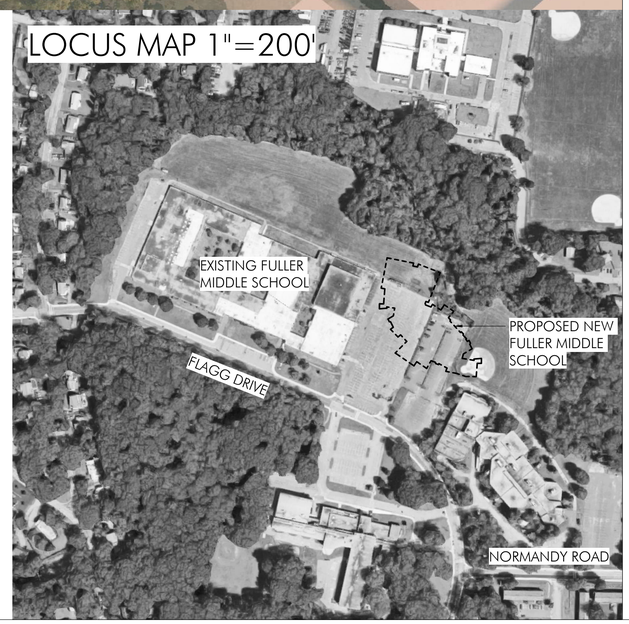


OWNER
CITY OF FRAMINGHAM
FULLER MIDDLE SCHOOL
31 FLAGG DRIVE
FRAMINGHAM, MA 01702

ARCHITECT
JONATHAN LEVI ARCHITECTS
266 BEACON STREET, SUITE 3
BOSTON, MA 02116

OWNER'S PROJECT MANAGER
SMMA
1000 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02138

CODE
HOWE ENGINEERS
101 LONGWATER CIRCLE, SUITE 203
NORWELL, MA 02061

COMMISSIONING AGENT
JACOBS
120 ST JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

SITE SURVEYOR & CIVIL ENGINEER
CDW CONSULTANTS, INC.
6 HURON DRIVE
NATICK, MA 01760

HAZARDOUS MATERIALS ENGINEER
CDW CONSULTANTS, INC.
6 HURON DRIVE
NATICK, MA 01760

GEOTECHNICAL
RSE ASSOCIATES, INC.
63 PLEASANT STREET
WATERTOWN, MA 02472

GEOENVIRONMENTAL
McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140

LANDSCAPE ARCHITECT
CBA LANDSCAPE ARCHITECTS, LLC
24 THORNDIKE STREET, 4TH FLOOR
CAMBRIDGE, MA 02141

STRUCTURAL ENGINEER
RSE ASSOCIATES, INC.
63 PLEASANT STREET
WATERTOWN, MA 02472

HVAC & ELECTRICAL ENGINEER
GARCIA GALUSKA DESOUSA
375 FAUNCE CORNER ROAD, SUITE D
DARTMOUTH, MA 02747

PLUMBING&FIRE PROTECTION ENGINEER
AKAL ENGINEERING INC.
44A CENTRAL ST, UNIT 4
BERLIN, MA 01503

AUDIO VISUAL ENGINEER
ACENTECH INC.
33 MOULTON STREET
CAMBRIDGE, MA 02138

THEATER CONSULTANT
THEATRE PROJECTS CONSULTANTS
47 WATER STREET
NORWALK, CT 06854

FOOD SERVICE
CRABTREE McGRATH ASSOCIATES,
161 WEST MAIN STREET
GEORGETOWN, MA 01833

COST ESTIMATING
MIYAKODA CONSULTING, INC.
PO BOX 47
RAYNHAM, MA 02767

SUSTAINABLE DESIGN
THE GREEN ENGINEER
23 BRADFORD STREET, 1ST FLOOR
CONCORD MA 01742

ACOUSTICS CONSULTANT
ACENTECH INC.
33 MOULTON STREET
CAMBRIDGE, MA 02138

TRAFFIC CONSULTANT
PARE CORPORATION
10 LINCOLN ROAD, SUITE 103
FOXBORO, MA 02035

ELEVATOR CONSULTANT
VAN DEUSEN & ASSOCIATES
101 SUMMER STREET, 4TH FLOOR
BOSTON, MA 02210

DOOR HARDWARE CONSULTANT
ALLEGION, PLC
77 WEXFORD STREET
NEEDHAM, MA 02494

SPECIFICATIONS CONSULTANT
WIL-SPEC LLC
LYNNFIELD MEDICAL OFFICE BUILDING
15 POST OFFICE SQUARE
LYNNFIELD, MA 01940

FURNITURE & EQUIP CONSULTANT
TAVARES DESIGN ASSOCIATES, INC.
591 NORTH AVENUE, DOOR 3
WAKEFIELD, MA 01880

CITY OF FRAMINGHAM, MA

PROJECT #1722

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

90% CONSTRUCTION DOCUMENTS

10/18/2019

Volume:2

DRAWING INDEX

ESP = EARLY SITE PACKAGE issued 5/10/2019
ECSP = EARLY CONCRETE & STEEL PACKAGE issued 8/9/2019
EMP = EARLY MASONRY PACKAGE issued 10/18/2019

VOLUME: 1

		BID PACKAGE	REVISION DATE	REVISION DESCRIPTION
LIFE SAFETY				
LS001	CODE COMPLIANCE APPROACH			
LS101	LIFE SAFETY PLAN FLOOR 1			
LS102	LIFE SAFETY PLAN FLOOR 2			
LS103	LIFE SAFETY PLAN FLOOR 3			
GEOTECHNICAL				
G100	EXTENT OF SURCHARGE AND OVEREXCAVATION	ESP	6/7/2019	Adden. 2
G101	GROUND IMPROVEMENT BEYOND BUILDING FOOTPRINT	ESP	6/7/2019	Adden. 2
CIVIL				
C 0.0	OVERALL EXISTING CONDITIONS PLAN	ECSP		
C 0.1	EXISTING CONDITIONS PLAN	ECSP		
C 0.2	EXISTING CONDITIONS PLAN	ECSP		
C 0.3	EXISTING CONDITIONS PLAN	ECSP		
C 1.0	PHASE 1- OVERALL DEMOLITION AND VEHICLE CIRCULATION	ESP	7/17/2019	ASI 4
C 1.1	PHASE 1- LAYOUT & MATERIALS (PERMANENT PARKING)	ESP	9/9/2019	90% CD Pricing
C 1.2	PHASE 1-GRADING & DRAINAGE (PERMANENT PARKING)	ESP	9/9/2019	90% CD Pricing
C 1.3	PHASE 1-UTILITY PLAN (PERMANENT PARKING)	ESP	9/9/2019	90% CD Pricing
C 1.4	PHASE1-TEMPORARY PARKING LAYOUT & MATERIALS, GRADING & DRAINAGE	ESP	9/9/2019	90% CD Pricing
C 2.0	PHASE 2- DEMOLITION AND VEHICLE CIRCULATION	ESP		
C 2.1	PHASE 2- LAYOUT & MATERIALS	ESP	9/9/2019	90% CD Pricing
C 2.2	PHASE 2- GRADING & DRAINAGE	ESP	9/9/2019	90% CD Pricing
C 2.3	PHASE 2- UTILITY PLAN	ESP	9/9/2019	90% CD Pricing
C 3.0	PHASE 3- DEMOLITION AND VEHICLE CIRCULATION	ESP	8/27/2019	Adden. 4
C 4.0	OVERALL LAYOUT & MATERIALS PLAN	ESP	10/18/2019	90% CD
C 4.1	LAYOUT & MATERIALS	ESP	9/9/2019	90% CD Pricing
C 4.2	LAYOUT & MATERIALS	ESP	9/9/2019	90% CD Pricing
C 4.3	COLUMN LINE LAYOUT	ESP	7/16/2019	ASI 2
C 5.0	OVERALL GRADING & DRAINAGE PLAN	ESP	10/18/2019	90% CD
C 5.1	GRADING & DRAINAGE	ESP	9/9/2019	90% CD Pricing
C 5.2	GRADING & DRAINAGE	ESP	9/9/2019	90% CD Pricing
C 6.0	OVERALL UTILITY PLAN	ESP	10/18/2019	90% CD
C 6.1	UTILITY PLAN	ESP	9/9/2019	90% CD Pricing
C 6.2	UTILITY PLAN	ESP	9/9/2019	90% CD Pricing
C 7.0	CONSTRUCTION SITE DETAILS	ESP	9/9/2019	90% CD Pricing
C 7.1	CONSTRUCTION SITE DETAILS	ESP	9/9/2019	90% CD Pricing
C 7.2	CONSTRUCTION SITE DETAILS	ESP	9/9/2019	90% CD Pricing
C 7.3	CONSTRUCTION SITE DETAILS	ESP	9/9/2019	90% CD Pricing
C 7.4	CONSTRUCTION SITE DETAILS	ESP	9/9/2019	90% CD Pricing
C 7.5	CONSTRUCTION SITE DETAILS	ESP		
C 7.6	CONSTRUCTION SITE DETAILS	ESP	9/9/2019	90% CD Pricing
LANDSCAPE				
L 1.0	LANDSCAPE KEY PLAN	ECSP	10/18/2019	90% CD
L 1.1	LANDSCAPE MATERIALS PLAN - AREA 1	ECSP	10/18/2019	90% CD
L 1.2	LANDSCAPE MATERIALS PLAN - AREA 2	ECSP	10/18/2019	90% CD
L 1.3	LANDSCAPE MATERIALS PLAN - ENLARGEMENT 1	ECSP	10/18/2019	90% CD
L 1.4	LANDSCAPE LAYOUT PLAN - AREA 1	ECSP	10/18/2019	90% CD
L 1.5	LANDSCAPE LAYOUT PLAN - AREA 2	ECSP	10/18/2019	90% CD
L 1.6	LANDSCAPE LAYOUT PLAN - ENLARGEMENT 1	ECSP	10/18/2019	90% CD
L 2.0	LANDSCAPE PLANTING PLAN - TREES, LAWN, GROUNDCOVER AREA 1	ECSP	10/18/2019	90% CD
L 2.1	LANDSCAPE PLANTING PLAN - TREES, LAWN, GROUNDCOVER AREA 2	ECSP	10/18/2019	90% CD
L 2.2	LANDSCAPE PLANTING PLAN - SHRUBS ENLARGEMENT 2	ECSP	10/18/2019	90% CD
L 3.0	LANDSCAPE CONSTRUCTION DETAILS	ECSP	10/18/2019	90% CD
ARCHITECTURAL				
A001	ABBREVIATIONS / LEGENDS	EMP		
A002	FIREPROOFING DIAGRAM	ECSP	9/12/2019	PR 12 REV1
A100	FOUNDATION DAMPPROOFING & WATERPROOFING	ECSP	8/27/2019	Adden. 4
A101	PLAN - FLOOR 1 - OVERALL	EMP		
A101A	PLAN - FLOOR 1-A	EMP		
A101B	PLAN - FLOOR 1-B	EMP		
A101C	PLAN - FLOOR 1-C	EMP		
A101D	PLAN - FLOOR 1-D	EMP		
A102	PLAN - FLOOR 2 - OVERALL	EMP		
A102A	PLAN - FLOOR 2-A	EMP		
A102B	PLAN - FLOOR 2-B	EMP		
A102C	PLAN - FLOOR 2-C	EMP		
A102D	PLAN - FLOOR 2-D	EMP		
A103	PLAN - FLOOR 3 - OVERALL	EMP		
A103A	PLAN - FLOOR 3-A	EMP		
A103B	PLAN - FLOOR 3-B	EMP		
A103C	PLAN - FLOOR 3-C	EMP		
A104	PLAN - ROOF - OVERALL	EMP		
A111A	EOS PLAN - FLOOR 1 - A	ECSP	9/12/2019	PR 12 REV1
A111B	EOS PLAN - FLOOR 1 - B	ECSP	9/12/2019	PR 12 REV1
A111C	EOS PLAN - FLOOR 1 - C	ECSP	8/27/2019	Adden. 4
A111D	EOS PLAN - FLOOR 1 - D	ECSP	10/18/2019	90% CD
A112A	EOS PLAN - FLOOR 2 - A	ECSP	10/18/2019	90% CD
A112B	EOS PLAN - FLOOR 2 - B	ECSP	8/27/2019	Adden. 4
A112C	EOS PLAN - FLOOR 2 - C	ECSP	8/27/2019	Adden. 4
A113A	EOS PLAN - FLOOR 3 - A	ECSP	8/27/2019	Adden. 4
A113B	EOS PLAN - FLOOR 3 - B	ECSP	8/27/2019	Adden. 4
A113C	EOS PLAN - FLOOR 3 - C	ECSP	8/27/2019	Adden. 4
A113D	EOS PLAN - FLOOR 3 - D	ECSP	8/27/2019	Adden. 4
A114B	EOS PLAN - ROOF - B	ECSP	8/27/2019	Adden. 4
A114C	EOS PLAN - ROOF - C	ECSP	8/27/2019	Adden. 4
A141A	FINISH PLAN - FLOOR 1-A & ROOM FINISH SCHEDULE			
A141B	FINISH PLAN - FLOOR 1-B			
A141C	FINISH PLAN - FLOOR 1-C			
A141D	FINISH PLAN - FLOOR 1-D			
A142A	FINISH PLAN - FLOOR 2-A			
A142B	FINISH PLAN - FLOOR 2-B			
A142C	FINISH PLAN - FLOOR 2-C			
A143A	FINISH PLAN - FLOOR 3-A			
A143B	FINISH PLAN - FLOOR 3-B			
A143C	FINISH PLAN - FLOOR 3-C			
A161A	FURNITURE PLAN - FLOOR 1-A			
A161B	FURNITURE PLAN - FLOOR 1-B			
A161C	FURNITURE PLAN - FLOOR 1-C			
A161D	FURNITURE PLAN - FLOOR 1-D			
A162A	FURNITURE PLAN - FLOOR 2-A			
A162B	FURNITURE PLAN - FLOOR 2-B			
A162C	FURNITURE PLAN - FLOOR 2-C			
A163A	FURNITURE PLAN - FLOOR 3-A			
A163B	FURNITURE PLAN - FLOOR 3-B			
A163C	FURNITURE PLAN - FLOOR 3-C			
A181	REFLECTED CEILING PLAN - FLOOR 1 - OVERALL			
A181A	REFLECTED CEILING PLAN - FLOOR 1-A			
A181B	REFLECTED CEILING PLAN - FLOOR 1-B			
A181C	REFLECTED CEILING PLAN - FLOOR 1-C			
A181D	REFLECTED CEILING PLAN - FLOOR 1-D			
A182	REFLECTED CEILING PLAN - FLOOR 2 - OVERALL			
A182A	REFLECTED CEILING PLAN - FLOOR 2-A			
A182B	REFLECTED CEILING PLAN - FLOOR 2-B			
A182C	REFLECTED CEILING PLAN - FLOOR 2-C			
A182D	REFLECTED CEILING PLAN - FLOOR 2-D			
A183	REFLECTED CEILING PLAN - FLOOR 3 - OVERALL			
A183A	REFLECTED CEILING PLAN - FLOOR 3-A			
A183B	REFLECTED CEILING PLAN - FLOOR 3-B			
A183C	REFLECTED CEILING PLAN - FLOOR 3-C			
A200	EXTERIOR 3D VIEWS	EMP		
A201	EXTERIOR ELEVATIONS	EMP		
A211	UNFOLDED ELEVATIONS - MAIN ENTRY (AREA A)	EMP		
A212	UNFOLDED ELEVATIONS - SOUTH	EMP		
A213	UNFOLDED ELEVATIONS - NORTH	EMP		
A214	UNFOLDED ELEVATIONS - EAST & WEST	EMP		
A215	UNFOLDED ELEVATIONS - GYM & AUDITORIUM (AREA D)	EMP		
A221	STOREFRONT TYPES			
A230	EXTERIOR MOCKUP	ECSP	10/18/2019	EMP
A300	BUILDING SECTIONS	EMP		
A301	BUILDING SECTIONS	EMP		
A311	EXTERIOR WALL SECTIONS - MAIN ENTRY (AREA A)	EMP		
A312	EXTERIOR WALL SECTIONS - MAIN ENTRY (AREA A)	EMP		
A313	EXTERIOR WALL SECTIONS - SOUTH (AREA B)	EMP		
A314	EXTERIOR WALL SECTIONS - SOUTH (AREA B)	EMP		
A315	EXTERIOR WALL SECTIONS - SOUTH (AREA B)	EMP		
A316	EXTERIOR WALL SECTIONS - SOUTH (AREA C)	EMP		
A317	EXTERIOR WALL SECTIONS - NORTH (AREA C)	EMP		
A318	EXTERIOR WALL SECTIONS - NORTH (AREA B)	EMP		
A319	EXTERIOR WALL SECTIONS - EAST ENTRY (AREA B)	EMP		
A320	EXTERIOR WALL SECTIONS - WEST ENTRY (AREA C)	EMP		
A321	EXTERIOR WALL SECTIONS - GYM (AREA D)	EMP		
A322	EXTERIOR WALL SECTIONS - AUDITORIUM (AREA D)	EMP		
A400	INTERIOR ELEVATIONS - CORRIDORS			
A401	INTERIOR ELEVATIONS - CORRIDORS	EMP		
A402	INTERIOR ELEVATIONS - CORRIDORS			
A403	INTERIOR ELEVATIONS - CORRIDORS			
A404	INTERIOR ELEVATIONS - CORRIDORS			
A405	INTERIOR ELEVATIONS - CORRIDORS			
A406	INTERIOR ELEVATIONS - CORRIDORS			
A410	ENLARGED PLAN, RCP, INTERIOR ELEVATIONS - TYP. CLASSROOM SUITE			
A411	ENLARGED PLAN, RCP, INTERIOR ELEVATIONS - TYP. SCIENCE SUITE			
A412	ENLARGED PLAN, RCP, INTERIOR ELEVATIONS - SCIENCE			
A413	ENLARGED PLAN, RCP - BAND / CHORUS / PRACTICE SUITE			
A414	INTERIOR ELEVATIONS - BAND / CHORUS / PRACTICE SUITE			
A415	ENLARGED PLAN, RCP - ART / DRAMA SUITE			
A416	INTERIOR ELEVATIONS - ART / DRAMA SUITE			
A417	ENLARGED PLANS, RCP - SPED SUITE/ SATELITE ADMIN			
A418	ENLARGED PLAN, RCP, INTERIOR ELEVATIONS - SATELITE ADMIN			
A419	ENLARGED PLAN, RCP, INTERIOR ELEVATIONS - MAKERSPACE/ SHOP			
A420	ENLARGED PLAN, RCP - LUNCH-STORAGE/ TECH-DIGITAL FAB LAB SUITE			
A421	INTERIOR ELEVATIONS - LUNCH ROOM/ TECH-FAB LAB			
A422	ENLARGED PLAN, RCP - MEDIA CENTER			
A423	INTERIOR ELEVATION - MEDIA CENTER			
A425	ENLARGED PLAN - MAIN ADMIN/ MEDICAL SUITE			
A426	ENLARGED RCP - MAIN ADMIN / MEDICAL SUITE			
A427	INTERIOR ELEVATIONS - MAIN ADMIN			
A428	INTERIOR ELEVATIONS - MEDICAL SUITE			
A429	ENLARGED PLAN - SERVICE AREA			
A430	ENLARGED PLANS, ELEVATIONS - BREAKOUT A			
A431	ENLARGED PLANS, ELEVATION - BREAKOUT B			
A432	SECTION ELEVATIONS - BREAKOUT SPACE B			
A433	ENLARGED PLANS, ELEVATIONS - BREAKOUT C			
A434	SECTION ELEVATIONS - BREAKOUT C			
A435	ENLARGED PLANS, ELEVATIONS - BREAKOUT D & E			
A440	ENLARGED PLAN, RCP, ELEVATIONS - TOILET SUITE			
A441	ENLARGED PLAN, RCP, ELEVATIONS - LOCKER/TOILET ROOMS	EMP		
A442	INTERIOR ELEVATIONS - LOCKER/TOILET ROOMS	EMP		
A450	ENLARGED PLAN - GYMNASIUM	EMP		
A451	ENLARGED RCP - GYMNASIUM	EMP		
A452	INTERIOR ELEVATIONS - GYMNASIUM	EMP		
A453	INTERIOR ELEVATIONS - GYMNASIUM	EMP		
A460	ENLARGED PLAN - AUDITORIUM	EMP		
A461	ENLARGED RCP - AUDITORIUM	EMP		
A462	INTERIOR ELEVATIONS - AUDITORIUM	EMP		
A463	INTERIOR ELEVATIONS - AUDITORIUM	EMP		
A470	ENLARGED PLANS, SECTIONS - STAIRS			
A471	ENLARGED PLAN, SECTIONS - STAIRS			
A472	ENLARGED PLANS, SECTIONS - STAIRS			
A473	ENLARGED PLANS, SECTIONS - STAIRS			
A480	ENLARGED PLAN, SECTIONS, DETAILS - ELEVATOR			
A490	ENLARGED EXTERIOR SITE ELEMENTS	ECSP	10/4/2019	PR 17
A491	ENLARGED EXTERIOR SITE DETAILS	ECSP	9/9/2019	90% CD Pricing
A492	ARCHITECTURAL SITE CONCRETE LAYOUT	ECSP	10/4/2019	PR 17
A501	EXTERIOR DETAILS - WALL TYPES	EMP		
A502	EXTERIOR DETAILS - ROOF TYPES	EMP		
A503	BRICK AND CMU TYPES	EMP		
A510	EXTERIOR PLAN DETAILS - TYPICAL CLASSROOM BAY	EMP		
A511	EXTERIOR PLAN DETAILS - SCIENCE CLASSROOMS & GUIDANCE OFFICES	EMP		
A512	EXTERIOR PLAN DETAILS	EMP		
A513	EXTERIOR PLAN DETAILS	EMP		
A514	EXTERIOR DETAILS - SEGMENTED WALL AT CORRIDOR	EMP		
A515	EXTERIOR DETAILS - SEGMENTED WALL AT CORRIDOR	EMP		
A520	EXTERIOR SECTION DETAILS - SOUTH	EMP		
A521	EXTERIOR SECTION DETAILS - SOUTH	EMP		
A522	EXTERIOR SECTION DETAILS - NORTH	EMP		
A523	EXTERIOR SECTION DETAILS	EMP		
A524	EXTERIOR SECTION DETAILS	EMP		
A530	EXTERIOR PLAN DETAILS - GYMNASIUM & AUDITORIUM	EMP		
A531	EXTERIOR SECTION DETAILS - GYMNASIUM & AUDITORIUM	EMP		
A532	EXTERIOR SECTION DETAILS	EMP		
A533	EXTERIOR PLAN DETAILS	EMP		
A540	SKYLIGHT DETAILS			
A541	SKYLIGHT DETAILS			
A542	ELEVATOR PENTHOUSE DETAILS			
A543	EXTERIOR & ROOF DETAILS			
A544	TYPICAL ROOF DETAILS			
A560	BANDSHELL			
A570	EXTERIOR CANOPY DETAILS			
A600	INTERIOR WALL SECTIONS & DETAILS			
A601	INTERIOR WALL SECTIONS & DETAILS			
A602	INTERIOR WALL SECTIONS			
A603	INTERIOR WALL SECTIONS	EMP		
A604	INTERIOR WALL SECTIONS			
A609	INTERIOR WALL SECTIONS - BREAKOUT SPACES			
A620	INTERIOR DETAILS			
A621	INTERIOR DETAILS			
A622	INTERIOR DETAILS - SHELF REFLECTORS & CABINETS			
A623	INTERIOR DETAILS			
A625	INTERIOR DETAILS - BREAKOUT SPACES			
A650	INTERIOR DETAILS - GUARDRAILS			
A651	INTERIOR DETAILS - STAIRS			
A652	INTERIOR DETAILS - STAIRS			
A690	INTERIOR DETAILS - CEILING			
A691	INTERIOR DETAILS - CEILING			
A700	PARTITION TYPES	EMP		
A710	DOOR SCHEDULE AND LEGENDS			
A711	DOOR SCHEDULES			
A712	SILL TRANSITION & BASE DETAILS			
A713	DOOR DETAILS			
A715	SIGNAGE DETAILS			
ELEVATOR				
VT01	ELEVATOR DETAILS			
FOOD SERVICE				
FS100	FOOD SERVICE EQUIPMENT PLAN & SCHEDULE			
FS101	FOOD SERVICE EQUIPMENT ROUGHING-IN PLAN			
FS102	FOOD SERVICE EQUIPMENT SPECIAL CONDITIONS PLAN			

VOLUME: 2

		BID PACKAGE	REVISION DATE	REVISION DESCRIPTION
STRUCTURAL				
S000	GENERAL NOTES	ESP	10/18/2019	EMP
S001	GEOMETRY PLAN	ECSP	10/18/2019	EMP
S002	SNOW DRIFT PLAN	ECSP		
S003	STEEL JOIST LOAD DIAGRAMS	ECSP	9/09/2019	PR 12
S101A	FOUNDATION PLAN-A	ESP	10/18/2019	EMP
S101B	FOUNDATION PLAN-B	ESP	9/12/2019	PR 12 REV1
S101C	FOUNDATION PLAN-C	ESP	10/18/2019	EMP
S101D	FOUNDATION PLAN-D	ESP	10/18/2019	EMP
S101L	FOUNDATION LOADS FOR GROUND IMPROVEMENT	ESP	9/09/2019	PR 12
S102A	FLOOR 2 FRAMING PLAN-A	ECSP	10/18/2019	EMP
S102B	FLOOR 2 FRAMING PLAN-B	ECSP	10/18/2019	EMP
S102C	FLOOR 2 FRAMING PLAN-C	ECSP	10/18/2019	EMP
S102D	FLOOR 2 FRAMING PLAN-D	ECSP	10/18/2019	EMP
S103A	FLOOR 3 FRAMING PLAN-A	ECSP	10/18/2019	EMP
S103B	FLOOR 3 FRAMING PLAN-B	ECSP	10/18/2019	EMP
S103C	FLOOR 3 FRAMING PLAN-C	ECSP	10/18/2019	EMP
S103D	FLOOR 3 FRAMING PLAN-D	ECSP	10/18/2019	EMP
S104B	ROOF FRAMING PLAN-B	ECSP	9/12/2019	PR 12 REV1
S104C	ROOF FRAMING PLAN-C	ECSP	8/27/2019	Addend. 4
S104D	ROOF FRAMING PLAN-D	ECSP	8/27/2019	Addend. 4
S105B	HIGH ROOF FRAMING PLAN-B	ECSP	9/12/2019	PR 12 REV1
S105C	HIGH ROOF FRAMING PLAN-C	ECSP	9/12/2019	PR 12 REV1
S200	NORTH BUILDING COLUMN SCHEDULE	ECSP	9/09/2019	PR 12
S201	SOUTH BUILDING COLUMN SCHEDULE	ECSP	10/18/2019	EMP
S202	BASE PLATE DETAILS	ECSP		
S203	BASE PLATE DETAILS	ECSP		
S204	BRACED FRAME AND TRUSS ELEVATIONS (NORTH)	ECSP		
S205	BRACED FRAME AND TRUSS ELEVATIONS (SOUTH)	ECSP	8/27/2019	Addend. 4
S300	TYPICAL DETAILS	ECSP	8/09/2019	ECSP
S301	TYPICAL DETAILS	ECSP	8/27/2019	Addend. 4
S302	TYPICAL DETAILS	ECSP		
S303	TYPICAL DETAILS	ECSP	10/18/2019	EMP
S304	TYPICAL DETAILS	ECSP		
S305	TYPICAL DETAILS	ECSP		
S400	FOUNDATION SECTIONS	ECSP	10/18/2019	EMP
S401	FOUNDATION SECTION	ECSP	10/18/2019	EMP
S500	SUPERSTRUCTURE SECTIONS	ECSP	9/12/2019	PR 12 REV1
S501	SUPERSTRUCTURE SECTIONS	ECSP	9/12/2019	PR 12 REV1
S502	BANDSHELL & ENTRANCE CANOPY DETAILS	ECSP	10/18/2019	EMP
S503	SUPERSTRUCTURE SECTIONS	ECSP	10/18/2019	EMP
S504	SUPERSTRUCTURE SECTIONS	EMP		
S600	EXTERIOR WALL ELEVATIONS	ECSP	9/12/2019	PR 12 REV1
S601	EXTERIOR WALL ELEVATIONS	ECSP	9/12/2019	PR 12 REV1
S602	EXTERIOR WALL ELEVATIONS	ECSP	9/12/2019	PR 12 REV1
S603	EXTERIOR WALL ELEVATIONS	ECSP	9/12/2019	PR 12 REV1
S604	EXTERIOR WALL ELEVATIONS	ECSP	9/12/2019	PR 12 REV1
S700	CMU SHEAR WALL ELEVATIONS AT GYM	EMP		
S701	CMU SHEAR WALL ELEVATIONS AT AUDITORIUM	EMP		
FIRE PROTECTION				
FP001	LEGEND, SCHEDULES, AND DETAILS			
FP101A	FIRST FLOOR RCP - FIRE PROTECTION A			
FP101B	FIRST FLOOR RCP - FIRE PROTECTION B			
FP101C	FIRST FLOOR RCP - FIRE PROTECTION C			
FP101D	FIRST FLOOR RCP - FIRE PROTECTION D			
FP102A	SECOND FLOOR RCP - FIRE PROTECTION A			
FP102B	SECOND FLOOR RCP - FIRE PROTECTION B			
FP102C	SECOND FLOOR RCP - FIRE PROTECTION C			
FP102D	SECOND FLOOR RCP - FIRE PROTECTION D			
FP103A	THIRD FLOOR RCP - FIRE PROTECTION A			
FP103B	THIRD FLOOR RCP - FIRE PROTECTION B			
FP103C	THIRD FLOOR RCP - FIRE PROTECTION C			
FP104	FOURTH FLOOR RCP - FIRE PROTECTION			
PLUMBING				
P001	LEGEND, NOTES, SCHEDULES, AND DETAILS			
P002	DETAIL SHEET			
P003	PLUMBING DETAILS			
P004	PLUMBING DETAILS			
P005	PLUMBING DETAILS			
P100A	FIRST FLOOR BELOW SLAB PLAN - PLUMBING A			
P100B	FIRST FLOOR BELOW SLAB PLAN - PLUMBING B			
P100C	FIRST FLOOR BELOW SLAB PLAN - PLUMBING C			
P100D	FIRST FLOOR BELOW SLAB PLAN - PLUMBING D			
P101A	FIRST FLOOR PLAN - PLUMBING A			
P101B	FIRST FLOOR PLAN - PLUMBING B			
P101C	FIRST FLOOR PLAN - PLUMBING C			
P101D	FIRST FLOOR PLAN - PLUMBING D			
P102A	SECOND FLOOR PLAN - PLUMBING A			
P102B	SECOND FLOOR PLAN - PLUMBING B			
P102C	SECOND FLOOR PLAN - PLUMBING C			
P102D	SECOND FLOOR PLAN - PLUMBING D			
P103A	THIRD FLOOR PLAN - PLUMBING A			
P103B	THIRD FLOOR PLAN - PLUMBING B			
P103C	THIRD FLOOR PLAN - PLUMBING C			
P103D	THIRD FLOOR PLAN - PLUMBING D			
P104	ROOF PLAN - PLUMBING			
P200	KITCHEN BELOW SLAB PLUMBING			
P201	KITCHEN ABOVE SLAB PLUMBING			
P300	ENLARGE MECHANICAL PLAN			
P400	SANITARY & VENT PIPING DIAGRAMS			
P401	COLD WATER & HOT WATER RISER DIAGRAMS			
P402	SCIENCE CLASSROOM ROOM PIPING DIAGRAMS			
P403	GAS PIPING RISER DIAGRAM			
HVAC				
M101A	DUCTWORK PLAN FLOOR 1-A - HVAC			
M101B	DUCTWORK PLAN FLOOR 1-B - HVAC			
M101C	DUCTWORK PLAN FLOOR 1-C - HVAC			
M101D	DUCTWORK PLAN FLOOR 1-D - HVAC			
M102A	DUCTWORK PLAN FLOOR 2-A - HVAC			
M102B	DUCTWORK PLAN FLOOR 2-B - HVAC			
M102C	DUCTWORK PLAN FLOOR 2-C - HVAC			
M102D	DUCTWORK PLAN FLOOR 2-D - HVAC			
M103A	DUCTWORK PLAN FLOOR 3-A - HVAC			
M103B	DUCTWORK PLAN FLOOR 3-B - HVAC			
M103C	DUCTWORK PLAN FLOOR 3-C - HVAC			
M103D	DUCTWORK PLAN FLOOR 3-D - HVAC			
M104	OVERALL ROOF PLAN - HVAC			
M201A	PIPING PLAN FLOOR 1-A - HVAC			
M201B	PIPING PLAN FLOOR 1-B - HVAC			
M201C	PIPING PLAN FLOOR 1-C - HVAC			
M201D	PIPING PLAN FLOOR 1-D - HVAC			
M202A	PIPING PLAN FLOOR 2-A - HVAC			
M202B	PIPING PLAN FLOOR 2-B - HVAC			
M202C	PIPING PLAN FLOOR 2-C - HVAC			
M202D	PIPING PLAN FLOOR 2-D - HVAC			
M203A	PIPING PLAN FLOOR 3-A - HVAC			
M203B	PIPING PLAN FLOOR 3-B - HVAC			
M203C	PIPING PLAN FLOOR 3-C - HVAC			
M203D	PIPING PLAN FLOOR 3-D - HVAC			
M301	SCHEDULES I - HVAC			
M302	SCHEDULES II - HVAC			
M303	DETAILS I - HVAC			
M304	DETAILS II - HVAC			
M305	DETAILS III - HVAC			
M306	RTU HYDRONIC & AIRFLOW DIAGRAMS - HVAC			
M307	HHW & CHW FLOW DIAGRAM - HVAC			
M401	CONTROLS I - HVAC			
M402	CONTROLS II - HVAC			
M403	CONTROLS III - HVAC			
M404	CONTROLS IV - HVAC			
M405	CONTROLS V - HVAC			
M406	CONTROLS VI - HVAC			
M407	CONTROLS VII - HVAC			
M408	SMOKE CONTROL I - HVAC			
VS101	VIBRATION & SEISMIC DETAILS			
ELECTRICAL				
E001	ELECTRICAL SYMBOL LIST			
E002	LIGHTING FIXTURES SCHEDULES & NOTES			
E-PH-1	ELECTRICAL EARLY SITE PLAN - PHASE 1	ESP	5/22/2019	Adden. 1
E003-1	ELECTRICAL SITE PLAN			
E003-2	ELECTRICAL SITE PLAN - WEST PARKING LOT			
E004	ELECTRICAL SITE PLAN DETAILS			
E005	ELECTRICAL SITE PLAN DETAILS			
E101A	FIRST FLOOR PLAN PART A - LIGHTING			
E101B	FIRST FLOOR PLAN PART B - LIGHTING			
E101C	FIRST FLOOR PLAN PART C - LIGHTING			
E101D	FIRST FLOOR PLAN PART D - LIGHTING			
E102A	SECOND FLOOR PLAN PART A - LIGHTING			
E102B	SECOND FLOOR PLAN PART B - LIGHTING			
E102C	SECOND FLOOR PLAN PART C - LIGHTING			
E102D	SECOND FLOOR PLAN PART D - LIGHTING			
E103A	THIRD FLOOR PLAN PART A - LIGHTING			
E103B	THIRD FLOOR PLAN PART B - LIGHTING			
E103C	THIRD FLOOR PLAN PART C - LIGHTING			
E103D	THIRD FLOOR PLAN PART D - LIGHTING			
E201A	FIRST FLOOR PLAN PART A - POWER			
E201B	FIRST FLOOR PLAN PART B - POWER			
E201C	FIRST FLOOR PLAN PART C - POWER			
E201D	FIRST FLOOR PLAN PART D - POWER			
E202A	SECOND FLOOR PLAN PART A - POWER			
E202B	SECOND FLOOR PLAN PART B - POWER			
E202C	SECOND FLOOR PLAN PART C - POWER			
E202D	SECOND FLOOR PLAN PART D - POWER			
E203A	THIRD FLOOR PLAN PART A - POWER			
E203B	THIRD FLOOR PLAN PART B - POWER			
E203C	THIRD FLOOR PLAN PART C - POWER			
E203D	THIRD FLOOR PLAN PART D - POWER			
E204	OVERALL ROOF PLAN - POWER & LIGHTNING PROTECTION			
E205	LIGHTNING PROTECTION DETAILS			
E300	ELECTRICAL ROOMS & IDF ROOMS PLANS - POWER			
E301	POWER ONE-LINE RISER			
E302	POWER SCHEDULES & DETAILS			
E303	MECHANICAL SCHEDULES & DETAILS			
E304	ELECTRICAL DETAILS			
E305	ELECTRICAL DETAILS	ECSP		
E306	ELECTRICAL DETAILS			
E307	FIRST FLOOR - PART 1-A - KITCHEN- POWER			
E400	FIRE ALARM RISER			
E401A	FIRST FLOOR PLAN PART A - FIRE ALARM			
E401B	FIRST FLOOR PLAN PART B - FIRE ALARM			
E401C	FIRST FLOOR PLAN PART C - FIRE ALARM			
E401D	FIRST FLOOR PLAN PART D - FIRE ALARM			
E402A	SECOND FLOOR PLAN PART A - FIRE ALARM			
E402B	SECOND FLOOR PLAN PART B - FIRE ALARM			
E402C	SECOND FLOOR PLAN PART C - FIRE ALARM			
E402D	SECOND FLOOR PLAN PART D - FIRE ALARM			
E403A	THIRD FLOOR PLAN PART A - FIRE ALARM			
E403B	THIRD FLOOR PLAN PART B - FIRE ALARM			
E403C	THIRD FLOOR PLAN PART C - FIRE ALARM			
E403D	THIRD FLOOR PLAN PART D - FIRE ALARM			
E500	SECURITY RISER			
E501A	FIRST FLOOR PLAN PART A - SECURITY			
E501B	FIRST FLOOR PLAN PART B - SECURITY			
E501C	FIRST FLOOR PLAN PART C - SECURITY			
E501D	FIRST FLOOR PLAN PART D - SECURITY			
E502A	SECOND FLOOR PLAN PART A - SECURITY			
E502B	SECOND FLOOR PLAN P

GENERAL NOTES

1. CONTRACTOR SHALL DETERMINE EXISTING CONDITIONS WHERE REQUIRED AND VERIFY ALL FIELD CONDITIONS FOR CLEARANCES, DIMENSIONS AND ELEVATIONS SHOWN ON DRAWINGS. ANY DISCREPANCIES SHALL BE MARKED ON A PRINT OF THE STRUCTURAL DRAWING AND FORWARDED IMMEDIATELY TO THE ENGINEER.
2. THE CONTRACTOR SHALL COMPARE STRUCTURAL DRAWINGS WITH THE ARCHITECTURAL DRAWINGS BEFORE COMMENCING WITH THE WORK AND SHALL NOTIFY THE ARCHITECT AND ENGINEER OF ANY DISCREPANCIES REQUIRING CLARIFICATION OR REVISIONS. DO NOT SCALE STRUCTURAL DRAWINGS. REFER TO ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS NOT SHOWN.
3. ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATIONS AND THE MASSACHUSETTS BUILDING CODE, 9TH EDITION.
4. THE CONTRACTOR SHALL SUBMIT COMPLETE SHOP DRAWINGS FOR THE ENGINEER'S APPROVAL FOR ALL PARTS OF THE WORK, INCLUDING A DESCRIPTION OF DEMOLITION, CONSTRUCTION METHODS, AND SEQUENCING WHERE APPLICABLE. EXISTING FIELD CONDITIONS SHALL BE INCORPORATED INTO SUBMITTALS. NO PERFORMANCE OF THE WORK INCLUDING, BUT NOT LIMITED TO, DEMOLITION OF THE EXISTING STRUCTURE, OR FABRICATION OR ERECTION OF NEW STRUCTURAL ELEMENTS SHALL COMMENCE WITHOUT REVIEW OF THE SHOP DRAWINGS BY THE ENGINEER.
5. IN THE EVENT THAT CERTAIN DETAILS OF THE CONSTRUCTION ARE NOT FULLY SHOWN OR NOTED ON THE DRAWINGS, THEIR CONSTRUCTION SHALL BE OF THE SAME TYPE AS FOR SIMILAR CONDITIONS WHICH ARE SHOWN AND NOTED, SUBJECT TO THE STRUCTURAL ENGINEER'S APPROVAL.
6. SEE THE ARCHITECTURAL DRAWINGS FOR THE FOLLOWING:
   A. SIZE AND LOCATION OF ALL INTERIOR AND EXTERIOR NON BEARING PARTITIONS.
   B. SIZE AND LOCATION OF ALL CONCRETE CURBS, FLOOR DRAINS, SLOPES, INSERTS, ETC. EXCEPT AS SHOWN.
   C. SIZE AND LOCATION OF ALL DOOR AND WINDOW OPENINGS EXCEPT AS SHOWN.
   D. FLOOR AND ROOF FINISHES.
   E. FINISHED FLOOR AND EXTERIOR ELEVATIONS.
   F. DIMENSIONS NOT SHOWN ON STRUCTURAL DRAWINGS.
   G. STAIR FRAMING AND DETAILS.
7. SEE THE MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR THE FOLLOWING:
   A. PIPE AND DUCT RUNS, SLEEVES, HANGERS, TRENCHES, WALL AND SLAB OPENINGS, ETC. EXCEPT AS SHOWN OR NOTED.
   B. ELECTRICAL CONDUIT RUNS, BOXES, OUTLETS IN WALLS AND SLABS
   C. CONCRETE INSERTS FOR ELECTRICAL, MECHANICAL, OR PLUMBING FIXTURES.
   D. SIZE AND LOCATION OF MACHINE OR EQUIPMENT BASES, ANCHOR BOLTS FOR MOTOR MOUNTS, EXCEPT AS SHOWN OR NOTED.
8. OPENING, POCKETS, ETC. LARGER THAN 6" SHALL NOT BE PLACED IN CONCRETE SLABS, DECKS, OR WALLS UNLESS SPECIFICALLY DETAILED ON THE STRUCTURAL DRAWINGS. NOTIFY THE STRUCTURAL ENGINEER WHEN DRAWINGS BY OTHERS SHOW OPENINGS, POCKETS, ETC LARGER THAN 6" WHICH ARE NOT SHOWN ON THE STRUCTURAL DRAWINGS, BUT WHICH ARE LOCATED IN STRUCTURAL MEMBERS.
9. ALL MECHANICAL SYSTEMS SUSPENDED LOADS EXCEEDING 100 POUNDS SHALL BE REVIEWED BY THE STRUCTURAL ENGINEER PRIOR TO INSTALLATION UNLESS SPECIFICALLY DETAILED ON THE DRAWINGS.
10. DESIGN BASIS:
    DESIGN IS IN ACCORDANCE WITH THE MASSACHUSETTS BUILDING CODE, 9TH EDITION

    LIVE LOAD
    SEE DESIGN LOAD SCHEDULE

    SNOW LOAD

Pg	40 PSF
Pf	35 PSF
Ce	1
I	1.1
Ct	1

    WIND LOAD (SPEED AND PSF IN ULTIMATE)*

BASIC WIND SPEED	137 MPH
RISK CATEGORY	III
EXPOSURE	C
INTERNAL PRESSURE COEFFICIENT	±0.18
MWFRS DESIGN LOAD	67 PSF

    *TO CONVERT ULTIMATE WIND PRESSURES TO ALLOWABLE, MULTIPLY BY 0.6. TO CONVERT ULTIMATE BASIC WIND SPEED TO ALLOWABLE, MULTIPLY BY √0.6. (IMPORTANCE FACTOR IS ALREADY INCLUDED IN SPEED AND PRESSURES).

    SEISMIC LOAD

I/ RISK CATEGORY	1.25/III
Ss/S1	0.194/0.067
SITE CLASS	D
SDS/SD1	0.207/0.107
SEISMIC DESIGN CATEGORY	B
SEISMIC-FORCE-RESISTING SYSTEM	STEEL CONCENTRICALLY BRACED FRAMES (NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE) AND INTERMEDIATE REINFORCED MASONRY SHEAR WALLS
DESIGN BASE SHEAR	1070 KIPS
Cs	0.086
R	3
ANALYSIS PROCEDURE	EQUIVALENT LATERAL FORCE

11. SEE ARCHITECTURAL DRAWINGS FOR WATERPROOFING AND DAMPPROOFING DETAILS.
12. THE OWNER WILL RETAIN AN INDEPENDENT TESTING AGENCY TO INSPECT THE FOLLOWING TYPES OF WORK. SEE THE PROJECT SPECIFICATIONS FOR SPECIFIC REQUIREMENTS.
    A. SUBGRADE, INCLUDING SOLID PREPARATION, COMPACTION AND BEARING CAPACITY
    B. STRUCTURAL FILL
    C. ALL CONCRETE WORK
    D. ALL STRUCTURAL STEEL WELDING AND HIGH STRENGTH BOLTING (EXCEPT METAL STUDS, FURRING, ETC.)
    E. SHOP WELDING PROCEDURES
    F. STEEL OPEN WEB JOISTS
    G. PRECAST DOUBLE TEE BEAMS
    H. INSTALLATION OF EXPANSION AND ADHESIVE ANCHORS
    I. STRUCTURAL STABILITY
    J. WIND BEARING OR LOAD BEARING LIGHT GAUGE METAL FRAMING
    K. WHERE INDICATED ON THE DRAWINGS OR PROJECT SPECIFICATIONS.
13. THE FOLLOWING SHALL BE DESIGNED BY A REGISTERED DESIGN PROFESSIONAL (RDP) NOT UNDER THE CONTROL OF THE STRUCTURAL ENGINEER OF RECORD (SER) AND SUBMITTED FOR REVIEW WITH CALCULATIONS PREPARED, STAMPED, AND SIGNED BY A LICENSED PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF MASSACHUSETTS.
    A. LIGHT GAUGE METAL SYSTEMS
    B. CURTAIN WALL
    C. METAL OR CONCRETE STAIRS AND RAILS NOT DETAILED ON STRUCTURAL DRAWINGS
    D. STRUCTURAL STEEL CONNECTIONS NOT FULLY DETAILED IN CONTRACT DRAWINGS (SHEAR CONNECTIONS, MOMENT CONNECTIONS).
    E. TEMPORARY SHORING WORK.
    F. PRE-FABRICATED STEEL OR WOOD TRUSSES.
    G. HAND RAILS, GUARDRAILS AND HALF WALLS SERVING AS SUCH.
    H. ALL OTHER SYSTEMS NOTED AS SUCH IN PROJECT SPECIFICATIONS.

    STRUCTURAL DRAWINGS PROVIDED BY SER SUBMITTED FOR PERMIT DO NOT INCLUDE DESIGN OF THE SYSTEMS LISTED ABOVE.
14. EACH CONTRACTOR RESPONSIBLE FOR THE CONSTRUCTION OF THE LATERAL SYSTEM (WIND OR SEISMIC) SHOWN ON THE STRUCTURAL DRAWINGS SHALL SUBMIT A WRITTEN STATEMENT OF RESPONSIBILITY TO THE BUILDING OFFICIAL AND THE OWNER ACKNOWLEDGING AWARENESS OF THE SPECIAL REQUIREMENTS CONTAINED IN THE STATEMENT OF SPECIAL INSPECTION.

TEMPORARY WORK

1. ALL TEMPORARY WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE MASSACHUSETTS BUILDING CODE, 9TH EDITION.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE PROPER SHORING AND BRACING WHEREVER NECESSARY. SHOP DRAWINGS FOR SUCH SHORING SHALL BE PREPARED BY A PROFESSIONAL ENGINEER RETAINED BY THE CONTRACTOR, IN ACCORDANCE WITH ALL APPLICABLE CURRENT RULES AND REGULATIONS.
3. CONSTRUCTION LOADS SHALL NOT EXCEED THE DESIGN LIVE LOAD PER SQUARE FOOT. PROVIDE ADEQUATE SHORING AND/OR BRACING WHERE STRUCTURE HAS NOT ATTAINED DESIGN STRENGTH.
4. SHEETING, SHORING AND BRACING FOR THE LATERAL SUPPORT OF EXCAVATION SHALL REMAIN IN PLACE UNTIL ALL PERMANENT STRUCTURAL SYSTEMS AT AND BELOW GROUND LEVEL ARE COMPLETE. FOR FURTHER INFORMATION ON LATERAL SUPPORT OF EXCAVATION, SEE SPECIFICATIONS.

EARTHWORK

1. ALL EARTHWORKS INCLUDING EXCAVATION, FILLING, SUBGRADE PREPARATIONS, AND PROOF ROLLING EXISTING SUBGRADE SHALL BE IN ACCORDANCE WITH THE GENERAL NOTES, SPECIFICATIONS, AND GEOTECHNICAL REPORT DATED MAY 2, 2019 BY RSE ASSOCIATES, INC.
2. DO NOT PLACE BACKFILL BEHIND WALLS UNTIL CONCRETE HAS ATTAINED ITS FULL DESIGN STRENGTH. DO NOT BACKFILL WALLS BELOW GRADE UNTIL GROUND LEVEL FLOOR OR OTHER PERMANENT LATERAL SUPPORT SYSTEM IS COMPLETELY IN PLACE AND HAS ATTAINED 80 PERCENT OF FULL STRENGTH.
3. EXCAVATIONS BELOW FOOTINGS OF ALL TYPES AS WELL AS SLABS ON GRADE SHOULD BE MADE SO AS TO PROVIDE A CLEAN SMOOTH BEARING AREA OF UNDISTURBED SOIL. THE BOTTOM THREE INCHES OF EXCAVATIONS FOR FOOTINGS, PILE CAPS, AND GRADE BEAMS SHALL BE FINISHED BY HAND.
4. ALL BEARING SURFACES SHALL BE PROTECTED FROM CHANGES IN MOISTURE CONTENT IN ACCORDANCE WITH THE GEOTECHNICAL REPORT.
5. NO RESPONSIBILITY IS ASSUMED BY THE ARCHITECT FOR THE VALIDITY OF THE SUBSURFACE CONDITIONS DESCRIBED ON THE DRAWINGS, SPECIFICATIONS, TEST BORINGS, OR TEST PITS. THIS DATA IS INCLUDED ONLY TO ASSIST THE CONTRACTOR DURING BIDDING AND SUBSEQUENT CONSTRUCTION AND REPRESENT CONDITIONS ONLY AT THESE SPECIFIC LOCATIONS AT THE PARTICULAR TIME THEY WERE MADE.

FOUNDATIONS

1. THE FOUNDATION DESIGN IS BASED ON THE GEOTECHNICAL INVESTIGATION REPORTS PREPARED BY RSE ASSOCIATES, INC. DATED MAY 2, 2019.
2. ALLOWABLE SOIL BEARING PRESSURE ASSUMED TO BE 4 KSF.
3. FOUNDATIONS ON THIS PROJECT CONSIST OF SPREAD FOOTINGS, BASEMENT AND FOUNDATION WALLS, AND SLAB ON GRADE.
4. DESIGN ELEVATION FOR GROUNDWATER IS AT ELEVATION 161.5 (NAVD88) AS PER GEOTECHNICAL...
5. NO FOUNDATION CONCRETE SHALL BE PLACED IN WATER OR ON FROZEN SUBGRADE MATERIAL. WATER SHALL NOT BE ALLOWED TO STAND IN TRENCHES BEFORE OR AFTER CONCRETE IS PLACED. REFER TO GEOTECHNICAL REPORT FOR GUIDELINES ON DEWATERING.
6. IF TRENCHES BECOME SOFTENED DUE TO RAIN OR OTHER WATER BEFORE THE FOOTINGS ARE CAST, THE CONTRACTOR SHALL EXCAVATE THE SOFTENED MATERIAL AND REPLACE WITH CONCRETE.
7. FOUNDATION UNITS SHALL BE CENTERED UNDER SUPPORTED STRUCTURAL MEMBER, UNLESS NOTED OTHERWISE ON THE DRAWINGS.
8. ALL EXCAVATIONS FOR FOUNDATIONS SHALL BE APPROVED BY THE OWNER'S GEOTECHNICAL ENGINEER PRIOR TO PLACING REINFORCEMENT AND CASTING CONCRETE.
9. BACKFILL UNDER ANY PORTION OF THE STRUCTURE SHALL BE COMPACTED IN 6 INCH LIFTS PER SPECIFICATION REQUIREMENTS.
10. ALL SLAB ON GRADE AND FOOTING SUBGRADE LEVELS SHALL BE APPROVED BY OWNERS GEOTECHNICAL ENGINEER.
11. EXTERIOR CONSTRUCTION SHALL BE CARRIED DOWN TO A MINIMUM DEPTH OF 4 FEET BELOW FINISHED EXTERIOR GRADE UNLESS NOTED OTHERWISE. PROTECT IN-PLACE FOUNDATIONS AND SLABS FROM FROST PENETRATION UNTIL THE PROJECT IS COMPLETED.
12. DOWELS FROM FOUNDATIONS INTO PIERS; COLUMNS, BUTTRESSES, OR WALLS ABOVE SHALL BE THE SAME SIZE AND NUMBER AS VERTICAL REINFORCEMENT IN PIERS, COLUMNS, BUTTRESSES, OR WALLS UNLESS NOTED OTHERWISE IN DRAWINGS.

EXPANSION AND ADHESIVE ANCHOR

1. ALL EXPANSION ANCHORS SHALL BE HILTI KWIK BOLT TZ OR APPROVED EQUAL, UNLESS NOTED OTHERWISE. SUBSTITUTIONS SHALL HAVE A CURRENT ICC EVALUATION REPORT.
2. ALL ADHESIVE ANCHORS SHALL BE THE HILTI HY 200 SYSTEM OR APPROVED EQUAL, UNLESS NOTED OTHERWISE. SUBSTITUTIONS SHALL HAVE A CURRENT ICC EVALUATION REPORT.
3. CONCRETE SHALL ATTAIN MINIMUM DESIGN STRENGTH PRIOR TO INSTALLATION OF THE ANCHORS.
4. INSTALL ANCHORS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND THE INSTRUCTIONS LISTED IN THE ICC REPORT.
5. PRIOR TO ALL EXPANSION ANCHOR DRILLING OPERATIONS IN CONCRETE OR MASONRY, THE CONTRACTOR SHALL LOCATE REINFORCEMENT BY NON-DESTRUCTIVE METHODS. NO REINFORCEMENT SHALL BE DAMAGED BY DRILLING OPERATIONS.
6. THE OWNER SHALL TEST TWENTY-FIVE PERCENT OF EACH GROUP OF ANCHORS USED FOR STRUCTURAL APPLICATIONS FOR THE FULL ALLOWABLE PULLOUT CAPACITY LISTED BY THE MANUFACTURER. IF HALF OF THE TESTED ANCHORS IN A GROUP FAIL THEN ALL OF THE ANCHORS IN THAT GROUP SHALL BE TESTED.

CONCRETE BLOCK MASONRY

1. MASONRY WORK SHALL CONFORM TO THE REQUIREMENTS OF THESE NOTES, THE SPECIFICATIONS, LATEST EDITION ACI 530 BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES, AND THE MASSACHUSETTS BUILDING CODE, 9TH EDITION.
2. CONCRETE BLOCK TO BE NORMAL WEIGHT HOLLOW BLOCK ASTM C90 TYPE 1 GRADE N, NOMINAL 8" TALL x 16" LONG.
3. MORTAR TO BE ASTM C270 TYPE M OR S. ADMIXTURES ARE NOT ALLOWED.
4. GROUT TO CONFORM TO ASTM C476, FINE OR COURSE, WITH A MINIMUM STRENGTH OF 3000 PSI.
5. NET AREA COMPRESSIVE STRENGTH OF MASONRY, f'm, TO BE 2000 PSI UNO, CONSTRUCTED FROM 2000 PSI CMU AND TYPE "M" OR "S" MORTAR.
6. REINFORCING BARS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615 GRADE 60.
7. JOINT REINFORCEMENT SHALL BE MANUFACTURED WIRE CONFORMING TO ASTM A82.
8. SEE THE ARCHITECTURAL DRAWINGS FOR NON-LOAD BEARING MASONRY PARTITIONS.
9. SEE SPECIFICATIONS FOR ALL TESTING AND INSPECTION REQUIREMENTS.
10. FILL ALL EXPANSION AND CONTROL JOINTS WITH CLOSED CELL NEOPRENE CONFORMING TO ASTM D1056 CLASS RE41 WITH 50% COMPRESSION.
11. REINFORCED MASONRY WALLS SHALL HAVE BOND BEAMS AT EACH FLOOR LEVEL, THE TOP COURSE OF PARAPETS, AND ELSEWHERE AS SHOWN. BOND BEAM REINFORCING SHALL BE EXTENDED INTO AND BE CONTINUOUS WITH ALL INTERSECTION BOND BEAMS. PROVIDE 2-#5 CONTINUOUS HORIZONTAL BARS MINIMUM IN BOND BEAMS AND FILL CONTINUOUSLY WITH GROUT.
12. MASONRY OPENINGS FOR MORE THAN 16" WIDE REQUIRE APPROVED LINTELS.
13. PROVIDE AND INSTALL LINTELS FOR OPENINGS IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

MAX OPENINGS	4" THICK CMU	6" THICK CMU	8" THICK CMU
4' - 0"	1-L4x3-1/2x5/16	1-L5x5x5/16	2-L4x3-1/2x5/16
7' - 0"	1-L6x3-1/2x5/16	1-8"x5x5/16" BENT PL.	2-L6x3-1/2x5/16

14. FOR WALLS LARGER THAN THE ABOVE THICKNESSES USE MULTIPLES OF THE ABOVE PIECES. LINTELS SHALL BEAR 8" MINIMUM AT BOTH ENDS. LONG LEGS SHALL BE VERTICAL. WHERE LINTEL ABUTS A COLUMN OR WALL PROVIDE CONNECTION TO SUCH. SUBMIT SHOP DRAWINGS OF CONNECTION DETAIL FOR APPROVAL.
15. BEAMS BEARING ON CMU WALLS SHALL HAVE BEARING PLATES OF SUFFICIENT SIZE TO DEVELOP THE MAXIMUM END REACTION OF THE BEAM. FILL CORES OF CONCRETE BLOCKS UNDER ALL BEARING PLATES WITH CONCRETE FOR A WIDTH EQUAL TO 3 TIMES THE BEARING PLATE LENGTH.
16. PROVIDE 1-#5 VERTICAL REINFORCING AT 32" O.C., UNO. THIS REINFORCING SHALL BE CONTINUOUS FOR THE FULL HEIGHT OF THE WALL, AND SPLICED 2'-0" ABOVE EACH FLOOR LEVEL.
17. REINFORCED MASONRY WALLS SHALL HAVE #9 GA LONGITUDINAL WIRES, LADDER OR TRUSS TYPE, AT 16 INCHES O.C. HORIZONTAL REINFORCEMENT, UNO.
18. MASONRY BLOCK CELLS CONTAINING VERTICAL REINFORCING SHALL BE GROUTED SOLID. FILLING CELL WITH MORTAR IS NOT ACCEPTABLE.
19. ALL CMU BELOW GRADE SHALL BE GROUTED SOLID.
20. OPENINGS, INCLUDING SEPARATE HORIZONTALLY-STAGGERED OPENINGS, IN NON-LOAD BEARING CMU WALLS TO INTERRUPT NO GREATER THAN ONE VERTICAL REINFORCEMENT BAR FOR EVERY 8 FEET IN LENGTH OF WALL. IN INSTANCES WHERE OPENINGS ARE GREATER THAN 4 FEET IN WIDTH, PROVIDE VERTICAL REINFORCEMENT AT EDGES OF OPENINGS PER TYPICAL DETAIL. DO NOT PLACE OPENINGS AT CELLS WHERE VERTICAL REINFORCEMENT RUNS AT ENDS OR CORNERS OF WALLS OR WHERE ANY HORIZONTAL REINFORCEMENT RUNS AT BOND BEAMS AT TOP AND BOTTOM OF WALLS. NOTIFY ENGINEER IF THESE PROPOSED OPENINGS DO NOT MEET THESE CRITERIA.

METAL DECK AND SHEAR CONNECTOR

1. ALL METAL DECK SHALL CONFORM TO THE REQUIREMENTS OF THESE NOTES, THE SPECIFICATIONS AND THE MASSACHUSETTS BUILDING CODE, 9TH EDITION.
2. STEEL DECK AND SHEAR CONNECTOR WORK SHALL CONFORM TO THE "SPECIFICATIONS FOR DESIGN OF LIGHT GAGE COLD-FORMED STEEL STRUCTURAL MEMBERS (AISI)"; "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS (AISC)"; "STRUCTURAL WELDING CODE-STEEL (AWS D1.1-LATEST EDITION)"; AND "STRUCTURAL WELDING CODE - SHEET STEEL (AWS D1.3-LATEST EDITION.)"
3. MINIMUM BEARING OF DECKING ON STEEL TO BE 2 INCHES.
4. STEEL DECK CROSS SECTIONS ARE ONLY REPRESENTED DIAGRAMMATICALLY ON THE DRAWINGS.
5. UNITS TO BE FASTENED TO ALL STEEL OVER WHICH THEY ARE PLACED WITH 5/8" DIAMETER PUDDLE WELDS. PUDDLE WELDS TO BE PLACED AT EACH RIB, OR AT 12" O/C, DEPENDING ON THE ORIENTATION OF THE DECK RELATIVE TO THE BEAMS. DECREASE WELD SPACING TO 6" O.C. FOR ROOF DECK WITHIN 4'-0" OF THE BUILDING PERIMETER.
6. SIDE LAPS BETWEEN ADJACENT DECK UNITS SHALL BE FASTENED BY #10 SCREW AT 36 INCHES O/C.
7. PROVIDE FLASHING AND CLOSURE PLATES AT ENDS OF ALL UNITS, AT SLAB OPENINGS, AND AROUND COLUMNS. ALL JOINTS TO BE GROUT TIGHT.
8. PROVIDE MISCELLANEOUS STEEL AT COLUMNS TO SUPPORT DISCONTINUOUS DECK AS REQUIRED.
9. FABRICATE DECK UNIT IN LENGTHS TO SPAN 3 OR MORE SUPPORTS WHERE POSSIBLE.
10. STEEL DECK PANEL SHALL BE FORMED FROM STEEL SHEETS CONFORMING TO ASTM A653 (GALV.), GRADE 33, WITH A MINIMUM YIELD POINT OF 33,000 PSI; ASTM A570/A1011 (UNGALV), GRADE 33, OR ASTM A611/A1008 (UNGALV), GRADE C, WITH A MINIMUM YIELD POINT OF 33,000 PSI AND A THICKNESS NOT THINNER THAN 20 GAGE.
11. SHEAR CONNECTORS SHALL CONFORM TO ASTM A108, GRADES 1010, 1015, 1017 OR 1020. TYPICALLY SHEAR CONNECTORS SHALL BE 3/4" DIAMETER X 4 1/2" LONG HEADED STUDS. IN NO CASE SHALL SHEAR CONNECTORS BE LESS THAN 1 1/2" ABOVE STEEL DECK.
12. SHEAR CONNECTORS SHALL BE EQUALLY SPACED OVER THE LENGTH OF THE BEAM. WHERE THE NUMBER OF DECK CORRUGATIONS AVAILABLE IS LESS THAN THE NUMBER OF SHEAR CONNECTORS, USE PAIRS OF SHEAR CONNECTORS STARTING FROM EACH END OF BEAM AND CONTINUING TOWARD THE CENTER UNTIL IT IS POSSIBLE TO RETURN TO A SINGLE SHEAR CONNECTOR IN EACH CORRUGATION. SHEAR CONNECTORS SHALL BE SPACED NOT CLOSER THAN 3" TRANSVERSELY AND 4" LONGITUDINALLY.
13. HORIZONTAL CLEARANCE SHALL BE A MINIMUM OF 1" FROM THE EDGE OF ANY SHEAR CONNECTOR TO THE FACE OF CONCRETE, STEEL DECK RIB, OR SIMILAR ADJACENCY.
14. EDGE DISTANCE FROM THE CENTER OF A SHEAR CONNECTOR TO THE EDGE OF A STRUCTURAL STEEL BEAM SHALL PREFERABLY BE 2", BUT IN NO CASE LESS THAN 1-1/4".
15. WHERE BOLTS OR MISCELLANEOUS STEEL BREAKS THE PLANE OF THE BOTTOM OF THE DECK RESULTING IN UNEVEN BEARING, SHOP DRAWING SHALL PROVIDE A DETAIL OR INSTRUCTIONS OF PROPOSED SOLUTION SO DECK CAN LAY FLAT.

CONCRETE AND REINFORCEMENT

1. ALL CONCRETE CONSTRUCTION TO CONFORM TO THESE NOTES, THE SPECIFICATIONS, THE LATEST EDITION OF ACI 318, AND THE MASSACHUSETTS BUILDING CODE, 9TH EDITION, WHICHEVER IS MOST RESTRICTIVE.
2. CONTRACTOR SHALL SUBMIT CONCRETE MIX TO ENGINEER BEFORE ORDERING CONCRETE TO JOB SITE.
3. SCHEDULE OF STRUCTURAL CONCRETE 28 DAY STRENGTHS AND TYPES:

LOCATION IN STRUCTURE	28 DAY STRENGTH	DENSITY
SUSPENDED SLABS ON DECK	4000	115
SLABS ON GRADE	4000	150
WALLS AND PIERS	4000	150
FOOTINGS	4000	150
EXPOSED INTERIOR TOPPING SLABS	5000	145

4. CLEAN AND ROUGHEN TO 1/4" AMPLITUDE ALL CONCRETE SURFACES AGAINST WHICH NEW CONCRETE IS TO BE PLACED. A MINIMUM OF 72 HOURS SHALL ELAPSE BETWEEN ADJACENT CONCRETE PLACEMENTS.
5. ALL CONSTRUCTION JOINTS SHALL BE IN ACCORDANCE WITH THE TYPICAL DETAILS SHOWN ON THE STRUCTURAL DRAWINGS AND ONLY AT APPROVED LOCATIONS.
6. REINFORCING BARS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615, GRADE 60. REINFORCING TO BE WELDED SHALL CONFORM TO ASTM A706, GRADE 60.
7. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A-185 AND SHALL HAVE AN ULTIMATE TENSILE STRENGTH OF 70,000 PSI.
8. ALL REINFORCEMENT SHALL BE DETAILED IN ACCORDANCE WITH THE LATEST EDITION OF THE ACI 315 DETAILING MANUAL.
9. ALL REINFORCING STEEL SHALL BE SECURELY HELD IN PROPER POSITION WHILE POURING CONCRETE. IF REQUIRED, ADDITIONAL BARS AND STIRRUPS SHALL BE PROVIDED BY THE CONTRACTOR TO FURNISH SUPPORT TO THE REINFORCING STEEL.
10. ALL REINFORCING BARS MARKED CONTINUOUS SHALL BE LAPPED 47 BAR DIAMETERS AT SPLICES, EXCEPT AS OTHERWISE SHOWN ON DRAWINGS. HOOK BARS AT NON-CONTINUOUS ENDS. LAP CONTINUOUS TOP BARS AT CENTER BETWEEN SUPPORTS AND CONTINUOUS BOTTOM BARS AT SUPPORTS.
11. PROVIDE CLEAR COVERAGE OF OUTER REINFORCEMENT AS FOLLOWS:

LOCATION IN STRUCTURE	CLEAR COVERAGE
SURFACE CAST AGAINST AND PERMANENTLY IN CONTACT WITH EARTH	3"
FORMED SURFACES EXPOSED TO EARTH OR WEATHER:	
#5 BAR OR SMALLER	1-1/2"
#6 BAR TO #18 BAR	2"
FORMED SLABS, WALLS AND JOISTS NOT EXPOSED TO EARTH OR WEATHER (#11 BAR OR SMALLER)	3/4"
FORMED BEAMS AND COLUMNS NOT EXPOSED TO EARTH OR WEATHER	1-1/2"

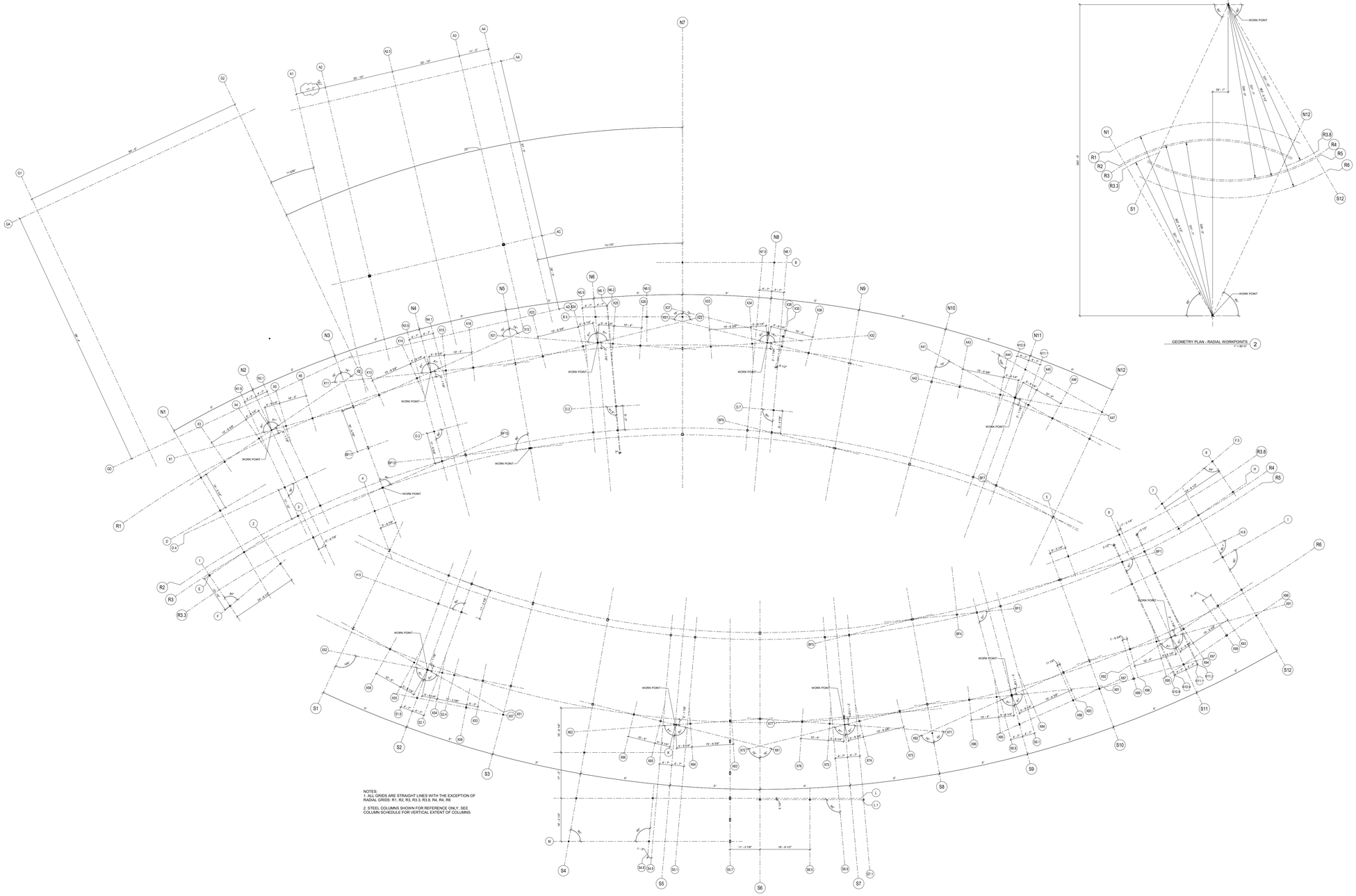
12. MINIMUM LAP OF WELDED WIRE FABRIC SHALL BE 6" OR ONE FULL MESH, WHICHEVER IS GREATER, AND SHALL BE WIRED TOGETHER.
13. NO CONCRETE SHALL BE POURED UNTIL ALL REINFORCEMENT AND INSTALLATIONS HAVE BEEN INSPECTED AND APPROVED BY THE OWNER'S TESTING AGENCY. THE CONTRACTOR SHALL NOTIFY THE OWNER'S TESTING AGENCY 48 HOURS BEFORE POURING CONCRETE TO ALLOW FOR ALL NECESSARY INSPECTIONS.
14. FOR CONCRETE SURFACES WHICH ARE TO RECEIVE FINISHES REFER TO ARCHITECTS DRAWINGS.
15. CONTRACTOR SHALL SUBMIT REBAR SHOP DRAWINGS FOR ENGINEER'S APPROVAL.
16. ALL CONCRETE TO BE EXPOSED TO FREEZING TEMPERATURES SHALL BE AIR-ENTRAINED.
17. NO PIPES OR CONDUIT SHALL BE EMBEDDED IN THE STRUCTURAL CONCRETE FLOOR SLABS WITHOUT APPROVAL OF STRUCTURAL ENGINEER.
18. PROVIDE POCKETS IN WALLS TO RECEIVE BEAMS AND SLABS WHERE REQUIRED.
19. PROVIDE VAPOR BARRIER UNDER INTERIOR SLABS CAST ON GRADE.
20. ALL OPENING FOR ELECTRICAL AND TELEPHONE CONDUITS AND ALL PLUMBING SLOTS SHALL BE FILLED WITH CONCRETE TO SAME DEPTH AS FLOOR SLAB AFTER ALL CONDUITS AND PIPING HAVE BEEN INSTALLED.
21. CONCRETE CAST ON SLOPED SURFACES SHALL BEGIN AT THE LOWEST ELEVATION AND CONTINUE MONOLITHICALLY TOWARD THE HIGHER ELEVATION UNTIL THE INTENDED CAST IS COMPLETED.
22. ALL CONSTRUCTION JOINT KEYS SHALL BE CONTINUOUS AND AS SHOWN ON THE DRAWINGS. MINIMUM KEY SIZE TO BE 3 1/2" WIDE BY 1 1/2" DEEP.
23. VERTICAL CONSTRUCTION JOINTS MAY BE MADE AT MIDSPAN OR AT POINTS OF MINIMUM SHEAR IN BEAM OR SLAB WHERE STOP IN CONCRETE WORK IS NECESSARY. SEE TYPICAL DETAILS FOR ADDITIONAL REINFORCING REQUIREMENTS AT CONSTRUCTION JOINTS.
24. CONCRETE FOUNDATION WALLS SHALL BE POURED IN ALTERNATE SECTIONS. EACH POUR SHALL NOT EXCEED 35 FEET IN LENGTH. NO HORIZONTAL JOINTS SHALL BE PERMITTED EXCEPT WHERE SHOWN ON PLAN OR APPROVED BY THE STRUCTURAL ENGINEER. LAYOUT OF ALL CONSTRUCTION AND/OR OTHER JOINTS SHALL BE SUBMITTED TO THE ARCHITECT AND ENGINEER FOR APPROVAL.
25. PROVIDE BAR SUPPORTS AND SPACERS WITH NON-CORROSIVE TIPS IN ACCORDANCE WITH ACI 315 FOR ALL REINFORCING INCLUDING WWF.
26. MECHANICAL SPLICES OR WELDED SPLICES ARE GENERALLY USED FOR BARS LARGER THAN #11 DIAMETER, HOWEVER THEY MAY BE USED FOR SMALLER BARS AT CONTRACTORS OPTION.
27. WHERE MECHANICAL SPLICES ARE USED, SPLICES SHALL BE STAGGERED 24 INCHES MINIMUM ALONG LONGITUDINAL AXIS OF MEMBER AND SHALL DEVELOP 125 PERCENT OF SPECIFIED YIELD STRENGTH IN TENSION OR COMPRESSION.
28. WELDING OF REINFORCING SHALL CONFORM TO "STRUCTURAL WELDING CODE - REINFORCING STEEL" AWS D1.4-79. WELDING STIRRUPS, TIES, INSERTS, OR OTHER SIMILAR ELEMENTS TO LONGITUDINAL REINFORCING SHALL NOT BE PERMITTED. FIELD WELDING OF CROSSING BARS IS NOT PERMITTED WITHOUT THE EXPRESS APPROVAL OF THE ENGINEER.

STRUCTURAL STEEL

1. STRUCTURAL STEEL WORK SHALL CONFORM TO THE REQUIREMENTS OF THESE NOTES, THE SPECIFICATIONS, AND THE MASSACHUSETTS BUILDING CODE, 9TH EDITION.
2. STRUCTURAL STEEL WORK SHALL CONFORM TO "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS (AISC 2010)"; "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS & BRIDGES (AISC 2010)"; AND "STRUCTURAL WELDING CODE - STEEL (AWS D1.1-94)"
3. STRUCTURAL STEEL SHALL BE DETAILED IN ACCORDANCE WITH "DETAILING FOR STEEL CONSTRUCTION (AISC)" AND, WHERE REQUIRED, DESIGNED IN ACCORDANCE WITH THE CITED REFERENCES.
4. STRUCTURAL STEEL SHALL BE THE FOLLOWING GRADES:

WIDE FLANGE ROLLED SHAPES	ASTM A992 GRADE 50
ANGLES, CHANNELS, PLATES AND BARS	ASTM A36
STEEL PIPE	ASTM A53 TYPE S GRADE B FY=35 KSI
ANCHOR RODS	ASTM F1554 GRADE 36 UNO
HIGH STRENGTH BOLTS	ASTM A325 OR A490
RECTANGULAR HSS	ASTM A500 GRADE B FY=46 KSI
ROUND HSS	ASTM A500 GRADE B FY=42 KSI

5. THE CONTRACTOR SHALL ENGAGE A PROFESSIONAL ENGINEER LICENSED IN MASSACHUSETTS TO SUPERVISE THE DESIGN OF ALL STEEL CONNECTIONS NOT SPECIFICALLY CALLED OUT AS FULLY DESIGNED ON THE STRUCTURAL DRAWINGS. SEE THE SPECIFICATIONS FOR SUBMITTAL REQUIREMENTS.
6. BOLTED CONNECTIONS SHALL BE AS FOLLOWS:
   a. 3/4 INCH MINIMUM BOLT DIAMETER, TWO BOLTS MINIMUM
   b. STANDARD, OVERSIZED, OR HORIZONTAL SHORT SLOTTED HOLES IN WEBS OF BEAMS
   c. SHEAR CONNECTIONS FOR MOMENT CONNECTED MEMBERS AND BRACED FRAMES SHALL BE SLIP CRITICAL TYPE HIGH STRENGTH BOLTS
   d. SHEAR CONNECTIONS FOR OTHER MEMBERS SHALL BE SIMPLE SHEAR CONNECTIONS WITH EITHER SLIP CRITICAL TYPE HIGH STRENGTH BOLTS OR BEARING TYPE HIGH STRENGTH BOLTS (ASSUME THREADS INCLUDED IN SHEAR PLANE FOR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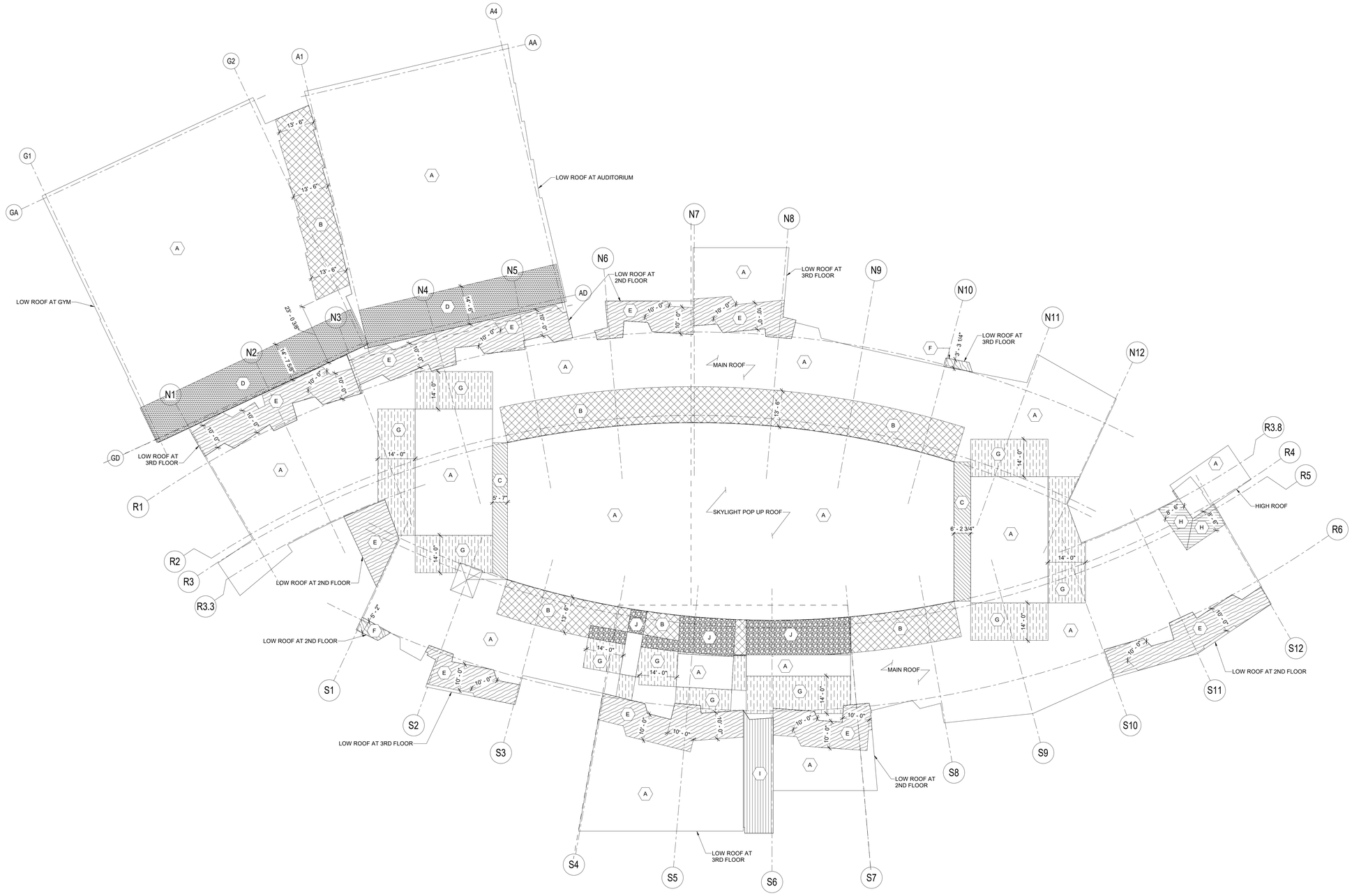

SNOW DRIFT PLAN
1/16" = 1'-0"
1

SNOW LOADING PLAN SCHEDULE

TYPE	FLAT ROOF SNOW LOAD	SNOW DRIFT	SNOW DRIFT	SNOW DRIFT	SNOW DRIFT	SNOW DRIFT	SNOW DRIFT	SNOW DRIFT	SNOW DRIFT	SNOW DRIFT
MARK	A	B	C	D	E	F	G	H	I	J
SNOW LOAD HIGH POINT	35 PSF	100 PSF	109 PSF	105 PSF	84 PSF	105 PSF	101 PSF	75 PSF	92 PSF	101 PSF
SNOW LOAD LOW POINT	35 PSF	35 PSF	101 PSF	35 PSF	35 PSF	35 PSF	35 PSF	35 PSF	35 PSF	100 PSF

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

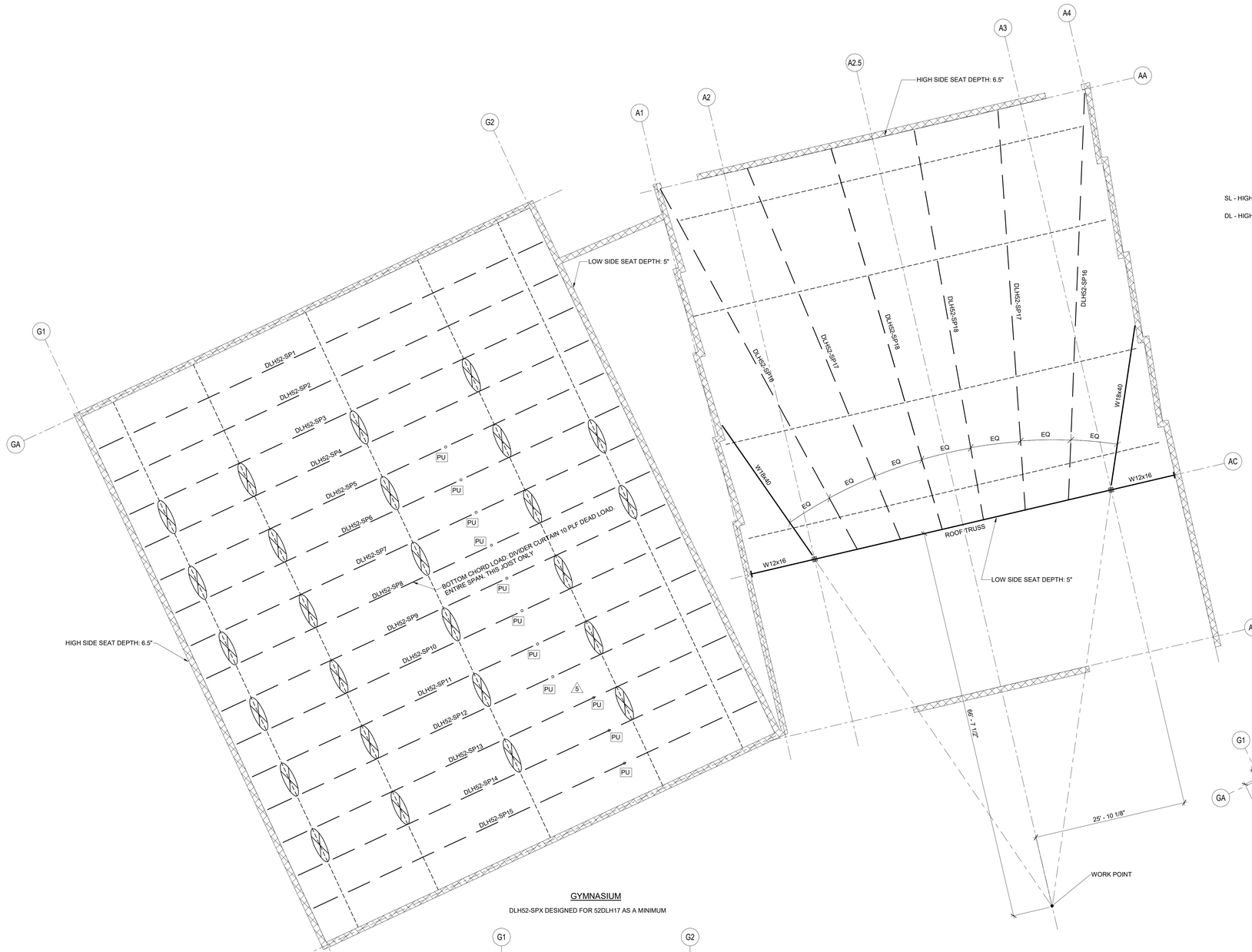
REVISIONS

No.	Date	Description

DRAWING NAME
SNOW DRIFT PLAN

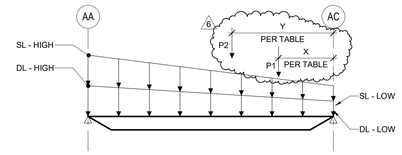
PROJECT NO. Project Number

DRAWING NO.
S002



AUDITORIUM

DLH52-SPX DESIGNED FOR 52DLH17 AS A MINIMUM



SNOW LOAD: SEE TABLE FOR HIGH AND LOW POINTS

DEAD LOAD: SEE TABLE FOR HIGH AND LOW POINTS (JOIST SELF WEIGHT NOT INCLUDED, ACCESSORIES & BRIDGING INCLUDED)

TRAPEZOIDAL LOADING TABLE

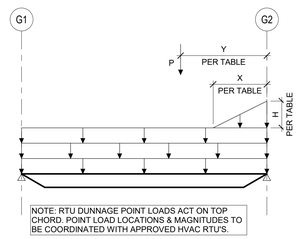
MARK	DL - HIGH	DL - LOW	SL - HIGH	SL - LOW
DLH52-SP16	435	310	370	265
DLH52-SP17	630	315	525	260
DLH52-SP18	595	300	510	255

THEATRICAL EQUIPMENT POINT LOADS (LIVE LOAD)

MARK	P1	X	P2	Y
DLH52-SP16	250 LBS	3' - 9¾"	450 LBS	26' - 7"
DLH52-SP17	260 LBS	4' - 3¼"	450 LBS	25' - 11½"
DLH52-SP18	260 LBS	4' - 7½"	450 LBS	25' - 8¼"

GYMNASIUM

DLH52-SPX DESIGNED FOR 52DLH17 AS A MINIMUM



HVAC RTU POINT LOADING (DEAD LOAD)

SNOW DRIFT LOAD 2 PER TABLE

SNOW DRIFT LOAD 1 PER TABLE

BASE SNOW LOAD: 190 PLF

DEAD LOAD: 260 PLF (JOIST SELF WEIGHT NOT INCLUDED, ACCESSORIES & BRIDGING INCLUDED)

NOTE: RTU DUNNAGE POINT LOADS ACT ON TOP CHORD. POINT LOAD LOCATIONS & MAGNITUDES TO BE COORDINATED WITH APPROVED HVAC RTU'S.

SNOW DRIFT LOAD 1

MARK	MAGNITUDE
DLH52-SP15	191 PLF
DLH52-SP14	26 PLF

SNOW DRIFT LOAD 2

MARK	H	X
DLH52-SP12	245 PLF	8' - 3"
DLH52-SP11	208 PLF	7' - 0"
DLH52-SP10	168 PLF	5' - 8"
DLH52-SP9	111 PLF	3' - 9"
DLH52-SP8	87 PLF	2' -11"
DLH52-SP7	30 PLF	1' - 0"

RTU POINT LOADS

MARK	P	Y
DLH52-SP5 THRU DLH52-SP12	3,200 LBS	30' - 1"
DLH52-SP13 THRU DLH52-SP15	1,800 LBS	25' - 3¼"

DESIGN CRITERIA:
USE THE FOLLOWING ASD LOAD COMBINATIONS:
1.0 DEAD + 1.0 SNOW
1.0 DEAD + 0.75 SNOW + 0.75 LIVE
0.6 DEAD + 1.0 WIND

DEFLECTION CRITERIA: DEFLECTION DUE TO TOTAL LOAD FROM GOVERNING LOAD COMBINATION SHALL NOT EXCEED L/240.
JOISTS TO BE CAMBERED PER STELL JOIST INSTITUTE STANDARDS

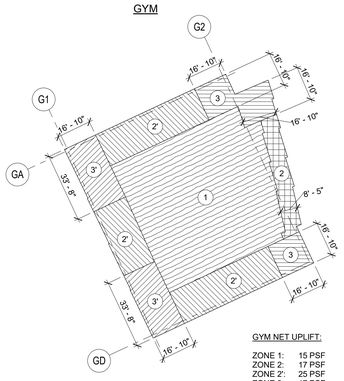
JOISTS AND THEIR END CONNECTIONS ARE TO BE DESIGNED FOR NET UPLIFT DUE TO COMPONENETS & CLADDING WIND FORCES SHOWN ON THIS SHEET.

LEGEND

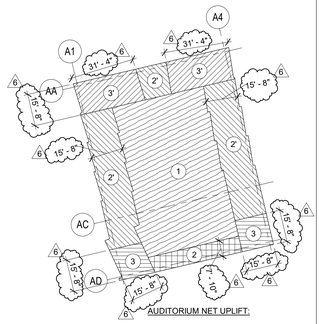
INDICATES JOIST BAY WHERE DIAGONAL BRIDGING IS TO BE REMOVED AFTER ERECTION TO ACCOMODATE MECH'LS. PERMANENT HORIZONTAL TOP & BOTTOM CHORD BRIDGING IS TO BE DESIGNED FOR THIS CONDITION

NOTES:
1. IN LOCATIONS WHERE DUCTS SHOWN TO INTERSECT JOISTS IN PLAN, JOISTS TO BE DESIGNED WITH SUFFICIENT OPEN AREA TO ACCOMMODATE DUCT SIZE SHOW. ASSUME DUCTS CENTERED WITH BAYS UNLESS NOTED OTHERWISE.
2. JOIST PROVIDER TO SUBMIT FOR REVIEW PE-STAMPED CALCULATIONS SHOWING CUSTOM LOADING DESCRIBED ON THIS STREET HAS BEEN INCORPORATED INTO "SPECIAL JOIST" DESIGN

GYM



AUDITORIUM



GYM NET UPLIFT:

ZONE 1: 15 PSF
ZONE 2: 17 PSF
ZONE 2': 25 PSF
ZONE 3: 17 PSF
ZONE 3': 27 PSF

AUDITORIUM NET UPLIFT:

ZONE 1: 14 PSF
ZONE 2: 16 PSF
ZONE 2': 24 PSF
ZONE 3: 16 PSF
ZONE 3': 26 PSF

NOTE: INDICATED LOADS REPRESENT THE NET UPLIFT USING THE LOAD COMBINATION 0.6D+1.0W. JOIST SELF-WEIGHT HAS BEEN EXCLUDED AND SHOULD BE ADDED WITH A 0.6 FACTOR TO COUNTERACT UPLIFT.

WIND NET UPLIFT LOADS

STEEL JOIST LOAD DIAGRAMS
1/8" = 1'-0"

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PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

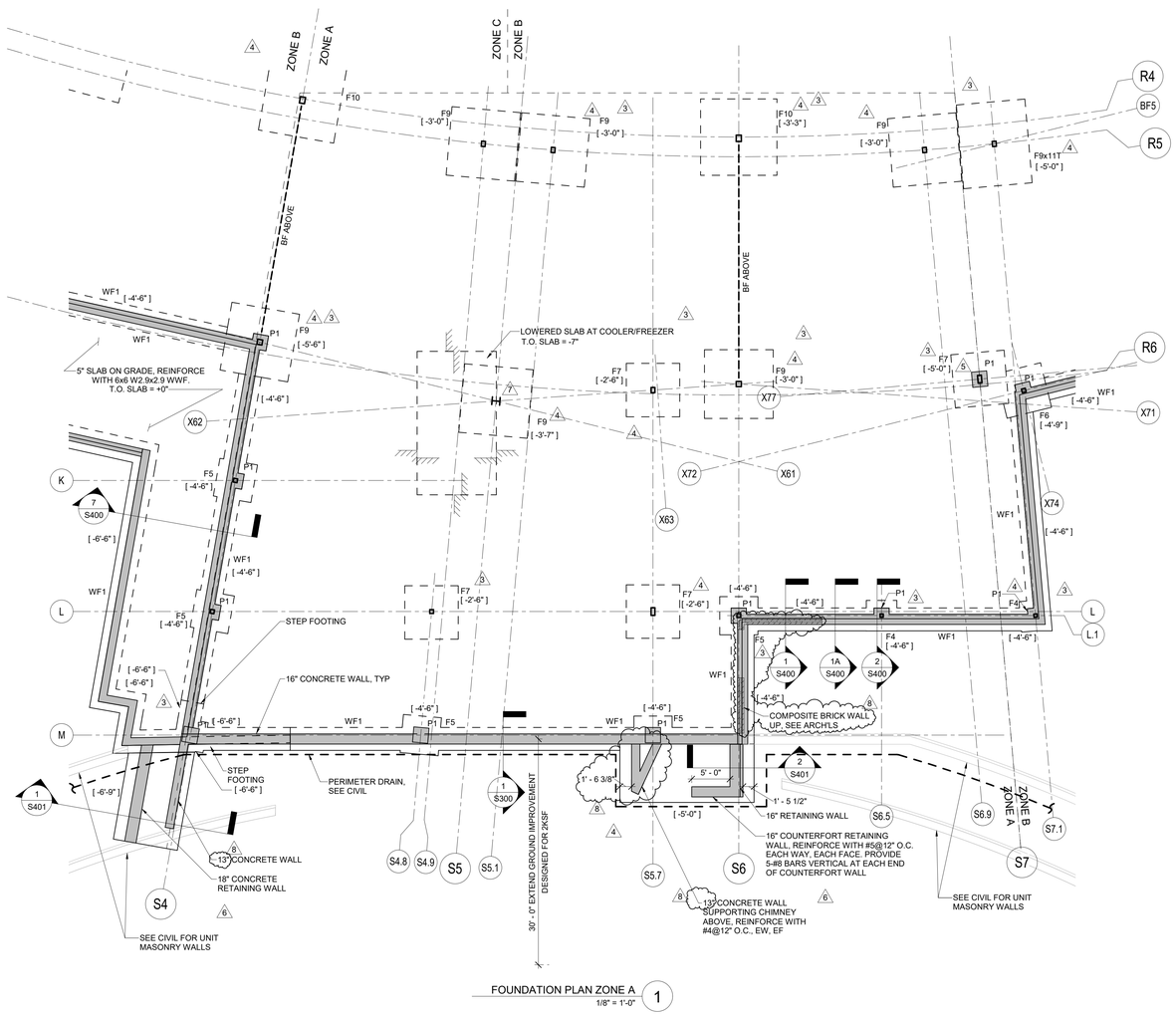
REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
6	9/09/2019	PR 12

DRAWING NAME
STEEL JOIST LOAD DIAGRAMS

PROJECT NO. Project Number

DRAWING NO.
S003



FOUNDATION PLAN ZONE A 1
1/8" = 1'-0"

NOTES:

1. GROUND UNDER FOOTINGS AND SLAB ON GRADE TO BE IMPROVED WITH GROUND IMPROVEMENT (ASSUME AGGREGATE PIERS TYPICALLY, RIGID INCLUSIONS UNDER GYM AND AUDITORIUM).
2. GROUND IMPROVEMENT TO BE DESIGNED BY A MA/LICENSED PE RETAINED BY THE CONTRACTOR FOR THE FOLLOWING CRITERIA:
   A. UNDER SPREAD FOOTINGS: ALLOWABLE BEARING CAPACITY OF 4 KSF. MAXIMUM ALLOWABLE SETTLEMENT = 1" TOTAL, ½" DIFFERENTIAL.
   B. UNDER SLAB ON GRADE: 100 PSF LIVE LOAD + SLAB SELFWEIGHT UNDER THE SLAB ON GRADE. MAXIMUM ALLOWABLE SETTLEMENT = ½" TOTAL, ¼" DIFFERENTIAL.
3. SLAB ON GRADE TO BE CAST ON A VAPOR BARRIER ON A 2' - 0" THICK MAXIMUM LAYER OF COMPACTED STRUCTURAL FILL OR 3/4" CRUSHED STONE. GROUND IMPROVEMENT CONTRACTOR TO PROVIDE & INSTALL ALL MATERIAL UP TO BOTTOM OF SLAB ELEVATION AND UP TO UNDERSIDE OF FOOTING ELEVATION
4. PROJECT ELEVATION = 0' - 0" = 165.5' SURVEY ELEVATION NAVD 88.
5. [X' - XX"] - INDICATES BOTTOM OF FOOTING ELEVATION.
6. BOTTOM OF EXTERIOR FOOTINGS TO BE 4 '- 0" BELOW EXTERIOR GRADE.
7. TOP OF STRAP GRADE BEAMS TO BE 1FT BELOW TOP OF SLAB ON GRADE

GEOTECHNICAL NOTES:
1. DUE TO THE PRESENCE OF ORGANICS, SITE SHOULD BE SURCHARGED PRIOR TO INSTALLING GROUND IMPROVEMENT UNDER ENTIRE BUILDING AREA FOR A DURATION OF 2 TO 3 MONTHS (TO BE CONFIRMED BY SETTLEMENT READINGS) REFER TO GEOTECHNICAL REPORT.

LEGEND

BF ABOVE	INDICATES BRACED FRAME
PSP	INDICATES HSS6x6x¼ PARTITION SUPPORT POST, SEE SECTIONS ON SHEET S501 FOR DETAILS.

BANDSHELL FOUNDATION PLAN MOVED TO SHEET S502

CONCRETE PILASTER SCHEDULE

MARK	LENGTH	WIDTH	VERT. REINF.	TIE REINF.
P1	2' - 0"	2' - 0"	(15)-#6 BARS	#4@12" O.C.
P2	1' - 9"	2' - 10"	(18)-#6 BARS	#4@12" O.C.
P3	3' - 2"	3' - 2"	(34)-#6 BARS	#4@12" O.C.
P4	2' - 4"	4' - 4"	(34)-#6 BARS	#4@12" O.C.
P5	3' - 9"	2' - 11"	(36)-#6 BARS	#4@12" O.C.

CONCRETE STRAP GRADE BEAM SCHEDULE

MARK	BEAM WIDTH	BEAM DEPTH	TOP REINFORCEMENT	BOTTOM REINFORCEMENT	TRANSVERSE
GRADE BEAM 1	4' - 6"	2' - 0"	(8)-#8 BARS	(18)-#8 BARS	#4@12" O.C.
GRADE BEAM 2	3' - 6"	2' - 0"	(12)-#8 BARS	(18)-#8 BARS	#4@12" O.C.
GRADE BEAM 3	3' - 3"	3' - 9"	(10)-#8 BARS	(18)-#8 BARS	#4@12" O.C.
GRADE BEAM 4	2' - 9"	2' - 9"	(8)-#8 BARS	(6)-#8 BARS	#4@12" O.C.
GRADE BEAM 5	3' - 0"	3' - 6"	(10)-#8 BARS	(18)-#8 BARS	#4@12" O.C.

FOOTING SCHEDULE

MARK	FOOTING LENGTH	FOOTING WIDTH	FOOTING DEPTH	REINFORCEMENT
F3	3' - 0"	3' - 0"	1' - 0"	(4)-#5 BOTTOM, EACH WAY
F4	4' - 0"	4' - 0"	1' - 0"	(5)-#5 BOTTOM, EACH WAY
F5	5' - 0"	5' - 0"	1' - 0"	(6)-#5 BOTTOM, EACH WAY
F6	6' - 0"	6' - 0"	1' - 3"	(7)-#6 BOTTOM, EACH WAY
F6.2	6' - 0"	6' - 0"	2' - 0"	(7)-#6 BOTTOM, EACH WAY
F7	7' - 0"	7' - 0"	1' - 6"	(8)-#6 BOTTOM, EACH WAY
F7.2	7' - 0"	7' - 0"	2' - 0"	(8)-#6 BOTTOM, EACH WAY
F8	8' - 0"	8' - 0"	1' - 9"	(9)-#7 BOTTOM, EACH WAY
F8.2	8' - 0"	8' - 0"	2' - 0"	(9)-#7 BOTTOM, EACH WAY
F8x3	8' - 0"	3' - 0"	1' - 0"	(9)-#4 BOTTOM, SHORT WAY, (3)-#5 BOTTOM, LONG WAY
F9	9' - 0"	9' - 0"	2' - 0"	(10)-#7 BOTTOM, EACH WAY
F9.3T	9' - 0"	9' - 0"	3' - 0"	(10)-#7 TOP AND BOTTOM, EACH WAY
F9T	9' - 0"	9' - 0"	2' - 0"	(10)-#7 TOP AND BOTTOM, EACH WAY
F9x11T	9' - 0"	11' - 0"	4' - 0"	(10)-#7 TOP AND BOTTOM, SHORT WAY, (13)-#7 TOP AND BOTTOM, SHORT WAY
F10	10' - 0"	10' - 0"	2' - 3"	(11)-#7 BOTTOM, EACH WAY
F10x3	10' - 0"	3' - 0"	1' - 0"	(11)-#4 BOTTOM, SHORT WAY, (3)-#5 BOTTOM, LONG WAY
F11	11' - 0"	11' - 0"	2' - 6"	(13)-#7 BOTTOM, EACH WAY
F11T	11' - 0"	11' - 0"	2' - 6"	(13)-#7 TOP AND BOTTOM, EACH WAY
WF1	CONT.	3' - 0"	1' - 0"	(3)-#5 BOTTOM, LONG WAY, #4@12" O.C. BOTTOM,TRANSVERSE
WF2	CONT.	4' - 0"	1' - 0"	(4)-#5 BOTTOM, LONG WAY, #4@12" O.C. BOTTOM,TRANSVERSE

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
EARLY SITE PACKAGE
MAY 10, 2019

REVISIONS

No.	Date	Description
1	5/17/2019	100% DD
3	6/07/2019	ESP Addem. 2
4	8/09/2019	ECSP
5	8/27/2019	Addend. 4
6	9/09/2019	PR 12
7	9/12/2019	PR 12 REV1
8	10/18/2019	EMP

DRAWING NAME
FOUNDATION PLAN-A

PROJECT NO. Project Number

DRAWING NO.
S101A

NOTES:

1. GROUND UNDER FOOTINGS AND SLAB ON GRADE TO BE IMPROVED WITH GROUND IMPROVEMENT (ASSUME AGGREGATE PIERS TYPICALLY, RIGID INCLUSIONS UNDER GYM AND AUDITORIUM).
2. GROUND IMPROVEMENT TO BE DESIGNED BY A MA/LICENSED PE RETAINED BY THE CONTRACTOR FOR THE FOLLOWING CRITERIA:
   A. UNDER SPREAD FOOTINGS: ALLOWABLE BEARING CAPACITY OF 4 KSF. MAXIMUM ALLOWABLE SETTLEMENT = 1" TOTAL, ½" DIFFERENTIAL.
   B. UNDER SLAB ON GRADE: 100 PSF LIVE LOAD + SLAB SELFWEIGHT UNDER THE SLAB ON GRADE. MAXIMUM ALLOWABLE SETTLEMENT = ½" TOTAL, ¼" DIFFERENTIAL.
3. SLAB ON GRADE TO BE CAST ON A VAPOR BARRIER ON A 2' - 0" THICK MAXIMUM LAYER OF COMPACTED STRUCTURAL FILL OR 3/4" CRUSHED STONE. GROUND IMPROVEMENT CONTRACTOR TO PROVIDE & INSTALL ALL MATERIAL UP TO BOTTOM OF SLAB ELEVATION AND UP TO UNDERSIDE OF FOOTING ELEVATION
4. PROJECT ELEVATION = 0' - 0" = 165.5' SURVEY ELEVATION NAVD 88.
5. [X' - XX"] - INDICATES BOTTOM OF FOOTING ELEVATION.
6. BOTTOM OF EXTERIOR FOOTINGS TO BE 4 '- 0" BELOW EXTERIOR GRADE.
7. TOP OF STRAP GRADE BEAMS TO BE 1FT BELOW TOP OF SLAB ON GRADE

GEOTECHNICAL NOTES:
1. DUE TO THE PRESENCE OF ORGANICS, SITE SHOULD BE SURCHARGED PRIOR TO INSTALLING GROUND IMPROVEMENT UNDER ENTIRE BUILDING AREA FOR A DURATION OF 2 TO 3 MONTHS (TO BE CONFIRMED BY SETTLEMENT READINGS) REFER TO GEOTECHNICAL REPORT.

LEGEND

BF ABOVE — INDICATES BRACED FRAME

PSP — INDICATES HSS4x4x¼ PARTITION SUPPORT POST, SEE SECTIONS ON SHEET S501 FOR DETAILS.

FOOTING SCHEDULE

MARK	FOOTING LENGTH	FOOTING WIDTH	FOOTING DEPTH	REINFORCEMENT
F3	3' - 0"	3' - 0"	1' - 0"	(4)-#5 BOTTOM, EACH WAY
F4	4' - 0"	4' - 0"	1' - 0"	(5)-#5 BOTTOM, EACH WAY
F5	5' - 0"	5' - 0"	1' - 0"	(6)-#5 BOTTOM, EACH WAY
F6	6' - 0"	6' - 0"	1' - 3"	(7)-#6 BOTTOM, EACH WAY
F6.2	6' - 0"	6' - 0"	2' - 0"	(7)-#6 BOTTOM, EACH WAY
F7	7' - 0"	7' - 0"	1' - 6"	(8)-#6 BOTTOM, EACH WAY
F7.2	7' - 0"	7' - 0"	2' - 0"	(8)-#6 BOTTOM, EACH WAY
F8	8' - 0"	8' - 0"	1' - 9"	(9)-#7 BOTTOM, EACH WAY
F8.2	8' - 0"	8' - 0"	2' - 0"	(9)-#7 BOTTOM, EACH WAY
F8x3	8' - 0"	3' - 0"	1' - 0"	(9)-#4 BOTTOM, SHORT WAY, (3)-#5 BOTTOM, LONG WAY
F9	9' - 0"	9' - 0"	2' - 0"	(10)-#7 BOTTOM, EACH WAY
F9.3T	9' - 0"	9' - 0"	3' - 0"	(10)-#7 TOP AND BOTTOM, EACH WAY
F9T	9' - 0"	9' - 0"	2' - 0"	(10)-#7 TOP AND BOTTOM, EACH WAY
F9x11T	9' - 0"	11' - 0"	4' - 0"	(10)-#7 TOP AND BOTTOM, SHORT WAY, (13)-#7 TOP AND BOTTOM, SHORT WAY
F10	10' - 0"	10' - 0"	2' - 3"	(11)-#7 BOTTOM, EACH WAY
F10x3	10' - 0"	3' - 0"	1' - 0"	(11)-#4 BOTTOM, SHORT WAY, (3)-#5 BOTTOM, LONG WAY
F11	11' - 0"	11' - 0"	2' - 6"	(13)-#7 BOTTOM, EACH WAY
F11T	11' - 0"	11' - 0"	2' - 6"	(13)-#7 TOP AND BOTTOM, EACH WAY
WF1	CONT.	3' - 0"	1' - 0"	(3)-#5 BOTTOM, LONG WAY, #4@12" O.C. BOTTOM,TRANSVERSE
WF2	CONT.	4' - 0"	1' - 0"	(4)-#5 BOTTOM, LONG WAY, #4@12" O.C. BOTTOM,TRANSVERSE

CONCRETE STRAP GRADE BEAM SCHEDULE

MARK	BEAM WIDTH	BEAM DEPTH	TOP REINFORCEMENT	BOTTOM REINFORCEMENT	TRANSVERSE
GRADE BEAM 1	4' - 6"	2' - 0"	(8)-#8 BARS	(18)-#8 BARS	#4@12" O.C.
GRADE BEAM 2	3' - 6"	2' - 0"	(12)-#8 BARS	(18)-#8 BARS	#4@12" O.C.
GRADE BEAM 3	3' - 3"	3' - 9"	(10)-#8 BARS	(18)-#8 BARS	#4@12" O.C.
GRADE BEAM 4	2' - 9"	2' - 9"	(8)-#8 BARS	(6)-#8 BARS	#4@12" O.C.
GRADE BEAM 5	3' - 0"	3' - 6"	(10)-#8 BARS	(18)-#8 BARS	#4@12" O.C.

CONCRETE PILASTER SCHEDULE

MARK	LENGTH	WIDTH	VERT. REINF.	TIE REINF.
P1	2' - 0"	2' - 0"	(15)-#6 BARS	#4@12" O.C.
P2	1' - 9"	2' - 10"	(18)-#6 BARS	#4@12" O.C.
P3	3' - 2"	3' - 2"	(34)-#6 BARS	#4@12" O.C.
P4	2' - 4"	4' - 4"	(34)-#6 BARS	#4@12" O.C.
P5	3' - 9"	2' - 11"	(36)-#6 BARS	#4@12" O.C.

FOUNDATION PLAN ZONE B 1
1/8" = 1'-0"

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
EARLY SITE PACKAGE
MAY 10, 2019

REVISIONS

No.	Date	Description
1	5/17/2019	100% DD
3	6/07/2019	ESP Adden. 2
4	8/09/2019	ECSP
5	8/27/2019	Addend. 4

DRAWING NAME
FOUNDATION PLAN-B

PROJECT NO. Project Number

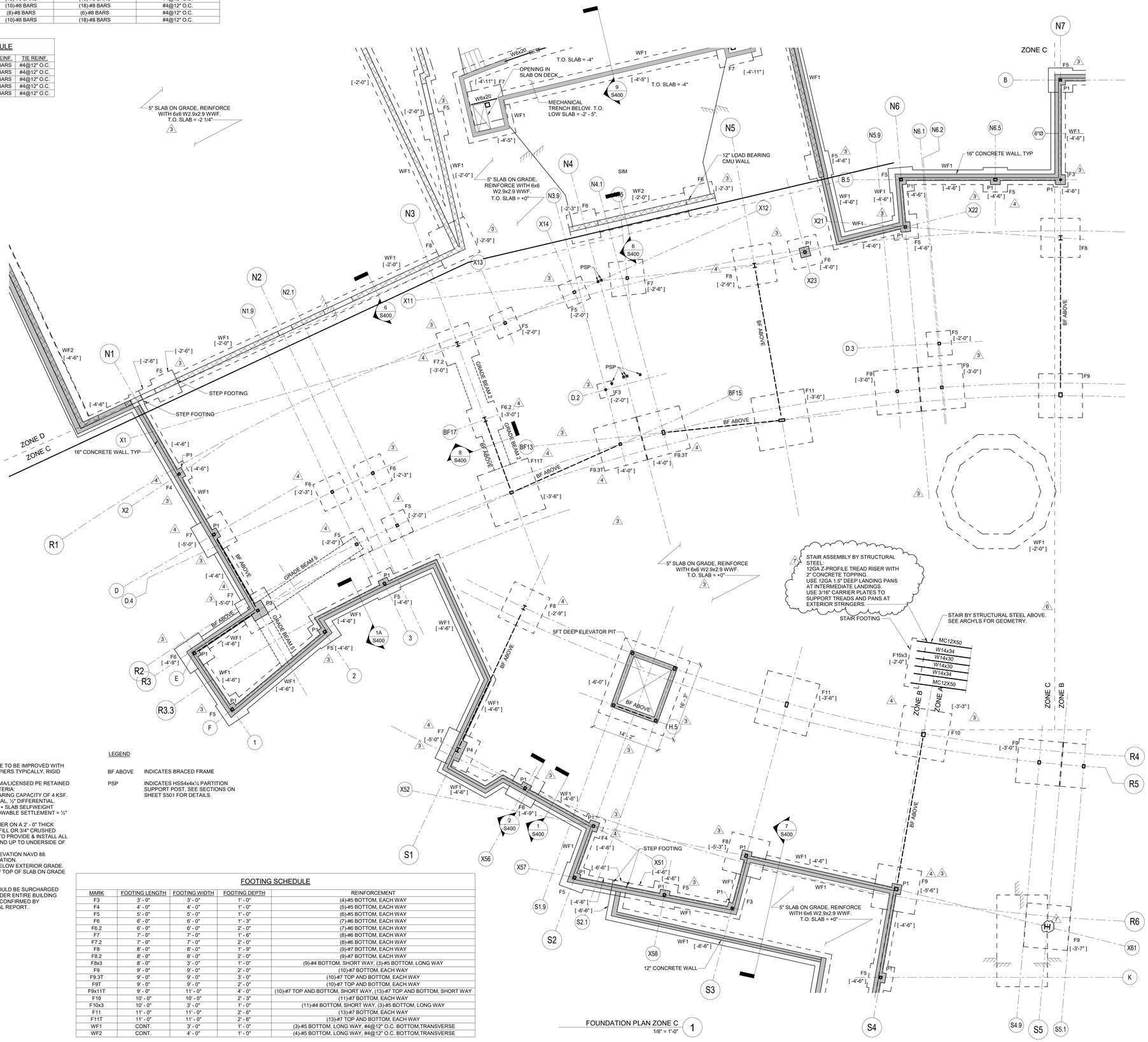
DRAWING NO.
S101B

CONCRETE STRAP GRADE BEAM SCHEDULE

MARK	BEAM WIDTH	BEAM DEPTH	TOP REINFORCEMENT	BOTTOM REINFORCEMENT	TRANSVERSE
GRADE BEAM 1	4' - 6"	2' - 0"	(8)-#8 BARS	(18)-#8 BARS	#4@12" O.C.
GRADE BEAM 2	3' - 6"	2' - 0"	(12)-#8 BARS	(18)-#8 BARS	#4@12" O.C.
GRADE BEAM 3	3' - 3"	3' - 9"	(10)-#8 BARS	(18)-#8 BARS	#4@12" O.C.
GRADE BEAM 4	2' - 9"	2' - 9"	(8)-#8 BARS	(6)-#8 BARS	#4@12" O.C.
GRADE BEAM 5	3' - 0"	3' - 6"	(10)-#8 BARS	(18)-#8 BARS	#4@12" O.C.

CONCRETE PILASTER SCHEDULE

MARK	LENGTH	WIDTH	VERT. REINF.	TIE REINF.
P1	2' - 0"	2' - 0"	(15)-#6 BARS	#4@12" O.C.
P2	1' - 9"	2' - 10"	(18)-#6 BARS	#4@12" O.C.
P3	3' - 2"	3' - 2"	(34)-#6 BARS	#4@12" O.C.
P4	2' - 4"	4' - 4"	(34)-#6 BARS	#4@12" O.C.
P5	3' - 9"	2' - 11"	(36)-#6 BARS	#4@12" O.C.



NOTES:

1. GROUND UNDER FOOTINGS AND SLAB ON GRADE TO BE IMPROVED WITH GROUND IMPROVEMENT (ASSUME AGGREGATE PIERS TYPICALLY, RIGID INCLUSIONS UNDER GYM AND AUDITORIUM).
2. GROUND IMPROVEMENT TO BE DESIGNED BY A MA/LICENSED PE RETAINED BY THE CONTRACTOR FOR THE FOLLOWING CRITERIA:
   A. UNDER SPREAD FOOTINGS: ALLOWABLE BEARING CAPACITY OF 4 KSF. MAXIMUM ALLOWABLE SETTLEMENT = 1" TOTAL, ½" DIFFERENTIAL.
   B. UNDER SLAB ON GRADE: 100 PSF LIVE LOAD + SLAB SELFWEIGHT UNDER THE SLAB ON GRADE. MAXIMUM ALLOWABLE SETTLEMENT = ½" TOTAL, ¼" DIFFERENTIAL.
3. SLAB ON GRADE TO BE CAST ON A VAPOR BARRIER ON A 2' - 0" THICK MAXIMUM LAYER OF COMPACTED STRUCTURAL FILL OR 3/4" CRUSHED STONE. GROUND IMPROVEMENT CONTRACTOR TO PROVIDE & INSTALL ALL MATERIAL UP TO BOTTOM OF SLAB ELEVATION AND UP TO UNDERSIDE OF FOOTING ELEVATION
4. PROJECT ELEVATION = 0' - 0" = 165.5' SURVEY ELEVATION NAVD 88.
5. [X' - XX"] - INDICATES BOTTOM OF FOOTING ELEVATION.
6. BOTTOM OF EXTERIOR FOOTINGS TO BE 4 '- 0" BELOW EXTERIOR GRADE.
7. TOP OF STRAP GRADE BEAMS TO BE 1FT BELOW TOP OF SLAB ON GRADE

GEOTECHNICAL NOTES:

1. DUE TO THE PRESENCE OF ORGANICS, SITE SHOULD BE SURCHARGED PRIOR TO INSTALLING GROUND IMPROVEMENT UNDER ENTIRE BUILDING AREA FOR A DURATION OF 2 TO 3 MONTHS (TO BE CONFIRMED BY SETTLEMENT READINGS) REFER TO GEOTECHNICAL REPORT.

LEGEND

BF ABOVE — INDICATES BRACED FRAME

PSP — INDICATES HSS4x4x¼ PARTITION SUPPORT POST, SEE SECTIONS ON SHEET S501 FOR DETAILS.

FOOTING SCHEDULE

MARK	FOOTING LENGTH	FOOTING WIDTH	FOOTING DEPTH	REINFORCEMENT
F3	3' - 0"	3' - 0"	1' - 0"	(4)-#5 BOTTOM, EACH WAY
F4	4' - 0"	4' - 0"	1' - 0"	(5)-#5 BOTTOM, EACH WAY
F5	5' - 0"	5' - 0"	1' - 0"	(6)-#5 BOTTOM, EACH WAY
F6	6' - 0"	6' - 0"	1' - 3"	(7)-#6 BOTTOM, EACH WAY
F6.2	6' - 0"	6' - 0"	2' - 0"	(7)-#6 BOTTOM, EACH WAY
F7	7' - 0"	7' - 0"	1' - 6"	(8)-#6 BOTTOM, EACH WAY
F7.2	7' - 0"	7' - 0"	2' - 0"	(8)-#6 BOTTOM, EACH WAY
F8	8' - 0"	8' - 0"	1' - 9"	(9)-#7 BOTTOM, EACH WAY
F8.2	8' - 0"	8' - 0"	2' - 0"	(9)-#7 BOTTOM, EACH WAY
F8x3	8' - 0"	3' - 0"	1' - 0"	(9)-#4 BOTTOM, SHORT WAY, (3)-#5 BOTTOM, LONG WAY
F9	9' - 0"	9' - 0"	2' - 0"	(10)-#7 BOTTOM, EACH WAY
F9.3T	9' - 0"	9' - 0"	3' - 0"	(10)-#7 TOP AND BOTTOM, EACH WAY
F9T	9' - 0"	9' - 0"	2' - 0"	(10)-#7 TOP AND BOTTOM, EACH WAY
F9x11T	9' - 0"	11' - 0"	4' - 0"	(10)-#7 TOP AND BOTTOM, SHORT WAY, (13)-#7 TOP AND BOTTOM, SHORT WAY
F10	10' - 0"	10' - 0"	2' - 3"	(11)-#7 BOTTOM, EACH WAY
F10x3	10' - 0"	3' - 0"	1' - 0"	(11)-#4 BOTTOM, SHORT WAY, (3)-#5 BOTTOM, LONG WAY
F11	11' - 0"	11' - 0"	2' - 6"	(13)-#7 BOTTOM, EACH WAY
F11T	11' - 0"	11' - 0"	2' - 6"	(13)-#7 TOP AND BOTTOM, EACH WAY
WF1	CONT.	3' - 0"	1' - 0"	(3)-#5 BOTTOM, LONG WAY, #4@12" O.C. BOTTOM,TRANSVERSE
WF2	CONT.	4' - 0"	1' - 0"	(4)-#5 BOTTOM, LONG WAY, #4@12" O.C. BOTTOM,TRANSVERSE

FOUNDATION PLAN ZONE C 1
1/8" = 1'-0"

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY SITE PACKAGE
MAY 10, 2019

REVISIONS

No.	Date	Description
1	5/17/2019	100% DD
3	6/07/2019	ESP Adden. 2
4	8/09/2019	ECSP
6	9/09/2019	PR 12
7	9/12/2019	PR 12 REV1

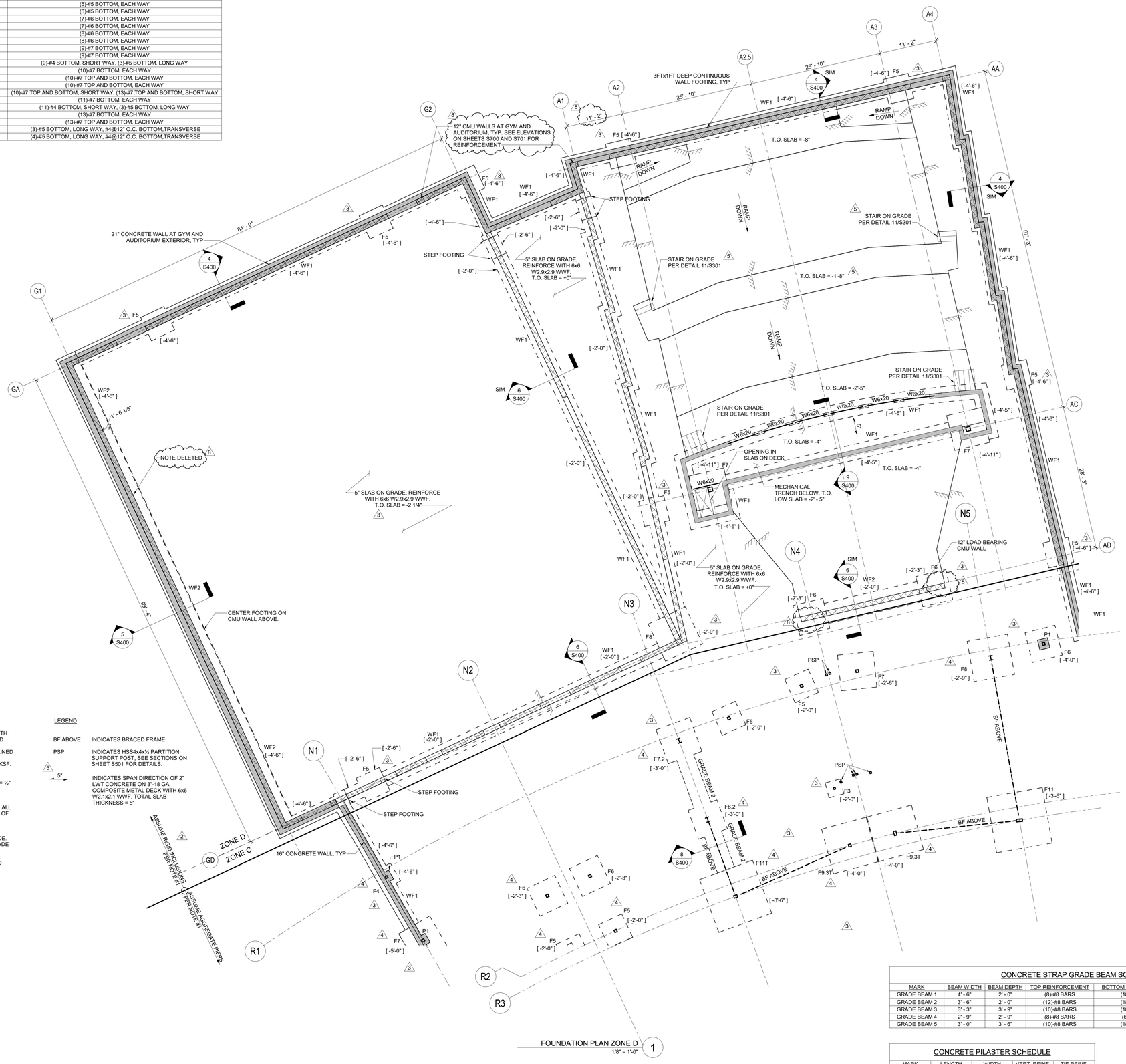
DRAWING NAME
FOUNDATION PLAN-C

PROJECT NO. Project Number

DRAWING NO.
S101C

FOOTING SCHEDULE

MARK	FOOTING LENGTH	FOOTING WIDTH	FOOTING DEPTH	REINFORCEMENT
F3	3' - 0"	3' - 0"	1' - 0"	(4)-#5 BOTTOM, EACH WAY
F4	4' - 0"	4' - 0"	1' - 0"	(5)-#5 BOTTOM, EACH WAY
F5	5' - 0"	5' - 0"	1' - 0"	(6)-#5 BOTTOM, EACH WAY
F6	6' - 0"	6' - 0"	1' - 3"	(7)-#6 BOTTOM, EACH WAY
F6.2	6' - 0"	6' - 0"	2' - 0"	(7)-#6 BOTTOM, EACH WAY
F7	7' - 0"	7' - 0"	1' - 6"	(8)-#6 BOTTOM, EACH WAY
F7.2	7' - 0"	7' - 0"	2' - 0"	(8)-#6 BOTTOM, EACH WAY
F8	8' - 0"	8' - 0"	1' - 9"	(9)-#7 BOTTOM, EACH WAY
F8.2	8' - 0"	8' - 0"	2' - 0"	(9)-#7 BOTTOM, EACH WAY
F8x3	8' - 0"	3' - 0"	1' - 0"	(9)-#4 BOTTOM, SHORT WAY, (3)-#5 BOTTOM, LONG WAY
F9	9' - 0"	9' - 0"	2' - 0"	(10)-#7 BOTTOM, EACH WAY
F9.3T	9' - 0"	9' - 0"	3' - 0"	(10)-#7 TOP AND BOTTOM, EACH WAY
F9T	9' - 0"	9' - 0"	2' - 0"	(10)-#7 TOP AND BOTTOM, EACH WAY
F9x11T	9' - 0"	11' - 0"	4' - 0"	(10)-#7 TOP AND BOTTOM, SHORT WAY, (13)-#7 TOP AND BOTTOM, SHORT WAY
F10	10' - 0"	10' - 0"	2' - 3"	(11)-#7 BOTTOM, EACH WAY
F10x3	10' - 0"	3' - 0"	1' - 0"	(11)-#4 BOTTOM, SHORT WAY, (3)-#5 BOTTOM, LONG WAY
F11	11' - 0"	11' - 0"	2' - 6"	(13)-#7 BOTTOM, EACH WAY
F11T	11' - 0"	11' - 0"	2' - 6"	(13)-#7 TOP AND BOTTOM, EACH WAY
WF1	CONT.	3' - 0"	1' - 0"	(3)-#5 BOTTOM, LONG WAY, #4@12" O.C. BOTTOM,TRANSVERSE
WF2	CONT.	4' - 0"	1' - 0"	(4)-#5 BOTTOM, LONG WAY, #4@12" O.C. BOTTOM,TRANSVERSE



FOUNDATION PLAN ZONE D
1/8" = 1'-0"

NOTES:

1. GROUND UNDER FOOTINGS AND SLAB ON GRADE TO BE IMPROVED WITH GROUND IMPROVEMENT (ASSUME AGGREGATE PIERS TYPICALLY, RIGID INCLUSIONS UNDER GYM AND AUDITORIUM).
2. GROUND IMPROVEMENT TO BE DESIGNED BY A MA/LICENSED PE RETAINED BY THE CONTRACTOR FOR THE FOLLOWING CRITERIA:
   A. UNDER SPREAD FOOTINGS: ALLOWABLE BEARING CAPACITY OF 4 KSF. MAXIMUM ALLOWABLE SETTLEMENT = 1" TOTAL, ½" DIFFERENTIAL.
   B. UNDER SLAB ON GRADE: 100 PSF LIVE LOAD + SLAB SELFWEIGHT UNDER THE SLAB ON GRADE. MAXIMUM ALLOWABLE SETTLEMENT = ½" TOTAL, ¼" DIFFERENTIAL.
3. SLAB ON GRADE TO BE CAST ON A VAPOR BARRIER ON A 2' - 0" THICK MAXIMUM LAYER OF COMPACTED STRUCTURAL FILL OR 3/4" CRUSHED STONE. GROUND IMPROVEMENT CONTRACTOR TO PROVIDE & INSTALL ALL MATERIAL UP TO BOTTOM OF SLAB ELEVATION AND UP TO UNDERSIDE OF FOOTING ELEVATION
4. PROJECT ELEVATION = 0' - 0" = 165.5' SURVEY ELEVATION NAVD 88.
5. [X' - XX"] - INDICATES BOTTOM OF FOOTING ELEVATION.
6. BOTTOM OF EXTERIOR FOOTINGS TO BE 4 '- 0" BELOW EXTERIOR GRADE.
7. TOP OF STRAP GRADE BEAMS TO BE 1FT BELOW TOP OF SLAB ON GRADE

GEOTECHNICAL NOTES:

1. DUE TO THE PRESENCE OF ORGANICS, SITE SHOULD BE SURCHARGED PRIOR TO INSTALLING GROUND IMPROVEMENT UNDER ENTIRE BUILDING AREA FOR A DURATION OF 2 TO 3 MONTHS (TO BE CONFIRMED BY SETTLEMENT READINGS) REFER TO GEOTECHNICAL REPORT.

LEGEND

BF ABOVE	INDICATES BRACED FRAME
PSP	INDICATES HSS4x4x¼ PARTITION SUPPORT POST, SEE SECTIONS ON SHEET S501 FOR DETAILS.
5"	INDICATES SPAN DIRECTION OF 2" LWT CONCRETE ON 3"-18 GA COMPOSITE METAL DECK WITH 6x6 W2.1x2.1 WWF. TOTAL SLAB THICKNESS = 5"

CONCRETE STRAP GRADE BEAM SCHEDULE

MARK	BEAM WIDTH	BEAM DEPTH	TOP REINFORCEMENT	BOTTOM REINFORCEMENT	TRANSVERSE
GRADE BEAM 1	4' - 6"	2' - 0"	(8)-#8 BARS	(18)-#8 BARS	#4@12" O.C.
GRADE BEAM 2	3' - 6"	2' - 0"	(12)-#8 BARS	(18)-#8 BARS	#4@12" O.C.
GRADE BEAM 3	3' - 3"	3' - 9"	(10)-#8 BARS	(18)-#8 BARS	#4@12" O.C.
GRADE BEAM 4	2' - 9"	2' - 9"	(8)-#8 BARS	(6)-#8 BARS	#4@12" O.C.
GRADE BEAM 5	3' - 0"	3' - 6"	(10)-#8 BARS	(18)-#8 BARS	#4@12" O.C.

CONCRETE PILASTER SCHEDULE

MARK	LENGTH	WIDTH	VERT. REINF.	TIE REINF.
P1	2' - 0"	2' - 0"	(15)-#6 BARS	#4@12" O.C.
P2	1' - 9"	2' - 10"	(18)-#6 BARS	#4@12" O.C.
P3	3' - 2"	3' - 2"	(34)-#6 BARS	#4@12" O.C.
P4	2' - 4"	4' - 4"	(34)-#6 BARS	#4@12" O.C.
P5	3' - 9"	2' - 11"	(36)-#6 BARS	#4@12" O.C.

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY SITE PACKAGE
MAY 10, 2019

REVISIONS

No.	Date	Description
1	5/17/2019	100% DD
2	5/20/2019	ESP Adden. 1
3	6/07/2019	ESP Adden. 2
4	8/09/2019	ECSP
5	8/27/2019	Addend. 4
8	10/18/2019	EMP

DRAWING NAME
FOUNDATION PLAN-D

PROJECT NO. Project Number

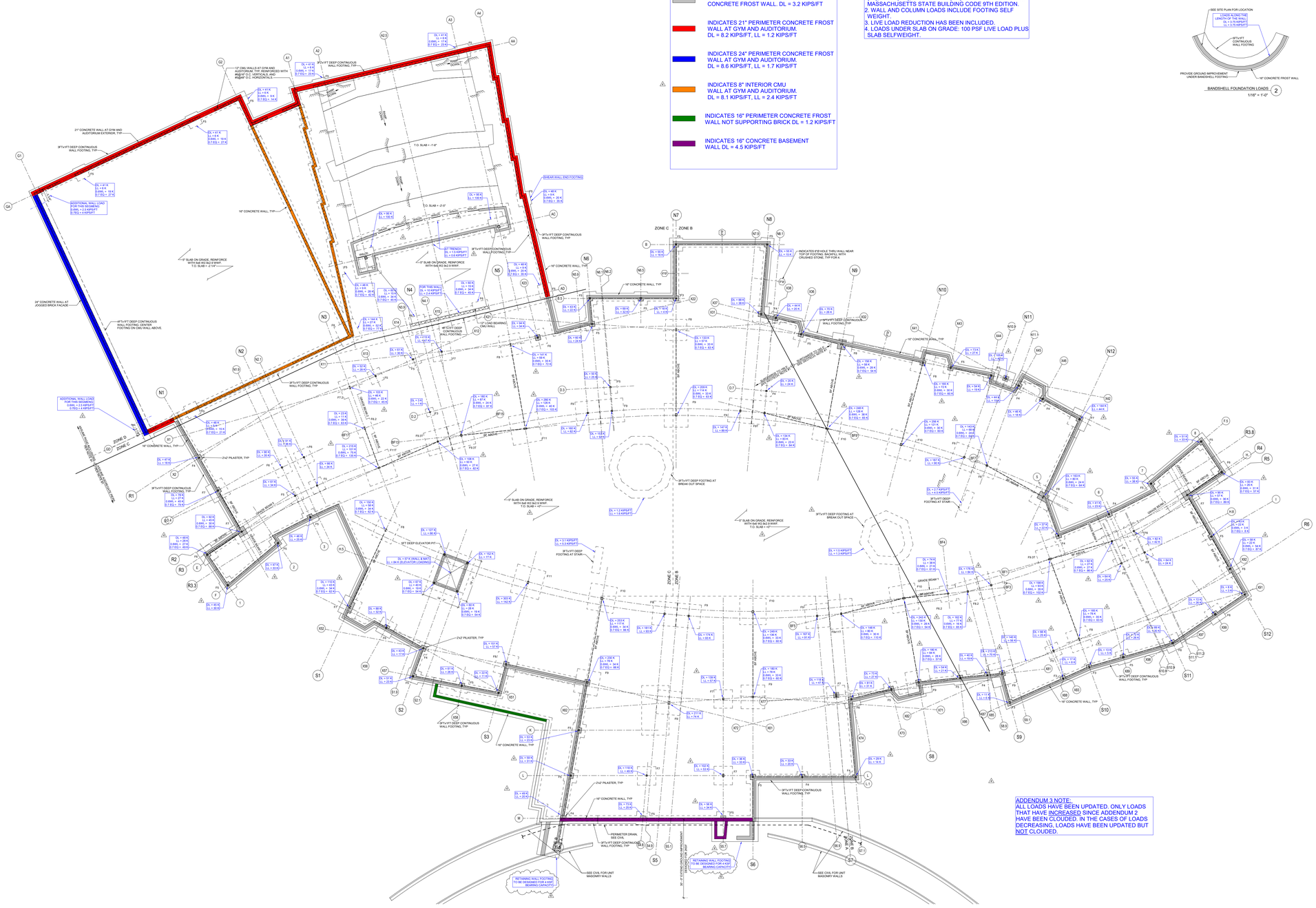
DRAWING NO.
S101D

LEGEND:

- INDICATES 16" TYPICAL PERIMETER CONCRETE FROST WALL. DL = 3.2 KIPS/FT
- INDICATES 21" PERIMETER CONCRETE FROST WALL AT GYM AND AUDITORIUM. DL = 8.2 KIPS/FT, LL = 1.2 KIPS/FT
- INDICATES 24" PERIMETER CONCRETE FROST WALL AT GYM AND AUDITORIUM. DL = 8.6 KIPS/FT, LL = 1.7 KIPS/FT
- INDICATES 8" INTERIOR CMU WALL AT GYM AND AUDITORIUM. DL = 8.1 KIPS/FT, LL = 2.4 KIPS/FT
- INDICATES 16" PERIMETER CONCRETE FROST WALL NOT SUPPORTING BRICK DL = 1.2 KIPS/FT
- INDICATES 16" CONCRETE BASEMENT WALL DL = 4.5 KIPS/FT

NOTES:

1. LOADS PROVIDED ARE SERVICE LEVEL DEAD (DL), LIVE (LL), WIND (WL), AND SEISMIC (EQ) LOADS BASED ON THE MASSACHUSETTS STATE BUILDING CODE 9TH EDITION.
2. WALL AND COLUMN LOADS INCLUDE FOOTING SELF WEIGHT.
3. LIVE LOAD REDUCTION HAS BEEN INCLUDED.
4. LOADS UNDER SLAB ON GRADE: 100 PSF LIVE LOAD PLUS SLAB SELFWEIGHT.



BANDSHELL FOUNDATION LOADS 2
1/16" = 1'-0"

ADDENDUM 3 NOTE:
ALL LOADS HAVE BEEN UPDATED. ONLY LOADS THAT HAVE INCREASED SINCE ADDENDUM 2 HAVE BEEN CLOUDED. IN THE CASES OF LOADS DECREASING, LOADS HAVE BEEN UPDATED BUT NOT CLOUDED.

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FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY SITE PACKAGE
MAY 10, 2019

REVISIONS

No.	Date	Description
3	6/07/2019	ESP Adden. 2
4	8/09/2019	ECSP
5	8/27/2019	Addend. 4
6	9/09/2019	PR 12

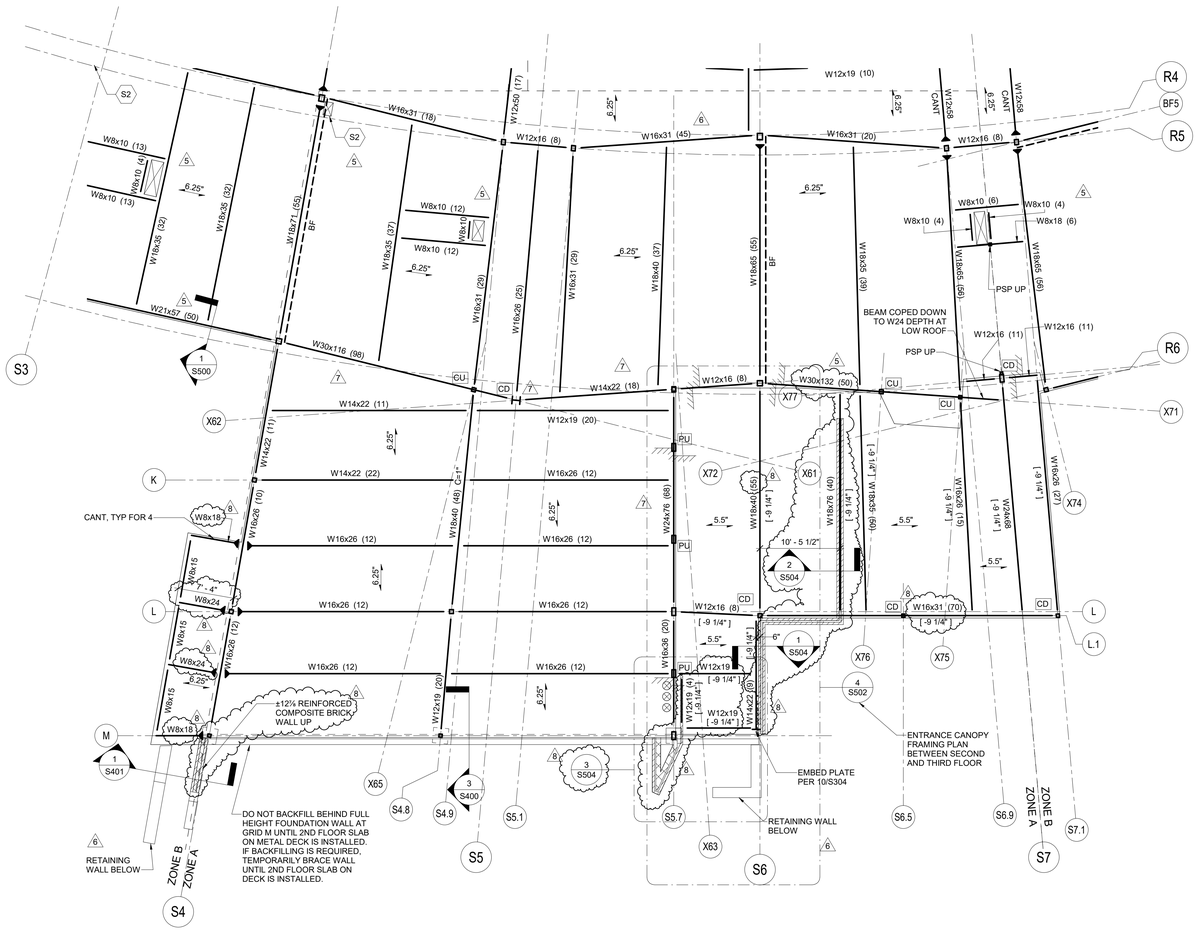
DRAWING NAME

FOUNDATION LOADS FOR GROUND IMPROVEMENT

PROJECT NO. Project Number

DRAWING NO. 3

S101L



FLOOR 2 FRAMING PLAN ZONE A 1
1/8" = 1'-0"

NOTES:

1. T.O. SLAB = 14'-0", UNO
2. T.O. STEEL =13'-5¾" , UNO IN PLAN THUS [+/-X"]
3. SEE ARCH'L DRAWINGS FOR EDGE OF SLAB GEOMETRY

LEGEND

6.25	INDICATES SPAN DIRECTION OF 3¼" LWT CONCRETE ON 3"-18 GA COMPOSITE METAL DECK WITH 6x6 W2.1x2.1 WWF. TOTAL SLAB THICKNESS = 6¼"
5.5	INDICATES SPAN DIRECTION OF 2½" LWT CONCRETE ON 3"-18 GA COMPOSITE METAL DECK WITH 6x6 W2.1x2.1 WWF. TOTAL SLAB THICKNESS = 5½"
R3	INDICATES SPAN DIRECTION OF 3" 18GA ROOF DECK
BF	INDICATES BRACED FRAME
CANT	INDICATES CANTILEVERED BEAM
	INDICATES MOMENT CONNECTION
	INDICATES STEEL BEAM
CU CD	INDICATES COLUMN UP OR COLUMN DOWN, RESPECTIVELY.
HU HD	INDICATES 1"x5" 50 KSI AESS PLATE HANGER UP OR HANGER DOWN, RESPECTIVELY. ORIENTATION OF PLATE IS INDICATED BY LINE IN CIRCLE.
BPx	INDICATES BEAM POCKET INTO CMU, SEE DETAIL 5/S303.
(#)	INDICATES NUMBER OF ¾"Ø x 4½" LONG HEADED SHEAR STUDS UNIFORMLY SPACED ON BEAM. UNLESS INDICATED, PROVIDE 1 STUD EVERY 1 FOOT AT BEAMS SUPPORTING SLAB ON METAL DECK.
PSP	INDICATES HSS4x4x¼ PARTITION SUPPORT POST, SEE SECTIONS ON SHEET S501 FOR DETAILS.
S2	INDICATES SLAB OPENING TO BE REINFORCED PER DETAIL 3/S304, OPTION 2.

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FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

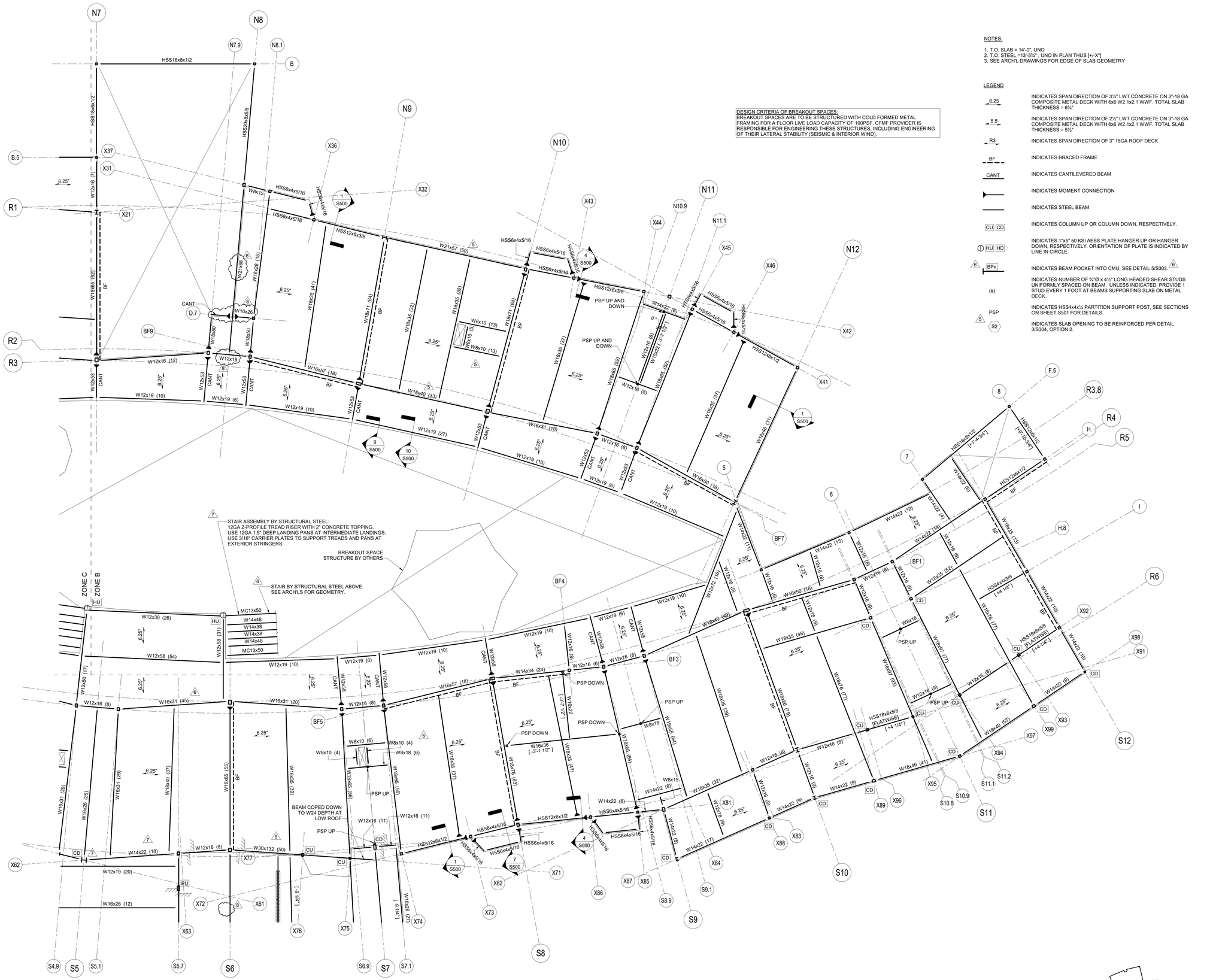
REVISIONS

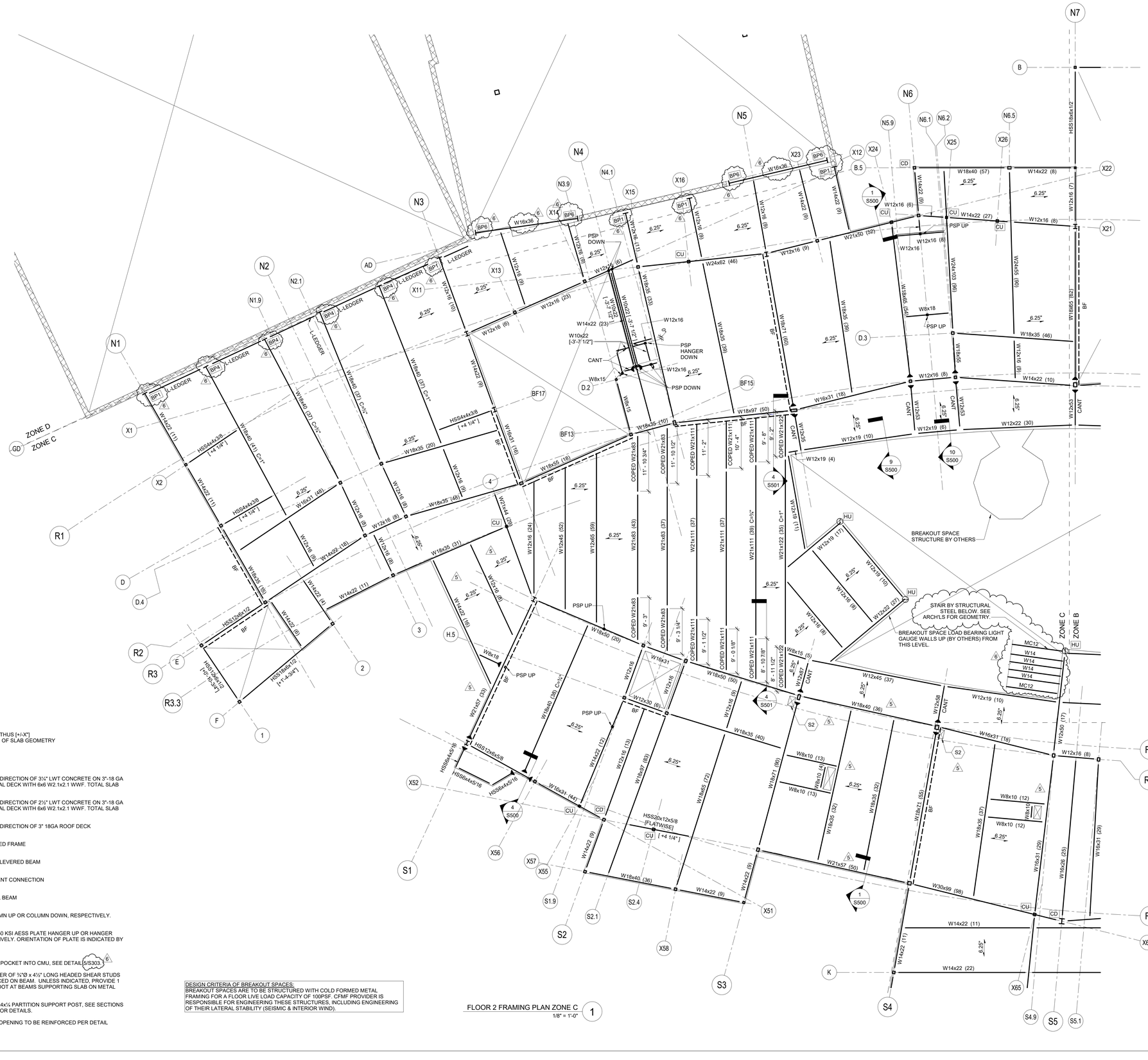
No.	Date	Description
5	8/27/2019	Addend. 4
6	9/09/2019	PR 12
7	9/12/2019	PR 12 REV1
8	10/18/2019	EMP

DRAWING NAME
FLOOR 2 FRAMING PLAN-A

PROJECT NO. Project Number

DRAWING NO.
S102A


N7
N8
N9
N10
N11
N12
N7.9
N8.1
N10.9
N11.1
B
B.5
R1
R2
R3
R4
R5
R6
H
H.8
I
F.5
R3.8
X37
X31
X21
X36
X32
X43
X44
X45
X46
X42
X41
X92
X98
X91
X93
X99
X97
X94
X95
X96
X89
X81
X88
X83
X84
X87
X85
X86
X82
X71
X73
X74
X75
X76
X77
X72
X61
X63
X62
X10
X10.8
X11
X11.1
X11.2
S12
S10
S10.8
S10.9
S9
S9.1
S8
S8.9
S7
S7.1
S6
S6.9
S5
S5.1
S5.7
S4.9
HSS16x8x1/2
HSS18x6x1/2"
HSS20x8x5/8
W12x16 (7)
W18x65 (82)
BF
CANT
D.7
BF9
BF7
BF1
BF4
BF3
BF5
W8x15
W21x68 (8)
W10x26 (15)
W16x26 (9)
W18x50
W18x59
W12x19
W12x16 (12)
W12x53
W12x19 (10)
W12x19 (6)
W16x57 (18)
W18x40 (33)
W18x35 (41)
W18x71 (64)
W18x35 (32)
W18x35 (37)
W8x10 (13)
W8x10 (5)
W16x31 (18)
W12x16 (8)
W16x30 (18)
W18x46 (31)
W18x65 (50)
W12x26 (8)
W10x22 (-3'-1 1/2")
W14x22 (8)
W18x35 (37)
W18x65 (52)
W18x65 (50)
W12x16 (11)
W16x36 (-3'-1 1/2")
W18x76 (63)
W18x65 (64)
W18x35 (39)
W18x65 (55)
W18x35 (32)
W18x76 (77)
W18x97 (69)
W18x46 (79)
W18x46 (41)
W18x46 (67)
W14x22 (18)
W30x132 (50)
W16x26 (12)
W16x31 (29)
W16x26 (25)
W16x31 (29)
W18x40 (37)
W12x30 (26)
W12x58 (31)
W12x58 (54)
W12x50 (17)
W16x31 (45)
W16x31 (20)
W14x22 (12)
W14x22 (4)
W14x22 (13)
W14x22 (11)
W14x22 (16)
W16x50 (16)
W18x40 (49)
W18x35 (48)
W18x76 (7)
W18x35 (13)
W14x22 (10)
W14x22 (9)
W14x22 (6)
W14x22 (17)
W18x35 (32)
W18x35 (27)
W18x35 (30)
W18x97 (60)
W18x76 (77)
W18x46 (41)
W18x46 (67)
W18x46 (79)
W16x57 (18)
W16x31 (20)
W16x31 (45)
W16x34 (24)
W16x57 (18)
W16x31 (18)
W16x30 (18)
W16x50 (16)
W16x60 (16


ZONE D
ZONE C
ZONE B
N1
N2
N3
N4
N5
N6
N7
BREAKOUT SPACE
STRUCTURE BY OTHERS
STAIR BY STRUCTURAL
STEEL BELOW. SEE
ARCH'LS FOR GEOMETRY
BREAKOUT SPACE LOAD BEARING LIGHT
GAUGE WALLS UP (BY OTHERS) FROM
THIS LEVEL.
PSP UP
PSP DOWN
PSP HANGER DOWN
CANT
L-LEDGER
HSS18x6x1/2"
W18x40 (57)
W14x22 (8)
W12x16 (7)
W24x62 (46)
W21x50 (52)
W18x35 (46)
W18x31 (18)
W18x97 (50)
W12x19 (10)
W12x22 (30)
W14x22 (11)
W14x22 (22)
W18x40 (36)
W21x57 (50)
W30x99 (98)
W12x45 (37)
W12x19 (4)
W12x19 (6)
W12x19 (11)
W12x19 (17)
W12x22 (27)
W12x16 (8)
W12x16 (6)
W24x103 (90)
W24x55 (90)
W18x65 (62)
W18x85 (54)
W18x55
W12x16 (9)
W12x22 (9)
W12x16 (11)
W12x16 (10)
W12x16 (23)
W12x16 (24)
W12x16 (25)
W12x16 (8)
W12x16 (6)
W12x16 (9)
W12x16 (13)
W12x16 (15)
W12x16 (16)
W12x16 (17)
W12x16 (18)
W12x16 (19)
W12x16 (20)
W12x16 (21)
W12x16 (22)
W12x16 (24)
W12x16 (26)
W12x16 (27)
W12x16 (28)
W12x16 (29)
W12x16 (30)
W12x16 (31)
W12x16 (32)
W12x16 (33)
W12x16 (34)
W12x16 (35)
W12x16 (36)
W12x16 (37)
W12x16 (38)
W12x16 (39)
W12x16 (40)
W12x16 (41)
W12x16 (42)
W12x16 (43)
W12x16 (44)
W12x16 (45)
W12x16

FLOOR 2 FRAMING PLAN ZONE D 1

1/8" = 1'-0"

NOTES:

1. T.O. SLAB = 14'-0", UNO
2. T.O. STEEL =13'-5⅝" , UNO IN PLAN THUS [+/-X"]
3. SEE ARCH'L DRAWINGS FOR EDGE OF SLAB GEOMETRY

LEGEND

6.25	INDICATES SPAN DIRECTION OF 3¼" LWT CONCRETE ON 3"-18 GA COMPOSITE METAL DECK WITH 6x6 W2.1x2.1 WWF. TOTAL SLAB THICKNESS = 6¼"
5.5	INDICATES SPAN DIRECTION OF 2½" LWT CONCRETE ON 3"-18 GA COMPOSITE METAL DECK WITH 6x6 W2.1x2.1 WWF. TOTAL SLAB THICKNESS = 5½"
R3	INDICATES SPAN DIRECTION OF 3" 18GA ROOF DECK
BF	INDICATES BRACED FRAME
CANT	INDICATES CANTILEVERED BEAM
	INDICATES MOMENT CONNECTION
	INDICATES STEEL BEAM
CU CD	INDICATES COLUMN UP OR COLUMN DOWN, RESPECTIVELY.
HU HD	INDICATES 1"x5" 50 KSI AESS PLATE HANGER UP OR HANGER DOWN, RESPECTIVELY. ORIENTATION OF PLATE IS INDICATED BY LINE IN CIRCLE.
6 BPx 6	INDICATES BEAM POCKET INTO CMU, SEE DETAIL 5/S303.
(#)	INDICATES NUMBER OF ¾"Ø x 4½" LONG HEADED SHEAR STUDS UNIFORMLY SPACED ON BEAM. UNLESS INDICATED, PROVIDE 1 STUD EVERY 1 FOOT AT BEAMS SUPPORTING SLAB ON METAL DECK.
5 PSP S2	INDICATES HSS4x4x¼ PARTITION SUPPORT POST, SEE SECTIONS ON SHEET S501 FOR DETAILS.
	INDICATES SLAB OPENING TO BE REINFORCED PER DETAIL 3/S304, OPTION 2.

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FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
6	9/09/2019	PR 12
8	10/18/2019	EMP

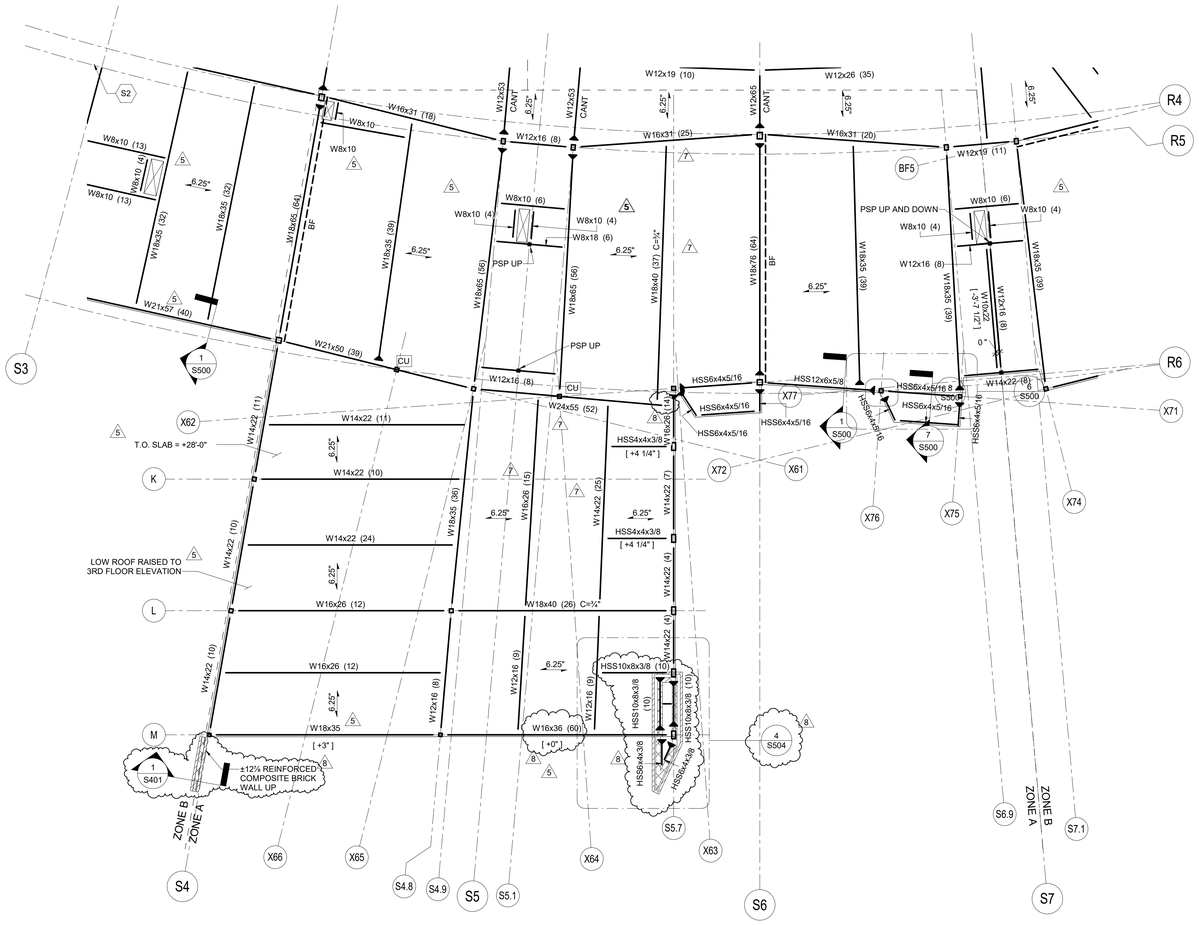
DRAWING NAME

FLOOR 2 FRAMING PLAN-D

PROJECT NO. Project Number

DRAWING NO.

S102D



FLOOR 3 FRAMING PLAN ZONE A (1)
1/8" = 1'-0"

NOTES:

1. T.O. SLAB = 28'-0", UNO
2. T.O. STEEL =27'-5¼" , UNO IN PLAN THUS [+/-X"]
3. SEE ARCH'L DRAWINGS FOR EDGE OF SLAB/DECK GEOMETRY

LEGEND

6.25	INDICATES SPAN DIRECTION OF 3¼" LWT CONCRETE ON 3"-18 GA COMPOSITE METAL DECK WITH 6x6 W2.1x2.1 WWF. TOTAL SLAB THICKNESS = 6¼"
R4.5A	INDICATES SPAN DIRECTION OF 4.5" 18GA DEEP LONG SPAN ROOF DECK.
R1.5A	INDICATES SPAN DIRECTION OF 1.5" 20GA ACOUSTIC ROOF DECK. CELLULAR DELETED.
R1.5	INDICATES SPAN DIRECTION OF 1.5" 20GA ROOF DECK
BF	INDICATES BRACED FRAME
CANT	INDICATES CANTILEVERED BEAM
	INDICATES MOMENT CONNECTION
	INDICATES STEEL BEAM
CU CD	INDICATES COLUMN UP OR COLUMN DOWN, RESPECTIVELY.
HU HD	INDICATES 1"x5" 50 KSI AESS PLATE HANGER UP OR HANGER DOWN, RESPECTIVELY. ORIENTATION OF PLATE IS INDICATED BY LINE IN CIRCLE.
BPx	INDICATES BEAM POCKET INTO CMU, SEE DETAIL 5/S303, 6
(#)	INDICATES NUMBER OF ¾"Ø x 4½" LONG HEADED SHEAR STUDS UNIFORMLY SPACED ON BEAM. UNLESS INDICATED, PROVIDE 1 STUD EVERY 1 FOOT AT BEAMS SUPPORTING SLAB ON METAL DECK.
PSP	INDICATES HSS4x4x¼ PARTITION SUPPORT POST, SEE SECTIONS ON SHEET S501 FOR DETAILS.
5 S2	INDICATES SLAB OPENING TO BE REINFORCED PER DETAIL 3/S304, OPTION 2.

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31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
6	9/09/2019	PR 12
7	9/12/2019	PR 12 REV1
8	10/18/2019	EMP

DRAWING NAME

FLOOR 3 FRAMING PLAN-A

PROJECT NO. Project Number

DRAWING NO.

S103A

DESIGN CRITERIA OF BREAKOUT SPACES:
BREAKOUT SPACES ARE TO BE STRUCTURED WITH COLD FORMED METAL FRAMING FOR A FLOOR LIVE LOAD CAPACITY OF 100PSF. CFMF PROVIDER IS RESPONSIBLE FOR ENGINEERING THESE STRUCTURES, INCLUDING ENGINEERING OF THEIR LATERAL STABILITY (SEISMIC & INTERIOR WIND).

NOTES:

1. T.O. SLAB = 28'-0", UNO
2. T.O. STEEL =27'-5¼" , UNO IN PLAN THUS [+/-X"]
3. SEE ARCH'L DRAWINGS FOR EDGE OF SLAB/DECK GEOMETRY

LEGEND

- 6.25 — INDICATES SPAN DIRECTION OF 3¼" LWT CONCRETE ON 3"-18 GA COMPOSITE METAL DECK WITH 6x6 W2.1x2.1 WWF. TOTAL SLAB THICKNESS = 6¼"
- R4.5A — INDICATES SPAN DIRECTION OF 4.5" 18GA DEEP LONG SPAN ROOF DECK.
- R1.5A — INDICATES SPAN DIRECTION OF 1.5" 20GA ACOUSTIC ROOF DECK. CELLULAR DELETED.
- R1.5 — INDICATES SPAN DIRECTION OF 1.5" 20GA ROOF DECK
- BF — INDICATES BRACED FRAME
- CANT — INDICATES CANTILEVERED BEAM
- INDICATES MOMENT CONNECTION
- INDICATES STEEL BEAM
- CU CD — INDICATES COLUMN UP OR COLUMN DOWN, RESPECTIVELY.
- HU HD — INDICATES 1"x5" 50 KSI AESS PLATE HANGER UP OR HANGER DOWN, RESPECTIVELY. ORIENTATION OF PLATE IS INDICATED BY LINE IN CIRCLE.
- BPx — INDICATES BEAM POCKET INTO CMU, SEE DETAIL 5/S303,
- (#) — INDICATES NUMBER OF ½"Ø x 4½" LONG HEADED SHEAR STUDS UNIFORMLY SPACED ON BEAM. UNLESS INDICATED, PROVIDE 1 STUD EVERY 1 FOOT AT BEAMS SUPPORTING SLAB ON METAL DECK.
- PSP — INDICATES HSS4x4x¼ PARTITION SUPPORT POST, SEE SECTIONS ON SHEET S501 FOR DETAILS.
- INDICATES SLAB OPENING TO BE REINFORCED PER DETAIL 3/S304, OPTION 2.

FLOOR 3 FRAMING PLAN ZONE B
1/8" = 1'-0"

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

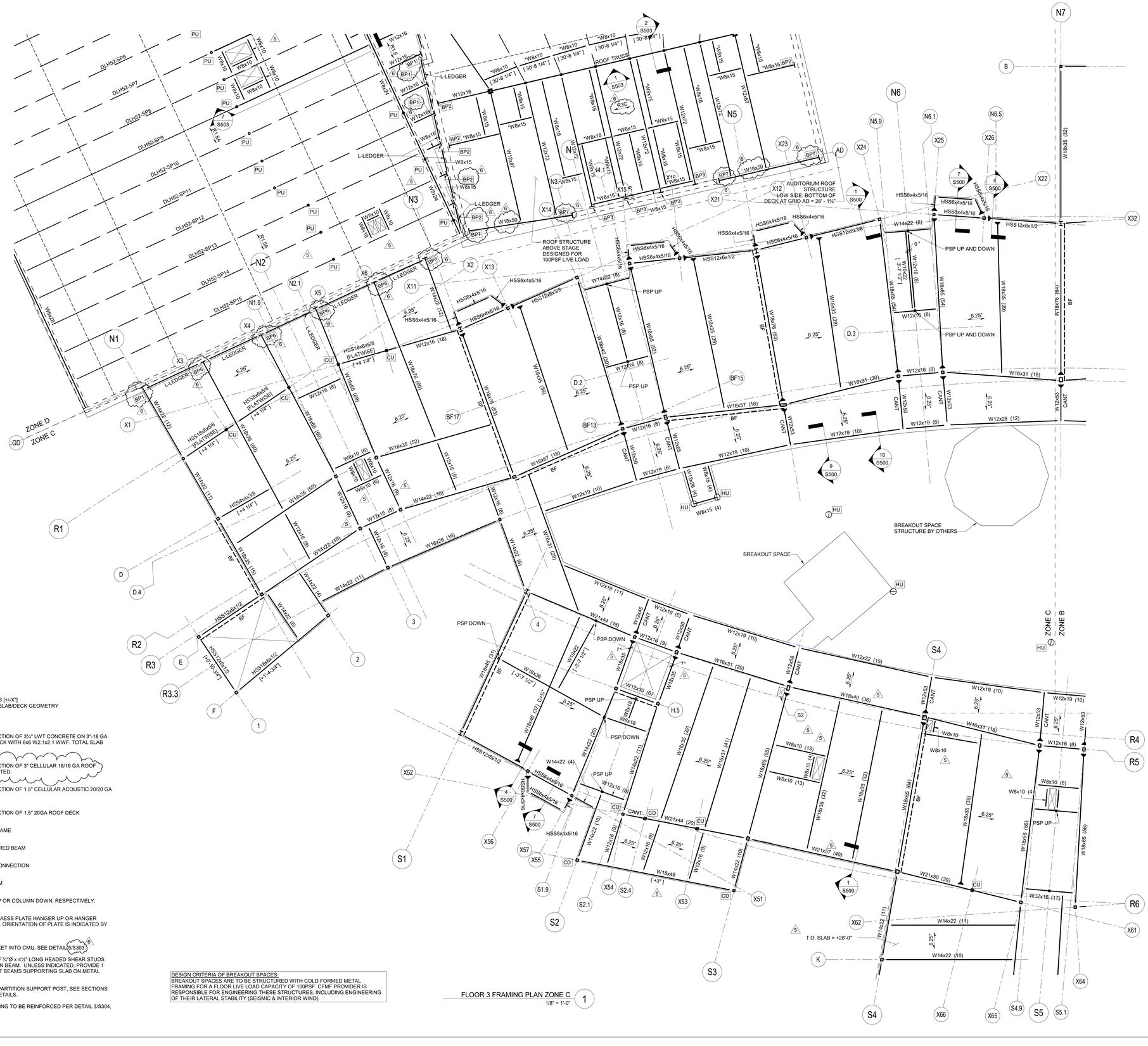
REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
6	9/09/2019	PR 12
7	9/12/2019	PR 12 REV1
8	10/18/2019	EMP

DRAWING NAME
FLOOR 3 FRAMING PLAN-B

PROJECT NO. Project Number

DRAWING NO.
S103B



NOTES:

1. T.O. SLAB = 28'-0", UNO
2. T.O. STEEL =27'-5¼" , UNO IN PLAN THUS [+/-X"]
3. SEE ARCH'L DRAWINGS FOR EDGE OF SLAB/DECK GEOMETRY

LEGEND

- 6.25 — INDICATES SPAN DIRECTION OF 3¼" LWT CONCRETE ON 3"-18 GA COMPOSITE METAL DECK WITH 6x6 W2.1x2.1 WWF. TOTAL SLAB THICKNESS = 6¼"
- 6 R3C — INDICATES SPAN DIRECTION OF 3" CELLULAR 18/16 GA ROOF DECK. ACOUSTIC DELETED.
- R1.5A — INDICATES SPAN DIRECTION OF 1.5" CELLULAR ACOUSTIC 20/20 GA ROOF DECK
- R1.5 — INDICATES SPAN DIRECTION OF 1.5" 20GA ROOF DECK
- BF — INDICATES BRACED FRAME
- CANT — INDICATES CANTILEVERED BEAM
- INDICATES MOMENT CONNECTION
- INDICATES STEEL BEAM
- CU CD — INDICATES COLUMN UP OR COLUMN DOWN, RESPECTIVELY.
- ⓘ HU HD — INDICATES 1"x6" 50 KSI AESS PLATE HANGER UP OR HANGER DOWN, RESPECTIVELY. ORIENTATION OF PLATE IS INDICATED BY LINE IN CIRCLE.
- 6 BPx — INDICATES BEAM POCKET INTO CMU, SEE DETAIL 6/S303
- (#) — INDICATES NUMBER OF ¾"Ø x 4½" LONG HEADED SHEAR STUDS UNIFORMLY SPACED ON BEAM. UNLESS INDICATED, PROVIDE 1 STUD EVERY 1 FOOT AT BEAMS SUPPORTING SLAB ON METAL DECK.
- PSP — INDICATES HSS4x4x¼ PARTITION SUPPORT POST, SEE SECTIONS ON SHEET S501 FOR DETAILS.
- 5 S2 — INDICATES SLAB OPENING TO BE REINFORCED PER DETAIL 3/S304, OPTION 2.

DESIGN CRITERIA OF BREAKOUT SPACES:
BREAKOUT SPACES ARE TO BE STRUCTURED WITH COLD FORMED METAL FRAMING FOR A FLOOR LIVE LOAD CAPACITY OF 100PSF. CFMF PROVIDER IS RESPONSIBLE FOR ENGINEERING THESE STRUCTURES, INCLUDING ENGINEERING OF THEIR LATERAL STABILITY (SEISMIC & INTERIOR WIND).

FLOOR 3 FRAMING PLAN ZONE C 1
1/8" = 1'-0"

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
6	9/09/2019	PR 12

DRAWING NAME
FLOOR 3 FRAMING PLAN-C

PROJECT NO. Project Number

DRAWING NO.
S103C

FLOOR 3 FRAMING PLAN ZONE D
1/8" = 1'-0"
NOTES:
1. T.O. SLAB = 28'-0", U.N.O.
2. T.O. STEEL =27'-5½", U.N.O. IN PLAN THUS [+/-X"]
3. SEE ARCH'L DRAWINGS FOR EDGE OF SLAB/DECK GEOMETRY
LEGEND
6.25 INDICATES SPAN DIRECTION OF 3½" LWT CONCRETE ON 3"-18 GA COMPOSITE METAL DECK WITH 6x6 W2.1x2.1 WWF. TOTAL SLAB THICKNESS = 6½"
R4.5A INDICATES SPAN DIRECTION OF 4.5" 18GA DEEP LONG SPAN ROOF DECK
R1.5A INDICATES SPAN DIRECTION OF 1.5" 20GA ACOUSTIC ROOF DECK
R1.5 INDICATES SPAN DIRECTION OF 1.5" 20GA ROOF DECK
BF INDICATES BRACED FRAME
CANT INDICATES CANTILEVERED BEAM
INDICATES MOMENT CONNECTION
INDICATES STEEL BEAM
CU CD INDICATES COLUMN UP OR COLUMN DOWN. RESPECTIVELY.
HU HD INDICATES 1"x5" 50 KSI AESS PLATE HANGER UP OR HANGER DOWN, RESPECTIVELY. ORIENTATION OF PLATE IS INDICATED BY LINE IN CIRCLE
BPx INDICATES BEAM POCKET INTO CMU. SEE DETAIL S/S303
INDICATES SUMMER OF ⅞"Ø x 4½" LONG HEADED SHEAR STUDS UNIFORMLY SPACED ON BEAM. UNLESS INDICATED. PROVIDE 1 STUD EVERY 1 FOOT AT BEAMS SUPPORTING SLAB ON METAL DECK
(#)
INDICATES HSS4x4x½ PARTITION SUPPORT POST. SEE SECTIONS ON SHEET S501 FOR DETAILS.
PSP INDICATES SLAB OPENING TO BE REINFORCED PER DETAIL 3/S304. OPTION 2.
W-XXX INDICATES DEDICATED THEATRE EQUIPMENT SUPPORT BEAM. COORDINATE LOCATION WITH TE-SERIES DRAWINGS.
BPJx INDICATES JOIST BEAM POCKET INTO CMU, SEE DETAIL 6/S303
N1 N2 N3 N4 N5
R1 R2 R3 R3.3
GD ZONE C ZONE D
GA G1 G2
AA AC AD
A1 A2 A2.5 A3 A4
W12x16 (8) W12x19 (10) W16x26 (26) W16x31 (31) W16x40 (40) W16x45 (45) W16x50 (50) W16x57 (57) W16x67 (67) W16x89 (89) W18x35 (35) W18x40 (40) W18x46 (46) W18x55 (55) W18x60 (60) W18x65 (65) W18x71 (71) W18x76 (76) W18x86 (86) W18x97 (97) W21x44 (44) W21x48 (48) W21x50 (50) W21x55 (55) W21x62 (62) W21x68 (68) W21x73 (73) W21x83 (83) W21x93 (93) W21x101 (101) W21x111 (111) W21x122 (122) W24x55 (55) W24x62 (62) W24x68 (68) W24x76 (76) W24x84 (84) W24x94 (94) W24x103 (103) W24x117 (117) W24x131 (131) W24x146 (146) W24x162 (162) W24x176 (176) W24x192 (192) W24x207 (207) W24x229 (229) W24x250 (250) W24x279 (279) W24x306 (306) W24x335 (335) W24x370 (370)
HSS4x4x¼ HSS4x4x5/16 HSS4x4x⅜ HSS4x4x½ HSS4x4x5/8 HSS5x5x¼ HSS5x5x5/16 HSS5x5x⅜ HSS5x5x½ HSS5x5x5/8 HSS6x4x¼ HSS6x4x5/16 HSS6x4x⅜ HSS6x4x½ HSS6x4x5/8 HSS6x6x¼ HSS6x6x5/16 HSS6x6x⅜ HSS6x6x½ HSS6x6x5/8 HSS7x5x¼ HSS7x5x5/16 HSS7x5x⅜ HSS7x5x½ HSS7x5x5/8 HSS8x4x¼ HSS8x4x5/16 HSS8x4x⅜ HSS8x4x½ HSS8x4x5/8 HSS8x6x¼ HSS8x6x5/16 HSS8x6x⅜ HSS8x6x½ HSS8x6x5/8 HSS10x4x¼ HSS10x4x5/16 HSS10x4x⅜ HSS10x4x½ HSS10x4x5/8 HSS10x6x¼ HSS10x6x5/16 HSS10x6x⅜ HSS10x6x½ HSS10x6x5/8 HSS12x4x¼ HSS12x4x5/16 HSS12x4x⅜ HSS12x4x½ HSS12x4x5/8 HSS12x6x¼ HSS12x6x5/16 HSS12x6x⅜ HSS12x6x½ HSS12x6x5/8
W8x10 W8x15 W8x18 W8x21 W8x24 W8x28 W8x31 W8x35 W8x40 W8x48 W8x58 W8x67 W10x12 W10x15 W10x17 W10x19 W10x22 W10x26 W10x30 W10x33 W10x39 W10x45 W10x49 W10x54 W10x60 W10x68 W10x77 W10x88 W10x100 W10x112 W12x14 W12x16 W12x19 W12x22 W12x26 W12x30 W12x35 W12x40 W12x45 W12x50 W12x53 W12x58 W12x65 W12x72 W12x79 W12x87 W12x96 W12x106 W12x120 W12x136 W12x152 W12x170 W12x190 W12x210 W12x230 W12x252 W12x279 W12x305 W12x336 W12x368 W12x397 W12x426 W12x454 W12x485 W12x504 W12x530 W12x550 W12x583 W12x624 W12x652 W12x696 W12x728 W12x768 W12x806 W12x841 W12x879 W12x926 W12x961 W12x1006 W12x1041 W12x1085 W12x1120 W12x1152 W12x1190 W12x1230 W12x1268 W12x1305 W12x1350 W12x1394 W12x1440 W12x1485 W12x1530 W14x22 W14x26 W14x30 W14x34 W14x38 W14x43 W14x48 W14x53 W14x61 W14x68 W14x74 W14x82 W14x90 W14x99 W14x109 W14x120 W14x132 W14x145 W14x159 W14x176 W14x193 W14x211 W14x233 W14x257 W14x283 W14x311 W14x342 W14x370 W14x398 W14x426 W14x455 W14x500 W14x550 W14x605 W14x665 W14x730 W14x808 W14x873 W14x932 W14x1000 W14x1082 W14x1176 W14x1269 W14x1370 W14x1478 W16x26 W16x31 W16x36 W16x40 W16x45 W16x50 W16x57 W16x67 W16x77 W16x89 W16x100 W16x26 W16x31 W16x36 W16x40 W16x45 W16x50 W16x57 W16x67 W16x77 W16x89 W16x100
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NOTES:

1. MAIN ROOF T.O. SLAB = 42'-0", UNO
2. MAIN ROOF T.O. STEEL =41'-6½" , UNO IN PLAN THUS [+/-X"]
3. POP-UP ROOF AT SKYLIGHTS T.O. STEEL & B.O. ROOF DECK = 47'-3", UNO
4. SEE ARCH'L DRAWINGS FOR EDGE OF SLAB/DECK GEOMETRY.
5. COORDINATE CONCRETE CURB LOCATIONS WITH MECH'L EQUIPMENT. SEE 9/S503

LEGEND

5.5	INDICATES SPAN DIRECTION OF 2½" LWT CONCRETE ON 3"-18 GA COMPOSITE METAL DECK WITH 6x6 W2.1x2.1 WWF. TOTAL SLAB THICKNESS = 5½"
R3	INDICATES SPAN DIRECTION OF 3" 18GA ROOF DECK
BF	INDICATES BRACED FRAME
CANT	INDICATES CANTILEVERED BEAM
	INDICATES MOMENT CONNECTION
	INDICATES STEEL BEAM
CU CD	INDICATES COLUMN UP OR COLUMN DOWN, RESPECTIVELY.
HU HD	INDICATES 1"x5" 50 KSI AESS PLATE HANGER UP OR HANGER DOWN, RESPECTIVELY. ORIENTATION OF PLATE IS INDICATED BY LINE IN CIRCLE.
(#)	INDICATES NUMBER OF ¾"Ø x 4½" LONG HEADED SHEAR STUDS UNIFORMLY SPACED ON BEAM. UNLESS INDICATED, PROVIDE 1 STUD EVERY 1 FOOT AT BEAMS SUPPORTING SLAB ON METAL DECK.
PSP	INDICATES HSS4x4x¼ PARTITION SUPPORT POST DOWN, SEE SECTIONS ON SHEET S501 FOR DETAILS.
S2	INDICATES SLAB OPENING TO BE REINFORCED PER DETAIL 3/S304, OPTION 2.

ROOF FRAMING PLAN ZONE B
1/8" = 1'-0"

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FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
7	9/12/2019	PR 12 REV1

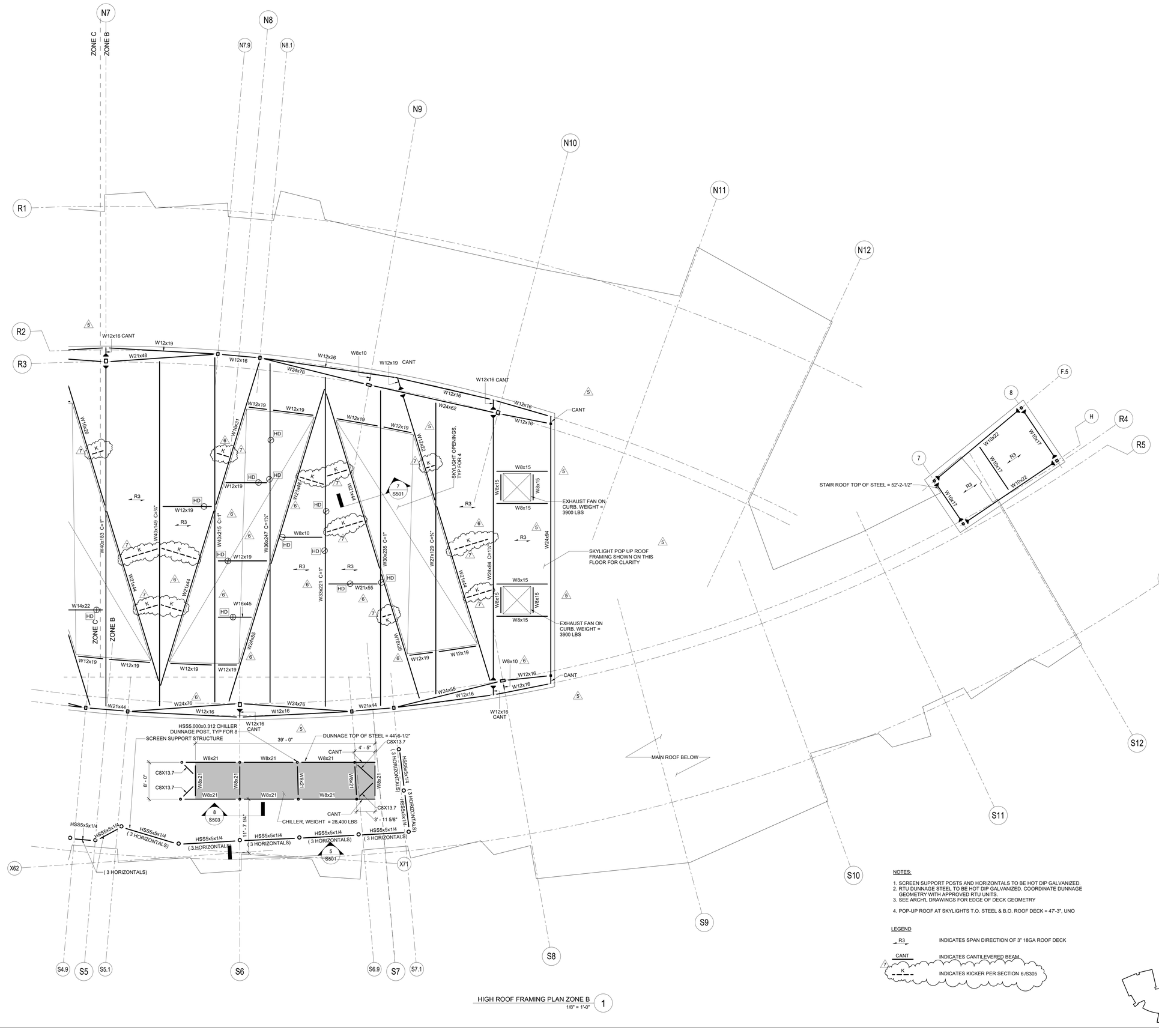
DRAWING NAME
ROOF FRAMING PLAN-B

PROJECT NO. Project Number

DRAWING NO.
S104B

ROOF FRAMING PLAN ZONE C
1/8" = 1'-0"
1
ZONE C
ZONE B
ZONE D
ZONE C
ZONE B
RTU 5 AND 6 WEIGHT = 30,000 LBS
RTU 7 WEIGHT = 7,900 LBS
RTU 7 AND 2 WEIGHT = 54,000 LBS
HSS5.000x0.312 RTU 5&6 DUNNAGE POST, TYP FOR 11
HSS5.000x0.312 RTU 7 DUNNAGE POST, TYP FOR 5
DUNNAGE TOP OF STEEL = 34'-0"
CANT
HSS4x4x5/16 POST FROM HIGH TO LOW
CONCRETE ROOF CURB
SKYLIGHT POP UP ROOF FRAMING NOW SHOWN ON HIGH ROOF PLAN FOR CLARITY
AREA DESIGNED FOR MECHANICAL EQUIPMENT
AREA DESIGNED FOR FUTURE PV ARRAYS, TYP FOR 4.
HSS7.625x0.375 ROUND SCREEN SUPPORT POST, TYP
W12x58
W8x21
W12x35
C8X13.7
W8x35
W18x35
W18x40
W18x60
W18x65
W24x76
W21x50
W16x26
W16x31
W14x22
W12x16
W12x19
W24x55
W2x455
HSS6x4x5/16
HSS12x6x5/16
HSS8x4x5/16
W10x22
W10x35
W10x45
W10x54
W10x60
W8x10
W12x26
W14x30
W14x26
W16x36
W16x40
W18x76
W18x71
W18x86
W24x62
W24x68
W24x84
W24x94
W24x103
W24x131
W24x146
W24x162
W24x176
W24x192
W24x207
W24x229
W24x250
W24x279
W24x306
W24x335
W24x370
W24x408
W24x450
W24x492
W24x535
W24x583
W24x629
W24x679
W24x720
W24x762
W24x807
W24x848
W24x897
W24x945
W24x992
W24x1041
W24x1088
W24x1139
W24x1192
W24x1249
W24x1304
W24x1355
W24x1409
W24x1461
W24x1512
W24x1566
W24x1618
W24x1671
W24x1724
W24x1777
W24x1830
W24x1883
W24x1936
W24x1989
W24x2042
W24x2095
W24x2148
W24x2201
W24x2254
W24x2307
W24x2360
W24x2413
W24x2466
W24x2519
W24x2572
W24x2625
W24x2678
W24x2731
W24x2784
W24x2837
W24x2890
W24x2943
W24x2996
W24x3049
W24x3102
W24x3155
W24x3208
W24x3261
W24x3314
W24x3367
W24x3420
W24x3473
W24x3526
W24x3579
W24x3632
W24x3685

A4
AA
A1
G2
G1
GA
ROOF BELOW
ROOF BELOW
CANT
CANT
C8X13.7
W8x21
3' - 6 3/4"
W12x30
W8x21
W8x21
18' - 6 1/8"
W8x21
W8x21
W8x21
W8x21
W12x58
W8x21
W8x21
W8x21
W8x21



NOTES:

1. SCREEN SUPPORT POSTS AND HORIZONTALS TO BE HOT DIP GALVANIZED.
2. RTU DUNNAGE STEEL TO BE HOT DIP GALVANIZED. COORDINATE DUNNAGE GEOMETRY WITH APPROVED RTU UNITS.
3. SEE ARCH'L DRAWINGS FOR EDGE OF DECK GEOMETRY

4. POP-UP ROOF AT SKYLIGHTS T.O. STEEL & B.O. ROOF DECK = 47'-3", UNO

LEGEND

R3 — INDICATES SPAN DIRECTION OF 3" 18GA ROOF DECK

CANT — INDICATES CANTILEVERED BEAM

7 K 6 — INDICATES KICKER PER SECTION 6/S305

HIGH ROOF FRAMING PLAN ZONE B 1
1/8" = 1'-0"

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FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
6	9/09/2019	PR 12
7	9/12/2019	PR 12 REV1

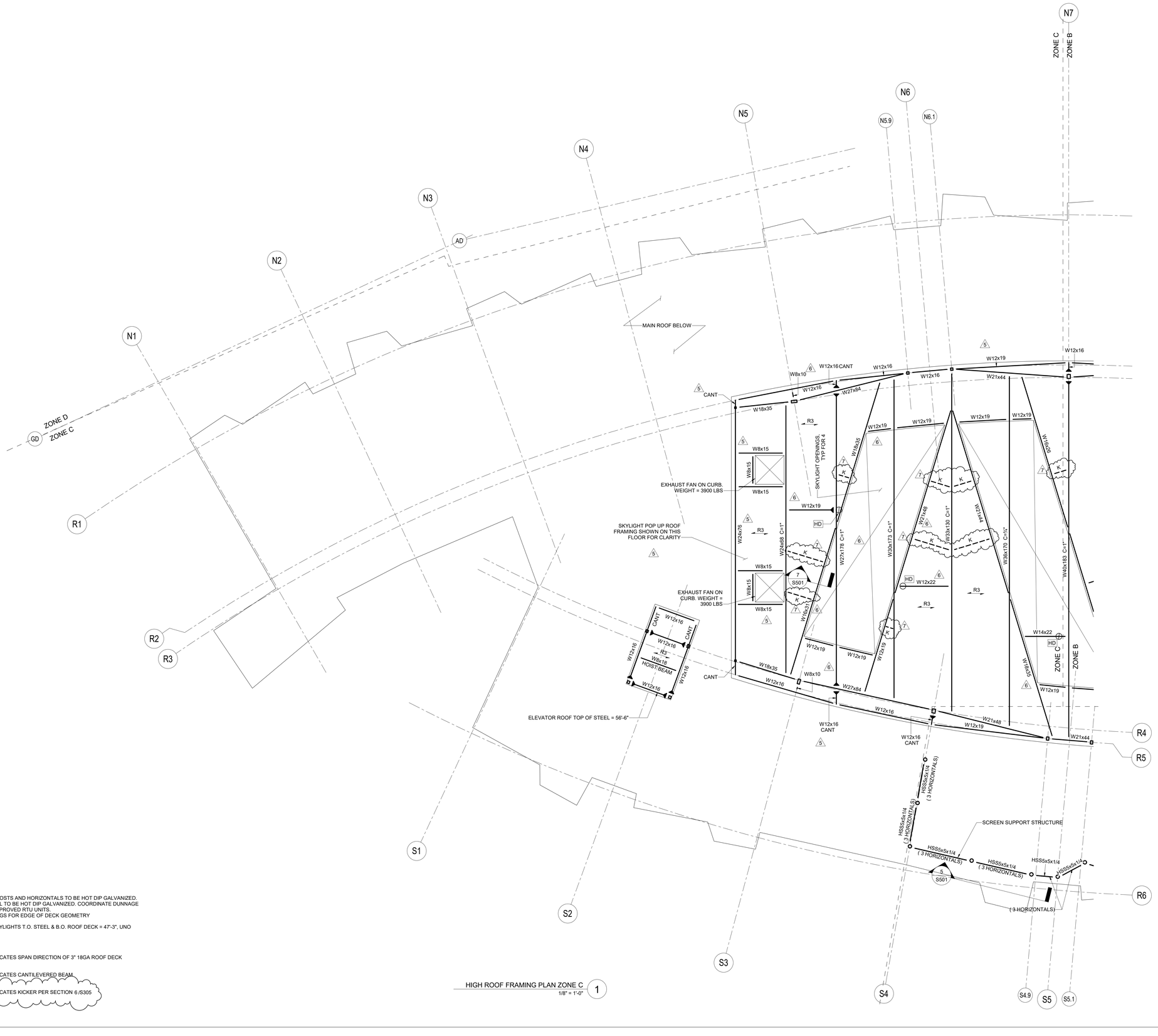
DRAWING NAME

HIGH ROOF FRAMING PLAN-B

PROJECT NO. Project Number

DRAWING NO.

S105B



HIGH ROOF FRAMING PLAN ZONE C 1
1/8" = 1'-0"

NOTES:

1. SCREEN SUPPORT POSTS AND HORIZONTALS TO BE HOT DIP GALVANIZED.
2. RTU DUNNAGE STEEL TO BE HOT DIP GALVANIZED. COORDINATE DUNNAGE GEOMETRY WITH APPROVED RTU UNITS.
3. SEE ARCH'L DRAWINGS FOR EDGE OF DECK GEOMETRY
4. POP-UP ROOF AT SKYLIGHTS T.O. STEEL & B.O. ROOF DECK = 47'-3", UNO

LEGEND

R3 — INDICATES SPAN DIRECTION OF 3" 18GA ROOF DECK

CANT — INDICATES CANTILEVERED BEAM

7 / K — INDICATES KICKER PER SECTION 6 /S305

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FULLER SCHOOL

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PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
6	9/09/2019	PR 12
7	9/12/2019	PR 12 REV1

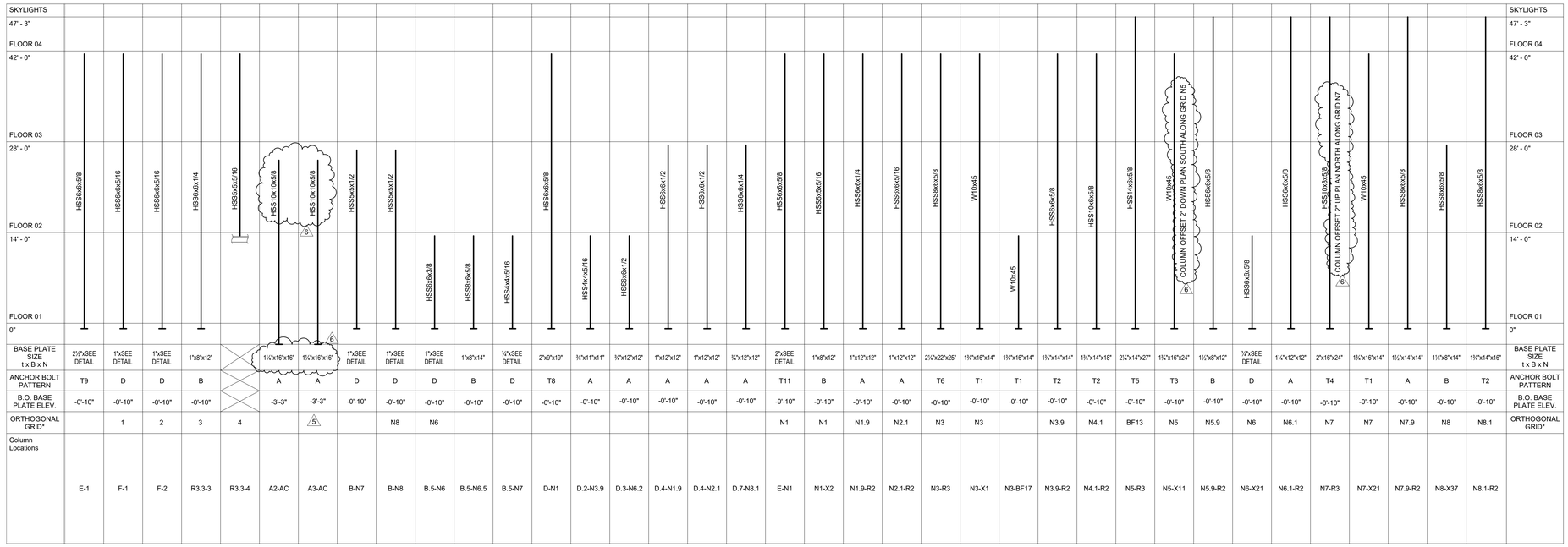
DRAWING NAME

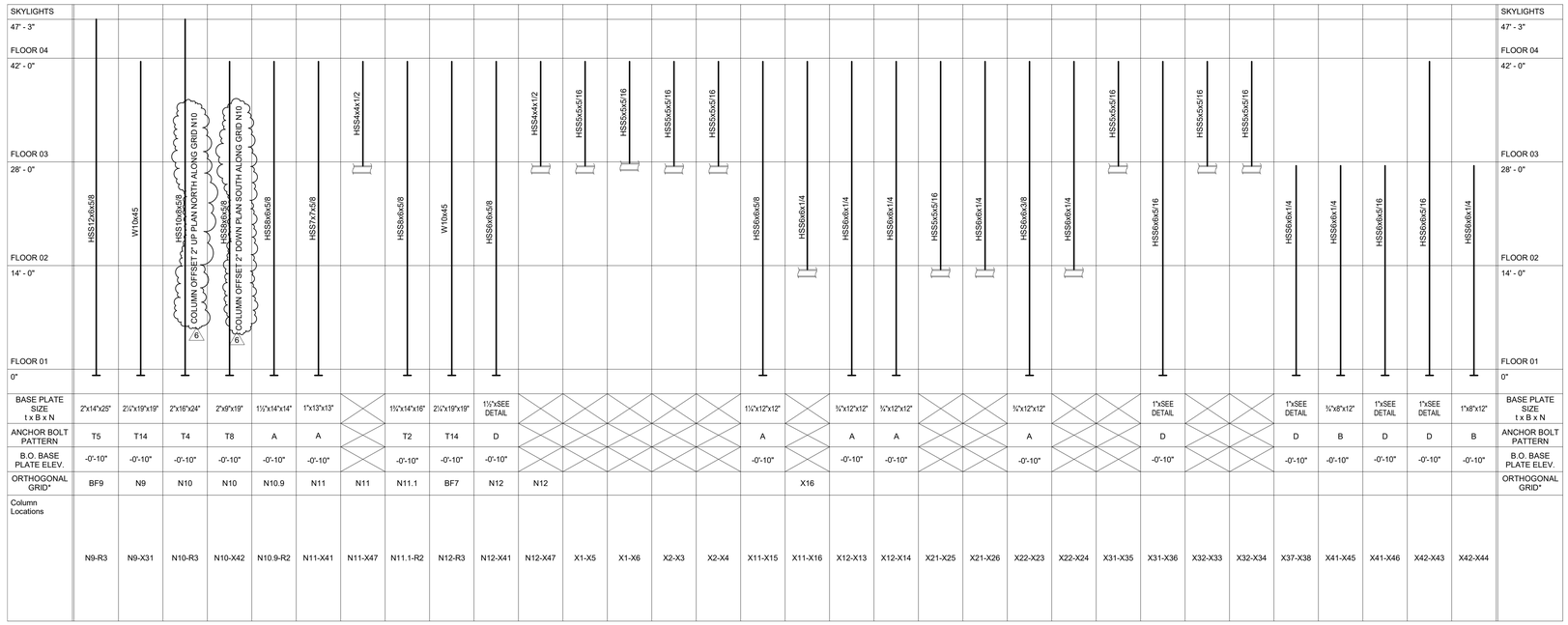
HIGH ROOF FRAMING PLAN-C

PROJECT NO. Project Number

DRAWING NO.

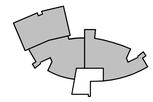
S105C





NORTH BUILDING COLUMN SCHEDULE (1)
1/8" = 1'-0"

*NOTE: ORTHOGONAL GRID DESIGNATION CLARIFIES COLUMN ORIENTATION WHEN GRIDS THAT DEFINE COLUMN ARE NOT ORTHOGONAL TO EACH OTHER. WHEN FIELD IS BLANK, GRIDS ARE ORTHOGONAL. SEE PLANS FOR GENERAL COLUMN ORIENTATION.



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PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

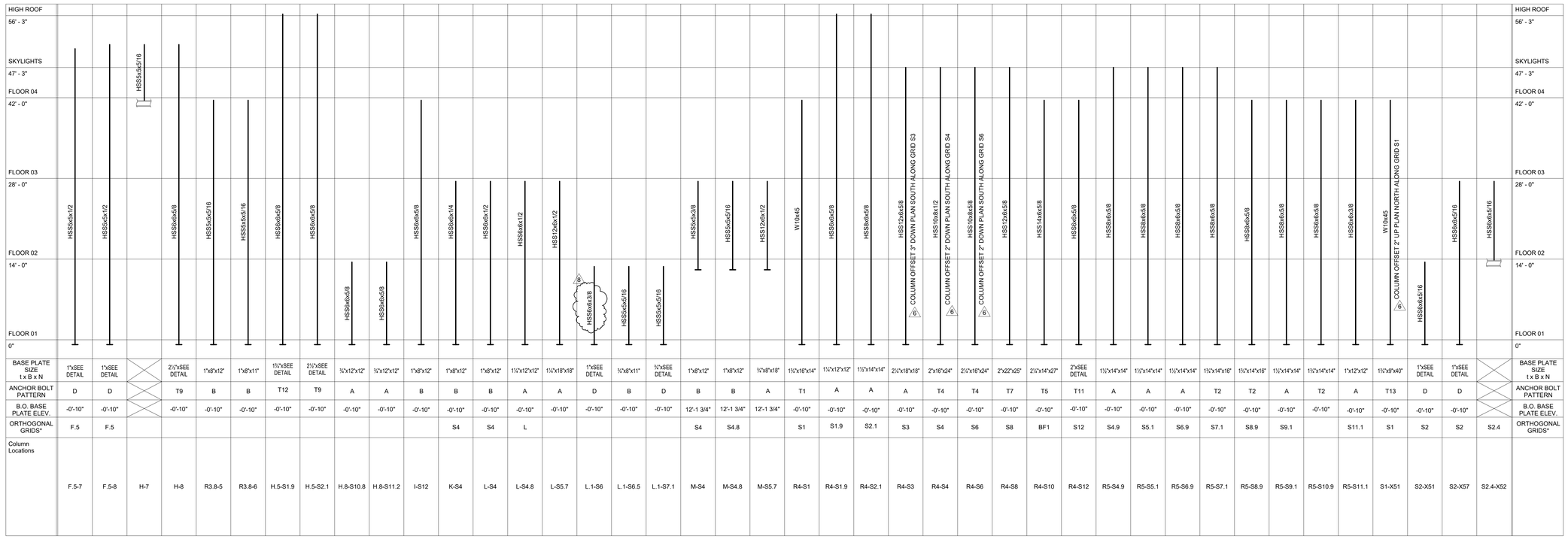
REVISIONS

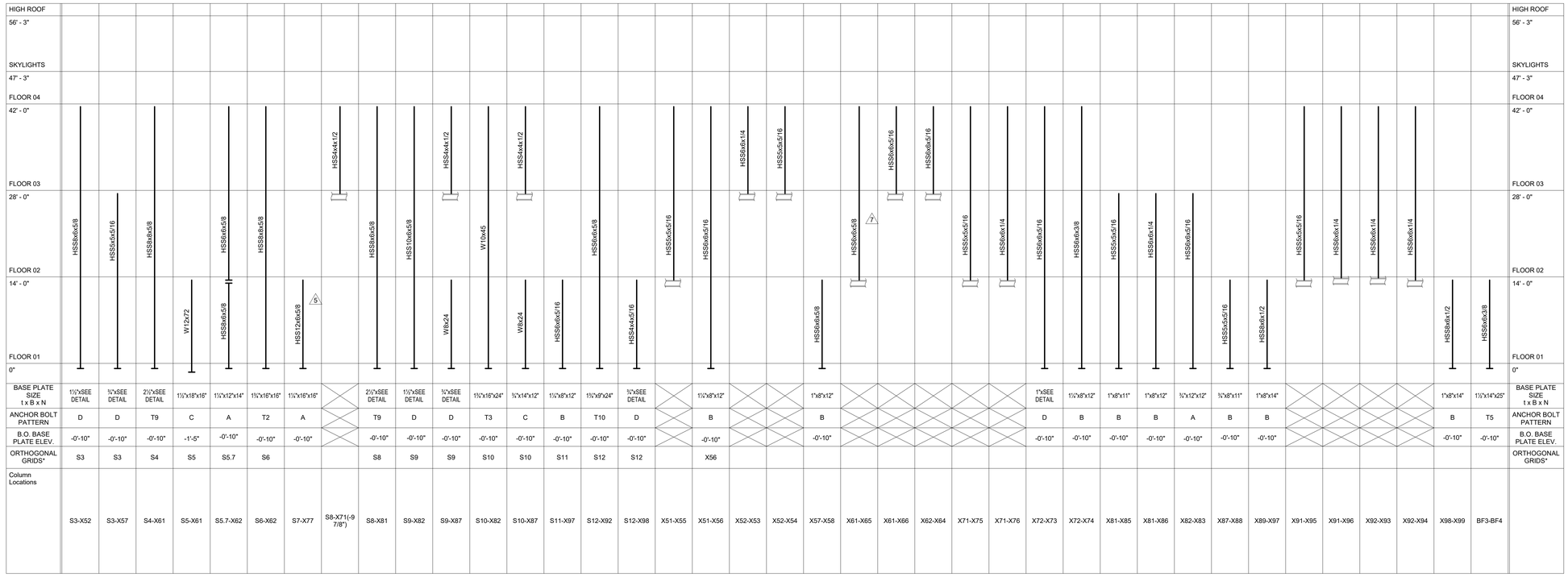
No.	Date	Description
5	8/27/2019	Addend. 4
6	9/09/2019	PR 12

DRAWING NAME
NORTH BUILDING COLUMN SCHEDULE

PROJECT NO. Project Number

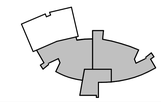
DRAWING NO.
S200





SOUTH BUILDING COLUMN SCHEDULE (1)
1/8" = 1'-0"

*NOTE: ORTHOGONAL GRID DESIGNATION CLARIFIES COLUMN ORIENTATION WHEN GRIDS THAT DEFINE COLUMN ARE NOT ORTHOGONAL TO EACH OTHER. WHEN FIELD IS BLANK, GRIDS ARE ORTHOGONAL. SEE PLANS FOR GENERAL COLUMN ORIENTATION.



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AUGUST 09, 2019

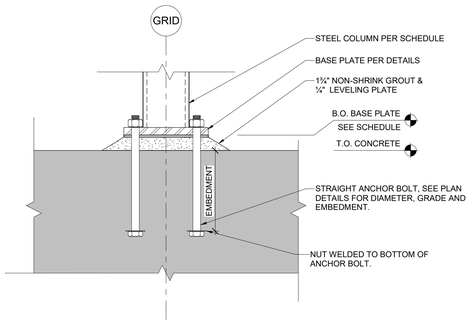
REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
6	9/09/2019	PR 12
7	9/12/2019	PR 12 REV1
8	10/18/2019	EMP

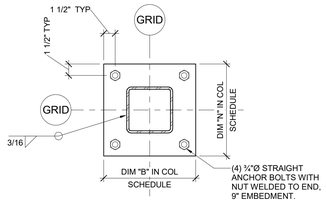
DRAWING NAME
SOUTH BUILDING COLUMN SCHEDULE

PROJECT NO. Project Number

DRAWING NO.
S201

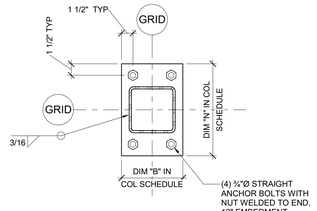


TYPICAL BASE PLATE SECTION 1
1 1/2" = 1'-0"



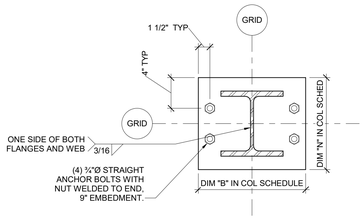
BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "A" 2
1 1/2" = 1'-0"



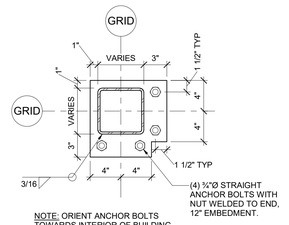
BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "B" 3
1 1/2" = 1'-0"



BASE PLATE PLAN DETAIL

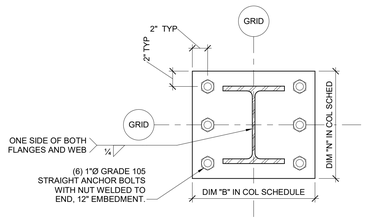
ANCHOR BOLT PATTERN "C" 4
1 1/2" = 1'-0"



NOTE: ORIENT ANCHOR BOLTS TOWARDS INTERIOR OF BUILDING.

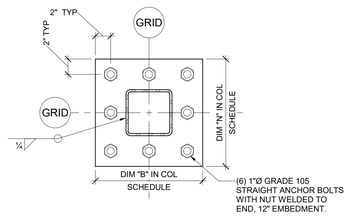
CORNER BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "D" 5
1 1/2" = 1'-0"



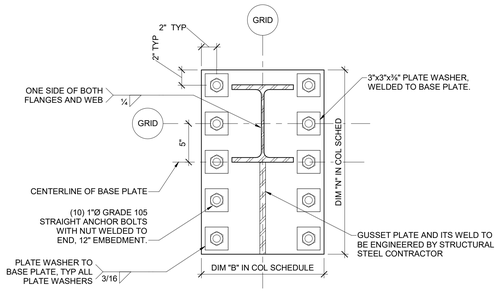
BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T1" 6
1 1/2" = 1'-0"



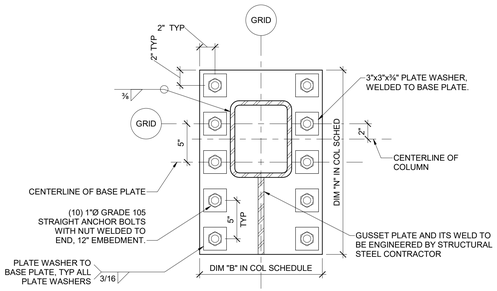
BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T2" 7
1 1/2" = 1'-0"



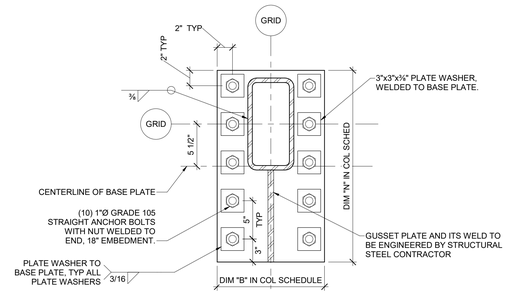
BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T3" 8
1 1/2" = 1'-0"



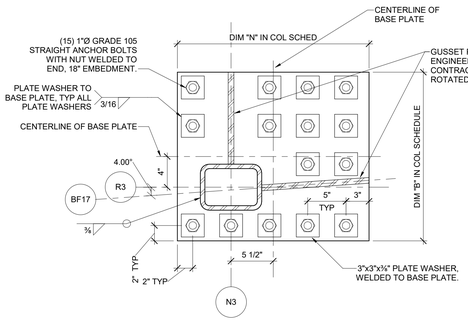
BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T4" 9
1 1/2" = 1'-0"



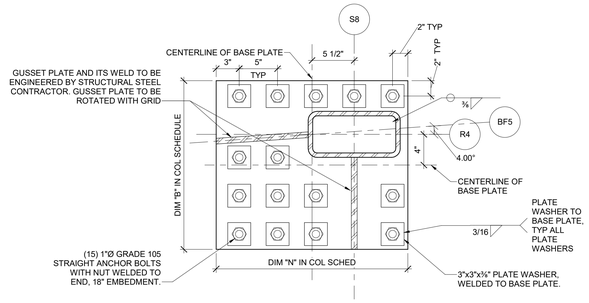
BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T5" 10
1 1/2" = 1'-0"



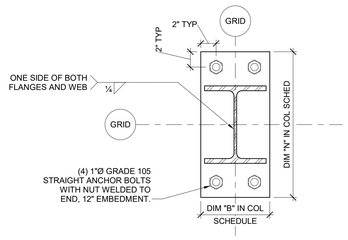
BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T6" 11
1 1/2" = 1'-0"



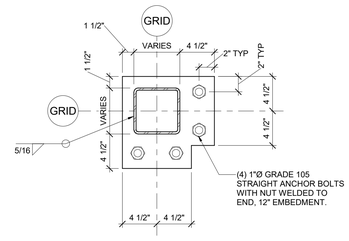
BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T7" 12
1 1/2" = 1'-0"



BASE PLATE PLAN DETAIL

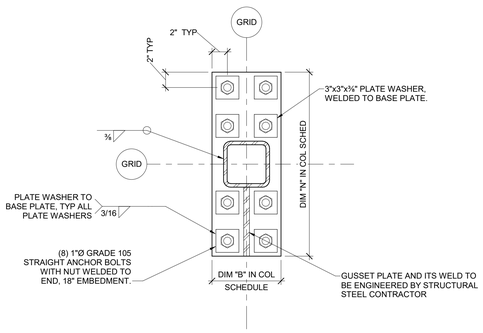
ANCHOR BOLT PATTERN "T8" 13
1 1/2" = 1'-0"



NOTE: ORIENT ANCHOR BOLTS TOWARDS INTERIOR OF BUILDING.

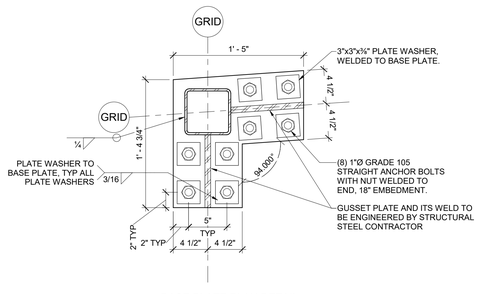
BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T9" 14
1 1/2" = 1'-0"



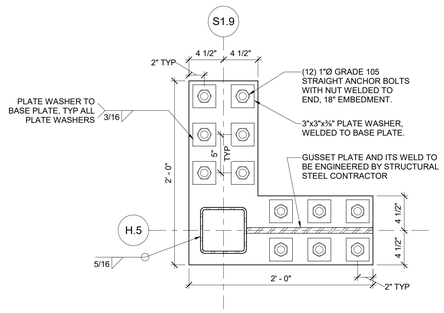
BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T10" 15
1 1/2" = 1'-0"



BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T11" 16
1 1/2" = 1'-0"



BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T12" 17
1 1/2" = 1'-0"

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description

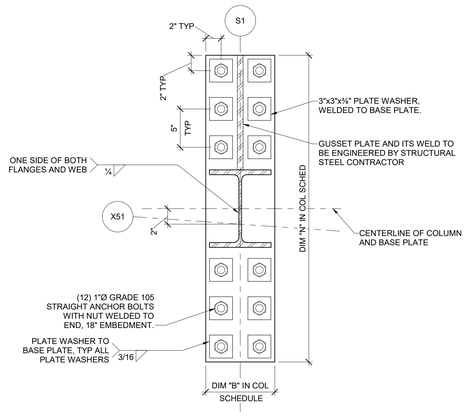
DRAWING NAME

BASE PLATE DETAILS

PROJECT NO. Project Number

DRAWING NO.

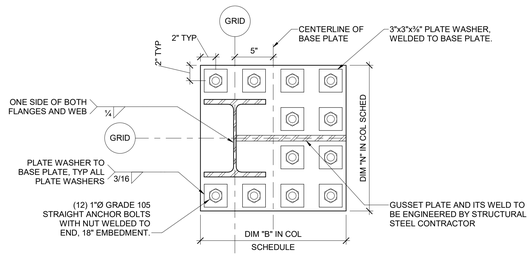
S202



BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T13" 1

1 1/2" = 1'-0"



BASE PLATE PLAN DETAIL

ANCHOR BOLT PATTERN "T14" 2

1 1/2" = 1'-0"

ANCHOR BOLT HOLES AND WASHERS		
ANCHOR BOLT DIAM.	MAX HOLE DIAM.	MIN WASHER SIZE*
3/4"Ø	1-5/16"Ø	2"x1/4"
1"Ø	1-13/16"Ø	3"x3/8"
1-1/4"Ø	2-5/16"Ø	3-1/4"x1/2"

*USE WASHERS WHERE WELDED PLATE WASHERS NOT SPECIFICALLY CALLED FOR IN BASE PLATE PLAN DETAILS. WASHER TO BE SQUARE OR ROUND, ASTM F844.

BASE PLATE HOLE AND WASHER SCHEDULE 3

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

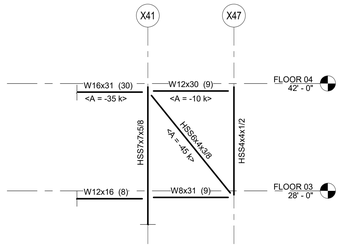
REVISIONS

No.	Date	Description

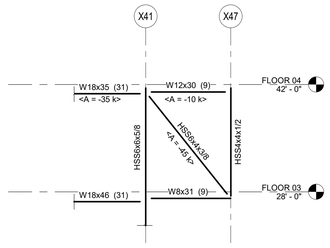
DRAWING NAME
BASE PLATE DETAILS

PROJECT NO. Project Number

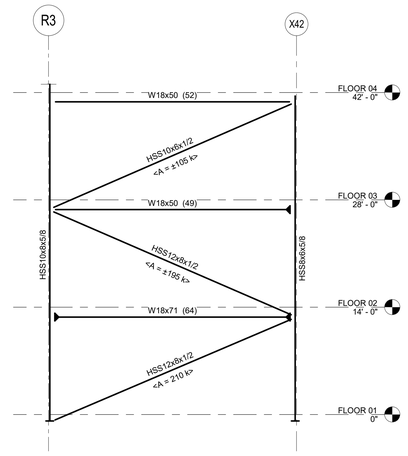
DRAWING NO.
S203



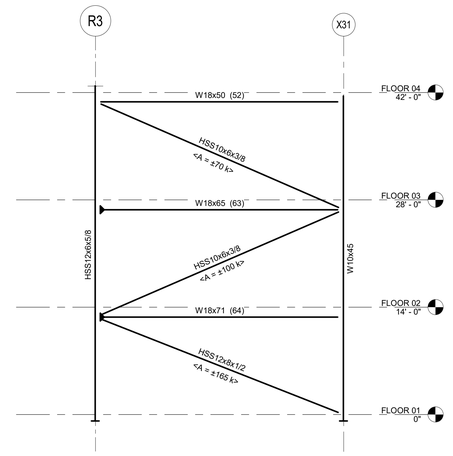
TRUSS ELEVATION AT GRID N11 — 1/8" = 1'-0" — 1



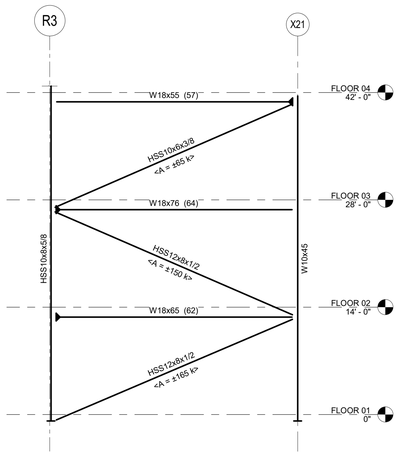
TRUSS ELEVATION AT GRID N12 — 1/8" = 1'-0" — 2



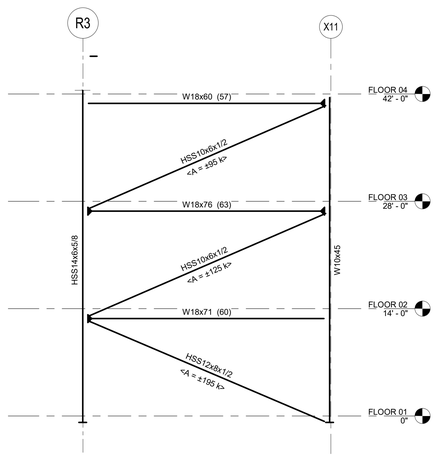
BRACED FRAME ELEVATION AT GRID N10 — 1/8" = 1'-0" — 3



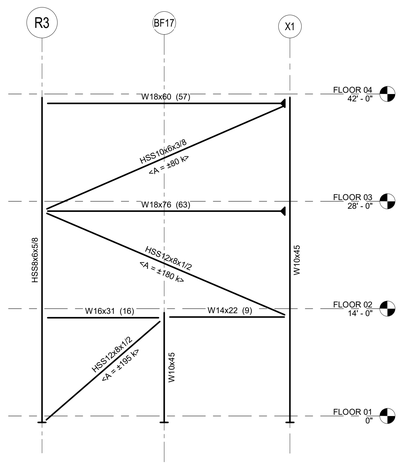
BRACED FRAME ELEVATION AT GRID N9 — 1/8" = 1'-0" — 4



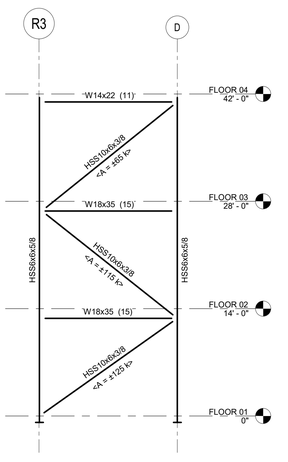
BRACED FRAME ELEVATION AT GRID N7 — 1/8" = 1'-0" — 5



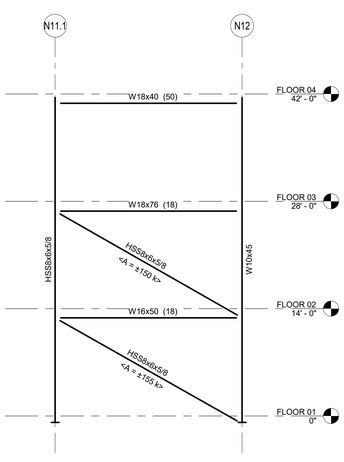
BRACED FRAME ELEVATION AT GRID N5 — 1/8" = 1'-0" — 6



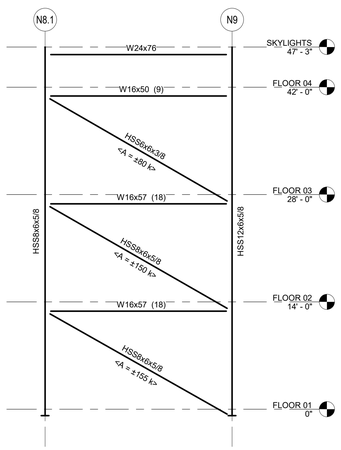
BRACED FRAME ELEVATION AT GRID N3 — 1/8" = 1'-0" — 7



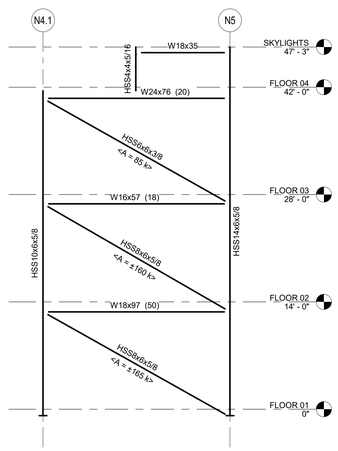
BRACED FRAME ELEVATION AT GRID N1 — 1/8" = 1'-0" — 8



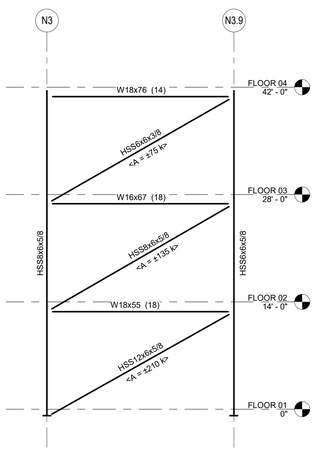
BRACED FRAME ELEVATION AT GRID BF7 — 1/8" = 1'-0" — 9



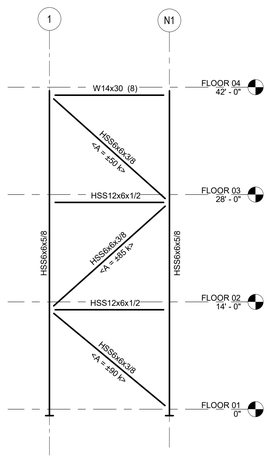
BRACED FRAME ELEVATION AT GRID BF9 — 1/8" = 1'-0" — 10



BRACED FRAME ELEVATION AT GRID BF13 — 1/8" = 1'-0" — 11

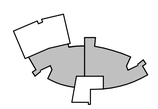


BRACED FRAME ELEVATION AT GRID BF15 — 1/8" = 1'-0" — 12



BRACED FRAME ELEVATION AT GRID E — 1/8" = 1'-0" — 13

NOTES:
1. <A=± XX K> INDICATES THE ASD BRACE CONNECTION DESIGN FORCE (- INDICATES TENSION, + INDICATES COMPRESSION) IN KIPS.
2. CONTRACTOR TO SUBMIT FOR REVIEW CALCULATIONS FOR BRACED FRAME AND TRUSS CONNECTIONS SIGNED AND STAMPED BY A MASSACHUSETTS LICENSED PROFESSIONAL ENGINEER.



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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

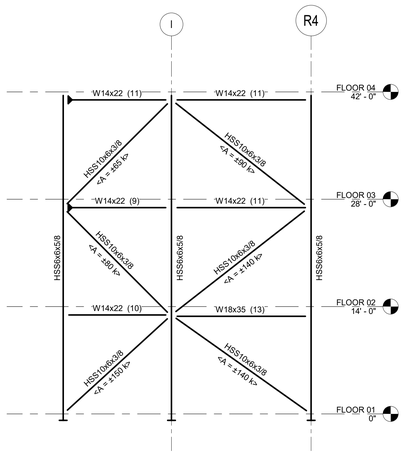
REVISIONS

No.	Date	Description

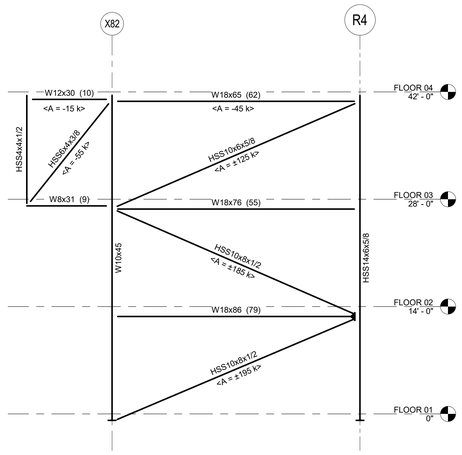
DRAWING NAME
BRACED FRAME AND TRUSS ELEVATIONS (NORTH)

PROJECT NO. Project Number

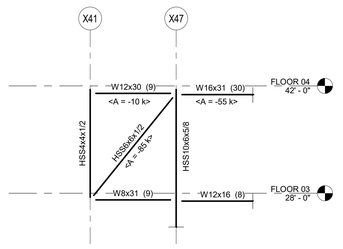
DRAWING NO.
S204



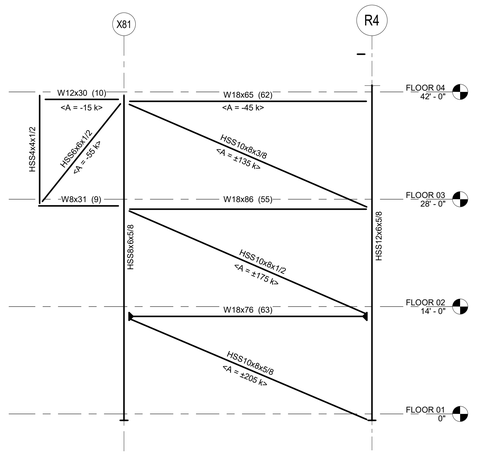
BRACED FRAME ELEVATION AT GRID S12 1
1/8" = 1'-0"



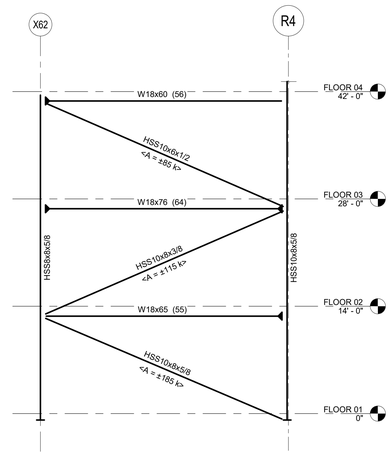
BRACED FRAME ELEVATION AT GRID S10 2
1/8" = 1'-0"



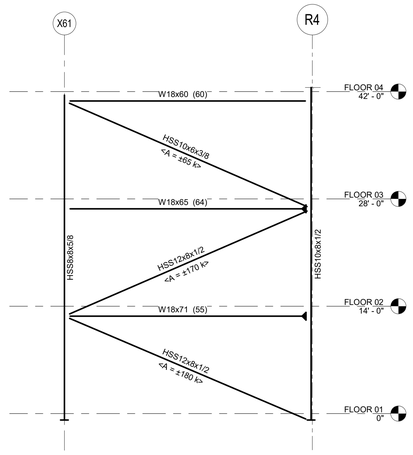
TRUSS ELEVATION AT GRID S9 3
1/8" = 1'-0"



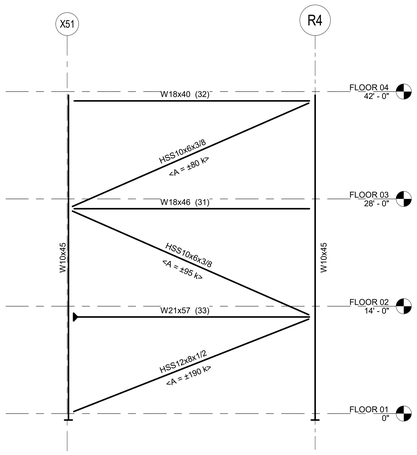
BRACED FRAME ELEVATION AT GRID S8 4
1/8" = 1'-0"



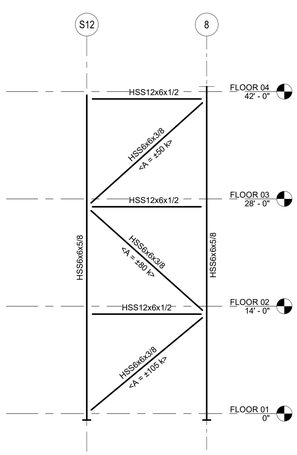
BRACED FRAME ELEVATION AT GRID S6 5
1/8" = 1'-0"



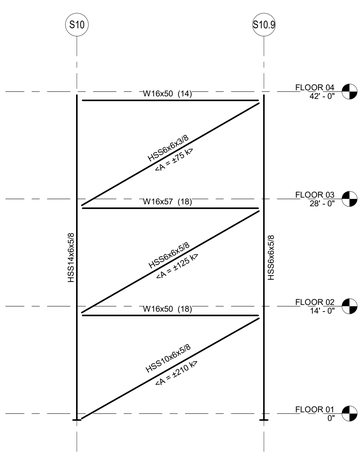
BRACED FRAME ELEVATION AT GRID S4 6
1/8" = 1'-0"



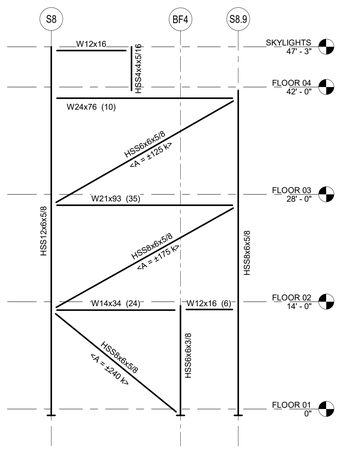
BRACED FRAME ELEVATION AT GRID S1 7
1/8" = 1'-0"



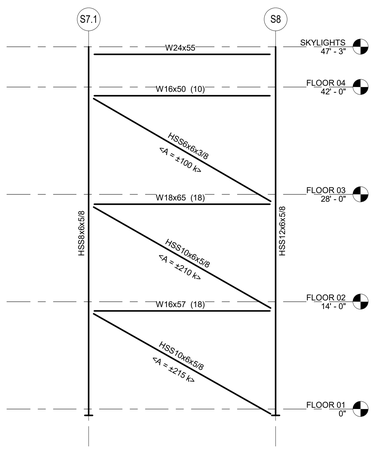
BRACED FRAME ELEVATION AT GRID H 8
1/8" = 1'-0"



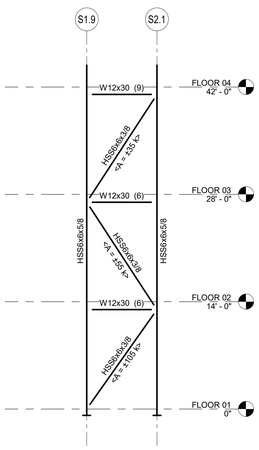
BRACED FRAME ELEVATION AT GRID BF1 9
1/8" = 1'-0"



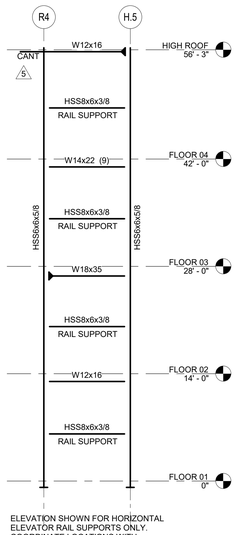
BRACED FRAME ELEVATION AT GRID BF3 10
1/8" = 1'-0"



BRACED FRAME ELEVATION AT GRID BF5 11
1/8" = 1'-0"

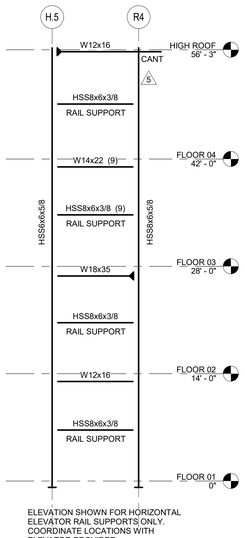


BRACED FRAME ELEVATION AT GRID H.5 12
1/8" = 1'-0"



ELEVATION SHOWN FOR HORIZONTAL ELEVATOR RAIL SUPPORTS ONLY. COORDINATE LOCATIONS WITH ELEVATOR PROVIDER

ELEVATION AT GRID S1.9 13
1/8" = 1'-0"



ELEVATION SHOWN FOR HORIZONTAL ELEVATOR RAIL SUPPORTS ONLY. COORDINATE LOCATIONS WITH ELEVATOR PROVIDER

ELEVATION AT GRID S2.1 14
1/8" = 1'-0"

NOTES:
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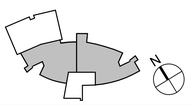

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

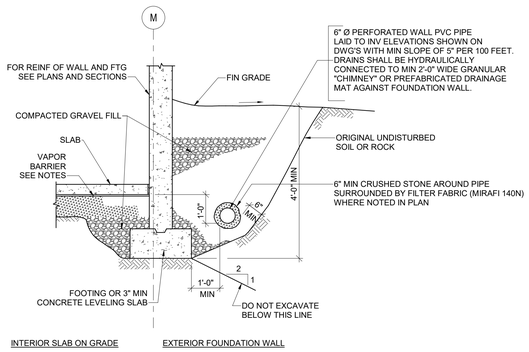
REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4

DRAWING NAME
BRACED FRAME AND TRUSS ELEVATIONS (SOUTH)

PROJECT NO. Project Number

DRAWING NO.
S205



TYPICAL UNDERSLAB FILL AND FOUNDATION DRAIN DETAILS 1

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FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY SITE PACKAGE
MAY 10, 2019

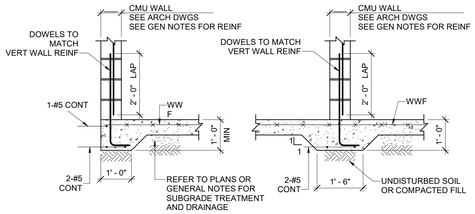
REVISIONS

No.	Date	Description
1	5/17/2019	100% DD
4	8/09/2019	ECSP

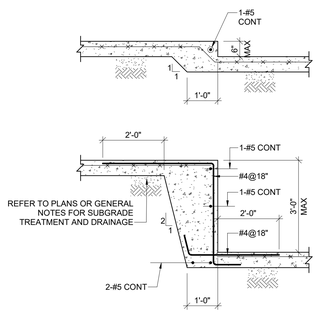
DRAWING NAME
TYPICAL DETAILS

PROJECT NO. Project Number

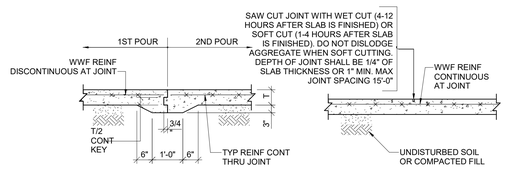
DRAWING NO.
S300



TYPICAL NON-LOAD BEARING CMU PARTITION WALL FOUNDATION DETAIL 1



TYPICAL STEPPED SLAB ON GRADE DETAILS 2



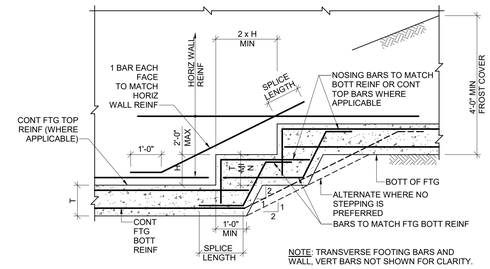
CONSTRUCTION JOINT

CONTROL JOINT

NOTE:

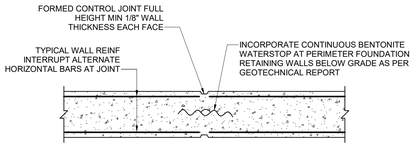
1. FILL SAW CUTS WITH RIGID OR SEMI RIGID JOINT FILLER WHERE REQUIRED BY ARCHITECT TO HIDE OR PROTECT JOINT.
2. SEE LAYOUT DETAIL FOR LOCATIONS OF SLAB ON GRADE JOINTS.
3. WWF REINFORCEMENT SHALL BE LOCATED WITHIN UPPER THIRD OF SLAB THICKNESS, OR 2" MAX FROM TOP OF SLAB.

SLAB ON GRADE JOINTS 3

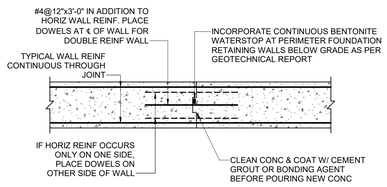


NOTE: TRANSVERSE FOOTING BARS AND WALL, VERT BARS NOT SHOWN FOR CLARITY.

TYPICAL STEPPED FOOTING DETAIL AT FOUNDATION WALLS 4



CONTROL JOINT

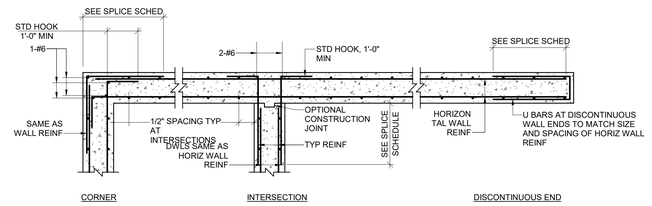


CONSTRUCTION JOINT

NOTE:

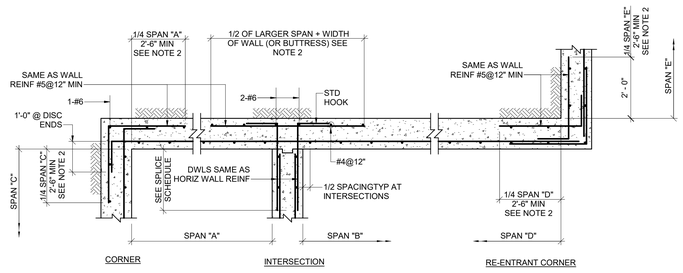
1. KEY WIDTH NOT TO EXCEED 1/3 DEPTH OF WALL.
2. VERTICAL CONSTRUCTION JOINTS SHALL BE LOCATED 4'-0" MIN AWAY FROM WALL CORNERS, FACE OF SUPPORTING PIERS OR BUTTRESSES, AND/OR WALL OPENINGS.
3. REFER TO GENERAL NOTES AND SPECIFICATIONS FOR JOINT SPACING REQUIREMENTS. SUBMIT JOINT LOCATIONS FOR APPROVAL.

TYPICAL VERTICAL JOINTS IN CONCRETE WALL 5



CORNER INTERSECTION DISCONTINUOUS END

DOUBLE LAYER



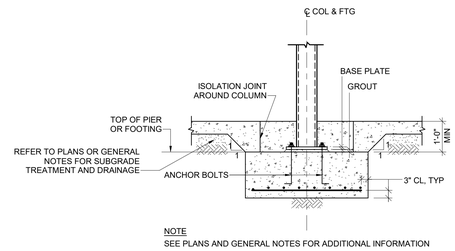
CORNER INTERSECTION RE-ENTRANT CORNER

SINGLE LAYER

NOTES:

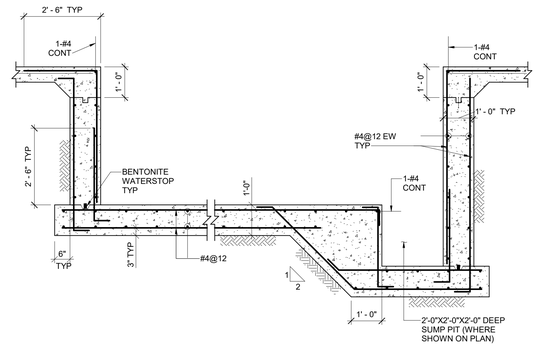
1. FOR WALL REINFORCEMENT, SEE FOUNDATION SECTIONS.
2. IF SPANS ARE LESS THAN 7 FEET, EXTEND REINFORCEMENT INTO ADJACENT SPAN.
3. ALL SPLICE LENGTHS ARE TENSION SPLICES PER CHARTS IN TYPICAL DETAILS.

TYPICAL WALL REINFORCEMENT DETAIL 6

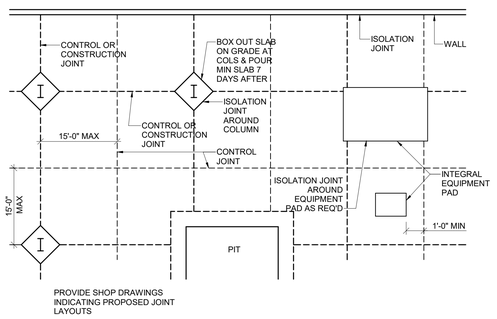


NOTE
SEE PLANS AND GENERAL NOTES FOR ADDITIONAL INFORMATION

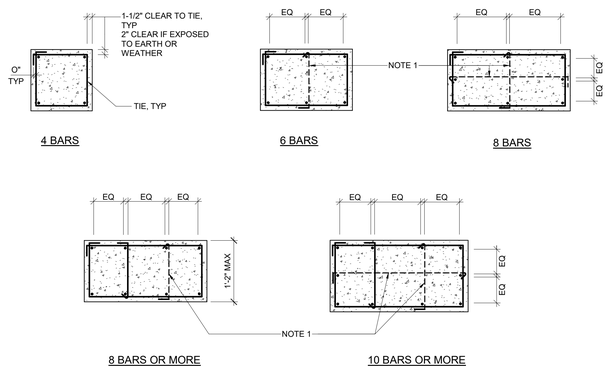
TYPICAL INTERIOR COLUMN DETAIL 7



TYPICAL ELEVATOR PIT DETAIL 8



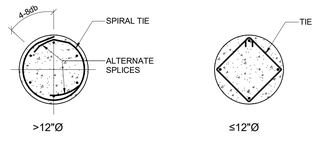
LAYOUT OF CONTROL AND CONSTRUCTION JOINTS IN CONCRETE SLABS ON GRADE 9



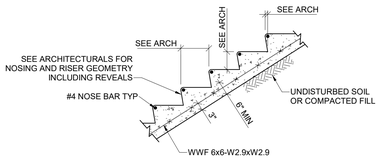
NOTE :

1. ALTERNATE TIES MAY BE OMITTED WHERE CLEAR DISTANCE BETWEEN ADJACENT BARS IS 6" OR LESS.
2. SEE SCHEDULE FOR COL SIZE AND REINF. SQUARE/RECTANGULAR

TYPICAL CONCRETE COLUMN / PIER REINFORCEMENT 10



TYPICAL CIRCULAR COLUMN REINFORCEMENT



NOTES :

1. SEE ARCH FOR STAIR DIMENSIONS.
2. CONCRETE SHALL BE NORMAL WEIGHT
3. USE AIR-ENTRAINTED FOR EXTERIOR APPLICATIONS ONLY.

5

TYPICAL CONCRETE STAIR ON GRADE 11

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4

DRAWING NAME
TYPICAL DETAILS

PROJECT NO. Project Number

DRAWING NO.
S301

ACI TENSION DEVELOPMENT LENGTHS (Ld) AND CLASS 'A' LAP SPLICE LENGTHS

BAR SIZE	LAP CLASS	f'c=3,000 PSI				f'c=4,000 PSI				f'c=5,000 PSI			
		TOP BARS		OTHER BARS		TOP BARS		OTHER BARS		TOP BARS		OTHER BARS	
		CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2
#3	A	22	32	17	25	19	28	15	22	17	25	13	19
	B	28	42	22	32	24	36	19	28	22	33	17	25
#4	A	29	43	22	33	25	37	19	29	22	33	17	26
	B	37	56	29	43	32	48	25	37	29	43	22	33
#5	A	36	54	28	41	31	47	24	36	28	42	22	32
	B	47	70	36	54	40	60	31	47	36	54	28	42
#6	A	43	64	33	50	37	56	29	43	33	50	26	38
	B	56	84	43	64	48	72	37	56	43	65	33	50
#7	A	63	94	48	72	54	81	42	63	49	73	37	56
	B	81	122	63	94	70	106	54	81	63	94	49	73
#8	A	72	107	55	82	62	93	48	71	55	83	43	64
	B	93	139	72	107	80	121	62	93	72	108	55	83
#9	A	81	121	62	93	70	105	54	81	63	94	48	72
	B	105	157	81	121	91	136	70	105	81	122	63	94
#10	A	91	136	70	105	79	118	61	91	70	105	54	81
	B	118	177	91	136	102	153	79	118	91	137	70	105
#11	A	101	151	78	116	87	131	67	101	78	117	60	90
	B	131	196	101	151	113	170	87	131	101	152	78	117
#14	N/A	121	181	93	139	105	157	81	121	94	140	72	108
#18	N/A	161	241	124	186	139	209	107	161	125	187	96	114

NOTES:

1. TABULATED VALUES ARE BASED ON GRADE 60 REINFORCING BARS AND NORMAL WEIGHT CONCRETE.
2. TENSION DEVELOPMENT LENGTHS OF STANDARD HOOKS ARE CALCULATED PER ACI 318-95, SECTION 318-95, SECTIONS 12.2.2 AND 12.15, RESPECTIVELY. TABULATED VALUES FOR BEAMS OR COLUMNS ARE BASED ON TRANSVERSE REINFORCEMENT AND CONCRETE COVER MEETING MINIMUM CODE REQUIREMENTS. LENGTHS ARE IN INCHES.
3. 'CASES 1 AND 2, WHICH DEPEND ON THE TYPE OF STRUCTURAL ELEMENT, CONCRETE COVER, AND THE CENTER-TO-CENTER SPACING OF THE BARS, ARE DEFINED AS:
   BEAMS OR COLUMNS: CASE 1: COVER AT LEAST 1.0 db AND c-c SPACING AT LEAST 2.0 db
   CASE 2: COVER LESS THAN 1.0 db OR c-c SPACING LESS THAN 2.0 db

   ALL OTHERS: CASE 1: COVER AT LEAST 1.0 db AND c-c SPACING AT LEAST 3.0 db
   CASE 2: COVER LESS THAN 1.0 db OR c-c SPACING LESS THAN 3.0 db
4. LAP SPLICE LENGTHS ARE MULTIPLES OF TENSION DEVELOPMENT LENGTHS; CLASS A = 1.0 ld AND CLASS B = 1.3 ld
   (ACI 318-95, SECTION 12.15.1).
5. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE CAST BELOW THE BARS.
6. FOR LIGHTWEIGHT AGGREGATE CONCRETE, MULTIPLY THE TABULATED VALUES BY 1.3.
7. FOR EPOXY-COATED BARS, MULTIPLY THE TABULATED VALUES BY ONE OF THE FOLLOWING FACTORS:

CONCRETE COVER AND SPACING	TOP BARS	OTHER BARS
COVER < 3.0 db OR c-c SPACING < 7.0 db	1.7/1.3 = 1.31	1.50
COVER ≥ 3.0 db AND c-c SPACING ≥ 7.0 db	1.20	1.20

ACI COMPRESSION DEVELOPMENT (Ldc) AND LAP SPLICE LENGTHS

BAR SIZ	COMPRESSION DEVELOPMENT LENGTHS PER f'c (PSI)						COMPRESSION LAP SPLICE LENGTH
	3,000	4,000	5,000	6,000	7,000	8,000	
#3	9	8	8	8	8	8	12
#4	11	10	9	9	9	9	15
#5	14	12	12	12	12	12	19
#6	17	15	14	14	14	14	23
#7	19	17	16	16	16	16	27
#8	22	19	18	18	18	18	30
#9	25	22	21	21	21	21	34
#10	28	24	23	23	23	23	38
#11	31	27	26	26	26	26	43
#14	37	32	31	31	31	31	N/A
#18	50	43	41	41	41	41	N/A

NOTES:

1. TABULATED VALUES ARE BASED ON GRADE 60 REINFORCING BARS AND NORMAL WEIGHT CONCRETE.
2. COMPRESSION DEVELOPMENT LENGTHS AND COMPRESSION LAP SPLICE LENGTHS ARE CALCULATED PER ACI 318-95, SECTIONS 12.3 AND 12.16, RESPECTIVELY. LENGTHS ARE IN INCHES.
3. FOR COMPRESSION DEVELOPMENT LENGTHS, IF BARS ARE ENCLOSED IN SPIRALS OR TIES PER ACI 318-95, SECTION 12.3.3.2 THEN A MODIFICATION FACTOR OF 0.75 MAY BE APPLIED BUT THE LENGTH MUST NOT BE LESS THAT 8 INCHES.
4. FOR COMPRESSION LAP SPLICE LENGTHS:
   A. IF BARS ARE ENCLOSED IN A TIED-REINFORCED COMPRESSION MEMBER PER ACI 318-95, SECTION 12.17.2.4,
   THEN A MODIFICATION FACTOR OF 0.83 MAY BE APPLIED BUT THE LENGTH MUST NOT BE LESS THAT 12 IN.
   B. IF THE BARS ARE ENCLOSED IN A SPIRALLY-REINFORCED COMPRESSION MEMBER PER ACI 318-95, SECTION
   12.17.2.5, THEN A MODIFICATION FACTOR OF 0.75 MAY BE APPLIED BUT THE LENGTH MUST NOT BE LESS THAN
   12 INCHES.
   C. THE TABULATED LENGTHS ARE APPLICABLE FOR ALL CONCRETE STRENGTHS OF AT LEAST 3,000 PSI.
5. ACI 318-95 DOES NOT ALLOW LAP SPLICES OF #14 OF #18 BARS, EXCEPT TO #11 OR SMALLER BARS.

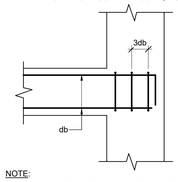
TYPICAL DEVELOPMENT AND LAP LENGTHS 1
1/2" = 1'-0"

ACI HOOK DEVELOPMENT LENGTHS (Ldh)

BAR SIZE	f'c IN PSI					
	3000	4000	5000	6000	7000	8000
#3	9	7	7	6	6	6
#4	11	10	9	8	7	7
#5	14	12	11	10	9	9
#6	17	15	13	12	11	10
#7	19	17	15	14	13	12
#8	22	19	17	16	15	14
#9	25	22	19	18	16	15
#10	28	24	22	20	19	17
#11	31	27	24	22	21	19
#14	37	32	29	27	25	23
#18	50	43	39	35	33	31

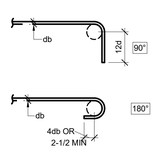
NOTES:

1. TABULATED VALUES ARE BASED ON GRADE 60 REINFORCING BARS AND NORMAL WEIGHT CONCRETE.
2. TENSION DEVELOPMENT LENGHTS OF STANDARD HOOKS ARE CALCULATED PER ACI 318-95, SECTION 318-95, SECTION 12.5. LENGTHS ARE IN INCHES.
3. FOR BAR SIZES #3 THROUGH #11 ONLY:
   A) IF CONCRETE COVER PER ACI 318-95 SECTIONS 12.5.3.2, THEN A MODIFICATION
   FACTOR OF 0.7 MAY BE APPLIED BUT THE LENGTH MUST NOT BE LESS THAN 8.0 db
   NOR 6 INCHES.
   B) IF HOOK IS ENCLOSED IN TIES OR STIRRUPS PER ACI 318-95, SECTION 12.5.3.3,
   THEN A MODIFICATION FACTOR OF 0.8 MAY BE APPLIED BUT THE LENGTH MUST NOT BE LESS THAN 8.0 db NOR 6 INCHES.
4. FOR EPOXY-COATED HOOKS, MULTIPLY THE TABULATED VALUES BY 1.2.



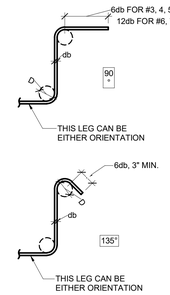
NOTE:
FOR HOOKS WITH BOTH SIDE & TOP OR BOTTOM COVER LESS THAN 2 1/2" ADD ADDL TIES PER ACI (AT DISCONTINUOUS MEMBERS ONLY) SEE DETAIL ABOVE

BAR SIZE	db	FINISHED BEND DIA. "D"
#3	3/8"	2-1/4"
#4	1/2"	3"
#5	5/8"	3-3/4"
#6	3/4"	4-1/2"
#7	7/8"	5-1/4"
#8	1"	6"
#9	1-1/8"	9-1/2"
#10	1-1/4"	10-3/4"



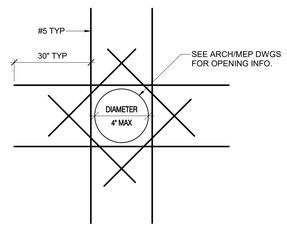
END HOOKS

BAR SIZE	db	FINISHED BEND DIA. "D"
#3	3/8"	1-1/2"
#4	1/2"	2"
#5	5/8"	2-1/2"
#6	3/4"	4-1/2"
#7	7/8"	5-1/4"
#8	1"	6"



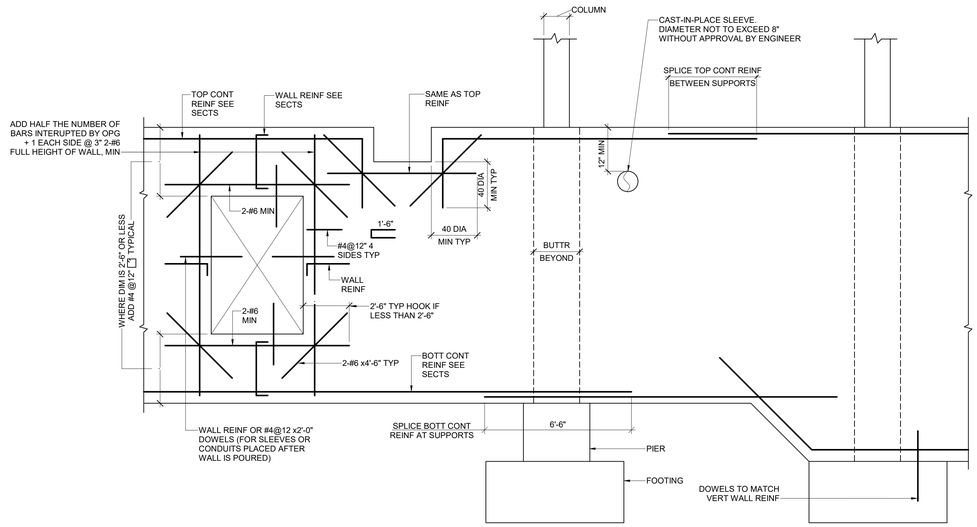
STIRRUP/TIE HOOKS

TYPICAL HOOK DETAILS 2
1/2" = 1'-0"

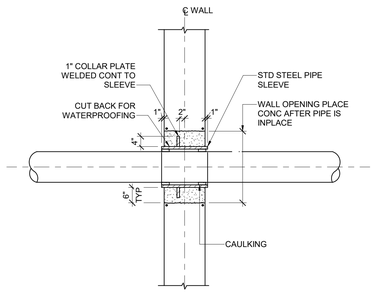


NOTE: NO REBAR REQ'D FOR D<8"

PLAN DETAIL OF SLAB ON GRADE OPENING 3
1/2" = 1'-0"



TYPICAL WALL ELEVATION INDICATING OPENING AND MISCELLANEOUS REINFORCING DETAILS 5
1/2" = 1'-0"



NOTE:
FOR REINF AROUND OPENING SEE TYPICAL WALL ELEVATION

TYPICAL SLEEVE THRU WALL DETAIL 4
1/2" = 1'-0"

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AUGUST 09, 2019

REVISIONS

No.	Date	Description

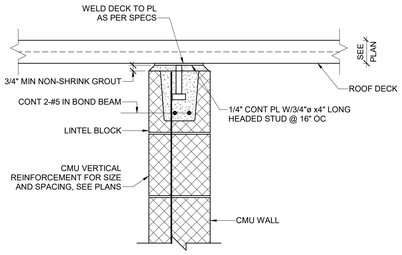
DRAWING NAME
TYPICAL DETAILS

PROJECT NO. Project Number

DRAWING NO.
S302

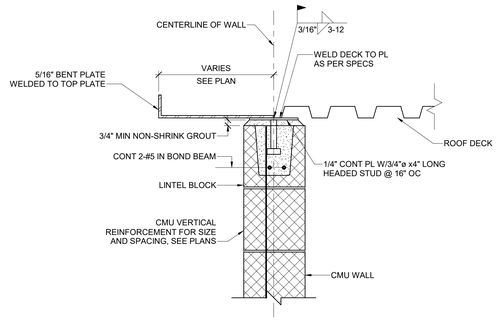
DETAIL DELETED.

7



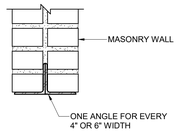
SEE PLANS FOR DECK ORIENTATION

ROOF DECK SUPPORT AT CMU WALLS - INTERIOR WALL 2A



SEE PLANS FOR DECK ORIENTATION

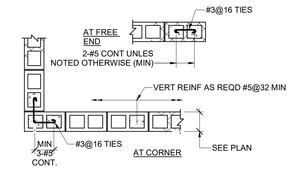
ROOF DECK SUPPORT AT CMU WALLS - EDGE 2B



SECTION

1. PROVIDE AND INSTALL LINTEL ANGLES FOR MASONRY OPENINGS IN ACCORDANCE WITH THE SCHEDULE IN GENERAL NOTES. INSTALL LONG LEG VERTICAL. SEE ARCHT & MECHANICAL PLANS FOR LOCATIONS.
2. TO INSTALL LINTELS IN EXISTING MASONRY WALLS, SAWCUT MASONRY ON ONE SIDE AND PLACE FIRST ANGLE. THEN SAWCUT SECOND SIDE AND PLACE SECOND ANGLE. WHEN BOTH ANGLES ARE IN PLACE, PROCEED WITH REMAINING DEMOLITION.
3. PROVIDE 8" MIN BEARING AT EACH END BUT NOT LESS THAN 1" PER FOOT OF SPAN. FILL 2 COURSES OF MASONRY BELOW BEARING WITH MORTAR WHERE POSSIBLE.
4. WHERE MINIMUM BEARING CANNOT BE PROVIDED, ATTACH SECURELY TO ADJACENT STRUCTURAL MEMBERS OR PROVIDE SEPERATE SUPPORTS.
5. WHERE LINTELS OCCUR IN EXTERIOR WALLS MINIMUM THICKNESS SHALL BE 5/16" AND ANGLES SHALL BE HOT DIP GALVINIZED.

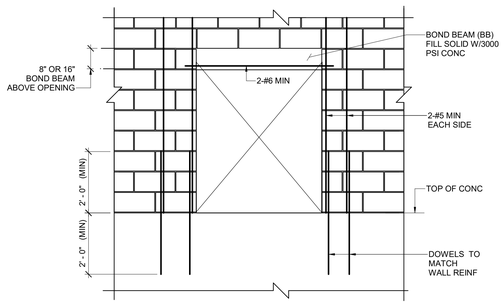
STEEL ANGLE LINTEL 3
1 1/2" = 1'-0"



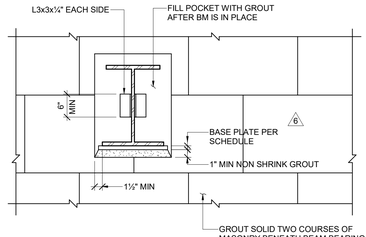
PLAN / CMU WALL

NOTES:

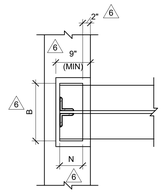
1. SEE SPECS FOR HORIZONTAL REINFORCEMENT REQUIREMENTS.
2. PROVIDE BOND BEAMS WITH MIN 2-#5 CONT BARS AT EACH FLOOR.



OPENING IN CMU WALL 4



SECTION

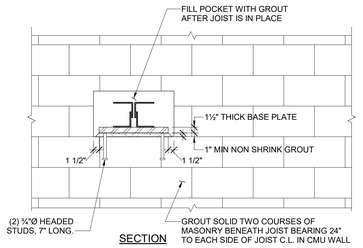


PLAN

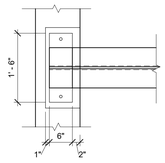
BEARING PLATE SCHEDULE 6

MARK	DIMENSION (BxN)	THICKNESS
BP1	8½"x6"	½"
BP2	6½"x6"	½"
BP3	14½"x6"	1¼"
BP4	10"x6"	1¼"
BP5	10"x6"	1"
BP6	13½"x6"	1½"
BP7	11"x7"	1½"

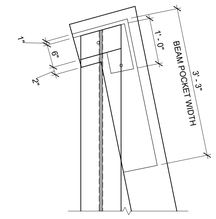
TYPICAL BEAM POCKETS IN CMU 5



SECTION

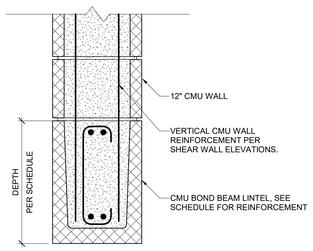


BPJ1 PLAN DETAIL



BPJ2 PLAN DETAIL

TYPICAL OWJ POCKETS IN CMU 6



CMU BOND BEAM LINTEL SCHEDULE

MARK	BOND BEAM DEPTH	HORIZONTAL REINFORCEMENT	SHEAR REINFORCEMENT	MINIMUM BEARING	MAXIMUM OPENING SIZE
BBL1	16"	(2) #6 BARS TOP AND BOTTOM	#3@4" O.C.	8"	4' - 6"
BBL2	16"	(2) #7 BARS TOP AND BOTTOM	#3@4" O.C.	8"	5' - 3"
BBL3	24"	(2) #7 BARS TOP AND BOTTOM	#3@4" O.C.	8"	8' - 0"

TYPICAL CMU BOND BEAM LINTEL 7 8

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AUGUST 09, 2019

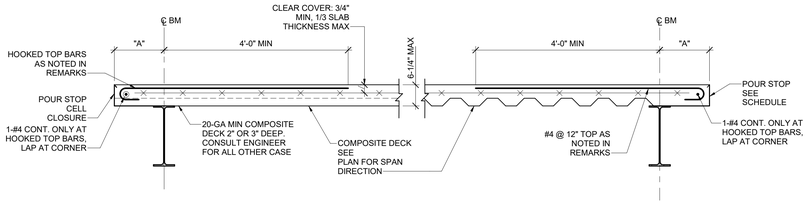
REVISIONS

No.	Date	Description
6	9/09/2019	PR 12
7	9/12/2019	PR 12 REV1
8	10/18/2019	EMP

DRAWING NAME
TYPICAL DETAILS

PROJECT NO. Project Number

DRAWING NO.
S303

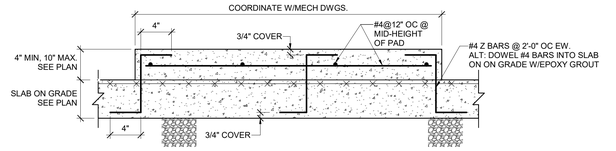


DECK ⊥ TO BEAM	
	REMARKS
A < 10"	
10" ≤ A ≤ 2'-10"	#4 @ 12" TOP

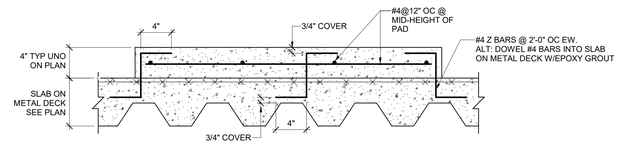
DECK || TO BEAM OR STOPPING AT BEAM		
"A"	POUR STOP PLATE GAGE	REMARKS
A ≤ 6"	14	
6"< A <10"	12	
10"≤ A <12"	10	#4 @ 12" TOP
12"≤ A ≤1'-6"	1/4"	#4 @ 12" TOP

1. SEE PLANS AND ARCHITECT DRAWINGS FOR EDGE OF SLAB DISTANCES.
2. FOR A > 1'-6" WHERE DECK SPAN IS PARALLEL TO THE BEAM OR A > 2'-10" WHERE DECK IS PERPENDICULAR AND EXTENDS PAST BEAM, NOTIFY ENGINEER.
3. FOR 1/4" THICK POUR STOPS, WELD TO BEAM FLANGE WITH 3/16" FILLET WELD, 3@12, B.S.

TYPICAL EDGE OF SLAB DETAIL 1

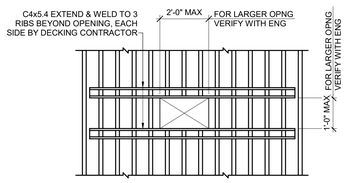


CONCRETE PAD ON SLAB ON GRADE



CONCRETE PAD ON SLAB ON METAL DECK

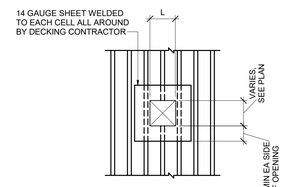
TYPICAL MECHANICAL PAD DETAIL 2



NOTE: NO REINF REQUIRED FOR HOLES 6'Ø OR LESS PROVIDE CONCRETE POUR STOP AT ALL OPENINGS.

FOR OPENINGS TO 2'-0" PERPENDICULAR TO DECK

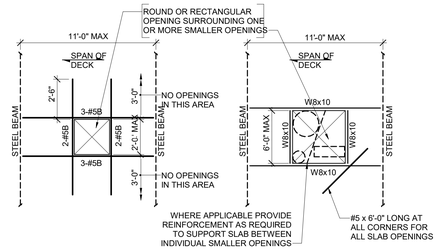
OPTION 1A



NOTE: NO REINF REQUIRED WHERE "L" IS 6" OR LESS IN DIRECTION PERPENDICULAR TO DECK.

FOR OPENINGS TO 13" PERPENDICULAR TO DECK

OPTION 1B

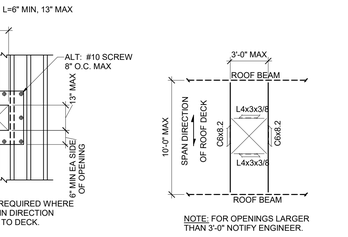


NOTES:

1. FOR OPTION 2, METAL DECK SHALL NOT BE CUT UNTIL CONCRETE HAS CURED.
2. CONTRACTOR SHALL SELECT REINFORCEMENT OPTION BASED ON OPENING SIZE.
3. COORDINATE SIZE, LOCATION AND QUANTITY WITH MECHANICAL AND ARCHITECTURAL DRAWINGS.

OPTION 2 OPTION 3

REINFORCEMENT AT OPENINGS IN SLABS WITH COMPOSITE METAL DECK 3



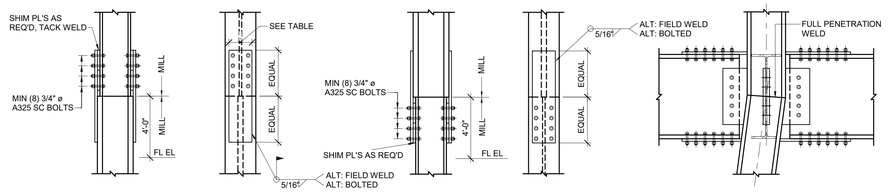
NOTE: NO REINF REQUIRED WHERE "L" IS 6" OR LESS IN DIRECTION PERPENDICULAR TO DECK.

OPTION 1

NOTE: FOR OPENINGS LARGER THAN 3'-0" NOTIFY ENGINEER.

OPTION 2

FRAMING FOR OPENINGS IN STEEL ROOF DECK (NO CONCRETE) 4

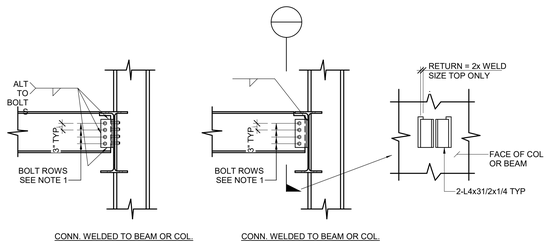


NOTE:
IF COLUMN DEPTHS DIFFER MORE THAN 2 TIMES FLANGE THICKNESS, FOLLOW AISC STANDARD DETAILS AND DEVELOP CONNECTION FOR BEARING CAPACITY OF SMALLER COLUMN. SUBMIT DETAIL FOR REVIEW.

COLUMN ABOVE SMALLER THAN COLUMN BELOW COLUMN ABOVE LARGER THAN COLUMN BELOW BENT COLUMN

TYPICAL COLUMN SPLICES FOR GRAVITY COLUMNS 6

SPLICE PLATE SIZE		
COLUMN SIZE	WIDTH	THICKNESS
W14x455 + OVER	16	3/4"
W14x257 TO 426	14	5/8"
W14x145 TO 233	14	1/2"
W14x90 TO 132	14	3/8"
W14x43 TO 82	8	3/8"
W12x4120 TO 336	12	5/8"
W12x40 TO 106	8	3/8"
W10x33 TO 112	8	3/8"
W8x31 TO 67	8	3/8"
W8x24 & 28	6	3/8"



MINIMUM NUMBER OF BOLTS	
BEAM SIZE	"N"
W33	8
W30	8
W27	7
W24	6
W21	5
W18	4
W16	4
W14	3
W12	3
W10	2
W8	2

"N" = MINIMUM NUMBER OF BOLT ROWS

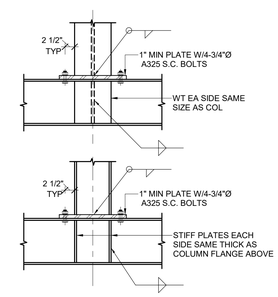
DOUBLE ANGLE CONNECTIONS TO BEAM OR COLUMN

NOTE: CONN SIMILAR WHEN CONNECTING TO GIRDER OR COLUMN (SHOWN DASHED)

NOTES:

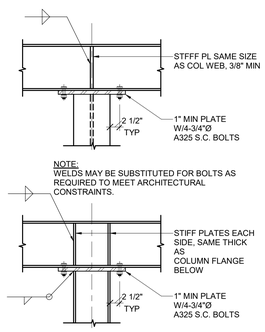
1. SIMPLE SHEAR CONNECTIONS SHALL BE DESIGNED FOR THE REACTION SHOWN ON THE DRAWINGS OR THE GREATEST OF THE FOLLOWING:
   a. REACTION FROM AISC MANUAL OF STEEL TABLES FOR BEAMS FOR APPLICABLE BEAM MATERIAL AS PER GENERAL NOTES.
   b. MINIMUM NUMBER OF BOLTS, SEE TABLE.
2. BOLTS SHALL BE 3/4" DIAMETER A325 MINIMUM U.O.N..
3. PROVIDE WEB REINFORCING AS REQUIRED DUE TO WEB CUTS, COPES ETC..
4. DESIGN OF DOUBLE ANGLE CONNECTIONS SHALL BE BASED ON THE LATEST AISC PROCEDURES SHOWN IN THE AISC MANUAL OF STEEL CONSTRUCTION.
5. FACTOR FOR CONVERSION OF LOADS FROM SERVICE TO ULTIMATE SHALL BE EQUAL TO 1.6.
6. ALTERNATE CONNECTION SYSTEM (SINGLE ANGLE, SEATED, ETC) MAY BE USED ONLY UPON SPECIFIED APPROVAL OF THE ENGINEER OF RECORD. DETAILER SHALL SUBMIT WRITTEN REQUESTS FOR USE OF ALTERNATE CONNECTIONS TO THE ARCHITECT AND ENGINEER OF RECORD.

TYPICAL SIMPLE SHEAR CONNECTION DETAIL 5



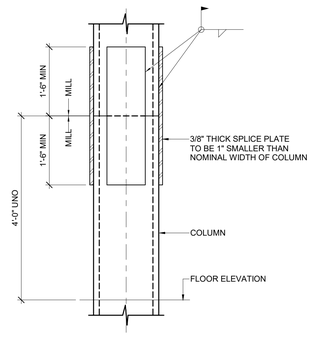
NOTE: WELDS MAY BE SUBSTITUTED FOR BOLTS AS REQUIRED TO MEET ARCHITECTURAL CONSTRAINTS.

TYPICAL COLUMN OR POST OVER BEAM 7

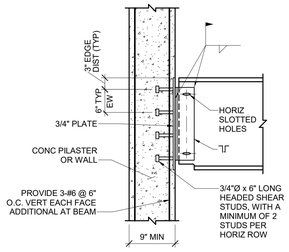


NOTE:
WELDS MAY BE SUBSTITUTED FOR BOLTS AS REQUIRED TO MEET ARCHITECTURAL CONSTRAINTS.

TYPICAL BEAM OVER COLUMN 8



TYPICAL GRAVITY BOX COLUMN SPLICE
3/4" = 1'-0" 9



NOTES:

1. DESIGN CONNECTIONS TO CARRY BEAM REACTIONS AS PER GENERAL NOTES.
2. NUMBER OF STUDS PER CONNECTION SHALL NOT BE LESS THAN THE FOLLOWING:

END REACTION	#OF STUDS
GREATER THAN 32k	12
GREATER THAN 24k 10BUT LESS THAN OR EQUAL TO 32k	
GREATER THAN 16k BUT LESS THAN OR EQUAL TO 24k	8
GREATER THAN 8k BUT LESS THAN OR EQUAL TO 16k	6
LESS THAN 8k	4

3. BEAM CONNECTIONS SHALL BE WITH DOUBLE ANGLES.

STEEL BEAM CONNECTION TO CONCRETE WALL
3/4" = 1'-0" 10

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description

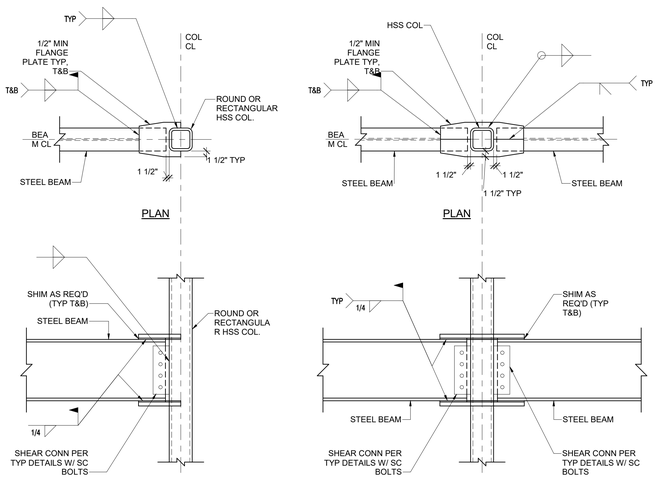
DRAWING NAME

TYPICAL DETAILS

PROJECT NO. Project Number

DRAWING NO.

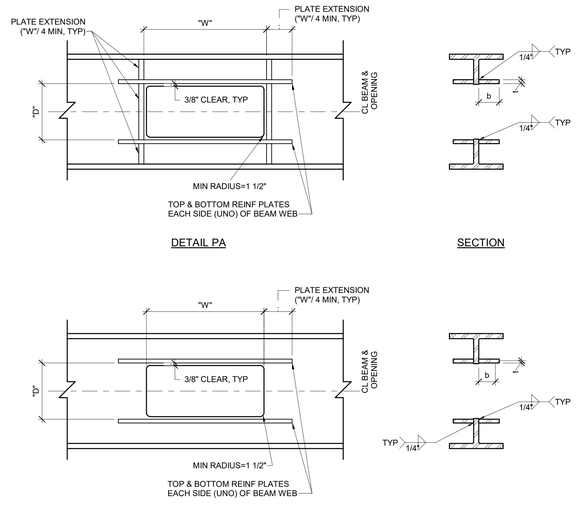
S304



NOTES:

1. ALTERNATE CONNECTION DETAILS MAY BE SUBMITTED FOR APPROVAL BY SER.

TYPICAL BEAM HSS TO COLUMN MOMENT CONNECTION DETAILS 1



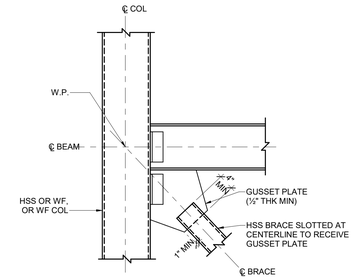
BEAM WEB PENETRATION SCHEDULE

MARK	SIZE WxD	"b" WIDTH x "t" THICKNESS	REINFORCING DETAIL
PO		NO ADDITIONAL PLATE REINFORCEMENT NEEDED	

NOTES:

1. SEE PLAN FOR MARK AND LOCATION.
2. ALL OPENINGS TO BE CENTERED AT BEAM MID-DEPTH.
3. AN ADDITIONAL 2 STUDS PER FOOT (IN ADDITION TO STUDS SHOWN ON PLAN) ARE REQUIRED FOR 3'-0" BEYOND EACH END OF OPENING.
4. CORRDINATE ALL BEAM PENETRATION WITH HVAC, PLUMBING, AND ELECTRICAL CONTRACTORS.

TYPICAL DETAIL OF BEAM WEB PENETRATION
1/2" = 1'-0" 2



NOTE:
ALL BRACED FRAME CONNECTIONS SHALL BE DESIGNED IN ACCORDANCE WITH SPECIFICATIONS AND DRAWINGS.

TYPICAL BRACED FRAME AND TRUSS CONNECTIONS 3

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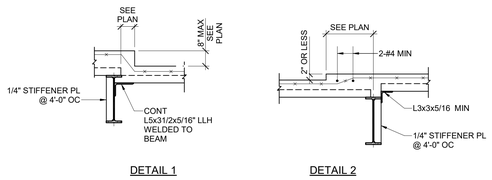
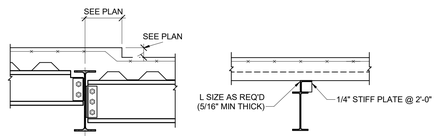
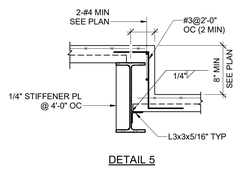
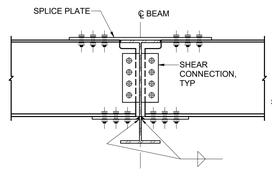


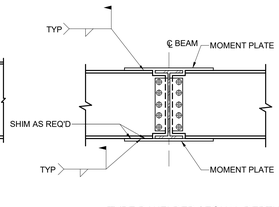


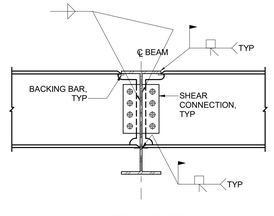


NOTE: PROVIDE CLOSURE PL WHERE ADJACENT DECKS ARE AT DIFFERENT ELEVATIONS

TYPICAL DETAILS FOR SLAB DEPRESSION ON STEEL DECK
3/4" = 1'-0" 4



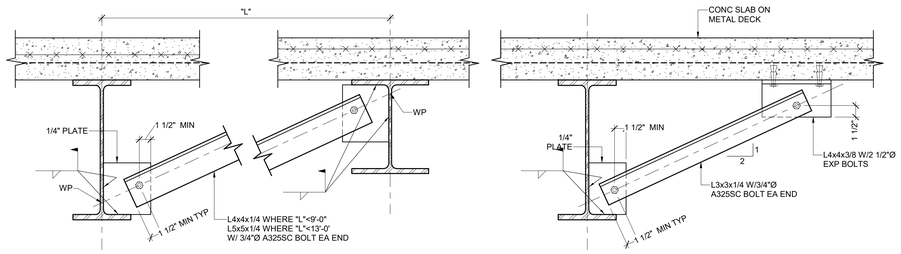




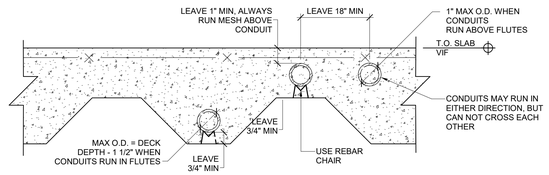
NOTES:

1. SHEAR CONNECTION SHALL BE DESIGNED FOR THE BEAM END REACTIONS PER GENERAL NOTES.
2. DESIGN MOMENT PLATES FOR THE FULL MOMENT CAPACITY OF THE SMALLER BEAM UNLESS NOTED OTHERWISE.

TYPICAL BEAM TO GIRDER MOMENT CONNECTION DETAILS 5



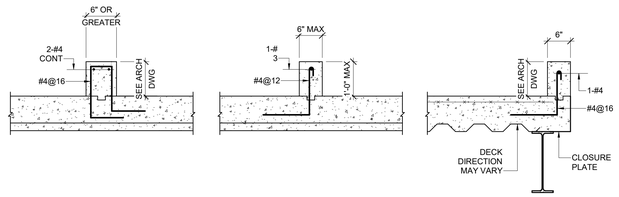
TYPICAL KICKER CONNECTION DETAIL
1 1/2" = 1'-0" 6



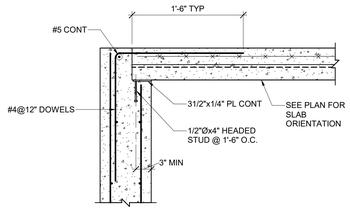
NOTE
NOTIFY ENGINEER IF CONFLICT OCCURS WITH SHEAR STUDS

SEE PLAN FOR EXACT THICKNESS OF SLAB AND DEPTH OF METAL DECK.

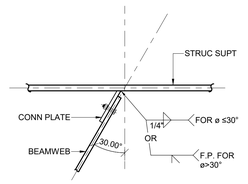
MIN CONCRETE COVER FOR CONDUIT IN CONCRETE ON METAL DECK CONSTRUCTION
3" = 1'-0" 7



TYPICAL CONCRETE CURB DETAILS
3/4" = 1'-0" 8



TYPICAL SUPPORT OF DECK AT CONCRETE WALL
1" = 1'-0" 9



PLAN

TYPICAL SKEWED CONNECTION PLATE TO SUPPORT CONNECTION
3/4" = 1'-0" 10

FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

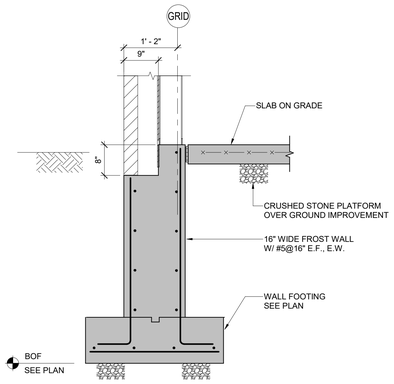
REVISIONS

No.	Date	Description

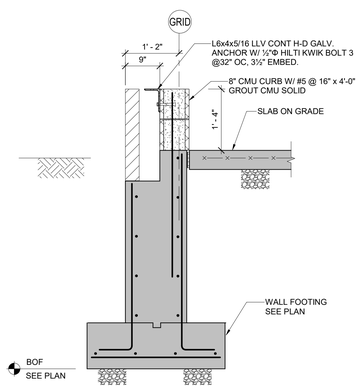
DRAWING NAME
TYPICAL DETAILS

PROJECT NO. Project Number

DRAWING NO.
S305

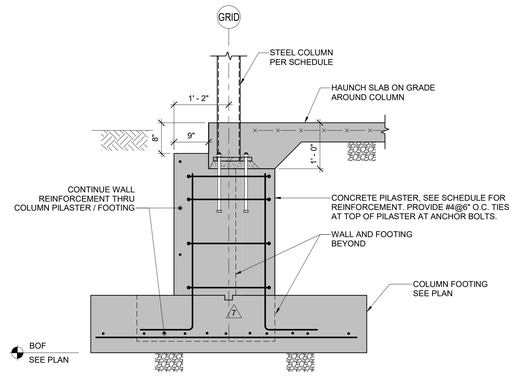


TYPICAL FROST WALL SECTION AT MASONRY BASE 1
3/4" = 1'-0"

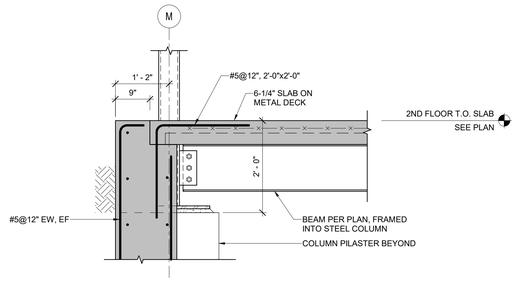


COORDINATE EXTENT OF CMU CURB W/ ARCH'LS.
SEE SECTION 1 FOR INFO NOW SHOWN HERE

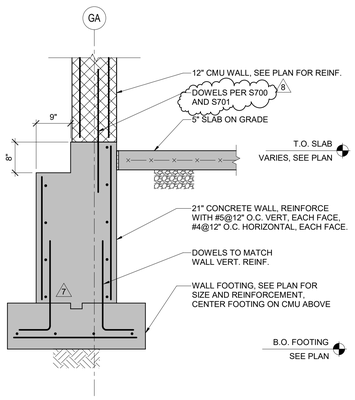
FROST WALL SECTION AT STOREFRONT CMU CURB 1A
3/4" = 1'-0"



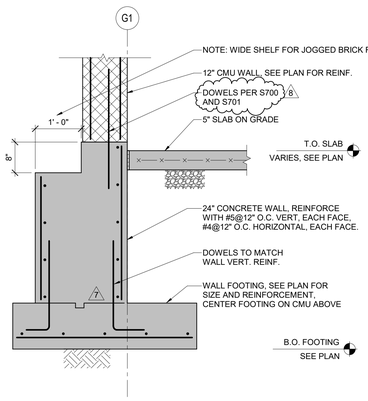
FOUNDATION DETAIL AT PILASTER 2
3/4" = 1'-0"



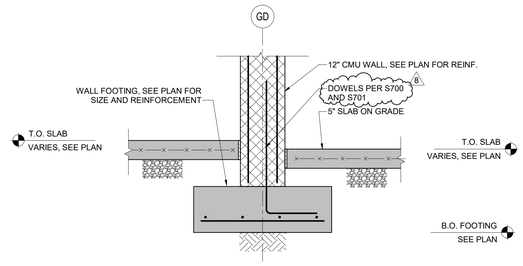
FOUNDATION DETAIL AT SOUTH RETAINING WALL 3
3/4" = 1'-0"



EXTERIOR CMU WALL - 21" WALL 4
3/4" = 1'-0"

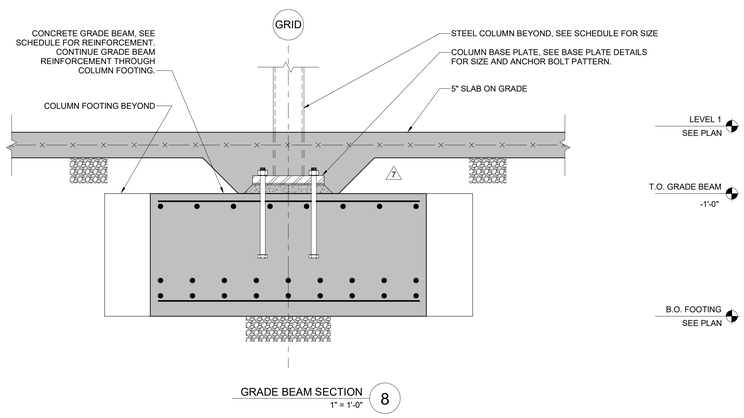


EXTERIOR CMU WALL SECTION 24" WALL 5
3/4" = 1'-0"

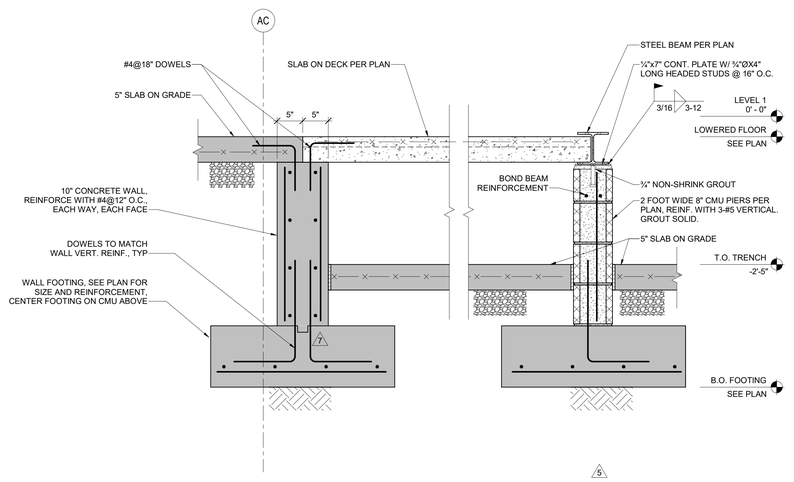


CMU WALL FOOTING SECTION 6
3/4" = 1'-0"

LOADING DOCK SECTION 7
3/4" = 1'-0"



GRADE BEAM SECTION 8
1" = 1'-0"



UNDER STAGE TRENCH SECTION 9
1" = 1'-0"

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL
PACKAGE
AUGUST 09, 2019

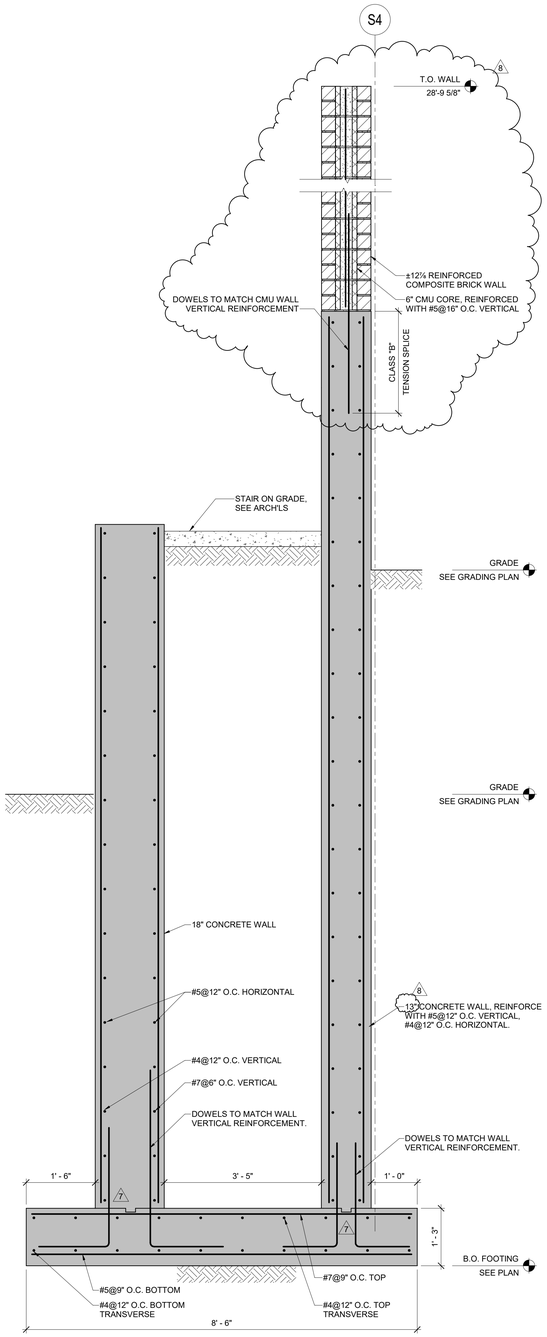
REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
7	9/12/2019	PR 12 REV1
8	10/18/2019	EMP

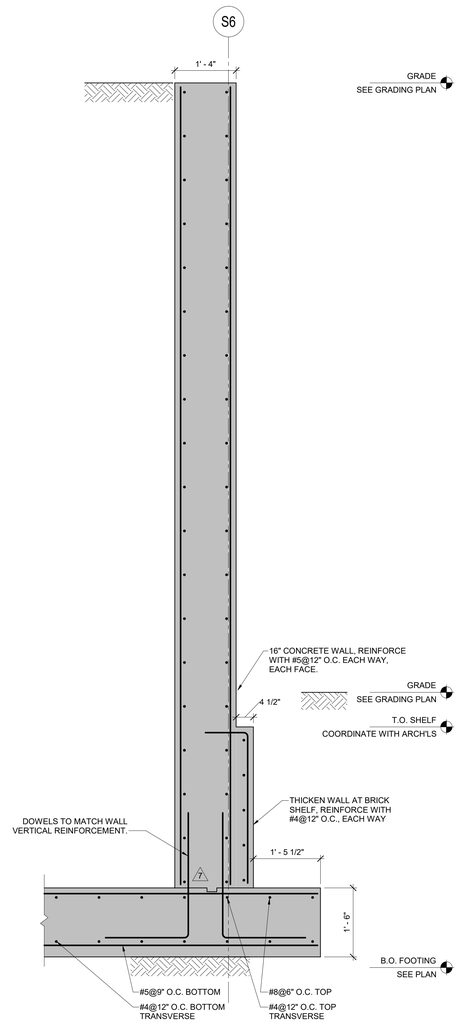
DRAWING NAME
FOUNDATION
SECTIONS

PROJECT NO. Project Number

DRAWING NO.
S400



RETAINING WALL AT EGRESS STAIR 1
3/4" = 1'-0"



RETAINING WALL AT GRID S6 2
3/4" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

PR 12

SEPTEMBER 09, 2019

REVISIONS

No.	Date	Description
6	9/09/2019	PR 12
7	9/12/2019	PR 12 REV1
8	10/18/2019	EMP

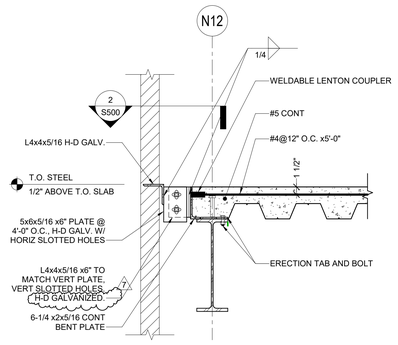
DRAWING NAME

FOUNDATION SECTION

PROJECT NO. Project Number

DRAWING NO.

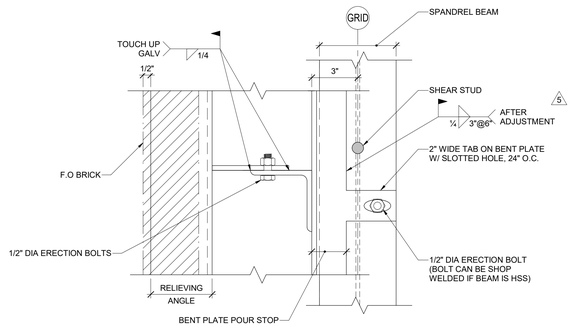
6 S401



SEE 2/S500 FOR BALANCE OF INFO

SECTION AT RELIEVING ANGLE 1

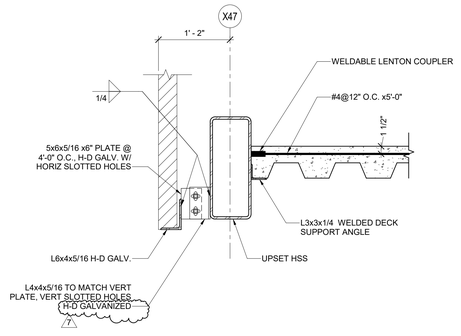
1" = 1'-0"



SEE 1/S500 FOR INFO NOT SHOWN HERE

PLAN DETAIL AT RELIEVING ANGLE 2

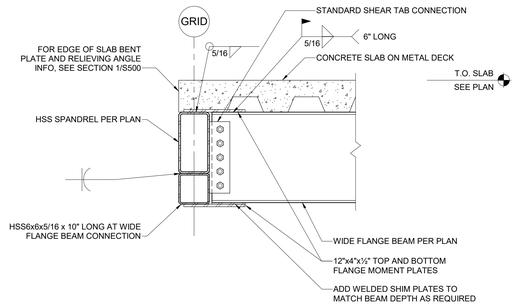
3" = 1'-0"



SEE 2/S500 FOR FIELD WELD INFO

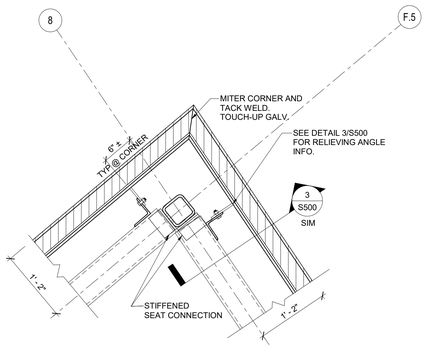
SECTION AT UPSET HSS SPANDRELS 3

1" = 1'-0"



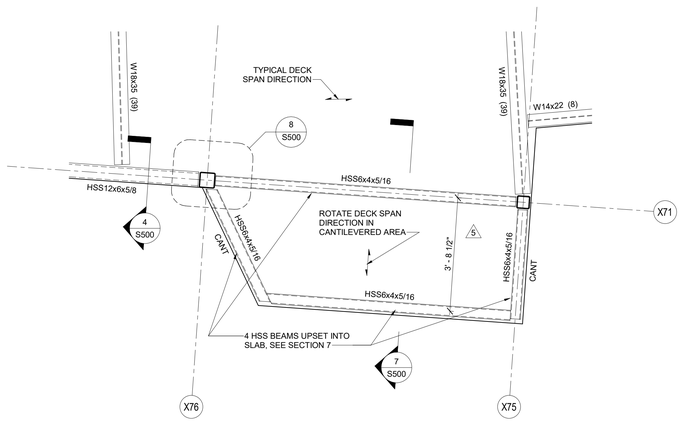
WIDE FLANGE TO HSS MOMENT CONNECTION SECTION 4

1" = 1'-0"



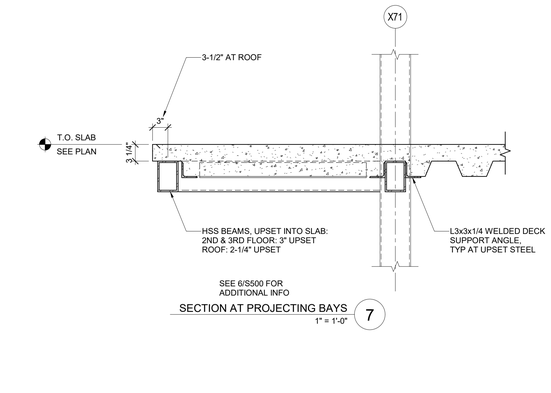
PLAN DETAIL @ BRICK CORNER 5

1" = 1'-0"



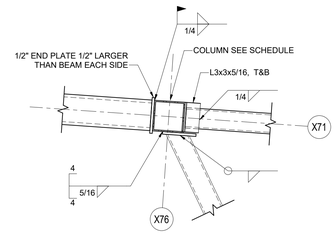
BAY WINDOW GEOMETRY - PART PLAN 6

1/2" = 1'-0"



SECTION AT PROJECTING BAYS 7

1" = 1'-0"

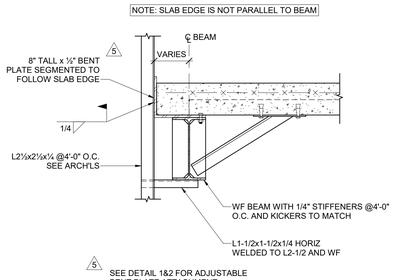


PLAN DETAIL

1" = 1'-0"

8

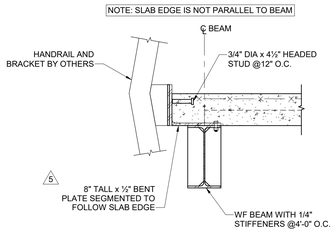
NOTE: SLAB EDGE IS NOT PARALLEL TO BEAM



SECTION AT LOCKERS 9

1" = 1'-0"

NOTE: SLAB EDGE IS NOT PARALLEL TO BEAM



SECTION AT HANDRAIL 10

1" = 1'-0"

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FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL
PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
7	9/12/2019	PR 12 REV1

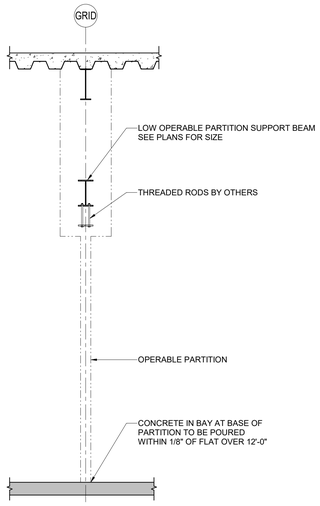
DRAWING NAME

SUPERSTRUCTURE
SECTIONS

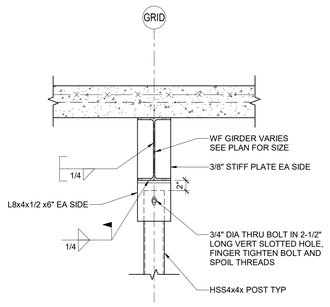
PROJECT NO. Project Number

DRAWING NO.

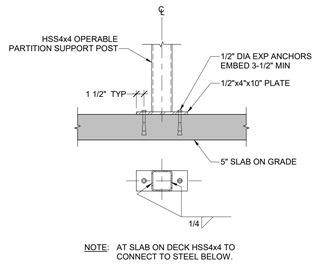
S500



TYPICAL OPERABLE PARTITION SUPPORT DETAIL 1
1/2" = 1'-0"

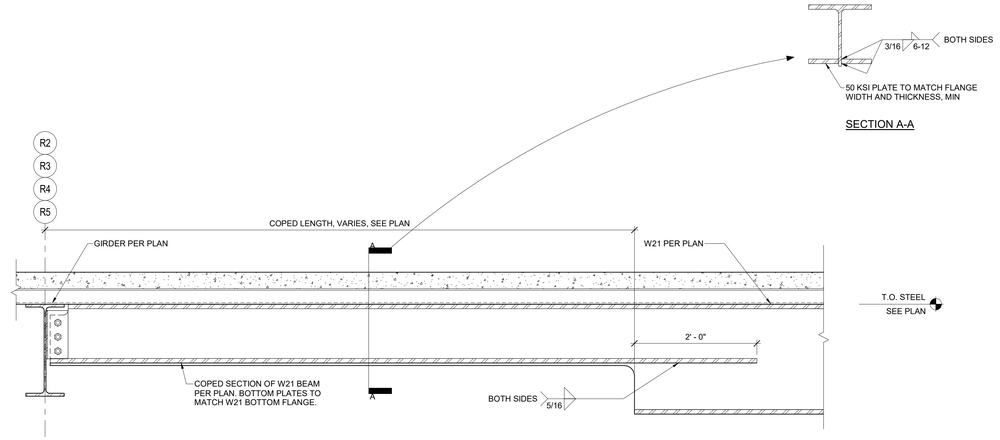


OPERABLE PARTITION SUPPORT POST DETAIL 2
1" = 1'-0"

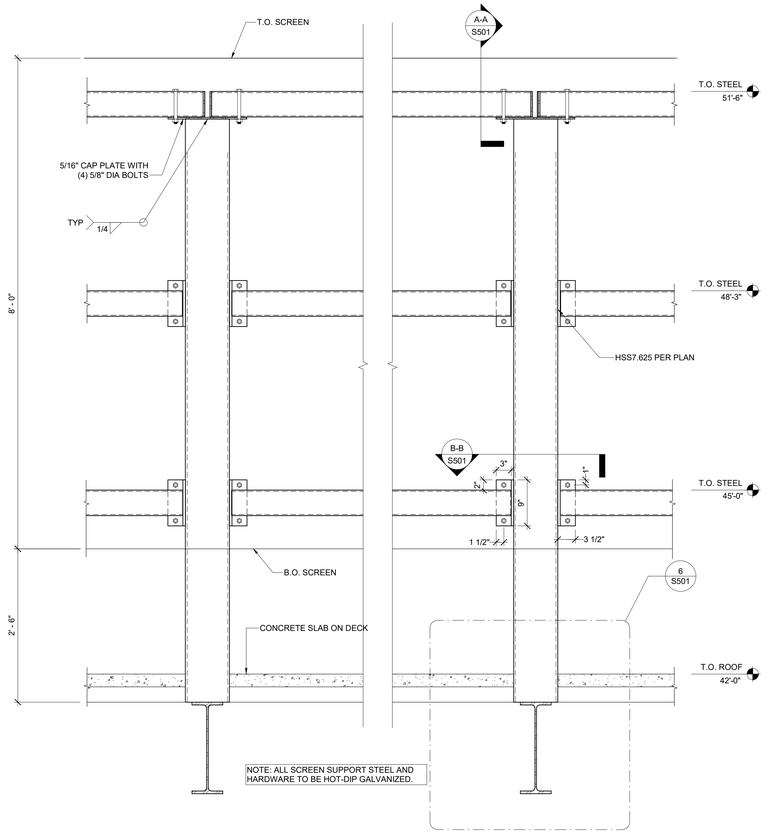


NOTE: AT SLAB ON DECK HSS4x4 TO CONNECT TO STEEL BELOW.

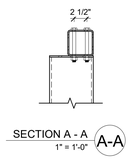
OPERABLE PARTITION BASE PLATE DETAIL 3
1" = 1'-0"



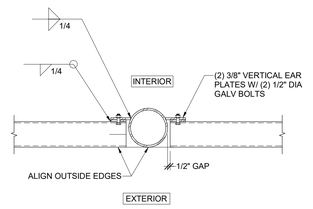
SECTION AT COPED BEAMS AT ATRIUM 4
1" = 1'-0"



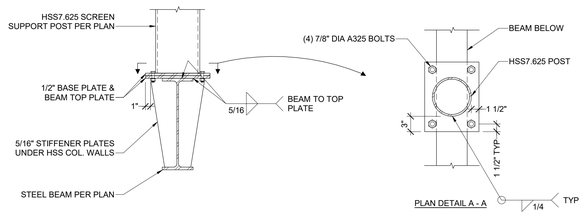
MECHANICAL SCREEN ELEVATION 5
1" = 1'-0"



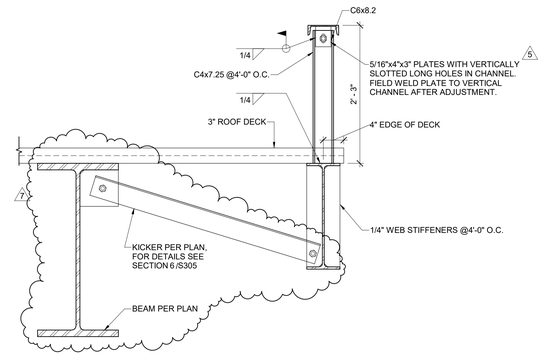
SECTION A - A A-A
1" = 1'-0"



PLAN DETAIL B - B B-B
1" = 1'-0"



MECHANICAL SCREEN POST BASE CONNECTION 6
1" = 1'-0"



SECTION AT SKYLIGHT CURB 7
1" = 1'-0"

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL
PACKAGE
AUGUST 09, 2019

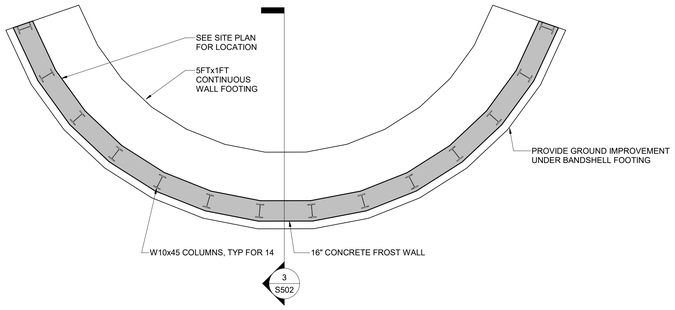
REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
7	9/12/2019	PR 12 REV1

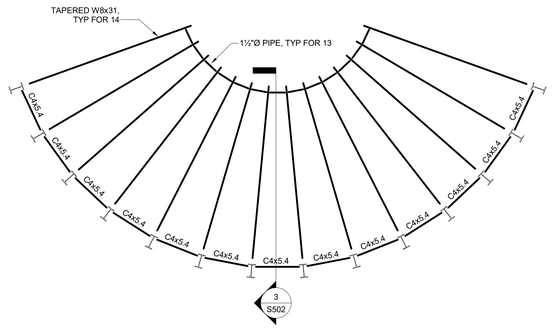
DRAWING NAME
SUPERSTRUCTURE
SECTIONS

PROJECT NO. Project Number

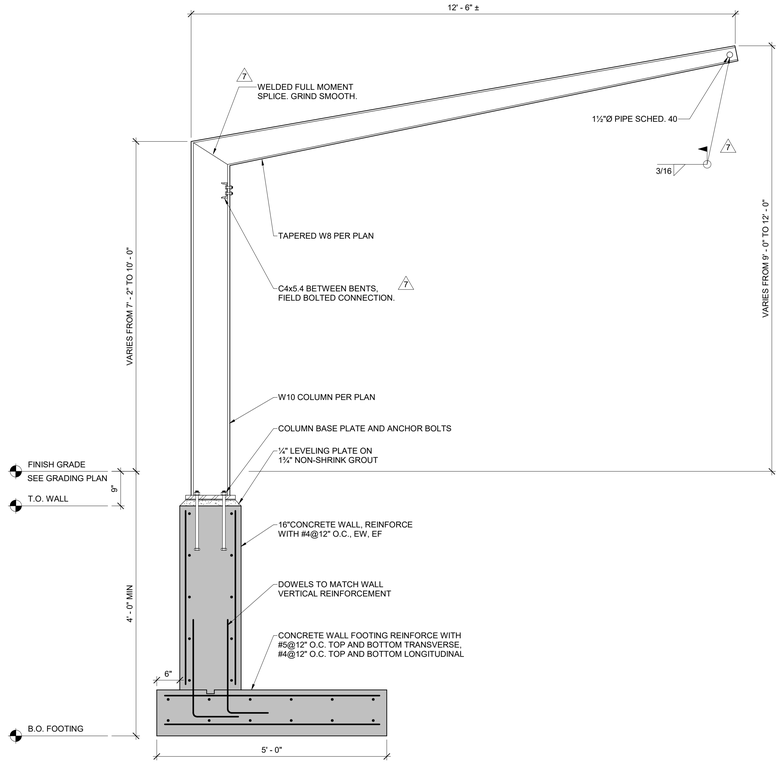
DRAWING NO.
S501



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

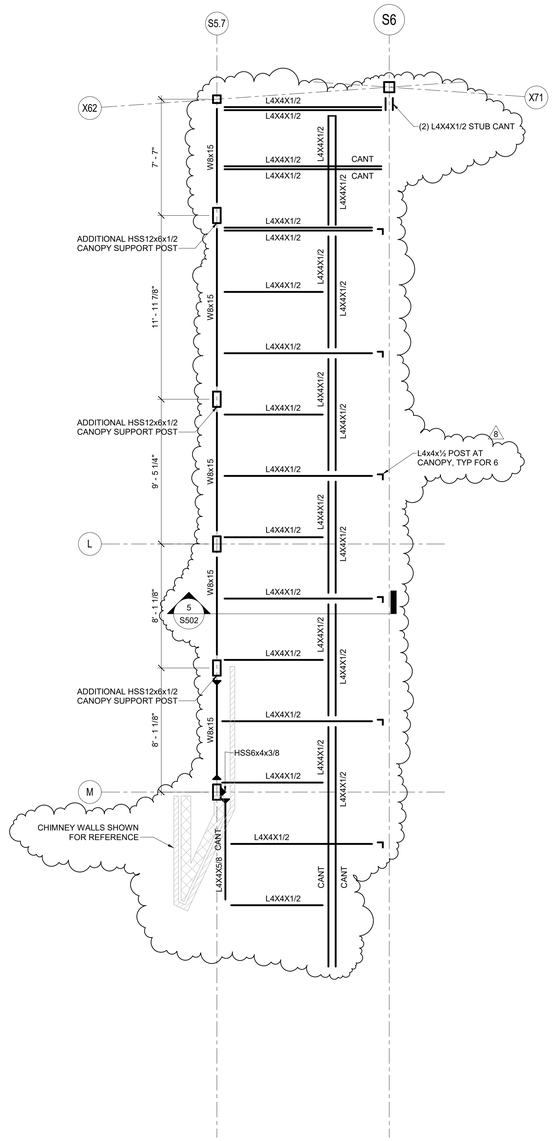


BANDSHELL FRAMING PLAN 2
1/4" = 1'-0"

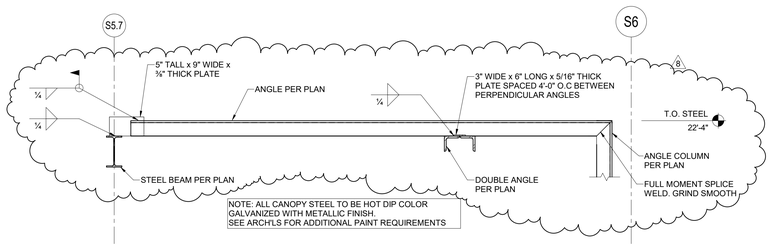


NOTE: ALL BANDSHELL STEEL TO BE HOT DIP GALVANIZED. SEE ARCH'LS FOR PAINT REQUIREMENTS.

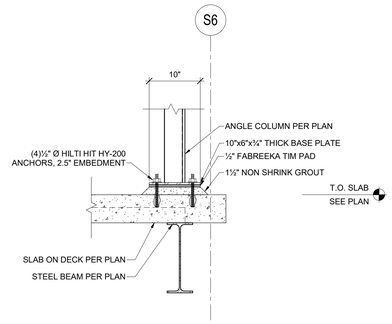
BANDSHELL SECTION 3
3/4" = 1'-0"



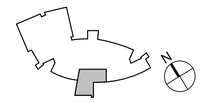
ENTRANCE CANOPY FRAMING PLAN 4
1/4" = 1'-0"



CANOPY SECTION 5
3/4" = 1'-0"



BASE CONNECTION AT CANOPY ANGLE COLUMN 6
1" = 1'-0"



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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
7	9/12/2019	PR 12 REV1
8	10/18/2019	EMP

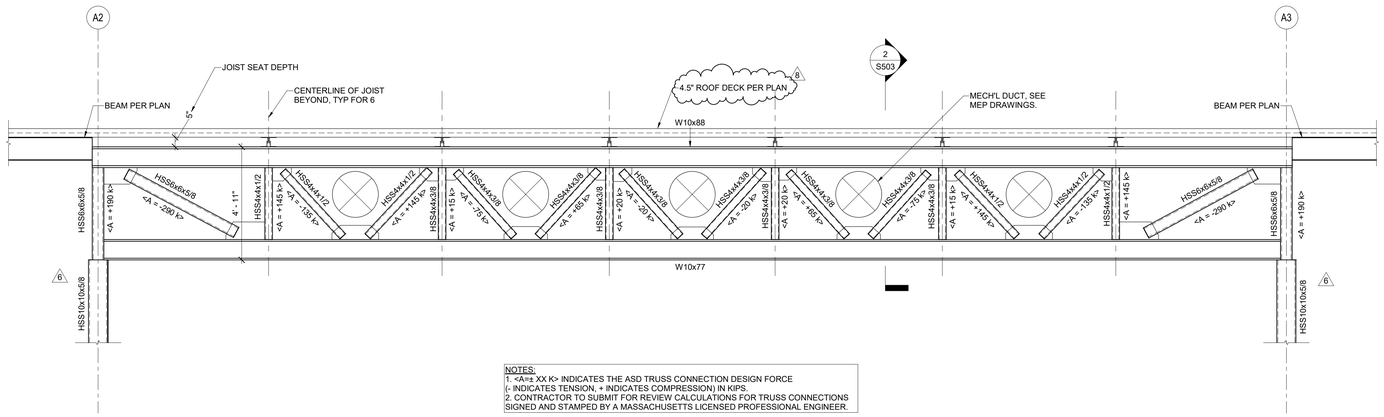
DRAWING NAME

BANDSHELL & ENTRANCE CANOPY DETAILS

PROJECT NO. Project Number

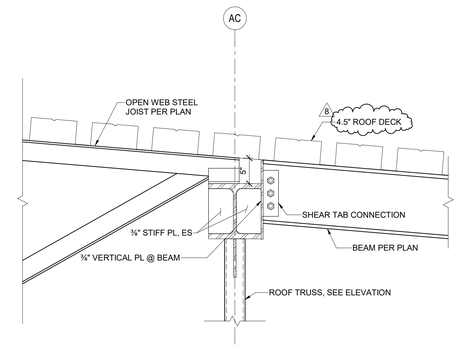
DRAWING NO.

S502

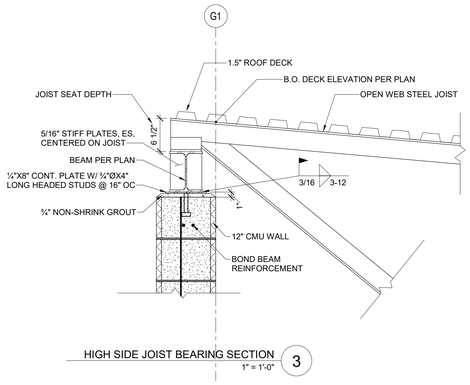


NOTES:
1. <A= XX K> INDICATES THE ASD TRUSS CONNECTION DESIGN FORCE
(- INDICATES TENSION, + INDICATES COMPRESSION) IN KIPS.
2. CONTRACTOR TO SUBMIT FOR REVIEW CALCULATIONS FOR TRUSS CONNECTIONS SIGNED AND STAMPED BY A MASSACHUSETTS LICENSED PROFESSIONAL ENGINEER.

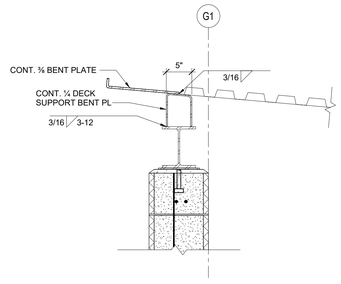
AUDITORIUM ROOF TRUSS ELEVATION 1
3/8" = 1'-0"



AUDITORIUM TRUSS SECTION 2
1" = 1'-0"

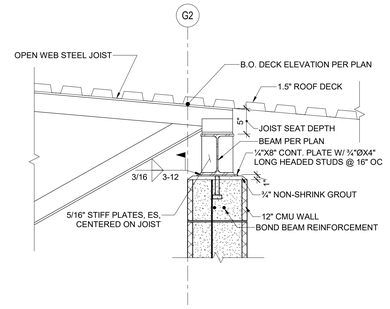


HIGH SIDE JOIST BEARING SECTION 3
1" = 1'-0"

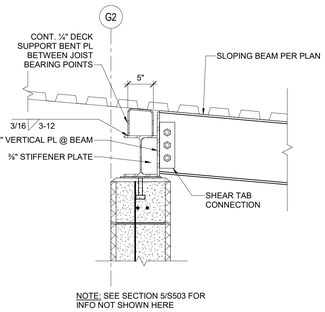


NOTE: SEE SECTION 3/S503 FOR INFO NOT SHOWN HERE

HIGH SIDE ROOF SECTION 4
1" = 1'-0"

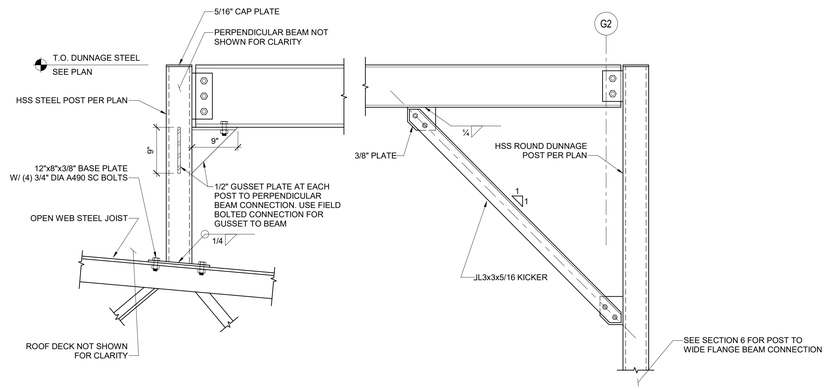


LOW SIDE JOIST BEARING SECTION 5
1" = 1'-0"

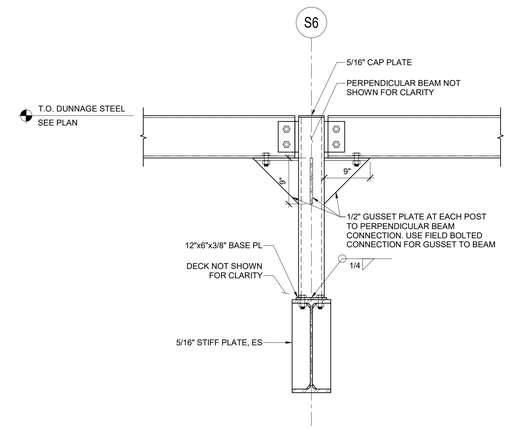


NOTE: SEE SECTION 5/S503 FOR INFO NOT SHOWN HERE

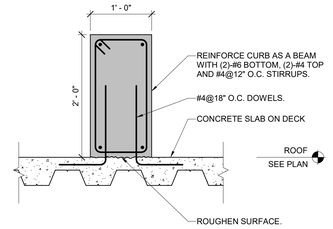
BEAM CONNECTION SECTION 6
1" = 1'-0"



GYM RTU DUNNAGE SECTION 7
1" = 1'-0"



DUNNAGE SECTION 8
1" = 1'-0"



RTU SUPPORT CURB SECTION 9
1" = 1'-0"

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

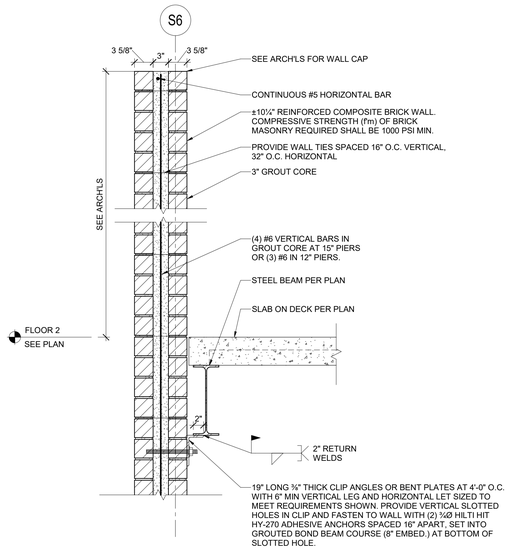
REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
6	9/09/2019	PR 12
8	10/18/2019	EMP

DRAWING NAME
SUPERSTRUCTURE SECTIONS

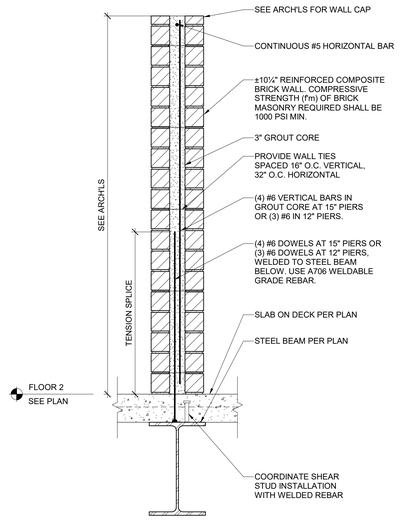
PROJECT NO. Project Number

DRAWING NO.
S503



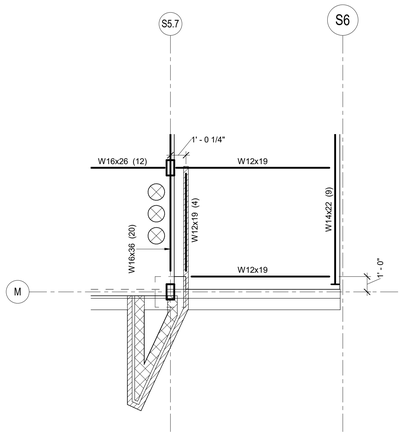
NOTES:
1. SEE ARCH'LS FOR EXTENT OF GROUTED CORE VS. PERFORATED AREAS
2. ALL REBAR TO BE EPOXY COATED

COMPOSITE BRICK PARAPET SECTION 1
1" = 1'-0"

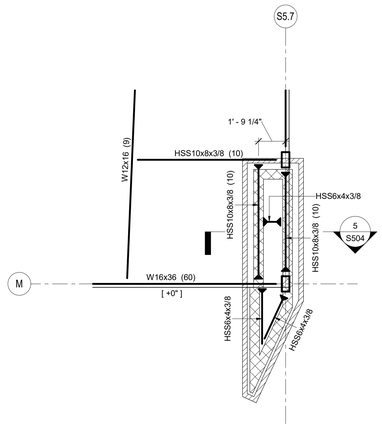


NOTES:
1. SEE ARCH'LS FOR EXTENT OF GROUTED CORE VS. PERFORATED AREAS
2. ALL REBAR TO BE EPOXY COATED

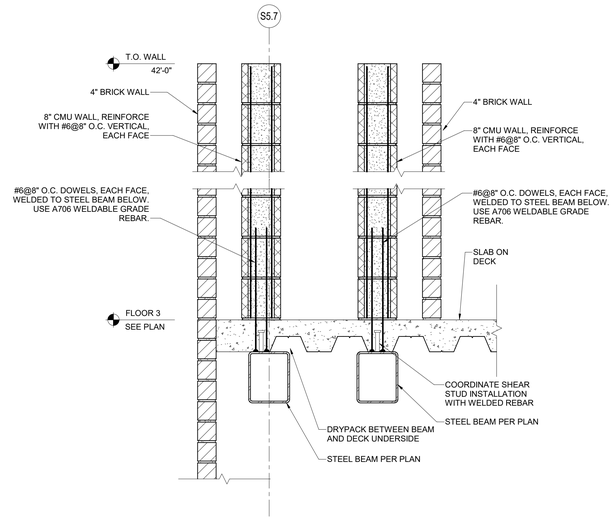
COMPOSITE BRICK PARAPET SECTION AT BEAM 2
1" = 1'-0"



CHIMNEY PART PLAN - FLOOR 2 3
1/4" = 1'-0"



CHIMNEY PART PLAN - FLOOR 3 4
1/4" = 1'-0"



CHIMNEY SECTION 5
1" = 1'-0"

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
EARLY MASONRY PACKAGE
OCTOBER 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
SUPERSTRUCTURE SECTIONS

PROJECT NO. Project Number

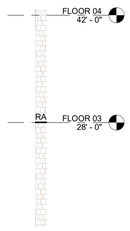
DRAWING NO.
S504

LEGEND:

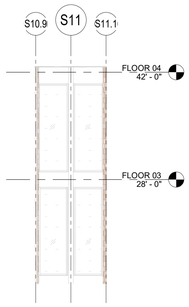
RA — INDICATES RELIEVING ANGLE SUPPORTED BY SLAB EDGE BENT PLATE OR HSS SPANDREL. SEE DETAILS ON S500.

LL — INDICATES STEEL LOOSE LINTEL PER SCHEDULE ON S000. HOT DIP GALVANIZE LINTELS IN EXTERIOR WALLS. 7 LL IN BRICK FACADE ONLY. OPENINGS IN CMU TO BE VIA BOND BEAM.

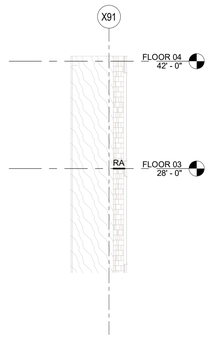
CLASSROOM ELEVATION - SOUTH 1
1/8" = 1'-0"



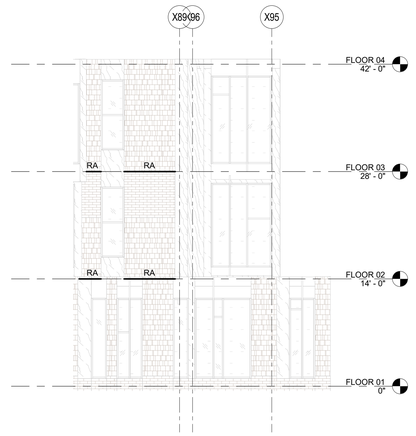
PARTIAL ELEVATION - SOUTH 3
1/8" = 1'-0"



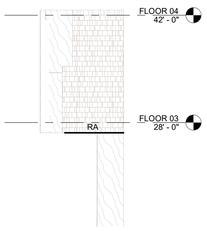
PARTIAL ELEVATION - SOUTH 4
1/8" = 1'-0"



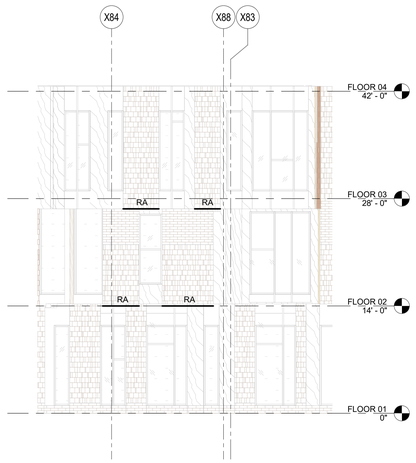
PARTIAL ELEVATION - SOUTH 5
1/8" = 1'-0"



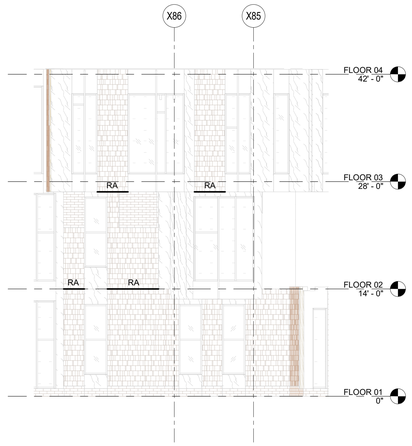
CLASSROOM ELEVATION SOUTH 6
1/8" = 1'-0"



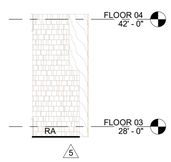
PARTIAL ELEVATION - SOUTH 8
1/8" = 1'-0"



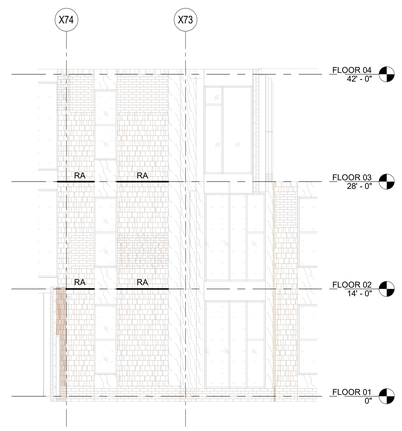
CLASSROOM ELEVATION - SOUTH 9
1/8" = 1'-0"



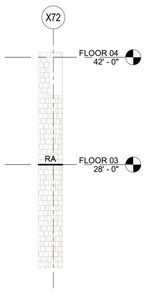
ELEVATION - SOUTH 15
1/8" = 1'-0"



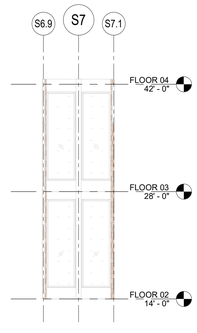
PARTIAL ELEVATION - SOUTH 17
1/8" = 1'-0"



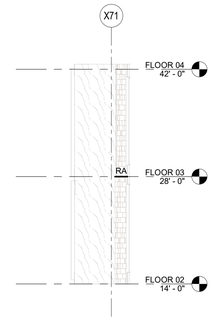
CLASSROOM ELEVATION - SOUTH 19
1/8" = 1'-0"



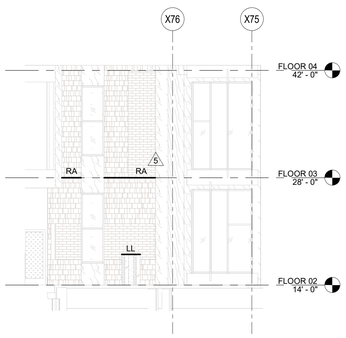
PARTIAL ELEVATION - SOUTH 21
1/8" = 1'-0"



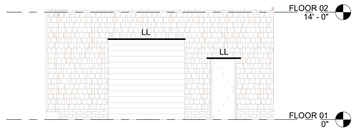
PARTIAL ELEVATION - SOUTH 22
1/8" = 1'-0"



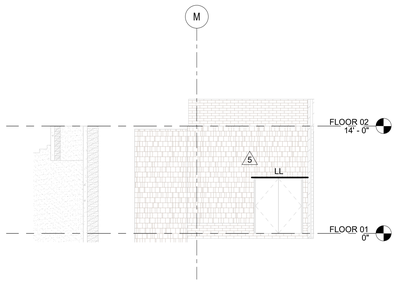
PARTIAL ELEVATION - SOUTH 23
1/8" = 1'-0"



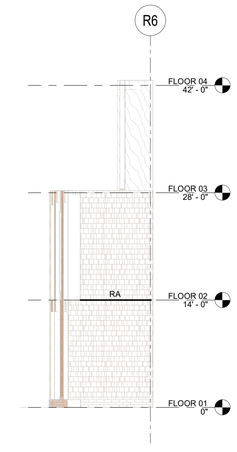
CLASSROOM ELEVATION - SOUTH 24
1/8" = 1'-0"



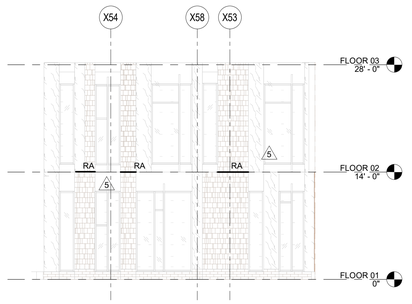
MAKER SPACE ELEVATION - SOUTH 26
1/8" = 1'-0"



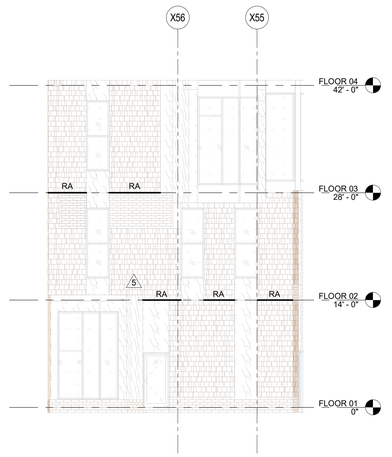
CUSTODIAN ELEVATION - SOUTH 30
1/8" = 1'-0"



PARTIAL ELEVATION - SOUTH 31
1/8" = 1'-0"



GUIDANCE OFFICE ELEVATION - SOUTH 32
1/8" = 1'-0"



RESOURCE ELEVATION - SOUTH 34
1/8" = 1'-0"

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FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
7	9/12/2019	PR 12 REV1

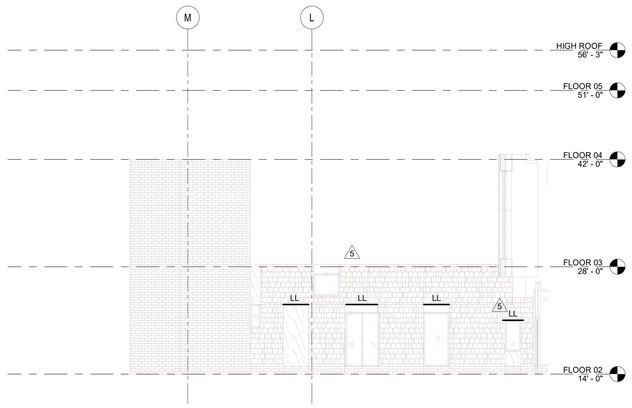
DRAWING NAME

EXTERIOR WALL ELEVATIONS

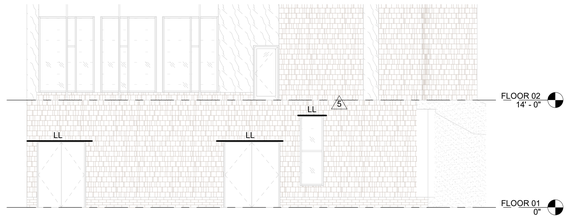
PROJECT NO. Project Number

DRAWING NO.

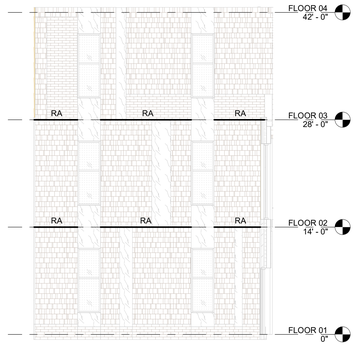
S600



ADMIN ELEVATION - SOUTH
1/8" = 1'-0"
1



ADMIN ELEVATION - SOUTH
1/8" = 1'-0"
4



TOILET ELEVATION - SOUTH
1/8" = 1'-0"
14

LEGEND:

RA — INDICATES RELIEVING ANGLE SUPPORTED BY SLAB EDGE BENT PLATE OR HSS SPANDREL. SEE DETAILS ON S500.

LL — INDICATES STEEL LOOSE LINTEL PER SCHEDULE ON S000. HOT DIP GALVANIZE LINTELS IN EXTERIOR WALLS.

7 — LL IN BRICK FACADE ONLY. OPENINGS IN CMU TO BE VIA BOND BEAM.

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31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
7	9/12/2019	PR 12 REV1

DRAWING NAME

EXTERIOR WALL ELEVATIONS

PROJECT NO. Project Number

DRAWING NO.

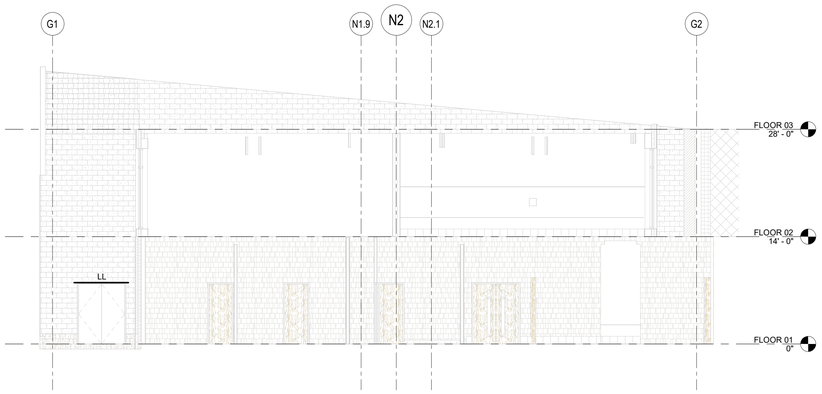
S601

LEGEND:

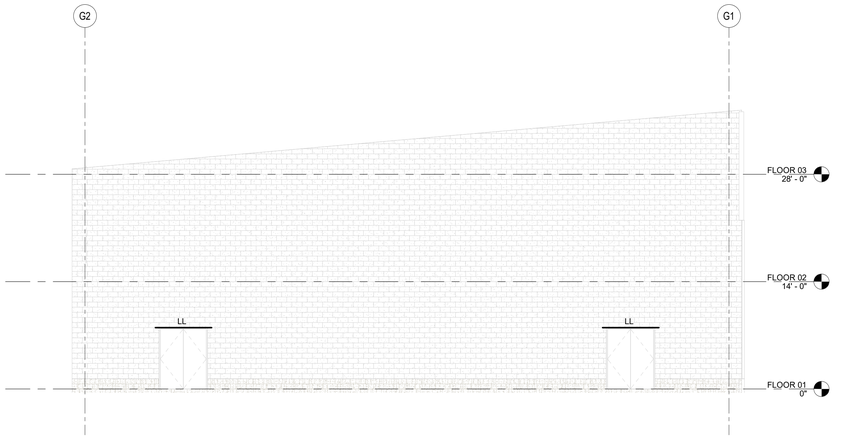
RA — INDICATES RELIEVING ANGLE SUPPORTED BY SLAB EDGE BENT PLATE OR HSS SPANDREL. SEE DETAILS ON S500.

LL — INDICATES STEEL LOOSE LINTEL PER SCHEDULE ON S000. HOT DIP GALVANIZE LINTELS IN EXTERIOR WALLS.

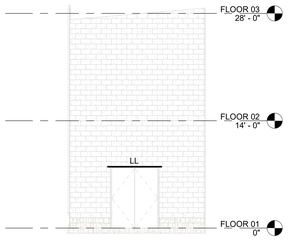
7 — LL IN BRICK FACADE ONLY. OPENINGS IN CMU TO BE VIA BOND BEAM.



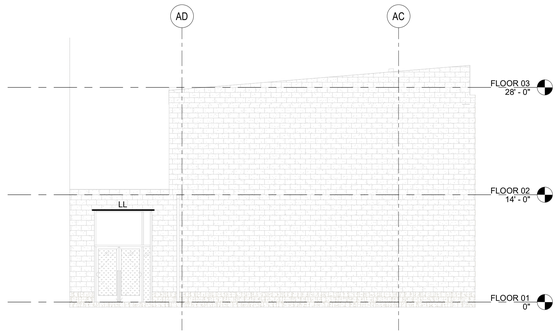
GYM ELEVATION - SOUTH 2
1/8" = 1'-0"



GYM ELEVATION - NORTH 4
1/8" = 1'-0"



GYM ELEVATION - NORTH 6
1/8" = 1'-0"



AUDITORIUM ELEVATION - EAST 8
1/8" = 1'-0"

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FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
7	9/12/2019	PR 12 REV1

DRAWING NAME

EXTERIOR WALL ELEVATIONS

PROJECT NO. Project Number

DRAWING NO.

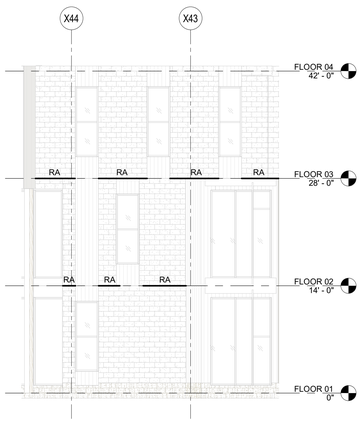
S602

LEGEND:

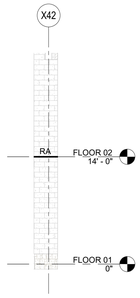
RA — INDICATES RELIEVING ANGLE SUPPORTED BY SLAB EDGE BENT PLATE OR HSS SPANDREL. SEE DETAILS ON S500.

LL — INDICATES STEEL LOOSE LINTEL PER SCHEDULE ON S000. HOT DIP GALVANIZE LINTELS IN EXTERIOR WALLS.

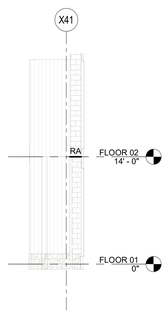
7 — LL IN BRICK FACADE ONLY. OPENINGS IN CMU TO BE VIA BOND BEAM.



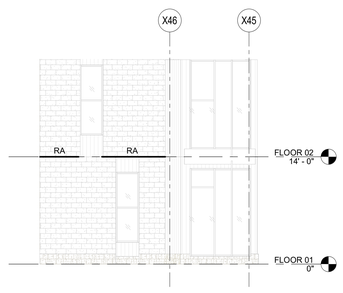
CLASSROOM ELEVATION - NORTH 3
1/8" = 1'-0"



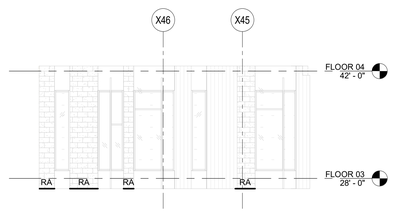
PARTIAL ELEVATION - NORTH 4
1/8" = 1'-0"



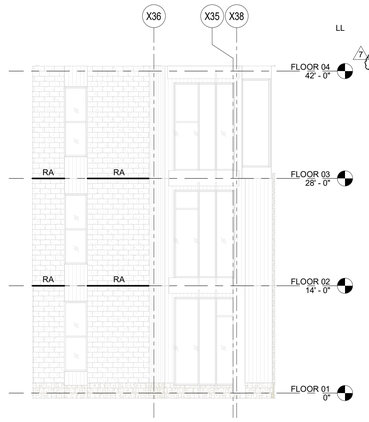
PARTIAL ELEVATION - NORTH 6
1/8" = 1'-0"



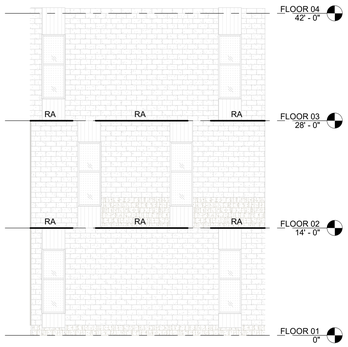
CLASSROOM ELEVATION - NORTH 7
1/8" = 1'-0"



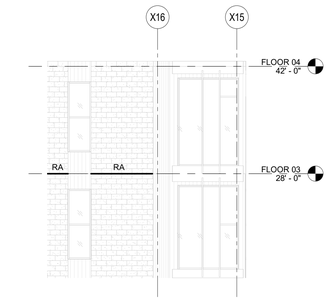
OFFICE ELEVATION - NORTH 10
1/8" = 1'-0"



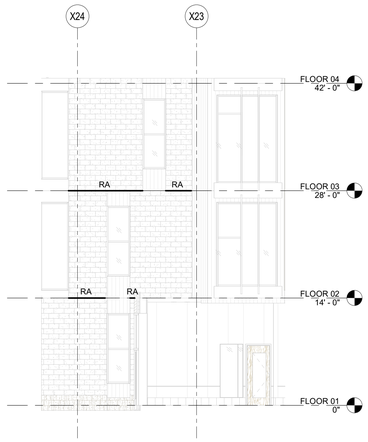
CLASSROOM ELEVATION - NORTH 19
1/8" = 1'-0"



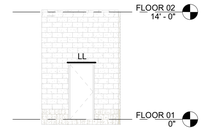
TOILET ELEVATION - NORTH 22
1/8" = 1'-0"



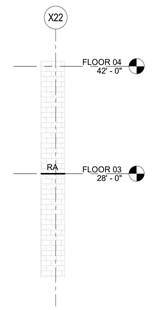
CLASSROOM ELEVATION - NORTH 23
1/8" = 1'-0"



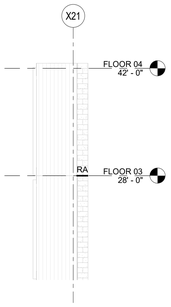
CLASSROOM ELEVATION - NORTH 26
1/8" = 1'-0"



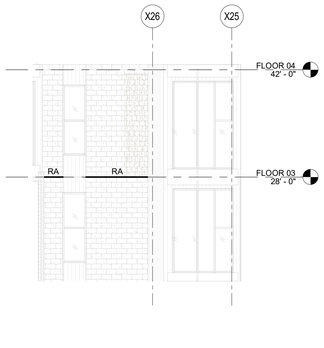
PARTIAL ELEVATION - NORTH 28
1/8" = 1'-0"



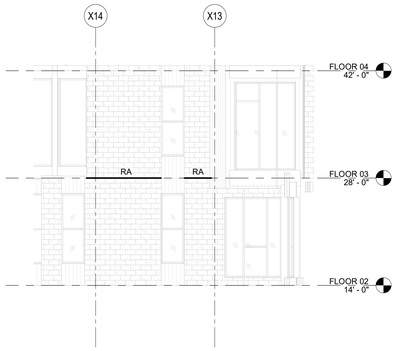
PARTIAL ELEVATION - NORTH 30
1/8" = 1'-0"



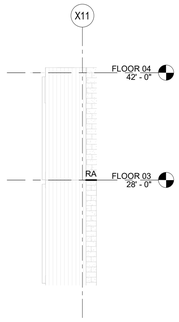
PARTIAL ELEVATION - NORTH 32
1/8" = 1'-0"



CLASSROOM ELEVATION - NORTH 33
1/8" = 1'-0"



BAND ELEVATION - NORTH 43
1/8" = 1'-0"



PARTIAL ELEVATION - NORTH 47
1/8" = 1'-0"

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FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
7	9/12/2019	PR 12 REV1

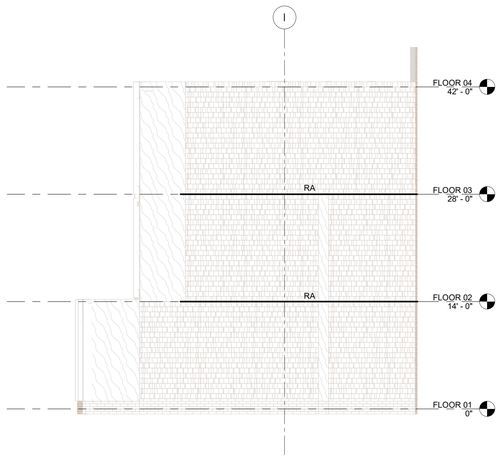
DRAWING NAME

EXTERIOR WALL ELEVATIONS

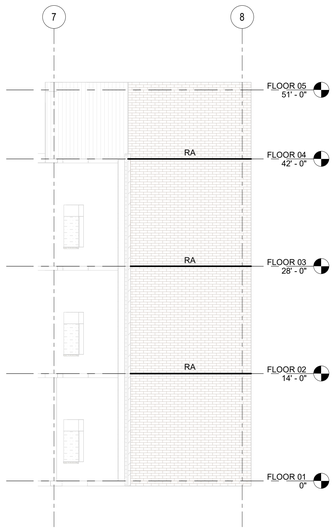
PROJECT NO. Project Number

DRAWING NO.

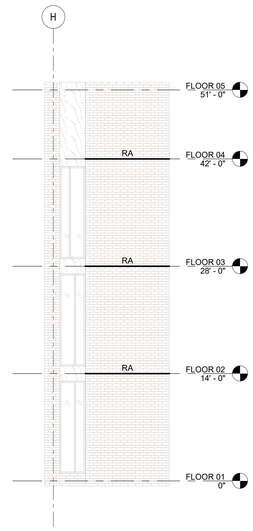
S603



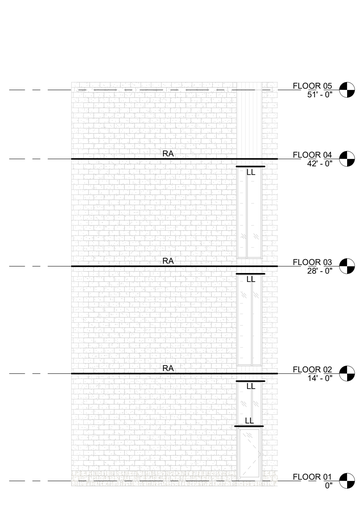
ENTRANCE ELEVATION - EAST 1
1/8" = 1'-0"



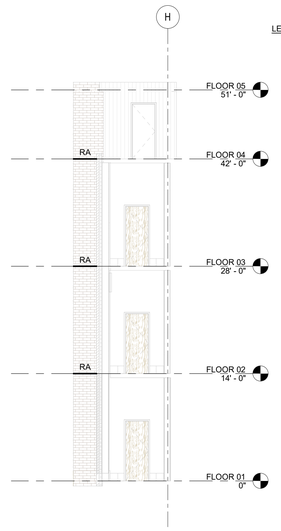
ENTRANCE ELEVATION - EAST 2
1/8" = 1'-0"



ENTRANCE ELEVATION - EAST 3
1/8" = 1'-0"



ENTRANCE ELEVATION - EAST 4
1/8" = 1'-0"



ENTRANCE ELEVATION - EAST 5
1/8" = 1'-0"

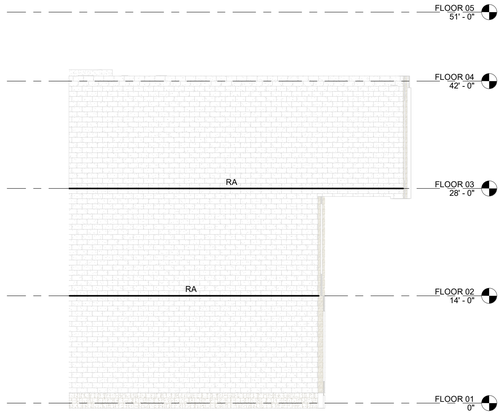
LEGEND:

RA INDICATES RELIEVING ANGLE SUPPORTED BY SLAB EDGE BENT PLATE OR HSS SPANDREL. SEE DETAILS ON S500.

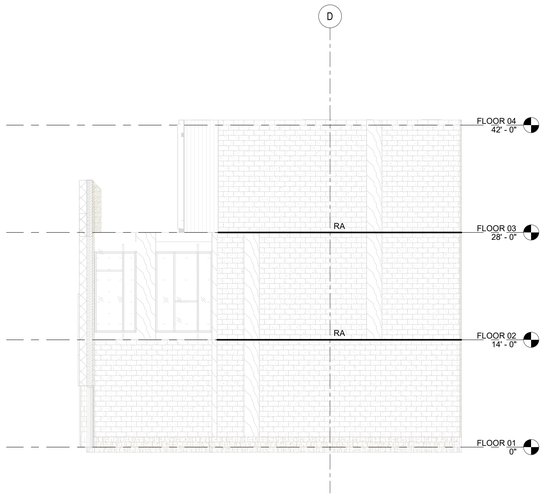
LL INDICATES STEEL LOOSE LINTEL PER SCHEDULE ON S000. HOT DIP GALVANIZE

7 LINTELS IN EXTERIOR WALLS
LL IN BRICK FACADE ONLY. OPENINGS IN CMU TO BE VIA BOND BEAM.

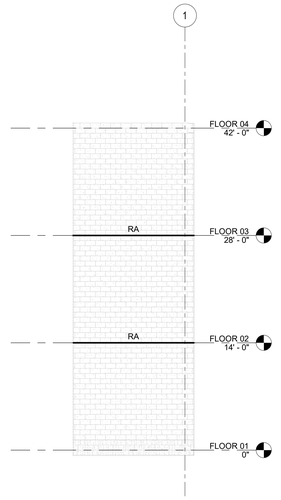
ENTRANCE ELEVATION - EAST 6
1/8" = 1'-0"



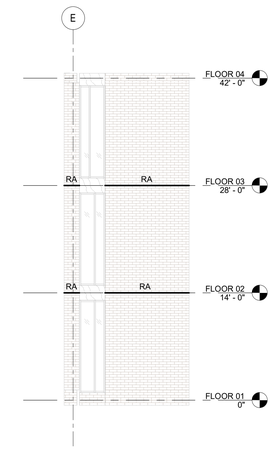
ENTRANCE ELEVATION - EAST 8
1/8" = 1'-0"



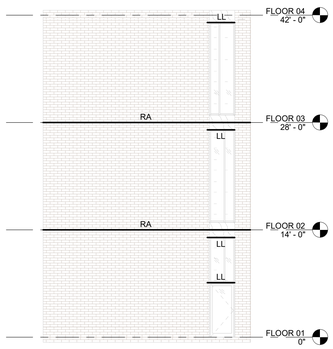
ENTRANCE ELEVATION - WEST 9
1/8" = 1'-0"



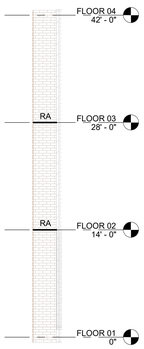
ENTRANCE ELEVATION - WEST 10
1/8" = 1'-0"



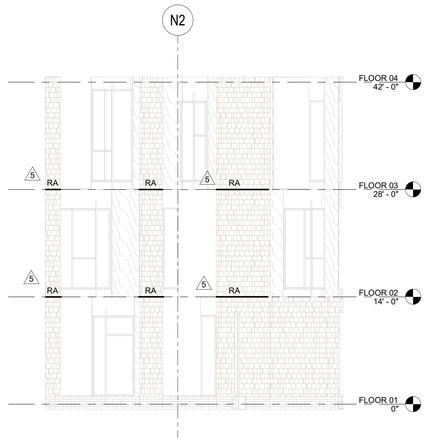
ENTRANCE ELEVATION - WEST 11
1/8" = 1'-0"



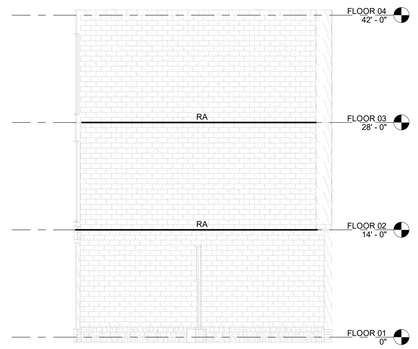
ENTRANCE ELEVATION - WEST 12
1/8" = 1'-0"



ENTRANCE ELEVATION - WEST 13
1/8" = 1'-0"



ENTRANCE ELEVATION - WEST 14
1/8" = 1'-0"



ENTRANCE ELEVATION - WEST 17
1/8" = 1'-0"

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FULLER SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY CONCRETE & STEEL PACKAGE
AUGUST 09, 2019

REVISIONS

No.	Date	Description
5	8/27/2019	Addend. 4
7	9/12/2019	PR 12 REV1

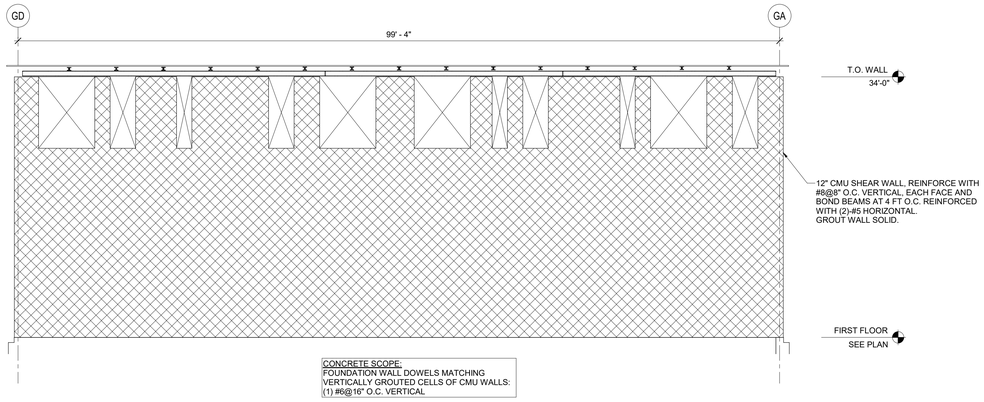
DRAWING NAME
EXTERIOR WALL ELEVATIONS

PROJECT NO. Project Number

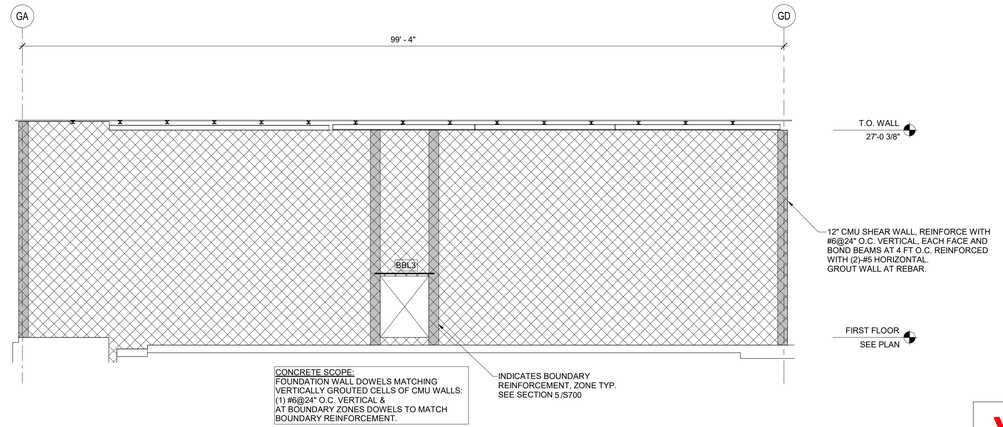
DRAWING NO.
S604

LEGEND:

BBLx — INDICATES 12" CMU BOND BEAM LINTEL. FOR SIZE AND REINFORCEMENT, SEE DETAIL



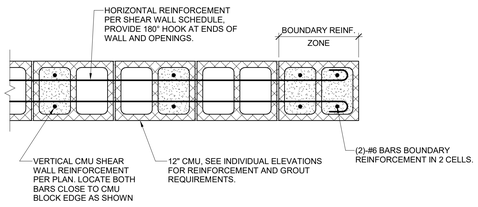
CMU SHEAR WALL ELEVATION AT GRID G1 — 1/8" = 1'-0" — 1



CMU SHEAR WALL ELEVATION AT GRID G2 — 1/8" = 1'-0" — 2

CMU SHEAR WALL ELEVATION AT GRID GD — 1/8" = 1'-0" — 3

CMU SHEAR WALL ELEVATION AT GRID GA — 1/8" = 1'-0" — 4



NOTE: SEE CMU SHEAR WALL ELEVATIONS FOR LOCATIONS WHERE BOUNDARY REINFORCEMENT IS REQUIRED.

BOUNDARY CONDITION AT CMU SHEAR WALLS — 1" = 1'-0" — 5

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FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY MASONRY PACKAGE

OCTOBER 18, 2019

REVISIONS

No.	Date	Description

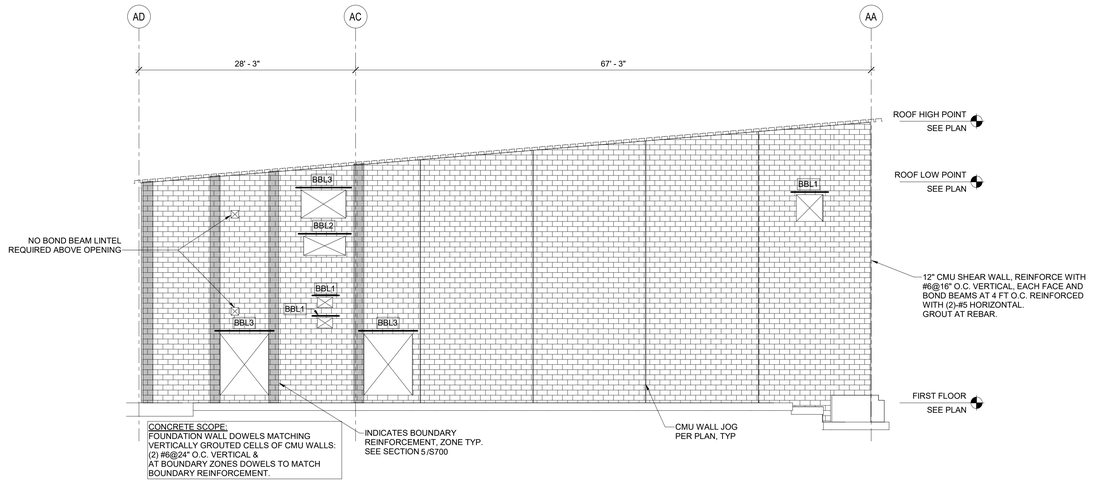
DRAWING NAME

CMU SHEAR WALL ELEVATIONS AT GYM

PROJECT NO. Project Number

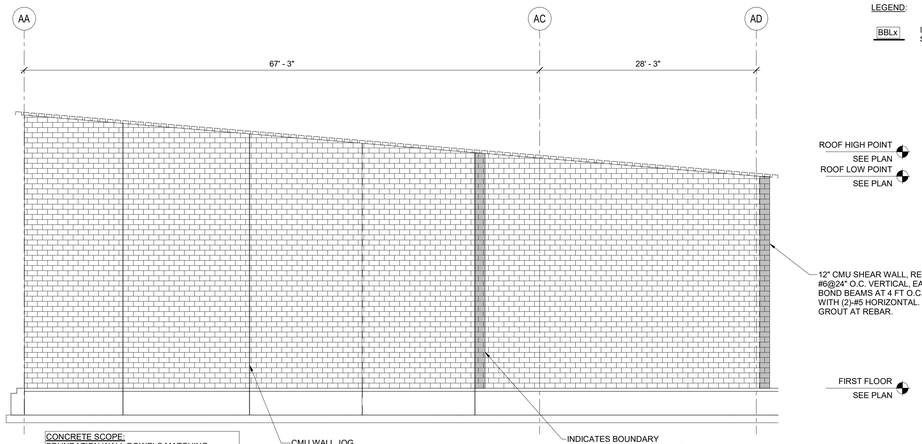
DRAWING NO.

S700



CMU SHEAR WALL ELEVATION AT GRID A1 — 1

1/8" = 1'-0"

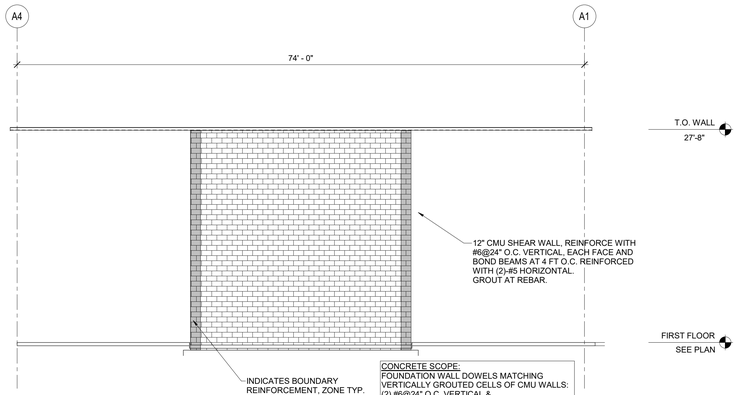


CMU SHEAR WALL ELEVATION AT GRID A4 — 2

1/8" = 1'-0"

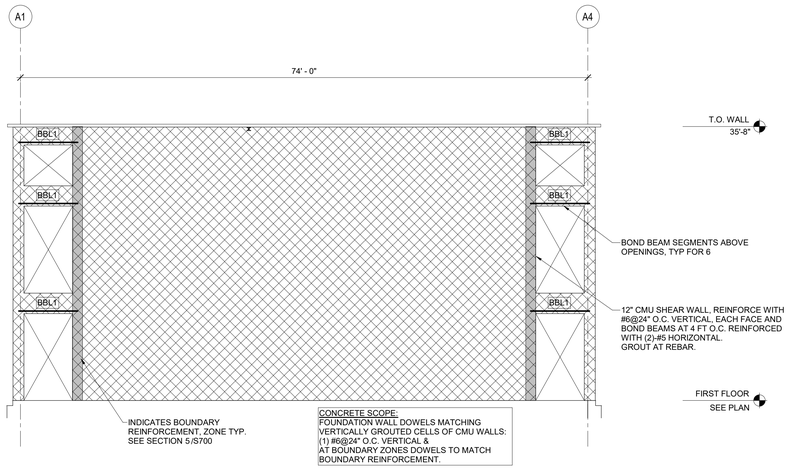
LEGEND:

BBLx — INDICATES 12" CMU BOND BEAM LINTEL. FOR SIZE AND REINFORCEMENT, SEE DETAIL



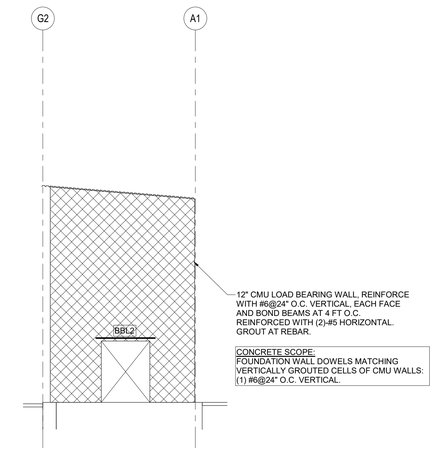
CMU SHEAR WALL ELEVATION AT GRID AA — 3

1/8" = 1'-0"



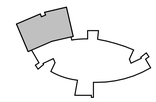
CMU SHEAR WALL ELEVATION AT GRID AD — 4

1/8" = 1'-0"



CMU LOAD BEARING WALL ELEVATION AT "WEDGE" — 5

1/8" = 1'-0"



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FULLER SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

EARLY MASONRY PACKAGE

OCTOBER 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

CMU SHEAR WALL ELEVATIONS AT AUDITORIUM

PROJECT NO. Project Number

DRAWING NO.

S701

FIRE PROTECTION LEGEND

WS	WS	WET SPRINKLER PIPE
SD	SD	SPRINKLER DRAIN
SP	SP	STAND PIPE
X		HYDRAULIC REFERENCE POINT
		UPRIGHT SPRINKLER HEAD
		CONCEALED PENDENT SPRINKLER HEAD
		INTERMEDIATE LEVEL PENDANT SPRINKLER HEAD
		EXTENDED COVERAGE (8.1 K) UPRIGHT SPRINKLER HEAD WITH 286°F TEMPERATURE RATING
DRY		DRY HORIZONTAL SIDEWALL SPRINKLER HEAD
		HORIZONTAL SIDEWALL SPRINKLER HEAD
DRY		DRY PENDENT SPRINKLER HEAD
NS		NO SPRINKLERS
AB	AB	ELECTRIC ALARM BELL
DC	DC	DRESSER COUPLING
	WTS	WATER TIGHT SLEEVE
		RISER PIPE (THRU FLOOR OR CEILING)
CAP	CAP	CAPPED PIPE
TS	OSY	OS&Y VALVE WITH SUPERVISORY TAMPER SWITCH
	CV	CHECK VALVE
FS	FS	FLOW SWITCH
	FDV	FIRE DEPARTMENT VALVE W/ KNOX SECURE CAP
	DCVA	DOUBLE CHECK VALVE ASSEMBLY
	FCVA	FLOOR CONTROL VALVE ASSEMBLY
	WRCV	WET RISER CHECK VALVE
	FDC	STORZ FIRE DEPARTMENT CONNECTION

NTS	NOT TO SCALE
TYP	TYPICAL
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
GC	GENERAL CONTRACTOR
FPC	FIRE PROTECTION CONTRACTOR

FIRE PROTECTION NOTES

1. FOLLOW THE LATEST REQUIREMENTS OF NFPA, THE MASSACHUSETTS STATE BUILDING CODE AND THOSE OF ANY 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. PROVIDE A NEW FLOW TEST AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION AND NFPA. USE THE RESULTS OF THE NEW HYDRANT FLOW TEST TO HYDRAULICALLY DESIGN THE SPRINKLER SYSTEMS WITHIN THE BUILDING.

7. THE SPRINKLER CONTRACTOR SHALL PROVIDE AS PART OF THIS CONTRACT ALL SPRINKLERS BELOW FIXED OBSTRUCTIONS 48" AND LARGER AS REQUIRED BY NFPA 13, 8.6.5.3.3. IT IS THE RESPONSIBILITY OF THE SPRINKLER CONTRACTOR TO PROVIDE THE REQUIRED SPRINKLERS AND ALL ASSOCIATED PIPING, FITTINGS, HANGERS, ETC. FOR A COMPLETE INSTALLATION.

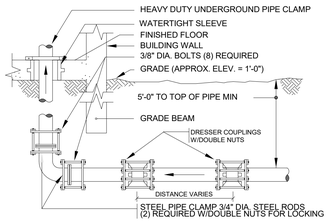
8. THE SPRINKLER CONTRACTOR SHALL PROVIDE AS PART OF HIS CONTRACT AN INSPECTOR'S TEST STATION ON EACH SPRINKLER ZONE. THE INSPECTOR'S TEST STATION WILL BE LOCATED AT THE MOST HYDRAULICALLY REMOTE PART OF EACH ZONE AND SHALL BE IDENTIFIED ON THE SPRINKLER SHOP DRAWINGS.

9. REFER TO NFPA 13 TABLE 8.3.2.5(a) FOR TEMPERATURE RATING OF SPRINKLERS BASED ON DISTANCE FROM HEAT SOURCES SUCH AS HEATING DUCTS, DIFFUSERS AND UNIT HEATERS.

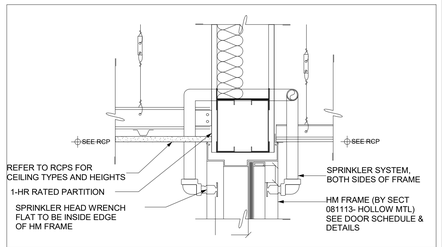
10. PROVIDE AUXILIARY DRAINS AT ALL LOW POINTS PER NFPA 13, SECTION 8.16.2.5.

11. DESIGN CRITERIA

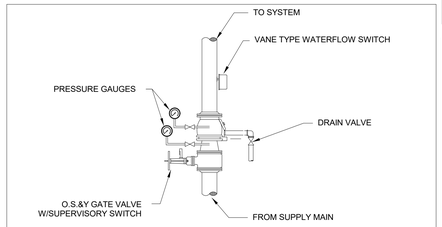
A. SPRINKLER SYSTEMS SHALL BE HYDRAULICALLY DESIGNED AND CALCULATED BY THE FIRE PROTECTION CONTRACTOR. THE FIRE PROTECTION CONTRACTOR SHALL SUBMIT ALL REQUIRED HYDRAULIC CALCULATIONS TO PROVE THE HYDRAULICALLY MOST REMOTE AREAS ARE BEING PROTECTED PER SYSTEM AND OCCUPANCY HAZARD. FABRICATION DRAWINGS 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.



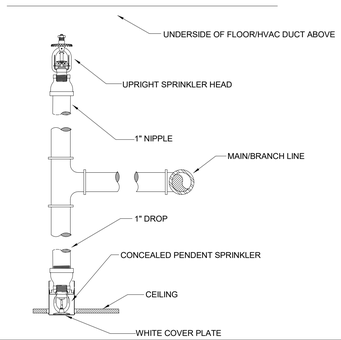
WATER SERVICE ENTRANCE — NO SCALE



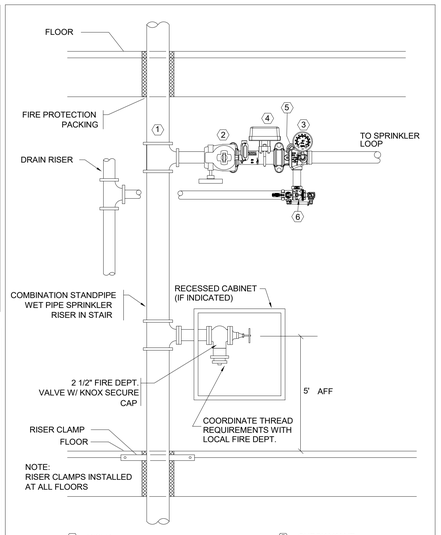
SPRINKLER AT GLASS WALLS DETAIL — NO SCALE



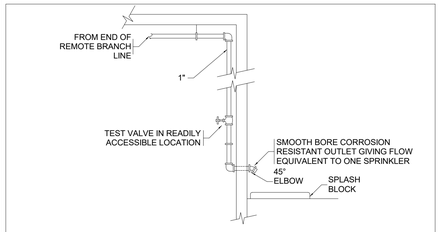
WET RISER CHECK VALVE — NO SCALE



UP AND DOWN SPRINKLER CONNECTION — NO SCALE

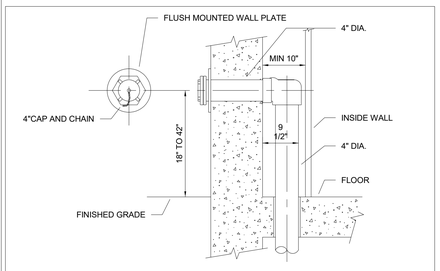


FIRE DEPARTMENT AND FLOOR CONTROL VALVES — NO SCALE

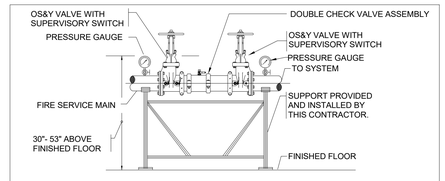


NOTE: NOT LESS THAN 4 FEET OF EXPOSED TEST PIPE IN WARM ROOM BEYOND VALVE WHERE PIPE EXTENDS THROUGH WALL TO OUTSIDE.

INSPECTOR'S TEST CONNECTION (WET PIPE) — NO SCALE

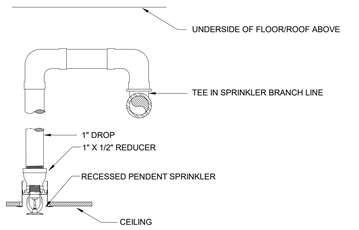


FIRE DEPARTMENT CONNECTION - STORZ — NO SCALE

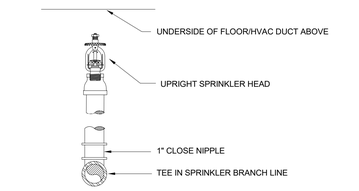


NOTES:
1. FURNISH TO OWNER ONE TEST KIT AND SPARE PARTS KIT.
2. THIS CONTRACTOR SHALL ACT AS THE OWNERS AGENT IN SEEKING APPROVAL FROM ALL LOCAL AND STATE AUTHORITIES. THIS CONTRACTOR SHALL SUBMIT ALL PLANS, SPECS. AND APPLICATIONS REQUIRED FOR APPROVAL AND PAY ALL FEES.
3. SEE FLOOR PLANS FOR SIZES.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

DOUBLE CHECK BACKFLOW PREVENTER DIAGRAM — NO SCALE

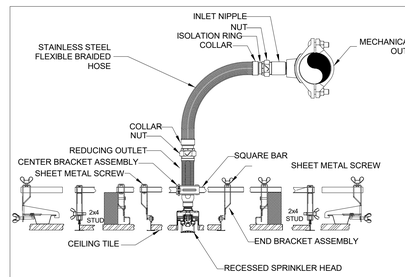


PENDENT SPRINKLER CONNECTION (RECESSED) — NO SCALE



NOTE:
METAL CAGES TO BE INSTALLED FOR UPRIGHTS LOCATED IN MECHANICAL ROOM.

UPRIGHT SPRINKLER CONNECTION — NO SCALE



FLEXIBLE SPRINKLER CONNECTION (RECESSED) — NO SCALE

FLOW TEST DATA	
STATIC PRESSURE	87 PSI
RESIDUAL PRESSURE	78 PSI
FLOW	1048 GPM
DATE & TIME	10/31/2018 @ 31 FLAGG DRIVE

SPRINKLER SYSTEM DESIGN CRITERIA			
	GENERAL CLASS ROOMS, OFFICE AREA, AUDITORIUM, CAFETERIA, REST ROOMS, CORRIDORS, LIBRARY (EXCEPT STACK ROOMS), ETC.	STORAGE, UTILITY, MECHANICAL & ELECTRICAL ROOMS, KITCHEN, SCIENCE LABS, GYM, ETC.	GYM STORAGE, STAGE ETC.
CLASSIFICATION	LIGHT HAZARD	ORDINARY HAZARD GP-1	ORDINARY HAZARD GP-2
DENSITY	0.10 GPM/SQ.FT	0.15 GPM/SQ.FT	0.20 GPM/SQ.FT
DESIGN AREA	1500 SQ.FT	1500 SQ.FT	1500 SQ.FT
MAX. COVERAGE	225 SQ.FT	130 SQ.FT	130 SQ.FT
HOSE ALLOWANCE	100 GPM	250 GPM	250 GPM

JLA
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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CONSTRUCTION DOCUMENTS
10/18/2019

REVISIONS

No.	Date	Description

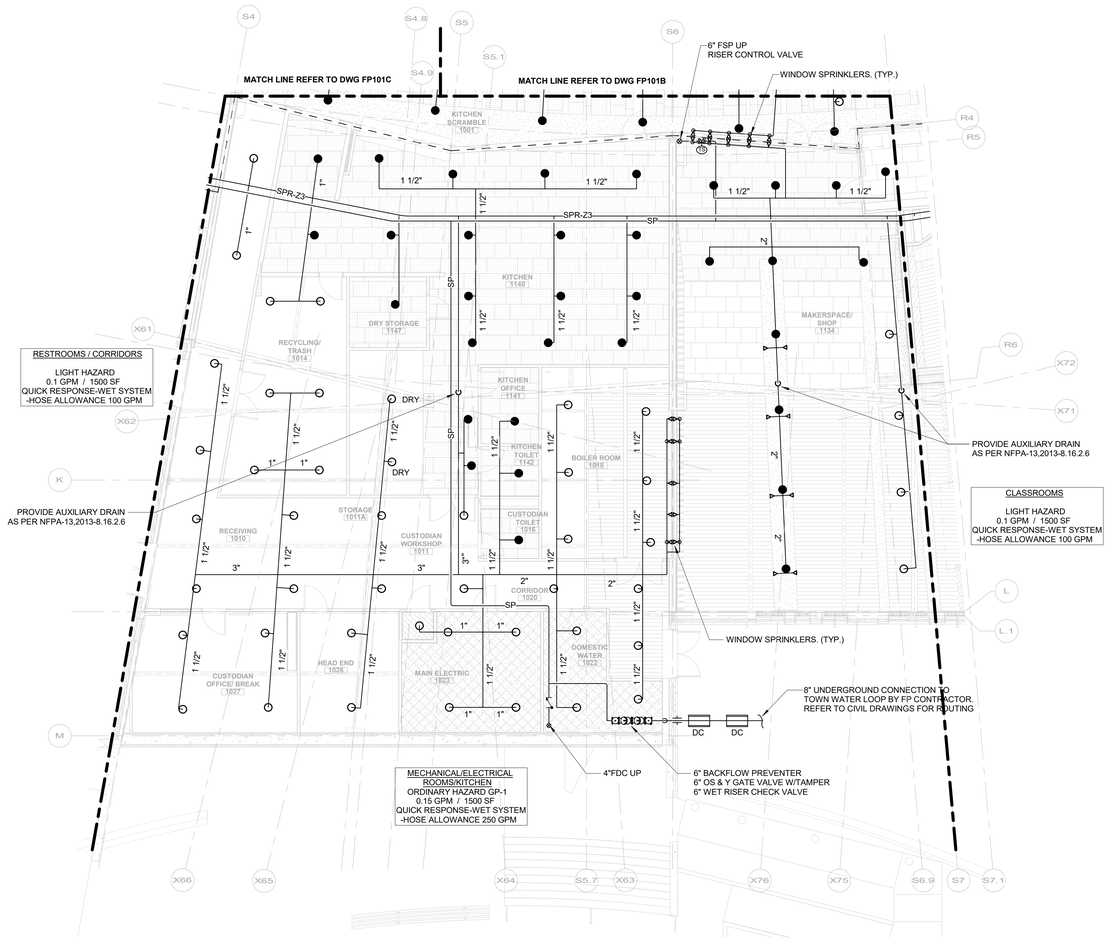
DRAWING NAME

LEGEND, SCHEDULES, AND DETAILS

PROJECT NO. 1722

DRAWING NO.

FP001



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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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10/18/2019

REVISIONS

No.	Date	Description
	Date 2	Revision 2

DRAWING NAME

FIRST FLOOR RCP - FIRE PROTECTION A

PROJECT NO. 1722

DRAWING NO.

FP101A

OPEN TO ABOVE

MATCH LINE REFER TO DWG FP101C

MATCH LINE REFER TO DWG FP101A

SPR-Z1

SPR-Z2

SPR-Z3

SP

DRY

UP & DN SPRINKLERS. (TYP.)

ATRIUM SPRINKLER ZONE 2

3"SD DP TO 18" ABOVE GRADE SPILL TO CONCRETE SPLASHBLOCK

6"FSP UP
RISER CONTROL VALVE
2 1/2"FDVC
3"SD UP
SCVA-Z3

6" FSP UP
RISER CONTROL VALVE

SPRINKLER ZONE 1

SPRINKLER ZONE 3

MEDIA 1240
CLASSROOM 1244
MEDIA 1242
CORRIDOR 1000
TOILET 1250
STORAGE 1253
TOILET 1256
CUSTODIAN CLOSET 1257
EMERGENCY ELECTRIC 1258
SPED-TOILET 1252
SPED-CLASSROOM 1260
SPED-CLASSROOM 1264
STAIR 3 1070
CAFETERIA/ LEARNING COMMON 1055
BREAKOUT 1038
BREAKOUT 1048
CORRIDOR 1000
CLASSROOM-TP 1122
ELECTRIC 1127
CORRIDOR 1121
WORKROOM 1120
GUIDANCE-STORAGE 1121A
GUIDANCE-OFFICE 1126
CORRIDOR 1121
GUIDANCE-OFFICE 1125
SPED-READING 1128B
SPED-READING 1128A
SPED-RESOURCE 1128C
CLASSROOM-ELL 1130
OFFICE-DEPT 1123
OFFICE-DEPT 1124
SCIENCE-CLASSROOM 1114
SCIENCE-PREP 1115A
SCIENCE-CLASSROOM 1110
SCIENCE-TP 1112
STAIR 1 1005
CORRIDOR 1000

CLASSROOMS

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

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31 FLAGG DRIVE FRAMINGHAM, MA

PROJECT STATUS

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10/18/2019

REVISIONS

No.	Date	Description
	Date 2	Revision 2

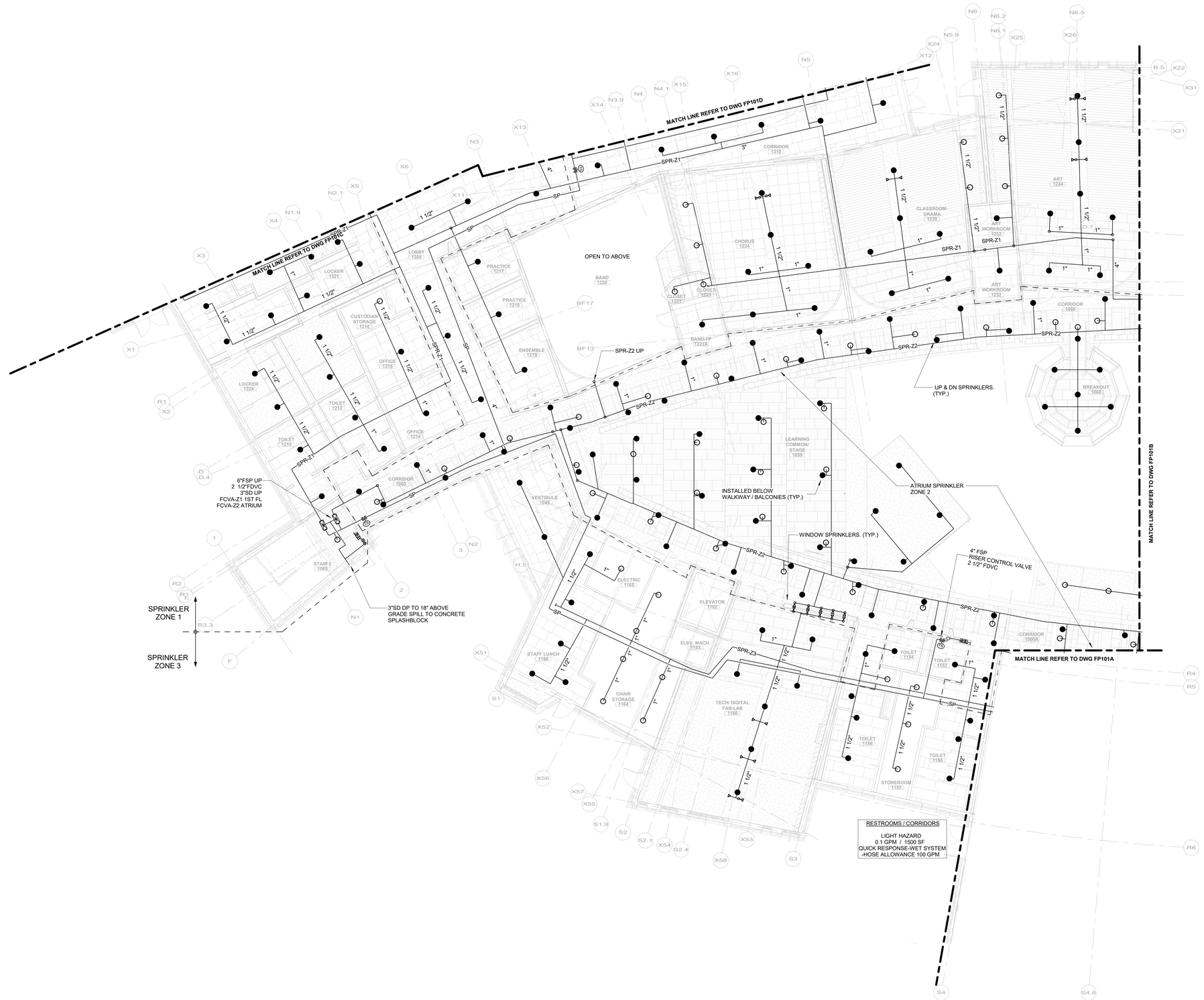
DRAWING NAME

FIRST FLOOR RCP - FIRE PROTECTION B

PROJECT NO. 1722

DRAWING NO.

FP101B



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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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10/18/2019

REVISIONS

No.	Date	Description
	Date 2	Revision 2

DRAWING NAME

FIRST FLOOR RCP - FIRE PROTECTION C

PROJECT NO. 1722

DRAWING NO.

FP101C

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31 FLAGG DRIVE, FRAMINGHAM, MA

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10/18/2019

REVISIONS

No.	Date	Description
	Date 2	Revision 2

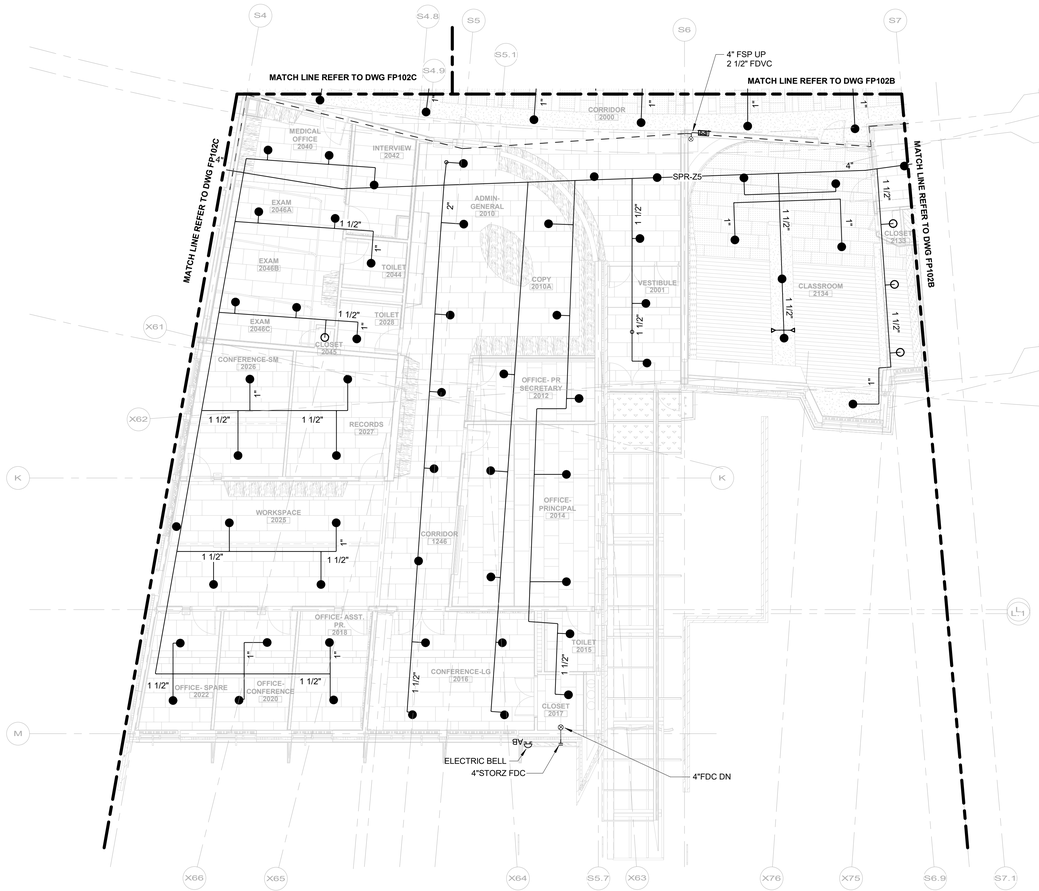
DRAWING NAME

FIRST FLOOR RCP - FIRE PROTECTION D

PROJECT NO. 1722

DRAWING NO.

FP101D



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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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10/18/2019

REVISIONS

No.	Date	Description
	Date 2	Revision 2

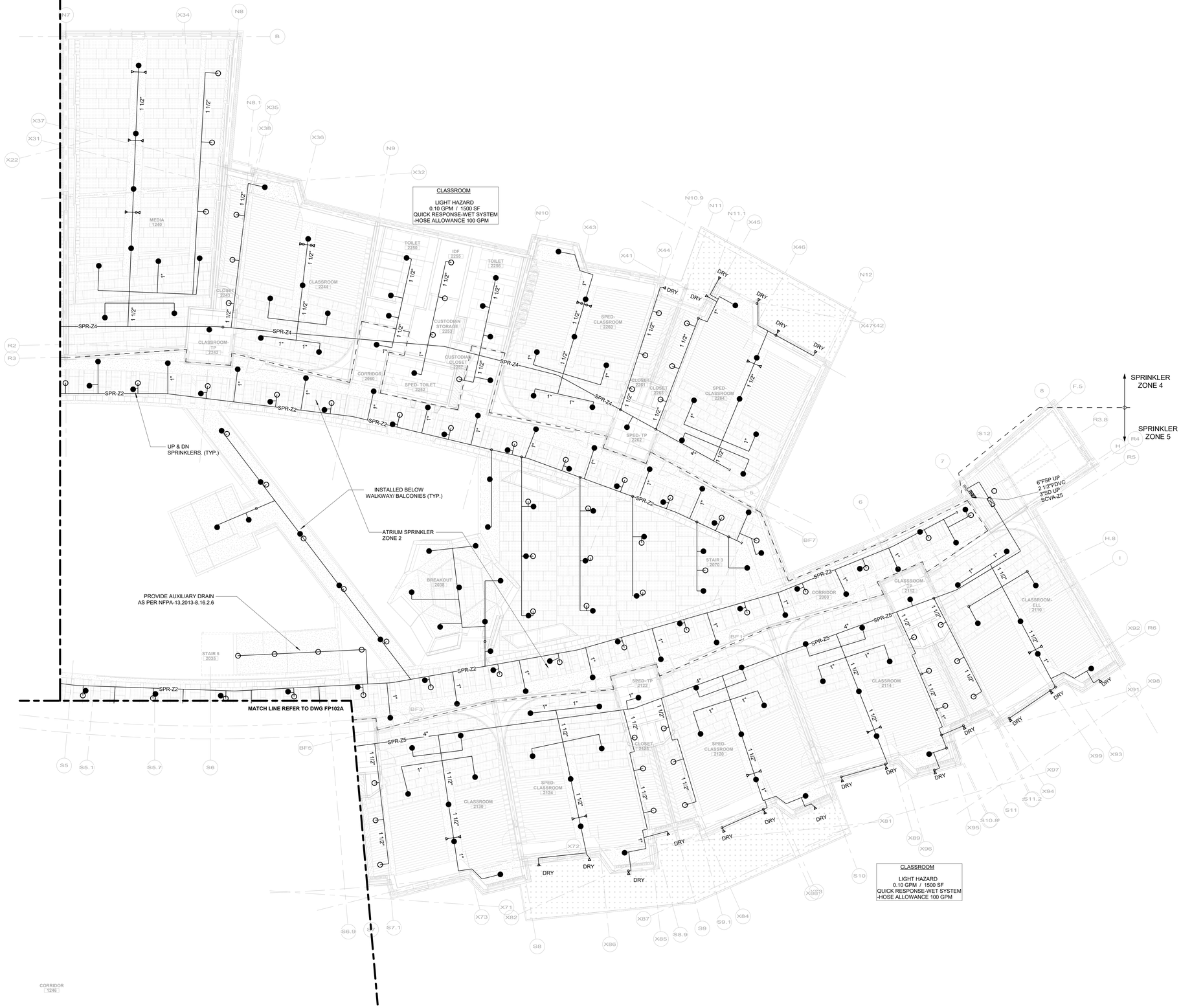
DRAWING NAME

SECOND FLOOR RCP - FIRE PROTECTION A

PROJECT NO. 1722

DRAWING NO.

FP102A



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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA.

PROJECT STATUS

90% CONSTRUCTION DOCUMENTS
10/18/2019

REVISIONS

No.	Date	Description
	Date 2	Revision 2

DRAWING NAME

SECOND FLOOR RCP - FIRE PROTECTION B

PROJECT NO. 1722

DRAWING NO.

FP102B

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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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10/18/2019

REVISIONS

No.	Date	Description
	Date 2	Revision 2

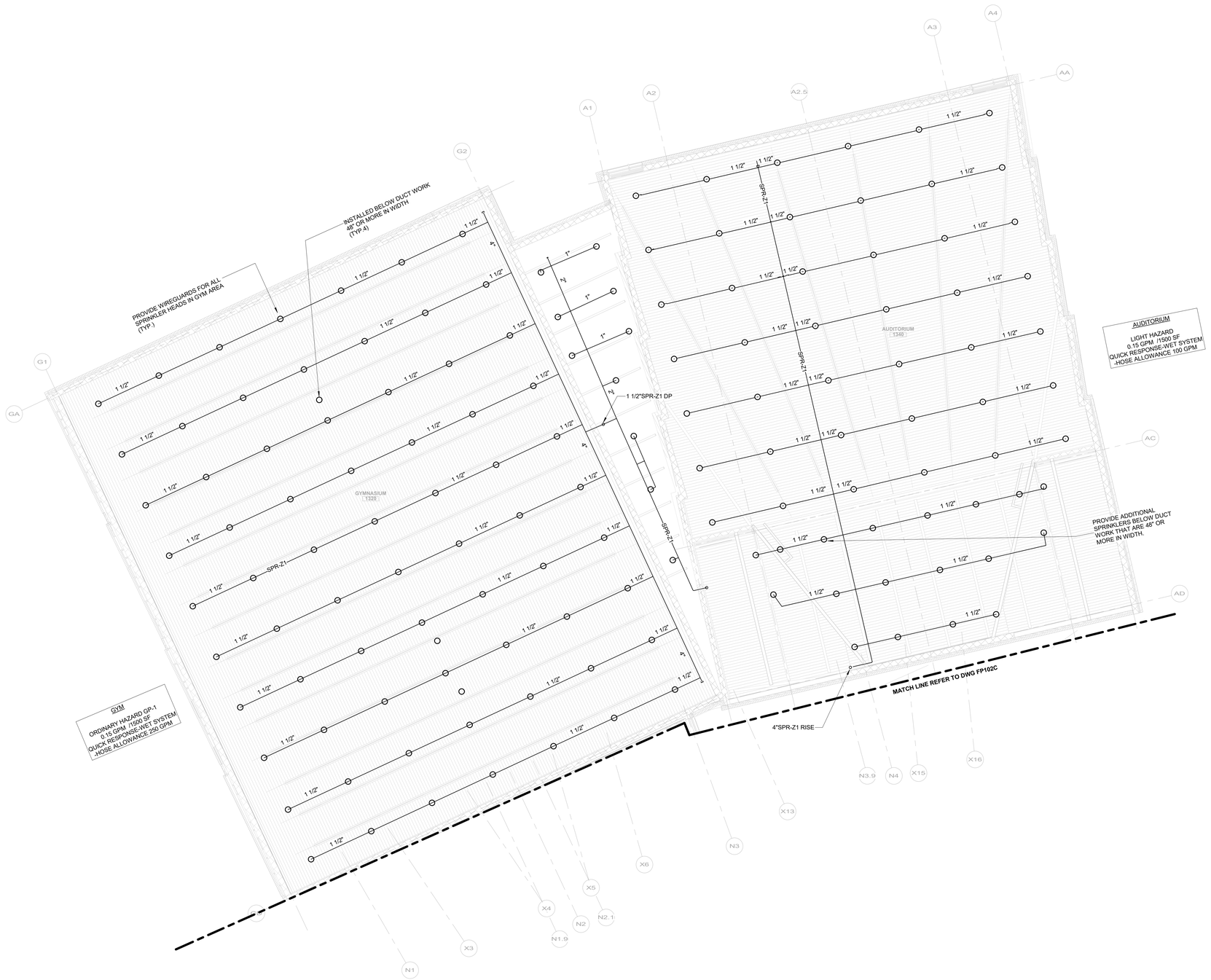
DRAWING NAME

SECOND FLOOR RCP - FIRE PROTECTION C

PROJECT NO. 1722

DRAWING NO.

FP102C



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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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10/18/2019

REVISIONS

No.	Date	Description
	Date 2	Revision 2

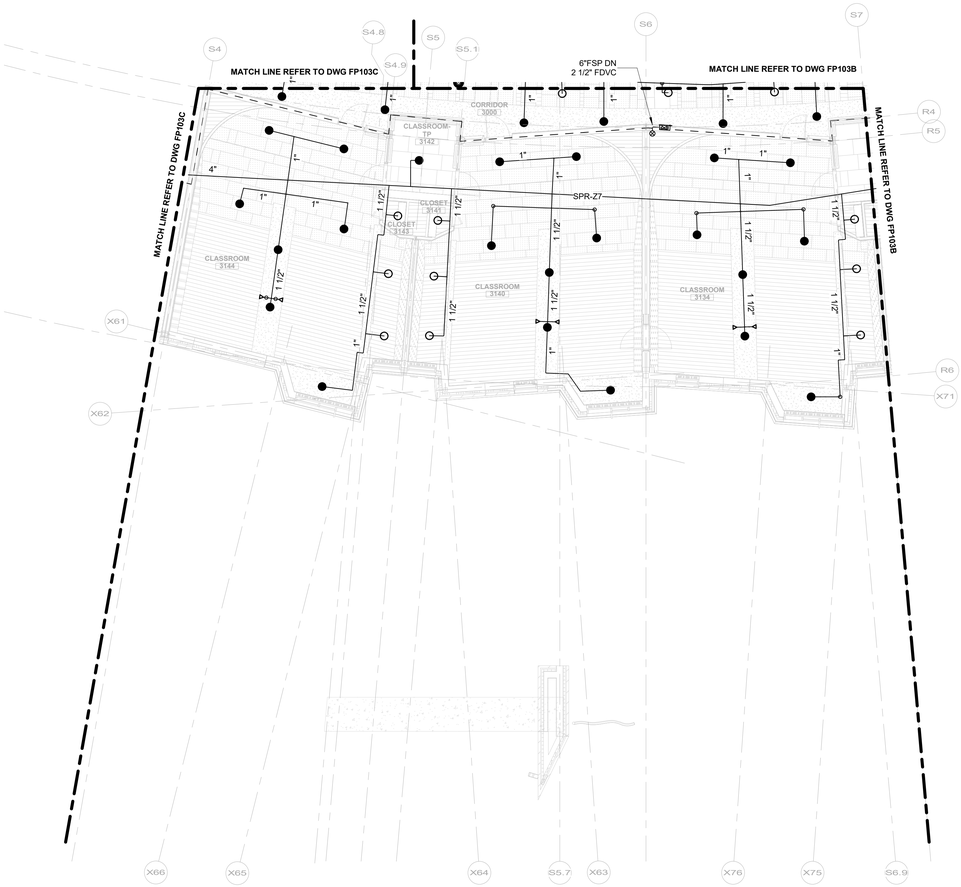
DRAWING NAME

SECOND FLOOR RCP - FIRE PROTECTION D

PROJECT NO. 1722

DRAWING NO.

FP102D



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REVISIONS

No.	Date	Description
	Date 2	Revision 2

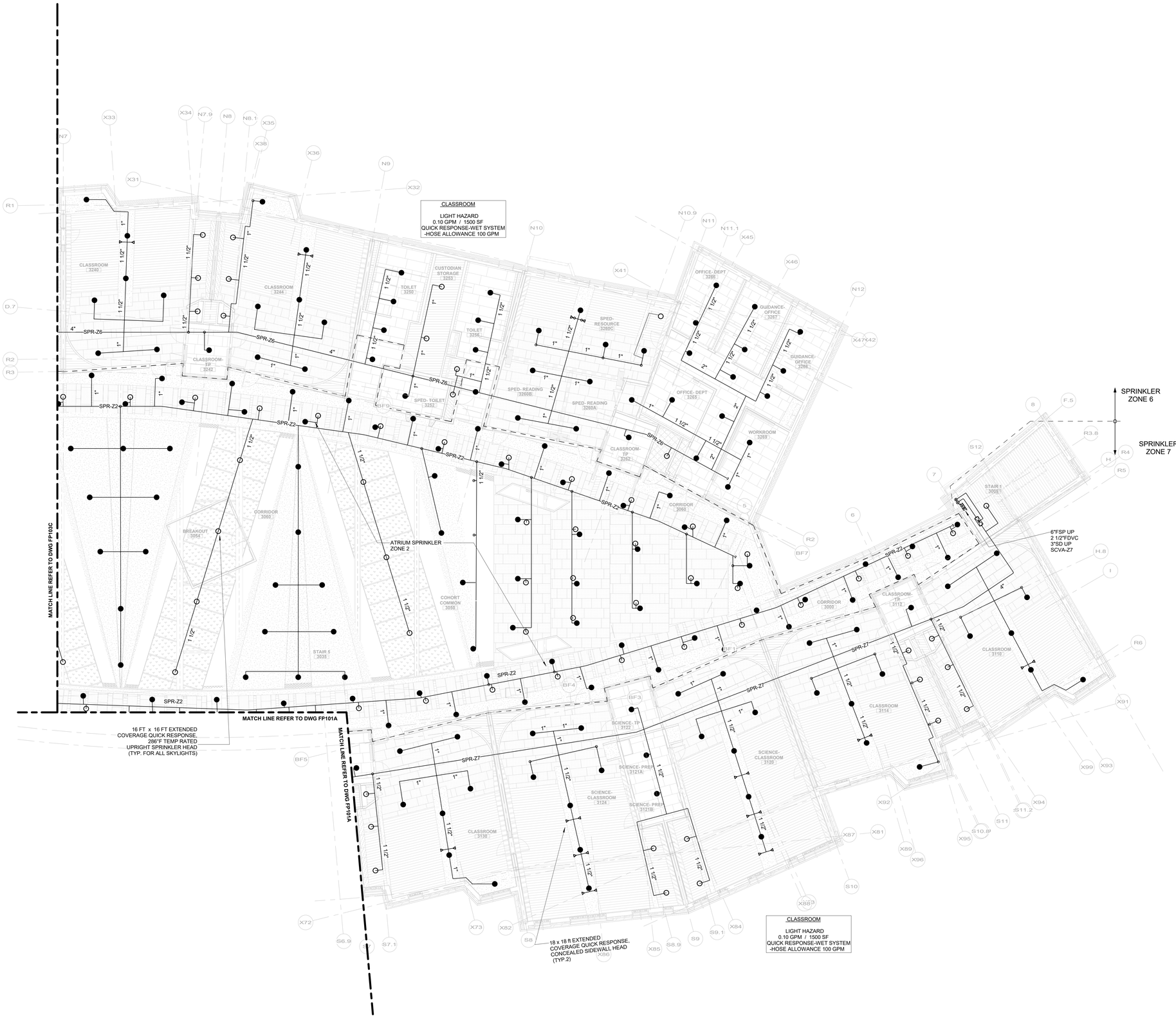
DRAWING NAME

THIRD FLOOR RCP - FIRE PROTECTION A

PROJECT NO. 1722

DRAWING NO.

FP103A



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FULLER MIDDLE SCHOOL

31 RAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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No.	Date	Description
	Date 2	Revision 2

DRAWING NAME

THIRD FLOOR RCP - FIRE PROTECTION B

PROJECT NO. 1722

DRAWING NO.

FP103B

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REVISIONS

No.	Date	Description
	Date 2	Revision 2

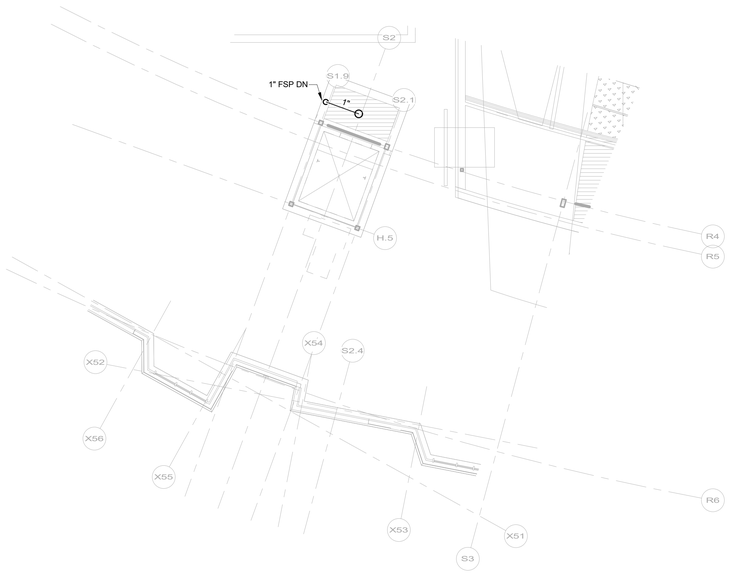
DRAWING NAME

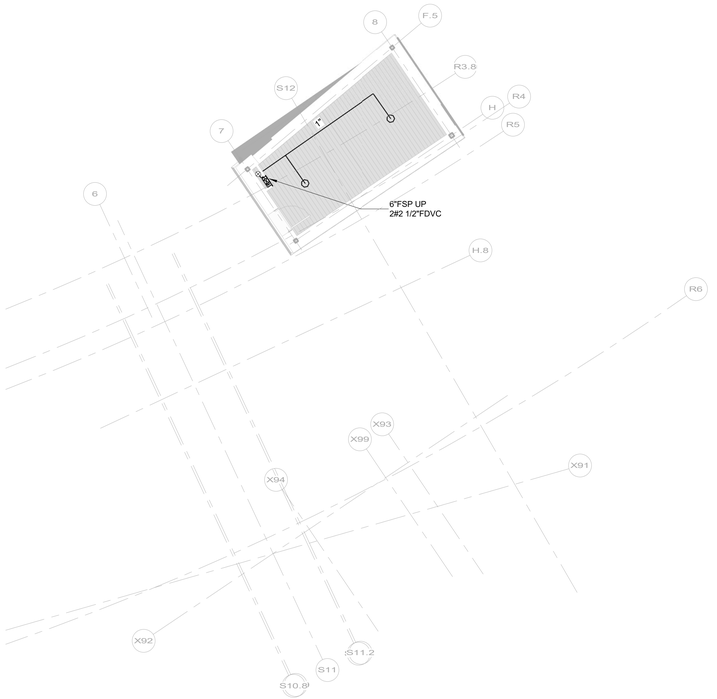
THIRD FLOOR RCP - FIRE PROTECTION C

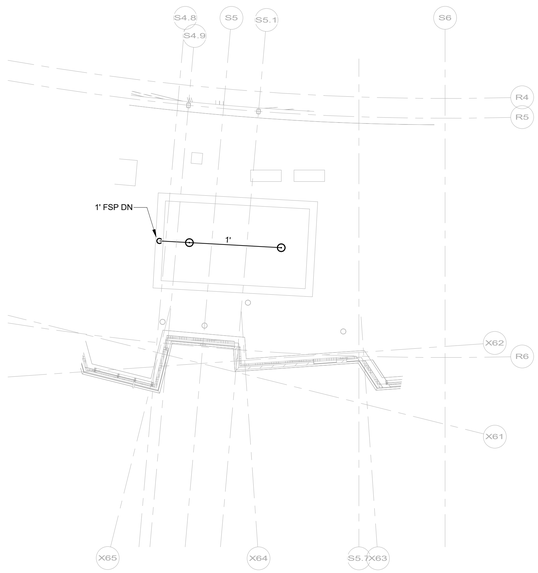
PROJECT NO. 1722

DRAWING NO.

FP103C







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10/18/2019

REVISIONS

No.	Date	Description

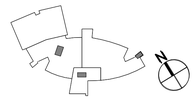
DRAWING NAME

FOURTH FLOOR RCP - FIRE PROTECTION

PROJECT NO. 1722

DRAWING NO.

FP104



LEGEND

SYMBOL	ABBREV	DESCRIPTION
AW	AW	ACID WASTE UNDERGROUND
AW	AW	ACID WASTE
SAN	SAN	SOIL/WASTE ABV. GRADE
SAN	SAN	SANITARY WASTE UNDERGROUND
V	V	VENT UNDERGROUND
V	V	VENT ABV. GRADE
IW	IW	INDIRECT WASTE
RL	RL	RAIN LEADER UNDERGROUND
RL	RL	RAIN LEADER ABV. GRADE
CW	CW	COLD WATER
HW	HW	HOT WATER
HWR	HWR	HOT WATER RETURN
HW 140°	HW 140°	HOT WATER 140°F
LCW	LCW	LAB COLD WATER
LHW	LHW	LAB HOT WATER
W	W	WASTE
KW		KITCHEN WASTE
KV		KITCHEN WASTE VENT
G	G	FUEL GAS PIPING
DP.DN	DP.DN	PIPE DROP OR DOWN
UP	UP	PIPE RISE OR UP
		TEE LOOKING DOWN
		CAP ON END OF PIPE
FD RD AD	FD RD AD	FLOOR DRAIN, ROOF DRAIN, AREA DRAIN
		STRAINER
		UNION
CO	CO	CLEANOUT
DCO	DCO	DANDY CLEANOUT
FCO	FCO	FLOOR CLEANOUT
PG/TG	PG/TG	PRESSURE GAGE/TEMPERATURE GAGE
SA	SA	SHOCK ABSORBER
		BALANCING VALVE
BV	BV	BALL VALVE
CV	CV	CHECK VALVE
		GAS COCK
		GAS PRESSURE REGULATOR
		SOLENOID VALVE
GV	GV	GATE VALVE
PRV	PRV	PRESSURE REDUCING VALVE
VOV	VOV	VALVE ON VERTICAL
PT	PT	P-TRAP
S&W	S&W	STOP & WASTE VALVE
EL	EL	EXPANSION LOOP
		PIPE GUIDE
		PIPE ANCHOR
		FLOW IN DIRECTION OF ARROW
HB/WH	HB/WH	HOSE BIBB/WALL HYDRANT
GW	GW	GARAGE WASTE UNDERGROUND
GV	GV	GARAGE VENT
GV	GV	GARAGE VENT UNDERGROUND
TP	TP	TRAP PRIMER
TW	TW	TEMPERED WATER
TYP.	TYPICAL	
FFE	FINISHED FLOOR ELEVATION	
INV	INVERT ELEVATION	
VTR	VENT THRU ROOF	
AVTR	ACID VENT THRU ROOF	
AP	ACCESS PANEL	
AFF	ABOVE FINISHED FLOOR	
AFG	ABOVE FINISHED GRADE	
FG	FINISHED GRADE	
CI	CAST IRON	
CP	CHROME PLATED	
ETP	ELECTRONIC TRAP PRIMER	
UC	UNDER COUNTER	
F&I	FURNISH AND INSTALL	
PC	PLUMBING CONTRACTOR	
FPC	FIRE PROTECTION CONTRACTOR	
GC	GENERAL CONTRACTOR	
HVAC	HEAT, VENT & AIR COND. CONTRACTOR	
DCVA	DOUBLE CHECK VALVE ASSEMBLY	
RPBP	REDUCED PRESSURE BACKFLOW PREVENTOR	
STK	STACK	
STP	STANDPIPE	
EXP	EXPOSED	
FBO	FURNISHED BY OTHERS	

NOTE: NOT ALL SYMBOLS LISTED ARE APPLICABLE TO THIS PROJECT

SHOCK ABSORBER SCHEDULE

PDI SYMBOL	A	B	C	D	E	F
ZURN SERIES 1250-XL OR EQ.	A	B	C	D	E	F
FIXTURE UNITS	1-11	12-32	33-60	61-113	114-154	155-330

PIPE SIZE TO FIXTURE SCHEDULE

P. NO.	FIXTURE	S/W	VENT	CW	HW	KW	KV	AW	AV	NPCW	NPHW	TW	GAS	REMARKS
P-1	WATER CLOSET	4"	2"	1 1/4"**	-	-	-	-	-	-	-	-	-	*SUPPLY RISER & 1" STUBOUT TO FLUSH VLV.
P-1A	WATER CLOSET, ACCESSIBLE	4"	2"	1 1/4"**	-	-	-	-	-	-	-	-	-	*SUPPLY RISER & 1" STUBOUT TO FLUSH VLV.
P-2	URINAL	3"	2"	1***	-	-	-	-	-	-	-	-	-	**SUPPLY RISER & 3/4" STUBOUT TO FLUSH VLV.
P-2A	URINAL, ACCESSIBLE	3"	2"	1***	-	-	-	-	-	-	-	-	-	**SUPPLY RISER & 3/4" STUBOUT TO FLUSH VLV.
P-3	LAVATORY ACCESSIBLE	1 1/2"	1 1/2"	1/2"	1/2"	-	-	-	-	-	-	-	-	COUNTER MOUNTED
P-3A	LAVATORY ACCESSIBLE	1 1/2"	1 1/2"	1/2"	1/2"	-	-	-	-	-	-	-	-	WALL MOUNTED
P-4	DRINKING FOUNTAIN	1 1/2"	1 1/2"	1/2"	-	-	-	-	-	-	-	-	-	
P-5	MOP RECEPTOR	3"	2"	1/2"	1/2"	-	-	-	-	-	-	-	-	FLOOR MOUNTED
P-6	SHOWER, ACCESSIBLE	2"	2"	1/2"	1/2"	-	-	-	-	-	-	-	-	
P-7	SCIENCE LAB SINK	-	-	-	-	-	-	2"	2"	1/2"	1/2"	-	-	
P-8	CLASSROOM	2"	2"	1/2"	1/2"	-	-	-	-	-	-	-	-	
P-9	ART SINK	2"	2"	1/2"	1/2"	-	-	-	-	-	-	-	-	WITH SOLIDS INTERCEPTOR
P-9A	ART SINK, ACCESSIBLE	2"	2"	1/2"	1/2"	-	-	-	-	-	-	-	-	WITH SOLIDS INTERCEPTOR
P-10	EMERGENCY SHOWER/ EYEWASH STATION			1 1/4"	1 1/4"	-	-	-	-	-	-	-	-	THERMOSTATIC MIXING VALVE FOR TEPID WATER
P-11	FUME HOOD CONNECTION			1/2"				2"					1/2"	
P-12	VALVE OUTLET BOX													
P-13	PREP SINK W/ EYEWASH	2"	1 1/2"	1/2"	1/2"									THERMOSTATIC MIXING VALVE FOR TEPID WATER
P-14	COUNTERTOP SINK FOR FAB LAB/ MAKER SPACE	2"	1 1/2"	1/2"	1/2"									
P-15	KITCHENETTE SINK	2"	1 1/2"	1/2"	1/2"									
P-16	GAS TURRET												3/4"	
P-17	MASTER GAS CONTROL VALVE												1"	

COORDINATE ALL ROUGH-IN REQUIREMENTS WITH ARCHITECTURAL DRAWINGS, ACCESSIBLE HEIGHTS VARY.

DOMESTIC WATER HEATER SCHEDULE (WH X)

TAG NO.	FUEL TYPE	INPUT (MBH)	MIN. EFF.	RECOVERY RATE (GPH) AT 100° F RISE	EWT (° F)	LWT (° F)	ELECTRICAL DATA VOLT	ELECTRICAL DATA PHASE	REMARKS
WH-1	NAT. GAS	399	94%	466	45	140	115	1	1 2 3 4 5
WH-2	NAT. GAS	399	94%	466	45	140	115	1	1 2 3 4 5

1. EQUAL TO LOCHINVAR MODEL AWN400PM. OTHER APPROVED MANUFACTURER ARE "HTP" AND "LAARS".
2. CONDENSATE NEUTRALIZATION KIT
3. ROOM AIR VENT KIT
4. BMS GATEWAY
5. STAINLESS STEEL CIRCULATING PUMP & CONTROL.

DOMESTIC WATER STORAGE TANK (ST X)

TAG NO.	TYPE	MIN. STORAGE (GAL)	MAX WORK PR.	REMARKS
ST-1	VERTICAL	300	125	1 2

1. WATER HEATER SHALL BE CONSTRUCTED AND STAMPED IN ACCORDANCE WITH ASME STANDARD REQUIREMENT.
2. EQUAL TO LOCHINVAR MODEL RJA175. OTHER APPROVED MANUFACTURER HTP AND LAARS

ACID NEUTRALIZING TANK (ANT X)

TAG NO.	TYPE	STORAGE CAPACITY (GAL)	DIMENSIONS	REMARKS
ANT #1	RECTANGULAR	15	12"x24"X12H	
ANT #2	RECTANGULAR	15	12"x24"X12H	
ANT #2A	RECTANGULAR	5	10"x16"x8"H	
ANT #3	RECTANGULAR	15	12"x24"X12H	
ANT #4	CYLINDRICAL	55	24" DIA, 34" H	DOUBLE WALL
ANT #5	CYLINDRICAL	55	24" DIA, 34" H	DOUBLE WALL

GENERAL PLUMBING NOTES

1. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE GENERAL CONTRACTOR.
2. REFER TO ARCHITECTURAL PLANS FOR HEIGHT OF CEILING AND COORDINATE ALL WORK WITH ALL OTHER CONTRACTORS PRIOR TO START.
3. COORDINATE WITH ARCHITECT FOR PLUMBING FIXTURES LOCATION.
4. GENERAL NOTES, SYMBOLS LIST AND DETAILS ARE APPLICABLE TO ALL DRAWINGS.
5. DRAWINGS ARE DIAGRAMMATIC: THIS CONTRACTOR SHALL DETERMINE EXACT LOCATIONS AND SIZES OF SYSTEMS AND COMPONENTS IN FIELD.
6. ALL PLUMBING WORK SHALL BE IN ACCORDANCE WITH THE LASTEST PLUMBING CODE AND ALL APPLICABLE LOCAL CODES. ALL WORK SHALL CONFORM TO THE AMERICANS WITH DISABILITIES ACT (ADA)
7. IT SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR TO COORDINATE HIS WORK WITH THAT OF ALL OTHER TRADES, INCLUDING BUT NOT LIMITED TO, ELECTRICAL, HVAC, SPRINKLER, STRUCTURAL AND GENERAL ARCHITECTURE.
8. ANY INTERFERENCE SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER, AND SHALL BE RESOLVED PRIOR TO THE INSTALLATION OF WORK.
9. NO WORK SHALL BE INSTALLED IN VIOLATION OF ANY GOVERNING CODES. ANY WORK SHOWN ON THE DRAWINGS WHICH IS IN VIOLATION OF SUCH CODES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND SHALL BE RESOLVED PRIOR TO THE INSTALLATION OF THE WORK.
10. ALL PIPING PENETRATING CEILINGS AND WALLS SHALL BE INSTALLED WITH ESCUTCHEONS AT THE PENETRATION. ALL PIPING PENETRATING EXTERIOR WALLS AND ROOFS SHALL BE FLASHED IN AN APPROVED MANNER AND SHALL BE SEALED WEATHERTIGHT. PIPING PENETRATING FIRE RATED PARTITIONS SHALL BE PROVIDED WITH FIRE RATED SEALS AS REQUIRED BY LOCAL CODE AUTHORITY.
11. MANUFACTURERS' MODEL NUMBERS ARE SPECIFIED SOLELY TO ESTABLISH STANDARDS OF QUALITY FOR PERFORMANCE AND MATERIALS. INSTALLATION SHALL ADHERE TO MANUFACTURERS' RECOMMENDATIONS.
12. TOP OF ALL FLOOR DRAINS SHALL BE SET FLUSH WITH FINISHED FLOOR. ALL PIPING ABOVE GRADE SHALL BE PROPERLY SUPPORTED BY THE BUILDING STRUCTURE AND SHALL NOT REST ON CEILING STRUCTURE OR COMPONENTS.
13. ALL PLUMBING EQUIPMENT, PIPING, INSULATION, ETC., INSTALLED IN HVAC PLENUM SPACES SHALL MEET CODE REQUIREMENTS FOR SMOKE AND COMBUSTIBILITY.
14. PROVIDE SHUTOFF VALVES ON ALL BRANCH PIPING AND ON ALL SUPPLIES TO INDIVIDUAL FIXTURES AND EQUIPMENT. PROVIDE BALL VALVES ON ALL WATER MAIN BRANCHES IN CORRIDORS AND WHERE INDICATED ON DRAWINGS.
15. PROVIDE BALANCING VALVES, BALL VALVES AND CHECK VALVES ON ALL HOT WATER RETURN BRANCHES, AS REQUIRED, TO BALANCE RETURN SYSTEM.
16. PROVIDE CLAMPS, OFFSETS, EXPANSION JOINTS, ANCHORS AND GUIDES AS NECESSARY TO PREVENT STRESS ON PIPING.
17. PROVIDE VENTS AT HIGH POINTS IN PIPING SYSTEMS AND DRAIN VALVES AT LOW POINTS.
19. PROVIDE GAUGE FITTINGS AT PUMP INLETS AND OUTLETS. PROVIDE THERMOMETER WELLS ON MIXING VALVE OUTLETS AND DOMESTIC WATER HEATER OUTLETS.
20. PITCH DOWN PRESSURE PIPING TO DOMESTIC WATER HEATERS.
21. VERIFY EXACT SIZES, LOCATIONS, INVERTS AND ELEVATIONS PRIOR TO RUNNING ANY PIPING.
22. ALL EXPOSED WATER, WASTE AND VENT PIPING SHALL BE PAINTED (COLOR TO BE SELECTED BY ARCHITECT). INSTALL WATER SHOCK ARRESTORS AT EACH FIXTURE OR BATTERY OF FIXTURES. ALL INDIRECT WASTE PIPING SHALL BE COPPER AND CHROME PLATED BRASS WHERE EXPOSED.
23. ALL PLUMBING VENTS THRU ROOF SHALL BE INSTALLED MINIMUM 25' AWAY FROM ADJOINING HVAC UNIT AIR INTAKES.
24. ALL FLOOR DRAIN SHALL BE PROVIDE WITH TRAP PRIMER. THE TRAP PRIMER SHALL BE LOCATED IN ACCESSIBLE LOCATION.
25 OBTAIN GAS PERMITS AND DEFRAY ALL COSTS INCIDENTAL TO THE GAS PIPING SYSTEM. CONTRACTORS WORK SHALL COMMENCE ON THE HOUSE SIDE OF THE UTILITY CO. METERS.
26. GAS PIPING AND SAFETY DEVICES SHALL CONFORM TO THE REQUIREMENTS OF NFPA 54 AND SHALL BE SUBJECT TO THE INSPECTION AND APPROVAL OF THE STATE REGULATORY BOARD.
27. PROVIDE A SUITABLE GAS COCK VALVE AT EACH BRANCH RUNOUT FROM THE MAIN RISER SERVING GAS OUTLETS AND AT EACH INDIVIDUAL GAS FIXTURE.
28. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING GAS TRAIN PRESSURE REGULATOR RELIEF VENTS TO ALL HEATING BOILERS AND WATER HEATERS AS REQUIRED BY THE MANUFACTURER. SIZE AND EXTEND RELIEF VENTS TO OUTDOOR AS PER 248CMR, 7.04 (11).
29. TRAP PIPING BELOW SLAB SHALL BE TYPE "K" SOFT ROLLED BRAZED COPPER ENCASED IN SUITABLE SIZE PEX TUBING. THE PEX TUBING SHALL BE LISTED FOR BURIAL IN SOIL & CONCRETE. THERE SHALL BE NO JOINTS IN COPPER OR PEX BELOW SLAB.
30. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING 24V POWER WIRING AND CONTROL MODULE ETC. TO ALL SENSOR ACTIVATED FIXTURES. COORDINATE WORK WITH ELECTRICAL CONTRACTOR. REFER TO ELECTRICAL DRAWING NUMBER 10.3.03 FOR DETAIL SCOPE OF WORK.
31. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF KITCHEN WASTE AND CHAMBER VENT PIPING BACK TO THE OUTDOOR GREASE INTERCEPTOR. THE PIPING SHALL BE CAST IRON AND SHALL BE INSTALLED IN ACCORDANCE TO 248CMR 10.09. REFER TO SITE UTILITY PLAN FOR THE OUTDOOR GREASE INTERCEPTOR.
32. KITCHEN EQUIPMENT SUCH DISHWASHER, GARBAGE DISPOSER, FIXTURE WITH HOSE ATTACHMENT ETC. PROVIDE BACKFLOW PREVENTER AT CROSS CONNECTIONS TO POTABLE WATER.
33. SEE DEMOLITION DRAWINGS ESP VI FOR UTILITY WORK PERFORMED UNDER SEPARATE CONTRACT.
34. SEE SECTION 019600 SPECIAL SUPPLEMENTAL CONDITIONS FOR IMAGING REQUIREMENTS FOR EXISTING BUILDING STRUCTURAL FLOOR SLABS.

CIRCULATION PUMP SCHEDULE (RP X)

TAG NO.	MANUFACTURER AND MODEL NO. OR EQUAL	TYPE	FLOW RATE (GPM)	HEAD (FT)	ELECTRICAL DATA AMPS	HP	VOLT /PH	RPM	REMARKS
RP-1	BELL & GOSSET ECOCIRC XL-20-35 OR EQUAL	INLINE	6.5	15	1.76	1/8	115/ 1	3250	1,2,3 &4
CP-1 CP-2	BELL & GOSSET SSF-22 OR EQUAL	INLINE	10	8	0.8	92 WATTS	115/ 1	2800	

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

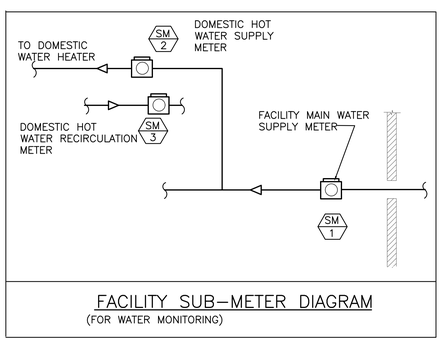
NOTES:

1. BRONZE BODY CONSTRUCTION, LEAD FREE, STAINLESS STEEL IMPELLER, 225°F MAX OPERATING TEMPERATURE, 125 PSI MAX WORKING PRESSURE.
2. PROVIDE AQUASTAT AND AUTOMATIC TIMER KIT.
3. ECM MOTOR
4. INTERFACE WITH BUILDING MANAGEMENT SYSTEM

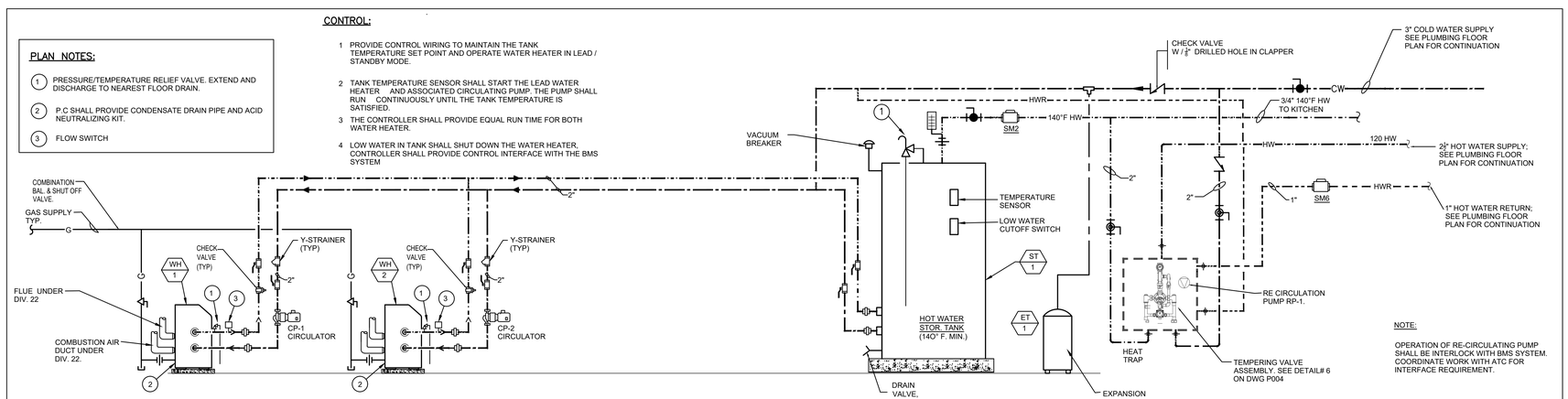
EXPANASION TANK (ET 1)

TAG NO.	MANUFACTURER AND MODEL NO. OR EQUAL	TYPE	TANK VOLUME (GAL)	MAX ACCEPT VOLUME. (GAL)	REMARKS
ET 1	AMTROL ST-30V-C	STAND MODEL	14	9	

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



FACILITY SUB-METER DIAGRAM
(FOR WATER MONITORING)



HW & CW CONNECTION TO DOMESTIC WATER HEATER (WH-1 & WH-2)
NOT TO SCALE

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE FRAMINGHAM, MA

PROJECT STATUS
90% Construction Documents
10/18/2019

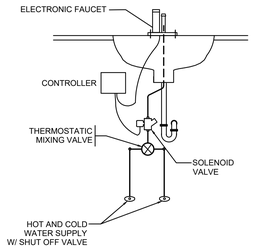
REVISIONS

No.	Date	Description

DRAWING NAME
PLUMBING LEGEND,NOTES, SCHEDULES AND DETAILS

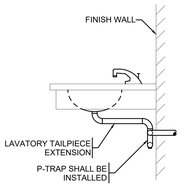
PROJECT NO. 1722

DRAWING NO.
P001



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.

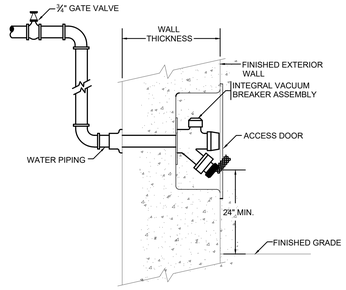
1 LAVATORY
NOT TO SCALE



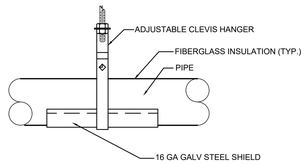
SIDE ELEVATION OF - ADA LAVATORY

NOTE:

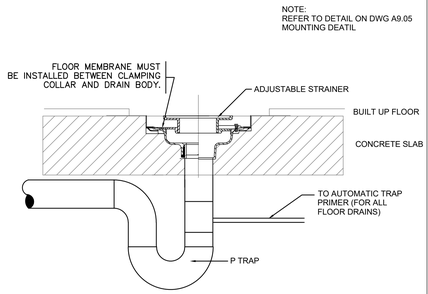
ALL LAVATORY PIPING, (SUPPLY AND WASTE) SHALL BE FULLY INSULATED.



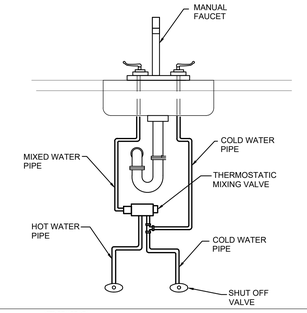
2 FROST PROOF HOSE BIBB
NOT TO SCALE



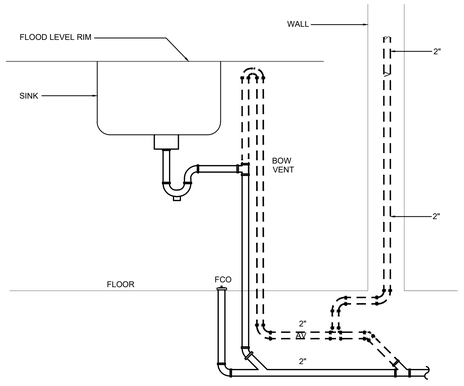
3 PIPE HANGER
NOT TO SCALE



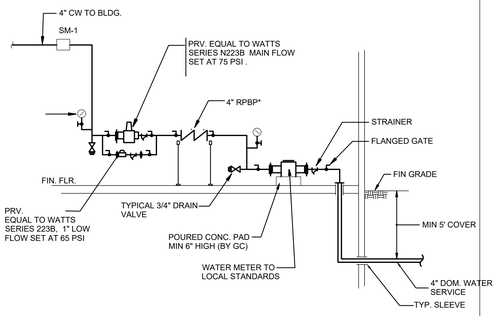
4 FLOOR DRAIN
NOT TO SCALE



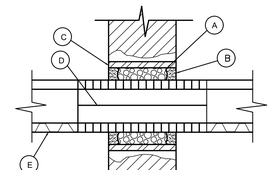
5 SINK
NOT TO SCALE



6 SINK BOW VENT PIPING DETAIL
NOT TO SCALE



7 WATER SERVICE PIPING DETAIL - SCHOOL
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

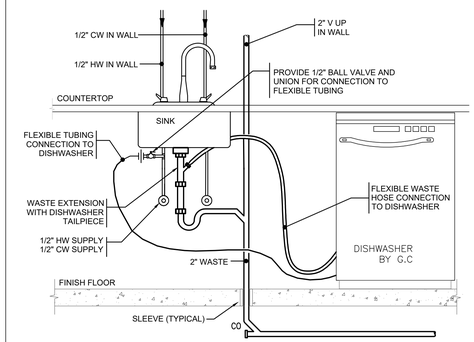
C SLEEVE-PROVIDE AS SPECIFIED. SLEEVE MAY BE OMITTED AND CORE DRILLED HOLE PROVIDED IN CONCRETE AS SPECIFIED. EXTEND FLOOR PIPE SLEEVES 2" ABOVE FLOOR.

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

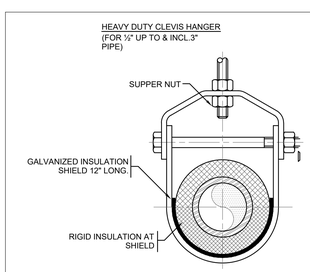
E SPECIFIED INSULATION

F WALL OR FLOOR

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



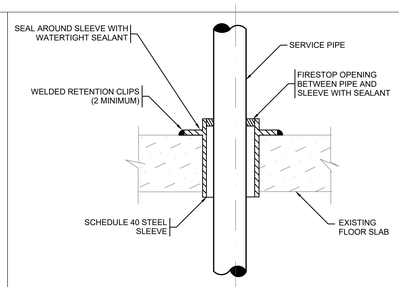
9 DISHWASHER AND SINK WASTE CONNECTION
NOT TO SCALE



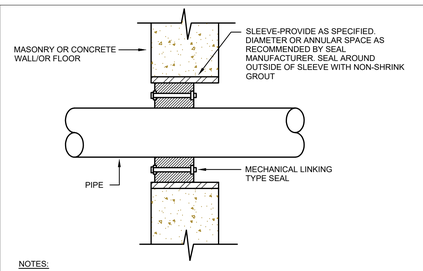
NOTES :
1. SEE SPECIFICATION FOR HANGER SIZES.

10 PIPE HANGER SUPPORT
NOT TO SCALE

11 -NOT USED-
NOT TO SCALE



12 PIPE SLEEVE PENETRATION AT FLOOR
NOT TO SCALE

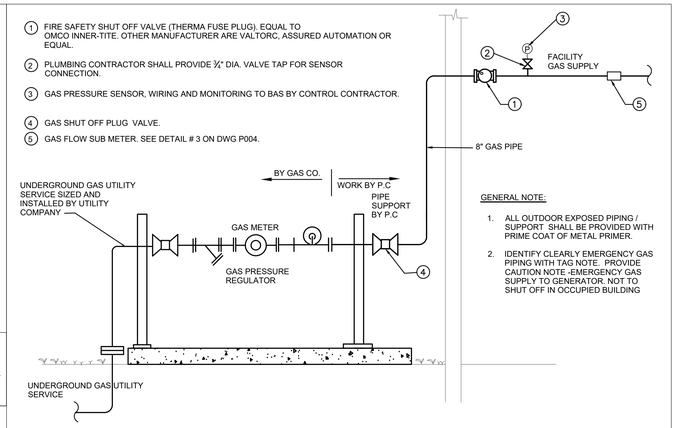


NOTES:

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.

13 PIPE PENETRATION THROUGH EXTERIOR WALL/FLOOR DETAIL
NOT TO SCALE

1. FIRE SAFETY SHUT OFF VALVE (THERMA FUSE PLUG), EQUAL TO OMCO INNER-TITE. OTHER MANUFACTURER ARE VALTORC, ASSURED AUTOMATION OR EQUAL.
2. PLUMBING CONTRACTOR SHALL PROVIDE ¾" DIA. VALVE TAP FOR SENSOR CONNECTION.
3. GAS PRESSURE SENSOR, WIRING AND MONITORING TO BAS BY CONTROL CONTRACTOR.
4. GAS SHUT OFF PLUG VALVE.
5. GAS FLOW SUB METER. SEE DETAIL # 3 ON DWG P004.



GENERAL NOTE:

1. ALL OUTDOOR EXPOSED PIPING / SUPPORT SHALL BE PROVIDED WITH PRIME COAT OF METAL PRIMER.
2. IDENTIFY CLEARLY EMERGENCY GAS PIPING WITH TAG NOTE. PROVIDE CAUTION NOTE -EMERGENCY GAS SUPPLY TO GENERATOR. NOT TO SHUT OFF IN OCCUPIED BUILDING

14 MAIN GAS METER
NOT TO SCALE

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FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% Construction Documents
10/18/2019

REVISIONS

No.	Date	Description

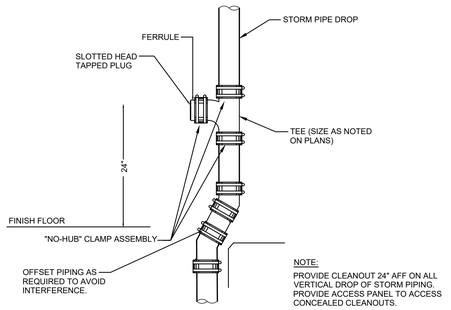
DRAWING NAME

PLUMBING DETAILS

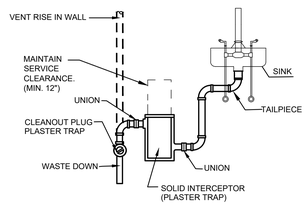
PROJECT NO. 1722

DRAWING NO.

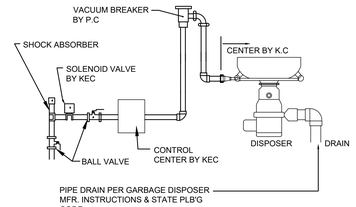
P002



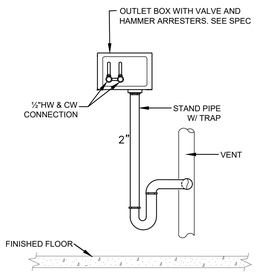
1 VERTICAL STORM PIPE CLEANOUT DETAIL (TYP)
NOT TO SCALE



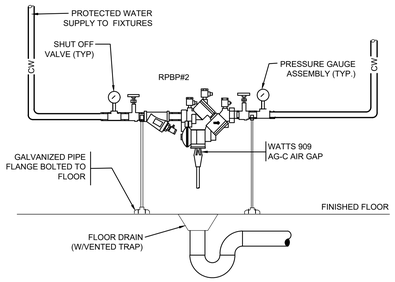
2 ART SINK PIPE CONN. DETAIL
NOT TO SCALE



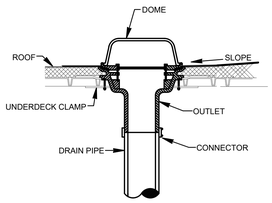
3 GARBAGE DISPOSAL PIPE CONNECTION
NOT TO SCALE



4 WASHING MACHINE SUPPLY
NOT TO SCALE



5 REDUCED PRESSURE BACKFLOW PREVENTOR
NOT TO SCALE

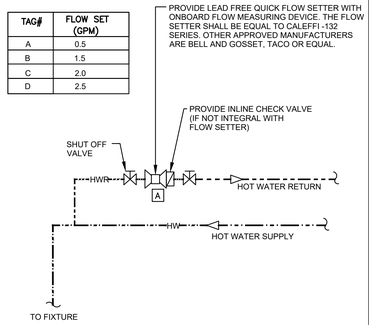


NOTE:
SEE ARCHITECTURAL DWG. FOR ROOFING DETAIL

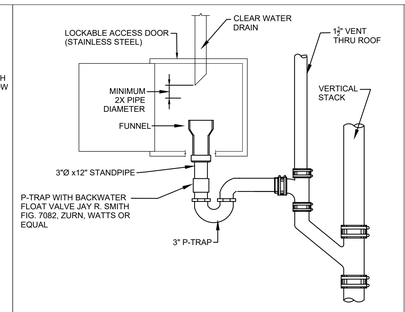
REGULAR ROOF DRAIN

6 ROOF DRAIN DETAIL
NOT TO SCALE

TAG#	FLOW SET (GPM)
A	0.5
B	1.5
C	2.0
D	2.5



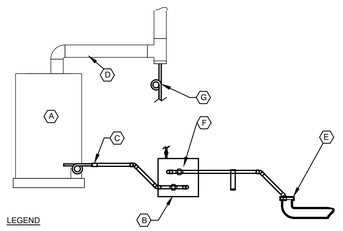
7 HOT WATER RECIRULATION LOOP DETAIL
NOT TO SCALE



NOTE:

1. ALL PIPING SHALL BE LOCATED IN WALL/CHASE SPACE.
2. COORDINATE LOCATION AND HEIGHT WITH LOCKABLE
3. ACCESS PANEL IN WALL FOR MAINTAINING DRAIN.
4. PROVIDE TRAP PRIMER CONNECTION OR TRAP GUARD AS PER PLUMBING CODE.

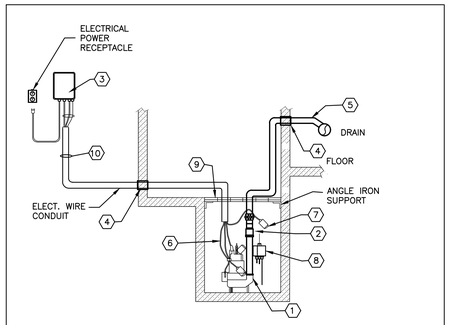
8 INDIRECT A/C DRAIN DETAIL
SCALE: NONE



LEGEND

- (A) CONDENSING WATER HEATER
- (B) CONDENSATE NEUTRALIZING TANK
- (C) WATER HEATER CONDENSATE TRAP CONNECTION
- (D) WATER HEATER VENT
- (E) FLOOR DRAIN OR SUMP
- (F) ELEVATE TE NB TANK ON A STRUCTURAL BASE TO BE RAISED, IF NECESSARY FOR THE OUTLET
- (G) WATER HEATER CONDENSATE TRAP CONNECTION

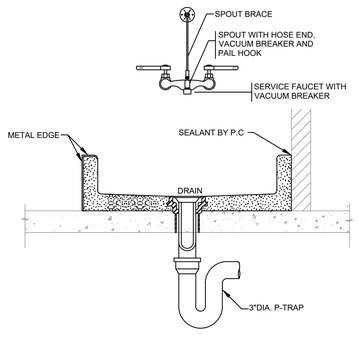
9 FLUE CONDENSATE DRAIN NEUTRALIZATION TANK DETAIL
NOT TO SCALE



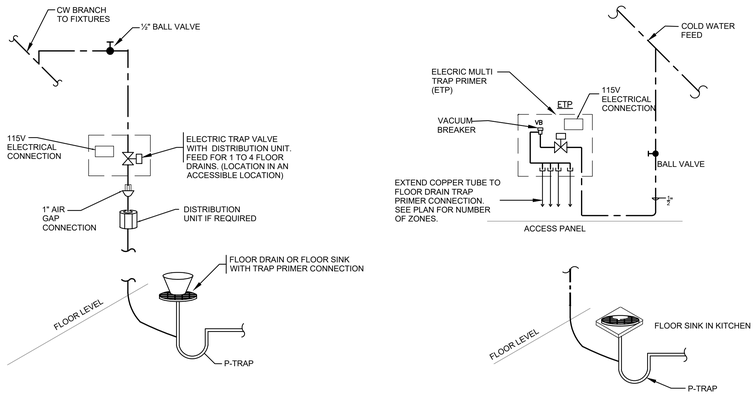
13 ELEVATOR SUMP PUMP SYSTEM DETAIL
NOT TO SCALE

1. SUBMERSIBLE EFFLUENT PUMP IN ELEVATOR. SEE PUMP SCHEDULE
2. CHECK VALVE
3. CONTROL PANEL WITH BUILT-IN AUDIBLE AND VISUAL ALARM WHEN PUMP DOES NOT RUN DUE TO OIL IN PIT OR 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 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. OIL AND LIQUID DETECTION SWITCH.
9. OPEN GRATING WITH CUT-OUT FOR DISCHARGE & ELECTRICAL CONDUIT

NOTE:
PROVIDE 6' STAINLESS STEEL BRADED WATER SUPPLY HOSE WITH PRESSURE BLEEDER DEVICE AND DUAL VENTED CHECK VALVE (ASSE1055B APPROVED) FOR SECONDARY BACK FLOW PREVENTER TO SOAP DISPENSER CONNECTION. INSTALLATION SHALL BE AS PER THE PLUMBING CODE REQUIREMENT.



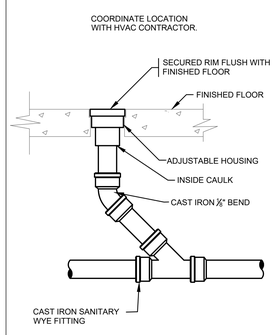
10 MOP SINK
NOT TO SCALE



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

UNDERSLAB COPPER TUBE SHALL BE ENCASED IN PIPE SLEEVE. \

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



12 FLOOR CLEANOUT DETAIL
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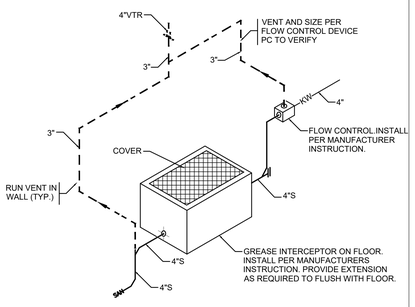
No.	Date	Description

DRAWING NAME
PLUMBING DETAILS

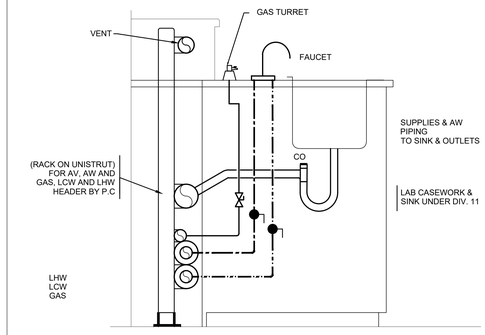
PROJECT NO. 1722

DRAWING NO.
P003

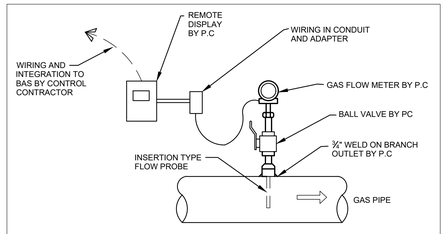


1 INTERIOR GREASE INTERCEPTOR PIPING DETAIL

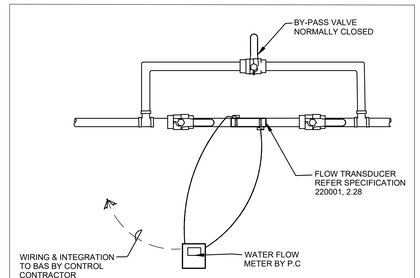
NOT TO SCALE



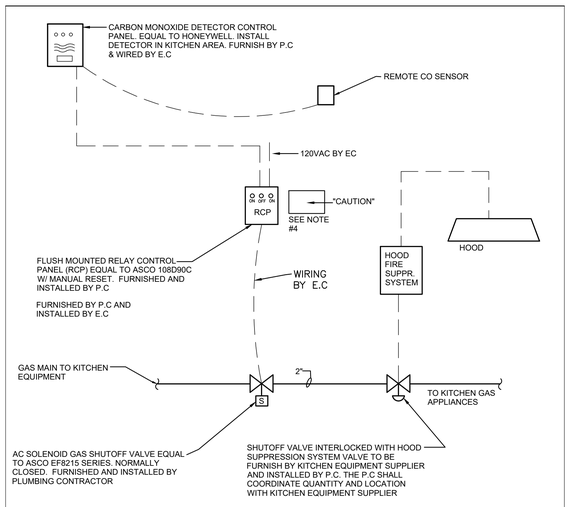
2 SCIENCE ROOM SINK



3 GAS FLOW SUB -METER

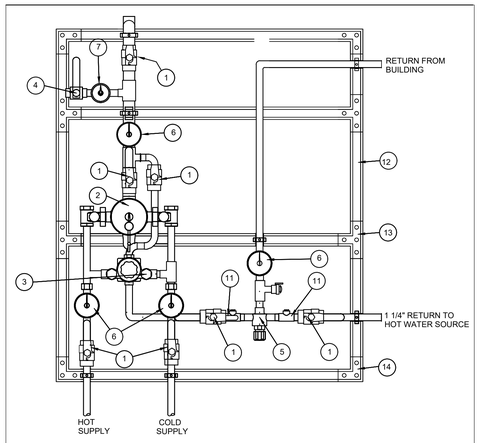


4 WATER SUB METER (SM)



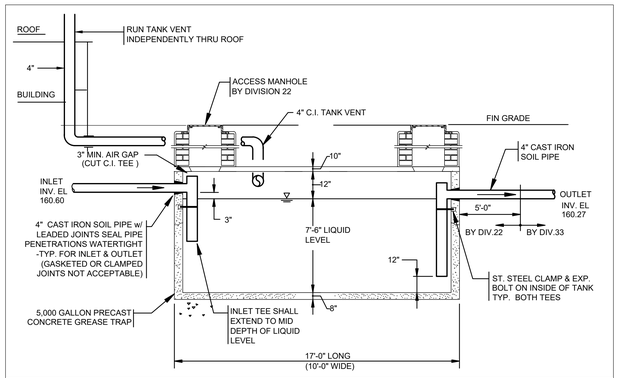
5 KITCHEN - MASTER GAS VALVE CONTROL DIAGRAM

1. ALL FIRE ALARM COMPONENTS AND WIRING SHALL BE BY THE ELECTRICAL CONTRACTOR. ALL GAS PIPING, RCP, PR. SWITCH AND VALVES SHALL BE BY THE PLUMBING CONTRACTOR.
2. ALARM MODE: WHENEVER THE CARBON MONOXIDE (CO) EXCEED THE SET LIMIT, POWER SHALL BE INTERRUPTED TO THE RELAY CONTROL PANEL (rcp) AND THE GAS SHUTOFF WILL CLOSE.
3. GAS FLOW MAY BE MANUALLY RESTARTED AFTER THE CO DETECTION AND THE FACP ARE RESET, WHICH WILL REPOWER THE RCP. TURNING KEY SWITCH TO "ON" WILL ENERGIZE THE SOLENOID.
4. P.C SHALL PROVIDE YELLOW ENGRAVED WARNING, PLACARD, MOUNTED ADJACENT TO THE RCP, WITH THE FOLLOWING "CAUTION-GAS FLOW IS RE-ESTABLISHED WHEN "ON" KEY SWITCH IS TURNED. RELIGHT ALL KITCHEN APPLIANCE PILOTS IMMEDIATELY UPON RESET. CO DETECTORS AND THE FIRE ALARM CONTROL PANEL MUST BE CLEAR OF ANY CO ALARMS PRIOR TO RESET.



PLAN NOTES	
1. FULL PORT BALL VALVE	7. PRESSURE GAUGE
2. LARGE TM MIXING VALVE	8. -
3. SMALL TM MIXING VALVE	9. AQUASTAT
4. TEST CONNECTION	10. CIRCULATOR POWER SWITCH
5. AUTOMATIC RETURN VALVE	11. FLAPPER CHECK
6. DIAL THERMOMETER	12. GALVANIZED STRUT
	13. TEE BRACKET

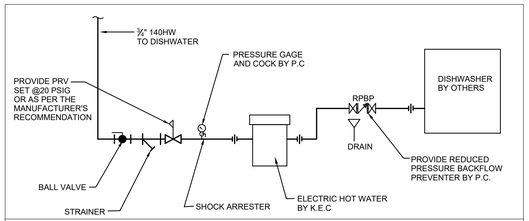
6 WATER TEMPERATURE CONTROL STATION



7 EXTERIOR GREASE TRAP DETAIL

N.T.S.

NOTES:
1. THE PRECAST STRUCTURE AND ALL PIPING WITHIN STRUCTURE IS BY DIVISION 22.
2. LOCATE INLET AND OUTLET TEES SO VISIBLE FROM ACCESS MANHOLES.



8 WAREWASHER HOT WATER PIPING DETAIL

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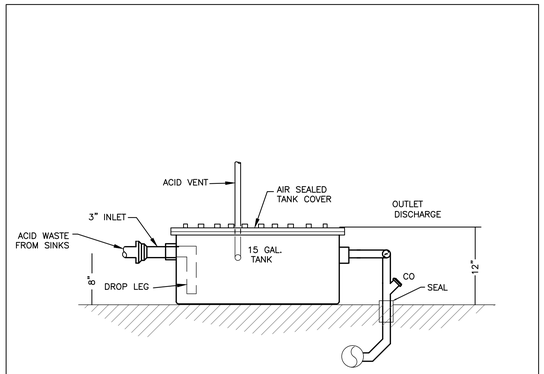
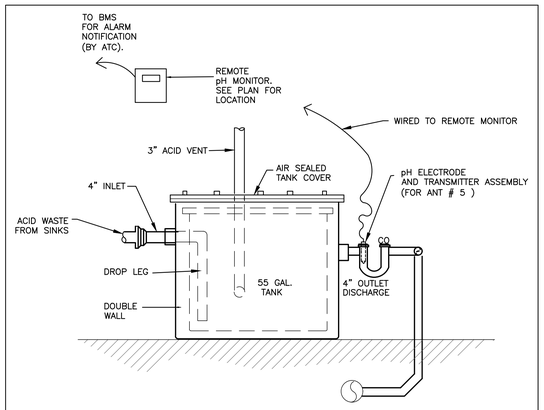


1 NEUTRALIZING TANK
NOT TO SCALE



2 NEUTRALIZING TANK
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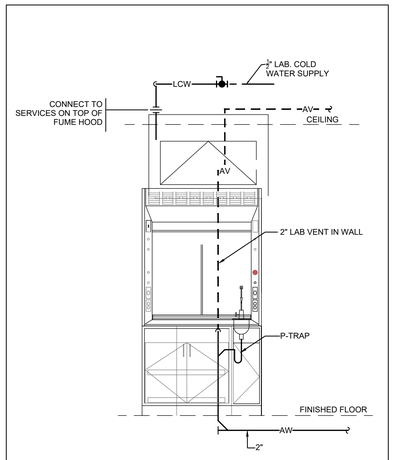
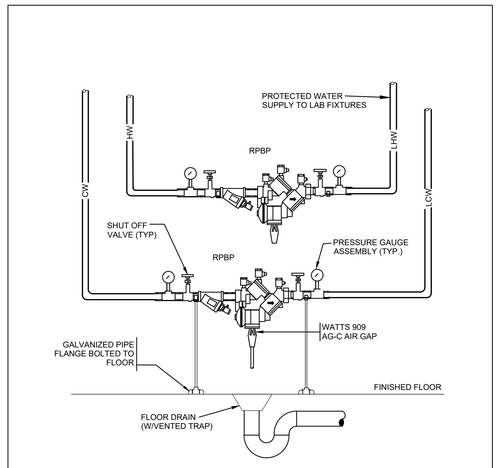
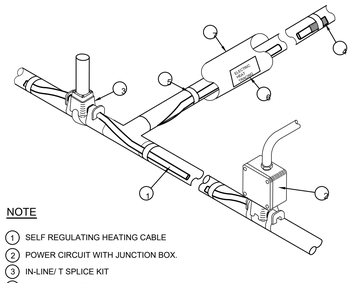


3 FUME HOOD PIPE CONNECTION DETAIL.
NOT TO SCALE



REDUCED PRESSURE BACKFLOW PREVENTOR

4 FOR LAB. WATER SUPPLY
NOT TO SCALE

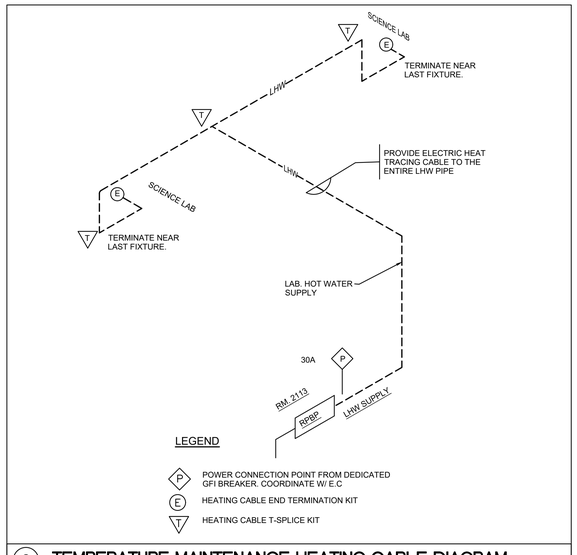


NOTE

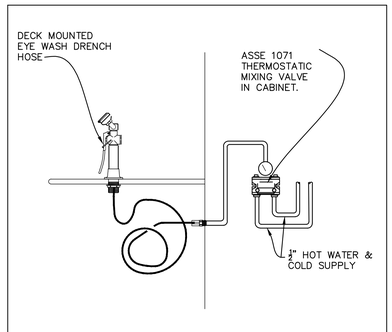
1. SELF REGULATING HEATING CABLE
2. POWER CIRCUIT WITH JUNCTION BOX.
3. IN-LINE/ T SPLICE KIT
4. CABLE END TERMINATION
5. TAPE SECURE CABLE TO PIPE. USE 12 TO 24" INTERVAL
6. PEEL AND STICK LABEL INSTALL 10' INTERVAL
7. FIBERGLASS INSULATION

NOTE:
REFER TO THE MANUFACTURERS INSTALLATION INSTRUCTION.

5 HEATING CABLE INSTALLATION DETAIL.
NOT TO SCALE



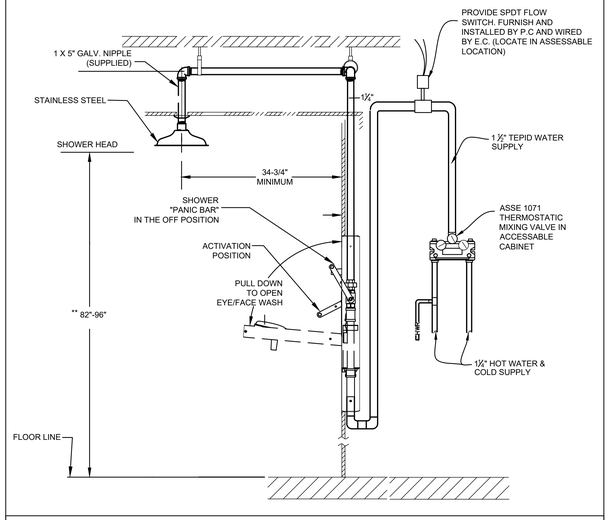
6 TEMPERATURE MAINTENANCE HEATING CABLE DIAGRAM.
NOT TO SCALE



7 EMERGENCY EYEWASH DRENCH HOSE
NOT TO SCALE

NOTES:

TO COMPLY WITH ANSI Z358.1-2009 FOR EMERGENCY EYEWASH OR EYE/FACE WASH AND SHOWER EQUIPMENT:
- UNIT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND ACCEPTABLE PLUMBING PRACTICES.
- EYEWASH OR EYE/FACE WASH SHALL BE POSITIONED WITH NOZZLES NOT LESS THEN (33 IN.) AND NO GREATER THAN (45 IN.) FROM SURFACE ON WHICH USER STANDS AND (6 IN.) MINIMUM FROM WALL OR NEAREST OBSTRUCTION.
- SHOWER SHALL BE POSITIONED SO THAT SHOWER HEAD IS NOT LESS THAN (82 IN.) NOR MORE THAN (96 IN.) FROM SURFACE ON WHICH USER STANDS.
- SHOWER SPRAY PATTERN SHALL HAVE A MINIMUM DIAMETER OF (20 IN.) AT (60 IN.) ABOVE SURFACE ON WHICH USER STANDS, AND CENTER OF SPRAY PATTERN SHALL BE LOCATED AT LEAST (16 IN.) FROM ANY OBSTRUCTION.



8 EMERGENCY SHOWER/ EYE WASH STATION -WALL RECESSED
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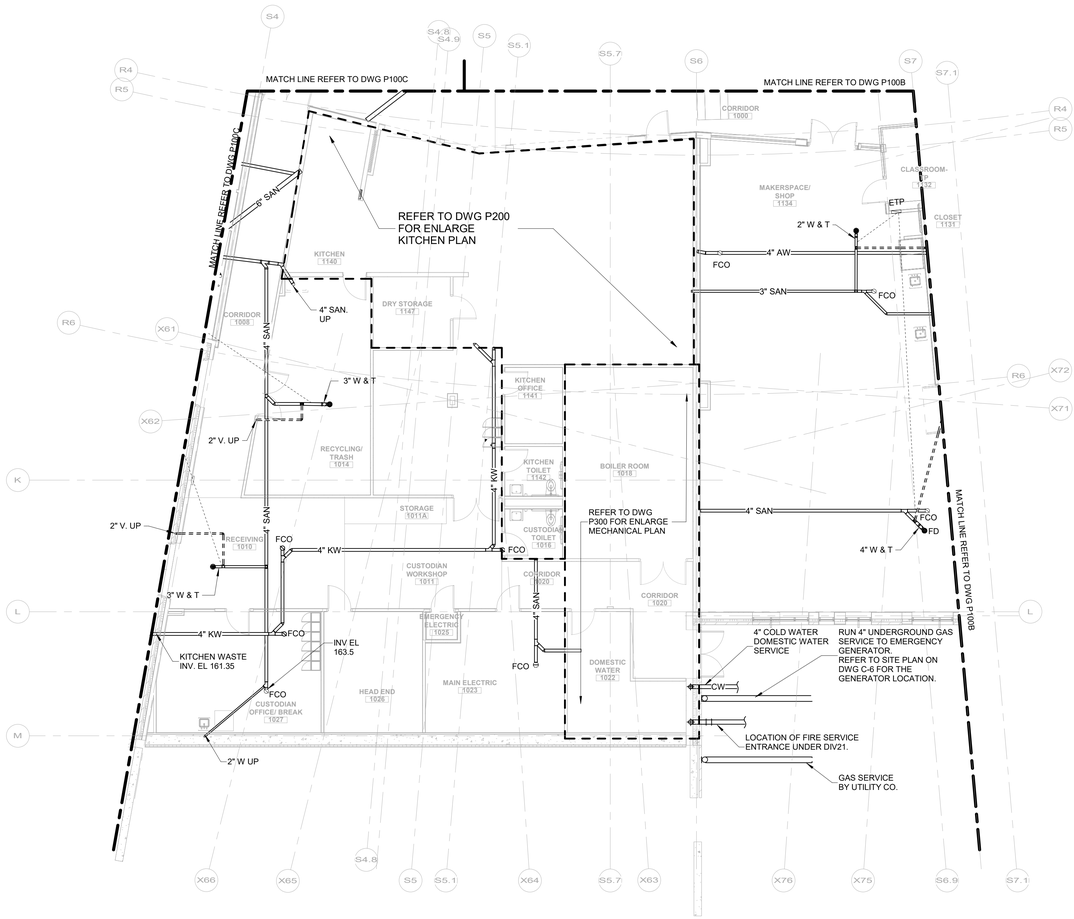

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No.	Date	Description

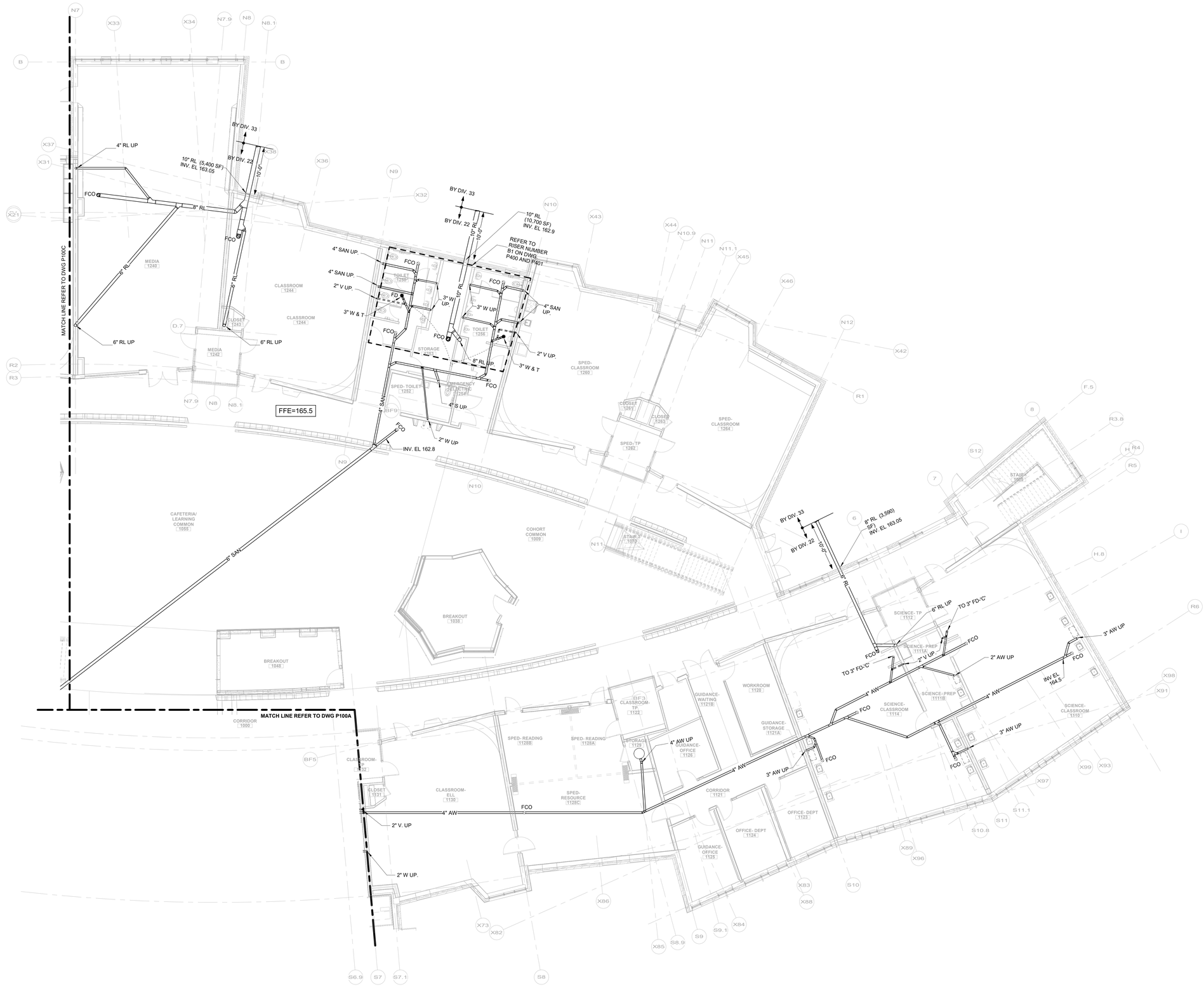
DRAWING NAME

FIRST FLOOR
BELOW SLAB PLAN
- PLUMBING A

PROJECT NO. 1722

DRAWING NO.

P100A



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FIRST FLOOR
BELOW SLAB PLAN
- PLUMBING B

PROJECT NO. 1722

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P100B

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No.	Date	Description

DRAWING NAME

FIRST FLOOR
BELOW SLAB PLAN
- PLUMBING C

PROJECT NO. 1722

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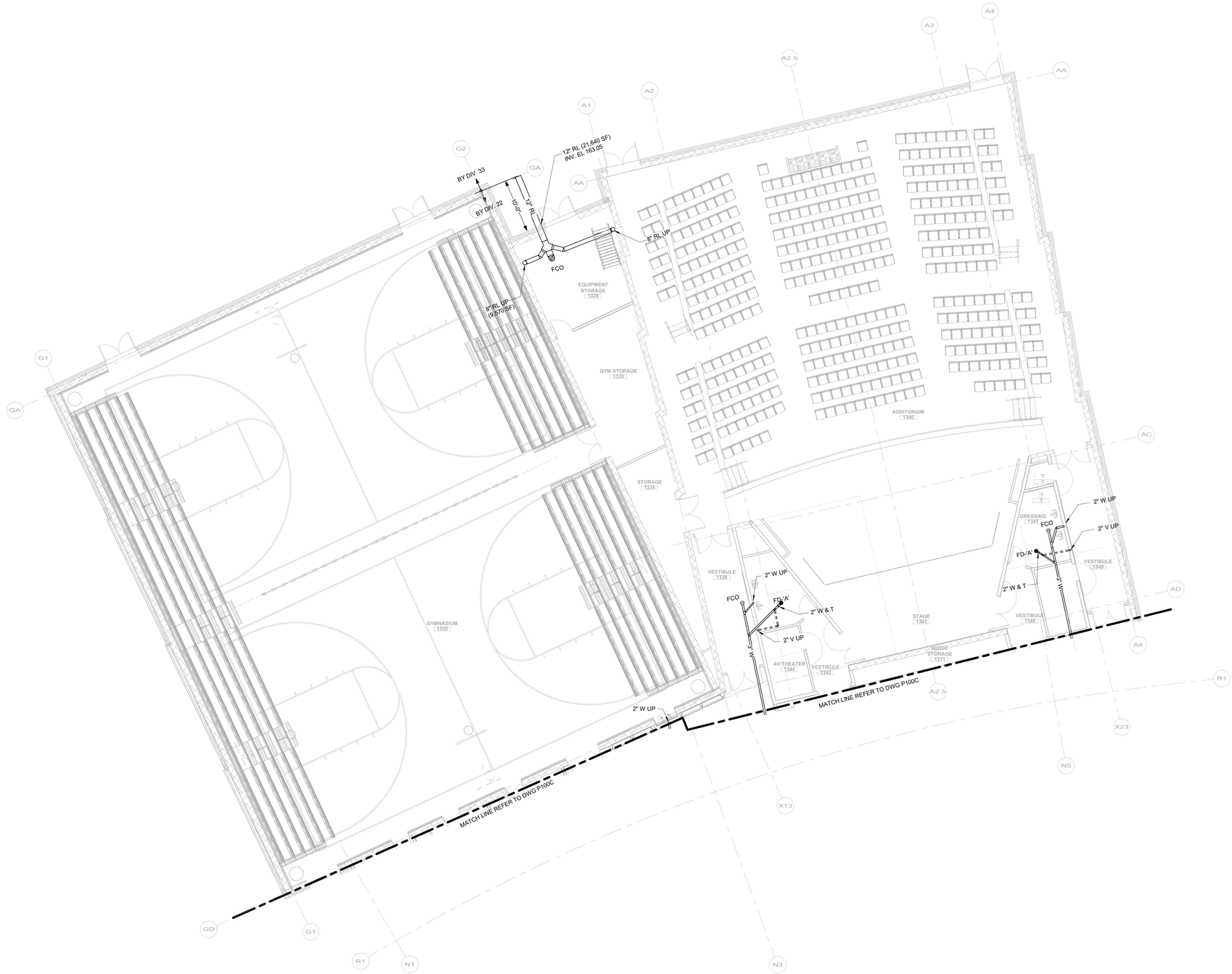
P100C



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FIRST FLOOR
BELOW SLAB PLAN
- PLUMBING D

PROJECT NO. 1722

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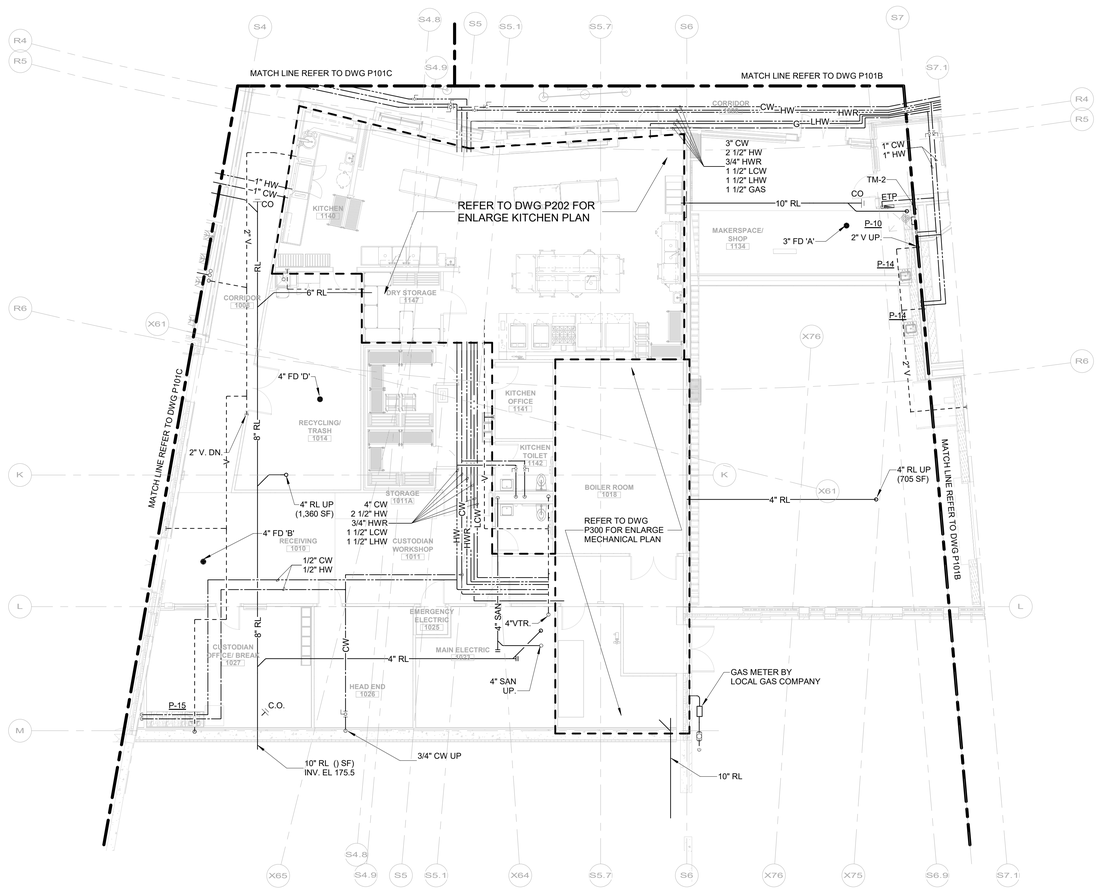
P100D



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No.	Date	Description

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FIRST FLOOR PLAN - PLUMBING A

PROJECT NO. 1722

DRAWING NO.

P101A

PLAN NOTES:

1. REFER TO PIPE RISER DIAGRAM ON DWG P402 FOR PIPE CONNECTION AND PIPE SIZES.
2. BALANCING VALVE AT RECIRCULATION LOOP. REFER TO DETAIL 7 ON DWG. P003.

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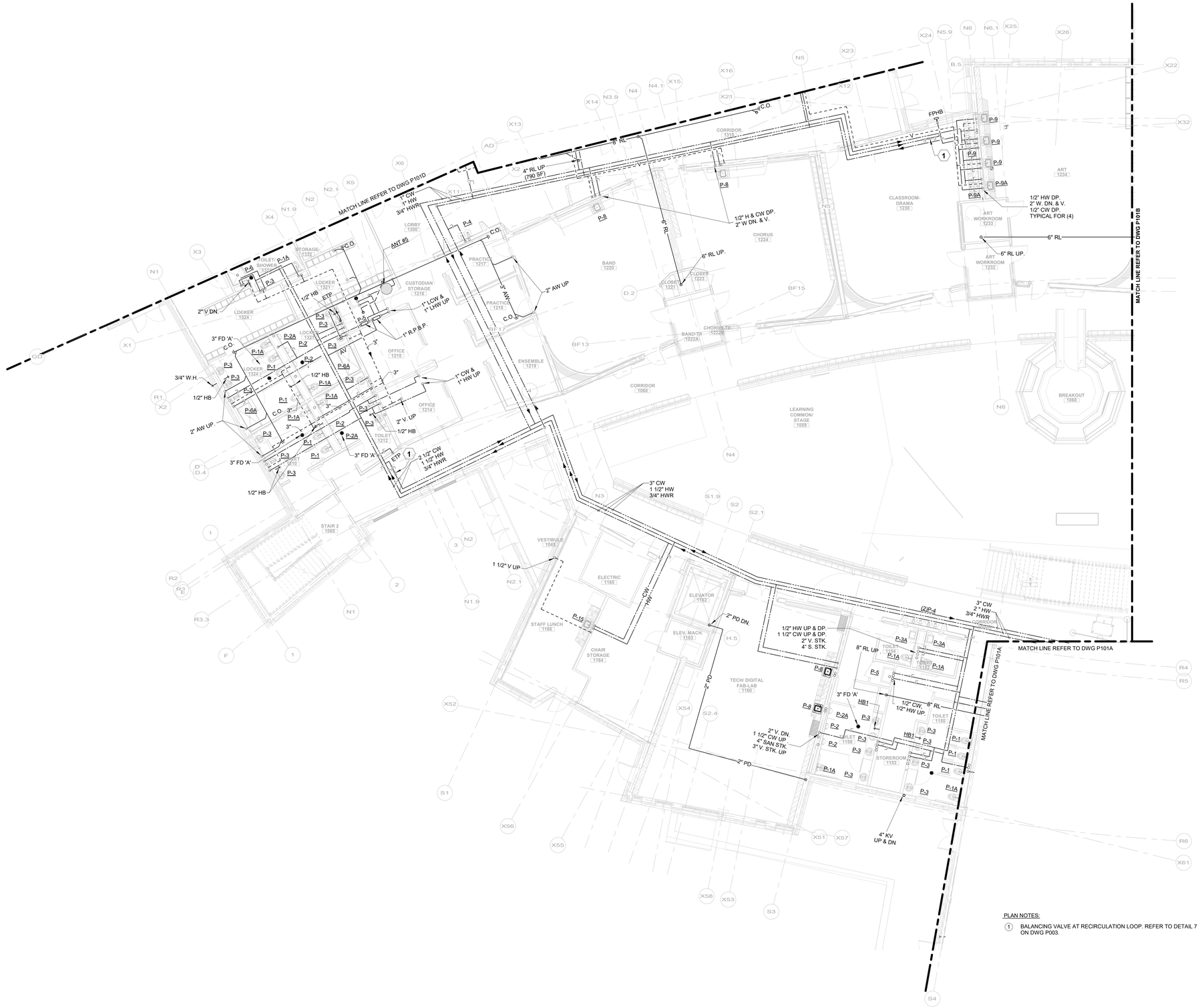
FIRST FLOOR PLAN - PLUMBING B

PROJECT NO. 1722

DRAWING NO.

P101B



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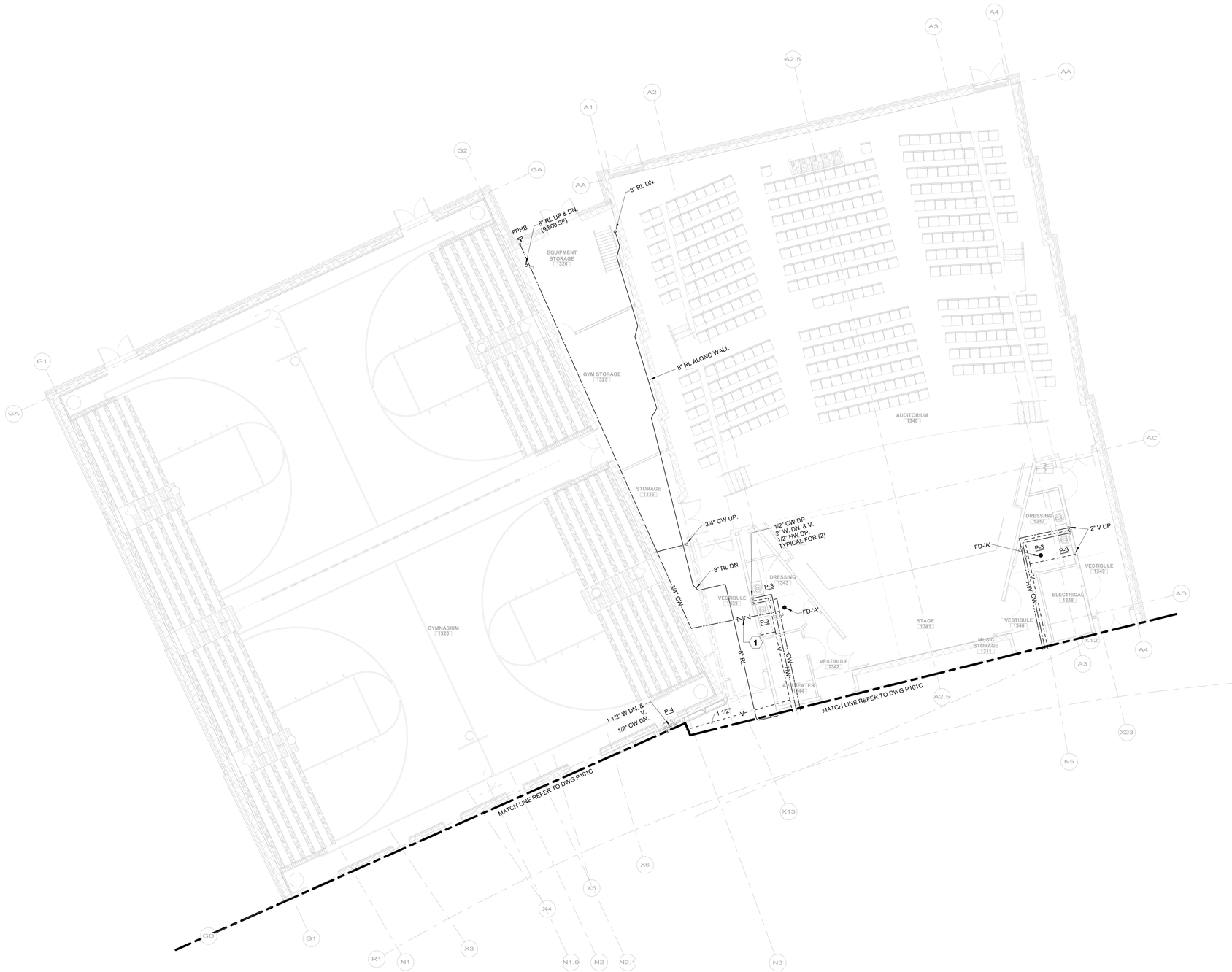
FIRST FLOOR PLAN - PLUMBING C

PROJECT NO. 1722

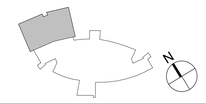
DRAWING NO.

P101C



PLAN NOTES:

(1) DUAL CHECK VALVE



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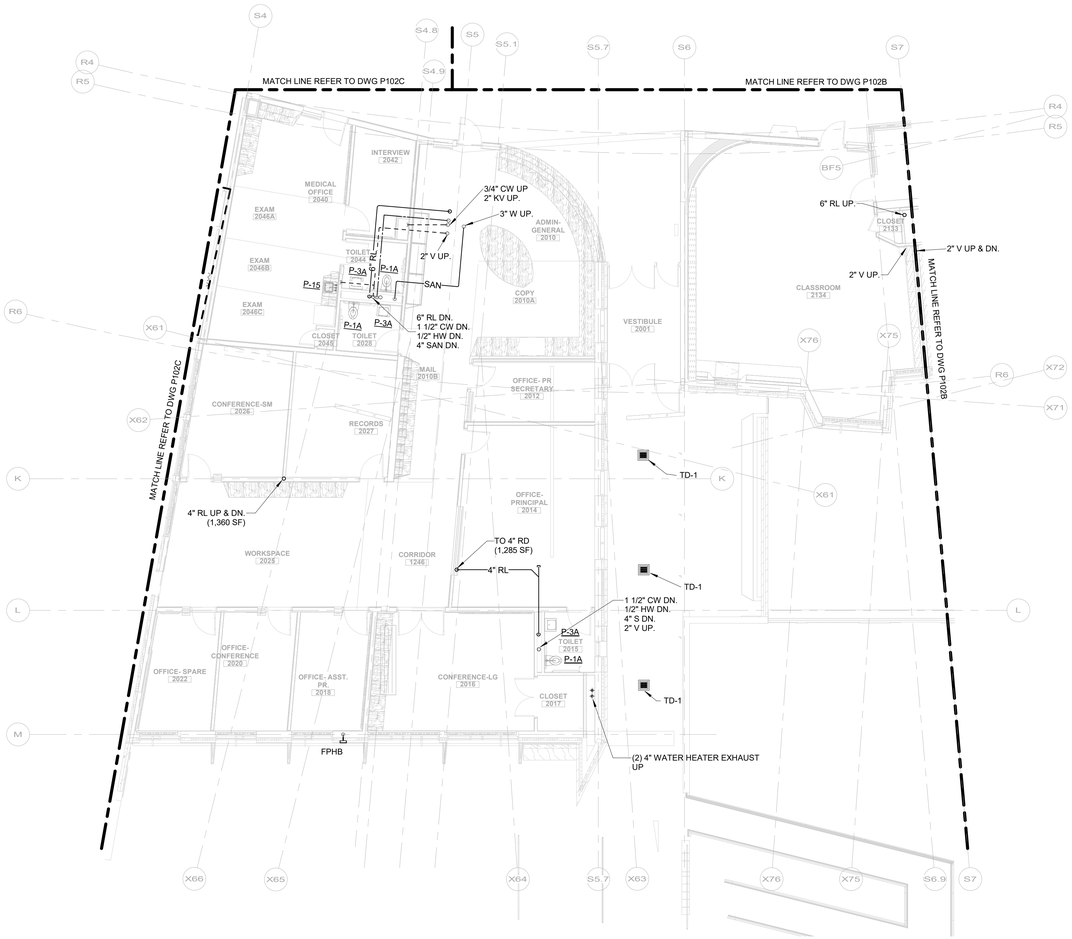
FIRST FLOOR PLAN - PLUMBING D

PROJECT NO. 1722

DRAWING NO.

P101D



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SECOND FLOOR PLAN - PLUMBING A

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P102A

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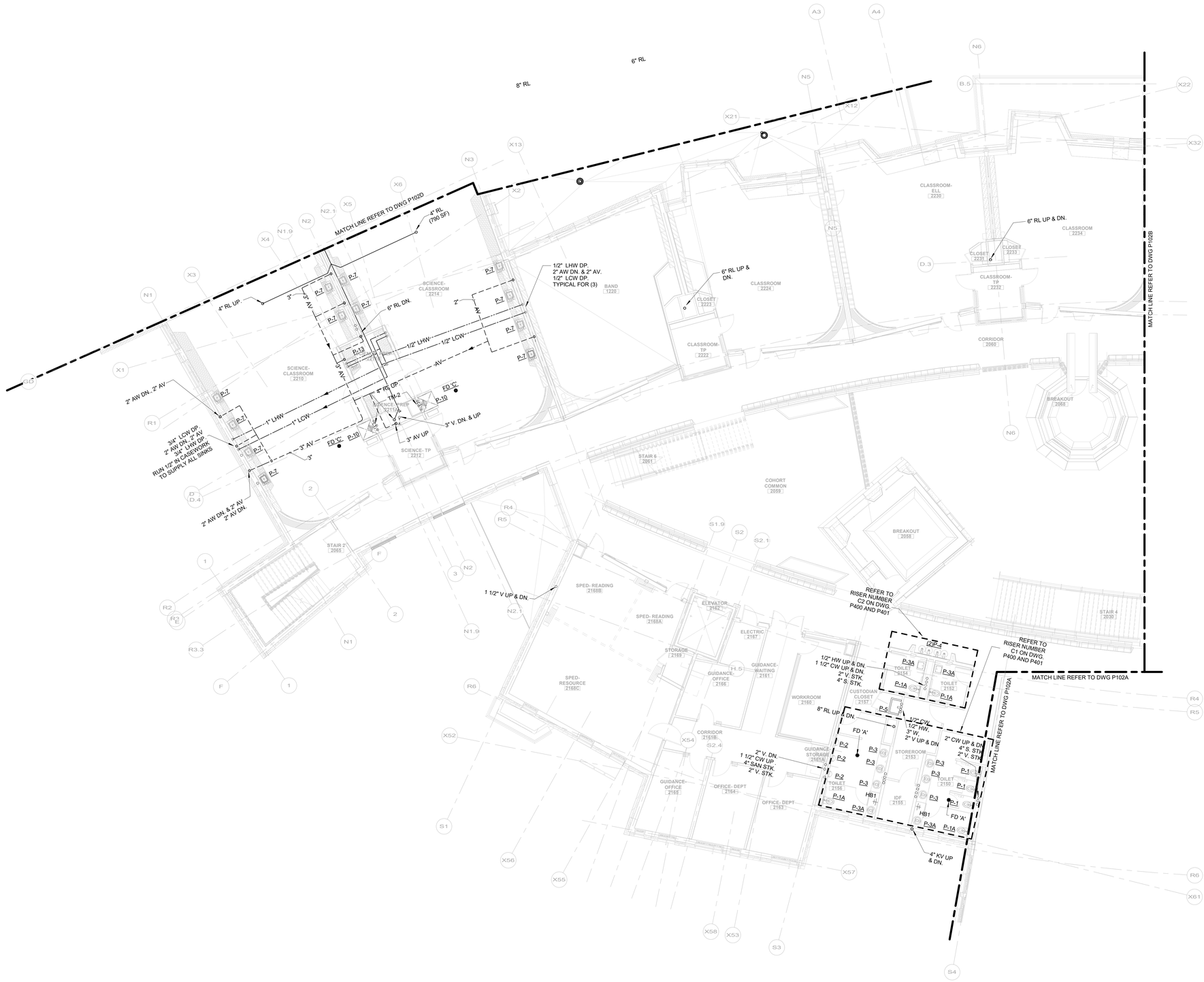
SECOND FLOOR PLAN - PLUMBING B

PROJECT NO. 1722

DRAWING NO.

P102B



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SECOND FLOOR PLAN - PLUMBING C

PROJECT NO. 1722

DRAWING NO.

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PROJECT STATUS

90% CONSTRUCTION DOCUMENTS
10/18/2019

REVISIONS

No.	Date	Description

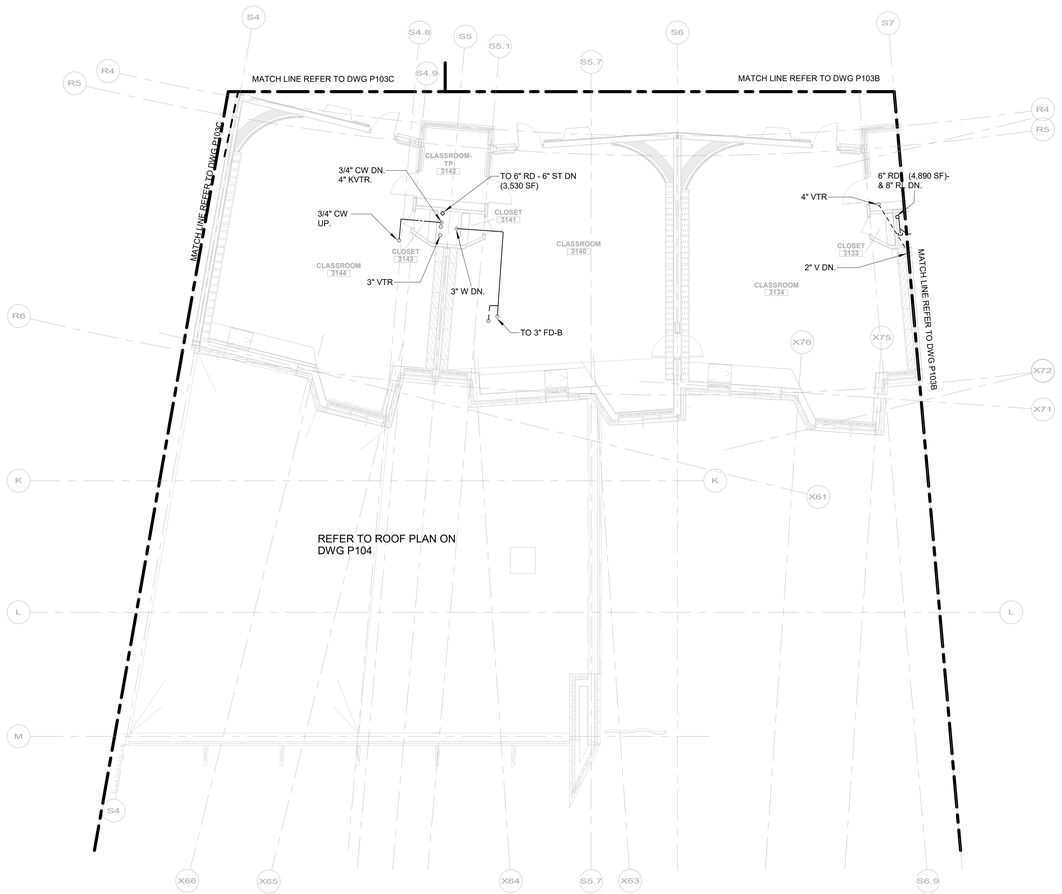
DRAWING NAME

SECOND FLOOR PLAN - PLUMBING D

PROJECT NO. 1722

DRAWING NO.

P102D



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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CONSTRUCTION DOCUMENTS
10/18/2019

REVISIONS

No.	Date	Description

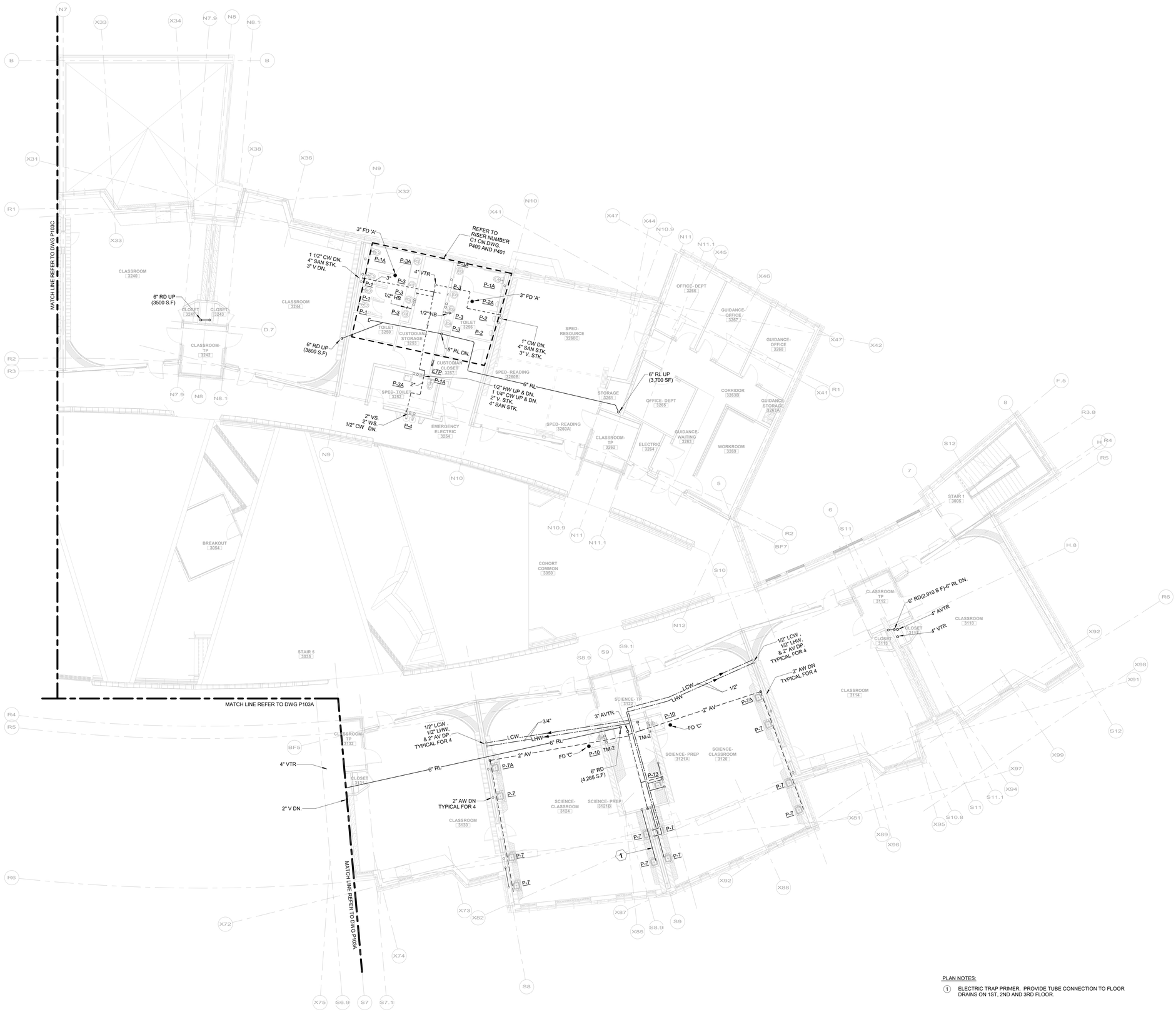
DRAWING NAME

THIRD FLOOR PLAN
- PLUMBING A

PROJECT NO. 1722

DRAWING NO.

P103A



PLAN NOTES:

1. ELECTRIC TRAP PRIMER. PROVIDE TUBE CONNECTION TO FLOOR DRAINS ON 1ST, 2ND AND 3RD FLOOR.

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31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CONSTRUCTION DOCUMENTS
10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN - PLUMBING B

PROJECT NO. 1722

DRAWING NO.

P103B

PLAN NOTES:

1. ELECTRIC TRAP PRIMER. PROVIDE TUBE CONNECTION TO FLOOR DRAINS ON 1ST, 2ND AND 3RD FLOOR.

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PROJECT STATUS

90% CONSTRUCTION DOCUMENTS
10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN - PLUMBING C

PROJECT NO. 1722

DRAWING NO.

P103C

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PROJECT STATUS

90% CONSTRUCTION DOCUMENTS
10/18/2019

REVISIONS

No.	Date	Description

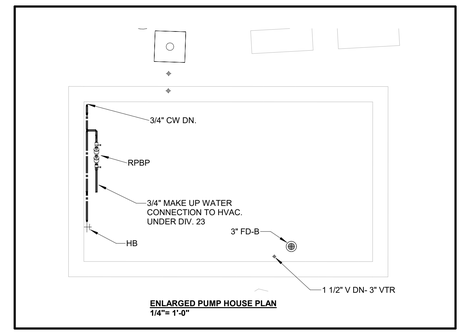
DRAWING NAME

THIRD FLOOR PLAN
- PLUMBING D

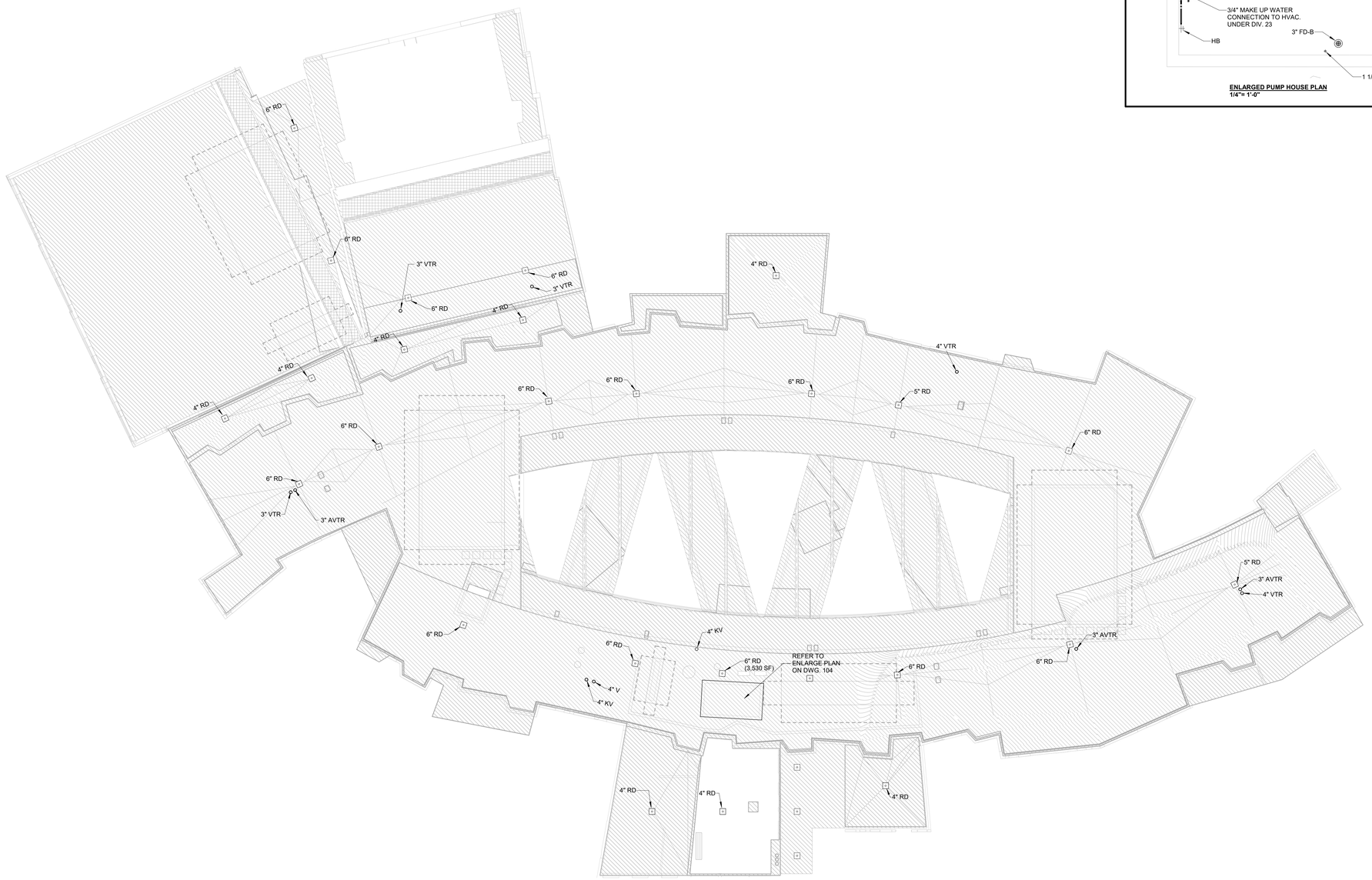
PROJECT NO. 1722

DRAWING NO.

P103D



ENLARGED PUMP HOUSE PLAN
1/4"= 1'-0"



PLUMBING ROOF PLAN
1/16" = 1'-0"

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31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CONSTRUCTION DOCUMENTS
10/18/2019

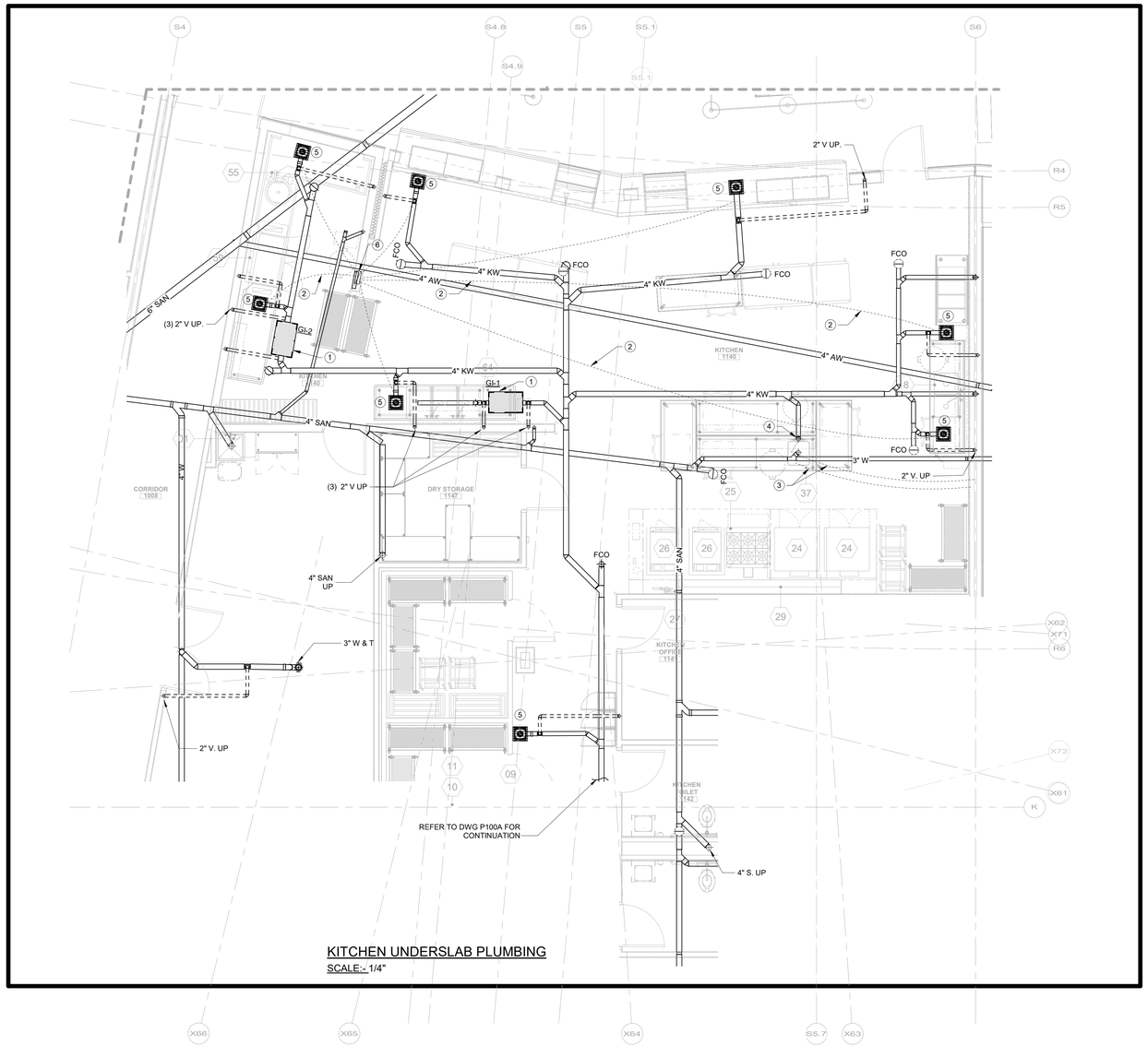
REVISIONS

No.	Date	Description

DRAWING NAME
ROOF PLAN - PLUMBING

PROJECT NO. 1722

DRAWING NO.
P104



KITCHEN UNDERSLAB PLUMBING

SCALE:- 1/4"

SCHEDULE OF FOODSERVICE EQUIPMENT & CONNECTIONS

Item	Qty	Description	Plumbing	Mechanical / Equipment Remarks
01	1	Mop Sink (by PC)	1/2" H&CW; Drain in Floor	
08a	1	Cooler Evaporator Coil	3/4" IW to FS	Remote refrigeration from Item 15b by KEC
09a	1	Freezer Evaporator Coil	3/4" IW to FS	Remote refrigeration from Item 14b by KEC
16	3	Hand Sink	1/2" H&CW; 1-1/2" W	Requires wall blocking by GC (See Special Conditions Plan)
18	1	Prep Table with Sinks	1/2" H&CW; 2" IW to FS	
20	1	Produce Washing Sink	3/4" H&CW; 1-1/2" IW to FS	
24	2	Double Convection Oven	3/4 G @ 100 MBTU (from Item 29)	
25	1	Six-Burner Range with Oven	3/4" G @ 243 MBTU (from Item 29)	
27	2	Water Filter Assembly	3/4" CW (from Item 29)	
29	1	Utility Distribution System	2" G @ 1,450 MBTU; 3/4" H&CW	Manufacturer to provide quick disconnect hoses and restraining cables
37	1	Cook's Table with Sink	1/2" H&CW; 2" IW to FS	
55	1	Trough Collector	1/2" H&CW" 2" W	
58	1	Hose Reel Assembly	1/2" H&CW	Requires wall blocking by GC (See Special Conditions Plan)
59	1	Rack Conveyor Warewasher	1/2" HW (2) 1/2" CW; 1-1/2" IW to FS	
64	1	Three Compartment Sink	3/4" 120°F H&CW; (3) 2" W thru GI by PC	200 & 400 CFM thru (2) 4" x 16" vents @ -0.25" SP; J-box for EXH fan control wiring to interlock with warewasher operation

KITCHEN PLAN NOTES:

1. FLOOR RECESSED GREASE INTERCEPTOR.
2. RUN 1/2" PRE INSULATED COPPER TUBE UNDERSLAB TO SERVE FLOOR DRAIN TRAP PRIMER.
3. RUN 1/2" CW AND 1/2" HW PRE INSULATED COPPER TUBE UNDERSLAB TO SERVE FOR SINK 37. SEE DETAIL 11 ON DWG. P002.
4. 2" KITCHEN WASTE WITH BOW VENT TO SINK 37. REFER TO PIPE CONNECTION DETAIL # 6 ON DWG P002.
5. 3" WASTE & TRAP TO FLOOR SINK.
6. 1/2" COPPER TUBE PIPE RISER TO TRAP PRIMER MANIFOLD. REFER TO DETAIL NO.11 DWG. P003

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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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10/18/2019

REVISIONS

No.	Date	Description

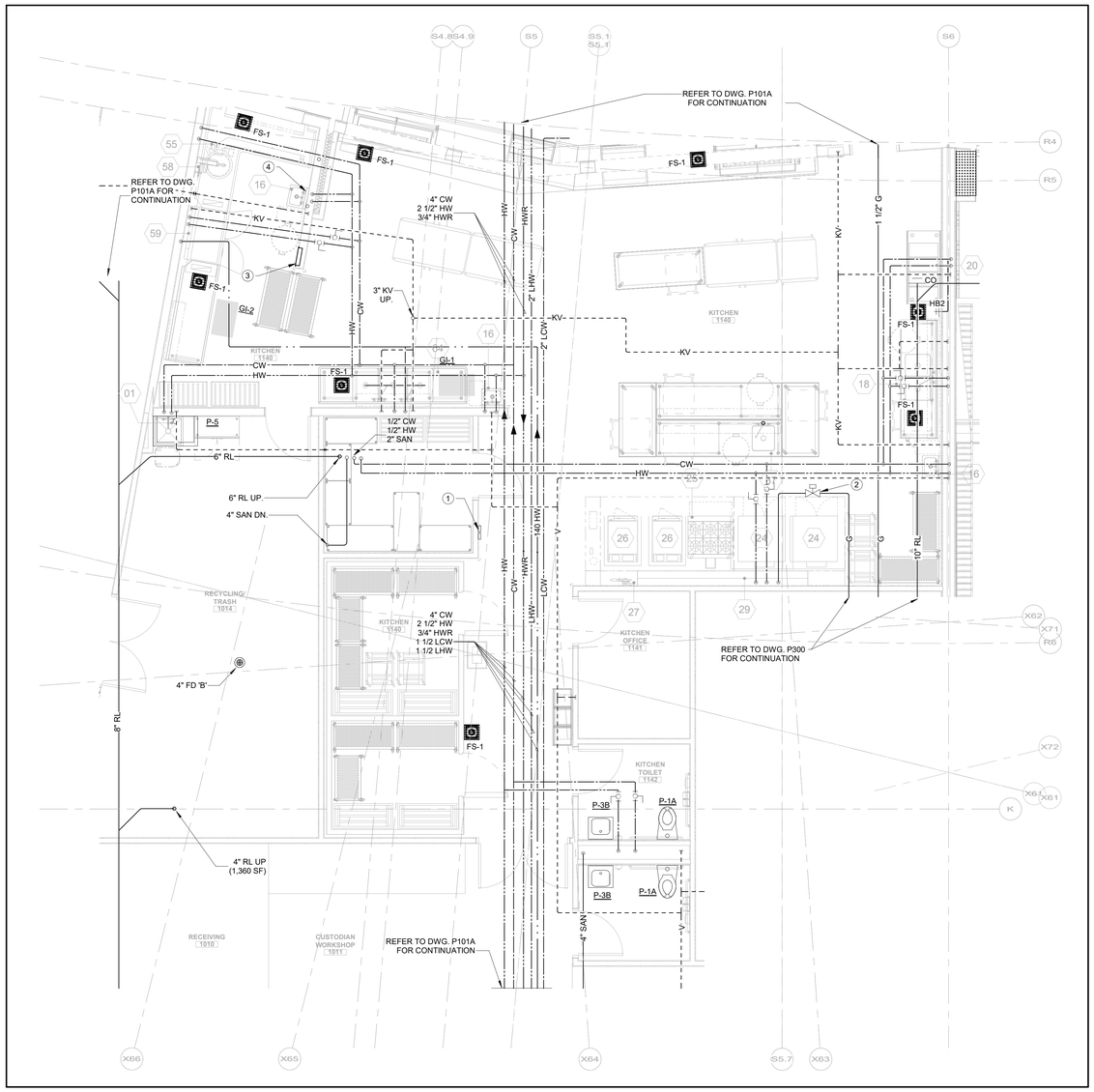
DRAWING NAME

KITCHEN BELOW SLAB PLUMBING

PROJECT NO. 1722

DRAWING NO.

P200



KITCHEN PLAN NOTES:

A. PROVIDE ROUGHING AND FINAL CONNECTIONS FOR WATER, WASTE, VENT AND GAS SYSTEMS; INCLUDING TRAPS, TAILPIECE AND STRAINERS,WHEEL HANDLE STOPS, VALVES, COCKS AND APPURTENANCES TO FIXTURES AND EQUIPMENT REQUIRING SAME. EACH FIXTURE AND PIECE OF EQUIPMENT, INCLUDING WORK IN, UNDER OR THROUGH TABLES, CABINETS AND EQUIPMENT CHASES, SHALL BE VALVED AND TRAPPED.

B. AS EQUIPMENT PURCHASED MAY VARY SLIGHTLY FROM THAT INDICATED, AND, THEREFORE, REQUIRE SOME RE-ARRANGEMENTS OF EQUIPMENT DIFFERENT FROM THAT INDICATED ON THE DRAWINGS, MAKE CONNECTIONS TO SUCH RE-ARRANGED EQUIPMENT WITHOUT ADDITIONAL COST TO OWNER. UNPACK, ASSEMBLE AND INSTALL SUPPLY TRIM FOR EQUIPMENT AND FIXTURES FURNISHED BY OWNER.

C. PROVIDE MISCELLANEOUS EQUIPMENT CONNECTIONS AND INDIRECT DRAINS FROM SERVICE UNITS AND SIMILAR EQUIPMENT. UNIONS SHALL BE INSTALLED AT KITCHEN EQUIPMENT AND AT OTHER SUCH PLACES AS MAY BE NECESSARY TO DISCONNECT PIPING SO AS TO MAKE REPAIRS.

D. ROUGHING SHALL NOT BE UNDERTAKEN UNTIL ARCHITECT HAS APPROVED EQUIPMENT AND FIXTURE SHOP DRAWINGS AND KITCHEN TEMPLATE IS FURNISHED BY PERTINENT MANUFACTURER SO THAT CONNECTING REQUIREMENTS MAY BE VERIFIED AND WORK INSTALLED IN A NEAT AND WORKMANLIKE MANNER. EXACT LOCATION OF SERVICE CONNECTIONS SHALL BE OBTAINED PRIOR TO ROUGHING.

E. IF APPLICABLE, HOOK-UP BETWEEN A GARBAGE DISPOSER AND COLD WATER BRANCH SHALL INCLUDE INSTALLATION OF BALL VALVE, SOLENOID VALVE AND VACUUM BREAKER.

F. SHOCK ABSORBERS SHALL BE INSTALLED IN CONJUNCTION WITH QUICK CLOSING VALVES INCLUDING DISHWASHER AND BOOSTER HEATER. SHUT OFF VALVE SHALL BE INSTALLED BENEATH EACH ABSORBER. ABSORBER SHALL BE SIZED IN ACCORDANCE WITH PLUMBING AND DRAINAGE INSTITUTE STANDARD PDI-WH 201.

G. PROVIDE 1/2 IN. STOP VALVES ON ALL FIXTURES AND EQUIPMENT SUPPLIES.

H. VACUUM BREAKER SHALL BE INSTALLED IN CONJUNCTION WITH WATER LINES WHERE REQUIRED.

I. ALL FLOOR SANI-CEPTOR "FD5" AND FLOOR DRAINS "FD4" SHALL BE BY P.C. AND SHALL BE PROVIDED W/ P- TRAP.TRAP SHALL BE VENTED AS PER 248 CMR 10.16 (12).

J. PROVIDE SHUT OFF VALVE FOR RESPECTIVE MANIFOLDS IN THE UTILITY DISTRIBUTION SYSTEM. COORDINATE WORK WITH K.E.C TO CONNECT INCOMING SERVICES. CONNECT HOSE CONNECTION TO GAS EQUIPMENT AND PRESSURE CHECK ALL LINES IN THE UTILITY DISTRIBUTION SYSTEM.

SCHEDULE OF FOODSERVICE EQUIPMENT & CONNECTIONS

Item	Qty	Description	Plumbing	Mechanical / Equipment Remarks
01	1	Mop Sink (by PC)	1/2" H&CW; Drain in Floor	
08a	1	Cooler Evaporator Coil	3/4" IW to FS	Remote refrigeration from Item 15b by KEC
09a	1	Freezer Evaporator Coil	3/4" IW to FS	Remote refrigeration from Item 14b by KEC
16	3	Hand Sink	1/2" H&CW; 1-1/2" W	Requires wall blocking by GC (See Special Conditions Plan)
18	1	Prep Table with Sinks	1/2" H&CW; 2" IW to FS	
20	1	Produce Washing Sink	3/4" H&CW; 1-1/2" IW to FS	
24	2	Double Convection Oven	3/4 G @ 100 MBTU (from Item 29)	
25	1	Six-Burner Range with Oven	3/4" G @ 243 MBTU (from Item 29)	
27	2	Water Filter Assembly	3/4" CW (from Item 29)	
29	1	Utility Distribution System	2" G @ 1,450 MBTU; 3/4" H&CW	Manufacturer to provide quick disconnect hoses and restraining cables
37	1	Cook's Table with Sink	1/2" H&CW; 2" IW to FS	
55	1	Trough Collector	1/2" H&CW: 2" W	
58	1	Hose Reel Assembly	1/2" H&CW	Requires wall blocking by GC (See Special Conditions Plan)
59	1	Rack Conveyor Warewasher	1/2" HW (2) 1/2" CW; 1-1/2" IW to FS	
64	1	Three Compartment Sink	3/4" 120°F H&CW; (3) 2" W thru GI by PC	200 & 400 CFM thru (2) 4" x 16" vents @ -0.25" SP; J-box for EXH fan control wiring to interlock with warewasher operation

KITCHEN PLAN NOTES:

1. GAS CONTROL SHUT OFF VALVE AS PER STATE FUEL GAS CODE. REFER TO CONTROL DIAGRAM 4 ON P005
2. GAS VALVE CONTROL PANEL. REFER TO CONTROL DIAGRAM 4 ON DWG P005
3. WALL RECESSED ELECTRONIC TRAP PIPING MANIFOLD . PRIME TRAPS OF ALL KITCHEN FLOOR DRAINS. SEE PIPE CONNECTION DETAIL-11 ON P004
4. PROVIDE THERMOSTATIC MIXING VALVE FOR EMERGENCY EYE WASH FAUCET .

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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CONSTRUCTION DOCUMENTS
10/18/2019

REVISIONS

No.	Date	Description

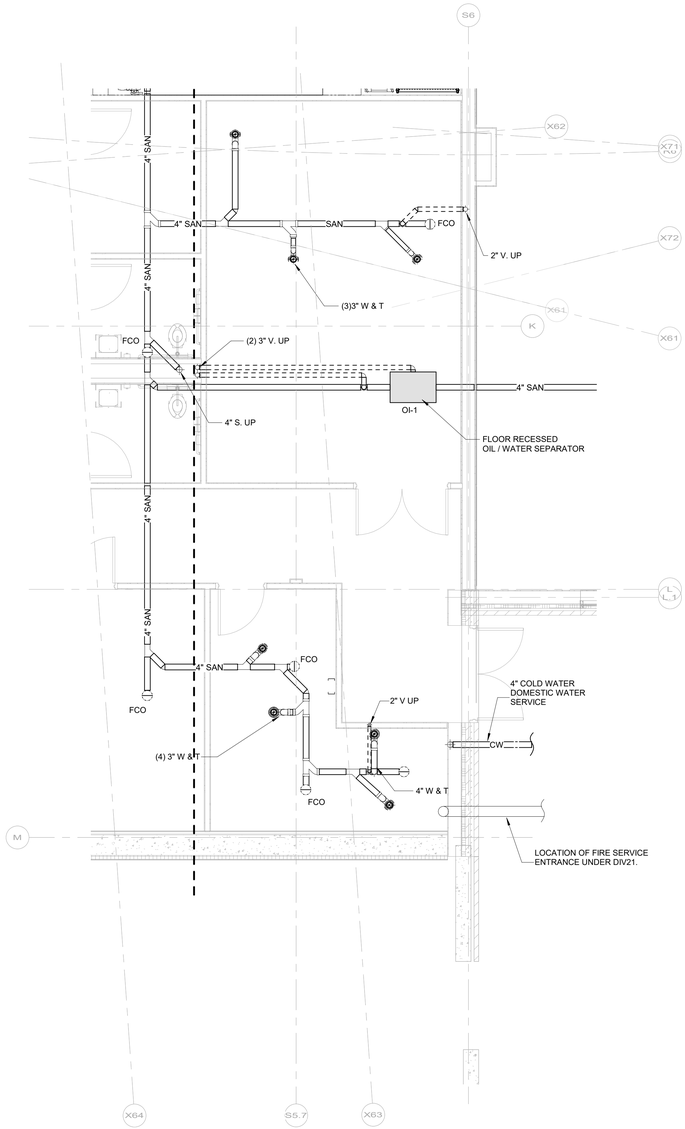
DRAWING NAME

KITCHEN ABOVE SLAB PLUMBING

PROJECT NO. 1722

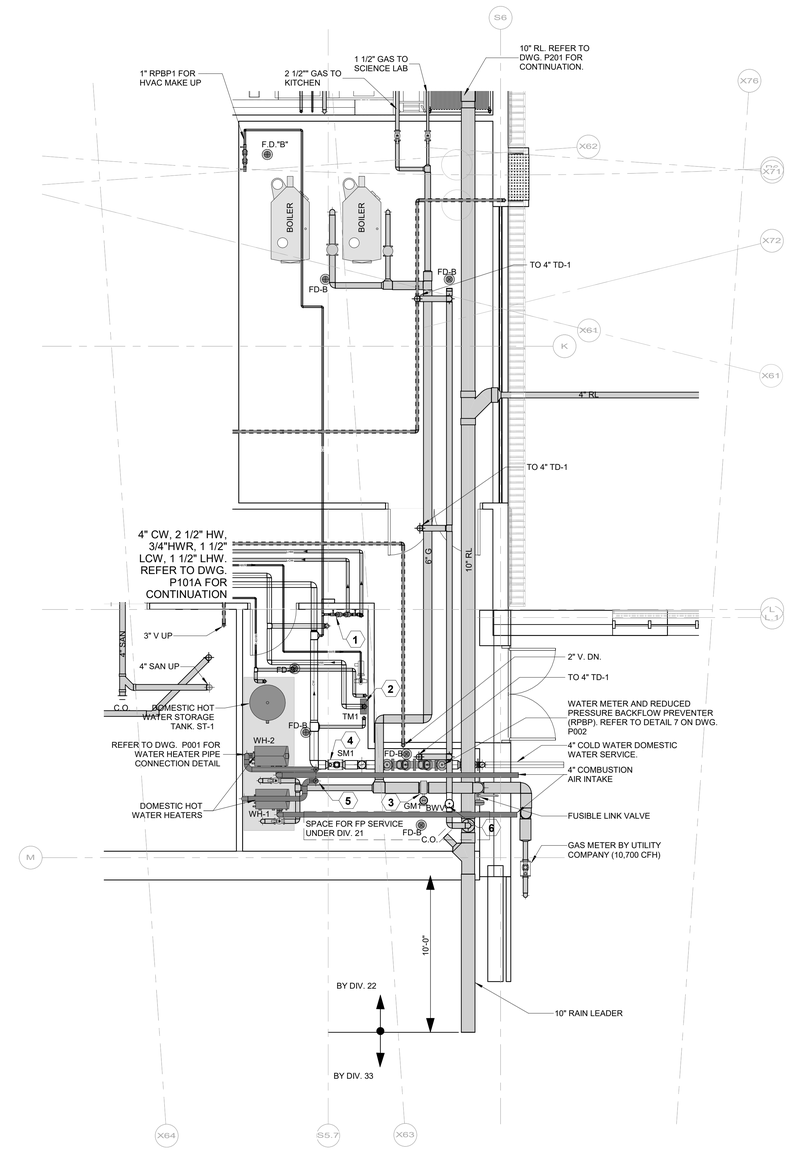
DRAWING NO.

P201



ENLARGE MECHANICAL PLAN UNDER SLAB

SCALE: 1/4"



ENLARGE MECHANICAL PLAN ABOVE SLAB

SCALE: 1/4"

PLAN NOTE:

1. (2) 1 1/2" REDUCED PRESSURE BACKFLOW PREVENTER (RPBP). REFER TO DETAIL # 6 ON DWG P006
2. THERMOSTATIC MASTER MIXING VALVE STATION (TM1). REFER TO DETAIL# 6 ON DWG P004
3. GAS FLOW SUB METER
4. WATER SUB METER
5. (2) 6" WATER HEATER FLUE UP
6. PROVIDE BACK WATER VALVE

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31 FLAGG DRIVE, FRAMINGHAM, MA

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10/18/2019

REVISIONS

No.	Date	Description

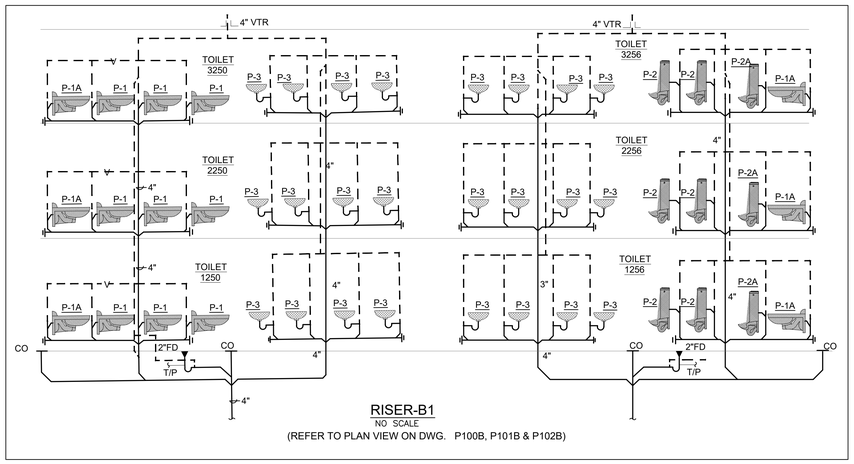
DRAWING NAME

ENLARGE MECHANICAL PLAN

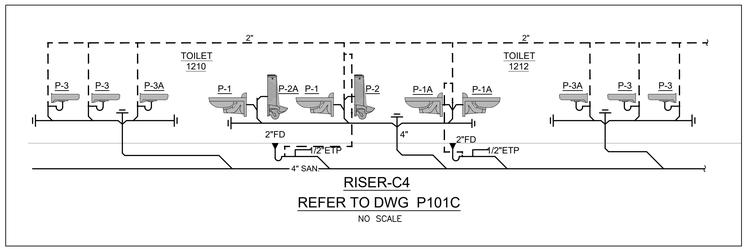
PROJECT NO. 1722

DRAWING NO.

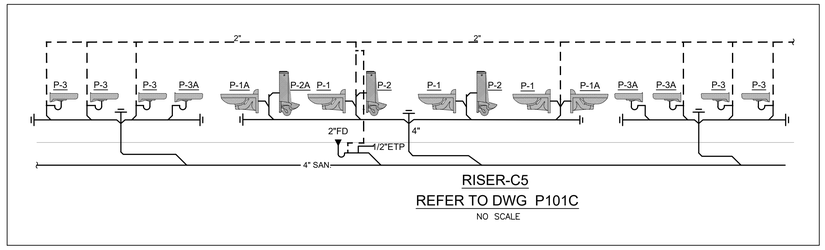
P300



RISER-B1
NO SCALE
(REFER TO PLAN VIEW ON DWG. P100B, P101B & P102B)



RISER-C4
REFER TO DWG P101C
NO SCALE



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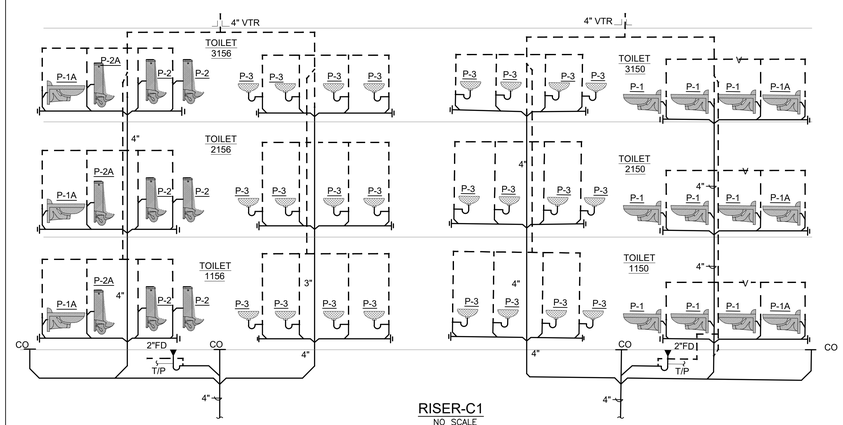

RISER-C1
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(REFER TO PLAN VIEW ON DWG. P100B, P101B & P102B)
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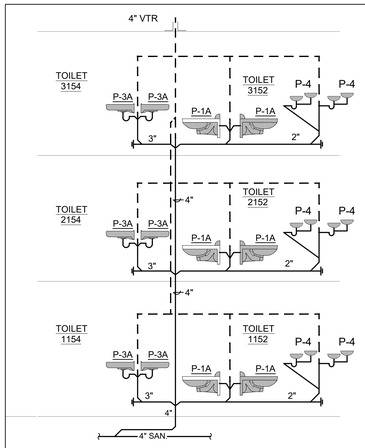

RISER-C2
REFER TO DWG P100C, P101C, P102C & P103C
NO SCALE

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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% Construction Documents
10/18/2019

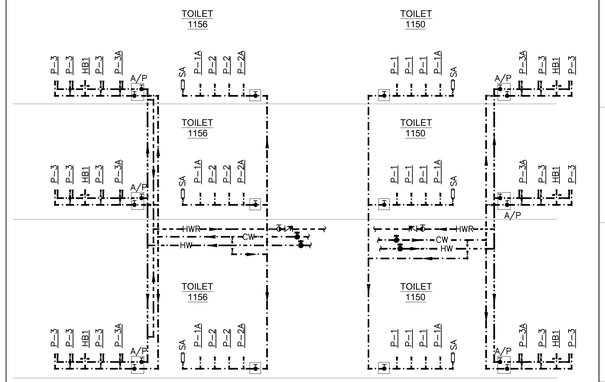
REVISIONS

No.	Date	Description

DRAWING NAME
SANITARY & VENT PIPING DIAGRAMS

PROJECT NO. 1722

DRAWING NO.
P400



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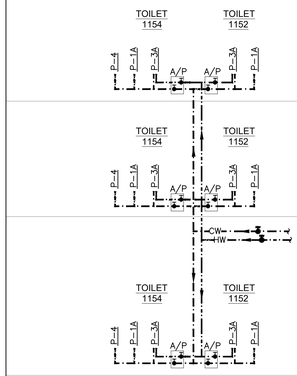
REFER TO DWG P101C
NO SCALE

RISER-C1
REFER TO DWG P101C



RISER-C3
REFER TO DWG P101C
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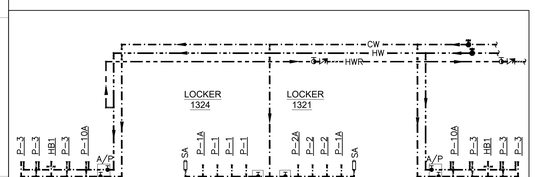

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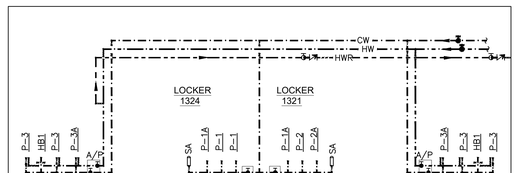

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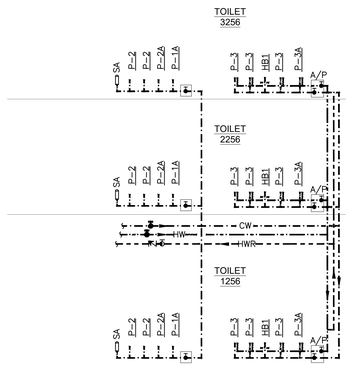

RISER-B1
REFER TO DWG P101B
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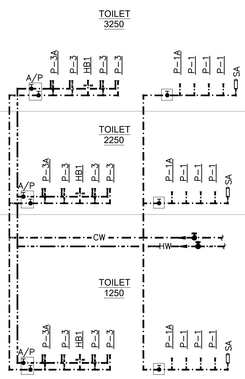

RISER-B2
REFER TO DWG P101B
NO SCALE

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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% Construction Documents
10/18/2019

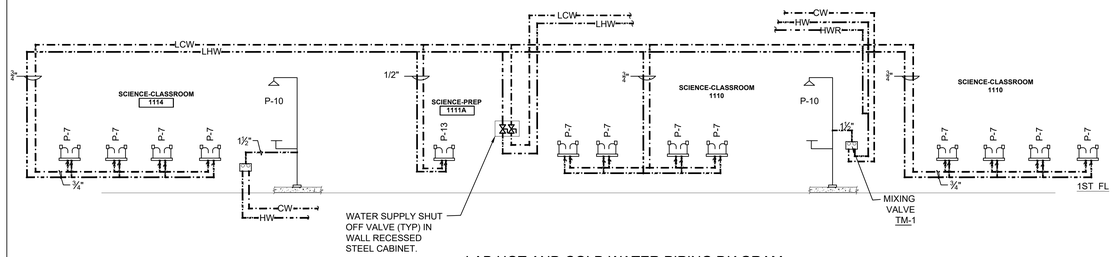
REVISIONS

No.	Date	Description

DRAWING NAME
COLD WATER & HOT WATER RISER DIAGRAMS

PROJECT NO. 1722

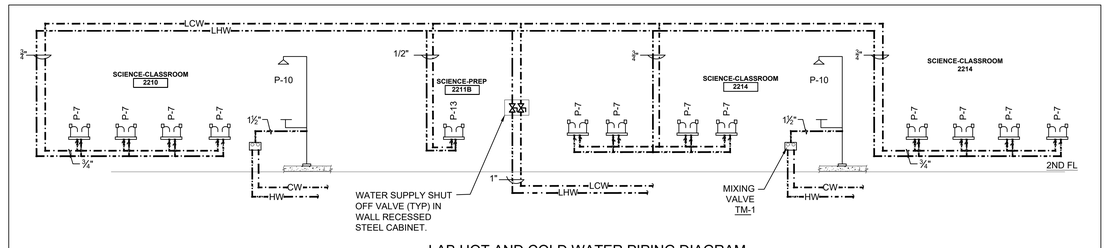
DRAWING NO.
P401



LAB HOT AND COLD WATER PIPING DIAGRAM

FIRST FLOOR SCIENCE CLASSROOMS

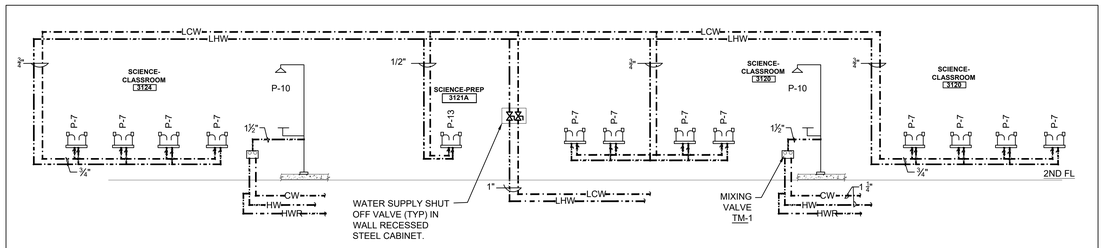
NO SCALE



LAB HOT AND COLD WATER PIPING DIAGRAM

SECOND FLOOR SCIENCE CLASSROOMS

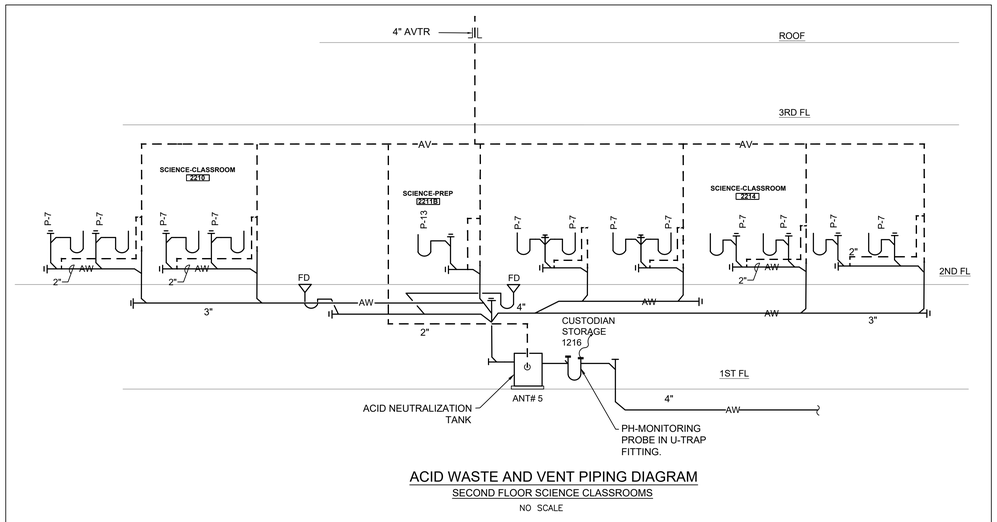
NO SCALE



LAB HOT AND COLD WATER PIPING DIAGRAM

THIRD FLOOR SCIENCE CLASSROOMS

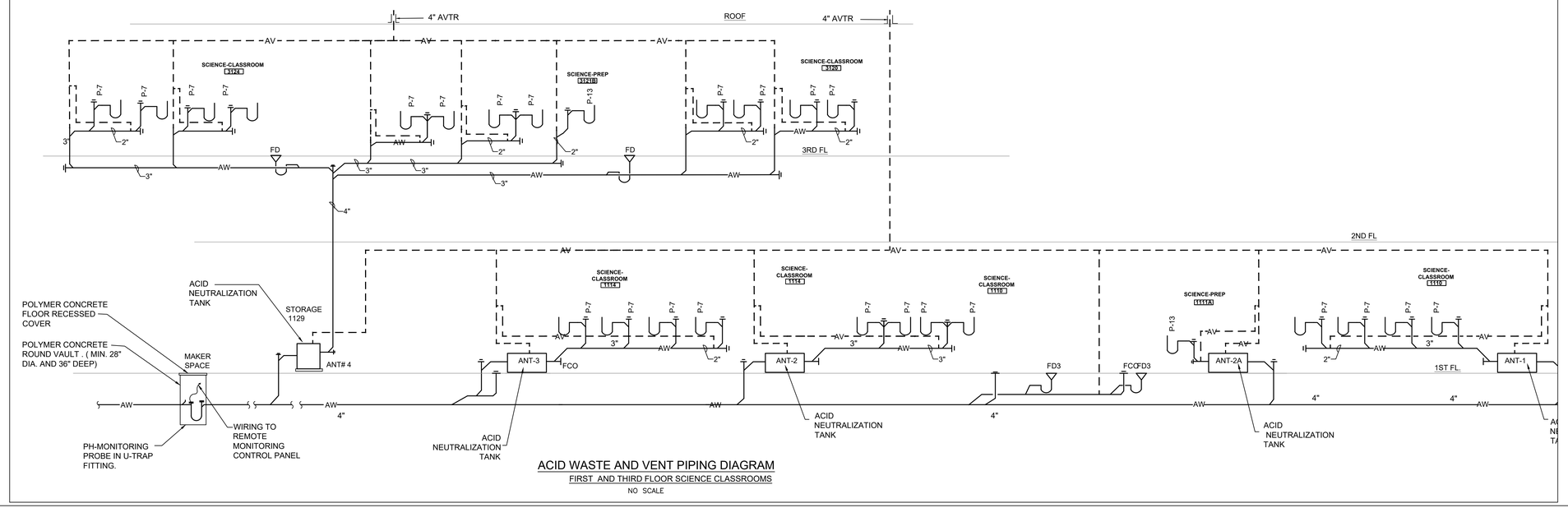
NO SCALE



ACID WASTE AND VENT PIPING DIAGRAM

SECOND FLOOR SCIENCE CLASSROOMS

NO SCALE



ACID WASTE AND VENT PIPING DIAGRAM

FIRST AND THIRD FLOOR SCIENCE CLASSROOMS

NO SCALE

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www.akalengineering.com

NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% Construction Documents
10/18/2019

REVISIONS

No.	Date	Description

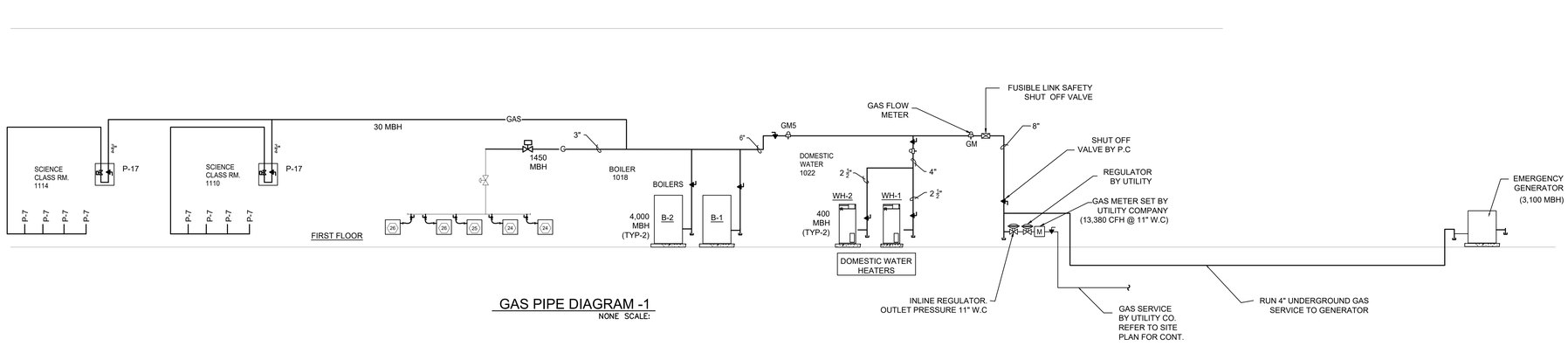
DRAWING NAME

SCIENCE CLASSROOM ROOM PIPING DIAGRAMS

PROJECT NO. 1722

DRAWING NO.

P402



GAS PIPE DIAGRAM -1
NONE SCALE:

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FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% Construction Documents
10/18/2019

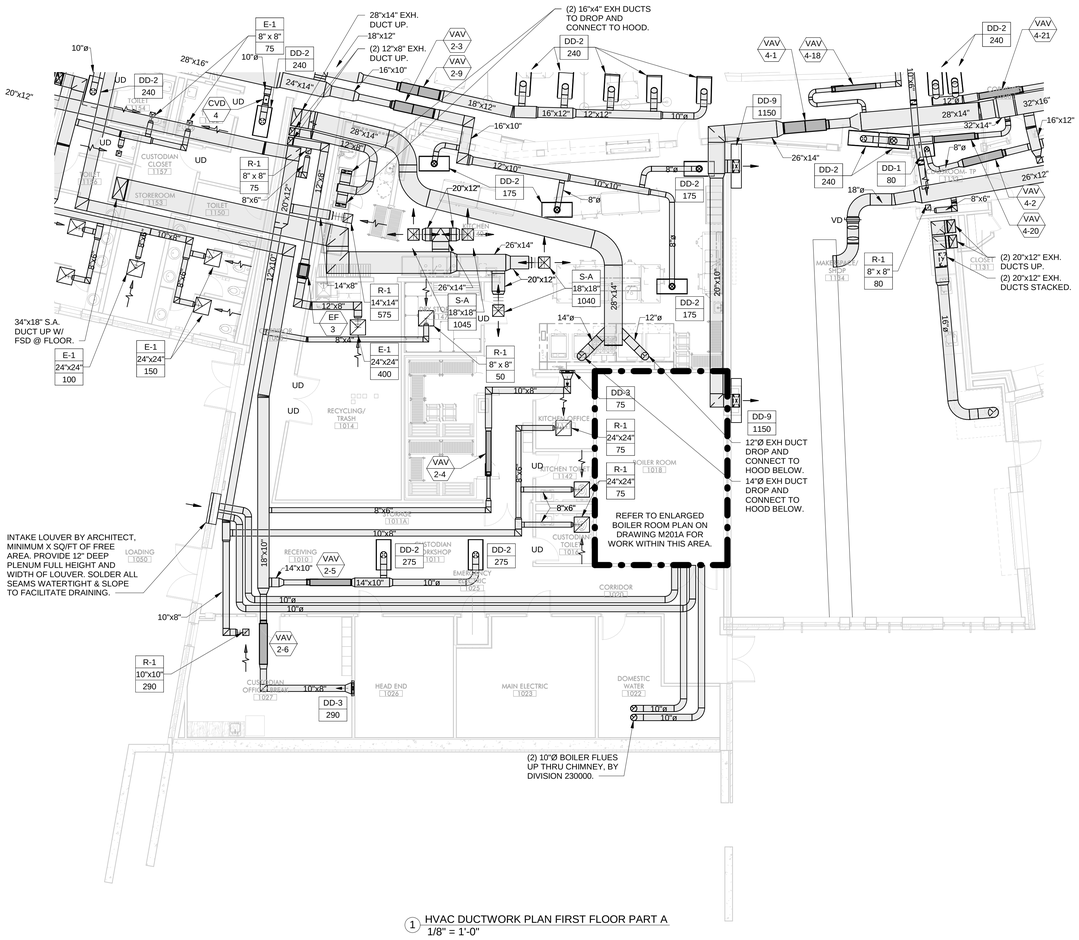
REVISIONS

No.	Date	Description

DRAWING NAME
GAS PIPING RISER DIAGRAM

PROJECT NO. 1722

DRAWING NO.
P403



1 HVAC DUCTWORK PLAN FIRST FLOOR PART A
1/8" = 1'-0"

DRAWING NOTES:

1.) 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.

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3.) ALL FIRE/SMOKE DAMPERS SHALL BE FURNISHED & INSTALLED BY THE HVAC CONTRACTOR, POWER WIRE & FIRE ALARM INTERLOCK BY THE ELECTRICAL CONTRACTOR. ATC CONTRACTOR SHALL PROVIDE THE NECESSARY WIRING, PROGRAMMING, & COMPONENTS TO SHUT ASSOCIATED EQUIPMENT DOWN UPON ACTIVATION OF THE DAMPER/SMOKE DETECTOR.

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12.) ALL EXPOSED DUCTWORK, INCLUDING DUCTWORK LOCATED ABOVE THE SLOPED ACT CEILING WITHIN THE CORRIDOR, SHALL BE INSULATED WITH A MATTE WHITE RIGID DUCT BOARD INSULATION SIMILAR TO JOHNS MANVILLE 800 SERIES SPIN-GLAS OR EQUAL.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

DUCTWORK PLAN FLOOR 1-A - HVAC

PROJECT NO. 1722

DRAWING NO.

M101A

DRAWING NOTES:

1.) 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.

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4.) ALL 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.

5.) ALL EQUIPMENT SHALL BE INSTALLED PER THE MANUFACTURE'S RECOMMENDATIONS & INSTALLATION INSTRUCTIONS. PROVIDE ALL NECESSARY COMPONENTS, FITTINGS, ACCESSORIES, WIRING, ETC. FOR A COMPLETE FUNCTIONAL SYSTEM.

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12.) ALL EXPOSED DUCTWORK, INCLUDING DUCTWORK LOCATED ABOVE THE SLOPED ACT CEILING WITHIN THE CORRIDOR, SHALL BE INSULATED WITH A MATTE WHITE RIGID DUCT BOARD INSULATION SIMILAR TO JOHNS MANVILLE 800 SERIES SPIN-GLAS OR EQUAL.

1 HVAC DUCTWORK PLAN FIRST FLOOR PART B
1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

DUCTWORK PLAN FLOOR 1-B - HVAC

PROJECT NO. 1722

DRAWING NO.

M101B

1 HVAC DUCTWORK PLAN FIRST FLOOR PART C
1/8" = 1'-0"

DRAWING NOTES:

1.) 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.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
DUCTWORK PLAN FLOOR 1-C - HVAC

PROJECT NO. 1722

DRAWING NO.
M101C

1 HVAC DUCTWORK PLAN FIRST FLOOR PART D
1/8" = 1'-0"

DRAWING NOTES:

1.) 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.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

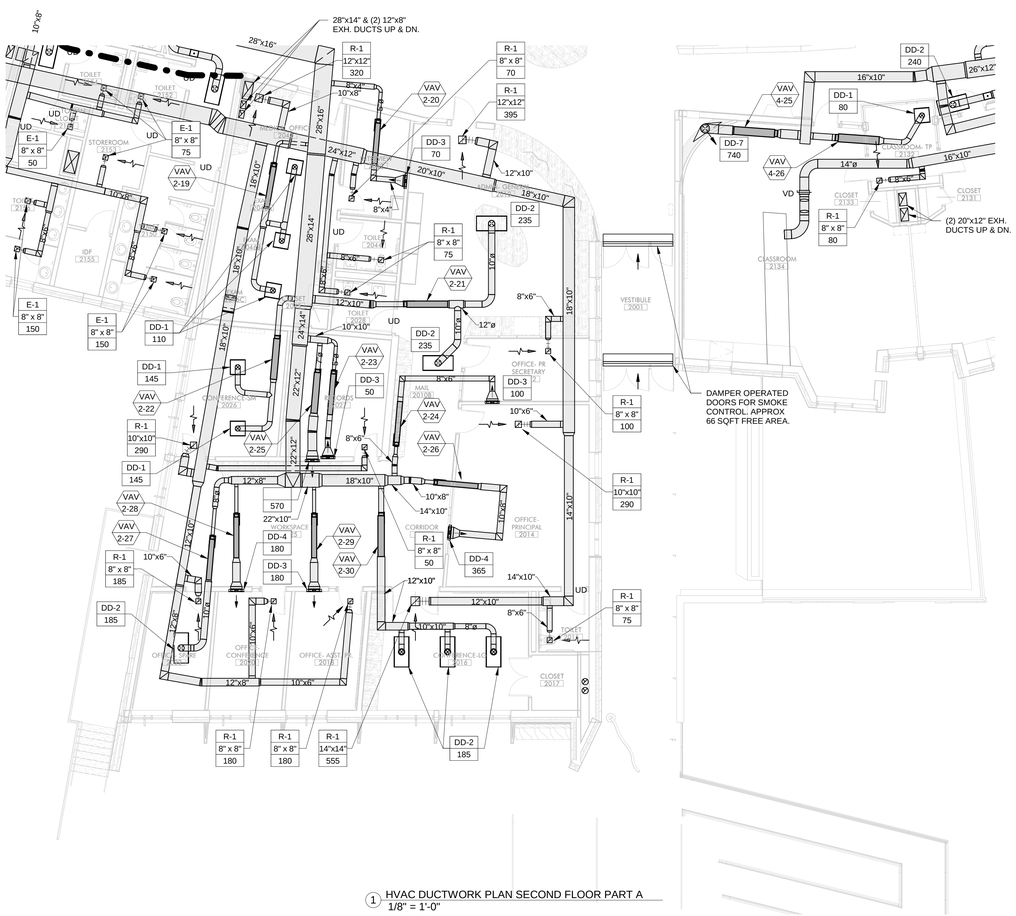
DRAWING NAME

DUCTWORK PLAN FLOOR 1-D - HVAC

PROJECT NO. 1722

DRAWING NO.

M101D



1 HVAC DUCTWORK PLAN SECOND FLOOR PART A
1/8" = 1'-0"

DRAWING NOTES:

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7.) ALL ATC CONTROLS SHALL BE POWER WIRED FROM THE ATC PANEL WITHIN THE BOILER ROOM. THIS MAIN PANEL 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.

8.) ALL KILN & FUME HOOD DUCTWORK SHALL BE STAINLESS STEEL OR PVC COATED. PROVIDE ALL REQUIRED TRANSITIONS TO FUME HOOD CONNECTION & TO ROOF-MOUNTED EXHAUST FAN.

9.) ALL DUCTWORK MAINS SHALL BE INSTALLED TIGHT TO STEEL TO ACCOMMODATE OTHER TRADES. COORDINATE ALL DUCTWORK WITH ALL NECESSARY TRADES.

10.) 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 SEPERATE JUNCTION BOX & THEN 24 V CONTROL WIRING TO VAV CONTROL PANEL. REFER TO CONTROL DWGS.

11.) VOLUME DAMPERS INDICATED ON DUCTWORK DRAWINGS REPRESENT LOCATIONS WHERE THESE ARE REQUIRED & INTENDED, HOWEVER IT DOES NOT REPRESENT ALL NECESSARY LOCATIONS. REFER TO DUCT/BRANCH DETAILS FOR FURTHER VOLUME DAMPER REQUIREMENTS IN ALL BRANCH/DIFFUSER DUCTS.

12.) ALL EXPOSED DUCTWORK, INCLUDING DUCTWORK LOCATED ABOVE THE SLOPED ACT CEILING WITHIN THE CORRIDOR, SHALL BE INSULATED WITH A MATTE WHITE RIGID DUCT BOARD INSULATION SIMILAR TO JOHNS MANVILLE 800 SERIES SPIN-GLAS OR EQUAL.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

DUCTWORK PLAN FLOOR 2-A - HVAC

PROJECT NO. 1722

DRAWING NO.

M102A

1 HVAC DUCTWORK PLAN SECOND FLOOR PART B
1/8" = 1'-0"

DRAWING NOTES:

1.) 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.

2.) REFER TO THE REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF ALL CEILING MOUNTED EQUIPMENT & COMPONENTS. IF IT IS NOT INDICATED ON THE REFLECTED CEILING PLANS CONTACT A/E IN WRITING PRIOR TO INSTALLATIONS.

3.) ALL FIRE/SMOKE DAMPERS SHALL BE FURNISHED & INSTALLED BY THE HVAC CONTRACTOR. POWER WIRE & FIRE ALARM INTERLOCK BY THE ELECTRICAL CONTRACTOR. ATC CONTRACTOR SHALL PROVIDE THE NECESSARY WIRING, PROGRAMMING, & COMPONENTS TO SHUT ASSOCIATED EQUIPMENT DOWN UPON ACTIVATION OF THE DAMPER/SMOKE DETECTOR.

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FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

DUCTWORK PLAN FLOOR 2-B - HVAC

PROJECT NO. 1722

DRAWING NO.

M102B

1 HVAC DUCTWORK PLAN SECOND FLOOR PART C
1/8" = 1'-0"

DRAWING NOTES:

1.) 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.

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3.) ALL FIRE/SMOKE DAMPERS SHALL BE FURNISHED & INSTALLED BY THE HVAC CONTRACTOR, POWER WIRE & FIRE ALARM INTERLOCK BY THE ELECTRICAL CONTRACTOR. ATC CONTRACTOR SHALL PROVIDE THE NECESSARY WIRING, PROGRAMMING, & COMPONENTS TO SHUT ASSOCIATED EQUIPMENT DOWN UPON ACTIVATION OF THE DAMPER/SMOKE DETECTOR.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

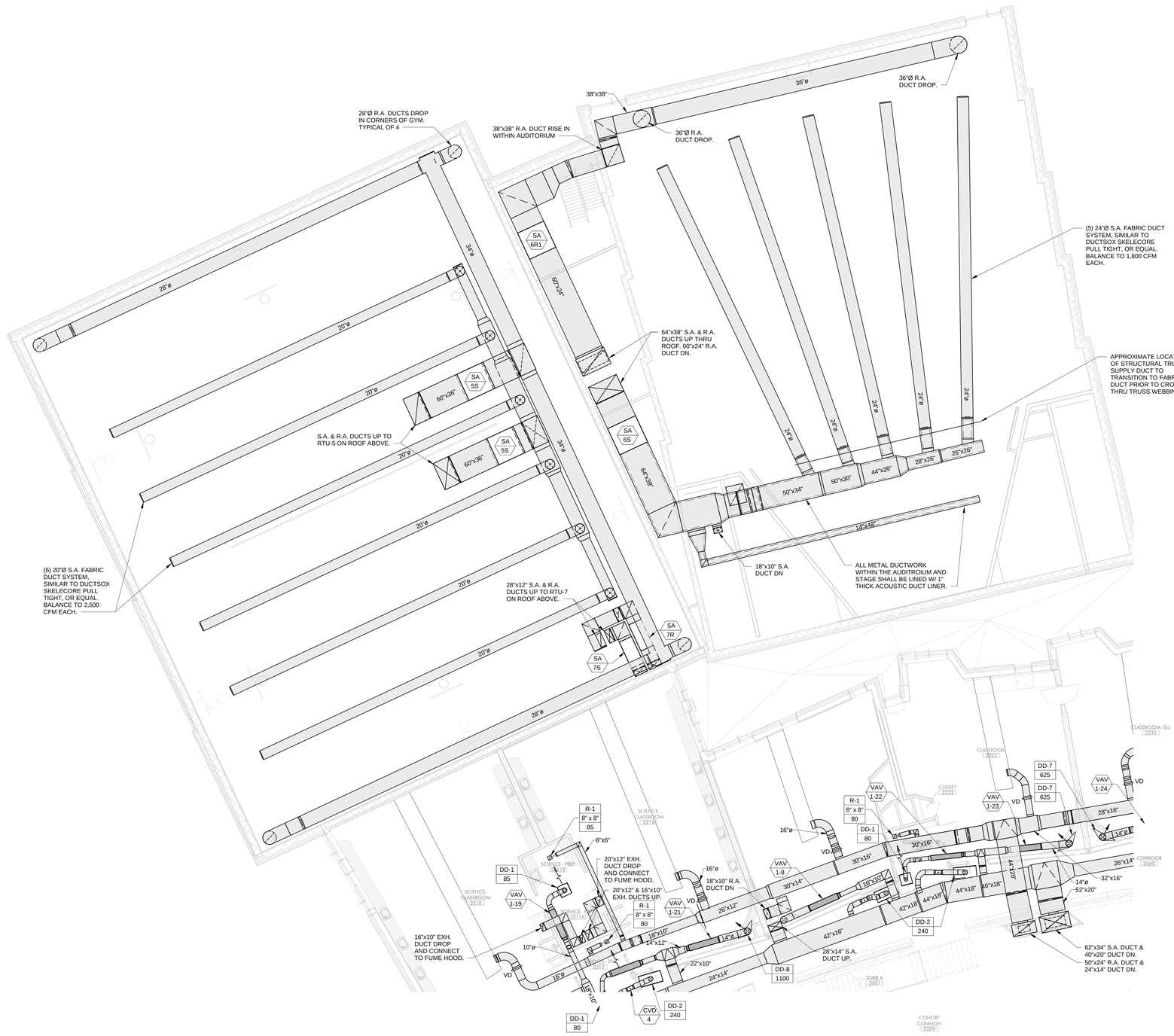
DRAWING NAME

DUCTWORK PLAN FLOOR 2-C - HVAC

PROJECT NO. 1722

DRAWING NO.

M102C



1 HVAC DUCTWORK PLAN SECOND FLOOR PART D
1/8" = 1'-0"

DRAWING NOTES:

1.) 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.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

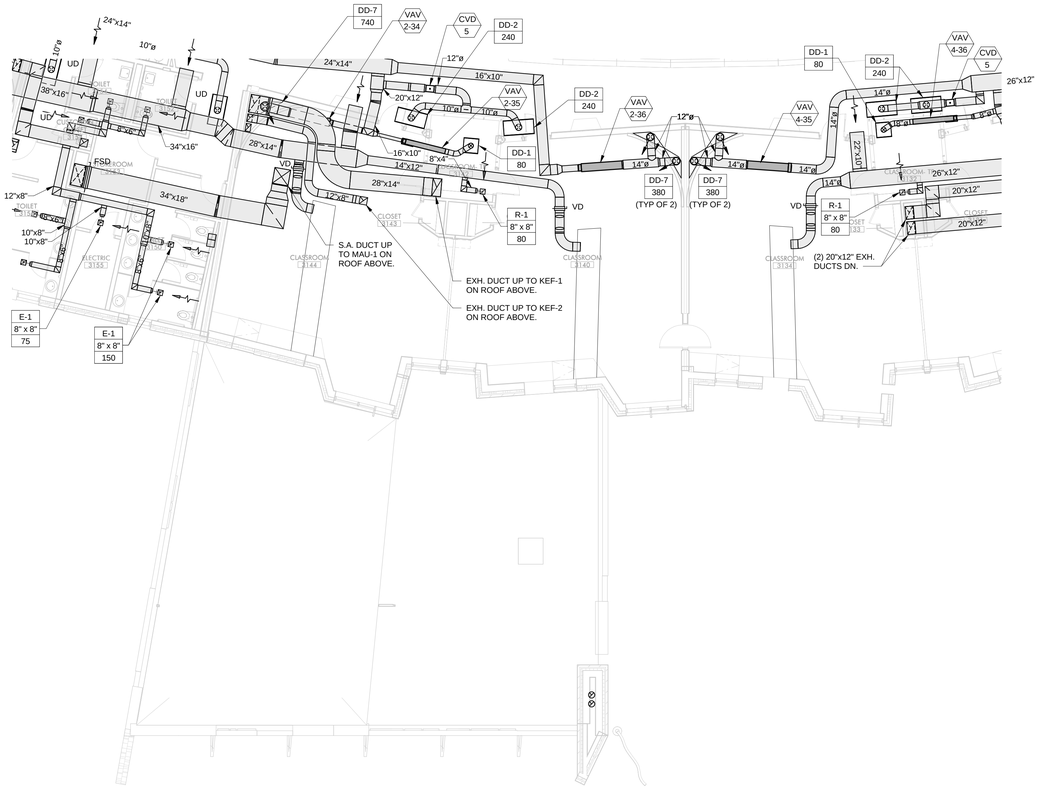
DRAWING NAME

DUCTWORK PLAN FLOOR 2-D - HVAC

PROJECT NO. 1722

DRAWING NO.

M102D



1 HVAC DUCTWORK PLAN THIRD FLOOR PART A
1/8" = 1'-0"

DRAWING NOTES:

1.) 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.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
DUCTWORK PLAN
FLOOR 3-A - HVAC

PROJECT NO. 1722

DRAWING NO.
M103A

DRAWING NOTES:

1.) 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.

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5.) ALL EQUIPMENT SHALL BE INSTALLED PER THE MANUFACTURE'S RECOMMENDATIONS & INSTALLATION INSTRUCTIONS. PROVIDE ALL NECESSARY COMPONENTS, FITTINGS, ACCESSORIES, WIRING, ETC. FOR A COMPLETE FUNCTIONAL SYSTEM.

6.) 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 THE NECESSARY FITTINGS, TRANSITIONS, OFFSETS, ELBOWS, ACCESSORIES, FLEXIBLE CONNECTORS, SPRING ISOLATORS, HANGERS, ETC, AS REQUIRED FOR A COMPLETE, OPERATIONAL, & CODE COMPLIANT SYSTEM(S) UTILIZING INDUSTRY STANDARDS.

7.) ALL ATC CONTROLS SHALL BE POWER WIRED FROM THE ATC PANEL WITHIN THE BOILER ROOM. THIS MAIN PANEL 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.

8.) ALL KILN & FUME HOOD DUCTWORK SHALL BE STAINLESS STEEL OR PVC COATED. PROVIDE ALL REQUIRED TRANSITIONS TO FUME HOOD CONNECTION & TO ROOF-MOUNTED EXHAUST FAN.

9.) ALL DUCTWORK MAINS SHALL BE INSTALLED TIGHT TO STEEL TO ACCOMMODATE OTHER TRADES. COORDINATE ALL DUCTWORK WITH ALL NECESSARY TRADES.

10.) 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 SEPERATE JUNCTION BOX & THEN 24 V CONTROL WIRING TO VAV CONTROL PANEL. REFER TO CONTROL DWGS.

11.) 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.

12.) ALL EXPOSED DUCTWORK, INCLUDING DUCTWORK LOCATED ABOVE THE SLOPED ACT CEILING WITHIN THE CORRIDOR, SHALL BE INSULATED WITH A MATTE WHITE RIGID DUCT BOARD INSULATION SIMILAR TO JOHNS MANVILLE 800 SERIES SPIN-GLAS OR EQUAL.

1 HVAC DUCTWORK PLAN THIRD FLOOR PART B
1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
DUCTWORK PLAN
FLOOR 3-B - HVAC

PROJECT NO. 1722

DRAWING NO.
M103B

1 HVAC DUCTWORK PLAN THIRD FLOOR PART C
1/8" = 1'-0"

DRAWING NOTES:

1.) 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.

2.) REFER TO THE REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF ALL CEILING MOUNTED EQUIPMENT & COMPONENTS. IF IT IS NOT INDICATED ON THE REFLECTED CEILING PLANS CONTACT A/E IN WRITING PRIOR TO INSTALLATIONS.

3.) ALL FIRE/SMOKE DAMPERS SHALL BE FURNISHED & INSTALLED BY THE HVAC CONTRACTOR. POWER WIRE & FIRE ALARM INTERLOCK BY THE ELECTRICAL CONTRACTOR. ATC CONTRACTOR SHALL PROVIDE THE NECESSARY WIRING, PROGRAMMING, & COMPONENTS TO SHUT ASSOCIATED EQUIPMENT DOWN UPON ACTIVATION OF THE DAMPER/SMOKE DETECTOR.

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9.) ALL DUCTWORK MAINS SHALL BE INSTALLED TIGHT TO STEEL TO ACCOMMODATE OTHER TRADES. COORDINATE ALL DUCTWORK WITH ALL NECESSARY TRADES.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

DUCTWORK PLAN FLOOR 3-C - HVAC

PROJECT NO. 1722

DRAWING NO.

M103C

DRAWING NOTES:

1.) 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.

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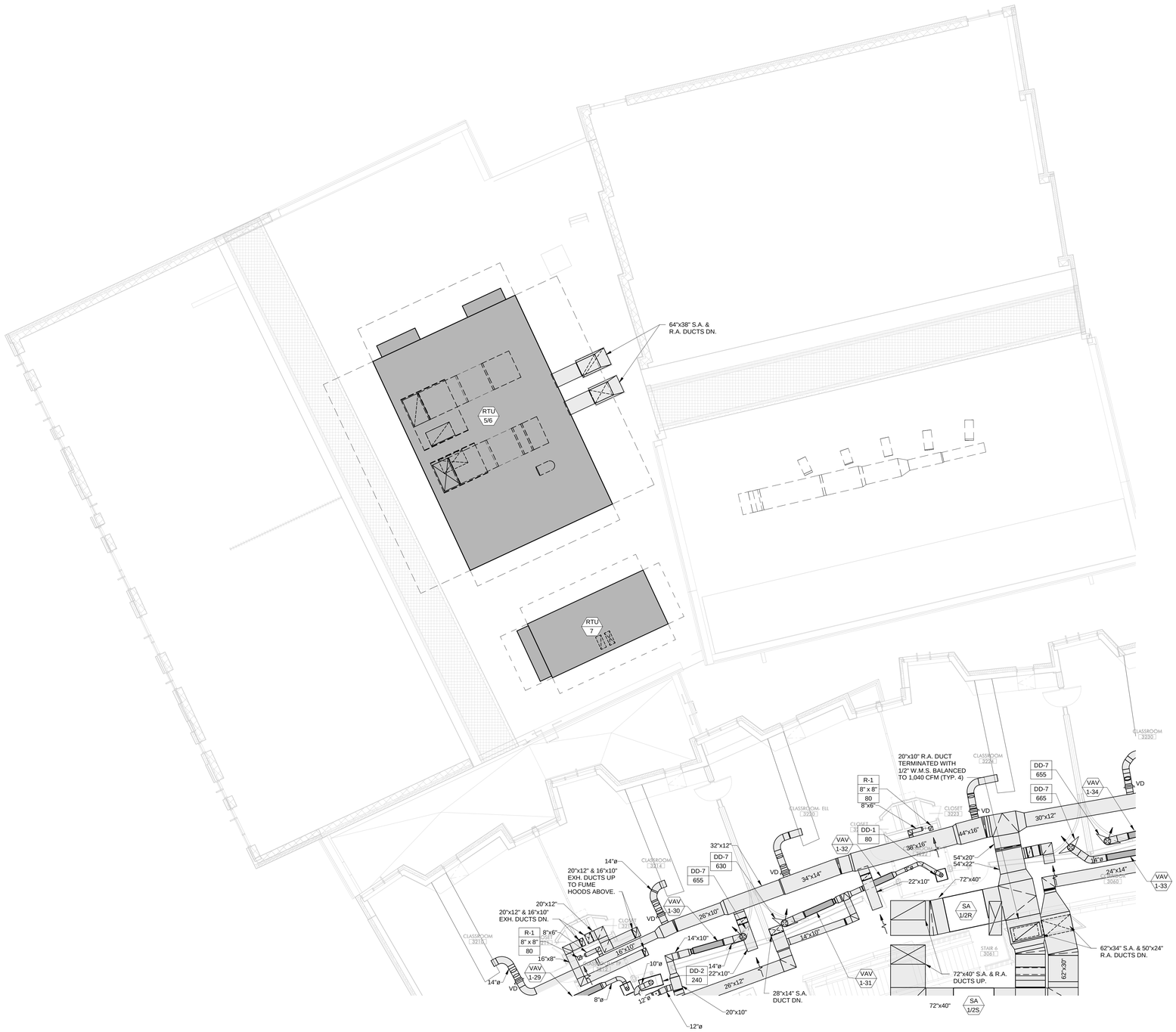

1 HVAC DUCTWORK PLAN THIRD FLOOR PART D
1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

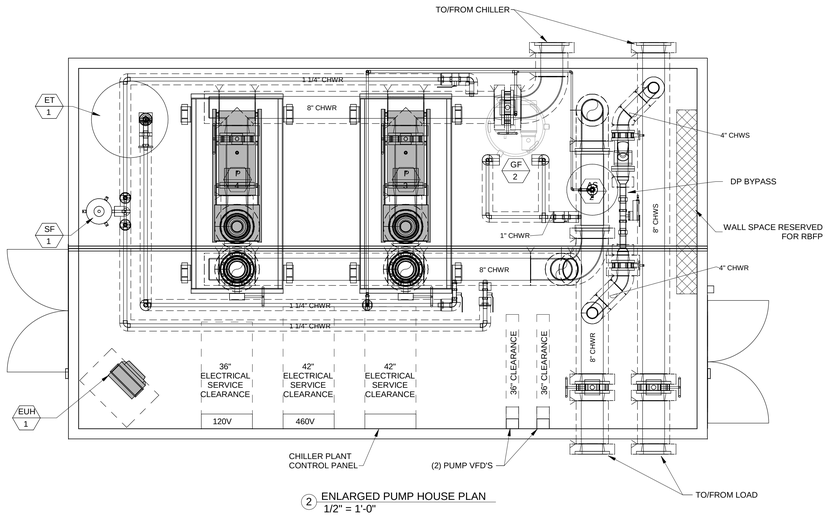
DRAWING NAME

DUCTWORK PLAN
FLOOR 3-D - HVAC

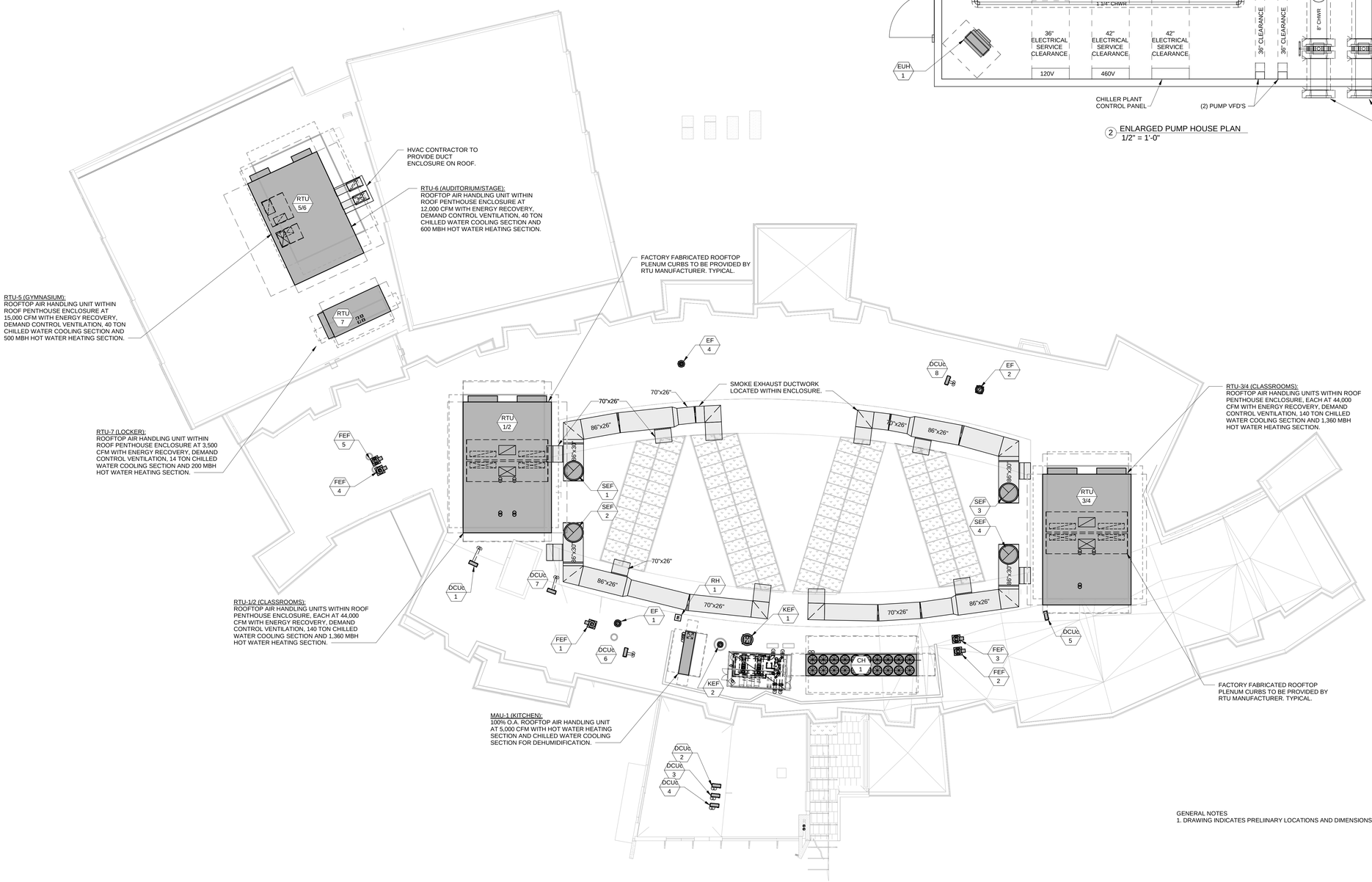
PROJECT NO. 1722

DRAWING NO.

M103D

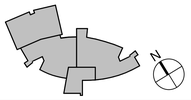


2 ENLARGED PUMP HOUSE PLAN
1/2" = 1'-0"



1 HVAC ROOF PLAN
1/16" = 1'-0"

GENERAL NOTES
1. DRAWING INDICATES PRELIINARY LOCATIONS AND DIMENSIONS ISSUED FOR COORDINATION PURPOSES ONLY



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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

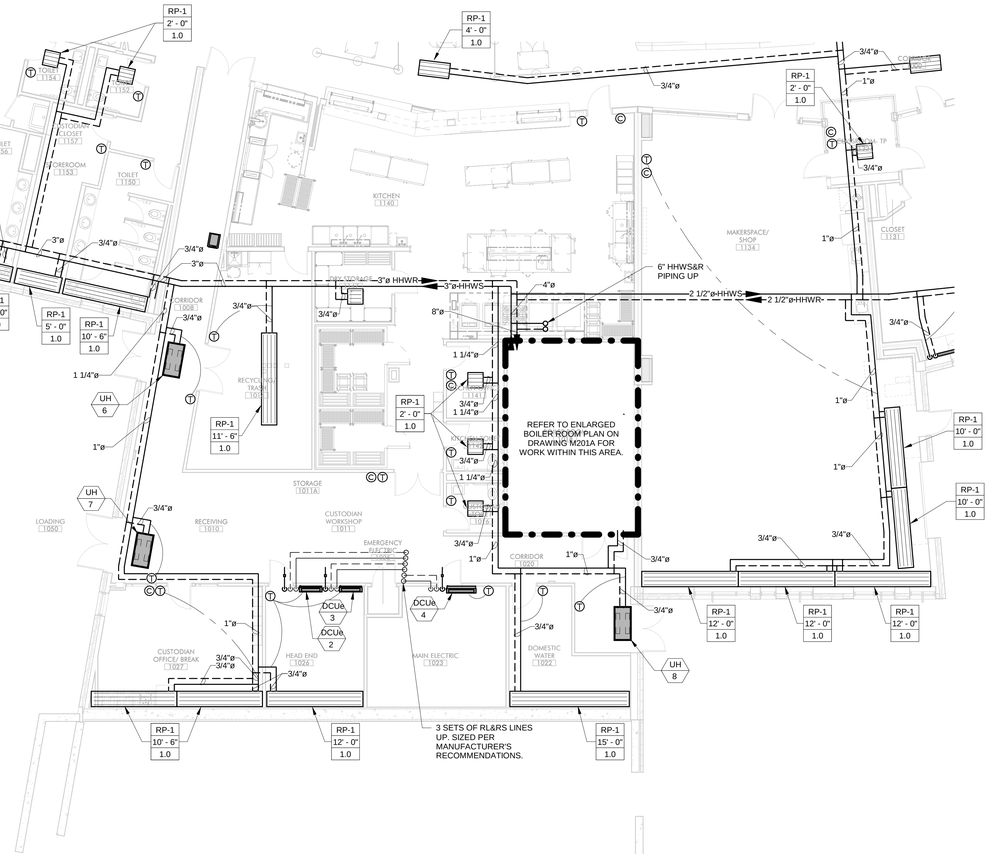
DRAWING NAME

OVERALL ROOF PLAN - HVAC

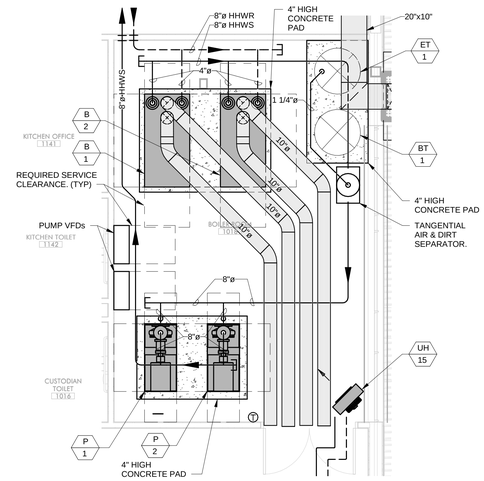
PROJECT NO. 1722

DRAWING NO.

M104



1 HVAC PIPING PLAN FIRST FLOOR PART A
1/8" = 1'-0"



2 ENLARGED BOILER ROOM PLAN
1/4" = 1'-0"

DRAWING NOTES:

1.) REFER TO THE REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF ALL CEILING MOUNTED EQUIPMENT & COMPONENTS. IF IT IS NOT INDICATED ON THE REFLECTED CEILING PLANS CONTACT A/E IN WRITING PRIOR TO INSTALLATIONS.

2.) ALL EQUIPMENT SHALL BE INSTALLED PER THE MANUFACTURE'S RECOMMENDATIONS & INSTALLATION INSTRUCTIONS. PROVIDE ALL NECESSARY COMPONENTS, FITTINGS, ACCESSORIES, WIRING, ETC. FOR A COMPLETE FUNCTIONAL SYSTEM.

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4.) ALL ATC CONTROLS SHALL BE POWER WIRED FROM THE ATC PANEL WITHIN THE BOILER ROOM. THIS MAIN PANEL 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.

5.) ALL DUCTLESS COOLING 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.

6.) ALL DENSELY OCCUPIED SPACES WITH OCCUPANT DENSITY OF 25 PEOPLE OR MORE PER 1000 SQFT SHALL BE PROVIDED W/ MULTIFUNCTION SENSORS W/ TEMPERATURE & CO2 CONTROL. THIS SHALL BE PROVIDED IN COMPLIANCE WITH LEED 2009 CREDIT IEQC1.

7.) ALL RADIANT PANELS SHALL BE FED W/ ONE SET OF INSULATED 3/4" HHWS & HHWR PIPES UNLESS NOTED OTHERWISE. RADIANT PANEL MANUFACTURER AND/OR HVAC CONTRACTOR SHALL PROVIDE ALL HEADERS AND/OR CIRCUITS REQUIRED FOR LINEAR PANELS W/ HIGH PRESSURE DROPS OVER 3 FEET W.C. ALONG W/ ANY TRIM CONNECTORS, INTERCONNECTING PIPES, END PIECES, MOUNTING ARMS & SUPPORTS FOR A COMPLETE & OPERATIONAL SYSTEM WHILE MAINTAINING A SEAMLESS LOOK. MOUNTING ARMS WILL BE UTILIZED FOR ALL RADIANT LIGHT SHELVES UNLESS OTHERWISE INDICATED.

8.) UTILIZE TRAPEZE HANGER/UNISTRUT WHERE MULTIPLE PIPING SYSTEMS ARE TRAVELING TO MINIMIZE CONGESTION. REFER TO DETAIL FOR FURTHER INFORMATION. PROVIDE INSULATION SHIELDS AT EACH POINT OF CONTACT BETWEEN PIPE INSULATION & ANY STYLE HANGER

9.) FOR CLASSROOMS WITH EXPOSED CEILINGS, LOCATE RADIANT PANEL CONTROL VALVE IN DROP CEILING AREA. ISOLATION VALVES FOR RADIANT PANEL SHALL BE LOCATED ABOVE PANEL CONNECTIONS.

10.) BRAIDED STAINLESS STEEL FLEXIBLE HOSES MAY BE UTILIZED FOR RADIANT PANEL PIPE CONNECTION TO COPPER BRANCH PIPING.

11.) ALL REFRIGERANT LIQUID AND REFRIGERANT SUCTION LINES SHALL BE SIZED AND INSTALLED PER MANUFACTURERS RECOMMENDATIONS.

12.) ALL EXPOSED PIPING, INCLUDING PIPING LOCATED ABOVE THE SLOPED ACT CEILING WITHIN THE CORRIDOR, SHALL BE INSULATED WITH A MATTE WHITE PIPE INSULATION SIMILAR TO KNAUF INSULATION REDI-KLAD PIPE INSULATION OR EQUAL.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

PIPING PLAN
FLOOR 1-A - HVAC

PROJECT NO. 1722

DRAWING NO.

M201A

1 HVAC PIPING PLAN FIRST FLOOR PART B
1/8" = 1'-0"

DRAWING NOTES:

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12.) ALL EXPOSED PIPING, INCLUDING PIPING LOCATED ABOVE THE SLOPED ACT CEILING WITHIN THE CORRIDOR, SHALL BE INSULATED WITH A MATTE WHITE PIPE INSULATION SIMILAR TO KNAUF INSULATION REDI-KLAD PIPE INSULATION OR EQUAL.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

PIPING PLAN
FLOOR 1-B - HVAC

PROJECT NO. 1722

DRAWING NO.

M201B

1 HVAC PIPING PLAN FIRST FLOOR PART C
1/8" = 1'-0"

DRAWING NOTES:

1.) REFER TO THE REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF ALL CEILING MOUNTED EQUIPMENT & COMPONENTS. IF IT IS NOT INDICATED ON THE REFLECTED CEILING PLANS CONTACT A/E IN WRITING PRIOR TO INSTALLATIONS.

2.) ALL EQUIPMENT SHALL BE INSTALLED PER THE MANUFACTURE'S RECOMMENDATIONS & INSTALLATION INSTRUCTIONS. PROVIDE ALL NECESSARY COMPONENTS, FITTINGS, ACCESSORIES, WIRING, ETC. FOR A COMPLETE FUNCTIONAL SYSTEM.

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4.) ALL ATC CONTROLS SHALL BE POWER WIRED FROM THE ATC PANEL WITHIN THE BOILER ROOM. THIS MAIN PANEL 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.

5.) ALL DUCTLESS COOLING 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.

6.) ALL DENSELY OCCUPIED SPACES WITH OCCUPANT DENSITY OF 25 PEOPLE OR MORE PER 1000 SQ/FT SHALL BE PROVIDED W/ MULTIFUNCTION SENSORS W/ TEMPERATURE & CO2 CONTROL. THIS SHALL BE PROVIDED IN COMPLIANCE WITH LEED 2009 CREDIT IEQC1.

7.) ALL RADIANT PANELS SHALL BE FED W/ ONE SET OF INSULATED 3/4" HHWS & HHWR PIPES UNLESS NOTED OTHERWISE. RADIANT PANEL MANUFACTURER AND/OR HVAC CONTRACTOR SHALL PROVIDE ALL HEADERS AND/OR CIRCUITS REQUIRED FOR LINEAR PANELS W/ HIGH PRESSURE DROPS OVER 3 FEET W.C. ALONG W/ ANY TRIM CONNECTORS, INTERCONNECTING PIPES, END PIECES, MOUNTING ARMS & SUPPORTS FOR A COMPLETE & OPERATIONAL SYSTEM WHILE MAINTAINING A SEAMLESS LOOK. MOUNTING ARMS WILL BE UTILIZED FOR ALL RADIANT LIGHT SHELVES UNLESS OTHERWISE INDICATED.

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31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

PIPING PLAN
FLOOR 1-C - HVAC

PROJECT NO. 1722

DRAWING NO.

M201C

1 HVAC PIPING PLAN FIRST FLOOR PART D
1/8" = 1'-0"

DRAWING NOTES:

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FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

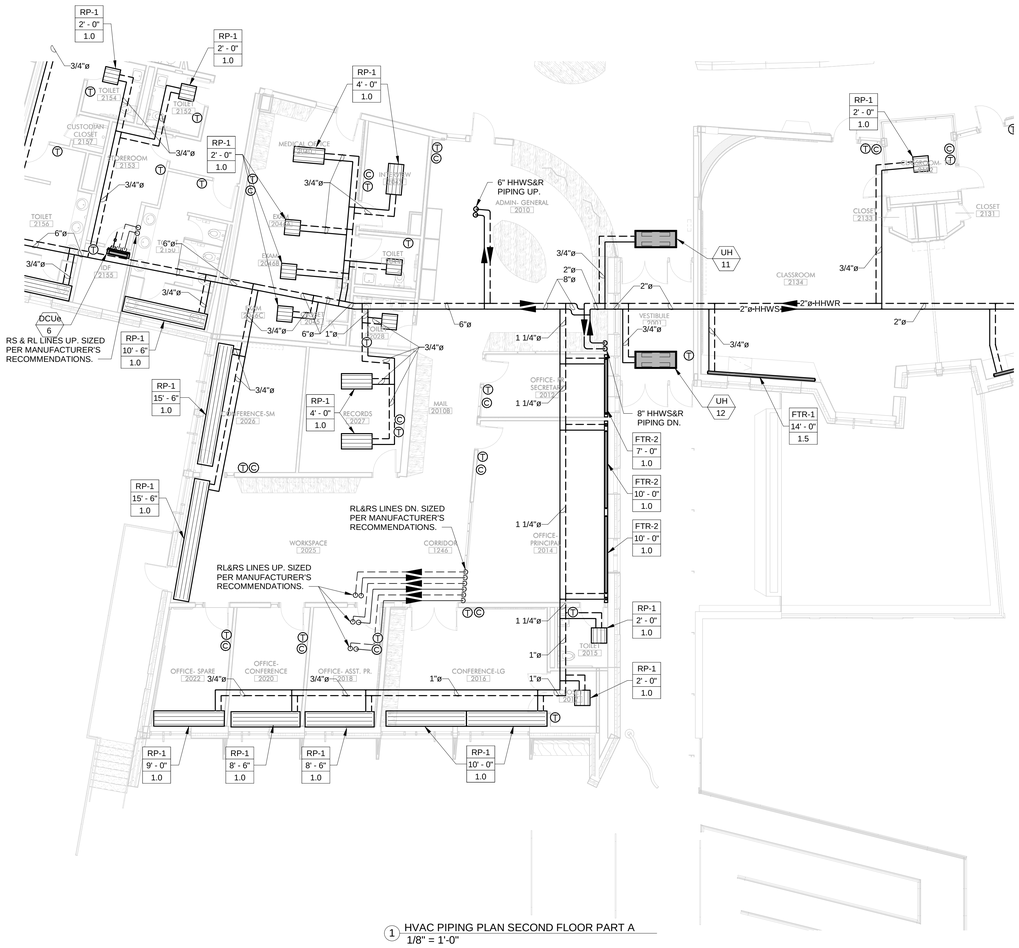
REVISIONS

No.	Date	Description

DRAWING NAME
PIPING PLAN
FLOOR 1-D - HVAC

PROJECT NO. 1722

DRAWING NO.
M201D



1 HVAC PIPING PLAN SECOND FLOOR PART A
1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

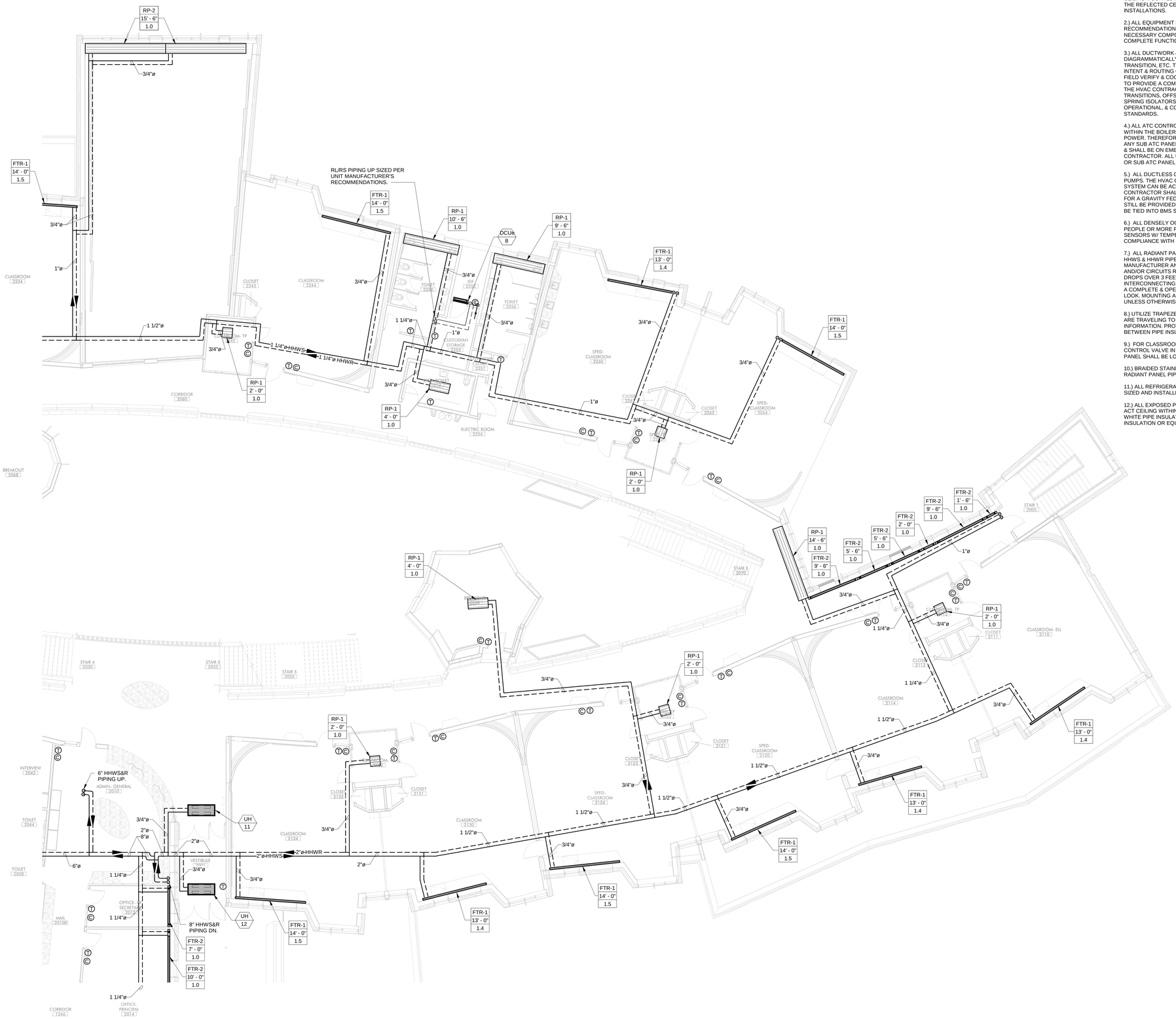
DRAWING NAME

PIPING PLAN
FLOOR 2-A - HVAC

PROJECT NO. 1722

DRAWING NO.

M202A



1 HVAC PIPING PLAN SECOND FLOOR PART B
1/8" = 1'-0"

DRAWING NOTES:

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

PIPING PLAN
FLOOR 2-B - HVAC

PROJECT NO. 1722

DRAWING NO.

M202B

1 HVAC PIPING PLAN SECOND FLOOR PART C
1/8" = 1'-0"

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FULLER MIDDLE SCHOOL

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PROJECT STATUS

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REVISIONS

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DRAWING NAME

PIPING PLAN
FLOOR 2-C - HVAC

PROJECT NO. 1722

DRAWING NO.

M202C

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1 HVAC PIPING PLAN SECOND FLOOR PART D
1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

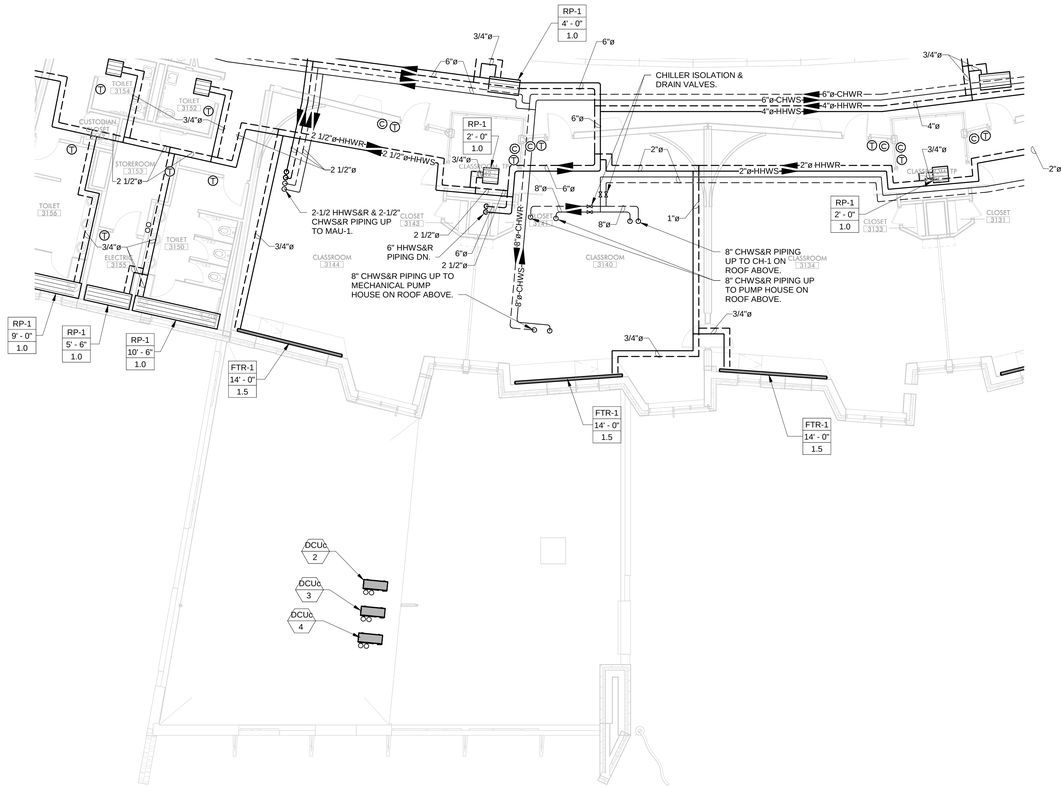
DRAWING NAME

PIPING PLAN
FLOOR 2-D - HVAC

PROJECT NO. 1722

DRAWING NO.

M202D



1 HVAC PIPING PLAN THIRD FLOOR PART A
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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

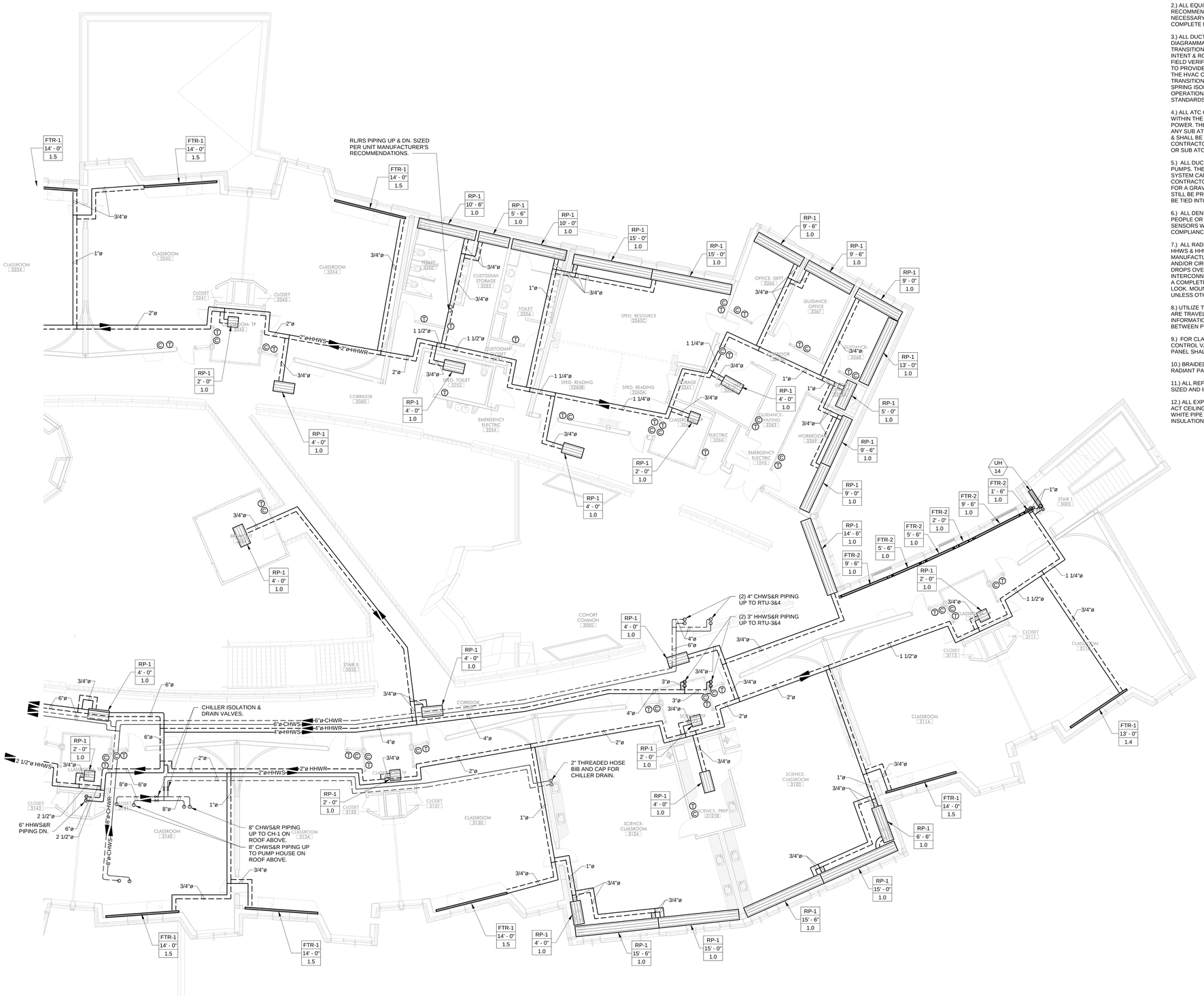
DRAWING NAME

PIPING PLAN
FLOOR 3-A - HVAC

PROJECT NO. 1722

DRAWING NO.

M203A



1 HVAC PIPING PLAN THIRD FLOOR PART B
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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

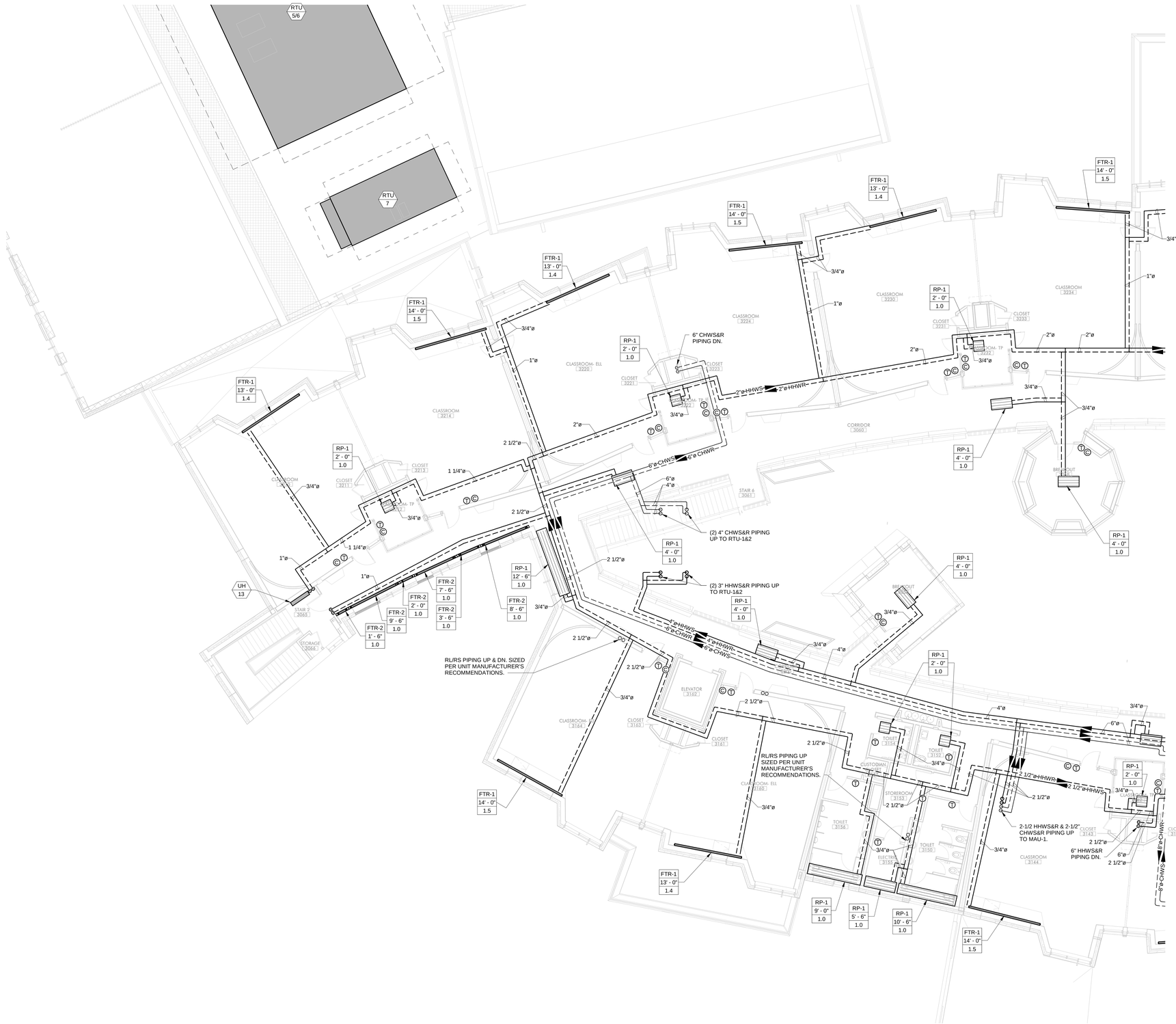
REVISIONS

No.	Date	Description

DRAWING NAME
PIPING PLAN
FLOOR 3-B - HVAC

PROJECT NO. 1722

DRAWING NO.
M203B



1 HVAC PIPING PLAN THIRD FLOOR PART C
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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

PIPING PLAN
FLOOR 3-C - HVAC

PROJECT NO. 1722

DRAWING NO.

M203C

DRAWING NOTES:

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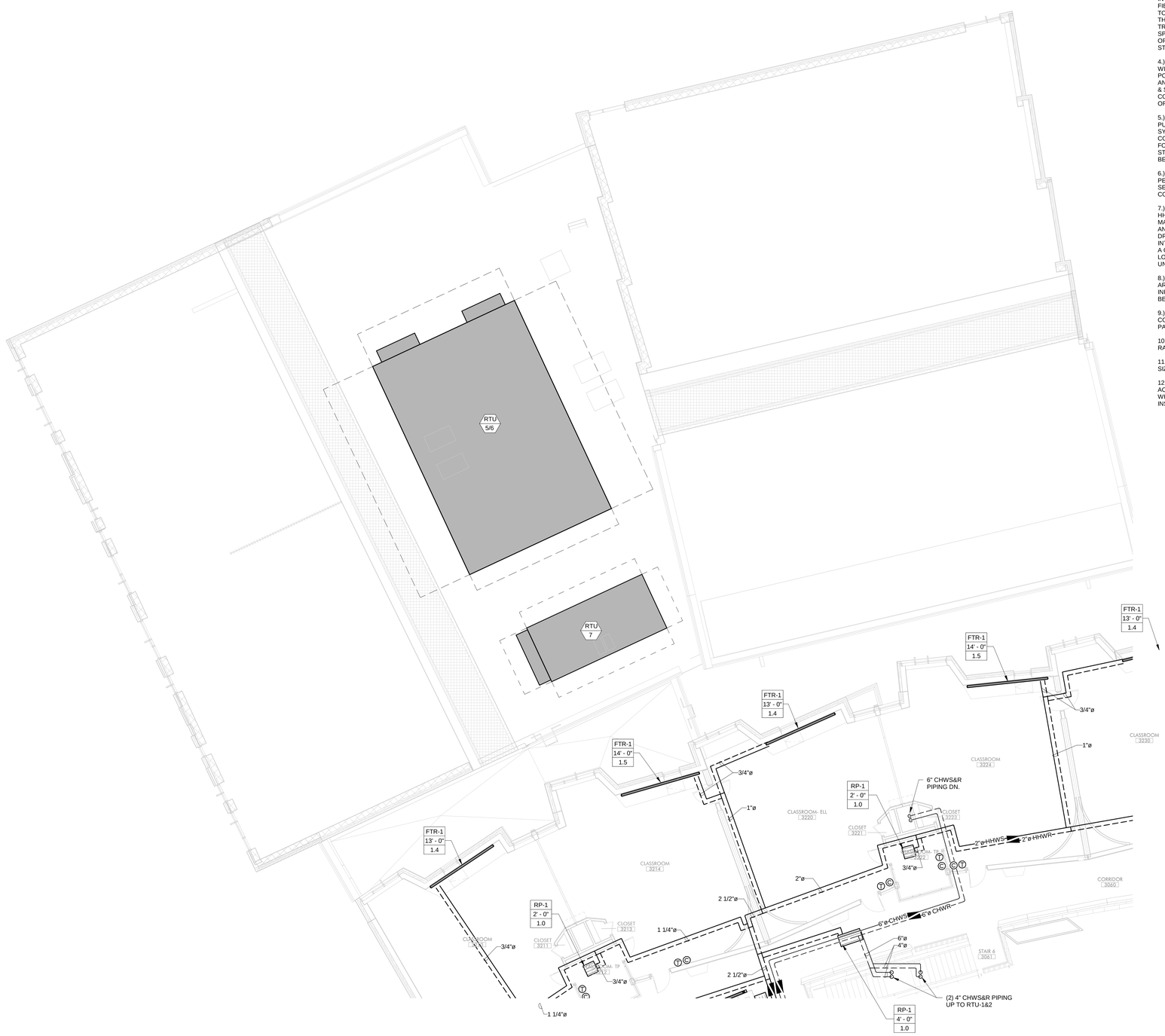

1 HVAC PIPING PLAN THIRD FLOOR PART D
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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

PIPING PLAN
FLOOR 3-D - HVAC

PROJECT NO. 1722

DRAWING NO.

M203D

ROOFTOP UNITS

UNIT NO.	MANUF. NO.	AREA SERVED	TOTAL C.F.M.	O.A. C.F.M.	MAX. COIL VEL. F.P.M.	HOT WATER HEATING DATA					CHILLED WATER COOLING DATA									VAV CONTROL	SUPPLY AIR					RETURN AIR					ELECTRICAL		FIRST ENTHALPY ENERGY HEAT PLATE CAPACITY (MBH)		SECOND SENSIBLE ENERGY HEAT PLATE CAPACITY (MBH)		UNIT WEIGHT (LBs) +/- 5%	REMARKS
						ENT. AIR°F	LVG. AIR°F	GPM	HEATING M.B.H.	FLUID PD (FT H2O)	ENT. COND. D.B.°F	ENT. COND. W.B.°F	LVG. COND. D.B.°F	LVG. COND. W.B.°F	CHILLED WATER E.W.T.	CHILLED WATER L.W.T.	M.B.H. SENS.	M.B.H. TOTAL	GPM TOTAL	FLUID PD (FT H2O)	VF DRIVE	E.S.P. IN.W.G.	H.P.	VOLT	PH.	R.P.M	WHEEL DIA.	E.S.P. IN.W.G.	H.P.	VOLT	PH.	R.P.M	WHEEL DIA.	MCA	MOP	SUMMER	WINTER	SUMMER	WINTER		
RTU-1		CLASSROOMS	20,000	12,500	500	46.3	85.0	88	836.0		64.9	62.4	52.0	52.0	43.0	53.0	279.0	601.0	127.0		YES	4.0"	(2) 25	460	3	1800		3.0"	(2) 15	460	3	1800		103	125	--	--	--	--	25,650	
RTU-2		CLASSROOMS	20,000	12,500	500	46.3	85.0	88	836.0		64.9	62.4	52.0	52.0	43.0	53.0	279.0	601.0	127.0		YES	4.0"	(2) 25	460	3	1800		3.0"	(2) 15	460	3	1800		103	125	--	--	--	--	25,650	
RTU-3		CLASSROOMS	20,000	12,500	500	46.3	85.0	88	836.0		64.9	62.4	52.0	52.0	43.0	53.0	279.0	601.0	127.0		YES	4.0"	(2) 25	460	3	1800		3.0"	(2) 15	460	3	1800		103	125	--	--	--	--	25,650	
RTU-4		CLASSROOMS	20,000	12,500	500	46.3	85.0	88	836.0		64.9	62.4	52.0	52.0	43.0	53.0	279.0	601.0	127.0		YES	4.0"	(2) 25	460	3	1800		3.0"	(2) 15	460	3	1800		103	125	--	--	--	--	25,650	
RTU-5		GYMNASIUM	15,000	11,000	500	42.5	85.0	74	689.0		65.5	63.0	52.0	52.0	43.0	53.0	219.0	480.0	102.0		YES	2.5"	(2) 20	460	3	1800		2.0"	(2) 7.5	460	3	1800		73	90	--	--	--	--	24,750	
RTU-6		AUDITORIUM/STAGE	12,000	5,000	500	53.5	85.0	43	409.0		63.7	61.0	52.0	52.0	43.0	53.0	152.0	309.0	65.0		YES	2.5"	(2) 15	460	3	1800		2.0"	(2) 7.5	460	3	1800		59	70	--	--	--	--	24,750	
RTU-7		LOCKER ROOMS	2,000	2,000	500	33.2	85.0	12	112.0		67.4	64.3	51.0	51.0	43.0	53.0	36.0	78.0	17.0		YES	2.5"	5	460	3	3600		2.0"	3	460	3	1800		12	15	--	--	--	--	7,200	

ROOFTOP UNIT SELECTIONS BASED ON "ANNEXAIR".
ROOFTOP UNIT MANUFACTURER SHALL PROVIDE VARIABLE FREQUENCY DRIVES FOR SUPPLY AND EXHAUST AIR FANS FOR EACH UNIT IN ACCORDANCE WITH DIV. 260000 REQUIREMENTS.
ALL ROOFTOP UNITS SHALL BE PROVIDED WITH AIRFLOW MEASURING STATIONS BY ATC.
ALL ROOFTOP UNITS TO HAVE SINGLE POINT 480V AND SINGLE POINT 120V GFI CONNECTIONS.

AIR CONDITIONING DESIGN DATA

DESIGN AREA	SUMMER				WINTER	
	OUT		IN		OUT	IN
	D.B.	W.B.	D.B.	W.B.	D.B.	D.B.
BOSTON, MASSACHUSETTS	88°F	74°F	75° 2°F	68°F	7°F	70 ° 2°F

MAKE UP AIR UNITS

UNIT NO.	MANUF. NO.	BUILDING LOCATION	TOTAL CFM	O.A. CFM	EXT. IN W.G.	E.D.B.	L.D.B.	HEATING MBH	HHW GPM	FLUID PD (FT H2O)	COOLING TOTAL MBH	SENSIBLE MBH	CHW GPM	E.A.T DB/WB	L.A.T DB/WB	FLUID PD (FT H2O)	MOTOR QTY	HP.	V	PH.	MCA	MOCP	RPM	REMARKS
MAU-1	MSX	KITCHEN	4,170	4,170	2.0	7	85.0	312.5	32.8	2.2	273.1	173.9	58	88/74	53/53	16.8	1	5	460	3	9.7	15	1,750	

SELECTION BASED ON "GREENHECK". HHW COIL BASED ON 160°F EWT, 20°F WTD, 30% PROPYLENE GLYCOL CONCENTRATION. CHW COIL BASED ON 53°F EWT, 10°F WTD, 30% PROPYLENE GLYCOL CONCENTRATION.
PROVIDE MOTORIZED INLET DAMPER.
NOTE #1: PROVIDE VFD ON SUPPLY FAN MOTOR IN ACCORDANCE W/ DIVISION 260000 REFRIGERANT
NOTE #2: MINIMUM EFFICIENCY RATINGS PER ANSI Z21.47 TEST PROCEDURES.

AIR COOLED LIQUID CHILLER

UNIT NO.	MANUF. NO.	NOMINAL TONS	AMB. TEMP.	EVAPORATOR E.W.T.	EVAPORATOR L.W.T.	EVAPORATOR G.P.M.	EVAPORATOR P.D.	COMP NO./STEPS	FANS NO./kW	ELECTRICAL K.W.	ELECTRICAL V	ELECTRICAL PH.	ELECTRICAL MCA	ELECTRICAL MOP	EER @AHRI	REMARKS
CH-1	AD150	369.6	95	53	43	926.3	13.4	4 / 4	20 / 45.62	423.2	460	3	632	757	22.57	

SELECTION BASED ON "SMARDT".
PROVIDE 30% BY WEIGHT PROPYLENE GLYCOL SOLUTION FOR FREEZE PROTECTION FOR CHILLED WATER SYSTEM.

WATER PUMPS

UNIT NO.	PUMP SERIES	MANUF. NO.	BUILDING LOCATION	SERVICE	G.P.M.	T.D.H. FT.	MOTOR HP.	MOTOR VOLT	MOTOR PH.	REMARKS
P-1	FI	4011C	BOILER ROOM	HHW	790	70	25	460	3	VFD
P-2	FI	4011C	BOILER ROOM	HHW	790	70	25	460	3	VFD
P-3	FI	5011D	PUMP HOUSE	CHW	800	65	20	460	3	VFD
P-4	FI	5011D	PUMP HOUSE	CHW	800	65	20	460	3	VFD

SELECTIONS BASED ON "TACO". PROVIDE 30% BY WEIGHT PROPYLENE GLYCOL SOLUTION FOR FREEZE PROTECTION IN HOT AND CHILLED WATER SYSTEMS.
PROVIDE SHAFT GROUNDING RINGS FOR ALL VFD DRIVEN PUMPS

VIBRATION ISOLATION SCHEDULE

UNIT(S)	ISOLATOR TYPE *	MIN. STATIC DEFLECTION (IN.)	BASE TYPE *	REMARKS
AHUS	--	2.0	-	SEE AHU INTERNAL FAN FOR INTERNAL ISOLATION & HVAC AHU DETAILS
ACC	SLF	1.5	--	--
BOILERS	--	0.25	--	MOUNT ON NEOPRENE MOUNTS (MODEL ND) OR PADS (SUPER W)
ROOFTOP CENT. EXHAUST FANS	BGS	0.75	CMAB	REFER TO SPEC. SECTION 23 05 48 FOR DUCTWORK CONNECTION TO EXHAUST FAN REQUIREMENTS.
INLINE EXHAUST FANS	HD	0.35	--	--
SMOKE EXHAUST FAN		1.5	--	--
CHILLER		2.0	--	--

*NOTES: 1. REFER TO ISOLATOR TYPES AND BASE TYPES INDICATED IN THE NOISE AND VIBRATION CONTROL SPECIFICATION (SECTION 230548) FOR THE PROJECT. SELECTION BASED ON MASON INDUSTRIES MODELS --
2. MINIMUM STATIC DEFLECTION LISTED IS UNDER LOAD CONDITIONS.

HOT WATER BOILER

UNIT NO.	MANUF. NO.	MIN. EFF.	MIN TURN DOWN	AIR INLET	FLUE SIZE	GROSS OUTPUT	GAS INPUT C.F.H.	MIN. GAS PRESS. (IN W.C.)	MAX. GAS PRESS. (IN W.C.)	HW GPM	EWT	LWT	BURNER FAN V	BURNER FAN PH.	BURNER FAN FLA	REMARKS
B-1	AR 4000	90%	20:1	10"	10"	3,844	4,000	4.0	14.0		140	160	230	3	30.2	--
B-2	AR 4000	90%	20:1	10"	10"	3,844	4,000	4.0	14.0		140	160	230	3	30.2	--

SELECTION BASED ON "RIELLO"
NOTE 1: BOILERS SHALL EXCEED 2009 IECC CODE REQUIREMENTS AT 95% THERMAL EFFICIENCY AND 94% COMBUSTION EFFICIENCY PER DOE 10 CFR PART 431 TEST PROCEDURES.

EXPANSION TANKS

UNIT NO.	MANUF. NO.	SERVICE	ACCEPT. VOL.	TOTAL VOL.	TANK SIZE HEIGHT	TANK SIZE DIA.	SYSTEM PRESSURES (PSIG) MIN.	SYSTEM PRESSURES (PSIG) MAX.	SYSTEM PRESSURES (PSIG) RELEIF
ET-1		HHW	100%						
ET-2		CHW	100%						
ET-3		CHW	100%						

SELECTION BASED ON "TACO"

GLYCOL MAKE-UP

UNIT NO.	MODEL	SYSTEM	MAKE-UP CAP. (GPM @ PSI)	DIMENSIONS	PRESURE RANGE(PSI)	ELECTRICAL DATA HP	ELECTRICAL DATA VOLTS	ELECTRICAL DATA PH
GF-1		HHW					120	1
GF-2		CHW					120	1

SELECTION BASED ON "WESSELS COMPANY."
PROVIDE 30% BY WEIGHT PROPYLENE GLYCOL SOLUTION FOR FREEZE PROTECTION FOR HHW & CHW SYSTEM.

AIR SEPERATOR

UNIT NO.	MANUF. NO.	SERVICE	GPM	SIZE	PRESS. DROP FT H_2O	REMARKS
AS-1	4900	HHW	790	8"	3	NOTE 1
AS-2	4900	CHW	800	8"	3	NOTE 1

SELECTION BASED ON "TACO"
NOTE #1: PROVIDE W/ AIR & DIRT SEPARATION STRAINER

BUFFER TANKS

UNIT NO.	MANUF. NO.	SERVICE	TOTAL VOL.	TANK SIZE HEIGHT	TANK SIZE DIA.	TANK SIZE THICK.
BT-1		CHW				

SELECTION BASED ON "CEMLINE"

ROOFTOP UNIT SOUND DATA

UNIT NO.	DISCHARGE (@ S.A. DUCT CONN.) OCTAVE BANDS 63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	INLET (@ R.A. DUCT CONN.) OCTAVE BANDS 63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	RADIATED OCTAVE BANDS 63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
RTU-1	74	82	90	95	99	92	89	80	58	67	83	87	85	83	81	80								
RTU-2	74	82	90	95	99	92	89	80	58	67	83	87	85	83	81	80								
RTU-3	74	82	90	95	99	92	89	80	58	67	83	87	85	83	81	80								
RTU-4	74	82	90	95	99	92	89	80	58	67	83	87	85	83	81	80								
RTU-5	74	82	88	92	98	90	87	78	54	67	79	87	86	83	81	79								
RTU-6	60	74	85	92	96	95	88	83	51	62	77	82	81	79	77	74								
RTU-7	76	75	83	88	91	88	85	78	58	56	67	73	72	73	70	65								
MAU-1	54	63	89	81	101	80	78	68	--	--	--	--	--	--	--	--								

DUCTLESS COOLING UNIT SYSTEMS

UNIT NO.	MANUF. NO.	EVAP. LOCATION	COND. LOCATION	COND. PUMP	EVAPORATOR UNITS CFM	EVAPORATOR UNITS COOLING BTUH	EVAPORATOR UNITS V	EVAPORATOR UNITS PH	EVAPORATOR UNITS MCA	EVAPORATOR UNITS MOP	ASSOCIATED CONDENSER	CONDENSER MODEL	ELECTRICAL DATA V	ELECTRICAL DATA PH	ELECTRICAL DATA MCA	ELECTRICAL DATA MOP	MIN SEER @ ARI	REMARKS
DCUe-1		ELEV. MACHINE 1163	ROOF	CP-1		12,000	208	1			DCUc-1		208	1				
DCUe-2		HEAD END 1026	ROOF	CP-1		24,000	208	1			DCUc-2		208	1				
DCUe-3		HEAD END 1026	ROOF	CP-1		24,000	208	1			DCUc-3		208	1				
DCUe-4		MAIN ELEC. 1024	ROOF	CP-1		18,000	208	1			DCUc-4		208	1				
DCUe-5		ELEC. 1127	ROOF	CP-1		18,000	208	1			DCUc-5		208	1				
DCUe-6		IDF 2155	ROOF	CP-1		18,000	208	1			DCUc-8		208	1				
DCUe-7		ELEC. 2167	ROOF	CP-1			208	1			DCUc-9		208	1				
DCUe-8		IDF 2255	ROOF	CP-1		18,000	208	1			DCUc-10		208	1				

SELECTION BASED ON "MITSUBISHI" PROVIDE WIRED T'STAT, LOW AMBIENT CONTROL (DOWN TO 0°) AND INTERNAL MOUNTED CONDENSATE PUMP OF MODEL LISTED ABOVE. CFM BASED ON FANS SET AT LOW SPEED. PROVIDE WITH MATCHING AIR COOLED CONDENSING UNIT. ALL REFRIGERANT TUBING SHALL BE SIZED BY UNIT MANUFACTURER. PROVIDE ALL NECESSARY JOINT KITS, FITTINGS AND ACCESSORIES FOR A COMPLETE OPERATING SYSTEM PER MANUFACTURER'S RECOMMENDATIONS. PROVIDE BAS (BACNET) INTERFACE FOR INTEGRATION TO BMS SYSTEM. PROVIDE SERVICE ISOLATION VALVES FOR EACH INDOOR UNIT.

SOUND ATTENUATORS

UNIT NO.	MANUF NO.	SERVES UNIT	SERVES AIR STREAM	MAX PD	AIRFLOW (CFM)	SIZE	LENGTH	MAX VEL FPM	DYNAMIC INSERTION LOSS (dB) 63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	REMARKS
SA-1/2S	ERM	RTU-1	SUPPLY	0.25	40,000	72"x40"	7'-0"										
SA-1/2R	ERM	RTU-1	RETURN	0.25	40,000	72"x40"	7'-0"										
SA-3/4S	ERM	RTU-2	SUPPLY	0.25	40,000	72"x40"	7'-0"										
SA-3/4R	ERM	RTU-2	RETURN	0.25	40,000	72"x40"	7'-0"										
SA-5S	ERM	RTU-5	SUPPLY	0.25	15,000	60"x36"	5'-0"										
SA-5R	ERM	RTU-5	RETURN	0.25	15,000	60"x36"	5'-0"										
SA-6S	ERM	RTU-6	SUPPLY	0.25	12,000	64"x38"	5'-0"										
SA-6R1	ERM	RTU-6	RETURN	0.25	6,000	60"x24"	5'-0"										
SA-6R2	ERM	RTU-6	RETURN	0.25	6,000	60"x24"	5'-0"										
SA-7S	ERM	RTU-7	SUPPLY	0.25	2,000	36"x16"	5'-0"										
SA-7R	ERM	RTU-7	RETURN	0.25	2,000	36"x16"	5'-0"										
SA-8	ERM	MAU-1	SUPPLY	0.25	4,670	40"x18"	5'-0"										

SELECTION BASED ON "PRICE" AND IS BASED ON SOUND PERFORMANCE OF BASIS OF DESIGN AIR HANDLING UNITS.
CONTRACTOR IS RESPONSIBLE FOR PROVIDING ROOF TOP UNITS WITH SIMILAR OR LOWER SOUND DATA OR PROVIDING ADDITIONAL SOUND ATTENUATION IN ORDER TO MEET MA-CHPS ACOUSTICAL REQUIREMENTS.
THE SOUND ATTENUATORS HAVE BEEN SELECTED BASED ON THE BASIS OF DESIGN AIR HANDLING UNIT EQUIPMENT SOUND DATA. AIR HANDLING UNIT EQUIPMENT WITH HIGHER SOUND PERFORMANCE DATA WILL NOT BE ACCEPTED.

UNIT HEATERS (HEATING HOT WATER)

UNIT NO.	MANUF. NO.	BUILDING LOCATION	C.F.M.	M.B.H.	G.P.M.	W.P.D.	MOTOR HP.	MOTOR V	MOTOR PH.	E.D.B.	L.D.B.	REMARKS
UH-1	RW	STAIR-2 1065	350	30.0	3.2		1/15	115	1	60°F		
UH-2	RW	VESTIBULE 1045	350	20.0	2.1		1/15	115	1	60°F		
UH-3	RH	EQUIP. STORAGE 1326	1050	35.0	3.8		1/10	115	1	60°F		
UH-4	RFRC	VESTIBULE 1348	480	20.0	2.1		1/15	115	1	60°F		
UH-5	RFRW	CORRIDOR 1310	350	20.0	2.1		1/15	115	1	60°F		
UH-6	RFRC	CORRIDOR 1008	350	20.0	2.1		1/15	115	1	60°F		
UH-7	RFRC	RECEIVING 1010	350	20.0	2.1		1/15	115	1	60°F		
UH-8	RFRC	CORRIDOR 1020	350	20.0	2.1		1/15	115	1	60°F		
UH-9	RFRC	CORRIDOR 1060	350	20.0	2.1		1/15	115	1	60°F		
UH-10	RW	STAIR-1 1005	350	30.0	3.2		1/15	115	1	60°F		
UH-11	RFRC	CORRIDOR 2000	350	20.0	2.1		1/15	115	1	60°F		
UH-12	RFRC	VESTIBULE 2001	350	20.0	2.1		1/15	115	1	60°F		
UH-13	RW	STAIR-2 3065	350	30.0	3.2		1/15	115	1	60°F		
UH-14	RW	STAIR-2 3005	350	20.0	3.2		1/15	115	1	60°F		
UH-15	RH	BOILER ROOM 1018					1/15	115	1	60°F		

SELECTION BASED ON "RITTLING", 160°F EWT, 20°F WTD, 30% PROPYLENE GLYCOL CONCENTRATION.
CEILING/WALL UNIT HEATERS SHALL BE RECESSED INSTALLATION. REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL INFORMATION.
PROVIDE UNIT WITH MOUNTING FRAME FOR RECESSED INSTALLATION.
CEILING MOUNTED CABINET TYPE UNIT HEATERS SHALL BE FACTORY PRIMED FOR FIELD PAINTING BY PAINTING SUBCONTRACTOR.
ALL OTHER UNIT HEATERS SHALL BE FACTORY PAINTED. COLOR FINISH SHALL BE SELECTED BY THE ARCHITECT.

CONDENSATE PUMPS

UNIT NO.	MANUF. NO.	SERVICE	G.P.H.	T.D.H. FT WATER	MOTOR WATTS	MOTOR VOLT	MOTOR PH.	REMARKS
CP-1	SI-10	DCU	5	33	..	120	1	--
CP-2								

SELECTION BASED ON "SAUERMANN"
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.

EXHAUST FANS

UNIT NO.	MANUF. NO.	BUILDING LOCATION	SERVICE	DRIVE TYPE	TIP SPEED	ESP	CFM	RPM	SONES	MOTOR HP	MOTOR V	MOTOR PH.	CONTROL TYPE	CONTROL SYST.	REMARKS
EF-1	G-VG	ROOF	GENERAL EXHAUST	DIRECT	3,951	0.375"	2,650	816	8.6	3/4	120	1		BUILD.	
EF-2	G-VG	ROOF	GENERAL EXHAUST	DIRECT	3,851	0.375"	2,550	795	8.4	3/4	120	1		BUILD.	
EF-3	SQ-VG	RM. 1014	1014 RECYCLING/TRASH	DIRECT	3,827	0.375"	400	1,344	6.6	1/6	120	1		BUILD.	
EF-4	G-VG	ROOF	1233 ART WORKROOM	DIRECT	4,578	0.5"	250	1,563	8.6	1/4	120	1		HOOD	
SEF-1	QEI	ROOF	ATRIUM EXHAUST	--	14,541	2.5"	50,000	1725	60	50	460	3		SMOKE	
SEF-2	QEI	ROOF	ATRIUM EXHAUST	--	14,541	2.5"	50,000	1725	60	50	460	3		SMOKE	
SEF-3	QEI	ROOF	ATRIUM EXHAUST	--	14,541	2.5"	50,000	1725	60	50	460	3		SMOKE	
SEF-4	QEI	ROOF	ATRIUM EXHAUST	--	14,541	2.5"	50,000	1725	60	50	460	3		SMOKE	
KEF-1	CUBE	ROOF	1140 KITCHEN MAIN HOOD	BELT	7,597	2.5"	3,570	1725	18.4	3	460	3		HOOD	
KEF-2	CUBE	ROOF	1140 KITCHEN WAREWASHER	BELT	6,640	1.5"	600	1725	12.0	1/2	120	1		HOOD	
FEF-1	VEKTOR-H	ROOF	1160 FAB-LAB FUME HOOD	BELT	--	1.2"	1,100	3600		1 1/2	460	3		HOOD	
FEF-2	VEKTOR-H	ROOF	1134 MAKERSPACE FUME HOOD	BELT	--	1.2"	1,100	3600		1 1/2	460	3		HOOD	
FEF-3	VEKTOR-H	ROOF	1134 MAKERSPACE WELDING BOOTH	BELT	--	1.2"	1,200	3600		1 1/2	460	3		HOOD	
FEF-4	VEKTOR-H	ROOF	2210 SCIENCE CLASSROOM	BELT	--	1.2"	550	3600		1 1/2	460	3		HOOD	
FEF-5	VEKTOR-H	ROOF	2214 SCIENCE CLASSROOM	BELT	--	1.2"	1,100	3600		1 1/2	460	3		HOOD	

SELECTION BASED ON "GREENHECK"
NOTE #1: UL LISTED FOR EMERGENCY SMOKE EXHAUST, PROVIDE EMERGENCY POWER; HOUSING SHALL BE CONSTRUCTED AS CLASS II TYPE FOR OUTDOOR LOCATION/VSE REFER TO DRAWINGS FOR ARRANGEMENT.
NOTE #2: EF IS INTEGRAL TO THE KILN AND SCHEDULED FOR COORDINATION PURPOSES ONLY.
NOTE #3: PROVIDE W/ ECM MOTOR AND BMS INTERFACE.

FIN-TUBE RADIATION SCHEDULE (HYDRONIC)

TAG NO.	MANUFACTURER MODEL NUMBER	BTU PER FT	EWT (°F)	LWT (°F)	PIPE SIZE (IN)	PIPE MTRL	FIN SIZE	FINS PER FOOT	FIN MTRL	ROWS	REMARKS
FTR-1	BARE ELEMENT	1,061	160	140	3/4"	COPPER	4-1/4" SQ	48	ALUM.	2	-
FTR-2	PIBG5	723	160	140	3/4"	COPPER	4-1/4" SQ	48	ALUM.	1	-
FTR-3	FS	1,337	160	140	1"	COPPER	4-1/4" SQ	48	ALUM.	2	-

SELECTION BASED ON "RITTLING" EWT 160°, 20° ΔT, 30% PROPYLENE GLYCOL
LENGTHS INDICATED ARE ACTIVE LENGTH.
PROVIDE WITH PIPE SUPPORTS FOR FTR WITH SUPPLY AND RETURN PIPING ENTERING/EXITING ON THE SAME SIDE.
ENCLOSURE SHALL BE 14 GAUGE CONSTRUCTION.

FTR-1
LENGTH
GPM

RADIANT HEATING PANELS

UNIT NO.	MANUF NO.	NO. OF PASSES	PANEL WIDTH	PANEL LENGTH	BTU/ LIN. FT.	REMARKS
RP-1	RPL	8	24"	SEE DRAWINGS	313	SEE FLOOR PLAN FOR LENGTH
RP-2	RPLS	8	24"	SEE DRAWINGS	313	SEE FLOOR PLAN FOR LENGTH

SELECTION BASED ON "PRICE", 160° EWT, 20° WTD, 150° AWT, 30% BY WEIGHT PROPYLENE GLYCOL SOLUTION. CONFIRM MOUNTING LOCATIONS WITH RCP ELEMENTS & ARCHITECT. PROVIDE MANUFACTURERS END AND INTER-CONNECTION TRIM PIECES TO PROVIDE A CONTINUOUS APPEARANCE
PROVIDE A MINIMUM OF 1.0 GPM FOR EACH CIRCUIT.
ALL RP-1 SHALL BE PROVIDED WITH FACTORY PRIMER & FIELD PAINTED BY G.C., COLOR BY ARCHITECT.

DUST COLLECTION UNIT

UNIT NO.	MANUF. NO.	ESP	CFM	FAN MOTOR HP	FAN MOTOR V	FAN MOTOR PH.	REMARKS
DC-1							

SELECTION BASED ON "DONALDSON TORIT"
DUST COLLECTOR MANUFACTURER TO PROVIDE UNIT W/ 1" SPRINKLER HEAD TAP

QUANTITY	EQUIPMENT	CONN. SIZE	CFM
1	BAND SAW	4"	300
1	COMBO SANDER	3"	200
1	PLANER	5"	600
1	TABLE SAW	4"	400
1	JOINTER	4"	400
1	MITRE SAW	3"	200
		TOTAL CFM =	2100

INSTALL ALL COMPONENETS AS REQUIRED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS AND RECOMMENDATIONS

FIN-TUBE RADIATION SCHEDULE (ELECTRIC)

UNIT NO.	MANUF. NO.	BUILDING LOCATION	ELEMENT KW	ELEMENT MBH	POWER V	POWER PH	POWER AMPS	REMARKS
EFT-1	QMKC2508W	1340 AUDITORIUM	2.0	6.8	208	1	9.6	
EFT-2	QMKC2508W	1340 AUDITORIUM	2.0	6.8	208	1	9.6	
EFT-3	QMKC2508W	1340 AUDITORIUM	2.0	6.8	208	1	9.6	
EFT-4	QMKC2508W	1340 AUDITORIUM	2.0	6.8	208	1	9.6	
EFT-5	QMKC2508W	1340 AUDITORIUM	2.0	6.8	208	1	9.6	
EFT-6	QMKC2508W	1340 AUDITORIUM	2.0	6.8	208	1	9.6	
EFT-7	QMKC2508W	1340 AUDITORIUM	2.0	6.8	208	1	9.6	
EFT-8	QMKC2508W	1340 AUDITORIUM	2.0	6.8	208	1	9.6	

SELECTION BASED ON Q-MARK

Jonathan Levi Architects
266 beacon street
boston ma 02116
tel 617 437 9458
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GARCIA GALUSKA DESOUSA
CONSULTING ENGINEERS, INC.
370 Faunce Corner Road, Dartmouth, MA 02747-1371
508 - 998 - 5700 FAX 508 - 998 - 0693 E - MAIL info@ggi. g - d . com

NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
SCHEDULES I - HVAC

PROJECT NO. 1722

DRAWING NO.
M301

VARIABLE AIR VOLUME BOXES

UNIT NO.	MANUF. NO.	SPACE SERVED	CFM MAX	CFM MIN	MAX NC @ 1.5" PD	APD	INLET DIA	REMARKS
VAV-1-1	SDVQ	1214 OFFICE	100		<25	0.6"	5"	RTU-1/2
VAV-1-2	SDVQ	1215 OFFICE	100		<25	0.6"	5"	RTU-1/2
VAV-1-3	SDVQ	1217 PRACTICE	75		<25	0.6"	5"	RTU-1/2
VAV-1-4	SDVQ	1218 PRACTICE	75		<25	0.6"	5"	RTU-1/2
VAV-1-5	SDVQ	1219 ENSEMBLE	110		<25	0.6"	5"	RTU-1/2
VAV-1-6	SDVQ	1300 LOBBY	140		<25	0.6"	5"	RTU-1/2
VAV-1-7	SDVQ	1310 CORRIDOR	465		<25	0.6"	8"	RTU-1/2
VAV-1-8	SDVQ	1220 BAND	625		<25	0.6"	8"	RTU-1/2
VAV-1-9	SDVQ	1222A BAND - TP	80		<25	0.6"	5"	RTU-1/2
VAV-1-10	SDVQ	1224 CHORUS	620		<25	0.6"	8"	RTU-1/2
VAV-1-11	SDVQ	1230 CR - DRAMA	520		<25	0.6"	8"	RTU-1/2
VAV-1-12	SDVQ	1232 ART WORKROOM	80		<25	0.6"	5"	RTU-1/2
VAV-1-13	SDVQ	1233 ART WORKROOM	80		<25	0.6"	5"	RTU-1/2
VAV-1-14	SDVQ	1234 ART	785		<25	0.6"	9"	RTU-1/2
VAV-1-15	SDVQ	1055A LEARNING COMMONS	1,680		<25	0.6"	14"	RTU-1/2
VAV-1-16	SDVQ	1055B LEARNING COMMONS	1,440		<25	0.6"	14"	RTU-1/2
VAV-1-17	SDVQ	1068 BREAKOUT	150		<25	0.6"	5"	RTU-1/2
VAV-1-18	SDVQ	2210 SCIENCE - CR	860		<25	0.6"	10"	RTU-1/2
VAV-1-19	SDVQ	2211A/B SCIENCE - PREP	85		<25	0.6"	5"	RTU-1/2
VAV-1-20	SDVQ	2212 SCIENCE - TP	80		<25	0.6"	5"	RTU-1/2
VAV-1-21	SDVQ	2214 SCIENCE - CR	1,100		<25	0.6"	12"	RTU-1/2
VAV-1-22	SDVQ	2222 CLASSROOM - TP	80		<25	0.6"	5"	RTU-1/2
VAV-1-23	SDVQ	2224 CLASSROOM	625		<25	0.6"	8"	RTU-1/2
VAV-1-24	SDVQ	2230 CLASSROOM - ELL	625		<25	0.6"	8"	RTU-1/2
VAV-1-25	SDVQ	2232 CLASSROOM - TP	80		<25	0.6"	5"	RTU-1/2
VAV-1-26	SDVQ	2234 CLASSROOM	630		<25	0.6"	8"	RTU-1/2
VAV-1-27	SDVQ	2068 BREAKOUT	220		<25	0.6"	6"	RTU-1/2
VAV-1-28	SDVQ	3210 CLASSROOM	730		<25	0.6"	9"	RTU-1/2
VAV-1-29	SDVQ	3212 CLASSROOM - TP	80		<25	0.6"	5"	RTU-1/2
VAV-1-30	SDVQ	3214 CLASSROOM	655		<25	0.6"	8"	RTU-1/2
VAV-1-31	SDVQ	3220 CLASSROOM - ELL	630		<25	0.6"	8"	RTU-1/2
VAV-1-32	SDVQ	3222 CLASSROOM - TP	80		<25	0.6"	5"	RTU-1/2
VAV-1-33	SDVQ	3224 CLASSROOM	665		<25	0.6"	8"	RTU-1/2
VAV-1-34	SDVQ	3230 CLASSROOM	655		<25	0.6"	8"	RTU-1/2
VAV-1-35	SDVQ	3232 CLASSROOM - TP	80		<25	0.6"	5"	RTU-1/2
VAV-1-36	SDVQ	3234 CLASSROOM	665		<25	0.6"	8"	RTU-1/2
VAV-1-37	SDVQ	3068 BREAKOUT	510		<25	0.6"	8"	RTU-1/2
VAV-2-1	SDVQ	1166 STAFF LUNCH	360		<25	0.6"	7"	RTU-1/2
VAV-2-2	SDVQ	1160 TECH/DIGITAL FAB LAB	1,100		<25	0.6"	12"	RTU-1/2
VAV-2-3	SDVQ	1140 KITCHEN	700		<25	0.6"	9"	RTU-1/2
VAV-2-4	SDVQ	1141 KITCHEN OFFICE	75		<25	0.6"	5"	RTU-1/2
VAV-2-5	SDVQ	1011 CUST. WORKSHOP	550		<25	0.6"	8"	RTU-1/2
VAV-2-6	SDVQ	1027 CUST. OFFICE	290		<25	0.6"	6"	RTU-1/2
VAV-2-7	SDVQ	1055 LEARNING COMMONS	480		<25	0.6"	8"	RTU-1/2
VAV-2-8	SDVQ	1055 LEARNING COMMONS	720		<25	0.6"	9"	RTU-1/2
VAV-2-9	SDVQ	1055 LEARNING COMMONS	1,200		<25	0.6"	12"	RTU-1/2
VAV-2-10	SDVQ	2168B SPED - READING	105		<25	0.6"	5"	RTU-1/2
VAV-2-11	SDVQ	2168A SPED - READING	80		<25	0.6"	5"	RTU-1/2
VAV-2-12	SDVQ	2168C SPED - RESOURCE	410		<25	0.6"	7"	RTU-1/2
VAV-2-13	SDVQ	2166 GUIDANCE - OFFICE	100		<25	0.6"	5"	RTU-1/2
VAV-2-14	SDVQ	2165 GUIDANCE - OFFICE	175		<25	0.6"	5"	RTU-1/2
VAV-2-15	SDVQ	2164 OFFICE - DEPT	200		<25	0.6"	5"	RTU-1/2
VAV-2-16	SDVQ	2163 OFFICE - DEPT	180		<25	0.6"	5"	RTU-1/2
VAV-2-17	SDVQ	2160 WORKSHOP	160		<25	0.6"	5"	RTU-1/2
VAV-2-18	SDVQ	2161 GUIDANCE WAITING	110		<25	0.6"	5"	RTU-1/2
VAV-2-19	SDVQ	2040 MEDICAL OFFICE	330		<25	0.6"	6"	RTU-1/2
VAV-2-20	SDVQ	2042 INTERVIEW	70		<25	0.6"	5"	RTU-1/2
VAV-2-21	SDVQ	2010 ADMIN - GENERAL	470		<25	0.6"	8"	RTU-1/2
VAV-2-22	SDVQ	2026 CONFERENCE - SM	290		<25	0.6"	6"	RTU-1/2
VAV-2-23	SDVQ	2027 RECORDS	50		<25	0.6"	4"	RTU-1/2
VAV-2-24	SDVQ	2012 OFFICE - PR SEC.	100		<25	0.6"	5"	RTU-1/2
VAV-2-25	SDVQ	2025 WORKSPACE	570		<25	0.6"	7"	RTU-1/2
VAV-2-26	SDVQ	2014 OFFICE - PRINCIPAL	365		<25	0.6"	6"	RTU-1/2
VAV-2-27	SDVQ	2022 OFFICE - SPARE	185		<25	0.6"	5"	RTU-1/2
VAV-2-28	SDVQ	2020 OFFICE - CONFERENCE	180		<25	0.6"	5"	RTU-1/2
VAV-2-29	SDVQ	2018 OFFICE - ASST. PR	180		<25	0.6"	5"	RTU-1/2
VAV-2-30	SDVQ	2016 CONFERENCE - LG	555		<25	0.6"	8"	RTU-1/2
VAV-2-31	SDVQ	2058 BREAKOUT	145		<25	0.6"	5"	RTU-1/2
VAV-2-32	SDVQ	3164 CLASSROOM - ELL	795		<25	0.6"	9"	RTU-1/2
VAV-2-33	SDVQ	3160 CLASSROOM - ELL	870		<25	0.6"	10"	RTU-1/2
VAV-2-34	SDVQ	3144 CLASSROOM	740		<25	0.6"	9"	RTU-1/2
VAV-2-35	SDVQ	3142 CLASSROOM - TP	80		<25	0.6"	5"	RTU-1/2
VAV-2-36	SDVQ	3140 CLASSROOM	760		<25	0.6"	9"	RTU-1/2
VAV-2-37	SDVQ	3058 BREAKOUT	535		<25	0.6"	8"	RTU-1/2

SELECTION BASED ON "PRICE" W/ HOSPITAL-GRADE LINER IN ATTENUATOR.
CONTROLS SHALL BE PROVIDED BY ATC CONTRACTOR & FIELD INSTALLED.

VARIABLE AIR VOLUME BOXES (continued)

UNIT NO.	MANUF. NO.	SPACE SERVED	CFM MAX	CFM MIN	MAX NC @ 1.5" PD	APD	INLET DIA	REMARKS
VAV-3-1	SDVQ	1240 MEDIA	1,605		<25	0.6"	14"	RTU-3/4
VAV-3-2	SDVQ	1242 MEDIA	65		<25	0.6"	5"	RTU-3/4
VAV-3-3	SDVQ	1244 CLASSROOM	670		<25	0.6"	8"	RTU-3/4
VAV-3-4	SDVQ	1260 SPED - CR	645		<25	0.6"	8"	RTU-3/4
VAV-3-5	SDVQ	1262 SPED - TP	80		<25	0.6"	5"	RTU-3/4
VAV-3-6	SDVQ	1264 SPED - CR	680		<25	0.6"	8"	RTU-3/4
VAV-3-7	SDVQ	1055 LEARNING COMMONS	1,440		<25	0.6"	14"	RTU-3/4
VAV-3-8	SDVQ	1055 LEARNING COMMONS	480		<25	0.6"	8"	RTU-3/4
VAV-3-9	SDVQ	1055 LEARNING COMMONS	960		<25	0.6"	10"	RTU-3/4
VAV-3-10	SDVQ	2242 CLASSROOM - TP	80		<25	0.6"	5"	RTU-3/4
VAV-3-11	SDVQ	2244 CLASSROOM	635		<25	0.6"	8"	RTU-3/4
VAV-3-12	SDVQ	2260 SPED - CR	660		<25	0.6"	8"	RTU-3/4
VAV-3-13	SDVQ	2262 SPED - TP	80		<25	0.6"	5"	RTU-3/4
VAV-3-14	SDVQ	2264 SPED - CR	685		<25	0.6"	8"	RTU-3/4
VAV-3-15	SDVQ	3240 CLASSROOM	660		<25	0.6"	8"	RTU-3/4
VAV-3-16	SDVQ	3242 CLASSROOM - TP	80		<25	0.6"	5"	RTU-3/4
VAV-3-17	SDVQ	3244 CLASSROOM	780		<25	0.6"	8"	RTU-3/4
VAV-3-18	SDVQ	3260B SPED - READING	105		<25	0.6"	5"	RTU-3/4
VAV-3-19	SDVQ	3260A SPED - READING	80		<25	0.6"	5"	RTU-3/4
VAV-3-20	SDVQ	3260C SPED - RESOURCE	395		<25	0.6"	7"	RTU-3/4
VAV-3-21	SDVQ	3262 CLASSROOM - TP	80		<25	0.6"	5"	RTU-3/4
VAV-3-22	SDVQ	3265 OFFICE - DEPT	100		<25	0.6"	5"	RTU-3/4
VAV-3-23	SDVQ	3269 WORKROOM	185		<25	0.6"	5"	RTU-3/4
VAV-3-24	SDVQ	3266 OFFICE - DEPT	145		<25	0.6"	5"	RTU-3/4
VAV-3-25	SDVQ	3267 GUIDANCE - OFFICE	160		<25	0.6"	5"	RTU-3/4
VAV-3-26	SDVQ	3268 GUIDANCE - OFFICE	160		<25	0.6"	5"	RTU-3/4
VAV-3-27	SDVQ	3263 GUIDANCE WAITING	145		<25	0.6"	5"	RTU-3/4
VAV-3-28	SDVQ	3054 BREAKOUT	455		<25	0.6"	7"	RTU-3/4
VAV-4-1	SDVQ	1134 MAKERSPACE	2,300		<25	0.6"	16"	RTU-3/4
VAV-4-2	SDVQ	1132 CLASSROOM - TP	80		<25	0.6"	5"	RTU-3/4
VAV-4-3	SDVQ	1130 CLASSROOM - ELL	670		<25	0.6"	8"	RTU-3/4
VAV-4-4	SDVQ	1128B SPED - READING	100		<25	0.6"	5"	RTU-3/4
VAV-4-5	SDVQ	1128A SPED - READING	85		<25	0.6"	5"	RTU-3/4
VAV-4-6	SDVQ	1128C SPED - RESOURCE	420		<25	0.6"	7"	RTU-3/4
VAV-4-7	SDVQ	1122 CLASSROOM - TP	80		<25	0.6"	5"	RTU-3/4
VAV-4-8	SDVQ	1126 GUIDANCE OFFICE	100		<25	0.6"	5"	RTU-3/4
VAV-4-9	SDVQ	1125 GUIDANCE OFFICE	175		<25	0.6"	5"	RTU-3/4
VAV-4-10	SDVQ	1124 OFFICE - DEPT	195		<25	0.6"	5"	RTU-3/4
VAV-4-11	SDVQ	1123 OFFICE - DEPT	160		<25	0.6"	5"	RTU-3/4
VAV-4-12	SDVQ	1120 WORKROOM	165		<25	0.6"	5"	RTU-3/4
VAV-4-13	SDVQ	1121B GUIDANCE WAITING	110		<25	0.6"	5"	RTU-3/4
VAV-4-14	SDVQ	1114 SCIENCE - CR	825		<25	0.6"	9"	RTU-3/4
VAV-4-15	SDVQ	1112 SCIENCE - TP	80		<25	0.6"	5"	RTU-3/4
VAV-4-16	SDVQ	1111A/B SCIENCE PREP	90		<25	0.6"	5"	RTU-3/4
VAV-4-17	SDVQ	1110 SCIENCE - CR	895		<25	0.6"	10"	RTU-3/4
VAV-4-18	SDVQ	1048 BREAKOUT	175		<25	0.6"	5"	RTU-3/4
VAV-4-19	SDVQ	1038 BREAKOUT	185		<25	0.6"	5"	RTU-3/4
VAV-4-20	SDVQ	1055 LEARNING COMMONS	480		<25	0.6"	8"	RTU-3/4
VAV-4-21	SDVQ	1055 LEARNING COMMONS	480		<25	0.6"	8"	RTU-3/4
VAV-4-22	SDVQ	1055 LEARNING COMMONS	720		<25	0.6"	9"	RTU-3/4
VAV-4-23	SDVQ	1055 LEARNING COMMONS	480		<25	0.6"	8"	RTU-3/4
VAV-4-24	SDVQ	1055 LEARNING COMMONS	720		<25	0.6"	9"	RTU-3/4
VAV-4-25	SDVQ	2134 CLASSROOM	710		<25	0.6"	9"	RTU-3/4
VAV-4-26	SDVQ	2132 CLASSROOM - TP	80		<25	0.6"	5"	RTU-3/4
VAV-4-27	SDVQ	2130 CLASSROOM	725		<25	0.6"	9"	RTU-3/4
VAV-4-28	SDVQ	2124 SPED - CR	720		<25	0.6"	9"	RTU-3/4
VAV-4-29	SDVQ	2122 SPED - TP	80		<25	0.6"	5"	RTU-3/4
VAV-4-30	SDVQ	2120 SPED - CR	725		<25	0.6"	9"	RTU-3/4
VAV-4-31	SDVQ	2114 CLASSROOM	720		<25	0.6"	9"	RTU-3/4
VAV-4-32	SDVQ	2112 CLASSROOM - TP	80		<25	0.6"	5"	RTU-3/4
VAV-4-33	SDVQ	2110 CLASSROOM - ELL	725		<25	0.6"	9"	RTU-3/4
VAV-4-34	SDVQ	2038 BREAKOUT	195		<25	0.6"	5"	RTU-3/4
VAV-4-35	SDVQ	3134 CLASSROOM	760		<25	0.6"	9"	RTU-3/4
VAV-4-36	SDVQ	3132 CLASSROOM - TP	80		<25	0.6"	5"	RTU-3/4
VAV-4-37	SDVQ	3130 CLASSROOM	705		<25	0.6"	9"	RTU-3/4
VAV-4-38	SDVQ	3124 SCIENCE - CR	840		<25	0.6"	9"	RTU-3/4
VAV-4-39	SDVQ	3122 SCIENCE - TP	80		<25	0.6"	5"	RTU-3/4
VAV-4-40	SDVQ	3121B SCIENCE PREP	95		<25	0.6"	5"	RTU-3/4
VAV-4-41	SDVQ	3120 SCIENCE - CR	850		<25	0.6"	10"	RTU-3/4
VAV-4-42	SDVQ	3114 CLASSROOM	745		<25	0.6"	9"	RTU-3/4
VAV-4-43	SDVQ	3112 CLASSROOM - TP	80		<25	0.6"	5"	RTU-3/4
VAV-4-44	SDVQ	3110 CLASSROOM	720		<25	0.6"	9"	RTU-3/4
VAV-6-1	SDVQ	1344 IT	275		<25	0.6"	6"	RTU-6
VAV-6-2	SDVQ	1343 DRESSING	100		<25	0.6"	5"	RTU-6
VAV-6-3	SDVQ	1348 AV	275		<25	0.6"	6"	RTU-6
VAV-6-4	SDVQ	1347 DRESSING	100		<25	0.6"	5"	RTU-6

SELECTION BASED ON "PRICE" W/ HOSPITAL-GRADE LINER IN ATTENUATOR.
CONTROLS SHALL BE PROVIDED BY ATC CONTRACTOR & FIELD INSTALLED.

CONSTANT VOLUME REGULATORS

UNIT NO.	MANUF. NO.	DIA. (INCHES)	MIN. CFM	MAX. CFM	REMARKS
CVD-1	MR MAX	4"	40	130	
CVD-2	MR MAX	5"	60	165	
CVD-3	MR MAX	6"	100	265	
CVD-4	MR MAX	8"	150	530	
CVD-5	MR MAX	10"	295	940	
CVD-6	MR MAX	12"	470	1,650	
CVD-7	MR MAX	14"	530	1,885	
CVD-8	MR MAX	16"	590	2,355	

SELECTION BASED ON "ALDES"
UNIT NUMBERS ARE FOR TYPE ONLY, REFER TO FLOOR PLANS FOR QUANTITIES

DISPLACEMENT DIFFUSERS

UNIT NO.	MANUF. NO.	SIZE W x H x D	MAX FACE VELOCITY	DUCT CONNECTION	REMARKS
DD-1	DF1L	24"Wx24"H	40 FPM		NOTE 2
DD-2	DF1L	24"Wx48"H	40 FPM		NOTE 2
DD-3	DFR	24"Wx30"H	40 FPM		NOTE 1,3
DD-4	DFR	24"Wx48"H	40 FPM		NOTE 1,3
DD-5	DFR	24"Wx60"H	40 FPM		NOTE 1,3
DD-6	DFR	36"Wx60"H	40 FPM		NOTE 1,3
DD-7	DFR	54"Wx28"H	40 FPM		NOTE 1,3
DD-8	DFR	48"Wx72"H	40 FPM		NOTE 1,3
DD-9	DFR	58"Wx72"H	40 FPM		NOTE 1,3

SELECTION BASED ON "PRICE" FINISH AND COLOR TO BE BY ARCH.
REFER TO FLOOR PLANS FOR CFM.
NOTE #1: PROVIDE 16" DEEP PLENUM ON REAR OF DIFFUSER.
NOTE #2: CEILING MOUNTED DISPLACEMENT DIFFUSERS FACTORY PRIMED FOR FIELD PAINTING BY PAINTING SUBCONTRACTOR. ALL OTHER DISPLACEMENT DIFFUSERS SHALL BE FACTORY PAINTED. COLOR FINISH SHALL BE SELECTED BY THE ARCHITECT.
NOTE #3: PROVIDE MUD FRAME.

ROOF HOOD SCHEDULE

UNIT NO.	MODEL	DIMENSION(INCHES) A	B	C	"TW"	"TL"	AREA
RH-1	FGR	18"	24"	14"	8"	14"	0.78 S.F.

SELECTION BASED ON "GREENHECK"

RETURN/ EXHAUST REGISTER(R/E)

NO.	STYLE
R/E-1	PDR
R/E-2	96
R/E-3	LBPH
R/E-4	MSRRP

SELECTION BASED ON "PRICE"
NOTE #1: REFER TO DRAWINGS FOR THROW DIRECTION, SIZE & CFM ALL CEILING REGISTERS SHALL BE PROVIDED W/ FACTORY PRIMER & FIELD PAINTED BY THE G.C., COLOR BY ARCHITECT.

SUPPLY DIFFUSER

NO.	STYLE
A	AMX
B	LBPH16A
C	91
D	RCBA

SELECTION BASED ON "PRICE"
NOTE #1: REFER TO DRAWINGS FOR THROW DIRECTION, SIZE & CFM

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

SCHEDULES II - HVAC

PROJECT NO. 1722

DRAWING NO.

M302

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
		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		THERMOSTAT
C		CARBON DIOXIDE SENSOR (SPACE MOUNTED)
H		HUMIDITY SENSOR
C		CARBON DIOXIDE SENSOR (DUCT MOUNTED)
		SUPPLY AIR DUCT SECTION
		RETURN/EXHAUST AIR DUCT SECTION
		SUPPLY AIR
		RETURN/EXHAUST AIR
S		SMOKE DETECTOR
		CONNECT TO EXISTING
	SD	SMOKE DAMPER
	MD	MOTORIZED DAMPER
	FD	FIRE DAMPER
	VD	VOLUME DAMPER
	BD	BACKDRAFT DAMPER
	FSD	COMBINATION SMOKE AND FIRE DAMPER
	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
	L.W.B.	LEAVING WET BULB
	E.W.T.	ENTERING WATER TEMPERATURE
	L.W.T.	LEAVING WATER TEMPERATURE
	T.S.P.	TOTAL STATIC PRESSURE
	E.S.P.	EXTERNAL STATIC PRESSURE
	T.D.H.	TOTAL DYNAMIC HEAD
	P.D.	PRESSURE DROP
	A.F.F.	ABOVE FINISHED FLOOR
	A.H.U.	AIR HANDLING UNIT
	A.S.	AIR SEPERATOR
	A.T.C.	AUTOMATIC TEMP. CONTROL
	B	BOILER
	BTUH	BRITISH THERMAL UNIT PER HOUR
	C	CONVECTOR
	CAF	COMBUSTION AIR FAN
	CFH	CUBIC FEET PER HOUR
	CFM	CUBIC FEET PER MINUTE
	CH	CHILLER
	CLG.	CEILING
	CO	CLEANOUT
	C.P.	CONDENSATE PUMP
	DCU	DUCTLESS COOLING UNIT
	DCUc	DUCTLESS COOLING UNIT CONDENSER (OUTDOOR)
	DCUe	DUCTLESS COOLING UNIT EVAPORATOR (INDOOR)
	DD	DISPLACEMENT DIFFUSER
	DG	DOOR GRILLE
	E.C.	ELECTRICAL CONTRACTOR
	EF	EXHAUST FAN
	ET	EXPANSION TANK
	EUH	ELECTRIC UNIT HEATER
	EXH.	EXHAUST
	FC	FAN COIL UNIT
	FRPM	FAN RPM
	G.C.	GENERAL CONTRACTOR
	GFS	GLYCOL FEED STATION
	HGS	HOT WATER GLYCOL LOOP
	HP	HORSEPOWER
	HV	HEATING & VENTILATING UNIT
	H.V.A.C.	HEATING,VENTILATING AND AIR COND.
	IU	INDUCTION UNIT
	L.H.C.	LIMIT OF HEATING CONTRACT
	L.P.C.	LIMIT OF PLUMBING CONTRACT
	MANUF	MANUFACTURER
	MAU	MAKE-UP AIR UNIT
	MBH	1,000 BTUH
	N.T.S.	NOT TO SCALE
	O.A.	OUTSIDE AIR
	O.C.	ON CENTER
	OED	OPEN ENDED DUCT
	P	PUMP
	P.C.	PLUMBING CONTRACTOR
	PH	PHASE
	R.A.	RETURN AIR
	RH	ROOF HOOD
	RHC	REHEAT COIL
	RP	RADIANT PANEL
	R.T.U.	ROOF TOP UNIT
	S.A.	SUPPLY AIR
	T'STAT	THERMOSTAT
	TYP.	TYPICAL
	U.D.	UNDERCUT DOOR
	UH	UNIT HEATER (CABINET OR HORIZONTAL)
	V	VOLTS
	VEL	VELOCITY
	VFD	VARIABLE FREQUENCY DRIVE
	WMS	WIRE MESH SCREEN
	WPD	WATER PRESSURE DROP
	WTD	WATER TEMPERATURE DROP

###/## — EQUIPMENT TYPE / EQUIPMENT NUMBER

S-A	GRD DESIGNATION (REFER TO SCHEDULE)
12x12	GRD SIZE
500	GRD CFM
DD-1	DD DESIGNATION (REFER TO SCHEDULE)
400	DD CFM
RP-1	RADIANT PANEL DESIGNATION (REFER TO SCHEDULES)
4'-0"	RADIANT PANEL LENGTH
0.5	RADIANT PANEL MBH

GENERAL NOTES

1 ALL PIPING AND DUCTWORK UNLESS DIMENSIONED IS SHOWN DIAGRAMATICALLY ONLY, 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 LIGHTING FIXTURES, SPRINKLERS, & OTHER DEVICES. REFER TO 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 LOCATIONS & ACCESS DOORS PROVIDED WHERE REQUIRED.

7 THIS CONTRACTOR SHALL PROVIDE CONCRETE BASES A 4" MINIMUM HEIGHT. LOCATION AND DIMENSIONS ARE APPROXIMATE. PROVIDE TO SUIT EQUIPMENT AND ALLOW A MIN. OF 6" ALL AROUND EQUIPMENT.

8 THIS 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.ALL AHU SUPPLY AND RETURN AIR DUCTWORK INCLUDING SMOKE EVACUATION EXHAUST DUCTWORK, PAINT BOOTH, AND WELDING EXHAUST DUCTWORK SHALL BE CONSTRUCTED PER SMACNA 4" CLASS, SEALED PER CLASS AND LEAKAGE CLASS 3. ALL OTHER DUCTWORK INCLUDING GENERAL EXHAUST, OUTSIDE AIR, KITCHEN SUPPLY/EXHAUST, KILN & FUME HOOD EXHAUST DUCTWORK SHALL BE CONSTRUCTED PER SMACNA 3" CLASS, SEALED PER CLASS A AND LEAKAGE CLASS 3.

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, SMOKE, AND CONTROL DAMPERS LOCATED IN DUCTWORK RUNS.

13 H.V.A.C. CONTRACTOR SHALL COORDINATE ALL WORK WITH PLUMBING, ELECTRICAL, FIRE PROTECTION, AND GENERAL 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 INSTALLED BY THIS CONTRACTOR, FURNISH AND FIRE ALARM INTERLOCK BY ELECTRICAL CONTRACTOR. ATC CONTRACTOR TO PROVIDE BMS INTERLOCK TO SHUT 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 THE 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 ALL DUCTWORK FROM FUME HOOD TO EXHAUST SHALL BE STAINLESS STEEL. FUME HOOD EXHAUST FANS SHALL BE REINFORCED WITH GUY WIRES AS NECESSARY.

23 ALL DUCTWORK BETWEEN WELDING HOOD/PAINT BOOTH AND ASSOCIATED EXHAUST FAN SHALL BE STAINLESS STEEL.

24 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.

25 ALL FLAT OVAL DUCTWORK SHALL BE DOUBLE WALL WITH 1" INTERNAL INSULATION. REFER TO SPECIFICATIONS.

26 DUCTWORK DIMENSIONS INDICATED ARE CLEAR INSIDE DIMENSIONS.

27 PROVIDE ISOLATION VALVES ON ALL BRANCH AND MAIN PIPING SUPPLY & RETURN LINES WHICH SERVE MORE THAN TWO PIECES OF TERMINAL HVAC EQUIPMENT.

28 CONDENSATE PIPING PENETRATING EXTERIOR WALLS TO BE FURNISHED WITH ESCUTCHEON

29 ALL KITCHEN EXHAUST DUCT SHALL BE 2-HOUR CONSTRUCTION STAINLESS STEEL OR EQUIVALENT PER NFPA 90 REQUIREMENTS.

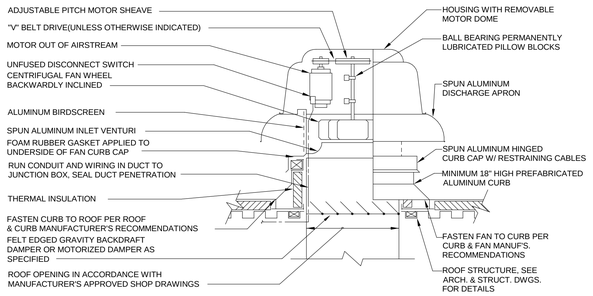
30 ALL SMOKE DAMPERS SHALL BE COMBINATION SMOKE/FIRE DAMPERS & SHALL BE FURNISHED & INSTALLED BY HVAC CONTRACTOR. FIRE ALARM INTERLOCK & POWER WIRING BY ELECTRICAL CONTRACTOR. AHU SHUT DOWN & BMS ALARM BY ATC CONTRACTOR.

31 ALL LOCKER ROOM DUCTWORK SHALL BE ALUMINUM.

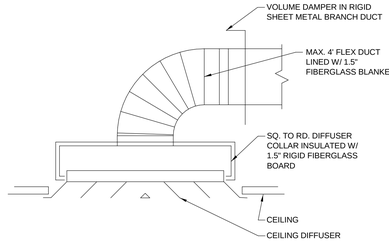
32 ALL DRYER DUCTWORK TO BE FRICTION FIT W/ TAPED JOINTS. NO MECHANICAL FASTENERS. PROVIDE NECESSARY FITTINGS & DUCTWORK FROM DRYER TO OUTSIDE WALL CAP.

33 ALL DOUBLE WALL DUCTWORK INDICATED ON DRAWINGS SHALL BE 16-GA. OUTER WALL. PERFORATED INNER WALL, W/ 1-1/2" INTERNAL ACOUSTIC LINER.

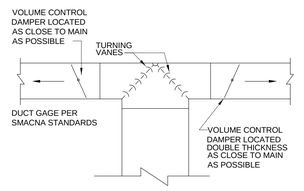
34 ALL AIR HANDLING UNITS >2000 CFM SHALL HAVE A DUCT MOUNTED SMOKE DETECTOR INSTALLED IN THE SUPPLY & RETURN AIRSTREAM.



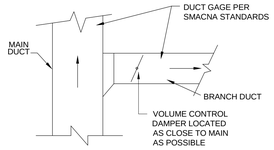
TYPICAL DETAIL-ROOF EXHAUST FAN
(NOT TO SCALE)



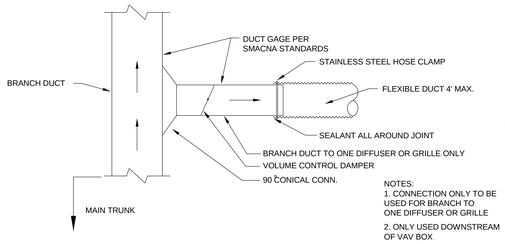
DIFFUSER/REGISTER DETAIL
NOT TO SCALE



TYPICAL TEE DUCT CONNECTION
(NOT TO SCALE)

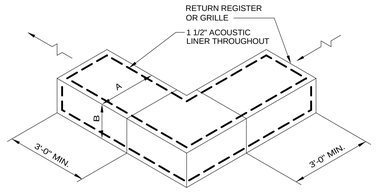


BRANCH DUCT CONNECTION TO MAIN
(NOT TO SCALE)



NOTES:
1. CONNECTION ONLY TO BE USED FOR BRANCH TO ONE DIFFUSER OR GRILLE
2. ONLY USED DOWNSTREAM OF VAV BOX

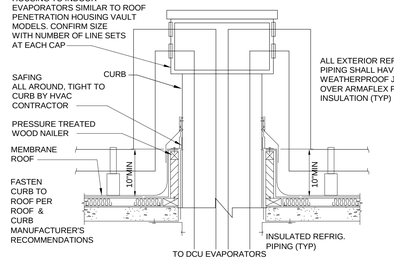
DIFFUSER/GRILLE CONNECTION TO BRANCH
(NOT TO SCALE)



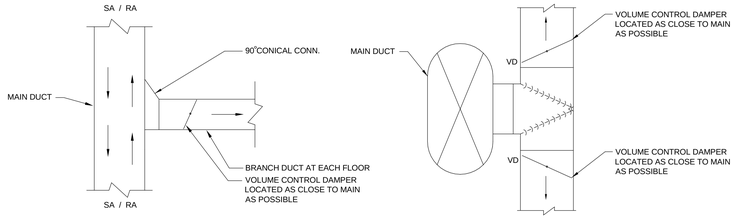
MAXIMUM CFM	DUCT SIZE (*) A	B
250	14	6
500	14	10
750	20	10
1000	26	10

* - DUCT SIZES ARE INSIDE CLEAR DIMENSIONS.

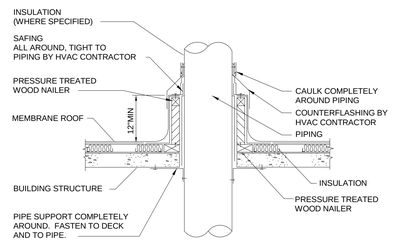
TYPICAL RETURN/TRANSFER DETAIL
(NOT TO SCALE)



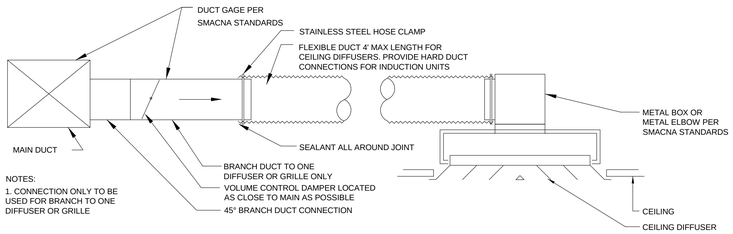
REFRIGERANT PIPE ROOF PENETRATION HOUSING
(NOT TO SCALE)



FLOOR RISER VOLUME CONTROL DAMPER DETAIL
(NOT TO SCALE)

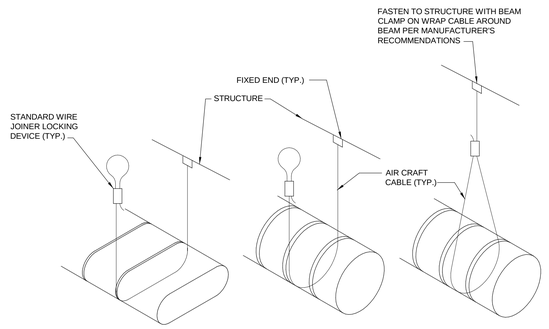


DUCT PENETRATION THROUGH ROOF DETAIL
(NOT TO SCALE)



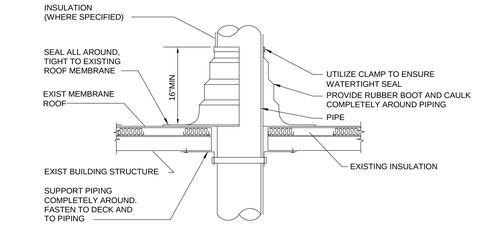
NOTES:
1. CONNECTION ONLY TO BE USED FOR BRANCH TO ONE DIFFUSER OR GRILLE

DIFFUSER/GRILLE CONNECTION TO BRANCH
(NOT TO SCALE)

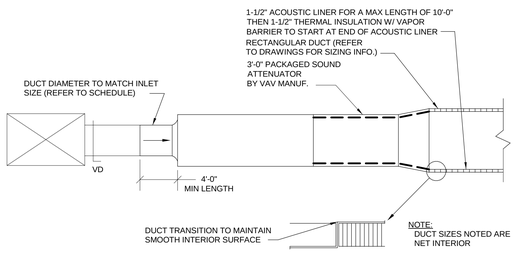


NOTES:.
1. THIS DETAIL APPLIES TO ALL DUCTWORK IN EXPOSED LOCATIONS INCLUDING AREAS WITH PERFORATED METAL CEILING
2. INSTALL PER MANUFACTURER'S REQUIREMENTS.
3. PROVIDE HANGER SPACING PER MANUFACTURER'S WEIGHT LOADING ALLOWABLE CAPACITY.

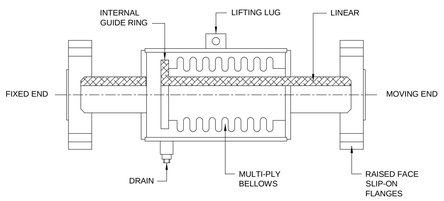
TYPICAL EXPOSED DUCTWORK HANGING DETAIL
(NOT TO SCALE)



PIPE PENETRATION THROUGH ROOF DETAIL
(NOT TO SCALE)



TYPICAL VARIABLE AIR VOLUME DUCT DETAIL
(NOT TO SCALE)



EXTERNALLY-PRESSURIZED INLINE EXPANSION JOINT DETAIL
(NOT TO SCALE)

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

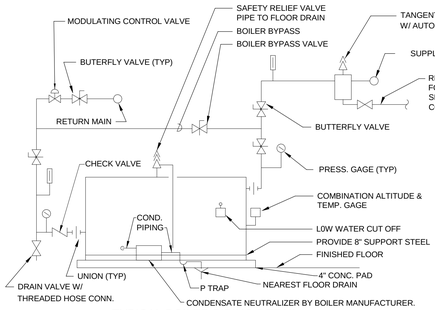
REVISIONS

No.	Date	Description

DRAWING NAME
DETAILS I - HVAC

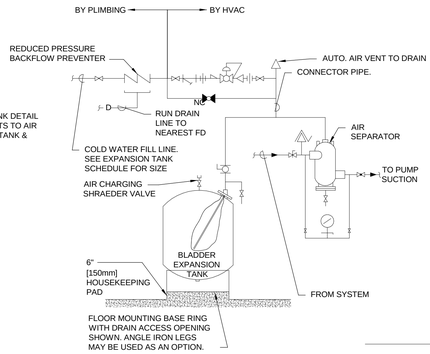
PROJECT NO. 1722

DRAWING NO.
M303

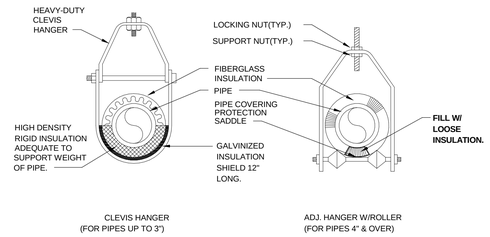


TYPICAL BOILER PIPING DETAIL
NO SCALE

NOTE:
BOILER CONDENSATE PIPING
DIVISION 22 00 00



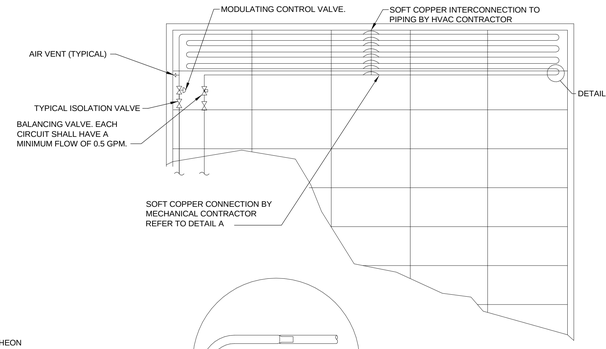
EXPANSION TANK DETAIL
NOT TO SCALE

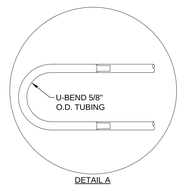


TYPICAL PIPE HANGER DETAIL

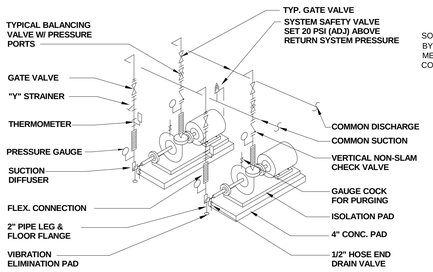
NOTE:
REFER TO SPECIFICATIONS FOR HANGER ROD SIZE & SPACING.

REFER TO SPEC SECTION 230548 FOR SEISMIC & VIBRATION ISOLATION REQUIREMENTS.

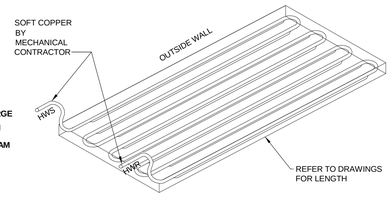




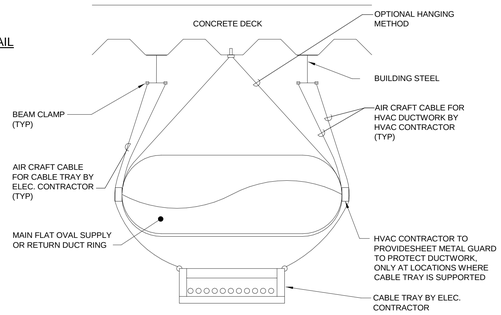
SINGLE CIRCUIT RADIANT HEATING PANEL PIPING DETAIL
(NOT TO SCALE)



TYPICAL PIPING DETAIL FOR ALL WATER PUMPS
NO SCALE

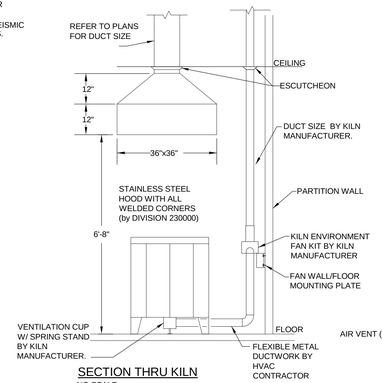


RADIANT HEATING PANEL & LIGHT SHELF PANEL SUPPLY, RETURN CONNECTION DETAIL
(NOT TO SCALE)

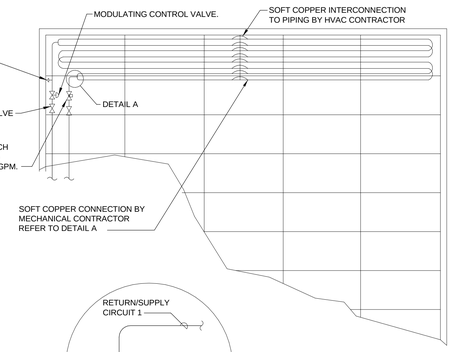


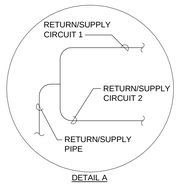
NOTE: COORDINATE DUCT INSTALLATION & AIR CRAFT CABLE INSTALLATION W/ ELECTRICAL CONTRACTOR & G.C. PRIOR TO DUCTWORK INSTALLATION, HVAC CONTRACTOR TO INSTALL DUCT AIR CRAFT CABLE & ELECTRICAL CONTRACTOR TO INSTALL CABLE TRAY AIR CRAFT CABLE.

CABLE TRAY SUPPORT DETAIL
(NOT TO SCALE)

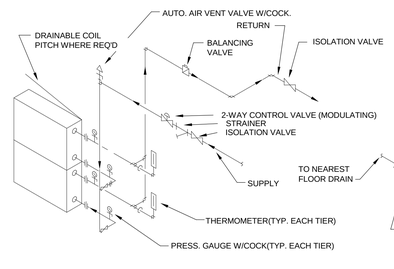


SECTION THRU KILN
NO SCALE

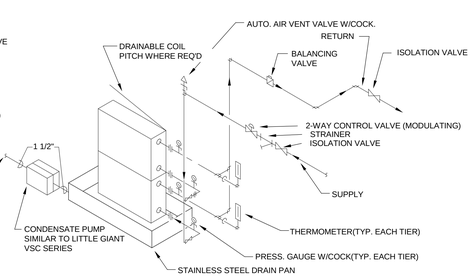




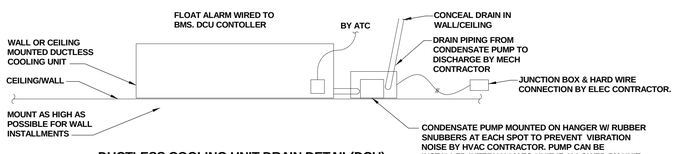
DOUBLE CIRCUIT RADIANT HEATING PANEL PIPING DETAIL
(NOT TO SCALE)



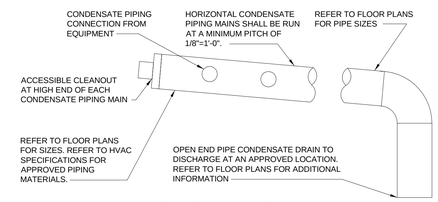
MULTI-TIER HOT WATER HEATING COIL PIPING W/2-WAY MODULATING CONTROL VALVE
(NOT TO SCALE)



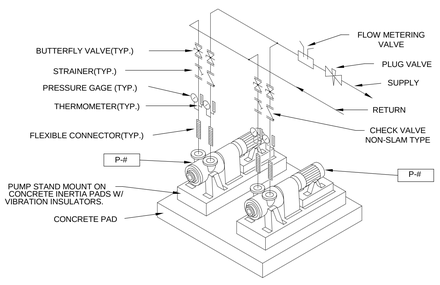
MULTI-TIER CHILLED WATER COIL PIPING W/2-WAY MODULATING CONTROL VALVE
(NOT TO SCALE)



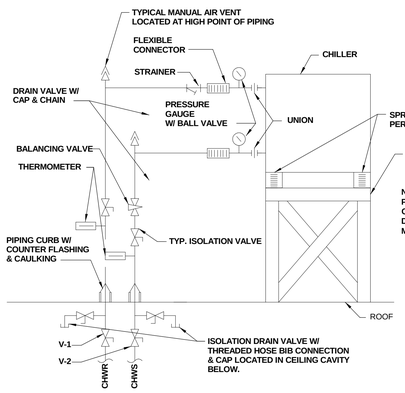
DUCTLESS COOLING UNIT DRAIN DETAIL(DCU) (NOT TO SCALE)



CONDENSATE PIPING DETAIL
NO SCALE



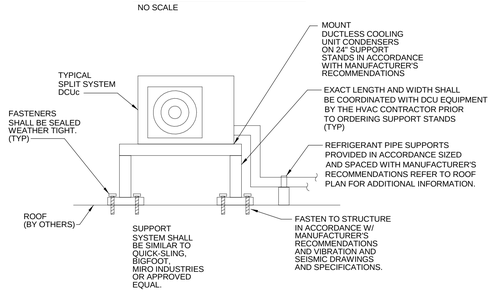
BASE MOUNTED PUMP PIPING DETAIL
(NOT TO SCALE)



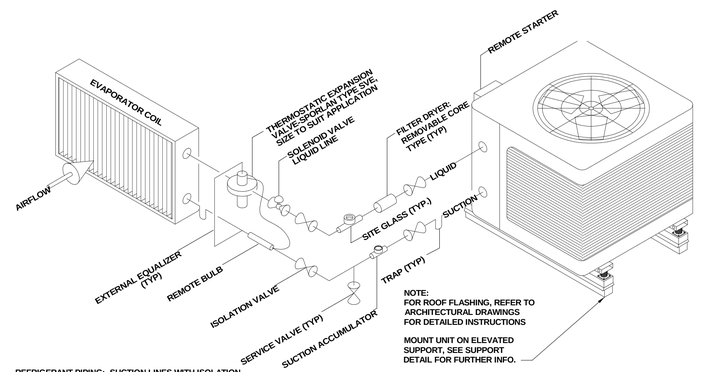
CHILLER PIPING DIAGRAM
(NOT TO SCALE)

NOTES:
PRIOR TO WINTER MONTHS, THE CHILLER SHALL BE SHUT DOWN & DRAINED BY THE FACILITIES MAINTENANCE STAFF.

1. **SHUT DOWN CHILLER THROUGH BMS & TURN OFF DISCONNECT SWITCH**
2. **CLOSE ISOLATION VALVES LABELED V-1 & V-2.**
3. **OPEN MANUAL AIR VENTS ON OUTDOOR PIPING.**
4. **UN-CAP THREADED HOSE BIB'S ON ISOLATION DRAIN VALVES & CONNECT HOSE. OTHER END OF HOSE CAN DRAIN INTO NEARBY SHOWER OR SINK DRAIN.**
5. **OPEN ISOLATION DRAIN VALVE. ONCE PIPING IS COMPLETELY DRAINED, CLOSE THE ISOLATION DRAIN VALVES & THE MANUAL AIR VENTS ON THE OUTDOOR PIPING.**
6. **PRIOR TO RESTARTING CHILLER, OPEN ISOLATION VALVES LABELED V-1 & V-2, TURN ON DISCONNECT SWITCH AND ENABLE CHILLER ON BMS SYSTEM**



OUTDOOR EQUIPMENT SUPPORT SYSTEM
(NOT TO SCALE)



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

MOUNT UNIT ON ELEVATED SUPPORT, SEE SUPPORT DETAIL FOR FURTHER INFO.

REFRIGERANT PIPING: 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.
COVER ALL REFRIGERANT PIPING WITH ULTRA VIOLET PROTECTED PVC COVERING (COLOR= GRAY)

DCU CONDENSOR UNIT & REFRIGERANT PIPING DIAGRAM
(NOT TO SCALE)

PIPING INDICATED IS FOR SINGLE CIRCUIT; CONTRACTOR SHALL PROVIDE ALL NECESSARY PIPING, FITTINGS, & VALVES FOR UNITS WITH MULTIPLE CIRCUITS AND HOT GAS BYPASS CIRCUIT. INSTALL ALL COMPONENTS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND GUIDELINE REQUIREMENTS. COORDINATE W/ MANUFACTURER PRIOR TO INSTALLATION TO DETERMINE PIPE SIZE, QUANTITY OF CIRCUITS & PIPING TO ENSURE A PROPER & FUNCTIONING SYSTEM IS PROVIDED.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

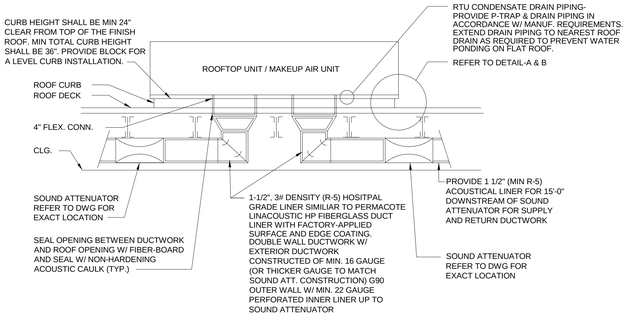
REVISIONS

No.	Date	Description

DRAWING NAME
DETAILS II - HVAC

PROJECT NO. 1722

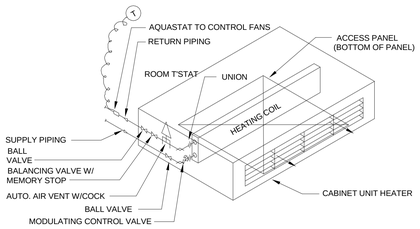
DRAWING NO.
M304



NOTE: THERMAL DUCT INSULATION TO START AT TERMINATION OF ACOUSTIC INSUL.

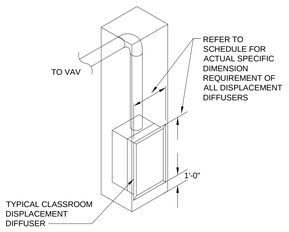
ROOFTOP UNIT / MAKEUP AIR UNIT DETAIL

(NOT TO SCALE)



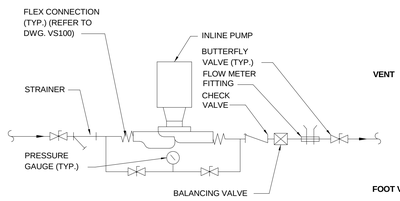
TYPICAL CABINET UNIT HEATER CEILING TYPE-PIPING DETAIL-HOT WATER

(NOT TO SCALE)



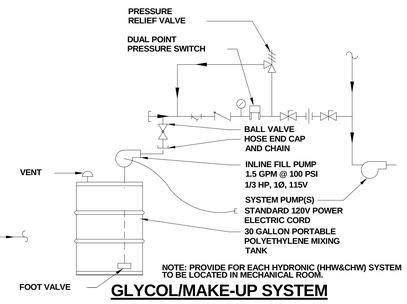
TYPICAL CLASSROOM DISPLACEMENT DIFFUSER DETAIL - TOP CONNECTION

(NOT TO SCALE)



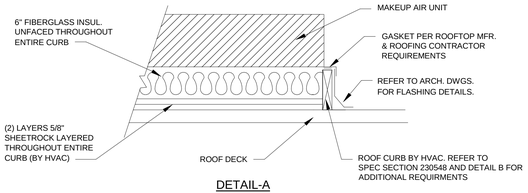
INLINE PUMP PIPING DETAIL

(NOT TO SCALE)

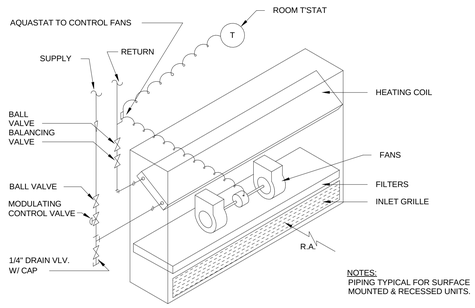


GLYCOL/MAKE-UP SYSTEM

(NOT TO SCALE)

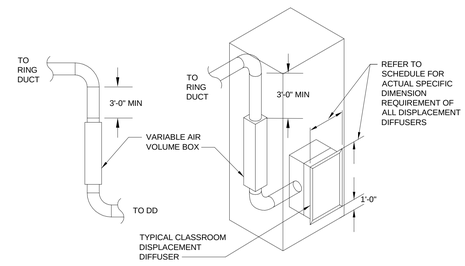


DETAIL-A



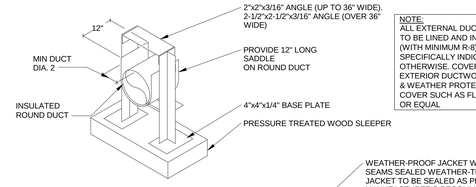
TYPICAL CABINET UNIT HEATER PIPING DETAIL

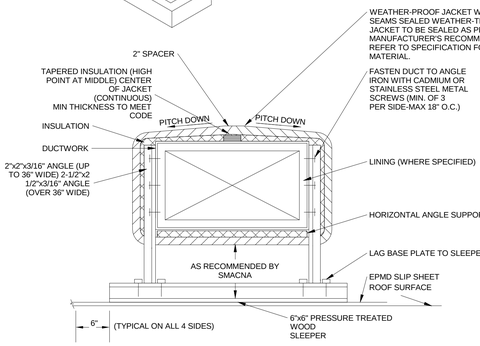
(NOT TO SCALE)



TYPICAL CLASSROOM DISPLACEMENT DIFFUSER DETAIL - SIDE CONNECTION

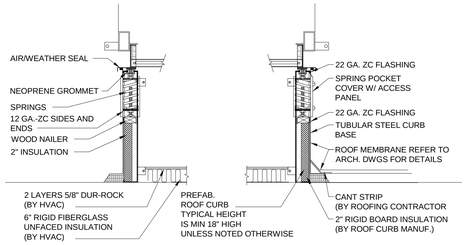
(NOT TO SCALE)



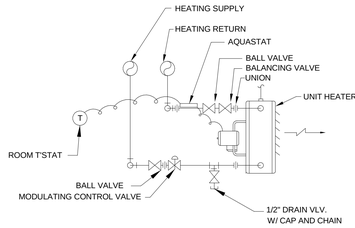


ROOF MOUNTED DUCTWORK SUPPORT

(NOT TO SCALE)

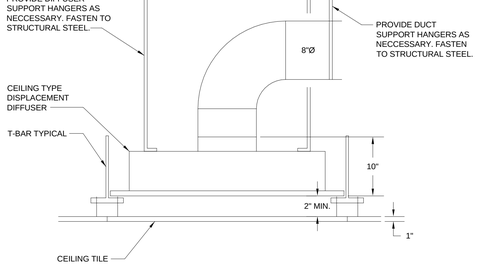


SEISMIC SPRING ROOF CURB DETAIL - DETAIL B



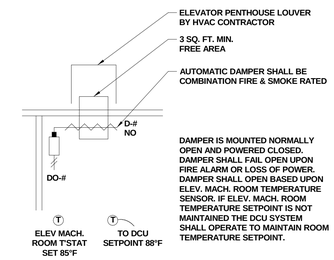
TYPICAL HORIZONTAL UNIT HEATER PIPING DETAIL-HEATING-HOT WATER

(NOT TO SCALE)



TYPICAL DISPLACMENT DIFFUSER IN T-BAR CEILING DETAIL (DD-6)

(NOT TO SCALE)



ELEVATOR HOISTWAY

(NOT TO SCALE)

NOTES:
1. FLOOR DRAIN BE ENCLOSURE MANUFACTURER. DRAIN PIPING BY DIVISION 220000.

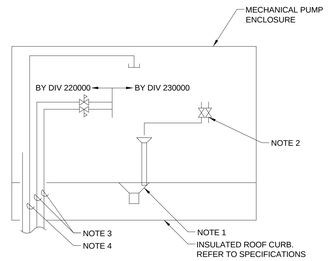
2. 2" DRAIN DOWN VALVES WITH VALVED AND CAPPED CONNECTION ROUTED HUB DRAIN. HUB DRAIN PROVIDED BY DIVISION 220000.

3. 1-1/4" CITY MAKE-UP WATER CONNECTION WITH RFBP BY DIVISION 220000. MAKE-UP WATER PIPING DOWNSTREAM OF RFBP BY DIVISION 230000. PIPING PENETRATION HOLE BY ENCLOSURE MANUFACTURER.

4. FIRE PROTECTION PIPING (1") PENETRATION HOLE BY ENCLOSURE MANUFACTURER.

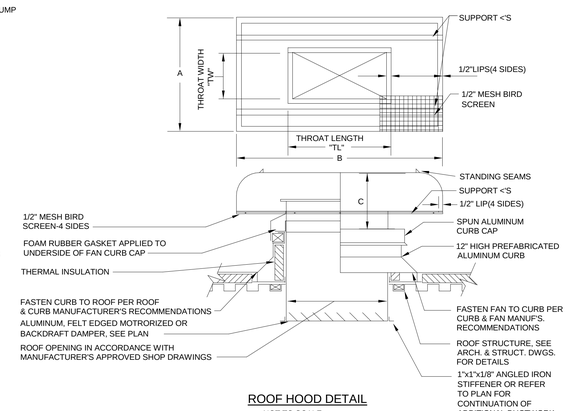
5. ENCLOSURE MANUFACTURER SHALL PROVIDE PENETRATION HOLES REQUIRED FOR ELECTRICAL POWER WIRING AND LIGHTING.

6. ALL PIPING AND WIRING CONDUIT PENETRATIONS SHALL BE FULLY WEATHER SEALED BY HVAC.



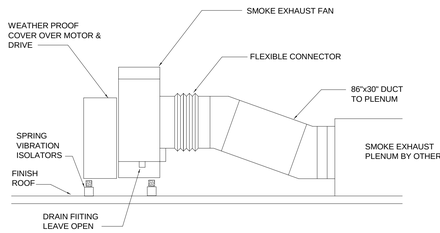
PUMP ENCLOSURE DETAIL

NOT TO SCALE



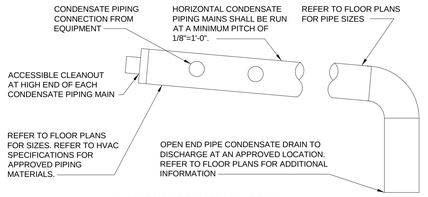
ROOF HOOD DETAIL

NOT TO SCALE



SMOKE EXHAUST FAN DETAIL

NOT TO SCALE



CONDENSATE PIPING DETAIL

NO SCALE

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

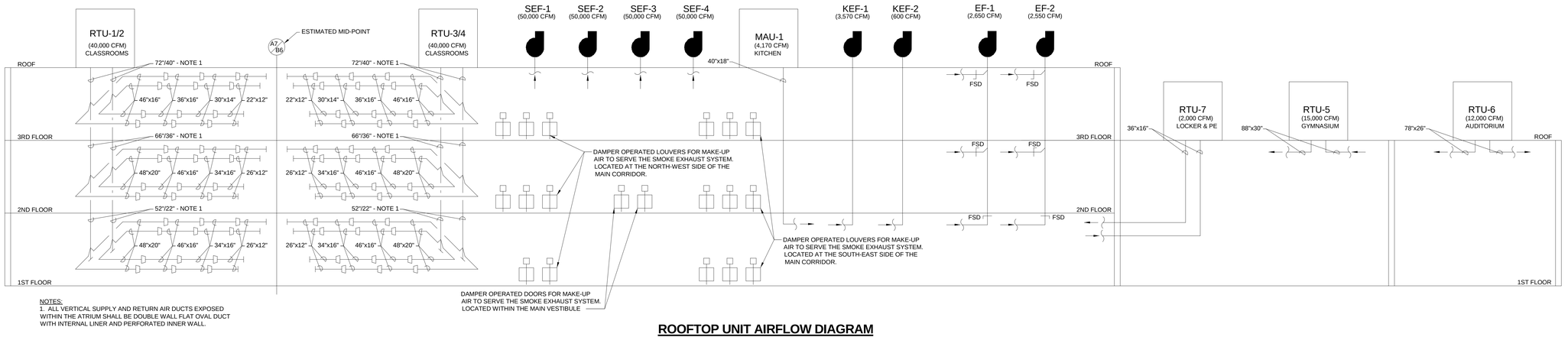
DRAWING NAME

DETAILS III - HVAC

PROJECT NO. 1722

DRAWING NO.

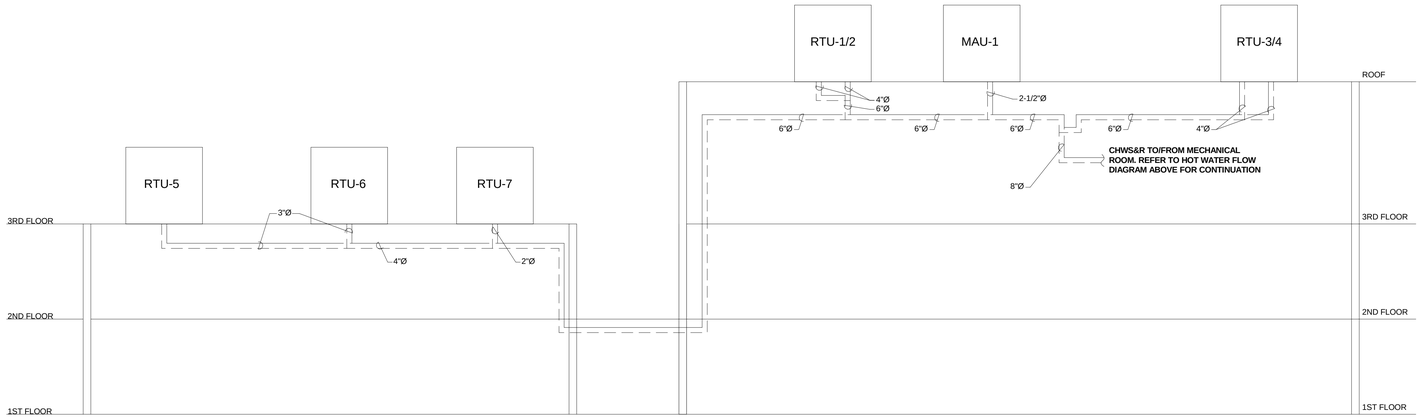
M305



NOTES:
1. ALL VERTICAL SUPPLY AND RETURN AIR DUCTS EXPOSED WITHIN THE ATRIUM SHALL BE DOUBLE WALL FLAT OVAL DUCT WITH INTERNAL LINER AND PERFORATED INNER WALL.

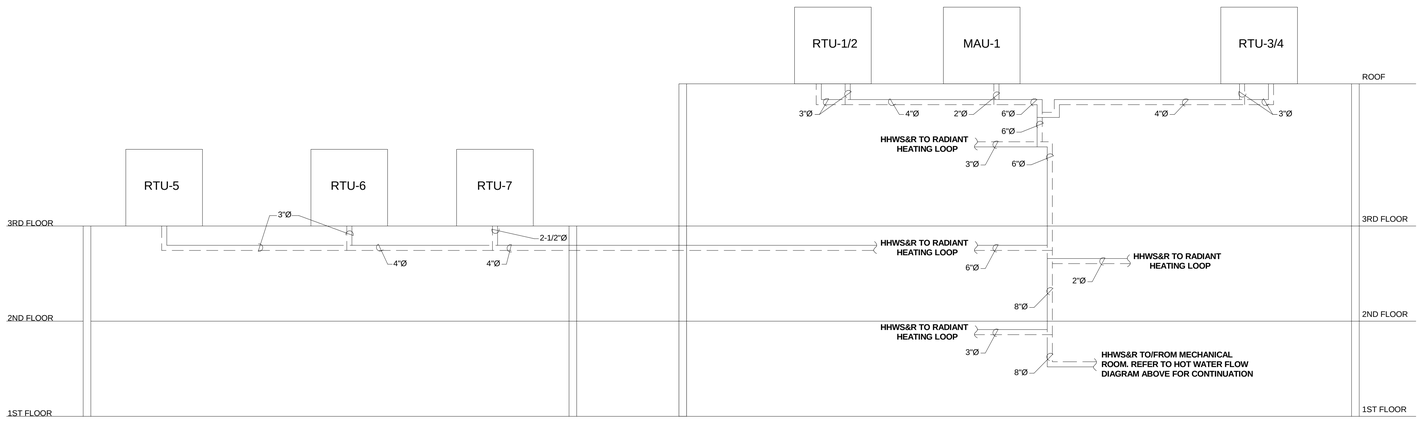
ROOFTOP UNIT AIRFLOW DIAGRAM

(NOT TO SCALE)



ROOFTOP UNIT CHILLED WATER FLOW DIAGRAM

(NOT TO SCALE)



ROOFTOP UNIT HOT WATER FLOW DIAGRAM

(NOT TO SCALE)

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

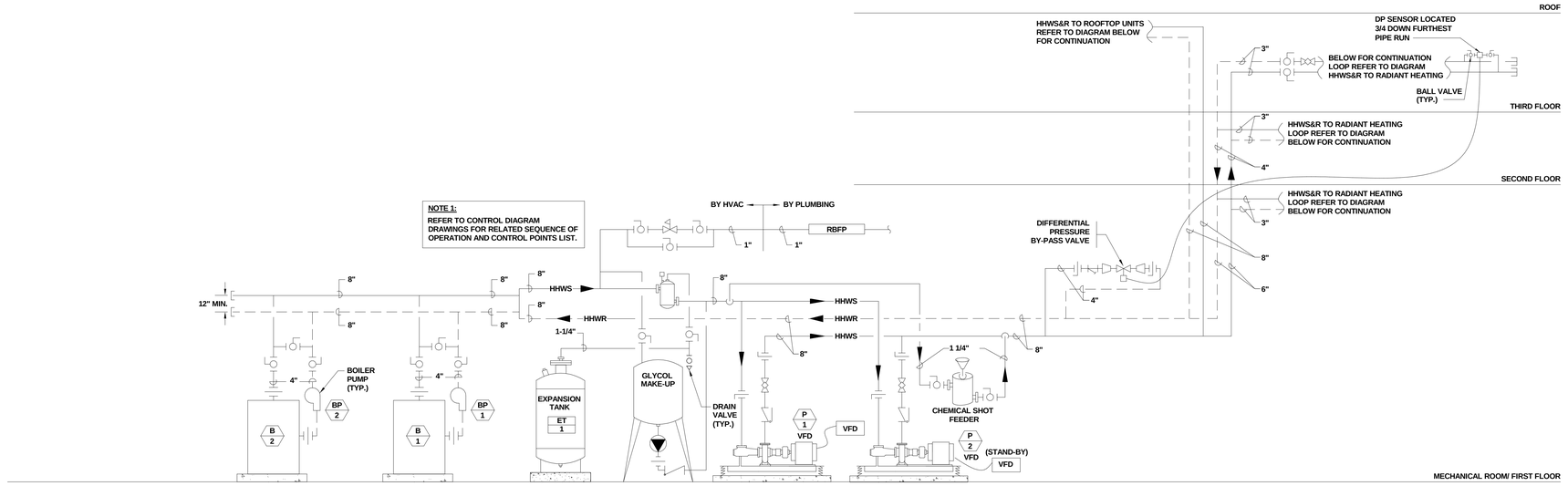
DRAWING NAME

RTU HYDRONIC & AIRFLOW DIAGRAMS - HVAC

PROJECT NO. 1722

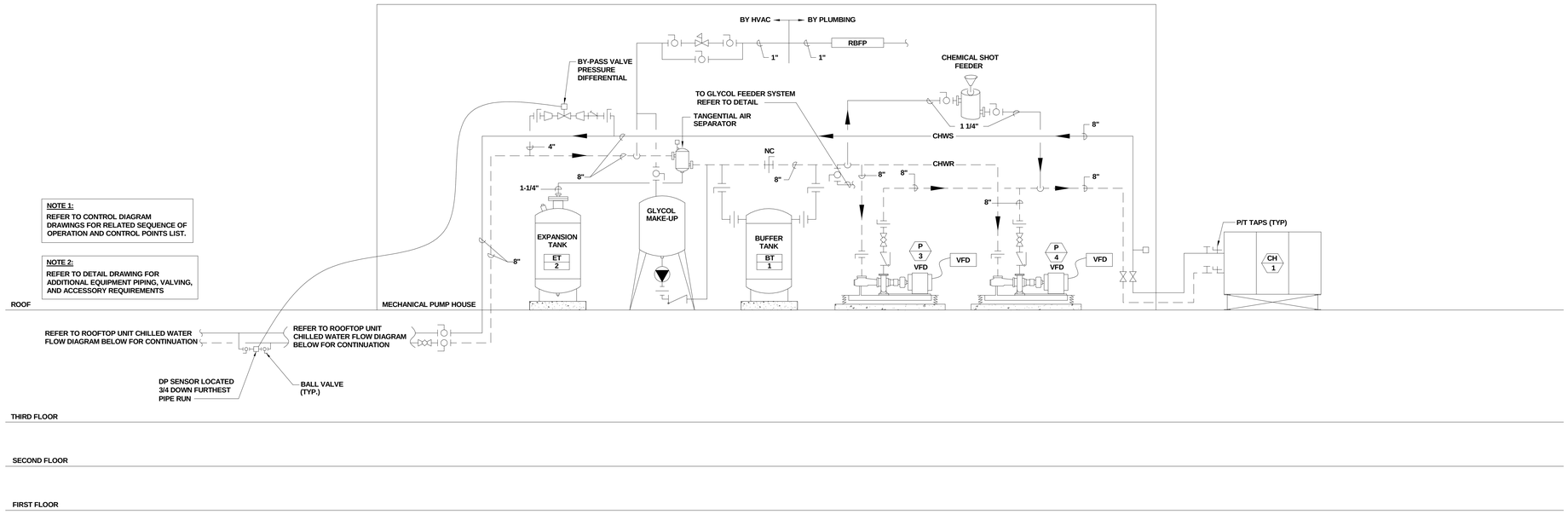
DRAWING NO.

M306



HOT WATER FLOW DIAGRAM

(NOT TO SCALE)



CHILLED WATER FLOW DIAGRAM

(NOT TO SCALE)

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

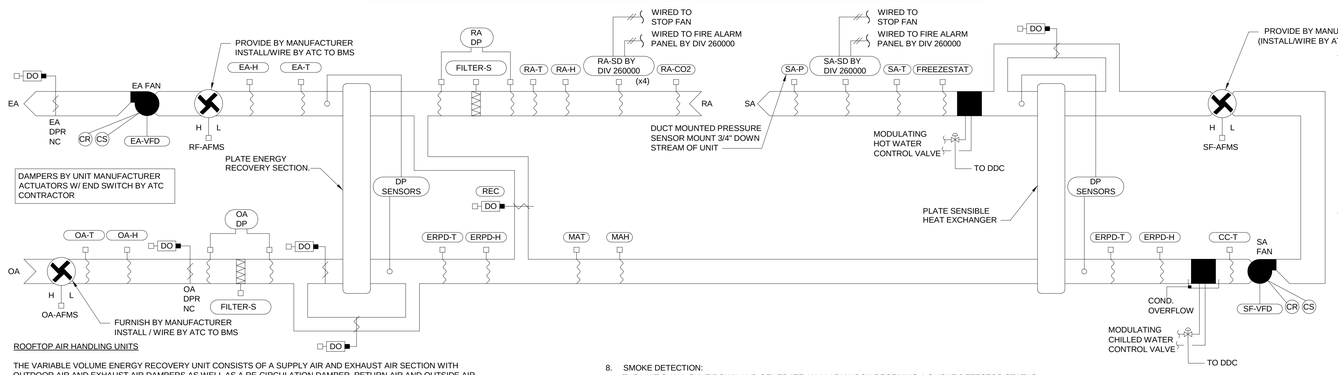
HHW & CHW FLOW DIAGRAM - HVAC

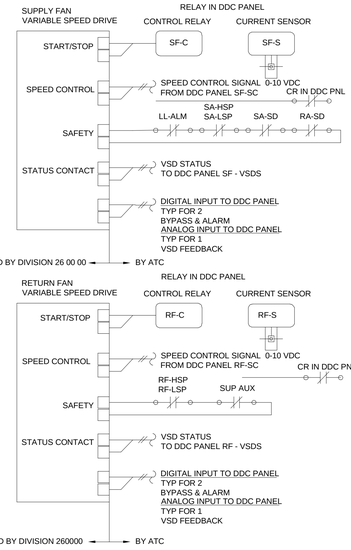
PROJECT NO. 1722

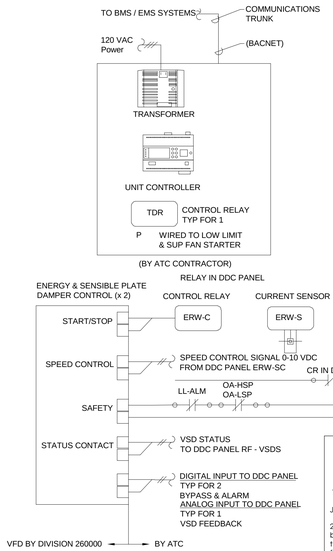
DRAWING NO.

M307

ROOFTOP AIR HANDLING UNIT - AC DISPLACEMENT VENTILATION SYSTEM (100% OUTSIDE AIR) - RTU-1-4







ROOFTOP AIR HANDLING UNITS

THE VARIABLE VOLUME ENERGY RECOVERY UNIT CONSISTS OF A SUPPLY AIR AND EXHAUST AIR SECTION WITH OUTDOOR AIR AND EXHAUST AIR DAMPERS AS WELL AS A RE-CIRCULATION DAMPER, RETURN AIR AND OUTSIDE AIR FILTERS, ONE TOTAL ENERGY PLATE HEAT EXCHANGER & ONE SENSIBLE ONLY PLATE HEAT EXCHANGER, HOT WATER HEATING COIL, CHILLED WATER COOLING COIL, SUPPLY FANS AND EXHAUST FANS. THE UNIT SHALL BE DDC CONTROLLED USING ELECTRIC ACTUATION.

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

RUN CONDITIONS - SCHEDULED:

1. WARM-UP:
   THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL CLOSE, THE CHILLED WATER CONTROL VALVES SHALL BE CLOSED, THE RE-CIR DAMPER SHALL OPEN, THE SUPPLY FAN SHALL START, THE EXHAUST FAN REMAINS OFF, AND THE HOT WATER CONTROL VALVE SHALL MODULATE TO 100% OPEN TO PROVIDE A RAPID RISE IN THE AVERAGE SPACE TEMPERATURE. ALL VAV BOXES WILL GO TO 100% OPEN. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE WARM-UP MODE MORE THAN ONCE PER DAY. THE RADIANT PANELS AND UNIT HEATERS WILL BE THE FIRST STAGE OF WARM-UP. IF THE RADIATION AND UNIT HEATERS ARE NOT MEETING THE SPACE SET POINTS TEMPERATURE AS THE OCCUPIED PERIOD APPROACHES THEN THE AIR HANDLING UNIT WILL RUN TO MEET THE OCCUPIED SETPOINT. THE BMS SHALL MONITOR THE RATE OF TEMPERATURE RISE TO DETERMINE WHEN TO USE THE AIR HANDLING UNIT FOR WARM-UP THROUGH THE OPTIMIZED START PROGRAM WITHIN THE DDC SYSTEM.
2. OCCUPIED:
   THE FANS START OR CONTINUE TO RUN AND THE UNIT IS CONTROLLED AS FOLLOWS: THE SUPPLY AND EXHAUST FAN SHALL RUN AND ADJUST ITS SPEED BASED ON THE DUCT MOUNTED PRESSURE SENSOR WHICH WILL FLUCTUATE BASED ON VAV DAMPER POSITIONS.THE TAB CONTRACTOR SHALL DETERMINE THE EXACT SYSTEM PRESSURE & UTILIZE THIS VALUE AS THE SYSTEM SETPOINT. THE OUTSIDE AIR DAMPER SHALL OPEN TO ITS MAX POSITION AS INDICATED IN THE AHU SCHEDULE. 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 DAMPERS WILL MODULATE IN SEQUENCE WITHOUT OVERLAP AS THE ASSOCIATED SYSTEM VAV BOXES MODULATE TO MAINTAIN SPACE CO_2 LEVELS & SPACE TEMPERATURE. IF ALL SPACE CO_2 LEVELS ARE BELOW 800 PPM THE OUTSIDE AIR DAMPER SHALL GO TO ITS MINIMUM POSITION WHICH SHALL BE 20% OF THE SCHEDULED CFM. THE OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN 800 PPM THRESHOLD AT THE SPACE CO $_2$. PROGRAMMING SHALL BE PROVIDED TO ALLOW THE MODULATION OF THE SUPPLY & EXHAUST FANS TO MAINTAIN THE SYSTEM STATIC PRESSURE. THE ENERGY RECOVERY SECTION WILL PRE-HEAT OR PRE-COOL THE INCOMING OUTSIDE AIR DEPENDING ON THE SEASON. THE CHILLED WATER COIL CONTROL VALVE SHALL MODULATE TO DEHUMIDIFY THE INCOMING AIR. THE SENSIBLE ENERGY SECTION SHALL MODULATE TO REHEAT THE SUB COOLED SUPPLY AIR FROM THE CHILLED WATER COIL TO 63°F (ADJ SUMMER). DURING THE WINTER WHEN THE OUTDOOR AIR IS BELOW 60°F (ADJ) THE HOT WATER COIL SHALL MODULATE AS REQUIRED TO PROVIDE HEAT TO THE SUPPLY AIR TO MAINTAIN THE DISCHARGE AIR TEMPERATURE OF 68°F (ADJ WINTER).
3. UNOCCUPIED:
   UNDER THIS MODE ALL UNITS SHALL BE OFF & DAMPERS CLOSED. ALL HEATING HOT WATER EQUIPMENT & COMPONENTS THROUGHOUT THE BUILDING SHALL MODULATE AS REQUIRED TO MAINTAIN THE BUILDING'S UNOCCUPIED SETPOINT OF 60° (ADJ) IN THE WINTER. IN THE EVENT THAT THE HEATING HOT WATER EQUIPMENT CAN NOT MAINTAIN THE BUILDING AVERAGE UNOCCUPIED SETPOINT, THE AHU(S) SHALL BE ACTIVATED & FUNCTION AS INDICATED IN THE WARM UP MODE W/ THE EXCEPTION THAT THE FAN SPEEDS WOULD BE REDUCED TO 60% OF THEIR TOTAL CAPACITY. DURING THE SUMMER MONTHS WHEN OAT IS ABOVE 80° (ADJ) AND/OR RH IS ABOVE 70% (ADJ) & THE BUILDING'S AVERAGE UNOCCUPIED SETPOINTS OF 80° (ADJ) ARE NOT MAINTAINING, THEN THE UNIT WILL BE ACTIVATED & FUNCTION AS INDICATED IN THE COOLDOWN MODE W/ THE EXCEPTION THAT THE FAN SPEEDS WOULD BE REDUCED TO 60% OF THEIR TOTAL CAPACITY.
4. COOLDOWN:
   THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL CLOSE, THE HOT WATER COIL CONTROL VALVE SHALL BE CLOSED, THE ENTHALPY AND SENSIBLE SECTION DAMPERS SHALL BE CLOSED, THE RE-CIR DAMPER SHALL OPEN, VAV BOXES SHALL OPEN TO MAX POSITION, THE SUPPLY FAN SHALL START, AND CHILLED WATER COOLING COIL SHALL MODULATE TO MAINTAIN DISCHARGE SETPOINT OF 55°F (ADJ). MORNING COOLDOWN SHALL OCCUR (1 HR. ADJ.) PRIOR TO UNIT SCHEDULED OCCUPIED START TIME (TIME PERIOD SHALL BE ADJUSTED THRU THE DDC OPTIMIZED START LOGIC UTILIZING UNIT TREND DATA). ECONOMIZER MODE OF OPERATION SHALL OVERRIDE NORMAL COOLDOWN MODE OF OPERATION. OPTIMIZE START LOGIC SHALL ALLOW 55°F SUPPLY AIR TEMPERATURE TO BE UTILIZED TO MINIMIZE THE COOLDOWN PERIOD.
5. ECONOMIZER (DUAL ENTHALPY CONTROL):
   THE CONTROLLER SHALL MEASURE THE RETURN AIR AND OUTSIDE AIR ENTHALPY TEMPERATURES AND MODULATE THE OUTSIDE AIR DAMPER, RETURN AIR DAMPER, AND DAMPERS OF THE ENERGY AND SENSIBLE REHEAT PLATE HEAT EXCHANGER TO MAINTAIN A SETPOINT 2°F LESS THAN THE COOLING SUPPLY AIR TEMPERATURE SETPOINT. THE ECONOMIZER SHALL BE ENABLED WHENEVER:
   - OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
   - AND THE OUTSIDE AIR ENTHALPY IS LESS THAN 22 BTU/LB (ADJ).
   - AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE.
   - AND THE OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY.
   - AND THE SUPPLY FAN STATUS IS ON.
   - AND THE CHILLED WATER SUPPLY IS ABOVE 70°F (ADJ.).

   THE ECONOMIZER SHALL BE DISABLED WHENEVER:
   - OUTSIDE AIR TEMPERATURE DROPS BELOW 48°F (ADJ.).
   - OR ON LOSS OF SUPPLY FAN STATUS.
   - OR THE FREEZESTAT IS ON.
6. EMERGENCY SHUTDOWN:
   THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING AN EMERGENCY SHUTDOWN SIGNAL.
7. LOW LEAVING TEMPERATURE:
   UPON A LOW LEAVING TEMPERATURE CONDITION (38°F ADJ) SENSED BY THE FREEZESTAT, THE OUTSIDE AIR AND EXHAUST AIR DAMPER SHALL CLOSE, THE SUPPLY AND EXHAUST AIR FANS SHALL SHUT DOWN THE HOT WATER CONTROL VALVE SHALL GO TO 100% FULL OPEN AND AN ALARM SHALL BE GENERATED.
8. SMOKE DETECTION:
   THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SMOKE DETECTOR STATUS.

SUPPLY FAN:
THE SUPPLY FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME, UNLESS SHUT DOWN ON SAFETIES. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF OR VICE VERSA.
- SUPPLY FAN VFD: IN FAULT.

EXHAUST FAN:
THE EXHAUST FAN SHALL RUN WHENEVER THE TOTAL ENERGY HEAT EXCHANGER DAMPER IS OPEN OR THE UNIT IS IN ECONOMIZER, UNLESS SHUT DOWN 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 SENSORS SHALL BE INSTALLED IN THE SUPPLY AND EXHAUST FANS. THE DDC SYSTEM USES THESE SENSORS 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.

SUPPLY AIR TEMPERATURE SETPOINT - FIXED:
THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE AND SHALL MAINTAIN A FIXED SUPPLY AIR TEMPERATURE SETPOINT OF 63°F IN THE SUMMER (OAT IS ABOVE 60°F ADJ.) & 68°F IN THE WINTER (OAT IS BELOW 60°F ADJ.).

CHILLED WATER COOLING:
THE CONTROLLER SHALL MEASURE THE SUPPLY AIR TEMPERATURE AND SHALL MODULATE THE CHILLED WATER CONTROL VALVE TO MAINTAIN THE REQUIRED COOLING COIL DAT OF 52°F (ADJ.). THE COOLING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS GREATER THAN 60°F (ADJ.).
- AND THE SUPPLY AIR TEMPERATURE IS ABOVE COOLING SETPOINT.
- AND THE FAN STATUS IS ON.
- SPACE TEMPERATURE CALLS FOR COOLING

HOT WATER HEATING:
THE CONTROLLER SHALL MEASURE THE SUPPLY AIR TEMPERATURE AND MODULATE THE HOT WATER HEATING CONTROL VALVE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SET POINT OF 68°F (ADJ). THE HEATING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 60°F (ADJ.).
- AND THE SUPPLY AIR TEMPERATURE IS BELOW HEATING SETPOINT.
- AND THE FAN STATUS IS ON.

THE HEATING SHALL NORMALLY BE DISABLED WHENEVER COOLING SYSTEM IS ENERGIZED AND SENSIBLE RECOVERY HEAT EXCHANGER REHEATING IS UTILIZED TO PROVIDE RE-HEAT.

PREFILTER 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.).

FINAL 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.).

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

ENERGY AND SENSIBLE HEAT PLATE EXCHANGER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE ENERGY AND SENSIBLE PLATE HEAT EXHANGER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HEAT EXCHANGER CLEANING REQUIRED: FINAL HEAT EXCHANGER 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.).

CARBON DIOXIDE (CO_2) LEVELS:
IF THE SPACE CO_2 LEVELS VARY BY 10% OR MORE FROM THE DESIGN VALUE OF 800 PPM, AN ALARM SHALL GENERATE AT THE BMS TO ALERT THE BUILDING OPERATOR.

ABBREVIATIONS

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

ATC/BMS GENERAL NOTES: THE FOLLOWING NOTES APPLY TO ALL M5 SERIES HVAC CONTROL DRAWINGS

1. ALL SETPOINTS INDICATED IN THE SEQUENCE OF OPERATIONS SHALL BE ADJUSTABLE.
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 PROVIDDED BY THE ATC CONTRACTOR UNLESS NOTED OTHERWISE.
4. ALL ATC CONTROLS SHALL BE POWERED BY EMERGENCY POWER CIRCUITS COORD W/ DIV 260000
5. ALL HW VALVES SHALL BE FAIL OPEN ON LOSS OF POWER ALL CHILLED WATER VALVES SHALL FAIL CLOSE ON LOSS OF POWER.
6. ALL HW & CHILLED WATER VALVES SHALL BE MODULATING TYPE FOR GPM %%U>%%U 1 GPM, 2-POSITION ACCEPTABLE FOR FLOW < 1GPM
7. ATC CONTRACTOR TO COORDINATE W/ OWNER FOR ALL COMMUNICATION & INTERFACE REQUIREMENTS TO CENTRAL OPERATING STATION. REFER TO SPEC FOR FURTHER INFO.

RTU-1 - 4	HARDWARE POINTS				SOFTWARE POINTS							
POINT NAME	AI	AO	DI	DO	AV	BV	LOOP	SCHED	TREND	ALARM	SHOW ON GRAPHIC	REMARKS
OUTSIDE AIR FLOW MEASURING STATION	X								X		X	
SUPPLY AIR FLOW MEASURING STATION	X								X		X	
EXHAUST AIR FLOW MEASURING STATION	X								X		X	
OUTSIDE AIR TEMP	X								X		X	FROM WEATHER STATION
OUTSIDE AIR HUMIDITY	X								X		X	FROM WEATHER STATION
EXHAUST AIR TEMP	X								X		X	
EXHAUST AIR HUMIDITY	X								X		X	
STATIC PLATE HEAT EXCHANGER DISCHARGE AIR TEMP	X								X		X	
STATIC PLATE HEAT EXCHANGER DISCHARGE AIR HUMIDITY	X								X		X	
MIXED AIR TEMP	X								X		X	
COOLING COIL AIR TEMP	X	X							X		X	
HEATING COIL AIR TEMP	X	X							X		X	
SUPPLY AIR TEMP	X	X							X		X	
SUPPLY AIR HUMIDITY	X	X							X		X	
OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE	X								X		X	
RETURN AIR FILTER DIFFERENTIAL PRESSURE	X								X		X	
RETURN AIR HUMIDITY	X								X		X	
RETURN AIR TEMP	X								X		X	
ENERGY RECOVERY SECTION DAMPER	X	X							X		X	
SUPPLY FAN VFD SPEED	X	X							X		X	
EXHAUST FAN VFD SPEED	X	X							X		X	
CHILLED WATER CONTROL VALVE		X							X		X	
HOT WATER CONTROL VAVLE		X							X		X	
RE-CIRC AIR DAMPER	X	X							X		X	W/ END SWITCH
OUTSIDE AIR DAMPER	X	X							X		X	W/ END SWITCH
EXHAUST AIR DAMPER	X	X							X		X	W/ END SWITCH
RETURN AIR SMOKE DETECTOR (x4)			X						X	X		
SUPPLY AIR SMOKE DETECTOR			X						X	X		
SUPPLY FAN STATUS			X						X		X	
EXHAUST FAN STATUS			X						X		X	
SUPPLY FAN START/STOP				X					X		X	
EXHAUST FAN START/STOP				X					X		X	
COOLING SUPPLY AIR SET POINT					X				X		X	
HEATING SUPPLY AIR SET POINT					X				X		X	
EMERGENCY SHUT DOWN						X			X	X	X	
SCHEDULE								X				
SUPPLY FAN FAILURE										X		
SUPPLY FAN VFD FAILURE										X		
EXHAUST FAN FAILURE										X		
EXHAUST FAN VFD FAILURE										X		
ENERGY RECOVERY SECTION DIFFERENTIAL PRESSURE	X									X		
HIGH COOLING SUPPLY AIR TEMP										X		ABOVE 75°F
HIGH HEATING SUPPLY AIR TEMP										X		ABOVE 90°F
LOW HEATING SUPPLY AIR TEMP										X		ABOVE 60°F
OUTSIDE AIR FILTER CHANGE REQUIRED										X	X	
RETURN AIR FILTER CHANGE REQUIRED										X	X	
HIGH RETURN AIR HUMIDITY										X		ABOVE 80% R.H.
LOW RETURN AIR TEMP										X		BELOW 50°F
HIGH RETURN AIR TEMP										X		ABOVE 90°F
SUPPLY SMOKE DETECTOR										X		
RETURN SMOKE DETECTOR										X		
FREEZESTAT		X							X	X		W/ AUTOMATIC RESET
CONDENSATE PAN OVERFLOW		X							X	X		

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

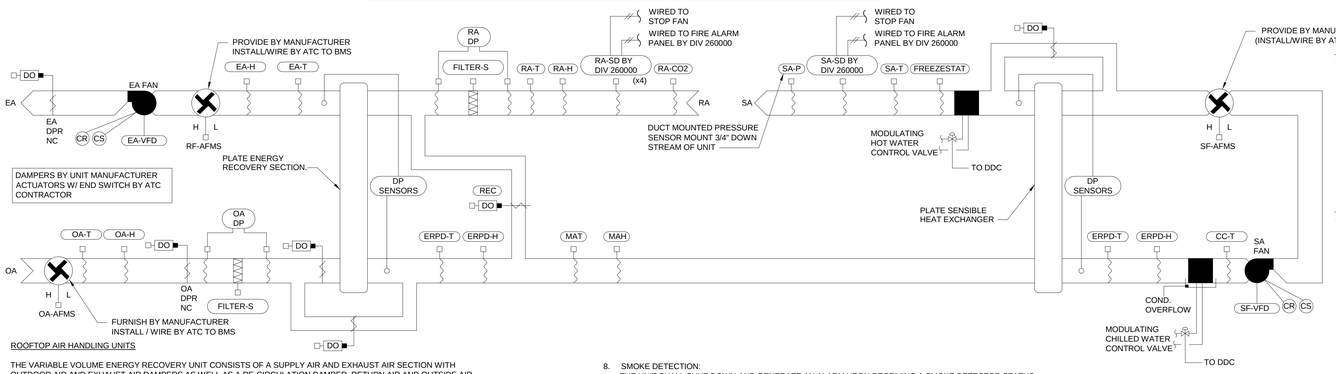
No.	Date	Description

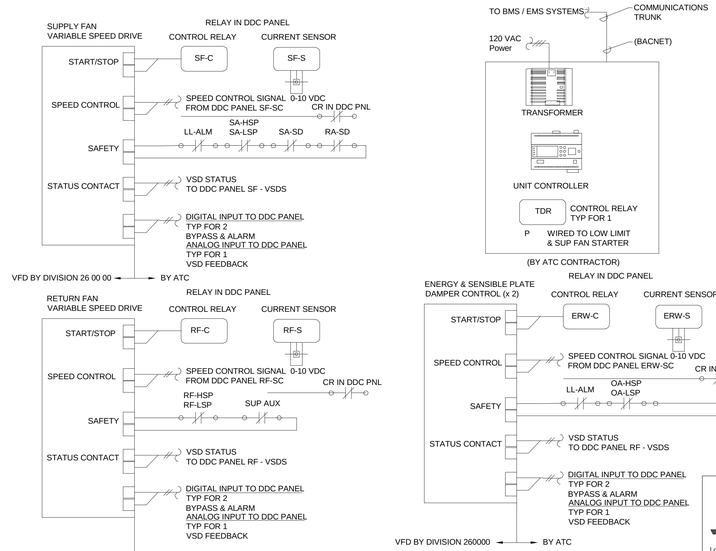
DRAWING NAME
CONTROLS I - HVAC

PROJECT NO. 1722

DRAWING NO.
M401

ROOFTOP AIR HANDLING UNIT - AC OVERHEAD VENTILATION SYSTEM (100% OA) - RTU-5





ROOFTOP AIR HANDLING UNITS

THE VARIABLE VOLUME ENERGY RECOVERY UNIT CONSISTS OF A SUPPLY AIR AND EXHAUST AIR SECTION WITH OUTDOOR AIR AND EXHAUST AIR DAMPERS AS WELL AS A RE-CIRCULATION DAMPER, RETURN AIR AND OUTSIDE AIR FILTERS, ONE TOTAL ENERGY PLATE HEAT EXCHANGER & ONE SENSIBLE ONLY PLATE HEAT EXCHANGER, HOT WATER HEATING COIL, CHILLED WATER COOLING COIL, SUPPLY FANS AND EXHAUST FANS. THE UNIT SHALL BE DDC CONTROLLED USING ELECTRIC ACTUATION.

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

RUN CONDITIONS - SCHEDULED:

1. WARM-UP:
   THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL CLOSE, THE CHILLED WATER CONTROL VALVES SHALL BE CLOSED, THE RE-CIR DAMPER SHALL OPEN, THE SUPPLY FAN SHALL START, THE EXHAUST FAN REMAINS OFF, AND THE HOT WATER CONTROL VALVE SHALL
   MODULATE TO 100% OPEN TO PROVIDE A RAPID RISE IN THE AVERAGE SPACE TEMPERATURE. ALL VAV BOXES WILL GO TO 100% OPEN. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE WARM-UP MODE MORE THAN ONCE PER DAY. THE RADIANT PANELS AND UNIT HEATERS WILL BE THE FIRST STAGE OF WARM-UP. IF THE RADIATION AND UNIT HEATERS ARE NOT MEETING THE SPACE SET POINTS TEMPERATURE AS THE OCCUPIED PERIOD APPROACHES THEN THE AIR HANDLING UNIT WILL RUN TO MEET THE OCCUPIED SETPOINT. THE BMS SHALL MONITOR THE RATE OF TEMPERATURE RISE TO DETERMINE WHEN TO USE THE AIR HANDLING UNIT FOR WARM-UP THROUGH THE OPTIMIZED START PROGRAM WITHIN THE DDC SYSTEM.
2. OCCUPIED:
   THE FANS START OR CONTINUE TO RUN AND THE UNIT IS CONTROLLED AS FOLLOWS:
   THE SUPPLY AND EXHAUST FAN SHALL RUN AND ADJUST ITS SPEED BASED ON THE DUCT MOUNTED PRESSURE SENSOR WHICH WILL FLUCTUATE BASED ON VAV DAMPER POSITIONS.THE TAB CONTRACTOR SHALL DETERMINE THE EXACT SYSTEM PRESSURE & UTILIZE THIS VALUE AS THE SYSTEM SETPOINT. THE OUTSIDE AIR DAMPER SHALL OPEN TO ITS MAX POSITION AS INDICATED IN THE AHU SCHEDULE. 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
   DAMPERS WILL MODULATE IN SEQUENCE WITHOUT OVERLAP AS THE ASSOCIATED SYSTEM VAV BOXES MODULATE TO MAINTAIN SPACE CO_2 LEVELS & SPACE TEMPERATURE. IF ALL SPACE CO_2 LEVELS ARE BELOW 800 PPM THE OUTSIDE AIR DAMPER SHALL GO TO ITS MINIMUM POSITION WHICH SHALL BE 20% OF THE SCHEDULED CFM. THE OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN 800 PPM THRESHOLD AT THE SPACE CO $_2$ PROGRAMMING SHALL BE PROVIDED TO ALLOW THE MODULATION OF THE SUPPLY & EXHAUST FANS TO MAINTAIN THE SYSTEM STATIC PRESSURE. THE ENERGY RECOVERY SECTION WILL PRE-HEAT OR PRE-COOL THE INCOMING OUTSIDE AIR DEPENDING ON THE SEASON. THE CHILLED WATER COIL CONTROL VALVE SHALL MODULATE TO DEHUMIDIFY THE INCOMING AIR. THE SENSIBLE ENERGY SECTION SHALL MODULATE TO REHEAT THE SUB COOLED SUPPLY AIR FROM THE CHILLED WATER COIL TO 63°F (ADJ SUMMER), DURING THE WINTER WHEN THE OUTDOOR AIR IS BELOW 60°F (ADJ) THE HOT WATER COIL SHALL MODULATE AS REQUIRED TO PROVIDE HEAT TO THE SUPPLY AIR TO MAINTAIN THE DISCHARGE AIR TEMPERATURE OF 68°F (ADJ WINTER).
3. UNOCCUPIED:
   UNDER THIS MODE ALL UNITS SHALL BE OFF & DAMPERS CLOSED. ALL HEATING HOT WATER EQUIPMENT & COMPONENTS THROUGHOUT THE BUILDING SHALL MODULATE AS REQUIRED TO MAINTAIN THE BUILDING'S UNOCCUPIED SETPOINT OF 60° (ADJ) IN THE WINTER. IN THE EVENT THAT THE HEATING HOT WATER EQUIPMENT CAN NOT MAINTAIN THE BUILDING AVERAGE UNOCCUPIED SETPOINT, THE AHU(S) SHALL BE ACTIVATED & FUNCTION AS INDICATED IN THE WARM UP MODE W/ THE EXCEPTION THAT THE FAN SPEEDS WOULD BE REDUCED TO 60% OF THEIR TOTAL CAPACITY. DURING THE SUMMER MONTHS WHEN OAT IS ABOVE 80° (ADJ) AND/OR RH IS ABOVE 70% (ADJ) & THE BUILDING'S AVERAGE UNOCCUPIED SETPOINTS OF 80° (ADJ) ARE NOT MAINTAINING, THEN THE UNIT WILL BE ACTIVATED & FUNCTION AS INDICATED IN THE COOLDOWN MODE W/ THE EXCEPTION THAT THE FAN SPEEDS WOULD BE REDUCED TO 60% OF THEIR TOTAL CAPACITY.
4. COOLDOWN:
   THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL CLOSE, THE HOT WATER COIL CONTROL VALVE SHALL BE CLOSED, THE ENTHALPY AND SENSIBLE SECTION DAMPERS SHALL BE CLOSED, THE RE-CIR DAMPER SHALL OPEN, VAV BOXES SHALL OPEN TO MAX POSITION, THE SUPPLY FAN SHALL START, AND CHILLED WATER COOLING COIL SHALL MODULATE TO MAINTAIN DISCHARGE SETPOINT OF 55°F (ADJ). MORNING COOLDOWN SHALL OCCUR (1 HR. ADJ.) PRIOR TO UNIT SCHEDULED OCCUPIED START TIME (TIME PERIOD SHALL BE ADJUSTED THRU THE DDC OPTIMIZED START LOGIC UTILIZING UNIT TREND DATA). ECONOMIZER MODE OF OPERATION SHALL OVERRIDE NORMAL COOLDOWN MODE OF OPERATION. OPTIMIZE START LOGIC SHALL ALLOW 55°F SUPPLY AIR TEMPERATURE TO BE UTILIZED TO MINIMIZE THE COOLDOWN PERIOD.
5. ECONOMIZER (DUAL ENTHALPY CONTROL):
   THE CONTROLLER SHALL MEASURE THE RETURN AIR AND OUTSIDE AIR ENTHALPY TEMPERATURES AND MODULATE THE OUTSIDE AIR DAMPER, RETURN AIR DAMPER, AND DAMPERS OF THE ENERGY AND SENSIBLE REHEAT PLATE HEAT EXCHANGER TO MAINTAIN A SETPOINT 2°F LESS THAN THE COOLING SUPPLY AIR TEMPERATURE SETPOINT. THE ECONOMIZER SHALL BE ENABLED WHENEVER:
   - OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
   - AND THE OUTSIDE AIR ENTHALPY IS LESS THAN 22 BTU/LB (ADJ).
   - AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE.
   - AND THE OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY.
   - AND THE SUPPLY FAN STATUS IS ON.

   THE ECONOMIZER SHALL BE DISABLED WHENEVER:
   - OUTSIDE AIR TEMPERATURE DROPS BELOW 48°F (ADJ.).
   - OR ON LOSS OF SUPPLY FAN STATUS.
   - OR THE FREEZESTAT IS ON.
6. EMERGENCY SHUTDOWN:
   THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING AN EMERGENCY SHUTDOWN SIGNAL.
7. LOW LEAVING TEMPERATURE:
   UPON A LOW LEAVING TEMPERATURE CONDITION (38°F ADJ) SENSED BY THE FREEZESTAT, THE OUTSIDE AIR AND EXHAUST AIR DAMPER SHALL CLOSE, THE SUPPLY AND EXHAUST AIR FANS SHALL SHUT DOWN THE HOT WATER CONTROL VALVE SHALL GO TO 100% FULL OPEN AND AN ALARM SHALL BE GENERATED.
8. SMOKE DETECTION:
   THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SMOKE DETECTOR STATUS.

SUPPLY FAN:
THE SUPPLY FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME, UNLESS SHUT DOWN ON SAFETIES.
ALARMS SHALL BE PROVIDED AS FOLLOWS:
- SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF OR VICE VERSA.
- SUPPLY FAN VFD: IN FAULT.

EXHAUST FAN:
THE EXHAUST FAN SHALL RUN WHENEVER THE TOTAL ENERGY HEAT EXCHANGER DAMPER IS OPEN OR THE UNIT IS IN ECONOMIZER, UNLESS SHUT DOWN 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 SENSORS SHALL BE INSTALLED IN THE SUPPLY AND EXHAUST FANS. THE DDC SYSTEM USES THESE SENSORS 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.

SUPPLY AIR TEMPERATURE SETPOINT - FIXED:
THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE AND SHALL MAINTAIN A FIXED SUPPLY AIR TEMPERATURE SETPOINT OF 63°F IN THE SUMMER (OAT IS ABOVE 60°F ADJ.) & 68°F IN THE WINTER (OAT IS BELOW 60°F ADJ.).

CHILLED WATER COOLING:
THE CONTROLLER SHALL MEASURE THE SUPPLY AIR TEMPERATURE AND SHALL MODULATE THE CHILLED WATER CONTROL VALVE TO MAINTAIN THE REQUIRED COOLING COIL DAT OF 52°F (ADJ.). THE COOLING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS GREATER THAN 60°F (ADJ.).
- AND THE SUPPLY AIR TEMPERATURE IS ABOVE COOLING SETPOINT.
- AND THE FAN STATUS IS ON.
- SPACE TEMPERATURE CALLS FOR COOLING

HOT WATER HEATING:
THE CONTROLLER SHALL MEASURE THE SUPPLY AIR TEMPERATURE AND MODULATE THE HOT WATER HEATING CONTROL VALVE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SET POINT OF 68°F (ADJ). THE HEATING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 60°F (ADJ.).
- AND THE SUPPLY AIR TEMPERATURE IS BELOW HEATING SETPOINT.
- AND THE FAN STATUS IS ON.

THE HEATING SHALL NORMALLY BE DISABLED WHENEVER COOLING SYSTEM IS ENERGIZED AND SENSIBLE RECOVERY HEAT EXCHANGER REHEATING IS UTILIZED TO PROVIDE RE-HEAT.

PREFILTER 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.).

FINAL 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.).

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

ENERGY AND SENSIBLE HEAT PLATE EXCHANGER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE ENERGY AND SENSIBLE PLATE HEAT EXHANGER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HEAT EXCHANGER CLEANING REQUIRED: FINAL HEAT EXCHANGER 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.).

CARBON DIOXIDE (CO_2) LEVELS:
IF THE SPACE CO_2 LEVELS VARY BY 10% OR MORE FROM THE DESIGN VALUE OF 800 PPM, AN ALARM SHALL GENERATE AT THE BMS TO ALERT THE BUILDING OPERATOR.

ABBREVIATIONS

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

ATC/BMS GENERAL NOTES: THE FOLLOWING NOTES APPLY TO ALL M5 SERIES HVAC CONTROL DRAWINGS

1. ALL SETPOINTS INDICATED IN THE SEQUENCE OF OPERATIONS SHALL BE ADJUSTABLE.
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 PROVIDDED BY THE ATC CONTRACTOR UNLESS NOTED OTHERWISE.
4. ALL ATC CONTROLS SHALL BE POWERED BY EMERGENCY POWER CIRCUITS COORD W/ DIV 260000
5. ALL HW VALVES SHALL BE FAIL OPEN ON LOSS OF POWER ALL CHILLED WATER VALVES SHALL FAIL CLOSE ON LOSS OF POWER.
6. ALL HW & CHILLED WATER VALVES SHALL BE MODULATING TYPE FOR GPM %%U>%%U 1 GPM, 2-POSITION ACCEPTABLE FOR FLOW < 1GPM
7. ATC CONTRACTOR TO COORDINATE W/ OWNER FOR ALL COMMUNICATION & INTERFACE REQUIREMENTS TO CENTRAL OPERATING STATION. REFER TO SPEC FOR FURTHER INFO.

RTU-5	HARDWARE POINTS				SOFTWARE POINTS							
POINT NAME	AI	AO	DI	DO	AV	BV	LOOP	SCHED	TREND	ALARM	SHOW ON GRAPHIC	REMARKS
OUTSIDE AIR FLOW MEASURING STATION	X								X		X	
SUPPLY AIR FLOW MEASURING STATION	X								X		X	
EXHAUST AIR FLOW MEASURING STATION	X								X		X	
OUTSIDE AIR TEMP	X								X		X	FROM WEATHER STATION
OUTSIDE AIR HUMIDITY	X								X		X	FROM WEATHER STATION
EXHAUST AIR TEMP	X								X		X	
EXHAUST AIR HUMIDITY	X								X		X	
STATIC PLATE HEAT EXCHANGER DISCHARGE AIR TEMP	X								X		X	
STATIC PLATE HEAT EXCHANGER DISCHARGE AIR HUMIDITY	X								X		X	
MIXED AIR TEMP	X								X		X	
COOLING COIL AIR TEMP	X	X							X		X	
HEATING COIL AIR TEMP	X	X							X		X	
SUPPLY AIR TEMP	X	X							X		X	
SUPPLY AIR HUMIDITY	X	X							X		X	
OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE	X								X		X	
RETURN AIR FILTER DIFFERENTIAL PRESSURE	X								X		X	
RETURN AIR HUMIDITY	X								X		X	
RETURN AIR TEMP	X								X		X	
ENERGY RECOVERY SECTION DAMPER	X	X							X		X	
SUPPLY FAN VFD SPEED	X	X							X		X	
EXHAUST FAN VFD SPEED	X	X							X		X	
CHILLED WATER CONTROL VALVE		X							X		X	
HOT WATER CONTROL VAVLE		X							X		X	
RE-CIRC AIR DAMPER	X	X							X		X	W/ END SWITCH
OUTSIDE AIR DAMPER	X	X							X		X	W/ END SWITCH
EXHAUST AIR DAMPER	X	X							X		X	W/ END SWITCH
RETURN AIR SMOKE DETECTOR (x4)			X						X	X		
SUPPLY AIR SMOKE DETECTOR			X						X	X		
SUPPLY FAN STATUS			X						X		X	
EXHAUST FAN STATUS			X						X		X	
SUPPLY FAN START/STOP				X					X		X	
EXHAUST FAN START/STOP				X					X		X	
COOLING SUPPLY AIR SET POINT					X				X		X	
HEATING SUPPLY AIR SET POINT					X				X		X	
EMERGENCY SHUT DOWN						X			X	X	X	
SCHEDULE								X				
SUPPLY FAN FAILURE										X		
SUPPLY FAN VFD FAILURE										X		
EXHAUST FAN FAILURE										X		
EXHAUST FAN VFD FAILURE										X		
ENERGY RECOVERY SECTION DIFFERENTIAL PRESSURE	X									X		
HIGH COOLING SUPPLY AIR TEMP										X		ABOVE 75°F
HIGH HEATING SUPPLY AIR TEMP										X		ABOVE 90°F
LOW HEATING SUPPLY AIR TEMP										X		ABOVE 60°F
OUTSIDE AIR FILTER CHANGE REQUIRED										X	X	
RETURN AIR FILTER CHANGE REQUIRED										X	X	
HIGH RETURN AIR HUMIDITY										X		ABOVE 80% R.H.
LOW RETURN AIR TEMP										X		BELOW 50°F
HIGH RETURN AIR TEMP										X		ABOVE 90°F
SUPPLY SMOKE DETECTOR										X		
RETURN SMOKE DETECTOR										X		
FREEZESTAT		X							X	X		W/ AUTOMATIC RESET
CONDENSATE PAN OVERFLOW		X							X	X		

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

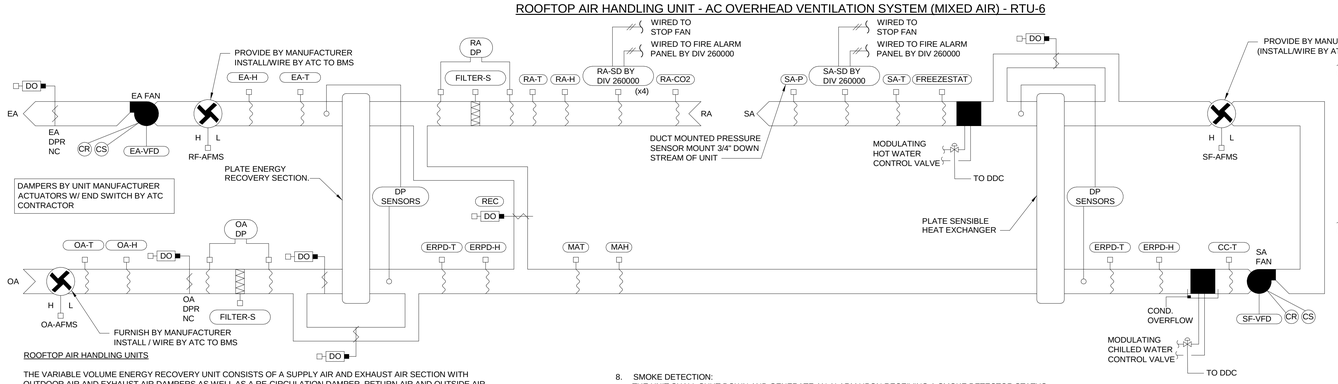
No.	Date	Description

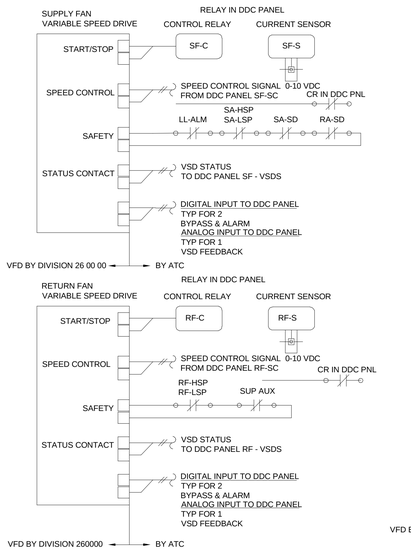
DRAWING NAME
CONTROLS II - HVAC

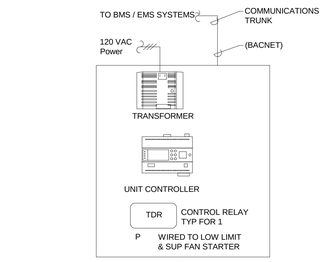
PROJECT NO. 1722

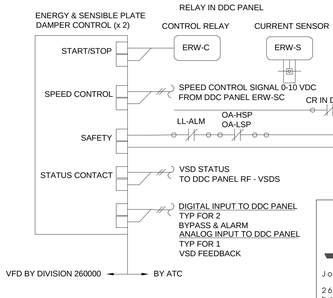
DRAWING NO.
M402

ROOFTOP AIR HANDLING UNIT - AC OVERHEAD VENTILATION SYSTEM (MIXED AIR) - RTU-6









ROOFTOP AIR HANDLING UNITS

THE VARIABLE VOLUME ENERGY RECOVERY UNIT CONSISTS OF A SUPPLY AIR AND EXHAUST AIR SECTION WITH OUTDOOR AIR AND EXHAUST AIR DAMPERS AS WELL AS A RE-CIRCULATION DAMPER, RETURN AIR AND OUTSIDE AIR FILTERS, ONE TOTAL ENERGY PLATE HEAT EXCHANGER & ONE SENSIBLE ONLY PLATE HEAT EXCHANGER, HOT WATER HEATING COIL, CHILLED WATER COOLING COIL, SUPPLY FANS AND EXHAUST FANS. THE UNIT SHALL BE DDC CONTROLLED USING ELECTRIC ACTUATION.

A DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE AIR HANDLING UNIT OPERATION AS FOLLOWS:
RUN CONDITIONS - SCHEDULED:

1. WARM-UP:
   THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL CLOSE, THE CHILLED WATER CONTROL VALVES SHALL BE CLOSED, THE RE-CIR DAMPER SHALL OPEN, THE SUPPLY FAN SHALL START, THE EXHAUST FAN REMAINS OFF, AND THE HOT WATER CONTROL VALVE SHALL MODULATE TO 100% OPEN TO PROVIDE A RAPID RISE IN THE AVERAGE SPACE TEMPERATURE. ALL VAV BOXES WILL GO TO 100% OPEN. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE WARM-UP MODE MORE THAN ONCE PER DAY. THE RADIANT PANELS AND UNIT HEATERS WILL BE THE FIRST STAGE OF WARM-UP, IF THE RADIATION AND UNIT HEATERS ARE NOT MEETING THE SPACE SET POINTS TEMPERATURE AS THE OCCUPIED PERIOD APPROACHES THEN THE AIR HANDLING UNIT WILL RUN TO MEET THE OCCUPIED SETPOINT. THE BMS SHALL MONITOR THE RATE OF TEMPERATURE RISE TO DETERMINE WHEN TO USE THE AIR HANDLING UNIT FOR WARM-UP THROUGH THE OPTIMIZED START PROGRAM WITHIN THE DDC SYSTEM.
2. OCCUPIED:
   THE FANS START OR CONTINUE TO RUN AND THE UNIT IS CONTROLLED AS FOLLOWS:
   THE SUPPLY AND EXHAUST FAN SHALL RUN AND ADJUST ITS SPEED BASED ON THE DUCT MOUNTED PRESSURE SENSOR WHICH WILL FLUCTUATE BASED ON VAV DAMPER POSITIONS.THE TAB CONTRACTOR SHALL DETERMINE THE EXACT SYSTEM PRESSURE & UTILIZE THIS VALUE AS THE SYSTEM SETPOINT. THE OUTSIDE AIR DAMPER SHALL OPEN TO ITS MAX POSITION AS INDICATED IN THE AHU SCHEDULE. 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 DAMPERS WILL MODULATE IN SEQUENCE WITHOUT OVERLAP AS THE ASSOCIATED SYSTEM VAV BOXES MODULATE TO MAINTAIN SPACE CO_2 LEVELS & SPACE TEMPERATURE. IF ALL SPACE CO_2 LEVELS ARE BELOW 800 PPM THE OUTSIDE AIR DAMPER SHALL GO TO ITS MINIMUM POSITION WHICH SHALL BE 20% OF THE SCHEDULED CFM. THE OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN 800 PPM THRESHOLD AT THE SPACE CO $_2$. PROGRAMMING SHALL BE PROVIDED TO ALLOW THE MODULATION OF THE SUPPLY & EXHAUST FANS TO MAINTAIN THE SYSTEM STATIC PRESSURE. THE ENERGY RECOVERY SECTION WILL PRE-HEAT OR PRE-COOL THE INCOMING OUTSIDE AIR DEPENDING ON THE SEASON. THE CHILLED WATER COIL CONTROL VALVE SHALL MODULATE TO DEHUMIDIFY THE INCOMING AIR. THE SENSIBLE ENERGY SECTION SHALL MODULATE TO REHEAT THE SUB COOLED SUPPLY AIR FROM THE CHILLED WATER COIL TO 63°F (ADJ SUMMER). DURING THE WINTER WHEN THE OUTDOOR AIR IS BELOW 60°F (ADJ) THE HOT WATER COIL SHALL MODULATE AS REQUIRED TO PROVIDE HEAT TO THE SUPPLY AIR TO MAINTAIN THE DISCHARGE AIR TEMPERATURE OF 68°F (ADJ WINTER).
3. UNOCCUPIED:
   UNDER THIS MODE ALL UNITS SHALL BE OFF & DAMPERS CLOSED. ALL HEATING HOT WATER EQUIPMENT & COMPONENTS THROUGHOUT THE BUILDING SHALL MODULATE AS REQUIRED TO MAINTAIN THE BUILDING'S UNOCCUPIED SETPOINT OF 60° (ADJ) IN THE WINTER. IN THE EVENT THAT THE HEATING HOT WATER EQUIPMENT CAN NOT MAINTAIN THE BUILDING AVERAGE UNOCCUPIED SETPOINT, THE AHU(S) SHALL BE ACTIVATED & FUNCTION AS INDICATED IN THE WARM UP MODE W/ THE EXCEPTION THAT THE FAN SPEEDS WOULD BE REDUCED TO 60% OF THEIR TOTAL CAPACITY. DURING THE SUMMER MONTHS WHEN OAT IS ABOVE 80° (ADJ) AND/OR RH IS ABOVE 70% (ADJ) & THE BUILDING'S AVERAGE UNOCCUPIED SETPOINTS OF 80° (ADJ) ARE NOT MAINTAINING, THEN THE UNIT WILL BE ACTIVATED & FUNCTION AS INDICATED IN THE COOLDOWN MODE W/ THE EXCEPTION THAT THE FAN SPEEDS WOULD BE REDUCED TO 60% OF THEIR TOTAL CAPACITY.
4. COOLDOWN:
   THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL CLOSE, THE HOT WATER COIL CONTROL VALVE SHALL BE CLOSED, THE ENTHALPY AND SENSIBLE SECTION DAMPERS SHALL BE CLOSED. THE RE-CIR DAMPER SHALL OPEN, VAV BOXES SHALL OPEN TO MAX POSITION, THE SUPPLY FAN SHALL START, AND CHILLED WATER COOLING COIL SHALL MODULATE TO MAINTAIN DISCHARGE SETPOINT OF 55°F (ADJ). MORNING COOLDOWN SHALL OCCUR (1 HR. ADJ.) PRIOR TO UNIT SCHEDULED OCCUPIED START TIME (TIME PERIOD SHALL BE ADJUSTED THRU THE DDC OPTIMIZED START LOGIC UTILIZING UNIT TREND DATA). ECONOMIZER MODE OF OPERATION SHALL OVERRIDE NORMAL COOLDOWN MODE OF OPERATION. OPTIMIZE START LOGIC SHALL ALLOW 55°F SUPPLY AIR TEMPERATURE TO BE UTILIZED TO MINIMIZE THE COOLDOWN PERIOD.
5. ECONOMIZER (DUAL ENTHALPY CONTROL):
   THE CONTROLLER SHALL MEASURE THE RETURN AIR AND OUTSIDE AIR ENTHALPY TEMPERATURES AND MODULATE THE OUTSIDE AIR DAMPER, RETURN AIR DAMPER, AND DAMPERS OF THE ENERGY AND SENSIBLE REHEAT PLATE HEAT EXCHANGER TO MAINTAIN A SETPOINT 2°F LESS THAN THE COOLING SUPPLY AIR TEMPERATURE SETPOINT.
   THE ECONOMIZER SHALL BE ENABLED WHENEVER:
   - OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
   - AND THE OUTSIDE AIR ENTHALPY IS LESS THAN 22 BTU/LB (ADJ).
   - AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE.
   - AND THE OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY.
   - AND THE SUPPLY FAN STATUS IS ON.

   THE ECONOMIZER SHALL BE DISABLED WHENEVER:
   - OUTSIDE AIR TEMPERATURE DROPS BELOW 48°F (ADJ.).
   - OR ON LOSS OF SUPPLY FAN STATUS.
   - OR THE FREEZESTAT IS ON.
6. EMERGENCY SHUTDOWN:
   THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING AN EMERGENCY SHUTDOWN SIGNAL.
7. LOW LEAVING TEMPERATURE:
   UPON A LOW LEAVING TEMPERATURE CONDITION (38°F ADJ) SENSED BY THE FREEZESTAT, THE OUTSIDE AIR AND EXHAUST AIR DAMPER SHALL CLOSE, THE SUPPLY AND EXHAUST AIR FANS SHALL SHUT DOWN THE HOT WATER CONTROL VALVE SHALL GO TO 100% FULL OPEN AND AN ALARM SHALL BE GENERATED.
8. SMOKE DETECTION:
   THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SMOKE DETECTOR STATUS.

SUPPLY FAN:
THE SUPPLY FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME, UNLESS SHUT DOWN ON SAFETIES. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF OR VICE VERSA.
- SUPPLY FAN VFD: IN FAULT.

EXHAUST FAN:
THE EXHAUST FAN SHALL RUN WHENEVER THE TOTAL ENERGY HEAT EXCHANGER DAMPER IS OPEN OR THE UNIT IS IN ECONOMIZER, UNLESS SHUT DOWN 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 SENSORS SHALL BE INSTALLED IN THE SUPPLY AND EXHAUST FANS. THE DDC SYSTEM USES THESE SENSORS 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.

SUPPLY AIR TEMPERATURE SETPOINT - FIXED:
THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE AND SHALL MAINTAIN A FIXED SUPPLY AIR TEMPERATURE SETPOINT OF 63°F IN THE SUMMER (OAT IS ABOVE 60°F ADJ.) & 68°F IN THE WINTER (OAT IS BELOW 60°F ADJ.).

CHILLED WATER COOLING:
THE CONTROLLER SHALL MEASURE THE SUPPLY AIR TEMPERATURE AND SHALL MODULATE THE CHILLED WATER CONTROL VALVE TO MAINTAIN THE REQUIRED COOLING COIL DAT OF 52°F (ADJ.). THE COOLING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS GREATER THAN 60°F (ADJ.).
- AND THE SUPPLY AIR TEMPERATURE IS ABOVE COOLING SETPOINT.
- AND THE FAN STATUS IS ON.
- SPACE TEMPERATURE CALLS FOR COOLING

HOT WATER HEATING:
THE CONTROLLER SHALL MEASURE THE SUPPLY AIR TEMPERATURE AND MODULATE THE HOT WATER HEATING CONTROL VALVE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SET POINT OF 68°F (ADJ). THE HEATING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 60°F (ADJ.).
- AND THE SUPPLY AIR TEMPERATURE IS BELOW HEATING SETPOINT.
- AND THE FAN STATUS IS ON.

THE HEATING SHALL NORMALLY BE DISABLED WHENEVER COOLING SYSTEM IS ENERGIZED AND SENSIBLE RECOVERY HEAT EXCHANGER REHEATING IS UTILIZED TO PROVIDE RE-HEAT.

PREFILTER 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.).

FINAL 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.).

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

ENERGY AND SENSIBLE HEAT PLATE EXCHANGER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE ENERGY AND SENSIBLE PLATE HEAT EXHANGER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HEAT EXCHANGER CLEANING REQUIRED: FINAL HEAT EXCHANGER 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.).

CARBON DIOXIDE (CO_2) LEVELS:
IF THE SPACE CO_2 LEVELS VARY BY 10% OR MORE FROM THE DESIGN VALUE OF 800 PPM, AN ALARM SHALL GENERATE AT THE BMS TO ALERT THE BUILDING OPERATOR.

ABBREVIATIONS

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

ATC/BMS GENERAL NOTES: THE FOLLOWING NOTES APPLY TO ALL MS SERIES HVAC CONTROL DRAWINGS

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RTU-6	HARDWARE POINTS				SOFTWARE POINTS							
POINT NAME	AI	AO	DI	DO	AV	BV	LOOP	SCHED	TREND	ALARM	SHOW ON GRAPHIC	REMARKS
OUTSIDE AIR FLOW MEASURING STATION	X								X		X	
SUPPLY AIR FLOW MEASURING STATION	X								X		X	
EXHAUST AIR FLOW MEASURING STATION	X								X		X	
OUTSIDE AIR TEMP	X								X		X	FROM WEATHER STATION
OUTSIDE AIR HUMIDITY	X								X		X	FROM WEATHER STATION
EXHAUST AIR TEMP	X								X		X	
EXHAUST AIR HUMIDITY	X								X		X	
STATIC PLATE HEAT EXCHANGER DISCHARGE AIR TEMP	X								X		X	
STATIC PLATE HEAT EXCHANGER DISCHARGE AIR HUMIDITY	X								X		X	
MIXED AIR TEMP	X								X		X	
COOLING COIL AIR TEMP	X	X							X		X	
HEATING COIL AIR TEMP	X	X							X		X	
SUPPLY AIR TEMP	X	X							X		X	
SUPPLY AIR HUMIDITY	X	X							X		X	
OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE	X								X		X	
RETURN AIR FILTER DIFFERENTIAL PRESSURE	X								X		X	
RETURN AIR HUMIDITY	X								X		X	
RETURN AIR TEMP	X								X		X	
ENERGY RECOVERY SECTION DAMPER	X	X							X		X	
SUPPLY FAN VFD SPEED	X	X							X		X	
EXHAUST FAN VFD SPEED	X	X							X		X	
CHILLED WATER CONTROL VALVE		X							X		X	
HOT WATER CONTROL VAVLE		X							X		X	
RE-CIRC AIR DAMPER	X	X							X		X	W/ END SWITCH
OUTSIDE AIR DAMPER	X	X							X		X	W/ END SWITCH
EXHAUST AIR DAMPER	X	X							X		X	W/ END SWITCH
RETURN AIR SMOKE DETECTOR (x4)			X						X	X		
SUPPLY AIR SMOKE DETECTOR			X						X	X		
SUPPLY FAN STATUS			X						X		X	
EXHAUST FAN STATUS			X						X		X	
SUPPLY FAN START/STOP				X					X		X	
EXHAUST FAN START/STOP				X					X		X	
COOLING SUPPLY AIR SET POINT					X				X		X	
HEATING SUPPLY AIR SET POINT					X				X		X	
EMERGENCY SHUT DOWN						X			X	X	X	
SCHEDULE								X				
SUPPLY FAN FAILURE										X		
SUPPLY FAN VFD FAILURE										X		
EXHAUST FAN FAILURE										X		
EXHAUST FAN VFD FAILURE										X		
ENERGY RECOVERY SECTION DIFFERENTIAL PRESSURE	X									X		
HIGH COOLING SUPPLY AIR TEMP										X		ABOVE 75°F
HIGH HEATING SUPPLY AIR TEMP										X		ABOVE 90°F
LOW HEATING SUPPLY AIR TEMP										X		ABOVE 60°F
OUTSIDE AIR FILTER CHANGE REQUIRED										X	X	
RETURN AIR FILTER CHANGE REQUIRED										X	X	
HIGH RETURN AIR HUMIDITY										X		ABOVE 80% R.H.
LOW RETURN AIR TEMP										X		BELOW 50°F
HIGH RETURN AIR TEMP										X		ABOVE 90°F
SUPPLY SMOKE DETECTOR										X		
RETURN SMOKE DETECTOR										X		
FREEZESTAT		X							X	X		W/ AUTOMATIC RESET
CONDENSATE PAN OVERFLOW		X							X	X		

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

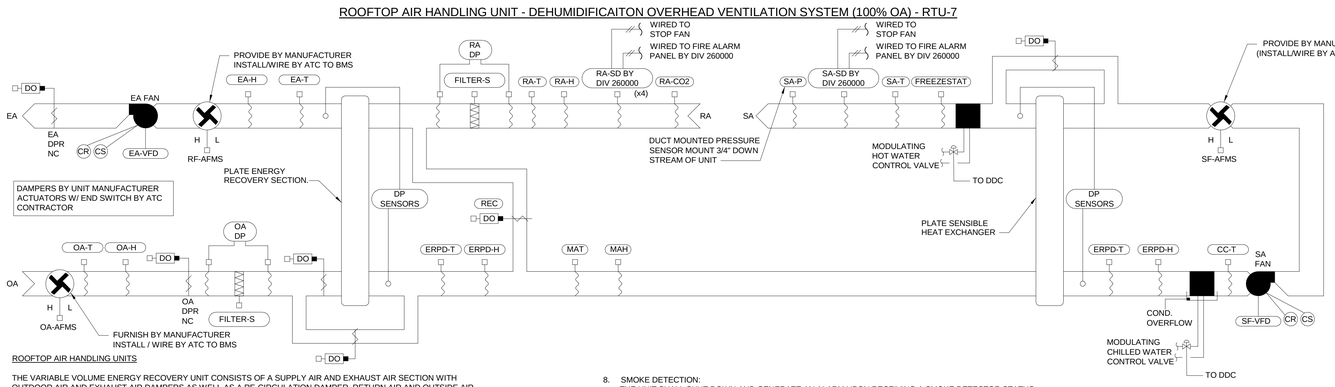
No.	Date	Description

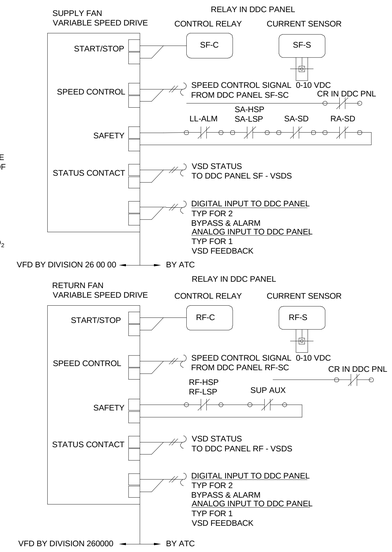
DRAWING NAME
CONTROLS III - HVAC

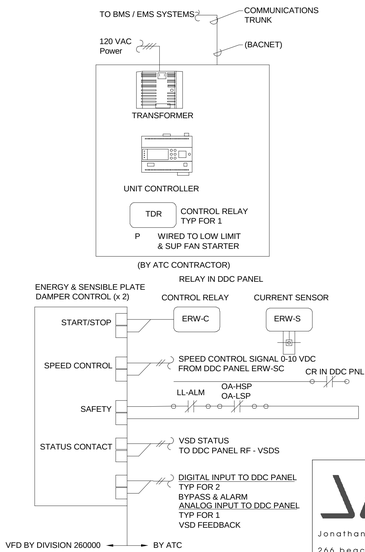
PROJECT NO. 1722

DRAWING NO.
M403

ROOFTOP AIR HANDLING UNIT - DEHUMIDIFICAITON OVERHEAD VENTILATION SYSTEM (100% OA) - RTU-7







ROOFTOP AIR HANDLING UNITS

THE VARIABLE VOLUME ENERGY RECOVERY UNIT CONSISTS OF A SUPPLY AIR AND EXHAUST AIR SECTION WITH OUTDOOR AIR AND EXHAUST AIR DAMPERS AS WELL AS A RE-CIRCULATION DAMPER, RETURN AIR AND OUTSIDE AIR FILTERS, ONE TOTAL ENERGY PLATE HEAT EXCHANGER & ONE SENSIBLE ONLY PLATE HEAT EXCHANGER, HOT WATER HEATING COIL, CHILLED WATER COOLING COIL, SUPPLY FANS AND EXHAUST FANS. THE UNIT SHALL BE DDC CONTROLLED USING ELECTRIC ACTUATION.

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

1. RUN CONDITIONS - SCHEDULED:
   WARM-UP:
   THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL CLOSE, THE CHILLED WATER CONTROL VALVES SHALL BE CLOSED, THE RE-CIR DAMPER SHALL OPEN, THE SUPPLY FAN SHALL START, THE EXHAUST FAN REMAINS OFF, AND THE HOT WATER CONTROL VALVE SHALL MODULATE TO 100% OPEN TO PROVIDE A RAPID RISE IN THE AVERAGE SPACE TEMPERATURE. ALL VAV BOXES WILL GO TO 100% OPEN. THE SYSTEM SHALL BE PREVENTED FROM ENTERING THE WARM-UP MODE MORE THAN ONCE PER DAY. THE RADIANT PANELS AND UNIT HEATERS WILL BE THE FIRST STAGE OF WARM-UP. IF THE RADIATION AND UNIT HEATERS ARE NOT MEETING THE SPACE SET POINTS TEMPERATURE AS THE OCCUPIED PERIOD APPROACHES THEN THE AIR HANDLING UNIT WILL RUN TO MEET THE OCCUPIED SETPOINT. THE BMS SHALL MONITOR THE RATE OF TEMPERATURE RISE TO DETERMINE WHEN TO USE THE AIR HANDLING UNIT FOR WARM-UP THROUGH THE OPTIMIZED START PROGRAM WITHIN THE DDC SYSTEM.
2. OCCUPIED:
   THE FANS START OR CONTINUE TO RUN AND THE UNIT IS CONTROLLED AS FOLLOWS:
   THE SUPPLY AND EXHAUST FAN SHALL RUN AND ADJUST ITS SPEED BASED ON THE DUCT MOUNTED PRESSURE SENSOR WHICH WILL FLUCTUATE BASED ON VAV DAMPER POSITIONS.THE TAB CONTRACTOR SHALL DETERMINE THE EXACT SYSTEM PRESSURE & UTILIZE THIS VALUE AS THE SYSTEM SETPOINT. THE OUTSIDE AIR DAMPER SHALL OPEN TO ITS MAX POSITION AS INDICATED IN THE AHU SCHEDULE. 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 DAMPERS WILL MODULATE IN SEQUENCE WITHOUT OVERLAP AS THE ASSOCIATED SYSTEM VAV BOXES MODULATE TO MAINTAIN SPACE CO_2 LEVELS & SPACE TEMPERATURE. IF ALL SPACE CO_2 LEVELS ARE BELOW 800 PPM THE OUTSIDE AIR DAMPER SHALL GO TO ITS MINIMUM POSITION WHICH SHALL BE 20% OF THE SCHEDULED CFM. THE OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN 800 PPM THRESHOLD AT THE SPACE CO_2 PROGRAMMING SHALL BE PROVIDED TO ALLOW THE MODULATION OF THE SUPPLY & EXHAUST FANS TO MAINTAIN THE SYSTEM STATIC PRESSURE. THE ENERGY RECOVERY SECTION WILL PRE-HEAT OR PRE-COOL THE INCOMING OUTSIDE AIR DEPENDING ON THE SEASON. THE CHILLED WATER COIL CONTROL VALVE SHALL MODULATE TO DEHUMIDIFY THE INCOMING AIR. THE SENSIBLE ENERGY SECTION SHALL MODULATE TO REHEAT THE SUB COOLED SUPPLY AIR FROM THE CHILLED WATER COIL TO 63°F (ADJ SUMMER). DURING THE WINTER WHEN THE OUTDOOR AIR IS BELOW 60°F (ADJ) THE HOT WATER COIL SHALL MODULATE AS REQUIRED TO PROVIDE HEAT TO THE SUPPLY AIR TO MAINTAIN THE DISCHARGE AIR TEMPERATURE OF 68°F (ADJ WINTER).
3. UNOCCUPIED:
   UNDER THIS MODE ALL UNITS SHALL BE OFF & DAMPERS CLOSED. ALL HEATING HOT WATER EQUIPMENT & COMPONENTS THROUGHOUT THE BUILDING SHALL MODULATE AS REQUIRED TO MAINTAIN THE BUILDING'S UNOCCUPIED SETPOINT OF 60° (ADJ) IN THE WINTER. IN THE EVENT THAT THE HEATING HOT WATER EQUIPMENT CAN NOT MAINTAIN THE BUILDING AVERAGE UNOCCUPIED SETPOINT, THE AHU(S) SHALL BE ACTIVATED & FUNCTION AS INDICATED IN THE WARM UP MODE W/ THE EXCEPTION THAT THE FAN SPEEDS WOULD BE REDUCED TO 60% OF THEIR TOTAL CAPACITY. DURING THE SUMMER MONTHS WHEN OAT IS ABOVE 80° (ADJ) AND/OR RH IS ABOVE 70% (ADJ) & THE BUILDING'S AVERAGE UNOCCUPIED SETPOINTS OF 80° (ADJ) ARE NOT MAINTAINING, THEN THE UNIT WILL BE ACTIVATED & FUNCTION AS INDICATED IN THE COOLDOWN MODE W/ THE EXCEPTION THAT THE FAN SPEEDS WOULD BE REDUCED TO 60% OF THEIR TOTAL CAPACITY.
4. COOLDOWN:
   THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL CLOSE, THE HOT WATER COIL CONTROL VALVE SHALL BE CLOSED, THE ENTHALPY AND SENSIBLE SECTION DAMPERS SHALL BE CLOSED. THE RE-CIR DAMPER SHALL OPEN, VAV BOXES SHALL OPEN TO MAX POSITION, THE SUPPLY FAN SHALL START, AND CHILLED WATER COOLING COIL SHALL MODULATE TO MAINTAIN DISCHARGE SETPOINT OF 55°F (ADJ). MORNING COOLDOWN SHALL OCCUR (1 HR. ADJ.) PRIOR TO UNIT SCHEDULED OCCUPIED START TIME (TIME PERIOD SHALL BE ADJUSTED THRU THE DDC OPTIMIZED START LOGIC UTILIZING UNIT TREND DATA). ECONOMIZER MODE OF OPERATION SHALL OVERRIDE NORMAL COOLDOWN MODE OF OPERATION. OPTIMIZE START LOGIC SHALL ALLOW 55°F SUPPLY AIR TEMPERATURE TO BE UTILIZED TO MINIMIZE THE COOLDOWN PERIOD.
5. ECONOMIZER (DUAL ENTHALPY CONTROL):
   THE CONTROLLER SHALL MEASURE THE RETURN AIR AND OUTSIDE AIR ENTHALPY TEMPERATURES AND MODULATE THE OUTSIDE AIR DAMPER, RETURN AIR DAMPER, AND DAMPERS OF THE ENERGY AND SENSIBLE REHEAT PLATE HEAT EXCHANGER TO MAINTAIN A SETPOINT 2°F LESS THAN THE COOLING SUPPLY AIR TEMPERATURE SETPOINT.
   THE ECONOMIZER SHALL BE ENABLED WHENEVER:
   - OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
   - AND THE OUTSIDE AIR ENTHALPY IS LESS THAN 22 BTU/LB (ADJ).
   - AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE.
   - AND THE OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY.
   - AND THE SUPPLY FAN STATUS IS ON.

   THE ECONOMIZER SHALL BE DISABLED WHENEVER:
   - OUTSIDE AIR TEMPERATURE DROPS BELOW 48°F (ADJ.).
   - OR ON LOSS OF SUPPLY FAN STATUS.
   - OR THE FREEZESTAT IS ON.
6. EMERGENCY SHUTDOWN:
   THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING AN EMERGENCY SHUTDOWN SIGNAL.
7. LOW LEAVING TEMPERATURE:
   UPON A LOW LEAVING TEMPERATURE CONDITION (38°F ADJ) SENSED BY THE FREEZESTAT, THE OUTSIDE AIR AND EXHAUST AIR DAMPER SHALL CLOSE, THE SUPPLY AND EXHAUST AIR FANS SHALL SHUT DOWN THE HOT WATER CONTROL VALVE SHALL GO TO 100% FULL OPEN AND AN ALARM SHALL BE GENERATED.
8. SMOKE DETECTION:
   THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SMOKE DETECTOR STATUS.

SUPPLY FAN:
THE SUPPLY FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME, UNLESS SHUT DOWN ON SAFETIES.
ALARMS SHALL BE PROVIDED AS FOLLOWS:
- SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF OR VICE VERSA.
- SUPPLY FAN VFD: IN FAULT.

EXHAUST FAN:
THE EXHAUST FAN SHALL RUN WHENEVER THE TOTAL ENERGY HEAT EXCHANGER DAMPER IS OPEN OR THE UNIT IS IN ECONOMIZER, UNLESS SHUT DOWN 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 SENSORS SHALL BE INSTALLED IN THE SUPPLY AND EXHAUST FANS. THE DDC SYSTEM USES THESE SENSORS 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.

SUPPLY AIR TEMPERATURE SETPOINT - FIXED:
THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE AND SHALL MAINTAIN A FIXED SUPPLY AIR TEMPERATURE SETPOINT OF 63°F IN THE SUMMER (OAT IS ABOVE 60°F ADJ.) & 68°F IN THE WINTER (OAT IS BELOW 60°F ADJ.).

CHILLED WATER COOLING:
THE CONTROLLER SHALL MEASURE THE SUPPLY AIR TEMPERATURE AND SHALL MODULATE THE CHILLED WATER CONTROL VALVE TO MAINTAIN THE REQUIRED COOLING COIL DAT OF 52°F (ADJ.). THE COOLING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS GREATER THAN 60°F (ADJ.).
- AND THE SUPPLY AIR TEMPERATURE IS ABOVE COOLING SETPOINT.
- AND THE FAN STATUS IS ON.
- SPACE TEMPERATURE CALLS FOR COOLING

HOT WATER HEATING:
THE CONTROLLER SHALL MEASURE THE SUPPLY AIR TEMPERATURE AND MODULATE THE HOT WATER HEATING CONTROL VALVE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SET POINT OF 68°F (ADJ). THE HEATING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 60°F (ADJ.).
- AND THE SUPPLY AIR TEMPERATURE IS BELOW HEATING SETPOINT.
- AND THE FAN STATUS IS ON.

THE HEATING SHALL NORMALLY BE DISABLED WHENEVER COOLING SYSTEM IS ENERGIZED AND SENSIBLE RECOVERY HEAT EXCHANGER REHEATING IS UTILIZED TO PROVIDE RE-HEAT.

PREFILTER 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.).

FINAL 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.).

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

ENERGY AND SENSIBLE HEAT PLATE EXCHANGER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE ENERGY AND SENSIBLE PLATE HEAT EXHANGER. ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HEAT EXCHANGER CLEANING REQUIRED: FINAL HEAT EXCHANGER 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.).

CARBON DIOXIDE (CO_2) LEVELS:
IF THE SPACE CO_2 LEVELS VARY BY 10% OR MORE FROM THE DESIGN VALUE OF 800 PPM, AN ALARM SHALL GENERATE AT THE BMS TO ALERT THE BUILDING OPERATOR.

ABBREVIATIONS

ALM	ALARM	HWS	HOT WATER SUPPLY
AQ	AQUASTAT	LT	LOW TEMPERATURE
ATC	AUTOMATIC TEMPERATURE CONTROLS	M	MOTOR
BLDG	BUILDING	MAT	OUTSIDE AIR
BLR	BOILER	NAC	NETWORK APPLICATION CONTROLLER
BMS	BUILDING MANAGEMENT SYSTEM (ENERGY & AUTOMATION)	NC	NORMALLY CLOSED
		NO	NORMALLY OPEN
CEMOC	CENTRAL ENERGY MANAGEMENT CENTER	OA	OUTSIDE AIR
COMB	COMBUSTION	OVR	OVERRIDE
CONTR	CONTROLLER	P	PRESSURE
CO2	CARBON DIOXIDE	PB	PUSH BUTTON
CR	CONTROL RELAY	PNL	PANEL
CS	CURRENT SENSOR	RA	RETURN AIR
D	DAMPER	REL	RELIEF AIR
DA	DISCHARGE AIR	RF	RETURN FAN
DAS	DISCHARGE AIR SENSOR	RFC	RETURN FAN CONTROLLER
DCW	DOMESTIC COLD WATER	RM	ROOM
DHW	DOMESTIC HOT WATER	SA	SUPPLY AIR
DDC	DIRECT DIGITAL CONTROL	SD	SMOKE DAMPER OR SMOKE DETECTOR
DO	DAMPER OPERATOR	SF	SUPPLY FAN
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FD	FIRE DAMPER	VLV	VALVE
H	HUMIDITY	VP	VELOCITY PROBE (AIRFLOW)
HT	HIGH TEMPERATURE	VSD	VARIABLE SPEED (FREQUENCY) DRIVE
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SUPPLY AIR FLOW MEASURING STATION	X								X		X	
EXHAUST AIR FLOW MEASURING STATION	X								X		X	
OUTSIDE AIR TEMP	X								X		X	FROM WEATHER STATION
OUTSIDE AIR HUMIDITY	X								X		X	FROM WEATHER STATION
EXHAUST AIR TEMP	X								X		X	
EXHAUST AIR HUMIDITY	X								X		X	
STATIC PLATE HEAT EXCHANGER DISCHARGE AIR TEMP	X								X		X	
STATIC PLATE HEAT EXCHANGER DISCHARGE AIR HUMIDITY	X								X		X	
MIXED AIR TEMP	X								X		X	
COOLING COIL AIR TEMP	X	X							X		X	
HEATING COIL AIR TEMP	X	X							X		X	
SUPPLY AIR TEMP	X	X							X		X	
SUPPLY AIR HUMIDITY	X	X							X		X	
OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE	X								X		X	
RETURN AIR FILTER DIFFERENTIAL PRESSURE	X								X		X	
RETURN AIR HUMIDITY	X								X		X	
RETURN AIR TEMP	X								X		X	
ENERGY RECOVERY SECTION DAMPER	X	X							X		X	
SUPPLY FAN VFD SPEED	X	X							X		X	
EXHAUST FAN VFD SPEED	X	X							X		X	
CHILLED WATER CONTROL VALVE		X							X		X	
HOT WATER CONTROL VAVLE		X							X		X	
RE-CIRC AIR DAMPER	X	X							X		X	W/ END SWITCH
OUTSIDE AIR DAMPER	X	X							X		X	W/ END SWITCH
EXHAUST AIR DAMPER	X	X							X		X	W/ END SWITCH
RETURN AIR SMOKE DETECTOR (x4)			X						X	X		
SUPPLY AIR SMOKE DETECTOR			X						X	X		
SUPPLY FAN STATUS			X						X		X	
EXHAUST FAN STATUS			X						X		X	
SUPPLY FAN START/STOP				X					X		X	
EXHAUST FAN START/STOP				X					X		X	
COOLING SUPPLY AIR SET POINT					X				X		X	
HEATING SUPPLY AIR SET POINT					X				X		X	
EMERGENCY SHUT DOWN						X			X	X	X	
SCHEDULE								X				
SUPPLY FAN FAILURE										X		
SUPPLY FAN VFD FAILURE										X		
EXHAUST FAN FAILURE										X		
EXHAUST FAN VFD FAILURE										X		
ENERGY RECOVERY SECTION DIFFERENTIAL PRESSURE	X									X		
HIGH COOLING SUPPLY AIR TEMP										X		ABOVE 75°F
HIGH HEATING SUPPLY AIR TEMP										X		ABOVE 90°F
LOW HEATING SUPPLY AIR TEMP										X		ABOVE 60°F
OUTSIDE AIR FILTER CHANGE REQUIRED										X	X	
RETURN AIR FILTER CHANGE REQUIRED										X	X	
HIGH RETURN AIR HUMIDITY										X		ABOVE 80% R.H.
LOW RETURN AIR TEMP										X		BELOW 50°F
HIGH RETURN AIR TEMP										X		ABOVE 90°F
SUPPLY SMOKE DETECTOR										X		
RETURN SMOKE DETECTOR										X		
FREEZESTAT		X							X	X		W/ AUTOMATIC RESET
CONDENSATE PAN OVERFLOW		X							X	X		

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

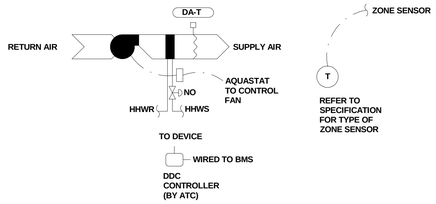
CONTROLS IV - HVAC

PROJECT NO. 1722

DRAWING NO.

M404

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



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

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

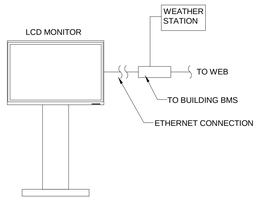
RUN CONDITIONS - SCHEDULED:
THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:
- OCCUPIED MODE: THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 70°F (ADJ.).
- UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 60°F (ADJ.).

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

HEATING COIL VALVE:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE HEATING COIL VALVE TO MAINTAIN ITS HEATING SETPOINT. THE HEATING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
- ZONE TEMPERATURE IS BELOW THE HEATING SETPOINT.

SUMMER OPERATIONS:
- THE FAN IS OFF.
- THE CONTROL VALVE IS CLOSED.

CABINET UNIT HEATER	HARDWARE POINTS				SOFTWARE POINTS							
POINT NAME	AI	AO	DI	DO	AV	BV	LOOP	SCHED	TREND	ALARM	SHOW ON GRAPHIC	REMARKS
ZONE TEMP	X								X	X	X	
HEATING VALVE		X							X		X	
SPACE SETPOINT				X				X			X	
FAN START/STOP				X				X			X	
FAN STATUS			X						X	X	X	
TOTALS	1	1	1	2	0	0	0	2	3	2	5	
	TOTAL HARDWARE (2)				TOTAL SOFTWARE (0)							



OWNERS INFORMATIONAL KIOSK:

AN OWNER INFORMATIONAL KIOSK FOR USE BY GENERAL PUBLIC SHALL BE FURNISHED 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 GAS CONSUMPTION, SUB METERS & TOTALIZATION
- 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.

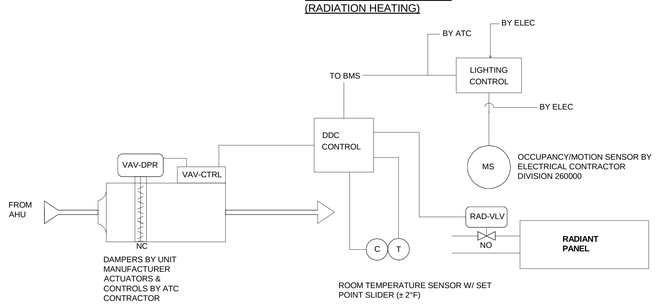
ABBREVIATIONS

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

ATC/BMS GENERAL NOTES: THE FOLLOWING NOTES APPLY TO ALL MS SERIES HVAC CONTROL DRAWINGS

1. ALL SETPOINTS INDICATED IN THE SEQUENCE OF OPERATIONS SHALL BE ADJUSTABLE.
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 PROVIDDED BY THE ATC CONTRACTOR UNLESS NOTED OTHERWISE.
4. ALL ATC CONTROLS SHALL BE POWERED BY EMERGENCY POWER CIRCUITS COORD W/ DIV 260000
5. ALL HW VALVES SHALL BE FAIL OPEN ON LOSS OF POWER ALL CHILLED WATER VALVES SHALL FAIL CLOSE ON LOSS OF POWER.
6. ALL HW & CHILLED WATER VALVES SHALL BE MODULATING TYPE FOR GPM %%U>%%U 1 GPM, 2-POSITION ACCEPTABLE FOR FLOW < 1GPM
7. ATC CONTRACTOR TO COORDINATE W/ OWNER FOR ALL COMMUNICATION & INTERFACE REQUIREMENTS TO CENTRAL OPERATING STATION. REFER TO SPEC FOR FURTHER INFO.

VARIABLE AIR VOLUME BOX
(RADIATION HEATING)

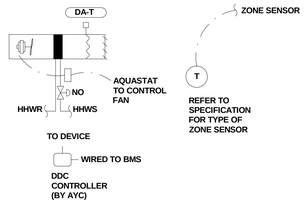


VARIABLE AIR VOLUME BOX WITH HOT WATER REHEAT AND RATIATION HEATING

A. THE SPACE THERMOSTAT SHALL MODULATE THE NORMALLY OPEN VARIABLE AIR VOLUME BOX DAMPER BETWEEN THE MAXIMUM AND MINIMUM POSITIONS AS INDICATED IN THE DRAWINGS. AT THE MINIMUM POSITION, IF THE SPACE TEMPERATURE CONTINUES TO FALL, THE MODULATING RADIATION VALVE SHALL MODULATE OPEN AS THE FIRST STAGE OF HEATING.
B. DURING UNOCCUPIED THE DAMPER SHALL BE FULL OPEN AND THE RADIATION HEATING HOT WATER CONTROL VALVE SHALL MODULATE TO MAINTAIN UNOCCUPIED SPACE THERMOSTAT SETPOINT.
C. WHEN THE BOILER IS NOT OPERATING, THE AIR VOLUME DAMPER SHALL MODULATE TO THE COOLING MINIMUM POSITION.
D. ROOMZONE TEMPERATURE SENSORS SHALL HAVE PUSH BUTTON OCCUPIED OVERRIDE BUTTON CAPABILITY TO MANUALLY CHANGE TO UNIT OCCUPIED MODE FOR A PERIOD OF 3 HOURS (ADJ.)
E. THE SPACE MOUNTED CO2 SENSOR SHALL GENERATE AN ALARM WHEN CONDITIONS VARY BY 10% OR MORE FROM THE DESIGN CONDITION.

VARIABLE AIR VOLUME BOX (VAV)	AI	AO	DI	DO	ALARM
DAMPER POS./COMMAND (EACH)	X	X			X
SUPPLY AIR TEMP.	X				
SUPPLY AIR VOLUME (CFM)	X				
ROOM TEMPERATURE	X				X
HH W RADIANT PANEL VALVE	X	X			
CO2 SENSOR	X				X
MOTION SENSOR (L.C.P)	X				

UNIT HEATER (UH)



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

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

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

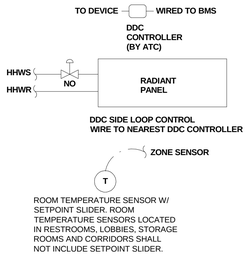
FAN:
THE FAN SHALL RUN ANYTIME THE AQUASTAT SENSES WATER TEMPERATURE IS ABOVE 90°F (ADJ.) AND THE SPACE TEMPERATURE IS BELOW SETPOINT, UNLESS SHUTDOWN ON SAFETIES.

HEATING COIL VALVE:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE HEATING COIL VALVE TO MAINTAIN ITS HEATING SETPOINT. THE HEATING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
- ZONE TEMPERATURE IS BELOW THE HEATING SETPOINT.

SUMMER OPERATIONS:
- THE FAN IS OFF.
- THE CONTROL VALVE IS CLOSED.

CABINET UNIT HEATER	HARDWARE POINTS				SOFTWARE POINTS							
POINT NAME	AI	AO	DI	DO	AV	BV	LOOP	SCHED	TREND	ALARM	SHOW ON GRAPHIC	REMARKS
ZONE TEMP	X								X	X	X	
HEATING VALVE		X							X		X	
SPACE SETPOINT				X				X			X	
FAN START/STOP				X				X			X	
FAN STATUS			X						X	X	X	
TOTALS	1	1	1	2	0	0	0	2	3	2	5	
	TOTAL HARDWARE (2)				TOTAL SOFTWARE (0)							

RADIATION



RADIATION AND CONVECTOR HEATING:

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

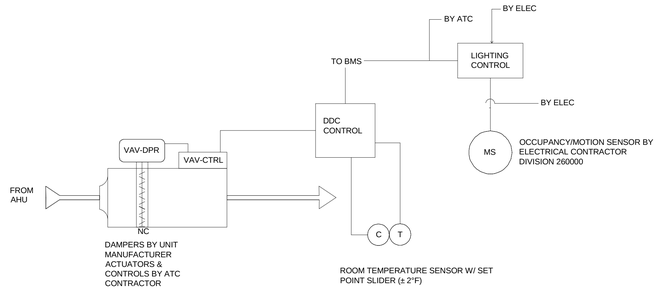
RUN CONDITIONS - SCHEDULED:
THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:
- OCCUPIED MODE: THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 70°F (ADJ.).
- UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 60°F (ADJ.).

HEATING COIL VALVE:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE HEATING COIL VALVE TO MAINTAIN IT'S HEATING SETPOINT. THE HEATING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
- THE ZONE TEMPERATURE IS BELOW THE HEATING SETPOINT.

SUMMER OPERATIONS:
- THE CONTROL VALVE IS CLOSED.

RADIATION	HARDWARE POINTS				SOFTWARE POINTS							
POINT NAME	AI	AO	DI	DO	AV	BV	LOOP	SCHED	TREND	ALARM	SHOW ON GRAPHIC	REMARKS
ZONE TEMP	X								X		X	
HEATING VALVE		X							X		X	
SPACE SETPOINT				X				X			X	
TOTALS	1	1	0	1	0	0	0	1	2	0	3	
	TOTAL HARDWARE (2)				TOTAL SOFTWARE (0)							

VARIABLE AIR VOLUME BOX



VARIABLE AIR VOLUME BOX

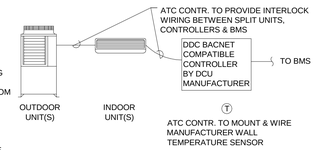
A. THE SPACE THERMOSTAT SHALL MODULATE THE NORMALLY OPEN VARIABLE AIR VOLUME BOX DAMPER BETWEEN THE MAXIMUM AND MINIMUM POSITIONS AS INDICATED IN THE DRAWINGS. AT THE MINIMUM POSITION, IF THE SPACE TEMPERATURE CONTINUES TO FALL, THE MODULATING RADIATION VALVE SHALL MODULATE OPEN AS THE FIRST STAGE OF HEATING.
B. WHEN THE BOILER IS NOT OPERATING, THE AIR VOLUME DAMPER SHALL MODULATE TO THE COOLING MINIMUM POSITION.
C. ROOMZONE TEMPERATURE SENSORS SHALL HAVE PUSH BUTTON OCCUPIED OVERRIDE BUTTON CAPABILITY TO MANUALLY CHANGE TO UNIT OCCUPIED MODE FOR A PERIOD OF 3 HOURS (ADJ.)
D. THE SPACE MOUNTED CO2 SENSOR SHALL GENERATE AN ALARM WHEN CONDITIONS VARY BY 10% OR MORE FROM THE DESIGN CONDITION.

VARIABLE AIR VOLUME BOX (VAV)	AI	AO	DI	DO	ALARM	REMARKS
DAMPER POS./COMMAND (EACH)	X	X			X	
SUPPLY AIR TEMP.	X					
SUPPLY AIR VOLUME (CFM)	X					
ROOM TEMPERATURE	X					NOTE #1
CO2 SENSOR	X				X	
NOTE #1: ± 5°F (ADJ.) FROM SETPOINT.						

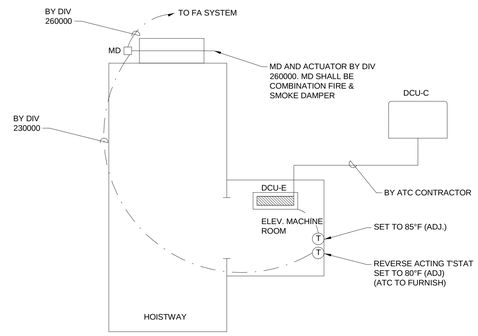
DUCTLESS COOLING UNITS (DCU)

ALL CONDENSATE DRAIN PANS ASSOCIATED WITH DCU'S TO BE PROVIDED WITH EQUIPMENT MANUFACTURER'S OVERFLOW SENSORS WHICH ARE TO BE INTERLOCKED WITH THE BUILDING MANAGEMENT SYSTEM FOR MONITORING ONLY. PROVIDE ROOM TEMPERATURE AND HIGH CONDENSATE ALARM.

ON A CONDENSATE OVERFLOW ALARM THE UNIT SHALL BE DE-ACTIVATED & ALARM SHALL BE GENERATED AT THE BMS



DUCTLESS COOLING UNIT (DCU)	AI	AO	DI	DO	ALARM
DCU SYSTEM S/S & STATUS			X	X	X
SPACE TEMPERATURE	X				X
CONDENSATE OVERFLOW ALARM			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	REMARKS
SPACE TEMPERATURE SENSOR	X				X	
MOTORIZED DAMPER POSITION			X	X	X	
DCU SYSTEM INDOOR S/S & STATUS			X	X	X	(1)
CONDENSATE ALARM			X		X	

(1) VIA BACNET COMPATIBLE CONTROLLER (BY DCU MANUF.)

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

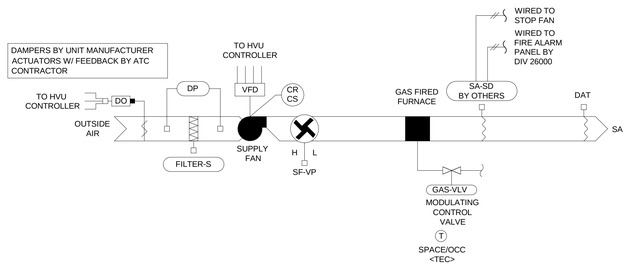
REVISIONS

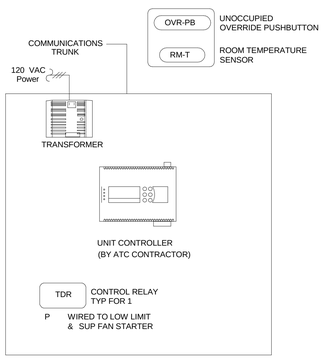
No.	Date	Description

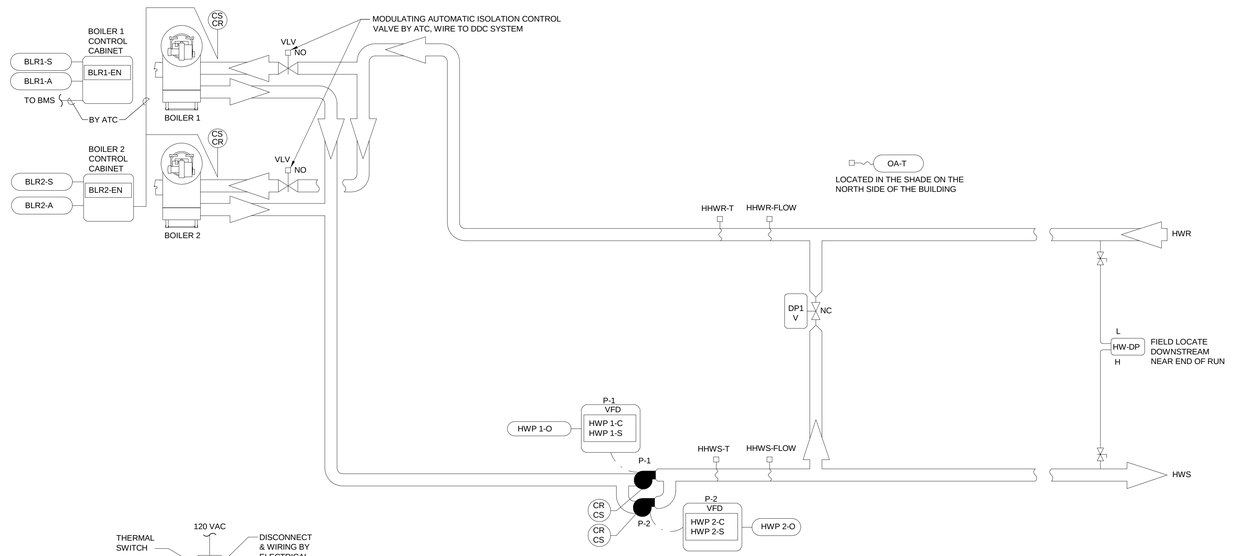
DRAWING NAME
CONTROLS V - HVAC

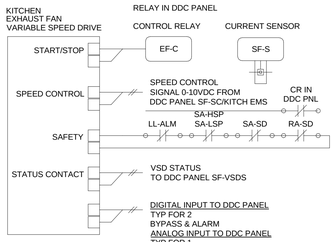
PROJECT NO. 1722

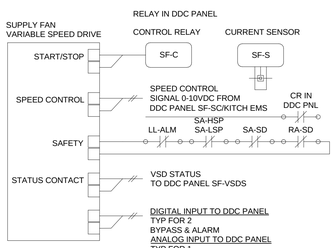
DRAWING NO.
M405

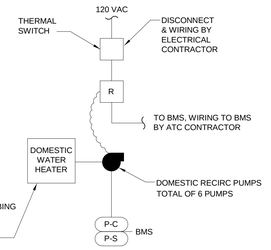










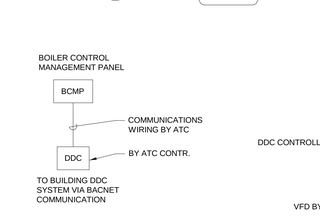


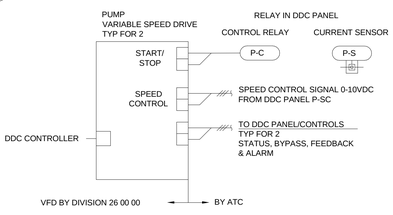
DOMESTIC RERIC PUMPS	AI	AO	DI	DO	ALARM	REMARKS
START				X		
STOP				X		
STATUS	X			X		

DOMESTIC RECIRC PUMPS

A DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE DOMESTIC RERIC PUMPS.

THE PUMPS SHALL BE ENABLED BASED ON THE BUILDING SCHEDULE.





BOILER PLANT CONTROL

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

1. THROUGH THE CENTRAL AUTOMATIC TEMPERATURE CONTROL SYSTEM, WHEN THE OUTSIDE AIR TEMPERATURE (O.A.T.) IS BELOW 65°F, THE PRIMARY HEATING HOT WATER PUMP SHALL START. IF THE PRIMARY PUMP SHALL FAIL TO START, THE STANDBY PUMP SHALL START IN ITS PLACE. EACH PUMP SHALL ALSO BE CAPABLE OF DUTY CYCLING WHICH WILL BE AUTOMATICALLY CONTROLLED THROUGH THE DDC SYSTEM BASED UPON PUMP OPERATION TIME. THE DIFFERENTIAL PRESSURE SENSORS LOCATED IN THE SUPPLY AND RETURN PIPING SYSTEM SHALL MODULATE THE HOT WATER FLOW VIA THE VARIABLE FREQUENCY DRIVE TO MAINTAIN A SYSTEM PRESSURE DROP EQUAL TO 5 PSI ABOVE THE DIFFERENTIAL PRESSURE SETPOINT (ADJ.). UPON A PUMP VFD FAILURE, THE SYSTEM DIFFERENTIAL PRESSURE CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN MINIMUM FLOW THROUGH THE BOILER SYSTEM AND TO MAINTAIN A MINIMUM OF 5 PSI (ADJ.) ABOVE THE DIFFERENTIAL PRESSURE SETPOINT. DP VALVE SHALL MODULATE OPEN UPON CONDITION WHERE PUMPS ARE AT MIN SPEED/FLOW CONDITION AND THE DP IS ABOVE SET POINT. DIFFERENTIAL PRESSURE CONTROL SETPOINTS SHALL BE FIELD DETERMINED BY ATC/TAB CONTRACTORS.

2. EACH BOILER SHALL BE CAPABLE OF CYCLING WHICH BOILER WILL BE SELECTED AS LEAD. THIS WILL BE AUTOMATICALLY CONTROLLED THROUGH THE BOILER BURNER MANUFACTURER CONTROLLER BASED UPON A DETERMINED SCHEDULE BASED UPON BOILER RUN-TIME. THE BOILER BURNER MANAGEMENT CONTROL SYSTEM SHALL DETERMINE WHEN BOILER #1, 2 OR 3 OPERATE AND AT WHICH FIRING RATE SO THAT THE BOILER PLANT OPERATES AT ITS HIGHEST EFFICIENCY.

3. RESET SCHEDULE
AN ADJUSTABLE BOILER TEMPERATURE WATER RESET SCHEDULE, THROUGH THE BURNER MANAGEMENT CONTROL SYSTEM, WILL RESET THE HEATING HOT WATER SUPPLY TEMPERATURE TO MAINTAIN A SUPPLY WATER OF 160°F AT A 0°F O.A.T. AS THE O.A.T. RISES, THE BOILER SUPPLY WATER TEMPERATURE WILL BE REDUCED BY THE BURNER MANAGEMENT CONTROL SYSTEM TO RUN AT A SUPPLY WATER TEMPERATURE OF 110°F AT AN O.A.T. OF 60°F THIS FEATURE WILL BE A LINEAR RELATIONSHIP BETWEEN 160°F TO 110°F BASED ON O.A.T. OUTDOOR AIR RESET SETPOINTS SHALL BE ADJUSTABLE AND SHALL BE COORDINATED WITH BOILER MANUFACTURE REQUIREMENTS.

4. COMBUSTION AIR CONTROL
CLOSING OF THE BOILER'S CONTACTS SHALL OPEN THE COMBUSTION AIR DAMPER ASSOCIATED WITH THE BOILER THAT IS ENABLED & READY TO FIRE. ONCE COMPLETE, THE BURNERS SHALL ENERGIZE. THE COMBUSTION AIR DAMPER SHALL CLOSE SHUT WHEN THE BURNER CIRCUITS ARE DE-ENERGIZED.

5. SAFETY
UPON A BOILER ALARM OR BOILER FAILURE THE BOILER BURNER MANAGEMENT PANEL SHALL SEND AN ALARM TO THE DDC SYSTEM. ONCE A BOILER GENERATES AN ALARM OR FAILURE THE NEXT BOILER IN LINE SHALL BE ENABLED & OPERATE AS REQUIRED TO MAINTAIN HHW SUPPLY TEMPERATURE. THE BOILER IN ALARM/FAILURE SHALL HAVE TO BE MANUALLY RESET

BOILER PLANT	AI	AO	DI	DO	ALARM	REMARKS
BOILER S/S & STATUS (EACH)			X	X	X	GENERAL ALARM
BOILER ISOLATION/CONTROL VALVE (EACH)	X	X				W/ END SWITCH
PUMP S/S & STATUS (EACH)			X	X	X	
HHWS TEMPERATURE	X	X				
HHWR TEMPERATURE	X					
OUTSIDE AIR TEMP.	X					
HHW DIFF PRESSURE BYPASS VALVE	X	X			X	W/ END SWITCH
VFD - EACH PUMP	X	X			X	
HHW BTU ENERGY METER (FLOW/TEMP CALC)	X	X				
BOILER (x2)			X	X	X	

MAIN KITCHEN HOOD VENTILATION CONTROL MAU-1

DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE MAU AND IS CONTROLLED AS FOLLOWS:

THE ROOFTOP UNIT CONSISTS OF AN OUTDOOR AIR DAMPER, FILTER, GAS FIRED FURNACE AND SUPPLY FAN.

THE ROOFTOP UNIT IS SCHEDULED FOR ON/OFF OPERATION BASED ON A PUSH TO START BUTTON IN THE KITCHEN AND PROVIDES TEMPERED MAKE UP AIR FOR THE KITCHEN HOOD.

THE MAU OPERATES IN OCCUPIED - HOOD OFF, OCCUPIED - HOOD ON, UNOCCUPIED AND SAFETY MODES AS FOLLOWS: (ALL SUGGESTED SETPOINTS AND SETTINGS ARE ADJUSTABLE.)

OCCUPIED - HOOD OFF
THE OUTDOOR AIR DAMPER IS CLOSED AND THE UNIT IS OFF.

OCCUPIED - HOOD ON
THE OUTDOOR AIR DAMPER OPENS TO ITS DESIGN "HOOD ON" POSITION, FULL OPEN AND THE GAS FURNACE CONTROL VALVE OR THE DX COOLING MODULATES TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT OF 68° WHEN OAT IS BELOW 60° & 60° WHEN OAT IS ABOVE 60°. THE KITCHEN EXHAUST FAN IS ACTIVATED & MODULATES 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 (HTZ) TO A SLIGHT NEGATIVE PRESSURE. 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.

UNOCCUPIED
THE SUPPLY FAN STOPS AND THE OUTDOOR AIR DAMPER CLOSES.

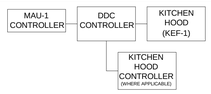
SAFETY
THE SMOKE DETECTOR IN THE SUPPLY AIRSTREAM DE-ENERGIZES THE SUPPLY FAN UPON ACTIVATION. OUTSIDE AIR DAMPER POSITIONS TO THE CLOSED POSITION AFTER THE FAN IS DE-ENERGIZED.

UPON ACTIVATION OF THE ANSUL SYSTEM THE MAU WILL ENTER THE UNOCCUPIED MODE & SHUT DOWN. THE KITCHEN EXHAUST FAN WILL ALSO SHUT DOWN. 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.

Makeup Air Unit (MAU-1)	AI	AO	DI	DO	ALARM
SUPPLY FAN S/S & STATUS			X	X	X
OA DAMPER POS.	X	X			X
FILTER STATUS					X
DISCHARGE AIR TEMP.	X	X			
AIRFLOW CFM (SA & RA)	X	X			
GAS FURNACE (MODULATING CONTROL VALVE)		X			
OUTSIDE AIR TEMP. (FROM DDC)	X				
OUTSIDE AIR %RH (FROM DDC)	X				
SMOKE DETECTOR			X		X
SUPPLY FAN VFD	X		X	X	X
KITCHEN EXHAUST FAN VFD	X		X	X	X
ANSUL SYSTEM			X		X
CO LEVEL ALARM			X		X



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.

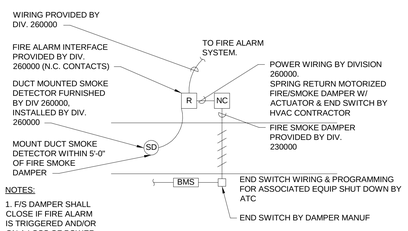
THE CONTROL OF THE MAU SUPPLY AND KITCHEN EXHAUST FAN FOR THE KITCHEN HOOD SHALL BE CONTROLLED BY A "KITCHEN HOOD ENERGY MANAGEMENT CONTROL SYSTEM."

ABBREVIATIONS

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

ATC/BMS GENERAL NOTES: THE FOLLOWING NOTES APPLY TO ALL M5 SERIES HVAC CONTROL DRAWINGS

1. ALL SETPOINTS INDICATED IN THE SEQUENCE OF OPERATIONS SHALL BE ADJUSTABLE.
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 PROVIDDED BY THE ATC CONTRACTOR UNLESS NOTED OTHERWISE.
4. ALL ATC CONTROLS SHALL BE POWERED BY EMERGENCY POWER CIRCUITS COORD W/ DIV 260000
5. ALL HW VALVES SHALL BE FAIL OPEN ON LOSS OF POWER ALL CHILLED WATER VALVES SHALL FAIL CLOSE ON LOSS OF POWER.
6. ALL HW & CHILLED WATER VALVES SHALL BE MODULATING TYPE FOR GPM %%U>%%U 1 GPM, 2-POSITION ACCEPTABLE FOR FLOW < 1GPM
7. ATC CONTRACTOR TO COORDINATE W/ OWNER FOR ALL COMMUNICATION & INTERFACE REQUIREMENTS TO CENTRAL OPERATING STATION. REFER TO SPEC FOR FURTHER INFO.



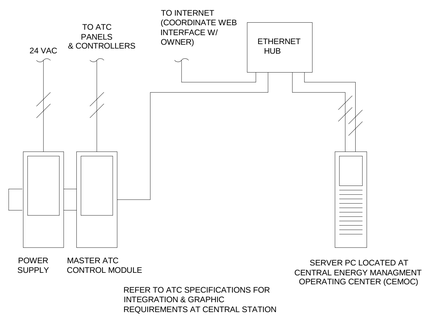
NOTES:

1. F/S DAMPER SHALL CLOSE IF FIRE ALARM IS TRIGGERED AND/OR ON A LOSS OF POWER.

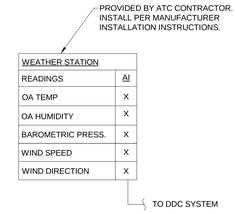
2. ACTIVATED END SWITCH SHALL SHUT DOWN ASSOCIATED EQUIPMENT SUCH AS EXH FAN & RTU THROUGH BMS PROGRAMMING. ALARM SHALL BE CORRECTED AT THE BMS.

FIRE/SMOKE DAMPER DETAIL

(NOT TO SCALE)



ATC FRONT END INTERFACE DIAGRAM



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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

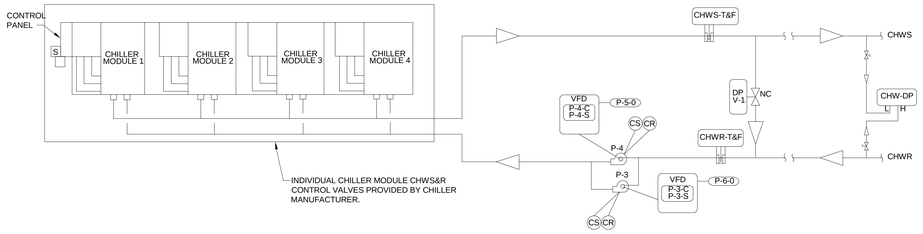
DRAWING NAME

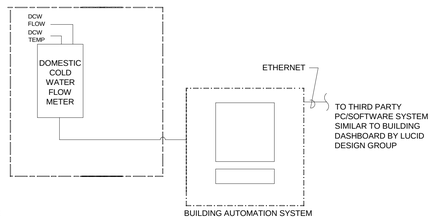
CONTROLS VI - HVAC

PROJECT NO. 1722

DRAWING NO.

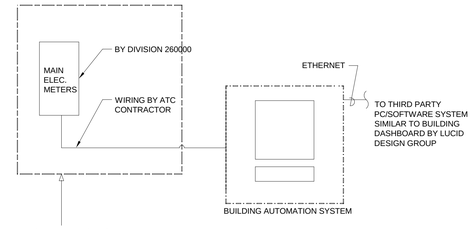
M406





BMS INTERFACE

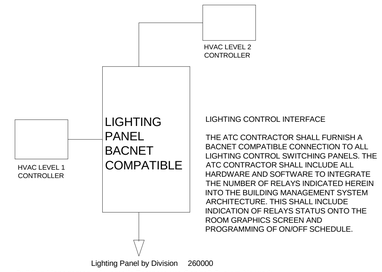
METERS, SENSORS & RELAYS SHALL BE FURNISHED BY THE ATC CONTRACTOR TO INPUT ENERGY CONSUMPTION (BTUH, GPM, ON/OFF STATUS) DATA TO THE BUILDING MANAGEMENT SYSTEM (BMS) FOR TRENDING ENERGY USAGE. ATC CONTRACTOR TO PROVIDE PROGRAMMING REQUIRED FOR DHW HEATER RELAYS TO DETERMINE ENERGY CONSUMED BY ON/OFF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



FROM MAIN ELECTRIC PANELS/METER IN ELECTRIC ROOM - REFER TO ELECTRICAL PLANS

BMS INTERFACE

METERS SHALL BE FURNISHED BY ELEC. CONTRACTOR WITH BACNET OUTPUT TO INPUT ELECTRICAL CONSUPMPTION DATA (KWH) TO THE BUILDING MANAGEMENT SYSTEM (BMS) FOR TRENDING ENERGY USAGE OF HVAC SYSTEMS. PROGRAMMING AND WIRING FROM METER TO BMS SHALL BE BY THE ATC CONTRACTOR.



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
The 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.

CHILLER PLANT CONTROL

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

THROUGH THE CENTRAL AUTOMATIC TEMPERATURE CONTROL SYSTEM AND/OR WHEN THE OUTSIDE TEMPERATURE IS ABOVE 65 DEGREES, THE LEAD PUMP FOR EACH PRIMARY & SECONDARY CHW LOOP SHALL START. IF THE LEAD CHILLED WATER PUMP IN EITHER SYSTEM SHALL FAIL TO START, THE STANDBY PUMP SHALL START IN IT'S PLACE. EACH PUMP SHALL ALSO BE CAPABLE OF DUTY CYCLING WHICH WILL BE AUTOMATICALLY CONTROLLED THROUGH THE DDC SYSTEM. THE DIFFERENTIAL PRESSURE SENSORS LOCATED IN THE SUPPLY AND RETURN PIPING SYSTEMS SHALL MODULATE THE ECM MOTOR TO MAINTAIN A SYSTEM PRESSURE EQUAL TO 2 PSI ABOVE THE SYSTEM PRESSURE SETPOINT. THE CHILLER PLANT SHALL CONTROL BUILDING CHILLED WATER SUPPLY TEMPERATURE. WHEN COMMANDED BY THE BMS DUE TO A COOLING DEMAND, AND THE CHILLED WATER FLOW HAS BEEN PROVEN IN THE SUPPLY WATER SYSTEM, THE CHILLER SHALL START.

RESET SCHEDULE:
AN ADJUSTABLE CHILLED WATER TEMPERATURE WATER RESET SCHEDULE BASED ON OUTDOOR AIR DRYBULB & WETBULB CONDITIONS, THROUGH THE CHILLED WATER SUPPLY SYSTEM, SHALL RESET THE CHILLED WATER SUPPLY TEMPERATURE. THE CHILLER SHALL SUPPLY CHILLED WATER AT A SUPPLY TEMPERATURE OF 45 DEGREES FAHRENHEIT (ADJ.) AT A DESIGN OUTDOOR AIR TEMPERATURE. AS THE OUTDOOR AIR TEMPERATURE DROPS BELOW 75 DEGREES F DB/ 50% RH, THE CHILLER SUPPLY WATER TEMPERATURE WILL BE INCREASED BY THE CHILLER MANAGEMENT CONTROL SYSTEM TO RUN AT A SUPPLY WATER TEMPERATURE OF 55 DEGREES F (ADJ.)

SAFETY:
IF THE CHILLER GOES OFFLINE ON A HIGH OR LOW WATER TEMPERATURE OR FLOW (ADJ.) FAILURE, AN ALARM WILL BE INDICATED BY THE CENTRAL AUTOMATIC CONTROL SYSTEM.

THE DIFFERENTIAL BYPASS VALVE ON THE PRIMARY LOOP SHALL MODULATE OPEN UPON A VFD FAILURE OR AS REQUIRED TO MEET MINIMUM CHILLED WATER FLOW REQUIREMENTS. THE DIFFERENTIAL PRESSURE CONTROL SETPOINTS SHALL BE FIELD DETERMINED BY ATC/TAB CONTRACTOR AND SHALL BE ADJUSTABLE.

CONTROL POINT	AI	AO	DI	DO	ALARM	SHOW ON GRAPHICS	REMARKS
CHILLER S/S & STATUS			X	X	X	X	
PUMP S/S & STATUS (EACH)			X	X	X	X	
CHWS TEMPERATURE	X	X				X	
CHWR TEMPERATURE	X					X	
CHWS FLOW	X				X	X	
VFD/ECM (EACH)	X	X			X	X	
CHW DIFF. PRESS. BYPASS	X	X			X	X	
PUMP SPEED (EACH)	X	X			X	X	
OUTSIDE AIR TEMP. (DB & WB)	X					X	FROM WEATHER STATION
OUTSIDE AIR HUMIDITY (% RH)	X					X	FROM WEATHER STATION

ATC CONTRACTOR TO PROVIDE ALL NECESSARY SENSORS, WIRING, PROGRAMMING, & MAPPING AS REQUIRED TO ACHIEVE SEQUENCE & OBTAIN ALL POINTS INDICATED ABOVE. ATC CONTRACTOR TO COORD. W/ UNIT MANUFACTURER TO PROVIDE SEAMLESS COMMUNICATION BETWEEN UNIT CONTROLS, INPUTS/OUTPUTS TO BMS SYSTEM GRAPHICS, & PROVIDE ALL READABLE/WRITEABLE POINTS.

BUILDING ENERGY METERING SYSTEM	AI	AO	DI	DO	ALARM	REMARKS
ELECTRICAL METER			X	X		ELEC. METER BY E.C., PROVIDE POINTS VIA METER
DOMESTIC CW FLOW METER	X	X				

EXHAUST FAN CONTROL:

REFER TO DRAWINGS AND SCHEDULES FOR TYPE OF CONTROL REQUIRED FOR EACH FAN. ALL MOTOR OPERATED DAMPERS SHALL BE PROVIDED AND WIRED BY THIS CONTRACTOR TO OPERATE AS SEQUENCED BELOW. THESE DAMPERS SHALL ALSO BE PROVIDED WITH END SWITCHES TO CONFIRM DAMPER POSITION. UPON RECEIVING A SIGNAL THE DAMPER WILL OPEN, ONCE THE END SWITCH MAKES CONTACT THE FAN WILL START. (TYPICAL FOR ALL FANS WITH MOTORIZED DAMPERS.) 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/ MFGR) AND ASSOCIATED WIRING FROM FAN TO BMS SYSTEM.

1. TYPE 1: EXHAUST FAN SHALL BE INTERLOCKED WITH NOTED AIR HANDLING UNIT (REFER TO SCHEDULE) TO RUN WHEN AIR HANDLING UNIT RUNS, AND DE-ENERGIZE WHEN AIR HANDLING UNIT IS OFF.
2. TYPE 2: EXHAUST FAN IS CONTROLLED BY SPACE THERMOSTAT. ON A RISE IN SPACE TEMPERATURE, THE EXHAUST FAN SHALL START AND MAKE-UP AIR DAMPERS SHALL OPEN.
3. TYPE 3: EXHAUST FAN IS CONTROLLED FROM A WALL MOUNTED SWITCH WITH PILOT LIGHT. SWITCH AND PILOT LIGHT PROVIDED BY DIVISION 230000, WIRED BY DIVISION 260000.
4. TYPE 4: EXHAUST FAN IS WIRED INTO LIGHTING CIRCUIT TO OPERATE WHEN LIGHTS ARE ON. WIRED BY DIVISION 260000.
5. TYPE 5: EXHAUST FAN SHALL BE CONTROLLED BY BMS SCHEDULING AND SHALL OPERATE DURING OCCUPIED CONDITIONS AND OFF DURING UNOCCUPIED CONDITIONS.
6. TYPE 6: UPON ACTIVATION OF FUME HOOD (FAN SWITCH ON HOOD) THE ASSOCIATED EXHAUST FAN SHALL ENERGIZE, ASSOCIATED VAV BOX SHALL OVERRIDE POSITION AND MODULATE TO MAX OPEN POSITION AND THE RETURN AIR MOTORIZED DAMPER SHALL CLOSE. WHEN HOOD IS OFF EXHAUST FAN SHALL DE-ENERGIZE, VAV BOX SHALL MODULATE BASED ON ROOM DEMAND AND RETURN AIR MOTORIZED DAMPER SHALL OPEN. BYPASS DAMPER ON EXH FAN SHALL MODULATE AS REQUIRED TO MAINTAIN PLUME HEIGHT.
7. TYPE 7: UPON ACTIVATION OF THE BEAM DETECTORS LOCATED WITHIN THE ATRIUM THE FIRE ALARM WILL BE ACTIVATED, THIS IS DONE BY THE ELECTRICIAN. THE ATC CONTRACTOR SHALL PROVIDE THE NECESSARY RELAYS, CONTROLLERS, SIGNALS, WIRING, PROGRAMMING & LOGIC TO INITIATE THE SMOKE EVACUATION SYSTEM THROUGH A SIGNAL FROM THE FIRE ALARM PANEL. ONCE THIS ATRIUM BEAM DETECTOR ZONE IS ACTIVATED THE MOTORIZED DAMPERS IN THE ROOF MOUNTED SMOKE EXHAUST FANS SEF-1, SEF-2, SEF-3 & SEF-4 SHALL OPEN ALONG WITH THE MAKE UP AIR LOUVER MOTORIZED DAMPERS. ONCE THE END SWITCHES MAKE CONTACT THE EXHAUST FANS SHALL START AND CONTINUE TO OPERATE UNTIL FIRE PERSONNEL REACH THE SITE. THROUGH OPERATION OF HAND OPERATED SWITCHES AT THE FACP, THE FIRE PERSONNEL SHALL DEACTIVATE OR WILL CYCLE VARIOUS SMOKE EXHAUST FANS AND MAKE-UP AIR DAMPERS TO SUITE SITE CONDITIONS.

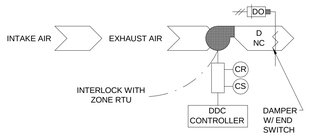
MISCELLANEOUS BMS POINTS							
UNIT#	UNIT FUNCTION	UNIT LOCATION	AI	AO	DI	DO	ALARM	REMARKS
AW-1	ACID NEUTRALIZER	---	X				X	
FS-1	EYEWASH FLOW SWITCH	---	X				X	NOTE #1
FS-2	EYEWASH FLOW SWITCH	---	X				X	NOTE #1
FS-3	EYEWASH FLOW SWITCH	---	X				X	NOTE #1
FS-4	EYEWASH FLOW SWITCH	---	X				X	NOTE #1
FS-5	EYEWASH FLOW SWITCH	---	X				X	NOTE #1
GSM-1	GAS METER	---	X					NOTE #1
RP-1	HWR CIR	---	X				X	NOTE #1
RP-2	HWR CIR	---	X				X	NOTE #1
WH-1	HW HEATER	---	X				X	NOTE #1
WH-2	HW HEATER	---	X				X	NOTE #1
WH-3	HW HEATER	---	X				X	NOTE #1
WH-4	NP HW HEATER	---	X				X	NOTE #1
	EMERG GENSET, STATUS ON/OFF				X		X	VIA GENSET DRY CONTACTS, NOTE #2
	FREEZER ALARM					X	X	VIA DRY CONTACTS (TYP FOR 2)
	LEAK DETECTION				X	X	X	NOTE #3
	ELEC. MAIN METER		X					NOTE #4
	ELEC. DEMAND METERS (30x)		X					NOTE #4

NOTE #1: ACTUAL METER, FLOW SWITCH & HIGH/LOW SENSOR FURNISHED & INSTALLED BY DIVISION 220000. COORDINATE INSTALLATION OF SENSORS 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.

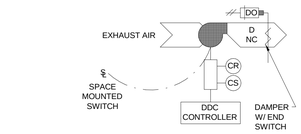
NOTE #2: ATC CONTRACTOR TO PROVIDE NECESSARY CONDUIT, WIRING, SENSORS, CONTROLLERS AND RELAYS FROM ATC MAIN CONTROL PANEL TO EMERGENCY GENERATOR FOR STATUS.

NOTE #3: ATC CONTRACTOR TO PROVIDE NECESSARY CONTROLLERS, WIRING & CONDUITS FOR COMMUNICATIONS & INTEGRATION WITH ELECTRICAL DEMAND & SERVICE METERS. ATC CONTRACTOR SHALL COORDINATE W/ ELECTRICAL CONTRACTOR & PROVIDE PROGRAMMING & GRAPHICAL REPRESENTATION OF ALL ELECTRICAL METERS & COLLECTED INFORMATION. ALSO PROVIDE INDIVIDUAL DESCRIPTIONS OF EACH DEMAND METER & ASSOCIATED CIRCUITS SUCH AS LIGHTING, PLUG LOADS, MECHANICAL EQUIPMENT, ETC. AS WELL AS THEIR LOCATION IN THE BUILDING.

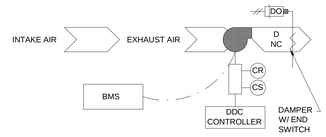
KEY: WH = WATER HEATER, RP = CIRCULATOR PUMP, NT = NEUTRALIZATION TANK, GB = GAS BOOSTER, GSM = GAS METER, FS = FLOW SWITCH, DWB = DOMESTIC WATER BOOSTER, HWSM = HOT WATER SUB METER, CWSM = COLD WATER SUB METER.



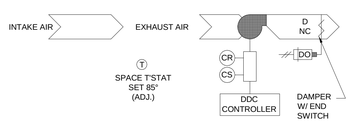
EXHAUST FAN - TYPE I CONTROLS



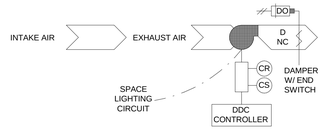
EXHAUST FAN - TYPE III CONTROLS



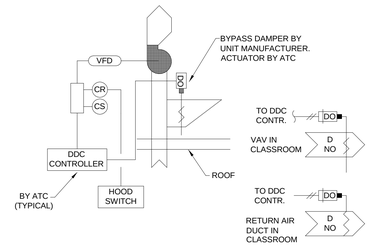
EXHAUST FAN - TYPE V CONTROLS



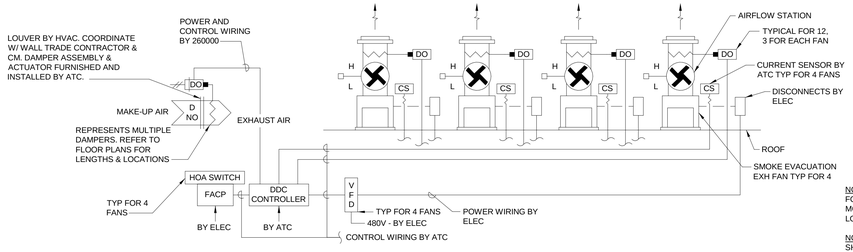
EXHAUST FAN - TYPE II CONTROLS



EXHAUST FAN - TYPE IV CONTROLS



EXHAUST FAN - TYPE VI CONTROLS



SMOKE EVACUATION EXHAUST FAN - TYPE VII CONTROLS

NOTE 1: REFER TO DRAWING M408 FOR LOCATIONS OF MAKE-UP AIR MOTORIZED DAMPER OPERATED LOUVERS & DOORS.

NOTE 2: SMOKE EXHAUST SYSTEM SHALL COMPLY WITH THE REQUIREMENTS OF UL 864 AND IBC SECTION 909.

ABBREVIATIONS

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

ATC/BMS GENERAL NOTES: THE FOLLOWING NOTES APPLY TO ALL M5 SERIES HVAC CONTROL DRAWINGS

1. ALL SETPOINTS INDICATED IN THE SEQUENCE OF OPERATIONS SHALL BE ADJUSTABLE.
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 PROVIDDED BY THE ATC CONTRACTOR UNLESS NOTED OTHERWISE.
4. ALL ATC CONTROLS SHALL BE POWERED BY EMERGENCY POWER CIRCUITS COORD W/ DIV 260000
5. ALL HW VALVES SHALL BE FAIL OPEN ON LOSS OF POWER ALL CHILLED WATER VALVES SHALL FAIL CLOSE ON LOSS OF POWER.
6. ALL HW & CHILLED WATER VALVES SHALL BE MODULATING TYPE FOR GPM %%U>%%U 1 GPM, 2-POSITION ACCEPTABLE FOR FLOW < 1GPM
7. ATC CONTRACTOR TO COORDINATE W/ OWNER FOR ALL COMMUNICATION & INTERFACE REQUIREMENTS TO CENTRAL OPERATING STATION. REFER TO SPEC FOR FURTHER INFO.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

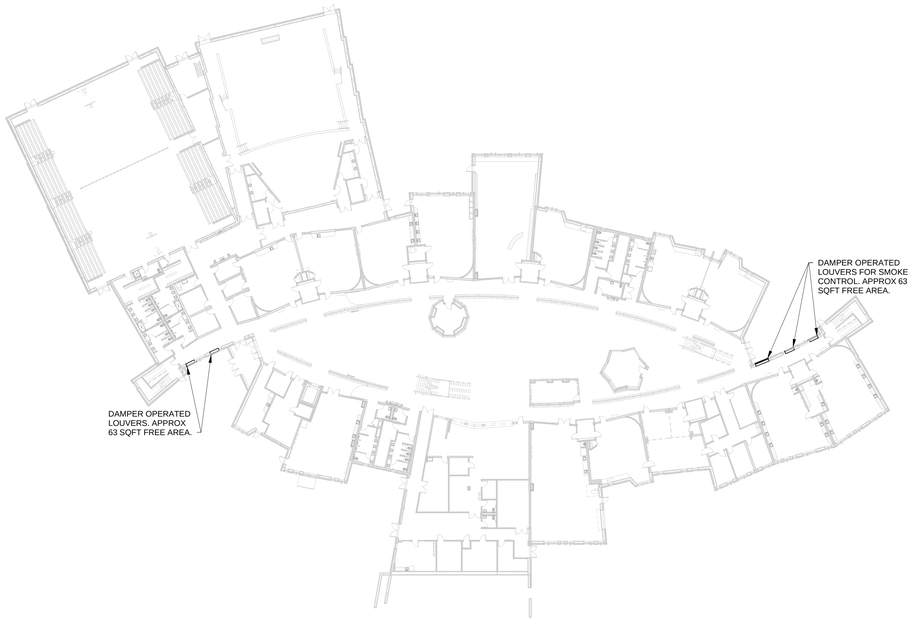
DRAWING NAME

CONTROLS VII - HVAC

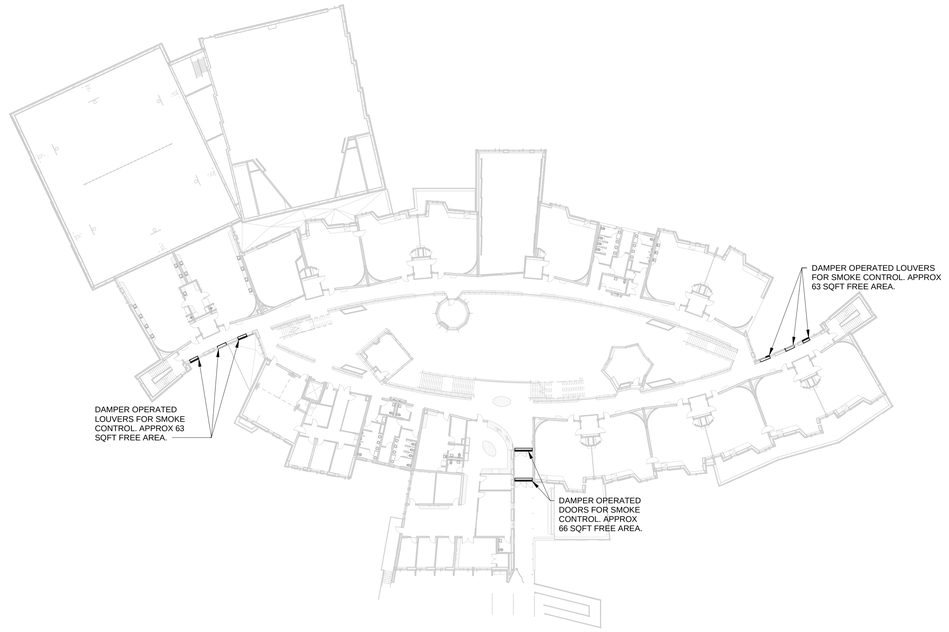
PROJECT NO. 1722

DRAWING NO.

M407



4 FLOOR 01 SMOKE CONTROL
1/32" = 1'-0"



3 FLOOR 02 SMOKE CONTROL
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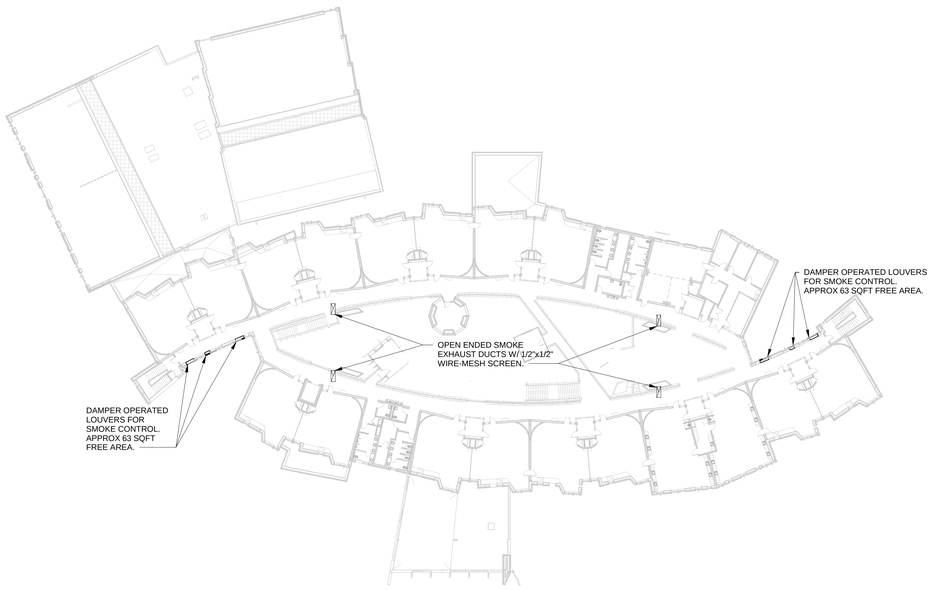
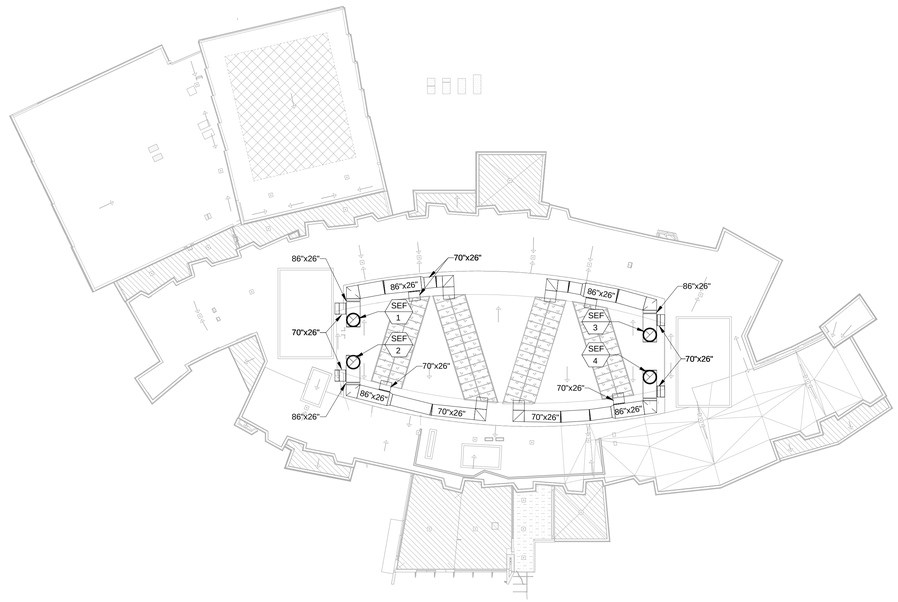


2 FLOOR 03 SMOKE CONTROL
1/32" = 1'-0"



1 HVAC ROOF PLAN SMOKE CONTROL
1/32" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

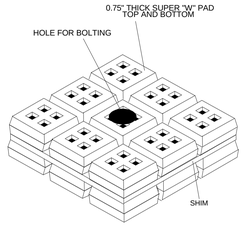
DRAWING NAME

SMOKE CONTROL I - HVAC

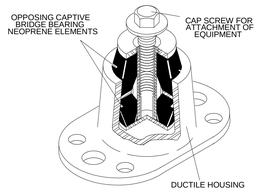
PROJECT NO. 1722

DRAWING NO.

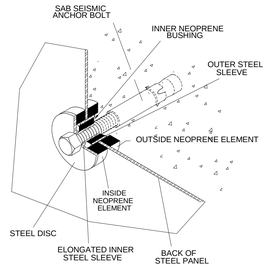
M408



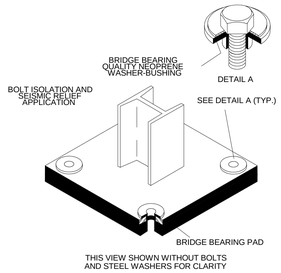
LAYERED SUPER "W" PADS
WITH STEEL SHIM
SPECIFICATION 1



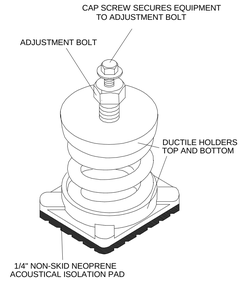
RESTRAINED BR MOUNT
SPECIFICATION 2



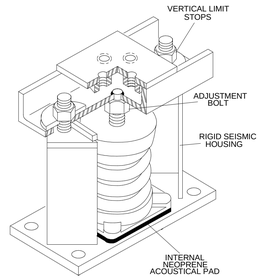
PB BUSHING
SPECIFICATION 3



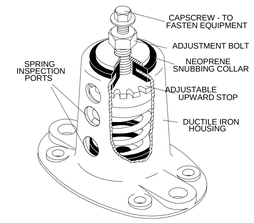
HG NEOPRENE BUSHING
SPECIFICATION 4



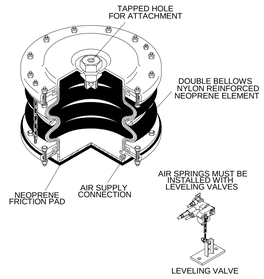
SLF SPRING MOUNT
SPECIFICATION 5



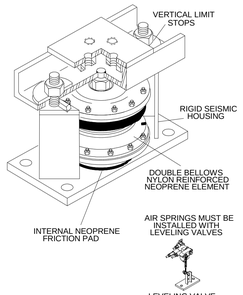
SLR SPRING MOUNT
SPECIFICATION 6



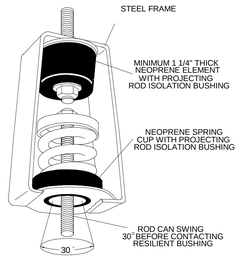
SSLFH HOUSED SPRING MOUNT
SPECIFICATION 7



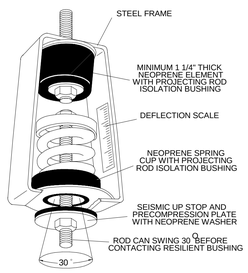
MT AIR SPRING MOUNT
SPECIFICATION 8



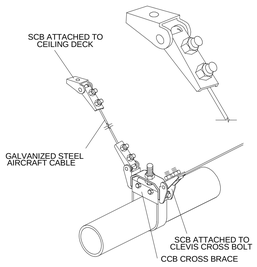
SLR AIR SPRING MOUNT
SPECIFICATION 9



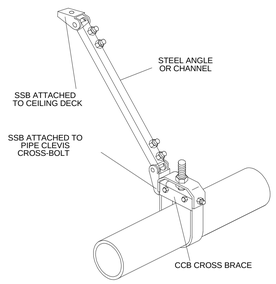
30N SPRING AND NEOPRENE HANGER
SPECIFICATION 10



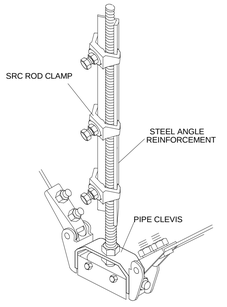
PC30N PRECOMPRESSED
SPRING AND NEOPRENE HANGER
SPECIFICATION 11



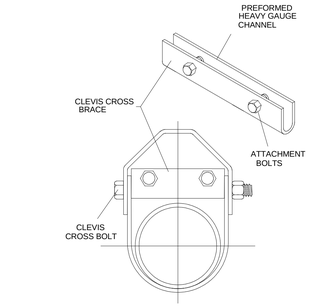
SCB, SCBH, AND SCBV CABLE RESTRAINTS
OSPD PRE-APPROVAL NO. 0202
SPECIFICATION 12



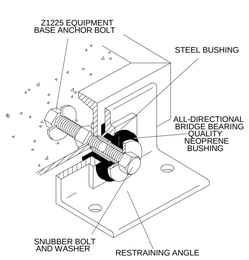
SEISMIC SOLID BRACE
SPECIFICATION 13



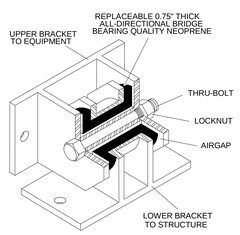
SRC SEISMIC ROD CLAMPS
SPECIFICATION 14



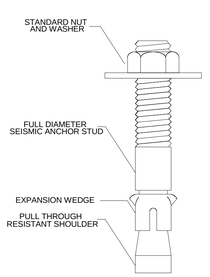
CCB CLEVIS CROSS BRACE
SPECIFICATION 15



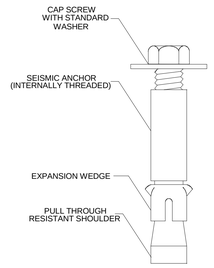
Z1225 ALL DIRECTIONAL SEISMIC SNUBBER
SPECIFICATION 16



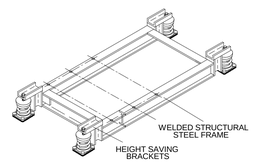
Z1011 ALL DIRECTIONAL SEISMIC SNUBBER
SPECIFICATION 17



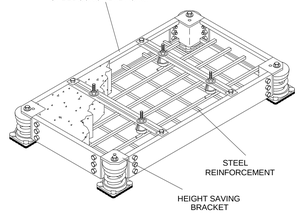
SAS SEISMIC ANCHOR STUD
SPECIFICATION 18



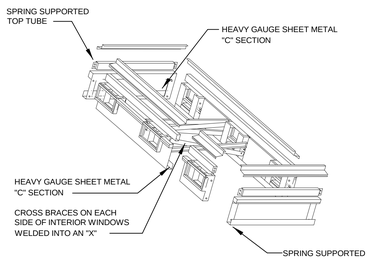
SAB SEISMIC ANCHOR BOLT
SPECIFICATION 19



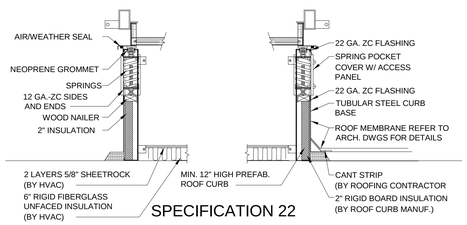
WF WIDE FLANGE STEEL BASE
SPECIFICATION 20



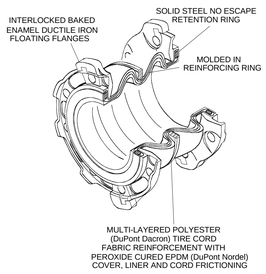
BMK CONCRETE FORM BASE
SPECIFICATION 21



RCS SEISMIC ROOFTOP CURB
SPECIFICATION 22

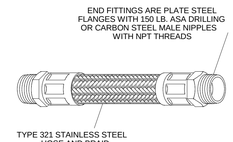


SPECIFICATION 22
SEISMIC SPRING ROOF CURB DETAIL

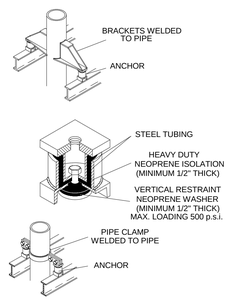


SFDEJ MOLDED EXPANSION JOINT
SPECIFICATION 23

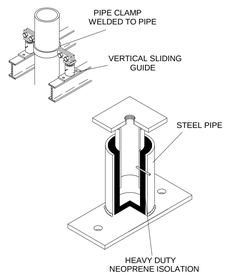
NOTE: PROVIDE 30" HIGH CURB OF SIMILAR CONSTRUCTION WITH SUPPLY AND RETURN AIR PLENUM SECTIONS AS REQUIRED TO OFFSET FOR ROOF SUPPLY AIR AND RETURN AIR OPENING LOCATIONS. PLENUMS SHALL BE OF SUFFICIENT SIZE AND AREA TO MAINTAIN LOW AIRFLOW VELOCITIES (<850 CFM) WITHIN PLENUM SECTIONS.



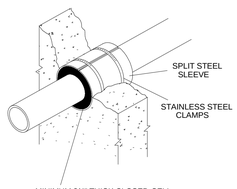
BSS STAINLESS STEEL HOSE
SPECIFICATION 24



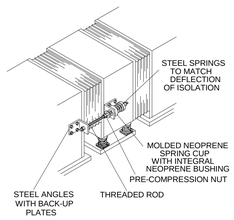
ADA ALL DIRECTIONAL ANCHOR
SPECIFICATION 25



VSG VERTICAL SLIDING GUIDES
SPECIFICATION 26



SWS ACOUSTICAL WALL, CEILING
OR FLOOR SEAL
SPECIFICATION 27



WB HORIZONTAL THRUST RESTRAINTS
USED IN PAIRS
SPECIFICATION 28

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
VIBRATION & SEISMIC DETAILS

PROJECT NO. 1722

DRAWING NO.
VS101

SYMBOL LIST

LIGHTING FIXTURES

(see lighting fixture schedule)

FLUORESCENT LIGHT FIXTURE, CEILING MOUNTED SURFACE OR RECESSED.

FIXTURE WIRED TO NORMAL/EMERGENCY CIRCUIT.

FLUORESCENT BARE LAMP CHANNEL STRIP OR INDUSTRIAL STRIP.

SINGLE FACE INTERNALLY LIT EXIT SIGN, DIRECTIONAL INDICATORS OF THE 'CHEVRON' TYPE AS INDICATED ON DRAWINGS.

DOUBLE FACE INTERNALLY LIT EXIT SIGN, DIRECTIONAL INDICATORS OF THE 'CHEVRON' TYPE AS INDICATED ON DRAWINGS.

CEILING MOUNTED FIXTURE-RECESSED, SURFACE OR PENDANT.

WALL MOUNTED FIXTURE.

FIXTURE KEYING SYSTEM

A1 — 32b

A1 = FIXTURE TYPE 32= CIRCUIT #, b= SWITCH CONTROL

EB

EMERGENCY BATTERY UNIT WITH INTEGRAL HEADS.

TRACK MOUNTED FIXTURES-LENGTH OF TRACK AS INDICATED ON DRAWINGS.

POLE MOUNTED FIXTURE-DOUBLE OR SINGLE HEAD.

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.

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 LOCAL SWITCHING / DIMMING STATION - REFER TO ALCS RISER DIAGRAM
- L_K ALCS KEYED LOCAL SWITCHING STATION - REFER TO ALCS RISER DIAGRAM
- L_V ALCS VANDAL RESISTANT LOCAL SWITCHING STATION - REFER TO ALCS RISER DIAGRAM
- M ALCS MASTER SWITCHING / DIMMING 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.
- 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.
- IO ALCS INPUT/OUTPUT MODULE - REFER TO ALCS ONE-LINE DIAGRAM.
- E/R EMERGENCY BY-PASS RELAY - REFER TO EMERGENCY SUPERVISORY BY-PASS RELAY DETAIL
- PC PHASE CUT DIMMING MODULE - REFER TO ALCS ONE-LINE DIAGRAM

SECURITY SYSTEM

REFER TO DWG. E500 FOR SECURITY SYMBOL LIST

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
- F UNDERGROUND FIRE ALARM 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.

MECHANICAL EQUIPMENT

(REFER TO MECHANICAL EQUIPMENT SCHEDULE)

- BB ELECTRIC BASEBOARD-FURNISHED BY HVAC, INSTALLED AND WIRED BY EC.
- CH 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

W VOICE OUTLET - AT 18" A.F.F., UNO - DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING AND PULL LINE IN A 1" CONDUIT TO CABLE TRAY. MOUNTING DESIGNATIONS: "C"=ABOVE COUNTER, "W" WALL PHONE AT 48" A.F.F. WIRING AND JACKS BY I.T. SUBCONTRACTOR

VOICE/DATA OUTLET - AT 18" A.F.F., UNO - DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING AND PULL LINE IN A 1" CONDUIT TO CABLE TRAY. MOUNTING DESIGNATIONS: "C"=ABOVE COUNTER. WIRING AND JACKS BY I.T. SUBCONTRACTOR.

DATA OUTLET - AT 18" A.F.F. UNO-DOUBLE GANG BOX WITH SINGLE GANG PLASTER RING AND PULL LINE IN A 1" CONDUIT TO CABLE TRAY. MOUNTING DESIGNATIONS: "C"=ABOVE COUNTER, "AN"=WIRELESS ACCESS POINT MTD. AT 8'-6" A.F.F. U.N.O. JACKS AND WIRING BY I.T. SUBCONTRACTOR.

DATA OUTLET FLUSH FLOOR MOUNTED - PROVIDE FLOOR BOX WITH SINGLE GANG OPENING WITH 1"C. WITH PULL LINE TO NEAREST ACCESSIBLE CEILING OF SAME FLOOR. WIRING AND JACKS BY I.T. SUBCONTRACTOR.

CLOCK, WALL MOUNTED - 120V PIGTAIL CONNECTOR FURNISHED BY I.T. SUBCONTRACTOR AND CONNECTED BY E.C. COORDINATE M.H. WITH I.T. SUBCONTRACTOR. CONNECT TO NEAREST 120V RECEPTACLE CIRCUIT OR AS SHOWN ON DRAWINGS. CLOCK FURNISHED & INSTALLED BY I.T. SUBCONTRACTOR.

CR DATA OUTLET FOR DATA CORD REEL - MTD AT UNI-STRUT GRID UNO. SINGLE GANG OPENING WITH SINGLE GANG PLASTER RING AND PULL LINE TO NEAREST ACCESSIBLE CEILING SPACE. DATA WIRING AND JACK BY I.T. SUBCONTRACTOR. REFER TO FLOOR PLANS. DATA CORD REEL PROVIDED BY E.C.

TVC VIDEO OUTLET & (2) 20AMP 120VOLT DUPLEX RECEPTACLE OUTLET PROVIDE WIREMOLD SERIES EFSB4 WALL BOX MODEL# EFSB4 OR EQUAL- AT 54"A.F.F., UNO-WITH (1)1"C. FOR DATA AND (1)2"C FOR FUTURE A/V WIRING WITH PULL LINE TO CABLE TRAY. DATA WIRING AND JACK BY I.T. SUBCONTRACTOR. SEE DETAIL 3/E306

TVE VIDEO OUTLET & (2) 20AMP 120VOLT DUPLEX RECEPTACLE OUTLET PROVIDE WIREMOLD SERIES EFSB4 WALL BOX MODEL# EFSB4 OR EQUAL- AT 54"A.F.F., UNO-WITH (1)1"C. FOR DATA AND (1)2"C FOR FUTURE A/V WIRING WITH PULL LINE TO CABLE TRAY. DATA WIRING AND JACK BY I.T. SUBCONTRACTOR. SEE DETAIL 3/E306

T VOICE/DATA OUTLET - AT 18" A.F.F., UNO - (2)DOUBLE GANG OPENING AND (2) 4"SQ.X4"DEEP J-B. WITH (4) 1"C. WITH PULL LINE T TO CABLE TRAY. (1) SINGLE GANG OPENINGS AND (1) 4"SQ. X 2 1/2"DP J-B. WITH (2) 1"C. WITH PULL LINE TO CABLE TRAY. MOUNTING DESIGNATIONS: "C"=ABOVE COUNTER. WIRING AND JACKS BY I.T. SUBCONTRACTOR.

T2 VOICE/DATA OUTLET - AT 18" A.F.F., UNO - (1)DOUBLE GANG OPENING AND (2) 4"SQ.X4"DEEP J-B. WITH (2) 1"C. WITH PULL LINE TO CABLE TRAY. (2) SINGLE GANG OPENINGS AND (2) 4"SQ. X 2 1/2"DP J-B. WITH (2) 1"C. WITH PULL LINE TO CABLE TRAY MOUNTING DESIGNATIONS: "C"=ABOVE COUNTER. WIRING AND JACKS BY I.T. SUBCONTRACTOR.

S CEILING FLUSH MOUNTED SPEAKER. BACKBOX FURNISHED BY IT SUBCONTRACTOR, INSTALLED BY E.C.

S FLUSH MOUNTED WALL MOUNTED SPEAKER. BACKBOX FURNISHED BY IT SUBCONTRACTOR, INSTALLED BY E.C.

S WP FLUSH MOUNTED EXTERIOR SPEAKER - BACKBOX FURNISHED BY I.T. CONTRACTOR, INSTALLED BY E.C.

S CEILING SURFACE MOUNTED SPEAKER, BACKBOX FURNISHED BY IT SUBCONTRACTOR, INSTALLED BY E.C.

V WALL MOUNTED VOLUME CONTROL OUTLET AS DESIGNATED- SINGLE GANG JB WITH SINGLE GANG PLASTER RING AND PULL LINE IN A 1" CONDUIT TO CABLE TRAY. MOUNTING HEIGHT AT 48" A.F.F. UNLESS OTHERWISE NOTED. WIRING AND JACKS BY I.T. SUBCONTRACTOR.

SRP SMART RESCUE PHONE. CUSTOM BACK BOX FURNISHED BY IT SUBCONTRACTOR AND INSTALL BY E.C. 1" CONDUIT W/PULL STRING TO CABLE TRAY BY E.C.. DEVICE AND WIRING BY I.T. SUBCONTRACTOR.

ARA AREA OF RESCUE ASSISTANCE BUTTON. CUSTOM BACK BOX FURNISHED BY IT SUBCONTRACTOR AND INSTALL BY E.C. 1" CONDUIT W/PULL STRING TO CABLE TRAY BY E.C.. DEVICE AND WIRING BY I.T. SUBCONTRACTOR.

IC INTERCOM CALL SWITCH - AT 48" A.F.F., - SINGLE GANG JB AND 4"SQ. X 2 1/2"DP J.B. WITH 1"C. WITH PULL LINE TO CABLE TRAY. MOUNTING WIRING AND JACKS BY I.T. SUBCONTRACTOR

M MICROPHONE OUTLET AS DESIGNATED- SINGLE GANG FACE PLATE AND 4"SQ.X2 1/2"DPJ. BOX. E.C. SHALL PROVIDE 1"C. WITH PULL LINE TO ACCESSIBLE CEILING SPACE. OR DIRECTLY TO AMPLIFIER WHERE EXPOSED STRUCTURE OR NON-ACCESSIBLE CLG. WIRING AND JACKS BY IT SUBCONTRACTOR.

AMP SOUND SYSTEM AMPLIFIER SYSTEM FURNISHED BY IT SUBCONTRACTOR, INSTALLED AND WIRED BY EC.

A/J AUDIO OUTLET AS DESIGNATED- SINGLE GANG FACE PLATE AND 4"SQ.X2 1/2"DPJ. BOX. E.C. SHALL PROVIDE 1"C. WITH PULL LINE TO ACCESSIBLE CEILING SPACE. OR DIRECTLY TO AMPLIFIER WHERE EXPOSED STRUCTURE OR NON-ACCESSIBLE CLG. WIRING AND JACKS BY IT SUBCONTRACTOR.

S WP FLUSH WALL MOUNTED LOCAL SOUND SYSTEM SPEAKER. BACKBOX FURNISHED BY IT SUBCONTRACTOR, INSTALLED BY E.C. 1" CONDUIT WITH PULL LINE & RUN TO AMPLIFIER BY E.C..

S LS CEILING MOUNTED LOCAL SOUND SYSTEM SPEAKER. BACKBOX FURNISHED BY IT SUBCONTRACTOR, INSTALLED BY E.C. 1" CONDUIT WITH PULL LINE & RUN TO AMPLIFIER BY E.C..

GS CEILING MOUNTED GYMNASIUM LOUDSPEAKER. BACKBOX FURNISHED BY IT SUBCONTRACTOR, INSTALLED BY E.C. PROVIDE 1" CONDUIT WITH PULL LINE TO AMPLIFIER.

A1 ANTENNA WALL PLATE - AT 10'-6" A.F.F. UNO-SINGLE GANG OPENING AND 4"SQ. X 2 1/2"DP J.B. WITH 1" CONDUIT WITH PULL LINE & RUN TO AMPLIFIER BY E.C.. JACKS AND WIRING BY I.T. SUBCONTRACTOR.

A AUDIO INPUT PLATE - AT 15" A.F.F. UNO-SINGLE GANG OPENING AND 4"SQ. X 2 1/2"DP J.B. WITH 1" CONDUIT WITH PULL LINE & RUN TO AMPLIFIER BY E.C.. JACKS AND WIRING BY I.T. SUBCONTRACTOR.

ACS AUDIO CONTROL STATION - AT 46" A.F.F. UNO-FIVE GANG OPENING AND 12 1/4"W X 4 1/2"H X 2 1/2"D J.B. WITH (3)1" CONDUIT WITH PULL LINE & RUN TO AMPLIFIER BY E.C.. JACKS AND WIRING BY I.T. SUBCONTRACTOR.

ALS ASSISTIVE LISTENING SYSTEM. F & I BY I.T. CONTRACTOR.

R PRIORITY RELAY. F & I BY I.T. CONTRACTOR.

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 L O AUTOMATIC TRANSFER SWITCH.
- K_1 KIRK-KEY INTERLOCK

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.

RECEPTACLES

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

TYPICAL OUTLET NOTATIONS

- "a" =SWITCHED OUTLET, "a" - INDICATES SWITCH CONTROL.
- "C" = MOUNTED 6" ABOVE COUNTER OR 42" AFF. COORDINATE EXACT MOUNTING HEIGHT WITH ARCHITECTURAL DRAWINGS.
- "F" =FURNITURE MTD, COORDINATE EXACT LOCATION WITH FURNITURE PLANS.
- "GFC" =GROUND FAULT INTERRUPTER TYPE MOUNTED AT 42" AFF.
- "GFI" = GROUND FAULT INTERRUPTER TYPE.
- "H" =HORIZONTALLY MOUNTED.
- "IG" = ISOLATED GROUND RECEPTACLE WITH SEPARATE GREEN GROUND CONDUCTOR WITH YELLOW 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 NEMA 4 ENCLOSURE W/KEY LOCK.
- "CD" = CABLE DROP RECEPTACLE- REFER TO CABLE DROP DETAIL.
- "CR" = CORD REEL - REFER TO FLOOR PLANS AND CORD REEL DETAIL.
- "P" = PEDESTAL MOUNTED ON CASEWORK WITH GFI RECEPTACLE. COORDINATE WITH EQUIPMENT DRAWINGS FOR EXACT LOCATION.
- "E" = RECEPTACLE CONNECTED TO NORMAL/EMERGENCY CIRCUIT.
- "G" = OUTLET FOR GOGGLE CABINET, MOUNTED 6'-6" A.F.F. (REFER TO ARCHITECTURAL ELEVATIONS)

20AMP, 120 VOLT SINGLE RECEPTACLE

2 20 AMP, 120 VOLT DUPLEX RECEPTACLE; "2" INDICATES CIRCUIT NUMBER.

20AMP, 120 VOLT DOUBLE DUPLEX RECEPTACLE.

20 AMP, 120 VOLT DUPLEX RECEPTACLE INTENDED FOR SWITCHED POWER. COLOR OF OUTLET TO BE SELECTED BY OWNER.

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.

EWC J EWC ELECTRIC WATER COOLER OUTLET OR BOTTLE FILLING STATION - 20 AMP, 120 VOLT. PROVIDE GROUND FAULT INTERRUPTER TYPE CIRCUIT BREAKER.

20AMP, 120VOLT DUPLEX RECEPTACLE CONNECTED TO NORMAL/ EMERGENCY CIRCUIT.

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.

S D 20 AMP, 120 VOLT DUPLEX SWITCHED RECEPTACLE. PROVIDE IO MODULE AND CONNECTION TO OCCUPANCY SENSOR.

S D/FSD 20 AMP, 120 VOLT DOUBLE DUPLEX SWITCHED RECEPTACLE. PROVIDE IO MODULE AND CONNECTION TO OCCUPANCY SENSOR.

RECESSED FLOOR BOX WITH (2) 20A, 120V DUPLEX RECEPTACLES AND PROVISIONS FOR (4) RJ45 JACKS EQUAL TO WIREMOLD #RFB4-XX - FPCTCBS (CARPET), FPBTCBS (WOOD FLOOR). PROVIDE 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 #RFB8S-XX - FPCTCBS (CARPET), FPBTCBS (WOOD FLOOR). PROVIDE (6)1"C FOR TEL/DATA TO NEAREST ACCESSIBLE CEILING SPACE.

1V/2D 2 4 FLUSH MOUNTED 2 HOUR RATED POKE-THRU ASSEMBLY WITH (2) DUPLEX RECEPTACLES & (4) COMMUNICATION DEVICES EQUAL TO WIREMOLD EVOLUTION 6AT SERIES WITH SOLID BRASS FINISH RING OR EQUAL. REQUIRES 6" CORED HOLE.

T RECESSED 2HR RATED FLOOR BOX WITH (2) 20A, 120V DUPLEX RECEPTACLES AND PROVISIONS FOR (4) RJ45 JACKS EQUAL TO WIREMOLD #RFB8S-FC - FPCTCBS (CARPET), FPBTCBS (WOOD FLOOR). PROVIDE (6)1"C FOR TEL/DATA TO NEAREST ACCESSIBLE CEILING SPACE.

CR CORD REEL - REFER TO FLOOR PLANS AND CORD REEL DETAIL.

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.
- T5 T DRY TYPE TRANSFORMER - REFER TO TRANSFORMER SCHEDULE FOR RATINGS "T5"-INDICATES 45KVA TRANSFORMER. "K13" INDICATES TRANSFORMER WITH A K13 RATING.
- E ELECTRIC MANHOLE
- T TELEPHONE MANHOLE
- C CATV MANHOLE
- M METER SOCKET
- J 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.
- 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
- RV MAGNETIC MOTOR STARTER, "RV" INDICATES REDUCED VOLTAGE.
- COMBINATION FUSED DISCONNECT AND MOTOR STARTER
- TS HORSEPOWER RATED THERMAL SWITCH WITH PILOT LIGHT
- VFD VARIABLE FREQUENCY DRIVE.
- C MULTI-POLE CONTACTOR IN NEMA I ENCLOSURE-RATINGS AND NUMBER OF POLES AS REQUIRED.
- CP EQUIPMENT CONTROL PANEL.
- UCP UTILITY CONTROL PANEL (LABS)
- ATS AUTOMATIC TRANSFER SWITCH.
- 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.

MISCELLANEOUS-DEVICES

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 "B" - INDICATES BREAK GLASS STATION WITH HAMMER SUPPORT CLIP AND FIVE REPLACEMENT DISCS STORED INSIDE BOX SUPPORTING DEVICE.

HANDICAP DOOR ACTIVATE SWITCH-FURN. & INST. BY SYSTEM SUPPLIER. PROVIDE 4"SQ X 2 1/2"DP JB AND 1"C WITH PULL LINE TO ELECTRIC DOOR OPERATOR.

SV SOLENOID VALVE - F&I BY P.C., WIRED BY E.C.

T/C TIMECLOCK - 7 DAY DIGITAL WITH BATTERY BACK-UP.

EFS EYE WASH FLOW SWITCH-F&I BY P.C., WIRED TO SECURITY SYSTEM 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.

1 / 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 KEYED SHEET NOTE SYMBOL, "1" INDICATES TO REFER TO NOTE #1

3 CIRCUIT SIZE NUMBER, REFER TO "CIRCUIT SIZE SCHEDULE".

S8 SCOREBOARD CONTROL OUTLET - WALL MOUNTED AT 18" A.F.F. OR FLOOR BOX. UNO - SINGLE GANG OPENING AND 4"SQ. X 2 1/2"DP J.B. WITH 1"C. WIRING AND JACKS BY I.T. CONTRACTOR.

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 FURNISHED BY SYSTEM SUPPLIER, WIRED BY E.C.

FIRE ALARM SYSTEM

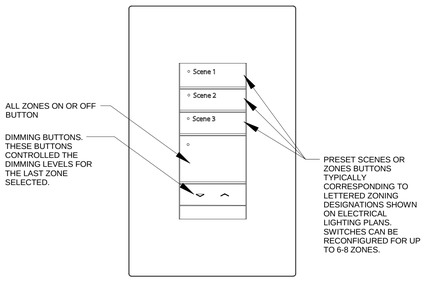
- F MANUAL PULL STATION - MTD 48" AFF TO ℄.
- F HORN/VISUAL "ADA" COMPLIANT SIGNAL - MTD 80" AFF TO ℄.
- F VISUAL "ADA" COMPLIANT SIGNAL - MTD 80" AFF TO ℄.
- F S SPEAKER/VISUAL "ADA" COMPLIANT SIGNAL - MTD 80" AFF TO ℄.
- F SPEAKER/VISUAL "ADA" COMPLIANT SIGNAL - CEILING MTD.
- S CEILING MOUNTED PHOTOELECTRIC SMOKE DETECTOR.
- S E SMOKE DETECTOR ALSO USED FOR ELEVATOR RECALL.
- S SELF-CONTAINED 120 VOLT SMOKE DETECTOR.
- S SC DUCT TYPE SMOKE DETECTOR WITH SAMPLING TUBE. FURNISHED BY EC, INSTALLED BY HVAC, WIRED BY EC.
- S D/FSD DUCT TYPE SMOKE DETECTOR WITH SAMPLING TUBE FOR CONTROL OF ASSOCIATED FSD AND UNIT SHUTDOWN FURNISHED BY EC, INSTALLED BY HVAC, WIRED BY EC.
- S A SPOT TYPE SMOKE DETECTOR USED TO INITIATE ATRIUM SMOKE CONTROL
- F H 135° THERMAL DETECTOR - 135℉ FIXED TEMPERATURE AND RATE OF RISE. "F" INDICATES FIXED TEMPERATURE ONLY.
- H 200° THERMAL DETECTOR - 200℉ 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.
- 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
- EVAC FIRE ALARM VOICE EVACUATION PANEL.
- FCC FIRE COMMAND CENTER
- F FIRE FIGHTERS PHONE (PHONE AND 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.
- E FIRE ALARM ELECTRIC BELL (120 VOLTS), MOUNTED ABOVE FIRE DEPARTMENT SPRINKLER CONNECTION. FURNISHED BY F.P.C., INSTALLED & WIRED BY E.C.

AUDIOVISUAL SYSTEMS SYMBOL LEGEND

SYMBOL	DESCRIPTION	BOX TYPE (H" x W" x D")	MOUNTING LOCATION
AV JUNCTION BOX SYMBOLS			
A1	WALL-MOUNTED ANTENNA, TYPE 1	1-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT 12'-0" AFF
A2	WALL-MOUNTED ANTENNA, TYPE 2	1-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT 12'-0" AFF
A3	CEILING-MOUNTED ANTENNA, TYPE 3	4" SQUARE METAL BOX WITH COVER	FLUSH MOUNT IN CEILING
A4	CEILING-MOUNTED ANTENNA, TYPE 4	4" SQUARE METAL BOX WITH COVER	FLUSH MOUNT IN CEILING
BP	WALL-MOUNTED BUTTON PANEL	2-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT SWITCH HEIGHT
C1	WALL-MOUNTED CAMERA, TYPE 1	2-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT 8'-0" AFF
D1	DISPLAY BACK BOX, TYPE 1	CHIEF PAC-526	FLUSH MOUNT IN WALL AT 5'-6" AFF
F1	FLOOR BOX	FSR FL-600P-6 WITH FINISHED COVER	MOUNT FLUSH IN FLOOR
J1	JUNCTION BOX, TYPE 1	6"X6"X24" METAL TROUGH	MOUNT AT 78" ABOVE AV EQUIPMENT RACK
J2	JUNCTION BOX, TYPE 2	18"X18"X4" NEMA 1 ENCLOSURE WITH OVERSIZED FLUSH COVER	FLUSH MOUNT IN WALL AT RECEPTACLE HEIGHT
M1	CEILING-MOUNTED MICROPHONE, TYPE 1	1-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN CEILING
M2	CEILING-MOUNTED MICROPHONE, TYPE 2	1-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN CEILING
MC	MOTOR CONTROLLER	4" SQUARE METAL BOX WITH COVER	PART OF PROJECTION SCREEN CASE
MC	MOTOR CONTROLLER	4" SQUARE METAL BOX WITH COVER	PART OF PROJECTION SCREEN CASE
PC	PRODUCTION COMMUNICATION	1-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT SWITCH HEIGHT
PS	PRODUCTION COMMUNICATION SPEAKER STATION	4-GANG DEEP MET

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

TYPE	MANUFACTURER	MODEL / SERIES	MTG.	VOLTAGE	LIGHT SOURCE			DESCRIPTION / REMARKS	MFG. EQUALS	SCHEDULE NOTES
					LUMENS	WATTS	SOURCE/CCT			
LSV4	ECLIPSE	574-SPL-40W-EBU-35K-*-DLC-TP-D7	S	UNV/277	**	40	LED/3500K	4' LINEAR UTILITY FIXTURE WITH PRISMATIC POLYCARBONATE LENS AND WET LOCATION GASKETING, 0-10V DIMMING	A	-
J	ORACLE	OVT-LED-1500L-MVOLT-40K-GR-WM	W	UNV/277	1500	18	LED/4000K	UTILITY FIXTURE WITH WHITE GLASS GLOBE AND CAST GLOBE GUARD	D	-
JB	PHOENIX	VA-W-17LED-WW-GHB-XX	W	UNV/120	1336	17	LED/3000K	UTILITY FIXTURE WITH BLUE TEMPERED GLASS GLOBE CAST GLOBE GUARD	D	-
JW	PHOENIX	VA-W-17LED-WW-FGC-XX	W	UNV/120	1336	17	LED/3000K	UTILITY FIXTURE WITH FROSTED TEMPERED GLASS GLOBE AND CAST GLOBE GUARD	D	-
G4	CREE	FLD-OL-2M-D4-14-D-UL-*-700-27K	S	UNV/277	6880	126	LED/2700K	4' LINEAR RUGGED LOW PROFILE 360° ADJUSTABLE FLOOD TYPE LUMINAIRE.		
HRL	ACCLAIM	FLEXOHI27-FLX444-FLX LP CL4	S	UNV/277	504/ft	5.5	LED/2700K	LED TAPE LIGHT WITH ALUMINUM ASSYMETRIC CHANNEL, DIFFUSE LENS, AND 0-10V DIMMING CAPABLE.	K	- -
LC2	INSIGHT	PCM-10-27K-120-SM-48-UNV-DIM-MG-FL	S	UNV/277	**	**	LED/2700K	LINEAR COVE FIXTURE WITH FROSTED DIFFUSER LENGTH AS SHOWN ON DRAWINGS. PROVIDE DRIVERS AS REQUIRED	-	- -
LC3	INSIGHT	PCM-13-27K-120-SM-48-UNV-DIM-MG-FL	S	UNV/277	1182/FT	13/FT	LED/2700K	LINEAR COVE FIXTURE WITH FROSTED DIFFUSER LENGTH AS SHOWN ON DRAWINGS. PROVIDE DRIVERS AS REQUIRED	-	- -
LCL	ACCLAIM	FLEXOHI27-FLK 45D-FLK MFL	S	UNV/277	504/ft	5.5	LED/2700K	LED TAPE LIGHT WITH ALUMINUM ASSYMETRIC CHANNEL, DIFFUSE LENS, 0-10V DIMMING CAPABLE. LENGTHS AS SHOWN ON PLANS	K	- -
LRK24	H.E. WILLIAMS	50-G-S-2-2-L43-8-27-F-AF12125-DIM-UNV	R	UNV/277	4300	33.7	LED/2700K	2'X2' RECESSED LUMINAIRE WITH PRISMATIC ACRYLIC LENS, FULLY GASKETED WITH 0-10V DIMMING	J	7 8
LP8	FINELITE	HP-4-ID-8-V-B-827-WSO-BG-277V-FA-FE-SC-*	AC	277	1522/FT	13.9/FT	LED/2700K	8' LED LINEAR FIXTURE WITH DIRECT/INDIRECT DISTRIBUTION, FROSTED DIFFUSING LENS, AND 0-10V DIMMING CAPABILITY.		
LR2	FINELITE	HP-2R-2-H-927-F-277-FE-SC-**	R	277	565/ft	7.1/FT	LED/2700K	2' LINEAR 2" APERTURE RECESSED LUMINAIRE WITH FROSTED WHITE LENS. 0-10 DIMMING CAPABLE	-	- -
LR2B	FINELITE	HP-2R-2-H-927-F-120-FE-SC-**	R	120	565/ft	7.1/FT	LED/2700K	2' LINEAR 2" APERTURE RECESSED LUMINAIRE WITH FROSTED WHITE LENS. 0-10 DIMMING CAPABLE	-	- -
LR4	FINELITE	HP-2R-4-H-927-F-277-FE-SC-**	R	277	565/ft	7.1/FT	LED/2700K	4' LINEAR 2" APERTURE RECESSED LUMINAIRE WITH FROSTED WHITE LENS. 0-10 DIMMING CAPABLE	-	- -
LSL	ACCLAIM	FLEXOHI3-XX-XX-XX-ALDXX-XX-XX	R	24	566/FT	7/FT	LED/2700K	LED STRIP LIGHT MOUNTED ON EDGE OF STAGE WITH FLEX MINI CHANNEL WITH OPAL LENS. 0-10V DIMMING AND DMX CAPABLE	-	- -
LS2	ELITE	2-OC1-LED-2700L-DIM10-MVOLT-30K-85	S/AC	UNV/277	3176	23	LED/2700K	2' UTILITY FIXTURE WITH FROSTED ACRYLIC DIFFUSER. 0-10 DIMMING CAPABLE	-	- -
LS4	CREE	LS4-27L-35-10V	S/AC	UNV/277	4,250	40	LED/3500K	4' UTILITY FIXTURE WITH FROSTED ACRYLIC DIFFUSER. 0-10 DIMMING CAPABLE	-	- -
LS4A	FINELITE	HP-4 SM-4'-V-827-BG-277V-*-FE-SC	S/AC	UNV/277	3705	9.3/FT	LED/2700K	4' LINEAR FIXTURE WITH FROSTED ACRYLIC DIFFUSER. 0-10 DIMMING CAPABLE	-	- -
LS8	CREE	LS8-80L-27-10V	S/AC	UNV/277	8400	80	LED/2700K	8' UTILITY FIXTURE WITH FROSTED ACRYLIC DIFFUSER. 0-10 DIMMING CAPABLE	K	- -
LUL	ACCLAIM	FLEXOHI27-FLX444-FLX LP CL4	S	UNV/277	504/ft	5.5	LED/2700K	LED TAPE LIGHT WITH ALUMINUM CHANNEL, CLEAR LENS, AND 0-10V DIMMING CAPABLE. LENGTHS AS SHOWN ON PLANS	K	- -
LRC	FINELITE	HP-6 R-*-V-830-F-277V-SC-**	R	277	556/FT	5.5/FT	LED/2700K	6" APERTURE LINEAR RECESSED LED PANEL FIXTURE. 0-10V DIMMING CAPABLE. **=LENGTH PER PLANS, **=CEILING TYPE BY ARCH.	-	- -
LRW	FOLIO	OPAL 10L-MULTI-12"-*-3000K-PWM	W	277	609/FT	6.7/FT	LED/2700K	12" APERTURE LINEAR RECESSED LED PANEL FIXTURE. 0-10V DIMMING CAPABLE. **LENGTH PER PLANS	-	- -
LWW	ACCLAIM	FLEXOHI27-FLX444-FLX LP FL4	S	UNV/277	504/ft	5.5	LED/2700K	LED TAPE LIGHT WITH ALUMINUM CHANNEL, DIFFUSE LENS, AND 0-10V DIMMING CAPABLE. LENGTHS AS SHOWN ON PLANS	K	- -
PC1	METEOR	AS6-40-308-UNV-DMX(RJ45)-60-STD-*-AD10	P	UNV/120	3895	40	LED/2700K	6" DOWNLIGHT FIXTURE WITH DMX DIMMING. *=COLOR BY ARCHITECT	M	- -
PC2	METEOR	AS6-60-308-UNV-DMX(RJ45)-60-STD-*-AD10	P	UNV/120	6180	60	LED/2700K	6" DOWNLIGHT FIXTURE WITH DMX DIMMING. *=COLOR BY ARCHITECT	M	- -
PC3	ELITE	FPR1-LED-1800L-DIM10-MVOLT-FL-30K-90	P	UNV/277	1800	21.7	LED/2700K	6" DOWNLIGHT FIXTURE WITH DEAD-FRONT GASKETED TRIM AND FROSTED ACYLIC LENS	M	- -
RC1	ELITE	HH4-LED-1500L-DIM10-MVOLT-30K-MD-90/HH4-4501-CL-WH	R	UNV/277	1500	20	LED/2700K	4" DOWNLIGHT FIXTURE 0-10V DIMMING CAPABLE. 0-10V DIMMING CAPABLE	M	- -
RC2	ELITE	HH4-LED-2000L-DIM10-MVOLT-30K-MD-90/HH4-4501-CL-WH	R	UNV/277	2144	26	LED/2700K	4" DOWNLIGHT FIXTURE 0-10V DIMMING CAPABLE. 0-10V DIMMING CAPABLE	M	- -
RSH	HE WILLIAMS	4PR-TL-L10/830-DIM-UNV-L-M-OF-WH-IP	R	UNV/277	1000	10.7	LED/2700K	4" DOWNLIGHT FIXTURE FOR SHOWER LOCATION. IP65 RATED. 0-10V DIMMING CAPABLE	M	- -
SL1	U.S. ARCHITECTURAL	RZR-PLED**-80LED-525-NW-277-*-	POLE	277	-	-	LED/3000K	LED POLE MOUNTED LUMINAIRE. PROVIDE WITH 20' ROUND, TAPERED POLE.	-	- - - -
SL2A	BEGA	84 147 K3	POLE	277	5100	47.2	LED/3000K	EXTERIOR POST TOP FIXTURE WITH 15' ROUND TAPERED ALUMINUM POLE WITH FINISH TO MATCH	-	- - - -
SL3	POULSEN	FLINDT-31.5-14W LED-120-277-*-DIM10	S	277	-	-	LED/3000K	EXTERIOR BOLLARD 43.3 CAST ALUMINUM	-	- - - -
SL4	BEGA	33 242	W	UNV/277	1893	17.9	LED/3000K	EGRESS / PERIMETER LIGHTING FIXTURE - CUSTOM COLOR/FINISH	-	- - - -
SL5	GRIVEN	OX561-RGBW-UNV-US-*-BND-3G	S	UNV/277	12785	310	LED/6500K (WHITE)	EXTERIOR AMPITHEATER RGB PROJECTOR. DMX CAPABLE, IP65 RATED	-	- - - -
SL6	BEGA	77 852 K3	R	UNV/277	1515	29	LED/3000K	FLOOD LIGHT FIXTURE WITH REMOTE DRIVER (LARGE FLOOD 30°)	-	- - -
SL7	TARGETTI	KPLM-10-GMB-SP-L1-30-S-1E2525	R	UNV/277	1515	29	LED/3000K	IN-GRADE SPOT LIGHT WITH 11° BEAM SPREAD. 0-10V DIMMING CAPABLE	-	- - - -
SL10	TARGETTI	DAS-RP-SP-L2-30-24/DELV96124DQS	G	UNIVERSAL	785	14	LED/3000K	LED MINI FLOOD FIXTURE CAPABLE OF 0-10V DIMMING AND PROVIDED WITH ALL NECESSARY MOUNTING HARDWARE.	K1 L1 D2	5 7
SLS	BEGA	33 165 K30	R	UNV/277	441	5.8	LED/3000K	LED RECESSED STEP LIGHT. 0-10V DIMMING CAPABLE. FINISH BY ARCHITECT.	-	- - - -
SPFL	LUMENPULSE	LBM-277-27K-FL-*-DIM-SY-UL-50FT	S	277	1428	28	LED-2700K	LED FLOOD LIGHT. FLOOD TYPE DISTRIBUTION (40°). *=COLOR BY ARCHITECT. 0-10V DIMMING CAPABLE.	R	- -
SPNF	LUMENPULSE	LBM-277-27K-NF-*-DIM-SY-UL-50FT	S	277	1428	28	LED-2700K	LED FLOOD LIGHT. NARROW FLOOD DISTRIBUTION (20°) *=COLOR BY ARCHITECT. 0-10V DIMMING CAPABLE.	R	- -
UC	GOLDENEYE	AL-0.5-ES-*-30K-80+	S	UNV/277	124/FT	4/FT	LED/3000K	TASK LIGHTING WITH REMOTE DRIVER AND CUSTOM COLOR. 0-10V DIMMING CAPABLE	R	- -
EXIT	EVENLITE	TEXZ-AC-G-1C	U	UNV/277	-	2	LED	SINGLE FACED EDGE-LIT EXIT SIGN. PROVIDE ARROWS AS SHOWN ON DRAWINS.	S	-
EXIT	EVENLITE	TEXZ-AC-G-2M	U	UNV/277	-	4	LED	DOUBLE FACED EDGE-LIT EXIT SIGN. PROVIDE ARROWS AS SHOWN ON DRAWINGS.	S	-
EXIT HC	EVENLITE	TRE-AC-G-1	U	UNV/277	-	-	LED	SINGLE FACED EDGE-LIT EXIT SIGN WITH HANDICAP ACCESSIBLE GRAPHIC	S	-
EXIT RS	EVENLITE	RZR3-AC-G-1-WH-1B-RS	W	UNV/277	-	2	LED	LOW PROFILE, SINGLE FACED EXIT SIGN WITH POLYCARBOANTE SHIELD FOR ROUGH SERVICE APPLICATION	S	
EXIT H	EVENLITE	RZR3-AC-G-1-WH-1B	W	UNV/277	-	2	LED	LOW PROFILE, SINGLE FACED EXIT SIGN WITH POLYCARBOANTE SHIELD FOR ROUGH SERVICE APPLICATION - ABOVE DOOR	S	
EXIT L	EVENLITE	RZR3-AC-G-1-WH-1B-RS	W	UNV/277	-	2	LED	FLOOR PROXIMITY SINGLE FACED DIECAST EXIT SIGN FOR ROUGH SERVICE APPLICATION - MTD @ LOW LEVEL	S	-
EXIT MM	EVENLITE	TRE-AC-G-1	S	UNV/277	-	2	LED	SINGLE FACED EDGE-LIT EXIT SIGN FOR MULLION MOUNTING WITH REMOTE POWER SUPPLY	S	
EXIT MM HC	EVENLITE	TRE-AC-G-1	S	UNV/277	-	2	LED	SINGLE FACED EDGE-LIT EXIT SIGN WITH HANDICAP ACCESSIBLE GRAPHIC AND MULLION MOUNTING WITH REMOTE POWER SUPPLY	S	-
EB	EVENLITE	TCL4W-SD	W	UNV/277	-	-	LED	SELF-CONTAINED EMERGENCY LIGHTING FIXTURE WITH TWIN ADJUSTABLE HEADS	S	



1 E0.2 TYPICAL LOW VOLTAGE SWITCH

SCALE: N.T.S.

FIXTURE MANUFACTURER (OR EQUAL)

A1 KENALL	I1 Q-TRAN	Q1 PEERLESS	Y1 PINNACLE	G2 CONTECH	O2 DUAL-LITE	W2 AIREY-THOMPSON	E3 AIREY-THOMPSON	M3 AIREY-THOMPSON
B1 FAIL-SAFE	J1 OPTIC ARTS	R1 MARK ARCH.	Z1 PRUDENTIAL	H2 PATHWAY	P2 EMERGI-LITE	X2 NOVUS LIGHTING	F3 NOVUS LIGHTING	N3 NOVUS LIGHTING
C1 WILLIAMS	K1 INSIGHT	S1 AXIS	A2 CORONET	I2 LIGHTOLIER	Q2 EVEN-LITE	Y2 ILP	G3 ILP	O3 ILP
D1 CREE	L1 LUMEN PULSE	T1 HOLOPHANE	B2 METALUMEN	J2 GOTHAM	R2 CELESTIAL	Z2 FSC	H3 FSC	P3 FSC
E1 PHOENIX	M1 DESIGN PLAN	U1 DECO LIGHITNG	C2 BEGA	K2 KIM	S2 SYSTEMALUX	A3 PRESCOLITE	I3 PRESCOLITE	Q3 PRESCOLITE
F1 HUBBELL	N1 ECOSENSE	V1 SPEC GRADE	D2 WE-EF	L2 HYDRELL	T2 LF ILLUMINATION	B3 NORA	J3 NORA	R3 NORA
G1 LURALINE	O1 ECLIPSE	W1 METALUX	E2 ZANEEN	M2 LIGMAN	U2 LITHONIA	C3 GVA LIGHTING	K3 GVA LIGHTING	S3 GVA LIGHTING
H1 GM LIGHTING	P1 FAIL-SAFE	X1 PAL	F2 USAI	N2 SIGNTEX	V2 SONNEMAN	D3 LITON	L3 LITON	T3 LITON

LIGHTING FIXTURE SCHEDULE NOTES ( )

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 MAXIMUM 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. FIXTURES TO BE PROVIDED WITH DMX DIMMABLE DRIVER CAPABLE OF A SMOOTH DIM TO BLACK (0% TOTAL LIGHT OUTPUT)
15. FIXTURE LENGTHS TO BE COORDINATED WITH ELECTRICAL LIGHTING PLANS. PROVIDE ALL NECESSARY MOUNTING HARDWARE, DRIVERS, CONNECTOR CABLES, ETC. FOR RUNS SHOWN.
16. FIXTURE MUST BE PROVIDED WITH ADJUSTABLE LENGTH STABILIZER / SAFETY CABLE
17. FIXTURE TO BE PROVIDED WITH INTEGRAL BATTERY BACK UP.
18. PROVIDE CURRENT LIMITER DEVICE AT FEED TO EACH RUN OF TRACK. LIMITER SHALL BE SIZED FOR LOAD OF HEADS INDICATED PLUS 100% ADDITIONAL SPARE CAPACITY (10A MAX.).
19. PROVIDE FIXTURE WITH CUSTOM METALLIC FINISH. COLOR TO BE DETERMINE BY OWNER/ARCHITECT.

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

E.C. SHALL PROVIDE 50 OF THE FOLLOWING MODEL TASK LAMP FOR PLACEMENT AT INDIVIDUAL DESKS / WORKSTATIONS BY THE CONSTRUCTION MANAGER AFTER COMPLETION OF MILLWORK AND FURNITURE INSTALLATIONS TO SATISFY REQUIREMENTS OF LEED IEQ CREDIT 6.1:
FINELITE #DL-C-RAL-WBCS-PS8W-ES (OR SAME BY LUXO, WALDMAN, OR EQUAL)

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,OOO 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 RUN LENGTH AS INDICATED (NUMERICALLY OR GRAPHICALLY) OR CONTINUOUS WHERE SHOWN BETWEEN TWO ARCHITECTURAL ELEMENTS (WALLS, SOFFITS, COLUMNS, ETC.).
7. LINEAR ROWS OF RECESSED, SURFACE, OR SUSPENDED FIXTURES SHALL BE INSTALLED TO PROVIDE CONTINUOUS RUN LENGTHS AS INDICATED ON THE DRAWINGS. PROVIDE ALL REQUIRED FITTINGS, CONNECTORS, SUPPORTS, TRIMS, ETC. SO THAT RUNS ARE A COMPLETE ASSEMBLY WITH THE APPEARANCE OF A SINGLE UNIT. 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.
8. 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.
9. FIXTURES WITH LOUVERS SHALL BE PROVIDED WITH HIGH TRANSMISSION (95% OR BETTER) DIFFUSING LENSES OR FILMS TO OBSCURE DIRECT LAMP VIEWING.
10. 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.
11. REFER TO SPECIFICATIONS FOR SEISMIC SUPPORT, RESTRAINT, AND BRACING REQUIREMENTS OF THIS PROJECT.
12. 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 OF LIGHTING SYSTEM POSSIBLE. TANDEM WIRING OF FIXTURES SHALL BE PROVIDED WHERE NECESSARY AND WITHIN THE WIRING DISTANCE RESTRICTIONS OF THE MANUFACTURER'S INSTALLATION REQUIREMENTS.
13. 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.
14. 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.
15. 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 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.
16. 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.
17. EXIT SIGNS INSTALLED IN GYMNASIUMS, LOCKER ROOMS, AND ANY OTHER DESIGNATED AREAS SHALL BE PROVIDED WITH POLYCARBONATE FACE PLATE / SHIELD AS PART OF EXIT SIGN PACKAGE FROM SAME MANUFACTURER.
18. PROVIDE A SELF CONTAINED EMERGENCY LIGHTING UNIT WITH TWIN ADJUSTABLE HEADS (TYPE "EB" WHERE SCHEDULED) AT EACH FIRE ALARM CONTROL PANEL , REMOTE FIRE ALARM ANNUNCIATOR, @ THE LIFE SAFETY TRANSFER SWITCH AND IN THE GENERATOR ROOM. EXACT MOUNTING TO BE COORDINATED IN FIELD WITH ARCHITECT OR ENGINEER.
19. FIXTURES WITH MULTI WATTAGE BALLASTS OR DRIVERS SHALL BE LABELED FROM THE FACTORY FOR THE WATTAGE SPECIFIED TO ENSURE COMPLIANCE WITH ENERGY CODE CALCULATIONS.
20. FINISH FOR ALL FIXTURES SHALL BE SELECTED BY THE ARCHITECT FROM THE MANUFACTURER'S CATALOG OPTIONS.
21. WHERE FIXTURES OTHER THAN THE SPECIFIED PRODUCTS ARE PROPOSED, THE CONTRACTOR SHALL PROVIDE LIGHT LEVEL CALCULATIONS IN ACCORDANCE WITH IESNA STANDARDS TO JUSTIFY THAT THE SUBSTITUTED FIXTURES ARE OF EQUAL PERFORMANCE (WITH EQUAL OR LOWER INPUT WATTAGE) TO THE SPECIFIED PRODUCTS (APPLIES TO ALL FIXTURES IN ALL SPACES.)
22. EVERY SPACE ENCLOSED BY FLOOR TO CEILING WALLS SHALL BE PROVIDED WITH A MINIMUM OF ONE MANUAL LIGHTING SWITCH AND ONE CEILING MOUNTED OCCUPANCY SENSOR. ADDITIONAL CONTROLS SHALL BE AS INDICATED ON THE PLAN OR AS SPECIFIED ELSEWHERE.

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 COMPLIAN

ELECTRICAL SITE NOTES PHASE 1:

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#8&#8G,1"C MINIMUM UNLESS SHOWN OTHERWISE.
4. ALL EXTERIOR LIGHTING TO BE PROGRAMMED FOR PHOTOCELL "ON", TIMED "OFF" .
5. REMOVE ALL SITE ELECTRICS WHEN NO LONGER REQUIRED.
6. 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.
7. 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.

LIGHTING FIXTURE SCHEDULE (1)

TYPE	MANUFACTURER	MODEL / SERIES	MTG.	VOLTAGE	LIGHT SOURCE			DESCRIPTION / REMARKS	MFG. EQUALS
					WATTS	LUMENS	CCT		
SL1	U.S. ARCHITECTURAL LIGHTING	RZR-PLED-III-M-80LED-525mA-WW	POLE	277	131	16990	3000K	LED POLE MOUNTED LUMINAIRES . PROVIDE WITH 20' ROUND TAPPERED POLE.	(P)

FIXTURE MANUFACTURER OPTIONS (OR EQUAL)

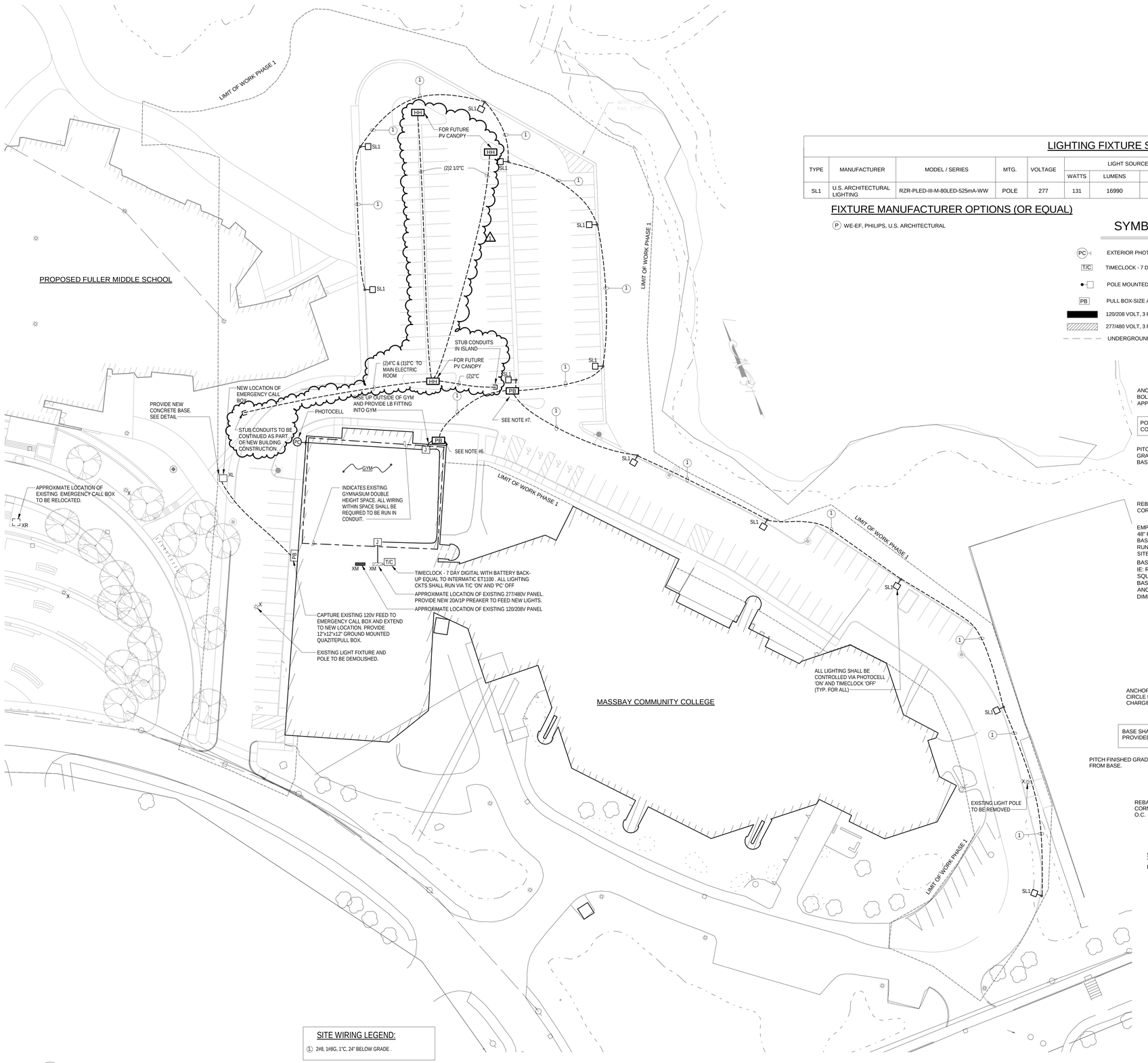
(P) WE-EF, PHILIPS, U.S. ARCHITECTURAL

SYMBOL LIST

- (PC) EXTERIOR PHOTOCELL
- T/C TIMECLOCK - 7 DAY DIGITAL WITH BATTERY BACK-UP.
- POLE MOUNTED FIXTURE-DOUBLE OR SINGLE HEAD.
- PB PULL BOX-SIZE AS REQUIRED.
- 120/208 VOLT, 3 PHASE, 4 WIRE PANELBOARD.
- 277/480 VOLT, 3 PHASE, 4 WIRE, PANELBOARD.
- UNDERGROUND SERVICE

EXISTING EQUIPMENT

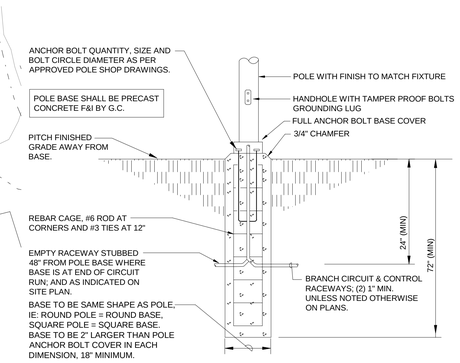
- DOTTED DENOTES EXISTING EQUIPMENT.
- X EXISTING EQUIPMENT TO BE REMOVED AND CIRCUIT PULLED BACK TO NEXT ACTIVE OUTLET/BACK TO PANEL.
- XM EXISTING EQUIPMENT TO REMAIN.
- XR EXISTING EQUIPMENT TO BE REMOVED AND RELOCATED.
- XL NEW LOCATION OF RELOCATED EXISTING EQUIPMENT.
- XN EXISTING EQUIPMENT TO BE REMOVED AND NEW EQUIPMENT INSTALLED IN VICINITY OF EXISTING LOCATION. REFER TO DETAILS FOR MOUNTING HEIGHTS.



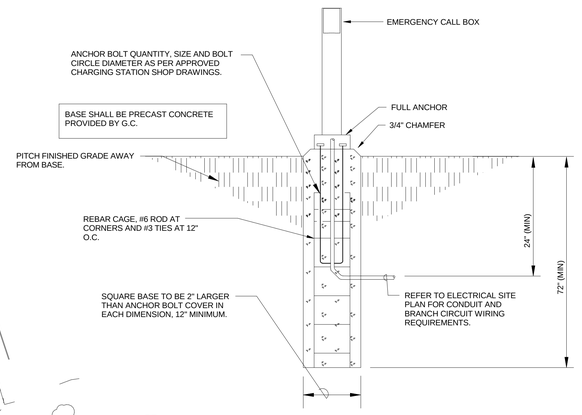
SITE WIRING LEGEND:

(1) 2#8, 1#8G, 1"C, 24" BELOW GRADE .

1 E-PH-1 ELECTRICAL EARLY SITE PLAN - PHASE 1
SCALE: 1" = 30'-0"



2 E-PH1 LIGHTING POLE BASE DETAIL
SCALE: N.T.S.



3 E-PH1 EMERGENCY CALL BOX BASE DETAIL
SCALE: N.T.S.
NOTES:
FURNISH & INSTALL PEDESTAL MOUNTED EMERGENCY CALL BOX. REFER TO SPECIFICATIONS.

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CONSULTING ENGINEERS

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
EARLY SITE PACKAGE
MAY 10,2019

REVISIONS

No.	Date	Description
1	5/20/2019	Addendum # 1

DRAWING NAME
ELECTRICAL EARLY SITE PLAN - PHASE 1

PROJECT NO. 1722

DRAWING NO.
E-PH-1

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#8&#8G,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.
11. PROVIDE 24"X36"X24" DP DIVIDED GROUND MOUNTED PULL BOX EQUAL TO QUAZITE #PG2436BC-24 WITH TWO PIECE COVER #PF2436BG-17-12, ELECTRIC/COMMUNICATIONS. CARSON, HIGHLINE, STRONGWELL ARE ALL CONSIDERED EQUAL.

PROPOSED FULLER MIDDLE SCHOOL

MASSBAY COMMUNITY COLLEGE

LIMIT OF WORK DURING PHASE 1

SEE DWG.E003-2 FOR CONTINUATION

SEE NOTE #7

(2)2 1/2"C TO MAIN ELECTRIC ROOM

FOR FUTURE PV CANOPY

ELECTRIC VEHICLE CHARGING STATION (TYP.)

PROTECTIVE BOLLARDS FOR EV CHARGING STATIONS, PAINTED GREEN BY G.C. (TYP.) SEE DETAIL 6/E005

FA MASTER BOX

APPROXIMATE LOCATION OF MDF ROOM.

APPROXIMATE LOCATION OF MAIN ELECTRIC ROOM & EMERGENCY ROOM.

UNDERGROUND GENERATOR FEEDERS, SEE 3/E005

UNDERGROUND PRIMARY, SEE 7/E004

PAD MOUNTED TRANSFORMER BY UTILITY COMPANY, CONCRETE PAD BY G.C., GROUNDING BY E.C., REFER TO DETAIL 9/E004

PROTECTIVE BOLLARDS, SEE 13/E004

LOCATE TRANSFORMER MIN.20' FROM GENERATOR

EXTERIOR PEDESTAL MOUNTED RECEPTACLE (TYP.). PEDESTAL MOUNT FOR EXTERIOR, GFI TYPE RECEPTACLE EQUAL TO WAYNE TYLER, INC. MODEL #CB-BOX (COLOR AS SELECTED BY ARCH.)

SEE 8/E004

LOCATE TRANSFORMER MIN.4' FROM THE WALL

LOCATE GENERATOR MIN.6' FROM THE WALL

EMERGENCY 250KW NATURAL GAS FIRED STANDBY GENERATOR WITH 10' STACK. SEE 1/E005 2/E005

APPROXIMATE LOCATION OF EXISTING EMERGENCY CALL BOX TO BE RELOCATED DURING PHASE 1.

SECURITY CAMERA POLE (TYP.)

LED IN-GRADE TREE ACCENT LIGHTING FIXTURE (TYP.). REFER TO DETAIL 5/E004

UNDERGROUND COMMUNICATION, SEE 12/E004

2"C TO IDF

(1)2" UNDERGROUND FIRE ALARM, SEE 1/E005

UNDERGROUND PRIMARY, SEE 6/E004

AMPHITHEATER BANDSHELL

POWER & DATA FOR AMPHITHEATER BANDSHELL

EXISTING UTILITY POLE #479/11 FEEDING EXISTING MIDDLE SCHOOL TO BE REPLACED BY UTILITY Co.

EXISTING UTILITY POLE #479/10 TO BE REPLACED BY UTILITY Co. AND USED FOR COMMUNICATIONS RISER POLE, REFER TO DETAIL 1/E004

EXISTING UTILITY POLE #479/9 TO BE REPLACED BY UTILITY Co. AND USED FOR PRIMARY & FIRE ALARM RISER POLE, REFER TO DETAIL 1/E004

UNDERGROUND PRIMARY, SEE 6/E004

PRIMARY MANHOLE, SEE 6/E005

FLAGG DRIVE

SEE DWG.E003-1 FOR CONTINUATION

SEE DWG.E003-2 FOR CONTINUATION

SITE WIRING LEGEND:

① 2#8, 1#8G, 1"C, 24" BELOW GRADE .

1/E003-1 ELECTRICAL SITE PLAN
SCALE: 1" = 30'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

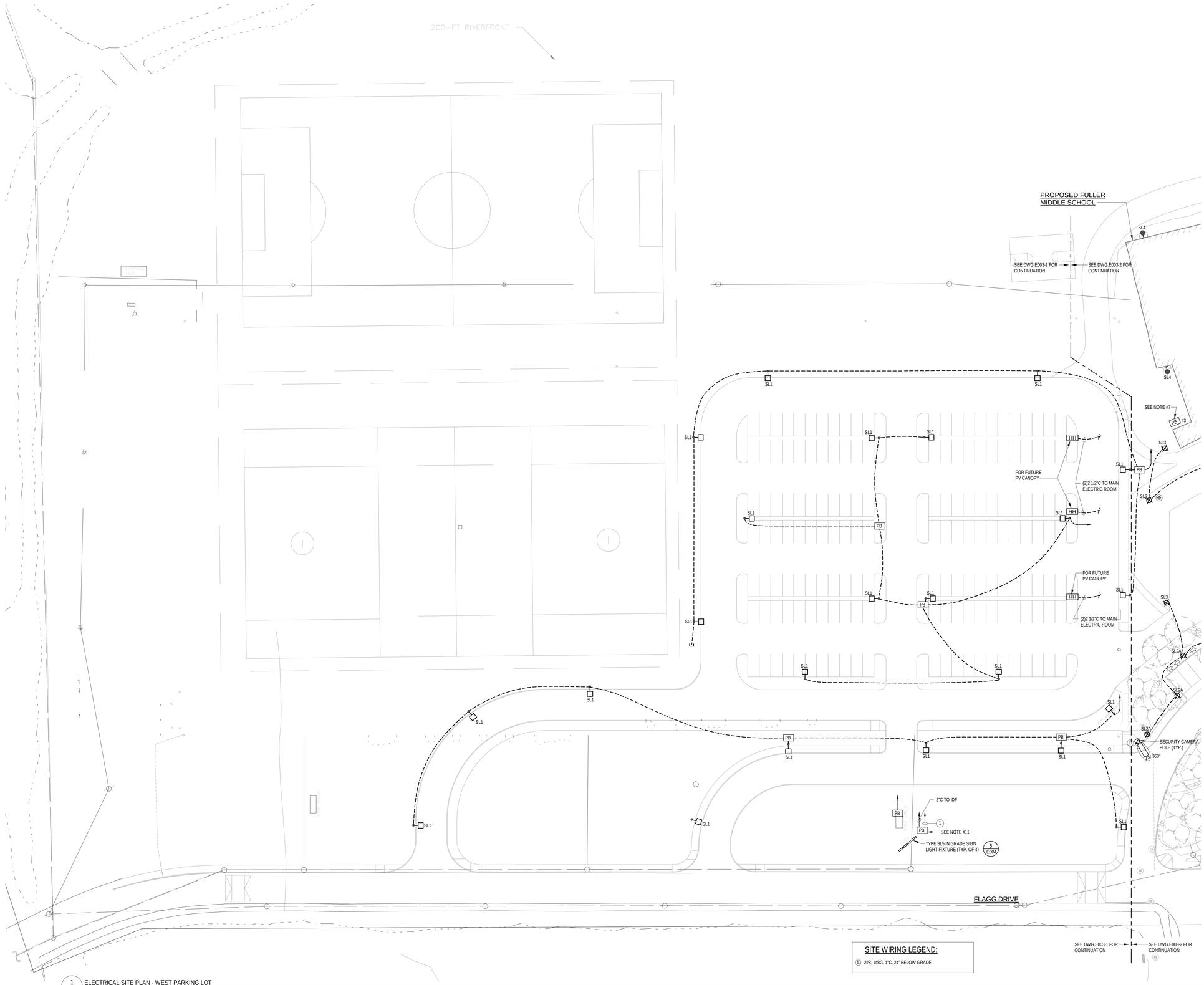
DRAWING NAME

ELECTRICAL SITE PLAN

PROJECT NO. 1722

DRAWING NO.

E003-1



SITE WIRING LEGEND:

1 2#8, 1#8G, 1"C, 24" BELOW GRADE .

1 E003-2 ELECTRICAL SITE PLAN - WEST PARKING LOT
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.
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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.
11. PROVIDE 24"X36"X24" DP DIVIDED GROUND MOUNTED PULL BOX EQUAL TO QUAZITE #PG2436BC-24 WITH TWO PIECE COVER #PF2436BG-17-12, ELECTRIC/COMMUNICATIONS. CARSON, HIGHLINE, STRONGWELL ARE ALL CONSIDERED EQUAL.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

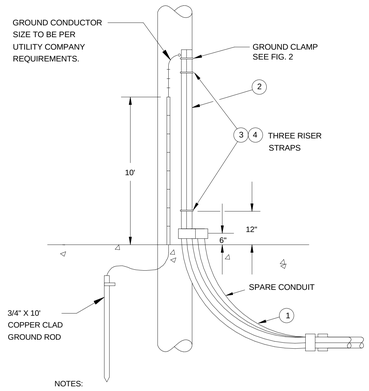
DRAWING NAME

ELECTRICAL SITE PLAN - WEST PARKING LOT

PROJECT NO. 1722

DRAWING NO.

E003-2



NOTES:

1. RISER CONDUITS SHALL BE LOCATED ON THE STREET QUARTER OF THE POLE, AND, WHEN POSSIBLE ON THE QUARTER AWAY FROM APPROACHING TRAFFIC.

CODE NUMBERS FOR PIPE SIZES OF:	
ITEM	DESCRIPTION
1	36" RADIUS SWEEP
2	CONDUIT-10' LENGTH-GALV. STEEL
3	RISER STRAPS
4	LAG SCREWS 3/8" x 3"
5	RISER PIPE CONNECTOR
6	#6 COPPER SOLID BARE (24" LONG)

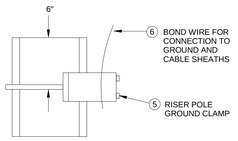
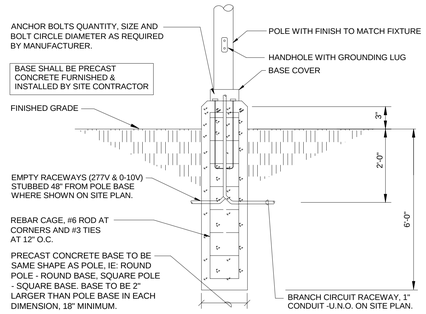


FIGURE 2 - RISER GROUND CLAMP

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 MOLDING OVER WIRE AND CONNECT RISER GROUND CLAMP TO GROUND WIRE ABOVE MOLDING AS SHOWN.

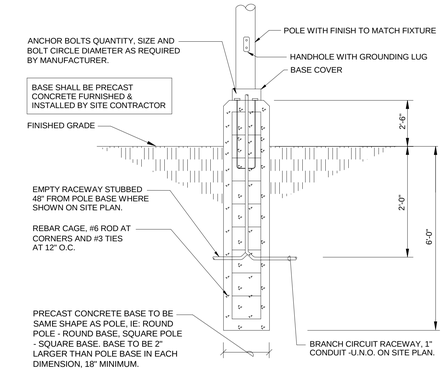
1 E004 POLE RISER DETAIL

SCALE: N.T.S.



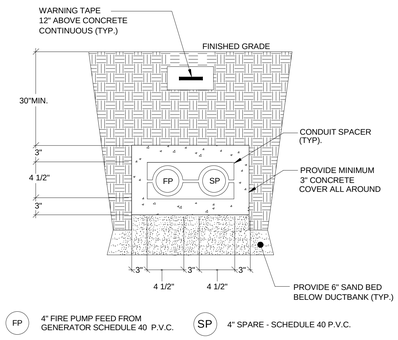
2 E004 TYPICAL PEDESTRIAN POLE BASE DETAIL

SCALE: N.T.S.



3 E004 TYPICAL PARKING/DRIVE POLE BASE DETAIL

SCALE: N.T.S.

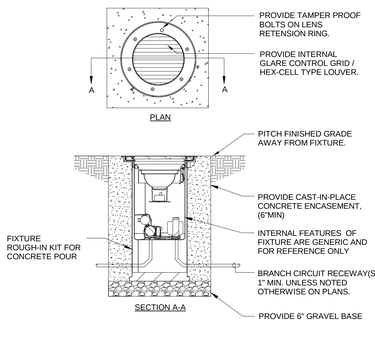


FP 4" FIRE PUMP FEED FROM GENERATOR SCHEDULE 40 P.V.C.

SP 4" SPARE - SCHEDULE 40 P.V.C.

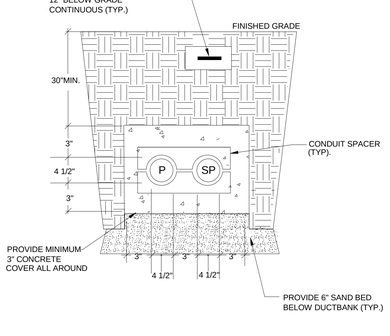
4 E004 DUCT BANK SECTION "F-F"

SCALE: N.T.S.



5 E004 GROUND MOUNTED LIGHT DETAIL

SCALE: N.T.S.

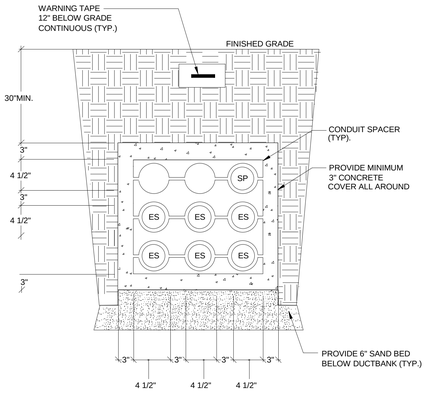


P 4" PRIMARY - SCHEDULE 40 P.V.C. (PROVIDE PULL LINE)

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

6 E004 PRIMARY DUCT BANK SECTION "A-A"

SCALE: N.T.S.

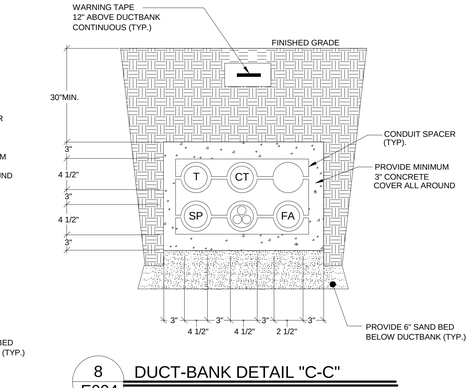


ES 4" ELECTRICAL SECONDARY - SCHEDULE 40 P.V.C.

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

7 E004 SECONDARY DUCT-BANK DETAIL "B-B"

SCALE: N.T.S.



8 E004 DUCT-BANK DETAIL "C-C"

SCALE: N.T.S.

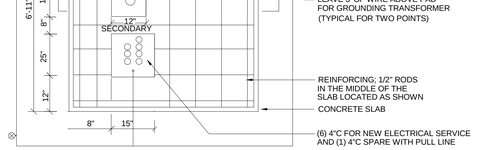
CT 4" CABLE TV - SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.

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

FA 2" FIRE ALARM - SCHEDULE 40 P.V.C. WITH IMSA CABLE PER FIRE DEPT. REQUIREMENTS.

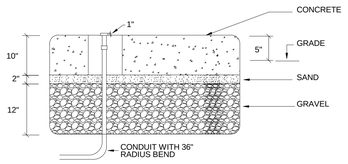
SP 4" SPARE - SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.

4" CONDUIT - SCHEDULE 40 P.V.C. (3) 1 1/4" INNER DUCTS FOR FIBER



PLAN

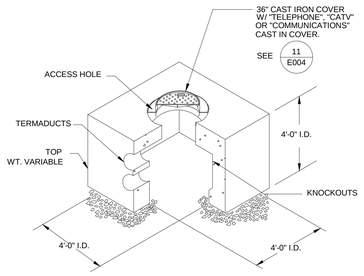
E.C. SHALL OBTAIN LATEST PAD SPECIFICATION FROM UTILITY COMPANY PRIOR TO PAD CONSTRUCTION.



SECTION A-A

9 E004 PADMOUNT TRANSFORMER PAD DETAIL

SCALE: N.T.S.

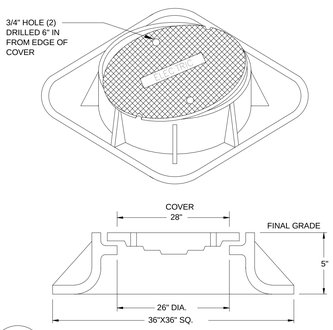


ELECTRICAL, TELEPHONE & C.A.T.V. & COMMUNICATIONS HANDHOLE

TMH # TVMH # CMH # FA #

10 E004

SCALE: N.T.S.



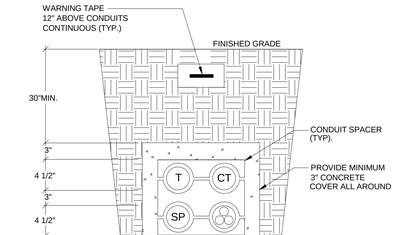
11 E004 FRAME AND COVER DETAIL

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



12 E004 DUCT-BANK DETAIL

SCALE: N.T.S.

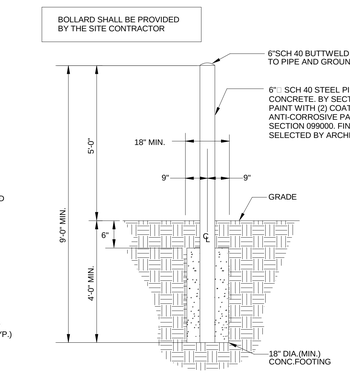
CT 4" CABLE TV - SCHEDULE 40 P.V.C. PROVIDE PULL LINE IN CONDUIT.

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

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

4" CONDUIT - SCHEDULE 40 P.V.C. (3) 1 1/4" INNER DUCTS FOR FIBER

BOLLARD SHALL BE PROVIDED BY THE SITE CONTRACTOR



13 E004 TYPICAL BOLLARD DETAIL

SCALE: N.T.S.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

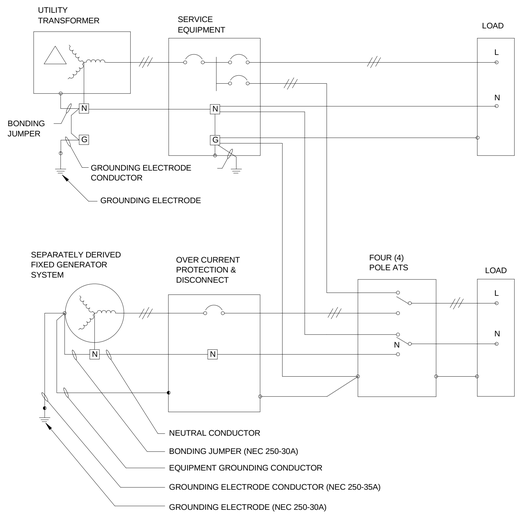
DRAWING NAME

ELECTRICAL SITE PLAN DETAILS

PROJECT NO. 1722

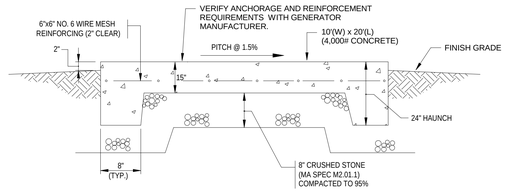
DRAWING NO.

E004



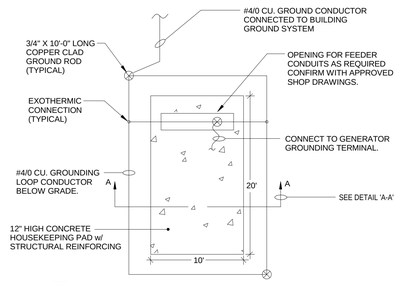
1 E005 SEPARATELY DERIVED GENERATOR SYSTEM

SCALE: N.T.S.



GENERATOR PAD DETAIL 'A-A'

SCALE: N.T.S.

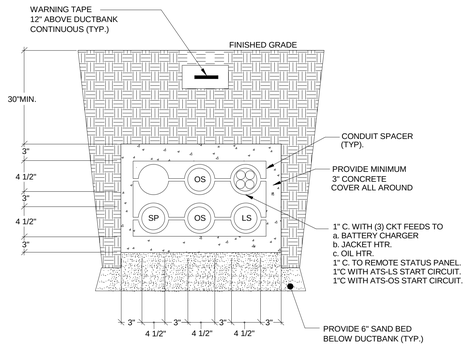


NOTE:

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.

2 E005 GENERATOR PAD DETAIL

SCALE: N.T.S.



3 E005 GENERATOR DUCT-BANK DETAIL "C-C"

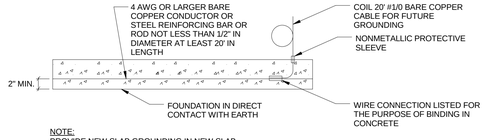
SCALE: N.T.S.

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

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

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

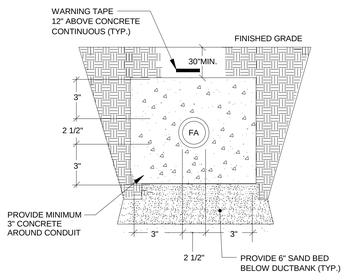
SCHEDULE 40 P.V.C. (4) 1"C



NOTE:
PROVIDE NEW SLAB GROUNDING IN NEW SLAB.

4 E005 SLAB GROUNDING DETAIL

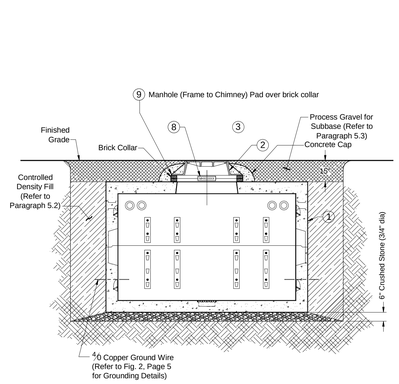
SCALE: N.T.S.



5 E005 FIRE ALARM DUCT-BANK DETAIL

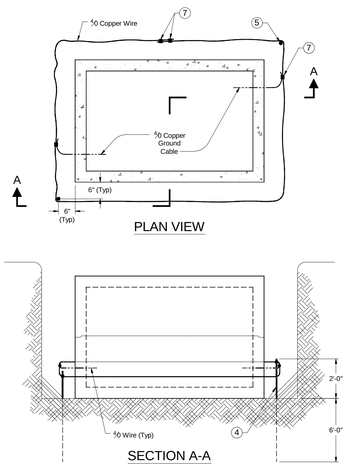
SCALE: N.T.S.

FA 2" FIRE ALARM - SCHEDULE 40 P.V.C. WITH IMSA CABLE PER FIRE DEPT. REQUIREMENTS.



TYPICAL SECTION
Showing Manhole Frame Installation

FIGURE 1



E.C. SHALL OBTAIN LATEST MANHOLE SPECIFICATION FROM UTILITY COMPANY PRIOR TO CONSTRUCTION.

FIGURE 2
MANHOLE GROUNDING DETAILS
Note: 5'x5' and Smaller Manholes Require 1/0 Ground Wire instead of 4/0.

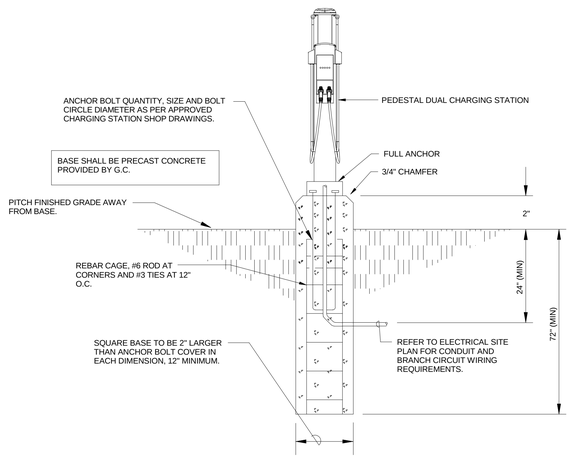
6 E005 PRIMARY MANHOLE DETAIL

PMH #

SCALE: N.T.S.

NOTES:

1. REFER TO EVERSOURCE C3813 - REVISIONS #1 FOR EQUIPMENT DESIGNATIONS ON FOOTNOTES. FURNISH MANHOLES, FRAMES & COVERS TO BE INSTALLED BY SITE CONTRACTOR.



6 E005 EV CHARGING STATION BASE DETAIL

SCALE: N.T.S.

NOTES:

1. FURNISH & INSTALL PEDESTAL DUAL AC LEVEL 2 COMMERCIAL/FLEET ELECTRIC VEHICLE CHARGING STATION, REFER TO SPECIFICATIONS.

Jonathan Levi Architects
266 beacon street
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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

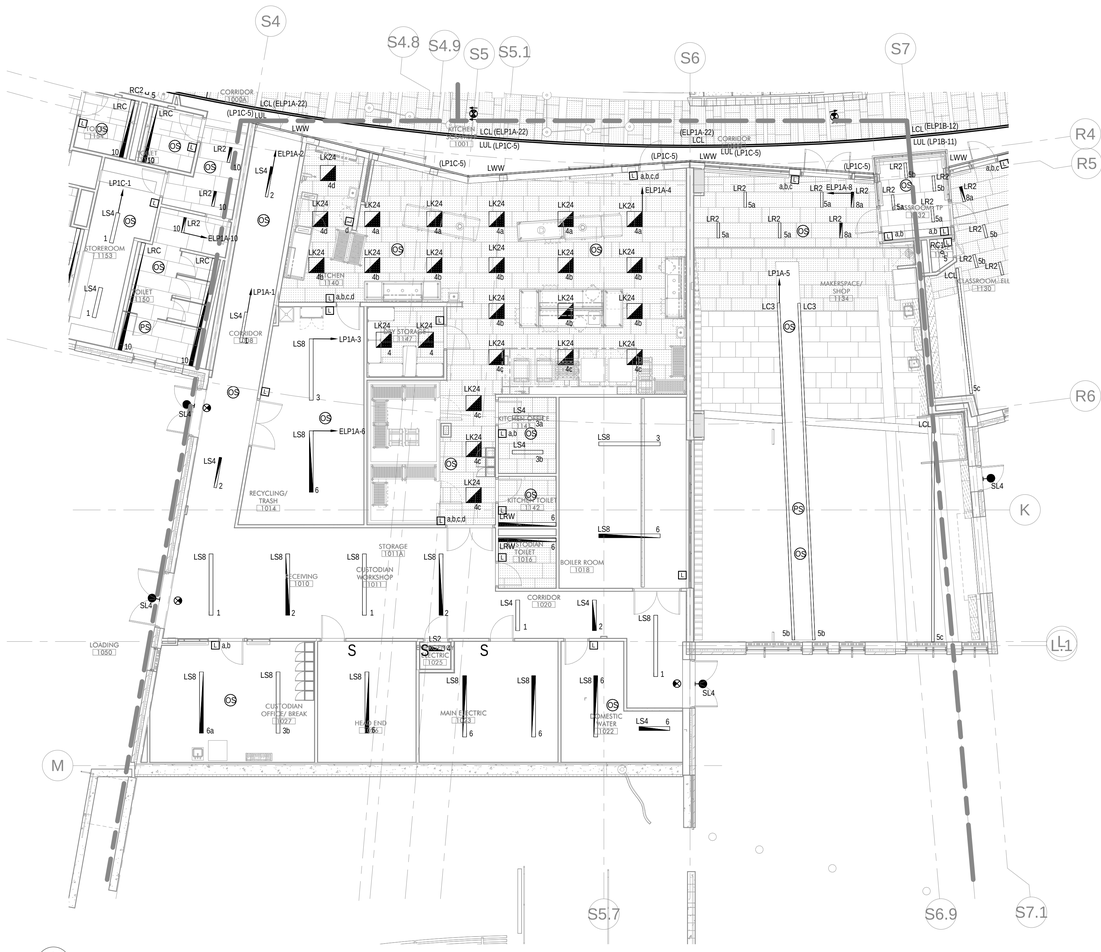
DRAWING NAME
ELECTRICAL SITE PLAN DETAILS

PROJECT NO. 1722

DRAWING NO.
E005

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 E101A FIRST FLOOR PLAN - PART 1-A - LIGHTING
SCALE: 1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

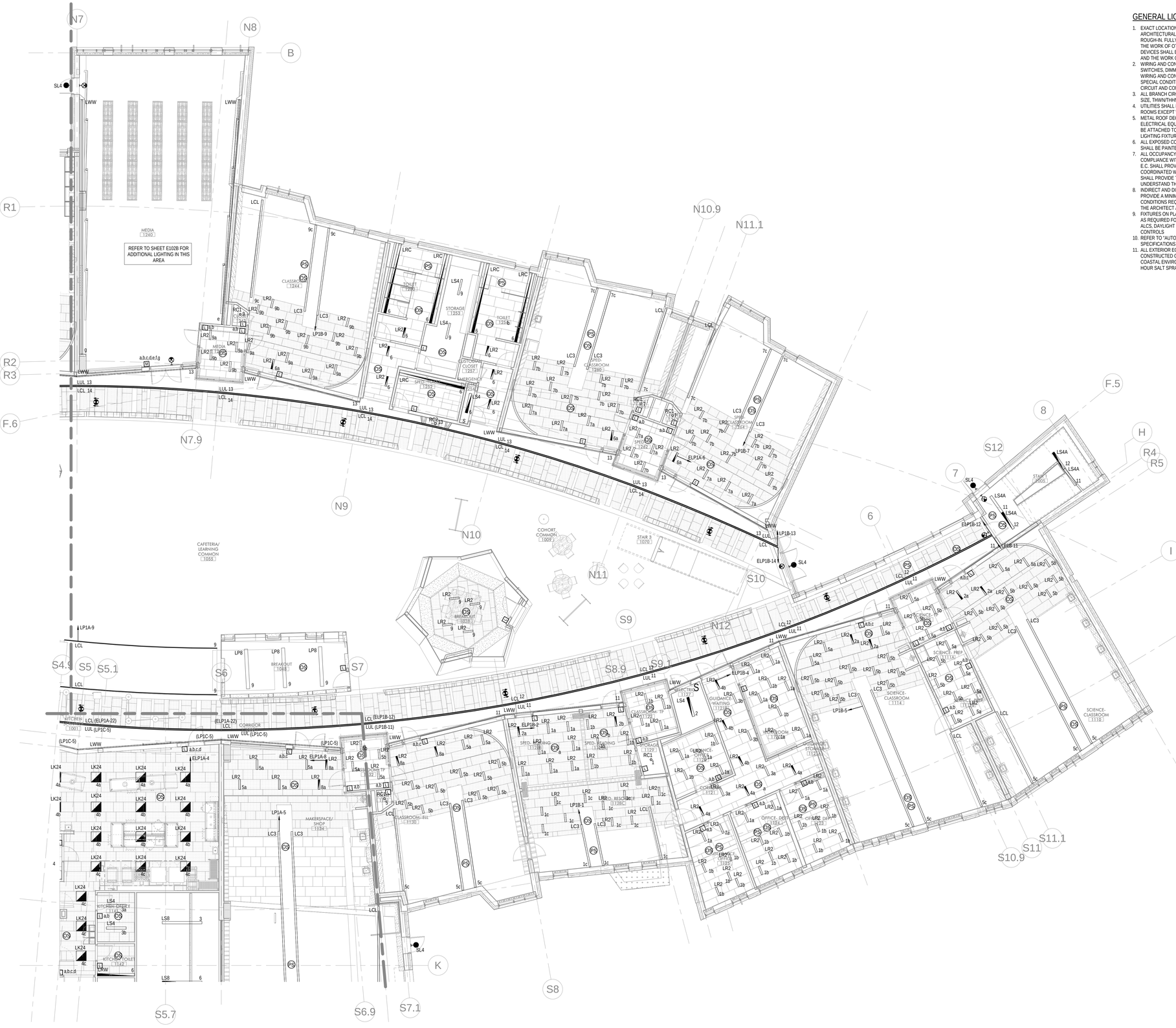
DRAWING NAME

FIRST FLOOR PLAN
PART A - LIGHTING

PROJECT NO. 1722

DRAWING NO.

E101A



1 E101B FIRST FLOOR PLAN - PART 1-B - LIGHTING
SCALE: 1/8" = 1'-0"

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.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

FIRST FLOOR PLAN
PART B - LIGHTING

PROJECT NO. 1722

DRAWING NO.

E101B

1 FIRST FLOOR PLAN - PART 1-C - LIGHTING
E101C SCALE: 1/8" = 1'-0"

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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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.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
FIRST FLOOR PLAN
PART C - LIGHTING

PROJECT NO. 1722

DRAWING NO.
E101C

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.
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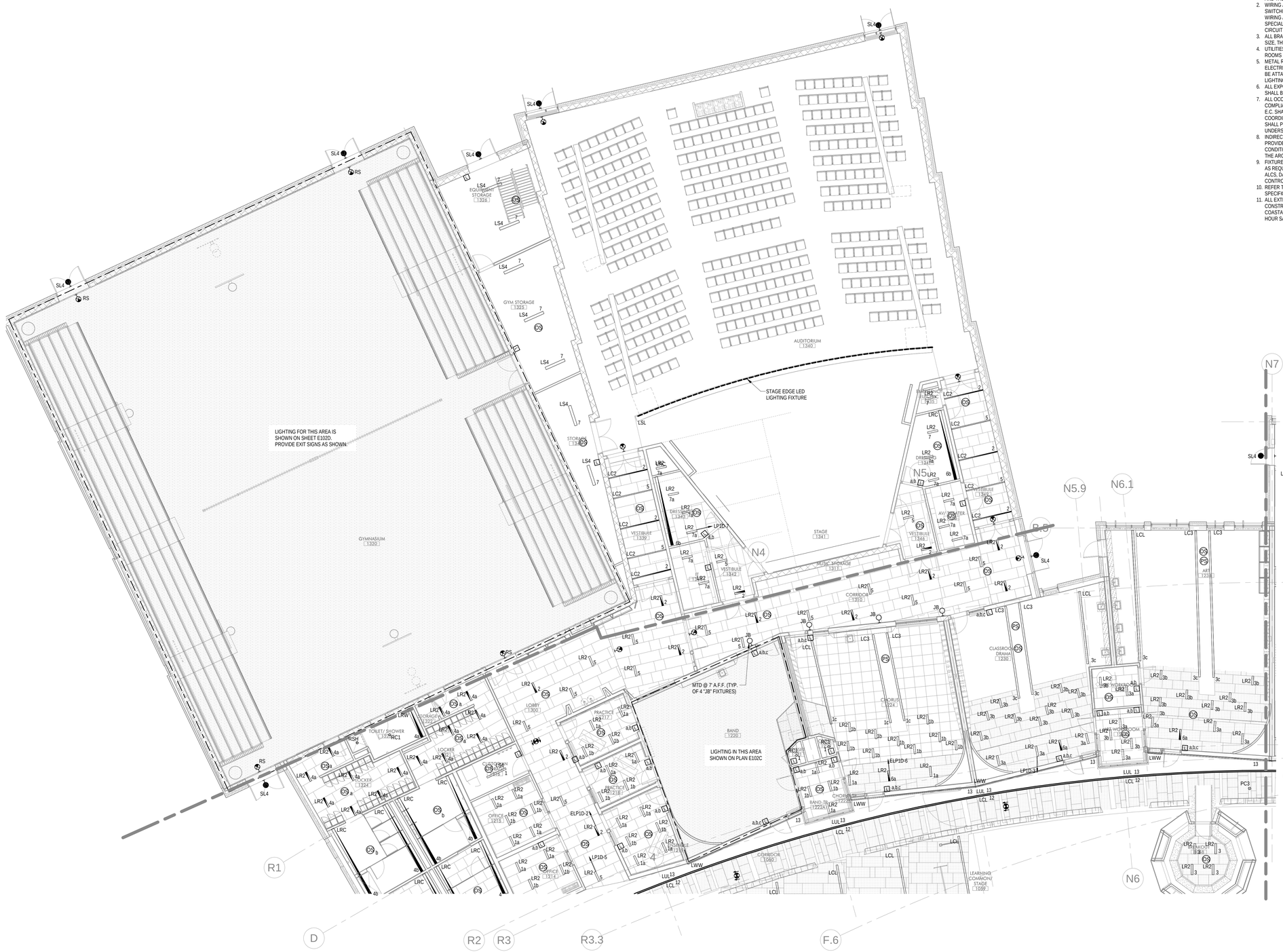

1 E101D FIRST FLOOR PLAN - PART 1-D - LIGHTING
SCALE: 1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
FIRST FLOOR PLAN
PART D - LIGHTING

PROJECT NO. 1722

DRAWING NO.
E101D

1 E102A SECOND FLOOR PLAN - PART 2-A - LIGHTING
SCALE: 1/8" = 1'-0"

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.
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.
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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.
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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
SECOND FLOOR PLAN PART A - LIGHTING

PROJECT NO. 1722

DRAWING NO.
E102A

1 E102B SECOND FLOOR PLAN - PART 2-B - LIGHTING
SCALE: 1/8" = 1'-0"

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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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
SECOND FLOOR PLAN PART B - LIGHTING

PROJECT NO. 1722

DRAWING NO.
E102B

1 E102C SECOND FLOOR PLAN - PART 2-C - LIGHTING
SCALE: 1/8" = 1'-0"

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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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART C - LIGHTING

PROJECT NO. 1722

DRAWING NO.

E102C

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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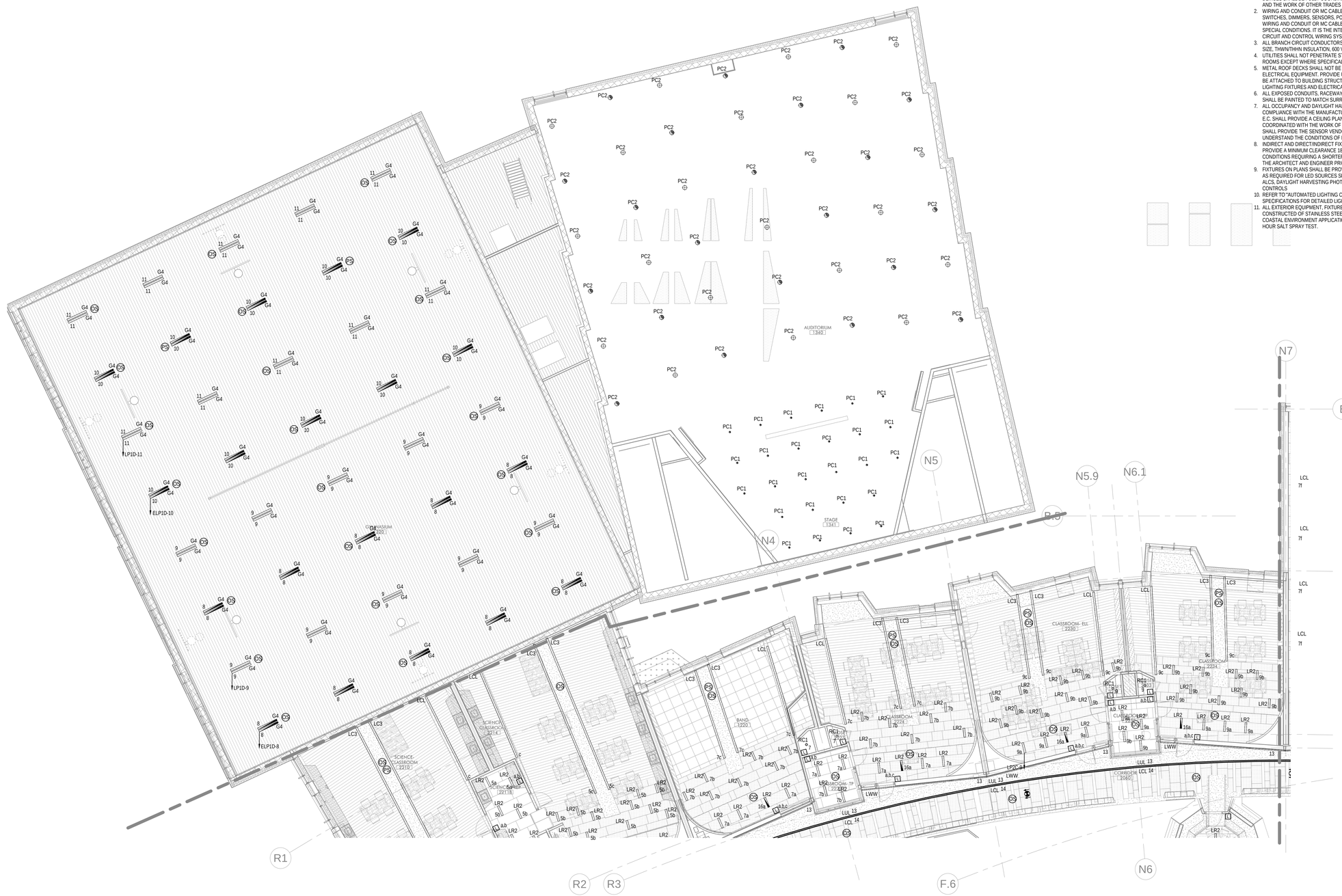

1 E102D SECOND FLOOR PLAN - PART 2-D - LIGHTING
SCALE: 1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART D - LIGHTING

PROJECT NO. 1722

DRAWING NO.

E102D

GENERAL LIGHTING NOTES:

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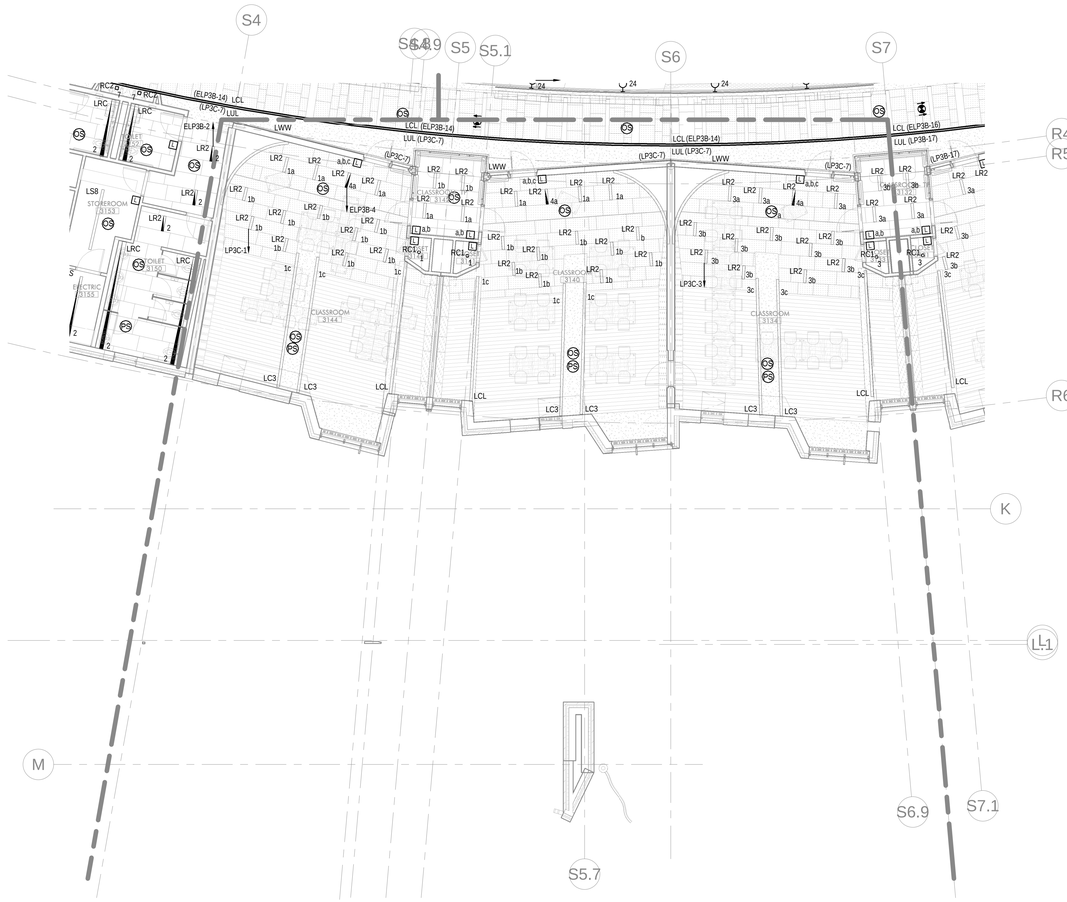
11. ALL EXTERIOR EQUIPMENT, FIXTURES, AND DEVICES SHALL BE RATED IP65 (MINIMUM) AND BE CONSTRUCTED OF STAINLESS STEEL AND/OR MARINE GRADE ALUMINUM SUITABLE FOR COASTAL ENVIRONMENT APPLICATION. PAINTED FINISHES SHALL HAVE PASSED A MINIMUM 5,000 HOUR SALT SPRAY TEST.



1 / E103A THIRD FLOOR PLAN - PART 3-A - LIGHTING
SCALE: 1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

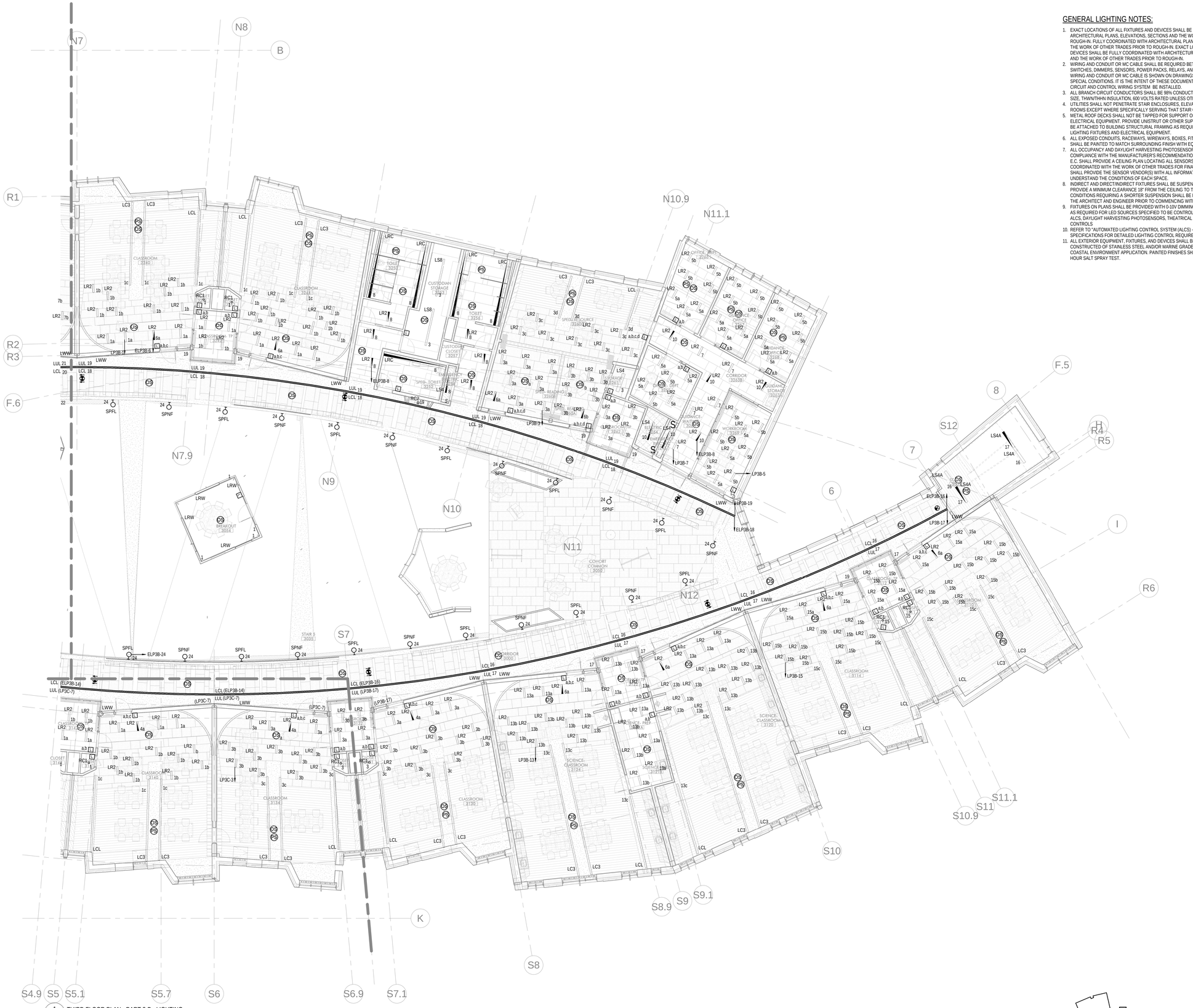
DRAWING NAME

THIRD FLOOR PLAN
PART A - LIGHTING

PROJECT NO. 1722

DRAWING NO.

E103A



1 E103B THIRD FLOOR PLAN - PART 3-B - LIGHTING
SCALE: 1/8" = 1'-0"

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.
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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN
PART B - LIGHTING

PROJECT NO. 1722

DRAWING NO.

E103B

LIGHTING FOR THIS AREA IS SHOWN ON SHEET E102D.

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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1 E103C THIRD FLOOR PLAN - PART 3-C - LIGHTING
SCALE: 1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
THIRD FLOOR PLAN
PART C - LIGHTING

PROJECT NO. 1722

DRAWING NO.
E103C

GENERAL LIGHTING NOTES:

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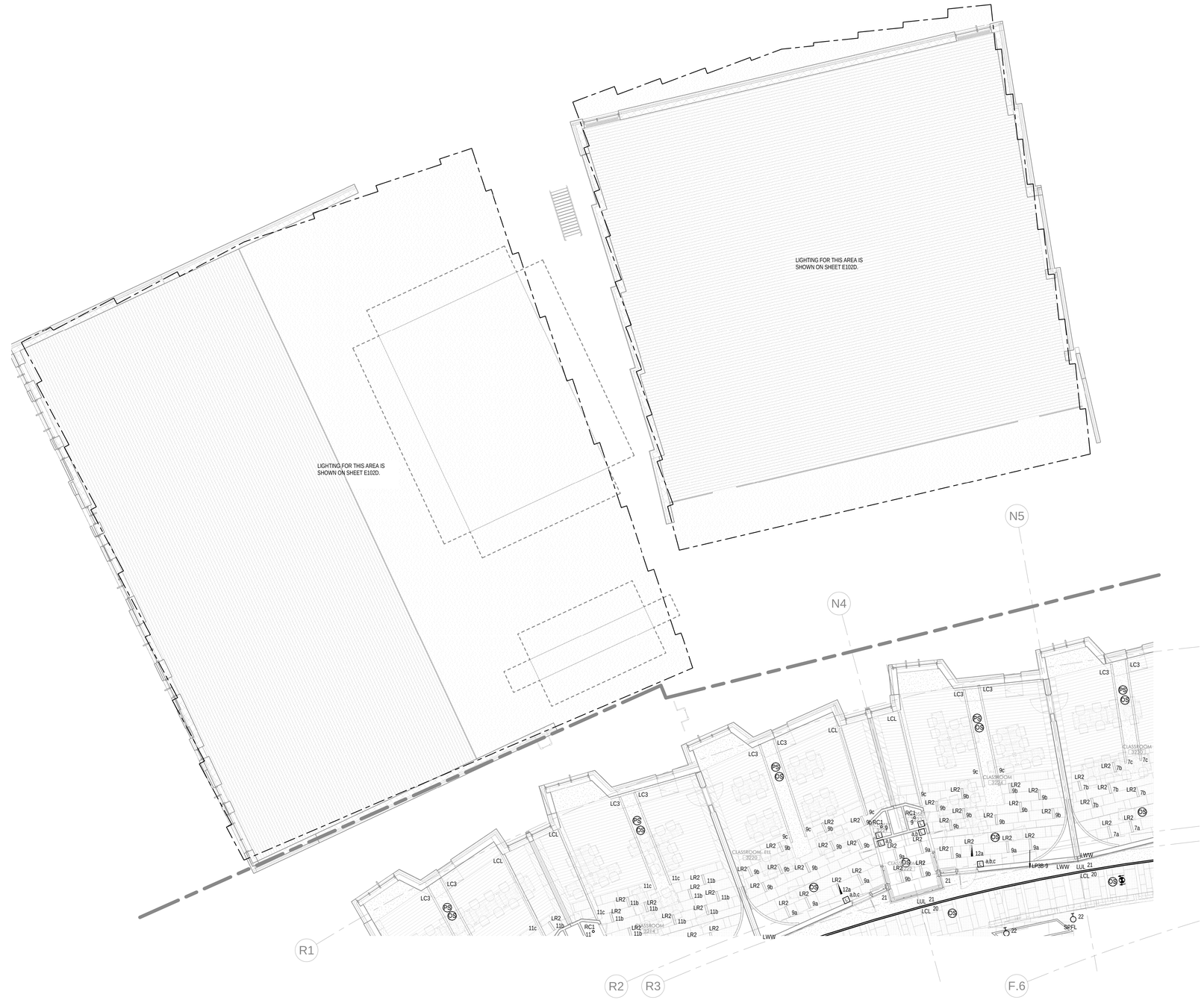

1 E103D THIRD FLOOR PLAN - PART 3-D - LIGHTING
SCALE: 1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN
PART D - LIGHTING

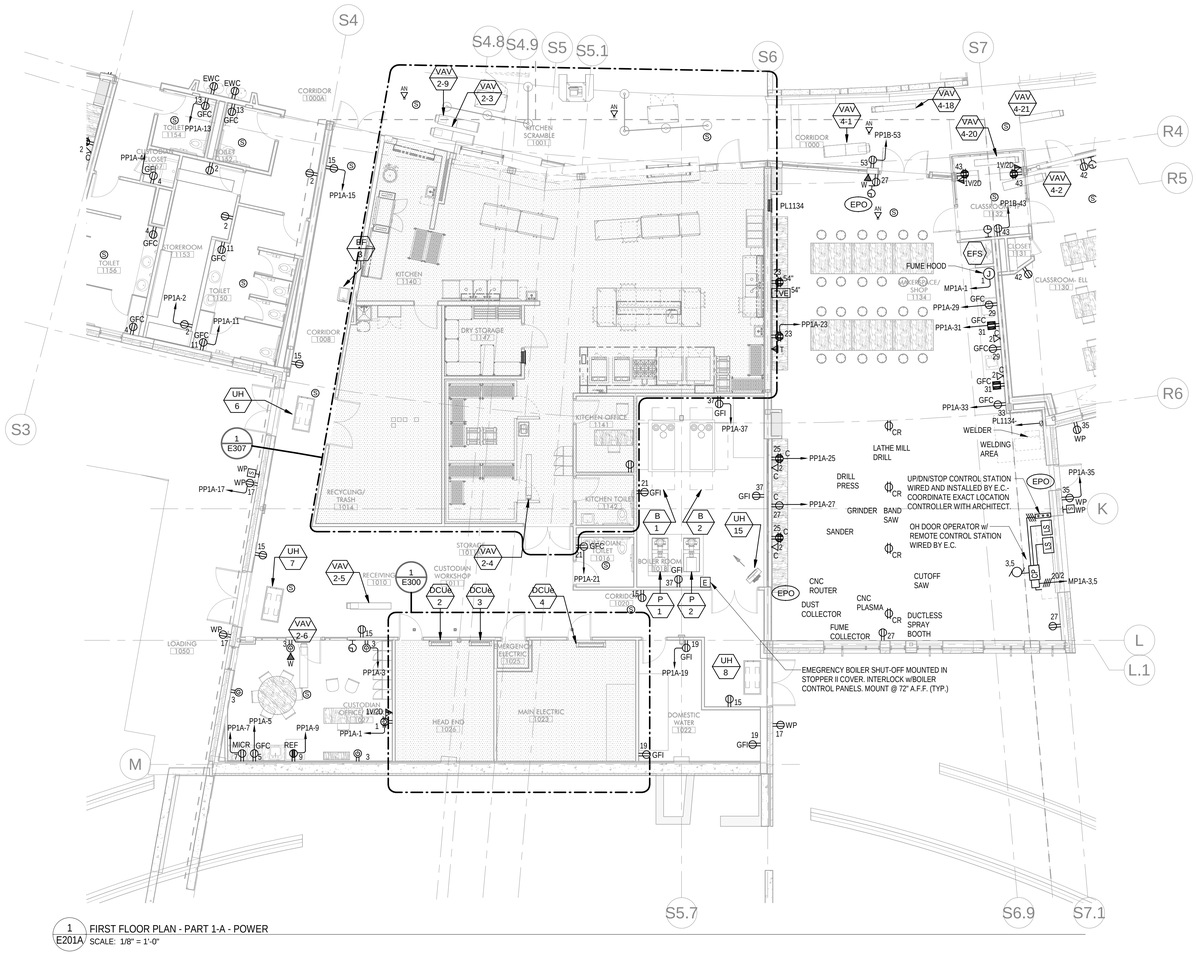
PROJECT NO. 1722

DRAWING NO.

E103D

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 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.
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 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.



1 E201A FIRST FLOOR PLAN - PART 1-A - POWER
SCALE: 1/8" = 1'-0"

MAKERSPACE / SHOP EQUIPMENT SCHEDULE - ROOM 1134

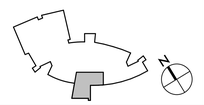
EQUIP NO.	EQUIPMENT	QTY	NEW	EXIST	HP	K.W.	AMPS.	VOLT, PHASE	PANEL	CKT. NO.	BRKR.	WIRE & COND.	EQUIPMENT AND CONNECTIONS: TS					CRHD			J	REMARKS
(1)	MS1	BAND SAW	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS2	DRILL PRESS	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS3	SANDER	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS4	TABLE SAW	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS5	DUST COLLECTOR	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS6	CNC ROUTER	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS7	FUME COLLECTOR	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS8	CNC PLASMA	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS9	DUCTLESS SPRAY BOOTH	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS10	CUT-OFF SAW	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS11	GRINDER	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS12	BAND SAW	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS13	LATHE MILL DRILL	1	X	-	-	-	-	120,1	PL1134	-	20A/1P	2#12+#12G, 3/4"C	-	-	-	-	-	X	X	-	-	-
(1)	MS14	WELDER	1	X	-	-	-	-	208,3	PL1134	-	60A/3P	4#4+#10G, 1 1/4"C	-	-	X	-	X	-	-	X	-	-
(1)	MS15	WORK TABLE	1	X	-	-	-	-	208,3	PL1134	-	60A/3P	4#4+#10G, 1 1/4"C	-	-	-	-	-	(2)X	(2)X	-	-	-

(1) FIELD CONFIRM EXACT EQUIPMENT LOCATION PRIOR TO ROUGHING. COORDINATE WITH ARCHITECT.

(2) TYPICALLY INSTALL CEILING MOUNTED RECEPTACLE AND PROVIDE CORD REEL HEAVY DUTY EQUAL TO HUBBELL ITEM #HBL45123C20, EXTENSION CORD 45 FEET 12 GAUGE WITH NEMA 5-20 SINGLE CONNECTOR. INSTALL CORD REEL ADJACENT TO RECEPTACLE. ALSO PROVIDE ALL MOUNTING BRACKETS AND STRUCTURAL SUPPORT FOR MOUNTING OF CORD REELS TO BEAMS. PROVIDE PIVOT BASE ON ALL REELS.

(3) E.C SHALL F&I #6 AWG GROUND IN CONDUIT TO BUILDING STEEL & GROUNG BUS OF PANEL PL125C, FROM LOCATION OF FLAMMABLE STORAGE CABINET. EXACT LOCATION TO BE COORDINATED WITH EQUIPMENT INSTALLER.

2 E201A MAKERSPACE / SHOP EQUIPMENT SCHEDULE - ROOM 1134
SCALE: N.T.S.



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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

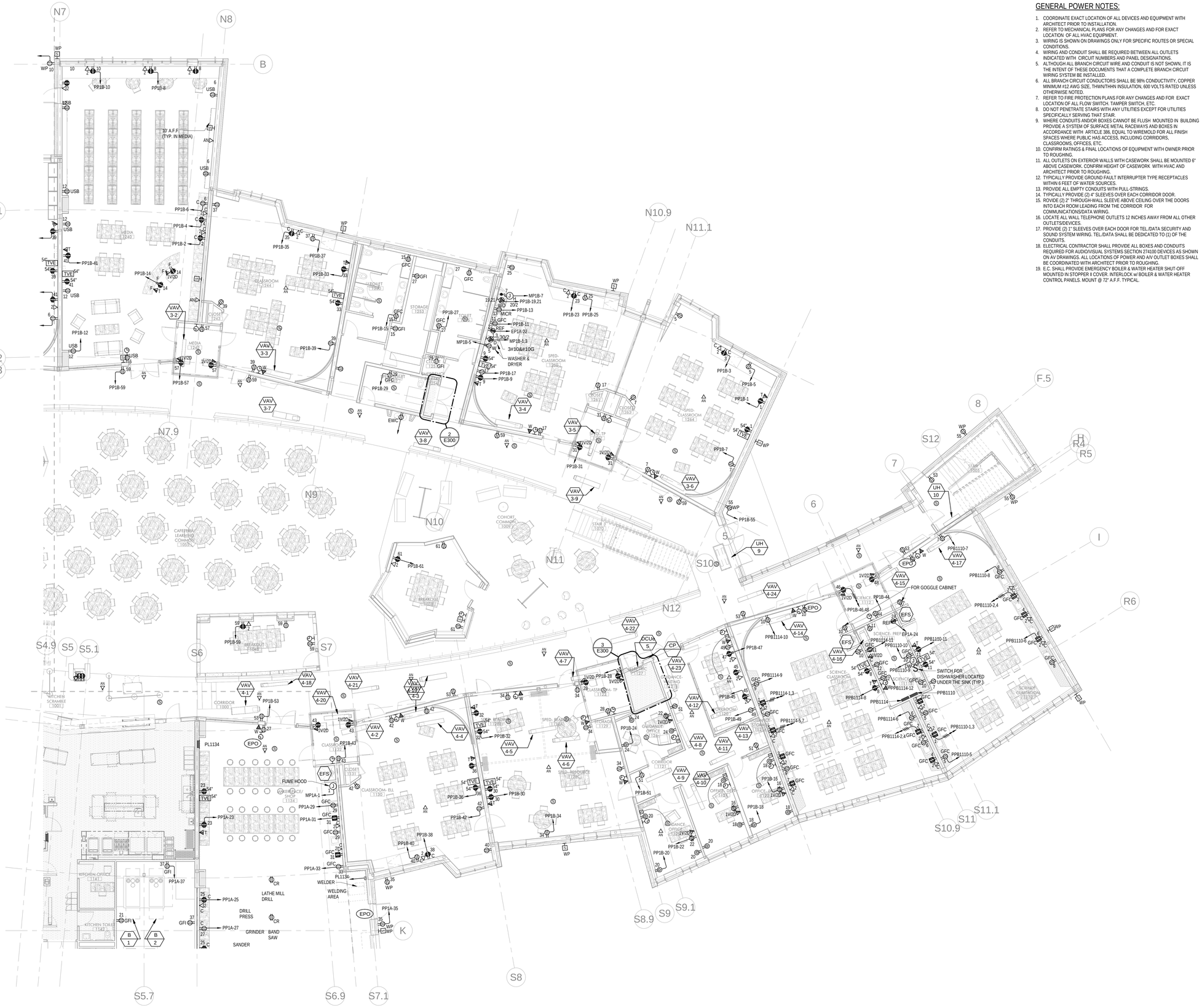
REVISIONS

No.	Date	Description

DRAWING NAME
FIRST FLOOR PLAN
PART A - POWER

PROJECT NO. 1722

DRAWING NO.
E201A



1 E201B FIRST FLOOR PLAN - PART 1-B - POWER
SCALE: 1/8" = 1'-0"

GENERAL POWER NOTES:

1. COORDINATE EXACT LOCATION OF ALL DEVICES AND EQUIPMENT WITH ARCHITECT PRIOR TO INSTALLATION.
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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 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.
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 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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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

FIRST FLOOR PLAN
PART B - POWER

PROJECT NO. 1722

DRAWING NO.

E201B

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.
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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.

LIQUID-TIGHT HARD-USE FLEXIBLE SO CABLE INSTALLED BELOW BLEACHERS (TYP.)

OUTLETS MOUNTED TO FACE OF BLEACHERS. COORDINATE EXACT LOCATION w/ ARCHITECT PRIOR TO ROUGH-IN (TYP.)

SEE DWG. E202D FOR ADDITIONAL EQUIPMENT ABOVE.

GYMNASIUM EQUIPMENT CONTROL STATIONS. COORDINATE LOCATION w/ ARCHITECT PRIOR TO ROUGH-IN (TYP.)

84" ABOVE TOP OF BLEACHER (TYP. IN GYM)

PILOT LIGHT FOR DRESSING ROOM LIGHTS & RECEPTACLES (TYP.)

INTERLOCK KILN WITH ITS ASSOCIATED EXHAUST FAN SO WHEN KILN IS ON EXHAUST FAN IS ON, AND REMAINS ON FOR 20 MINUTE TIME DELAY AFTER KILN IS TURNED OFF. REFER TO DETAIL

KILN DOWN DRAFT FAN

PROJECTION SCREEN WIRED BY E.C.

TO CONTROL STATION, EXACT LOCATION TO BE COORDINATED w/ ARCHITECT PRIOR TO ROUGH-IN (TYP.)

UP/DN/STOP MOMENTARY KEYED SWITCH (CONTROL STATION), FURNISHED BY OTHERS. WIRED AND INSTALLED BY E.C. - EXACT LOCATION TO BE COORDINATED w/ ARCHITECT PRIOR TO ROUGH-IN (TYP.)

1 E201C FIRST FLOOR PLAN - PART 1-C - POWER
SCALE: 1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

FIRST FLOOR PLAN
PART C - POWER

PROJECT NO. 1722

DRAWING NO.

E201C

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1 E201D FIRST FLOOR PLAN - PART 1-D - POWER
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FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
FIRST FLOOR PLAN
PART D - POWER

PROJECT NO. 1722

DRAWING NO.
E201D

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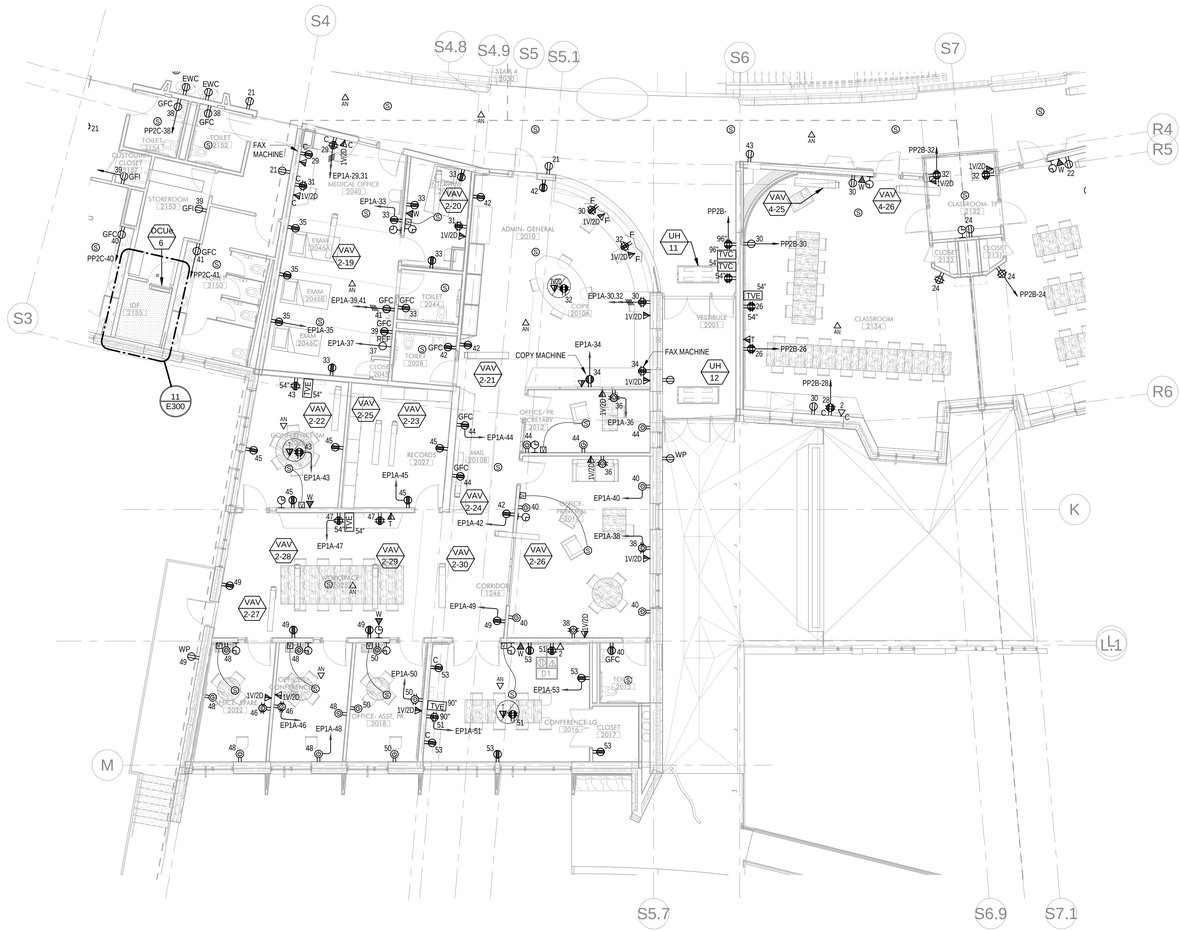

1 / E202A SECOND FLOOR PLAN - PART 2-A - POWER
SCALE: 1/8" = 1'-0"

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PROJECT STATUS

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REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART A - POWER

PROJECT NO. 1722

DRAWING NO.

E202A

1 E202B SECOND FLOOR PLAN - PART 2-B - POWER
SCALE: 1/8" = 1'-0"

GENERAL POWER NOTES:

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31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART B - POWER

PROJECT NO. 1722

DRAWING NO.

E202B

1 E202C SECOND FLOOR PLAN - PART 2-C - POWER
SCALE: 1/8" = 1'-0"

GENERAL POWER NOTES:

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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART C - POWER

PROJECT NO. 1722

DRAWING NO.

E202C

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DRAWING NAME

SECOND FLOOR PLAN PART D - POWER

PROJECT NO. 1722

DRAWING NO.

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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 388, 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 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.
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.
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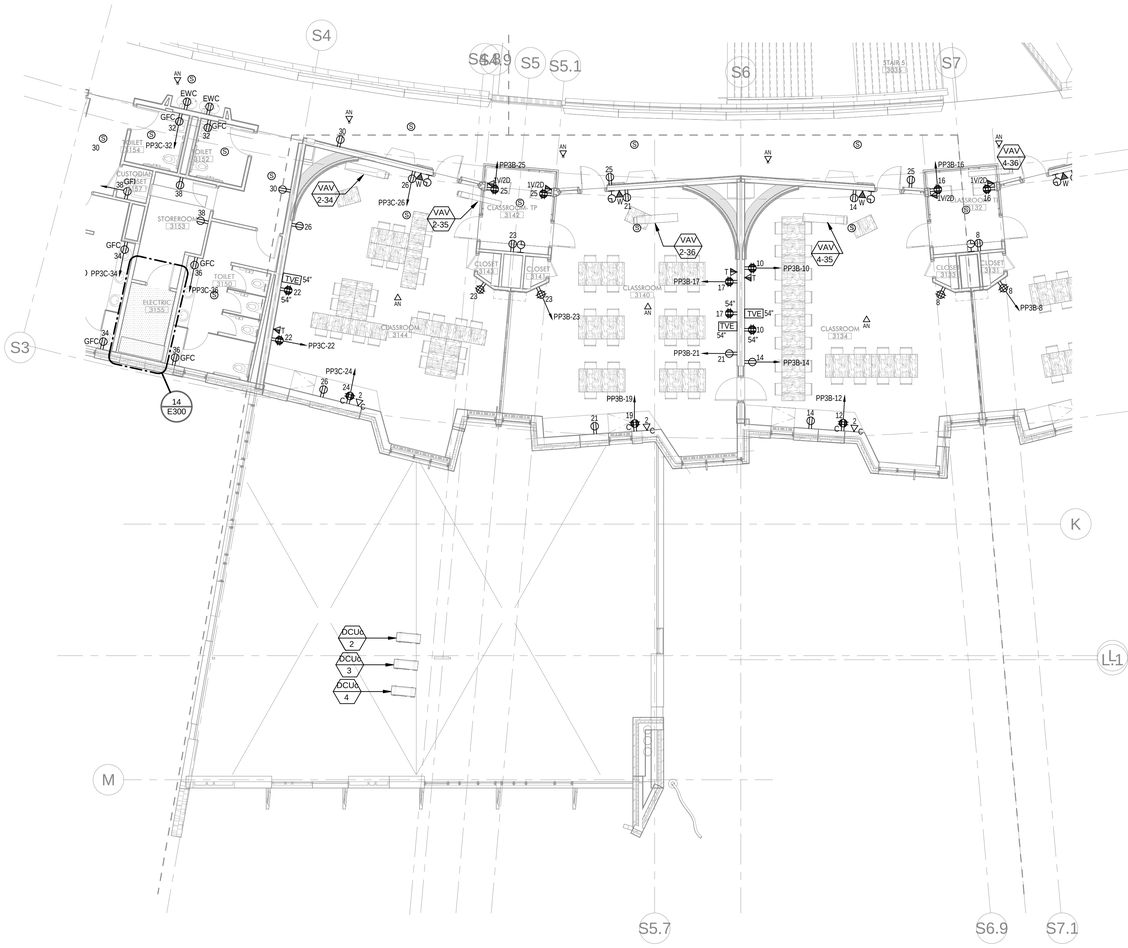
19. E.C. SHALL PROVIDE EMERGENCY BOILER & WATER HEATER SHUT-OFF MOUNTED IN STOPPER II COVER. INTERLOCK w/ BOILER & WATER HEATER CONTROL PANELS. MOUNT @ 72" A.F.F. TYPICAL.



1 E203A THIRD FLOOR PLAN - PART 3-A - POWER
SCALE: 1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN
PART A - POWER

PROJECT NO. 1722

DRAWING NO.

E203A

1 E203B THIRD FLOOR PLAN - PART 3-B - POWER
SCALE: 1/8" = 1'-0"

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8. DO NOT PENETRATE STAIRS WITH ANY UTILITIES EXCEPT FOR UTILITIES SPECIFICALLY SERVING THAT STAIR.
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PROJECT STATUS

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October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN
PART B - POWER

PROJECT NO. 1722

DRAWING NO.

E203B

1 E203C THIRD FLOOR PLAN - PART 3-C - POWER
SCALE: 1/8" = 1'-0"

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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN
PART C - POWER

PROJECT NO. 1722

DRAWING NO.

E203C

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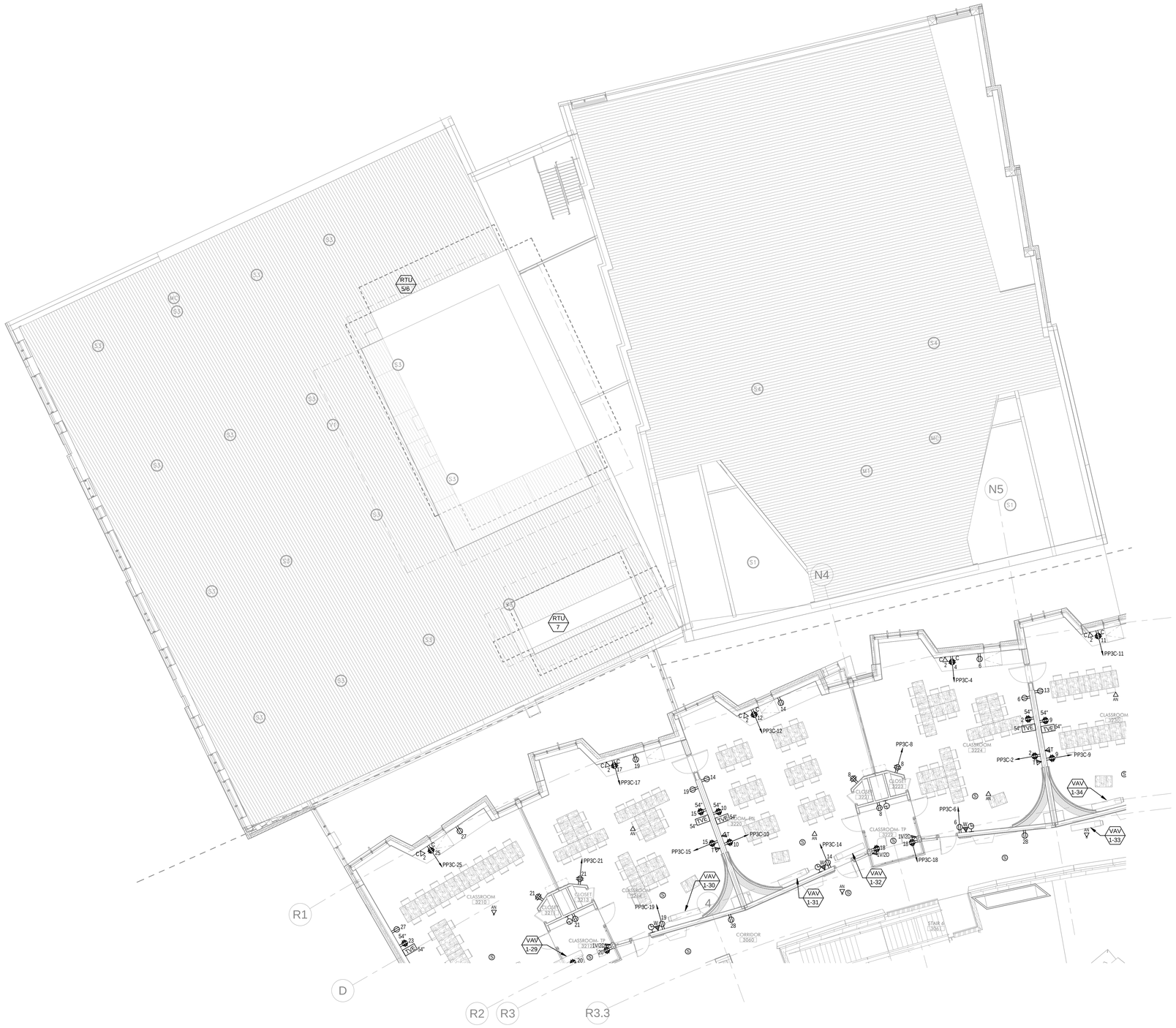
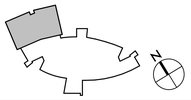


1 E203D THIRD FLOOR PLAN - PART 3-D - POWER
SCALE: 1/8" = 1'-0"



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31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN
PART D - POWER

PROJECT NO. 1722

DRAWING NO.

E203D

LIGHTNING PROTECTION NOTES:

1. LIGHTNING PROTECTION CONDUCTORS SHALL MAINTAIN A HORIZONTAL OR DOWNWARD COURSE, AVOIDING NUMEROUS BENDS AND TURNS CONDUCTORS SHALL ALSO BE FREE FROM "U" OR "V" (DOWN AND UP) POCKETS.
2. NO BEND OF A CONDUCTOR SHALL FORM AN ANGLE OF LESS THAN 90° NOR SHALL HAVE A RADIUS OF BEND LESS THAN 8 INCHES.
3. ALL ADHESIVE CABLE FASTENERS SHALL BE SECURED TO THE ROOF WITH AN ADHESIVE COMPOUND OR PITCH THAT COMPLIES WITH THE ROOFING BOND REQUIREMENTS PER THE ROOF MANUFACTURER'S GUARANTEE. ADHESIVE COMPOUND SHALL BE FURNISHED BY THE ROOFING CONTRACTOR.
4. ALL PROPER ROOF FLASHINGS SHALL BE FURNISHED, INSTALLED AND WEATHERPROOFED BY THE ROOFING CONTRACTOR PER THE ROOF MANUFACTURER'S GUARANTEE.
5. ALL PVC CONDUIT SHALL BE FURNISHED, INSTALLED, WEATHERPROOFED AND MAINTAINED FREE FROM OBSTRUCTIONS BY THE ELECTRICAL CONTRACTOR.
6. ACTUAL JOB SITE CONDITIONS MAY REQUIRE SLIGHT ALTERATIONS IN MAST, DOWNLEAD AND GROUND ROD LOCATIONS.
7. BARE COPPER MATERIALS SHALL NOT BE INSTALLED ON ALUMINUM OR GALVALUM SURFACES, AND ALUMINUM MATERIALS SHALL NOT BE INSTALLED ON COPPER SURFACES.
8. ALL LIGHTNING PROTECTION CONDUCTORS SHALL BE FASTENED EVERY 3'-0" MAXIMUM.
9. BOND STRUCTURAL STEEL OR REBAR TO NEAREST DOWN CONDUCTOR OR GROUND ROD.
10. ALL BOLTS ON BOLT PRESSURE CONNECTORS SHALL BE TORQUED AT 150 FT-LB.
11. ALL CONNECTIONS MUST BE USED WITH UL LISTED CABLE OF THE SAME METAL TYPE.
12. THE LIGHTNING PROTECTION SYSTEM SHALL BE INSTALLED
13. IN A NEAT WORKMANLIKE AND INCONSPICUOUS MANNER.
14. PRIOR TO GROUND CONNECTION ON ANY STRUCTURAL STEEL FRAMING, REMOVE ALL PAINT, GREASE, RUST, ETC.
15. CONNECTIONS TO GROUND ROD SHALL BE MADE AT A POINT NOT LESS THAN 1'-0" BELOW FINISHED GRADE AND 2'-0" AWAY FROM THE FOUNDATION WALL.
16. BOND WATERLINES (DOMESTIC & FIRE) TO THE NEAREST STRUCTURAL STEEL, DOWN CONDUCTOR OR GROUND ROD.
17. THE BUILDING GROUND LOOP, INCLUDING GROUND RODS AND BONDING TO BASE OF STRUCTURAL STEEL COLUMNS EVERY 60'-0" O.C., MAY BE USED FOR THE LIGHTNING PROTECTION SYSTEM GROUNDING SYSTEM.
18. ALL ADDITIONAL GROUNDING, OTHER THAN THAT SHOWN ON DRAWING, SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.
19. A LIGHTNING ARRESTOR, PROTECTOR OR ANTENNA DISCHARGE UNIT SHALL BE INSTALLED ON EACH ELECTRIC AND TELEPHONE SERVICE AND RADIO AND TELEVISION ANTENNA LEAD-IN BY THE ELECTRICAL CONTRACTOR, OR OTHERS, PER NFPA-70.
20. SURGE TRANSIENT PROTECTION OF SERVICES (TVSS) IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR OR THE SUPPLIER OF THE SENSITIVE EQUIPMENT. (I.E. COMPUTERS, COPIERS, TELEPHONE, ETC.)
21. THE LIGHTNING PROTECTION INSTALLING CONTRACTOR SHALL PROVIDE A VIDEOTAPE OF THE INSTALLATION, INCLUDING, BUT NOT LIMITED TO; AIR TERMINAL, MAST MOUNTING, BONDING CONNECTIONS (WATERLINE & STRUCTURAL STEEL), DOWN CONDUCTORS, GROUND RODS/GRIDS, GROUND TEST RESULTS AND ALL BURIED, CONCEALED OR INACCESSIBLE CONNECTIONS AND COMPONENTS. THE VIDEOTAPE SHALL BE FORWARDED TO LIGHTNING PREVENTOR OF AMERICA.
22. A GROUND RESISTANT TEST, USING "FALL OF POTENTIAL" METHOD, SHALL BE PERFORMED IMMEDIATELY AFTER DRIVING GROUND RODS. IF THE TEST RESULTS EXCEED 10 OHMS, THEN ADDITIONAL GROUND RODS SHALL BE DRIVEN UNTIL THE RESISTANCE IS 10 OHMS OR LESS. THE TEST RESULTS AND TEST DATE SHALL BE VIDEOTAPED AND INCLUDED ON THE FINAL AS-BUILT DRAWING, AND THEN FORWARDED TO LIGHTNING PREVENTOR OF AMERICA.
23. THE LPA-2005 AIR TERMINAL SHALL EXTEND 20'-0" MIN. ABOVE ALL PROJECTIONS ON THE STRUCTURE IT IS PROTECTING.
24. LIGHTNING MASTS MAY REQUIRE GUY WIRES IN HIGH WIND AREAS. THE INSTALLING CONTRACTOR SHALL DETERMINE NECESSITY OF GUY WIRES AT JOB SITE. GUY WIRES SHALL BE PROVIDED BY OTHERS.
25. METALLIC MASTS (ANTENNAS, FLAGPOLES, SATELLITE DISHES, METAL STACKS, ETC.) PROJECTING 5'-0" ABOVE THE FINISHED ROOF MUST BE GROUNDED WITH MAIN SIZE CONDUCTOR TO THE LPS DOWN CONDUCTOR.
26. THE INSTALLATION SHALL COMPLY WITH HBP-21 (LEVELS 1 & 2) PRIOR TO ISSUANCE OF ANY WARRANTIES/GUARANTEES.
27. NOT USED.
28. ARL CERTIFICATION SHALL BE PROVIDED UPON COMPLETION OF INSTALLATION.

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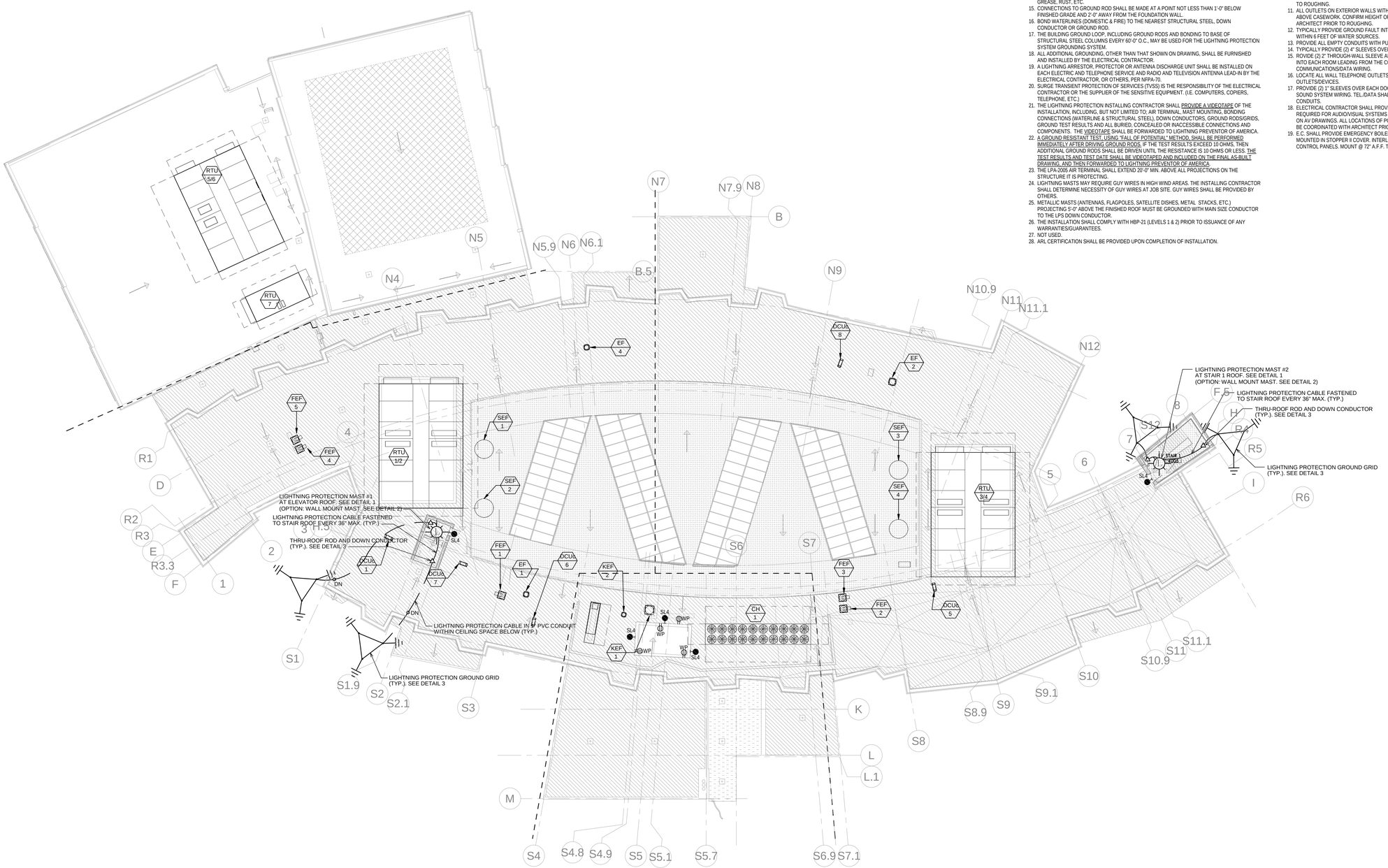
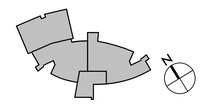


1 / E204 OVERALL ROOF PLAN - POWER & LIGHTNING PROTECTION
SCALE: 1/16" = 1'-0"



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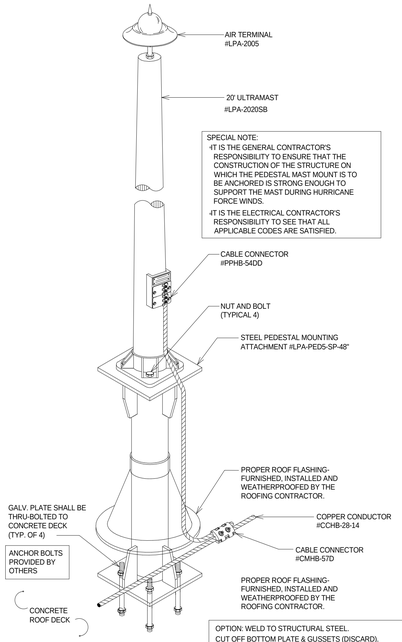
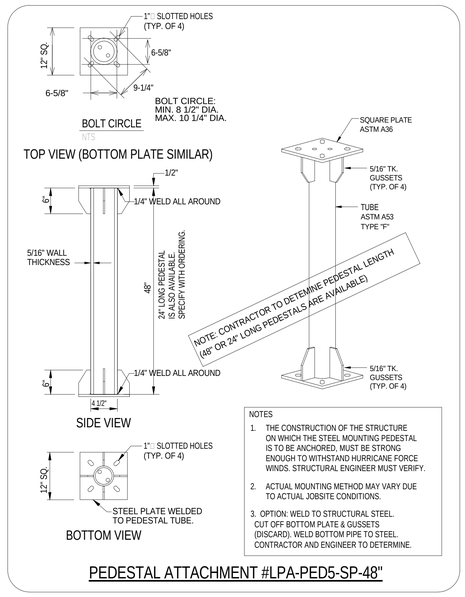
OVERALL ROOF PLAN - POWER & LIGHTNING PROTECTION

PROJECT NO. 1722

DRAWING NO.

E204

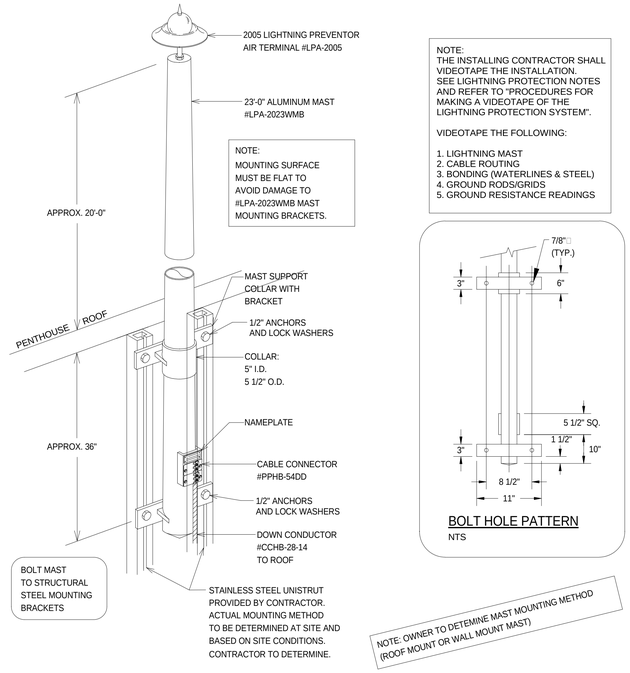




1 LIGHTNING MAST MOUNTING (ROOF MOUNT) - 48" PEDESTAL

NTS

SYMBOL



NOTE:
THE INSTALLING CONTRACTOR SHALL VIDEOTAPE THE INSTALLATION. SEE LIGHTNING PROTECTION NOTES AND REFER TO "PROCEDURES FOR MAKING A VIDEOTAPE OF THE LIGHTNING PROTECTION SYSTEM".

VIDEOTAPE THE FOLLOWING:

1. LIGHTNING MAST
2. CABLE ROUTING
3. BONDING (WATERLINES & STEEL)
4. GROUND RODS/GRIDS
5. GROUND RESISTANCE READINGS

BOLT HOLE PATTERN

NTS

2 OPTIONAL MAST MOUNTING (WALL MOUNT LIGHTNING MAST)

NTS

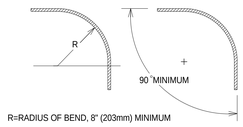
SYMBOL

LIGHTNING PROTECTION NOTES

1. LIGHTNING PROTECTION CONDUCTORS SHALL MAINTAIN A HORIZONTAL OR DOWNWARD COURSE, AVOIDING NUMEROUS BENDS AND TURNS CONDUCTORS SHALL ALSO BE FREE FROM "U" OR "V" (DOWN AND UP) POCKETS.
2. NO BEND OF A CONDUCTOR SHALL FORM AN ANGLE OF LESS THAN 90° NOR SHALL HAVE A RADIUS OF BEND LESS THAN 8 INCHES.
3. ALL ADHESIVE CABLE FASTENERS SHALL BE SECURED TO THE ROOF WITH AN ADHESIVE COMPOUND OR PITCH THAT COMPLIES WITH THE ROOFING BOND REQUIREMENTS PER THE ROOF MANUFACTURER'S GUARANTEE. ADHESIVE COMPOUND SHALL BE FURNISHED BY THE ROOFING CONTRACTOR.
4. ALL PROPER ROOF FLASHINGS SHALL BE FURNISHED, INSTALLED AND WEATHERPROOFED BY THE ROOFING CONTRACTOR PER THE ROOF MANUFACTURER'S GUARANTEE.
5. ALL PVC CONDUIT SHALL BE FURNISHED, INSTALLED, WEATHERPROOFED AND MAINTAINED FREE FROM OBSTRUCTIONS BY THE ELECTRICAL CONTRACTOR.
6. ACTUAL JOB SITE CONDITIONS MAY REQUIRE SLIGHT ALTERATIONS IN MAST, DOWNLEAD AND GROUND ROD LOCATIONS.
7. BARE COPPER MATERIALS SHALL NOT BE INSTALLED ON ALUMINUM OR GALVALUM SURFACES, AND ALUMINUM MATERIALS SHALL NOT BE INSTALLED ON COPPER SURFACES.
8. ALL LIGHTNING PROTECTION CONDUCTORS SHALL BE FASTENED EVERY 3'-0" MAXIMUM.
9. BOND STRUCTURAL STEEL OR REBAR TO NEAREST DOWN CONDUCTOR OR GROUND ROD.
10. ALL BOLTS ON BOLT PRESSURE CONNECTORS SHALL BE TORQUED AT 150 FT-LB.
11. ALL CONNECTIONS MUST BE USED WITH UL LISTED CABLE OF THE SAME METAL TYPE.
12. THE LIGHTNING PROTECTION SYSTEM SHALL BE INSTALLED IN A NEAT WORKMANLIKE AND INCONSPICUOUS MANNER.
13. PRIOR TO GROUND CONNECTION ON ANY STRUCTURAL STEEL FRAMING, REMOVE ALL PAINT, GREASE, RUST, ETC.
14. CONNECTIONS TO GROUND ROD SHALL BE MADE AT A POINT NOT LESS THAN 1'-0" BELOW FINISHED GRADE AND 2'-0" AWAY FROM THE FOUNDATION WALL.
15. BOND WATERLINES (DOMESTIC & FIRE) TO THE NEAREST STRUCTURAL STEEL, DOWN CONDUCTOR OR GROUND ROD.
16. THE BUILDING GROUND LOOP, INCLUDING GROUND RODS AND BONDING TO BASE OF STRUCTURAL STEEL COLUMNS EVERY 60'-0" O.C., MAY BE USED FOR THE LIGHTNING PROTECTION SYSTEM GROUNDING SYSTEM.
17. ALL ADDITIONAL GROUNDING, OTHER THAN THAT SHOWN ON DRAWING, SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.
18. A LIGHTNING ARRESTOR, PROTECTOR OR ANTENNA DISCHARGE UNIT SHALL BE INSTALLED ON EACH ELECTRIC AND TELEPHONE SERVICE AND RADIO AND TELEVISION ANTENNA LEAD-IN BY THE ELECTRICAL CONTRACTOR, OR OTHERS, PER NFPA-70.
19. SURGE TRANSIENT PROTECTION OF SERVICES (TVSS) IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR OR THE SUPPLIER OF THE SENSITIVE EQUIPMENT. (I.E. COMPUTERS, COPIERS, TELEPHONE, ETC.)
20. THE LIGHTNING PROTECTION INSTALLING CONTRACTOR SHALL PROVIDE A VIDEOTAPE OF THE INSTALLATION, INCLUDING, BUT NOT LIMITED TO; AIR TERMINAL, MAST MOUNTING, BONDING CONNECTIONS (WATERLINE & STRUCTURAL STEEL), DOWN CONDUCTORS, GROUND RODS/GRIDS, GROUND TEST RESULTS AND ALL BURIED, CONCEALED OR INACCESSIBLE CONNECTIONS AND COMPONENTS. THE VIDEOTAPE SHALL BE FORWARDED TO LIGHTNING PREVENTOR OF AMERICA.
21. A GROUND RESISTANT TEST, USING "FALL OF POTENTIAL" METHOD, SHALL BE PERFORMED IMMEDIATELY AFTER DRIVING GROUND RODS. IF THE TEST RESULTS EXCEED 10 OHMS, THEN ADDITIONAL GROUND RODS SHALL BE DRIVEN UNTIL THE RESISTANCE IS 10 OHMS OR LESS. THE TEST RESULTS AND TEST DATE SHALL BE VIDEOTAPED AND INCLUDED ON THE FINAL AS-BUILT DRAWING, AND THEN FORWARDED TO LIGHTNING PREVENTOR OF AMERICA .
22. THE LPA-2005 AIR TERMINAL SHALL EXTEND 20'-0" MIN. ABOVE ALL PROJECTIONS ON THE STRUCTURE IT IS PROTECTING.
23. LIGHTNING MASTS MAY REQUIRE GUY WIRES IN HIGH WIND AREAS. THE INSTALLING CONTRACTOR SHALL DETERMINE NECESSITY OF GUY WIRES AT JOB SITE. GUY WIRES SHALL BE PROVIDED BY OTHERS.
24. METALLIC MASTS (ANTENNAS, FLAGPOLES, SATELLITE DISHES, METAL STACKS, ETC.) PROJECTING 5'-0" ABOVE THE FINISHED ROOF MUST BE GROUNDED WITH MAIN SIZE CONDUCTOR TO THE LPS DOWN CONDUCTOR.
25. THE INSTALLATION SHALL COMPLY WITH HBP-21 (LEVELS 1 & 2) PRIOR TO ISSUANCE OF ANY WARRANTIES/GUARANTEES.
26. NOT USED.
27. ARL CERTIFICATION SHALL BE PROVIDED UPON COMPLETION OF INSTALLATION.

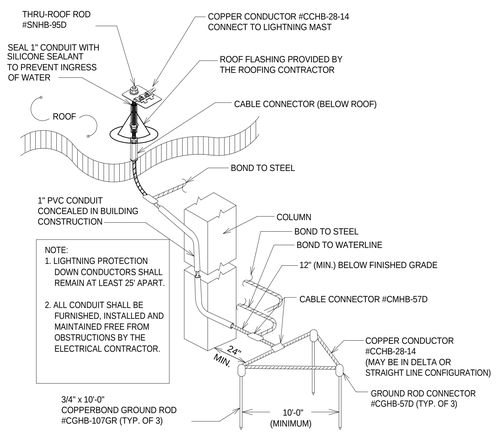
LIGHTNING PROTECTION LEGEND

	LIGHTNING PREVENTOR AIR TERMINAL 2005, 20'-0" ALUMINUM MAST AND PEDESTAL MOUNTING ATTACHMENT (ROOF MOUNT) (OR)	#LPA-2005, #LPA-2020SB, #LPA-PED5-SP-48
	LIGHTNING PREVENTOR AIR TERMINAL 2005 & 23'-0" ALUMINUM MAST (WALL MOUNT)	#LPA-2005, #LPA-2023WMB
	COPPER LIGHTNING PROTECTION CABLE	#CCHB-28-14
	CABLE FASTENERS (FASTEN CABLE EVERY 3FT. MAX.)	#CFHB-72, 64/80SS
△	THRU-ROOF ROD	#CNHB-95D
	CABLE CONNECTOR (AT BASE OF LIGHTNING MAST)	#PPHB-54DD
	BONDING PLATE (TO STEEL)	#PPHB-54D
	CABLE CONNECTOR	#CMHB-57D
	WATERLINE CONNECTOR (FIRE & DOMESTIC)	#CMHB-97D
	3/4" x 10'-0" COPPERBOND GROUND ROD AND CONNECTOR	#CGHB-107GR, #CGHB-57D



LIGHTNING CABLE SHALL REMAIN IN A HORIZONTAL OR DOWNWARD PATH AVOIDING "U" & "V" POCKETS (DOWN & UP).
NO BEND OF A CONDUCTOR SHALL FORM AN INCLUDED ANGLE OF LESS THAN 90 DEGREES OR HAVE A RADIUS OF BEND LESS THAN 8".

8" MIN. RADIUS BEND IN CABLE



NOTES:

1. PROVIDE BONDING CONNECTION #CMHB-97D TO WATERLINE (FIRE & DOMESTIC) AND CONNECT COPPER CABLE #CCHB-28-14 TO NEAREST DOWN CONDUCTOR, GROUND ROD OR STRUCTURAL STEEL FRAMEWORK.
2. PROVIDE BONDING PLATE #PPHB-54D TO STRUCTURAL STEEL OR REBAR AT EACH DOWN CONDUCTOR, AND CONNECT COPPER CABLE #CCHB-28-14 TO NEAREST DOWN CONDUCTOR OR GROUND ROD.
3. THE LIGHTNING PROTECTION SYSTEM INSTALLING CONTRACTOR SHALL PERFORM A RESISTANCE-TO-GROUND TEST IMMEDIATELY AFTER DRIVING GROUND RODS. IF THE TEST RESULTS EXCEED 10 OHMS, THEN ADDITIONAL GROUND RODS SHALL BE DRIVEN UNTIL THE RESISTANCE IS LESS THAN 10 OHMS. THE TEST RESULTS FOR EACH GROUND ROD SHALL BE VIDEOTAPED AND RECORDED ON THE AS-BUILT DRAWING AND FORWARDED TO LIGHTNING PREVENTOR OF AMERICA.
4. THE LIGHTNING PROTECTION INSTALLING CONTRACTOR SHALL PROVIDE A VIDEOTAPE OF THE INSTALLATION, INCLUDING, BUT NOT LIMITED TO; AIR TERMINAL, MAST MOUNTING, BONDING CONNECTIONS (WATERLINE & STRUCTURAL STEEL), DOWN CONDUCTORS, GROUND RODS/GRIDS, GROUND TEST RESULTS AND ALL BURIED, CONCEALED OR INACCESSIBLE CONNECTIONS AND COMPONENTS. THE VIDEOTAPE SHALL BE FORWARDED TO LIGHTNING PREVENTOR OF AMERICA.

NOTE:
1. 24" x 24" GROUND PLATES MAY BE USED IF SOIL CONDITIONS DO NOT ALLOW DRIVING OF GROUND RODS.
2. LIGHTNING PROTECTION DOWN CONDUCTORS SHALL REMAIN AT LEAST 10' APART.
3. FIBERGLASS, RGS, EMT, ETC. CONDUIT MAY BE USED IF LOCAL CODES DO NOT ALLOW USE OF PVC CONDUIT. METALLIC CONDUIT SHALL BE BONDED AT EACH END TO THE LIGHTNING DOWN CONDUCTOR.
4. ALL CONDUIT SHALL BE FURNISHED, INSTALLED AND MAINTAINED FREE FROM OBSTRUCTIONS BY THE ELECTRICAL CONTRACTOR.

3 LIGHTNING PROTECTION GROUNDING

NTS

SYMBOL △

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

LIGHTNING PROTECTION DETAILS

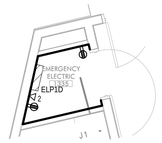
PROJECT NO. 1722

DRAWING NO.

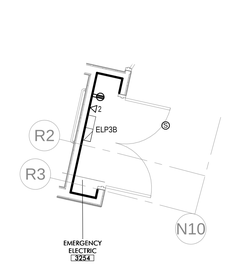
E205

GENERAL POWER NOTES:

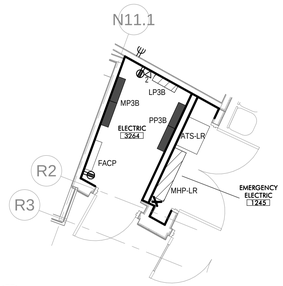
1. COORDINATE EXACT LOCATION OF ALL DEVICES AND EQUIPMENT WITH ARCHITECT PRIOR TO INSTALLATION.
2. REFER TO MECHANICAL PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL HVAC EQUIPMENT.
3. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
4. WIRING AND CONDUIT SHALL BE REQUIRED 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 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.
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 AUDIOVISUAL 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.



6 E300 FIRST FLOOR - PART 1-D - EMERG. ELEC.RM.1335 - POWER
SCALE: 1/4" = 1'-0"



12 E300 THIRD FLOOR - PART 3-B - EMERG.ELEC RM.3254 - POWER
SCALE: 1/4" = 1'-0"



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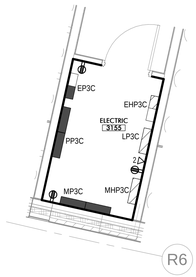

14 E300 THIRD FLOOR - PART 3-C - ELEC RM.3155 - POWER
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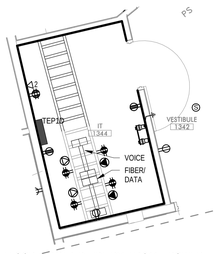

5 E300 FIRST FLOOR - PART 1-D - IDF RM. IT1344 - POWER
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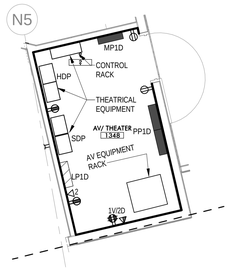
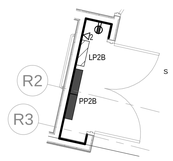
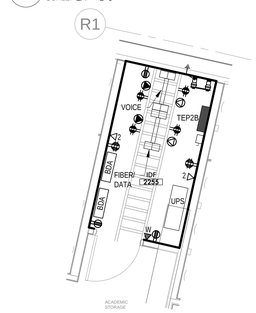


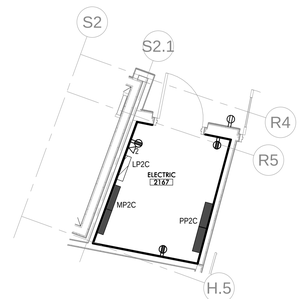
7 E300 FIRST FLOOR - PART 1-D - AV/THEATER ELEC.RM.1348 - POWER
SCALE: 1/4" = 1'-0"



8 E300 SECOND FLOOR - PART 2-B - ELEC RM.2254 - POWER
SCALE: 1/4" = 1'-0"



9 E300 SECOND FLOOR - PART 2-B - IDF RM.2255 - POWER
SCALE: 1/4" = 1'-0"



10 E300 SECOND FLOOR - PART 2-C - ELEC RM.2167 - POWER
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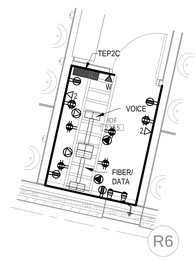
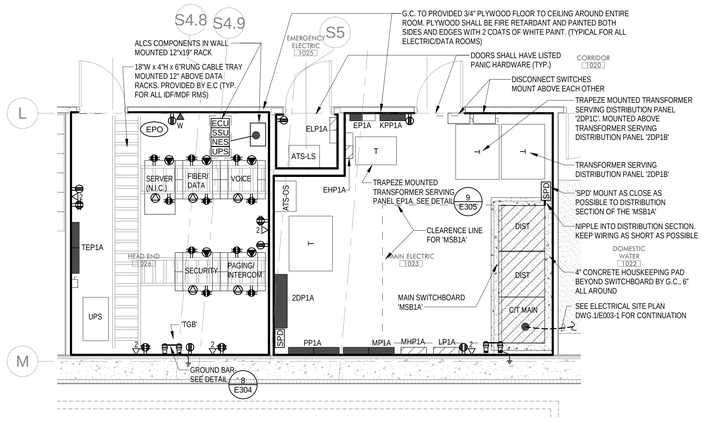
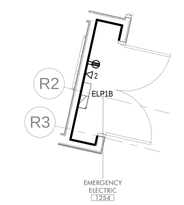


11 E300 SECOND FLOOR - PART 2-C - IDF RM.2155 - POWER
SCALE: 1/4" = 1'-0"



1 E300 FIRST FLOOR - PART 1-A - MAIN ELEC RM.1023 & HEAD END RM.1026 - POWER
SCALE: 1/4" = 1'-0"



2 E300 FIRST FLOOR - PART 1-B - EMERG.ELEC RM.1254 - POWER
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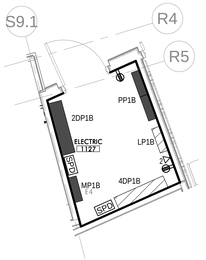
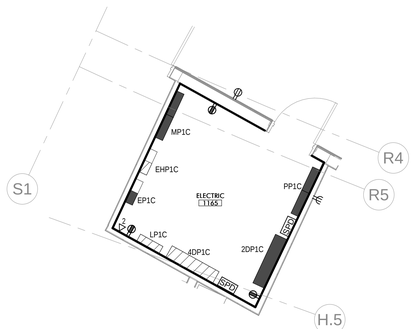


3 E300 FIRST FLOOR - PART 1-B - ELEC RM.1127 - POWER
SCALE: 1/4" = 1'-0"



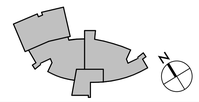
4 E300 FIRST FLOOR - PART 1-C - ELEC RM.1165 - POWER
SCALE: 1/4" = 1'-0"

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/E3.04, 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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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

ELECTRICAL ROOMS & IDF ROOMS PLANS - POWER

PROJECT NO. 1722

DRAWING NO.

E300

ROOF

TO SEF-1 TO SEF-2 TO SEF-3 TO SEF-4

ELECTRICAL ROOM 3155

PANEL MP3C — SPD — SEC 1 / SEC 2
PANEL PP3C — SPD — SEC 1 / SEC 2
PANEL LP3C — SPD
PANEL MHP3C — SPD
PANEL EHP3C — SPD
PANEL EP3C — SPD

ELECTRICAL ROOM 3264

PANEL LP3B — SPD
PANEL PP3B — SPD — SEC 1 / SEC 2
PANEL MP3B — SPD — SEC 1 / SEC 2

EMERGENCY ELEC. CLOSET

N, E, L, Y — ATS-LR
PANEL EHP-LR — SPD

400A, 277/480V, 4P AUTOMATIC TRANSFER SWITCH.

4#500KCMIL & 1#3G, 4"C

EMER. ROOM 3254

PANEL ELP3B — SPD

THIRD FLOOR

4#6AWG MI CABLE (FOUR CONDUCTOR CABLE)

4#4 & 1#8G, 1 1/4"C

ELECTRICAL ROOM 2167

PANEL MP2C — SPD — SEC 1 / SEC 2
PANEL PP2C — SPD — SEC 1 / SEC 2
PANEL LP2C — SPD

ELECTRICAL ROOM 2254

PANEL LP2B — SPD
PANEL MP2B — SPD — SEC 1 / SEC 2
PANEL PP2B — SPD

TO

PANEL TEP2B — SPD — SEC 2 — UPS — EPO

4#4 & 2#8G - 1 1/4"C

IDF ROOM 2255

PROVIDE 24KW / 30kVA, .8PF UPS WITH 8 MINUTE BATTERY BACKUP. 208V, 3∅, 4W INPUT-120/208V, 3∅, 4W OUTPUT. PROVIDE GROUNDING PER NEC 250- SEPARATELY DERIVED SYSTEMS.

PROVIDE EPO PUSHBUTTON W/ GUARD IN HEAD END RM. LOCATE NEAR DOOR. CONNECT TO INTEGRAL UPS REMOTE EPO RELAY. ALSO PROVIDE 20A/2P RELAY, NEMA 1 TO DISCONNECT AC UNIT 'DCU-4E'. THEREFORE WHEN EPO IS ACTIVATED IT WILL DISCONNECT UPS INCLUDING BATTERY & AC UNIT.

PANEL TEP2C — SPD

IDF ROOM 2155

PROVIDE 24KW / 30kVA, .8PF UPS WITH 8 MINUTE BATTERY BACKUP. 208V, 3∅, 4W INPUT-120/208V, 3∅, 4W OUTPUT. PROVIDE GROUNDING PER NEC 250- SEPARATELY DERIVED SYSTEMS.

PROVIDE EPO PUSHBUTTON W/ GUARD IN IDF RM. LOCATE NEAR DOOR. CONNECT TO INTEGRAL UPS REMOTE EPO RELAY. ALSO PROVIDE 20A/2P RELAY, NEMA 1 TO DISCONNECT AC UNIT 'DCU-7E'. THEREFORE WHEN EPO IS ACTIVATED IT WILL DISCONNECT UPS INCLUDING BATTERY & AC UNIT.

SECOND FLOOR

4#1 & 1#6G, 1 1/2"C

HEAD END ROOM 1024

PANEL TEP1A — SPD — SEC 1 / SEC 2 — UPS — EPO

4#4 & 2#8G - 1 1/4"C

ELECTRICAL ROOM 1165

PANEL EHP1C — SPD
PANEL EP1C — SPD
PANEL MP1C — SPD — SEC 1 / SEC 2
PANEL PP1C — SPD — SEC 1 / SEC 2
PANEL LP1C — SPD

TO RTU-1 TO RTU-2 TO RTU-5 TO RTU-6

SPD — 2DP1C - SEE SCHEDULE
SPD — 4DP1C - SEE SCHEDULE

ELECTRICAL ROOM 1127

PANEL PP1A — SPD — SEC 1 / SEC 2
PANEL MP1A — SPD — SEC 1 / SEC 2
PANEL EHP1A — SPD
PANEL EP1A — SPD

100A/3P 100A/3P

T-6

SPD — 2DP1A - SEE SCHEDULE

PANEL KPP1A — SPD — SEC 1 / SEC 2

PANEL LP1B — SPD
PANEL MP1B — SPD — SEC 1 / SEC 2
PANEL PP1B — SPD — SEC 1 / SEC 2

TO RTU-3 TO RTU-4

SPD — 4DP1B - SEE SCHEDULE
SPD — 2DP1B - SEE SCHEDULE

EMER. ROOM 1254

50A/3P

PANEL ELP1B — SPD

PANEL TEP1D — SPD

IDF ROOM 1343

ELECTRICAL ROOM 1347

200A

HOUSE DIMMING PANEL HDP
STAGE DIMMING PANEL SDP
PANEL PP1D — SPD — SEC 1 / SEC 2
PANEL MP1D — SPD
PANEL LP1D — SPD

200A

TO 2DP1A

EMER. ROOM 3254

PANEL ELP1D — SPD

4#2 AWG MI CABLE (SINGLE CONDUCTORS)

T-9 K13 — TO CHILLER CH-1

PANEL LP1A — SPD
PANEL MHP1A — SPD

T-9 K13

T-9 K13

4#2 AWG MI CABLE (SINGLE CONDUCTORS)

SPD

6 SETS OF: 4# 600KCMIL IN (6) 4"C. PLUS (1) 4"C. SPARE w/ PULL LINE

SEE ELECTRICAL SITE PLAN FOR PRIMARY SERVICE CONDUIT REQUIREMENTS

2500A.T. 2500A.F

C.T. P.T. GF M

3000A, 277/480V, 3 PHASE, 4 WIRE

MAIN BONDING JUMPER — N G

SEE MSB-1A SCHEDULE FOR CONTINUATON

PAD MOUNTED TRANSFORMER BY UTILITY CO., CONCRETE PAD BY G.C. GROUNDING BY E.C. PER UTILITY CO. STANDARDS

C.T'S AND P.T'S IN SWITCHBOARD BY UTILITY COMPANY

METER AND SOCKET ON TRANSFORMER BY UTILITY CO.

2#14AWG, 1"C TO BMS.

PROVIDE SERVICE GROUND ELECTRODE IN ACCORDANCE WITH CODE. SEE DETAIL 1/E304

MAIN SWITCHBOARD "MSB-1A" SEE SCHEDULE

3# 3/0 & 1#6G, 2"C

2/E400 SEE EP1A

20A 30A

ELEVATOR CONTROLLER — 125A 200A — 40

ELEV. A-2 (PASSENGER)

ATS-OS

4#4/0 & 1#4G, 2 1/2"C

225A, 277/480V, 4P AUTOMATIC TRANSFER SWITCH

PROVIDE ATS-OS w/ FOUR N.O. & FOUR N.C. CONTACTS. ALSO PROVIDE 4#14AWG&1#14G-3/4"C TO DDC/ATC PANEL LOCATED IN BOILER ROOM.

2#14AWG, 1"C START CKT

4#4/0 & 1#4G, 2 1/2"C

4#1/0 & 1#6G, 2"C

ATS-LS

2#14AWG, 1"C START CKT

150A, 277/480V, 4P AUTOMATIC TRANSFER SWITCH.

100A/3P 100A/3P

PANEL ELP1A — SPD

4#1/0 & 1#6G, 2"C

EMERGENCY ELECTRICAL CLOSET

PROVIDE CONTACT CLOSURE INTERFACE TO AUTOMATED LIGHTING CONTROL SYSTEM (ALCS) VIA A SINGLE PAIR OF 2#18 CONDUCTORS. UPON TRANSFER FROM NORMAL POWER SOURCE TO EMERGENCY SOURCE, A SIGNAL SHALL BE ISSUED TO THE ALCS TO TURN ALL INTERIOR & EXTERIOR LIGHTING "ON".

WP

EXTERIOR QUICK CONNECT SWITCH EQUAL TO ESL STORM SWITCH 3020 SERIES, MODEL #SSDX-XXXA-C-XXXA-C-480-311-S-C

INTERLOCKED SWITCHES

MALE CAM-LOCK CONNECTORS

ROLL-UP GENERATOR CABLE (N.I.C.)

ROLL-UP 277/480V, 3 PH, 4W EMERGENCY GENERATOR (N.I.C.) — EG

4#500KCMIL & 1#3G, 4"C

4#1/0 & 1#6G, 2"C

4#4/0 & 1#4G, 2 1/2"C

2#14AWG, 1"C START CKT

350KW, 437.5KVA, 0.8PF 277/480, 3∅, 4W NATURAL GAS GENERATOR SET WITH 10' STACK

225A 150A 400A G E — GROUND PER CODE SEE 11/E304

EP1A TO REMOTE ANN. — SEE 12/E304

4#10&#10G-1"C

FIRST FLOOR

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CONSULTING ENGINEERS, INC.
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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

POWER ONE-LINE RISER

PROJECT NO. 1722

DRAWING NO.

E301

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	1/2"	15/3	10	8.3	4#12+#12(EG)	1/2"	15/3	15	#8
T-2	9	10.8	3#12+#12EG	1/2"	20/3	20	25	4#10+#10(EG)	3/4"	30/3	30	#8
T-3	15	18	3#10+#10EG	1/2"	30/3	30	41.6	3#6(Φ)+2#2(N)+1#6(IG)+1#8(EG)	1 1/2"	50/3	50	#8
T-4	30	36	3#6+#10EG	3/4"	60/3	45	83.3	3#2(Φ)+#3/0(N)+1#2(IG)+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(Φ)+2#1/0(N) +1#1/0(IG)+1#6(EG)	3"	150/3	150	#6
T-6	75	90.2	3#1/0+#6EG	1 1/2"	150/3	150	208	3#250 KCMIL(Φ)+2#250 KCMIL(N) +1#250 KCMIL(IG)+1#4(EG)	4"	250/3	250	#2
T-7	112.5	135.3	3#3/0+#6EG	2"	200/3	200	311	3#600 KCMIL(Φ)+2#600 KCMIL(N) +1#3(IG)+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(Φ)+2#250 KCMIL(N) +1#250KCMIL(IG)+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#600 KCMIL(Φ)+2#600 KCMIL(N) +1#3(IG)+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(Φ)+2#400 KCMIL (N) +1#400KCMIL(IG)+1#2/0(EG)	3 - 3"	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 " Φ" INDICATES PHASE CONDUCTOR.

THREE PHASE TRANSFORMER SCHEDULE 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	1/2"	15/3	10	8.3	4#12+#12(EG)	1/2"	15/3	15	#8
T-2	9	10.8	3#12+#12EG	1/2"	20/3	20	25	4#10+#10(EG)	3/4"	30/3	30	#8
T-3	15	18	3#10+#10EG	1/2"	30/3	30	41.6	4#6+2#10(EG)	1 1/2"	50/3	50	#8
T-4	30	36	3#6+#10EG	3/4"	60/3	45	83.3	4#2+2#8(EG)	2"	100/3	100	#8
T-5	45	54.3	3#2+#8EG	1 1/4"	90/3	80	125	4#1/0+2#6(EG)	3"	150/3	150	#6
T-6	75	90.2	3#1/0+#6EG	1 1/2"	150/3	150	208	4#250KCMIL+#4(EG)	4"	250/3	250	#2
T-7	112.5	135.3	3#3/0+#6EG	2"	200/3	200	311	4#500KCMIL+#3(EG)	4"	400/3	400	#1/0
T-8	150	180.6	3#350KCMIL+#4EG	3"	300/3	300	416.8	2 SETS 4#250KCMIL+#2(EG)	2 - 3"	500/3	500	#2/0
T-9	225	270.7	3#500KCMIL+ #3EG	3"	400/3	400	625	2 SETS 4#600KCMIL+#1/0(EG)	2 - 4"	800/3	800	#3/0
T-10	300	360.8	2 SETS 3#350KCMIL+#1EG	2-3"	600/3	600	833	3 SETS 4#400KCMIL+#2/0(EG)	3 - 3"	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 " Φ" INDICATES PHASE CONDUCTOR.

277/480V, 3 Φ, 4W, 65 KAIC — FRONT ACCESSIBLE

MAIN SWITCHBOARD "MSB1A" SCHEDULE

	OVER CURRENT DEVICES No.	TRIP	FRAME	CIRCUIT	FEEDER SIZE	COND. SIZE	REMARKS
④	-	2500	2500	MAIN BREAKER / PULL SECTION	SEE RISER	-	100% RATED WITH GFI PROTECTION
	1	60	100	SURGE PROTECTION DEVICE (SPD)	4#6+#6G	1 1/4"	PER MFGR. REQUIREMENTS
	2	200	225	HOUSE DIMMING PANEL - HDP	4#3/0+#6G	2"	
	3	100	100	LP1D	4#2+#8G	1 1/4"	
	4	800	800	CHILLER CH-1	2 SETS OF 4#500KCMIL+#1/0G	(2) 4"	
	5	100	100	SPARE			
	6	400	400	2DP1C VIA T-9	③	③	
	7	800	800	4DP1C	2 SETS OF 4#500KCMIL+#1/0G	(2) 4"	
	8	100	100	LP1A	4#2+#8G	1 1/4"	
	9	100	100	SPARE			
	10	400	400	MHP1A	4#500KCMIL+#3G	4"	
	11	300	400	2DP1A VIA T-8	③	③	
	12	800	800	4DP1B	2 SETS OF 4#500KCMIL+#1/0G	(2) 4"	
	13	400	400	2DP1B VIA T-9	③	③	
	14	150	225	SPARE			
	15	200	225	SPARE			
②	16	400	400	ATS-LR	4#500KCMIL+#3G	4"	
②	17	150	225	ATS-LS	4#1/0+#6G	2"	
②	18	225	225	ATS-OS	4#4/0+#4G	2 1/2"	
	19	200	225	SPARE			
	20	400	400	SPARE			
	21	-	100	SPACE PROVISION			
	22	-	100	SPACE PROVISION			
	23	-	225	SPACE PROVISION			
	24	-	225	SPACE PROVISION			
	25	-	400	SPACE PROVISION			
	26						
	27						

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 PROVIDE ENERGY-REDUCTION MAINTENANCE SWITCH (ARMS) WITH LOCAL STATUS INDICATOR FOR ARC ENERGY REDUCTION.

277/480V, 3 Φ, 4W, 65 KAIC

PANEL SCHEDULE

PANEL NO.	LOCATION	MTG	MAIN BUS AMPS	MAIN CB	BRANCH CKT BREAKER (AMPS) 1 POLE 15	1 POLE 20	1 POLE 30	2 POLE 15	2 POLE 20	2 POLE 30	3 POLE 15	3 POLE 20	3 POLE 30	3 POLE 50	TOTAL POLES	OTHERS
LP1A	MAIN ELECTRICAL ROOM 1023	S	100	-	-										42	
LP1B	MAIN ELECTRICAL ROOM 146	S	100	-	-										42	
LP1C	ELECTRICAL ROOM 1127	S	100	-	-										42	
LP1D	ELECTRICAL ROOM 1347	S	100	-	-										42	
LP2B	ELECTRICAL ROOM 2254	S	100	-	-										42	
LP2C	ELECTRICAL ROOM 2167	S	100	-	-										42	
MHP1A	ELECTRICAL ROOM 1023	S	400	-	-										42	
MHP3C	ELECTRICAL ROOM 3153	S	400												42	
ELP1A	EMERGENCY ELEC ROOM 1ST FLOOR	S	225	-	-										42	
ELP1B	EMERGENCY ROOM 1254	S	100	-	-										42	
ELP3A	EMERGENCY ROOM 3254	S	100	-	-										42	
EHP1A	MAIN ELECTRICAL ROOM 1023	S	400	-	-										42	
EHP1C	ELECTRICAL ROOM 1165	S	225												42	
EHP3C	ELECTRICAL ROOM 3153	S	225												42	
EHP-LR	EMERGENCY ELEC CLOSET 3RD FLOOR	S	400	-	-										42	

① FEED FROM CURRENT LIMITING BREAKERS. UL LISTED SERIES RATED FOR 65,000A RMS @ RATED VOLTAGE WITH UPSTRAM BREAKERS IS ACCEPTABLE.
② SINGLE TUB PANEL BUT TALLER IN HEIGHT.

500A MCB, 120/208V, 3 Φ, 4W, 65 KAIC — LOCATION: MAIN ELECTRICAL ROOM
600AMP BUS

DISTRIBUTION PANEL 2DP1A SCHEDULE

OVER CURRENT DEVICES No.	TRIP	FRAME	CIRCUIT	FEEDER SIZE	COND. SIZE	REMARKS
1	60	100	SURGE PROTECTION DEVICE (SPD)	4#6+#6G	1 1/4"	PER MFGR. REQUIREMENTS
2	100	100	MP1D	4#2+#8G	1 1/4"	
3	150	225	PP1D	4#1/0+#6G	2"	
4	200	225	STAGE DIMMING PANEL - SDP	4#1/0+#6G	2"	
5	150	225	PP1A	4#1/0+#6G	2"	
6	100	100	MP1A	4#2+#8G	1 1/4"	
7	200	225	KPP1A	4#1/0+#6G	2"	
8	100	100	SPARE	-	-	
9	100	100	SPARE	-	-	
10	200	225	SPARE	-	-	
11	100	100	SPACE PROVISIONS	-	-	
12	-	225	SPACE PROVISIONS	-	-	
13						
14						
15						
16						

600A MCB, 277/480V, 3 PHASE, 4W, 65 KAIC — LOCATION: ELECTRICAL ROOM 1127
600AMP BUS

DISTRIBUTION PANEL 4DP1B SCHEDULE

OVER CURRENT DEVICES No.	TRIP	FRAME	CIRCUIT	FEEDER SIZE	COND. SIZE	REMARKS
1	60	100	SURGE PROTECTION DEVICE (SPD)	4#6+#6G	1 1/4"	PER MFGR. REQUIREMENTS
2	100	100	LP1B	4#2+#8G	1 1/4"	
3	100	100	LP3B	4#2+#8G	1 1/4"	
4	100	100	LP2B	4#2+#8G	1 1/4"	
5	125	225	RTU-3	3#1+#6G	1 1/4"	
6	125	225	RTU-4	3#1+#6G	1 1/4"	
7	100	100	SPARE	-	-	
8	100	100	SPARE	-	-	
9	200	225	SPARE	-	-	
10	-	100	SPACE PROVISIONS	-	-	
11	-	225	SPACE PROVISIONS	-	-	
12						

120/208V, 3 Φ, 4W, 22 KAIC

PANEL SCHEDULE

PANEL NO.	LOCATION	MTG	MAIN BUS AMPS	MAIN CB	BRANCH CKT BREAKER (AMPS) 1 POLE 15	1 POLE 20	1 POLE 30	2 POLE 15	2 POLE 20	2 POLE 30	3 POLE 15	3 POLE 20	3 POLE 30	3 POLE 50	TOTAL POLES	OTHERS
⑤ ② PP1A	MAIN ELECTRICAL ROOM 1023	S	225	150	-										84	
② ④ MP1A	MAIN ELECTRICAL ROOM 1023	S	225	150	-										84	
② ⑤ EP1A	MAIN ELECTRICAL ROOM 1023	S	225	150	-										42	
② ① KPP1A	KITCHEN 146	F	400	400	-										84	
② ③ TEP1A	HEAD END ROOM 1024	S	100	100	-										42	
② ① PP1B	ELECTRICAL ROOM 1127	S	225	150	-										84	
② ① MP1B	ELECTRICAL ROOM 1127	S	225	150	-										42	
② ① PP1C	ELECTRICAL ROOM 1165	S	225	150	-										84	
② ① EP1C	ELECTRICAL ROOM 1165	S	100	100	-										42	
⑤ ② MP1C	ELECTRICAL ROOM 1165	S	225	150	-										42	
② ④ PP1D	ELECTRICAL ROOM 1347	S	225	150	-										84	
② ① TEP1D	IDF ROOM 1343	S	100	100	-										42	
② ① PP2B	ELECTRICAL ROOM 2254	S	225	150	-										84	
⑤ ② TEP2B	IDF ROOM 2255	S	100	-	-										42	
② ④ PP2C	ELECTRICAL ROOM 2167	S	225	150	-										84	
② ① MP2C	ELECTRICAL ROOM 2167	S	225	150	-										42	
② ① TEP2C	IDF ROOM 2155	S	100	100	-										42	
⑤ ② PP3B	ELECTRICAL ROOM 3264	S	225	150	-										84	
② ④ MP3B	ELECTRICAL ROOM 3264	S	225	150	-										42	
② PP3C	ELECTRICAL ROOM 3153	S	225	100	-										84	
② ① MP3C	ELECTRICAL ROOM 3153	S	225	150	-										42	
② ① EP3C	ELECTRICAL ROOM 3153	S	100	100	-										42	

① PROVIDE SHUNT TRIP MAIN CIRCUIT BREAKER.
② 200% NEUTRAL BUS.
③ DOUBLE NEUTRAL BUS AND IG BUS. IG BUS SHALL BE SIZED FOR SAME SIZE AS PHASE CONDUCTOR.
④ SINGLE TUB PANEL BUT TALLER IN HEIGHT.
⑤ DOUBLE TUB PANEL BUT TALLER IN HEIGHT.

800A MCB, 120/208V, 3 Φ, 4W, 65 KAIC — LOCATION: ELECTRICAL ROOM
800AMP BUS

DISTRIBUTION PANEL 2DP1B SCHEDULE

OVER CURRENT DEVICES No.	TRIP	FRAME	CIRCUIT	FEEDER SIZE	COND. SIZE	REMARKS
1	60	100	SURGE PROTECTION DEVICE (SPD)	4#6+#6G	1 1/4"	PER MFGR. REQUIREMENTS
2	100	100	MP1B	4#2+#8G	1 1/4"	
3	150	225	PP1B	4#1/0+#6G	2"	
4	150	225	PP2B	4#1/0+#6G	2"	
5	150	225	PP3B	4#1/0+#6G	2"	
6	100	100	MP3B	4#2+#8G	1 1/4"	
7	100	100	SPARE	-	-	
8	100	100	SPARE	-	-	
9	200	225	SPARE	-	-	
10	-	100	SPACE PROVISIONS	-	-	
11	-	225	SPACE PROVISIONS	-	-	
12	-	225	SPACE PROVISIONS	-	-	
13						
14						
15						
16						

800A MCB, 277/480V, 3 PHASE, 4W, 65 KAIC — LOCATION: ELECTRICAL ROOM 1127
800AMP BUS

DISTRIBUTION PANEL 4DP1C SCHEDULE

OVER CURRENT DEVICES No.	TRIP	FRAME	CIRCUIT	FEEDER SIZE	COND. SIZE	REMARKS
1	60	100	SURGE PROTECTION DEVICE (SPD)	4#6+#6G	1 1/4"	PER MFGR. REQUIREMENTS
2	100	100	LP1C	4#2+#8G	1 1/4"	
3	100	100	LP3C	4#2+#8G	1 1/4"	
4	225	225	MHP3C	4#4/0+#4G	2 1/2"	
5	100	100	LP2C	4#2+#8G	1 1/4"	
6	125	225	RTU-1	3#1+#6G	1 1/4"	
7	125	225	RTU-2	3#1+#6G	1 1/4"	
8	100	100	RTU-5	3#1+#6G	1 1/4"	
9	70	100	RTU-6	3#4+#8G	1"	
10	100	100	SPARE	-	-	
11	100	100	SPARE	-	-	
12	200	225	SPARE	-	-	
13	-	100	SPACE PROVISIONS	-	-	
	-	225	SPACE PROVISIONS	-	-	

800A MCB, 120/208V, 3 Φ, 4W, 65 KAIC — LOCATION: ELECTRICAL ROOM
800AMP BUS

DISTRIBUTION PANEL 2DP1C SCHEDULE

OVER CURRENT DEVICES No.	TRIP	FRAME	CIRCUIT	FEEDER SIZE	COND. SIZE	REMARKS
1	60	100	SURGE PROTECTION DEVICE (SPD)	4#6+#6G	1 1/4"	PER MFGR. REQUIREMENTS
2	100	100	MP1C	4#2+#8G	1 1/4"	
3	150	225	PP1C	4#1/0+#6G	2"	
4	100	100	MP3C	4#2+#8G	1 1/4"	
5	150	225	PP3C	4#1/0+#6G	2"	
6	100	100	MP2C	4#2+#8G	1 1/4"	
7	150	225	PP2C	4#1/0+#6G	2"	
8						
9						
10	100	100	SPARE	-	-	
11	100	100	SPARE	-	-	
12	200	225	SPARE	-	-	
13	-	100	SPACE PROVISIONS	-	-	
14	-	225	SPACE PROVISIONS	-	-	
15	-	225	SPACE PROVISIONS	-	-	
16						

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME
POWER SCHEDULES & DETAILS

PROJECT NO. 1722

DRAWING NO.
E302

SCHEDULE OF MECHANICAL EQUIPMENT

UNIT NO.	DESCRIPTION	LOAD CHARACTERISTICS	VOLT	PH	PANEL CIRCUIT	CIRCUIT BREAKER	FEEDER	EQUIPMENT AND CONNCECTIONS: TS				S D		WP	J	S WP	J	CO D	VFD	REMARKS
B-1	BOILER	30.2 FLA	208	3	EP1A-	40A-3P	3#8&1#10G-3/4"C	-	X	-	X	-	-	-	-	X	-	-	-	-
B-2	BOILER	30.2 FLA	208	3	EP1A-	40A-3P	3#8&1#10G-3/4"C	-	X	-	X	-	-	-	-	X	-	-	-	-
BP-1 ??	BOILER PUMP	?	208	3	EP1A-	20A-3P	3#12&1#12G-3/4"C	-	X	-	X	-	-	-	-	X	-	-	-	STARTER VIA BOILER CONTROL PANEL
BP-2 ??	BOILER PUMP	?	208	3	EP1A-	20A-3P	3#12&1#12G-3/4"C	-	X	-	X	-	-	-	-	X	-	-	-	STARTER VIA BOILER CONTROL PANEL
CH-1	CHILLER	632.0 MCA / 757.0 MOP	480	3	MSB1A-	800A-3P	SEE "MSB1A" SCHEDULE	-	X	-	X	-	X	-	X	X	-	-	-	CONNECT LIGHT & RECEPTACLE TO MP*-*
CH-1	CHILLER	-	120	1	MP-	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	CONTROL POWER CONNECTION
CH-1	CHILLER	-	120	1	MP-	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	HEAT TAPE POWER CONNECTION
CP-1	CONDENSATE PUMP	55 WATTS	120	1	-	20A-1P	2#12&1#12G-3/4"C	X			X				X					SEE DETAIL 1/E303 (TYPICAL) ②③
CP-2 ?																				
DC-1	DUST COLLECTOR	? HP	480	3	MHP*-*,*,*	40A-3P	4#8&1#10G-3/4"C	-	X	-	X	-	-	-	-	X	-	-	-	- ⑨
DCUc-1	DUCTLESS COOLING UNIT	-	208	1	EP*-*	30A-2P	3#10&1#10G-3/4"C	-	X	-	X	-	X	-	X	-	-	-	-	CONNECT "WP" RECEPTACLE TO EP-*
DCUe-1	DUCTLESS COOLING UNIT	ELEV. MACHINE RM 1163	208	1	EP*-*	15A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	PROVIDE 3#12&1#12G - 3/4"C TO DCUc-1 FOR CONTROLS. CONNECT CP-1 TO EP-* ①②③
DCUc-2	DUCTLESS COOLING UNIT	-	208	1	EP*-*	30A-2P	3#10&1#10G-3/4"C	-	X	-	X	-	X	-	X	-	-	-	-	CONNECT "WP" RECEPTACLE TO EP-*
DCUe-2	DUCTLESS COOLING UNIT	HEAD END 1026	208	1	EP*-*	15A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	PROVIDE 3#12&1#12G - 3/4"C TO DCUc-2 FOR CONTROLS. CONNECT CP-1 TO EP-* ①②③
DCUc-3	DUCTLESS COOLING UNIT	-	208	1	EP*-*	30A-2P	3#10&1#10G-3/4"C	-	X	-	X	-	X	-	X	-	-	-	-	CONNECT "WP" RECEPTACLE TO EP-*
DCUe-3	DUCTLESS COOLING UNIT	HEAD END 1026	208	1	EP*-*	15A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	PROVIDE 3#12&1#12G - 3/4"C TO DCUc-3 FOR CONTROLS. CONNECT CP-1 TO EP-* ①②③
DCUc-4	DUCTLESS COOLING UNIT	-	208	1	MP-*	30A-2P	3#10&1#10G-3/4"C	-	X	-	X	-	X	-	X	-	-	-	-	CONNECT "WP" RECEPTACLE TO EP1-*
DCUe-4	DUCTLESS COOLING UNIT	MAIN ELEC 1024	208	1	MP-*	15A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	PROVIDE 3#12&1#12G - 3/4"C TO DCUc-4 FOR CONTROLS. CONNECT CP-1 TO EP1-* ①②③
DCUc-5	DUCTLESS COOLING UNIT	-	208	1	MP-*	30A-2P	3#10&1#10G-3/4"C	-	X	-	X	-	X	-	X	-	-	-	-	CONNECT "WP" RECEPTACLE TO EP6-*
DCUe-5	DUCTLESS COOLING UNIT	ELEC 1127	208	1	MP-*	15A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	PROVIDE 3#12&1#12G - 3/4"C TO DCUc-5 FOR CONTROLS. CONNECT CP-1 TO EP6-* ①②③
DCUc-6	DUCTLESS COOLING UNIT	-	208	1	EP*-*	30A-2P	3#10&1#10G-3/4"C	-	X	-	X	-	X	-	X	-	-	-	-	CONNECT "WP" RECEPTACLE TO EP-*
DCUe-6	DUCTLESS COOLING UNIT	IDF 2155	208	1	EP*-*	15A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	PROVIDE 3#12&1#12G - 3/4"C TO DCUc-6 FOR CONTROLS. CONNECT CP-1 TO EP-* ①②③
DCUc-7	DUCTLESS COOLING UNIT	-	208	1	MP-*	30A-2P	3#10&1#10G-3/4"C	-	X	-	X	-	X	-	X	-	-	-	-	CONNECT "WP" RECEPTACLE TO MP4-*
DCUe-7	DUCTLESS COOLING UNIT	ELEC 2167	208	1	MP-*	15A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	PROVIDE 3#12&1#12G - 3/4"C TO DCUc-7 FOR CONTROLS. CONNECT CP-1 TO MP4-* ①②③
DCUc-8	DUCTLESS COOLING UNIT	-	208	1	EP*-*	30A-2P	3#10&1#10G-3/4"C	-	X	-	X	-	X	-	X	-	-	-	-	CONNECT "WP" RECEPTACLE TO EP*
DCUe-8	DUCTLESS COOLING UNIT	IDF 2255	208	1	EP*-*	15A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	PROVIDE 3#12&1#12G - 3/4"C TO DCUc-8 FOR CONTROLS. CONNECT CP-1 TO EP-* ①②③
EF-1	EXHAUST FAN	3/4 HP	120	1	MP-*	30A-1P	2#10&1#10G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
EF-2	EXHAUST FAN	3/4 HP	120	1	MP-*	30A-1P	2#10&1#10G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
EF-3	EXHAUST FAN	1/6 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
EF-4	EXHAUST FAN	1/4 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
EF-5 ?	EXHAUST FAN	-	120	1	MP-*	30A-1P	2#10&1#10G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
EFT-1	ELEC. FIN TUBE	2.0 KW / 9.6 AMPS	208	1	MP-*	20A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	1340 AUDITORIUM
EFT-2	ELEC. FIN TUBE	2.0 KW / 9.6 AMPS	208	1	MP-*	20A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	1340 AUDITORIUM
EFT-3	ELEC. FIN TUBE	2.0 KW / 9.6 AMPS	208	1	MP-*	20A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	1340 AUDITORIUM
EFT-4	ELEC. FIN TUBE	2.0 KW / 9.6 AMPS	208	1	MP-*	20A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	1340 AUDITORIUM
EFT-5	ELEC. FIN TUBE	2.0 KW / 9.6 AMPS	208	1	MP-*	20A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	1340 AUDITORIUM
EFT-6	ELEC. FIN TUBE	2.0 KW / 9.6 AMPS	208	1	MP-*	20A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	1340 AUDITORIUM
EFT-7	ELEC. FIN TUBE	2.0 KW / 9.6 AMPS	208	1	MP-*	20A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	1340 AUDITORIUM
EFT-8	ELEC. FIN TUBE	2.0 KW / 9.6 AMPS	208	1	MP-*	20A-2P	3#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	1340 AUDITORIUM
FEF-1	FUME HOOD EXHAUST FAN	1.5 HP	480	3	MHP*-*,*,*	20A-3P	4#12&1#12G-3/4"C	-	X	-	X	-	-	-	X	-	-	-	X	1160 FAB-LAB FUME HOOD
FEF-2	FUME HOOD EXHAUST FAN	1.5 HP	480	3	MHP*-*,*,*	20A-3P	4#12&1#12G-3/4"C	-	X	-	X	-	-	-	X	-	-	-	X	1134 MARKETSPACE FUME HOOD
FEF-3	FUME HOOD EXHAUST FAN	1.5 HP	480	3	MHP*-*,*,*	20A-3P	4#12&1#12G-3/4"C	-	X	-	X	-	-	-	X	-	-	-	X	1134 MARKETSPACE WELDING BOOTH
FEF-4	FUME HOOD EXHAUST FAN	1.5 HP	480	3	MHP*-*,*,*	20A-3P	4#12&1#12G-3/4"C	-	X	-	X	-	-	-	X	-	-	-	X	2210 SCIENCE CLASSROOM
FEF-5	FUME HOOD EXHAUST FAN	1.5 HP	480	3	MHP*-*,*,*	20A-3P	4#12&1#12G-3/4"C	-	X	-	X	-	-	-	X	-	-	-	X	2214 SCIENCE CLASSROOM
GF-1	GLYCOL PUMP	1/2 HP	120	1	MP	20A-1P	2#12&1#12G-3/4"C	-	-	-	-	-	X	-	-	-	-	-	-	MOUNT OUTLET ON UNISTRUT FOR VFD'S
GF-2	GLYCOL PUMP	1/2 HP	120	1	MP	20A-1P	2#12&1#12G-3/4"C	-	-	-	-	-	X	-	-	-	-	-	-	MOUNT OUTLET ON UNISTRUT FOR VFD'S
KEF-1	KITCHEN EXHAUST FAN	3.0 HP	480	3	MHP*-*,*,*	20A-3P	4#12&1#12G-3/4"C	-	X	-	X	-	-	-	X	-	-	-	-	- ⑩
KEF-2	KITCHEN WAREWASHER FAN	1/2 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
MAU-1	MAKE UP AIR UNIT	5.0 HP	480	3	MHP*-*,*,*	20A-3P	4#12&1#12G- 3/4"C	-	X	-	X	-	-	-	X	-	-	-	-	-
P-1	HHW PUMP	25.0 HP	480	3	EHP1A-	90A-3P	4#3&1#8G- 1 1/4"C	-	X	-	X	-	-	-	X	-	-	-	X	-
P-2	HHW PUMP	25.0 HP	480	3	EHP1A-	90A-3P	4#3&1#8G- 1 1/4"C	-	X	-	X	-	-	-	X	-	-	-	X	-
P-3	CHW PUMP	20.0 HP	480	3	MHP1A-	70A-3P	4#8&1#8G- 1 1/4"C	-	X	-	X	-	-	-	X	-	-	-	X	-
P-4	CHW PUMP	20.0 HP	480	3	MHP1A-	70A-3P	4#8&1#8G- 1 1/4"C	-	X	-	X	-	-	-	X	-	-	-	X	-
RTU-1	ROOF TOP UNIT	103 MCA / 125 MOP	480	3	4DP1C-3	125A-3P	SEE "4DP1C" SCHEDULE	-	X	-	X	(5) X	X	-	X	X	-	-	-	CONNECT FIXTURE TYPE "J" & RECEPTACLE TO MP*-* ④⑤⑥⑦
RTU-2	ROOF TOP UNIT	103 MCA / 125 MOP	480	3	4DP1C-4	125A-3P	SEE "4DP1C" SCHEDULE	-	X	-	X	(5) X	X	-	X	X	-	-	-	CONNECT FIXTURE TYPE "J" & RECEPTACLE TO MP*-* ④⑤⑥⑦
RTU-3	ROOF TOP UNIT	103 MCA / 125 MOP	480	3	4DP1B-3	125A-3P	SEE "4DP1B" SCHEDULE	-	X	-	X	(5) X	X	-	X	X	-	-	-	CONNECT FIXTURE TYPE "J" & RECEPTACLE TO MP*-* ④⑤⑥⑦
RTU-4	ROOF TOP UNIT	103 MCA / 125 MOP	480	3	4DP1B-4	125A-3P	SEE "4DP1B" SCHEDULE	-	X	-	X	(5) X	X	-	X	X	-	-	-	CONNECT FIXTURE TYPE "J" & RECEPTACLE TO MP*-* ④⑤⑥⑦
RTU-5	ROOF TOP UNIT	73 MCA / 90 MOP	480	3	4DP1C-5	100A-3P	SEE "4DP1C" SCHEDULE	-	X	-	X	(5) X	X	-	X	X	-	-	-	CONNECT FIXTURE TYPE "J" & RECEPTACLE TO MP*-* ④⑤⑥⑦
RTU-6	ROOF TOP UNIT	59 MCA / 70 MOP	480	3	4DP1C-6	70A-3P	SEE "4DP1C" SCHEDULE	-	X	-	X	(5) X	X	-	X	X	-	-	-	CONNECT FIXTURE TYPE "J" & RECEPTACLE TO MP*-* ④⑤⑥⑦
RTU-7	ROOF TOP UNIT	12 MCA / 15 MOP	480	3	MHP3C-	20A-3P	3#12&1#12G-3/4"C	-	X	-	X	(5) X	X	-	X	X	-	-	-	CONNECT FIXTURE TYPE "J" & RECEPTACLE TO MP*-* ④⑤⑥⑦
~~SEF-1~~	~~ATRIUM EXHAUST FAN (SMOKE)~~	~~50.0 HP~~	480	3	EHP-LR-1,3,5	175A-3P	4 #1 M CABLE (SINGLE CONDUCTORS)	-	X	-	X	-	-	-	X	-	-	-	X	SHALL BE CONTROLLLED BY FIRE ALARM SYSTEM
~~SEF-2~~	~~ATRIUM EXHAUST FAN (SMOKE)~~	~~50.0 HP~~	480	3	EHP-LR-7,9,11	175A-3P	4 #1 M CABLE (SINGLE CONDUCTORS)	-	X	-	X	-	-	-	X	-	-	-	X	SHALL BE CONTROLLLED BY FIRE ALARM SYSTEM
~~SEF-3~~	~~ATRIUM EXHAUST FAN (SMOKE)~~	~~50.0 HP~~	480	3	EHP-LR-2,4,6	175A-3P	4 #1 M CABLE (SINGLE CONDUCTORS)	-	X	-	X	-	-	-	X	-	-	-	X	SHALL BE CONTROLLLED BY FIRE ALARM SYSTEM
~~SEF-4~~	~~ATRIUM EXHAUST FAN (SMOKE)~~	~~50.0 HP~~	480	3	EHP-LR-8,10,12	175A-3P	4 #1 M CABLE (SINGLE CONDUCTORS)	-	X	-	X	-	-	-	X	-	-	-	X	SHALL BE CONTROLLLED BY FIRE ALARM SYSTEM
UH-1	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-2	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-3	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-4	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-5	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-6	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-7	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-8	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-9	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-10	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-11	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-12	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-13	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-14	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
UH-15	UNIT HEATER	1/15 HP	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	-
VAV-1-1 THRU 7	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(7) X	-	-	(7) X	-	-	-	(7) X	-	-	-	-	1ST FLOOR "C" SERVING UNITS RTU-1 & 2 ⑧
VAV-1-8	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	2ND FLOOR "C" SERVING UNITS RTU-1 & 2 ⑧
VAV-1-9 THRU 17	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(9) X	-	-	(9) X	-	-	-	(9) X	-	-	-	-	1ST FLOOR "C" SERVING UNITS RTU-1 & 2 ⑧
VAV-1-18 THRU 27	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(10) X	-	-	(10) X	-	-	-	(10) X	-	-	-	-	2ND FLOOR "C" SERVING UNITS RTU-1 & 2 ⑧
VAV-1-28 THRU 36	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(9) X	-	-	(9) X	-	-	-	(9) X	-	-	-	-	3RD FLOOR "C" SERVING UNITS RTU-1 & 2 ⑧
VAV-1-37	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	2ND FLOOR "C" SERVING UNITS RTU-1 & 2 ⑧
VAV-2-1 THRU 4	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(4) X	-	-	(4) X	-	-	-	(4) X	-	-	-	-	1ST FLOOR "C" SERVING UNITS RTU-1 & 2 ⑧
VAV-2-5 & 6	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(2) X	-	-	(2) X	-	-	-	(2) X	-	-	-	-	1ST FLOOR "A" SERVING UNITS RTU-1 & 2 ⑧
VAV-2-7, 8 & 9	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(3) X	-	-	(3) X	-	-	-	(3) X	-	-	-	-	1ST FLOOR "A" SERVING UNITS RTU-1 & 2 ⑧
VAV-2-10 THRU 26	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(17) X	-	-	(17) X	-	-	-	(17) X	-	-	-	-	2ND FLOOR "A" SERVING UNITS RTU-1 & 2 ⑧
VAV-2-27 THRU 30	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(4) X	-	-	(4) X	-	-	-	(4) X	-	-	-	-	2ND FLOOR "A" SERVING UNITS RTU-1 & 2 ⑧
VAV-2-31	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	2ND FLOOR "A" SERVING UNITS RTU-1 & 2 ⑧
VAV-2-32 THRU 35	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(4) X	-	-	(4) X	-	-	-	(4) X	-	-	-	-	3RD FLOOR "A" SERVING UNITS RTU-1 & 2 ⑧
VAV-1-36	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	3RD FLOOR "A" SERVING UNITS RTU-1 & 2 ⑧
VAV-1-37	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	X	-	-	-	X	-	-	-	-	2ND FLOOR "C" SERVING UNITS RTU-1 & 2 ⑧
VAV-3-1 THRU 28	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(28) X	-	-	(28) X	-	-	-	(28) X	-	-	-	-	SERVING UNITS RTU-3 & 4 ⑧
VAV-4-1 THRU 44	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(44) X	-	-	(44) X	-	-	-	(44) X	-	-	-	-	SERVING UNITS RTU-3 & 4 ⑧
VAV-6-1 THRU 4	VAV BOX	-	120	1	MP-*	20A-1P	2#12&1#12G-3/4"C	(4) X	-	-	(4) X	-	-	-	(4) X	-	-	-	-	1ST FLOOR "C" SERVING UNIT RTU-6 ⑧

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 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 WILL BE FURNISHED BY ATC WITH CONNECTIONS TO BACNET DATA COMMUNICATION PROTOCOL FOR BUILDING AUTOMATION AND CONTROL NETWORK. COORDINATE WITH ATC CONTRACTOR. PROVIDE POWER WIRING.

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/E303

③ REFER TO MECHANICAL DRAWINGS FOR EXACT LOCATION OF CONDENSATE PUMPS CP-1.

④ VFD FURNISHED INTEGRAL WITH UNIT BY HVAC EQUIPMENT SUPPLIER. SINGLE POINT CONNECTION BY E.C.

⑤ 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 3/E303

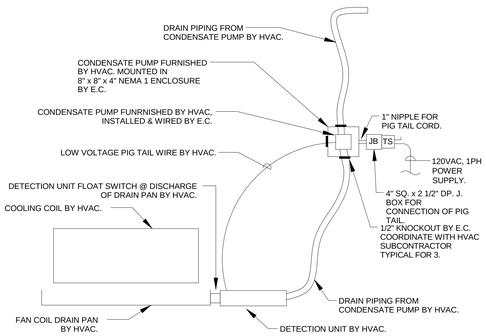
⑥ REFER TO MECHANICAL DRAWINGS FOR EXACT LOCATION OF DUCT TYPE SMOKE DETECTORS.

⑦ CARBON MONOXIDE DETECTOR SHALL BE MOUNTED ON SUPPLY DUCT. PROVIDE REMOTE TEST STATION WITH EACH CO DETECTOR. FIELD CONFIRM LOCATION OF REMOTE TEST STATION. ACTIVATION OF CO DETECTOR TO REPORT SUPERVISORY ALARM OF SHUT DOWN RESPECTIVE ROOF TOP UNIT.

⑧ 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.

⑨ CONNECT VIA DC-1 CONTROL PANEL FURNISHED BY SYSTEM SUPPLIER. FIELD CONFIRM LOCATION. INTERLOCK WITH FIRE ALARM SYSTEM TO SHUT DOWN UPON SPARK IGNITION SENSING.

⑩ VFD IS FURNISHED BY KITCHEN EQUIPMENT SUPPLIER, INSTALLED AND WIRED BY EC.

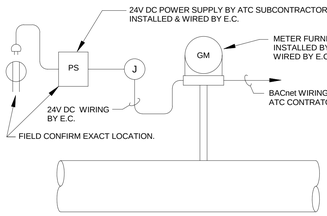


1 / E303 CONDENSATE PUMP (CP-1) WIRING DETAIL

SCALE: N.T.S.

NOTE:

① WIRING MAY VARY BY MANUFACTURER. FIELD CONFIRM WITH APPROVED SHOP DRAWINGS PRIOR TO ROUGHING.



2 / E303 GAS SUB METER DETAIL

SCALE : N.T.S.

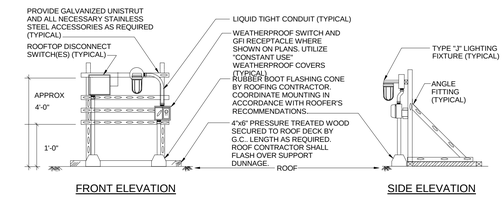
PLUMBING SCHEDULE NOTES

① PUMPS WILL RUN VIA DDC SYSTEM. COORDINATE WITH ATC CONTRACTOR.

② AQUASTATS FURNISHED AND INSTALLED BY PC, 120V CONNECTION BY EC.

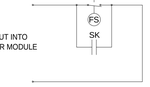
③ PROVIDE 2 #14, 3/4"C TO BMS SYSTEM. COORDINATE WITH ATC CONTRACTOR.

④ PROVIDE 6 #14, 3/4"C TO TANK FOR PH SENSORS. CONNECTIONS PROVIDED BY E.C.



3 / E303 TYPICAL ROOFTOP DISCONNECT SWITCHE(ES) DETAIL

SCALE : N.T.S.



NOTES:

FS = FLOW SWITCH BY P.C.

SK = KEY SWITCH FOR TESTING. LABEL SWITCH "TEST" & "NORMAL" BY E.C.

4 / E303 KEY SWITCH FOR EMERGENCY SHOWER FLOW SWITCH OVER-RIDE

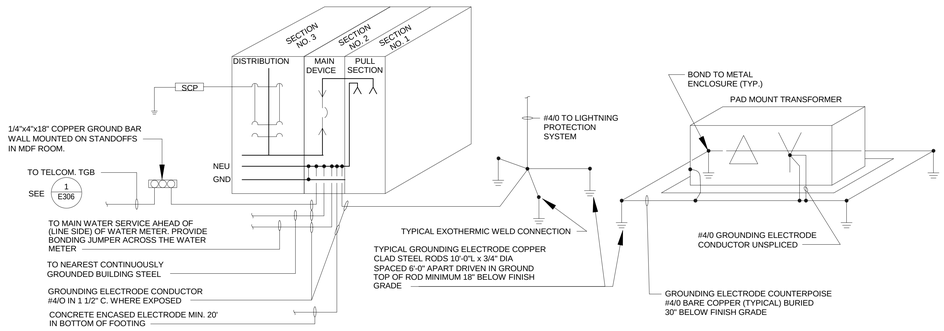
SCALE : N.T.S.

NOTE:

THE PURPOSE OF THIS DETAIL IS FOR OWNER TESTING.

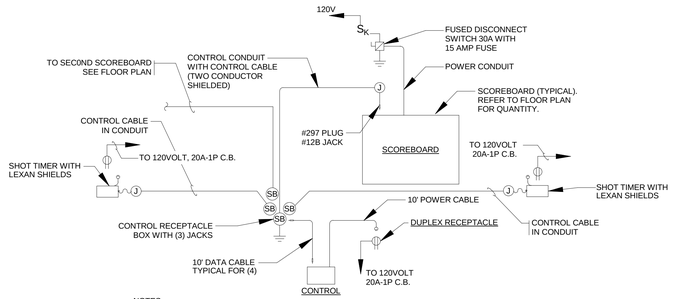
SCHEDULE OF PLUMBING EQUIPMENT

UNIT NO.	DESCRIPTION	LOCATION	LOAD CHARACTERISTICS	VOLT	PH	PANEL CIRCUIT	CIRCUIT BREAKER	FEEDER	EQUIPMENT AND CONNCECTIONS: TS				S D		WP	J	REMARKS
WH-1	DOMESTIC HOT WATER	-	1.0 AMPS	120	1	MP*-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	-	X	-	-	X	CONTROL POWER
WH-2	DOMESTIC HOT WATER	-	1.0 AMPS	120	1	MP*-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	-	X	-	-	X	CONTROL POWER
WH-3	DOMESTIC HOT WATER	-	1.0 AMPS	120	1	MP*-*	20A-1P	2#12&1#12G-3/4"C	X	-	-	-	X	-	-	X	CONTROL POWER
WH-4	DOMESTIC HOT WATER	-	6 KW	208	3	MP*-*,*,*



1 E304 MAIN SWITCHBOARD GROUNDING DETAIL (TYPICAL)

SCALE: N.T.S.

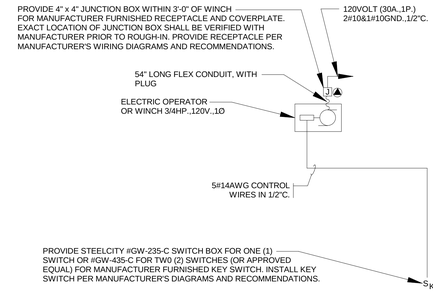


NOTES:

1. POWER WIRING SHOULD BE ROUTED IN SEPARATE CONDUIT FROM CONTROL CABLING. PROVIDE 3/4" CONDUIT FOR POWER AND 3/4" CONDUIT FOR CONTROL.
2. SCOREBOARD SHALL BE FURNISHED UNDER SECTION 116620 BY GC, INSTALLED AND WIRED BY E.C.

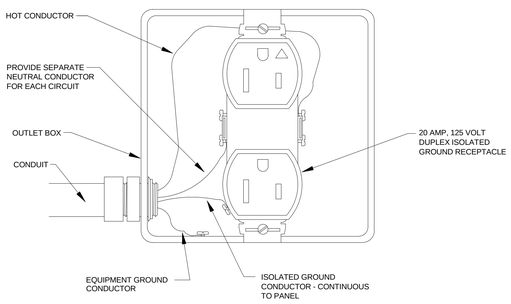
2 E304 BASKETBALL SCOREBOARD WIRING DIAGRAM

SCALE: N.T.S.



3 E304 TYPICAL ELECTRICAL WINCH WIRING FOR BACKBOARD, CURTAIN OR BLEACHER

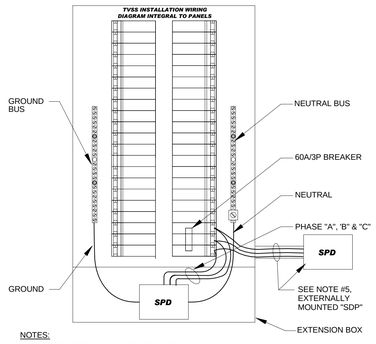
SCALE N.T.S.



4 E304 I.G. RECEPTACLE DETAIL

SCALE: N.T.S.

NOTE:
MAXIMUM OF (2) I.G. RECEPTACLES OR (1) QUADRUPLEX I.G. RECEPTACLES PER CIRCUIT

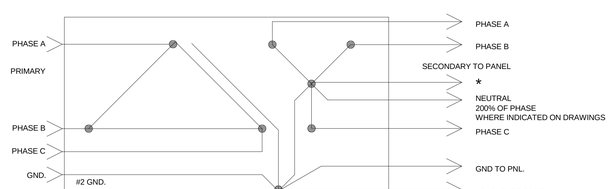


NOTES:

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. DIRECT BUS MOUNTED SURGE PROTECTION IS NOT ACCEPTABLE. SPD SHALL BE CONNECTED TO A CIRCUIT BREAKER.

6 E304 SPD WIRING DIAGRAM

SCALE: N.T.S.



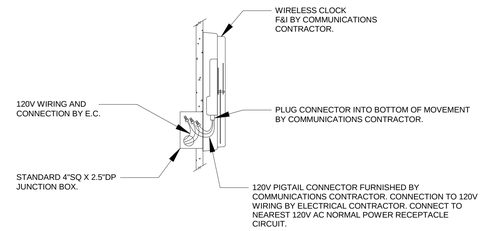
7 E304 TRANSFORMER CONNECTIONS WIRING DETAIL

SCALE: N.T.S.

* NEUTRAL CONNECTORS #1/0 OR LARGER MAY BE PARALLELLED

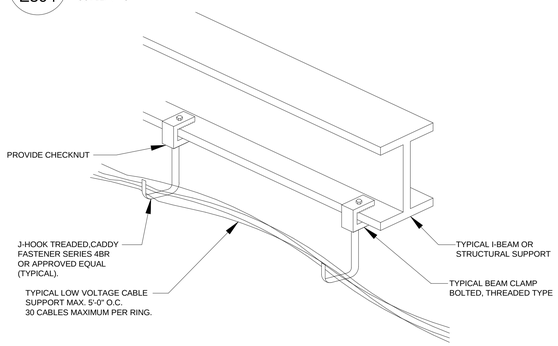
8 E304 TELECOM BAR DETAIL (TGB)

SCALE: N.T.S.



5 E304 WIRELESS CLOCK INSTALLATION DETAIL

SCALE: N.T.S.

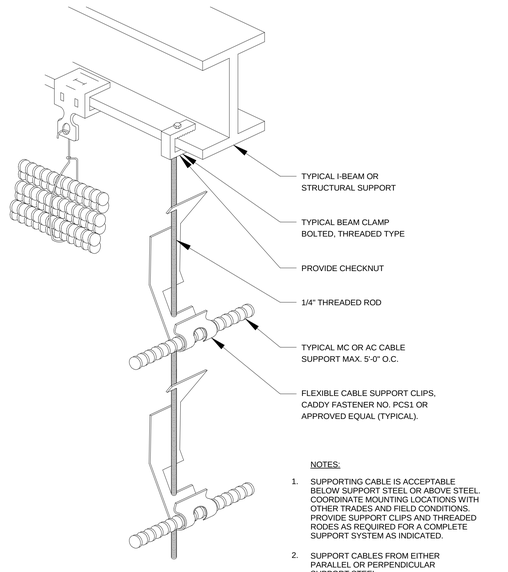


9 E304 TYPICAL LOW VOLTAGE CABLE SUPPORT DETAIL

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.

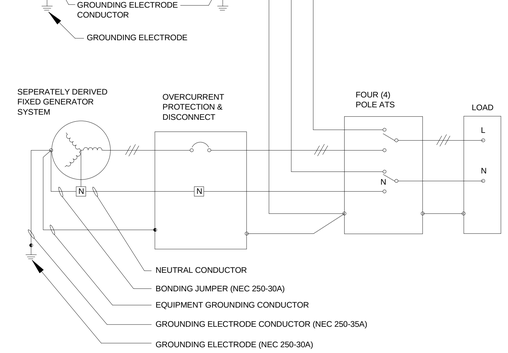


NOTES:

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.

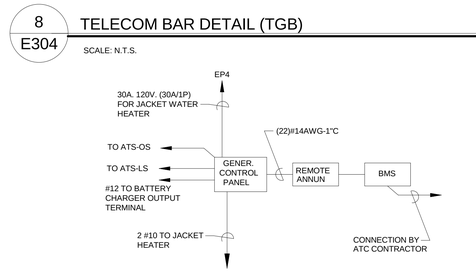
10 E304 TYPICAL MC CABLE SUPPORTING DETAIL

SCALE: N.T.S.



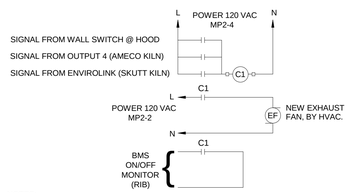
11 E304 SEPARATELY DERIVED GENERATOR SYSTEM

SCALE: N.T.S.



12 E304 TYPICAL EMERGENCY GENERATOR CONTROL WIRING

SCALE: N.T.S. (NOTE: MAY VARY BY MANUFACTURER)



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".

13 E304 KILN EXHAUST FAN TIE-IN DETAIL

SCALE: N.T.S.

Jonathan Levi Architects
266 beacon street
boston ma 02116
tel 617 437 9458
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GARCIA GALUSKA DESOUSA
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508 - 998 - 5700 FAX 508 - 998 - 0800 E - MAIL info@g g d - e . com

NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

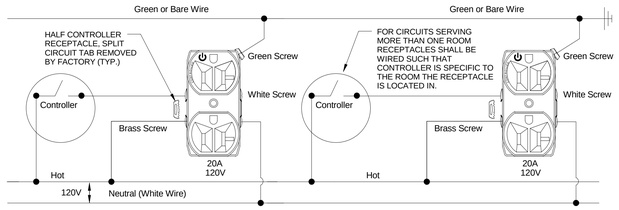
REVISIONS

No.	Date	Description

DRAWING NAME
ELECTRICAL DETAILS

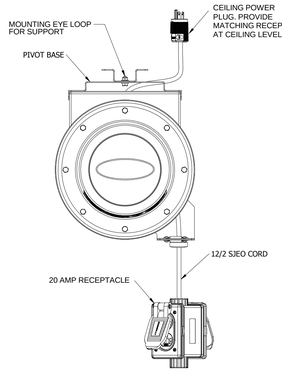
PROJECT NO. 1722

DRAWING NO.
E304



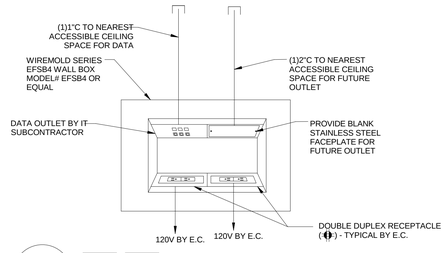
1 E305 PLUG LOAD CONTROLLED RECEPTACLE DETAIL

SCALE: N.T.S.



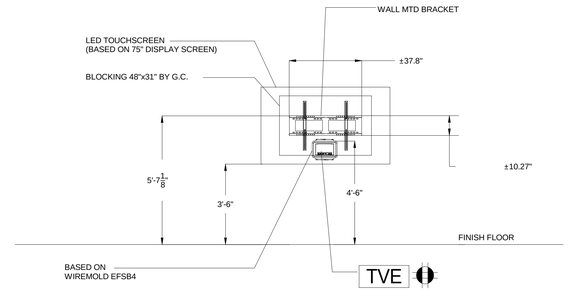
2 E305 CORD REEL DETAIL

SCALE: N.T.S.



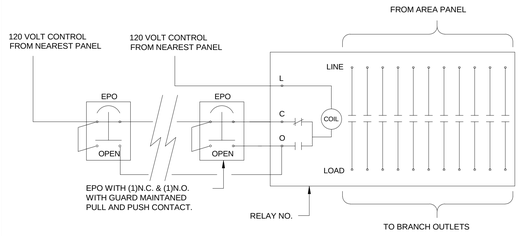
2 E305 TVE / TVC BOX AND CONDUIT PROVISION DETAIL

SCALE: N.T.S.



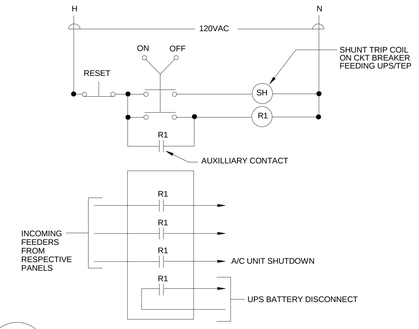
4 E305 TYPICAL CLASSROOM TOUCHSCREEN DISPLAY OUTLET LAYOUT

SCALE: N.T.S.



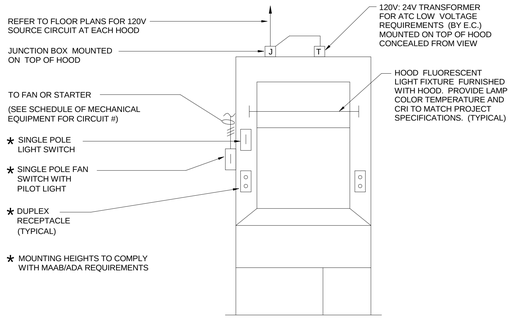
5 E305 EMERGENCY EPO SHUT DOWN (SCIENCE LAB)

SCALE: N.T.S.



6 E305 TECH MDF ROOM SHUT DOWN DETAIL

SCALE: N.T.S.

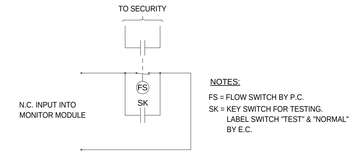


NOTES:

1. REFER TO APPROVED SHOP DRAWINGS FOR EXACT REQUIREMENTS.
2. REFER TO ARCH. DWGS. FOR FUME HOOD TYPES AND DETAILS FOR ALL COMPONENT REQUIREMENTS.
3. UNLESS NOTED OTHERWISE, ALL COMPONENTS ARE SHIPPED LOOSE AND REQUIRE ASSEMBLY & WIRING BY THE ELECTRICAL CONTRACTOR.
4. ALL LOW VOLTAGE WIRING IS THE RESPONSIBILITY OF THE ATC CONTRACTOR.

7 E305 TYPICAL LAB FUME HOOD WIRING REQUIREMENTS

SCALE: N.T.S.



NOTES:

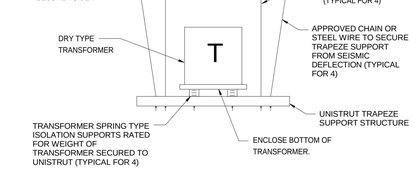
FS = FLOW SWITCH BY P.C.
SK = KEY SWITCH FOR TESTING. LABEL SWITCH "TEST" & "NORMAL" BY E.C.

8 E305 KEY SWITCH FOR EMERGENCY SHOWER FLOW SWITCH OVER-RIDE

SCALE : N.T.S.

NOTE:

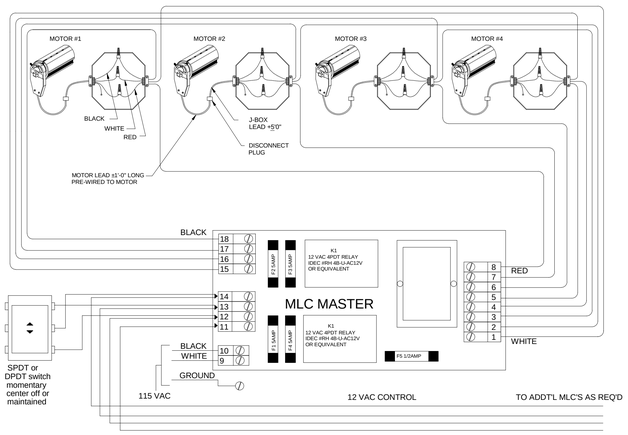
THE PURPOSE OF THIS DETAIL IS FOR OWNER TESTING.



9 E305 TRAPEZE MOUNTED TRANSFORMER DETAIL

SCALE: N.T.S.

NOTE: CONFIRM WITH STRUCTURAL ENGINEER.



10 E305 MOTOR LOGIC CONTROLLER (MLC) WIRING DIAGRAM

SCALE: N.T.S.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

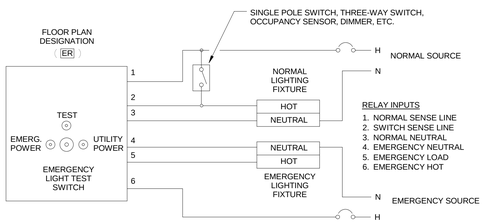
DRAWING NAME

ELECTRICAL DETAILS

PROJECT NO. 1722

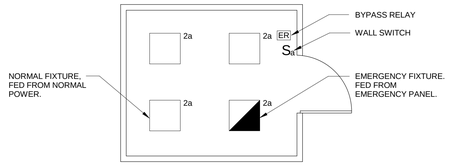
DRAWING NO.

E305



NOTES:

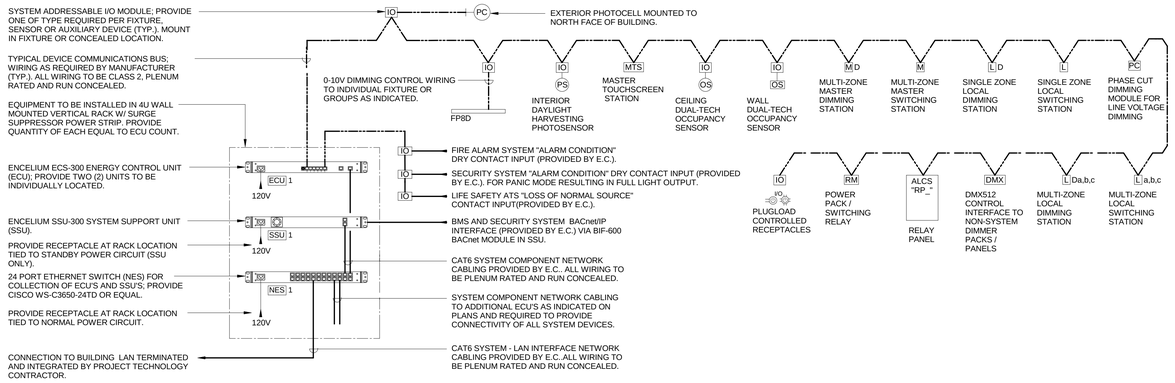
1. ALL SWITCH AND SENSOR CONTROLLED EMERGENCY LIGHTING IN PUBLIC AREAS, EGRESS ROUTES AND ALL "NORMALLY-OFF" EMERGENCY LIGHTING SHALL BE CONTROLLED BY AN EMERGENCY SUPERVISORY RELAY TO AUTOMATICALLY ENERGIZE EMERGENCY LIGHTS WHEN NORMAL (UTILITY) POWER FAILS. WHERE MORE THAN THREE CIRCUITS SERVE AN AREA, PROVIDE A HOMERUN(S) FROM RESPECTIVE LIGHTING PANEL(S) TO SENSING COIL.
2. THE EMERGENCY BYPASS RELAY TIES TO THE NORMAL CIRCUIT AND SWITCH TO MONITOR THE NORMAL SOURCE AND MIMIC THE SWITCH POSITION. THE RELAY ALLOWS THE ROOM SWITCH TO CONTROL THE EMERGENCY FIXTURE(S) DURING NORMAL OPERATION AND BYPASS THE SWITCH TO TURN LIGHTS ON DURING EMERGENCY OPERATION REGARDLESS OF THE SWITCH POSITION.
3. RELAY SHALL BE UL 924 LISTED, SOLID STATE, AND HAVE MECHANICALLY HELD RELAYS IN COMPLIANCE WITH NEC 700 AS MANUFACTURED BY BODINE, SCHNEIDER, BLTC, OR EQUAL.
4. MOUNT RELAY IN A SQUARE 4 11/16" JUNCTION BOX TO BE LOCATED ABOVE THE CEILING DIRECTLY ABOVE THE WALL SWITCH LOCATION OR IN A REMOTE LOCATION WHERE HARD CEILINGS WOULD PREVENT ACCESS. COORDINATE FINAL LOCATION WITH BUILDING CONSTRUCTION AND THE WORK OF OTHER TRADES TO ENSURE A READILY ACCESSIBLE MOUNTING LOCATION..



APPLICATION EXAMPLE

1 / E306 EMERGENCY SUPERVISORY BY-PASS RELAY DETAIL

SCALE: N.T.S.



AUTOMATED LIGHTING CONTROL SYSTEM NOTES:

1. PROVIDE SWITCHING AND 0-10V DIMMING CONTROL FOR ALL LIGHTING (REFER TO PLANS) WITH PRESETS VIA I/O 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 OSRAM ENCELIUM SYSTEM (W/ POLARIS 3D AND PCS SOFTWARE) INCLUDING THE FOLLOWING COMPONENTS:

MASTER TOUCHSCREEN STATION:	#RTI-K4-M-BZW-K4-CO
LOCAL TOUCHSCREEN STATION:	#RTI-K4-L-BZW-K4-CO
SINGLE ZONE LOCAL SWITCHING / DIMMING STATION:	#EN-WS-R-GB2
SINGLE ZONE LOCAL SWITCHING STATION:	#EN-WS-R-GB2
MULTI-ZONE LOCAL SWITCHING / DIMMING STATION:	#EN-WS-SC3D-GB2
MULTI-ZONE LOCAL SWITCHING STATION:	#EN-WS-ZC3-GB2
CEILING DUAL-TECH OCCUPANCY SENSORS:	#SCM-2000
WALL DUAL-TECH OCCUPANCY SENSORS	#SCM-2000-W
CEILING PHOTOSENSOR:	#CES/I
EXTERIOR PHOTOCELL:	#CES/O
POWER PACK / SWITCHING RELAY:	#PPK-020
RELAY PANEL:	#EN-RP-24C-GB2

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, SENSOR SWITCH, CRESTRON, PHILLIPS, COOPER OR EQUAL ARE ACCEPTABLE MANUFACTURER OPTIONS.

ALCS METHODS OF OPERATION NOTES

ZONING & PRESET LEVELS :

1. INTERIOR SPACES SHALL BE PROGRAMMED FOR 50% AND 100% DIMMING LEVELS TO BE ACTIVATED VIA LOCAL SWITCH STATIONS. 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 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 SETPOINTS AND TIMED SCHEDULES.
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 TO 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.

SWITCH STATION OPERATIONS :

1. INTERIOR SPACES SHALL BE PROVIDED WITH SWITCH STATIONS OF THE 3 BUTTON + RAISE/LOWER TYPE. BUTTONS SHALL BE PROGRAMMED GENERALLY AS FOLLOWS: BUTTON 1 = "ON" 100%, BUTTON 2 = "ON" 50%, BUTTON 3 = "ALL OFF", BUTTON 4 = RAISE/LOWER. 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. SWITCH STATIONS SHALL BE PROGRAMMED FOR OVERRIDE OF TIMED SCHEDULE "OFF" PERIODS FOR A MAXIMUM OF 90 MINUTES.

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 IN A "VACANCY" MODE UNLESS OTHERWISE NOTED (CORRIDORS, STAIRS, AND ALL PORTIONS OF THE EGRESS PATH ARE GENERAL EXCEPTIONS) SO THAT MANUAL ACTIVATION OF THE LIGHTING VIA LOCAL SWITCH STATIONS IS REQUIRED. SENSORS SHALL MAINTAIN 100% DIMMING LEVELS LIGHTING FOR AS LONG AS MOTION IS DETECTED. ABSENCE OF MOTION DETECTION FOR THE FOLLOWING TIME PERIODS SHALL TRIGGER THE LIGHTING TO DIM TO THE LEVELS ASSOCIATED WITH EACH TIME PERIOD: 5 MINUTES = 50%, 10 MINUTES = 25%, 15 MINUTES = 10%, 30 MINUTES = OFF. NON-DIMMED FIXTURES SHALL SWITCH TO THE LEVELS ASSOCIATED WITH EACH TIME PERIOD: 5 MINUTES = 50%, 15 MINUTES = OFF. FADE/RISE RATES SHALL BE ESTABLISHED TO PROVIDE SMOOTH, NON-INTRUSIVE, CHANGES IN SPACE LIGHT LEVELS. MOTION DETECTED AT ANYTIME PRIOR TO THE 30 MINUTE FULL TIME-OUT SHALL RETURN THE LIGHTING TO THE 100% LEVEL.
4. SENSOR ADJUSTMENTS FOR ALL FUNCTIONS SHALL BE TURNED TO THE MINIMUM ON EACH DEVICE AND ADJUSTED SOLELY THROUGH THE SYSTEM SOFTWARE.

3 / E306 AUTOMATED LIGHTING CONTROL SYSTEM ONE-LINE DIAGRAM

SCALE: N.T.S.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

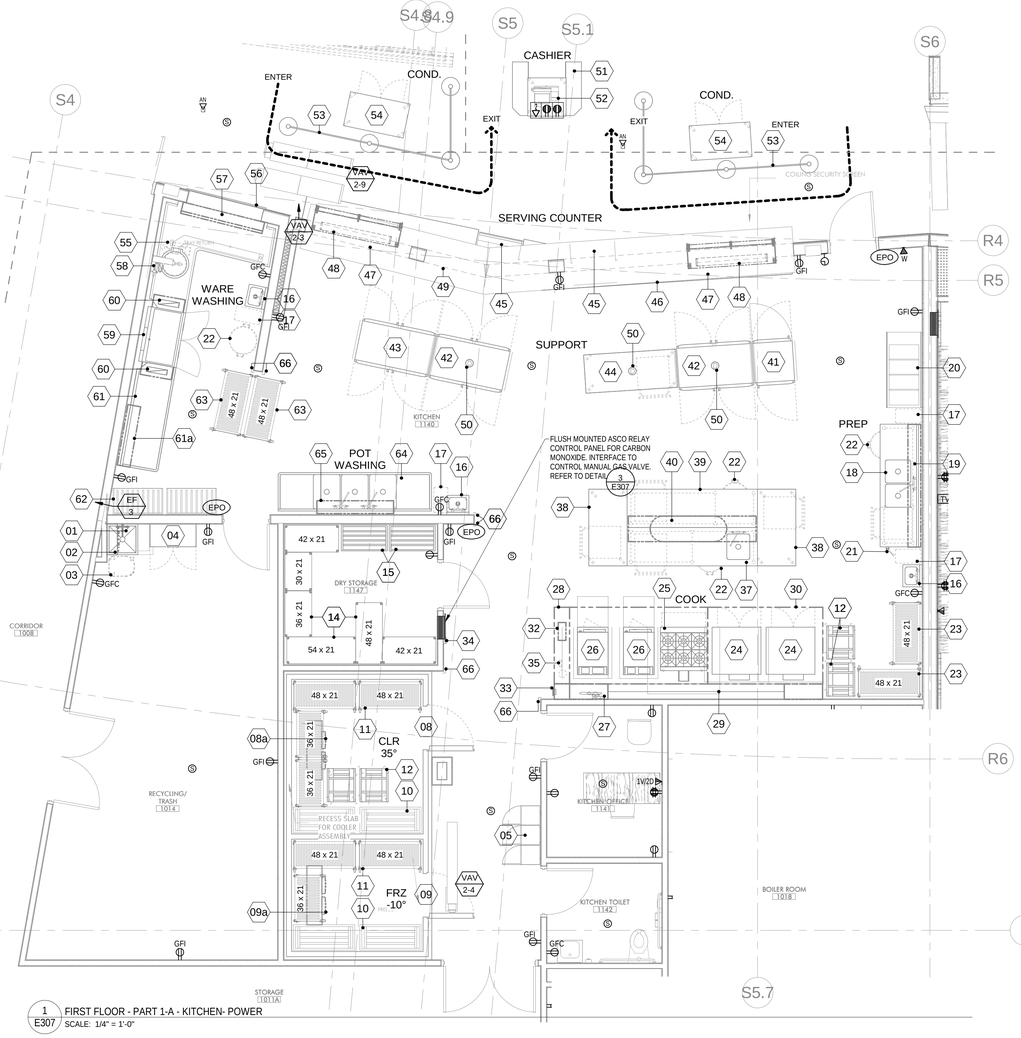
DRAWING NAME

ELECTRICAL DETAILS

PROJECT NO. 1722

DRAWING NO.

E306



1 E307 FIRST FLOOR - PART 1-A - KITCHEN- POWER

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

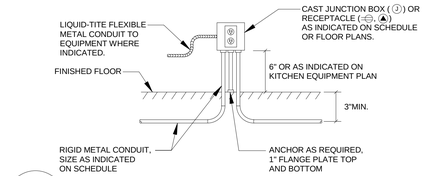
KITCHEN EQUIPMENT NOTES:

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 CULINARY ARTS 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 SWITCHES 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 (IF APPLICABLE).
14. UNLESS OTHERWISE NOTED ALL CIRCUITS SHALL BE FED FROM PANEL "KPP1A".
15. ALL FLOOR BOXES IN KITCHEN SHALL BE INSTALLED 6" AFF. FLOOR BOXES SHALL BE WATERTIGHT.
16. PROVIDE SHUTDOWN WIRING FOR GAS SOLENOID IN CULINARY ARTS FROM ANSUL SYSTEM.
17. CONNECT KITCHEN WALK-IN COOLER & FREEZER ALARMS TO LOCAL DDC SYSTEM 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 FURTHER INFORMATION.
22. PROVIDE 3#12 WIRES FROM MICRO SWITCH FOR FIRE EXTINGUISHER IN CEILING TO U.D.S (ITEM #29).
23. PROVIDE THE FOLLOWING WIRING FROM THE FIRE SUPPRESSION SYSTEM:
    A) 2#12 TO VENTILATOR CONTROL PANEL (N.O.).
    B) 2#12 WIRES TO GAS VALVE AND CONTRACTOR.
    C) 3#12 WIRES TO FIRE/FUEL SHUTOFF VALVE IN U.D.S. (ITEM #29).
    D) 2#12 WIRES TO AUTOMAN RELEASE.
24. EXTEND 1"C FOR DATA OUTLETS FOR CASH REGISTERS TO KITCHEN OFFICE (TYPICAL).

KITCHEN EQUIPMENT SCHEDULE

EQUIP NO.	EQUIPMENT	QTY	HP	K.W.	AMPS.	VOLT ϕ	PANEL	CKT. NO.	BRKR.	WIRE & COND.	EQUIPMENT AND CONNECTIONS (TS / ▽ / J)	REMARKS
	WALK IN COOLER - LIGHTS	1	-	1.1	-	120/1	EP1A	1	20A-1P	2#12+1#12G-3/4"C	- - - - X - - - X	-
08	WALK-IN COOLER - DRAIN LINE HEAT TRACE	1	-	-	-	120/1	EP1A	3	20A-1P	2#12+1#12G-3/4"C	X - - - X - - - X	-
	WALK IN COOLER - ALARM	1										SEE NOTE #17
08A	WALK-IN COOLER - EVAPORATOR COIL	1	-	-	2.0	120/1	EP1A	5	20A-1P	2#12+1#12G-3/4"C	X - - - X - - - X	PROVIDE 6 #14 FOR INTERLOCK TO CONDENSING UNIT
08B	WALK IN COOLER - CONDENSING UNIT	1	-	-	6.5	208/3	EP1A	7,9,11	20A-3P	4#12+1#12G-3/4"C	- - - X X - - - X	-
	WALK IN FREEZER - LIGHTS	1	-	1.3	-	120/1	EP1A	2	20A-1P	2#12+1#12G-3/4"C	- - - - X - - - X	-
09	WALK-IN FREEZER - DRAIN LINE HEAT TRACE	1	-	-	-	120/1	EP1A	4	20A-1P	2#12+1#12G-3/4"C	X - - - X - - - X	-
	WALK IN COOLER - ALARM	1										SEE NOTE #17
09A	WALK-IN FREEZER - EVAPORATOR COIL	1	-	-	8.2	208/1	EP1A	14,16	20A-2P	3#12+1#12G-3/4"C	- - - X X - - - X	PROVIDE 6 #14 FOR INTERLOCK TO CONDENSING UNIT
09B	WALK IN FREEZER - CONDENSING UNIT	1	-	-	12.0	208/3	EP1A	8,10,12	30A-3P	4#10+1#10G-3/4"C	- - - X X - - - X	-
18	PREP TABLE WITH SINKS	1	-	-	-	120/1	KPP1A	1 & 3	(2) 20A-1P	(2) 2#12+1#12G-3/4"C	- - - - - - (2) X -	-
20	VEGETABLE WASHER	1	-	-	17.0	480/3	MHP1A	1,3,5	30A-2P	4#10+1#10G-3/4"C	- - - X - - - - -	-
24	DOUBLE CONVECTION OVEN	2	-	-	(2) 8.0	120/1	-	-	-	-	- - - - (4) X - - -	POWER CONNECTION IS FROM ITEM #29
25	SIX-BURNER RANGE WITH OVEN	1	-	-	-	120/1	-	-	-	-	- - - - - X - - -	POWER CONNECTION IS FROM ITEM #29
26	TEN PAN CONVECTION STEAMER	2	-	0.3	-	120/1	-	-	-	-	- - - - (2) X - - -	POWER CONNECTION IS FROM ITEM #29
27	WATER FILTER ASSEMBLY	2	-	-	-	120/1	-	-	-	-	- - - - (2) X - - -	POWER CONNECTION IS FROM ITEM #29
28	EXHAUST VENTILATOR	1	-	-	-	120/1	-	-	-	-	- - - - X - - - X	POWER CONNECTION TO LIGHTS IS FROM ITEM #32
29	UTILITY DISTRIBUTION SYSTEM (UDS)	1	-	-	50.0	208/3	KPP1A	1,3,5	60A-3P	4#6+1#10G-1"C	- - X - - X - - - X	-
30	EXHAUST VENTILATOR	1	-	-	-	120/1	-	-	-	-	- - - - X - - - X	POWER CONNECTION TO LIGHTS IS FROM ITEM #32
32	DVC CONTROL PANEL	1	-	-	-	120/1	EP1A	18 & 20	20A-1P	2#12+1#12G-3/4"C	- - - - (2) X - - - (2) X	REFER TO DETAIL 4/E307
33	DVC CONTROL INTERFACE	1										CABLE FROM ITEM #34
34	ROOM TEMPERATURE SENSOR	1										CABLE FROM ITEM #34
35	FIRE SUPPRESSION SYSTEM	1	-	-	-	120/1	EP1A	6	20A-1P	2#12+1#12G-3/4"C	- - - - X - - - X	-
37	COOK'S TABLE WITH SINK	1	-	-	-	120/1	KPP1A	5-7-9-11	(4) 20A-1P	(4) 2#12+1#12G-3/4"C	- - - - - - (4) X - -	-
41	PASS-THRU HEATED CABINET	1	-	-	6.3	208/1	KPP1A	8,10	20A-2P	3#12+1#12G-3/4"C	- - - - - - - X -	NEMA 6-20P
42	PASS-THRU REFRIGERATOR	2	-	-	11.0	120/1	EP1A	13 & 15	(2) 20A-1P	(2) 2#12+1#12G-3/4"C	- - - - - (2) X - - -	-
43	PASS-THRU HEATED CABINET	1	-	-	13.0	208/1	KPP1A	12,14	20A-2P	3#12+1#12G-3/4"C	- - - - - - - X -	NEMA 6-20P
45	REFRIGERATED SELF-SERVICE COUNTER CASE	2	-	-	10.7	120/1	EP1A	17 & 19	(2) 20A-1P	(2) 2#12+1#12G-3/4"C	- - - - - (2) X - - -	-
46	SERVING COUNTER	1	-	-	-	120/1	KPP1A	16 & 18	(2) 20A-1P	(2) 2#12+1#12G-3/4"C	- - - - - - (2) X - -	-
		1	-	-	-	120/1	KPP1A	20 & 22	(2) 20A-1P	(2) 2#12+1#12G-3/4"C	- - - - - - (2) X - -	-
47	HEATED BLACK GLASS SHELF	2	-	-	8.8	120/1	KPP1A	13 & 15	(2) 20A-1P	(2) 2#12+1#12G-3/4"C	- - - - - (2) X - - -	-
48	HEAT LAMP	2	-	1.25	-	208/1	KPP1A	17,19 & 21,23	(2) 20A-2P	(2) 3#12+1#12G-3/4"C	(2) X - - - (2) X - - - (2) X	-
49	SERVING COUNTER	1	-	-	-	120/1	KPP1A	24 & 26	(2) 20A-1P	(2) 2#12+1#12G-3/4"C	- - - - - - (2) X - -	-
		1	-	-	-	120/1	KPP1A	28 & 30	(2) 20A-1P	(2) 2#12+1#12G-3/4"C	- - - - - - (2) X - -	-
50	DROP CORDS	3	-	-	-	120/1	KPP1A	25-27-29	(3) 20A-1P	(3) 2#12+1#12G-3/4"C	- - - - - - (3) X - -	-
52	POS TERMINALS	1	-	-	-	120/1	EP1A	21 & 23	(2) 20A-1P	(2) 2#12+1#12G-3/4"C	- - - - - - (2) X - -	- PROVIDE FLUSH FLOOR BOXES FOR POWER & DATA. ALSO PROVIDE (1) EMPTY 1"C WITH PULL STRING TO KITCHEN OFFICE FOR EACH STATION.
55	TROUGH COLLECTOR	1	-	-	5.5	208/1	KPP1A	31,33	20A-2P	3#12+1#12G-3/4"C	- - - - X X - - - X	-
59	WAREWASHER - MACHINE & TANK HEAT	1	-	-	27.9	480/3	MHP1A	2,4,6	40A-3P	4#8+1#10G-3/4"C	- - - X X - - - X	-
	WAREWASHER - BOOSTER HEATER	1	-	-	40.1	480/3	MHP1A	8,10,12	60A-3P	4#6+1#10G-1"C	- - - X X - - - X	-

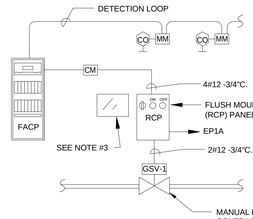
REFER TO FOOD SERVICE DRAWINGS FOR EXACT EQUIPMENT LOCATION & ROUGHING REQUIREMENTS.



2 E307 TYPICAL KITCHEN RAISED JUNCTION/OUTLET BOX INSTALLATION

SCALE: N.T.S.

NOTE:
THIS DETAIL DOES NOT APPLY TO P.O.S. FLOOR BOXES.



3 E307 CARBON MONOXIDE GAS SOLENOID SHUT DOWN DETAIL

SCALE: NTS

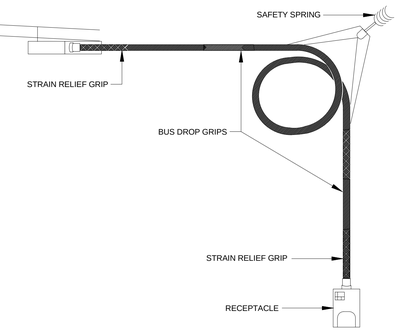
NOTES:

1. CARBON MONOXIDE (CO) DETECTORS SHALL BE PROGRAMMED AS SUPERVISORY POINTS IN THE FACP. UPON DETECTION OF CO, POWER SHALL BE INTERRUPTED TO THE (RCP) AND THE GAS SHUTOFF WILL CLOSE.
2. GAS FLOW MAY BE RESTARTED AFTER THE CO DETECTION AND THE FACP ARE RESET WHICH WILL RE-POWER THE (RCP), TURNING THE KEY SWITCH TO "ON" WILL ENERGIZE THE SOLENOID.
3. YELLOW ENGRAVED WARNING PLACARD, MOUNTED ADJACENT TO THE (RCP), WITH THE FOLLOWING"CAUTION- GAS FLOW IS RE-ESTABLISHED WHEN "ON" KEY SWITCH IS TURNED AND GAS VALVE IS MANUALLY RESET. RELIGHT ALL ASSOCIATED PILOTS IMMEDIATELY UPON RESET. CO DETECTORS AND THE FIRE ALARM SYSTEM CONTROL PANEL MUST CLEAR OF ANY CO ALARMS PRIOR TO RESET".

4 E307 KITCHEN HOOD VENTILATOR DEMAND CONTROL SYSTEM WIRING DIAGRAM (ITEM #32)

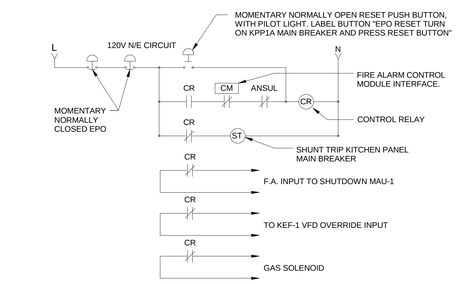
SCALE : N.T.S.

NOTE: REFER TO APPROVED FOOD SERVICE SUBMITTALS WIRING DIAGRAM FOR FINAL COORDINATION OF ITEM #32.



6 E307 CABLE DROP SUPPORT DETAIL

SCALE: NTS



5 E307 KITCHEN EQUIPMENT EMERGENCY POWER OFF WIRING DIAGRAM

SCALE: NTS

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:
   a. TURN OFF POWER TO THE GAS SOLENOID.
   b. 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. THE ACTIVATION OF HOOD FIRE SUPPRESSION SYSTEM, SHALL CAUSE THE FOLLOWING TO OCCUR:
   a. TURN OFF POWER TO THE GAS SOLENOID.
   b. 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.
   c. 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.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

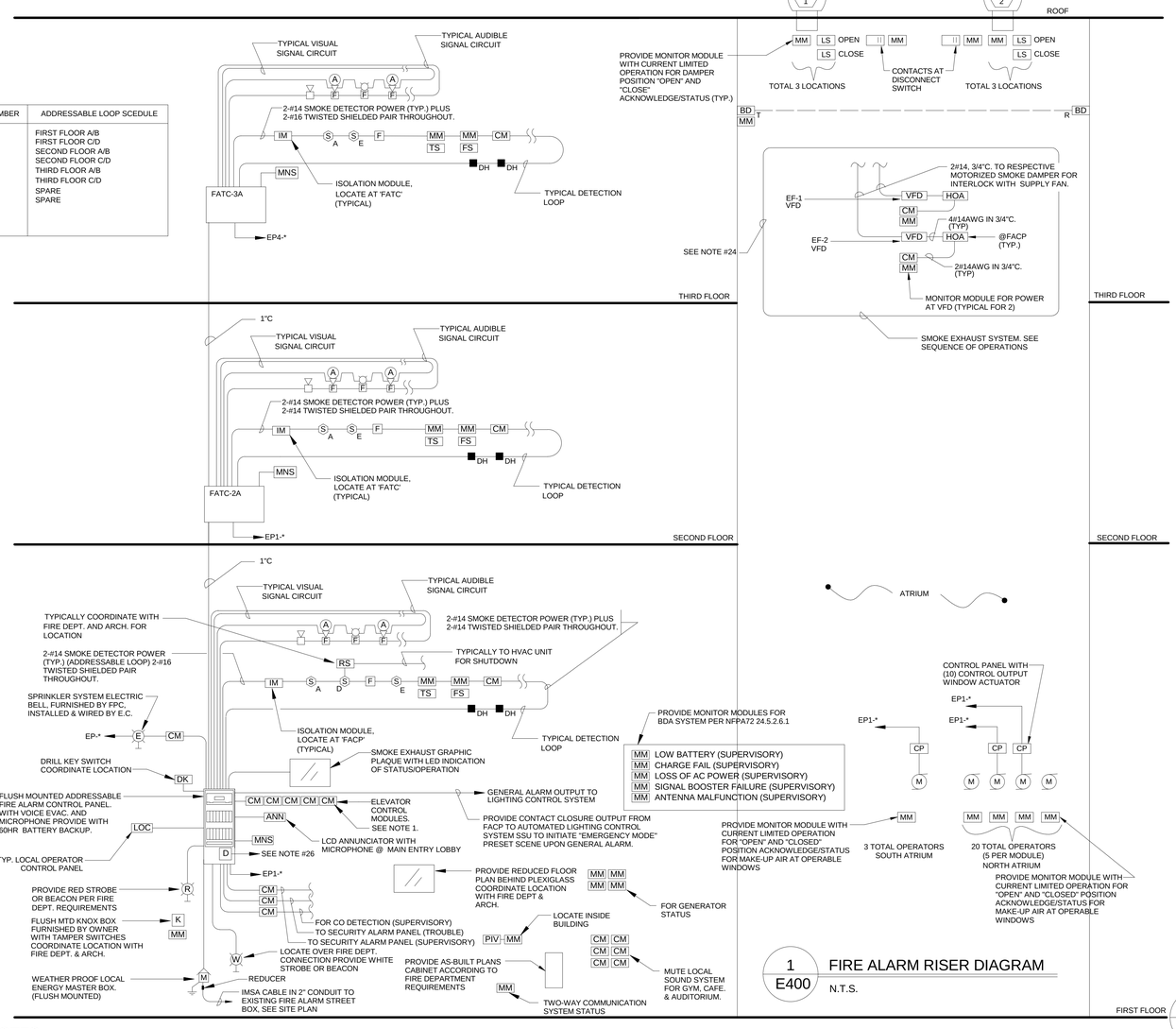
No.	Date	Description

DRAWING NAME
FIRST FLOOR - PART 1-A - KITCHEN- POWER

PROJECT NO. 1722

DRAWING NO.
E307

LOOP NUMBER	ADDRESSABLE LOOP SCEDULE
1	FIRST FLOOR A/B
2	FIRST FLOOR C/D
3	SECOND FLOOR A/B
4	SECOND FLOOR C/D
5	THIRD FLOOR A/B
6	THIRD FLOOR C/D
7	SPARE
8	SPARE



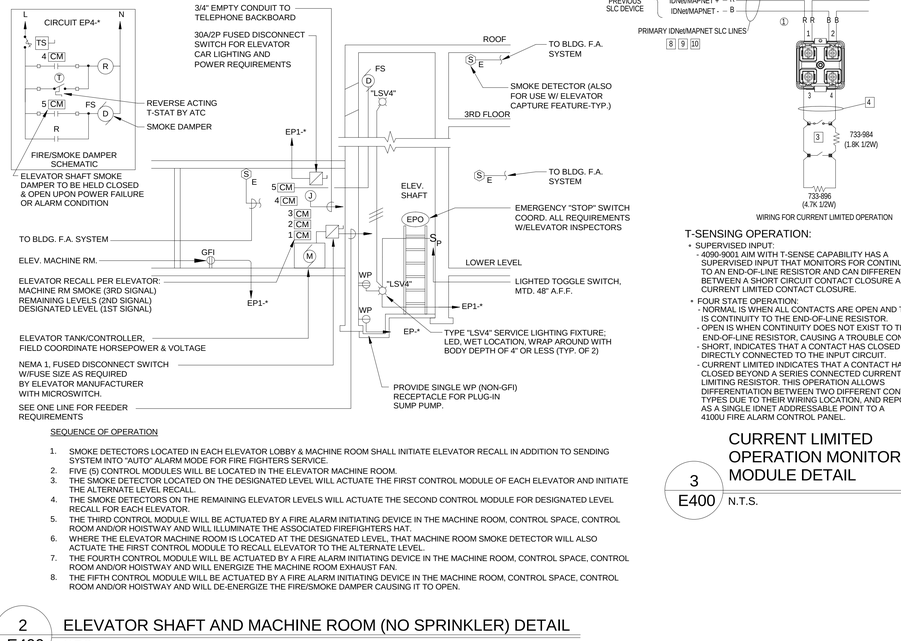
1 E400 FIRE ALARM RISER DIAGRAM N.T.S.

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

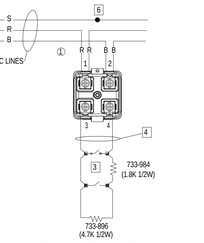
ROOM SPACING FOR WALL-MOUNTED VISIBLE APPLIANCES			
	MINIMUM REQUIRED LIGHT OUTPUT EFFECTIVE INTENSITY (cd)		
MAXIMUM ROOM SIZE	ONE LIGHT PER ROOM (CEILING HEIGHT)	TWO LIGHTS PER ROOM (LOCATED ON OPPOSITE WALLS)	FOUR LIGHTS PER ROOM ONE LIGHT PER WALLS
20' x 20'	15	NA	NA
28' x 28'	30	UNKNOWN	NA
30' x 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

SYSTEM INPUTS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	REMARKS
1 SMOKE SENSOR/DETECTOR	●	●					●	●	●	●										●	●	●		1
2 MANUAL PULL STATION							●	●	●	●														2
3 HEAT SENSOR/DETECTOR	●	●					●	●	●	●														3
4 DUCT SENSOR/DETECTOR			●	●			●			●		●								●	●	●		4
5 MAIN FLR. ELEV. LOBBY SMOKE DETECTOR	●	●					●	●	●	●				●				●		●	●	●		5
6 ELEVATOR LOBBY SMOKE DETECTORS (EXC. MAIN FLR.)	●	●					●	●	●	●				●		●				●	●	●		6
7 ELEVATOR MECH. ROOM HEAT DETECTOR	●	●					●	●	●	●					●									7
8 ELEVATOR MECH. ROOM SMOKE DETECTOR	●	●					●	●	●	●						●		●		●	●	●		8
9 ELEVATOR SHAFT SMOKE DETECTOR	●	●					●	●	●	●						●		●		●	●	●		9
10 ELEVATOR POWER MONITOR			●	●			●			●		●										●		10
11 WATERFLOW SWITCH	●	●					●	●	●	●												●		11
12 TAMPER SWITCH			●	●			●			●		●										●		12
13 POST INDICATOR VALVE SWITCH			●	●			●			●		●										●		13
14 GENERATOR RUNNING			●	●			●			●		●										●		14
15 GENERATOR FAULT					●	●	●			●			●									●		15
16 FIRE ALARM AC POWER FAILURE					●	●				●			●	●								●		16
17 FIRE ALARM SYSTEM LOW BATTERY					●	●				●			●									●		17
18 OPEN CIRCUIT OR GROUND FAULT					●	●				●			●									●		18
19 CLASS A NOTIFICATION CIRCUIT (NAC) - SHORT					●	●				●			●									●		19
20 ATRIUM SPRINKLER ZONE	●	●					●	●	●	●										●	●	●		20
21 ATRIUM BEAM DETECTOR	●	●					●	●	●	●										●	●	●		21
22 ATRIUM SPOT TYPE DETECTOR	●	●					●	●	●	●										●	●			22
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	

SYSTEM OUTPUTS	CONTROL UNIT ANNUNCIATION						NOTIFICATION			FIRE SAFETY CONTROL													
	ACTUATE COMMON ALARM SIGNAL INDICATOR	ACTUATE GENERAL ALARM SIGNAL	ACTUATE CARBON MONOXIDE SUPERVISORY SIGNAL INDICATOR	ACTUATE GENERAL SUPERVISORY SIGNAL	ACTUATE COMMON TROUBLE SIGNAL INDICATOR	ACTUATE AUDIBLE TROUBLE SIGNAL	ACTUATE APPROPRIATE LOCATION INDICATORS	ACTUATE ALL AUDIBLE EVACUATION SIGNALS	DISPLAY DEVICE STATUS	TRANSMIT ALARM SIGNAL TO SUPERVISING STATION	TRANSMIT SUPV. SIGNAL TO SUPERVISING STATION	TRANSMIT TROUBLE SIGNAL TO SUPERVISING STATION	RELEASE ELEVATOR SHUNT TRIP	ELEVATOR DOOR PERIMETER DOOR	MAIN FLOOR ELEVATOR RECALL	ALTERNATE FLOOR ELEVATOR RECALL	ELEVATOR #1 ELEVATOR RECALL	ELEVATOR #2 ELEVATOR RECALL	ATRIUM SMOKE CONTROL	FAN SHUT DOWN	DAMPER SHUT DOWN	REMOTELY DISPLAY ACTIVE STATUS
1 SMOKE SENSOR/DETECTOR	●	●						●															
2 MANUAL PULL STATION	●	●						●															
3 HEAT SENSOR/DETECTOR	●	●						●															
4 DUCT SENSOR/DETECTOR	●	●						●															
5 MAIN FLR. ELEV. LOBBY SMOKE DETECTOR	●	●						●															
6 ELEVATOR LOBBY SMOKE DETECTORS (EXC. MAIN FLR.)	●	●						●															
7 ELEVATOR MECH. ROOM HEAT DETECTOR	●	●						●															
8 ELEVATOR MECH. ROOM SMOKE DETECTOR	●	●						●															
9 ELEVATOR SHAFT SMOKE DETECTOR	●	●						●															
10 ELEVATOR POWER MONITOR								●															
11 WATERFLOW SWITCH	●	●						●															
12 TAMPER SWITCH								●															
13 POST INDICATOR VALVE SWITCH								●															
14 GENERATOR RUNNING								●															
15 GENERATOR FAULT								●															
16 FIRE ALARM AC POWER FAILURE								●															
17 FIRE ALARM SYSTEM LOW BATTERY								●															
18 OPEN CIRCUIT OR GROUND FAULT								●															
19 CLASS A NOTIFICATION CIRCUIT (NAC) - SHORT								●															
20 ATRIUM SPRINKLER ZONE	●	●						●															
21 ATRIUM BEAM DETECTOR	●	●						●															
22 ATRIUM SPOT TYPE DETECTOR	●	●						●															



2 E400 ELEVATOR SHAFT AND MACHINE ROOM (NO SPRINKLER) DETAIL N.T.S.



T-SENSING OPERATION:

- SUPERVISED INPUT:
  - 4090-9001 AIM WITH T-SENSE CAPABILITY HAS A SUPERVISED INPUT THAT MONITORS FOR CONTINUITY TO AN END-OF-LINE RESISTOR AND CAN DIFFERENTIATE BETWEEN A SHORT CIRCUIT CONTACT CLOSURE AND A CURRENT LIMITED CONTACT CLOSURE.
- FOUR STATE OPERATION:
  - NORMAL IS WHEN ALL CONTACTS ARE OPEN AND THERE IS CONTINUITY TO THE END-OF-LINE RESISTOR.
  - OPEN IS WHEN CONTINUITY DOES NOT EXIST TO THE END-OF-LINE RESISTOR, CAUSING A TROUBLE CONDITION.
  - SHORT, INDICATES THAT A CONTACT HAS CLOSED THAT IS DIRECTLY CONNECTED TO THE INPUT CIRCUIT.
  - CURRENT LIMITED INDICATES THAT A CONTACT HAS CLOSED BEYOND A SERIES CONNECTED CURRENT LIMITING RESISTOR. THIS OPERATION ALLOWS DIFFERENTIATION BETWEEN TWO DIFFERENT CONTACT TYPES DUE TO THEIR WIRING LOCATION, AND REPORTING AS A SINGLE IDNET ADDRESSABLE POINT TO A 4100U FIRE ALARM CONTROL PANEL.

3 E400 CURRENT LIMITED OPERATION MONITOR MODULE DETAIL N.T.S.

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 UNITS AND FOR 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. ALL FIRE ALARM WIRING SHALL BE INSTALLED IN CONDUIT. PLENUM RATED LOW ENERGY FIRE ALARM CABLE IS ALLOWED WHERE CONCEALED AND ALLOWED BY CODE.
4. TYPICALLY ALL SPEAKER/STROBE UNITS SHALL BE WIRED SO THAT THE SPEAKER/STROBES CAN BE SILENCED SIMULTANEOUSLY.
5. ALL SPEAKER/STROBES WITHIN ALL CLASSROOMS , SHALL BE MULTI-TAPPED TYPE. E.C. SHALL OWN dB AJUSTING DURING FIRE DEPARTMENT TESTING.
6. ALL SPEAKER/STROBES SHALL BE MOUNTED IN ACCORDANCE WITH ADA ROOM SPACING ALLOCATION TABLES FOR VISUAL SIGNALING DEVICES.
7. PROVIDE CONTROL MODULES TO OVERRIDE MAGLOCKS FOR CARD ACCESS. REFER TO SECURITY FLOOR PLANS FOR EXACT LOCATION AND QUANTITIES.
8. ALL DEVICES SHALL BE LABELED WITH CLEAR TAPE WITH BLACK INK. LABEL SHALL IDENTIFY LOOP# AND DEVICE NUMBER.
9. ALL REMOTE TEST STATIONS SHALL BE KEYED AND MOUNTED ADJACENT TO FACP OR AS DIRECTED BY LOCAL FIRE DEPT. LABEL EACH UNIT.
10. PULL STATIONS SHALL BE DOUBLE ACTION. PROVIDE TAMPER RESISTANT PLASTIC COVERS ON ALL PULL STATIONS.
11. A/V DEVICES SHALL NOT BE INSTALLED WITHIN CHALK BOARDS. COORDINATE EXACT LOCATION OF ALL A/V DEVICES W/ARCH. PRIOR TO INSTALLING.
12. ALL TAMPER AND SUPERVISORY SWITCHES SHALL BE WIRED AS LOCAL SUPERVISONS ALARM CONDITION UPON ACTIVATION. TROUBLE OR SUPERVISORY SHALL BE SELF RESTORING. TRANSMIT SIGNAL TO FIRE DEPT. BUT DO NOT ALARM BUILDING.
13. 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.
14. COORDINATE WITH SELECTED SYSTEM MANUFACTURER FOR WIRING REQUIREMENTS.
15. ALL DETECTION &SIGNAL WIRING SHALL BE CLASS "A".
16. SUBMIT AS PART OF SHOP DRAWINGS COMPLETE FLOOR PLANS & RISERS WITH ALL DEVICES SHOWN AND WITH DEVICE ADDRESSES.
17. PROVIDE ISOLATION MODULE FOR EVERY 25 DEVICES, TYPICAL.
18. PROVIDE INTERFACE WITH SECURITY SYSTEM SO THAT ACTUATION OF FIRE ALARM SYSTEM WILL NOTIFY SECURITY SYSTEM TO UNLOCK SECURED DOORS REQUIRED BY THE FIRE DEPT. PROVIDE CONTROL MODULE AT EACH ELECTRIFIED DOOR.
19. PROVIDE CONTACT CLOSURE INTERFACE TO AUTOMATED LIGHTING CONTROL SYSTEM (ALCS) VIA A SINGLE PAIR OF 2#18 CONDUCTORS. WHEN FIRE ALARM SYSTEM GOES INTO ALARM A SIGNAL SHALL BE ISSUED TO ALLOW THE ALCS TO TURN ALL INTERIOR AND EXTERIOR LIGHTING "ON".
20. PROGRAMMING OF ADDRESSES SHALL BE COORDINATED WITH THE FIRE DEPARTMENT TO MATCH THE LOCAL FIRE DEPT. LABELING PROTOCOL. DEVICE ADDRESS DESCRIPTIONS TO BE ISSUED TO THE ARCHITECT AND FIRE DEPT. FOR APPROVAL PRIOR TO FINAL PROGRAMMING.
21. TYPICALLY PROVIDE (1) MONITOR MODULE FOR EACH CARBON MONOXIDE, GAS DETECTOR, ETC.
22. DOOR HOLDERS ARE FURNISHED BY HARDWARE, INSTALLED & WIRED BY E.C.
23. PROVIDE #18/2C TWISTED SHIELDED CABLE FROM FACP TO EACH LOCAL SOUND SYSTEM LOCATED IN CAFETORIUM, GYMNASIUM & MEDIA ROOM.
24. PROVIDE (4) H.O.A. SWITCHES IN FACP FOR FIRE DEPT USE. PROVIDE (1) CONTROL MODULES ADJACENT TO EACH STARTER/VFD SO THAT EXHAUST FANS FOR ATRIUM SMOKE EXHAUST SYSTEM SHALL ENERGIZE UPON ACTIVATION OF ANY SMOKE DETECTOR IN ATRIUM OR SPRINKLER FLOW SWITCH SERVING ATRIUM.
25. ALL WIRING FOR ATRIUM DETECTION AND CONTROL SYSTEM SHALL BE FULLY ENCLOSED IN CONTINUOUS RACEWAYS PER IBC 909.12.1.
26. PROVIDE CAT6 TELEPHONE CABLE, IN 3/4"C. TO DEMARCATION ALL SUPERVISORY AND TROUBLE SIGNALS TO BE SENT TO 911 COMMUNICATIONS CENTER. (COORDINATE WITH FIRE DEPT.)

SEQUENCE OF OPERATION FOR SMOKE EXHAUST SYSTEM

THE ATRIUM SPACE INCLUDES A CENTRAL VERTICAL OPENING THROUGH ALL FOUR FLOORS. THE BUILDING IS PROTECTED THROUGHOUT WITH AN AUTOMATIC SPRINKLER SYSTEM.
THE SPRINKLER ZONE SERVING THE ATRIUM, CONSISTS OF EXPOSED UPRIGHT HEADS AT ATRIUM SKYLIGHTS.
THE SPRINKLER SYSTEM IN THE NON-ATRIUM ZONES (EACH FLOOR WITH EXCEPTION ATRIUM SKYLIGHTS) WILL BE ZONED SEPARATELY FROM THE SPRINKLER SYSTEM PROTECTING THE ATRIUM. ACTIVATION OF SPRINKLER ZONES THAT ARE NOT PART OF ATRIUM ZONE WILL NOT INITIATE ATRIUM SMOKE CONTROL SYSTEM.
THE SMOKE CONTROL SYSTEM CONSISTS OF TWO ROOF MOUNTED EXHAUST FANS WITH VFD'S. THE EXHAUST DUCT FOR EACH FAN IS ROOF MOUNTED AND TRAVELS FROM EACH FAN TO THREE SEPARATE FIRE/SMOKE DAMPERS (TOTAL OF 6) LOCATED WITHIN THE DUCTWORK PRIOR TO PENETRATING THE ATRIUM SKYLIGHTS. THE MAKE-UP AIR SYSTEM CONSISTS OF OPERABLE WINDOWS LOCATED ON THE FIRST FLOOR NORTH AND SOUTH SIDES OF THE ATRIUM.
THE AVAILABLE POWER IS MONITORED AT EACH VFD AND EACH DISCONNECT SWITCH.
UPON DETECTION OF SMOKE FROM ATRIUM BEAM DETECTORS, ATRIUM SPOT TYPE SMOKE DETECTOR OR ATRIUM SPRINKLER ZONE, THE SMOKE CONTROL SYSTEM SHALL OPERATE AS FOLLOWS:

- THE FIRE ALARM PANEL SHALL ACTIVATE AUTOMATIC SEQUENCE AND START "AUTO" MODE. AIR HANDLERS AHU-1 AND AHU-2 SHALL SHUT DOWN.
- THE MAKE-UP AIR SYSTEM SHALL INITIATE. THE MAKE-UP AIR SYSTEM CONSISTS OF (2) LOCATIONS OF OPERABLE WINDOWS LOCATED ON FIRST FLOOR. THERE ARE TWENTY (20) OPERABLE WINDOWS ON THE NORTH SIDE OF ATRIUM AND THREE (3) OPERABLE WINDOWS ON SOUTH SIDE OF ATRIUM. LIMIT SWITCHES AT ALL MOTORIZED WINDOWS WILL CONFIRM STATUS OF WINDOW "OPEN" AND "CLOSED" POSITION. THE MULTIPLE WINDOW OPERATIONS WILL BE GROUPED IN SERIES OF (5) WINDOWS PER STATUS INDICATION. THE TIME INTERVAL FOR WINDOWS TO OPEN WILL TAKE 67 SECONDS. IN THE EVENT "OPEN" STATUS IS NOT ACHIEVED IN 90 SECONDS A FAULT CONDITION WILL INDICATE ON THE FIRE SMOKE CONTROL PANEL
- SIMULTANEOUSLY WITH THE MAKE-UP AIR SYSTEM INITIATION, EXHAUST FIRE/SMOKE DAMPERS (TOTAL OF 6) SHALL INITIATE. LIMIT SWITCHES AT EACH FIRE/SMOKE DAMPER (GROUPED THREE (3) PER EXHAUST FAN) SHALL INDICATE STATUS AT FIRE SMOKE CONTROL PANEL. THE TIME INTERVAL FOR THE EXHAUST FIRE/SMOKE DAMPER TO OPEN WILL TAKE 45 SECONDS. IN THE EVENT OPEN STATUS IS NOT ACHIEVED IN 120 SECONDS A FAULT CONDITION WILL INDICATE ON THE FIRE SMOKE CONTROL PANEL.
- SMOKE EXHAUST FANS EF-1 AND EF-2 SHALL ACTIVATE UPON SIGNAL FROM FIRE SMOKE CONTROL PANEL ONCE "OPEN" STATUS OF FIRE/SMOKE DAMPERS AND MAKE-UP AIR SYSTEM IS CONFIRMED.
- THE SMOKE CONTROL SYSTEM SHALL CONTINUE TO OPERATE UNTIL FIRE PERSONNEL REACH THE SITE, AND THROUGH OPERATION OF HAND-OFF AUTOMATIC (H.O.A.) SWITCHES AT THE FIRE SMOKE CONTROL PANEL, WILL CYCLE THE SMOKE EXHAUST FANS AND MOTORIZED WINDOWS TO SUITE SITE CONDITIONS.
- TWO (2) HAND-OFF-AUTOMATIC (H.O.A.) SWITCHES WILL BE LOCATED IN THE FIRE SMOKE CONTROL PANEL FOR FIRE DEPARTMENT USE FOR MANUAL OVERRIDE OF EF-1 AND EF-2.
- H.O.A. SWITCHES FOR EXHAUST FANS SHALL ALSO OVERRIDE FIRE/SMOKE DAMPERS, RESPECTIVELY.
- THE MAKE-UP AIR H.O.A. SWITCHES WILL TOTAL FIVE. THE SWITCHES SHALL BE GROUPED ONE (1) FOR SOUTH ATRIUM WINDOW OPERATORS AND FOUR (4) FOR NORTH WINDOW OPERATORS.
- IN THE EVENT LIMIT SWITCHES ON THE MAKEUP AIR SYSTEM AND/OR FIRE/SMOKE DAMPERS DO NOT INDICATE "OPEN" STATUS, AN ALARM SHALL BE INITIATED AT THE FIRE SMOKE CONTROL PANEL. IF AT LEAST 1/3 OF THE FIRE/SMOKE DAMPERS AND OPERABLE WINDOWS INDICATE "OPEN" STATUS THE SMOKE CONTROL SYSTEM SHALL FUNCTION AND OPERATE PER THE SEQUENCE AT A REDUCED CAPACITY. A FAULT INDICATION SHALL BE TRANSMITTED TO THE FIRE SMOKE CONTROL PANEL IF EACH GROUP OF WINDOWS DO NOT PROVE "OPEN" WITHIN 90 SECONDS INDICATE "FAULT" STATUS.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

FIRE ALARM RISER

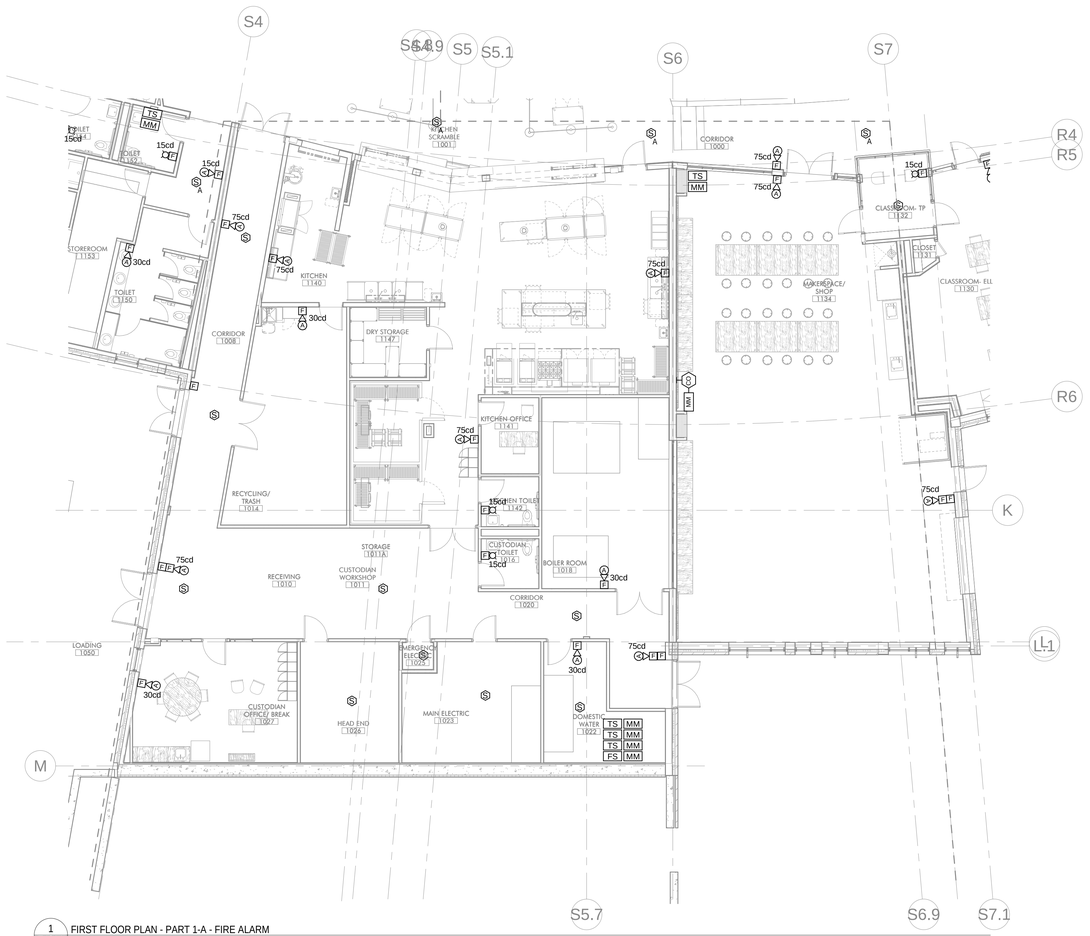
PROJECT NO. 1722

DRAWING NO.

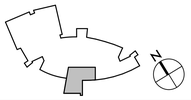
E400

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 E401A FIRST FLOOR PLAN - PART 1-A - FIRE ALARM
SCALE: 1/8" = 1'-0"



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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

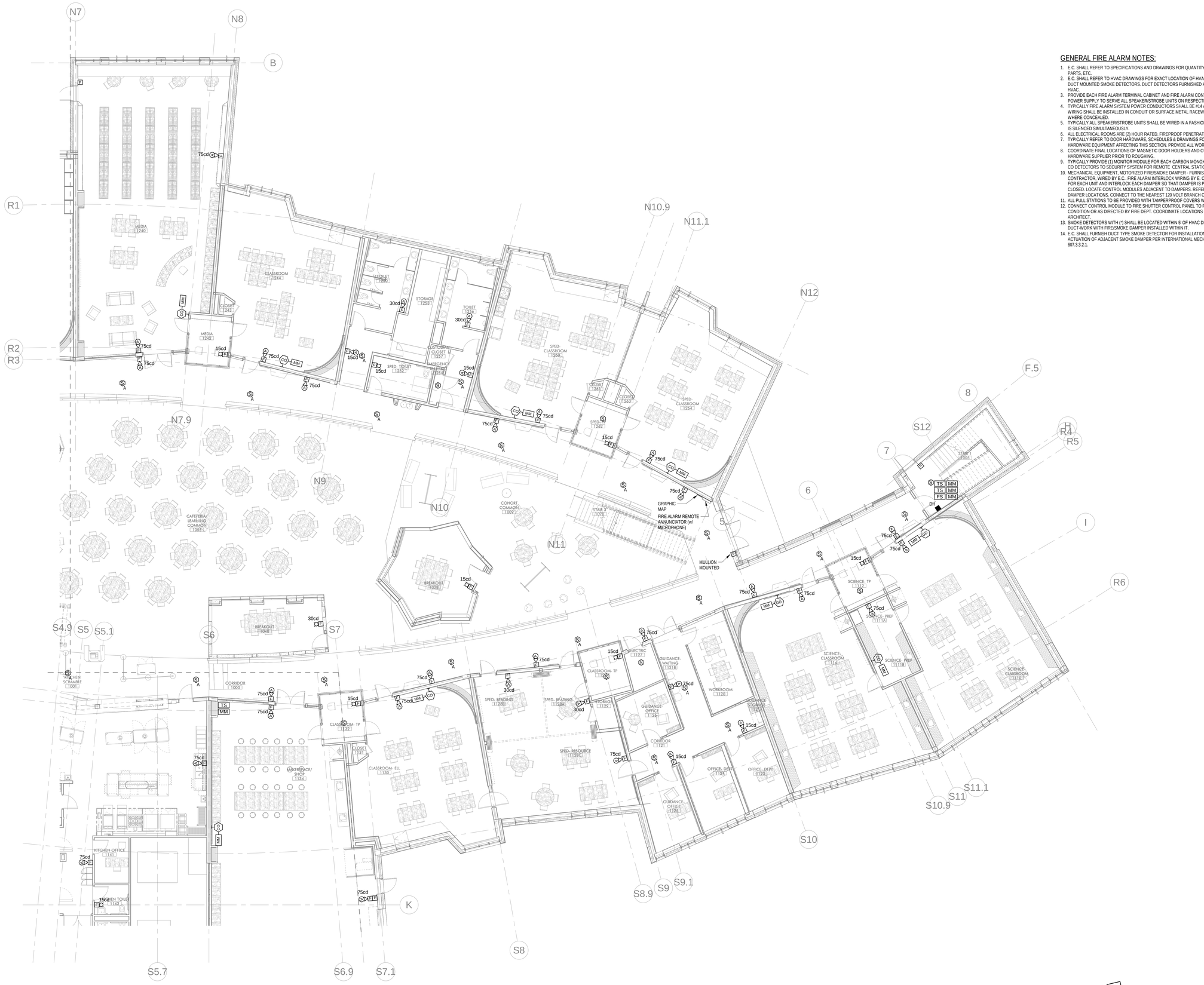
DRAWING NAME

FIRST FLOOR PLAN PART A - FIRE ALARM

PROJECT NO. 1722

DRAWING NO.

E401A



1 E401B FIRST FLOOR PLAN - PART 1-B - FIRE ALARM
SCALE: 1/8" = 1'-0"

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.
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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.

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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

FIRST FLOOR PLAN PART B - FIRE ALARM

PROJECT NO. 1722

DRAWING NO.

E401B

1 E401C FIRST FLOOR PLAN - PART 1-C - FIRE ALARM
SCALE: 1/8" = 1'-0"

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.
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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

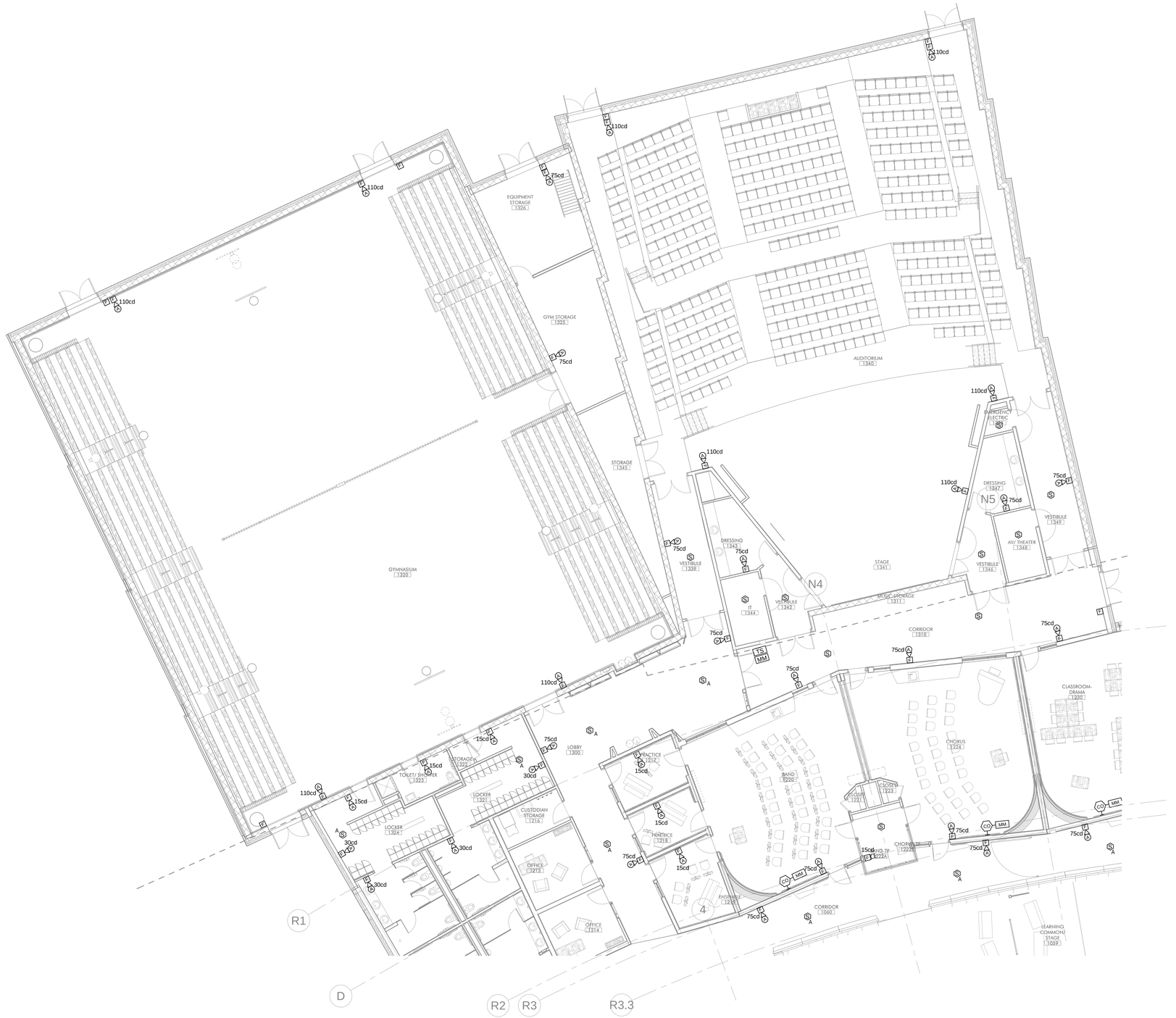
REVISIONS

No.	Date	Description

DRAWING NAME
FIRST FLOOR PLAN PART C - FIRE ALARM

PROJECT NO. 1722

DRAWING NO.
E401C



1 E401D FIRST FLOOR PLAN - PART 1-D - FIRE ALARM
SCALE: 1/8" = 1'-0"

GENERAL FIRE ALARM NOTES:

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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

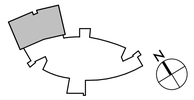
DRAWING NAME

FIRST FLOOR PLAN PART D - FIRE ALARM

PROJECT NO. 1722

DRAWING NO.

E401D



GENERAL FIRE ALARM NOTES:

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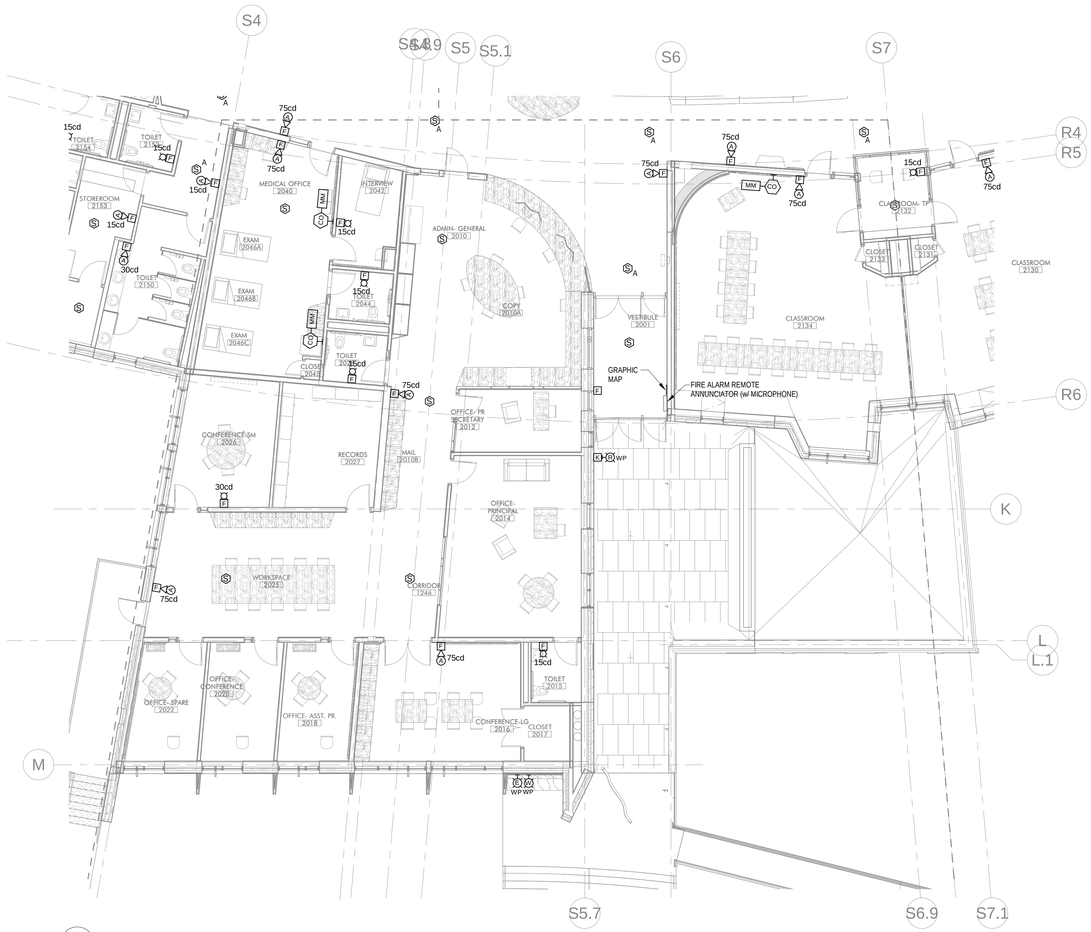

1 E402A SECOND FLOOR PLAN - PART 2-A - FIRE ALARM
SCALE: 1/8" = 1'-0"

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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART A - FIRE ALARM

PROJECT NO. 1722

DRAWING NO.

E402A

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.
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1 E402B SECOND FLOOR PLAN - PART 2-B - FIRE ALARM
SCALE: 1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART B - FIRE ALARM

PROJECT NO. 1722

DRAWING NO.

E402B

1 E402C SECOND FLOOR PLAN - PART 2-C - FIRE ALARM
SCALE: 1/8" = 1'-0"

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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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.

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CONSULTING ENGINEERS INC.

NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART C - FIRE ALARM

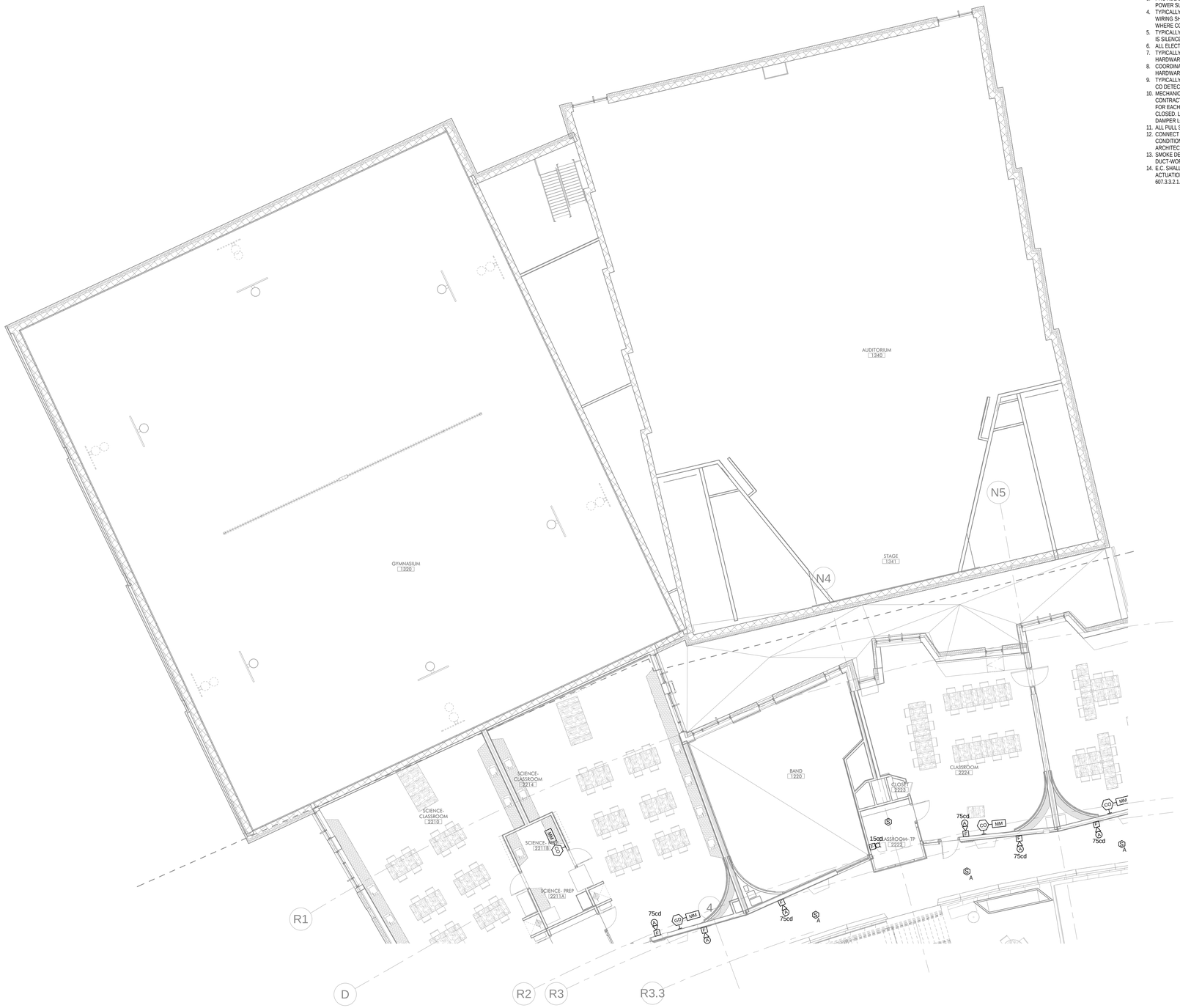
PROJECT NO. 1722

DRAWING NO.

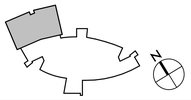
E402C

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 E402D SECOND FLOOR PLAN - PART 2-D - FIRE ALARM
SCALE: 1/8" = 1'-0"



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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

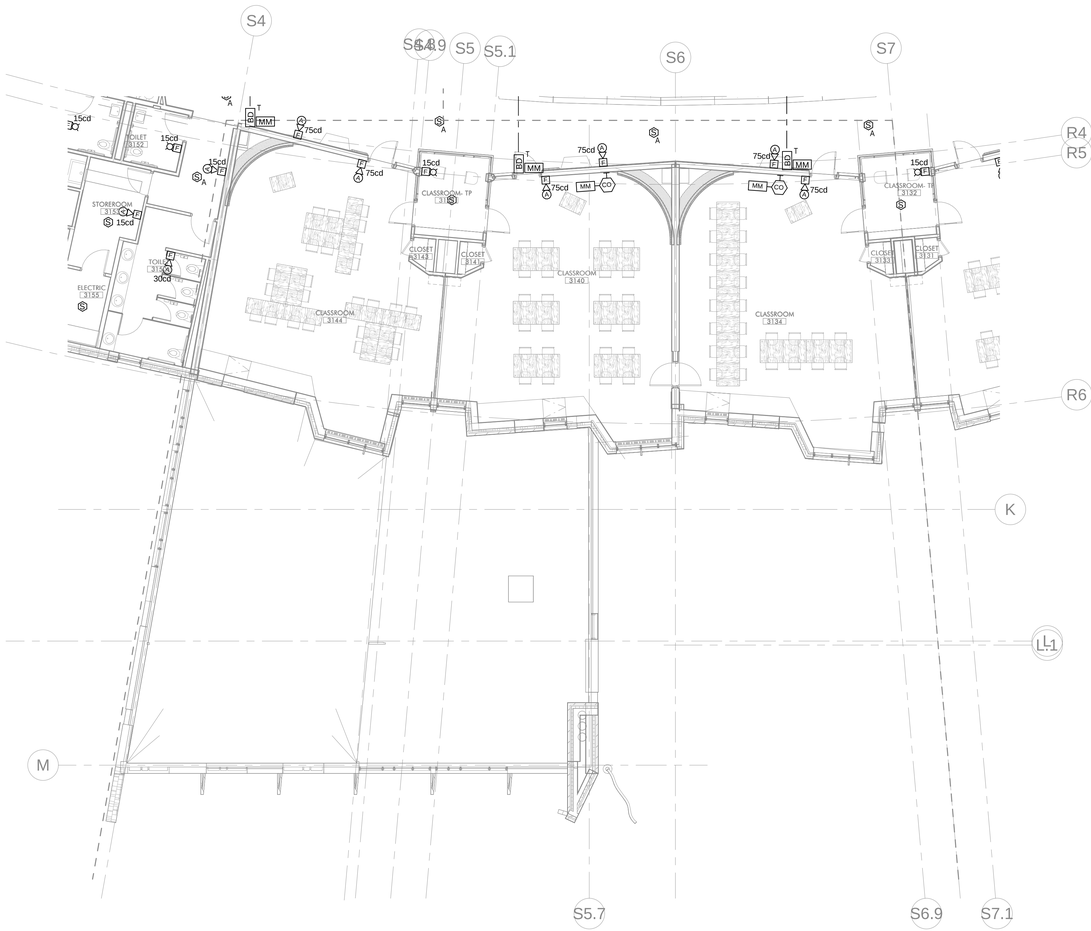
DRAWING NAME

SECOND FLOOR PLAN PART D - FIRE ALARM

PROJECT NO. 1722

DRAWING NO.

E402D



1 E403A THIRD FLOOR PLAN - PART 3-A - FIRE ALARM
SCALE: 1/8" = 1'-0"

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.
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11. ALL PULL STATIONS TO BE PROVIDED WITH TAMPERPROOF COVERS WITH LOCAL ALARM.
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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

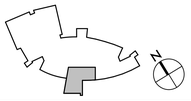
DRAWING NAME

THIRD FLOOR PLAN PART A - FIRE ALARM

PROJECT NO. 1722

DRAWING NO.

E403A



1 THIRD FLOOR PLAN - PART 3-B - FIRE ALARM
E403B SCALE: 1/8" = 1'-0"

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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PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN PART B - FIRE ALARM

PROJECT NO. 1722

DRAWING NO.

E403B

1 E403C THIRD FLOOR PLAN - PART 3-C - FIRE ALARM
SCALE: 1/8" = 1'-0"

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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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN PART C - FIRE ALARM

PROJECT NO. 1722

DRAWING NO.

E403C

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.
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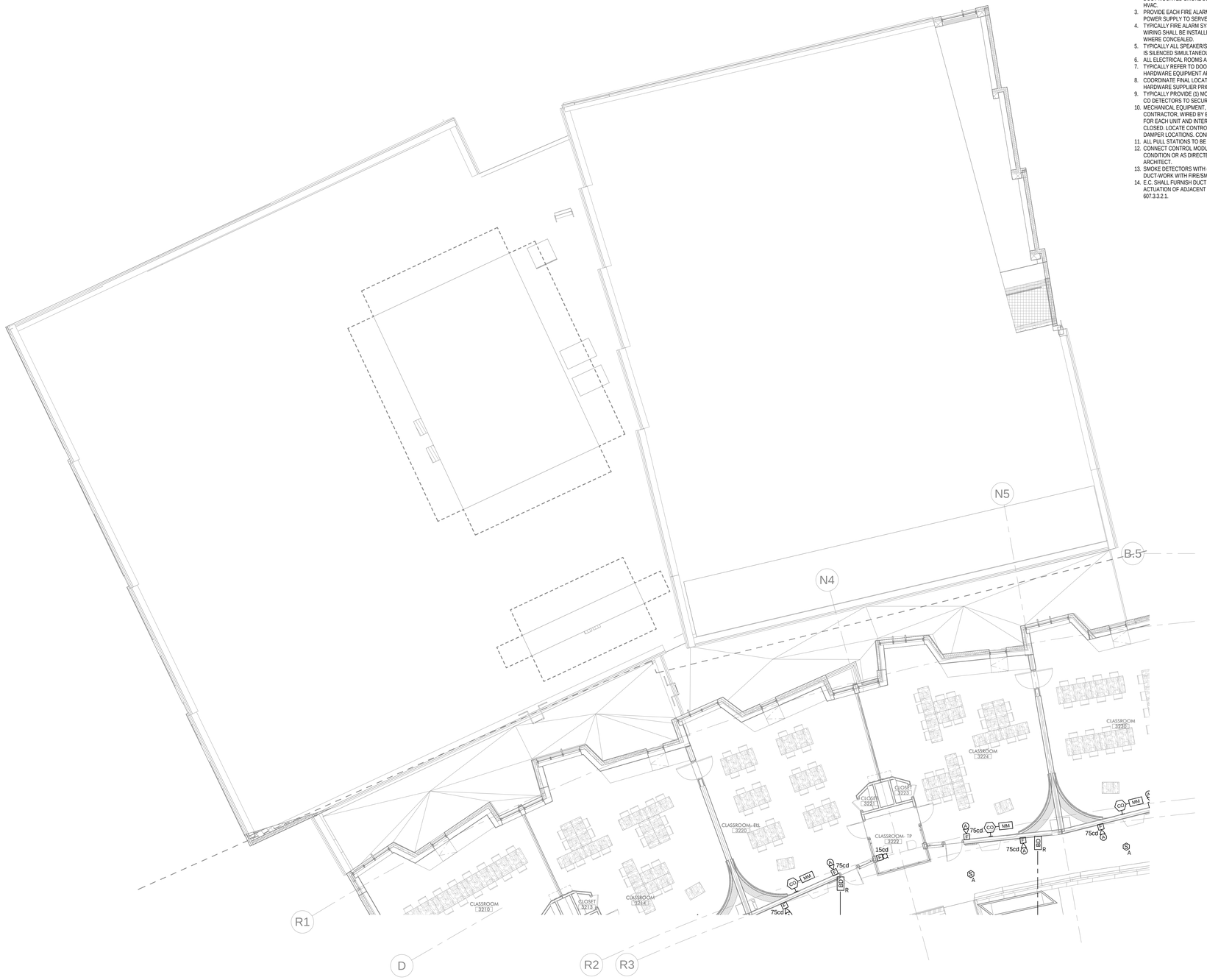

1 E403D THIRD FLOOR PLAN - PART 3-D - FIRE ALARM
SCALE: 1/8" = 1'-0"

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FULLER MIDDLE SCHOOL

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PROJECT STATUS

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No.	Date	Description

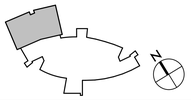
DRAWING NAME

THIRD FLOOR PLAN PART D - FIRE ALARM

PROJECT NO. 1722

DRAWING NO.

E403D



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.

SECURITY SYSTEM

DOME IP CAMERA. E.C. TO PROVIDE SINGLE GANG OPENING AND 4"SQ.X2 1/2"DP. J.B. & 3/4" CONDUIT WITH PULL STRING TO ACCESSIBLE ABOVE CEILING SPACE AT EACH LOCATION.
WP = WEATHERPROOF 180°= 180° COVERAGE CAMERA
PTZ = PAN/TILT/ZOOM 360°= 360° COVERAGE CAMERA

K — INTRUSION ALARM LCD KEYPAD SINGLE GANG BOX, 3/4" CONDUIT W/ PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.

PT — POWER SUPPLY FOR ELECTRIFIED HARDWARE FURNISHED BY DOOR HARDWARE CONTRACTOR. INSTALLED & WIRED BY E.C. 120VAC EMERGENCY BY E.C. INTERFACE WIRING BY E.C.

REX — REQUEST TO EXIT PANIC DEVICE SHALL BE CRASH BAR W/BUILT IN MICROSWITCH. CRASH BAR FURNISHED AND INSTALLED BY DOOR HARDWARE CONTRACTOR AND WIRED BY E.C. PROVIDE 3/4" CONDUIT W/ PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.

DC — DOOR POSITION SWITCH - GE/SENTROL 1076DB DOUBLE POLE DEVICE ONE POLE TO ACCESS CONTROL, SECOND POLE TO INTRUSION, COORDINATE HOLE WITH DOOR HARDWARE. PROVIDE 3/4" CONDUIT w/ PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.

CR — HID iCLASS RPK40 COMBINATION iCLASS READER AND KEYPAD. CUSTOM BACK BOX FURNISHED AND INSTALL BY E.C. 3/4" CONDUIT W/PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C..

CR — E — PROXIMITY READER ELEVATOR @48"A.F.F. SINGLE GANG BOX, 3/4" CONDUIT W/PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.. COORDINATE INTERFACE WITH ELEVATOR CONTRACTOR BY SECURITY SUBCONTRACTOR.

CR — (*) — HID iCLASS RPK40 COMBINATION iCLASS READER AND KEYPAD FOR LOCKDOWN/ SHELTER-IN-PLACE @48"A.F.F. CUSTOM BACK BOX FURNISHED AND INSTALL BY E.C. 3/4" CONDUIT W/PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C..

EFS — EYE WASH FOW SWITH- F&I BY PLUMBING CONTRACTOR WIRED TO SECURITY SYSTEM BY E.C. SINGLE GANG BOX, 3/4" CONDUIT W/ PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.

AM — ADDRESSABLE INPUT MODULE - SEE ONE LINE FOR REQUIRED ADDRESSING - EACH DEVICE COMES WITH THE APPROPRIATE EOL RESISTOR. DOES NOT REQ/ BACK BOX

M — MOTION SENSOR - WALL MOUNTED SINGLE GANG BACK BOX W/3/4"C WITH PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C. WIRING BY E.C.

M — MOTION SENSOR - CEILING MOUNTED, 360° SINGLE GANG BACK BOX AND 3/4"C WITH PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C. WIRING BY E.C.

M — MOTION SENSOR - CORNER MOUNTED FOR 90° PATTERN SINGLE GANG BACK BOX AND 3/4"C WITH PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C. WIRING BY E.C.

M — MOTION SENSOR - FOR LONG RANGE, CEILING MOUNTED SINGLE GANG BACK BOX AND 3/4"C WITH PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C. WIRING BY E.C.

M — MOTION SENSOR - FOR 360° PATTERN SINGLE GANG BACK BOX AND 3/4"C WITH PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C. WIRING BY E.C.

716 — INTRUSION ALARM REMOTE ADDRESSABLE MODULE IN ENCLOSURE SURFACE MOUNT ENCLOSURE - INCLUDE IN LOOP AS REQUIRED/AS SHOWN

IACP — INTRUSION ALARM CONTROL PANEL WITH BUILD IN DIGITAL COMMUNICATOR DMP XR500-L-G, REQUIRES 120VAC, INTERFACE TO ACCESS CONTROL AND TELEPHONE CONNECTION TO POD WITH BATTERIES BY E.C.

IAPS — INTRUSION ALARM POWER SUPPLY - ONE LOCATED AT EACH IDF DESIGNATED - SUPPORT MOTION DETECTOR DC VOLTAGE - REQUIRES 120VAC, MODEL DMP 502-12-G W/ BATTERIES BY E.C.

B — BLUE SECURITY ALARM BEACON, WEATHERPROOF, PROVIDED BY E.C. SINGLE GANG BOX, 3/4" CONDUIT W/ PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.

DB — SECURITY DURESS BUTTON, PROVIDED BY E.C. SINGLE GANG BOX, 3/4" CONDUIT & PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.

LB — SECURITY LOCKDOWN BUTTON, PROVIDED BY E.C. SINGLE GANG BOX, 3/4" CONDUIT & PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.

IESS — INTEGRATED ELECTRONIC SAFETY & SECURITY SYSTEM HEADEND

ACP — WALL MOUNTED ACCESS CONTROLLER. E.C. SHALL PROVIDE 20A EMERGENCY CIRCUIT AND DOUBLE DUPLEX RECEPTACLE. (SEE SPECS)

KVM — RACK MOUNTED MONITOR AND KVM SWITCH

ACS — ACCESS CONTROL SYSTEM SERVER RACK MOUNT. E.C. SHALL PROVIDE 20A EMERGENCY CIRCUIT AND DOUBLE DUPLEX RECEPTACLE. (SEE SPECIFICATIONS)

TVM — 43" NEC MULTISYNC E436 LED/LCD CCTV COLOR MONITOR OR EQUAL W/ WALL MTD ACER VERITON N4640G_W12kbl MINI COMPUTER OR EQUAL, LOGITECH WIRELESS COMBO MK270 KEYBOARD AND MOUSE SET OR EQUAL & WALL/CEILING MOUNT BRACKET BY SECURITY SUBCONTRACTOR. E.C. TO PROVIDE 120 EMERGENCY VAC POWER RECEPTACLE, & 3/4" CONDUIT IN SINGLE GANG BOX W/ PULL STRING. MOUNT OUTLET AND BOX AT 84" A.F.F. U.N.O.

IC — EXTERIOR DOOR VIDEO INTERCOM STATION BY E.C. INTERFACE TO INTERCOM SYSTEM TO ALLOW FOR RECORDING, CAMERA CALL-UP IF EXTERIOR INTERCOM STATIONS ARE ACTIVATED. COORDINATE AS REQUIRED WITH SUPPLIER. DUAL GANG BOX, 3/4" CONDUIT & PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.

IMS — DOOR INTERCOM MASTER STATION, PROVIDED BY E.C. SINGLE GANG BOX, 3/4" CONDUIT & PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.

EH — ELECTRIC HINGE OR ELECTRONIC POWER TRANSFER BETWEEN DOOR AND FRAME. FURNISHED AND INSTALLED BY DOOR HARDWARE CONTRACTOR (SEE DOOR HARDWARE SECTIONS FOR DETAILS), WIRED BY E.C. 4"SQ.X2 1/2"DP. J.B. WITH 3/4" CONDUIT W/ PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.

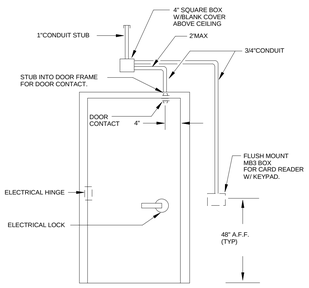
EL — ELECTRIC LOCK FURNISHED AND INSTALLED BY HARDWARE CONTRACTOR, WIRED BY E.C. 4"SQ.X2 1/2"DP. J.B. WITH 3/4" CONDUIT W/ PULL STRING TO NEAREST ACCESSIBLE CEILING SPACE BY E.C.

DJ — 4" SQ. DOOR JUNCTION BOX BY E.C.

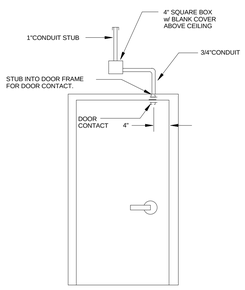
SC — SECURITY MONITOR MODULE

UPS — RACK MOUNTED UNINTERRUPTIBLE POWER SUPPLY

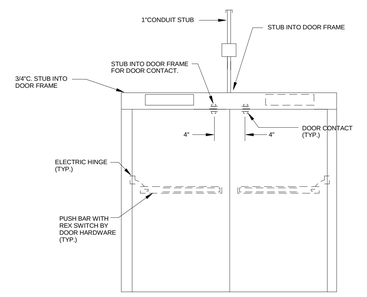
TS — HORSEPOWER RATED THERMAL SWITCH WITH PILOT LIGHT BY E.C.



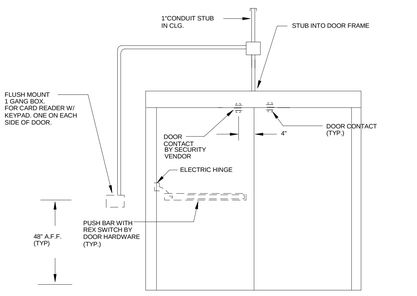
1 E500 TYPICAL DOOR WITH ACCESS CONTROL
SCALE: N.T.S.



2 E500 TYPICAL DOOR WITHOUT ACCESS CONTROL
SCALE: N.T.S.



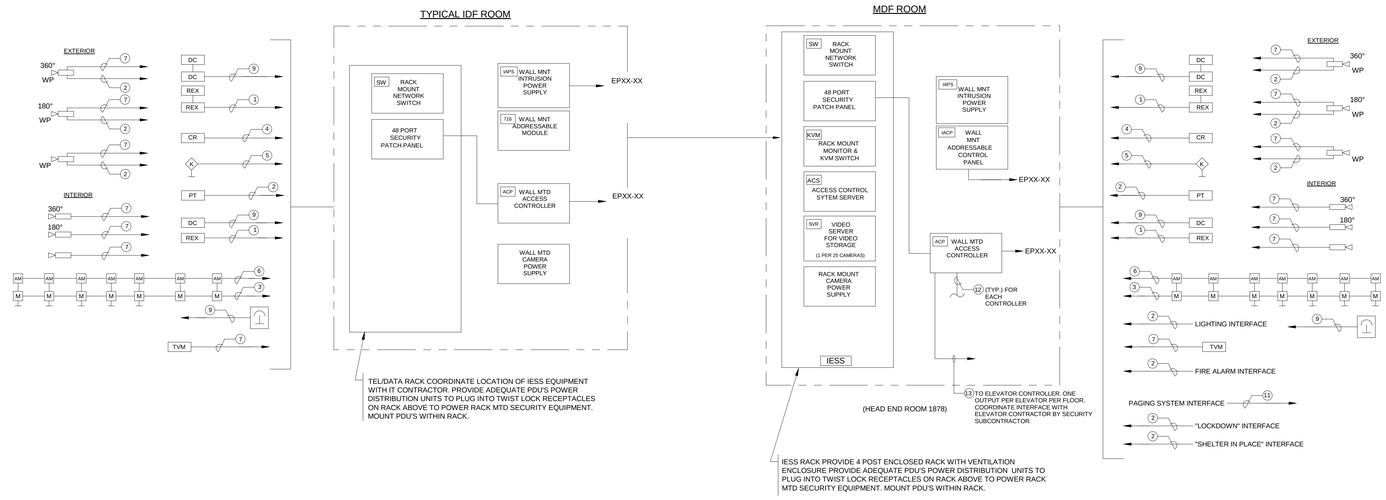
3 E500 TYPICAL DOOR WITHOUT ACCESS CONTROL
SCALE: N.T.S.



4 E500 TYPICAL EXTERIOR DOOR W/ ACCESS CONTROL
SCALE: N.T.S.

GENERAL NOTES

1. ALL HARDWARE SETS SHALL CONTAIN INTEGRAL REQUEST TO EXIT DEVICE. E.C. SHALL TIE INTO THESE DEVICES AND INSURE PROPER OPERATION.
2. 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.
3. REFER TO FLOOR PLAN FOR PROPOSED LOCATIONS OF ALL EQUIPMENT.



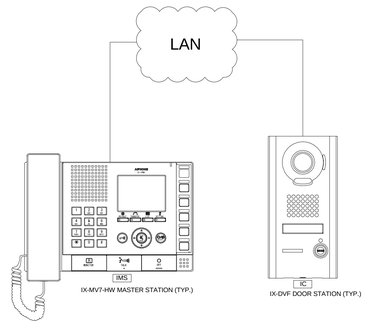
5 E500 INTEGRATED ELECTRONIC SECURITY SYSTEM PARTIAL RISER DIAGRAM
SCALE: N.T.S.

KEY NOTES

1. E.C. SHALL INTERFACE IESS TO NETWORK TO ALLOW ANY NETWORKED PC TO VIEW ALARM EVENTS, LIVE OR RECORDED VIDEO AND SYSTEM SCHEDULES. VIEWING SOFTWARE TO BE WEB-BASED.
2. ALL DOOR CONTACTS SHALL BE INDIVIDUALLY ADDRESSED AND ANNUNCIATED ON CONTROL PANEL.
3. TYPICALLY EXTERIOR CAMERA LOCATIONS FURNISH AND INSTALL DAY/NIGHT DOME CAMERAS WITH HEATER BLOWERS AT THESE LOCATIONS. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS.
4. INTERFACE IESS TO INTERCOM SYSTEM TO ALLOW FOR RECORDING, CAMERA CALL-UP IF EXTERIOR INTERCOM STATIONS ARE ACTIVATED. COORDINATE AS REQUIRED WITH SUPPLIER.
5. PROVIDE DIGITAL COMMUNICATOR CONNECTION TO UL CENTRAL STATION. PROVIDE CONTACT ID FOR ALL POINTS TO MONITORING STATION. PROVIDE 4 YEARS MONITORING WITH CONTRACT.
6. PROVIDE FIRE ALARM INTERFACE. PROVIDE FIRE ALARM OVERRIDE AS REQUIRED, (2#18GAUGE WIRES BY E.C.)
7. PROVIDE INTEGRATED ELECTRONIC SECURITY SERVER COMPLETE WITH 4 HOUR UPS BACK-UP. PROVIDE SOFTWARE FOR UNLIMITED NUMBER OF USERS, DOORS, AND 100 WORKSTATIONS.
8. INTERFACE TO AUTOMATED LIGHTING SYSTEM, WHEN INTRUSION SYSTEM GOES INTO ALARM ALL HALLWAY LIGHTS SHALL TURN-ON.
9. PROVIDE (3) KEYFOBS/PROX CARDS IN ADDITION TO THE AMOUNT SPECIFIED IN EACH KNOX BOX FOR FIRE DEPT. AND POLICE USE. FOBS/CARDS SHALL BE PROGRAMMED FOR FULL ACCESS TO THE BUILDING.
10. PROVIDE CONTACT CLOSURE INTERFACE TO AUTOMATED LIGHTING CONTROL SYSTEM (ALCS) VIA A SINGLE PAIR OF 2#18 CONDUCTORS. WHEN INTRUSION SYSTEM GOES INTO ALARM A SIGNAL SHALL BE ISSUED TO DIRECT THE ALCS TO TURN ALL INTERIOR AND EXTERIOR LIGHTING "ON".
11. PROVIDE INTEGRATION WITH FIRE ALARM SYSTEM TO RELEASE DOOR HOLDERS DURING LOCK DOWN AND ON A SCHEDULE.
12. SECURITY INTEGRATOR SHALL COORDINATE LOCK DOWN PROCEDURE w/ OWNER AND PROGRAM THE SYSTEM ACCORDINGLY.
13. INTEGRATE THE INTRUSION SYSTEM WITH THE ACCESS CONTROL SYSTEM SO THAT THE KEY FOB PRESENTED AT THE EXTERIOR CARD READER CAN DISARM THE COMMON ZONE, AND INTERIOR CARD READERS WILL DISARM THE ZONE THAT ARE ASSOCIATED WITH THEIR LOCATION. THE SYSTEM SHALL BE CAPABLE OF MINIMUM OF EIGHT (8) PARTITIONS.
14. INTEGRATE THE ACCESS CONTROL SYSTEM WITH THE BUILDING PAGING SYSTEM TO GIVE (5) DISTINCT INPUTS TO TONE GENERATOR (PART OF PAGING SYSTEM) FOR ALARMS TO BE SELECTED BY OWNER SUCH AS PANIC AND LOCK DOWN.
15. FACILITATE AND PROVIDE REMOTE ACCESS TO SYSTEM FOR POLICE DEPT. AND FIRE DEPT.
16. PANIC BUTTONS SHALL ALSO TIE INTO A ZONE ON THE FIRE ALARM DET RADIO BOX TO TRANSMIT TO FIRE DEPT.
17. PROGRAM PROPPED DOOR ALARM SO THAT ANY DOOR PROPPED OPEN BEYOND A SET TIME WILL SEND AN AUDIBLE ALARM TO STAFF AND A TEXT MESSAGE TO THE SECURITY OFFICER.

WIRING LEGEND

1. INPUT - CABLE REQUIREMENTS 18AWG FOUR CONDUCTOR STRANDED NON-SHIELDED FOR DPS ONE PAIR PER POLE, FOR REX ONE PAIR SPARE
2. OUTPUT - CABLE REQUIREMENTS 18AWG TWO CONDUCTOR STRANDED, NON-SHIELDED
3. MOTION DETECTOR - CABLE REQUIREMENTS 18AWG TWO CONDUCTOR STRANDED NON SHIELDED (THIS IS FOR DC POWER ONLY IN DESIGN)
4. READER - CABLE REQUIREMENTS 20AWG THREE PAIR SHIELDED REFERENCE MODEL BELDEN 82777 FOR PLENUM RATED APPLICATIONS
5. KEYPAD - CABLE REQUIREMENTS 18AWG FOUR CONDUCTOR STRANDED NON SHIELDED
6. INTRUSION ALARM BUS - CABLE REQUIREMENT 18AWG FOUR CONDUCTOR STRANDED NON SHIELDED
7. CAT 6A NON-PLENUM RATED UTP CABLE TO SECURITY PATCH PANEL
8. POWER SUPPLY CABLE AND CONTROL FOR EXTERIOR PTZ CAMERA. 2#18&2#18TSP.
9. INPUT - CABLE REQUIREMENTS 18AWG TWO CONDUCTOR STRANDED NON-SHIELDED
10. (2)CAT 6A NON-PLENUM RATED UTP CABLE TO SECURITY PATCH PANEL
11. OUTPUT - CABLE REQUIREMENTS 14AWG TWO CONDUCTOR STRANDED, NON-SHIELDED
12. (2) 24AWG TWISTED PAIR STRANDED (BELDEN 9501)
13. TO ELEVATOR CONTROLLER - CABLE REQUIREMENT TWISTED SHIELDED 22AWG BELDEN #9462 OR EQUAL



6 E500 IP DOOR INTERCOM SYSTEM
SCALE: N.T.S.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

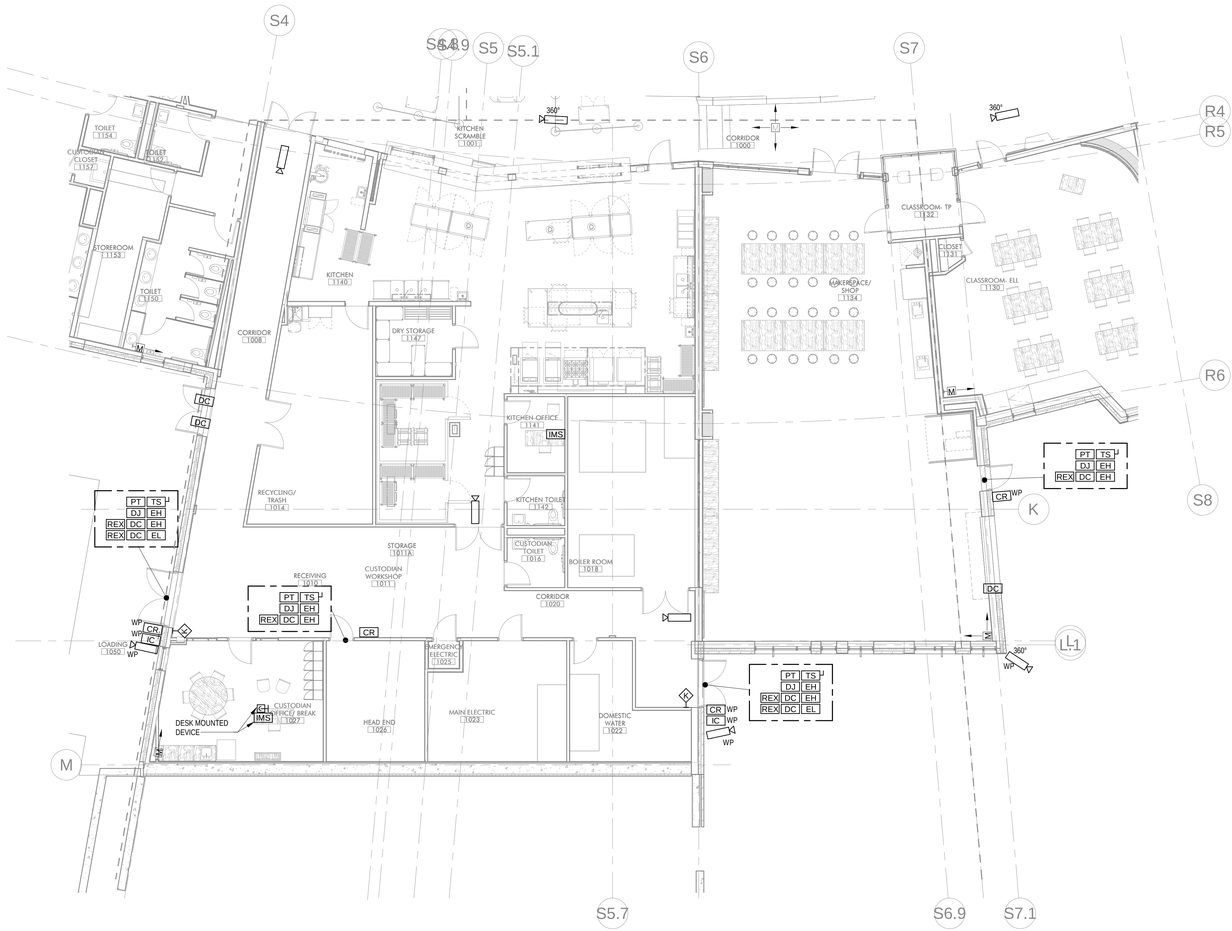
DRAWING NAME
SECURITY RISER

PROJECT NO. 1722

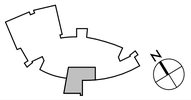
DRAWING NO.
E500

GENERAL SECURITY NOTES:

1. PROVIDE CORNER MOUNTED MOTION SENSOR WHENEVER POSSIBLE.
2. IESS TO COORDINATE FINAL SECURITY ZONES WITH OWNER. PROGRAM PER OWNER'S DIRECTIONS.
3. COORDINATE FINAL LOCATIONS OF MAGNETIC DOOR HOLDERS AND OTHER HARDWARE DEVICES WITH HARDWARE SUPPLIER PRIOR TO ROUGHING.
4. SECURITY PANIC SWITCH. DOOR SHALL REMAIN SECURED UPON ACTIVATION OF PANIC STATION. SECURITY PERSONEL SHALL BE NOTIFIED.
5. INTERFACE HANDICAP DOOR CONTROLLER WITH RESPECTIVE ACCESS CONTROL HARDWARE AT EACH DOOR WITH EITHER POWER ASSIST OR HANDICAP PUSH PLATE.



1 E501A FIRST FLOOR PLAN - PART 1-A - SECURITY
SCALE: 1/8" = 1'-0"



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PROJECT STATUS

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REVISIONS

No.	Date	Description

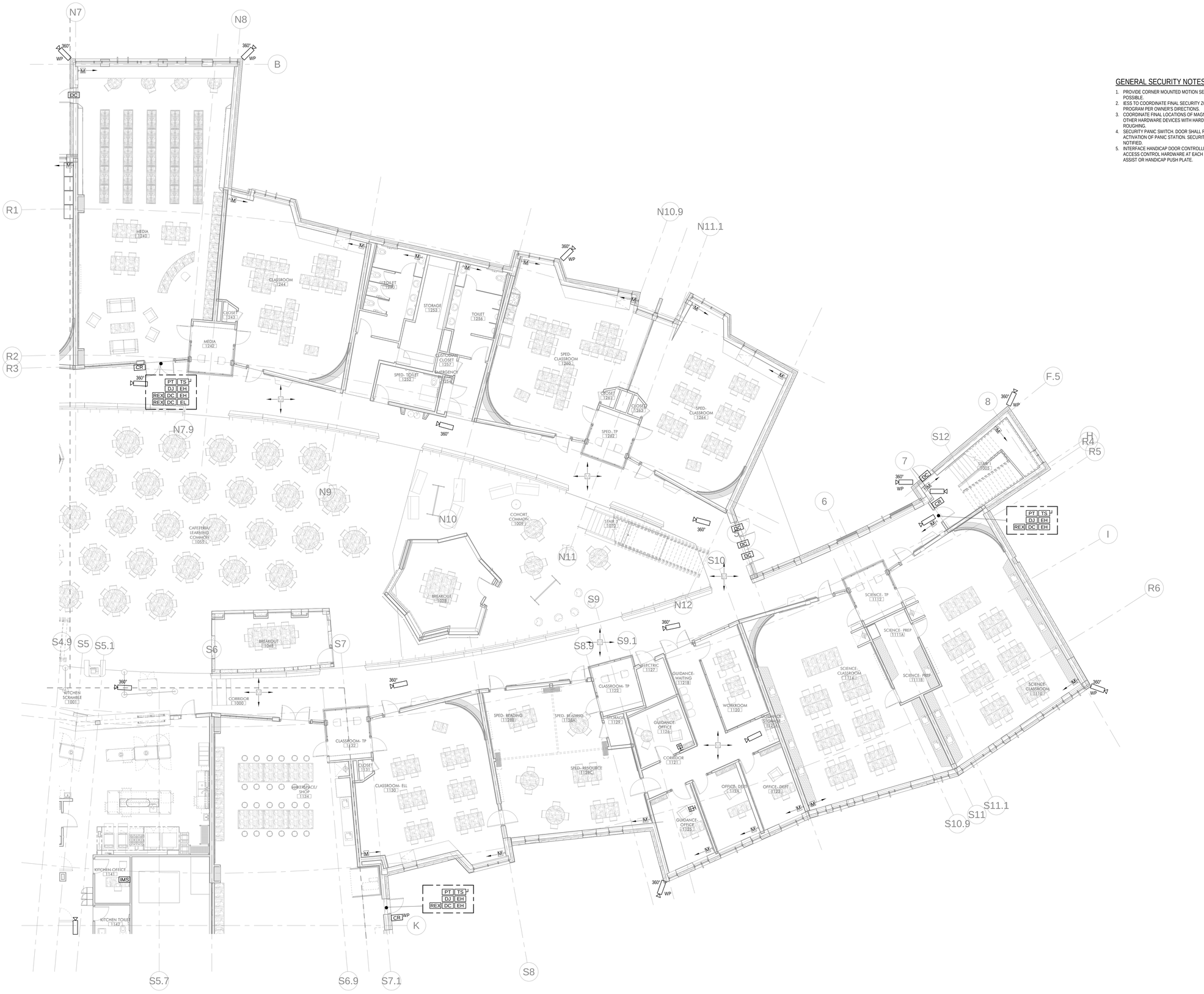
DRAWING NAME

FIRST FLOOR PLAN
PART A - SECURITY

PROJECT NO. 1722

DRAWING NO.

E501A



1 E501B FIRST FLOOR PLAN - PART 1-B - SECURITY
SCALE: 1/8" = 1'-0"

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No.	Date	Description

DRAWING NAME

FIRST FLOOR PLAN
PART B - SECURITY

PROJECT NO. 1722

DRAWING NO.

E501B

1 E501C FIRST FLOOR PLAN - PART 1-C - SECURITY
SCALE: 1/8" = 1'-0"

GENERAL SECURITY NOTES:

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REVISIONS

No.	Date	Description

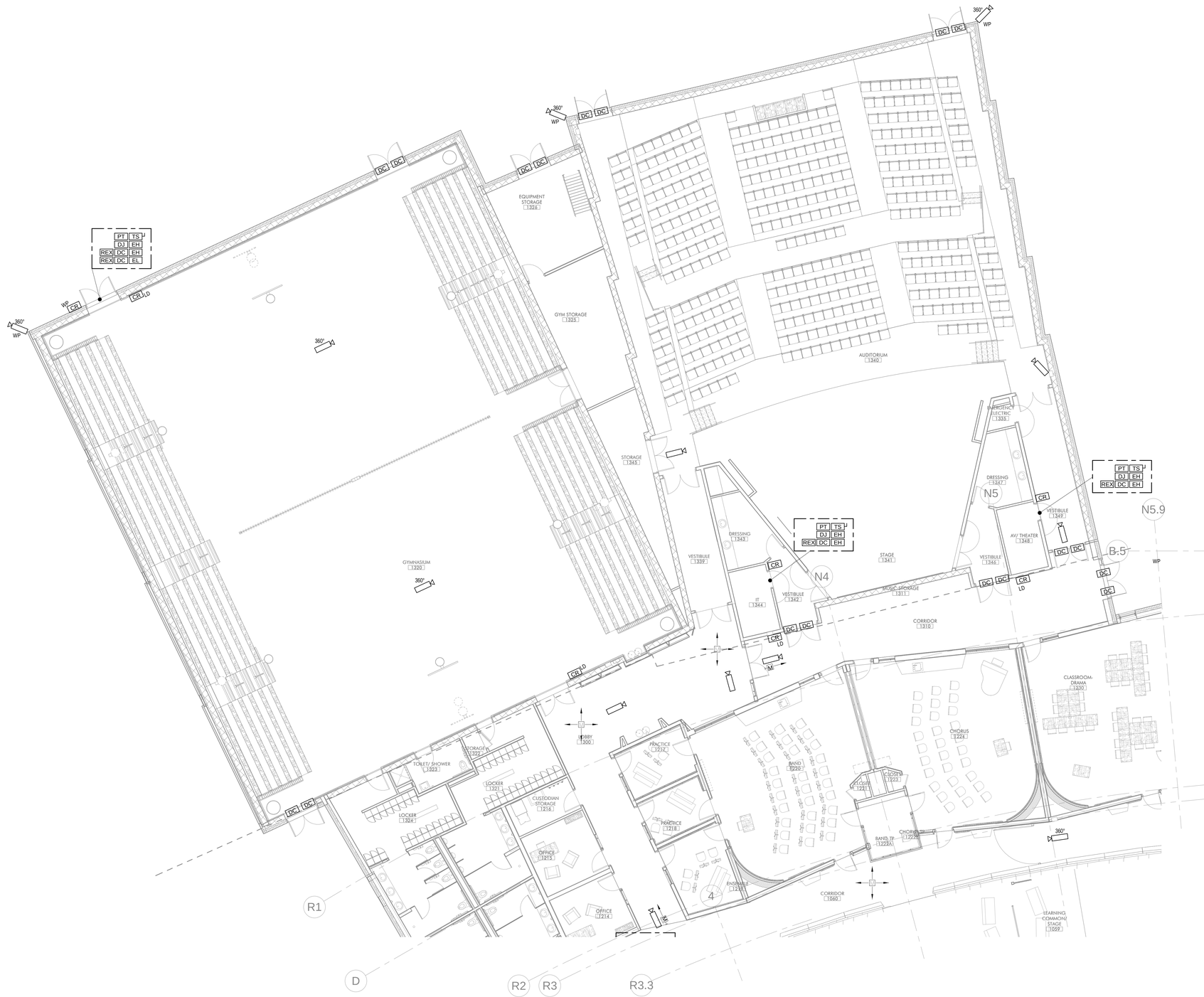
DRAWING NAME

FIRST FLOOR PLAN
PART C - SECURITY

PROJECT NO. 1722

DRAWING NO.

E501C



1 FIRST FLOOR PLAN - PART 1-D - SECURITY
E501D SCALE: 1/8" = 1'-0"

GENERAL SECURITY NOTES:

1. PROVIDE CORNER MOUNTED MOTION SENSOR WHENEVER POSSIBLE.
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DRAWING NAME

FIRST FLOOR PLAN
PART D - SECURITY

PROJECT NO. 1722

DRAWING NO.

E501D

GENERAL SECURITY NOTES:

1. PROVIDE CORNER MOUNTED MOTION SENSOR WHENEVER POSSIBLE.
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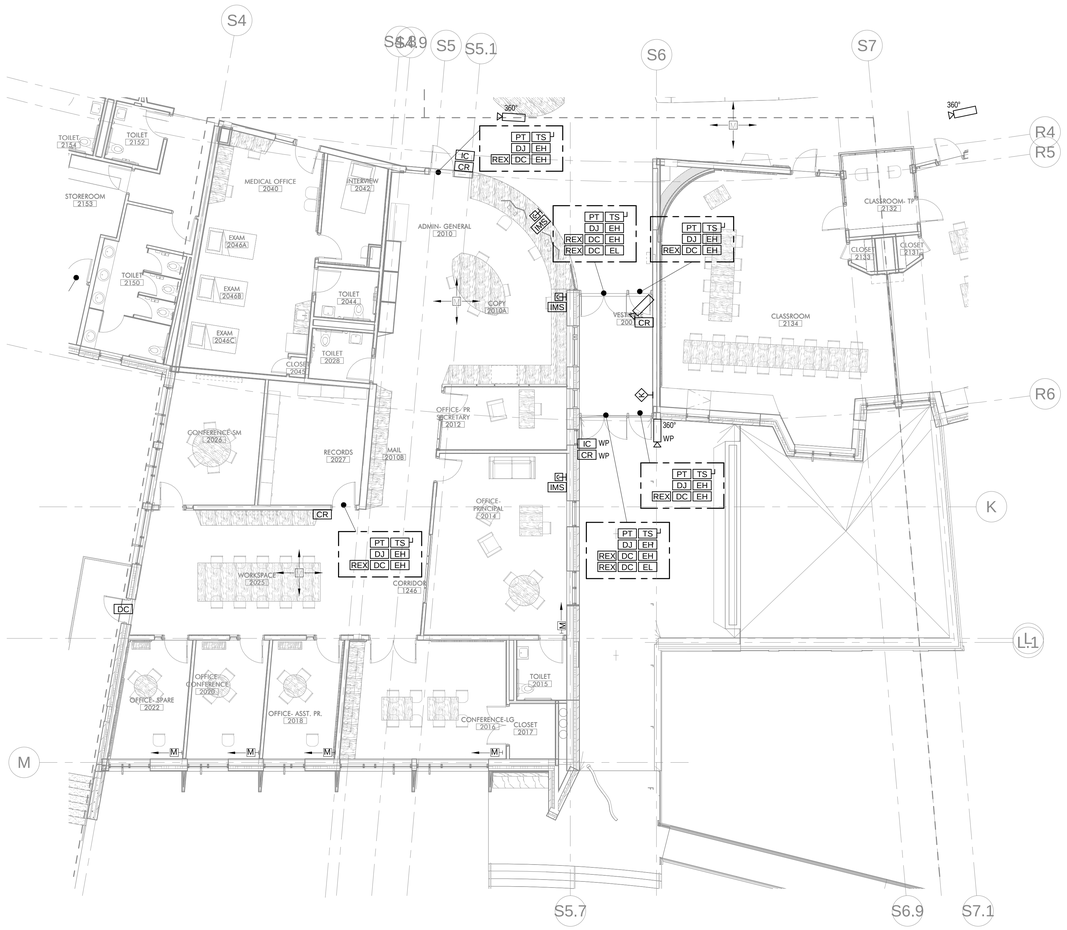

1 E502A SECOND FLOOR PLAN - PART 2-A - SECURITY
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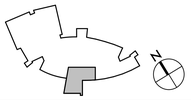

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No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART A - SECURITY

PROJECT NO. 1722

DRAWING NO.

E502A

1 E502B SECOND FLOOR PLAN - PART 2-B - SECURITY
SCALE: 1/8" = 1'-0"

GENERAL SECURITY NOTES:

1. PROVIDE CORNER MOUNTED MOTION SENSOR WHENEVER POSSIBLE.
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DRAWING NAME

SECOND FLOOR PLAN PART B - SECURITY

PROJECT NO. 1722

DRAWING NO.

E502B

GENERAL SECURITY NOTES:

1. PROVIDE CORNER MOUNTED MOTION SENSOR WHENEVER POSSIBLE.
2. IESS TO COORDINATE FINAL SECURITY ZONES WITH OWNER. PROGRAM PER OWNER'S DIRECTIONS.
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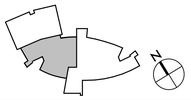
1 E502C SECOND FLOOR PLAN - PART 2-C - SECURITY
SCALE: 1/8" = 1'-0"



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REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART C - SECURITY

PROJECT NO. 1722

DRAWING NO.

E502C

GENERAL SECURITY NOTES:

1. PROVIDE CORNER MOUNTED MOTION SENSOR WHENEVER POSSIBLE.
2. IESS TO COORDINATE FINAL SECURITY ZONES WITH OWNER. PROGRAM PER OWNER'S DIRECTIONS.
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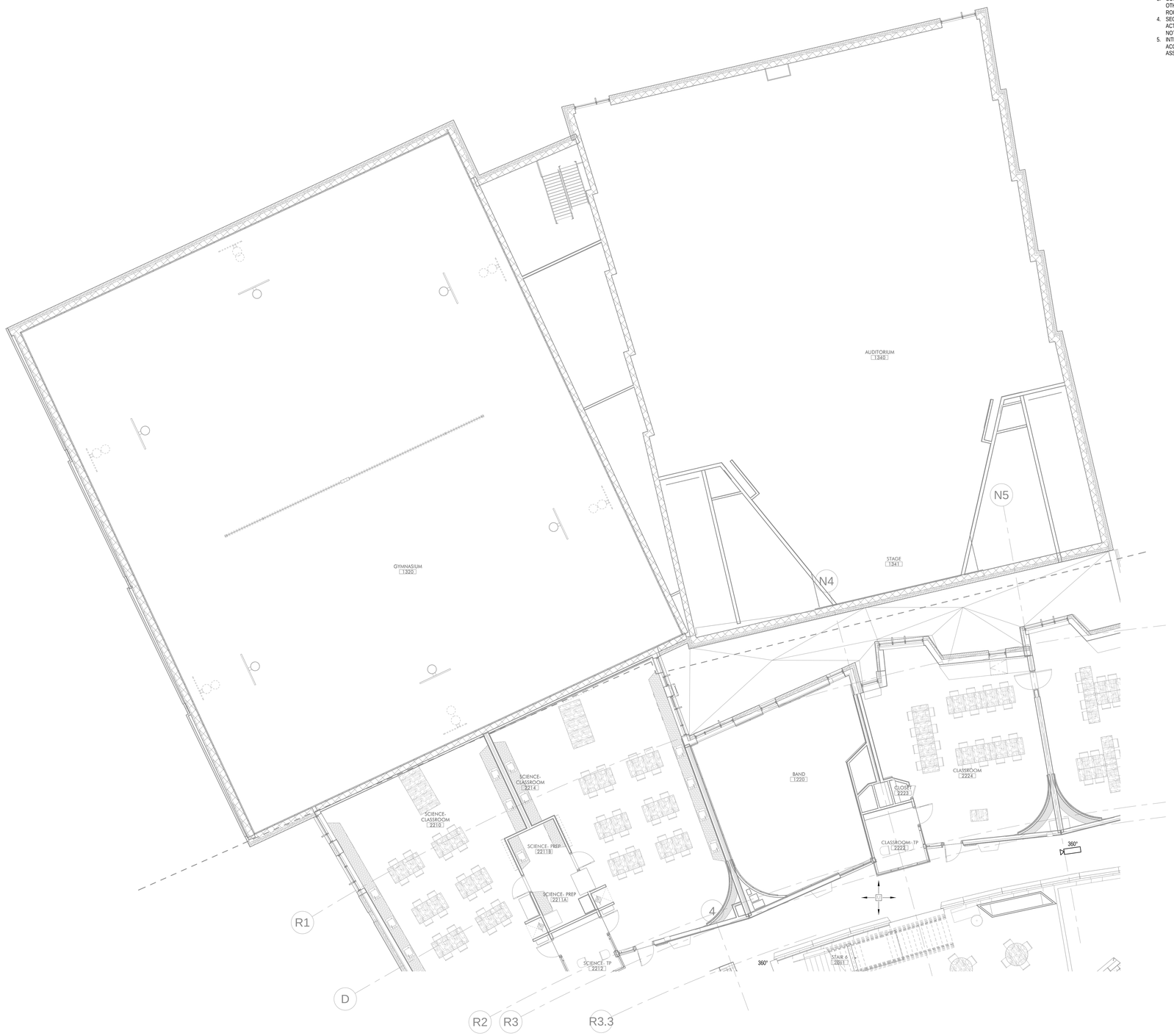
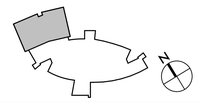


1 E502D SECOND FLOOR PLAN - PART 2-D - SECURITY
SCALE: 1/8" = 1'-0"



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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART D - SECURITY

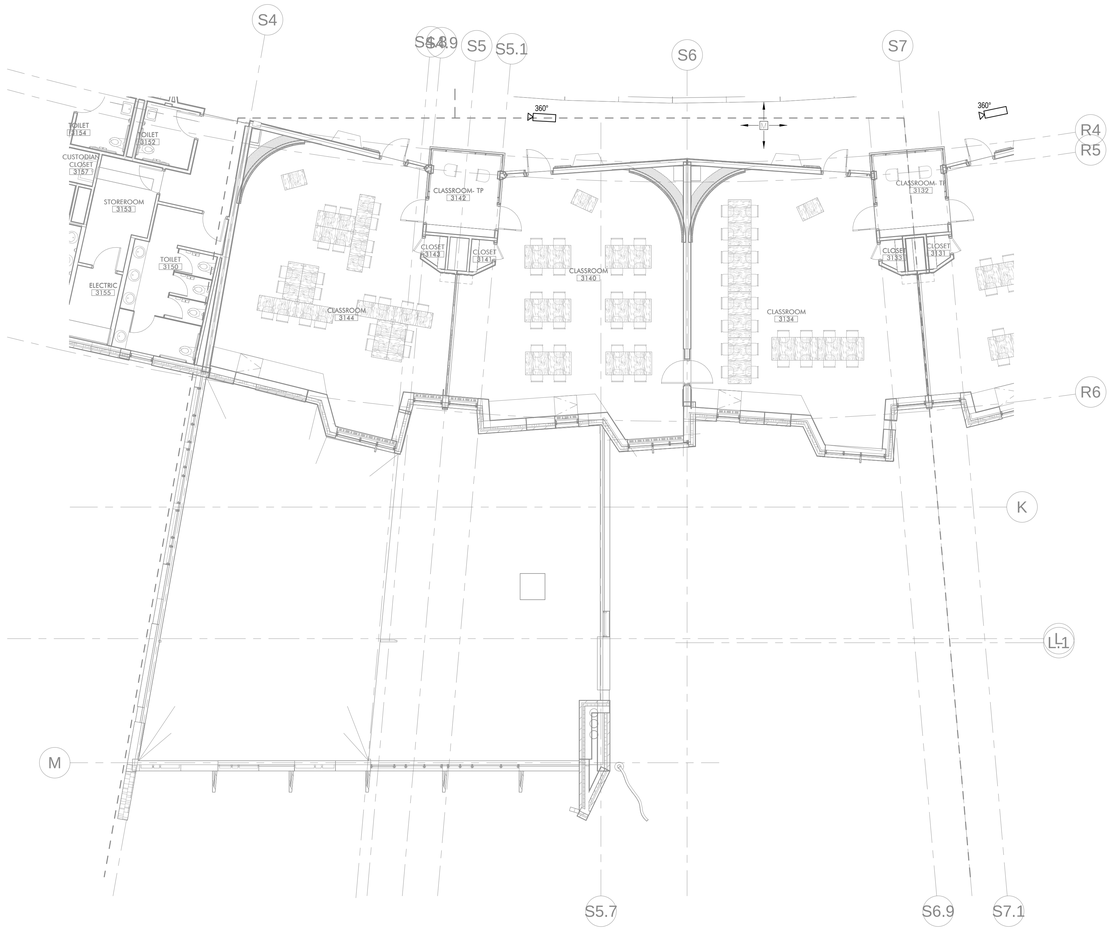
PROJECT NO. 1722

DRAWING NO.

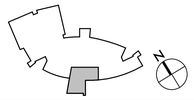
E502D

GENERAL SECURITY NOTES:

1. PROVIDE CORNER MOUNTED MOTION SENSOR WHENEVER POSSIBLE.
2. IESS TO COORDINATE FINAL SECURITY ZONES WITH OWNER. PROGRAM PER OWNER'S DIRECTIONS.
3. COORDINATE FINAL LOCATIONS OF MAGNETIC DOOR HOLDERS AND OTHER HARDWARE DEVICES WITH HARDWARE SUPPLIER PRIOR TO ROUGHING.
4. SECURITY PANIC SWITCH. DOOR SHALL REMAIN SECURED UPON ACTIVATION OF PANIC STATION. SECURITY PERSONEL SHALL BE NOTIFIED.
5. INTERFACE HANDICAP DOOR CONTROLLER WITH RESPECTIVE ACCESS CONTROL HARDWARE AT EACH DOOR WITH EITHER POWER ASSIST OR HANDICAP PUSH PLATE.



1 E503A THIRD FLOOR PLAN - PART 3-A - SECURITY
SCALE: 1/8" = 1'-0"



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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN
PART A - SECURITY

PROJECT NO. 1722

DRAWING NO.

E503A

1 E503B THIRD FLOOR PLAN - PART 3-B - SECURITY
SCALE: 1/8" = 1'-0"

GENERAL SECURITY NOTES:

1. PROVIDE CORNER MOUNTED MOTION SENSOR WHENEVER POSSIBLE.
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REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN
PART B - SECURITY

PROJECT NO. 1722

DRAWING NO.

E503B

1 E503C THIRD FLOOR PLAN - PART 3-C - SECURITY
SCALE: 1/8" = 1'-0"

GENERAL SECURITY NOTES:

1. PROVIDE CORNER MOUNTED MOTION SENSOR WHENEVER POSSIBLE.
2. IESS TO COORDINATE FINAL SECURITY ZONES WITH OWNER. PROGRAM PER OWNER'S DIRECTIONS.
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October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN
PART C - SECURITY

PROJECT NO. 1722

DRAWING NO.

E503C

GENERAL SECURITY NOTES:

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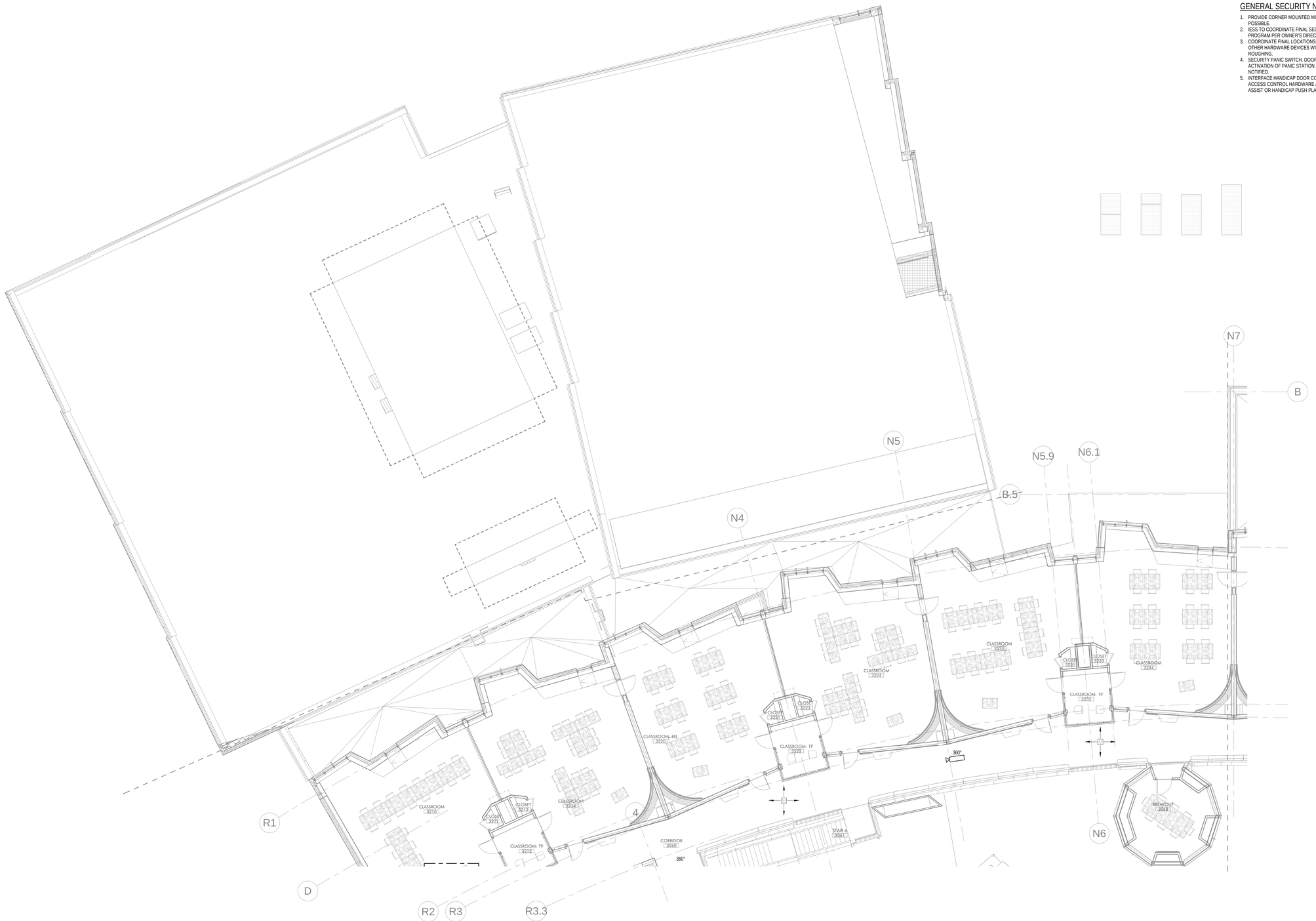

1 E503D THIRD FLOOR PLAN - PART 3-D - SECURITY
SCALE: 1/8" = 1'-0"

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31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN
PART D - SECURITY

PROJECT NO. 1722

DRAWING NO.

E503D

GENERAL SECURITY NOTES:

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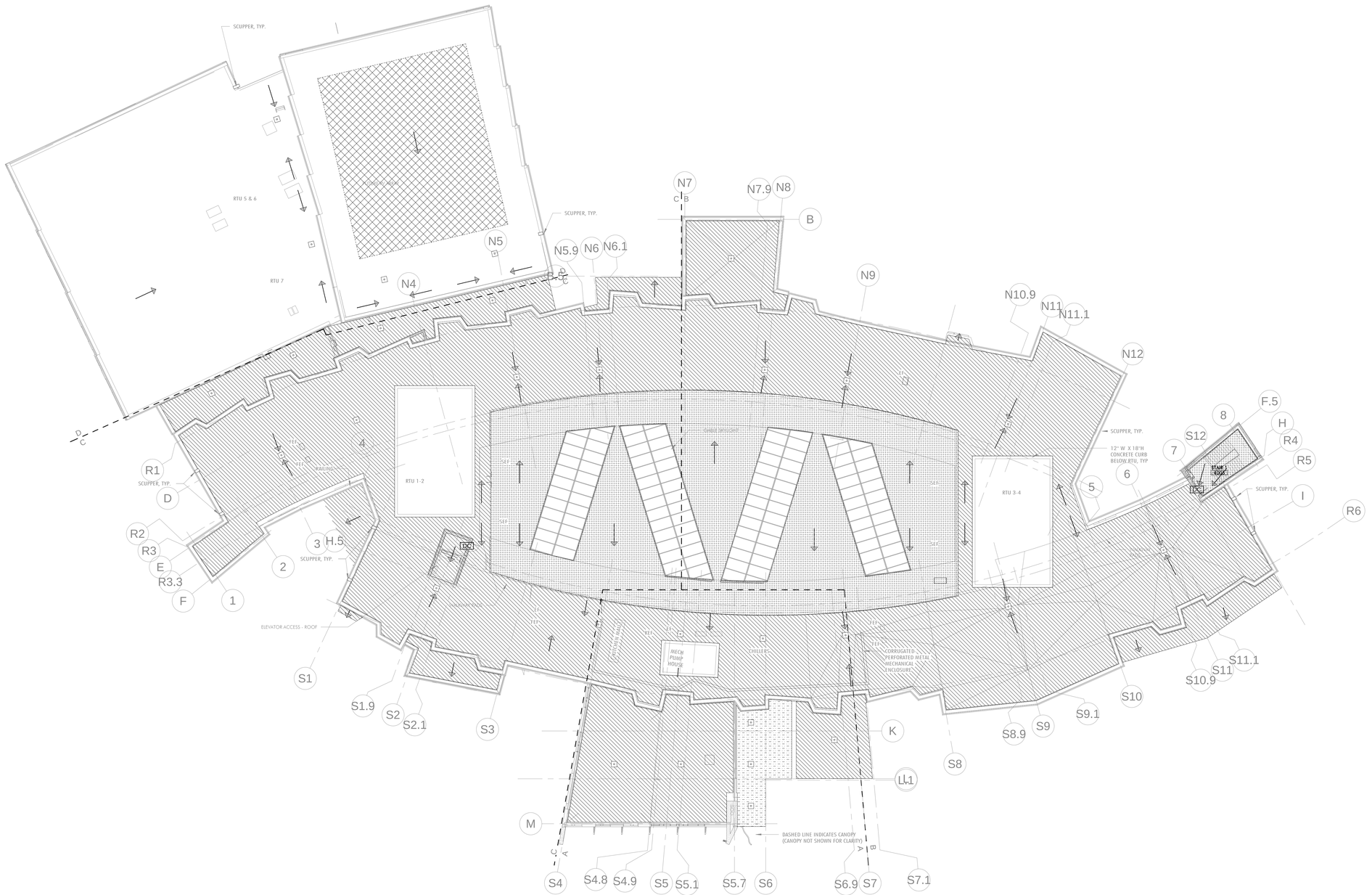

1 / E504 OVERALL ROOF PLAN - SECURITY
SCALE: 1/16" = 1'-0"

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PROJECT STATUS

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October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

OVERALL ROOF PLAN - SECURITY

PROJECT NO. 1722

DRAWING NO.

E504

SYMBOL LIST

TEL/DATA OUTLETS

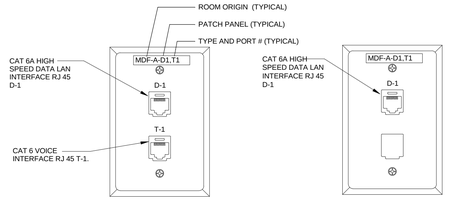
W ▼	WALL MOUNTED TELEPHONE OUTLET @ 48" A.F.F. REFER TO TEL/DATA RISER FOR WIRING REQUIREMENTS. COVER PLATES SHALL BE STAINLESS STEEL.
# ▽	WALL MOUNTED DATA OUTLET @ 18" A.F.F REFER TO TEL/DATA RISER FOR WIRING REQUIREMENTS. NUMERAL INDICATES NUMBER OF RJ45 JACKS ON SAME FACEPLATE. COVER PLATES SHALL BE STAINLESS STEEL.
#V/#D ▼/▽	COMBINATION TEL/DATA OUTLET @ 18" A.F.F. #V INDICATES NUMBER OF RJ45 VOICE JACKS, #D INDICATES NUMBER OF RJ45 DATA JACKS ON SAME FACEPLATE. (1) VOICE & (1) DATA IF #V/#D IS NOT SHOWN (TYPICAL). REFER TO TEL/DATA RISER FOR WIRING REQUIREMENTS. COVER PLATES SHALL BE STAINLESS STEEL.
"C" =	MOUNTED 6" ABOVE COUNTER OR 42" AFF. COORDINATE EXACT MOUNTING HEIGHT WITH ARCHITECTURAL DRAWINGS.
"F" =	FURNITURE MTD, COORDINATE EXACT LOCATION WITH FURNITURE PLANS.
AN ▽	WIRELESS ACCESS NODE - DATA REFER TO TEL/DATA RISER FOR WIRING REQUIREMENTS. COVER PLATES SHALL BE STAINLESS STEEL. MOUNTED ABOVE CEILING U.N.O.
TVC	CABLE/DATA OUTLET **REFER TO TEL/DATA RISER FOR WIRING REQUIREMENTS** **COVER PLATES SHALL BE STAINLESS STEEL.** MOUNTED @ 84" A.F.F. U.N.O.
TVE	VIDEO PROJECTOR OUTLET REFER TO TEL/DATA RISER FOR WIRING REQUIREMENTS. COVER PLATES SHALL BE STAINLESS STEEL. CEILING MOUNTED U.N.O.
T ▶	TEACHER'S STATION REFER TO TEL/DATA RISER FOR WIRING REQUIREMENTS COVER PLATES SHALL BE STAINLESS STEEL. MOUNTED @ 18" A.F.F. U.N.O.
IDF	INTERMEDIATE DISTRIBUTION FRAME
MDF	MAIN DISTRIBUTION FRAME
	WIRELESS SYSTEM CLOCK
S	FLUSH MOUNTED CEILING SPEAKER
S	FLUSH WALL MOUNTED SPEAKER
S WP	WEATHER PROOF FLUSH MOUNTED SPEAKER. FINISH TO BE SELECTED BY ARCH.
S S	SPEAKER CEILING TYPE SUBSCRIPT 'S' DENOTES SURFACE MOUNTED
SRP	SMART RESCUE PHONE
ARA	AREA RESCUE ASSISTANCE BUTTON

RECEPTACLES

	FLUSH FLOOR OUTLET BOXES WITH BOTH 120 VOLT & TELE/DATA COMPARTMENTS FLOOR BOX BY OTHERS. BRASS COVER PLATE BY I.T. CONTRACTOR.
	FLUSH FLOOR OUTLET BOXES WITH BOTH 120 VOLT & DATA COMPARTMENTS. FLOOR BOX BY OTHERS. BRASS COVER PLATE BY I.T. CONTRACTOR.
	WIREMOLD RACEWAY PROVIDED UNDER SECTION 260000

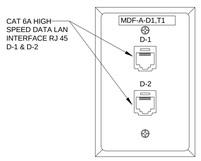
ABBREVIATIONS

A.F.F.	ABOVE FINISHED FLOOR	P.C.	PLUMBING CONTRACTOR
A.F.G.	ABOVE FINISHED GRADE	M.H.	MOUNTING HEIGHT
APC	ANGLE POLISHED CONNECTOR	W.P.	WEATHER PROOF
ARCH.	ARCHITECT	U.N.O.	UNLESS NOTED OTHERWISE
A.T.C.	AUTO-TEMP CONTROL CONTRACTOR	WG	WIRE GUARD
℄	CENTERLINE	CATV	CABLE TELEVISION
CLG.	CEILING	DH	DOOR HOLDER
E.C.	ELECTRICAL CONTRACTOR	F.A.C.P.	FIRE ALARM CONTROL PANEL
F&I	FURNISHED AND INSTALLED	PAC	PUBLIC ACCESS COMPUTER
F.P.C.	FIRE PROTECTION CONTRACTOR	MAC	MACINTOSH COMPUTER
G.C.	GENERAL CONTRACTOR	I.T.	INFORMATION TECHNOLOGY
H.V.A.C.	HEATING, VENTILATION, AND AIR CONDITIONING CONTRACTOR	IESS	INTEGRATED ELECTRONIC SECURITY SYSTEM INTEGRATOR

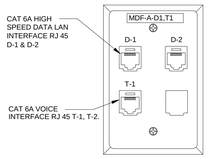


1 / T001 — TYPICAL WALL MTD VOICE/DATA OUTLET (▼/▽) DETAIL
SCALE: NTS

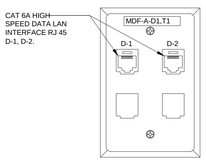
2 / T001 — TYPICAL DATA OUTLET (▽) DETAIL
SCALE: NTS



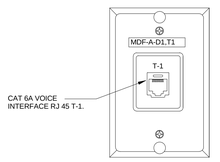
3 / T001 — TYPICAL DATA OUTLET (2▽) DETAIL
SCALE: NTS



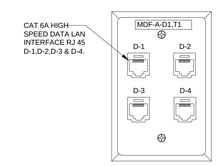
4 / T001 — TYPICAL DATA OUTLET (1V/2D▼) DETAIL
SCALE: NTS



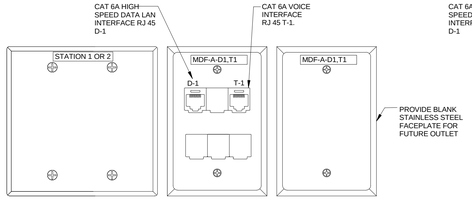
5 / T001 — TYPICAL CABLE/DATA JACK OUTLET (TVC) DETAIL
SCALE: NTS



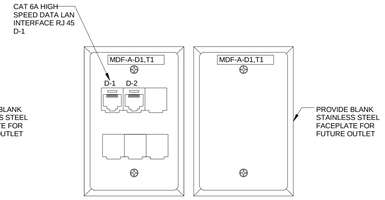
6 / T001 — TYPICAL WALL PHONE OUTLET (W▼) DETAIL
SCALE: NTS



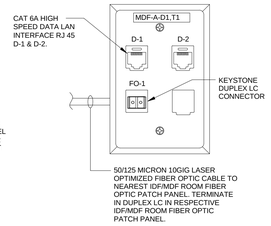
7 / T001 — TYPICAL DATA OUTLET (4▽) DETAIL
SCALE: NTS



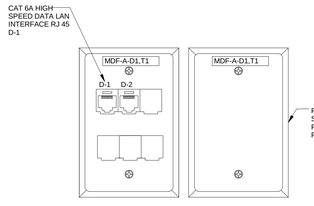
8 / T001 — TYPICAL TEACHER STATION OUTLET(T▼) DETAIL
SCALE: NTS



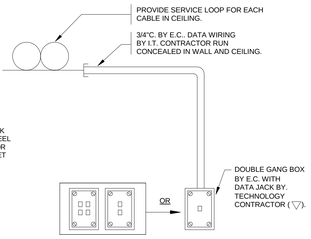
9 / T001 — LCD PROJECTOR JACK OUTLET(TVE) DETAIL
SCALE: NTS



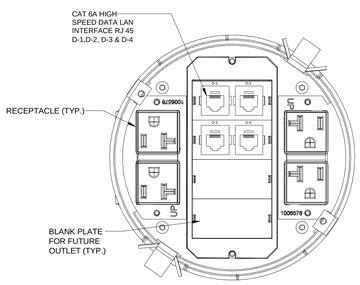
10 / T001 — TYPICAL OUTLET (AN▽) DETAIL
SCALE: NTS



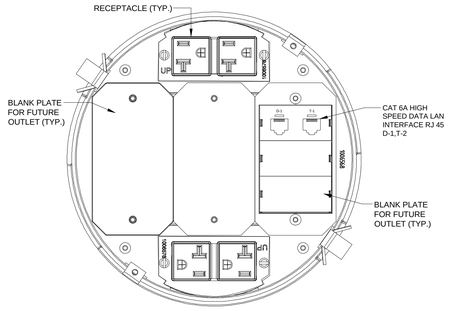
11 / T001 — LCD/LED DISPLAY JACK OUTLET(TVC) DETAIL
SCALE: NTS



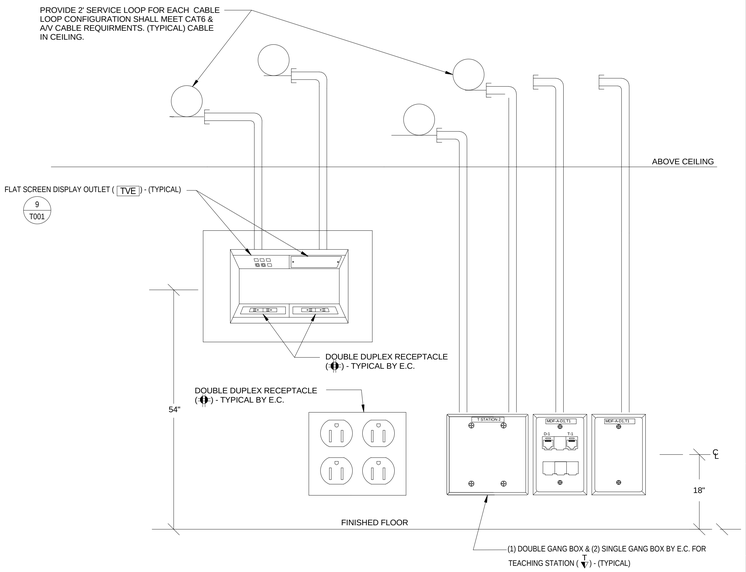
12 / T001 — DATA OUTLET DETAIL
SCALE: NTS



14 / T001 — TYPICAL 6" POKE THRU DATA & VOICE OUTLET (2▽,4▽) DETAIL
SCALE: NTS



15 / T001 — TYPICAL 8" POKE THRU DATA OUTLET (T▼) DETAIL
NOT TO SCALE



16 / T001 — TYPICAL TEACHER STATION JACK OUTLET (T▼ TVE) DETAIL
SCALE: NTS

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FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
October 18, 2019

REVISIONS

No.	Date	Description

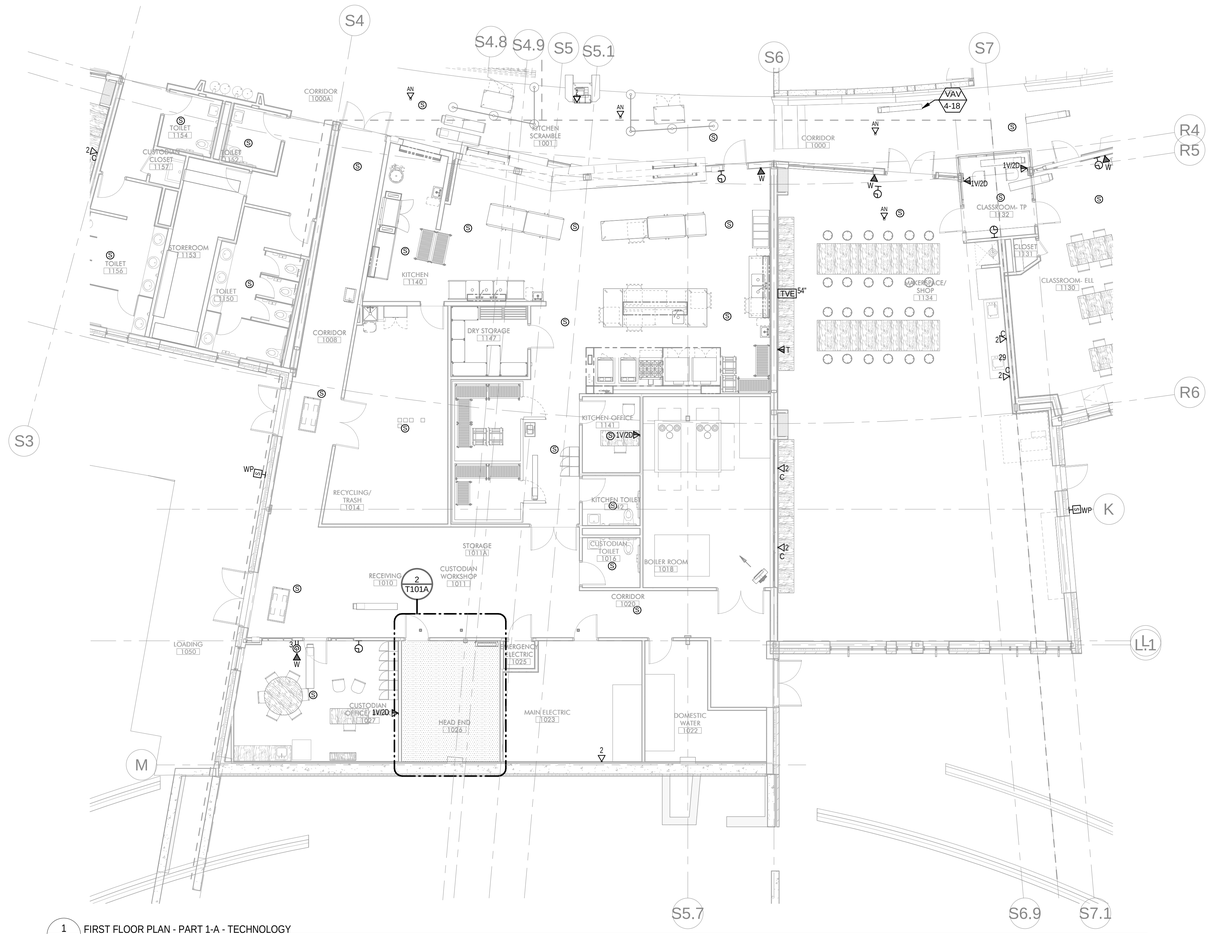
DRAWING NAME
TECHNOLOGY SYMBOL LIST

PROJECT NO. 1722

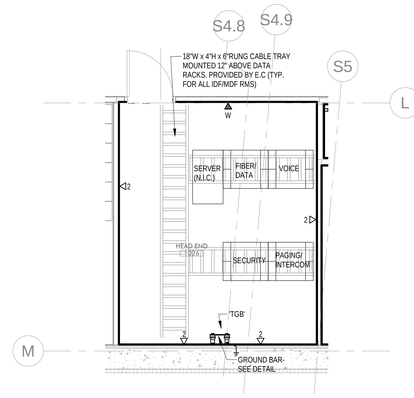
DRAWING NO.
T001

GENERAL TECHNOLOGY NOTES:

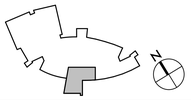
1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.



1 T101A FIRST FLOOR PLAN - PART 1-A - TECHNOLOGY
SCALE: 1/8" = 1'-0"



2 T101A FIRST FLOOR - PART 1-A - HEAD END RM.1026 - TECHNOLOGY
SCALE: 1/4" = 1'-0"



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No.	Date	Description

DRAWING NAME

FIRST FLOOR PLAN PART A - TECHNOLOGY

PROJECT NO. 1722

DRAWING NO.

T101A

GENERAL TECHNOLOGY NOTES:

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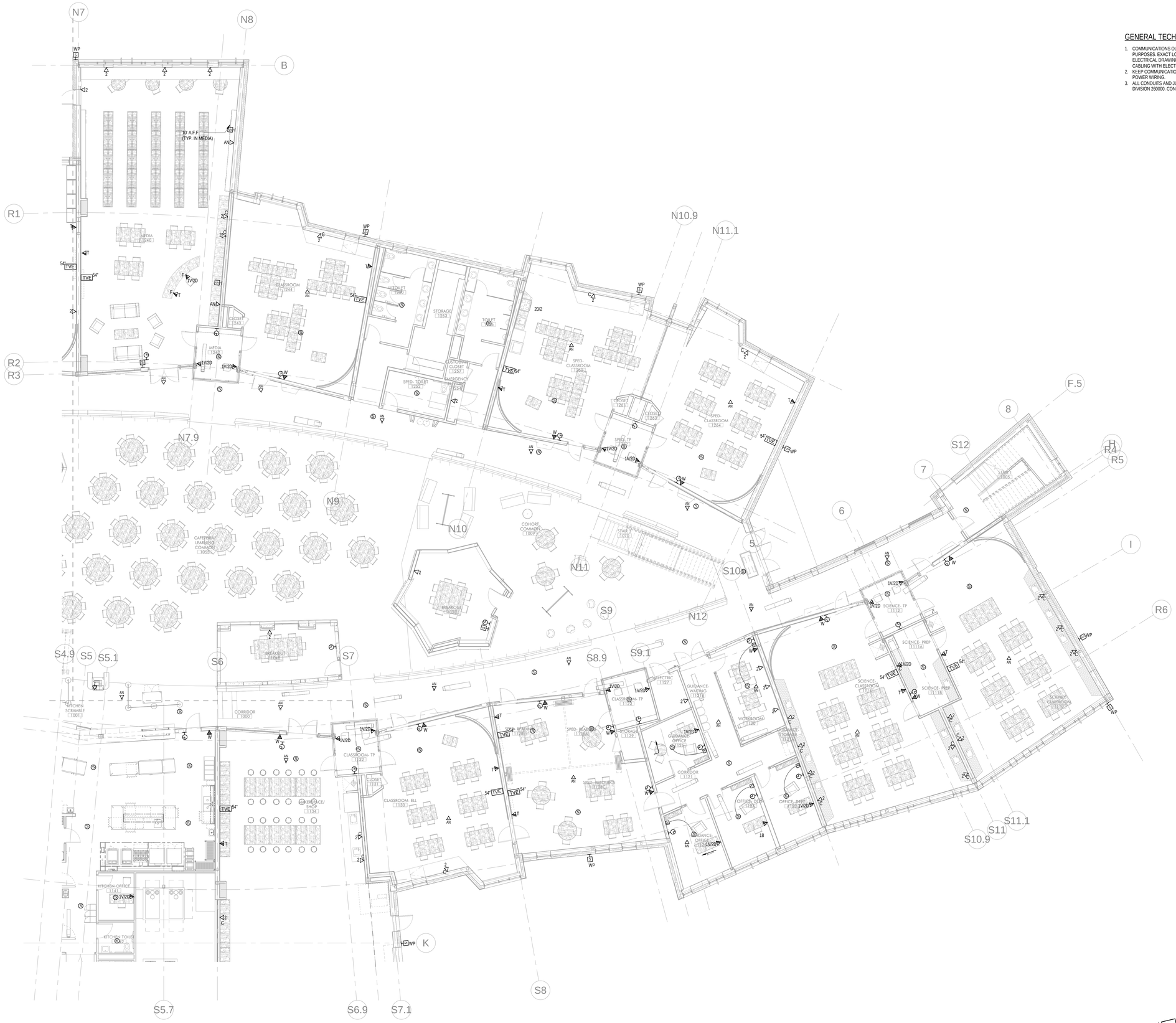
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.



1 T101B FIRST FLOOR PLAN - PART 1-B - TECHNOLOGY
SCALE: 1/8" = 1'-0"

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No.	Date	Description

DRAWING NAME

FIRST FLOOR PLAN PART B - TECHNOLOGY

PROJECT NO. 1722

DRAWING NO.

T101B

1 T101C FIRST FLOOR PLAN - PART 1-C - TECHNOLOGY
SCALE: 1/8" = 1'-0"

GENERAL TECHNOLOGY NOTES:

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

FIRST FLOOR PLAN PART C - TECHNOLOGY

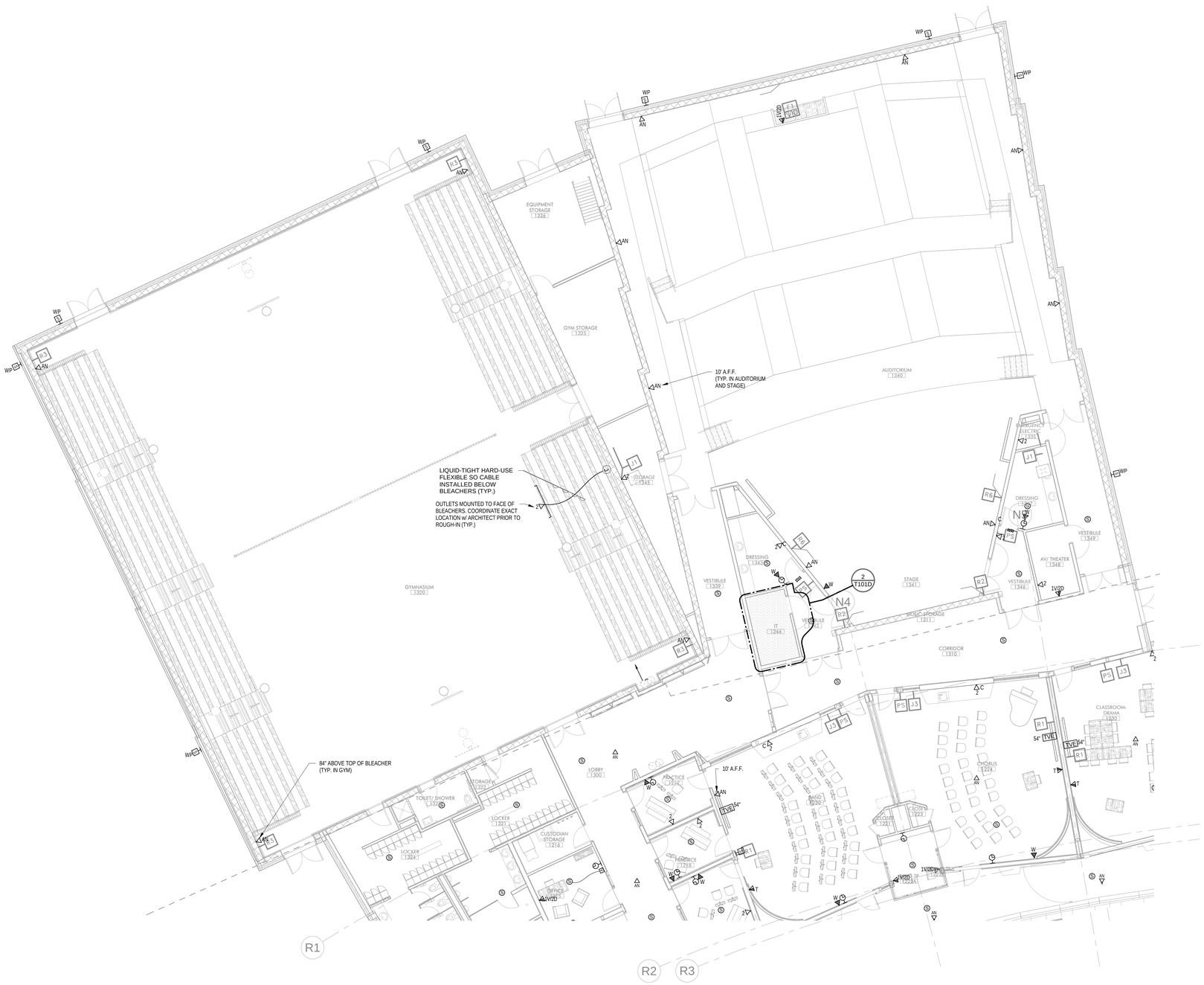
PROJECT NO. 1722

DRAWING NO.

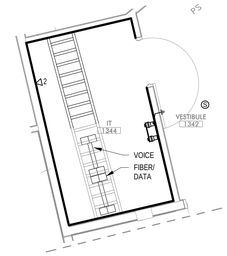
T101C

GENERAL TECHNOLOGY NOTES:

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.



1 T101D FIRST FLOOR PLAN - PART 1-D - TECHNOLOGY
SCALE: 1/8" = 1'-0"



2 T101D FIRST FLOOR - PART 1-D - IDF RM. IT1344 - TECHNOLOGY
SCALE: 1/4" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

FIRST FLOOR PLAN PART D - TECHNOLOGY

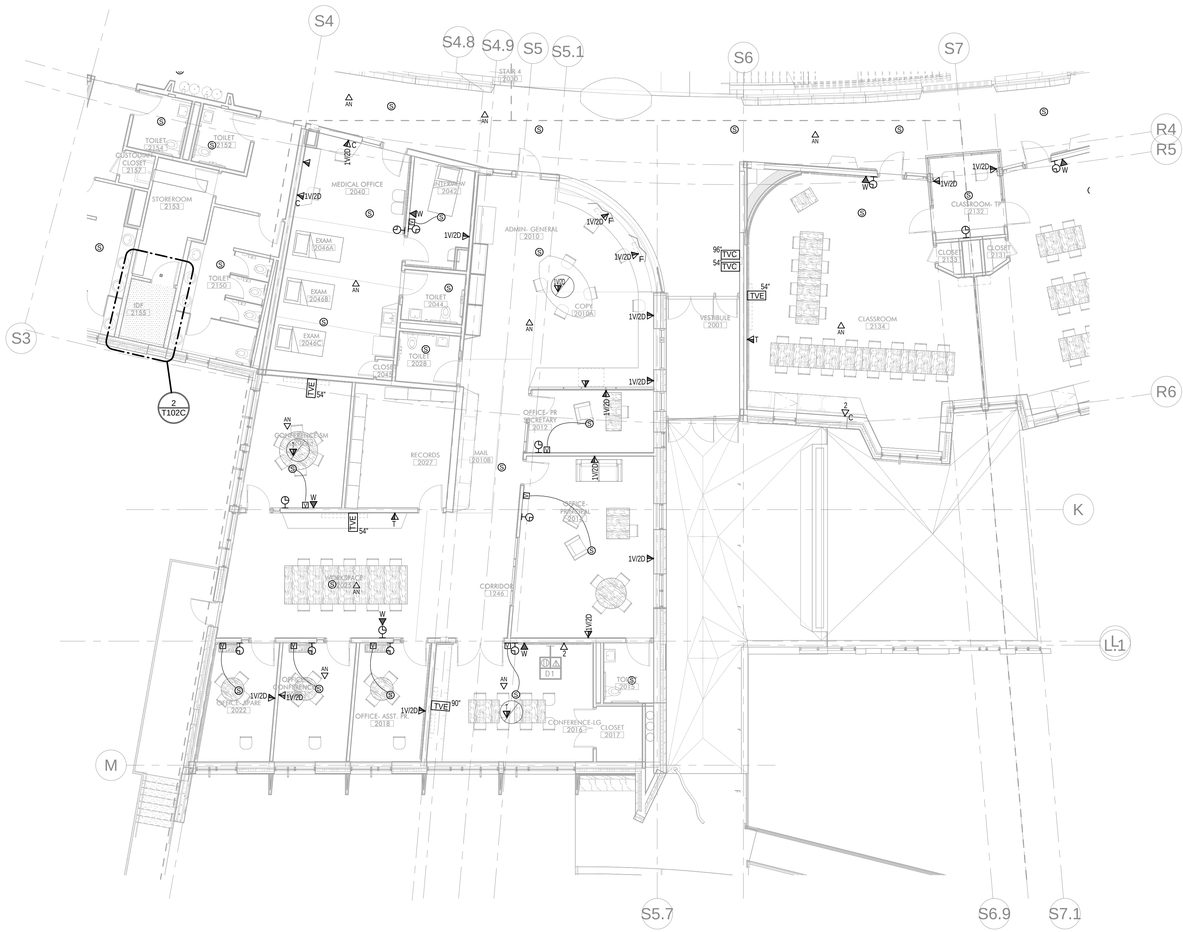
PROJECT NO. 1722

DRAWING NO.

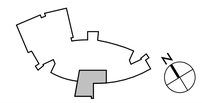
T101D

GENERAL TECHNOLOGY NOTES:

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.



1 T102A SECOND FLOOR PLAN - PART 2-A - TECHNOLOGY
SCALE: 1/8" = 1'-0"



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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART A - TECHNOLOGY

PROJECT NO. 1722

DRAWING NO.

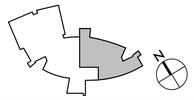
T102A

GENERAL TECHNOLOGY NOTES:

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.

2 T102B SECOND FLOOR - PART 2-B - IDF RM.2255 - TECHNOLOGY
SCALE: 1/4" = 1'-0"

1 T102B SECOND FLOOR PLAN - PART 2-B - TECHNOLOGY
SCALE: 1/8" = 1'-0"



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October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART B - TECHNOLOGY

PROJECT NO. 1722

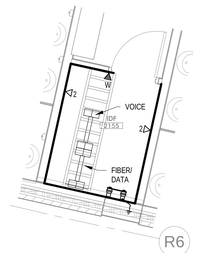
DRAWING NO.

T102B

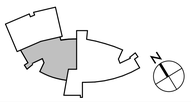
GENERAL TECHNOLOGY NOTES:

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.

1 T102C SECOND FLOOR PLAN - PART 2-C - TECHNOLOGY
SCALE: 1/8" = 1'-0"



2 T102C SECOND FLOOR - PART 2-C - IDF RM.2155 - TECHNOLOGY
SCALE: 1/4" = 1'-0"



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REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART C - TECHNOLOGY

PROJECT NO. 1722

DRAWING NO.

T102C

GENERAL TECHNOLOGY NOTES:

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
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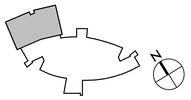
1 T102D SECOND FLOOR PLAN - PART 2-D - TECHNOLOGY
SCALE: 1/8" = 1'-0"



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REVISIONS

No.	Date	Description

DRAWING NAME

SECOND FLOOR PLAN PART D - TECHNOLOGY

PROJECT NO. 1722

DRAWING NO.

T102D

GENERAL TECHNOLOGY NOTES:

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
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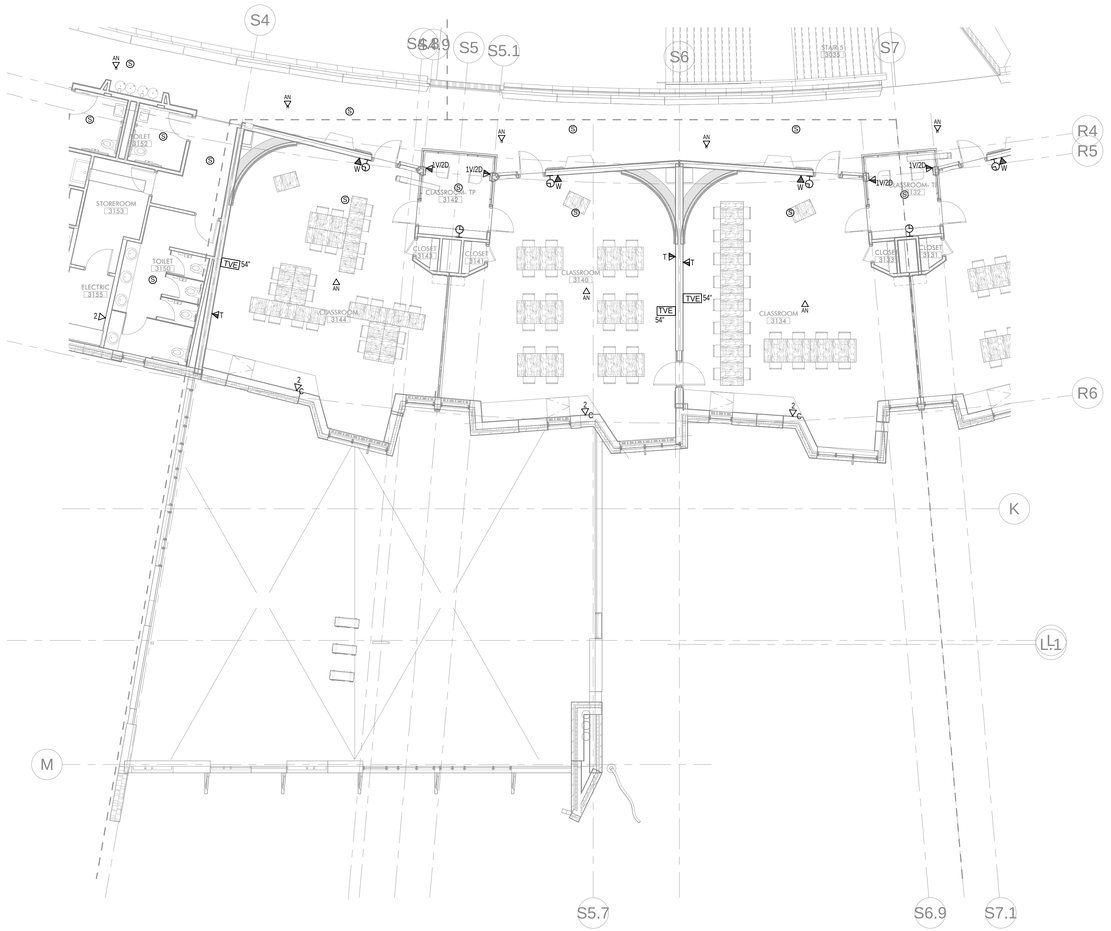

1 / T103A THIRD FLOOR PLAN - PART 3-A - TECHNOLOGY
SCALE: 1/8" = 1'-0"

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October 18, 2019

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No.	Date	Description

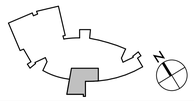
DRAWING NAME

THIRD FLOOR PLAN PART A - TECHNOLOGY

PROJECT NO. 1722

DRAWING NO.

T103A



GENERAL TECHNOLOGY NOTES:

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.

1 T103B THIRD FLOOR PLAN - PART 3-B - TECHNOLOGY
SCALE: 1/8" = 1'-0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN PART B - TECHNOLOGY

PROJECT NO. 1722

DRAWING NO.

T103B

GENERAL TECHNOLOGY NOTES:

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.

1 T103C THIRD FLOOR PLAN - PART 3-C - TECHNOLOGY
SCALE: 1/8" = 1'-0"

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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

THIRD FLOOR PLAN PART C - TECHNOLOGY

PROJECT NO. 1722

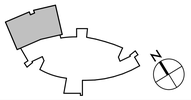
DRAWING NO.

T103C

GENERAL TECHNOLOGY NOTES:

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.

1 T103D THIRD FLOOR PLAN - PART 3-D - TECHNOLOGY
SCALE: 1/8" = 1'-0"



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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

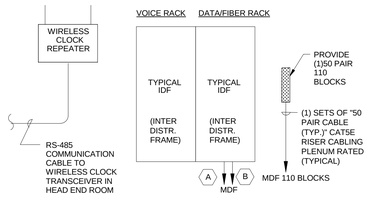
THIRD FLOOR PLAN PART D - TECHNOLOGY

PROJECT NO. 1722

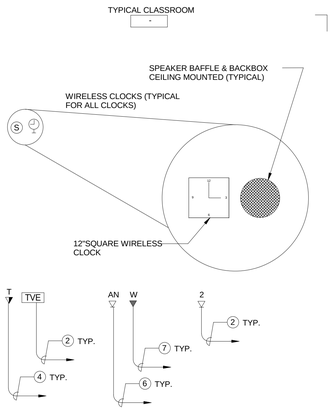
DRAWING NO.

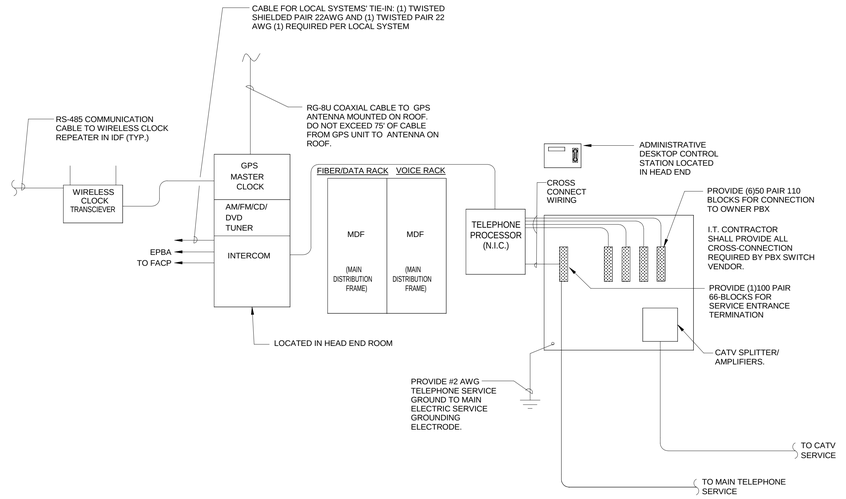
T103D

ROOF



SECOND FLOOR





FIRST FLOOR

NOTES:

1. - (1) CAT 6A UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
2. - (2) CAT 6A UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
3. - (4) CAT 6A UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
4. - (1) CAT 6A UTP CABLE PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA & (1) CAT 6A UTP CABLE PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA (TYPICAL)
5. - (2) CAT 6A UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA & (1) CAT 6A UTP CABLES PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA
6. - (2) CAT 6A UTP CABLES PLENUM RATED TO IDF/MDF IN BLOCKED AREA. 2 STRAND MULTI-MODE LASER OPTIMIZED ARMORED FIBER CABLE TO IDF/MDF IN BLOCKED AREA (TYPICAL)
7. - (1) CAT 6A UTP CABLE PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA (TYPICAL)
8. - 2 STRAND SINGLE MODE OPTIMIZED ARMORED FIBER CABLE TO TV BOOTH 1281 (TYPICAL)
9. - (2) 2 STRAND SINGLE MODE OPTIMIZED ARMORED FIBER CABLE TO TV BOOTH 1281 (TYPICAL)

A. 12 STRAND MULTI-MODE FIBER CABLE TO MDF. INSTALL PLENUM RATED INNER-DUCT.

B. 6 STRAND SINGLE MODE 8/9 MICRON FIBER CABLE TO MDF. INSTALL PLENUM RATED INNER-DUCT.

C. 6 STRAND OUTSIDE PLANT SINGLE MODE 8/9 MICRON FIBER CABLE TO MDF. INSTALL PLENUM RATED INNER-DUCT.

D. 4 STRAND OUTSIDE PLANT SINGLE MODE 8/9 MICRON FIBER CABLE TO MDF. INSTALL PLENUM RATED INNER-DUCT.

NOTE:

1. THIS CONTRACTOR SHALL PROVIDE FOR A COMPLETE INSTALLATION. FURNISH ALL EQUIP. LABOR, WIRING AND OUTLETS REQUIRED FOR A COMPLETELY OPERATIONAL SYSTEM.
2. ALL WIRING SHALL BE IN ACCORDANCE WITH EQUIPMENT SUPPLIER. COORDINATE ALL WIRING REQUIREMENTS PRIOR TO ROUGHING-IN.
3. PROVIDE APPROPRIATE QUANTITIES OF DATA PATCH PANELS TO ACCOMODATE ALL RESPECTIVE DATA CIRCUITS.
4. PROVIDE CAT 6A PATCH CORDS TO MATCH TOTAL QUANTITY OF PATCH PANEL PORTS. AT BOTH MDF/IDF AND WORK STATION.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

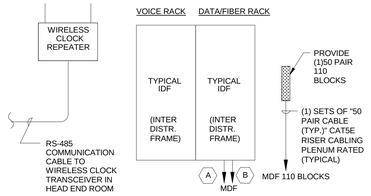
TECHNOLOGY RISER

PROJECT NO. 1722

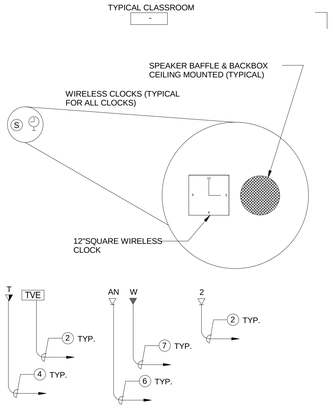
DRAWING NO.

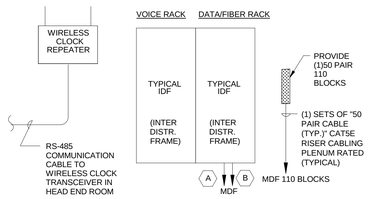
T201

ROOF



SECOND FLOOR





FIRST FLOOR

NOTES:

1. - (1) CAT 6A UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
2. - (2) CAT 6A UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
3. - (4) CAT 6A UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
4. - (1) CAT 6A UTP CABLE PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA & (1) CAT 6A UTP CABLE PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA (TYPICAL)
5. - (2) CAT 6A UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA & (1) CAT 6A UTP CABLES PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA
6. - (2) CAT 6A UTP CABLES PLENUM RATED TO IDF/MDF IN BLOCKED AREA. 2 STRAND MULTI-MODE LASER OPTIMIZED ARMORED FIBER CABLE TO IDF/MDF IN BLOCKED AREA (TYPICAL)
7. - (1) CAT 6A UTP CABLE PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA (TYPICAL)
8. - 2 STRAND SINGLE MODE OPTIMIZED ARMORED FIBER CABLE TO TV BOOTH 1281 (TYPICAL)
9. - (2) 2 STRAND SINGLE MODE OPTIMIZED ARMORED FIBER CABLE TO TV BOOTH 1281 (TYPICAL)

A. 12 STRAND MULTI-MODE FIBER CABLE TO MDF. INSTALL PLENUM RATED INNER-DUCT.

B. 6 STRAND SINGLE MODE 8/9 MICRON FIBER CABLE TO MDF. INSTALL PLENUM RATED INNER-DUCT.

C. 6 STRAND OUTSIDE PLANT SINGLE MODE 8/9 MICRON FIBER CABLE TO MDF. INSTALL PLENUM RATED INNER-DUCT.

NOTE:

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2. ALL WIRING SHALL BE IN ACCORDANCE WITH EQUIPMENT SUPPLIER. COORDINATE ALL WIRING REQUIREMENTS PRIOR TO ROUGHING-IN.
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4. PROVIDE CAT 6A PATCH CORDS TO MATCH TOTAL QUANTITY OF PATCH PANEL PORTS. AT BOTH MDF/IDF AND WORK STATION.

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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DRAWING NAME

TECHNOLOGY RISER

PROJECT NO. 1722

DRAWING NO.

T202

MAIN DISTRIBUTION FRAME MDF

LOCATION: MDF

CAT 6A (RJ45) VOICE PORT			CAT 6A (RJ45) DATA PORTS		
USED	SPARE	PATCH PANEL SIZE	USED	SPARE	PATCH PANEL SIZE
-	-	(-) 48 PORT	-	-	(-) 48 PORT

INTERMEDIATE DISTRIBUTION FRAME IDF

LOCATION: IDF

-	-	(-) 48 PORT	-	-	(-) 48 PORT

INTERMEDIATE DISTRIBUTION FRAME IDF

LOCATION: IDF

-	-	(-) 48 PORT	-	-	(-) 48 PORT

INTERMEDIATE DISTRIBUTION FRAME IDF

LOCATION:IDF

-	-	(-) 48 PORT	-	-	(-) 48 PORT

QUANTITY OF DEVICES

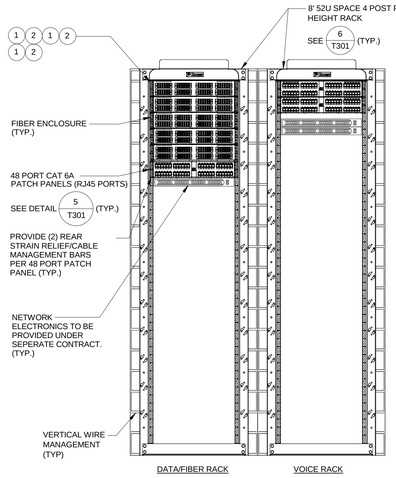
MDF

	DATA (CAT 6A)	VOICE (CAT 6A)	2 STRAND MM FIBER
▽ = -	-	-	-
2 ▽ = -	-	-	-
4 ▽ = -	-	-	-
AN ▽ = -	-	-	-
F ▽ = -	-	-	-
▼ = -	-	-	-
1V/2D ▼ = -	-	-	-
W ▼ = -	-	-	-
T ▼ = -	-	-	-
TVE = -	-	-	-
TVC = -	-	-	-
TOTAL	-	-	-

QUANTITY OF DEVICES

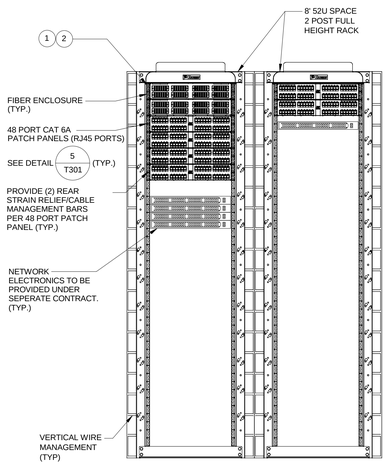
TYPICAL IDF ROOM

	DATA (CAT 6A)	VOICE (CAT 6A)	2 STRAND MM FIBER
▽ = -	-	-	-
2 ▽ = -	-	-	-
4 ▽ = -	-	-	-
AN ▽ = -	-	-	-
F ▽ = -	-	-	-
▼ = -	-	-	-
1V/2D ▼ = -	-	-	-
W ▼ = -	-	-	-
T ▼ = -	-	-	-
TVE = -	-	-	-
TVC = -	-	-	-
TOTAL	-	-	-



1 T300 MDF DETAIL

NOT TO SCALE



2 T300 TYPICAL IDF DETAIL

NOT TO SCALE

CABLE/FIBER SCHEDULE

1. FIBER OPTIC MULTIMODE LIU (LIGHTGUIDE INTERFACE UNIT) PATCH PANEL (12 PORT - SC CONNECTORS) - PREMISES DISTRIBUTION
2. FIBER OPTIC SINGLEMODE LIU (LIGHTGUIDE INTERFACE UNIT) PATCH PANEL (6 PORT - ST CONNECTORS) - PREMISES DISTRIBUTION
3. FIBER OPTIC SINGLEMODE LIU (LIGHTGUIDE INTERFACE UNIT) PATCH PANEL (12 PORT - ST CONNECTORS) - PREMISES DISTRIBUTION

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GARCIA GALUSKA DESOUSA
CONSULTING ENGINEERS INC.

NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

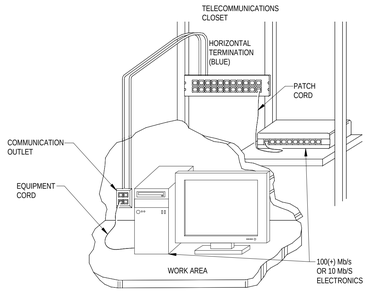
DRAWING NAME

TECHNOLOGY DETAILS

PROJECT NO. 1722

DRAWING NO.

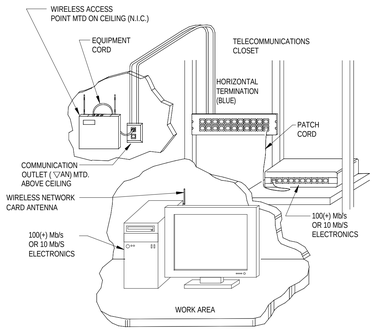
T300



1 T301

TYPICAL INTERCONNECTION ARCHITECTURE

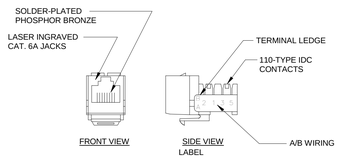
SCALE: N.T.S.



2 T301

TYPICAL WIRELESS INTERCONNECTION ARCHITECTURE

SCALE: N.T.S.



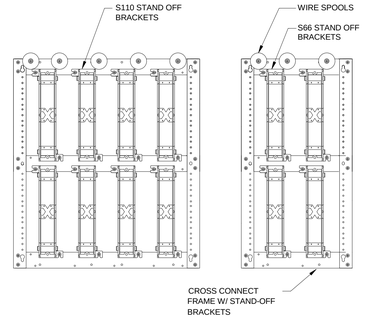
3 T301

RJ45 CONNECTION DETAILS

SCALE: N.T.S.

NOTE

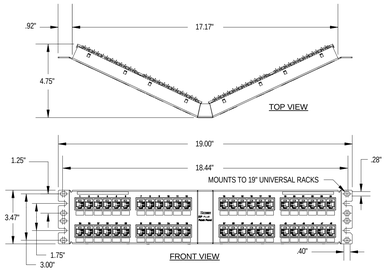
PANELS SHALL BE UL LITSED; MEET NATIONAL ELECTRICAL CODE REQUIREMENTS AND SPECIFICATIONS FOR UL 1863; AND FULLY COMPLY WITH FCC PART 68 AND TIA-568-A CATEGORY 5E.



4 T301

TYPICAL CROSS CONNECT

SCALE: N.T.S.



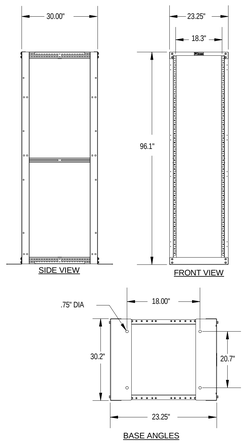
5 T301

48 PORT CAT 6A PATCH PANEL

SCALE: N.T.S.

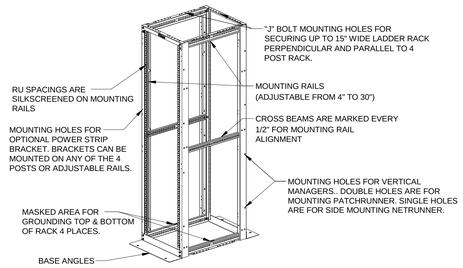
NOTE

PANELS SHALL BE UL LISTED; MEET NATIONAL ELECTRICAL CODE REQUIREMENTS AND SPECIFICATIONS FOR UL 1863; AND FULLY COMPLY WITH FCC PART 68 AND TIA-568-A CATEGORY 6A.



NOTES:

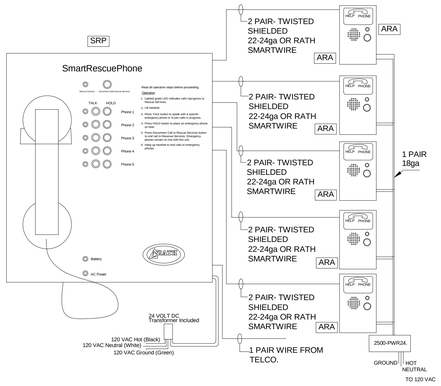
1. CAN BE USED WITH ANY EIA STANDARD COMPONENT IN ADDITION TO ALL PANDUIT HORIZONTAL CABLE MANAGEMENT AND PATCH PANEL PRODUCTS.
2. 52 AVAILABLE RACK SPACES.
3. RU SPACING NUMBERS ARE CLEARLY PRINTER ON MOUNTING RAILS.
4. EASY ASSEMBLY. ONE WRENCH NEEDED TO INSTALL BOLTS INTO WELDNUTS IN ALL 8 CORNERS.
5. FULLY BONDED STRUCTURE WHEN ASSEMBLED PER INSTRUCTIONS.
6. LOAD RATING - 2000 LBS.



6 T301

4 POST RACK

SCALE: N.T.S.



7 T301

SMARTRESCUE BASE STATION WIRING DIAGRAM

SCALE: N.T.S.

SRP SMART RESCUE PHONE

ARA AREA RESCUE ASSISTANCE BUTTON

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

October 18, 2019

REVISIONS

No.	Date	Description

DRAWING NAME

TECHNOLOGY DETAILS

PROJECT NO. 1722

DRAWING NO.

T301

FULLER MIDDLE SCHOOL
AUDIOVISUAL SYSTEMS

NOTES FOR GENERAL CONTRACTOR:

1. VERIFY EXACT LOCATION OF AUDIOVISUAL DEVICES AND THEIR MOUNTING WITH ARCHITECTURAL DRAWINGS.
2. PROVIDE ALL MISCELLANEOUS MATERIALS IN ORDER TO PROVIDE A COMPLETE AND OPERABLE AUDIOVISUAL SYSTEM.
3. PROVIDE BLOCKING FOR WALL MOUNTED AUDIOVISUAL DEVICES AS INDICATED OR REQUIRED.
4. SUPPLY MILLWORK FOR AUDIOVISUAL SYSTEMS AS INDICATED OR REQUIRED.
5. PROVIDE ATTACHMENT POINTS AT SUPERSTRUCTURE FOR MOUNTING LOUDSPEAKERS, VIDEO PROJECTORS, ETC. AS REQUIRED.
6. AUDIOVISUAL BOXES SHALL NOT BE INSTALLED BACK TO BACK WITH ANY OTHER DEVICE IN A WALL WITHIN A GIVEN STUD BAY.

NOTES FOR ELECTRICAL CONTRACTOR:

1. AC POWER, CONDUIT, AND TELECOMMUNICATION REQUIREMENTS SHOWN ON AUDIOVISUAL DRAWINGS ARE PROVIDED FOR COORDINATION AND REFERENCE ONLY AND ARE NOT PART OF THE AUDIOVISUAL CONTRACTORS SCOPE OF WORK. AUDIOVISUAL DRAWINGS DO NOT SHOW ALL REQUIRED COMPONENTS FOR A COMPLETE SYSTEM (E.G. PULL BOXES, ETC.).
2. SEE ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR AC POWER AND CONDUIT DETAILS.
3. SEE TECHNOLOGY (IT) DRAWINGS AND SPECIFICATIONS FOR TELECOMMUNICATION DETAILS.
4. PROVIDE AN AC POWER SYSTEM FOR THE AUDIOVISUAL SYSTEM. AC SYSTEM INCLUDES A DEDICATED POWER PANEL WITH TRANSIENT VOLTAGE SURGE SUPPRESSORS, AND A SEPARATE ISOLATED GROUND.
5. AC POWER FOR GIVEN AUDIOVISUAL SYSTEM WILL BE FED FROM A COMMON AC PANEL WITH TRANSIENT VOLTAGE SURGE SUPPRESSION AND ON THE SAME PHASE.
6. EACH 120 VAC CIRCUIT SHALL BE 3-WIRE WITH A HOT, DEDICATED NEUTRAL, AND GROUND.
7. DEDICATED AC CIRCUITS TERMINATE IN THE AUDIOVISUAL EQUIPMENT RACKS UNLESS OTHERWISE INDICATED. AC CIRCUITS TERMINATE IN A RACEWAY SYSTEM PROVIDED BY THE AUDIOVISUAL CONTRACTOR.
8. INSULATE AUDIOVISUAL EQUIPMENT RACKS FROM INCOMING METAL CONDUITS WITH PVC TO EMT CONNECTOR IN TOP OF RACK OR USING OTHER APPROVED MEANS.
9. TELECOMMUNICATION AND AC POWER OUTLETS ARE TO BE MOUNTED ADJACENT TO ASSOCIATED AUDIOVISUAL DEVICES UNLESS OTHERWISE NOTED.
10. PROVIDE A COMPLETE CONDUIT SYSTEM FOR THE AUDIOVISUAL SYSTEM WITH A PULL LINE IN AUDIOVISUAL SYSTEM CONDUITS.
11. PROVIDE A PULLBOX IN AUDIOVISUAL SYSTEM CONDUIT RUNS OVER 100 FEET OR THAT CONTAIN MORE THAN (2) CONSECUTIVE 90° BENDS.
12. ALL CONDUITS CARRYING AUDIOVISUAL SYSTEM SIGNALS ARE NOT TO BE RUN PARALLEL TO POWER CONDUITS UNLESS THE SPACING EXCEEDS 2'-0" AND THE RUN IS LESS THAN 50'-0".
13. ALL CONDUITS CARRYING AUDIOVISUAL SYSTEM SIGNALS SHALL BE FERROUS METALS, BONDED TO GROUND EVEN IN OR BELOW SLABS. CONDUITS IN OR BELOW SLABS SHALL BE RIGID METALLIC CONDUITS. SEAL ALL JOINTS TO PREVENT LEAKING.
14. NO FLEX CONDUIT SHALL BE USED IN AUDIOVISUAL SYSTEMS UNLESS OTHERWISE NOTED.
15. ALL CONDUITS TO BE 3/4" UNLESS OTHERWISE NOTED.
16. VERIFY SIZE OF PULL BOXES AND JUNCTION BOXES WILL ACCEPT REQUIRED CONDUIT CONNECTIONS, AND SUPPLY LARGER BOXES IF REQUIRED.
17. ALL GANG BOXES ARE 2-1/2" DEEP WITH 13/16" GANG COVER FOR DRY WALL OR PLASTER WALL CONSTRUCTION, OR 3- 1/2" DEEP FOR MASONRY WALL CONSTRUCTION UNLESS OTHERWISE NOTED.
18. ALL AUDIOVISUAL SYSTEM CONDUIT STUBS SHALL BE TERMINATED WITH PLASTIC BUSHINGS AND SHALL BE STUBBED INTO ACCESSIBLE LOCATIONS.
19. ALL AUDIOVISUAL SYSTEM CONDUIT QUANTITIES AND SIZES HAVE BEEN CHOSEN BASED UPON SYSTEM REQUIREMENTS AND TO MAINTAIN SIGNAL SEPARATION. DO NOT COMBINE MULTIPLE RUNS INTO LARGER CONDUITS.

NOTES FOR AUDIOVISUAL CONTRACTOR:

1. VERIFY EXACT LOCATION OF AUDIOVISUAL DEVICES WITH ARCHITECTURAL DRAWINGS.
2. THE SIGNAL LEVEL SEPARATION INDICATED ON DRAWINGS (MICROPHONE, LINE, SPEAKER, INTERCOM, VIDEO, CONTROL, RF, AND AC) IS TO BE MAINTAINED.
3. NO SPLICES SHALL BE PERMITTED. ALL CABLE RUNS SHALL BE CONTINUOUS FROM POINT OF ORIGIN TO TERMINATION POINT.
4. WIRING ENTERING A PLENUM SPACE FROM A CONDUIT STUB SHALL BE PLENUM RATED IN ITS ENTIRETY.
5. AUDIOVISUAL SYSTEM CONTRACTOR PROVIDES MOUNTING HARDWARE AS REQUIRED TO ATTACH AUDIOVISUAL EQUIPMENT TO ATTACHMENT POINTS SUPPLIED BY THE GENERAL CONTRACTOR.
6. LAYOUTS OF EQUIPMENT RACKS, RECEPTACLE PLATES, AND PANELS ARE DIAGRAMMATIC. ACTUAL LAYOUTS AND LABELS SHALL BE SUBMITTED TO THE ARCHITECT AND THE AUDIOVISUAL CONSULTANT FOR APPROVAL PRIOR TO FABRICATION.
7. LAYOUTS OF MULTIPLE PLATES/PANELS ARE SIMILAR OR TYPICAL AS NOTED. VERIFY AND SUBMIT EXACT CONFIGURATION THAT DETAILS CONNECTORS AND LABELING SCHEME FOR ALL RECEPTACLE PANELS AND RACK PANELS WITH FUNCTIONAL DIAGRAM TO ARCHITECT AND AUDIOVISUAL CONSULTANT FOR APPROVAL PRIOR TO FABRICATION.
8. PROVIDE SECURITY COVERS FOR FRONT ACCESSIBLE CONTROLS THAT DO NOT REQUIRE USER ACCESS OR ADJUSTMENT.
9. SUPPLY AUDIOVISUAL EQUIPMENT RACKS WITH AC RECEPTACLES, LACING BARS, AND REAR RACK RAILS. USE SPECIFIED AC RECEPTACLES WITHIN AUDIOVISUAL EQUIPMENT RACKS.
10. PROVIDE NON-CONDUCTIVE FIRE-RATED PLINTH UNDER FIXED EQUIPMENT RACKS AND SECURE PLINTH TO FLOOR. PLINTH TO BE MASONITE OR SIMILAR.
11. EQUIPMENT RACK WIRING MUST MEET INDUSTRY STANDARDS FOR NEATNESS AND SEPARATION OF SIGNAL TYPES (MIC, LINE, VIDEO, LOUDSPEAKER, AC POWER).
12. PROVIDE ENGRAVED LABELS ON EQUIPMENT RACKS THAT CLEARLY INDICATE THE EQUIPMENT TYPE AND FUNCTION. SECURE LABELS BELOW EQUIPMENT ON VENT OR BLANK PANEL.
13. ALL CONNECTION PANELS ARE FINISHED 1/8" ALUMINUM ANODIZED WITH ENGRAVED LETTERING FILLED WITH ENAMEL PAINT. COORDINATE FINISH WITH ARCHITECT AND AUDIOVISUAL CONSULTANT PRIOR TO FABRICATION AND INSTALLATION OF PANELS.
14. RACK PANELS ARE FINISHED 1/8" ALUMINUM ANODIZED BLACK WITH ENGRAVED LETTERING FILLED WITH WHITE ENAMEL PAINT. COORDINATE FINISH WITH ARCHITECT AND AUDIOVISUAL CONSULTANT PRIOR TO FABRICATION AND INSTALLATION OF PANELS.
15. USE INSULATED JACKS ON RACK PANELS, CONNECTION PANELS, AND WALL PLATES.
16. PROVIDE FLUSH FITTING COVERS FOR ALL SURFACE MOUNT RECEPTACLE BOXES.

AV SHEET INDEX

SHEET NUMBER	SHEET TITLE
AV000	AV SYSTEMS - SYMBOLS AND LEGENDS
AV101C	AV SYSTEMS - PLAN FLOOR 1 - C
AV101D	AV SYSTEMS - PLAN FLOOR 1 - D
AV201C	AV SYSTEMS - RCP FLOOR 1 - C
AV201D	AV SYSTEMS - RCP FLOOR 1 - D
AV300	AV SYSTEMS - INTERIOR ELEVATIONS AUDITORIUM
AV301	AV SYSTEMS - INTERIOR ELEVATIONS GYM
AV303	AV SYSTEMS - INTERIOR ELEVATIONS
AV400	AV SYSTEMS - CONDUIT RISER DIAGRAMS
AV500	AV SYSTEMS - AUDITORIUM AUDIO FUNCTIONAL DIAGRAM
AV501	AV SYSTEMS - AUDITORIUM VIDEO FUNCTIONAL DIAGRAM
AV502	AV SYSTEMS - FUNCTIONAL DIAGRAMS 2
AV503	AV SYSTEMS - FUNCTIONAL DIAGRAMS 3
AV600	AV SYSTEMS - RACKS AND PLATE DETAILS

SYMBOL	DESCRIPTION	BOX TYPE	MOUNTING LOCATION	ADDITIONAL NOTES
AV ELECTRICAL SYMBOLS (COORDINATION ONLY)		NOTE: I.G. = ISOLATED GROUND RECEPTACLE		
	DUPLEX AC RECEPTACLE	1-GANG METAL BOX	FLUSH MOUNT IN WALL AT RECEPTACLE HEIGHT	
	DOUBLE DUPLEX AC RECEPTACLE	2-GANG METAL BOX	FLUSH MOUNT IN WALL AT RECEPTACLE HEIGHT	
	HARDWIRED AC POWER	PROVIDE JUNCTION BOX AS REQUIRED	HARDWIRE TO AV DEVICE AS INDICATED	COORDINATE WITH AV DEVICE MANUFACTURERS SPECIFICATIONS
	CEILING MOUNTED DUPLEX AC RECEPTACLE	1-GANG METAL BOX	FLUSH MOUNT IN CEILING UNLESS OTHERWISE NOTED	
	CEILING MOUNTED DOUBLE DUPLEX AC RECEPTACLE	2-GANG METAL BOX	FLUSH MOUNT IN CEILING UNLESS OTHERWISE NOTED	
	CEILING MOUNTED HARDWIRED AC POWER	PROVIDE JUNCTION BOX AS REQUIRED	HARDWIRE TO AV DEVICE AS INDICATED	COORDINATE WITH AV DEVICE MANUFACTURERS SPECIFICATIONS
	FLOOR MOUNTED DUPLEX AC POWER	PROVIDE JUNCTION BOX AS REQUIRED	FLUSH MOUNT IN FLOOR BOX	
DP	AV DISPLAY BOX DUPLEX AC RECEPTACLE	1 GANG DISPLAY BOX INSERT	MOUNT TO SIDE OF DISPLAY BOX	COORDINATE WITH AV AND TELE/DATA
F#	AV FLOOR BOX DUPLEX AC RECEPTACLE	1 GANG FLOOR BOX INSERT	FLUSH MOUNT IN FLOOR BOX	COORDINATE WITH AV AND TELE/DATA
V#	AV CEILING BOX DUPLEX AC RECEPTACLE	1 GANG CEILING BOX INSERT	MOUNT TO SIDE OF CEILING BOX	COORDINATE WITH AV AND TELE/DATA
AV TEL/DATA SYMBOLS (COORDINATION ONLY)				
	DATA DROP	1-GANG METAL BOX	FLUSH MOUNT IN WALL AT RECEPTACLE HEIGHT	PROVIDE DROPS PER PROJECT STANDARD
	CEILING MOUNT ONE DATA DROP	1-GANG METAL BOX	FLUSH MOUNT IN CEILING	PROVIDE DROPS PER PROJECT STANDARD
	FLOOR BOX COMPONENT	1-GANG METAL BOX	FLUSH MOUNT IN FLOOR AS INDICATED	PROVIDE DROPS PER PROJECT STANDARD
DP	AV DISPLAY BOX TELE/DATA OUTLET	1 GANG DISPLAY BOX INSERT	MOUNT TO SIDE OF DISPLAY BOX	PROVIDE DROPS PER PROJECT STANDARD
F#	AV FLOOR BOX TELE/DATA OUTLET	1 GANG FLOOR BOX INSERT	FLUSH MOUNT IN FLOOR BOX	PROVIDE DROPS PER PROJECT STANDARD
V#	AV CEILING BOX TELE/DATA OUTLET	1 GANG CEILING BOX INSERT	MOUNT TO SIDE OF CEILING BOX	PROVIDE DROPS PER PROJECT STANDARD

AUDIOVISUAL SYSTEMS SYMBOL LEGEND

SYMBOL	DESCRIPTION	BOX TYPE (H" x W" x D")	MOUNTING LOCATION	ADDITIONAL NOTES
AV JUNCTION BOX SYMBOLS				
A1	WALL-MOUNTED ANTENNA, TYPE 1	1-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT 12'-0" AFF	
A2	WALL-MOUNTED ANTENNA, TYPE 2	1-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT 12'-0" AFF	
A3	CEILING-MOUNTED ANTENNA, TYPE 3	4" SQUARE METAL BOX WITH COVER	MOUNT TO CEILING	
A4	CEILING-MOUNTED ANTENNA, TYPE 4	4" SQUARE METAL BOX WITH COVER	MOUNT TO CEILING	
A5	CEILING-MOUNTED ANTENNA, TYPE 5	4" SQUARE METAL BOX WITH COVER	FLUSH MOUNT IN CEILING	
BP	WALL-MOUNTED BUTTON PANEL	2-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT SWITCH HEIGHT	
C1	WALL-MOUNTED CAMERA, TYPE 1	2-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT 8'-0" AFF	
DP1	DISPLAY BACK BOX, TYPE 1	CHIEF PAC-526	FLUSH MOUNT IN WALL AT 5'-6" AFF	TELE/DATA AND POWER REQUIREMENTS BY OTHERS
F1	FLOOR BOX	FSR FL-600P-6 WITH FINISHED COVER	MOUNT FLUSH IN FLOOR	TELE/DATA AND POWER REQUIREMENTS BY OTHERS
J1	JUNCTION BOX, TYPE 1	6"X6"X24" METAL TROUGH	MOUNT AT 78" ABOVE AV EQUIPMENT RACK	
J2	JUNCTION BOX, TYPE 2	18"X18"X4" NEMA 1 ENCLOSURE WITH OVERSIZED FLUSH COVER	FLUSH MOUNT IN WALL AT RECEPTACLE HEIGHT	
J3	JUNCTION BOX, TYPE 2	18"X18"X4" NEMA 1 ENCLOSURE WITH OVERSIZED FLUSH COVER	FLUSH MOUNT IN WALL AT RECEPTACLE HEIGHT	
M1	CEILING-MOUNTED MICROPHONE, TYPE 1	1-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN CEILING	
M2	CEILING-MOUNTED MICROPHONE, TYPE 2	1-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN CEILING	
MC	MOTOR CONTROLLER	4" SQUARE METAL BOX WITH COVER	PART OF PROJECTION SCREEN CASE	
MC	MOTOR CONTROLLER	4" SQUARE METAL BOX WITH COVER	PART OF PROJECTION SCREEN CASE	
PC	PRODUCTION COMMUNICATION	1-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT SWITCH HEIGHT	
PS	PRODUCTION COMMUNICATION SPEAKER STATION	4-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT SWITCH HEIGHT	
R1	RECEPTACLE PANEL, TYPE 1	8"X8"X4" NEMA 1 ENCLOSURE WITH OVERSIZED FLUSH COVER	FLUSH MOUNT IN WALL AT RECEPTACLE HEIGHT	
R2	RECEPTACLE PANEL, TYPE 2	12"X12"X4" NEMA 1 ENCLOSURE WITH OVERSIZED FLUSH COVER	FLUSH MOUNT IN WALL AT RECEPTACLE HEIGHT	
R3	RECEPTACLE PANEL, TYPE 3	3-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT RECEPTACLE HEIGHT	
R4	RECEPTACLE PANEL, TYPE 4	8"X8"X4" NEMA 1 ENCLOSURE WITH OVERSIZED FLUSH COVER	FLUSH MOUNT IN WALL AT RECEPTACLE HEIGHT	
R5	RECEPTACLE PANEL, TYPE 5	3-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT RECEPTACLE HEIGHT	
R6	RECEPTACLE PANEL, TYPE 6	12"X12"X4" NEMA 1 ENCLOSURE WITH OVERSIZED FLUSH COVER	FLUSH MOUNT IN WALL AT RECEPTACLE HEIGHT	
S1	CEILING LOUDSPEAKER, TYPE 1	4" SQUARE METAL BOX WITH COVER	MOUNT ABOVE FINISHED CEILING AT LOUDSPEAKER LOCATION	
S2	WALL MOUNTED LOUDSPEAKER, TYPE 2	1-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT 7'-0" AFF	
S3	CEILING LOUDSPEAKER, GYMNASIUM - TYPE 3	4" SQUARE METAL BOX WITH COVER	MOUNT TO STRUCTURE ABOVE LOUDSPEAKER LOCATION	
S4	CEILING LOUDSPEAKER, TYPE 4	4" SQUARE METAL BOX WITH COVER	MOUNT ABOVE FINISHED CEILING AT LOUDSPEAKER LOCATION	
S5	CEILING LOUDSPEAKER, TYPE 5	4" SQUARE METAL BOX WITH COVER	MOUNT FLUSH IN CEILING AT LOUDSPEAKER LOCATION	
SS	VIDEO PROJECTOR SCREEN SWITCH	1-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT SWITCH HEIGHT	
T1	WALL-MOUNTED TOUCH PANEL	3-GANG DEEP METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT SWITCH HEIGHT	
V1	CEILING-MOUNTED VIDEO PROJECTOR, TYPE 1	4" SQUARE METAL BOX WITH COVER	MOUNT TO STRUCTURE ABOVE VIDEO PROJECTOR LOCATION	
V2	WALL-MOUNTED VIDEO PROJECTOR, TYPE 2	4" SQUARE METAL BOX WITH COVER	FLUSH MOUNT IN WALL AT 16'-6" AFF	
V3	CEILING-MOUNTED VIDEO PROJECTOR, TYPE 3	4" SQUARE METAL BOX WITH COVER	FLUSH MOUNT IN CEILING AT PROJECTOR LOCATION	
VC	WALL-MOUNTED AUDIO VOLUME CONTROL	1-GANG DEEP METAL BOX	FLUSH MOUNT IN WALL AT SWITCH HEIGHT UNLESS NOTED OTHERWISE	

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME

AV SYSTEMS - SYMBOLS AND LEGENDS

PROJECT NO. 1722

DRAWING NO.

AV000

1 AV SYSTEMS FLOOR PLAN - FLOOR 1 - C

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

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

10/18/2019

REVISIONS

No.	Date	Description

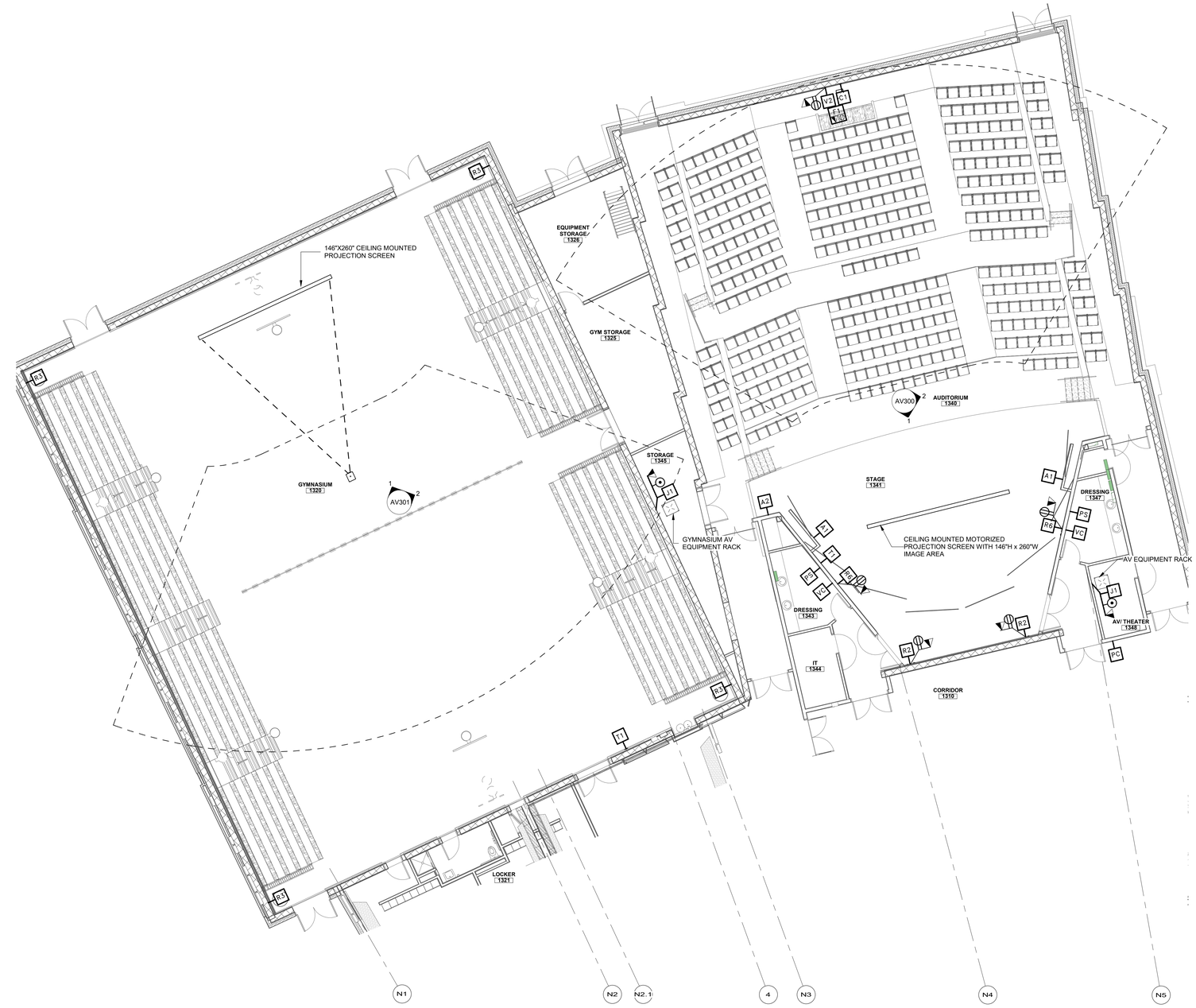
DRAWING NAME

AV SYSTEMS - PLAN
FLOOR 1 - C

PROJECT NO. 1722

DRAWING NO.

AV101C



1 AV SYSTEMS FLOOR PLAN - FLOOR 1 - D

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

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FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME

AV SYSTEMS - PLAN
FLOOR 1 - D

PROJECT NO. 1722

DRAWING NO.

AV101D

1 **AV SYSTEMS RCP - FLOOR 1 - C**
SCALE: 1/8" = 1'-0"

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10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME
AV SYSTEMS - RCP
FLOOR 1 - C

PROJECT NO. 1722

DRAWING NO.
AV201C

1 AV SYSTEMS RCP - FLOOR 1 - D

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

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PROJECT STATUS

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10/18/2019

REVISIONS

No.	Date	Description

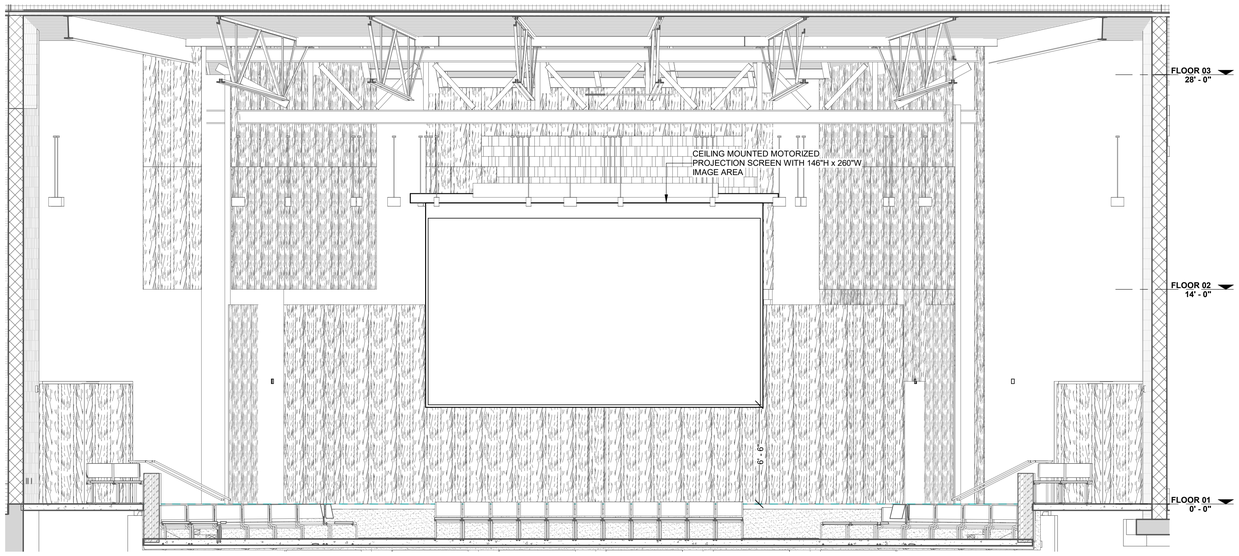
DRAWING NAME

AV SYSTEMS - RCP
FLOOR 1 - D

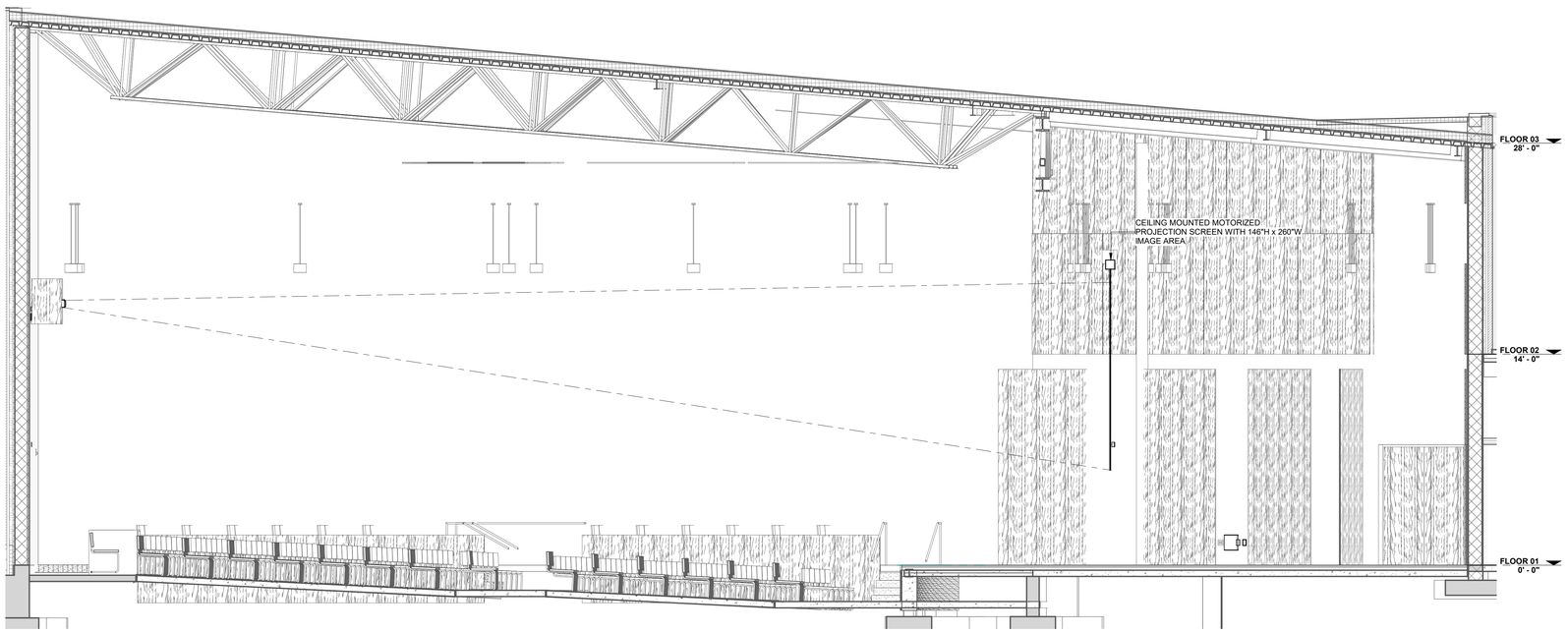
PROJECT NO. 1722

DRAWING NO.

AV201D



1 AUDITORIUM 1340-SOUTH
SCALE: 1/4" = 1'-0"



2 AUDITORIUM 1340-EAST
SCALE: 1/4" = 1'-0"

LOUDSPEAKER RIGGING NOTES:

1. DESIGN THE LOUDSPEAKER CLUSTER MOUNTS USED TO ATTACH THEM TO THE SUPERSTRUCTURE. PROVIDE DRAWING OR DRAWINGS, THAT HAVE BEEN SEALED BY A STRUCTURAL ENGINEER, LICENSED IN THE STATE OF THIS PROJECT DETAILING THE LOUDSPEAKER SYSTEM MOUNTING TO THE ARCHITECT AND THE CONSULTANT FOR APPROVAL PRIOR TO PURCHASE OR FABRICATION OF MOUNTS OR INSTALLATION OF THE LOUDSPEAKERS.
2. COORDINATE EXACT LOCATION OF THE RIGGING POINTS WITH THE ARCHITECT. NOTIFY ARCHITECT AND AUDIOVISUAL CONTRACTOR, OF ANY DISCREPANCIES WITH AUDIOVISUAL DRAWINGS IMMEDIATELY FOR CONFLICT RESOLUTION.
3. TAKE INTO ACCOUNT ALL SAFETY FACTORS, KNOT EFFICIENCIES, LOAD ANGLES, AND ALL HARDWARE AND WIRE ROPE LOAD RATINGS WHEN DESIGNING RIGGING SYSTEM.
4. EMPLOY STANDARD SAFE RIGGING PRACTICES.
5. VERIFY ALL CONNECTIONS (INCLUDING SHACKLE TIGHTNESS) BEFORE LIFTING LOAD. REPLACE ANY DEFECTIVE HARDWARE. APPLY LOAD AND VERIFY ALL CONNECTIONS JUST OFF THE GROUND (PRIOR TO LIFTING INTO FINAL POSITION).
6. USE ONLY FORGED HARDWARE IN RIGGING SYSTEM. PROVIDE ONLY SHOULDER OR PAD TYPE EYE BOLTS AND SAE GRADE 8 BOLTS.
7. USE PACKING WASHERS AS NECESSARY TO CENTER NARROW LOADS WHERE APPLICABLE.
8. WRAP OR PAD CORNERS OF BEAMS IN ANY BEAM WRAP TYPE CONDITIONS WITH NEOPRENE OR BURLAP OR OTHER APPROVED MEANS.
9. ALL AIRCRAFT CABLES SHALL BE SECURED USING NICROPRESS FITTINGS AND THIMBLES. PROVIDE FORGED EYE BOLTS AND FORGED EYE PADS AS REQUIRED.
10. PROVIDE SEPARATE SAFETY CABLE, SIZED AS REQUIRED, AFFIXED TO INDEPENDENT SUPERSTRUCTURE AND DEVICE ATTACHMENT POINTS.
11. SAFETY CABLE LINE(S) ARE TO BE TAUT (NO SLACK ALLOWED).
12. USE A SAFETY FACTOR OF NO LESS THAN (5) FOR EACH SUSPENSION POINT ON THE LOAD AND ON BUILDING SUPERSTRUCTURE ATTACHMENT POINTS. PROVIDE INDIVIDUAL SAFETY CABLES ON EACH LOUDSPEAKER TO INDEPENDENT SUSPENSION POINT. VERIFY EXACT WEIGHT OF LOUDSPEAKER CLUSTERS WITH HARDWARE PRIOR TO FABRICATION OR PURCHASE OF MOUNTING HARDWARE.
13. ALL LOUDSPEAKER CLUSTERS SHALL BE MOUNTED WITH ATM FLYWARE TYPE MOUNTING HARDWARE OR APPROVED EQUAL AND SUSPENDED WITH MINIMUM 1/16" AIRCRAFT CABLE (OR APPROVED EQUAL) OR AS REQUIRED TO SUPPORT LOAD.
14. RIGGING MOUNTING SYSTEM SHALL PROVIDE +/- 5° UP/DOWN AND LEFT/RIGHT FIELD ADJUSTMENT ON EACH LOUDSPEAKER.
15. SUPPLY MOUNTING RIGGING COMPONENTS IN FINISH APPROVED BY THE ARCHITECT.

LOUDSPEAKER NOTES:

1. LOUDSPEAKER LAYOUTS SHOWN ON AUDIOVISUAL DRAWINGS ARE CONCEPTUAL AND ARE FOR ILLUSTRATIVE PURPOSE ONLY.
2. EXACT LOUDSPEAKER MOUNTING & AIMING DETAILS TO BE COORDINATED BETWEEN AV CONSULTANT AND AV CONTRACTOR.
3. PROVIDE ATTACHMENT POINTS FOR LOUDSPEAKER RIGGING IF NECESSARY.
4. LOOSELY AFFIX LOUDSPEAKER CABLE TO AIRCRAFT CABLE.
5. STRUCTURAL MEMBERS ARE NOT BE ALLOWED WITHIN THE COVERAGE PATTERN OF THE HIGH FREQUENCY COMPONENTS IN THE LOUDSPEAKER SYSTEM.
6. AUDIOVISUAL SYSTEM CONTRACTOR PROVIDES ALL MOUNTING HARDWARE, INCLUDING WIRE, ROPE, TURNBUCKLES, CRIMPS, ETC. FOR A COMPLETE MOUNTING SYSTEM.
7. PAINT LOUDSPEAKER CABINETS, GRILLES AND MOUNTING HARDWARE AS REQUIRED. COORDINATE EXACT FINISHES WITH ARCHITECT AND CONSULTANT PRIOR TO PAINTING. REMOVE SPEAKER GRILLES AND PAINT SEPARATELY AND PROTECT LOUDSPEAKER COMPONENTS.

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31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
10/18/2019

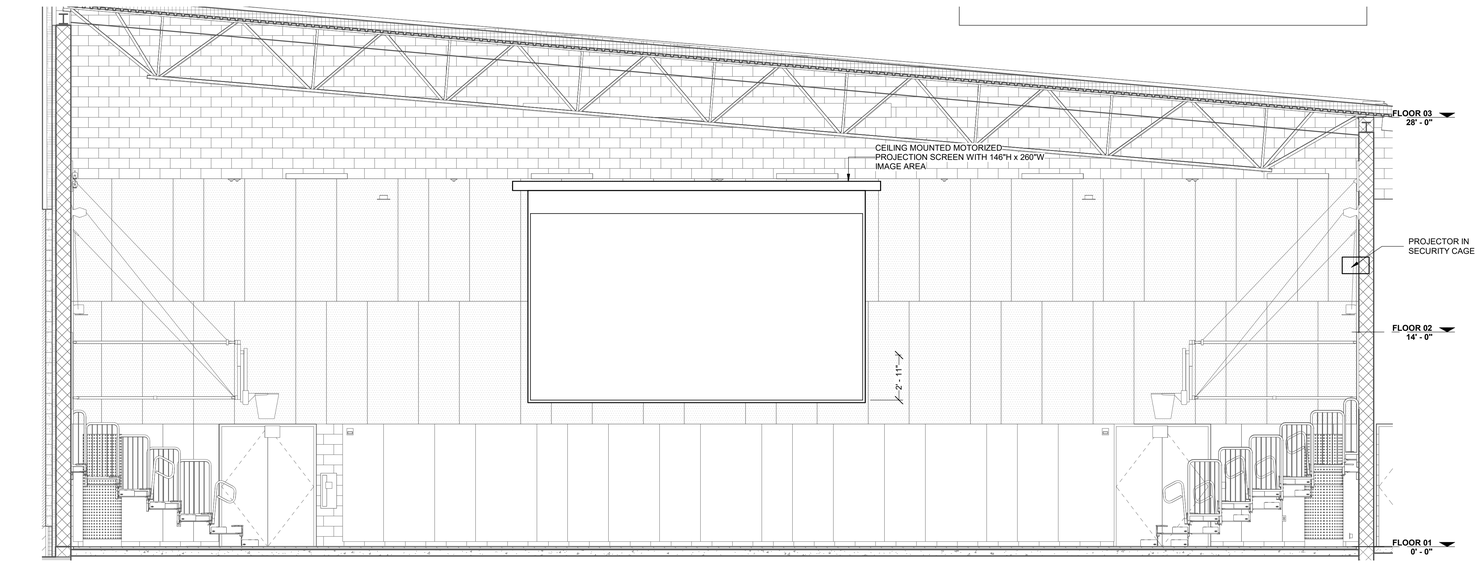
REVISIONS

No.	Date	Description

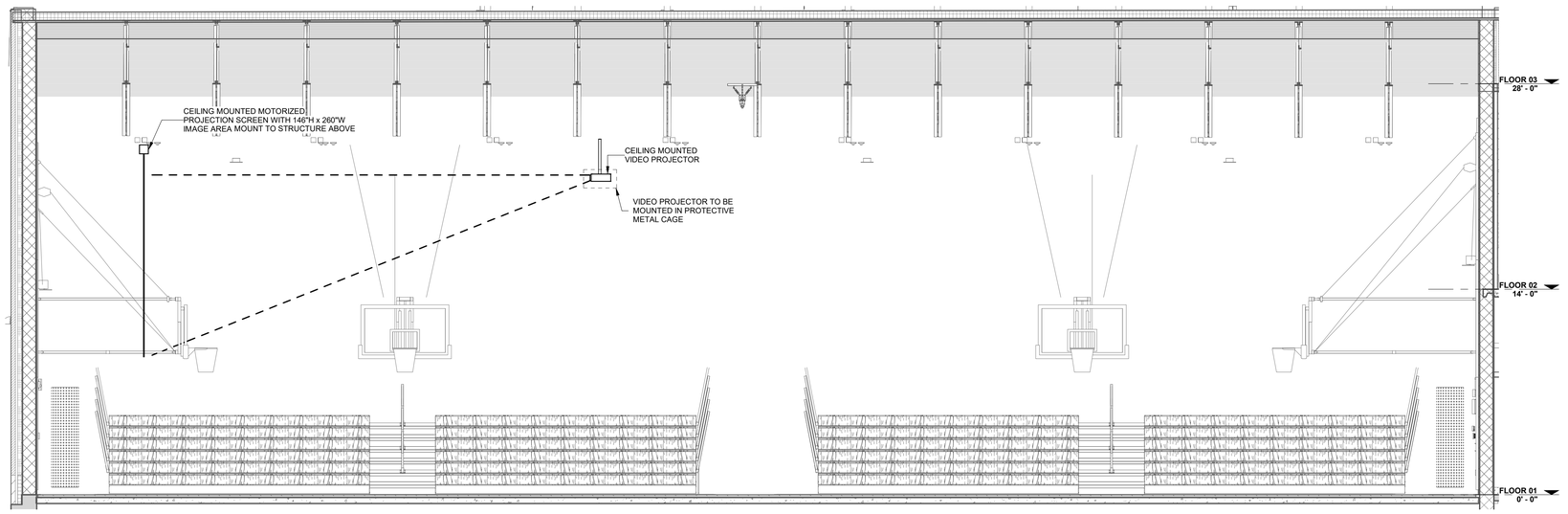
DRAWING NAME
AV SYSTEMS - INTERIOR ELEVATIONS AUDITORIUM

PROJECT NO. 1722

DRAWING NO.
AV300



1 **GYMNASIUM 1320-NW**
SCALE: 1/4" = 1'-0"



2 **GYMNASIUM 1320-NE**
SCALE: 1/4" = 1'-0"

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31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

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10/18/2019

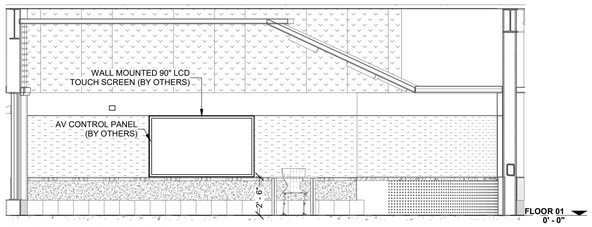
REVISIONS

No.	Date	Description

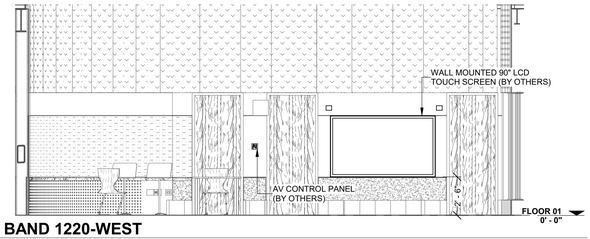
DRAWING NAME
AV SYSTEMS - INTERIOR ELEVATIONS GYM

PROJECT NO. 1722

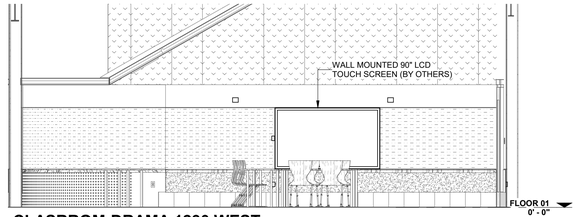
DRAWING NO.
AV301



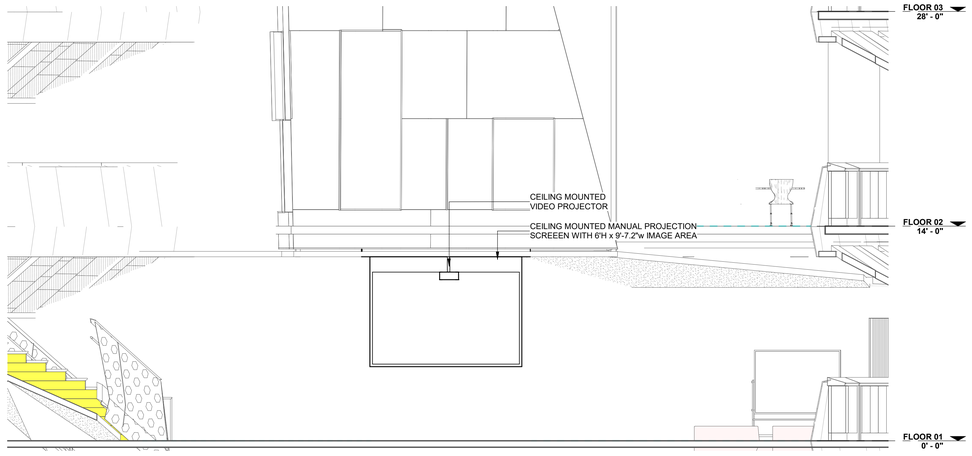
1 **CHORUS 1224-EAST**
SCALE: 1/4" = 1'-0"



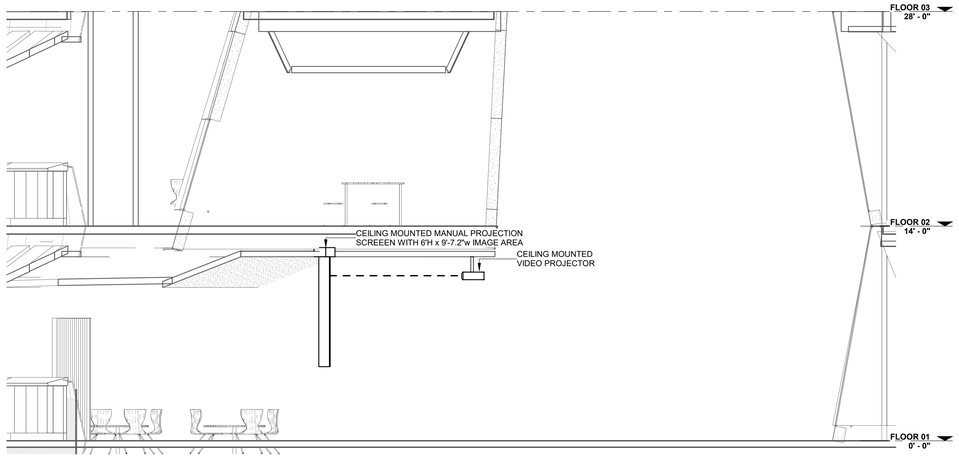
2 **BAND 1220-WEST**
SCALE: 1/4" = 1'-0"



3 **CLASRROM-DRAMA 1230 WEST**
SCALE: 1/4" = 1'-0"



4 **LEARNING COMMONS SCREEN ELEVATION**
SCALE: 1/4" = 1'-0"



5 **LEARNING COMMONS SIDE ELEVATION**
SCALE: 1/4" = 1'-0"

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FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

10/18/2019

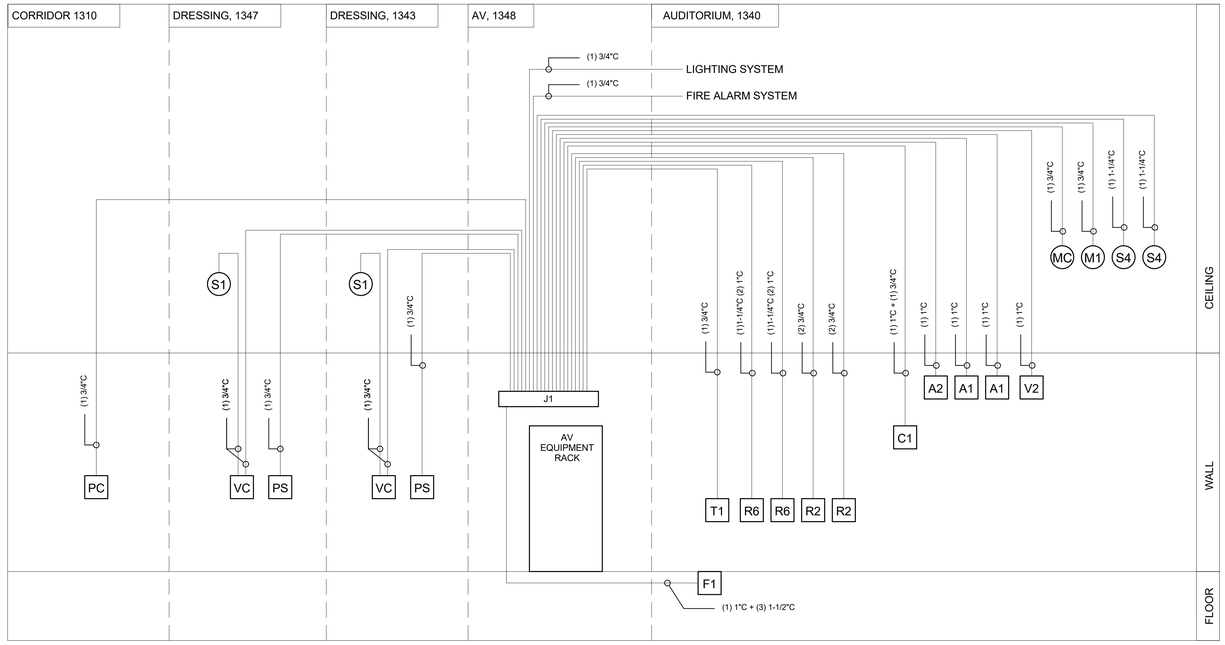
REVISIONS

No.	Date	Description

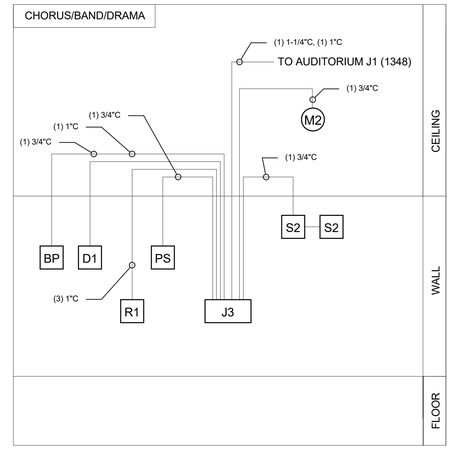
DRAWING NAME
AV SYSTEMS - INTERIOR ELEVATIONS

PROJECT NO. 1722

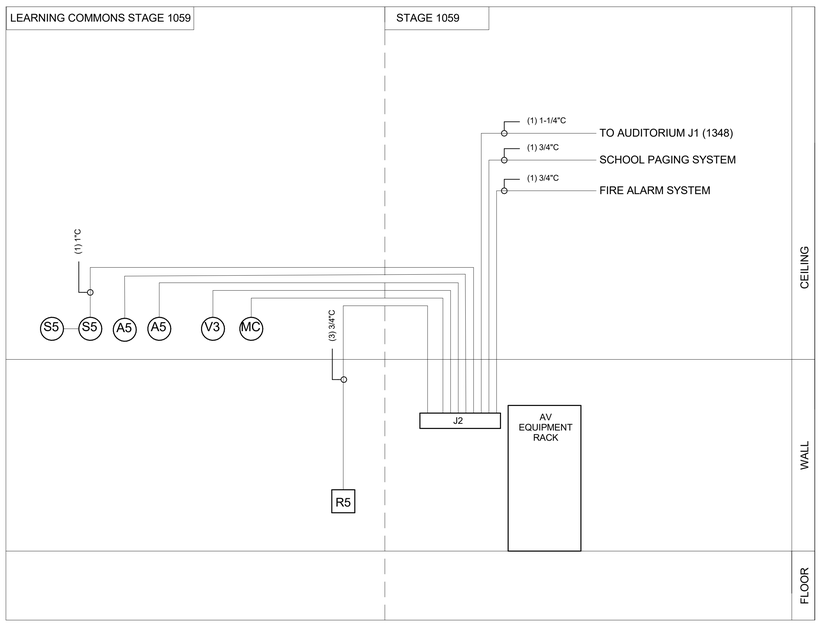
DRAWING NO.
AV303



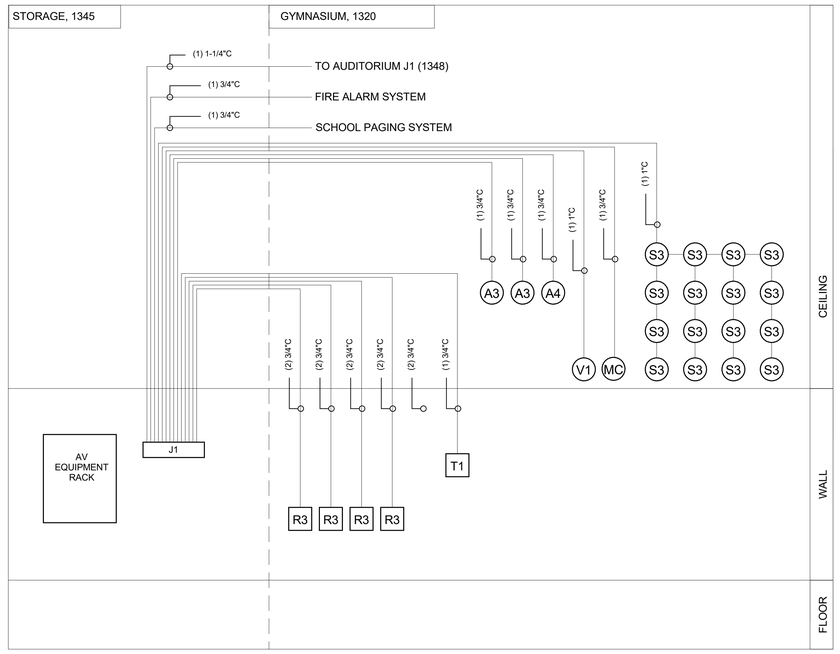
1 **AV RISER - AUDITORIUM**
SCALE: NOT TO SCALE



2 **AV RISER - BAND, CHORUS AND DRAMA**
SCALE: NOT TO SCALE



4 **AV RISER - CAFETERIA / LEARNING COMMONS**
SCALE: NOT TO SCALE



5 **AV RISER - GYMNASIUM**
SCALE: NOT TO SCALE

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FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% CD MSBA Submission
10/18/2019

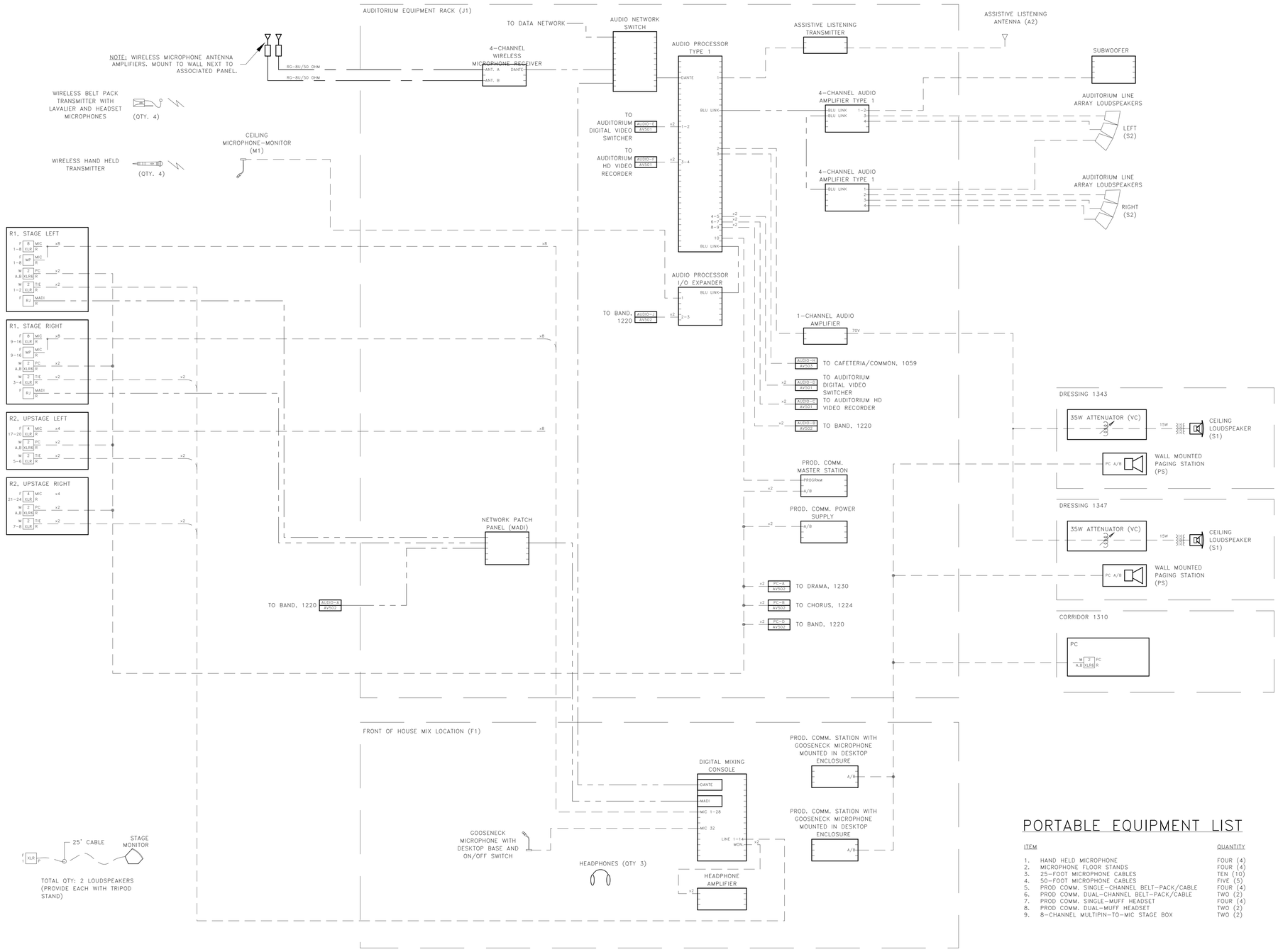
REVISIONS

No.	Date	Description

DRAWING NAME
AV SYSTEMS - CONDUIT RISER DIAGRAMS

PROJECT NO. 1722

DRAWING NO.
AV400



PORTABLE EQUIPMENT LIST

ITEM		QUANTITY
1.	HAND HELD MICROPHONE	FOUR (4)
2.	MICROPHONE FLOOR STANDS	FOUR (4)
3.	25-FOOT MICROPHONE CABLES	TEN (10)
4.	50-FOOT MICROPHONE CABLES	FIVE (5)
5.	PROD COMM. SINGLE-CHANNEL BELT-PACK/CABLE	FOUR (4)
6.	PROD COMM. DUAL-CHANNEL BELT-PACK/CABLE	TWO (2)
7.	PROD COMM. SINGLE-MUFF HEADSET	FOUR (4)
8.	PROD COMM. DUAL-MUFF HEADSET	TWO (2)
9.	8-CHANNEL MULTIPIN-TO-MIC STAGE BOX	TWO (2)

1 **AUDIOTORIUM AUDIO FUNCTIONAL**
SCALE: NOT TO SCALE

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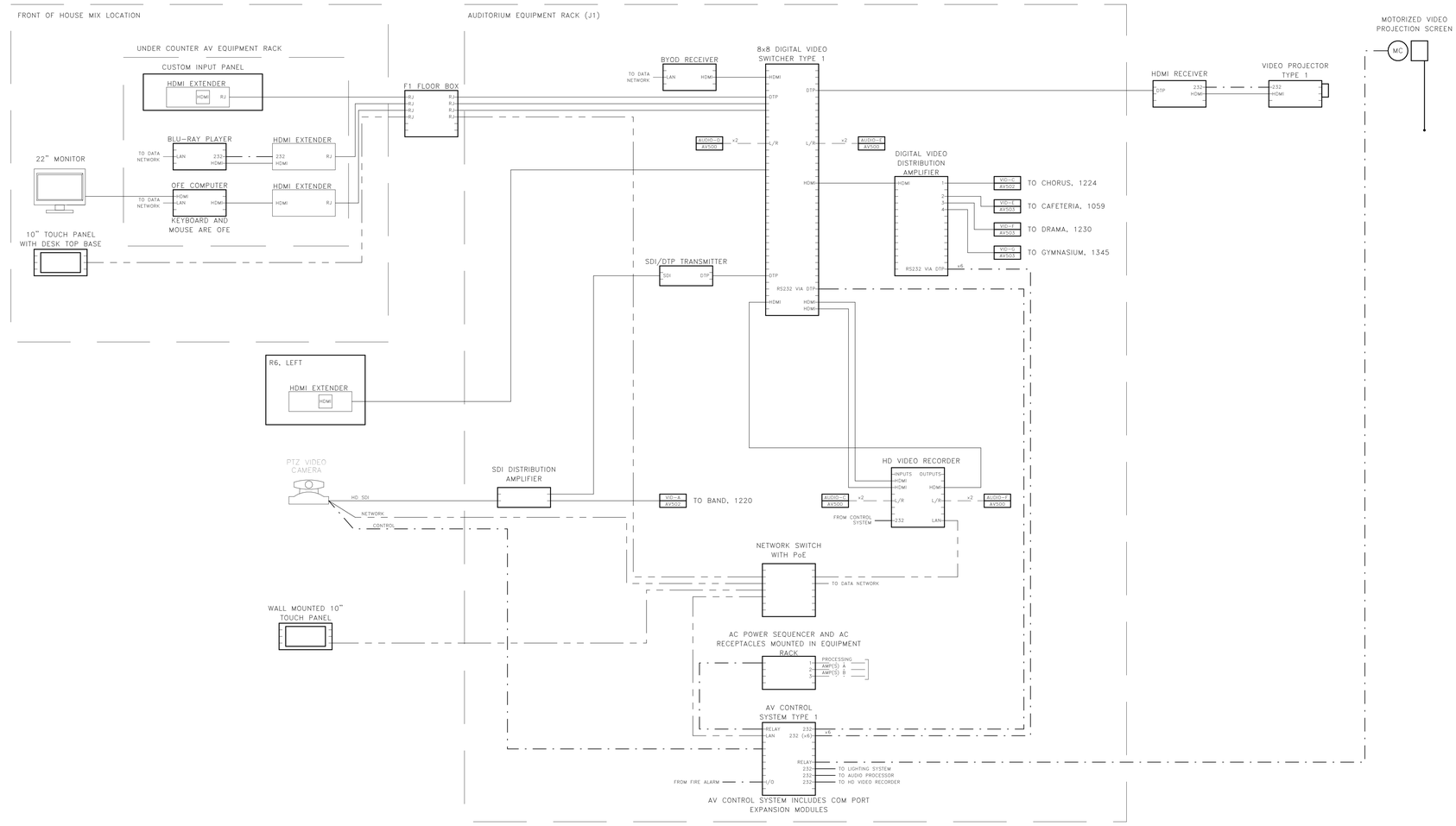
REVISIONS

No.	Date	Description

DRAWING NAME
AV SYSTEMS - AUDITORIUM AUDIO FUNCTIONAL DIAGRAM

PROJECT NO. 1722

DRAWING NO.
AV500



1 AUDITORIUM VIDEO FUNCTIONAL

SCALE: 12" = 1'-0"

ACENTECH
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REVISIONS

No.	Date	Description

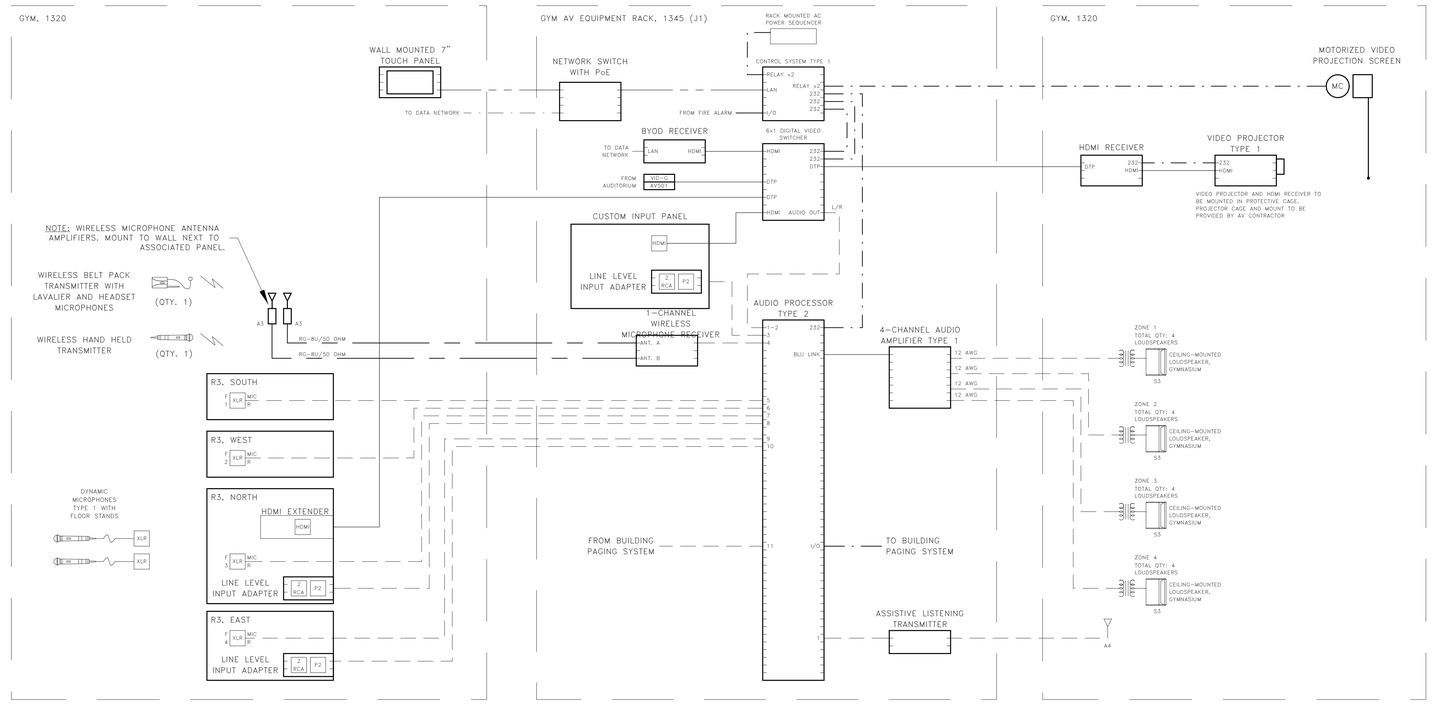
DRAWING NAME

AV SYSTEMS - AUDITORIUM VIDEO FUNCTIONAL DIAGRAM

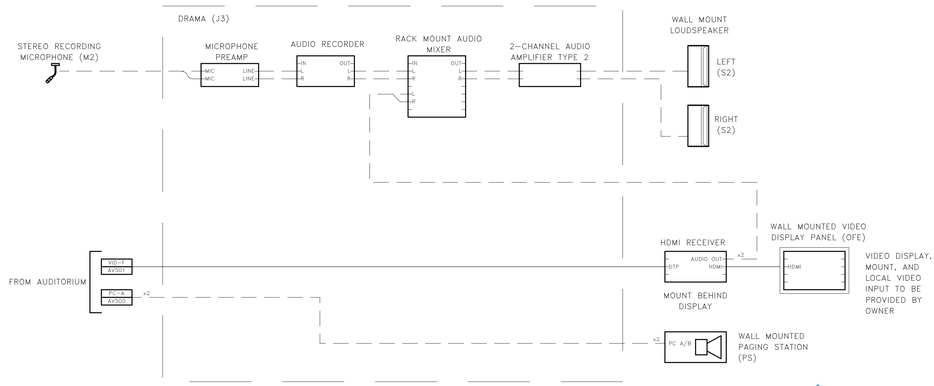
PROJECT NO. 1722

DRAWING NO.

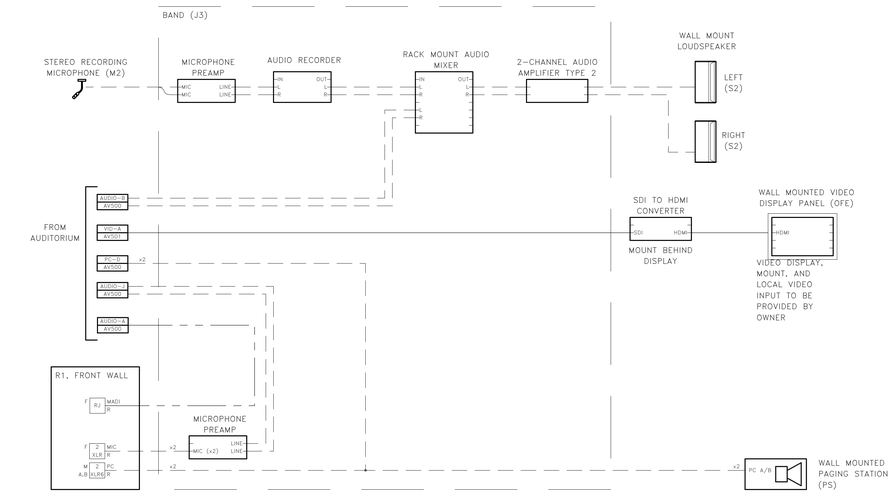
AV501



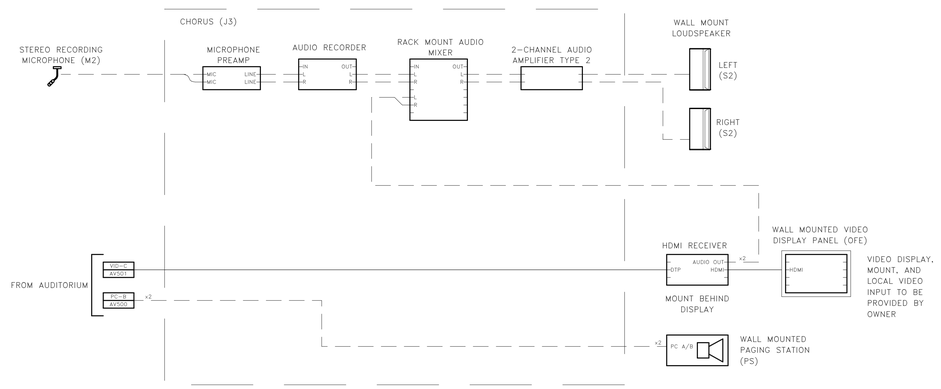
1 GYMNASIUM FUNCTIONAL
SCALE: NOT TO SCALE



4 DRAMA FUNCTIONAL
SCALE: NOT TO SCALE



3 BAND FUNCTIONAL
SCALE: NOT TO SCALE



2 CHORUS FUNCTIONAL
SCALE: NOT TO SCALE

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No.	Date	Description

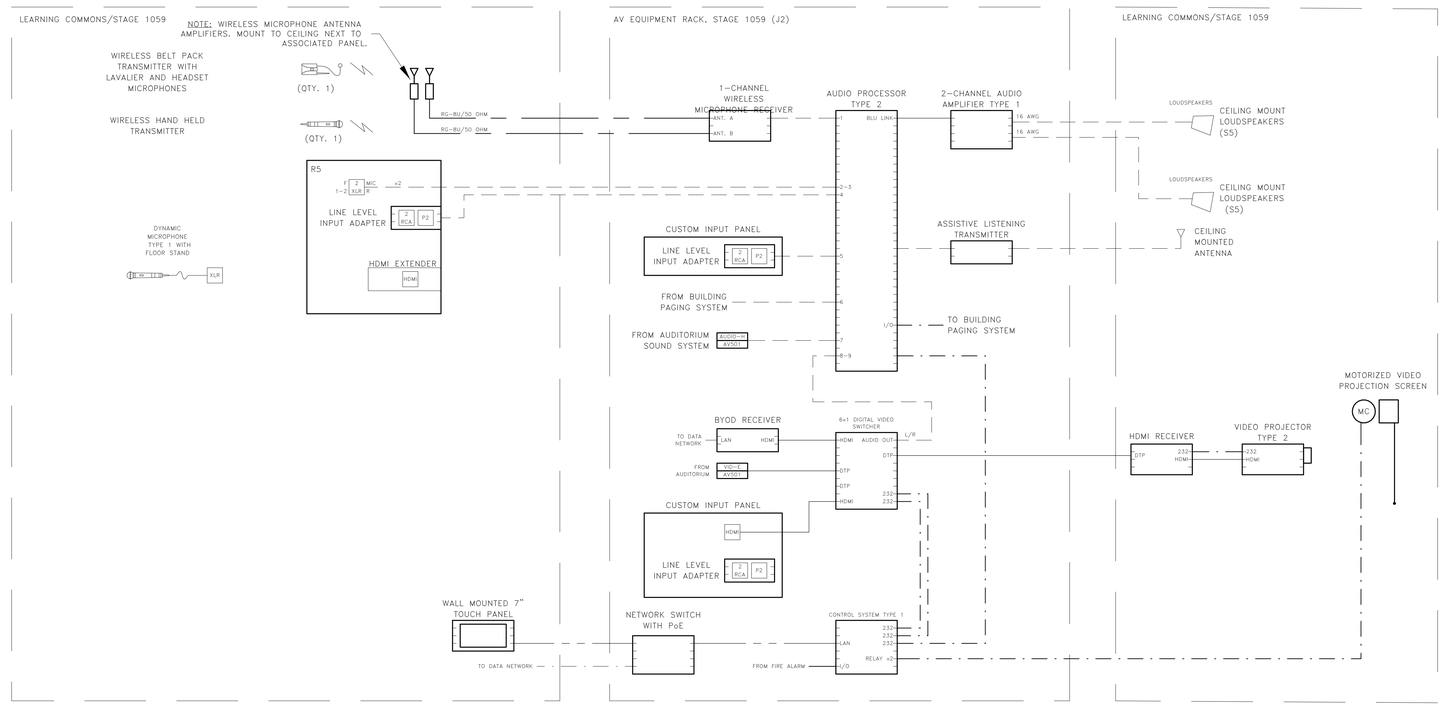
DRAWING NAME

AV SYSTEMS - FUNCTIONAL DIAGRAMS 2

PROJECT NO. 1722

DRAWING NO.

AV502



1 LEARNING COMMONS FUNCTIONAL
SCALE: NOT TO SCALE

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No.	Date	Description

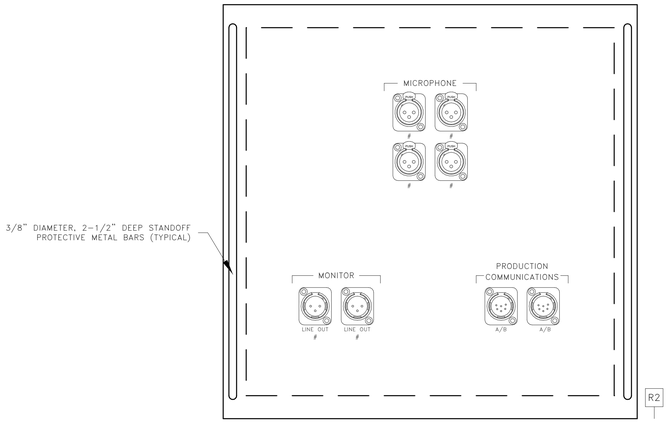
DRAWING NAME

AV SYSTEMS - FUNCTIONAL DIAGRAMS 3

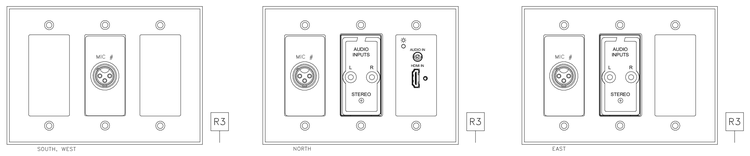
PROJECT NO. 1722

DRAWING NO.

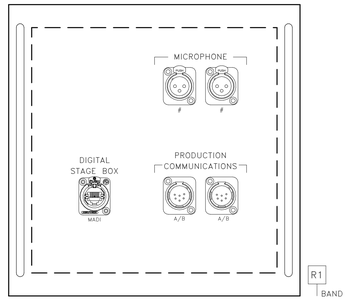
AV503



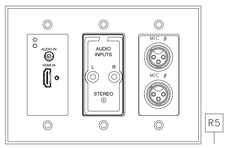
1 **PLATE DETAIL - R2-AUDITORIUM**
SCALE: NOT TO SCALE



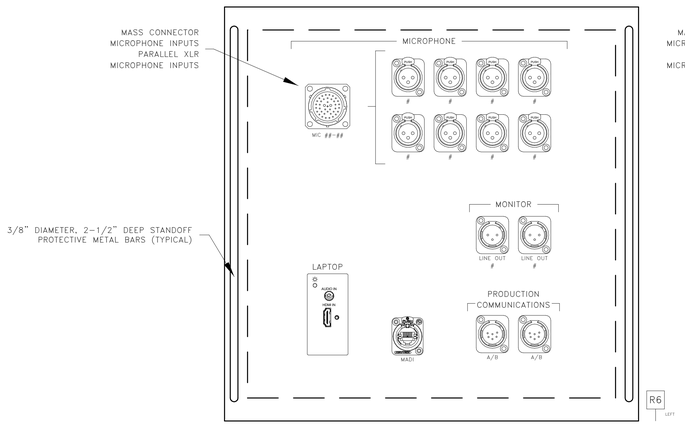
2 **PLATE DETAIL - R3-GYMNASIUM**
SCALE: NOT TO SCALE



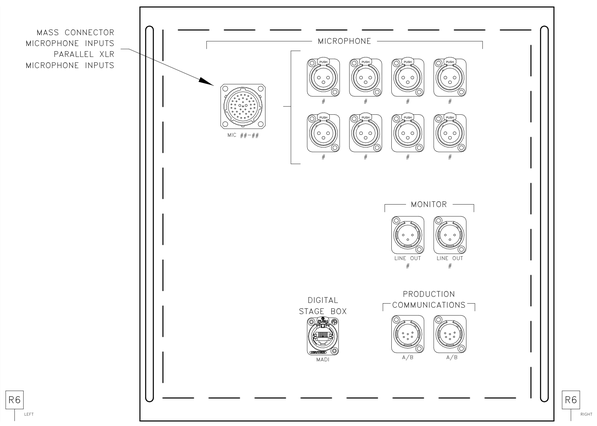
3 **PLATE DETAIL - R1-BAND**
SCALE: NOT TO SCALE



4 **PLATE DETAIL - R5-CAFETERIA / COMMONS**
SCALE: NOT TO SCALE



5 **PLATE DETAIL - R6-AUDITORIUM**
SCALE: NOT TO SCALE



6 **PLATE DETAIL - ID PANEL**
SCALE: NOT TO SCALE

ACENTECH
ACOUSTICS ANTISECURITY VIBRATION
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d 617 499 8000

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% CD MSBA Submission

10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME
AV SYSTEMS - RACKS AND PLATE DETAILS

PROJECT NO. 1722

DRAWING NO.
AV600

GA (GENERAL ARRANGEMENT) DRAWINGS ARE DESIGN DEVELOPMENT DRAWINGS PREPARED FOR THE USE AND REFERENCE OF THE DESIGN TEAM, OWNER, AND TENANTS. GA DRAWINGS DO NOT APPEAR IN CONSTRUCTION DOCUMENTS. THE INFORMATION CONTAINED HEREIN WILL BE TRANSFERRED TO ARCHITECTURAL AND ENGINEERING DRAWINGS AS CONSTRUCTION DOCUMENTS ARE DEVELOPED. TE, TS, AND TL DRAWINGS ARE CONSTRUCTION DOCUMENTS DRAWINGS.

1 GENERAL ARRANGEMENT NOTES
NTS

1. ALL CONDUIT, BACK BOXES, PULL BOXES, WIREWAYS, CABLE TRAYS, AND CABLE MANAGEMENT DEVICES ARE SPECIFIED AND PROVIDED UNDER DIVISION 26, UNLESS NOTED OTHERWISE. SIZES OF ALL JUNCTION BOXES AND BACK BOXES FOR DIVISION 11 EQUIPMENT ARE TO BE CONFIRMED BY THE EQUIPMENT MANUFACTURER.
2. ALL ELECTRICAL SERVICES ARE SPECIFIED AND PROVIDED UNDER DIVISION 26, UNLESS NOTED OTHERWISE.
3. PERFORMANCE DIMMING AND CONTROLS ARE SPECIFIED AND PROVIDED UNDER DIVISION 26.
4. MATERIAL AND EQUIPMENT SCHEDULES ARE PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR. VERIFY ALL QUANTITIES AND PROVIDE ALL REQUIRED MATERIAL, WHETHER SCHEDULED OR NOT.

2 GENERAL NOTES
NTS

TE000 THEATRE EQUIPMENT: DRAWING INDEX, TYPICAL ABBREVIATIONS, SYMBOLS, AND KEYS
TE101 THEATRE EQUIPMENT: COORDINATION ZONES
TE111 THEATRE EQUIPMENT: THEATRE PLAN
TE112 THEATRE EQUIPMENT: THEATRE RCP
TE121 THEATRE EQUIPMENT: THEATRE CENTERLINE SECTION
TE122 THEATRE EQUIPMENT: THEATRE TRANSVERSE SECTIONS
TE131 NOT USED
TE141 THEATRE EQUIPMENT: SCHEDULES AND DETAILS

TL100 PERFORMANCE LIGHTING: PERFORMANCE LIGHTING POSITIONS
TL111 PERFORMANCE DIMMING AND CONTROL: BOX SCHEDULE AND CONTROL RISER
TL121 PERFORMANCE DIMMING AND CONTROL: FACEPLATE DETAILS

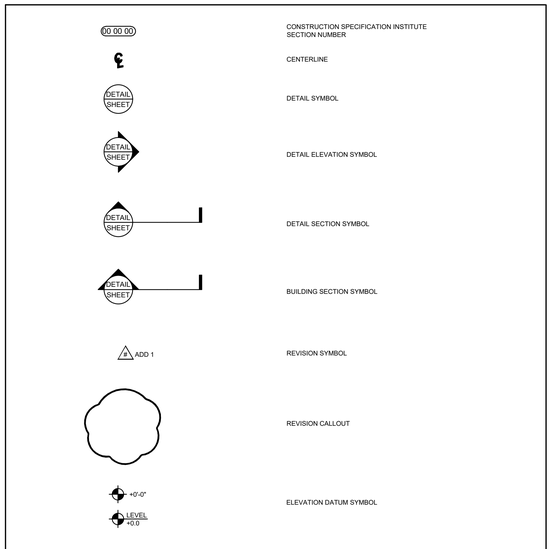
3 DRAWING INDEX
NTS

NOTE:
FALL PROTECTION POTENTIALLY REQUIRED.
FALL PROTECTION SYSTEMS DESIGNED AND PROVIDED BY OTHERS.
ARCHITECT AND ENGINEER SHOULD CONSIDER ACCOMMODATION FOR FALL PROTECTION SYSTEMS.
COORDINATE REQUIREMENTS WITH OWNER
SYSTEMS TO COMPLY WITH RELEVANT CODES AND STANDARDS

@	AT
A	AMPS
AFF	ABOVE FINISHED FLOOR
ALD	ARCHITECTURAL LIGHTING DESIGNER
ARCH	ARCHITECTURAL
AUD	AUDITORIUM
AUX	AUXILIARY
BATS	BRANCH CIRCUIT AUTOMATIC TRANSFER SWITCH
C	CONDUIT
CKT	CIRCUIT
CL	CENTERLINE
CS	COMPANY SWITCH
D	DISCONNECT
DC	DOWN CENTER STAGE
DIA	DIAMETER
DIM	DIMMER
DIV	DIVISION
DMX	DIGITAL MULTIPLEXED LIGHTING CONTROL SIGNAL
DS	DOWNSTAGE
DSL	DOWN STAGE LEFT
DSR	DOWN STAGE RIGHT
DUP	DUPLICATE
DWG	DRAWING
EA	EACH
EE	ELECTRICAL ENGINEER
ELEC	ELECTRICAL
ELEV	ELEVATION
ELTS	EMERGENCY LIGHTING TRANSFER SWITCH
ENET	ETHERNET
EQ	EQUAL
F/S	FOLLOWSPOT
FOH	FRONT OF HOUSE
FRT	FRONT
FS	FORESTAGE
FT	FEET
HL	HOUSE LEFT
HLM	HOUSE LIGHT MASTER
HP	HORSE POWER
HR	HOUSE RIGHT
HVAC	HEATING VENTILATION AND AIR CONDITIONING
I.D.	INSIDE DIAMETER
IFR	INHERENTLY FLAME RETARDANT
IG	ISOLATED GROUND
IMS	INTEGRATED MOTOR STARTER
JB	JUNCTION BOX
KW	KILOWATT
LED	LIGHT EMITTING DIODE
LTG	LIGHTING
MAX	MAXIMUM
MCP	MOTOR CONTROL PANEL
MECH	MECHANICAL
MFR	MANUFACTURER
MIN	MINIMUM
u	MICROSECOND
MS	MICROSECOND
MTD	MOUNTED
MTG	MOUNTING
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
OPP	OPPOSITE
PB	PULL BOX
PCP	PRODUCTION CONTROL PANEL
PERF	PERFORMANCE
PH	PHASE
PL	PERFORMANCE LIGHTING
PNL	PANEL BOARD
PROD	PRODUCTION
PSVC	PERFORMANCE SOUND VIDEO AND COMMUNICATIONS
REF	REFER TO
REQ	REQUIRED
REQ'D	REQUIRED
RFU	REMOTE FOCUS UNIT
SIM	SIMILAR
SL	STAGE LEFT
SMP	STAGE MANAGERS PANEL
SQ	SQUARE
SR	STAGE RIGHT
STRUCT	STRUCTURAL
TBD	TO BE DETERMINED
TYP	TYPICAL
U/S	UNDERSIDE
UC	UP CENTER STAGE
US	UPSTAGE
USL	UP STAGE LEFT
USR	UP STAGE RIGHT
V	VOLT
VAC	VOLTS A.C.
VIF	VERIFY IN FIELD
W/	WITH
WL	WORK LIGHT DEVICE
WLM	WORK LIGHT MASTER

NOTE:
THE ABBREVIATIONS REPRESENTED ARE TYPICAL AND MAY NOT BE USED IN THIS DRAWING SET.

4 TYPICAL ABBREVIATIONS
NTS



5 DRAWING SYMBOLS
NTS

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% Construction Documents
10/18/2019

REVISIONS

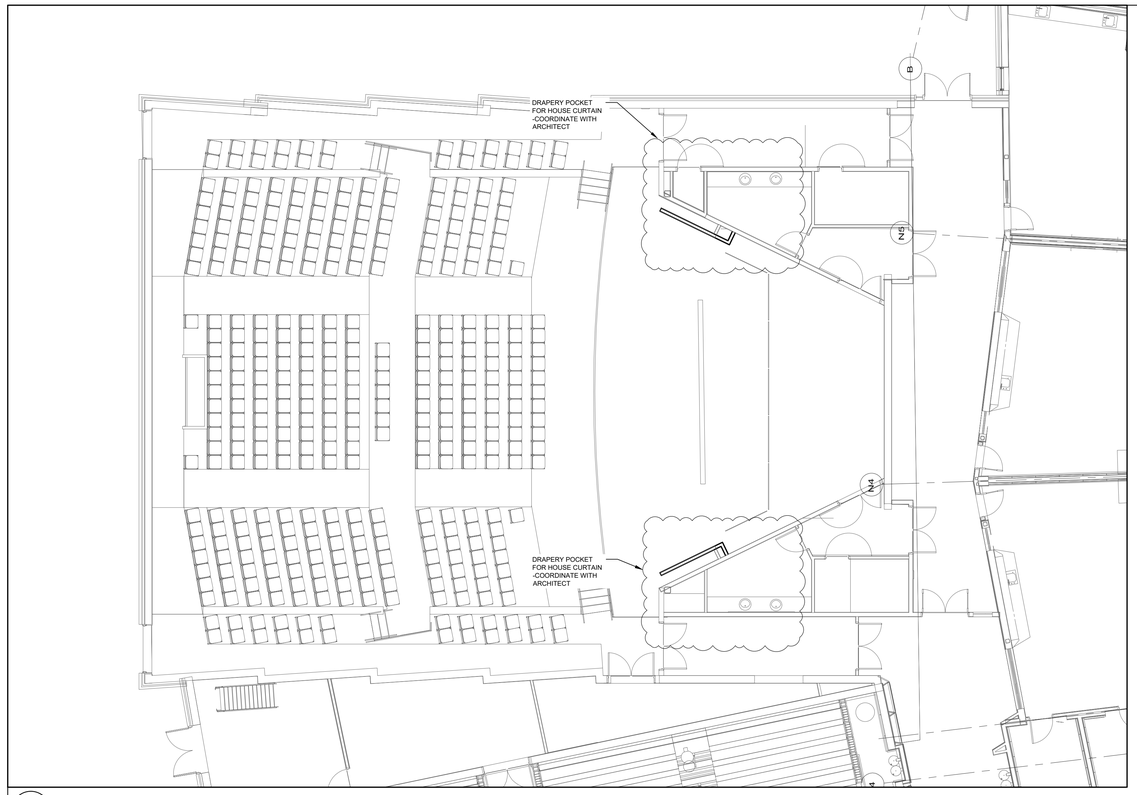
No.	Date	Description

DRAWING NAME
THEATRE EQUIPMENT: DRAWING INDEX, TYPICAL ABBREVIATIONS, SYMBOLS, AND KEYS

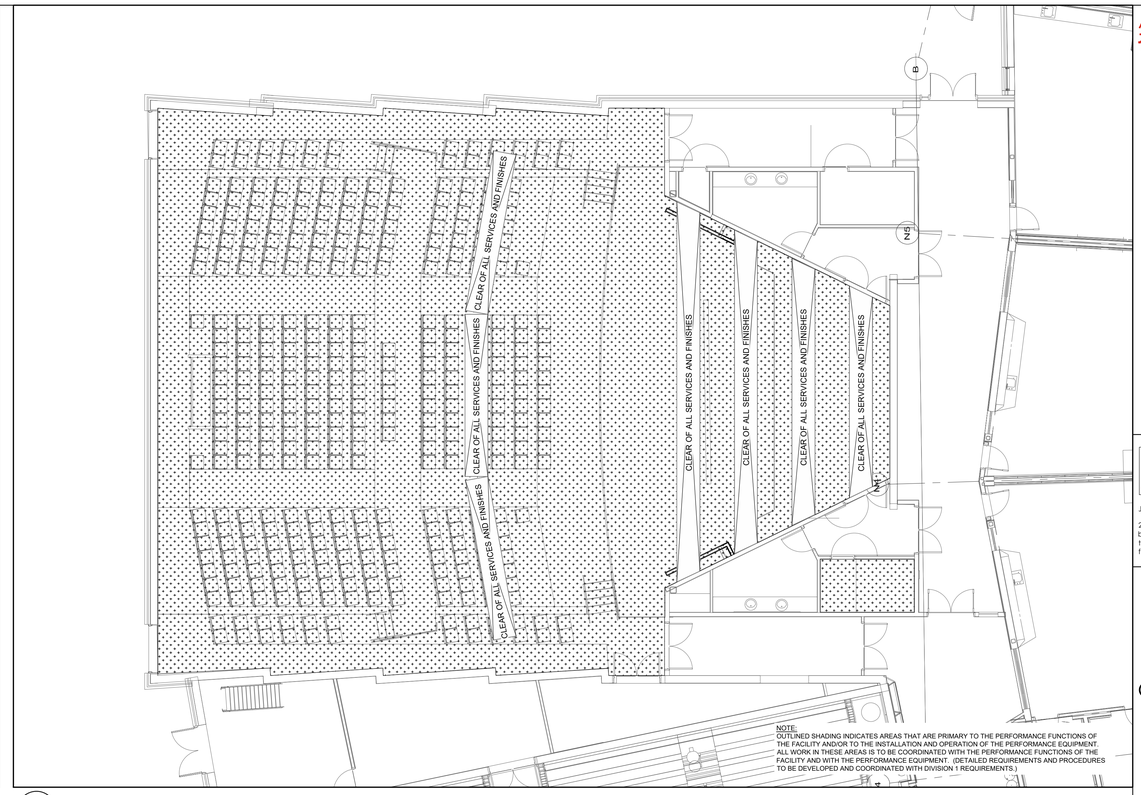
PROJECT NO. 1722

DRAWING NO.
TE000

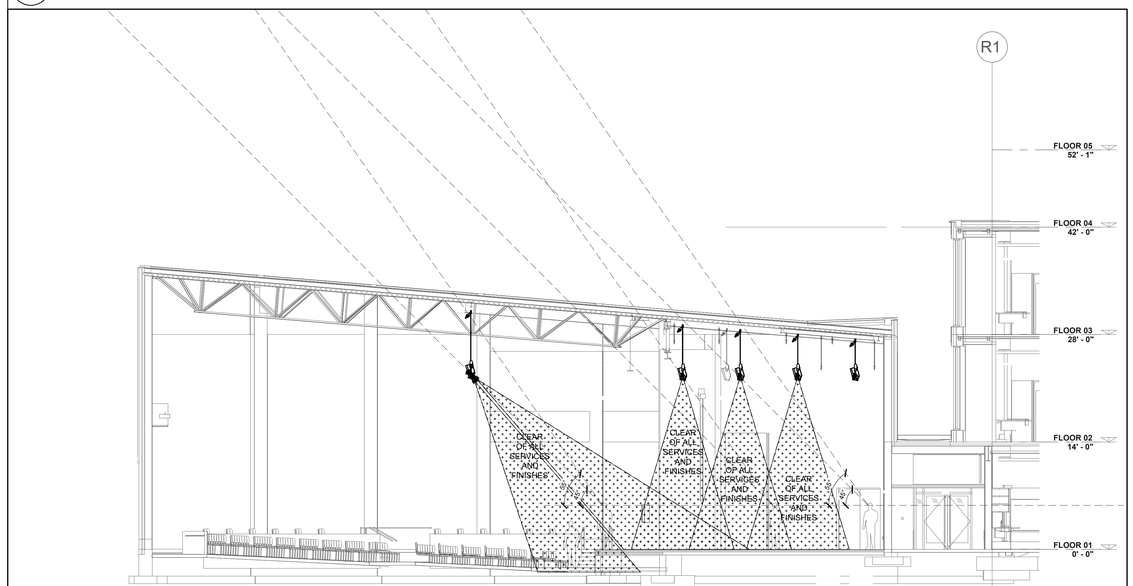
XREFS: 1902TR-ARCH TP-PLAN.RTL TP-ROOF TP-SECTDTL 1902TTR.TL 1902LGHG.XREF
DWG FILE: 1902 FULLER MIDDLE SCHOOL 1902 MASTER TEMPLATE.DWG 10/18/2019 7:04:43 PM EDT



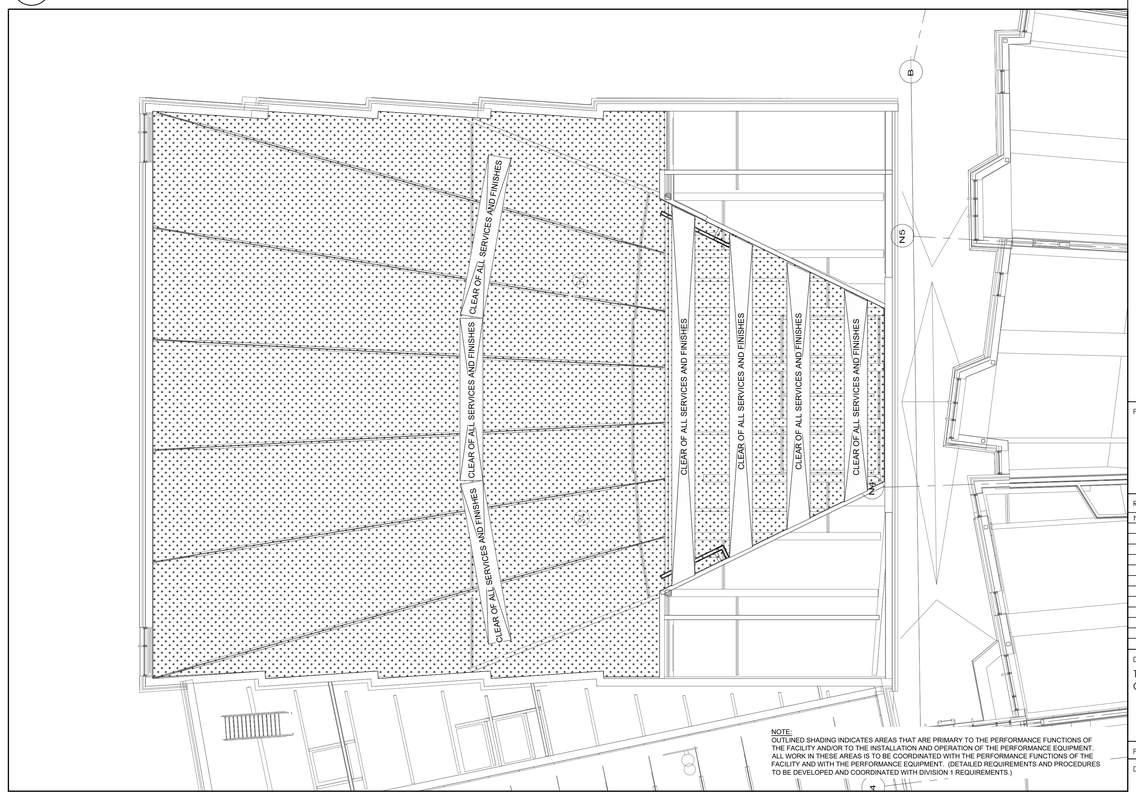
3 COORDINATION - LEVEL 1 PLAN
1/8"=1'-0"



1 COORDINATION ZONES - LEVEL 1 PLAN
1/8"=1'-0"



4 COORDINATION - CENTERLINE SECTION
1/8"=1'-0"



2 COORDINATION ZONES - LEVEL 1 RCP
1/8"=1'-0"

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31 FLAGG DRIVE FRAMINGHAM, MA

PROJECT STATUS

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10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME

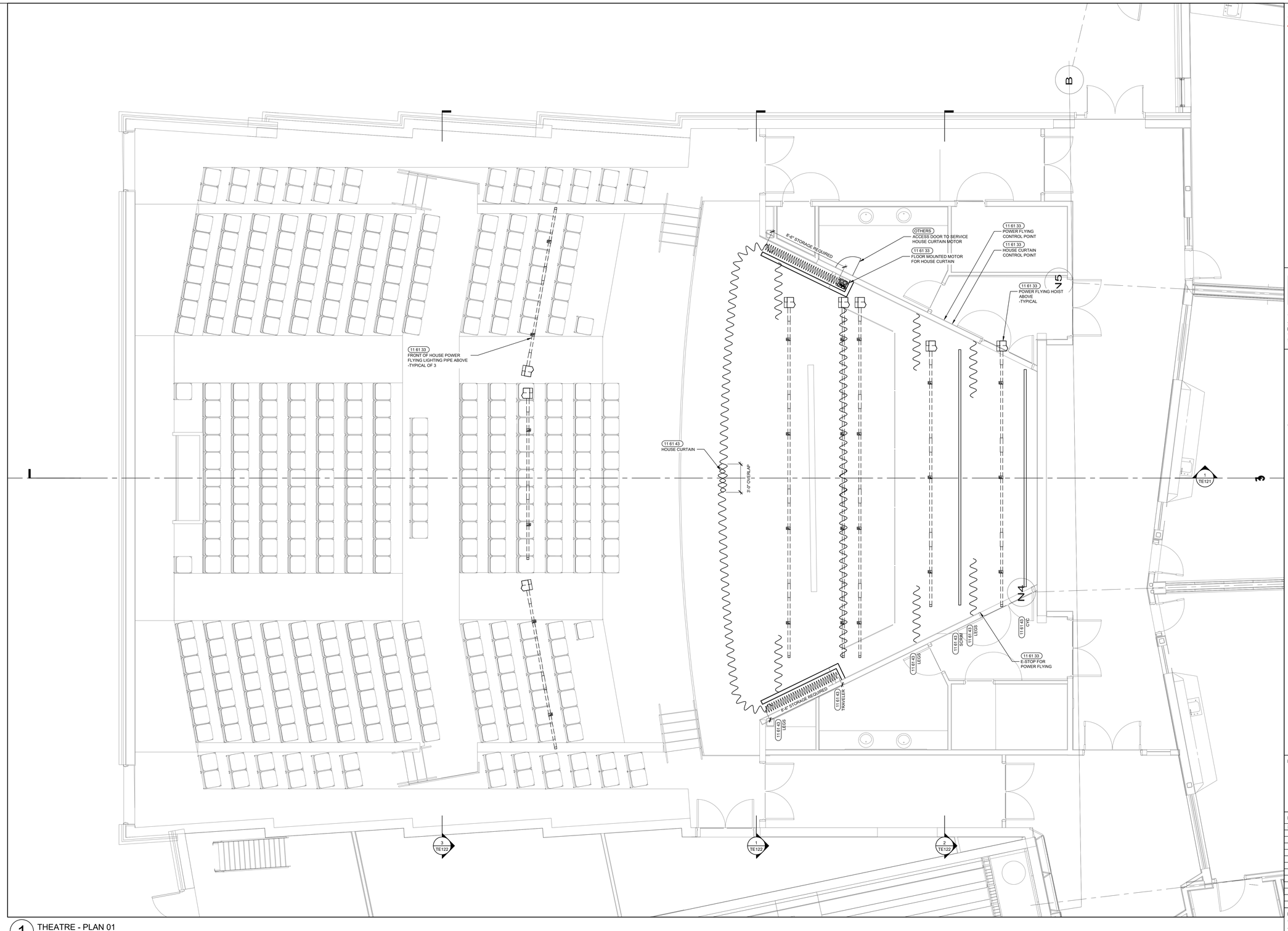
THEATRE EQUIPMENT: COORDINATION ZONES

PROJECT NO. 1722

DRAWING NO.

TE001

XREFS = 19SCETB-XREF; TP-PLAN-01; TP-PCP; TP-SECTION-CL; 19SCETB-T1; 19SCD-GRID-XREF
ZONES TO ALL PROJECT LEVELS EXCEPT ROOF AND AREAS IN MEZZANINES OVER AUDITORIUM



1 THEATRE - PLAN 01
SCALE=1/4"=1'-0"

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10/18/2019

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No.	Date	Description

DRAWING NAME

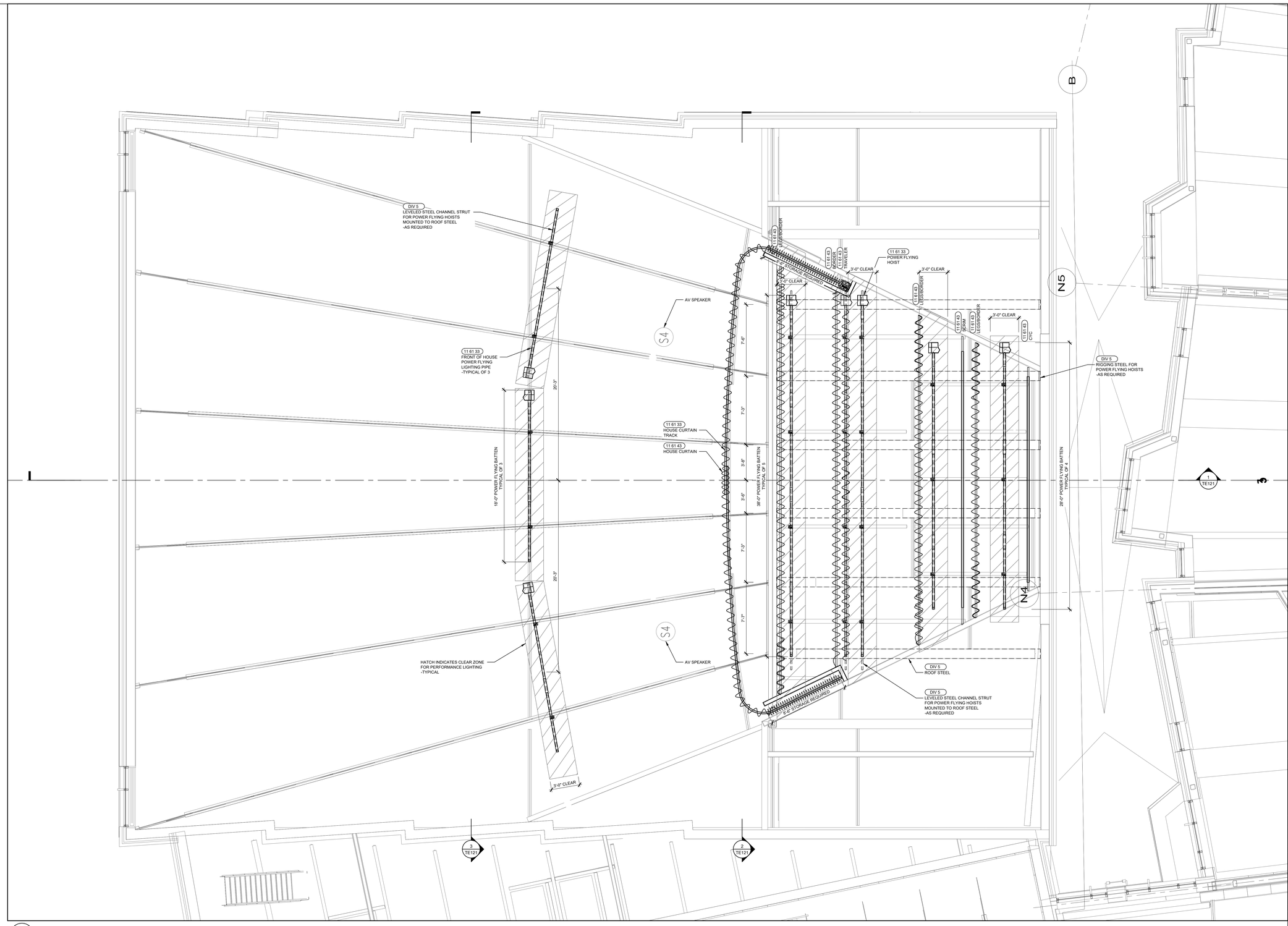
THEATRE EQUIPMENT:
THEATRE PLAN

PROJECT NO. 1722

DRAWING NO.

TE111

XREFS: - 19037B-XREF - TP-PLAN 01 - TP-SECTION 02 - TP-SECTION TRANSVERSE LIVE - TP-PROP - TP-SECTION TRANSVERSE A AISLE - 19052-GRID-XREF - TP-SECTION TRANSVERSE AT FOH PIPE - TP-SECTION TRANSVERSE LIVE WALL LIFE BEAMS
2019.10.4 - 1:\1900\1722.JULES THOMAS SCHOOL\1900-M-2019 V 3.4\1900-TEMP-1722.DWG TE111.DWG



1 THEATRE - RCP
SCALE=1/4"=1'-0"

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PROJECT STATUS

90% Construction Documents

10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME

THEATRE EQUIPMENT: THEATRE RCP

PROJECT NO. 1722

DRAWING NO.

TE112

XREFS: 1 16CITS-XREF | TP-PLAN ET | TP-SECTION CL | TP-SECTION TRANSVERSE CB | TP-CP | TP-SECTION TRANSVERSE X-AXIS | 19052-GRID-XREF | TP-SECTION TRANSVERSE AT FOH PIPE | TP-SECTION TRANSVERSE US WALL LSE BEAMS
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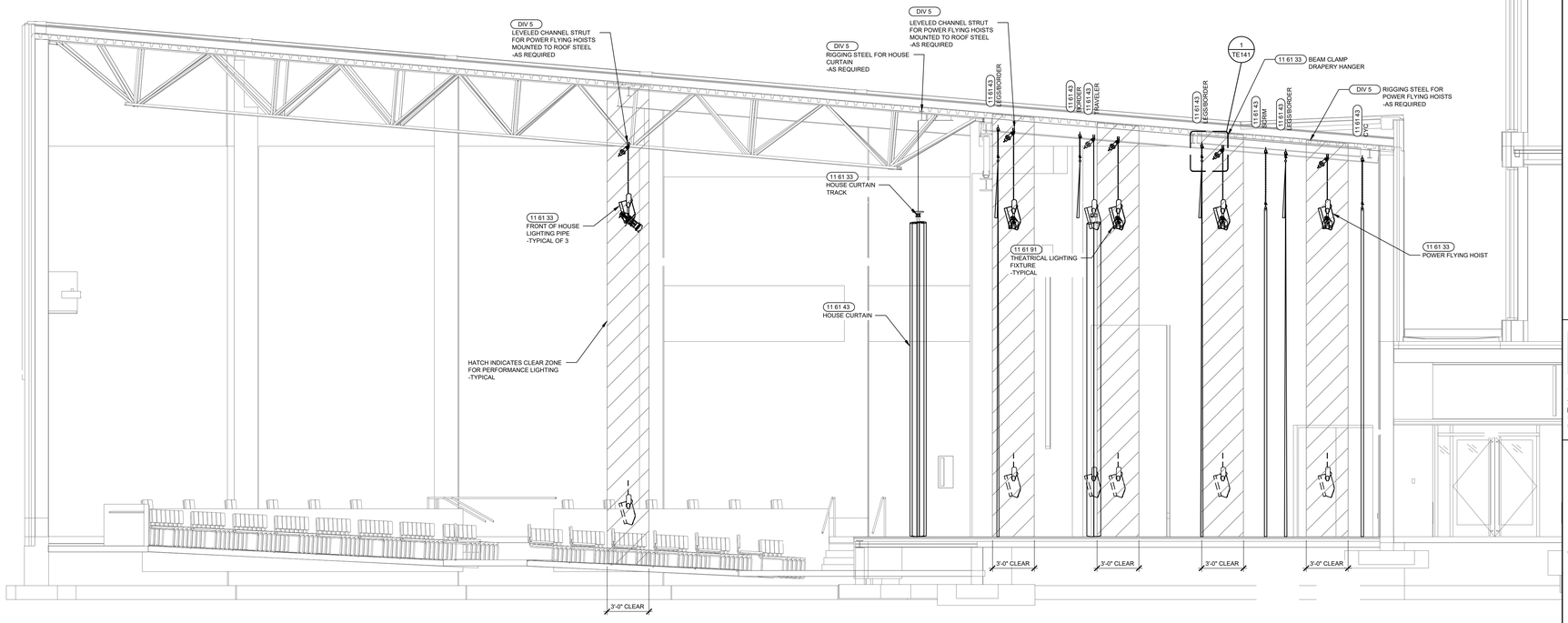

1 THEATRE - CENTERLINE SECTION
1/4"=1'-0"

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10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME

THEATRE EQUIPMENT: THEATRE CENTERLINE SECTION

PROJECT NO. 1722

DRAWING NO.

TE121

XREFS: 1 - 19ECITB-XREF | TP-PLAN 01 - TP-SECTION 01_TP-SECTION TRANSVERSE 03_TP-ICP - TP-SECTION TRANSVERSE X-AISLE | 19022-GRID-XREF - TP-SECTION TRANSVERSE AT FOH PIPE - TP-SECTION TRANSVERSE US WALL LIS BEAMS
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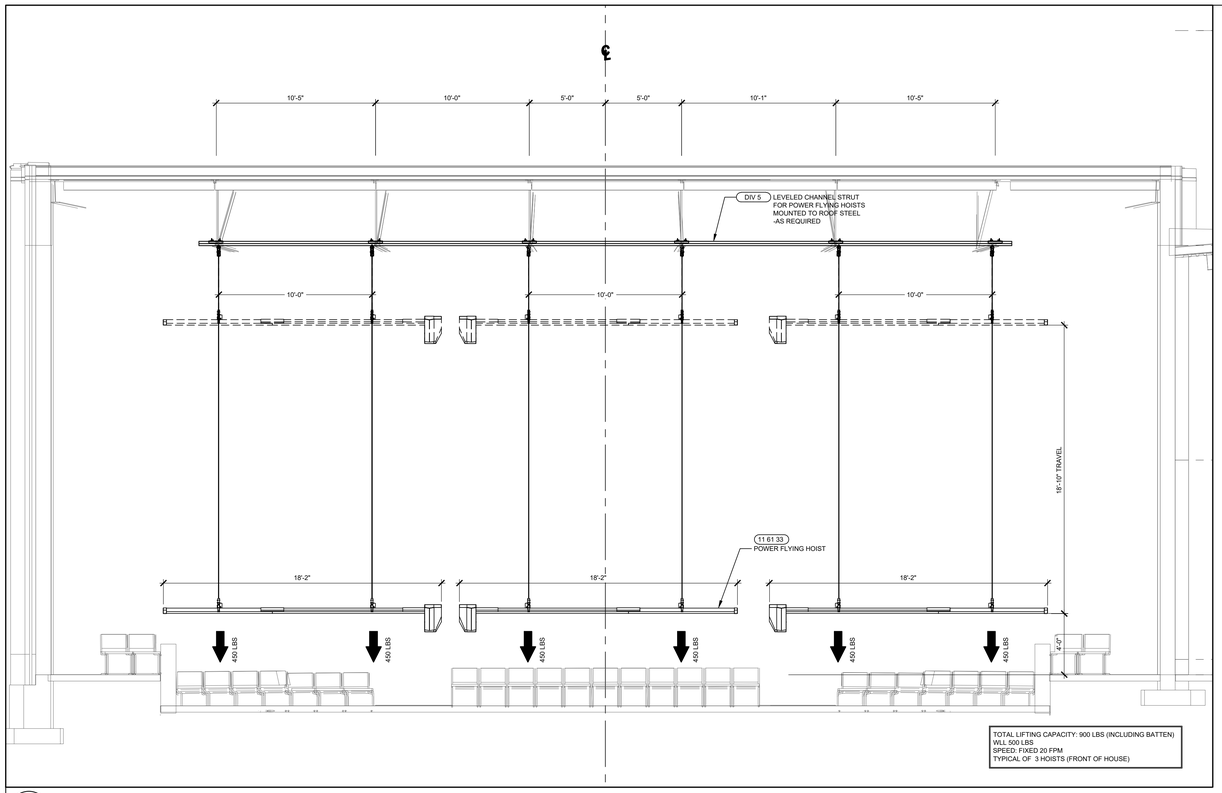
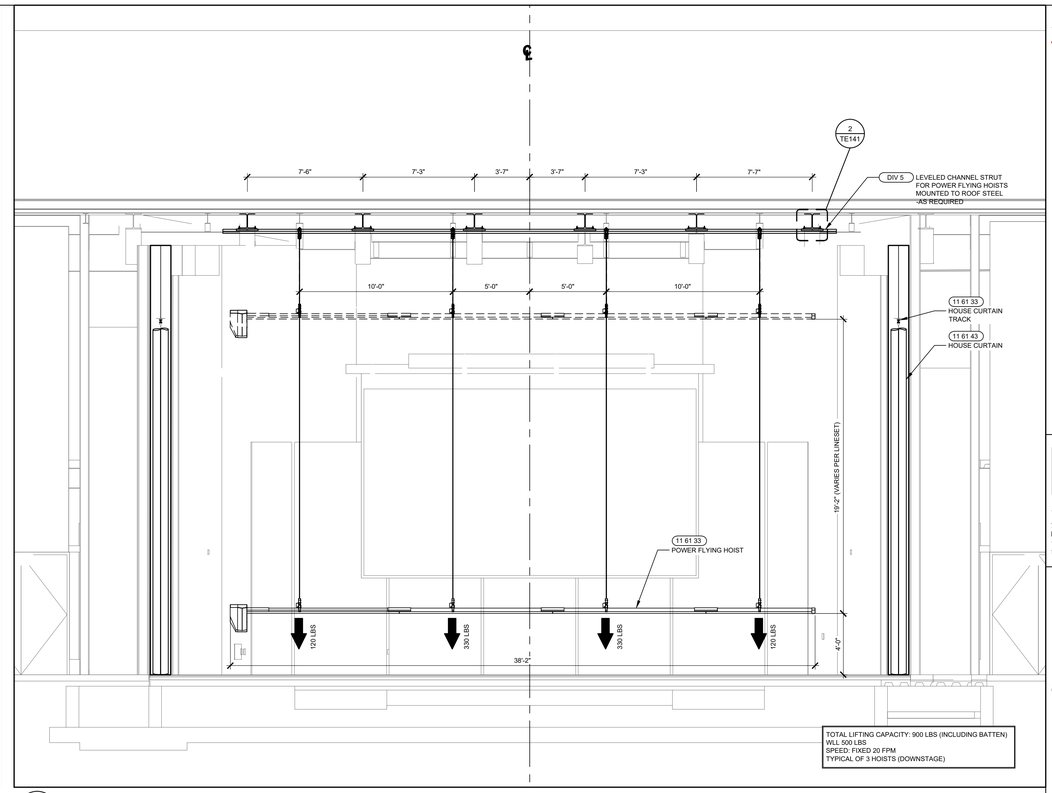
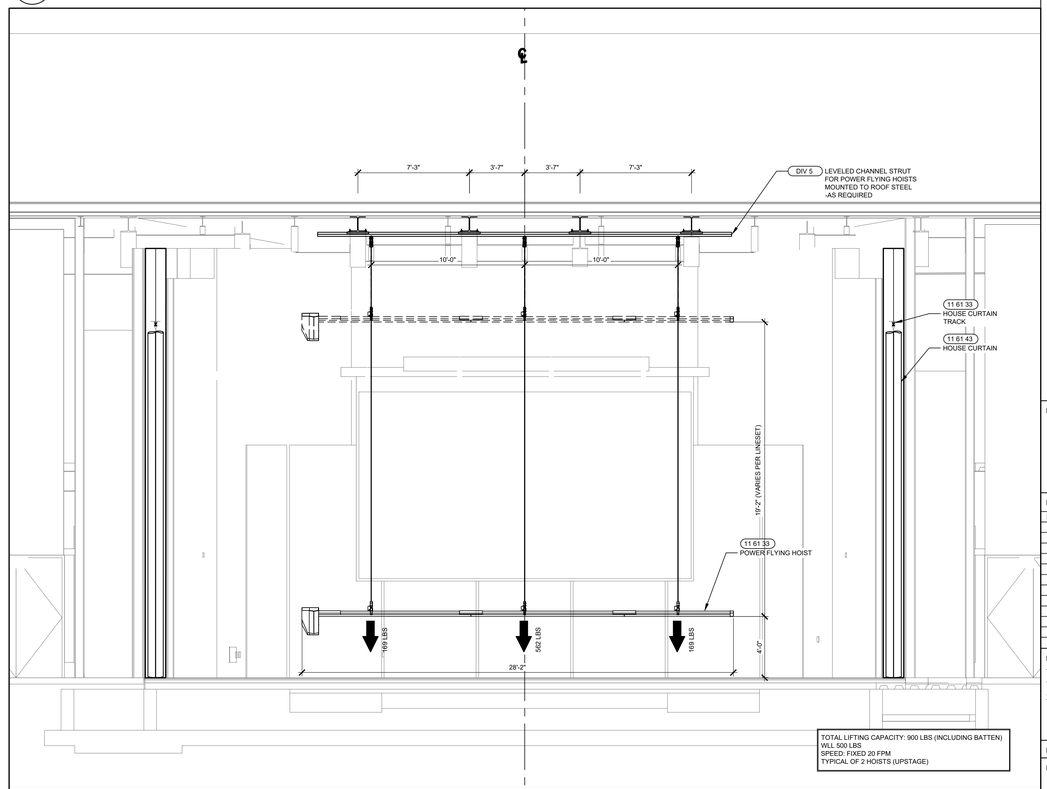


3 FRONT OF HOUSE LIGHTING RIGGING
1/4"=1'-0"



1 TYPICAL RIGGING - DOWNSTAGE HOISTS
1/4"=1'-0"



2 TYPICAL RIGGING - UPSTAGE HOISTS
1/4"=1'-0"

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31 FLAGG DRIVE FRAMINGHAM, MA

PROJECT STATUS
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10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME
THEATRE EQUIPMENT: THEATRE TRANSVERSE SECTIONS

PROJECT NO. 1722

DRAWING NO.
TE122

XREFS = 19SECTBHSEC TP-PLAN 01 TP-SECTION-CL TP-SECTION TRANSVERSE-CL TP-SD1" TP-SECTION TRANSVERSE A-AISLE 19SD2-GRIDLINEREF TP-SECTION TRANSVERSE AT FOH PIPE TP-SECTION TRANSVERSE US WALL I-B BEAMS
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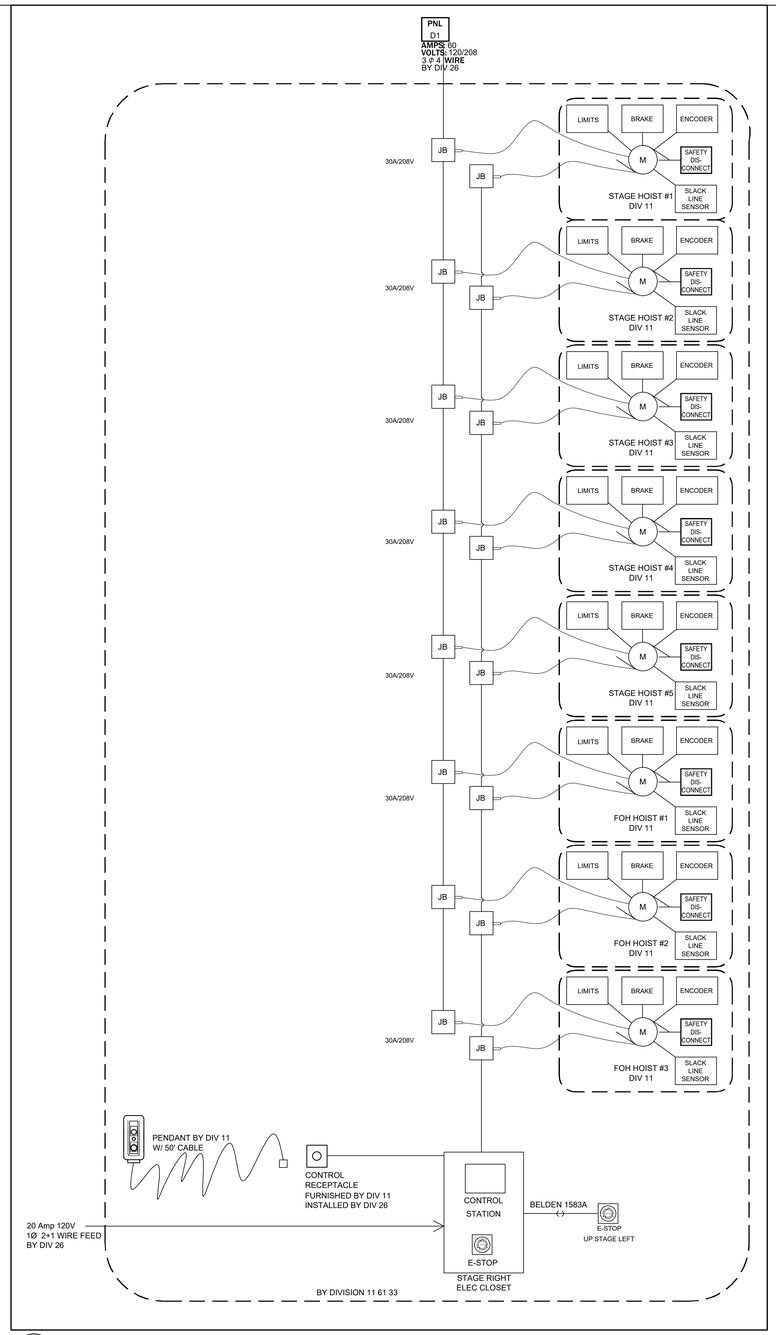
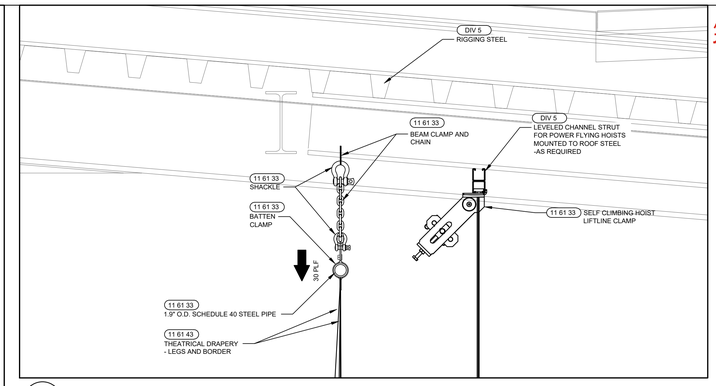


6 MOTORIZED RIGGING ELECTRICAL LINE DIAGRAM
NTS



1 FIXED DRAPERY PIPE AND MOTORIZED PIPE CONNECTION DETAIL
1 1/2"=1'-0"

DRAPE TYPE	QUANTITY	HEIGHT - VIF	WIDTH - VIF	FABRIC	FULLNESS	COLOR	NOTES
HOUSE CURTAIN	1 PAIR	22'-7"	29'-0"	25 OZ IFR VELOUR	100%	TBD	
LEGS	3 PAIR	26'-11"	6'-0"	22 OZ IFR VELOUR	100%	BLACK	
BORDER	4	4'-0"	45'-4"	22 OZ IFR VELOUR	100%	BLACK	
CYC	1	23'-6"	23'-0"	IFR MUSLIN	FLAT	WHITE	
SCRIM	1	23'-6"	25'-0"	IFR SHARKSTOOTH SCRIM	FLAT	BLACK	
TRAVELER	1 PAIR	22'-6"	20'-0"	22 OZ IFR VELOUR	100%	BLACK	
VIF = VERIFY IN FIELD							
NOTE: ACCURATE FIELD DIMENSIONAL INFORMATION MUST BE CONFIRMED BY THE CONTRACTOR PRIOR TO FABRICATION OF ANY PERMANENT OR TEMPORARY DRAPERY.							

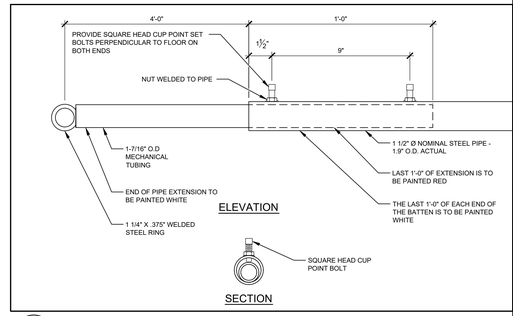
2 DRAPERY SCHEDULE
NTS

No.	Distance	Purpose	Use	Notes
	+0'-6"	(GP)	DRAPERY	DEAD HUNG
# 1	+1'-7"	ELECTRIC		WITH RACEWAY
	+6'-4"	(GP)	DRAPERY	DEAD HUNG
# 2	+7'-5"	(GP)	MOTORIZED	TRAVELER WITH TRACK
# 3	+9'-2"	ELECTRIC		WITH RACEWAY
	+15'-2"	(GP)	DRAPERY	DEAD HUNG
# 4	+16'-8"	ELECTRIC		WITH RACEWAY
	+19'-8"	(GP)	DRAPERY	DEAD HUNG
	+21'-2"	(GP)	DRAPERY	DEAD HUNG
# 5	+24'-2"	ELECTRIC		WITH RACEWAY
	+26'-8"	(GP)	DRAPERY	DEAD HUNG

3 LINESET SCHEDULE
NTS

ITEM	QTY	NOTES
STEEL PIPE CLAMP	34 EA	90 DEGREE 1-1/2" O
SHACKLES	34 EA	ALLOY STEEL GALVANIZED 5/8" ANCHOR SHACKLES SCREW PIN
BEAM CLAMPS	34	PLATE & ADJUSTABLE 350 IB O
BATTEN EXTENSIONS	12 EA	0 5' 0
BATTEN	21 EA	SCHEDULE 40 1-1/2" 10' LONG W/A SLEEVE

4 LOOSE EQUIPMENT SCHEDULE
NTS



5 BATTEN EXTENSION DETAIL
SCALE: 3" = 1'-0"

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31 FLAGG DRIVE FRAMINGHAM, MA

PROJECT STATUS
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10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME
THEATRE EQUIPMENT: SCHEDULES AND DETAILS

PROJECT NO. 1722

DRAWING NO.
TE141

XREFS: I:\AUSTIN.XREF1 - TP-PLAN.ST - TP-SECTION CL - TP-SECTION TRANSVERSE US - TP-PCP - TP-SECTION TRANSVERSE A.DWLE - 1902-GRID.XREF - TP-SECTION TRANSVERSE AT FOH PIPE - TP-SECTION TRANSVERSE US WALL US BEAMS
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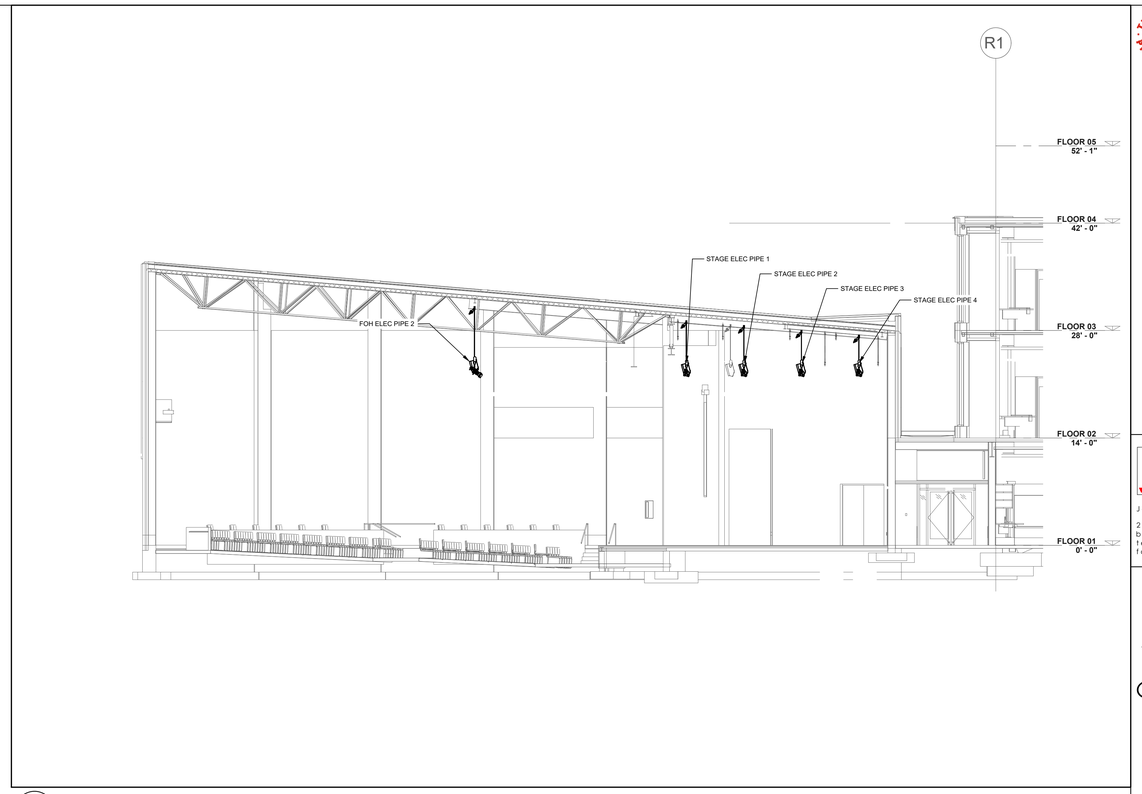
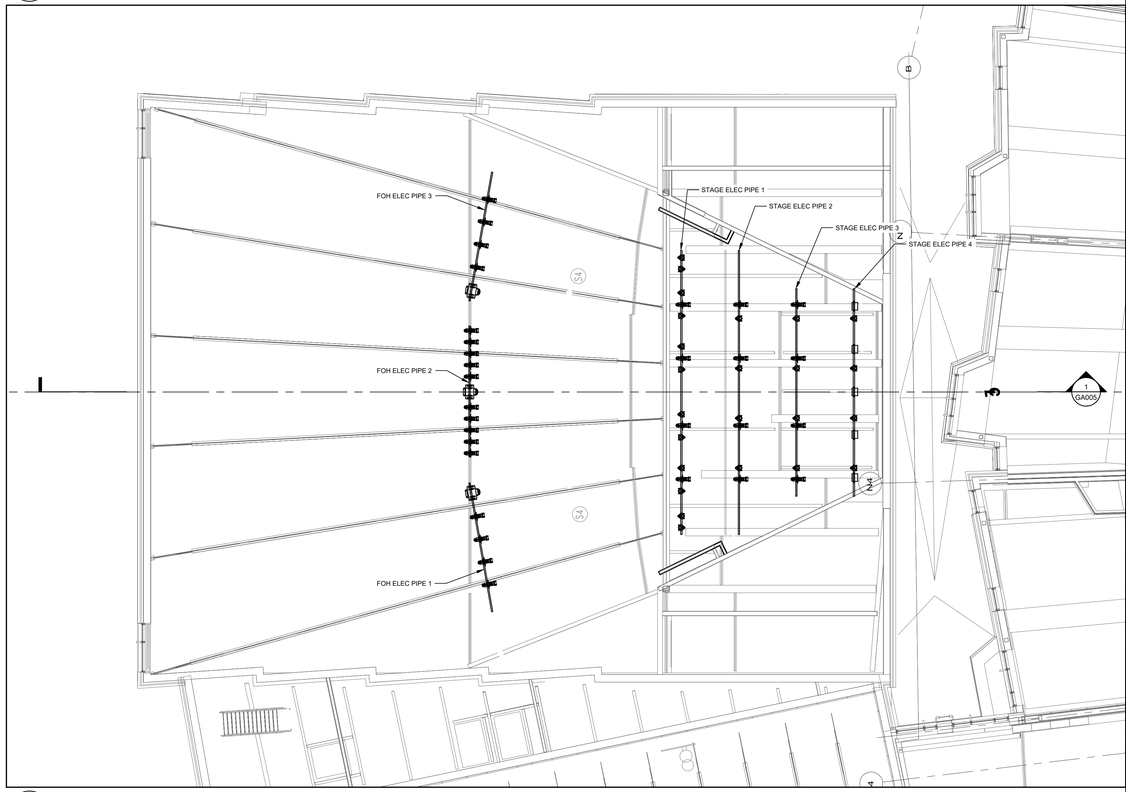


1 AUDITORIUM CENTERLINE SECTION
1/8"=1'-0"



2 COORDINATION ZONES - LEVEL 1 RCP
1/8"=1'-0"

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REVISIONS

No.	Date	Description

DRAWING NAME

PERFORMANCE LIGHTING: PERFORMANCE LIGHTING POSITIONS

PROJECT NO. 1722

DRAWING NO.

TL100

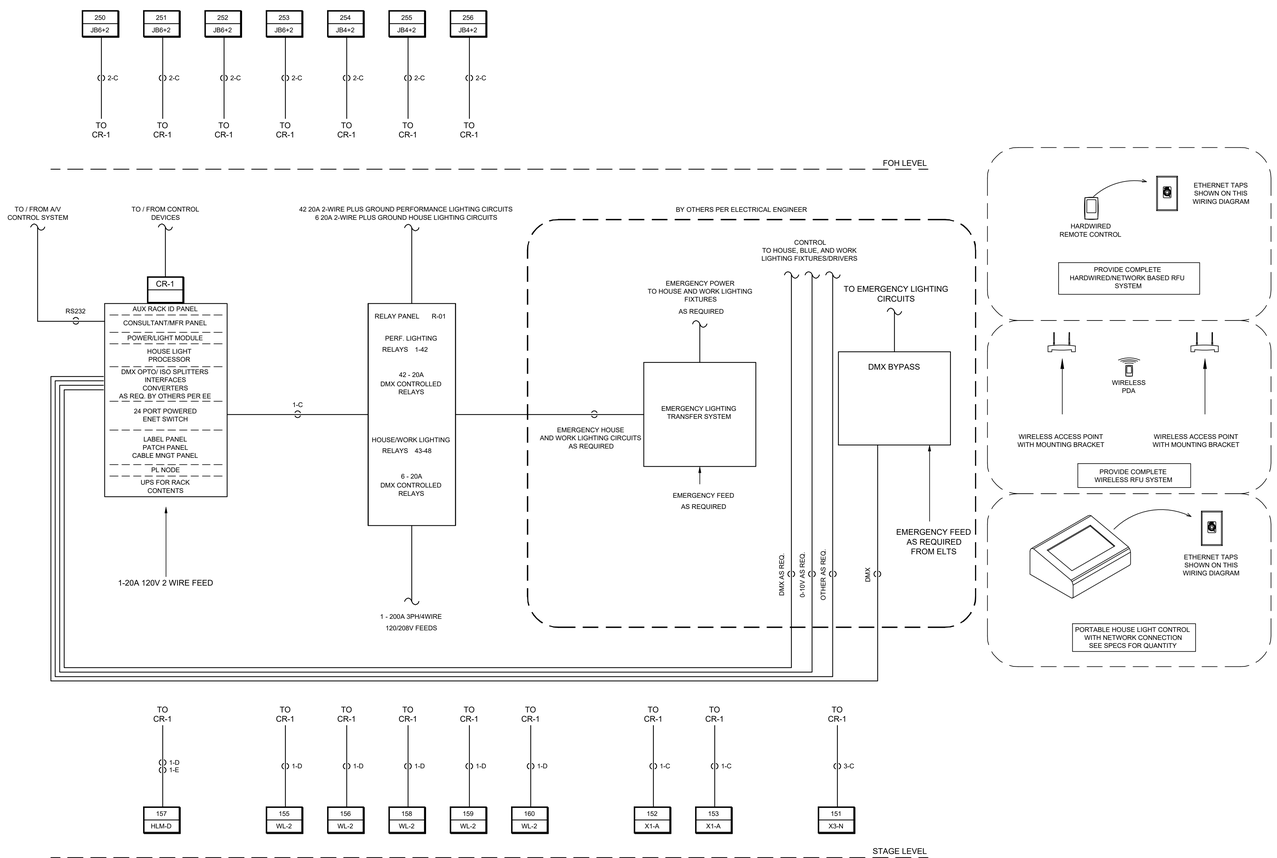
BOX #	FACEPLATE	LOCATION	MOUNTING	BOX SIZE	HEIGHT	RELAY CK#	DMX ADDRESS	20A RELAY	ENET	ARCH	FINISH	NOTES
POWER RECEPTACLES												
101	E1	STAGE - DSL	SURFACE	2.75"x4.5"x4"	18" AFF			1			CUSTOM	
102	E1	STAGE - DSR	SURFACE	2.75"x4.5"x4"	18" AFF			1			CUSTOM	
103	E2	STAGE - USL	SURFACE	4.75"x4.5"x4"	18" AFF			2			CUSTOM	
104	E2	STAGE - USR	SURFACE	4.75"x4.5"x4"	18" AFF			2			CUSTOM	
250	JB6+2	FIRST ELECTRIC	SURFACE	JBOX	CEILING			6	2		BLACK	INTEGRATED RACEWAY PROVIDED BY DIV 11. SEE TE SHEETS FOR DETAILS
251	JB6+2	SECOND ELECTRIC	SURFACE	JBOX	CEILING			6	2		BLACK	
252	JB6+2	THIRD ELECTRIC	SURFACE	JBOX	CEILING			6	2		BLACK	
253	JB6+2	FOURTH ELECTRIC	SURFACE	JBOX	CEILING			6	2		BLACK	
254	JB4+2	FOH PIPE	SURFACE	JBOX	CEILING			4	2		BLACK	
255	JB4+2	FOH PIPE	SURFACE	JBOX	CEILING			4	2		BLACK	
256	JB4+2	FOH PIPE	SURFACE	JBOX	CEILING			4	2		BLACK	
TOTAL 20A RELAY CIRCUITS								**42**				
TOTAL 20A HOUSE/WORK LIGHT RELAY CIRCUITS								**6**				

BOX #	FACEPLATE	LOCATION	MOUNTING	BOX SIZE	HEIGHT	RELAY CK#	DMX ADDRESS	20A RELAY	ENET	ARCH	FINISH	NOTES
CONTROL RECEPTACLES												
CR-1	AUX	ELECTRICAL ROOM										
151	X3-N	TECH POSITION	FLUSH	3 GANG	18" AFF				3		CUSTOM	
152	X1-A	STAGE - DSL	FLUSH	1 GANG	18" AFF				1		CUSTOM	
153	X1-A	STAGE - DSR	FLUSH	1 GANG	18" AFF				1		CUSTOM	
154	NOT USED											
155	WL-2	AUDITORIUM ENTRANCE	FLUSH	1 GANG	48" AFF					1	CUSTOM	HOUSE LIGHTS / WORK LIGHTS
156	WL-2	AUDITORIUM ENTRANCE	FLUSH	1 GANG	48" AFF					1	CUSTOM	HOUSE LIGHTS / WORK LIGHTS
157	HLM-D	AUDITORIUM ENTRANCE	FLUSH	PER MFR.	60" AFF					1	CUSTOM	HOUSE LIGHT MASTER
158	WL-2	AUDITORIUM ENTRANCE	FLUSH	1 GANG	48" AFF					1	CUSTOM	HOUSE LIGHTS / WORK LIGHTS
159	WL-2	STAGE - USR	FLUSH	1 GANG	48" AFF					1	CUSTOM	
160	WL-2	STAGE - USL	FLUSH	1 GANG	48" AFF					1	CUSTOM	
TOTAL CONTROL RECEPTACLES									19	6		
NOTE: HEIGHT IS VERTICAL DISTANCE BETWEEN FINISHED FLOOR AND CENTER OF FACEPLATE.												

GENERAL NOTES:

1. BOX SCHEDULES ARE SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR. EACH CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF QUANTITIES AND SHALL FURNISH ALL MATERIALS, WHETHER SPECIFIED OR NOT, TO PRODUCE A COMPLETE AND WORKING SYSTEM.
2. CONTRACTOR SHALL CONFIRM LOCATIONS, MOUNTING HEIGHTS, AND MOUNTING CONDITIONS WITH ARCHITECT AND THEATRE CONSULTANT PRIOR TO BOX ROUGH-IN.
3. CONTROL RECEPTACLE BACK BOX SIZES MAY VARY FROM SIZES LISTED ON SCHEDULES, DEPENDING ON MANUFACTURER. CONTRACTOR SHALL PROVIDE BACK BOXES IN ACCORDANCE WITH MANUFACTURER'S SUBMITTALS.
4. REFER TO ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
5. EMERGENCY LIGHTING SYSTEM DESIGN AND DEVICES SHOWN ON ELECTRICAL DRAWINGS.

1 PERFORMANCE DIMMING AND CONTROL: BOX SCHEDULE
NTS



2 PERFORMANCE DIMMING AND CONTROL: CRONTROL RISER
NTS

KEY

FOR PERFORMANCE LIGHTING RISER DIAGRAM

A - DMX CONTROL
BELDEN 9829*

B - REMOTE FOCUS
BELDEN 9728
PLUS 2 #16 AWG*

C - CATEGORY 6 ETHERNET
BELDEN 2412*
300 FEET MAXIMUM RUN

D - ARCHITECTURAL CONTROL
BELDEN 8471 PLUS 3 #14 AWG*

E - ARCHITECTURAL LCD POWER
2 #16 AWG

F - KEYSWITCH CONTROL
6 #16 AWG

G - MULTIPLE Q LIGHT CONTROL
BELDEN 8466*

H - CUE LIGHT POWER - 2 #14 AWG

J - 4 FIBER MULTI-MODE ETHERNET
BELDEN 89C039*

* ACTUAL WIRE SPECIFICATION AND CONTROL WIRING TOPOLOGY IS DEPENDENT UPON THE DIMMING MANUFACTURER. PROVIDE CONTROL WIRING IN ACCORDANCE WITH MANUFACTURER'S SUBMITTALS.

NOTE:
EMERGENCY LIGHTING SYSTEM DESIGN AND DEVICES SHOWN ON ELECTRICAL DRAWINGS.

SYMBOLS KEY:

PERFORMANCE LIGHTING

LIGHTING CONTROL CIRCUIT BOX

999 — BOX NUMBER
XX — FACEPLATE
1-D — WIRE TYPE (SEE KEY)

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL

31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS

90% Construction Documents

10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME

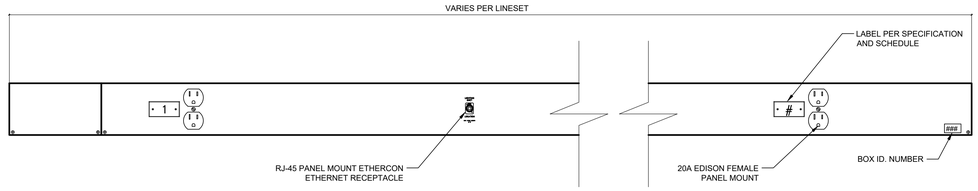
PERFORMANCE DIMMING AND CONTROL: BOX SCHEDULE AND CONTROL RISER

PROJECT NO. 1722

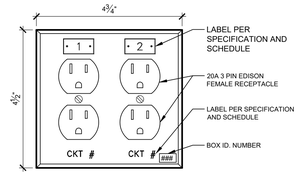
DRAWING NO.

TL111

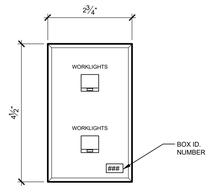
XREFS = 190427B-XREF
DWG NO. TL111 ISSUED FULLER MIDDLE SCHOOL 190227B-2019-10-10.MWG3 ISSUED 190227TL111.DWG



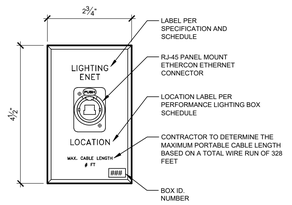
7 LIGHTING RACEWAY DETAIL
SCALE: 3"=1'-0"



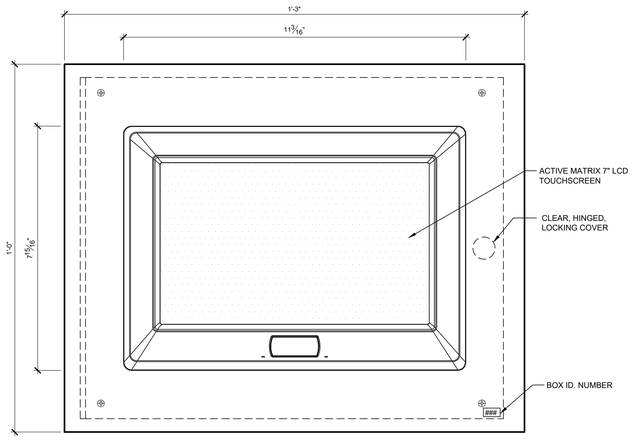
4 E2 FACEPLATE DETAIL
SCALE: 6"=1'-0"



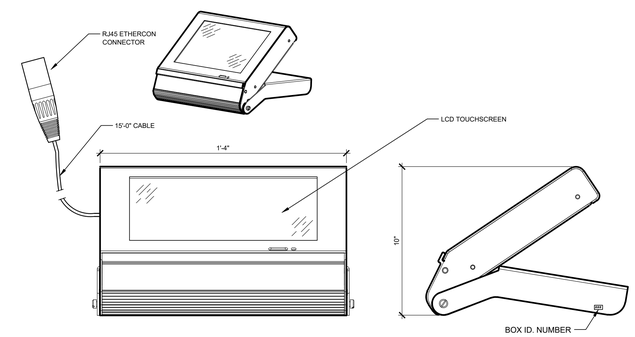
5 WL-2 FACEPLATE DETAIL
SCALE: 6" = 1' -0"



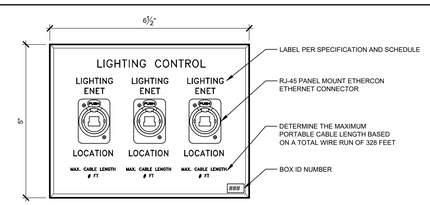
6 X1-A FACEPLATE DETAIL
SCALE: 6" = 1' -0"



1 HLM-D FACEPLATE DETAIL
SCALE: 6" = 1' -0"



2 HLM-P FACEPLATE DETAIL
SCALE: 3" = 1' -0"



3 X3-N FACEPLATE DETAIL
SCALE: 6" = 1' -0"

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NOT FOR CONSTRUCTION

FULLER MIDDLE SCHOOL
31 FLAGG DRIVE, FRAMINGHAM, MA

PROJECT STATUS
90% Construction Documents
10/18/2019

REVISIONS

No.	Date	Description

DRAWING NAME
PERFORMANCE DIMMING AND CONTROL: FACEPLATE DETAILS

PROJECT NO. 1722

DRAWING NO.
TL121

XREFS = 1902FBLINDEF
P:\19 TL's\1722\CAD\FULLER MIDDLE SCHOOL (1902)-08.2019.10.11(ADDED ISSUE).VW22TTL11.DWG