ADDENDUM NO. 2

TO

RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL – HVAC RENOVATIONS
BID PACKAGE 'A'

This addendum is hereby made part of the Project Manual and Drawings dated 1 May 2015.

The Project Manual and Drawings shall be supplemented or amended as specified herein.

This Addendum contains changes to the requirement of the Project Manual. Such changes shall be incorporated into the Contract Documents and shall apply to work with the same meaning and force as if they had been included in the original Documents. Whenever this Addendum modifies a portion of a paragraph of the Project Manual, the remainder of the paragraph affected shall remain in force. Added information is shown as **Bold,** deleted information is shown as ~~strikethrough~~**.**

This Addendum contains changes to the requirement of the Drawings. Such changes shall be incorporated into the Contract Documents and shall apply to work with the same meaning and force as if they had been included in the original Documents. Whenever this Addendum modifies a portion of any drawing, the remainder of the drawing affected shall remain in force. Added, deleted or revised information is shown as "clouded".

The conditions and terms of the basic Contract Documents shall govern work unless otherwise described in this Addendum. Whenever the conditions of work, and the quality or quantity of materials, or workmanship are not fully described in this Addendum, the conditions of work included in the basic Contract Documents for similar items of work shall apply to the work described in this Addendum.

If no similar items of work are included in the basic Contract Document, the best quality of material and workmanship shall apply and all work shall be subject to the written acceptance of the Architect.

THE BID OPENING DATE HAS CHANGED. ALL BIDS ARE DUE AT THE MAIN OFFICE OF BRANDYWINE SPRINGS SCHOOL, 2916 DUNCAN ROAD, WILMINGTON, DELAWARE 19808 UNTIL 4:00 PM LOCAL TIME ON TUESDAY, 2 JUNE 2015.

THE LAST DAY FOR QUESTIONS IS TUESDAY, 26 MAY 2015.

BIDDERS ARE ADVISED THAT THE ONLY RELIABLE SOURCE OF DOCUMENTS FOR THIS SOLICITATION IS THE EDIS FTP SITE. BIDDERS THAT RELY ON INFORMATION PUBLISHED ON ANY OTHER COMMERCIAL WEBSITES DO SO AT THEIR OWN RISK.

Addendum No. 2 – Consists of the following:

I. Prequalification

II. Clarifications

III. Response to Bidders' Questions

IV. Revisions to Project Manual/Specifications

V. Revisions to Drawings

I. PREQUALIFICATION

A. The following contractors have submitted supplementary prequalification statements which have been reviewed and approved for this project:

1. J.F. Sobieski Mechanical Contractors Inc.
2. Merit Mechanical Co., Inc.
3. Gaudelli Bros., Inc.
4. Ralph G. Degli Obizzi & Sons, Inc.
5. Worth and Company, Inc.

II. CLARIFICATIONS

A. All duct smoke detectors are to be provided with monitoring modules and control relays.
B. All existing televisions and television mounts in all classrooms to be removed and relinquished to owner. Each classroom has (1) television and mount.
C. Mechanical dampers tagged "SD" are smoke dampers, dampers tagged "FD" are fire dampers, and dampers tagged "FD/SD" are combination fire / smoke dampers.
D. Mechanical contractor to own removal and reinstallation of escutcheon plates at sprinkler heads.
E. Electrical contractor is to provide remote test switches in accessible locations for all duct detectors.
F. Electrical contractor is to provide emergency boiler shutdown switches at each boiler room door, wired to the units as required by code.
G. All new electrical panels are to be provided as recessed except in Boiler Room – which are to be provided as surface mount.
H. All components on single line diagram and panel schedules are new unless noted otherwise.
I. Sizes for all replacement GRDs are to be verified in field.
J. Typical in-line pump details are to be provided for all new, in-line pumps and for all new, in-line freeze protection pumps. Typical base-mounted pump detail is to be provided for all base-mounted pumps.
K. Vulcan shall be an acceptable manufacturer for cabinet unit heaters, convectors, and unit heaters.
L. Architectural sketch SK-A.6 is not used.

III. RESPONSE TO BIDDERS' QUESTIONS

A. A copy of the response to RFI No. 1, 2, 5 & 6 is attached hereto.

IV. REVISIONS TO PROJECT MANUAL/SPECIFICATIONS

A. SECTION 000110 – TABLE OF CONTENTS - Make the following pen and ink changes to this section and annotate these changes as Addendum No. 2.

1. ADD Section 23 74 13 – Packaged Outdoor Central-Station Air Handling Units to Division 23 on page 000110-03.

B. SECTION 000115 – LIST OF DRAWINGS

1. ADD the following drawings to the List of Drawings:

a) A 6.2 Pipe Penetration Details
b) A 6.3 Duct Penetration Details
c) M8.42 Mechanical Schematic

C. SECTION 011100 – SUMMARY OF WORK

1. Contract A-07 Electrical

a) DELETE item 7-28 on page 011100-26 and INSERT revised item:

I. 7-28. Electrical contractor will remove and relinquish to the owner all existing televisions and television mounts in all classrooms. Each classroom has (1) television and mount.

b) ADD the following NEW item(s) after item 7-29 on page 011100-26:

I. 7-30. Electrical contractor is to provide remote test switches in accessible locations for all duct detectors.

II. 7-31. Electrical contractor is to provide emergency boiler shutdown switches at each boiler room door, wired to the units as required by code.

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D. SECTION 08 71 00 – DOOR HARDWARE. ADD section included in this addendum, dated May 19, 2015.

E. SECTION 23 74 13 – PACKAGED OUTDOOR CENTRAL-STATION AIR HANDLING UNITS. New section added, dated May 19, 2015. See attached.

F. SECTION 23 72 23 – PACKAGED AIR-TO-AIR ENERGY RECOVER UNITS: Add Xetex to "MANUFACTURERS."

G. SECTION 23 81 29 – VARIABLE REFRIGERANT VOLUME (VRV) HVAC SYSTEMS: See attached revised specification clarifying manufacturer discrepancies, as well as control requirements for remote temperature sensors at each unit, with the controller to be mounted above the ceiling, dated May 19, 2015.

V. REVISIONS TO DRAWINGS

A. Structural

1. Drawing S1.3 – Revise structural plans at ERV-2. See sketch SK-S.1.

B. Architectural

1. Drawings A2.1 - A2.3 – Demolition keynote D-1 revised to read, "DEMOLISH AND DISPOSE OF EXISTING H.M. DOOR AND HARDWARE IN ITS ENTIRETY. EXISTING H.M. FRAME TO REMAIN." No sketch has been issued to reflect this change.
2. Drawings A2.1 - A2.3 – Demolition General Note #11 remove wording "AND TERRAZZO FLOORING" from note. No sketch has been issued to reflect this change.
3. Drawings A2.6 - A2.10 – Demolition General Note #12 remove wording "AND TERRAZZO FLOORING" from note. No sketch has been issued to reflect this change.
4. Drawings A2.1 - A2.3 – Add new Demolition General Note: "AT NEW DOOR INSTALLATION, REMOVE SUFFICIENT GYP. BD. AT HEAD, JAMB, AND SILL. DIMENSION SHOWN FOR NEW OPENINGS DOES NOT REPRESENT EXTENT OF GYP. BD. TO BE REMOVED FOR PROPER INSTALLATION. VERIFY EXACT AMOUNT IN FIELD." No sketch has been issued to reflect this change.
5. Drawings A2.6 - A2.10 – Demolition General Note #6 revised to read "AT NEW DOOR INSTALLATION, REMOVE SUFFICIENT GYP. BD. AT HEAD, JAMB, AND SILL. DIMENSION SHOWN FOR NEW OPENINGS DOES NOT REPRESENT EXTENT OF GYP. BD. TO BE REMOVED FOR PROPER INSTALLATION. VERIFY EXACT AMOUNT IN FIELD." No sketch has been issued to reflect this change.
6. Drawings A2.6 - A2.10 – In Symbols Legend, 1x4 Surface Mounted Light Fixture revised to read "1x4 LAY-IN LIGHT FIXTURE". No sketch has been issued to reflect this change.
7. Drawing A2.4 – Demo existing chases in their entirety. Demo portions of CMU walls in areas of new electrical panels. See attached reissued sheet, dated May 19, 2015.
8. Drawing A2.3 – Demo existing concrete pad and fence enclosure. See sketch SK-A.7, dated May 18, 2015.
9. Drawing A2.4 – In Office 208, existing wood door to be undercut by 3/4". Remove door as necessary to provide undercut. Reinstall existing door in existing frame. No sketch issued to reflect this change.
10. Drawing A2.5 – Demo (3) housekeeping pads. See sketch SK-A.4, dated May 18, 2015.
11. Drawings A2.1 & A3.1 – At First Floor Area A, demo portions of existing cmu walls in areas of new electrical panels. New patch and repair of cmu and plaster at perimeter of new electrical panels. See attached sketch SK-A.14, dated May 18, 2015.
12. Drawings A2.2 & A3.2 – At First Floor Area B, demo portions of existing cmu walls in areas of new electrical panels. New patch and repair of cmu and plaster at perimeter of new electrical panels. See attached sketch SK-A.15, dated May 18, 2015.
13. Drawings A2.3 & A3.3 – At First Floor Area C, demo portions of existing cmu walls in areas of new electrical panels. New patch and repair of cmu and plaster at perimeter of new electrical panels. See attached sketch SK-A.16, dated May 18, 2015.
14. Drawings A2.5 & A3.5 – At Second Floor Area B, demo portions of existing cmu walls in areas of new electrical panels. New patch and repair of cmu and plaster at perimeter of new electrical panels. See attached sketch SK-A.17, dated May 18, 2015.

15. Drawings A3.1, A3.3-A3.5 – Construction Key Note C-2 revised to read, "NEW APPROXIMATE 16" x 16" WALL INFILL. REFER TO HATCH LEGEND FOR MORE INFORMATION."
16. Drawings A3.1, A3.3-A3.5 – Construction Key Note C-3 revised to read, "NEW APPROXIMATE 24" x 24" FLOOR INFILL. REFER TO HATCH LEGEND FOR MORE INFORMATION."
17. Drawing A3.2 – Construction Key Note C-8 revised to read, "NEW APPROXIMATE 16" x 16" WALL INFILL. REFER TO HATCH LEGEND FOR MORE INFORMATION."
18. Drawing A3.2 – Construction Key Note C-9 revised to read, "NEW APPROXIMATE 24" x 24" FLOOR INFILL. REFER TO HATCH LEGEND FOR MORE INFORMATION."
19. Drawing A3.1 – Revised Construction Key Notes added. See sketch SK-A.8, dated 5/19/15.
20. Drawing A3.2 – New wall and marker boards in Cub Care Room 100X. See sketch SK-A.12, dated 5/18/15.
21. Drawing A3.5 – Add (6) floor infills and (2) wall infills. See sketch SK-A.3, dated 5/18/15.
22. Drawing A3.4 – New chase walls where existing were demolished. New patch and repair at perimeter of new electrical panels. See attached reissued sheet, dated May 19, 2015.
23. Drawing A3.3 – Revised plan for new switchboard locations. Removal and reinstallation of existing storefront to facilitate equipment installation. See sketch SK-A.5, dated May 18, 2015.
24. Drawings A3.6 – A3.8 – First Floor corridor ceiling to be lowered with typical shadow molding detail. See sketch SK-A.9, dated May 18, 2015.
25. Drawings A3.7- Revised RCP for Cub Care Room 100X per new layout. See sketch SK-A.13, dated 5/19/15.
26. Drawings A3.9 – A3.10 – Second Floor corridor ceiling to be lowered with typical shadow molding detail. See sketch SK-A.9, dated May 18, 2015.
27. Drawings A3.6 – A3.10 – In Symbols Legend, 1x4 Surface Mounted Light Fixture revised to read "1x4 LAY-IN LIGHT FIXTURE". No sketch has been issued to reflect this change.
28. Drawing A3.11 – Re-issued Sheet with Typ. Duct Support Pitch Pocket Detail 4/3.11, Typ. Pipe/Conduit Pitch Pocket Detail 5/3.11, Typ. Dunnage Post Flashing Detail 6/3.11 and Typ. Duct Penetration Detail 7/3.11. See revised Roof Plan on reissued sheet, dated 5/19/15, for detail locations.
29. Drawing A3.12 – Re-issued Sheet, dated 5/19/15. See revised Roof Plan for detail locations.
30. Drawing A3.13 – Re-issued Sheet, dated 5/19/15. See revised Roof Plan for detail locations.
31. Drawing A6.1 – Revised wall type now labeled "A". Added wall type "A1". See sketch SK-A.11, dated May 18, 2015.
32. Drawing A6.2 – Pipe Penetration Details. New Drawing, dated May 1, 2015. Add to Drawing Set.

33. Drawing A6.3 – Pipe Penetration Details. New Drawing, dated May 1, 2015. Add to Drawing Set.

C. Mechanical

1. Drawing M8.40 – Revise notes adjacent to Server Rm: From: Ensure Operation… To: Ensure Proper Operation…. From: Alternate #2 for Bollards (2 Typ)… To: Bollards (2 Typ)…. From: ...piping to splash block. To: …piping to 18" above splash block. See sketch SK-M.2, dated 5/18/15.

2. Drawing M8.40 – Revise Ductless Split System Schedule. See sketch SK-M.3, dated 5/18/15.

3. Drawing M8.40 – Revise Drawing Sheet Title to: Annex Alternate #6 Mechanical 1st Floor. No sketch issued to reflect this change.

4. Drawing M8.40 – Revise Turn Down Slab Detail. See sketch SK-M.5, dated 5/18/15..

5. Drawing M8.40 – Revise Fence Elevation. See sketch SK-M.4, dated 5/18/15.

6. Drawing M8.40 – Add Drop Rod Foundation Detail. See sketch SK-M.6, dated 5/18/15..

7. Drawing M8.11 – Delete callout MD-6, add note: Demolish Air Handler, Associated Controls, Ductwork and Curb. See sketch SK-M.7, dated 5/18/15..

8. Drawing M8.11 – Delete callout MD-6, add note: Demolish Air Handler, Associated Controls, Ductwork and Curb. See sketch SK-M.8, dated 5/18/15..

9. Drawing M8.33 – At ERV-1, add keynote M-1: "Duct Penetration Through Roof. Contractor to Provide 14" High Curb." Add note: "Miro Duct Support. Fastened to Deck and Flashed to Roof". See sketch SK-M.9, dated 5/18/18..

10. Drawing M8.33 – At ERV-3, add keynote M-1: "Duct Penetration Through Roof. Contractor to Provide 14" High Curb." Add note: "Miro Duct Support. Fastened to Deck and Flashed to Roof". See sketch SK-M.10, , dated 5/18/15.

11. Drawing M8.33 – At ERV-2, add note:"Miro Duct Support. Fastened to Deck and Flashed to Roof. See sketch SK-M.11, dated 5/18/15..

12. Drawing M8.36 – Add R-13 to "Return Schedule". See sketch SK-M.12, dated 5/15/15..

13. Drawing M8.12 – Add transfer grilles and wall sleeves as indicated. See sketch SKM.13, dated 5/15/15..

14. Drawing M8.13 – Add transfer grilles and wall sleeves as indicated. See sketch SKM.14, dated May 1, 2015.

15. Drawing M8.13 – Add transfer grilles and wall sleeves as indicated. See sketch SKM.15, May 1, 2015.

16. Drawing M8.14 – Add transfer grilles and wall sleeves as indicated. See sketch SKM.16, dated May 1, 2015.

17. Drawing M8.14 – Add transfer grilles and wall sleeves as indicated. See sketch SKM.17, dated May 1, 2015.

18. Drawing M8.32 – Add piping to unit heater, revise unit heater tag to "UH-1," add pipe size tag to "MAU-1," and revise pipe size tag to tag 2" headers to "MAU-1" and "UH-1". See sketch SK-M.18, dated May 1, 2015.

19. Drawing M8.16 – Add air terminals in gymnasium. See sketch SK-M.19, dated May 1, 2015.

20. Drawing M8.24 – Add note "Up to 200E Machine Rm". Add work extent symbols as indicated. See sketch SK-M.20, dated 5/18/15.
21. Drawing M8.37 – Revised pump schedule. See sketch SK-M.21, dated May 18, 2015.
22. Drawing M8.42 – Added Mechanical Schematic drawing sheet, dated 5/18/15.
23. Drawing M8.12 – Added detail to show typical locations of flat plate temp sensors. See sketch SK-M.22, dated May 18, 2015.
24. Drawing M8.13 – Added flat plate temp sensor location to cafeteria. See sketch SKM.23, dated May 18, 2015.
25. Drawing M8.14 – Added flat plate temp sensor location to gym. See sketch SKM.24, dated May 18, 2015.

D. Electrical

1. Drawing E9.17 – Sheet reissued. See attached sheet E9.17, dated 5/18/15. Add GFCI to roof top equipment. Revise circuit callout to equipment GFCI.
2. Drawing SK-E.1 (E9.25), dated May 18, 2015 – Revised single line diagram and notation.
3. Drawing SK-E.2 (E9.3), dated May 18, 2015 – Revised background to include missing mechanical unit demolition.
4. Drawing SK-E.3 (E9.5), dated May 18, 2015 – Revised drawing to include existing EF's to be demolished.
5. Drawing SK-E.4 (E9.15), dated May 18, 2015 – Revised drawing to show electrical circuiting to new MODs.
6. Drawing SK-E.5 (E9.23), dated May 18, 2015 – Updated panel schedule PL2D to include electrical circuiting to MODs.
7. Drawing SK-E.6 (E9.19), dated May 18, 2015 – Updated plan to reflect fire alarm relocation per Alternate #2.
8. Drawing E9.1 – Revise panel replacement notes and tags. See reissued E9.1, dated 5/18/15, attached.
9. Drawing SK-E.7 (E9.12), dated May 18, 2015 – Added emergency light fixtures. Alternate #2.
10. Drawing SK-E.7 (E9.12), dated May 18, 2015 – Added emergency light fixtures to Stairwell 1.
11. Drawing SK-E.8 (E9.23), dated May 18, 2015 – Revised panel schedule PL1E.
12. Drawing E9.2 – Revise panel replacement notes and tags. Add panels for replacement. See reissued E9.2, dated 5/18/15, attached.
13. Drawing E9.3 – Revise panel replacement notes and tags. Add panels for replacement. See reissued E9.3, dated 5/18/15, attached.
14. Drawing E9.4 – Revise panel replacement notes and tags. Delete panel for replacement. See reissued E9.4, dated 5/18/15, attached.
15. Drawing E9.5 – Revise panel replacement notes and tags. Add panel for replacement. See reissued E9.5, dated 5/18/15, attached.
16. Drawing SKE-.9 (E9.11), dated May 18, 2015 – Revised pump VFD note.
17. Drawings E9.19 to E9.22: Revised plan titles to read Fire Alarm. No Sketches issued.
18. Drawing E9.6 – Added keynote LD-2 "Demolish Emergency Light Fixture". See reissued E9.6, dated 5/18/15, attached.

19. Drawing E9.14 – Added CUH locations. See reissued E9.14, dated 5/18/15, attached.
20. Drawing E9.7 – Add lighting demolition for add alternate #7. See sketch SK-E.10, dated May 1, 2015.
21. Drawing E9.12 – Add new lighting, power, motion sensors, switches, and speaker for add alternate #7. See sketch SK-E.11, May 1, 2015.
22. Drawing E9.18 – Revise panel schedule PNL-PL1D. See sketch SK-E.12, dated 5/18/15.
23. Drawing E9.23 – Revise panel schedule PNL-PL2B. See sketch SK-E.13, dated May 18, 2015.

END OF ADDENDUM NO. 2

REQUEST FOR INFORMATION

TO: PHIL CONTE, STUDIO JAED PRE-BID RFI#: 1

FROM: VINNIE COLONNA DATE: 19 MAY 2015

PROJECT: BRANDYWINE SPRINGS SCHOOL RENOVATIONS – BID PACK 'A'

DWG. # / DETAIL: SPEC. SECTIONS: PAGE:

REQUEST:

1. On all the RCP's there is a 1' x 4' surface mounted light fixture. On the actual grid design the architect shows a continuous linear light trough, that is a considerable difference. Please clarify if these 1x4 fixtures are surface mounted or recessed in the grid.

Submitted By: David Humpton, Master Acoustical Date: 18 May 15

RESPONSE: 1'x4' light fixtures are to be recessed/lay-in light fixtures to match existing.

Response By: Phil Conte Date: 19 May 15

REQUEST FOR INFORMATION

TO: PHIL CONTE, STUDIO JAED PRE-BID RFI#: 2

FROM: VINNIE COLONNA DATE: 19 MAY 2015

PROJECT: BRANDYWINE SPRINGS SCHOOL RENOVATIONS – BID PACK 'A'

DWG. # / DETAIL: SPEC. SECTIONS: PAGE:

REQUEST:

Attached is Seiberlich Trane Energy Services' request to be named and equipment submittals for Brandywine Springs ES.

Seiberlich Trane Energy Services requests approval for alternates to the following equipment:

- Xetex – Energy Recovery Ventilator (ERV-1,2,3,4,5,6)
- Xetex – Energy Recovery Rooftop Air Handling Unit (RTU-1)
- Vulcan – Cabinet Unit Heater (CUH-1,2,3), Convector (CV-1), Unit Heater (UH-1)

Submitted By: Brandon Leggett, SEIBERLICH TRANE Date: 18 May 15

RESPONSE:

Alternate requests are approved on all counts.

Response By: Dan Shurina Date: 5/19/2015

SEIBERLICH TRANE
66 Southgate Blvd.
New Castle, DE 19720
(302) 395-0200 Phone
(302) 395-0700 Fax
Steve.rendulic@seiberlich.com

To:
Company: **Seiberlich Trane Energy Services**
E-mail: **Brandon.leggett@seiberlich.com**

From: **Brandon Leggett**

Date: **5/14/15**

● Comments:

PROJECT: Brandywine Springs School

Seiberlich Trane Energy Services requests approval for alternates to the following equipment:

- Xetex – Energy Recovery Ventilator (ERV-1,2,3,4,5,6)
- Xetex – Energy Recovery Rooftop Air Handling Unit (RTU-1)
- Vulcan – Cabinet Unit Heater (CUH-1,2,3), Convector (CV-1), Unit Heater (UH-1)

Thank you,

Brandon Leggett

XeteX Heat-X-Changer®

HX-2000-E-RT

Energy Recovery Ventilator

HX-2000-E-RT Specifications & Technical Data

Nominal Capacity
1000-2000 CFM

Casing – Standard
- Double-wall cabinet
- 22-gauge galvanized steel interior and exterior
- Supply and exhaust hoods with bird screens
- Access doors with quarter-turn handles
- 22-gauge galvanized steel drain pan
- Drain Connections: 1” NPT
- Insulation: 1” (25 mm)

Casing – Optional
- Painted white baked enamel outside finish
- Pool Construction: TEFC motors, stainless steel interior, and epoxy-coated fans (NOTE: ERV not recommended for indoor pool applications)
- Removable access panels

Mounting – Standard
On 18-gauge galvanized steel roof curb (insulation optional)

Plate Exchanger Options
Standard Enthalpy (sensible and latent heat transfer)
Quantity: 2
Pitch: 0.14” (3.5 mm)
Dimensions: 21-7/32” x 21-7/32” x 19-3/8”
(539 mm x 539 mm x 492 mm)

High-Efficiency Enthalpy (sensible and latent heat transfer)
Quantity: 2
Pitch: 0.10” (2.5 mm)
Dimensions: 21-7/32” x 21-7/32” x 19-3/8”
(539 mm x 539 mm x 492 mm)

High-Latent-Transfer Enthalpy (sensible and latent heat transfer)
Quantity: 2
Pitch: 0.10” (2.5 mm)
Dimensions: 21-7/32” x 21-7/32” x 19-3/8”
(539 mm x 539 mm x 492 mm)

Listed By

ETL Listed c US
Intertek

Blowers & Motors – Standard Options
Blowers:
- Quantity: 2
- Forward-curved
- Permanently sealed and lubricated ball bearings
- Power transmission by adjustable pulleys and belts

Motors:
- Type: Inverter duty 10:1
- Maximum Power: 3 hp
- Available Voltage:
  - » 120, 208, 230 V / 1ph / 60Hz
  - » 208, 230, 460, 575 V / 3ph / 60Hz

(See table on page 2 for details)

EC Motors – Optional
Blowers:
- Quantity: 2 (1 per air stream)
- Plenum Type: Backward Inclined
- Permanently sealed and lubricated ball bearings
- Direct Drive

EC Motors:
- Maximum Power:
  - » 1.9 kW at 208-230 V / 3ph / 60Hz
  - » 2.5 kW at 460 V / 3ph / 60Hz
- Available Voltage:
  - » 208, 230, 460 V / 3ph / 60Hz

(See table on page 2 for details)

Electrical & Controls – Standard
- 24 V double motor contactor with start-stop dry contact
- Non-fused disconnect (NEMA 4)
- 24 V transformer for controls

ELECTRICAL & CONTROLS – OPTIONAL
- Fused disconnect
- 24 VAC, 20 VA power available for accessories

FILTERS – STANDARD
Quantity: 2 supply, 2 exhaust
Type: MERV 8
Dimensions: 18” x 20” x 2” (457 mm x 508 mm x 51 mm)

FILTERS – OPTIONAL
MERV 13 Filters (substitute on supply air circuit only)

HX-2000-E-RT Features (Continued)

Frost Prevention/Control – Options
If no defrost mode is selected, it is the customer's responsibility to protect the core from freezing.

Frost control activated by a temperature reference: 14°F (-10°C)

Internal Pre-Heat by Electric Coil:
- Powered by unit, SCR control (unavailable with 120 V)

Internal Pre-Heat by Hot Water Coil:
- 0-10 V signal on the control panel
- Piping connections under unit

Exhaust Defrost:
- Supply air blower shuts down and outside air damper closes. Warm exhaust air defrosts the core until it is completely defrosted.
- Includes motorized and insulated damper on fresh air intake (OA)

Recirculation Defrost:
- Exhaust air blower shuts down, outside air damper closes, exhaust air damper (optional) closes, and recirculation damper (included) opens. Exhaust air warms up the core for a predetermined amount of time (see table at right).
- Includes motorized and insulated damper on fresh air intake (OA)

Post-Heat Coils
Post-Heat by Electric Coil:
- Powered by unit, SCR control (unavailable with 120 V)

Post-Heat by Hot Water Coil:
- 0-10VDC signal to maintain supply air temperature, or 0-10VDC signal by others

Optional Components
- Motorized and insulated damper for exhaust port (EA)
- Non-insulated backdraft damper for exhaust port (EA)
- Motorized and insulated damper on fresh air intake (OA) (included with exhaust defrost and recirculation)

Warranty
Core Assembly:
- Standard & High-Efficiency Enthalpy: Limited 10-year
- High-Latent-Transfer: Limited 2-year

All Other Covered Components: Limited 2-year

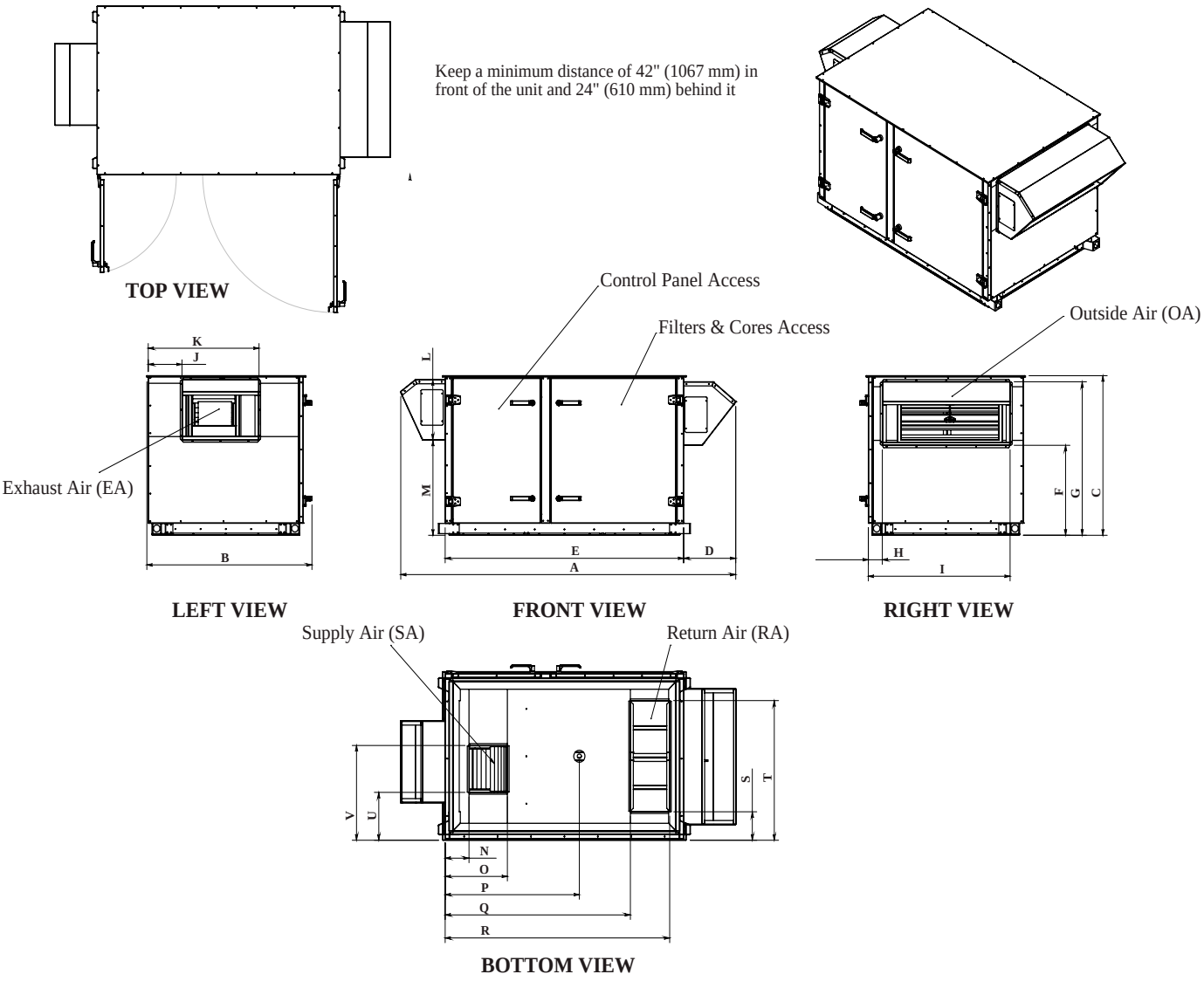
Recirculation Defrost Cycle Temperature			
Outside Temperature		**Minutes Defrost/Vent**	
°F	**°C**	**Standard**	**Extended**
t > 14	t > -10	N/A	N/A
14 > t > -13	-10 > t > -25	7/25	10/20
-13 > t	-25 > t	10/22	10/15

HX-2000-E-RT Motor & Blower Options*

		Parameters																
		HP					**Voltage & Phase**							**Motor Speed**				
							1-Phase			**3-Phase**					**2-Speed**		**Variable Speed**	
		3/4	**1**	**1.5**	**2**	**3**	**120 V**	**208 V**	**230 V**	**208 V**	**230 V**	**460 V**	**575 V**	**Single Speed**	**Motor**	**VFD**	**Motor**	**VFD**
Motor Type & Efficiency†	**ODP, EPAct**	√	√	√	√		√	√	√					√	√	√		√
	ODP, Premium					√				√	√	√	√	√		√		√
	TEFC, EPAct	√	√				√	√	√					√		√		√
	TEFC, Premium			√	√	√				√	√	√	√	√		√		√
	EC Motors	**N/A**								√	√	√		√	√		√	

*See pages 9-10 for motor sizing. See page 10 for EC Motors Power Consumption.
†Premium efficiency required when available.

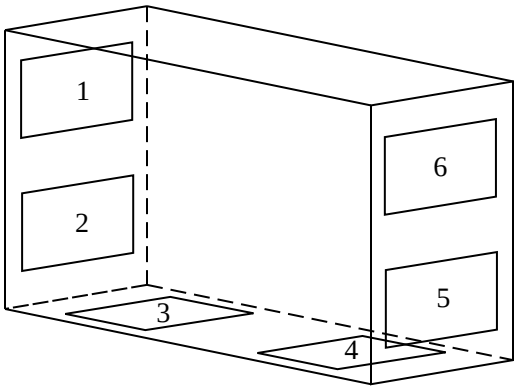
HX-2000-E-RT Dimensions



Dimensions in inches (mm)													
Overall					Openings								
A			B	C	D	E			F	G	H		
Standard	1 Extension	2 Extensions				Standard	1 Extension	2 Extensions					
90.5 (2299)	110.5 (2807)	130.5 (3315)	46 (1168)	46.75 (1187)	14 (356)	62.375 (1584)	82.375 (2092)	102.375 (2600)	26.5 (673)	42.625 (1083)	3.75 (95)		
Openings													
I	J	K	L	M	N	O	P	Q	R	S	T	U	V
38.25 (972)	9.125 (232)	29.875 (759)	15 (381)	25 (635)	6.5 (165)	16.75 (425)	36.25 (921)	50 (1270)	60.375 (1534)	6.875 (175)	34.875 (886)	11.875 (302)	23.625 (600)

HX-2000-E-RT Configurations & Weights

Available Configurations*
1-2-5-6
1-3-5-6
1-2-4-6
1-3-4-6



Duct Connection Key	
1	Exhaust Air (EA)
2, 3	Supply Air (SA)
4, 5	Return Air (RA)
6	Outside Air (OA)

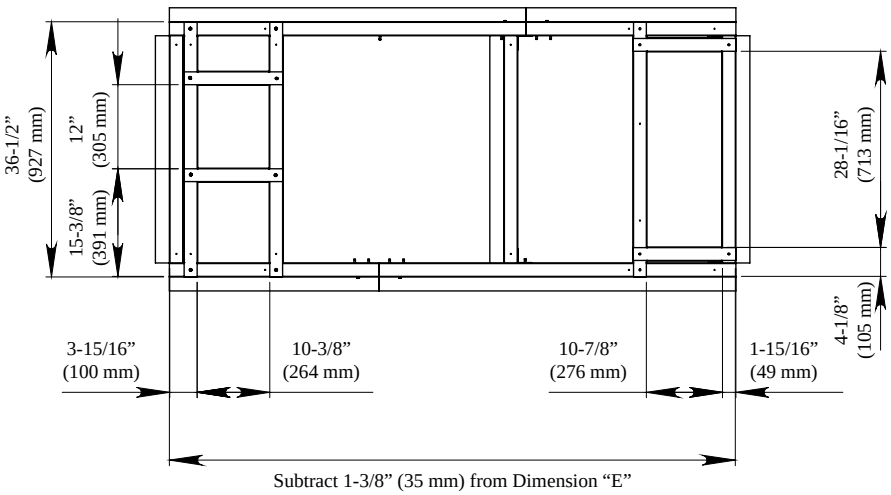
*Mirror Image Cabinet Also Available

HX-2000-E-RT Weights & Dimensions †	
Minimum Unit Weight	665 lbs (302 kg)
Maximum Unit Weight	1310 lbs (594 kg)
Minimum Shipping Weight	710 lbs (322 kg)
Maximum Shipping Weight	1355 lbs (615 kg)

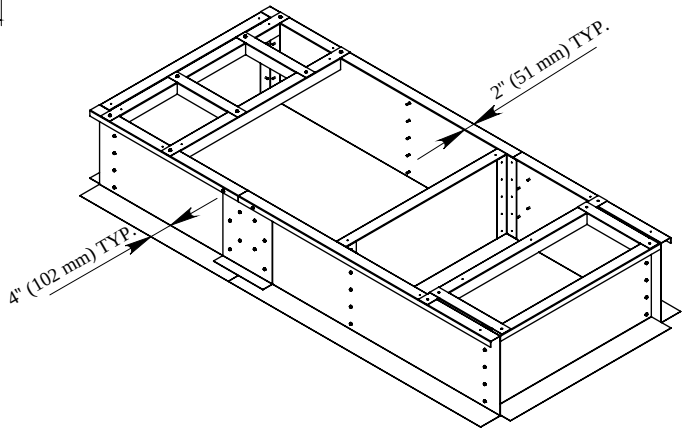
† Actual weight may vary by ±10%.
Roof curb shipped separately.

HX-2000-E-RT Roof Curb Dimensions

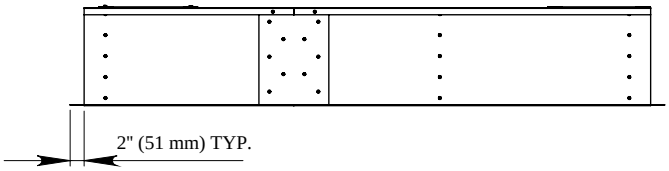
TOP VIEW



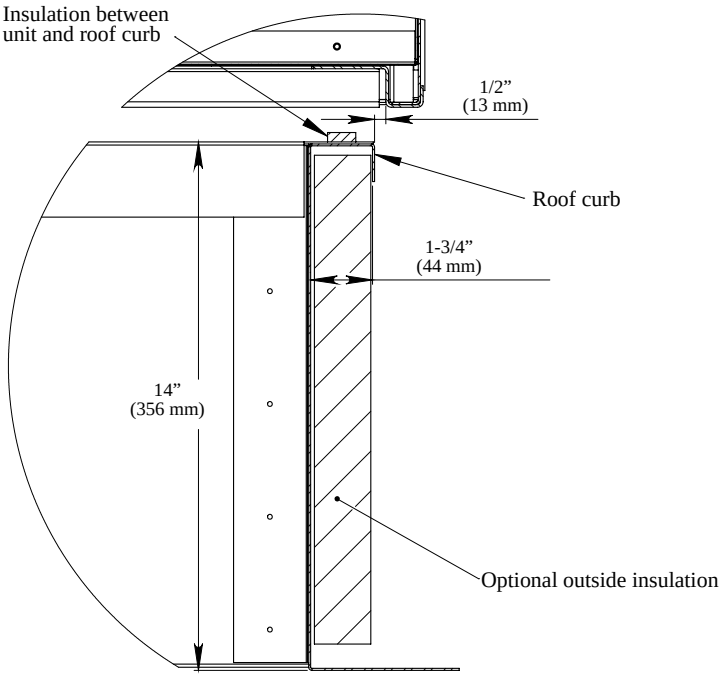
Assembly Drawing Only



FRONT VIEW



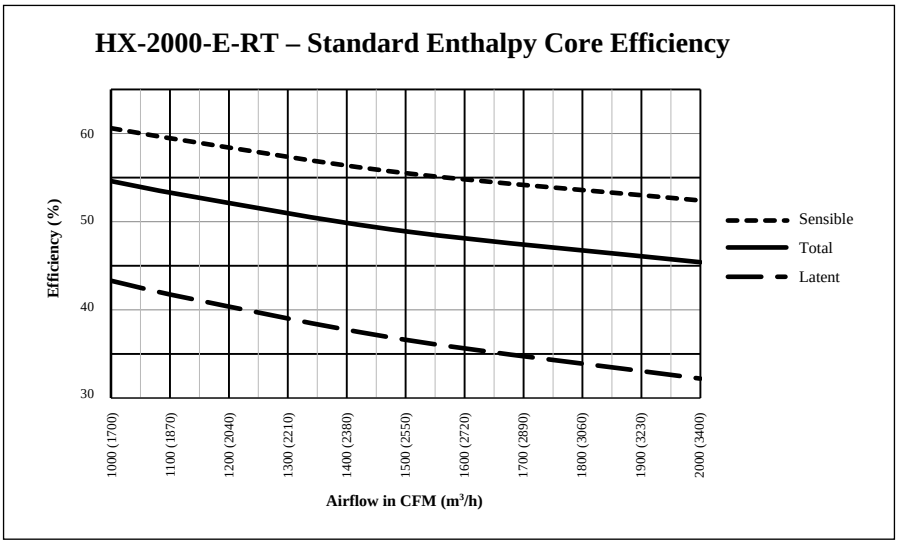
HX-2000-E-RT Roof Curb Weights & Dimensions	
Roof Curb Weight	71 lbs (34 kg)
Shipping Weight	96 lbs (45 kg)
Shipping Dimensions (W x H x D)	60” x 20” x 25” (1524 mm x 508 mm x 635 mm)

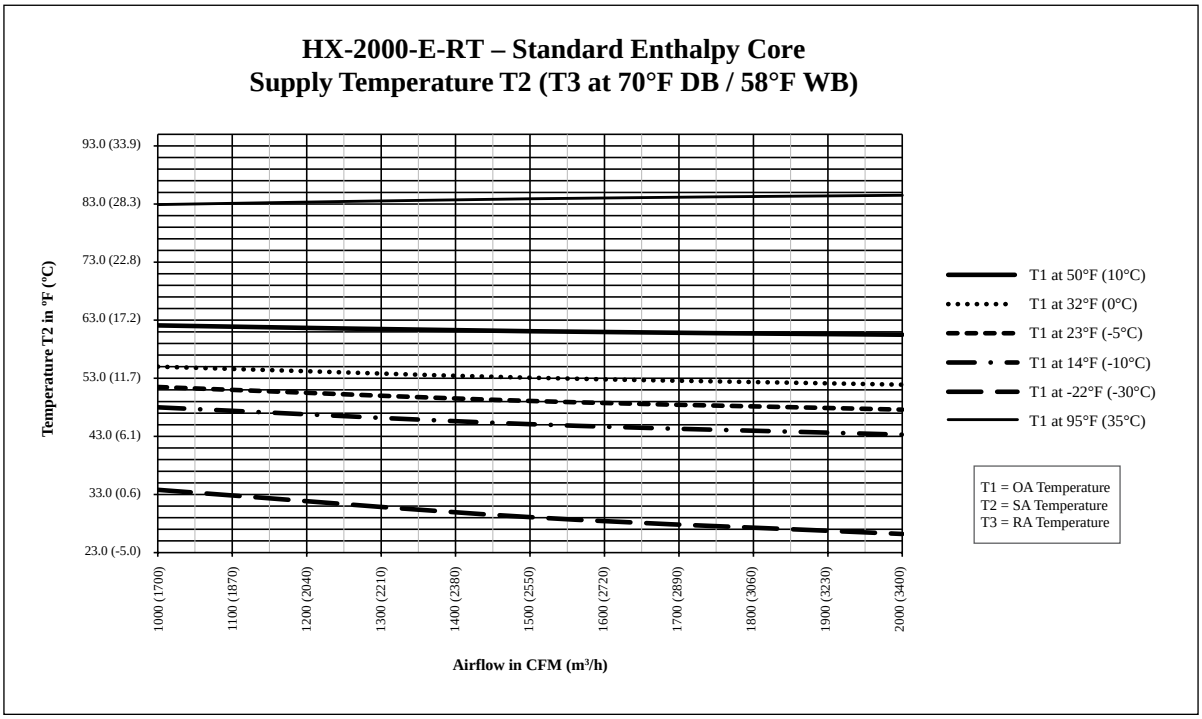


Standard Enthalpy Core Performance

AHRI Standard Conditions	Conditions	
Outside Air Temperature	**Winter**	**Summer**
Dry Bulb	35°F (1.7°C)	95°F (35°C)
Wet Bulb	33°F (0.6°C)	78°F (25.6°C)
Exhaust Air Temperature	**Winter**	**Summer**
Dry Bulb	70°F (21.1°C)	75°F (23.9°C)
Wet Bulb	58°F (14.4°C)	63°F (17.2°C)

Note: Efficiencies are based on AHRI standard winter conditions.



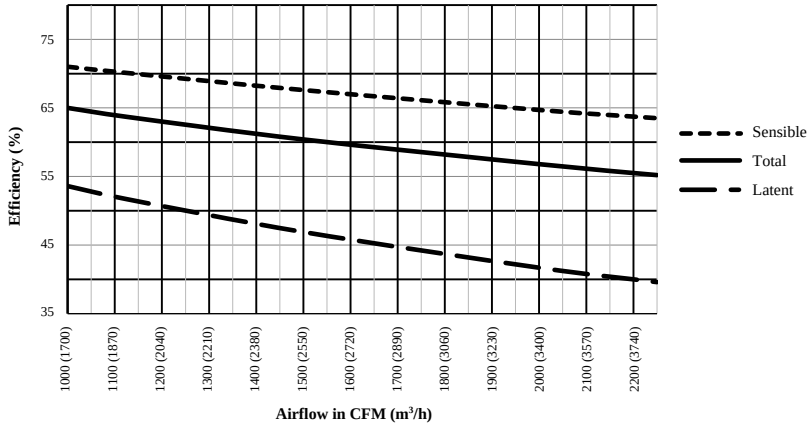


High-Efficiency Enthalpy Core Performance

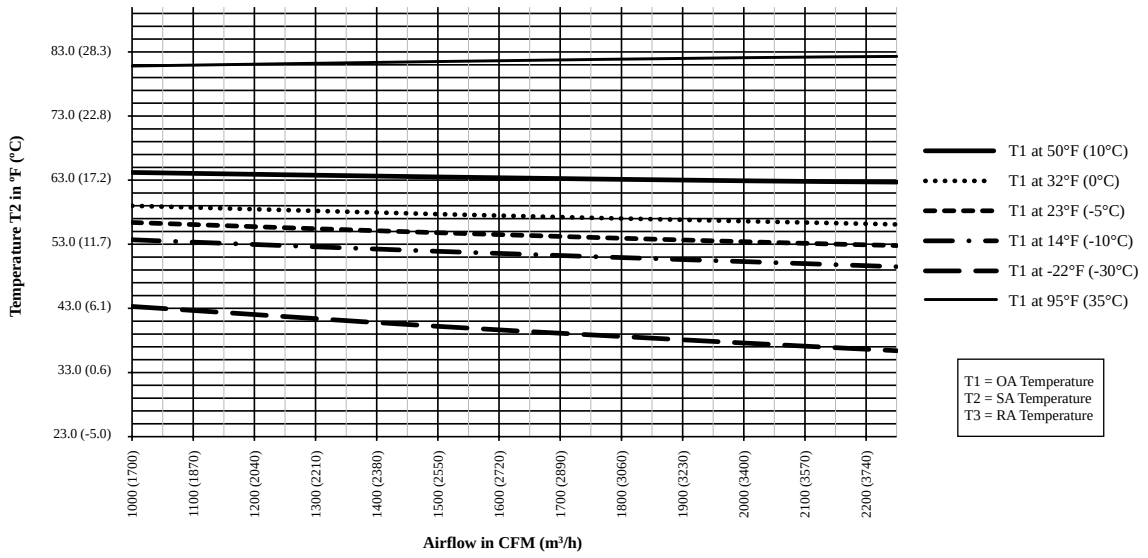
AHRI Standard Conditions	Conditions	
Outside Air Temperature	**Winter**	**Summer**
Dry Bulb	35°F (1.7°C)	95°F (35°C)
Wet Bulb	33°F (0.6°C)	78°F (25.6°C)
Exhaust Air Temperature	**Winter**	**Summer**
Dry Bulb	70°F (21.1°C)	75°F (23.9°C)
Wet Bulb	58°F (14.4°C)	63°F (17.2°C)

Note: Efficiencies are based on AHRI standard winter conditions.

HX-2000-E-RT – High-Efficiency Enthalpy Core Efficiency



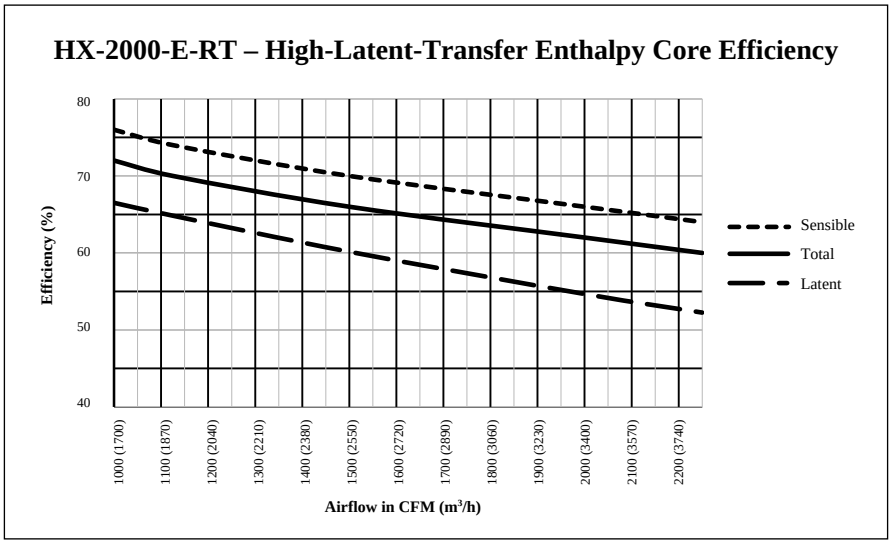
HX-2000-E-RT – High-Efficiency Enthalpy Core
Supply Temperature T2 (T3 at 70°F DB / 58°F WB)

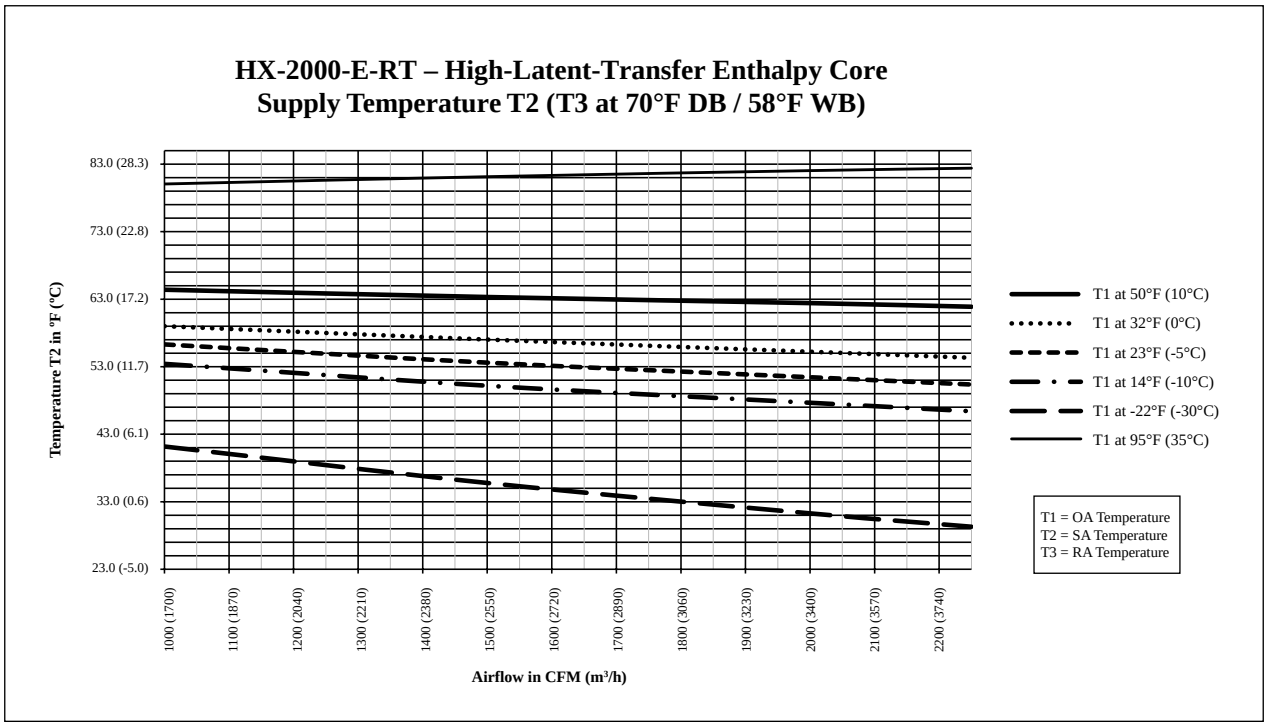


High-Latent-Transfer Enthalpy Core Performance

AHRI Standard Conditions	Conditions	
Outside Air Temperature	**Winter**	**Summer**
Dry Bulb	35°F (1.7°C)	95°F (35°C)
Wet Bulb	33°F (0.6°C)	78°F (25.6°C)
Exhaust Air Temperature	**Winter**	**Summer**
Dry Bulb	70°F (21.1°C)	75°F (23.9°C)
Wet Bulb	58°F (14.4°C)	63°F (17.2°C)

Note: Efficiencies are based on AHRI standard winter conditions.





Motor Selection – Standard Enthalpy Core

Supply/Exhaust																				
Motor	CFM (m^3/h)	External Static Pressure (inH_20) - Supply/Exhaust																		Motor
		0.25 (60 Pa)			0.50 (125 Pa)			0.75 (185 Pa)			1.00 (250 Pa)			1.25 (310 Pa)			1.50 (375 Pa)			
		RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	
3/4 hp	1000 (1700)	903	0.23	0.28	1067	0.32	0.38	1210	0.42	0.50	1336	0.52	0.62	1448	0.62	0.74	1549	0.73	0.88	1 hp
	1100 (1870)	923	0.26	0.31	1083	0.36	0.43	1224	0.46	0.55	1349	0.57	0.68	1463	0.68	0.82	1567	0.80	0.96	
	1200 (2040)	950	0.31	0.37	1102	0.41	0.59	1241	0.52	0.62	1366	0.63	0.76	1479	0.75	0.90	1583	0.87	1.04	1.5 hp
	1300 (2210)	971	0.35	0.42	1117	0.46	0.55	1253	0.57	0.68	1376	0.69	0.83	1490	0.81	0.97	1594	0.94	1.13	
	1400 (2380)	999	0.41	0.49	1138	0.51	0.61	1268	0.63	0.76	1390	0.75	0.90	1503	0.88	1.06	1607	1.02	1.22	
	1500 (2550)	1027	0.47	0.56	1160	0.58	0.70	1285	0.70	0.84	1404	0.83	1.00	1515	0.96	1.15	1619	1.10	1.32	
	1600 (2720)	1056	0.54	0.65	1183	0.65	0.78	1303	0.77	0.92	1418	0.90	1.08	1527	1.04	1.25	1630	1.19	1.43	
	1700 (2890)	1084	0.62	0.74	1205	0.73	0.88	1321	0.85	1.02	1431	0.98	1.18	1538	1.13	1.36	1640	1.28	1.54	2 hp
1 hp	1800 (3060)	1114	0.70	0.84	1229	0.81	0.97	1341	0.94	1.13	1449	1.07	1.28	1550	1.22	1.46	1650	1.37	1.64	
	1900 (3230)	1143	0.79	0.95	1253	0.90	1.08	1360	1.03	1.24	1464	1.17	1.40	1564	1.32	1.58	1661	1.47	1.76	
1.5 hp	2000 (3400)	1172	0.89	1.07	1278	1.00	1.20	1381	1.13	1.36	1481	1.27	1.52	1578	1.42	1.70	1672	1.58	1.90	

Motor Selection – High-Efficiency Enthalpy Core

Supply/Exhaust																				
Motor	CFM (m^3/h)	External Static Pressure (inH_20) - Supply/Exhaust																		Motor
		0.25 (60 Pa)			0.50 (125 Pa)			0.75 (185 Pa)			1.00 (250 Pa)			1.25 (310 Pa)			1.50 (375 Pa)			
		RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	
3/4 hp	1000 (1700)	1036	0.30	0.36	1183	0.40	0.48	1311	0.50	0.60	1426	0.60	0.72	1530	0.71	0.84	1622	0.81	0.97	1 hp
	1100 (1870)	1064	0.35	0.42	1208	0.45	0.54	1335	0.56	0.67	1450	0.67	0.80	1555	0.78	0.94	1652	0.90	1.08	1.5 hp
	1200 (2040)	1085	0.40	0.48	1225	0.50	0.60	1351	0.62	0.74	1466	0.73	0.88	1571	0.86	1.03	1669	0.98	1.18	
	1300 (2210)	1112	0.45	0.54	1247	0.56	0.67	1372	0.68	0.82	1485	0.81	0.97	1590	0.94	1.13	1687	1.07	1.28	
	1400 (2380)	1138	0.51	0.61	1268	0.63	0.76	1390	0.75	0.90	1503	0.88	1.06	1607	1.02	1.22	1705	1.16	1.39	
	1500 (2550)	1165	0.58	0.70	1290	0.70	0.84	1409	0.83	1.00	1520	0.97	1.16	1623	1.11	1.33	1720	1.25	1.50	
1 hp	1600 (2720)	1192	0.66	0.79	1312	0.78	0.94	1427	0.91	1.09	1536	1.05	1.26	1638	1.20	1.44	1734	1.35	1.62	
	1700 (2890)	1224	0.75	0.90	1339	0.87	1.04	1449	1.01	1.21	1555	1.15	1.38	1656	1.30	1.56	1751	1.46	1.75	2 hp
1.5 hp	1800 (3060)	1256	0.84	1.01	1366	0.97	1.16	1472	1.11	1.33	1575	1.25	1.50	1674	1.41	1.69	1768	1.57	1.88	
	1900 (3230)	1288	0.94	1.13	1394	1.07	1.28	1497	1.22	1.46	1595	1.37	1.64	1691	1.52	1.82	1784	1.69	2.08	
	2000 (3400)	1319	1.05	1.26	1421	1.19	1.43	1520	1.33	1.60	1616	1.48	1.78	1709	1.65	1.98	1799	1.81	2.17	
	2100 (3570)	1351	1.18	1.42	1449	1.31	1.57	1545	1.46	1.80	1637	1.61	1.93	1727	1.78	2.14	1815	1.95	2.34	3 hp
2 hp	2200 (3740)	1387	1.31	1.57	1480	1.45	1.74	1573	1.73	2.10	1663	1.76	2.11	1751	1.92	2.30	1836	2.10	2.52	
	2250 (3825)	1405	1.38	1.66	1497	1.52	1.82	1587	1.67	2.00	1676	1.83	2.20	1762	2.00	2.40	1846	2.17	2.60	

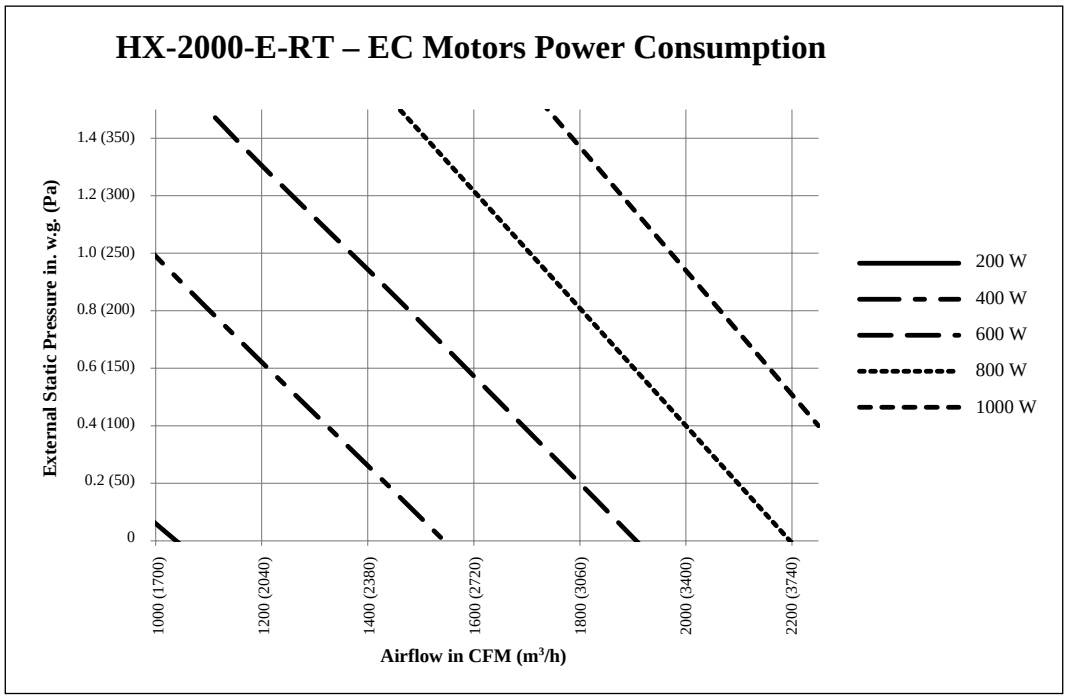
Notes:
hp = bhp x 1.2
Internal static pressure will vary based on selected options.
Motor selections do not apply to EC Motors.

Motor Selection – High-Latent-Transfer Enthlapy Core

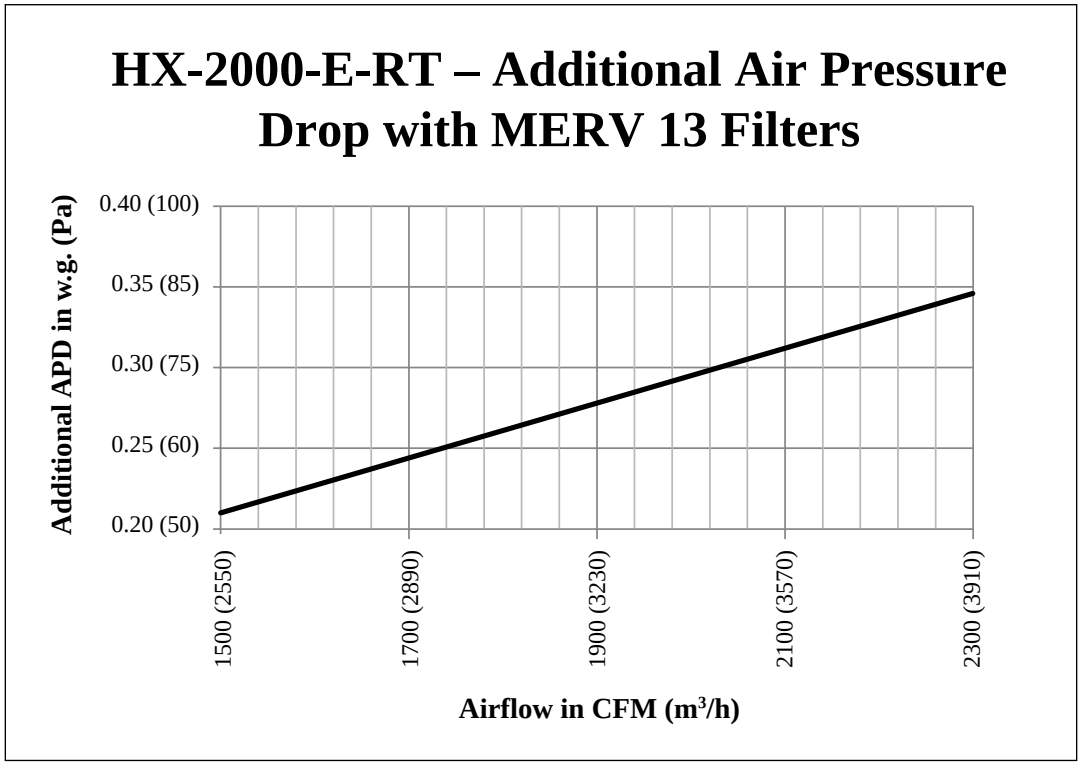
Supply/Exhaust																				
Motor	CFM (m^3/h)	External Static Pressure (inH_20) - Supply/Exhaust																		Motor
		0.25 (60 Pa)			0.50 (125 Pa)			0.75 (185 Pa)			1.00 (250 Pa)			1.25 (310 Pa)			1.50 (375 Pa)			
		RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	
3/4 hp	1000 (1700)	1080	0.33	0.40	1221	0.42	0.50	1345	0.53	0.64	1457	0.53	0.76	1557	0.74	0.89	1647	0.84	1.01	1.5 hp
	1100 (1870)	1112	0.38	0.46	1250	0.48	0.58	1372	0.59	0.71	1484	0.70	0.84	1586	0.82	0.98	1680	0.94	1.13	
	1200 (2040)	1143	0.44	0.53	1278	0.55	0.66	1399	0.66	0.79	1509	0.78	0.94	1611	0.90	1.08	1706	1.03	1.24	
	1300 (2210)	1167	0.50	0.60	1298	0.61	0.73	1418	0.73	0.88	1528	0.86	1.03	1630	0.99	1.19	1725	1.12	1.34	
	1400 (2380)	1197	0.56	0.67	1324	0.68	0.82	1441	0.81	0.97	1550	0.94	1.13	1651	1.08	1.30	1746	1.22	1.46	
1 hp	1500 (2550)	1225	0.64	0.77	1348	0.76	0.91	1463	0.90	1.08	1570	1.03	1.24	1670	1.18	1.42	1764	1.32	1.58	2 hp
	1600 (2720)	1251	0.72	0.86	1368	0.84	1.01	1480	0.98	1.18	1585	1.12	1.34	1685	1.27	1.52	1778	1.42	1.70	
	1700 (2890)	1285	0.81	0.97	1397	0.94	1.13	1505	1.08	1.30	1609	1.23	1.48	1706	1.38	1.66	1799	1.54	1.85	
1.5 hp	1800 (3060)	1309	0.90	1.08	1418	1.03	1.24	1522	1.18	1.42	1623	1.33	1.60	1719	1.48	1.78	1811	1.65	1.98	
	1900 (3230)	1339	1.00	1.20	1444	1.14	1.37	1544	1.29	1.55	1641	1.44	1.73	1736	1.60	1.92	1827	1.77	2.12	3 hp
	2000 (3400)	1368	1.12	1.34	1469	1.26	1.51	1567	1.40	1.68	1661	1.56	1.87	1753	1.73	2.08	1842	1.90	2.28	
	2100 (3570)	1394	1.23	1.48	1492	1.37	1.64	1586	1.53	1.80	1678	1.68	2.02	1766	1.85	2.22	1854	2.03	2.44	
2 hp	2200 (3740)	1428	1.37	1.64	1521	1.51	1.81	1613	1.67	2.00	1702	1.83	2.20	1788	2.00	2.40	1873	2.17	2.60	
	2250 (3825)	1442	1.44	1.73	1533	1.58	1.90	1623	1.73	2.10	1711	1.90	2.28	1796	2.07	2.48	1879	2.25	2.70	

Notes:
hp = bhp x 1.2
Internal static pressure will vary based on selected options.
Motor selections do not apply to EC Motors.

EC Motors



Additional Air Pressure Drop with MERV 13 Filters



Selection Information

▲ = Standard Feature
☐ = Optional Feature (check the box to select this option)
Send your completed selection to XeteX, Inc.

Model
Series: Standard Commercial (HX)
Nominal Capacity: 1000-2000 CFM
Application: Exterior (RT)

Casing & Core
Cabinet Finish
- ▲ Galvanized
- ☐ Painted
- ☐ Pool Construction

Duct Configuration (see pg. 4)
- ▲ 1-2-5-6
- ☐ 1-3-5-6
- ☐ 1-2-4-6
- ☐ 1-3-4-6

Mirror Image Cabinet
- ☐ Optional

Access Doors
- ▲ Fixed/Hinged
- ☐ Removable Panels

Roof Curb
- ☐ Insulated
- ☐ Non-Insulated

Plate Exchanger
- ▲ Standard Enthalpy
- ☐ High-Efficiency Enthalpy
- ☐ High-Latent-Transfer Enthalpy

Filters (Supply)
▲ MERV 8 ☐ MERV 13

Blowers & Motors [1]
Supply Blower
- ☐ 3/4 hp ☐ 2 hp
- ☐ 1 hp ☐ 3 hp
- ☐ 1.5 hp

Exhaust Blower
- ☐ 3/4 hp ☐ 2 hp
- ☐ 1 hp ☐ 3 hp
- ☐ 1.5 hp

Motor Type
- ☐ ODP
- ☐ TEFC
- ☐ EC Motors

Speed
- ▲ Single Speed
- ☐ 2-Speed
- ☐ 2-Speed VFD
- ☐ Variable Speed Motor
- ☐ Variable Speed VFD

Electrical Requirements [1]
- ☐ 120V/1ph/60Hz
- ☐ 208V/1ph/60Hz
- ☐ 230V/1ph/60Hz
- ☐ 208V/3ph/60Hz
- ☐ 230V/3ph/60Hz
- ☐ 460V/3ph/60Hz
- ☐ 575V/3ph/60Hz

Disconnect
- ▲ Non-Fused
- ☐ Fused

Frost Control
- ▲ None
- ☐ Exhaust Defrost [2]
- ☐ Recirculation [2]
- ☐ Pre-Heat (Electric Coil)
- ☐ Pre-Heat (Hot Water Coil)

Heating Options
- ▲ None
- ☐ Post-Heat (Electric Coil)
- ☐ Post-Heat (Hot Water Coil)

Add-Ons
- ☐ Motorized & Insulated Damper for OA [2]
- ☐ Motorized & Insulated Damper for EA
- ☐ Non-Insulated Backdraft Damper for EA
- ☐ 24 VAC, 10 VA terminals for OA and/or EA dampers by others
- ☐ 24 VAC, 20 VA power available for accessories by others
- ☐ Spare Filters QTY: _____
- ☐ Spare Belts QTY: _____

[1] See pg. 2 for motor and blower restrictions.
[2] OA Motorized & Insulated Damper included

Project:		**Architect:**	
Location:		**Engineer:**	
Model #:		**Contractor:**	
Quantity:		**Comments:**	
Submitted By:			
Date:			

HX-4000-E-RT

Energy Recovery Ventilator

HX-4000-E-RT Specifications & Technical Data

Nominal Capacity
3000-4000 CFM

Casing – Standard
- Double-wall cabinet
- 22-gauge galvanized steel interior and exterior
- Supply and exhaust hoods with bird screens
- Access doors with quarter-turn handles
- 22-gauge galvanized steel drain pan
- Drain Connections: 1” NPT
- Insulation: 1” (25 mm)

Casing – Optional
- Painted white baked enamel outside finish
- Pool Construction: TEFC motors, stainless steel interior, and epoxy-coated fans (NOTE: ERV not recommended for indoor pool applications)
- Removable access panels

Mounting – Standard
On 18-gauge galvanized steel roof curb (insulation optional)

Plate Exchanger Options
Standard Enthalpy (sensible and latent heat transfer)
Quantity: 4
Pitch: 0.14” (3.5 mm)
Dimensions: 21-7/32” x 21-7/32” x 19-3/8”
(539 mm x 539 mm x 492 mm)

High-Efficiency Enthalpy (sensible and latent heat transfer)
Quantity: 4
Pitch: 0.10” (2.5 mm)
Dimensions: 21-7/32” x 21-7/32” x 19-3/8”
(539 mm x 539 mm x 492 mm)

High-Latent-Transfer Enthalpy (sensible and latent heat transfer)
Quantity: 4
Pitch: 0.10” (2.5 mm)
Dimensions: 21-7/32” x 21-7/32” x 19-3/8”
(539 mm x 539 mm x 492 mm)

Listed By

Intertek

Blowers & Motors – Standard Options
Blowers:
- Quantity: 2
- Forward-curved
- Permanently sealed and lubricated ball bearings
- Power transmission by adjustable pulleys and belts

Motors:
- Type: Inverter duty 10:1
- Maximum Power: 5 hp
- Available Voltage:
  - » 120, 208, 230 V / 1ph / 60Hz
  - » 208, 230, 460, 575 V / 3ph / 60Hz

(See table on page 2 for details)

EC Motors – Optional
Blowers:
- Quantity: 4 (2 per air stream)
- Plenum Type: Backward Inclined
- Permanently sealed and lubricated ball bearings
- Direct Drive

EC Motors:
- Maximum Power:
  - » 1.9 kW at 208-230 V / 3ph / 60Hz
  - » 2.5 kW at 460 V / 3ph / 60Hz
- Available Voltage:
  - » 208, 230, 460 V / 3ph / 60Hz

(See table on page 2 for details)

Electrical & Controls – Standard
- 24 V double motor contactor with start-stop dry contact
- Non-fused disconnect (NEMA 4)
- 24 V transformer for controls

Electrical & Controls – Optional
- Fused disconnect
- 24 VAC, 20 VA power available for accessories

Filters – Standard
Quantity: 4 supply, 4 exhaust
Type: MERV 8
Dimensions: 18” x 20” x 2” (457 mm x 508 mm x 51 mm)

Filters – Optional
MERV 13 Filters (substitute on supply air circuit only)

HX-4000-E-RT Features (Continued)

Frost Prevention/Control – Options
If no defrost mode is selected, it is the customer's responsibility to protect the core from freezing.

Frost control activated by a temperature reference: 14°F (-10°C)

Internal Pre-Heat by Electric Coil:
- Powered by unit, SCR control (unavailable with 120 V)

Internal Pre-Heat by Hot Water Coil:
- 0-10 V signal on the control panel
- Piping connections under unit

Exhaust Defrost:
- Supply air blower shuts down and outside air damper closes. Warm exhaust air defrosts the core until it is completely defrosted.
- Includes motorized and insulated damper on fresh air intake (OA)

Recirculation Defrost:
- Exhaust air blower shuts down, outside air damper closes, exhaust air damper (optional) closes, and recirculation damper (included) opens. Exhaust air warms up the core for a predetermined amount of time (see table at right).
- Includes motorized and insulated damper on fresh air intake (OA)

Post-Heat Coils
Post-Heat by Electric Coil:
- Powered by unit, SCR control (unavailable with 120 V)

Post-Heat by Hot Water Coil:
- 0-10VDC signal to maintain supply air temperature, or 0-10VDC signal by others

Optional Components
- Motorized and insulated damper for exhaust port (EA)
  - » Adds 10" (254 mm) to overall unit width
- Non-insulated backdraft damper for exhaust port (EA)
- Motorized and insulated damper on fresh air intake (OA) (included with exhaust defrost and recirculation)

Warranty
Core Assembly:
- Standard & High-Efficiency Enthalpy: Limited 10-year
- High-Latent-Transfer: Limited 2-year

All Other Covered Components: Limited 2-year

Recirculation Defrost Cycle Temperature

Outside Temperature		Minutes Defrost/Vent	
°F	°C	Standard	Extended
t > 14	t > -10	N/A	N/A
14 > t > -13	-10 > t > -25	7/25	10/20
-13 > t	-25 > t	10/22	10/15

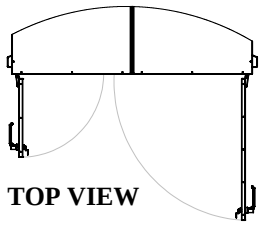
HX-4000-E-RT Motor & Blower Options*

		Parameters																		
		HP						Voltage & Phase							Motor Speed				
								1-Phase			3-Phase					2-Speed		Variable Speed	
		3/4	1	1.5	2	3	5	120 V	208 V	230 V	208 V	230 V	460 V	575 V	Single Speed	Motor	VFD	Motor	VFD
Motor Type & Efficiency†	ODP, EPAct	√	√	√	√			√	√	√					√	√	√		√
	ODP, Premium					√	√				√	√	√	√	√		√		√
	TEFC, EPAct	√	√					√	√	√					√		√		√
	TEFC, Premium			√	√	√	√				√	√	√	√	√		√		√
	EC Motors	N/A									√	√	√		√	√		√	

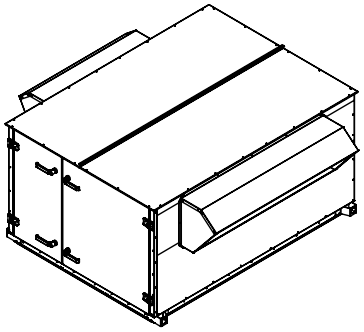
*See pages 9-10 for motor sizing. See page 10 for EC Motors Power Consumption.
†Premium efficiency required when available.

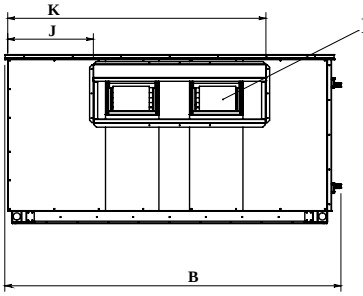
HX-4000-E-RT Dimensions

Keep a minimum distance of 42" (1067 mm) in the front of the unit and 24" (610 mm) behind it

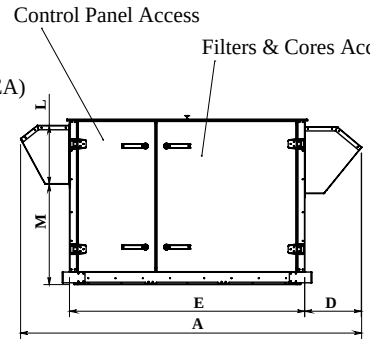


TOP VIEW

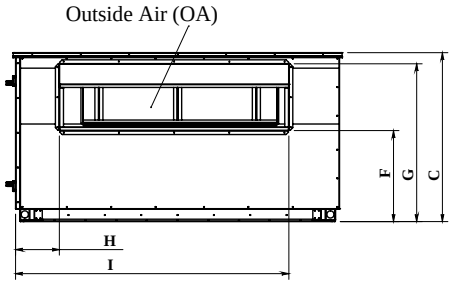




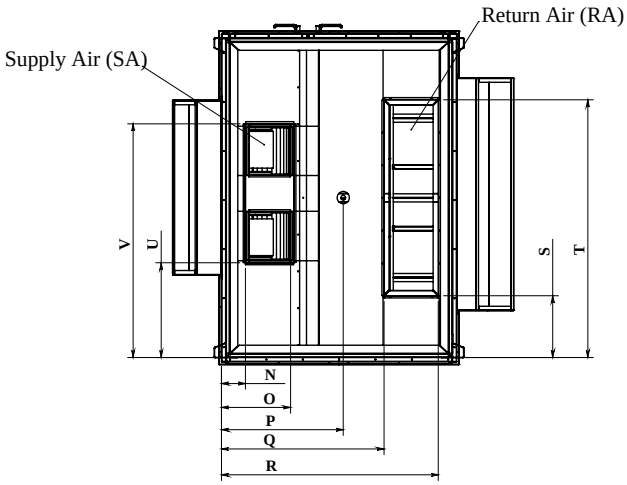
LEFT VIEW



FRONT VIEW



RIGHT VIEW



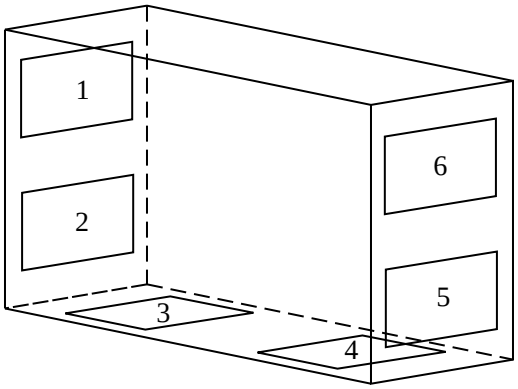
BOTTOM VIEW

Dimensions in inches (mm)													
Overall					Openings								
A*			B	C	D	E			F	G	H		
Standard	1 Extension	2 Extensions				Standard	1 Extension	2 Extensions					
90.5 (2299)	110.5 (2807)	130.5 (3315)	83.375 (2118)	41.5 (1054)	14 (356)	62.375 (1584)	82.375 (2092)	102.375 (2600)	26.5 (673)	42.625 (1083)	10.875 (276)		
Openings													
I	J	K	L	M	N	O	P	Q	R	S	T	U	V
67.75 (1721)	21.25 (540)	64 (1626)	15 (381)	25 (635)	6 (152)	18 (457)	30.25 (768)	40.25 (1022)	53.625 (1362)	15 (381)	63 (1600)	23.125 (587)	57.125 (1451)

*Optional motorized and insulated damper for exhaust port (EA) adds 10" (254 mm) to overall unit width

HX-4000-E-RT Configurations & Weights

Available Configurations*
1-2-5-6
1-3-5-6
1-2-4-6
1-3-4-6



Duct Connection Key	
1	Exhaust Air (EA)
2, 3	Supply Air (SA)
4, 5	Return Air (RA)
6	Outside Air (OA)

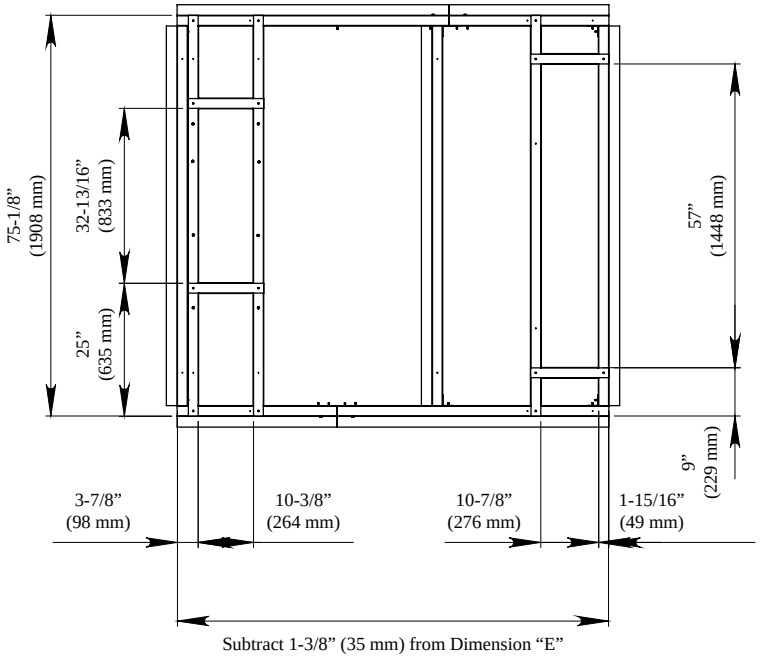
*Mirror Image Cabinet Also Available

HX-4000-RT Weights & Dimensions †	
Minimum Unit Weight	935 lbs (424 kg)
Maximum Unit Weight	1865 lbs (846 kg)
Minimum Shipping Weight	980 lbs (445 kg)
Maximum Shipping Weight	1910 lbs (866 kg)

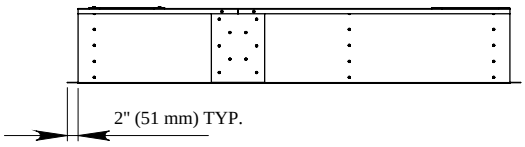
† Actual weight may vary by ±10%.
Roof curb shipped separately.

HX-4000-E-RT Roof Curb Dimensions

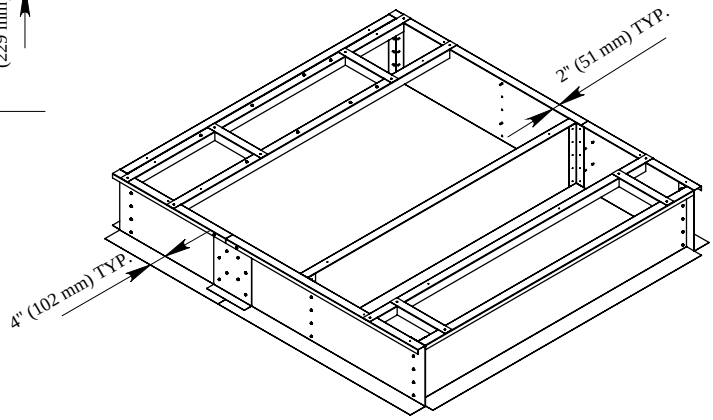
TOP VIEW



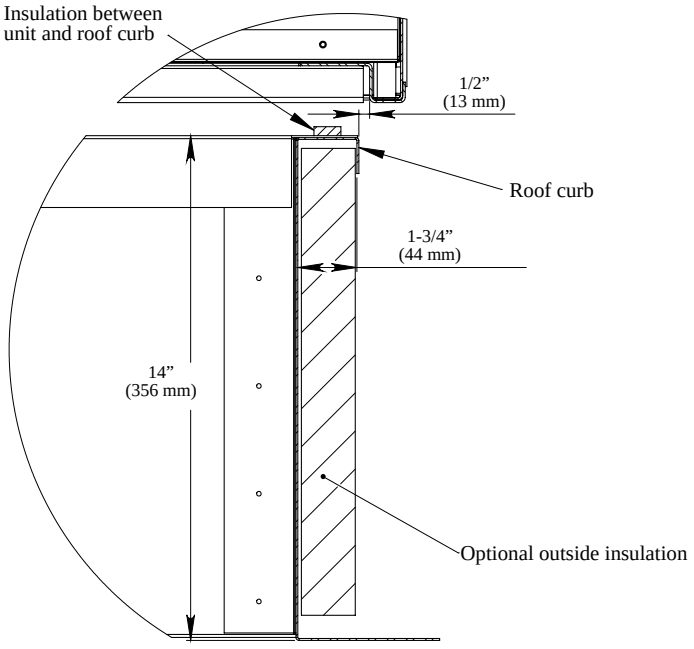
FRONT VIEW



Assembly Drawing Only



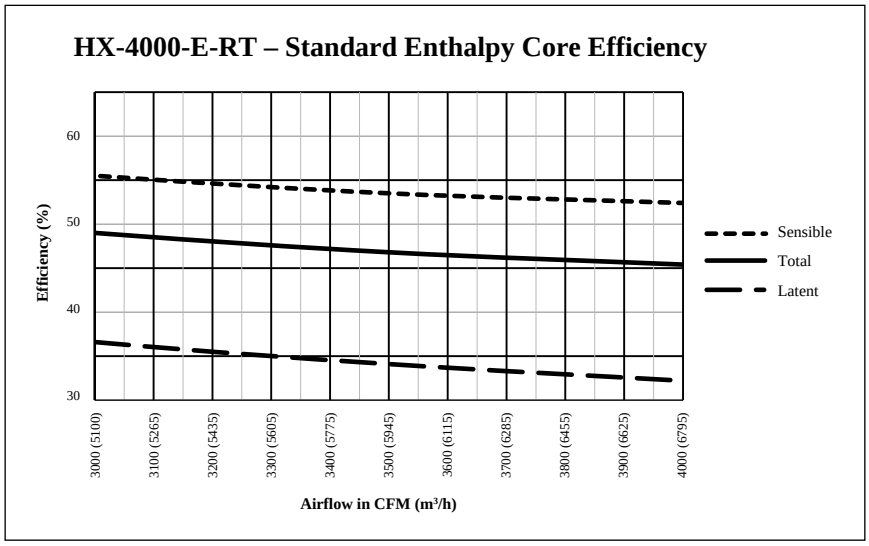
HX-4000-E-RT Roof Curb Weights & Dimensions	
Roof Curb Weight	99 lbs (48 kg)
Shipping Weight	144 lbs (68 kg)
Shipping Dimensions (W x H x D)	96" x 24" x 25" (2438 mm x 610 mm x 635 mm)

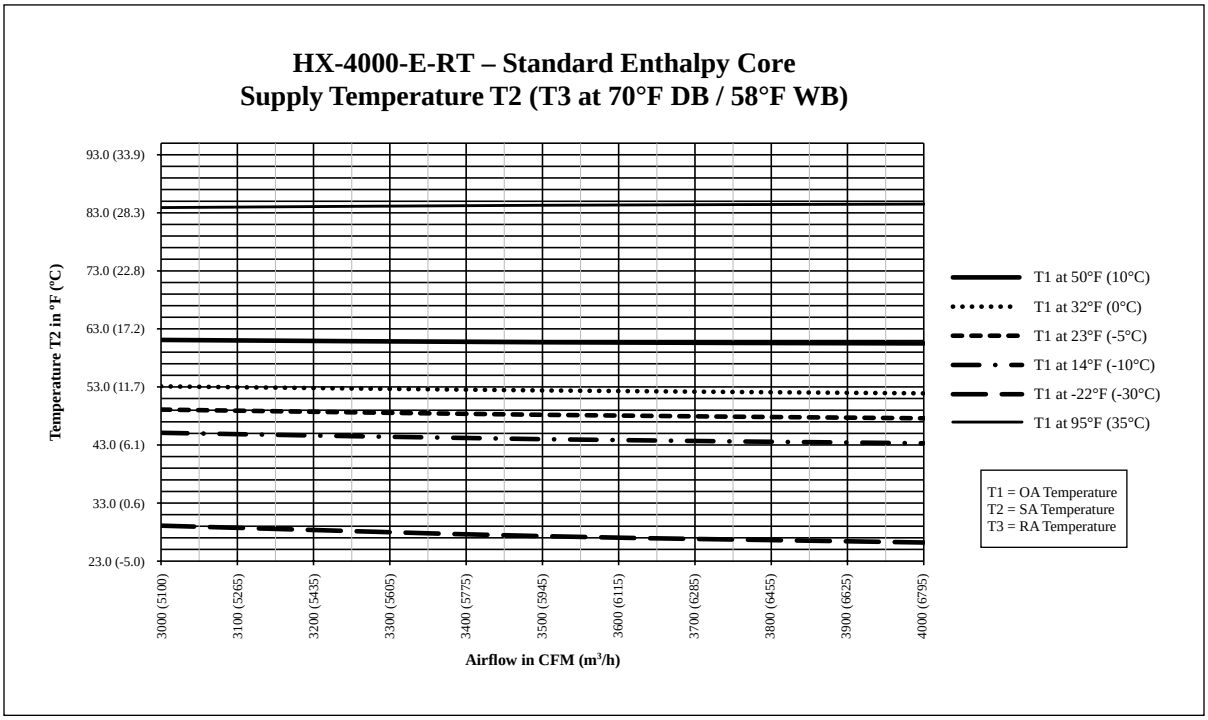


Standard Enthalpy Core Performance

AHRI Standard Conditions	Conditions	
Outside Air Temperature	**Winter**	**Summer**
Dry Bulb	35°F (1.7°C)	95°F (35°C)
Wet Bulb	33°F (0.6°C)	78°F (25.6°C)
Exhaust Air Temperature	**Winter**	**Summer**
Dry Bulb	70°F (21.1°C)	75°F (23.9°C)
Wet Bulb	58°F (14.4°C)	63°F (17.2°C)

Note: Efficiencies are based on AHRI standard winter conditions.

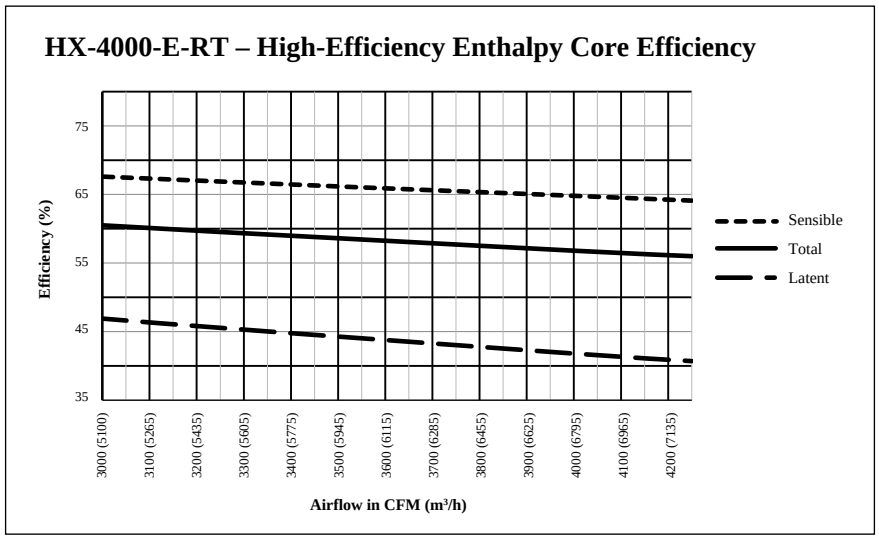


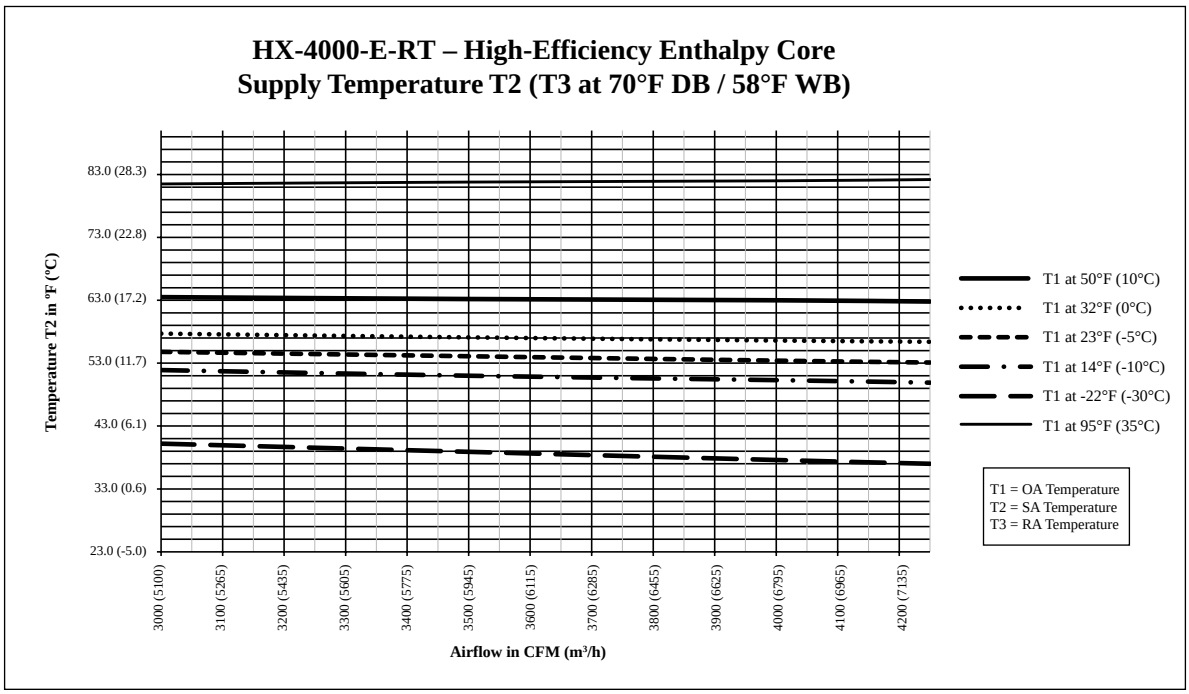


High-Efficiency Enthalpy Core Performance

AHRI Standard Conditions	Conditions	
Outside Air Temperature	**Winter**	**Summer**
Dry Bulb	35°F (1.7°C)	95°F (35°C)
Wet Bulb	33°F (0.6°C)	78°F (25.6°C)
Exhaust Air Temperature	**Winter**	**Summer**
Dry Bulb	70°F (21.1°C)	75°F (23.9°C)
Wet Bulb	58°F (14.4°C)	63°F (17.2°C)

Note: Efficiencies are based on AHRI standard winter conditions.

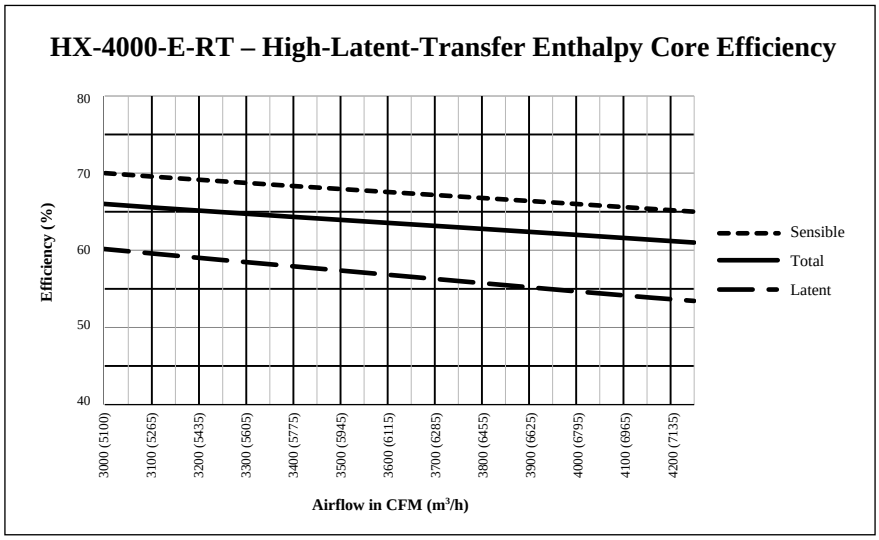


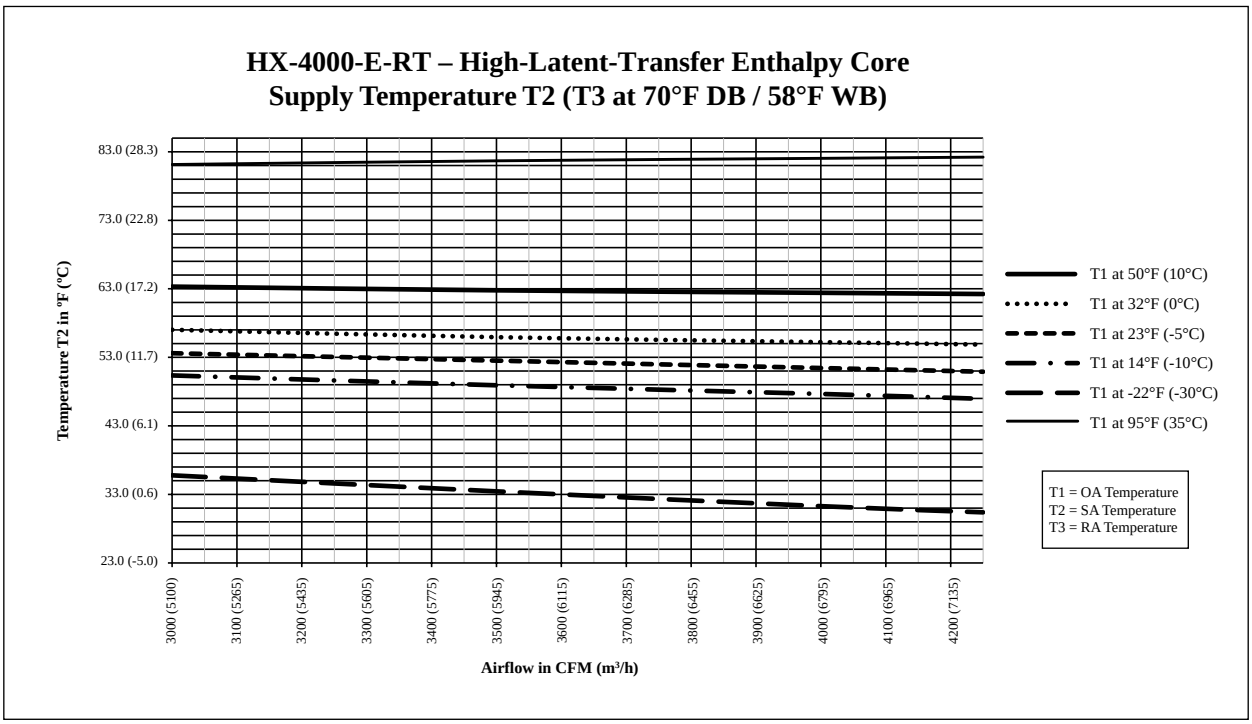


High-Latent-Transfer Enthalpy Core Performance

AHRI Standard Conditions	Conditions	
Outside Air Temperature	**Winter**	**Summer**
Dry Bulb	35°F (1.7°C)	95°F (35°C)
Wet Bulb	33°F (0.6°C)	78°F (25.6°C)
Exhaust Air Temperature	**Winter**	**Summer**
Dry Bulb	70°F (21.1°C)	75°F (23.9°C)
Wet Bulb	58°F (14.4°C)	63°F (17.2°C)

Note: Efficiencies are based on AHRI standard winter conditions.





Motor Selection – Standard Enthalpy Core

Supply/Exhaust																				
Motor	CFM (m^3/h)	External Static Pressure (inH_20) - Supply/Exhaust																		Motor
		0.25 (60 Pa)			0.50 (125 Pa)			0.75 (185 Pa)			1.00 (250 Pa)			1.25 (310 Pa)			1.50 (375 Pa)			
		RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	
1.5 hp	3000 (5100)	1017	0.93	1.12	1149	1.14	1.37	1275	1.37	1.64	1395	1.63	1.96	1506	1.90	2.28	1611	2.18	2.62	3 hp
	3100 (5265)	1033	1.00	1.20	1164	1.21	1.45	1286	1.45	1.74	1404	1.71	2.05	1515	1.98	2.38	1619	2.27	2.72	
	3200 (5435)	1051	1.07	1.28	1178	1.29	1.55	1298	1.53	1.84	1413	1.79	2.15	1523	2.07	2.48	1626	2.36	2.83	
	3300 (5605)	1068	1.15	1.38	1192	1.37	1.64	1310	1.61	1.93	1423	1.88	2.26	1531	2.16	2.59	1633	2.46	2.95	
	3400 (5775)	1084	1.23	1.48	1205	1.45	1.74	1321	1.70	2.04	1431	1.97	2.36	1538	2.25	2.70	1640	2.55	3.06	5 hp
2 hp	3500 (5945)	1107	1.33	1.60	1224	1.55	1.86	1338	1.80	2.16	1446	2.07	2.48	1551	2.36	2.83	1651	2.66	3.19	
	3600 (6115)	1123	1.42	1.70	1238	1.64	1.97	1349	1.90	2.28	1456	2.17	2.60	1559	2.46	2.95	1658	2.77	3.32	
	3700 (6285)	1140	1.51	1.81	1251	1.73	2.08	1361	1.99	2.39	1466	2.27	2.72	1567	2.56	3.07	1665	2.87	3.44	
	3800 (6455)	1156	1.61	1.93	1266	1.83	2.20	1373	2.09	2.51	1476	2.37	2.84	1575	2.67	3.20	1672	2.98	3.58	
3 hp	3900 (6625)	1173	1.71	2.05	1280	1.94	2.33	1385	2.20	2.64	1487	2.48	2.98	1584	2.78	3.34	1680	3.10	3.72	
	4000 (6795)	1190	1.81	2.17	1295	2.05	2.46	1397	2.31	2.77	1497	2.59	3.11	1594	2.90	3.48	1687	3.21	3.85	

Motor Selection – High-Efficiency Enthalpy Core

Supply/Exhaust																				
Motor	CFM (m^3/h)	External Static Pressure (inH_20) - Supply/Exhaust																		Motor
		0.25 (60 Pa)			0.50 (125 Pa)			0.75 (185 Pa)			1.00 (250 Pa)			1.25 (310 Pa)			1.50 (375 Pa)			
		RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	
1.5 hp	3000 (5100)	1155	1.15	1.38	1280	1.38	1.66	1399	1.64	1.97	1511	1.91	2.29	1615	2.19	2.63	1713	2.48	2.98	3 hp
	3100 (5265)	1174	1.23	1.48	1296	1.47	1.76	1413	1.73	2.08	1523	2.01	2.41	1627	2.29	2.75	1724	2.59	3.11	5 hp
2 hp	3200 (5435)	1188	1.31	1.57	1307	1.55	1.86	1422	1.82	2.18	1531	2.09	2.51	1634	2.39	2.87	1731	2.68	3.22	
	3300 (5605)	1206	1.40	1.68	1323	1.64	1.97	1435	1.91	2.29	1543	2.20	2.64	1645	2.49	2.99	1741	2.80	3.36	
	3400 (5775)	1224	1.49	1.79	1339	1.74	2.09	1449	2.01	2.41	1555	2.30	2.76	1656	2.60	3.12	1751	2.91	3.49	
	3500 (5945)	1243	1.59	1.91	1355	1.84	2.21	1463	2.12	2.54	1567	2.41	2.89	1667	2.71	3.25	1761	3.03	3.64	
3 hp	3600 (6115)	1265	1.70	2.04	1375	1.96	2.35	1480	2.24	2.69	1583	2.53	3.04	1682	2.84	3.41	1775	3.17	3.80	
	3700 (6285)	1279	1.80	2.16	1387	2.06	2.47	1491	2.34	2.81	1591	2.64	3.17	1688	2.95	3.54	1781	3.28	3.94	
	3800 (6455)	1301	1.92	2.30	1407	2.18	2.62	1508	2.47	2.96	1607	2.77	3.32	1703	3.09	3.71	1795	3.42	4.10	
	3900 (6625)	1314	2.02	2.42	1418	2.29	2.75	1518	2.57	3.08	1615	2.88	3.46	1709	3.20	3.84	1801	3.53	4.24	
	4000 (6795)	1336	2.15	2.58	1438	2.42	2.90	1536	2.71	3.25	1631	3.02	3.62	1723	3.34	4.01	1814	3.68	4.42	
	4100 (6965)	1353	2.27	2.72	1453	2.55	3.06	1550	2.84	3.41	1643	3.15	3.78	1734	3.48	4.18	1823	3.82	4.58	
	4200 (7135)	1371	2.40	2.88	1468	2.68	3.22	1564	2.98	3.58	1656	3.29	3.95	1745	3.62	4.34	1833	3.97	4.76	
	4250 (7220)	1379	2.47	2.96	1476	2.74	3.29	1571	3.04	3.65	1662	3.36	4.03	1751	3.69	4.43	1838	4.04	4.85	

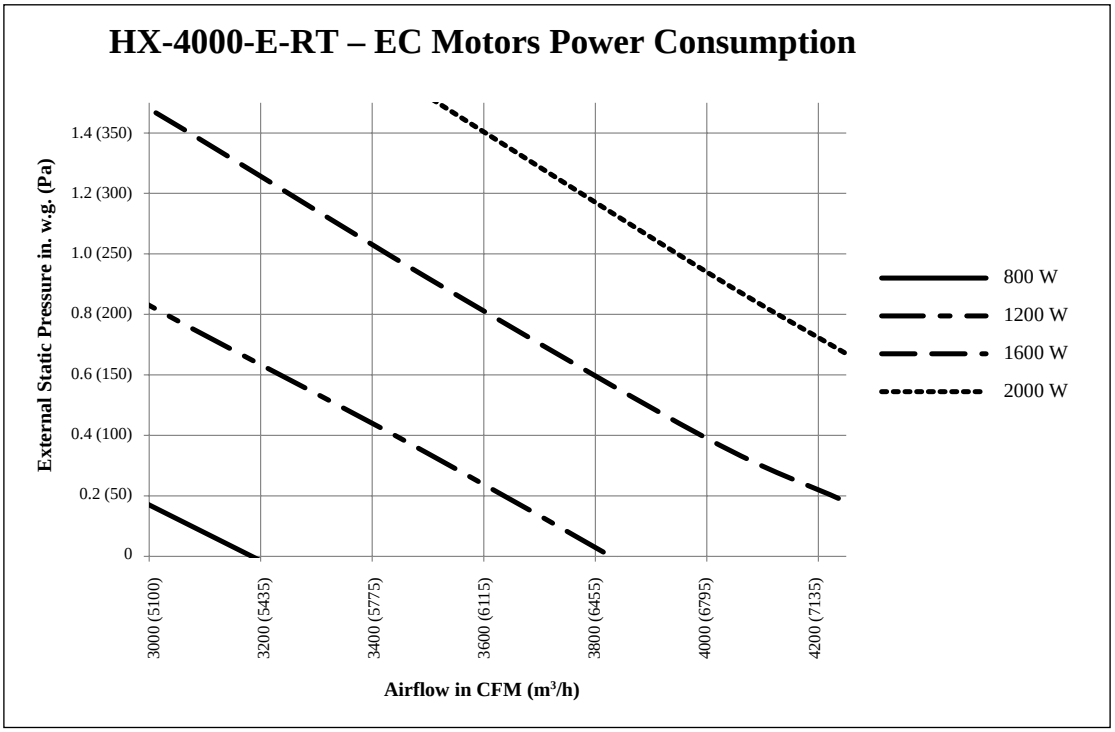
Notes:
hp = bhp x 1.2
Internal static pressure will vary based on selected options.
Motor selections do not apply to EC Motors.

Motor Selection – High-Latent-Transfer Enthalpy Core

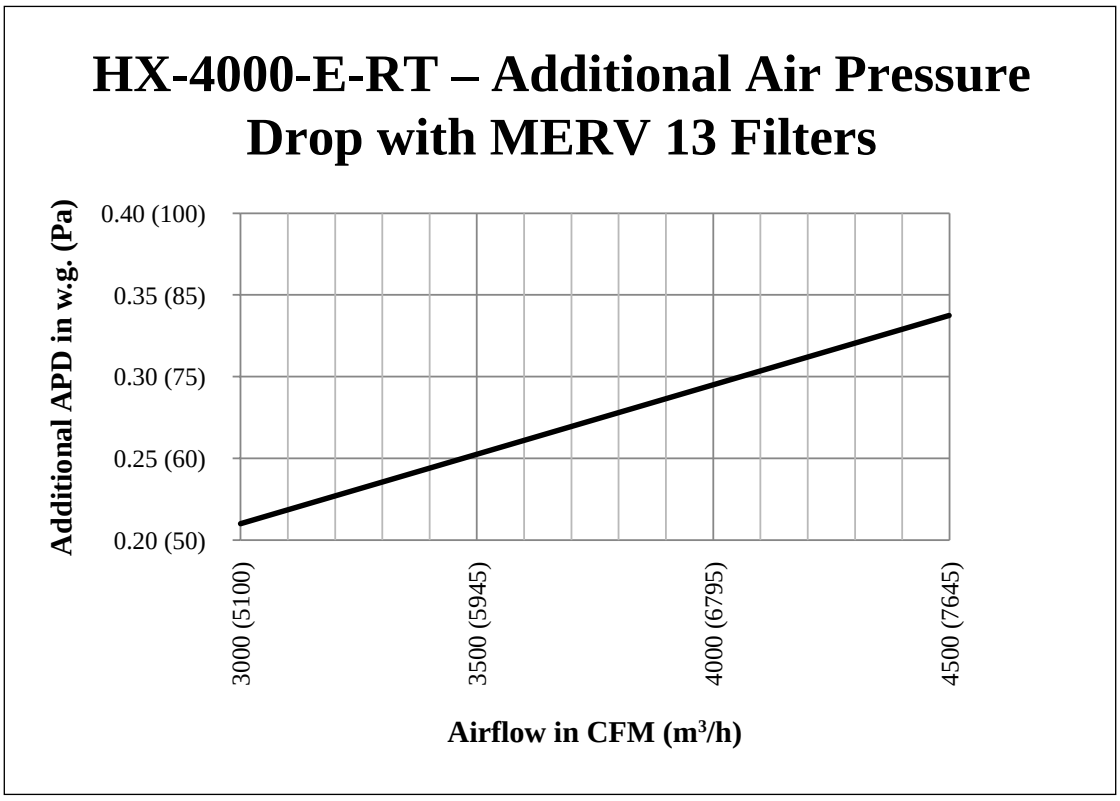
Supply/Exhaust																			
Motor	CFM (m^3/h)	External Static Pressure (inH_20) - Supply/Exhaust																	Motor
		0.25 (60 Pa)			0.50 (125 Pa)			0.75 (185 Pa)			1.00 (250 Pa)			1.25 (310 Pa)			1.50 (375 Pa)			
		RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	
2 hp	3000 (5100)	1215	1.26	1.51	1338	1.51	1.81	1454	1.77	2.12	1561	2.04	2.45	1662	2.33	2.80	1757	2.62	3.14	5 hp
	3100 (5265)	1233	1.34	1.61	1353	1.59	1.91	1467	1.86	2.23	1573	2.14	2.57	1674	2.43	2.92	1768	2.73	3.28	
	3200 (5435)	1251	1.43	1.72	1368	1.69	2.03	1480	1.96	2.35	1585	2.24	2.69	1685	2.54	3.05	1778	2.84	3.41	
	3300 (5605)	1263	1.51	1.81	1377	1.77	2.12	1488	2.05	2.46	1593	2.34	2.81	1692	2.64	3.17	1786	2.95	3.54	
	3400 (5775)	1280	1.61	1.93	1393	1.87	2.24	1501	2.15	2.58	1604	2.44	2.93	1703	2.75	3.30	1796	3.06	3.67	
3 hp	3500 (5945)	1302	1.72	2.06	1412	1.98	2.38	1518	2.27	2.72	1620	2.57	3.08	1717	2.88	3.46	1809	3.20	3.84	
	3600 (6115)	1318	1.82	2.18	1426	2.09	2.51	1530	2.38	2.86	1631	2.68	3.22	1727	3.00	3.60	1818	3.32	3.98	
	3700 (6285)	1331	1.92	2.30	1437	2.19	2.63	1538	2.48	2.98	1638	2.78	3.34	1733	3.10	3.72	1824	3.44	4.13	
	3800 (6455)	1352	2.04	2.45	1456	2.32	2.78	1556	2.61	3.13	1653	2.92	3.50	1747	3.21	3.85	1837	3.58	4.30	
	3900 (6625)	1368	2.16	2.59	1470	2.43	2.92	1569	2.73	3.28	1665	3.04	3.65	1757	3.37	4.04	1847	3.71	4.45	
	4000 (6795)	1385	2.28	2.74	1485	2.56	3.07	1582	2.86	3.43	1676	3.17	3.80	1768	3.51	4.21	1856	3.85	4.62	
	4100 (6965)	1397	2.39	2.87	1496	2.67	3.20	1592	2.98	3.58	1684	3.29	3.95	1774	3.63	4.36	1862	3.98	4.78	
5 hp	4200 (7135)	1414	2.52	3.02	1510	2.81	3.37	1604	3.11	3.73	1694	3.43	4.12	1784	3.77	4.52	1871	4.12	4.94	
	4250 (7220)	1426	2.59	3.11	1522	2.89	3.47	1615	3.19	3.83	1705	3.52	4.22	1792	3.85	4.62	N/A			

Notes:
hp = bhp x 1.2
Internal static pressure will vary based on selected options.
Motor selections do not apply to EC Motors.

EC Motors



Additional Air Pressure Drop with MERV 13 Filters



Selection Information

▲ = Standard Feature
☐ = Optional Feature (check the box to select this option)
Send your completed selection to XeteX, Inc.

Model
Series: Standard Commercial (HX)
Nominal Capacity: 3000-4000 CFM
Application: Exterior (RT)

Casing & Core
Cabinet Finish
- ▲ Galvanized
- ☐ Painted
- ☐ Pool Construction

Duct Configuration (see pg. 4)
- ▲ 1-2-5-6
- ☐ 1-3-5-6
- ☐ 1-2-4-6
- ☐ 1-3-4-6

Mirror Image Cabinet
- ☐ Optional

Access Doors
- ▲ Fixed/Hinged
- ☐ Removable Panels

Roof Curb
- ☐ Insulated
- ☐ Non-Insulated

Plate Exchanger
- ▲ Standard Enthalpy
- ☐ High-Efficiency Enthalpy
- ☐ High-Latent-Transfer Enthalpy

Filters (Supply)
▲ MERV 8 ☐ MERV 13

Blowers & Motors [1]
Supply Blower
- ☐ 3/4 hp ☐ 2 hp
- ☐ 1 hp ☐ 3 hp
- ☐ 1.5 hp ☐ 5 hp

Exhaust Blower
- ☐ 3/4 hp ☐ 2 hp
- ☐ 1 hp ☐ 3 hp
- ☐ 1.5 hp ☐ 5 hp

Motor Type
- ☐ ODP
- ☐ TEFC
- ☐ EC Motors

Speed
- ▲ Single Speed
- ☐ 2-Speed
- ☐ 2-Speed VFD
- ☐ Variable Speed Motor
- ☐ Variable Speed VFD

Electrical Requirements [1]
- ☐ 120V/1ph/60Hz
- ☐ 208V/1ph/60Hz
- ☐ 230V/1ph/60Hz
- ☐ 208V/3ph/60Hz
- ☐ 230V/3ph/60Hz
- ☐ 460V/3ph/60Hz
- ☐ 575V/3ph/60Hz

Disconnect
- ▲ Non-Fused
- ☐ Fused

Frost Control
- ▲ None
- ☐ Exhaust Defrost [2]
- ☐ Recirculation [2]
- ☐ Pre-Heat (Electric Coil)
- ☐ Pre-Heat (Hot Water Coil)

Heating Options
- ▲ None
- ☐ Post-Heat (Electric Coil)
- ☐ Post-Heat (Hot Water Coil)

Add-Ons
- ☐ Motorized & Insulated Damper for OA [2]
- ☐ Motorized & Insulated Damper for EA
- ☐ Non-Insulated Backdraft Damper for EA
- ☐ 24 VAC, 10 VA terminals for OA and/or EA dampers by others
- ☐ 24 VAC, 20 VA power available for accessories by others
- ☐ Spare Filters QTY: _____
- ☐ Spare Belts QTY: _____

[1] See pg. 2 for motor and blower restrictions.
[2] OA Motorized & Insulated Damper included

Project:		**Architect:**	
Location:		**Engineer:**	
Model #:		**Contractor:**	
Quantity:		**Comments:**	
Submitted By:			
Date:			

HX-8500-E
HX-8500-E-RT

Energy Recovery Ventilator

HX-8500-E & HX-8500-E-RT Specifications & Technical Data

Nominal Capacity
7000-8500 CFM

Casing
Double-wall cabinet
White exterior paint, 22-gauge galvanized steel
18-gauge galvanized steel interior walls
Access doors with quarter-turn handles
18-gauge stainless steel drain pan
Drain Connections: 1” NPT
Insulation: 2” (51 mm)

Mounting
On roof curb or on platform

Plate Exchanger
Material: Enthalpy
Quantity: 3
Pitch: 0.13” (3.3 mm)
Dimensions: 30” x 30” x 22.75”
(762 mm x 762 mm x 578 mm)

Filters
Type: MERV 8
Quantity: 6 per circuit
Dimensions: 20” x 24” x 4”
(508 mm x 610 mm x 102 mm)

Blowers
Quantity: 2
- Forward-curved
- Permanently sealed and lubricated ball bearings
- Power transmission by adjustable pulleys and belts

Motors
Type: Inverter duty 10:1, ODP or TEFC, EPAct or Premium
Maximum Power: 15 hp
Drive Assembly/Blower: On vibration-isolating springs

Electrical & Controls
- Start/stop dry contact and general alarm dry contact
- Occupancy control dry contact
- Fan interlock dry contact
- 24VAC, 20VA power available for accessories
- Access panel with non-fused disconnect (NEMA 4)
- Single-point power connection
- 120, 208, 230 V / 1ph / 60Hz
- 208, 230, 460, 575 V / 3ph / 60Hz

Warranty
- Core: Limited 10-year warranty
- All Other Covered Components: Limited 2-year warranty

Listed By

HX-8500-E & HX-8500-E-RT Optional Features

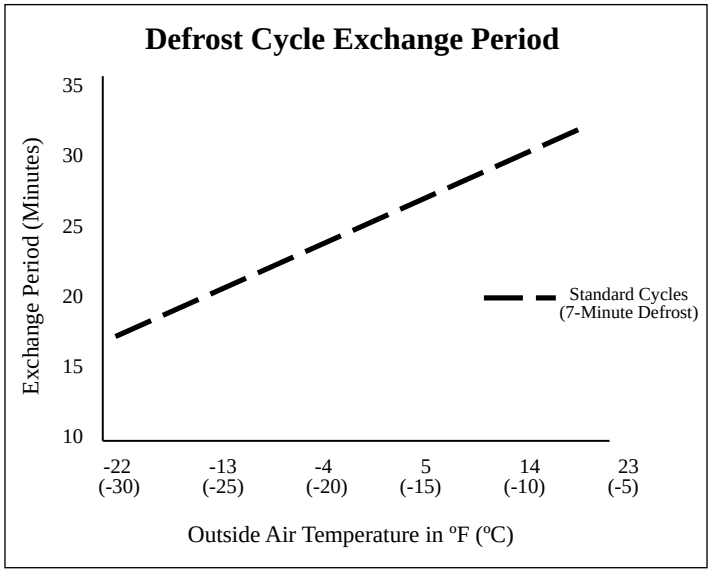
Frost Prevention/Control Options
Frost control activated by a temperature reference
Set point: 14°F (-10°C)

Internal Pre-Heat by Electric Coil:
- Powered by unit
- Factory calibrated
- SCR control

Internal Pre-Heat by Hot Water Coil:
- 0-10 V signal on the control panel
- Front or back piping connections

Internal Face and Bypass Damper:
- Fresh air deviation

Defrost Cycles:
- Exhaust Only or Recirculation
- Comes with motorized and insulated damper on OA only
- See table below for temperature references



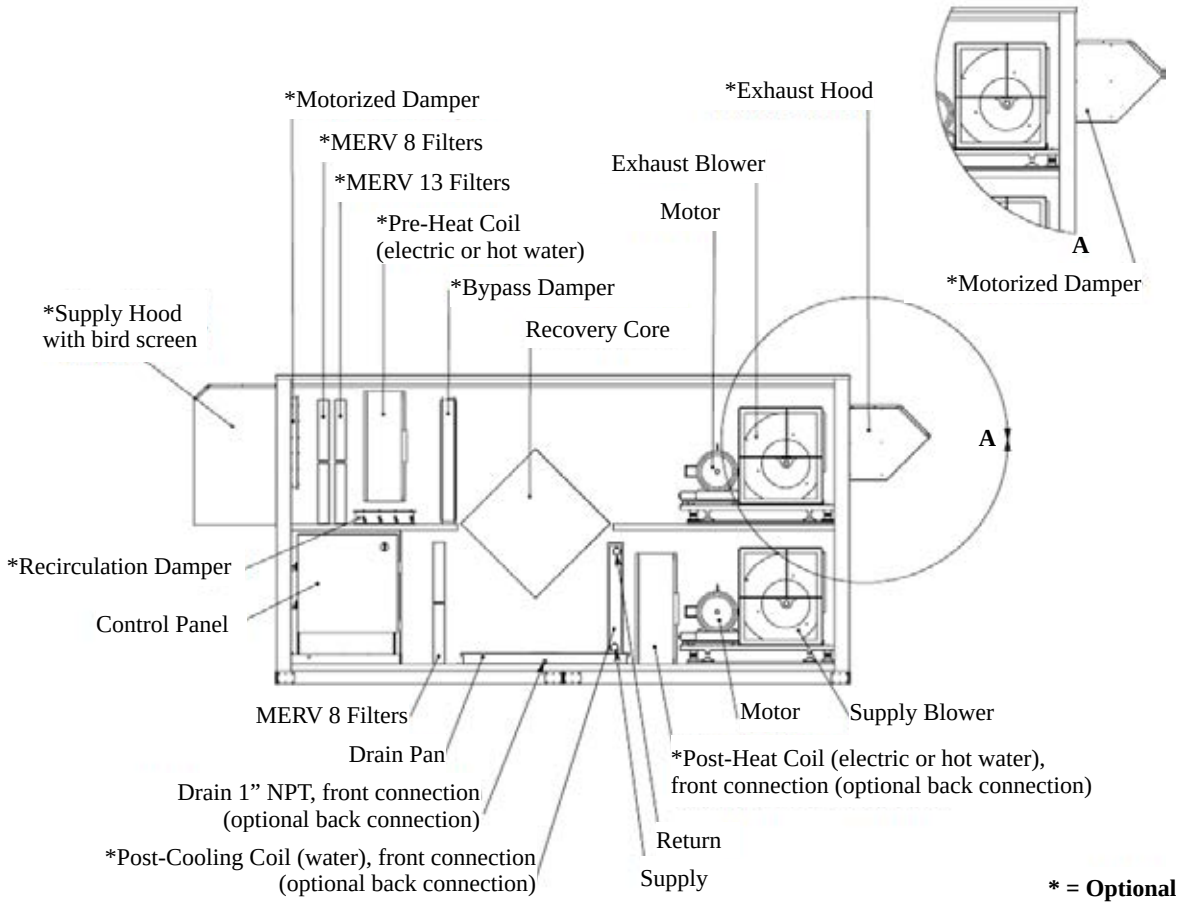
Available Options
Cabinet Options:
- Supply and Exhaust Hoods with bird screens
- Roof Curb: 14" (356 mm) high, 18-gauge galvanized steel, insulation optional
- Front or back piping connections (drain pan and water coil and/or cooling connections)
- Pool Construction: TEFC motors, stainless steel interior, and epoxy-coated fans (NOTE: ERV not recommended for indoor pool applications)

Available Options
Components Options:
- Final MERV 13 filters added to the fresh air circuit
- Motorized and insulated dampers (on OA and/or EA openings)
- Non-insulated backdraft damper (on EA opening only)
- Post-Heat by Electric Coil: Powered by unit
- Post-Heat by Hot Water Coil: 0-10VDC signal to maintain supply air temperature, or 0-10VDC signal by others
- Cold Water Cooling Coil: Control by others, comes with 18-gauge stainless steel drain pan
- DX Cooling Coil: All controls and condensation unit by others, comes with 18-gauge stainless steel drain pan

Blower Motor Options:
- TEFC, Premium (only available with ≥1.5 hp/ 3ph)
- 2-Speed motors (only available with ODP, EPAct motors)
- Programmable 2-Speed (VFD)
- Variable Frequency Drive (VFD), 0-10VDC control signal by others
- Backward-inclined blowers

Control Options:
- Economizer Cycle: Free cooling management by temperature sensor on OA (available with face and bypass damper only)
- Dirty Filters Contact: Will close a dry contact when dirty filters are detected
- Low Airflow Switch: Will open a dry contact when no airflow is detected on supply blower
- Low Temperature Limit: Unit will stop if fresh air supply is under set point (adjustable) for more than 5 minutes
- Phase Loss Detection: Unit will stop when a phase loss occurs, automatic restart (3-phase power only)
- Damper End Switch: Unit start up conditional to dampers opening
- Recirculation Dry Contact: For unoccupied mode, must select recirculation defrost option
- Terminals for OA and/or EA damper power and control (24VAC, 10VA): Included when OA/EA damper selected
- Programmable Timer
- $C0_2$ or Relative Humidity (RH) Sensor: Sequence of operations must be verified by factory
- BacNet Compatible Controller
  Available Upgrades:
  - » IP Communication Network Module
  - » MS/TP Communication Network Module
  - » Remote Keypad
  - » Remote Keypad with Touchscreen

Components & Configurations

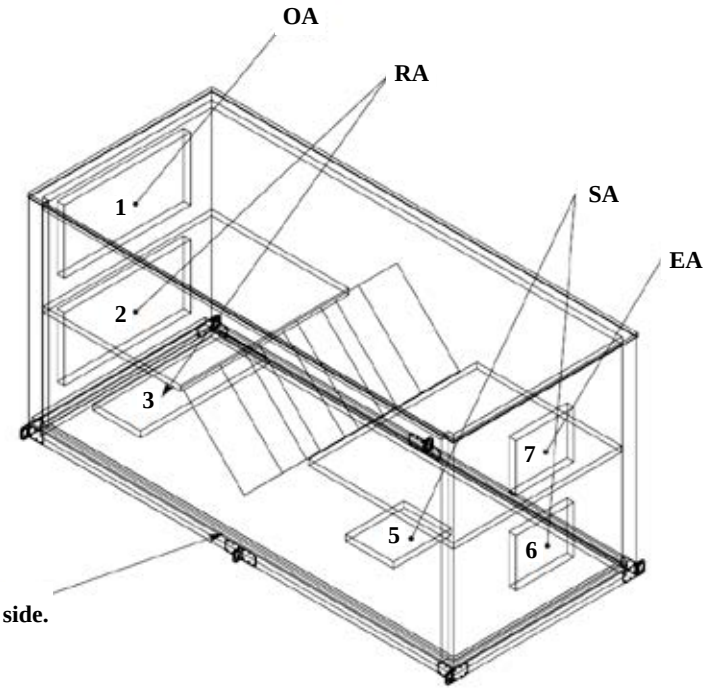


*** = Optional Feature**

Available Configurations
1-2-6-7
1-3-5-7
1-3-6-7
1-2-5-7

Mirror Image Cabinet Also Available

Legend	
RA	Return Air
SA	Supply Air
OA	Outside Air
EA	Exhaust Air



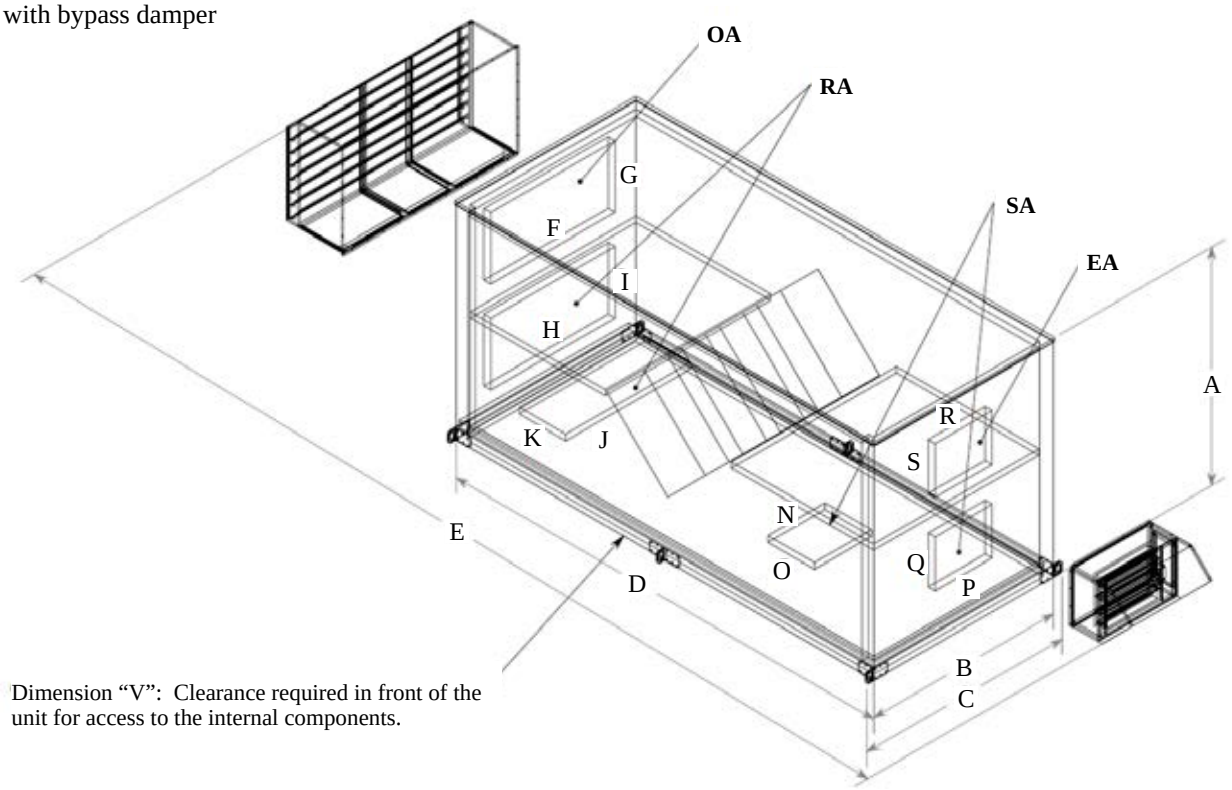
Access internal components on this side.

Dimensions & Weights

Cabinet*																	
Unit	Height	Width			Length												V
	A	B	Overall		Overall - Standard				Overall - 1 Coil Option				Overall - 2 Coils Option				
			C		D	E			D	E			D	E			
	Overall	Base Standard	Standard	Hoods Option	Base Standard	Standard	Motorized Exhaust Damper Option	Hoods Option	Base Standard	Standard	Motorized Exhaust Damper Option	Hoods Option	Base Standard	Standard	Motorized Exhaust Damper Option	Hoods Option	Front Clearance Required
HX-8500-E	95.8 (2502)	78.0 (1981)	83.8 (2129)	84.0 (2134)	141.7 (3599)	146.0 (3708)	151.8 (3856)	193.1 (4905)	161.3 (4097)	167.3 (4249)	171.8 (4364)	213.1 (5413)	181.3 (4605)	187.3 (4757)	191.8 (4872)	233.1 (5921)	75 (1905)
HX-8500-E-BP**	95.8 (2502)	92.5 (2350)	98.5 (2502)	98.5 (2502)	141.3 (3589)	147.3 (3741)	151.8 (3856)	193.1 (4905)	161.3 (4097)	167.3 (4249)	171.8 (4364)	213.1 (5413)	181.3 (4605)	187.3 (4757)	191.8 (4872)	233.1 (5921)	75 (1905)

Openings														
Unit	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**	**R**	**S**
HX-8500-E	52 (1321)	26 (660)	52 (1321)	26 (660)	56 (1422)	18 (457)	N/A	N/A	22 (559)	24 (610)	22 (559)	24 (610)	22 (559)	24 (610)
HX-8500-E-BP**	52 (1321)	26 (660)	52 (1321)	26 (660)	56 (1422)	18 (457)	N/A	N/A	22 (559)	24 (610)	22 (559)	24 (610)	22 (559)	24 (610)

* All dimensions in inches (mm)
** Unit with bypass damper



Dimension "V": Clearance required in front of the unit for access to the internal components.

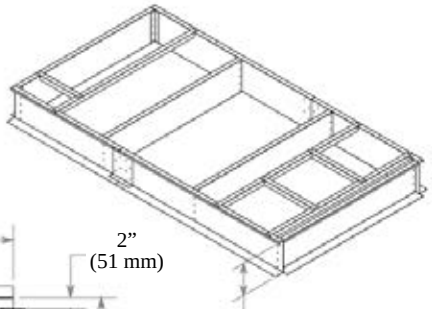
Weight - HX-8500-E†	
Minimum	4128 lbs (1872 kg)
Maximum	6257 lbs (2838 kg)

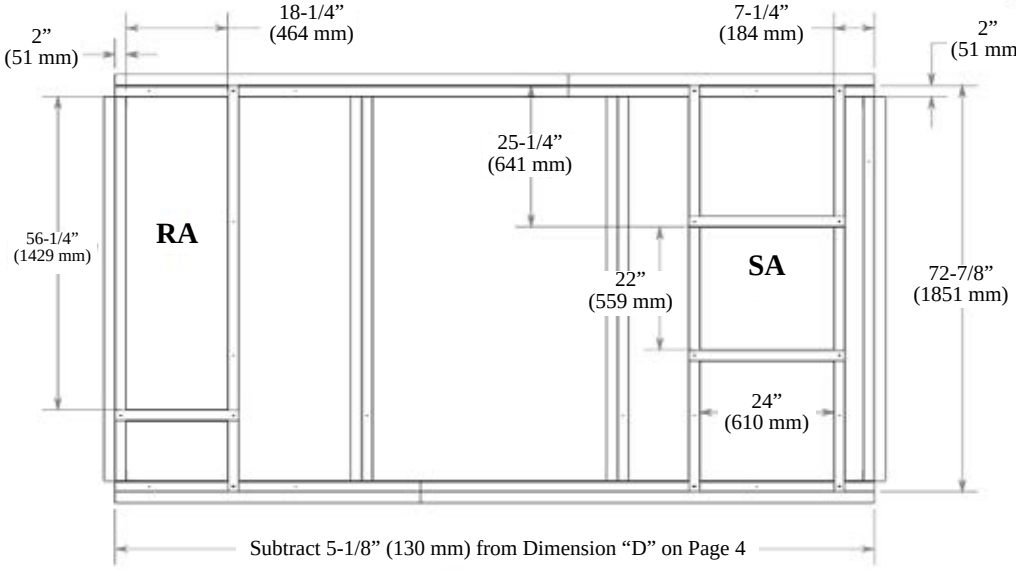
Weight - HX-8500-E-BP†	
Minimum	4800 lbs (2177 kg)
Maximum	6521 lbs (2958 kg)

† Actual weight may vary by ±10%. Shipping weight calculated after final selection. Roof curbs shipped separately.

Roof Curb Dimensions

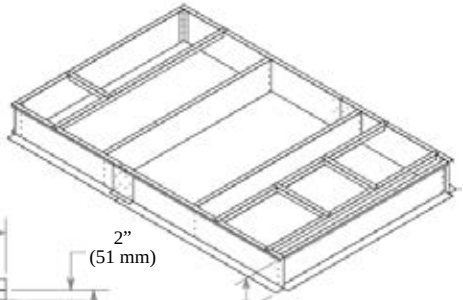
HX-8500-E-RT

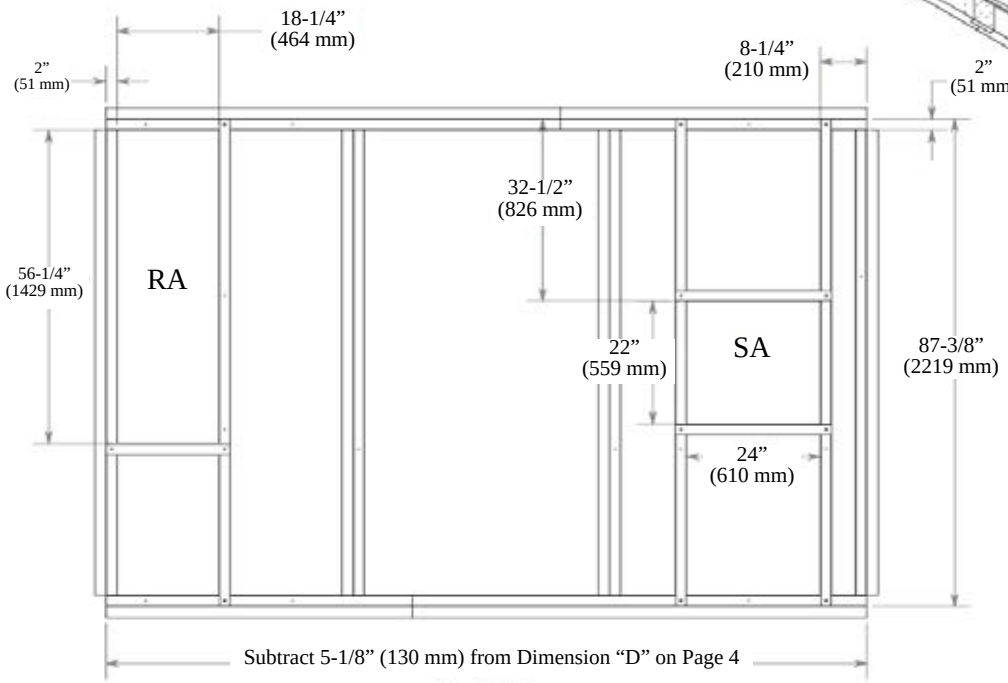




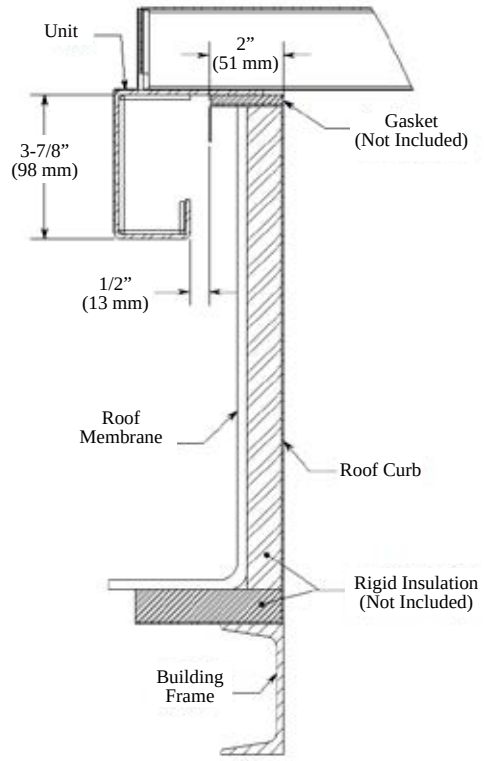
Note: Drawings not to scale

HX-8500-E-RT-BP



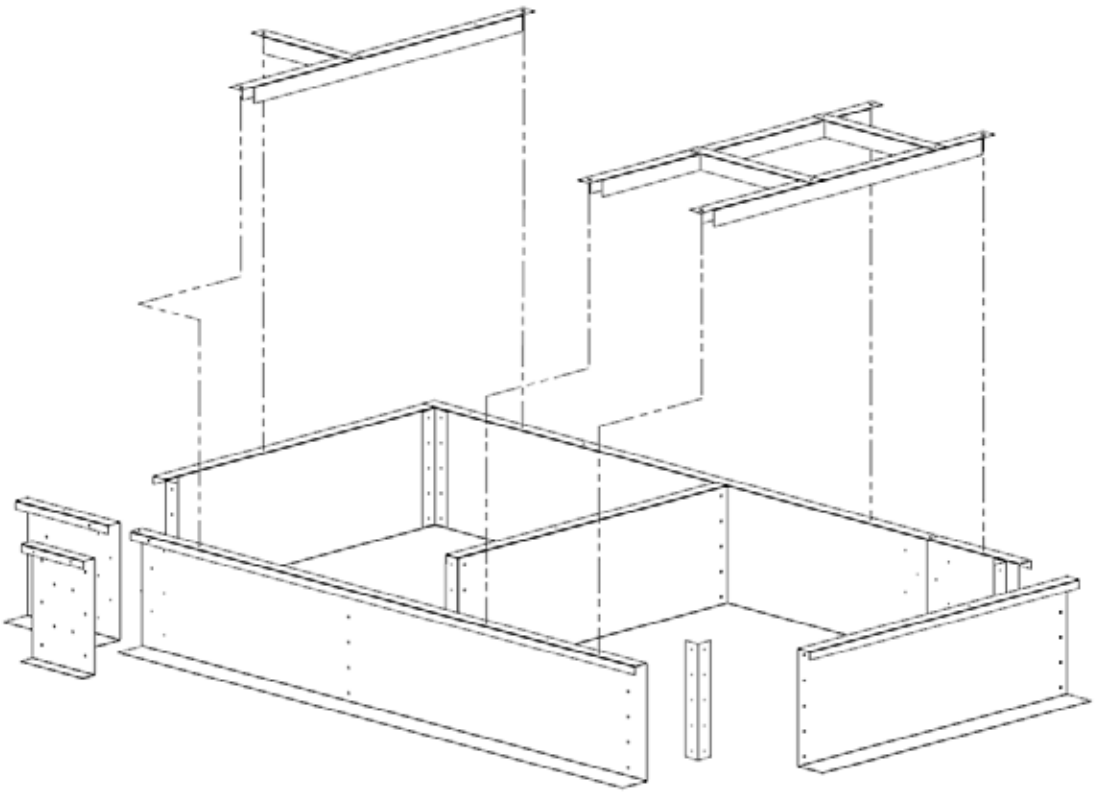


Roof Curb Assembly



Roof Curb Weights & Dimensions	
Unit	**HX-8500-E-RT**
Roof Curb Weight	195 lbs (88 kg)
Shipping Weight	240 lbs (109 kg)
Shipping Dimensions (W x H x D)	96” x 24” x 25” (2438 mm x 610 mm x 635 mm)

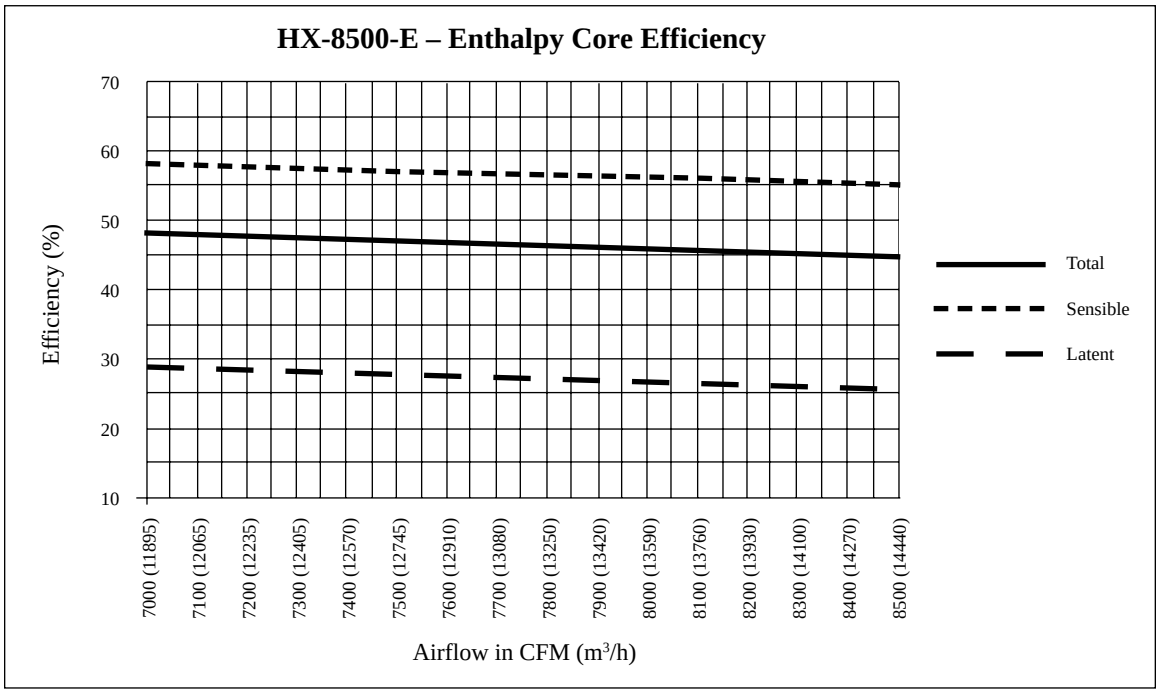
Roof Curb Weights & Dimensions	
Unit	**HX-8500-E-RT-BP**
Roof Curb Weight	220 lbs (100 kg)
Shipping Weight	265 lbs (120 kg)
Shipping Dimensions (W x H x D)	96” x 24” x 25” (2438 mm x 610 mm x 635 mm)

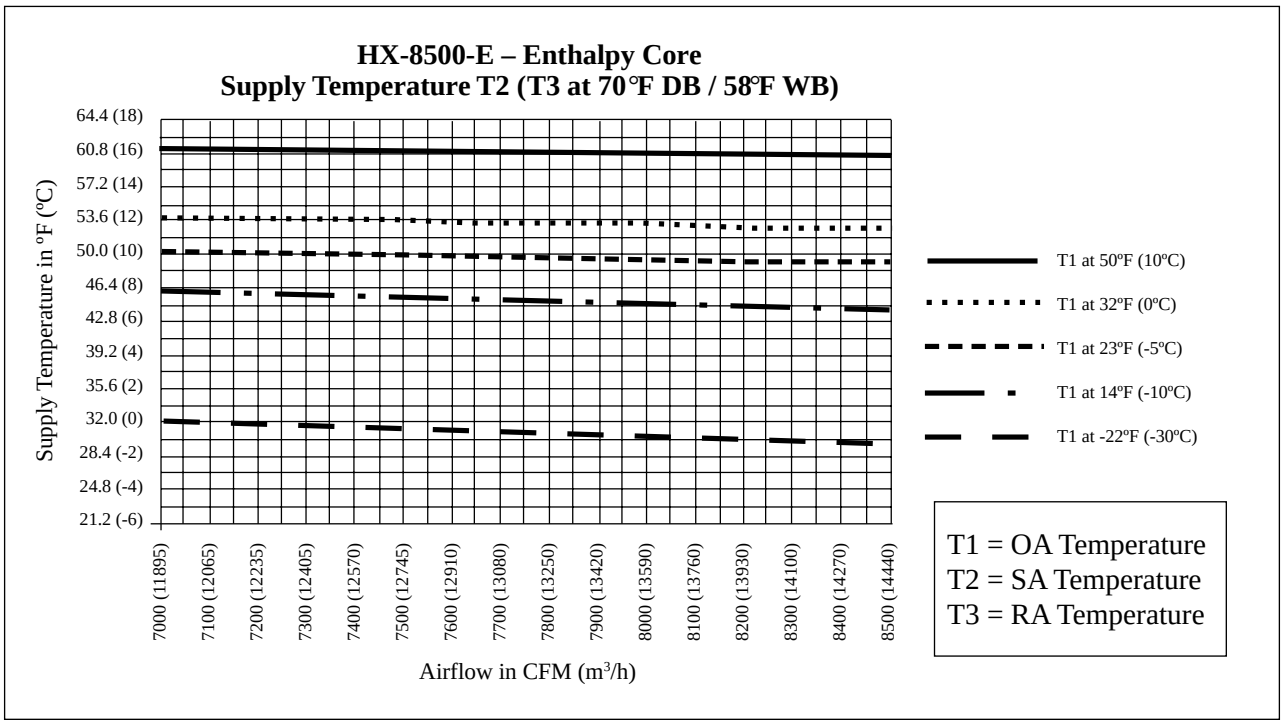


Enthalpy Core Performance

AHRI Standard Conditions	Conditions		AHRI Standard Conditions	Conditions	
Outside Air Temperature	**Winter**	**Summer**	**Exhaust Air Temperature**	**Winter**	**Summer**
Dry Bulb	35°F (1.7°C)	95°F (35°C)	Dry Bulb	70°F (21.1°C)	75°F (23.9°C)
Wet Bulb	33°F (0.6°C)	78°F (25.6°C)	Wet Bulb	58°F (14.4°C)	63°F (17.2°C)

Note: Efficiencies are based on AHRI standard winter conditions.





Motor Selection – Enthalpy Core

Supply/Exhaust																				
Motor	Airflow	External Static Pressure (IN H_20) - Supply/Exhaust																		Motor
		0.25 (60 Pa)			0.50 (125 Pa)			0.75 (185 Pa)			1.00 (250 Pa)			1.25 (310 Pa)			1.50 (375 Pa)			
	CFM (m^3/h)	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	RPM	BHP	HP	
5 hp	7000 (11895)	837	4.14	4.97	884	4.54	5.45	932	4.95	5.95	985	5.52	6.63	1038	6.16	7.39	1089	6.78	8.14	
7.5 hp	7100 (12065)	844	4.28	5.14	891	4.68	5.62	938	5.10	6.13	989	5.65	6.78	1041	6.27	7.53	1092	6.91	8.30	
	7200 (12235)	851	4.42	5.31	897	4.83	5.80	943	5.25	6.30	993	5.77	6.93	1044	6.39	7.67	1096	7.05	8.46	
	7300 (12405)	858	4.57	5.49	904	4.98	5.98	949	5.40	6.48	997	5.91	7.09	1048	6.52	7.82	1099	7.19	8.62	
	7400 (12570)	865	4.72	5.67	910	5.13	6.16	955	5.56	6.67	1001	6.05	7.26	1051	6.65	7.98	1102	7.33	8.79	
	7500 (12745)	872	4.88	5.85	917	5.29	6.35	961	5.72	6.86	1006	6.20	7.44	1055	6.79	8.14	1106	7.47	8.96	10 hp
	7600 (12910)	879	5.04	6.04	923	5.45	6.54	967	5.88	7.06	1011	6.35	7.62	1059	6.93	8.32	1109	7.62	9.14	
	7700 (13080)	886	5.20	6.24	930	5.62	6.74	973	6.05	7.26	1016	6.51	7.81	1063	7.08	8.50	1113	7.76	9.32	
	7800 (13250)	893	5.36	6.43	937	5.78	6.94	979	6.22	7.46	1022	6.67	8.01	1067	7.23	8.68	1116	7.91	9.50	
	7900 (13420)	901	5.53	6.64	944	5.95	7.15	986	6.39	7.67	1027	6.85	8.21	1072	7.40	8.88	1120	8.07	9.68	
	8000 (13590)	908	5.70	6.84	950	6.13	7.36	992	6.57	7.89	1033	7.02	8.43	1076	7.56	9.08	1123	8.22	9.86	
	8100 (13760)	915	5.88	7.05	957	6.31	7.57	998	6.75	8.10	1039	7.21	8.65	1081	7.74	9.29	1127	8.38	10.05	
	8200 (13930)	923	6.06	7.27	964	6.49	7.79	1005	6.94	8.33	1045	7.40	8.88	1086	7.92	9.50	1131	8.54	10.24	
	8300 (14100)	930	6.24	7.49	971	6.68	8.01	1011	7.13	8.55	1051	7.59	9.11	1091	8.10	9.72	1134	8.70	10.44	15 hp
10 hp	8400 (14270)	938	6.43	7.71	978	6.87	8.24	1017	7.32	8.79	1058	7.80	9.36	1097	8.29	9.95	1138	8.86	10.64	
	8500 (14440)	945	6.62	7.94	985	7.06	8.47	1024	7.52	9.02	1064	8.01	9.61	1103	8.49	10.19	1142	9.03	10.84	

Notes:
hp = bhp x 1.2
Contact XeteX for Additional Pressure Drop (APD) with Hot Water or Electric Coils

Additional Air Pressure Drop with MERV 13 Filters

Airflow CFM (m^3/h)	APD in. H_2O (Pa)
7000 (11895)	0.16 (39)
7100 (12065)	0.16 (40)
7200 (12235)	0.16 (41)
7300 (12405)	0.17 (42)
7400 (12570)	0.17 (42)
7500 (12745)	0.17 (43)
7600 (12910)	0.18 (44)
7700 (13080)	0.18 (45)

Airflow CFM (m^3/h)	APD in. H_2O (Pa)
7800 (13250)	0.18 (46)
7900 (13420)	0.19 (47)
8000 (13590)	0.19 (48)
8100 (13760)	0.20 (49)
8200 (13930)	0.20 (50)
8300 (14100)	0.20 (50)
8400 (14270)	0.21 (51)
8500 (14440)	0.21 (52)

Selection Information

▲ = Standard Feature ☐ = Optional Feature (check the box to select this option) Send finished selection to XeteX, Inc.

Model

Series: Advanced Commercial (HX) Nominal Capacity: 7000-8500 CFM Application: ☐ Interior ☐ Exterior (RT)

Casing

Cabinet Finish
- ▲ Painted
- ☐ Pool Construction

Supply & Exhaust Hoods
- ☐ Optional (exterior models)

Duct Configuration (see pg. 3)
- ▲ 1-2-6-7
- ☐ 1-3-5-7
- ☐ 1-3-6-7
- ☐ 1-2-5-7

Mirror Image Cabinet
- ☐ Optional

Roof Curb (exterior models)
- ▲ None
- ☐ Insulated
- ☐ Non-Insulated

Piping Connections
- ☐ Front
- ☐ Back

Electrical Requirements
- ☐ 120V/1ph/60Hz
- ☐ 208V/1ph/60Hz
- ☐ 230V/1ph/60Hz
- ☐ 208V/3ph/60Hz
- ☐ 230V/3ph/60Hz
- ☐ 460V/3ph/60Hz
- ☐ 575V/3ph/60Hz

Filters
- ▲ MERV 8
- ☐ MERV 13 (Final Filter)

Frost Control
- ▲ None
- ☐ Exhaust Defrost [1]
- ☐ Recirculation [1]
- ☐ Pre-Heat (Electric Coil)
- ☐ Pre-Heat (Hot Water Coil)
- ☐ Face & Bypass Damper

Blowers & Motors

Supply Blower
- ☐ 5 hp ☐ 10 hp
- ☐ 7.5 hp ☐ 15 hp

Exhaust Blower
- ☐ 5 hp ☐ 10 hp
- ☐ 7.5 hp ☐ 15 hp

Motor Type
- ☐ ODP, EPAct [2]
- ☐ ODP, Premium [3]
- ☐ TEFC, EPAct [2]
- ☐ TEFC, Premium [4]

Blower Type
- ▲ Forward Curved
- ☐ Backward Inclined

Blower Control
- ▲ Single Speed
- ☐ 2-Speed [5]
- ☐ Programmable 2-Speed (VFD)
- ☐ VFD

Heating Options
- ▲ None
- ☐ Post-Heat (Electric Coil)
- ☐ Post-Heat (Hot Water Coil)

Cooling Options
- ▲ None
- ☐ Cold Water Cooling Coil
- ☐ DX Cooling Coil

Add-Ons
- ☐ Motorized & Insulated Damper for EA
- ☐ Non-Insulated Backdraft Damper for EA
- ☐ Motorized & Insulated Damper for OA[1]
- ☐ Terminals for OA and/or EA damper power and control (24VAC, 10VA)
- ☐ Low Temperature Limit
- ☐ Economizer Cycle
- ☐ Dirty Filters Contact
- ☐ Low Airflow Switch
- ☐ Phase Loss Detection
- ☐ Damper End Switch
- ☐ Recirculation Dry Contact [6]
- ☐ Programmable Timer
- ☐ CO_2 Sensor [7]
- ☐ Relative Humidity Sensor [7]
- ☐ BacNet Compatible Controller
  - ☐ With IP Module
  - ☐ With MS/TP Module
  - ☐ With Remote Keypad
  - ☐ With Remote Keypad (Touchscreen)
- ☐ Spare MERV 8 Filters QTY: _____
- ☐ Spare Belts QTY: _____

[1] OA Motorized & Insulated Damper included with exhaust defrost and recirculation
[2] EPAct efficiency only available when Premium efficiency is not available (e.g., with single-phase motors)
[3] ODP, Premium only available with ≥ 3 hp/ 3ph motors
[4] TEFC, Premium only available with ≥1.5 hp/ 3ph motors
[5] 2-Speed only available with ODP, EPAct motors
[6] Recirculation Dry Contact requires selection of recirculation defrost
[7] Sequence of operations must be verified by factory

Project:		**Architect:**	
Location:		**Engineer:**	
Model #:		**Contractor:**	
Quantity:		**Comments:**	
Submitted By:			
Date:			

Unit Tag	Manufacturer	Model	Supply Fan						E	
			CFM (MAX)	E.S.P. (IN.W.G.)	RPM	MAX BHP	MOTOR HP	VFD	CFM (MAX)	E.S.P. (IN.W.G.)
ERV-1	XeteX	HX-8500-E-RT	8000	1	1146	8.55	15	Yes	7500	0.8
ERV-2	XeteX	HX-2000-E-RT	1100	0.5	1143	0.4	0.8	Yes	1000	0.2
ERV-5	XeteX	HX-2000-E-RT	1600	0.8	1348	0.82	1	Yes	1200	0.5
ERV-6	XeteX	HX-2000-E-RT	1600	0.8	1348	0.82	1	Yes	1200	0.5
ERV-4	XeteX	HX-4000-E-RT	3600	0.8	1392	2	3	Yes	3200	0.5
ERV-3	XeteX	HX-8500-E-RT	7600	1	1128	7.88	10	Yes	7100	0.8
OUTSIDE * : Temperature may be after pre-heat coil, and not actual OAT. See "Heating Coils" for details.										

Notes:

1) Enthalpic
2) Hood OA and EA
3) Exhaust Damper Motorized with end switch
4) Supply Damper Motorized with end switch
5) Roof Curb: 14" Insulated Roof Curb
6) MERV 13 final filter on supply circuit
7) Terminal for damper power and control
8) Low airflow limit switch
9) Painted exterior finish
10) Spring isolators
11) Independent blower management
12) Cabinet length increase ahead of the core

xhaust Fan				Energy Recove									
				WINTER									
				OUTSIDE *		ROOM AIR		SUPPLY AIR		EFFICIENCY		ENERGY SAVED	
RPM	MAX BHP	MOTOR HP	VFD	DB (°F)	WB (°F)	DB (°F)	WB (°F)	DB (°F)	WB (°F)	Sensible	Total	Sensible (MBH)	Total (MBH)
962	5.73	7.5	Yes	14	9	70	54.4	44.8	34.8	58.7	52	266.3	344.2
902	0.23	0.8	Yes	14	9	70	54.4	44.7	35.4	60.3	55.3	36.5	48.8
1102	0.41	0.8	Yes	14	9	70	54.4	38.8	30.9	59.1	53.7	42.9	56.9
1102	0.41	0.8	Yes	14	9	70	54.4	38.8	30.9	59.1	53.7	42.9	56.9
1178	1.29	2	Yes	14	9	70	54.4	41.1	32.2	54.4	48.7	105.3	137.5
938	5.11	7.5	Yes	14	9	70	54.4	44.9	34.9	59.2	52.6	254	329.3

ry Performance										Heating Coils			
SUMMER										Pre-heat			
OUTSIDE		ROOM AIR		SUPPLY AIR		EFFICIENCY		ENERGY RECOVERED			Capacity		
DB (°F)	WB (°F)	DB (°F)	WB (°F)	DB (°F)	WB (°F)	Sensible	Total	Sensible (MBH)	Total (MBH)	TYPE	kW	VOLTS	PHASE
92	75	75	62.5	82.6	70.3	58.7	43.5	80.8	153.7	SCR	9	460	3
92	75	75	62.5	82.7	69.9	60.3	48.4	11.1	22.8	SCR	2	460	3
92	75	75	62.5	84.5	71	59.1	46.3	13	26.2	SCR	2	460	3
92	75	75	62.5	84.5	71	59.1	46.3	13	26.2	SCR	2	460	3
92	75	75	62.5	83.8	70.8	54.4	41	32	61.9	SCR	4	460	3
92	75	75	62.5	82.6	70.2	59.2	44.1	77.1	147.7	SCR	9	460	3

Electrical				
HZ	FLA	MCA	MOP	Notes
60	36.4	45.5	50	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
60	7.5	9.4	10	1, 2, 3, 4, 5, 6, 7, 8, 12
60	7.5	9.4	10	1, 2, 3, 4, 5, 6, 7, 8, 12
60	7.5	9.4	10	1, 2, 3, 4, 5, 6, 7, 8, 12
60	14.5	18.2	20	1, 2, 3, 4, 5, 6, 7, 8, 12
60	33	41.2	45	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

Construction Specification

Unit Tag: RTU-1
Project Name: BRANDYWINE
Project Location: SIEBERLICH

P: Provided by XeteX M: Mounted by XeteX

Unit Model

AHR - Rotory Heat Recovery Unit
Outdoor Construction

Air-to-Air Heat Exchanger w/Purge Section

P	M	
☒	☒	1) Rotary Heat Exchanger (3A Molec. Sieve)
☐	☐	2)

Unit Construction - Formed Sheet Metal

P	M	
☒		3) Heavy Duty Case - 18ga G90 Galv.
☒		4) Double Wall Constr. - 22ga G90 Galv.
☒		5) Unit Wall Insulation - Mineral Wool - 2.0"
☒		6) Unit Floor - 16ga Galv. - 2.0" Ins.
☒		7) Welded Steel Base Frame
☒		8) Access Doors w/Galvanized Hinges
☐		9) Access Door Windows -
☒		10) Lifting Lugs
☒		11) All Welded Drain Pan - 304 SS
☒		12) MPT Drains
☒		13) Plumbing / Electrical Chase
☒		14) Sloped Roof w/Capped Seams
☒	☐	15) Intake / Exhaust Hoods w/Birdscreens
☒		16) 1.0" Insulated Roof Curb – 12" Flat Stnd
☐	☐	17) Misc. Options -
☐	☐	18) Misc. Options -
☐	☐	19) Misc. Options -
☐	☐	20)
☐	☐	21)

Filters

P	M	
☒	☒	22) Outside Air - 2" MERV 8
☒	☒	23) Return Air - 2" MERV 8
☐	☐	24)
☐	☐	25)
☐	☐	26)

Dampers (Low Leakage) -

P	M	
☒	☒	27) Outside Air Shut-off Dmpr
☒	☒	28) Exhaust Air Shut-off Dmpr
☒	☒	29) Outside Air Wheel Bypass Dmpr
☐	☐	30) Coil Face & Bypass Dmpr
☐	☐	31) Recirculating Air Dmpr
☐	☐	32)

Blowers/Motors

P	M	
☒	☒	33) SA Blower - AF Wheel (Plenum)
☒	☒	34) SA Motor - NEMA Frame ODP
☒	☒	35) SA Motor Efficiency - Premium
☒	☒	36) SA Drive - Adj V-Belt
☒	☒	37) SA Isolators - 1" Spring Restrained
☒	☒	38) EA Blower - AF Wheel (Plenum)
☒	☒	39) EA Motor - NEMA Frame ODP
☒	☒	40) EA Motor Efficiency - Premium
☒	☒	41) EA Drive - Adj V-Belt
☒	☒	42) EA Isolators - 1" Spring Restrained
☒	☒	43) Drive Service Factor - 1.5
☒	☒	44) Adjustable Motor Base
☐	☐	45)
☐	☐	46)
☐	☐	47)
☐	☐	48)

Heating and Cooling Equipment

P	M	
☒	☒	49) Heating Coil - Hot Water
☒	☒	50) Cooling Coil - DX (AC)
☐	☐	51) Gas Fired Heater -
☒	☒	52) HGRH
☐	☐	53)
☐	☐	54)

Unit Electrical

P	M	
☒	☒	55) Non-Fused Disconnect - Single Point Power
☒	☒	56) Branch Circuit Distribution Block
☒	☒	57) Branch Circuit Circuit Breakers
☒	☒	58) NEMA 4 Electrical Panel
☐	☐	59) 120v GFI (Separate 120v Circuit Required)
☐	☐	60) Service Lights (Separate 120v Circuit Required)
☐	☐	61)

Miscellaneous Options

☒		62) ETL Listed Unit
☒		63) 1 Year(s) Limited Warranty
☐		64) Extra Set(s) of Blower Belts
☐		65) Extra Set(s) of Filters
☒		66) Start Up - By Others
☒		67) Critical Refrigerant Charging By Others
☐		68)

Notes:

Controls Specification

Unit Tag: RTU-1
Project Name: BRANDYWINE
Project Location: SIEBERLICH

F: Provided/Controlled by XeteX O: Provided/Controlled by Others I: Provided by Others, Installed by XeteX

Controls Communication

Device		
F		1) DDC Controller - BACnet IP
F		2) HMI - LCD Display
		3)

Heat Exchanger Controls - Mod. FaceBypass

Device	Signal	
F	F	4) Frost Control - DDC
F	F	5) Warm Weather Economizer - DDC
F	F	6) Summer Mode Changeover - DDC
		7) Heat Wheel VFD -
		8)
		9)

Supply Air Motor Controls

Device	Signal	
F	F	10) VFD w/o Bypass
		11) VFD Options -
		12) VFD Options -
		13) VFD Panel
		14)
		15)

Exhaust Air Motor Controls

Device	Signal	
F	F	16) VFD w/o Bypass
		17) VFD Options -
		18) VFD Options -
		19) VFD Panel
		20)
		21)

Filter Options

Device	Signal	
		22)
		23)

Damper Actuators

Device	Signal	
F	F	24) Outside Air Shut-off Dmpr - 2 Pos.
F	F	25) Exhaust Air Shut-off Dmpr - 2 Pos.
F	F	26) Outside Air Wheel Dmpr - Mod.
		27) Coil F&B Dmpr -
		28) Recirculating Air Dmpr -
		29) Occupied/Unoccupied Switch
		30)
		31)

Heating Controls

Device	Signal	
0	F	32) Heating Coil Valve -
		33) Staging Relays -
		34) Burner Control -
		35)
		36)

Cooling Controls

Device	Signal	
		37) Cooling Coil Valve -
F	F	38) Staging Relays - DX Coil
		39) Hot Gas Reheat -
		40)
		41)

Airflow Monitoring

Device	Signal	
		42) OA Airflow Monitor -
		43) RA Airflow Monitor -
		44) SA Airflow Monitor -
		45) EA Airflow Monitor -
		46)

Control Sensors

Device	Signal	
F	F	47) Outside Air - Temp. and Hum.
F	F	48) Return Air - Temp. and Hum.
F	F	49) Supply Air (After HX) - Temp.
F	F	50) Exhaust Air - Temp.
F	F	51) Heating Discharge - Temp.
F	F	52) Aux. Heating Discharge - Temp.
F	F	53) Cooling Discharge - Temp.
		54) Room Sensor -
		55) Pressure Transducer -
		56) Programmable Remote Stat
		57)
		58)

Remote Panel Options

Device	
	59) On-Off Switch
	60) Fan Indicator Lights
	61) Fan Switches
	62) Dirty Filter Lights
	63) Low Temp Limit Light
	64)

Miscellaneous Options

Device	Signal	
		65)
		66)

Notes:

PERFORMANCE SPECIFICATION

UNIT TAG : RTU-1 **PROJECT:** Brandywine
MODEL : AHR- 1400-RT-BP-RC-CD-HW-AC **LOCATION:** Seiberlich Elevation: 0 ft

UNIT SPECIFICATIONS

	SUPPLY	AIRFLOW	EXHAUST
MIN OUTDOOR AIRFLOW :	3000	SCFM	3249
TOTAL AIRFLOW :	10000	SCFM	3249
EXTERNAL. S.P. :	0.75	IN. WG	0.25
TOTAL S.P. :	3.50	IN. WG	1.65
BLOWER TYPE :	AF PLENUM	TYPE	AF PLENUM
DRIVE TYPE :	Belt	DRIVE	Belt
BLOWER SIZE :	25	DIAMETER	18
MOTOR HP :	10	HP	2
BHP :	8.28	BHP	1.37
RPM :	1436	RPM	1400
VOLTAGE :	480	VOLTS	480
PHASE :	3	PHASE	3

AIRotor Model #	SXA-1400-MW
Purge Angle :	5
Press. Diff. (IN. WG) :	1.5
Frost Ctrl Stpt (°F DB) :	15
Frost Ctrl SA (°F DB) :	
OACF CFM :	249
OACF :	
EATR (%) :	

UNIT OPTIONS

	COOLING		HEATING	HEATING
COIL TYPE	DX		HW	HG
BYPASS :	0%	%	0%	0%
PERCENT GLYCOL :				
ROWS :	8		3	2
FINS :	9	FPI	12	8
HEIGHT :	48	INCHES	48	48
WIDTH :	62	INCHES	62	62
AIR VELOCITY :	484	FPM	484	484
AIR P.D. :	0.85	IN. WG	0.33	0.23
EVAP TEMP (°F) :	45	WATER FLOW (GPM) :	31	
COND TEMP (°F) :	110	WATER P.D. (FTHD) :	3	
REF. P.D. (psi) :	5.8	WATER TEMP (°F) :	130/100	(psi)
ENT. TEMP DB :	76.2	°F	65.9	50.9
ENT. TEMP WB :	63.5	°F	N/A	N/A
LEAV. TEMP DB :	50.9	°F	96.1	75
LEAV. TEMP WB :	50.1	°F	N/A	N/A
MIXED AIR DB :		°F		
MIXED AIR ABS HUMIDITY :		grains/lb	N/A	N/A
CAPACITY :	380.9	MBH	327.7	261.5
TONS COOLING :	31.7	KW	96.0	76.6
SENS. HEAT RATIO :	0.72			
			56.2	
			95.0	

AIRotor PERFORMANCE

SUPPLY AIR	WINTER		SUMMER
ENTERING TEMP :	10.0	°F DB	92.0
ENTERING WB :	7.5	°F WB	75.0
ENTERING % RH :	52.0%	% RH	45.8%
ENT. ENTHALPY :	3.21	BTU/LB	38.32
LEAVING TEMP :	56.2	°F DB	78.9
LEAVING WB :	46.4	°F WB	65.6
LEAV. ENTHALPY :	18.28	BTU/LB	30.33
FACE VELOCITY :	501	FPM	501
AIR P.D. :	0.52	IN. WG	0.62
ENERGY RECOVERED :	203	MBH	108
EXHAUST AIR			
ENTERING TEMP :	70.0	°F DB	75.0
ENTERING WB :	54.4	°F WB	62.5
ENTERING % RH :	35.0%	% RH	49.8%
ENT. ENTHALPY :	22.71	BTU/LB	28.04
LEAVING TEMP :	23.8	°F DB	88.1
LEAVING WB :	20.8	°F WB	72.6
LEAV. ENTHALPY :	7.53	BTU/LB	36.12
FACE VELOCITY :	501	FPM	501
AIR P.D. :	0.59	IN. WG	0.60

MIXED AIR	CFM	DB	WB
OA SUMMER:	3000	78.9	65.6
RECIRC SUMMER	7000	75.0	62.5
MIX SUMMER	10000	76.2	63.5
OA WINTER	3000	56.2	46.4
RECIRC WINTER	7000	70.0	54.4
MIX WINTER	10000	65.9	52.1

ACCU :	CONDENSING COIL	UNIT
ROWS :		Tons : 35
FINS :	FPI	Circuits : 2
HEIGHT :	INCHES	HGRH : Yes
WIDTH :	INCHES	HGBP : No
FEEDS :		Digital Lead : Yes
AIR FLOW :	SCFM	
AIR P.D. :	IN. WG	(1) 15 Digital & (1) 20
ENT. TEMP DB :	°F DB	
CAPACITY :	MBH	

FILTERS

OUTSIDE AIR (2", MERV 8) :	Height	Width	Quantity
SIZE :	24	24	2
FACE VEL. (FPM) :	375		
AIR P.D. (IN. WG) :	0.47	(includes filter loading)	
RETURN AIR (2", MERV 8) :	Height	Width	Quantity
SIZE :	24	24	6
FACE VEL. (FPM) :	417		
AIR P.D. (IN. WG) :	0.52	(includes filter loading)	

Primary Energy Recovery Effectivnesses*

	Winter		Summer
Sensible :	77.0	%	77.1
Latent :	78.6	%	78.1
Total :	77.3	%	77.7

*Effectiveness is calculated according to ASHRAE and AHRI 1060-2005. The occurrence of condensation may cause values of greater than 100%. Contact Factory for further information.

DAMPERS		ACUTATORS	
OA SHUT-OFF :	Included	2 Position :	Included
EA SHUT-OFF :	Included	2 Position :	Included
OA Wheel Bypass Defrost:	Included	Modulating :	Included

Notes:

UNIT PHYSICAL DATA

HEIGHT (IN.) 112 **LENGTH (IN.)** 240 **WIDTH (IN.)** 76 **WGT (lbs)**

Vulcan – Cabinet Unit Heater (CUH-1,2,3), Convector (CV-1), Unit Heater (UH-1)

LINOVECTOR II

Submittal

LV3-S 11, 14
Slope Top Enclosure
Copper/Aluminum Ratings
Steel Element Ratings

☐ **LV3 Slip Jointed Enclosure**

Specification

ENCLOSURE:

STYLE: Slope
OUTLET: Stamped Louvers
Pencil Proof

LENGTHS: 2' thru 8' in 6' Increments
MAT'L: ☐ 18 Ga. CRS STD.
☐ 16 Ga. CRS (Opt'l)
☐ 14 Ga. CRS (Opt'l)
FINISH: ☐ Prime Finish Std.
☐ Baked Enamel (Opt'l).
☐ 16 Ga. Stainless Steel (Opt'l)
☐ 14 Ga. Aluminum (Opt'l)

ACCESSORIES:

☐ Overlapping Type
All accessories return to the wall at the bottom and have pre-punched holes for fastening to the wall.

ELEMENT:

TYPE: ☐ Cu/Al (Mechanically Expanded)
LENGTHS: 2'0' thru 12'6' in 1' Increments for 1' & 1-1/4' Cu.
2' thru 8' in 1' Increments for 3/4' Cu.

One End Flared, Std.

TYPE: ☐ IPS Steel (Mechanically Expanded)
LENGTHS: 2'0' thru 12'6' in 1' Increments
☐ NPT Thread both Ends Std.
☐ Beveled Ends for Field Weld
See Catalog for Working Pressures

BACKPLATE:

TYPE: ☐ Partial B/P
LENGTHS: 8' Only
MAT'L: ☐ 20 Ga. Prepainted Std.
☐ 18 Ga. Galvannealed (Opt'l)

TYPE: ☐ Full Ht. B/P (Opt'l)
LENGTHS: 2' thru 8' in 6' increments
MAT'L: ☐ 20 Ga. Galvannealed (Opt'l)
☐ 18 Ga. Painted (Opt'l)

AIRSEAL:

☐ 1/8' x 3/8' Closed Cell (Opt'l)

BRACKETS:

☐ Water Brkt w/B.B.
☐ 14" Only Steam Brkt w/Brkt Mtd B.B. Hngr

DAMPER:

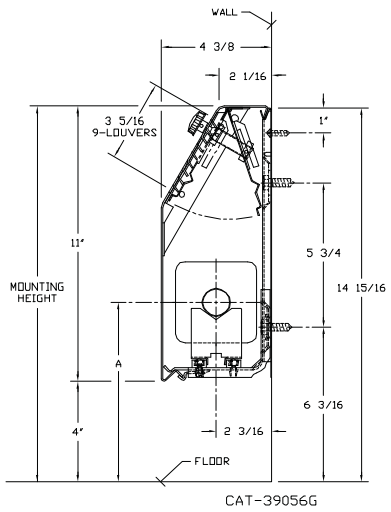
☐ Damper Blades Factory Installed
☐ Knob Damper (Opt'l)
☐ Tamper Resistant (Opt'l)

☐ LV3-S11

(use with water bracket only)

ELEMENT TUBE SIZE	CRADLE NUMBER	A
3/4" COPPER	2	7
1" COPPER	2	7-3/16
1-1/4" COPPER	1	6-5/8
1" STEEL	2	7-5/16
1-1/4" STEEL	1	6-13/16

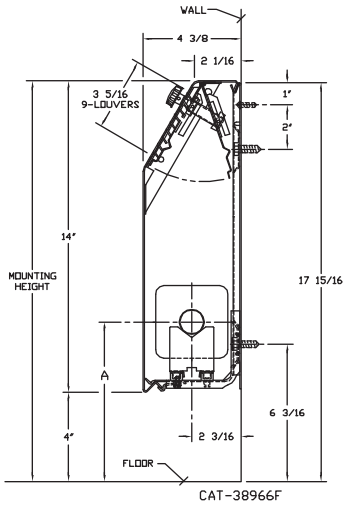
Note: Not recommended for steam applications.



CAT-39056G

☐ LV3-S14

ELEMENT TUBE SIZE	CRADLE NUMBER	A
3/4" COPPER	2	7
1" COPPER	2	7-3/16
1-1/4" COPPER	1	6-5/8
1" STEEL	2	7-5/16
1-1/4" STEEL	1	6-13/16



CAT-38966F

Vulcan RADIATOR
260 North Elm St., Westfield, MA 01085
(413) 568-9571 Fax: (413) 564-5661
www.vulcanrad.com

03/10

PROJECT: _____ **DATE:** _____
LOCATION: _____
ARCHITECT: _____
ENGINEER: _____
CONTRACTOR: _____
PO NUMBER: _____

STYLE "LV3-S" SLOPE TOP LOW PROFILE

STEEL ELEMENT								STEAM	HOT WATER (AVG.)					
								215°	200°	190°	180°	170°	160°	150°
I.P.S. SIZE	CATALOG DESIGNATION	FIN SIZE IN INCHES	FIN/FT	FIN THICKNESS	ENCL HEIGHT IN INCHES	TIERS AND CENTERS IN INCHES	MTG. HEIGHT IN INCHES	FACTOR	FACTOR					
								1.00	0.86	0.78	0.69	0.61	0.53	0.45
1"	VR11	2-3/4 x 3-3/4	40	.024"	11*	1	15	900	770	700	620	550	480	410
1-1/4"	VS133	3-1/4" SQ.	32	.032"	"	"	"	920	790	720	640	560	490	410
1-1/4"	VS134	3-1/4" SQ.	40	.032"	"	"	"	1000	860	780	690	610	530	450
1-1/4"	VS133	3-1/4" SQ.	32	.032"	14	1	18	960	830	750	660	590	510	430
1-1/4"	VS134	3-1/4" SQ.	40	.032"	14	1	18	1120	960	870	770	680	590	500

Notes: 1) Steel fins furnished as .032 thick painted black.
2) NPT threads furnished on steel elements. Please use domestic fittings for proper installation.
3) The ends can be provided chamfered for field welded fittings when specified.
***Not recommended for steam applications consult factory.**

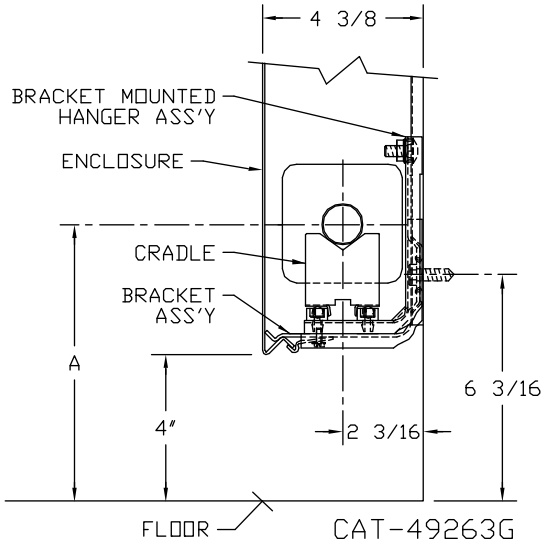
COPPER/ALUMINUM ELEMENT								STEAM	HOT WATER (AVG.)					
								215°	200°	190°	180°	170°	160°	150°
TUBE SIZE	CATALOG DESIGNATION	FIN SIZE IN INCHES	FIN/FT	FIN THICKNESS	ENCL HEIGHT IN INCHES	TIERS AND CENTERS IN INCHES	MTG. HEIGHT IN INCHES	FACTOR	FACTOR					
								1.00	0.86	0.78	0.69	0.61	0.53	0.45
3/4"	VC3/4-34	3-1/4 "SQ.	40	.020"	11*	1	15	1180	1010	920	810	720	630	530
3/4"	VC3/4-35	3-1/4" SQ.	50	.020"	"	"	"	1320	1140	1030	910	810	700	590
1"	VC33	3-1/4" SQ.	32	.020"	"	"	"	980	840	760	680	600	520	440
1"	VC34	3-1/4" SQ.	40	.020"	"	"	"	1150	990	900	790	700	610	520
1"	VC35	3-1/4" SQ.	50	.020"	"	"	"	1260	1080	980	870	770	670	570
1-1/4"	VC133	3-1/4" SQ.	32	.020"	"	"	"	920	790	720	630	560	490	410
1-1/4"	VC134	3-1/4" SQ.	40	.020"	"	"	"	1080	930	840	750	660	570	490
1-1/4"	VC135	3-1/4" SQ.	50	.020"	"	"	"	1190	1020	930	820	730	630	540
3/4"	VR01	2-1/4 x 2-1/2	50	.011"	"	"	"	710	610	550	490	430	380	320
3/4"	VR02	2-3/4 x 2-1/2	60	.011"	"	"	"	950	820	740	660	580	500	430
3/4"	VR04	2-3/4 x 3-3/4	50	.011"	"	"	"	980	840	760	680	600	520	440
1"	VR05	2-3/4 x 3-3/4	50	.011"	"	"	"	990	850	770	680	600	520	450
1"	VR03	2-3/4 x 2-1/2	55	.011"	"	"	"	920	790	720	630	560	490	410
3/4"	VC3/4-34	3-1/4 "SQ.	40	.020"	14	1	18	1290	1110	1010	890	790	680	580
3/4"	VC3/4-35	3-1/4" SQ.	50	.020"	"	"	"	1440	1240	1120	990	880	760	650
1"	VC33	3-1/4" SQ.	32	.020"	"	"	"	1060	910	830	730	650	560	480
1"	VC34	3-1/4" SQ.	40	.020"	"	"	"	1250	1080	980	860	760	660	560
1"	VC35	3-1/4" SQ.	*50*	*.020"*	"	"	"	*1370*	*1180*	*1070*	*950*	*840*	*730*	*620*
1-1/4"	VC133	3-1/4 "SQ.	32	.020"	14	1	18	1020	880	800	700	620	540	460
1-1/4"	VC134	3-1/4" SQ.	40	.020"	"	"	"	1190	1020	930	820	730	630	540
1-1/4"	VC135	3-1/4" SQ.	50	.020"	"	"	"	1330	1140	1040	920	810	700	600

***Not recommended for steam applications consult factory.**
Note: Copper tube furnished flared one end standard.

Steam Bracket and BB Hanger

ELEMENT TUBE SIZE	CRADLE NO.	A MIN	A MAX
3/4 COPPER	2	7 3/8	9 5/8
1" COPPER	2	7 1/2	9 3/4
1 1/4 COPPER	2	7 5/8	9 7/8
1 1/4 STEEL	1	7"	9 1/4

14" Enclosure Only



LINOVECTOR II

Submittal

LV4-DS 19, 25, 29
Double Slope Enclosures
Copper/Aluminum &
Steel Element Ratings

☐ **LV4 Slip Jointed Enclosure**

Specification

ENCLOSURE:

STYLE: Double Slope, Slope Outlet
OUTLET: Stamped Louvers
Pencil Proof

LENGTHS: 2' thru 8' in 6" Increments
MAT'L: ☐ 18 Ga. CRS STD.
☐ 16 Ga. CRS (Opt'l)
☐ 14 Ga. CRS (Opt'l)
FINISH: ☐ Prime Finish Std.
☐ Baked Enamel (Opt'l).
☐ 16 Ga. Stainless Steel (Opt'l)
☐ 14 Ga. Aluminum (Opt'l)

ACCESSORIES:

☐ Overlapping Type
All accessories return to the wall at the bottom and have pre-punched holes for fastening to the wall.

ELEMENT:

TYPE: ☐ Cu/Al (Mechanically Expanded)
LENGTHS: 2'0" thru 12'6" in 1" Increments for 1" & 1-1/4" Cu.
2' thru 8' in 1" Increments for 3/4" Cu.

One End Flared, Std.

TYPE: ☐ IPS Steel (Mechanically Expanded)
LENGTHS: 2'0" thru 12'6" in 1" Increments
☐ NPT Thread both Ends Std.
☐ Beveled Ends for Field Weld
See Catalog for Working Pressures

BACKPLATE:

TYPE: ☐ Partial B/P
LENGTHS: 8' Only
MAT'L: ☐ 20 Ga. Prepainted Std.
☐ 18 Ga. Galvannealed (Opt'l)

TYPE: ☐ Full Ht. B/P (Opt'l)
LENGTHS: 2' thru 8' in 6" increments
MAT'L: ☐ 20 Ga. Galvannealed (Opt'l)
☐ 18 Ga. Painted (Opt'l)

AIRSEAL:

☐ 1/8" x 3/8" Closed Cell (Opt'l)

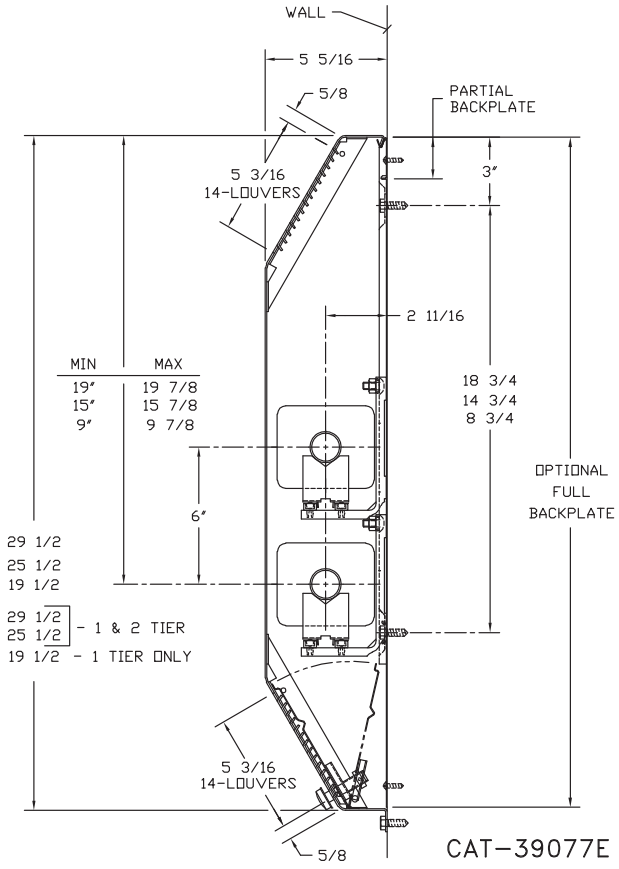
BRACKETS:

☐ Vertical Brkt w/Brkt Mtd B.B. Hngr
☐ Brkt Mtd B.B. Hngr for 2nd Tier

DAMPER:

☐ Damper Blades Factory Installed
☐ Knob Damper (Opt'l)
☐ Tamper Resistant (Opt'l)

☐ **LV4-DS**



Vulcan RADIATOR
260 North Elm St., Westfield, MA 01085
(413) 568-9571 Fax: (413) 564-5661
www.vulcanrad.com

03/10

PROJECT: _____ **DATE:** _____
LOCATION: _____
ARCHITECT: _____
ENGINEER: _____
CONTRACTOR: _____
PO NUMBER: _____

STYLE "LV4-DS" DOUBLE SLOPE TOP

STEEL ELEMENT

I.P.S. SIZE	CATALOG DESIGNATION	FIN SIZE IN INCHES	FIN/FT	FIN THICKNESS	ENCL HEIGHT IN INCHES	TIERS AND CENTERS IN INCHES	MTG. HEIGHT IN INCHES	STEAM 215° FACTOR 1.00	HOT WATER (AVG.) 200° FACTOR 0.86	190° FACTOR 0.78	180° FACTOR 0.69	170° FACTOR 0.61	160° FACTOR 0.53	150° FACTOR 0.45
1-1/4"	VS143	4-1/4" SQ.	32	.032"	19-1/2	1	–	1210	1040	940	830	740	640	540
					25-1/2	1	–	1280	1100	1000	880	780	680	580
					"	2-6 CL	–	1920	1650	1500	1320	1170	1020	860
					29-1/2	1	–	1350	1160	1050	930	820	720	610
					"	2-6 CL	–	2030	1750	1580	1400	1240	1080	910
1-1/4"	VS144	4-1/4" SQ.	40	.032"	19-1/2	1	–	1360	1170	1060	940	830	720	610
					25-1/2	1	–	1470	1260	1150	1010	900	780	660
					"	2-6 CL	–	2090	1800	1630	1440	1270	1110	940
					29-1/2	1	–	1560	1340	1220	1080	950	830	700
					"	2-6 CL	–	2240	1930	1750	1550	1370	1190	1010
2"	VS242	4-1/4" SQ.	25	.032"	19-1/2	1	–	1050	900	820	720	640	560	470
					25-1/2	1	–	1110	950	870	770	680	590	500
					"	2-6 CL	–	1670	1440	1300	1150	1020	890	750
					29-1/2	1	–	1170	1010	910	810	710	620	530
					"	2-6 CL	–	1770	1520	1380	1220	1080	940	800
2"	VS243	4-1/4" SQ.	32	.032"	19-1/2	1	–	1220	1050	950	840	740	650	550
					25-1/2	1	–	1290	1110	1010	890	790	680	580
					"	2-6 CL	–	1930	1660	1510	1330	1180	1020	870
					29-1/2	1	–	1360	1170	1060	940	830	720	610
					"	2-6 CL	–	2040	1750	1590	1410	1240	1080	920

Notes: 1) Steel fins furnished as .032 thick painted black
2) NPT threads furnished on steel elements. Please use domestic fittings for proper installation.
3) The ends can be provided chamfered for field welded fittings when specified.

COPPER/ALUMINUM ELEMENT

TUBE SIZE	CATALOG DESIGNATION	FIN SIZE IN INCHES	FIN/FT	FIN THICKNESS	ENCL HEIGHT IN INCHES	TIERS AND CENTERS IN INCHES	MTG. HEIGHT IN INCHES	STEAM 215° FACTOR 1.00	HOT WATER (AVG.) 200° FACTOR 0.86	190° FACTOR 0.78	180° FACTOR 0.69	170° FACTOR 0.61	160° FACTOR 0.53	150° FACTOR 0.45
3/4"	VC3/4-434	4-1/4 x 3-5/8	40	.020"	19-1/2	1	—	1470	1265	1145	1015	895	780	660
					25-1/2	1	—	1570	1350	1225	1085	960	830	705
					"	2-6 CL	—	2230	1215	1740	1540	1360	1180	1005
					29-1/2	1	—	1650	1420	1285	1140	1010	875	740
					"	2-6 CL	—	2330	2000	1815	1610	1420	1235	1050
3/4"	VC3/4-435	4-1/4 x 3-5/8	50	.020"	19-1/2	1	—	1590	1365	1240	1095	970	840	715
					25-1/2	1	—	1805	1550	1405	1245	1100	955	810
					"	2-6 CL	—	2435	2095	1900	1680	1485	1290	1095
					29-1/2	1	—	1950	1675	1520	1345	1190	1035	880
					"	2-6 CL	—	2685	2310	2095	1850	1640	1425	1210
1"	VC433	4-1/4 x 3-5/8	32	.020"	19-1/2	1	—	1330	1145	1035	920	810	705	600
					25-1/2	1	—	1400	1205	1090	965	855	740	630
					"	2-6 CL	—	2160	1857	1685	1490	1320	1145	970
					29-1/2	1	—	1460	1255	1140	1010	890	775	660
					"	2-6 CL	—	2235	1920	1745	1540	1365	1185	1005
1"	VC434	4-1/4 x 3-5/8	40	.020"	19-1/2	1	—	1535	1320	1195	1060	935	815	690
					25-1/2	1	—	1640	1410	1280	1130	1000	870	740
					"	2-6 CL	—	2300	1980	1795	1585	1405	1220	1035
					29-1/2	1	—	1720	1480	1340	1185	1050	910	775
					"	2-6 CL	—	2390	2055	1865	1650	1460	1265	1075
1"	VC435	4-1/4 x 3-5/8	50	.020"	19-1/2	1	—	1665	1430	1300	1150	1015	880	750
					25-1/2	1	—	1880	1615	1465	1295	1145	995	845
					"	2-6 CL	—	2280	1960	1780	1575	1390	1210	1025
					29-1/2	1	—	2040	1755	1590	1410	1245	1080	920
					"	2-6 CL	—	2510	2160	1955	1730	1530	1330	1130
1-1/4"	VC1433	4-1/4 x 3-5/8	32	.020"	19-1/2	1	—	1250	1075	975	860	760	660	565
					25-1/2	1	—	1320	1135	1030	910	805	700	595
					"	2-6 CL	—	2040	1755	1590	1410	1245	1080	920
					29-1/2	1	—	1375	1180	1070	950	840	730	620
					"	2-6 CL	—	2115	1820	1650	1450	1290	1120	950
1-1/4"	VC1434	4-1/4 x 3-5/8	40	.020"	19-1/2	1	—	1500	1290	1170	1035	915	795	675
					25-1/2	1	—	1625	1390	1265	1120	990	860	730
					"	2-6 CL	—	2255	1940	1760	1555	1375	1195	1015
					29-1/2	1	—	1685	1450	1315	1160	1030	895	760
					"	2-6 CL	—	2340	2010	1825	1615	1425	1240	1055

Note: Copper tube furnished flared one end standard.
Consult factory for optional stainless steel cover for swimming pool applications.

STYLE "LV4-DS" DOUBLE SLOPE TOP

COPPER/ALUMINUM ELEMENT								STEAM	HOT WATER (AVG.)					
								215°	200°	190°	180°	170°	160°	150°
TUBE SIZE	CATALOG DESIGNATION	FIN SIZE IN INCHES	FIN/FT	FIN THICKNESS	ENCL HEIGHT IN INCHES	TIERS AND CENTERS IN INCHES	MTG. HEIGHT IN INCHES	FACTOR	FACTOR					
								1.00	0.86	0.78	0.69	0.61	0.53	0.45
1-1/4"	VC1435	4-1/4 x 3-5/8	50	.020"	19-1/2	1	—	1610	1385	1255	1110	980	855	725
					25-1/2	1	—	1840	1580	1435	1270	1120	975	830
					"	2-6 CL	—	2165	1860	1690	1495	1320	1150	975
					29-1/2	1	—	1960	1685	1530	1350	1195	1040	880
					"	2-6 CL	—	2425	2085	1890	1675	1480	1285	1090
1"	VC43	4-1/4" SQ.	32	.020"	19-1/2	1	—	1425	1225	1110	985	870	755	640
					25-1/2	1	—	1500	1290	1170	1035	915	795	675
					"	2-6 CL	—	2235	1920	1745	1540	1365	1185	1005
					29-1/2	1	—	1565	1245	1220	1080	955	830	705
					"	2-6 CL	—	2445	2100	1910	1685	1490	1295	1100
1"	VC44	4-1/4" SQ.	40	.020"	19-1/2	1	—	1625	1395	1270	1120	990	860	730
					25-1/2	1	—	1760	1515	1370	1215	1075	930	790
					"	2-6 CL	—	2325	2000	1815	1605	1420	1230	1045
					29-1/2	1	—	1850	1590	1445	1275	1130	980	830
					"	2-6 CL	—	2520	2165	1965	1740	1535	1335	1135
1"	VC45	4-1/4" SQ.	50	.020"	19-1/2	1	—	1780	1530	1390	1230	1085	945	800
					25-1/2	1	—	2020	1735	1575	1400	1230	1070	910
					"	2-6 CL	—	2315	1990	1805	1595	1410	1225	1040
					29-1/2	1	—	2165	1860	1690	1495	1320	1150	975
					"	2-6 CL	—	2590	2225	2020	1790	1580	1370	1165
1-1/4"	VC143	4-1/4" SQ.	32	.020"	19-1/2	1	—	1400	1205	1090	965	855	740	630
					25-1/2	1	—	1475	1270	1150	1015	900	780	665
					"	2-6 CL	—	2195	1885	1710	1515	1340	1165	990
					29-1/2	1	—	1530	1315	1195	1055	935	810	690
					"	2-6 CL	—	2400	2065	1870	1655	1465	1270	1080
1-1/4"	VC144	4-1/4" SQ.	40	.020"	19-1/2	1	—	1600	1375	1250	1105	975	850	720
					25-1/2	1	—	1725	1485	1345	1190	1050	915	775
					"	2-6 CL	—	2280	1960	1780	1575	1390	1210	1025
					29-1/2	1	—	1815	1560	1415	1250	1110	960	815
					"	2-6 CL	—	2480	2130	1935	1710	1510	1315	1115
1-1/4"	VC145	4-1/4" SQ.	50	.020"	19-1/2	1	—	1745	1500	1360	1205	1065	925	785
					25-1/2	1	—	1986	1710	1550	1370	1210	1050	895
					"	2-6 CL	—	2270	1950	1770	1565	1385	1205	1020
					29-1/2	1	—	2135	1835	1665	1475	1300	1130	960
					"	2-6 CL	—	2545	2190	1985	1755	1550	1350	1145

REQUEST FOR INFORMATION

TO: PHIL CONTE, STUDIO JAED PRE-BID RFI#: 5

FROM: VINNIE COLONNA DATE: 20 MAY 2015

PROJECT: BRANDYWINE SPRINGS SCHOOL RENOVATIONS – BID PACK 'A'

DWG. # / DETAIL: SPEC. SECTIONS: PAGE:

REQUEST:

The construction Schedule states painting of the Ductwork within the cafeteria.
The RCP plan show the entire ceiling is to be Act tiles and grid.
Please clarify.

Submitted By: JR Rhoades, County Group Companies Date: 20 May 15

RESPONSE: The Ductwork is exposed and located below the ceiling system.

Response By: Vinnie Colonna / EDiS Company Date: 20 May 15

REQUEST FOR INFORMATION

TO: PHIL CONTE, STUDIO JAED PRE-BID RFI#: 6

FROM: VINNIE COLONNA DATE: 20 MAY 2015

PROJECT: BRANDYWINE SPRINGS SCHOOL RENOVATIONS – BID PACK 'A'

DWG. # / DETAIL: SEE BELOW SPEC. SECTIONS: PAGE:

REQUEST:

On the Mechanical drawings 8.27 thru 8.31 it calls for HRU's but the mechanical schedule drawing does not have them called out. Could you revise with the HRU unit schedule?

Submitted By: George Schubert, Worth & Company Date: 20 May 15

RESPONSE:

THE "HRU" IS NOTED ON THE COVER SHEET. THE HRU IS A HEAT RECOVERY UNIT AND IT IS AN INTEGRAL PART OF THE VRF HEAT RECOVERY SYSTEM. THE HRUs ARE ALSO SHOWN ON THE VRF PIPING SCHEMATICS ON 8.38. THEY ARE NOT SCHEDULED, BUT ARE RATHER PROPRIETARY COMPONENTS IDENTIFIED BY MANUFACTURER'S MODEL NUMBERS AND ARE PROVIDED BY THE VRF EQUIPMENT VENDOR.

Response By: DAN SHURINA Date: 5/21/2015

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:

a. Swinging doors.
b. Folding doors.
c. Other doors to the extent indicated.

B. Related Sections include the following:

1. Division 8 Section "Steel Doors and Frames"
2. Division 8 Section "Flush Wood Doors"
3. Division 8 Section "Aluminum Entrances and Storefronts"

1.3 SUBMITTALS

A. Product Data: Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Details of electrified door hardware, indicating the following:

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. System schematic.
b. Point-to-point wiring diagram.
c. Riser diagram.
d. Elevation of each door.

2. Detail interface between electrified door hardware and access fire alarm, control, and security building control system.

C. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of door hardware indicated.

1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

D. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.

    a. Organize door hardware sets in same order as in the Door Hardware Schedule at the end of Part 3.

3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.

        1) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
5. Submittal Sequence: Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in the Project construction schedule. Submit the final Door Hardware Schedule after Samples, Product Data, coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.

E. Keying Schedule: Prepared by or under the supervision of supplier, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

F. Product Certificates: Signed by manufacturers of electrified door hardware certifying that products furnished comply with requirements.

1. Certify that door hardware approved for use on types and sizes of labeled fire doors complies with listed fire door assemblies.

G. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

1. Include lists of completed projects with project names and addresses of architects and owners, and other information specified.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, indicating current products comply with requirements.

I. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.

J. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

1. Electrified Door Hardware Supplier Qualifications: An experienced door hardware supplier who has completed projects with electrified door hardware similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance, and who is acceptable to manufacturer of primary materials.

a. Engineering Responsibility: Prepare data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

2. Scheduling Responsibility: Preparation of door hardware and keying schedules.

C. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

1. Electrified Door Hardware Qualifications: Experienced in providing consulting services for electrified door hardware installations.

D. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that are listed to perform electrical modifications, by a testing and inspecting agency acceptable to authorities having jurisdiction, are acceptable.

E. Regulatory Requirements: Comply with provisions of the following:

1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1, FED-STD-795, "Uniform Federal Accessibility Standards**,"** as follows:

    a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
    b. Door Closers: Comply with the following maximum opening-force requirements indicated:

        1) Interior Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
        2) Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
        3) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

    c. Thresholds: Not more than 1/2 inch (13 mm) high, Not more than 3/4 inch (19 mm) high for exterior sliding doors. Bevel raised thresholds with a slope of not more than 1:2.

2. NFPA 101: Comply with the following for means of egress doors:

    a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
    b. Delayed-Egress Locks: Lock releases within 15 seconds after applying a force not more than 15 lbf (67 N) for not more than 3 seconds.
    c. Door Closers: Not more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.
    d. Thresholds: Not more than 1/2 inch (13 mm) high.

3. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

F. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1. Test Pressure: Test at atmospheric pressure.

G. Keying Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

I. All Electric Door Hardware shall be furnished and installed by the General Contractor. All Electric Door Hardware shall be wired by the Electrical Contractor. Both the Electrical & General Contractor shall meet and coordinate all work before proceeding.

J. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." Review methods and procedures related to electrified door hardware including, but not limited to, the following:

1. Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
2. Review sequence of operation for each type of electrified door hardware.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review required testing, inspecting, and certifying procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item with Door Number related to the final Approved Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver keys to manufacturer of key control system, or Owner as Directed.

D. Deliver keys to Owner by registered mail or overnight package service.

1.6 COORDINATION

A. Coordinate layout and installation of recessed pivots and closers with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

B. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, security system, and building control system.

1.7 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of operators and door hardware.

3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

C. Warranty Period for Locksets: Three, (3) years from date of Substantial Completion, unless otherwise indicated.

D. Warranty Period for Manual Closers: Ten, (10) years from date of Substantial Completion, unless otherwise indicated.

E. Warranty Period for Exit Devices: Three, (3) years from date of Substantial Completion, unless otherwise indicated.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies as used in the manufacture and installation of original products.

C. Engage a factory authorized service representative to train Owner’s maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section**,** door hardware sets indicated in door and frame schedule, and the Door Hardware Schedule at the end of Part 3.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturer's products**.** Retain subparagraph below for electrified door hardware.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Schedule at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

2.2 HINGES

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

1. Butt Hinges:
   a. Stanley Commercial Hardware

2. Continuous Hinges:

   a. Architectural Builders Hardware Mfg., Inc.
   b. Stanley Commercial Hardware

B. Standards: Comply with the following:
1. Hinges ANSI/BHMA Standard A156.1 Grade 1
2. Continuous Hinges ANSI/BHMA Standard A156.26 Grade 1

C. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

D. Concealed bearings are made from engineered polymer material with PTFE and Aramid fiber; bearing is maintenance free, no oil, no grease.

E. Butt hinges equipped with easily seated, non-rising pin. Hole in bottom of pin enables quick pin removal for ease of installation.

F. Continuous hinge material to be 14 gauge, 304 stainless steel

G. Continuous hinge steel pin to be .25 diameter, 304 stainless steel

H. Continuous hinge exterior barrel diameter .438 (7/16)

I. Continuous hinge knuckle to be 2”, including split nylon bearing at each separation for a quiet, smooth, self-lubricating operation

J. All hinges to carry Warnock Hersey Int. or UL for fire rated doors and frames up to 3 hours

K. Continuous hinges to have Symmetrically templated hole pattern

L. Continuous hinge to have a 10 year Warranty

M. Hinge Weight: Unless otherwise indicated, provide the following:
1. Supports weights up to 600lbs.

N. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Continuous Hinges: Stainless steel, with stainless-steel pin,
2. Interior Continuous Hinges: Stainless steel, with stainless-steel pin.
3. Continuous Hinges for Fire-Rated Assemblies: Stainless steel, with stainless-steel pin.
4. Exterior Butt Hinges: Stainless Steel or Brass or Bronze
5. Interior Butt Hinges: Steel or Brass or Bronze

O. Hinge Options: Comply with the following where indicated in the Door Hardware Schedule or on Drawings:

1. Hospital Tips: Slope ends of hinge barrel.
2. Maximum Security Pin: Fix pin in hinge barrel after it is inserted.

3. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:

   a. Outswinging exterior doors.
   b. Outswinging corridor doors with locks.

P. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Wood Screws: For wood doors and frames.
3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
4. Screws: Phillips flat-head screws; machine screws drilled and tapped holes for metal doors, wood screws for wood doors and frames. Finish screw heads to match surface of hinges.

2.3 LOCKS AND LATCHES

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

1. Mechanical Locks and Latches:
   a. Schlage Lock Corporation, Red Clay School District Standard

B. Standards: Comply with the following:

1. Bored Locks and Latches: BHMA A156.2.

C. Bored Locks: ANSI A156.2, BHMA Series 4000, Grade 1, and is UL Listed.

D. Certified Products: Provide door hardware listed in the following BHMA directories:

1. Mechanical Locks and Latches: BHMA's "Directory of Certified Locks & Latches."

E. Lock Trim: Comply with the following:

1. Lever: Cylindrical Locks & Latches, Zinc material with a minimum wall thickness of .060
2. Dummy Trim: Match lever lock trim and escutcheons.

F. Lock Functions: Function numbers and descriptions indicated in the Door Hardware Schedule comply with the following:

1. Bored Locks: BHMA A156.2.

G. Lock Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:

1. Bored Locks: Minimum 9/16-inch latch bolt throw.
2. Deadbolts: Minimum 1-inch bolt throw.

H. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

I. Cylindrical Locks & Latches to have solid shank with no opening for access to keyed lever keeper.

2.4 DOOR BOLTS

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

1. Flush Bolts:
   a. Burns Manufacturing Company, Inc.
   b. Triangle Brass Manufacturing Company, Inc.

B. Standards: Comply with the following:

1. Automatic and Self-Latching Flush Bolts: BHMA A156.3.
2. Manual Flush Bolts: BHMA A156.16.

C. Flush Bolts: BHMA Grade 1, designed for mortising into door edge.

D. Bolt Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:

1. Mortise Flush Bolts: Minimum 3/4-inch (19-mm) throw.

2.5 EXIT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Von Duprin, Inc., Red Clay School District Standard

B. Standard: BHMA A156.3.

1. BHMA Grade: Grade 1

C. Certified Products: Provide exit devices listed in BHMA's "Directory of Certified Exit Devices."

D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

E. Fire Exit Devices: Complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

F. Warranty: Exit device to have published Five (5) Year Warranty.

G. Exit device shall be “touch pad” type with a touch pad that shall extend a minimum of one half (1/2) of the door width.

H. Exit device shall have a one-quarter (1/4) gap between the face of the door and the touch bar channel eliminating the need for shims or cutting away the glass molding.

I. Exit device lock stile chassis shall be investment cast steel. Stamped steel units will not be accepted. All device latch bolts shall be stainless steel and shall be deadlocking type.

J. Exit device strikes shall be adjustable type investment cast stainless steel.

K. Exit device shall include sound reduction dampening for both depression and extension of the touch pad.

L. Exit device end cap shall be all metal and secured with a bracket that interlocks both at the touch bar channel base and hinge side filler to prevent end cap “peel-back”.

M. All exposed surfaces of the exit device housing shall be no less than 14 gauge brass or bronze; or no less than 16 gauge stainless steel. Aluminum housing type exit devices are not acceptable.

N. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

1. Operation: Rigid

O. Outside Trim: Lever, Lever with cylinder, Pull, Pull with cylinder**,** material and finish to match locksets, unless otherwise indicated.

1. Match design for locksets and latchsets, unless otherwise indicated.

2.6 CYLINDERS AND KEYING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cylinders:
a. Schlage Lock Corporation, Red Clay School District Standard

B. Standards: Comply with the following:

1. Cylinders: BHMA A156.5.

C. Cylinder Grade: BHMA Grade 1**,** Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

1. Number of Pins: Seven.
2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
3. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
4. Bored-Lock Type: Cylinders with tailpieces to suit locks.

D. Keying System: Unless otherwise indicated, provide a factory-registered keying system complying with the following requirements:
1. Existing System: Master key or grand master key locks to Owner's existing system.

E. Keys: Provide nickel-silver keys complying with the following:

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: **"DO NOT DUPLICATE."**

2. Quantity: In addition to one extra blank key for each lock, provide the following:

a. Cylinder Change Keys: Three.
b. Master Keys: Five.
c. Grand Master Keys: Five.
d. Great-Grand Master Keys: Five.
e. Construction Master Keys: Ten
f. Construction Core Control Keys: Five

2.7 STRIKES

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

1. Electric Strikes:

a. Security Door Controls Inc.
b. Folger Adam Security Inc.

B. Standards: Comply with the following:

1. Strikes for Bored Locks and Latches: BHMA A156.2.
2. Strikes for Auxiliary Deadlocks: BHMA A156.5.

C. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latch bolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

2.8 OPERATING TRIM

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

1. Burns Manufacturing Company, Inc.
2. Stanley Commercial Hardware

B. Standard: Comply with BHMA A156.6.

C. Materials: Fabricate from aluminum, brass, bronze, stainless steel, unless otherwise indicated.

2.9 ACCESSORIES FOR PAIRS OF DOORS

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

1. Coordinators:
   a. Burns Manufacturing Company, Inc.
   b. Triangle Brass Manufacturing Company, Inc.

2. Removable Mullions:
   a. Von Duprin, Inc., Red Clay School District Standard

3. Astragals:
   a. Stanley Commercial Hardware
   b. Architectural Builders Hardware, Inc.

B. Standards: Comply with the following:

1. Coordinators: BHMA A156.3.
2. Removable Mullions: BHMA A156.3.

C. Fire-Exit Removable Mullions: Provide removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions shall be used only with exit devices for which they have been tested.

2.10 CLOSERS

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

1. Surface-Mounted Closers:
   a. LCN Door Closers, Red Clay School District Standard

B. Standards: Comply with the following:

1. Closers: BHMA A156.4.

C. Surface Closers: BHMA Grade 1

D. Certified Products: Provide door closers listed in BHMA's "Directory of Certified Door Closers."

E. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.11 PROTECTIVE TRIM UNITS

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

1. Metal Protective Trim Units:
   a. Burns Manufacturing Company, Inc.
   b. Triangle Brass Manufacturing Company, Inc.

B. Standard: Comply with BHMA A156.6.

C. Materials: Fabricate protection plates from the following:
1. Stainless Steel: 0.050 inch (1.3 mm) thick; beveled 4 sides.

D. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine or self-tapping screws.

E. Furnish protection plates sized 2” less than door width on push side and 1” less than door width on pull side, by height specified in Door Hardware Schedule.

2.12 STOPS AND HOLDERS

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

1. Architectural Builders Hardware Mfg., Inc.

2. Triangle Brass Manufacturing Company, Inc.

B. Standards: Comply with the following:

1. Stops and Bumpers: BHMA A156.16.
2. Mechanical Door Holders: BHMA A156.16.
3. Electromagnetic Door Holders: BHMA A156.15.
4. Combination Overhead Holders and Stops: BHMA A156.8.
5. Door Silencers: BHMA A156.16.

C. Stops and Bumpers: BHMA Grade 1

D. Mechanical Door Holders: BHMA Grade 1

E. Combination Overhead Stops and Holders: BHMA Grade 1

F. Electromagnetic Door Holders for Labeled Fire Door Assemblies: Coordinate with fire detectors and interface with fire alarm system.

G. Silencers for Metal Door Frames: BHMA Grade 1; neoprene or rubber, minimum diameter 1/2 inch (13 mm); fabricated for drilled-in application to frame.

2.13 DOOR GASKETING

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

1. Door Gasketing:
   a. Reese Manufacturing Co., Inc.
   b. National Guard Products, Inc.

2. Door Bottoms:
   a. Reese Manufacturing Co., Inc.
   b. National Guard Products

B. Standard: Comply with BHMA A156.22.

C. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

D. Air Leakage: Not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.

E. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.

1. Provide smoke-labeled gasketing on 20-minute-rated doors and on smoke-labeled doors.

F. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL 10B or NFPA 252.

G. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

H. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

I. Gasketing Materials: Comply with ASTM D 2000 and AAMA 701/702.

2.14 THRESHOLDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Reese Manufacturing Co., Inc.
   2. National Guard Products, Inc.

B. Standard: Comply with BHMA A156.21.

2.15 FABRICATION

A. Manufacturer's Nameplate: Do not provide manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved by Architect.

   1. Manufacturer's identification will be permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

   1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
   2. Steel Machine or Wood Screws: For the following fire-rated applications:

      a. Mortise hinges to doors.
      b. Strike plates to frames.
      c. Closers to doors and frames.

   3. Steel Through Bolts: For the following fire-rated applications, unless door blocking is provided:

a. Surface hinges to doors.
b. Closers to doors and frames.
c. Surface-mounted exit devices.

4. Spacers or Sex Bolts: For through bolting of hollow metal doors.
5. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.16 FINISHES

A. Standard: Comply with BHMA A156.18.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. BHMA Designations: Comply with base material and finish requirements indicated by the following:

1. BHMA 600: Primed for painting, over steel base metal.
2. BHMA 626: Satin chromium plated over nickel, over brass or bronze base metal.
3. BHMA 628: Satin aluminum, clear anodized, over aluminum base metal.
4. BHMA 630: Satin stainless steel, over stainless steel base metal.
5. BHMA 652: Satin chromium plated over nickel, over steel base metal.
6. BHMA 689: Aluminum painted, over any base metal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

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

3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 series.

1. Surface-Applied Door Hardware: Drill and tap doors and frames according to SDI 107.

B. Wood Doors: Comply with DHI A115-W series.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Key Control System: Place keys on markers and hooks in key control system cabinet, as determined by final keying schedule. Supply key cabinet with 25% expansion. Factory install keys in cabinet or in field with owner’s representative. Key cabinet to be supplied with a “Complete System” equal to the Telkee System.

D. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings, in equipment room. Verify location with Architect.

1. Configuration: Provide one power supply for each door opening.
2. Configuration: Provide the least number of power supplies required to adequately serve doors with electrified door hardware.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.4 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Owner or Architect will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as

intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

B. Six-Month Adjustment: Approximately six months after date of Substantial Completion, Installer shall perform the following:

1. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
2. Consult with and instruct Owner's personnel on recommended maintenance procedures.
3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.8 DOOR HARDWARE SCHEDULE

Hardware Schedule
BRANDYWINE SPRINGS SCHOOL

Hardware Set #: 0001 - PRS DRS HMD & EXISTING FR EXTERIOR
D01 D04 D05 D16

Opening to Have:

Qty	Description	Finish	Mfg
6	HINGE FILLER PLATES 4-1/2" x VIF IF REQUIRED	600	
2	CONTINUOUS HINGE A500 x FULL HEIGHT	630	ABH
1	RIM CYLINDER (PRIMUS) 20-709	626	SCHLAGE
2	MORTISE CYLINDER (IC) 20-700 x XQ11-949	626	SCHLAGE
1	MORTISE CYLINDER (IC) 20-700	626	SCHLAGE
1	POWER TRANSFER PT1000	628	ABH

1	RIM EXIT DEVICE CD99EO	626	VON DUPRIN
1	REMOVABLE MULLION KR4954 x (2) 154 x SIZE AS REQ	689	VON DUPRIN
1	MULLION WALL MOUNT KIT MT54	689	VON DUPRIN
1	VANDAL RESISTANT TRIM VR910-NL	630	VON DUPRIN
1	VANDAL RESISTANT TRIM VR910-DT	630	VON DUPRIN
1	POWER SUPPLY PS914 x 900-2RS-FA	600	VON DUPRIN
1	RIM EXIT DEVICE SD x EL99NL-OP x 110NL-MD	626	VON DUPRIN
2	DOOR CLOSER 4111 x SPRING-H-CUSH x SRI	689	LCN
2	KICK PLATE 16" x 1" LDW .050 x B4E x CTSK	630	TRIMCO
2	DOOR CONTACT MC-7 x SPDT x 1" DIA		SDC
1	TEAR DROP SEAL 797B x HEAD & JAMBS	BLK	REESE
2	TEAR DROP SEAL 797B x MULLION x FULL HEIGHT	BLK	REESE
1	RAIN DRIP R201A x FULL WIDTH + 4"	628	REESE
1	THRESHOLD S483APR x SRS x FHSL x FULL WIDTH	628	REESE
2	DOOR SWEEP 772A x FULL WIDTH	628	REESE
1	CARD READER BY OTHERS		

Hardware Set #: 0002 - PRS DRS HMD & EXISTING FR EXTERIOR

D02 D06 D07 D08 D09 D10 D11 D12 D18 D19

Opening to Have:

Qty	Description	Finish	Mfg
6	HINGE FILLER PLATES 4-1/2" x VIF IF REQUIRED	600	
2	CONTINUOUS HINGE A500 x FULL HEIGHT	630	ABH
1	RIM CYLINDER (PRIMUS) 20-709	626	SCHLAGE
2	MORTISE CYLINDER (IC) 20-700 x XQ11-949	626	SCHLAGE
1	MORTISE CYLINDER (IC) 20-700	626	SCHLAGE
1	RIM EXIT DEVICE CD99EO	626	VON DUPRIN
1	RIM EXIT DEVICE CD99NL-OP	626	VON DUPRIN
1	REMOVABLE MULLION KR4954 x (2) 154 x SIZE AS REQ	689	VON DUPRIN
1	MULLION WALL MOUNT KIT MT54	689	VON DUPRIN
1	VANDAL RESISTANT TRIM VR910-NL	630	VON DUPRIN
1	VANDAL RESISTANT TRIM VR910-DT	630	VON DUPRIN
2	DOOR CLOSER 4111 x SPRING-H-CUSH x SRI	689	LCN
2	KICK PLATE 16" x 1" LDW .050 x B4E x CTSK	630	TRIMCO
1	TEAR DROP SEAL 797B x HEAD & JAMBS	BLK	REESE
2	TEAR DROP SEAL 797B x MULLION x FULL HEIGHT	BLK	REESE
1	RAIN DRIP R201A x FULL WIDTH + 4"	628	REESE
1	THRESHOLD S483APR x SRS x FHSL x FULL WIDTH	628	REESE
2	DOOR SWEEP 772A x FULL WIDTH	628	REESE

Hardware Set #: 0003 - SGL DRS HMD & EXISTING FR EXTERIOR
D03

Opening to Have:

Qty	Description	Finish	Mfg
3	HINGE FILLER PLATES 4-1/2" x VIF IF REQUIRED	600	
1	CONTINUOUS HINGE A500 x FULL HEIGHT	630	ABH
2	PRIMUS CYLINDER 20-765 (ND-LINE)	626	SCHLAGE
1	STOREROOM LOCKSET ND96LD x SPA x 10-025	626	SCHLAGE
2	KICK PLATE 16" x 1" LDW .050 x B4E x CTSK	630	TRIMCO
1	WALL STOP 1270WV	630	TRIMCO
1	TEAR DROP SEAL 797B x HEAD & JAMBS	BLK	REESE
1	RAIN DRIP R201A x FULL WIDTH + 4"	628	REESE
1	THRESHOLD S405A x SRS x FHSL x FULL WIDTH	628	REESE
1	DOOR SWEEP 772A x FULL WIDTH	628	REESE

Hardware Set #: 0004 - SGL DRS HMD & EXISTING FR EXTERIOR
D13 D14 D15 D17

Opening to Have:

Qty	Description	Finish	Mfg
3	HINGE FILLER PLATES 4-1/2" VIF IF REQUIRED	600	
1	CONTINUOUS HINGE A500 x FULL HEIGHT	630	ABH
1	RIM CYLINDER (PRIMUS) 20-709	626	SCHLAGE
1	MORTISE CYLINDER (IC) 20-700 x XQ11-949	626	SCHLAGE
1	RIM EXIT DEVICE CD99NL-OP	626	VON DUPRIN
1	VANDAL RESISTANT TRIM VR910-NL	630	VON DUPRIN
1	DOOR CLOSER 4111 x SPRING-H-CUSH	689	LCN
1	KICK PLATE 16" x 2" LDW .050 x B4E x CTSK	630	TRIMCO
1	TEAR DROP SEAL 797B x HEAD & JAMBS	BLK	REESE
1	RAIN DRIP R201A x FULL WIDTH + 4"	628	REESE
1	THRESHOLD S483APR x SRS x FHSL x FULL WIDTH	628	REESE
1	DOOR SWEEP 772A x FULL WIDTH	628	REESE

Hardware Set #: 0005 - PRS DRS HMD & HMF
D21 D23

Opening to Have:

Qty	Description	Finish	Mfg
2	CONTINUOUS HINGE A500 x FULL HEIGHT	630	ABH
1	RIM CYLINDER (PRIMUS) 20-709	626	SCHLAGE
2	MORTISE CYLINDER (IC) 20-700 x XQ11-949	626	SCHLAGE
1	MORTISE CYLINDER (IC) 20-700	626	SCHLAGE
1	RIM EXIT DEVICE CD99DT x 996L-DT x 17	626	VON DUPRIN
1	RIM EXIT DEVICE CD99L x 996L-17	626	VON DUPRIN
1	REMOVABLE MULLION KR4954 x (2) 154 x SIZE AS REQ	689	VON DUPRIN
1	MULLION WALL MOUNT KIT MT54	689	VON DUPRIN
2	DOOR CLOSER 4111 x SPRING-H-CUSH	689	LCN
2	KICK PLATE 16" x 1" LDW .050 x B4E x CTSK	630	TRIMCO
2	MOP PLATE 6" x 1" LDW .050 x B4E x CTSK	630	TRIMCO
2	SILENCERS 1229A	GRAY	TRIMCO

Hardware Set #: 0006 - SGL DRS WD & HMF
D20

Opening to Have:

Qty	Description	Finish	Mfg
1	CONTINUOUS HINGE A500 x FULL HEIGHT	630	ABH
1	RIM CYLINDER (PRIMUS) 20-709	626	SCHLAGE
1	MORTISE CYLINDER (IC) 20-700 x XQ11-949	626	SCHLAGE
1	RIM EXIT DEVICE CD99L x 996L x 17	626	VON DUPRIN
1	DOOR CLOSER 4111 x H-EDA	689	LCN
1	KICK PLATE 10" x 2" LDW .050 x B4E x CTSK	630	TRIMCO
1	MOP PLATE 6" x 1" LDW .050 x B4E x CTSK	630	TRIMCO
1	WALL STOP 1270WV	630	TRIMCO
3	SILENCERS 1229A	GRAY	TRIMCO

Hardware Set #: 0007 - SGL DRS WD & HMF
D22

Opening to Have:

Qty	Description	Finish	Mfg
1	CONTINUOUS HINGE A500 x FULL HEIGHT	630	ABH
1	RIM CYLINDER (PRIMUS) 20-709	626	SCHLAGE
1	MORTISE CYLINDER (IC) 20-700 x XQ11-949	626	SCHLAGE
1	RIM EXIT DEVICE CD99L x 996L x 17	626	VON DUPRIN
1	DOOR CLOSER 4111 x SPRING-H-CUSH	689	LCN
1	KICK PLATE 10" x 2" LDW .050 x B4E x CTSK	630	TRIMCO
1	MOP PLATE 6" x 1" LDW .050 x B4E x CTSK	630	TRIMCO
3	SILENCERS 1229A	GRAY	TRIMCO

END OF SECTION

SECTION 23 74 13

PACKAGED OUTDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Packaged roof top unit.

B. Unit controls.

C. Remote panel.

D. Mounting curb and base.

E. Maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 07 62 00 - Sheet Metal Flashing and Trim.

B. Section 23 05 13 - Common motor requirements for HVAC Equipment.

C. Section 23 05 48 - Vibration and Seismic Contols for HVAC.

D. Section 23 40 00 - HVAC Air Cleaning Devices.

E. Section 23 09 13 - Instrumentation and Control Devices for HVAC: Control components, time clocks.

F. Section 23 09 13 - Instrumentation and Control Devices for HVAC: Installation of thermostats and other controls components.

G. Section 26 27 17 - Equipment Wiring: Installation and wiring of thermostats and other controls components; wiring from unit terminal strip to remote panel.

H. Section 26 27 17 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Standard for Performance Rating of Unitary Air Conditioning and Air-Source Heat Pump Equipment; Air-Conditioning, Heating, and Refrigeration Institute.

B. AHRI 270 - Sound Rating of Outdoor Unitary Equipment; Air-Conditioning, Heating, and Refrigeration Institute.

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilation Systems; National Fire Protection Association.

1.04 SUBMITTALS

A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

C. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

D. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

1.07 WARRANTY

A. Provide a five year warranty to include coverage for refrigeration compressors and heat exchangers.

1.08 MAINTENANCE SERVICE

A. Furnish service and maintenance of packaged roof top units for one year from Date of Substantial Completion.

B. Provide maintenance service with a two month interval as maximum time period between calls. Provide 24-hour emergency service on breakdowns and malfunctions.

C. Include maintenance items as outlined in manufacturer's operating and maintenance data, including minimum of six filter replacements, minimum of one fan belt replacement, and controls check-out, adjustments, and recalibration.

D. Submit copy of service call work order or report, and include description of work performed.

1.09 EXTRA MATERIALS

A. Provide two sets of filters.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Modine Corporation

B. Trane Corporation

C. Xetex Corporation

D. Innovent Corporation

E. McQuay

F. Valent Incorporated

2.02 AIR CONDITIONING UNITS

A. General: Roof or ground mounted packaged units having gas burner as scheduled and electric refrigeration.

B. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, return fan, heat exchanger and burner,, energy recovery wheel (where noted in the schedule), factory-mounted controls, air filters, hot water heating coil, refrigerant cooling coil and variable-speed compressors and hot-gas reheat circuits, condenser coil and condenser fan as scheduled.

C. Disconnect Switch: Factory mount disconnect switch on equipment under provisions of Section 26 27 17.

2.03 FABRICATION

A. Cabinet: Galvanized steel with baked enamel finish, including access doors with piano hinges and locking handle. Structural members shall be minimum 18 gage, with access doors or panels of minimum 20 gage.

B. Insulation: two inch thick minimum glass fiber or injected foam, double-walled unit construction.

C. Supply and Return and Exhaust Fan as scheduled: Backward inclined or airfoil type, resiliently mounted with V-belt drive and adjustable variable pitch motor pulley, and rubber isolated hinge mounted high efficiency motor or direct drive as indicated. Isolate complete fan assembly. Provide factory-mounted variable-frequency drives for all fan motors.

D. Air Filters: Minimum efficiency reporting value (MERV) of at least 10.

E. Vibration Isolation Curb: 20" nominal height, Kinetics Noise Control model ESR or approved equal.

2.04 HEATING COIL

A. Water Heating Coils:
   1. Headers: seamless copper tube, or prime coated steel pipe with brazed joints.
   2. Configuration: Drainable, with threaded plugs for drain and vent; serpentine type with return bends on smaller sizes and return headers on larger sizes.
   3. Fully modulating control valve.

2.05 EVAPORATOR OR INDOOR COILS

A. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection for cooling coils.

B. Provide thermostatic expansion valves for units of 6 tons capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons cooling capacity and larger.

2.06 COMPRESSOR

A. Provide hermetic compressors, 3600 rpm maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gage ports, and filter drier.

B. Five minute timed off circuit to delay compressor start.

C. Outdoor thermostat to energize compressor above 35 degrees F ambient.

D. Provide step capacity control by variable-speed scroll technology and/or adjusting variable-speed compressors.

E. Provide hot-gas reheat coil for humidity control.

2.07 CONDENSER OR OUTDOOR COIL

A. Provide copper tube aluminum or copper fin coil assembly with subcooling rows and coil guard.

B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.

C. Provide refrigerant pressure switches to cycle condenser fans.

2.08 MIXED AIR CASING

A. Dampers: Provide outside, return, and relief dampers with damper operator and control package to automatically vary outside air quantity. Outside air damper to fall to closed position.

B. Gaskets: Provide tight fitting dampers with edge gaskets.

C. Damper Operator, Units 7.5 Ton Cooling Capacity and Larger: 24 volt with gear train sealed in oil with spring return on.

D. Outdoor airflow monitoring station: Provided at intake of the unit.

E. Mixed Air Controls: Maintain selected supply air temperature and return dampers to minimum position on call for heating and above 70 degrees (F) ambient, or when ambient air enthalpy exceeds return air enthalpy.

2.09 OPERATING CONTROLS

A. Provide factory controller and all necessary sensors and components for operation of refrigerant system, fan VFDs based on static-pressure feedback, energy recovery wheel, humidity control function, and economizer function. The humidity control (dehumidification sequence) shall be capable of being enabled when the unit is in both heating and cooling modes. The humidistat setpoint shall govern control of this sequence.

B. Provide BACnet interface on unit for connection of operating controls for BAS control. Control shall allow for modulating heating via the hot water coil control valve and modulating stages cooling, fan, and damper control. See section 23 09 93 for required data to be relayed to the BAS for monitoring and control.

C. See Specification Section 230993 - Sequence Of Operations, paragraphs 3.08 and 3.11 for required operatiing capabilities of the units.

2.10 HEAT RECOVERY

A. The heat recovery module shall be provided as shown on the drawing and shall have a factory mounted and tested energy recovery wheel. The energy recovery wheel shall be mounted in a rigid frame containing the wheel drive motor, drive belt, wheel seats and bearings.

B. The energy recovery cassette shall be rated in accordance with ARI Standard 1060 and shall bear the ARI certification symbol.

C. The energy recovery cassette shall contain a total energy heat wheel constructed of a light weight polymer material with permanently bonded desiccant coating. The energy recovery wheel media shall be capable of removal from the cassette and be cleanable using hot water or light detergent without degrading the latent efficiency.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.or illustrated by the manufacturer.

B. Verify that proper power supply is available.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NFPA 90A.

C. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

D. Locate remote panels where identified in field coordination meeting.

E. Tie unit into BAS as specified.

3.03 SYSTEM STARTUP

A. Prepare and start equipment. Adjust for proper operation.

3.04 CLOSEOUT ACTIVITIES

A. Demonstrate operation to Owner's maintenance personnel.

3.05 MAINTENANCE

A. Provide service and maintenance of packaged roof top units for one year year from Date of Substantial Completion.

B. Provide routine maintenance service with a three month interval as maximum time period between calls.

C. Include maintenance items as outlined in manufacturer's operating and maintenance data, including minimum of six filter replacements, minimum of one fan belt replacement, and controls check-out, adjustments, and recalibration.

D. After each service call, submit copy of service call work order or report that includes description of work performed.

END OF SECTION

SECTION 23 81 29

VARIABLE REFRIGERANT VOLUME (VRV, VRF) HVAC SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Variable refrigerant volume HVAC system includes:
   1. Outdoor/Condensing unit(s).
   2. Indoor/Evaporator units.
   3. Branch selector units.
   4. Refrigerant piping.
   5. Control panels.
   6. Control wiring.

1.02 RELATED REQUIREMENTS

A. Section 01 23 00 - Alternates: List of alternates relevant to this section.

B. Section 01 79 00 - Demonstration and Training.

C. Section 22 10 05 - Plumbing Piping: Condensate drain piping.

D. Section 22 30 00 - Plumbing Equipment: Cooling condensate removal pumps.

E. Section 23 08 00 - Commissioning of HVAC.

F. Section 23 23 00 - Refrigerant Piping and Specialties: Additional requirements for refrigerant piping system.

G. Section 26 27 17 - Equipment Wiring: Power connections to equipment.
   1. Provide separate power connections for each unit of equipment.

H. Section 23 09 23 and 23 09 93: Building automation system providing centralized control of this system.

I. Section 01 91 00 - Commissioning

J. Section 01 91 10 - Functional Testing Procedures

K. Section 23 08 00 - Mechanical Systems Commissioning

L. Section 23 08 10 - Control Systems Commissioning

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; Air-Conditioning, Heating, and Refrigeration Institute.

B. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals.

C. ASHRAE Std 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings; American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc; 2013, Including All Addenda (ANSI/ASHRAE/IES Std 90.1).

D. NFPA 70 - National Electrical Code; National Fire Protection Association.

E. UL 1995 - Heating and Cooling Equipment.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Pre-Bid Submittals: For proposed substitute systems/products, as defined in PART 2, and alternate systems/products, as defined above, proposer shall submit all data described in this article, under the terms given for substitutions stated in PART 2.

C. Design Data:
   1. Provide design calculations showing that system will achieve performance specified.
   2. Provide design data required by ASHRAE 90.1.

D. Product Data: Submit manufacturer's standard data sheets showing the following for each item of equipment, marked to correlate to equipment item markings shown in the contract documents:
   1. Control Panels: Complete description of options, control points, zones/groups.

E. Specimen Warranty: Copy of manufacturer's warranties.

F. Shop Drawings: Installation drawings custom-made for this project; include as-designed HVAC layouts, locations of equipment items, refrigerant piping sizes and locations, condensate piping sizes and locations, remote sensing devices, control components, electrical connections, control wiring connections. Include:
   1. Detailed piping diagrams, with branch balancing devices.
   2. Condensate piping routing, size, and pump connections.
   3. Detailed power wiring diagrams.
   4. Detailed control wiring diagrams.
   5. Locations of required access through fixed construction.
   6. Drawings required by manufacturer.

G. Operating and Maintenance Data:
   1. Manufacturer's complete standard instructions for each unit of equipment and control panel.
   2. Custom-prepared system operation, troubleshooting, and maintenance instructions and recommendations.
   3. Identification of replaceable parts and local source of supply.

H. Project Record Documents: Record the following:
   1. As-installed routing of refrigerant piping and condensate piping.
   2. Locations of access panels.
   3. Locations of control panels.

I. Warranty: Executed warranty, made out in Owner's name.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Company that has been manufacturing variable refrigerant volume heat pump equipment for at least 5 years.
   2. Company that provides system design software to installers.

B. Installer Qualifications: Trained and approved by manufacturer of equipment.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle equipment and refrigerant piping according to manufacturer's recommendations.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Compressors: Provide manufacturer's warranty for six (6) years from date of installation. During the stated period, should any part fail due to defects in material and workmanship, it shall be repaired or replaced by the manufacturer. All warranty service work shall be preformed by a factory trained service professional.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: The system design shown in the contract documents is based on equipment and system designed by LG Industries.

B. Additional acceptable manufacturers:
   1. Daikin AC: www.daikinac.com
   2. Mitsubishi: www.lg-vrf.com
   3. Samsung: www.www.samsungaccentre.com
   4. Trane Corporation: www.trane.com

C. For systems proposed by other manufacturers other than the basis of design, LG, all required modifications to the design and installation shall be the responsibility of the contractor and supplier for both costs and coordination with all other contractors and designers. These changes include, but are not limited to:
   1. Changes in refrigerant piping sizes, legnhts, and locations.
   2. Changes in branch selector quantities, locations, and accessibility.
   3. Changes in electrical requirements, including all power wiring, terminations, breakers, disconnects, and control wiring.
      a. UNDER NO CIRCUMSTANCES MAY BLOWER COIL OR FAN COIL TERMINAL UNITS BE GROUPED TOGETHER ON THE SAME ELECTRICAL CIRCUIT. All units must maintain a dedicated circuit to each.
   4. Changes in heat-pump unit locations and quantities.
   5. Changes in structural supports, vibration isolation, and hangers.
   6. Changes to the drawings to reflect the new system parameters.

2.02 HVAC SYSTEM DESIGN

A. System Operation: Heating and cooling, simultaneously.
   1. Zoning: Provide capability for temperature control for each individual indoor/evaporator unit independently of all other units.
   2. Zoning: Provide heating/cooling selection for each individual indoor/evaporator unit independently of all other units.
   3. Provide a complete functional system that achieves the specified performance based on the specified design conditions and that is designed and constructed according to the equipment manufacturer's requirements.
   4. Conditioned spaces are shown on the drawings.
   5. Branch selector unit locations are shown on the drawings for reference only. Final design locations shall be corrdinated in the field to ensure optimized line lengths and maintanence access.
   6. Required equipment unit capacities are shown on the drawings.
   7. Refrigerant piping sizes shown on the drawings are for general reference only. Final line sizing shall be the responsibility of the successful contractor and manufacturer.
   8. Connect equipment to condensate piping; condensate piping is shown on the drawings.

B. Cooling Mode Interior Design Performance:
   1. Daytime Setpoint: 74 degrees F, plus or minus 2 degrees F.
   2. Setpoint Range: 57 degrees F to 80 degrees F.
   3. Night Setback: 78 degrees F.
   4. Interior Relative Humidity: 50 percent, maximum.

C. Heating Mode Interior Design Performance:
   1. Daytime Setpoint: 70 degrees F, plus or minus 2 degrees F.
   2. Setpoint Range: 59 degrees F to 76 degrees F.
   3. Night Setback: 60 degrees F.

4. Interior Relative Humidity: 20 percent, minimum.

D. Outside Air Design Conditions:
   1. Summer Outside Air Design Temperature: 0.4 percent cooling design condition listed in ASHRAE Fundamentals Handbook.

E. Operating Temperature Ranges:
   1. Simultaneous Heating and Cooling Operating Range: minus 4 degrees F to 60 degrees F dry bulb.
   2. Cooling Mode Operating Range: minus 4 degrees F to 110 degrees F dry bulb.
   3. Heating Mode Operating Range: 0 degrees F to 77 degrees F dry bulb; minus 4 degrees F to 60 degrees F wet bulb; without low ambient controls or auxiliary heat source.

F. Refrigerant Piping Lengths: Provide equipment capable of serving system with following piping lengths without any oil traps:
   1. Minimum Piping Length from Outdoor/Central Unit(s) to Furthest Terminal Unit: 540 feet, actual; 620 feet, equivalent.
   2. Total Combined Liquid Line Length: 3280 feet, minimum.
   3. Minimum Piping Length Between Indoor Units: 49 feet.

G. Controls: Provide the following control interfaces:
   1. For Each Indoor/Evaporator Unit: One wall-mounted wired "local" controller, with temperature sensor; locate where directed, in each space.
      a. Where two or more units are used to condition the same space, provide a splitter or twinning kit to allow for multiple unit control from a single controller.
   2. One central remote control panel for entire system; locate where indicated.
   3. BACNet gateways sufficient to connect all units to building automation system by others; include wiring to gateways. Unit shall be BTL certified.
   4. Building automation system by HVAC system manufacturer; provide one user stations located where indicated.

H. Local Controllers: Mount units above ceiling for use with remote, flat-plate temerpature sensors. Units shall be wired, and provide local setpoint adjustment (with central control override, maximum temperature adjustment), and temperature display for trouble-shooting.

I. Remote Temperature Sensors: Provide wall-mounted, flush-mount flat-plate style RTD temperatuer sensors located in the same room for all units. For rooms with multiple units, provide twinning kits for simlutaneous control.

2.03 EQUIPMENT

A. All Units: Factory assembled, wired, and piped and factory tested for function and safety.
   1. Refrigerant: R-410A.
   2. Performance Certification: AHRI Certified; www.ahrinet.org.
   3. Safety Certification: Tested to UL 1995 by UL or Intertek-ETL and bearing the certification label.
   4. Provide outdoor/condensing units capable of serving indoor unit capacity up to 200 percent of the capacity of the outdoor/condensing unit.
   5. Provide units capable of serving the zones indicated.
   6. Thermal Performance: Provide heating and cooling capacity as indicated, based on the following nominal operating conditions:
   7. Energy Efficiency: Report EER and COP based on tests conducted at “full load” in accordance with AHRI 210/240 or alternate test method approved by U.S. Department of Energy.

B. Electrical Characteristics:
   1. See drawings.

C. System Controls:
   1. Include self diagnostic, auto-check functions to detect malfunctions and display the type and location.

D. Unit Controls: As required to perform input functions necessary to operate system; provided by manufacturer of units.
   1. Provide interfaces to remote control and building automation systems in BACNET native format.

E. Wiring:
   1. Control Wiring: 18 AWG, 2-conductor, non-shielded, non-polarized, stranded cable.
   2. Control Wiring Configuration: Daisy chain.
   3. All control wiring for the VRF system in it's entirety is the responsbility of the installing contractor, including, but not limited to: Wiring between the condensing unit(s) and system controller, wiring between the branch selector boxes and system controller, wiring from the terminal units to the system controllers, wiring from the thermostats to the terminal units. The BAS contractor shall only be required to provide communications wiring to the BACnet interface from the nearest BAS controller.

F. Refrigerant Piping:
   1. Refrigerant Flow Balancing: Provide refrigerant piping joints and headers specifically designed to ensure proper refrigerant balance and flow for optimum system capacity and performance.
   2. Insulate each refrigerant line individually between the condensing and indoor units.

2.04 OUTDOOR/CONDENSING UNITS

A. Outdoor/Condensing Units: Air-cooled DX refrigeration units, designed specifically for use with indoor/evaporator units; factory assembled and wired with all necessary electronic and refrigerant controls; modular design for ganging multiple units.
   1. Refrigeration Circuit: Scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports and refrigerant regulator.
   2. Refrigerant: Factory charged.
   3. Variable Volume Control: Modulate compressor capacity automatically to maintain constant suction and condensing pressures while varying refrigerant volume to suit heating/cooling loads.
   4. Capable of being installed with wiring and piping to the left, right, rear or bottom.
   5. Capable of heating operation at low end of operating range as specified, without additional low ambient controls or auxiliary heat source; during heating operation, reverse cycle (cooling mode) oil return or defrost is not permitted, due to potential reduction in space temperature.
   6. Sound Pressure Level: As specified, measured at 3 feet from front of unit; provide night setback sound control as a standard feature; three selectable sound level steps of 55 dB, 50 dB, and 45 dB, maximum.
   7. Power Failure Mode: Automatically restart operation after power failure without loss of programmed settings.
   8. Safety Devices: High pressure sensor and switch, low pressure sensor/switch, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.
   9. Provide refrigerant sub-cooling to ensure the liquid refrigerant does not flash when supplying to us indoor units.
   10. Oil Recovery Cycle: Automatic, occurring 2 hours after start of operation and then every 8 hours of operation; maintain continuous heating during oil return operation.

11. Controls: Provide contacts for electrical demand shedding.

B. Unit Cabinet: Weatherproof and corrosion resistant; rust-proofed mild steel panels coated with baked enamel finish.
   1. Designed to allow side-by-side installation with minimum spacing.

C. Fans: One or more direct-drive propeller type, vertical discharge, with multiple speed operation via DC (digitally commutating) inverter.
   1. Provide minimum of 2 fans for each condensing unit.
   2. External Static Pressure: Factory set at 0.12 in WG, minimum.
   3. Indoor Mounted Air-Cooled Units: External static pressure field set at 0.32 in WG, minimum; provide for mounting of field-installed ducts.
   4. Fan Airflow: As indicated for specific equipment.
   5. Fan Motors: Factory installed; permanently lubricated bearings; inherent protection; fan guard; output as indicated for specific equipment.

D. Condenser Coils: Copper tubes expanded into aluminum fins to form mechanical bond; waffle louver fin and rifled bore tube design to ensure high efficiency performance.

E. Compressors: Scroll type, hermetically sealed, variable speed inverter-driven and fixed speed in combination to suit total capacity; minimum of one variable speed, inverter driven compressor per condenser unit; minimum of two compressors per condenser unit; capable of controlling capacity within range of 6 percent to 100 percent of total capacity.
   1. Multiple Condenser Modules: Balance total operation hours of compressors by means of duty cycling function, providing for sequential starting of each module at each start/stop cycle, completion of oil return, and completion of defrost, or every 8 hours. Provide twinning kits where required.
   2. Failure Mode: In the event of compressor failure, operate remaining compressor(s) at proportionally reduced capacity; provide microprocessor and associated controls specifically designed to address this condition.
   3. Provide each compressor with crankcase heater, high pressure safety switch, and internal thermal overload protector.
   4. Provide oil separators and intelligent oil management system.
   5. Provide spring mounted vibration isolators.

2.05 BRANCH SELECTOR UNITS

A. Branch Selector Units: Concealed boxes designed specifically for this type of system to control heating/cooling mode selection of downstream units; consisting of electronic expansion valves, subcooling heat exchanger, refrigerant control piping and electronics to facilitate communications between unit and main processor and between branch unit and indoor/evaporator units.
   1. Provide one electronic expansion valve for each downstream unit served, except multiple indoor/evaporator units may be connected, provided balancing joints are used in downstream piping and total capacity is within capacity range of the branch selector.
   2. When branch unit is simultaneously heating and cooling, energize subcooling heat exchanger.
   3. Casing: Galvanized steel sheet; with flame and heat resistant foamed polyethylene sound and thermal insulation.
   4. Refrigerant Connections: Braze type.
   5. Condensate Drainage: Provide condensate drain tap where required.

2.06 INDOOR/EVAPORATOR UNITS

A. All Indoor/Evaporator Units: Factory assembled and tested DX fan-coil units, with electronic proportional expansion valve, control circuit board, factory wiring and piping, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.

1. Refrigerant: Refrigerant circuits factory-charged with dehydrated air, for field charging.
2. Temperature Control Mechanism: Return air thermistor and computerized Proportional-Integral-Derivative (PID) control of superheat.
3. Dehumidification Function: On command.
4. Coils: Direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond; waffle louver fin and high heat exchange, rifled bore tube design; factory tested.
   a. Provide thermistor on liquid and gas lines.
5. Fans: Direct-drive, with statically and dynamically balanced impellers; high and low speeds unless otherwise indicated; motor thermally protected.
6. Return Air Filter: High efficiency, MERV 13
7. Condensate Drainage: Built-in condensate drain pan with PVC drain connection.
8. Cabinet Insulation: Sound absorbing foamed polystyrene and polyethylene insulation.

B. Recessed Ceiling Units: Four-way airflow cassette with central return air grille, for installation in a fixed ceiling.
   1. Cabinet Height: Maximum of 10 inches above face of ceiling.
   2. Exposed Housing: White, impact resistant, with washable decoration panel.
   3. Supply Airflow Adjustment:
      a. Via motorized louvers which can be horizontally and vertically adjusted from 0 to 90 degrees.
      b. Field-modifiable to 3-way and 2-way airflow.
      c. Three auto-swing positions, including standard, draft prevention and ceiling stain prevention.
   4. Return Air Filter: High efficiency,MERV 13.
   5. Minimum Capacity: As indicated on the drawings.
   6. Sound Pressure Range: Between 28 dB(A) to 33 dB(A) at low speed measured at 5 feet below the unit.
   7. Fan: Direct-drive turbo type, with motor output range of 0.06 to 0.12 HP.
   8. Condensate Pump: Built-in, with lift of 21 inches, minimum.
   9. Provide side-mounted fresh air intake duct connection.

C. Concealed-In-Ceiling Units: Ducted horizontal discharge and return; galvanized steel cabinet.
   1. Return Air Filter: MERV 13.
   2. Sound Pressure: Measured at low speed at 5 feet below unit.
   3. Provide external static pressure switch adjustable for high efficiency filter operation
   4. Condensate Pump: Built-in, with lift of 9 inches, minimum.
   5. Switch box accessible from side or bottom.

D. Wall Surface-Mounted Units: Finished white casing, with removable front grille; foamed polystyrene and polyethylene sound insulation; wall mounting plate; polystyrene condensate drain pan.
   1. Airflow Control: Auto-swing louver that closes automatically when unit stops; five (5) steps of discharge angle, set using remote controller; upon restart, discharge angle defaulting to same angle as previous operation.
   2. Sound Pressure Range: Measured at low speed at 3.3 feet below and away from unit.
   3. Condensate Drain Connection: Side (end), not concealed in wall.
   4. Fan: Direct-drive cross-flow type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that required electrical services have been installed and are in the proper locations prior to starting installation.

B. Verify that condensate piping has been installed and is in the proper location prior to starting installation.

C. Notify Architect if conditions for installation are unsatisfactory.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install refrigerant piping in accordance with equipment manufacturer's instructions.

C. Perform wiring in accordance with NFPA 70, National Electric Code (NEC).

D. Coordinate with installers of systems and equipment connecting to this system.

3.03 FIELD QUALITY CONTROL

A. Provide manufacturer's field representative to inspect installation prior to startup.

3.04 SYSTEM STARTUP

A. Provide manufacturer's field representative to perform system startup.

B. Prepare and start equipment and system in accordance with manufacturer's instructions and recommendations.

C. Adjust equipment for proper operation within manufacturer's published tolerances.

3.05 CLEANING

A. Clean exposed components of dirt, finger marks, and other disfigurements.

3.06 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of equipment to Owner's designated representative.

B. Demonstration: Demonstrate operation of system to Owner's personnel.
   1. Use operation and maintenance data as reference during demonstration.
   2. Briefly describe function, operation, and maintenance of each component.

C. Training: Train Owner's personnel on operation and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training.
   3. Instructor: Manufacturer's training personnel.
   4. Location: At project site.

3.07 PROTECTION

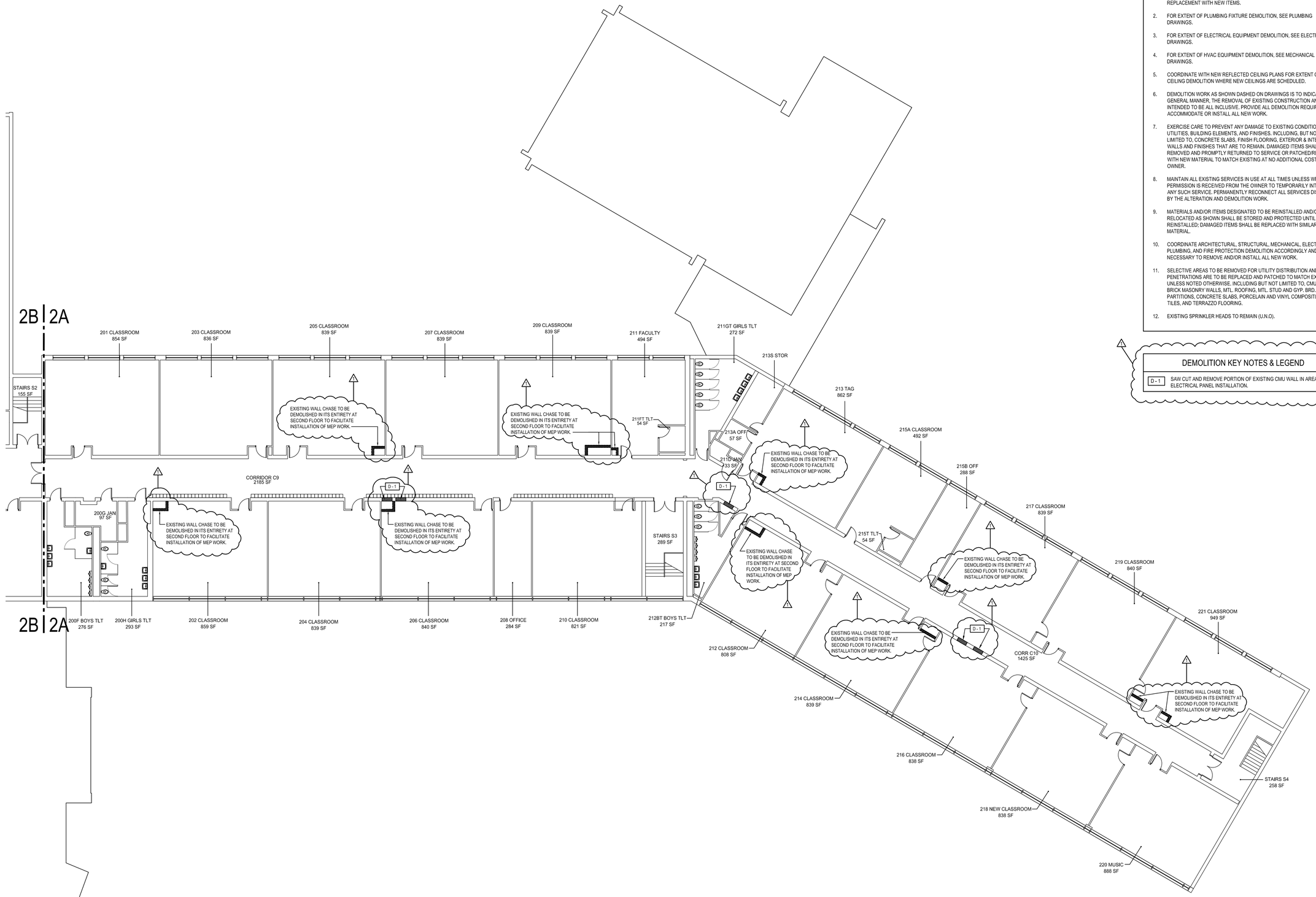
A. Protect installed components from subsequent construction operations.

B. Replace exposed components broken or otherwise damaged beyond repair.

3.08 MAINTENANCE

A. See Section 01 70 00 - Execution Requirements, for additional requirements relating to maintenance service.

END OF SECTION



SECOND FLOOR DEMOLITION PLAN - AREA A

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

NORTH

2ND FLR. KEY PLAN

DEMOLITION GENERAL NOTES

1. PERFORM ALL NECESSARY DISASSEMBLY, REMOVAL AND DISPOSAL OF BUILDING MATERIALS AND EQUIPMENT WHERE "NOTES" ON THE DRAWINGS REFER TO "REPLACE..." OR "INSTALL NEW..." OR IMPLY REMOVAL OF (E) AND REPLACEMENT WITH NEW ITEMS.
2. FOR EXTENT OF PLUMBING FIXTURE DEMOLITION, SEE PLUMBING DRAWINGS.
3. FOR EXTENT OF ELECTRICAL EQUIPMENT DEMOLITION, SEE ELECTRICAL DRAWINGS.
4. FOR EXTENT OF HVAC EQUIPMENT DEMOLITION, SEE MECHANICAL DRAWINGS.
5. COORDINATE WITH NEW REFLECTED CEILING PLANS FOR EXTENT OF CEILING DEMOLITION WHERE NEW CEILINGS ARE SCHEDULED.
6. DEMOLITION WORK AS SHOWN DASHED ON DRAWINGS IS TO INDICATE, IN A GENERAL MANNER, THE REMOVAL OF EXISTING CONSTRUCTION AND IS NOT INTENDED TO BE ALL INCLUSIVE. PROVIDE ALL DEMOLITION REQUIRED TO ACCOMMODATE OR INSTALL ALL NEW WORK.
7. EXERCISE CARE TO PREVENT ANY DAMAGE TO EXISTING CONDITIONS, UTILITIES, BUILDING ELEMENTS, AND FINISHES. INCLUDING, BUT NOT LIMITED TO, CONCRETE SLABS, FINISH FLOORING, EXTERIOR & INTERIOR WALLS AND FINISHES THAT ARE TO REMAIN. DAMAGED ITEMS SHALL BE REMOVED AND PROMPTLY RETURNED TO SERVICE OR PATCHED/REPLACED WITH NEW MATERIAL TO MATCH EXISTING AT NO ADDITIONAL COST TO THE OWNER.
8. MAINTAIN ALL EXISTING SERVICES IN USE AT ALL TIMES UNLESS WRITTEN PERMISSION IS RECEIVED FROM THE OWNER TO TEMPORARILY INTERRUPT ANY SUCH SERVICE. PERMANENTLY RECONNECT ALL SERVICES DISRUPTED BY THE ALTERATION AND DEMOLITION WORK.
9. MATERIALS AND/OR ITEMS DESIGNATED TO BE REINSTALLED AND/OR RELOCATED AS SHOWN SHALL BE STORED AND PROTECTED UNTIL REINSTALLED; DAMAGED ITEMS SHALL BE REPLACED WITH SIMILAR NEW MATERIAL.
10. COORDINATE ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION DEMOLITION ACCORDINGLY AND AS NECESSARY TO REMOVE AND/OR INSTALL ALL NEW WORK.
11. SELECTIVE AREAS TO BE REMOVED FOR UTILITY DISTRIBUTION AND PENETRATIONS ARE TO BE REPLACED AND PATCHED TO MATCH EXISTING UNLESS NOTED OTHERWISE. INCLUDING BUT NOT LIMITED TO, CMU AND BRICK MASONRY WALLS, MTL. ROOFING, MTL. STUD AND GYP. BRD. PARTITIONS, CONCRETE SLABS, PORCELAIN AND VINYL COMPOSITION TILES, AND TERRAZZO FLOORING.
12. EXISTING SPRINKLER HEADS TO REMAIN (U.N.O).

DEMOLITION KEY NOTES & LEGEND

D - 1	SAW CUT AND REMOVE PORTION OF EXISTING CMU WALL IN AREA OF NEW ELECTRICAL PANEL INSTALLATION.

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1662, F: (302) 832-1423
E-Mail: info@StudioJAED.com
Website: www.StudioJAED.com

REVISIONS

DESCRIPTION	DATE
Addendum #2	May 19, 2015

PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
SECOND FLOOR DEMOLITION PLAN - AREA A

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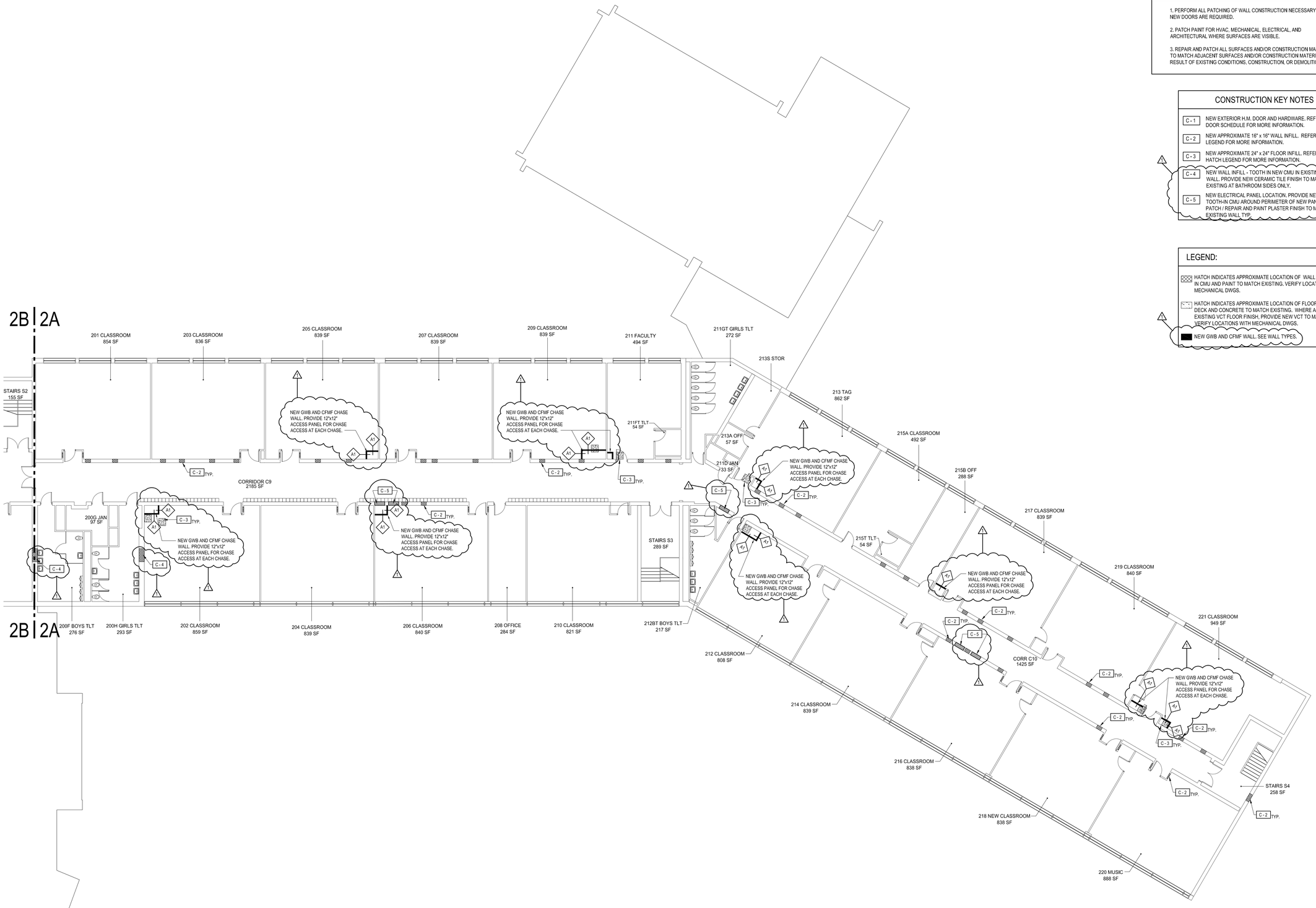


CONSTRUCTION GENERAL NOTES

1. PERFORM ALL PATCHING OF WALL CONSTRUCTION NECESSARY WHERE NEW DOORS ARE REQUIRED.

2. PATCH PAINT FOR HVAC, MECHANICAL, ELECTRICAL, AND ARCHITECTURAL WHERE SURFACES ARE VISIBLE.

3. REPAIR AND PATCH ALL SURFACES AND/OR CONSTRUCTION MATERIALS TO MATCH ADJACENT SURFACES AND/OR CONSTRUCTION MATERIALS, AS A RESULT OF EXISTING CONDITIONS, CONSTRUCTION, OR DEMOLITION.

CONSTRUCTION KEY NOTES

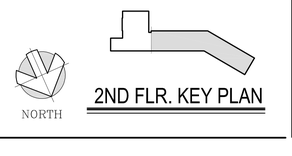
- C - 1 NEW EXTERIOR H.M. DOOR AND HARDWARE. REFER TO DOOR SCHEDULE FOR MORE INFORMATION.
- C - 2 NEW APPROXIMATE 16" x 16" WALL INFILL. REFER TO HATCH LEGEND FOR MORE INFORMATION.
- C - 3 NEW APPROXIMATE 24" x 24" FLOOR INFILL. REFER TO HATCH LEGEND FOR MORE INFORMATION.
- C - 4 NEW WALL INFILL - TOOTH IN NEW CMU IN EXISTING WALL. PROVIDE NEW CERAMIC TILE FINISH TO MATCH EXISTING AT BATHROOM SIDES ONLY.
- C - 5 NEW ELECTRICAL PANEL LOCATION. PROVIDE NEW TOOTH-IN CMU AROUND PERIMETER OF NEW PANEL. PATCH / REPAIR AND PAINT PLASTER FINISH TO MATCH EXISTING WALL TYP.

LEGEND:

- HATCH INDICATES APPROXIMATE LOCATION OF WALL INFILL. TOOTH IN CMU AND PAINT TO MATCH EXISTING. VERIFY LOCATIONS WITH MECHANICAL DWGS.
- HATCH INDICATES APPROXIMATE LOCATION OF FLOOR INFILL. INFILL DECK AND CONCRETE TO MATCH EXISTING. WHERE ADJACENT TO EXISTING VCT FLOOR FINISH, PROVIDE NEW VCT TO MATCH EXISTING. VERIFY LOCATIONS WITH MECHANICAL DWGS.
- NEW GWB AND CFMF WALL. SEE WALL TYPES.

SECOND FLOOR PLAN - AREA A

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



2ND FLR. KEY PLAN

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P.: (302) 832-1662, F: (302) 832-1423
E-Mail: info@StudioJAED.com
Website: www.StudioJAED.com

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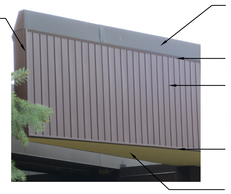
EXISTING FRONT ENTRY SOFFIT/FASCIA TO MATCH



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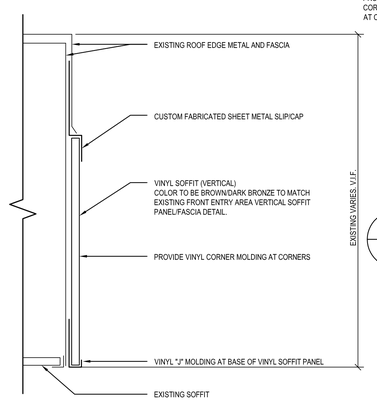


3 A3.11 ALTERNATE #3: SOFFIT/FASCIA DETAIL TO MATCH
SCALE: N.T.S.

2 A3.11 ALTERNATE #3: ROOF SOFFIT FASCIA DETAIL
SCALE: 3" = 1'-0"

DASHED LINES INDICATE THE LOCATION OF EXISTING OPENINGS IN THE ROOF DECK THAT REQUIRE AN INFILL SEE STRUCTURAL DRAWINGS FOR DETAIL

CONSTRUCTION GENERAL NOTES

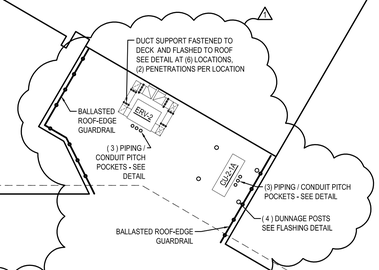
1. PERFORM ALL PATCHING OF WALL CONSTRUCTION NECESSARY WHERE NEW DOORS ARE REQUIRED.

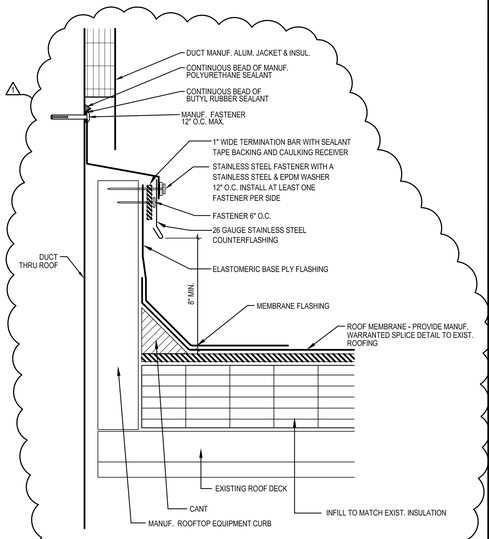
2. PATCH PAINT FOR HVAC, MECHANICAL, ELECTRICAL, AND ARCHITECTURAL WHERE SURFACES ARE VISIBLE.

3. REPAIR AND PATCH ALL SURFACES AND/OR CONSTRUCTION MATERIALS TO MATCH ADJACENT SURFACES AND/OR CONSTRUCTION MATERIALS, AS A RESULT OF EXISTING CONDITIONS, CONSTRUCTION, OR DEMOLITION.

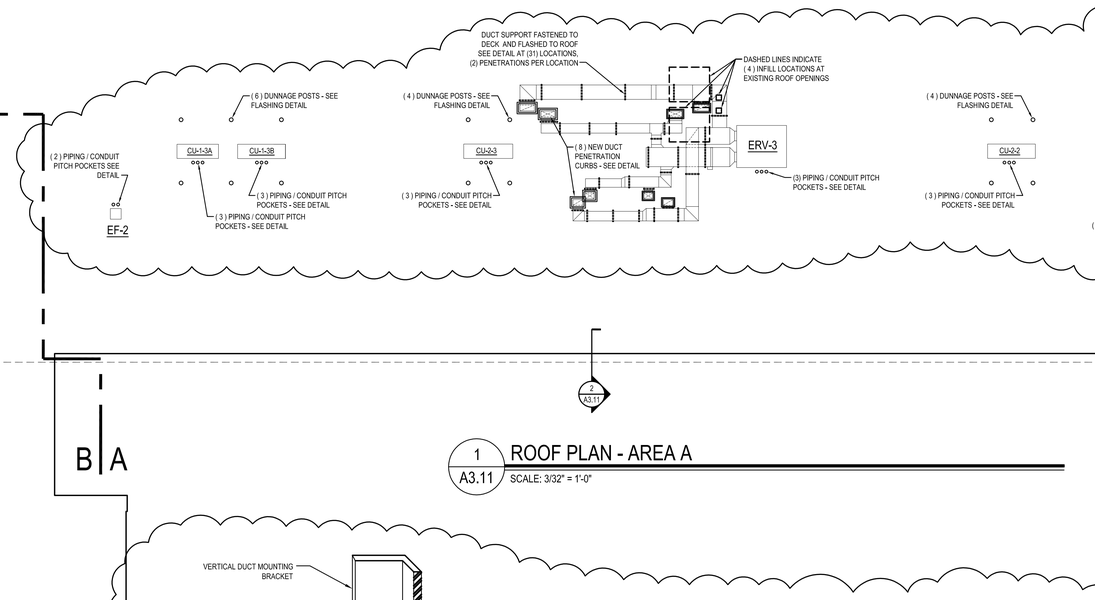
CONSTRUCTION KEY NOTES

C - 1 PER ALTERNATE #3: DASHED LINE INDICATES LOCATION OF EXISTING FASCIA PANELS TO REMAIN. PATCH AND PREP EXISTING SURFACE FOR INSTALLATION OF NEW VERTICAL VINYL SOFFIT PANELS OVER EXISTING SIMILAR TO FRONT ENTRY AREA. PAINT TO MATCH EXISTING. REFER TO DETAILS.



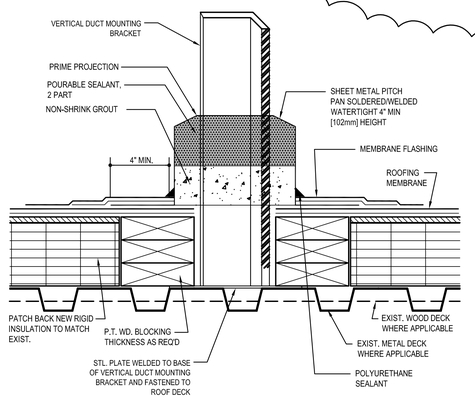


7 A3.11 TYP. DUCT PENETRATION DETAIL
NOT TO SCALE



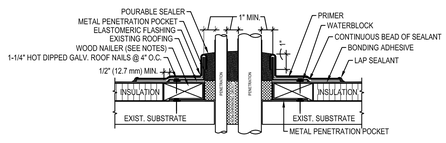
1 A3.11 ROOF PLAN - AREA A
SCALE: 3/32" = 1'-0"

B | A

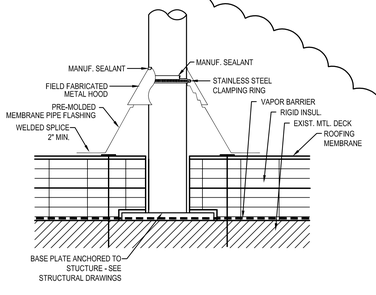


4 A3.11 TYP. DUCT SUPPORT PITCH POCKET DETAIL
SCALE: 3" = 1'-0"

NOTES:
1. REMOVE ALL EXISTING FLASHINGS, LEADS, ETC. PIPE SURFACE MUST BE FREE OF ALL RUST, GREASE, INSULATION, ETC.
2. POURABLE SEALER MOUNDED TO SHED WATER (MINIMUM DEPTH OF 2" (50.8 mm), REMAINDER OF POCKET MAY BE FILLED WITH A NON - SHRINKING GROUT).
3. DO NOT USE OVER EXISTING PENETRATION POCKETS.
4. WOOD NAILER MUST BE INSTALLED TO MEET APPLICABLE BUILDING CODES OR 200 LBS PER LINEAR FOOT MINIMUM IN ANY GIVEN DIRECTION.
5. APPLY LAP SEALANT AROUND ENTIRE PERIMETER OF FLASHING. REFER TO LS-9 FOR SEAM EDGE TREATMENT.
6. PRIMER REQUIRED ON PENETRATIONS AND MEMBRANE INSIDE OF PENETRATION POCKET.

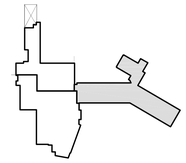


5 A3.11 TYP. PIPE / CONDUIT PITCH POCKET DETAIL
NOT TO SCALE



6 A3.11 TYP. DUNNAGE POST FLASHING DETAIL
NOT TO SCALE

NORTH



ROOF KEY PLAN

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 YARNALL HALL ROAD, STE. 110
BEAR, DE 19701
P.: (302) 832-1652 F: (302) 832-1423
E-Mail: info@StudioJAED.com
Website: www.StudioJAED.com

REVISIONS

DESCRIPTION	DATE
ADDENDUM # 2	5/19/2015

PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
ROOF PLAN - AREA A

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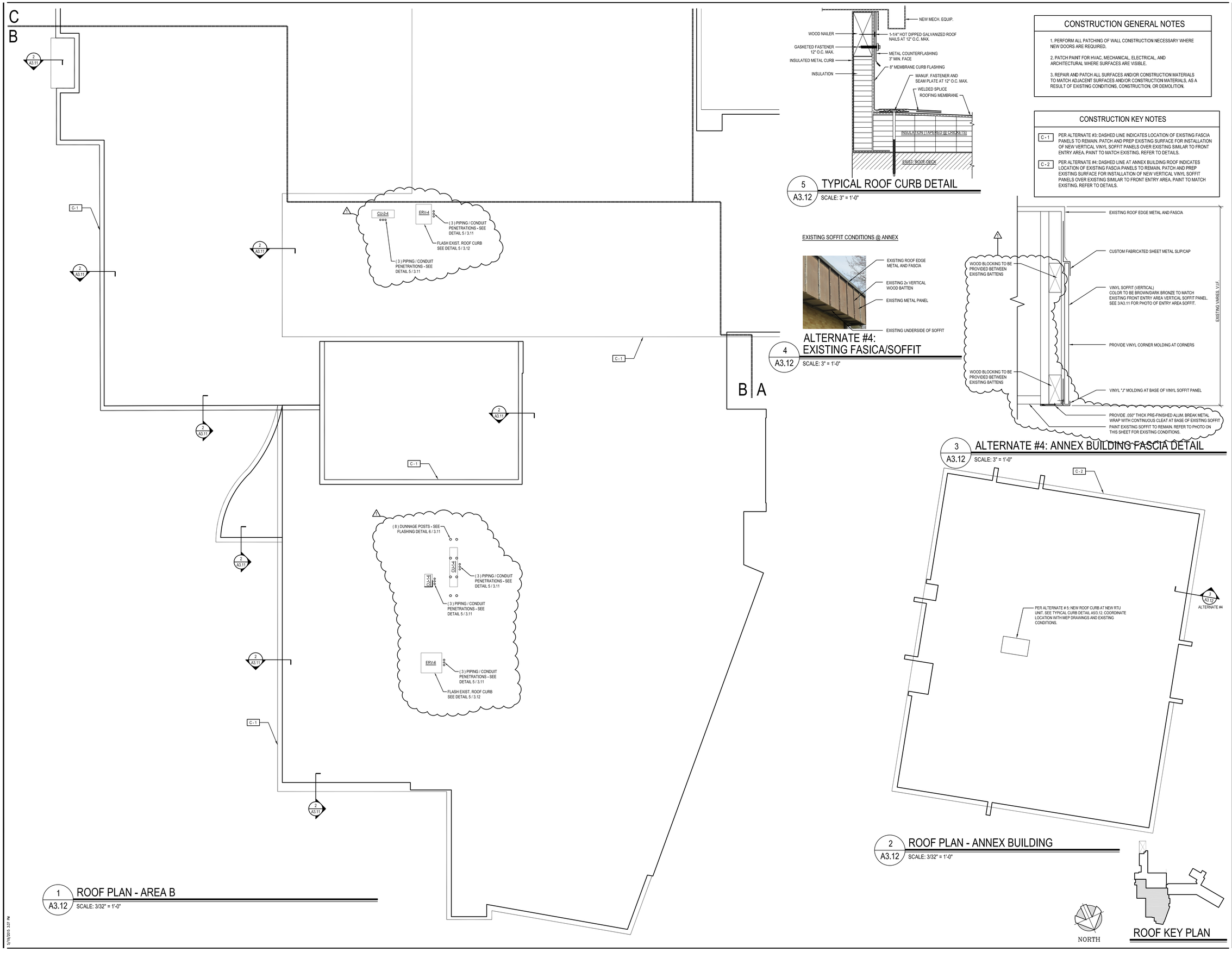

1 A3.12 ROOF PLAN - AREA B
SCALE: 3/32" = 1'-0"

5 A3.12 TYPICAL ROOF CURB DETAIL
SCALE: 3" = 1'-0"

CONSTRUCTION GENERAL NOTES

1. PERFORM ALL PATCHING OF WALL CONSTRUCTION NECESSARY WHERE NEW DOORS ARE REQUIRED.

2. PATCH PAINT FOR HVAC, MECHANICAL, ELECTRICAL, AND ARCHITECTURAL WHERE SURFACES ARE VISIBLE.

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CONSTRUCTION KEY NOTES

C - 1 PER ALTERNATE #3: DASHED LINE INDICATES LOCATION OF EXISTING FASCIA PANELS TO REMAIN. PATCH AND PREP EXISTING SURFACE FOR INSTALLATION OF NEW VERTICAL VINYL SOFFIT PANELS OVER EXISTING SIMILAR TO FRONT ENTRY AREA. PAINT TO MATCH EXISTING. REFER TO DETAILS.

C - 2 PER ALTERNATE #4: DASHED LINE AT ANNEX BUILDING ROOF INDICATES LOCATION OF EXISTING FASCIA PANELS TO REMAIN. PATCH AND PREP EXISTING SURFACE FOR INSTALLATION OF NEW VERTICAL VINYL SOFFIT PANELS OVER EXISTING SIMILAR TO FRONT ENTRY AREA. PAINT TO MATCH EXISTING. REFER TO DETAILS.

EXISTING SOFFIT CONDITIONS @ ANNEX

4 A3.12 ALTERNATE #4: EXISTING FASICA/SOFFIT
SCALE: 3" = 1'-0"

3 A3.12 ALTERNATE #4: ANNEX BUILDING FASCIA DETAIL
SCALE: 3" = 1'-0"

2 A3.12 ROOF PLAN - ANNEX BUILDING
SCALE: 3/32" = 1'-0"

NORTH

ROOF KEY PLAN

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652 F: (302) 832-1423
E-Mail: info@StudioJAED.com
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1	ADDENDUM # 2	5/19/2015

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2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
ROOF PLAN - AREA B

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CONSTRUCTION GENERAL NOTES

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3. REPAIR AND PATCH ALL SURFACES AND/OR CONSTRUCTION MATERIALS TO MATCH ADJACENT SURFACES AND/OR CONSTRUCTION MATERIALS, AS A RESULT OF EXISTING CONDITIONS, CONSTRUCTION, OR DEMOLITION.

CONSTRUCTION KEY NOTES

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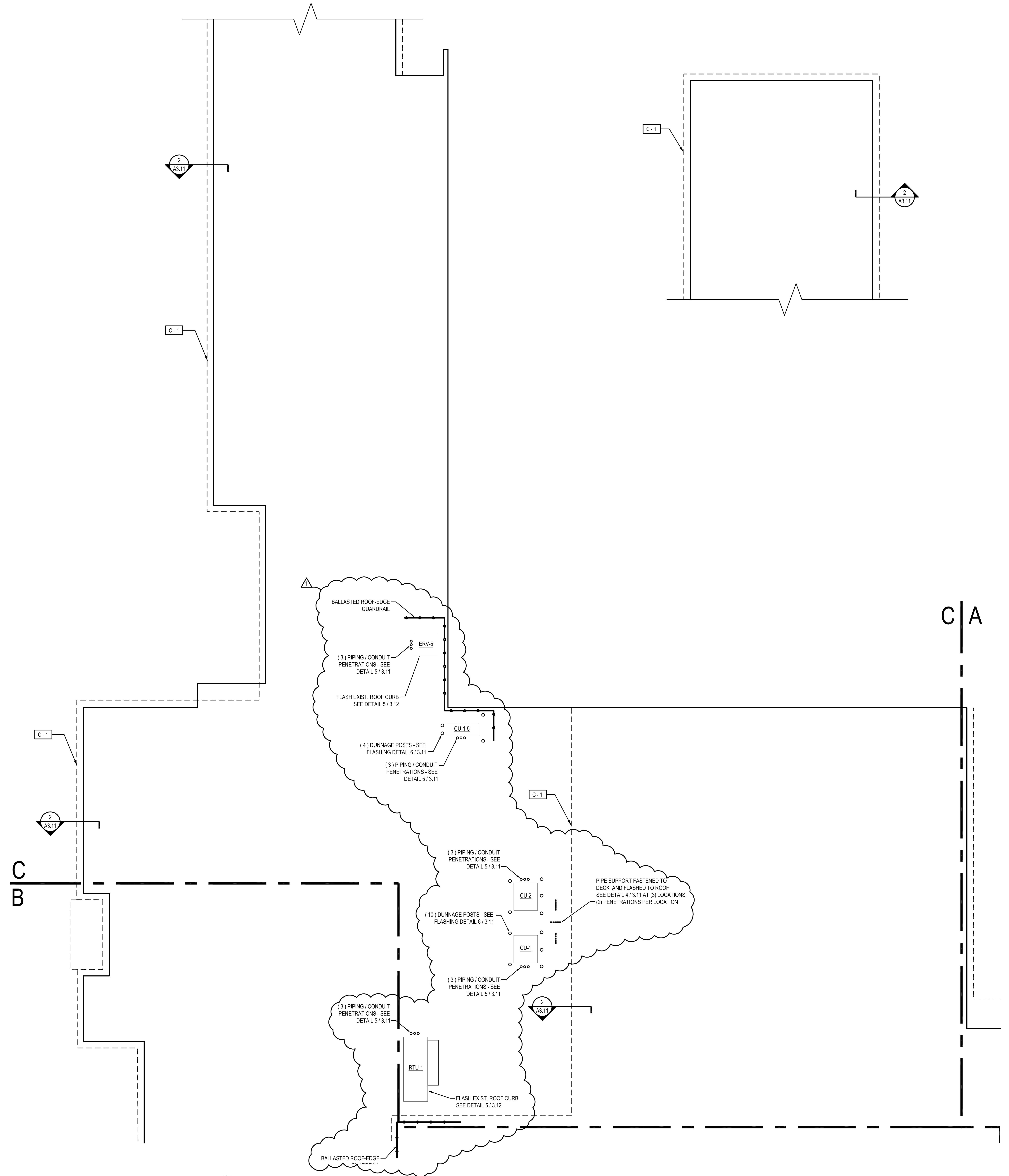
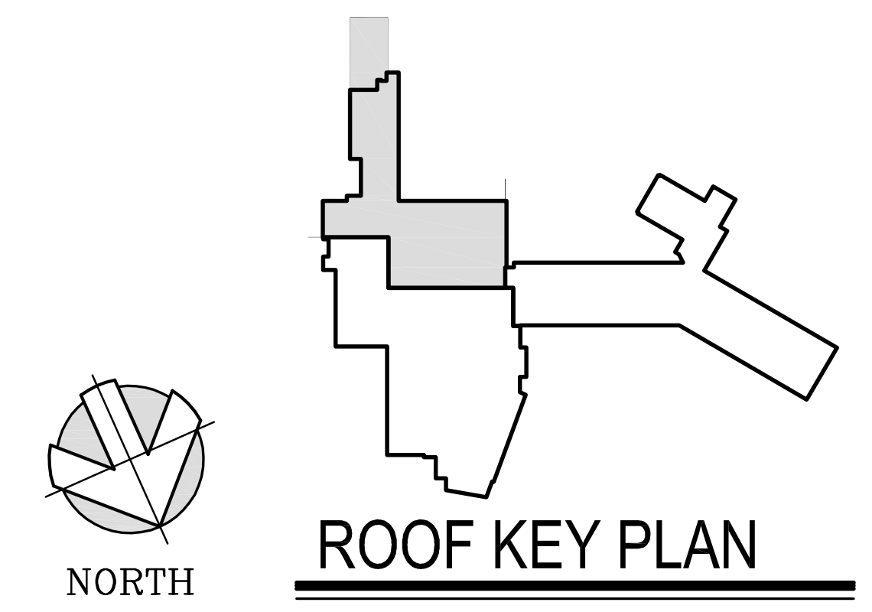


1
A3.13
ROOF PLAN - AREA C
SCALE: 3/32" = 1'-0"



ROOF KEY PLAN

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CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652 F: (302) 832-1423

Website:
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SHEET TITLE

ROOF PLAN - AREA C

BID DOCUMENTS
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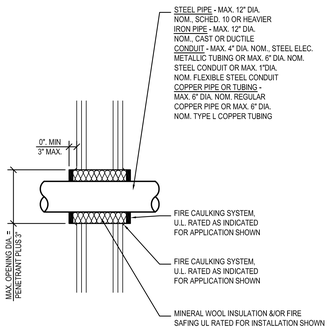
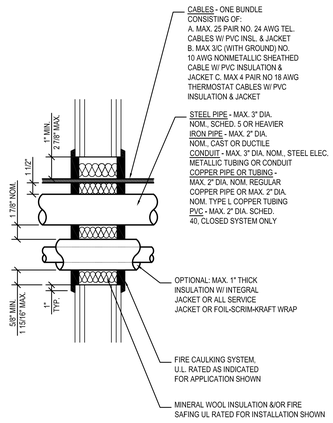
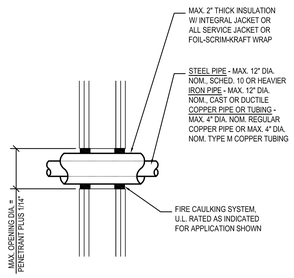
PROJECT NO.	
14037	



NONCOMBUSTIBLE PIPE
U.L. # WL-1079 (1 & 2 HOUR RATING)



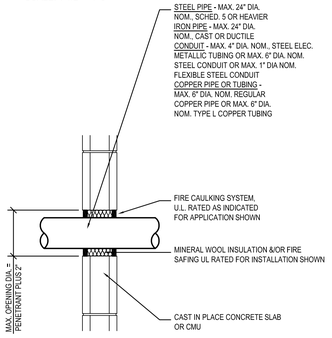
MULTIPLE (4 MAX.) COMBUSTIBLE
AND /OR NONCOMBUSTIBLE PIPES
U.L. # WL-8003 (1 & 2 HOUR RATING)



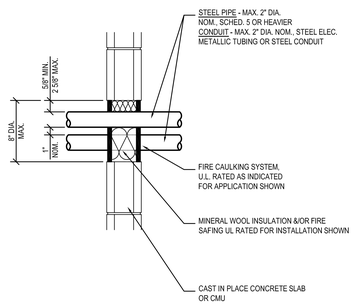
INSULATED NONCOMBUSTIBLE PIPE
U.L. # WL-5014 (1 & 2 HOUR RATING)

FIRE RATED WALL ASSEMBLY PENETRATIONS - METAL STUD

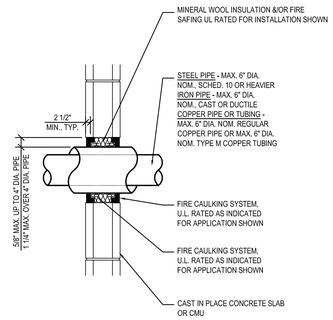
SCALE: 1 1/2" = 1'-0"



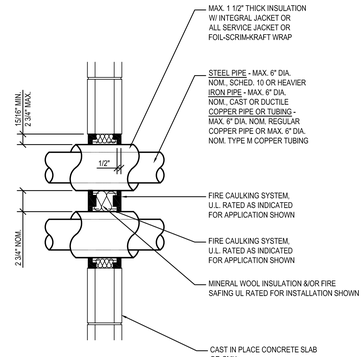
NONCOMBUSTIBLE PIPE
U.L. # C-AJ-1079 (1 & 2 HOUR RATING)



MULTIPLE (3 MAX.) NONCOMBUSTIBLE PIPES
U.L. # C-AJ-1048 (1 & 2 HOUR RATING)



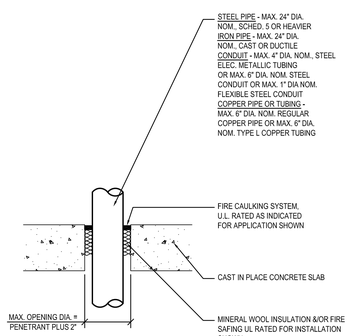
INSULATED NONCOMBUSTIBLE PIPE
U.L. # C-AJ-5058 (1 & 2 HOUR RATING)



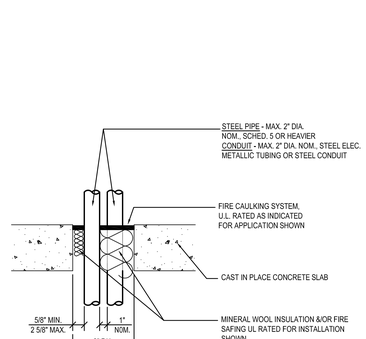
MULTIPLE (2 MAX.) INSULATED
NONCOMBUSTIBLE PIPES
U.L. # C-AJ-5042 (1 & 2 HOUR RATING)

FIRE RATED WALL ASSEMBLY PENETRATIONS -CONCRETE OR CMU

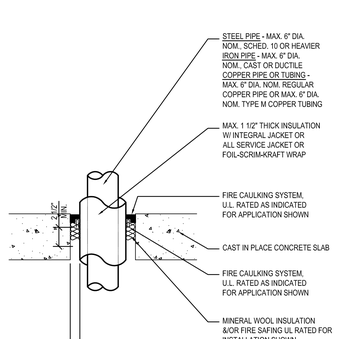
SCALE: 1 1/2" = 1'-0"



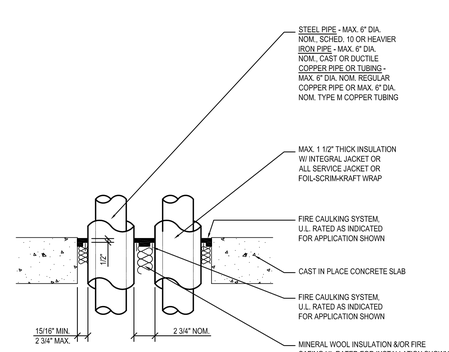
NONCOMBUSTIBLE PIPE
U.L. # C-AJ-1079 (1 & 2 HOUR RATING)



MULTIPLE (3 MAX.) NONCOMBUSTIBLE PIPES
U.L. # C-AJ-1048 (1 & 2 HOUR RATING)



INSULATED NONCOMBUSTIBLE PIPE
U.L. # C-AJ-5058 (1 & 2 HOUR RATING)



MULTIPLE (2 MAX.) INSULATED
NONCOMBUSTIBLE PIPES
U.L. # C-AJ-5042 (1 & 2 HOUR RATING)

FIRE RATED FLOOR ASSEMBLY PENETRATIONS - CONCRETE

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

5/19/2015 10:45 AM

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P.: (302) 832-1662, F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS

DESCRIPTION	DATE

PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

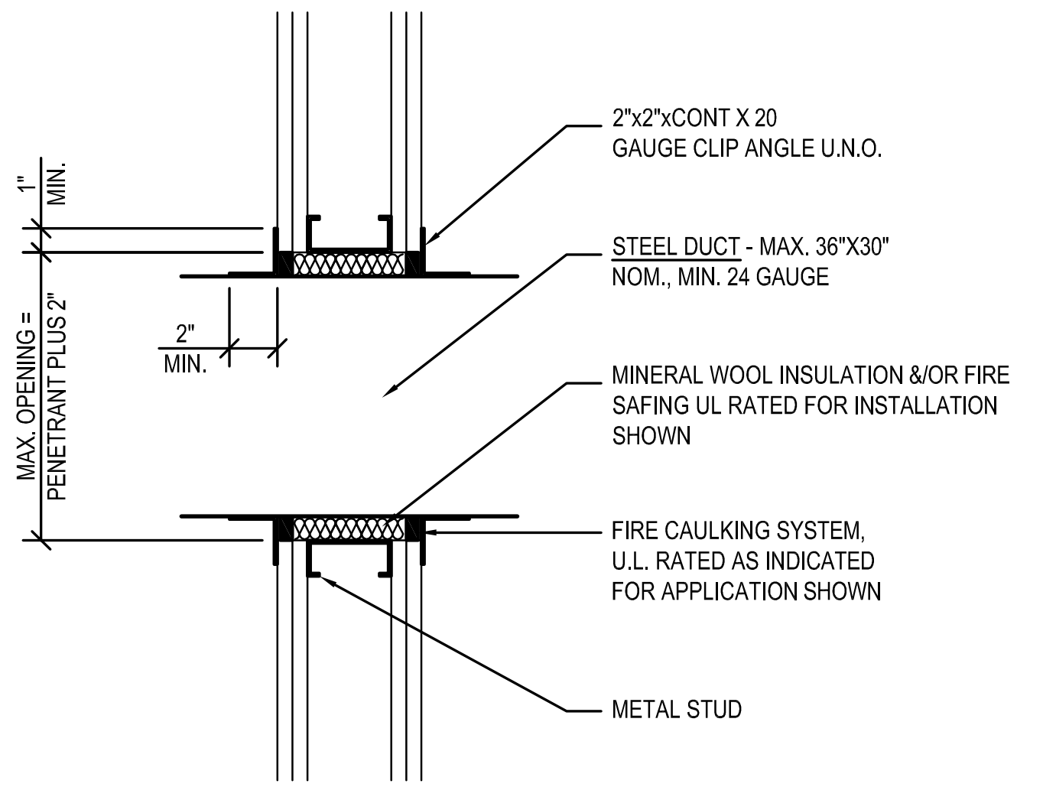
SHEET TITLE
PIPE PENETRATION DETAILS

BID DOCUMENTS
MAY 1, 2015

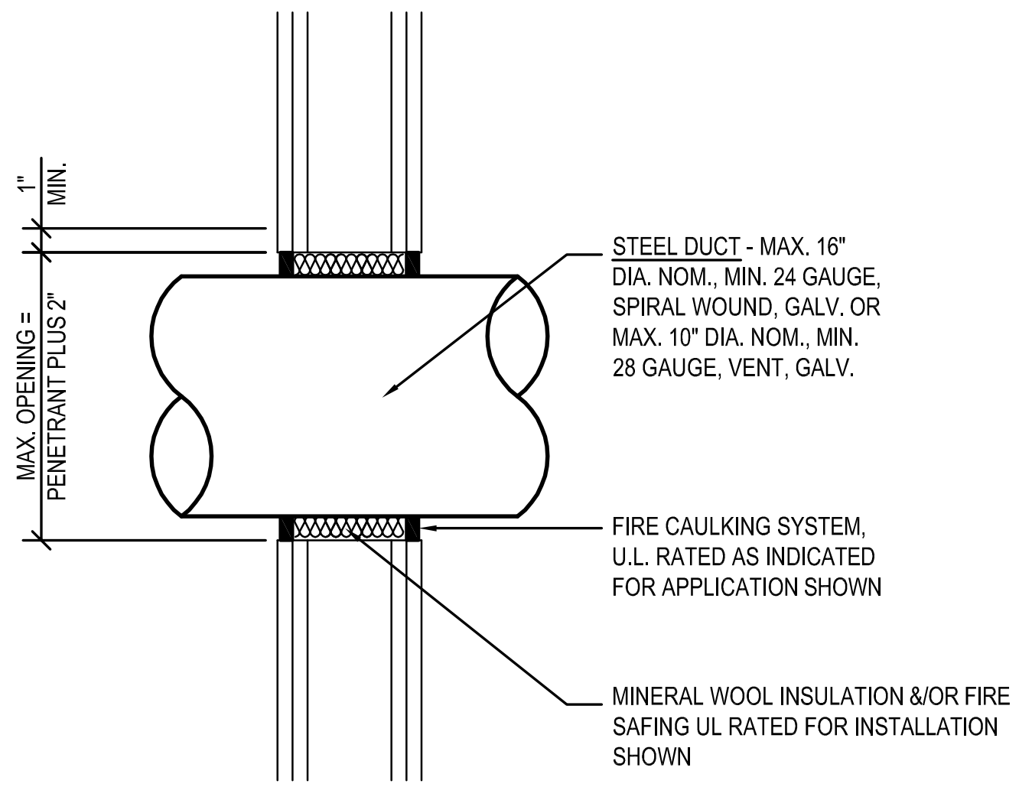
DRAWN	CHK'D/DESIGNER
HMS	PRC
DISCIPLINE	SHEET NO.
A	6.2

PROJECT NO.
14037

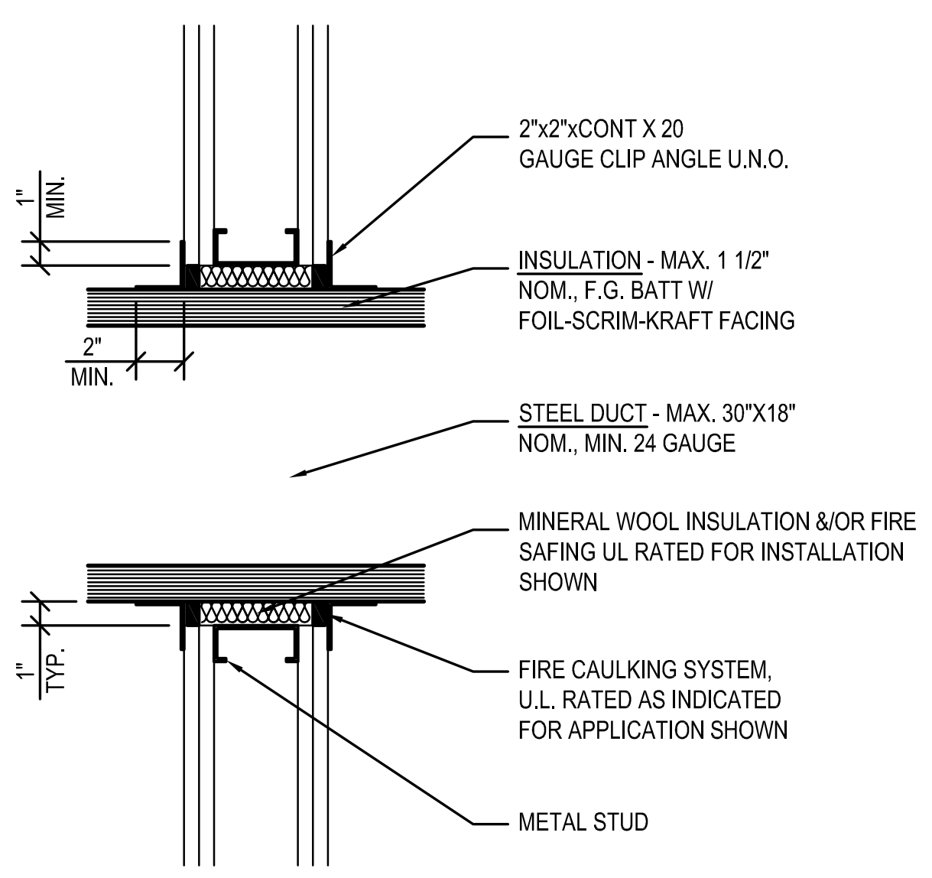
5/19/2015 10:52 AM



RECTANGULAR DUCT
U.L. # W-L-7008 (1 & 2 HOUR RATING)



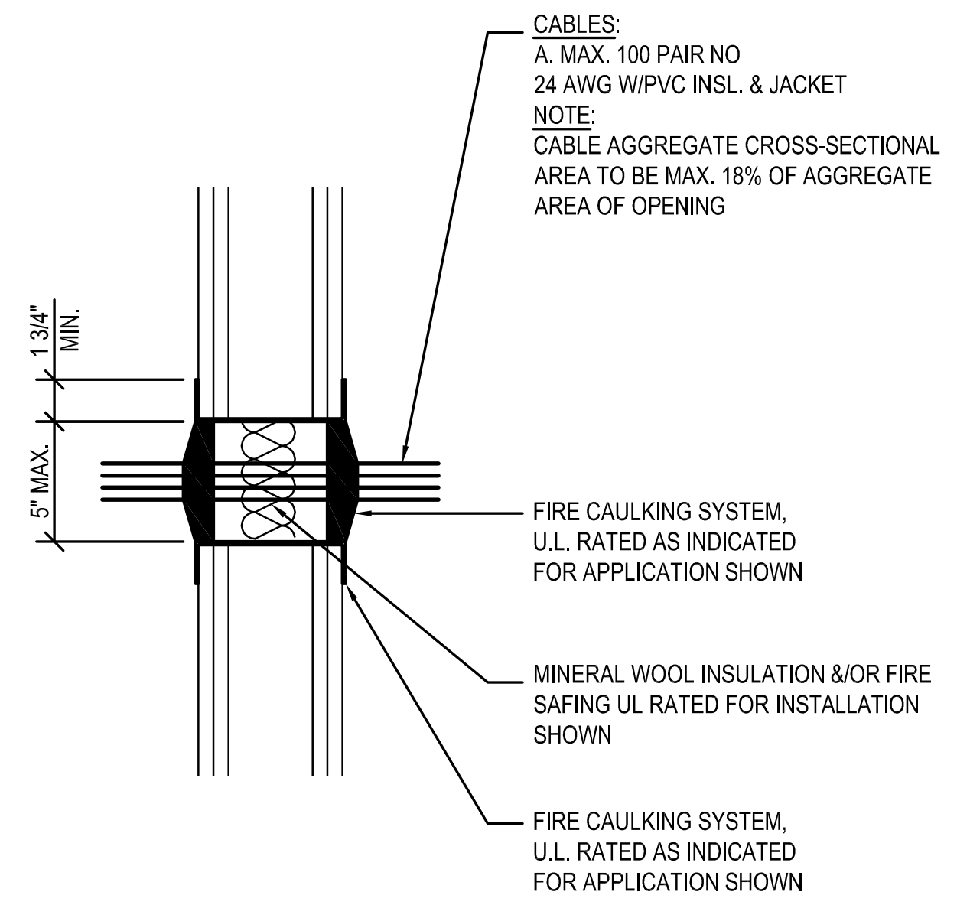
ROUND DUCT
U.L. # W-L-7013 (1 & 2 HOUR RATING)



RECTANGULAR DUCT - INSULATED
U.L. # W-L-7051 (1 & 2 HOUR RATING)

FIRE RATED WALL ASSEMBLY PENETRATIONS - METAL STUD

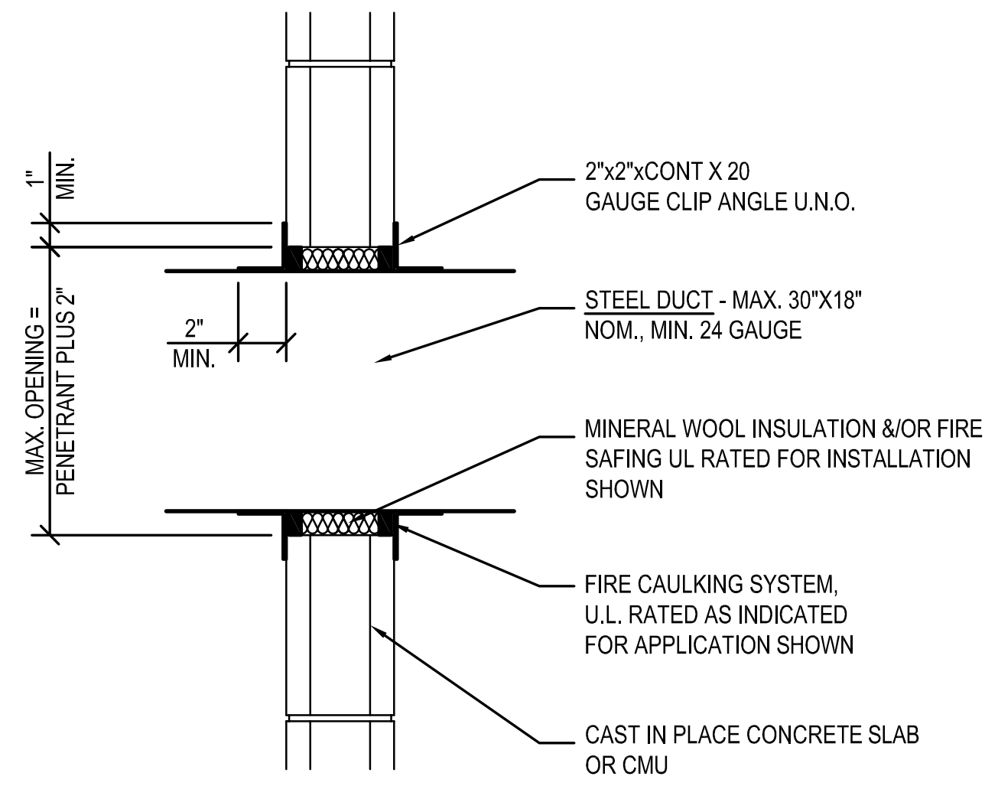
SCALE: 1 1/2" = 1'-0"



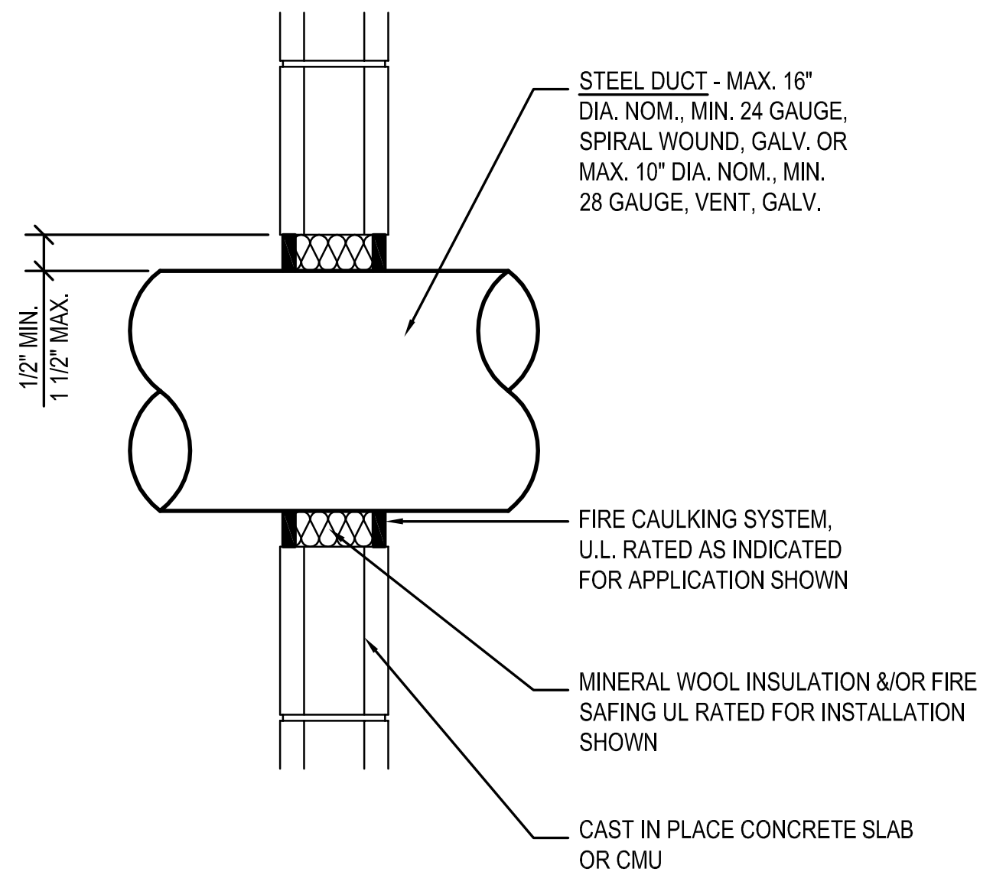
LOOSE CABLE OR SMALL CABLE BUNDLES
U.L. # W-L-3025 (1 & 2 HOUR RATING)

FIRE RATED WALL ASSEMBLY PENETRATIONS - METAL STUD

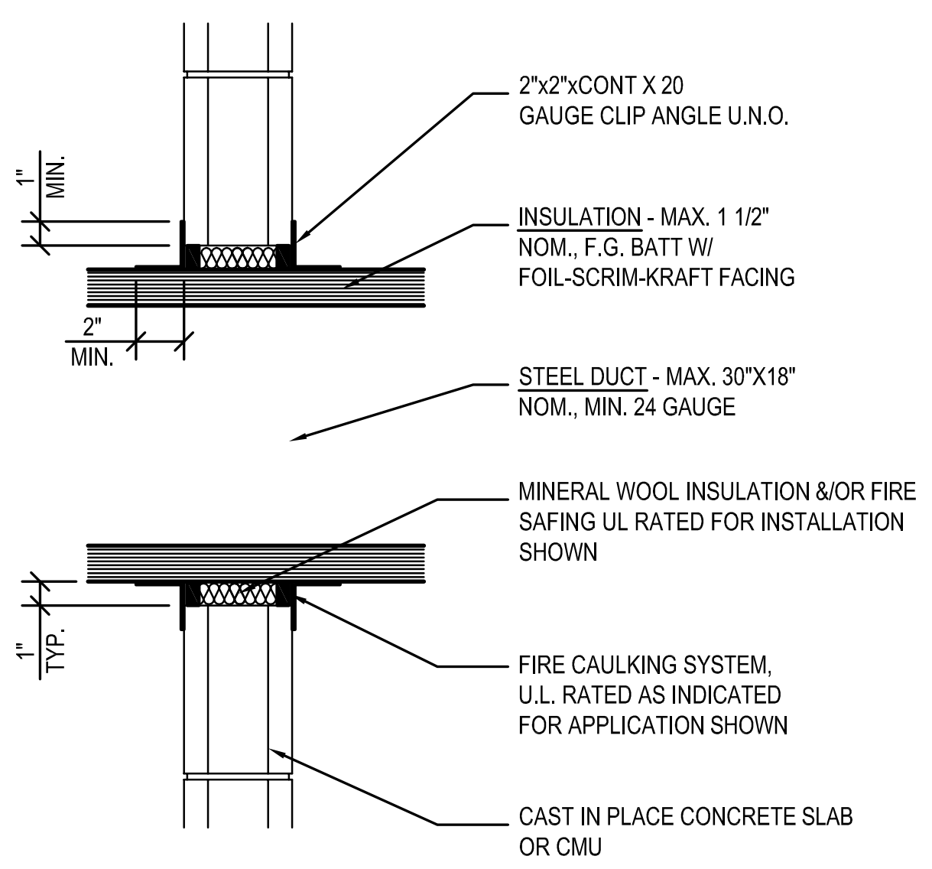
SCALE: 1 1/2" = 1'-0"



RECTANGULAR DUCT
U.L. # C-AJ-7076 (1 & 2 HOUR RATING)



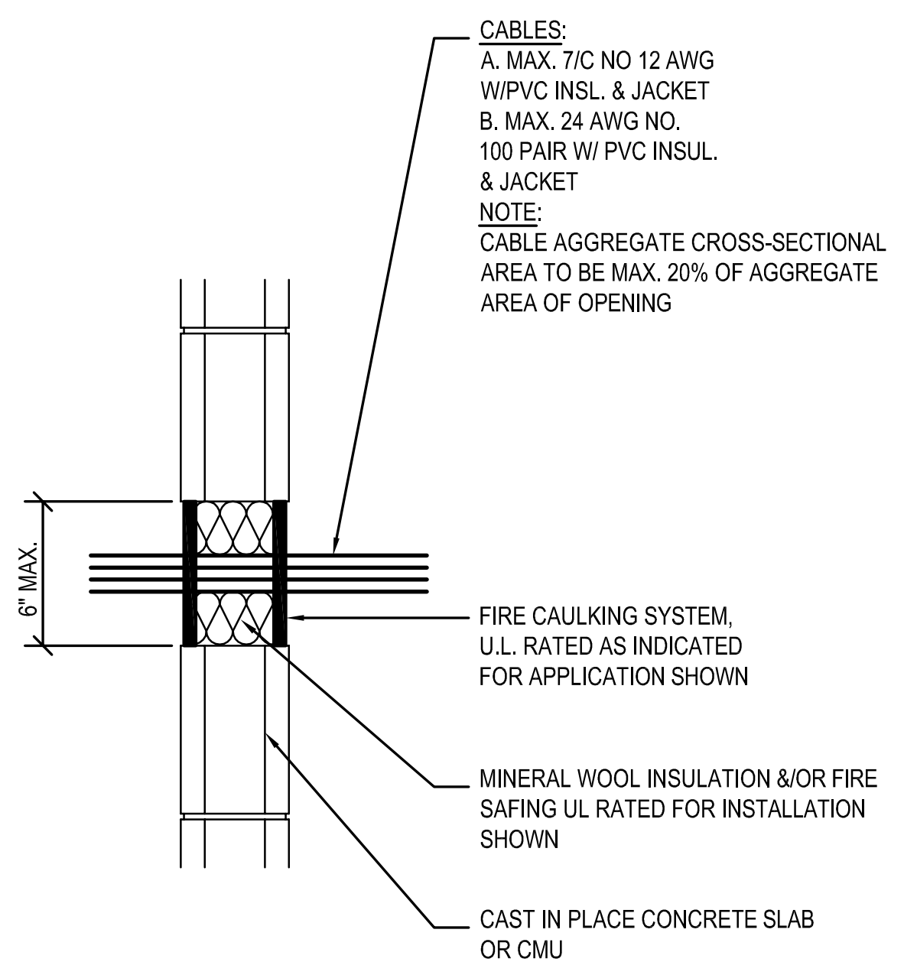
ROUND DUCT
U.L. # C-AJ-7081 (1 & 2 HOUR RATING)



RECTANGULAR DUCT - INSULATED
U.L. # C-AJ-7030 (1 & 2 HOUR RATING)

FIRE RATED WALL ASSEMBLY PENETRATIONS -CONCRETE OR CMU

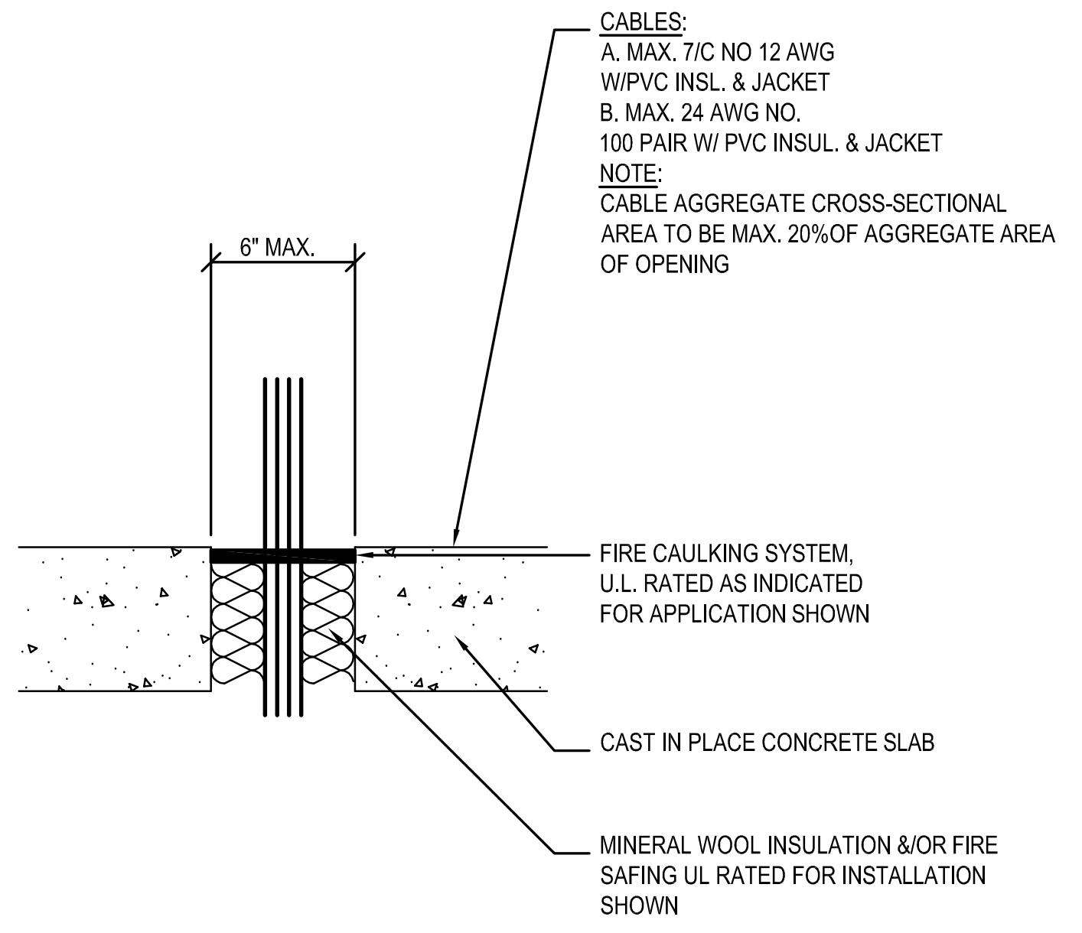
SCALE: 1 1/2" = 1'-0"



LOOSE CABLE OR SMALL CABLE BUNDLES
U.L. # C-AL-3085 (1 & 2 HOUR RATING)

FIRE RATED WALL ASSEMBLY PENETRATIONS -CONCRETE OR CMU

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



LOOSE CABLE OR SMALL CABLE BUNDLES
U.L. # C-AL-3085 (1 & 2 HOUR RATING)

FIRE RATED FLOOR ASSEMBLY PENETRATIONS - CONCRETE

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

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652 F: (302) 832-1423
Website:
www.StudioJAED.com
E-Mail:
info@StudioJAED.com

REVISIONS

△ DESCRIPTION	DATE

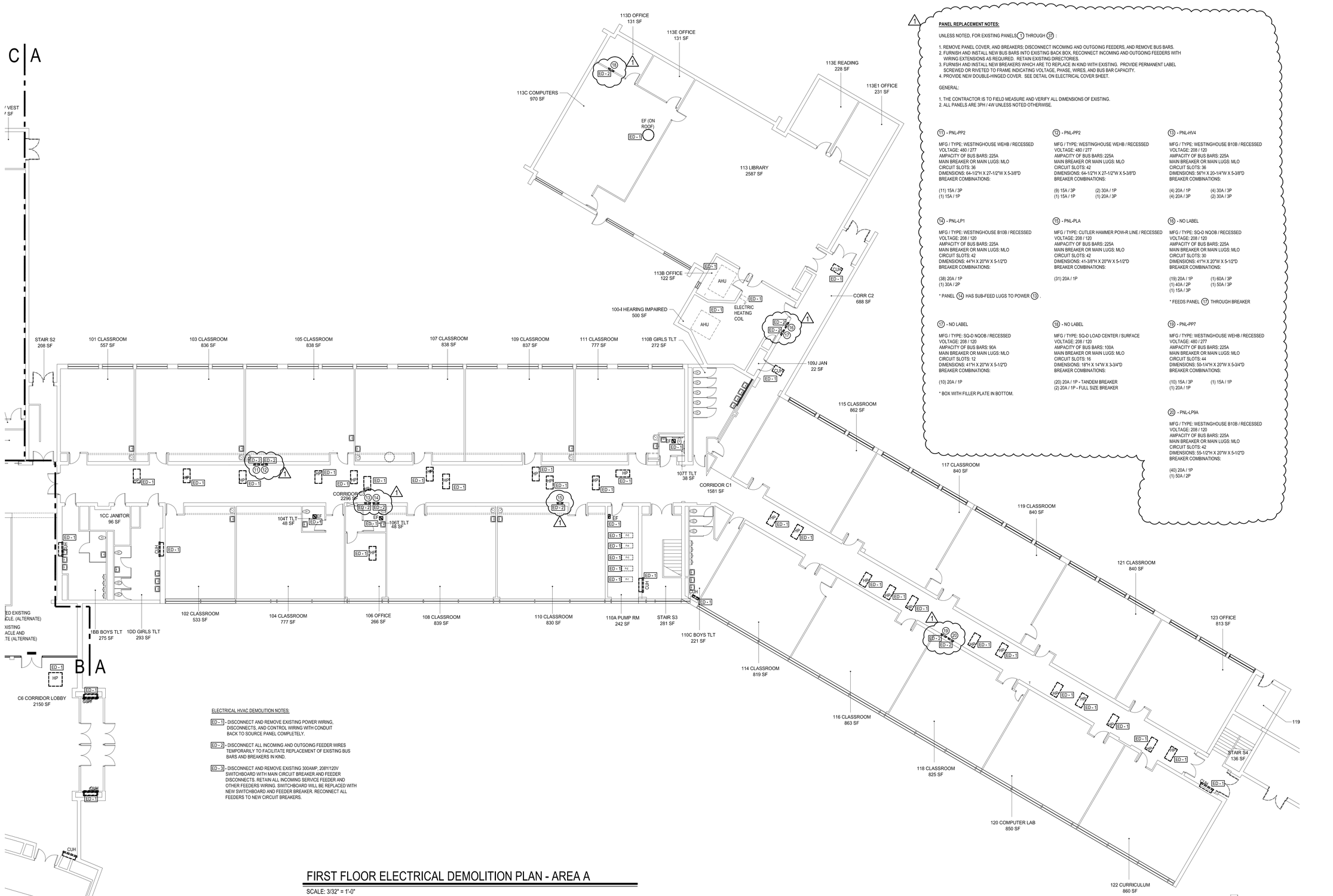
PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
DUCT PENETRATION
DETAILS

BID
DOCUMENTS
MAY 1, 2015

DRAWN	CHK'D/DESIGNER
HMS	PRC
DISCIPLINE	SHEET NO.
A	6.3
PROJECT NO.	
14037	

5/19/2015 11:23 AM



PANEL REPLACEMENT NOTES:

UNLESS NOTED, FOR EXISTING PANELS (1) THROUGH (37) :

1. REMOVE PANEL COVER, AND BREAKERS; DISCONNECT INCOMING AND OUTGOING FEEDERS, AND REMOVE BUS BARS.
2. FURNISH AND INSTALL NEW BUS BARS INTO EXISTING BACK BOX, RECONNECT INCOMING AND OUTGOING FEEDERS WITH WIRING EXTENSIONS AS REQUIRED. RETAIN EXISTING DIRECTORIES.
3. FURNISH AND INSTALL NEW BREAKERS WHICH ARE TO REPLACE IN KIND WITH EXISTING. PROVIDE PERMANENT LABEL SCREWED OR RIVETED TO FRAME INDICATING VOLTAGE, PHASE, WIRES, AND BUS BAR CAPACITY.
4. PROVIDE NEW DOUBLE-HINGED COVER. SEE DETAIL ON ELECTRICAL COVER SHEET.

GENERAL:

1. THE CONTRACTOR IS TO FIELD MEASURE AND VERIFY ALL DIMENSIONS OF EXISTING.
2. ALL PANELS ARE 3PH / 4W UNLESS NOTED OTHERWISE.

(11) - PNL-PP2

MFG / TYPE: WESTINGHOUSE WEHB / RECESSED
VOLTAGE: 480 / 277
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 36
DIMENSIONS: 64-1/2"H X 27-1/2"W X 5-3/8"D
BREAKER COMBINATIONS:

(11) 15A / 3P
(1) 15A / 1P

(12) - PNL-PP2

MFG / TYPE: WESTINGHOUSE WEHB / RECESSED
VOLTAGE: 480 / 277
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 42
DIMENSIONS: 64-1/2"H X 27-1/2"W X 5-3/8"D
BREAKER COMBINATIONS:

(9) 15A / 3P
(1) 15A / 1P
(2) 30A / 1P
(1) 20A / 3P

(13) - PNL-HV4

MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 36
DIMENSIONS: 56"H X 20-1/4"W X 5-3/8"D
BREAKER COMBINATIONS:

(4) 20A / 1P
(4) 20A / 3P
(4) 30A / 3P
(2) 30A / 3P

(14) - PNL-LP1

MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 42
DIMENSIONS: 44"H X 20"W X 5-1/2"D
BREAKER COMBINATIONS:

(38) 20A / 1P
(1) 30A / 2P

* PANEL (14) HAS SUB-FEED LUGS TO POWER (13).

(15) - PNL-PLA

MFG / TYPE: CUTLER HAMMER POW-R LINE / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 42
DIMENSIONS: 41-3/8"H X 20"W X 5-1/2"D
BREAKER COMBINATIONS:

(31) 20A / 1P

(16) - NO LABEL

MFG / TYPE: SQ-D NQOB / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 30
DIMENSIONS: 41"H X 20"W X 5-1/2"D
BREAKER COMBINATIONS:

(19) 20A / 1P
(1) 40A / 2P
(1) 15A / 3P
(1) 60A / 3P
(1) 50A / 3P

* FEEDS PANEL (17) THROUGH BREAKER

(17) - NO LABEL

MFG / TYPE: SQ-D NQOB / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 90A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 12
DIMENSIONS: 41"H X 20"W X 5-1/2"D
BREAKER COMBINATIONS:

(10) 20A / 1P

* BOX WITH FILLER PLATE IN BOTTOM.

(18) - NO LABEL

MFG / TYPE: SQ-D LOAD CENTER / SURFACE
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 100A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 16
DIMENSIONS: 18"H X 14"W X 3-3/4"D
BREAKER COMBINATIONS:

(20) 20A / 1P - TANDEM BREAKER
(2) 20A / 1P - FULL SIZE BREAKER

(19) - PNL-PP7

MFG / TYPE: WESTINGHOUSE WEHB / RECESSED
VOLTAGE: 480 / 277
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 44
DIMENSIONS: 50-1/4"H X 20"W X 5-3/4"D
BREAKER COMBINATIONS:

(10) 15A / 3P
(1) 20A / 1P
(1) 15A / 1P

(20) - PNL-LP9A

MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 42
DIMENSIONS: 55-1/2"H X 5-1/2"D
BREAKER COMBINATIONS:

(40) 20A / 1P
(1) 50A / 2P

ELECTRICAL HVAC DEMOLITION NOTES:

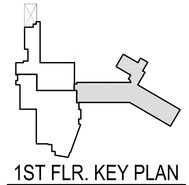
ED - 1 - DISCONNECT AND REMOVE EXISTING POWER WIRING, DISCONNECTS, AND CONTROL WIRING WITH CONDUIT BACK TO SOURCE PANEL COMPLETELY.

ED - 2 - DISCONNECT ALL INCOMING AND OUTGOING FEEDER WIRES TEMPORARILY TO FACILITATE REPLACEMENT OF EXISTING BUS BARS AND BREAKERS IN KIND.

ED - 3 - DISCONNECT AND REMOVE EXISTING 300AMP, 208Y/120V SWITCHBOARD WITH MAIN CIRCUIT BREAKER AND FEEDER DISCONNECTS. RETAIN ALL INCOMING SERVICE FEEDER AND OTHER FEEDERS WIRING. SWITCHBOARD WILL BE REPLACED WITH NEW SWITCHBOARD AND FEEDER BREAKER. RECONNECT ALL FEEDERS TO NEW CIRCUIT BREAKERS.

FIRST FLOOR ELECTRICAL DEMOLITION PLAN - AREA A

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



1ST FLR. KEY PLAN

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1662, F: (302) 832-1423
E-Mail: info@StudioJAED.com
Website: www.StudioJAED.com

REVISIONS

DESCRIPTION	DATE
1 REVISED FOR ADDENDUM #2	5/18/2015

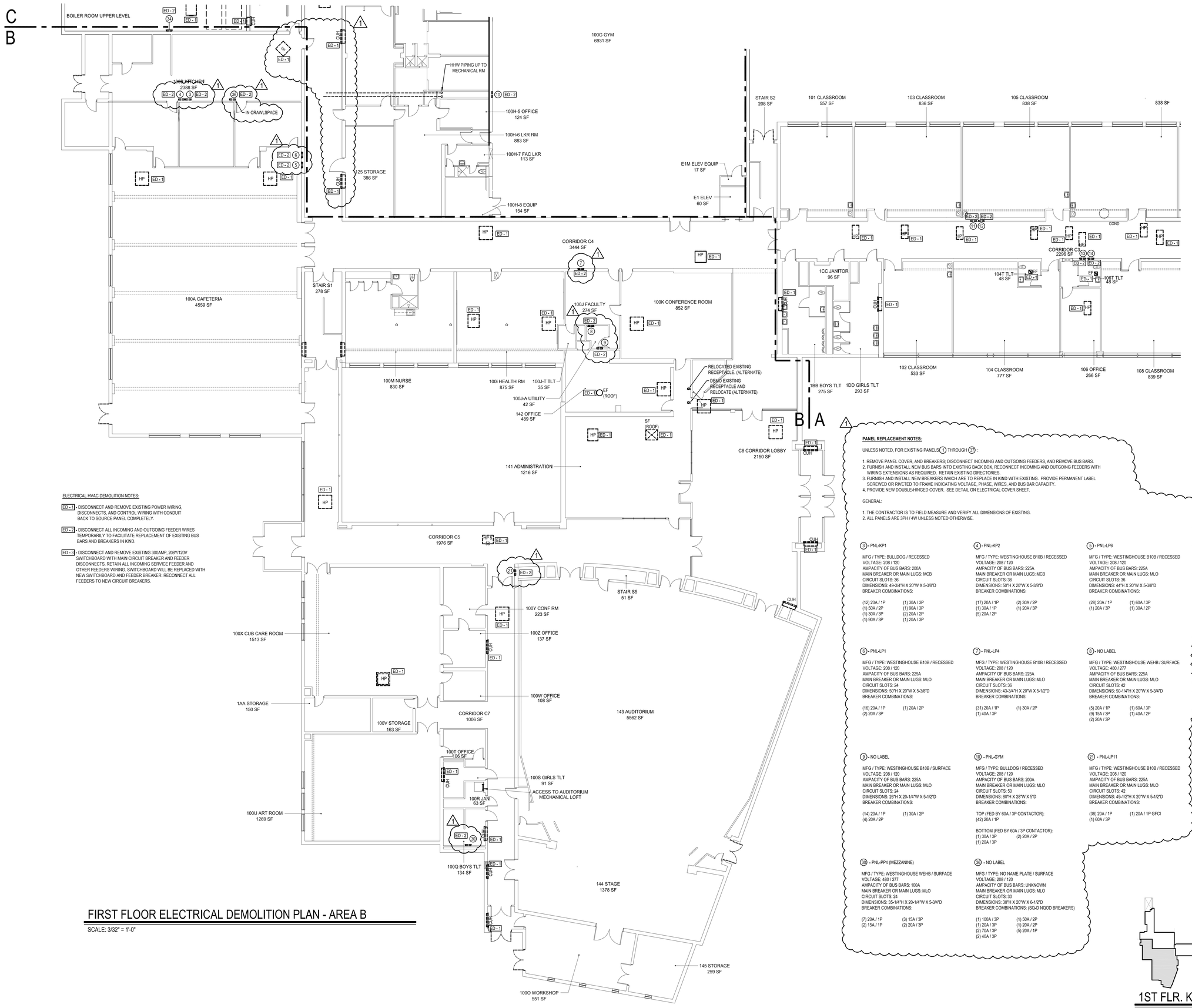
PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
FIRST FLOOR ELECTRICAL DEMOLITION PLAN - AREA A

BID DOCUMENTS
MAY 1, 2015

DRAWN	CHK'D/DESIGNER
JRB	PP
DISCIPLINE	SHEET NO.
E	9.1

PROJECT NO.
14037



ELECTRICAL HVAC DEMOLITION NOTES:

ED - 1 - DISCONNECT AND REMOVE EXISTING POWER WIRING, DISCONNECTS, AND CONTROL WIRING WITH CONDUIT BACK TO SOURCE PANEL COMPLETELY.

ED - 2 - DISCONNECT ALL INCOMING AND OUTGOING FEEDER WIRES TEMPORARILY TO FACILITATE REPLACEMENT OF EXISTING BUS BARS AND BREAKERS IN KIND.

ED - 3 - DISCONNECT AND REMOVE EXISTING 300AMP, 208Y/120V SWITCHBOARD WITH MAIN CIRCUIT BREAKER AND FEEDER DISCONNECTS. RETAIN ALL INCOMING SERVICE FEEDER AND OTHER FEEDERS WIRING. SWITCHBOARD WILL BE REPLACED WITH NEW SWITCHBOARD AND FEEDER BREAKER. RECONNECT ALL FEEDERS TO NEW CIRCUIT BREAKERS.

FIRST FLOOR ELECTRICAL DEMOLITION PLAN - AREA B

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

PANEL REPLACEMENT NOTES:

UNLESS NOTED, FOR EXISTING PANELS (1) THROUGH (37) :

1. REMOVE PANEL COVER, AND BREAKERS; DISCONNECT INCOMING AND OUTGOING FEEDERS, AND REMOVE BUS BARS.
2. FURNISH AND INSTALL NEW BUS BARS INTO EXISTING BACK BOX. RECONNECT INCOMING AND OUTGOING FEEDERS WITH WIRING EXTENSIONS AS REQUIRED. RETAIN EXISTING DIRECTORIES.
3. FURNISH AND INSTALL NEW BREAKERS WHICH ARE TO REPLACE IN KIND WITH EXISTING. PROVIDE PERMANENT LABEL SCREWED OR RIVETED TO FRAME INDICATING VOLTAGE, PHASE, WIRES, AND BUS BAR CAPACITY.
4. PROVIDE NEW DOUBLE-HINGED COVER. SEE DETAIL ON ELECTRICAL COVER SHEET.

GENERAL:

1. THE CONTRACTOR IS TO FIELD MEASURE AND VERIFY ALL DIMENSIONS OF EXISTING.
2. ALL PANELS ARE 3PH / 4W UNLESS NOTED OTHERWISE.

(3) - PNL-KP1

MFG / TYPE: BULLDOG / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 200A
MAIN BREAKER OR MAIN LUGS: MCB
CIRCUIT SLOTS: 36
DIMENSIONS: 49-3/4"H X 20"W X 5-3/8"D
BREAKER COMBINATIONS:

(12) 20A / 1P
(1) 50A / 2P
(1) 30A / 3P
(1) 90A / 3P
(1) 30A / 3P
(1) 90A / 3P
(1) 20A / 3P
(1) 20A / 3P

(4) - PNL-KP2

MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MCB
CIRCUIT SLOTS: 36
DIMENSIONS: 50"H X 20"W X 5-3/8"D
BREAKER COMBINATIONS:

(17) 20A / 1P
(1) 30A / 1P
(5) 20A / 2P
(2) 30A / 2P
(1) 20A / 3P

(5) - PNL-LP6

MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 36
DIMENSIONS: 44"H X 20"W X 5-3/8"D
BREAKER COMBINATIONS:

(28) 20A / 1P
(1) 20A / 3P
(1) 60A / 3P
(1) 30A / 2P

(6) - PNL-LP1

MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 24
DIMENSIONS: 50"H X 20"W X 5-3/8"D
BREAKER COMBINATIONS:

(16) 20A / 1P
(2) 20A / 3P
(1) 20A / 2P

(7) - PNL-LP4

MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 36
DIMENSIONS: 43-3/4"H X 20"W X 5-1/2"D
BREAKER COMBINATIONS:

(31) 20A / 1P
(1) 40A / 3P
(1) 30A / 2P

(8) - NO LABEL

MFG / TYPE: WESTINGHOUSE WEHB / SURFACE
VOLTAGE: 480 / 277
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 42
DIMENSIONS: 50-1/4"H X 20"W X 5-3/4"D
BREAKER COMBINATIONS:

(5) 20A / 1P
(9) 15A / 3P
(2) 20A / 3P
(1) 60A / 3P
(1) 40A / 2P

(9) - NO LABEL

MFG / TYPE: WESTINGHOUSE B10B / SURFACE
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 24
DIMENSIONS: 26"H X 20-1/4"W X 5-1/2"D
BREAKER COMBINATIONS:

(14) 20A / 1P
(4) 20A / 2P
(1) 30A / 2P

(10) - PNL-GYM

MFG / TYPE: BULLDOG / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 200A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 50
DIMENSIONS: 80"H X 28"W X 5"D
BREAKER COMBINATIONS:

TOP (FED BY 60A / 3P CONTACTOR):
(42) 20A / 1P

BOTTOM (FED BY 60A / 3P CONTACTOR):
(1) 30A / 3P
(1) 20A / 3P
(2) 20A / 2P

(21) - PNL-LP11

MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 42
DIMENSIONS: 49-1/2"H X 20"W X 5-1/2"D
BREAKER COMBINATIONS:

(38) 20A / 1P
(1) 60A / 3P
(1) 20A / 1P GFCI

(30) - PNL-PP4 (MEZZANINE)

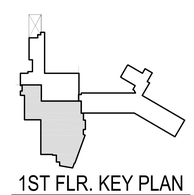
MFG / TYPE: WESTINGHOUSE WEHB / SURFACE
VOLTAGE: 480 / 277
AMPACITY OF BUS BARS: 100A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 24
DIMENSIONS: 35-1/4"H X 20-1/4"W X 5-3/4"D
BREAKER COMBINATIONS:

(7) 20A / 1P
(2) 15A / 1P
(3) 15A / 3P
(2) 20A / 3P

(36) - NO LABEL

MFG / TYPE: NO NAME PLATE / SURFACE
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: UNKNOWN
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 30
DIMENSIONS: 38"H X 20"W X 6-1/2"D
BREAKER COMBINATIONS: (SQ-D NOOD BREAKERS)

(1) 100A / 3P
(1) 20A / 3P
(2) 70A / 3P
(2) 40A / 3P
(1) 50A / 2P
(1) 20A / 2P
(5) 20A / 1P



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STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P.: (302) 832-1662 F.: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS

	DESCRIPTION	DATE
1	REVISED FOR ADDENDUM #2	5/18/2015

PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
FIRST FLOOR ELECTRICAL DEMOLITION PLAN - AREA B

BID DOCUMENTS
MAY 1, 2015

DRAWN	CHK'D/DESIGNER
JRB	PP

DISCIPLINE	SHEET NO.
E	9.2

PROJECT NO.
14037

PANEL REPLACEMENT NOTES:

UNLESS NOTED, FOR EXISTING PANELS (1) THROUGH (37) :

1. REMOVE PANEL COVER, AND BREAKERS; DISCONNECT INCOMING AND OUTGOING FEEDERS, AND REMOVE BUS BARS.
2. FURNISH AND INSTALL NEW BUS BARS INTO EXISTING BACK BOX, RECONNECT INCOMING AND OUTGOING FEEDERS WITH WIRING EXTENSIONS AS REQUIRED. RETAIN EXISTING DIRECTORIES.
3. FURNISH AND INSTALL NEW BREAKERS WHICH ARE TO REPLACE IN KIND WITH EXISTING. PROVIDE PERMANENT LABEL SCREWED OR RIVETED TO FRAME INDICATING VOLTAGE, PHASE, WIRES, AND BUS BAR CAPACITY.
4. PROVIDE NEW DOUBLE-HINGED COVER. SEE DETAIL ON ELECTRICAL COVER SHEET.

GENERAL:

1. THE CONTRACTOR IS TO FIELD MEASURE AND VERIFY ALL DIMENSIONS OF EXISTING.
2. ALL PANELS ARE 3PH / 4W UNLESS NOTED OTHERWISE.

(1) - NO LABEL

MFG / TYPE: SQ-D NQOD / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 42
DIMENSIONS: CONTRACTOR TO FIELD MEASURE
BREAKER COMBINATIONS:

(15) 20A / 1P (1) 30A / 3P

* REPLACE FRAME, TRIM, AND DOOR ONLY.
RETAIN EXISTING BREAKERS AND BUS BARS.

(2) - PNL-PP5

MFG / TYPE: WESTINGHOUSE WEHB / RECESSED
VOLTAGE: 480 / 277
AMPACITY OF BUS BARS: 100A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 32
DIMENSIONS: 41-1/2"H X 20"W X 5-3/4"D
BREAKER COMBINATIONS:

(7) 20A / 1P (8) 15A / 3P

(31) - PNL-MDP

MFG / TYPE: WESTINGHOUSE CDB / SURFACE
VOLTAGE: 480 / 277
AMPACITY OF BUS BARS: 800A
MAIN BREAKER OR MAIN LUGS: MCB
CIRCUIT SLOTS: 24
DIMENSIONS: 49-3/8"H X 38-1/4"W X 10"D
BREAKER COMBINATIONS:

(4) 100A / 3P (4) 250A / 3P

(32) - PNL-PP6

MFG / TYPE: WESTINGHOUSE WEHB / SURFACE
VOLTAGE: 480 / 277
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 42
DIMENSIONS: 50-1/4"H X 20-1/2"W X 6"D
BREAKER COMBINATIONS:

(3) 20A / 1P (2) 40A / 3P
(6) 20A / 3P (1) 15A / 3P
(2) 60A / 3P (1) 10A / 3P
(1) 30A / 3P
(1) 90A / 3P - FED FROM PV SYSTEM

(33) - PNL-EMP1

MFG / TYPE: WESTINGHOUSE B10B / SURFACE
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 100A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 24 (12 TOP, 12 BOTTOM)
DIMENSIONS: 39-1/4"H X 20-1/4"W X 5-3/4"D
BREAKER COMBINATIONS:

TOP:
(9) 20A / 1P (1) 100A / 3P

BOTTOM:
(9) 20A / 1P (1) 20A / 3P

(34) - PNL-PP6

MFG / TYPE: BULLDOG / SURFACE
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 200A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 28
DIMENSIONS: 32"H X 20"W X 5-3/4"D
BREAKER COMBINATIONS:

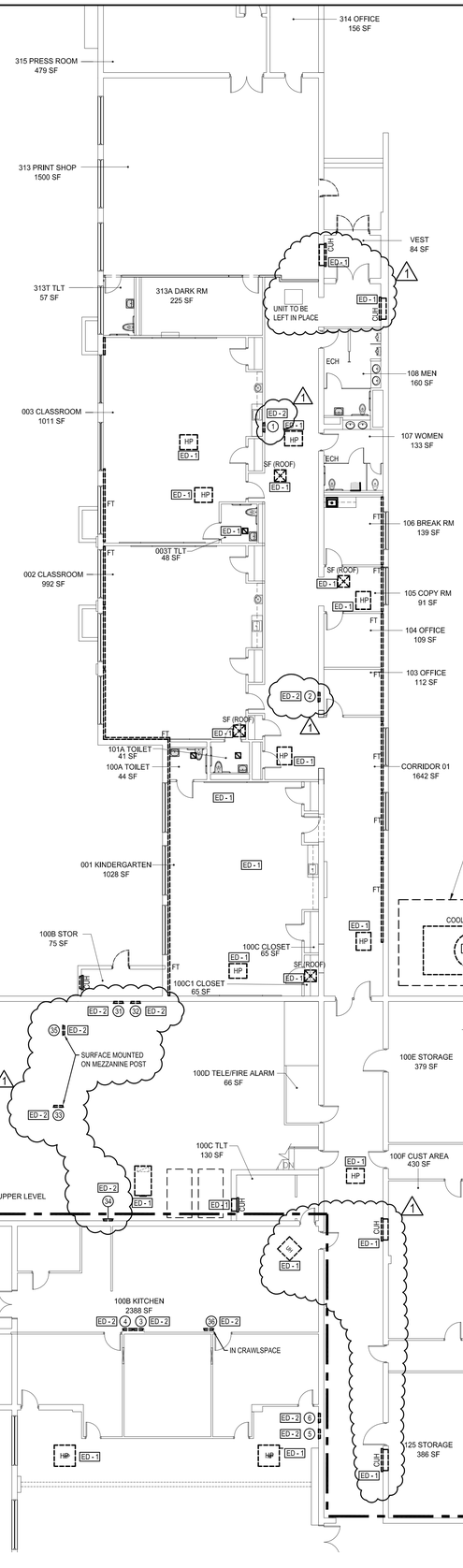
(12) 20A / 1P (1) 20A / 2P
(1) 30A / 2P

(35) - PNL-PHOTOVOLTAIC

MFG / TYPE: SQ-D NF / SURFACE
VOLTAGE: 480 / 277
AMPACITY OF BUS BARS: 100A
MAIN BREAKER OR MAIN LUGS: MCB
CIRCUIT SLOTS: 18
DIMENSIONS: 26"H X 20-1/4"W X 5-1/2"D
BREAKER COMBINATIONS:

(3) 25A / 1P (4) 40A / 1P

* REPLACE FRAME, TRIM, AND DOOR ONLY.
RETAIN EXISTING BREAKERS AND BUS BARS.



FIRST FLOOR ELECTRICAL DEMOLITION PLAN - AREA C

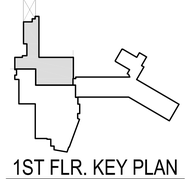
SCALE: 3/32" = 1'-0"

ELECTRICAL HVAC DEMOLITION NOTES:

ED - 1 - DISCONNECT AND REMOVE EXISTING POWER WIRING, DISCONNECTS, AND CONTROL WIRING WITH CONDUIT BACK TO SOURCE PANEL COMPLETELY.

ED - 2 - DISCONNECT ALL INCOMING AND OUTGOING FEEDER WIRES TEMPORARILY TO FACILITATE REPLACEMENT OF EXISTING BUS BARS AND BREAKERS IN KIND.

ED - 3 - DISCONNECT AND REMOVE EXISTING 300AMP, 208Y/120V SWITCHBOARD WITH MAIN CIRCUIT BREAKER AND FEEDER DISCONNECTS. RETAIN ALL INCOMING SERVICE FEEDER AND OTHER FEEDERS WIRING. SWITCHBOARD WILL BE REPLACED WITH NEW SWITCHBOARD AND FEEDER BREAKER. RECONNECT ALL FEEDERS TO NEW CIRCUIT BREAKERS.



1ST FLR. KEY PLAN

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652, F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS

	DESCRIPTION	DATE
1	REVISED PER ADDENDUM #2	MAY 18, 2015

PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
FIRST FLOOR ELECTRICAL DEMOLITION PLAN - AREA C

BID DOCUMENTS
MAY 1, 2015

DRAWN	CHK'D/DESIGNER
JRB	PP
DISCIPLINE	SHEET NO.
E	9.3
PROJECT NO.	
14037	

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ELECTRICAL HVAC DEMOLITION NOTES:

ED - 1 - DISCONNECT AND REMOVE EXISTING POWER WIRING, DISCONNECTS, AND CONTROL WIRING WITH CONDUIT BACK TO SOURCE PANEL COMPLETELY.

ED - 2 - DISCONNECT ALL INCOMING AND OUTGOING FEEDER WIRES TEMPORARILY TO FACILITATE REPLACEMENT OF EXISTING BUS BARS AND BREAKERS IN KIND.

PANEL REPLACEMENT NOTES:

UNLESS NOTED, FOR EXISTING PANELS (1) THROUGH (37) :

1. REMOVE PANEL COVER, AND BREAKERS; DISCONNECT INCOMING AND OUTGOING FEEDERS, AND REMOVE BUS BARS.
2. FURNISH AND INSTALL NEW BUS BARS INTO EXISTING BACK BOX. RECONNECT INCOMING AND OUTGOING FEEDERS WITH WIRING EXTENSIONS AS REQUIRED. RETAIN EXISTING DIRECTORIES.
3. FURNISH AND INSTALL NEW BREAKERS WHICH ARE TO REPLACE IN KIND WITH EXISTING. PROVIDE PERMANENT LABEL SCREWED OR RIVETED TO FRAME INDICATING VOLTAGE, PHASE, WIRES, AND BUS BAR CAPACITY.
4. PROVIDE NEW DOUBLE-HINGED COVER. SEE DETAIL ON ELECTRICAL COVER SHEET.

GENERAL:

1. THE CONTRACTOR IS TO FIELD MEASURE AND VERIFY ALL DIMENSIONS OF EXISTING.
2. ALL PANELS ARE 3PH / 4W UNLESS NOTED OTHERWISE.

(25) - PNL-LP2

MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 36
DIMENSIONS: 65"H X 20"W X 5-1/2"D
BREAKER COMBINATIONS:

(36) 20A / 1P

(26) - PNL-EMP3

MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 100A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 24 (12 TOP, 12 BOTTOM)
DIMENSIONS: 38-1/4"H X 20"W X 5-3/4"D
BREAKER COMBINATIONS:

TOP:
(7) 20A / 1P

BOTTOM:
(7) 20A / 1P (1) 15A / 2P

(27) - PNL-PP6

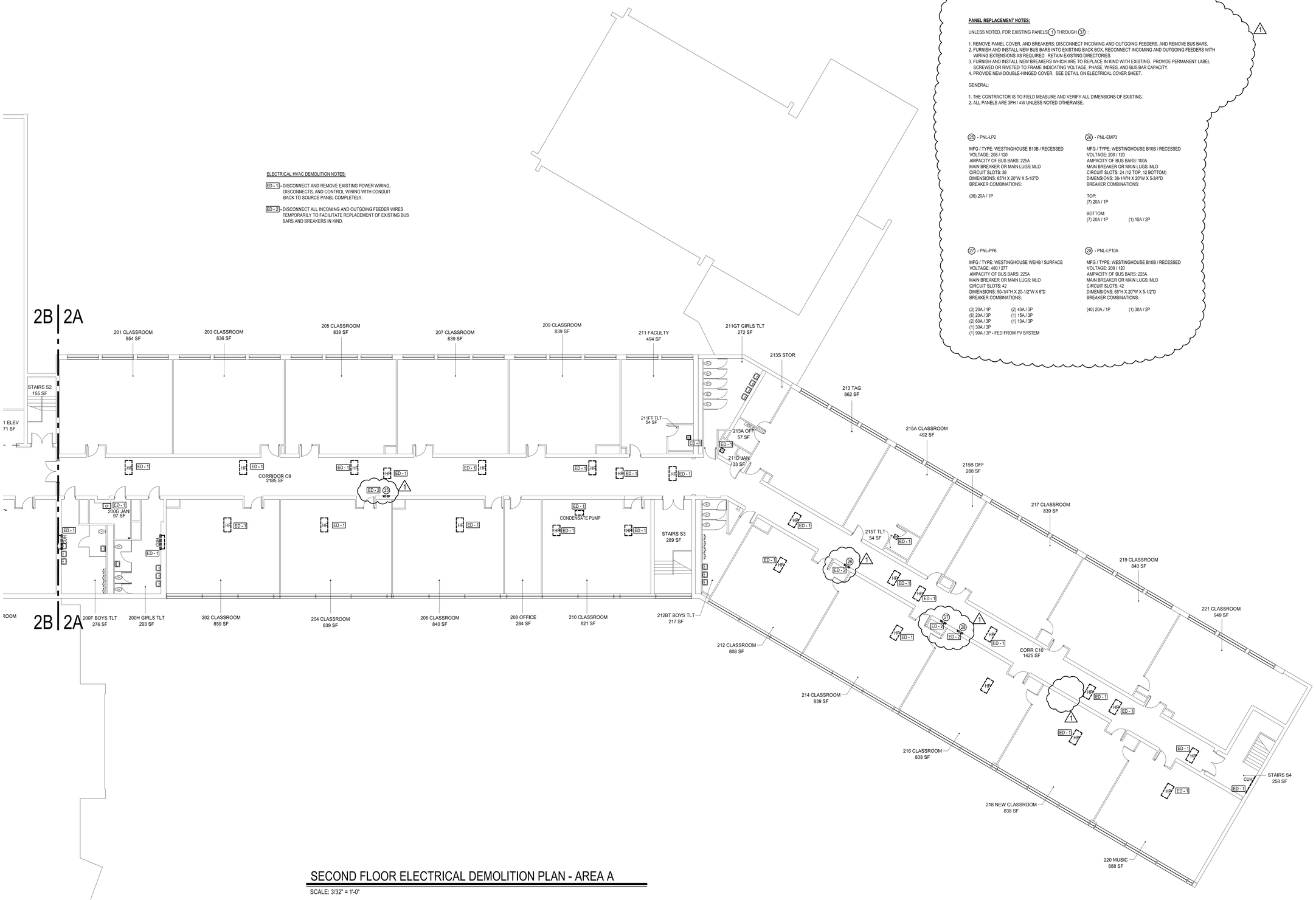
MFG / TYPE: WESTINGHOUSE WEHB / SURFACE
VOLTAGE: 480 / 277
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 42
DIMENSIONS: 50-1/4"H X 20-1/2"W X 6"D
BREAKER COMBINATIONS:

(3) 20A / 1P (2) 40A / 3P
(6) 20A / 3P (1) 15A / 3P
(2) 60A / 3P (1) 10A / 3P
(1) 30A / 3P
(1) 90A / 3P - FED FROM PV SYSTEM

(28) - PNL-LP10A

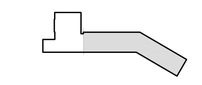
MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 42
DIMENSIONS: 65"H X 20"W X 5-1/2"D
BREAKER COMBINATIONS:

(40) 20A / 1P (1) 30A / 2P



SECOND FLOOR ELECTRICAL DEMOLITION PLAN - AREA A

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



STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652, F: (302) 832-1423
E-Mail: info@StudioJAED.com
Website: www.StudioJAED.com

REVISIONS

DESCRIPTION	DATE
1 REVISED FOR ADDENDUM #2	5/18/2015

PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
SECOND FLOOR ELECTRICAL DEMOLITION PLAN - AREA A

BID DOCUMENTS
MAY 1, 2015

DRAWN	CHK'D/DESIGNER
JRB	PP
DISCIPLINE	SHEET NO.
E	9.4
PROJECT NO.	
14037	

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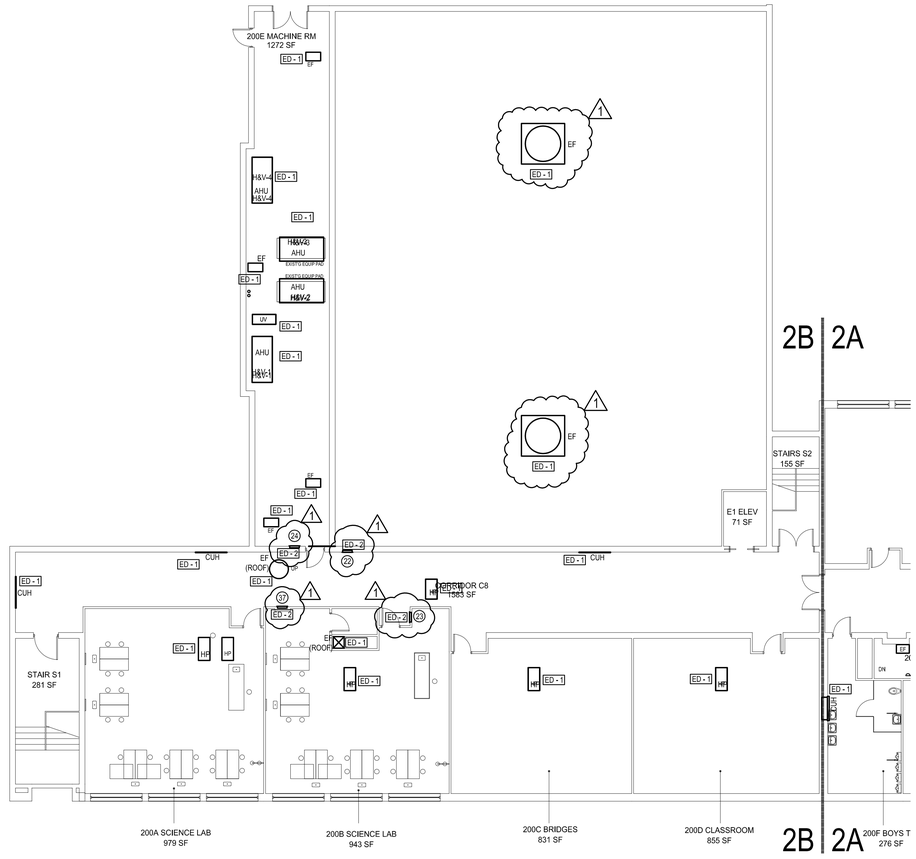


ELECTRICAL HVAC DEMOLITION NOTES:

ED - 1 - DISCONNECT AND REMOVE EXISTING POWER WIRING, DISCONNECTS, AND CONTROL WIRING WITH CONDUIT BACK TO SOURCE PANEL COMPLETELY.

ED - 2 - DISCONNECT ALL INCOMING AND OUTGOING FEEDER WIRES TEMPORARILY TO FACILITATE REPLACEMENT OF EXISTING BUS BARS AND BREAKERS IN KIND.

PANEL REPLACEMENT NOTES:

UNLESS NOTED, FOR EXISTING PANELS (1) THROUGH (37) :

1. REMOVE PANEL COVER, AND BREAKERS; DISCONNECT INCOMING AND OUTGOING FEEDERS, AND REMOVE BUS BARS.
2. FURNISH AND INSTALL NEW BUS BARS INTO EXISTING BACK BOX, RECONNECT INCOMING AND OUTGOING FEEDERS WITH WIRING EXTENSIONS AS REQUIRED. RETAIN EXISTING DIRECTORIES.
3. FURNISH AND INSTALL NEW BREAKERS WHICH ARE TO REPLACE IN KIND WITH EXISTING. PROVIDE PERMANENT LABEL SCREWED OR RIVETED TO FRAME INDICATING VOLTAGE, PHASE, WIRES, AND BUS BAR CAPACITY.
4. PROVIDE NEW DOUBLE-HINGED COVER. SEE DETAIL ON ELECTRICAL COVER SHEET.

GENERAL:

1. THE CONTRACTOR IS TO FIELD MEASURE AND VERIFY ALL DIMENSIONS OF EXISTING.
2. ALL PANELS ARE 3PH / 4W UNLESS NOTED OTHERWISE.

(22) - PNL-LP3

MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 30
DIMENSIONS: 38"H X 20"W X 5-1/2"D
BREAKER COMBINATIONS:

(28) 20A / 1P (1) 30A / 2P

(23) - NO LABEL

MFG / TYPE: SQ-D NQOD / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 225A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 42
DIMENSIONS: 35"H X 20"W X 5-3/4"D
BREAKER COMBINATIONS:

(29) 20A / 1P

* REPLACE FRAME, TRIM, AND DOOR ONLY. RETAIN EXISTING BREAKERS AND BUS BARS.

(24) - PNL-HV3

MFG / TYPE: WESTINGHOUSE B10B / SURFACE
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 100A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 24
DIMENSIONS: 50-1/4"H X 20"W X 5-3/4"D
BREAKER COMBINATIONS:

(15) 20A / 1P (3) 20A / 3P

(29) - PNL-LP12

MFG / TYPE: FEDERAL PACIFIC / SURFACE
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 60A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 16
DIMENSIONS: 25"H X 38-1/4"W X 10-1/2"D
BREAKER COMBINATIONS:

(11) 20A / 1P

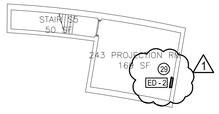
* 22-1/2" HIGH BLANK PLATE BELOW PANEL EXTENDING ENTIRE WIDTH.

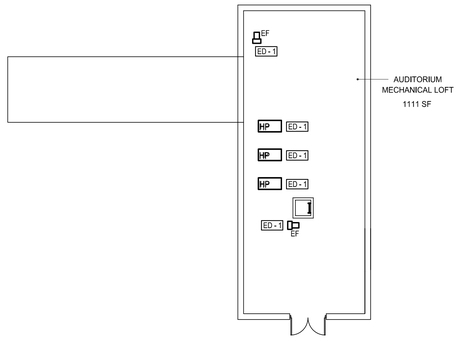
(37) - PNL-EMP2

MFG / TYPE: WESTINGHOUSE B10B / RECESSED
VOLTAGE: 208 / 120
AMPACITY OF BUS BARS: 100A
MAIN BREAKER OR MAIN LUGS: MLO
CIRCUIT SLOTS: 24 (12 TOP, 12 BOTTOM)
DIMENSIONS: 38-1/4"H X 20"W X 5-3/4"D
BREAKER COMBINATIONS:

TOP:
(7) 20A / 1P

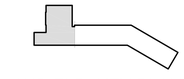
BOTTOM:
(7) 20A / 1P (1) 15A / 3P





SECOND FLOOR ELECTRICAL DEMOLITION PLAN - AREA B

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



2ND FLR. KEY PLAN

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652, F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS

	DESCRIPTION	DATE
1	REVISED PER ADDENDUM #2	MAY 18, 2015

PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
SECOND FLOOR ELECTRICAL DEMOLITION PLAN - AREA B

BID DOCUMENTS
MAY 1, 2015

DRAWN	CHK'D/DESIGNER
JRB	PP
DISCIPLINE	SHEET NO.
E	9.5

PROJECT NO.
14037

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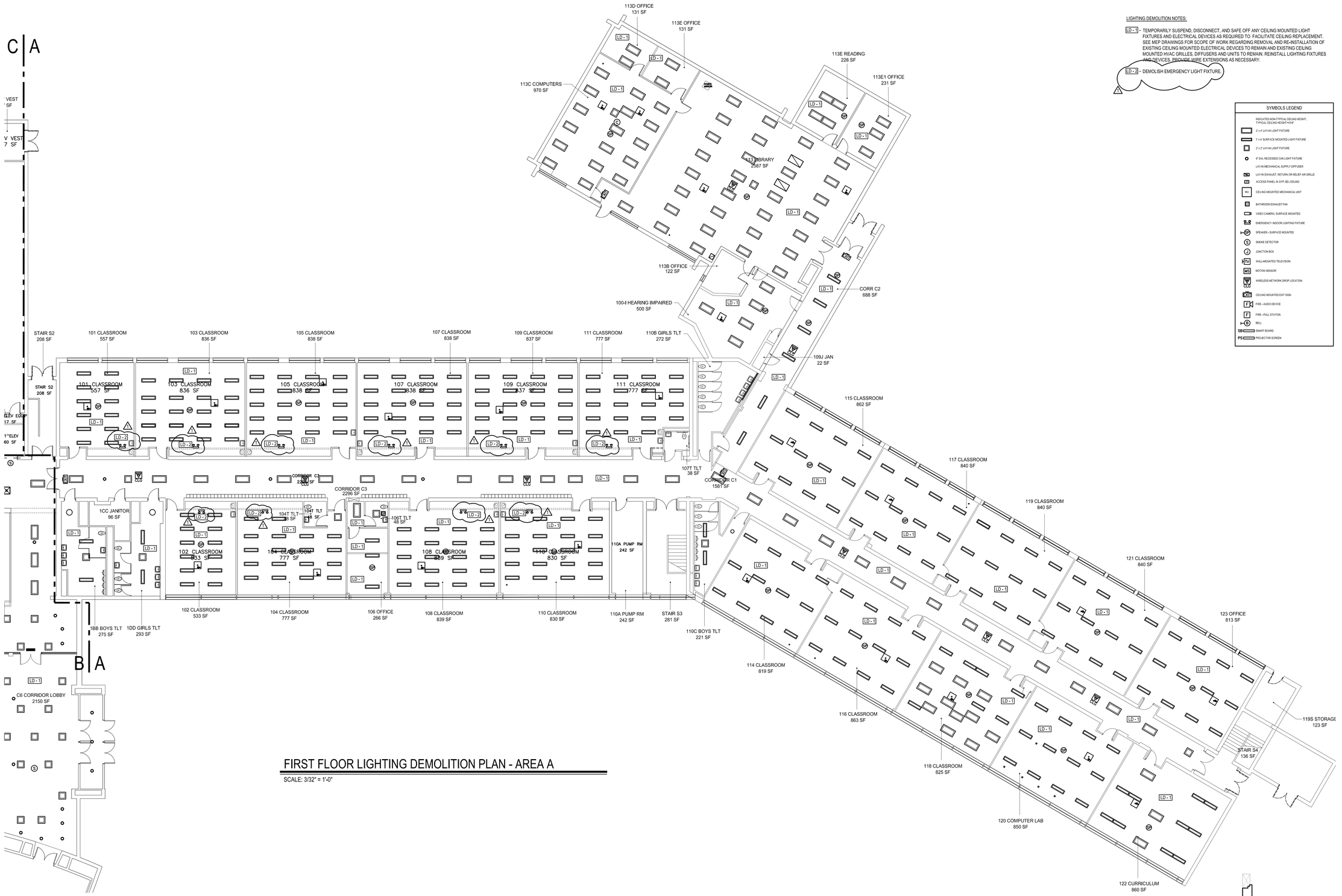

FIRST FLOOR LIGHTING DEMOLITION PLAN - AREA A

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

LIGHTING DEMOLITION NOTES:

LD - 1 - TEMPORARILY SUSPEND, DISCONNECT, AND SAFE OFF ANY CEILING MOUNTED LIGHT FIXTURES AND ELECTRICAL DEVICES AS REQUIRED TO FACILITATE CEILING REPLACEMENT. SEE MEP DRAWINGS FOR SCOPE OF WORK REGARDING REMOVAL AND RE-INSTALLATION OF EXISTING CEILING MOUNTED ELECTRICAL DEVICES TO REMAIN AND EXISTING CEILING MOUNTED HVAC GRILLES, DIFFUSERS AND UNITS TO REMAIN. REINSTALL LIGHTING FIXTURES AND DEVICES. PROVIDE WIRE EXTENSIONS AS NECESSARY.

LD - 2 - DEMOLISH EMERGENCY LIGHT FIXTURE

SYMBOLS LEGEND

- INDICATES NON-TYPICAL CEILING HEIGHT, TYPICAL CEILING HEIGHT 9'-0"
- 2' x 4' LAY-IN LIGHT FIXTURE
- 1' x 4' SURFACE MOUNTED LIGHT FIXTURE
- 2' x 2' LAY-IN LIGHT FIXTURE
- 6" DIA. RECESSED CAN LIGHT FIXTURE
- LAY-IN MECHANICAL SUPPLY DIFFUSER
- LAY-IN EXHAUST, RETURN OR RELIEF AIR GRILLE
- ACCESS PANEL IN GYP. BD. CEILING
- CEILING MOUNTED MECHANICAL UNIT
- BATHROOM EXHAUST FAN
- VIDEO CAMERA, SURFACE MOUNTED
- EMERGENCY INDOOR LIGHTING FIXTURE
- SPEAKER - SURFACE MOUNTED
- SMOKE DETECTOR
- JUNCTION BOX
- WALL-MOUNTED TELEVISION
- MOTION SENSOR
- WIRELESS NETWORK DROP LOCATION
- CEILING MOUNTED EXIT SIGN
- FIRE + AUDIO DEVICE
- FIRE + PULL STATION
- BELL
- SMART BOARD
- PROJECTOR SCREEN

1ST FLR. KEY PLAN

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 YARNALL HILL ROAD, STE. 110
BEAR, DE 19701
P.: (302) 832-1662, F: (302) 832-1423
E-Mail: info@StudioJAED.com
Website: www.StudioJAED.com

REVISIONS

DESCRIPTION	DATE
REVISED PER ADDENDUM #2	5/18/15

PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
FIRST FLOOR LIGHTING DEMOLITION PLAN - AREA A

BID DOCUMENTS
MAY 1, 2015

DRAWN	CHK'D/DESIGNER
JRB	PP
DISCIPLINE	SHEET NO.
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14037	

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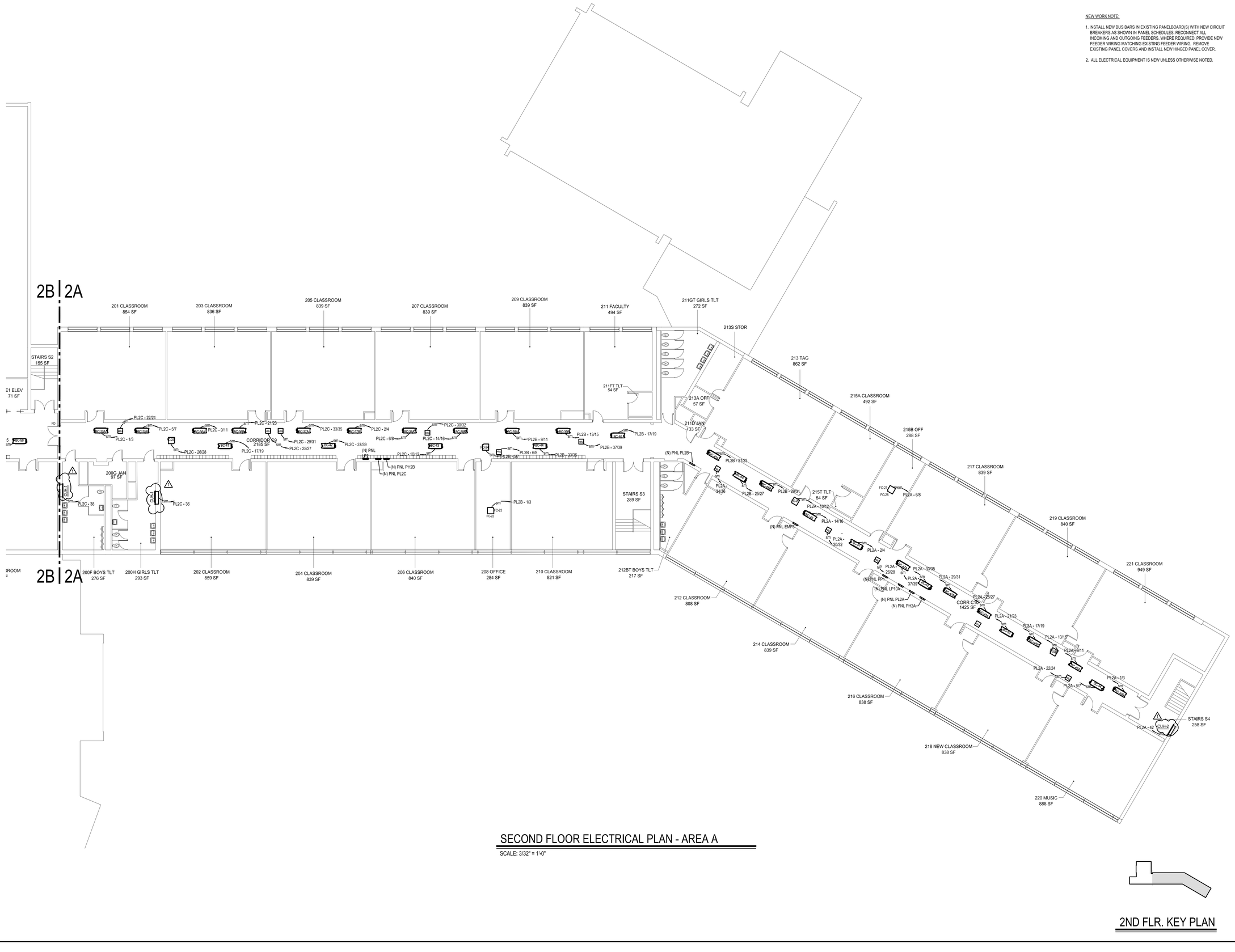


SECOND FLOOR ELECTRICAL PLAN - AREA A

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

2ND FLR. KEY PLAN

NEW WORK NOTE:

1. INSTALL NEW BUS BARS IN EXISTING PANELBOARD(S) WITH NEW CIRCUIT BREAKERS AS SHOWN IN PANEL SCHEDULES. RECONNECT ALL INCOMING AND OUTGOING FEEDERS. WHERE REQUIRED, PROVIDE NEW FEEDER WIRING MATCHING EXISTING FEEDER WIRING. REMOVE EXISTING PANEL COVERS AND INSTALL NEW HINGED PANEL COVER.
2. ALL ELECTRICAL EQUIPMENT IS NEW UNLESS OTHERWISE NOTED.

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P.: (302) 832-1652, F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS

	DESCRIPTION	DATE
1	REVISED PER ADDENDUM #2	5/18/15

PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
SECOND FLOOR ELECTRICAL PLAN - AREA A

BID DOCUMENTS
MAY 1, 2015

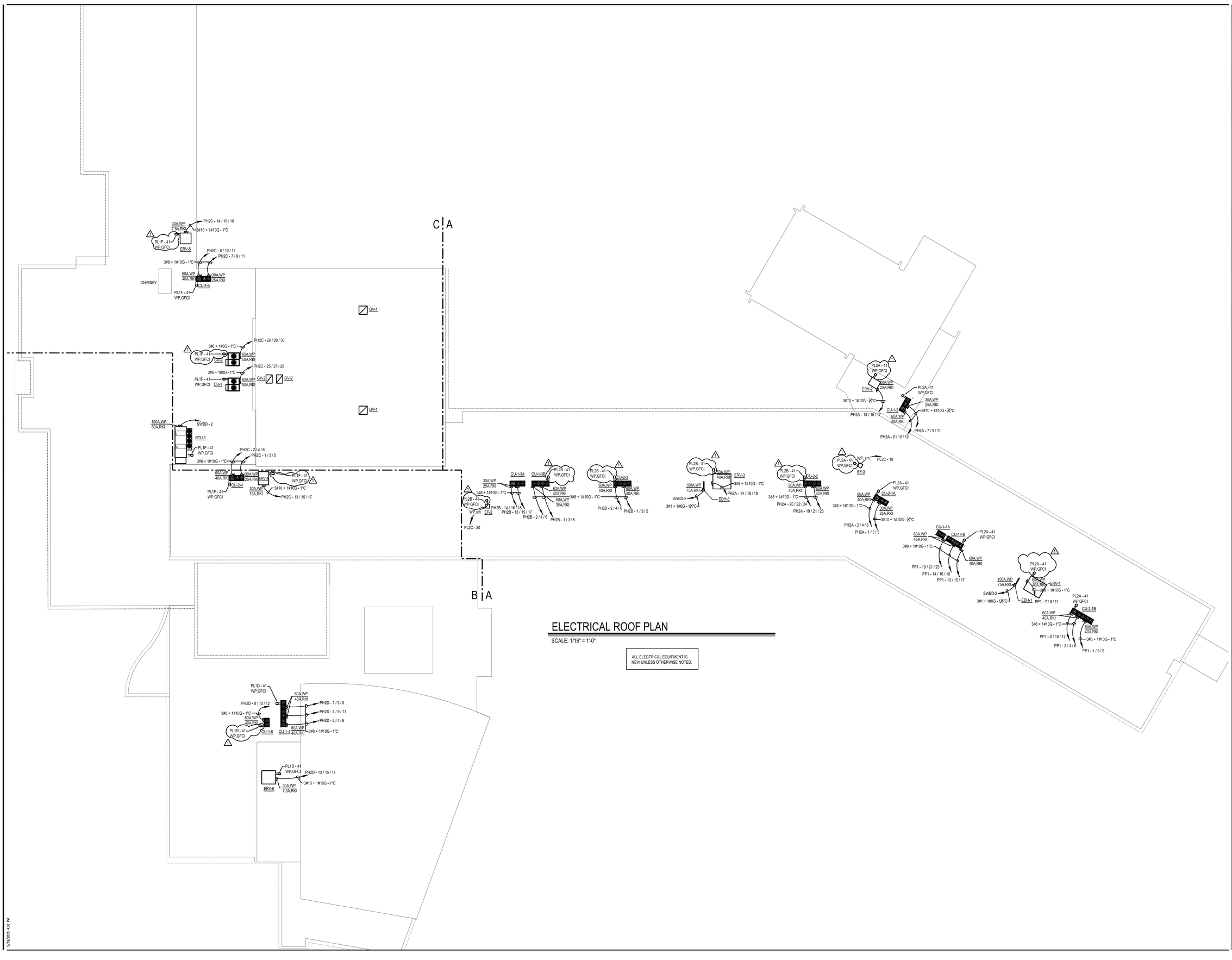
DRAWN	CHK'D/DESIGNER
JRB	PP

DISCIPLINE	SHEET NO.
E	9.14

PROJECT NO.
14037

3/19/2015 12:19 PM

3/19/2015 4:30 PM



ELECTRICAL ROOF PLAN

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

ALL ELECTRICAL EQUIPMENT IS NEW UNLESS OTHERWISE NOTED.

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ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P.: (302) 832-1652 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS

	DESCRIPTION	DATE
1	REVISED PER ADDENDUM #2	5/18/15

PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
ELECTRICAL ROOF PLAN

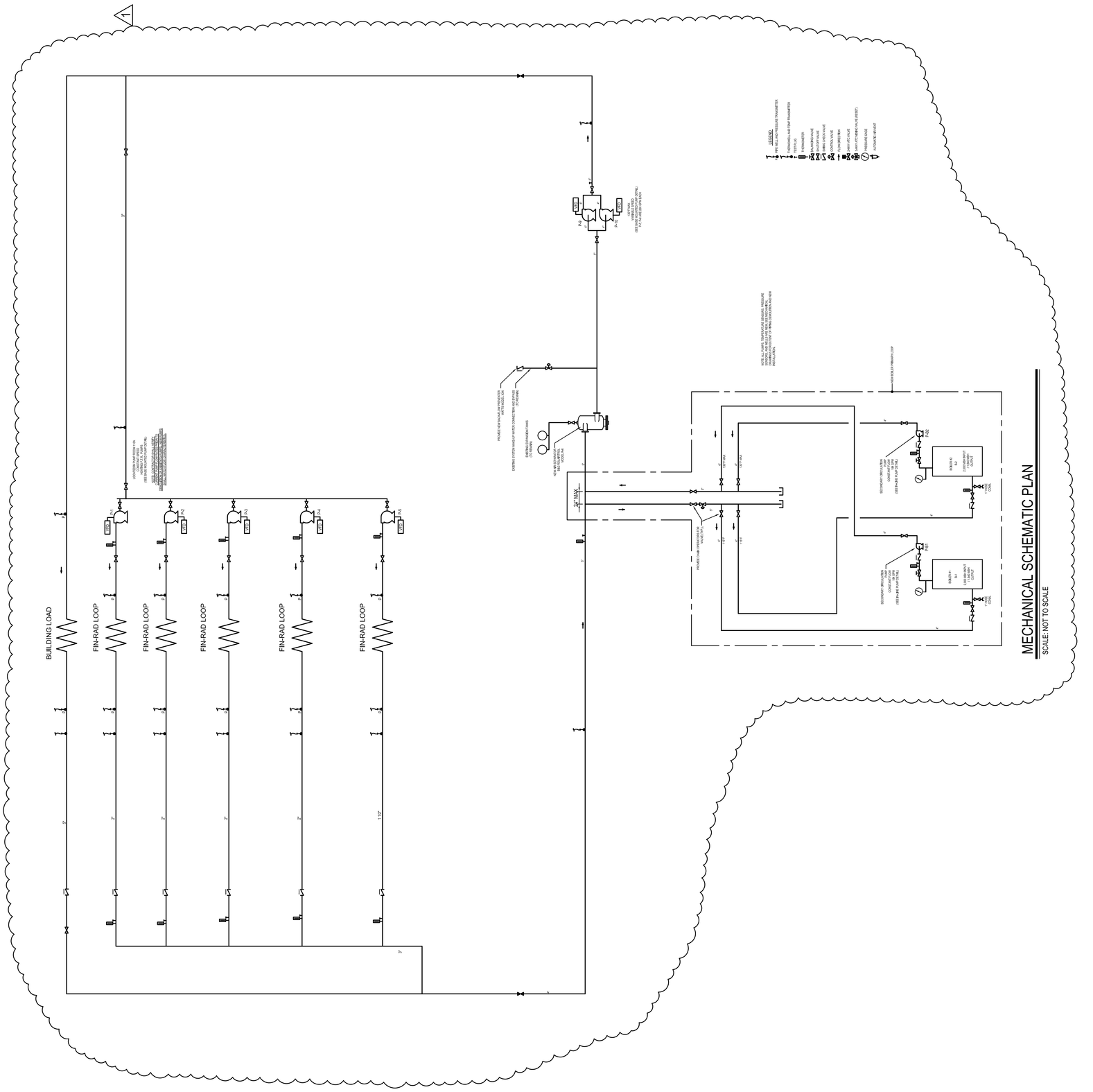
BID DOCUMENTS
MAY 1, 2015

DRAWN	CHK'D/DESIGNER
JRB	PP

DISCIPLINE	SHEET NO.
E	9.17

PROJECT NO.
14037

5/19/2015 9:21 AM



LOCATED IN PUMP ROOM 110A
CONSTANT SPEED
HEATING F.T.R. PUMPS
(SEE BASE MOUNTED PUMP DETAIL)

NOTE: CONTRACTOR SHALL VERIFY CURRENT PUMP FLOW RATES PRIOR TO DEMOLITION OF EXISITNTG PUMPS. NEW PUMPS SHALL MATCH FLOW CHARACTERISTICS.

PROVIDE NEW BACK-FLOW PREVENTER
WATTS MODEL XXX

EXISTING SYSTEM MAKE-UP WATER CONNECTION AND BYPASS
(TO REMAIN)

EXISTING EXPANSION TANKS
(TO REMAIN)

NEW AIR SEPARATOR
B&G ROLAIRTROL
MODEL R-6

130°F MAX
VARIABLE SPEED
(SEE BASE MOUNTED PUMP DETAIL)
P-7, P-8 ARE 260 GPM EACH

PROVIDE CHAIN OPERATORS FOR VALVE (TYP.).

NOTE: ALL PUMPS, TEMPERATURE SENSORS, PRESSURE SENSORS, AND WELLS ARE NEW. SEE MECHANICAL DRAWINGS FOR EXTENT OF PIPING DEMOLITION AND NEW INSTALLATION.

SECONDARY CIRCULATION
PUMP
CONSTANT FLOW
184 GPM
(SEE IN-LINE PUMP DETAIL)

SECONDARY CIRCULATION
PUMP
CONSTANT FLOW
184 GPM
(SEE IN-LINE PUMP DETAIL)

MECHANICAL SCHEMATIC PLAN

SCALE: NOT TO SCALE

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ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652 F: (302) 832-1423
Website:
www.StudioJAED.com
E-Mail:
info@StudioJAED.com

REVISIONS

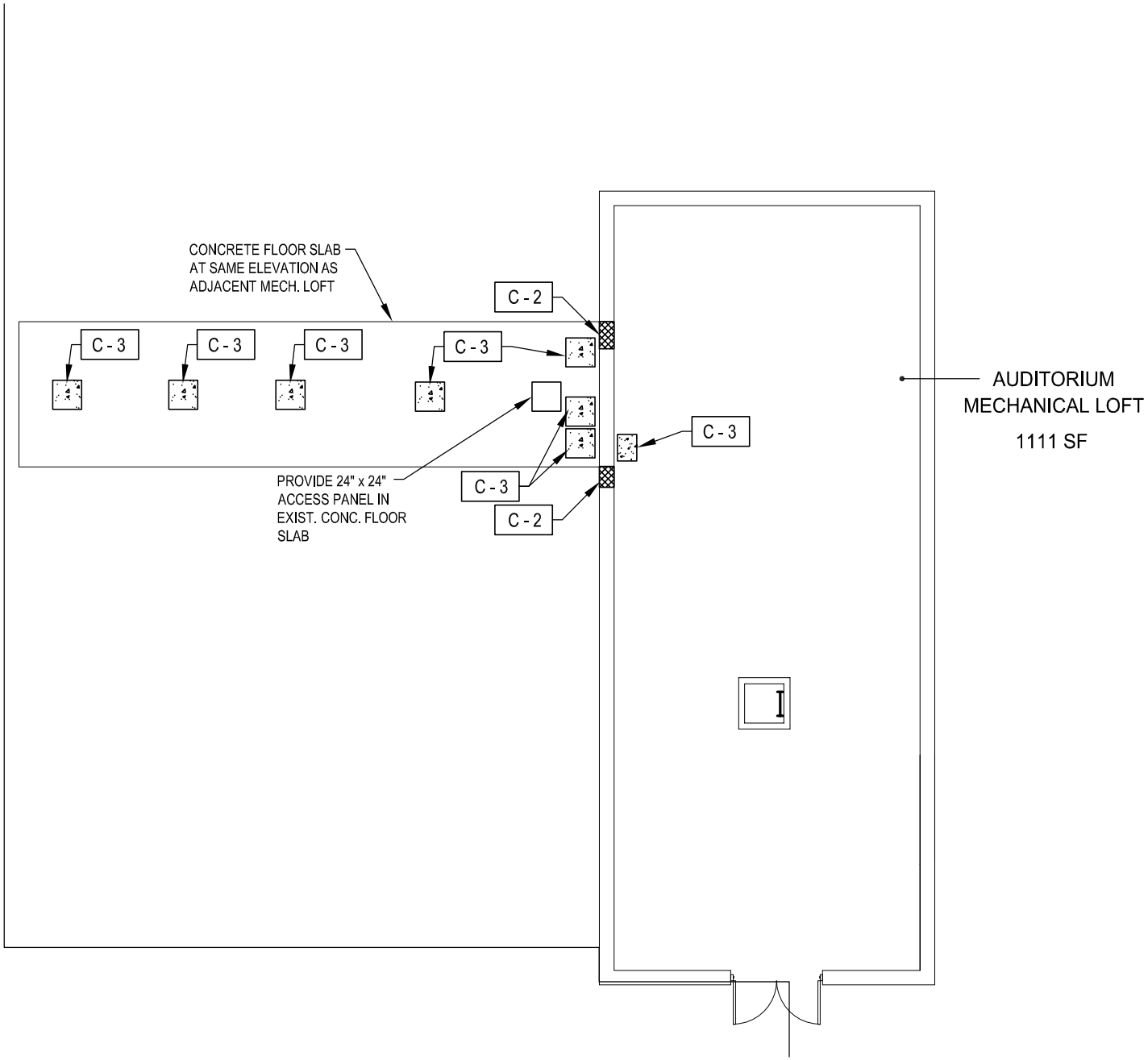
DESCRIPTION	DATE
1 REVISED PER ADDENDUM #2 MAY 18, 2015	

PROJECT
RED CLAY CONSOLIDATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

SHEET TITLE
MECHANICAL
SCHEMATIC

BID
DOCUMENTS
MAY 1, 2015

DRAWN: JRB
CHK'D/DESIGNER: BMZ
DISCIPLINE: M
SHEET NO.: 8.42
PROJECT NO.: 14037



SECOND FLOOR PLAN - AREA B - AUD. MECH. LOFT AREA

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

REVISIONS:
1 ADDENDUM # 2

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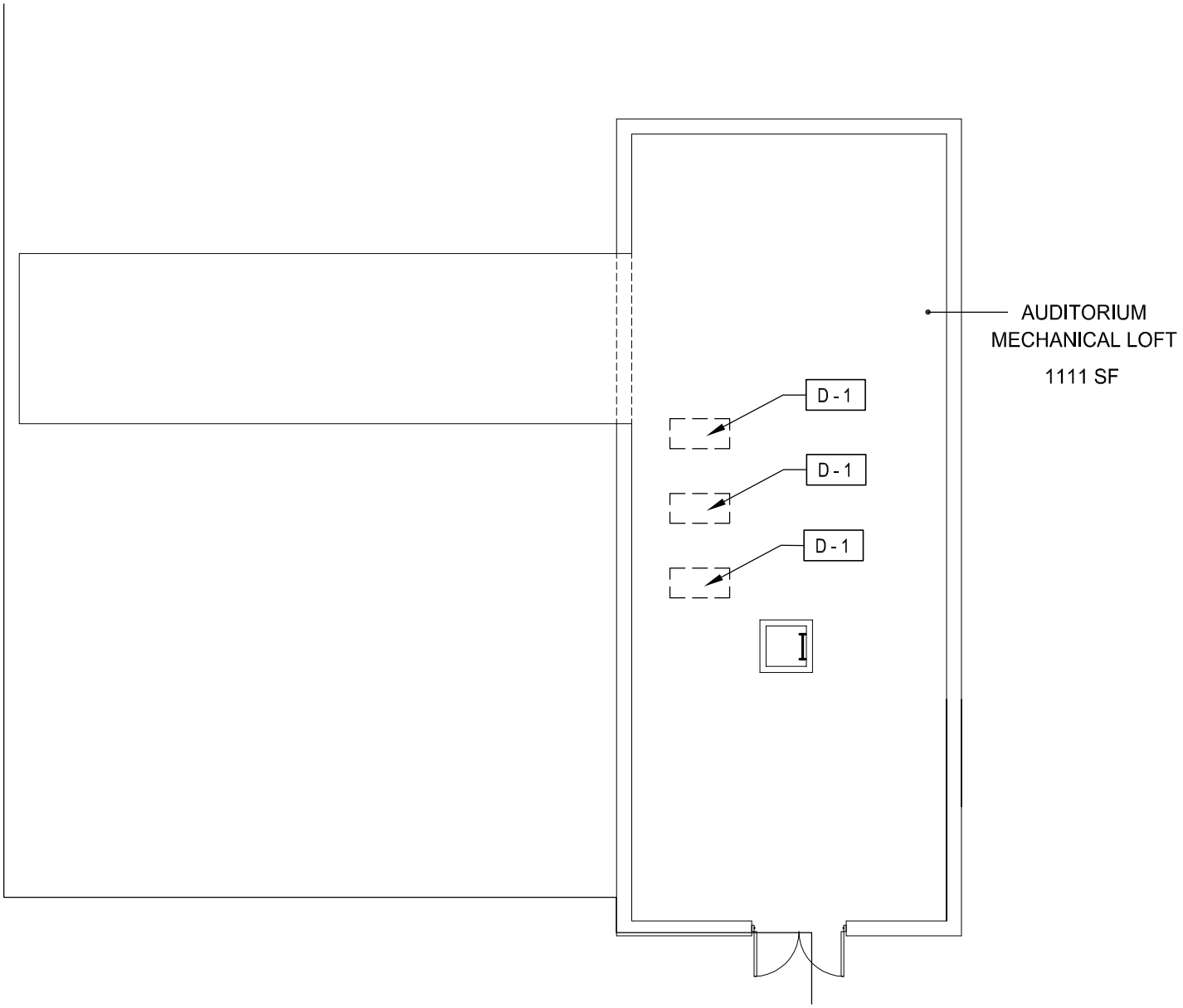
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2301 WHALEY HALL ROAD, STE. 110
BEAR, DE 19701
P (302) 832-1600 F (302) 832-1603
Website:
www.studio-jaed.com
E-mail:
info@studio-jaed.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

MAY 18, 2015
DATE
14037
PROJECT NO.

A3.5
SHEET OF ORIGIN

SHEET NO.
SK-A.3



SECOND FLOOR DEMO. PLAN - AREA B - MECH. LOFT AREA

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

REVISIONS:
1 ADDENDUM # 2

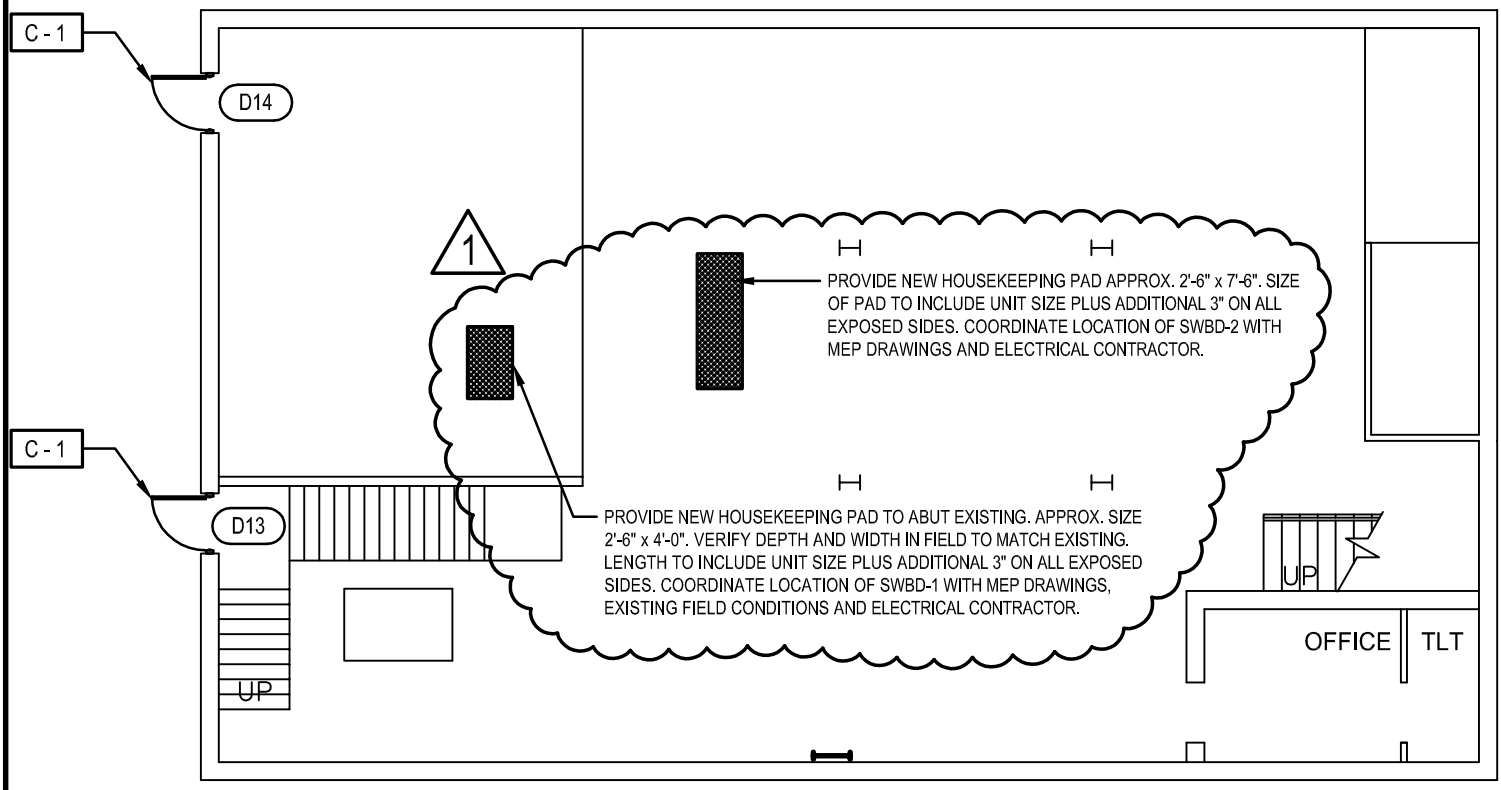
STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WHALEY HALL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1403
Website:
www.studio-jaed.com
E-mail:
info@studio-jaed.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

MAY 18, 2015
DATE
14037
PROJECT NO.

A2.5
SHEET OF ORIGIN

SHEET NO.
SK-A.4



LOWER LEVEL BOILER ROOM PLAN

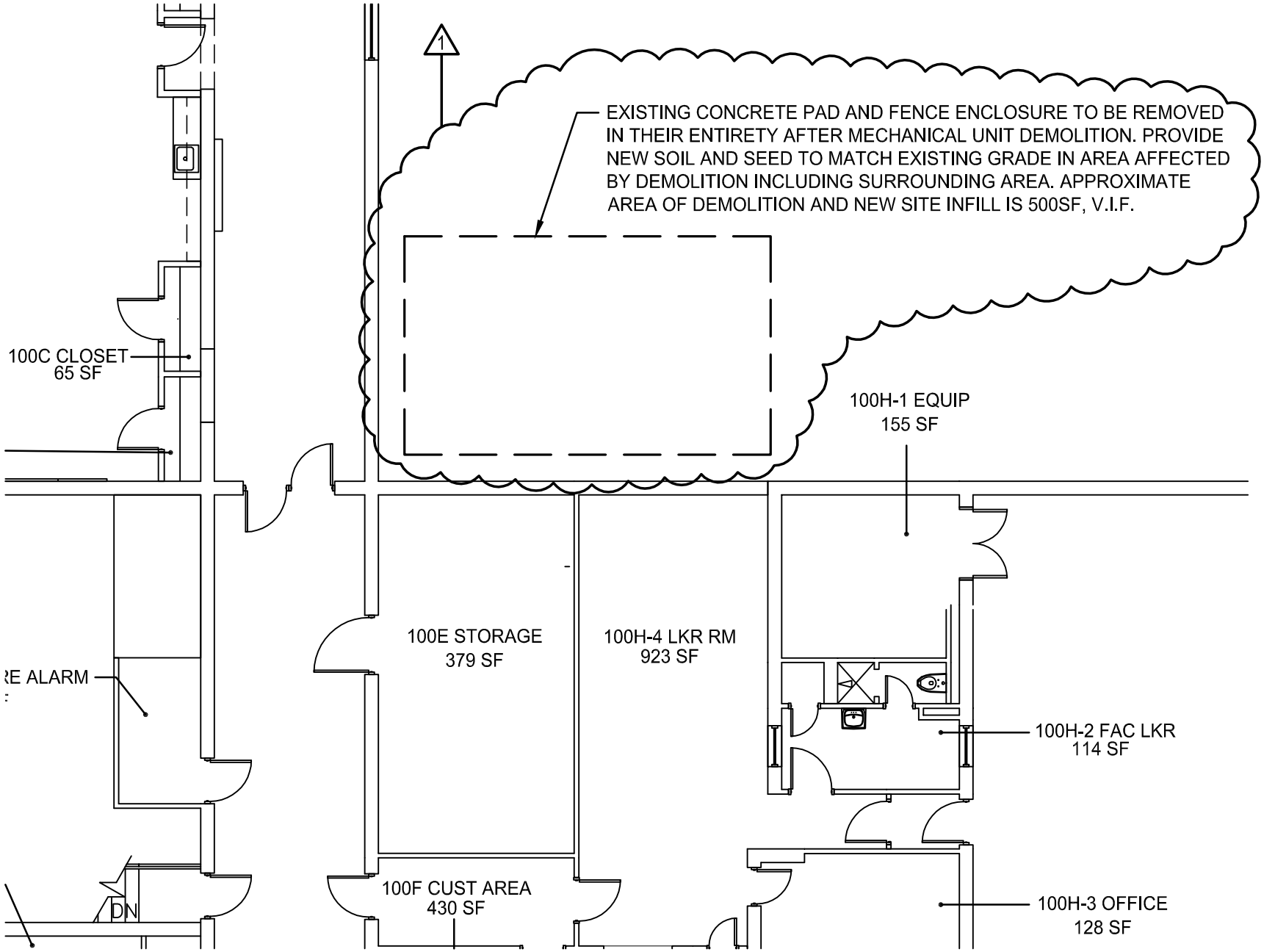
SCALE: 3/32" = 1'-0"

MAY 18, 2015	A3.3
DATE	SHEET NO.
14037	SK-A.5
PROJECT NO.	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 YRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652 F: (302) 832-1423
Web/Inc
www.StudioJAED.com
E-Mail:
info@StudioJAED.com

REVISIONS:
1 REVISED PER ADDENDUM #2



1
SK-A.7

PARTIAL FIRST FLOOR DEMOLITION PLAN - AREA C

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

REVISIONS:
1 ADDENDUM # 2

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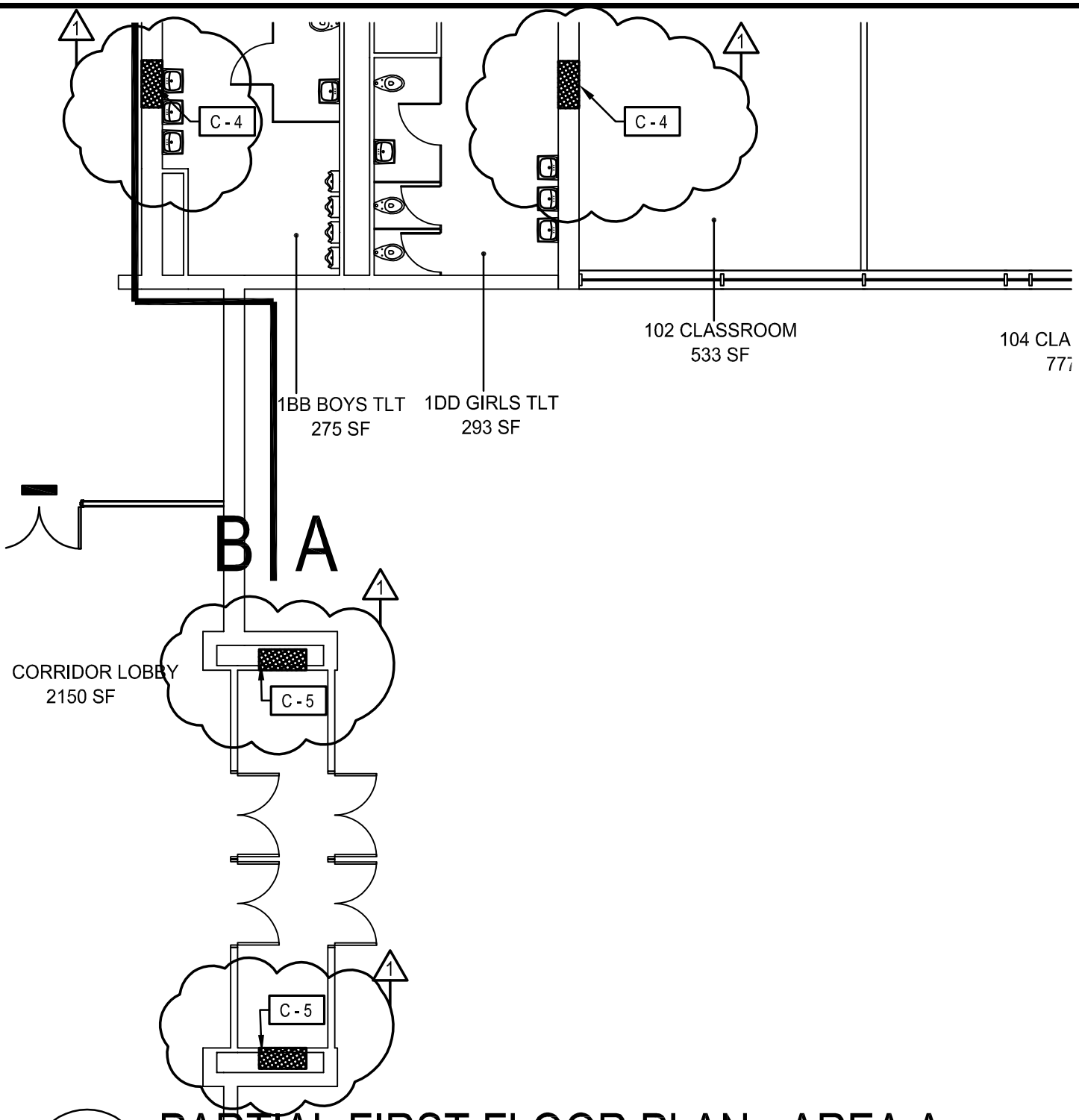
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2035 LAUREL ROAD, SUITE 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
E-MAIL:
info@StudioJAED.com
WEBSITE:
www.StudioJAED.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

MAY 18, 2015
DATE
14037
PROJECT NO.

A2.3
SHEET OF ORIGIN

SHEET NO.
SK-A.7



1 SK-A.8 PARTIAL FIRST FLOOR PLAN - AREA A

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

1 CONSTRUCTION KEY NOTES

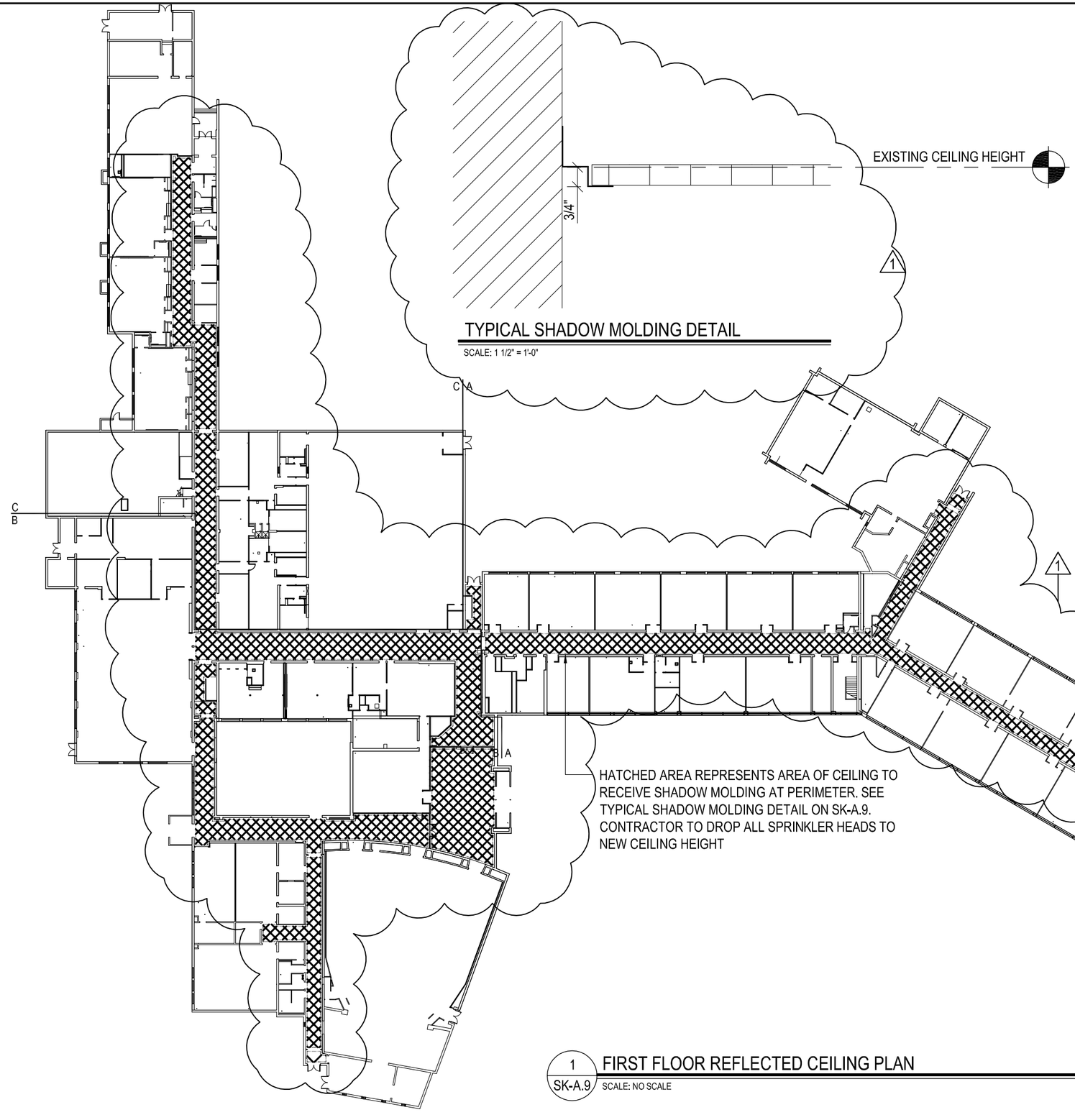
C - 4	NEW WALL INFILL - TOOTH IN NEW CMU IN EXISTING WALL. PROVIDE NEW CERAMIC TILE FINISH TO MATCH EXISTING AT BATHROOM SIDES ONLY.
C - 5	NEW WALL INFILL - TOOTH IN NEW CMU IN EXISTING WALL. PROVIDE NEW PORCELAIN TILE FINISH TO MATCH EXISTING AT VESTIBULE SIDES ONLY.

5/19/15 DATE | A3.1 SHEET NO.
14037 PROJECT NO. | SK-A.8

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WHANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: Info@StudioJAED.com

REVISIONS:
1 ADDENDUM #2



REVISIONS:
1 ADDENDUM # 2

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
3500 YORKLYN HILL ROAD, STE 118
HOCKESSIN, DE 19707
T: (302) 235-5423 F: (302) 235-5423
Email:
Web:
www.StudioJAED.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

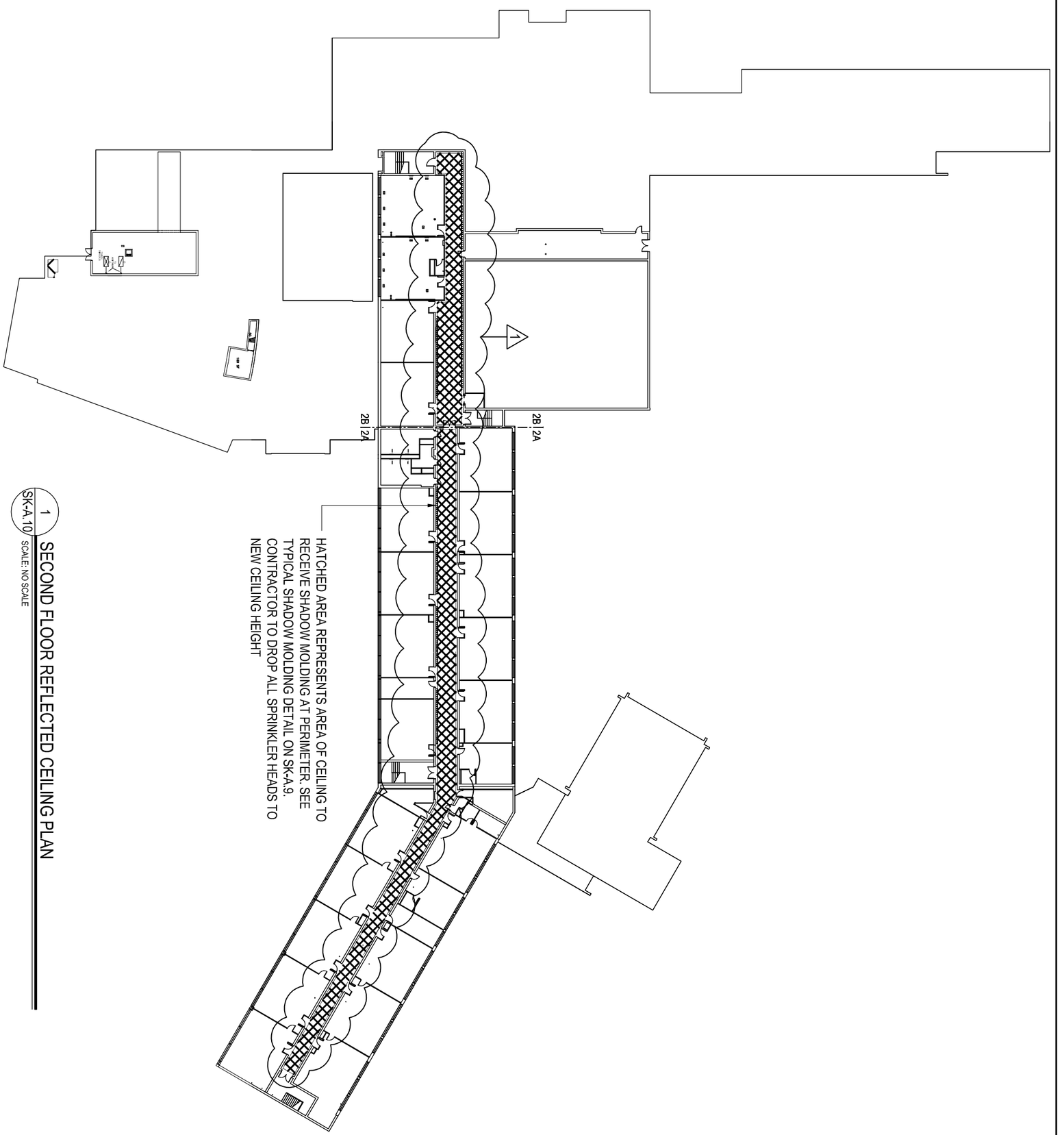
MAY 18, 2015
DATE
14037
PROJECT NO.

A3.6-A3.8
SHEET OF ORIGIN

SHEET NO.
SK-A.9

5/19/2015 2:54 PM

5/19/2015 2:55 PM



1
SK-A.10
SCALE: NO SCALE

SECOND FLOOR REFLECTED CEILING PLAN

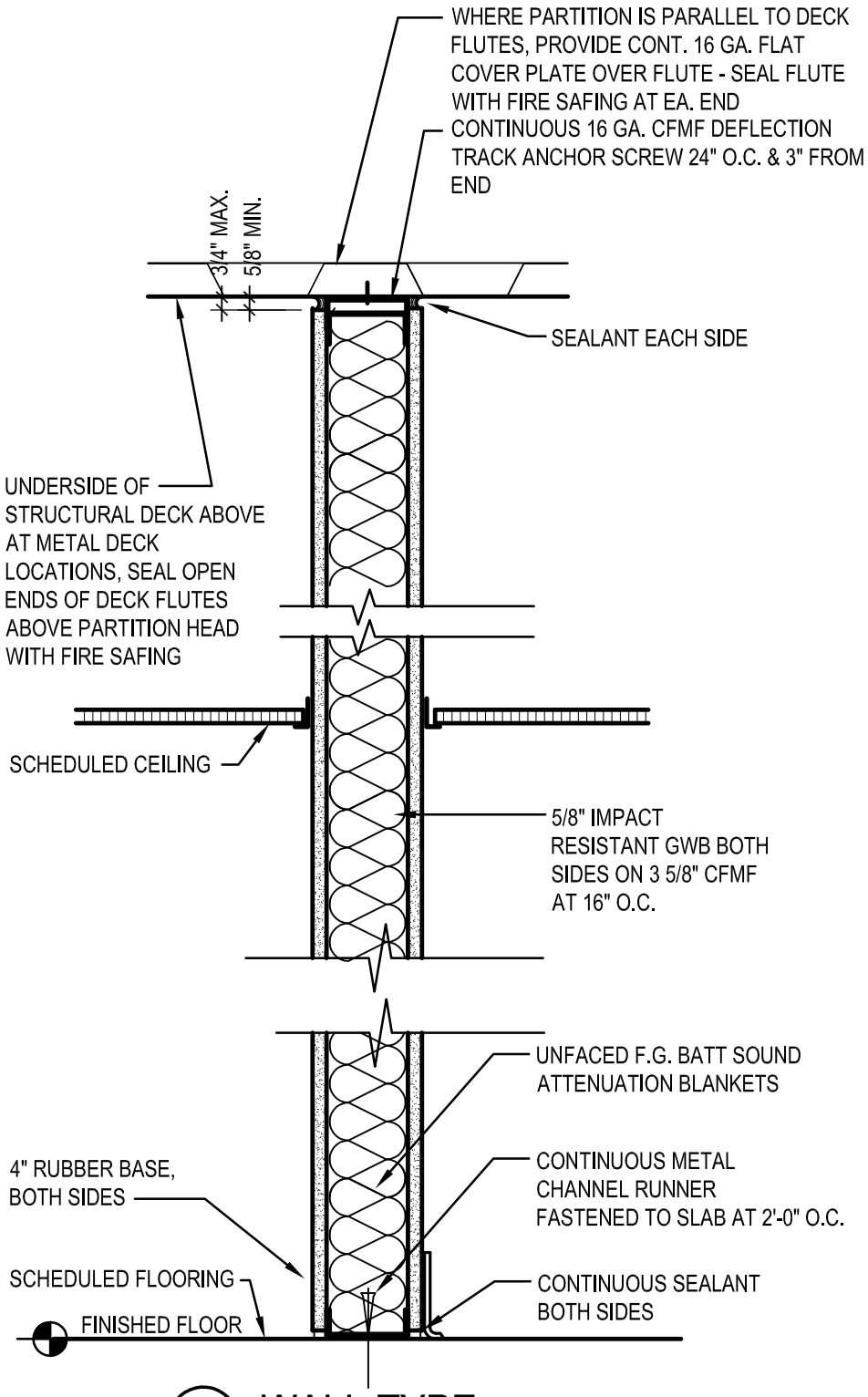
HATCHED AREA REPRESENTS AREA OF CEILING TO RECEIVE SHADOW MOLDING AT PERIMETER. SEE TYPICAL SHADOW MOLDING DETAIL ON SK-A.9. CONTRACTOR TO DROP ALL SPRINKLER HEADS TO NEW CEILING HEIGHT

DATE	MAY 18, 2015
PROJECT NO.	14037
SHEET OF ORIGIN	A3.9-A3.10
SHEET NO.	SK-A.10

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2600 NAAMANS RD., ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1650 F: (302) 832-0433
Website: www.StudioJAED.com
EMAIL: Info@StudioJAED.com

REVISIONS:
1 ADDENDUM # 2



1

SK-A.11

WALL TYPES - 3/A6.1

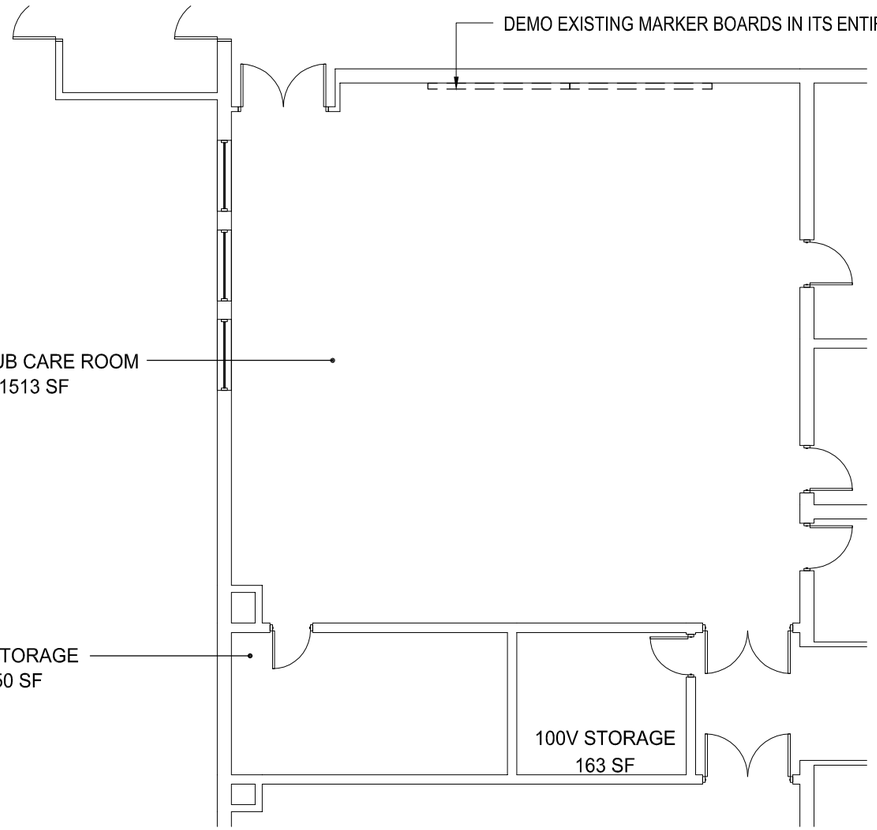
SCALE: 1 1/2" = 1'-0"

DATE	MAY 18, 2015
SHEET NO.	A6.1
PROJECT NO.	14037
	SK-A.11

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

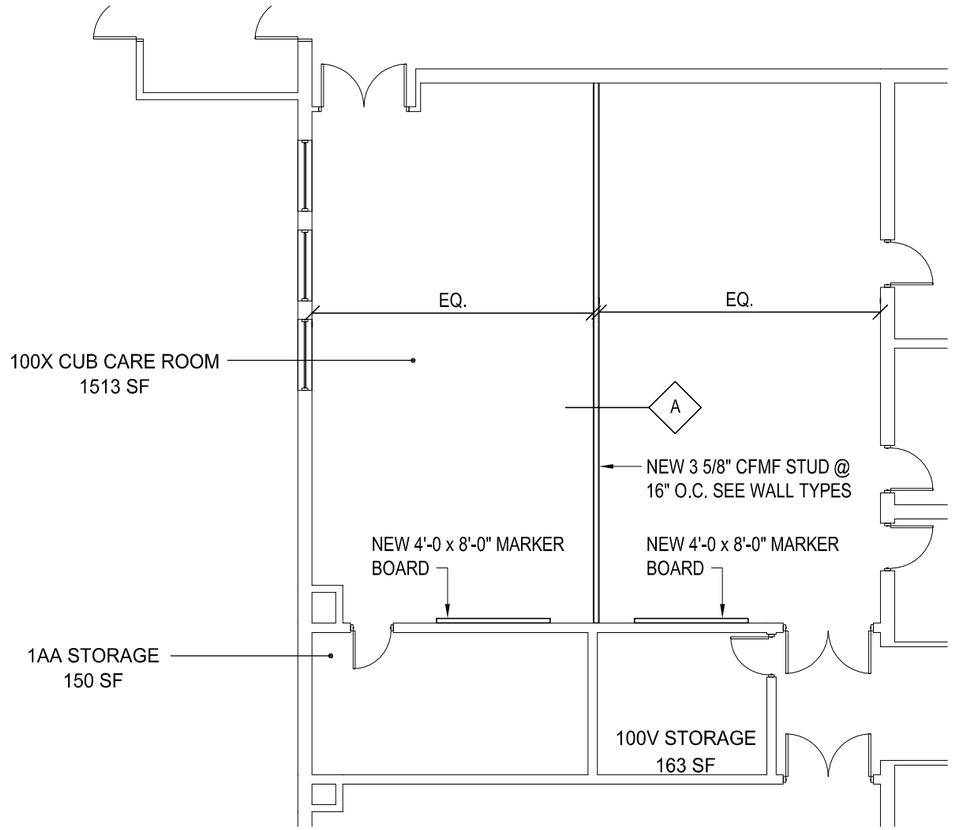
STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
1 ADDENDUM #2



FIRST FLOOR DEMOLITION PLAN - AREA B

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



FIRST FLOOR PLAN - AREA B

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

REVISIONS:
1 ADDENDUM # 2

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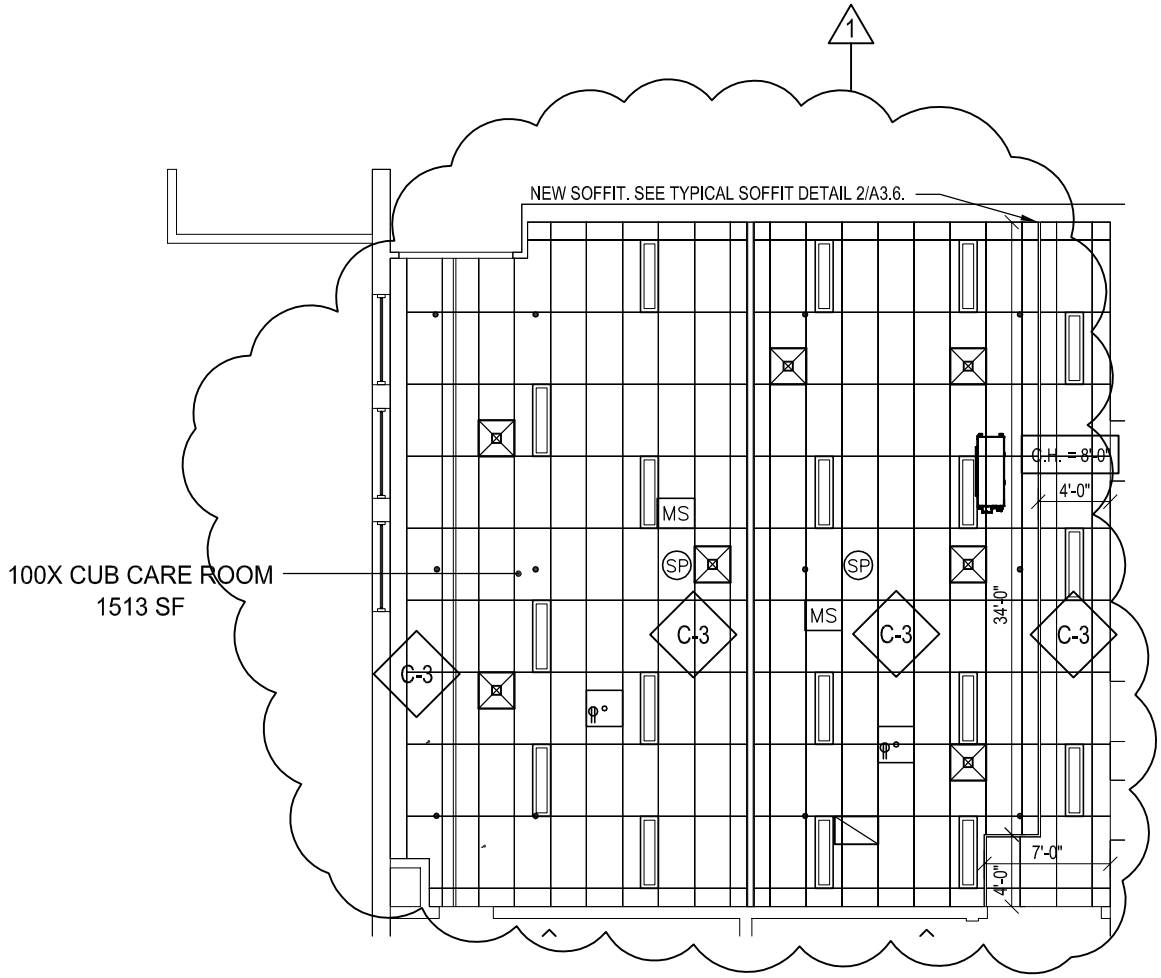
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2961 WW BEAZLEY BLVD, STE. 119
WILMINGTON, DE 19808
P: (302) 633-0400 F: (302) 633-0420
Website:
www.StudioJAED.com
E-MAIL:
info@studioJAED.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

MAY 18, 2015
DATE
14037
PROJECT NO.

A3.2
SHEET OF ORIGIN
SHEET NO.
SK-A.12

5/19/2015 3:04 PM



FIRST FLOOR REFLECTED CEILING PLAN - AREA B

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

5/19/15	A3.7
DATE	SHEET NO.
14037	SK-A.13
PROJECT NO.	

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

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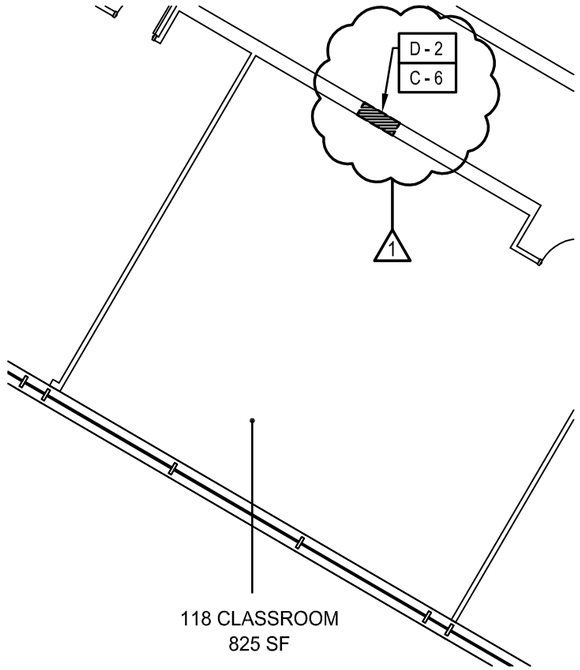
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
1 ADDENDUM #2



DEMOLITION KEY NOTES & LEGEND

D - 2	SAW CUT AND REMOVE PORTION OF EXISTING CMU WALL IN AREA OF NEW ELECTRICAL PANEL INSTALLATION.

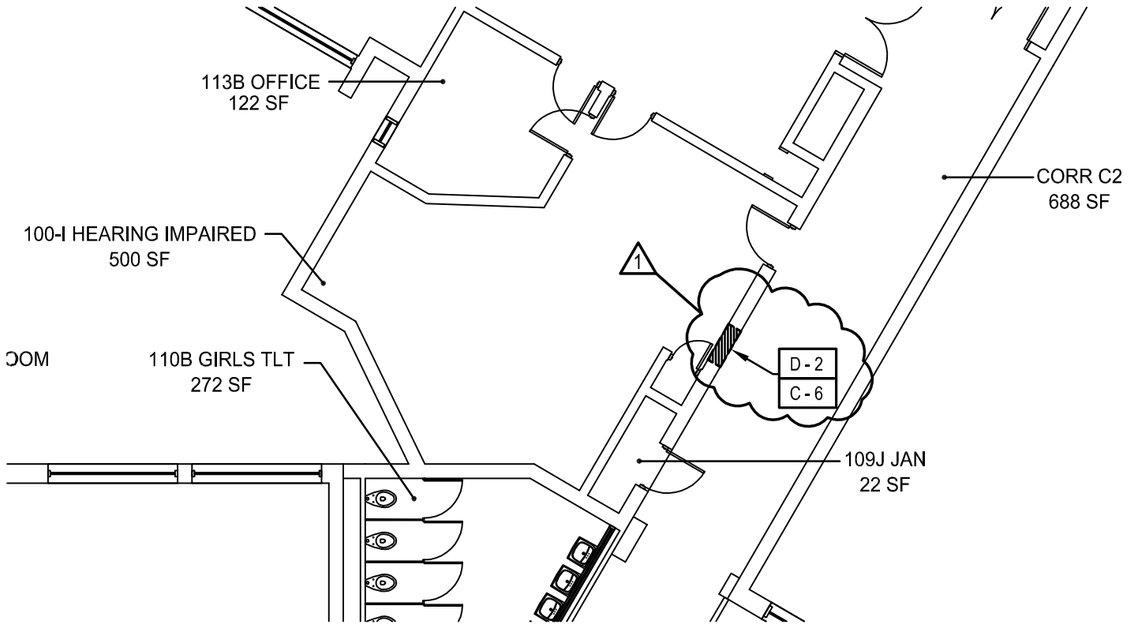
CONSTRUCTION KEY NOTES

C - 6	NEW ELECTRICAL PANEL LOCATION. PROVIDE NEW TOOTH-IN CMU AROUND PERIMETER OF NEW PANEL. PATCH / REPAIR AND PAINT PLASTER FINISH TO MATCH EXISTING WALL TYP.

1 / SK-A.14

PARTIAL FIRST FLOOR PLAN - AREA A

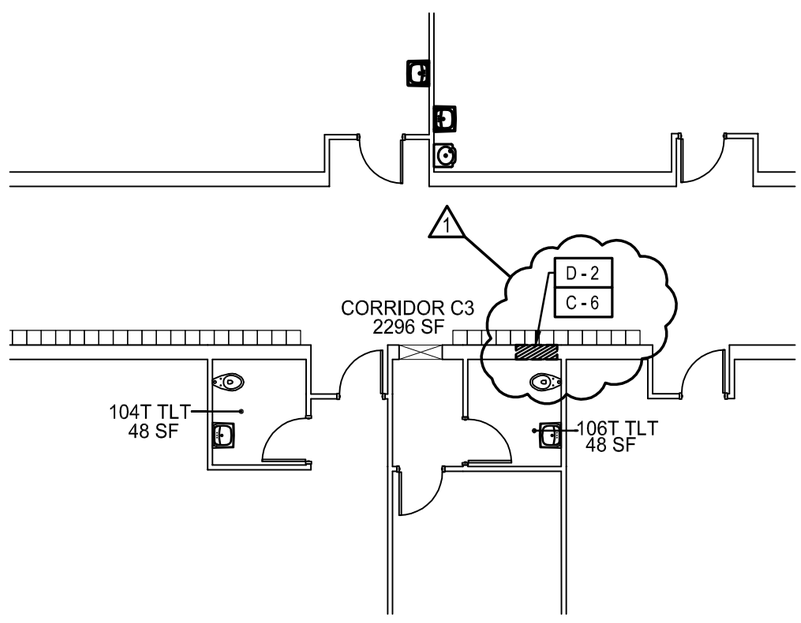
SCALE: 3/32" = 1'-0"



2 / SK-A.14

PARTIAL FIRST FLOOR PLAN - AREA A

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



3 / SK-A.14

PARTIAL FIRST FLOOR PLAN - AREA A

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

REVISIONS:
1 ADDENDUM # 2

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ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2961 WILMINGTON ROAD, SUITE 100
NEW CASTLE COUNTY
BEAR, DE 19701
PHONE: 302-838-3579
FAX: 302-838-3570
E-MAIL: info@studiojaed.com
WEB: www.studiojaed.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

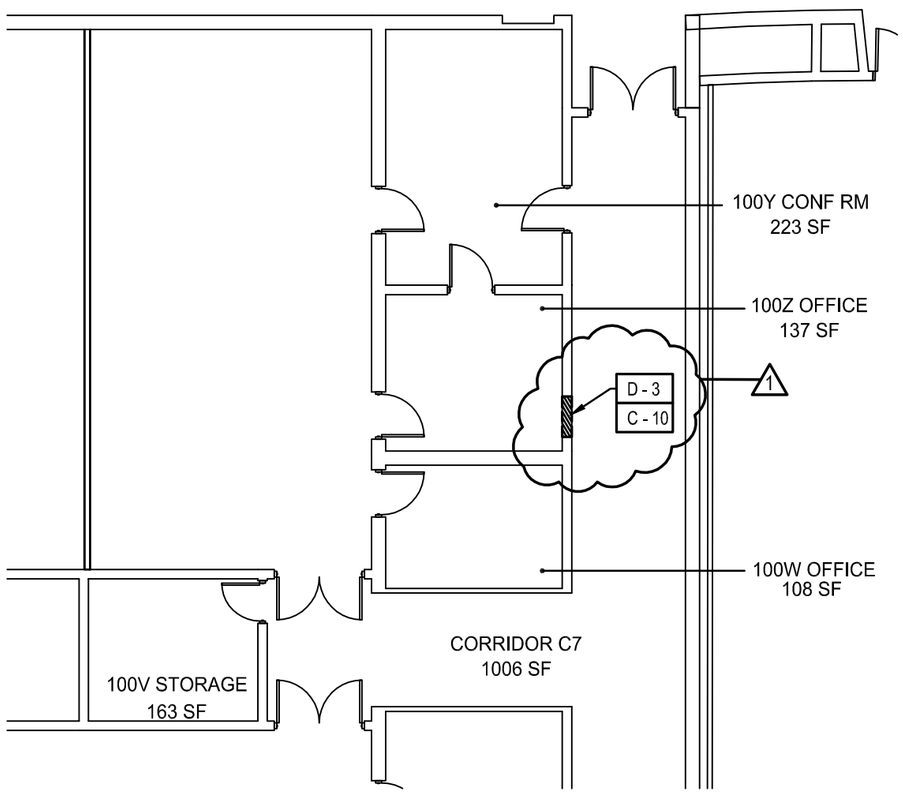
MAY 18, 2015 — DATE
14037 — PROJECT NO.
A2.1 & A3.1 — SHEET OF ORIGIN
SK-A.14 — SHEET NO.

DEMOLITION KEY NOTES & LEGEND

D - 3	SAW CUT AND REMOVE PORTION OF EXISTING CMU WALL IN AREA OF NEW ELECTRICAL PANEL INSTALLATION.

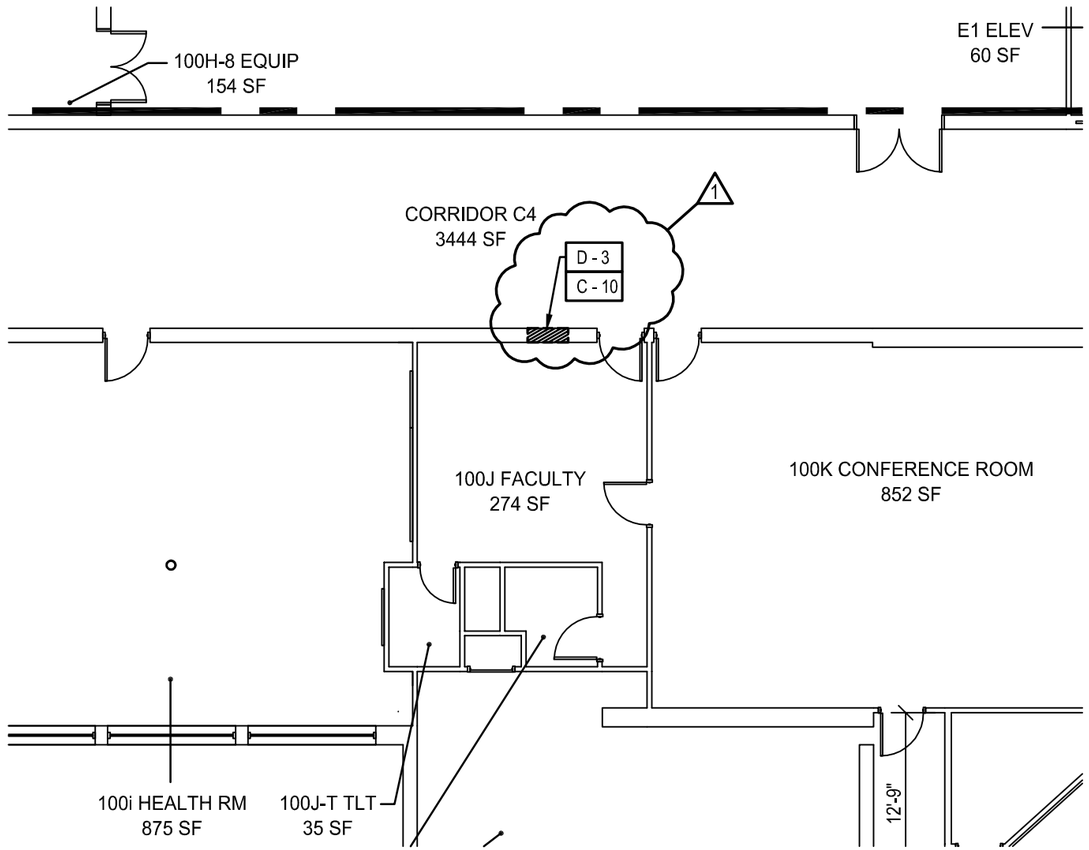
CONSTRUCTION KEY NOTES

C - 10	NEW ELECTRICAL PANEL LOCATION. PROVIDE NEW TOOTH-IN CMU AROUND PERIMETER OF NEW PANEL. PATCH / REPAIR AND PAINT PLASTER FINISH TO MATCH EXISTING WALL TYP.



1 SK-A.15 **PARTIAL FIRST FLOOR PLAN - AREA B**

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



2 SK-A.15 **PARTIAL FIRST FLOOR PLAN - AREA B**

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

REVISIONS:
1 ADDENDUM # 2

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
1209 KIRKWYN FIELD COURT
NEW CASTLE, DELAWARE 19720
PHONE: 302.328.5010 FAX: 302.328.5423
E-mail: info@studiojaed.com
Website: www.studiojaed.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

MAY 18, 2015
DATE
14037
PROJECT NO.

A2.2 & A3.2
SHEET OF ORIGIN

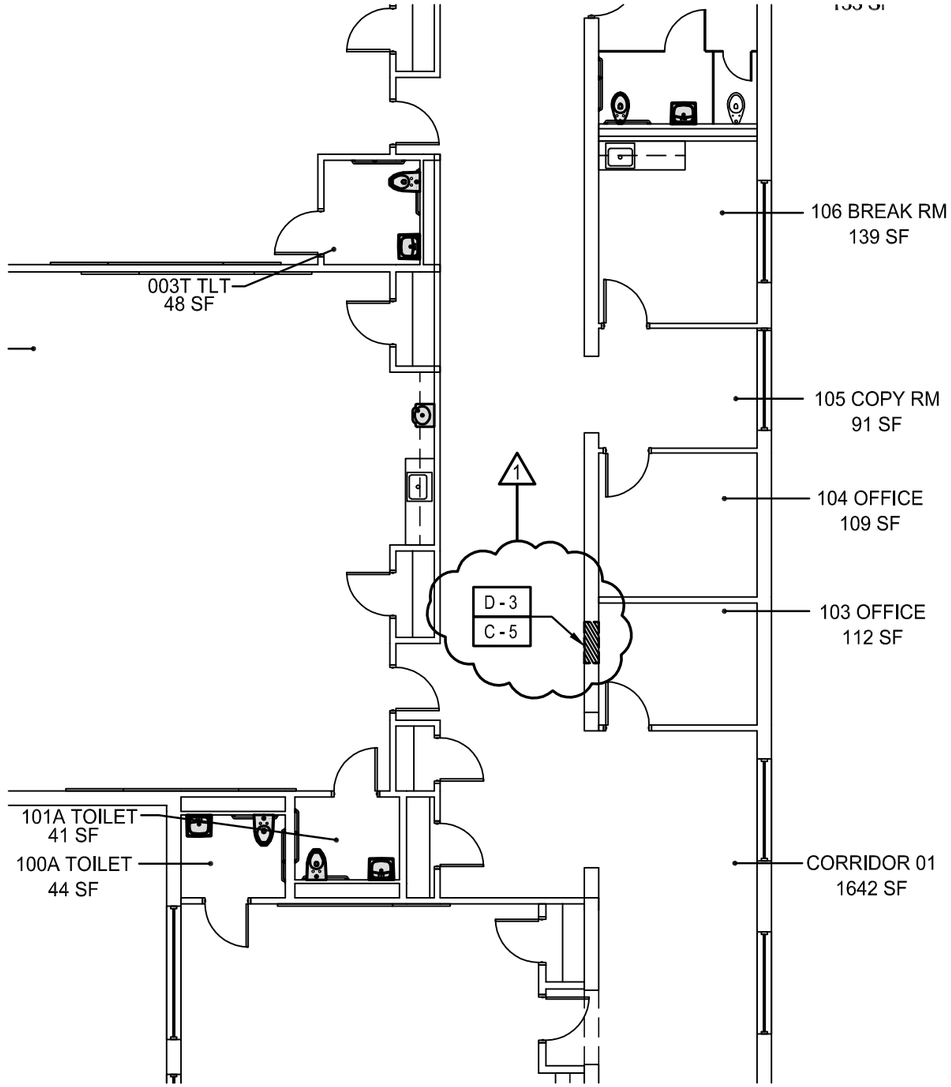
SHEET NO.
SK-A.15

DEMOLITION KEY NOTES & LEGEND

D - 3	SAW CUT AND REMOVE PORTION OF EXISTING CMU WALL IN AREA OF NEW ELECTRICAL PANEL INSTALLATION.

CONSTRUCTION KEY NOTES

C - 5	NEW ELECTRICAL PANEL LOCATION. PROVIDE NEW TOOTH-IN CMU AROUND PERIMETER OF NEW PANEL. PATCH / REPAIR AND PAINT PLASTER FINISH TO MATCH EXISTING WALL TYP.



1 PARTIAL FIRST FLOOR PLAN - AREA C

1 / SK-A.16

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

REVISIONS:
1 ADDENDUM # 2

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2961 CENTERVILLE ROAD, SUITE 100
WILMINGTON, DELAWARE 19808
302.633.5970
FACSIMILE 302.633.5971
EMAIL info@studiojaed.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

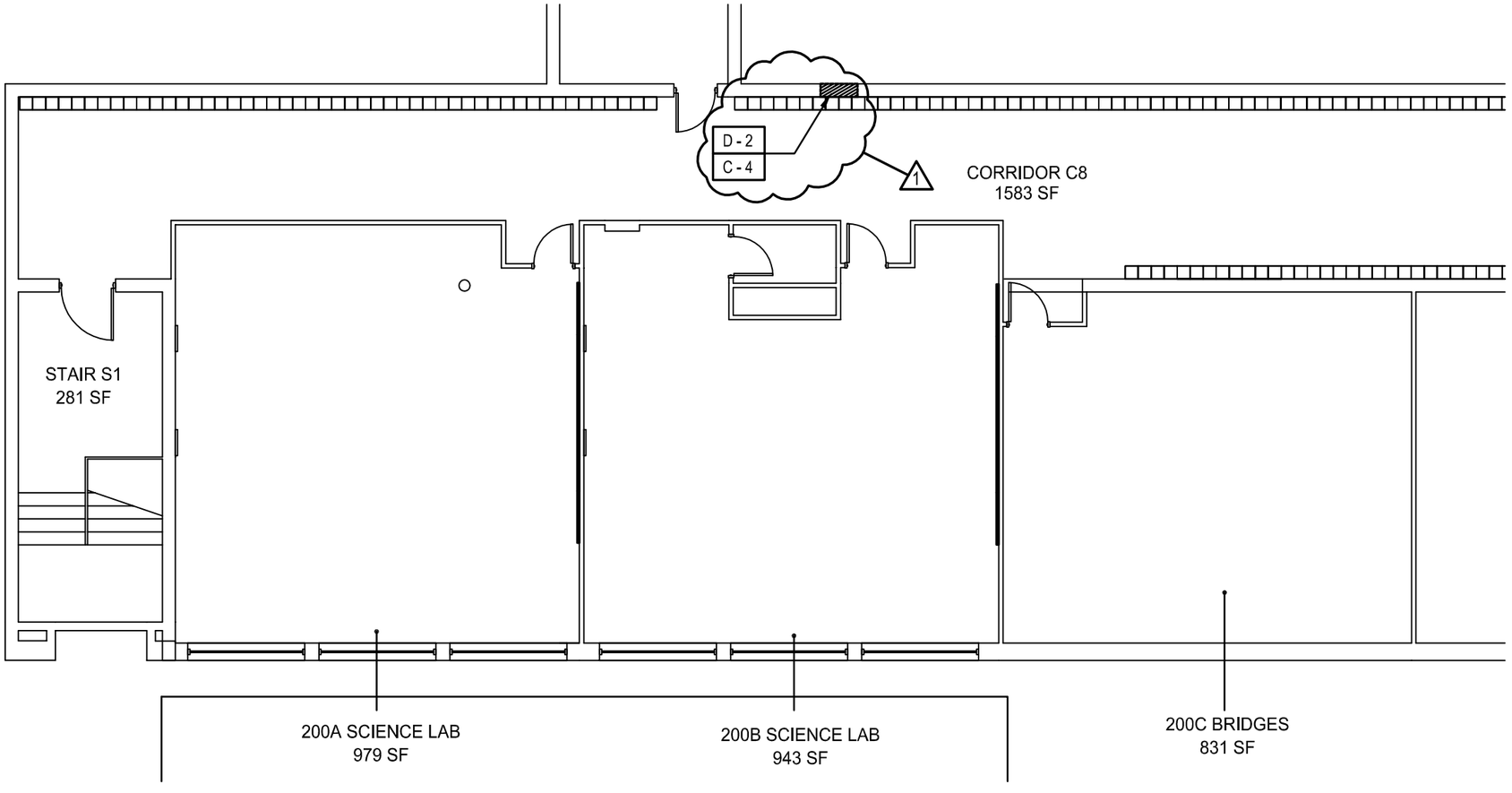
DATE: MAY 18, 2015
SHEET OF ORIGIN: A2.3 & A3.3
PROJECT NO.: 14037
SHEET NO.: SK-A.16

DEMOLITION KEY NOTES & LEGEND

D - 2	SAW CUT AND REMOVE PORTION OF EXISTING CMU WALL IN AREA OF NEW ELECTRICAL PANEL INSTALLATION.

CONSTRUCTION KEY NOTES

C - 4	NEW ELECTRICAL PANEL LOCATION. PROVIDE NEW TOOTH-IN CMU AROUND PERIMETER OF NEW PANEL. PATCH / REPAIR AND PAINT PLASTER FINISH TO MATCH EXISTING WALL TYP.



1
SK-A.17

PARTIAL SECOND FLOOR PLAN - AREA B

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

REVISIONS:
1 ADDENDUM # 2

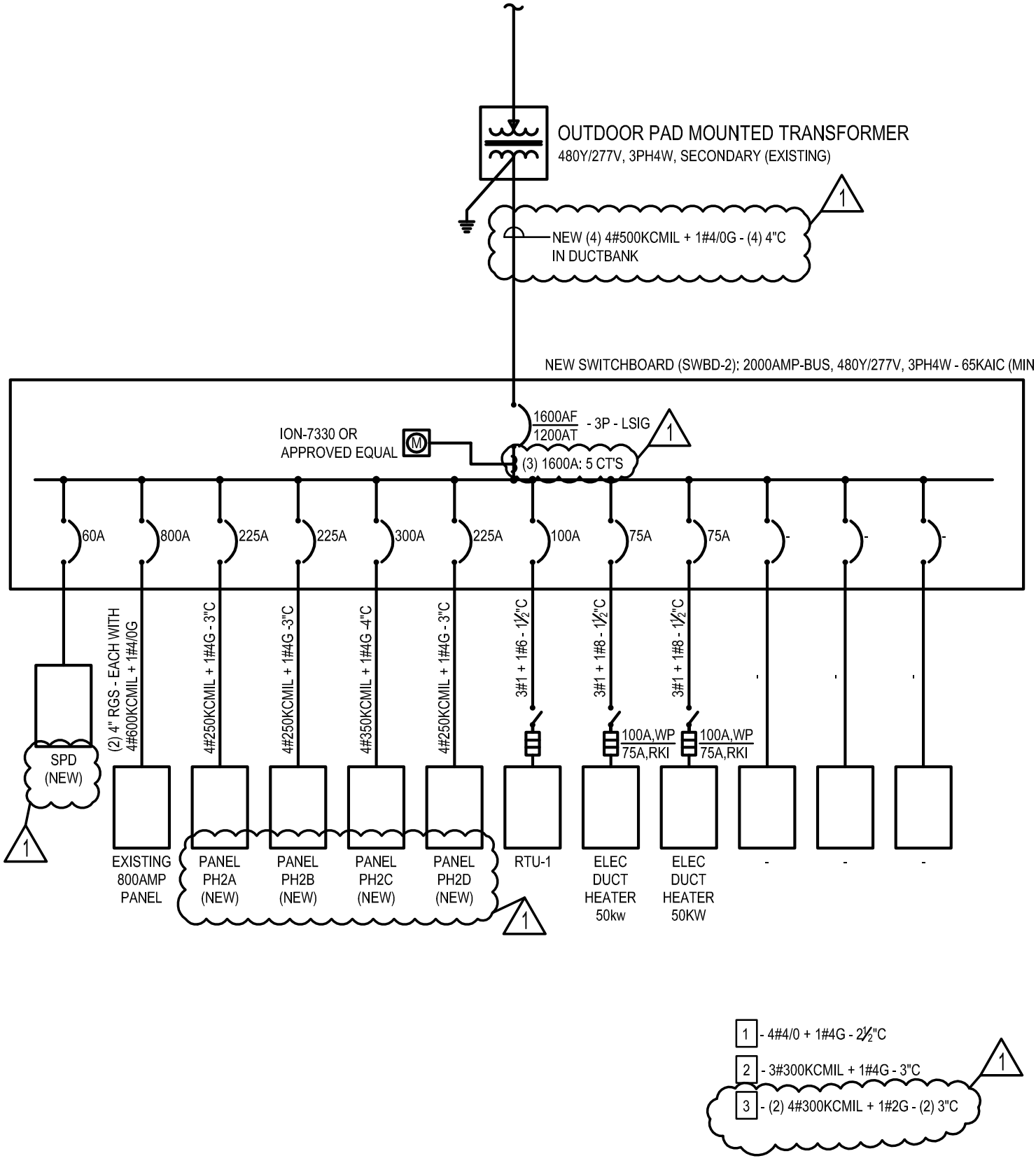
STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
2301 WOODLAKE RD, SUITE 119
OKEMOS, MI 48864
PHONE: 517.703.0100 FAX: 517.703.0101
www.studiojaed.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

MAY 18, 2015
DATE
14037
PROJECT NO.

A2.5 & A3.5
SHEET OF ORIGIN

SHEET NO.
SK-A.17

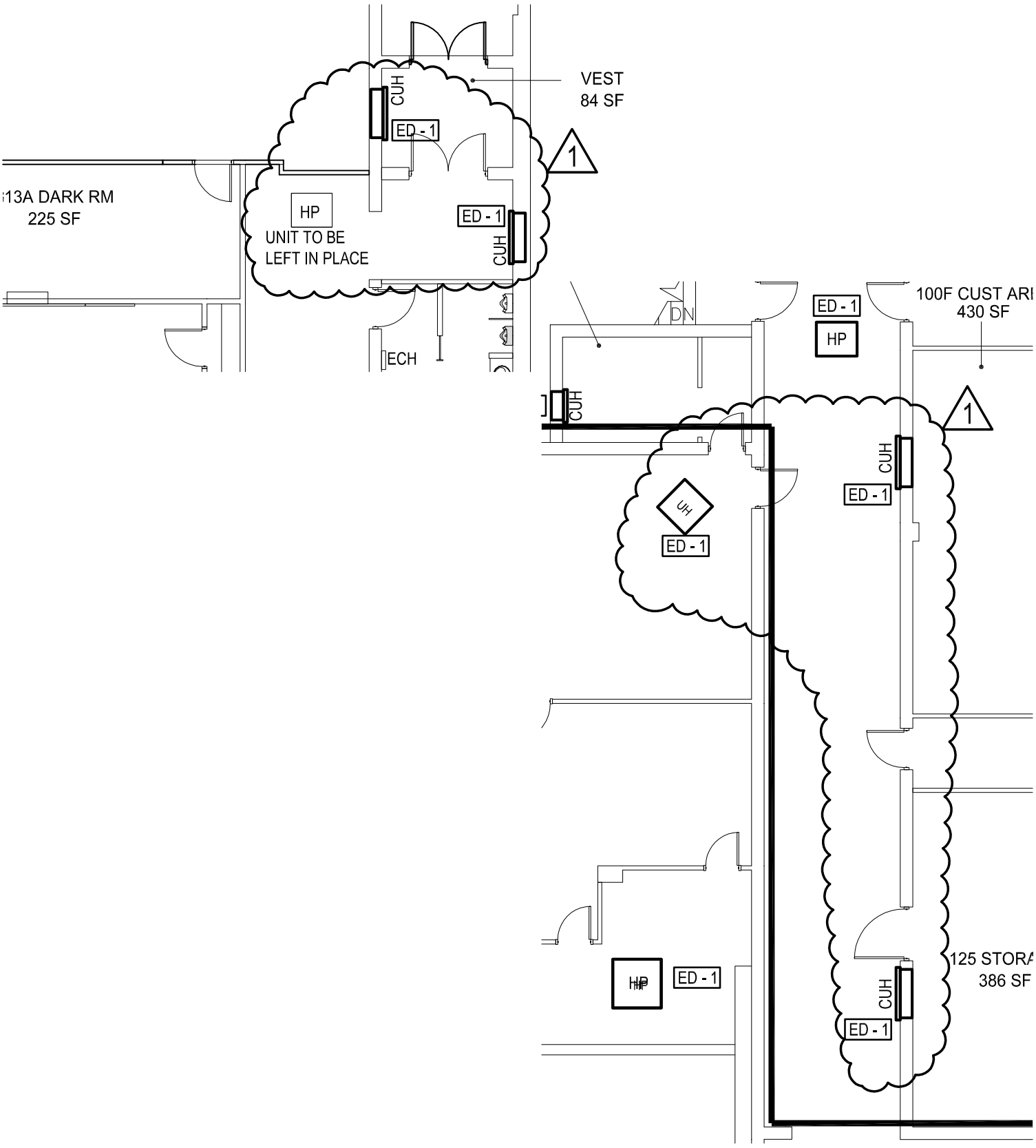


ELECTRICAL SINGLE LINE DIAGRAM

SCALE: NOT TO SCALE

MAY 18, 2015 (DATE)	E9.25 (SHEET NO.)	PROJECT: RED CLAY CONSOLIDATED SCHOOL DISTRICT BRANDYWINE SPRINGS SCHOOL HVAC RENOVATIONS 2916 DUNCAN ROAD WILMINGTON, DELAWARE 19808	REVISIONS: 1 REVISED PER ADDENDUM #2
14037 (PROJECT NO.)	SK-E.1		

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com



1ST FLOOR ELECTRICAL DEMOLITION PLAN - AREA C

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

MAY 18, 2015 (DATE)	E9.3 (SHEET NO.)	
14037 (PROJECT NO.)	SK-E.2	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

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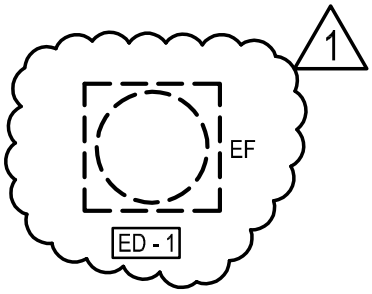
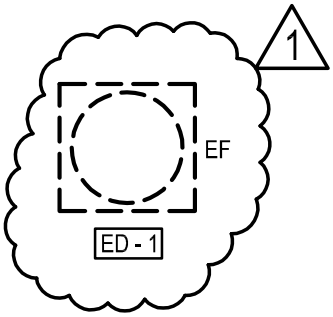
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 YRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1662 F: (302) 832-1423
Website
www.StudioJAED.com
E-Mail
info@StudioJAED.com

REVISIONS:
1 REVISED PER ADDENDUM #2



2ND FLOOR ELECTRICAL DEMOLITION PLAN - AREA B

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



E1 ELEV
71 SF

ED - 2
#19 PNL

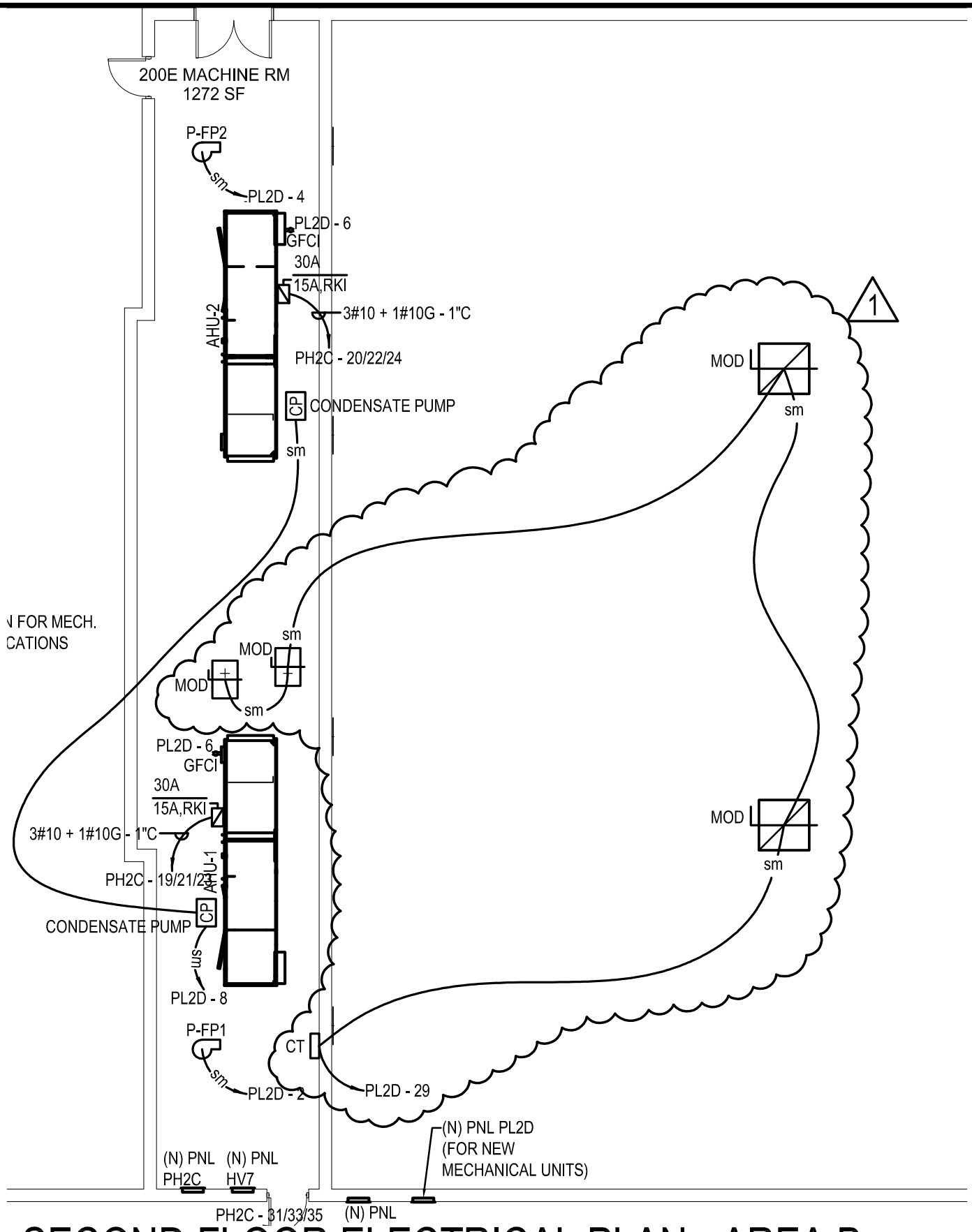
ED - 1 CUH

MAY 18, 2015	E9.5	
DATE	SHEET NO.	
14037	SK-E.3	
PROJECT NO.		

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 YRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1662 F: (302) 832-1423
Website
www.StudioJAED.com
E-Mail
info@StudioJAED.com

REVISIONS:
1 REVISED PER ADDENDUM #2



SECOND FLOOR ELECTRICAL PLAN - AREA B

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

MAY 18, 2015 — DATE
E9.15 — SHEET NO.
14037 — PROJECT NO.
SK-E.4

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 YRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1662 F: (302) 832-1423
WebNo
www.StudioJAED.com
E-MAIL
info@StudioJAED.com

REVISIONS:
1 REVISED PER ADDENDUM #2

PANEL: PL2D
LOCATION: CORRIDOR C10 - SECOND FLOOR
BUS: 225A
MAIN: MLO

VOLTAGE: 208/120V, 3PH4W
ENCLOSURE: NEMA1
A.I.C: 14,000
RATINGS: FULL

WIRE SIZE	ØA kVA	ØB kVA	ØC kVA	DESCRIPTION	Pole	Br	Ckt
12	0.23	-	-	BLOWER COIL - BC-54	2	20	1
12	-	0.23	-	-	-	-	3
12	-	-	0.23	BLOWER COIL - BC-55	2	20	5
12	0.23	-	-	-	-	-	7
12	-	0.23	-	BLOWER COIL - BC-56	2	20	9
12	-	-	0.23	-	-	-	11
12	0.23	-	-	BLOWER COIL - BC-57	2	20	13
12	-	0.23	-	-	-	-	15
12	-	-	0.02	FAN COIL - FC-33	2	20	17
12	0.02	-	-	-	-	-	19
12	-	0.20	-	HEAT RECOVERY UNIT (HRU)	2	20	21
12	-	-	0.20	-	-	-	23
12	0.20	-	-	HEAT RECOVERY UNIT (HRU)	2	20	25
12	-	0.20	-	-	-	-	27
12	-	-	0.04	24V CONTROL TRANSFORMER	1	20	29
-	-	-	-	-	-	-	31
-	-	-	-	-	-	-	33
-	-	-	-	-	-	-	35
-	-	-	-	-	-	-	37
-	-	-	-	-	-	-	39
-	-	-	-	-	-	-	41

Ø
A B C

Ckt	Br	Pole	DESCRIPTION	ØA kVA	ØB kVA	ØC kVA	WIRE SIZE
2	20	1	FREEZE PROTECTION PUMP	0.25	-	-	12
4	20	1	FREEZE PROTECTION PUMP	-	0.25	-	12
6	20	1	MECH ROOM OUTLETS	-	-	0.36	12
8	20	1	CONDENSATE PUMPS	0.25	-	-	12
10	20	1	SMOKE DAMPERS	-	0.10	-	12
12	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-
34	-	-	-	-	-	-	-
36	-	-	-	-	-	-	-
38	-	-	-	-	-	-	-
40	-	-	-	-	-	-	-
42	-	-	-	-	-	-	-

CONNECTED LOAD
PHASE A: 1.41 kVA
PHASE B: 1.34 kVA
PHASE C: 1.08 kVA
TOTAL CONNECTED LOAD = 3.83 kVA

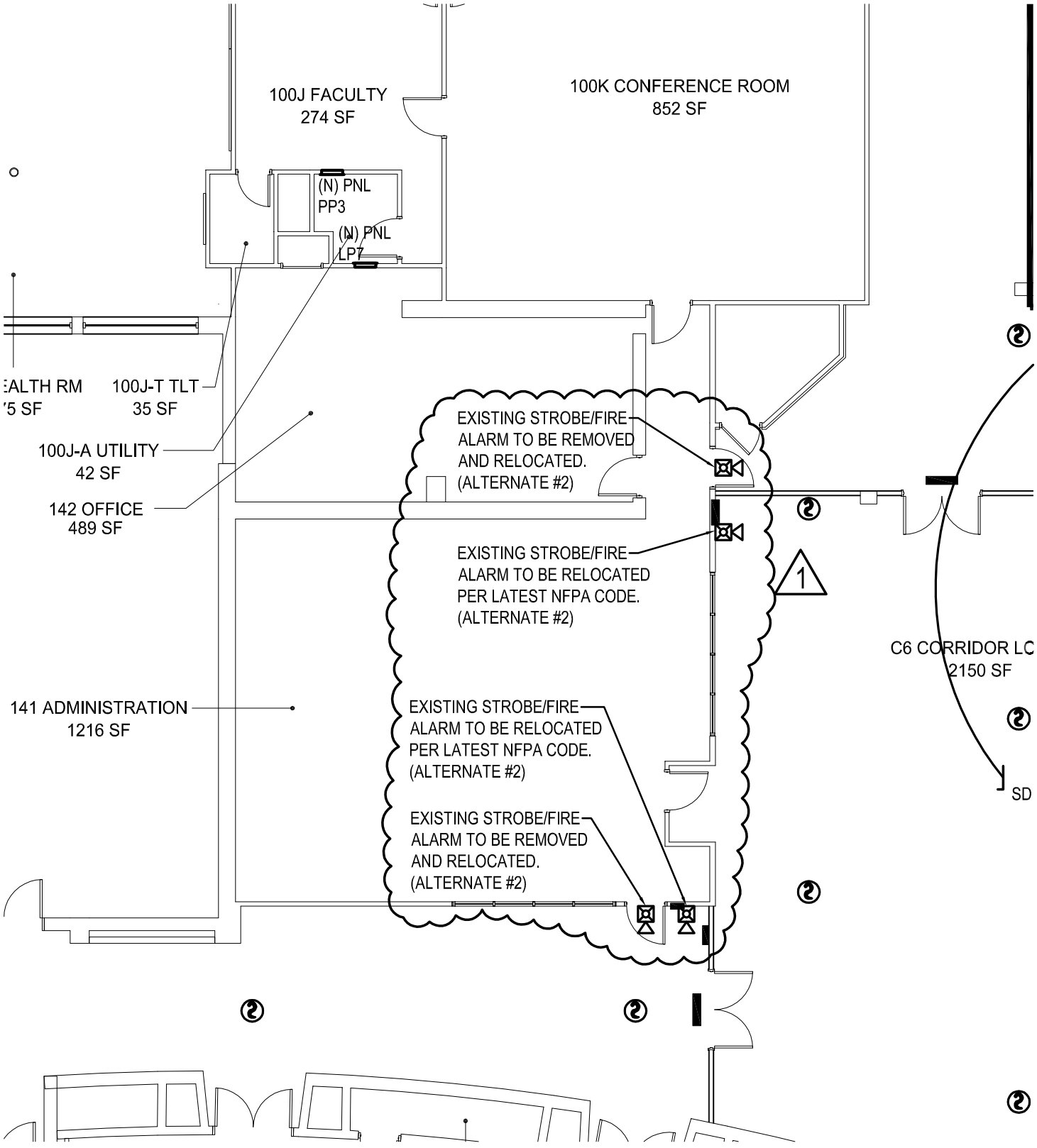
1

REVISIONS:
1 REVISED PER ADDENDUM #2

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2961 WHALEY HILL ROAD, STE. 110
DOVER, DE 19701
P: (302) 678-1400 F: (302) 653-1423
E-mail: info@STUDIOJAED.com
Website: www.STUDIOJAED.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

DATE: MAY 18, 2015
SHEET NO.: E9.23
PROJECT NO.: 14037
SK-E.5



FIRST FLOOR ELECTRICAL PLAN - AREA B

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

MAY 18, 2015
DATE

E9.19
SHEET NO.

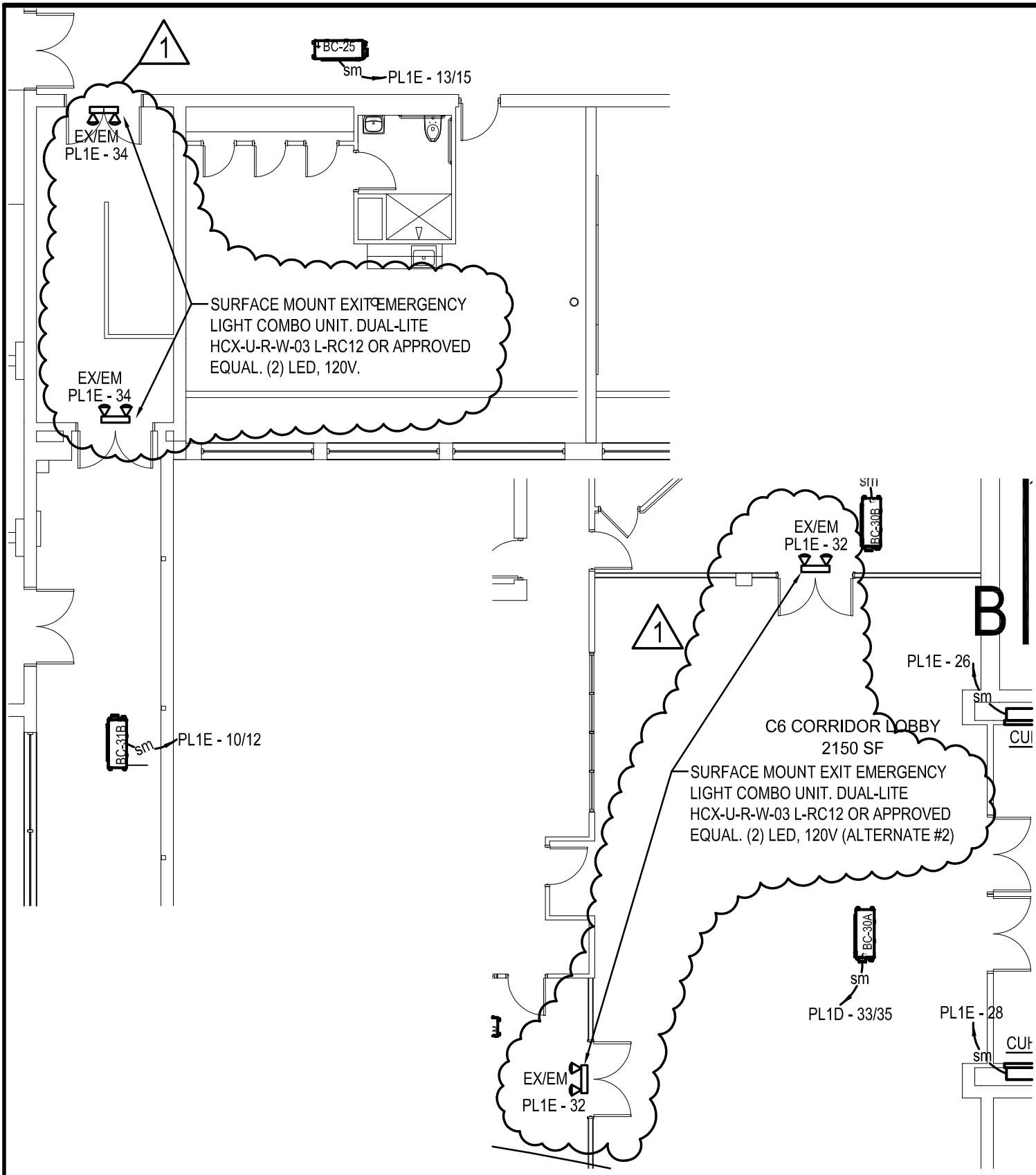
14037
PROJECT NO.

SK-E.6

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
1 REVISED PER ADDENDUM #2



FIRST FLOOR ELECTRICAL PLAN - AREA B

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

MAY 18, 2015	E9.12
DATE	SHEET NO.
14037	SK-E.7
PROJECT NO.	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 YRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1662 F: (302) 832-1423
Website
www.StudioJAED.com
E-Mail
info@StudioJAED.com

REVISIONS:
1 REVISED PER ADDENDUM #2

PANEL: PL1E
LOCATION: CORRIDOR C4 - FIRST FLOOR
BUS: 225A
MAIN: MLO

VOLTAGE: 208/120V, 3PH4W
ENCLOSURE: NEMA1
A.I.C: 14,000
RATINGS: FULL

WIRE SIZE	ØA kVA	ØB kVA	ØC kVA	DESCRIPTION	Pole	Br	Ckt	Ø A B C	Ckt	Br	Pole	DESCRIPTION	ØA kVA	ØB kVA	ØC kVA	WIRE SIZE
12	0.23	-	-	BLOWER COIL - BC-26	2	20	1		2	20	2	FAN COIL - FC-17	0.02	-	-	12
12	-	0.23	-	-	-	-	3		4	-	-	-	-	0.02	-	12
12	-	-	0.23	BLOWER COIL - BC-28	2	20	5		6	20	2	FAN COIL - FC-18	-	-	0.02	12
12	0.23	-	-	-	-	-	7		8	-	-	-	0.02	-	-	12
12	-	0.23	-	BLOWER COIL - BC-25	2	20	9		10	20	2	BLOWER COIL - BC-30A	-	0.23	-	12
12	-	-	0.23	-	-	-	11		12	-	-	-	-	-	0.23	12
12	0.23	-	-	BLOWER COIL - BC-24	2	20	13		14	20	2	BLOWER COIL - BC-29C	0.23	-	-	12
12	-	0.23	-	-	-	-	15		16	-	-	-	-	0.23	-	12
12	-	-	0.02	FAN COIL - FC-15	2	20	17		18	20	2	HEAT RECOVERY UNIT (HRU)	-	-	0.20	12
12	0.02	-	-	-	-	-	19		20	-	-	-	0.20	-	-	12
12	-	0.02	-	FAN COIL - FC-14	2	20	21		22	20	1	UNIT HEATER	-	0.30	-	12
12	-	-	0.02	-	-	-	23		24	20	1	SMOKE DAMPERS	-	-	0.10	12
12	0.02	-	-	FAN COIL - FC-13	2	20	25		26	20	1	CABINET UNIT HEATER - CUH-3 (MAIN ENTR)	0.04	-	-	12
12	-	0.02	-	-	-	-	27		28	20	1	CABINET UNIT HEATER - CUH-3 (MAIN ENTR)	-	0.04	-	12
12	-	-	0.20	HRU	2	20	29		30	20	1	CABINET UNIT HEATER - CUH-3 (C6 LOBBY)	-	-	0.04	12
12	0.20	-	-	-	-	-	31		32	20	1	EMERGENCY EXIT LIGHT - ALTERNATE #2	0.012	-	-	12
12	-	0.20	-	HRU	2	20	33		34	20	1	EMERGENCY EXIT LIGHT - STAIRWELL 1	-	0.012	-	12
12	-	-	0.20	-	-	-	35		36	-	-	-	-	-	-	-
12	0.02	-	-	FAN COIL - FC-16	2	20	37		38	-	-	-	-	-	-	-
12	-	0.02	-	-	-	-	39		40	-	-	-	-	-	-	-
12	-	-	0.15	FREEZE PROOF PUMP - FP-3	1	20	41		42	-	-	-	-	-	-	-

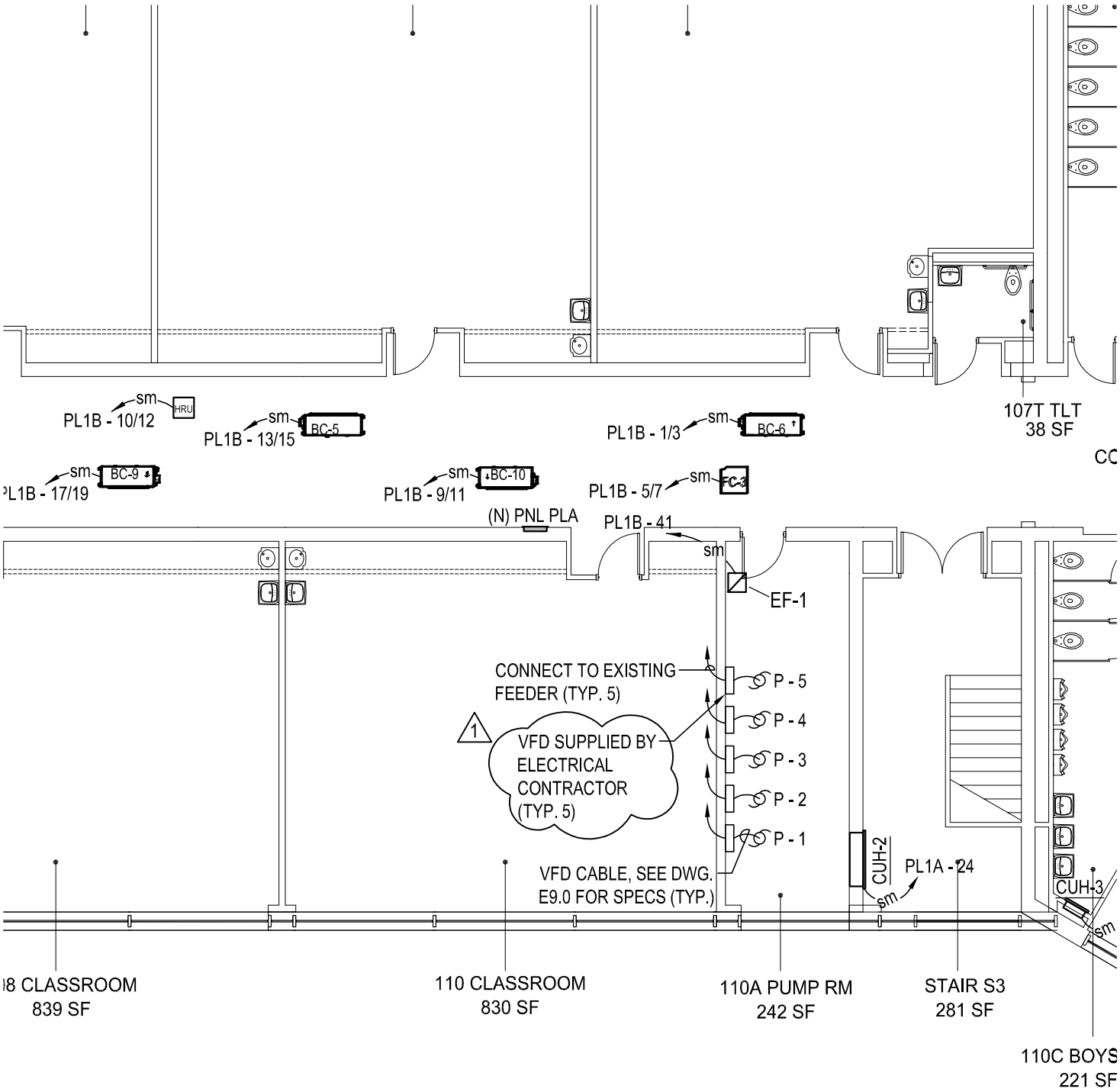
CONNECTED LOAD
PHASE A: 1.47 kVA
PHASE B: 1.78 kVA
PHASE C: 1.64 kVA
TOTAL CONNECTED LOAD = 4.89 kVA

REVISIONS:
1 REVISED PER ADDENDUM #2

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WM HILLE HILL ROAD, STE. 110
BEAR, DE 19701
PHONE/FAX: P (302) 832-1123
Website: www.STUDIOJAED.com
E-Mail: info@STUDIOJAED.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

DATE: MAY 18, 2015
SHEET NO.: E9.23
PROJECT NO.: 14037
SK-E.8



1ST FLOOR ELECTRICAL PLAN - AREA A

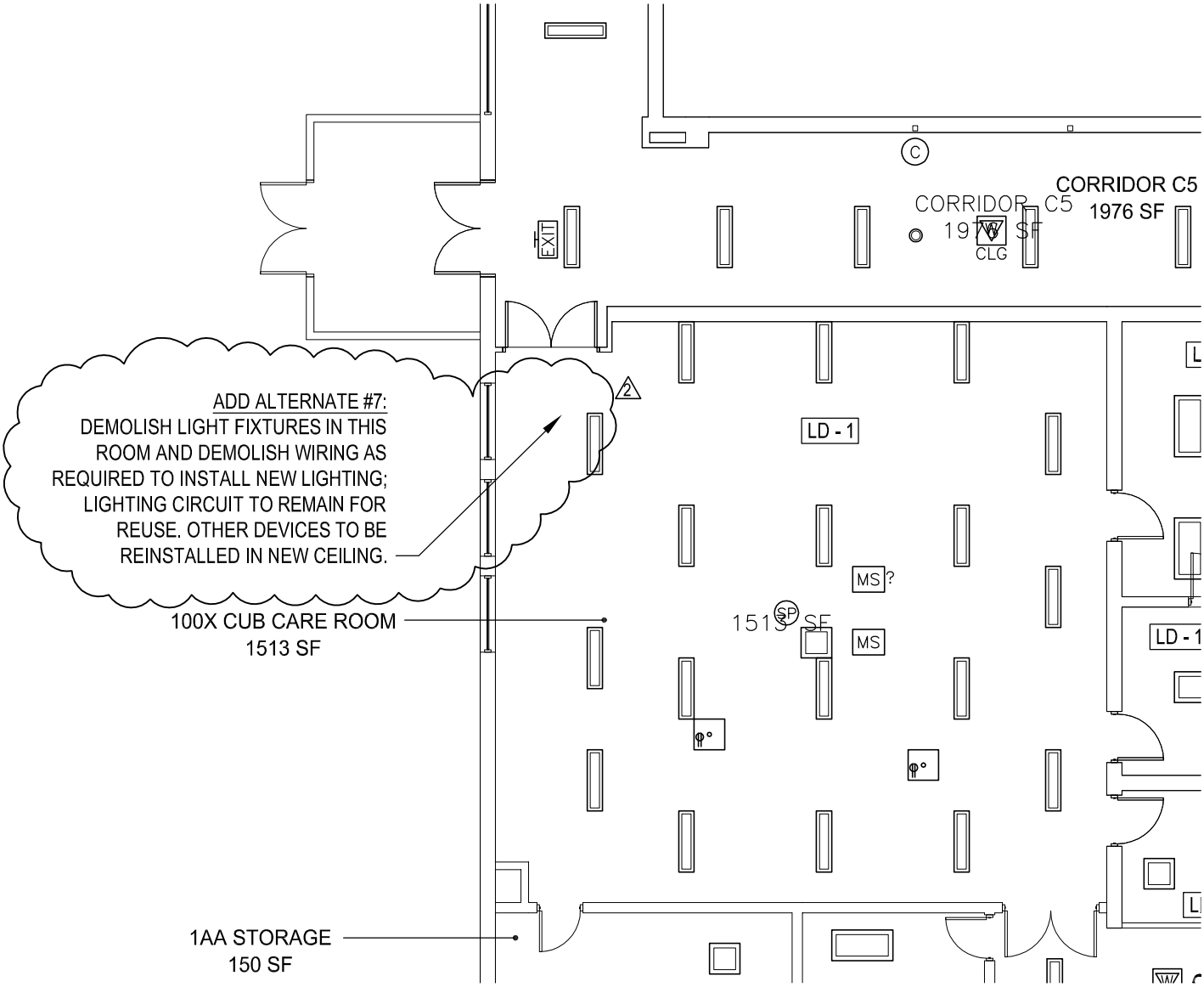
SCALE: 3/32" = 1'-0"

MAY 18, 2015	E9.11
DATE	SHEET NO.
14037	SK-E.9
PROJECT NO.	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: Info@StudioJAED.com

REVISIONS:
1 REVISED PER ADDENDUM #2



PARTIAL FIRST FLOOR LIGHTING DEMOLITION PLAN

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

MAY 1, 2015	E9.7
DATE	SHEET NO.
14037	SK-E.10
PROJECT NO.	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

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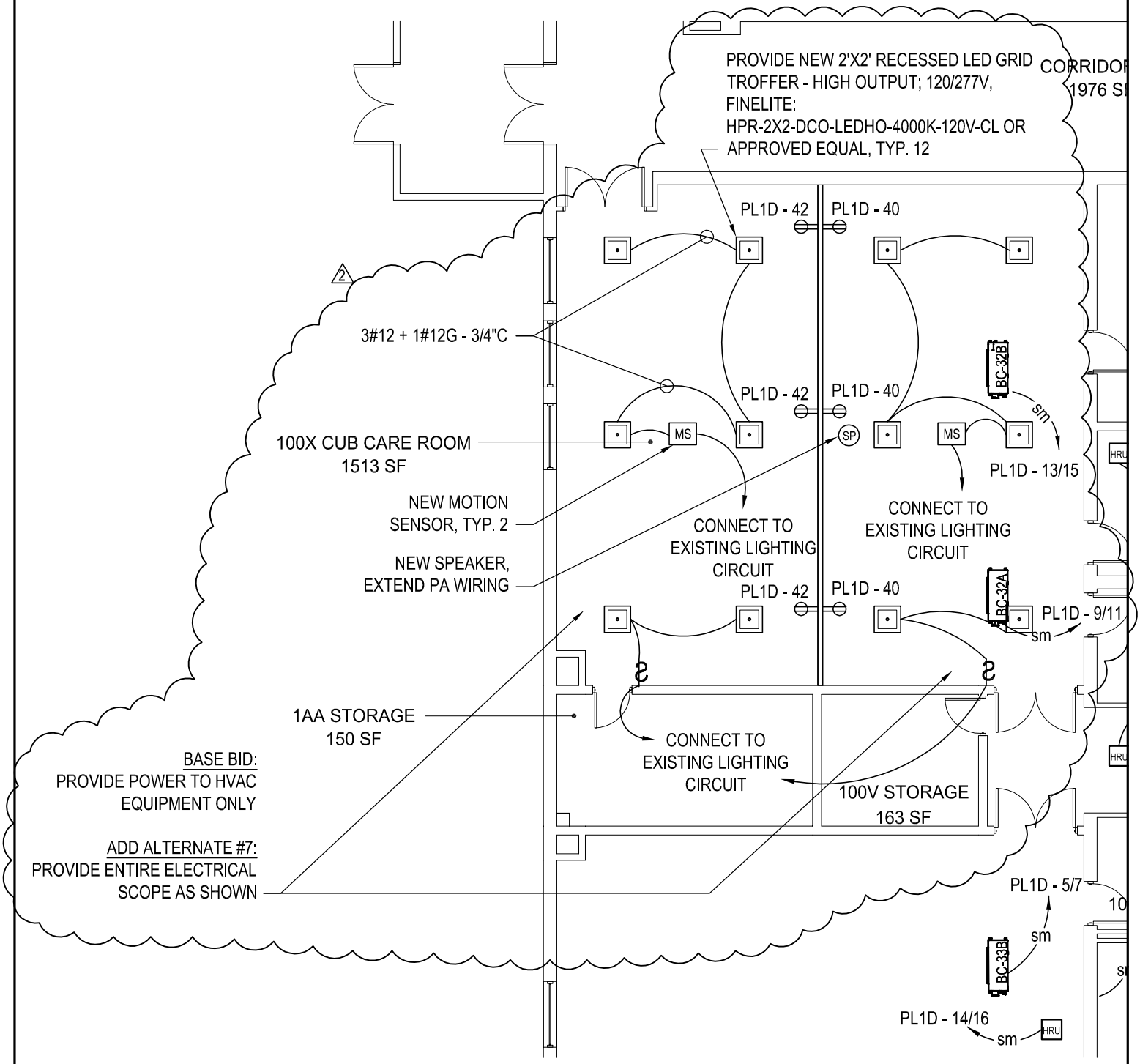
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



PARTIAL FIRST FLOOR ELECTRICAL PLAN

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

MAY 1, 2015 (DATE)	E9.12 (SHEET NO.)	
14037 (PROJECT NO.)	SK-E.11	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652 F: (302) 832-1423
Website: www.StudioJAED.com
E-MAIL: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2

PANEL: PL1D
LOCATION: CORRIDOR C7 - FIRST FLOOR
BUS: 225 AMP
MAIN: MLO

VOLTAGE: 208/120V, 3PH4W
ENCLOSURE: NEMA1
A.I.C: 14,000
RATINGS: FULL

WIRE SIZE	ØA kVA	ØB kVA	ØC kVA	DESCRIPTION	Pole	Br	Ckt	Ø A B C	Ckt	Br	Pole	DESCRIPTION	ØA kVA	ØB kVA	ØC kVA	WIRE SIZE
12	0.23	-	-	BLOWER COIL - BC32A	2	20	1		2	20	2	FAN COIL - FC-20	0.02	-	-	12
12	-	0.23	-	-	-	-	3		4	-	-	-	-	0.02	-	12
12	-	-	0.23	BLOWER COIL - BC32B	2	20	5		6	20	2	FAN COIL - FC-21	-	-	0.02	12
12	0.23	-	-	-	-	-	7		8	-	-	-	0.02	-	-	12
12	-	0.23	-	BLOWER COIL - BC31A	2	20	9		10	20	2	FAN COIL - FC-22	-	0.02	-	12
12	-	-	0.23	-	-	-	11		12	-	-	-	-	-	0.02	12
12	0.23	-	-	BLOWER COIL - BC31B	2	20	13		14	20	2	HEAT RECOVERY UNIT (HRU)	0.20	-	-	12
12	-	0.23	-	-	-	-	15		16	-	-	-	-	0.20	-	12
12	-	-	0.23	BLOWER COIL - BC30A	2	20	17		18	20	2	HEAT RECOVERY UNIT (HRU)	-	-	0.20	12
12	0.23	-	-	-	-	-	19		20	-	-	-	0.20	-	-	12
12	-	0.23	-	BLOWER COIL - BC27A	2	20	21		22	20	2	HEAT RECOVERY UNIT (HRU)	-	0.20	-	12
12	-	-	0.23	-	-	-	23		24	-	-	-	-	-	0.20	12
12	0.09	-	-	BLOWER COIL - BC27B	2	20	25		26	20	1	CABINET UNIT HEATER-CUH-3 (NEAR STAGE CORR.)	0.04	-	-	12
12	-	0.09	-	-	-	-	27		28	-	-	-	-	-	-	-
12	-	-	0.09	BLOWER COIL - BC29A	2	20	29		30	20	2	FAN COIL - FC-32	-	-	0.02	12
12	0.09	-	-	-	-	-	31		32	-	-	-	0.02	-	-	12
12	-	0.23	-	BLOWER COIL - BC29B	2	20	33		34	20	1	SMOKE DAMPERS	-	0.10	-	12
12	-	-	0.23	-	-	-	35		36	20	1	CABINET UNIT HEATER-CUH-3 (100Q BOYS)	-	-	0.04	12
12	0.02	-	-	FAN COIL FC-19	2	20	37		38	20	1	CABINET UNIT HEATER-CUH-3 (NEAR WORKSHP)	0.04	-	-	12
12	-	0.02	-	-	-	-	39		40	20	1	RECEPTACLES: CUB CARE A	-	0.18	-	12
10	-	-	0.54	ROOFTOP OUTLETS	1	20	41		42	20	1	RECEPTACLES: CUB CARE A	-	-	0.18	12

2

CONNECTED LOAD
PHASE A: 1.66 kVA
PHASE B: 1.70 kVA
PHASE C: 2.28 kVA
TOTAL CONNECTED LOAD = 5.64 kVA

5/19/2015 3:20 PM

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS

DESCRIPTION	DATE
2 REVISED FOR ADDENDUM #2	5/18/2015

RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

PROJECT

SHEET TITLE

ADDENDUM #2

DRAWN	CHK'D/DESIGNER
DLS	BMZ
DISCIPLINE: E	SHEET NO.: SK-E.12
PROJECT NO.: 14037	

PANEL: PL2B
LOCATION: CORRIDOR C9 - SECOND FLOOR
BUS: 400 AMP
MAIN: MLO

VOLTAGE: 208/120V, 3PH4W
ENCLOSURE: NEMA1
A.I.C: 14,000
RATINGS: FULL

WIRE SIZE	ØA kVA	ØB kVA	ØC kVA	DESCRIPTION	Pole	Br	Ckt	Ø A B C	Ckt	Br	Pole	DESCRIPTION	ØA kVA	ØB kVA	ØC kVA	WIRE SIZE
12	0.02	-	-	FAN COIL - FC-23	2	20	1		2	20	2	HEAT RECOVERY UNIT (HRU)	0.20	-	-	12
12	-	0.02	-	-	-	-	3		4	-	-	-	-	0.20	-	12
12	-	-	0.02	FAN COIL - FC-25	2	20	5		6	20	2	HEAT RECOVERY UNIT (HRU)	-	-	0.20	12
12	0.02	-	-	-	-	-	7		8	-	-	-	0.20	-	-	12
12	-	0.23	-	BLOWER COIL - BC-38A	2	20	9		10	-	-	-	-	-	-	-
12	-	-	0.23	-	-	-	11		12	-	-	-	-	-	-	-
12	0.23	-	-	BLOWER COIL - BC-38B	2	20	13		14	-	-	-	-	-	-	-
12	-	0.23	-	-	-	-	15		16	-	-	-	-	-	-	-
12	-	-	0.23	BLOWER COIL - BC-39	2	20	17		18	-	-	-	-	-	-	-
12	0.23	-	-	-	-	-	19		20	-	-	-	-	-	-	-
12	-	0.23	-	BLOWER COIL - BC-44A	2	20	21		22	-	-	-	-	-	-	-
12	-	-	0.23	-	-	-	23		24	-	-	-	-	-	-	-
12	0.23	-	-	BLOWER COIL - BC-49	2	20	25		26	-	-	-	-	-	-	-
12	-	0.23	-	-	-	-	27		28	-	-	-	-	-	-	-
12	-	-	0.23	BLOWER COIL - BC-44B	2	20	29		30	-	-	-	-	-	-	-
12	0.23	-	-	-	-	-	31		32	-	-	-	-	-	-	-
12	-	0.23	-	BLOWER COIL - BC-43	2	20	33		34	-	-	-	-	-	-	-
12	-	-	0.23	-	-	-	35		36	-	-	-	-	-	-	-
12	0.20	-	-	HEAT RECOVERY UNIT (HRU)	2	20	37		38	-	-	-	-	-	-	-
12	-	0.20	-	-	-	-	39		40	-	-	-	-	-	-	-
10	-	-	0.72	ROOFTOP OUTLETS	1	20	41		42	-	-	-	-	-	-	-

CONNECTED LOAD
PHASE A: 1.56 kVA
PHASE B: 1.57 kVA
PHASE C: 2.27 kVA
TOTAL CONNECTED LOAD = 5.40 kVA

1

NOTE: INCOMING FEEDER FROM SWITCHBOARD (2) 3"C - (2) 4#300KCMIL + 1#4/0G

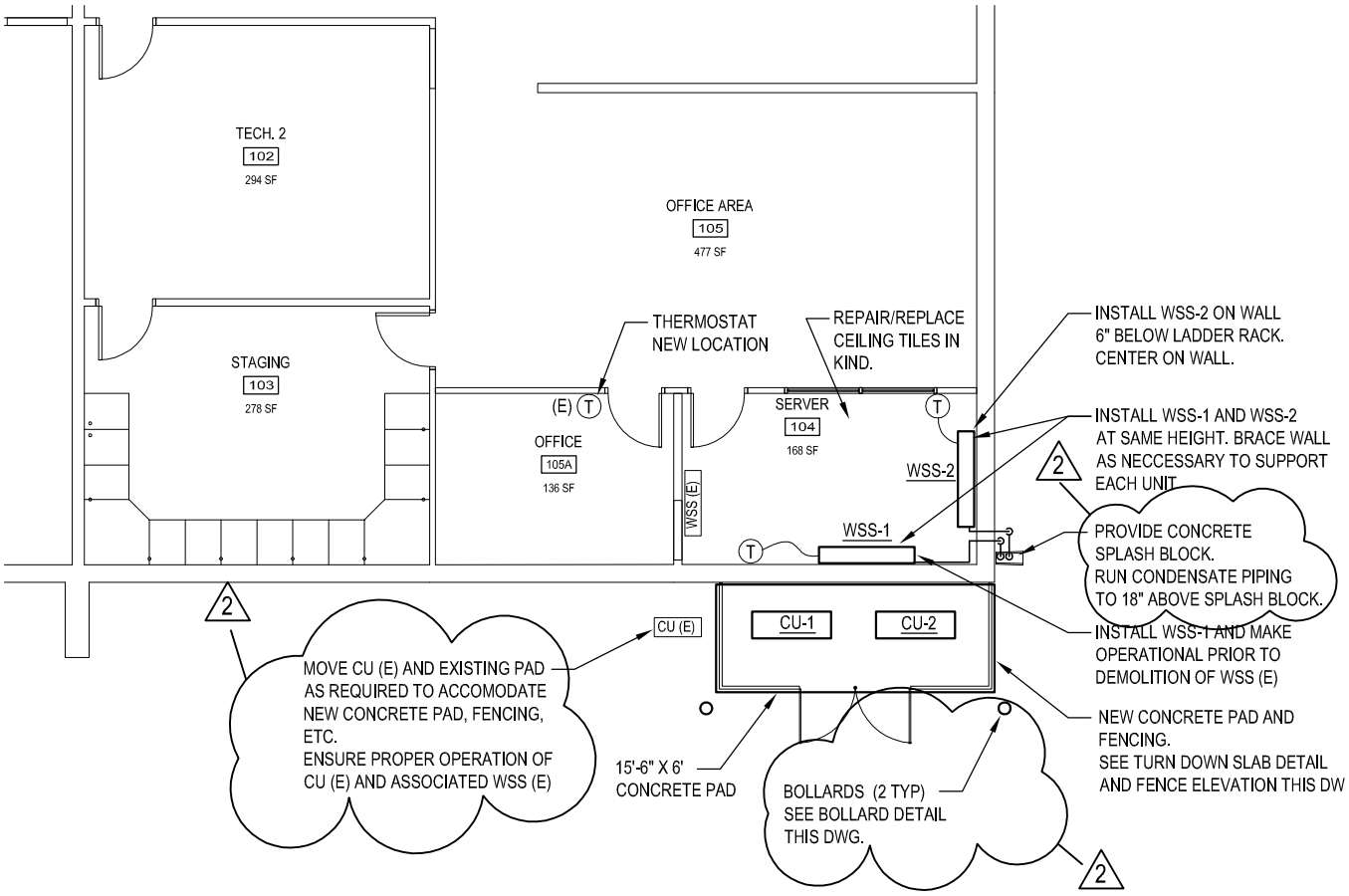
1

REVISIONS:
1 REVISED PER ADDENDUM #2

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 ARKWILE HILL ROAD, STE. 110
BEAR, DE 19701
P (302) 832-1400 F (302) 832-1403
Website: www.studiojaed.com
E-mail: info@studiojaed.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

DATE: MAY 18, 2015
SHEET NO.: E9.23
PROJECT NO.: 14037
SK-E.13



PARTIAL FIRST FLOOR
ANNEX ALTERNATE #6 - MECHANICAL

2
SK-M.2

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

5/18/15	M8.40
DATE	SHEET NO.
14037	SK-M.2
PROJECT NO.	

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2

WALL MOUNTED DUCTLESS SPLIT SYSTEM SCHEDULE

WSS #

2

UNIT NUMBER	INDOOR UNIT COOLING CAP. (BTU/H)	ELEC	FAN HP	2 SCOP	INDOOR UNIT LIEBERT MODEL #	OUTOOR UNIT ELEC	MAX FUSE SIZE (A)/MIN. AMP	OUTOOR UNIT LIEBERT MODEL #	REMARKS
WSS-1/CU-1	33,500	208/230/1/60	0.27	2.62	DME037E-PC7	208V/1 PH	40	PFHZ37A-PL7	PROVIDE SWEAT ADAPTER KIT AND 2ND THROUGH 5TH YEAR COMPRESSOR WARRANTY
WSS-2/CU-2	33,500	208/230/1/60	0.27	2.62	DME037E-PC7	208V/1 PH	40	PFHZ37A-PL7	PROVIDE SWEAT ADAPTER KIT AND 2ND THROUGH 5TH YEAR COMPRESSOR WARRANTY

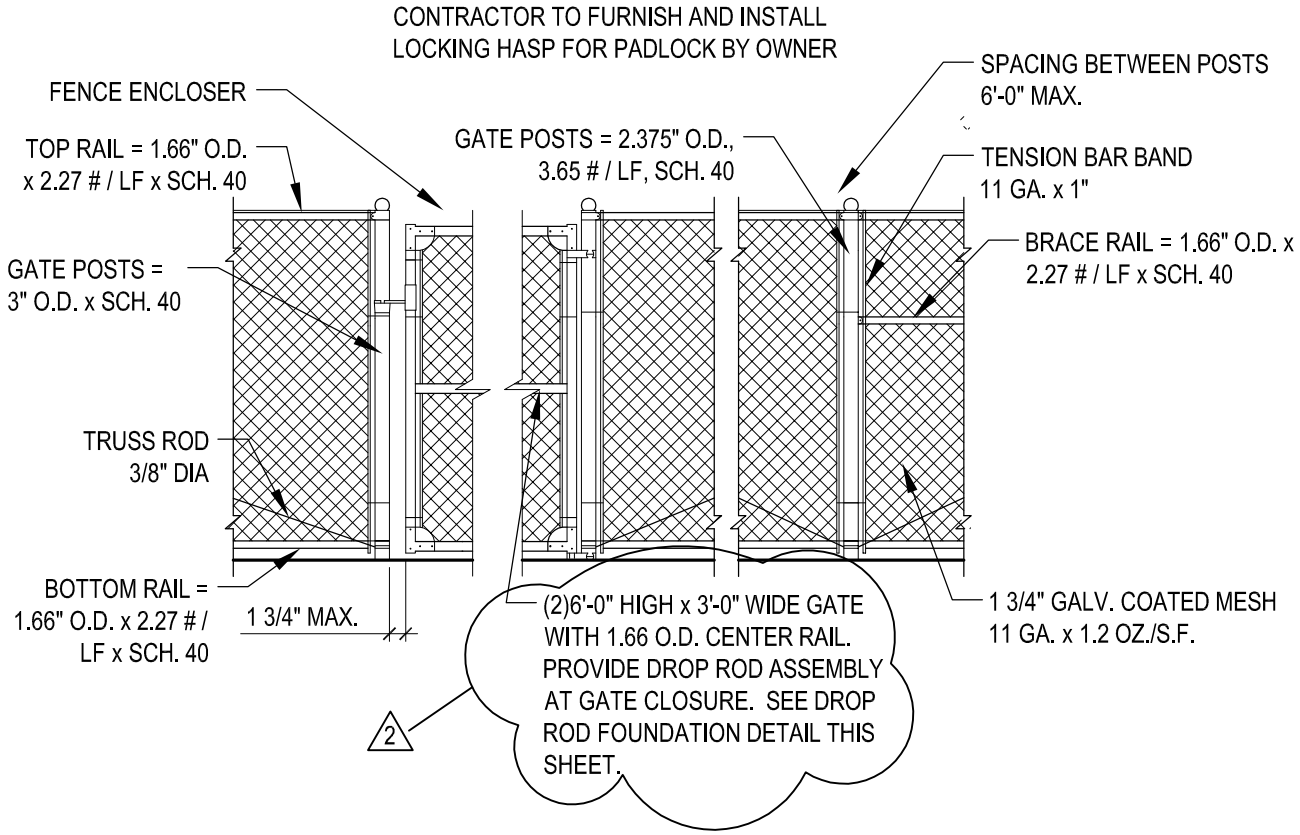
NOTES: PROVIDE MANUFACTURER SUPPLIED WALL MOUNTED MICROPROCESSOR CONTROL AND MONITOR. INSTALL ALL UNITS, ELECTRIC, PIPING, CONDENSATE DRAINS, ETC. PER MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS. PROVIDE UNITS OR APPROVED EQUAL. REFER TO SPECIFICATIONS FOR SUBSTITUTION REQUIREMENTS.

REVISIONS:
2 ADDENDUM #2

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
2200 WHEELER MILL ROAD, STE. 110
BEAR, DE. 19701
P: (302) 832-0762 F: (302) 832-0763
Website: www.StudioJAED.com
E-mail: info@StudioJAED.com

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

DATE 5/18/15
PROJECT NO. 14037
SHEET NO. M8.40
SK-M.3



ANNEX ALTERNATE #6
FENCE ELEVATION

2
SK-M.4

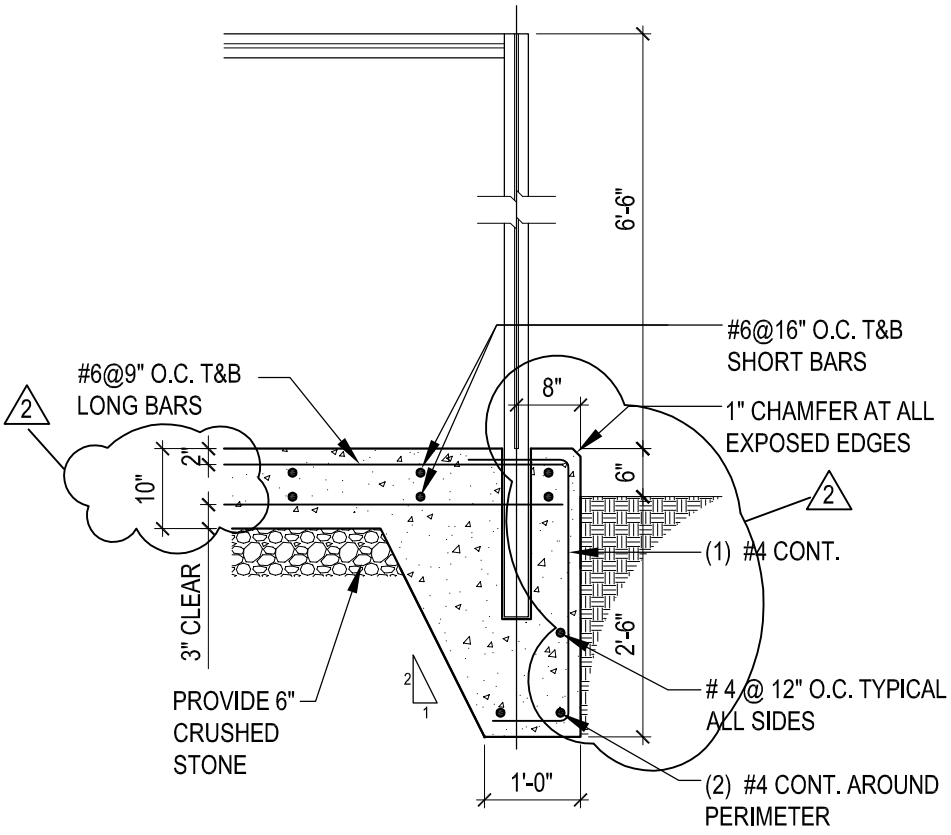
SCALE: NTS

5/18/15 DATE	M8.40 SHEET NO.	
14037 PROJECT NO.	SK-M.4	

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1652 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



ANNEX ALTERNATE #6
TURN DOWN SLAB DETAIL

2
SK-M.5

SCALE: NTS

5/18/15	M8.40
DATE	SHEET NO.
14037	SK-M.5
PROJECT NO.	

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
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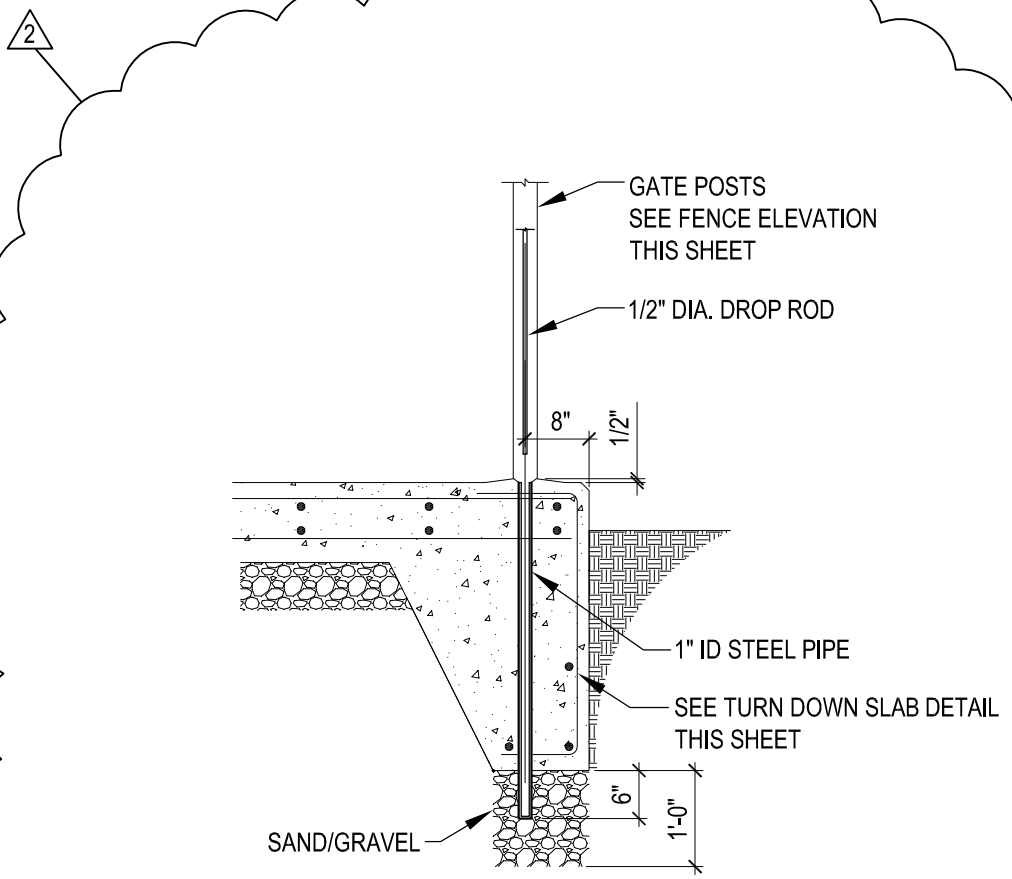
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



ANNEX ALTERNATE #6
DROP ROD FOUNDATION DET.

2
SK-M.6

SCALE: NTS

5/18/15 DATE	M8.40 SHEET NO.	
14037 PROJECT NO.	SK-M.6	

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
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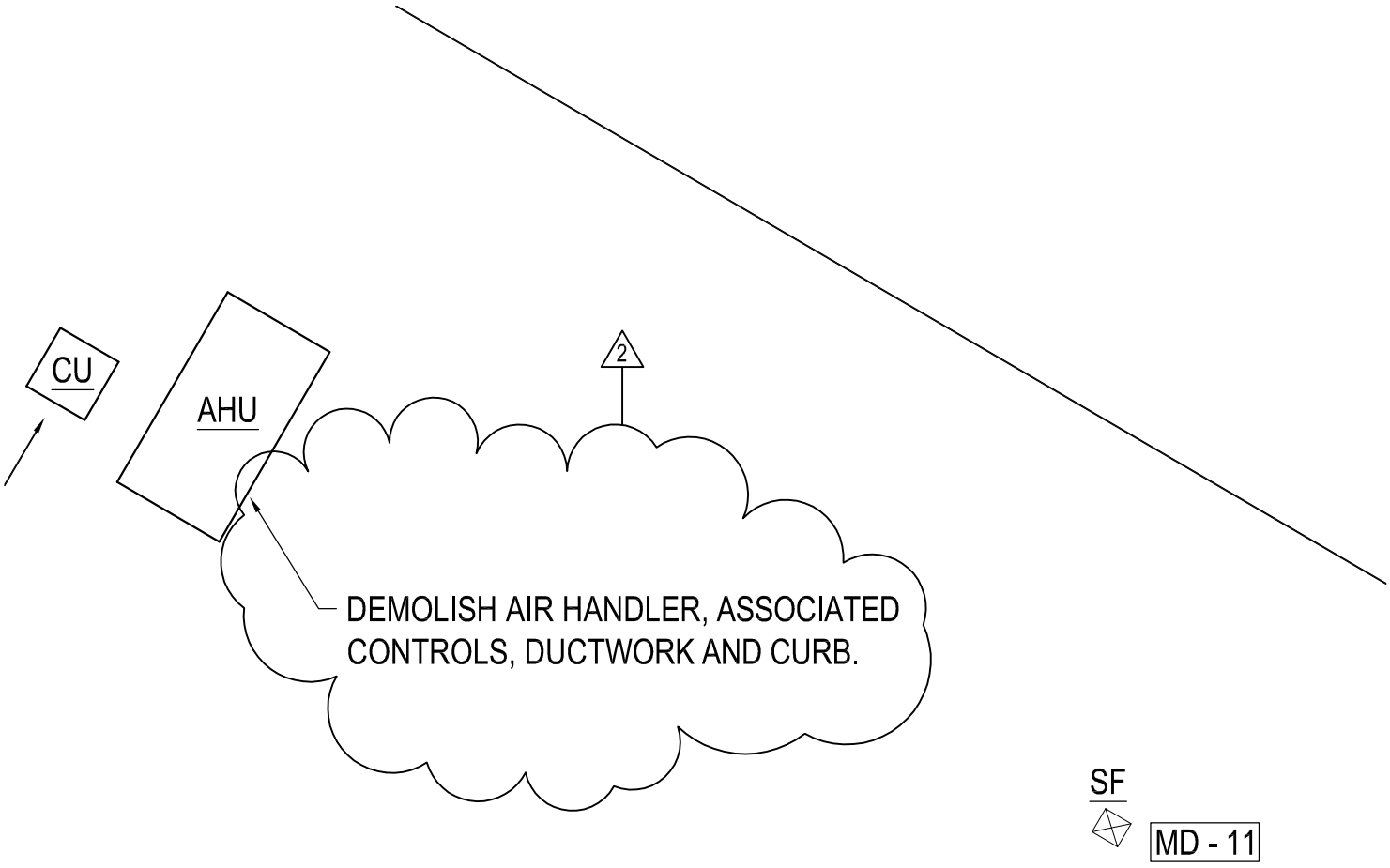
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



PARTIAL ROOF PLAN
MECHANICAL DEMO PLAN - AREA A WEST SIDE

2
SK-M.7

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

5/18/15	M8.11
DATE	SHEET NO.
14037	SK-M.7
PROJECT NO.	

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

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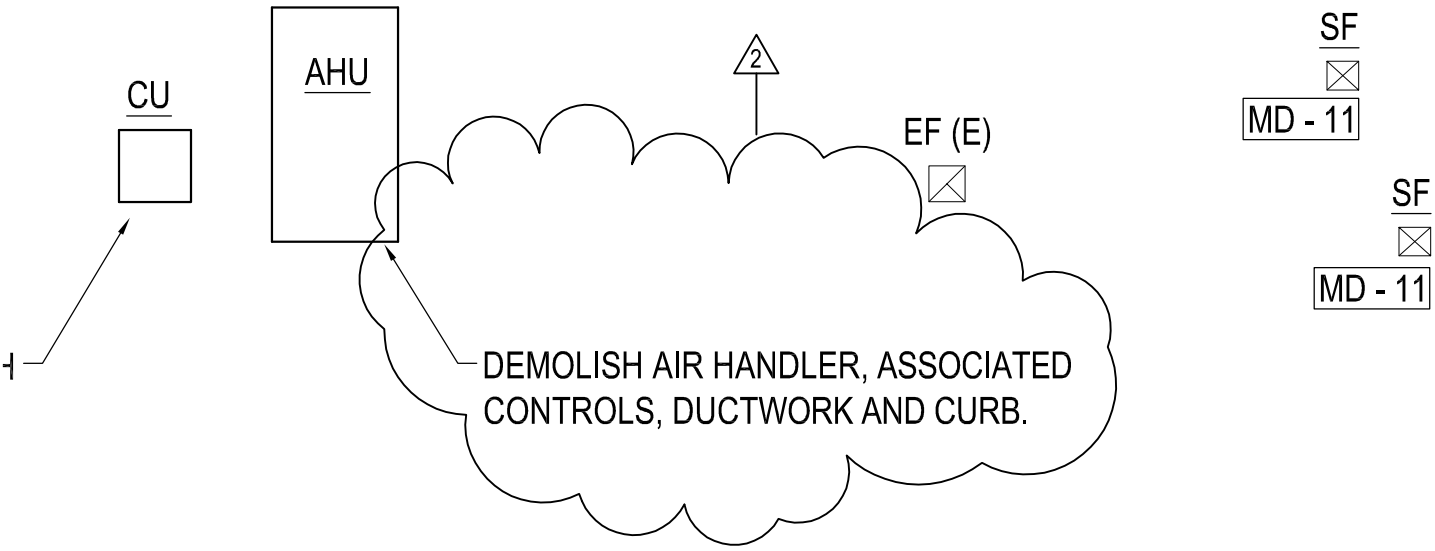
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



PARTIAL ROOF PLAN
MECHANICAL DEMO PLAN - AREA A EAST SIDE

2
SK-M.8

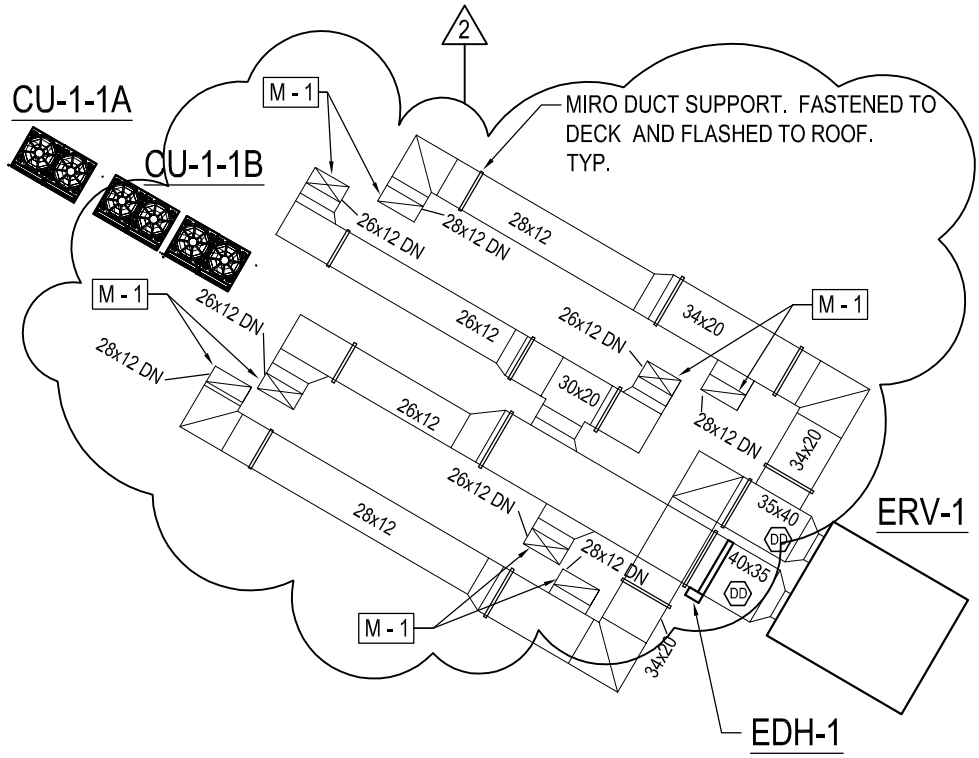
SCALE: 3/32" = 1'-0"

5/18/15	M8.11
DATE	SHEET NO.
14037	SK-M.8
PROJECT NO.	

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



PARTIAL ROOF PLAN
MECHANICAL PLAN - AREA A WEST SIDE

2
SK-M.9

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

2

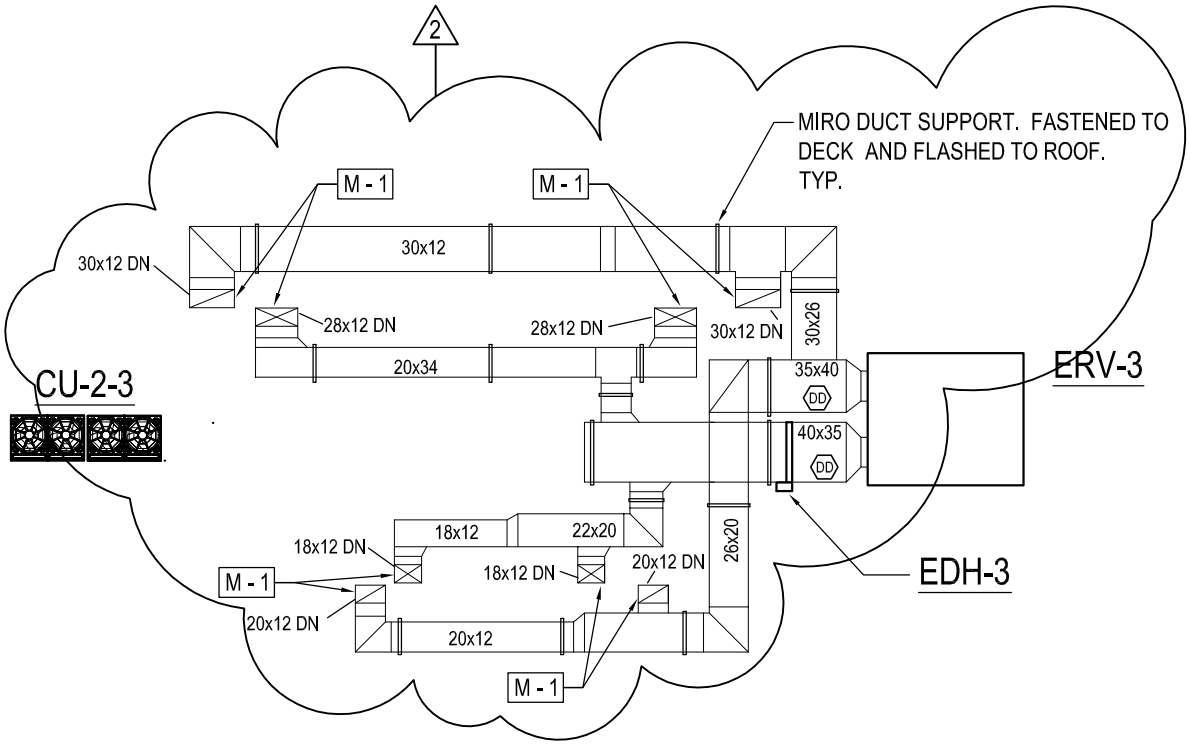
M - 1 - DUCT PENETRATION THROUGH ROOF. CONTRACTOR TO PROVIDE 14" HIGH CURB.

5/18/18	M8.33
DATE	SHEET NO.
14037	SK-M.9
PROJECT NO.	

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



PARTIAL ROOF PLAN
MECHANICAL PLAN - AREA A EAST SIDE

2
SK-M.10

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

2

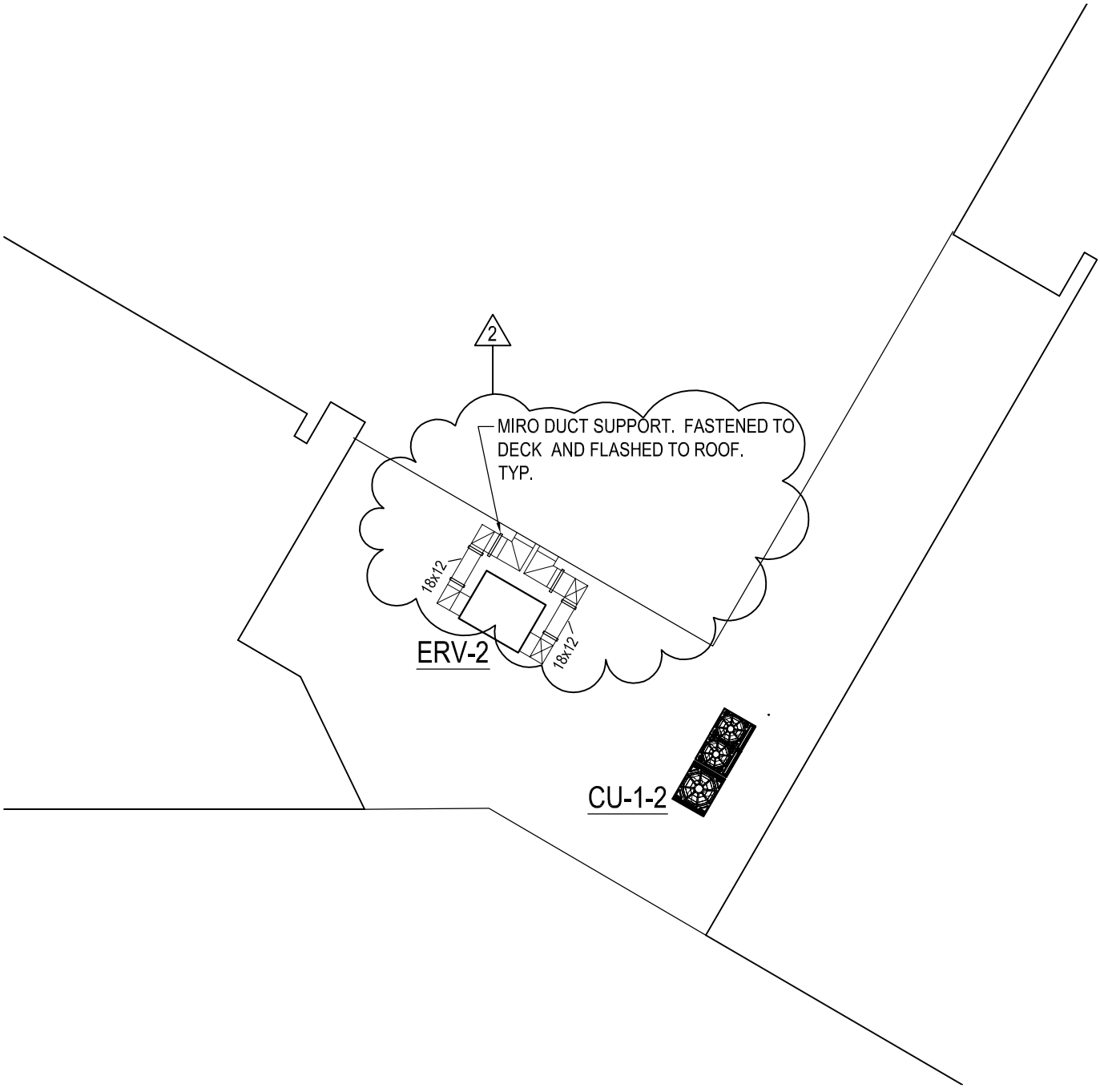
M - 1 - DUCT PENETRATION THROUGH ROOF. CONTRACTOR TO PROVIDE 14" HIGH CURB.

5/18/15	M8.33
DATE	SHEET NO.
14037	SK-M.10
PROJECT NO.	

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



PARTIAL ROOF PLAN
MECHANICAL PLAN - AREA A LIBRARY

2
SK-M.11

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

5/18/15 DATE	M8.33 SHEET NO.	
14037 PROJECT NO.	SK-M.11	

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2

R
#

RETURN SCHEDULE

UNIT NUMBER	PRICE HVAC MODEL #	SIZE (NECK/FACE)	TYPE
R-1	APDDR	6"x6" / 24"x24"	PERFORATED RETURN GRILLE
R-2	APDDR	8"x8" / 24"x24"	PERFORATED RETURN GRILLE
R-3	APDDR	10"x10" / 24"x24"	PERFORATED RETURN GRILLE
R-4	APDDR	12"x12" / 24"x24"	PERFORATED RETURN GRILLE
R-5	APDDR	14"x14" / 24"x24"	PERFORATED RETURN GRILLE
R-6	APDDR	18"x18" / 24"x24"	PERFORATED RETURN GRILLE
R-7	APDDR	22"x22" / 24"x24"	PERFORATED RETURN GRILLE
R-8	70DAL	14"x8" / 14"x8"	LOUVERED RETURN REGISTER
R-9	70DAL	16"x8" / 16"x8"	LOUVERED RETURN REGISTER
R-10	60DAL	30"x8" / 30"x8"	LOUVERED RETURN REGISTER
R-11	60DAL	60"x30" / 60"x30"	LOUVERED RETURN REGISTER
~~R-12~~	~~60DAL~~	~~48"x72" / 48"x72"~~	~~LOUVERED RETURN REGISTER~~
R-13	60	16"x8" / 16"x8"	LOUVERED RETURN GRILLE

2

~~NOTE: PROVIDE EQUIPMENT BY PRICE HVAC OR EQUAL. FINISH SHALL BE FACTORY OFF-WHITE FINISH.~~
CONTRACTOR IS RESPONSIBLE TO SELECT APPROPRIATE MOUNT DEPENDING ON CEILING TYPE. REFER TO ROOM SCHEDULE ON ARCHITECTURAL PLANS.

5/15/2015
DATE

M8.36
SHEET NO.

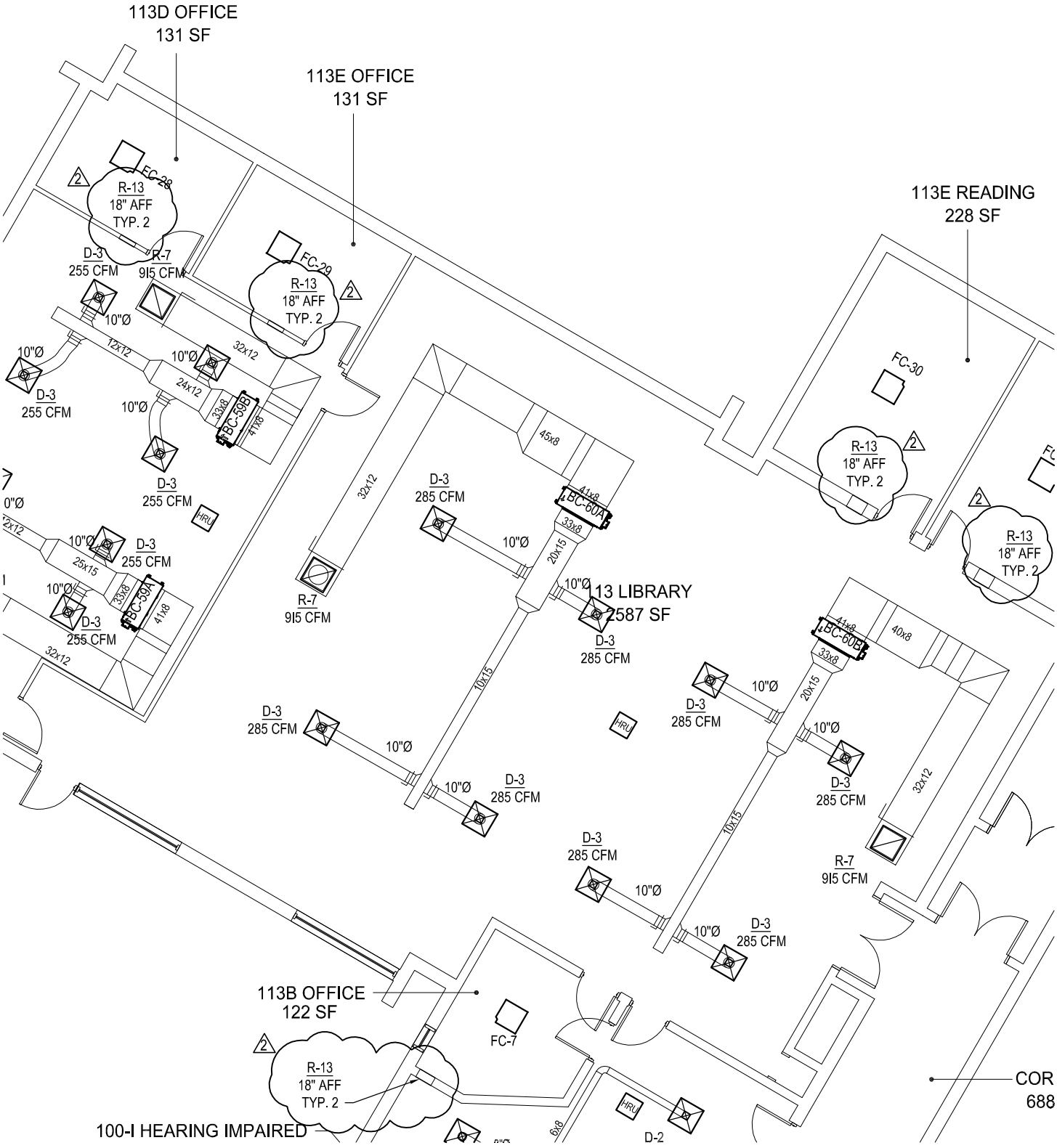
14037
PROJECT NO.

SK-M.12

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



PARTIAL FIRST FLOOR MECHANICAL PLAN - AREA A

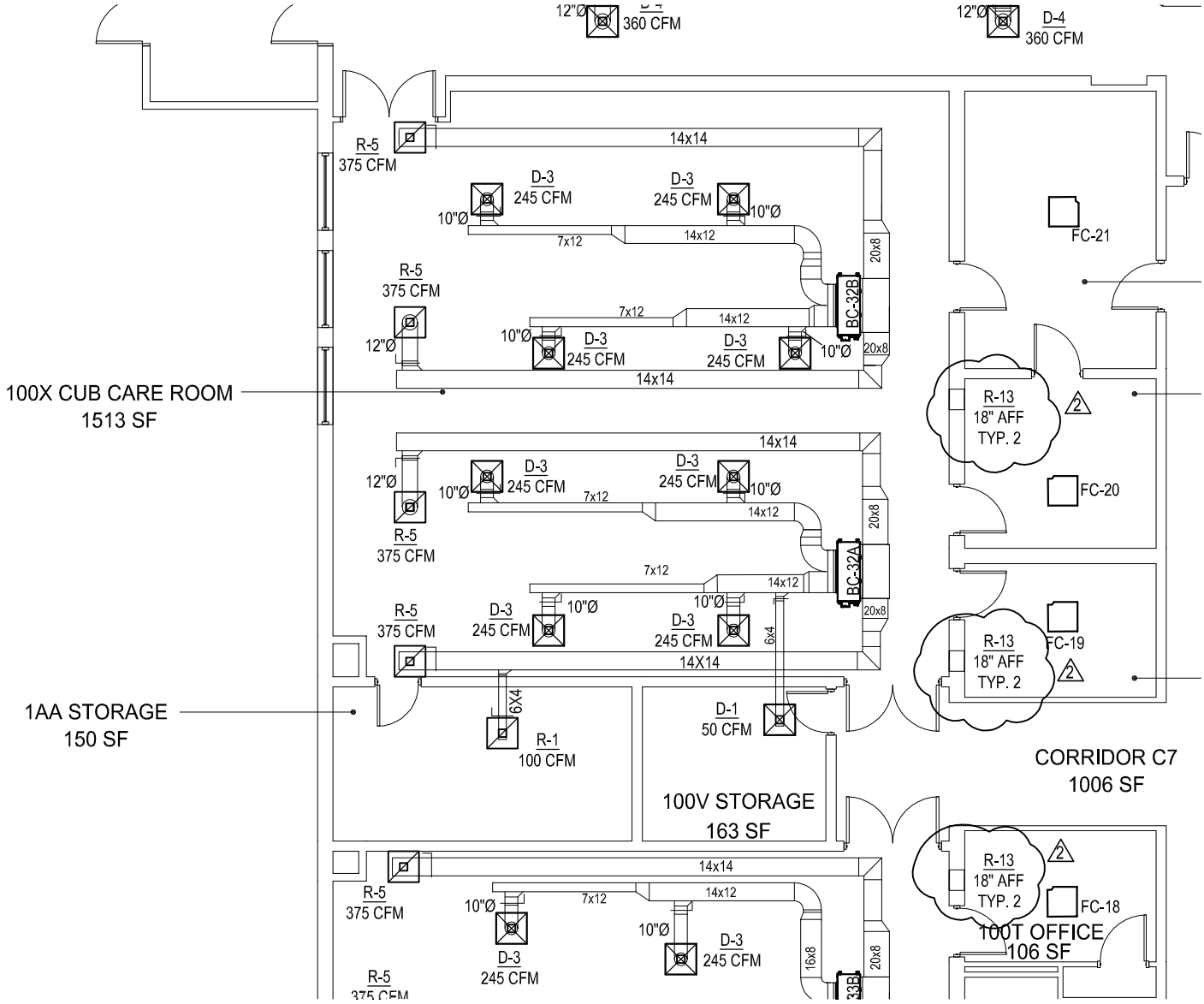
SCALE: 3/32" = 1'-0"

5/15/2015 DATE	M8.12 SHEET NO.	
14037 PROJECT NO.	SK-M.13	

PROJECT:
RED CLAY CONSOLODATED SCHOOL DISTRICT
HVAC RENOVATIONS
BRANDYWINE SPRINGS SCHOOL
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 835-1652 F: (302) 832-1423
Web: www.StudioJAED.com
E-Mail: info@StudioJAED.com

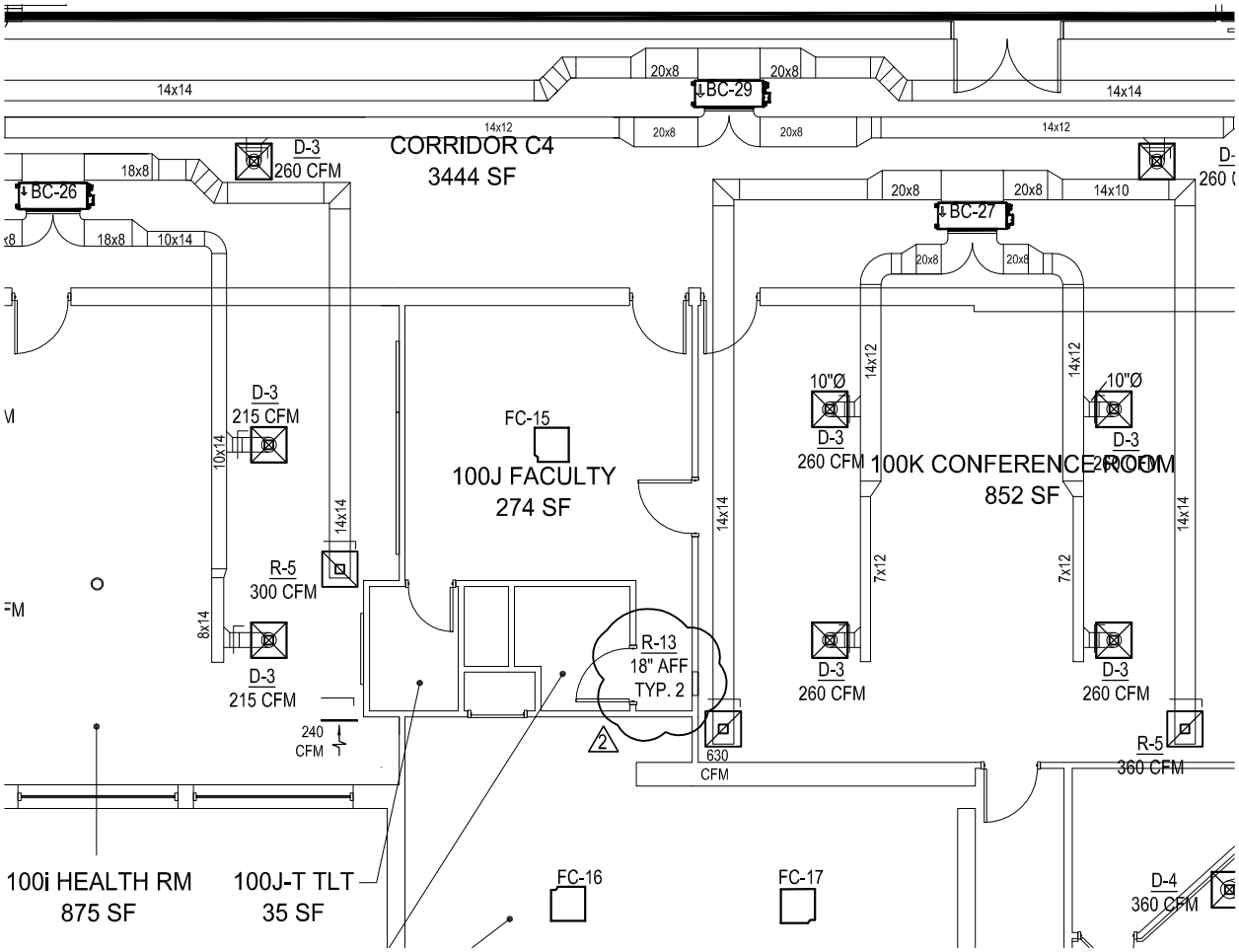
REVISIONS:
2 ADDENDUM #2



PARTIAL FIRST FLOOR MECHANICAL PLAN - AREA B

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

MAY 1, 2015 (DATE)	SK-M.14 (SHEET NO.)	PROJECT: RED CLAY CONSOLIDATED SCHOOL DISTRICT BRANDYWINE SPRINGS SCHOOL HVAC RENOVATIONS 2916 DUNCAN ROAD WILMINGTON, DELAWARE 19808	STUDIO JAED ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS CORPORATE HEADQUARTERS 2500 WRANGLE HILL ROAD, STE. 110 BEAR, DE 19701 P: (302) 832-1852 F: (302) 832-1423 Website: www.StudioJAED.com E-Mail: pm@StudioJAED.com	REVISIONS: 2 ADDENDUM #2
14037 (PROJECT NO.)	SK-M.14			



PARTIAL IRST FLOOR MECHANICAL PLAN - AREA B

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

MAY 1, 2015	SK-M.15
DATE	SHEET NO.
14037	SK-M.15
PROJECT NO.	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

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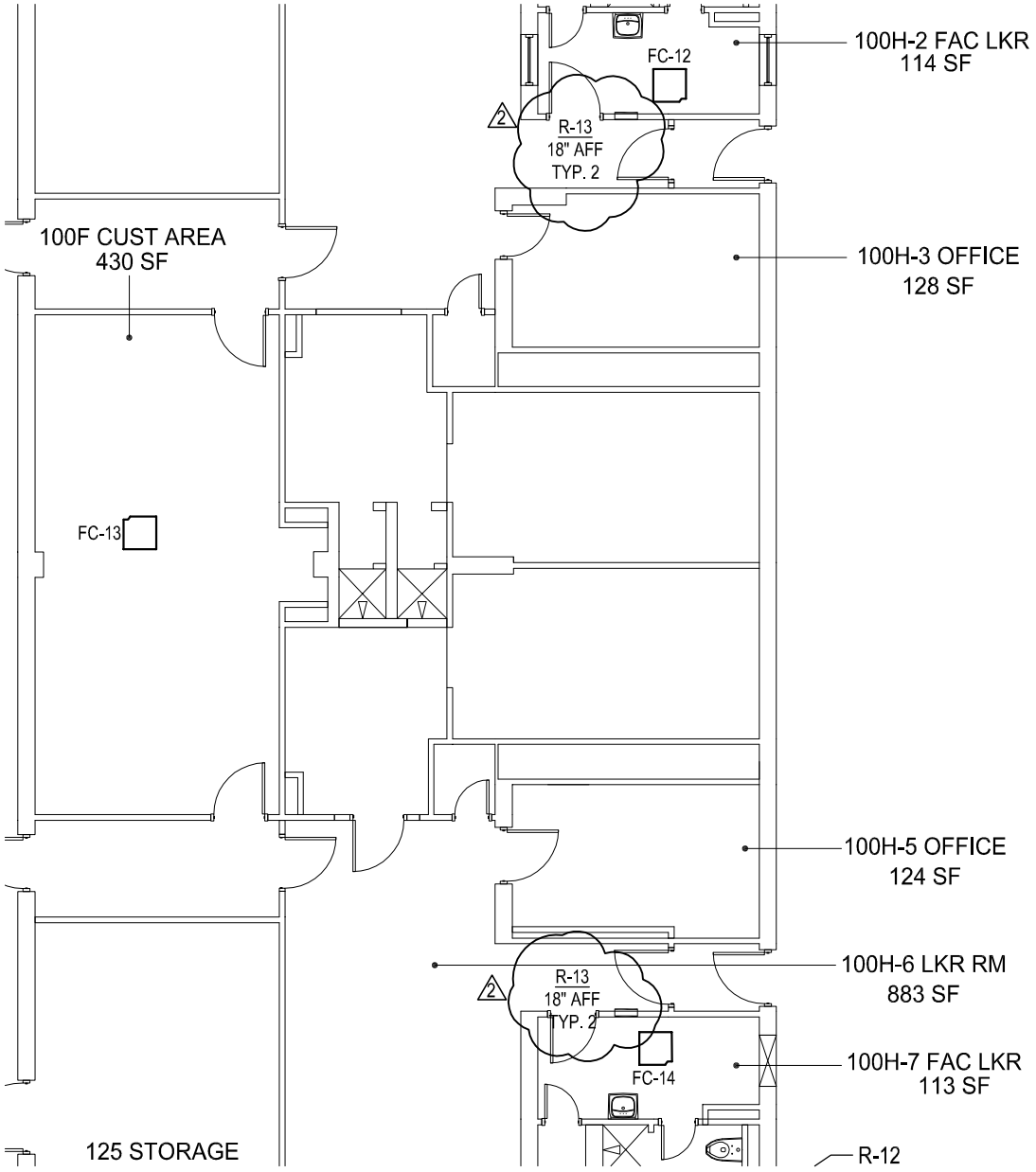
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: pm@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



PARTIAL FIRST FLOOR MECHANICAL PLAN - AREA C

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

MAY 1, 2015	M8.14
DATE	SHEET NO.
14037	SK-M.16
PROJECT NO.	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

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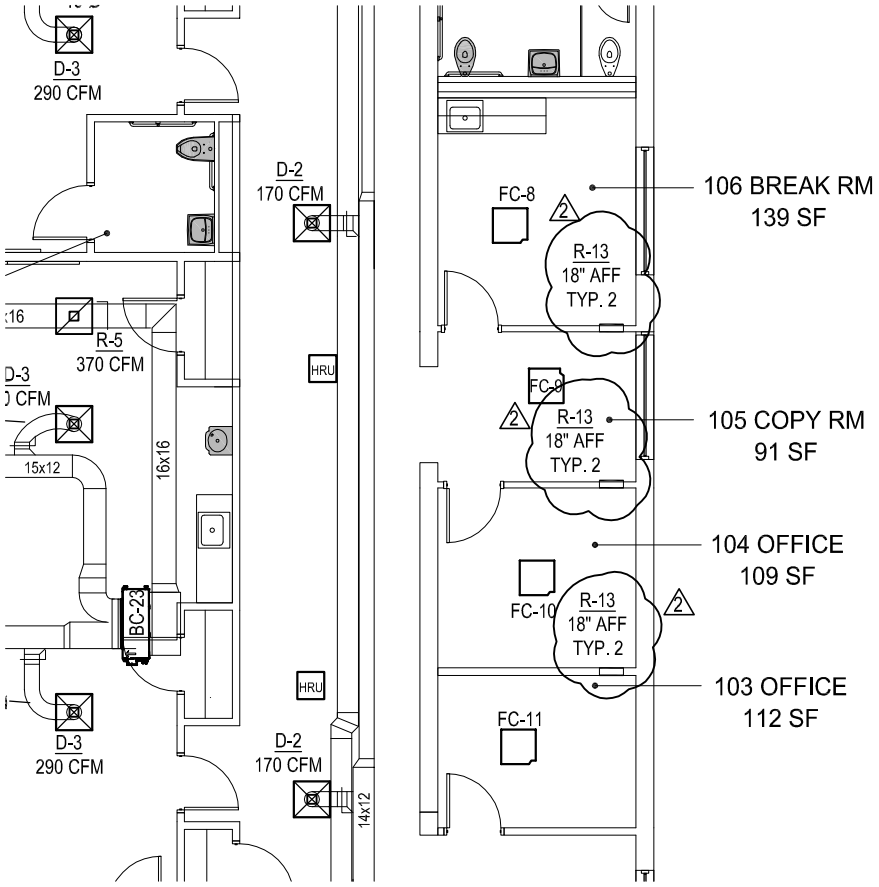
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 835-1652 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



PARTIAL FIRST FLOOR MECHANICAL PLAN - AREA C

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

MAY 1, 2015	M8.14
DATE	SHEET NO.
14037	SK-M.17
PROJECT NO.	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
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STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
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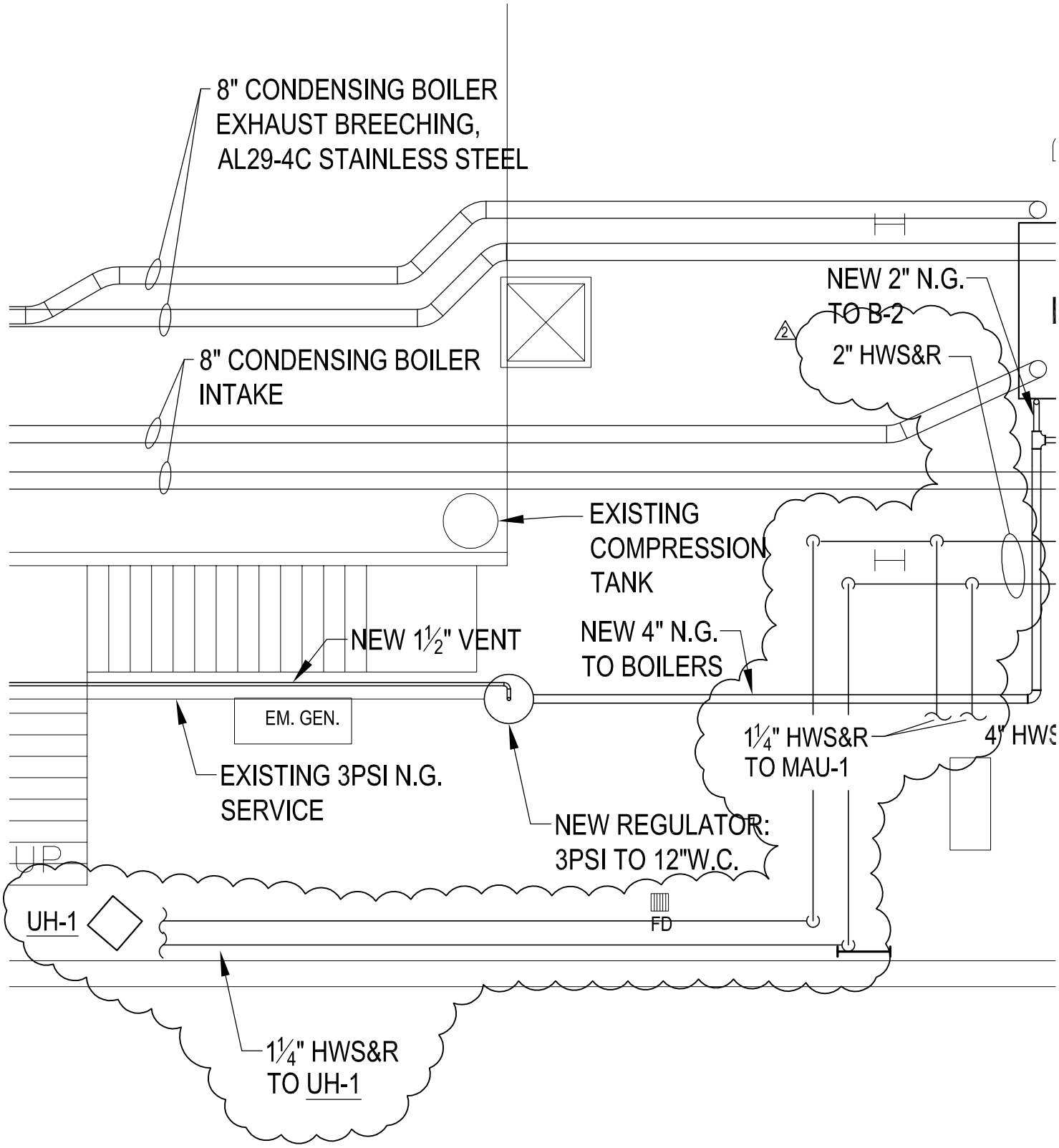
REVISIONS:
2 ADDENDUM #2



PARTIAL BOILER ROOM PLAN - NEW

SCALE: 3/16" = 1'-0"

MAY 1, 2015 (DATE)	M8.32 (SHEET NO.)	
14037 (PROJECT NO.)	SK-M.18	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
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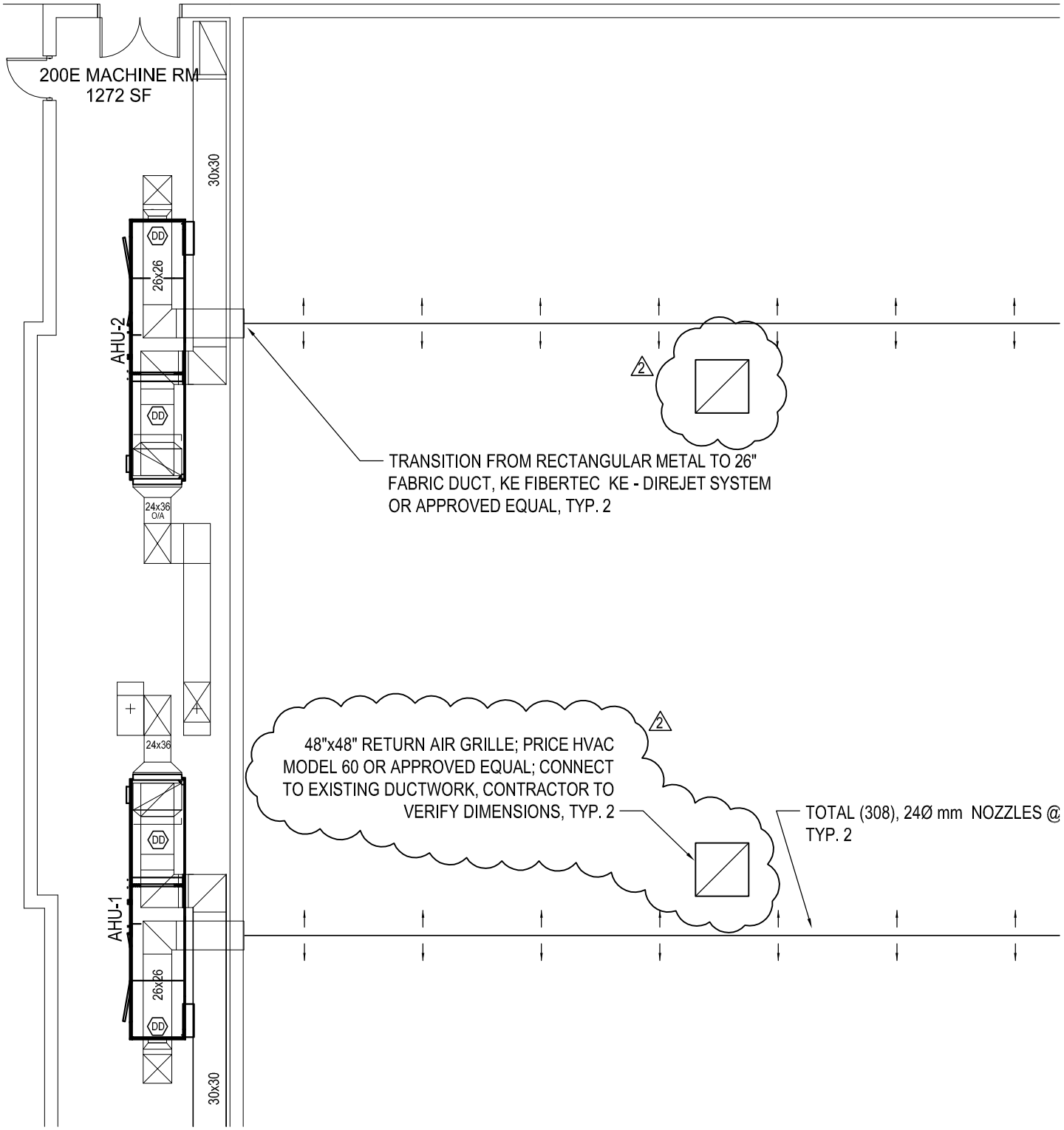
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



PARTIAL SECOND FLOOR MECHANICAL PLAN - AREA B

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

MAY 1, 2015 (DATE)	M8.16 (SHEET NO.)	
14037 (PROJECT NO.)	SK-M.19	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

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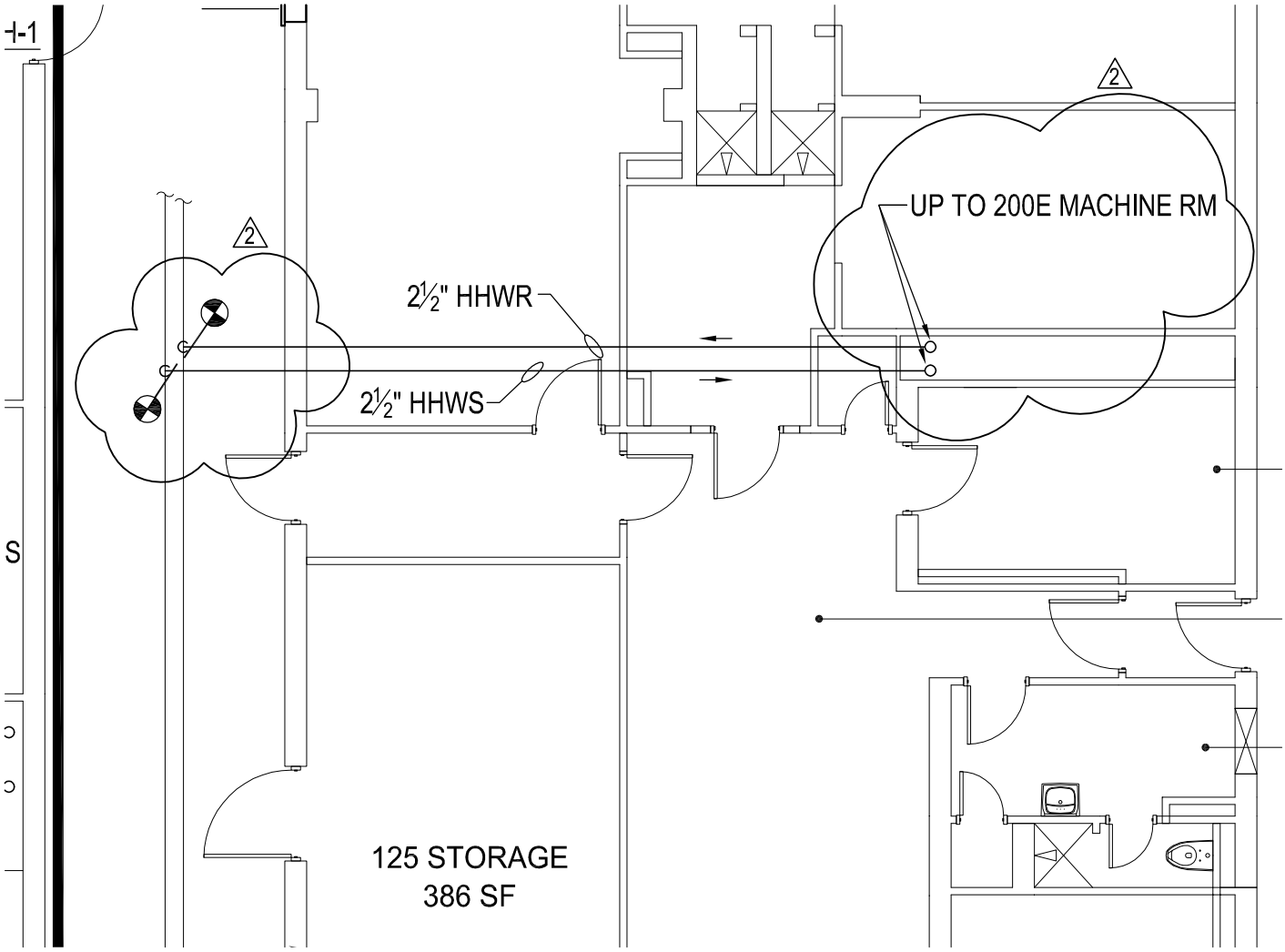
CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

REVISIONS:
2 ADDENDUM #2



PARTIAL FIRST FLOOR PLAN
HYDRONIC PLAN - AREA C

2
SK-M.20

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

5/18/15	M8.24	PROJECT: RED CLAY CONSOLIDATED SCHOOL DISTRICT BRANDYWINE SPRINGS SCHOOL HVAC RENOVATIONS 2916 DUNCAN ROAD WILMINGTON, DELAWARE 19808	REVISIONS: 2 ADDENDUM #2
DATE	SHEET NO.		
14037	SK-M.20		
PROJECT NO.			

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CORPORATE HEADQUARTERS
2500 WRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1852 F: (302) 832-1423
Website: www.StudioJAED.com
E-Mail: info@StudioJAED.com

P
#

PUMP SCHEDULE

UNIT NUMBER	UNIT TYPE	RPM	GPM	W.P.D. (FT-H20)	IMPELLER SIZE (IN)	ELEC	HP	BELL & GOSSETT MODEL #	REMARKS
P-B1	IN-LINE	1150	184	10	5.5	460/3/60	1.5	80-4x4x7	
P-B2	IN-LINE	1150	184	10	5.5	460/3/60	1.5	80-4x4x7	
P-FP1	IN-LINE	3300	26	8	-	120/1/60	0.17	PL-36	
P-FP2	IN-LINE	3300	26	8	-	120/1/60	0.17	PL-36	
P-FP3	IN-LINE	3200	51	10	-	120/1/60	0.4	PL-130	
P-FPM1	IN-LINE	2650	14	8	-	120/1/60	0.1	PL-30	
P-1	IN-LINE	1750	90	34	-	208/3/60	1.5	60-2x2x7	Model 611T-LF
P-2	IN-LINE	1750	80	26	-	208/3/60	.75	60-2x2x5.25	Model 625T-LF
P-3	IN-LINE	1750	50	26	-	208/3/60	.75	60-1.5x1.5x7	Model 622-LF
P-4	IN-LINE	1750	50	26	-	208/3/60	.75	60-1.5x1.5x7	Model 622-LF
P-5	IN-LINE	1750	80	45	-	208/3/60	2	60-1.5x1.5x7	Model 618-LF
P-9	BASE-MOUNTED	1750	260	75	9.0	460/3/60	10	E1510	Model 2.5 BB. Provide with vendor supplied vfd.
P-10	BASE-MOUNTED	1750	260	75	9.0	460/3/60	10	E1510	Model 2.5 BB. Provide with vendor supplied vfd.

NOTE: PROVIDE UNITS AS SCHEDULED OR APPROVED EQUAL. ALL UNITS SHALL HAVE PREMIUM EFFICIENCY, INVERTER-DUTY MOTORS. ALL IN-LINE PUMPS ARE TO BE PROVIDED WITH TYPICAL IN-LINE PUMP DETAIL AND ALL BASE-MOUNTED PUMPS ARE TO BE PROVIDED WITH TYPICAL BASE-MOUNTED PUMP DETAIL.

1

1

REVISIONS:
1 REVISED PER ADDENDUM #2

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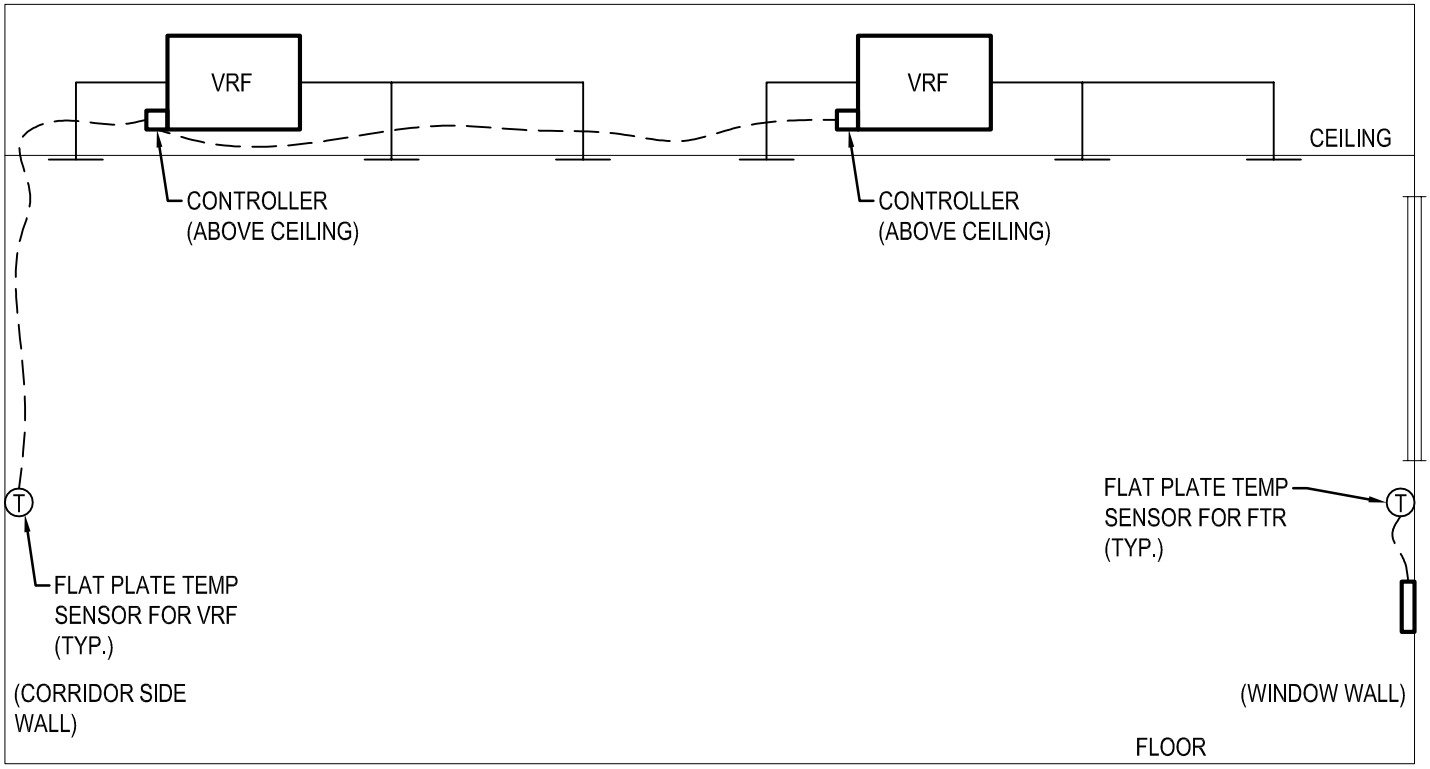
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 WINGATE MILL ROAD, STE. 110
BEAR, DE. 19701
P.(302)832-1600 F.(302)832-1423
Website:
www.STUDIO-JAED.com
E-Mail:
INFO@STUDIO-JAED.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

DATE: MAY 18, 2015
SHEET NO.: M8.37
PROJECT NO.: 14037
SK-M.21



TYPICAL MECHANICAL SENSOR DETAIL

SCALE: NOT TO SCALE

TYPICAL FOR ALL CLASSROOMS AND OFFICES.
PROVIDE FLAT PLATE SENSOR FOR FTR WHERE
APPLICABLE.

MAY 18, 2015 (DATE)	ALL MECHANICAL (SHEET NO.)	PROJECT: RED CLAY CONSOLIDATED SCHOOL DISTRICT BRANDYWINE SPRINGS SCHOOL HVAC RENOVATIONS 2916 DUNCAN ROAD WILMINGTON, DELAWARE 19808	REVISIONS: 1 REVISED PER ADDENDUM #2
14037 (PROJECT NO.)	SK-M.22		

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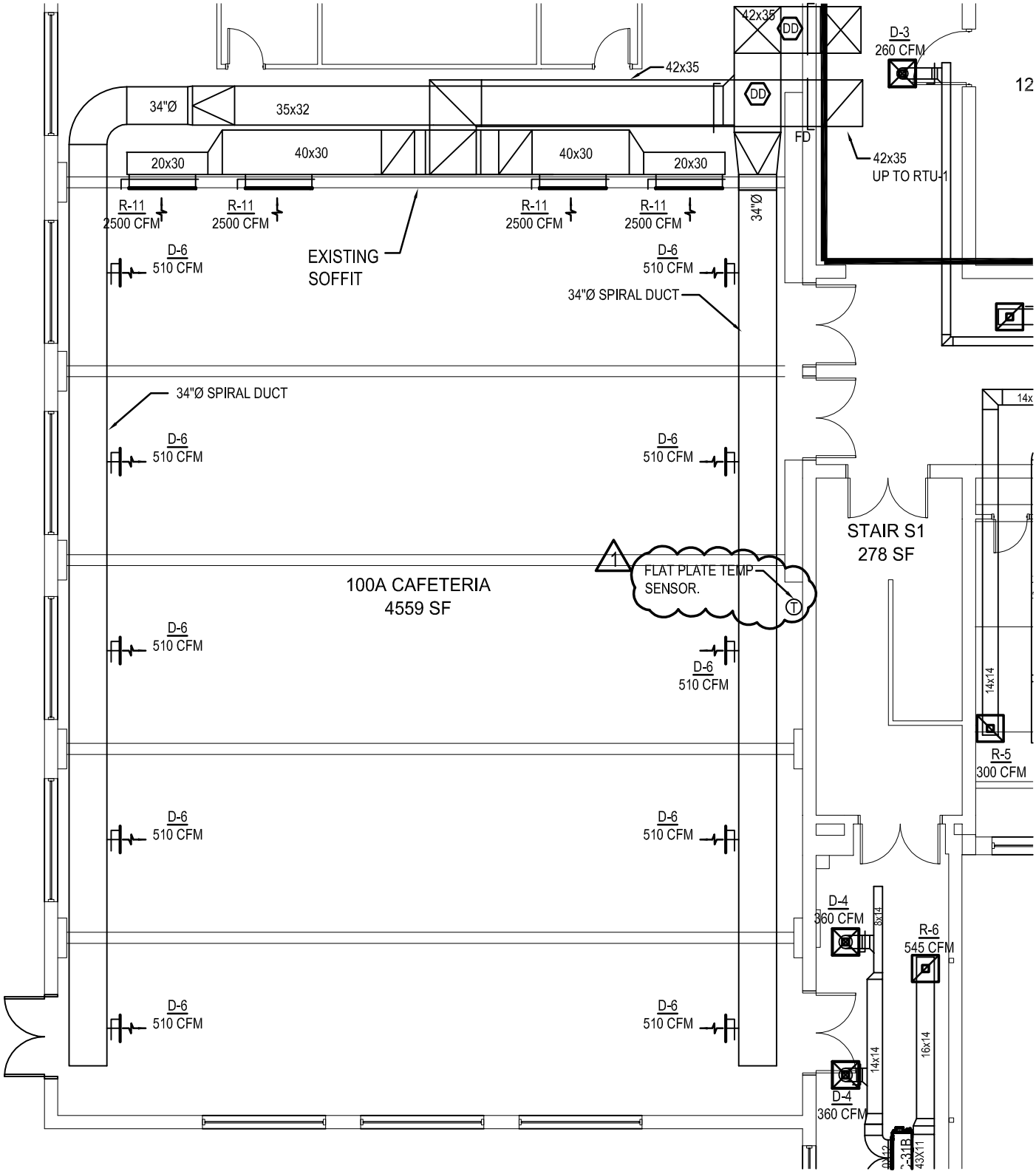
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 YRIANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1662 F: (302) 832-1423
WebNet
www.StudioJAED.com
E-MAIL
info@StudioJAED.com



FIRST FLOOR MECHANICAL PLAN - AREA B

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

MAY 18, 2015 (DATE)	M8.13 (SHEET NO.)	
14037 (PROJECT NO.)	SK-M.23	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATIONS
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

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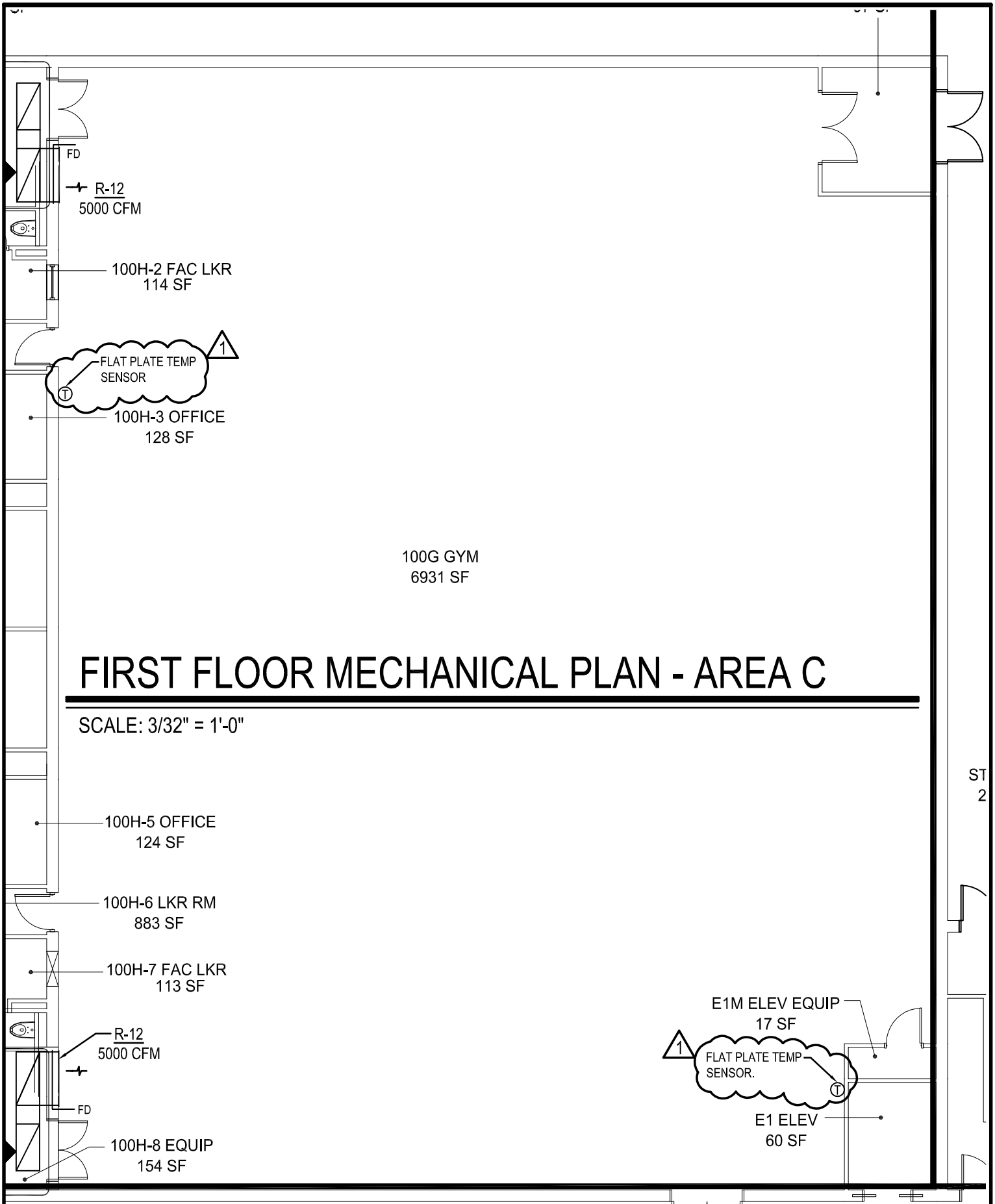
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 YRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1662 F: (302) 832-1423
Website
www.StudioJAED.com
E-Mail
info@StudioJAED.com

REVISIONS:
1 REVISED PER ADDENDUM #2



FIRST FLOOR MECHANICAL PLAN - AREA C

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

MAY 18, 2015	M8.14
DATE	SHEET NO.
14037	SK-M.24
PROJECT NO.	

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
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STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 YRANGLE HILL ROAD, STE. 110
BEAR, DE 19701
P: (302) 832-1662 F: (302) 832-1423
Website
www.StudioJAED.com
E-Mail
info@StudioJAED.com

REVISIONS:
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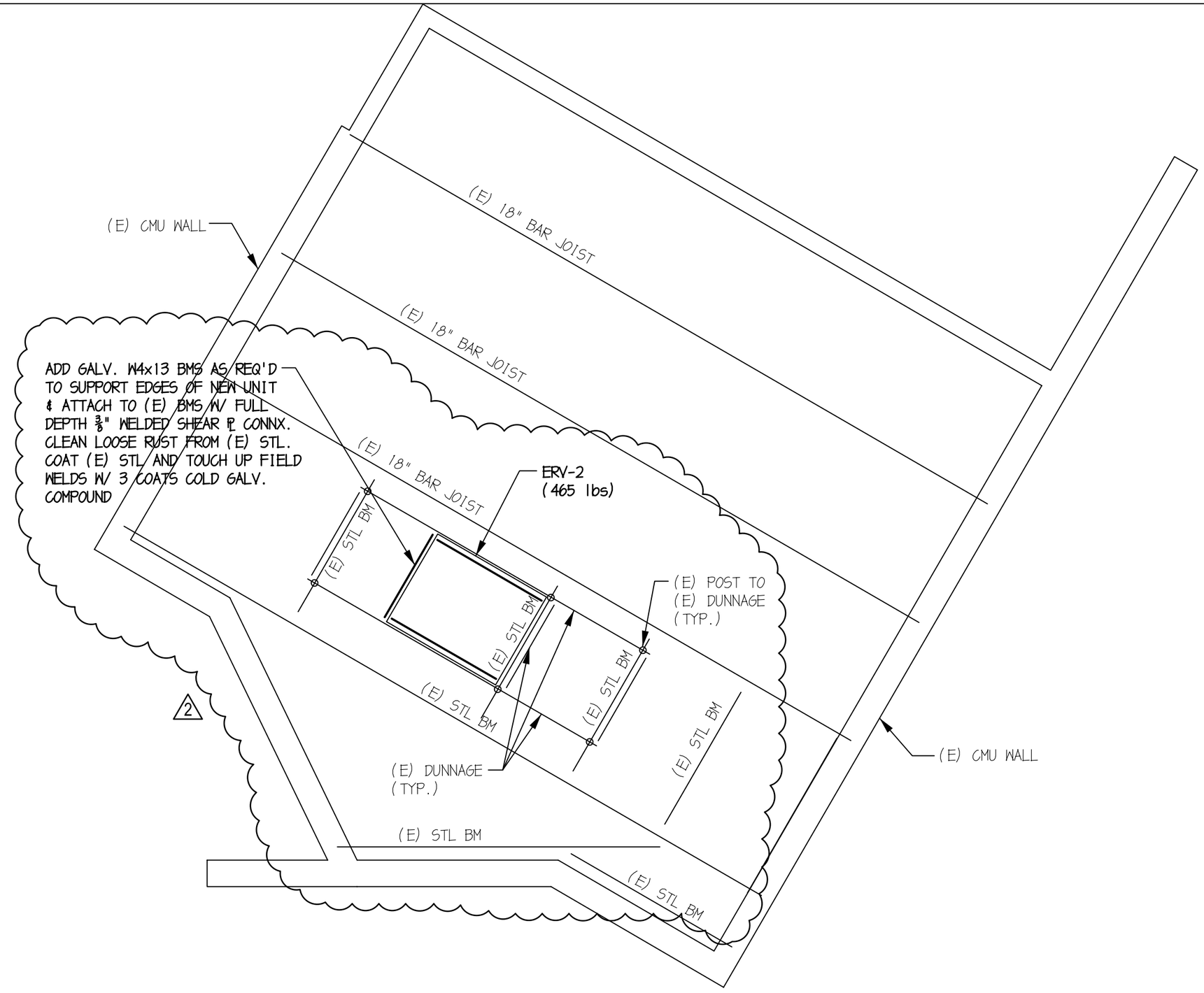

P6
S1.3

PARTIAL PLAN (ERV-2)

1/4" = 1'-0"

SUBMISSION:
2 ADDENDUM #2

STUDIO JAED
ARCHITECTS ■ ENGINEERS ■ FACILITIES SOLUTIONS
CORPORATE HEADQUARTERS
2500 GRANT AVE. - 1ST FLOOR
PHILADELPHIA, PA 19114
P: (215) 464-4400
Website:
www.StudioJAED.com
E-Mail:
info@StudioJAED.com

PROJECT:
RED CLAY CONSOLIDATED SCHOOL DISTRICT
BRANDYWINE SPRINGS SCHOOL
HVAC RENOVATION
2916 DUNCAN ROAD
WILMINGTON, DELAWARE 19808

05/15/15	DATE
D9341.00	PROJECT NO.
S1.3	SHEET NO.
SK-S.1	