

**ADDITIONS AND MAJOR RENOVATIONS AT
HARVARD H. ELLIS TECHNICAL HIGH SCHOOL
613 UPPER MAPLE STREET
DANIELSON, CONNECTICUT
PROJECT BI-RT-841**

BID OPENING

1:00 P.M.

August 3, 2011

ADDENDUM NUMBER 2

DATE OF ADDENDUM

June 24, 2011

The following clarifications are applicable to Drawings and specifications for the project referenced above.

Item 1

New Architectural Sketch Drawing, dated March 30, 2011, and attached:

1. **SSK-01** "Part General Notes"
2. **ASK-01** "Modular #2 – Phasing"
3. **ASK-02** "Phase Two Revisions"
4. **ASK-03** "Modular #2 – Layout and Fire Safety Plan"
5. **ASK-04** "Revised Classroom Doors – Part G – 1 of 3"
6. **ASK-05** "Revised Classroom Doors – Part G – 2 of 3"
7. **ASK-06** "Revised Classroom Doors – Part G – 3 of 3"
8. **ASK-07** "Revised 4E + 5E/A710 – Part G"
9. **ASK-08** "Revised 4D/A710"
10. **ASK-09** "Revised 2E/A710"
11. **ASK-10** "Revised Garage Details"
12. **ASK-11** "Plan Detail @ Garage"
13. **SKM-01 – SKM-06** not issued
14. **SKM-07** "First Floor HVAC Ductwork Partial Plan Part D"
15. **SKM-08** "First Floor HVAC Ductwork Partial Plan Part G"
16. **SKM-09** "First Floor HVAC Ductwork Partial Plan Part G"
17. **SKM-10** "First Floor HVAC Ductwork Partial Plan Part H"
18. **SKM-11** Roof Partial Plan – Part D
19. **SKM-12** Detail - Condensate Drain
20. **SKM-13** One Shot Chemical Feeder Detail
21. **SKM-14** Indirect Gas Fired Rooftop make-up Air Unit Detail
22. **SKM-15** Duct Penetration Detail – Exterior Wall
23. **SKM-16** Hot Water Flow Diagram
24. **SKM-17** Chilled Water Flow Diagram
25. **SKM-18** – "Exhaust and Supply Fans Schedule"
26. **SKM-19** Detail – Fire Damper/Flex Connector Installation at Building Seismic Joint
27. **SKM-20** – "AHU-1 Ductwork Revision"
28. **SKM-21** – "Media Air Cleaner Schedule"
29. **SKM-22** – "Hairdressing Area Revision"
30. **SKM-23** – "First Floor HVAC Ductwork Partial Plan Part E1+F"
31. **SKM-24** – "First Floor HVAC Ductwork Partial Plan – Part C"
32. **SKM-25** – "First Floor HVAC Ductwork Partial Plan – Part C"
33. **SKM-26** – "Transfer Duct Penetration Thru Corridor Wall"
34. **SKM-27** – not issued
35. **SKM-28** – "General Notes, Abbreviations, Symbols"
36. **SKM-29 – SKM-31** not issued

37. **SKM-32** – “Temporary HVAC Equipment Schedules Revision”
38. **SKM-33** – “Temporary Cafeteria HVAC Partial Plan”
39. **SKM-34 -- SKM-37** not issued
40. **SKM-38** – “Garage Floor Partial Plan – HVAC Plan – Part K”
41. **SKM-39** – “Garage Floor Partial Plan – HVAC Plan – Part K”
42. **SK-P1** “Revised Water Heater”
43. **SK-P2** “Added CODP’s”
44. **SK-P3** “Added CODP’s and Clarifications”
45. **SK-P4** “Added CODP’s and Clarifications”
46. **SK-P5** “Added CODP’s and Clarifications”
47. **SK-P6** “Added CODP’s”
48. **SK-P7** Added CODP’s
49. **SK-P8** “Added Valves”
50. **SK-P9** “Revised Wall Hydrant Detail”
51. **SKEL-01** “Updated Lighting Room Layout”
52. **SKEL-02** “Updated Lighting Room Layout”
53. **SKEP-01** “Added Smoke Dampers and Duct Smoke Detectors”
54. **SKEP-02** “Added Power to MAC-1 Units”
55. **SKEP-03** “Added Power to MAC-1 Units”
56. **SKEP-04** “Relocated Equipment”
57. **SKEP-05** “Added Power to MAC-1 Units”
58. **SKEP-06** “Updated Power Requirements for EF Units ...”
59. **SKEP-07** “Updated Power Requirements for EF Units ...”
60. **SKEP-08** “Added Power Requirements for Modular Classroom”
61. **SKEP-09** “Added Load for MAC-I Units”
62. **SKEP-10** “Updated Power Requirements for EF Units”
63. **SKEP-11** “Added Loads for MAC-1 Units”
64. **SKEP-12** “Added IT Spare Conduit ...”
65. **SKEP-13** “Relocated Site Lighting Fixtures”
66. **SKEP-14** “Added Power Feed to Modular Classroom”
67. **SKEP-15** “Added Smoke Damper Details”

Item 2

Deleted Drawings: According to Building Seismic Design category (Category B) seismic restraints and bracing will be eliminated from project. **DELETE** Drawings M401, M402, and M403 in their entirety.

Item 3

Revised Drawings, dated March 30, 2011 and attached and reissued as full-size attachments to this Addendum:

1. **GP01-MEP**
2. **GP03-MEP**
3. **GP04-MEP**
4. **GP05-MEP**
5. **C201**
6. **C301**
7. **L201**
8. **L202**
9. **L301**
10. **S101K**
11. **S301K**

12. **A101K**

13. **P101C**

Item 4

Revised Technical Specification Sections, attached and reissued as complete sections by this Addendum:

1. Section 05 31 00 – Steel Decking
2. Section 23 05 48 - Mechanical Vibration and Seismic Controls
3. Section 23 31 13 – Metal Ducts

REVISIONS TO TECHNICAL SPECIFICATIONS: Technical Specifications are hereby amended as follows:

Item 5

Section 01 23 13 – Supplemental Bids

1. Paragraph 3.1-B: **REVISE** the sentence describing the garage demolition to read as follows: “Demolish the existing Garage/Storage building down to, and excluding, the floor slab and any associated foundations, as shown on the site (L series) Drawings”.7

Item 6

Section 08 00 00 – Door and Frame Schedule

1. **RENUMBER** the following Doors (see also Drawing A101K, reissued by this Addendum):
 - a. K-101-C (old) to **K-502-B**.
 - b. K101-D (old) to **K-502-A**.
 - c. K101-E (old) to **K-501-F**.
 - d. K101-F (old) to **K-501-E**.
 - e. K101-G (old) to **K-501-D**.
 - f. K101-H (old) to **K-501-C**.
 - g. K101-I (old) to **K-501-B**.
 - h. K101-J (old) to **K-501-A**.
 - i. K101-K (old) to **K-500-F**.
 - j. K101-L (old) to **K-500-E**.
 - k. K101-M (old) to **K-500-D**.
 - l. K101-N (old) to **K-500-C**.
 - m. K-102-B (old) to **K-500-B**.
 - n. K-500 (old) to **K-500-A**.
 - o. K501 (old) to **K-501-G**.
 - p. K-502 (old) to **K-502-C**.

2. **REVISE** (new) Door No. K-501-G to have a 45 minute fire rating.

Item 7

Section 09 00 00 – Finish Schedule

1. At Paragraph 3.1-A: **ADD** “and locker areas” to Note P.

2. At Paragraph 3.4 – Finish Schedule: **REVISE** the following rooms' floor types to be "CTF2, CTF3" and **ADD** Note P under 'Notes' column:
 - a. 302E, 307E, 308E, 310F, 318F, 407A, 410A, 425A, 425C, 427H
3. At Paragraph 3.4 – Finish Schedule: **REVISE** the following rooms' floor types to be "CTF1" :
 - a. 228F
4. At Paragraph 3.4 – Finish Schedule: **REVISE** the following rooms' floor types to be "CTF2" :
 - a. 122G, 411.

Item 8

Section 220100 "General Conditions for Plumbing Trade" paragraph 1.5 B, Codes and Standards: **ADD** "1996" to NFPA 54, National Fuel Gas Code.

Item 9

Section 220500 "Common Work Results for Plumbing" paragraph 2.3 H4, Joining Materials; **DELETE** H4; "PVC to ABS Piping Transition: ASTM D 3138."

Item 10

Section 221116 "Domestic Water Piping"

1. Paragraph 1.6 B, Codes and Standards; **ADD** "1996" to NFPA 54, National Fuel Gas Code.
2. Paragraph 3.7 C, Valve Installation; **ADD** #3; "Provide a cap and chain to all drain valves."

Item 11

Section 221119 "Domestic Water Piping Specialties" paragraph 1.6 B, Codes and Standards;

1. **ADD** 1996 to NFPA 54, National Fuel Gas Code.
2. Paragraph 3.3 A, Labeling and identifying; **ADD** item #17: "Plenum rated areas."

Item 12

Section 221123 "Fuel Gas Piping" paragraph 1.8 B, Codes and Standards: **ADD** "1996" to NFPA 54, National Fuel Gas Code.

Item 13

Section 221413 "Storm Drainage Piping" paragraph 3.3, Piping Installation: **ADD** item T. "Provide cleanouts as required by the International Plumbing Code 2003, section 1101.8."

Item 14

Section 223400 "Fuel-fired Domestic Water Heaters" paragraph 1.5 B, Codes and Standards: **ADD** "1996" to NFPA 54, National Fuel Gas Code.

Item 15

Section 224000 "Plumbing Fixtures"

1. Paragraph 1.5 C, Quality Assurance; **ADD** "2003" to ICC ANSI A117.1.
2. Paragraph 2.7 A, Protective Shielding Guards; **ADD**:
 - "2. Flame spread:
 - a. Guards shall have a flame spread index of not greater than 25."

Item 16

Section 224500 "Emergency Plumbing Fixtures" paragraph 1.5 A, Quality Assurance: **ADD** "2003" to ANSI Z358.1.

Item 17

Section 224700 "Drinking Fountains and Water Coolers" paragraph 1.7 B, Codes and Standards: **ADD** "2003" to ICC ANSI A117.1.

Item 18

Section 23 05 48 "Mechanical Vibration and Seismic Control". **DELETE** seismic restrains, bracings, supports, spring isolators, restrained elastomeric. **REISSUED** by this Addendum (see Item 4).

Item 19

Section 23 31 13 "Metal Duct": **ADD** "2006" to SMACNA "HVAC Duct Construction Standard". **REISSUED** by this Addendum (see Item 4).

Item 20

Section 23 51 00 - Breechings, Chimneys and Stack", paragraph 3.3.A, Codes and Standards: **ADD** "2005" to NFPA 211, Standard for Chimneys, Fireplaces, Vents. See revised page 5, attached.

Item 21

Section 23 52 16 – Condensing Boilers, paragraph 3.3.A, Codes and Standards: **ADD** "2005" to NFPA 211, Standard for Chimneys, Fireplaces, Vents. See revised page 6, attached.

Item 22

Section 23 64 26 – Rotary Screw Water Chillers, paragraph 1.5.d, Codes and Standards: **ADD** "2005" to NFPA 70, National Electrical Code. See revised page 2, attached.

Item 23

REVISIONS TO DRAWINGS: Drawings are hereby amended as follows:

1. Drawings GP01 – GP05: **ADD** graphic depiction of second modular classroom building ("Modular #2) as shown on attached sketch ASK-01, dated March 30, 2011.
2. Drawing GP02: **REVISE** Relocation Schedule as follows:
 1. **REVISE** "Trade Prep 224" to "Trade Prep/CDL" and **REVISE** New Location to "Modular #2." See attached sketch ASK-02, dated March 30, 2011.
 2. **ADD** "LAN Room 126" moving from Existing Location "Part G" to New Location "Temp. Cafeteria (Adjacent Space)", **ADD** "T" under Temp/Perm heading.

3. Drawing GP01-MEP: **REVISE** mechanical notes per sketch SKM-29, and reissued drawing.
4. Drawing GP03-MEP: **REVISE** mechanical notes per sketch SKM-30, and reissued drawing.
5. Drawing GP04-MEP: **REVISE** mechanical notes per sketch SKM-31, and reissued drawing.
6. Drawing GP11-MEP – Phasing Partial Plans –Temporary Hairdressing Cafeteria-HVAC .
 1. See Sketch SKM-20 – “AHU-1 Ductwork Revision” – **ADD** two fire dampers at duct penetration thru fire rated wall.
 2. See Sketch SKM-22 – “Hairdressing Area Revision” – **ADD** air cleaners for hairdressing classrooms, clarified pipe connection for unit UH-1.
 3. See Sketch SKM-32 – “Temporary HVAC Equipment Schedules Revision” – **REVISE** schedules for HVAC equipment.
 4. See Sketch SKM-33 – “Temporary Cafeteria HVAC Partial Plan” – **ADD** fire dampers, modified ductwork.
7. DWG GP-13 – Temp. Hairdressing Room Power Plan
 1. See sketches SKEP-05 and SKEP-11 – **ADD** MAC-1 units. See mechanical sketches for additional information.
8. Drawing GP20: **ADD** layout and fire safety plan of second modular classroom building (“Modular #2), as shown on attached sketch ASK-03.
9. DWG C201 – Site Drainage and Utilities Plan – ENTIRE DRAWING REISSUED (see Item 23) with the following changes:
 1. **ADD** graphic depiction of second modular classroom building (modular #2).
 2. **REVISE** fire main located west of modular #2.
 3. **ADD** utility connections to modular #2.
10. DWG C301 – Sedimentation and Erosion Control Plan - ENTIRE DRAWING REISSUED (see Item 23) with the following change:
 1. **REVISE** soil stockpile location and west driveway alignment.
11. Drawing L200 – **UPDATE** to reflect changes in road alignment, garage changes, and modular addition indicated by applicable sketches and drawings issued by this Addendum.
12. Drawing L401 – **RELOCATE** tree shown under temporary Modular #2 location. Tree shall be field located by landscape architect. This new tree shall be provided and installed after modular has been removed.
13. Drawing L601 – **NOTE** that the changes in road alignment in reissued Drawing L201 are to be carried over to Details 2G and 2L.
14. Drawing AD001: At Shop Storage/Maintenance Garage (Supplemental Bid No. 2) **REVISE** Demolition Keynote from “1.01” to “1.02”. Existing garage slab is to remain.

15. Drawing A101GH: **REVISE** classroom doors (re-swing) and casework in Part G classrooms as shown on attached sketches ASK-04 through ASK-06.
16. Drawing A502: **REVISE** Detail 5C- typical plan detail at garage door jamb per attached sketch ASK-11.
17. Drawing A710:
 1. **REVISE** doors and casework dimensions on interior elevations 2E and 4E as shown on attached sketch ASK-07.
 2. Detail 4D: **REVISE** casework dimensions per attached sketch ASK-08.
18. Drawing M001 – General Notes, Abbreviations, Symbols: See Sketch SKM-28 – “General Notes, Abbreviations, Symbols” – **ADD** Phasing notes.
19. Drawing M101C – First Floor HVAC ductwork Plan – Part C
 1. See Sketch SKM-24 – “First Floor HVAC Ductwork Partial Plan – Part C” – **ADD** sensors in room 427D.
 2. See Sketch SKM-25 – “First Floor HVAC Ductwork Partial Plan – Part C” – **ADD** sensors in room 427A, **ADD** flex duct connector at duct penetrations thru seismic wall.
20. Drawing M101D - First Floor HVAC Ductwork Plan – Part D
 1. See Sketch SKM-7 – “First Floor HVAC Ductwork Partial Plans -Part D”. **ADD** CO sensor in mechanical room, **RELOCATE** refrigerant piping from unit AC-19.
 2. **RELOCATE** exhaust pipe per Plumbing Sketch SKP-10.
 3. **RELOCATE** exhaust fan RF-1 per sketch SKM-11.
 4. See Sketch SKM-15 – “Duct Penetration Detail – Exterior Wall”- **ADD** duct penetration detail
21. Drawing. M101E-1 F – First Floor HVAC Ductwork Plan – Part E1+F
 1. See Sketch SKM-19 – “Detail – Fire Damper/Flex Connector Installation at Building Seismic Joint ” – **ADD** detail of duct penetration thru wall.
22. Drawing M101GH – First Floor HVAC Ductwork Plan – Parts G+H
 1. See Sketch SKM-8: **ADD** smoke damper at transfer ducts.
 2. See Sketch SKM-9 – **ADD** smoke damper at transfer ducts.
 3. See Sketch SKM-10 – **ADD** smoke damper at transfer ducts.
 4. See Sketch SKM-23 – **ADD** air cleaners for hairdressing classrooms.
23. Drawing M101K – “Garage Floor Plan – HVAC Ductwork Plan – Part K”
 1. See Sketches SKM-38, SKM-39 : **REVISE** location of exhaust fans and size of make-up louvers with motorized damper. **ADD** NO2 sensors for Maintenance Vehicles and Buses parking areas.
24. M201B-C-E.1-F: See sketch SKM-27 to **ADD** new RF-8 and RF-10.

25. Drawing. M201D – Roof HVAC Plan – Part D: See Sketch SKM-11 — **RELOCATE** fans RF-1 and EF-29.
26. Drawing M301 – HVAC Schedule: See Sketch SKM-21 – “Media Air Cleaner Schedule” – **ADD** schedule for air cleaners MAC-1.
27. Drawing. M306 – HVAC Schedule: See Sketch SKM-18 – “Exhaust and Supply Fans Schedule” – **ADD** fans RF-6 thru RF-10, **REVISE** selection of fans EF-40 thru EF-44.
28. Drawing. M405 – HVAC Details: See Sketch SKM-12 – “Detail – Condensate Drain” – **ADD** cleanout at condensate pipe
29. Drawing. M406 – HVAC Details
1. See Sketch SKM-13 – “One Shot Chemical Feeder Detail – **ADD** shut-off valve and union.
 2. See sketch SKM-26 – “Transfer Duct Penetration Thru Corridor Wall” – **ADD** detail
30. Drawing. M407 – HVAC Details: See Sketch SKM-14 – “Indirect Gas Fired Rooftop Make-up Air Unit Detail” – **ADD** dimensions for rooftop unit.
31. Drawing M408 – Hot Water Flow Diagram
1. See Sketch SKM-16 – “Hot Water Flow Diagram” – **ADD** shut-off valve and union at expansion tanks.
 2. See Sketch SKM-17 – “Chilled Water Flow Diagram” – **ADD** shut-off valve and union at expansion tanks.
32. Plumbing Demolition – General Revision:
1. Existing underground piping in kitchen area shall be capped and abandoned in place in lieu of removal.
33. Drawing P003: Details – Plumbing
1. See Sketch SK-P1 – “Revised Water Heater”
 2. See Sketch SK-P9 – “Revised Wall Hydrant Detail”.
34. Drawing P101D – First Floor Plumbing Plan – Part D: See Sketch SK-P2 – “Added CODP’s”.
35. Drawing P201 and P202 – Upper and Lower Food Service Plans – Plumbing
1. See Sketch SK-P3 – “Added CODP’s and Clarifications”
 2. See Sketch SK-P4 – “Added CODP’s and Clarification”
 3. See Sketch SK-P5 – “Added CODP’s and Clarifications”
36. Drawing P302 – Riser Diagrams – Plumbing
1. See Sketch SK-P6 – “Added CODP’s”.

2. See Sketch SK-P7 – “Added CODP’s”.
 3. See Sketch SK-P8 – “Added Valves”.
37. Drawing FP101D – First Floor Plan Part D – Fire Protection: see Sketch SK-FP1 – “Sprinkler Temporary Phasing Piping”.
38. Drawing FP101A, FP101E1/F and FP101GH – First Floor Plans – Fire Protection
1. See Sketch SK-FP2 – “Seismic Expansion Joints”.
39. Drawing ES001 – Site Utility Plan
1. See sketch SKEP-12 and SKEP-13 – **ADD** electrical feed for new modular classrooms. **ADD** spare 4” conduit for telecomm services. **REVISE** location of site lighting fixtures.
40. Drawing EL101K - First Floor Lighting Plan – Part K
1. See sketches SKEL-01, SKEL-02, SKEP-06, SKEP-07 and SKEP-10 – **REVISE** device locations to accommodate dimensional change of garage. **REVISE** mechanical equipment sizes.
41. Drawing EP101C – First Floor Power Plan – Part C: See sketch SKEP-08 – **ADD** modular classroom and associated work.
42. Drawing EP101E1-F – First Floor Power Plan – Part E (West) + Part F
1. See sketches SKEP-02, SKEP-03 and SKEP-09 – **ADD** MAC-1 units. See mechanical sketches for additional information.
43. Drawing EP101GH – First Floor Power Plan – Parts G + H: see sketches SKEP-01 and SKEP-15 – **ADD** duct smoke dampers and related detail.
44. Drawing EP102 – Overall Roof Plan Electrical: See sketch SKEP-04 – **REVISE** location of mechanical units.
45. Drawing E201 – One-Line Power Riser Diagram: See sketch SKEP-14 – **ADD** feeder and breaker from temporary electrical service for new modular classrooms.
46. Drawing E303 – Electrical Details: See sketch SKEP-15 – **REVISE** duct smoke damper details.

End of Addendum Number Two

All questions must be in writing (not phone or e-mail) and forwarded to the Construction Administrator (Ken Biega, Fax: 860-626-6447), with copies sent to the Architect (Rick Bouchard, Fax: 860-657-8141) and DPW Project Manager (Rob Dexter, Fax: 860-713-7261).

David Busanet, Bidding & Contracts Supervisor
Department of Public Works

RESPONSIBILITY OF THE CONTRACTOR

1. STATE BUILDING CODE - 2006 CONNECTICUT SUPPLEMENT WITH 2008 AMENDMENT. NOTE: A COPY OF THE CURRENT CONNECTICUT SUPPLEMENT MAY BE DOWNLOADED AT [HTTP://WWW.CT.GOV/DPS](http://www.ct.gov/dps)

2. INTERNATIONAL BUILDING CODE 1630-2006

3. MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES- AMERICAN SOCIETY OF CIVIL ENGINEERS (ANSI/ASCE 7-02), INCLUDING SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS

B. DESIGN DATA:

1. FLOOR LIVE LOAD:

AREA	UNIFORM LOAD	LL REDUCIBLE?
a. CLASSROOMS	40 + 20 PSF	NO
b. OFFICES	50 + 20 PSF	NO
c. CORRIDORS & LOBBIES	100 PSF	NO
d. GYMNASIUM	100 PSF	NO
e. FIXED PLATFORM	100 PSF	NO
f. STORAGE	125 PSF	NO
g. LIBRARY	60 PSF	NO
g.a. READING ROOMS	60 PSF	NO
g.b. STACK ROOMS	150 PSF	NO

2. ROOF SNOW LOAD:

a. GROUND SNOW LOAD, PG	40PSF
b. FLAT ROOF SNOW LOAD, PF	31PSF
c. SNOW EXPOSURE FACTOR, CE	34PSF (AT BUILDING K-GARAGE)
d. SNOW LOAD IMPORTANCE FACTOR, IS	1.0
e. THERMAL FACTOR, CT	1.0 (AT BUILDING K-GARAGE)
	1.0
	1.2 (AT BUILDING K-GARAGE)

3. WIND LOAD

a. MAIN WIND FORCE RESISTING SYSTEM:		
i. BASIC WIND SPEED (3 SECOND GUST)	108MPH	
ii. WIND IMPORTANCE FACTOR, IW	1.15	
iii. SURFACE ROUGHNESS	C	
iv. WIND EXPOSURE CATEGORY	C	
v. ENCLOSURE CLASSIFICATION	ENCLOSED	
vi. INTERNAL PRESSURE COEFFICIENT	PARTIALLY ENCLOSED (BUILDING K-GARAGE)	
b. COMPONENTS AND CLADDING:		
i. BASIC WIND SPEED (3 SECOND GUST)	108MPH	
ii. WIND IMPORTANCE FACTOR, IW	1.15	
iii. WIND EXPOSURE	C	
iv. INTERNAL PRESSURE COEFFICIENT	+/-0.18	
v. DIRECTIONALITY FACTOR, KD	+/-0.85 (BUILDING K-GARAGE)	
vi. REDUCIBILITY	0.85	

4. EARTHQUAKE DESIGN DATA:

a. SEISMIC IMPORTANCE FACTOR, IE	1.25
b. MAPPED SPECTRAL RESPONSE ACCELERATIONS FOR SHORT PERIOD, SS	1.0 (BUILDING K-GARAGE)
c. MAPPED SPECTRAL RESPONSE ACCELERATIONS FOR 1 SECOND, S1	0.229
d. SITE CLASS	D
e. BUILDING CATEGORY (PER TABLE 1604.5 2006 CT BC)	II (BUILDING K-GARAGE)
f. BUILDING CATEGORY (PER TABLE 1604.5 2006 CT BC)	II (BUILDING K-GARAGE)
g. SEISMIC USE GROUP (PER TABLE 1604.5 2006 CT BC)	II (BUILDING K-GARAGE)
h. SEISMIC USE GROUP (PER TABLE 1604.5 2006 CT BC)	II (BUILDING K-GARAGE)
i. SPECTRAL RESPONSE COEFFICIENT FOR SHORT PERIOD, SDS	0.244
j. SPECTRAL RESPONSE COEFFICIENT FOR 1 SECOND, SD1	0.099
k. SEISMIC DESIGN CATEGORY	B
l. SEISMIC RESPONSE COEFFICIENT, CS	0.102
	0.081 (BUILDING K-GARAGE)

BUILDING AREA D (GYMNASIUM):

a. BASIC SEISMIC FORCE RESISTING SYSTEM - STRUCTURAL STEEL SYSTEM NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE. THE LATERAL FORCE RESISTING SYSTEM CONSISTS OF INTERMEDIATE REINFORCED MASONRY SHEAR WALLS AND ORDINARY STEEL CONCENTRICALLY BRACED FRAMES.

b. DESIGN BASE SHEAR	320 kips
c. SEISMIC MODIFICATION FACTOR, R	3.0
d. SYSTEM OVERSTRENGTH FACTOR, O0	3.0
e. DEFLECTION AMPLIFICATION FACTOR, CD	3.0
f. ANALYSIS PROCEDURE USED	EQUIVALENT LATERAL FORCE PROCEDURE

BUILDING E:
a. BASIC SEISMIC FORCE RESISTING SYSTEM - STRUCTURAL STEEL SYSTEM NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE. THE LATERAL FORCE RESISTING SYSTEM CONSISTS OF INTERMEDIATE REINFORCED MASONRY SHEAR WALLS AND ORDINARY STEEL MOMENT FRAMES.

b. DESIGN BASE SHEAR	430 kips
c. SEISMIC MODIFICATION FACTOR, R	3.0
d. SYSTEM OVERSTRENGTH FACTOR, O0	3.0
e. DEFLECTION AMPLIFICATION FACTOR, CD	3.0
f. ANALYSIS PROCEDURE USED	EQUIVALENT LATERAL FORCE PROCEDURE

BUILDING AREA F (ALTERNAITE):
a. BASIC SEISMIC FORCE RESISTING SYSTEM - STRUCTURAL STEEL SYSTEM NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE. THE LATERAL FORCE RESISTING SYSTEM CONSISTS OF ORDINARY STEEL CONCENTRICALLY BRACED FRAMES AND INTERMEDIATE REINFORCED MASONRY SHEAR WALLS

b. DESIGN BASE SHEAR	32 kips
c. SEISMIC MODIFICATION FACTOR, R	3.0
d. SYSTEM OVERSTRENGTH FACTOR, O0	3.0
e. DEFLECTION AMPLIFICATION FACTOR, CD	3.0
f. ANALYSIS PROCEDURE USED	EQUIVALENT LATERAL FORCE PROCEDURE

BUILDING AREA H:
a. BASIC SEISMIC FORCE RESISTING SYSTEM - STRUCTURAL STEEL SYSTEM NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE. THE LATERAL FORCE RESISTING SYSTEM CONSISTS OF ORDINARY STEEL MOMENT FRAMES AND INTERMEDIATE REINFORCED MASONRY SHEAR WALLS

b. DESIGN BASE SHEAR	75 kips
c. SEISMIC MODIFICATION FACTOR, R	3.0
d. SYSTEM OVERSTRENGTH FACTOR, O0	3.0
e. DEFLECTION AMPLIFICATION FACTOR, CD	3.0
f. ANALYSIS PROCEDURE USED	EQUIVALENT LATERAL FORCE PROCEDURE

BUILDING AREA K (GARAGE):
a. BASIC SEISMIC FORCE RESISTING SYSTEM - STRUCTURAL STEEL SYSTEM NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE. THE LATERAL FORCE RESISTING SYSTEM CONSISTS OF STRUCTURAL STEEL CONCENTRICALLY BRACED FRAMES.

b. DESIGN BASE SHEAR	47 kips
c. SEISMIC MODIFICATION FACTOR, R	3.0
d. SYSTEM OVERSTRENGTH FACTOR, O0	3.0
e. DEFLECTION AMPLIFICATION FACTOR, CD	3.0
f. ANALYSIS PROCEDURE USED	EQUIVALENT LATERAL FORCE PROCEDURE

5. MISCELLANEOUS LOADS:
a. HYDROSTATIC UPLIFT
b. HYDRODYNAMIC LOADS
c. FLOOD LOAD

d. INTERIOR WALLS AND PARTITIONS (HEAD) (LATERAL)	5 PSF	IN ACCORDANCE WITH SECTION 1607.12 2006 CT BC
e. AT REST SOIL PRESSURE (STATIC)	55 PCF	IN ACCORDANCE WITH ASCE 7
f. ACTIVE SOIL PRESSURE (STATIC)	35 PCF	IN ACCORDANCE WITH ASCE 7
g. SURCHARGE (1.5x100 PSF = 50 PSF/FT UNIFORMLY DISTRIBUTED OVER THE HEIGHT OF WALL)		
h. SURCHARGE (1.5x100 PSF = 50 PSF/FT UNIFORMLY DISTRIBUTED OVER THE HEIGHT OF WALL)		

GENERAL STRUCTURAL AND CONSTRUCTION NOTES

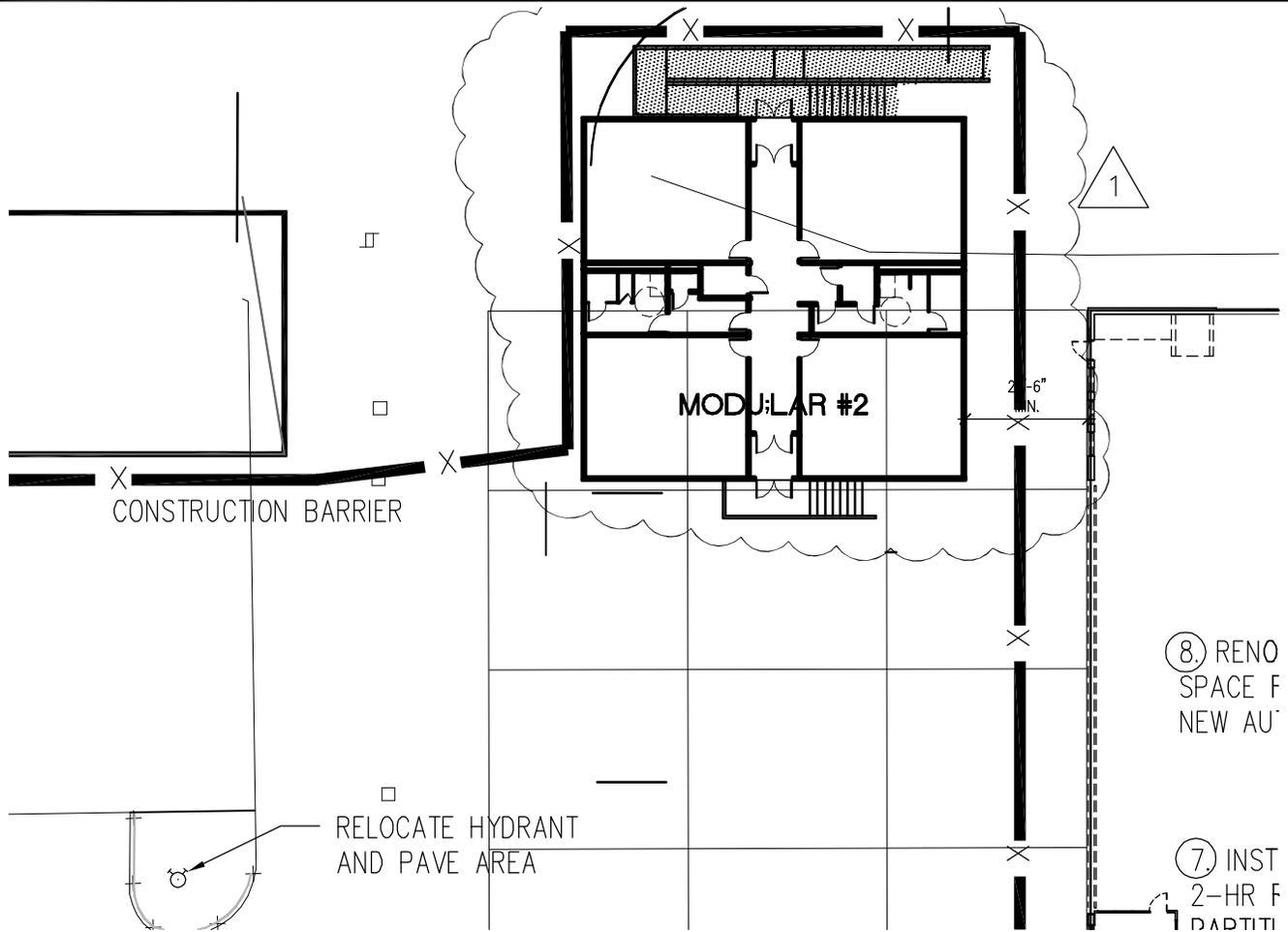
Scale: **NTS**
Reference: **8001**
Date: **3/30/11**
Proj. No. **0478.00**

Sketch No:
SSK-01
ADDENDUM #2

PART GENERAL NOTES

H. H. ELLIS TECHNICAL HIGH SCHOOL
ADDITIONS + MAJOR RENOVATIONS
DANIELSON, CONNECTICUT

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⑧ RENO SPACE F NEW AU'

⑦ INST 2-HR F DADITI

RELOCATION SCHEDULE

ROOM	EXIST. LOCATION	NEW LOCATION	Temp/PERM.
TRADE PREP	BUILDING L	MODULAR #2	T
RENOVATE IN PLACE: T			

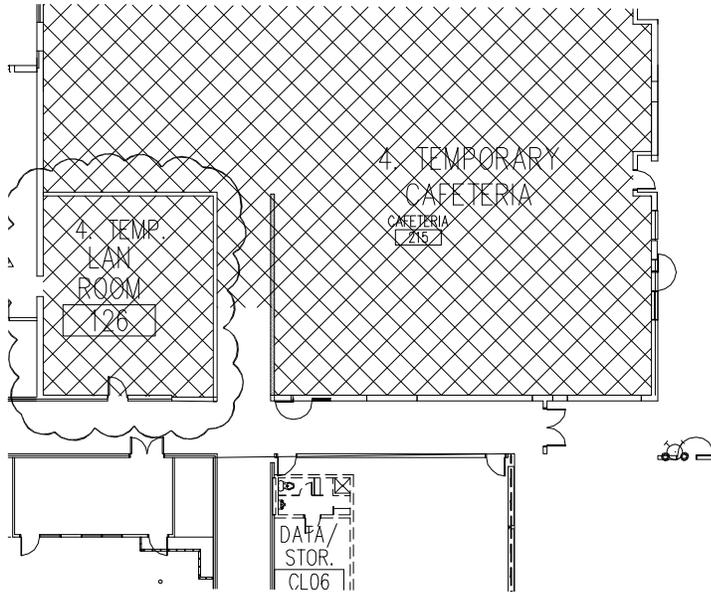
NOTE: MODULAR #2 WILL PROVIDE ADDITIONAL CLASSROOM SWING SPACE FOR THE DURATION OF CONSTRUCTION, AND WILL BE ON-SITE AND IN USE IN THE LOCATION SHOWN FOR ALL 5 PHASES. SEE ALSO REISSUED DRAWING L201 FOR SITE INFO, ASK-03 FOR MODULAR LAYOUT, AND SPECIFICATION SECTION 13 3423 FOR BUILDING FIT-OUT.

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Additional Modular Building
H.H. Ellis TECHNICAL HIGH SCHOOL
ADDITIONS + MAJOR RENOVATIONS
DANIELSON, CT

Scale: **No Scale**
Reference: **GP-01**
Date: **03/30/11**
Proj. No. **04179.00**

Sketch No:
ASK-01
BI-RT-841



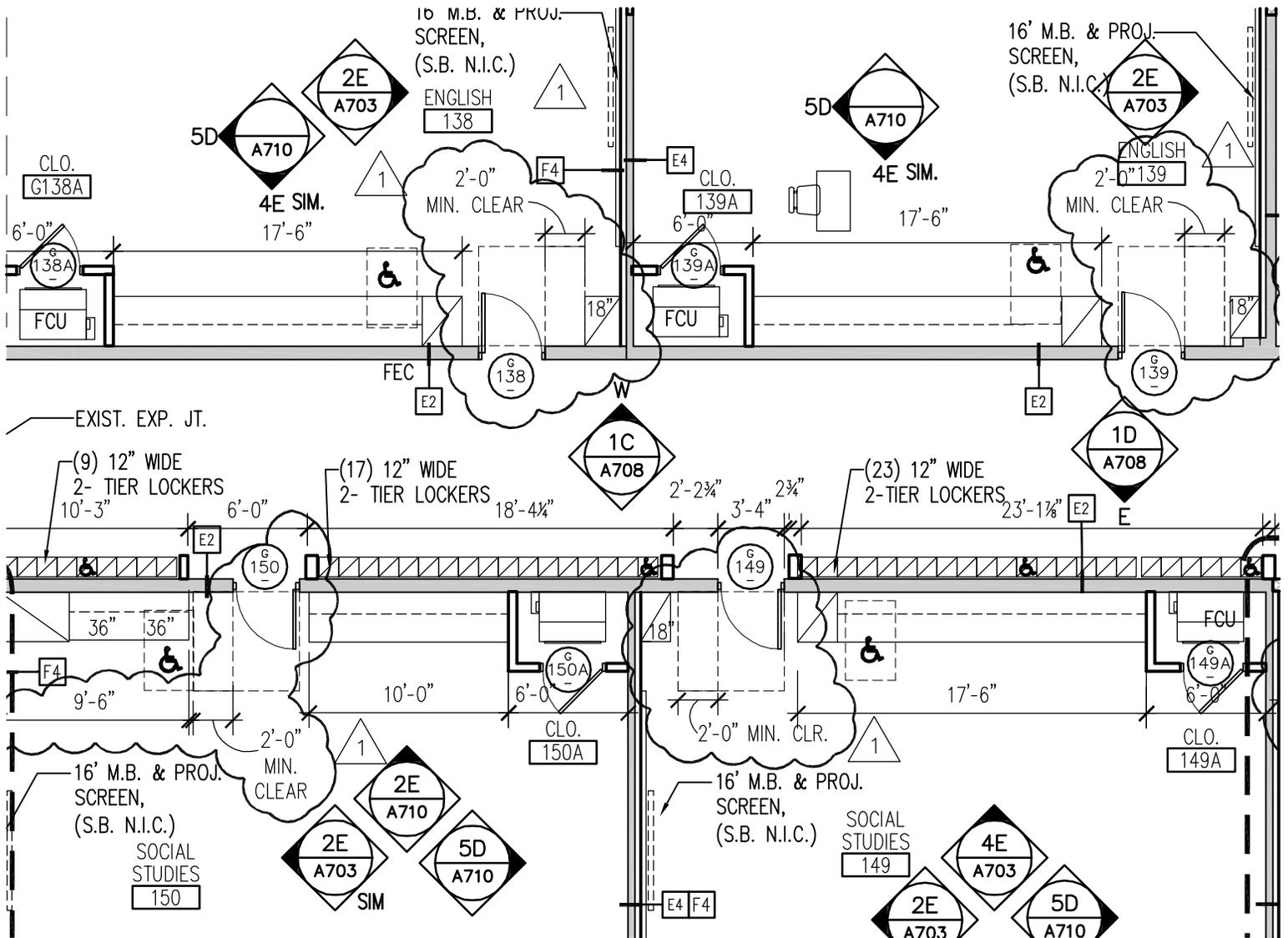
RELOCATION SCHEDULE			
ROOM	EXIST. LOCATION	NEW LOCATION	Temp/Perm.
AUTOMOTIVE TECHNOLOGY 306	PART. B	PART C (427)	P
CAFETERIA 215	PART E	PART C	T
FACULTY DINING 217	PART E	TEMP. CAFETERIA	T
GYMNASIUM 204	PART E	PART D(400A)	P
KITCHEN 219	PART E	TEMP. CAFETERIA (LIMITED OPERATIONS)	-
LOCKER/BOYS 202A	PART E	PART D (407A)	P
LOCKER/GIRLS 200A	PART E	PART D (410A)	P
MAINTENANCE 304/OFFICE	PART. B	PART J (112A)	T
MAINTENANCE 304/WORKSHOP	PART B	PART A (313)	T
MAINTENANCE 304/STORAGE	PART B	PART C (420A)	T
TRADE PREP 224 (CDL)	PART B	MODULAR #2	T
LAN ROOM 126	PART G	TEMP. CAFETERIA (ADJACENT SPACE)	T

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Phase Two Revisions
H.H. Ellis TECHNICAL HIGH SCHOOL
ADDITIONS + MAJOR RENOVATIONS
DANIELSON, CT

Scale:
No Scale
Reference:
GP-02
Date:
03/30/11
Proj. No.
04179.00

Sketch No:
ASK-02
BI-RT-841



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Revised Classroom Doors - Part G - 1 of 3

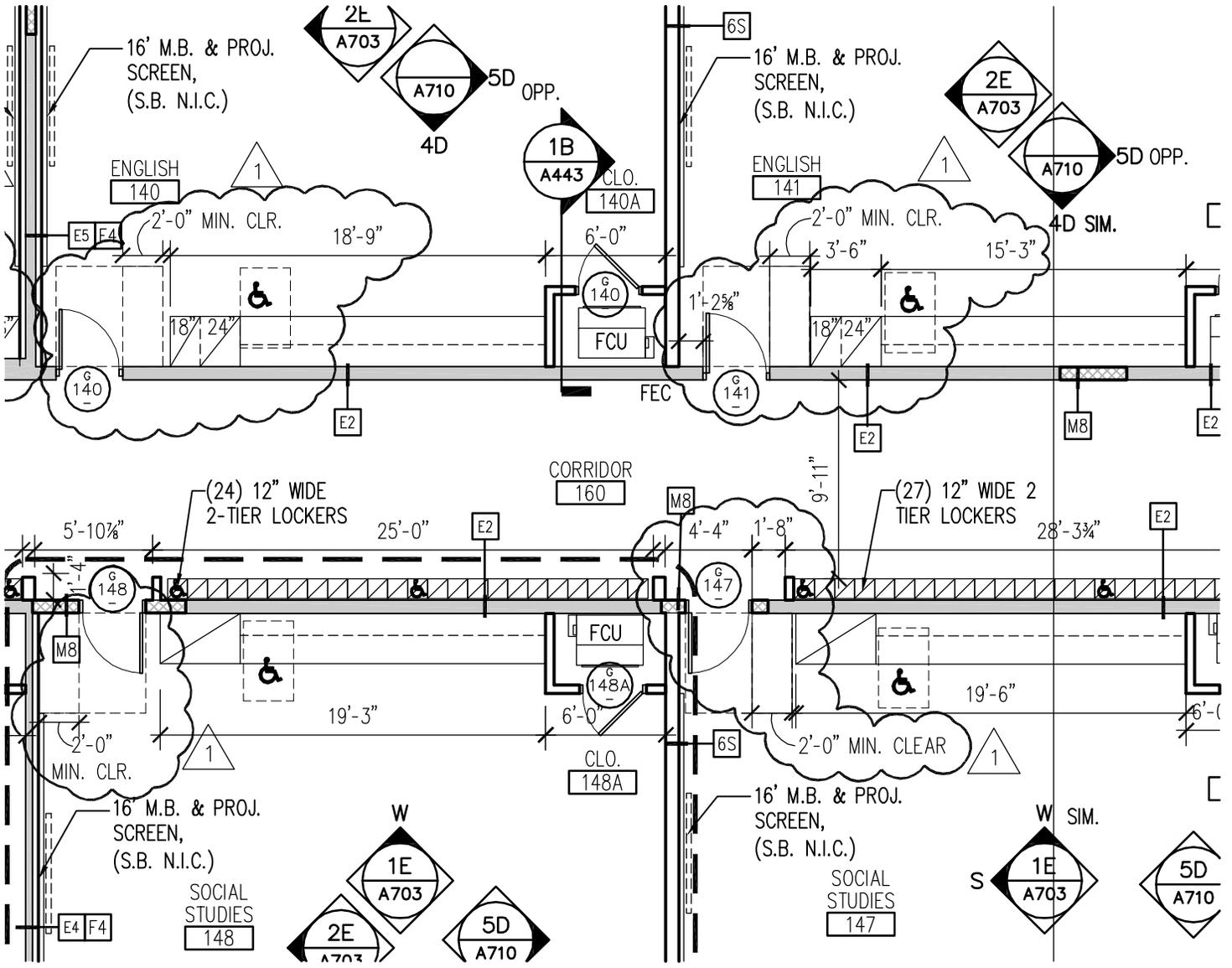
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
 1/8" = 1'-0"
 Reference:
 A101GH
 Date:
 03/30/11
 Proj. No.
 04179.00

Sketch No:

ASK-04

Addendum #2

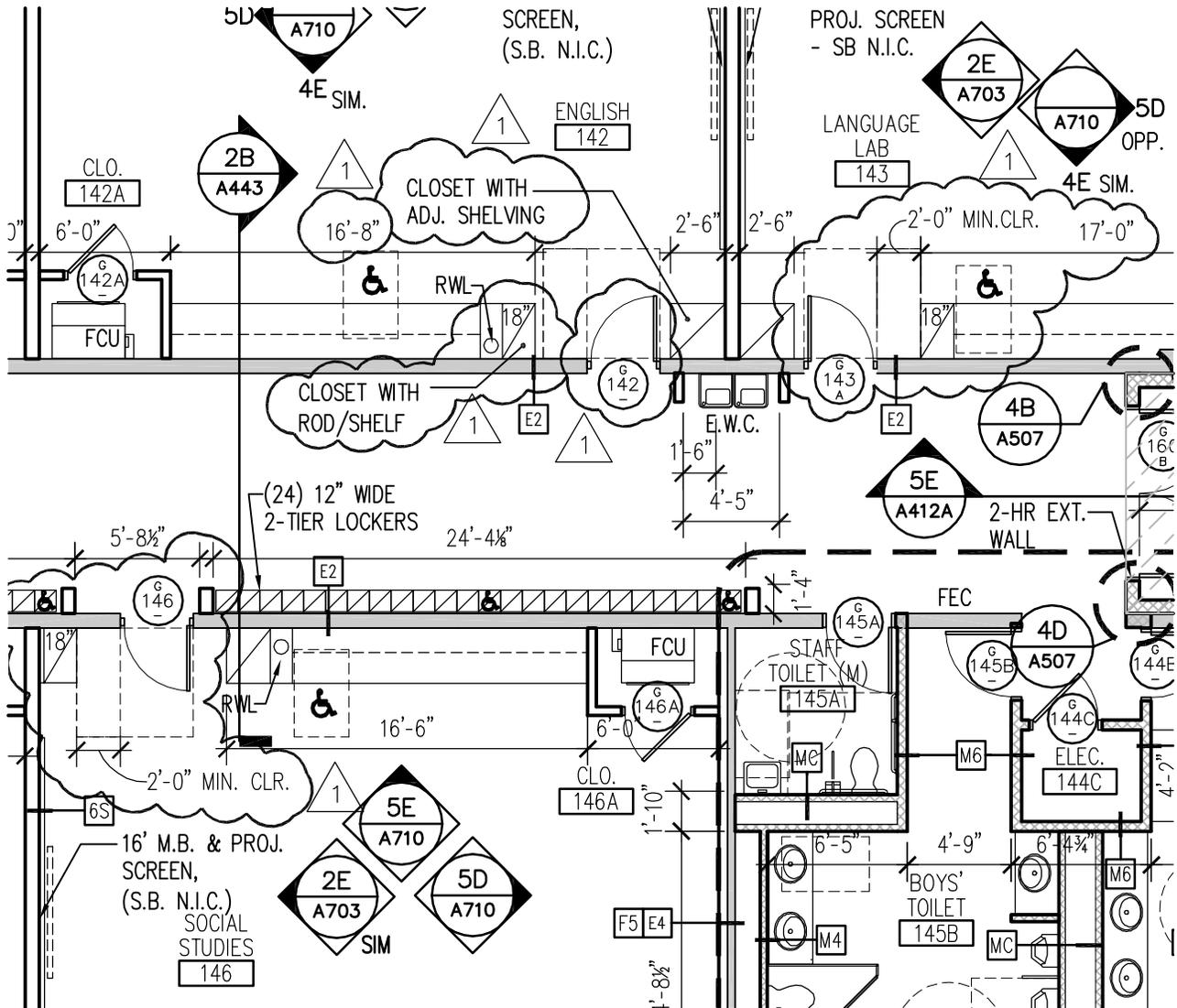


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Revised Classroom Doors - Part G - 2 of 3
H.H. Ellis Technical High School
 Additions + Major Renovations
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Scale:
 1/8" = 1'-0"
 Reference:
 A101GH
 Date:
 03/30/11
 Proj. No.
 04179.00

Sketch No:
ASK-05
 Addendum #2



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Revised Classroom Doors - Part G - 3 of 3

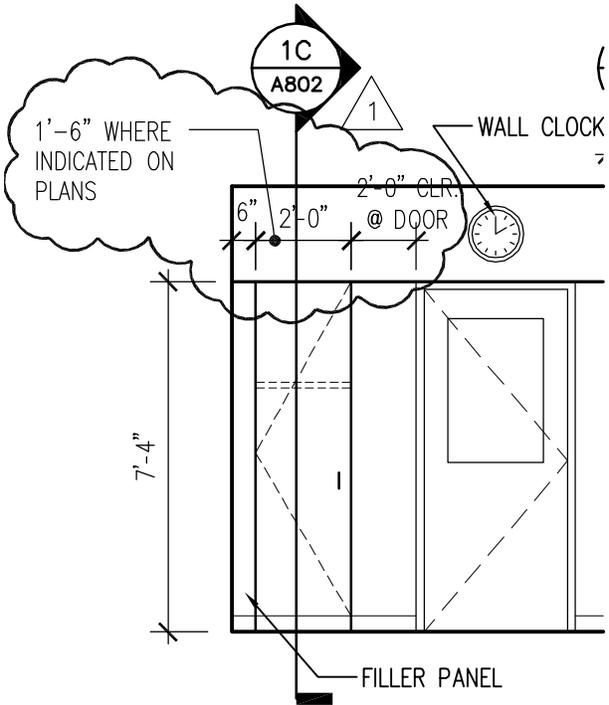
H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale:
 1/8" = 1'-0"
 Reference:
 A101GH
 Date:
 03/30/11
 Proj. No.
 04179.00

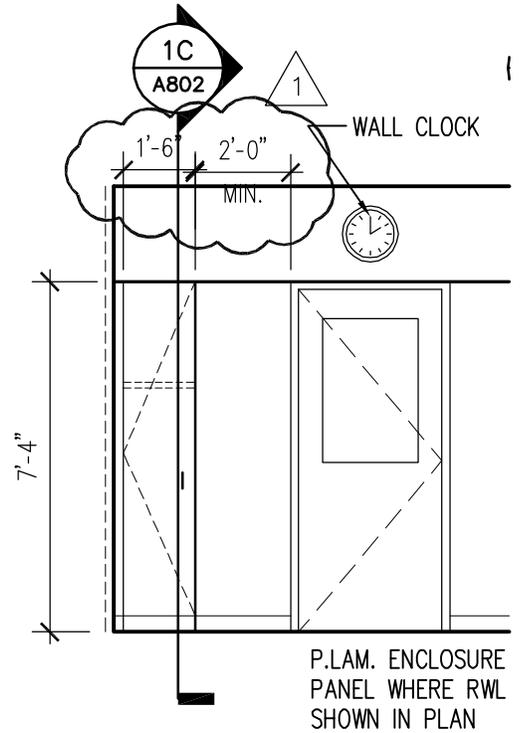
Sketch No:

ASK-06

Addendum #2



4E CLASSROOM 149
 $1/4" = 1'-0"$



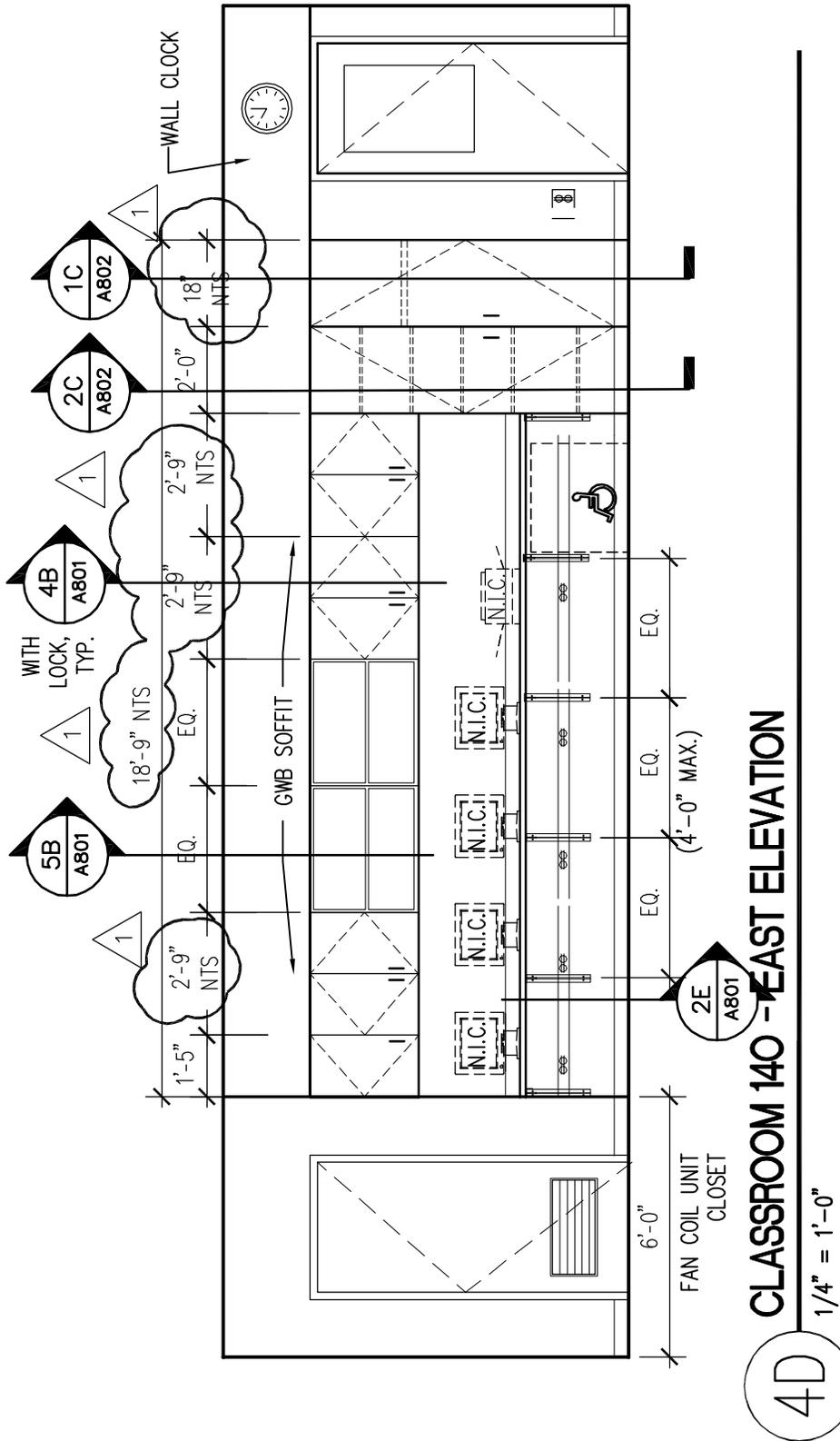
5E CLASSROOM 146 -
 $1/4" = 1'-0"$

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Revised 4E + 5E/A710 - Part G
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
 $1/8" = 1'-0"$
 Reference:
 A710
 Date:
 03/30/11
 Proj. No.
 04179.00

Sketch No:
ASK-07
 Addendum #2



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Revised 4D/A710

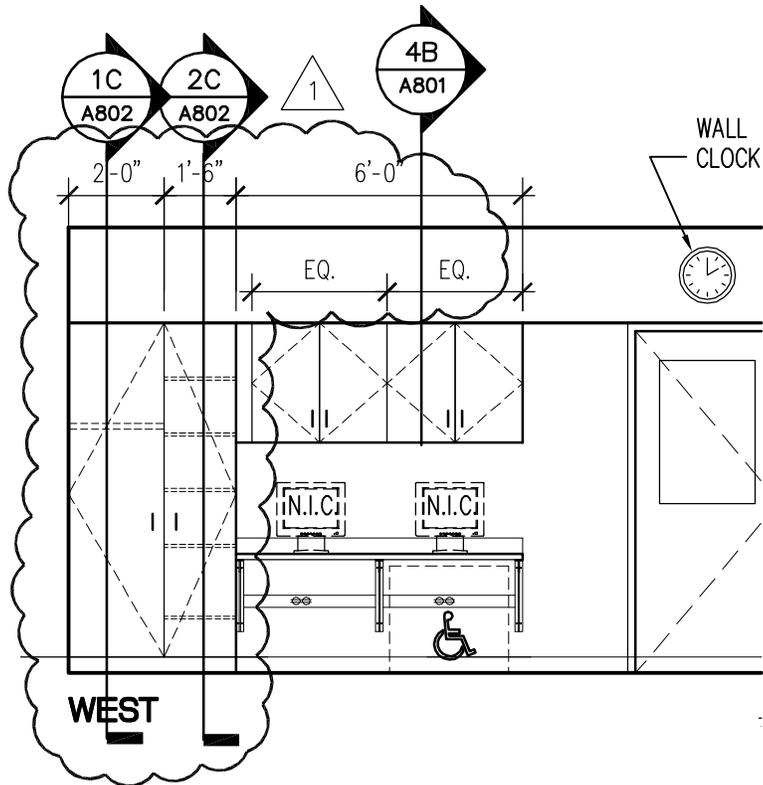
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
 1/8" = 1'-0"
 Reference:
 A710
 Date:
 03/30/11
 Proj. No.
 04179.00

Sketch No:

ASK-08

Addendum #2



2E CLASSROOM 150 - WEST ELEV
 1/4" = 1'-0"

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Revised 2E/A710

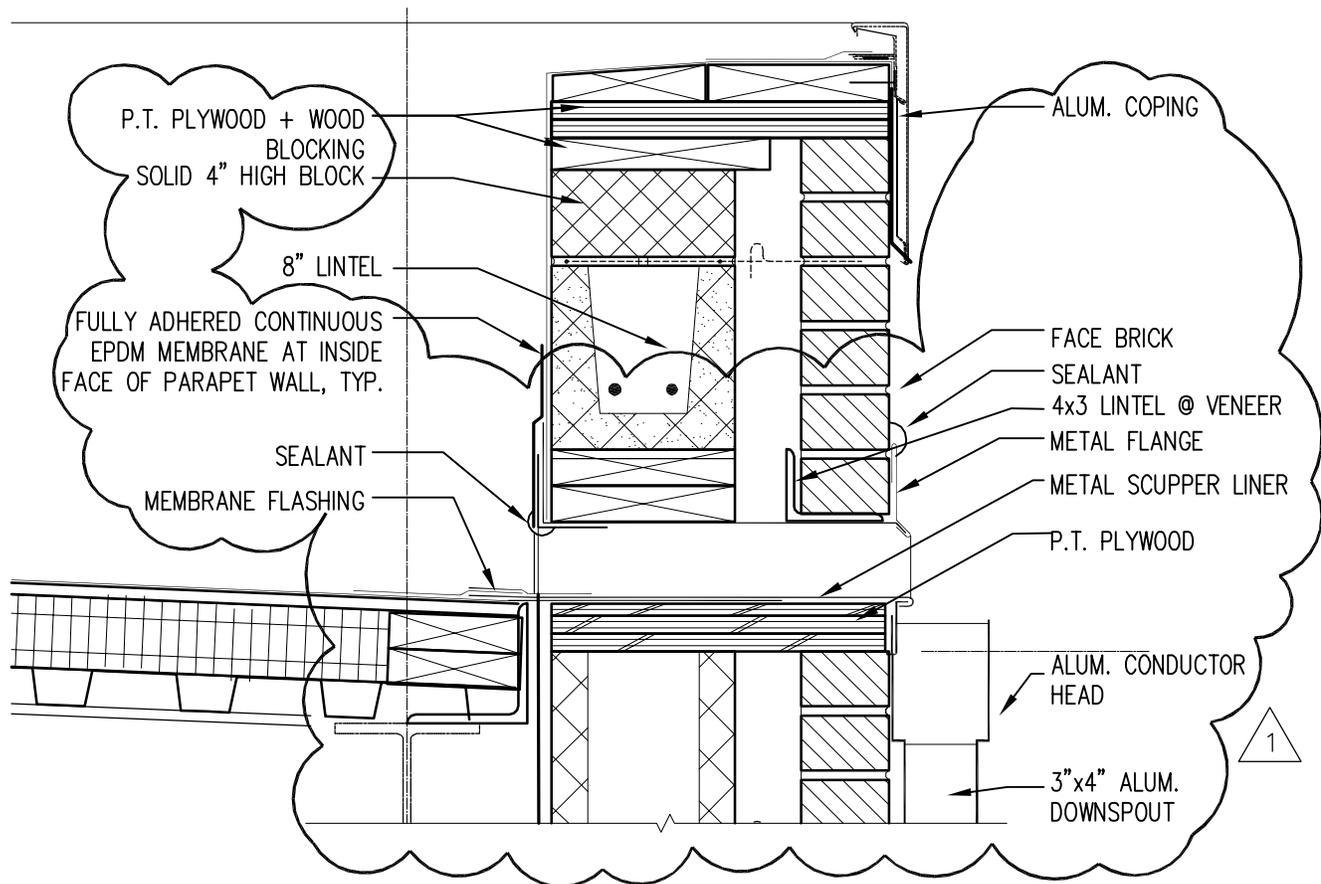
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
 1/8" = 1'-0"
 Reference:
 A710
 Date:
 03/30/11
 Proj. No.
 04179.00

Sketch No:

ASK-09

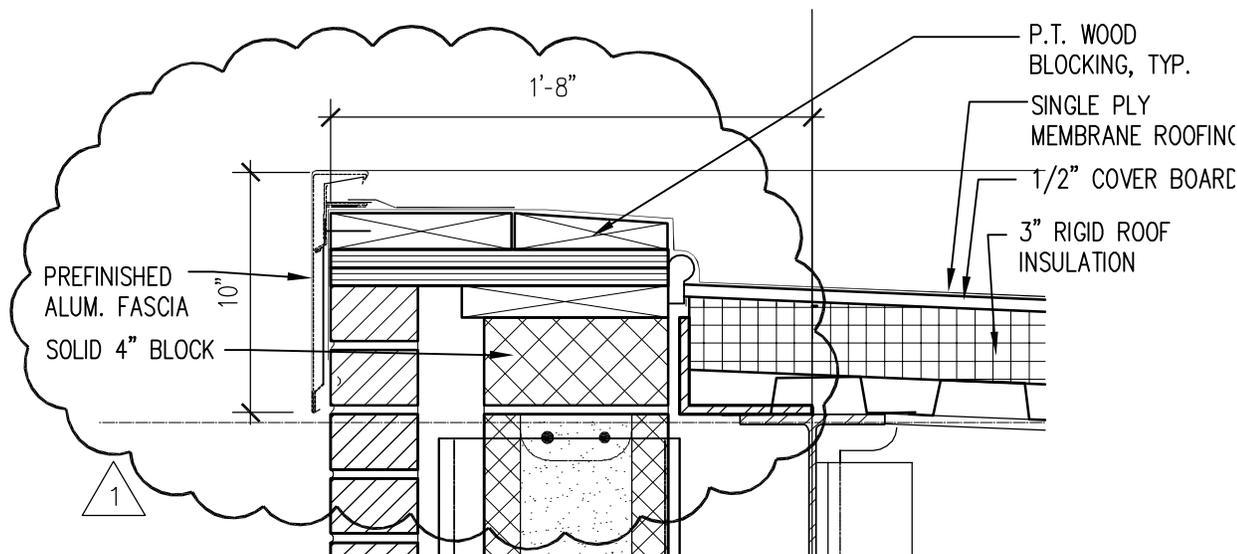
Addendum #2



5A

SCUPPER DETAIL (SUPP. BID NO. 2)

1 1/2" = 1'-0"



4D

GARAGE ROOF EDGE DETAIL (SUPP. BID #2)

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

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Revised Garage Details
ADDITIONS & RENOVATIONS TO
H.H. ELLIS TECH HIGH SCHOOL
DANIELSON, CT

Scale:
as noted
Reference:
A521
Date:
03/30/11
Proj. No.
04179.00

Sketch No:

ASK-010

Addendum #2

NOTE: DIMS. AT EA. COLUMN
MAY VARY - SEE A101K

GARAGE EXTERIOR WALL
CONSTRUCTION:

4" NOM. BRICK
±2" AIR SPACE
8" NOM. CMU

MASONRY ANCHOR 16" OC.
VERTICALLY -TYP. ALL
CHANNELS, ALL OPENINGS

GALV. STEEL ANGLE
PER STRUCT. (TYP.)

GALV. STEEL CHANNEL
PER STRUCT. (TYP.)

3'-0" (MASONRY ONLY)

1'-4"

1'-8"

2 3/4"

3 5/8"

7 5/8"

HORIZ. JOINT
REINFORCING PER
SPEC, TYP.

12'-0" MASONRY OPENING

OVERHEAD COILING
ROLLING DOOR & FRAME

12'-0" MASONRY OPENING

HOOD ABOVE

EXPOSED STEEL COLUMN

5C

PLAN DETAIL • GARAGE

1" = 1'-0"

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Plan Detail • Garage

**H.H. Ellis TECHNICAL HIGH SCHOOL
ADDITIONS + MAJOR RENOVATIONS
DANIELSON, CT**

Scale:
No Scale

Reference:
A502

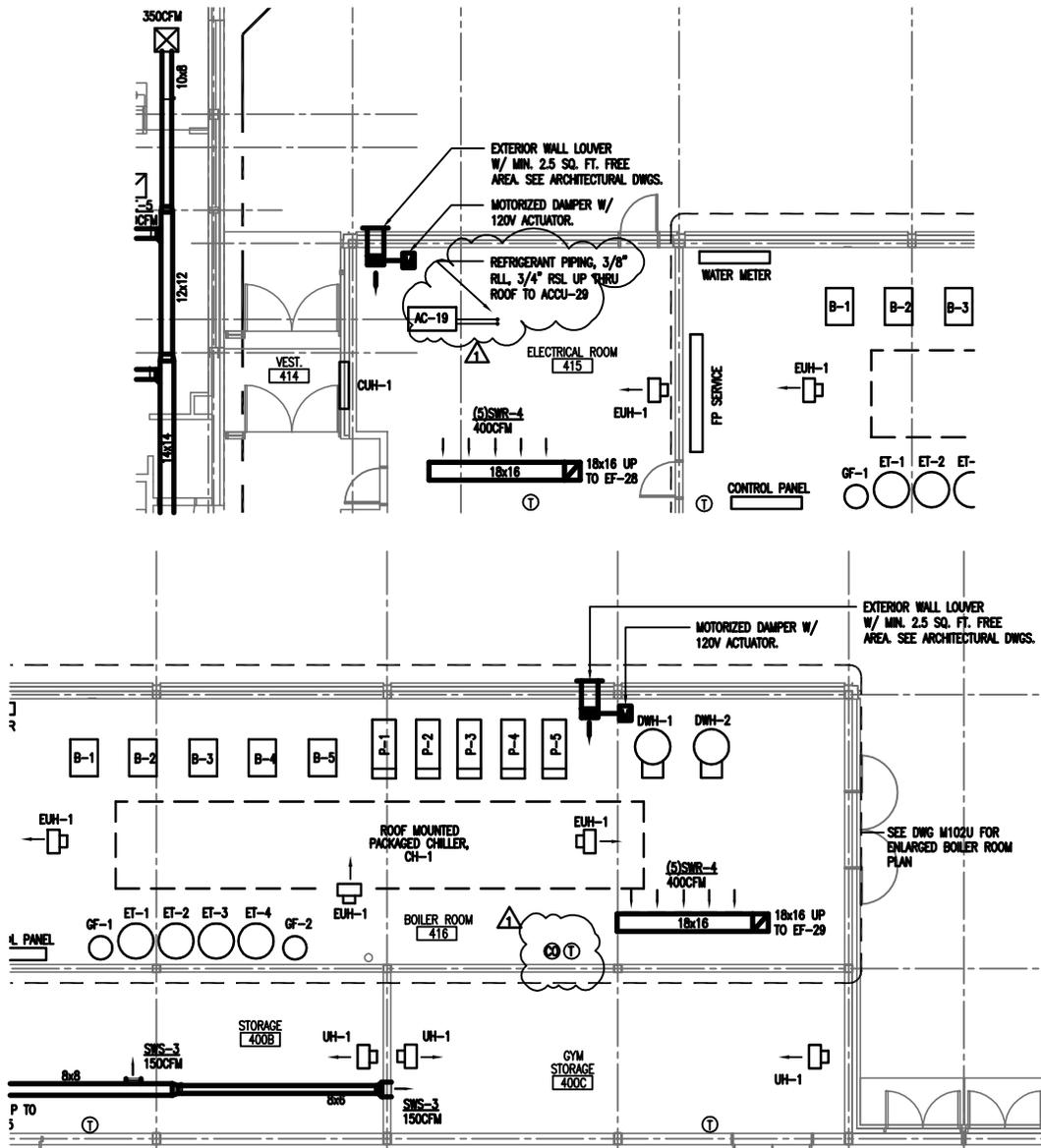
Date:
03/30/11

Proj. No.
04179.00

Sketch No:

ASK-11

BI-RT-841



FIRST FLOOR HVAC DUCTWORK PARTIAL PLANS - PART D

1/8"=1'-0"

MEP/ FIRE PROTECTION
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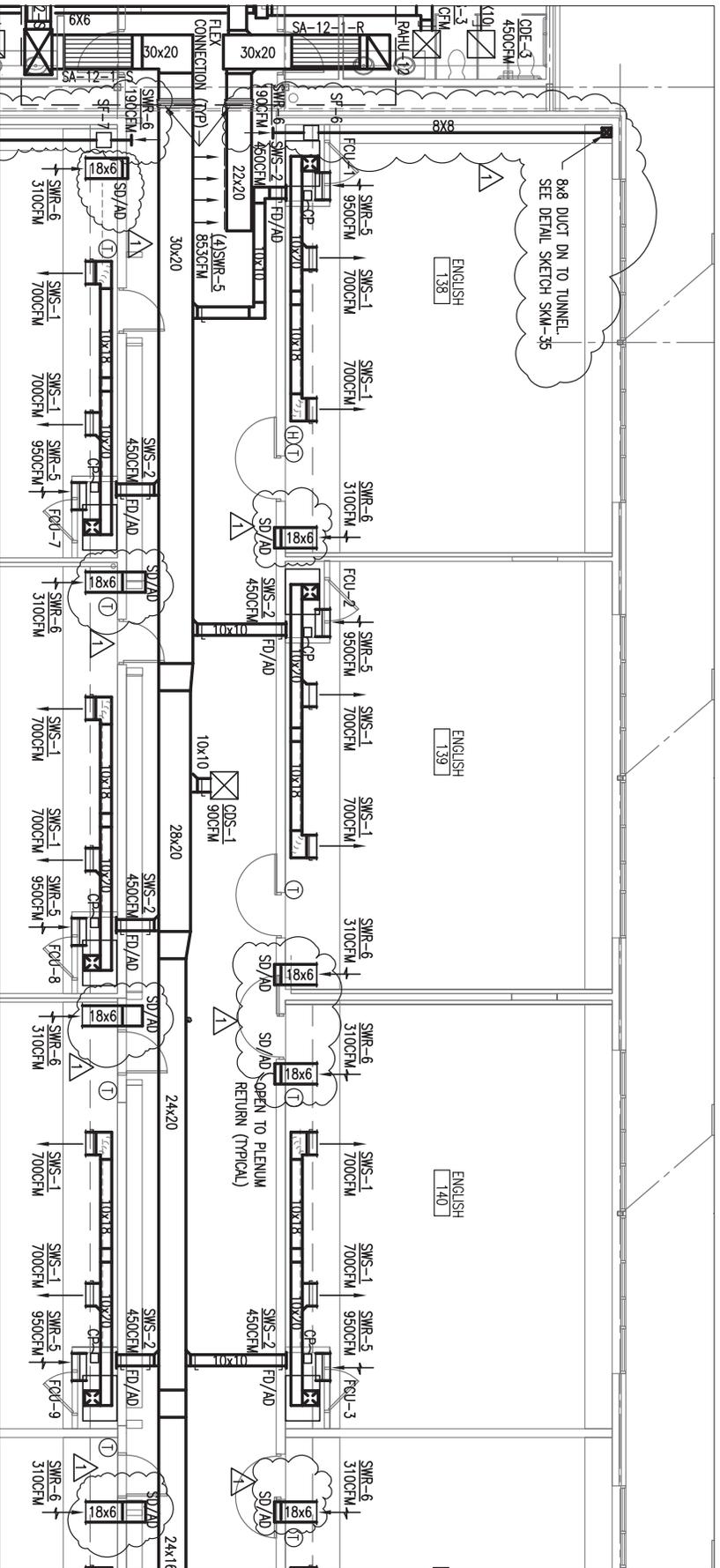
ADDENDUM #2

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EXHAUST FANS RELOCATION
H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale:
 As Noted
 Reference:
 M10D
 Date:
 MAR. 30, 2011
 Proj. No.
 04179.00

Sketch No:
SKM-07
 BI-RT-841



FIRST FLOOR HVAC DUCTWORK PARTIAL PLAN - PART G

1/8"=1'-0"

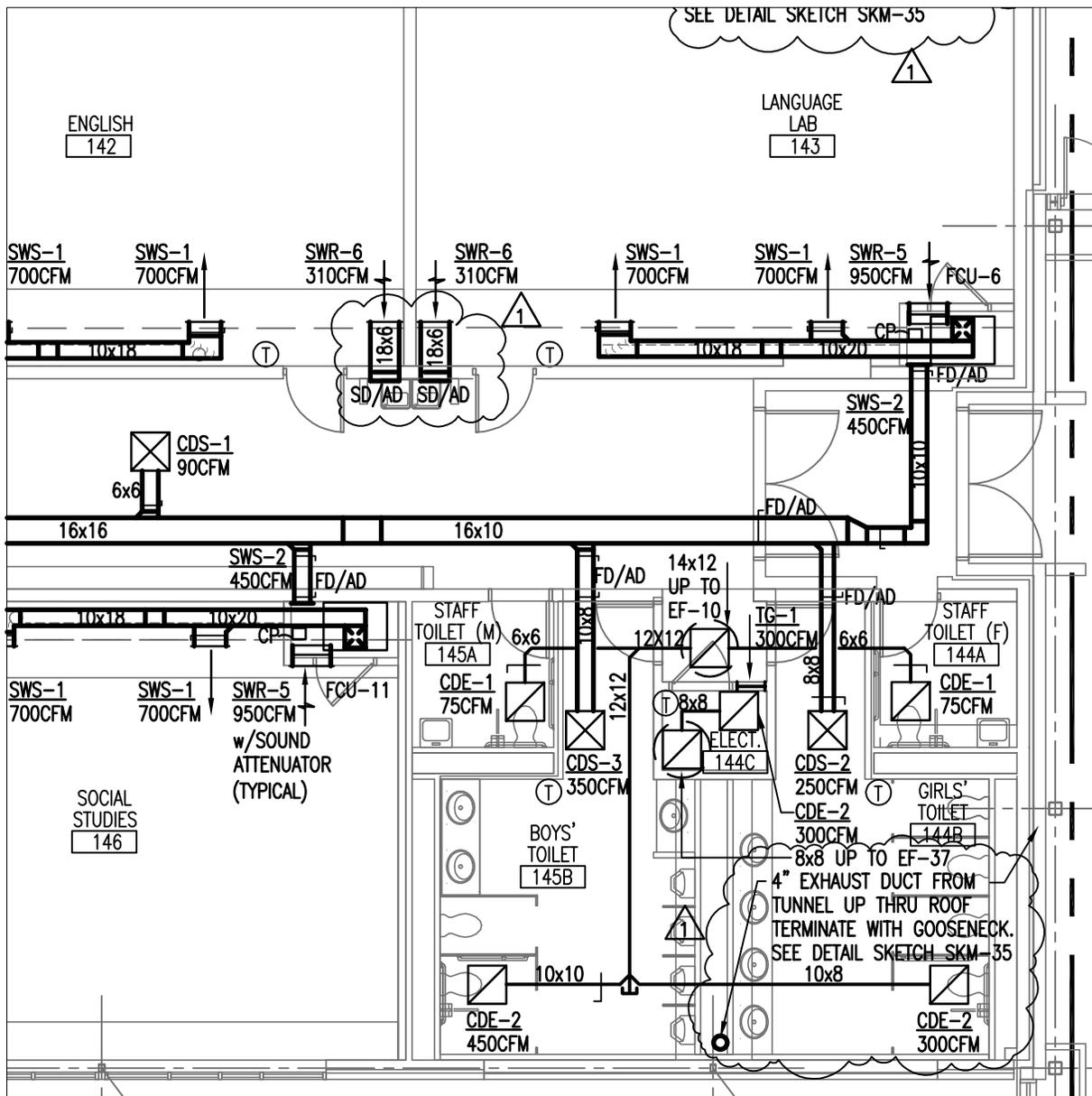
MEP/FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 2321 WHITNEY AVENUE
 HAMDEN, CT 06518

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FIRST FLOOR DUCTWORK PARTIAL PLAN - PART G
H.H. Ellis Technical High School
 Additions + Major Renovations
 Danelson, CT

Scale:	As Noted	Sheet No.:	SKM-08
Reference:	MOJCH	Date:	MARCH 30 2011
Proj. No.:	047800		
			BT-RT-041

ADDENDUM #2



FIRST FLOOR HVAC DUCTWORK PARTIAL PLAN - PART G

1/8"=1'-0"

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ADDENDUM #2

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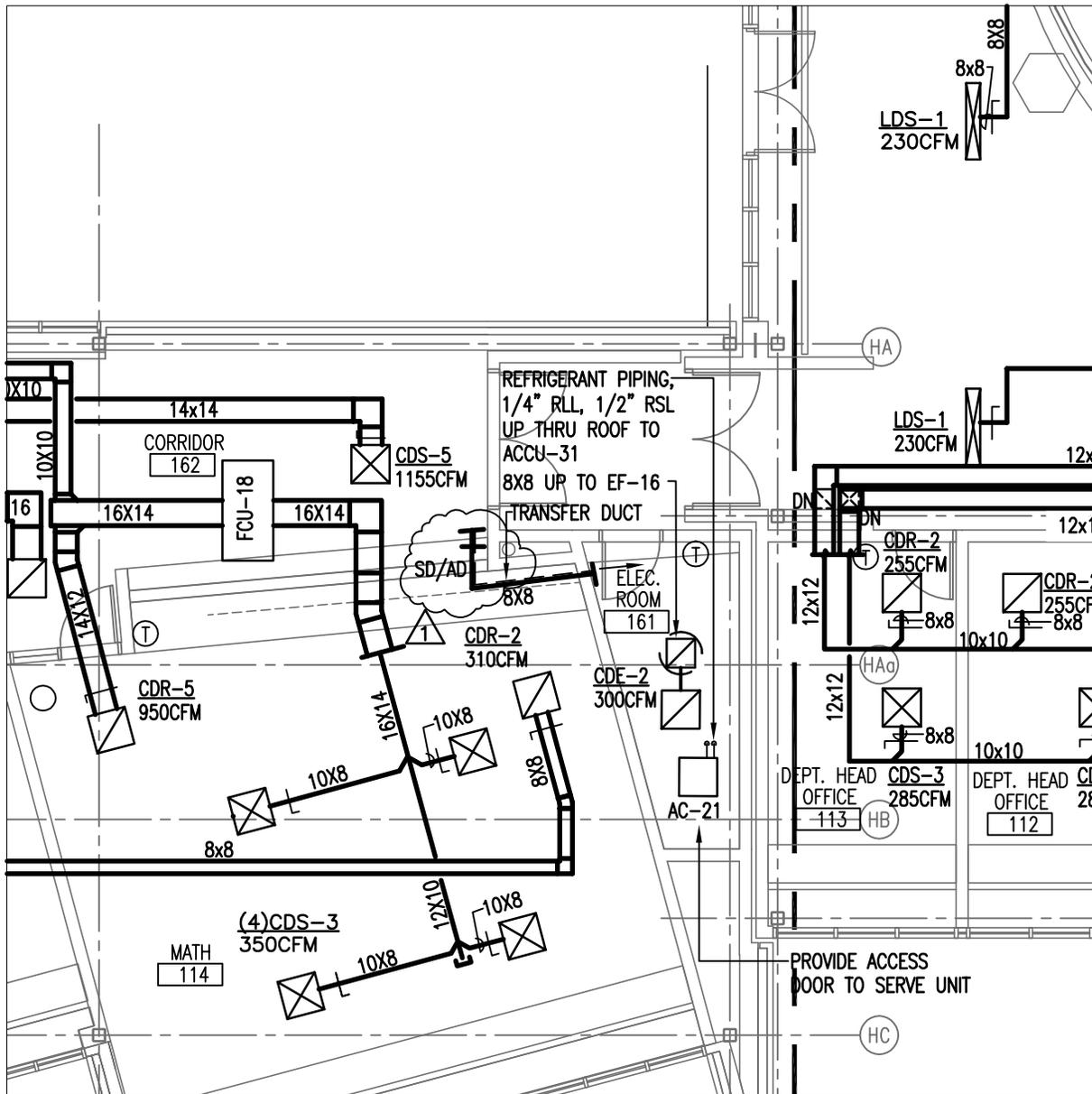
FIRST FLOOR HVAC DUCTWORK PARTIAL PLAN - PART G

H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale:
 As Noted
 Reference:
 M101GH
 Date:
 MAR. 30, 2011
 Proj. No.
 04179.00

Sketch No:
SKM-09

BI-RT-841



FIRST FLOOR HVAC DUCTWORK PARTIAL PLAN - PART H

1/8"=1'-0"

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ADDENDUM #2

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FIRST FLOOR HVAC DUCTWORK PARTIAL PLAN - PART H

H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale:
 As Noted

Reference:
 MIOIGH

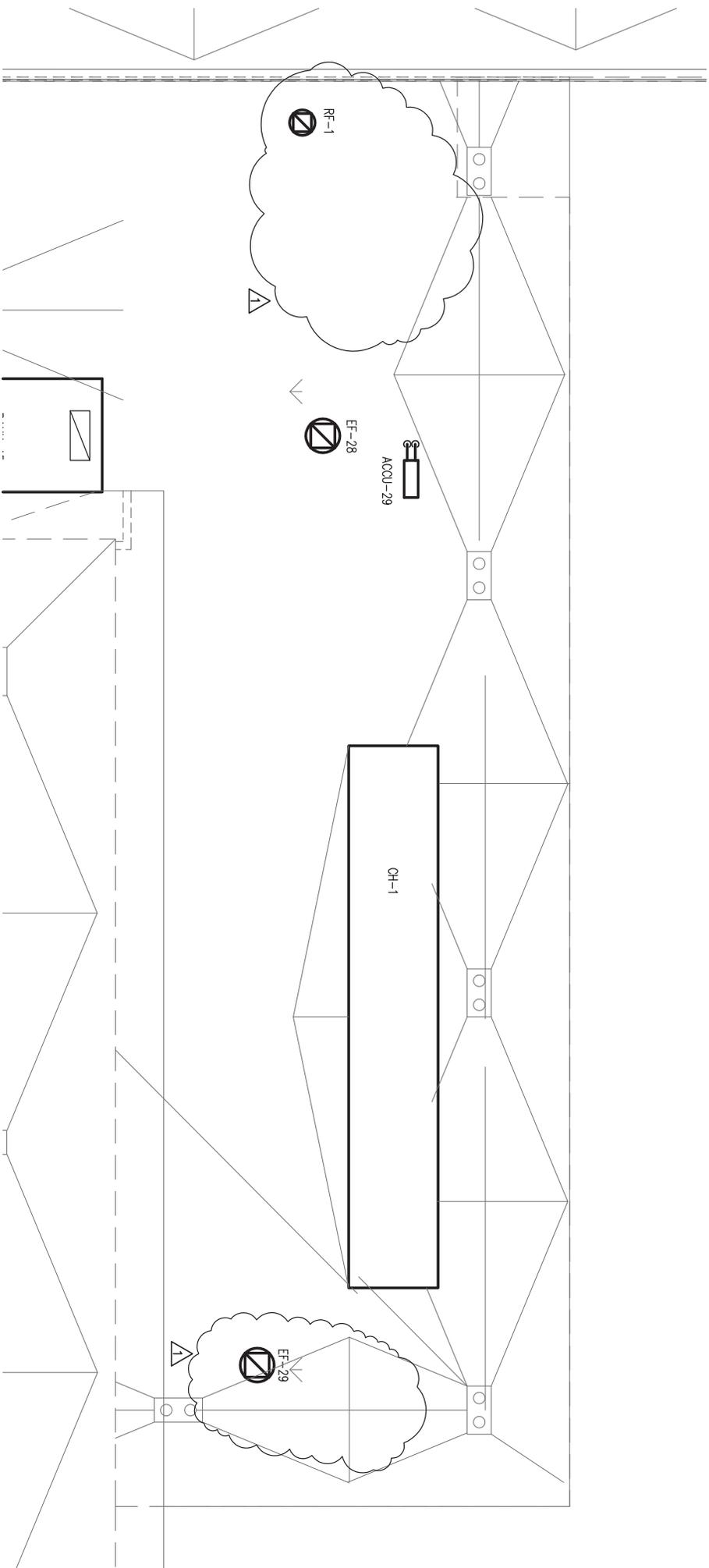
Date:
 MAR. 30, 2011

Proj. No.
 04179.00

Sketch No:

SKM-10

BI-RT-841



ROOF PARTIAL PLAN - PART D
 1/8"=1'-0"

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ADDENDUM #2

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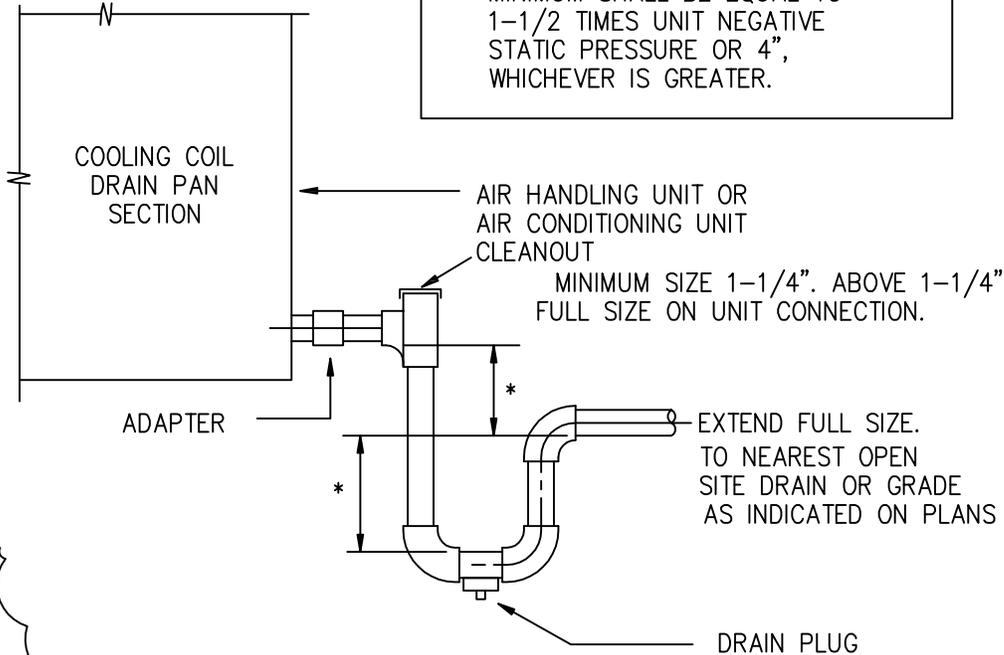
ROOF PARTIAL PLAN - PART D
H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale:	As Noted	Sketch No.
Reference:	M202	SKM-11
Date:	MARCH 30, 2011	
Proj. No.:	04/78/00	BR-RT-041

PROVIDE A SECONDARY CONDENSATE OVERFLOW DRAIN PAN WITH WATER DETECTION DEVICE

1

* MINIMUM SHALL BE EQUAL TO 1-1/2 TIMES UNIT NEGATIVE STATIC PRESSURE OR 4", WHICHEVER IS GREATER.



DETAIL - CONDENSATE DRAIN

NOT TO SCALE

MEP/ FIRE PROTECTION
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 HAMDEN, CT 06518

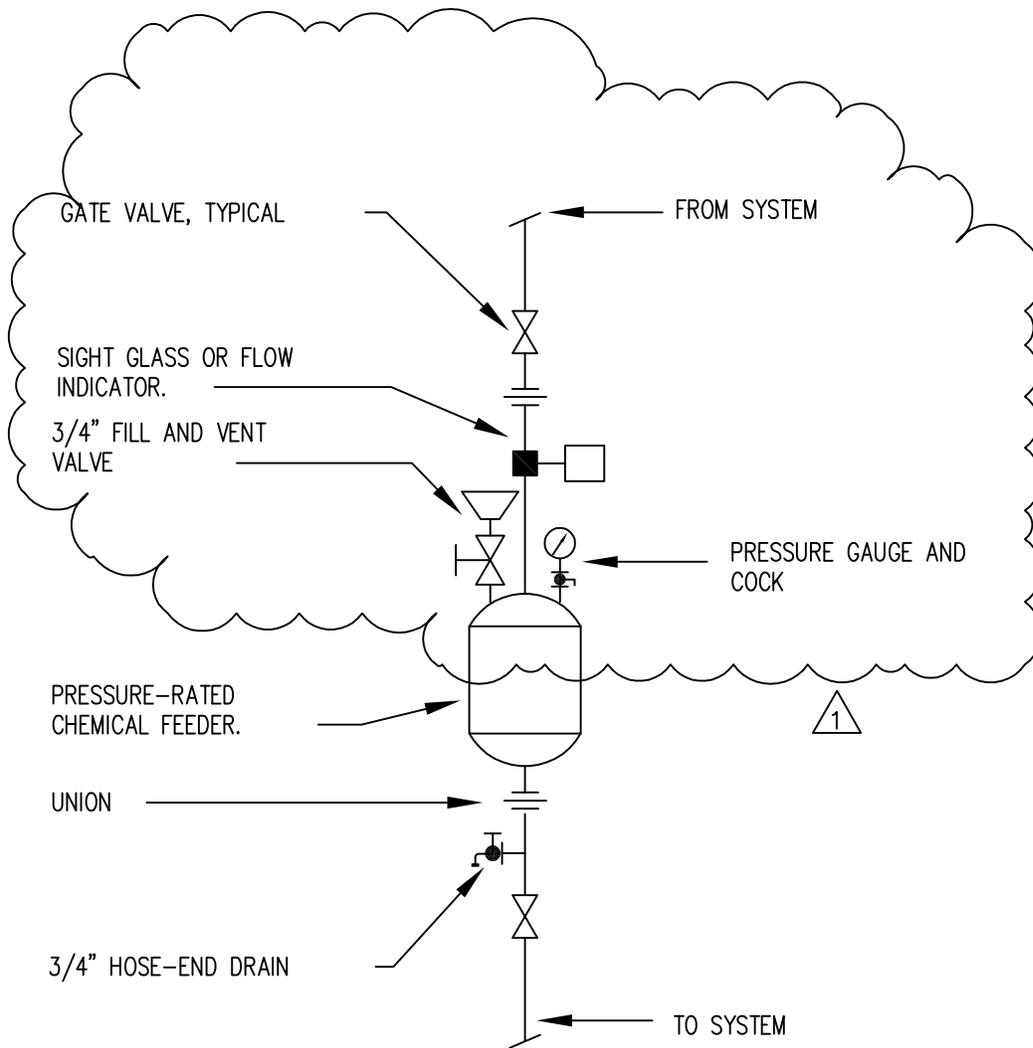
ADDENDUM #2

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DETAIL - CONDENSATE DRAIN
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale: *As Noted*
 Reference: **M405**
 Date: **MAR. 30, 2011**
 Proj. No. **04179.00**

Sketch No:
SKM-12
BI-RT-841



ONE SHOT CHEMICAL FEEDER DETAIL

NOT TO SCALE

MEP/ FIRE PROTECTION
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 HAMDEN, CT 06518

ADDENDUM #2

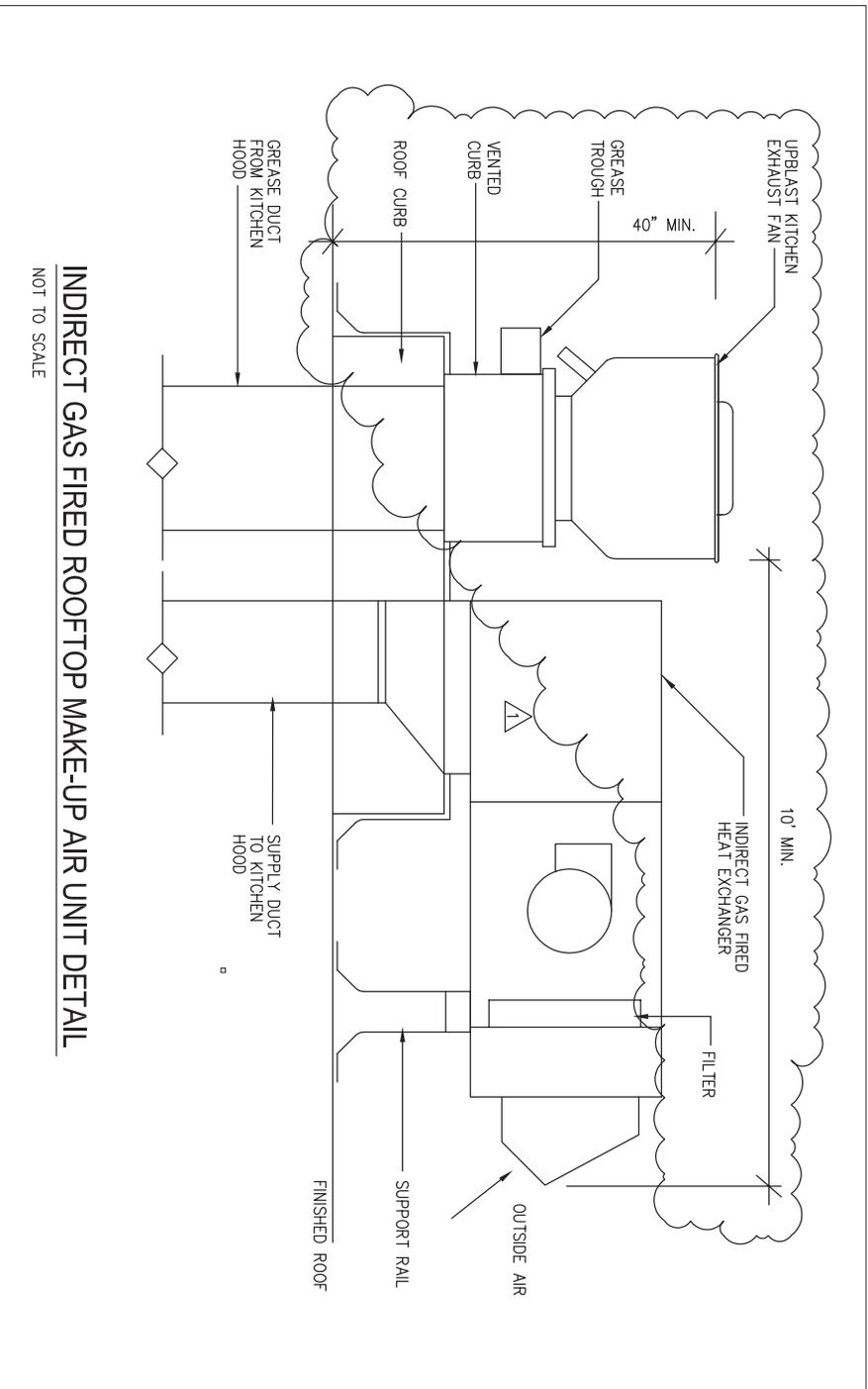
The
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ONE SHOT CHEMICAL FEEDER DETAIL
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale: *As Noted*
 Reference: **M406**
 Date: **MAR. 30, 2011**
 Proj. No. **04179.00**

Sketch No:
SKM-13

BI-RT-841



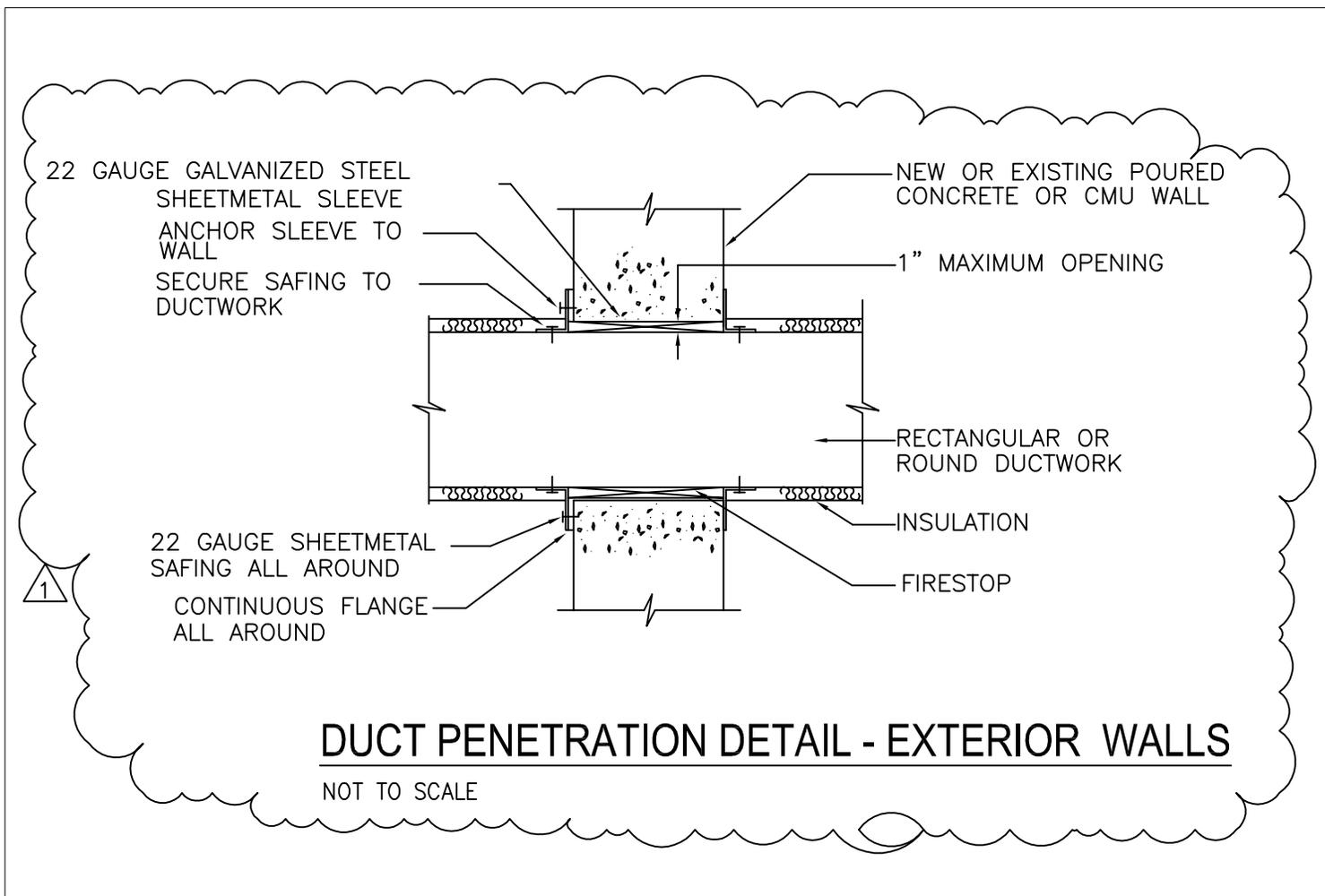
INDIRECT GAS FIRED ROOFTOP MAKE-UP AIR UNIT DETAIL
 NOT TO SCALE

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INDIRECT GAS FIRED ROOFTOP MAKE-UP AIR UNIT DETAIL		Scale:	As Noted
H.H. Ellis Technical High School		Reference:	MA07
Additions + Major Renovations		Date:	MARCH 30, 2011
Danielson, CT		Proj. No.:	04/7800
		Sketch No.:	BR-RT-041

ADDENDUM #2



MEP/ FIRE PROTECTION
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ADDENDUM #2

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DUCT PENETRATION DETAIL - EXTERIOR WALL

**H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT**

Scale:
 As Noted

Reference:
 M407

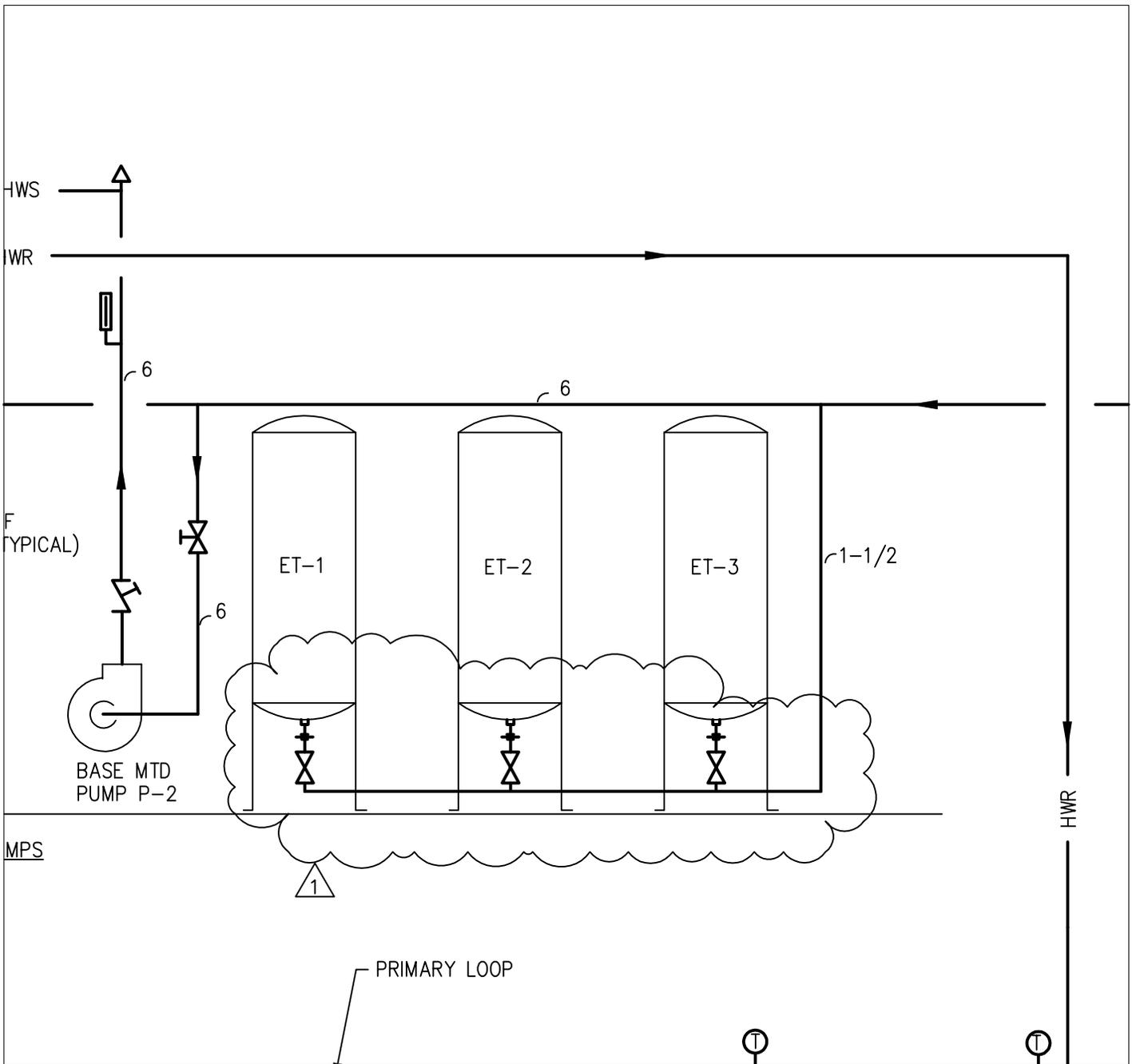
Date:
 MAR. 30, 2011

Proj. No.
 04179.00

Sketch No:

SKM-15

BI-RT-841



MEP/ FIRE PROTECTION
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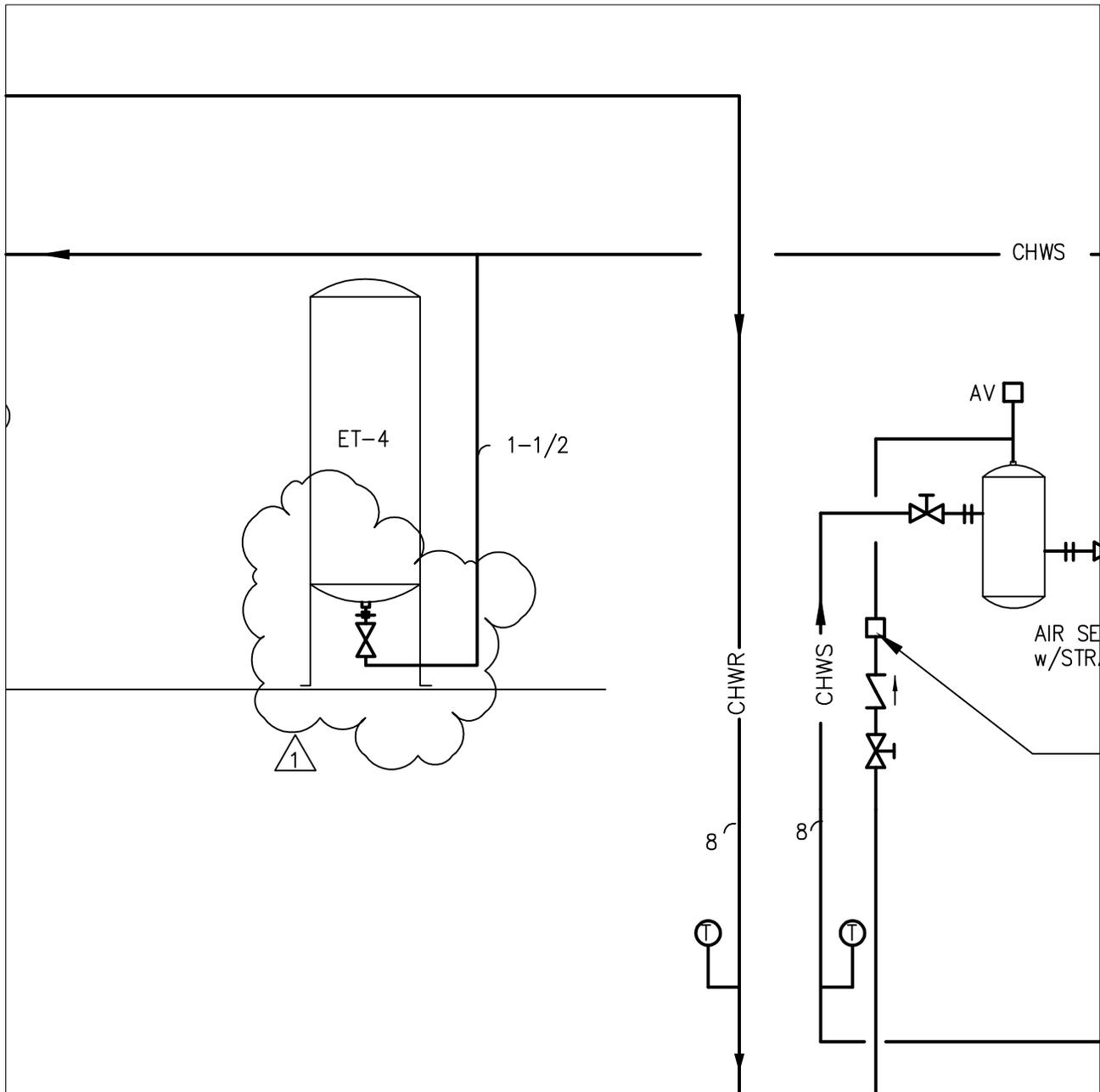
ADDENDUM #2

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HOT WATER FLOW DIAGRAM
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
As Noted
 Reference:
 M408
 Date:
 MAR. 30, 2011
 Proj. No.
 04179.00

Sketch No:
SKM-16
 BI-RT-841



MEP/ FIRE PROTECTION
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ADDENDUM #2

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CHILLED WATER FLOW DIAGRAM
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale: *As Noted*
 Reference: **M409**
 Date: **MAR. 30, 2011**
 Proj. No. **04179.00**

Sketch No:
SKM-17
BI-RT-841

Item No.	Description	Quantity	Unit	Notes
EF-39	GREENHECK	300	DIR	
EF-40	GREENHECK	2200	BELT	
EF-41	GREENHECK	2200	BELT	
EF-42	GREENHECK	2575	BELT	
EF-43	GREENHECK	2575	BELT	
EF-44	GREENHECK	1200	DIR	
EF-45	GREENHECK	75	DIR	

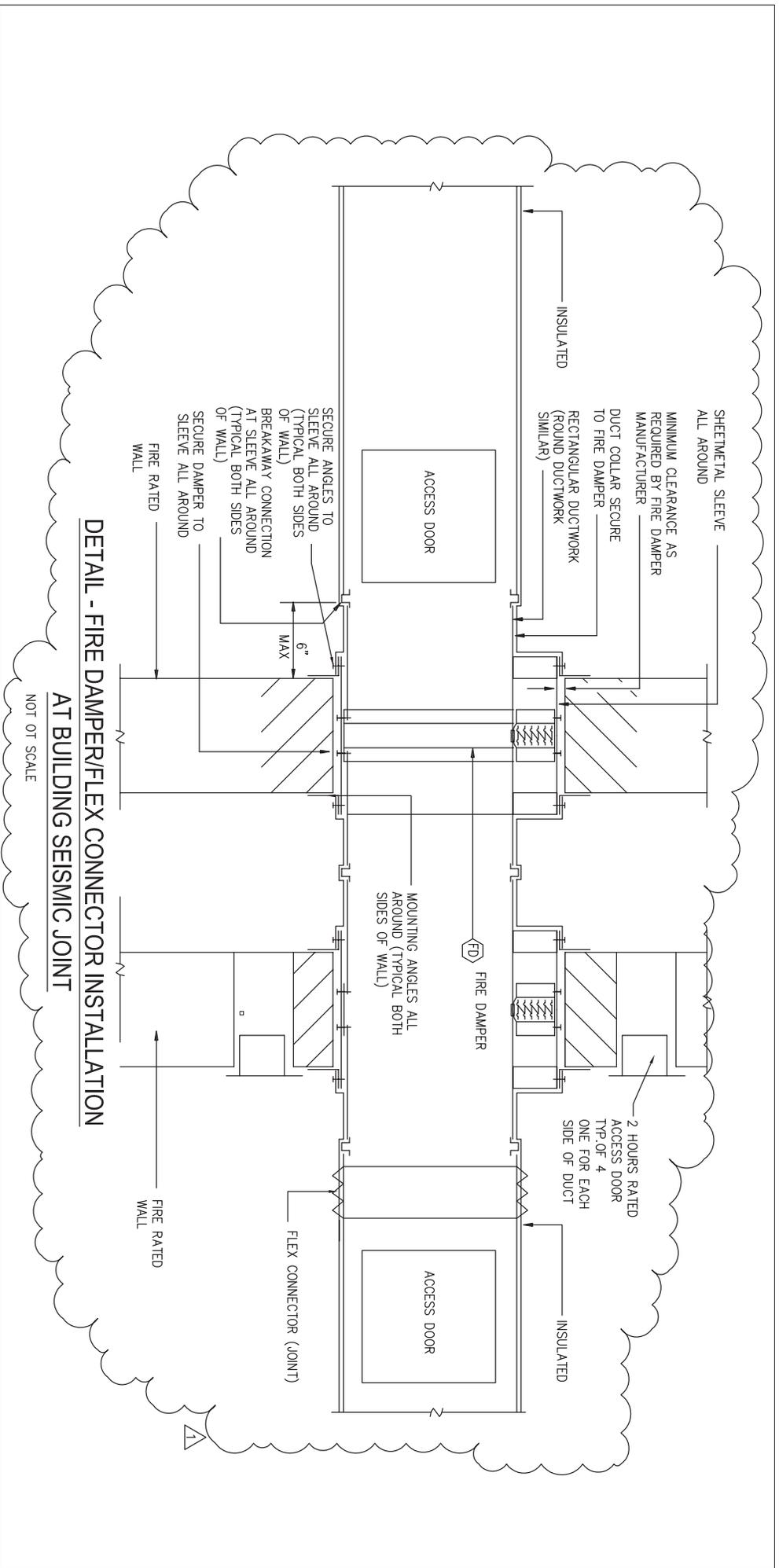
MEP/FIRE PROTECTION
DTC-DIVERSIFIED TECH. CONSULTANTS
2321 WHITNEY AVENUE
HAMDEN, CT 06518

The S/L/A/M
Collaborative
Darien, CT
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EXHAUST FANS SCHEDULE MODIFICATION
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:	As Noted	Sketch No.	SKM-18
Reference:	MS06		
Date:	MARCH 30, 2011		
Proj. No.:	04/79/00		BR-TT-041

ADDENDUM #2



DETAIL - FIRE DAMPER/FLEX CONNECTOR INSTALLATION AT BUILDING SEISMIC JOINT

NOT TO SCALE

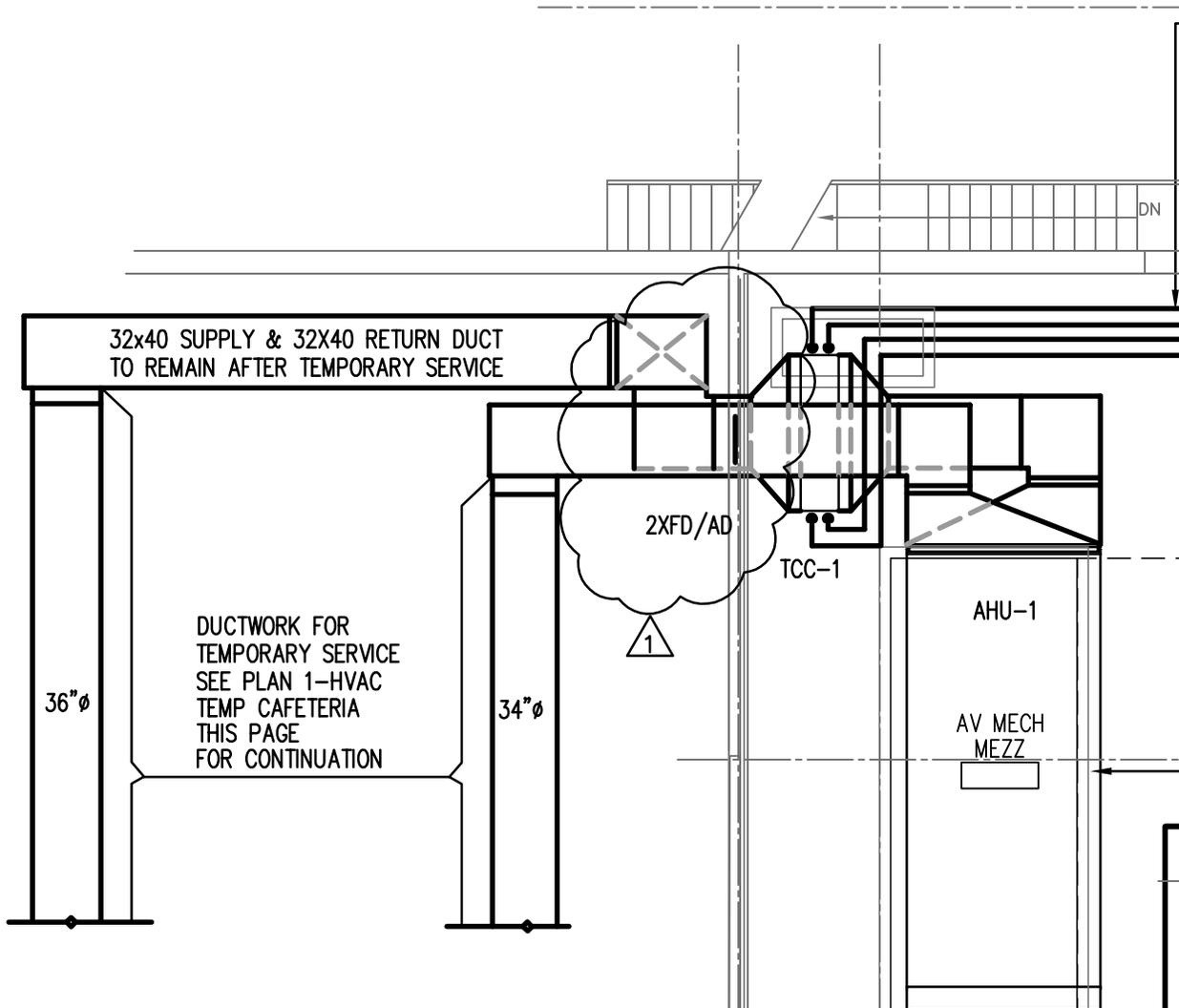
MEP/FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 2321 WHITNEY AVENUE
 HAMDEN, CT 06518

The
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DETAIL - FIRE DAMPER/FLEX JOINT INSTALLATION AT BUILDING SEISMIC JOINT	
H.H. Ellis Technical High School	
Additions + Major Renovations	
Danielson, CT	
Scale:	As Noted
Reference:	M406
Date:	MARCH 30, 2011
Proj. No.:	04/79/00

Sketch No.
SKM-19
 BR-RT-041

ADDENDUM #2



MEP/ FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
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 HAMDEN, CT 06518

ADDENDUM #2

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AHU-1 DUCTWORK REVISIONS
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
As Noted
 Reference:
 GP11-MEP
 Date:
 MAR. 30, 2011
 Proj. No.
 04179.00

Sketch No:
SKM-20
 BI-RT-841

MEDIA AIR CLEANER SCHEDULE

NUMBER	MANUFACTURER AND MODEL	ADSORBER OPTION	SUPPLY AIR FAN			REMARKS
			CFM	MOTOR HP	V-Ph-Hz	
MAC-1	TRION AIR BOSS MODEL M750	CHARCOAL	750	1/8	120/60/1	

NOTES: 1. PROVIDE UNIT WITH 14 LBS ACTIVATED CHARCOAL (ADSORBER MODUL OPTION) AND 4 LBS ACTIVATED CHARCOAL (FINAL ADSORBER).

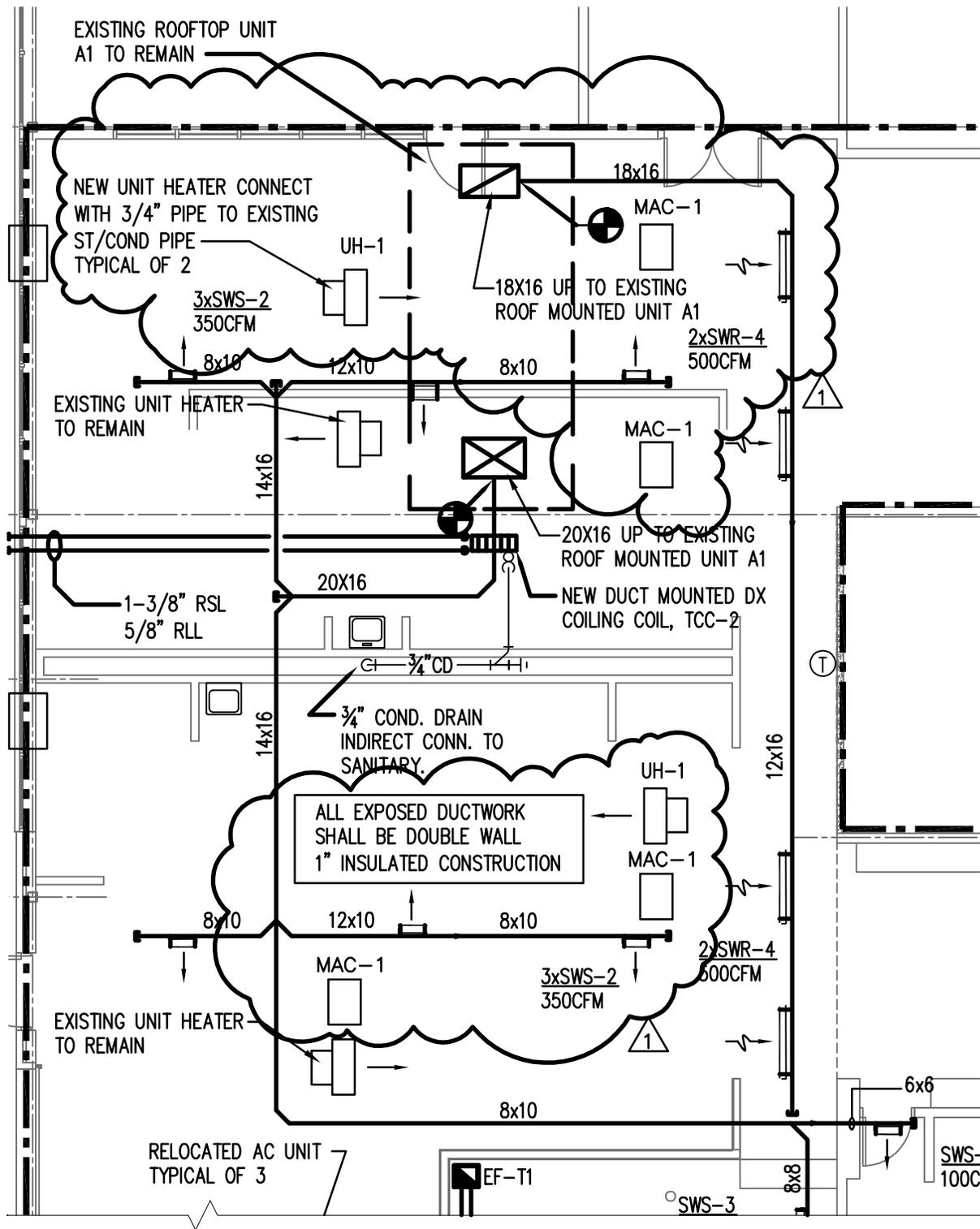
MEP/FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 2321 WHITNEY AVENUE
 HAMDEN, CT 06518

The
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MEDIA AIR CLEANER SCHEDULE
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:	As Noted	Sketch No.
Reference:	MS01	SKM-21
Date:	MARCH 30, 2011	
Proj. No.:	04/7800	BT-RT-941

ADDENDUM #2



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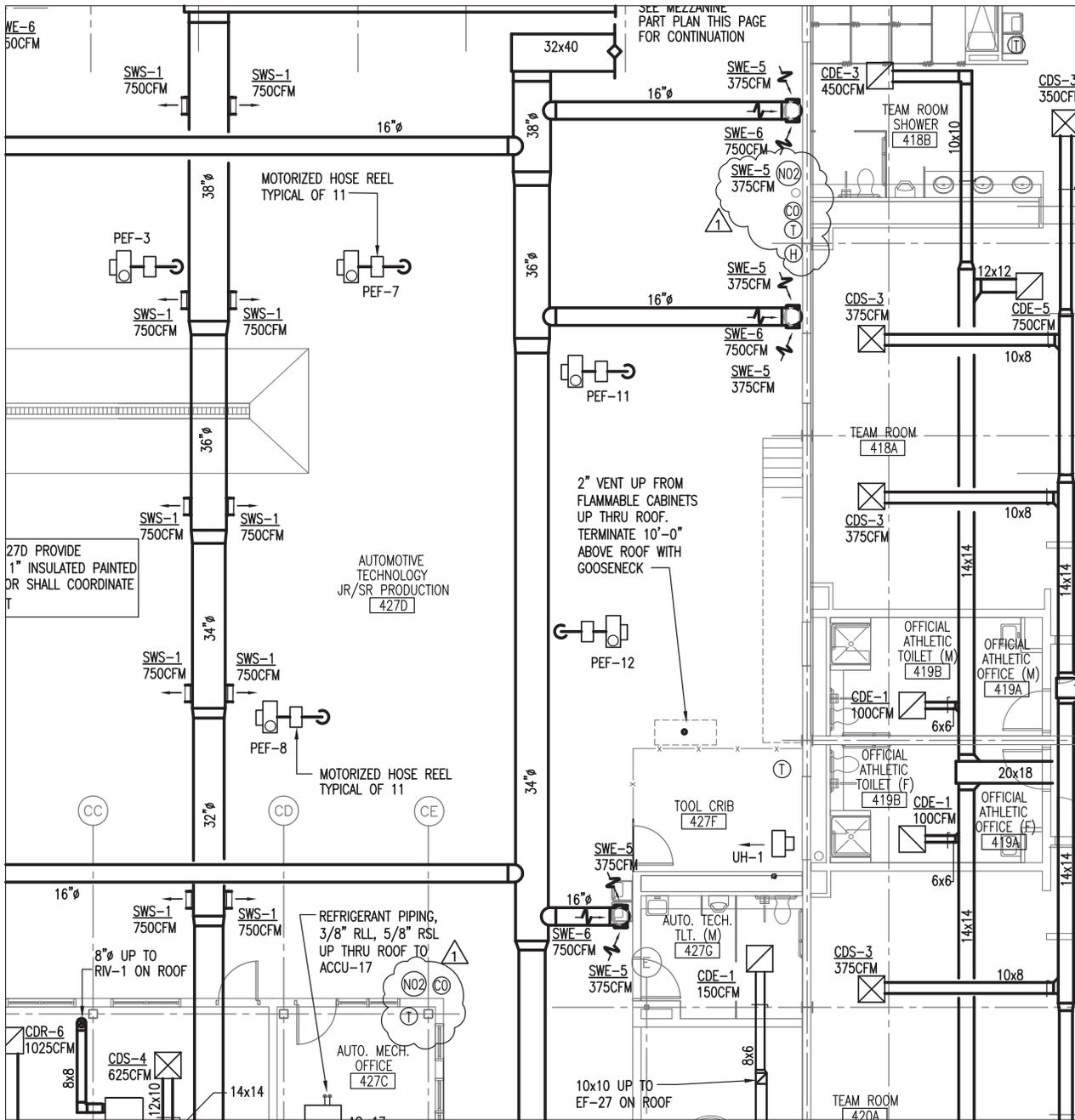
ADDENDUM #2

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 Fax 860 657-3141

HAIRDRESSING AREA REVISIONS
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
As Noted
 Reference:
 GP11-MEP
 Date:
 MAR. 30, 2011
 Proj. No.
 04179.00

Sketch No:
SKM-22
 BI-RT-841



FIRST FLOOR HVAC DUCTWORK PARTIAL PLAN - PART C

1/8" = 1'-0"

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 DTC-DIVERSIFIED TECH. CONSULTANTS
 2321 WHITNEY AVENUE
 HAMDEN, CT 06518

ADDENDUM #2

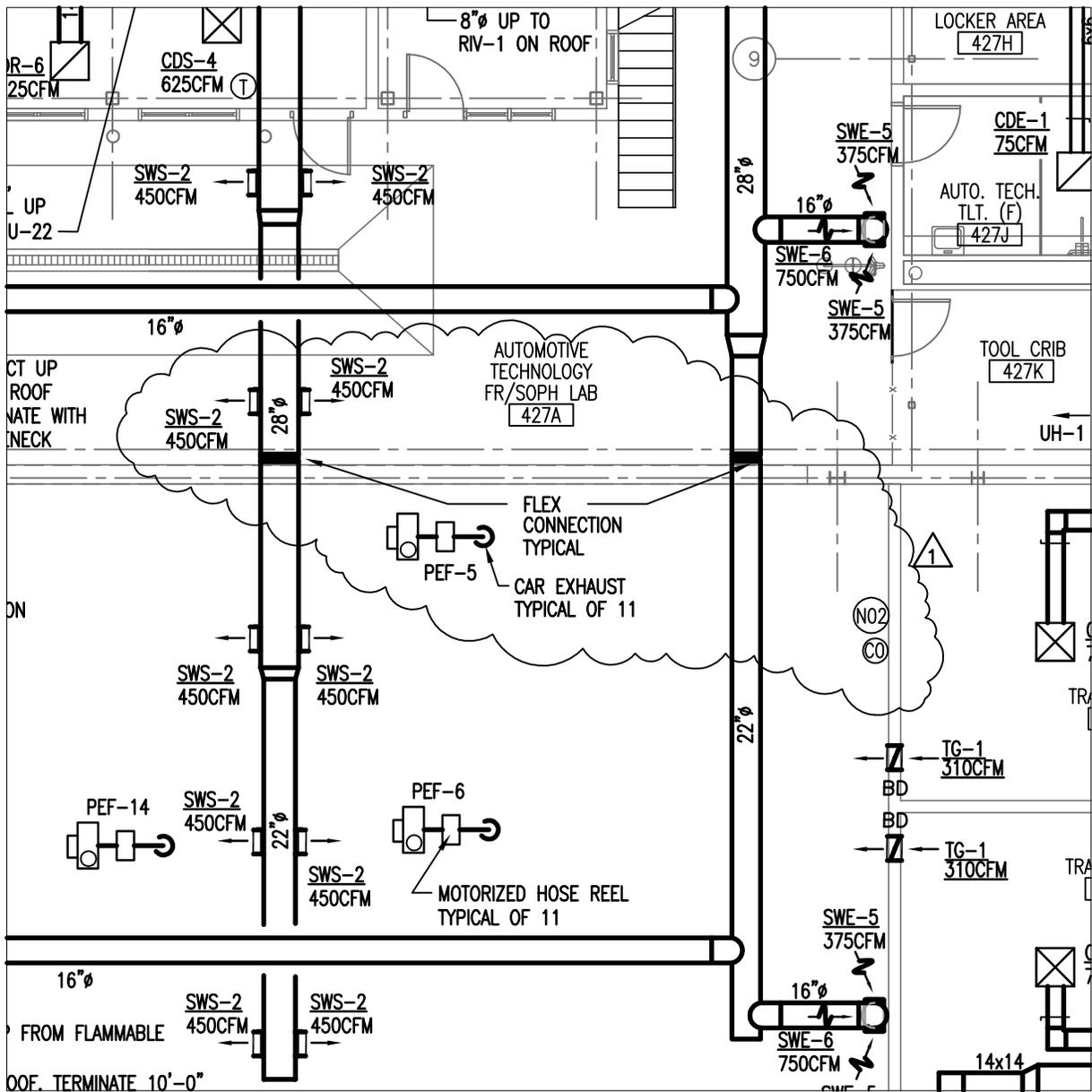
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FIRST FLOOR DUCTWORK PARTIAL PLAN - PART C

H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale: As Noted
 Reference: MIOC
 Date: MARCH 30, 2011
 Proj. No. 04179.00

Sketch No:
SKM-24
 BI-RT-841



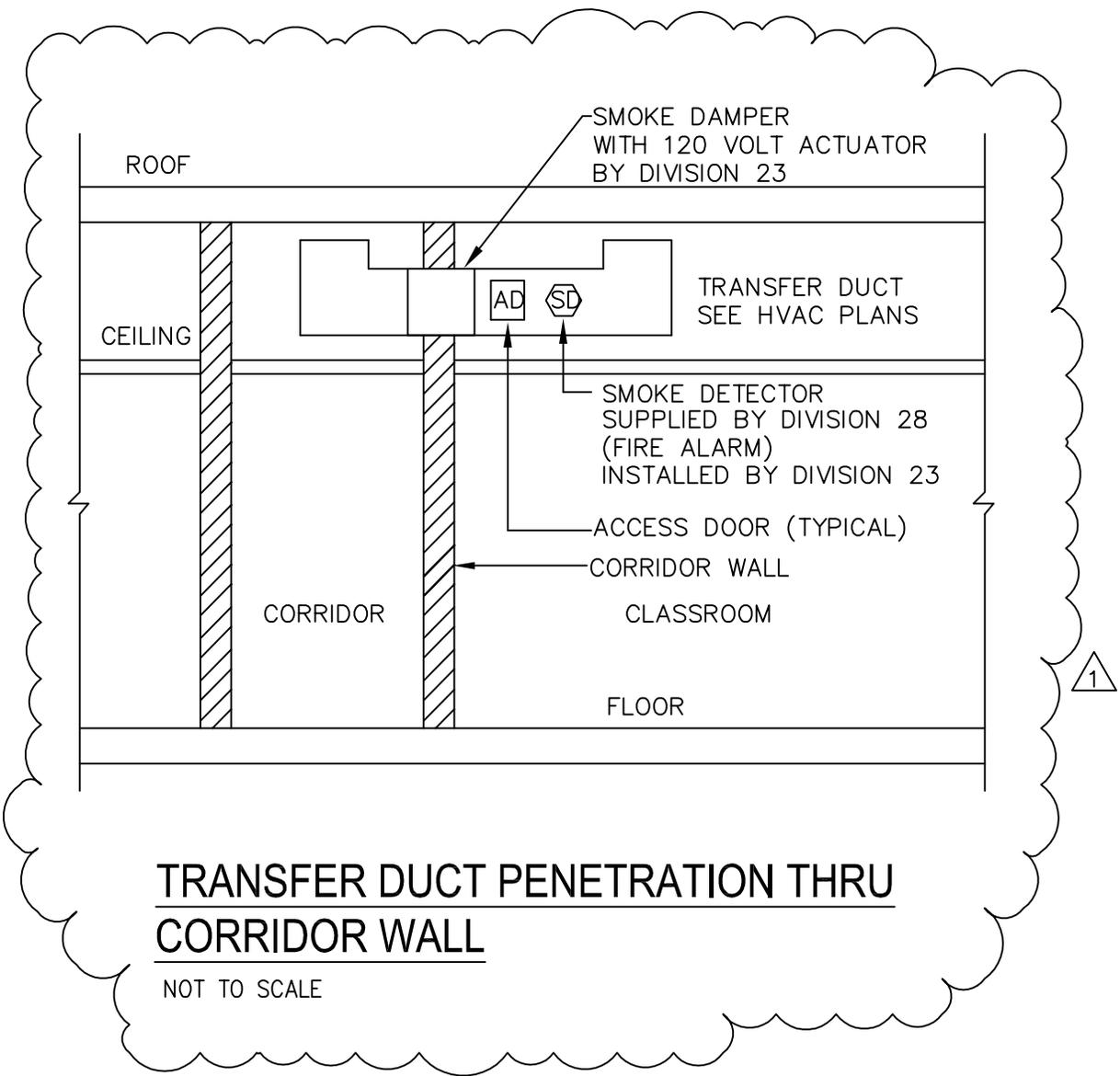
FIRST FLOOR HVAC DUCTWORK PARTIAL PLAN - PART C

1/8"=1'-0"

MEP/ FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 2321 WHITNEY AVENUE
 HAMDEN, CT 06518

ADDENDUM #2

<p style="text-align: center;"><i>The</i> S L A M <i>Collaborative</i> Glastonbury, CT Tel. 860 657-8077 Fax 860 657-3141</p>	<p><i>FIRST FLOOR HVAC DUCTWORK PARTIAL PLAN - PART C</i></p> <p>H.H. Ellis Technical High School <i>Additions + Major Renovations</i> Danielson, CT</p>	<p>Scale: As Noted</p> <p>Reference: MIOIGH</p> <p>Date: MAR. 30, 2011</p> <p>Proj. No. 04179.00</p>	<p>Sketch No: SKM-25</p> <hr/> <p style="text-align: center;">BI-RT-841</p>
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TRANSFER DUCT PENETR. THRU CORRIDOR WALL

H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
As Noted

Reference:
M406

Date:
MAR. 30, 2011

Proj. No.
04179.00

Sketch No:

SKM-26

BI-RT-841

DIFFUSER AND GRILLE ABB

CDS	CEILING DIFFUSER – SUPPLY	SWS	SIDEWALL GRILLE – SUPPLY
CDR	CEILING DIFFUSER – RETURN	SWR	SIDEWALL GRILLE – RETURN
CDE	CEILING DIFFUSER – EXHAUST	SWE	SIDEWALL GRILLE – EXHAUST

PHASING NOTES

1. CONTRACTOR SHALL PROVIDE ALL HVAC WORK ACCORDING TO PROJECT PHASING. SEE PHASING DRAWING GP-01-MEP THRU GP06-MEP, GP11-MEP.
2. CONTRACTOR SHALL PROVIDE ALL REQUIRED HVAC PHASING COORDINATION DRAWINGS – PIPING AND DUCTWORK



PHASING NOTES

NTS

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HVAC GENERAL NOTES, ABBREVIATIONS, SYMBOLS
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale: *As Noted*
 Reference: **M001**
 Date: **MAR. 30, 2011**
 Proj. No. **04179.00**

Sketch No:
SKM-28

BI-RT-841

1. CONTRACTOR SHALL PROVIDE FACTORY ROOF TERMINATION KIT, GAS REGULATOR.
2. UNIT OPERATION SHALL BE INTERLOCKED WITH AHU-1 OPERATION.
3. PROVIDE UNIT WITH ELECTRONIC MODULATION OF FIRING.
4. CONTRACTOR SHALL PROVIDE UNITS W/ CONDENSATE DRAIN, STAINLESS STEEL BURNERS AND HEAT EXCHANGER.
5. PROVIDE UNITS WITH STARTER AND LOCAL DISCONNECT SWITCH

TEMPORARY UNIT HEATERS SCHEDULE (LOW PRESSURE STEAM)

UNIT	LOCATION	MANUFACTURER	MODEL	ACTUAL BTU/HR 60°F EAT	MOTOR AND FAN			STEAM/CONDENSATE			BRANCH PIPE SIZE		TYPE	ARRANGEMENT	REMARKS	
					CFM	HP	RPM	LBS/H	EAT°F	LAT°F	S	C				
UH-1	AS SHOWN	RITTLING	H-33	33000	630	1/15	1550	277/1/60	35	70	110	3/4"	3/4"	PROPELLER	HORIZONTAL	

- NOTES:
1. PROVIDE WITH FAN SWITCH.
 2. PROVIDE WITH STARTER AND LOCAL DISCONNECT SWITCH
 3. CONTROL CONTRACTOR PROVIDE CONTROL VALVE, FAN RELAY, WALL MOUNTED SENSOR
 4. CONNECT UNITS TO DDC CONTROL SYSTEM

TEMPORARY MEDIA AIR CLEANER SCHEDULE

NUMBER	MANUFACTURER AND MODEL	ADSORBER OPTION	SUPPLY AIR FAN		REMARKS
			CFM	MOTOR HP	
MAC-1	TRION AIR BOSS MODEL M750	CHARCOAL	750	1/8	120/60/1

- NOTES:
1. PROVIDE UNIT WITH 14 LBS ACTIVATED CHARCOAL (ADSORBER MODUL OPTION) AND 4 LBS ACTIVATED CHARCOAL (FINAL ADSORBER).

HVAC NOTES FOR TEMPORARY AREAS:

1. REFER TO DRAWING M301 FOR SCHEDULE INFORMATION ON AHU-1 AND COIL TCC-1.
2. PROVIDE ACCU'S WITH INDIVIDUAL DDC CONTROL. COORDINATE WITH PHASING AND DDC CONTROL CONTRACTOR.
3. THE EXISTING CONDITION REPRESENTED ARE BASED ON MINOR SITE INVESTIGATION AND SHOP DRAWINGS M-3 AND M-12 DATED DECEMBER 1990.

TEMPORARY HVAC EQUIPMENT SCHEDULE REVISION

NTS

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DTC-DIVERSIFIED TECH. CONSULTANTS
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HAMDEN, CT 06518

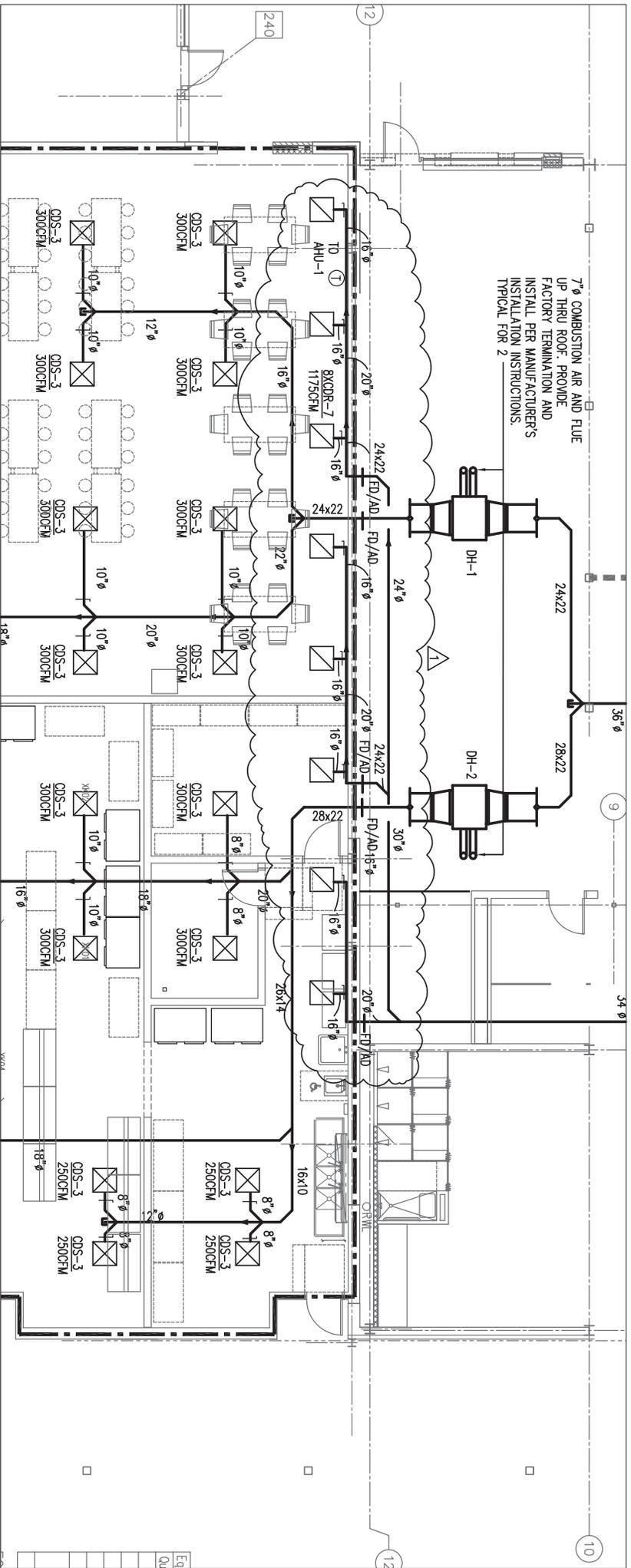
The
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TEMPORARY HARDNESSING AREA REVISION
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale: As Noted
Reference: GFI-MEP
Date: MARCH 30, 2011
Proj. No.: 04/79/00

Sketch No.: **SKM-32**
Revision: **BT-RT-041**

APPENDUM #2



TEMPORARY CAFETERIA HVAC PARTIAL PLAN
 1/8"=1'-0"

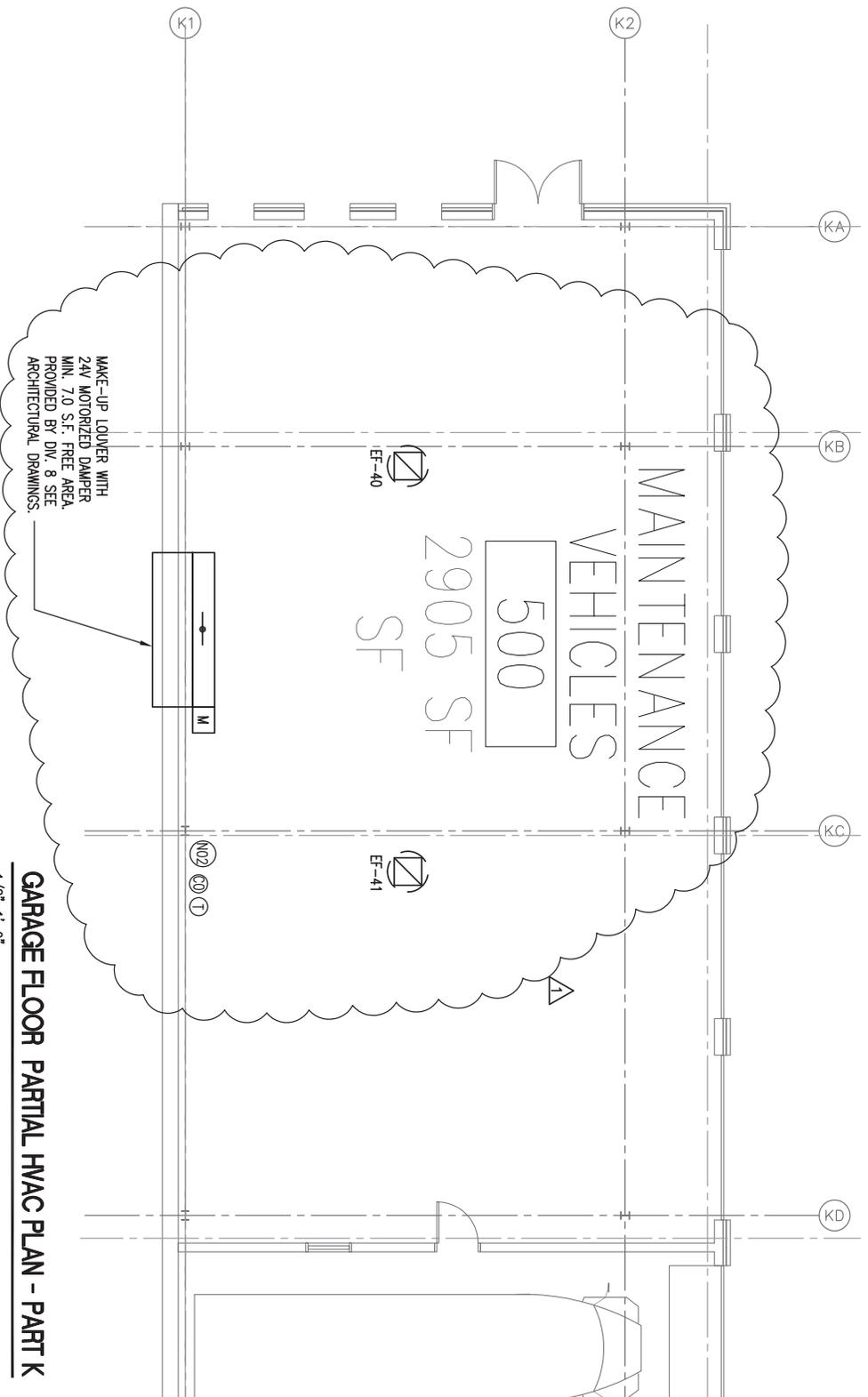
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TEMPORARY CAFETERIA AREA RENOVATION
H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale:	As Noted
Reference:	GP1-MEP
Date:	MARCH 30, 2011
Proj. No.:	04/79/00

ADDENDUM #2
 Sketch No. **SKM-33**
 BR-RT-041



GARAGE FLOOR PARTIAL HVAC PLAN - PART K
 1/8"=1'-0"

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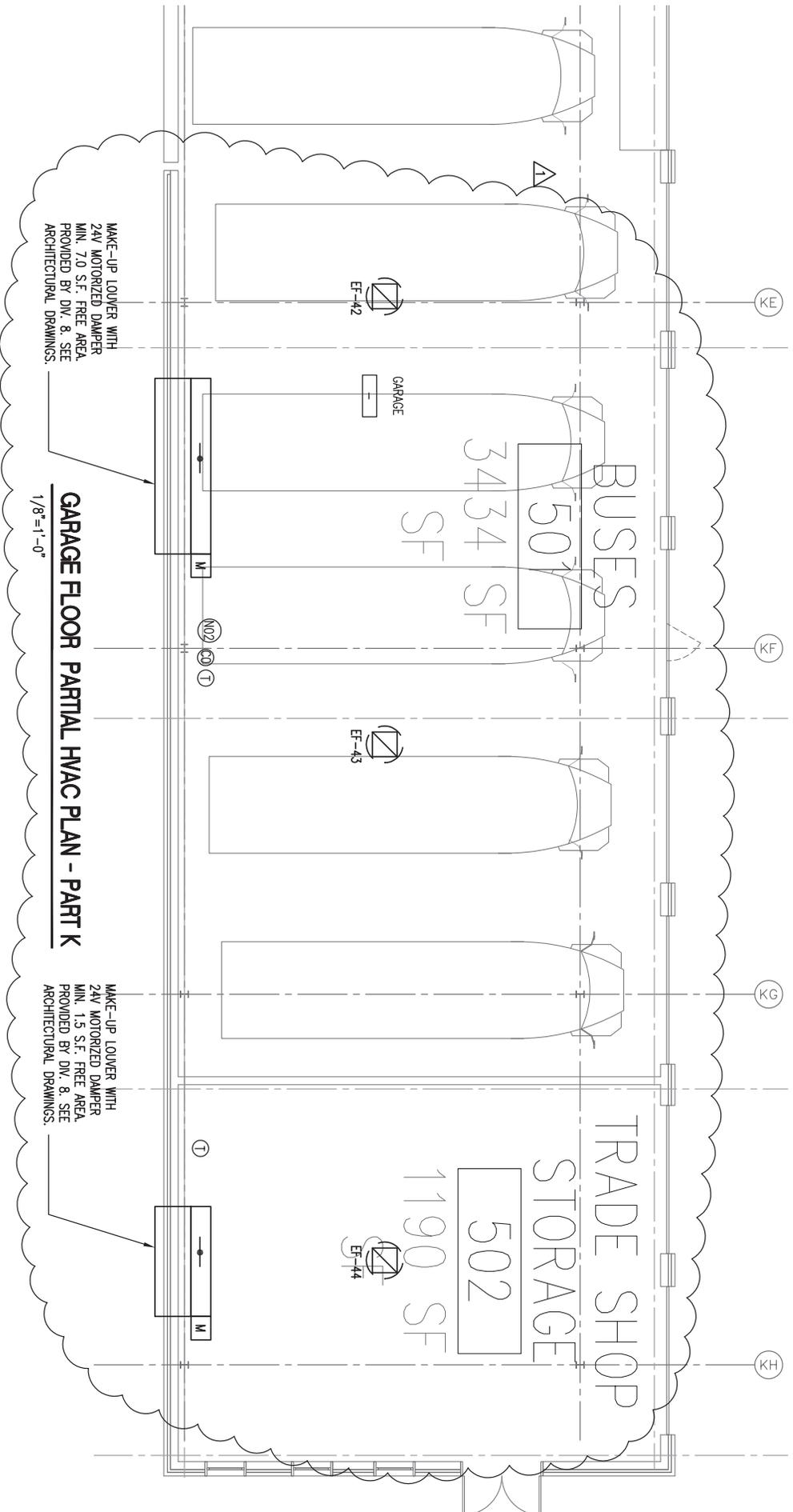
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 Fax 860 657-3141

GARAGE FLOOR PARTIAL PLAN - PART K
H.H. Ellis Technical High School
 Additions + Major Renovations
 Danelson, CT

Scale: As Noted
 Reference: MKK
 Date: MARCH 30, 2011
 Proj. No.: 04/79/00

Sketch No.: **SKM-38**
 BH-TT-041

ADDENDUM #2



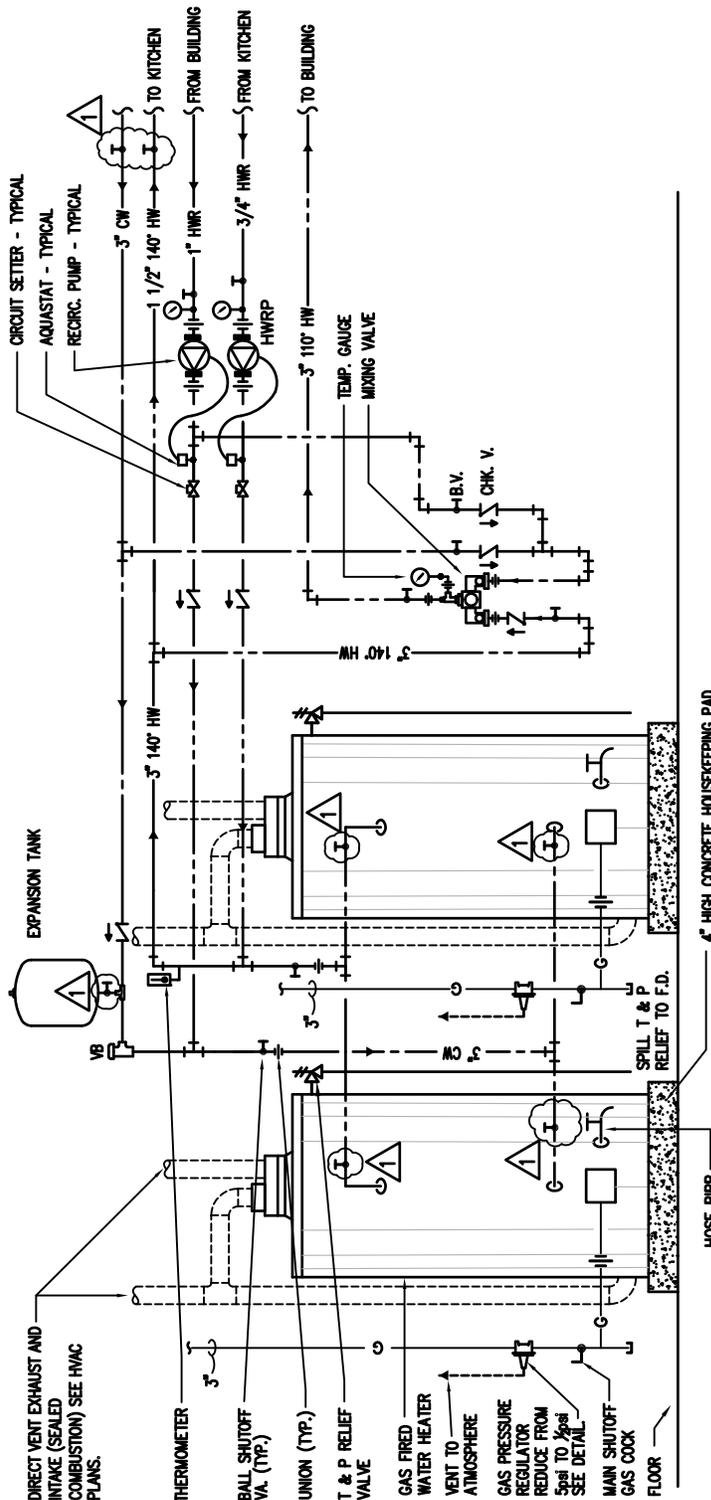
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GARAGE FLOOR PARTIAL PLAN - PART K
H.H. Ellis Technical High School
Additions + Major Renovations
Danelson, CT

Scale:	As Noted	Sketch No.
Reference:	AMK	SKM-39
Date:	MARCH 30 2011	
Proj. No.:	047800	BT-RT-041

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16
 P003
 DETAIL OF MAIN WATER HEATERS
 SCALE: NONE

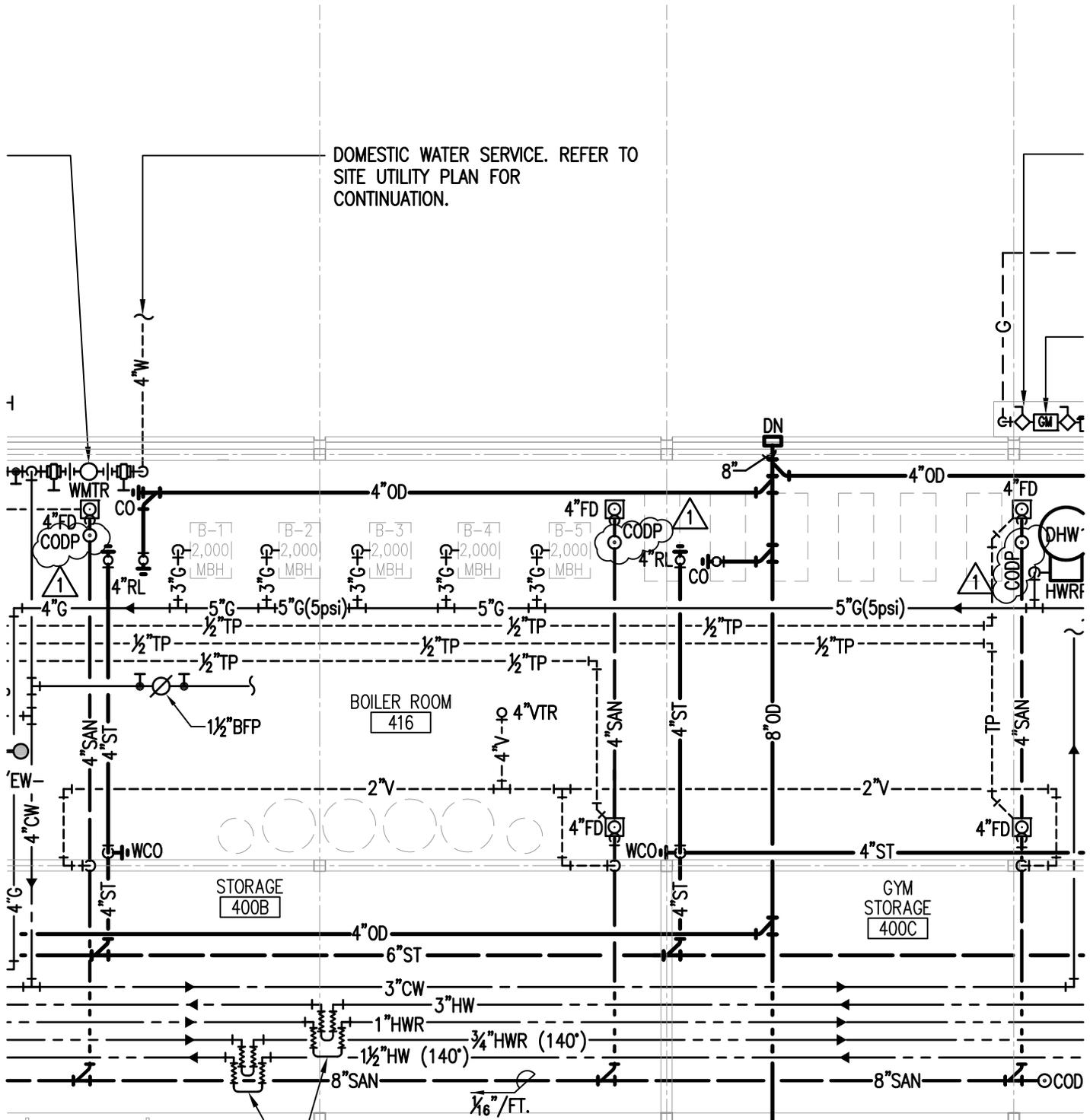
ADDENDUM #2

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REVISED WATER HEATER
H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale: As Noted
 Reference: P003
 Date: March 30, 2011
 Proj. No. 04179.00

Sketch No:
SK-P1
 BI-RT-841



MEP/ FIRE PROTECTION
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1

FIRST FLOOR PLAN - PART D

NONE

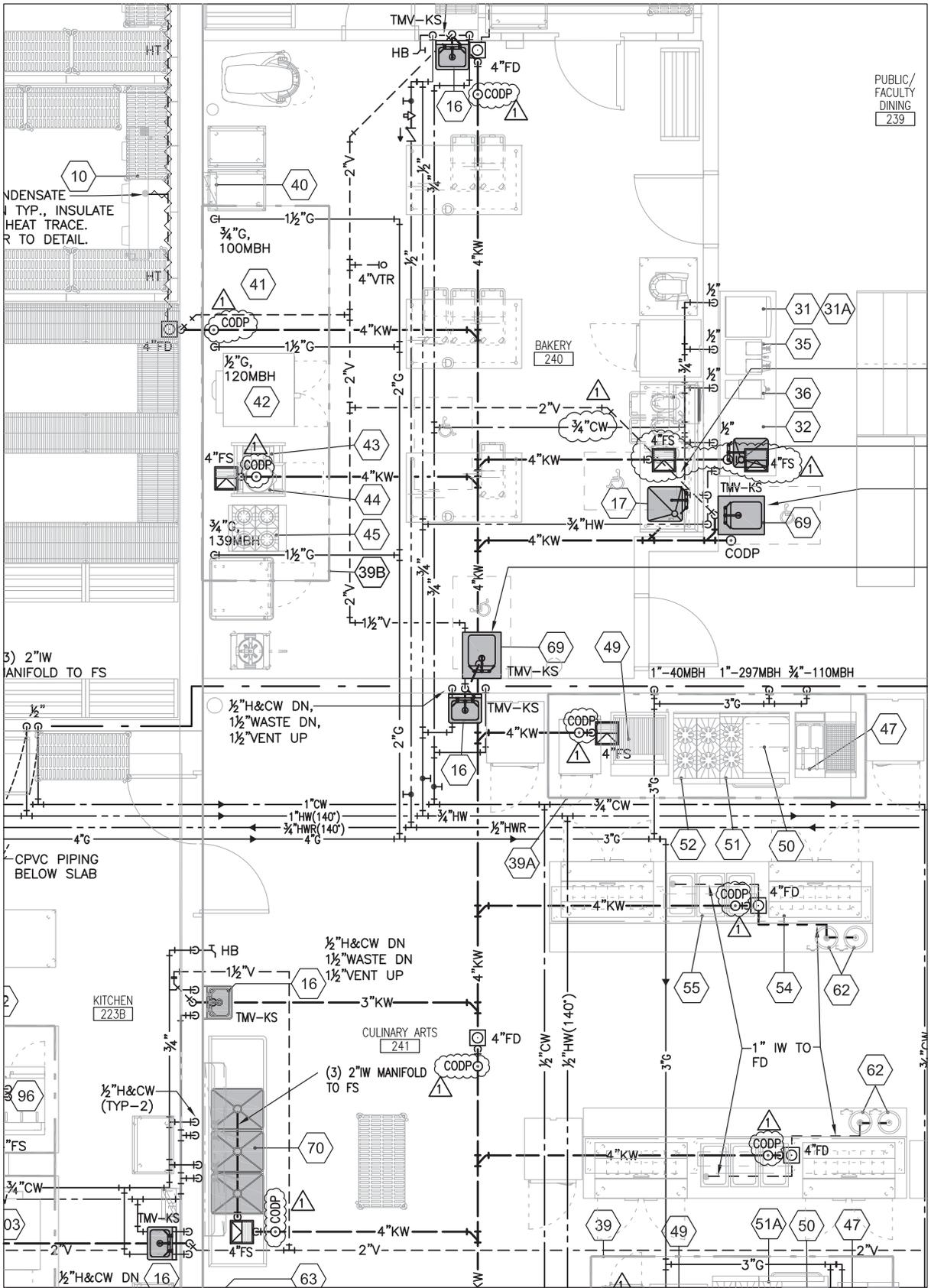
ADDENDUM #2

The
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 Collaborative
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 Tel. 860 657-8077
 Fax 860 657-3141

ADDED CODP'S
H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale:
 As Noted
 Reference:
 P10D
 Date:
 MAR 30, 2011
 Proj. No.
 04179.00

Sketch No:
SKP-2
 BI-RT-841



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FACULTY
DINING
239

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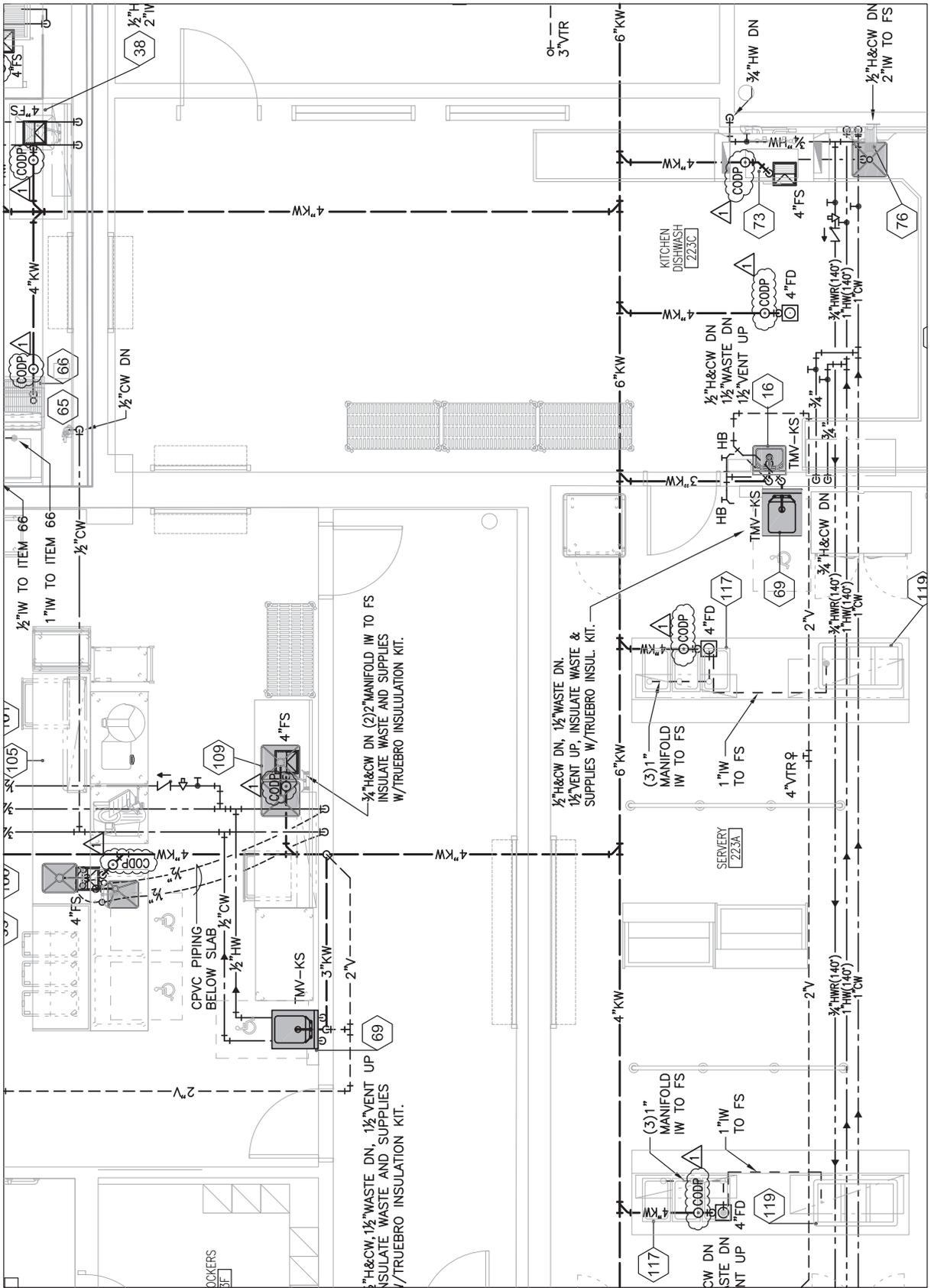
1 FOOD SERVICE PLAN
NONE

ADDENDUM #2

The
S/L/A/M
Collaborative
Glastonbury, CT
Tel. 860 657-8077
Fax 860 657-3141

ADDED CODP'S AND CLARIFICATIONS
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale: As Noted
Reference: P201 + P202
Date: MARCH 30, 2011
Proj. No. 0478.00
Sketch No: **SK-P3**
BI-RT-841

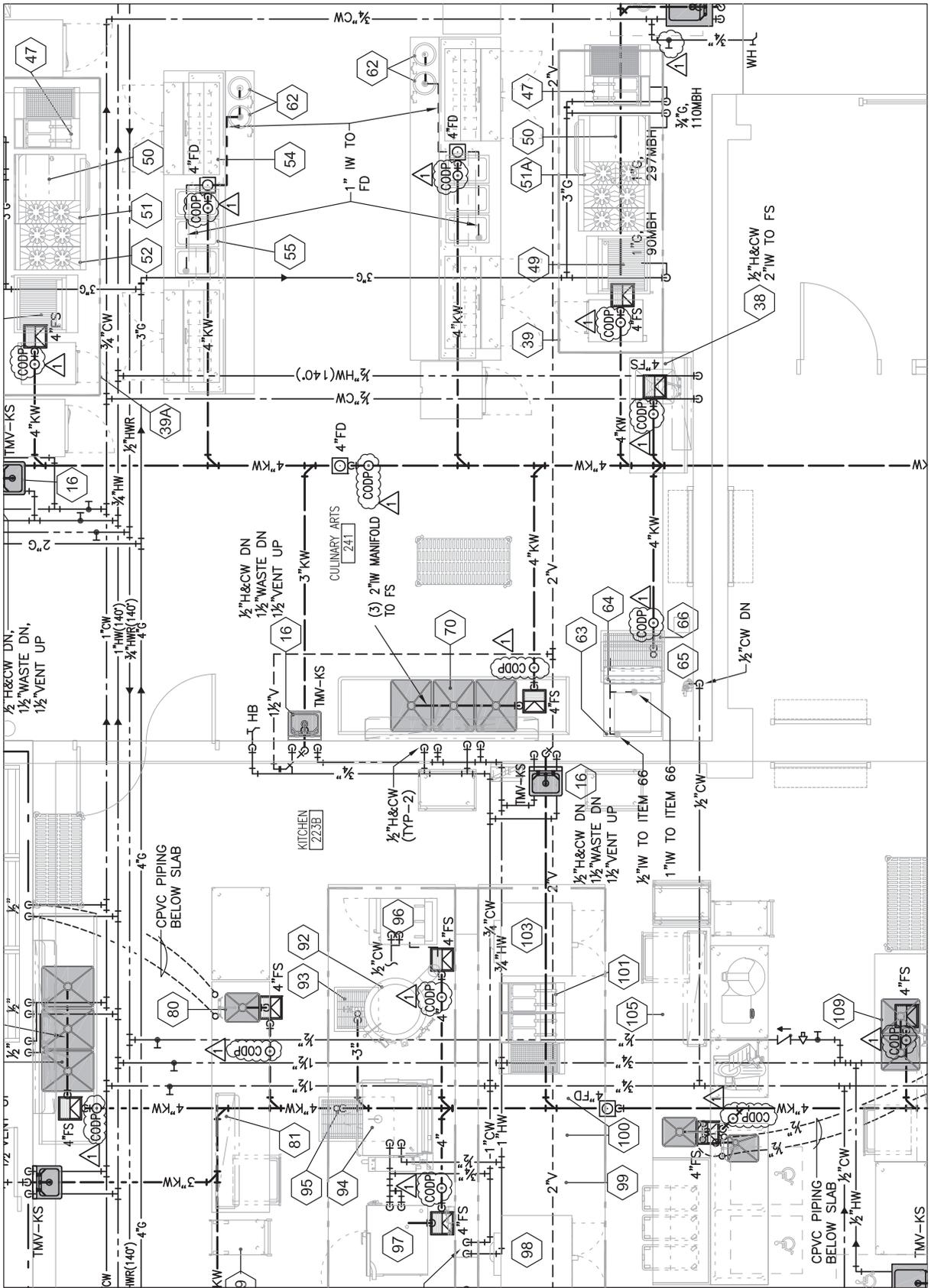


MEP/ FIRE PROTECTION
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 HAMDEN, CT 06518

1 FOOD SERVICE PLAN
 1/4"=1'-0"

ADDENDUM #2

<p>The S/L/A/M Collaborative Glastonbury, CT Tel. 860 657-8077 Fax. 860 657-3141</p>	<p>ADDED CODP'S AND CLARIFICATIONS H.H. Ellis Technical High School Additions + Major Renovations Danielson, CT</p>	<p>Scale: As Noted Reference: P202 Date: MARCH 30, 2011 Proj. No. 0478.00</p>	<p>Sketch No: SK-P4 BI-RT-841</p>
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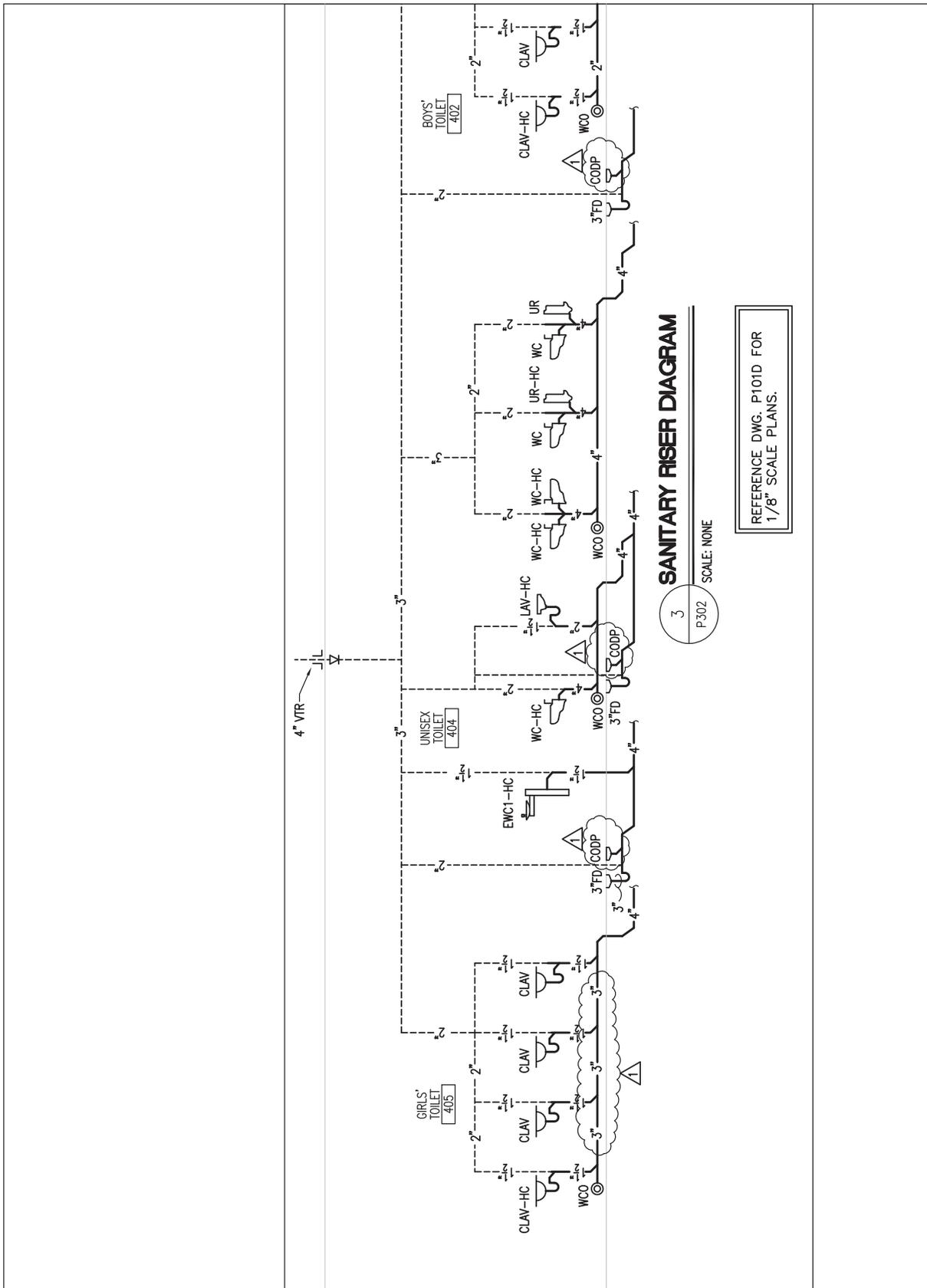
1 FOOD SERVICE PLAN
 1/4" = 1'-0"

ADDENDUM #2

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ADDED CODP'S AND CLARIFICATIONS
H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale: As Noted	Sketch No: SK-P5
Reference: P202	
Date: MARCH 30, 2011	
Proj. No. 047800	BI-RT-841



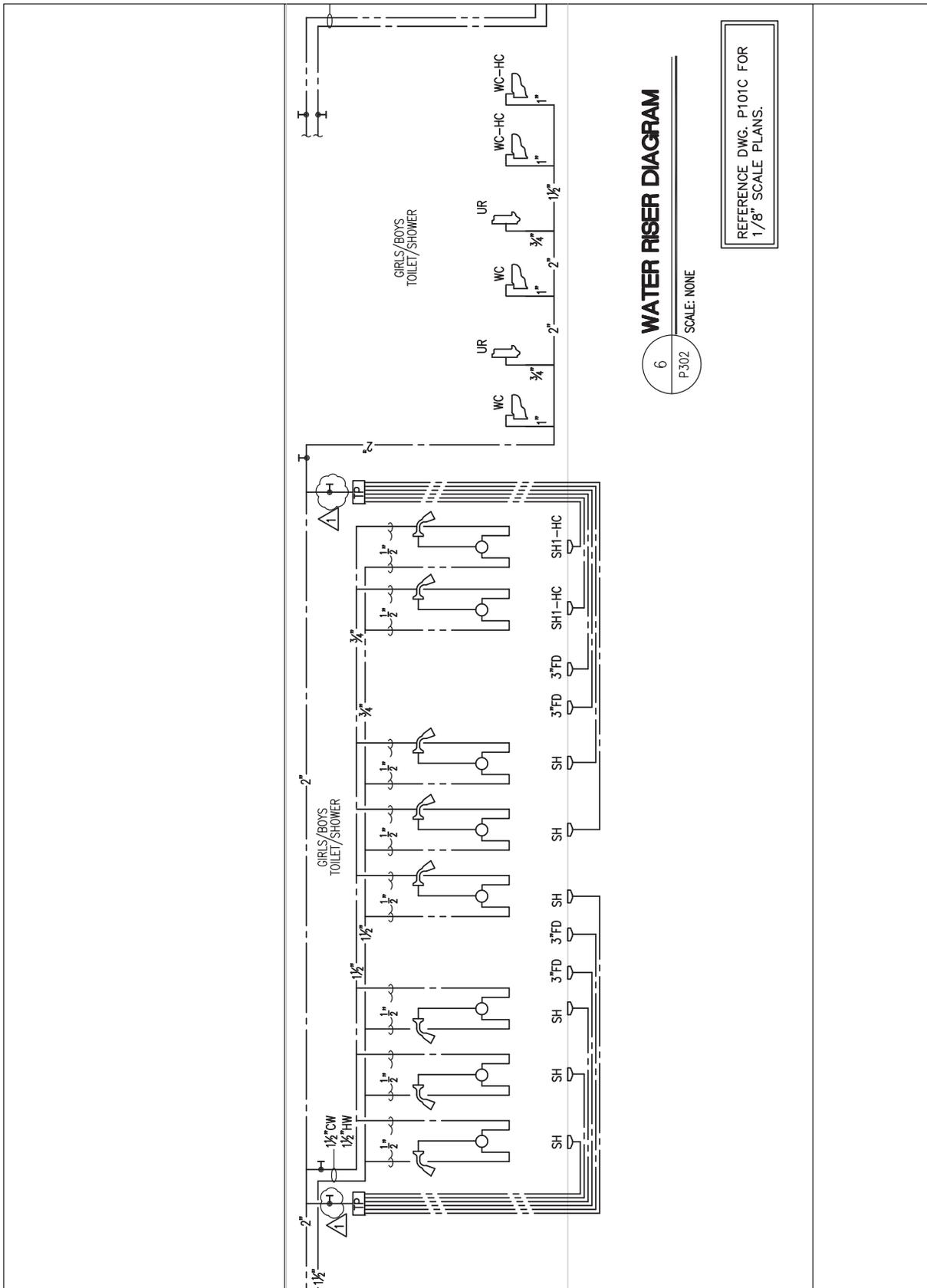
SANITARY RISER DIAGRAM
 3
 P302
 SCALE: NONE

REFERENCE DWG. P101D FOR
 1/8" SCALE PLANS.

MEP/ FIRE PROTECTION
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ADDENDUM #2

<p><i>The</i> S I L A M <i>Collaborative</i> Glastonbury, CT Tel. 860 657-8077 Fax 860 657-3141</p>	<p>ADDED CODP'S</p> <p>H.H. Ellis Technical High School Additions + Major Renovations Danielson, CT</p>	<p>Scale: <i>As Noted</i></p>	<p>Sketch No: SKP-7</p>
		<p>Reference: P302</p>	
		<p>Date: MARCH 30, 2011</p>	
		<p>Proj. No. 0478.00</p>	<p>BI-RT-841</p>



MEP/ FIRE PROTECTION
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ADDENDUM #2

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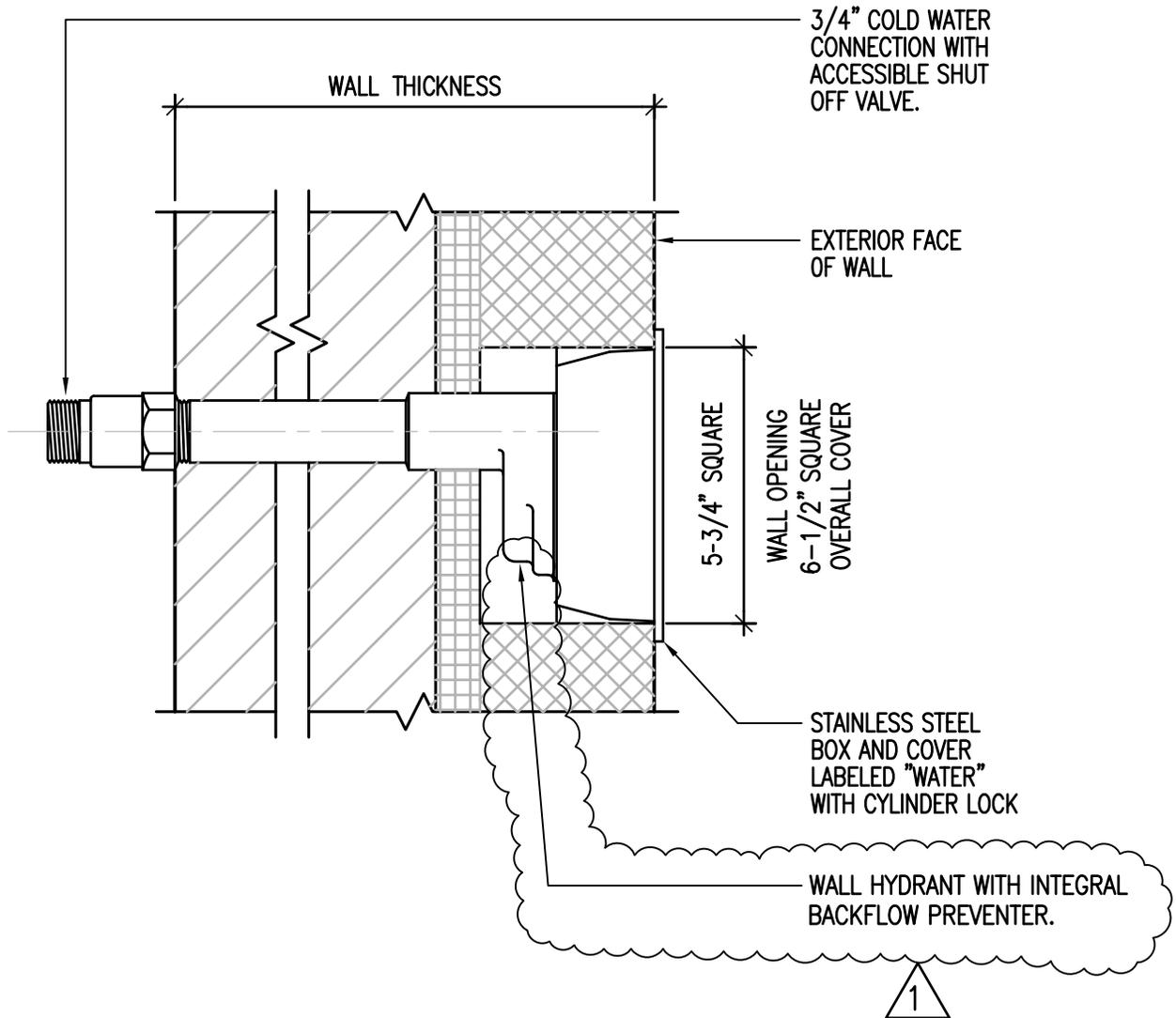
ADDED VALVES

H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale:
As Noted
 Reference:
 P302
 Date:
 MARCH 30, 2011
 Proj. No.
 0478.00

Sketch No:
SKP-8

BI-RT-841



9
P003

WALL HYDRANT

SCALE: NONE

p. 1 of 3

MEP/ FIRE PROTECTION
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ADDENDUM #2

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REVISED WALL HYDRANT DETAIL

H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
As Noted

Reference:
P003

Date:
March 30, 2011

Proj. No.
04179.00

Sketch No:

SK-P9

BI-RT-841



FOR NON-FREEZING AREAS

The Model 26 and B26 are **backflow protected** wall faucets designed for use in mild climate areas. The Model B26 is enclosed in a flush mounted wall box. Both models are designed to blend with modern architecture for installation on homes, service stations, churches, motels, drive-in restaurants, etc. The Model Y26 is designed to be used on a stand pipe in the lawn and garden, etc.

Backflow Protected
Wall Faucets
Model 26/B26/Y26

SPECIFICATIONS:

HOSE CONNECTION BACKFLOW PREVENTER –

- NIDEL Model 37HF with 3/4 inch male hose thread
- ASSE Standard 1052 approved
- IAPMO listed
- Field Testable
- Two check valves

PACKING – Teflon impregnated packing.

PACKING NUT - Adjustable brass nut with deep stem guard.

VALVE SEAT – Standard “O” size washer.

HANDLES – Furnished with polycarbonate wheel handle and loose tee key. **Optional:** Metal wheel handle.

INLETS – Model 26 as shown below.
Model B26: 26P- 1/2 and 26P 3/4 only.
Model Y26: 3/4 “ FPT.

MAX PRESSURE – 125 p.s.i.

MAX TEMPERATURE - 120 F

SHIPPING WEIGHT: (per unit)
MODEL 26 & Y26 - 1.2 lb.

MODEL B26 - 14.6 lbs. (brass or chrome box.)
6.5 lbs. (aluminum box.)



MODEL 26

Exterior Finish:
Standard - Chrome (CH)
Optional - Rough Brass (BR) or Polished Chrome (PC)



MODEL B26

Exterior Finish:
Standard - Chrome (CH)
Optional - Rough Brass (BR), Polished Brass (PB)
Other Options: Anodized or Powder Coated Aluminum Box



MODEL Y26

Exterior Finish:
Standard - Rough Brass (BR)
Optional - Chrome (CH) or Polished Chrome (PC)

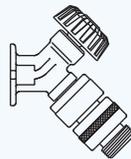
Backflow preventer

Backflow preventer

Inlet Descriptions

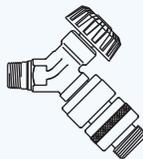
MODEL 26/B26

- P-1/2 Inlet
1/2" FPT
- P-3/4 Inlet
3/4" FPT



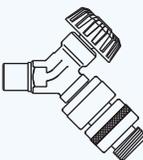
MODEL 26 ONLY

- CP Inlet
COMBINATION
1/2" COPPER TUBE
1/2" MPT



MODEL 26 ONLY

- C Inlet
COMBINATION
1/2" COPPER TUBE
3/4" COPPER TUBE



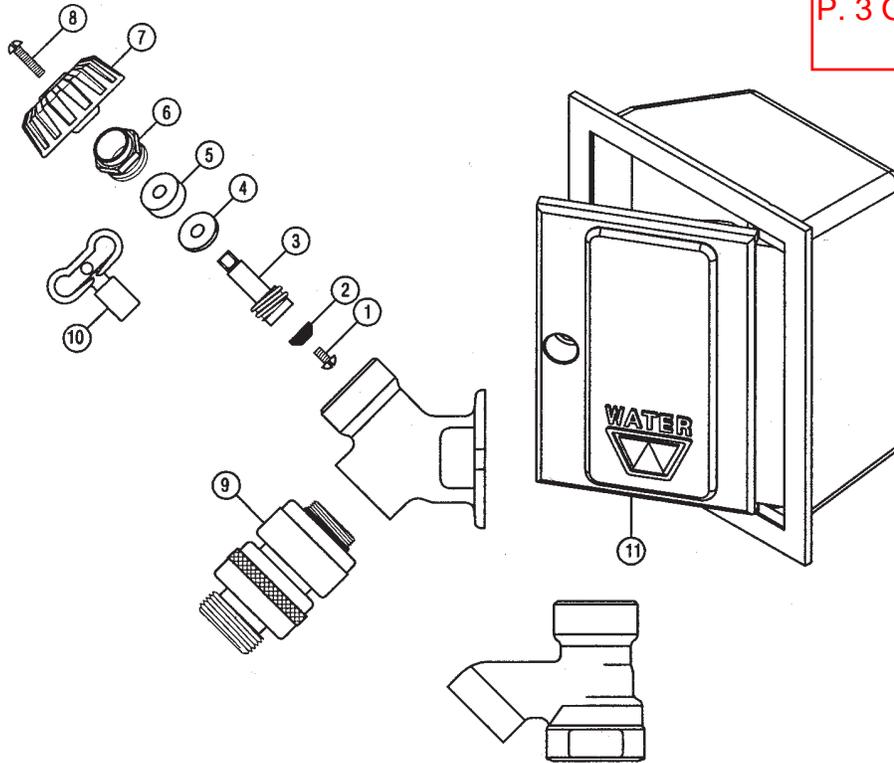
When ordering, specify model number, inlet, and finish.



WOODFORD



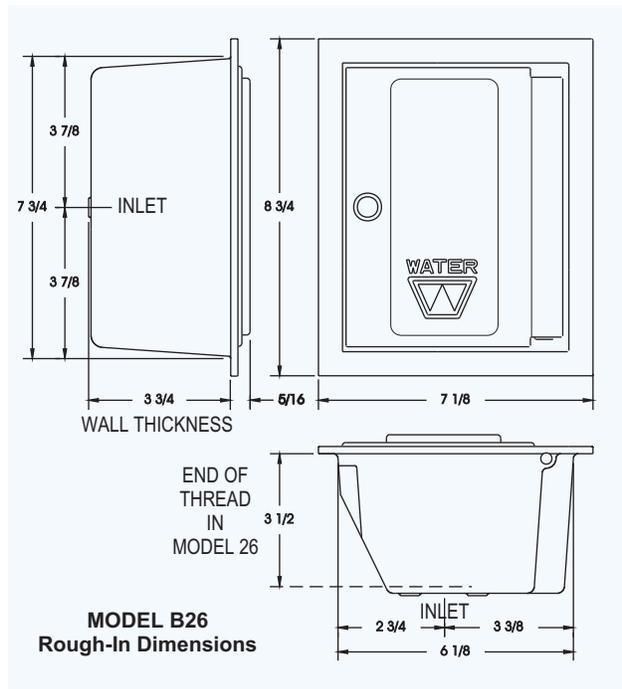
SK-P9
P. 3 OF 3



MODEL 26/B26/Y26 PARTS LIST

ITEM	PART #	DESCRIPTION
1	30009	Washer Screw
2	30008	Washer
3	30104	Operating Stem
4	30105	Packing Washer
5	30005	Packing
6	30109	Packing Nut - chrome
	30107	Packing Nut - brass
7	30120	Wheel Handle - clear
	30233	Wheel Handle - tan
8	30121	Handle Screw - nickel
	30002	Handle Screw - brass
9	37HF-CH	37HF Backflow Preventer - chrome
	37HF-BR	37HF Backflow Preventer - brass
10	RK-STK	Tee Key
11	B26BX	Box/Door Assembly - chrome
	B26BX-BR	Box/Door Assembly - brass
	B26BX-PB	Box/Door Assembly - polished brass
	B26BX-AL	Box/Door Assembly - anodized aluminum
	RK-24	Chrome Repair Kit (Includes Items 1-8)
	RK-H34	Brass Repair Kit (Includes Items 1-8)

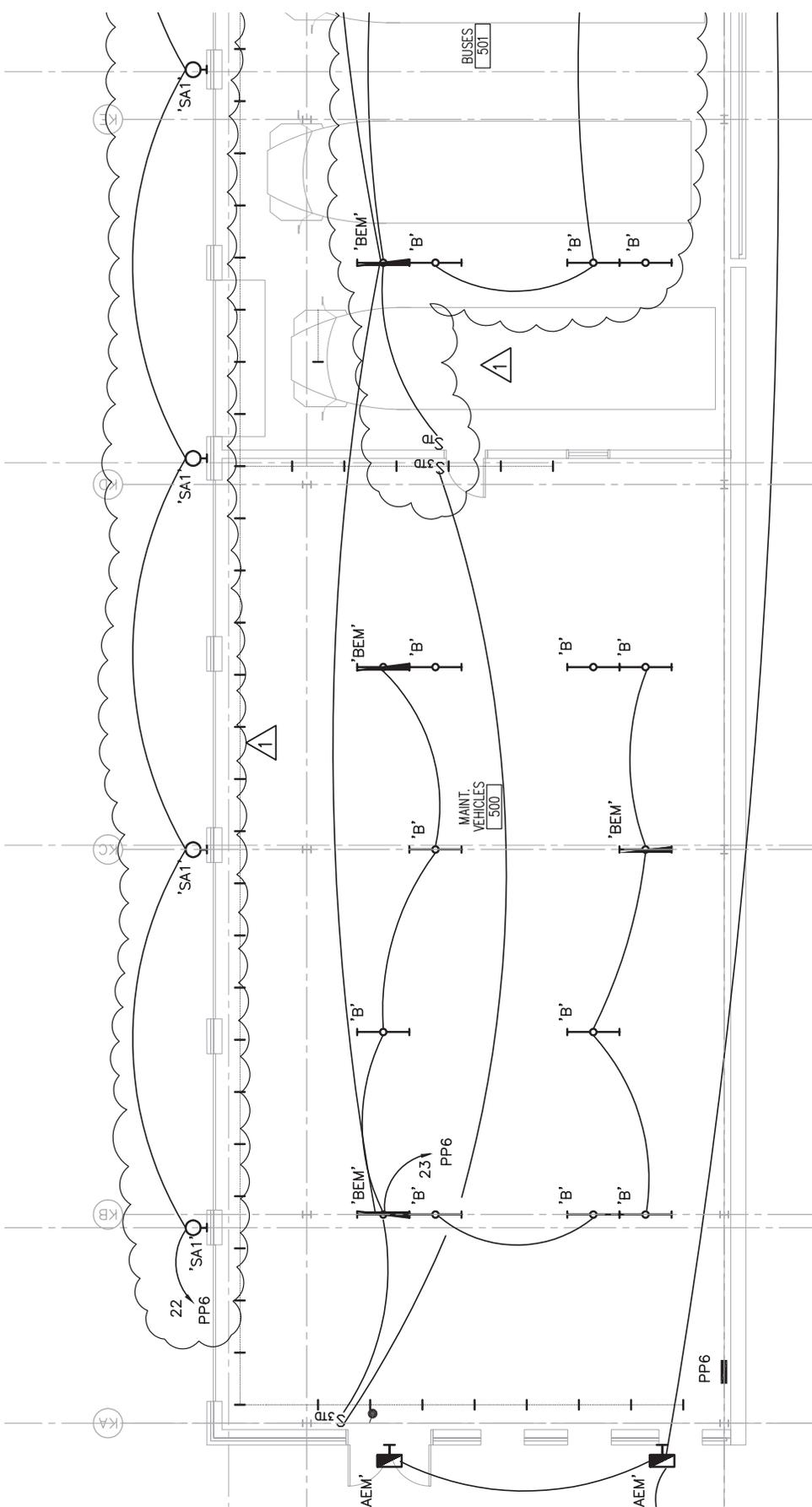
Backflow preventer



For more information contact...

WOODFORD MANUFACTURING COMPANY

2121 Waynoka Road, Colorado Springs, Colorado 80915 Phone: (719) 574-1101 Fax: (719) 574-7621
To view our complete product line visit: www.woodfordmfg.com



MEP/ FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 2321 WHITNEY AVENUE
 HAMDEN, CT 06518

1 PARTIAL FLOOR LIGHTING PLAN - PART K
 1/8" = 1'-0"

ADDENDUM #2

The
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 Collaborative
 Glastonbury, CT
 Tel. 860 657-8077
 Fax 860 657-3741

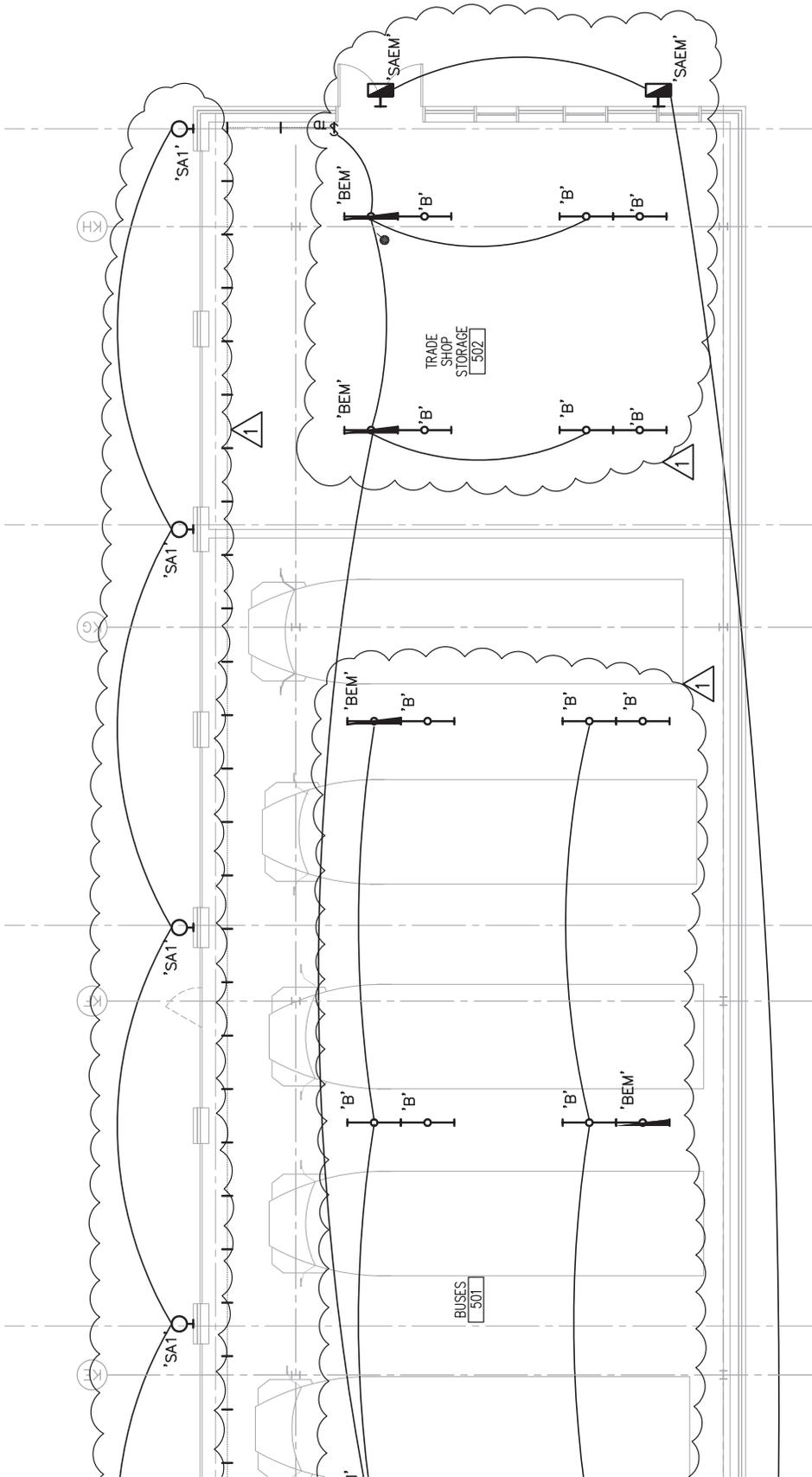
UPDATED LIGHTING ROOM LAYOUT

H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale: As Noted
 Reference: EL10K
 Date: MAR 30, 2011
 Proj. No. 0472.00

Sketch No:
SKEL-01

BF-RT-841



MEP/ FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
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1 PARTIAL FLOOR LIGHTING PLAN - PART K
 1/8" = 1'-0"

ADDENDUM #2

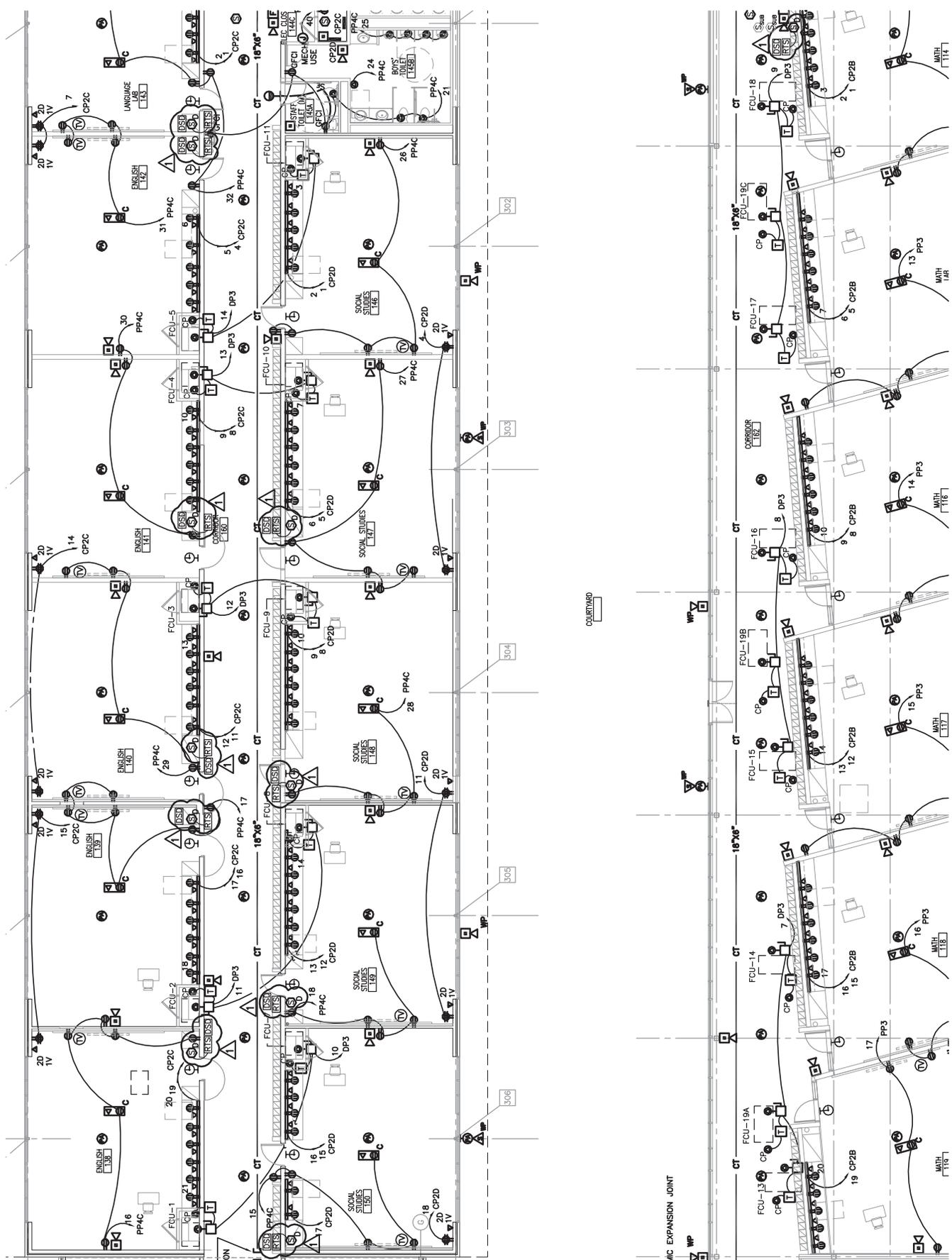
The
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 Glastonbury, CT
 Tel. 860 657-8077
 Fax 860 657-3141

UPDATED LIGHTING ROOM LAYOUT

H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale: As Noted
 Reference: EL10K
 Date: March 30, 2011
 Proj. No. 0472.00

Sketch No:
SKEL-02
 BI-RT-841



MEP/ FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 2321 WHITNEY AVENUE
 HAMDEN, CT 06518

1 PARTIAL POWER PLAN-PART G + H
 N.T.S.

ADDENDUM #2

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 Tel. 860 657-8077
 Fax 860 657-3141

ADDED SMOKE DAMPERS AND DUCT SMOKE DETECTORS

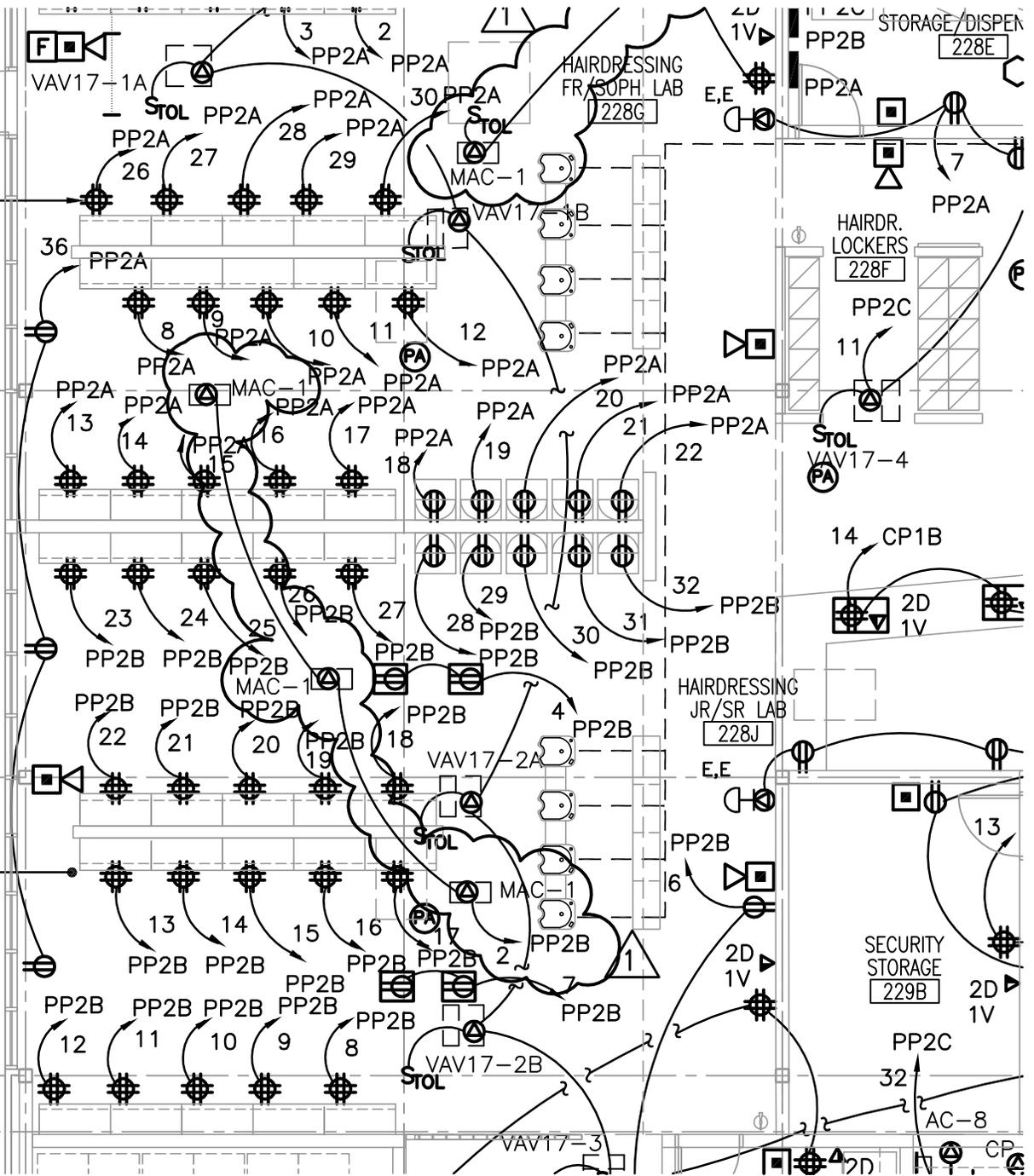
H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale:
 As Noted
 Reference:
 EP101GH
 Date:
 March 30, 2011
 Proj. No.
 0479.00

Sketch No:
SKEP-01
 BR-RT-841

PLEX RECEPTACLE
SEWOK (TYP)
RICAL DRAWING FOR
FORMATION

EMERGENCY SHUT
WITH PANELS
3 (ROOMS 228)



1 PARTIAL POWER PLAN - PART E (WEST) + PART F
1/8" = 1'-0"

MEP/ FIRE PROTECTION
DTC-DIVERSIFIED TECH. CONSULTANTS
556 WASHINGTON AVENUE
NORTH HAVEN, CT 06473

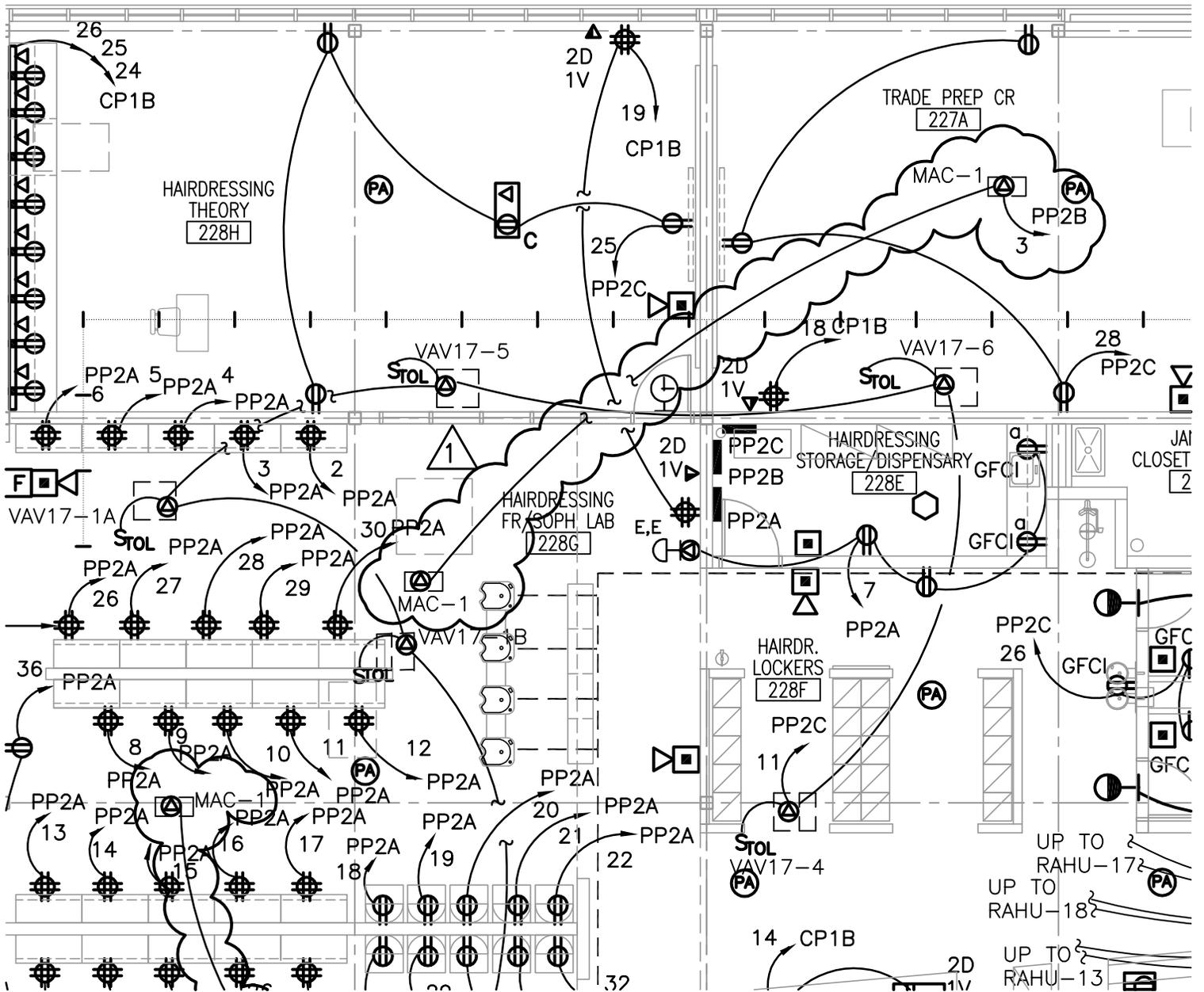
ADDENDUM #2

The
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Collaborative
Glastonbury, CT
Tel. 860 657-8077
Fax 860 657-3141

ADDED POWER TO MAC-1 UNITS
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
As Noted
Reference:
EP101E-F
Date:
March 30, 2011
Proj. No.
04179.00

Sketch No:
SKEP-02
BI-RT-841



1 PARTIAL POWER PLAN - PART E (WEST) + PART F
 1/8" = 1'-0"

MEP/ FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 556 WASHINGTON AVENUE
 NORTH HAVEN, CT 06473

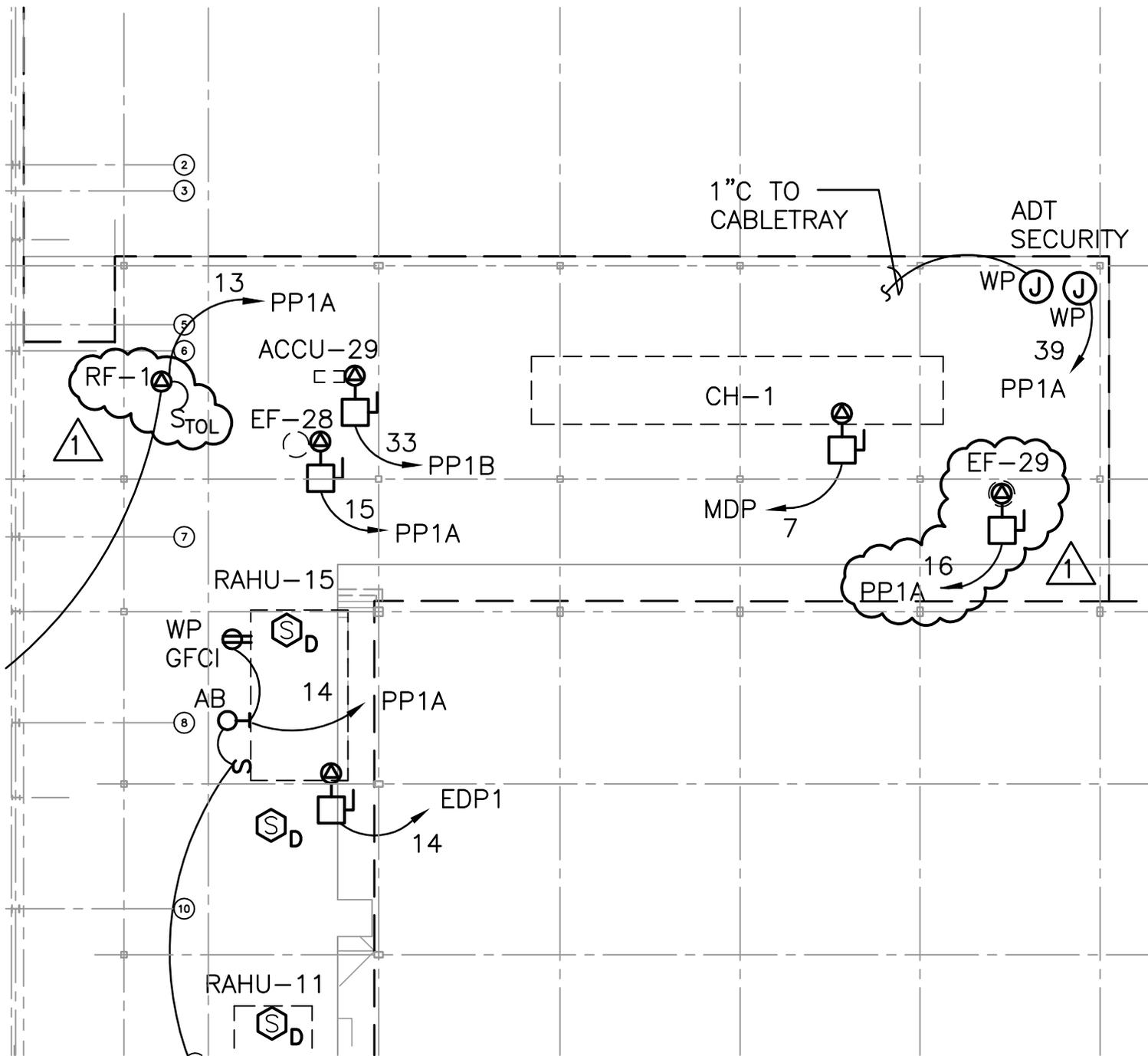
ADDENDUM 2

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ADDED POWER TO MAC-1 UNITS
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
 As Noted
 Reference:
 EP101E-F
 Date:
 March 30, 2011
 Proj. No.
 04179.00

Sketch No:
SKEP-03
 BI-RT-841

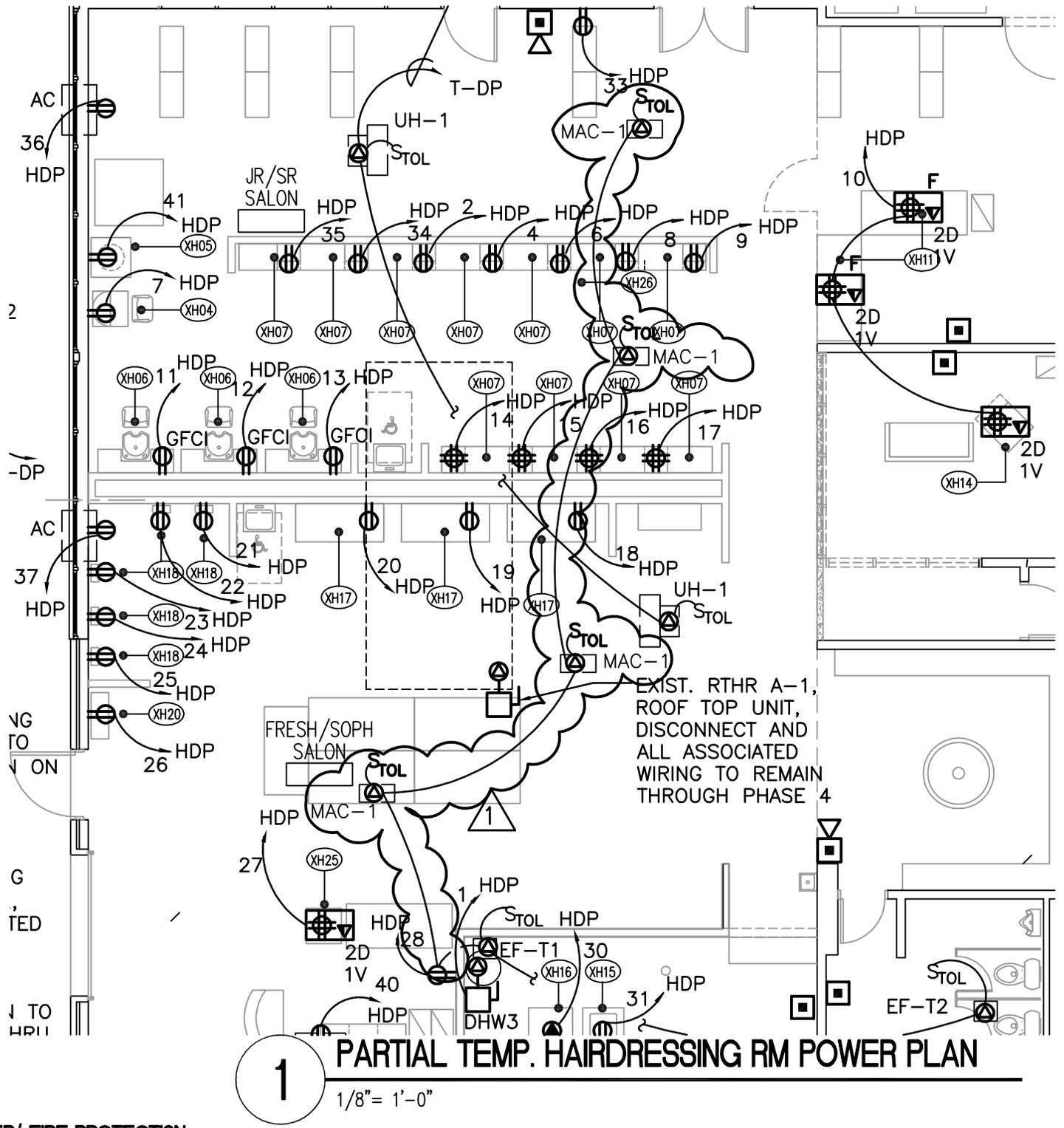


1 PARTIAL ROOF PLAN ELECTRICAL
 SCALE: 1" = 20'

MEP/ FIRE PROTECTION
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 2321 WHITNEY AVENUE
 HAMDEN, CT 06518

ADDENDUM #2

<p><i>The</i> S L A M <i>Collaborative</i> Glastonbury, CT Tel. 860 657-8077 Fax 860 657-3141</p>	<p>RELOCATED EQUIPMENT</p> <p>H.H. Ellis Technical High School Additions + Major Renovations Danielson, CT</p>		<p>Scale: <i>As Noted</i></p>	<p>Sketch No: SKEP-04</p>
			<p>Reference: EP102</p>	
			<p>Date: March 30, 2011</p>	
			<p>Proj. No. 04179.00</p>	<p>BI-RT-841</p>



MEP/ FIRE PROTECTION
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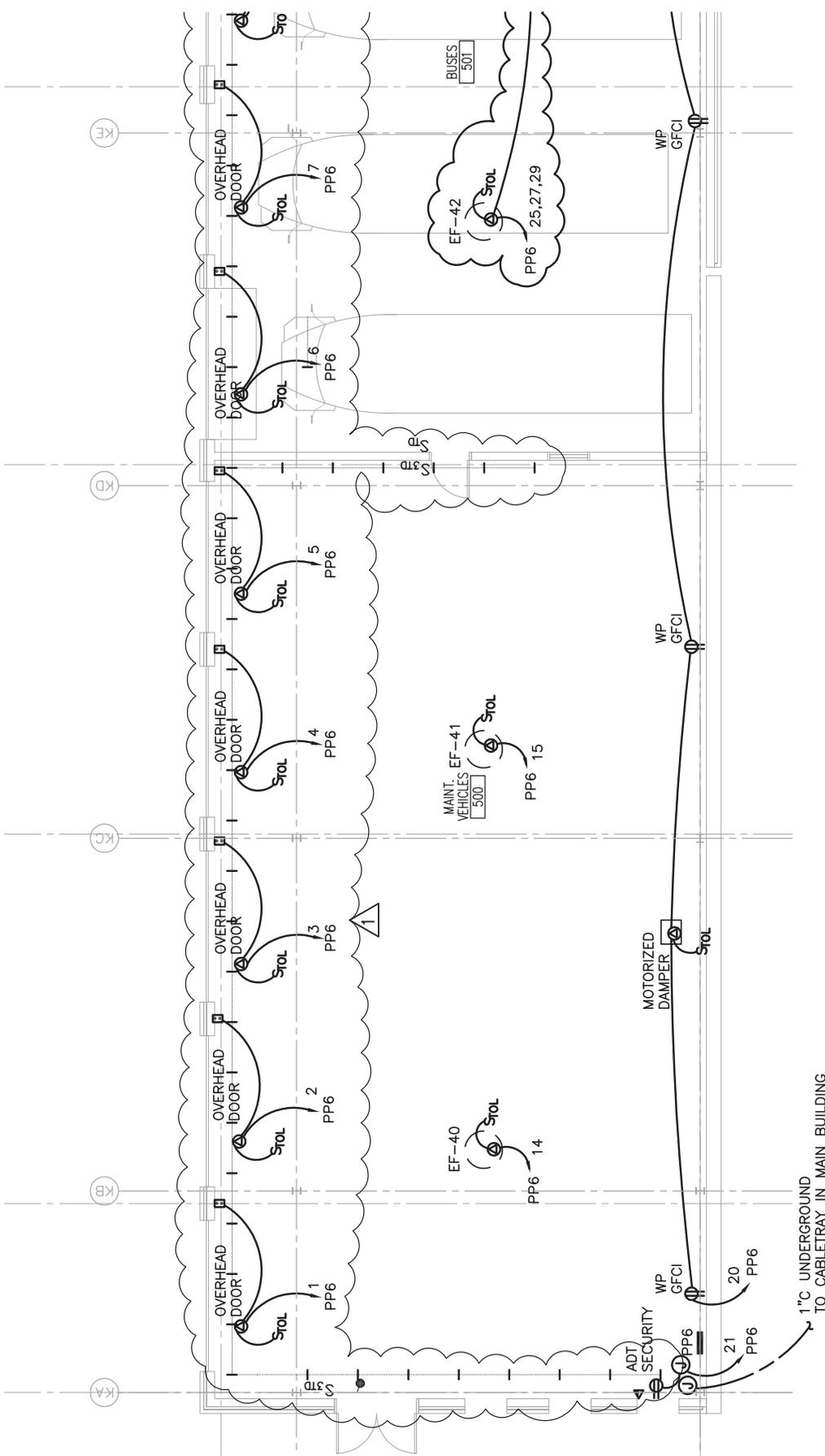
ADDENDUM #2

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ADDED POWER TO MAC-1 UNITS
H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale:
 As Noted
 Reference:
 GP13
 Date:
 March 30, 2011
 Proj. No.
 04179.00

Sketch No:
SKEP-05
 BI-RT-841



MEP/ FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 2321 WHITNEY AVENUE
 HAMDEN, CT 06518

1 PARTIAL FLOOR POWER PLAN - PART K
 1/8" = 1'-0"

ADDENDUM #2

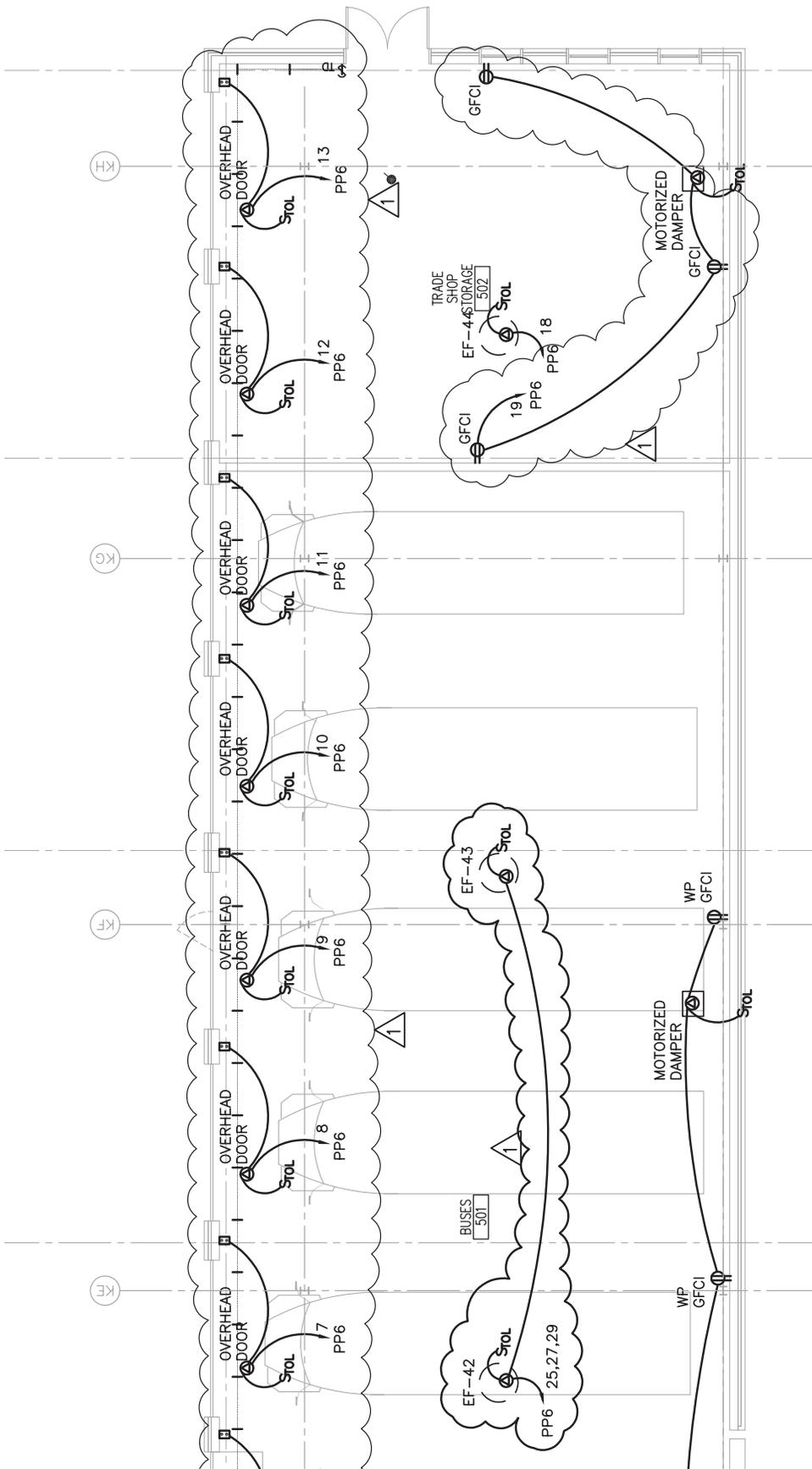
The
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 Collaborative
 Glastonbury, CT
 Tel. 860 657-8077
 Fax 860 657-3741

UPDATED POWER REQUIREMENTS FOR EF UNITS AND ROOM LAYOUT

H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale: As Noted
 Reference: EL10K
 Date: March 30, 2011
 Proj. No. 04729.00

Sketch No:
SKEP-06
 EF-RT-841



MEP/ FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 2321 WHITNEY AVENUE
 HAMDEN, CT 06518

1 PARTIAL FLOOR POWER PLAN - PART K
 1/8" = 1'-0"

ADDENDUM #2

The
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 Collaborative
 Glastonbury, CT
 Tel. 860 657-8077
 Fax 860 657-3741

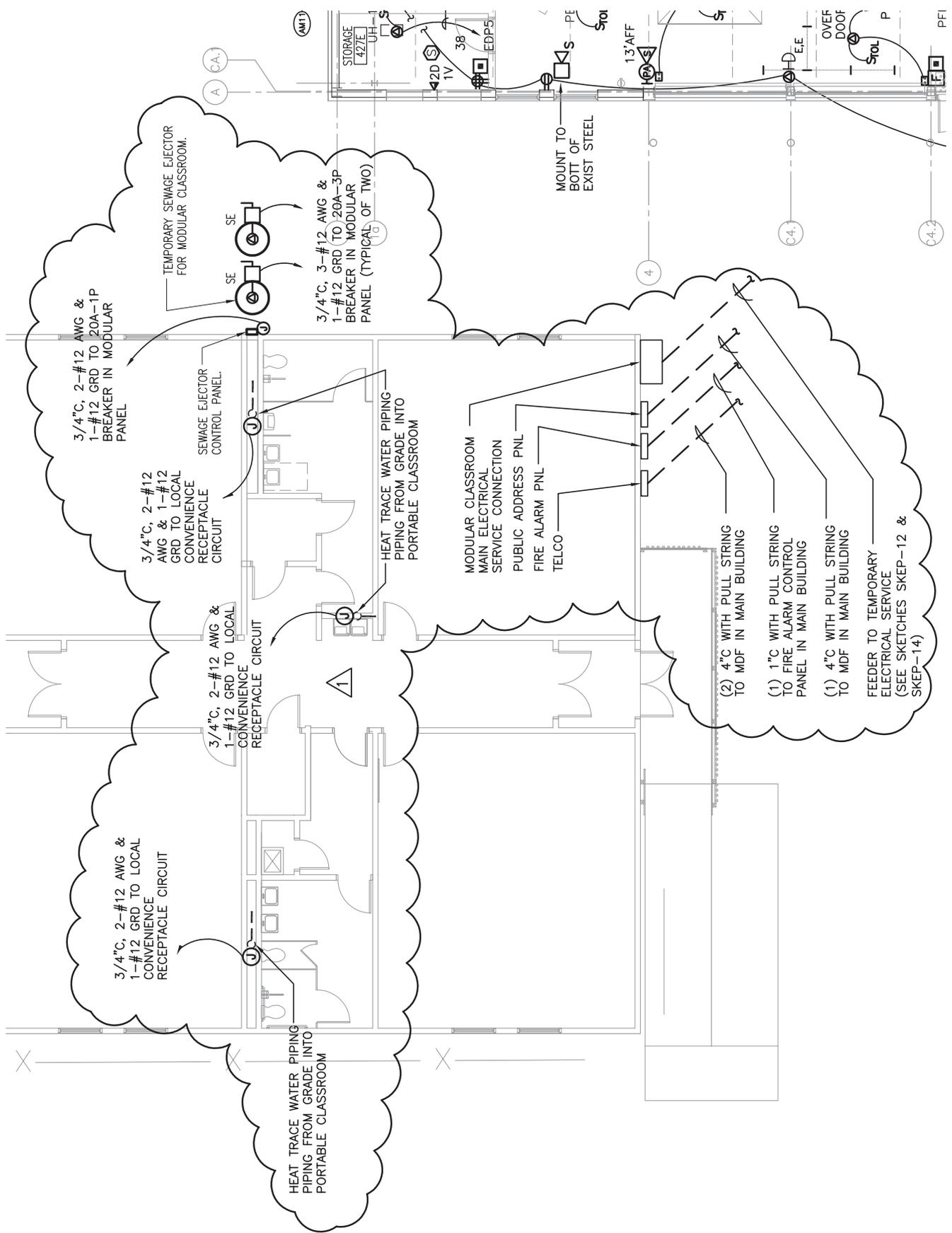
UPDATED POWER REQUIREMENTS FOR EF UNITS AND ROOM LAYOUT

H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale: As Noted
 Reference: EL10K
 Date: March 30, 2011
 Proj. No. 0472.00

Sketch No:
SKEP-07

BF-RT-841



MEP/ FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 2321 WHITNEY AVENUE
 HAMDEN, CT 06518

1 PARTIAL POWER PLAN-PART G + H
 N.T.S.

ADDENDUM #2

The
S | L | A | M
 Collaborative
 Glastonbury, CT
 Tel. 860 657-8077
 Fax 860 657-3741

ADDED POWER REQUIREMENTS FOR MODULAR CLASSROOM

H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale:
 As Noted
 Reference:
 EP/IC
 Date:
 MAR 30, 2011
 Proj. No.
 04729.00

Sketch No:
SKEP-08
 BF-RT-841

PANELBOARD PP2B											
DESIGN BASED MODEL NO.: Pow-R-Line 3A		S/RATING NO									
DESIGN BASED MANUFACTURER: Cutler-Hammer		MOUNTING SURFACE									
CLASS: <input checked="" type="checkbox"/> Lighting <input type="checkbox"/> Distribution		CB TYPE MLO									
BUS SIZE 225A		FEEDER ENTRANCE TOP									
VOLTAGE CLASS: 208Y/120V, 3Ø, 4W		LOCATION Hair Dressing Stroage 228E									
SCR (FULLY RATED) 22KAIC											
CKT. NO.	DESCRIPTION	P	TRIP SIZE	FRAME SIZE	SETS	CONDUIT SIZE	BRANCH WIRING	A	B	C	NOTES
1	SPARE	1	20	100	-	-	-	00.0			
2	(3) MAC-1	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.9			1
3	(2) MAC-1	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.6		
4	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.4		
5	RECEPT RM228L	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.8	
6	RECEPT RM228J & K	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.8	
7	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.4			
8	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.4			
9	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.4		
10	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.4		
11	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.4	
12	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.4	
13	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.4			
14	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.4			
15	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.4		
16	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.4		
17	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.4	
18	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.4	
19	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.4			
20	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.4			
21	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.4		
22	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.4		
23	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.4	
24	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.4	
25	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.4			
26	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.4			
27	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.4		
28	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.2		
29	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.2	
30	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.2	
31	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.2			
32	RECEPT RM228J	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.2			
33	SPARE	1	20	100	-	-	-		00.0		
34	SPARE	1	20	100	-	-	-		0.0		
35	SPARE	1	20	100	-	-	-			00.0	
36	SPARE	1	20	100	-	-	-			0.0	
37	SPARE	1	20	100	-	-	-	0.0			
38	SPARE	1	20	100	-	-	-	0.0			
39	SPARE	1	20	100	-	-	-		0.0		
40	SPARE	1	20	100	-	-	-		0.0		
41	SPARE	1	20	100	-	-	-			0.0	
42	SPARE	1	20	100	-	-	-			0.0	
TOTAL								4.5	4	4.4	
NOTES: PROVIDE 3/4" CONDUIT UNLESS OTHERWISE NOTED.											

**MEP/ FIRE PROTECTION
DTC-DIVERSIFIED TECH. CONSULTANTS
556 WASHINGTON AVENUE
NORTH HAVEN, CT 06473**

ADDENDUM 2

The
S | L | A | M
Collaborative
Glastonbury, CT
Tel. 860 657-8077
Fax 860 657-3141

ADDED LOAD FOR MAC-1 UNITS
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
As Noted
Reference:
E503
Date:
March 30, 2011
Proj. No.
04179.00

Sketch No:
SKEP-9
BI-RT-841

PANELBOARD PP6											
DESIGN BASED MODEL NO.: Pow-R-Line 1A			S/E RATING NO								
DESIGN BASED MANUFACTURER: Cutler-Hammer			MOUNTING SURFACE								
CLASS: <input checked="" type="checkbox"/> Lighting <input type="checkbox"/> Distribution			CB TYPE 100A								
BUS SIZE 100A			FEEDER ENTRANCE TOP								
VOLTAGE CLASS: 208Y/120V, 3Ø, 4W			LOCATION GARAGE RM 500								
SCR (FULLY RATED) 10KAIC											
CKT. NO.	DESCRIPTION	P	TRIP SIZE	FRAME SIZE	SETS	CONDUIT SIZE	BRANCH WIRING	A	B	C	NOTES
1	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	01.7			
2	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	01.7			
3	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		01.7		
4	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		01.7		
5	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			01.7	
6	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			01.7	
7	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	01.7			
8	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	01.7			
9	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		01.7		
10	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		01.7		
11	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			01.7	
12	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			01.7	
13	OVERHEAD DOOR	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	01.7			
14	EF-40	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	01.2			
15	EF-41	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		01.2		
16	SPARE	1	20	100	-	-	-		00.0		
17	SPARE	1	20	100	-	-	-			00.0	
18	EF-44	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.5	
19	RECEPT RM502	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.8			
20	RECEPT RM500 & 501	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	01.2			
21	J-BOX ADT SECURITY SYSTEM	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		01.5		
22	LIGHTS EXTERIOR BLDG MOUNT	1	20	100	-	-	2-#10 AWG & 1-#10 GRD		00.5		
23	LIGHTS RM 500, 501 & 502	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			01.6	
24	EXTERIOR LIGHTS BLDG MOUNT	4	20	100	-	-	2-#10 AWG & 1-#10 GRD			01.0	A
25	EF-42, EF-43	3	20	100	-	-	3-#12 AWG & 1-#12 GRD	00.4			
26	SPARE	1	20	100	-	-	-	00.0			
27	-	-	-	-	-	-	-		00.4		
28	SPARE	1	20	100	-	-	-		00.0		
29	-	-	-	-	-	-	-			00.4	
30	SPARE	1	20	100	-	-	-			00.0	
TOTAL								12.1	10.4	10.3	

NOTES:

PROVIDE 3/4" CONDUIT UNLESS OTHERWISE NOTED.

LIGHTS ARE 120V ON THIS PANELBOARD ONLY.

A: LOCATE 2100VA UPS IN ROOM 500 (MAIN. STORAGE) FOR EACH LIGHTING CIRCUIT. SEE DETAIL TYP EXTERIOR BUILDING MOUNTED LIGHTING CONTROL DWG ES002

MEP/ FIRE PROTECTION
DTC-DIVERSIFIED TECH. CONSULTANTS
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 NORTH HAVEN, CT 06473

ADDENDUM 2

The
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 Tel. 860 657-8077
 Fax 860 657-3141

UPDATED POWER REQUIREMENTS FOR EF UNITS

H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
As Noted

Reference:
E506

Date:
March 30, 2011

Proj. No.
04179.00

Sketch No:

SKEP-10

BI-RT-841

PANELBOARD HDP

DESIGN BASED MODEL NO.: Pow-R-Line 2A
 DESIGN BASED MANUFACTURER: Cutler-Hammer

S/RATING NO

MOUNTING SURFACE

CLASS: Lighting
 Distribution

CB TYPE 225A

BUS SIZE 225A

FEEDER ENTRANCE TOP

VOLTAGE CLASS: 208Y/120V, 3Ø, 4W
 SCR (FULLY RATED) 14KAIC

LOCATION Hairdressing - Temp

CKT. NO.	DESCRIPTION	P	TRIP SIZE	FRAME SIZE	SETS	CONDUIT SIZE	BRANCH WIRING	A	B	C	NOTES
1	HOT WATER HEATER DHW3	3	20	100	-	-	3-#10 AWG & 1-#12 GRD	06.0			
2	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.0			
3	-	-	-	-	-	-	-		06.0		
4	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.0		
5	-	-	-	-	-	-	-			06.0	
6	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.2	
7	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.2			
8	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.2			
9	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.2		
10	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.2		
11	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.2	
12	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.2	
13	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	0.2			
14	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	0.2			
15	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.2		
16	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.2		
17	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.2	
18	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.2	
19	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	0.2			
20	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	0.2			
21	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.2		
22	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.2		
23	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.2	
24	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.2	
25	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	0.2			
26	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	0.2			
27	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.2		
28	RECEPT, (4) MAC-1, EF-T1, EF-T2	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		01.9		
29	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.0	
30	DRYER XH16	2	30	100	-	-	3-#10 AWG & 1-#10 GRD			02.0	
31	WASHER	1	20	100	-	-	2-#12 AWG & 1-#12 GRD	1.5			
32	-	-	-	-	-	-	-	2.0			
33	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.2		
34	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD		0.2		
35	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.2	
36	RECEPT WINDOW AC UNIT (EXISTING)	2	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.7	A
37	RECEPT WINDOW AC UNIT (EXISTING)	2	20	100	-	-	2-#12 AWG & 1-#12 GRD	00.7			A
38	-	-	-	-	-	-	-	00.7			
39	-	-	-	-	-	-	-		00.0		
40	RECEPT WINDOW AC UNIT (EXISTING)	2	20	100	-	-	2-#12 AWG & 1-#12 GRD		00.7		A
41	RECEPT	1	20	100	-	-	2-#12 AWG & 1-#12 GRD			00.2	
42	-	-	-	-	-	-	-			00.7	
TOTAL								12.5	10.42	11.2	

NOTES:
 PROVIDE 3/4" CONDUIT UNLESS OTHERWISE NOTED.
 A: CONTRACTOR SHALL FIELD VERIFY THE ELECTRICAL REQUIREMENTS FOR THE EXISTING WINDOW AC-UNITS BEFORE PLACEMENT OF RECEPTACLES.

**MEP/ FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 556 WASHINGTON AVENUE
 NORTH HAVEN, CT 06473**

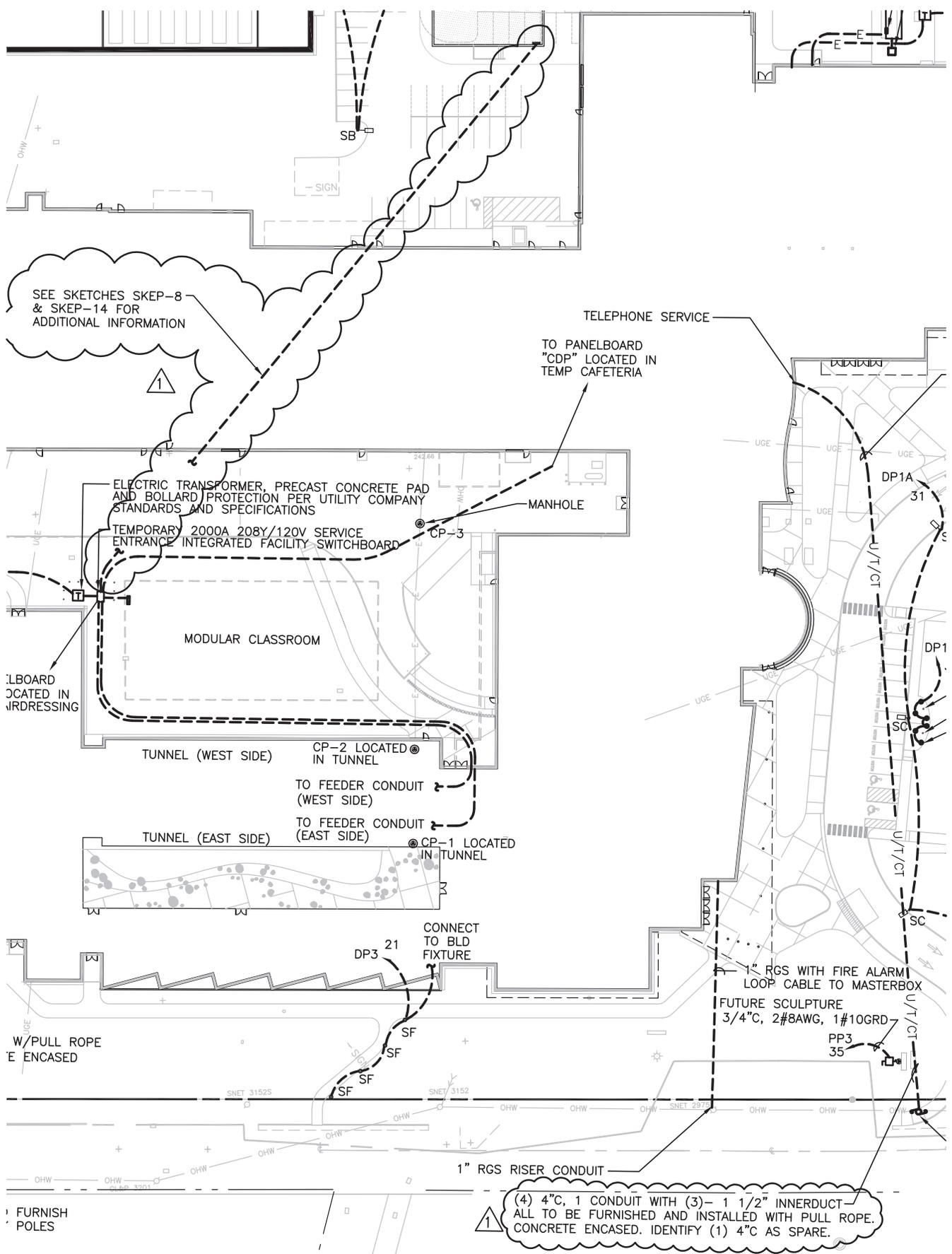
ADDENDUM 2

The
S | L | A | M
 Collaborative
 Glastonbury, CT
 Tel. 860 657-8077
 Fax 860 657-3141

ADDED LOADS FOR MAC-1 UNITS
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
As Noted
 Reference:
 E508
 Date:
 March 30, 2011
 Proj. No.
 04179.00

Sketch No:
SKEP-11
BI-RT-841



MEP/ FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 2321 WHITNEY AVENUE
 HAMDEN, CT 06518

1 PARTIAL SITE UTILITY PLAN
 1" = 50'

ADDENDUM #2

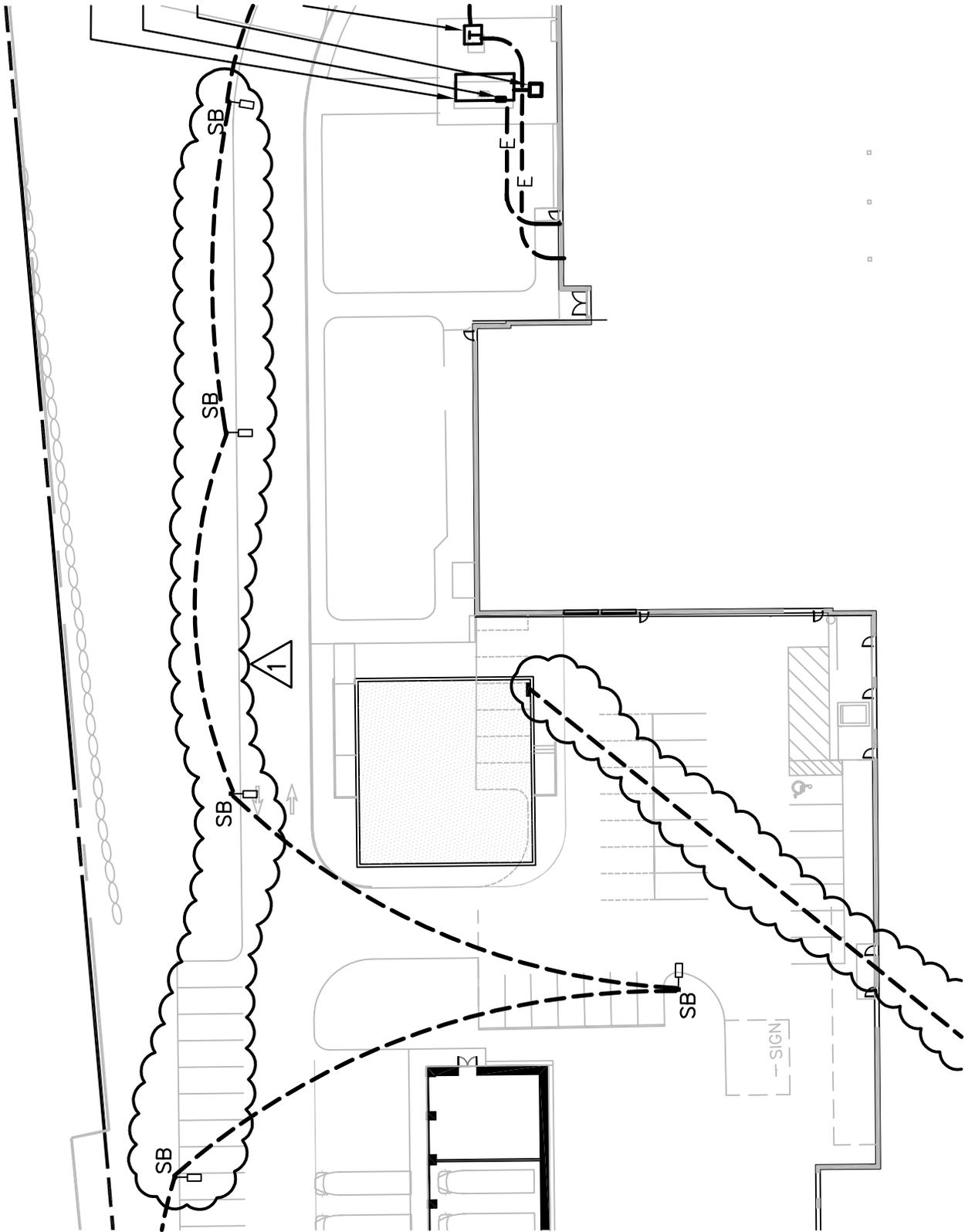
The
S/L/A/M
 Collaborative
 Glastonbury, CT
 Tel. 860 657-8077
 Fax 860 657-3741

ADDED IT SPARE CONDUIT AND POWER FEED TO MODULAR CLASSROOM

H.H. Ellis Technical High School
 Additions + Major Renovations
 Danielson, CT

Scale:
 As Noted
 Reference:
 ES001
 Date:
 March 30, 2011
 Proj. No.
 0479.00

Sketch No:
SKEP-12
 BF-RT-841



MEP/ FIRE PROTECTION
 DTC-DIVERSIFIED TECH. CONSULTANTS
 556 WASHINGTON AVENUE
 NORTH HAVEN, CT 06473

1

PARTIAL SITE UTILITY PLAN

1" = 50'

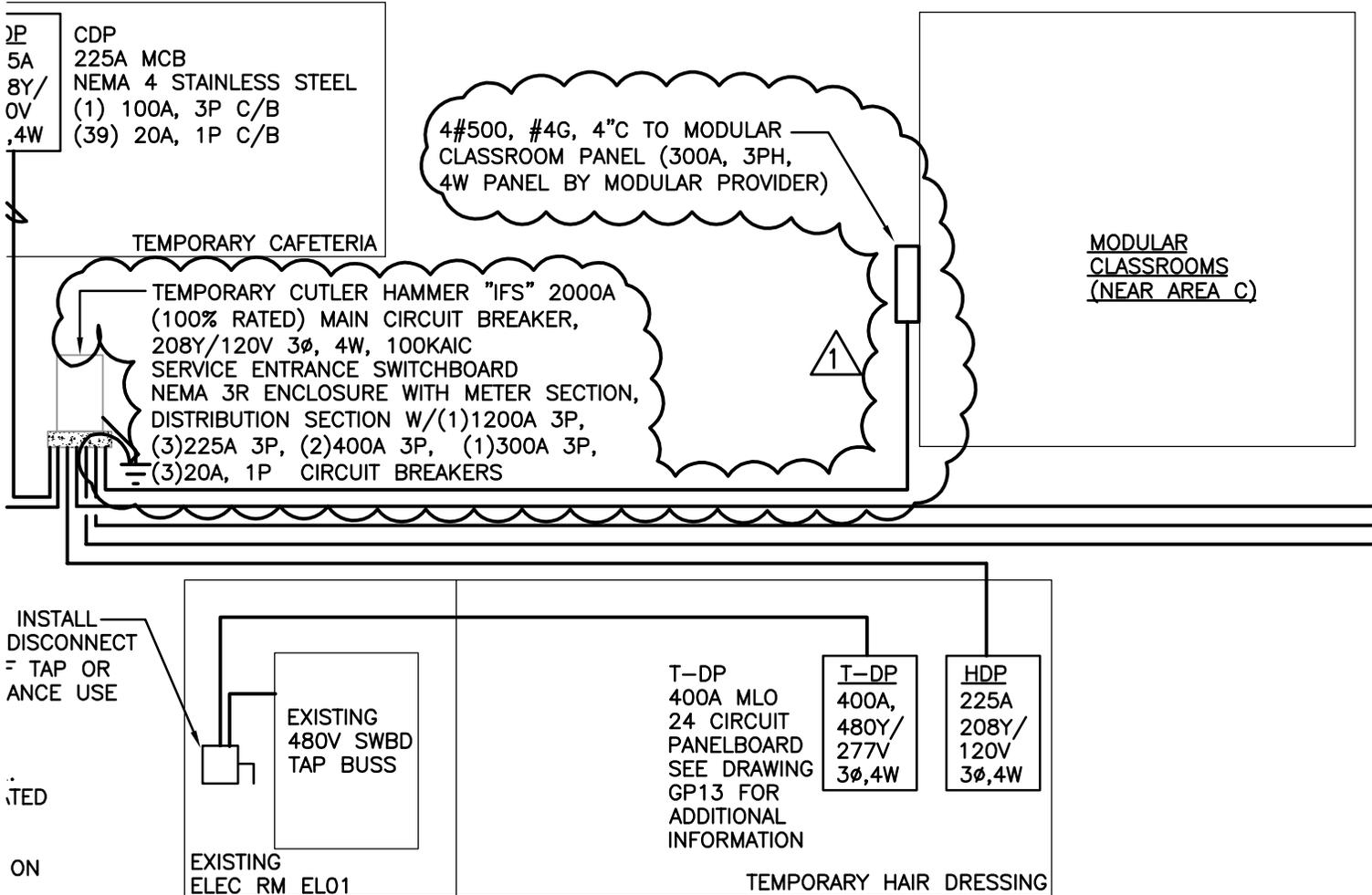
ADDENDUM #2

The
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 Collaborative
 Glastonbury, CT
 Tel. 860 657-8077
 Fax 860 657-3141

RELOCATED SITE LIGHTING FIXTURES
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale: *As Noted*
 Reference: **ES001**
 Date: **March 30, 2011**
 Proj. No. **04179.00**

Sketch No:
SKEP-13
BI-RT-841



1 PARTIAL TEMPORARY SERVICE ONE-LINE RISER DIAGRAM
 1/8" = 1'-0"

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 NORTH HAVEN, CT 06473

ADDENDUM #1

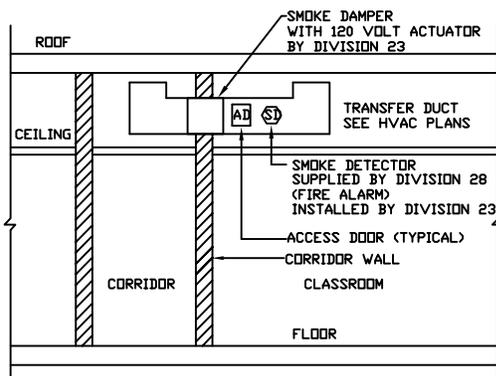
ADDENDUM 2

The
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 Collaborative
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 Fax 860 657-3141

ADDED POWER FEED TO MODULAR CLASSROOM
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

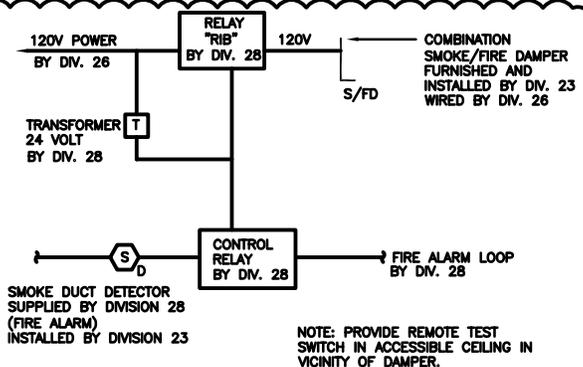
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 Date: *March 30, 2011*
 Proj. No. *04179.00*

Sketch No:
SKEP-14
 BI-RT-841



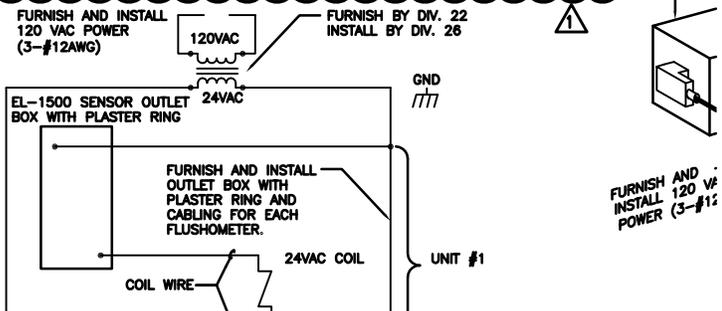
TYPICAL DUCT PENETRATION WITH SMOKE DAMPER THRU CORRIDOR WALL

NOT TO SCALE



TYPICAL SMOKE DAMPER WIRING DETAIL

NOT TO SCALE



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ADDENDUM 2

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 Fax 860 657-3141

ADDED SMOKE DAMPER DETAILS
H.H. Ellis Technical High School
Additions + Major Renovations
Danielson, CT

Scale:
As Noted
 Reference:
 E303
 Date:
 March 30, 2011
 Proj. No.
 04179.00

Sketch No:
SKEP-15
 BI-RT-841

SECTION 05 3100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Roof deck.
 - 2. Acoustical roof deck.
 - 3. Cellular roof deck.
 - 4. Composite floor deck.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete" for concrete fill.
 - 2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
 - 3. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
 - 4. Division 09 painting Sections for repair painting of primed deck.

1.3 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product Certificates: For each type of steel deck, signed by product manufacturer.
- D. Welding certificates.
- E. Field quality-control test and inspection reports.

1.4 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

- B. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- C. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.
- D. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so post consumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1.6 COORDINATION

- A. Coordinate installation of sound-absorbing insulation strips in topside ribs of acoustical deck with roofing installation specified in Division 07 Section 2100 "Thermal insulation" to ensure protection of insulation strips against damage from effects of weather and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Steel Deck:
 - a. ASC Profiles, Inc.
 - b. Canam Steel Corp.;The Canam Manac Group.
 - c. Consolidated Systems, Inc.
 - d. Marlyn Steel Decks, Inc.
 - e. Nucor Corp.; Vulcraft Division.
 - f. United Steel Deck, Inc. as manufactured by Canam.
 - g. Verco Manufacturing Co.
 - h. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

2.2 ROOF DECK

- A. Steel Roof Deck "R1" as indicated on Dwg. S002,also refer to framing plans for specific deck location.: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:

-
1. Galvanized Steel Sheet (top and bottom): ASTM A 653/A 653M, Structural Steel (SS), Grade ~~33(230)~~ 40, G90 (Z275) zinc coating.
 2. ~~Galvanized top and bottom and Shop Primed bottom (where indicated on architectural drawings) Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33(230), G90(Z180) zinc coating; cleaned, and phosphatized after galvanizing and primed with manufacturer's standard baked on, rust-inhibitive primer.~~
 - a. ~~Color: White.~~
 3. Deck Profile: Type WR, wide rib.
 4. Profile Depth: 1-1/2 inches (38 mm).
 5. Design Uncoated-Steel Thickness: 0.0358 inch (0.91 mm).
 6. Span Condition: Triple span or more.
 7. Side Laps: Overlapped. ~~or interlocking seam at Contractor's option.~~
- B. Steel Roof Deck "R2" as indicated on Dwg. S002, also refer to framing plans for specific deck location: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
1. Galvanized Steel Sheet (top and bottom): ASTM A 653/A 653M, Structural Steel (SS), Grade ~~33(230)~~ 40, G90 (Z275) zinc coating.
 2. Galvanized top and bottom and Shop-Primed bottom (where indicated on architectural drawings) Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade ~~33(230)~~ 40, G90 (Z180) zinc coating; cleaned, and phosphatized after galvanizing and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: White.
 3. Deck Profile: Type WR, wide rib.
 4. Profile Depth: 1-1/2 inches (38 mm).
 5. Design Uncoated-Steel Thickness: 0.0474 inch (1.20 mm)
 6. Span Condition: Triple span or more.
 7. Side Laps: Overlapped. ~~or interlocking seam at Contractor's option.~~
- C. Steel Roof Deck "R5 cellular" as indicated on Dwg. S002, also refer to framing plans for specific deck location: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
1. Galvanized top, bottom and bottom plate. Shop-Primed bottom plate as indicated on architectural drawings.
 2. Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33(230) , G90 (Z180) zinc coating.
 3. Bottom plate cleaned, phosphatized after galvanizing and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: White.
 4. Cellular Deck Profile: Type WR, wide rib with bottom plate.
 5. Profile Depth: 1-1/2 inches (38 mm).
 6. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: 0.0474/0.0474 inch (1.20/1.20 mm).

7. Span Condition: Triple span or more.
8. Side Laps: Overlapped. ~~or interlocking seam at Contractor's option.~~

2.3 ACOUSTICAL ROOF DECK

A. Acoustical Steel Roof Deck "R3" as indicated on Dwg. S002, also refer to framing plans for specific deck location: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33(230), G90 (Z275) zinc coating.
2. Galvanized top and bottom and Shop-Primed bottom (where indicated on architectural drawings).
3. Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33(230), G90(Z180) zinc coating; cleaned, and phosphatized after galvanizing and primed with manufacturer's standard baked-on, rust-inhibitive primer.

a. Color: White.

4. Deck Profile: Type WR, wide rib.
5. Profile Depth: 1-1/2 inches (38 mm).
6. Design Uncoated-Steel Thickness: 0.0358 inch (0.91 mm).
7. Span Condition: Triple span or more.
8. Side Laps: Overlapped. ~~or interlocking seam at Contractor's option.~~
9. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.

a. Installation of sound-absorbing insulation is specified in Division 07 Section 2100 "Thermal Insulation"

B. Acoustical Steel Roof Deck "R4" as indicated on Dwg. S002, also refer to framing plans for specific deck location: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33(230), G90 (Z275) zinc coating.
2. Galvanized top and bottom and Shop-Primed bottom (where indicated on architectural drawings).
3. Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G90 (Z180) zinc coating; cleaned, and phosphatized after galvanizing and primed with manufacturer's standard baked-on, rust-inhibitive primer.

a. Color: White.

4. Deck Profile: Type WR, wide rib.
5. Profile Depth: 1-1/2 inches (38 mm).
6. Design Uncoated-Steel Thickness: 0.0474 inch (1.20 mm).
7. Span Condition: Triple span or more.

8. Side Laps: Overlapped, ~~or interlocking seam at Contractor's option.~~
9. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.
 - a. Installation of sound-absorbing insulation is specified in Division 07 Section "Thermal Insulation"

2.4 COMPOSITE FLOOR DECK

- A. Composite Steel Floor Deck "F1, and "F2" as indicated on Dwg. S002, also refer to framing plans for specific deck location: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:
 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade ~~33(230)~~ 40, G60 (Z180) zinc coating.
 2. Profile Depth: 3 inches (76 mm).
 3. Design Uncoated-Steel Thickness: 0.0358 inch (0.91 mm).
 4. Span Condition: Double span.

2.5 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10(4.8-mm) minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi(230 MPa), not less than 0.0359-inch(0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi(230 MPa), of same material and finish as deck, and of thickness and profile as indicated on drawings or recommended by SDI Publication No. 30 for overhang and slab depth.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- H. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch-(76-mm-) wide flanges and recessed pans of 1-1/2-inch (38-mm) minimum depth. For drains, cut holes in the field.

- I. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.
- J. Galvanizing Repair Paint: ASTM A 780 SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- K. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
 - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

-
- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches(38 mm) long, and as follows:
1. Weld Diameter: 3/4 inch (19 mm)], nominal.
 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches (305 mm) apart in the field of roof and 6 inches (150 mm) apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 36 inches(910 mm), and as follows:
1. Mechanically fasten with self-drilling, No. 10(4.8-mm-) diameter or larger, carbon-steel screws.
 2. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
1. End Joints: Lapped 2 inches (51 mm) minimum for deck types R1 and R2 as indicated on drawings.
 2. End Joints: Butted for deck types R3, R4, and R5 as indicated on drawings.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or mechanical fasteners not more than 12 inches (305 mm) apart with at least one weld or mechanical fastener at each corner.
1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten unless otherwise shown on structural drawings.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.
- G. Sound-Absorbing Insulation: Installation into topside ribs of deck as specified in Division 07 Section "Thermal Insulation".

3.4 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
1. Weld Diameter: 3/4 inch (19 mm), nominal.

2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (305 mm) apart.
 3. Weld Spacing: Space and locate welds as indicated.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches(910 mm), and as follows:
1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
 2. Fasten with a minimum of 1-1/2-inch-(38-mm-) long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
1. End Joints: Lapped or butted at Contractor's option.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting:
 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
 2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Division 09 Section "Interior Painting"

- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 3100

Revised by Addendum #2

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Elastomeric isolation pads and mounts.
 - 2. ~~Restrained elastomeric isolation mounts.~~
 - 3. Freestanding and restrained spring isolators.
 - 4. Housed spring mounts.
 - 5. Elastomeric hangers.
 - 6. Spring hangers.
 - 7. Spring hangers with vertical-limit stops.
 - 8. Thrust limits.
 - 9. Pipe riser resilient supports.
 - 10. Resilient pipe guides.
 - 11. Freestanding and restrained air spring isolators.
 - 12. ~~Restrained vibration isolation roof curb rails.~~
 - 13. ~~Seismic snubbers.~~
 - 14. ~~Restraining cables.~~
 - 15. Steel and inertia, vibration isolation equipment bases.

1.3 DEFINITIONS

- A. Effective peak velocity related acceleration coefficient.
- B. ~~OSHPD: Office of Statewide Health Planning & Development for the State of Connecticut. OSHPD assigns a unique anchorage preapproval "R" number to each seismic restraint it tests. The number describes a specific device applied as tested.~~

1.4 PERFORMANCE REQUIREMENTS

- A. In accordance with the local and state current regulations and codes.
- B. ~~Component Seismic Coefficient: In accordance with the local and state current regulations and codes.~~
- C. Performance Criteria Factor: In accordance with the local and state current regulations and codes.

ADDENDUM #2

- D. Attachment Amplification Factor: In accordance with the local and state current regulations and codes.

1.5 SUBMITTALS

- A. Product Data: Include load deflection curves for each vibration isolation device.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Include the following:
1. Design Calculations: Calculate requirements for selecting vibration isolators ~~and seismic restraints~~ and for designing vibration isolation bases.
 2. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, ~~and seismic loads~~. Include certification that riser system has been examined for excessive stress and that none will exist.
 3. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.
 4. ~~Seismic Restraint Details: Detail fabrication and attachment of seismic restraints and snubbers. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.~~
 5. Submittals for Interlocking Snubbers: Include load deflection curves up to 1/2-inch (13-mm) deflection in x, y, and z planes.
 6. ~~Coordination drawings shall have all seismic restraint locations, quantities, and types laid out and stamped by the seismic design engineer of record. Restraints shall be detailed for all piping and ductwork applicable.~~
- C. Welding certificates.
- ~~D. Manufacturer Seismic Qualification Certification: Submit certification that all specified equipment will withstand seismic forces identified in "Performance Requirements" Article above. Include the following:~~
1. ~~Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculations.~~
 - a. ~~The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."~~
 - b. ~~The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."~~
 2. ~~Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.~~
 3. ~~Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.~~

ADDENDUM #2

1.6 QUALITY ASSURANCE

- ~~A. Seismic restraint devices shall have horizontal and vertical load testing and analysis performed according to OSHPD and shall bear anchorage preapproval "R" number, from OSHPD or another agency acceptable to authorities having jurisdiction, showing maximum seismic restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic restraint designs must be signed and sealed by a qualified professional engineer. Testing and calculations must include both shear and tensile loads and 1 test or analysis at 45 degrees to the weakest mode.~~
- B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

1.7 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into base. Concrete, reinforcement, and formwork requirements are specified in Division 3.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 Section "Roof Accessories."

~~1.8 EXTRA MATERIALS~~

- ~~A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.~~
 - ~~1. Seismic Snubber Units: Furnish replacement neoprene inserts for all snubbers.~~

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.
- B. Refer to Part 3 schedule articles for requirements on applications.

2.2 VIBRATION ISOLATORS

- A. Available Manufacturers:

ADDENDUM #2

- B. Manufacturers:
1. Kinetics Noise Control, Inc.
 2. Mason Industries, Inc.
 3. Vibration Eliminator Co., Inc.
 4. Vibration Isolation Co., Inc.
- C. Elastomeric Isolator Pads Type VII (Mason Industries Model Super W): Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
1. Material: Bridge-bearing neoprene, complying with AASHTO M 251.
 2. Durometer Rating: 50.
 3. Number of Layers: 2.
- ~~D. Restrained Elastomeric Mounts Type VI3 (Mason Industries Model BR or RB): All directional elastomeric mountings with seismic restraint.~~
- ~~1. Materials: Cast ductile iron housing containing two separate and opposing, molded, bridge bearing neoprene elements that prevent central threaded sleeve and attachment bolt from contacting the casting during normal operation.~~
 - ~~2. Neoprene: The standard for bridge bearing neoprene as defined by AASHTO (for outdoor use only).~~
 - ~~3. Mounting to have OSHPD anchorage Preapproval "R" number.~~
- E. Spring Isolators Type VI4 (Mason Industries Type SLF): Freestanding, laterally stable, open-spring isolators.
1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 3. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
 4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- (6-mm-) thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 100 psig (690 kPa).
 6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
- F. Restrained Spring Isolators Type VI5 (Mason Industries Model SLRS): Freestanding, steel, open-spring isolators with seismic restraint.
1. One Piece Steel Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation. Housing to be electrogalvanized for weather protection.
 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.

ADDENDUM #2

3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 6. Mounting to have OSHPD Preapproval "R" number.
- G. ~~Housed Spring Mounts Type VI6 (Mason Industries Model SSLFH): Housed spring isolator with integral seismic snubbers.~~
1. ~~Housing: Ductile iron or steel housing to provide all directional seismic restraint.~~
 2. ~~Base: Factory drilled for bolting to structure.~~
 3. ~~Snubbers: Vertically adjustable to allow a maximum of 1/4 inch (6 mm) travel before contacting a resilient collar.~~
 4. ~~Mounting to have OSHPD Preapproval "R" number.~~
- H. Elastomeric Hangers Type VI7 (Mason Industries Model HD): Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.
- I. Spring Hangers Type VI8 (Mason Industries Model 30N): Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
- J. Spring Hangers with Vertical-Limit Stop Type VI9 (Mason Industries model 30N with Limit Stop): Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.
1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.

ADDENDUM #2

7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
- K. Thrust Limits Type VI10 (Mason Industries Model WBI): Combination coil spring and elastomeric insert with spring and insert in compression and with a load stop. Include rod and angle-iron brackets for attaching to equipment.
1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch (6-mm) movement at start and stop.
- L. Pipe Riser Resilient Support Type VI11 (Mason Industries Model ADA): All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of 1/2-inch- (13-mm-) thick, 60-durometer neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of 500 psig (3.45 MPa) and for equal resistance in all directions.
- M. Resilient Pipe Guides Type VI12 (Mason Industries Model VSG): Telescopic arrangement of 2 steel tubes separated by a minimum of 1/2-inch- (13-mm-) thick, 60-durometer neoprene. Factory set guide height with a shear pin to allow vertical motion due to pipe expansion and contraction. Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

~~2.3 RESTRAINED VIBRATION ISOLATION ROOF CURB RAILS (RVIR 1)(Mason Model RSC)~~

~~A. Available Manufacturers:~~

~~B. Manufacturers:~~

- ~~1. Kinetics Noise Control, Inc.~~
- ~~2. Mason Industries, Inc.~~
- ~~3. Vibration Eliminator Co., Inc.~~
- ~~4. Vibration Isolation Co., Inc.~~

~~C. Description: Factory assembled, fully enclosed, air and watertight curb rail designed to resiliently support equipment and to withstand 125 mph (56 m/s) wind impinging laterally against side of equipment. Roof curb shall have linear loading across each side of the curb framing.~~

ADDENDUM #2

- ~~D. Lower Support Assembly: Sheet metal "Z" section containing adjustable and removable steel springs that support upper floating frame. Upper frame shall provide continuous support for equipment and shall be captive to resiliently resist wind and seismic forces. Lower support assembly shall have a means for attaching to building structure and a wood nailer for attaching roof materials, and shall be insulated with a minimum of 2 inches (50 mm) of rigid, glass fiber insulation on inside of assembly.~~
- ~~E. Spring Isolators: Adjustable, restrained spring isolators shall be mounted on 1/4 inch (6 mm) thick, elastomeric vibration isolation pads and shall have access ports, for level adjustment, with removable waterproof covers at all isolator locations. Isolators shall be located so they are accessible for adjustment at any time during the life of the installation without interfering with the integrity of the roof.~~
- ~~1. Restrained Spring Isolators: Freestanding, steel, open spring isolators with seismic restraint.~~
 - ~~a. Housing: Steel with resilient vertical limit stops and adjustable equipment mounting and leveling bolt.~~
 - ~~b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.~~
 - ~~c. Minimum Additional Travel: 50 percent of the required deflection at rated load.~~
 - ~~d. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.~~
 - ~~e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.~~
 2. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
 - a. Material: Bridge-bearing neoprene, complying with AASHTO M 251.
 - b. Durometer Rating: 50.
 - c. Number of Layers: 1.
- F. Snubber Bushings: All-directional, elastomeric snubber bushings at least 1/4 inch (6 mm) thick.
- G. Water Seal: Galvanized sheet metal with EPDM seals at corners, attached to upper support frame, extending down past wood nailer of lower support assembly, and counterflashed over roof materials.
- H. Entire curb assembly to have OSHPD Preapproval "R" number.
- I. Sound package shall consist of a 2" thick double wall acoustical panel located at and supported from the top floating portion of the curb. Entire acoustical curb and panel assembly shall be acoustically tested by an independent acoustics firm and results detailing a 26 dBA reduction in the occupied space below the curb shall be submitted.

ADDENDUM #2

2.4 SEISMIC RESTRAINT DEVICES

A. ~~Available Manufacturers:~~

B. ~~Manufacturers:~~

- ~~1. B Line Systems, Inc.~~
- ~~2. California Dynamics Corp.~~
- ~~3. Kinetics Noise Control, Inc.~~
- ~~4. Mason Industries, Inc.~~
- ~~5. Vibration Eliminator Co., Inc.~~
- ~~6. Vibration Isolation Co., Inc.~~

C. ~~Resilient Isolation Washers and Bushings Type SR1 (Mason Industries Model HG): 1 piece, molded, bridge bearing neoprene complying with AASHTO M 251 and having a durometer of 50, plus or minus 5, with a flat washer face.~~

D. ~~Seismic Snubbers Type SR2 (Mason Industries Model Z 1011, Z 1225): Factory fabricated using welded structural steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.~~

- ~~1. Anchor bolts for attaching to concrete shall be seismic rated, drill in, and stud wedge or female wedge type.~~
- ~~2. Resilient Isolation Washers and Bushings: 1 piece, molded, bridge bearing neoprene complying with AASHTO M 251 and having a durometer of 50, plus or minus 5.~~

E. ~~Restraining Cables Type SR3 (Mason Industries Type SCB/ SCBH) : Galvanized steel aircraft cables with OSHPD preapproved end connections made of steel assemblies that swivel to final installation angle and utilize two clamping bolts for cable engagement.~~

F. ~~Anchor Bolts Type SR4 (Mason Industries SAB/SAS): Seismic rated, drill in, and stud wedge or female wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488/E 488M.~~

2.5 VIBRATION ISOLATION EQUIPMENT BASES

A. Available Manufacturers:

B. Manufacturers:

1. Isolation Technology, Inc.
2. Kinetics Noise Control, Inc.
3. Mason Industries, Inc.
4. Vibration Eliminator Co., Inc.
5. Vibration Isolation Co., Inc.

C. Steel Base Type B1 (Mason Industries Model WFB / MSL): Factory-fabricated, welded, structural-steel bases and rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch (25-mm) clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails. Include supports for suction and discharge elbows for pumps.
 2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
 3. Support Brackets: Factory-welded steel angles on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
- D. Inertia Base Type B2 (Mason Industries Model BMK): factory fabricated, welded, structural-steel bases and rails ready for field-applied, cast-in-place concrete.
1. Design Requirements: Lowest possible mounting height with not less than 1-inch (25-mm) clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails. Include supports for suction and discharge elbows for pumps.
 2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
 3. Support Brackets: Factory-welded steel angles on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
 4. Fabrication: Fabricate steel templates to hold equipment anchor-bolt sleeves and anchors in place during placement of concrete. Obtain anchor-bolt templates from supported equipment manufacturer.

2.6 ROOF CURBS FOR ROOFTOP UNITS

- A. Manufacturers:
1. Isolation Technology, Inc.
 2. Kinetics Noise Control, Inc.
 3. Mason Industries, Inc.
 4. Vibration Eliminator Co., Inc.
 5. Vibration Isolation Co., Inc.
- B. Description: Factory-assembled, fully enclosed, insulated, air-and watertight curb designed to resiliently support equipment and to withstand 125-mph (56-m/s) wind impinging laterally against side of equipment. Roof curb shall have linear loading across each side of the curb framing.
- C. Curb mounted rooftop units shall be mounted on spring isolation curbs. The lower member shall consist of a sheet metal Z-section containing adjustable and removable steel springs that supports the upper floating section. The upper frame must provide continuous support for the equipment and must be captive so as to resiliently resist wind forces. All directional neoprene snubber bushings shall be a minimum of 1/4" thick neoprene acoustical pads. Hardware must be plated and the springs provided with a rust resistant finish. The curb's weatherproofing shall consist of a continuous galvanized flexible counter flashing nailed over the lower curb's waterproofing and joined at the corners by EPDM bellows. Spring locations shall have access ports with removable waterproof covers. Lower curbs shall have a provision for 2" of insulation. The roof curbs shall be built to contain the rooftop equipment. The unit must be solidly fastened to the top-floating rail, and the lower Z-section anchored to the roof structure.

Curbs to be type RSC as manufactured by Mason Industries, Inc. or approved equal. Roof curbs shall incorporate the following options:

1. Curbs to supply 3" deflection capability.
2. A licensed PE from the State in which the project is located, shall perform all calculations and supply all specific details for the attachment of the rooftop unit to the curb as well as the curb to the structure. Calculations shall be project specific. Typical attachment details from similar projects will not be acceptable.

2.7 FACTORY FINISHES

- A. Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 1. Powder coating on springs and housings.
 2. All hardware shall be electrogalvanized. Hot-dip galvanize or electrogalvanize metal components for exterior use.
 3. Baked enamel for metal components on isolators for interior use.
 4. ~~Color code or otherwise mark vibration isolation and seismic control devices to indicate capacity range.~~

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation ~~and seismic control~~ devices for compliance with requirements, installation tolerances, and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install roof curbs, equipment supports, and roof penetrations as specified in Division 7 Section "Roof Accessories."
- B. Install thrust limits at centerline of thrust, symmetrical on either side of equipment.

-
- C. ~~Install seismic snubbers on isolated equipment. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.~~
 - D. ~~Install restraining cables at each trapeze and individual pipe hanger. At trapeze anchor locations, shackle piping to trapeze. Install cables so they do not bend across sharp edges of adjacent equipment or building structure.~~
 - E. Install steel angles or channel, sized to prevent buckling, clamped with ductile-iron clamps to hanger rods for trapeze and individual pipe hangers. At trapeze anchor locations, shackle piping to trapeze. Requirements apply equally to hanging equipment. Do not weld angles to rods.
 - F. Install resilient bolt isolation washers on equipment anchor bolts.

3.3 EQUIPMENT BASES

- A. Fill concrete inertia bases, after installing base frame, with 3000-psi (20.7-MPa) concrete; trowel to a smooth finish.
 - 1. Cast-in-place concrete materials and placement requirements are specified in Division 3.
- B. ~~Concrete Bases: Anchor equipment to concrete base according to supported equipment manufacturer's written instructions for seismic codes at Project site.~~
 - 1. ~~Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450 mm) centers around the full perimeter of the base.~~
 - 2. ~~Install epoxy coated anchor bolts for supported equipment that extend through concrete base and anchor into structural concrete floor.~~
 - 3. ~~Place and secure anchorage devices. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.~~
 - 4. ~~Install anchor bolts to elevations required for proper attachment to supported equipment.~~
 - 5. ~~Install anchor bolts according to anchor bolt manufacturer's written instructions.~~
 - 6. Cast in place concrete materials and placement requirements are specified in Division 3.

3.4 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified testing agency to perform the following field quality-control testing:
- B. Testing: Engage a qualified testing agency to perform the following field quality-control testing:
- C. Testing: Perform the following field quality-control testing:
 - 1. ~~Isolator seismic restraint clearance.~~
 - 2. Isolator deflection.
 - 3. Snubber minimum clearances.

4. Air-Mounting System Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
5. Air-Mounting System Operational Test: Test the compressed-air leveling system. Remove malfunctioning units, replace with new units, and retest.
6. Test and adjust air-mounting system controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5 ADJUSTING AND INSPECTION

- A. Adjust isolators after piping systems have been filled and equipment is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch (6-mm) movement during start and stop.
- D. Adjust air spring leveling mechanism.
- E. Adjust active height of spring isolators.
- F. Adjust snubbers according to manufacturer's written recommendations.
- ~~G. Adjust seismic restraints to permit free movement of equipment within normal mode of operation.~~
- ~~H. Torque anchor bolts according to equipment manufacturer's written recommendations to resist seismic forces.~~
- I. Upon completion of the installation, the Seismic Design Engineer of Record (SDER) shall visit the project and inspect all installations for compliance with the project requirements. Upon completion of thy inspection, the SDER shall supply a stamped letter of approval and acceptance of all applicable installations.

3.6 CLEANING

- A. After completing equipment installation, inspect vibration isolation and seismic-control devices. Remove paint splatters and other spots, dirt, and debris.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air-mounting systems. Refer to Division 1 Section "Closeout Procedures."

3.8 VIBRATION ISOLATOR AND SEISMIC RESTRAINT SCHEDULE

A. Equipment, Pipe and Ductwork Schedule

EQUIPMENT SCHEDULE						
EQUIPMENT	HP	MSE	ISOLATION	DEFLECTION	BASE	RESTRAINT
Condensing Unit	ALL	SOG	--	--	--	SR-1/SR-4
	ALL	Roof	VI 15	1.0	--	VI 15
Computer Room A/C Unit	ALL	Raised Floor	VI 15	1.0	B1	VI 15
Base Mounted Pump	≥ 15	Floor	VI 14	1.0	B2	SR-2
Boiler	ALL	See	Drawing	Detail		
Axial Fans	ALL	Floor	VI 15	Note 1	--	VI 15
	ALL	Ceiling	VI 9	Note 1	--	SR 3
Fans/AHU/Fan Powered VAV Without Internal Isolation	>1	Floor	VI 15	Note 1	B1	VI 15
	>1	Ceiling	VI 9	Note 1	--	SR-3
Fans/AHU/Fan Powered VAV With Internal Isolation	>1	Floor	VI 1	0.1	--	SR-1/SR-4
	>1	Ceiling	VI 7	0.3	--	SR-3
Centrifugal Fan Arrangement 1, 3, 9, 10	ALL	Floor	VI 15	Note 1	B1	VI 15
Heat Pump Units	ALL	Floor	VI 3	0.3	--	VI 3
	ALL	CLG	VI 7	1.3	--	SR-3
Cooling Tower	ALL	SOG	--	--	--	SR 4
	ALL	Roof	VI 15	Note 1	B1	VI 15
RTU (Critical)	ALL	SOG	--	--	--	SR-1/SR-4
	ALL	Roof	RVIR-1	3.0	--	RVIR-1
Unit/Cab Heaters	ALL	Ceiling	VI 7	0.3	--	SR-3
In-Line Pump	ALL	Ceiling	VI 7	0.3	--	SR-3
Compressor	ALL	SOG	--	--	--	SR-1/SR-4
	ALL	Floor	VI 4	Note 1	B2	SR-2
RTU (Non-Critical)	ALL	SOG	--	--	--	SR-1/SR-4
	ALL	Roof	RVIR-1	1.0	--	RVIR-1
Centrifugal Chiller Non Critical Application	ALL	Floor	VI 15	1.0	--	VI 15
Centrifugal Chiller Critical Application	ALL	Floor	VI 15	2.0	--	VI 15

General Comments:

1. **MSE** refers to method of supporting of equipment from structure.
2. **SOG** refers to slab on grade.

Notes:

1. Isolator deflection per the following deflection guide.

Deflection Guide	
RPM	Deflection (inches)
<400	3.5
<600	2.5
>600	1.5

DUCTWORK SEISMIC RESTRAINT SCHEDULE	
DUCTWORK	SEISMIC RESTRAINT TYPE
Cross-sectional area of 6 S.F or greater	SR-3
Round ducts of 28" diameter or larger	SR-3
Duct Riser	SR-4
Seismic restraint shall be provided on ductwork at every turn at duct ends, and throughout entire run; where ductwork is supported by hangers longer than 12", as measured from duct hanger attachment point to bottom of supporting structure.	

PIPE SEISMIC RESTRAINT/VIBRATION ISOLATOR SCHEDULE		
PIPING	PIPE SIZE	SEISMIC RESTRAINT
Compressed Air	1" & Larger	SR-3
Fuel Oil	1" & Larger	SR-3
All Piping in Mechanical Room	1 1/4" & Larger	SR-3
All Piping in Any Space	2 1/2" & Larger	SR-3
Horizontal Chimney Stack	Any Size	SR-3
Vertical Chimney Stack	Any Size	SR-4
<ol style="list-style-type: none"> 1. Seismic restraint shall be provided on the above piping systems at every turn of — more than 4 feet and throughout entire run; where piping is supported by — hangers longer than 12" as measured from top of pipe to bottom of supporting — structure. 2. Provide Vibration Isolator type VI8 (1" deflection) on horizontal piping within — 50 feet or 100 diameters of rotating equipment at every hanger. 3. Provide Vibration Isolator type VII2 on vertical water piping within 50 feet — or 100 pipe diameter of rotating equipment at every hanger. 4. Steam piping upstream of PRV and 25 feet down stream shall be provided — with vibration isolator type VI7. 		

END OF SECTION 230548

Revised by Addendum No. 2

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Double-wall rectangular ducts and fittings.
3. Single-wall round ducts and fittings.
4. Double-wall round ducts and fittings.
5. Industrial exhaust ducts and fittings.
6. Sheet metal materials.
7. Duct liner.
8. Sealants and gaskets.
9. Hangers and supports.
10. Seismic-restraint devices.

B. Related Sections:

1. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible".
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

ADDENDUM #2

1.4 SUBMITTALS

A. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

B. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved: Coordination drawings to include above ceiling piping and components of other trades, including, but not limited to, plumbing piping, sprinkler piping, technology pathways, etc.

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.

C. Welding certificates.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

ADDENDUM #2

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
 3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."
- C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 DOUBLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. McGill AirFlow LLC.
 2. Sheet Metal Connectors, Inc.
 3. SEMCO Incorporated.
- B. Rectangular Ducts: Fabricate ducts with indicated dimensions for the inner duct.

ADDENDUM #2

- C. Outer Duct: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- D. Transverse Joints: Select joint types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- E. Longitudinal Seams: Select seam types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- F. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
 - 1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F (0.039 W/m x K) at 75 deg F (24 deg C) mean temperature.
 - 2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
 - 3. Coat insulation with antimicrobial coating.
 - 4. Cover insulation with polyester film complying with UL 181, Class 1.
- G. Inner Duct: Minimum 0.028-inch (0.7-mm) perforated galvanized sheet steel having 3/32-inch-(2.4-mm-) diameter perforations, with overall open area of 23 percent.
- H. Formed-on Transverse Joints (Flanges): Select joint types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Traverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- I. Longitudinal Seams: Select seam types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

ADDENDUM #2

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Lindab Inc.
 - b. McGill AirFlow LLC.
 - c. SEMCO Incorporated.
 - d. Sheet Metal Connectors, Inc.
 - e. Spiral Manufacturing Co., Inc.

 - B. Transverse Joints: Select joint types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Transverse Joints - Round Duct," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 1. Transverse Joints in Ducts Larger Than 60 Inches (1524 mm) in Diameter: Flanged.

 - C. Longitudinal Seams: Select seam types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 1. Fabricate round ducts larger than 90 inches (2286 mm) in diameter with butt-welded longitudinal seams.

 - D. Tees and Laterals: Select types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- 2.4 DOUBLE-WALL ROUND DUCTS AND FITTINGS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Lindab Inc.
 2. McGill AirFlow LLC.
 3. SEMCO Incorporated.
 4. Sheet Metal Connectors, Inc.

 - B. Outer Duct: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on static-pressure class unless otherwise indicated.

1. Transverse Joints: Select joint types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Transverse Joints - Round Duct," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - a. Transverse Joints in Ducts Larger Than 60 Inches (1524 mm) in Diameter: Flanged.
 2. Longitudinal Seams: Select seam types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - a. Fabricate round ducts larger than 90 inches (2286 mm) in diameter with butt-welded longitudinal seams.
 - b. Fabricate flat-oval ducts larger than 72 inches (1830 mm) in width (major dimension) with butt-welded longitudinal seams.
 3. Tees and Laterals: Select types and fabricate according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Inner Duct: Minimum 0.028-inch (0.7-mm) perforated galvanized sheet steel having 3/32-inch-(2.4-mm-) diameter perforations, with overall open area of 23 percent.
- D. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F (0.039 W/m x K) at 75 deg F (24 deg C) mean temperature.
 2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
 3. Coat insulation with antimicrobial coating.
 4. Cover insulation with polyester film complying with UL 181, Class 1.

2.5 INDUSTRIAL EXHAUST DUCT SYSTEMS

- A. This system exhaust from carpentry shop should be designed by Dustvent Inc. or equal, and shall meet NFPA 91.
- B. The systems shall be installed under original contract documents.
- C. Systems shall be classified as "Class 2".

ADDENDUM #2

- D. Ducts are specified most often for use in the low static pressure range (-10" w.g. to +10" w.g.)
- E. Ducts are constructed of min. 16 gauge black iron, which has been welded or flanged and gasketed.
- F. Round duct shall be used.
- G. Longitudinal joints or seams should be welded.
- H. Elbows and bends should be a minimum of two gauges heavier than straight lengths of equal diameter and have a centerline radius of at least one and a half and preferably two times the pipe diameter. Elbows of 90 degrees should be of five-piece construction for round duct.
- I. Clean-out doors should be provided in horizontal runs, near elbows, junctions, and vertical runs. The spacing of clean-out doors should not exceed 12 feet for ducts of 12" diameter. Removable caps should be installed at all terminal ends and the last branch connection should not be more than six inches from the capped end.
- J. Systems should be leak tested after installation at the maximum expected static pressure. Leakage should be no more than 1% of the design volume.

2.6 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90 (Z275).
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- D. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.
- E. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M) Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- F. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

ADDENDUM #2

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

- G. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.7 DUCT LINER

- A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. CertainTeed Corporation; Insulation Group.
- b. Johns Manville.
- c. Knauf Insulation.
- d. Owens Corning.
- e. Maximum Thermal Conductivity:

- 1) Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F (0.039 W/m x K) at 75 deg F (24 deg C) mean temperature.
- 2) Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F (0.033 W/m x K) at 75 deg F (24 deg C) mean temperature.

2. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
3. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.

- B. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A or NFPA 90B.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Aeroflex USA Inc.
- b. Armacell LLC.
- c. Rubatex International, LLC

2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

ADDENDUM #2

- a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Insulation Pins and Washers:
1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- (3.5-mm-) diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.
 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick aluminum; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.
- D. Shop Application of Duct Liner: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-19, "Flexible Duct Liner Installation."
1. Adhese a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
 2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
 3. Butt transverse joints without gaps, and coat joint with adhesive.
 4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
 5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
 6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm (12.7 m/s).
 7. Secure liner with mechanical fasteners 4 inches (100 mm) from corners and at intervals not exceeding 12 inches (300 mm) transversely; at 3 inches (75 mm) from transverse joints and at intervals not exceeding 18 inches (450 mm) longitudinally.
 8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - a. Fan discharges.
 - b. Intervals of lined duct preceding unlined duct.
 - c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm (12.7 m/s) or where indicated.
 9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
 - a. Sheet Metal Inner Duct Perforations: 3/32-inch (2.4-mm) diameter, with an overall open area of 23 percent.
 10. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other

buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.8 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65 percent.
 - 3. Shore A Hardness: Minimum 20.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. VOC: Maximum 75 g/L (less water).
 - 7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
 - 8. Service: Indoor or outdoor.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- C. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
 - 6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- E. Round Duct Joint O-Ring Seals:
 - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg (0.14 L/s per sq. m at 250 Pa) and shall be rated for 10-inch wg (2500-Pa) static-pressure class, positive or negative.
 - 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 - 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.9 HANGERS AND SUPPORTS (ALSO SEE SECTION 230529)

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
 - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.10 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install round ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

- H. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches (38 mm).
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with 2006 SMACNA's "Duct Cleanliness for New Construction Guidelines."

2.11 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

2.12 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 - 1. Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 2. Outdoor, Supply-Air Ducts: Seal Class A.
 - 3. Outdoor, Exhaust Ducts: Seal Class C.

4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

2.13 HANGER AND SUPPORT INSTALLATION

- A. Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 1. Where practical, install concrete inserts before placing concrete.
 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.
 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches (610 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet (5 m).
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

ADDENDUM #2

2.14 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."
- B. Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

2.15 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 09 painting Sections.

2.16 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
 - 1. Comply with 2006 SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 - 2. Test the following systems:
 - a. Ducts with a Pressure Class Higher Than 3-Inch wg (750 Pa): Test representative duct sections, selected by Commissioner from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.
 - b. Supply Ducts with a Pressure Class of 3-Inch wg (750 Pa) or Higher: Test representative duct sections, selected by Commissioner from sections installed, totaling no less than 50percent of total installed duct area for each designated pressure class.
 - c. Return Ducts with a Pressure Class of 3-Inch wg (750 Pa) or Higher: Test representative duct sections, selected by Commissioner from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
 - d. Exhaust Ducts with a Pressure Class of 3-Inch wg (750 Pa) or Higher: Test representative duct sections, selected by Commissioner from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
 - e. Outdoor Air Ducts with a Pressure Class of 2-Inch wg (500 Pa) or Higher: Test representative duct sections, selected by Commissioner from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
 - 3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 - 4. Test for leaks before applying external insulation.

ADDENDUM #2

5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

2.17 DUCT CLEANING

A. Clean new and existing duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Division 23 Section "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.

3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

2.18 START UP

- A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

2.19 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

1. Toilet room/locker room exhaust shall be aluminum.
2. Lab hood exhaust shall be stainless steel.

B. Supply Ducts:

1. Ducts Connected to Fan Coil Units, and Terminal Units:
 - a. Pressure Class: Positive 2-inch wg (250 Pa .

ADDENDUM #2

2. Ducts Connected to Constant-Volume Air-Handling Units :
 - a. Pressure Class: Positive 3-inch wg (750 Pa).
 3. Ducts Connected to Variable-Air-Volume Air-Handling Units :
 - a. Pressure Class: Positive 3-inch wg (750 Pa).
 4. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive 2-inch wg (500 Pa) .
- C. Return Ducts:
1. Ducts Connected to Fan Coil Units, and Terminal Units:
 - a. Pressure Class: Positive or negative 2-inch wg (250 Pa).
 - b. Minimum 2006 SMACNA Seal Class: A B C.
 2. Ducts Connected to Air-Handling Units :
 - a. Pressure Class: Positive or negative 3-inch wg (500 Pa).
 3. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive or negative 2-inch wg (500 Pa).
- D. Exhaust Ducts:
1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 2-inch wg (500 Pa).
 2. Ducts Connected to Air-Handling Units :
 - a. Pressure Class: Positive or negative 2-inch wg (500 Pa).
 3. Ducts Connected to Commercial Kitchen Hoods: Comply with NFPA 96.
 - a. Double wall grease duct (see Section 235100).
 - b. Pressure Class: Positive or negative 3-inch wg.
 4. Ducts Connected to Dishwasher Hoods:
 - a. Type 304, stainless-steel sheet.
 - b. Exposed to View: No. 4 No. 3 Insert finish finish.
 - c. Concealed: No. 2D Insert finish finish.
 - d. Welded seams and flanged joints with watertight EPDM gaskets.
 - e. Pressure Class: Positive or negative 2-inch wg.

ADDENDUM #2

5. Ducts Connected to Fans Exhausting Laboratory and Process (ASHRAE 62.1, Class 3 and 4) Air:
 - a. Type 316, Type 304, stainless-steel sheet.
 - 1) Exposed to View: No. 4 No. 3 Insert finish.
 - 2) Concealed: No. 2B No. 2D Insert finish.
 - b. Pressure Class: Positive or negative 3-inch wg (750 Pa) 4-inch wg (1000 Pa) 6-inch wg (1500 Pa) Insert value.
6. Ducts connected to fans exhausting bathrooms, showers, lockers:
 - a. Aluminum sheet.
7. Industrial Duct:
 - a. Pressure Class: Positive or negative 10 inch wg.
 - b. Minimum 16 gauge black iron, which has been welded or flanged and gasketed.
8. Double wall duct supply and return.
 - a. Provide double wall duct supply return, and exhaust for systems RAHU-11 (Gym), RAHU-16 (Multipurpose Room).
 - b. Provide double wall duct supply and return for Library Room #102A, Control Room #102E, and TV Studio Control Room #102D (System RAHU-14).
 - c. Provide double wall duct for all exposed to view ductwork (except electrical and mechanical rooms and ductwork in areas A and B.)
9. Provide duct liner for:
 - a. Minimum 20' duct liner at each air handler unit and rooftop unit (supply and return unit connection).
 - b. All supply and return duct for fan-coils and unit ventilators.
 - c. Transfer duct.
 - d. Minimum 3' duct liner at each VAV box branch duct unit connection and duct liners for duct from VAV box to supply diffuser.
- E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:
 1. Ducts Connected to Fan Coil Units:
 - a. Pressure Class: Positive or negative 2-inch wg (250 Pa).
 2. Ducts Connected to Air-Handling Units :

- a. Pressure Class: Positive or negative 2-inch wg (500 Pa).

F. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel or carbon steel coated with zinc-chromate primer.
2. Stainless-Steel Ducts:
 - a. Exposed to Airstream: Match duct material.
 - b. Not Exposed to Airstream: Match duct material.
3. Aluminum Ducts: Aluminum.

G. Liner:

1. Supply Air Ducts: Fibrous glass, Type I 1-1/2 inches (38 mm) thick.
2. Return Air Ducts: Fibrous glass, Type I 1-1/2 inches (38 mm) thick.
3. Exhaust Air Ducts: Fibrous glass, Type I 1 inch (25 mm) thick.
4. Supply Fan Plenums: Fibrous glass, Type II 1-1/2 inches (38 mm) thick.
5. Return- and Exhaust-Fan Plenums: Fibrous glass, Type II 2 inches (51 mm) thick.
6. Transfer Ducts: Fibrous glass, Type I 1-1/2 inches (38 mm) thick.

H. Double-Wall Duct Interstitial Insulation:

1. Supply Air Ducts: 2 inches (51 mm) thick.
2. Return Air Ducts: 2 inches (51 mm) thick.
3. Exhaust Air Ducts: 1 inch (25 mm) thick.

I. Elbow Configuration:

1. Rectangular Duct: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm (5 m/s) or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm (5 to 7.6 m/s):
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm (7.6 m/s) or Higher:

- 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
2. Rectangular Duct: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
- a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
3. Round Duct: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-3, "Round Duct Elbows."
- a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm (5 m/s) or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm (5 to 7.6 m/s): 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm (7.6 m/s) or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches (305 mm) and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches (356 mm) and Larger in Diameter: Standing seam or Welded.
- J. Branch Configuration:
1. Rectangular Duct: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-6, "Branch Connections."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.
 2. Round and Flat Oval: Comply with 2006 SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm (5 m/s) or Lower: 90-degree tap.

ADDENDUM #2

- b. Velocity 1000 to 1500 fpm (5 to 7.6 m/s): Conical tap.
- c. Velocity 1500 fpm (7.6 m/s) or Higher: 45-degree lateral.

END OF SECTION 233113

Revised by Addendum No. 2

3.2 APPLICATION

- A. Listed Type B Vents: Combustion air inlet for gas boiler.
- B. Listed Type L Vent: Vents for low-heat appliances.
- C. Listed Special Gas Vent: Condensing gas appliances.
- D. Listed Grease Ducts: Type I commercial kitchen grease duct.

3.3 INSTALLATION OF LISTED VENTS AND CHIMNEYS

- A. Locate to comply with minimum clearances from combustibles and minimum termination heights according to product listing or NFPA 211 2005, whichever is most stringent.
- B. Seal between sections of positive-pressure vents and grease exhaust ducts according to manufacturer's written installation instructions, using sealants recommended by manufacturer.
- C. Support vents at intervals recommended by manufacturer to support weight of vents and all accessories, without exceeding appliance loading.
- D. Slope breechings down in direction of appliance, with condensate drain connection at lowest point piped to nearest drain.
- E. Lap joints in direction of flow.
- F. Connect base section to foundation using anchor lugs of size and number recommended by manufacturer.
- G. Join sections with acid-resistant joint cement to provide continuous joint and smooth interior finish.
- H. Erect stacks plumb to finished tolerance of no more than **1 inch (25 mm)** out of plumb from top to bottom.

3.4 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.
- B. Clean breechings internally, during and after installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth and apply touchup finish to match factory or shop finish.
- C. Provide temporary closures at ends of breechings, chimneys, and stacks that are not completed or connected to equipment.

2.7 SOURCE QUALITY CONTROL

- A. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.
- B. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.
- C. Allow Owner access to source quality-control testing of boilers. Notify Architect 14 days in advance of testing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.
 - 1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
- B. Examine mechanical spaces for suitable conditions where boilers will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BOILER INSTALLATION

- A. Install boilers level on concrete base.
- B. Vibration Isolation: Elastomeric isolation pads with a minimum static deflection of 0.25 inch (6.35 mm). Vibration isolation devices and installation requirements are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
- C. Install gas-fired boilers according to NFPA 54 1996.
- D. Assemble and install boiler trim.
- E. Install electrical devices furnished with boiler but not specified to be factory mounted by Control Contractor.
- F. Install control wiring to field-mounted electrical devices by Control Contractor.

- C. Coordination Drawings: Floor plans drawn to scale and coordinated with the following:
1. Structural supports.
 2. Piping roughing-in requirements.
 3. Wiring roughing-in requirements, including spaces reserved for electrical equipment.
 4. Access requirements, including working clearances for mechanical controls and electrical equipment, and tube pull and service clearances.
- D. Certificates: For certification required in "Quality Assurance" Article.
- E. Manufacturer Seismic Qualification Certification: Submit certification that water chillers, accessories, and components will withstand seismic forces defined in Division 23 Section "Mechanical Vibration and Seismic Controls." Include the following:
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- F. Source quality-control test reports.
- G. Startup service reports.
- H. Operation and Maintenance Data: For each water chiller to include in emergency, operation and maintenance manual.
- I. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. ARI Certification: Signed by manufacturer certifying compliance with requirements in ARI 550/590, "Water Chilling Packages Using the Vapor Compression Cycle."
- B. ASHRAE Certification: Signed by manufacturer certifying compliance with ASHRAE 15 for safety code for mechanical refrigeration. Comply with ASHRAE Guideline 3 for refrigerant leaks, recovery, and handling and storage requirements.
- C. ASME Compliance: Fabricate and label water chiller heat exchangers to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. Comply with NFPA 70 2005.