WITH COCKS SUCH THAT THE DEVICE CAN BE REMOVED WITHOUT DRAINING PIPING SYSTEM.
12. PROVIDE DUCT ACCESS DOORS FOR ALL FIRE AND CONTROL DAMPERS LOCATED IN DUCTWORK RUNS.
13. H.V.A.C. CONTRACTOR SHALL COORDINATE ALL WORK WITH PLUMBING AND ELECTRICAL CONTRACTORS.
14. H.V.A.C. CONTRACTOR SHALL INFORM G.C. AS TO THE LOCATION AND SIZE OF ALL ACCESS PANELS.
15. ALL DOOR GRILLES SHALL BE BY G.C.
16. ALL SUPPORT STEEL UNLESS SHOWN ON STRUCTURAL DRAWINGS SHALL BE PROVIDED BY H.V.A.C. CONTRACTOR.
17. ALL DUCT ELBOWS SHALL BE LONG RADIUS (R=1.5), OR SQUARE TYPE WITH DOUBLE THICKNESS TURNING VANES.
18. DUCT SMOKE DETECTORS INDICATED ARE TO BE FURNISHED & INSTALLED IN THE DUCT BY HVAC CONTRACTOR. POWER WIRING AND FIRE ALARM INTERLOCK BY ELECTRICAL CONTRACTOR. ATC CONTRACTOR TO PROVIDE BMS INTERLOCK TO SHUT ASSOCIATED UNIT DOWN AND INITIATE AN ALARM UPON ACTIVATION.
19. FOR ALL CONNECTIONS TO BUILDING STEEL REFER TO STRUCTURAL DRAWINGS.
20. TOTAL DYNAMIC HEAD AND STATIC PRESSURE INDICATED IN THE SCHEDULES IS BASED ON ENGINEERING ANALYSIS AND MAY NOT NECESSARILY MATCH ACTUAL INSTALLED CONDITIONS. THIS CONTRACTOR SHALL PROVIDE REQUIRED SHEEVES, BELTS AND DRIVES TO MEET VOLUME FLOW CHARACTERISTICS SPECIFIED. ACTUAL INSTALLED CONDITIONS SHALL BE DETERMINED BY THE TAB CONTRACTOR
21. PROVIDE 4" FLEXIBLE CONNECTION AT EACH DUCT CONNECTION TO FAN OR AIR HANDLING UNIT.
22. THE MANUFACTURER LISTED IN THE SCHEDULES REFLECTS THE BASIS OF DESIGN AS INDICATED ON THE CONTRACT DRAWINGS AND IS NOT INTENDED TO SUGGEST THE REQUIRED PROVIDER. REFER TO THE SPECIFICATIONS FOR A COMPLETE DESCRIPTION OF EACH PRODUCT REQUIRED AND REFERENCE "OR EQUAL" REQUIREMENTS.
23. DUCTWORK DIMENSIONS INDICATED ARE CLEAR INSIDE DIMENSIONS.
24. PROVIDE ISOLATION VALVES AT THE BASE OF ALL PIPE RISERS AND ON ALL LATERAL BRANCHES FROM THE RISER, AND ALL BRANCH AND MAIN PIPING SUPPLY & RETURN LINES WHICH SERVE MORE THAN TWO PIECES OF TERMINAL HVAC EQUIPMENT.
25. CONDENSATE PENETRATING EXTERIOR WALL TO BE FURNISHED WITH ESCUTCHEON.
26. ALL KITCHEN/FUME HOOD EXHAUST DUCT SHALL BE 2-HOUR CONSTRUCTION WELDED BLACK STEEL OR EQUIVALENT PER NFPA 96 REQUIREMENTS.
27. ALL SMOKE DAMPERS SHALL BE COMBINATION SMOKE/FIRE DAMPERS, SHALL BE FURNISHED & INSTALLED BY HVAC CONTRACTOR, AND POWER WIRED BY ATC CONTRACTOR. DAMPERS SHALL BE MOTOR OPERATED WITH 24 VOLT / 120 VOLT ACTUATOR BY HVAC CONTRACTOR. FIRE ALARM INTERLOCK BY ELECTRICAL CONTRACTOR. ATC CONTRACTOR SHALL PROVIDE THE NECESSARY WIRING, PROGRAMMING, & COMPONENTS FOR BMS INTEGRATION. ASSOCIATED EQUIPMENT SHALL BE SHUT DOWN UPON ACTIVATION OF THE DAMPER/SMOKE DETECTOR.
28. ALL LOCKER ROOM, SHOWER ROOM, AND DISHWASHER EXHAUST DUCTWORK SHALL BE ALUMINUM.
29. ALL DRYER DUCTWORK TO BE FRICTION FIT W/ TAPED JOINTS. NO MECHANICAL FASTENERS. PROVIDE NECESSARY FITTINGS FROM DRYER TO OUTSIDE WALL CAP.
30. REFER TO ARCHITECTS RCP'S AND CEILING DETAILS FOR LOCATION AND COMPOSITION OF ACOUSTIC ISOLATION CEILINGS. COORDINATE USE OF COMPATIBLE EQUIPMENT HANGERS WITH GC IN THESE LOCATIONS.
31. ALL DOUBLE WALL DUCTWORK INDICATED ON DRAWINGS SHALL BE 16-GA. OUTER WALL, PERFORATED INNER WALL, W/ 2" ACOUSTIC LINER TO EXTENT SHOWN ON DRAWINGS.
32. PROVIDE PERFORATED DOUBLE WALL DUCT W/ 2" ACOUSTIC SOUND LINER, SIMILAR TO PERMACOATE LINECOUSTIC ON ALL S.A., R.A., O.A. & E.A. (WHERE APPLICABLE) DUCTWORK FROM THE UNIT TO THE SOUND ATTENUATOR. PROVIDE SINGLE WALL DUCT WITH 1 1/2" INTERNAL LINER FOR AN ADDITIONAL 15'-0" (MIN.) DOWNSTREAM OF THE SOUND ATTENUATOR. DUCTWORK SHALL ALSO BE EXTERNALLY INSULATED WHERE NECESSARY TO ACHIEVE IECC 2021 MINIMUM ASSMEBLY INSULATION VALUE OF R-6.
33. ALL AIR HANDLING UNITS >2000 CFM SHALL HAVE A DUCT MOUNTED SMOKE DETECTOR INSTALLED IN THE AIRSTREAM.
34. ALL EQUIPMENT SHALL BE INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS & INSTALLATION INSTRUCTIONS. PROVIDE ALL NECESSARY COMPONENTS, FITTINGS, ACCESSORIES, WIRING, ETC. FOR A COMPLETE FUNCTIONAL SYSTEM.
35. ALL ATC CONTROLS SHALL BE POWER WIRED FROM THE CORRESPONDING MAIN ATC PANEL, OR SUB ATC PANEL. EACH ATC PANEL WILL BE FED BY EMERGENCY POWER, THEREFORE, ALL CONTROLS SHALL BE ON EMERGENCY POWER. ALL PANELS SHALL BE PROVIDED BY ATC CONTRACTOR. ALL UNIT CONTROLS SHALL BE FED BY THE MAIN ATC PANEL OR, SUB ATC PANEL, & NOT THROUGH THE UNIT'S MAIN POWER SOURCE. ATC CONTRACTOR SHALL PROVIDE EMERGENCY POWER FEEDER FROM THE ELECTRICAL EMERGENCY POWER PANELS TO ANY AND ALL ATC PANELS/SUB PANELS. ATC CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR TO DETERMINE WHERE EMERGENCY POWER MAY BE DERIVED FROM.
36. ALL DUCTLESS COOLING UNITS AND HEAT PUMP UNITS SHALL BE PROVIDED W/ CONDENSATE PUMPS. THE HVAC CONTRACTOR SHALL FIELD DETERMINE IF A GRAVITY FED SYSTEM CAN BE ACCOMPLISHED. WHERE POSSIBLE THE HVAC CONTRACTOR SHALL SLOPE THE CONDENSATE PIPING SYSTEM TO ALLOW FOR A GRAVITY FED SYSTEM. HOWEVER, THE CONDENSATE PUMP SHALL STILL BE PROVIDED, ALONG W/ AN OVERFLOW SAFETY ALARM WHICH SHALL BE TIED INTO BMS SYSTEM.
37. ALL OCCUPIED SPACES SHALL BE PROVIDED W/ MULTIFUNCTION SENSORS W/ TEMPERATURE, HUMIDITY & CO2 CONTROL. THIS SHALL BE PROVIDED IN COMPLIANCE WITH LEED v.4 CREDIT IEQC1.
38. ALL RADIANT PANELS WHETHER MODULAR OR LINEAR SHALL BE FED W/ ONE SET OF INSULATED 3/4" HHWS & HHWR PIPES. RADIANT PANEL MANUFACTURER AND/OR HVAC CONTRACTOR SHALL PROVIDE ALL HEADERS AND/OR CIRCUITS REQUIRED FOR LINEAR PANELS W/ HIGH PRESSURE DROPS OVER 8 FEET W.C. ALONG W/ ANY TRIM CONNECTORS, INTERCONNECTING PIPES, END PIECES, MOUNTING ARMS & SUPPORTS FOR A COMPLETE & OPERATIONAL SYSTEM WHILE MAINTAINING A SEAMLESS APPEARANCE. MOUNTING ARMS WILL BE UTILIZED FOR ALL RADIANT LIGHT SHELVES UNLESS OTHERWISE INDICATED.
39. ALL REFRIGERANT LIQUID AND REFRIGERANT SUCTION LINES SHALL BE SIZED AND INSTALLED PER MANUFACTURERS RECOMMENDATIONS.
40. PROVIDE ALL NECESSARY DUCT TRANSITIONS, OFFSET, FASTENERS, ELBOWS & CLIPS FOR A COMPLETE CONNECTION FROM THE DUCT MAIN TO THE VAV BOX THEN TO THE DISPLACEMENT DIFFUSER. UTILIZE DUCT SEALANT & MECHANICAL FASTENERS FOR AN AIRTIGHT SEAL. PROVIDE SUPPLEMENTAL STRUCTURAL SUPPORTS AS REQUIRED FOR THE INSTALLATION OF VAV BOX & ANY TYPE OF DISPLACEMENT DIFFUSER INCLUDING WALL BRACING IF NECESSARY.
41. ALL EXPOSED DUCTWORK SHALL BE PAINTED UNLESS NOTED OTHERWISE. FINISH COLOR BY ARCHITECT.
42. ALL AHU'S, RTU's & MAU'S SHALL BE PROVIDED W/ SUPPLY & RETURN AIR DUCT MOUNTED SMOKE DETECTORS. THE DUCT MOUNTED SMOKE DETECTORS SHALL BE INSTALLED BY THE HVAC CONTRACTOR. FIRE ALARM INTERLOCK, POWER, WIRING, & FURNISHING OF THE DETECTOR SHALL BE BY THE ELECTRICAL CONTRACTOR. UNIT SHUT DOWN UPON ACTIVATION WILL BE PROVIDED BY THE ATC CONTRACTOR, PROVIDE NECESSARY WIRING, PROGRAMMING, & COMPONENTS TO ACHIEVE THE DESIRED SEQUENCE.
43. ALL KILN HOOD DUCTWORK SHALL BE STAINLESS STEEL CONSTRUCTION. PROVIDE ALL REQUIRED TRANSITIONS TO KILN CONNECTION & TO ROOF-MOUNTED EXHAUST FAN.
44. ALL DUCTWORK MAINS SHALL BE INSTALLED TIGHT TO STEEL TO ACCOMMODATE OTHER TRADES. COORDINATE ALL DUCTWORK WITH ALL NECESSARY TRADES.
45. ALL VAV BOXES WILL BE PROVIDED W/ 120V POWER WIRING BY ELECTRICAL CONTRACTOR. POWER WIRING SHALL TERMINATE IN JUNCTION BOX PROVIDED BY ELECTRICAL CONTRACTOR. ATC CONTRACTOR SHALL PROVIDE TRANSFORMER IN SEPARATE JUNCTION BOX & THEN 24 V CONTROL WIRING TO VAV CONTROL PANEL. REFER TO CONTROL DWGS.
46. VOLUME DAMPERS INDICATED ON DUCTWORK DRAWINGS REPRESENT LOCATIONS WHERE THESE ARE REQUIRED & INTENDED. HOWEVER IT DOES NOT REPRESENT ALL NECESSARY LOCATIONS. REFER TO DUCTBRANCH DETAILS FOR FURTHER VOLUME DAMPER REQUIREMENTS IN ALL BRANCH/DIFFUSER DUCTS.
47. ALL WRU UNITS SHALL BE INSTALLED RECESSED WITHIN PROVIDED ARCHITECTURAL NICHES UNLESS OTHERWISE NOTED. COORDINATE WITH ARCHITECTURAL PLANS AND WALL SECTIONS FOR LOCATIONS AND DIMENSIONS OF WALL NICHES.
48. ALL DUCT PENETRATIONS THROUGH FLOORS SHALL BE INSTALLED WITH SUITABLE FIRE DAMPER AT THE FLOOR PENETRATION RATED TO MATCH THE RATING OF THE FLOOR.
49. VERTICAL DUCTS IN WALLS/CHASES TO DISPLACEMENT DIFFUSERS SHALL MATCH THE CONNECTION SIZE LISTED IN THE DD SCHEDULE FOR THE ASSOCIATED DISPLACEMENT DIFFUSER UNLESS OTHERWISE NOTED.
50. ALL THERMOSTATS SHALL BE MOUNTED 48" A.F.F.
51. ALL LOUVERS SHALL BE FURNISHED BY THE G.C. AND INSTALLED BY THE HV

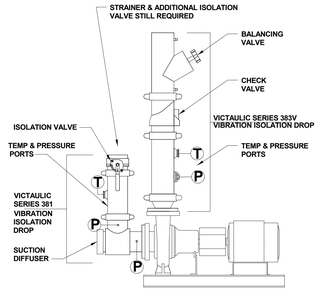


INLINE PUMP PIPING DETAIL
(NOT TO SCALE)

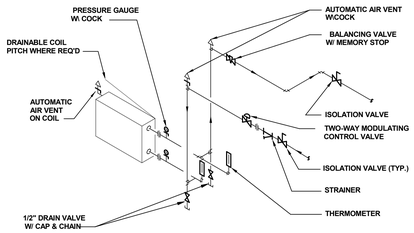
NOTE: ADDITIONAL PUMPS AS REQUIRED FOR PARALLEL PUMPING ARRANGEMENT SHALL FOLLOW THEPIPING ARRANGEMENT INDICATED IN THIS DETAIL



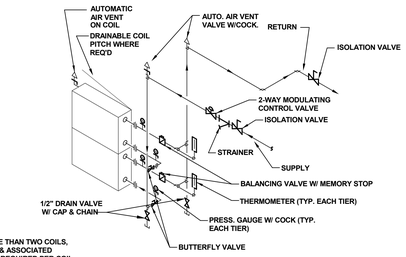
PIPING DETAILS AT WATER PUMPS
NO SCALE



VICTAULIC SERIES 381/383V VIBRATION ISOLATION PUMP DROP - END SUCTION
(NOT TO SCALE)

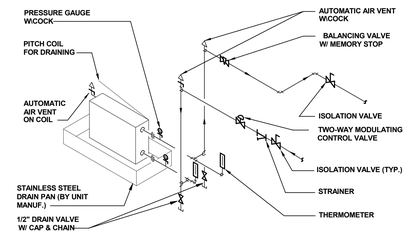


HOT WATER HEATING & REHEATING COIL PIPING W/ 2-WAY MODULATING CONTROL VALVE - SINGLE COIL
(NOT TO SCALE)

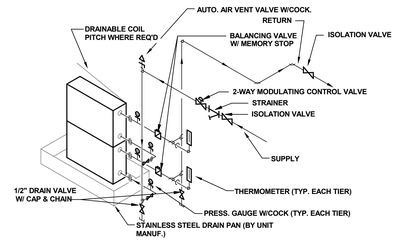


FOR UNITS W/ MORE THAN TWO COILS, INDIVIDUAL PIPING & ASSOCIATED COMPONENTS ARE REQUIRED PER COIL INCLUDING BUT NOT LIMITED TO PRESSURE GAUGES, TEMPERATURE GAUGES, BALANCING VALVE & AIR VENT.

MULTI-COIL HOT WATER HEATING COIL PIPING W/ 2-WAY MODULATING CONTROL VALVE
(NOT TO SCALE)

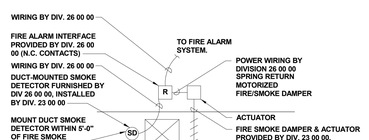


CHILLED WATER COIL PIPING W/ 2-WAY MODULATING CONTROL VALVE - SINGLE COIL
(NOT TO SCALE)



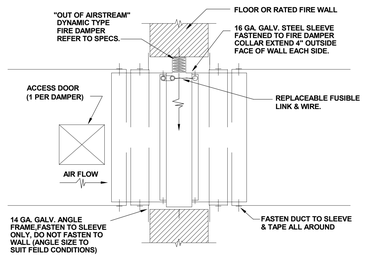
FOR UNITS W/ MORE THAN TWO COILS, INDIVIDUAL PIPING & ASSOCIATED COMPONENTS ARE REQUIRED PER COIL INCLUDING BUT NOT LIMITED TO PRESSURE GAUGES, TEMPERATURE GAUGES, BALANCING VALVE & AIR VENT.

MULTI-COIL CHILLED WATER COIL PIPING W/2-WAY MODULATING CONTROL VALVE
(NOT TO SCALE)

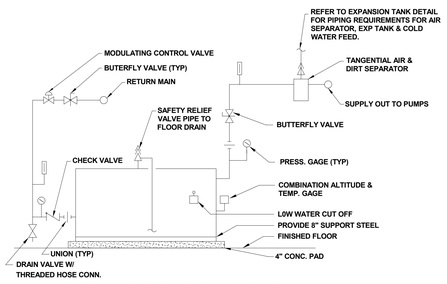


NOTES:
1. F/S DAMPER SHALL CLOSE IF FIRE ALARM IS TRIGGERED AND/OR LOSS OF POWER.
2. ACTIVATED END SWITCH SHALL SHUT DOWN ASSOCIATED RTU.

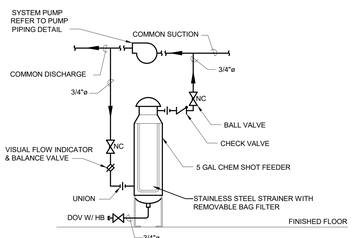
FIRE/SMOKE DAMPER DETAIL
(NOT TO SCALE)



AUTOMATIC FIRE DAMPER
(NOT TO SCALE)

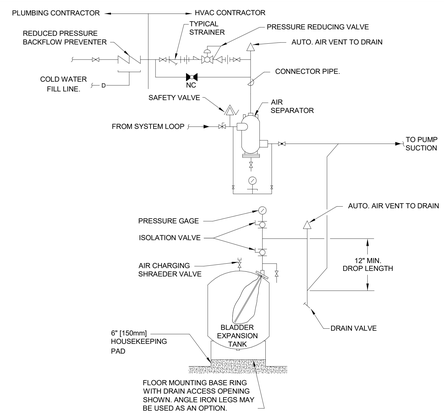


TYPICAL ELECTRIC BOILER PIPING DETAIL
(NOT TO SCALE)

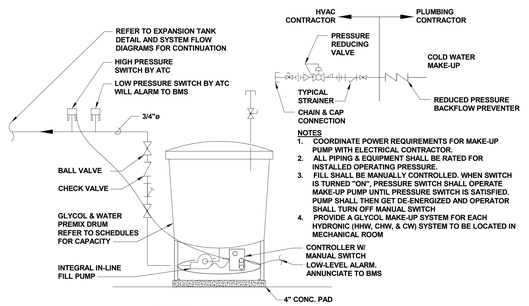


1. PROVIDE FOR CLOSED LOOP CONDENSER WATER (ALTERNATE 1 - GEOTHERMAL GROUND SOURCE), CHILLED, & HOT WATER SYSTEMS
2. VISUAL FLOW INDICATOR AND BALANCE VALVE COULD BE TWO DIFFERENT COMPONENTS

CHEMICAL SHOT FEEDER PIPING DETAIL
(NOT TO SCALE)

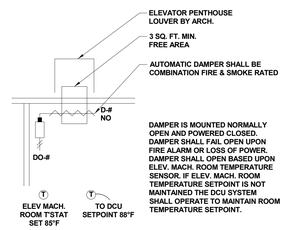


EXPANSION TANK & AIR SEPARATOR PIPING DETAIL
(NOT TO SCALE)



NOTES
1. COORDINATE POWER REQUIREMENTS FOR MAKE-UP PUMP WITH ELECTRICAL CONTRACTOR.
2. ALL PIPING & EQUIPMENT SHALL BE RATED FOR INSTALLED OPERATING PRESSURE.
3. FILL SHALL BE MANUALLY CONTROLLED. WHEN SWITCH IS TURNED "ON", PRESSURE SWITCH SHALL OPERATE MAKE-UP PUMP UNTIL PRESSURE SWITCH IS SATISFIED. PUMP SHALL THEN GET DE-ENERGIZED AND OPERATOR SHALL TURN OFF MANUAL SWITCH
4. PROVIDE A GLYCOL MAKE-UP SYSTEM FOR EACH HYDRONIC (HHW, CHW, & CW) SYSTEM TO BE LOCATED IN MECHANICAL ROOM

GLYCOL MAKE-UP UNIT
(NOT TO SCALE)



ELEVATOR SHAFT & MACHINE ROOM VENT DETAIL
(NOT TO SCALE)

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

NO.	DATE	TITLE

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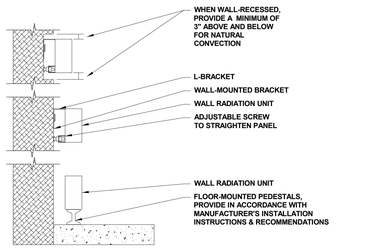
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SCALE: AS INDICATED

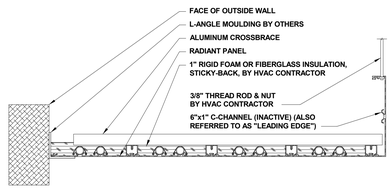
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DETAILS II

SHEET NUMBER:
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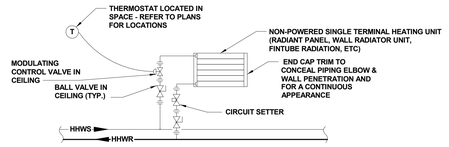
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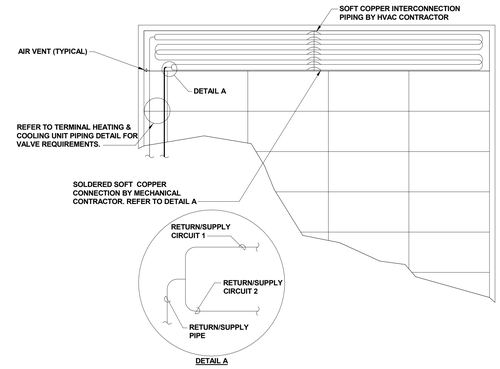
TYPICAL WALL RADIATION UNIT INSTALLATION DETAIL
(NOT TO SCALE)



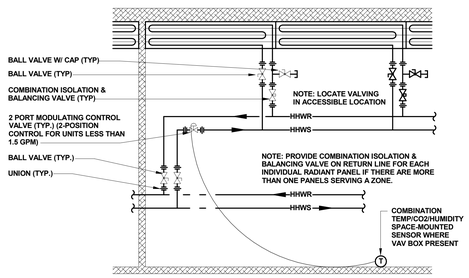
RADIANT PANEL AT EXTERIOR WALL WITH ONE SIDE EXPOSED DETAIL
(NOT TO SCALE)



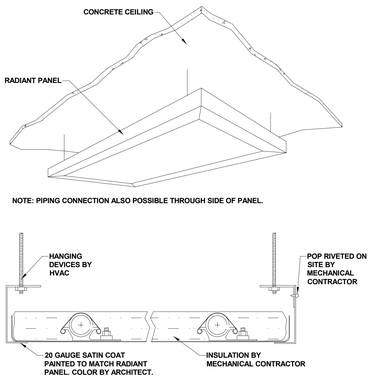
TERMINAL HEATING UNIT PIPING DETAIL
(NOT TO SCALE)



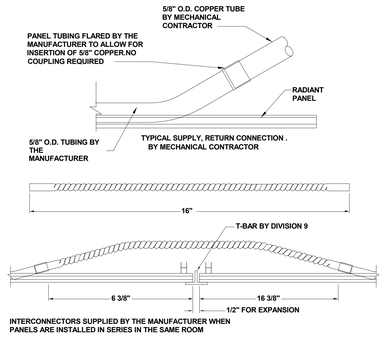
DOUBLE CIRCUIT RADIANT HEATING PANEL PIPING DETAIL
(NOT TO SCALE)



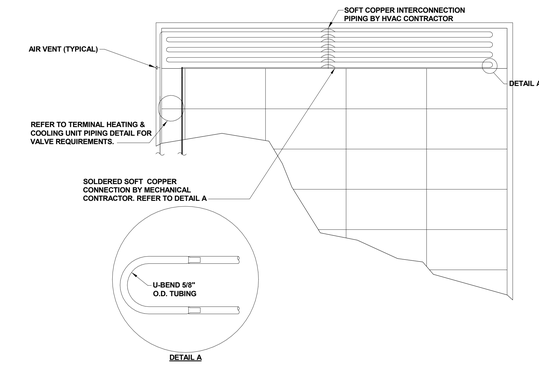
MULTIPLE HEATING RADIANT PANEL PIPING DETAIL
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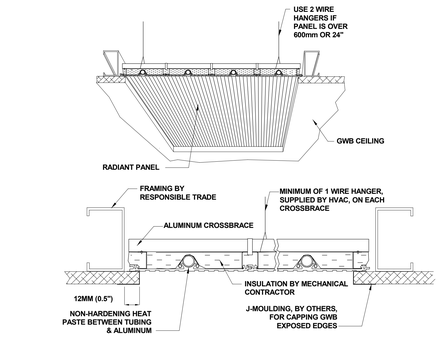
FREE HANGING MODULAR PANEL
(NOT TO SCALE)



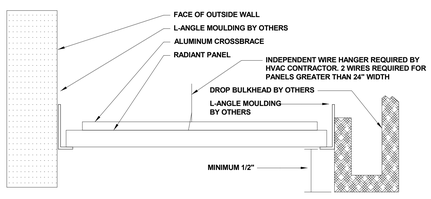
COPPER CONNECTION DETAILS
(NOT TO SCALE)



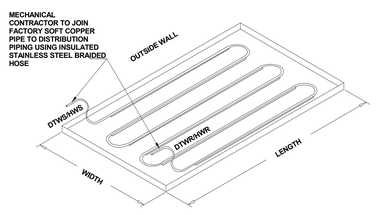
SINGLE CIRCUIT RADIANT HEATING PANEL PIPING DETAIL
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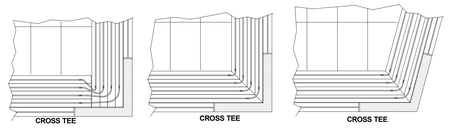
TYPICAL RADIANT PANEL WITHIN A GYP-BOARD CEILING
(NOT TO SCALE)



RADIANT PANEL BULKHEAD-STYLE INSTALLATION DETAIL
(NOT TO SCALE)

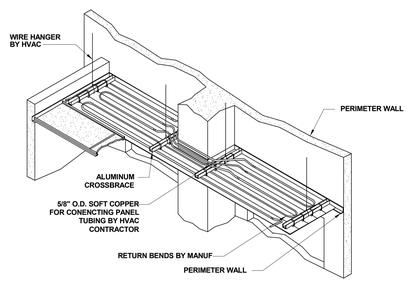


RADIANT HEATING PANEL SUPPLY, RETURN CONNECTION DETAIL
(NOT TO SCALE)

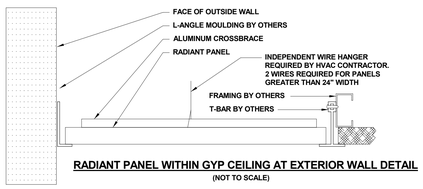


5/8" (16 mm) O.D. SOFT COPPER FOR CONNECTING PANELS BY MECHANICAL CONTRACTOR

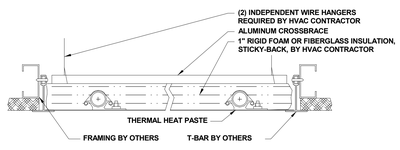
CORNER DETAILS
(NOT TO SCALE)



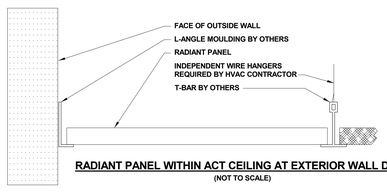
SERPENTINE CIRCUITING AROUND COLUMN
NO SCALE



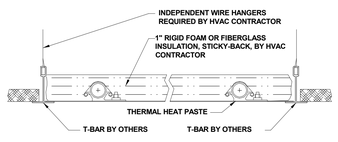
RADIANT PANEL WITHIN GYP CEILING AT EXTERIOR WALL DETAIL
(NOT TO SCALE)



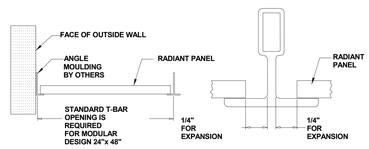
RADIANT PANEL WITHIN GYP CEILING DETAIL
(NOT TO SCALE)



RADIANT PANEL WITHIN ACT CEILING AT EXTERIOR WALL DETAIL
(NOT TO SCALE)



RADIANT PANEL WITHIN ACT CEILING DETAIL
(NOT TO SCALE)



RADIANT HEATING PANEL EXPANSION GAP DETAIL
(NOT TO SCALE)

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999
VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

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WILMINGTON, MA 01887

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KEY PLAN

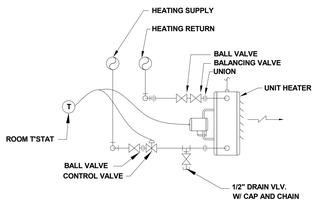
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SCALE: AS INDICATED

SHEET TITLE:
DETAILS III

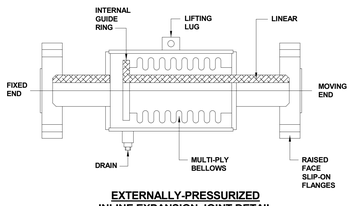
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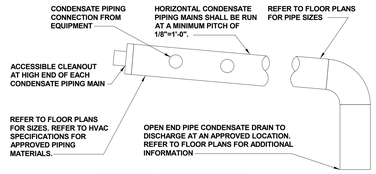
TYPICAL HORIZONTAL UNIT HEATER PIPING DETAIL-HEATING-HOT WATER

(NOT TO SCALE)



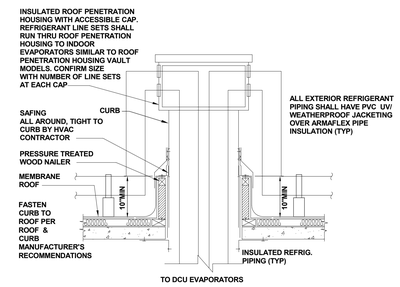
EXTERNALLY-PRESSURIZED INLINE EXPANSION JOINT DETAIL

(NOT TO SCALE)



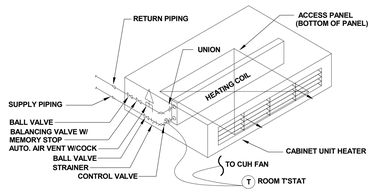
CONDENSATE PIPING DETAIL

NO TO SCALE



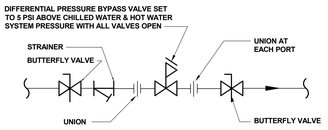
REFRIGERANT PIPE ROOF PENETRATION HOUSING

(NOT TO SCALE)



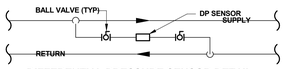
TYPICAL CABINET UNIT HEATER CEILING TYPE-PIPING DETAIL-HOT WATER

(NOT TO SCALE)



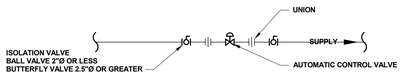
DIFFERENTIAL PRESSURE BYPASS VALVE PIPING

NO SCALE



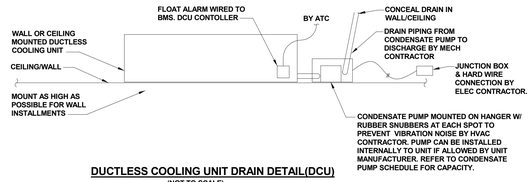
DIFFERENTIAL PRESSURE SENSOR DETAIL

NO SCALE



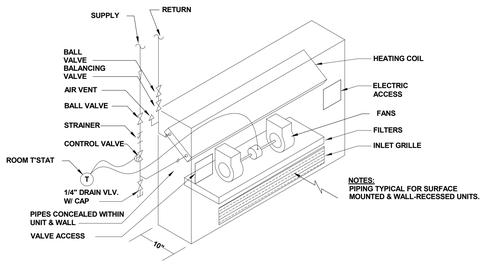
AUTOMATIC CONTROL VALVE DETAIL

NO SCALE



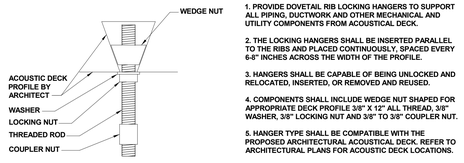
DUCTLESS COOLING UNIT DRAIN DETAIL(DCU)

(NOT TO SCALE)



TYPICAL CABINET UNIT HEATER PIPING DETAIL (FLOOR MOUNT & WALL-RECESSED)

NO SCALE



1. PROVIDE DOVETAIL RIB LOCKING HANGERS TO SUPPORT ALL PIPING, DUCTWORK AND OTHER MECHANICAL AND UTILITY COMPONENTS FROM ACOUSTICAL DECK.

2. THE LOCKING HANGERS SHALL BE INSERTED PARALLEL TO THE RIBS AND PLACED CONTINUOUSLY, SPACED EVERY 6-8" INCHES ACROSS THE WIDTH OF THE PROFILE.

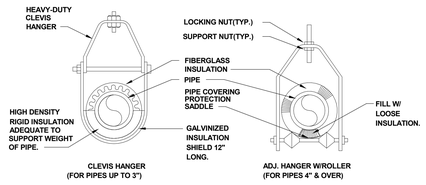
3. HANGERS SHALL BE CAPABLE OF BEING UNLOCKED AND RELOCATED, INSERTED, OR REMOVED AND REUSED.

4. COMPONENTS SHALL INCLUDE WEDGE NUT SHAPED FOR APPROPRIATE DECK PROFILE 3/8" X 12" ALL THREAD, 3/8" WASHER, 3/8" LOCKING NUT AND 3/8" TO 3/8" COUPLER NUT.

5. HANGER TYPE SHALL BE COMPATIBLE WITH THE PROPOSED ARCHITECTURAL ACOUSTICAL DECK. REFER TO ARCHITECTURAL PLANS FOR ACOUSTIC DECK LOCATIONS.

ACOUSTIC DECK HANGER DETAIL

(NOT TO SCALE)

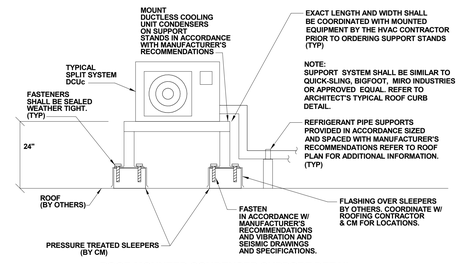


TYPICAL PIPE HANGER DETAIL

NOTE:

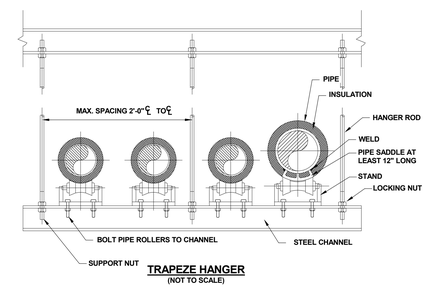
REFER TO SPECIFICATIONS FOR HANGER ROD SIZE & SPACING.

REFER TO SPEC FOR SEISMIC & VIBRATION ISOLATION REQUIREMENTS.



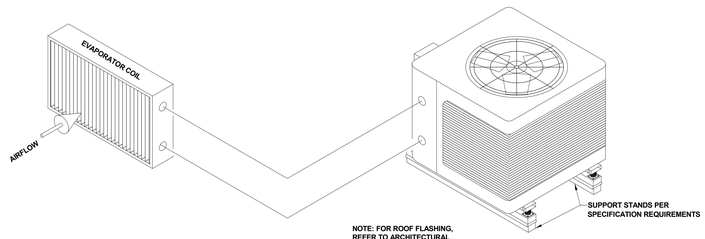
ROOF-MOUNTED CONDENSER SUPPORT DETAIL

(NOT TO SCALE)



TRAPEZE HANGER

(NOT TO SCALE)



NOTE: FOR ROOF FLASHING, REFER TO ARCHITECTURAL DRAWINGS FOR DETAILED INSTRUCTIONS

REFRIGERANT PIPING: PROVIDE SUCTION LINES WITH ISOLATION VALVE, SUCTION ACCUMULATOR AND CHARGING CONNECTION. LIQUID LINE WITH SITE GLASS HAVING DOUBLE PORTS WITH CAPS, FILTER DRYER, ISOLATION VALVES AND CHARGING CONNECTION. INSULATE PER SPECIFICATIONS. SIZING PER MANUFACTURER. PROVIDE ALUMINUM JACKET ON EXTERIOR PIPING.

PIPING INDICATED IS FOR SINGLE CIRCUIT; CONTRACTOR SHALL PROVIDE ADDITIONAL PIPING, VALVES, INSULATION, ETC FOR ADDITIONAL CIRCUITS & HOT GAS BYPASS IN ACCORDANCE WITH MANUFACTURE'S RECOMMENDATIONS AND GUIDELINE REQUIREMENTS. CONFIRM, VERIFY & COORDINATE W/ UNIT MANUFACTURER FOR ALL PIPING & INSTALLATION REQUIREMENTS.

DUCTLESS COOLING UNIT AND REFRIGERANT PIPING DIAGRAM

(NOT TO SCALE)

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

NO.	DATE	TITLE

ISSUE TITLE AND DATE:

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KEY PLAN

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SCALE: AS INDICATED

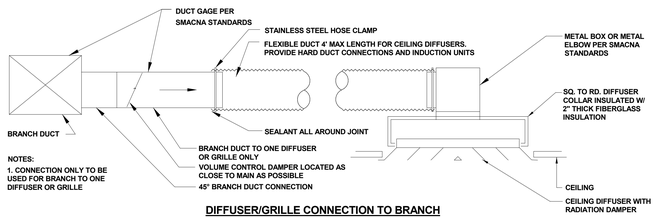
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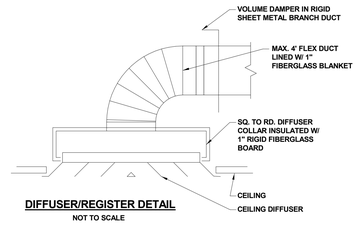
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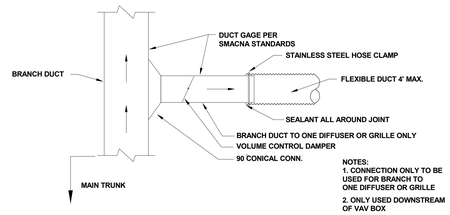
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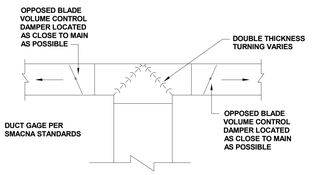
DIFFUSER/GRILLE CONNECTION TO BRANCH
(NOT TO SCALE)



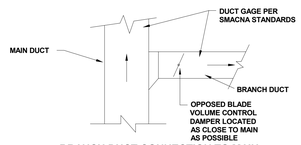
DIFFUSER/REGISTER DETAIL
NOT TO SCALE



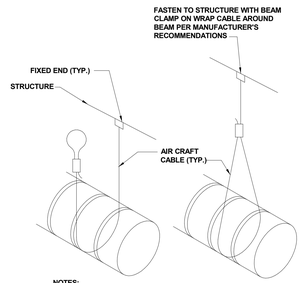
DIFFUSER/GRILLE CONNECTION TO BRANCH
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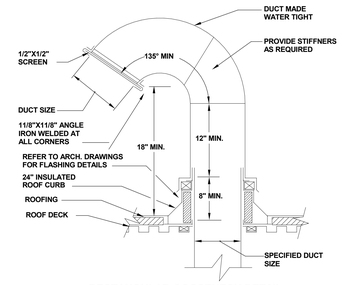
TYPICAL TEE DUCT CONNECTION
(NOT TO SCALE)



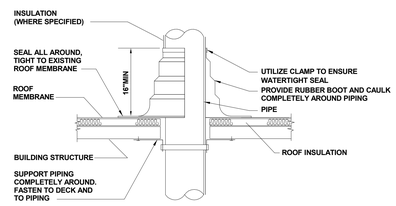
BRANCH DUCT CONNECTION TO MAIN
(NOT TO SCALE)



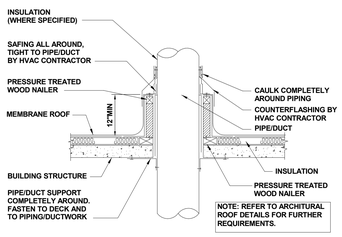
ROUND DUCTWORK HANGING DETAIL
(NOT TO SCALE)



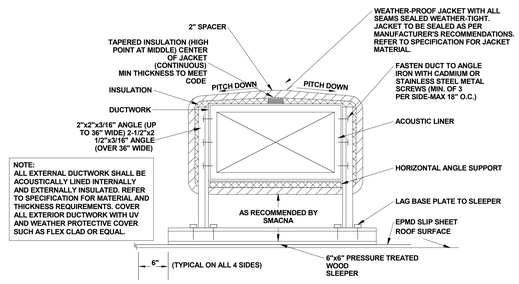
RECTANGULAR GOOSENECK DETAIL
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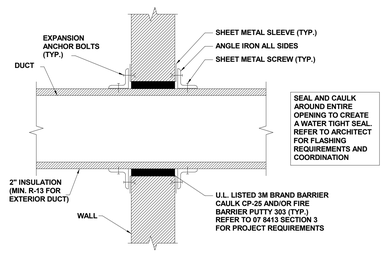
PIPE PENETRATION THROUGH ROOF DETAIL
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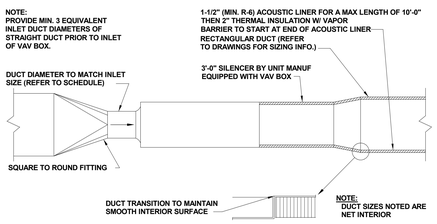
DUCT PENETRATION THROUGH ROOF DETAIL
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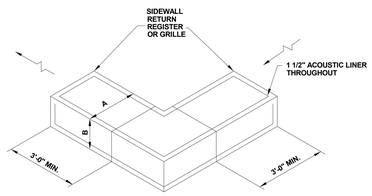
ROOF MOUNTED EXTERIOR DUCTWORK DETAIL
(NOT TO SCALE)



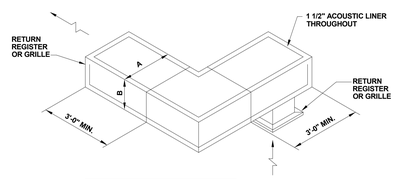
DUCT THRU EXTERIOR WALL DETAIL
(NOT TO SCALE)



TYPICAL VARIABLE AIR VOLUME DUCT DETAIL
(NOT TO SCALE)



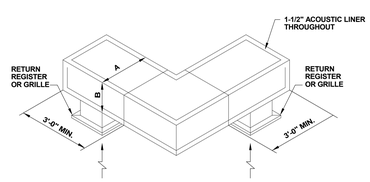
TYPICAL SIDEWALL TO SIDEWALL DETAIL
NO SCALE



CLG RETURN REG. SIZE	DUCT SIZE (*) A	B
8x8	12	6
10x10	12	8
12x12	16	10
14x14	20	10
16x16	24	10
18x18	24	14

* - DUCT SIZES ARE INSIDE CLEAR DIMENSIONS.

TYPICAL RETURN/TRANSFER DETAIL
NO SCALE



RETURN REG. SIZE	MAXIMUM CFM	DUCT SIZE (*) A	B
8x8	200	10	6
10x10	300	14	6
12x12	450	14	8
14x14	590	18	8
16x16	800	16	10

* - DUCT SIZES ARE INSIDE CLEAR DIMENSIONS.

TYPICAL RETURN/TRANSFER DETAIL
NO SCALE

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999
VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

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p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

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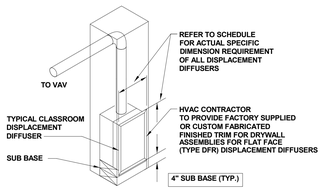
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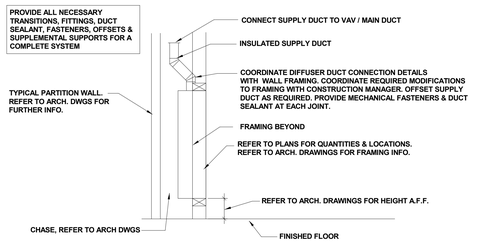
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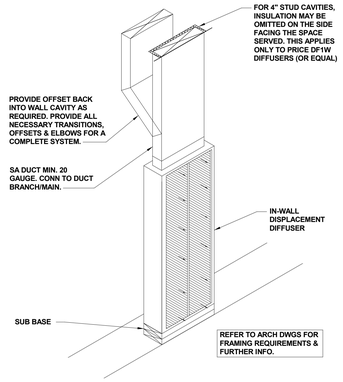
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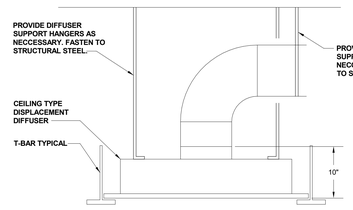
TYPICAL CLASSROOM DISPLACEMENT DIFFUSER DETAIL - TOP CONNECTION
NOT TO SCALE



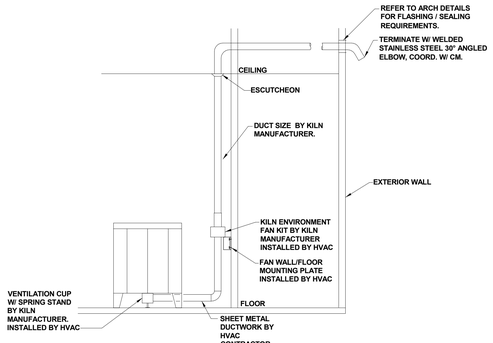
TYPICAL WALL MOUNTED DISPLACEMENT DIFFUSER DETAIL
(NOT TO SCALE)



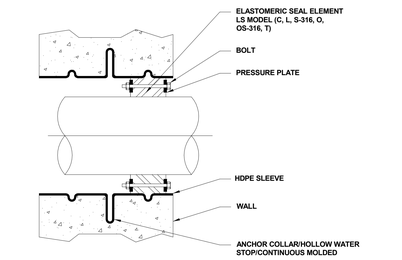
TYPICAL IN-WALL DISPLACEMENT DIFFUSER
(NOT TO SCALE)



CEILING DISPLACMENT DIFFUSER IN T-BAR DETAIL
(NOT TO SCALE)



KILN DUCT DETAIL
(NOT TO SCALE)

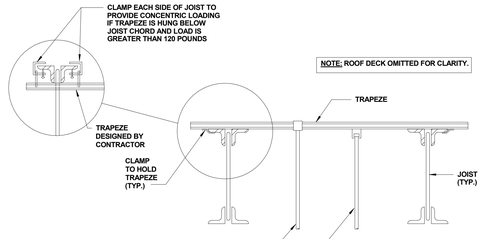


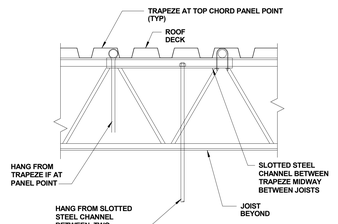
LS Model	Seal Element	Bolts/Nuts	Pressure Plate
C	EPDM (Black)	Zinc Dichromate/Organic Coated Carbon Steel Bolt	Reinforced Nylon Polymer
L	EPDM (Blue)	Zinc Dichromate/Organic Coated Carbon Steel Bolt	Reinforced Nylon Polymer
O	Nitrile	Zinc Dichromate/Organic Coated Carbon Steel Bolt	Reinforced Nylon Polymer
T	Silicone	Zinc Dichromate/Organic Coated Carbon Steel Bolt	Steel Zinc Dichromate
(C,L,O)+S-316 (see model options)		316 Stainless Steel	Reinforced Nylon Polymer

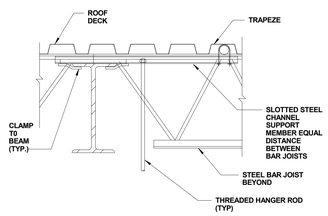
Sleeve Model	Description	Material
CS	Century-Line Sleeve	HDPE
WS	Steel Wall Sleeve	Steel

For more Material Property Information, see literature at www.linkseal.com

MODULAR SEALS SIMILAR TO LINK-SEAL® WITH CENTURY-LINE® SLEEVES
(NOT TO SCALE)







JOIST HANGING

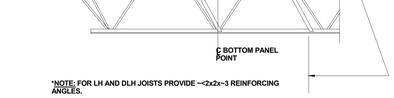
DETAIL "C" HANGING FROM TOP CHORD
(NOT TO SCALE)

JOIST HANGING NOTES:
1. DO NOT HANG PIPES AND EQUIPMENT FROM STEEL DECK OR FROM BRIDGING ANGLES.
2. WHERE POSSIBLE SUSPEND HANGERS FROM WIDE-FLANGED BEAMS, NOT FROM BAR JOISTS.
3. UTILITIES, INCLUDING PIPING, DUCTWORK AND CONDUIT RUNNING PARALLEL TO BAR JOISTS, WHERE THE LOAD IS 25 POUNDS PER LINEAR FOOT OR LESS, MAY BE HUNG FROM A SINGLE JOIST.
4. UTILITIES, INCLUDING PIPING, DUCTWORK AND CONDUIT, RUNNING PARALLEL TO BAR JOISTS, WHERE THE LOAD IS GREATER THAN 25 POUNDS PER LINEAR FOOT, SHALL BE SUPPORTED MID-WAY BETWEEN TWO JOISTS.
5. WHERE PAIRS OF PIPES RUN PERPENDICULAR TO BAR JOISTS, STAGGER HANGERS BETWEEN ALTERNATE JOISTS, OR HANG FROM EVERY JOIST.
6. THE TOTAL WEIGHT OF ALL UTILITIES, SERVICES, PIPING, DUCTWORK AND CONDUIT HANGING FROM A SINGLE POINT SHALL NOT EXCEED 200 LBS FOR K-SERIES JOISTS AND 400 LBS FOR LH AND DLH SERIES JOISTS UNLESS OTHERWISE NOTED ON THE STRUCTURAL DRAWINGS. WHEN THIS WEIGHT IS EXCEEDED, SUBMIT A DETAIL OF PROPOSED METHOD OF HANGING TO THE ARCHITECT FOR APPROVAL.
7. HANGERS MAY BE LOCATED BETWEEN PANEL POINTS PROVIDED THAT THEY DO NOT EXCEED THE FOLLOWING LOADS:

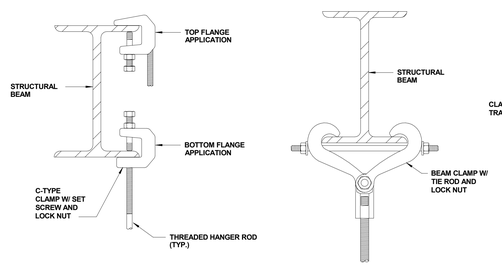
	K-SERIES JOISTS	LH & DLH-SERIES JOISTS
BETWEEN TOP CHORD PANEL POINTS	100 LBS	200 LBS
BETWEEN BOTTOM CHORD PANEL POINTS	50 LBS	100 LBS

8. ECCENTRIC HANGERS (C-CLAMPS) WILL BE ALLOWED FOR PIPING AND OTHER TRADES WHERE THE HANGER SPACING LIMITS THE TOTAL POINT LOAD TO 120 LBS OR LESS. C-CLAMPS FOR LOADS GREATER THAN 30 LBS, BUT NOT MORE THAN 120 LBS, MUST BE LOCATED AT JOIST PANEL POINTS UNLESS THE JOIST CHORD IS REINFORCED WITH AN ANGLE SIMILAR TO DETAIL "D".
9. WELDING OF JOISTS SHALL ONLY BE IN A DIRECTION PARALLEL TO JOIST CHORDS.

NOTE:
ALL FIELD WELDING OF JOISTS MUST OCCUR IN A DIRECTION PARALLEL TO THE CHORDS, NOT PERPENDICULAR.

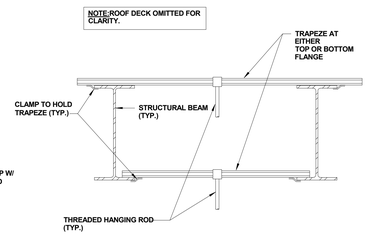


DETAIL "D" TYPICAL JOIST REINFORCING
(NOT TO SCALE)

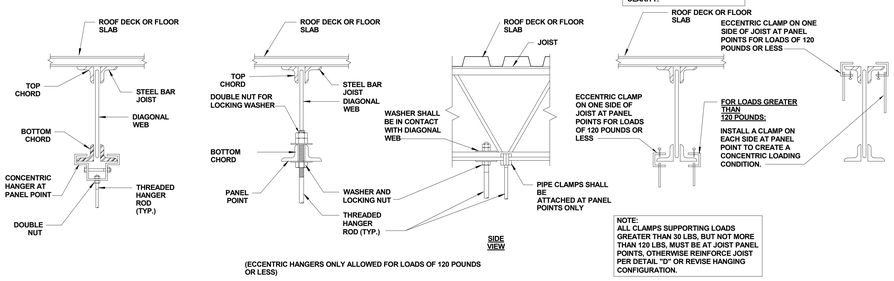


FOR PIPING 10"Ø AND SMALLER

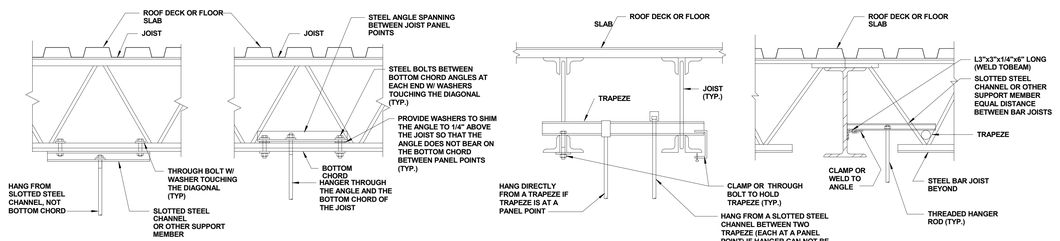
FOR PIPING 12"Ø AND LARGER



BEAM HANGING
(NOT TO SCALE)



DETAIL "A" CONCENTRIC (AND ECCENTRIC) HANGERS
(NOT TO SCALE)



DETAIL "B" HANGING FROM BOTTOM CHORD
(NOT TO SCALE)

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

NO.	DATE	TITLE

ISSUE TITLE AND DATE:

60% CONSTRUCTION DOCUMENTS
06/19/2026

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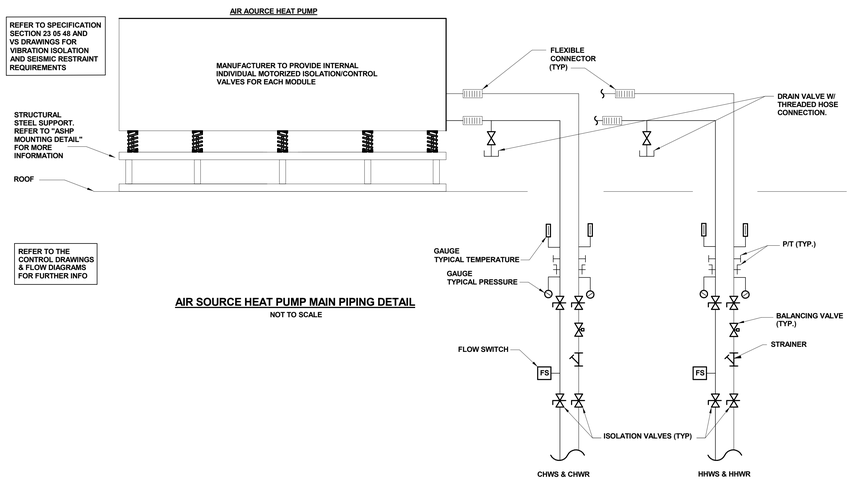
KEY PLAN

ORIENTATION AND SCALE:
SCALE: AS INDICATED

SHEET TITLE:
DETAILS VI

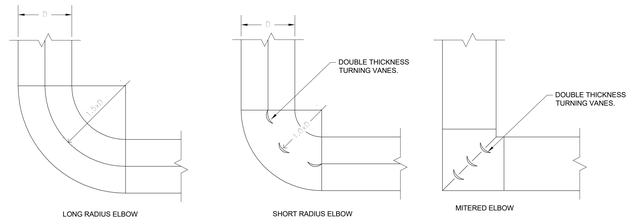
SHEET NUMBER:
M0.16

Autodesk Docs://Wilmington Elementary School/Wildwood ME Model SD.rvt
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AIR SOURCE HEAT PUMP MAIN PIPING DETAIL

NOT TO SCALE



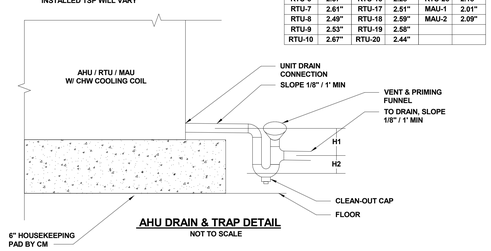
WHEREVER POSSIBLE, EVEN IF NOT INDICATEDF ON FLOOR PLANS, LONG RADIUS ELBOWS SHALL BE USED IN ALL SUPPLY, RETURN, AND EXHAUST DUCT SYSTEMS. WHERE LONG RADIUS IS NOT POSSIBLE, SHORT RADIUS ELBOWS WITH DOUBLE THICKNESS TURNING VANES SHALL BE USED. WHERE NEITHER RADIUS ELBOW USE IS POSSIBLE DUE TO CONFLICTS, MITERED RECTANGULAR ELBOWS WITH DOUBLE THICKNESS TURNING VANES SHALL BE INSTALLED.

TYPICAL DUCT ELBOW AND TURNING VANES DETAIL

(NOT TO SCALE)

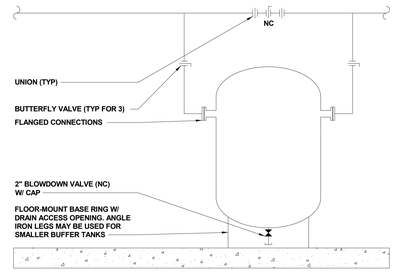
FOR NEGATIVE PLENUM PRESSURE:
H1 = PLENUM PRESSURE + 1"
H2 = 0.5 * PLENUM PRESSURE + 1"
TOTAL HEIGHT = 1.5 * PLENUM PRESSURE + 2"
NOTE: PLENUM PRESSURES ARE PROVIDED FOR REFERENCE ONLY, BASED ON ENGINEERING CALCULATIONS & SHALL BE FIELD-VERIFIED AS INSTALLED TSP WILL VARY

UNIT	PLENUM PRESS.	UNIT	PLENUM PRESS.	UNIT	PLENUM PRESS.
RTU-1	2.67"	RTU-11	2.53"	RTU-21	2.25"
RTU-2	2.67"	RTU-12	2.67"	RTU-22	2.25"
RTU-3	2.81"	RTU-13	2.69"	RTU-23	2.11"
RTU-4	2.72"	RTU-14	2.54"	RTU-24	2.18
RTU-5	2.26"	RTU-15	2.51"	RTU-25	2.18"
RTU-6	2.57"	RTU-16	2.28"	RTU-26	2.18"
RTU-7	2.61"	RTU-17	2.51"	MAU-1	2.01"
RTU-8	2.49"	RTU-18	2.59"	MAU-2	2.09"
RTU-9	2.53"	RTU-19	2.58"		
RTU-10	2.67"	RTU-20	2.44"		



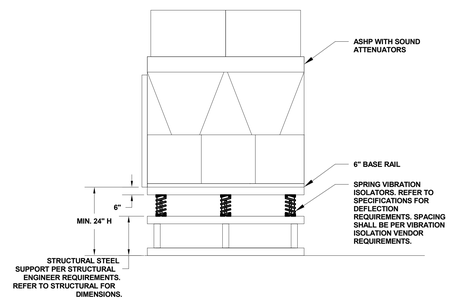
AHU DRAIN & TRAP DETAIL

NOT TO SCALE



BUFFER TANK PIPING DETAIL

NOT TO SCALE



ASHP MOUNTING DETAIL

(NOT TO SCALE)

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
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KEY PLAN

ORIENTATION AND SCALE:

SCALE: AS INDICATED

SHEET TITLE:

DETAILS VII

SHEET NUMBER:

M0.17

Autodesk Docs://Wilmington Elementary School/Wildwood ME Model SD.rvt
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AIR HANDLING UNITS

| UNIT NO. | MANUF. NO. | AREA SERVED | SUPPLY CFM | O.A. CFM | R.A. CFM | E.A. CFM | MIN. OCC OUTSIDE AIR | MAX. COIL VEL. | HEATING HOT WATER COILS (25% PROP GLYCOL, 130°F EWT, 110° LWT) TYPE | ENT. AIR°F | LVG. AIR°F | S.A. AIR°F | HHW MBH | HHW GPM | HHW WPD | CHILLED WATER COOLING COILS (25% PROP GLYCOL, 43°F EWT, 55° LWT) TYPE | ENT. COND. COIL D.B.°F | LVG. COND. COIL W.B.°F | LVG. COND. UNIT D.B.°F | LVG. COND. UNIT W.B.°F | M.B.H. SENS. | M.B.H. TOTAL | CHW GPM | CHW WPD | SUPPLY AIR FAN VFD/ ECM | E.S.P. IN.W.G. | H.P. | NORMAL DESIGN B.H.P. | R.P.M | RETURN/EXHAUST AIR FAN VFD/ ECM | E.S.P. | H.P. | NORMAL DESIGN B.H.P. | R.P.M | ELECTRICAL DATA MCA | MOP | VOLTAGE | PH | LOW VOLTAGE TERMINAL STRIP ELECTRICAL DATA MCA | MOP | VOLTAGE | PH | Y/N | TOTAL ENERGY RECOVERY DEVICE DEVICE | SUMMER RA INPUTS DB F | WB F | SUMMER OA LVG DB F | WB F | WINTER RA INPUTS DB F | WB F | WINTER OA LVG DB F | WB F | SUMMER HEAT RECOVERY (MBH) SENSIBLE | LATENT | TOTAL | WINTER HEAT RECOVERY (MBH) SENSIBLE | LATENT | TOTAL | REMARKS |
|---|---|---

VARIABLE AIR VOLUME BOXES

UNIT NO.	MANUF. NO.	SPACE SERVED	NORMAL COOLING (CFM)	MIN. FLOW (CFM)	DIFF. PD	INLET DIA	OctaveBands Radiated 2	3	4	5	6	7	OctaveBands Discharge 2	3	4	5	6	7	REMARKS
VAV-1-1	SDVQ	112 PRE-K	370	220	1.5"	6"	59	51	43	39	34	31	66	62	52	44	28	29	RTU-1
VAV-1-2	SDVQ	105A EXTENDED LEARNING	240	140	1.5"	5"	56	47	41	38	36	33	63	58	50	42	23	30	RTU-1
VAV-1-3	SDVQ	111 SMALL GROUP RM.	95	55	1.5"	4	43	36	33	29	28	31	50	47	41	34	19	26	RTU-1
VAV-1-4	SDVQ	110 PRE-K	440	260	1.5"	7"	58	48	42	38	36	35	65	61	53	42	28	30	RTU-1
VAV-1-5	SDVQ	109 SPEECH & LANGUAGE	105	60	1.5"	4"	45	38	35	31	29	31	52	49	43	36	19	27	RTU-1
VAV-1-6	SDVQ	108 SCHOOL PSYCH	105	60	1.5"	4"	45	38	35	31	29	31	52	49	43	36	19	27	RTU-1
VAV-1-7	SDVQ	107 STRIDES PK-K	410	245	1.5"	7"	57	47	41	37	35	34	64	60	52	41	26	29	RTU-1
VAV-1-8	SDVQ	106 MUSIC/CHORUS	390	230	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-9	SDVQ	105E EXTENDED LEARNING	230	135	1.5"	5"	56	46	41	37	35	32	62	57	49	41	23	56	RTU-1
VAV-1-10	SDVQ	116 ART CLASSROOM	450	270	1.5"	7"	58	48	43	38	36	35	66	61	53	43	28	31	RTU-1
VAV-1-11	SDVQ	115 STRIDES PK-K	370	220	1.5"	6"	59	51	43	39	34	31	66	62	52	44	28	29	RTU-1
VAV-1-12	SDVQ	105B EXTENDED LEARNING	480	285	1.5"	7"	60	49	43	39	36	35	67	63	54	44	29	32	RTU-1
VAV-1-13	SDVQ	114 PRE-K	370	220	1.5"	6"	59	51	43	39	34	31	66	62	52	44	28	29	RTU-1
VAV-1-14	SDVQ	113 SMALL GROUP	95	55	1.5"	4"	43	36	33	29	28	31	50	47	41	34	19	26	RTU-1
VAV-1-15	SDVQ	213 GENERAL CLASSROOM	390	230	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-16	SDVQ	205A EXTENDED LEARNING	335	200	1.5"	6"	58	50	43	39	34	31	64	60	51	42	27	28	RTU-1
VAV-1-17	SDVQ	212 SMALL GROUP	75	50	1.5"	4"	39	31	30	26	26	30	47	43	38	31	19	25	RTU-1
VAV-1-18	SDVQ	211 GENERAL CLASSROOM	390	230	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-19	SDVQ	210 LEARNING CENTER	135	80	1.5"	4"	50	43	38	34	31	32	56	53	46	39	19	28	RTU-1
VAV-1-20	SDVQ	209 READ	120	70	1.5"	4"	48	41	36	32	30	32	54	51	44	37	19	27	RTU-1
VAV-1-21	SDVQ	208 GENERAL CLASSROOM	390	230	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-22	SDVQ	207 SMALL GROUP	70	45	1.5"	4"	38	29	29	25	25	30	46	42	38	30	19	25	RTU-1
VAV-1-23	SDVQ	206 GENERAL CLASSROOM	390	230	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-24	SDVQ	218 STAGES 1ST/2ND	390	230	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-25	SDVQ	217 SMALL GROUP	530	315	1.5"	7"	61	51	45	40	37	35	68	64	55	46	31	33	RTU-1
VAV-1-26	SDVQ	216 GENERAL CLASSROOM	410	245	1.5"	7"	57	47	41	37	35	34	64	60	52	41	26	29	RTU-1
VAV-1-27	SDVQ	205D EXTENDED LEARNING	70	40	1.5"	4"	38	29	29	25	25	30	46	42	38	30	19	25	RTU-1
VAV-1-28	SDVQ	215 GENERAL CLASSROOM	390	230	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-29	SDVQ	214 SMALL GROUP	1280	770	1.5"	12"	66	54	52	46	45	41	71	63	56	44	36	47	RTU-1
VAV-1-30	SDVQ	316 GENERAL CLASSROOM	390	230	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-31	SDVQ	302A EXTENDED LEARNING	95	60	1.5"	4"	43	36	33	29	28	31	50	47	41	34	19	26	RTU-1
VAV-1-32	SDVQ	315 SMALL GROUP	390	235	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-33	SDVQ	314 GENERAL CLASSROOM	320	195	1.5"	6"	57	50	43	38	34	31	63	59	50	42	26	28	RTU-1
VAV-1-34	SDVQ	313 LEARNING CENTER	75	45	1.5"	4"	39	31	30	26	26	30	47	43	38	31	19	25	RTU-1
VAV-1-35	SDVQ	312 READ	390	235	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-36	SDVQ		130	80	1.5"	4"	49	42	38	33	31	32	56	53	45	39	19	28	RTU-1
VAV-1-37	SDVQ		123	75	1.5"	4"	48	42	37	33	30	32	55	52	45	38	19	28	RTU-1
VAV-1-38	SDVQ		390	230	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-39	SDVQ		70	40	1.5"	4"	38	29	29	25	25	30	46	42	38	30	19	25	RTU-1
VAV-1-40	SDVQ		390	235	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-41	SDVQ		420	250	1.5"	7"	57	47	42	37	35	35	65	60	52	42	27	30	RTU-1
VAV-1-42	SDVQ		70	40	1.5"	4"	38	29	29	25	25	30	46	42	38	30	19	25	RTU-1
VAV-1-43	SDVQ		390	230	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-44	SDVQ		1280	770	1.5"	12"	66	54	52	46	45	41	71	63	56	44	36	47	RTU-1
VAV-1-45	SDVQ		390	235	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-1
VAV-1-46	SDVQ		75	45	1.5"	4"	39	31	30	26	26	30	47	43	38	31	19	25	RTU-1
VAV-1-47	SDVQ		295	175	1.5"	6"	56	49	42	38	34	31	62	57	49	40	25	27	RTU-1
VAV-2-1	SDVQ		370	220	1.5"	6"	59	51	43	39	34	31	66	62	52	44	28	29	RTU-2
VAV-2-2	SDVQ		165	95	1.5"	4"	54	47	41	36	33	33	59	57	48	42	21	29	RTU-2
VAV-2-3	SDVQ		390	230	1.5"	6"	60	52	43	39	34	31	66	63	53	45	29	29	RTU-2
VAV-2-4	SDVQ		75	50	1.5"	4"	39	31	30	26	26	30	47	43	38	31	19	25	RTU-2
VAV-2-5	SDVQ		360	215	1.5"	6"	59	51	43	39	34	31	65	61	52	43	28	28	RTU-2
VAV-2-6	SDVQ		330	195	1.5"	5"													RTU-2
VAV-2-7	SDVQ		390	230	1.5"	5"													RTU-2
VAV-2-8	SDVQ		75	50	1.5"	5"													RTU-2
VAV-2-9	SDVQ		390	230	1.5"	5"													RTU-2
VAV-2-10	SDVQ		250	150	1.5"	5"													RTU-2
VAV-2-11	SDVQ		230	135	1.5"	5"													RTU-2
VAV-2-12	SDVQ		115	65	1.5"	5"													RTU-2
VAV-2-13	SDVQ		370	220	1.5"	5"													RTU-2
VAV-2-14	SDVQ		290	170	1.5"	5"													RTU-2
VAV-2-15	SDVQ		370	220	1.5"	5"													RTU-2
VAV-2-16	SDVQ		85	50	1.5"	5"													RTU-2
VAV-2-17	SDVQ		80	50	1.5"	5"													RTU-2
VAV-2-18	SDVQ		370	220	1.5"	5"													RTU-2
VAV-2-19	SDVQ		70	50	1.5"	5"													RTU-2
VAV-2-20	SDVQ		145	85	1.5"	5"													RTU-2
VAV-2-21	SDVQ		480	285	1.5"	6"													RTU-2
VAV-2-22	SDVQ		75	50	1.5"	5"													RTU-2
VAV-2-23	SDVQ		390	230	1.5"	5"													RTU-2
VAV-2-24	SDVQ		345	205	1.5"	5"													RTU-2
VAV-2-25	SDVQ		390	230	1.5"	5"													RTU-2
VAV-2-26	SDVQ		75	50	1.5"	5"													RTU-2
VAV-2-27	SDVQ		430	255	1.5"	5"													RTU-2
VAV-2-28	SDVQ		220	130	1.5"	5"													RTU-2
VAV-2-29	SDVQ		105	60	1.5"	5"													RTU-2
VAV-2-30	SDVQ		145	85	1.5"	5"													RTU-2
VAV-2-31	SDVQ		390	230	1.5"	5"													RTU-2
VAV-2-32	SDVQ		80	50	1.5"	5"													RTU-2
VAV-2-33	SDVQ		390	230	1.5"	5"													RTU-2
VAV-2-34	SDVQ		75	50	1.5"	5"													RTU-2
VAV-2-35	SDVQ		110	65	1.5"	5"													RTU-2
VAV-2-36	SDVQ		390	230	1.5"	5"													RTU-2
VAV-2-37	SDVQ		70	50	1.5"	5"													RTU-2
VAV-2-38	SDVQ		470	280	1.5"	6"													RTU-2
VAV-2-39	SDVQ		420	250	1.5"	5"													RTU-2
VAV-2-40	SDVQ		160	95	1.5"	5"													RTU-2
VAV-2-41	SDVQ		75	50	1.5"	5"													RTU-2
VAV-2-42	SDVQ		390	230	1.5"	5"													RTU-2
VAV-2-43	SDVQ		320	190	1.5"	5"													RTU-2
VAV-2-44	SDVQ		75	50	1.5"	5"													RTU-2
VAV-2-45	SDVQ		400	240	1.5"	5"													RTU-2
VAV-2-46	SDVQ		420	250	1.5"	5"													RTU-2
VAV-2-47	SDVQ		260	155	1.5"	5"													RTU-2
VAV-2-48	SDVQ		130	75	1.5"	5"													RTU-2
VAV-2-49	SDVQ		120	70	1.5"	5"													RTU-2
VAV-2-50	SDVQ		390	230	1.5"	5"													RTU-2
VAV-2-51	SDVQ		75	50	1.5"	5"													RTU-2
VAV-2-52	SDVQ		390	230	1.5"	5"													RTU-2
VAV-2-53	SDVQ		125	75	1.5"	5"													RTU-2
VAV-2-54	SDVQ		100	60	1.5"	5"													RTU-2
VAV-2-55	SDVQ		450	270	1.5"	5"													RTU-2
VAV-2-56	SDVQ		75	50	1.5"	5"													RTU-2
VAV-2-57	SDVQ		390	230	1.5"	5"													RTU-2
VAV-3-1	SDVQ		100	60	1.5"	5"													RTU-3
VAV-3-2	SDVQ		600	360	1.5"	7"													RTU-3
VAV-3-3	SDVQ		100	60	1.5"	5"													RTU-3
VAV-3-4	SDVQ		100	60	1.5"	5"													RTU-3
VAV-3-5	SDVQ		645	385	1.5"	7"													RTU-3
VAV-3-6	SDVQ		225	135	1.5"	5"													RTU-3
VAV-3-7	SDVQ		225	135	1.5"	5"													RTU-3
VAV-3-8	SDVQ		125	75	1.5"	5"													RTU-3
VAV-3-9	SDVQ		645	385	1.5"	7"													RTU-3
VAV-3-10	SDVQ		50	50	1.5"	5"													RTU-3
VAV-3-11	SDVQ		510	305	1.5"	7"													RTU-3
VAV-3-12	SDVQ		400	240	1.5"	5"													RTU-3
VAV-3-13	SDVQ		470	280	1.5"	6"													RTU-3
VAV-3-14	SDVQ		705	420	1.5"	7"													RTU-3
VAV-3-15	SDVQ		110	65	1.5"	5"													RTU-3
VAV-3-16	SDVQ		160	95	1.5"	5"													RTU-3
VAV-3-17	SDVQ		165	95	1.5"	5"													RTU-3
VAV-3-18	SDVQ		165	95	1.5"	5"													RTU-3
VAV-3-19	SDVQ		450	270	1.5"	5"													RTU-3
VAV-3-20	SDVQ		130	75	1.5"	5"													RTU-3
VAV-3-21	SDVQ		450	270	1.5"	5"													RTU-3
VAV-3-22	SDVQ		260	155	1.5"	5"													RTU-3
VAV-3-23	SDVQ		450	270	1.5"	5"													RTU-3
VAV-3-24	SDVQ		260	155	1.5"	5"													RTU-3
VAV-3-25	SDVQ		260	155	1.5"	5"													RTU-3
VAV-3-26	SDVQ		450	270	1.5"	5"													RTU-3
VAV-3-27	SDVQ		75	50	1.5"	5"													RTU-3
VAV-3-28	SDVQ		260	155	1.5"	5"													RTU-3
VAV-3-29	SDVQ		260	155	1.5"	5"													RTU-3
VAV-3-30	SDVQ		450	270	1.5"	5"													RTU-3
VAV-3-31	SDVQ		450	270	1.5"	5"													RTU-3
VAV-3-32	SDVQ		130	75	1.5"	5"													RTU-3
VAV-3-33	SDVQ		450	270	1.5"	5"													RTU-3
VAV-3-34	SDVQ		450	270	1.5"	5"													RTU-3
VAV-3-35	SDVQ		75	50	1.5"	5"													RTU-3
VAV-3-36	SDVQ		450	270	1.5"	5"													RTU-3
VAV-3-37	SDVQ		130	75	1.5"	5"													RTU-3
VAV-3-38	SDVQ		450	270	1.5"	5"													RTU-3
VAV-3-39	SDVQ		260	155	1.5"	5"													RTU-3
VAV-5-1	SDVQ		2900	1740	1.5"	14"													RTU-5
VAV-5-2	SDVQ		820	490	1.5"	8"													RTU-5
VAV-5-3	SDVQ		2900	1740	1.5"	14"													RTU-5
VAV-7-1	SDVQ		340	200	1.5"	5"													RTU-7
VAV-7-2	SDVQ		110	65	1.5"	5"													RTU-7
VAV-7-3	SDVQ		110	65	1.5"	5"													RTU-7
VAV-7-4	SDVQ		110	65	1.5"	5"													RTU-7
VAV-7-5	SDVQ		360	215	1.5"	5"													RTU-7
VAV-8-1	SDVQ		140	80	1.5"	5"													RTU-8
VAV-8-2	SDVQ		260	155	1.5"	5"													RTU-8
VAV-8-3	SDVQ		140	80	1.5"	5"													RTU-8
VAV-8-4	SDVQ		85	50	1.5"	5"													RTU-8
VAV-8-5	SDVQ		190	110	1.5"	5"													RTU-8
VAV-8-6	SDVQ		580	345	1.5"	7"													RTU-8
VAV-8-7	SDVQ		85	50	1.5"	5"													RTU-8

SELECTION BASED ON "PRICE" W/ POLYMER LINER IN ATTENUATOR & FIBER FREE FOAM TERMINAL LINER.
CONTROLS SHALL BE PROVIDED BY ATC CONTRACTOR & FIELD INSTALLED. ALL MODELS SHALL INCLUDE UNIT MANUFACTURER'S ATTENUATOR UNLESS NOTED OTHERWISE.

FANS

UNIT NO.	MANUF. NO.	BUILDING LOCATION	SERVICE	DRIVE TYPE	SP	CFM	RPM	SONES (SND PWR)	MOTOR HP	V	PH	CONTROL TYPE	SYST.	REMARKS
KEF-1	CUBE	ROOF	KITCHEN HOODS	BELT		6,800								
EF-1	G-VG	ROOF	RECEIVING	DIRECT		600								
EF-2	G-VG	ROOF	TOILETS	DIRECT		2,040								
EF-3	G-VG	ROOF	TOILETS	DIRECT		2,220								
EF-4	SQ-VG	INLINE	ART ROOM	DIRECT		450								
BF-5	LB-2	CUSTODIAN LAUNDRY	DRYER	DIRECT										
BF-6	LB-2	KITCHEN LAUNDRY	DRYER	DIRECT										

SELECTION BASED ON "GREENHECK". EF-10 SELECTION BASED ON "CAR-MON"
NOTE #1: UL-762 RATED FOR CONTAMINATED OR GREASE-LADEN AIR.
NOTE #2: CONSTRUCTED OF ALUMINUM FOR WET ENVIRONMENT PROTECTION.
NOTE #3: PROVIDE EXTENDED/VENTED CURB AND WINDBAND EXTENSION.
NOTE #4: KITCHEN/HOOD CONSULTANT'S PACKAGE SHALL PROVIDE VARIABLE FREQUENCY DRIVES. COORDINATE FINAL VFD LOCATION WITH POWER WIRING BY DIV 26 00 00. PROVIDE SHAFT GROUNDING SIMILAR TO "AEGIS."
NOTE #5: FAN SHALL OPERATE 24/7
NOTE #6: ATC CONTRACTOR SHALL PROVIDE SPEED CONTROL BMS INTEGRATION, FOR ALL VG (ECM) MOTORS.
NOTE #7: SELECTION BASED ON "TJERNLUND"

UNIT HEATERS (HEATING HOT WATER)

UNIT NO.	MANUF. NO.	BUILDING LOCATION	C.F.M.	M.B.H.	G.P.M.	W.P.D. (FT H2O)	MOTOR HP	V	PH.	E.D.B.	L.D.B.	REMARKS
UH-01	RH	152 WATER ENTRY	400	13.0	1.3	0.49	1/4	120	1	65	90.0	
UH-02	RH	155A RECYCLING RM /TRASH	630	24.5	2.5	0.12	1/4	120	1	65	96.0	
UH-03	RH	155 RECEIVING/GEN SUPPLY	630	24.5	2.5	0.12	1/4	120	1	65	96.0	
UH-04	RH	247 MECH PUMP RM	630	24.5	2.5	0.12	1/4	120	1	65	96.0	
UH-05	RH	247 MECH PUMP RM	630	24.5	2.5	0.12	1/4	120	1	65	96.0	
CUH-01	RC	S3-1 STAIR 3	230	16.4	1.64	0.3	1/4	120	1	65	85.2	NOTE #1
CUH-02	RC	S4-1 STAIR 4	335	22.8	2.28	0.3	1/4	120	1	65	104.4	NOTE #1
CUH-03	RC	124 VESTIBULE	230	16.4	1.64	0.3	1/4	120	1	65	85.4	NOTE #1
CUH-04	RC	S2-1 STAIR 2	335	22.8	2.28	0.3	1/4	120	1	65	104.4	NOTE #1
CUH-05	RC	101 VESTIBULE	230	16.4	1.64	0.3	1/4	120	1	65	105.2	NOTE #1
CUH-06	RC	S1-1 STAIR 1	230	16.4	1.64	0.3	1/4	120	1	65	105.2	NOTE #1
CUH-07	RC	167 VESTIBULE	230	16.4	1.64	0.3	1/4	120	1	65	106.8	NOTE #1
CUH-08	RC	172 VESTIBULE	230	16.4	1.64	0.3	1/4	120	1	65	103.5	NOTE #1
CUH-09	RC	172 VESTIBULE	230	16.4	1.64	0.3	1/4	120	1	65	103.5	NOTE #1
CUH-10	RC	S3-3 STAIR 3	230	16.4	1.64	0.3	1/4	120	1	65	104.0	NOTE #1
CUH-11	RC	S4-3 STAIR 4	335	22.8	2.28	0.3	1/4	120	1	65	104.4	NOTE #1
CUH-12	RC	S2-3 STAIR 2	230	16.4	1.64	0.3	1/4	120	1	65	106.8	NOTE #1
CUH-13	RC	S1-3 STAIR 1	230	16.4	1.64	0.3	1/4	120	1	65	88.6	NOTE #1
CUH-14	RC	S4-4 STAIR 4	230	16.4	1.64	0.3	1/4	120	1	65	106.8	NOTE #1

SELECTION BASED ON "RITTLING", 130° EWT, 20° WTD MEDIUM FAN SPEED (UNLESS NOTED OTHERWISE).
NOTE #1: PROVIDE W/ HIGH STATIC EC MOTORS.

REGISTERS

NO.	DESCRIPTION	REMARKS
E/R/T-1	80	NOTE #1
E/R/T-2	96	NOTE #1
E/R/T-3	96FH	NOTE #1
E/R/T-4	RECG	NOTE #1

SELECTION BASED ON "PRICE."
ALL LOCKER ROOM R/G/D SHALL BE ALUMINUM.

NOTE #1: REFER TO DRAWINGS FOR THROW DIRECTION, SIZE & CFM.

DIFFUSERS

NO.	DESCRIPTION	REMARKS
S-A	AMX	NOTE #1
S-B	910	NOTE #1
S-C	HCD	NOTE #1,2
S-D	SDGE	NOTE #1
S-E	HCD	NOTE #1,2,3
S-F	AMD	NOTE #1

SELECTION BASED ON "PRICE"

NOTE #1: REFER TO DRAWINGS FOR THROW DIRECTION, SIZE & CFM. ALL LOCKER ROOM R/G/D SHALL BE ALUMINUM

NOTE #2: FURNISH W/ SPLIT BLADE CORE FROM FACTORY

NOTE #3: SET AT 15° BLADE DEFLECTION ANGLE

VARIABLE AIR VOLUME BOXES (CONT.)

UNIT NO.	MANUF. NO.	SPACE SERVED	NORMAL COOLING (CFM)	MIN. FLOW (CFM)	INLET APD	INLET DIA	REMARKS
VAV-8-8	SDVQ		290	170	0.5"	5"	RTU-8
VAV-8-9	SDVQ		175	105	0.5"	5"	RTU-8
VAV-8-10	SDVQ		100	60	0.5"	5"	RTU-8
VAV-8-11	SDVQ		55	50	0.5"	5"	RTU-8
VAV-8-12	SDVQ		55	50	0.5"	5"	RTU-8
VAV-8-13	SDVQ		210	125	0.5"	5"	RTU-8
VAV-9-1	SDVQ		695	415	0.5"	7"	RTU-9
VAV-9-2	SDVQ		70	50	0.5"	5"	RTU-9
VAV-9-3	SDVQ		435	260	0.5"	5"	RTU-9
VAV-9-4	SDVQ		195	115	0.5"	5"	RTU-9

SELECTION BASED ON "PRICE" W/ POLYMER LINER IN ATTENUATOR & FIBER FREE FOAM TERMINAL LINER. CONTROLS SHALL BE –PROVIDED BY ATC CONTRACTOR & FIELD INSTALLED. ALL MODELS SHALL INCLUDE UNIT MANUFACTURER'S ATTENUATOR UNLESS NOTED OTHERWISE.

CONDENSATE PUMPS

UNIT NO.	MANUF. NO.	SERVICE	G.P.H.	T.D.H. FT WATER	MOTOR WATTS	VOLT	PH.	REMARKS
CP-1	SI-10	DCU/FCU	5	33'	14	120	1	

CP-1 SELECTION BASED ON "SAUERMANN." CP-2 SELECTION BASED ON "LITTLE GIANT."
PROVIDE OVERFLOW SAFETY SWITCH FOR EACH PUMP W/ ALARM, ALSO EACH PUMP SHALL BE FURNISHED WITH PROVISIONS FOR DIRECT CONNECTION (HARD WIRE) WITH PIGTAIL READY FOR CONNECTION BY ELECTRICAL CONTRACTOR.

RADIANT HEATING PANELS

UNIT NO.	PANEL WIDTH	NUM. OF PASSES	HEATING BTU/LF	GPM	REMARKS
RP-1	24"	8		VARIES	LINEAR PANEL, ACT/GYP INSTALL
RP-2	24"	8		VARIES	LINEAR PANEL, HANGING EXPOSED
RP-3	20"	4		VARIES	LINEAR, CHAMFERED SURFACE MOUNT

SELECTION BASED ON "TWA." 130°F EWT & 20° WTD. REFER TO DRAWINGS FOR PANEL LENGTH. CONFIRM MOUNTING LOCATIONS WITH ARCHITECT. PROVIDE END-CAP TRIM ON EACH SIDE OF PANEL. PROVIDE TRIMMABLE PANEL, FOIL-BACKED INSULATION, INSULATED INTERCONNECTING PIPING, HEADERS FOR LOWER PRESSURE DROPS, SMOOTH FINISH & 45° MITERED PANELS FOR CORNERS. PROVIDE CEILING M



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MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

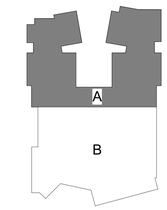
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KEY PLAN



ORIENTATION AND SCALE:



PROJECT NORTH

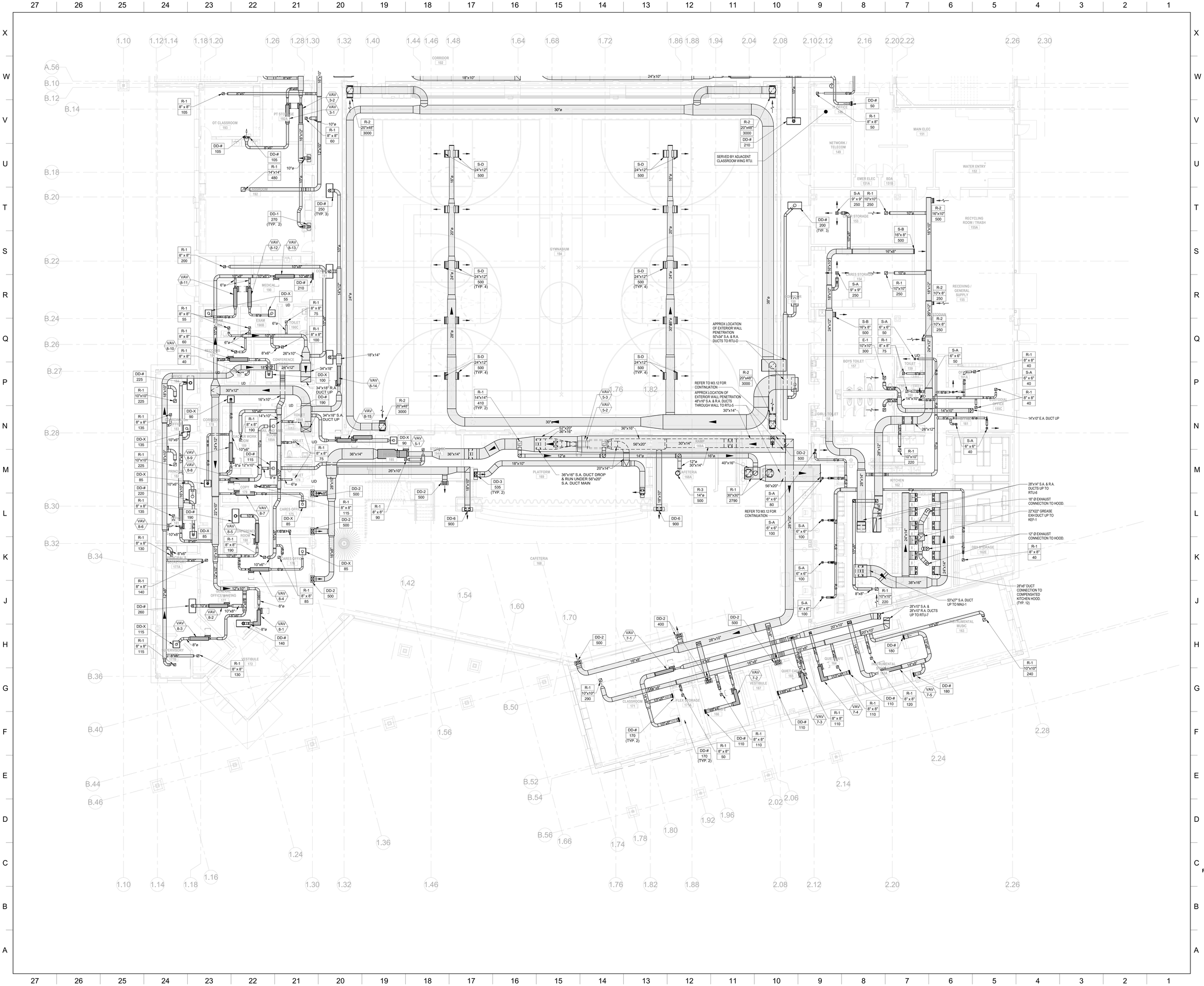
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LEVEL 1 AREA A - DUCTWORK

SHEET NUMBER:

M1.11

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BURLINGTON, VT 05401
P: (802) 863-1428

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p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

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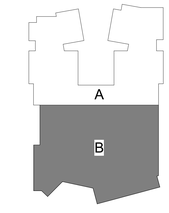
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KEY PLAN



ORIENTATION AND SCALE:

N
TRUE NORTH
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE

PROJECT NORTH

SHEET TITLE:

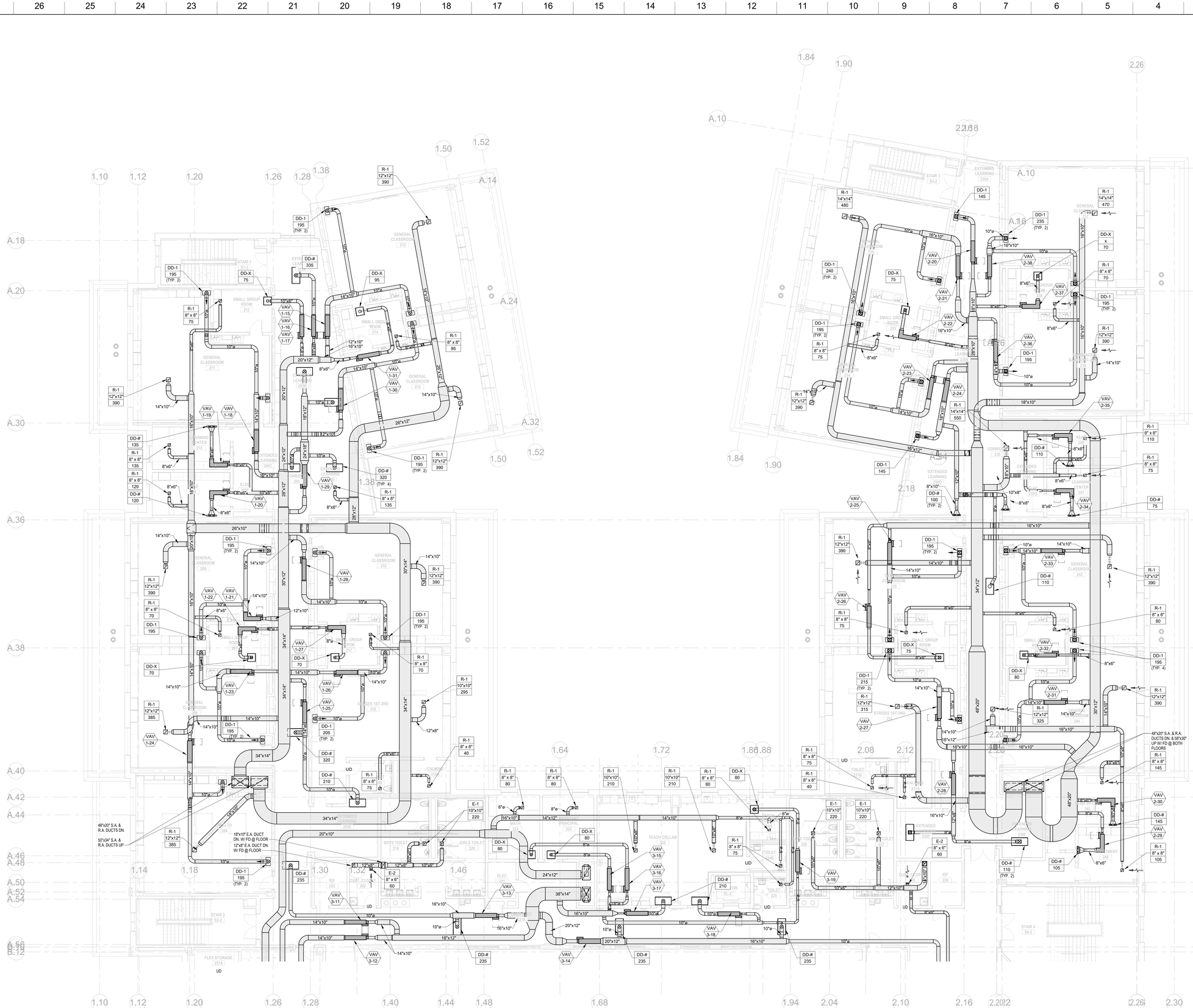
LEVEL 1 AREA B - DUCTWORK

SHEET NUMBER:

M1.12

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BURLINGTON, VT 05401
P: (802) 863-1428

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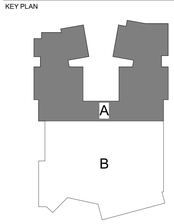
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ORIENTATION AND SCALE:

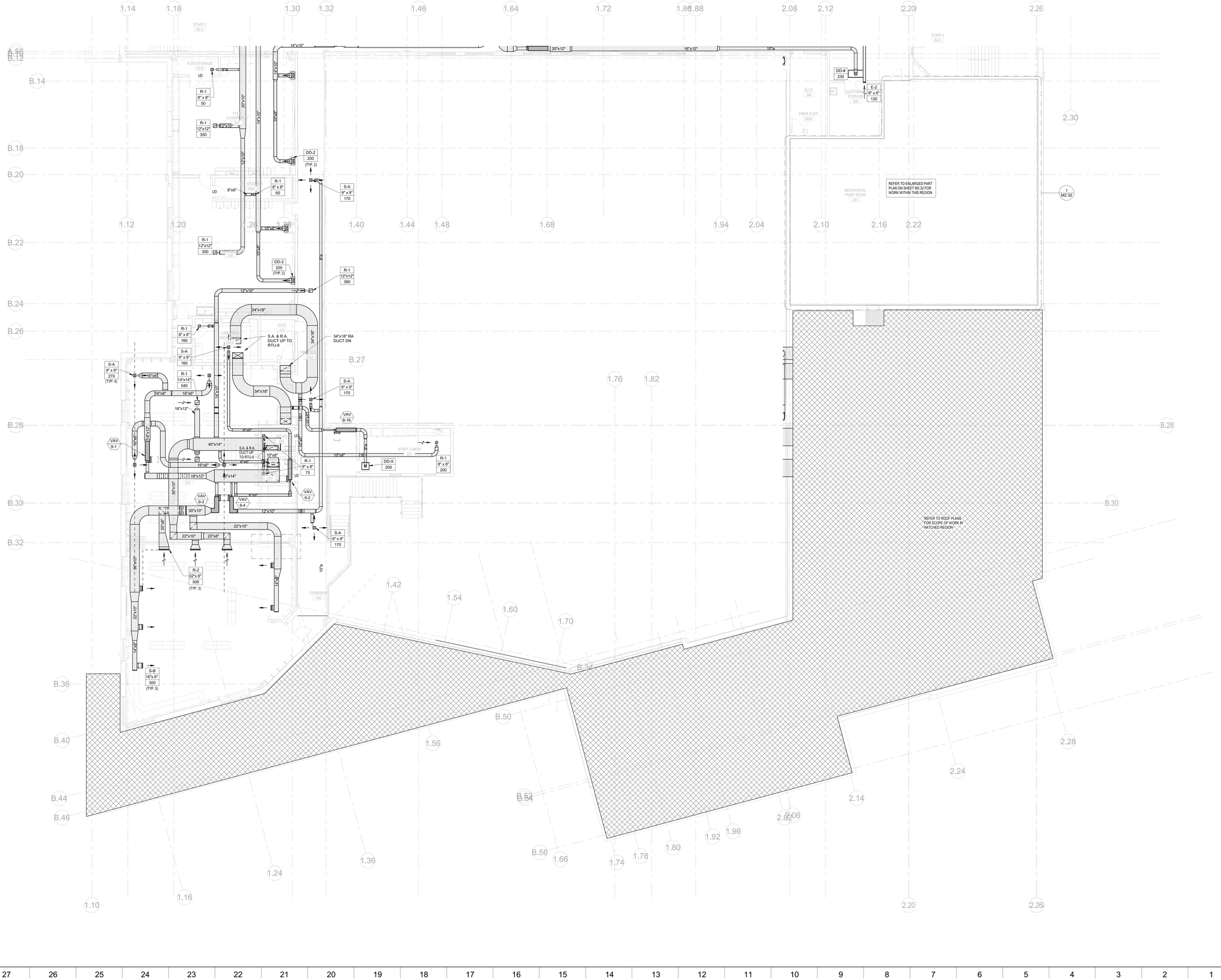
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TRUE NORTH
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SCALE: 1/8"=1'-0" GRAPHIC SCALE

PROJECT NORTH

SHEET TITLE:
LEVEL 2 AREA A - DUCTWORK

SHEET NUMBER:
M1.21

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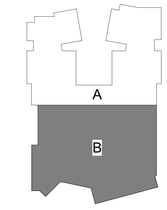
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KEY PLAN



ORIENTATION AND SCALE:

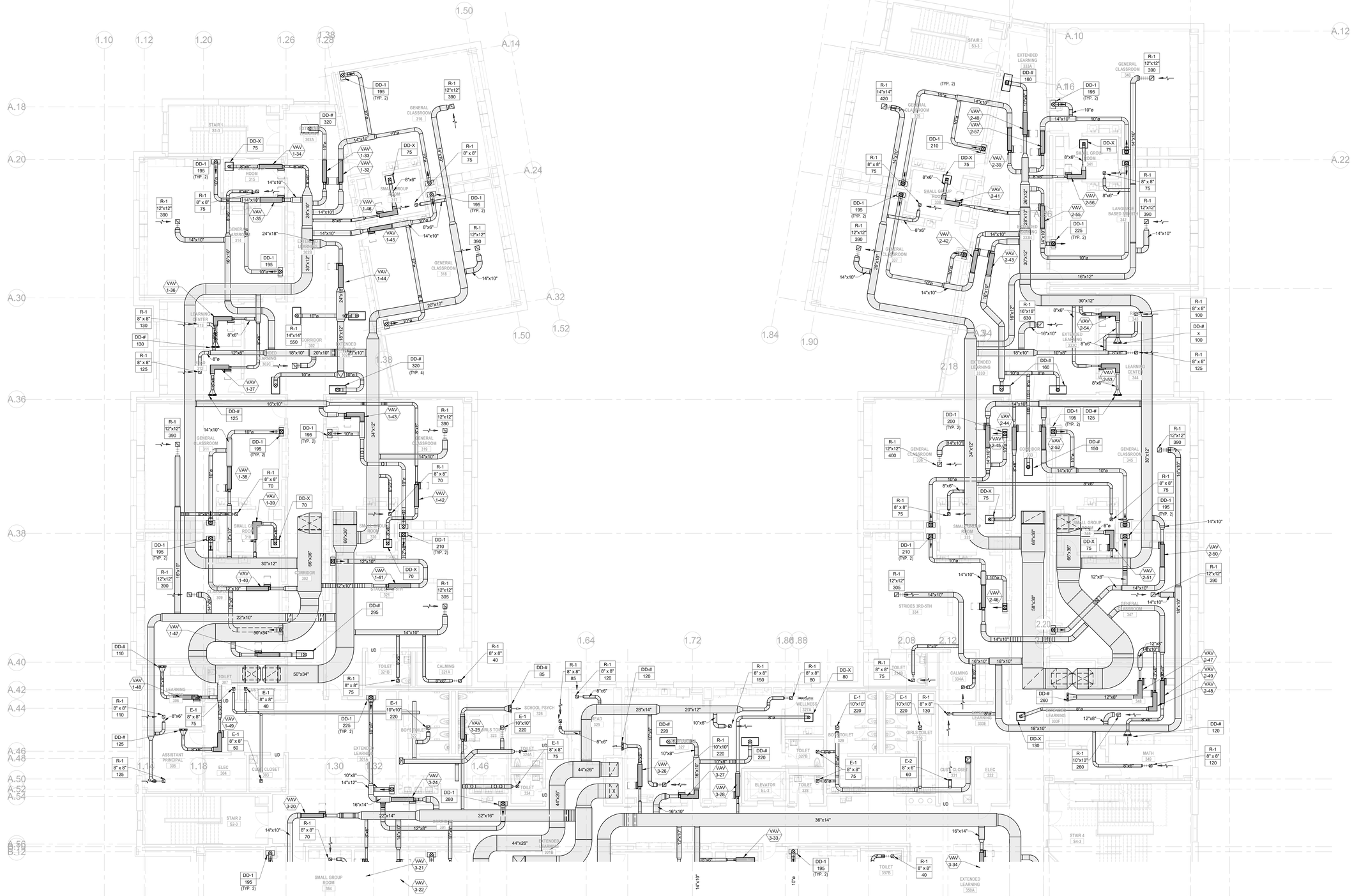
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SCALE: 1/8"=1'-0" GRAPHIC SCALE

PROJECT NORTH

SHEET TITLE:
LEVEL 2 AREA B - DUCTWORK

SHEET NUMBER:
M1.22

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WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

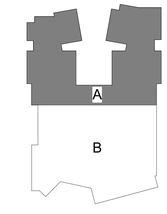
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ISSUE TITLE AND DATE:

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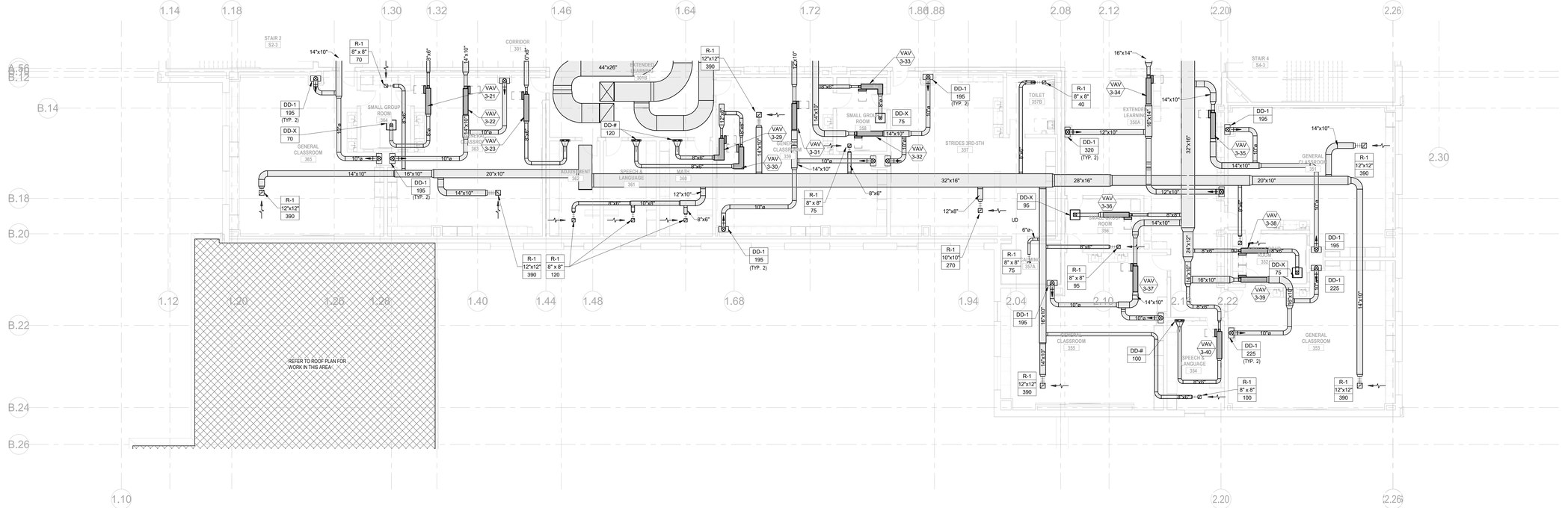
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SCALE: 1/8"=1'-0" GRAPHIC SCALE

PROJECT NORTH

SHEET TITLE:
LEVEL 3 AREA A - DUCTWORK

SHEET NUMBER:
M1.31

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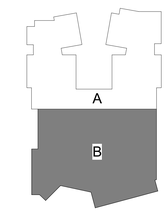
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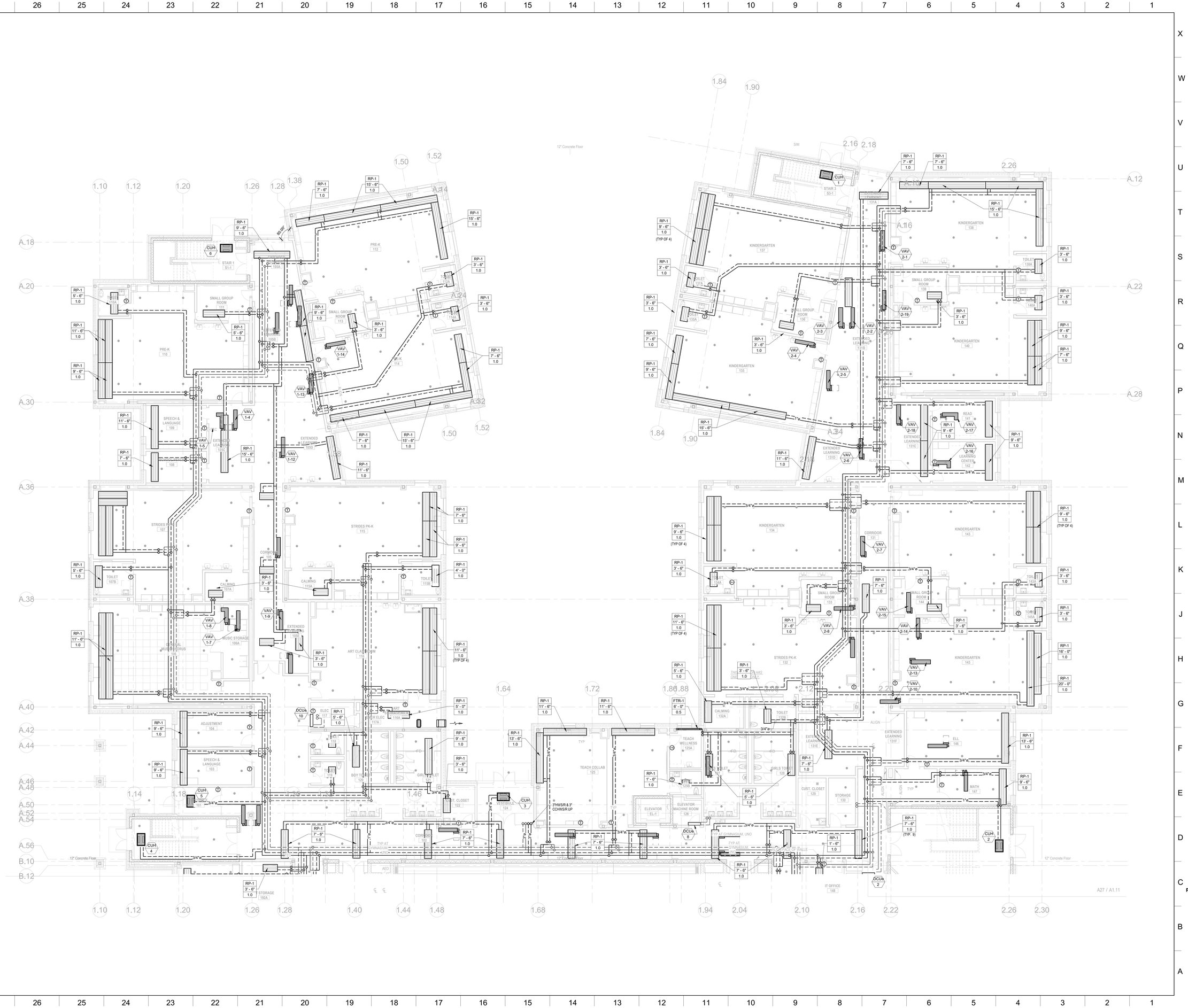
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SCALE: 1/8"=1'-0"
GRAPHIC SCALE

SHEET TITLE:
LEVEL 3 AREA B - DUCTWORK

SHEET NUMBER:
M1.32

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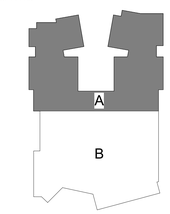
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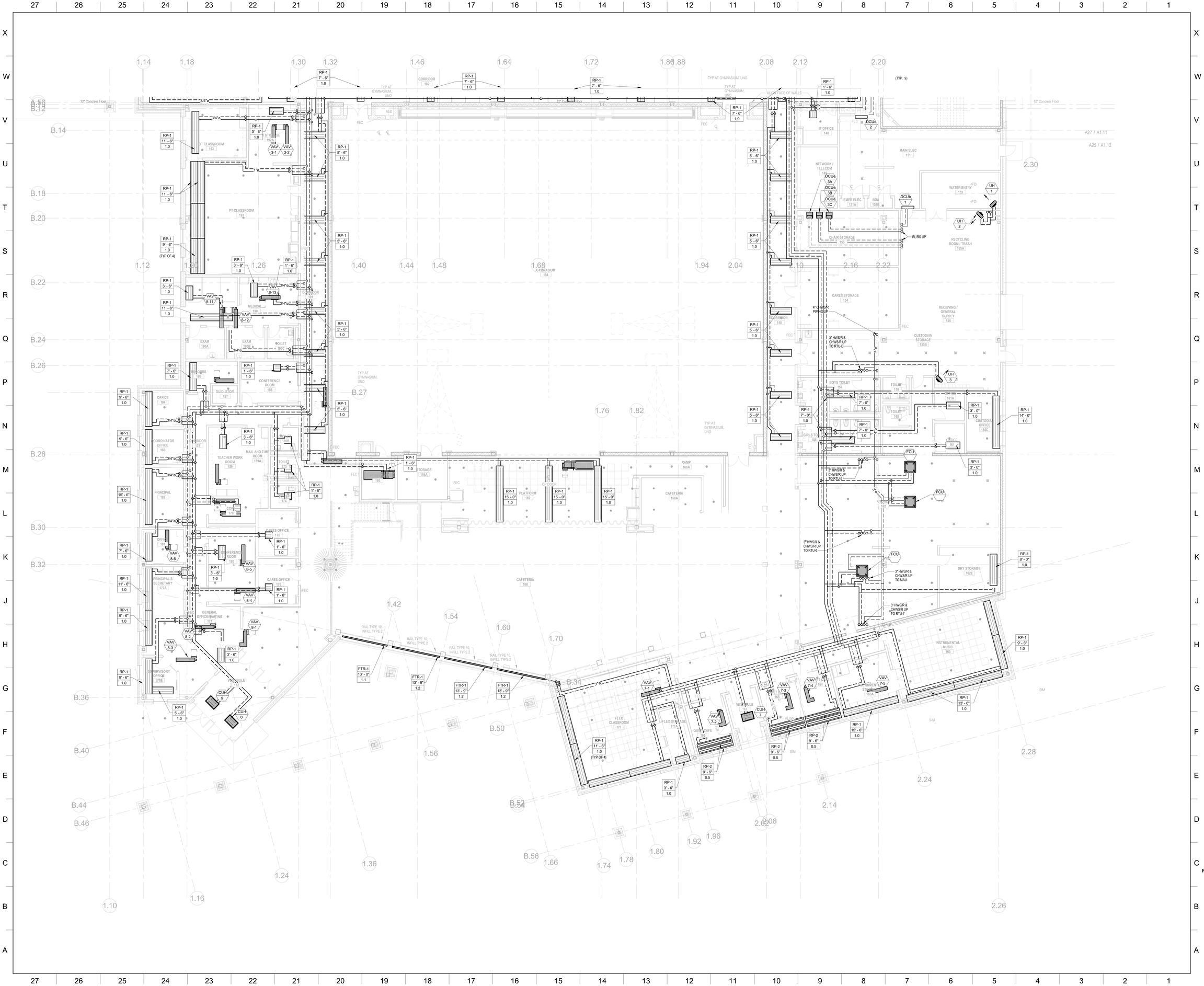
N TRUE NORTH
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE

PROJECT NORTH

SHEET TITLE:
LEVEL 1 AREA A - PIPING

SHEET NUMBER:
M2.11

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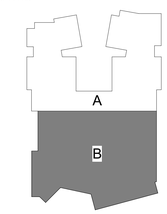
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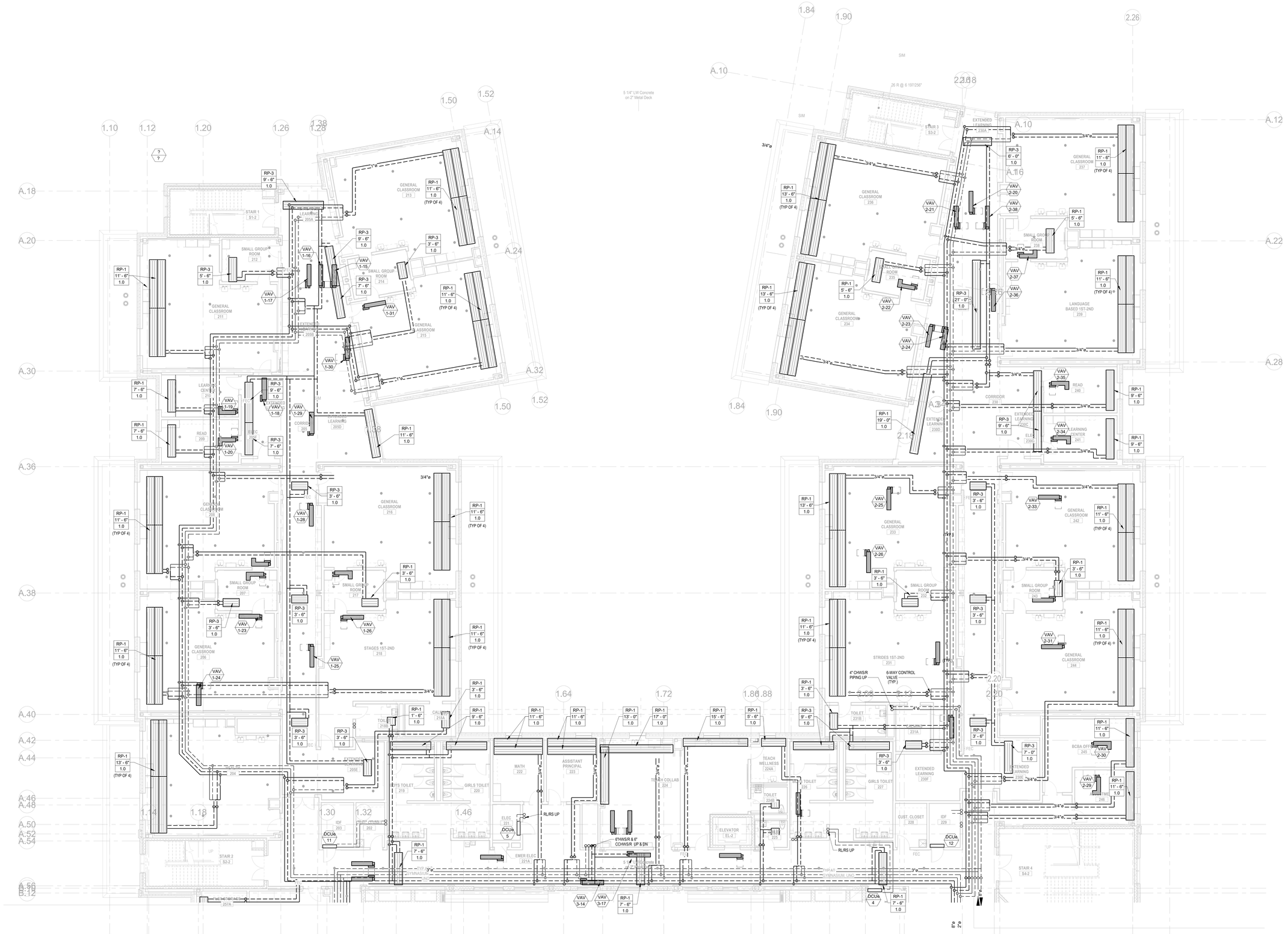
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SCALE: 1/8"=1'-0"
GRAPHIC SCALE
TRUE NORTH
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SHEET TITLE:
LEVEL 1 AREA B - PIPING

SHEET NUMBER:
M2.12

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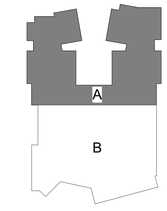
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KEY PLAN



ORIENTATION AND SCALE:

N
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

SHEET TITLE:
LEVEL 2 AREA A - PIPING

SHEET NUMBER:
M2.21

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PROJECT NUMBER: 23-0847

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REVISIONS:

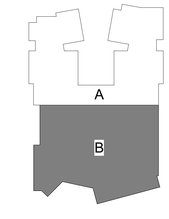
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ORIENTATION AND SCALE:

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SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

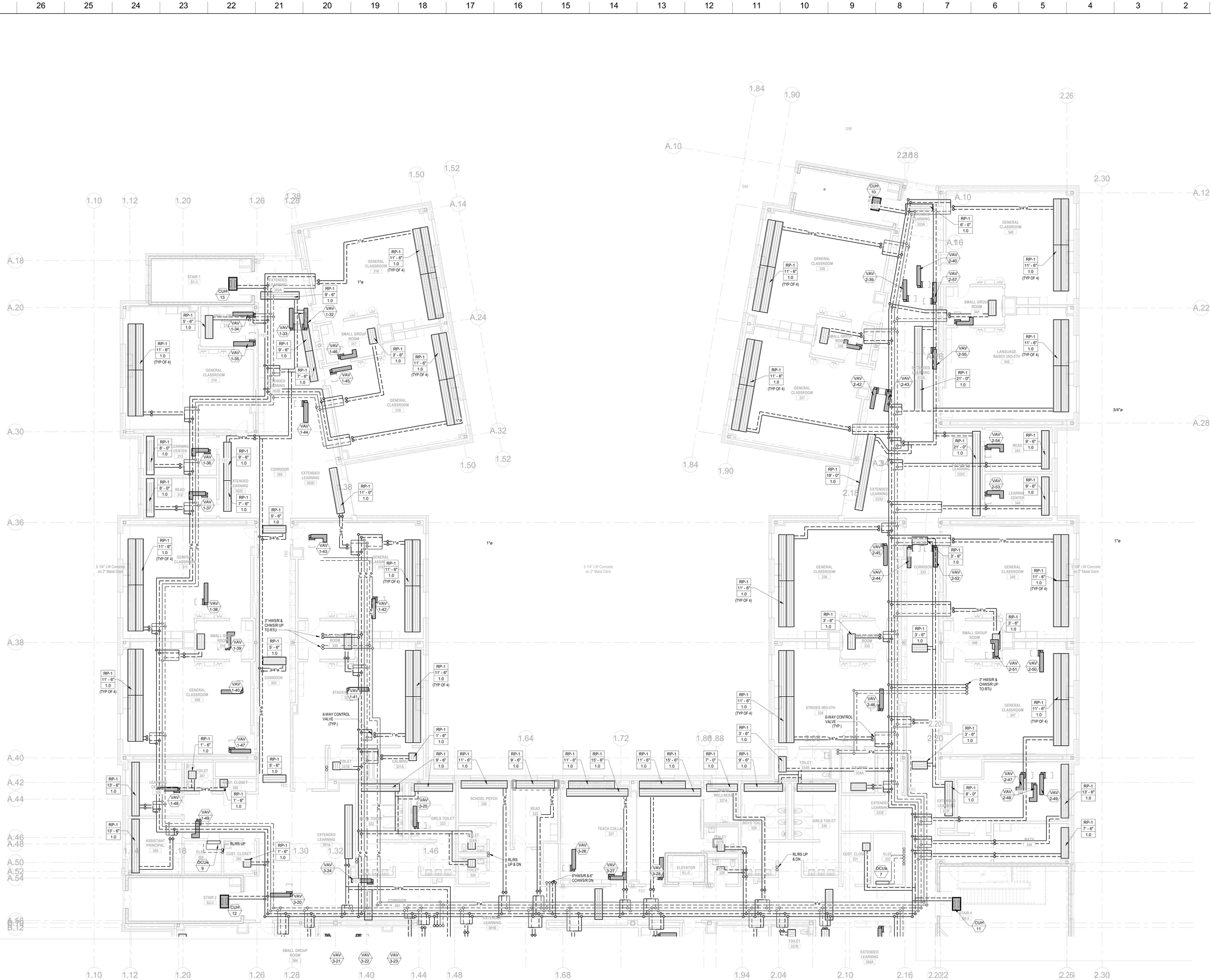
SHEET TITLE:

LEVEL 2 AREA B - PIPING

SHEET NUMBER:

M2.22

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PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

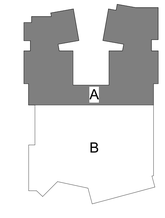
NO.	DATE	TITLE

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KEY PLAN



ORIENTATION AND SCALE:

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SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

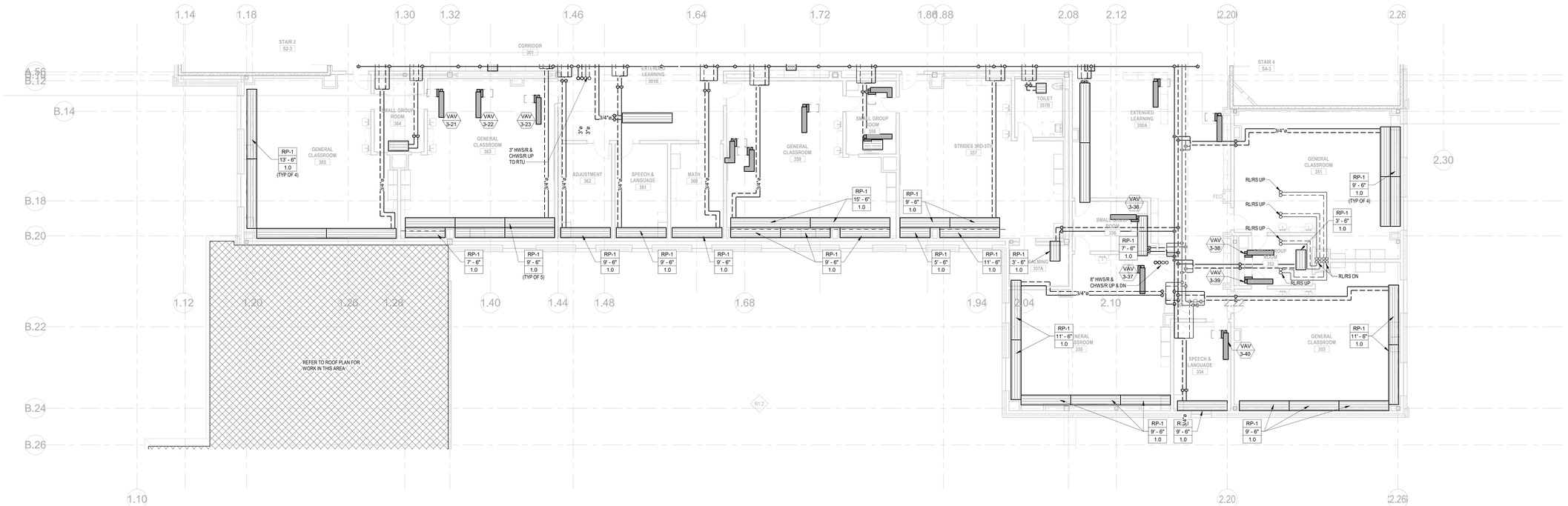
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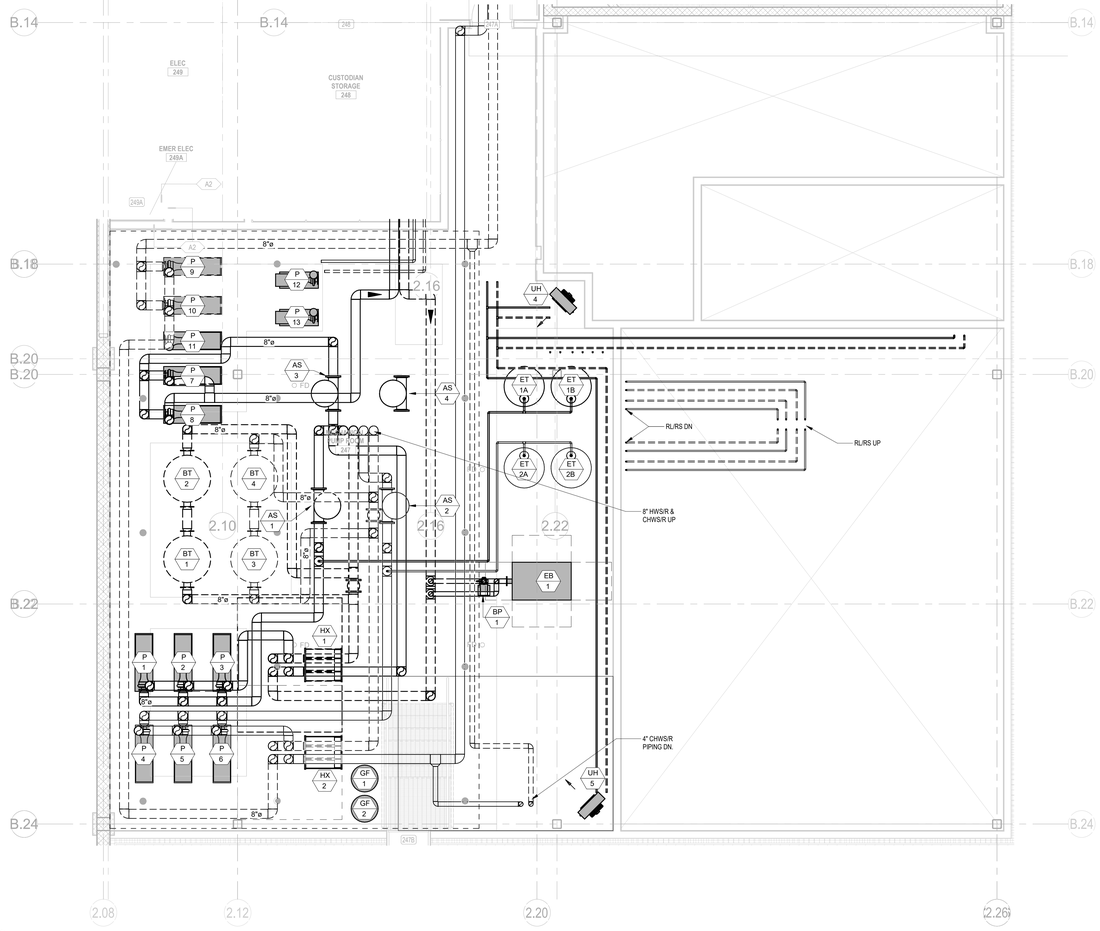
SHEET NUMBER:

M2.31

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2 M2.32 LEVEL 3 - HVAC PIPING - PART B
SCALE: 1/8" = 1'-0"



1 M2.32 Enlarged Mechanical Room
SCALE: 1/4" = 1'-0"

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PROJECT NUMBER: 23-0847

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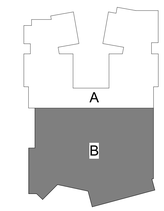
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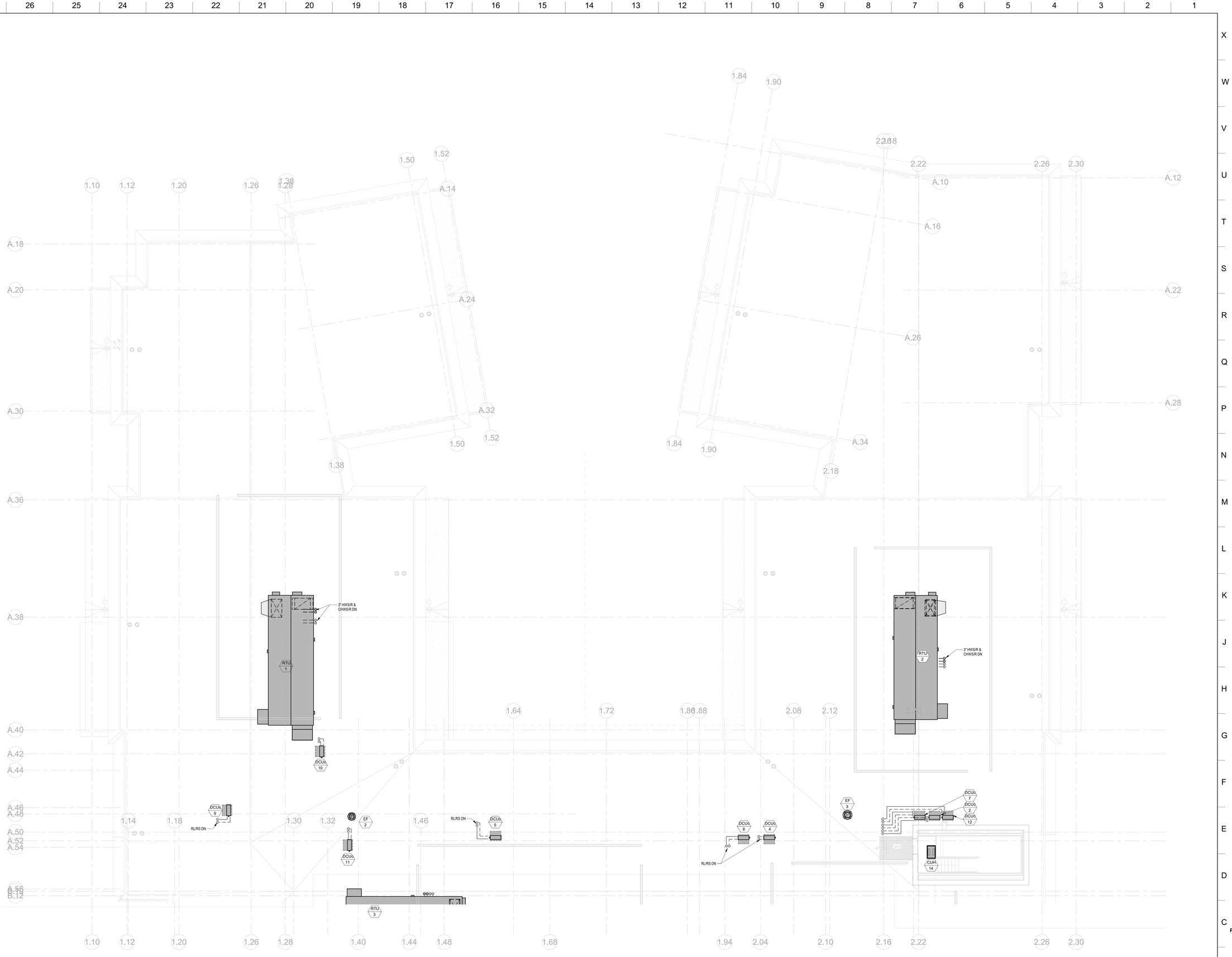
ORIENTATION AND SCALE:

PROJECT NORTH
TRUE NORTH
SCALE: AS INDICATED

SHEET TITLE:
LEVEL 3 AREA B - PIPING & ENLARGED MECH RM

SHEET NUMBER:
M2.32

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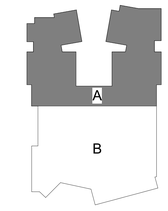
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KEY PLAN



ORIENTATION AND SCALE:



PROJECT NORTH

SHEET TITLE:
ROOF AREA A

SHEET NUMBER:
M3.11

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RTU 3

ASHP 2

ASHP 1

RLRS DN (TYP. 4)

DCU 1

DCU 3C

DCU 3B

DCU 3A

8" HWS/R & CHWS/R DOWN TO MECH ROOM

ROOF MOUNTED PIPE SUPPORTS

RTU 8

DCU 6

RTU 9

DUCTWORK PENETRATES EXTERIOR WALL AND CONTINUES WITHIN BUILDING

40"x40"

RTU 4

ALL EXTERIOR DUCTWORK SHALL BE PHENOLIC

EF 1

DUCTWORK PENETRATES EXTERIOR WALL AND CONTINUES WITHIN BUILDING

56"x20"

31"x23"
27"x34"

RTU 5

56"x20"

ALL EXTERIOR DUCTWORK SHALL BE PHENOLIC

KEF 1

RTU 6

ROOF MOUNTED DUCT SUPPORT AS NECESSARY

MAU 1

22"x22" GREASE DUCT DN THROUGH ROOF

RTU 7

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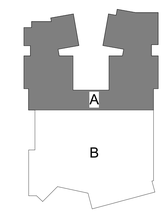
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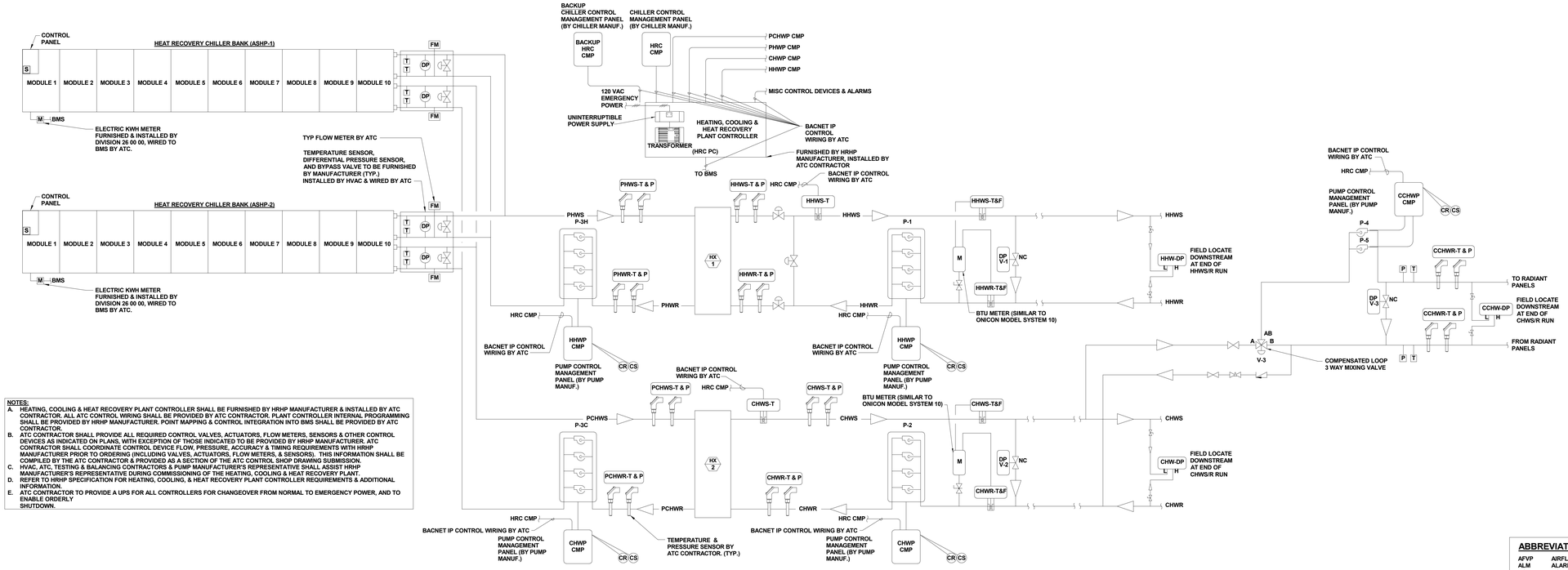


ORIENTATION AND SCALE:

N
TRUE NORTH
PROJECT NORTH
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE

SHEET TITLE:
ROOF AREA B

SHEET NUMBER:
M3.12



NOTES:

A. HEATING, COOLING & HEAT RECOVERY PLANT CONTROLLER SHALL BE FURNISHED BY HRHP MANUFACTURER & INSTALLED BY ATC CONTRACTOR. ALL ATC CONTROL WIRING SHALL BE PROVIDED BY ATC CONTRACTOR. PLANT CONTROLLER INTERNAL PROGRAMMING SHALL BE PROVIDED BY HRHP MANUFACTURER. POINT MAPPING & CONTROL INTEGRATION INTO BMS SHALL BE PROVIDED BY ATC CONTRACTOR.

B. ATC CONTRACTOR SHALL PROVIDE ALL REQUIRED CONTROL VALVES, ACTUATORS, FLOW METERS, SENSORS & OTHER CONTROL DEVICES AS INDICATED ON PLANS, WITH EXCEPTION OF THOSE INDICATED TO BE PROVIDED BY HRHP MANUFACTURER. ATC CONTRACTOR SHALL COORDINATE CONTROL DEVICE FLOW, PRESSURE, ACCURACY & TIMING REQUIREMENTS WITH HRHP MANUFACTURER PRIOR TO ORDERING (INCLUDING VALVES, ACTUATORS, FLOW METERS, & SENSORS). THIS INFORMATION SHALL BE COMPILED BY THE ATC CONTRACTOR & PROVIDED AS A SECTION OF THE ATC CONTROL SHOP DRAWING SUBMISSION.

C. HVAC, ATC, TESTING & BALANCING CONTRACTORS & PUMP MANUFACTURER'S REPRESENTATIVE SHALL ASSIST HRHP MANUFACTURER'S REPRESENTATIVE DURING COMMISSIONING OF THE HEATING, COOLING & HEAT RECOVERY PLANT.

D. REFER TO HRHP SPECIFICATION FOR HEATING, COOLING, & HEAT RECOVERY PLANT CONTROLLER REQUIREMENTS & ADDITIONAL INFORMATION.

E. ATC CONTRACTOR TO PROVIDE A UPS FOR ALL CONTROLLERS FOR CHANGEOVER FROM NORMAL TO EMERGENCY POWER, AND TO ENABLE ORDERLY SHUTDOWN.

SIMULTANEOUS HEATING AND COOLING MODULAR CHILLER WITH HEAT RECOVERY PLANT CONTROL

A DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE HEAT PUMP CHILLER PLANT OPERATION AS FOLLOWS:

HEAT RECOVERY OPERATION:
PROVIDES HOT WATER THROUGH THE CONDENSER LOOP WHILE SIMULTANEOUSLY PRODUCING CHILLED WATER THROUGH THE EVAPORATOR LOOP FOR THE CHILLER SYSTEM AND SHALL INCLUDE ALL NECESSARY SAFETY AND OPERATING CONTROLS FOR HIGH TEMPERATURE OPERATING RANGE.

SIMULTANEOUS HEATING/COOLING OPERATION :
MODULES SHALL OPERATE AS A SIMULTANEOUS HEATING AND COOLING BANK. MASTER CONTROL PANEL SHALL ENABLE BANK TO PRODUCE CHILLED AND HOT WATER. EVERY MODULE IN THE BANK SHALL BE SELECTABLE FOR COOLING, HEATING OR COOLING/HEATING OPERATION. IF THE CHILLED WATER (EVAPORATOR) OR HOT WATER (CONDENSER) IS NOT NEEDED FOR THE BUILDING LOAD THEN IT WILL BE DIVERTED IN THE MODULE TO BE SENT TO THE INTERNAL SOURCE HEADER AND NOT THE LOAD HEADERS.

EACH CHILLER BANK SHALL BE EQUIPPED WITH A DEDICATED STANDALONE DIRECT DIGITAL CONTROL (DDC) SYSTEM INCLUDING A MASTER CONTROLLER AND DISPLAY.

EACH MODULE CONTROL PANEL SHALL COMMUNICATE WITH THE MASTER CONTROLLER. THE MODULE CONTROL PANEL SHALL MONITOR AND CONTROL EACH REFRIGERATION SYSTEM IN RESPONSE TO COMMANDS BY THE MASTER COMPUTER. THE MASTER CONTROLLER SHALL HAVE A TERMINAL STRIP TO ACCEPT FIELD WIRED LOW VOLTAGE SYSTEM INTERLOCK SUCH AS FLOW SWITCHES, AUXILIARY CONTACTS, REMOTE START/STOP, COMMON ALARM OUTPUT, ETC. THE MASTER CONTROLLER SHALL BE PROVIDED BY THE UNIT MANUFACTURER FOR FIELD MOUNTING.

EACH MODULE IS EQUIPPED TO CONTROL ALL ALARM AND FAULT CONDITIONS PROTECTING THE COMPRESSOR AND FEED BACK INPUT CONDITIONS AND OUTPUT CONDITIONS TO THE MASTER CONTROLLER FOR IT TO MONITOR INDIVIDUAL CHILLER MODULE STATUS. THE MASTER CONTROLLER SHALL CONTINUALLY MONITOR ALL OF THE FOLLOWING AREAS FOR EACH INDIVIDUAL MODULE'S REFRIGERATION SYSTEM THROUGH DIGITAL SWITCHING:
(1) DISCHARGE PRESSURE CUTOUT.
(2) SUCTION PRESSURE CUTOUT.
(3) SOLID STATE COMPRESSOR MOTOR PROTECTION.
(4) EVAPORATOR LEAVING CHILLED WATER TEMPERATURE (FOR MODULE FREEZE PROTECTION).

THE MASTER CONTROLLER SHALL ADDITIONALLY MONITOR THE FOLLOWING AREAS: (
(5) EVAPORATOR LEAVING CHILLED WATER TEMPERATURE (FOR CHILLER CAPACITY CONTROL).
(6) EVAPORATOR ENTERING CHILLED WATER TEMPERATURE.
(7) PHASE LOSS (EACH PHASE).
(8) PHASE IMBALANCE AND PHASE REVERSAL.
(9) OVER-UNDER VOLTAGE.
(10) EVAPORATOR FLOW STATUS.
(11) CONDENSER FLOW STATUS.
(12) CONDENSER ENTERING WATER TEMPERATURE.
(13) CONDENSER LEAVING WATER TEMPERATURE.

A POTENTIALLY UNSAFE (OUT OF TOLERANCE) CONDITION FROM ANY OF THESE CONTROLS OR SENSORS SHALL CAUSE A "FAULT" SHUTDOWN OF THAT COMPRESSOR WITH AN AUTOMATIC TRANSFER OF LOAD REQUIREMENTS TO ANOTHER AVAILABLE COMPRESSOR. A RUNNING HISTORY OF THE COMPLETE FAULT OCCURRENCE CONDITIONS SHALL BE AUTOMATICALLY MAINTAINED (UP TO THE LAST 20 OCCURRENCES) SHOULD IT EVER BE REQUIRED FOR TROUBLESHOOTING.

CONTINUOUS INDIVIDUAL MONITORING OF LEAVING CHILLED WATER TEMPERATURE FROM EACH MODULE'S REFRIGERATION SYSTEM SHALL PROVIDE PROTECTION AGAINST FREEZE-UP IN THE EVENT OF UNUSUAL, UNEXPECTED OPERATING CONDITIONS.

THE MASTER CONTROLLER MUST LEAD/LAG THE DUAL SCROLL COMPRESSORS, BALANCE THE RUN TIME, PREVENT SHORT CYCLING OF COMPRESSORS, AND REGISTER THE LAST 20 FAILURE OCCURRENCES. FAULT CONDITIONS MUST BE ALARMED SO THE COMPRESSOR CAN BE TAKEN OFF LINE. BOTH ALARM AND FAILED CONDITIONS MUST BE DISPLAYED ON DIGITAL DISPLAY ON FRONT OF THE MASTER CONTROL PANEL. AN ALARM RELAY FOR REMOTE INDICATION OF FAULTS AND FAILED CONDITIONS WITH A NORMALLY OPEN AND NORMALLY CLOSED DRY CONTACT MUST BE SUPPLIED. THE OPERATING CONTROL OF CHILLED WATER OUTLET TEMPERATURE MUST BE ABLE TO BE RESET REMOTELY WITH A 4 ,20MA INPUT SIGNAL. STAGING OF THE ALL SCROLL COMPRESSORS, LEAD/LAG OF THE COMPRESSORS, EQUALIZE RUNTIME OF COMPRESSORS AND PREVENTING COMPRESSOR SHORT CYCLING WILL BE DONE BY THE MASTER CONTROLLER. COMPRESSOR STAGING IS ACCOMPLISHED THROUGH PID CONTROL LOGIC, ADJUSTABLE IN RESPONSE TIMES AND SETTINGS. THE SYSTEM SHALL PROVIDE FOR VARIABLE TIME BETWEEN COMPRESSOR SEQUENCING AND TEMPERATURE SENSING. INPUTS/OUTPUTS TO THE MASTER CONTROLLER INCLUDE:
1. REMOTE START/STOP
2. CHILLER FAILURE OUTPUT (NOTE: CHILLER IS COMPRISED OF ONE OR MORE MODULES- EACH MODULE WILL INDICATE ITS OWN INDIVIDUAL FAILURE AT THE CHILLER. THE "CHILLER FAILURE" INDICATION IS A REMOTE SIGNAL SENT REMOTELY TO INDICATE THAT THE CHILLER HAS HAD SUFFICIENT MODULES FAIL THAT OPERATION OF THE CHILLER WILL NOT BE BENEFICIAL. THIS FAILURE SIGNAL SHALL BE CAPABLE OF ADJUSTING TO PROVIDE A FAILURE SIGNAL ACCORDING TO THE PERCENTAGE OF CAPACITY THAT HAS FAILED.)
3. EVAPORATOR FLOW STATUS (PROVIDED BY DIFFERENTIAL PRESSURE SWITCH)
4. CONDENSER FLOW STATUS (PROVIDED BY DIFFERENTIAL PRESSURE SWITCH)
5. ENTERING AND LEAVING WATER TEMPERATURES OF THE EVAPORATOR ANDGEOTHERMAL WATER MAINS CONNECTED TO THE CHILLER BANK.
6. BAS INTERFACE - BACNET INTERFACE SHALL BE PROVIDED FOR COMMUNICATION TO BUILDING AUTOMATION SYSTEM

A MOTORIZED VALVE SHALL BE PROVIDED TO MAINTAIN PROPER FLOW THRU EACH OPERATING MODULE. SOLENOID OR ON/OFF VALVES ARE NOT ACCEPTABLE FOR VARIABLE FLOW APPLICATIONS.

CHILLER SAFETY CONTROLS SYSTEM SHALL BE PROVIDED WITH THE UNIT (MINIMUM) AS FOLLOWS:
1. LOW EVAPORATOR REFRIGERANT PRESSURE.
2. LOSS OF FLOW THROUGH THE EVAPORATOR.
3. LOSS OF FLOW THROUGH THE CONDENSER.
4. HIGH CONDENSER REFRIGERANT PRESSURE
5. HIGH COMPRESSOR MOTOR TEMPERATURE.
6. LOW LEAVING EVAPORATOR WATER TEMPERATURE
7. FAILURE OF CHILLER TO START OR SHUTDOWN DUE TO ANY OF THE ABOVE SAFETY CUTOUTS SHALL BE ENUNCIATED BY DISPLAY OF THE APPROPRIATE DIAGNOSTIC DESCRIPTION AT THE UNIT CONTROL PANEL. THIS ANNUNCIATION WILL BE IN PLAIN ENGLISH-ALPHANUMERIC CODES SHALL BE UNACCEPTABLE.

THE CHILLER SHALL BE FURNISHED WITH A MASTER CONTROLLER AS AN INTEGRAL PORTION OF THE CHILLER CONTROL CIRCUITRY TO PROVIDE THE FOLLOWING
FUNCTIONSPROVIDE AUTOMATIC CHILLER SHUTDOWN DURING PERIODS WHEN THE LOAD LEVEL DECREASES BELOW THE NORMAL OPERATING REQUIREMENTS OF THE CHILLER. UPON AN INCREASE IN LOAD, THE CHILLER SHALL AUTOMATICALLY RESTART.
2. PROVISIONS FOR CONNECTION TO AUTOMATICALLY ENABLE THE CHILLER FROM A REMOTE ENERGY MANAGEMENT SYSTEM.
3. THE CHILLER CONTROLLER SHALL UTILIZE THE INTEGRAL MOTORIZED VALVES TO THROTTLE BACK FLOW AND MAINTAIN HEAD PRESSURE IN THE CASE OF THE SOURCE RETURN WATER TEMPS GOING OUTSIDE 'NORMAL' OPERATION.

RESET SCHEDULES:
AN ADJUSTABLE HOT WATER TEMPERATURE RESET SCHEDULE, THROUGH THE CHILLER CONTROL SYSTEM, WILL RESET THE HEATING HOT WATER SUPPLY TEMPERATURE TO MAINTAIN A SUPPLY WATER OF 130 DEGREES AT A 0 DEGREE OUTSIDE AIR TEMPERATURE. AS THE OUTSIDE AIR TEMPERATURE RISES TO 55 DEGREES, THE SUPPLY WATER TEMPERATURE WILL BE RESET BY THE CHILLER MANAGEMENT CONTROL SYSTEM TO RUN AT A SUPPLY WATER TEMPERATURE OF 100 DEGREES. THE RELATIONSHIP BETWEEN OUTDOOR AIR TEMPERATURE & HWS SETPOINT SHALL BE LINEAR.

AN ADJUSTABLE CHILLED WATER TEMPERATURE WATER RESET SCHEDULE, THROUGH THE CHILLER CONTROL SYSTEM, WILL RESET THE CHILLED WATER SUPPLY TEMPERATURE TO MAINTAIN A SUPPLY WATER OF 45 DEGREES AT A 91 DEGREE OUTSIDE AIR TEMPERATURE. AS THE OUTSIDE AIR TEMPERATURE LOWERS TO 55 DEGREES, THE SUPPLY WATER TEMPERATURE WILL BE RESET BY THE CHILLER MANAGEMENT CONTROL SYSTEM TO RUN AT A SUPPLY WATER TEMPERATURE OF 55 DEGREES. THE RELATIONSHIP BETWEEN OUTDOOR AIR TEMPERATURE & CHWS SETPOINT SHALL BE LINEAR.

HEAT RECOVERY CHILLER PRIMARY PUMP CONTROL (PUMP CONTROL FROM CHILLER HEADER DIFFERENTIAL PRESSURE (DP) SET POINT):
UPON A CALL FOR COOLING OR HEATING, THE AIR SOURCE HEAT PUMP CHILLER PRIMARY CHILLED WATER OR PRIMARY HEATING HOT WATER PUMP SHALL ENERGIZE AND THE PUMP SPEED WILL INCREASE OR DECREASE TO MAINTAIN THE SUBMITTED DP VALUE ACROSS THE HEAT RECOVERY CHILLER DP SENSOR. THERE SHALL BE A 5 MINUTE DELAY BETWEEN PUMP ENABLE AND CHILLER ENABLE. PUMPS SHALL CONTROL TO DIFFERENTIAL PRESSURE ACROSS THE CHILLER ON BOTH THE EVAPORATOR AND CONDENSER SIDE. THE AIR SOURCE HEAT PUMP BYPASS VALVE SHALL MODULATE OPEN TO THE MINIMUM BYPASS POSITION WHEN NO COMPRESSORS ARE RUNNING IN HEATING OR COOLING MODE.

WHEN OUTSIDE AIR TEMPERATURE IS LESS THEN 35 DEGREES (ADJ) AND THE CHILLER HAS BEEN DISABLED FOR 1 HOUR (ADJ.), THE PRIMARY PUMP ARRAYS P-3C & P-3H SHALL BE ACTIVATED FOR 5 MIN (ADJ) EVERY HOUR (ADJ) FOR FREEZE PROTECTION.

BUILDING (LOAD SIDE) SECONDARY PUMP CONTROL (PUMP CONTROL FROM BUILDING DIFFERENTIAL PRESSURE (DP) SET POINT):
THE BUILDING SYSTEM DP SET POINT WILL MAINTAIN THE PUMP SPEED, PROPORTIONALLY DECREASING PUMP SPEED WHEN THE SYSTEM DP SENSOR DP IS HIGH (WHEN SOME LOAD VALVES ARE CLOSED) AND PROPORTIONALLY INCREASING PUMP SPEED WHEN THE SYSTEM DP IS LOW (AS THE LOAD SIDE VALVES ARE OPENING). WHEN THE LOAD SIDE VALVES ARE OPEN (PUMP SPEED IS INCREASED), THIS INTRODUCES ADDITIONAL LOAD TO THE CHILLER CAUSING IT TO STAGE UP TO MEET THIS INCREASED LOAD DEMAND. MEANWHILE, THE BUILDING SYSTEM BYPASS VALVE MONITORS FIELD SUPPLIED AND INSTALLED DP SENSORS THE SYSTEM BYPASS VALVE SHALL OPEN PROPORTIONALLY, TO MAINTAIN MINIMUM MINIMUM HHW AND CHW PUMP SPEED, 30% (ADJ). WHEN THERE IS NO CALL FOR COOLING OR HEATING IN THE BUILDING, THE ASSOCIATED CHILLED OR HEATING HOT WATER PUMPS SHALL DE-ENERGIZE. EACH PUMP SHALL ALSO BE CAPABLE OF DUTY CYCLING WHICH WILL BE AUTOMATICALLY CONTROLLED THROUGH THE DDC SYSTEM AND ROTATE ON A WEEKLY BASIS ON EQUALIZING THE RUN TIME OF THE PUMPS.

COMPENSATED RADIANT PANEL CHILLED WATER LOOPS:
ON A CALL FOR COMPENSATED CHILLED WATER, THE COMPENSATED LOOP PUMPS SHALL ENERGIZE AND CIRCULATE WATER TO THE CHILLED WATER RADIANT PANELS. THE PUMP SHALL MODULATE TO MAINTAIN THE DIFFERENTIAL PRESSURE CONTROL SETPOINT, SETPOINT SHALL BE FIELD DETERMINED BY ATC/TAB CONTRACTOR AND SHALL BE ADJUSTABLE. THE DIFFERENTIAL PRESSURE VALVE SHALL MODULATE OPEN WHEN PUMPS ARE AT MINIMUM SPEED AND THE DIFFERENTIAL PRESSURE IS ABOVE SETPOINT. EACH PUMP SHALL ALSO BE CAPABLE OF DUTY CYCLING WHICH WILL BE AUTOMATICALLY CONTROLLED THROUGH THE DDC SYSTEM AND ROTATE ON A WEEKLY BASIS ON EQUALIZING THE RUN TIME OF THE PUMPS. THE THREE WAY MIXING VALVE V-3 OF THE COMPENSATED LOOP SHALL MODULATE TO MAINTAIN A SUPPLY TEMP OF 55 DEG. F. IN THE EVENT THAT THE RTU SENSES A HIGH RETURN AIR HUMIDITY LEVEL OF 70% RH (ADJ.) FOR A PERIOD OF 30 MIN. (ADJ.) , THE DIVERTING VALVE SHALL RESET TO 60 DEG. F (ADJ.).

EMERGENCY POWER SEQUENCE:
UPON A LOSS OF BUILDING NORMAL POWER AND WHILE OPERATING UNDER EMERGENCY POWER THE HEAT RECOVERY AIR SOURCE HEAT PUMP SYSTEM SHALL BE DISABLED. THE FOLLOWING SHALL OCCUR:
1. THE ASHP SHALL BE LOCKED OUT BY THE BMS. (1) ELECTRIC BOILER SHALL BE ENABLED AND RUN TO MAINTAIN THE BUILDING LOOP TEMPERATURE.
2. THE (2) HX ISOLATION VALVES SHALL CLOSE, AND THE HX BYPASS VALVE SHALL OPEN.
3. THE P-1 SECONDARY HOT WATER PUMPS SHALL OPERATE; OTHER PUMPS SHALL BE LOCKED OUT THROUGH THE BMS.
4. THE PRIMARY WATER PUMPS SHALL CYCLE ON FOR (5) MINUTES (ADJ.) EVERY (1) HOUR (ADJ.) FOR FREEZE PREVENTION. OTHER PUMPS SHALL BE LOCKED OUT THROUGH THE BMS.
5. THE CHILLED WATER PUMPS SHALL BE OFF.

HEAT PUMP SYSTEM LOAD SHED SEQUENCE FOR EXTREME WEATHER CONDITIONS
COOLING:
FIRST STAGE - UPON AN INCREASE IN THE CHILLED WATER SUPPLY TEMPERATURE (CHWS) TO THE BUILDING OF 10 DEG F (ADJ) ABOVE SETPOINT, AN ALARM SHALL GENERATE AND THE DESIGNATED PRIORITY LEVEL OF ROOFTOP UNIT ZONES SHALL ENTER THE LOAD SHED SEQUENCE AS FOLLOWS:
STEP 1: PRIORITY LEVELS 1 & 2 RTU ZONES - NO CHANGE IN DESIGN SEQUENCE OR SPACE TEMPERATURE SETPOINTS
STEP 2: PRIORITY LEVEL 3 RTU ZONES - INCREASE SPACE COOLING TEMPERATURE SETPOINT FOR THESE RTU ZONES BY 2° F (ADJ)
STEP 3: PRIORITY LEVEL 2 RTU ZONES - IF THE CHWS TEMPERATURE DOES NOT FALL BACK TO THE INITIAL DESIGN SETPOINT AFTER STEP 2, INCREASE SPACE TEMPERATURE SETPOINT FOR THESE RTU ZONES BY 2° F (ADJ)

SECOND STAGE - UPON A CONTINUED INCREASE IN THE CHILLED WATER SUPPLY TEMPERATURE (CHWS) TO THE BUILDING OF 20° F (ADJ) ABOVE SETPOINT, AN ALARM SHALL GENERATE AND THE DESIGNATED PRIORITY LEVEL OF ROOFTOP UNIT ZONES SHALL ENTER THE LOAD SHED SEQUENCE AS FOLLOWS:
STEP 1: PRIORITY LEVEL 1 RTU ZONES - NO CHANGE IN DESIGN SEQUENCE OR SPACE TEMPERATURE SETPOINTS
STEP 2: PRIORITY LEVEL 2 RTU ZONES - NO CHANGE IN SEQUENCE OR SPACE TEMPERATURE SETPOINTS BEYOND THOSE OUTLINED IN FIRST STAGE
STEP 3: LOAD SHED SETPOINTS STEP 3: PRIORITY LEVEL 3 RTU ZONES - INCREASE SPACE COOLING TEMPERATURE SETPOINT FOR THESE RTU ZONES BY 2 DEG F (ADJ) ABOVE THE FIRST STAGE LOAD SHED SETPOINT
STEP 4: PRIORITY LEVEL 2 RTU ZONES - IF THE GWST DOES NOT FALL BACK TO FIRST STAGE LOAD SHED SETPOINTS AFTER STEP 3, INCREASE SPACE COOLING TEMPERATURE SETPOINT FOR THESE RTU ZONES BY 2° F (ADJ) ABOVE THE FIRST STAGE LOAD SHED SETPOINT

HEATING:
FIRST STAGE - UPON A DECREASE IN THE HOT WATER SUPPLY TEMPERATURE (HWST) TO THE BUILDING OF 10° F (ADJ) BELOW SETPOINT, AN ALARM SHALL GENERATE AND THE DESIGNATED PRIORITY LEVEL OF ROOFTOP UNIT ZONES SHALL ENTER THE LOAD SHED SEQUENCE AS FOLLOWS:
STEP 1: PRIORITY LEVELS 1 & 2 RTU ZONES - NO CHANGE IN DESIGN SEQUENCE OR SPACE TEMPERATURE SETPOINTS
STEP 2: PRIORITY LEVEL 3 RTU ZONES - DECREASE SPACE HEATING TEMPERATURE SETPOINT FOR THESE RTU ZONES BY 2° F (ADJ)
STEP 3: PRIORITY LEVEL 2 RTU ZONES - IF THE HWS TEMPERATURE DOES NOT FALL BACK TO THE INITIAL DESIGN SETPOINT AFTER STEP 2, DECREASE SPACE TEMPERATURE SETPOINT FOR THESE RTU ZONES BY 2° F (ADJ)

SECOND STAGE - UPON A CONTINUED DECREASE IN THE HOT WATER SUPPLY TEMPERATURE (HWST) TO THE BUILDING OF 15° F (ADJ) BELOW SETPOINT, AN ALARM SHALL GENERATE AND THE DESIGNATED PRIORITY LEVEL OF ROOFTOP UNIT ZONES SHALL ENTER THE LOAD SHED SEQUENCE AS FOLLOWS:
STEP 1: PRIORITY LEVEL 1 RTU ZONES - NO CHANGE IN DESIGN SEQUENCE OR SPACE TEMPERATURE SETPOINTS
STEP 2: PRIORITY LEVEL 2 RTU ZONES - NO CHANGE IN SEQUENCE OR SPACE TEMPERATURE SETPOINTS BEYOND THOSE OUTLINED IN FIRST STAGE
STEP 3: PRIORITY LEVEL 3 RTU ZONES - DECREASE SPACE HEATING TEMPERATURE SETPOINT FOR THESE RTU ZONES BY 2 DEG F (ADJ) ABOVE THE FIRST STAGE LOAD SHED SETPOINT
STEP 4: PRIORITY LEVEL 2 RTU ZONES - IF THE HWST DOES NOT FALL BACK TO FIRST STAGE LOAD SHED SETPOINTS AFTER STEP 3, DECREASE SPACE HEATING TEMPERATURE SETPOINT FOR THESE RTU ZONES BY 2 DEG F (ADJ) ABOVE THE FIRST STAGE LOAD SHED SETPOINT

HEAT RECOVERY SYSTEM LOAD SHED PRIORITY LEVEL ZONING	
PRIORITY LEVEL	RTU ZONES
1	CLASSROOMS
2	GYM, CAFETERIA, SHOPS, LOCKER ROOMS
3	ADMIN, MEDIA CENTER

*** ABOVE IS THE SUGGESTED ZONING, FINAL PRIORITIZATION SCHEDULE SHALL BE COORDINATED W/ OWNER PRIOR TO PROGRAMMING. PRIORITY LEVEL ASSOCIATIONS SHALL BE ADJUSTABLE.**

THIRD STAGE - UPON A CONTINUED DECREASE IN THE HOT WATER SUPPLY TEMPERATURE (HWST) TO THE BUILDING 20 DEG F (ADJ) BELOW SETPOINT, AN ALARM SHALL GENERATE AND THE DESIGNATED PRIORITY LEVEL OF ROOFTOP UNIT ZONES SHALL ENTER THE LOAD SHED SEQUENCE AS FOLLOWS:
STEP 1: PRIORITY LEVEL 1 RTU ZONES - NO CHANGE IN DESIGN SEQUENCE OR SPACE TEMPERATURE SETPOINTS
STEP 2: PRIORITY LEVELS 2 RTU ZONES - NO CHANGE IN SEQUENCE OR SPACE TEMPERATURE SETPOINTS BEYOND THOSE OUTLINED IN SECOND STAGE STEP 4 LOAD SHED SETPOINTS
STEP 3: PRIORITY LEVEL 3 RTU ZONES - MAINTAIN UNOCCUPIED SPACE COOLING TEMPERATURE SETPOINT FOR THESE RTU ZONES

LOW LOAD ISSUE PREVENTION:
INCREASE THE COMPRESSOR STAGING BANDWIDTH TO PREVENT EXCESSIVE COMPRESSOR CYCLING AT LOW LOAD FOR BOTH HOT WATER AND CHILLED WATER.
ONCE A WEEK, SET MINIMUM BYPASS TO 100% FOR 5 MINUTES TO FLOW WATER THROUGH THE ENTIRE MACHINE, DISABLE HEATING AND COOLING WHEN THIS OCCURS AND ONLY PERFORM THE FLUSH OVERNIGHT AT 2AM.

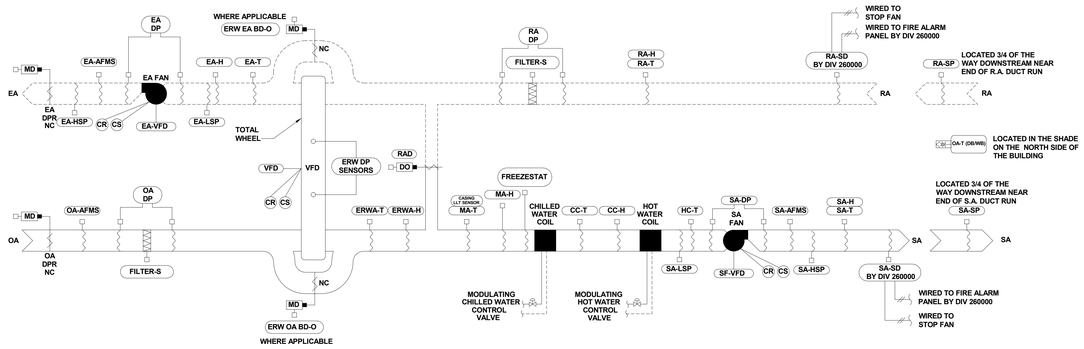
HEAT RECOVERY HEAT PUMP CHILLER PLANT	AI	AO	DI	DO	ALARM	REMARKS
HRHP BANK S/S & STATUS (EACH MODULE)			X	X	X	
PUMP S/S & STATUS (EACH)			X	X	X	ALL CHW, PCHW, PHW, HHW, EBP
PUMP SPEED (EACH)	X	X			X	ALL CHW, PCHW, PHW, HHW, EBP
CHWS TEMPERATURE	X	X			X	
CHWR TEMPERATURE	X					
CHW BTU ENERGY METER	X	X			X	
CHW DIFF PRESSURE BYPASS VALVE	X	X			X	W/ POS. FEEDBACK
CHWS PRESSURE	X					
CHWR PRESSURE	X					
EACH PUMP ARRAY CONTROLLER	X	X	X	X	X	ALL CHW, PCHW, PHW, HHW - BACNET IP
OUTSIDE AIR TEMP.	X					FROM CENTRAL POINT
OUTSIDE AIR % RH	X	X				FROM CENTRAL POINT
HHWS TEMPERATURE	X				X	
HHWR TEMPERATURE	X					
HHW BTU ENERGY METER	X	X			X	
HHW DIFF PRESSURE BYPASS VALVE	X	X			X	W/ POS. FEEDBACK
HHWS PRESSURE	X					
HHWR PRESSURE	X					
PHWS PRESSURE	X					
PHWR PRESSURE	X					
PHWS TEMPERATURE	X	X			X	
PHWR TEMPERATURE	X					
PHW BYPASS VALVE	X	X			X	W/ POS. FEEDBACK
PHW BTU ENERGY METER	X	X			X	
PCHWS PRESSURE	X					
PCHWR PRESSURE	X					
PCHWS TEMPERATURE	X	X			X	
PCHWR TEMPERATURE	X					
PCHW BYPASS VALVE	X	X			X	W/ POS. FEEDBACK
PCHW BTU ENERGY METER	X	X			X	
CCHWS PRESSURE	X					
CCHWR PRESSURE	X					
CCHWS TEMPERATURE	X	X			X	
CCHWR TEMPERATURE	X					
COMPENSATED LOOP 3-WAY VALVE	X	X			X	W/ POS. FEEDBACK
HRHP DP (CHW/HHW)	X					
HRHP TEMPERATURE (CHW/HHW)	X					
HRHP DIFFERENTIAL BYPASS VALVE	X	X			X	W/ POS. FEEDBACK
HRHP FLOW METER (CHW/HHW)	X					BY ATC
REFRIGERANT MONITORING MAKE UP AIR DAMPER	X	X				W/ POS. FEEDBACK
LOOP DIFFERENTIAL PRESSURE (HHW, CHW, CCHW)	X					
CCHW DIFF PRESSURE BYPASS VALVE	X	X			X	W/ POS. FEEDBACK

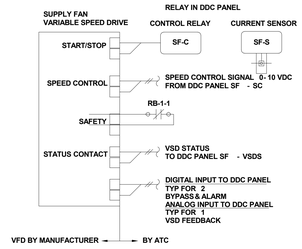
NOTES:
1. POINT LIST DOES NOT INCLUDE INTEGRAL COMPONENTS INTEGRAL OF THE CHILLERS (I.E. ISOLATION VALVES, ETC.) THAT WILL BE CONTROLLED BY THE CHILLER CONTROL PANEL PROVIDED BY THE MANUFACTURER.
2. POINT MAP ALARMS FROM ALL HRC, BOILERS, & PUMPS INTO BMS FOR GRAPHICAL DISPLAY.
3. ALL POINTS TO BE SHOWN ON GRAPHICS UNLESS NOTED OTHERWISE.
4. REFER TO HEAT PUMP MANUFACTURER BACNET POINT LIST IN SPECIFICATION FOR POINTS OWNED BY HEAT PUMP MASTER CONTROLLER.
5. REFER TO CONTROL DIAGRAM & SEQUENCES FOR SENSOR QUANTITIES & CONTROL DEVICES.
6. FOR ALL ABSOLUTE PRESSURE SENSORS LOCATED ACROSS HEAT EXCHANGERS, PROVIDE THE PRESSURE READING, ALONG WITH CALCULATED DIFFERENTIAL PRESSURE.

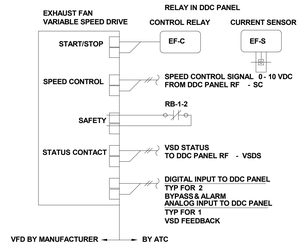
ABBREVIATIONS

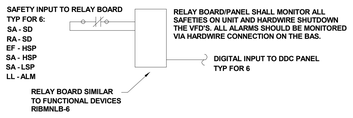
AFVP	AIRFLOW VELOCITY PROBE
ALM	ALARM
AQ	AQUASTAT
ATC	AUTOMATIC TEMPERATURE CONTROLS
BLDG	BUILDING
BLR	BOILER
BMS	BUILDING MANAGEMENT SYSTEM (ENERGY & AUTOMATION)
CCHWS	COMPENSATED CHILLED WATER SUPPLY
CCHWR	COMPENSATED CHILLED WATER RETURN
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CM	CONSTRUCTION MANAGER
CMP	CONTROL MANAGEMENT PANEL
COMB	COMBUSTION
CONTR	CONTROLLER
CO2	CARBON DIOXIDE
CR	CONTROL RELAY
CS	CURRENT SENSOR
CUV	CABINET UNIT VENTILATOR
D	DAMPER
DA	DISCHARGE AIR
DAS	DISCHARGE AIR SENSOR
DAT	DISCHARGE AIR TEMPERATURE
DCV	DEMAND CONTROL VENTILATION
DCW	DOMESTIC COLD WATER
DHW	DOMESTIC HOT WATER
DDC	DIRECT DIGITAL CONTROL
DO	DAMPER OPERATOR
DP	DIFFERENTIAL PRESSURE
DPR	DAMPER
DPV	DIFFERENTIAL PRESSURE VALVE
EA	EXHAUST AIR
EF	EXHAUST FAN
F	FLOW/FARENHEIT (AS APPLICABLE)
FB	FACE & BYPASS
FD	FIRE DAMPER
H	HUMIDITY
HS	ENTHALPY SENSOR
HT	HIGH TEMPERATURE
HTG	HEATING
HR	HEAT RECOVERY
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
LT	LOW TEMPERATURE
M	MOTOR
MAT	MIXED AIR TEMPERATURE
NAC	NETWORK APPLICATION CONTROLLER
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OA	OUTSIDE AIR
OVR	OVERRIDE
P	PRESSURE
PB	PUSH BUTTON
PCHWR	PRIMARY CHILLED WATER
PHW	PRIMARY HOT WATER
PNL	PANEL
RA	RETUR

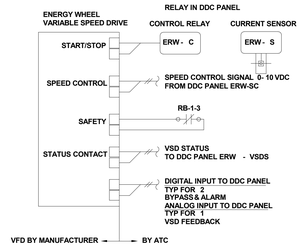
RTU-# - 100% O.A. DISPLACEMENT VENTILATION AIR HANDLING SYSTEM w/ DEMAND CONTROL VENTILATION

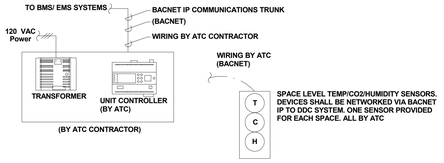












RTU AIR HANDLING UNITS

A DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE ROOFTOP AIR HANDLING UNIT OPERATION AS FOLLOWS:

RUN CONDITIONS - SCHEDULED:
THE RTU SHALL RUN BASED UPON AN OPERATOR-ADJUSTABLE SCHEDULE.

WARM-UP: THE TERMINAL HEATING UNITS (RADIANT PANELS, WALL RADIATION UNITS, FINTUBE, ETC) VALVES SHALL MODULATE OPEN TO RAISE THE SPACES TO THE OCCUPIED SET POINT OF 70°F (ADJ.), ALONG WITH THE TERMINAL HEATING UNITS, THE RTU SHALL ALSO BE ACTIVATED. ALL VAV'S ASSOCIATED WITH THE RTU SHALL GO TO FULL-OPEN POSITION. THE RTU OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE CLOSED, THE RECIRCULATION DAMPER SHALL BE CLOSED. THE CHILLED WATER CONTROL VALVE SHALL BE CLOSED, THE TOTAL ENERGY RECOVERY WHEEL SHALL BE DE-ENERGIZED, AND THE ASSOCIATED ERW BYPASS DAMPERS SHALL BE OPEN. THE EXHAUST FAN SHALL BE OFF AND THE SUPPLY FAN SHALL START AND RECIRCULATE BUILDING AIR. THE RTU HOT WATER CONTROL VALVE SHALL MODULATE OPEN AND THE UNIT DISCHARGE AIR SETPOINT DURING WARM-UP SHALL BE 85°F (ADJ.). ONCE BUILDING HAS REACHED SPACE SETPOINT, THE TERMINAL HEATING UNITS SHALL ENTER THE OCCUPIED MODE, ALLOWING THEIR HOT WATER VALVES TO MODULATE AS REQUIRED TO MAINTAIN THE SPACE SETPOINT. THE RTU SHALL ALSO ENTER OCCUPIED MODE. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE WARM-UP MODE MORE THAN ONCE PER DAY. THROUGH THE OPTIMIZED START PROGRAM LOGIC WITHIN THE DDC SYSTEM SOFTWARE, THE BMS SHALL MONITOR THE RATE OF TEMPERATURE RISE TO DETERMINE WHEN TO ACTIVATE THE WARM UP MODE TO ENSURE THAT THE BUILDING HAS REACHED ITS SETPOINT FOR OCCUPIED
MODE.
COOL-DOWN: ALL VAV'S ASSOCIATED WITH THIS RTU SHALL GO TO FULL-OPEN POSITION. THE RTU OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE CLOSED, THE RECIRCULATION DAMPER SHALL BE OPEN. THE HOT WATER CONTROL VALVE SHALL BE CLOSED, THE TOTAL ENERGY RECOVERY WHEEL SHALL BE DE-ENERGIZED, AND THE ASSOCIATED ERW BYPASS DAMPERS SHALL BE CLOSED. THE EXHAUST FANS SHALL BE OFF AND THE SUPPLY FAN SHALL START AND RECIRCULATE BUILDING AIR. THE RTU CHILLED WATER VALVE SHALL MODULATE OPEN AND THE UNIT DISCHARGE AIR SETPOINT DURING COOL-DOWN SHALL BE 55°F (ADJ.). ONCE THE BUILDING HAS REACHED SPACE SETPOINT OF 78°F (ADJ.), THE RTU SHALL ENTER OCCUPIED MODE. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE COOL-DOWN MODE MORE THAN ONCE PER DAY. THROUGH THE OPTIMIZED START PROGRAM LOGIC WITHIN THE DDC SYSTEM SOFTWARE, THE BMS SHALL MONITOR THE RATE OF TEMPERATURE DECREASE TO DETERMINE WHEN TO ACTIVATE THE COOL DOWN MODE TO ENSURE THAT THE BUILDING HAS REACHED ITS SETPOINT FOR OCCUPIED MODE. ECONOMIZER MODE OF OPERATION SHALL OVERRIDE NORMAL COOL-DOWN MODE OF OPERATION DURING UNOCCUPIED
MODE.
OCCUPIED MODE:

GENERAL:
THE FANS START OR CONTINUE TO RUN AND THE RTU IS CONTROLLED AS FOLLOWS:

THE EXHAUST AIR DAMPER SHALL OPEN. THE OUTSIDE AIR DAMPER SHALL OPEN & THE RECIRCULATION DAMPER SHALL BE CLOSED. THE ENERGY RECOVERY WHEEL SHALL BE ACTIVATED ERW BYPASS DAMPERS CLOSE AND OPERATE PER THE SEQUENCES BELOW. THE SUPPLY AND EXHAUST FANS SHALL BE ACTIVATED OR CONTINUE TO RUN AND THE SUPPLY FAN SHALL ADJUST ITS SPEED BASED ON THE SUPPLY DUCT MOUNTED STATIC PRESSURE SENSOR LOCATED 3/4 DOWN STREAM. THE SYSTEM'S ACTUAL STATIC PRESSURE SETPOINT WILL BE PROVIDED/OBTAINED THROUGH THE TESTING AND BALANCING CONTRACTOR DURING THE BALANCING PROCESS. THE EXHAUST FAN SHALL MODULATE ITS SPEED BASED ON THE SUPPLY AIR FLOW. THE ATC CONTRACTOR SHALL PROVIDE LOGIC TO CONSISTENTLY COLLECT THE TOTAL CFM FROM ALL VAV BOXES AND UTILIZE THAT VALUE IN CONJUNCTION WITH THE EXHAUST AIR FLOW SYSTEM CURVE PROFILE TO MODULATE THE EXHAUST FAN VFD. A SLIGHT OFFSET BETWEEN SUPPLY AND RETURN AIR FLOWS SHALL BE SET TO 5% (ADJ) TO ALLOW THE BUILDING TO MAINTAIN A SLIGHTLY POSITIVE PRESSURE. THE STATIC PRESSURE RESET SHALL BE RESET BASED ON PID (PROPORTIONAL-INTEGRAL-DERIVATIVE) LOGIC TO ALLOW THE VAV BOX ZONE REQUIRING THE MOST PRESSURE TO SATISFY ITS AIRFLOW REQUIREMENT AT ITS DESIGN FULL OPEN POSITION. THE STATIC PRESSURE SET POINT SHALL BE LOWERED TO THE POINT WHERE FAN SPEED REDUCTION CAN OCCUR, YET STILL ENSURE THAT THE VAV BOX ZONES REMAIN SATISFIED. THE SYSTEM SHALL USE INPUT SIGNALS FROM VAV BOX CONTROLLERS, THE MAIN DUCTWORK MOUNTED SYSTEM STATIC PRESSURE SENSOR AND THE CONTROLLER'S PROGRAM ALGORITHM TO ACHIEVE THIS CONTROL. IN ADDITION, PROVIDE DETECTION AND ALARM OF ANY VAV ZONE THAT EXCESSIVELY NEGATIVELY DRIVES THE RESET LOGIC. THE BMS SYSTEM SHALL BE CAPABLE OF ALLOWING OPERATOR TO READILY REMOVE OR ADD VAV BOX ZONES FROM THE RESET LOGIC ALGORITHM. THE PROJECT TAB/ATC CONTRACTORS SHALL FIELD DETERMINE THE ADJUSTABLE SETPOINT RANGE FOR EACH RTU/AHU SYSTEM AND THE PRIMARY VAV BOX UTILIZED TO CONTROL THE STATIC PRESSURE RESET CONTROL STRATEGY.

SUPPLY FAN:
THE SUPPLY FAN SHALL RUN ANYTIME THE RTU IS COMMANDED TO RUN AND EITHER THE O.A. DAMPER & E.A. DAMPER, OR THE RECIRCULATION DAMPER ARE PROVEN OPEN. THE SUPPLY FAN SHALL MODULATE ITS SPEED BASED ON THE SYSTEM'S STATIC PRESSURE DUE TO VAV DAMPERS OPENING/CLOSING. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER-DEFINABLE 10 MIN (ADJ.) MINIMUM RUNTIME, UNLESS SHUTDOWN ON SAFETIES. BALANCING CONTRACTOR & ATC CONTRACTOR SHALL COORDINATE AND PROVIDE AN EXHAUST FAN(S) PROFILE OF AIR FLOW THROUGHOUT THE FAN SYSTEM CURVE AT DIFFERENT SPEEDS AND AIR FLOW TESTING. THIS SHALL BE USED FOR EXHAUST FAN SPEED CONTROL, TYP. FOR SUPPLY FANS.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.**
- **SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.**

EXHAUST FAN:
THE EXHAUST FAN SHALL RUN ANYTIME THE RTU IS COMMANDED TO RUN AND EITHER THE O.A. DAMPER & E.A. DAMPER, OR THE RECIRCULATION DAMPER ARE PROVEN OPEN. THE EXHAUST FAN SHALL MODULATE ITS SPEED BASED ON THE EXHAUST AIR FLOW STATION WHICH SHALL TRACK TOTAL SUPPLY AIR FLOW ACHIEVED AT THE VAV BOXES. EXHAUST FAN SHALL MAINTAIN 5% (ADJ.) LESS AIRFLOW THAT THE SUPPLY FAN TO ALLOW A SLIGHTLY POSITIVE PRESSURE THROUGHOUT THE BUILDING. THE EXHAUST FAN SHALL HAVE A USER DEFINABLE 10 MIN (ADJ.) MINIMUM RUNTIME, UNLESS SHUTDOWN ON SAFETIES. ATC CONTRACTOR & BALANCING CONTRACTOR SHALL PROVIDE AN EXHAUST FAN(S) PROFILE OF AIR FLOW THROUGHOUT THE FAN SYSTEM CURVE AT DIFFERENT SPEEDS AND AIR FLOW TESTING. THIS SHALL BE USED FOR EXHAUST FAN SPEED CONTROL TO TRACK THE SUPPLY FAN AIRFLOW, TYP. FOR SUPPLY FANS.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **EXHAUST FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.**
- **EXHAUST FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.**

CURRENT SWITCHES SHALL BE INSTALLED ON THE SUPPLY AND RETURN FAN STARTERS. THE DDC SYSTEM USES THESE SWITCHES TO CONFIRM THE FANS ARE IN THE DESIRED STATE (I.E. ON OR OFF) AND GENERATES AN ALARM IF STATUS DEVIATES FROM DDC START/STOP CONTROL.

TOTAL ENERGY RECOVERY WHEEL - VARIABLE SPEED:
THE CONTROLLER SHALL MODULATE THE TOTAL ENERGY RECOVERY WHEEL AS FOLLOWS:

COOLING RECOVERY MODE:
THE CONTROLLER SHALL MEASURE THE TOTAL WHEEL DISCHARGE AIR TEMPERATURE AND MODULATE THE TOTAL WHEEL SPEED OR BYPASS DAMPERS TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL WHEEL SHALL RUN FOR COOLING RECOVERY WHENEVER:
- **THE RTU RETURN AIR TEMPERATURE IS 5°F (ADJ.) OR MORE BELOW THE OUTSIDE AIR TEMPERATURE.**
- **AND THE ECONOMIZER IS OFF.**
- **AND THE SUPPLY FAN IS ON.**

HEATING RECOVERY MODE:
THE CONTROLLER SHALL MEASURE THE TOTAL WHEEL DISCHARGE AIR TEMPERATURE AND MODULATE THE TOTAL WHEEL SPEED OR BYPASS DAMPERS TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL WHEEL SHALL RUN FOR HEAT RECOVERY WHENEVER:
- **THE RTU RETURN AIR TEMPERATURE IS 5°F (ADJ.) OR MORE ABOVE THE OUTSIDE AIR TEMPERATURE.**
- **AND THE ECONOMIZER IS OFF.**
- **AND THE SUPPLY FAN IS ON.**

PERIODIC SELF-CLEANING:
THE TOTAL ENERGY RECOVERY WHEEL SHALL RUN AT 5% SPEED (ADJ.) FOR 10 SEC (ADJ.) EVERY 4HRS (ADJ.) THE UNIT RUNS.

WHEEL DEFROST CYCLE AND FROST PROTECTION:
IF THE WHEEL DIFFERENTIAL PRESSURE RISES 1 INCH. (ADJ.) AND THE OUTSIDE AIR TEMPERATURE IS BELOW 30°F (ADJ.), THE WHEEL SPEED SHALL BE REDUCED VIA WHEEL VARIABLE FREQUENCY DRIVE, OR THE ENERGY RECOVERY WHEEL FACE & BYPASS DAMPERS SHALL MODULATE OPEN TO BYPASS THE WHEEL UNTIL THE PRESSURE RETURNS TO NORMAL. WHEEL DEFROST CONTROL SEQUENCE SHALL BE CHOSEN PER MANUFACTURER'S RECOMMENDATIONS. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **RECOVERY WHEEL ROTATION FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.**
- **RECOVERY WHEEL IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.**
- **RECOVERY WHEEL RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).**
- **RECOVERY WHEEL VFD IN FAULT**

COOLING AND DEHUMIDIFICATION - CHILLED WATER:
OUTSIDE AIR SHALL PASS THROUGH THE TOTAL ENERGY RECOVERY WHEEL, PRE-COOLED BY THE INCOMING RETURN AIR, UPON SENSING A MIXED AIR TEMPERATURE AND/OR MIXED AIR HUMIDITY ABOVE THE DESIRED SUPPLY AIR DISCHARGE SETPOINTS OF 63°(ADJ) & 55%RH (ADJ) OR SPACE HUMIDITY ABOVE 55% (ADJ), THE CHILLED WATER CONTROL VALVE SHALL BE ACTIVATED AND MODULATE TO COOL AND DEHUMIDIFY THE INCOMING AIR. THE COOLING COIL SHALL MODULATE TO MAINTAIN THE DESIRED COOLING COIL TEMPERATURE SETPOINT STARTING AT 55°F (53DR/LB) (ADJ.) AND SHALL RESET DOWN IN 1°F STEPS OVER TIME, 1°F EVERY FIVE MINUTES (ADJ), TO THE CHILLED WATER LEAVING AIR TEMPERATURE SETPOINT OF 50°F (ADJ.) UNTIL THE SPACE HUMIDITY LEVEL OF 55% RH (ADJ) IS MET. REFER TO RTU SCHEDULE FOR CHILLED WATER LEAVING AIR TEMPERATURE FOR LOW SETPOINT. THE HOT WATER CONTROL VALVE SHALL MODULATE TO REHEAT THE 55°F (ADJ.) SUPPLY AIR FROM THE COOLING COIL BACK UP TO 63°F (ADJ., SUMMER ONLY). THE SUPPLY AIR SETPOINT WILL BE RESET BASED ON OUTDOOR AIR TEMPERATURE / HUMIDITY CONDITION AND/OR A CALL FOR COOLING FROM (2) (ADJ.) OF THE SPACES SERVED BY THE RTU AND (2) (ADJ.) OF THE ROOMS SERVED BY THE RTU ARE CALLING FOR COOLING AND THE VAV BOXES ARE OPENED 100% THEN THE RESET WILL BE INITIATED. WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 55°F (ADJ.) THE SUPPLY AIR SETPOINT SHALL BE 68°F (ADJ.) & SHALL RESET TO 63°F (ADJ.) AT AN OUTDOOR TEMPERATURE ABOVE 75°F (ADJ.). THE RESET SHALL BE LINEAR BETWEEN THE TWO SETPOINTS. THE COOLING COIL AND HOT WATER COIL (REHEAT) SHALL BE ENABLED WHENEVER:
- **THE SUPPLY FAN STATUS IS ON.**
- **OUTSIDE AIR TEMPERATURE IS GREATER THAN 55°F (ADJ.).**
- **OR THE DISCHARGE SUPPLY AIR TEMPERATURE IS ABOVE THE DESIRED SETPOINT.**
- **OR SPACE TEMPERATURES ARE CALLING FOR COOLING**

HEATING - HOT WATER:
OUTSIDE AIR SHALL PASS THROUGH THE TOTAL ENERGY RECOVERY WHEEL, PRE-HEATED BY THE INCOMING RETURN AIR. UPON SENSING A MIXED AIR TEMPERATURE BELOW THE DESIRED SUPPLY AIR DISCHARGE SETPOINT OF 68°F (ADJ.) THE HOT WATER CONTROL VALVE SHALL BE ACTIVATED AND MODULATE TO HEAT THE INCOMING AIR TO MAINTAIN THE SUPPLY AIR DISCHARGE SETPOINT OF 68°F (ADJ.). WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 55°F (ADJ.), THE SUPPLY AIR SETPOINT SHALL BE 68°F (ADJ.) & SHALL RESET TO 63°F (ADJ.) AT AN OUTDOOR TEMPERATURE ABOVE 75°F (ADJ.). THE RESET SHALL BE LINEAR BETWEEN THE TWO SETPOINTS. THE HEATING COIL SHALL BE ENABLED WHENEVER:
- **THE SUPPLY FAN STATUS IS ON.**
- **OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).**
- **OR THE DISCHARGE SUPPLY AIR TEMPERATURE IS BELOW THE DESIRED SETPOINT.**
- **OR COOLING IS ACTIVATED AND REHEAT IS REQUIRED.**

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **LOW ENTERING AIR TEMP: IF THE MIXED AIR OR COOLING COIL LEAVING AIR TEMPERATURE IS LESS THAN 30°F (ADJ.).**

ECONOMIZER (DUAL ENTHALPY CONTROL):
THE CONTROLLER SHALL MEASURE THE RETURN AND OUTSIDE AIR ENTHALPIES AND MODULATE THE OUTSIDE AIR DAMPER, RECIRCULATION DAMPER (DURING UNOCCUPIED CONDITIONS) AND WHEEL BYPASS DAMPERS AS REQUIRED TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL ENERGY RECOVERY WHEEL SHALL BE OFF. THE ECONOMIZER SHALL BE ENABLED WHENEVER:
- **OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).**
- **AND THE OUTSIDE AIR ENTHALPY IS LESS THAN RETURN AIR ENTHALPY.**
- **AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE.**
- **AND THE SUPPLY FAN STATUS IS ON.**

THE ECONOMIZER SHALL BE DISABLED WHENEVER:
- **OUTSIDE AIR TEMPERATURE DROPS BELOW 40°F (ADJ.).**
- **OR ON LOSS OF SUPPLY FAN STATUS.**
- **OR THE FREEZESTAT IS ON.**

UNOCCUPIED MODE:
UNDER THIS MODE, ALL RTUS SHALL BE OFF & DAMPERS CLOSED. VAV DAMPERS SHALL BE CLOSED. ALL TERMINAL HEATING UNITS & COMPONENTS THROUGHOUT THE BUILDING SHALL MODULATE AS REQUIRED TO MAINTAIN THE BUILDING'S UNOCCUPIED SETPOINT OF 60°F (ADJ.) IN THE WINTER. IN THE EVENT THAT THE TERMINAL HEATING UNITS CANNOT MAINTAIN THE BUILDING AVERAGE UNOCCUPIED SETPOINT, THE RTUS SHALL BE ACTIVATED & FUNCTION AS INDICATED IN WARM-UP MODE W/ THE EXCEPTION THAT THE FAN SPEED WOULD BE REDUCED TO 60% (ADJ.), DURING THE SUMMER MONTHS, WHEN OAT IS ABOVE 80°F (ADJ.) AND/OR RH IS ABOVE 70% (ADJ.) & THE BUILDING'S AVERAGE UNOCCUPIED TEMPERATURE SETPOINTS OF 85°F (ADJ.) & UNOCCUPIED HUMIDITY SETPOINT OF 70% RH (ADJ) ARE NOT MAINTAINED, THE RTUS WILL BE ACTIVATED & FUNCTION AS INDICATED IN THE COOL-DOWN MODE W/ THE EXCEPTION THAT THE FAN SPEED WOULD BE REDUCED TO 60% (ADJ.).

SAFETY SEQUENCES

EMERGENCY SHUTDOWN:
UPON RECEIVING A SIGNAL FROM THE FIRE ALARM SYSTEM, THE UNIT'S FANS SHALL SHUTDOWN, ALL DAMPERS SHALL CLOSE, HOT AND CHILLED WATER VALVES SHALL CLOSE AND AN ALARM SHALL BE GENERATED AT THE BMS. THIS MODE SHALL BE CALLED EMERGENCY SHUTDOWN MODE. ATC CONTRACTOR SHALL HARD WIRE A DIRECT CONNECTION FROM THE FIRE ALARM PANELS DRY CONTACTS TO THE BMS. ALL ASSOCIATED VAV BOXES SHALL FULLY OPEN.

LOW LEAVING TEMPERATURE:
UPON A LOW LEAVING TEMPERATURE CONDITION (38°F ADJ) SENSED BY THE FREEZESTAT SENSOR, CO2 DEMAND CONTROL SHALL BE OVERRIDDEN, THE OUTSIDE AIR AND EXHAUST AIR DAMPER SHALL CLOSE, AND THE SUPPLY AND EXHAUST AIR FAN SHALL SHUT DOWN AND AN ALARM SHALL BE GENERATED.

SMOKE DETECTION:
THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SMOKE DETECTOR STATUS.

CASING TEMPERATURE SETPOINT:
THE DDC SYSTEM SHALL MONITOR THE UNIT CASING TEMPERATURE SETPOINT (BY THE MAT SENSOR). THE HOT WATER HEATING COIL VALVE SHALL OPEN TO MAINTAIN A 40°F (ADJ.) MINIMUM CASING TEMPERATURE SETPOINT.

STAGED OPTIMIZED START/STOP OPERATION:
ALL UNIT CONTROLLERS SHALL BE EQUIPPED WITH OPTIMAL START/STOP OPERATION AND TIME OF DAY SCHEDULING. UNITS SHALL START UP DURING MORNING WARM-UP/COOL-DOWN MODES IN A STAGGERED MANNER SUCH THAT ALL EQUIPMENT IS NOT STARTED AT THE SAME TIME.

ADDITIONAL ALARMS:

OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE PREFILTER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **PREFILTER CHANGE REQUIRED: PREFILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).**

RETURN AIR FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FINAL FILTER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **FINAL FILTER CHANGE REQUIRED: FINAL FILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).**

SUPPLY AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **HIGH SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS GREATER THAN 120°F (ADJ.).**
- **LOW SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS LESS THAN 45°F (ADJ.).**

SPACE HUMIDITY SENSOR:
THE DDC SYSTEM SHALL MONITOR THE SYSTEM ZONE HUMIDITY SENSORS AND REPORT THE INFORMATION TO THE BUILDING DDC SYSTEM ROOM GRAPHICS.

OVERRIDE:
THE SPACE MOUNTED TEMPERATURE SENSOR SHALL HAVE A PUSH BUTTON OVERRIDE CAPABILITY. UPON ACTIVATION OF 10% (ADJ.) OR MORE THERMOSTATS ON ONE RTU THE ASSOCIATED ROOFTOP UNIT AND ASSOCIATED VAV'S SHALL CHANGE TO OCCUPIED MODE FOR A PERIOD OF 2 HOURS (ADJ).

CO2 ALARM : **UPON A RISE IN SPACE CO2 10% OR MORE THAN THE DESIGN OF 800 PPM (ADJ.) AN ALARM WILL BE GENERATED AT THE BMS WITH A 20 MIN. (ADJ.) DELAY.**

CO2 DEMAND CONTROL VENTILATION (DCV):
UPON A RISE IN SPACE CO2 (GREATER THAN 800 PPM) THE ROOM'S RESPECTIVE VAV BOX SHALL MODULATE OPEN (WHERE APPLICABLE). UPON A RISE IN SPACE CO2 10% OR MORE THAN THE DESIGN OF 800 PPM (ADJ) AN ALARM WILL BE GENERATED AT THE BMS WITH A 20 MIN. (ADJ.) DELAY. ONCE LEVELS BEGIN TO DROP BELOW 800 PPM, THE VAV DAMPER SHALL RETURN CONTROL TO THE ROOM THERMOSTAT AND MODULATE ACCORDING TO THE DEMAND.

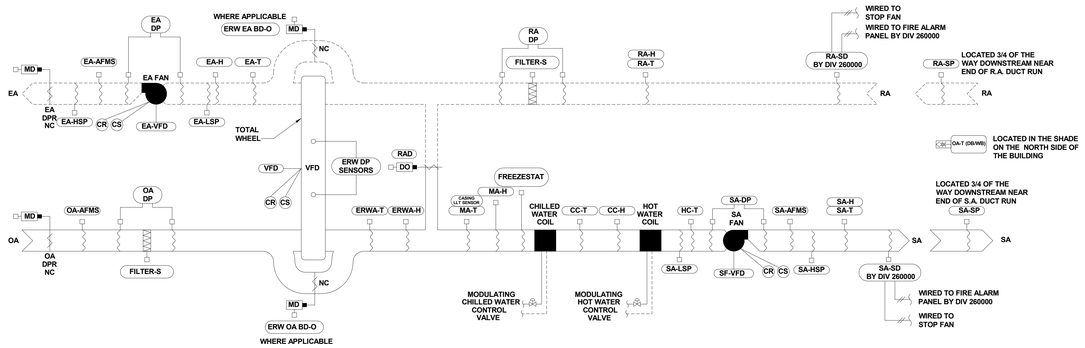
CO2 DEMAND CONTROL OVERRIDE:
FOR ALL RTU'S EQUIPPED WITH CO2 DEMAND CONTROL VENTILATION, THE ATC CONTRACTOR SHALL CREATE A SEQUENCE OF OPERATION AND ASSOCIATED GRAPHIC USER INTERFACE (GUI) BUTTON THAT SHALL BE CAPABLE OF ALLOWING THE BMS OPERATOR TO DISENGAGE AND RE-ENGAGE THE CO2 DEMAND VENTILATION CONTROL CAPABILITIES OF THE VAVS AND ASSOCIATED AIR DISTRIBUTION SYSTEM. A SOFTWARE NOTIFICATION SHALL BE GENERATED WHEN THIS MODE OF OPERATION IS ACTIVATED. THIS SEQUENCE AND GUI BUTTON SHALL BE PROVIDED FOR EACH INDIVIDUAL RTU AND A MASTER COMMAND GUI BUTTON SHALL ENGAGE/DISENGAGE THE MODE FOR ALL RTU'S. UNDER THIS MODE, THE VENTILATION OVERRIDE SHALL ALLOW THE ROOFTOP UNIT TO OPERATE AT IT'S MAXIMUM AIRFLOW AND MAXIMUM OUTSIDE AIR VENTILATION RATE. VARIABLE AIR VOLUME BOXES SHALL OPEN TO THEIR MAXIMUM POSITIONS. MORNING WARM-UP AND COOL DOWN MODES FOR THIS MODE OF OPERATION SHALL ALSO OPERATE WITH MAXIMUM OUTSIDE AIR ENABLED. OUTSIDE AIR VENTILATION SHALL BE ENABLED AT A MINIMUM OF TWO HOURS (ADJ) PRIOR TO SCHEDULED OCCUPIED TIME, AND SHALL CONTINUE TO RUN TWO HOURS (ADJ) POST SCHEDULED OCCUPANCY.

EXTREME WEATHER MODE:
THROUGH THE BMS WEATHER STATION, WHEN WIND SPEED NUMBERS ABOVE 50 MPH (ADJ) AND RTU'S ARE IN OCCUPIED MODE, ALL OUTSIDE AIR DAMPERS SHALL CLOSE AND UNIT SHALL GO INTO RECIRCULATION MODE BUT STILL MAINTAIN OCCUPIED SETPOINTS. DURING THIS CONDITION AN ALARM SHALL BE GENERATED AT THE BMS INDICATING HIGH WINDS - OA DAMPER CLOSED.

ECONOMIZER OVERRIDE:
FOR ALL RTU'S EQUIPPED WITH ECONOMIZER CONTROL, THE ATC CONTRACTOR SHALL CREATE A SEQUENCE OF OPERATION AND ASSOCIATED GRAPHIC USER INTERFACE (GUI) BUTTON THAT SHALL BE CAPABLE OF ALLOWING THE BMS OPERATOR TO DISENGAGE AND RE-ENGAGE THE ECONOMIZER CONTROL CAPABILITIES OF THE RTU. A SOFTWARE NOTIFICATION SHALL BE GENERATED WHEN THIS MODE OF OPERATION IS ACTIVATED. THIS SEQUENCE AND GUI BUTTON SHALL BE PROVIDED FOR EACH INDIVIDUAL RTU AND IN ADDITION A MASTER COMMAND GUI BUTTON SHALL ENGAGE/DISENGAGE THE MODE FOR ALL RTU'S. UNDER THIS MODE, THE ECONOMIZER OVERRIDE SHALL ALLOW THE ROOFTOP UNIT TO OPERATE ITS HOT WATER AND/OR CHILLED WATER CONTROL VALVES TO MAINTAIN THE DAT SETPOINT. THE OUTSIDE AND RETURN AIR DAMPERS SHALL FUNCTION AS INDICATED IN THE OCCUPIED MODE. THE VARIABLE AIR VOLUME BOXES SHALL MODULATE AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AND CO2 SETPOINTS.

RTU HANDLING UNITS	BMS CONTROL POINTS					
POINT NAME	AI	AO	BI	BO	ALARM	REMARKS
OUTSIDE AIR FLOW MEASURING STATION	X				X	NOTE #1
SUPPLY AIR FLOW MEASURING STATION	X					NOTE #6
EXHAUST AIR FLOW MEASURING STATION	X					NOTE #6
OUTSIDE AIR TEMP	X					
OUTSIDE AIR HUMIDITY	X					
EXHAUST AIR TEMP	X					
EXHAUST AIR HUMIDITY	X					
ENERGY RECOVERY HEAT WHEEL DISCHARGE AIR TEMP	X					
ENERGY RECOVERY WHEEL DISCHARGE AIR HUMIDITY	X					
MIXED AIR TEMP & HUMIDITY	X				X	
COOLING COIL AIR TEMP & HUMIDITY	X				X	
HEATING COIL AIR TEMP	X				X	
SUPPLY AIR TEMP	X				X	
SUPPLY AIR HUMIDITY	X					
SUPPLY AIR STATIC PRESSURE	X	X			X	
OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE	X					
RETURN AIR FILTER DIFFERENTIAL PRESSURE	X					
SUPPLY FAN DIFFERENTIAL PRESSURE SENSOR/SWITCH	X				X	NOTE #7
EXHAUST FAN DIFFERENTIAL PRESSURE SENSOR/SWITCH	X				X	NOTE #7
RETURN AIR HUMIDITY	X					
RETURN AIR TEMP	X					

RTU- # - MIXED AIR DISPLACEMENT VENTILATION AIR HANDLING SYSTEM w/ DEMAND CONTROL VENTILATION - SINGLE ZONE



ROOF TOP UNITS

A DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE ROOFTOP AIR HANDLING UNIT OPERATION AS FOLLOWS:

RUN CONDITIONS - SCHEDULED:
THE RTU SHALL RUN BASED UPON AN OPERATOR-ADJUSTABLE SCHEDULE.

WARM-UP:
THE TERMINAL HEATING UNITS (RADIANT PANELS, WALL RADIATION UNITS, FINTUBE, ETC) VALVES SHALL MODULATE OPEN TO RAISE THE SPACES TO THE OCCUPIED SET POINT OF 70°F (ADJ.). ALONG WITH THE TERMINAL HEATING UNITS, THE RTU SHALL ALSO BE ACTIVATED. THE RTU OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE CLOSED, THE RECIRCULATION DAMPER SHALL BE OPEN. THE CHILLED WATER CONTROL VALVE SHALL BE CLOSED, THE TOTAL ENERGY RECOVERY WHEEL SHALL BE DE-ENERGIZED & ASSOCIATED ERW BYPASS DAMPERS SHALL CLOSE. THE SUPPLY FAN SHALL START AND RECIRCULATE BUILDING AIR, THE EXHAUST FAN SHALL BE OFF. THE RTU HOT WATER CONTROL VALVE SHALL MODULATE OPEN AND THE UNIT DISCHARGE AIR SETPOINT DURING WARM-UP SHALL BE 85°F (ADJ.). ONCE THE SPACE HAS REACHED SPACE SETPOINT, THE TERMINAL HEATING UNITS SHALL ENTER THE OCCUPIED MODE. ALLOWING THEIR HOT WATER VALVES TO MODULATE AS REQUIRED TO MAINTAIN THE SPACE SETPOINT. THE RTU SHALL ALSO ENTER OCCUPIED MODE. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE WARM-UP MODE MORE THAN ONCE PER DAY, THROUGH THE OPTIMIZED START PROGRAM LOGIC WITHIN THE DDC SYSTEM SOFTWARE, THE BMS SHALL MONITOR THE RATE OF TEMPERATURE RISE TO DETERMINE WHEN TO ACTIVATE THE WARM UP MODE TO ENSURE THAT THE BUILDING HAS REACHED ITS SETPOINT FOR OCCUPIED MODE.

COOL-DOWN:
THE RTU OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE CLOSED, THE RECIRCULATION DAMPER SHALL BE OPEN. THE HOT WATER CONTROL VALVE SHALL BE CLOSED, THE TOTAL ENERGY RECOVERY WHEEL SHALL BE DE-ENERGIZED & ASSOCIATED ERW BYPASS DAMPERS SHALL CLOSE. THE EXHAUST FAN SHALL BE OFF AND THE SUPPLY FAN SHALL START AND RECIRCULATE BUILDING AIR. THE RTU CHILLED WATER VALVE SHALL MODULATE OPEN AND THE UNIT DISCHARGE AIR SETPOINT DURING COOL-DOWN SHALL BE 55°F (ADJ.). ONCE THE SPACE HAS REACHED SPACE SETPOINT OF 78°F (ADJ.), THE RTU SHALL ENTER OCCUPIED MODE. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE COOL-DOWN MODE MORE THAN ONCE PER DAY, THROUGH THE OPTIMIZED START PROGRAM LOGIC WITHIN THE DDC SYSTEM SOFTWARE, THE BMS SHALL MONITOR THE RATE OF TEMPERATURE DECREASE TO DETERMINE WHEN TO ACTIVATE THE COOL DOWN MODE TO ENSURE THAT THE SPACE HAS REACHED ITS SETPOINT FOR OCCUPIED MODE. ECONOMIZER MODE OF OPERATION SHALL OVERRIDE NORMAL COOL-DOWN MODE OF OPERATION DURING UNOCCUPIED MODE.

OCCUPIED MODE:

GENERAL:
THE FANS START OR CONTINUE TO RUN AND THE RTU IS CONTROLLED AS FOLLOWS:
THE EXHAUST, OUTSIDE, & RETURN AIR DAMPERS SHALL OPEN TO MINIMUM POSITIONS AS SCHEDULED & AS DETERMINED DURING BALANCING. THE ENERGY RECOVERY WHEEL SHALL BE ACTIVATED, ERW BYPASS DAMPERS SHALL CLOSE AND THE WHEEL SHALL OPERATE PER THE SEQUENCES BELOW. THE SUPPLY AND EXHAUST FANS SHALL BE ACTIVATED OR CONTINUE TO RUN. THE SUPPLY AIR FAN SHALL MODULATE BETWEEN 60% & 100% SPEED TO MAINTAIN SPACE TEMP DURING HEATING & COOLING MODES. FANS SHALL RUN AT 60% SPEED UNLESS THE SPACE SETPOINT CANNOT BE MET AFTER THE HOT WATER OR CHILLED WATER VALVE HAS BEEN OPEN FOR 5 MINUTES (ADJ.) OR BASED ON SPACE CO2 LEVELS. REFER TO CO2 DEMAND SEQUENCE FOR FURTHER INFORMATION. THE SYSTEMS OPERATING STATIC PRESSURE RANGES SHALL BE PROVIDED/OBTAINED THROUGH TESTING AND BALANCING CONTRACTOR DURING THE BALANCING PROCESS TO ESTABLISH MIN & MAX SETPOINTS. THE EXHAUST FAN WILL MODULATE ITS SPEED TO MAINTAIN A -5% CFM OFFSET WITH THE SUPPLY FAN. THE RETURN AIR DAMPER AND EXHAUST AIR DAMPER SHALL MODULATE INVERSELY, ALLOWING THE RETURN AIR TO EITHER MIX WITH OA FOR TEMPERATURE CONTROL OR TO EXHAUST FROM THE UNIT.

SUPPLY FAN:
THE SUPPLY FAN SHALL RUN ANYTIME THE RTU IS COMMANDED TO RUN AND THE O.A. DAMPER, RECIRC DAMPER & E.A. DAMPER, ARE PROVEN OPEN. THE SUPPLY FAN SHALL MODULATE ITS SPEED TO MAINTAIN SUPPLY STATIC SETPOINT AND SPACE TEMPERATURE. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER-DEFINABLE 10 MIN (ADJ.) MINIMUM RUNTIME, UNLESS SHUTDOWN ON SAFETIES.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.**
- **SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.**

EXHAUST FAN:
THE EXHAUST FAN SHALL RUN ANYTIME THE RTU IS COMMANDED TO RUN AND THE O.A. DAMPER & E.A. DAMPER, & THE RECIRCULATION DAMPER ARE PROVEN OPEN. THE EXHAUST FAN SHALL MODULATE ITS SPEED BASED ON THE SUPPLY AIR FLOW, ACHIEVING 5% (ADJ.) LESS AIRFLOW THAN THE SUPPLY FAN TO ALLOW A SLIGHTLY POSITIVE PRESSURE THROUGHOUT THE BUILDING. THE EXHAUST FAN SHALL HAVE A USER DEFINABLE 10 MIN (ADJ.) MINIMUM RUNTIME, UNLESS SHUTDOWN ON SAFETIES.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **EXHAUST FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.**
- **EXHAUST FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.**

CURRENT SWITCHES SHALL BE INSTALLED ON THE SUPPLY AND RETURN FAN STARTERS. THE DDC SYSTEM USES THESE SWITCHES TO CONFIRM THE FANS ARE IN THE DESIRED STATE (I.E. ON OR OFF) AND GENERATES AN ALARM IF STATUS DEVIATES FROM DDC START/STOP CONTROL.

TOTAL ENERGY RECOVERY WHEEL - VARIABLE SPEED:
THE CONTROLLER SHALL MODULATE THE TOTAL ENERGY RECOVERY WHEEL AS FOLLOWS:

COOLING RECOVERY MODE:
THE CONTROLLER SHALL MEASURE THE TOTAL WHEEL DISCHARGE AIR TEMPERATURE AND MODULATE THE TOTAL WHEEL SPEED AND/OR BYPASS DAMPERS TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL WHEEL SHALL RUN FOR COOLING RECOVERY WHENEVER:
- **THE RTU RETURN AIR TEMPERATURE IS 5°F (ADJ.) OR MORE BELOW THE OUTSIDE AIR TEMPERATURE.**
- **AND THE ECONOMIZER IS OFF.**
- **AND THE SUPPLY FAN IS ON.**

HEATING RECOVERY MODE:
THE CONTROLLER SHALL MEASURE THE TOTAL WHEEL DISCHARGE AIR TEMPERATURE AND MODULATE THE TOTAL WHEEL SPEED AND/OR BYPASS DAMPERS TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL WHEEL SHALL RUN FOR HEAT RECOVERY WHENEVER:
- **THE RTU RETURN AIR TEMPERATURE IS 5°F (ADJ.) OR MORE ABOVE THE OUTSIDE AIR TEMPERATURE.**
- **AND THE ECONOMIZER IS OFF.**
- **AND THE SUPPLY FAN IS ON.**

PERIODIC SELF-CLEANING:
THE TOTAL ENERGY RECOVERY WHEEL SHALL RUN AT 5% SPEED (ADJ.) FOR 10 SEC (ADJ.) EVERY 4HRS (ADJ.) THE UNIT RUNS.

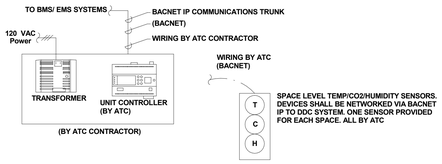
WHEEL DEFROST CYCLE AND FROST PROTECTION:
IF THE WHEEL DIFFERENTIAL PRESSURE RISES 1 INCH (ADJ.) AND THE OUTSIDE AIR TEMPERATURE IS BELOW 30°F (ADJ.), THE WHEEL SPEED SHALL BE REDUCED VIA WHEEL VARIABLE FREQUENCY DRIVE, OR THE ENERGY RECOVERY WHEEL FACE & BYPASS DAMPERS SHALL MODULATE OPEN TO BYPASS THE WHEEL UNTIL THE PRESSURE RETURNS TO NORMAL. WHEEL DEFROST CONTROL SEQUENCE SHALL BE CHOSEN PER MANUFACTURER'S RECOMMENDATIONS. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **RECOVERY WHEEL ROTATION FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.**
- **RECOVERY WHEEL IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.**
- **RECOVERY WHEEL RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).**
- **RECOVERY WHEEL VFD IN FAULT**

COOLING AND DEHUMIDIFICATION - CHILLED WATER:
OUTSIDE AIR SHALL PASS THROUGH THE TOTAL ENERGY RECOVERY WHEEL, PRE-COOLED BY THE INCOMING RETURN AIR, UPON SENSING A MIXED AIR TEMPERATURE AND/OR MIXED AIR HUMIDITY ABOVE THE DESIRED SUPPLY AIR DISCHARGE SETPOINTS OF 63°(ADJ) & 55%RH (ADJ) OR SPACE HUMIDITY ABOVE 55% (ADJ), THE CHILLED WATER CONTROL VALVE SHALL BE ACTIVATED AND MODULATE TO COOL AND DEHUMIDIFY THE INCOMING AIR. THE COOLING COIL SHALL MODULATE TO MAINTAIN THE DESIRED COOLING COIL TEMPERATURE SETPOINT STARTING AT 55°F (53GR/LB) (ADJ.) AND SHALL RESET DOWN IN 1°F STEPS OVER TIME, 1°F EVERY FIVE MINUTES (ADJ), UNTIL THE CHILLED WATER LEAVING AIR TEMPERATURE SETPOINT OF 50°F (ADJ.) IS ACHIEVED & THE SPACE TEMPERATURE OF 78°F & SPACE HUMIDITY LEVEL OF 55% RH (ADJ) IS MET. REFER TO RTU SCHEDULE FOR CHILLED WATER LEAVING AIR TEMPERATURE FOR LOW SETPOINT. THE HOT WATER CONTROL VALVE SHALL MODULATE TO REHEAT THE SUB-COOLED SUPPLY AIR FROM THE COOLING COIL BACK UP TO 63°F (ADJ., SUMMER ONLY) FOR DEHUMIDIFICATION PURPOSES. THE SUPPLY AIR SETPOINT WILL BE RESET BASED ON OUTDOOR AIR TEMPERATURE / HUMIDITY CONDITION AND/OR A CALL FOR COOLING FROM THE SPACE SERVED BY THE RTU. IF THE SPACE SERVED BY THE RTU IS CALLING FOR COOLING AND THE FAN IS OVER 75% (ADJ.) THEN THE RESET WILL BE INITIATED. WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 55°F (ADJ.) THE SUPPLY AIR SETPOINT SHALL BE RESET TO 63°F (ADJ.) AT AN OUTDOOR TEMPERATURE ABOVE 75°F (ADJ.). THE RESET SHALL BE LINEAR BETWEEN THE TWO SETPOINTS. THE COOLING COIL AND HOT WATER COIL (REHEAT) SHALL BE ENABLED WHENEVER:
- **THE SUPPLY FAN STATUS IS ON.**
- **OUTSIDE AIR TEMPERATURE IS GREATER THAN 55°F (ADJ.).**
- **OR THE DISCHARGE SUPPLY AIR TEMPERATURE IS ABOVE THE DESIRED SETPOINT.**
- **OR SPACE TEMPERATURE IS CALLING FOR COOLING**

HEATING - HOT WATER:
OUTSIDE AIR SHALL PASS THROUGH THE TOTAL ENERGY RECOVERY WHEEL, PRE-HEATED BY THE INCOMING RETURN AIR. UPON SENSING A MIXED AIR TEMPERATURE BELOW THE DESIRED SUPPLY AIR DISCHARGE SETPOINT OF 68°F (ADJ.) THE HOT WATER CONTROL VALVE SHALL BE ACTIVATED AND MODULATE TO HEAT THE INCOMING AIR TO MAINTAIN THE SUPPLY AIR DISCHARGE SETPOINT OF 68°F (ADJ.).

- **THE SUPPLY FAN STATUS IS ON.**
- **OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).**
- **OR THE DISCHARGE SUPPLY AIR TEMPERATURE IS BELOW THE DESIRED SETPOINT.**
- **OR COOLING IS ACTIVATED AND REHEAT IS REQUIRED.**

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **LOW ENTERING AIR TEMP: IF THE MIXED AIR OR COOLING COIL LEAVING AIR TEMPERATURE IS LESS THAN 30°F (ADJ.).**



(BY ATC CONTRACTOR)

ECONOMIZER (DUAL ENTHALPY CONTROL):
THE CONTROLLER SHALL MEASURE THE RETURN AND OUTSIDE AIR ENTHALPIES AND MODULATE THE OUTSIDE AIR DAMPER, RECIRCULATION DAMPER AND WHEEL BYPASS DAMPERS AS REQUIRED TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL ENERGY RECOVERY WHEEL SHALL BE OFF DURING UNOCCUPIED MODE. THE ECONOMIZER SHALL BE ENABLED WHENEVER:
- **OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).**
- **AND THE OUTSIDE AIR ENTHALPY IS LESS THAN RETURN AIR ENTHALPY.**
- **AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE.**
- **AND THE SUPPLY FAN STATUS IS ON.**

THE ECONOMIZER SHALL BE DISABLED WHENEVER:
- **OUTSIDE AIR TEMPERATURE DROPS BELOW 40°F (ADJ.).**
- **OR ON LOSS OF SUPPLY FAN STATUS.**
- **OR THE FREEZESTAT IS ON.**

UNOCCUPIED MODE:
UNDER THIS MODE, ALL RTUS SHALL BE OFF & DAMPERS CLOSED. ALL TERMINAL HEATING UNITS & COMPONENTS THROUGHOUT THE SPACE SHALL MODULATE AS REQUIRED TO MAINTAIN THE SPACE UNOCCUPIED SETPOINT OF 60°F (ADJ.) IN THE WINTER. IN THE EVENT THAT THE TERMINAL HEATING UNITS CANNOT MAINTAIN THE SPACE UNOCCUPIED SETPOINT, THE RTUS SHALL BE ACTIVATED & FUNCTION AS INDICATED IN WARM-UP MODE W/ THE EXCEPTION THAT THE FAN SPEED WOULD BE REDUCED TO 60% (ADJ.). DURING THE SUMMER MONTHS, WHEN OAT IS ABOVE 80°F (ADJ.) AND/OR RH IS ABOVE 70% (ADJ.) & THE SPACE UNOCCUPIED TEMPERATURE SETPOINTS OF 85°F (ADJ.) & UNOCCUPIED HUMIDITY SETPOINT OF 70% RH (ADJ.) ARE NOT MAINTAINED, THE RTUS WILL BE ACTIVATED & FUNCTION AS INDICATED IN THE COOL-DOWN MODE W/ THE EXCEPTION THAT THE FAN SPEED WOULD BE REDUCED TO 60% (ADJ.).

SAFETY SEQUENCES

EMERGENCY SHUTDOWN:
UPON RECEIVING A SIGNAL FROM THE FIRE ALARM SYSTEM, THE UNIT'S FANS SHALL SHUTDOWN, ALL DAMPERS SHALL CLOSE, HOT AND CHILLED WATER VALVES SHALL CLOSE AND AN ALARM SHALL BE GENERATED AT THE BMS. THIS MODE SHALL BE CALLED EMERGENCY SHUTDOWN MODE. ATC CONTRACTOR SHALL HARD WIRE A DIRECT CONNECTION FROM THE FIRE ALARM PANELS DRY CONTACTS TO THE BMS. ALL ASSOCIATED VAV BOXES SHALL CLOSE.

LOW LEAVING TEMPERATURE:
UPON A LOW LEAVING TEMPERATURE CONDITION (38°F ADJ) SENSED BY THE FREEZESTAT SENSOR, CO2 DEMAND CONTROL SHALL BE OVERRIDDEN, THE OUTSIDE AIR AND EXHAUST AIR DAMPER SHALL CLOSE, AND THE SUPPLY AND EXHAUST AIR FAN SHALL SHUT DOWN AND AN ALARM SHALL BE GENERATED.

SMOKE DETECTION:
THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SMOKE DETECTOR STATUS.

CASING TEMPERATURE SETPOINT:
THE DDC SYSTEM SHALL MONITOR THE UNIT CASING TEMPERATURE SETPOINT (BY THE MAT SENSOR). THE HOT WATER HEATING COIL VALVE SHALL OPEN TO MAINTAIN A 40°F (ADJ.) MINIMUM CASING TEMPERATURE SETPOINT.

STAGED OPTIMIZED START/STOP OPERATION:
ALL UNIT CONTROLLERS SHALL BE EQUIPPED WITH OPTIMAL START/STOP OPERATION AND TIME OF DAY SCHEDULING. UNITS SHALL START UP DURING MORNING WARM-UP/COOL-DOWN MODES IN A STAGGERED MANNER SUCH THAT ALL EQUIPMENT IS NOT STARTED AT THE SAME TIME.

ADDITIONAL ALARMS:

OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE PREFILTER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **PREFILTER CHANGE REQUIRED: PREFILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).**

RETURN AIR FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FINAL FILTER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **FINAL FILTER CHANGE REQUIRED: FINAL FILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).**

SUPPLY AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **HIGH SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS GREATER THAN 120°F (ADJ.).**
- **LOW SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS LESS THAN 45°F (ADJ.).**

SPACE HUMIDITY SENSOR:
THE DDC SYSTEM SHALL MONITOR THE SPACE HUMIDITY SENSORS AND REPORT THE INFORMATION TO THE BUILDING DDC SYSTEM ROOM GRAPHICS. UPON A HIGH SPACE HUMIDITY LEVEL ABOVE 80% RH (ADJ.) AN ALARM WILL BE GENERATED IN THE BMS & THE UNIT WILL ENTER THE COOL DOWN MODE.

OVERRIDE:
THE SPACE MOUNTED TEMPERATURE SENSOR SHALL HAVE A PUSH BUTTON OVERRIDE CAPABILITY. UPON ACTIVATION OF THE THERMOSTAT OVERRIDE BUTTON THE ASSOCIATED ROOFTOP UNIT SHALL CHANGE TO OCCUPIED MODE FOR A PERIOD OF 2 HOURS (ADJ).

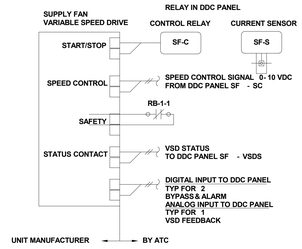
CO2 ALARM : UPON A RISE IN SPACE CO2 10% OR MORE THAN THE DESIGN OF 800 PPM (ADJ.) AN ALARM WILL BE GENERATED AT THE BMS WITH A 20 MIN. (ADJ.) DELAY.

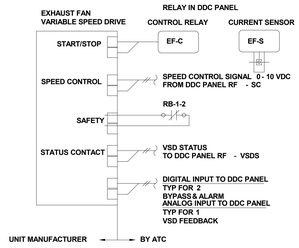
CO2 DEMAND CONTROL VENTILATION (DCV):
UPON A RISE IN SPACE CO2 (GREATER THAN 800 PPM) THE RTU'S RESPECTIVE OUTSIDE AIR DAMPER SHALL MODULATE OPEN FROM ITS MINIMUM POSITION AND THE RETURN DAMPER SHALL BEGIN TO MODULATE CLOSED IN UNISON. UPON A RISE IN SPACE CO2 10% OR MORE THAN THE DESIGN OF 800 PPM (ADJ) AN ALARM WILL BE GENERATED AT THE BMS WITH A 20 MIN. (ADJ.) DELAY. THE FANS SHALL BEGIN TO RAMP UP TO INCREASE VENTILATION. ONCE LEVELS BEGIN TO DROP BELOW 800 PPM, THE RTU SHALL RETURN TO OCCUPIED MODE, AND THE DAMPERS & FANS SHALL MODULATE TO MAINTAIN DISCHARGE AIR & SPACE TEMPERATURE & HUMIDITY.

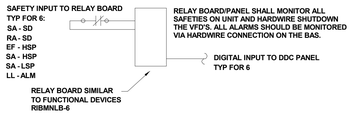
CO2 DEMAND CONTROL OVERRIDE:
FOR ALL RTU'S EQUIPPED WITH CO2 DEMAND CONTROL VENTILATION, THE ATC CONTRACTOR SHALL CREATE A SEQUENCE OF OPERATION AND ASSOCIATED GRAPHIC USER INTERFACE (GUI) BUTTON THAT SHALL BE CAPABLE OF ALLOWING THE BMS OPERATOR TO DISENGAGE AND RE-ENGAGE THE CO2 DEMAND VENTILATION CONTROL CAPABILITIES OF THE ASSOCIATED AIR DISTRIBUTION SYSTEM. A SOFTWARE NOTIFICATION SHALL BE GENERATED WHEN THIS MODE OF OPERATION IS ACTIVATED. THIS SEQUENCE AND GUI BUTTON SHALL BE PROVIDED FOR EACH INDIVIDUAL RTU AND A MASTER COMMAND GUI BUTTON SHALL ENGAGE/DISENGAGE THE MODE FOR ALL RTU'S. UNDER THIS MODE, THE VENTILATION OVERRIDE SHALL ALLOW THE ROOFTOP UNIT TO OPERATE AT IT'S MAXIMUM AIRFLOW AND MAXIMUM OUTSIDE AIR VENTILATION RATE. MORNING WARM-UP AND COOL DOWN MODES FOR THIS MODE OF OPERATION SHALL ALSO OPERATE WITH MAXIMUM OUTSIDE AIR ENABLED WHEN CO2 CONTOL OVERRIDE IS ENABLED. OUTSIDE AIR VENTILATION SHALL BE ENABLED AT A MINIMUM OF TWO HOURS (ADJ) PRIOR TO SCHEDULED OCCUPIED TIME, AND SHALL CONTINUE TO RUN TWO HOURS (ADJ) POST SCHEDULED OCCUPANCY.

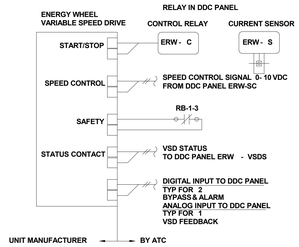
EXTREME WEATHER MODE:
THROUGH THE BMS WEATHER STATION, WHEN WIND SPEED NUMBERS ABOVE 50 MPH (ADJ) AND RTU'S ARE IN OCCUPIED MODE, ALL OUTSIDE AIR DAMPERS SHALL CLOSE AND UNIT SHALL GO INTO RECIRCULATION MODE BUT STILL MAINTAIN OCCUPIED SETPOINTS. DURING THIS CONDITION AN ALARM SHALL BE GENERATED AT THE BMS INDICATING HIGH WINDS - OA DAMPER CLOSED.

ECONOMIZER OVERRIDE:
FOR ALL RTU'S EQUIPPED WITH ECONOMIZER CONTROL, THE ATC CONTRACTOR SHALL CREATE A SEQUENCE OF OPERATION AND ASSOCIATED GRAPHIC USER INTERFACE (GUI) BUTTON THAT SHALL BE CAPABLE OF ALLOWING THE BMS OPERATOR TO DISENGAGE AND RE-ENGAGE THE ECONOMIZER CONTROL CAPABILITIES OF THE RTU. A SOFTWARE NOTIFICATION SHALL BE GENERATED WHEN THIS MODE OF OPERATION IS ACTIVATED. THIS SEQUENCE AND GUI BUTTON SHALL BE PROVIDED FOR EACH INDIVIDUAL RTU AND IN ADDITION A MASTER COMMAND GUI BUTTON SHALL ENGAGE/DISENGAGE THE MODE FOR ALL RTU'S. UNDER THIS MODE, THE ECONOMIZER OVERRIDE SHALL ALLOW THE ROOFTOP UNIT TO OPERATE ITS HOT WATER AND/OR CHILLED WATER CONTROL VALVES TO MAINTAIN THE DAT SETPOINT. THE OUTSIDE AND RETURN AIR DAMPERS SHALL FUNCTION AS INDICATED IN THE OCCUPIED MODE. THE VARIABLE AIR VOLUME BOXES SHALL MODULATE AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AND CO2 SETPOINTS.



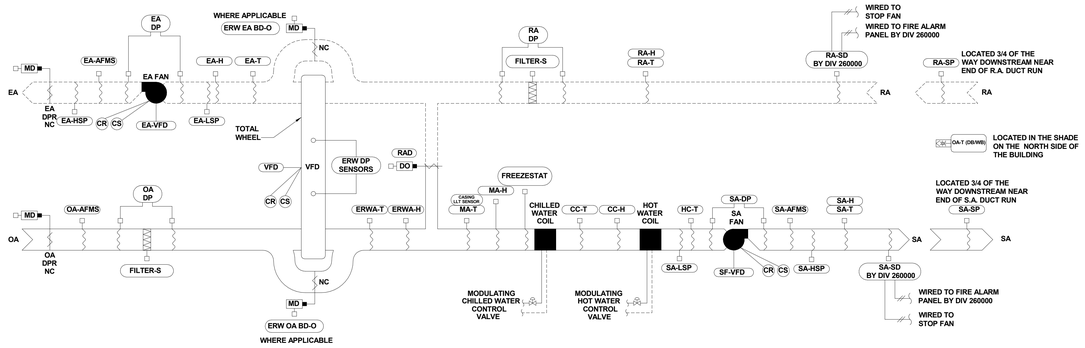


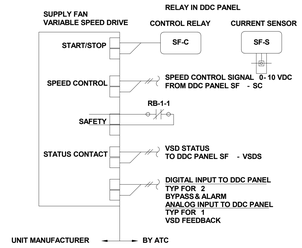


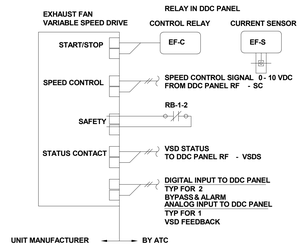


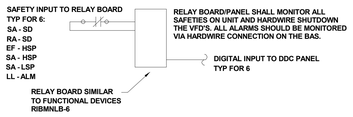
ROOF TOP UNITS	BMS CONTROL POINTS					
POINT NAME	AI	AO	BI	BO	ALARM	REMARKS
OUTSIDE AIR FLOW MEASURING STATION	X				X	NOTE #1
SUPPLY AIR FLOW MEASURING STATION	X					NOTE #6
EXHAUST AIR FLOW MEASURING STATION	X					NOTE #6
OUTSIDE AIR TEMP	X					
OUTSIDE AIR HUMIDITY	X					
EXHAUST AIR TEMP	X					
EXHAUST AIR HUMIDITY	X					
ENERGY RECOVERY HEAT WHEEL DISCHARGE AIR TEMP	X					
ENERGY RECOVERY WHEEL DISCHARGE AIR HUMIDITY	X					
MIXED AIR TEMP & HUMIDITY	X					
COOLING COIL AIR TEMP & HUMIDITY	X	X				
HEATING COIL AIR TEMP	X	X				
SUPPLY AIR TEMP	X	X				
SUPPLY AIR HUMIDITY	X					
SUPPLY AIR STATIC PRESSURE	X	X			X	
OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE	X					
RETURN AIR FILTER DIFFERENTIAL PRESSURE	X					
SUPPLY FAN DIFFERENTIAL PRESSURE SENSOR/SWITCH	X				X	NOTE #7
EXHAUST FAN DIFFERENTIAL PRESSURE SENSOR/SWITCH	X				X	NOTE #7
RETURN AIR HUMIDITY	X					
RETURN AIR TEMP	X					
RETURN AIR STATIC PRESSURE	X	X			X	
ENERGY RECOVERY WHEEL VFD SPEED	X	X				
SUPPLY FAN VFD SPEED	X	X				
EXHAUST FAN VFD SPEED	X	X				
CHILLED WATER CONTROL VALVE	X	X				
HOT WATER CONTROL VALVE	X	X				
RE-CIRC AIR DAMPER	X	X				
OUTSIDE AIR DAMPER	X	X				
EXHAUST AIR DAMPER	X	X				
RETURN AIR SMOKE DETECTOR			X		X	
SUPPLY AIR SMOKE DETECTOR			X		X	
SUPPLY FAN STATUS			X		X	
EXHAUST FAN STATUS			X		X	
ENERGY RECOVERY WHEEL STATUS			X		X	
ENERGY RECOVERY WHEEL VFD FAULT			X		X	
SUPPLY FAN VFD FAULT			X		X	
EXHAUST FAN VFD FAULT			X		X	
SUPPLY FAN START/STOP				X		
EXHAUST FAN START/STOP				X		
ENERGY RECOVERY WHEEL START/STOP				X		
COOLING SUPPLY AIR SET POINT						
HEATING SUPPLY AIR SET POINT						
EMERGENCY SHUT DOWN					X	
SUPPLY FAN FAILURE					X	
SUPPLY FAN IN HAND					X	
EXHAUST FAN FAILURE					X	
EXHAUST FAN IN HAND					X	
ENERGY RECOVERY WHEEL ROTATION FAILURE					X	
ENERGY RECOVERY WHEEL IN HAND					X	
TOTAL WHEEL RUNTIME EXCEEDED					X	
HIGH COOLING SUPPLY AIR TEMP					X	10° ABOVE
HIGH HEATING SUPPLY AIR TEMP					X	10° ABOVE
LOW HEATING SUPPLY AIR TEMP					X	10° BELOW
OUTSIDE AIR FILTER CHANGE REQUIRED					X	
RETURN AIR FILTER CHANGE REQUIRED					X	
HIGH RETURN AIR CARBON DIOXIDE CONCENTRATION					X	880 PPM ALRM
HIGH RETURN AIR HUMIDITY					X	75% RH ALARM
LOW RETURN AIR TEMP					X	60° OR LESS
HIGH RETURN AIR TEMP					X	85° OR ABOVE
SPACE CO2	X				X	880 PPM ALRM
FREEZESTAT	X				X	NOTE #5
CASING LOW LIMIT TEMPERAT

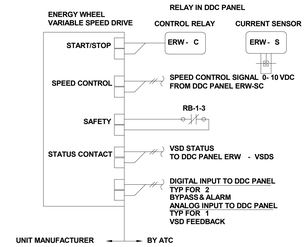
RTU-# - 100% OUTSIDE VENTILATION AIR HANDLING SYSTEM w/ DEMAND CONTROL VENTILATION











ROOF TOP UNIT

A DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE ROOFTOP AIR HANDLING UNIT OPERATION AS FOLLOWS:

RUN CONDITIONS - SCHEDULED:
THE RTU SHALL RUN BASED UPON AN OPERATOR-ADJUSTABLE SCHEDULE.

WARM-UP:
THE TERMINAL HEATING UNITS (RADIANT PANELS & VRF SYSTEM SHALL MODULATE ON TO RAISE THE SPACES TO THE OCCUPIED SET POINT OF 70°F (ADJ.). ALONG WITH THE TERMINAL HEATING UNITS, THE RTU SHALL ALSO BE ACTIVATED. ALL VAV'S ASSOCIATED WITH THE RTU SHALL GO TO FULL-OPEN POSITION. THE RTU OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE CLOSED, THE RECIRCULATION DAMPER SHALL BE OPEN. THE CHILLED WATER CONTROL VALVE SHALL BE CLOSED, THE TOTAL ENERGY RECOVERY WHEEL SHALL BE DE-ENERGIZED, THE ERW BYPASS DAMPERS CLOSE, THE EXHAUST FAN SHALL BE OFF & THE SUPPLY FAN SHALL START AND RECIRCULATE BUILDING AIR. THE RTU HOT WATER CONTROL VALVE SHALL MODULATE OPEN AND THE UNIT DISCHARGE AIR SETPOINT DURING WARM-UP SHALL BE 85°F (ADJ.). ONCE BUILDING HAS REACHED SPACE SETPOINT, THE TERMINAL HEATING UNITS SHALL ENTER THE OCCUPIED MODE, ALLOWING THEIR HOT WATER VALVES TO MODULATE AS REQUIRED TO MAINTAIN THE SPACE SETPOINT. THE RTU SHALL ALSO ENTER OCCUPIED MODE. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE WARM-UP MODE MORE THAN ONCE PER DAY, THROUGH THE OPTIMIZED START PROGRAM LOGIC WITHIN THE DDC SYSTEM SOFTWARE, THE BMS SHALL MONITOR THE RATE OF TEMPERATURE RISE TO DETERMINE WHEN TO ACTIVATE THE WARM UP MODE TO ENSURE THAT THE BUILDING HAS REACHED ITS SETPOINT FOR OCCUPIED MODE.

COOL-DOWN:
ALL VAV'S ASSOCIATED WITH THIS RTU SHALL GO TO FULL-OPEN POSITION. THE RTU OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE CLOSED, THE RECIRCULATION DAMPER SHALL BE OPEN. THE HOT WATER CONTROL VALVE SHALL BE CLOSED, THE TOTAL ENERGY RECOVERY WHEEL SHALL BE DE-ENERGIZED, THE ERW BYPASS DAMPERS CLOSE, THE EXHAUST FAN SHALL BE OFF AND THE SUPPLY FAN SHALL START AND RECIRCULATE BUILDING AIR. THE RTU CHILLED WATER VALVE SHALL MODULATE OPEN AND THE UNIT DISCHARGE AIR SETPOINT DURING COOL-DOWN SHALL BE 55°F (ADJ.). ONCE THE BUILDING HAS REACHED SPACE SETPOINT OF 75°F (ADJ.), THE RTU SHALL ENTER OCCUPIED MODE. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE COOL-DOWN MODE MORE THAN ONCE PER DAY, THROUGH THE OPTIMIZED START PROGRAM LOGIC WITHIN THE DDC SYSTEM SOFTWARE, THE BMS SHALL MONITOR THE RATE OF TEMPERATURE DECREASE TO DETERMINE WHEN TO ACTIVATE THE COOL DOWN MODE TO ENSURE THAT THE BUILDING HAS REACHED ITS SETPOINT FOR OCCUPIED MODE. ECONOMIZER MODE OF OPERATION SHALL OVERRIDE NORMAL COOL-DOWN MODE OF OPERATION DURING UNOCCUPIED MODE.

OCCUPIED MODE:

GENERAL:
THE FANS START OR CONTINUE TO RUN AND THE RTU IS CONTROLLED AS FOLLOWS:

THE EXHAUST & OUTSIDE AIR DAMPERS SHALL OPEN TO MAX POSITIONS AS DETERMINED DURING BALANCING & AS SCHEDULED. THE RETURN AIR DAMPER SHALL BE CLOSED. THE ENERGY RECOVERY WHEEL SHALL BE ACTIVATED, ERW BYPASS DAMPERS SHALL BE CLOSED, AND OPERATE PER THE SEQUENCES BELOW. THE SUPPLY AND EXHAUST FANS SHALL BE ACTIVATED OR CONTINUE TO RUN. THE SUPPLY AIR FAN SHALL ADJUST ITS SPEED BASED ON THE SUPPLY DUCT MOUNTED STATIC PRESSURE SENSOR LOCATED 3/4 DOWN STREAM. THE SYSTEMS ACTUAL STATIC PRESSURE SETPOINTS SHALL BE PROVIDED/OBTAINED THROUGH TESTING AND BALANCING CONTRACTOR DURING THE BALANCING PROCESS. THE EXHAUST FAN WILL MODULATE ITS SPEED BASED ON THE SUPPLY AIRFLOW. THE ATC CONTRACTOR SHALL PROVIDE LOGIC TO CONSISTENTLY COLLECT THE TOTAL CFM FROM ALL VAV BOXES & UTILIZE THAT VALUE IN CONJUNCTION WITH THE EXHAUST AIRFLOW SYSTEM CURVE PROFILE TO MODULATE EXHAUST FAN SPEED. STATIC PRESSURE SETPOINTS SHALL ALLOW FOR A SLIGHT 5% (ADJ.) BUILDING PRESSURIZATION. THE STATIC PRESSURE SET POINT SHALL BE RESET BASED ON PID (PROPORTIONAL-INTEGRAL- DERIVATIVE) LOGIC TO ALLOW THE VAV BOX ZONE REQUIRING THE MOST PRESSURE TO SATISFY ITS AIRFLOW REQUIREMENT AT ITS DESIGN FULL OPEN POSITION. THE STATIC PRESSURE SET POINT SHALL BE LOWERED TO THE POINT WHERE FAN SPEED REDUCTION CAN OCCUR, YET STILL ENSURE THAT THE VAV BOX ZONES REMAIN SATISFIED. THE SYSTEM SHALL USE INPUT SIGNALS FROM VAV BOX CONTROLLERS, THE MAIN DUCTWORK MOUNTED SYSTEM STATIC PRESSURE SENSOR AND THE CONTROLLER'S PROGRAM ALGORITHM TO ACHIEVE THIS CONTROL. IN ADDITION, PROVIDE DETECTION AND ALARM OF ANY VAV ZONE THAT EXCESSIVELY NEGATIVELY DRIVES THE RESET LOGIC. THE BMS SYSTEM SHALL BE CAPABLE OF ALLOWING OPERATOR TO READILY REMOVE OR ADD VAV BOX ZONES FROM THE RESET LOGIC ALGORITHM. THE PROJECT TAB/ATC CONTRACORS SHALL FIELD DETERMINE THE ADJUSTABLE SETPOINT RANGE FOR THE RTU SYSTEM AND THE PRIMARY VAV BOX UTILIZED TO CONTROL THE STATIC PRESSURE RESET CONTROL STRATEGY.

SUPPLY FAN:
THE SUPPLY FAN SHALL RUN ANYTIME THE RTU IS COMMANDED TO RUN AND EITHER THE O.A. DAMPER & E.A. DAMPER, OR THE RECIRCULATION DAMPER ARE PROVEN OPEN. THE SUPPLY FAN SHALL MODULATE BASED ON THE SYSTEMS STATIC PRESSURE DUE TO VAV DAMPERS OPENING/CLOSING. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER-DEFINABLE 10 MIN (ADJ.) MINIMUM RUNTIME, UNLESS SHUTDOWN ON SAFETIES.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

EXHAUST FAN:
THE EXHAUST FAN SHALL RUN ANYTIME THE RTU IS COMMANDED TO RUN AND EITHER THE O.A. DAMPER & E.A. DAMPER, OR THE RECIRCULATION DAMPER ARE PROVEN OPEN. THE EXHAUST FAN SHALL MODULATE ITS SPEED BASED ON THE SUPPLY AIR FLOW, ACHIEVED AT THE VAV BOXES. EXHAUST FAN SHALL MAINTAIN 5% (ADJ.) LESS AIRFLOW THAN THE SUPPLY FAN TO ALLOW A SLIGHTLY POSITIVE PRESSURE THROUGHOUT THE BUILDING. THE EXHAUST FAN SHALL HAVE A USER DEFINABLE 10 MIN (ADJ.) MINIMUM RUNTIME, UNLESS SHUTDOWN ON SAFETIES. BALANCING & ATC CONTRACTORS SHALL COORDINATE & PROVIDE AN EXHAUST FAN PROFILE OF AIRFLOW THROUGHOUT THE FAN SYSTEM CURVE AT DIFFERENT SPEEDS & AIRFLOW TESTING. THIS SHALL BE USED FOR EXHAUST FAN SPEED CONTROL, TO TRACK THE SUPPLY FAN AIRFLOW. TYPICAL FOR SUPPLY FANS.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- EXHAUST FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- EXHAUST FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

CURRENT SWITCHES SHALL BE INSTALLED ON THE SUPPLY AND RETURN FAN STARTERS. THE DDC SYSTEM USES THESE SWITCHES TO CONFIRM THE FANS ARE IN THE DESIRED STATE (I.E. ON OR OFF) AND GENERATES AN ALARM IF STATUS DEVIATES FROM DDC START/STOP CONTROL.

TOTAL ENERGY RECOVERY WHEEL - VARIABLE SPEED:
THE CONTROLLER SHALL MODULATE THE TOTAL ENERGY RECOVERY WHEEL AS FOLLOWS:

COOLING RECOVERY MODE:
THE CONTROLLER SHALL MEASURE THE TOTAL WHEEL DISCHARGE AIR TEMPERATURE AND MODULATE THE TOTAL WHEEL SPEED OR BYPASS DAMPERS TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL WHEEL SHALL RUN FOR COOLING RECOVERY WHENEVER:
- THE RTU RETURN AIR TEMPERATURE IS 5°F (ADJ.) OR MORE BELOW THE OUTSIDE AIR TEMPERATURE.
- AND THE ECONOMIZER IS OFF.
- AND THE SUPPLY FAN IS ON.

HEATING RECOVERY MODE:
THE CONTROLLER SHALL MEASURE THE TOTAL WHEEL DISCHARGE AIR TEMPERATURE AND MODULATE THE TOTAL WHEEL SPEED OR BYPASS DAMPERS TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL WHEEL SHALL RUN FOR HEAT RECOVERY WHENEVER:
- THE RTU RETURN AIR TEMPERATURE IS 5°F (ADJ.) OR MORE ABOVE THE OUTSIDE AIR TEMPERATURE.
- AND THE ECONOMIZER IS OFF.
- AND THE SUPPLY FAN IS ON.

PERIODIC SELF-CLEANING:
THE TOTAL ENERGY RECOVERY WHEEL SHALL RUN AT 5% SPEED (ADJ.) FOR 10 SEC (ADJ.) EVERY 4HRS (ADJ.) THE UNIT RUNS.

WHEEL DEFROST CYCLE AND FROST PROTECTION:
IF THE WHEEL DIFFERENTIAL PRESSURE RISES 1 INCH. (ADJ.) AND THE OUTSIDE AIR TEMPERATURE IS BELOW 30°F (ADJ.), THE WHEEL SPEED SHALL BE REDUCED VIA WHEEL VARIABLE FREQUENCY DRIVE, AND THE ENERGY RECOVERY WHEEL FACE & BYPASS DAMPERS SHALL MODULATE OPEN TO BYPASS THE WHEEL UNTIL THE PRESSURE RETURNS TO NORMAL. WHEEL DEFROST CONTROL SEQUENCE SHALL BE CHOSEN PER MANUFACTURER'S RECOMMENDATIONS. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- RECOVERY WHEEL ROTATION FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- RECOVERY WHEEL IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- RECOVERY WHEEL RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).
- RECOVERY WHEEL VFD IN FAULT

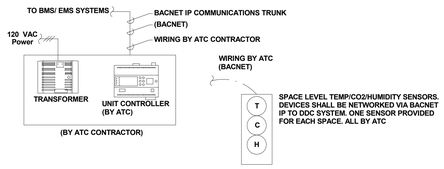
COOLING AND DEHUMIDIFICATION - CHILLED WATER:
OUTSIDE AIR SHALL PASS THROUGH THE TOTAL ENERGY RECOVERY WHEEL, PRE-COOLED BY THE INCOMING RETURN AIR, UPON SENSING A MIXED AIR TEMPERATURE ABOVE AND/OR MIXED AIR DISCHARGE HUMIDITY ABOVE THE DESIRED SUPPLY AIR DISCHARGE SETPOINTS OF 63°(ADJ) & 55%RH (ADJ) OR SPACE HUMIDITY ABOVE 55% (ADJ), THE CHILLED WATER CONTROL VALVE SHALL BE ACTIVATED AND MODULATE TO COOL AND DEHUMIDIFY THE INCOMING AIR. THE COOLING COIL SHALL MODULATE TO MAINTAIN THE DESIRED COOLING COIL TEMPERATURE SETPOINT STARTING AT 55°F (53GR/LB) (ADJ.) AND SHALL RESET DOWN IN 1°F STEPS OVER TIME, 1°F EVERY FIVE MINUTES (ADJ), UNTIL THE CHILLED WATER LEAVING AIR TEMPERATURE SETPOINT OF 50°F (ADJ.) & THE DISCHARGE AIR & HUMIDITY SETPOINT OR THE SPACE HUMIDITY LEVEL OF 55% RH (ADJ) IS MET. REFER TO RTU SCHEDULE FOR CHILLED WATER LEAVING AIR TEMPERATURE FOR LOW SETPOINT. THE HOT WATER CONTROL VALVE SHALL MODULATE TO REHEAT THE SUB-COOLED SUPPLY AIR FROM THE COOLING COIL BACK UP TO 63°F (ADJ., SUMMER ONLY). THE SUPPLY AIR SETPOINT WILL BE RESET BASED ON OUTDOOR AIR TEMPERATURE / HUMIDITY CONDITIONS, WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 55°F (ADJ.) THE SUPPLY AIR SETPOINT SHALL BE 68°F (ADJ.) & SHALL RESET TO 63°F (ADJ.) AT AN OUTDOOR TEMPERATURE ABOVE 75°F (ADJ.). THE RESET SHALL BE LINEAR BETWEEN THE TWO SETPOINTS. THE COOLING COIL AND HOT WATER COIL (REHEAT) SHALL BE ENABLED WHENEVER:

- THE SUPPLY FAN STATUS IS ON.
- OUTSIDE AIR TEMPERATURE IS GREATER THAN 55°F (ADJ.).
- OR THE DISCHARGE SUPPLY AIR TEMPERATURE IS ABOVE THE DESIRED SETPOINT.
- OR SPACE TEMPERATURES ARE CALLING FOR COOLING

HEATING - HOT WATER:
OUTSIDE AIR SHALL PASS THROUGH THE TOTAL ENERGY RECOVERY WHEEL, PRE-HEATED BY THE INCOMING RETURN AIR. UPON SENSING A MIXED AIR TEMPERATURE BELOW THE DESIRED SUPPLY AIR DISCHARGE SETPOINT OF 68°F (ADJ.) THE HOT WATER CONTROL VALVE SHALL BE ACTIVATED AND MODULATE TO HEAT THE INCOMING AIR TO MAINTAIN THE SUPPLY AIR DISCHARGE SETPOINT OF 68°F (ADJ.). WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 55°F (ADJ.), THE SUPPLY AIR SETPOINT SHALL BE 68°F (ADJ.) & SHALL RESET TO 63°F (ADJ.) AT AN OUTDOOR TEMPERATURE ABOVE 75°F (ADJ.). THE RESET SHALL BE LINEAR BETWEEN THE TWO SETPOINTS. THE HEATING COIL SHALL BE ENABLED WHENEVER:

- THE SUPPLY FAN STATUS IS ON.
- OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
- OR THE DISCHARGE SUPPLY AIR TEMPERATURE IS BELOW THE DESIRED SETPOINT.
- OR COOLING IS ACTIVATED AND REHEAT IS REQUIRED.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- LOW ENTERING AIR TEMP: IF THE MIXED AIR OR COOLING COIL LEAVING AIR TEMPERATURE IS LESS THAN 30°F (ADJ.).



ECONOMIZER (DUAL ENTHALPY CONTROL):
THE CONTROLLER SHALL MEASURE THE RETURN AND OUTSIDE AIR ENTHALPIES AND MODULATE THE OUTSIDE AIR DAMPER, RECIRCULATION DAMPER (DURING UNOCCUPIED CONDITIONS) AND WHEEL BYPASS DAMPERS AS REQUIRED TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL ENERGY RECOVERY WHEEL SHALL BE OFF. THE ECONOMIZER SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
- AND THE OUTSIDE AIR ENTHALPY IS LESS THAN RETURN AIR ENTHALPY.
- AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE.
- AND THE SUPPLY FAN STATUS IS ON.

THE ECONOMIZER SHALL BE DISABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE DROPS BELOW 40°F (ADJ.).
- OR ON LOSS OF SUPPLY FAN STATUS.
- OR THE FREEZESTAT IS ON.

UNOCCUPIED MODE:
UNDER THIS MODE, ALL RTUS SHALL BE OFF & DAMPERS CLOSED. VAV DAMPERS SHALL BE CLOSED. ALL TERMINAL HEATING UNITS & COMPONENTS THROUGHOUT THE BUILDING SHALL MODULATE AS REQUIRED TO MAINTAIN THE BUILDING'S UNOCCUPIED SETPOINT OF 60°F (ADJ.) IN THE WINTER. IN THE EVENT THAT THE TERMINAL HEATING UNITS CANNOT MAINTAIN THE BUILDING AVERAGE UNOCCUPIED SETPOINT, THE RTUS SHALL BE ACTIVATED & FUNCTION AS INDICATED IN WARM-UP MODE W/ THE EXCEPTION THAT THE FAN SPEED WOULD BE REDUCED TO 60% (ADJ.). DURING THE SUMMER MONTHS, WHEN OAT IS ABOVE 80°F (ADJ.) AND/OR RH IS ABOVE 70% (ADJ.) & THE BUILDING'S AVERAGE UNOCCUPIED TEMPERATURE SETPOINTS OF 85°F (ADJ.) & UNOCCUPIED HUMIDITY SETPOINT OF 70% RH (ADJ) ARE NOT MAINTAINED, THE RTUS WILL BE ACTIVATED & FUNCTION AS INDICATED IN THE COOL-DOWN MODE W/ THE EXCEPTION THAT THE FAN SPEED WOULD BE REDUCED TO 60% (ADJ.).

SAFETY SEQUENCES

EMERGENCY SHUTDOWN:
UPON RECEIVING A SIGNAL FROM THE FIRE ALARM SYSTEM, THE UNIT'S FANS SHALL SHUTDOWN, ALL DAMPERS SHALL CLOSE, HOT AND CHILLED WATER VALVES SHALL CLOSE AND AN ALARM SHALL BE GENERATED AT THE BMS. THIS MODE SHALL BE CALLED EMERGENCY SHUTDOWN MODE. ATC CONTRACTOR SHALL HARD WIRE A DIRECT CONNECTION FROM THE FIRE ALARM PANELS DRY CONTACTS TO THE BMS. ALL ASSOCIATED VAV BOXES SHALL CLOSE.
LOW LEAVING TEMPERATURE:
UPON A LOW LEAVING TEMPERATURE CONDITION (38°F ADJ) SENSED BY THE FREEZESTAT SENSOR, CO2 DEMAND CONTROL SHALL BE OVERRIDDEN, THE OUTSIDE AIR AND EXHAUST AIR DAMPER SHALL CLOSE, AND THE SUPPLY AND EXHAUST AIR FAN SHALL SHUT DOWN AND AN ALARM SHALL BE GENERATED.

SMOKE DETECTION:
THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SMOKE DETECTOR STATUS.

CASING TEMPERATURE SETPOINT:
THE DDC SYSTEM SHALL MONITOR THE UNIT CASING TEMPERATURE SETPOINT (BY THE MAT SENSOR). THE HOT WATER HEATING COIL VALVE SHALL OPEN TO MAINTAIN A 40°F (ADJ.) MINIMUM CASING TEMPERATURE SETPOINT.

STAGED OPTIMIZED START/STOP OPERATION:
ALL UNIT CONTROLLERS SHALL BE EQUIPPED WITH OPTIMAL START/STOP OPERATION AND TIME OF DAY SCHEDULING. UNITS SHALL START UP DURING MORNING WARM-UP/COOL-DOWN MODES IN A STAGGERED MANNER SUCH THAT ALL EQUIPMENT IS NOT STARTED AT THE SAME TIME.

ADDITIONAL ALARMS:

OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE PREFILTER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- PREFILTER CHANGE REQUIRED: PREFILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

RETURN AIR FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FINAL FILTER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- FINAL FILTER CHANGE REQUIRED: FINAL FILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

SUPPLY AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS GREATER THAN 120°F (ADJ.).
- LOW SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS LESS THAN 45°F (ADJ.).

SPACE HUMIDITY SENSOR:
THE DDC SYSTEM SHALL MONITOR THE SYSTEM ZONE HUMIDITY SENSORS AND REPORT THE INFORMATION TO THE BUILDING DDC SYSTEM ROOM GRAPHICS.

OVERRIDE:
THE SPACE MOUNTED TEMPERATURE SENSOR SHALL HAVE A PUSH BUTTON OVERRIDE CAPABILITY. UPON ACTIVATION OF 10% (ADJ) OR MORE THERMOSTATS ON ONE RTU THE ASSOCIATED ROOFTOP UNIT AND ASSOCIATED VAV'S SHALL CHANGE TO OCCUPIED MODE FOR A PERIOD OF 2 HOURS (ADJ).

CO2 ALARM : UPON A RISE IN SPACE CO2 10% OR MORE THAN THE DESIGN OF 800 PPM (ADJ.) AN ALARM WILL BE GENERATED AT THE BMS WITH A 20 MIN. (ADJ.) DELAY.

CO2 DEMAND CONTROL VENTILATION (DCV):
UPON A RISE IN SPACE CO2 (GREATER THAN 800 PPM) THE ROOM'S RESPECTIVE VAV BOX SHALL MODULATE OPEN (WHERE APPLICABLE). UPON A RISE IN SPACE CO2 10% OR MORE THAN THE DESIGN OF 800 PPM (ADJ) AN ALARM WILL BE GENERATED AT THE BMS WITH A 20 MIN. (ADJ.) DELAY. ONCE LEVELS BEGIN TO DROP BELOW 800 PPM, THE VAV DAMPER SHALL RETURN CONTROL TO THE ROOM THERMOSTAT AND MODULATE ACCORDING TO THE DEMAND.

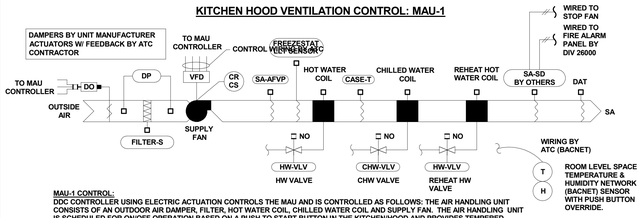
CO2 DEMAND CONTROL OVERRIDE:
FOR ALL RTU'S EQUIPPED WITH CO2 DEMAND CONTROL VENTILATION, THE ATC CONTRACTOR SHALL CREATE A SEQUENCE OF OPERATION AND ASSOCIATED GRAPHIC USER INTERFACE (GUI) BUTTON THAT SHALL BE CAPABLE OF ALLOWING THE BMS OPERATOR TO DISENGAGE AND RE-ENGAGE THE CO2 DEMAND VENTILATION CONTROL CAPABILITIES OF THE VAV'S AND ASSOCIATED AIR DISTRIBUTION SYSTEM. A SOFTWARE NOTIFICATION SHALL BE GENERATED WHEN THIS MODE OF OPERATION IS ACTIVATED. THIS SEQUENCE AND GUI BUTTON SHALL BE PROVIDED FOR EACH INDIVIDUAL RTU AND A MASTER COMMAND GUI BUTTON SHALL ENGAGE/DISENGAGE THE MODE FOR ALL RTU'S. UNDER THIS MODE, THE VENTILATION OVERRIDE SHALL ALLOW THE ROOFTOP UNIT TO OPERATE AT IT'S MAXIMUM AIRFLOW AND MAXIMUM OUTSIDE AIR VENTILATION RATE. VARIABLE AIR VOLUME BOXES SHALL OPEN TO THEIR MAXIMUM POSITIONS. MORNING WARM-UP AND COOL DOWN MODES FOR THIS MODE OF OPERATION SHALL ALSO OPERATE WITH MAXIMUM OUTSIDE AIR ENABLED WHEN CO2 CONTOL OVERRIDE IS ENABLED. OUTSIDE AIR VENTILATION SHALL BE ENABLED AT A MINIMUM OF TWO HOURS (ADJ) PRIOR TO SCHEDULED OCCUPIED TIME, AND SHALL CONTINUE TO RUN TWO HOURS (ADJ) POST SCHEDULED OCCUPANCY.

EXTREME WEATHER MODE:
THROUGH THE BMS WEATHER STATION, WHEN WIND SPEED NUMBERS ABOVE 50 MPH (ADJ) AND RTU'S ARE IN OCCUPIED MODE, ALL OUTSIDE AIR DAMPERS SHALL CLOSE AND UNIT SHALL GO INTO RECIRCULATION MODE BUT STILL MAINTAIN OCCUPIED SETPOINTS. DURING THIS CONDITION AN ALARM SHALL BE GENERATED AT THE BMS INDICATING HIGH WINDS - OA DAMPER CLOSED.

ECONOMIZER OVERRIDE:
FOR ALL RTU'S EQUIPPED WITH ECONOMIZER CONTROL, THE ATC CONTRACTOR SHALL CREATE A SEQUENCE OF OPERATION AND ASSOCIATED GRAPHIC USER INTERFACE (GUI) BUTTON THAT SHALL BE CAPABLE OF ALLOWING THE BMS OPERATOR TO DISENGAGE AND RE-ENGAGE THE ECONOMIZER CONTROL CAPABILITIES OF THE RTU. A SOFTWARE NOTIFICATION SHALL BE GENERATED WHEN THIS MODE OF OPERATION IS ACTIVATED. THIS SEQUENCE AND GUI BUTTON SHALL BE PROVIDED FOR EACH INDIVIDUAL RTU AND IN ADDITION A MASTER COMMAND GUI BUTTON SHALL ENGAGE/DISENGAGE THE MODE FOR ALL RTU'S. UNDER THIS MODE, THE ECONOMIZER OVERRIDE SHALL ALLOW THE ROOFTOP UNIT TO OPERATE ITS HOT WATER AND/OR CHILLED WATER CONTROL VALVES TO MAINTAIN THE DAT SETPOINT. THE OUTSIDE AND RETURN AIR DAMPERS SHALL FUNCTION AS INDICATED IN THE OCCUPIED MODE. THE VARIABLE AIR VOLUME BOXES SHALL MODULATE AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AND CO2 SETPOINTS.

ROOF TOP UNIT	BMS CONTROL POINTS					
POINT NAME	AI	AO	BI	BO	ALARM	REMARKS
OUTSIDE AIR FLOW MEASURING STATION	X				X	NOTE #1
SUPPLY AIR FLOW MEASURING STATION	X					NOTE #6
EXHAUST AIR FLOW MEASURING STATION	X					NOTE #6
OUTSIDE AIR TEMP	X					
OUTSIDE AIR HUMIDITY	X					
EXHAUST AIR TEMP	X					
EXHAUST AIR HUMIDITY	X					
ENERGY RECOVERY HEAT WHEEL DISCHARGE AIR TEMP	X					
ENERGY RECOVERY WHEEL DISCHARGE AIR HUMIDITY	X					
MIXED AIR TEMP & HUMIDITY	X				X	
COOLING COIL AIR TEMP & HUMIDITY	X				X	
HEATING COIL AIR TEMP	X				X	
SUPPLY AIR TEMP	X				X	
SUPPLY AIR HUMIDITY	X				X	
SUPPLY AIR STATIC PRESSURE	X	X			X	
OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE	X				X	
RETURN AIR FILTER DIFFERENTIAL PRESSURE	X				X	
SUPPLY FAN DIFFERENTIAL PRESSURE SENSOR/SWITCH	X				X	NOTE #7
EXHAUST FAN DIFFERENTIAL PRESSURE SENSOR/SWITCH	X				X	NOTE #7
RETURN AIR HUMIDITY	X					
RETURN AIR TEMP	X					
RETURN AIR STATIC PRESSURE	X	X			X	
ENERGY RECOVERY WHEEL VFD SPEED	X	X				
SUPPLY FAN VFD SPEED	X	X				
EXHAUST FAN VFD SPEED	X	X				
CHILLED WATER CONTROL VALVE	X	X				
HOT WATER CONTROL VALVE	X	X				
RE-CIRC AIR DAMPER	X	X				
OUTSIDE AIR DAMPER	X	X				
EXHAUST AIR DAMPER	X	X				
RETURN AIR SMOKE DETECTOR			X		X	
SUPPLY AIR SMOKE DETECTOR			X		X	
SUPPLY FAN STATUS			X		X	
EXHAUST FAN STATUS			X		X	
ENERGY RECOVERY WHEEL STATUS			X		X	
ENERGY RECOVERY WHEEL VFD FAULT			X		X	
SUPPLY FAN VFD FAULT			X		X	
EXHAUST FAN VFD FAULT			X		X	
SUPPLY FAN START/STOP				X		
EXHAUST FAN START/STOP				X		
ENERGY RECOVERY WHEEL START/STOP				X		
COOLING SUPPLY AIR SET POINT						

KITCHEN HOOD VENTILATION CONTROL: MAU-1



MAU-1 CONTROL:
DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE MAU AND IS CONTROLLED AS FOLLOWS. THE AIR HANDLING UNIT CONSISTS OF AN OUTDOOR AIR DAMPER, FILTER, HOT WATER COIL, CHILLED WATER COIL AND SUPPLY FAN. THE AIR HANDLING UNIT IS SCHEDULED FOR ON/OFF OPERATION BASED ON A PUSH TO START BUTTON IN THE KITCHEN/HOOD AND PROVIDES TEMPERED MAKE UP AIR FOR THE KITCHEN HOOD. THE MAU OPERATES IN OCCUPIED - HOOD ON, UNOCCUPIED AND SAFETY MODES AS FOLLOWS: (ALL SUGGESTED SETPOINTS AND SETTINGS ARE ADJUSTABLE.)

OCCUPIED - HOOD ON
THE OUTDOOR AIR DAMPER OPENS TO FULL OPEN, AND THE HOT WATER COIL CONTROL VALVE OR COOLING COIL CONTROL VALVE MODULATES TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT OF 68° (ADJ.) WHEN OAT IS BELOW 60° (ADJ.) OF ABOVE 70° (ADJ.) THE KITCHEN EXHAUST FAN ASSOCIATED WITH MAU-1 SHALL MODULATE ITS SPEED BASED ON A SIGNAL FROM THE KITCHEN MANAGEMENT SYSTEM CONTROLLER PROVIDED BY THE KITCHEN CONSULTANT. THE SUPPLY FAN MODULATES AND TRACKS THE EXHAUST FAN SPEED (HZ) TO MAINTAIN A SLIGHT NEGATIVE PRESSURE (10% OFFSET). THE OUTSIDE AIR DAMPER REMAINS OPEN WHILE THE MAU IS ON. THE ATC CONTRACTOR SHALL PROVIDE ALL THE NECESSARY PROGRAMMING, INTEGRATION, WIRING AND GRAPHICS FOR A COMPLETE AND FUNCTIONAL SYSTEM ASSOCIATED WITH THE KITCHEN MANAGEMENT SYSTEM CONTROLLER. COORDINATE WITH KITCHEN VENDOR FOR WIRING AND PROGRAMMING INFORMATION.

COOLING AND DEHUMIDIFICATION - CHILLED WATER:
TEMPERATURE AND/OR MIXED AIR HUMIDITY ABOVE THE DESIRED SUPPLY AIR DISCHARGE SETPOINTS OF 55°(ADJ) & 55%RH (ADJ) OR SPACE HUMIDITY ABOVE 55% (ADJ.), THE CHILLED WATER CONTROL VALVE SHALL BE ACTIVATED AND MODULATE TO COOL AND DEHUMIDIFY THE INCOMING AIR. THE COOLING COIL SHALL MODULATE TO MAINTAIN THE DESIRED COOLING COIL TEMPERATURE SETPOINT STARTING AT 55°F (53GR/LB) (ADJ.) AND SHALL RESET DOWN IN 1°F STEPS OVER TIME. 1°F EVERY FIVE MINUTES (ADJ), TO THE CHILLED WATER LEAVING AIR TEMPERATURE SETPOINT OF 50°F (ADJ.) UNTIL THE SPACE HUMIDITY LEVEL OF 55% RH (ADJ) IS MET. SETPOINT. THE HOT WATER CONTROL VALVE SHALL MODULATE TO REHEAT THE SUB-COOLED SUPPLY AIR FROM THE COOLING COIL BACK UP TO 65°F (ADJ., SUMMER ONLY). THE SUPPLY AIR SETPOINT WILL BE RESET BASED ON OUTDOOR AIR TEMPERATURE / HUMIDITY CONDITION AND/OR A CALL FOR COOLING THEN THE RESET WILL BE INITIATED. WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 55°F (ADJ.) THE SUPPLY AIR SETPOINT SHALL BE 68°F (ADJ.) & SHALL RESET TO 63°F (ADJ.) AT AN OUTDOOR TEMPERATURE ABOVE 75°F (ADJ.). THE RESET SHALL BE LINEAR BETWEEN THE TWO SETPOINTS. THE COOLING COIL AND HOT WATER COIL (REHEAT) SHALL BE ENABLED WHENEVER:

- THE SUPPLY FAN STATUS IS ON.
- OUTSIDE AIR TEMPERATURE IS GREATER THAN 55°F (ADJ.).
- OR THE DISCHARGE SUPPLY AIR TEMPERATURE IS ABOVE THE DESIRED SETPOINT.
- OR SPACE TEMPERATURES ARE CALLING FOR COOLING

UNOCCUPIED
THE SUPPLY FAN STOPS AND THE OUTDOOR AIR DAMPER CLOSES. THE UNIT SHALL BE OFF.

SAFETY
THE SMOKE DETECTOR IN THE SUPPLY AIRSTREAM DE-ENERGIZES THE SUPPLY FAN UPON ACTIVATION. OUTSIDE AIR DAMPER MOVES TO THE CLOSED POSITION AFTER THE FAN IS DE-ENERGIZED.

UPON ACTIVATION OF THE ANSUL SYSTEM THE MAU WILL ENTER THE UNOCCUPIED MODE & SHUT DOWN. THE KITCHEN EXHAUST FAN WILL REMAIN OPERATING. ATC CONTRACTOR TO PROVIDE RELAY WIRING & PROGRAMMING WITH THE ANSUL SYSTEM TO ACKNOWLEDGE ACTIVATION & SEQUENCE HVAC EQUIPMENT.

UPON SENSING A HIGH CO LEVEL THROUGH THE FIRE ALARM SYSTEM THE MAU WILL ENTER THE UNOCCUPIED MODE & SHUT DOWN. THE KITCHEN EXHAUST FAN WILL START OR CONTINUE TO RUN TO REMOVE ANY RESIDUAL CO. ONCE CO LEVELS RETURN TO NORMAL THE MAU & KEF WILL REVERT TO THEIR NORMAL MODE OF OPERATION.

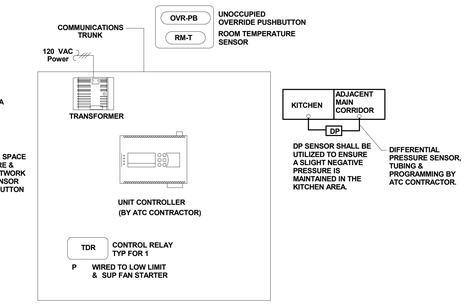
A CURRENT SWITCH IS INSTALLED IN THE SUPPLY FAN STARTER. THE DDC SYSTEM USES THE SWITCH TO CONFIRM THE FAN IS IN THE DESIRED STATE (I.E. ON OR OFF) AND GENERATES AN ALARM IF STATUS DEVIATES FROM DDC START/STOP CONTROL.

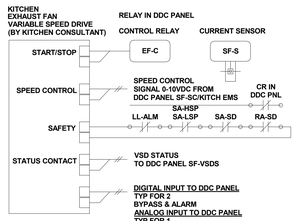
THE HOT WATER CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN A CASING TEMPERATURE OF 40°F (ADJ.)

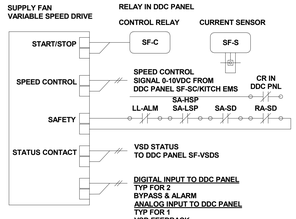
MAIN KITCHEN HOOD VENTILATION CONTROL
THROUGH THE "PUSH-TO-START" CONTROL PROVIDED ON THE KITCHEN HOOD THE EXHAUST FAN (KEF-1) SHALL START. WHEN THE KITCHEN HOOD IS OFF THE REVERSE SHALL OCCUR. THE SPEED CONTROL OF THE KITCHEN EXHAUST FAN FOR THE KITCHEN HOOD SHALL BE CONTROLLED BY A "KITCHEN HOOD ENERGY MANAGEMENT CONTROL SYSTEM." ATC TO PROVIDE FAN SPEED CONTROL INTERLOCK BETWEEN THE KITCHEN HOOD SYSTEM AND THE MAU SUPPLY FAN.

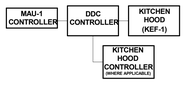
Makeup Air Unit	AI	AO	DI	DO	ALARM	REMARKS
SUPPLY FAN SS & STATUS	X	X			X	
OA DAMPER POS.	X	X			X	
FILTER STATUS			X		X	
DISCHARGE AIR TEMP.	X	X			X	
AIRFLOW CFM (SA)	X	X				
HOT WATER COIL (MODULATING CONTROL VALVE)	X	X				
CHILLED WATER COIL (MODULATING CONTROL VALVE)	X	X				
OUTSIDE AIR TEMP. (FROM DDC)	X					
OUTSIDE AIR %RH (FROM DDC)	X					
SMOKE DETECTOR			X		X	
SUPPLY FAN VFD	X	X			X	
KITCHEN EXHAUST FAN VFD	X		X	X	X	
ANSUL SYSTEM			X		X	
CO LEVEL ALARM			X		X	
CASING LOW LIMIT TEMPERATURE	X				X	
HIGH COOLING SUPPLY AIR TEMP					X	10° ABOVE
HIGH HEATING SUPPLY AIR TEMP					X	10° ABOVE
LOW HEATING SUPPLY AIR TEMP					X	10° BELOW
SPACE DIFFERENTIAL PRESSURE	X	X			X	

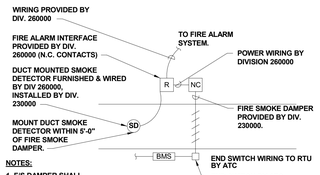
NOTE: ALL POINTS TO BE SHOWN ON GRAPHICS UNLESS NOTED OTHERWISE.











NOTES:
1. F/S DAMPER SHALL CLOSE IF FIRE ALARM IS TRIGGERED AND/OR LOSS OF POWER.
2. ACTIVATED END SWITCH SHALL SHUT DOWN ASSOCIATED RTU.

FIRE/SMOKE DAMPER DETAIL
(NOT TO SCALE)

MISCELLANEOUS BMS POINTS

UNIT #	UNIT FUNCTION	UNIT LOCATION	AI	AO	DI	DO	ALARM	REMARKS
WSM	WATER SUB METER	REFER TO P0.01 & P3.3	X					NOTE #1, QTY. 11
	EMERG GENSET, STATUS ON/OFF	X			X		X	VIA GENSET CONTROLLER NOTE #2
	BUILDING POWER STATUS (GRID OR GENSET)	X			X			VIA GENSET CONTROLLER NOTE #2
	WALK-IN REFRIGERATOR, TEMP ALARM	X			X		X	VIA DRY CONTACTS, QTY. 3
	WALK-IN FREEZER, TEMP ALARM	X			X		X	VIA DRY CONTACTS, QTY. 3
	WEATHER STATION	X						NOTE #3
SP-1	SEWAGE EJECTOR PUMP	EJECTOR PUMP 134B			X	X	X	COORD. W/ DIV 220000
GF-1	GLYCOL FEEDER	BOILER ROOM 1123			X	X	X	NOTE #4
DWH	HOT WATER HEATER	REFER TO PLUMBING SHEETS			X	X		COORD. W/ DIV 220000, QTY. 5
RP	HOT WATER CIRC PUMP	REFER TO PLUMBING SHEETS	X	X			X	COORD. W/ DIV 220000, QTY. 3
NT	ACID NEUTRALIZER	MECHANICAL ROOM	X				X	
TM	THERMOSTATIC MIXING VALVE	REFER TO PLUMBING SHEETS			X			COORD. W/ DIV 220000, QTY. 2
SP-1 & SP-2	ELEVATOR SUMP PUMP	ELEVATOR 1 & 2	X				X	COORD. W/ DIV 220000
	KITCHEN CO DETECTION	MAIN & CULINARY KITCHENS					X	COORD. W/ DIV 260000, QTY. 2
	BOOSTER PUMP ALARM	X					X	COORD. W/ DIV 220000
	ELECTRICAL MAIN METER	REFER TO ELEC. SHEETS					X	COORD. W/ DIV 260000, QTY. 4
	ELECTRICAL SUB METER	REFER TO ELEC. SHEETS					X	COORD. W/ DIV 260000, QTY. 103
	SEWER PUMP STATION	REFER TO CIVIL SHEETS					X	COORD. W/ DIV 330000, QTY. 3

NOTE #1: ACTUAL METER, FLOW SWITCH & HIGH/LOW SENSOR FURNISHED BY ATC CONTRACTOR. COORDINATE INSTALLATION OF METERS W/ DIVISION 220000 CONTRACTOR. ATC CONTRACTOR TO PROVIDE ALL CONTROLLERS, CONDUITS, WIRING, RELAYS, ETC., AS WELL AS GRAPHICAL REPRESENTATION ON THE BMS SYSTEM OF ALL COLLECTED INFORMATION.

NOTE #2: ATC CONTRACTOR TO PROVIDE NECESSARY CONDUIT, WIRING, SENSORS, CONTROLLERS AND RELAYS FROM ATC MAIN CONTROL PANEL TO EMERGENCY GENERATOR FOR STATUS.

NOTE #3: INCLUDES OA TEMP (DB/WB), OA HUMIDITY (%RH), BAROMETRIC PRESSURE AND WIND SPEED.

NOTE #4: WATER CUT-OFF ALARM VIA GLYCOL FEEDER CONTROL PANEL OUTPUT

KEY: WH = WATER HEATER, RP = CIRCULATOR PUMP, NT = NEUTRALIZATION TANK, GB = GAS BOOSTER, GSM = GAS METER, FS = FLOW SWITCH, DWB = DOMESTIC WATER BOOSTER, WSM = WATER SUB METER

ABBREVIATIONS

AFVP	AIRFLOW VELOCITY PROBE
ALM	ALARM
AQ	AQUASTAT
ATC	AUTOMATIC TEMPERATURE CONTROLS
BLDG	BUILDING
BLR	BOILER
BMS	BUILDING MANAGEMENT SYSTEM (ENERGY & AUTOMATION)
CM	CONSTRUCTION MANAGER
COMB	COMBUSTION
CONTR	CONTROLLER
CO2	CARBON DIOXIDE
CR	CONTROL RELAY
CS	CURRENT SENSOR
CUV	CABINET UNIT VENTILATOR
D	DAMPER
DA	DISCHARGE AIR
DAS	DISCHARGE AIR SENSOR
DAT	DISCHARGE AIR TEMPERATURE
DCV	DEMAND CONTROL VENTILATION
DCW	DOMESTIC COLD WATER
DHW	DOMESTIC HOT WATER
DDC	DIRECT DIGITAL CONTROL
DO	DAMPER OPERATOR
DP	DIFFERENTIAL PRESSURE
DPR	DAMPER
DPV	DIFFERENTIAL PRESSURE VALVE
EA	EXHAUST AIR
EF	EXHAUST FAN
F	FLOW/FARENHEIT (AS APPLICABLE)
FB	FACE & BYPASS
FD	FIRE DAMPER
H	HUMIDITY
HS	ENTHALPY SENSOR
HT	HIGH TEMPERATURE
HTG	HEATING
HR	HEAT RECOVERY
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
LT	LOW TEMPERATURE
M	MOTOR
MAT	MIXED AIR TEMPERATURE
NAC	NETWORK APPLICATION CONTROLLER
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OA	OUTSIDE AIR
OVR	OVERRIDE
P	PRESSURE
PB	PUSH BUTTON
PNL	PANEL
RA	RETURN AIR
REL	RELIEF AIR
RF	RETURN FAN
RFC	RETURN FAN CONTROLLER
RM	ROOM
SA	SUPPLY AIR
SD	SMOKE DAMPER OR SMOKE DETECTOR
SF	SUPPLY FAN
SFC	SUPPLY FAN CONTROLLER
SP	STATIC PRESSURE
T	TEMPERATURE
TEC	TERMINAL EQUIPMENT CONTROLLER
VAC	VOLTS - ALTERNATING CURRENT
VDC	VOLTS - DIRECT CURRENT
VFD	SEE VSD
VLV	VALVE
VP	VELOCITY PROBE (AIRFLOW)
VSD	VARIABLE SPEED (FREQUENCY) DRIVE
XFMR	TRANSFORMER

ATC/BMS GENERAL NOTES

1. ALL SETPOINTS INDICATED IN THE SEQUENCE OF OPERATIONS SHALL BE ADJUSTABLE ON GRAPHICAL INTERFACE.
2. THE CONTROL POINTS LISTED IN THE SUMMARY MATRIX ARE THE MINIMUM CONTROL POINTS REQUIRED. ATC CONTRACTOR SHALL PROVIDE ALL CONTROL POINTS AS REQUIRED FOR COMPLETE SYSTEM CONTROL PER THE SEQUENCE OF OPERATIONS.
3. ALL CONTROL WIRING, SENSORS, RELAYS, CONTROLLERS, PANELS, DAMPERS, ACTUATORS, ETC. INDICATED ON THE CONTROL DIAGRAMS SHALL BE PROVIDED BY THE ATC CONTRACTOR UNLESS NOTED OTHERWISE.
4. ALL HHW VALVES SHALL BE FAIL OPEN ON LOSS OF POWER.
5. ALL HHW WATER VALVES SHALL BE MODULATING TYPE FOR GPM > 2.0; 2-POSITION ACCEPTABLE FOR FLOWS < 2.0 GPM
6. ATC CONTRACTOR TO COORDINATE W/ OWNER FOR ALL COMMUNICATION & INTERFACE REQUIREMENTS TO CENTRAL OPERATING STATION. REFER TO SPEC FOR FURTHER INFO.
7. DUCT SMOKE DETECTORS INDICATED ARE TO BE FURNISHED BY DIV. 260000 & INSTALLED BY HVAC CONTRACTOR. POWER WIRING AND FIRE ALARM INTERLOCK BY ELECTRICAL CONTRACTOR. ATC CONTRACTOR TO PROVIDE BMS INTERLOCK TO SHUT ASSOCIATED UNIT DOWN AND INITIATE AN ALARM UPON ACTIVATION
8. ALL SMOKE DAMPERS SHALL BE COMBINATION SMOKE/FIRE DAMPERS, SHALL BE FURNISHED & INSTALLED BY HVAC CONTRACTOR, AND POWER WIRED BY ELECTRICAL CONTRACTOR. DAMPERS SHALL BE MOTOR OPERATED WITH 24 VOLT / 120 VOLT ACTUATOR. FIRE ALARM INTERLOCK BY ELECTRICAL CONTRACTOR. DAMPER ENDSWITCH INTEGRATION TO BMS BY ATC CONTRACTOR.
9. ALL ATC CONTROLS SHALL BE POWER WIRED FROM THE MAIN ATC PANEL WITHIN THE MECHANICAL ROOM AND DESIGNATED EMERGENCY POWER JUNCTION BOXES LOCATED ON THE ELECTRICAL DRAWINGS. THIS MAIN PANEL AND JUNCTION BOXES WILL BE FED BY EMERGENCY POWER. THEREFORE ALL CONTROLS SHALL BE ON EMERGENCY POWER. ANY SUB ATC PANELS REQUIRED SHALL BE FED FROM THIS MAIN ATC PANEL & SHALL BE ON EMERGENCY POWER & ALL SHALL BE PROVIDED BY ATC CONTRACTOR. ALL UNIT CONTROLS SHALL BE FED BY THIS MAIN ATC PANEL OR SUB ATC PANEL & NOT THROUGH THE UNIT'S MAIN POWER SOURCE.
10. ALL DENSELY OCCUPIED SPACES WITH OCCUPANT DENSITY OF 25 PEOPLE OR MORE PER 1000 SQFT SHALL BE PROVIDED W/ ROOM LEVEL TEMPERATURE, CO2, & HUMIDITY SENSORS W/ CO2 CONTROL. THIS SHALL BE PROVIDED IN COMPLIANCE WITH LEED v.4 CREDIT IEQC1. (PROVIDED BY FMS CONTRACTOR & INSTALLED BY ATC CONTRACTOR)

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999
VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

NO.	DATE	TITLE

ISSUE TITLE AND DATE:

60% CONSTRUCTION DOCUMENTS
06/19/2026

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KEY PLAN

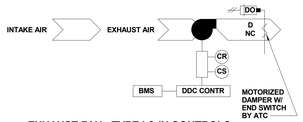
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SCALE: AS INDICATED

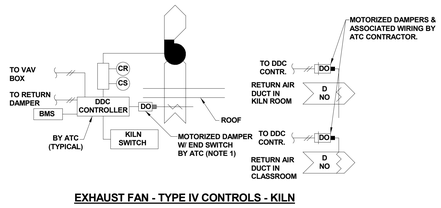
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CONTROLS V

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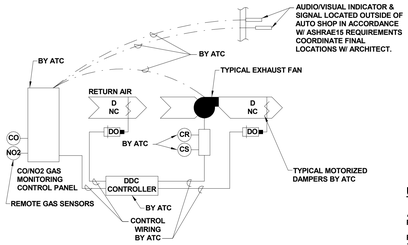
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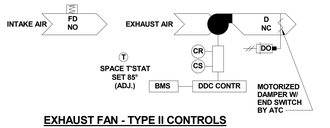
EXHAUST FAN - TYPE I & IX CONTROLS



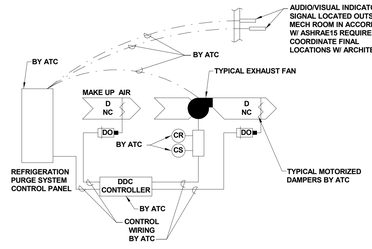
EXHAUST FAN - TYPE IV CONTROLS - KILN



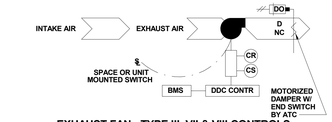
EXHAUST FAN - TYPE VI CONTROLS



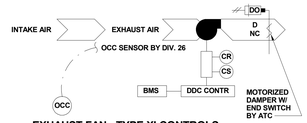
EXHAUST FAN - TYPE II CONTROLS



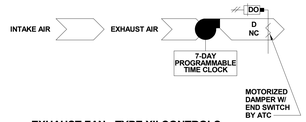
EXHAUST FAN - TYPE V CONTROLS



EXHAUST FAN - TYPE III, VII & VIII CONTROLS



EXHAUST FAN - TYPE XI CONTROLS



EXHAUST FAN - TYPE XII CONTROLS

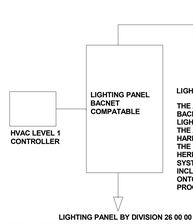
EXHAUST FAN CONTROL : REFER TO DRAWINGS AND SCHEDULES FOR TYPE OF CONTROL REQUIRED FOR EACH FAN. THESE MOTORIZED DAMPERS, SHALL BE PROVIDED AND WIRED BY THIS CONTRACTOR TO OPEN DURING THE OCCUPIED CYCLE AND CLOSE DURING THE UNOCCUPIED CYCLE, UNLESS OTHERWISE NOTED. FANS SHALL BE INTERLOCKED THROUGH THE END SWITCH ON THE DAMPER, TO ONLY OPERATE WHEN THE DAMPER IS PROVEN OPEN. ATC CONTRACTOR SHALL REFER TO EXHAUST FAN SCHEDULE FOR ALL DIRECT DRIVE FANS WITH ECM (GREENHECK VARI-GREEN OR EQUAL) MOTORS. ATC CONTRACTOR SHALL PROVIDE SPEED CONTROL SIGNAL POINT (0-10V - COORDINATED W/ MF/GR) AND ASSOCIATED WIRING FROM FAN TO BMS SYSTEM.

1. **TYPE I :** EXHAUST FAN SHALL BE WIRED INTO BUILDING BMS TO OPERATE DURING OCCUPIED CONDITIONS AND OFF DURING UNOCCUPIED CONDITIONS.
2. **TYPE II :** EXHAUST FAN IS CONTROLLED BY SPACE THERMOSTAT. ON A RISE IN SPACE TEMPERATURE, THE EXHAUST FAN SHALL START AND MAKE-UP AIR DAMPERS (WHERE APPLICABLE) SHALL OPEN.
3. **TYPE III :** EXHAUST FAN IS CONTROLLED FROM A WALL OR UNIT MOUNTED SWITCH WITH PILOT LIGHT. SWITCH AND PILOT LIGHT PROVIDED BY ATC CONTRACTOR.
4. **TYPE IV :**
   UPON ACTIVATION OF KILN THE ASSOCIATED EXHAUST FAN DAMPER SHALL OPEN. ONCE THE END SWITCH HAS BEEN PROVEN THE FAN SHALL ENERGIZE, ASSOCIATED KILN ROOM RETURN AIR MOTORIZED DAMPER SHALL CLOSE, THE CLASSROOM RETURN DAMPER SHALL MODULATE TO ITS MINIMUM POSITION DETERMINED BY THE TAB CONTRACTOR AND THE VAV DAMPER ASSOCIATED WITH THAT SPACE SHALL OVERRIDE ITS POSITION & MODULATE TO MAX OPEN POSITION. UPON DEACTIVATION OF KILN, FAN SHALL REMAIN ON UNTIL SPACE TEMPERATURE DECREASES TO SETPOINT, THEN FAN SHALL DEACTIVATE. WHEN THE EXHAUST FAN IS DE-ENERGIZED, ASSOCIATED RETURN AIR DAMPER SHALL OPERATE TO IT'S NORMALLY OPEN POSITION AND VAV DAMPER SHALL MODULATE BASED ON ROOM DEMAND.
5. **TYPE V :** REFRIGERANT PURGE OPERATION
   UPON ACTIVATION OF THE SPACES REFRIGERANT LEAK DETECTOR THE MOTORIZED EXHAUST FAN & MAKE UP AIR DAMPERS SHALL OPEN, ONCE THEIR END SWITCHES MAKE CONTACT THE INTERLOCKED EXHAUST FAN SHALL ACTIVATE. THE REFRIGERANT CONTROL PANEL SHALL ISSUE AN ALARM TO THE BMS, ACTIVATE THE AUDIO/VISUAL INDICATORS, AND START THE FAN VIA HARDWIRE INTERLOCK. THE SYSTEM SHALL OPERATE UNTIL THE SPACE REFRIGERANT LEVELS DROP BELOW THE THRESHOLD FOR 10 MIN (ADJ).
6. **TYPE VI :** CO2/NO PURGE OPERATION
   - UPON ACTIVATION OF THE SPACES GAS MONITORING SYSTEM LEVEL 1 ALARM THE MOTORIZED EXHAUST FAN DAMPER SHALL OPEN, RETURN AIR DAMPER SHALL CLOSE, ONCE THEIR END SWITCHES MAKE CONTACT THE INTERLOCKED EXHAUST FAN SHALL ACTIVATE. IF LEVEL 2 ALARM LEVEL IS REACHED, THE GAS MONITORING PANEL SHALL ISSUE AN ALARM TO THE BMS, ACTIVATE THE AUDIO/VISUAL INDICATORS, AND CONTINUE TO RUN THE FAN. THE SYSTEM SHALL OPERATE UNTIL THE SPACE GAS LEVELS DROP BELOW THE THRESHOLD FOR 10 MIN (ADJ). THE SPACE GAS MONITORING SYSTEM SHALL BE MONITORED VIA BACNET. EACH GAS SENSOR SHALL HAVE 3 ALARM LEVELS THAT ARE REPORTED TO THE BMS FOR NOTIFICATION, ALARMS SHALL BE AS FOLLOWS:
   - LEVEL 1 CO = 25PPM NO2 = 72PPM
   - LEVEL 2 CO = 200PPM NO2 = 2.0PPM
   - LEVEL 3 CO = 225PPM NO2 = 9.0PPM
7. **TYPE VII :** DRYER EXHAUST FANS
   THE DRYER EXHAUST FANS SHALL BE ENABLED WHEN THE DUCT PRESSURE SENSOR SENSES THAT THE DRYER IS IN OPERATION. THE FAN SHALL RUN UNTIL THE DRYER IS DE-ENERGIZED.
8. **TYPE VIII :** DISHWASHER EXHAUST FANS
   THE DISHWASHER EXHAUST FANS SHALL BE ENABLED WHEN THE DISHWASHER IS ENABLED. DISHWASHER OPERATION IS TO BE MONITORED VIA AN ADJUSTABLE CURRENT TRANSDUCER. THE FAN SHALL RUN FOR 5 MINS (ADJ.) AFTER UNIT IS DISABLED TO VENT ANY REMAINING HEAT & MOISTURE. AN ALARM SHALL BE GENERATED IF THE FAN IS NOT PROVEN ON AFTER 2 MINS (ADJ.)
9. **TYPE IX :** WASTE & CHEM STORAGE EXHAUST FANS
   THE EXHAUST FAN SHALL BE SCHEDULED TO RUN 24/7 TO PROVIDE VENTILATION TO THESE SPACES. IF THE FAN IS DE-ENERGIZED, A CRITICAL ALARM SHALL BE GENERATED AT THE BMS.
10. **TYPE X :** FIELD TEAM ROOMS (LOCKER ROOMS)
    THE EXHAUST FANS SHALL BE TIED TO THE SPACE OCCUPANCY SENSORS. THE EXHAUST FAN SHALL RUN WHILE THE SPACE IS OCCUPIED. ONCE THE SPACE HAS BEEN UNOCCUPIED FOR 30 MINUTES (ADJ.) THE EXHAUST FAN SHALL BE DE-ENERGIZED. THERE SHALL ALSO BE THE ABILITY TO SCHEDULE EVENT TIMES THROUGH THE BMS FOR FUTURE OCCUPANCY.
11. **TYPE XI :** PLASMA TABLE EXHAUST FANS
    THE EXHAUST FAN SHALL BE ENABLED WHEN PLASMA TABLE CUTTING OPERATION IS ENABLED. PLASMA TABLE OPERATION IS TO BE MONITORED VIA AN ADJUSTABLE CURRENT TRANSDUCER. THE FAN SHALL RUN FOR 2 MINS (ADJ.) AFTER UNIT IS DISABLED TO VENT ANY REMAINING FUMES. AN ALARM SHALL BE GENERATED IF THE FAN IS NOT PROVEN ON AFTER 2 MINS (ADJ.)

EXHAUST FANS (EF)	AI	AO	DI	DO	ALARM	REMARKS
FAN S/S & STATUS			X	X	X	ALL TYPES
EA DAMPER/MAKE UP AIR DAMPER	X	X			X	INTERLOCK W/ FAN
SPACE TEMP.	X				X	TYPE II & IV CONTROL
KILN / FUME HOOD CONTROLLER / SWITCH			X	X	X	TYPE IV CONTROL
DIRECT DRIVE SPEED CONTROL	X	X			X	ALL TYPES W/ DIRECT DRIVE
REFRIG. PURGE CONTROL PANEL	X		X		X	TYPE V CONTROL
CO2/NO2 GAS LEVEL	X		X		X	TYPE VI CONTROL
MONITORED EQUIPMENT STATUS			X	X	X	TYPE III, IV, VII, VIII CONTROL
OCCUPANCY SENSOR			X			TYPE X CONTROL

NOTES:

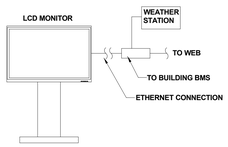
1. ALL FANS GREATER THAN 300 CFM SHALL BE PROVIDED WITH MOTORIZED DAMPERS THAT ARE EQUIPPED W/ END SWITCHES. ONCE THE END SWITCH HAS BEEN PROVEN, THE EXHAUST FAN SHALL START.
2. ALL POINTS TO BE SHOWN ON GRAPHICS UNLESS NOTED OTHERWISE.



LIGHTING CONTROL INTERFACE

THE ATC CONTRACTOR SHALL FURNISH A BACNET COMPATIBLE CONNECTION TO ALL LIGHTING CONTROL SWITCHING PANELS. THE ATC CONTRACTOR SHALL INCLUDE ALL HARDWARE AND SOFTWARE TO INTEGRATE THE NUMBER OF RELAYS INDICATED HEREIN INTO THE BUILDING MANAGEMENT SYSTEM ARCHITECTURE. THIS SHALL INCLUDE INDICATION OF RELAYS STATUS ONTO THE ROOM GRAPHICS SCREEN AND PROGRAMMING OF ON/OFF SCHEDULE.

BUILDING MANAGEMENT (AUTOMATIC TEMPERATURE CONTROL)
SYSTEM NETWORK LIGHT CONTROL SYSTEM SHALL BE CAPABLE OF PANEL-TO-PANEL COMMUNICATIONS OVER A HIGH SPEED, HARDWIRED DATA NETWORK. THE NETWORK SHALL CONSIST OF WIRING AS REQUIRED BY THE MANUFACTURER TO THE BMS/ATC SYSTEM FOR OPERATOR CONTROL AT A SINGLE LOCATION. ATC CONTRACTOR SHALL PROVIDE ALL NETWORK WIRING BETWEEN LIGHTING CONTROL PANEL AND BMS SYSTEM CONTROLLER.



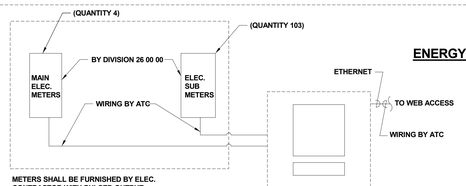
OWNERS INFORMATIONAL KIOSK:

AN OWNER INFORMATIONAL KIOSK FOR USE BY GENERAL PUBLIC SHALL BE PROVIDED BY ATC CONTRACTOR. THE WORKSTATION SHALL BE FULLY PASSWORD PROTECTED SO THAT INFORMATION ON THE SYSTEM MAY ONLY BE VIEWED AND NOT CHANGED IN ANYWAY. VISUAL GRAPHICS AND MANEUVERABILITY ON THIS WORKSTATION SHALL BE MADE AS EASY AS POSSIBLE FOR THE PUBLIC USER AND SHALL FOCUS ON DISPLAYING SYSTEM OPERATIONAL STATUS AND ENERGY CONSUMPTION OF SPECIFIED SYSTEMS. THE SYSTEM SHALL ALSO BE INTERFACED WITH LIGHT CONTROL PANEL FOR LIGHTING SYSTEM OPERATION. THE OWNERS MAIN WORKSTATION SHALL ALSO REFLECT THIS DATA.

DISPLAY THE FOLLOWING BUILDING INFORMATION AND ENERGY METERING DATA:

- OUTSIDE AIR TEMPERATURE, HUMIDITY, WIND SPEED & DIRECTION, RAIN SENSOR STATUS
- BUILDING ELECTRICAL CONSUMPTION THROUGH ELECTRIC METERS
- BUILDING HEATING HOT WATER CONSUMPTION THROUGH BTU METERS
- BUILDING CHILLED WATER CONSUMPTION THROUGH BTU METERS
- BUILDING COLD WATER CONSUMPTION THROUGH FLOW METERS
- BUILDING DOMESTIC HOT WATER CONSUMPTION THROUGH RELAY PROGRAMMING
- HRHP PLANT AS WHOLE INCLUDING ADIABATIC DRY COOLERS, GEOTHERMAL WELL SYSTEM (ALTERNATE)

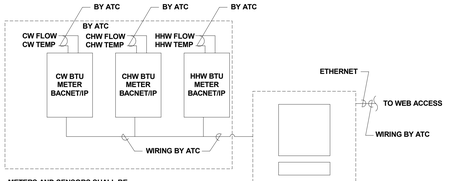
ENERGY METERING SYSTEMS



METERS SHALL BE FURNISHED BY ELEC. CONTRACTOR WITH PULSED OUTPUT (PROPORTIONAL TO KWH CONSUMED) TO INPUT ELECTRICAL CONSUMPTION DATA (KWH) TO THE BUILDING MANAGEMENT SYSTEM FOR TRENDING ENERGY USAGE OF HVAC SYSTEMS. PROGRAMMING & WIRING FROM METER & SUB-METERS TO BMS SHALL BE BY THE ATC.

WEATHER STATION	AI
READINGS	
OA TEMP*	X
OA HUMIDITY*	X
BAROMETRIC PRESSURE	X
WIND SPEED	X
WIND DIRECTION	X
BACNET/IP PROTOCOL	X

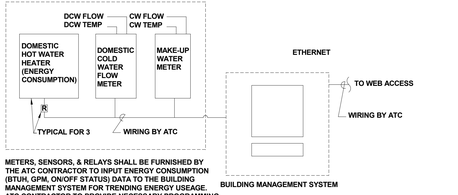
*OA TEMP & HUMIDITY SENSORS SHALL BE PROVIDED WITH WEATHER SHIELD AND SHALL BE LOCATED ON NORTH SIDE OF BUILDING IN A LOCATION WITH NO DIRECT SOLAR EXPOSURE



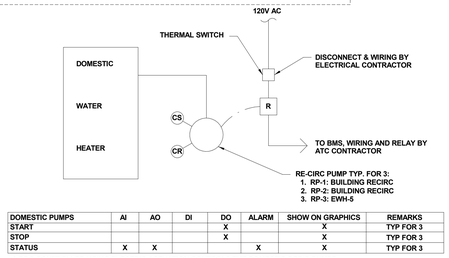
METERS AND SENSORS SHALL BE FURNISHED BY THE ATC CONTRACTOR TO INPUT ENERGY CONSUMPTION (BTUH, GPM, TEMPERATURE,ETC.) DATA TO THE (BMS) BUILDING MANAGEMENT SYSTEM FOR TRENDING ENERGY USAGE.

DISPLAY THE FOLLOWING BUILDING INFORMATION AND ENERGY METERING DATA ON THE BMS:

- OUTSIDE AIR TEMPERATURE, HUMIDITY, WIND SPEED & DIRECTION, RAIN SENSOR STATUS
- BUILDING ELECTRICAL CONSUMPTION THROUGH MAIN METER
- BUILDING HEATING HOT WATER CONSUMPTION THROUGH BTU METER
- BUILDING CHILLED WATER CONSUMPTION THROUGH BTU METER
- BUILDING COLD WATER CONSUMPTION THROUGH FLOW METER
- BUILDING DOMESTIC HOT WATER CONSUMPTION THROUGH RELAY PROGRAMMING
- BUILDING CHECK METERS FOR PLUG LOADS, LIGHTING LOADS, MECHANICAL LOADS, ETC.
- PV GENERATION



METERS, SENSORS, & RELAYS SHALL BE FURNISHED BY THE ATC CONTRACTOR TO INPUT ENERGY CONSUMPTION (BTUH, GPM, ON/OFF STATUS) DATA TO THE BUILDING MANAGEMENT SYSTEM FOR TRENDING ENERGY USEAGE. ATC CONTRACTOR TO PROVIDE NECESSARY PROGRAMMING REQUIRED FOR DHW HEATER RELAYS TO DETERMINE ENERGY CONSUMED BY ON/OFF STATUS OF WATER HEATER

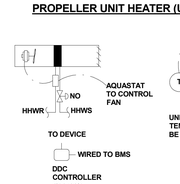


DOMESTIC PUMPS	AI	AO	DI	DO	ALARM	SHOW ON GRAPHICS	REMARKS
START				X		X	TYP FOR 3
STOP				X		X	TYP FOR 3
STATUS	X	X			X	X	TYP FOR 3

A DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE DOMESTIC RERIC PUMPS.
THE PUMPS SHALL BE ENABLED BASED ON SCHEDULE.
(2) PUMPS ONE IS LOCATED IN MECH ROOM 3003 (E BUILD MEZZ) & SECOND PUMP IS LOCATED IN (EAST CAMPUS PENTHOUSE

DOMESTIC WATER CIRCULATION CONTROL

PROPELLER UNIT HEATER (UH)



UNIT HEATER SPACE TEMPERATURE SENSORS SHALL BE METAL PLATE SENSOR TYPE.

UNIT HEATER CONTROL: (PROPELLER TYPE)

A DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE UNIT OPERATION AS FOLLOWS:

RUN CONDITIONS - SCHEDULED:
THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:

- OCCUPIED MODE: THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 70°F (ADJ.).
- UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 60°F (ADJ.).

FAN:
THE FAN SHALL RUN ANYTIME THE AQUASTAT SENSES WATER TEMPERATURE IS ABOVE 90°F (ADJ) UNLESS SHUTDOWN ON SAFETIES.

HEATING COIL VALVE:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE HEATING COIL VALVE TO MAINTAIN THE SPACE SETPOINT.

THE HEATING SHALL BE ENABLED WHENEVER:

- OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
- AND THE ZONE TEMPERATURE IS BELOW HEATING SETPOINT.

SUMMER OPERATIONS:

- THE FAN IS OFF
- AND THE CONTROL VALVE IS CLOSED

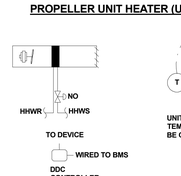
EMERGENCY SHUTDOWN:
UPON RECEIVING A SIGNAL FROM THE FIRE ALARM SYSTEM, THE FANS SHALL SHUTDOWN, ALL DAMPERS SHALL CLOSE AND AN ALARM SHALL BE GENERATED AT THE BMS. THIS MODE SHALL BE CALLED EMERGENCY SHUTDOWN MODE. ATC CONTRACTOR SHALL HARD WIRE A DIRECT CONNECTION FROM THE FIRE ALARM PANELS DRY CONTACTS TO THE BMS.

PROPELLER UNIT HEATER	AI	AO	DI	DO	ALARM	SHOW ON GRAPHIC	REMARKS
ZONE TEMP	X				X	X	NOTE #1
HEATING VALVE	X	X			X	X	NOTE #2
HEATING SETPOINT		X				X	

NOTE #1: ALARM WHEN MEASURED TEMP IS +10°(ADJ.) FROM COOL SETPOINT OR -10°(ADJ.) FROM HEAT SETPOINT FOR MORE THAN 15 MIN (ADJ.)

NOTE #2: ALARM WHEN COMMANDED POSITION AND SENSED POSITION DO NOT AGREE FOR A PERIOD OF MORE THAN 2 MIN (ADJ.)

PROPELLER UNIT HEATER (UH 13-19)



UNIT HEATER SPACE TEMPERATURE SENSORS SHALL BE CENTRAL SENSOR FOR EACH SHOP.

UNIT HEATER CONTROL: (PROPELLER TYPE)

A DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE UNIT OPERATION AS FOLLOWS:

RUN CONDITIONS - SCHEDULED:
THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:

- OCCUPIED MODE: THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 55°F (ADJ.).

HEATING COIL VALVE:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE HEATING COIL VALVE TO MAINTAIN THE SPACE SETPOINT.

THE HEATING SHALL BE ENABLED WHENEVER:

- OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
- AND THE ZONE TEMPERATURE IS BELOW HEATING SETPOINT.

SUMMER OPERATIONS:

- THE FAN IS OFF
- AND THE CONTROL VALVE IS CLOSED

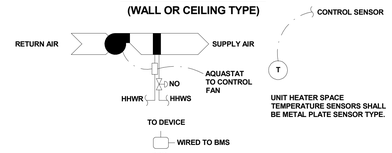
EMERGENCY SHUTDOWN:
UPON RECEIVING A SIGNAL FROM THE FIRE ALARM SYSTEM, THE FANS SHALL SHUTDOWN, ALL DAMPERS SHALL CLOSE AND AN ALARM SHALL BE GENERATED AT THE BMS. THIS MODE SHALL BE CALLED EMERGENCY SHUTDOWN MODE. ATC CONTRACTOR SHALL HARD WIRE A DIRECT CONNECTION FROM THE FIRE ALARM PANELS DRY CONTACTS TO THE BMS.

PROPELLER UNIT HEATER	AI	AO	DI	DO	ALARM	SHOW ON GRAPHIC	REMARKS
ZONE TEMP	X				X	X	NOTE #1
HEATING VALVE	X	X			X	X	NOTE #2
HEATING SETPOINT		X				X	

NOTE #1: ALARM WHEN MEASURED TEMP IS -10°(ADJ.) FROM HEAT SETPOINT FOR MORE THAN 15 MIN (ADJ.)

NOTE #2: ALARM WHEN COMMANDED POSITION AND SENSED POSITION DO NOT AGREE FOR A PERIOD OF MORE THAN 2 MIN (ADJ.)

CABINET UNIT HEATER (UH)
(WALL OR CEILING TYPE)



UNIT HEATER SPACE TEMPERATURE SENSORS SHALL BE METAL PLATE SENSOR TYPE.

UNIT HEATER CONTROL: (CABINET, CONCEALED, & WALL TYPE)

A DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE UNIT OPERATION AS FOLLOWS:

RUN CONDITIONS - SCHEDULED:
THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:

- OCCUPIED MODE: THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 70°F (ADJ.).
- UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 60°F (ADJ.).

FAN:
THE FAN SHALL RUN ANYTIME THE AQUASTAT SENSES WATER TEMPERATURE IS ABOVE 90°F (ADJ) UNLESS SHUTDOWN ON SAFETIES.

HEATING COIL VALVE:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE HEATING COIL VALVE TO MAINTAIN THE SPACE SETPOINT.

THE HEATING SHALL BE ENABLED WHENEVER:

- OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
- AND THE ZONE TEMPERATURE IS BELOW HEATING SETPOINT.

SUMMER OPERATIONS:

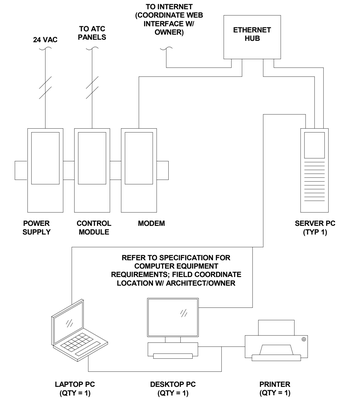
- THE FAN IS OFF
- AND THE CONTROL VALVE IS CLOSED

EMERGENCY SHUTDOWN:
UPON RECEIVING A SIGNAL FROM THE FIRE ALARM SYSTEM, THE FANS SHALL SHUTDOWN, ALL DAMPERS SHALL CLOSE AND AN ALARM SHALL BE GENERATED AT THE BMS. THIS MODE SHALL BE CALLED EMERGENCY SHUTDOWN MODE. ATC CONTRACTOR SHALL HARD WIRE A DIRECT CONNECTION FROM THE FIRE ALARM PANELS DRY CONTACTS TO THE BMS.

CABINET UNIT HEATER	AI	AO	DI	DO	ALARM	SHOW ON GRAPHIC	REMARKS
ZONE TEMP	X				X	X	NOTE #1
HEATING VALVE	X	X			X	X	NOTE #2
HEATING SETPOINT		X				X	

NOTE #1: ALARM WHEN MEASURED TEMP IS +10°(ADJ.) FROM COOL SETPOINT OR -10°(ADJ.) FROM HEAT SETPOINT FOR MORE THAN 15 MIN (ADJ.)

NOTE #2: ALARM WHEN COMMANDED POSITION AND SENSED POSITION DO NOT AGREE FOR A PERIOD OF MORE THAN 2 MIN (ADJ.)



ATC FRONT END INTERFACE DIAGRAM

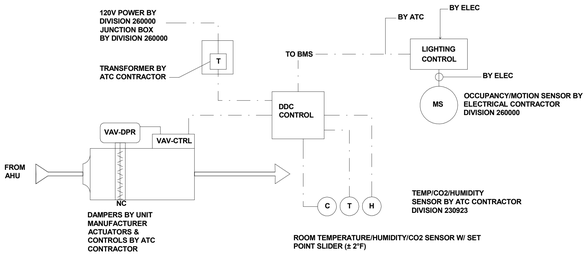
ABBREVIATIONS

AFVP	AIRFLOW VELOCITY PROBE
ALM	ALARM
AQ	AQUASTAT
ATC	AUTOMATIC TEMPERATURE CONTROLS
BLDG	BUILDING
BLR	BOILER
BMS	BUILDING MANAGEMENT SYSTEM (ENERGY & AUTOMATION)
CM	CONSTRUCTION MANAGER
COMB	COMBUSTION
CONTR	CONTROLLER
CO2	CARBON DIOXIDE
CR	CONTROL RELAY
CS	CURRENT SENSOR
CUV	CABINET UNIT VENTILATOR
D	DAMPER
DA	DISCHARGE AIR
DAS	DISCHARGE AIR SENSOR
DAT	DISCHARGE AIR TEMPERATURE
DCV	DEMAND CONTROL VENTILATION
DCW	DOMESTIC COLD WATER
DHW	DOMESTIC HOT WATER
DDC	DIRECT DIGITAL CONTROL
DO	DAMPER OPERATOR
DP	DIFFERENTIAL PRESSURE
DPR	DAMPER
DPV	DIFFERENTIAL PRESSURE VALVE
EA	EXHAUST AIR
EF	EXHAUST FAN
F	FLOW/FARENHEIT (AS APPLICABLE)
FB	FACE & BYPASS
FD	FIRE DAMPER
H	HUMIDITY
HS	ENTHALPY SENSOR
HT	HIGH TEMPERATURE
HTG	HEATING
HR	HEAT RECOVERY
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
LT	LOW TEMPERATURE
M	MOTOR
MAT	MIXED AIR TEMPERATURE
NAC	NETWORK APPLICATION CONTROLLER
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OA	OUTSIDE AIR
OVR	OVERRIDE
P	PRESSURE
PB	PUSH BUTTON
PNL	PANEL
RA	RETURN AIR
REL	RELIEF AIR
RF	RETURN FAN
RFC	RETURN FAN CONTROLLER
RM	ROOM
SA	SUPPLY AIR
SD	SMOKE DAMPER OR SMOKE DETECTOR
SF	SUPPLY FAN
SFC	SUPPLY FAN CONTROLLER
SP	STATIC PRESSURE
T	TEMPERATURE
TEC	TERMINAL EQUIPMENT CONTROLLER
VAC	VOLTS - ALTERNATING CURRENT
VDC	VOLTS - DIRECT CURRENT
VFD	SEE VSD
VLV	VALVE
VP	VELOCITY PROBE (AIRFLOW)
VSD	VARIABLE SPEED (FREQUENCY) DRIVE
XFMR	TRANSFORMER

ATC/BMS GENERAL NOTES

1. ALL SETPOINTS INDICATED IN THE SEQUENCE OF OPERATIONS SHALL BE ADJUSTABLE ON GRAPHICAL INTERFACE.
2. THE CONTROL POINTS LISTED IN THE SUMMARY MATRIX ARE THE MINIMUM CONTROL POINTS REQUIRED. ATC CONTRACTOR SHALL PROVIDE ALL CONTROL POINTS AS REQUIRED FOR COMPLETE SYSTEM CONTROL PER THE SEQUENCE OF OPERATIONS.
3. ALL CONTROL WIRING, SENSORS, RELAYS, CONTROLLERS, PANELS, DAMPERS, ACTUATORS, ETC. INDICATED ON THE CONTROL DIAGRAMS SHALL BE PROVIDED BY THE ATC CONTRACTOR UNLESS NOTED OTHERWISE.
4. ALL HHW VALVES SHALL BE FAIL OPEN ON LOSS OF POWER.
5. ALL HHW WATER VALVES SHALL BE MODULATING TYPE FOR GPM > 2.0; 2-POSITION ACCEPTABLE FOR FLOWS < 2.0 GPM
6. ATC CONTRACTOR TO COORDINATE W/ OWNER FOR ALL COMMUNICATION & INTERFACE REQUIREMENTS TO CENTRAL OPERATING STATION. REFER TO SPEC FOR FURTHER INFO.
7. DUCT SMOKE DETECTORS INDICATED ARE TO BE FURNISHED BY DIV. 260000 & INSTALLED BY HVAC CONTRACTOR. POWER WIRING AND FIRE ALARM INTERLOCK BY ELECTRICAL CONTRACTOR. ATC CONTRACTOR TO PROVIDE BMS INTERLOCK TO SHUT ASSOCIATED UNIT DOWN AND INITIATE AN ALARM UPON ACTIVATION
8. ALL SMOKE DAMPERS SHALL BE COMBINATION SMOKE/FIRE DAMPERS, SHALL BE FURNISHED & INSTALLED BY HVAC CONTRACTOR, AND POWER WIRED BY ELECTRICAL CONTRACTOR. DAMPERS SHALL BE MOTOR OPERATED WITH 24 VOLT / 120 VOLT ACTUATOR. FIRE ALARM INTERLOCK BY ELECTRICAL CONTRACTOR. DAMPER ENDSWITCH INTEGRATION TO BMS BY ATC CONTRACTOR.
9. ALL ATC CONTROLS SHALL BE POWER WIRED FROM THE MAIN ATC PANEL WITHIN THE MECHANICAL ROOM AND DESIGNATED EMERGENCY POWER JUNCTION BOXES LOCATED ON THE ELECTRICAL DRAWINGS. THIS MAIN PANEL AND JUNCTION BOXES WILL B

VARIABLE AIR VOLUME BOX



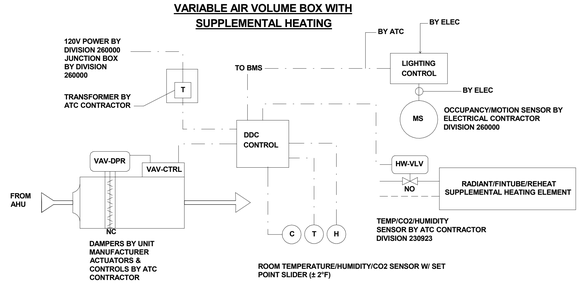
VARIABLE AIR VOLUME BOX

1. OCCUPIED: DURING OCCUPIED MODE, THE SPACE THERMOSTAT SHALL MODULATE THE NORMALLY-CLOSED VARIABLE AIR VOLUME BOX DAMPER BETWEEN THE MAXIMUM AND MINIMUM POSITIONS AS INDICATED IN THE DRAWINGS TO MAINTAIN THE OCCUPIED SETPOINTS OF 70°F (ADJ) HEATING & 76°F (ADJ) COOLING. THE VAV BOX REMAINS IN OCCUPIED MODE AS LONG AS THE SPACE MOUNTED OCCUPANCY SENSOR SENSES MOTION AT LEAST ONCE EVERY 10 MINUTES (ADJ). IF NOT THEN THE VAV BOX WILL GO INTO STANDBY MODE.
2. UNOCCUPIED: DURING UNOCCUPIED MODE, THE DAMPER SHALL BE FULL OPEN.
3. OVERRIDE: ROOM/ZONE TEMPERATURE SENSORS SHALL HAVE PUSH BUTTON OCCUPIED OVERRIDE BUTTON CAPABILITY. UPON ACTIVATION OF OVERRIDE BUTTON ON APPROXIMATELY 10% (ADJ) OF THE VAV'S ASSOCIATED WITH ONE RTU, THE RTU STATUS WILL CHANGE TO OCCUPIED MODE FOR A PERIOD OF 2 HOURS (ADJ).
4. CO2 CONTROLS: THE SPACE MOUNTED CO2 SENSOR SHALL GENERATE AN ALARM WHEN CONDITIONS VARY BY 10% OR MORE FROM THE DESIGN CONDITION OF 800 PPM. ONCE THE SPACE CO2 LEVELS REACH 850 PPM, THE VAV DAMPER SHALL MODULATE OPEN UNTIL THE CO2 LEVELS FALL BELOW THE THRESHOLD.
5. STANDBY MODE: DURING STANDBY MODE, THE VAV DAMPER SHALL CLOSE AND THE ROOM SETPOINTS WILL RESET FROM 70°F (ADJ) HEATING TO 68°F (ADJ) AND 76°F (ADJ) COOLING TO 78°F. THE VAV DAMPER SHALL MODULATE TO MAINTAIN THESE RESET SETPOINTS. ONCE THE OCCUPANCY SENSOR SENSES MOTION, THE VAV BOX WILL REVERT BACK TO OCCUPIED MODE.
6. ENTHALPY SENSOR: (EXTERIOR SPACES W/ OPERABLE WINDOWS ONLY): WHEN THE SPACE ENTHALPY IS ABOVE DEWPOINT CONDITIONS, THE SENSOR SHALL NOTIFY THE DDC CONTROLLER AND THE VAV DAMPER SHALL REDUCE TO MINIMUM POSITION. ONCE THE ENTHALPY SENSOR SENSES THE SPACE ENTHALPY IS BELOW DEWPOINT CONDITIONS, THE VAV BOX WILL REVERT BACK TO OCCUPIED MODE.

VARIABLE AIR VOLUME BOX (VAV)	AI	AO	DI	DO	ALARM	REMARKS
DAMPER POS./COMMAND (EACH)	X	X			X	NOTE #3
SUPPLY AIR TEMP.	X					
SUPPLY AIR VOLUME (CFM)	X					NOTE #1
ROOM TEMPERATURE	X				X	NOTE #2
CO2 SENSOR	X				X	880 PPM ALARM
HUMIDITY SENSOR	X				X	75% RH ALARM
OCCUPANCY SENSOR	X					

GENERAL NOTES: ALL POINTS TO BE SHOWN ON GRAPHICS UNLESS NOTED OTHERWISE.
NOTE #1: ATC CONTRACTOR SHALL BE RESPONSIBLE FOR PROGRAMMING/REPORTING AIRFLOW MEASUREMENT DATA FROM VAV BOXES TO THE BMS.
NOTE #2: ALARM WHEN MEASURED TEMP IS +10°(ADJ.) FROM COOL SETPOINT OR -10°(ADJ.) FROM HEAT SETPOINT FOR MORE THAN 15 MIN (ADJ.)
NOTE #3: ALARM WHEN COMMANDED POSITION AND SENSED POSITION DO NOT AGREE FOR A PERIOD OF MORE THAN 2 MIN (ADJ.)

VARIABLE AIR VOLUME BOX WITH SUPPLEMENTAL HEATING



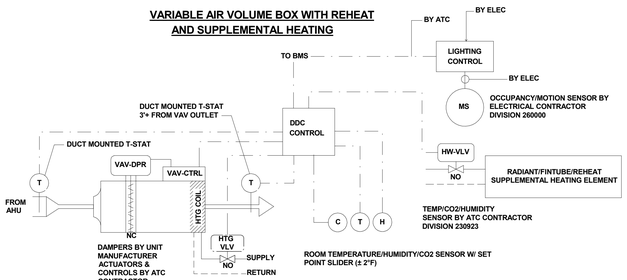
VARIABLE AIR VOLUME BOX WITH SUPPLEMENTAL HEATING

1. OCCUPIED: THE SPACE THERMOSTAT SHALL MODULATE THE NORMALLY-CLOSED VARIABLE AIR VOLUME BOX DAMPER BETWEEN THE MAXIMUM AND MINIMUM POSITIONS AS INDICATED IN THE DRAWINGS TO MAINTAIN THE OCCUPIED SETPOINTS OF 70°F (ADJ) HEATING & 75°F (ADJ) COOLING. AT ANY POSITION, IF THE SPACE TEMPERATURE FALLS BELOW THE HEATING SETPOINT THEN THE MODULATING RADIATION VALVE SHALL MODULATE OPEN TO MAINTAIN HEATING SETPOINT OF 70°F (ADJ). THE VAV BOX REMAINS IN OCCUPIED MODE AS LONG AS THE SPACE MOUNTED OCCUPANCY SENSOR SENSES MOTION AT LEAST ONCE EVERY 10 MINUTES (ADJ), IF NOT THEN THE VAV BOX WILL GO INTO STANDBY MODE.
2. UNOCCUPIED: DURING UNOCCUPIED MODE, THE DAMPER SHALL BE FULL OPEN AND THE RADIATION HEATING HOT WATER CONTROL VALVE SHALL MODULATE TO MAINTAIN UNOCCUPIED SPACE TEMPERATURE SETPOINT OF 60°(ADJ).
3. OVERRIDE: ROOM/ZONE TEMPERATURE SENSORS SHALL HAVE PUSH BUTTON OCCUPIED OVERRIDE BUTTON CAPABILITY. UPON ACTIVATION OF A SINGLE SPACE TEMPERATURE SENSOR DURING THE WINTER MONTHS, THE SPACE RADIANT PANEL CONTROL VALVE WILL BEGIN TO MODULATE OPEN TO MAINTAIN THE OCCUPIED HEATING SETPOINT OF 70°F (ADJ) FOR A PERIOD OF 2 HOURS (ADJ). UPON ACTIVATION OF OVERRIDE BUTTON ON APPROXIMATELY 10% (ADJ) OF THE VAV'S ASSOCIATED WITH ONE RTU, THE RTU STATUS WILL CHANGE TO OCCUPIED MODE FOR A PERIOD OF 2 HOURS (ADJ).
4. CO2 CONTROLS: THE SPACE MOUNTED CO2 SENSOR SHALL GENERATE AN ALARM WHEN CONDITIONS VARY BY 10% OR MORE FROM THE DESIGN CONDITION OF 800 PPM. ONCE THE SPACE CO2 LEVELS REACH 850 PPM THE VAV DAMPER SHALL MODULATE OPEN UNTIL THE CO2 LEVELS FALL BELOW THE THRESHOLD. DURING WINTER MONTHS THE RADIANT PANEL HHW VALVE SHALL MODULATE OPEN TO MAINTAIN SPACE TEMPERATURE DURING THIS CONDITION.
5. STANDBY MODE: DURING STANDBY MODE, THE VAV DAMPER AND HHW RADIANT CONTROL VALVE SHALL CLOSE AND THE ROOM SETPOINTS WILL RESET FROM 70°F (ADJ) HEATING TO 68°F (ADJ) AND 75°F (ADJ) COOLING TO 78°F (ADJ.). DURING THIS MODE BOTH THE VAV DAMPER AND SUPPLEMENTAL HEATING CONTROL VALVE SHALL MODULATE TO MAINTAIN THESE RESET SETPOINTS. ONCE THE OCCUPANCY SENSOR SENSES MOTION THE VAV BOX WILL REVERT BACK TO OCCUPIED MODE.

VARIABLE AIR VOLUME BOX (VAV)	AI	AO	DI	DO	ALARM	REMARKS
DAMPER POS./COMMAND (EACH)	X	X			X	NOTE #3
SUPPLY AIR TEMP.	X					
SUPPLY AIR VOLUME (CFM)	X					NOTE #1
ROOM TEMPERATURE	X				X	NOTE #2
SUPPLEMENTAL HEATING CONTROL VALVE	X	X			X	NOTE #3
CO2 SENSOR	X				X	880 PPM ALARM
HUMIDITY SENSOR	X				X	75% RH ALARM
OCCUPANCY SENSOR	X					

GENERAL NOTES: ALL POINTS TO BE SHOWN ON GRAPHICS UNLESS NOTED OTHERWISE.
NOTE #1: ATC CONTRACTOR SHALL BE RESPONSIBLE FOR PROGRAMMING/REPORTING AIRFLOW MEASUREMENT DATA FROM VAV BOXES TO THE BMS.
NOTE #2: ALARM WHEN MEASURED TEMP IS +10°(ADJ.) FROM COOL SETPOINT OR -10°(ADJ.) FROM HEAT SETPOINT FOR MORE THAN 15 MIN (ADJ.)
NOTE #3: ALARM WHEN COMMANDED POSITION AND SENSED POSITION DO NOT AGREE FOR A PERIOD OF MORE THAN 2 MIN (ADJ.)

VARIABLE AIR VOLUME BOX WITH REHEAT AND SUPPLEMENTAL HEATING



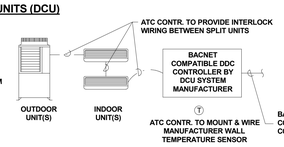
VARIABLE AIR VOLUME BOX WITH REHEAT

1. OCCUPIED: DURING OCCUPIED MODE, THE SPACE THERMOSTAT SHALL MODULATE THE NORMALLY-OPEN VARIABLE AIR VOLUME BOX DAMPER BETWEEN THE MAXIMUM AND MINIMUM POSITIONS AS INDICATED IN THE DRAWINGS TO MAINTAIN THE OCCUPIED SETPOINTS OF 70°F (ADJ) HEATING & 75°F (ADJ) COOLING. IF THE SPACE TEMPERATURE DROPS BELOW THE HEATING SETPOINT THEN THE REHEAT CONTROL VALVE WILL MODULATE OPEN TO MAINTAIN THE SPACE HEATING SETPOINT. A HIGH SIDE LIMIT OF 20°F ABOVE SPACE SETPOINT SHALL BE PLACED ON VAV DISCHARGE AIR TEMP. THE VAV BOX REMAINS IN OCCUPIED MODE AS LONG AS THE SPACE MOUNTED OCCUPANCY SENSOR SENSES MOTION AT LEAST ONCE EVERY 10 MINUTES (ADJ). IF NOT THEN THE VAV BOX WILL GO INTO STANDBY MODE. FOR SPACES WHERE SUPPLEMENTAL HEATING ARE LOCATED, THOSE CONTROL VALVES SHALL MODULATE IN CONJUNCTION WITH THE VAV REHEAT CONTROL VALVE TO MAINTAIN SPACE TEMP.
2. UNOCCUPIED: DURING UNOCCUPIED MODE, THE DAMPER SHALL BE FULL OPEN AND THE SUPPLEMENTAL HEATING CONTROL SHALL MODULATE TO MAINTAIN UNOCCUPIED SETPOINT OF 60°(ADJ)
3. OVERRIDE: ROOM/ZONE TEMPERATURE SENSORS SHALL HAVE PUSH BUTTON OCCUPIED OVERRIDE BUTTON CAPABILITY. UPON ACTIVATION OF OVERRIDE BUTTON ON APPROXIMATELY 10% (ADJ) OF THE VAV'S ASSOCIATED WITH ONE RTU/AHU, THE RTU/AHU STATUS WILL CHANGE TO OCCUPIED MODE FOR A PERIOD OF 2 HOURS (ADJ).
4. CO2 CONTROLS: THE SPACE MOUNTED CO2 SENSOR SHALL GENERATE AN ALARM WHEN CONDITIONS VARY BY 10% OR MORE FROM THE DESIGN CONDITION OF 800 PPM (ADJ). ONCE THE SPACE CO2 LEVELS REACH 750 PPM (ADJ), THE VAV DAMPER SHALL MODULATE OPEN UNTIL THE CO2 LEVELS FALL BELOW THE THRESHOLD.
5. STANDBY MODE: DURING STANDBY MODE, THE VAV DAMPER SHALL CLOSE AND THE ROOM SETPOINTS WILL RESET FROM 70°F (ADJ) HEATING TO 68°F (ADJ) AND 75°F (ADJ) COOLING TO 78°F. THE VAV DAMPER AND REHEAT CONTROL VALVE SHALL MODULATE TO MAINTAIN THESE RESET SETPOINTS. ONCE THE OCCUPANCY SENSOR SENSES MOTION, THE VAV BOX WILL REVERT BACK TO OCCUPIED MODE.

VARIABLE AIR VOLUME BOX (VAV)	AI	AO	DI	DO	ALARM	REMARKS
DAMPER POS./COMMAND (EACH)	X	X			X	
SUPPLY AIR TEMP.	X					NOTE #4
SUPPLY AIR VOLUME (CFM)	X					NOTE #2
ROOM TEMPERATURE	X	X			X	NOTE #3
CO2 SENSOR	X				X	880 PPM ALARM
HUMIDITY SENSOR	X				X	75% RH ALARM
HHW REHEAT CONTROL VALVE	X	X			X	NOTE #4
SUPPLEMENTAL HEATING CONTROL VALVE	X	X			X	NOTE #4
MOTION SENSOR (L.C.P)	X					

NOTE #1: ALL POINTS TO BE SHOWN ON GRAPHICS UNLESS NOTED OTHERWISE.
NOTE #2: ATC CONTRACTOR SHALL BE RESPONSIBLE FOR PROGRAMMING/REPORTING AIRFLOW MEASUREMENT DATA FROM VAV BOXES TO THE BMS.
NOTE #3: ALARM WHEN MEASURED TEMP IS +10°(ADJ.) FROM COOL SETPOINT OR -10°(ADJ.) FROM HEAT SETPOINT FOR MORE THAN 15 MIN (ADJ.)
NOTE #4: ALARM WHEN COMMANDED POSITION AND SENSED POSITION DO NOT AGREE FOR A PERIOD OF MORE THAN 2 MIN (ADJ.)

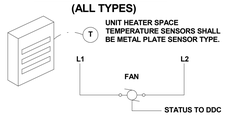
DUCTLESS COOLING UNITS (DCU)



DUCTLESS COOLING UNIT (DCU)	AI	AO	DI	DO	ALARM	SHOW ON GRAPHIC	REMARKS
DCU SYSTEM INDOOR STATUS			X	X	X	X	
SPACE TEMPERATURE	X				X	X	NOTE #1
CONDENSATE OVERFLOW ALARM			X		X	X	

PROVIDE EVAPORATOR UNIT STATUS CONTROL POINTS VIA DCU SYSTEM CONTROLLER'S BAS INTERFACE.
SAFETY: UPON A HIGH FLOAT CONDITION UNIT SHALL BE DE-ENERGIZED.
NOTE #1: ALARM WHEN MEASURED TEMP IS +10°(ADJ.) FROM COOL SETPOINT OR -10°(ADJ.) FROM HEAT SETPOINT FOR MORE THAN 15 MIN (ADJ.)

ELECTRIC UNIT HEATERS (ALL TYPES)



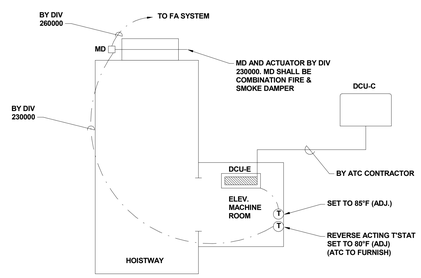
ELECTRIC UNIT HEATER	AI	AO	DI	DO	ALARM	REMARKS
SPACE TEMP & SETPOINT	X	X			X	NOTE #1
FAN S/S & STATUS		X	X	X	X	

NOTE #1: ALARM WHEN MEASURED TEMP IS -10°(ADJ.) FROM HEAT SETPOINT FOR MORE THAN 15 MIN (ADJ.)

VARIABLE FREQUENCY DRIVE INTERFACE

VARIABLE FREQUENCY DRIVE (VFD) INTERFACE MONITOR:
CURRENT VFD STATUS AND OPERATING CONDITIONS SHALL BE MONITORED THROUGH ITS COMMUNICATIONS INTERFACE PORT. THE INTERFACE SHALL MONITOR AND TREND THE POINTS AS SHOWN ON THE POINTS LIST.

VARIABLE FREQUENCY DRIVE INTERFACE	HARDWARE POINTS				SOFTWARE POINTS						
POINT NAME	AI	AO	BI	BO	AV	BV	LOOP	SCHED	TREND	ALARM	SHOW ON GRAPHICS	REMARKS
MOTOR SPEED RPM					X				X		X	
MOTOR FREQUENCY HERTZ					X				X		X	
MOTOR CURRENT AMPS					X				X		X	
MOTOR RUNTIME					X						X	
VFD STATUS						X			X	X	X	
IN FAULT CONDITION						X			X	X	X	
IN BYPASS						X			X	X	X	
POWER, KW					X				X		X	
ENERGY, KWH					X				X		X	



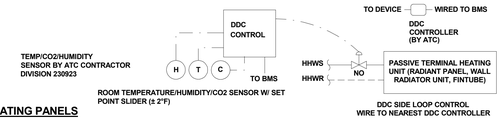
ELEVATOR MACHINE ROOM VENTILATION/AC CONTROL

MOTORIZED DAMPER SHALL MODULATE OPEN TO MAINTAIN ELEVATOR MACHINE ROOM SPACE TEMP OF (80° F, ADJ.); MD SHALL FAIL OPEN UPON LOSS OF POWER OR OPEN AS COMMANDED BY FIRE ALARM SYSTEM.

IF ELEVATOR MACHINE ROOM TEMPERATURE RISES ABOVE 85°F, THE DCU AC SYSTEM SHALL OPERATE TO MAINTAIN SPACE TEMPERATURE SETPOINT AND HOISTWAY MD SHALL CLOSE DURING NORMAL OPERATION.

ELEVATOR MACHINE ROOM CONTROL	AI	AO	DI	DO	ALARM	SHOW ON GRAPHICS	REMARKS
SPACE TEMPERATURE SENSOR	X				X	X	NOTE #2
MOTORIZED DAMPER POSITION			X	X	X	X	NOTE #3
DCU SYSTEM INDOOR S/S & STATUS			X	X	X	X	NOTE #1
CONDENSATE ALARM			X		X	X	

NOTE #1: VIA BACNET COMPATIBLE CONTROLLER (BY DCU MANUF.)
NOTE #2: ALARM WHEN MEASURED TEMP IS +10°(ADJ.) FROM COOL SETPOINT OR -10°(ADJ.) FROM HEAT SETPOINT FOR MORE THAN 15 MIN (ADJ.)
NOTE #3: ALARM WHEN COMMANDED POSITION AND SENSED POSITION DO NOT AGREE FOR A PERIOD OF MORE THAN 2 MIN (ADJ.)



HOT WATER RADIANT HEATING PANELS

A DDC TEC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE HOT WATER TERMINAL HEATING UNITS.

THE SPACES SERVED BY THE HOT WATER TERMINAL HEATING UNITS ARE CONTROLLED IN OCCUPIED AND UNOCCUPIED MODE AS FOLLOWS:
OCCUPIED
THE HOT WATER TERMINAL HEATING UNIT CONTROLLER MONITORS THE ROOM TEMPERATURE SENSOR.
THE MODULATING CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN
THE SPACE TEMPERATURE SET POINT. THE UNIT REMAINS IN OCCUPIED MODE AS LONG AS THE SPACE MOUNTED OCCUPANCY SENSOR SENSES MOTION AT LEAST ONCE EVERY 10 MINUTES, IF NOT THE UNIT WILL GO INTO STANDBY MODE. THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 70°F (ADJ.).
STANDBY MODE (DURING THE DAY)
THE HOT WATER TERMINAL HEATING UNIT CONTROL VALVES REMAIN IN UNOCCUPIED MODE UNTIL THE SPACE MOUNTED OCCUPANCY SENSOR INDICATES MOTION IN THE SPACE OR THE SPACE TEMPERATURE IS LESS THAN 67°F (ADJ.) WHICH CAUSES THE VALVES TO OPEN AND THE TERMINAL HEATING UNIT TO GO BACK INTO OCCUPIED MODE.
UNOCCUPIED (AT NIGHT)
THE TERMINAL HEATING UNIT IS CONTROLLED USING THE UNOCCUPIED SPACE TEMPERATURE SET POINT. THE CONTROLLER MAY RESET TO THE OCCUPIED MODE FOR A PREDETERMINED TIME PERIOD UPON A SIGNAL FROM THE CONTROL SYSTEM OR MANUALLY FROM THE SWITCH AT THE ROOM SENSOR. NIGHT SETBACK TEMPERATURE SETPOINTS SHALL BE 60°F (ADJ.).
ROOM/ZONE TEMPERATURE SENSORS SHALL HAVE PUSH BUTTON OCCUPIED OVER-RIDE BUTTON CAPABILITY TO MANUALLY CHANGE TO UNIT OCCUPIED MODE FOR A PERIOD OF 3 HOURS (ADJ.)
SUMMER MODE
HOT WATER CONTROL VALVE SHALL CLOSE WHEN OUTSIDE AIR TEMPERATURE IS ABOVE 75°(ADJ)

HOT WATER TERMINAL HEATING UNITS	AI	AO	DI	DO	ALARM	REMARKS
SPACE TEMP.	X	X			X	NOTE #1
HHW COIL VALVE	X	X			X	2-POSITION IF < 1.5 GPM
COS SENSOR	X				X	
HUMIDITY SENSOR	X				X	
OCCUPANCY SENSOR	X					

GENERAL NOTE: ALL POINTS TO BE SHOWN ON GRAPHICS UNLESS NOTED OTHERWISE.
NOTE #1: ALARM WHEN MEASURED TEMP IS -10°(ADJ.) FROM HEAT SETPOINT FOR MORE THAN 15 MIN (ADJ.)

ABBREVIATIONS

AFVP	AIRFLOW VELOCITY PROBE
ALM	ALARM
AQ	AQUASTAT
ATC	AUTOMATIC TEMPERATURE CONTROLS
BLDG	BUILDING
BLR	BOILER
BMS	BUILDING MANAGEMENT SYSTEM (ENERGY & AUTOMATION)
CM	CONSTRUCTION MANAGER
COMB	COMBUSTION
CONTR	CONTROLLER
CO2	CARBON DIOXIDE
CR	CONTROL RELAY
CS	CURRENT SENSOR
CUV	CABINET UNIT VENTILATOR
D	DAMPER
DA	DISCHARGE AIR
DAS	DISCHARGE AIR SENSOR
DAT	DISCHARGE AIR TEMPERATURE
DCV	DEMAND CONTROL VENTILATION
DCW	DOMESTIC COLD WATER
DHW	DOMESTIC HOT WATER
DDC	DIRECT DIGITAL CONTROL
DO	DAMPER OPERATOR
DP	DIFFERENTIAL PRESSURE
DPR	DAMPER
DPV	DIFFERENTIAL PRESSURE VALVE
EA	EXHAUST AIR
EF	EXHAUST FAN
F	FLOW/FAHRENHEIT (AS APPLICABLE)
FB	FACE & BYPASS
FD	FIRE DAMPER
H	HUMIDITY
HS	ENTHALPY SENSOR
HT	HIGH TEMPERATURE
HTG	HEATING
HR	HEAT RECOVERY
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
LT	LOW TEMPERATURE
M	MOTOR
MAT	MIXED AIR TEMPERATURE
NAC	NETWORK APPLICATION CONTROLLER
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OA	OUTSIDE AIR
OVR	OVERRIDE
P	PRESSURE
PB	PUSH BUTTON
PNL	PANEL
RA	RETURN AIR
REL	RELIEF AIR
RF	RETURN FAN
RFC	RETURN FAN CONTROLLER
RM	ROOM
SA	SUPPLY AIR
SD	SMOKE DAMPER OR SMOKE DETECTOR
SF	SUPPLY FAN
SFC	SUPPLY FAN CONTROLLER
SP	STATIC PRESSURE
T	TEMPERATURE
TEC	TERMINAL EQUIPMENT CONTROLLER
VAC	VOLTS - ALTERNATING CURRENT
VDC	VOLTS - DIRECT CURRENT
VFD	SEE VSD
VLV	VALVE
VP	VELOCITY PROBE (AIRFLOW)
VSD	VARIABLE SPEED (FREQUENCY) DRIVE
XFMR	TRANSFORMER

ATC/BMS GENERAL NOTES

1. ALL SETPOINTS INDICATED IN THE SEQUENCE OF OPERATIONS SHALL BE ADJUSTABLE ON GRAPHICAL INTERFACE.
2. THE CONTROL POINTS LISTED IN THE SUMMARY MATRIX ARE THE MINIMUM CONTROL POINTS REQUIRED. ATC CONTRACTOR SHALL PROVIDE ALL CONTROL POINTS AS REQUIRED FOR COMPLETE SYSTEM CONTROL PER THE SEQUENCE OF OPERATIONS.
3. ALL CONTROL WIRING, SENSORS, RELAYS, CONTROLLERS, PANELS, DAMPERS, ACTUATORS, ETC. INDICATED ON THE CONTROL DIAGRAMS SHALL BE PROVIDED BY THE ATC CONTRACTOR UNLESS NOTED OTHERWISE.
4. ALL HHW VALVES SHALL BE FAIL OPEN ON LOSS OF POWER.
5. ALL HHW WATER VALVES SHALL BE MODULATING TYPE FOR GPM > 2.0; 2-POSITION ACCEPTABLE FOR FLOWS < 2.0 GPM
6. ATC CONTRACTOR TO COORDINATE W/ OWNER FOR ALL COMMUNICATION & INTERFACE REQUIREMENTS TO CENTRAL OPERATING STATION. REFER TO SPEC FOR FURTHER INFO.
7. DUCT SMOKE DETECTORS INDICATED ARE TO BE FURNISHED BY DIV. 260000 & INSTALLED BY HVAC CONTRACTOR. POWER WIRING AND FIRE ALARM INTERLOCK BY ELECTRICAL CONTRACTOR. ATC CONTRACTOR TO PROVIDE BMS INTERLOCK TO SHUT ASSOCIATED UNIT DOWN AND INITIATE AN ALARM UPON ACTIVATION
8. ALL SMOKE DAMPERS SHALL BE COMBINATION SMOKE/FIRE DAMPERS, SHALL BE FURNISHED & INSTALLED BY HVAC CONTRACTOR, AND POWER WIRED BY ELECTRICAL CONTRACTOR. DAMPERS SHALL BE MOTOR OPERATED WITH 24 VOLT / 120 VOLT ACTUATOR. FIRE ALARM INTERLOCK BY ELECTRICAL CONTRACTOR. DAMPER ENDSWITCH INTEGRATION TO BMS BY ATC CONTRACTOR.
9. ALL ATC CONTROLS SHALL BE POWER WIRED FROM THE MAIN ATC PANEL WITHIN THE MECHANICAL ROOM AND DESIGNATED EMERGENCY POWER JUNCTION BOXES LOCATED ON THE ELECTRICAL DRAWINGS. THIS MAIN PANEL AND JUNCTION BOXES WILL BE FED BY EMERGENCY POWER. THEREFORE ALL CONTROLS SHALL BE ON EMERGENCY POWER. ANY SUB ATC PANELS REQUIRED SHALL BE FED FROM THIS MAIN ATC PANEL & SHALL BE ON EMERGENCY POWER & ALL SHALL BE PROVIDED BY ATC CONTRACTOR. ALL UNIT CONTROLS SHALL BE FED BY THIS MAIN ATC PANEL OR SUB ATC PANEL & NOT THROUGH THE UNIT'S MAIN POWER SOURCE.
10. ALL DENSELY OCCUPIED SPACES WITH OCCUPANT DENSITY OF 25 PEOPLE OR MORE PER 1000 SQ/FT SHALL BE PROVIDED W/ ROOM LEVEL TEMPERATURE, CO2, & HUMIDITY SENSORS W/ CO2 CONTROL. THIS SHALL BE PROVIDED IN COMPLIANCE WITH LEED v.4 CREDIT IEQC1. (PROVIDED BY FMS CONTRACTOR & INSTALLED BY ATC CONTRACTOR)

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999
VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

NO.	DATE	TITLE

ISSUE TITLE AND DATE:

60% CONSTRUCTION DOCUMENTS
06/19/2026

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KEY PLAN

ORIENTATION AND SCALE:

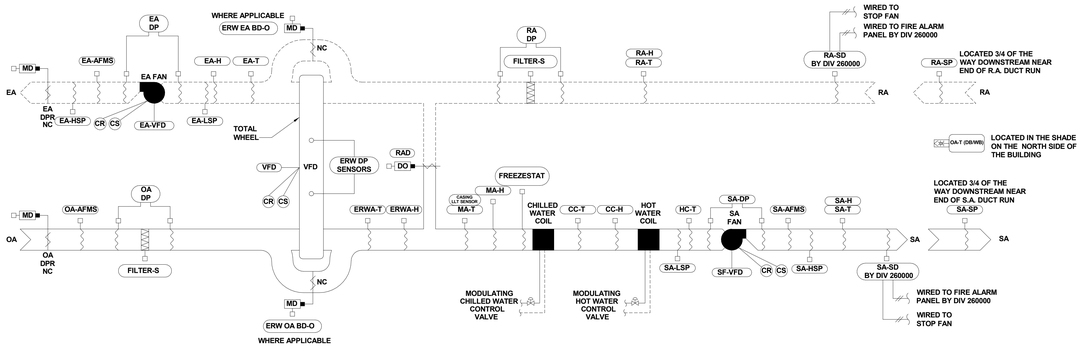
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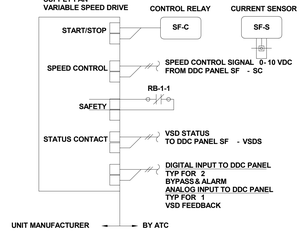
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CONTROLS VII

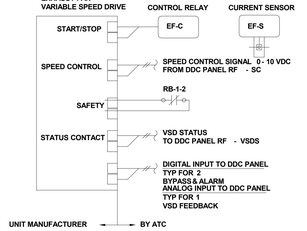
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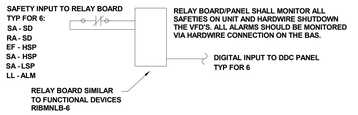
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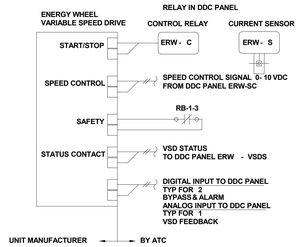
RTU-# - MIXED AIR OVERHEAD AIR HANDLING SYSTEM w/ DEMAND CONTROL VENTILATION











ROOF TOP UNITS

A DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE ROOFTOP AIR HANDLING UNIT OPERATION AS FOLLOWS:

RUN CONDITIONS - SCHEDULED:
THE RTU SHALL RUN BASED UPON AN OPERATOR-ADJUSTABLE SCHEDULE.

WARM-UP:
THE TERMINAL HEATING UNITS (RADIANT PANELS, WALL RADIATION UNITS, FINTUBE, ETC) VALVES SHALL MODULATE OPEN TO RAISE THE SPACES TO THE OCCUPIED SET POINT OF 70°F (ADJ.) WHERE PRESENT. ALONG WITH THE TERMINAL HEATING UNITS, THE RTU SHALL ALSO BE ACTIVATED. THE RTU OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE CLOSED, THE RECIRCULATION DAMPER SHALL BE OPEN. THE CHILLED WATER CONTROL VALVE SHALL BE CLOSED, THE TOTAL ENERGY RECOVERY WHEEL SHALL BE DE-ENERGIZED & ASSOCIATED ERW BYPASS DAMPERS SHALL CLOSE. THE SUPPLY FAN SHALL START AND RECIRCULATE BUILDING AIR, THE EXHAUST FAN SHALL BE OFF. THE RTU HOT WATER CONTROL VALVE SHALL MODULATE OPEN AND THE UNIT DISCHARGE AIR SETPOINT DURING WARM-UP SHALL BE 85°F (ADJ.). ONCE THE SPACE HAS REACHED SPACE SETPOINT, THE TERMINAL HEATING UNITS SHALL ENTER THE OCCUPIED MODE, ALLOWING THEIR HOT WATER VALVES TO MODULATE AS REQUIRED TO MAINTAIN THE SPACE SETPOINT WHERE PRESENT. THE RTU SHALL ALSO ENTER OCCUPIED MODE. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE WARM-UP MODE MORE THAN ONCE PER DAY. THROUGH THE OPTIMIZED START PROGRAM LOGIC WITHIN THE DDC SYSTEM SOFTWARE, THE BMS SHALL MONITOR THE RATE OF TEMPERATURE RISE TO DETERMINE WHEN TO ACTIVATE THE WARM UP MODE TO ENSURE THAT THE BUILDING HAS REACHED ITS SETPOINT FOR OCCUPIED MODE.

COOL-DOWN:
THE RTU OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE CLOSED, THE RECIRCULATION DAMPER SHALL BE OPEN. THE HOT WATER CONTROL VALVE SHALL BE CLOSED, THE TOTAL ENERGY RECOVERY WHEEL SHALL BE DE-ENERGIZED & ASSOCIATED ERW BYPASS DAMPERS SHALL CLOSE. THE EXHAUST FAN SHALL BE OFF AND THE SUPPLY FAN SHALL START AND RECIRCULATE BUILDING AIR. THE RTU CHILLED WATER VALVE SHALL MODULATE OPEN AND THE UNIT DISCHARGE AIR SETPOINT DURING COOL-DOWN SHALL BE 55°F (ADJ.). ONCE THE SPACE HAS REACHED SPACE SETPOINT OF 78°F (ADJ.), THE RTU SHALL ENTER OCCUPIED MODE. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE COOL-DOWN MODE MORE THAN ONCE PER DAY. THROUGH THE OPTIMIZED START PROGRAM LOGIC WITHIN THE DDC SYSTEM SOFTWARE, THE BMS SHALL MONITOR THE RATE OF TEMPERATURE DECREASE TO DETERMINE WHEN TO ACTIVATE THE COOL DOWN MODE TO ENSURE THAT THE SPACE HAS REACHED ITS SETPOINT FOR OCCUPIED MODE. ECONOMIZER MODE OF OPERATION SHALL OVERRIDE NORMAL COOL-DOWN MODE OF OPERATION DURING UNOCCUPIED MODE.

OCCUPIED MODE:

GENERAL:
THE FANS START OR CONTINUE TO RUN AND THE RTU IS CONTROLLED AS FOLLOWS:
THE OUTSIDE AIR DAMPER SHALL OPEN TO ITS MINIMUM POSITION AS DETERMINED DURING BALANCING. THE EXHAUST DAMPER SHALL RECEIVE THE SAME SIGNAL AS THE OUTSIDE AIR DAMPER & BOTH SHALL MODULATE IN UNISON. THE RETURN AIR DAMPER SHALL RECEIVE THE OPPOSITE SIGNAL AS THE OUTSIDE AIR DAMPER. ALL THREE DAMPERS WILL MODULATE IN SEQUENCE WITHOUT OVERLAP. THE ENERGY RECOVERY WHEEL SHALL BE ACTIVATED, ERW BYPASS DAMPERS SHALL CLOSE AND THE WHEEL SHALL OPERATE PER THE SEQUENCES BELOW. THE SUPPLY AND EXHAUST FANS SHALL BE ACTIVATED OR CONTINUE TO RUN. THE SUPPLY AIR FAN SHALL MODULATE BETWEEN 60% & 100% SPEED TO MAINTAIN SPACE TEMP DURING HEATING & COOLING MODES. THE EXHAUST FAN SHALL MODULATE ITS SPEED BASED ON THE SUPPLY FAN SPEED MODULATION. FANS SHALL RUN AT 60% SPEED UNLESS THE AVERAGE SPACE SETPOINT CANNOT BE MET AFTER THE HOT WATER OR CHILLED WATER VALVE HAS BEEN OPEN FOR 5 MINUTES (ADJ.) OR UNLESS SPACE CO2 LEVELS RISE ABOVE 800 PPM. REFER TO CO2 DEMAND SEQUENCE FOR FURTHER INFORMATION. THE SYSTEMS OPERATING STATIC PRESSURE RANGES SHALL BE PROVIDED/OBTAINED THROUGH TESTING AND BALANCING CONTRACTOR DURING THE BALANCING PROCESS TO ESTABLISH MIN & MAX SETPOINTS. THE EXHAUST FAN WILL MODULATE ITS SPPSET TO MAINTAIN THE SCHEDULED AIRFLOW OFFSET WITH THE SUPPLY FAN. THE RETURN AIR DAMPER AND EXHAUST AIR DAMPER SHALL MODULATE INVERSELY, ALLOWING THE RETURN AIR TO EITHER MIX WITH OA FOR TEMPERATURE CONTROL OR TO EXHAUST FROM THE UNIT.

SUPPLY FAN:
THE SUPPLY FAN SHALL RUN ANYTIME THE RTU IS COMMANDED TO RUN AND THE O.A. DAMPER, RECIRC DAMPER & E.A. DAMPER, ARE PROVEN OPEN. THE SUPPLY FAN SHALL MODULATE ITS SPEED BETWEEN 60% AND 100% TO MAINTAIN SPACE TEMPERATURE.
TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER-DEFINABLE 10 MIN (ADJ.) MINIMUM RUNTIME, UNLESS SHUTDOWN ON SAFETIES.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

EXHAUST FAN:
THE EXHAUST FAN SHALL RUN ANYTIME THE RTU IS COMMANDED TO RUN AND THE O.A. DAMPER & E.A. DAMPER, OR THE RECIRCULATION DAMPER ARE PROVEN OPEN. THE EXHAUST FAN SHALL MODULATE ITS SPEED BASED ON THE SUPPLY AIR FLOW, ACHIEVING THE SCHEDULED AIRFLOW OFFSET FROM THE SUPPLY FAN. THE EXHAUST FAN SHALL HAVE A USER DEFINABLE 10 MIN (ADJ.) MINIMUM RUNTIME, UNLESS SHUTDOWN ON SAFETIES.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- EXHAUST FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- EXHAUST FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

CURRENT SWITCHES SHALL BE INSTALLED ON THE SUPPLY AND RETURN FAN STARTERS. THE DDC SYSTEM USES THESE SWITCHES TO CONFIRM THE FANS ARE IN THE DESIRED STATE (I.E. ON OR OFF) AND GENERATES AN ALARM IF STATUS DEVIATES FROM DDC START/STOP CONTROL.

TOTAL ENERGY RECOVERY WHEEL - VARIABLE SPEED:
THE CONTROLLER SHALL MODULATE THE TOTAL ENERGY RECOVERY WHEEL AS FOLLOWS:

COOLING RECOVERY MODE:
THE CONTROLLER SHALL MEASURE THE TOTAL WHEEL DISCHARGE AIR TEMPERATURE AND MODULATE THE TOTAL WHEEL SPEED AND/OR BYPASS DAMPERS TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL WHEEL SHALL RUN FOR COOLING RECOVERY WHENEVER:
- THE RTU RETURN AIR TEMPERATURE IS 5°F (ADJ.) OR MORE BELOW THE OUTSIDE AIR TEMPERATURE.
- AND THE ECONOMIZER IS OFF.
- AND THE SUPPLY FAN IS ON.

HEATING RECOVERY MODE:
THE CONTROLLER SHALL MEASURE THE TOTAL WHEEL DISCHARGE AIR TEMPERATURE AND MODULATE THE TOTAL WHEEL SPEED AND/OR BYPASS DAMPERS TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL WHEEL SHALL RUN FOR HEAT RECOVERY WHENEVER:
- THE RTU RETURN AIR TEMPERATURE IS 5°F (ADJ.) OR MORE ABOVE THE OUTSIDE AIR TEMPERATURE.
- AND THE ECONOMIZER IS OFF.
- AND THE SUPPLY FAN IS ON.

PERIODIC SELF-CLEANING:
THE TOTAL ENERGY RECOVERY WHEEL SHALL RUN AT 5% SPEED (ADJ.) FOR 10 SEC (ADJ.) EVERY 4HRS (ADJ.) THE UNIT RUNS.

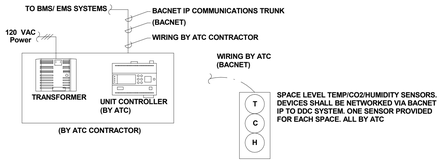
WHEEL DEFROST CYCLE AND FROST PROTECTION:
IF THE WHEEL DIFFERENTIAL PRESSURE RISES 1 INCH. (ADJ.) AND THE OUTSIDE AIR TEMPERATURE IS BELOW 30°F (ADJ.), THE WHEEL SPEED SHALL BE REDUCED VIA WHEEL VARIABLE FREQUENCY DRIVE, OR THE ENERGY RECOVERY WHEEL FACE & BYPASS DAMPERS SHALL MODULATE OPEN TO BYPASS THE WHEEL UNTIL THE PRESSURE RETURNS TO NORMAL. WHEEL DEFROST CONTROL SEQUENCE SHALL BE CHOSEN PER MANUFACTURER'S RECOMMENDATIONS. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- RECOVERY WHEEL ROTATION FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- RECOVERY WHEEL IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- RECOVERY WHEEL RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).
- RECOVERY WHEEL VFD IN FAULT

COOLING AND DEHUMIDIFICATION - CHILLED WATER:
OUTSIDE AIR SHALL PASS THROUGH THE TOTAL ENERGY RECOVERY WHEEL, PRE-COOLED BY THE INCOMING RETURN AIR. UPON SENSING A MIXED AIR TEMPERATURE AND/OR MIXED AIR HUMIDITY ABOVE THE SCHEDULED SUPPLY AIR DISCHARGE SETPOINTS, THE CHILLED WATER CONTROL VALVE SHALL BE ACTIVATED AND MODULATE TO COOL AND DEHUMIDIFY THE INCOMING AIR. THE COOLING COIL SHALL MODULATE TO MAINTAIN THE AVERAGE SPACE TEMPERATURE SETPOINT OF 75°F AT 50% RH . IF THE AVERAGE ZONE TEMPERATURE DROPS BELOW SETPOINT BY 3°F FOR GREATER THAN 10 MINUTES WHILE COOLING IS ENABLED, THE FANS SHALL FURTHER MODULATE DOWN IN 10% SPEED INCREMENTS EACH 10 MINUTES THE AVERAGE ZONE TEMPERATURE REMAINS BELOW SETPOINT. THIS LOOP SHALL CONTINUE UNTIL THE ZONE TEMPERATURE IS SATISFIED OR THE FAN SECTION REACHES MINIMUM TURNDOWN. IF THE AVERAGE ZONE TEMPERATURE REMAINS BELOW SETPOINT FOR AN ADDITIONAL 10 MINUTES, THE UNIT REHEAT COIL SHALL BE ENGAGED TO RAISE THE DISCHARGE AIR TEMPERATURE UNTIL SETPOINT IS SATISFIED. THE COOLING COIL AND HOT WATER COIL (REHEAT) SHALL BE ENABLED WHENEVER:
- THE SUPPLY FAN STATUS IS ON.
- OUTSIDE AIR TEMPERATURE IS GREATER THAN 55°F (ADJ.).
- OR THE DISCHARGE SUPPLY AIR TEMPERATURE IS ABOVE THE DESIRED SETPOINT.
- OR SPACE TEMPERATURE IS CALLING FOR COOLING

HEATING - HOT WATER:
OUTSIDE AIR SHALL PASS THROUGH THE TOTAL ENERGY RECOVERY WHEEL. PRE-HEATED BY THE INCOMING RETURN AIR. UPON SENSING AN AVERAGE ZONE TEMPERATURE BELOW THE DESIRED ZONE TEMPERATURE SETPOINT OF 70°F (ADJ.) THE HOT WATER CONTROL VALVE SHALL BE ACTIVATED AND MODULATE TO HEAT THE INCOMING AIR TO MAINTAIN A SUPPLY AIR DISCHARGE SETPOINT OF 70°F (ADJ.). IF THE AVERAGE ZONE TEMPERATURE DROPS BELOW SETPOINT BY 3°F FOR GREATER THAN 10 MINUTES WHILE HEATING IS ENABLED, THE HOT WATER CONTROL VALVE SHALL MODULATE, RAISING THE DISCHARGE AIR TEMPERATURE IN A 5°F INCREMENT. IF THE AVERAGE ZONE TEMPERATURE REMAINS BELOW SETPOINT FOR AN ADDITIONAL 5 MINUTES, THE HEATING COIL SHALL AGAIN RAISE THE DISCHARGE AIR TEMPERATURE IN THIS FASHION. THIS ITERATION SHALL REPEAT UNTIL THE AVERAGE ZONE SETPOINT IS SATISFIED. THE OPPOSITE SHALL OCCUR IF THE AVERAGE ZONE TEMPERATURE EXCEEDS SETPOINT.

- THE SUPPLY FAN STATUS IS ON.
- OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
- OR THE DISCHARGE SUPPLY AIR TEMPERATURE IS BELOW THE DESIRED SETPOINT.
- OR COOLING IS ACTIVATED AND REHEAT IS REQUIRED

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- LOW ENTERING AIR TEMP: IF THE MIXED AIR OR COOLING COIL LEAVING AIR TEMPERATURE IS LESS THAN 30°F (ADJ.).



ECONOMIZER (DUAL ENTHALPY CONTROL):
THE CONTROLLER SHALL MEASURE THE RETURN AND OUTSIDE AIR ENTHALPIES AND MODULATE THE OUTSIDE AIR DAMPER, RECIRCULATION DAMPER AND WHEEL BYPASS DAMPERS AS REQUIRED TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL ENERGY RECOVERY WHEEL SHALL BE OFF DURING UNOCCUPIED MODE. THE ECONOMIZER SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
- AND THE OUTSIDE AIR ENTHALPY IS LESS THAN RETURN AIR ENTHALPY.
- AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE.
- AND THE SUPPLY FAN STATUS IS ON.

THE ECONOMIZER SHALL BE DISABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE DROPS BELOW 40°F (ADJ.).
- OR ON LOSS OF SUPPLY FAN STATUS.
- OR THE FREEZESTAT IS ON.

UNOCCUPIED MODE:
UNDER THIS MODE, ALL RTUS SHALL BE OFF & DAMPERS CLOSED. ALL TERMINAL HEATING UNITS & COMPONENTS THROUGHOUT THE SPACE SHALL MODULATE AS REQUIRED TO MAINTAIN THE SPACE UNOCCUPIED SETPOINT OF 55°F (ADJ.) IN THE WINTER. IN THE EVENT THAT THE TERMINAL HEATING UNITS CANNOT MAINTAIN THE SPACE UNOCCUPIED SETPOINT, THE RTUS SHALL BE ACTIVATED & FUNCTION AS INDICATED IN WARM-UP MODE W/ THE EXCEPTION THAT THE FAN SPEED WOULD BE REDUCED TO 60% (ADJ.). DURING THE SUMMER MONTHS, WHEN OAT IS ABOVE 80°F (ADJ.) AND/OR RH IS ABOVE 70% (ADJ.) & THE SPACE UNOCCUPIED TEMPERATURE SETPOINTS OF 85°F (ADJ.) & UNOCCUPIED HUMIDITY SETPOINT OF 70% RH (ADJ) ARE NOT MAINTAINED, THE RTUS WILL BE ACTIVATED & FUNCTION AS INDICATED IN THE COOL-DOWN MODE W/ THE EXCEPTION THAT THE FAN SPEED WOULD BE REDUCED TO 60% (ADJ.).

SAFETY SEQUENCES

EMERGENCY SHUTDOWN:
UPON RECEIVING A SIGNAL FROM THE FIRE ALARM SYSTEM, THE UNIT'S FANS SHALL SHUTDOWN, ALL DAMPERS SHALL CLOSE, HOT AND CHILLED WATER VALVES SHALL CLOSE AND AN ALARM SHALL BE GENERATED AT THE BMS. THIS MODE SHALL BE CALLED EMERGENCY SHUTDOWN MODE. ATC CONTRACTOR SHALL HARD WIRE A DIRECT CONNECTION FROM THE FIRE ALARM PANELS DRY CONTACTS TO THE BMS. ALL ASSOCIATED VAV BOXES SHALL CLOSE.
LOW LEAVING TEMPERATURE:
UPON A LOW LEAVING TEMPERATURE CONDITION (38°F ADJ) SENSED BY THE FREEZESTAT SENSOR, CO2 DEMAND CONTROL SHALL BE OVERRIDDEN, THE OUTSIDE AIR AND EXHAUST AIR DAMPER SHALL CLOSE, AND THE SUPPLY AND EXHAUST AIR FAN SHALL SHUT DOWN AND AN ALARM SHALL BE GENERATED.

SMOKE DETECTION:
THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SMOKE DETECTOR STATUS.

CASING TEMPERATURE SETPOINT:
THE DDC SYSTEM SHALL MONITOR THE UNIT CASING TEMPERATURE SETPOINT (BY THE MAT SENSOR). THE HOT WATER HEATING COIL VALVE SHALL OPEN TO MAINTAIN A 40°F (ADJ.) MINIMUM CASING TEMPERATURE SETPOINT.

STAGED OPTIMIZED START/STOP OPERATION:
ALL UNIT CONTROLLERS SHALL BE EQUIPPED WITH OPTIMAL START/STOP OPERATION AND TIME OF DAY SCHEDULING. UNITS SHALL START UP DURING MORNING WARM-UP/COOL-DOWN MODES IN A STAGGERED MANNER SUCH THAT ALL EQUIPMENT IS NOT STARTED AT THE SAME TIME.

ADDITIONAL ALARMS:

OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE PREFILTER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- PREFILTER CHANGE REQUIRED: PREFILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

RETURN AIR FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FINAL FILTER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- FINAL FILTER CHANGE REQUIRED: FINAL FILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

SUPPLY AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS GREATER THAN 120°F (ADJ.).
- LOW SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS LESS THAN 45°F (ADJ.).

SPACE HUMIDITY SENSOR:
THE DDC SYSTEM SHALL MONITOR THE SPACE HUMIDITY SENSORS AND REPORT THE INFORMATION TO THE BUILDING DDC SYSTEM ROOM GRAPHICS. UPON A HIGH SPACE HUMIDITY LEVEL ABOVE 80% RH (ADJ.) AN ALARM WILL BE GENERATED IN THE BMS & THE UNIT WILL ENTER THE COOL DOWN MODE.

OVERRIDE:
THE SPACE MOUNTED TEMPERATURE SENSOR SHALL HAVE A PUSH BUTTON OVERRIDE CAPABILITY. UPON ACTIVATION OF THE THERMOSTAT OVERRIDE BUTTON THE ASSOCIATED ROOFTOP UNIT SHALL CHANGE TO OCCUPIED MODE FOR A PERIOD OF 2 HOURS (ADJ).

CO2 ALARM : UPON A RISE IN SPACE CO2 10% OR MORE THAN THE DESIGN OF 800 PPM (ADJ.) AN ALARM WILL BE GENERATED AT THE BMS WITH A 20 MIN. (ADJ.) DELAY.

CO2 DEMAND CONTROL VENTILATION (DCV):
UPON A RISE IN SPACE CO2 (GREATER THAN 800 PPM) THE RTU'S RESPECTIVE OUTSIDE AIR DAMPER SHALL MODULATE OPEN FROM ITS MINIMUM POSITION AND THE RETURN DAMPER SHALL BEGIN TO MODULATE CLOSED IN UNISON. UPON A RISE IN SPACE CO2 10% OR MORE THAN THE DESIGN OF 800 PPM (ADJ) AN ALARM WILL BE GENERATED AT THE BMS WITH A 20 MIN. (ADJ.) DELAY. THE FANS SHALL BEGIN TO RAMP UP TO INCREASE VENTILATION. ONCE LEVELS BEGIN TO DROP BELOW 800 PPM, THE RTU SHALL RETURN TO OCCUPIED MODE, AND THE DAMPERS & FANS SHALL MODULATE TO MAINTAIN DISCHARGE AIR & SPACE TEMPERATURE & HUMIDITY.

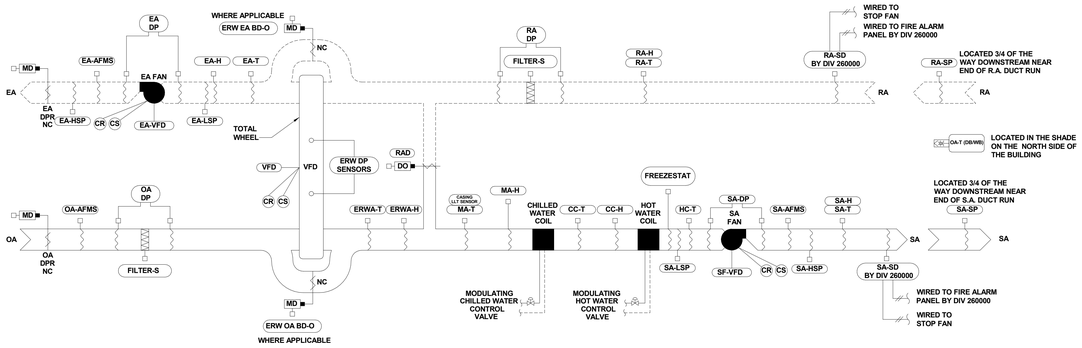
CO2 DEMAND CONTROL OVERRIDE:
FOR ALL RTU'S EQUIPPED WITH CO2 DEMAND CONTROL VENTILATION, THE ATC CONTRACTOR SHALL CREATE A SEQUENCE OF OPERATION AND ASSOCIATED GRAPHIC USER INTERFACE (GUI) BUTTON THAT SHALL BE CAPABLE OF ALLOWING THE BMS OPERATOR TO DISENGAGE AND RE-ENGAGE THE CO2 DEMAND VENTILATION CONTROL CAPABILITIES OF THE ASSOCIATED AIR DISTRIBUTION SYSTEM. A SOFTWARE NOTIFICATION SHALL BE GENERATED WHEN THIS MODE OF OPERATION IS ACTIVATED. THIS SEQUENCE AND GUI BUTTON SHALL BE PROVIDED FOR EACH INDIVIDUAL RTU AND A MASTER COMMAND GUI BUTTON SHALL ENGAGE/DISENGAGE THE MODE FOR ALL RTU'S. UNDER THIS MODE, THE VENTILATION OVERRIDE SHALL ALLOW THE ROOFTOP UNIT TO OPERATE AT IT'S MAXIMUM AIRFLOW AND MAXIMUM OUTSIDE AIR VENTILATION RATE. MORNING WARM-UP AND COOL DOWN MODES FOR THIS MODE OF OPERATION SHALL ALSO OPERATE WITH MAXIMUM OUTSIDE AIR ENABLED WHEN CO2 CONTOL OVERRIDE IS ENABLED. OUTSIDE AIR VENTILATION SHALL BE ENABLED AT A MINIMUM OF TWO HOURS (ADJ) PRIOR TO SCHEDULED OCCUPIED TIME, AND SHALL CONTINUE TO RUN TWO HOURS (ADJ) POST SCHEDULED OCCUPANCY.

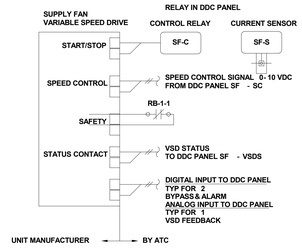
EXTREME WEATHER MODE:
THROUGH THE BMS WEATHER STATION, WHEN WIND SPEED NUMBERS ABOVE 50 MPH (ADJ) AND RTU'S ARE IN OCCUPIED MODE, ALL OUTSIDE AIR DAMPERS SHALL CLOSE AND UNIT SHALL GO INTO RECIRCULATION MODE BUT STILL MAINTAIN OCCUPIED SETPOINTS. DURING THIS CONDITION AN ALARM SHALL BE GENERATED AT THE BMS INDICATING HIGH WINDS - OA DAMPER CLOSED.

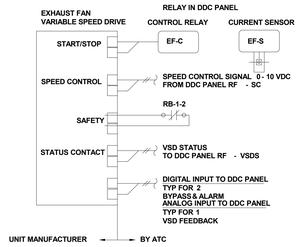
ECONOMIZER OVERRIDE:
FOR ALL RTU'S EQUIPPED WITH ECONOMIZER CONTROL, THE ATC CONTRACTOR SHALL CREATE A SEQUENCE OF OPERATION AND ASSOCIATED GRAPHIC USER INTERFACE (GUI) BUTTON THAT SHALL BE CAPABLE OF ALLOWING THE BMS OPERATOR TO DISENGAGE AND RE-ENGAGE THE ECONOMIZER CONTROL CAPABILITIES OF THE RTU. A SOFTWARE NOTIFICATION SHALL BE GENERATED WHEN THIS MODE OF OPERATION IS ACTIVATED. THIS SEQUENCE AND GUI BUTTON SHALL BE PROVIDED FOR EACH INDIVIDUAL RTU AND IN ADDITION A MASTER COMMAND GUI BUTTON SHALL ENGAGE/DISENGAGE THE MODE FOR ALL RTU'S. UNDER THIS MODE, THE ECONOMIZER OVERRIDE SHALL ALLOW THE ROOFTOP UNIT TO OPERATE ITS HOT WATER AND/OR CHILLED WATER CONTROL VALVES TO MAINTAIN THE DAT SETPOINT. THE OUTSIDE AND RETURN AIR DAMPERS SHALL FUNCTION AS INDICATED IN THE OCCUPIED MODE. THE VARIABLE AIR VOLUME BOXES SHALL MODULATE AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AND CO2 SETPOINTS.

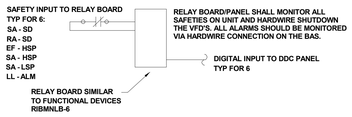
ROOF TOP UNITS	BMS CONTROL POINTS					
POINT NAME	AI	AO	BI	BO	ALARM	REMARKS
OUTSIDE AIR FLOW MEASURING STATION	X				X	NOTE #1
SUPPLY AIR FLOW MEASURING STATION	X					NOTE #6
EXHAUST AIR FLOW MEASURING STATION	X					NOTE #6
OUTSIDE AIR TEMP	X					
OUTSIDE AIR HUMIDITY	X					
EXHAUST AIR TEMP	X					
EXHAUST AIR HUMIDITY	X					
ENERGY RECOVERY HEAT WHEEL DISCHARGE AIR TEMP	X					
ENERGY RECOVERY WHEEL DISCHARGE AIR HUMIDITY	X					
MIXED AIR TEMP & HUMIDITY	X					
COOLING COIL AIR TEMP & HUMIDITY	X	X				
HEATING COIL AIR TEMP	X	X				
SUPPLY AIR TEMP	X	X				
SUPPLY AIR HUMIDITY	X					
SUPPLY AIR STATIC PRESSURE	X	X			X	
OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE	X					
RETURN AIR FILTER DIFFERENTIAL PRESSURE	X					
SUPPLY FAN DIFFERENTIAL PRESSURE SENSOR/SWITCH	X				X	NOTE #7
EXHAUST FAN DIFFERENTIAL PRESSURE SENSOR/SWITCH	X				X	NOTE #7
RETURN AIR HUMIDITY	X					
RETURN AIR TEMP	X					
RETURN AIR STATIC PRESSURE	X	X			X	
ENERGY RECOVERY WHEEL VFD SPEED	X	X				
SUPPLY FAN VFD SPEED	X	X				
EXHAUST FAN VFD SPEED	X	X				
CHILLED WATER CONTROL VALVE	X	X				
HOT WATER CONTROL VALVE	X	X				
RE-CIRC AIR DAMPER	X	X				
OUTSIDE AIR DAMPER	X	X				
EXHAUST AIR DAMPER	X	X				
RETURN AIR SMOKE DETECTOR			X		X	
SUPPLY AIR SMOKE DETECTOR			X		X	
SUPPLY FAN STATUS			X		X	
EXHAUST FAN STATUS			X		X	
ENERGY RECOVERY WHEEL STATUS			X		X	
ENERGY RECOVERY WHEEL VFD FAULT			X		X	
SUPPLY FAN VFD FAULT			X		X	
EXHAUST FAN VFD FAULT			X		X	
SUPPLY FAN START/STOP				X		
EXHAUST FAN START/STOP				X		
ENERGY RECOVERY WHEEL START/STOP				X		
COOLING SUPPLY AIR SET POINT						
HEATING SUPPLY AIR SET POINT						
EMERGENCY SHUT DOWN					X	
SUPPLY FAN FAILURE					X	
SUPPLY FAN IN HAND					X	
EXHAUST FAN FAILURE					X	
EXHAUST FAN IN HAND					X	
ENERGY RECOVERY WHEEL ROTATION FAILURE					X	
ENERGY RECOVERY WHEEL IN HAND					X	
TOTAL WHEEL RUNTIME EXCEEDED					X	
HIGH COOLING SUPPLY AIR TEMP					X	10° ABOVE
HIGH HEATING SUPPLY AIR TEMP					X	10° ABOVE
LOW HEATING SUPPLY AIR TEMP					X	10° BELOW
OUTSIDE AIR FILTER CHANGE REQUIRED					X	
RETURN AIR FILTER CHANGE REQUIRED					X	
HIGH RETURN AIR CARBON DIOXIDE CONCENTRATION					X	880 PPM ALRM
HIGH RETURN AIR HUMIDITY					X	75% RH ALARM
LOW RETURN AIR TEMP					X	60° OR LESS
HIGH RETURN AIR TEMP					X	85° OR ABOVE
SPACE CO2	X				X	880 PPM ALRM
FREEZESTAT	X				X	NOTE #5
CASING LOW LIMIT TEMPERATURE	X				X	35°

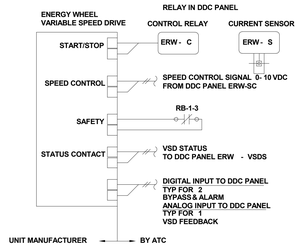
RTU-19 - MIXED AIR OVERHEAD VAV MULTIZONE AIR HANDLING SYSTEM











ROOF TOP UNITS 19

A DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE ROOFTOP AIR HANDLING UNIT OPERATION AS FOLLOWS:

RUN CONDITIONS - SCHEDULED:
THE RTU SHALL RUN BASED UPON AN OPERATOR-ADJUSTABLE SCHEDULE.

WARM-UP:
THE TERMINAL HEATING UNITS (RADIANT PANELS, WALL RADIATION UNITS, FINTUBE, ETC) VALVES SHALL MODULATE OPEN TO RAISE THE SPACES TO THE OCCUPIED SET POINT OF 70°F (ADJ.). ALONG WITH THE TERMINAL HEATING UNITS, THE RTU SHALL ALSO BE ACTIVATED. THE RTU OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE CLOSED, THE RECIRCULATION DAMPER SHALL BE OPEN. THE CHILLED WATER CONTROL VALVE SHALL BE CLOSED, THE TOTAL ENERGY RECOVERY WHEEL SHALL BE DE-ENERGIZED & ASSOCIATED ERW BYPASS DAMPERS SHALL CLOSE. THE SUPPLY FAN SHALL START AND RECIRCULATE BUILDING AIR, THE EXHAUST FAN SHALL BE OFF. THE RTU HOT WATER CONTROL VALVE SHALL MODULATE OPEN AND THE UNIT DISCHARGE AIR SETPOINT DURING WARM-UP SHALL BE 85°F (ADJ.). ONCE THE SPACE HAS REACHED SPACE SETPOINT, THE TERMINAL HEATING UNITS SHALL ENTER THE OCCUPIED MODE, ALLOWING THEIR HOT WATER VALVES TO MODULATE AS REQUIRED TO MAINTAIN THE SPACE SETPOINT. THE RTU SHALL ALSO ENTER OCCUPIED MODE. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE WARM-UP MODE MORE THAN ONCE PER DAY. THROUGH THE OPTIMIZED START PROGRAM LOGIC WITHIN THE DDC SYSTEM SOFTWARE, THE BMS SHALL MONITOR THE RATE OF TEMPERATURE RISE TO DETERMINE WHEN TO ACTIVATE THE WARM UP MODE TO ENSURE THAT THE BUILDING HAS REACHED ITS SETPOINT FOR OCCUPIED MODE.

COOL-DOWN:
THE RTU OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE CLOSED, THE RECIRCULATION DAMPER SHALL BE OPEN. THE HOT WATER CONTROL VALVE SHALL BE CLOSED, THE TOTAL ENERGY RECOVERY WHEEL SHALL BE DE-ENERGIZED & ASSOCIATED ERW BYPASS DAMPERS SHALL CLOSE. THE EXHAUST FAN SHALL BE OFF AND THE SUPPLY FAN SHALL START AND RECIRCULATE BUILDING AIR. THE RTU CHILLED WATER VALVE SHALL MODULATE OPEN AND THE UNIT DISCHARGE AIR SETPOINT DURING COOL-DOWN SHALL BE 55°F (ADJ.). ONCE THE SPACE HAS REACHED SPACE SETPOINT OF 78°F (ADJ.), THE RTU SHALL ENTER OCCUPIED MODE. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE COOL-DOWN MODE MORE THAN ONCE PER DAY. THROUGH THE OPTIMIZED START PROGRAM LOGIC WITHIN THE DDC SYSTEM SOFTWARE, THE BMS SHALL MONITOR THE RATE OF TEMPERATURE DECREASE TO DETERMINE WHEN TO ACTIVATE THE COOL DOWN MODE TO ENSURE THAT THE SPACE HAS REACHED ITS SETPOINT FOR OCCUPIED MODE. ECONOMIZER MODE OF OPERATION SHALL OVERRIDE NORMAL COOL-DOWN MODE OF OPERATION DURING UNOCCUPIED MODE.

OCCUPIED MODE:
GENERAL:
THE FANS START OR CONTINUE TO RUN AND THE RTU IS CONTROLLED AS FOLLOWS:
THE OUTSIDE AIR DAMPER SHALL OPEN TO ITS MINIMUM POSITION AS DETERMINED DURING BALANCING. THE EXHAUST DAMPER SHALL RECEIVE THE SAME SIGNAL AS THE OUTSIDE AIR DAMPER & BOTH SHALL MODULATE IN UNISON. THE RETURN AIR DAMPER SHALL RECEIVE THE OPPOSITE SIGNAL AS THE OUTSIDE AIR DAMPER. ALL THREE DAMPERS WILL MODULATE IN SEQUENCE WITHOUT OVERLAP. THE ENERGY RECOVERY WHEEL SHALL BE ACTIVATED, ERW BYPASS DAMPERS SHALL CLOSE AND THE WHEEL SHALL OPERATE PER THE SEQUENCES BELOW. THE SUPPLY AND EXHAUST FANS SHALL BE ACTIVATED OR CONTINUE TO RUN. THE SUPPLY FAN SHALL ADJUST ITS SPEED BASED ON THE SUPPLY DUCT MOUNTED STATIC PRESSURE SENSOR LOCATED 3/4 DOWN STREAM. THE SYSTEM'S ACTUAL STATIC PRESSURE SETPOINT WILL BE PROVIDED/OBTAINED THROUGH THE TESTING AND BALANCING CONTRACTOR DURING THE BALANCING PROCESS. THE EXHAUST FAN SHALL MODULATE ITS SPEED BASED ON THE SUPPLY FAN SPEED MODULATION. THE STATIC PRESSURE SET POINT SHALL BE RESET BASED ON PID (PROPORTIONAL-INTEGRAL- DERIVATIVE) LOGIC TO ALLOW THE VAV BOX ZONE REQUIRING THE MOST PRESSURE TO SATISFY ITS AIRFLOW REQUIREMENT AT ITS DESIGN FULL OPEN POSITION. THE STATIC PRESSURE SET POINT SHALL BE LOWERED TO THE POINT WHERE FAN SPEED REDUCTION CAN OCCUR, YET STILL ENSURE THAT THE VAV BOX ZONES REMAIN SATISFIED. THE SYSTEM SHALL USE INPUT SIGNALS FROM VAV BOX CONTROLLERS, THE MAIN DUCTWORK MOUNTED SYSTEM STATIC PRESSURE SENSOR AND THE CONTROLLER'S PROGRAM ALGORITHM TO ACHIEVE THIS CONTROL. IN ADDITION, PROVIDE DETECTION AND ALARM OF ANY VAV ZONE THAT EXCESSIVELY NEGATIVELY DRIVES THE RESET LOGIC. THE BMS SYSTEM SHALL BE CAPABLE OF ALLOWING OPERATOR TO READILY REMOVE OR ADD VAV BOX ZONES FROM THE RESET LOGIC ALGORITHM. THE RETURN AIR DAMPER AND EXHAUST AIR DAMPER SHALL MODULATE INVERSELY, ALLOWING THE RETURN AIR TO EITHER MIX WITH OA FOR TEMPERATURE CONTROL OR TO EXHAUST FROM THE UNIT.

SUPPLY FAN:
THE SUPPLY FAN SHALL RUN ANYTIME THE RTU IS COMMANDED TO RUN AND THE O.A. DAMPER, RECIRC DAMPER & E.A. DAMPER, ARE PROVEN OPEN. THE SUPPLY FAN SHALL MODULATE ITS SPEED TO MAINTAIN SUPPLY STATIC SETPOINT AND SPACE TEMPERATURE. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER-DEFINABLE 10 MIN (ADJ.) MINIMUM RUNTIME, UNLESS SHUTDOWN ON SAFETIES.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.**
- **SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.**

EXHAUST FAN:
THE EXHAUST FAN SHALL RUN ANYTIME THE RTU IS COMMANDED TO RUN AND THE O.A. DAMPER & E.A. DAMPER, OR THE RECIRCULATION DAMPER ARE PROVEN OPEN. THE EXHAUST FAN SHALL MODULATE ITS SPEED BASED ON THE SUPPLY AIR FLOW, ACHIEVING THE SCHEDULED AIRFLOW OFFSET FROM THE SUPPLY FAN.. THE EXHAUST FAN SHALL HAVE A USER DEFINABLE 10 MIN (ADJ.) MINIMUM RUNTIME, UNLESS SHUTDOWN ON SAFETIES.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **EXHAUST FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.**
- **EXHAUST FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.**

CURRENT SWITCHES SHALL BE INSTALLED ON THE SUPPLY AND RETURN FAN STARTERS. THE DDC SYSTEM USES THESE SWITCHES TO CONFIRM THE FANS ARE IN THE DESIRED STATE (I.E. ON OR OFF) AND GENERATES AN ALARM IF STATUS DEVIATES FROM DDC START/STOP CONTROL.

TOTAL ENERGY RECOVERY WHEEL - VARIABLE SPEED:
THE CONTROLLER SHALL MODULATE THE TOTAL ENERGY RECOVERY WHEEL AS FOLLOWS:

COOLING RECOVERY MODE:
THE CONTROLLER SHALL MEASURE THE TOTAL WHEEL DISCHARGE AIR TEMPERATURE AND MODULATE THE TOTAL WHEEL SPEED AND/OR BYPASS DAMPERS TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL WHEEL SHALL RUN FOR COOLING RECOVERY WHENEVER:
- **THE RTU RETURN AIR TEMPERATURE IS 5°F (ADJ.) OR MORE BELOW THE OUTSIDE AIR TEMPERATURE.**
- **AND THE ECONOMIZER IS OFF.**
- **AND THE SUPPLY FAN IS ON.**

HEATING RECOVERY MODE:
THE CONTROLLER SHALL MEASURE THE TOTAL WHEEL DISCHARGE AIR TEMPERATURE AND MODULATE THE TOTAL WHEEL SPEED AND/OR BYPASS DAMPERS TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL WHEEL SHALL RUN FOR HEAT RECOVERY WHENEVER:
- **THE RTU RETURN AIR TEMPERATURE IS 5°F (ADJ.) OR MORE ABOVE THE OUTSIDE AIR TEMPERATURE.**
- **AND THE ECONOMIZER IS OFF.**
- **AND THE SUPPLY FAN IS ON.**

PERIODIC SELF-CLEANING:
THE TOTAL ENERGY RECOVERY WHEEL SHALL RUN AT 5% SPEED (ADJ.) FOR 10 SEC (ADJ.) EVERY 4HRS (ADJ.) THE UNIT RUNS.

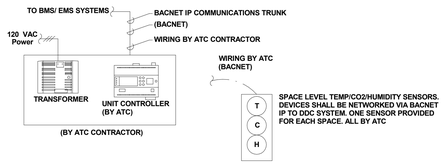
WHEEL DEFROST CYCLE AND FROST PROTECTION:
IF THE WHEEL DIFFERENTIAL PRESSURE RISES 1 INCH. (ADJ.) AND THE OUTSIDE AIR TEMPERATURE IS BELOW 30°F (ADJ.), THE WHEEL SPEED SHALL BE REDUCED VIA WHEEL VARIABLE FREQUENCY DRIVE, OR THE ENERGY RECOVERY WHEEL FACE & BYPASS DAMPERS SHALL MODULATE OPEN TO BYPASS THE WHEEL UNTIL THE PRESSURE RETURNS TO NORMAL. WHEEL DEFROST CONTROL SEQUENCE SHALL BE CHOSEN PER MANUFACTURER'S RECOMMENDATIONS. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **RECOVERY WHEEL ROTATION FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.**
- **RECOVERY WHEEL IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.**
- **RECOVERY WHEEL RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).**
- **RECOVERY WHEEL VFD IN FAULT**

COOLING AND DEHUMIDIFICATION - CHILLED WATER:
OUTSIDE AIR SHALL PASS THROUGH THE TOTAL ENERGY RECOVERY WHEEL, PRE-COOLED BY THE INCOMING RETURN AIR. UPON SENSING A MIXED AIR TEMPERATURE AND/OR MIXED AIR HUMIDITY ABOVE THE SCHEDULED SUPPLY AIR DISCHARGE SETPOINTS, THE CHILLED WATER CONTROL VALVE SHALL BE ACTIVATED AND MODULATE TO COOL AND DEHUMIDIFY THE INCOMING AIR. THE COOLING COIL SHALL MODULATE TO MAINTAIN THE AVERAGE SPACE TEMPERATURE SETPOINT OF 75°F AT 50% RH. IF THE AVERAGE ZONE TEMPERATURE DROPS BELOW SETPOINT BY 3°F FOR GREATER THAN 10 MINUTES WHILE COOLING IS ENABLED, THE HOT WATER CONTROL VALVE SHALL MODULATE, RAISING THE DISCHARGE AIR TEMPERATURE IN A 5°F INCREMENT. IF THE AVERAGE ZONE TEMPERATURE REMAINS BELOW SETPOINT FOR AN ADDITIONAL 5 MINUTES, THE REHEAT COIL SHALL AGAIN RAISE THE DISCHARGE AIR TEMPERATURE IN THIS FASHION. THIS ITERATION SHALL REPEAT UNTIL THE AVERAGE ZONE SETPOINT IS SATISFIED. THE COOLING COIL AND HOT WATER COIL (REHEAT) SHALL BE ENABLED WHENEVER:
- **THE SUPPLY FAN STATUS IS ON.**
- **OUTSIDE AIR TEMPERATURE IS GREATER THAN 55°F (ADJ.).**
- **OR THE DISCHARGE SUPPLY AIR TEMPERATURE IS ABOVE THE DESIRED SETPOINT.**
- **OR SPACE TEMPERATURE IS CALLING FOR COOLING**

HEATING - HOT WATER:
OUTSIDE AIR SHALL PASS THROUGH THE TOTAL ENERGY RECOVERY WHEEL, PRE-HEATED BY THE INCOMING RETURN AIR. UPON SENSING AN AVERAGE ZONE TEMPERATURE BELOW THE DESIRED ZONE TEMPERATURE SETPOINT OF 70°F (ADJ.) THE HOT WATER CONTROL VALVE SHALL BE ACTIVATED AND MODULATE TO HEAT THE INCOMING AIR TO MAINTAIN A SUPPLY AIR DISCHARGE SETPOINT OF 70°F (ADJ.). IF THE AVERAGE ZONE TEMPERATURE DROPS BELOW SETPOINT BY 3°F FOR GREATER THAN 10 MINUTES WHILE HEATING IS ENABLED, THE HOT WATER CONTROL VALVE SHALL MODULATE, RAISING THE DISCHARGE AIR TEMPERATURE IN A 5°F INCREMENT. IF THE AVERAGE ZONE TEMPERATURE REMAINS BELOW SETPOINT FOR AN ADDITIONAL 5 MINUTES, THE HEATING COIL SHALL AGAIN RAISE THE DISCHARGE AIR TEMPERATURE IN THIS FASHION. THIS ITERATION SHALL REPEAT UNTIL THE AVERAGE ZONE SETPOINT IS SATISFIED. THE OPPOSITE SHALL OCCUR IF THE AVERAGE ZONE TEMPERATURE EXCEEDS SETPOINT.

- **THE SUPPLY FAN STATUS IS ON.**
- **OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).**
- **OR THE DISCHARGE SUPPLY AIR TEMPERATURE IS BELOW THE DESIRED SETPOINT.**
- **OR COOLING IS ACTIVATED AND REHEAT IS REQUIRED.**

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **LOW ENTERING AIR TEMP: IF THE MIXED AIR OR COOLING COIL LEAVING AIR TEMPERATURE IS LESS THAN 30°F (ADJ.).**



ECONOMIZER (DUAL ENTHALPY CONTROL):
THE CONTROLLER SHALL MEASURE THE RETURN AND OUTSIDE AIR ENTHALPIES AND MODULATE THE OUTSIDE AIR DAMPER, RECIRCULATION DAMPER AND WHEEL BYPASS DAMPERS AS REQUIRED TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. THE TOTAL ENERGY RECOVERY WHEEL SHALL BE OFF DURING UNOCCUPIED MODE. THE ECONOMIZER SHALL BE ENABLED WHENEVER:
- **OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).**
- **AND THE OUTSIDE AIR ENTHALPY IS LESS THAN RETURN AIR ENTHALPY.**
- **AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE.**
- **AND THE SUPPLY FAN STATUS IS ON.**

THE ECONOMIZER SHALL BE DISABLED WHENEVER:
- **OUTSIDE AIR TEMPERATURE DROPS BELOW 40°F (ADJ.).**
- **OR ON LOSS OF SUPPLY FAN STATUS.**
- **OR THE FREEZESTAT IS ON.**

UNOCCUPIED MODE:
UNDER THIS MODE, ALL RTUS SHALL BE OFF & DAMPERS CLOSED. ALL TERMINAL HEATING UNITS & COMPONENTS THROUGHOUT THE SPACE SHALL MODULATE AS REQUIRED TO MAINTAIN THE SPACE UNOCCUPIED SETPOINT OF 55°F (ADJ.) IN THE WINTER. IN THE EVENT THAT THE TERMINAL HEATING UNITS CANNOT MAINTAIN THE SPACE UNOCCUPIED SETPOINT, THE RTUS SHALL BE ACTIVATED & FUNCTION AS INDICATED IN WARM-UP MODE W/ THE EXCEPTION THAT THE FAN SPEED WOULD BE REDUCED TO 60% (ADJ.). DURING THE SUMMER MONTHS, WHEN OAT IS ABOVE 80°F (ADJ.) AND/OR RH IS ABOVE 70% (ADJ.) & THE SPACE UNOCCUPIED TEMPERATURE SETPOINTS OF 85°F (ADJ.) & UNOCCUPIED HUMIDITY SETPOINT OF 70% RH (ADJ) ARE NOT MAINTAINED, THE RTUS WILL BE ACTIVATED & FUNCTION AS INDICATED IN THE COOL-DOWN MODE W/ THE EXCEPTION THAT THE FAN SPEED WOULD BE REDUCED TO 60% (ADJ.).

SAFETY SEQUENCES

EMERGENCY SHUTDOWN:
UPON RECEIVING A SIGNAL FROM THE FIRE ALARM SYSTEM, THE UNIT'S FANS SHALL SHUTDOWN, ALL DAMPERS SHALL CLOSE, HOT AND CHILLED WATER VALVES SHALL CLOSE AND AN ALARM SHALL BE GENERATED AT THE BMS. THIS MODE SHALL BE CALLED EMERGENCY SHUTDOWN MODE. ATC CONTRACTOR SHALL HARD WIRE A DIRECT CONNECTION FROM THE FIRE ALARM PANELS DRY CONTACTS TO THE BMS. ALL ASSOCIATED VAV BOXES SHALL CLOSE.

LOW LEAVING TEMPERATURE:
UPON A LOW LEAVING TEMPERATURE CONDITION (38°F ADJ) SENSED BY THE FREEZESTAT SENSOR, CO2 DEMAND CONTROL SHALL BE OVERRIDDEN, THE OUTSIDE AIR AND EXHAUST AIR DAMPER SHALL CLOSE, AND THE SUPPLY AND EXHAUST AIR FAN SHALL SHUT DOWN AND AN ALARM SHALL BE GENERATED.

SMOKE DETECTION:
THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SMOKE DETECTOR STATUS.

CASING TEMPERATURE SETPOINT:
THE DDC SYSTEM SHALL MONITOR THE UNIT CASING TEMPERATURE SETPOINT (BY THE MAT SENSOR). THE HOT WATER HEATING COIL VALVE SHALL OPEN TO MAINTAIN A 40°F (ADJ.) MINIMUM CASING TEMPERATURE SETPOINT.

STAGED OPTIMIZED START/STOP OPERATION:
ALL UNIT CONTROLLERS SHALL BE EQUIPPED WITH OPTIMAL START/STOP OPERATION AND TIME OF DAY SCHEDULING. UNITS SHALL START UP DURING MORNING WARM-UP/COOL-DOWN MODES IN A STAGGERED MANNER SUCH THAT ALL EQUIPMENT IS NOT STARTED AT THE SAME TIME.

ADDITIONAL ALARMS:

OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE PREFILTER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **PREFILTER CHANGE REQUIRED: PREFILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).**

RETURN AIR FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FINAL FILTER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **FINAL FILTER CHANGE REQUIRED: FINAL FILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).**

SUPPLY AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- **HIGH SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS GREATER THAN 120°F (ADJ.).**
- **LOW SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS LESS THAN 45°F (ADJ.).**

SPACE HUMIDITY SENSOR:
THE DDC SYSTEM SHALL MONITOR THE SPACE HUMIDITY SENSORS AND REPORT THE INFORMATION TO THE BUILDING DDC SYSTEM ROOM GRAPHICS. UPON A HIGH SPACE HUMIDITY LEVEL ABOVE 80% RH (ADJ.) AN ALARM WILL BE GENERATED IN THE BMS & THE UNIT WILL ENTER THE COOL DOWN MODE.

OVERRIDE:
THE SPACE MOUNTED TEMPERATURE SENSOR SHALL HAVE A PUSH BUTTON OVERRIDE CAPABILITY. UPON ACTIVATION OF THE THERMOSTAT OVERRIDE BUTTON THE ASSOCIATED ROOFTOP UNIT SHALL CHANGE TO OCCUPIED MODE FOR A PERIOD OF 2 HOURS (ADJ).

CO2 ALARM : UPON A RISE IN SPACE CO2 10% OR MORE THAN THE DESIGN OF 800 PPM (ADJ.) AN ALARM WILL BE GENERATED AT THE BMS WITH A 20 MIN. (ADJ.) DELAY.

CO2 DEMAND CONTROL VENTILATION (DCV):

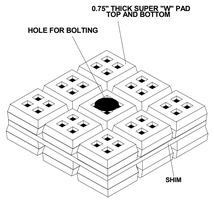
UPON A RISE IN SPACE CO2 (GREATER THAN 800 PPM) THE RTU'S RESPECTIVE OUTSIDE AIR DAMPER SHALL MODULATE OPEN FROM ITS MINIMUM POSITION AND THE RETURN DAMPER SHALL BEGIN TO MODULATE CLOSED IN UNISON. UPON A RISE IN SPACE CO2 10% OR MORE THAN THE DESIGN OF 800 PPM (ADJ) AN ALARM WILL BE GENERATED AT THE BMS WITH A 20 MIN. (ADJ.) DELAY. THE FANS SHALL BEGIN TO RAMP UP TO INCREASE VENTILATION. ONCE LEVELS BEGIN TO DROP BELOW 800 PPM, THE RTU SHALL RETURN TO OCCUPIED MODE, AND THE DAMPERS & FANS SHALL MODULATE TO MAINTAIN DISCHARGE AIR & SPACE TEMPERATURE & HUMIDITY.

CO2 DEMAND CONTROL OVERRIDE:
FOR ALL RTU'S EQUIPPED WITH CO2 DEMAND CONTROL VENTILATION, THE ATC CONTRACTOR SHALL CREATE A SEQUENCE OF OPERATION AND ASSOCIATED GRAPHIC USER INTERFACE (GUI) BUTTON THAT SHALL BE CAPABLE OF ALLOWING THE BMS OPERATOR TO DISENGAGE AND RE-ENGAGE THE CO2 DEMAND VENTILATION CONTROL CAPABILITIES OF THE ASSOCIATED AIR DISTRIBUTION SYSTEM. A SOFTWARE NOTIFICATION SHALL BE GENERATED WHEN THIS MODE OF OPERATION IS ACTIVATED. THIS SEQUENCE AND GUI BUTTON SHALL BE PROVIDED FOR EACH INDIVIDUAL RTU AND A MASTER COMMAND GUI BUTTON SHALL ENGAGE/DISENGAGE THE MODE FOR ALL RTU'S. UNDER THIS MODE, THE VENTILATION OVERRIDE SHALL ALLOW THE ROOFTOP UNIT TO OPERATE AT IT'S MAXIMUM AIRFLOW AND MAXIMUM OUTSIDE AIR VENTILATION RATE. MORNING WARM-UP AND COOL DOWN MODES FOR THIS MODE OF OPERATION SHALL ALSO OPERATE WITH MAXIMUM OUTSIDE AIR ENABLED WHEN CO2 CONTOL OVERRIDE IS ENABLED. OUTSIDE AIR VENTILATION SHALL BE ENABLED AT A MINIMUM OF TWO HOURS (ADJ) PRIOR TO SCHEDULED OCCUPIED TIME, AND SHALL CONTINUE TO RUN TWO HOURS (ADJ) POST SCHEDULED OCCUPANCY.

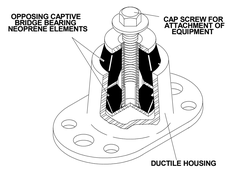
EXTREME WEATHER MODE:
THROUGH THE BMS WEATHER STATION, WHEN WIND SPEED NUMBERS ABOVE 50 MPH (ADJ) AND RTU'S ARE IN OCCUPIED MODE, ALL OUTSIDE AIR DAMPERS SHALL CLOSE AND UNIT SHALL GO INTO RECIRCULATION MODE BUT STILL MAINTAIN OCCUPIED SETPOINTS. DURING THIS CONDITION AN ALARM SHALL BE GENERATED AT THE BMS INDICATING HIGH WINDS - OA DAMPER CLOSED.

ECONOMIZER OVERRIDE:
FOR ALL RTU'S EQUIPPED WITH ECONOMIZER CONTROL, THE ATC CONTRACTOR SHALL CREATE A SEQUENCE OF OPERATION AND ASSOCIATED GRAPHIC USER INTERFACE (GUI) BUTTON THAT SHALL BE CAPABLE OF ALLOWING THE BMS OPERATOR TO DISENGAGE AND RE-ENGAGE THE ECONOMIZER CONTROL CAPABILITIES OF THE RTU. A SOFTWARE NOTIFICATION SHALL BE GENERATED WHEN THIS MODE OF OPERATION IS ACTIVATED. THIS SEQUENCE AND GUI BUTTON SHALL BE PROVIDED FOR EACH INDIVIDUAL RTU AND IN ADDITION A MASTER COMMAND GUI BUTTON SHALL ENGAGE/DISENGAGE THE MODE FOR ALL RTU'S. UNDER THIS MODE, THE ECONOMIZER OVERRIDE SHALL ALLOW THE ROOFTOP UNIT TO OPERATE ITS HOT WATER AND/OR CHILLED WATER CONTROL VALVES TO MAINTAIN THE DAT SETPOINT. THE OUTSIDE AND RETURN AIR DAMPERS SHALL FUNCTION AS INDICATED IN THE OCCUPIED MODE. THE VARIABLE AIR VOLUME BOXES SHALL MODULATE AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AND CO2 SETPOINTS.

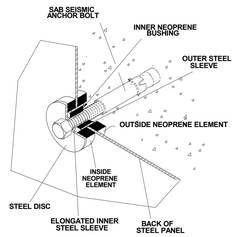
ROOF TOP UNITS 19	BMS CONTROL POINTS					
POINT NAME	AI	AO	BI	BO	ALARM	REMARKS
OUTSIDE AIR FLOW MEASURING STATION	X				X	NOTE #1
SUPPLY AIR FLOW MEASURING STATION	X					NOTE #6
EXHAUST AIR FLOW MEASURING STATION	X					NOTE #6
OUTSIDE AIR TEMP	X					
OUTSIDE AIR HUMIDITY	X					
EXHAUST AIR TEMP	X					
EXHAUST AIR HUMIDITY	X					
ENERGY RECOVERY HEAT WHEEL DISCHARGE AIR TEMP	X					
ENERGY RECOVERY WHEEL DISCHARGE AIR HUMIDITY	X					
MIXED AIR TEMP & HUMIDITY	X					
COOLING COIL AIR TEMP & HUMIDITY	X	X				
HEATING COIL AIR TEMP	X	X				
SUPPLY AIR TEMP	X	X				
SUPPLY AIR HUMIDITY	X					
SUPPLY AIR STATIC PRESSURE	X	X			X	
OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE	X					
RETURN AIR FILTER DIFFERENTIAL PRESSURE	X					
SUPPLY FAN DIFFERENTIAL PRESSURE SENSOR/SWITCH	X				X	NOTE #7
EXHAUST FAN DIFFERENTIAL PRESSURE SENSOR/SWITCH	X				X	NOTE #7
RETURN AIR HUMIDITY	X					
RETURN AIR TEMP	X					
RETURN AIR STATIC PRESSURE	X	X			X	
ENERGY RECOVERY WHEEL VFD SPEED	X	X				
SUPPLY FAN VFD SPEED	X	X				
EXHAUST FAN VFD SPEED	X	X				
CHILLED WATER CONTROL VALVE	X	X				
HOT WATER CONTROL VALVE	X	X				
RE-CIRC AIR DAMPER	X	X				
OUTSIDE AIR DAMPER	X	X				
EXHAUST AIR DAMPER	X	X				
RETURN AIR SMOKE DETECTOR			X		X	
SUPPLY AIR SMOKE DETECTOR			X		X	
SUPPLY FAN STATUS			X		X	
EXHAUST FAN STATUS			X		X	
ENERGY RECOVERY WHEEL STATUS			X		X	
ENERGY RECOVERY WHEEL VFD FAULT			X		X	
SUPPLY FAN VFD FAULT			X		X	
EXHAUST FAN VFD FAULT			X		X	
SUPPLY FAN START/STOP				X		
EXHAUST FAN START/STOP				X		
ENERGY RECOVERY WHEEL START/STOP				X		
COOLING SUPPLY AIR SET POINT						
HEATING SUPPLY AIR SET POINT						
EMERGENCY SHUT DOWN					X	
SUPPLY FAN FAILURE					X	
SUPPLY FAN IN HAND					X	
EXHAUST FAN FAILURE					X	
EXHAUST FAN IN HAND					X	
ENERGY RECOVERY WHEEL ROTATION FAILURE					X	
ENERGY RECOVERY WHEEL IN HAND					X	
TOTAL WHEEL RUNTIME EXCEEDED					X	
HIGH COOLING SUPPLY AIR TEMP					X	10° ABOV



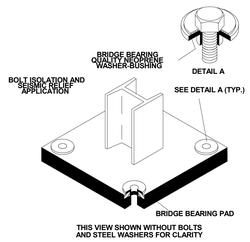
LAYERED SUPER "W" PADS WITH STEEL SHIM
SPECIFICATION 1



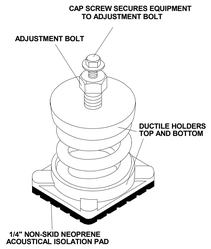
RESTRAINED BR MOUNT
SPECIFICATION 2



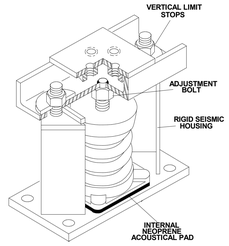
PB BUSHING
SPECIFICATION 3



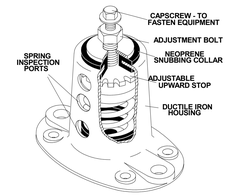
HG NEOPRENE BUSHING
SPECIFICATION 4



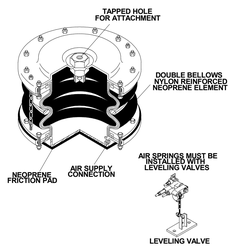
SLF SPRING MOUNT
SPECIFICATION 5



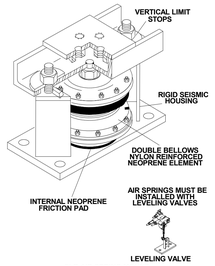
SLR SPRING MOUNT
SPECIFICATION 6



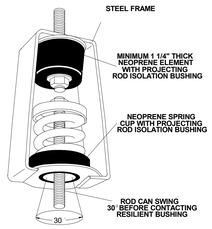
SSLFH HOUSED SPRING MOUNT
SPECIFICATION 7



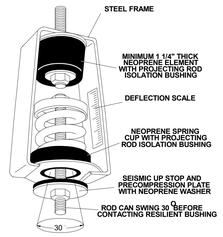
MT AIR SPRING MOUNT
SPECIFICATION 8



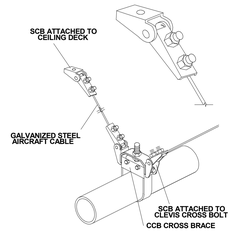
SLR AIR SPRING MOUNT
SPECIFICATION 9



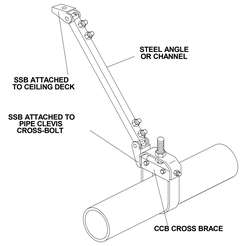
30N SPRING AND NEOPRENE HANGER
SPECIFICATION 10



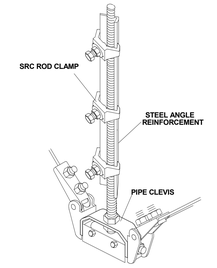
PC30N PRECOMPRESSED SPRING AND NEOPRENE HANGER
SPECIFICATION 11



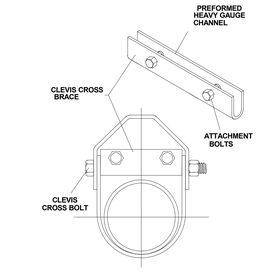
SCB, SCBH, AND SCBV CABLE RESTRAINTS OSPD PRE-APPROVAL NO. 0202
SPECIFICATION 12



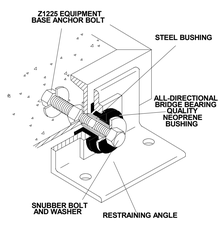
SEISMIC SOLID BRACE
SPECIFICATION 13



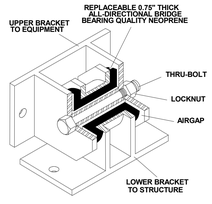
SRC SEISMIC ROD CLAMPS
SPECIFICATION 14



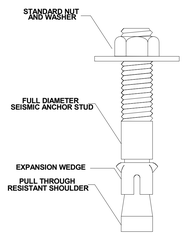
CCB CLEVIS CROSS BRACE
SPECIFICATION 15



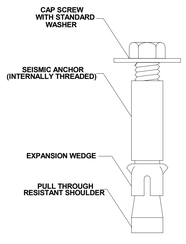
Z1225 ALL DIRECTIONAL SEISMIC SNUBBER
SPECIFICATION 16



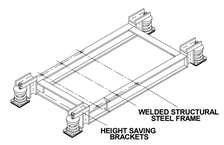
Z1011 ALL DIRECTIONAL SEISMIC SNUBBER
SPECIFICATION 17



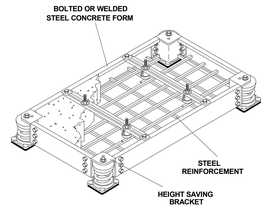
SAS SEISMIC ANCHOR STUD
SPECIFICATION 18



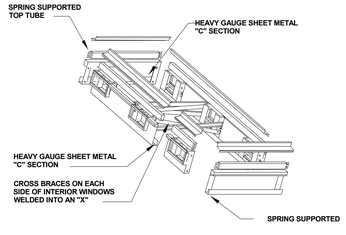
SAB SEISMIC ANCHOR BOLT
SPECIFICATION 19



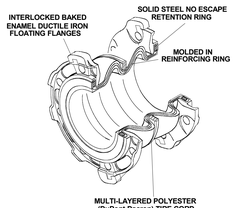
WF WIDE FLANGE STEEL BASE
SPECIFICATION 20



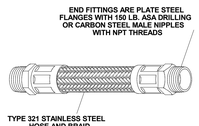
BMK CONCRETE FORM BASE
SPECIFICATION 21



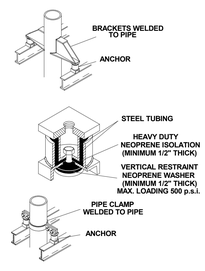
RCS SEISMIC ROOFTOP CURB
SPECIFICATION 22



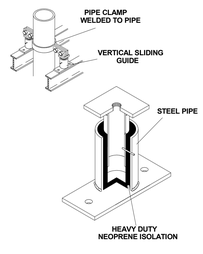
SFDEJ MOLDED EXPANSION JOINT
SPECIFICATION 23



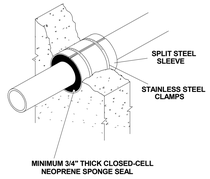
BSS STAINLESS STEEL HOSE
SPECIFICATION 24



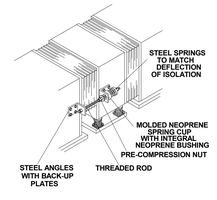
ADA ALL DIRECTIONAL ANCHOR
SPECIFICATION 25



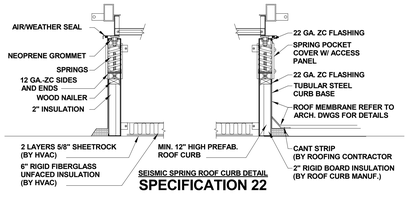
VSG VERTICAL SLIDING GUIDES
SPECIFICATION 26



SWS ACOUSTICAL WALL, CEILING OR FLOOR SEAL
SPECIFICATION 27



WB HORIZONTAL THRUST RESTRAINTS USED IN PAIRS
SPECIFICATION 28



SEISMIC SPRING ROOF CURB DETAIL
SPECIFICATION 22

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

NO.	DATE	TITLE

ISSUE TITLE AND DATE:

60% CONSTRUCTION DOCUMENTS
06/19/2026

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KEY PLAN

ORIENTATION AND SCALE:

SCALE: AS INDICATED

SHEET TITLE:
VIBRATION & SEISMIC

SHEET NUMBER:
VS1.11

Autodesk Docs://Wilmington Elementary School/Wildwood ME Model SD.rvt
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SYMBOL LIST

LEGEND NOTES:

A. THIS SHEET IS A GENERAL LIST OF SYMBOLS AND ABBREVIATIONS AND SHALL BE USED AS A DICTIONARY TO DEFINE ITEMS INDICATED ON DRAWINGS. NOT ALL SYMBOLS OR ABBREVIATIONS ARE NECESSARILY USED ON THIS PROJECT. ALL EQUIPMENT IS TO BE PROVIDED UNDER THIS SECTION UNLESS SPECIFICALLY INDICATED OTHERWISE.

LIGHTING FIXTURES (see lighting fixture schedule)

A1 / 32b — FIXTURE KEYING SYSTEM
A1 = FIXTURE TYPE; REFER TO PLANS FOR TYPES
32= CIRCUIT #; REFER TO PLANS FOR CIRCUIT NUMBERS
b= SWITCH CONTROL; REFER TO PLANS FOR SWITCH CONTROL

LED LIGHT FIXTURE, CEILING MOUNTED SURFACE, GRID MOUNTED SURFACE, PENDANT, OR RECESSED.

LIGHT FIXTURE CIRCUITED TO NORMAL/EMERGENCY SOURCE AND/OR PROVIDED WITH EMERGENCY BATTERY PACK.

SINGLE FACE INTERNALLY LIT EXIT SIGN, ARROWS AS INDICATED ON DRAWINGS.

DOUBLE FACE INTERNALLY LIT EXIT SIGN, ARROWS AS INDICATED ON DRAWINGS.

WALL MOUNTED FIXTURE.

IU — IN USE SIGN - REFER TO FIXTURE SCHEDULE

POLE MOUNTED LIGHT FIXTURE

SITE UTILITY POLE RISER

SWITCHES (typically mtd 48" AFF u.n.o)

S_a — SINGLE POLE SWITCH-"a" DESIGNATES SWITCH CONTROL (LOWER CASE).
S_2 — TWO POLE SWITCH
S_3 — THREE-WAY SWITCH.
S_P — SINGLE POLE SWITCH WITH PILOT LIGHT-GLOWS IN "OFF" POSITION WHEN IN VIEW OF LIGHTS. GLOWS IN "ON" POSITION WHEN REMOTE FROM LIGHTS.
S_4 — FOUR-WAY SWITCH.
S_D — DIMMER SWITCH; 0-10V TYPE.
S_K — KEY OPERATED SWITCH.
S_T — TIMER SWITCH-DIGITAL PROGRAMMABLE TYPE.
S_{WP} — WEATHERPROOF SINGLE POLE SWITCH.
S_{XP} — EXPLOSION PROOF SINGLE POLE SWITCH.
S_{DT} — SINGLE POLE/DOUBLE THROW SWITCH.
S_F — FAN SPEED SWITCH.
S_{MC} — THREE POSITION MOMENTARY CONTACT SWITCH-UP/DOWN/CENTER OFF.
S_{OS} — WALL MOUNTED LOW VOLTAGE, DUAL TECHNOLOGY (PASSIVE INFRARED/ ULTRASONIC) OCCUPANCY SENSOR AND ASSOCIATED POWER PACK(S) AS REQUIRED FOR LOADS CONTROLLED (REFER TO PLANS). PROVIDE WITH RELAY OPTION AND DRY CONTACT CLOSURE TO INTERFACE WITH BUILDING MANAGEMENT SYSTEM (BMS).

LIGHTING CONTROLS

SSU — ALCS SYSTEM SERVER UNIT - REFER TO ALCS ONE-LINE DIAGRAM.
ECU — ALCS ENERGY CONTROL UNIT - REFER TO ALCS ONE-LINE DIAGRAM.
NES — ALCS NETWORK ETHERNET SWITCH - REFER TO ALCS ONE-LINE DIAGRAM.
L — ALCS MULTI-ZONE LOCAL STATION - REFER TO ALCS RISER DIAGRAM
L RS — ALCS SINGLE ZONE LOCAL ROUGH SERVICE STATION - REFER TO ALCS RISER DIAGRAM
M — ALCS MULTI-ZONE MASTER STATION - REFER TO ALCS RISER DIAGRAM
MTS — ALCS MASTER TOUCH SCREEN - REFER TO ALCS ONE-LINE DIAGRAM.
LTS — ALCS LOCAL TOUCH SCREEN - REFER TO ALCS ONE-LINE DIAGRAM.
I/O DMX — ALCS DMX512 CONTROL INTERFACE - REFER TO ALCS ONE-LINE DIAGRAM.
PC — ALCS EXTERIOR PHOTOCELL - REFER TO ALCS ONE-LINE DIAGRAM.
OS — ALCS CEILING OCCUPANCY SENSOR - REFER TO ALCS ONE-LINE DIAGRAM.
PS — ALCS CEILING PHOTO SENSOR - REFER TO ALCS ONE-LINE DIAGRAM.
OS — ALCS WALL OCCUPANCY SENSOR - REFER TO ALCS ONE-LINE DIAGRAM.
I/O — ALCS INPUT/OUTPUT MODULE - REFER TO ALCS ONE-LINE DIAGRAM.
ER — EMERGENCY BY-PASS RELAY - REFER TO EMERGENCY SUPERVISORY BY-PASS RELAY DETAIL
ALC — ALCS RELAY MODULE FOR PLUG LOAD CONTROL

FIRE ALARM SYSTEM

F — MANUAL PULL STATION - MTD 48" AFF TO ℄.
F — SPEAKER / VISUAL "ADA" COMPLIANT SIGNAL - MTD 80" AFF TO ℄.
F — VISUAL "ADA" COMPLIANT SIGNAL - MTD 80" AFF TO ℄.
F A — COMBINATION WALL MOUNTED FIRE ALARM/ MASS NOTIFICATION VISUAL SIGNAL - MTD 80" AFF TO ℄.
F A — COMBINATION WALL MOUNTED FIRE ALARM/ MASS NOTIFICATION SPEAKER/ VISUAL SIGNAL - MTD 80" AFF TO ℄.
A — MASS NOTIFICATION VISUAL SIGNAL - CEILING MTD.
F — SPEAKER / VISUAL "ADA" COMPLIANT SIGNAL - CEILING MTD.
S — CEILING MOUNTED PHOTOELECTRIC SMOKE DETECTOR.
S_E — SMOKE DETECTOR ALSO USED FOR ELEVATOR RECALL.
S_{SC} — SELF-CONTAINED 120 VOLT SMOKE DETECTOR.
S_D DIFSD — DUCT TYPE SMOKE DETECTOR WITH SAMPLING TUBE. FURNISHED BY EC, INSTALLED BY HVAC, WIRED BY EC.
S_D DIFSD — DUCT TYPE SMOKE DETECTOR WITH SAMPLING TUBE FOR CONTROL OF ASSOCIATED FSD AND UNIT SHUTDOWN FURNISHED BY EC, INSTALLED BY HVAC, WIRED BY EC.
F H 135° — THERMAL DETECTOR - 135°F FIXED TEMPERATURE AND RATE OF RISE. "F" INDICATES FIXED TEMPERATURE ONLY.
H 200° — THERMAL DETECTOR - 200°F FIXED TEMPERATURE.
REMOTE ALARM INDICATOR-LABEL.
T BD — BEAM SMOKE DETECTOR -"T" DESIGNATES TRANSMITTER, "R" RECEIVER.
RT — KEY OPERATED REMOTE TEST STATION WITH LED-LABEL.
FS — SPRINKLER FLOW SWITCH - F&I BY F.P.C. WIRED BY E.C.
TS — SPRINKLER TAMPER SWITCH - F&I BY F.P.C. WIRED BY E.C.
PS — SPRINKLER PRESSURE SWITCH - F&I BY F.P.C. WIRED BY E.C.
LPS — SPRINKLER LOW PRESSURE SWITCH - F&I BY F.P.C. WIRED BY E.C.
FSD — FIRE SMOKE DAMPER - F&I BY HVAC CONTRACTOR, WIRED BY E.C. CONTROL MODULE AND FIRE ALARM INTERLOCK WIRED BY ELECTRICAL CONTRACTOR.
DH — MAGNETIC DOOR HOLDER - MTD 80" AFF TO ℄.
DC — ELECTRIC DOOR CLOSER-F&I BY HARDWARE, WIRED BY EC.
FACP — FIRE ALARM CONTROL PANEL.
ANN — FIRE ALARM ANNUNCIATOR.
LOC — MASS NOTIFICATION SYSTEM LOCAL OPERATOR CONSOLE.
MNS — MASS NOTIFICATION SYSTEM ELECTRONIC TEXTUAL / ORAL MESSAGE BOARD
R — RED FIRE ALARM BEACON-WEATHERPROOF.
W — WHITE FIRE ALARM BEACON-WEATHERPROOF.
F — RED FIRE ALARM LIGHT OVER MASTER BOX-WEATHERPROOF.
MM — MONITOR MODULE
CM — CONTROL MODULE
IM — ISOLATION MODULE
K — KEY REPOSITORY BOX (KNOX BOX)
FATC — FIRE ALARM TERMINAL CABINET
PIV — POST INDICATOR VALVE-F&I BY FPC, WIRED BY EC.
CO — WALL MOUNTED CARBON MONOXIDE DETECTOR, MOUNTING HEIGHT PER MANUFACTURERS RECOMMENDATION. PROVIDE ONE MONITOR MODULE PER SENSOR.
GD — WALL MOUNTED COMBUSTIBLE GAS DETECTOR (CH4) . PROVIDE A FIRE ALARM CONTROL MODULE PER DETECTOR FOR MONITORING BY THE FACP. MOUNT 1' BELOW CEILING.
CO D — DUCT MOUNTED CARBON MONOXIDE DETECTOR WITH SAMPLING TUBE FURNISHED BY E.C., INSTALLED BY HVAC, WIRED BY E.C. PROVIDE (1) MONITOR MODULE PER DETECTOR. PROVIDE (1) REMOTE ACCESSORY KIT WITH KEY TEST SWITCH AND INTEGRAL AUDIBLE AND VISUAL ALARM INDICATION TO BE MOUNTED BELOW HVAC UNIT.
E — FIRE ALARM ELECTRIC BELL (120 VOLTS), MOUNTED ABOVE FIRE DEPARTMENT SPRINKLER CONNECTION. FURNISHED BY F.P.C., INSTALLED & WIRED BY E.C.

POWER

120/208 VOLT, 3 PHASE, 4 WIRE PANELBOARD.
277/480 VOLT, 3 PHASE, 4 WIRE, PANELBOARD.
120/208 VOLT, 3 PHASE, 4 WIRE NORMAL/EMERGENCY SYSTEM PANELBOARD.
277/480 VOLT 3 PHASE, 4 WIRE NORMAL/EMERGENCY SYSTEM PANELBOARD.
PANELBOARD FLUSH MOUNTED.
E — ELECTRIC MANHOLE
T — TELEPHONE MANHOLE
C — CATV MANHOLE
F — FIBER MANHOLE
M — METER SOCKET
J — JUNCTION BOX - SIZE AS REQUIRED.
DW J — JUNCTION BOX - WITH FLEXIBLE CONNECTION TO EQUIPMENT."DW" DENOTES DISHWASHER, "H" HOOD, "WO" WALL OVEN, "D" DISPOSER, "HD" HAND DRYER, "ATC" AUTOMATIC TEMPERATURE CONTROLLER.
3R — FUSED DISCONNECT SWITCH HEAVY DUTY TYPE-"3R" INDICATES NEMA 3R
20 — INDICATES TIME DELAY FUSE SIZE.
30 — INDICATES SAFETY SWITCH SIZE
3R — UNFUSED DISCONNECT SWITCH HEAVY DUTY TYPE-"3R" INDICATES NEMA 3R
TS — HORSEPOWER RATED THERMAL SWITCH WITH PILOT LIGHT
VFD — VARIABLE FREQUENCY DRIVE.
C — MULTIPOLE CONTACTOR IN NEMA I ENCLOSURE-RATINGS AND NUMBER OF POLES AS RQUIRED.
CP — EQUIPMENT CONTROL PANEL.
ATS — AUTOMATIC TRANSFER SWITCH.
ATC — AUTOMATIC TRANSFER CONTROLLER.
HOA — HAND-OFF-AUTOMATIC SELECTOR SWITCH.
— THREE FUNCTION PUSHBUTTON SWITCH (UP/DOWN/STOP)-FURNISHED BY EQUIPMENT SUPPLIER, INST. & WIRED BY EC.
— ON/OFF PUSHBUTTON SWITCH.
70AT 100AF CB — ENCLOSED CIRCUIT BREAKER-"70AT" INDICATES 70 AMP TRIP; "100AF" INDICATES 100 AMP FRAME.
PB — PULL BOX-SIZE AS REQUIRED.
G — GENERATOR.

WIRE AND RACEWAYS

WIRING AND RACEWAY - NO. OF DIAGONAL LINES INDICATES NO. #12 AWG CONDUCTORS. ABSENCE OF DIAGONAL LINES INDICATES 2 #12 AWG+#12AWG GROUND UNLESS NOTED OTHERWISE. GROUND WIRE IS NOT SHOWN IN COUNT BUT SHALL BE PROVIDED.
HOMERUN TO PANEL - NO. OF ARROWS INDICATES NO. OF 20 AMP/1 POLE CIRCUITS TO PANEL - UNLESS NOTED OTHERWISE.
NE — NORMAL/EMERGENCY WIRING - MIN. 2#10 AWG + #10 AWG GROUND. RUN IN SEPARATE RACEWAY.
4F — FIRE ALARM WIRING - "4F" INDICATES 4 #14 THHN SOLID IN 3/4" MIN. SIZE CONDUIT.
E — EMERGENCY ONLY WIRING-MINIMUM 2#10 AWG IN SEPARATE RACEWAY.
P — UNDERGROUND PRIMARY ELECTRIC SERVICE
SE — UNDERGROUND SECONDARY ELECTRIC SERVICE
T — UNDERGROUND TELEPHONE SERVICE
CTV — UNDERGROUND CABLE TV SERVICE
4" CONDUIT SLEEVE THRU-WAY, ACROSS CORRIDOR OR BETWEEN ROOMS FOR TEL/DATA - LOCATE ABOVE CEILING.
1" CONDUIT SLEEVE THRU-WAY, ACROSS CORRIDOR OR BETWEEN ROOMS FOR TEL/DATA - LOCATE ABOVE CEILING.
CONDUIT SLEEVE EXTENDED TO NEAREST ACCESSIBLE CEILING-TERMINATE WITH INSULATED BUSHING.
FLEXIBLE CONNECTION TO EQUIPMENT
CABLE TRAY-CONCEALED ABOVE CEILING IN FINISHED AREAS. PROVIDE LATERAL SUPPORT AS REQUIRED.

MISCELLANEOUS-DEVICES

EPO EPO — EMERGENCY POWER SHUNT TRIP - RED MUSHROOM HEAD WITH EXTENDED GUARD WITH EMERGENCY OFF LEGEND. MOUNT AT 48"AFF., U.O.I. PROVIDE NAMEPLATE INDICATING LOAD CONTROLLED.
HANDICAP DOOR ACTIVATE SWITCH-FURN. & INST. BY SYSTEM SUPPLIER. PROVIDE 4"SQ X 2 1/2"DP JB AND 3#18 IN 1"C TO ELECTRIC DOOR OPERATOR.
SV — SOLENOID VALVE - F&I BY P.C., WIRED BY E.C.
FT — FLUSH VALVE TRANSFORMER / POWER SUPPLY (120V/24V). FURNISHED BY P.C., INSTALLED & WIRED BY E.C.
TPD — TEMPERATURE SENSOR - CONNECT TO SECURITY SYSTEM.
LS — LIMIT SWITCH.
B — DOOR BELL-COORDINATE MH WITH ARCHITECT.
LOW VOLTAGE PUSHBUTTON.
1 E-3 — DETAIL IDENTIFIER-INDICATES DETAIL #1 ON DWG. E-3.
GROUND BAR 24W" X 1/8" THICK X 18" LONG COPPER BUS, U.N.O.
2 E-3 A A — SECTION IDENTIFIER- INDICATES SECTION A-A, DETAIL #2 ON DWG. E-3.
K2 — EQUIPMENT TAG NUMBER, REFER TO EQUIPMENT SCHEDULE, "K" INDICATES KITCHEN "C" INDICATES COMPUTER.
1 — NOTE SYMBOL, "1" INDICATES TO REFER TO NOTE #1
3 — CIRCUIT SIZE NUMBER, REFER TO "CIRCUIT SIZE SCHEDULE".
ADA CS — ADA "CALL STATION", HANDS FREE. MOUNT AT 48"AFF.
ADA MCS — ADA "MASTER CALL STATION", HANDS FREE. MOUNT AT 48"AFF.
P — EMERGENCY CALL STATION - LOCATE WITHIN 3' OF WATER CLOSET WITH PULL CORD EXTENDING TO WITHIN 12" OF THE FLOOR.
AV — AUDIO/VISUAL SIGNAL FOR SINGLE TOILETS. MOUNT OVER DOOR.
E — ELECTRIC DOOR-OPERATOR. FURN. & INST. BY GC, WIRED BY EC.
LS — LIMIT SWITCH WIRED BY E.C.
MS — MICRO SWITCH PHOTO-EYE DOOR CONTROLLER FURNISHED BY DOOR CONTRACTOR, INSTALLED & WIRED BY E.C.
G — TRAFFIC LIGHT FURNISHED BY OVERHEAD DOOR SUPPLIER, INSTALLED & WIRED BY E.C.
SPD — SURGE PROTECTION DEVICE
R — TRAFFIC LIGHT FURNISHED BY OVERHEAD DOOR SUPPLIER, INSTALLED & WIRED BY E.C.
T — REVERSE ACTING THERMOSTAT , INSTALLED & WIRED BY ATC CONTRACTOR
C — CLOCK , FURNISHED BY OTHERS, WIRED BY ELECTRICAL CONTRACTOR
E — EMERGENCY BOILER SHUT-OFF MOUNTED IN STOPPER II COVER, MOUNTED @ 72" A.F.F.

ONE LINE POWER

LOAD-BREAK SWITCH.
CIRCUIT BREAKER.
CURRENT TRANSFORMER
POTENTIAL TRANSFORMER.
LA — LIGHTNING ARRESTER AND GROUNDING TO PROTECT ALL PHASES.
CONTACT, NORMALLY OPEN (NO).
CONTACT, NORMALLY CLOSED (NC).
ST — SHUNT TRIP COIL.
CM — CUSTOMER METERING, ELECTRONIC SOLID STATE, UNLESS OTHERWISE INDICATED.
POWER TRANSFORMER.
FUSE, SIZE AS INDICATED.
GF — GROUND FAULT SENSOR & RELAY.
400A / 300A — SWITCH AND FUSE
"400A" - INDICATES AMPERE SWITCH SIZE.
"300A" - INDICATES AMPERE FUSE SIZE.
SYSTEM GROUND OR EQUIPMENT GROUND.
N E LA — AUTOMATIC TRANSFER SWITCH.

RECEPTACLES (typically mtd. at 18" a.f.f., uno)

ALL 20 AMP RECEPTACLES MOUNTED BELOW 5'6" SHALL BE TAMPER RESISTANT TYPE

"a" = SWITCHED OUTLET, "a" - INDICATES SWITCH CONTROL.
"C" = MOUNTED 8" ABOVE COUNTER OR 42" AFF. COORDINATE EXACT MOUNTING HEIGHT WITH ARCHITECTURAL DRAWINGS.
"CP" = CONNECTED TO CCPS PANEL.
"F" = FURNITURE MTD, COORDINATE EXACT LOCATION WITH FURNITURE PLANS.
"GFC" = GROUND FAULT INTERRUPTER TYPE MOUNTED 8" ABOVE COUNTER OR 42" AFF. COORDINATE EXACT MOUNTING HEIGHT WITH ARCHITECTURAL DRAWINGS.
"GFI" = GROUND FAULT INTERRUPTER TYPE.
"H" = HORIZONTALLY MOUNTED .
"IG" = ISOLATED GROUND RECEPTACLE WITH SEPARATE GREEN GROUND CONDUCTOR WITH YELLLOW STRIPE TO ISOLATED GROUND BUS IN PANEL.
"M" = MODULAR FURNITURE SERVICE - PROVIDE FLEXIBLE CONNECTION, COORDINATE EXACT LOCATION WITH FURNITURE PLANS.
"SP" = SURGE PROTECTION RECEPTACLE
"T" = TAMPER RESISTANT SAFETY RECEPTACLE.
"TL" = TWIST LOCK TYPE.
"WP" = WEATHERPROOF RECEPTACLE WITH "NRTL" LISTED COVERPLATE FOR WET LOCATION WITH GFI TYPE RECEPTACLE INSTALLED IN NIEMA 4 ENCLOSURE W/KEY LOCK. MOUNT AT 48" A.F.F.
"CD" = CABLE DROP RECEPTACLE- REFER TO CABLE DROP DETAIL.
"P" = PEDESTAL MOUNTED ON CASEWORK WITH GFI RECEPTACLE. COORDINATE WITH EQUIPMENT DRAWINGS FOR EXACT LOCATION.
"E" = RECEPTACLE CONNECTED TO NORMAL/EMERGENCY CIRCUIT.
"CP" = RECEPTACLE CONNECTED TO COP PANEL CIRCUIT.

20AMP, 120 VOLT SINGLE RECEPTACLE
2_2 — 20 AMP, 120 VOLT DUPLEX RECEPTACLE; "2" INDICATES CIRCUIT NUMBER.
20AMP, 120 VOLT DOUBLE DUPLEX RECEPTACLE.
SPECIAL PURPOSE OUTLET - RATING AS INDICATED ON DRAWINGS. EXAMPLE: ELECTRIC DRYER= 30A, 125/250V, 3 POLE, 4 WIRE, NEMA 14-30R ELECTRIC RANGE= 50A, 125/250V, 3 POLE, 4 WIRE, NEMA 14-50R
20 AMP, 120 VOLT DUPLEX RECEPTACLE FLUSH FLOOR MOUNTED WITH COVER.
20 AMP, 120 VOLT DOUBLE DUPLEX RECEPTACLE FLUSH FLOOR MOUNTED WITH COVER.
20AMP, 120VOLT DUPLEX RECEPTACLE CONNECTED TO NORMAL/ EMERGENCY CIRCUIT.
20AMP, 120VOLT DOUBLE DUPLEX RECEPTACLE CONNECTED TO NORMAL/ EMERGENCY CIRCUIT.
NEMA TYPE L5 -20R ELECTRICAL RECEPTACLE WITH DEDICATED 20 AMP CIRCUIT. MOUNTED ABOVE EQUIPMENT RACK ON UNDERSIDE OF CABLE TRAY.
EWC J — ELECTRIC WATER COOLER OUTLET OR BOTTLE FILLING STATION - 20 AMP, 120 VOLT. PROVIDE GROUND FAULT INTERRUPTER TYPE CIRCUIT BREAKER & LOCAL TOGGLE SWITCH.
CR — CORD REEL EQUAL TO HUBBELL Cat. No. HBL45123GF220WM1 WITH HBL340PB AND KELLUM GRIPS.
SURFACE RACEWAY WITH BASE, COVER, AND DIVIDER "B,C&D". IVORY FINISH. PROVIDE FIBER READY 2" RADIUS FITTINGS. SOLID END INDICATES RISE TO ABOVE ACCESSIBLE CEILING SPACE WITH B,C&D.
20 AMP, 120 VOLT GFI, HORIZONTALLY MOUNTED ON FURNITURE DUPLEX RECEPTACLE INTENDED FOR COMPUTER USE. COLOR OF OUTLET TO BE SELECTED BY OWNER.
20 AMP, 120 VOLT DUPLEX RECEPTACLE INTENDED FOR COMPUTER USE. COLOR OF OUTLET TO BE SELECTED BY OWNER.
20AMP, 120VOLT DOUBLE DUPLEX RECEPTACLE INTENDED FOR COMPUTER USE. COLOR OF OUTLET TO BE SELECTED BY OWNER.
TWO DUPLEX RECEPTACLES, MOUNTED AT 18" AFF AND 84" AFF.
USB — 20 AMP, 120 VOLT DUPLEX RECEPTACLE w/ USB OUTLETS INTENDED FOR COMPUTER USE. COLOR OF OUTLET TO BE SELECTED BY ARCHITECT.
20 AMP, 120 VOLT DUPLEX SWITCHED RECEPTACLE. PROVIDE IO MODULE AND CONNECTION TO OCCUPANCY SENSOR.
20 AMP, 120 VOLT DOUBLE DUPLEX SWITCHED RECEPTACLE. PROVIDE IO MODULE AND CONNECTION TO OCCUPANCY SENSOR.
4, 2 — RECESSED FLOOR BOX WITH (2) 20A, 125V DUPLEX RECEPTACLES AND PROVISIONS FOR (4) RJ45 JACKS EQUAL TO WIREMOLD SERIES #RFB4-FPCTCBS (CARPET). FRSTCBS (WOOD FLOR) AND COMMUNICATION BRACKET FOR TEL/DATA DEVICES. PROVIDE 1"C FOR TEL/DATA TO NEAREST ACCESSIBLE CEILING SPACE.
1V/5D — RECESSED FLOOR BOX WITH (2) 20A, 120V DUPLEX RECEPTACLES AND PROVISIONS FOR (4) RJ45 JACKS EQUAL TO WIREMOLD SERIES #RFB4-FPCTCBS (CARPET). FRSTCBS (WOOD FLOR) AND COMMUNICATION BRACKET FOR TEL/DATA DEVICES. PROVIDE (2)1"C FOR TEL/DATA TO NEAREST ACCESSIBLE CEILING SPACE.
RECESSED FLOOR BOX WITH (2) 20A, 120V DUPLEX RECEPTACLES AND PROVISIONS FOR (4) RJ45 JACKS EQUAL TO WIREMOLD SERIES #RFB6-FPCTCBS (CARPET). FRSTCBS (WOOD FLOR) AND COMMUNICATION BRACKET FOR TEL/DATA DEVICES. PROVIDE (1)1"C FOR TEL/DATA AND (3) 1 1/4" FOR A/V WIRING TO NEAREST ACCESSIBLE CEILING SPACE.
SRP — SMART RESCUE PHONE. CUSTOM BACK BOX FURNISHED AND INSTALL BY E.C. 1" CONDUIT W/PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.. DEVICE AND WIRING BY E.C.
ARA — AREA OF RESCUE ASSISTANCE BUTTON. CUSTOM BACK BOX FURNISHED AND INSTALL BY E.C. 1" CONDUIT W/PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.. DEVICE AND WIRING BY E.C.
1V/3D — FLUSH MOUNTED 2 HOUR RATED POKE-THRU ASSEMBLY WITH (2) DUPLEX RECEPTACLES & (4) COMMUNICATION DEVICES WITH SOLID BRASS FINISH RING. REQUIRES 6" CORED HOLE.
2V/4D — FLUSH MOUNTED 2 HOUR RATED POKE-THRU ASSEMBLY WITH (2) DUPLEX RECEPTACLES & (6) COMMUNICATION DEVICES WITH SOLID BRASS FINISH RING. REQUIRES 6" CORED HOLE.
T — FLUSH MOUNTED 2 HOUR RATED POKE-THRU ASSEMBLY WITH (2) DUPLEX RECEPTACLES & (2) COMMUNICATION DEVICES WITH SOLID BRASS FINISH RING. REQUIRES 8" CORED HOLE.

MECHANICAL EQUIPMENT

(REFER TO MECHANICAL EQUIPMENT SCHEDULE)

BB — ELECTRIC BASEBOARD-FURNISHED BY HVAC, INSTALLED AND WIRED BY EC.
CUH — CABINET HEATER - F & I BY HVAC, WIRED BY E.C.
UH — UNIT HEATER - F & I BY HVAC, WIRED BY E.C.
EF — EXHAUST FAN - F & I BY HVAC, WIRED BY E.C.
C.O. J — CONNECTION TO CARBON MONOXIDE MONITOR MIN. 3#14 AWG. PER MONITOR.
TB — TERMINAL BOX-F&I BY HVAC WIRED BY E.C.
FS D — MOTORIZED FIRE/SMOKE DAMPER-F&I BY HVAC, WIRED BY E.C. TO POWER & FIRE ALARM SYSTEM.
2 — MOTOR - NUMERAL INDICATES HORSEPOWER

TECHNOLOGY SYSTEM (PROVISIONS ONLY)

REFER TO TECHNOLOGY DETAILS SHEET T2.01 FOR SYMBOLS AND LEGENDS

ABBREVIATIONS

A	AMPERE
AL	ALUMINUM
AF	AMP. FRAME
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AIC	INTERRUPTING CAPACITY
ALCS	AUTOMATED LIGHTING CONTROL SYSTEM
ARCH	ARCHITECT
AT	AMP TRIP
ATC	AUTO-TEMP CONTROL CONTRACTOR
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
C	CONDUIT (GENERIC TERM FOR RACEWAY. PROVIDE AS SPECIFIED)
CATV	CABLE TELEVISION
CB	CIRCUIT BREAKER
CKT	CIRCUIT
COP	CRITICAL OPERATION SYSTEM
CLG	CEILING
C.M.	CONSTRUCTION MANAGER
CU	COPPER
℄	CENTERLINE
DEP	DEPARTMENT OF ENVIRONMENTAL PROTECTION
DP	DEEP
EPA	ENVIRONMENTAL PROTECTION AGENCY
DWG	DRAWING
EC	ELECTRICAL CONTRACTOR
EWC	ELECTRIC WATER COOLER
EMT	ELECTRIC METALLIC TUBING
FA	FIRE ALARM
FPC	FIRE PROTECTION SYSTEM CONTRACTOR
F&I	FURNISHED AND INSTALLED
G,GND	GROUND
GC	GENERAL CONDITIONS
GFI	GROUND FAULT INTERRUPTER
HVAC	HEATING, VENTILATING, AND AIR CONDITIONING CONTRACTOR
HP	HORSEPOWER
IG	ISOLATED GROUND
IMC	INTERMEDIATE METALLIC CONDUIT
IT	INFORMATION TECHNOLOGY CONTRACTOR
JB	JUNCTION BOX
KCMIL	THOUSAND CIRCULAR MILS
KES	KITCHEN EQUIPMENT SUPPLIER
KVA	KILO-VOLT AMPERE
KW	KILO-WATT
LTG	LIGHTING
MAAB	MASS ARCHITECTURAL ACCESS BOARD
MC	METAL CLAD CABLE
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MDP	MAIN DISTRIBUTION PANEL
MH	MOUNTING HEIGHT
MI	MINERAL-INSULATED METAL SHEATHED CABLE
MLO	MAIN LUGS ONLY
MTD	MOUNTED
MTG	MOUNTING
MTS	MANUAL TRANSFER SWITCH
NIC	NOT IN CONTRACT
NO.#	NUMBER
NTS	NOT TO SCALE
P	POLE(S)
PB	PULL BOX
PC	PLUMBING CONTRACTOR
PH.#	PHASE
PVC	POLY-VINYL CHLORIDE CONDUIT
PWR	POWER
REF	REFRIGERATOR
RSC	RIGID STEEL CONDUIT
SN	SOLID NEUTRAL
SWBD	SWITCHBOARD
TEL/DATA	TELEPHONE/DATA
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTED POWER SUPPLY
WG	WIRE GUARD
WP	WEATHERPROOF
XFMR	TRANSFORMER
XP	EXPLOSION PROOF
@72"	MOUNT 72 INCHES TO CENTERLINE ABOVE FINISHED FLOOR OR GRADE

ELECTRICAL GENERAL NOTES

1. THE SCOPE OF WORK SHALL INCLUDE PROVIDING ALL WORK INDICATED, AND COORDINATION WITH ALL TRADES. SCOPE OF WORK IS INDICATED ON THE CONTRACT DOCUMENTS INCLUDING THE DRAWINGS AND THE SPECIFICATIONS, WHICH ARE COMPLIMENTARY. WORK INDICATED IN ANY CONTRACT DOCUMENT SHALL BE CONSIDERED PART OF THE SCOPE OF WORK. IN GENERAL, WORK REQUIREMENTS ARE NOT INDICATED IN BOTH DOCUMENTS. WHERE DOCUMENTS CONFLICT WITHIN THEMSELVES OR WITH CODES AND REGULATIONS, PROVIDE THE HIGHER QUANTITY AND QUALITY AND FOLLOW THE STRICTER REQUIREMENTS.
2. COORDINATE WITH THE GENERAL CONTRACTOR, OTHER TRADES AND OF MANUFACTURERS EQUIPMENT AND MAKE ALL FINAL CONNECTIONS AS REQUIRED, I.E., POWER, CONTROL, INTERLOCK, ETC.
3. ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH OSHA, NFPA STANDARDS, THE ELECTRICAL CODE AND THE LOCAL GOVERNING AUTHORITIES. THE DRAWINGS AND SPECIFICATIONS DO NOT ATTEMPT TO INDICATE ALL WORK REQUIRED BY CODES AND AUTHORITIES.
4. TEST ALL EQUIPMENT AND SYSTEMS INSTALLED TO CERTIFY COMPLIANCE WITH DRAWINGS, SPECIFICATIONS, CODES, LOCAL AUTHORITIES AND REGULATIONS. INCLUDE LABOR AND COSTS FOR TESTING, REVIEWS, APPROVALS AND CERTIFICATIONS.
5. DRAWINGS ARE DIAGRAMMATIC ONLY. EXACT LOCATION, MOUNTING HEIGHTS OF EQUIPMENT AND ROUTING OF RACEWAYS SHALL BE COORDINATED WITH THE EQUIPMENT REQUIREMENTS AND FIELD CONDITIONS.
6. FURNISH AND INSTALL ALL INCIDENTAL ACCESSORIES NECESSARY TO MAKE THE ELECTRICAL WORK COMPLETE AND READY FOR OPERATION.
7. SUPPORT ALL WORK FROM THE BUILDING STRUCTURE.
8. ALL MOUNTING HEIGHTS ARE TO CENTERLINE UNLESS OTHERWISE INDICATED.
9. IF EXACT MOUNTING OR RACEWAY ROUTINGS ARE NOT INDICATED (LOCATOR HEIGHT) REQUEST CLARIFICATION PRIOR TO ROUGHING, OR INSTALLATION.
10. ELECTRICAL WORK SHALL BE RECESSED INTO WALLS OR INSTALLED ABOVE HUNG CEILINGS UNLESS OTHERWISE INDICATED.
11. DO NOT INSTALL OUTLETS BACK TO BACK. PROVIDE 24 INCH SPACING IN FIRE RATED WALLS.
12. PROVIDE ELECTRICAL OUTLET PLATE GASKET SEALS AT RECEPTACLES, SWITCHES AND OTHER ELECTRICAL BOXES ON EXTERIOR WALLS AND INTERIOR WALLS BETWEEN CONDITIONED AND NON-CONDITIONED SPACES.
13. WIRE AND CONDUIT SIZES INDICATED ON HOMERUNS SHALL BE CONTINUOUS THROUGHOUT CIRCUIT.
14. FURNISH AND INSTALL CODE REQUIRED DISCONNECTS WHICH ARE NOT FURNISHED BY THE HVAC OR PLUMBING CONTRACTORS.
15. INSTALL A GREEN GROUNDING CONDUCTOR WITHIN EACH RACEWAY SIZED IN ACCORDANCE WITH THE ELECTRIC CODE.
16. PROVIDE WATERTIGHT AND GAS TIGHT SEALS INSIDE AND OUTSIDE OF CONDUITS THAT PENETRATE THE BUILDING BELOW GRADE, O.Z. GEDNEY OR APPROVED EQUAL. PROVIDE WEATHER TIGHT SEAL AT PENETRATIONS ABOVE GRADE.
17. PROVIDE NRTL LISTED SMOKE AND FIRE SEALS AT ALL PENETRATIONS THROUGH FLOORS OR FULL HEIGHT (SLAB TO SLAB) WALLS.
18. USE CAUTION TO AVOID DAMAGE TO EXISTING UTILITY LINES AND/OR HARM TO PERSONNEL WORKING IN THESE AREAS.
19. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE COPPER MINIMUM #12 AWG. SIZE UNLESS OTHERWISE INDICATED.
20. PROVIDE A PULL LINE IN EVERY EMPTY CONDUIT PROVIDED UNDER THIS SECTION.
21. WIRING IS INDICATED ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
22. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL OUTLETS INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS.
23. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE PROVIDED.
24. ALL SWITCH CONTROLS SHALL BE PROVIDED WITH WIRING AND CONDUIT AS REQUIRED.
25. RACEWAYS SHALL BE LIMITED TO SIX CURRENT CARRYING CONDUCTORS (THREE PHASE AND THREE NEUTRALS) AND GROUNDING CONDUCTOR, UNLESS OTHERWISE INDICATED. PROVIDE A DEDICATED NEUTRAL CONDUCTOR FOR EACH SINGLE PHASE RECEPTACLE CIRCUIT UNLESS AN OVERSIZED NEUTRAL IS SPECIFICALLY INDICATED.
26. ELECTR

LIGHTING FIXTURE SCHEDULE (1)(8)(9)(10)(11)

TYPE	MANUFACTURER	MODEL / SERIES	MTG.	VOLTAGE	LIGHTING SOURCE			DESCRIPTION	ACCEPTABLE MANUFACTURE EQUALS	SCHEDULE NOTES
					LUMENS	WATTS	SOURCE/CCT			
J	RAB LIGHTING	VXBRLED13DG-XX	W	UNIVERSAL	729	13	LED/5000K	UTILITY JELLY JAR STYLE FIXTURE WITH FROSTED HEAT TREATED GLASS GLOBE AND CAST GUARD CAPABLE OF 0-10V DIMMING.	PHOENIX MOBERN	5 7 - - - -
LC1	ACOLYTE LIGHTING	-	S	UNIVERSAL	-	-	LED/3500K	LED FLEXIBLE TAPE CAPABLE OF 90 DEGREE ROTATION. FIXTURE TO BE PROVIDED WITH 0-10V DIMMING CAPABLE DRIVER.	LUMINII LIGHTING GM LIGHTING	5 7 13
LDC	ACOLYTE LIGHTING	PIC-3-0-35-M-XX + (QTY)DRVW249610P-XX	S/R	UNIVERSAL	164/LF	3/LF	LED/3500K	LED CORNER MOUNTED TAPE IN CHANNEL MOUNTED CONCEALED INTO BUILT IN CASEWORK. FIXTURE TO BE PROVIDED W/ 0-10V DRIVER AND POWER SUPPLY.	LUMINII LIGHTING GM LIGHTING	5 7 13
LK22	KURTZON LIGHTING	FP-R-3-2X2-2-LEDR-835-UNV-GH85-SW-WHT-316SS-DOOR-XX	R	UNIVERSAL	3165	29	LED/3500K	2'X2' LED RECESSED TROFFER, NSF RATED, SUITABLE FOR USE IN AREAS OF FOOD PREPARATION & CAPABLE OF 0-10V DIMMING. STAINLESS STEEL DOOR & HOUSING.	KENALL LIGHTING XXXX	5 7 - - - -
LP2	AXIS LIGHTING	TB2DILED-300-750-80-35-BW-SO-2-XX-UNV-DP-1-CA-DOS	P	UNIVERSAL	2100	19	LED/3500K	4' LED LINEAR PENDANT MOUNTED FIXTURE PROVIDED WITH DIRECT/INDIRECT BATWING DISTRIBUTION & 0-10V DIMMING CAPABILITY. COORDINATE ALL FINISHES AND MOUNTING WITH ARCHITECT.	AXIS LIGHTING FINELITE	5 7 - - - -
LP4	AXIS LIGHTING	TB2DILED-300-750-80-35-BW-SO-4-XX-UNV-DP-1-CA-DOS	P	UNIVERSAL	4200	38	LED/3500K	4' LED LINEAR PENDANT MOUNTED FIXTURE PROVIDED WITH DIRECT/INDIRECT BATWING DISTRIBUTION & 0-10V DIMMING CAPABILITY. COORDINATE ALL FINISHES AND MOUNTING WITH ARCHITECT.	AXIS LIGHTING FINELITE	5 7 - - - -
LP6	AXIS LIGHTING	TB2DILED-300-750-80-35-BW-SO-6-XX-UNV-DP-1-CA-DOS	P	UNIVERSAL	6300	57	LED/3500K	6' LED LINEAR PENDANT MOUNTED FIXTURE PROVIDED WITH DIRECT/INDIRECT DISTRIBUTION & 0-10V DIMMING CAPABILITY. FINISH AND MOUNTING SHALL BE SELECTED BY ARCHITECT.	AXIS LIGHTING FINELITE	5 7 - - - -
LP8	AXIS LIGHTING	TB2DILED-300-750-80-35-BW-SO-8-XX-UNV-DP-1-CA-DOS	P	UNIVERSAL	8400	76	LED/3500K	8' LED LINEAR PENDANT MOUNTED FIXTURE PROVIDED WITH DIRECT/INDIRECT DISTRIBUTION & 0-10V DIMMING CAPABILITY. FINISH AND MOUNTING SHALL BE SELECTED BY ARCHITECT.	AXIS LIGHTING FINELITE	5 7 - - - -
LPA	AXIS LIGHTING	TB2DILED-300-750-80-35-BW-SO-S-XX-UNV-DP-1-CA-DOS	P	UNIVERSAL	1050/LF	9.5/LF	LED/3500K	LED LINEAR PENDANT MOUNTED FIXTURE PROVIDED WITH DIRECT/INDIRECT DISTRIBUTION & 0-10V DIMMING CAPABILITY. FINISH AND MOUNTING SHALL BE SELECTED BY ARCHITECT.	AXIS LIGHTING FINELITE	5 7 - - - -
LPB	-	-	P	UNIVERSAL	-	-	LED/3500K	-	AXIS LIGHTING FINELITE	5 7 - - - -
LPG	SPEC GRADE LTG.	HBF-150-35K-120-V01-XX-PM2-VDIM-UL-FL-80C-XX	P	UNIVERSAL	19,900	150	LED/3500K	LED HIGH BAY FIXTURE PROVIDED WITH FROSTED POLYCARBONATE LENSING OPTION AND UP-LIGHT SOURCE. COLOR BY ARCHITECT.	AGL SOLAS RAY LIGHTING	5 7 - - - -
LR2	AXIS LIGHTING	B2SQRLED-1000-80-35-SO-2-X-UNV-DP-1-TB9-DOS	R	UNIVERSAL	2000	17	LED/3500K	2' X 2' LED LINEAR RECESS MOUNTED FIXTURE PROVIDED WITH 0-10V DIMMING CAPABILITY. COORDINATE ALL FINISHES AND MOUNTING WITH ARCHITECT.	FINELITE LIGHTING MARK ARCHITECTURAL LIGHTING	5 7 - - - -
LR4	AXIS LIGHTING	B2SQRLED-1000-80-35-SO-4-X-UNV-DP-1-TB9-DOS	R	UNIVERSAL	4000	25.5	LED/3500K	4' X 2' LED LINEAR RECESS MOUNTED FIXTURE PROVIDED WITH 0-10V DIMMING CAPABILITY. COORDINATE ALL FINISHES AND MOUNTING WITH ARCHITECT.	FINELITE LIGHTING MARK ARCHITECTURAL LIGHTING	5 7 - - - -
LR6	AXIS LIGHTING	B2SQRLED-1000-80-35-SO-6-X-UNV-DP-1-TB9-DOS	R	UNIVERSAL	6000	51	LED/3500K	6' X 2' LED LINEAR RECESS MOUNTED FIXTURE PROVIDED WITH 0-10V DIMMING CAPABILITY. COORDINATE ALL FINISHES AND MOUNTING WITH ARCHITECT.	FINELITE LIGHTING MARK ARCHITECTURAL LIGHTING	5 7 - - - -
LR6T	AXIS LIGHTING	B2SQRLED-1000-80-TW2750-SO-6-X-UNV-DP-1-TB9-DOS	R	UNIVERSAL	6000	51	LED/TUNABLE	6' X 2' LED LINEAR RECESS MOUNTED FIXTURE PROVIDED WITH 0-10V DIMMING CAPABILITY AND TUNABLE CCT LED SOURCE. COORDINATE ALL FINISHES AND MOUNTING WITH ARCHITECT.	FINELITE LIGHTING MARK ARCHITECTURAL LIGHTING	5 7 - - - -
LR8	AXIS LIGHTING	B2SQRLED-1000-80-35-SO-8-X-UNV-DP-1-TB9-DOS	R	UNIVERSAL	8000	68	LED/3500K	8' X 2' LED LINEAR RECESS MOUNTED FIXTURE PROVIDED WITH 0-10V DIMMING CAPABILITY. COORDINATE ALL FINISHES AND MOUNTING WITH ARCHITECT.	FINELITE LIGHTING MARK ARCHITECTURAL LIGHTING	5 7 - - - -
LR8T	AXIS LIGHTING	B2SQRLED-1000-80-TW2750-SO-8-X-UNV-DP-1-TB9-DOS	R	UNIVERSAL	8000	68	LED/TUNABLE	8' X 2' LED LINEAR RECESS MOUNTED FIXTURE PROVIDED WITH 0-10V DIMMING CAPABILITY AND TUNABLE CCT LED SOURCE. COORDINATE ALL FINISHES AND MOUNTING WITH ARCHITECT.	FINELITE LIGHTING MARK ARCHITECTURAL LIGHTING	5 7 - - - -
LR22	AXIS LIGHTING	AULED-22-4500-90-35-SO-W-UNV-DP-1-XX	R	UNIVERSAL	4500	33	LED/3500K	2' X 2' ARCHITECTURAL TROFFER WITH LOW GLARE DIRECT DISTRIBUTION	DAY-BRITE LIGHTING LITHONIA LIGHTING	
LRA	AXIS LIGHTING	B2SQRLED-1000-80-35-SO-S-X-UNV-DP-1-TB9-DOS	R	UNIVERSAL	1000/LF	8.5/LF	LED/3500K	LED RECESSED FIXTURE WITH 0-10V DIMMING CAPABILITY. FIXTURE SHALL BE SUITABLE FOR USE IN DAMP LOCATIONS.	FINELITE LIGHTING MARK ARCHITECTURAL LIGHTING	5 7 - - - -
LRB	LUMENWERX LIGHTING	LBISEALR-D-MWPL-SW-80CRI-500LMF-35K-XFT-UNV-D1-1C-XX-XX	R	UNIVERSAL	500/LF	3.8/LF	LED/3500K	LED RECESSED FIXTURE WITH 0-10V DIMMING CAPABILITY. FIXTURE SHALL BE SUITABLE FOR USE IN DAMP LOCATIONS.	-	5 7 - - - -
LS2	FINELITE LIGHTING	LN2-FRL-35K-M-UNV10%-SM-OEK-X-2	S	UNIVERSAL	1628	13	LED/3500K	2' X 2' LED UTILITY STRIP FIXTURE WITH FROSTED ACRYLIC LENSING PROVIDED WITH CHAIN MOUNTING HARDWARE WHERE REQUIRED.	CREE LIGHTING COLUMBIA LIGHTING	5 7 - - - -
LS4	FINELITE LIGHTING	LN2-FRL-35K-M-UNV10%-SM-OEK-X-4	S	UNIVERSAL	3256	26	LED/3500K	4' X 2' LED UTILITY STRIP FIXTURE WITH FROSTED ACRYLIC LENSING PROVIDED WITH CHAIN MOUNTING HARDWARE WHERE REQUIRED.	CREE LIGHTING COLUMBIA LIGHTING	5 7 - - - -
LS6	FINELITE LIGHTING	LN2-FRL-35K-M-UNV10%-SM-OEK-X-6	S	UNIVERSAL	4884	39	LED/3500K	6' X 2' LED UTILITY STRIP FIXTURE WITH FROSTED ACRYLIC LENSING PROVIDED WITH CHAIN MOUNTING HARDWARE WHERE REQUIRED.	FINELITE MARK LIGHTING	5 7 - - - -
LS8	FINELITE LIGHTING	LN2-FRL-35K-M-UNV10%-SM-OEK-X-8	S	UNIVERSAL	6512	52	LED/3500K	8' X 2' LED UTILITY STRIP FIXTURE WITH FROSTED ACRYLIC LENSING PROVIDED WITH CHAIN MOUNTING HARDWARE WHERE REQUIRED.	CREE LIGHTING COLUMBIA LIGHTING	5 7 - - - -
LT1	-	-	S	UNIVERSAL	-	-	LED/3500K	-	-	5 7 - - - -
PC1	FOCAL POINT	FSDL-22-FLXP-2000L-35K-1C-UNV-LD1-U-XX	R	UNIVERSAL	2000	27	LED/3500K	2' RECESSED LED RING FIXTURE WITH FROSTED ACRYLIC DIFFUSER AND FLAT FROSTED LENS, 0-10V DIMMING CAPABILITY.	-	5 7 - - - -
PC2	GOTHAM LIGHTING	EV04CC-35-20-AR-LSS-WD-MVOLT-GZ10-JBX-XX-SXX-XX-NONE-XX-XX	P	UNIVERSAL	1994	19.5	LED/3500K	4" APERTURE LED PENDANT CYLINDER FIXTURE WITH SEMI-SPECULAR REFLECTOR FINISH, EXTRUDED HEAVY GUAGE ALUMINUM CYLINDER BODY, AND 0-10V DIMMING CAPABILITY.	-	5 7 - - - -
RC1	GOTHAM LIGHTING	EV04-35-15-AR-XX-LSS-MWD-MVOLT-GZ10-NONE-NONE-XX	R	UNIVERSAL	1527	13.7	LED/3500K	4" APERTURE LED DOWNLIGHT FIXTURE WITH SEMI-SPECULAR REFLECTOR AND PROVIDED WITH 0-10V DIMMING CAPABILITY. FIXTURE IS CONSTRUCTED TO BE FULLY UPGRADED & SERVICED FROM BELOW.	FOCAL POINT LIGHTING ELITE LIGHTING	5 7 - - - -
RC2	GOTHAM LIGHTING	EV02-35-10-AR-XX-LSS-MWD-MVOLT-UGZ-NONE-XX	R	UNIVERSAL	1073	12.7	LED/3500K	2" APERTURE LED DOWNLIGHT FIXTURE WITH SEMI-SPECULAR REFLECTOR AND PROVIDED WITH 0-10V DIMMING CAPABILITY. FIXTURE IS CONSTRUCTED TO BE FULLY UPGRADED & SERVICED FROM BELOW.	FOCAL POINT LIGHTING ELITE LIGHTING	5 7 - - - -
SL1	LITHONIA LIGHTING	DSX0-P1-30K-80CRI-BLC3-MVOLT-RPA-NLTAIR2 PIRHN	POLE	UNIVERSAL	33	3344	LED/3000K	POLE FIXTURE W/ TYPE III DISTRIBUTION & MOUNTED ON 12.5' ROUND ALUMINUM TAPERED POLE RATED FOR 110MPH WIND CONDITIONS	GARDCO COOPER	4 5 7 15 17
SL2	LITHONIA LIGHTING	(4)DSX0-P1-30K-80CRI-BLC4-MVOLT-RPA-NLTAIR2 PIRHN	POLE	UNIVERSAL	(4) 33	3454	LED/3000K	4 HEADED POLE FIXTURE W/ TYPE III DISTRIBUTION W HOUSE SIDE SHIELD & MOUNTED ON 12.5' ROUND ALUMINUM TAPERED POLE RATED FOR 110MPH WIND CONDITIONS	GARDCO COOPER	4 5 7 15 17
SL3	LITHONIA LIGHTING	DSX0-P1-30K-80CRI-BLC4-MVOLT-RPA-NLTAIR2 PIRHN	POLE	UNIVERSAL	33	3454	LED/3000K	POLE FIXTURE W/ TYPE IV DISTRIBUTION & MOUNTED ON 12.5' ROUND ALUMINUM TAPERED POLE RATED FOR 110MPH WIND CONDITIONS	GARDCO COOPER	4 5 7 15 17
SL4	LITHONIA LIGHTING	RADPT LED-P1-30K-SYM-MVOLT-PT4-NLTAIR2-XX	POLE	UNIVERSAL	3189	25	LED/4000K	LED WALL MOUNTED FIXTURE WITH TYPE IV DISTRIBUTION AND 0-10V DIMMING CAPABILITY IP65 RATED FOR USE IN WET LOCATION	GARDCO MCGRAW-EDISION	5 7 - - - -
SL5	BEGA LIGHTING	B84623 + B84705-30K-XX	BOL	UNIVERSAL	2961	23.6	LED/4000K	LED WALL MOUNTED FIXTURE WITH TYPE IV DISTRIBUTION AND 0-10V DIMMING CAPABILITY IP65 RATED FOR USE IN WET LOCATION	GARDCO MCGRAW-EDISION	5 7 - - - -
SL6	TARGETTI LIGHTING	JU-R-FL-L2-30-24-XX	R	UNIVERSAL	704	7	LED/4000K	LED WALL MOUNTED FIXTURE WITH TYPE IV DISTRIBUTION AND 0-10V DIMMING CAPABILITY IP65 RATED FOR USE IN WET LOCATION	GARDCO MCGRAW-EDISION	5 7 - - - -
SL7	LITHONIA LIGHTING	WDGE1 LED-P1-30K-80CRI-VF-MVOLT-SRM-XX	W	UNIVERSAL	1200	4	LED/4000K	LED WALL MOUNTED FIXTURE WITH TYPE IV DISTRIBUTION AND 0-10V DIMMING CAPABILITY IP65 RATED FOR USE IN WET LOCATION	GARDCO MCGRAW-EDISION	5 7 - - - -
SL8	GOTHAM LIGHTING	EV04-35-15-AR-XX-LSS-MWD-MVOLT-GZ10-NONE-NONE-XX	R	UNIVERSAL	1527	13.7	LED/4000K	LED WALL MOUNTED FIXTURE WITH TYPE IV DISTRIBUTION AND 0-10V DIMMING CAPABILITY IP65 RATED FOR USE IN WET LOCATION	GARDCO MCGRAW-EDISION	5 7 - - - -
SL9	HYDREL LIGHTING	-	W	UNIVERSAL	-	-	LED/4000K	LED WALL MOUNTED FIXTURE WITH TYPE IV DISTRIBUTION AND 0-10V DIMMING CAPABILITY IP65 RATED FOR USE IN WET LOCATION	GARDCO MCGRAW-EDISION	5 7 - - - -
SL10	ACOLYTE LIGHTING	-	R	UNIVERSAL	-	-	LED/4000K	LED WALL MOUNTED FIXTURE WITH TYPE IV DISTRIBUTION AND 0-10V DIMMING CAPABILITY IP65 RATED FOR USE IN WET LOCATION	GARDCO MCGRAW-EDISION	5 7 - - - -
UC	ACOLYTE LIGHTING	CHAC2-M-XX + RB-0-SWS220-3-0-35-XX-FI + (QTY)DRVW249610P-XX + XX	S	UNIVERSAL	279.3/LF	3.0/LF	LED/3500K	LED SURFACE MOUNTED TAPE IN CHANNEL FOR USE IN UNDER CABINET APPLICATIONS. FITURE TO DIM UTILIZING 0-10V SIGNAL.	LUMINII Q-TRAN	4 5 7 15 17
EV	EVENLITE	SOV-AC-G-1C-XX-XX-XX	U	UNIVERSAL	-	5	LED	SINGLE FACED LED EDGE LIT EXIT SIGN WITH GREEN LETTERING COORDINATE CHEVRONS WITH ARCHITECTURAL CODE PLAN	SIGNTEX MULE	2 6 - - - -
EV	EVENLITE	SOV-AC-G-2M-XX-XX-XX	U	UNIVERSAL	-	5	LED	DOUBLE FACED LED EDGE LIT EXIT SIGN WITH GREEN LETTERING COORDINATE CHEVRONS WITH ARCHITECTURAL CODE PLAN	SIGNTEX MULE	2 3 - - - -
EV	EVENLITE	SOV-AC-G-XX-XX-SW-XX-XX	U	UNIVERSAL	-	5	LED	SINGLE FACED LED EDGE LIT EXIT SIGN WITH GREEN LETTERING COORDINATE CHEVRONS WITH ARCHITECTURAL CODE PLAN	SIGNTEX MULE	2 6 - - - -
EV MM	EVENLITE	SOV-AC-G-1C-XX-MU-XX-IN	U	UNIVERSAL	-	5	LED	SINGLE FACED LED EXIT SIGN WITH WITH GREEN LETTERING AND SUITABLE FOR USE IN MULLION MOUNTED APPLICATIONS.	DUAL-LITE MULE	2 - - - - -
EV HC	EVENLITE	TRE-AC-G-1C-W/SC-MA	U	UNIVERSAL	-	5	LED	SINGLE FACED LED EXIT SIGN WITH MASS. APPROVED WHEEL CHAIR GRAPHIC LOCATED AT ANY EXIT FROM BUILDING TO GRADE.	MULE EMERGI-LITE	2 - - - - -
EV RS	EVENLITE	AUR-1-XX-XX-RS	U	UNIVERSAL	-	5	LED	SINGLE FACED LED EXIT SIGN WITH WITH GREEN LETTERING AND SUITABLE FOR USE IN ROUGH SURFACE APPLICATIONS.	SIGNTEX ISOLITE	- - - - - -
EB	MULE LIGHTING	ELW-BB-7L2-XX-DP-DG-XX	U	UNIVERSAL	-	14	LED	LED EMERGENCY BATTERY UNIT FIXTURE TYPICALLY MOUNTED AT 7' 6" A.F.F. AND PROVIDED WITH SELF DIAGNOSTIC CAPABILITIES	SIGNTEX SIGNTEX	- - - - - -

MOUNTING DESIGNATIONS

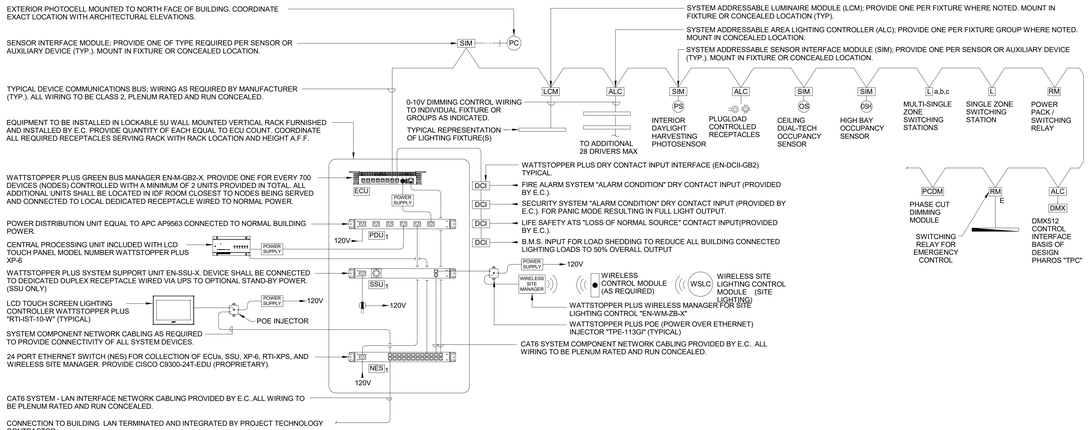
C	COVE	U	UNIVERSAL
P	PENDANT	W	WALL
R	RECESSED	AC	AIRCRAFT CABLE
S	SURFACE	BOL	BOLLARD
T	TRACK / RAIL / CABLE	POLE	POLE

LIGHTING FIXTURE SCHEDULE NOTES (A)

1. LIGHTING FIXTURE PACKAGE SUBMITTALS SHALL BE FULLY COORDINATED BETWEEN THE ELECTRICAL CONTRACTOR, LIGHTING FIXTURE REPRESENTATIVE(S), AND LIGHTING MANUFACTURERS TO ENSURE ALL PRODUCT, INSTALLATION, AND CONTROL REQUIREMENTS ARE MET PRIOR TO SUBMISSION FOR REVIEW. IT IS THE ELECTRICAL CONTRACTORS RESPONSIBILITY TO PROVIDE A PACKAGE MEETING ALL REQUIREMENTS OF THE PROJECT FOR A COMPLETE AND FULLY FUNCTIONAL LIGHTING SYSTEM.=
2. PROVIDE EXIT SIGN THAT COMPLIES WITH NFPA 101, UL 924, 521 CMR 26.1.2 AND ALL REFERENCED STANDARDS AND CODES.
3. PROVIDE FLOOR PROXIMITY SIGN IN ADDITION TO STANDARD SIGN ABOVE DOOR; MOUNT SIGN AT 18" A.F.F. TO THE TOP ON THE STRIKE SIDE OF DOOR. SIGN SHALL BE RECESSED MOUNTED AND PROVIDED WITH FLUSH POLYCARBONATE SHIELD.
4. SITE LIGHTING POLES SHALL BE PROVIDED WITH FULL BASE COVERS TO MATCH PROFILE OF POLE; NUT COVERS ONLY ARE NOT ACCEPTABLE.
5. UNLESS OTHER NOTED, PROVIDE ALL FIXTURES WITH 0-10V DIMMING BALLAST, DRIVER, TRANSFORMER, OR LIGHT ENGINE REQUIRED FOR LAMP OR LED SOURCE SPECIFIED.
6. E.C. SHALL PROVIDE ADDITIONAL EXIT SIGNS (TO INCLUDE 100' OF MC CABLE BRANCH CIRCUITING) FOR FIELD PLACEMENT DURING CONSTRUCTION. REFER TO SPECIFICATIONS FOR QUANTITIES.
7. PROVIDE ALCS ADDRESSABLE INPUT/OUTPUT (I/O) MODULE FOR EACH FIXTURE UNLESS OTHERWISE NOTED. APPLICATIONS NOT REQUIRING INDIVIDUAL CONTROL (WHERE NOTED ON PLANS) SHALL BE PROVIDED WITH I/O MODULES ON A FIXTURE GROUPING BASIS. WHERE FIXTURES ARE LOCATED IN HARD CEILING AREAS THE I/O MODULE SHALL BE REMOTE MOUNTED IN ACCESSIBLE AREA ABOVE AN A.C.T. CEILING. WHERE FIXTURES ARE LOCATED OUTDOORS THE I/O MODULE SHALL BE LOCATED IN THE MAIN ELECTRICAL ROOM ADJACENT TO THE PANEL SERVING THE LIGHTING. REFER TO "AUTOMATED LIGHTING CONTROL SYSTEM - TYPICAL ONE-LINE DIAGRAM" AND SPECIFICATIONS FOR FURTHER INFORMATION.
8. PROVIDE LED SOURCES WITH A MAXIMUM COLOR VARIATION OF 3-STEP MCADAM ELLIPSE. PROVIDE STATEMENT OF COMPLIANCE WITH SUBMITTALS.
9. PROVIDE FIXTURES WITH A MINIMUM WARRANTY COVERAGE OF 5 YEARS ON ALL PARTS. MANUFACTURER SHALL PROVIDE WRITTEN WARRANTY TO PROVIDE REPLACEMENT PARTS, INCLUDING BUT NOT LIMITED TO, LED SOURCE MODULE AND DRIVER FOR A MINIMUM OF TEN YEARS. PARTS SHALL BE FULLY COMPATIBLE WITH FIXTURE TO PROVIDE SAME LIGHT OUTPUT, DISTRIBUTION, COLOR, AND COLOR RENDERING AT OR BELOW THE ORIGINAL WATTAGE. PROVIDE STATEMENT OF COMPLIANCE WITH SUBMITTALS.
10. PROVIDE FIXTURES WITH PROJECT SPECIFIC LABELS CLEARLY INDICATING THE FIXTURE TYPE, SERVICE CONTACT INFORMATION, AND REPLACEMENT PARTS (INCLUDING BUT NOT LIMITED TO SOURCE, DRIVER, AND LENS). MANUFACTURER STANDARD OFFERING OF QR CODE OR BAR CODE CONTAINING REQUIRED INFORMATION WILL BE ACCEPTABLE. PROVIDE STATEMENT OF COMPLIANCE WITH SUBMITTALS.
11. PROVIDE FIXTURES FROM MANUFACTURERS WITH A DOCUMENTED HISTORY OF SUPPLYING PRODUCTS SPECIFIED FOR A MINIMUM OF 5 YEARS. PROVIDE STATEMENT OF COMPLIANCE WITH SUBMITTALS.
12. FIXTURE TO BE PROVIDED WITH A MINIMUM 10 YEAR WARRANTY COVERING BOTH LED'S AND DRIVERS. ALSO FIXTURE TO HAVE A MINIMUM L90 RATING OF 100,000 HOURS BASED ON TM-21 CALCULATION DATA THIS INFORMATION MUST BE SUBMITTED FOR REVIEW.
13. FIXTURE TO BE PROVIDED WITH TUNABLE WHITE DRIVER OPERATING ON A DALI INTERFACE PROTOCOL. FIXTURE SUPPLIER TO PROVIDE A LIST OF CCT SET POINTS FROM THE MANUFACTURER TO THE LIGHTING CONTROL SYSTEM PROGRAMMER.
14. FIXTURE LENGTHS TO BE CONSISTENT AND FIXTURE ELECTRICAL LIGHTING PLANS. PROVIDE ALL NECESSARY MOUNTING HARDWARE, DRIVERS, CONNECTOR CABLES, ETC. FOR RUNS SHOWN
15. ALL EXTERIOR LIGHTING FIXTURES TO HAVE GRAPHITE METALLIC FINISH.
16. FIXTURE SELECTED IS DLC LISTED THIS IS A REQUIREMENT FOR APPROVAL FOR THIS TYPE.
17. FIXTURE SHALL BE PROVIDED WITH AN UP-LIGHT SOURCE AND SAFETY HOOK MOUNTING CHAIN.
18. PROVIDE 7 PIN PHOTOCELL PROVISIONS FOR EACH POLE FIXTURE TO HOUSE THE WIRELESS SITE LIGHTING CONTROL MODULE (WSLC) - SEE ALCS RISER.
19. FIXTURES TO BE PROVIDED WITH DMX (WIRABLE) DRIVER CAPABLE OF A SMOOTH DIM TO BLACK (0% TOTAL LIGHT OUTPUT). FIXTURES SHALL BE REVIEWED IN A DIMMING MOCK-UP PRIOR TO FINAL APPROVAL.
20. FIXTURES SHALL BE WIRED VIA DMX OPTO/ISO SPLITTER TO DIMMING CONTROL RACK. PROVIDE ALL NECESSARY WIRING AND COMPONENTS FOR A COMPLETE RUN.
21. CUSTOM FINISH TO BE COORDINATED WITH ARCHITECT PRIOR TO FINAL APPROVAL.
22. PROVIDE LIGHTING CALCULATION USING FINAL APPROVED SIGNAGE DESIGN INDICATING DIMENSIONS FOR FIXTURE SET, FIXTURE OPTICS, AND TILT SETTING.
23. ROUGH SERVICE EXIT SIGNS TO BE PROVIDED IN ALL GYMS, LOCKER ROOMS, AND UTILITY SPACES WHEN REQUIRED REGARDLESS OF EXIT SIGN TYPE INDICATED ON PLANS.
24. HANDICAP EXIT SIGNS TO BE PROVIDED AT ALL EXITS TO GRADE FROM THE BUILDING REGARDLESS OF EXIT SIGN TYPE INDICATED ON PLANS. ALL HANDICAP EXIT SIGNS TO BE PROVIDED WITH MASS APPROVED WHEELCHAIR GRAPHIC.

LIGHTING GENERAL NOTES

1. MANUFACTURERS AND CATALOG NUMBERS IDENTIFIED IN THE "LIGHTING FIXTURE SCHEDULE" SHALL SERVE TO ESTABLISH THE BASIS OF DESIGN FOR EACH LIGHTING FIXTURE TYPE. PRODUCTS OF EQUAL APPEARANCE, CONSTRUCTION, PERFORMANCE, AND WARRANTY COVERAGE FROM MANUFACTURERS OTHER THAN THOSE IDENTIFIED MAY BE PROPOSED FOR USE ON THIS PROJECT, SUBJECT TO REVIEW AND APPROVAL BY THE ARCHITECT AND ENGINEER. THE "FIXTURE MANUFACTURER OPTIONS (OR EQUAL)" LISTING IS PROVIDED FOR GUIDANCE IN IDENTIFYING MANUFACTURERS CAPABLE OF PROVIDING EQUAL PRODUCTS. BUT IN NO WAY LIMITS MANUFACTURERS OR PRODUCTS THAT MAY BE PROPOSED AS EQUALS FOR THE PROJECT.
2. "LIGHTING FIXTURE SCHEDULE" REMARKS, "LIGHTING FIXTURE SCHEDULE NOTES", "LIGHTING GENERAL NOTES", AND NOTATIONS ELSEWHERE MAY INDICATE FEATURES AND ACCESSORIES THAT ARE NOT INDICATED IN THE CATALOG NUMBER BUT ARE REQUIRED FOR THE PROJECT. PRODUCTS OTHER THAN THOSE SPECIFIED SUBMITTED SHALL BE DOCUMENTED FOR CONFORMANCE IN PERFORMANCE, CONSTRUCTION, AND APPEARANCE WITH THE CRITERIA ESTABLISHED BY THE SPECIFIED PRODUCT.
3. FURNISH ALL LIGHTING FIXTURES COMPLETE WITH MOUNTING ACCESSORIES TO MEET THE JOB REQUIREMENTS. VERIFY ROOM SURFACE CONSTRUCTION AND FINISHES PRIOR TO ORDERING FIXTURES TO ENSURE PROPER MOUNTING PROVISIONS AND FIXTURE FITTINGS. REFER TO LATEST ARCHITECTURAL DRAWINGS.
4. VERIFY ALL FIXTURE MOUNTING HEIGHTS AND LOCATIONS WITH LATEST ARCHITECTURAL DRAWINGS. EXACT LOCATION OF FIXTURES SHALL BE CONFIRMED WITH THE ARCHITECT PRIOR TO START OF ROUGHING.
5. LED ARRAYS, MODULES, AND LIGHT ENGINES SHALL HAVE KELVIN COLOR TEMPERATURE AS SCHEDULED HAVING A MINIMUM COLOR RENDERING INDEX (CRI) OF 82 AND A MINIMUM L70 LIFETIME RATING OF 50,000 HOURS AT 25°C AMBIENT. LED DRIVERS SHALL HAVE 0-10V DIMMING CONTROL WITH FULLY ISOLATED CONTROL INPUTS AND MINIMUM POWER LEVEL OF 10%/%. LED FIXTURES WITH ARRAY / MODULE AND DRIVER PACKAGES OR LIGHT ENGINES SHALL HAVE PUBLISHED IESNA LM-79 AND LM-80 TESTING DATA AS A STANDARD MANUFACTURED OFFERING. INDIVIDUAL COMPONENT TESTING DATA WILL NOT BE ACCEPTED. ALL FIXTURES SHALL BE "DESIGN LIGHTS CONSORTIUM" (DLC) OR "ENERGYSTAR" LISTED, OR FURNISHED WITH DATA INDICATING CONFORMANCE WITH LATEST APPLICABLE LISTING CRITERIA.
6. FIXTURE LETTERS SHOWN ONCE ON A CONTINUOUS ROW OF FIXTURES SHALL BE TYPICAL FOR THAT ROW UNLESS OTHERWISE INDICATED. PROVIDE ALL REQUIRED FITTINGS, CONNECTORS, SUPPORTS, TRIMS, ETC. SO THAT RUNS ARE A COMPLETE ASSEMBLY WITH THE APPEARANCE OF A SINGLE FIXTURE. ROWS SHALL BE CONFIGURED FOR MINIMUM NUMBER OF FEEDS, JOINTS, AND MOUNTINGS. PROVIDE ROW AND PATTERN CONFIGURATION DRAWINGS FOR REVIEW PRIOR AND APPROVAL PRIOR TO RELEASE OF MATERIAL ORDER.
7. PROVIDE FLAT ROUND CANOPIES FOR SUSPENDED FIXTURE LOCATIONS WHERE SUSPENSIONS MOUNTS TO UNFINISHED CEILING STRUCTURE (WHERE LOCATED IN FINISHED SPACES) AND WHERE PASSING THROUGH SUSPENDED CEILINGS (CONFIRM WHETHER IN TILE OR AT GRID). PROVIDE SWIVEL ALIGNERS FOR SUSPENSIONS WHERE REQUIRED FOR SLOPED CEILINGS. ENTIRE SUSPENSION ASSEMBLY SHALL BE SUPPLIED BY MANUFACTURER OF FIXTURES.
8. PROVIDE WITH LOUVERS SHALL BE PROVIDED WITH HIGH TRANSMISSION (95%%% OR BETTER) DIFFUSING LENSES OR FILMS TO OBSCURE DIRECT LAMP VIEWING.
9. FIXTURES SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE, INDEPENDENT OF HUNG CEILINGS. DO NOT TAP METAL ROOF DECK FOR SUPPORT OF ANY ELECTRICAL EQUIPMENT. PROVIDE UNISTRUT AS REQUIRED FOR SUPPORT OF ALL ELECTRICAL EQUIPMENT.
10. REFER TO SPECIFICATIONS FOR SEISMIC SUPPORT, RESTRAINT, AND BRACING REQUIREMENTS OF THIS PROJECT.
11. PROVIDE TYPE AND QUANTITY OF DRIVERS AND TRANSFORMERS AS REQUIRED TO PROVIDE CONTROL METHOD INDICATIONS ON THE PLANS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING: SWITCHING SUBSCRIPTS, NOTES, SCHEDULE REMARKS / DESCRIPTIONS, AND DETAILS. QUANTITY OF DRIVERS AND TRANSFORMERS SHALL BE THE MINIMUM REQUIRED TO PROVIDE CONTROL INDICATED TO MAINTAIN THE LOWEST CONNECTED LOAD PER LIGHTING SYSTEM POSSIBLE. TANDEM WIRING OF FIXTURES SHALL BE PROVIDED WHERE NECESSARY AND WITHIN THE WIRING DISTANCE RESTRICTIONS OF THE MANUFACTURER'S INSTALLATION REQUIREMENTS.
12. ALL LAMPS, LED SOURCES, DRIVERS, AND CONTROLS SHALL MEET THE LATEST UTILITY COMPANY INCENTIVE REQUIREMENTS. REFER TO THE LATEST PROGRAM REQUIREMENTS DOCUMENTATION AND COORDINATE WITH THE UTILITY COMPANY TO ENSURE COMPLIANCE.
13. ALL EXIT SIGN LIGHTING SHALL BE CIRCUITED AHEAD OF ANY SWITCH CONTROL FOR CONSTANT "ON" OPERATION. PROVIDE LOCKING DEVICE ON CIRCUIT BREAKER SERVING EXIT SIGNS.
14. EXIT SIGNS TO BE PROVIDED WITH ARROWS AS INDICATED ON DRAWINGS. TYPICALLY MOUNT ON CEILING WHERE VISIBLE OR ON WALL WHERE CEILING MOUNTING IS NOT PRACTICAL. EDGE-LIT SIGNS SHALL GENERALLY HAVE CLEAR PANELS LIT EXCEPT FOR DOUBLE FACED UNITS AND SINGLE FACED UNITS ABLE TO BE VIEWED FROM BEHIND WHICH SHALL HAVE OPAQUE / MIRRORED PANELS. REFER TO ARCHITECTURAL DRAWINGS FOR INDICATION OF MOUNTING REQUIREMENTS.
15. EXIT SIGNS SHALL BE THE SELF-CONTAINED TYPE WITH INTEGRAL BATTERY BACK-UP AND SELF-DIAGNOSTICS WHERE NO LIFE SAFETY POWER SOURCE IS AVAILABLE, REGARDLESS OF MODEL / SERIES SPECIFIED.
16. EXIT SIGNS INS



LUMINAIRE CONTROL MODULE

WIRED

1. ELECTRICAL CONTRACTOR (E.C.) SHALL PROVIDE LUMINAIRE CONTROL MODULE (LCM), ALL CABLING AND FIXTURES. E.C. TO MAKE ALL LINE AND LOW VOLTAGE CONNECTIONS TO/BETWEEN LCM AND FIXTURE DRIVERS.
2. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 0-10V CABLES ALONG WITH ANY REQUIRED RACEWAY, SUPPORTS, HARDWARE, ETC. TO MAKE CONNECTIONS FROM LCM TO DRIVER WHERE DISTANCE BETWEEN THEM EXCEEDS THE LENGTHS OF WHIPS ON LCM AND DRIVERS.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 0-10V CABLES ALONG WITH AND REQUIRED RACEWAY, SUPPORTS, HARDWARE, ETC. TO MAKE CONNECTIONS BETWEEN DRIVERS.

OCCUPANCY SENSOR

1. ELECTRICAL CONTRACTOR (E.C.) SHALL PROVIDE SENSOR INTERFACE MODULES (SIM), ALL CABLING AND ASSOCIATED SENSOR DEVICES. E.C. TO PROVIDE CABLE AS REQUIRED AND MAKE ALL WIRING CONNECTIONS TO/BETWEEN SIM AND SENSOR.
2. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL CABLES (EXCEPT GREENBUS FURNISHED BY ENCELIUM TO E.C.) ALONG WITH ANY REQUIRED RACEWAY, SUPPORTS, HARDWARE, ETC. TO MAKE CONNECTIONS FROM SIM TO SENSOR / DEVICE WHERE DISTANCE BETWEEN THEM EXCEEDS THE LENGTH OF THE WHIPS ON SIM AND SENSOR / DEVICE.

SENSOR INTERFACE MODULE

1. ELECTRICAL CONTRACTOR (E.C.) SHALL PROVIDE SENSOR INTERFACE MODULES (SIM), ALL CABLING AND ASSOCIATED SENSOR DEVICES. E.C. TO PROVIDE CABLE AS REQUIRED AND MAKE ALL WIRING CONNECTIONS TO/BETWEEN SIM AND SENSOR.
2. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL CABLES (EXCEPT GREENBUS FURNISHED BY ENCELIUM TO E.C.) ALONG WITH ANY REQUIRED RACEWAY, SUPPORTS, HARDWARE, ETC. TO MAKE CONNECTIONS FROM SIM TO SENSOR / DEVICE WHERE DISTANCE BETWEEN THEM EXCEEDS THE LENGTH OF THE WHIPS ON SIM AND SENSOR / DEVICE.

PHOTO SENSOR

1. INTERIOR PHOTOSENSORS (ADDRESSABLE): EACH PHOTOSENSOR SHALL BE PROGRAMMED TO MAINTAIN FOOTCANDLE SETPOINTS ESTABLISHED FOR EACH SPACE DURING SYSTEM SETUP AND COMMISSIONING. DIMMING DEADBANDS AND FADE/RISE RATES SHALL BE ESTABLISHED TO PROVIDE SMOOTH, NON-INTRUSIVE, CHANGES IN SPACE LIGHT LEVELS IN RESPONSE TO CHANGING DAYLIGHT CONTRIBUTIONS AT ANY GIVEN TIME.
2. EXTERIOR PHOTOCELLS (ADDRESSABLE): SENSOR SHALL BE PROGRAMMED TO TURN SITE LIGHTING "ON" AT DUSK AND TURN LIGHTS "OFF" AT DAWN. TIMED SCHEDULE PRESETS WILL DETERMINE OUTPUT LEVELS.

EMERGENCY LIGHTING RELAY

1. ELECTRICAL CONTRACTOR (E.C.) SHALL PROVIDE LUMINAIRE CONTROL MODULE (LCM), ALL CABLING AND FIXTURES. E.C. TO MAKE ALL LINE AND LOW VOLTAGE CONNECTIONS TO/BETWEEN LCM AND FIXTURE DRIVERS.
2. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 0-10V CABLES ALONG WITH ANY REQUIRED RACEWAY, SUPPORTS, HARDWARE, ETC. TO MAKE CONNECTIONS FROM LCM TO DRIVER WHERE DISTANCE BETWEEN THEM EXCEEDS THE LENGTHS OF WHIPS ON LCM AND DRIVERS.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 0-10V CABLES ALONG WITH AND REQUIRED RACEWAY, SUPPORTS, HARDWARE, ETC. TO MAKE CONNECTIONS BETWEEN DRIVERS.

PHASE CUT DIMMING MODULE

WIRED

1. ELECTRICAL CONTRACTOR (E.C.) SHALL PROVIDE LUMINAIRE CONTROL MODULE (LCM), ALL CABLING AND FIXTURES. E.C. TO MAKE ALL LINE AND LOW VOLTAGE CONNECTIONS TO/BETWEEN LCM AND FIXTURE DRIVERS.
2. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 0-10V CABLES ALONG WITH ANY REQUIRED RACEWAY, SUPPORTS, HARDWARE, ETC. TO MAKE CONNECTIONS FROM LCM TO DRIVER WHERE DISTANCE BETWEEN THEM EXCEEDS THE LENGTHS OF WHIPS ON LCM AND DRIVERS.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 0-10V CABLES ALONG WITH AND REQUIRED RACEWAY, SUPPORTS, HARDWARE, ETC. TO MAKE CONNECTIONS BETWEEN DRIVERS.

WIRELESS CONTROL MODULE

WIRELESS

1. ELECTRICAL CONTRACTOR (E.C.) SHALL PROVIDE LUMINAIRE CONTROL MODULE (LCM), ALL CABLING AND FIXTURES. E.C. TO MAKE ALL LINE AND LOW VOLTAGE CONNECTIONS TO/BETWEEN LCM AND FIXTURE DRIVERS.
2. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 0-10V CABLES ALONG WITH ANY REQUIRED RACEWAY, SUPPORTS, HARDWARE, ETC. TO MAKE CONNECTIONS FROM LCM TO DRIVER WHERE DISTANCE BETWEEN THEM EXCEEDS THE LENGTHS OF WHIPS ON LCM AND DRIVERS.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 0-10V CABLES ALONG WITH AND REQUIRED RACEWAY, SUPPORTS, HARDWARE, ETC. TO MAKE CONNECTIONS BETWEEN DRIVERS.

WIRELESS CONTROL MODULE

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3. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 0-10V CABLES ALONG WITH AND REQUIRED RACEWAY, SUPPORTS, HARDWARE, ETC. TO MAKE CONNECTIONS BETWEEN DRIVERS.

AREA LIGHTING CONTROLLER

WIRED

1. ELECTRICAL CONTRACTOR (E.C.) TO PROVIDE AREA LIGHTING CONTROLLER (ALC). ALL CABLING, AND FIXTURES. E.C. TO MAKE ALL LINE VOLTAGE AND LOW VOLTAGE WIRING CONNECTIONS TO/BETWEEN ALC AND FIXTURE BALLASTS/DRIVERS IN FIELD.
2. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 0-10V CABLES ALONG WITH ANY REQUIRED RACEWAY, SUPPORTS, HARDWARE, ETC. TO MAKE ALL NECESSARY CONNECTIONS.
3. MAXIMUM OF 30 0-10V DIMMING BALLASTS/DRIVERS WITH ALC IN 0-10V DIMMING CONFIGURATION.
4. MAXIMUM OF 100FT OF 0-10V CABLING (VIOLET & GREY) FROM FARTHEST BALLAST/DRIVER IN GROUP TO ALC.

CONTROL SEQUENCE NOTES:

1. ALL SEQUENCE OF OPERATIONS LISTED IN THE TABLE ABOVE SHALL BE USED TO SERVE AS A BASIS FOR DESIGN. FINAL CONTROL PROGRAMMING AND TIME CONTROLS TO BE REVIEWED AND APPROVED BY OWNER OR OWNERS PROJECT MANAGER PRIOR TO SYSTEM COMMISSIONING.
2. SENSOR QUANTITIES SHALL BE COORDINATED WITH WHAT IS SHOWN ON FLOOR PLANS. SENSORS TO BE LOCATED AND INSTALLED PER MANUFACTURES RECOMMENDATIONS.
3. ALL SPACES WITHIN THE BUILDING WHERE THE OCCUPANCY SENSOR WILL EXCEED A MOUNTING HEIGHT OF 15' AFF. THE SENSOR PROVIDED SHALL BE OF THE HIGH BAY VARIETY.
4. ALL SENSOR OPERATIONS SHALL BE IN ACCORDANCE WITH IECC 2018, IESNA RECOMMENDATIONS, AND LOCAL APPLICABLE ENERGY CODES IRREGARDLESS OF INFORMATION SHOWN IN SCHEDULE ABOVE.

AUTOMATED LIGHTING CONTROL SYSTEM NOTES:

1. PROVIDE SWITCHING AND 0-10V DIMMING CONTROL FOR ALL LIGHTING (REFER TO PLANS) WITH PRESETS VIA LCM MODULES AND ACCESSORY POWER PACKS.
2. PROVIDE ALL SYSTEM COMPONENTS (AND WARRANTIES) FROM A SINGLE MANUFACTURER EXCEPT WHERE OTHERWISE SPECIFIED.
3. PROVIDE GANGED MASTER AND LOCAL SWITCHES AT LOCATION AS INDICATED FOR USER CONTROL OF LIGHTING (UNDER COMMON MULTI-GANG PLATE).ALL SWITCHES SHALL BE PROVIDED WITH ENGRAVED LABELS ON PLATES DESIGNATING THEIR FUNCTION. FILL FOR ENGRAVED LETTERING SHALL BE AS DIRECTED BY THE ARCHITECT.
4. PROVIDE ENERGY MONITORING AND REPORTING MODULE TO ALLOW FOR ALL LIGHTING ELECTRICAL CONSUMPTION TO BE RECORDED, TRENDED, AND PASSED TO THE BMS SYSTEM VIA THE BACNET IP INTERFACE.
5. THE BASIS-OF-DESIGN FOR THIS SYSTEM IS THE WATTSTOPPER PLUS SYSTEM (W/ POLARIS 3D AND PCS SOFTWARE)
6. REFER TO THE "ALCS METHODS OF OPERATION NOTES" FOR SYSTEM SETUP REQUIREMENTS.
7. ALCS VENDOR SHALL ASSIST THE BMS SUB-SUB CONTRACTOR WITH ALL MAPPING OF BACNET DEVICES / POINTS.
8. LUTRON, N-LIGHT, CRESTRON, OR EQUAL ARE ACCEPTABLE MANUFACTURER OPTIONS.

ALCS METHODS OF OPERATION NOTES

SENSOR OPERATIONS

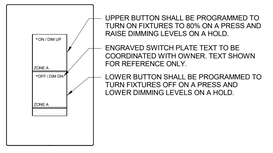
1. INTERIOR PHOTOSENSORS (ADDRESSABLE): EACH PHOTOSENSOR SHALL BE PROGRAMMED TO MAINTAIN FOOTCANDLE SETPOINTS ESTABLISHED FOR EACH SPACE DURING SYSTEM SETUP AND COMMISSIONING. DIMMING DEADBANDS AND FADE/RISE RATES SHALL BE ESTABLISHED TO PROVIDE SMOOTH, NON-INTRUSIVE, CHANGES IN SPACE LIGHT LEVELS IN RESPONSE TO CHANGING DAYLIGHT CONTRIBUTIONS AT ANY GIVEN TIME.
2. EXTERIOR PHOTOCELLS (ADDRESSABLE): SENSOR SHALL BE PROGRAMMED TO TURN SITE LIGHTING "ON" AT DUSK AND TURN LIGHTS "OFF" AT DAWN. TIMED SCHEDULE PRESETS WILL DETERMINE OUTPUT LEVELS.
3. OCCUPANCY SENSORS (ADDRESSABLE): EACH OCCUPANCY SENSOR SHALL BE PROGRAMMED TO OPERATE AS INDICATED IN AUTOMATED LIGHTING CONTROL SYSTEM SEQUENCE OF OPERATIONS 2/E0.2 UNLESS OTHERWISE NOTED. SENSORS SHALL MAINTAIN 100% DIMMING LEVELS LIGHTING FOR AS LONG AS MOTION IS DETECTED. ABSENCE OF MOTION DETECTION FOR TIME PERIODS AS INDICATED IN SEQUENCE OF OPERATIONS 2/E0.2 SHALL PROMPT A RESPONSE AS INDICATED. FADE/RISE RATES SHALL BE ESTABLISHED TO PROVIDE SMOOTH, NON-INTRUSIVE, CHANGES IN SPACE LIGHT LEVELS. MOTION DETECTED AT ANYTIME PRIOR TO THE FULL TIME-OUT SHALL RETURN THE LIGHTING TO THE NORMAL LEVEL.
4. SENSOR ADJUSTMENTS FOR ALL FUNCTIONS SHALL BE TURNED TO THE MINIMUM ON EACH DEVICE AND ADJUSTED SOLELY THROUGH THE SYSTEM SOFTWARE.

ZONING & PRESET LEVELS

1. INTERIOR SPACES SHALL BE PROGRAMMED AS INDICATED IN SEQUENCE OF OPERATIONS DETAIL 2/E0.03. LEVELS MAY BE ADJUSTED OUTSIDE OF THESE PRESETS VIA THE LOCAL WALL STATION. HOWEVER, WHERE PHOTOSENSORS ARE PRESENT THE LIGHTING SHALL NOT BE ALLOWED EXCEED THE FOOTCANDLE LEVEL ESTABLISHED BY THE SPACE'S PHOTOSENSOR BASED ON AVAILABLE DAYLIGHT CONTRIBUTION AT ANY GIVEN TIME.
2. LIGHTING WITHIN THE DAYLIGHT ZONE ADJACENT TO OPENINGS TO THE EXTERIOR SUCH AS WINDOWS AND SKYLIGHTS (DEPTH OF EACH DAYLIGHT ZONE RELATIVE TO THE DAYLIGHT OPENING SHALL BE AS DEFINED BY UTILITY COMPANY ADVANCED BUILDING PROGRAM CORE REQUIREMENTS AND COMMONWEALTH OF MASSACHUSETTS ENERGY CODE) SHALL BE PROGRAMMED TO ALLOW FOR CONTROL SEPARATE FROM THE REMAINDER OF THE SPACE.
3. EXTERIOR LIGHTING SHALL BE PROGRAMMED FOR 50% (POST-CURFEW) AND 100% (PRE-CURFEW) DIMMING LEVELS TO BE ACTIVATED VIA PHOTOCELL SET POINTS AND TIMED SCHEDULES. PROVIDE (1) WIRELESS SITE LIGHTING CONTROL MODULE "WSLC" PER EACH POLE MOUNTED LIGHT FIXTURE. COORDINATE WITH POLE FIXTURE MANUFACTURER. PROVIDE WIRELESS MANAGER & WIRELESS CONTROL MODULES REQUIRED FOR COMPLETE CONTROL OF SITE LIGHTING.
4. INTERIOR AND EXTERIOR PATHS OF EGRESS SHALL BE PROGRAMMED TO ACTIVATE AT 100% LEVELS UPON RECEIPT OF AN ALARM SIGNAL FROM THE LIFE SAFETY AUTOMATIC TRANSFER SWITCH, FIRE ALARM SYSTEM, AND SECURITY SYSTEM. LIGHTING LEVELS SHALL BE MAINTAINED AT 100% LEVELS REGARDLESS OF SUBSEQUENT INPUT REQUESTS UNTIL THE ORIGINATING ALARM SIGNAL IS RESTORED TO A NORMAL CONDITION. CONTACT CLOSURE OUTPUTS FROM EACH PIECE OF EQUIPMENT / SYSTEM SHALL BE PROVIDED BY THE RESPECTIVE VENDOR WITH COORDINATION OF ALL PROGRAMMING REQUIRED TO PROVIDE THE FUNCTIONALITY DESCRIBED.
5. REFER TO SPECIFICATIONS FOR FURTHER CONTROL SCENARIOS SUCH AS LOAD SHEDDING, PEAK LIMITING, TASK TUNING, ETC..
6. EXACT ZONING AND LEVEL PROGRAMMING SHALL BE MAPPED OUT (VIA BUILDING FLOOR & SITE GRAPHICS IN SYSTEM SOFTWARE) WITH THE OWNER OR THEIR REPRESENTATIVE PRIOR TO SYSTEM SETUP AND PROGRAMMING OF THE SYSTEM. ALL PROGRAMMING SHALL BE CONFIRMED AND COMPLETED PRIOR TO COMMISSIONING NO OWNER REQUESTED PROGRAMMING SHALL BE ALLOWED WHICH WILL VIOLATE THE LEED PROGRAM REQUIREMENTS OR COMMONWEALTH OF MASSACHUSETTS BUILDING, ELECTRICAL, AND ENERGY CODES OR ANY CODES. REFERENCED THEREIN.

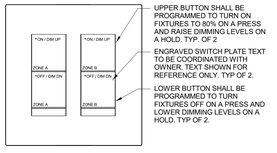
	OCCUPANCY SENSORS					DAYLIGHT SENSORS		WALL SWITCH OPERATION						TIME CLOCK OPERATION			OTHER		
	VACANCY MODE	OCCUPANCY MODE	DUAL TECHNOLOGY SENSOR	SENSOR TIMEOUT PERIODS	GENERAL NOTES	TARGET LIGHTING LEVEL	GENERAL NOTES	SCHEDULE OVERRIDE SWITCH	MANUAL ON/OFF	MANUAL DIMMING	SCENE CONTROL	GRAPHICAL TOUCHSCREEN	KEY SWITCH	GENERAL NOTES	TIME CLOCK SCHEDULE ON	TIME CLOCK SCHEDULE OFF	GENERAL NOTES	EXTERIOR LOCATION PLUG LOAD CONTROLLER	GENERAL NOTES
OFFICES	X	-	X	10 MIN -> 25% 15 MIN -> OFF	REFER TO NOTE #1,2,4	30 FC	REFER TO NOTE #2,4	-	X	X	-	-	-	-	-	-	REFER TO NOTE #1	-	-
LOBBY/VESTIBULE	-	X	X	30 MIN -> 25%	REFER TO NOTE #1,2,3,4	20 FC	REFER TO NOTE #2,4	-	-	-	-	-	-	-	-	-	REFER TO NOTE #1	-	-
CORRIDOR	-	X	X	30 MIN -> 25%	REFER TO NOTE #1,2,4	20 FC	REFER TO NOTE #2,4	-	-	-	-	-	-	-	-	-	REFER TO NOTE #1	-	-
TRAINING ROOM	X	-	X	30 MIN -> OFF	REFER TO NOTE #1,2,4	30FC	REFER TO NOTE #2,4	-	X	X	-	-	-	-	-	-	REFER TO NOTE #1	-	-
STORAGE	X	-	X	10 MIN -> OFF	REFER TO NOTE #1,2,4	20 FC	REFER TO NOTE #2,4	-	X	X	-	-	-	-	-	-	REFER TO NOTE #1	-	-
STAIRWELL	-	X	X	10 MIN -> 50%	REFER TO NOTE #1,2,4	20 FC	REFER TO NOTE #2,4	-	-	-	-	-	-	-	-	-	REFER TO NOTE #1	-	-
BATHROOM	-	X	X	15 MIN -> OFF	REFER TO NOTE #1,2,4	20 FC	REFER TO NOTE #2,4	-	X	X	-	-	-	-	-	-	REFER TO NOTE #1	-	-
GARAGE SPACES	-	X	X	30 MIN -> 10% 45 MIN -> OFF	REFER TO NOTE #1,2,3,4	50FC	REFER TO NOTE #2,4	-	X	X	-	-	-	-	-	-	REFER TO NOTE #1	-	-
SECURED AREAS	-	-	-	-	-	-	-	-	X	X	-	X	-	-	-	-	-	-	-
LIBRARY	X	-	X	30 MIN -> OFF	REFER TO NOTE #1,2,4	30FC	REFER TO NOTE #2,4	-	X	X	-	-	-	-	-	-	REFER TO NOTE #1	-	-
EQUIPMENT ROOM	X	-	X	10 MIN -> OFF	REFER TO NOTE #1,2,4	20 FC	REFER TO NOTE #2,4	-	X	X	-	-	-	-	-	-	REFER TO NOTE #1	-	-
FITNESS ROOM	X	-	X	30 MIN -> OFF	REFER TO NOTE #1,2,4	40FC	REFER TO NOTE #2,4	-	X	X	-	-	-	-	-	-	REFER TO NOTE #1	-	-
PARKING LOT	-	-	-	-	-	.5 FC	REFER TO NOTE #2,4	-	-	-	-	-	-	-	DUSK	DAWN	REFER TO NOTE #1	-	-
BUILDING FACADE	-	-	-	-	-	2 FC	REFER TO NOTE #2,4	-	-	-	-	-	-	-	DUSK	DAWN	REFER TO NOTE #1	-	-
LOCKER ROOM	X	-	X	15 MIN -> OFF	REFER TO NOTE #1,2,4	30FC	REFER TO NOTE #2,4	-	X	X	-	-	-	-	-	-	REFER TO NOTE #1	-	-
ROLL CALL	X	-	X	30 MIN -> OFF	REFER TO NOTE #1,2,4	30FC	REFER TO NOTE #2,4	-	X	X	-	-	-	-	-	-	REFER TO NOTE #1	-	-
CONFERENCE RM.	X	-	X	15 MIN -> OFF	REFER TO NOTE #1,2,4	30FC	REFER TO NOTE #2,4	-	X	X	-	-	-	-	-	-	REFER TO NOTE #1	-	-
KITCHEN / DINING	X	-	X	30 MIN -> OFF	REFER TO NOTE #1,2,4	30FC	REFER TO NOTE #2,4	-	X	X	-	-	-	-	-	-	REFER TO NOTE #1	-	-

1 E0.03 AUTOMATED LIGHTING CONTROL SYTEM ONE-LINE DIAGRAM



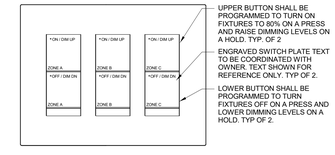
2 E0.03 STANDARD ZONE CONTROLLER DETAIL — SCALE : N.T.S. — SYMBOL REF: L a

NOTES:
1. BASIS OF DESIGN FOR SWITCH SHOWN IS WATTSTOPPER PLUS MODEL NUMBER "EN-WS-2B-GB2-WH" AND (1)"EN-WS-2B-CBK-WH"
2. ALL ENGRAVED SWITCH PLATES SHALL BE COORDINATED WITH OWNER OR OWNERS PROJECT MANAGER PRIOR TO CONTROL STATION PROCUREMENT.
3. SWITCH STATIONS BEING UTILIZED TO CONTROL FIXTURES WITHIN A DAY LIGHTING ZONE SHALL BE PROGRAMMED AS TO NOT ALLOW A MANUAL OVERRIDE OF THE DIMMING LEVELS SET BY THE PHOTO SENSOR IN THE SPACE.
4. SWITCH SHALL BE PROGRAMMED TO MANUAL OVERRIDE TIME SCHEDULE INDICATED FOR 60 MINUTE INTERVALS.



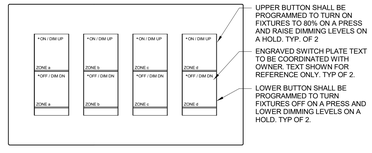
3 E0.03 STANDARD 2 ZONE CONTROL DETAIL — SCALE : N.T.S. — SYMBOL REF: L a,b

NOTES:
1. BASIS OF DESIGN FOR SWITCH SHOWN IS WATTSTOPPER PLUS MODEL NUMBER (2)"EN-WS-2B-GB2-WH" AND (1)"EN-WS-2B-CBK-WH"
2. ALL ENGRAVED SWITCH PLATES SHALL BE COORDINATED WITH OWNER OR OWNERS PROJECT MANAGER PRIOR TO CONTROL STATION PROCUREMENT.
3. SWITCH STATIONS BEING UTILIZED TO CONTROL FIXTURES WITHIN A DAY LIGHTING ZONE SHALL BE PROGRAMMED AS TO NOT ALLOW A MANUAL OVERRIDE OF THE DIMMING LEVELS SET BY THE PHOTO SENSOR IN THE SPACE.
4. SWITCH SHALL BE PROGRAMMED TO MANUAL OVERRIDE TIME SCHEDULE INDICATED FOR 60 MINUTE INTERVALS.



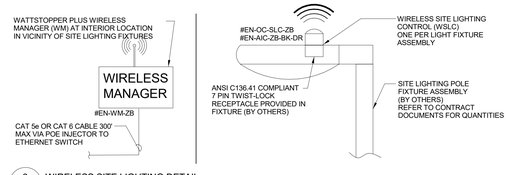
4 E0.03 STANDARD 3 ZONE CONTROLLER DETAIL — SCALE : N.T.S. — SYMBOL REF: L a,b,c

NOTES:
1. BASIS OF DESIGN FOR SWITCH SHOWN IS WATTSTOPPER PLUS MODEL NUMBER (3)"EN-WS-2B-GB2-WH" AND (1)"EN-WS-2B-CBK-WH"
2. ALL ENGRAVED SWITCH PLATES SHALL BE COORDINATED WITH OWNER OR OWNERS PROJECT MANAGER PRIOR TO CONTROL STATION PROCUREMENT.
3. SWITCH STATIONS BEING UTILIZED TO CONTROL FIXTURES WITHIN A DAY LIGHTING ZONE SHALL BE PROGRAMMED AS TO NOT ALLOW A MANUAL OVERRIDE OF THE DIMMING LEVELS SET BY THE PHOTO SENSOR IN THE SPACE.
4. SWITCH SHALL BE PROGRAMMED TO MANUAL OVERRIDE TIME SCHEDULE INDICATED FOR 60 MINUTE INTERVALS.

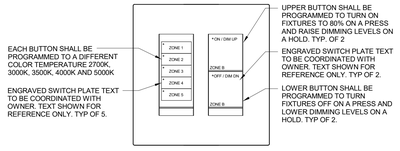


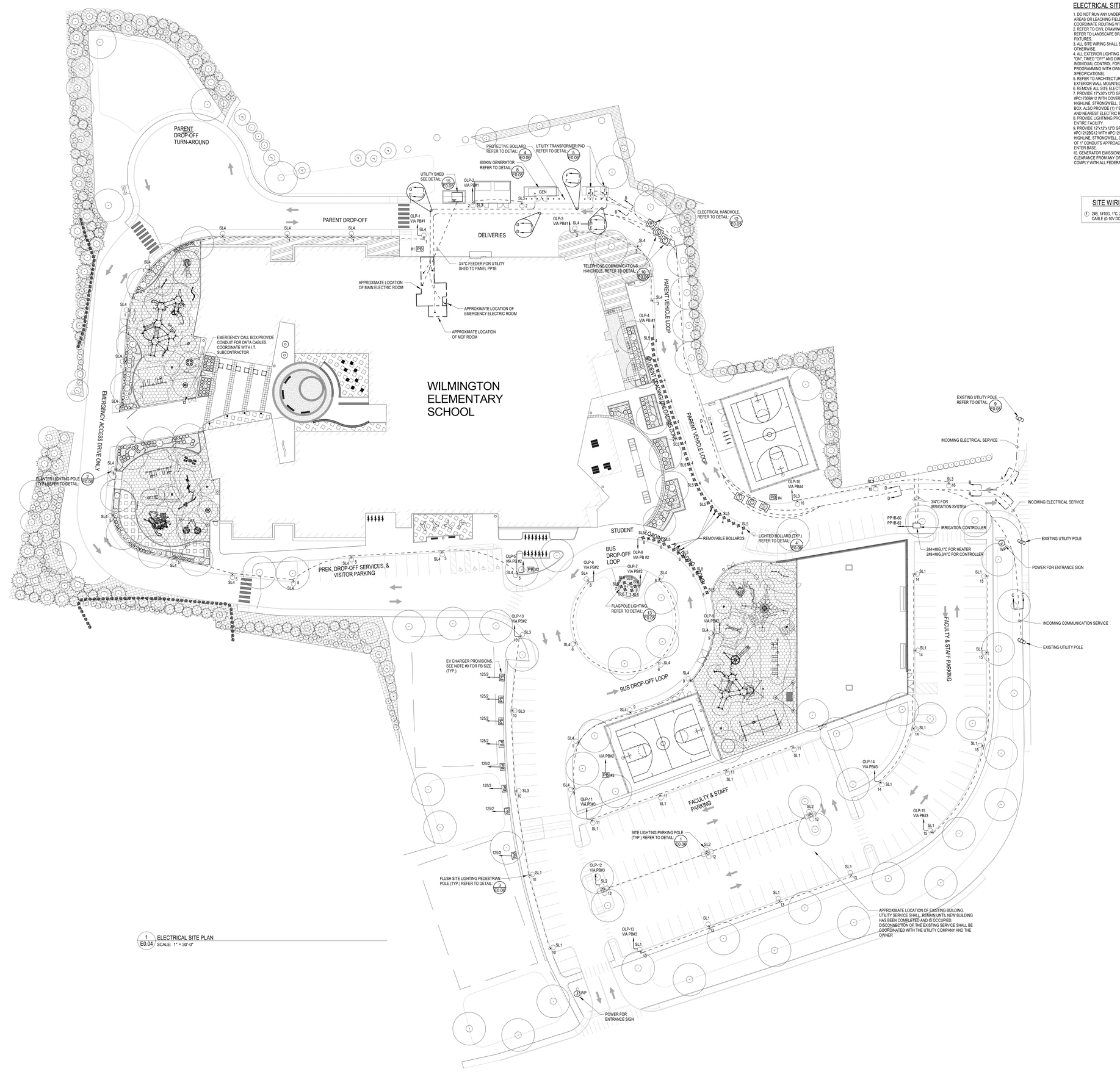
5 E0.03 STANDARD 4 ZONE CONTROLLER DETAIL — SCALE : N.T.S. — SYMBOL REF: L a,b,c,d

NOTES:
1. BASIS OF DESIGN FOR SWITCH SHOWN IS WATTSTOPPER PLUS MODEL NUMBER (4)"EN-WS-2B-GB2-WH" AND (1)"EN-WS-2B-CBK-WH"
2. ALL ENGRAVED SWITCH PLATES SHALL BE COORDINATED WITH OWNER OR OWNERS PROJECT MANAGER PRIOR TO CONTROL STATION PROCUREMENT.
3. SWITCH STATIONS BEING UTILIZED TO CONTROL FIXTURES WITHIN A DAY LIGHTING ZONE SHALL BE PROGRAMMED AS TO NOT ALLOW A MANUAL OVERRIDE OF THE DIMMING LEVELS SET BY THE PHOTO SENSOR IN THE SPACE.
4. SWITCH SHALL BE PROGRAMMED TO MANUAL OVERRIDE TIME SCHEDULE INDICATED FOR 60 MINUTE INTERVALS.



6 E0.03 WIRELESS SITE LIGHTING DETAIL — SCALE : N.T.S.


EACH BUTTON SHALL BE PROGRAMMED TO A DIFFERENT COLOR TEMPERATURE 2700K, 3000K, 3500K, 4000K AND 5000K
ENGRAVED SWITCH PLATE TEXT TO BE COORDINATED WITH OWNER. TEXT SHOWN FOR REFERENCE ONLY.



1 E0.04 ELECTRICAL SITE PLAN
SCALE: 1" = 30'-0"

ELECTRICAL SITE NOTES:

1. DO NOT RUN ANY UNDERGROUND RACEWAYS WITHIN PLANTING AREAS OR LEACHING FIELDS. REFER TO DRAWINGS FOR LOCATIONS. COORDINATE ROUTING WITH LANDSCAPE ARCHITECT.
2. REFER TO CIVIL DRAWINGS FOR EXACT ROUTING OF UTILITIES. REFER TO LANDSCAPE DRAWINGS FOR EXACT LOCATION OF 'SITE' FIXTURES.
3. ALL SITE WIRING SHALL BE 2#6&#10G,1"C MINIMUM UNLESS SHOWN OTHERWISE.
4. ALL EXTERIOR LIGHTING TO BE PROGRAMMED FOR PHOTOCELL "ON", TIMED "OFF" AND DIMMED LEVELS (VIA 0-10V SIGNAL). PROVIDE INDIVIDUAL CONTROL FOR EACH CIRCUIT. COORDINATE PROGRAMMING WITH OWNER. (REFER TO ALCS ONE-LINE DIAGRAM & SPECIFICATIONS)
5. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATION OF EXTERIOR WALL MOUNTED LIGHTING.
6. REMOVE ALL SITE ELECTRICS WHEN NO LONGER REQUIRED.
7. PROVIDE 17"x30"x12"D GROUND MOUNTED PULL BOX (QUAZITE #PC1730BA12 WITH COVER #PC1730CA17 OR SAME BY CARSON, HIGHLINE, STRONGWELL, OR EQUAL. RUN ALL SITE LIGHTING VIA PULL BOX. ALSO PROVIDE (1) 1"SPARE WITH PULL LINE BETWEEN PULL BOX AND NEAREST ELECTRIC ROOM. LABEL @ EACH END.
8. PROVIDE LIGHTNING PROTECTION SYSTEM FOR COVERAGE OF ENTIRE FACILITY.
9. PROVIDE 12"x12"x12"D GROUND MOUNTED PULL BOX (QUAZITE #PC1212BG12 WITH #PC1212HG00 COVER OR SAME BY CARSON, HIGHLINE, STRONGWELL, OR EQUAL) AT ALL POLES WITH THREE PAIRS OF 1" CONDUITS APPROACHING BASE TO ALLOW FOR SINGLE PAIR TO ENTER BASE.
10. GENERATOR EMISSIONS EXHAUST SHALL MAINTAIN 25 FEET CLEARANCE FROM ANY OPERABLE WINDOWS OR INTAKE LOUVERS. COMPLY WITH ALL FEDERAL EPA AND STATE DEP REQUIREMENTS.

SITE WIRING LEGEND:

① 2#8, 1#10G, 1"C, 24" BELOW GRADE & 2#12 SHIELDED CABLE (0-10V DC) 1"C, 24" BELOW GRADE.

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

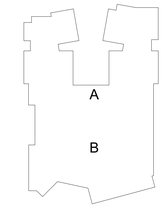
NO.	DATE	TITLE

ISSUE TITLE AND DATE:

60% CONSTRUCTION DOCUMENTS
06/19/2026

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KEY PLAN



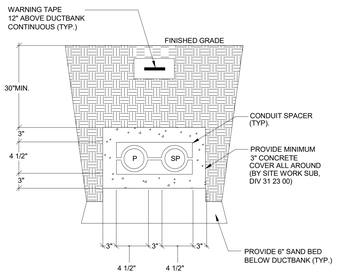
ORIENTATION AND SCALE:

N
TRUE NORTH
PROJECT NORTH

SHEET TITLE:
ELECTRICAL SITE PLAN

SHEET NUMBER:
E0.04

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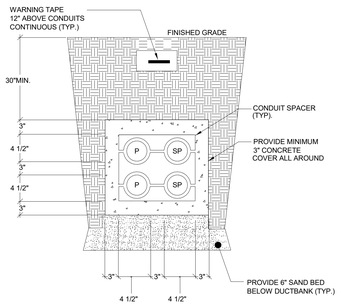


1 E0.05 PRIMARY DUCT BANK SECTION "A-A"

SCALE: N.T.S.

P 4" PRIMARY- SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.

SP 4" SPARE - SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.

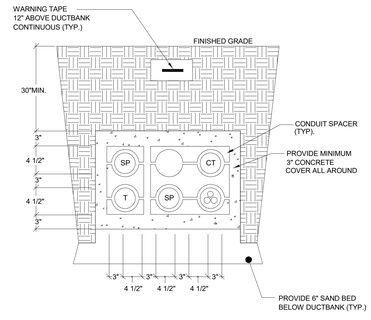


2 E0.05 PRIMARY DUCT BANK SECTION "B-B"

SCALE: N.T.S

P 4" PRIMARY- SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.

SP 4" SPARE - SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.



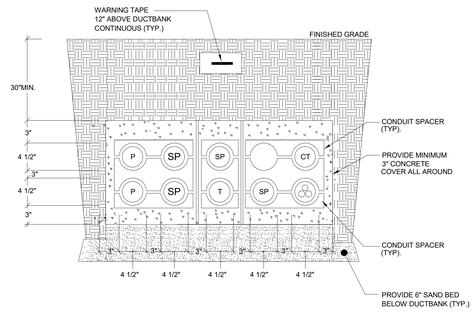
3 E0.05 COMMUNICATIONS DUCT BANK SECTION "C-C"

SCALE: N.T.S

T 4" TELEPHONE - SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.

CT 4" CATV - SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.

4" FIBER - SCHEDULE 40 P.V.C. PROVIDE (3) 1 1/4" INNERDUCTS w/ PULL WIRES.



4 E0.05 PRIMARY/COMMUNICATIONS DUCT BANK SECTION "D-D"

SCALE: N.T.S

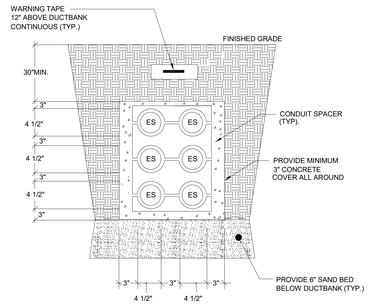
P 4" PRIMARY- SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.

SP 4" SPARE - SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.

T 4" TELEPHONE - SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.

CT 4" CATV - SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.

4" FIBER - SCHEDULE 40 P.V.C. PROVIDE (3) 1 1/4" INNERDUCTS w/ PULL WIRES.

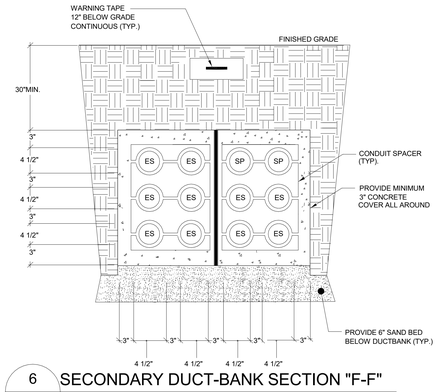


5 E0.05 SECONDARY DUCT-BANK SECTION "E-E"

SCALE: N.T.S.

ES 4" SECONDARY- SCHEDULE 40 P.V.C.

SP 4" SPARE - SCHEDULE 40 P.V.C. PROVIDE PULL LINE.

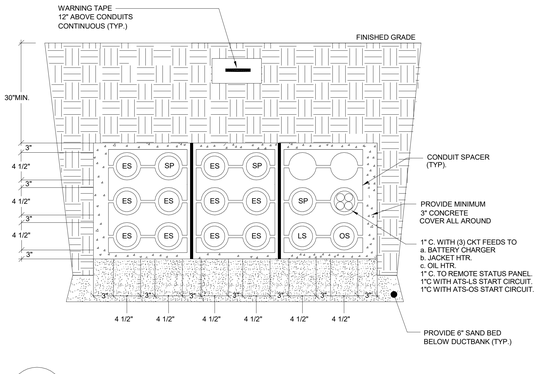


6 E0.05 SECONDARY DUCT-BANK SECTION "F-F"

SCALE: N.T.S.

ES 4" SECONDARY- SCHEDULE 40 P.V.C.

SP 4" SPARE - SCHEDULE 40 P.V.C. PROVIDE PULL LINE.



7 E0.05 SECONDARY/GENERATOR DUCT BANK SECTION "G-G"

SCALE: N.T.S

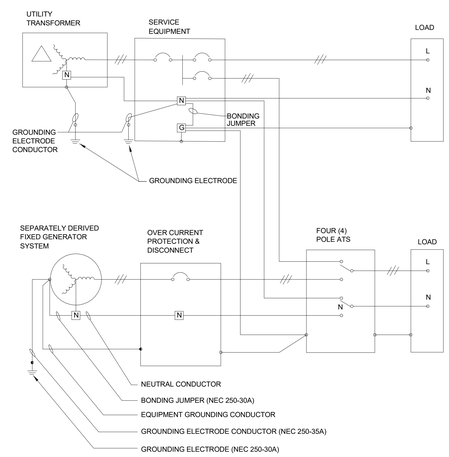
ES 4" SECONDARY- SCHEDULE 40 P.V.C.

OS 4 " ATS-OS SCHEDULE 40 P.V.C.

LS 4" ATS-LS SCHEDULE 40 P.V.C.

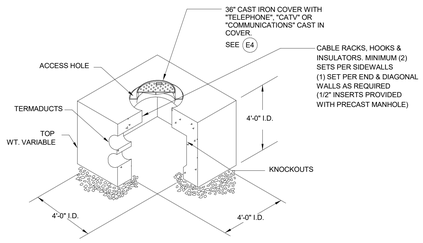
SP 4" SPARE - SCHEDULE 40 P.V.C. PROVIDE PULL LINE.

(4) 1" CONDUIT - SCHEDULE 40 P.V.C.



8 E0.05 SEPARATELY DERIVED GENERATOR SYSTEM

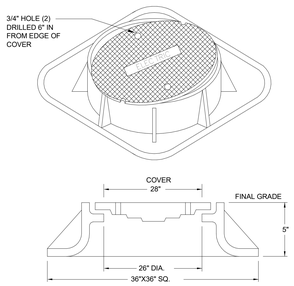
SCALE: N.T.S



TELEPHONE & C.A.T.V. & COMMUNICATIONS HANDHOLE

T C

9 E0.05 SCALE: N.T.S

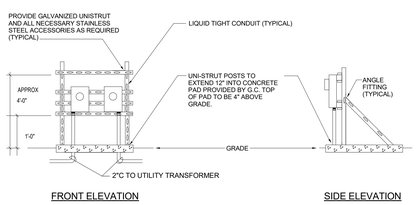


10 E0.05 FRAME AND COVER DETAIL

SCALE: N.T.S

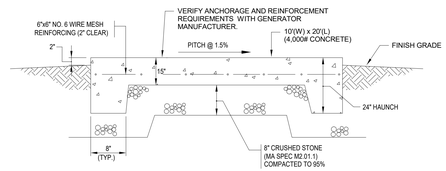
NOTES:
1. COVERS WILL HAVE "ELECTRIC", "TELEPHONE", OR "CATV" CAST IN THEM IN 3 INCH LETTERS.
2. FRAME AND COVER TO SUPPORT H2O WHEEL LOAD.
3. NO VAULT MANHOLE SHALL BE BURIED DEEPER THAN 18" BELOW FINISHED GRADE.
4. COVER SHALL BE FLUSH TO FINAL GRADE (CONCRETE, ASPHALT, GRAVEL, GRASS, ETC..)

	SUPPLIER & CATALOG#	STOCK CODE
FRAME	NACIP AE 124 LEBARON LE-285L OR APPROVED EQUAL	07-29-229
COVER	NACIP LEBARON LE-28C5 ELECTRIC OR APPROVED EQUAL	07-15-530



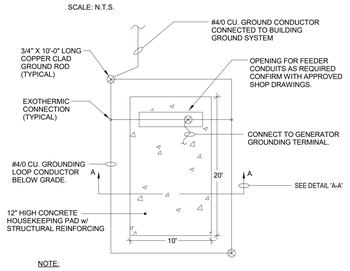
13 E0.05 CT METER DETAIL

SCALE: N.T.S



GENERATOR PAD DETAIL 'A-A'

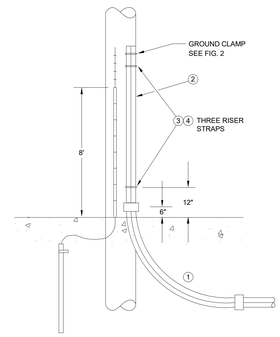
SCALE: N.T.S.



NOTE:
1. PAD SHALL BE PROVIDED IN ACCORDANCE WITH APPROVED SHOP DRAWINGS. PAD SHALL BE PROVIDED BY G.C.
2. PAD DIMENSIONS ARE APPROXIMATE. PROVIDE 12" OF PAD ALL AROUND GENERATOR.

11 E0.05 GENERATOR PAD DETAIL

SCALE: N.T.S



CODE NUMBERS FOR PIPE SIZES OF:	
ITEM	DESCRIPTION
1	3' RADIUS
2	CONDUIT-10' GALVANIZED STEEL
3	RISER STRAPS
4	LAG SCREWS 3/8" x 3"
5	RISER PIPE CONNECTOR
6	#6 COPPER SOLID BARE (24" LONG)

NOTES:
1. RISER CONDUITS SHALL BE LOCATED ON THE STREET QUARTER OF THE POLE, AND, WHEN POSSIBLE ON THE QUARTER AWAY FROM APPROACHING TRAFFIC.
2. SPARE CONDUIT SHALL BE CAPPED 6" ABOVE GRADE.

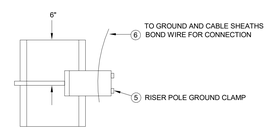


FIGURE 2 - RISER GROUND CLAMP

INSTALL GROUND CLAMP AS SHOWN. CONNECT TO POLE EQUIPMENT GROUNDING CONDUCTOR. INSTALL GROUND ROD AND RUN MINIMUM #6 SOLID COPPER UP POLE AND CONNECT TO COMMON NEUTRAL. INSTALL 8 FEET OF MOULDING OVER WIRE AND CONNECT RISER GROUND CLAMP TO GROUND WIRE ABOVE MOULDING AS SHOWN.

12 E0.05 POLE RISER DETAIL

SCALE: N.T.S

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

NO.	DATE	TITLE

ISSUE TITLE AND DATE:

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KEY PLAN

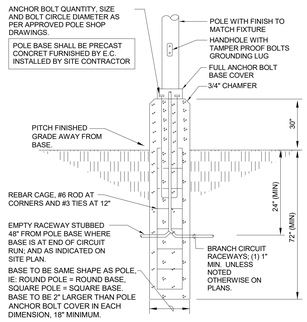
ORIENTATION AND SCALE:

SHEET TITLE:
ELECTRICAL SITE DETAILS

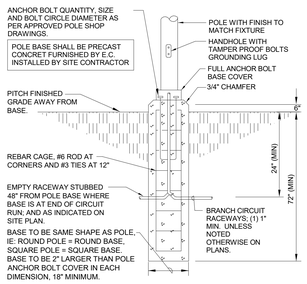
SHEET NUMBER:
E0.05

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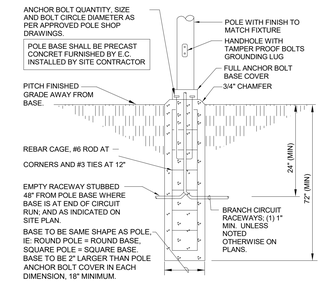
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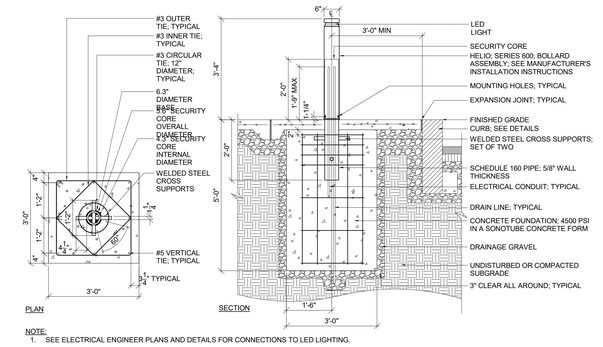
1 E0.06 **TYPICAL PARKING/DRIVE POLE BASE DETAIL**
SCALE: N.T.S.



2 E0.06 **TYPICAL PEDESTRIAN POLE BASE DETAIL**
SCALE: N.T.S.

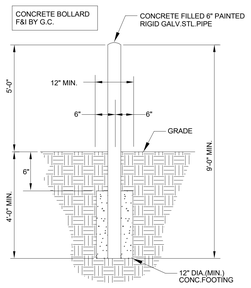


3 E0.06 **TYPICAL FLUSH PEDESTRIAN POLE BASE DETAIL**
SCALE: N.T.S.

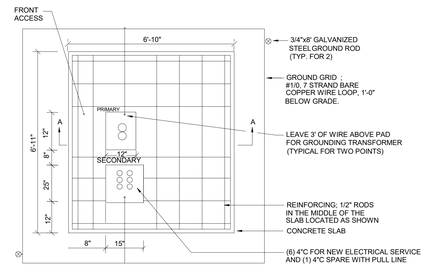


NOTE:
1. SEE ELECTRICAL ENGINEER PLANS AND DETAILS FOR CONNECTIONS TO LED LIGHTING.

4 E0.06 **LIGHTED BOLLARD BASE DETAIL**
SCALE: N.T.S.

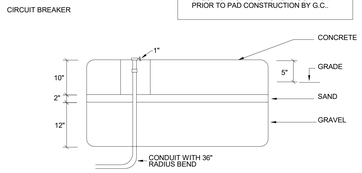


5 E0.06 **PROTECTIVE BOLLARD DETAIL**
SCALE: N.T.S.



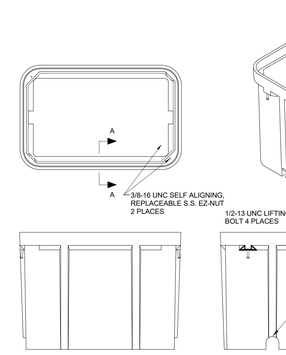
PLAN

E.C. SHALL OBTAIN LATEST PAD SPECIFICATION FROM UTILITY COMPANY PRIOR TO PAD CONSTRUCTION BY G.C..



SECTION A-A

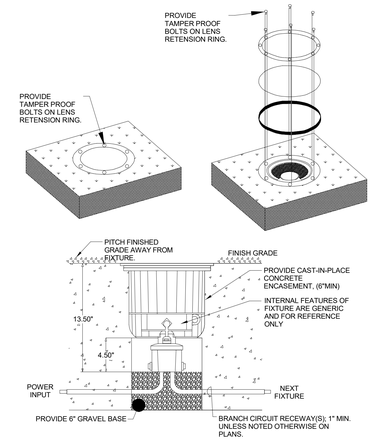
6 E0.06 **PADMOUNT TRANSFORMER PAD DETAIL**
SCALE: N.T.S.



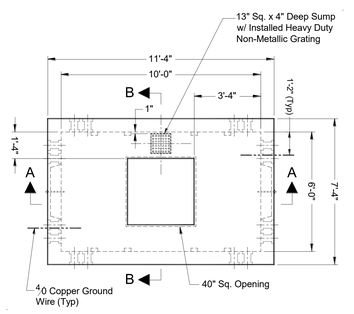
NOTES:
1. THIS BOX IS TO BE USED AS THE BOTTOM UNIT WHEN USED IN AN ASSEMBLY.

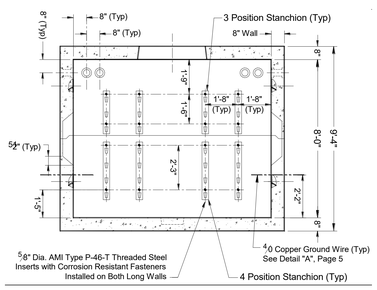
NOTES:
1. LOGO TO BE SPECIFIED "ELECTRIC" .
2. THIS COVER IS RATED FOR A STATIC DESIGN LOAD OF 15,000 LBS. [66,720 N] OVER A 10 [254] X 10 [254] AREA AND MUST PASS A MIN. STATIC TEST LOAD OF 22,568 LBS. [100,382 N].
3. FURNISHED W/(2) 3/8-16 [10] UNC X 4 [102] LONG HEX HEAD BOLTS AND (2) 3/8 [10] FLAT WASHERS.
4. DIMENSIONS IN BRACKETS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

7 E0.06 **PULL BOX DETAIL**
SCALE: N.T.S.

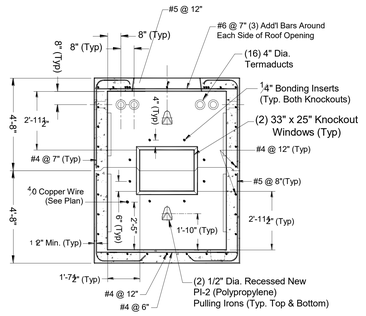


8 E0.06 **GROUND MOUNTED LIGHT DETAIL**
SCALE: N.T.S.





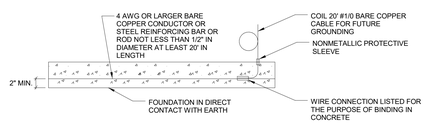
SECTION A-A



SECTION B-B

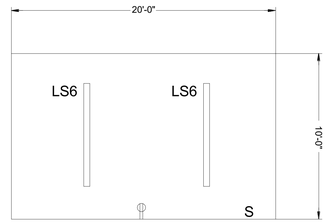
9 E0.06 **ELECTRICAL HANDHOLE**
SCALE: N.T.S

NOTES:
1. CONCRETE - 5,000 P.S.I. MIN. STRENGTH @ 28 DAYS.
2. STEEL REINFORCEMENT - ASTM A-615, GRADE 60.
3. COVER TO STEEL - 1" MINIMUM
4. VAULTS ARE DESIGNED TO MEET ASTM C857 AND ACI 318 WITH AASHTO HS20-44 LOADING.
5. CONSTRUCTION JOINT - SEALED WITH BUTYL RUBBER RESIN OR EQUIVALENT.
6. PROVIDE WATERPROOFING TO ALL OUTSIDE SURFACES
7. ALL MANHOLES TO HAVE CONNECTORS TO DRAINAGE SYSTEM.
8. EXACT MANHOLE SIZE AND CONSTRUCTION SHALL BE PER UTILITY COMPANY STANDARDS.



10 E0.06 **SLAB GROUNDING DETAIL**
SCALE: N.T.S

NOTE:
PROVIDE NEW SLAB GROUNDING IN NEW SLAB.



11 E0.06 **SHED DETAIL**
SCALE: N.T.S

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999
VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

NO.	DATE	TITLE

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KEY PLAN

ORIENTATION AND SCALE:

SHEET TITLE:
ELECTRICAL SITE DETAILS

SHEET NUMBER:
E0.06

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GENERAL LIGHTING NOTES:

1. EXACT LOCATIONS OF ALL FIXTURES AND DEVICES SHALL BE FULLY COORDINATED WITH ARCHITECTURAL PLANS, ELEVATIONS, SECTIONS AND THE WORK OF OTHER TRADES PRIOR TO ROUGH-IN. FULLY COORDINATED WITH ARCHITECTURAL PLANS, ELEVATIONS, SECTIONS AND THE WORK OF OTHER TRADES PRIOR TO ROUGH-IN. EXACT LOCATIONS OF ALL FIXTURES AND DEVICES SHALL BE FULLY COORDINATED WITH ARCHITECTURAL PLANS, ELEVATIONS, SECTIONS AND THE WORK OF OTHER TRADES PRIOR TO ROUGH-IN.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED BETWEEN ALL LIGHTING FIXTURES, SWITCHES, DIMMERS, SENSORS, POWER PACKS, RELAYS, AND OTHER AUXILIARY DEVICES. WIRING AND CONDUIT OR MC CABLE IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT AND CONTROL WIRING SYSTEM BE INSTALLED.
3. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
4. UTILITIES SHALL NOT PENETRATE STAIR ENCLOSURES, ELEVATOR SHAFTS, AND MACHINE ROOMS EXCEPT WHERE SPECIFICALLY SERVING THAT STAIR OR ELEVATOR.
5. METAL ROOF DECKS SHALL NOT BE TAPPED FOR SUPPORT OF ANY LIGHTING FIXTURES OR ELECTRICAL EQUIPMENT. PROVIDE UNISTRUT OR OTHER SUPPLEMENTAL SUPPORT FITTINGS TO BE ATTACHED TO BUILDING STRUCTURAL FRAMING AS REQUIRED FOR SUPPORT OF ALL LIGHTING FIXTURES AND ELECTRICAL EQUIPMENT.
6. ALL EXPOSED CONDUITS, RACEWAYS, WIREWAYS, BOXES, FITTINGS AND SIMILAR COMPONENTS SHALL BE PAINTED TO MATCH SURROUNDING FINISH WITH EQUAL TYPE PRODUCT(S).
7. ALL OCCUPANCY AND DAYLIGHT HARVESTING PHOTOSENSORS SHALL BE LOCATED IN COMPLIANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR EACH INDIVIDUAL SPACE. E.C. SHALL PROVIDE A CEILING PLAN LOCATING ALL SENSORS WHICH HAS BEEN FULLY COORDINATED WITH THE WORK OF OTHER TRADES FOR FINAL REVIEW AND APPROVAL. E.C. SHALL PROVIDE THE SENSOR VENDOR(S) WITH ALL INFORMATION REQUIRED TO FULLY UNDERSTAND THE CONDITIONS OF EACH SPACE.
8. INDIRECT AND DIRECT/INDIRECT FIXTURES SHALL BE SUSPENDED WITH AIRCRAFT CABLE TO PROVIDE A MINIMUM CLEARANCE 18" FROM THE CEILING TO TOP OF EACH FIXTURE. FIELD CONDITIONS REQUIRING A SHORTER SUSPENSION SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AND ENGINEER PRIOR TO COMMENCING WITH FIXTURE INSTALLATIONS.
9. FIXTURES ON PLANS SHALL BE PROVIDED WITH 0-10V DIMMING DRIVER(S) OR LIGHT ENGINE(S) AS REQUIRED FOR LED SOURCES SPECIFIED TO BE CONTROLLED VIA A 0-10V SIGNAL FROM THE ALCS, DAYLIGHT HARVESTING PHOTOSENSORS, THEATRICAL DIMMING SYSTEM OR OTHER CONTROLS
10. REFER TO "AUTOMATED LIGHTING CONTROL SYSTEM (ALCS) - TYPICAL ONE LINE DIAGRAM" AND SPECIFICATIONS FOR DETAILED LIGHTING CONTROL REQUIREMENTS.
11. ALL EXTERIOR EQUIPMENT, FIXTURES, AND DEVICES SHALL BE RATED IP65 (MINIMUM) AND BE CONSTRUCTED OF STAINLESS STEEL AND/OR MARINE GRADE ALUMINUM SUITABLE FOR COASTAL ENVIRONMENT APPLICATION. PAINTED FINISHES SHALL HAVE PASSED A MINIMUM 5,000 HOUR SALT SPRAY TEST.

1 E1.11 LEVEL ONE AREA A - LIGHTING
SCALE: 1/8" = 1'-0"

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
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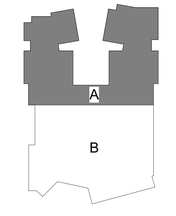
NO.	DATE	TITLE

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KEY PLAN



ORIENTATION AND SCALE:

N
0 4' 8' 16'
TRUE NORTH
SCALE: 1/8"=1'-0" GRAPHIC SCALE
PROJECT NORTH

SHEET TITLE:
LEVEL 1 AREA A - LIGHTING

SHEET NUMBER:
E1.11

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GENERAL LIGHTING NOTES:

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2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED BETWEEN ALL LIGHTING FIXTURES, SWITCHES, DIMMERS, SENSORS, POWER PACKS, RELAYS, AND OTHER AUXILIARY DEVICES. WIRING AND CONDUIT OR MC CABLE IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT AND CONTROL WIRING SYSTEM BE INSTALLED.
3. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
4. UTILITIES SHALL NOT PENETRATE STAIR ENCLOSURES, ELEVATOR SHAFTS, AND MACHINE ROOMS EXCEPT WHERE SPECIFICALLY SERVING THAT STAIR OR ELEVATOR.
5. METAL ROOF DECKS SHALL NOT BE TAPPED FOR SUPPORT OF ANY LIGHTING FIXTURES OR ELECTRICAL EQUIPMENT. PROVIDE UNISTRUT OR OTHER SUPPLEMENTAL SUPPORT FITTINGS TO BE ATTACHED TO BUILDING STRUCTURAL FRAMING AS REQUIRED FOR SUPPORT OF ALL LIGHTING FIXTURES AND ELECTRICAL EQUIPMENT.
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9. FIXTURES ON PLANS SHALL BE PROVIDED WITH 0-10V DIMMING DRIVER(S) OR LIGHT ENGINE(S) AS REQUIRED FOR LED SOURCES SPECIFIED TO BE CONTROLLED VIA A 0-10V SIGNAL FROM THE ALCS, DAYLIGHT HARVESTING PHOTOSENSORS, THEATRICAL DIMMING SYSTEM OR OTHER CONTROLS
10. REFER TO "AUTOMATED LIGHTING CONTROL SYSTEM (ALCS) - TYPICAL ONE LINE DIAGRAM" AND SPECIFICATIONS FOR DETAILED LIGHTING CONTROL REQUIREMENTS.
11. ALL EXTERIOR EQUIPMENT, FIXTURES, AND DEVICES SHALL BE RATED IP65 (MINIMUM) AND BE CONSTRUCTED OF STAINLESS STEEL AND/OR MARINE GRADE ALUMINUM SUITABLE FOR COASTAL ENVIRONMENT APPLICATION. PAINTED FINISHES SHALL HAVE PASSED A MINIMUM 5,000 HOUR SALT SPRAY TEST.

SEE LEVEL ABOVE FOR LIGHTING IN THIS AREA

STAGE LIGHTING CONTROLLER

FLEXIBLE TAPE TYPE FIXTURE MOUNTED UNDER STAGE STAIRS (TYP.)

SEE LEVEL ABOVE FOR LIGHTING IN THIS AREA

1 E1.12 LEVEL ONE AREA B - LIGHTING
SCALE: 1/8" = 1'-0"

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MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

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WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

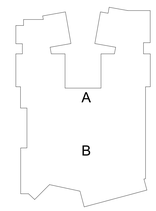
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KEY PLAN



ORIENTATION AND SCALE:

N TRUE NORTH
0 4" 8" 16"
SCALE: 1/8"=1'-0" GRAPHIC SCALE

PROJECT NORTH

SHEET TITLE:
LEVEL 1 AREA B - LIGHTING

SHEET NUMBER:
E1.12

Autodesk Docs://Wilmington Elementary School/Wildwood ME Model SD.rvt
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GENERAL LIGHTING NOTES:

1. EXACT LOCATIONS OF ALL FIXTURES AND DEVICES SHALL BE FULLY COORDINATED WITH ARCHITECTURAL PLANS, ELEVATIONS, SECTIONS AND THE WORK OF OTHER TRADES PRIOR TO ROUGH-IN. FULLY COORDINATED WITH ARCHTECTURAL PLANS, ELEVATIONS, SECTIONS AND THE WORK OF OTHER TRADES PRIOR TO ROUGH-IN. EXACT LOCATIONS OF ALL FIXTURES AND DEVICES SHALL BE FULLY COORDINATED WITH ARCHITECTURAL PLANS, ELEVATIONS, SECTIONS AND THE WORK OF OTHER TRADES PRIOR TO ROUGH-IN.
2. WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED BETWEEN ALL LIGHTING FIXTURES, SWITCHES, DIMMERS, SENSORS, POWER PACKS, RELAYS, AND OTHER AUXILIARY DEVICES. WIRING AND CONDUIT OR MC CABLE IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT AND CONTROL WIRING SYSTEM BE INSTALLED.
3. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
4. UTILITIES SHALL NOT PENETRATE STAIR ENCLOSURES, ELEVATOR SHAFTS, AND MACHINE ROOMS EXCEPT WHERE SPECIFICALLY SERVING THAT STAIR OR ELEVATOR.
5. METAL ROOF DECKS SHALL NOT BE TAPPED FOR SUPPORT OF ANY LIGHTING FIXTURES OR ELECTRICAL EQUIPMENT. PROVIDE UNISTRUT OR OTHER SUPPLEMENTAL SUPPORT FITTINGS TO BE ATTACHED TO BUILDING STRUCTURAL FRAMING AS REQUIRED FOR SUPPORT OF ALL LIGHTING FIXTURES AND ELECTRICAL EQUIPMENT.
6. ALL EXPOSED CONDUITS, RACEWAYS, WIREWAYS, BOXES, FITTINGS AND SIMILAR COMPONENTS SHALL BE PAINTED TO MATCH SURROUNDING FINISH WITH EQUAL TYPE PRODUCT(S).
7. ALL OCCUPANCY AND DAYLIGHT HARVESTING PHOTOSENSORS SHALL BE LOCATED IN COMPLIANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR EACH INDIVIDUAL SPACE. E.C. SHALL PROVIDE A CEILING PLAN LOCATING ALL SENSORS WHICH HAS BEEN FULLY COORDINATED WITH THE WORK OF OTHER TRADES FOR FINAL REVIEW AND APPROVAL. E.C. SHALL PROVIDE THE SENSOR VENDOR(S) WITH ALL INFORMATION REQUIRED TO FULLY UNDERSTAND THE CONDITIONS OF EACH SPACE.
8. INDIRECT AND DIRECT/INDIRECT FIXTURES SHALL BE SUSPENDED WITH AIRCRAFT CABLE TO PROVIDE A MINIMUM CLEARANCE 18" FROM THE CEILING TO TOP OF EACH FIXTURE. FIELD CONDITIONS REQUIRING A SHORTER SUSPENSION SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AND ENGINEER PRIOR TO COMMENCING WITH FIXTURE INSTALLATIONS.
9. FIXTURES ON PLANS SHALL BE PROVIDED WITH 0-10V DIMMING DRIVER(S) OR LIGHT ENGINE(S) AS REQUIRED FOR LED SOURCES SPECIFIED TO BE CONTROLLED VIA A 0-10V SIGNAL FROM THE ALCS, DAYLIGHT HARVESTING PHOTOSENSORS, THEATRICAL DIMMING SYSTEM OR OTHER CONTROLS
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1 LEVEL TWO AREA A - LIGHTING
E1.21 SCALE: 1/8" = 1'-0"

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NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

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WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

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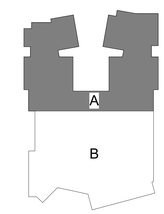
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KEY PLAN



ORIENTATION AND SCALE:

N TRUE NORTH
PROJECT NORTH
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE

SHEET TITLE:
LEVEL 2 AREA A - LIGHTING

SHEET NUMBER:
E1.21

Autodesk Docs://Wilmington Elementary School/Wildwood ME Model SD.rvt
6/17/2026 11:33:09 AM

GENERAL LIGHTING NOTES:

1. EXACT LOCATIONS OF ALL FIXTURES AND DEVICES SHALL BE FULLY COORDINATED WITH ARCHITECTURAL PLANS, ELEVATIONS, SECTIONS AND THE WORK OF OTHER TRADES PRIOR TO ROUGH-IN. FULLY COORDINATED WITH ARCHITECTURAL PLANS, ELEVATIONS, SECTIONS AND THE WORK OF OTHER TRADES PRIOR TO ROUGH-IN. EXACT LOCATIONS OF ALL FIXTURES AND DEVICES SHALL BE FULLY COORDINATED WITH ARCHITECTURAL PLANS, ELEVATIONS, SECTIONS AND THE WORK OF OTHER TRADES PRIOR TO ROUGH-IN.
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3. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
4. UTILITIES SHALL NOT PENETRATE STAIR ENCLOSURES, ELEVATOR SHAFTS, AND MACHINE ROOMS EXCEPT WHERE SPECIFICALLY SERVING THAT STAIR OR ELEVATOR.
5. METAL ROOF DECKS SHALL NOT BE TAPPED FOR SUPPORT OF ANY LIGHTING FIXTURES OR ELECTRICAL EQUIPMENT. PROVIDE UNISTRUT OR OTHER SUPPLEMENTAL SUPPORT FITTINGS TO BE ATTACHED TO BUILDING STRUCTURAL FRAMING AS REQUIRED FOR SUPPORT OF ALL LIGHTING FIXTURES AND ELECTRICAL EQUIPMENT.
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8. INDIRECT AND DIRECT/INDIRECT FIXTURES SHALL BE SUSPENDED WITH AIRCRAFT CABLE TO PROVIDE A MINIMUM CLEARANCE 18" FROM THE CEILING TO TOP OF EACH FIXTURE. FIELD CONDITIONS REQUIRING A SHORTER SUSPENSION SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AND ENGINEER PRIOR TO COMMENCING WITH FIXTURE INSTALLATIONS.
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1 E1.22 LEVEL TWO AREA B - LIGHTING
SCALE: 1/8" = 1'-0"

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260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
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BURLINGTON, VT 05401
P: (802) 863-1428

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WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

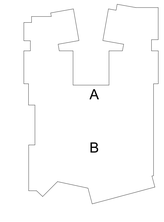
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KEY PLAN



ORIENTATION AND SCALE:

N
TRUE NORTH
PROJECT NORTH
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE

SHEET TITLE:

LEVEL 2 AREA B - LIGHTING

SHEET NUMBER:

E1.22

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6/17/2026 11:33:19 AM

GENERAL LIGHTING NOTES:

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1 E1.31 LEVEL THREE AREA A - LIGHTING
SCALE: 1/8" = 1'-0"

2 E1.31 ROOF - LIGHTING
SCALE: 1/8" = 1'-0"

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MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
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WILMINGTON ELEMENTARY SCHOOL

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PROJECT NUMBER: 23-0847

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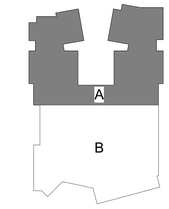
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KEY PLAN



ORIENTATION AND SCALE:

N TRUE NORTH
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE
PROJECT NORTH

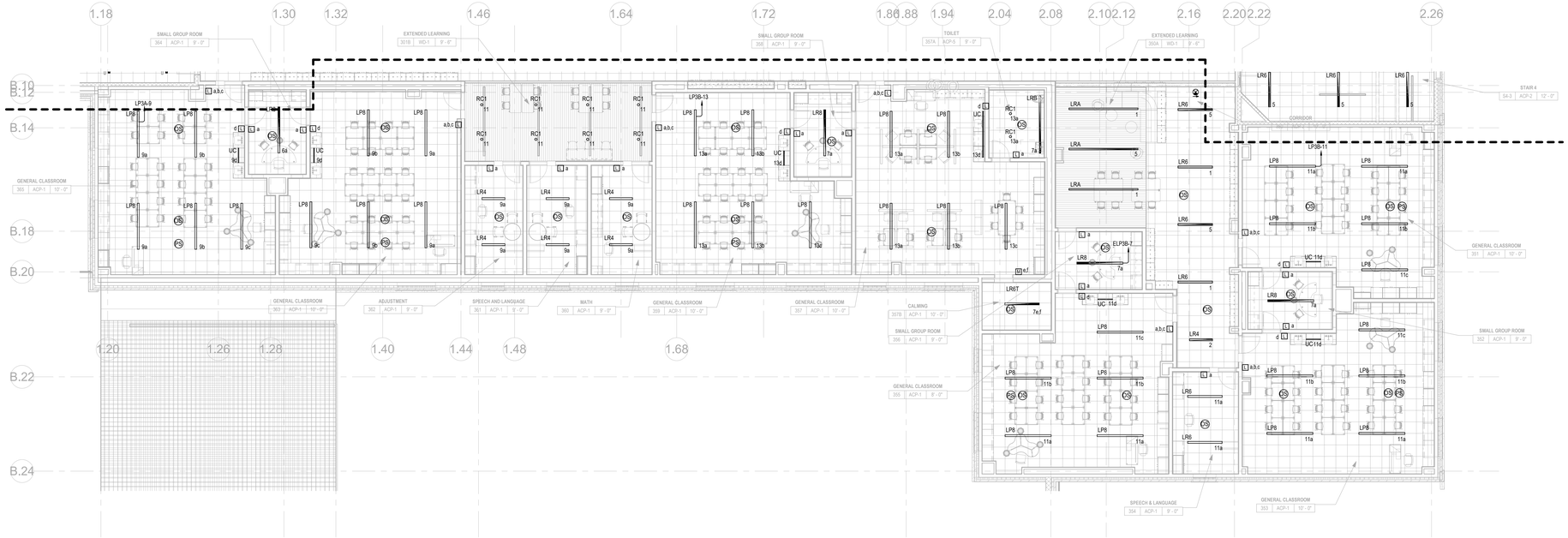
SHEET TITLE:
LEVEL 3 AREA A - LIGHTING

SHEET NUMBER:
E1.31

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6/17/2026 11:33:50 AM

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1 / E1.32 LEVEL THREE AREA B - LIGHTING
SCALE: 1/8" = 1'-0"

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NEWBURYPORT, MA 01950
P: (978) 499-2999

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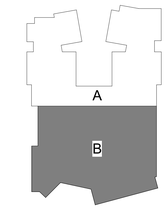
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KEY PLAN



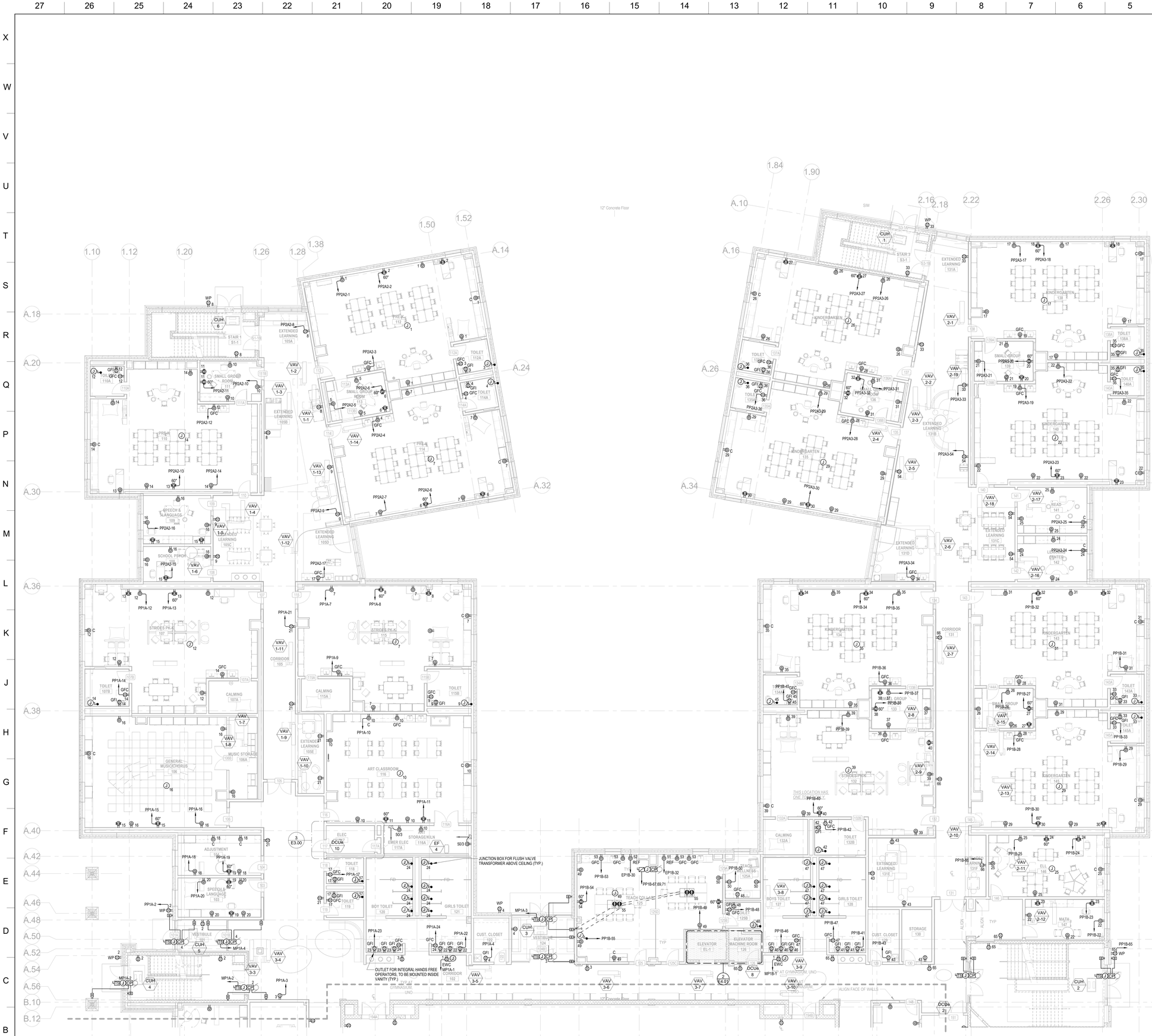
ORIENTATION AND SCALE:

N
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SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

SHEET TITLE:
LEVEL 3 AREA B LIGHTING

SHEET NUMBER:
E1.32

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6/17/2026 11:33:35 AM



1 / E2.11 LEVEL ONE A - POWER
SCALE: 1/8" = 1'-0"

GENERAL POWER NOTES:

1. COORDINATE EXACT LOCATION OF ALL DEVICES AND EQUIPMENT WITH ARCHITECT PRIOR TO INSTALLATION.
2. REFER TO MECHANICAL PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL HVAC EQUIPMENT.
3. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
4. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL OUTLETS INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS.
5. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
6. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
7. REFER TO FIRE PROTECTION PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL FLOW SWITCH, TAMPER SWITCH, ETC.
8. DO NOT PENETRATE STAIRS WITH ANY UTILITIES EXCEPT FOR UTILITIES SPECIFICALLY SERVING THAT STAIR.
9. WHERE CONDUITS AND/OR BOXES CANNOT BE FLUSH MOUNTED IN BUILDING PROVIDE A SYSTEM OF SURFACE METAL RACEWAYS AND BOXES IN ACCORDANCE WITH ARTICLE 386, EQUAL TO WIREMOLD FOR ALL FINISH SPACES WHERE PUBLIC HAS ACCESS, INCLUDING CORRIDORS, CLASSROOMS, OFFICES, ETC.
10. CONFIRM RATINGS & FINAL LOCATIONS OF EQUIPMENT WITH OWNER PRIOR TO ROUGHING.
11. ALL OUTLETS ON EXTERIOR WALLS WITH CASEWORK SHALL BE MOUNTED 8" ABOVE CASEWORK. CONFIRM HEIGHT OF CASEWORK WITH HVAC AND ARCHITECT PRIOR TO ROUGHING.
12. TYPICALLY PROVIDE GROUND FAULT INTERRUPTER TYPE RECEPTACLES WITHIN 6 FEET OF WATER SOURCES.
13. PROVIDE ALL EMPTY CONDUITS WITH PULL-STRINGS.
14. TYPICALLY PROVIDE (2) 4" SLEEVES OVER EACH CORRIDOR DOOR.
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16. LOCATE ALL WALL TELEPHONE OUTLETS 12 INCHES AWAY FROM ALL OTHER OUTLETS/DEVICES.
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18. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL BOXES AND CONDUITS REQUIRED FOR AUDIO/VISUAL SYSTEMS SECTION 27410 DEVICES AS SHOWN ON AV DRAWINGS. ALL LOCATIONS OF POWER AND AV OUTLET BOXES SHALL BE COORDINATED WITH ARCHITECT PRIOR TO ROUGHING.
19. E.C. SHALL PROVIDE EMERGENCY BOILER & WATER HEATER SHUT-OFF MOUNTED IN STOPPER II COVER. INTERLOCK w/ BOILER & WATER HEATER CONTROL PANELS. MOUNT @ 72" A.F.F. TYPICAL.
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DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

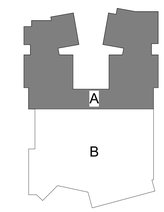
NO.	DATE	TITLE

ISSUE TITLE AND DATE:

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KEY PLAN



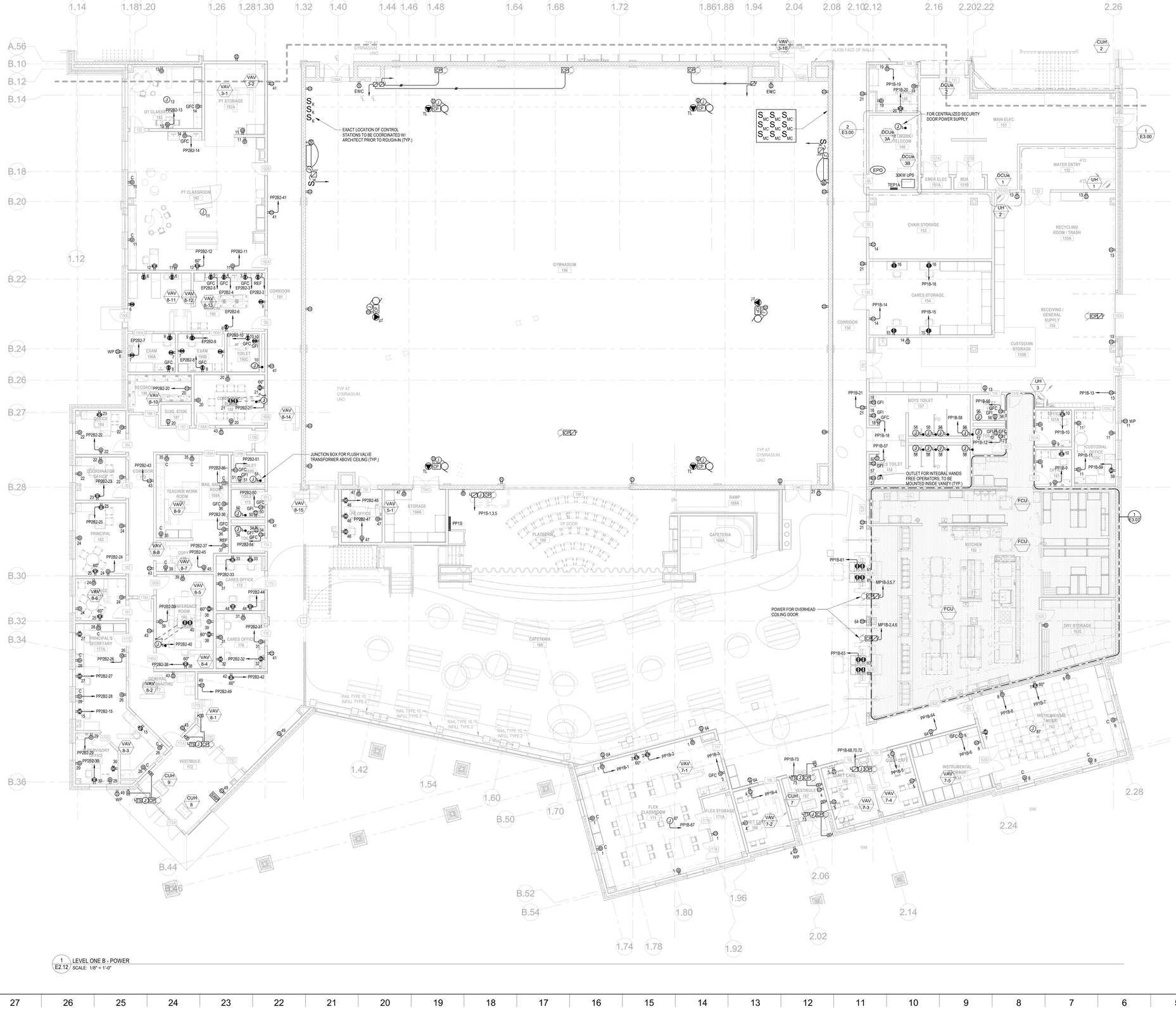
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SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

SHEET TITLE:
LEVEL 1 AREA A - POWER

SHEET NUMBER:
E2.11

Autodesk Docs://Wilmington Elementary School/Wildwood ME Model SD.rvt
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GENERAL POWER NOTES:

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MASSACHUSETTS
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NEWBURYPORT, MA 01950
P: (978) 499-2999

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WILMINGTON ELEMENTARY SCHOOL

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WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

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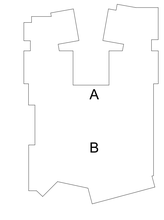
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KEY PLAN



ORIENTATION AND SCALE:

N
SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

SHEET TITLE:
LEVEL 1 AREA B - POWER

SHEET NUMBER:
E2.12

Autodesk Docs://Wilmington Elementary School/Wildwood ME Model SD.rvt
6/17/2026 11:33:41 AM

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5 1/4" LW Concrete on 2" Metal Deck

JUNCTION BOX FOR FLUSH VALVE TRANSFORMER (TYP.)

OUTLET FOR INTEGRAL HANDS FREE OPERATORS. TO BE MOUNTED INSIDE VANITY (TYP.)

1 E2.21 LEVEL TWO AREA A - POWER
SCALE: 1/8" = 1'-0"

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MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

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WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

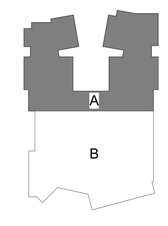
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KEY PLAN



ORIENTATION AND SCALE:

N
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

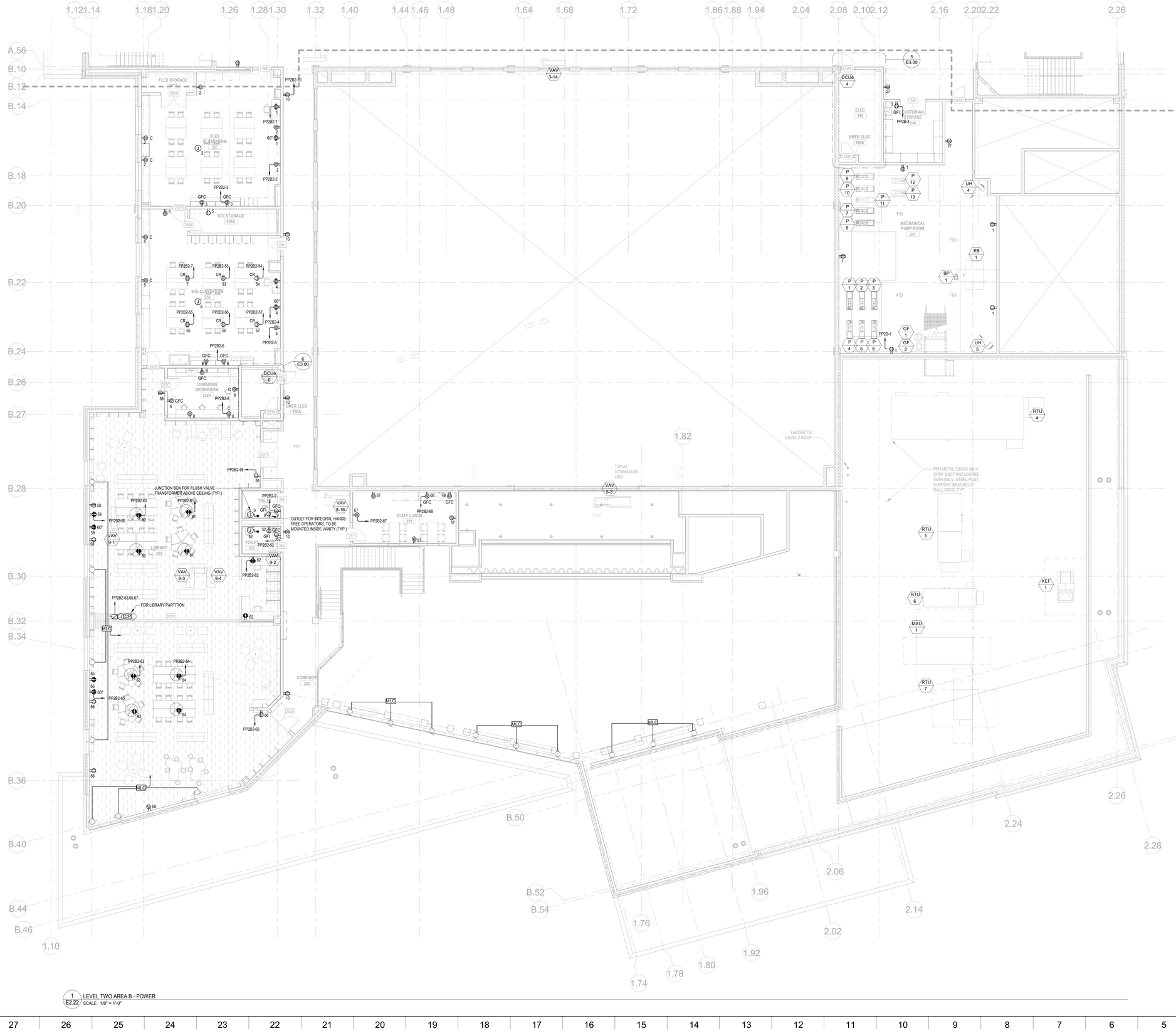
SHEET TITLE:
LEVEL 2 AREA A - POWER

SHEET NUMBER:
E2.21

Autodesk Docs://Wilmington Elementary School/Wildwood ME Model SD.rvt
6/17/2026 11:33:45 AM

GENERAL POWER NOTES:

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1 E2.22 LEVEL TWO AREA B - POWER
SCALE: 1/8" = 1'-0"

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MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

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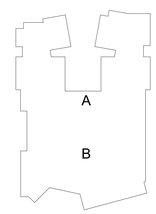
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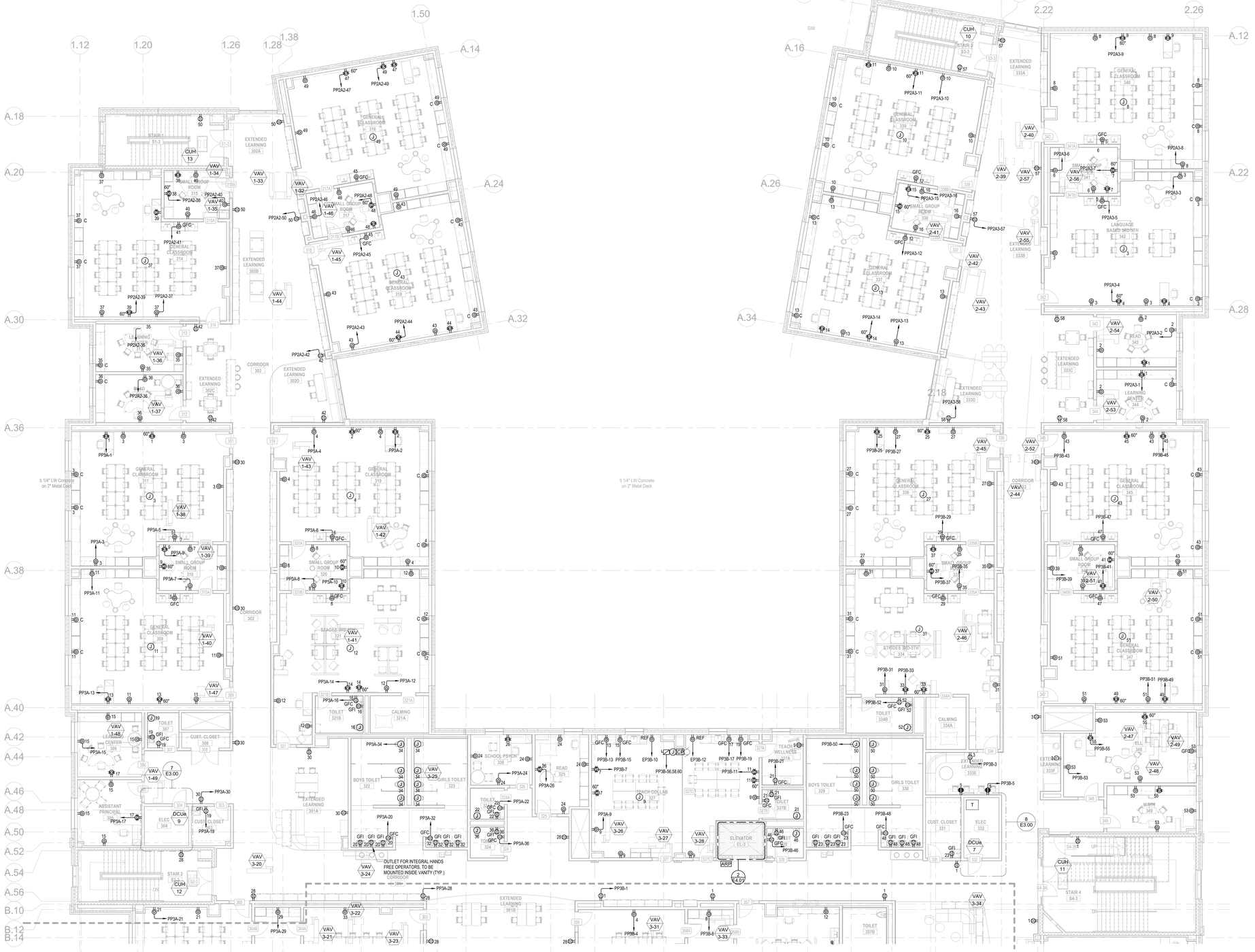
ORIENTATION AND SCALE:

N TRUE NORTH
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE
PROJECT NORTH

SHEET TITLE:
LEVEL 2 AREA B - POWER

SHEET NUMBER:
E2.22

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6/17/2026 11:33:47 AM



1 LEVEL THREE AREA A - POWER
E2.31 SCALE: 1/8" = 1'-0"

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20. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL BOXES AND CONDUITS REQUIRED FOR COMMUNICATIONS SYSTEMS DIVISION 27 DEVICES AS SHOWN ON TECHNOLOGY DRAWINGS. ALL LOCATIONS OF POWER AND COMMUNICATIONS OUTLET BOXES SHALL BE COORDINATED WITH ARCHITECT PRIOR TO ROUGHING.
21. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL BOXES AND CONDUITS REQUIRED FOR AUDIO/VISUAL(AV) SYSTEM SECTION 274000 DEVICES AS SHOWN ON AV DRAWINGS. ALL LOCATIONS OF POWER AND AV OUTLET BOXES SHALL BE COORDINATED WITH ARCHITECT PRIOR TO ROUGHING.
22. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL BOXES AND CONDUITS REQUIRED FOR AUDIO/VISUAL(AV) SYSTEM SECTION 280000 DEVICES AS SHOWN ON AV DRAWINGS. ALL LOCATIONS OF POWER AND AV OUTLET BOXES SHALL BE COORDINATED WITH ARCHITECT PRIOR TO ROUGHING

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MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999
VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

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375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

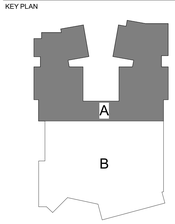
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ISSUE TITLE AND DATE:

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KEY PLAN



ORIENTATION AND SCALE:

N TRUE NORTH
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE
PROJECT NORTH

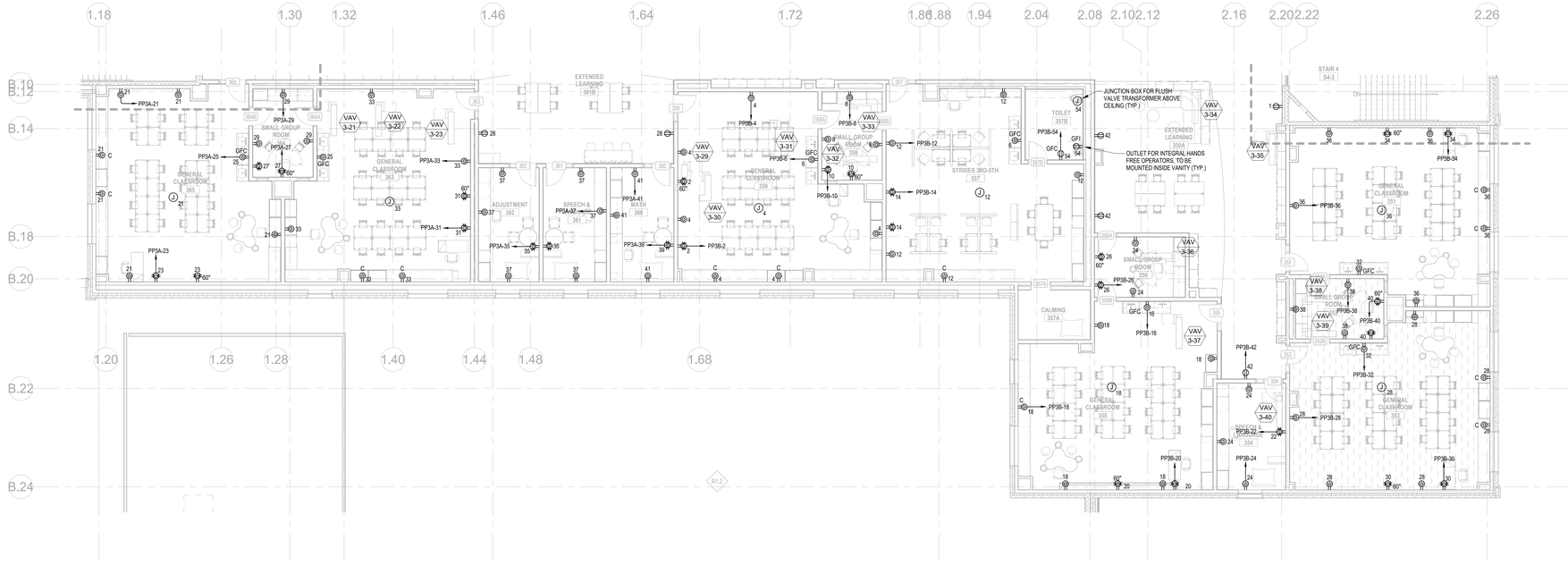
SHEET TITLE:
LEVEL 3 AREA A - POWER

SHEET NUMBER:
E2.31

Autodesk Docs://Wilmington Elementary School/Wildwood ME Model SD.rvt
6/17/2026 11:33:51 AM

GENERAL POWER NOTES:

1. COORDINATE EXACT LOCATION OF ALL DEVICES AND EQUIPMENT WITH ARCHITECT PRIOR TO INSTALLATION.
2. REFER TO MECHANICAL PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL HVAC EQUIPMENT.
3. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
4. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL OUTLETS INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS.
5. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
6. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
7. REFER TO FIRE PROTECTION PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL FLOW SWITCH, TAMPER SWITCH, ETC.
8. DO NOT PENETRATE STAIRS WITH ANY UTILITIES EXCEPT FOR UTILITIES SPECIFICALLY SERVING THAT STAIR.
9. WHERE CONDUITS AND/OR BOXES CANNOT BE FLUSH MOUNTED IN BUILDING PROVIDE A SYSTEM OF SURFACE METAL RACEWAYS AND BOXES IN ACCORDANCE WITH ARTICLE 386, EQUAL TO WIREMOLD FOR ALL FINISH SPACES WHERE PUBLIC HAS ACCESS, INCLUDING CORRIDORS, CLASSROOMS, OFFICES, ETC.
10. CONFIRM RATINGS & FINAL LOCATIONS OF EQUIPMENT WITH OWNER PRIOR TO ROUGHING.
11. ALL OUTLETS ON EXTERIOR WALLS WITH CASEWORK SHALL BE MOUNTED 8" ABOVE CASEWORK. CONFIRM HEIGHT OF CASEWORK WITH HVAC AND ARCHITECT PRIOR TO ROUGHING.
12. TYPICALLY PROVIDE GROUND FAULT INTERRUPTER TYPE RECEPTACLES WITHIN 6 FEET OF WATER SOURCES.
13. PROVIDE ALL EMPTY CONDUITS WITH PULL-STRINGS.
14. TYPICALLY PROVIDE (2) 4" SLEEVES OVER EACH CORRIDOR DOOR.
15. ROVIDE (2) 2" THROUGH-WALL SLEEVE ABOVE CEILING OVER THE DOORS INTO EACH ROOM LEADING FROM THE CORRIDOR FOR COMMUNICATIONS/DATA WIRING
16. LOCATE ALL WALL TELEPHONE OUTLETS 12 INCHES AWAY FROM ALL OTHER OUTLETS/DEVICES.
17. PROVIDE (2) 1" SLEEVES OVER EACH DOOR FOR TEL./DATA SECURITY AND SOUND SYSTEM WIRING. TEL./DATA SHALL BE DEDICATED TO (1) OF THE CONDUITS.
18. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL BOXES AND CONDUITS REQUIRED FOR AUDIO/VISUAL SYSTEMS SECTION 27410 DEVICES AS SHOWN ON AV DRAWINGS. ALL LOCATIONS OF POWER AND A/V OUTLET BOXES SHALL BE COORDINATED WITH ARCHITECT PRIOR TO ROUGHING.
19. E.C. SHALL PROVIDE EMERGENCY BOILER & WATER HEATER SHUT-OFF MOUNTED IN STOPPER II COVER. INTERLOCK w/ BOILER & WATER HEATER CONTROL PANELS. MOUNT @ 72" A.F.F. TYPICAL.
20. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL BOXES AND CONDUITS REQUIRED FOR COMMUNICATIONS SYSTEMS DIVISION 27 DEVICES AS SHOWN ON TECHNOLOGY DRAWINGS. ALL LOCATIONS OF POWER AND COMMUNICATIONS OUTLET BOXES SHALL BE COORDINATED WITH ARCHITECT PRIOR TO ROUGHING.
21. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL BOXES AND CONDUITS REQUIRED FOR AUDIO/VISUAL(AV) SYSTEM SECTION 274000 DEVICES AS SHOWN ON AV DRAWINGS. ALL LOCATIONS OF POWER AND AV OUTLET BOXES SHALL BE COORDINATED WITH ARCHITECT PRIOR TO ROUGHING.
22. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL BOXES AND CONDUITS REQUIRED FOR AUDIO/VISUAL(AV) SYSTEM SECTION 280000 DEVICES AS SHOWN ON AV DRAWINGS. ALL LOCATIONS OF POWER AND AV OUTLET BOXES SHALL BE COORDINATED WITH ARCHITECT PRIOR TO ROUGHING



1 / E2.32 LEVEL THREE AREA B - POWER
SCALE: 1/8" = 1'-0"

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NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
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BURLINGTON, VT 05401
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WILMINGTON ELEMENTARY SCHOOL

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PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

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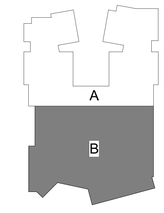
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KEY PLAN



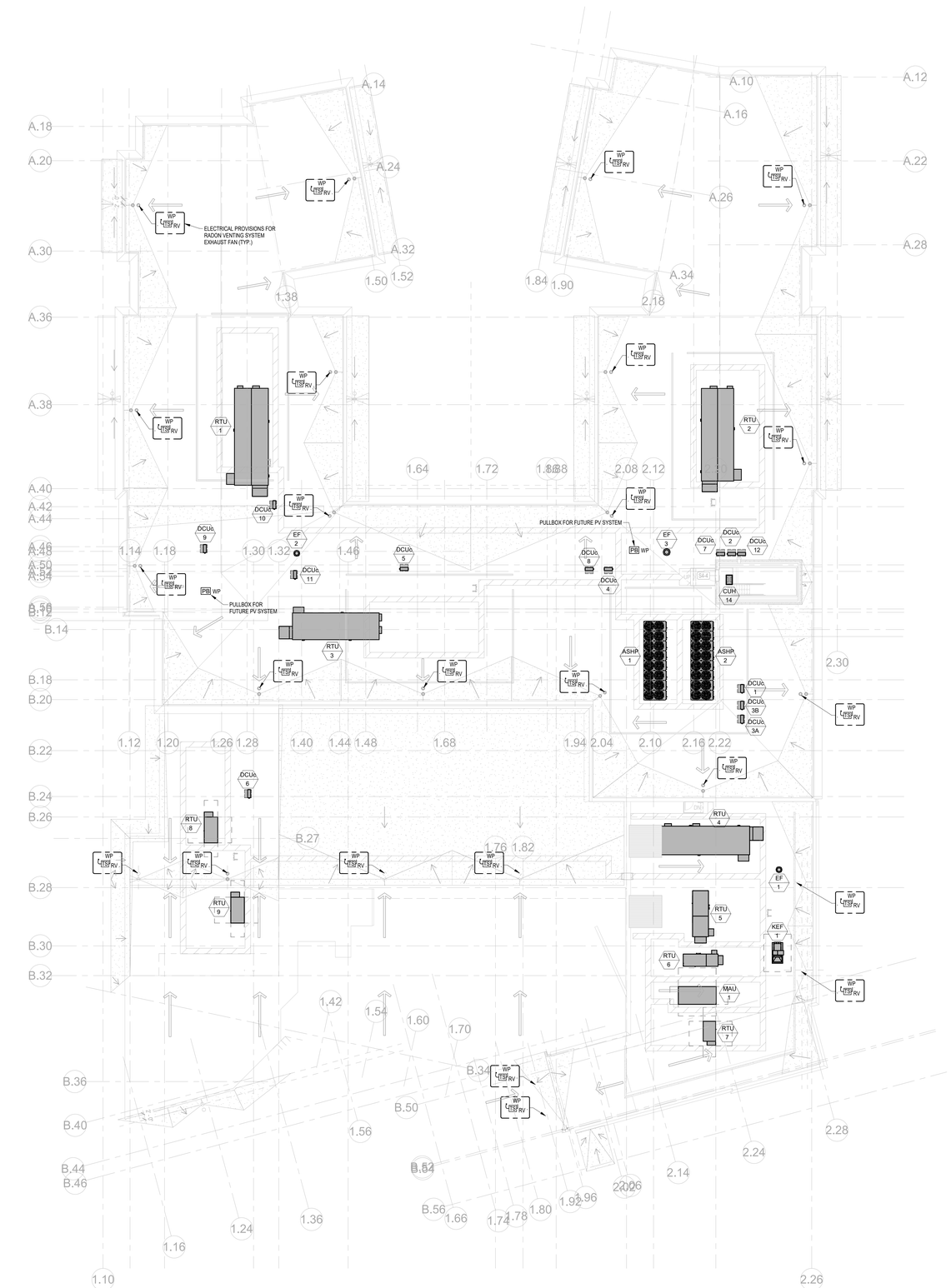
ORIENTATION AND SCALE:

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SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

SHEET TITLE:
LEVEL 3 AREA B - POWER

SHEET NUMBER:
E2.32

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6/17/2026 11:33:52 AM



1 E2.40 ROOF POWER
SCALE: 1/16" = 1'-0"

GENERAL POWER NOTES:

1. COORDINATE EXACT LOCATION OF ALL DEVICES AND EQUIPMENT WITH ARCHITECT PRIOR TO INSTALLATION.
2. REFER TO MECHANICAL PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL HVAC EQUIPMENT.
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10. CONFIRM RATINGS & FINAL LOCATIONS OF EQUIPMENT WITH OWNER PRIOR TO ROUGHING.
11. ALL OUTLETS ON EXTERIOR WALLS WITH CASEWORK SHALL BE MOUNTED 6" ABOVE CASEWORK. CONFIRM HEIGHT OF CASEWORK WITH HVAC AND ARCHITECT PRIOR TO ROUGHING.
12. TYPICALLY PROVIDE GROUND FAULT INTERRUPTER TYPE RECEPTACLES WITHIN 6 FEET OF WATER SOURCES.
13. PROVIDE ALL EMPTY CONDUITS WITH PULL-STRINGS.
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15. ROVIDE (2) 2" THROUGH-WALL SLEEVE ABOVE CEILING OVER THE DOORS INTO EACH ROOM LEADING FROM THE CORRIDOR FOR COMMUNICATIONS/DATA WIRING.
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17. PROVIDE (2) 1" SLEEVES OVER EACH DOOR FOR TEL./DATA SECURITY AND SOUND SYSTEM WIRING. TEL./DATA SHALL BE DEDICATED TO (1) OF THE CONDUITS.
18. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL BOXES AND CONDUITS REQUIRED FOR AUDIO/VISUAL SYSTEMS SECTION 274100 DEVICES AS SHOWN ON AV DRAWINGS. ALL LOCATIONS OF POWER AND A/V OUTLET BOXES SHALL BE COORDINATED WITH ARCHITECT PRIOR TO ROUGHING.
19. E.C. SHALL PROVIDE EMERGENCY BOILER & WATER HEATER SHUT-OFF MOUNTED IN STOPPER II COVER. INTERLOCK w/ BOILER & WATER HEATER CONTROL PANELS. MOUNT @ 72" A.F.F. TYPICAL.
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NEWBURYPORT, MA 01950
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WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

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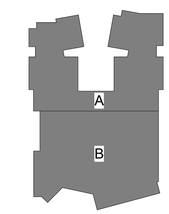
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KEY PLAN



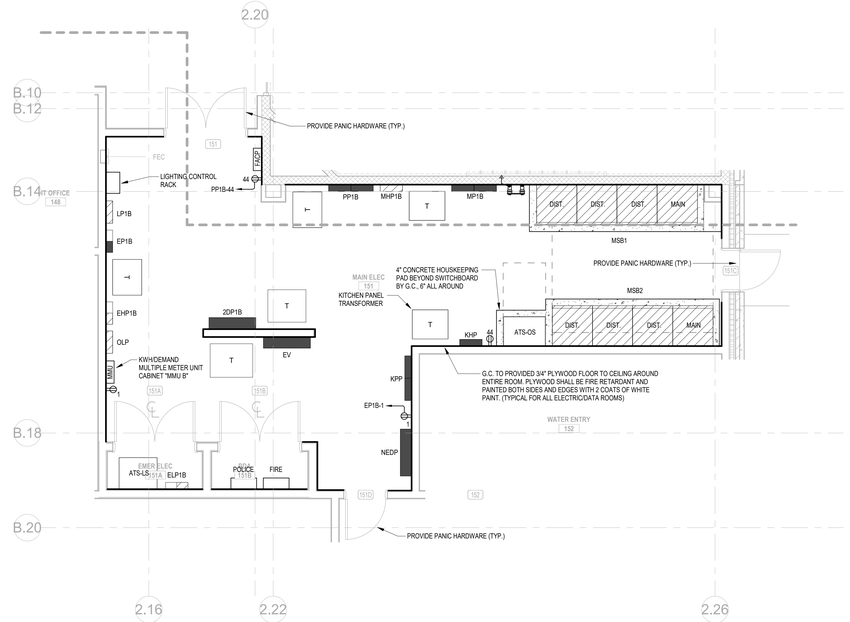
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N TRUE NORTH
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE
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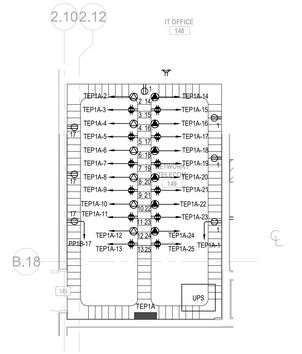
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ROOF PLAN

SHEET NUMBER:
E2.40

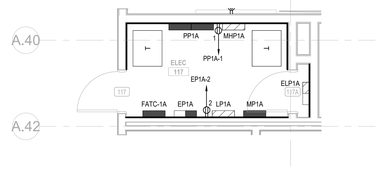
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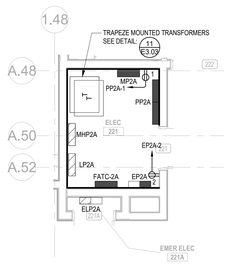
1 E3.00 MAIN ELECTRIC ROOM
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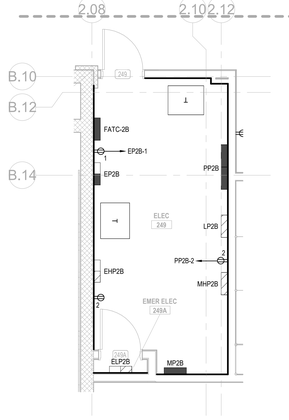
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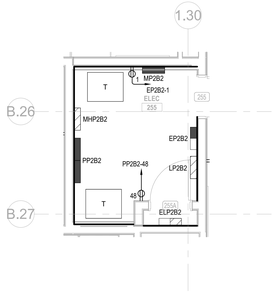
3 E3.00 FIRST FLOOR A ELEC ROOM 117
SCALE: 1/4" = 1'-0"



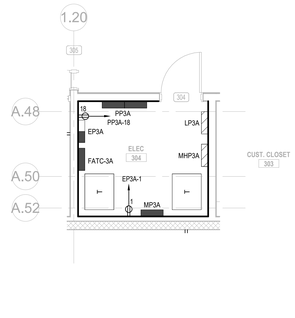
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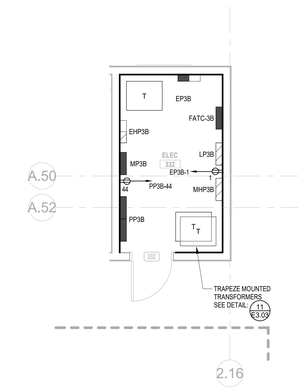
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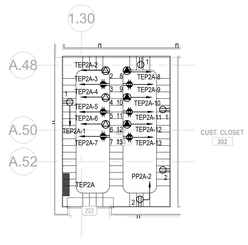
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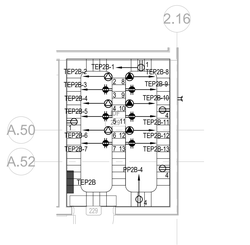
7 E3.00 THIRD FLOOR A ELEC ROOM 304
SCALE: 1/4" = 1'-0"



8 E3.00 THIRD FLOOR A ELEC ROOM 332
SCALE: 1/4" = 1'-0"



9 E3.00 SECOND FLOOR A IDF ROOM 203
SCALE: 1/4" = 1'-0"



10 E3.00 SECOND FLOOR A IDF ROOM 229
SCALE: 1/4" = 1'-0"

TECHNOLOGY ROOM NOTES:

1. CONTRACTOR IS TO USE THE L5-20R RECEPTACLE MOUNTED ON CABLE TRAY FOR POWERING OF ALL EQUIPMENT RACKS.
2. ALL CABLE TRAY IS TO PROVIDED BY E.C. CABLE TRAY SHALL BE 12" W x 4" HIGH AND 6" RUNG ALUMINUM CONSTRUCTION. INSTALL CABLE TRAY 18" ABOVE EQUIPMENT RACK.
3. ELECTRICAL CONTRACTOR SHALL LABEL EACH RECEPTACLE WITH THE CIRCUIT NUMBER AND THE PHASE "A", "B" OR "C" ON THE OUTSIDE FACE OF THE FACEPLATE WITH MACHINE GENERATED LABELS. BLACK LETTERING ON WHITE TAPE. HANDWRITTEN LABELS ARE NOT ACCEPTABLE.
4. PROVIDE CONDUIT SLEEVES FROM MDF/IDF ROOM TO THE NEAREST ACCESSIBLE CEILING SPACE AS REQUIRED TO ACCOMMODATE THE QUANTITY OF CABLES TERMINATED WITHIN THE ROOM. REFER TO DETAIL 20/E3.00. TELECOMMUNICATIONS CONDUIT AND GROUNDING RISER FOR ADDITIONAL CONDUIT SLEEVE INFORMATION.

TECHNOLOGY ROOM LEGEND:

- QUADRAPLEX ELECTRICAL OUTLET WITH 20 AMP DEDICATED CIRCUIT. MOUNTED ABOVE EQUIPMENT RACK ON UNDERSIDE OF CABLE TRAY. COORDINATE EXACT LOCATION OF OUTLET WITH EQUIPMENT RACK INSTALLER.
- NEMA TYPE L5 -20R ELECTRICAL TWIST LOCK RECEPTACLE WITH DEDICATED 20 AMP CIRCUIT. MOUNTED ABOVE EQUIPMENT RACK ON UNDERSIDE OF CABLE TRAY TO RECEIVE NEMA TYPE L5-20P PLUG FROM EQUIPMENT RACK POWER STRIPS AND UNINTERRUPTIBLE POWER SUPPLIES. COORDINATE EXACT LOCATION OF OUTLET WITH EQUIPMENT RACK INSTALLER.
- NEMA TYPE L5 -30R ELECTRICAL TWIST LOCK RECEPTACLE WITH DEDICATED 30 AMP CIRCUIT. MOUNTED ABOVE EQUIPMENT RACK ON UNDERSIDE OF CABLE TRAY TO RECEIVE NEMA TYPE L5-30P PLUG FROM EQUIPMENT RACK POWER STRIPS AND UNINTERRUPTIBLE POWER SUPPLIES. COORDINATE EXACT LOCATION OF OUTLET WITH EQUIPMENT RACK INSTALLER.

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MASSACHUSETTS
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NEWBURYPORT, MA 01950
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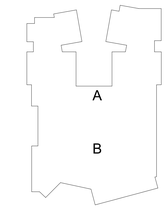
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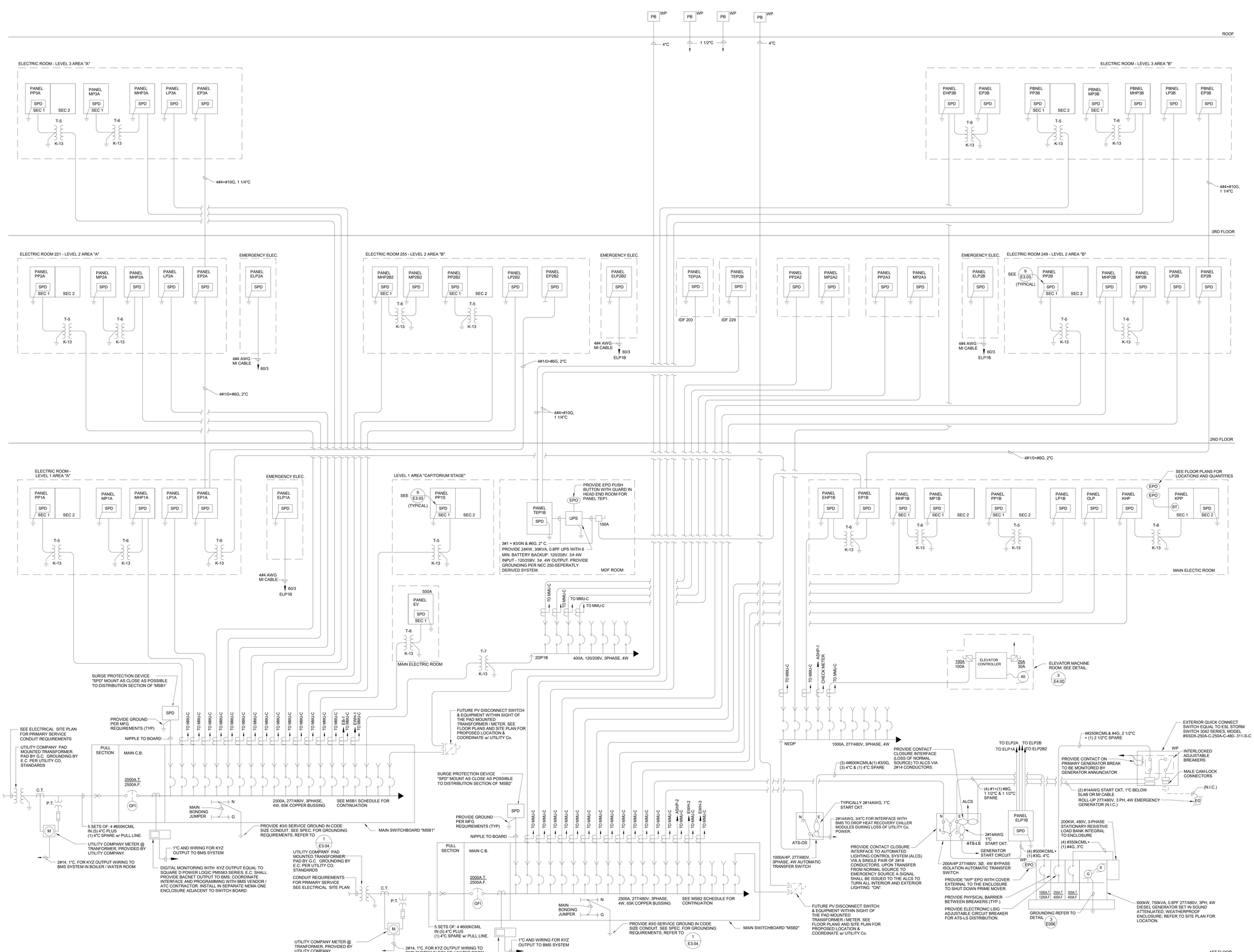
ORIENTATION AND SCALE:

N
TRUE NORTH
PROJECT NORTH

SHEET TITLE:
ELECTRICAL ROOM PART PLANS

SHEET NUMBER:
E3.00

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6/17/2026 11:40:18 AM



1 E3.01 ONE LINE RISER DIAGRAM
SCALE: N.T.S.

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NEWBURYPORT, MA 01950
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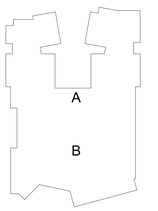
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KEY PLAN



ORIENTATION AND SCALE:

SHEET TITLE:
ELECTRICAL ONE LINE RISER

SHEET NUMBER:
E3.01

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6/17/2026 1:46:58 PM

THREE PHASE TRANSFORMER SCHEDULE (K13 RATED) COPPER CONDUCTORS

ID NO	KVA	PRIMARY 480 VOLT				SECONDARY 208 VOLT					GROUNDING ELECTRODE CONDUCTOR (250-66)*
		AMPS	WIRE (THHN)	COND.	C.B.	FUSE	AMPS	WIRE (THHN)	COND.	C.B.	FUSE	
T-1	3	3.6	3#12+#12EG	3/4"	15/3	10	8.3	4#12+#12(EG)	3/4"	15/3	15	#8
T-2	9	10.8	3#12+#12EG	3/4"	20/3	20	25	4#10+#10(EG)	3/4"	30/3	30	#8
T-3	15	18	3#10+#10EG	3/4"	30/3	30	41.6	3#6(Ø)+1#2(N)+1#8/(G)+1#8(EG)	1 1/4"	50/3	50	#8
T-4	30	36	3#6+#10EG	3/4"	60/3	45	83.3	3#2(Ø)+#3/0(N)+1#8/(G)+1#8(EG)	2"	100/3	100	#8
T-5	45	54.3	3#2+#8EG	1 1/4"	90/3	80	125	3#1/0(Ø)+2#1/0(N) +1#6(G)+1#6(EG)	2 1/2"	150/3	150	#6
T-6	75	90.2	3#1/0+#6EG	1 1/2"	150/3	150	208	3#250 KCMIL(Ø)+2#250 KCMIL(N) +1#4(G)+1#4(EG)	3"	250/3	250	#2
T-7	112.5	135.3	3#3/0+#6EG	2"	200/3	200	311	3#500 KCMIL(Ø)+2#500 KCMIL(N) +1#3(G)+1#3(EG)	4"	400/3	400	#1/0
T-8	150	180.6	3#350+#4EG	3"	300/3	300	416.8	2 SETS 3#250 KCMIL(Ø)+2#250 KCMIL(N) +1#2/(G)+1#2(EG)	2 - 3"	500/3	500	#2/0
T-9	225	270.7	3#500+#3EG	3"	400/3	400	625	2 SETS 3#500 KCMIL(Ø)+2#500 KCMIL(N) +1#1/0(G)+1#1/0(EG)	2 - 4"	800/3	800	#2/0
T-10	300	360.8	2 SETS 3#350& #1EG	2-3"	600/3	600	833	3 SETS 3#400KCMIL(Ø)+2#400 KCMIL (N) +1#2/0(G)+1#2/0(EG)	3 - 4"	1000/3	1000	#3/0

* RUN IN CODE SIZE CONDUIT TO CODE APPROVED GROUNDING ELECTRODE, i.e., BUILDING STEEL, ETC. "EG" INDICATES EQUIPMENT GROUNDING CONDUCTOR, "IG" INDICATES ISOLATED GROUNDING CONDUCTOR, "N" INDICATES NEUTRAL CONDUCTOR AND "-Ø" INDICATES PHASE CONDUCTOR.
** PROVIDE "IG" GROUNDING CONDUCTORS FOR PANELBOARDS DESIGNATED WITH "IG" BUS WHERE SHOWN ON PANEL SCHEDULE.

277/480V, 3 PHASE, 4W, 65 KAIC
2500A BUS

FRONT ACCESSIBLE

SWITCHBOARD "MSB1" SCHEDULE ⑥

	OVER CURRENT DEVICES No.	TRIP	FRAME	CIRCUIT	FEEDER SIZE	COND. SIZE	REMARKS
	-	2000	2500	MAIN BREAKER	SEE RISER	-	100% RATED WITH GFI PROTECTION
	1	60	100	SURGE PROTECTION DEVICE (SPD)	(4) #6 & (1) #6G	1 1/4"	PER MFGR. REQUIREMENTS
	2	150	225	PANEL PP1A VIA T-5 XMFR	REFER TO SCHEDULE NOTE ③	③	
	3	400	400	PANEL MHP1A	4#500KCMIL+#3G	4"	
	4	100	100	PANEL LP1A	4#1+#8G	1 1/2"	
	5	150	225	PANEL PP2A VIA T-5 XFMR	REFER TO SCHEDULE NOTE ③	③	
	6	400	400	PANEL MHP2A	4#500KCMIL+#3G	4"	
①	7	100	100	PANEL LP2A	4#1+#8G	1 1/2"	
	8	150	225	PANEL PP3A VIA T-5 XFMR	REFER TO SCHEDULE NOTE ③	③	
	9	400	400	PANEL MHP3A	4#500KCMIL+#3G	4"	
①	10	100	100	PANEL LP3A	4#1+#8G	1 1/2"	
②	11	400	400	PANEL MHP2B2	4#500KCMIL+#3G	4"	
②	12	150	225	PANEL PP2B2 VIA T-5 XFMR	REFER TO SCHEDULE NOTE ③	③	
②	13	100	100	PANEL LP2B2	4#1+#8G	1 1/2"	
	14	150	225	PANEL PP1S	4#1/0+#6G	2"	
	15	400	400	PANEL 2DP1B	4#500KCMIL+#3G	4"	
	16	500	500	PANEL EV	2 SETS 4#250KCMIL+#2G	(2)2 1/2"	
②	17						
②	18						
	19						
	20						

① PROVIDE CURRENT LIMITING BREAKER UL LISTED SERIES RATED FOR 65,000 AMPS RMS @ RATED VOLTAGE WITH DOWNSTREAM BREAKERS IS ACCEPTABLE.
② PROVIDE CURRENT LIMITING BREAKER.
③ SEE TRANSFORMER SCHEDULE FOR WIRE AND CONDUIT SIZE.
④ CONDUCTOR SIZES SHOWN ARE FOR COPPER. ALUMINUM CONDUCTORS ARE ACCEPTABLE. RESIZE CONDUCTORS & CONDUITS ACCORDINGLY.
⑤ PROVIDE SHUNT TRIP CIRCUIT BREAKER.
⑥ PROVIDE ENERGY-REDUCING MAINTENANCE SWITCHING WITH LOCAL STATUS INDICATOR FOR ARC ENERGY REDUCTION.

277/480V, 3 PHASE, 4W, 65 KAIC
2500A BUS

FRONT ACCESSIBLE

SWITCHBOARD "MSB2" SCHEDULE ⑥

	OVER CURRENT DEVICES No.	TRIP	FRAME	CIRCUIT	FEEDER SIZE	COND. SIZE	REMARKS
	-	2000	2500	MAIN BREAKER	SEE RISER	-	100% RATED WITH GFI PROTECTION
	1	60	100	SPD	(4) #6 & (1) #6G	1 1/4"	PER MFGR. REQUIREMENTS
	2	150	250	PANEL PP3B VIA T-5 XFMR	REFER TO SCHEDULE NOTE ③	③	
	3	400	400	PANEL MHP3B	4#500KCMIL+#3G	4"	
	4	100	100	PANEL LP3B	4#1+#8G	1 1/2"	
	5	150	250	PANEL PP2B VIA T-5 XFMR	REFER TO SCHEDULE NOTE ③	③	
	6	400	400	PANEL MHP2B	4#500KCMIL+#3G	4"	
①	7	100	100	PANEL LP2B	4#1+#8G	1 1/2"	
	8	400	400	PANEL MHP1B	4#500KCMIL+#3G	4"	
	9	150	250	PANEL PP1B VIA T-5 XFMR	REFER TO SCHEDULE NOTE ③	③	
①	10	100	100	PANEL LP1B	4#1+#8G	1 1/2"	
②	11	100	100	PANEL OLP	4#1+#8G	1 1/2"	
②	12	400	400	PANEL KHP	4#500KCMIL+#3G	4"	
②	13	1000	1000	ATS-OS	3 SETS 4#400KCMIL+#2/0G	(3) 3"	
	14	250	400	ATS-LS	4#500KCMIL+#3G	4"	
	15						
	16						
②	17						
②	18						
	19						
	20						

① PROVIDE CURENT LIMITING BREAKER UL LISTED SERIES RATED FOR 65,000 AMPS RMS @ RATED VOLTAGE WITH DOWNSTREAM BREAKERS IS ACCEPTABLE.
② PROVIDE CURRENT LIMITING BREAKER.
③ SEE TRANSFORMER SCHEDULE FOR WIRE AND CONDUIT SIZE.
④ CONDUCTOR SIZES SHOWN ARE FOR COPPER. ALUMINUM CONDUCTORS ARE ACCEPTABLE. RESIZE CONDUCTORS & CONDUITS ACCORDINGLY.
⑤ PROVIDE SHUNT TRIP CIRCUIT BREAKER.
⑥ PROVIDE ENERGY-REDUCING MAINTENANCE SWITCHING WITH LOCAL STATUS INDICATOR FOR ARC ENERGY REDUCTION.

277/480V, 3 PHASE, 4W, 65 KAIC

PANEL SCHEDULE

	PANEL NO.	LOCATION	MTG	MAIN BUS AMPS	MAIN CB	BRANCH CKT BREAKER (AMPS) 1 POLE 15	20	30	2 POLE 15	20	30	3 POLE 15	20	30	60	TOTAL POLES	OTHERS
	ELP1A	1ST FLOOR AREA "A" EM. CLOSET	S	100												42	
	ELP1B	1ST FLOOR AREA "B" EM. CLOSET	S	100												42	
	ELP2A	2ND FLOOR AREA "A" EM. CLOSET	S	100												42	
	ELP2B	2ND FLOOR AREA "B" EM. CLOSET	S	100												42	
	ELP2B2	2ND FLOOR AREA "B" EM. CLOSET	S	100												42	
	EHP1B	1ST FLOOR AREA "B" ELEC ROOM	S	400												42	
	LP1A	1ST FLOOR AREA "A" ELEC ROOM	S	100												42	
	LP1B	1ST FLOOR AREA "B" ELEC ROOM	S	100												42	
	LP2A	2ND FLOOR AREA "A" ELEC ROOM	S	100												42	
	LP2B	2ND FLOOR AREA "B" ELEC ROOM	S	100												42	
	LP2B2	2ND FLOOR AREA "B" ELEC ROOM	S	100												42	
	LP3A	3RD FLOOR AREA "A" ELEC ROOM	S	100												42	
	LP3B	3RD FLOOR AREA "A" ELEC ROOM	S	100												42	
	OLP	1ST FLOOR AREA "B" ELEC ROOM	S	100												42	
	KHP	1ST FLOOR AREA "B" ELEC ROOM	S	400												42	
	MHP1A	1ST FLOOR AREA "A" ELEC ROOM	S	400												42	
	MHP1B	1ST FLOOR AREA "B" ELEC ROOM	S	400												42	
	MHP2A	2ND FLOOR AREA "A" ELEC ROOM	S	400												42	
	MHP2B	2ND FLOOR AREA "B" ELEC ROOM	S	400												42	
	MHP2B	2ND FLOOR AREA "B" ELEC ROOM	S	400												42	
	MHP3A	3RD FLOOR AREA "A" ELEC ROOM	S	600												42	
	MHP3B	3RD FLOOR AREA "A" ELEC ROOM	S	600												42	

① FED FROM CURRENT LIMITING BREAKERS. UL LISTED SERIES RATED FOR 65,000A RMS @ RATED VOLTAGE WITH UPSTREAM BREAKERS IS ACCEPTABLE.
② PROVIDE SHUNT TRIP CIRCUIT BREAKER WITH 120V COIL.
③ SINGLE TUB PANEL BUT TALLER IN HEIGHT.

277/480V, 3 PHASE, 4W, 65 KAIC
1000A MLO

DISTRIBUTION PANEL "NEDP" SCHEDULE

	OVER CURRENT DEVICES No.	TRIP	FRAME	CIRCUIT	FEEDER SIZE	COND. SIZE	REMARKS
①	1	100	100	PANEL EP1A VIA T-6	REFER TO SCHEDULE NOTE ③	③	
②	2	400	400	PANEL EHP1B	4#500KCMIL+#3G	4"	
	3	600	600	ASHP-1	2 SETS 4#350KCMIL+#1G	(2) 3"	
	4	100	100	ELEVATOR	4#1+#8G	1 1/2"	
	5	60	100				
①	6	100	100				
	7	90	100				
①	8	300	400				
①	9	100	100				
②	10	200	225				
	11	-	100				
	12	-	225				
	13	-	225				
	14						
	15						

① UL LISTED SERIES RATED FOR 65,000A RMS @ RATED VOLTAGE WITH DOWNSTREAM BREAKERS IS ACCEPTABLE.
② PROVIDE CURRENT LIMITING BREAKER
③ SEE TRANSFORMER SCHEDULE FOR WIRE AND CONDUIT SIZE.
④ CONDUCTOR SIZES SHOWN ARE FOR COPPER. ALUMINUM CONDUCTORS ARE ACCEPTABLE. RESIZE CONDUCTORS & CONDUITS ACCORDINGLY.

120/208V, 3 PHASE, 4W, 65 KAIC
400A MLO

DISTRIBUTION PANEL "2DP1B" SCHEDULE

	OVER CURRENT DEVICES No.	TRIP	FRAME	CIRCUIT	FEEDER SIZE	COND. SIZE	REMARKS
	1	150	225	PANEL PP2A2	4#1/0+#6G	2"	
	2	200	225	PANEL MP2A2	4#3/0+#6G	2"	
	3	150	225	PANEL PP2A3	4#1/0+#6G	2"	
	4	200	225	PANEL MP2A3	4#3/0+#6G	2"	
	5	-	100	SPACE PROVISIONS	-	-	
	6	-	225	SPACE PROVISIONS	-	-	
	7	-	225	SPACE PROVISIONS	-	-	
	8						
	9						
	10						
	11						
	12						
	13						
	14						
	15						

① UL LISTED SERIES RATED FOR 65,000A RMS @ RATED VOLTAGE WITH DOWNSTREAM BREAKERS IS ACCEPTABLE.
② PROVIDE CURRENT LIMITING BREAKER
③ SEE TRANSFORMER SCHEDULE FOR WIRE AND CONDUIT SIZE.
④ CONDUCTOR SIZES SHOWN ARE FOR COPPER. ALUMINUM CONDUCTORS ARE ACCEPTABLE. RESIZE CONDUCTORS & CONDUITS ACCORDINGLY.

120/208V, 3 PHASE, 4W, 22 KAIC

PANEL SCHEDULE

	PANEL NO.	LOCATION	MTG	MAIN BUS AMPS	MAIN CB	BRANCH CKT BREAKER (AMPS) 1 POLE 15	20	30	2 POLE 15	20	30	3 POLE 15	20	30	60	TOTAL POLES	OTHERS
④ ③	EP1A	1ST FLOOR AREA "A" ELEC RM	S	100												84	
⑤ ③	EP1B	1ST FLOOR AREA "B" ELEC RM	S	100												42	
③	EP2A	2ND FLOOR AREA "A" ELEC RM	S	100												42	
③	EP2B	2ND FLOOR AREA "B" ELEC RM	S	100												42	
③	EP2B2	2ND FLOOR AREA "B" ELEC RM	S	100												42	
③	EP3A	3RD FLOOR AREA "A" ELEC RM	S	100												42	
③	EP3B	3RD FLOOR AREA "A" ELEC RM	S	100												42	
④ ③	TEP1B	1ST FLOOR AREA "B" IDF ROOM	S	100												84	
④ ③	TEP2A	2ND FLOOR AREA "A" IDF ROOM 203	S	60												42	
④ ③	TEP2B	2ND FLOOR AREA "A" IDF ROOM 229	S	60												42	
⑤ ②	KPP	1ST FLOOR AREA "B" ELEC ROOM	S	250												84	
⑤ ②	PP1A	1ST FLOOR AREA "A" ELEC RM	S	225												84	
④ ②	PP1B	1ST FLOOR AREA "B" ELEC RM	S	225												84	
①	PP1S	1ST FLOOR AREA "B" STAGE	S	225												42	
⑤ ②	PP2A	2ND FLOOR AREA "A" ELEC RM	S	225												84	
⑤ ②	PP2A2	2ND FLOOR AREA "A" ELEC RM	S	225												84	
⑤ ②	PP2A3	2ND FLOOR AREA "A" ELEC RM	S	225												84	
④ ②	PP2B	2ND FLOOR AREA "B" ELEC RM	S	225												84	
④ ②	PP2B2	2ND FLOOR AREA "B" ELEC RM	S	225												84	
⑤ ②	PP3A	3RD FLOOR AREA "A" ELEC RM	S	225												84	
④ ②	PP3B	3RD FLOOR AREA "A" ELEC RM	S	225												84	
①	EV	1ST FLOOR AREA "B" ELEC RM	S	500												84	
④ ⑥	MP1A	1ST FLOOR AREA "A" ELEC RM	S	400												84	
⑤ ⑥	MP1B	1ST FLOOR AREA "B" ELEC RM	S	400												84	
④ ⑥	MP2A	2ND FLOOR AREA "A" ELEC RM	S	400												84	
④ ⑥	MP2B	2ND FLOOR AREA "B" ELEC RM	S	400												84	
④ ⑥	MP2B2	2ND FLOOR AREA "B" ELEC RM	S	400												84	
④ ⑥	MP3A	3RD FLOOR AREA "A" ELEC RM	S	400												84	
④ ⑥	MP3B	3RD FLOOR AREA "A" ELEC RM	S	400												84	

① PROVIDE SHUNT TRIP MAIN CIRCUIT BREAKER WITH 120V COIL.
② 200% NEUTRAL BUS.
③ DOUBLE NEUTRAL BUS AND IG BUS.
④ SINGLE TUB PANEL BUT TALLER IN HEIGHT.
⑤ DOUBLE TUB PANEL BUT TALLER IN HEIGHT.
⑥ PROVIDE GFPE TYPE CIRCUIT BREAKER FOR EWC'S.

SUB-METERING (BFM) SCHEDULE

##	LOAD METERED	LOAD TYPE	VOLTAGE, PH, WIRE	AMPERE RATING	NOTES
1	MAIN SERVICE	TOTAL ELEC ENERGY	277/480V, 3PH, 4W	2000	-
2	MAIN SERVICE	TOTAL ELEC ENERGY	277/480V, 3PH, 4W	2000	
3	PP1A	PLUGLOAD / REC	277/480V, 3PH, 4W	150	
4	MHP1A	HVAC	277/480V, 3PH, 4W	400	
5	LP1A	INTERIOR LIGHTING	277/480V, 3PH, 4W	200	
6	PP2A	PLUGLOAD / REC	277/480V, 3PH, 4W	150	
7	MHP2A	HVAC	277/480V, 3PH, 4W	400	
8	LP2A	INTERIOR LIGHTING	277/480V, 3PH, 4W	100	
9	PP3A	PLUGLOAD / REC	277/480V, 3PH, 4W	150	
10	MHP3A	HVAC	277/480V, 3PH, 4W	400	
11	LP3A	INTERIOR LIGHTING	277/480V, 3PH, 4W	100	
12	MHP2B2	HVAC	277/480V, 3PH, 4W	400	
13	PP2B2	PLUGLOAD / REC	277/480V, 3PH, 4W	150	
14	LP2B2	INTERIOR LIGHTING	277/480V, 3PH, 4W	100	
15	PP1S	INTERIOR LIGHTING	277/480V, 3PH, 4W	100	
16	EV	EV CHARGING	277/480V, 3PH, 4W	500	
17	PP3B	PLUGLOAD / REC	277/480V, 3PH, 4W	150	
18	MHP3B	HVAC	277/480V, 3PH, 4W	400	
19	LP3B	INTERIOR LIGHTING	277/480V, 3PH, 4W	100	
20	PP2B	PLUGLOAD / REC	277/480V, 3PH, 4W	150	
21	MHP2B	HVAC	277/480V, 3PH, 4W	400	
22	LP2B	INTERIOR LIGHTING	277/480V, 3PH, 4W	100	
23	MHP1B	HVAC	277/480V, 3PH, 4W	400	
24	PP1B	PLUGLOAD / REC	277/480V, 3PH, 4W	150	
25	LP1B	INTERIOR LIGHTING	277/480V, 3PH, 4W	100	
26	OLP	EXTERIOR LIGHTING	277/480V, 3PH, 4W	100	
27	KHP	KITCHEN EQUIPMENT	277/480V, 3PH, 4W	400	
28	EP1A	EMERGENCY POWER	277/480V, 3PH, 4W	100	
29	EHP1B	EMERGENCY POWER	277/480V, 3PH, 4W	400	
30	ASHP-1	HVAC	277/480V, 3PH, 4W	600	
31	ELEVATOR	ELEVATOR	277/480V, 3PH, 4W	100	
32	ATS-OS	EMERGENCY POWER	277/480V, 3PH, 4W	1000	
33	ATS-LS	EMERGENCY POWER	277/480V, 3PH, 4W	400	
34	PP2A2	PLUGLOAD / REC	120/208V, 3PH, 4W	150	
35	MP2A2	HVAC	120/208V, 3PH, 4W	200	
36	PP2A3	PLUGLOAD / REC	120/208V, 3PH, 4W	150	
37	MP2A3	HVAC	120/208V, 3PH, 4W	200	
38	SPARE	-	-	-	
39	SPARE	-	-	-	
40	SPARE	-	-	-	

SUB-METERING NOTES:

1. PROVIDE SATEC BFM-II SUB-METERING SYSTEM OR APPROVED EQUAL. SEE ELECTRICAL SPECIFICATIONS FOR COMPLETE SET OF SYSTEM REQUIREMENTS.
2. SINGLE BFM-II EXTENDED UNIT WITH V/M DUAL VOLTAGE INPUT MODULE CAN MONITOR UP TO 36 SINGLE PHASE / 12 THREE PHASE CURRENT CHANNELS. PROVIDE MULTIPLE BFM-II UNITS AS REQUIRED TO ACCOMMODATE LOADS AS SCHEDULED.
3. PROVIDE 15A/3P CIRCUIT BREAKER PER VOLTAGE SOURCE FOR EACH BFM-II UNIT FOR INPUT VOLTAGE REFERENCE.
4. PROVIDE NEMA-1 ENCLOSURE WITH HINGED COVER AND DIN RAIL MOUNTING PROVISIONS TO HOUSE BFM-II UNIT(S) AND ACCESSORY MODULES. COORDINATE EXACT DIMENSIONS WITH ACTUAL EQUIPMENT TO BE INSTALLED.
5. CURRENT TRANSFORMERS (C/T) SHALL BE SIZED FOR LOAD SCHEDULED WITH LEADS SELECTED BY METERING MANUFACTURER TO ALLOW FOR DISTANCE REQUIRED BETWEEN C/T'S AND METERING UNIT. PROVIDE EXTERNAL WIRING TROUGH AND/OR BOXES FOR INSTALLATION OF CURRENT TRANSFORMERS AROUND CONDUCTORS IF REQUIRED TO MAINTAIN CODE COMPLIANT PANELBOARD GUTTER FILL.
6. PROVIDE THREE (3) SPLIT / SOLID CORE CURRENT TRANSFORMERS FOR EACH THREE PHASE LOAD IN SCHEDULE. PROVIDE ONE (1) SPLIT/ SOLID CORE CURRENT TRANSFORMER FOR EACH SINGLE PHASE LOAD IN SCHEDULE.
7. PROVIDE ONE (1) CAT-6A CONNECTION FROM EACH BFM-II UNIT TO NEAREST MDF/IDF ROOM.

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

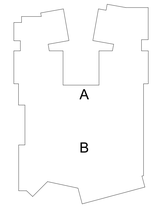
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KEY PLAN

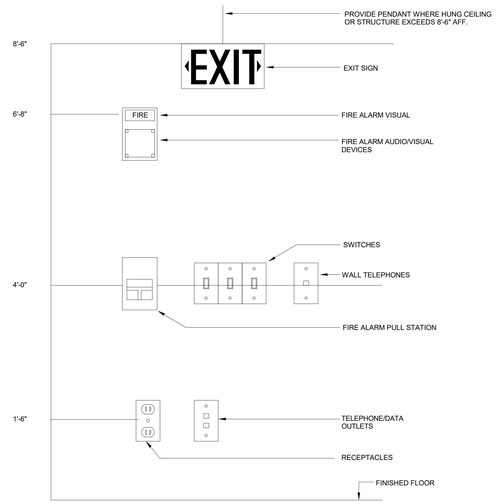


ORIENTATION AND SCALE:

SHEET TITLE:
ELECTRICAL PANEL SCHEDULES

SHEET NUMBER:
E3.02

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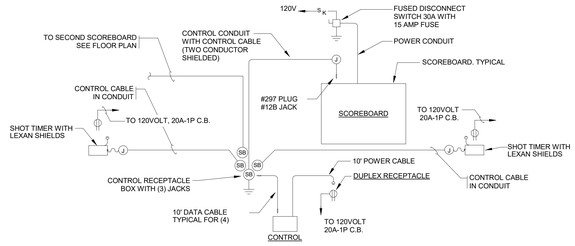


NOTES:

1. ALL MOUNTING HEIGHTS SHALL BE MEASURED FROM FINISHED FLOOR TO CENTERLINE OF DEVICE EXCEPT EXIT SIGNS. MEASURE 6'-8" TO VISUAL OF AUDIO/VISUAL DEVICE.
2. DEVICES SHALL BE INSTALLED ON A COMMON VERTICAL CENTERLINE WHEREVER POSSIBLE.
3. ALL DEVICES SHALL BE INSTALLED AT MOUNTING HEIGHTS AS INDICATED ON THIS DETAIL UNLESS OTHERWISE NOTED.

1 / E3.03 TYPICAL DEVICE MOUNTING HEIGHT DETAIL

SCALE: N.T.S

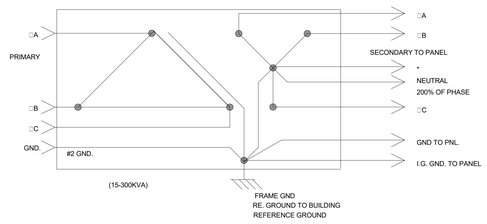


NOTES:

1. POWER WIRING SHOULD BE ROUTED IN SEPARATE CONDUIT FROM CONTROL CABLING. PROVIDE 1/2" CONDUIT FOR POWER AND 3/4" CONDUIT FOR CONTROL.

2 / E3.03 BASKETBALL SCOREBOARD WIRING DIAGRAM

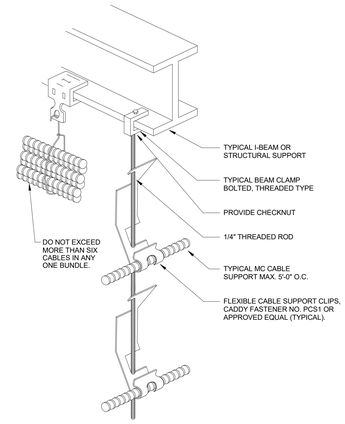
SCALE: N.T.S.



3 / E3.03 K-RATED TRANSFORMER CONNECTIONS WIRING DETAIL

SCALE: N.T.S.

* NEUTRAL CONDUCTORS #1/0 OR LARGER MAY BE PARALLELED. DO NOT PARALLEL CONDUCTORS SMALLER THAN #1/0.

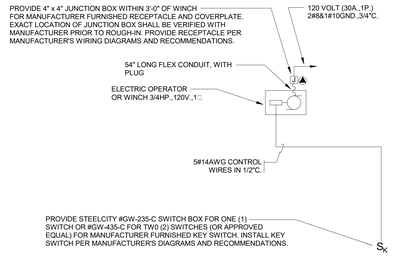


NOTES:

1. SUPPORTING CABLE IS ACCEPTABLE BELOW SUPPORT STEEL OR ABOVE STEEL. COORDINATE MOUNTING LOCATIONS WITH OTHER TRADES AND FIELD CONDITIONS. PROVIDE SUPPORT CLIPS AND THREADED RODES AS REQUIRED FOR A COMPLETE SUPPORT SYSTEM AS INDICATED.
2. SUPPORT CABLES FROM EITHER PARALLEL OR PERPENDICULAR SUPPORT STEEL.
3. BUNDLE A UP TO A MAXIMUM OF (6) SIX CABLES.

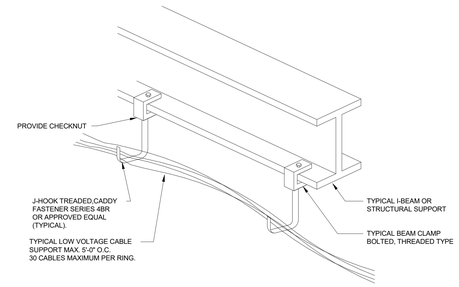
4 / E3.03 TYPICAL MC CABLE SUPPORTING DETAIL

SCALE: N.T.S.



5 / E3.03 TYPICAL ELECTRICAL WINCH WIRING FOR BACKBOARD, CURTAIN OR BLEACHER

SCALE N.T.S.

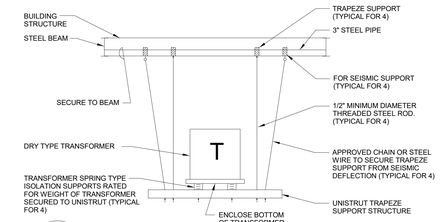


NOTES:

1. SUPPORTING CABLE IS ACCEPTABLE BELOW SUPPORT STEEL OR ABOVE STEEL. COORDINATE MOUNTING LOCATIONS WITH OTHER TRADES AND FIELD CONDITIONS. PROVIDE SUPPORT CLIPS AND THREADED RODS AS REQUIRED FOR A COMPLETE SUPPORT SYSTEM AS INDICATED.
2. SUPPORT CABLE EITHER PARALLEL OR PERPENDICULAR TO SUPPORT STEEL.

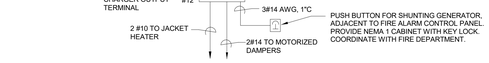
6 / E3.03 TYPICAL LOW VOLTAGE CABLE SUPPORT DETAIL

SCALE N.T.S.



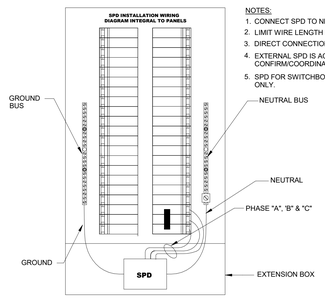
7 / E3.03 TRAPEZE MOUNTED TRANSFORMER DETAIL

SCALE: N.T.S.
NOTE: CONFIRM WITH STRUCTURAL ENGINEER.



8 / E3.03 TYPICAL EMERGENCY GENERATOR CONTROL WIRING

SCALE: N.T.S. (NOTE: MAY VARY BY MANUFACTURER)



NOTES:

1. CONNECT SPD TO NEAREST 60A BREAKER IN PANEL.
2. LIMIT WIRE LENGTH TO 18" OR LESS, KEEP WIRE FREE OF ANY SHARP BENDS.
3. DIRECT CONNECTION TO PHASE BUS IS NOT PERMITTED.
4. EXTERNAL SPD IS ACCEPTABLE; PROVIDE WITH 60A/3P BREAKER. ALSO CONFIRM/COORDINATE MOUNTING SPACE FOR EXTERNAL SPD.
5. SPD FOR SWITCHBOARD(S) AND DISTRIBUTION PANEL(S) SHALL BE EXTERNAL ONLY.

9 / E3.03 SPD WIRING DIAGRAM

SCALE: N.T.S.

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999
VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

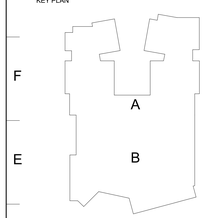
NO.	DATE	TITLE

ISSUE TITLE AND DATE:

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06/19/2026

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KEY PLAN

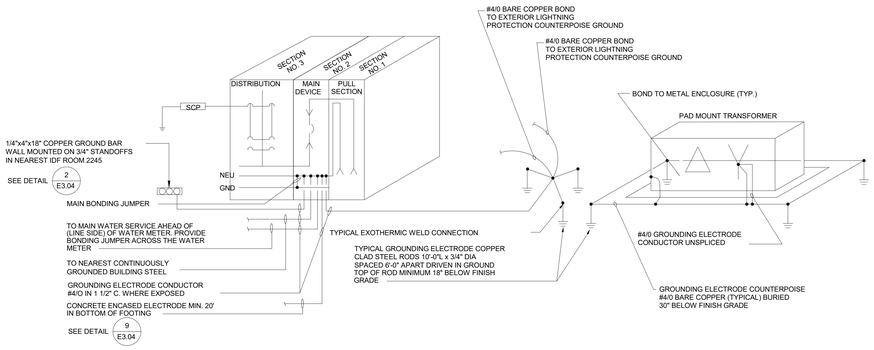


ORIENTATION AND SCALE:

SHEET TITLE:
ELECTRICAL DETAILS

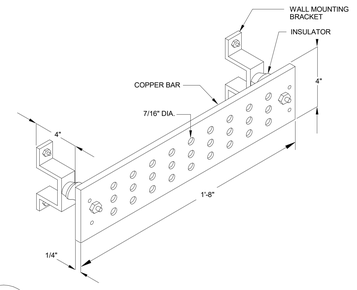
SHEET NUMBER:
E3.03

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6/17/2026 11:40:17 AM



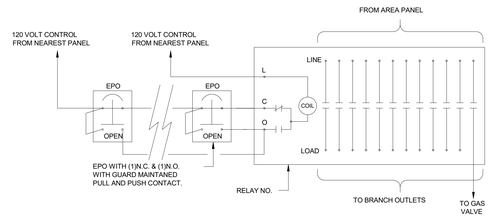
1 E3.04 MAIN SWITCHBOARD GROUNDING DETAIL (TYPICAL)

SCALE: N.T.S.



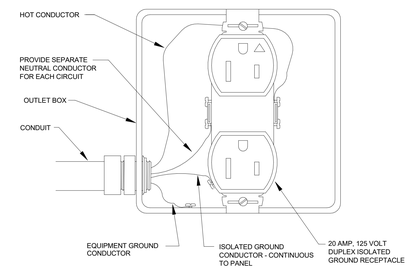
2 E3.04 TELECOMMUNICATIONS GROUNDING BAR DETAIL

SCALE: N.T.S.



3 E3.04 EPO SHUTDOWN DETAIL

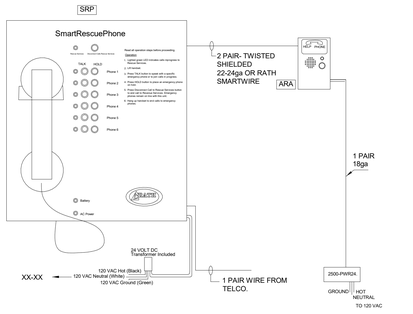
SCALE: N.T.S.



NOTE:
MAXIMUM OF (2) I.G. RECEPTACLES OR (1) QUADRUPLEX I.G. RECEPTACLES PER CIRCUIT

4 E3.04 I.G. RECEPTACLE DETAIL

SCALE: N.T.S.

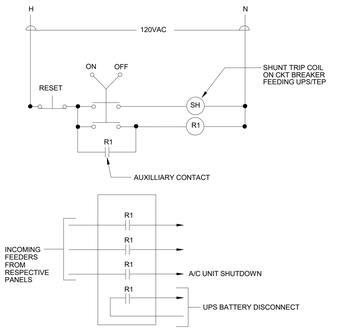


5 E3.04 SMARTRESCUE BASE STATION WIRING DIAGRAM

SCALE: N.T.S.

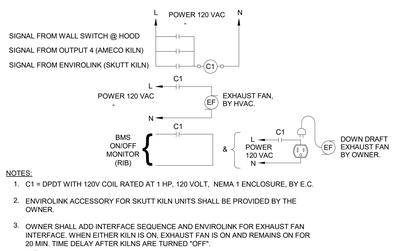
SRP SMART RESCUE PHONE

ARA AREA RESCUE ASSISTANCE BUTTON



6 E3.04 NET/TEL ROOM 112.0 SHUT DOWN DETAIL

SCALE: N.T.S.

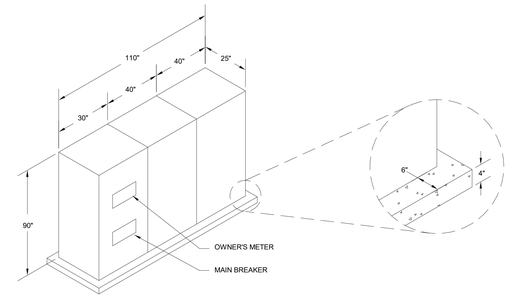


NOTES:

1. C1 = DPDT WITH 120V COIL RATED AT 1 HP, 120 VOLT, NEMA 1 ENCLOSURE, BY E.C.
2. ENVIROLINK ACCESSORY FOR SKUTT KILN UNITS SHALL BE PROVIDED BY THE OWNER.
3. OWNER SHALL ADD INTERFACE SEQUENCE AND ENVIROLINK FOR EXHAUST FAN INTERFACE. WHEN EITHER KILN IS ON, EXHAUST FAN IS ON AND REMAINS ON FOR 20 MIN. TIME DELAY AFTER KILNS ARE TURNED "OFF".

7 E3.04 KILN EXHAUST FAN TIE-IN DETAIL

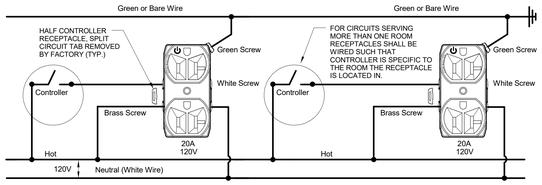
N.T.S.



NOTE:
SWITCHBOARD DIMENSIONS ARE FOR DIAGRAMMATICAL PURPOSES. CONSULT APPROVED MANUFACTURER'S EQUIPMENT FOR ACTUAL DIMENSIONS.

8 E3.04 MAIN SWITCHBOARD "MSB" ELEVATION DETAIL

SCALE: N.T.S.

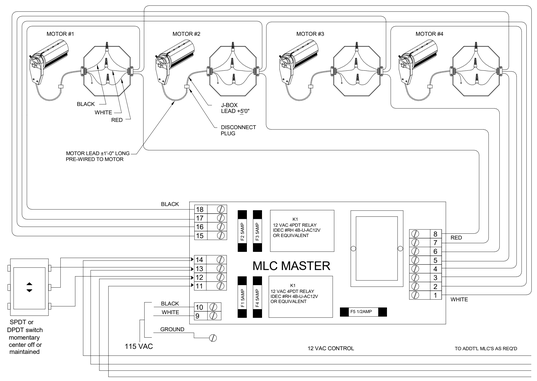


9 E3.04 PLUG LOAD CONTROLLED RECEPTACLE DETAIL

SCALE: N.T.S.

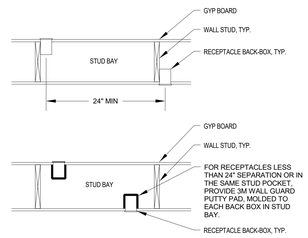
NOTES:

1. ALL GFI/GFC RECEPTACLES ARE NOT TO BE SPLIT TAB TYPE AND SHOULD BE FULLY CONTROLLED BY OCCUPANCY SENSOR.



10 E3.04 MOTOR LOGIC CONTROLLER (MLC) WIRING DIAGRAM

SCALE: N.T.S.

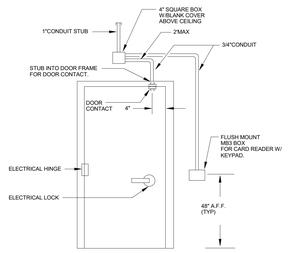


NOTES:

1. ALL BOXES ARE TO BE OFFSET HORIZONTALLY WHERE SPACES SHARE A STUD WALL IN WHICH OUTLETS ARE TO BE INSTALLED.
2. WHERE BACK BOXES EXCEED 100 SQUARE INCHES PER 100 SQUARE FEE OF WALL SURFACE FOR FIRE RATED WALLS, PROVIDE 3M WALL GUARD PUTTY, MOLDED TO BACK-BOX.

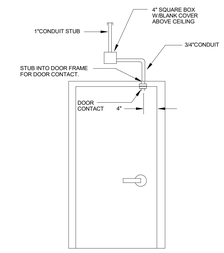
11 E3.04 ELECTRICAL BACK-BOX INSTALLATION DETAIL

SCALE: N.T.S.



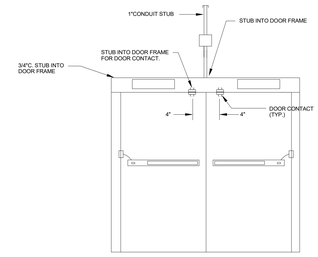
12 E3.04 TYPICAL EXTERIOR DOOR W/ ACCESS CONTROL

SCALE: N.T.S.



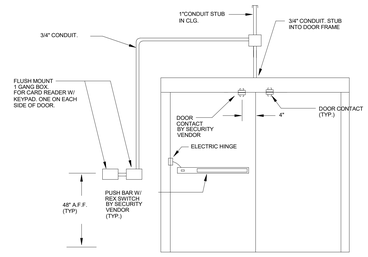
13 E3.04 TYPICAL DOOR WITHOUT ACCESS CONTROL

SCALE: N.T.S.



14 E3.04 TYPICAL EXTERIOR DOOR WITHOUT ACCESS CONTROL

SCALE: N.T.S.



15 E3.04 TYPICAL EXTERIOR DOOR W/ ACCESS CONTROL

SCALE: N.T.S.

GENERAL NOTES

1. ALL BOX, CONDUIT AND 120V WIRING PROVISIONS FOR SECURITY SYSTEM SHALL BE PROVIDED BY SECTION 260000. REFER TO FLOOR PLANS FOR QUANTITIES AND LOCATIONS OF EQUIPMENT.

IESS SYMBOL LEGEND

NOTE

TYPICALLY ALL CONDUITS TO RUN TO AN ACCESSIBLE CEILING.

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

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375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

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320 SALEM ST.
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PROJECT NUMBER: 23-0847

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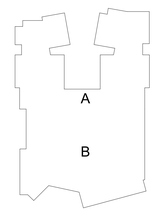
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KEY PLAN



ORIENTATION AND SCALE:

SHEET TITLE:
ELECTRICAL DETAILS

SHEET NUMBER:
E3.04

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6/17/2026 11:40:17 AM

ELECTRICAL SCHEDULE OF MECHANICAL EQUIPMENT (10)(11)

UNIT NO.	DESCRIPTION	LOCATION	LOAD CHARACTERISTICS	VOLT	PH	PANEL CIRCUIT	CIRCUIT BREAKER	FEEDER	EQUIPMENT AND CONNCECTIONS: TS				S D	CO2 D	WP	J	S WP	VFD	REMARKS
ASHP-1	AIR SOURCE HEAT PUMP	ROOF	588 MCA/600 MOCP	480	3	NEDP-3	600A/3P	SEE "NEDP" SCHEDULE	-	X	-	X	-	-	-	X	-	-	-
		CONTROL PANEL	15 MOCP	120	1	-	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
		-	15 MOCP	120	1	-	20A/1P	2#12+#12G, 3/4"C	(8)X	-	-	(8)X	-	-	-	(8)X	-	-	MISC. INTERCONNECTION REQUIREMENTS
ASHP-2	AIR SOURCE HEAT PUMP	ROOF	588 MCA/600 MOCP	480	3	MSB2-15	600A/3P	SEE "MSB2" SCHEDULE	-	X	-	X	-	-	-	X	-	-	-
		CONTROL PANEL	15 MOCP	120	1	-	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
		-	15 MOCP	120	1	-	20A/1P	2#12+#12G, 3/4"C	(8)X	-	-	(8)X	-	-	-	(8)X	-	-	MISC. INTERCONNECTION REQUIREMENTS
CP-1	CONDENSATE PUMP	-	14 W	120	1	-	20A/1P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (3)
DCUc-1	CONDENSER	ROOF	18.8 MCA/20 MOCP	208	1	EP1B-7,9	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-1	EVAPORATER	151 MAIN ELEC	1 MCA	208	1	EP1B-8,10	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
DCUc-2	CONDENSER	ROOF	18.8 MCA/20 MOCP	208	1	EP1B-11,13	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-2	EVAPORATER	151 MAIN ELEC	1 MCA	208	1	EP1B-12,14	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
DCUc-3A	CONDENSER	ROOF	34.6 MCA/35 MOCP	208	1	EP1B-15,17	35A/2P	2#8+#10G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-3A	EVAPORATER	149 MDF	1 MCA	208	1	EP1B-16,18	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
DCUc-3B	CONDENSER	ROOF	34.6 MCA/35 MOCP	208	1	EP1B-19,21	35A/2P	2#8+#10G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-3B	EVAPORATER	149 MDF	1 MCA	208	1	EP1B-20,22	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
DCUc-4	CONDENSER	ROOF	12.3 MCA/15 MOCP	208	1	EP2B-3,5	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-4	EVAPORATER	249 ELEC	1 MCA	208	1	EP2B-4,6	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
DCUc-5	CONDENSER	ROOF	12.3 MCA/15 MOCP	208	1	EP2A-3,5	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-5	EVAPORATER	221 ELEC	1 MCA	208	1	EP2A-4,6	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
DCUc-6	CONDENSER	ROOF	12.3 MCA/15 MOCP	208	1	EP2B2-11,13	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-6	EVAPORATER	255 ELEC	1 MCA	208	1	EP2B2-12,14	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
DCUc-7	CONDENSER	ROOF	12.3 MCA/15 MOCP	208	1	EP3B-3,5	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-7	EVAPORATER	332 ELEC	1 MCA	208	1	EP3B-4,6	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
DCUc-8	CONDENSER	ROOF	18.8 MCA/20 MOCP	208	1	EP1B-23,25	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-8	EVAPORATER	126 ELEV. MACHINE RM	1 MCA	208	1	EP1B-24,26	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
DCUc-9	CONDENSER	ROOF	12.3 MCA/15 MOCP	208	1	EP3A-3,5	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-9	EVAPORATER	304 ELEC	1 MCA	208	1	EP3A-4,6	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
DCUc-10	CONDENSER	ROOF	12.3 MCA/15 MOCP	208	1	EP1A-3,5	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-10	EVAPORATER	117 ELEC	1 MCA	208	1	EP1A-4,6	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
DCUc-11	CONDENSER	ROOF	34.6 MCA/35 MOCP	208	1	EP2A-7,9	35A/2P	2#8+#10G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-11	EVAPORATER	203 IDF	1 MCA	208	1	EP2A-8,10	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
DCUc-12	CONDENSER	ROOF	34.6 MCA/35 MOCP	208	1	EP2B-7,9	35A/2P	2#8+#10G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
DCUe-12	EVAPORATER	229 IDF	1 MCA	208	1	EP2B-8,10	20A/2P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	- (1)(2)(3)
EF-1	EXHAUST FAN	ROOF	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-
EF-2	EXHAUST FAN	ROOF	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-
EF-3	EXHAUST FAN	ROOF	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-
EF-4	EXHAUST FAN	116A STORAGE	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-
BF-5	EXHAUST FAN	CUST. LAUNDRY	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-
BF-6	EXHAUST FAN	KITCHEN LAUNDRY	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-
KEF-1	KITCHEN EXHAUST FAN	ROOF	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	- (8)
EB-1	ELECTRIC BOILER	ROOF	723 FLA/904 MCA	480	3	MSB1-17	1000A/3P	SEE "MSB1" SCHEDULE	-	X	-	X	-	-	-	X	-	-	-
FCU-1-1	FAN COIL UNIT	ROOF	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-
FCU-1-2	FAN COIL UNIT	ROOF	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-
FCU-1-3	FAN COIL UNIT	ROOF	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-
FCU-1-4	FAN COIL UNIT	ROOF	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-
FCU-1-5	FAN COIL UNIT	ROOF	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-
FCU-1-6	FAN COIL UNIT	ROOF	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-
GF-1	GLYCOL MAKE UP	247 MECH PUMP RM	.7 A	120	1	MP2B-1	20A/1P	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
GF-2	GLYCOL MAKE UP	247 MECH PUMP RM	.7 A	120	1	MP2B-1	-	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
GF-3	GLYCOL MAKE UP	-	.7 A	120	1	MP2B-	-	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
GF-4	GLYCOL MAKE UP	-	.7 A	120	1	MP2B-	-	2#12+#12G,3/4"C	X	-	-	X	-	-	-	X	-	-	-
MAU-1	MAKE UP AIR UNIT	KITCHEN	9.2 MCA/15 MOCP	480	3	MHP2B-1,2,3	20A/3P	4#12+#12G, 3/4"C	-	X	-	X	-	-	-	X	-	-	-
		-	15 MOCP	120	1	MP2B-2	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
P-1	WATER PUMP	247 MECH PUMP RM	7.5 HP	480	3	EHP2B-1,3,5	20A/3P	3#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
P-2	WATER PUMP	247 MECH PUMP RM	7.5 HP	480	3	EHP2B-2,4,6	20A/3P	3#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
P-3	WATER PUMP	247 MECH PUMP RM	7.5 HP	480	3	EHP2B-7,9,11	20A/3P	3#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
P-4	WATER PUMP	247 MECH PUMP RM	10 HP	480	3	MHP2B-2,4,6	30A/3P	3#10+#10G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
P-5	WATER PUMP	247 MECH PUMP RM	10 HP	480	3	MHP2B-7,9,11	30A/3P	3#10+#10G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
P-6	WATER PUMP	247 MECH PUMP RM	10 HP	480	3	MHP2B-8,10,12	30A/3P	3#10+#10G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
P-7	WATER PUMP	247 MECH PUMP RM	20 HP	480	3	EHP2B-8,10,12	60A/3P	3#4+#10G, 1"C	X	-	-	X	-	-	-	X	-	-	-
P-8	WATER PUMP	247 MECH PUMP RM	20 HP	480	3	EHP2B-13,15,17	60A/3P	3#4+#10G, 1"C	X	-	-	X	-	-	-	X	-	-	-
P-9	WATER PUMP	247 MECH PUMP RM	20 HP	480	3	MHP2B-13,15,17	60A/3P	3#4+#10G, 1"C	X	-	-	X	-	-	-	X	-	-	-
P-10	WATER PUMP	247 MECH PUMP RM	20 HP	480	3	MHP2B-14,16,18	60A/3P	3#4+#10G, 1"C	X	-	-	X	-	-	-	X	-	-	-
P-11	WATER PUMP	247 MECH PUMP RM	20 HP	480	3	MHP2B-19,21,23	60A/3P	3#4+#10G, 1"C	X	-	-	X	-	-	-	X	-	-	-
P-12	WATER PUMP	247 MECH PUMP RM	10 HP	480	3	MHP2B-20,22,24	20A/3P	3#10+#10G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
P-13	WATER PUMP	247 MECH PUMP RM	10 HP	480	3	MHP2B-25,27,29	20A/3P	3#10+#10G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
BP-1	WATER PUMP	247 MECH PUMP RM	3 HP	480	3	MHP2B-26,28,30	20A/3P	3#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
RTU-1	ROOF TOP UNIT	ROOF	69.4 MCA/80 MOCP	480	3	MHP3A-1,3,5	80A/3P	3#3+#8G, 1 1/4"C	-	X	-	X	-	-	-	X	-	-	-
		-	15 MOCP	120	1	MP3A-1	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
RTU-2	ROOF TOP UNIT	ROOF	69.4 MCA/80 MOCP	480	3	MHP3B-1,3,5	80A/3P	3#3+#8G, 1 1/4"C	-	X	-	X	-	-	-	X	-	-	-
		-	15 MOCP	120	1	MP3B-1	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
RTU-3	ROOF TOP UNIT	ROOF	45.2 MCA/50 MOCP	480	3	MHP3B-2,4,6	50A/3P	3#6+#10G, 1"C	-	X	-	X	-	-	-	X	-	-	-
		-	15 MOCP	120	1	MP3B-2	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
RTU-4	ROOF TOP UNIT	ROOF	50.8 MCA/60 MOCP	480	3	EHP2B-14,16,18	60A/3P	3#4+#8G, 1 1/4"C	-	X	-	X	-	-	-	X	-	-	-
		-	15 MOCP	120	1	EP2B-11	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
RTU-5	ROOF TOP UNIT	ROOF	31.5 MCA/45 MOCP	480	3	EHP2B-20,22,24	45A/3P	3#8+#10G, 3/4"C	-	X	-	X	-	-	-	X	-	-	-
		-	15 MOCP	120	1	EP2B-12	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
RTU-6	ROOF TOP UNIT	ROOF	9.1 MCA/15 MOCP	480	3	MHP2B-31,33,35	20A/3P	3#12+#12G, 3/4"C	-	X	-	X	-	-	-	X	-	-	-
		-	15 MOCP	120	1	MP2B-3	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
RTU-7	ROOF TOP UNIT	ROOF	10.0 MCA/15 MOCP	480	3	MHP2B-32,34,36	20A/3P	3#12+#12G, 3/4"C	-	X	-	X	-	-	-	X	-	-	-
		-	15 MOCP	120	1	MP2B-4	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
RTU-8	ROOF TOP UNIT	ROOF	13.1 MCA/15 MOCP	480	3	MHP2B2-1,3,5	20A/3P	3#12+#12G, 3/4"C	-	X	-	X	-	-	-	X	-	-	-
		-	15 MOCP	120	1	MP2B2-1	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
RTU-9	ROOF TOP UNIT	ROOF	- MCA/- MOCP	480	3	EHP3B-1,3,5	20A/3P	3#12+#12G, 3/4"C	-	X	-	X	-	-	-	X	-	-	-
		-	15 MOCP	120	1	EP2B2-15	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
UH-01	UNIT HEATER	152 WATER ENTRY	1/4 HP	120	1	MP1B-8	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
UH-02	UNIT HEATER	155A RECYCLING RM	1/4 HP	120	1	MP1B-9	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
UH-03	UNIT HEATER	155 RECEIVING	1/4 HP	120	1	MP1B-10	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
UH-04	UNIT HEATER	247 MECH PUMP RM	1/4 HP	120	1	MP2B-5	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
UH-05	UNIT HEATER	247 MECH PUMP RM	1/4 HP	120	1	MP2B-6	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-01	UNIT HEATER	S3-1 STAIR 3	1/4 HP	120	1	MP2A3-1	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-02	UNIT HEATER	S4-1 STAIR 4	1/4 HP	120	1	MP1B-11	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-03	UNIT HEATER	124 VESTIBULE	1/4 HP	120	1	MP1A-5	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-04	UNIT HEATER	ST2-1 STAIR 2	1/4 HP	120	1	MP1A-6	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-05	UNIT HEATER	101 VESTIBULE	1/4 HP	120	1	MP1A-7	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-06	UNIT HEATER	S1-1 STAIR 1	1/4 HP	120	1	MP2A2-1	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-07	UNIT HEATER	167 VESTIBULE	1/4 HP	120	1	MP1B-12	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-08	UNIT HEATER	172 VESTIBULE	1/4 HP	120	1	MP2B2-2	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-09	UNIT HEATER	172 VESTIBULE	1/4 HP	120	1	MP2B2-4	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-10	UNIT HEATER	S3-3 STAIR 3	1/4 HP	120	1	MP2A3-2	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-11	UNIT HEATER	S4-3 STAIR 4	1/4 HP	120	1	MP3B-3	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-12	UNIT HEATER	S2-3 STAIR 2	1/4 HP	120	1	MP3A-2	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-13	UNIT HEATER	S1-3 STAIR 1	1/4 HP	120	1	MP2A2-2	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-
CUH-14	UNIT HEATER	S4-4 STAIR 4	1/4 HP	120	1	MP3B-4	20A/1P	2#12+#12G, 3/4"C	X	-	-	X	-	-	-	X	-	-	-

ELECTRICAL SCHEDULE OF MECHANICAL EQUIPMENT (10)(11)

UNIT NO.	DESCRIPTION	LOCATION	LOAD CHARACTERISTICS	VOLT	PH	PANEL CIRCUIT	CIRCUIT BREAKER	FEEDER	EQUIPMENT AND CONNCECTIONS: TS				S D	CO2 D	WP	J	S WP	VFD	REMARKS
VAV-1-1 THRU VAV-1-10	VARIABLE AIR VOLUME BOX	-	-	120	1	EP1A-7	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-1 (7)
VAV-1-11 THRU VAV-1-20	VARIABLE AIR VOLUME BOX	-	-	120	1	EP1A-8	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-1 (7)
VAV-1-21 THRU VAV-1-30	VARIABLE AIR VOLUME BOX	-	-	120	1	EP1A-9	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-1 (7)
VAV-1-31 THRU VAV-1-40	VARIABLE AIR VOLUME BOX	-	-	120	1	EP3A-7	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-1 (7)
VAV-1-41 THRU VAV-1-49	VARIABLE AIR VOLUME BOX	-	-	120	1	EP3A-8	20A/1P	2#12+#12G, 3/4"C	(9)X	-	-	(9)X	-	-	-	(9)X	-	-	SERVING RTU-1 (7)
VAV-2-1 THRU VAV-2-10	VARIABLE AIR VOLUME BOX	-	-	120	1	EP1B-27	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-2 (7)
VAV-2-11 THRU VAV-2-20	VARIABLE AIR VOLUME BOX	-	-	120	1	EP1B-28	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-2 (7)
VAV-2-21 THRU VAV-2-30	VARIABLE AIR VOLUME BOX	-	-	120	1	EP2B-13	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-2 (7)
VAV-2-31 THRU VAV-2-40	VARIABLE AIR VOLUME BOX	-	-	120	1	EP2B-14	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-2 (7)
VAV-2-41 THRU VAV-2-50	VARIABLE AIR VOLUME BOX	-	-	120	1	EP3B-7	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-2 (7)
VAV-2-51 THRU VAV-2-57	VARIABLE AIR VOLUME BOX	-	-	120	1	EP3B-8	20A/1P	2#12+#12G, 3/4"C	(7)X	-	-	(7)X	-	-	-	(7)X	-	-	SERVING RTU-2 (7)
VAV-3-1 THRU VAV-3-10	VARIABLE AIR VOLUME BOX	-	-	120	1	EP1A-10	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-3 (7)
VAV-3-11 THRU VAV-3-20	VARIABLE AIR VOLUME BOX	-	-	120	1	EP2A-11	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-3 (7)
VAV-3-21 THRU VAV-3-30	VARIABLE AIR VOLUME BOX	-	-	120	1	EP3A-9	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-3 (7)
VAV-3-31 THRU VAV-3-40	VARIABLE AIR VOLUME BOX	-	-	120	1	EP3B-9	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-3 (7)
VAV-5-1 THRU VAV-5-3	VARIABLE AIR VOLUME BOX	-	-	120	1	EP2B2-16	20A/1P	2#12+#12G, 3/4"C	(3)X	-	-	(3)X	-	-	-	(3)X	-	-	SERVING RTU-5 (7)
VAV-7-1 THRU VAV-7-5	VARIABLE AIR VOLUME BOX	-	-	120	1	EP1B-29	20A/1P	2#12+#12G, 3/4"C	(5)X	-	-	(5)X	-	-	-	(5)X	-	-	SERVING RTU-7 (7)
VAV-8-1 THRU VAV-8-10	VARIABLE AIR VOLUME BOX	-	-	120	1	EP2B2-17	20A/1P	2#12+#12G, 3/4"C	(10)X	-	-	(10)X	-	-	-	(10)X	-	-	SERVING RTU-8 (7)
VAV-8-11 THRU VAV-8-16	VARIABLE AIR VOLUME BOX	-	-	120	1	EP2B2-18	20A/1P	2#12+#12G, 3/4"C	(6)X	-	-	(6)X	-	-	-	(6)X	-	-	SERVING RTU-8 (7)
VAV-9-1 THRU VAV-9-4	VARIABLE AIR VOLUME BOX	-	-	120	1	EP2B2-19	20A/1P	2#12+#12G, 3/4"C	(4)X	-	-	(4)X	-	-	-	(4)X	-	-	SERVING RTU-9 (7)

MECHANICAL SCHEDULE GENERAL NOTES:

1. DUCT SMOKE DETECTORS SHALL BE PROVIDED ON RETURN DUCT FOR ALL MECHANICAL UNITS OVER 2000CFM. PROVIDE DUCT SMOKE ON RETURN AND SUPPLY DUCTWORK FOR ALL MECHANICAL UNITS OVER 15000 CFM. PROVIDE REMOTE TEST STATION WITH EACH DETECTOR. LOCATION OF TEST STATION SHALL BE ADJACENT TO THE FACP. DUCT SMOKES TO INITIATE ALARM.
2. PROVIDE FLEXIBLE CONNECTION TO EQUIPMENT REFER TO SPECIFICATIONS.
3. CONTROLLERS AND DISCONNECT DEVICES SHALL BE NRTL RATED FOR USE WITH A DESIGN E MOTOR WITH A HORSE POWER RATING NOT LESS THAN 1.4 TIMES THE MOTOR HORSE POWER. (REFER TO ELECTRICAL CODE ARTICLE 430).
4. TWO SPEED MOTORS SHALL HAVE TWO MOTOR BRANCH CIRCUITS AND SIX POLE DISCONNECTS.
5. WHERE INDICATED PROVIDE WEATHERPROOF DUPLEX RECEPTACLES AT MECHANICAL EQUIPMENT. PROVIDE 3/4"C WITH 2#12+#12G AWG TO NEAREST PANEL AND CONNECT TO 20A/1P CIRCUIT BREAKER UNLESS OTHERWISE INDICATED.
6. TYPICALLY LOCATE STARTERS OR VFD'S IN ELECTRIC ROOM (NEAR PANEL).
7. ALL EXTERIOR MOUNTED DISCONNECT SWITCHES, JUNCTION/PULL BOXES, RACEWAYS, FLEXIBLE CONNECTION TO EQUIPMENT, ETC. SHALL BE NEMA "3R."
8. THE E.C. SHALL PROVIDE NEMA 7 DISCONNECT SWITCHES AND SEAL FITTINGS AT EXPLOSION PROOF FANS.
9. WHERE INDICATED PROVIDE 120 VOLT CIRCUIT FOR RECEPTACLE AND LIGHT FIXTURE TYPE "J" AT ROOF TOP UNIT AS NOTED. TYPICALLY CONNECT TO NEAREST 120 VOLT RECEPTACLE CIRCUIT UNLESS OTHERWISE INDICATED.
10. ALL VFD'S SHALL BE PROVIDED WITH CONNECTIONS TO BACNET DATA COMMUNICATION PROTOCOL FOR BUILDING AUTOMATION AND CONTROL NETWORK. COORDINATE WITH ATC CONTRACTOR.

MECHANICAL SCHEDULE KEY NOTES:

(1) PROVIDE 3/4"CONDUIT w/ PULL WIRE BETWEEN INDOOR UNIT & OUTDOOR UNIT FOR EACH SPLIT SYSTEM.

(2) PROVIDE HARD CONNECTION FOR CONDENSATE PUMP (CP-1) CONNECT TO NEAREST 120V, 1□ BRANCH CIRCUIT UNLESS OTHERWISE INDICATED. PROVIDE THERMAL SWITCH AT UNIT. FIELD COORDINATE EXACT LOCATION WITH HVAC.
SEE DETAIL 1/E3.05

(3) REFER TO MECHANICAL DRAWINGS FOR EXACT LOCATION OF CONDENSATE PUMPS CP-1.

(4) E.C. SHALL F&I UNI-STRUT, FOR MOUNTING OF DISCONNECT SWITCH, ATTACHED TO ROOF STRUCTURE INDEPENDENT OF HVAC ROOF-TOP EQUIPMENT TO PREVENT EXCESSIVE WEAR DUE TO VIBRATIONS. LOCATE ADJACENT TO ROOFTOP UNIT BEING SERVED.
SEE DETAIL 2/E3.05

(5) VFD FURNISHED INTEGRAL WITH UNIT BY HVAC EQUIPMENT SUPPLIER. SINGLE POINT CONNECTION BY E.C.

(6) REFER TO MECHANICAL DRAWINGS FOR EXACT LOCATION OF DUCT TYPE SMOKE DETECTORS.

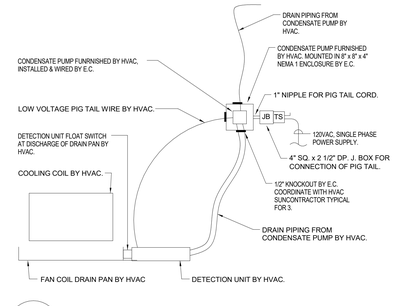
(7) FINAL VAV BOX CONNECTION BY ATC CONTRACTOR. ALSO REFER TO MECHANICAL DRAWINGS FOR UNIT EXACT LOCATIONS AND QUANTITIES. COORDINATE WITH HVAC CONTRACTOR FOR EXACT LOCATION OF JUNCTION BOXES.

(8) VFD FURNISHED WITH VENTILATOR CONTROL SYSTEM BY KITCHEN EQUIPMENT SUPPLIER.

(9) EMERGENGY BOILER SHUT OFF SWITCH LOCATED INSIDE OF MECHANICAL PUMP ROOM 126 AT EXTERIOR DOOR AND OUTSIDE AT INTERIOR CORRIDOR 125 AND MOUNTED IN STOPPER II COVER, INTERLOCK WITH BOILER CONTROL PANEL. MOUNT 72" AFF AND COORDINATE EXACT LOCATION IN FIELD WITH ARCHITECT. REFER TO DRAWING E3.12 FOR LOCATION.

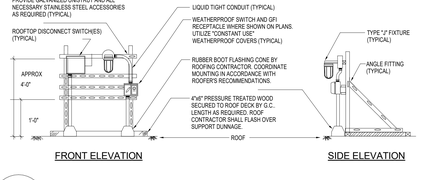
(10) REFER TO APPROVED HVAC SHOP DRAWINGS FOR ELECTRICAL WIRING DIAGRAMS AND ROUGHING REQUIREMENTS.

(11) REFER TO HVAC DRAWINGS FOR EXACT EQUIPMENT LOCATIONS AND TOTAL QUANTITIES.



1 E3.05 CONDENSATE PUMP (CP-1) WIRING DETAIL
SCALE : N.T.S.

NOTE:
1. WIRING MAY VARY BY MANUFACTURER. FIELD CONFIRM WITH APPROVED SHOP DRAWINGS PRIOR TO ROUGHING.



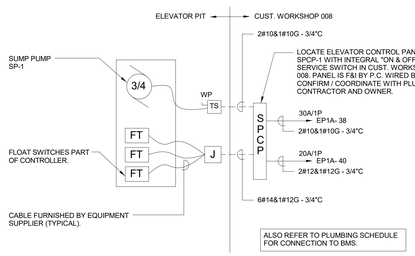
2

ELECTRICAL SCHEDULE OF PLUMBING EQUIPMENT (6) (7)

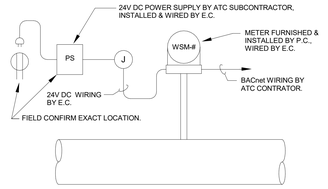
	UNIT NUMBER	UNIT DESCRIPTION	UNIT LOCATION	LOAD CHARACTERISTICS	VOLTAGE	PHASE	PANEL CIRCUIT	CIRCUIT BREAKER	FEEDER & CONDUIT SIZE	EQUIPMENT AND CONNECTIONS						REMARKS
										TS					J	
(5) (3)	EWH-1	ELECTRIC WATER HEATER	MECH ROOM	90kW	480	3	MSB1-18	150A-3P	SEE "MSB1" SCHEDULE	-	-	-	X	X	-	X -
(5) (3)	EWH-2	ELECTRIC WATER HEATER	MECH ROOM	90kW	480	3	MSB2-16	150A-3P	SEE "MSB2" SCHEDULE	-	-	-	X	X	-	X -
(5) (3)	EWH-3	ELECTRIC WATER HEATER	MECH ROOM	54kW	480	3	MSB2-17	90A-3P	SEE "MSB2" SCHEDULE	-	-	-	X	X	-	X -
	MV-1	MIXING VALVE	-	-	120	1	-	20A-1P	2 #12 + 1 #12G - 3/4"C	X	-	-	-	X	-	X -
	MV-2	MIXING VALVE	-	-	120	1	-	20A-1P	2 #12 + 1 #12G - 3/4"C	X	-	-	-	X	-	X -
(3) (2) (1)	RP-1	CIRCULATION PUMP	-	1/4 HP, 0.76 A	120	1	MP2B-7	20A-1P	2 #12 + 1 #12G - 3/4"C	X	-	-	-	X	-	X -
(3) (2) (1)	RP-2	CIRCULATION PUMP	-	1/6 HP, 0.4 A	120	1	MP2B-8	20A-1P	2 #12 + 1 #12G - 3/4"C	X	-	-	-	X	-	X -
	SP-1	ELEVATOR SUMP PUMP (SIMPLEX)	ELEVATOR PIT	3/4 HP, 3 A	208	1	EP1B-31	20A-2P	3 #12 + 1 #12G - 3/4"C	X	-	-	-	X	-	X -
(3)	SPCP-1	ELEVATOR SUMP PUMP CONTROL PANEL	-	-	120	1	MP1B-13	20A-1P	2 #12 + 1 #12G - 3/4"C	X	-	-	-	X	-	X -
(3)	OMP-1	OIL MONITORING PANEL	-	-	120	1	MP1B-14	20A-1P	2 #12 + 1 #12G - 3/4"C	X	-	-	-	X	-	X -
(3)	SM-1	WATER SUB-METER (DCW)	-	-	120	1	MP1B-15	20A-1P	2 #12 + 1 #12G - 3/4"C	-	-	-	-	-	X	- -
(3)	SM-2	WATER SUB-METER (DHW)	-	-	120	1	MP1B-16	20A-1P	2 #12 + 1 #12G - 3/4"C	-	-	-	-	-	X	- -
(3)	SM-3	WATER SUB-METER (KHW)	-	-	120	1	MP1B-17	20A-1P	2 #12 + 1 #12G - 3/4"C	-	-	-	-	-	X	- -
(3)	SM-4	WATER SUB-METER (IRRIGATION)	-	-	120	1	MP2B2-3	20A-1P	2 #12 + 1 #12G - 3/4"C	-	-	-	-	-	X	- -

PLUMBING SCHEDULE KEY NOTES:

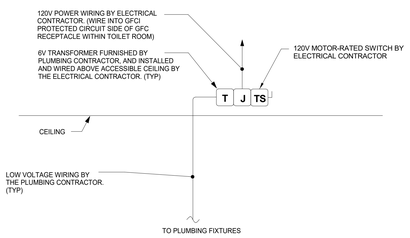
(1) AQUASTATS FURNISHED AND INSTALLED BY PC, 120V CONNECTION BY EC.
(2) PROVIDE GFCI TYPE CIRCUIT BREAKER.
(3) CONNECT TO BMS SYSTEM WITH 3#14 - 3/4"C. FINAL CONNECTION TO BMS SYSTEM BY ATC CONTRACTOR.
(4) PROVIDE GFCI TYPE CIRCUIT BREAKERS TO FEED "EWC" CIRCUITS.
(5) EMERGENGY WATER HEATER SHUT OFF SWITCH LOCATED OUTSIDE MEP ROOM 004 IN BASEMENT CORRIDOR C0-0. MOUNT IN STOPPER II COVER & INTERLOCK WITH BOILER CONTROL PANEL. MOUNT 72" A.F.F. AND COORDINATE FINAL LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
(6) REFER TO APPROVED PLUMBING SHOP DRAWINGS FOR ELECTRICAL WIRING DIAGRAMS AND ROUGHING REQUIREMENTS.
(7) REFER TO PLUMBING DRAWINGS FOR EXACT EQUIPMENT LOCATIONS AND TOTAL QUANTITIES.



1 E3.06 ELEVATOR SUMP PUMPS DETAIL
SCALE : N.T.S.



2 E3.06 WATER SUB-METER DETAIL
SCALE : N.T.S.



3 E3.06 TYPICAL ELECTRONIC CONTROL FOR FLUSH VALVES AND /OR FAUCETS DETAIL
SCALE : N.T.S.

NOTES:
1. E.C. SHALL PROVIDE LABELS ON CEILING GRID AT LOCATIONS OF TRANSFORMERS. COORDINATE WITH ARCHITECT ON LOCATIONS OF LABELING/IDENTIFICATION.

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

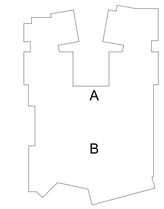
NO.	DATE	TITLE

ISSUE TITLE AND DATE:

60% CONSTRUCTION DOCUMENTS
06/19/2026

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KEY PLAN

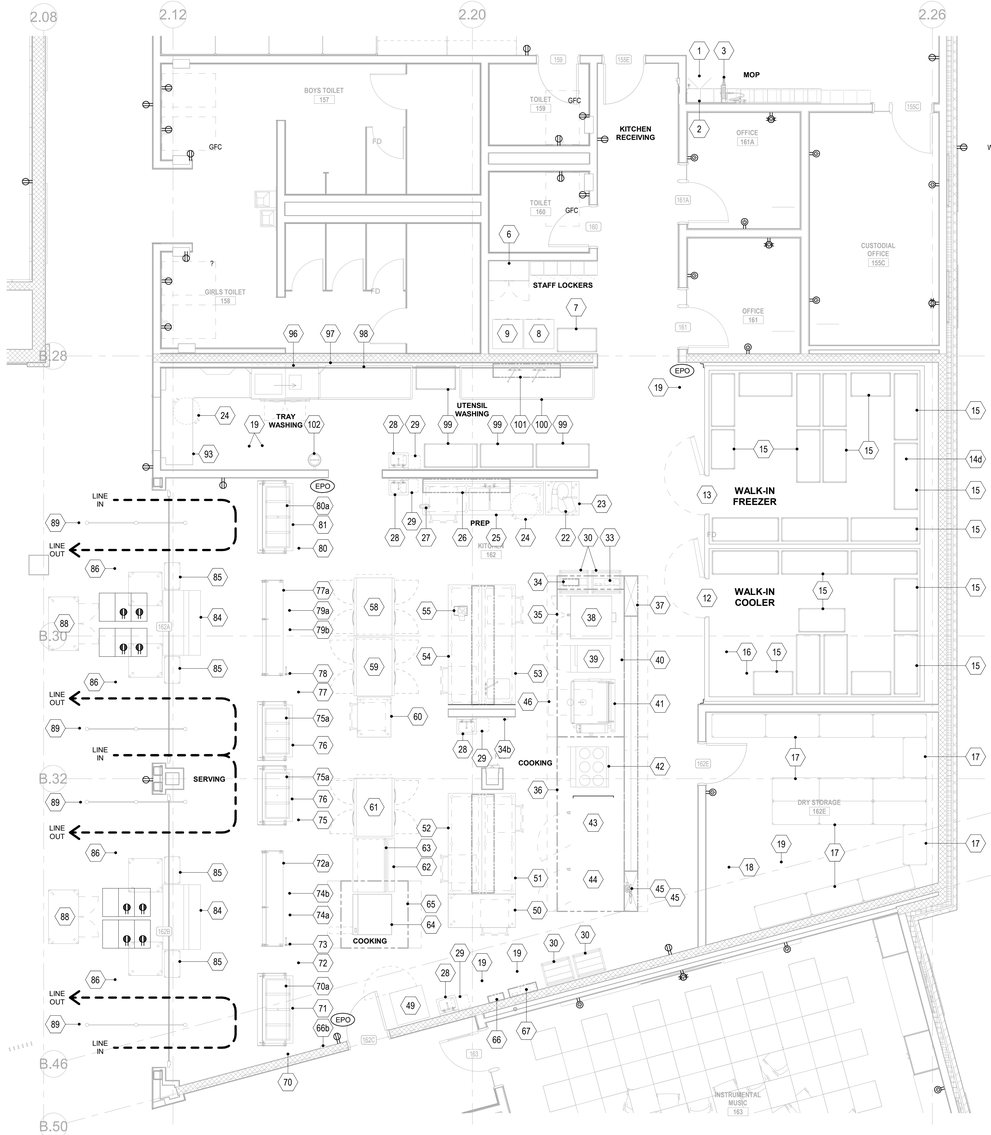


ORIENTATION AND SCALE:

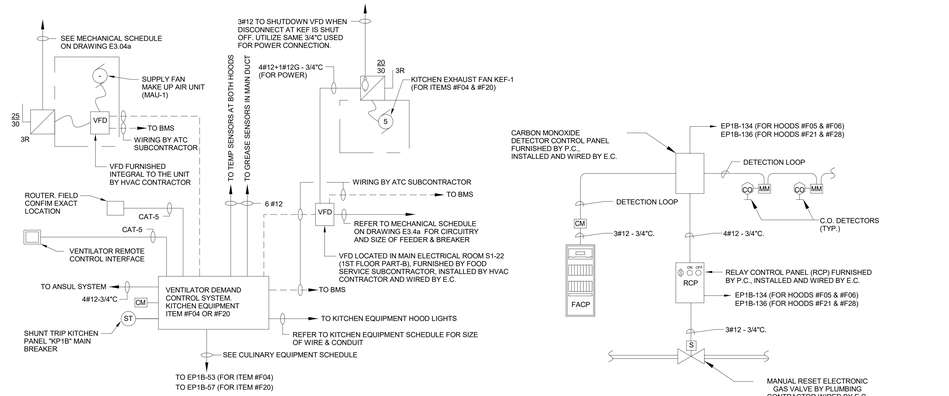
SHEET TITLE:
PLUMBING EQUIPMENT SCHEDULE

SHEET NUMBER:
E3.06

Autodesk Docs://Wilmington Elementary School/Wildwood ME Model SD.rvt
6/17/2026 11:40:17 AM



1 KITCHEN - POWER
E3.07 SCALE: 1/4" = 1'-0"



NOTE:
REFER TO APPROVED FOOD SERVICE SUBMITTALS WIRING DIAGRAM FOR FINAL COORDINATION OF ITEM #26.

2 KITCHEN HOOD VENTILATOR DEMAND CONTROL SYSTEM WIRING DIAGRAM (ITEMS 34 & 66)
E6.15 SCALE : N.T.S.

NOTES:
1. CARBON MONOXIDE (CO) DETECTORS SHALL BE PROGRAMMED AS SUPERVISORY POINTS IN THE FACP. UPON DETECTION OF CO, POWER SHALL BE INTERRUPTED TO THE GAS VALVE AND THE GAS SHUTOFF WILL CLOSE.
2. GAS FLOW MAY BE RESTARTED AFTER THE CO DETECTION DEVICES ARE CLEAR AND THE RESET RELAY IS RESET, WHICH WILL RE-POWER THE GAS SOLENOID VALVE.
3. REFER TO DETAIL 2/P3.3 FOR FINAL COORDINATION.

3 CARBON MONOXIDE GAS SOLENOID SHUT DOWN DETAIL (TYPICAL FOR 2)
E6.15 SCALE: NTS

ELECTRICAL KITCHEN EQUIPMENT SCHEDULE

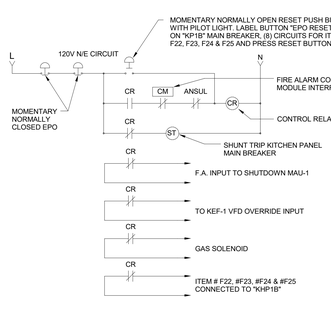
UNIT NUMBER	UNIT DESCRIPTION	QTY.	H.P.	K.W.	AMPS	VOLTAGE	PHASE	PANEL CIRCUIT	CIRCUIT BREAKER	FEEDER & CONDUIT SIZE	EQUIPMENT AND CONNECTIONS								REMARKS
											TS							J	
8	FRONT LOAD CLOTHES WASHER	1	-	1.1	15	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	-	X	-	-	CORD & PLUG CONNECTION
9	FRONT LOAD CLOTHES DRYER	1				120/240	1	KP-	30A/2P	3 #10+1 #10G-3/4"C	-	-	-	-	-	-	X	-	NEMA 14-30R
12	WALK-IN-COOLER	1	-	1.1	-	120	1	EP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	-	-	-	-	CONNECTED TO BMS, REFER TO NOTE 17
13	WALK-IN-FREEZER	1	-	1.3	-	120	1	EP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	(6) X	-	-	(6) X	CONNECTED TO BMS, REFER TO NOTE 17
14a	COOLER CONDENSING UNIT	1	-	-	8.7	208	3	EP-	-	-	-	-	-	-	-	X	-	-	PROVIDE EQUIPMENT GROUND FAULT PROTECTION PER NEC
14b	COOLER EVAPORATOR COIL	1	-	-	1.8	208	1	EP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	-	-	-	-	SEE EQUIPMENT NOTE
14c	FREEZER CONDENSING UNIT	1	4.5	-	11.9	208	3	EP-	-	-	-	-	-	X	X	-	-	X	MOUNTED ON THE ROOF
14d	FREEZER EVAPORATOR COIL	1	-	-	13.7	208	1	EP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	X	X	-	-	X	PROVIDE 6 #14 FOR INTERLOCK TO CONDENSING UNIT
22	AUTOMATIC SLICER	1	4.5	-	5.6	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	X	X	-	-	X	MOUNTED ON THE ROOF
25a	PREP TABLE WITH SINKS	1	-	-	-	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	X	X	-	-	X	PROVIDE 6 #14 FOR INTERLOCK TO CONDENSING UNIT
25b	PREP TABLE WITH SINKS	1	-	-	-	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	X	X	-	-	X	PROVIDE 6 #14 FOR INTERLOCK TO CONDENSING UNIT
33	FIRE SUPPRESSION SYSTEM	1	-	-	-	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	X	-	-	-	X	-	-	X	-
34	DEMAND CONTROL VENTILATION SYSTEM	1	-	-	-	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	X	-	-	-	X	-	-	X	-
34a	VENTILATOR CONTROL INTERFACE SCREEN	1	-	-	-	120	1	KP-	-	2 #12+1 #12G-3/4"C	X	-	-	-	X	-	-	X	CABLE FROM ITEM 34
34b	ROOM TEMPERATURE SENSOR	1	-	-	-	120	1	KP-	-	2 #12+1 #12G-3/4"C									WIRING FROM ITEM 34
35	EXHAUST VENTILATOR	1	-	-	-	120	1	KP-	-	2 #12+1 #12G-3/4"C									POWER TO LIGHTS FROM ITEM 34
36	EXHAUST VENTILATOR	1	-	-	-	120	1	KP-	-	2 #12+1 #12G-3/4"C	-	-	-	-	-	-	-	-	POWER TO LIGHTS FROM ITEM 34
37-1	UTILITY DISTRIBUTION SYSTEM (UDS)	1	-	-	250	408	3	MSB2	-	-	-	-	-	-	X	-	-	X	POWER TO LIGHTS FROM ITEM F04
37-2	UTILITY DISTRIBUTION SYSTEM (UDS)	1	-	-	150	208	3	2DP1B	-	-	-	-	-	-	X	-	-	X	POWER TO LIGHTS FROM ITEM F04
38	DOUBLE CONVECTION OVEN	1	-	11	14	480	3	UDS-1,3,5 UDS-2,4,6	(2) 20A/3P	(2) 4 #12+1 #12G-1 3/4"C	-	-	X	-	X	-	-	X	SEE EQUIPMENT NOTE 18
39	TEN-PAN CONVECTION STEAMER	1	-	30	94	208	3	UDS-2,4,6	125A/3P	4 #1/0+1 #6G-2"C	-	-	X	-	X	-	-	X	SEE EQUIPMENT NOTE 18
41	FORTY-GALLON TILTING BRAISING PAN	1	-	15.3	19	480	3	UDS	20/3P	4 #12+1 #12G-3/4"C	-	-	-	-	(2)X	-	-	(2)X	SEE EQUIPMENT NOTE 18
42	SIX-BURNER RANGER WITH OVEN	1	-	17	23.5	480	3	UDS	30A/3P	4 #10+1 #10G-3/4"C	-	-	-	-	(2)X	-	-	(2)X	SEE EQUIPMENT NOTE 18
43	DOUBLE COMBINATION OVEN	1	-	22.4	26.9	480	3	UDS-X UDS-X	(2) 30A/3P	(2) 4 #10+1 #10G-1 3/4"C	-	-	-	-	X	-	-	X	SEE EQUIPMENT NOTE 18
44	DOUBLE COMBINATION OVEN	1	-	22.4	26.9	480	3	UDS-X UDS-X	(2) 30A/3P	(2) 4 #10+1 #10G-1 3/4"C	-	-	-	-	X	-	-	X	SEE EQUIPMENT NOTE 18
49	MOBILE HOT FOOD HOLDING CABINET	1	-	-	13.8	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	
51	WORK TABLE WITH OVERSHELF	1	-	-	-	120	1	KP-	(3) 20A/1P	(3) 2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	
52	WORK TABLE	1	-	-	-	120	1	KP-	(3) 20A/1P	(3) 2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	
53	COOK'S WORK TABLE WITH SINK AND OVERSHELF	1	-	-	-	120	1	KP-	(3) 20A/1P	(3) 2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	FOR FUTURE ELECTRIC RANGE
54	WORK TABLE	1	-	-	-	120	1	KP-	(3) 20A/1P	(3) 2 #12+1 #12G-3/4"C	X	-	-	-	X	-	-	X	-
55	FOOD PROCESSOR	1	-	-	12	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	X	-	-	-	X	-	-	X	FROM MOUNTED DR AT ITEM 54
58	REFRIGERATOR, PASS-THRU	1	-	-	6.4	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C									CABLE FROM ITEM F20
59	HOT FOOD HOLDING CABINET, PASS-THRU	1	-	-	10.6	208	1	KP-	20A/1P	2 #12+1 #12G-3/4"C									WIRING FROM ITEM F20
61	REFRIGERATOR, PASS-THRU	1	-	-	6.4	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	POWER TO LIGHTS FROM ITEM F20
62a	STAINLESS STEEL ELECTRICAL CHASE	1	-	-	-	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	POWER TO LIGHTS FROM ITEM F20
62b	STAINLESS STEEL ELECTRICAL CHASE	1	-	-	-	208	3	KP-	50A/3P	3 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	POWER TO LIGHTS FROM ITEM F20
63	REFRIGERATOR WORKTOP	1	-	-	3	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	X	(2)X	-	-	(2)X	-
64	GRIDDLE WITH MOBILE STAND	1	-	-	40	208	3	KP-	40A/3P	4 #8+1 #10G-3/4"C	-	-	-	X	(2)X	-	-	(2)X	-
65	EXHAUST VENTILATOR	1	-	-	-			KP-	-		-	-	-	X	(2)X	-	-	(2)X	-
66	DEMAND CONTROL VENTILATION SYSTEM	1	-	-	-	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	X	(2)X	-	-	(2)X	
66a	VENTILATOR CONTROL INTERFACE SCREEN	1	-	-	-	120	1	KP-	-	2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	CABLE FROM ITEM 66
66b	ROOM TEMPERATURE SENSOR	1	-	-	-	120	1	KP-	-	2 #12+1 #12G-3/4"C	-	-	-	-	-	-	(2) X	-	WIRING FROM ITEM 66
67	FIRE SUPPRESSION SYSTEM	1	-	-	-	120	1	KP-	-	2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	J-BOX FOR CONNECTION TO BUILDING ALARM SYSTEM AND EQUIPMENT SHUTDOWN
70	SERVING COUNTER	1	-	-	-	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
71	REFRIGERATED COLD PAN, DROP-IN	1	-	-	5	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	-	-	(2) X	-	-
72	SERVING COUNTER	1	-	-	-	120	1	KP-	(2) 20A/1P	(2) 2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
74a	HOT FOOD WELLS, DROP-IN	2	-	-	1.8	208	1	KP-	20A/2P	3 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
74b	HOT FOOD WELLS, DROP-IN	3	-	-	2.7	208	1	KP-	20A/2P	3 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
75	SERVING COUNTER	1	-	-	-	120	1	KP-	(2) 20A/1P	(2) 2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
76	REFRIGERATED COLD PAN, DROP-IN	2	-	-	5	120	1	KP-	(2) 20A/1P	(2) 2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
77	SERVING COUNTER	1	-	-	-	120	1	KP-	(2) 20A/1P	(2) 2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
79a	HOT FOOD WELLS, DROP-IN	2	-	-	1.8	208	1	KP-	20A/2P	3 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
79b	HOT FOOD WELLS, DROP-IN	3	-	-	2.7	208	1	KP-	20A/2P	3 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
80	SERVING COUNTER	1	-	-	-	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
81	REFRIGERATED COLD PAN, DROP-IN	1	-	-	5	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
84	MILK COOLER	2	-	-	3.3	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
87	CASHIER TERMINAL (BY OWNER)	4	-	-	-	120	1	KP-	20A/1P	2 #12+1 #12G-3/4"C	-	-	-	-	X	-	-	X	-
96-1	WAREWASHER - TANK HEAT	1	-	-	35	480	3	KHP-	40A/3P	4 #8+1 #10G-3/4"C	-	-	-	-	X	-	-	X	J-BOX FOR WIRING TO TABLE LIMIT SWITCH AT ITEM 98
96-2	WAREWASHER - BOOSTER HEATER	1	-	-	26	480	3	KHP-	30A/3P	4 #10+1 #10G-3/4"C	-	-	-	-	X	-	-	X	J-BOX FOR WIRING TO TABLE LIMIT SWITCH AT ITEM 98
98	CLEAN WARE TABLE	1	-	-	-	-	-	-	-		-	-	-	-	X	-	-	X	J-BOX FOR WIRING TO TABLE LIMIT SWITCH FROM ITEM 96

KEYED SCHEDULE NOTES (-)

1. REFER TO FOOD SERVICE DRAWINGS FOR EXACT EQUIPMENT LOCATION AND ROUGHING REQUIREMENTS.

KEYED EQUIPMENT NOTES

1. REFER TO KITCHEN EQUIPMENT DRAWINGS AND ARCHITECTURAL DRAWINGS FOR KITCHEN EQUIPMENT LAYOUT, ELECTRICAL CHARACTERISTICS, AND EXACT LOCATION, ROUGH-IN AND CONNECTION REQUIREMENTS.
2. COORDINATE WITH THE KITCHEN EQUIPMENT INSTALLER'S FINAL ELECTRICAL REQUIREMENTS PRIOR TO ROUGHING IN OF ANY ELECTRICAL WORK.
3. PROVIDE ALL DISCONNECTING DEVICES FOR ALL KITCHEN EQUIPMENT REQUIRED BY ELECTRICAL CODE ART. 422, PART D UNLESS PROVIDED AS PART OF KITCHEN EQUIPMENT.
4. GROUND CONDUCTORS SIZED PER ELECTRIC CODE GROUNDING CONDUCTOR TABLE 250-95 SHALL BE INCLUDED IN ALL KITCHEN BRANCH CIRCUITS.
5. PROVIDE CONTROL CONNECTION FROM AUTOMATIC FIRE SUPPRESSION SYSTEM TO SHUNT TRIP AND SOLENOID CONTROLS.
6. ALL DIRECT CONNECTIONS TO KITCHEN EQUIPMENT SHALL BE MADE PER KITCHEN EQUIPMENT MANUFACTURER'S REQUIREMENTS, VERIFY LIQUITITE FLEXIBLE CONDUIT/CORD LENGTHS REQUIRED.
7. ALL SWITCHES INSTALLED AS AN EQUIPMENT DISCONNECTING MEANS SHALL BE LABELED WITH THE DESCRIPTION OF THE EQUIPMENT BEING SERVED. EXAMPLE: WALK-IN COOLER.
8. EXPOSED WIRING SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS FOR A WET AREA. MOUNT WORK OFF SURFACES TO ALLOW CLEANING. ALL WORK SHALL USE GALVANIZED OR CORROSIVE RESISTANT MATERIALS. CONDUITS PENETRATING FLOOR SHALL BE RIGID GALVANIZED STEEL.
9. CIRCUIT SIZE SHALL MATCH THE CIRCUIT BREAKER AMPACITY, REFER TO SCHEDULES.
10. TO HOOD SUPPLIED JB @ CEILING TO FEED HOOD LIGHTING FROM REMOTE SWITCH PROVIDED BY E.C. & CONTROL SWITCH FOR REMOTE FAN PROVIDED BY E.C.
11. JB MTD CEILING TO LIGHTS FROM REMOTE SWITCHES PROVIDED BY E.C. (EACH SIDE CONTROLLED SEPARATELY) CONTROL SW FOR REMOTE FANS PROVIDED BY E.C. (EACH SIDE CONTROLLED SEPARATELY).
12. INSTALL AND CONNECT LIGHT FIXTURES IN COOLER & FREEZER, FURNISHED BY KITCHEN EQUIPMENT SUPPLIER.
13. TRENCH FLOOR AS REQUIRED TO FEED KITCHEN ISLANDS.
14. UNLESS OTHERWISE NOTED ALL CIRCUITS SHALL BE FED FROM PANEL "KP1B" FOR NORMAL 120/208V POWER, "KHP1B" FOR NORMAL 277/480V POWER AND "EP1B" FOR NORMAL/EMERGENCY 120/208V POWER .
15. ALL FLOOR BOXES IN KITCHEN SHALL BE INSTALLED 6" AFF. FLOOR BOXES SHALL BE WATERTIGHT.
16. PROVIDE SHUTDOWN WIRING FOR GAS SOLENOID IN KITCHEN. FROM ANSUL SYSTEM.
17. CONNECT KITCHEN WALK-IN COOLER & FREEZER ALARMS TO LOCAL BMS SYSTEM IN MECHANICAL ROOM WITH 2 #14 - 3/4"C FOR EACH ALARM. ALSO REFER TO KITCHEN DRAWINGS FOR FURTHER CLARIFICATION. FINAL CONNECTION AT BMS BY ATC CONTRACTOR.
18. ALL DISCONNECT SWITCHES LOCATED IN THE KITCHEN AREA SHALL BE NEMA 4X STAINLESS STEEL.
19. ALL SINGLE PHASE RECEPTACLES 50 AMPS OR LESS AND THREE PHASE RECEPTACLES 100 AMPS OR LESS IN THE KITCHEN SHALL BE PROVIDED WITH GROUND FAULT PROTECTION (GFI) PER NEC ARTICLE 210.8.B(2).
20. PROVIDE JUNCTION BOX FOR UNIT LIGHTS, FOR DOOR HEATER, AND AUDIO/VISUAL ALARM.
21. E.C. TO WIRE THERMOSTATS FOR WALK-IN REFRIGERATORS AND FREEZERS REFER TO FOOD SERVICE DRAWINGS FOR ADDITIONAL INFORMATION.
22. PROVIDE 3#12 WIRES FROM MICRO SWITCH FOR FIRE EXTINGUISHER IN CEILING TO U.D.S.
23. PROVIDE THE FOLLOWING WIRING FROM THE FIRE SUPPRESSION SYSTEM:
    - 23.1. 2#12 TO VENTILATOR CONTROL PANEL (N.O.)
    - 23.2. 2#12 WIRES TO GAS VALVE AND CONTRACTOR.
    - 23.3. 3#12 WIRES TO FIRE/FUEL SHUTOFF VALVE IN U.D.S.
    - 23.4. 2#12 WIRES TO AUTOMAN RELEASE
24. EXTEND 1"C FOR DATA OUTLETS FOR CASH REGISTERS TO KITCHEN OFFICE (TYPICAL).



SEQUENCE OF OPERATIONS:

1. PROVIDE ALL RELAYS, PUSH BUTTONS, TRANSFORMERS, CONTACTORS SHUNT TRIP CIRCUIT BREAKERS, WIRING AND CONDUITS FOR A COMPLETE POWER OFF SYSTEM AND ALARM NOTIFICATION DESCRIBED IN PARAGRAPHS 2 & 3 BELOW.
2. THE ACT OF PUSHING ANY EMERGENCY POWER OFF PUSH-BUTTON, SHALL CAUSE THE FOLLOWING TO OCCUR:
   - 2.1. TURN OFF POWER TO THE GAS SOLENOID.
   - 2.2. TURN OFF POWER TO ALL ITEMS UNDER KITCHEN HOOD REQUIRING ELECTRICAL CONNECTION OR CONTROL BY TURNING OFF POWER TO THE KITCHEN PANEL VIA SHUNT TRIP MAIN BREAKER.
3. THE ACTIVATION OF HOOD FIRE SUPPRESSION SYSTEM, SHALL CAUSE THE FOLLOWING TO OCCUR:
   - 3.1. TURN OFF POWER TO THE GAS SOLENOID.
   - 3.2. TURN OFF POWER TO ALL ITEMS UNDER KITCHEN HOOD REQUIRING ELECTRICAL CONNECTION OR CONTROL BY TURNING OFF POWER TO KITCHEN PANEL VIA SHUNT TRIP MAIN BREAKER.
   - 3.3. SEND A SIGNAL TO THE FIRE ALARM CONTROL PANEL TO INITIATE (FACP) SYSTEM OPERATION.
4. COORDINATE WITH INSTALLERS OF FIRE SUPPRESSION SYSTEM, AND KITCHEN EQUIPMENT SUPPLIER.
5. ONE SYSTEM REQUIRED PER HOOD.
6. KITCHEN HOOD SUMMARY: THE HOOD FIRE SUPPRESSION SYSTEM CONTROL PANEL, UPON ACTIVATION, SHALL PUT THE FACP INTO "AUTO" ALARM MODE AND SHALL ALSO SHUTDOWN THE HOOD'S SUPLLY FAN, TURN OFF POWER TO THE GAS SOLENOID AND TURN OFF POWER TO ALL ITEMS UNDER THE KITCHEN HOOD. THE HOOD EXHAUST FAN SHALL CONTINUE TO OPERATE. FIRE ACTUATED DAMPERS IF INSTALLED IN THE EXHAUST OUTLET SHALL SHUT DOWN THE EXHAUST FAN UPON ACTUATION. IT SHALL NOT BE REQUIRED TO RESTART THE HOOD EXHAUST FAN WHEN THE EXTINGUISHING SYSTEM IS ACTIVATED IF THE EXHAUST FAN AND ALL COOKING EQUIPMENT SERVED BY THE FAN HAD PREVIOUSLY BEEN SHUTDOWN. SHUTOFF DEVICES SHALL REQUIRE MANUAL RESET.

4 KITCHEN EQUIPMENT EMERGENCY POWER OFF WIRING DIAGRAM
E6.15 SCALE: NTS

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

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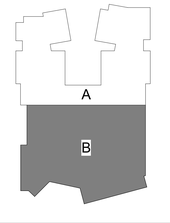
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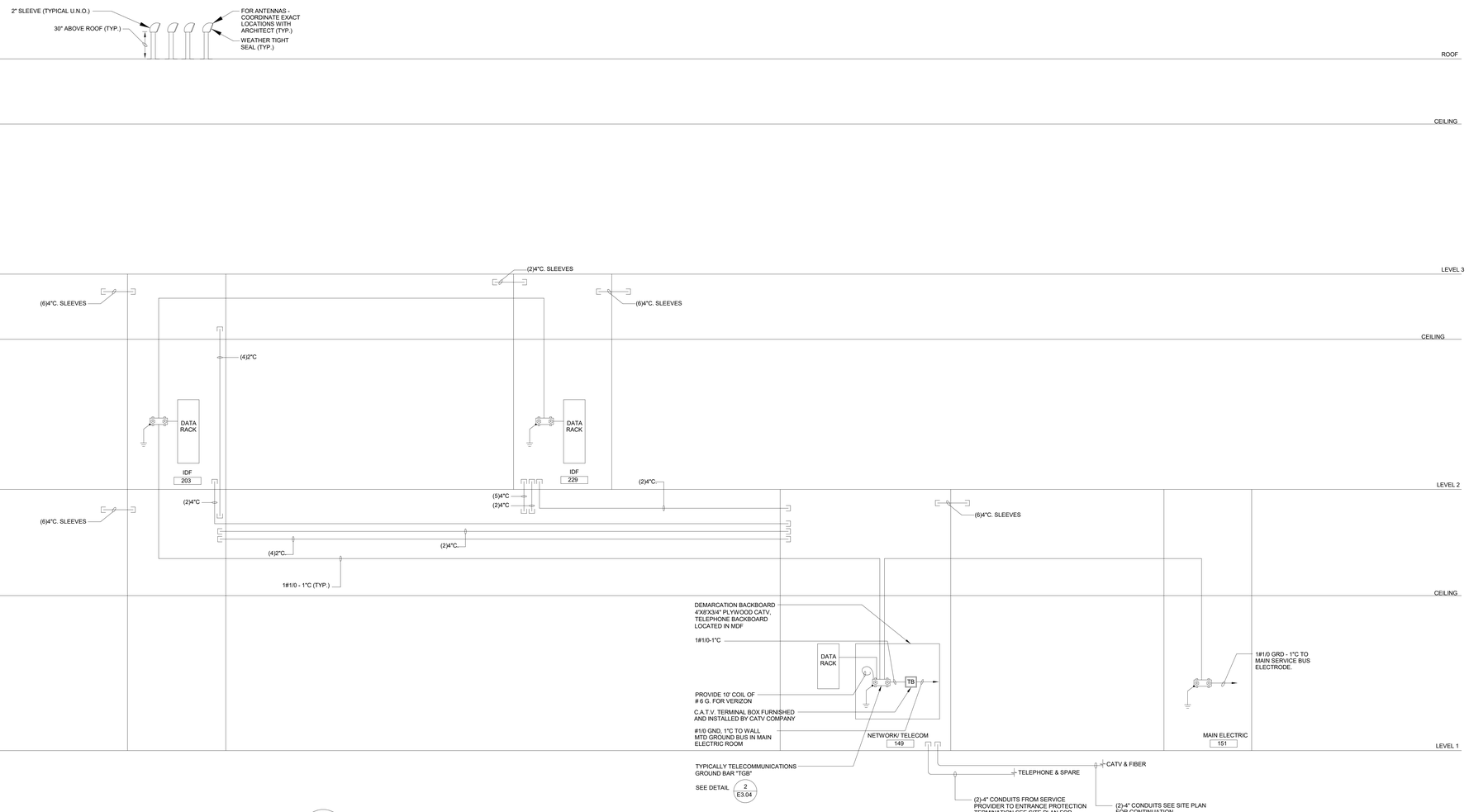


PROJECT NORTH

SHEET TITLE:
KITCHEN SCHEDULE

SHEET NUMBER:
E3.07

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1 / E3.07 TELECOMMUNICATIONS CONDUIT & GROUNDING RISER DIAGRAM

SCALE: N.T.S.

NOTES:

1. COORDINATE ALL SLEEVE LOCATIONS WITH TELECOMMUNICATIONS CONTRACTOR PRIOR TO INSTALLATION.
2. COORDINATE ALL CONDUIT ROUTING WITH TELECOMMUNICATIONS CONTRACTOR. PROVIDE PULL BOXES WHERE CONDUIT BEND EXCEEDS A TOTAL OF 180 DEGREES OR DISTANCE EXCEEDS 150'. ALWAYS ALIGN CONDUITS ON OPPOSITE ENDS OF PULL BOX.
3. PULL BOX SIZES FOR 4" CONDUITS SHALL BE MINIMUM 15" WIDE X 60" LONG X 3" DEEP. INCREASE WIDTH OF PULL BOX 8" FOR EVERY ADDITIONAL 4" CONDUIT.
4. ALL CONDUIT BENDS SHALL BE MINIMUM 36" RADIUS.
5. DO NOT RUN CONDUITS PARALLEL WITH POWER CONDUITS. MAINTAIN MINIMUM OF 4" CLEARANCE.
6. E.C. SHALL BOND ALL CABLE TRAY TO "TGB" IN RESPECTIVE DATA ROOM WITH #6 GROUND. THE CABLE TRAY SHALL BE ELECTRICALLY CONTINUOUS THROUGH. ENTIRE RUN INCLUDING ALL FITTINGS.

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999
VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

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320 SALEM ST.
WILMINGTON, MA 01887

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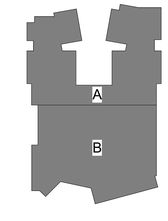
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KEY PLAN



ORIENTATION AND SCALE:



PROJECT NORTH

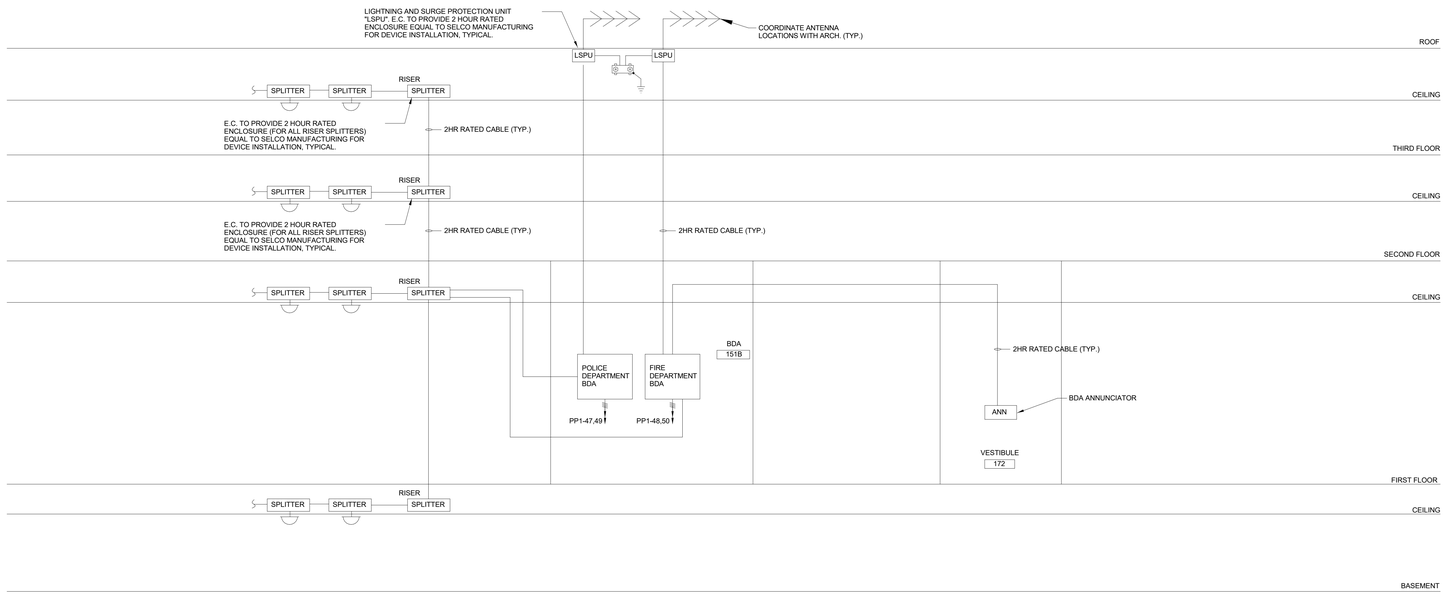
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TELECOM RISER DIAGRAM

SHEET NUMBER:

E3.08

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2 / E3.3 DISTRIBUTED ANTENNA SYSTEM (DAS)

SCALE: N.T.S.

DAS NOTES:

1. PROVIDE ALL BONDING HARDWARE REQUIRED FOR A COMPLETE GROUNDING SYSTEM TO ASSOCIATED PANELS, EQUIPMENT, SHELVES, RACKS, AND ANY OTHER METALLIC COMPONENTS TO ENSURE ELECTRICAL CONTINUITY BETWEEN METALIC COMPONENTS AND THE GROUNDED RACK OR CABINET.
2. MAXIMUM FOUR ANTENNAE PER REMOTE DEVICE. PROVIDE AND LOCATE DEVICES IN SUFFICIENT QUANTITY TO PROVIDE A MINIMUM SIGNAL COVERAGE OF 95% AT NEG. 85dBM WITHIN THE BUILDING.
3. PRIORITY AREAS OF COVERAGE INCLUDE THE COMMON SPACES, CORRIDORS, MAIN ENTRANCE LOBBY AND STAIR WELLS.
4. ALL COMPONENTS THAT REQUIRE 120V SHALL BE FED FROM CONDITIONED/UPS POWER NEAREST "TEP" PANEL.
5. PUBLIC SAFTEY BI-DIRECTIONAL AMPLIFIERS, ANTENNAE "POLICE" AND "FIRE" SHALL BE PROVIDED. COORDINATE EXACT FREQUENCIES WITH THE TOWN/CITY PUBLIC SAFETY AUTHORITIES, AMPLIFIED DISTRIBUTION OF PUBLIC SAFETY FREQUENCIES SHALL BE OPERATIONAL AT SUBSTANTIAL COMPLETION OF THE PROJECT.
6. PROVIDE ADEQUATE RACK SPACE FOR FUTURE CELLULAR CARRIER BIDIRECTIONAL AMPLIFIERS, OWNER SHALL BE RESPONSIBLE FOR SELECTING AND NEGOTIATION WITH CELLULAR CARRIER.

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

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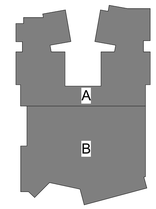
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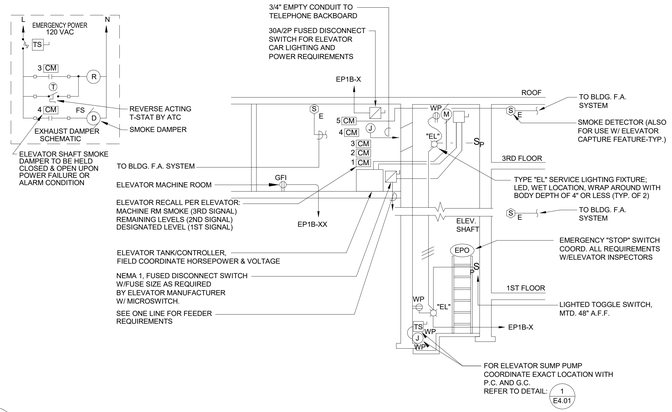
ORIENTATION AND SCALE:

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PROJECT NORTH

SHEET TITLE:
BDA SYSTEM DIAGRAM

SHEET NUMBER:
E3.09

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2
E4.01

TYPICAL ELEVATOR SHAFT AND MACHINE ROOM (NO SPRINKLER) DETAIL (TYP. FOR 2)

N.T.S.

SEQUENCE OF OPERATION

1. SMOKE DETECTORS LOCATED IN EACH ELEVATOR LOBBY & MACHINE ROOM SHALL INITIATE ELEVATOR RECALL IN ADDITION TO SENDING SYSTEM INTO "AUTO" ALARM MODE FOR FIRE FIGHTERS SERVICE.
2. FIVE (5) CONTROL MODULES WILL BE LOCATED IN THE ELEVATOR MACHINE ROOM.
3. THE SMOKE DETECTOR LOCATED ON THE DESIGNATED LEVEL WILL ACTUATE THE FIRST CONTROL MODULE OF EACH ELEVATOR AND INITIATE THE ALTERNATE LEVEL RECALL.
4. THE SMOKE DETECTORS ON THE REMAINING ELEVATOR LEVELS WILL ACTUATE THE SECOND CONTROL MODULE FOR DESIGNATED LEVEL RECALL FOR EACH ELEVATOR.
5. THE THIRD CONTROL MODULE WILL BE ACTUATED BY A FIRE ALARM INITIATING DEVICE IN THE MACHINE ROOM, CONTROL SPACE, CONTROL ROOM AND/OR HOISTWAY AND WILL ILLUMINATE THE ASSOCIATED FIREFIGHTERS HAT.
6. WHERE THE ELEVATOR MACHINE ROOM IS LOCATED AT THE DESIGNATED LEVEL, THAT MACHINE ROOM SMOKE DETECTOR WILL ALSO ACTUATE THE FIRST CONTROL MODULE TO RECALL ELEVATOR TO THE ALTERNATE LEVEL.
7. THE FOURTH CONTROL MODULE WILL BE ACTUATED BY A FIRE ALARM INITIATING DEVICE IN THE MACHINE ROOM, CONTROL SPACE, CONTROL ROOM AND/OR HOISTWAY AND WILL ENERGIZE THE MACHINE ROOM EXHAUST FAN.
8. THE FIFTH CONTROL MODULE WILL BE ACTUATED BY A FIRE ALARM INITIATING DEVICE IN THE MACHINE ROOM, CONTROL SPACE, CONTROL ROOM AND/OR HOISTWAY AND WILL DE-ENERGIZE THE FIRE/SMOKE DAMPER CAUSING IT TO OPEN.

ZONE	F.A. RADIO BOX ZONE SCHEDULE
1	SPRINKLER MAIN
2	SPRINKLER ZONE 1 - FIRST FLOOR
3	SPRINKLER ZONE 2 - SECOND FLOOR
4	SPRINKLER ZONE 3 - THIRD FLOOR
5	PULL STATIONS - FIRST FLOOR
6	PULL STATIONS - SECOND FLOOR
7	PULL STATIONS - THIRD FLOOR
8	SMOKES AND HEATS (AUTOMATIC DEVICES) - FIRST FLOOR
9	SMOKES AND HEATS (AUTOMATIC DEVICES) - SECOND FLOOR
10	SMOKES AND HEATS (AUTOMATIC DEVICES) - THIRD FLOOR
11	DUCT SMOKE DETECTORS (SUPERVISORY)
12	SYSTEM TROUBLE
13	CO DETECTOR (SUPERVISORY)
14	SPRINKLER TAMPERS (SUPERVISORY)
15	KNOX BOX (SUPERVISORY)

NOTE: CONFIRM ALL ZONES WITH FIRE DEPARTMENT PRIOR TO SHOP DRAWING SUBMITTAL.

FIRE ALARM SYSTEM INPUT/OUTPUT MATRIX

NOTES:

1. COORDINATE SEQUENCE OF OPERATIONS WITH FIRE DEPT PRIOR TO PROGRAMING.

		FACP ANNUNCIATION				NOTIFICATION						REQUIRED FIRE SAFETY CONTROL															
		ACTUATE COMMON ALARM SIGNAL INDICATOR	ACTUATE AUDIBLE ALARM SIGNAL	ACTUATE COMMON SUPERVISORY SIGNAL INDICATOR	ACTUATE AUDIBLE SUPERVISORY SIGNAL	ACTUATE COMMON TROUBLE SIGNAL INDICATOR	ACTUATE AUDIBLE TROUBLE SIGNAL	ACTUATE ZONE OR DEVICE ADDRESS ALARM INDICATOR	ACTUATE GENERAL EVACUATION SIGNAL	DISPLAY CHANGE OF STATUS	TRANSMIT FIRE ALARM SIGNAL TO FIRE DEPT.	TRANSMIT SUPERVISORY SIGNAL TO FIRE DEPT.	TRANSMIT TROUBLE SIGNAL TO FIRE DEPT.	RELEASE MAGNETICALLY HELD DOORS	RECALL ELEVATORS TO DESIGNATED FLOOR	RECALL ELEVATORS TO ALTERNATE RECALL FLOOR	ACTUATE WARNING TO ELEVATOR CARS	CLOSE ALL SMOKE DAMPERS	UNLOCK EGRESS AND CONTROL DOORS	TURN OFF POWER TO GAS SHUTDOWN	MUTE LOCAL SOUND SYSTEMS	SHUT DOWN RESPECTIVE AIR HANDLING UNIT	ACTUATE HORN EXHAUST FAN	DISABLE HOOD MAKE-UP	ACTUATE FLOOR PRESSURIZATION	ACTUATE STAIRWELL PRESSURIZATION	ACTUATE SMOKE EXHAUST	
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
1	FIRE ALARM SYSTEM AC POWER FAILURE			X	X							X																1
2	FIRE ALARM SYSTEM LOW BATTERY					X	X						X															2
3	OPEN CIRCUIT					X	X						X															3
4	GROUND FAULT					X	X						X															4
5	NOTIFICATION APPLIANCE DEVICE SHORT					X	X						X															5
6	BUILDING MANUAL PULL STATIONS	X	X					X	X	X	X			X					X									6
7	CORRIDOR SMOKE DETECTOR	X	X					X	X	X	X			X	X			X	X		X							7
8	AREA SMOKE DETECTOR	X	X					X	X	X	X			X	X			X	X		X							8
9	HVAC AIR DUCT SMOKE DETECTOR OR DUCT CO DETECTOR	X	X					X	X	X	X											X						9
10	AREA HEAT DETECTORS	X	X					X	X	X	X			X	X			X	X		X							10
11	HOOD OR ROOM FIRE SUPPRESSION SYSTEM ALARM	X	X					X	X	X	X			X	X			X	X	X		X						11
12	SPRINKLER TAMPER SWITCH			X	X			X				X																12
13	SPRINKLER WATER FLOW SWITCH	X	X					X	X	X	X			X	X			X	X		X							13
14	ELEVATOR EQUIPMENT AREA SMOKE DETECTOR	X	X					X	X	X	X			X	X		X	X	X									14
15																												15
16	ELEVATOR LOBBY SMOKE DETECTOR, ALTERNATE FL	X	X					X	X	X	X			X	X													16
17	ELEVATOR LOBBY SMOKE DETECTOR, RECALL FL	X	X					X	X	X	X			X		X	X	X	X									17
18	STANDBY GENERATOR SYSTEM LOW BATTERY			X	X			X				X																18
19	STANDBY GENERATOR SYSTEM NOT IN AUTO MODE			X	X			X				X																19
20	AREA OF REFUGE TWO WAY COMMUNICATIONS STATUS			X	X			X				X																20
21	SYSTEM CARBON MONOXIDE DETECTOR			X	X			X				X																21
22	KITCHEN CARBON MONOXIDE DETECTOR			X	X			X				X								X								22
23	BI DIRECTIONAL ANTENNA SYSTEM			X	X			X				X																23
24																												24
25																												25
26																												26

LOOP NUMBER	ADDRESSABLE LOOP SCHEDULE
1	FIRST FLOOR SECTION A + B
2	FIRST FLOOR SECTION C + D
3	SECOND FLOOR SECTION A + B
4	SECOND FLOOR SECTION C + D
5	THIRD FLOOR SECTION A + B
6	FOURTH FLOOR SECTION A + B
7	SPARE
8	SPARE
9	SPARE
10	SPARE

ROOM SPACING FOR CEILING-MOUNTED VISIBLE APPLIANCES

MAXIMUM ROOM SIZE	MAXIMUM LENS HEIGHT	MINIMUM REQUIRED LIGHT OUTPUT (EFFECTIVE INTENSITY) - ONE LIGHT (cd)
20' x 20'	10	15
30' x 30'	10	30
40' x 40'	10	60
44' x 44'	10	75
50' x 50'	10	95
53' x 53'	10	110
55' x 55'	10	115
59' x 59'	10	135
63' x 63'	10	150
68' x 68'	10	177
70' x 70'	10	185
20' x 20'	20	30
30' x 30'	20	45
44' x 44'	20	75
46' x 46'	20	80
50' x 50'	20	95
53' x 53'	20	110
55' x 55'	20	115
59' x 59'	20	135
63' x 63'	20	150
68' x 68'	20	177
70' x 70'	20	185
20' x 20'	30	55
30' x 30'	30	75
50' x 50'	30	95
53' x 53'	30	110
55' x 55'	30	115
59' x 59'	30	135
63' x 63'	30	150
68' x 68'	30	177
70' x 70'	30	185

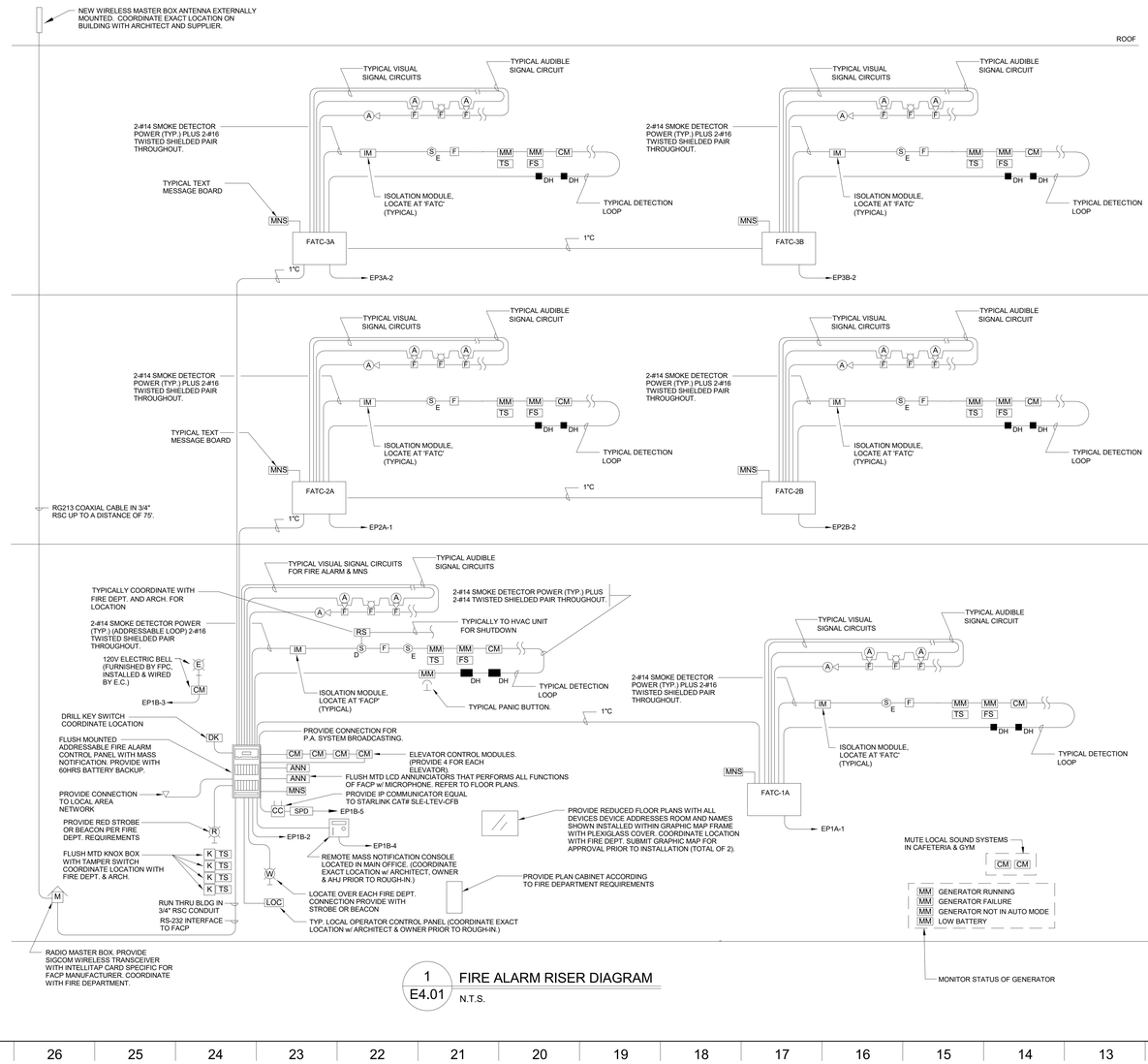
ROOM SPACING FOR WALL-MOUNTED VISIBLE APPLIANCES

MINIMUM REQUIRED LIGHT OUTPUT EFFECTIVE INTENSITY (cd)

MAXIMUM ROOM SIZE	ONE LIGHT PER ROOM (CEILING HEIGHT)	TWO LIGHTS PER ROOM (LOCATED ON OPPOSITE WALLS)	FOUR LIGHTS PER ROOM ONE LIGHT PER WALLS
20' x 20'	15	NA	NA
28' x 28'	30	UNKNOWN	NA
30' x 30'	34	15	NA
40' x 40'	60	30	15
45' x 45'	75	UNKNOWN	19
50' x 50'	94	60	30
54' x 54'	110	UNKNOWN	30
55' x 55'	115	UNKNOWN	28
60' x 60'	135	95	30
63' x 63'	150	UNKNOWN	37
68' x 68'	177	UNKNOWN	43
70' x 70'	184	95	60
80' x 80'	240	135	60
90' x 90'	304	185	95
100' x 100'	375	240	95
110' x 110'	455	240	135
120' x 120'	540	305	135
130' x 130'	635	375	185

FIRE ALARM NOTES

1. E.C. SHALL REFER TO SPECIFICATIONS AND DRAWINGS FOR QUANTITY OF DEVICES, SPARE CAPACITY, PARTS, ETC.
2. E.C. SHALL FIELD CONFIRM LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS. DUCT DETECTORS FURNISHED AND WIRED BY E.C., INSTALLED BY HVAC.
3. TYPICALLY FIRE ALARM SYSTEM SIGNAL CONDUCTORS SHALL BE #14 AWG MINIMUM, TYPE THHN SOLID. FIRE ALARM MC CABLE WITH RED ARMOR IS ALLOWED WHERE RUN CONCEALED AND ALLOWED BY CODE.
4. TYPICALLY ALL SPEAKER/STROBE UNITS SHALL BE WIRED SO THAT THE SPEAKERS AND THE STROBES CAN BE SILENCED SIMULTANEOUSLY.
5. ALL SPEAKER/STROBES SHALL BE MULTI-TAPPED TYPE. E.C. SHALL OWN dB ADJUSTING DURING FIRE DEPARTMENT TESTING.
6. ALL SPEAKER/STROBES SHALL BE MOUNTED IN ACCORDANCE WITH ADA/NFPA ROOM SPACING
7. ALL DEVICES SHALL BE LABELED WITH CLEAR TAPE WITH BLACK INK. LABEL SHALL IDENTIFY LOOP# AND DEVICE NUMBER.
8. ALL REMOTE TEST STATIONS SHALL BE KEYED AND MOUNTED ADJACENT TO FACP OR AS DIRECTED BY LOCAL FIRE DEPT. LABEL EACH UNIT.
9. PULL STATIONS SHALL BE DOUBLE ACTION.
10. ALL TAMPER AND SUPERVISORY SWITCHES SHALL BE PROGRAMMED AS LOCAL SUPERVISORY CONDITION UPON ACTIVATION. TROUBLE OR SUPERVISORY SHALL BE SELF RESTORING.
11. PRIOR TO SUBMITTING SHOP DRAWINGS, COORDINATE WITH LOCAL FIRE DEPT. FOR EXACT REQUIREMENTS. OBTAIN FIRE PREVENTION RULES AND REGULATIONS WHEN AVAILABLE AND COMPLY IN FULL.
12. COORDINATE WITH SELECTED SYSTEM MANUFACTURER FOR WIRING REQUIREMENTS.
13. ALL DETECTION & SIGNAL WIRING SHALL BE CLASS "A".
14. SUBMIT AS PART OF SHOP DRAWINGS COMPLETE FLOOR PLANS & RISERS WITH ALL DEVICES SHOWN AND WITH DEVICE ADDRESSES.
15. PROVIDE ISOLATION MODULE FOR EVERY 20 DEVICES, TYPICAL.
16. ALL VISUAL SIGNALS SHALL BE SYNCHRONIZED.
17. PROVIDE CONTACT CLOSURE INTERFACE TO AUTOMATED LIGHTING CONTROL SYSTEM (ALCS) VIA A SINGLE PAIR OF 2#18 CONDUCTORS. WHEN ALARM SYSTEM GOES INTO ALARM A SIGNAL SHALL BE ISSUED TO ALLOW THE ALCS TO TURN ALL INTERIOR AND EXTERIOR LIGHTING "ON" UNLESS NOTED OTHERWISE. MUTE LOCAL SOUND SYSTEMS FOR PUBLIC ASSEMBLY SPACES.
18. FIRE ALARM PROGRAMMING SHALL BE COORDINATED WITH APPROVED SIGNAGE SHOP DRAWINGS.
19. MASS NOTIFICATION SIGNAL LOOP SHALL TAKE PRIORITY OVER FIRE ALARM SIGNAL LOOP. COORDINATE MESSAGE.
20. FOR "SHELTER - IN - PLACE" AND "LOCK DOWN" COORDINATE WITH OWNER FOR INSTRUCTIONS.



1
E4.01

FIRE ALARM RISER DIAGRAM

N.T.S.

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

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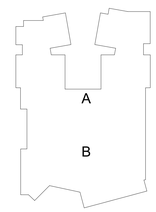
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KEY PLAN



ORIENTATION AND SCALE:



PROJECT NORTH

SHEET TITLE:

FIRE ALARM RISER

SHEET NUMBER:

E4.01

Autodesk Docs://Wilmington Elementary School/Wildwood ME Model SD.rvt
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GENERAL FIRE ALARM NOTES:

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2. E.C. SHALL REFER TO HVAC DRAWINGS FOR EXACT LOCATION OF HVAC UNITS AND FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS. DUCT DETECTORS FURNISHED AND WIRED BY E.C.; INSTALLED BY HVAC.
3. PROVIDE EACH FIRE ALARM TERMINAL CABINET AND FIRE ALARM CONTROL PANEL WITH AN ADA POWER SUPPLY TO SERVE ALL SPEAKER/STROBE UNITS ON RESPECTIVE FLOORS.
4. TYPICALLY FIRE ALARM SYSTEM POWER CONDUCTORS SHALL BE #14 AWG, TYPE THHN SOLID. ALL WIRING SHALL BE INSTALLED IN CONDUIT OR SURFACE METAL RACEWAY. MC CABLE IS ALLOWED WHERE CONCEALED.
5. TYPICALLY ALL SPEAKER/STROBE UNITS SHALL BE WIRED IN A FASHION THAT THE SPEAKER & STROBE IS SILENCED SIMULTANEOUSLY.
6. ALL ELECTRICAL ROOMS ARE (2) HOUR RATED. FIREPROOF PENETRATIONS AS REQUIRED.
7. TYPICALLY REFER TO DOOR HARDWARE SCHEDULES & DRAWINGS FOR LOCATIONS & QUANTITIES OF HARDWARE EQUIPMENT AFFECTING THIS SECTION. PROVIDE ALL WORK AS REQUIRED.
8. COORDINATE FINAL LOCATIONS OF MAGNETIC DOOR HOLDERS AND OTHER HARDWARE DEVICES WITH HARDWARE SUPPLIER PRIOR TO ROUGHING.
9. TYPICALLY PROVIDE (1) MONITOR MODULE FOR EACH CARBON MONOXIDE DETECTOR. ALSO CONNECT CO DETECTORS TO SECURITY SYSTEM FOR REMOTE CENTRAL STATION REPORTING.
10. MECHANICAL EQUIPMENT, MOTORIZED FIRE/SMOKE DAMPER - FURNISHED & INSTALLED BY HVAC CONTRACTOR, WIRED BY E.C.. FIRE ALARM INTERLOCK WIRING BY E. C. PROVIDE A CONTROL MODULE FOR EACH UNIT AND INTERLOCK EACH DAMPER SO THAT DAMPER IS POWERED OPEN AND IS SPRING CLOSED. LOCATE CONTROL MODULES ADJACENT TO DAMPERS. REFER TO HVAC DRAWINGS FOR DAMPER LOCATIONS. CONNECT TO THE NEAREST 120 VOLT BRANCH CIRCUIT.
11. ALL PULL STATIONS TO BE PROVIDED WITH TAMPERPROOF COVERS WITH LOCAL ALARM.
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14. E.C. SHALL FURNISH DUCT TYPE SMOKE DETECTOR FOR INSTALLATION BY HVAC. E.C. SHALL WIRE FOR ACTUATION OF ADJACENT SMOKE DAMPER PER INTERNATIONAL MECHANICAL CODE (IMC) 2009, 607.3.3.2.1.

1 E4.11 LEVEL ONE AREA A - FIRE ALARM
SCALE: 1/8" = 1'-0"

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

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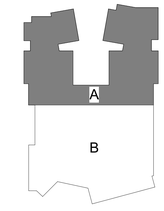
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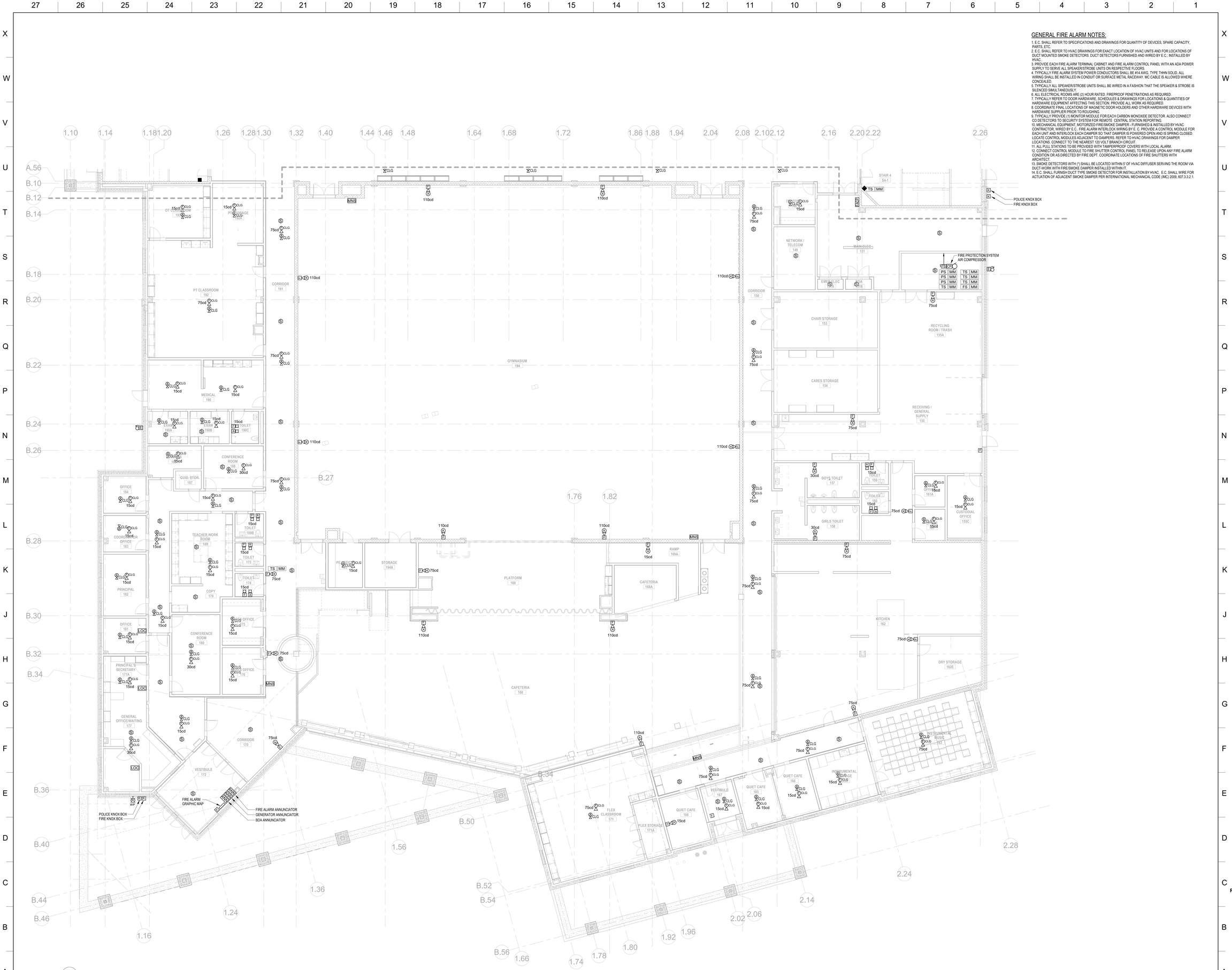


PROJECT NORTH

SHEET TITLE:
LEVEL 1 AREA A - FIRE ALARM

SHEET NUMBER:
E4.11

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GENERAL FIRE ALARM NOTES:
1. E.C. SHALL REFER TO SPECIFICATIONS AND DRAWINGS FOR QUANTITY OF DEVICES, SPARE CAPACITY, PARTS, ETC.
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4. TYPICALLY FIRE ALARM SYSTEM POWER CONDUCTORS SHALL BE #14 AWG, TYPE THHN SOLID. ALL WIRING SHALL BE INSTALLED IN CONDUIT OR SURFACE METAL RACEWAY. MC CABLE IS ALLOWED WHERE CONCEALED.
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POLICE KNOX BOX
FIRE KNOX BOX
FIRE PROTECTION SYSTEM AIR COMPRESSOR
FIRE ALARM GRAPHIC MAP
FIRE ALARM ANNUNCIATOR
GENERATOR ANNUNCIATOR
BDA ANNUNCIATOR
POLICE KNOX BOX
FIRE KNOX BOX
PT CLASSROOM 192
CORRIDOR 191
GYMNASIUM 194
CORRIDOR 150
CHAIR STORAGE 153
CARES STORAGE 154
RECYCLING ROOM / TRASH 155A
RECEIVING / GENERAL SUPPLY 155
MEDICAL 190
CONFERENCE ROOM 188
GUID. STOR. 187
OFFICE 184
COORDINATOR OFFICE 183
TEACHER WORK ROOM 189
PRINCIPAL 182
OFFICE 181
CONFERENCE ROOM 180
PRINCIPAL'S SECRETARY 177
GENERAL OFFICE/WAITING 177
COPY 179
CORRIDOR 170
VESTIBULE 172
BOYS TOILET 157
GIRLS TOILET 156
TOILET 158
TOILET 159
OFFICE 161A
CUSTODIAL OFFICE 155C
KITCHEN 162
DRY STORAGE 162E
INSTRUMENTAL MUSIC 163
QUIET CAFE 164
QUIET CAFE 165
QUIET CAFE 166
VESTIBULE 167
FLEX CLASSROOM 171
FLEX STORAGE 171A
CAFETERIA 168
CAFETERIA 168A
PLATFORM 169
RAMP 169A
STORAGE 194A
FLEX CLASSROOM 195
NETWORK / TELECOM 140
MAIN ELEC 131
EMER ELEC 130A
STAIR 4 S4-1
TOILET 189C
TOILET 189B
TOILET 173
TOILET 174
TOILET 175
TOILET 176
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OFFICE 202
OFFICE 203
OFFICE 204
OFFICE

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1 E4.21 LEVEL TWO AREA A - FIRE ALARM
SCALE: 1/8" = 1'-0"

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

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WILMINGTON, MA 01887

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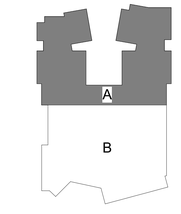
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KEY PLAN



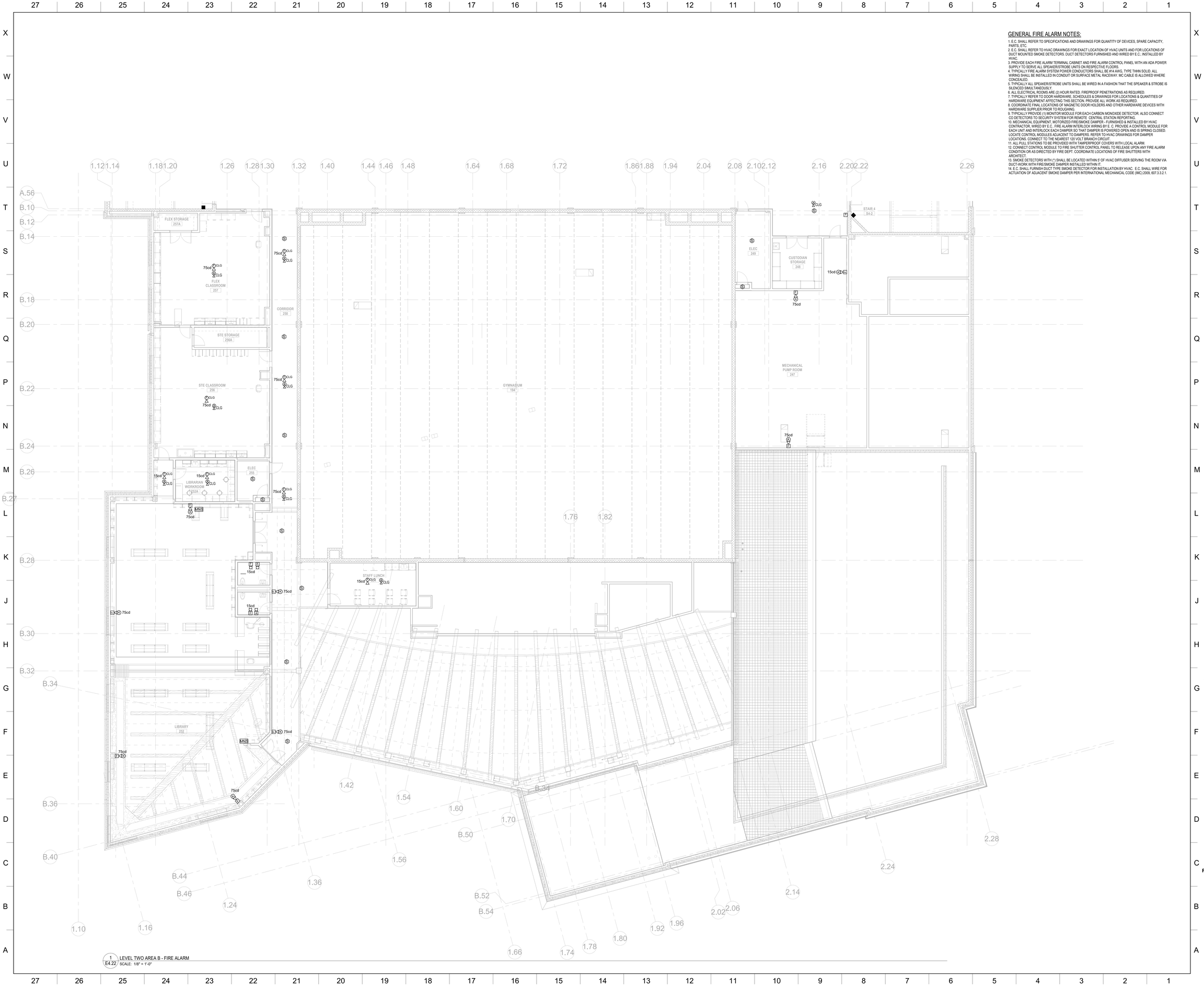
ORIENTATION AND SCALE:

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SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

SHEET TITLE:
LEVEL 2 AREA A - FIRE ALARM

SHEET NUMBER:
E4.21

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6/17/2026 11:40:27 AM



1 LEVEL TWO AREA B - FIRE ALARM
E4.22 SCALE: 1/8" = 1'-0"

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MASSACHUSETTS
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NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
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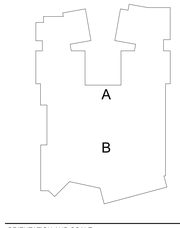
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KEY PLAN



ORIENTATION AND SCALE:

N TRUE NORTH
0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE
PROJECT NORTH

SHEET TITLE:
LEVEL 2 AREA B - FIRE ALARM

SHEET NUMBER:
E4.22

Autodesk Docs://Wilmington Elementary School/Wildwood ME Model SD.rvt
6/17/2026 11:40:28 AM

GENERAL FIRE ALARM NOTES:

1. E.C. SHALL REFER TO SPECIFICATIONS AND DRAWINGS FOR QUANTITY OF DEVICES, SPARE CAPACITY, PARTS, ETC.
2. E.C. SHALL REFER TO HVAC DRAWINGS FOR EXACT LOCATION OF HVAC UNITS AND FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS. DUCT DETECTORS FURNISHED AND WIRED BY E.C.; INSTALLED BY HVAC.
3. PROVIDE EACH FIRE ALARM TERMINAL CABINET AND FIRE ALARM CONTROL PANEL WITH AN ADA POWER SUPPLY TO SERVE ALL SPEAKER/STROBE UNITS ON RESPECTIVE FLOORS.
4. TYPICALLY FIRE ALARM SYSTEM POWER CONDUCTORS SHALL BE #14 AWG, TYPE THHN SOLID. ALL WIRING SHALL BE INSTALLED IN CONDUIT OR SURFACE METAL RACEWAY. MC CABLE IS ALLOWED WHERE CONCEALED.
5. TYPICALLY ALL SPEAKER/STROBE UNITS SHALL BE WIRED IN A FASHION THAT THE SPEAKER & STROBE IS SILENCED SIMULTANEOUSLY.
6. ALL ELECTRICAL ROOMS ARE (2) HOUR RATED. FIREPROOF PENETRATIONS AS REQUIRED.
7. TYPICALLY REFER TO DOOR HARDWARE SCHEDULES & DRAWINGS FOR LOCATIONS & QUANTITIES OF HARDWARE EQUIPMENT AFFECTING THIS SECTION. PROVIDE ALL WORK AS REQUIRED.
8. COORDINATE FINAL LOCATIONS OF MAGNETIC DOOR HOLDERS AND OTHER HARDWARE DEVICES WITH HARDWARE SUPPLIER PRIOR TO ROUGHING.
9. TYPICALLY PROVIDE (1) MONITOR MODULE FOR EACH CARBON MONOXIDE DETECTOR. ALSO CONNECT CO DETECTORS TO SECURITY SYSTEM FOR REMOTE CENTRAL STATION REPORTING.
10. MECHANICAL EQUIPMENT, MOTORIZED FIRE/SMOKE DAMPER - FURNISHED & INSTALLED BY HVAC CONTRACTOR, WIRED BY E.C.. FIRE ALARM INTERLOCK WIRING BY E. C. PROVIDE A CONTROL MODULE FOR EACH UNIT AND INTERLOCK EACH DAMPER SO THAT DAMPER IS POWERED OPEN AND IS SPRING CLOSED. LOCATE CONTROL MODULES ADJACENT TO DAMPERS. REFER TO HVAC DRAWINGS FOR DAMPER LOCATIONS. CONNECT TO THE NEAREST 120 VOLT BRANCH CIRCUIT.
11. ALL PULL STATIONS TO BE PROVIDED WITH TAMPERPROOF COVERS WITH LOCAL ALARM.
12. CONNECT CONTROL MODULE TO FIRE SHUTTER CONTROL PANEL TO RELEASE UPON ANY FIRE ALARM CONDITION OR AS DIRECTED BY FIRE DEPT. COORDINATE LOCATIONS OF FIRE SHUTTERS WITH ARCHITECT.
13. SMOKE DETECTORS WITH (*) SHALL BE LOCATED WITHIN 5' OF HVAC DIFFUSER SERVING THE ROOM VIA DUCT-WORK WITH FIRE/SMOKE DAMPER INSTALLED WITHIN IT.
14. E.C. SHALL FURNISH DUCT TYPE SMOKE DETECTOR FOR INSTALLATION BY HVAC. E.C. SHALL WIRE FOR ACTUATION OF ADJACENT SMOKE DAMPER PER INTERNATIONAL MECHANICAL CODE (IMC) 2009, 607.3.3.2.1.

1 E4.31 LEVEL THREE AREA A - FIRE ALARM
SCALE: 1/8" = 1'-0"

2 E4.31 ROOF - FIRE ALARM
SCALE: 1/8" = 1'-0"

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WILMINGTON ELEMENTARY SCHOOL

320 SALEM ST.
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PROJECT NUMBER: 23-0847

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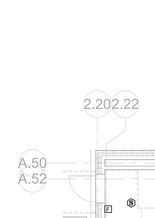
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KEY PLAN



ORIENTATION AND SCALE:

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0 4' 8' 16'
TRUE NORTH
SCALE: 1/8"=1'-0" GRAPHIC SCALE
PROJECT NORTH

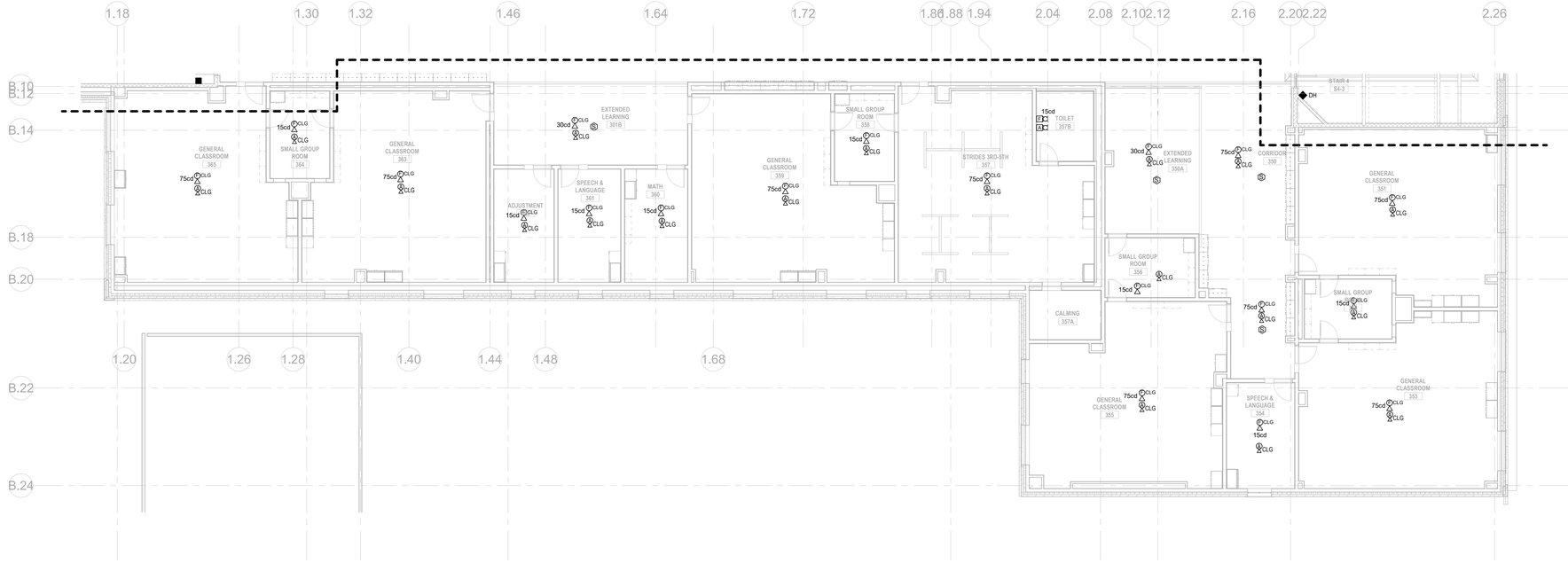
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LEVEL 3 AREA A - FIRE ALARM

SHEET NUMBER:
E4.31

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6/17/2026 11:40:31 AM

GENERAL FIRE ALARM NOTES:

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1 / E4.32 LEVEL THREE AREA B - FIRE ALARM
SCALE: 1/8" = 1'-0"

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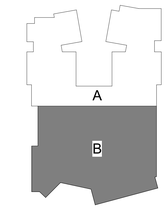
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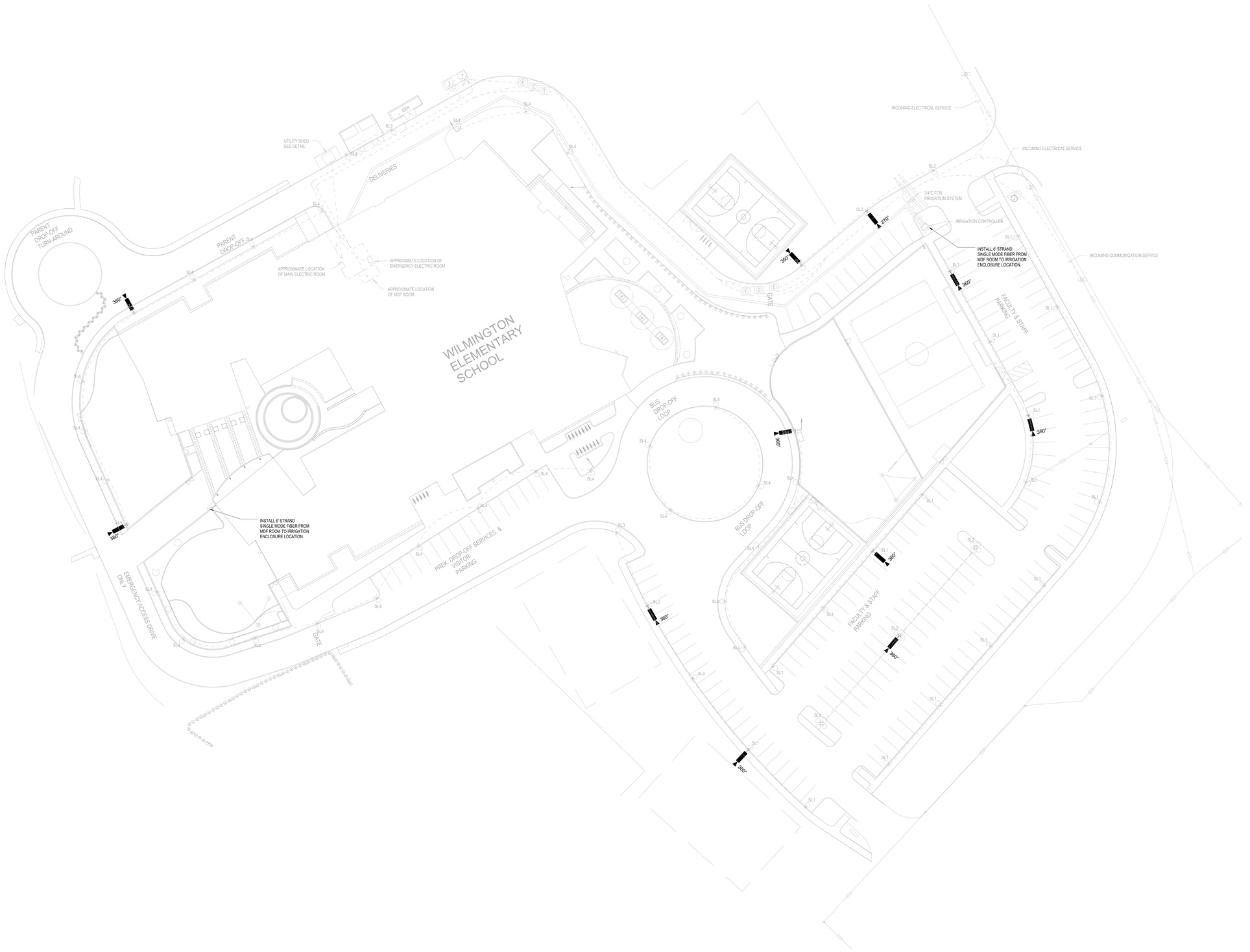
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TRUE NORTH
PROJECT NORTH
0 4' 8' 16'
SCALE: 1/8"=1'-0"
GRAPHIC SCALE

SHEET TITLE:
LEVEL 3 AREA B - FIRE ALARM

SHEET NUMBER:
E4.32

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1 TECHNOLOGY SITE PLAN EXTERIOR CAMERAS
1" = 30'-0"

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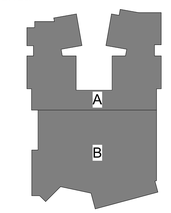
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PROJECT NORTH

SHEET TITLE:
SITE PLAN EXTERIOR CAMERAS TECHNOLOGY

SHEET NUMBER:
T0.01



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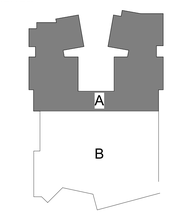
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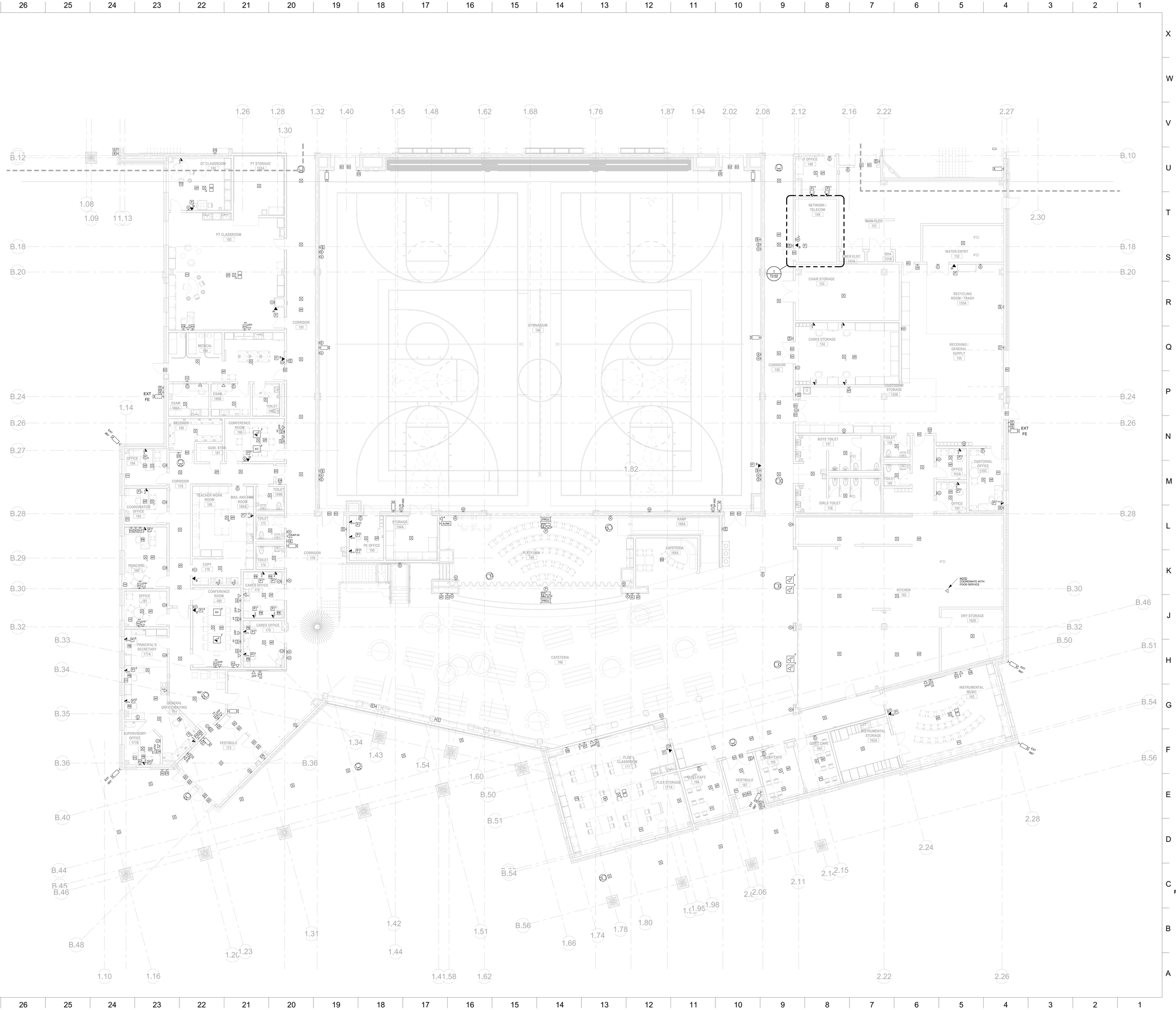
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SCALE: 1/8"=1'-0" GRAPHIC SCALE

SHEET TITLE:

LEVEL 1 - AREA A
TECHNOLOGY

SHEET NUMBER:

T1.11



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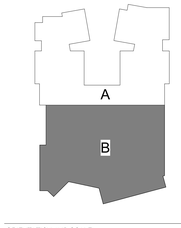
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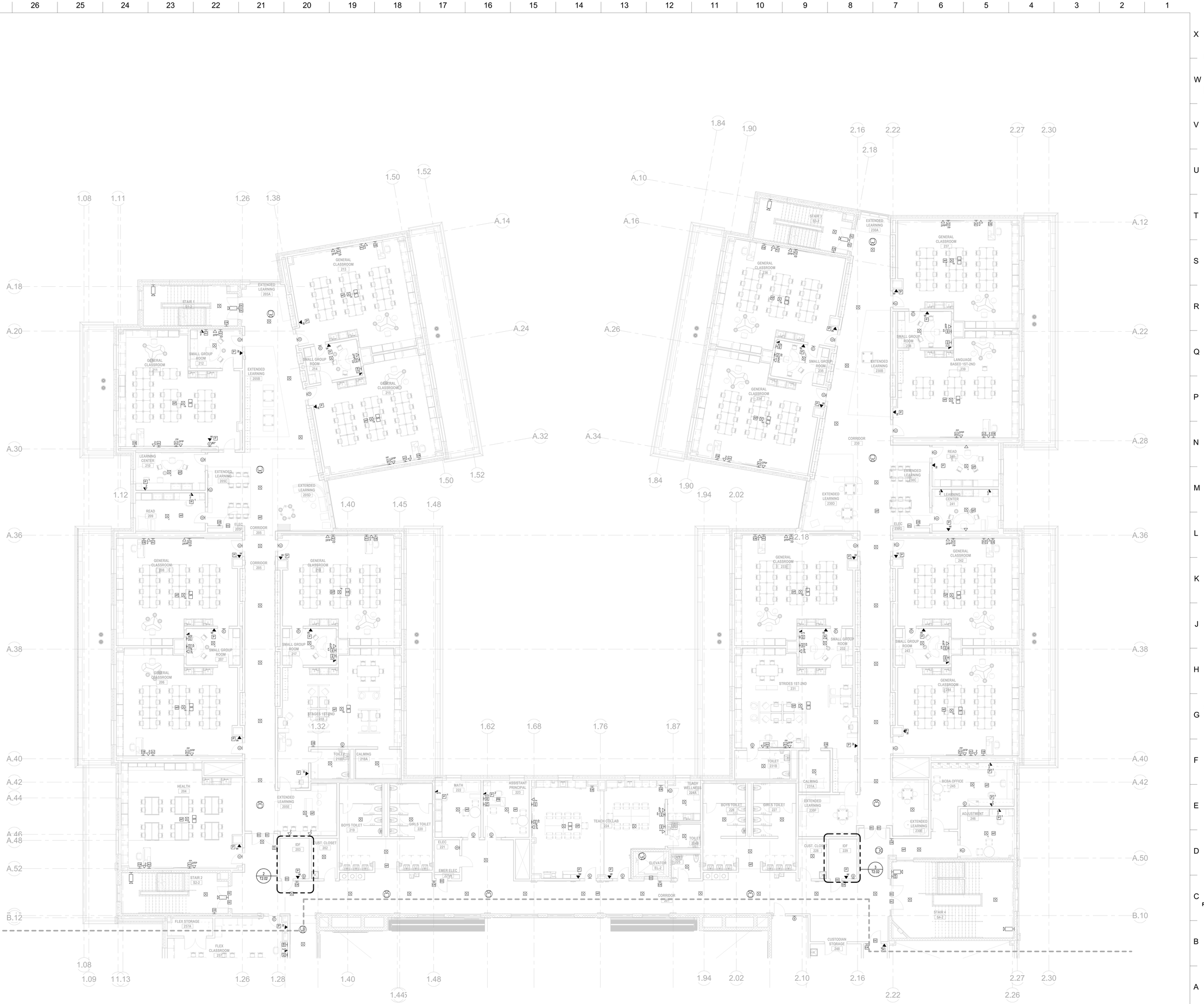
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SHEET TITLE:

LEVEL 1 - AREA B
TECHNOLOGY

SHEET NUMBER:

T1.12



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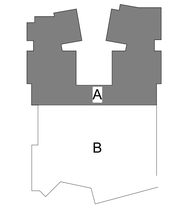
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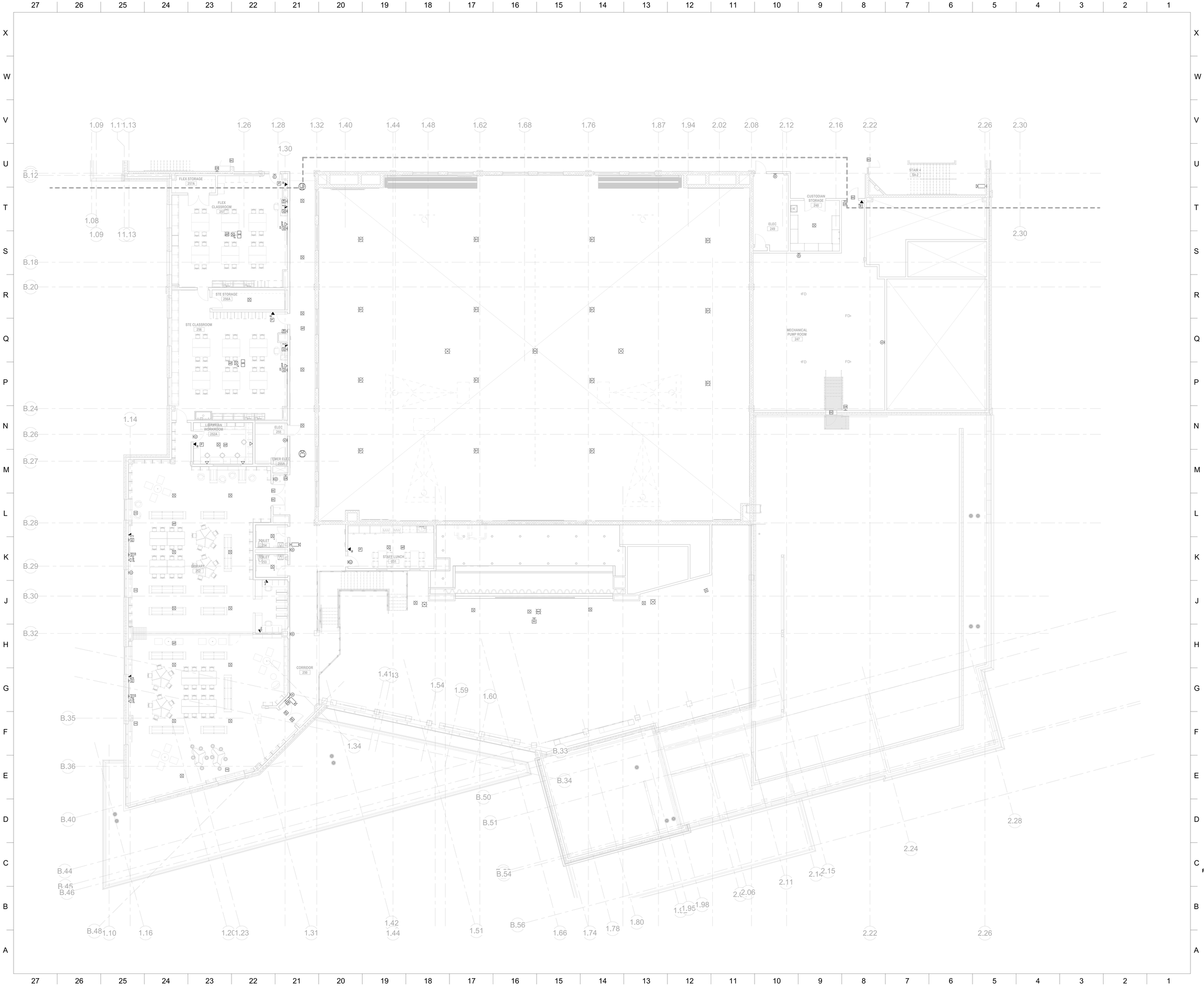
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SHEET TITLE:

LEVEL 2 - AREA A TECHNOLOGY

SHEET NUMBER:

T1.21



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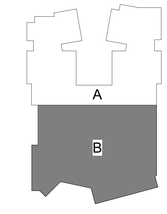
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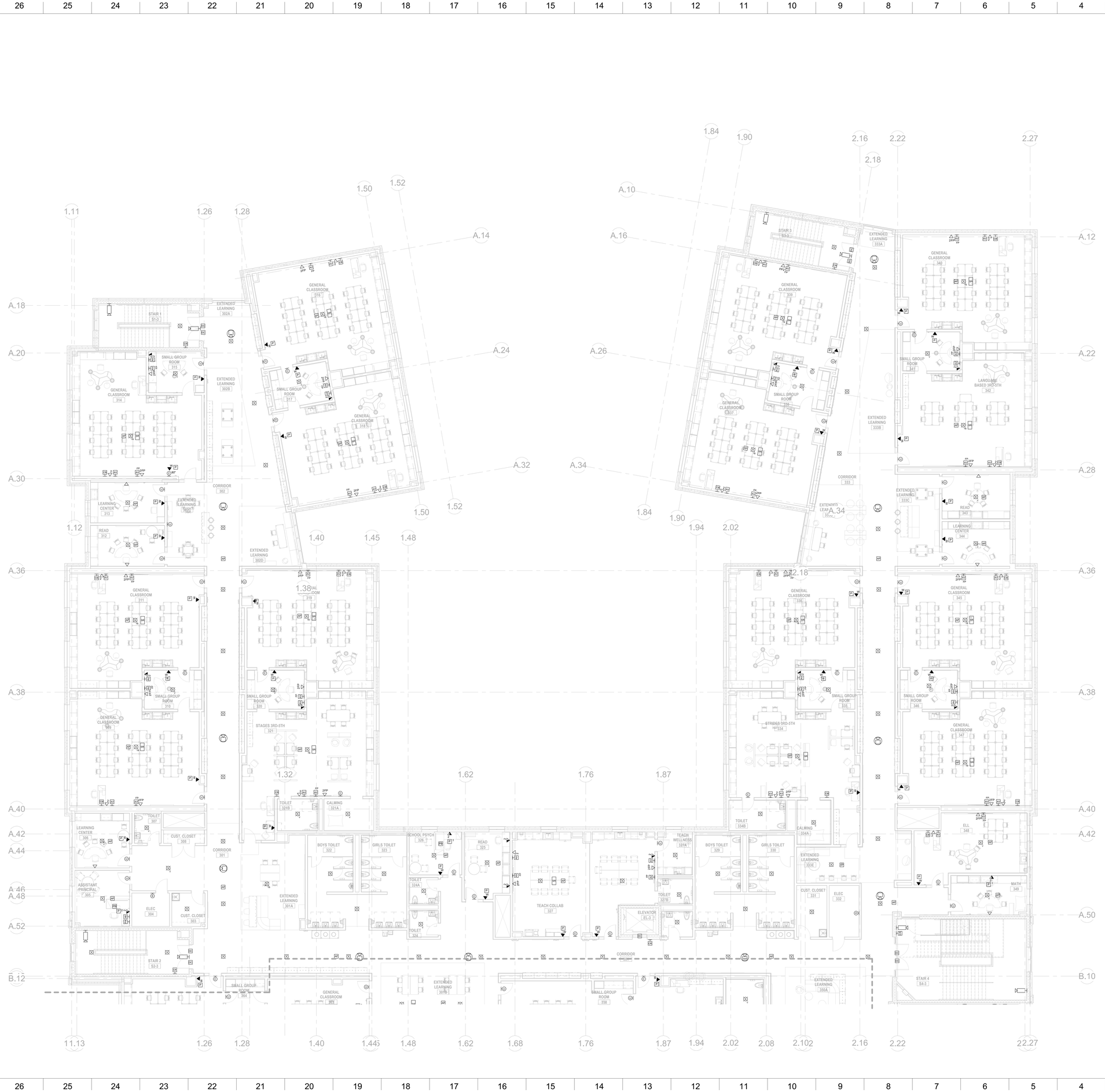
PROJECT NORTH

SHEET TITLE:

LEVEL 2 - AREA B TECHNOLOGY

SHEET NUMBER:

T1.22



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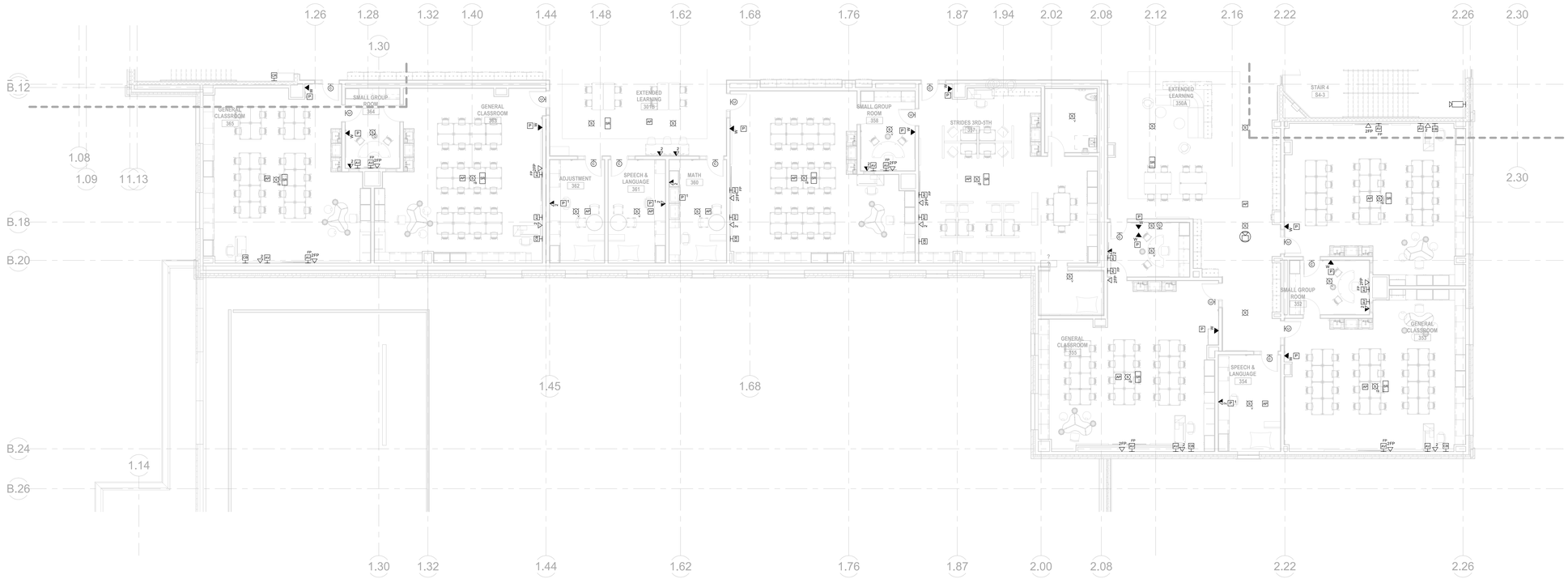
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ORIENTATION AND SCALE:

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0 4' 8' 16'
SCALE: 1/8"=1'-0" GRAPHIC SCALE
TRUE NORTH
PROJECT NORTH

SHEET TITLE:
LEVEL 3 - AREA A TECHNOLOGY

SHEET NUMBER:
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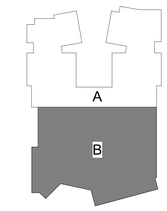
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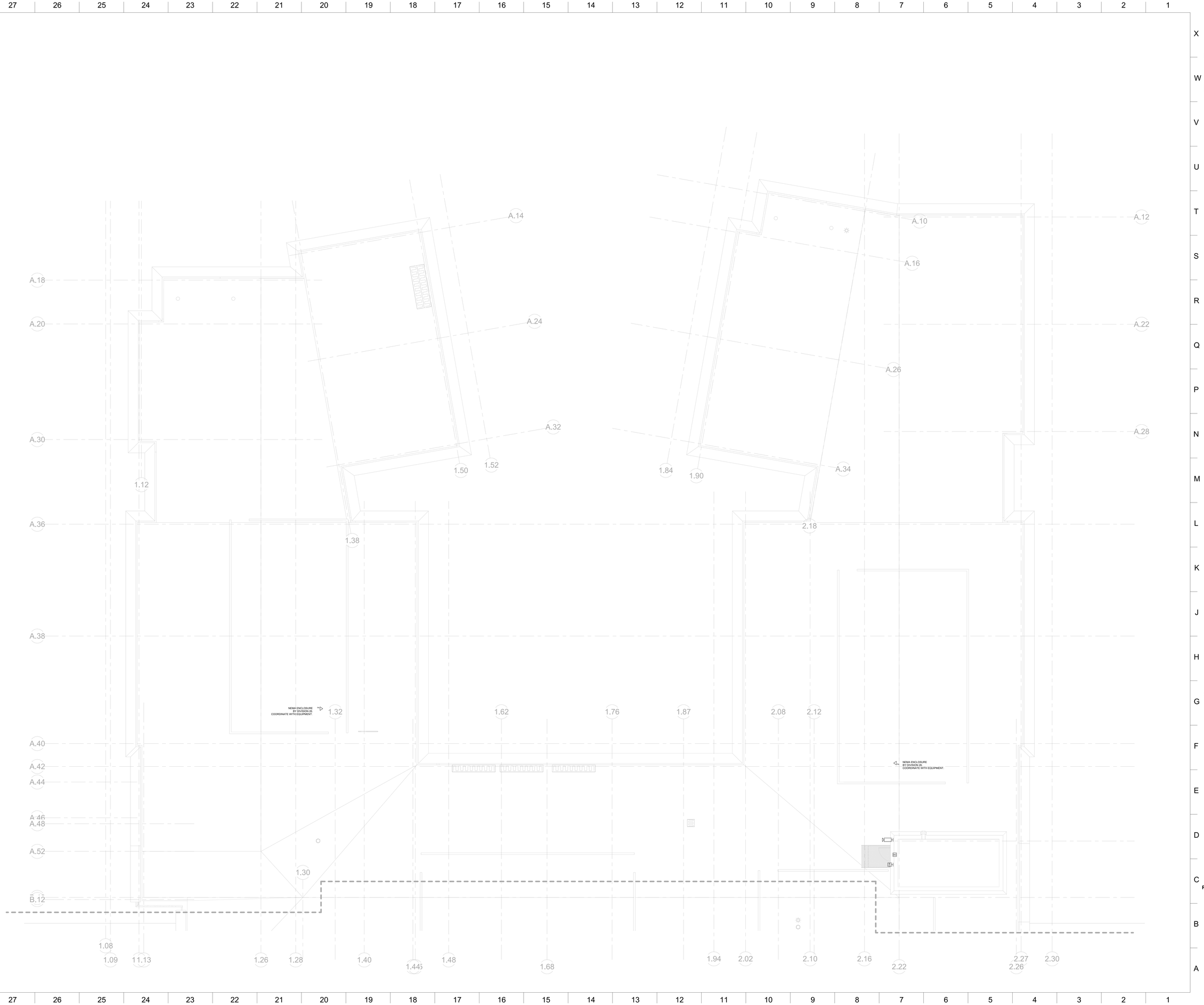
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TRUE NORTH
PROJECT NORTH
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SCALE: 1/8"=1'-0" GRAPHIC SCALE

SHEET TITLE:

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TECHNOLOGY

SHEET NUMBER:

T1.32



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P: (802) 863-1428

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300 Brickstone Square, Suite 201
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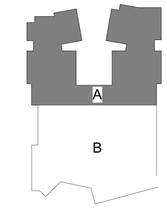
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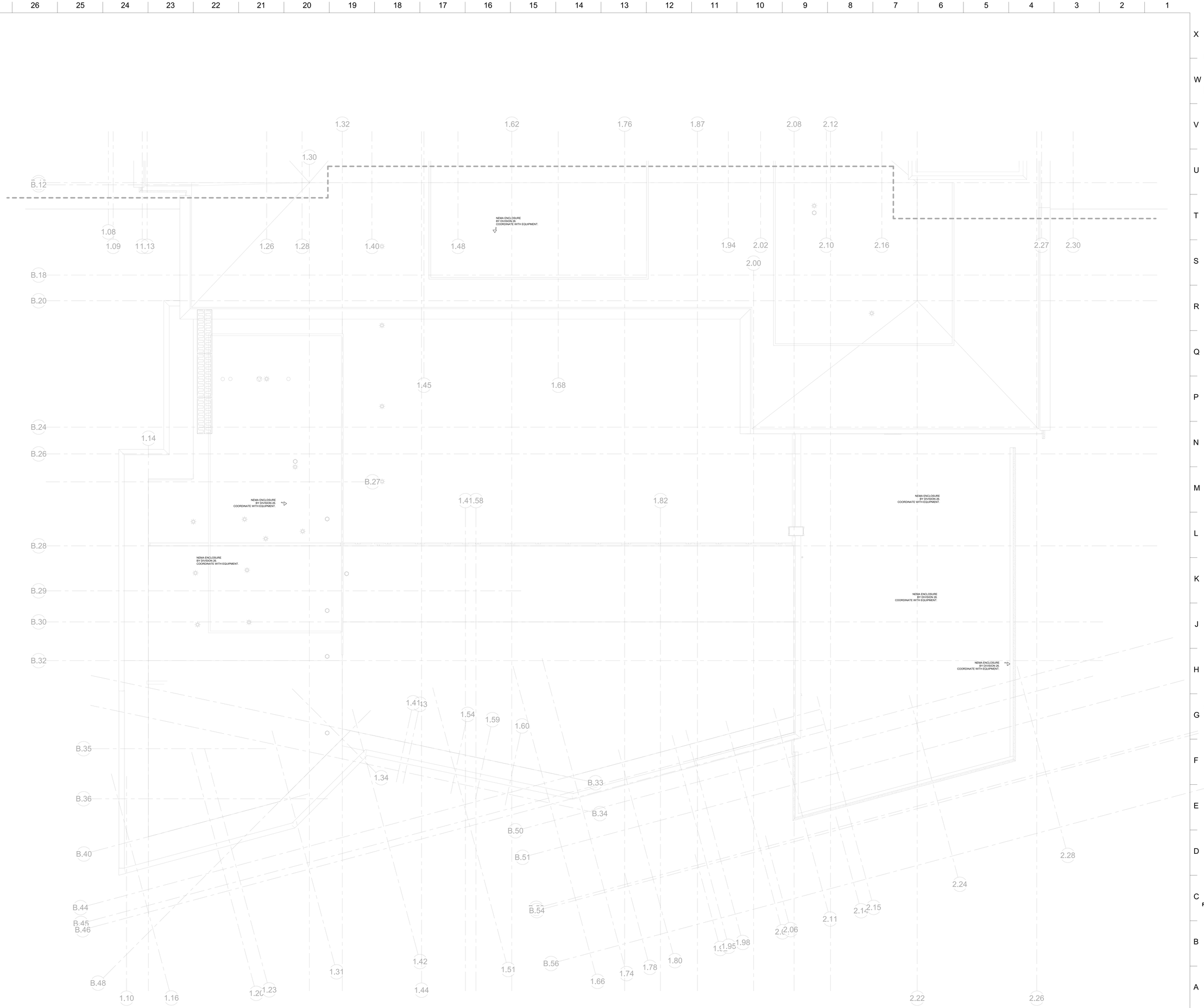
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SHEET TITLE:

ROOF - AREA A
TECHNOLOGY

SHEET NUMBER:

T1.41



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MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
BURLINGTON, VT 05401
P: (802) 863-1428

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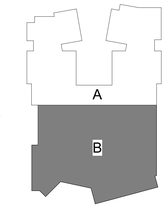
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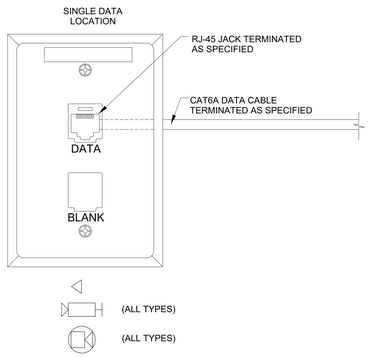
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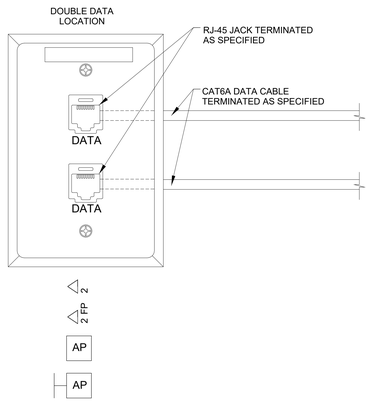
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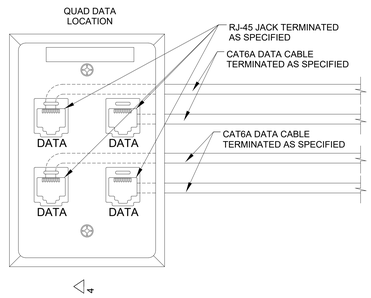
ROOF - AREA B
TECHNOLOGY

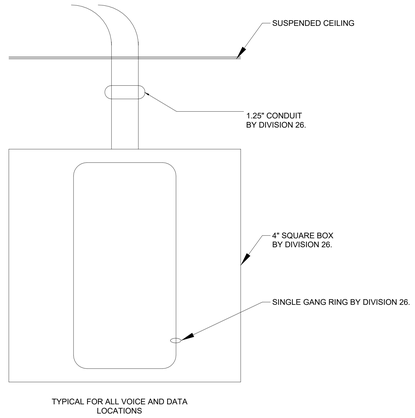
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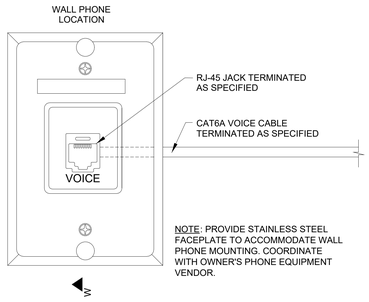




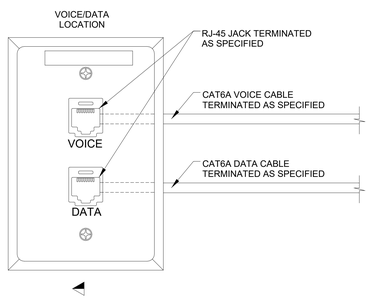


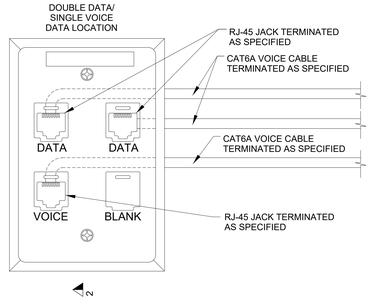


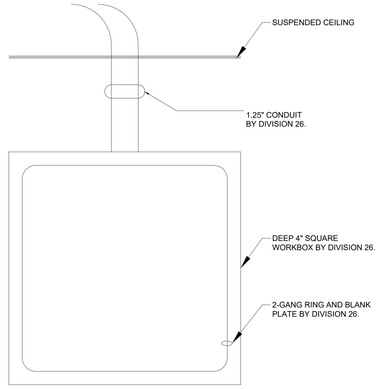
TYPICAL FOR ALL VOICE AND DATA LOCATIONS



NOTE: PROVIDE STAINLESS STEEL FACEPLATE TO ACCOMMODATE WALL PHONE MOUNTING. COORDINATE WITH OWNER'S PHONE EQUIPMENT VENDOR.







TYPICAL FOR LOCATION

AV AV FP

1 TECHNOLOGY FACEPLATE CONFIGURATIONS
NTS

GENERAL NOTES:

1) ALL FACEPLATES SHALL MATCH ELECTRICAL FOR COLOR, FINISH AND MATERIAL.

2) TECHNOLOGY OUTLET SYMBOLS ARE SHOWN AS A REPRESENTATION OF THE JACKS AND FACE PLATES TO BE INSTALLED. THESE TECHNOLOGY OUTLET LOCATIONS ARE APPROXIMATE AND ARE TO BE CLOSELY COORDINATED WITH FIELD CONDITIONS AND THE ARCHITECT.

3) COMMUNICATION SYSTEMS INSTALLER IS TO COORDINATE ALL TECHNOLOGY OUTLET LOCATIONS WITH ALL ADJACENT COEXISTING CLASSES OF WORK.

4) COMMUNICATION SYSTEMS INSTALLER IS TO COORDINATE THE EXACT MOUNTING LOCATION AND CONSTRUCTION METHOD FOR ALL TECHNOLOGY OUTLETS WITH THE ARCHITECT, CASEWORK CONTRACTOR, TECHNOLOGY EQUIPMENT VENDOR AND FURNITURE CONTRACTOR TO PROVIDE A COMPLETE AND SATISFACTORY INSTALLATION.

5) ALL CONDUIT, WORKBOXES, FLOOR BOXES AND PLASTER RINGS SHALL BE PROVIDED BY DIVISION 26. SPECIAL DEVICE WORKBOXES WILL BE FURNISHED BY COMMUNICATION SYSTEM INSTALLER FOR INSTALLATION BY DIVISION 26. FACEPLATES, CONNECTORS AND CABLING WILL BE FURNISHED AND INSTALLED BY COMMUNICATION SYSTEM INSTALLER.

6) ALL REFERENCES TO DIVISION 26 ARE MEANT TO CONVEY WORK BEING PERFORMED BY THE ELECTRICAL CONTRACTOR.

7) ALL REFERENCES TO OUTLET AND DEVICE HEIGHTS REFER TO HEIGHT OF THE CENTER OF THE OUTLET OR DEVICE ABOVE FINISHED FLOOR. COORDINATE ALL MOUNTING HEIGHTS WITH DIVISION 26, ARCHITECT AND ELEVATIONS.

TYPICAL SYMBOL KEY

EXAMPLE:

"SPECIAL DESIGNATION"
"MOUNTING DESIGNATION"

2 144 DOUBLE DATA MOUNTED 144" A.F.F.

"MOUNTING DESIGNATION"

CLG "CEILING MOUNTING DESIGNATION"

MOUNTING DESIGNATIONS:

"AE" = REFER TO ARCHITECTURAL ELEVATIONS AND ARCHITECT FOR MOUNTING HEIGHT AND LOCATION.

"AD" = DEVICE MOUNTED HORIZONTALLY AND CENTERED DIRECTLY ABOVE DOOR FRAME

"C" = DEVICE MOUNTED AT COUNTER HEIGHT

"CLG" = DEVICE FINISH CEILING MOUNTED.

"##" = DEVICE MOUNTED "##" INCHES ABOVE FINISH FLOOR

"F" = DEVICE MOUNTED IN FLOOR BOX OR POKE-THRU

"AB" = MOUNT ABOVE WHITE BOARD LOCATION. COORDINATE WITH ARCHITECTURAL AND ELECTRICAL ELEVATIONS.

"D" = DIRECT CONNECT TELEPHONE LINE. CONNECT DIRECTLY TO TELCO LINE.

"WG" = DEVICE PROTECTED BY WIREGUARD. COORDINATE WIREGUARD TYPE WITH DIVISION 260144.

"FP" = MOUNT AT FLAT PANEL DISPLAY LOCATION IN AV BOX.

"TB" = TALKBACK SPEAKER

"TV" = MOUNT BEHIND FLATSCREEN TV IN AV BOX. COORDINATE WITH ARCHITECTURAL ELEVATIONS.

"PRO" = MOUNT ADJACENT TO PROJECTOR. COORDINATE WITH ARCHITECTURAL ELEVATIONS.

LEGEND

- DATA OUTLET- SINGLE GANG FACEPLATE WITH DATA JACK (QUANTITY AS INDICATED BY SPECIAL DESIGNATION). WORKBOX AND CONDUIT STUB BY DIVISION 26. COORDINATE MOUNTING HEIGHTS WITH DIVISION 26. SPECIAL DESIGNATIONS: "2"=TWO DATA JACKS PER FACEPLATE, "3"=THREE DATA JACKS PER FACEPLATE, "4"=FOUR DATA JACKS PER FACEPLATE, ETC. NO SPECIAL DESIGNATION INDICATES A SINGLE DATA JACK.
- W SINGLE VOICE OUTLET- SINGLE GANG FACEPLATE WITH CONNECTORS AND CABLING AS INDICATED IN TECHNOLOGY DETAILS. WORKBOX AND CONDUIT STUB BY DIVISION 26. USE A STAINLESS STEEL FACEPLATE WITH RJ45 JACK TO ACCOMMODATE PERMANENT WALLPHONE MOUNTING. ALL STAINLESS STEEL FACEPLATES SHALL HAVE A LABEL WINDOW. COORDINATE MOUNTING HEIGHTS WITH DIVISION 26.
- VOICE/DATA OUTLET- SINGLE GANG FACEPLATE WITH CONNECTORS AND CABLING AS INDICATED IN TECHNOLOGY DETAILS. WORKBOX AND CONDUIT STUB BY DIVISION 26. COORDINATE MOUNTING HEIGHTS WITH DIVISION 26.
- 2 DOUBLE DATA/SINGLE VOICE OUTLET- SINGLE GANG FACEPLATE WITH CONNECTORS AND CABLING AS INDICATED IN TECHNOLOGY DETAILS. WORKBOX AND CONDUIT STUB BY DIVISION 26. COORDINATE MOUNTING HEIGHTS WITH DIVISION 26.
- AP WIRELESS ACCESS POINT PER SECTION 272000. DOUBLE DATA OUTLET FOR WIRELESS ACCESS POINTS WITH WIRELESS ACCESS POINT CABLING INSTALLED AS SPECIFIED ABOVE REFLECTED CEILING WITH 20' OF COILED CABLE SLACK. FOR HARD/GYP CEILING AREAS, PROVIDE SINGLE GANG FACEPLATE WITH CONNECTORS AND CABLING AS INDICATED IN TECHNOLOGY DETAILS. WORKBOX AND CONDUIT STUB BY DIVISION 26. COORDINATE MOUNTING HEIGHTS WITH DIVISION 26. CABLING BY SECTION 270100 AND WIRELESS ACCESS POINT BY SECTION 272000.
- AP WIRELSS ACCESS POINT PER SECTION 272000. WALL MOUNTED DOUBLE DATA OUTLET FOR WIRELESS ACCESS POINT. SINGLE GANG FACEPLATE WITH CONNECTORS AND CABLING AS INDICATED IN TECHNOLOGY DETAILS. WORKBOX AND CONDUIT STUB BY DIVISION 26. COORDINATE MOUNTING HEIGHTS WITH DIVISION 26. CABLING BY SECTION 270100 AND WIRELESS ACCESS POINT BY SECTION 272000.
- AV AUDIO/VISUAL BOX AT TEACHER'S LOCATIONS. (1) 4" SQUARE WORKBOXES, WITH (1) 1.25" CONDUIT AND (1) 1" CONDUIT TO CORRESPONDING SPACE'S ACCESSIBLE CEILING BY DIVISION 26. MOUNTING HEIGHTS 18" A.F.F. UNLESS OTHERWISE NOTED.
- AV FP AUDIO/VISUAL BOX FOR FLAT PANEL DISPLAY. (1) 4" SQUARE WORKBOX AND (1) 1.25" CONDUIT AND (1) 1" CONDUIT TO CORRESPONDING SPACE'S ACCESSIBLE CEILING BY DIVISION 26. COORDINATE MOUNTING HEIGHTS WITH ARCHITECT.
- C SECONDARY CLOCK AS SPECIFIED. WORKBOX AND CONDUIT STUB BY DIVISION 26.
- CB CALL BUTTON WITH DEVICE PLATE AND CABLING AS SPECIFIED. WORKBOX AND 1" CONDUIT TO ACCESSIBLE CEILING BY DIVISION 26. MOUNTED AT 48" A.F.F. UNLESS OTHERWISE NOTED.
- S CEILING SPEAKER AS SPECIFIED. CUSTOM BACKBOX FURNISHED AND INSTALLED BY COMMUNICATION CONTRACTOR. PROVIDE WEATHER PROOF PRODUCT WHERE SHOWN OUTDOORS. COORDINATE MOUNTING HEIGHTS WITH DIVISION 26.
- S TB TALK BACK CEILING SPEAKER AS SPECIFIED. CUSTOM BACKBOX FURNISHED AND INSTALLED BY COMMUNICATION CONTRACTOR. PROVIDE WEATHER PROOF PRODUCT WHERE SHOWN OUTDOORS. COORDINATE MOUNTING HEIGHTS WITH DIVISION 26.
- S V VOLUME CONTROLLED CEILING SPEAKER AS SPECIFIED. CUSTOM BACKBOX FURNISHED AND INSTALLED BY COMMUNICATION CONTRACTOR. BACKBOX AND 1" CONDUIT TO ACCESSIBLE CEILING BY DIVISION 26.
- S WALL SPEAKER AS SPECIFIED. PROVIDE CUSTOM BACKBOX AS REQUIRED BY MANUFACTURER TO DIVISION 26 FOR INSTALLATION. PROVIDE SURFACE MOUNTED BACK BOX AT BLOCK WALL LOCATIONS. 1" CONDUIT TO ACCESSIBLE CEILING BY DIVISION 26.
- S TB TALK BACK WALL SPEAKER AS SPECIFIED. PROVIDE CUSTOM BACKBOX AS REQUIRED BY MANUFACTURER TO DIVISION 26 FOR INSTALLATION. PROVIDE SURFACE MOUNTED BACK BOX AT BLOCK WALL LOCATIONS. 1" CONDUIT TO ACCESSIBLE CEILING BY DIVISION 26.
- HS HORN SPEAKER AS SPECIFIED. PROVIDE CUSTOM BACKBOX AS REQUIRED BY MANUFACTURER TO DIVISION 26 FOR INSTALLATION. 1" CONDUIT TO ACCESSIBLE CEILING BY DIVISION 26.
- PA PA CONSOLE AS SPECIFIED.
- SR CLASSROOM SPEECH REINFORCEMENT SYSTEM AS SPECIFIED. HARDWIRED POWER BY DIVISION 26. "W" DESIGNATES WALL MOUNT.
- P PHONES AS SPECIFIED BY SECTION 273000 VOICE COMMUNICATION SYSTEM WHERE PHONE WITH NO DESIGNATION = WALL PHONE, "1" = GENERAL OFFICE DESK PHONE, "2" = ADMINISTRATIVE DESK PHONE, "3" = CONFERENCE PHONE.
- PB ALARM PANIC BUTTON. 1" CONDUIT TO ACCESSIBLE CEILING BY DIVISION 26.
- CR PROXIMITY CARD READER AS SPECIFIED. WORKBOX AND CONDUIT STUB BY DIVISION 26. "M" = MULLION MOUNTED.
- KP ALARM KEYPAD CONTROL STATION. WORKBOX AND 1" CONDUIT TO ACCESSIBLE CEILING AS REQUIRED BY DIVISION 26. MOUNT AT 48" A.F.F.
- DC DOUBLE POLE/DOUBLE THROW DOOR CONTACT AS SPECIFIED. WORKBOX AND CONDUIT STUB BY DIVISION 26.
- DR DOOR RELEASE BUTTON AS SPECIFIED. WORKBOX AND CONDUIT STUB BY DIVISION 26.
- AI VIDEO INTERCOM DOOR STATION AS SPECIFIED. WORKBOX AND CONDUIT STUB BY DIVISION 26.
- AI VIDEO INTERCOM MASTER STATION AS SPECIFIED. WORKBOX AND CONDUIT STUB BY DIVISION 26.
- PIR CEILING MOUNTED ALARM MOTION SENSOR BY SECTION 281000. WORKBOX AND 1" CONDUIT TO ACCESSIBLE CEILING BY DIVISION 26.
- PIR WALL MOUNTED ALARM MOTION SENSOR BY SECTION 281000. SINGLE GANG BOX AND 1" CONDUIT TO ACCESSIBLE CEILING BY DIVISION 26.
- CI CAMERA INPUT PLATE. WORKBOX AND CONDUIT STUB BY DIVISION 26.
- CEILING MOUNTED INTERIOR SURVEILLANCE CAMERA AS SPECIFIED. "360"" DESIGNATION INDICATES 360 DEGREE CAMERA. "180"" DESIGNATION INDICATES 180 DEGREE CAMERA. WORKBOX AND CONDUIT AS REQUIRED BY DIVISION 26.
- SURFACE MOUNTED SURVEILLANCE CAMERA AS SPECIFIED. "P" DESIGNATION INDICATES PENDANT MOUNT. "S" DESIGNATION INDICATES STAIRWELL CAMERA. WORKBOX AND CONDUIT AS REQUIRED BY DIVISION 26.
- PROJ PROJECTOR CABLING INTERFACE OUTLET AS SPECIFIED BY SECTION 274000. DOUBLE GANG BOX AND CONDUIT BY DIVISION 26.
- P PROJECTOR AS SPECIFIED BY SECTION 274000.

MISC. AUDIO-VISUAL SYSTEMS

- S1 GYMNASIUM CEILING MOUNT LOCAL SOUND SYSTEM SPEAKERS BY SECTION 274000.
- S1 GYMNASIUM S1 SPEAKER CABLE BACKBOX FOR LOCAL SOUND SYSTEM S1 SPEAKERS BY SECTION 274000. SINGLE GANG BOX WITH 1" CONDUIT BY DIVISION 26.
- S2 CAFETERIA SURFACE MOUNT PROGRAM LOUDSPEAKERS BY SECTION 274000.
- S2 CAFETERIA S2 SPEAKER CABLE BACKBOX FOR S2 SPEAKERS BY SECTION 274000. SINGLE GANG BOX WITH 1" CONDUIT BY DIVISION 26.
- S3 CAFETERIA CEILING MOUNT PROGRAM LOUDSPEAKERS BY SECTION 274000.
- S3 CAFETERIA S3 SPEAKER CABLE BACKBOX FOR S3 SPEAKERS BY SECTION 274000. SINGLE GANG BOX WITH 1" CONDUIT BY DIVISION 26.
- W ASSISTED LISTENING AND WIRELESS MICROPHONE ANTENNA BY SECTION 274000. SINGLE GANG BOX AND CONDUIT BY DIVISION 26.
- WA ASSISTED LISTENING AND MICROPHONE ANTENNA BY SECTION 274000. SINGLE BOX AND CONDUIT BY DIVISION 26.
- M MICROPHONE PLATE AS SPECIFIED BY SECTION 274000. SINGLE GANG BOX AND CONDUIT BY DIVISION 26.
- AVRK AV EQUIPMENT RACK. NEMA BOX BY DIVISION 26 TO ACCOMMODATE ALL CONDUITS AND CABLING. DEDICATED 20A CIRCUIT QUAD RECEPTACLE BY DIVISION 26.
- PC COMPUTER CONNECTION TO AV SYSTEM BY 274000. FLOOR WORKBOX AND CONDUIT BY DIVISION 26.

2 TECHNOLOGY OUTLET LEGEND
NTS

DORE + WHITTIER

MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

VERMONT
212 BATTERY STREET
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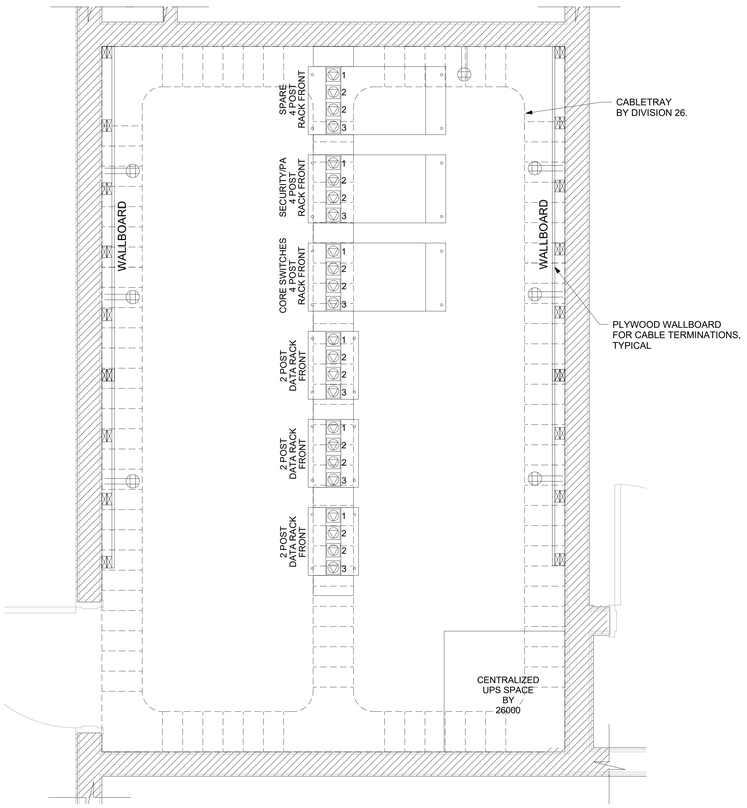
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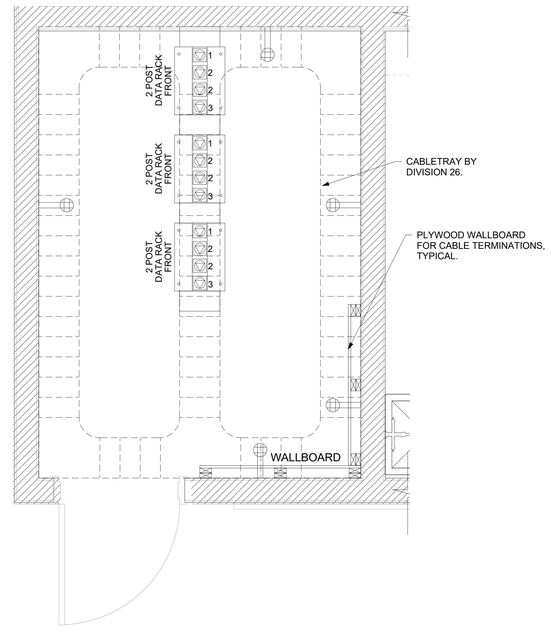
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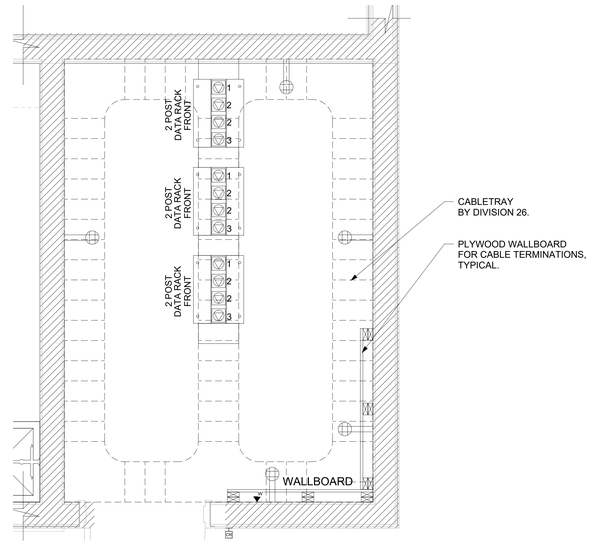
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1 TECHNOLOGY NETWORK/TELECOM ROOM 149 EQUIPMENT LAYOUT
3/4" = 1'-0"



2 TECHNOLOGY IDF ROOM 203 EQUIPMENT LAYOUT
3/4" = 1'-0"



3 TELECOM - ENL - IDF 229
3/4" = 1'-0"

LEGEND:

DUPLEX ELECTRICAL CONVENIENCE OUTLET WITH 20 AMP DEDICATED AND ISOLATED CIRCUIT ON UPS. COORDINATE EXACT ELECTRICAL OUTLET REQUIREMENTS WITH DIVISION 26 DRAWINGS.

QUADRAPLEX ELECTRICAL CONVENIENCE OUTLET WITH 20 AMP DEDICATED AND ISOLATED CIRCUIT ON UPS. COORDINATE EXACT ELECTRICAL OUTLET REQUIREMENTS WITH DIVISION 26 DRAWINGS.

"x"

LOCKING NEMA RECEPTACLE MOUNTED TO THE UNDERSIDE OF CABLE TRAY FACING DOWNWARD, WHERE:
"1" SIGNIFIES 20 120 = 20A L5-20R DEDICATED AND ISOLATED CIRCUIT ON UPS.
"2" SIGNIFIES 30 120 = 30A L5-30R DEDICATED AND ISOLATED CIRCUIT ON UPS.
"3" SIGNIFIES 30 208 = 30A L6-30R DEDICATED AND ISOLATED CIRCUIT ON UPS.

COORDINATE EXACT ELECTRICAL OUTLET REQUIREMENTS WITH DIVISION 26 DRAWINGS.

GENERAL NOTES:

1) COMMUNICATION CONTRACTOR SHALL USE THE POWER RECEPTACLES PROVIDED BY THE DIVISION 26 FOR POWERING OF ALL EQUIPMENT IN THE EQUIPMENT RACKS. PROVIDE EXTENSION CORDS AS REQUIRED.

2) ALL CABLES ARE TO BE ROUTED THROUGH CABLE TRAY. NO CABLES MAY BE RUN ALONG THE FLOOR.

3) ALL CABLE TRAY SHOWN SHALL BE PROVIDED AND INSTALLED BY DIVISION 26.

4) COORDINATE ALL REQUIREMENTS WITH GENERAL CONTRACTOR, ELECTRICAL CONTRACTOR AND ALL OTHER APPLICABLE TRADES.

5) ALL CONDUITS AND CONDUIT SLEEVES TO ACCOMMODATE HORIZONTAL AND BACKBONE CABLING SHALL BE PROVIDED BY DIVISION 26.

VOICE/DATA EQUIPMENT RACK GENERAL NOTES:

1) THE QUANTITY OF 48 PORT PATCH PANELS REQUIRED FOR EACH RACK SHALL BE EQUAL TO THE THE QUANTITY NEEDED TO TERMINATE ALL VOICE AND DATA CABLES AT THAT RACK PLUS THE QUANTITY REQUIRED TO PROVIDE FOR 20% SPARE.

2) A SINGLE 24 PORT FIBER OPTIC PATCH PANEL IS REQUIRED TO TERMINATE FIBERS IN EACH IDF ROOM AND THE MDF ROOM. THE MDF ROOM REQUIRES A QUANTITY OF 24 PORT FIBER OPTIC PATCH PANELS EQUAL TO THE NUMBER OF TECHNOLOGY ROOMS PLUS THE SERVICE ENTRANCE ROOM.

3) MEET WITH OWNER PRIOR TO INSTALLATION OF RACKS, PATCH PANELS, CABLE MANAGEMENT AND EQUIPMENT TO COORDINATE EXACT LOCATIONS FOR ALL COMPONENTS.

4 TECHNOLOGY ROOM EQUIPMENT LAYOUTS NOTES AND LEGEND
NTS

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

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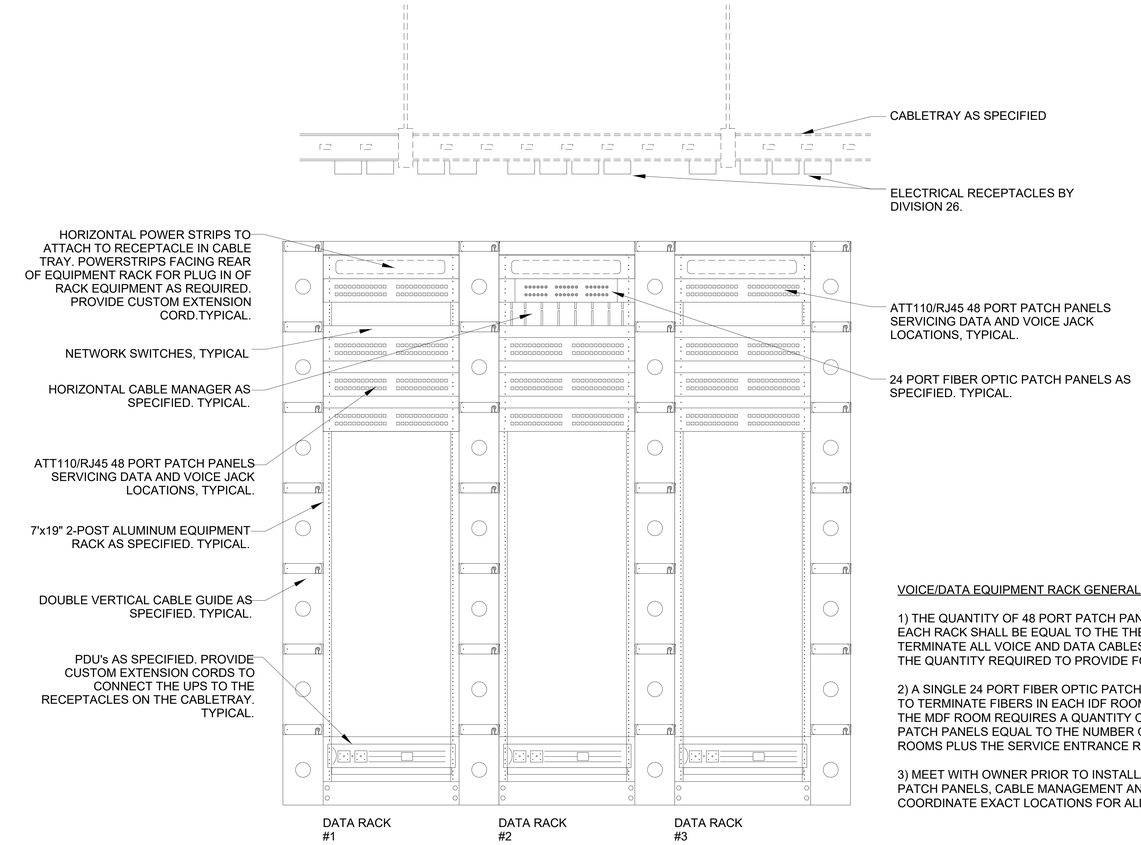
KEY PLAN

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SCALE: AS INDICATED

SHEET TITLE:
DETAIL SHEET
TECHNOLOGY

SHEET NUMBER:
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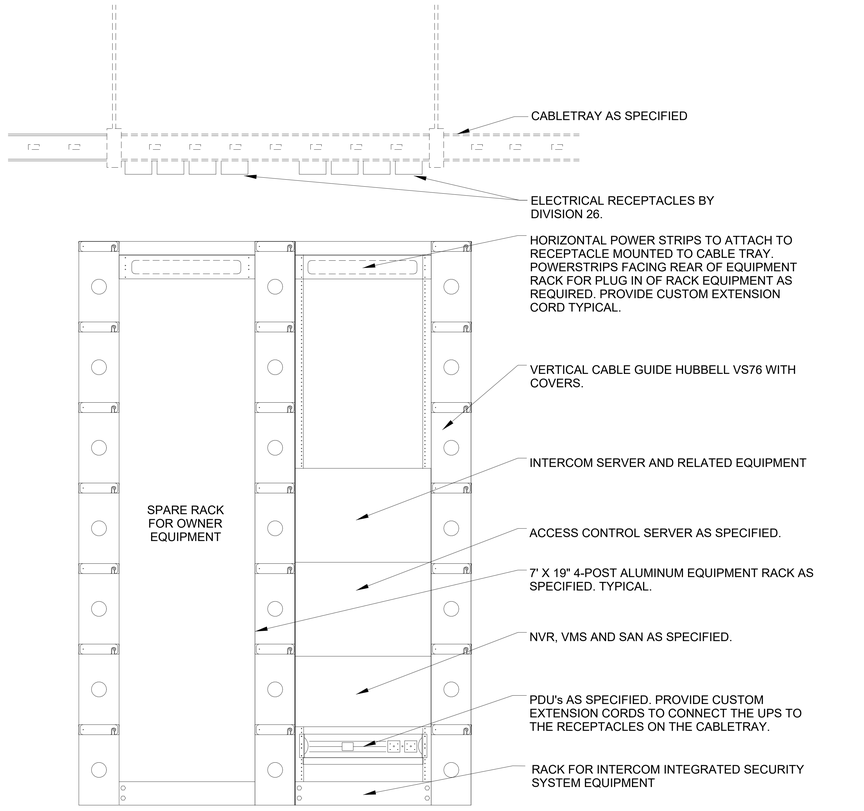
1 TYPICAL MDF-IDF 2 POST TRIPLE DATA EQUIPMENT RACK CONFIGURATION
NTS

VOICE/DATA EQUIPMENT RACK GENERAL NOTES:

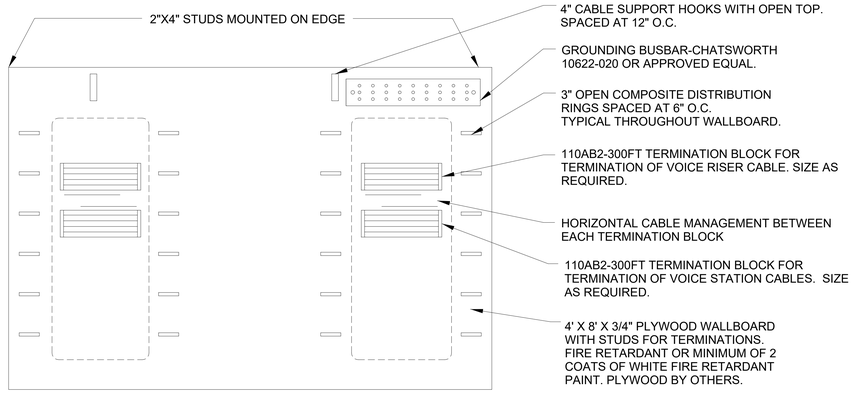
1) THE QUANTITY OF 48 PORT PATCH PANELS REQUIRED FOR EACH RACK SHALL BE EQUAL TO THE THE QUANTITY NEEDED TO TERMINATE ALL VOICE AND DATA CABLES AT THAT RACK PLUS THE QUANTITY REQUIRED TO PROVIDE FOR 20% SPARE.

2) A SINGLE 24 PORT FIBER OPTIC PATCH PANEL IS REQUIRED TO TERMINATE FIBERS IN EACH IDF ROOM AND THE MDF ROOM. THE MDF ROOM REQUIRES A QUANTITY OF 24 PORT FIBER OPTIC PATCH PANELS EQUAL TO THE NUMBER OF TECHNOLOGY ROOMS PLUS THE SERVICE ENTRANCE ROOM.

3) MEET WITH OWNER PRIOR TO INSTALLATION OF RACKS, PATCH PANELS, CABLE MANAGEMENT AND EQUIPMENT TO COORDINATE EXACT LOCATIONS FOR ALL COMPONENTS.



2 TYPICAL MDF SPARE AND SECURITY/PA 4 POST EQUIPMENT RACK CONFIGURATION
NTS



EXTEND CABLES FROM CABLETRAY TO WALLBOARDS IN A NEAT AND PROFESSIONAL MANNER.

PROVIDE ALL REQUIRED CROSS CONNECTIONS BETWEEN BACKBONE CABLING, HORIZONTAL CABLING, PATCH PANELS, ETC.

INTRUSION DETECTION AND ACCESS CONTROL EQUIPMENT MAY BE MOUNTED ON BACKBOARD.

3 TYPICAL VOICE WALLBOARD CONFIGURATION
NTS

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VERMONT
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P: (802) 863-1428
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Andover, MA, 01810
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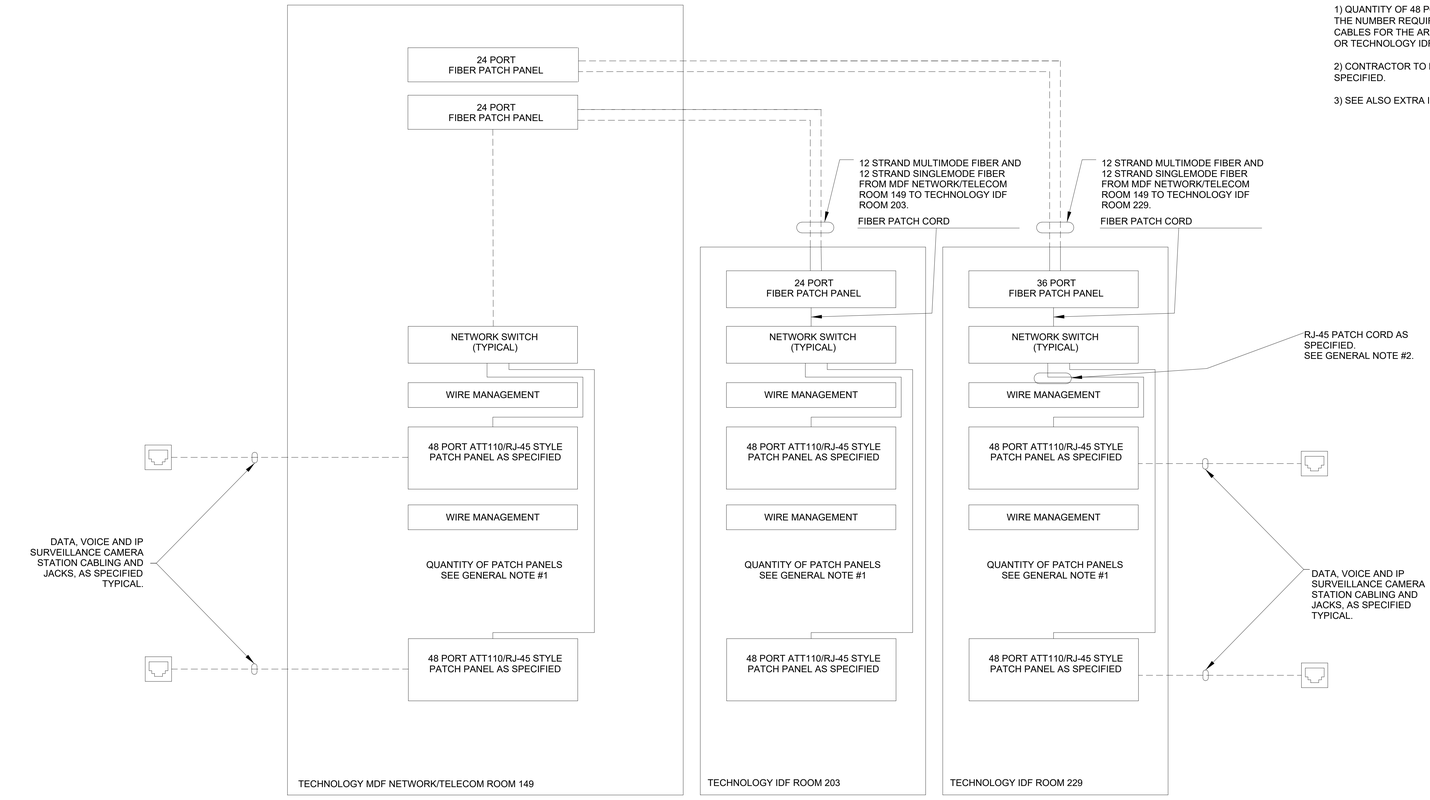
KEY PLAN

ORIENTATION AND SCALE:

SCALE: AS INDICATED

SHEET TITLE:
DETAIL SHEET TECHNOLOGY

SHEET NUMBER:
T2.03



NOTES:

1) QUANTITY OF 48 PORT PATCH PANELS PER RACK SHALL EQUAL THE NUMBER REQUIRED TO TERMINATE ALL DATA AND VOICE CABLES FOR THE AREA THAT THE MDF NETWORK/TELECOM ROOM OR TECHNOLOGY IDF ROOMS SERVICES PLUS 20% SPARE PORTS.

2) CONTRACTOR TO PROVIDE DATA AND FIBER PATCH CORDS, AS SPECIFIED.

3) SEE ALSO EXTRA INSTALLATION PROVISIONS AS SPECIFIED.

1 TECHNOLOGY DATA SYSTEM ONE LINE DIAGRAM
NTS

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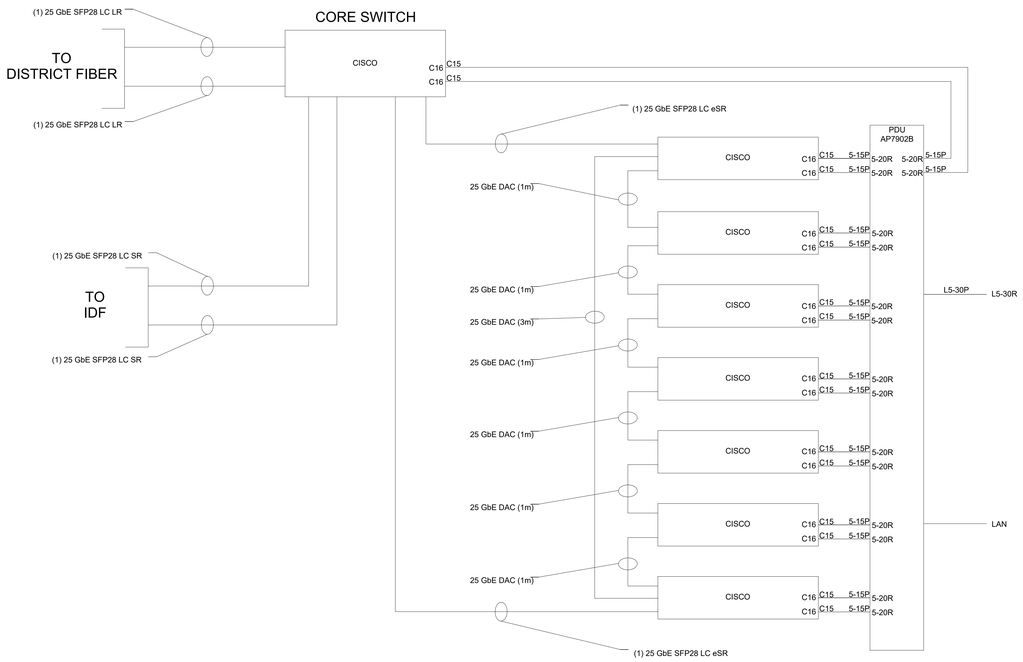
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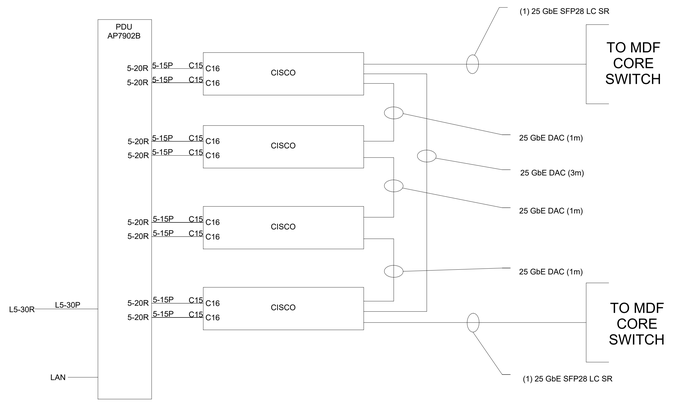
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SHEET TITLE:
DETAIL SHEET
TECHNOLOGY

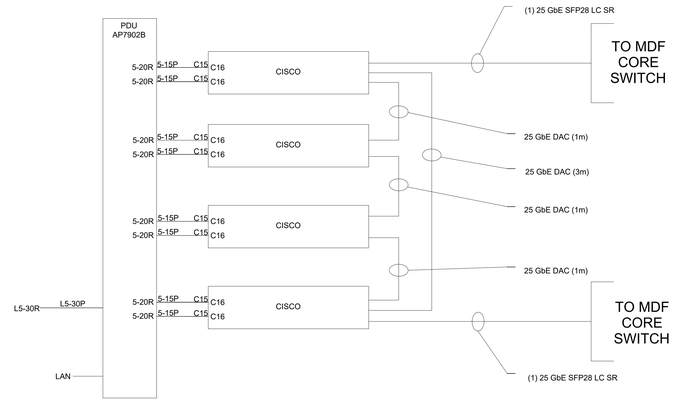
SHEET NUMBER:
T2.04



1 TECHNOLOGY MDF NETWORK/TELECOM ROOM 149 SWITCHES ONE LINE DIAGRAM
NTS



2 TECHNOLOGY IDF ROOM 203 SWITCHES ONE LINE DIAGRAM
NTS



3 TECHNOLOGY IDF ROOM 229 SWITCHES ONE LINE DIAGRAM
NTS

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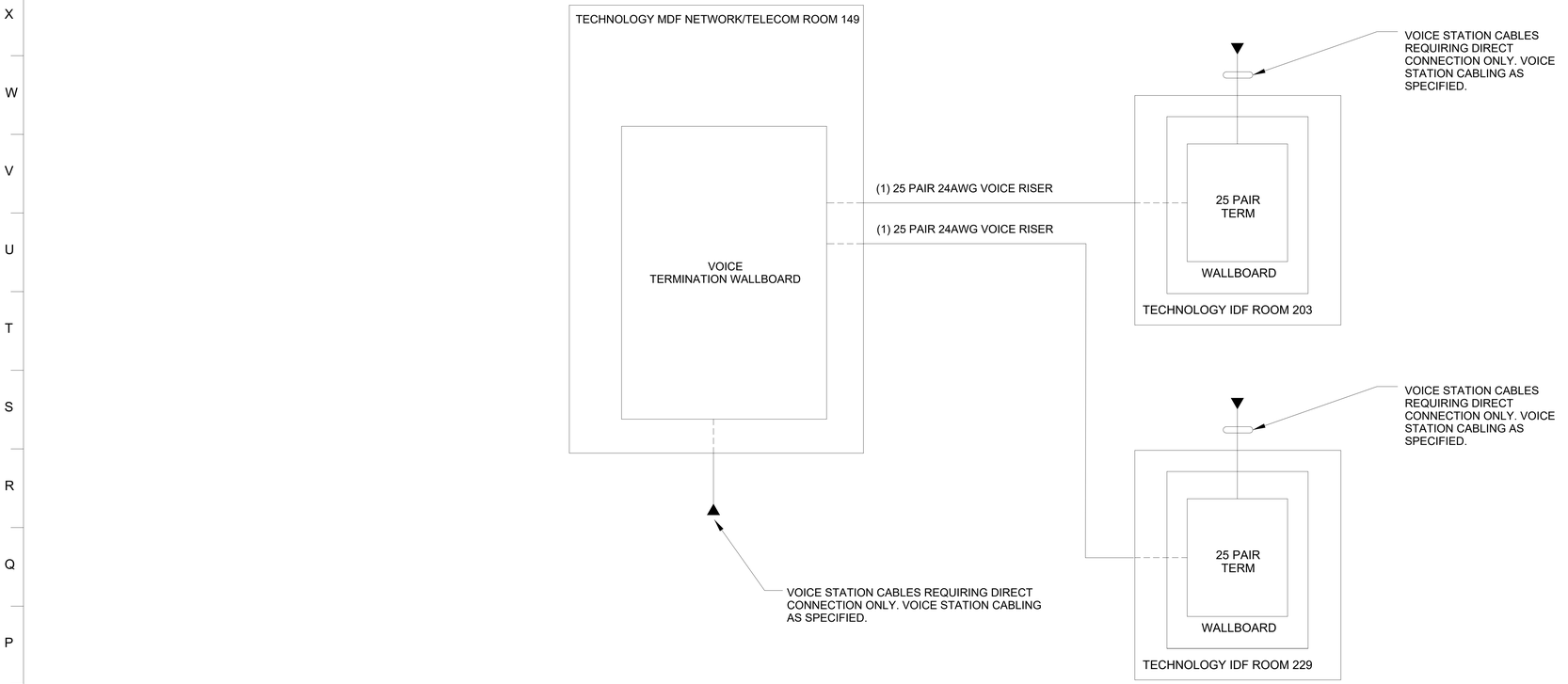
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SCALE: AS INDICATED

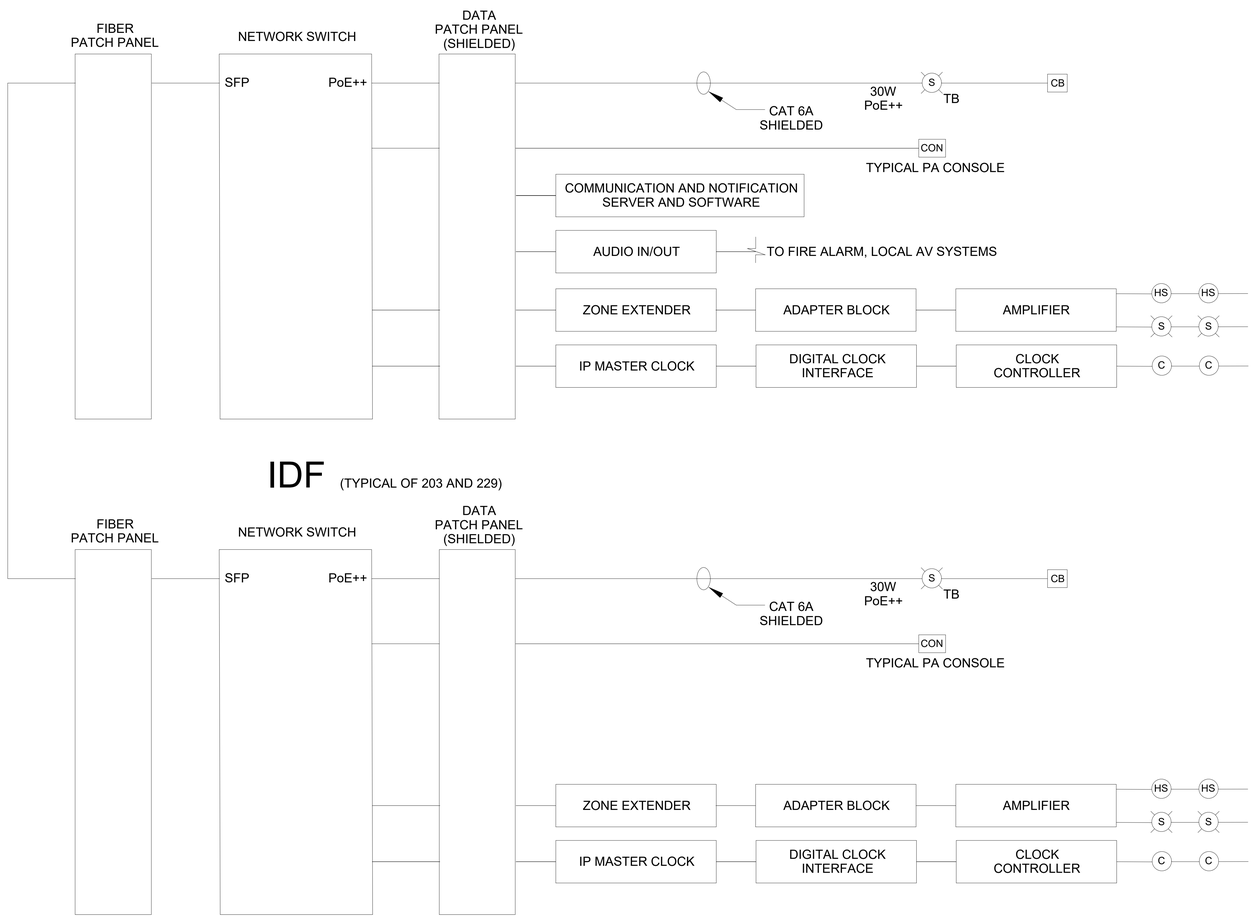
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TECHNOLOGY

SHEET NUMBER:
T2.05



1 TECHNOLOGY VOICE SYSTEM ONE LINE DIAGRAM
NTS

MDF (NETWORK/TELECOM ROOM 149)



IDF (TYPICAL OF 203 AND 229)

2 TECHNOLOGY PA SYSTEM ONE LINE DIAGRAM
NTS

GENERAL NOTES:

1) PROVIDE ALL CROSS-CONNECT CABLING REQUIRED FOR FULLY FUNCTIONAL SYSTEM(S).

2) PROVIDE ALL NECESSARY PROGRAMMING AND CONNECTION BETWEEN PUBLIC ADDRESS SYSTEM AND TELEPHONE SYSTEM.

3) PROVIDE ALL CABLING REQUIRED FOR FULLY FUNCTIONAL PUBLIC ADDRESS AND CLOCK SYSTEMS.

4) PROVIDE ALL REQUIRED CONNECTIONS TO TELCO LINES FOR ALL SYSTEMS REQUIRING DIAL-TONE.

5) RACK MOUNT EQUIPMENT IN TECHNOLOGY IDF ROOMS AS SPECIFIED.

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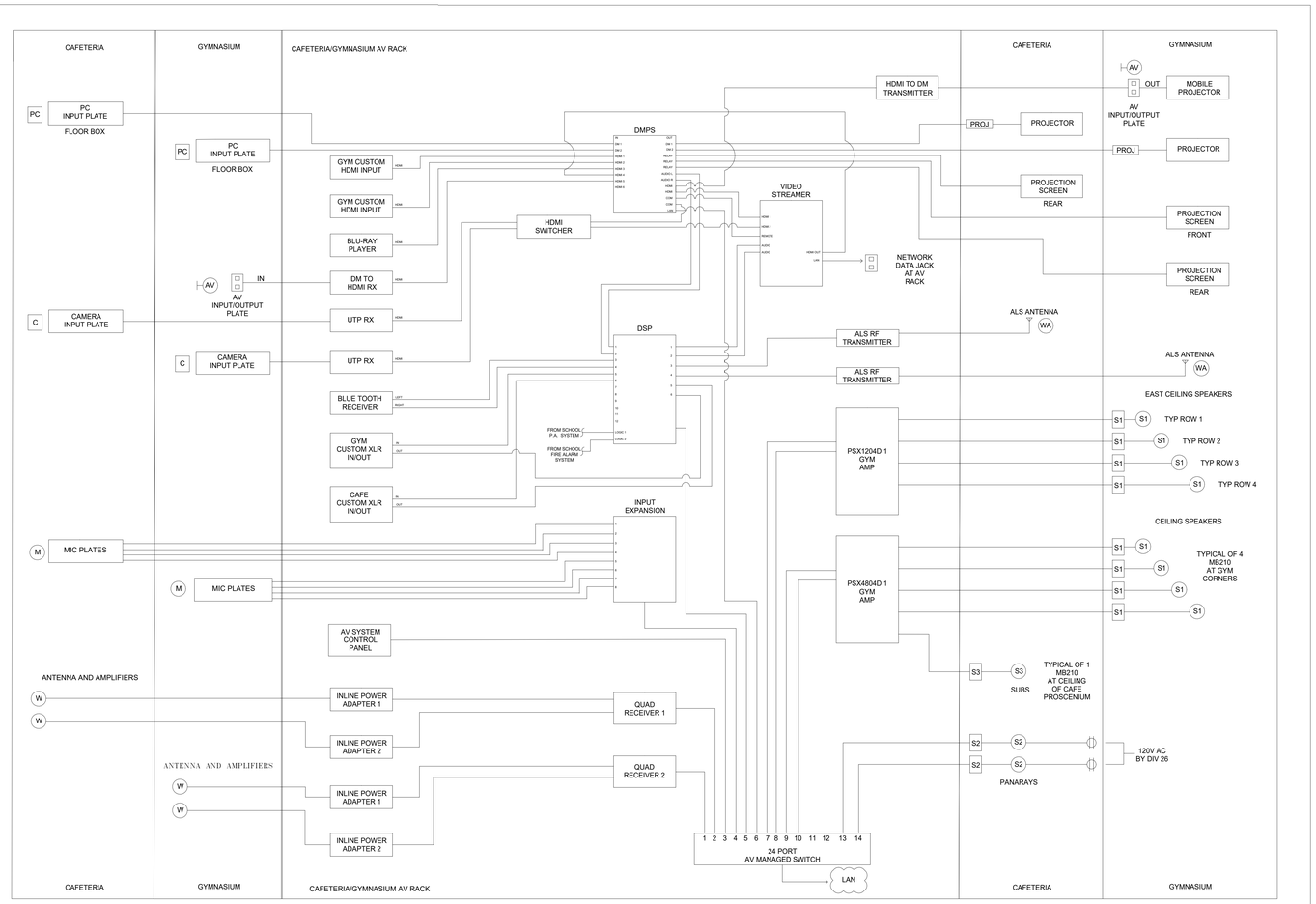
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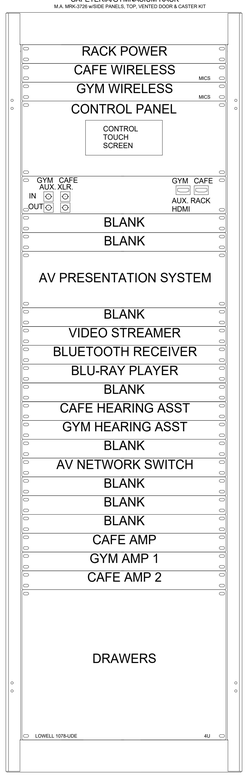
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SHEET TITLE:
DETAIL SHEET TECHNOLOGY

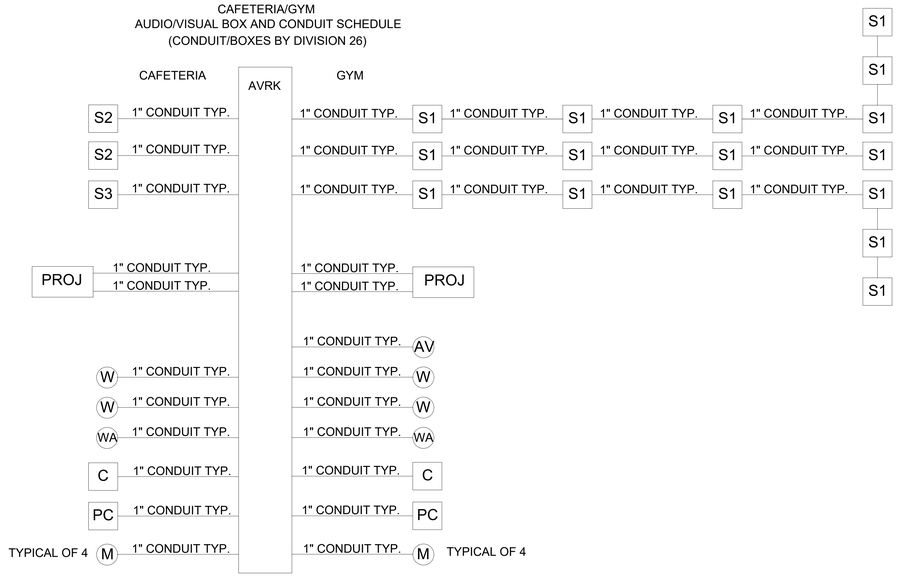
SHEET NUMBER:
T2.06



1 GYMNASIUM AND CAFETERIA AUDIO VISUAL SYSTEM ONE-LINE DIAGRAM
NTS



CAFETERIA/GYM
AUDIO/VISUAL BOX AND CONDUIT SCHEDULE
(CONDUIT/BOXES BY DIVISION 26)



AVRK	=	AV JUNCTION BOX TO ACCOMMODATE ALL CONDUITS
S1	=	SINGLE GANG BOX FOR GYM CEILING SPEAKERS
S2	=	SINGLE GANG BOX/EXTENSION RING FOR PANARAY SPEAKERS
S3	=	SINGLE GANG BOX/EXTENSION RING FOR SUBWOOFER SPEAKERS
PROJ	=	DOUBLE GANG DEEP WORKBOX FOR PROJECTOR CABLING
W	=	SINGLE GANG BOX/EXTENSION RING FOR WIRELESS MICS ANTENNA. LOCATE FOR BEST RECEPTION.
WA	=	SINGLE GANG BOX/EXTENSION RING FOR ASSISTIVE LISTENING ANTENNA. LOCATE FOR BEST RECEPTION.
M	=	SINGLE GANG BOX/EXTENSION RING FOR WIRE MICROPHONES
PC	=	DOUBLE GANG BOX FOR COMPUTER CONNECTION
AV	=	AV INPUT/OUTPUT PLATE FOR MOBILE PROJECTOR
C	=	DOUBLE GANG BOX FOR CAMERA INPUT PLATE

2 GYMNASIUM AND CAFETERIA AUDIO VISUAL BOX AND CONDUIT SCHEDULE
NTS

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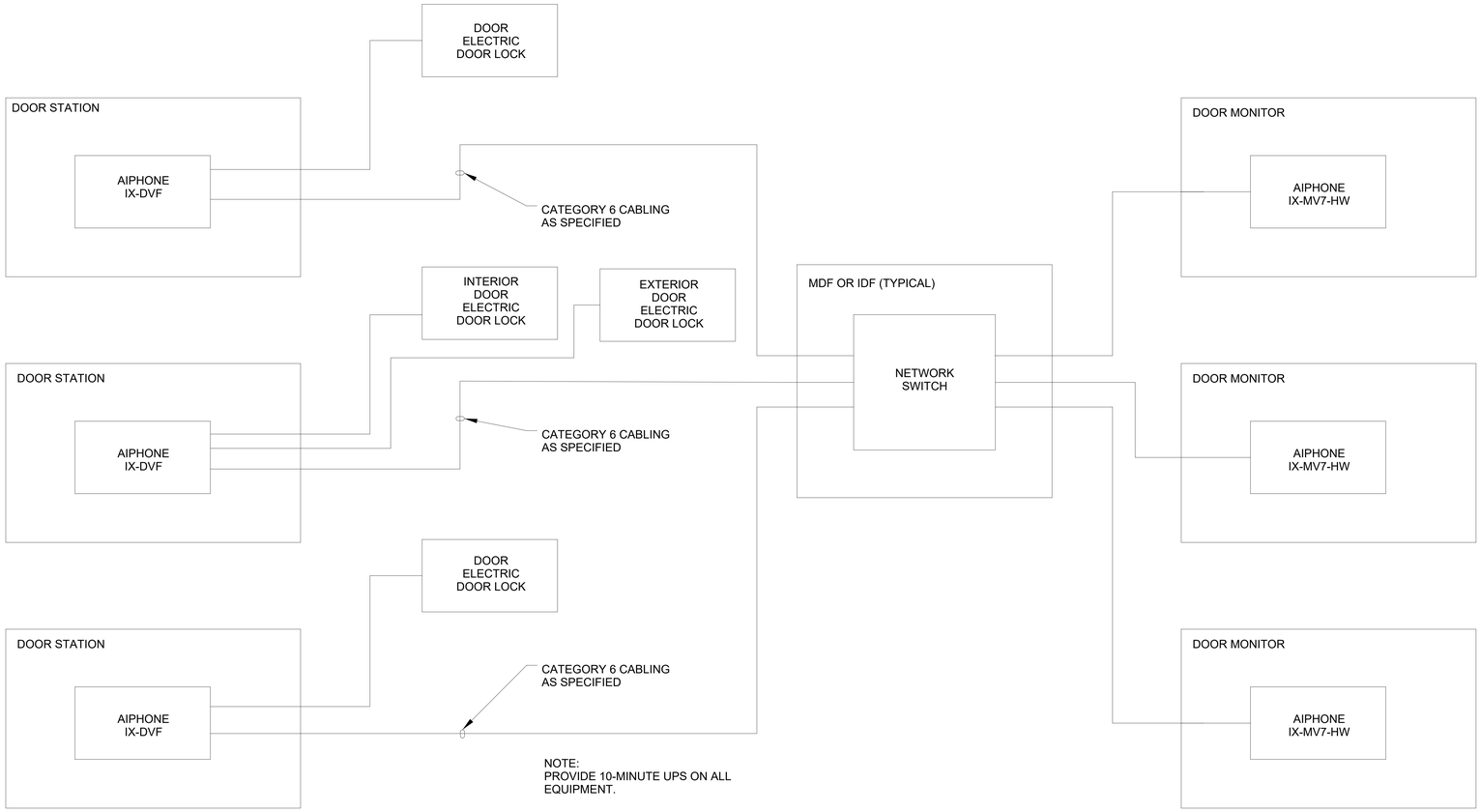
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ORIENTATION AND SCALE:

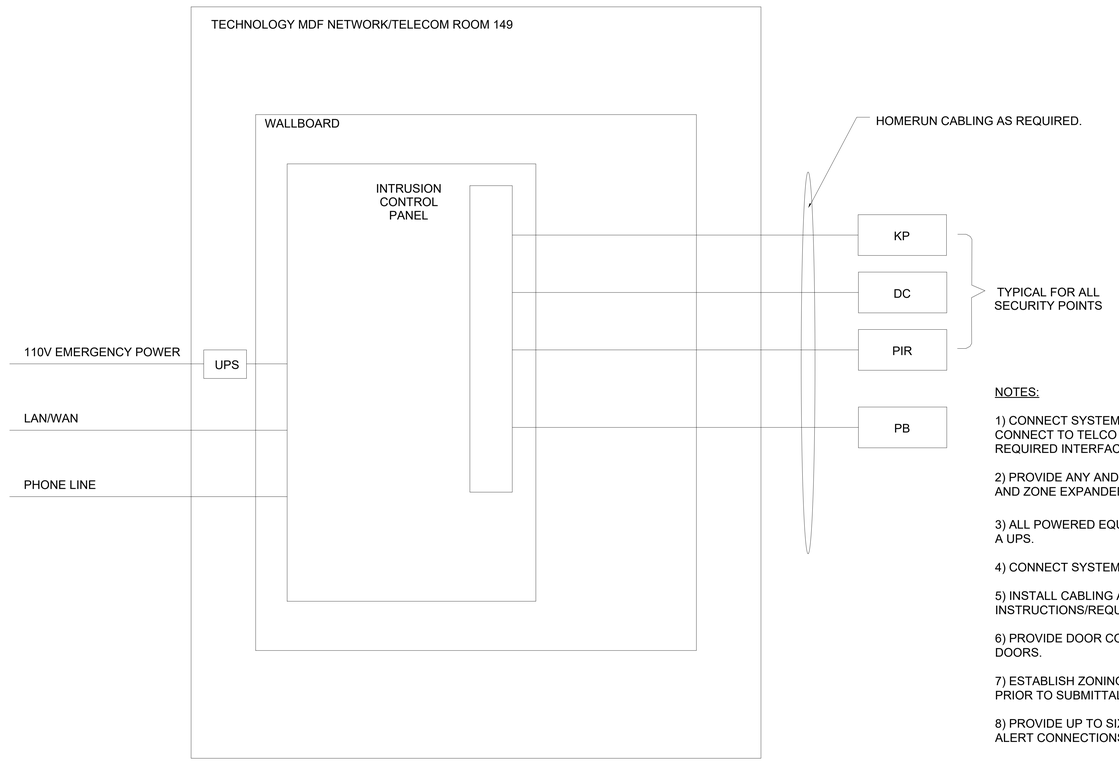
SCALE: AS INDICATED

SHEET TITLE:
DETAIL SHEET TECHNOLOGY

SHEET NUMBER:
T2.07



1 TECHNOLOGY DOOR AND INTERCOM SYSTEM ONE LINE DIAGRAM
NTS



NOTES:

1) CONNECT SYSTEMS TO THE DATA NETWORK. CONNECT TO TELCO PHONE LINE. PROVIDE ALL REQUIRED INTERFACE EQUIPMENT.

2) PROVIDE ANY AND ALL REQUIRED POWER SUPPLIES AND ZONE EXPANDERS IN LOCATIONS AS REQUIRED.

3) ALL POWERED EQUIPMENT SHALL BE CONNECTED TO A UPS.

4) CONNECT SYSTEMS TO FIRE ALARM AS REQUIRED.

5) INSTALL CABLING ACCORDING TO MANUFACTURER INSTRUCTIONS/REQUIREMENTS.

6) PROVIDE DOOR CONTACTS ON ALL ROOF ACCESS DOORS.

7) ESTABLISH ZONING REQUIREMENTS WITH THE OWNER PRIOR TO SUBMITTALS AND INSTALLATION.

8) PROVIDE UP TO SIX (6) HIGH/LOW TEMPERATURE ALERT CONNECTIONS TO OWNER'S EQUIPMENT.

2 TECHNOLOGY INTRUSION DETECTION SYSTEM ONE LINE DIAGRAM
NTS

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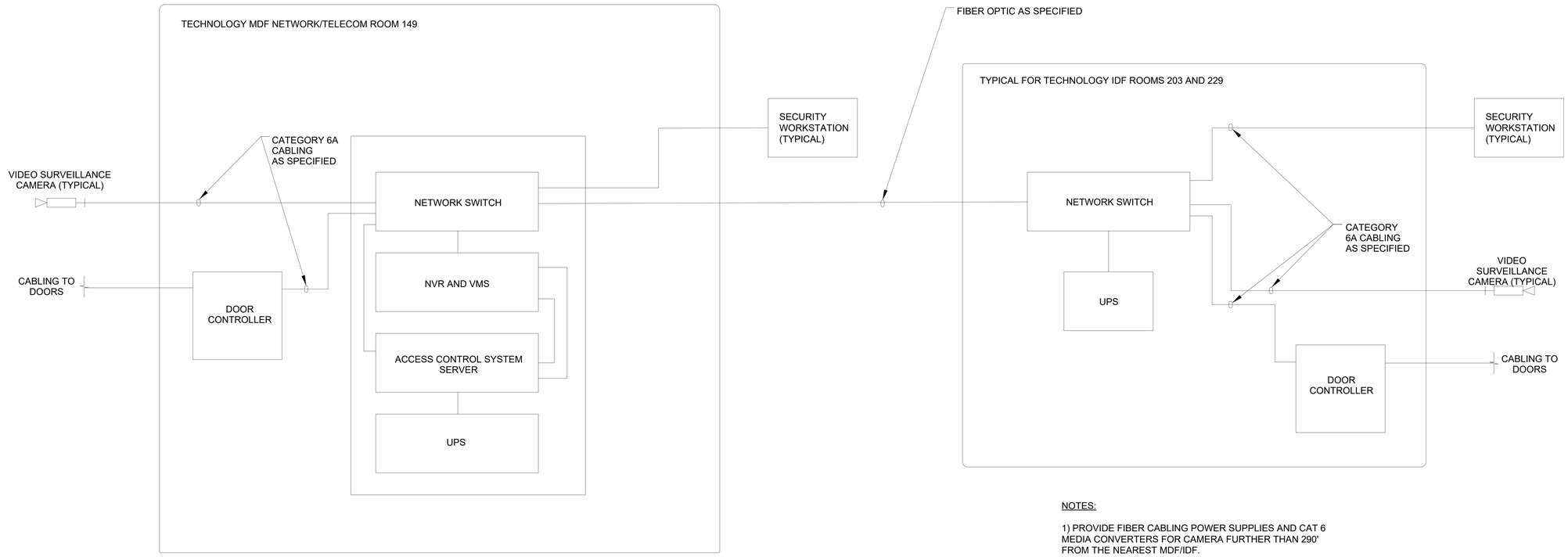
KEY PLAN

ORIENTATION AND SCALE:

SCALE: AS INDICATED

SHEET TITLE:
DETAIL SHEET TECHNOLOGY

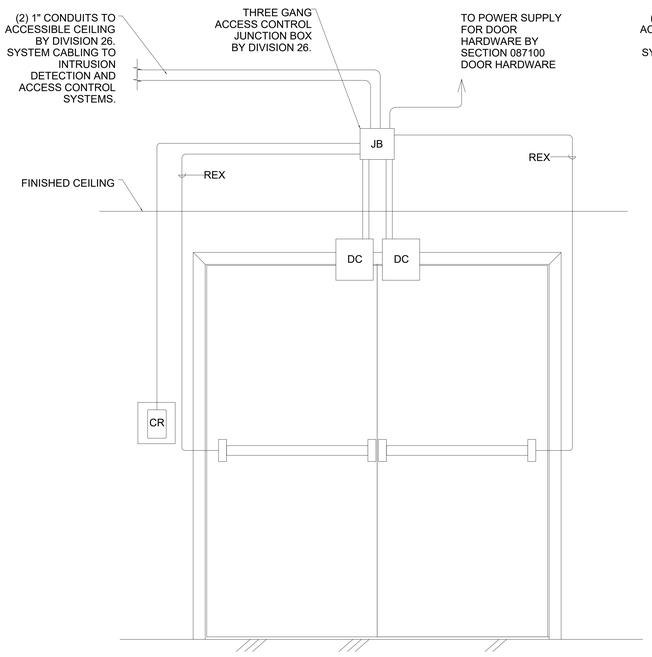
SHEET NUMBER:
T2.08



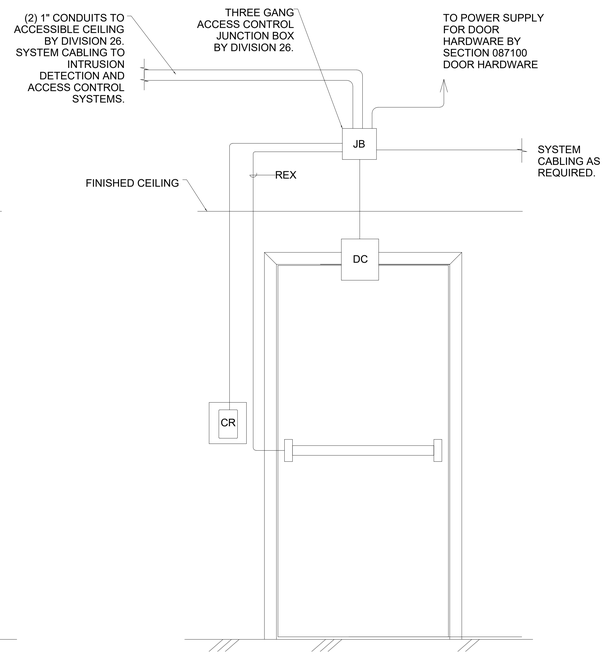
NOTES:

1) PROVIDE FIBER CABLING POWER SUPPLIES AND CAT 6 MEDIA CONVERTERS FOR CAMERA FURTHER THAN 290' FROM THE NEAREST MDF/IDF.

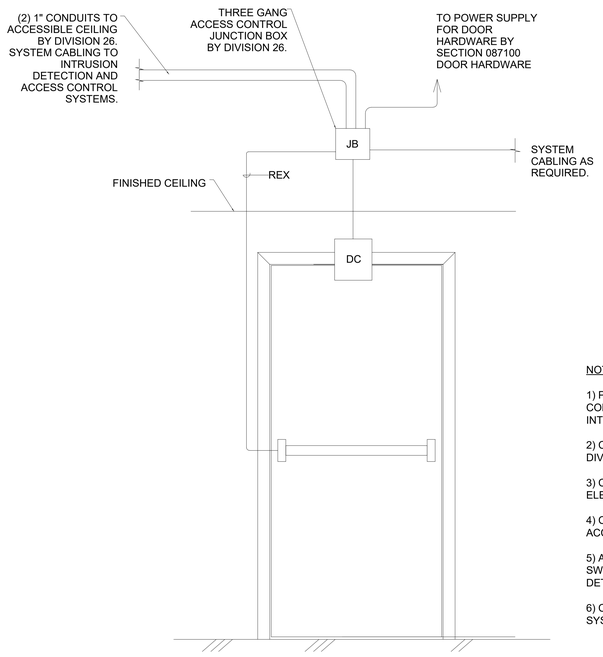
1 TECHNOLOGY ACCESS CONTROL AND VIDEO SURVEILLANCE ONE LINE DIAGRAM
NTS



TYPICAL ACCESS CONTROL DOUBLE DOOR
SHOWING CARD READER(S) AND DOOR CONTACT(S)



TYPICAL ACCESS CONTROL SINGLE DOOR
SHOWING CARD READER(S) AND DOOR CONTACT(S)



TYPICAL EXTERIOR DOOR WITHOUT CARD READER
SHOWING DOOR CONTACT(S) ONLY

NOTES:

1) PROVIDE QUANTITY OF CABLES AND AWG REQUIRED TO CONNECT ALL COMPONENTS TO ACCESS CONTROL AND INTRUSION DETECTION SYSTEMS.

2) CONDUITS AND BOXES AS REQUIRED SHALL BE PROVIDED BY DIVISION 26.

3) COORDINATE WITH DOOR HARDWARE AND DIVISION 26 ELECTRICAL.

4) CONNECT ALL DOORS WITH ELECTRIFIED HARDWARE TO THE ACCESS CONTROL SYSTEM.

5) ALL DOOR CONTACTS SHALL BE USED AS DOOR POSITION SWITCHES ON BOTH THE ACCESS CONTROL AND INTRUSION DETECTION SYSTEMS.

6) CONNECT ALL REQUEST TO EXIT (REX) DEVICES TO THE SYSTEM. REX DEVICES ARE BUILT-INTO CRASHBARS.

2 TECHNOLOGY ACCESS CONTROL AND INTRUSION DETECTION ONE LINE DIAGRAM
NTS

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NEWBURYPORT, MA 01950
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BURLINGTON, VT 05401
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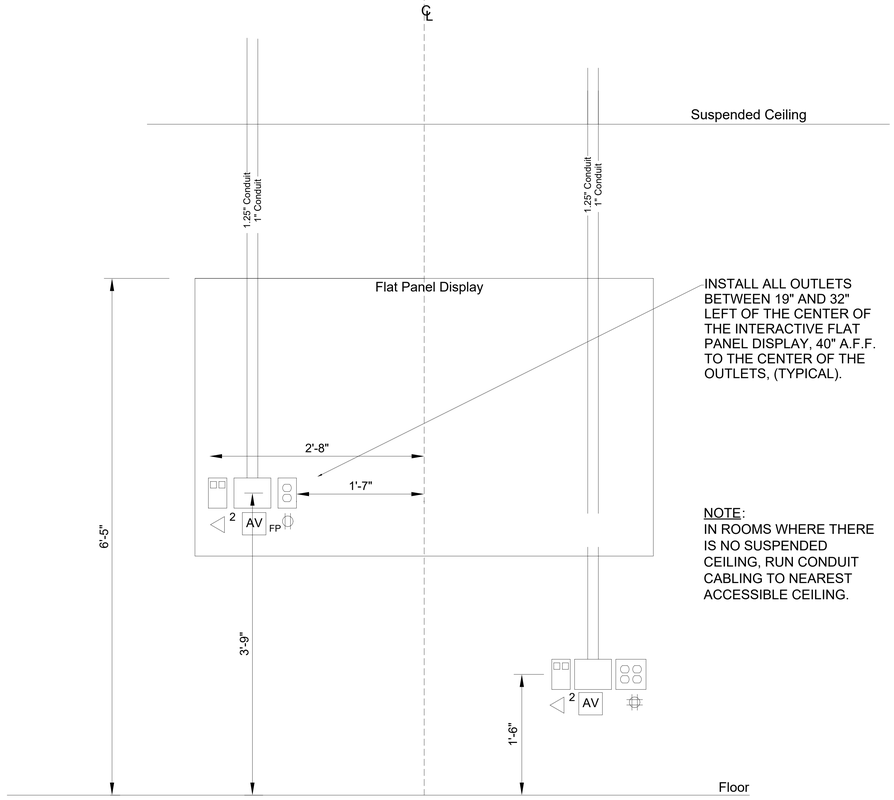
KEY PLAN

ORIENTATION AND SCALE:

SCALE: AS INDICATED

SHEET TITLE:
DETAIL SHEET TECHNOLOGY

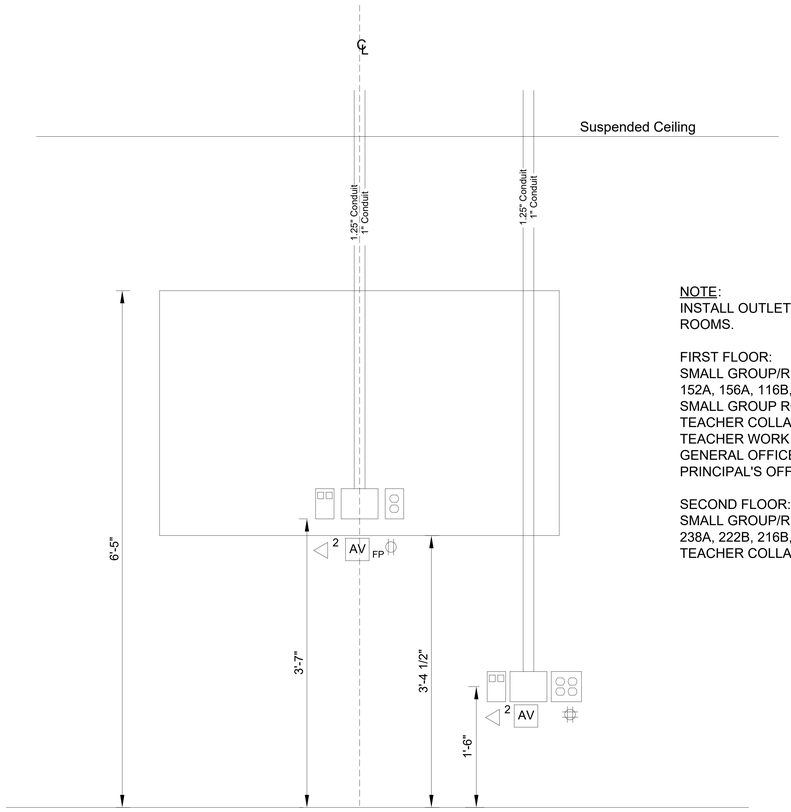
SHEET NUMBER:
T2.09



INSTALL ALL OUTLETS BETWEEN 19" AND 32" LEFT OF THE CENTER OF THE INTERACTIVE FLAT PANEL DISPLAY, 40" A.F.F. TO THE CENTER OF THE OUTLETS, (TYPICAL).

NOTE:
IN ROOMS WHERE THERE IS NO SUSPENDED CEILING, RUN CONDUIT CABLING TO NEAREST ACCESSIBLE CEILING.

1 CLASSROOM FLAT PANEL ONE LINE DIAGRAM
NTS

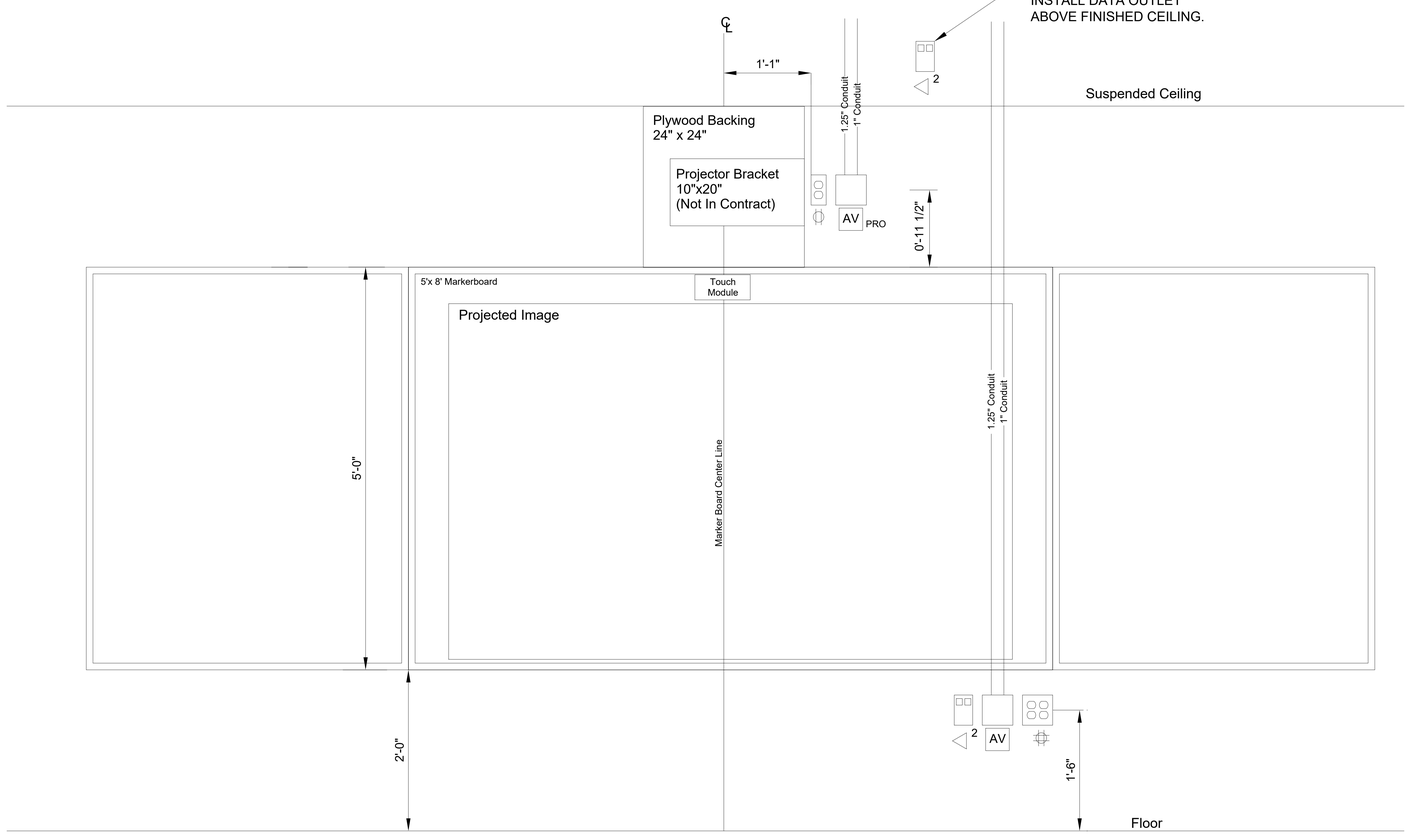


NOTE:
INSTALL OUTLETS IN THE FOLLOWING ROOMS.

FIRST FLOOR:
SMALL GROUP/READING ROOMS 148A, 152A, 156A, 116B, 106B
SMALL GROUP ROOMS 138A, 122B, 110B
TEACHER COLLABORATION 143, 115
TEACHER WORK ROOM 164N
GENERAL OFFICE WAITING 164B
PRINCIPAL'S OFFICE 164G

SECOND FLOOR:
SMALL GROUP/READING ROOMS 248A, 238A, 222B, 216B, 210B, 206B
TEACHER COLLABORATION 243 AND 215

2 SMALL AREA FLAT PANEL ONE LINE DIAGRAM
NTS



3 TEACHING WALL DIAGRAM WITH PROJECTION
NTS

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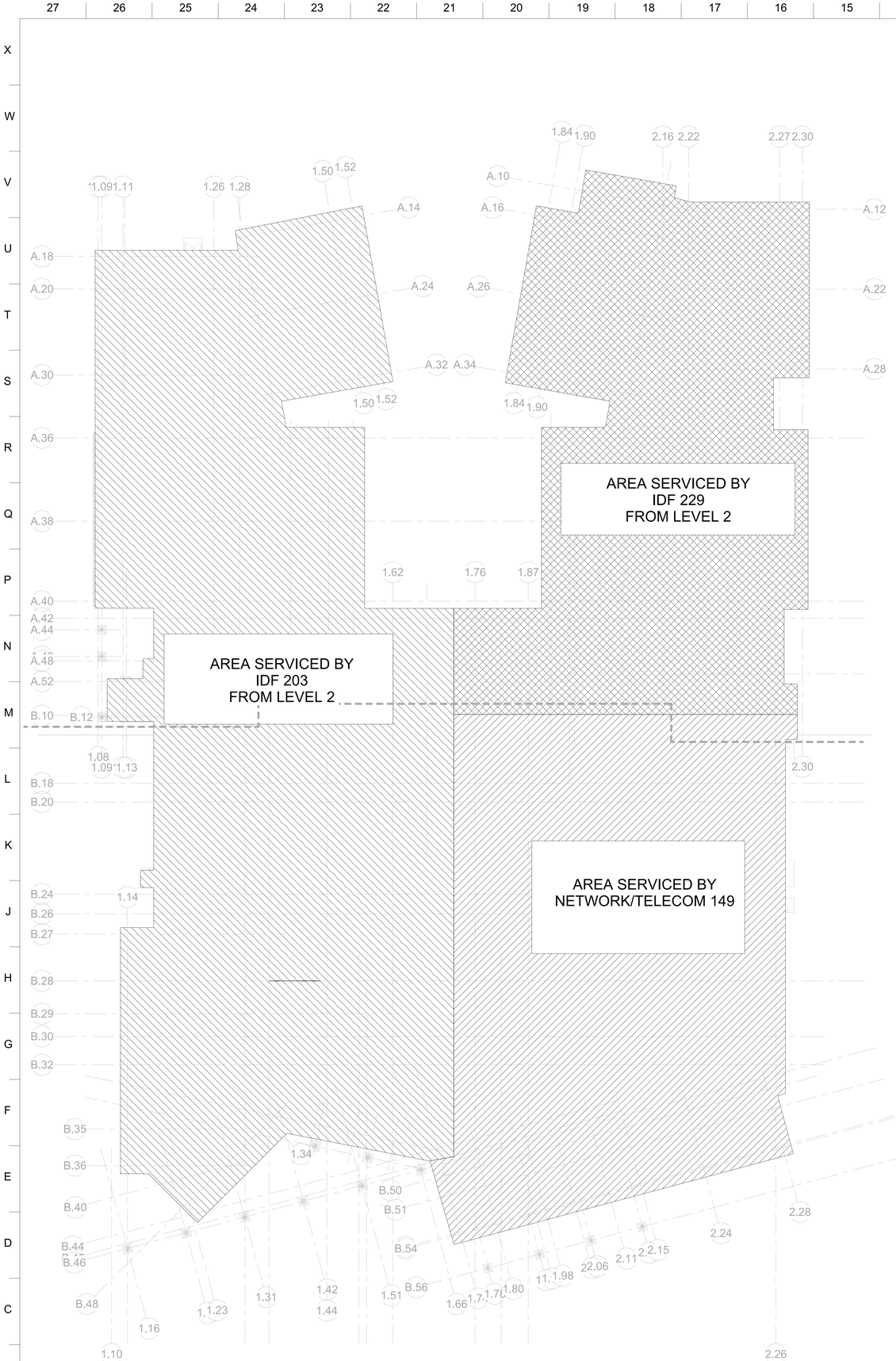
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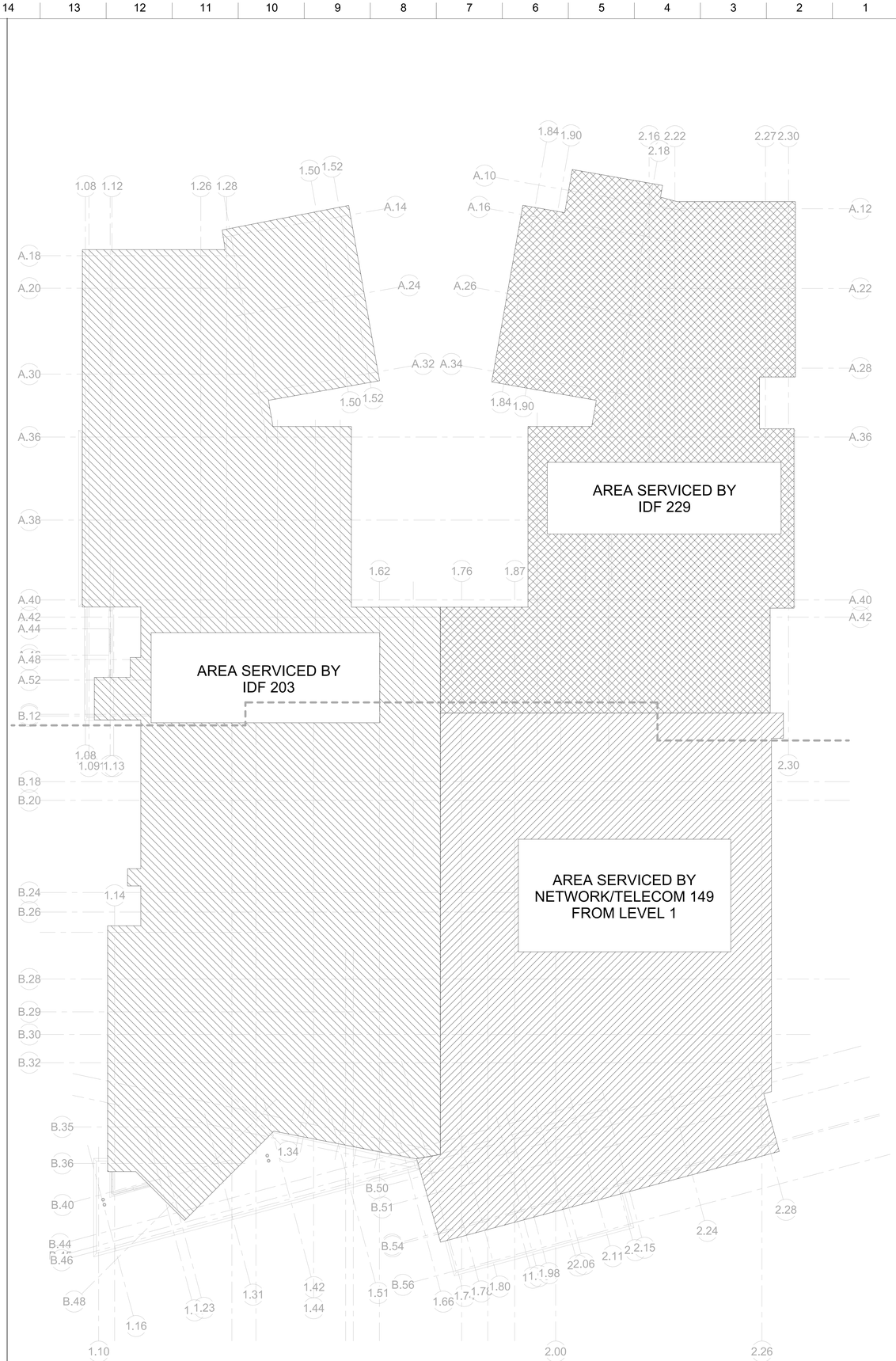
SCALE: AS INDICATED

SHEET TITLE:
DETAIL SHEET TECHNOLOGY

SHEET NUMBER:
T2.10



1 TECHNOLOGY LEVEL 1 COVERAGE PLAN
1/16" = 1'-0"



2 TECHNOLOGY LEVEL 2 COVERAGE PLAN
1/16" = 1'-0"

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WILMINGTON
ELEMENTARY SCHOOL

320 SALEM ST.
WILMINGTON, MA 01887

PROJECT NUMBER: 23-0847

SEAL AND SIGNATURE:

REVISIONS:

NO.	DATE	TITLE

ISSUE TITLE AND DATE:

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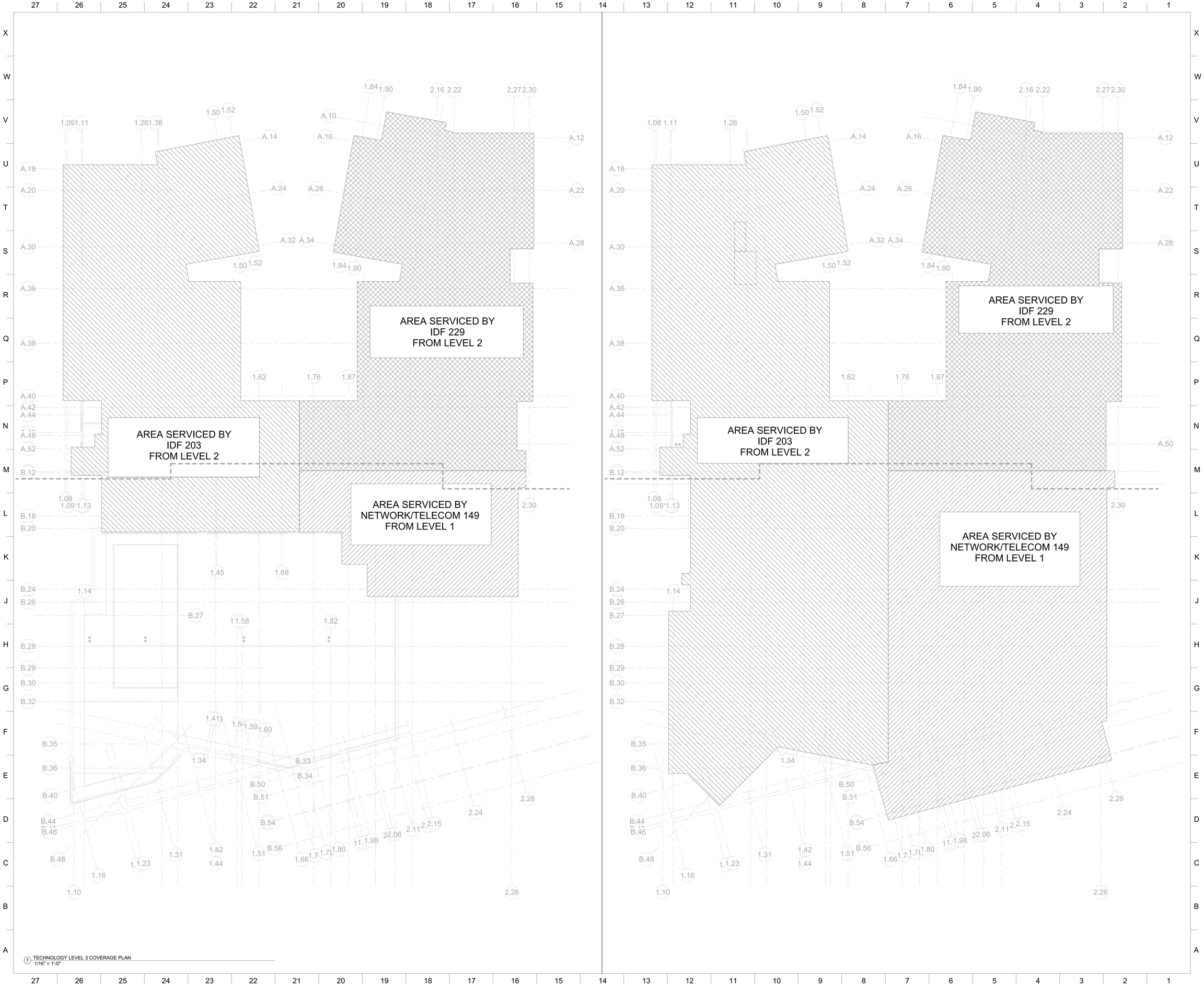
KEY PLAN

ORIENTATION AND SCALE:

SCALE: AS INDICATED

SHEET TITLE:
DETAIL SHEET
TECHNOLOGY

SHEET NUMBER:
T2.11



1 TECHNOLOGY LEVEL 3 COVERAGE PLAN
1/16" = 1'-0"

DORE + WHITTIER
MASSACHUSETTS
260 MERRIMAC STREET BUILDING 7, 2ND FLOOR
NEWBURYPORT, MA 01950
P: (978) 499-2999

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BURLINGTON, VT 05401
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TECHNOLOGY DESIGN, INC
300 Brickstone Square, Suite 201
Andover, MA, 01810
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KEY PLAN

ORIENTATION AND SCALE:

SCALE: AS INDICATED

SHEET TITLE:
DETAIL SHEET
TECHNOLOGY

SHEET NUMBER:
T2.12