HAMPTON COMMERCIAL CONSTRUCTION, INC.
3701 Union Drive, Suite 100
Lincoln, NE 68516
www.hampton1.com
(402)489-8858 • (402)489-9287 FAX

HAMPTON CONSTRUCTION

PROJECT

Name **The Career Academy - Bid Package 4**
Owner **SCC**

Bids Due **6/26/2014** Time **2:00 p.m.**

ADDENDUM

Number **2**

DATE

Issued **6/19/2014**
Bid Date Change _____ Yes **X** No New Bid Date _____

DRAWINGS

Drawings Issued? _____ Yes **X** No

REMARKS

INCLUDED:

3 pages of text from Hampton Commercial Construction
1 page of attachments from Hampton Commercial Construction
4 pages of text from BVH
57 pages of attachments from BVH
5 pages of text from ETI
164 pages of attachments from ETI

REMINDER: **Bids are to be delivered at:**

LPS Facilities & Maintenance Department
800 S 24th Street
Lincoln, NE 68510

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THE CAREER ACDEMY
8800 O STREET
LINCOLN, NE

ADDENDUM #2 – PART 1
Bid Package 4

June 19, 2014

The following changes have been made in the Contract Documents; and insofar as the Contract Documents are inconsistent therewith, the changes mentioned hereinafter shall govern:

BIDDING AND CONTRACT DOCUMENTS

SECTION 00 2200 – BID FORM

1. Add the Bid Form supplement indicating the additional Electrical Unit Price required.

SECTION 00 2400 – DESCRIPTION OF WORK

2. General Notes:

   a) The preliminary construction schedule has been included to allow anticipated timing for scopes of work and durations for use during bidding. It is located in Section 003100.

3. TCA 3.2 Interior Concrete and Flatwork

   a) See specification section 072100 for the separate limits of the under slab insulation. Refer to Sheets M2.1A & B for the extent of radiant heat system.
   b) Refer to Mechanical and electrical plans to determine locations of mechanical pads required per Description of Work item 'G'
   c) Item 'R' - The base course material under the interior slabs is under review currently. As such, Contractors bidding TCA 3.2 are to include an allowance of $50,000. This allowance will be required to be listed as a separate line item on the pay application. Billings against the allowance will be based on actual invoice amounts from the supplier.

4. TCA 9.3 Carpet & Resilient Flooring & 9.4 Rubber Flooring

   a) Performance and Payment bods are required for these contracts. Costs for said bonds are to be included in your bid proposals.
   b) See the following clarification regard base and transitions:
   Midwest Floor Covering is responsible for all base and transitions associated with rubber installations. Floors, Inc. is responsible for all base and transitions associated with carpet

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installations. At locations where both rubber and carpet are installed in the same room, Floors Inc. will be responsible for all vinyl base and transitions. Floors Inc. is responsible for vinyl base in areas scheduled for sealed concrete or terrazzo.

5. TCA 22.1 Plumbing

   a) The following product information is provided to assist with determination of connection methods required for service tie-in's. Incoming storm piping is being installed as ADS. Incoming sanitary sewer is PVC.
   b) The new water service is terminated at the flange within the building. Per Item 'V' the plumbing contractor is responsible for are work beyond that point. This includes the meter and associated costs.
   c) The mud trap called for on sheet M1.1-B, Note 6 and detailed on sheet M5.2 is to be constructed by the foundation contractor. The plumbing contractor is responsible for coring their pipes into the trap after installation.
   d) All stands required for Plumbing equipment are to be supplied and installed by this contractor.

6. TCA 23.2 HVAC

   a) Item 'I' – Change the word 'plumbing' in the second sentence to 'HVAC'.
   b) All stands required for HVAC equipment are to be supplied and installed by this contractor.

7. TCA 26.2 Electrical

   a) Item 'I' – Change the word 'plumbing' in the second sentence to 'electrical'.
   b) All stands required for electrical equipment are to be supplied and installed by this contractor.

<u>SECTION 00 7200 – GENERAL CONDITIONS OF THE CONTRACT</u>

1. Page 8 – Paragraph 2.4.1
   a. Line 2 – Change 'seven-day' to '48 hour'.
2. Page 9 – Paragraph 2.4.1
   a. Line 1 – Change 'may after such seven-day' to 'after such 48 hour period may at their discretion'.
   b. Line 2 – Change 'seven-day' to '48 hour'.
   c. Line 3 – Change 'seven-day' to '48 hour'.

<u>SECTION 00 12200 – UNIT PRICES</u>

1. Add Item: No. 43; Power/Data rough-in.

<u>SECTION 00 17000 – EXECUTION AND CLOSEOUT REQUIREMENTS</u>

2. Page 5 – Paragraph 3.06 ALTERATIONS - 'O'

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a. Delete in its entirety. Existing systems and equipment are not required to cleaned.

3. Page 9 – 3.15 MAINTENANCE
    a. Routine maintenance is to be performed by the Owner unless specifically indicated in individual specification sections. Service required for warranty issues are by the contractors installing the affected systems for the established warranty period.

SECTION 23 0050 – GENERAL MECHANICAL PROVISIONS

1. Page 5 – Paragraph 1.14 TEMPORARY HEAT/COOLING
    a. Delete in its entirety. Temporary heating and cooling will be provided by others. The permanent mechanical system will be required to be started to allow sufficient time for test and balance and commissioning. Temporary filters will be required to be installed one time during this period. The final change of filters and attic stock filters are still required as specified.

* *

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Bid Form Attachment

UNIT PRICES		**Units**	**Cost**
Description: Contract TCA 26.2 Electrical			
43.	Power/Data rough-in to above ceiling	EA	_____

PROJECT:	LPS-SCC Career Academy	PROJECT NO.	L13414
FROM:	BVH Architects	DATE:	06/19/2014
TO:	Hampton Commercial Construction, Inc.	ADDENDUM	#2

This Addendum is issued by the Architect to all bidders of record prior to receipt of proposals. Bidders shall acknowledge receipt of this addendum by so indicating on the Proposal Form. Failure to do so may subject Bidder to disqualification.

All information and instructions given herein shall become a part of the Contract Documents.

PROJECT MANUAL

1. Section 064100 – ARCHITECTURAL WOOD CASEWORK
   a. Replace the entire Section with the attached 064100 – ARCHITECTURAL WOOD CASEWORK.
2. Section 074215 – INSULATED COPPER PANELS
   a. Paragraph 2.02.E.: Acceptable adhesive includes exterior grade elastomeric polyurethane, silicone, butyl, polysulfide, or other inorganic or rubber based construction adhesives or sealants in accordance with SMACNA and CDA industry standards for compatibility with copper and polyisocyanurate insulation and that which allows thermal expansion of dissimilar materials.
   b. Paragraph 3.04.J.: The referenced adhesive provides a means of installing the copper panels prior to the placement of the copper battens, which is the primary attachment method for the panels.
3. Section 087100 – DOOR HARDWARE
   a. Add the attached Section 087100 – DOOR HARDWARE to the Project Manual.
2. Section 104400 – FIRE PROTECTION SPECIALTIES
   a. Paragraph 1.01 B.; delete this paragraph in its entirety.
   b. Paragraph 2.01 B.; delete this paragraph in its entirety.
   c. Paragraph 2.04; delete this paragraph in its entirety.
3. Section 102226.33 FOLDING PANEL PARTITIONS
   a. Paragraph 2.02.A.; Operable Panel Partition shall be 21'-4" wide by 10'-6" tall nominal with the top track flush to the ACT Ceiling. The panels shall fold to the West.
   b. Paragraph 2.02.E.; Track shall be suspended by adjustable steel hanger brackets and threaded rods connected to the structural steel channel header shown on Detail S10/S3.0.
4. Section 115300 – LABORATORY EQUIPMENT
   a. Replace the entire Section with the attached 115300 – LABORATORY EQUIPMENT.

DRAWINGS

1. Sheet G1.1
   a. Reference WALL TYPE SCHEDULE: Wall Type C87 shall be "DOUBLE WYTHE 4" BRICK VENEER WALL TO 7'-4" AFF, 8" CMU FROM 7'-4" AFF TO TOW".
   b. See attached CMU TOW DIAGRAM for masonry wall heights.
2. Sheets A1.1A, A1.1B, A1.1C, A1.2A, A1.2B
   a. Reference SPECIALTIES LEGEND: Revise Tag 6 "115300 Eye Wash Station" to reference mechanical drawings and specifications.
3. Sheet A1.2B – SECOND FLOOR PLAN – AREA B

a. See attached partial plan A1/A1.2B SECOND FLOOR PLAN for additional Hollow Metal Frame Types.

4. Sheet A1.4 – ENLARGED PLANS
   a. See the attached Drawing A1/A1.4 – ENLARGED PLAN – RR 181 for additional dimensions to clarify the restrooms layout.
   b. See the attached Drawing A8/A1.4 – ENLARGED PLAN – RR 180 for the revised layout of these restrooms and the addition of MENS SHOWER 180BA and WOMENS SHOWER Shower 180GA Rooms
   c. See the attached Drawing G1/A1.4 – ENLARGED PLAN – RR 281 for additional dimensions to clarify the restroom layout.
   d. See the attached Drawing G8/A1.4 – ENLARGED PLAN – RR 280 for additional dimensions to clarify the layout the restrooms.
5. Sheet A6.1 – DETAILS
   a. Add the attached G7/A6.1 – DETAIL – COPPER HORIZONTAL SLIP JOINT. Reference A11/A6.5 TYPICAL WALL ASSEMBLY for locations.
6. Sheet A6.5 – DETAILS
   a. Reference A11 DETAIL – TYPICAL WALL ASSEMBLY; Delete all copper and copper flashings weights/gauges references. See the specifications for thicknesses.
7. Sheet A7.1 – DOOR AND WINDOW FRAME TYPES / DETAILS
   a. Reference the DOOR SCHEDULE:
      i. Delete Door 103Ca from the Door Schedule.
      ii. Add Door 115b to the Door Schedule. Door 115b shall be a single leaf, 3'0"x7'0" door, Type W-4 wood door, HM Frame Type HM-5, 8 ¼" jamb depth, and Hardware Set 18.
      iii. Add Door 180BAa to the Door Schedule. Door 180BAa shall be a single leaf, 3'0"x7'0" door, Type W-1 wood door, HM Frame Type HM-2, 5 ¾" jamb depth, and Hardware Set 7.
      iv. Add Door 180GAa to the Door Schedule. Door 180GAa shall be a single leaf, 3'0"x7'0" door, Type W-1 wood door, HM Frame Type HM-2, 5 ¾" jamb depth, and Hardware Set 7.
      v. Door 180Ta shall be changed to a single leaf 3'0" x 7'0" door.
      vi. Add Door 180Ua to the Door Schedule. Door 180Ua shall be a single leaf, 3'0"x7'0" door, Type W-1 wood door, HM Frame Type HM-1, 9" jamb depth, and Hardware Set 32.
      vii. Add Door 280Ka to the Door Schedule. Door 280Ka shall be a single leaf, 3'0"x7'0" door, Type W-1 wood door, HM Frame Type HM-1, 9" jamb depth, and Hardware Set 32.
      viii. Delete HDWE SET column in its entirety. Reference Specification Section 087100 – DOOR HARDWARE for door hardware sets.
   b. Reference Drawings A8/A7.1 and F8/A7.1:
      i. Replace details in their entirety with the attached details K8/A7.3 HOLLOW METAL FRAME DETAILS on Sheet A7.3.
   c. Reference Drawing A16 – HM DOOR FRAME ELEVATIONS:
      ix. See the attached Drawing A16/A7.1 – HM DOOR FRAME ELEVATIONS for Frame HM-5.
5. Sheet A7.3 – FRAME ELEVATIONS
   a. Add the attached HOLLOW METAL FRAME SCHEDULE for interior hollow metal frames.
   b. Add the attached K8/A7.3 HOLLOW METAL FRAME DETAILS.
6. Sheet A7.4 – FRAME ELEVATIONS
   a. Add the attached Hollow Metal Frame Types HM 37, HM55, and HM56
7. Sheet A8.14 – INTERIOR ELEVATIONS
   a. See the attached Drawing E5/A8.14 – INT ELEV – MENS RR 180B SOUTH for the revised interior elevation of the south wall of MENS 180B and the new interior of the south wall of MENS SHOWER 180BA.

b. See the attached Drawing E15/A8.14 – INT ELEV – WOMENS RR 180G SOUTH for the revised interior elevation of the north wall of WOMENS 180G and the new interior of the north wall of WOMENS SHOWER 180GA.
c. See the attached Drawing E11/A8.14 – INT ELEV – MENS SHOWER 180BA WEST for the new interior elevation of the west wall of MENS SHOWER 180BA. Note, west wall of WOMENS SHOWER 180GA similar.
d. See the attached Drawing E21/A8.14 – INT ELEV – MENS SHOWER 180BA EAST for the new interior elevation of the east wall of MENS SHOWER 180BA. Note, east wall of WOMENS SHOWER 180GA similar.

8. Sheet A8.16 – INTERIOR ELEVATIONS
   a. Reference detail G1 – replace keynote PLAM COUNTERTOP on each detail with:
      i. COUNTERTOP – SEE RFS FOR TYPE
   b. Reference detail P19 – replace keynotes SOLID SURFACE BACKSPLASH; INTEGRAL and SOLID SURFACE COUNTERTOP with:
      i. COUNTERTOP & COUNTERTOP BACKSPLASH – SEE RFS FOR TYPE
   c. Reference details A1 & G1 regarding countertop edge condition. See project manual for specific direction as to finish of Plastic Laminate and Solid Surface countertop exposed edges.
9. Sheet A9.1 – ROOM FINISH SCHEDULE & FINISH LEGEND
   a. Reference ROOM FINISH SCHEDULE for revisions to the following rooms:
      i. The following rooms should have PL-4 counters included within them: 105A, 106E, 107D, 108D, 201B, 201E, 202A, 203A, 206A, 207A, 208A, & 210A. Delete PL-4 from Room 207B. See plans & typical layout/details for additional direction.
      ii. The followings rooms should have PL-1 as the entry cubbies: 206 & 207.
      iii. DEMONSTRATION CLASSROOM 111 should have SS-1 counters & PL-1 casework.
      iv. Add the following rooms & finishes to the ROOM FINISH SCHEDULE:
         i. 180BA – MENS SHOWER
            1. Floor finish: CT-1
            2. Base finish: CTB-1
            3. North wall: EP-3
            4. South wall: CT-2/EP-3
            5. East wall: CT-2/EP-3
            6. West wall: CT-2/EP-3
            7. Ceiling finish: EP-3
            8. Comments: 1,2
         ii. 180GA – WOMENS SHOWER
            9. Floor finish: CT-1
            10. Base finish: CTB-1
            11. North wall: CT-2/EP-3
            12. South wall: EP-3
            13. East wall: CT-2/EP-3
            14. West wall: CT-2/EP-3
            15. Ceiling finish: EP-3
            16. Comments: 1,2
         iii. 280K – MDF ROOM
            17. Floor finish: RF-1
            18. Base finish: RB-1
            19. All wall finish: P-3

20. Ceiling Finish: ACT-1

b. Reference FINISH LEGEND
   i. Section 064100 PLASTIC LAMINATE
      i. Rooms receiving a PLAM-CR (Plastic Laminate with a Chemical Resist finish) should utilize the selection for PL-2 but with the CR finish rather than the standard finish.
      ii. Reference RFS column Casework for locations of the PLAM-CR.

See Attached Mechanical and Electrical Addendum.

END OF ADDENDUM

SECTION 064100
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

2.01 SECTION INCLUDES

A. Specially fabricated cabinet units.

B. Wood cabinet units.

C. Plastic laminate clad countertops.

D. Solid polymer countertops and other fabrications.

E. Natural Quartz Resin Composite countertops.

F. Cabinet hardware.

2.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

B. Section 062000 - Finish Carpentry: Site finished carpentry items not included in this Section.

C. Section 079005 - Joint Sealers: Sealants to be used at counter splashes.

D. Materials List on drawings: Laminate, solid surface and quartz selections.

E. Section 099000 - Painting and Coating: Site finishing of cabinet exterior and interior.

F. Section 115300 - Laboratory Equipment: Work surfaces at laboratory equipment.

2.03 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2009.

B. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.

C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.

D. AWI - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute; 2005, 8th Ed., Version 2.0.

E. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).

F. BIFMA - Desk Products X5.5; 1989.

G. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

H. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2010.

I. ISSFA-2 - Classification and Standards for Solid Surfacing Material; International Solid Surface Fabricators Association; 2001 (2007).

J. MIA (DSDM) - Dimensional Stone Design Manual; VII, 2007.

K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.

2.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.

C. Product Data: Provide data and cut sheets for all hardware and accessories.

D. Verification Samples: Submit two samples of each style and color of plastic laminate and quartz and solid surface.

E. Samples: Submit two sample of sealant showing colors or manufacturer's color charts.

F. Maintenance and Warranty Information per Section 017800.

2.05 QUALITY ASSURANCE

A. Quality: Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Premium quality.

B. Fabricator's Qualifications: Company specializing in fabricating and installing the products specified in this section with minimum 5 years of documented experience and with adequate capacity to perform the Work of this project in a timely manner.

2.06 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver units until areas to receive units are fully enclosed and HVAC is operational.

B. Store in a secure area that is clean, level, dry, well ventilated, and out of direct sunlight.

C. Protect units from moisture damage.

2.07 FIELD CONDITIONS

A. During and after installation of work of this section, maintain the same temperature and humidity conditions in building spaces as will occur after occupancy. Relative humidity shall not be less than 25% or more than 55%.

PART 2 PRODUCTS

3.01 MANUFACTURERS

A. Custom Cabinet Manufacturers:
   1. Designer Woods, Omaha.
   2. Kay Dee, Omaha.
   3. Woodcraft, Omaha.
   4. Holt Woodworking, Council Bluffs.
   5. Central Plains Millwork, Lincoln
   6. Windtree Mfg., Lincoln.
   7. Designer Craft Woodworking, Lexington.
   8. Custom Woodworks, Sioux City.
   9. C & H Cabinet & Countertop Inc., Crete.
   10. Eurowood Inc., Omaha.
   11. Substitutions: See Section 016000 - Product Requirements.

3.02 CABINETS

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Standards for Premium Grade.

B. Cabinet Style: Reveal Overlay.

3.03 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

3.04 WOOD CABINET MATERIALS

A. Veneer Faced Plywood Finish: HPVA HP-1; graded in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, core as indicated; type of glue recommended for specific application; thickness of 3/4 inch or as indicated; with face veneer as indicated.

B. Exposed Cabinet Surfaces: 3/4 inch thick, 9-ply oak plywood with Douglas fir plywood core A-2 premium grade, rotary cut.

C. Semi-Exposed Surfaces: 3/4 inch thick Douglas fir plywood core, AB Grade, 7 ply with exterior glue.

D. Cabinet Facing: Full 3/4 inch thick oak, two inch wide vertical and 1 1/4 inch wide bottom horizontal stile and 2 inch wide top horizontal stile.

E. Door and Drawer Fronts: 3/4 inch thick, 9-ply oak with Douglas Fir core plywood, A-2 premium grade, rotary cut.
   1. Center style to be provided at double door locations.
   2. Maximum size doors-23 inches wide x 63 inches tall.
   3. Drawer glides to have solid wood backing from front to back of cabinet.

F. Exposed Shelves: 3/4 inch thick 9-ply oak plywood with 3/4 x 1/2 inch thick solid oak edge at front of shelf.

G. Semi-Exposed Shelves: 3/4 inch thick fir plywood with solid oak front edge.

H. Particleboard: ANSI A208.1; medium density industrial type as specified in AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, composed of wood chips bonded with moisture resistant adhesive under heat and pressure; sanded faces; thickness as required; use for components as indicated.

I. Cabinet Back: 1/4 inch thick fir plywood. Provide 1 x 4 softwood or 3/4 inch plywood fastening block near top of wall cabinets.

J. Veneer Matching: Running match vertical grain pattern for drawers, door fronts, cabinet boxes exposed to view and fixed panels.

3.05 LAMINATE MATERIALS

A. Manufacturers: See Materials List for Basis of Design.
   1. Formica Corporation: www.formica.com.
   2. Panolam Industries International, Inc\Nevamar : www.nevamar.com.
   3. Pioneer Plastics Corporation:
   4. Wilsonart International, Inc: www.wilsonart.com.
   5. Substitutions: See Section 016000 - Product Requirements.

B. Plastic Laminate: In accordance with AWI and as follows unless noted otherwise:
   1. Horizontal: 0.050 General Purpose.
   2. Veritical: 0.028 General Purpose.

C. Laminate Backing Sheet: 0.020 inch Backing Sheet grade, undecorated plastic laminate.

3.06 SOLID POLYMER MATERIALS

A. Manufacturers: See Materials List on drawings for Basis of Design.

B. Approved manufacturers:
   1. Avonite.
   2. Corian by DuPont.
   3. Hi-Mac's by L. G. Chemical.
   4. Surrel.
   5. Wilsonart.
   6. Substitutions: See Section 016000 - Product Requirements.

C. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate. Complying with ISSFA-2 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
   1. Flat Sheet Thickness: 3/4 inch, minimum.
   2. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E84.
   3. NSF approved for food contact.

4. Other Components Thickness: 3/4 inch, minimum.
5. Exposed Edge Treatment: Built up to minimum 1 1/2 inch thick; edge profile as indicated.
6. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
7. Skirts, Sills and Trim: As indicated on drawings.

3.07 COUNTERTOPS AND BACKSPLASHES

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Standards for Premium Grade.

B. Plastic Laminate Countertops:
   1. Grade GP-50 (0.050 inch nominal thickness) laminated to 3/4 inch thick particle board.
   2. Edge: 1 1/2 x 1/2 inch thick solid oak edge with eased exposed edges.
   3. Back and Side splashes: Particleboard construction, 4 inch tall x 3/4 inch thick. Edges and exposed ends shall be 1/2 inch thick solid oak and shall be eased at all exposed edges. Laminate shall match countertop.
      a. Grade: HGP-0.039 inch.
   4. Back and Side splashes shall be secured to the counterop and not glued to wall. Install sealant at top and side edge to seal to wall.

C. Countertops without splashes: Provide oak hardwood scribe, 5/16 x 1 1/8 inch bullnose flat on top of countertop scribed to wall.

D. Natural Quartz and Resin Composite Countertops: Sheet or slab of natural quartz and plastic resin over continuous substrate.
   1. Flat Sheet Thickness: 1-1/4 inch, minimum.
   2. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISFA-2 and NEMA LD 3; orthopthalic polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a. Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with the MIA Dimension Stone Design Manual.
      b. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E84.
      c. NSF approved for food contact.
      d. Finish on Exposed Surfaces: Polished.
      e. Color and Pattern: As indicated on drawings.
      f. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
   3. Other Components Thickness: 3/4 inch, unless otherwise indicated. See drawings for details.
   4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.

3.08 ACCESSORIES

A. Adhesive: Type recommended by AWI/AWMAC to suit application unless otherwise indicated.

B. Fasteners: Size and type to suit application.

C. Open Counter Support Brackets: 1/8" thick steel bracket with 1000 lb. load limit per bracket.
   1. Size: 18 x 24 inch.
   2. Finish: Factory Primed.
   3. Manufacturer: A & M Hardware, Inc. or approved equal.

D. Grommets: Standard plastic grommets for cut-outs, in color to match adjacent surface.
   1. Size and Shape: As indicated on Drawings.
   2. Manufacturers:
      a. Doug Mockett Co., Inc. 800-523-1269.
      b. Outwater Plastic Industries, Inc. 888-688-9283.

E. Sealant for Countertop Splashes: Interior Silicone sealant as indicated in Section 079005.

1. Color: To match countertop. Submit color samples and receive approval prior to start of Work.

3.09 HARDWARE

A. Hardware: BHMA A156.9, Types; as indicated.
   1. Type and Finish: See Schedule at end of this Section.

3.10 FABRICATION

A. Fabricate in accordance with AWI Quality Standards for level of quality indicated.

B. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

C. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

D. Door and Drawer Fronts: 3/4 inch thick.

E. Adjustable Shelf Techniques/Supports within cabinets: Metal shelf standards; recessed flush with metal brackets.

F. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

G. Where necessary to cut holes for plumbing fixtures seal edges of opening with waterproof sealer.

H. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Locate counter butt joints minimum 2 feet from sink cut-outs.

I. Matching Wood Grain: Comply with requirements of quality standard for specified Grade exclusively.

J. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces at open counters.

K. Mechanically Fastened Splashes: Provide mechanically fastened splashes unless otherwise indicated. Attach to countertops using steel brackets at 16 inches on center.

L. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Seal cut edges to make waterproof.

3.11 FABRICATION-QUARTZ COUNTERTOPS

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall-unless otherwise indicated.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches, unless otherwise indicated.

C. Attach countertops to substrate with adhesive as recommended by the manufacturer.

D. Seal joint between back/end splashes and vertical surfaces.

E. Tolerances:
   1. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
   2. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
   3. Field Joints: 1/32 inch wide, maximum.

3.12 SITE FINISHING OF WOOD CABINETS

A. Sand work smooth and set exposed nails and screws.

B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.

C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.

D. See Section 099000 for transparent wood finish.
   1. Submit samples and receive approval of stained wood finish prior to start of finishing Work.

PART 3 EXECUTION

4.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

4.02 INSTALLATION

A. Install in accordance with AWI Quality Standards for level of quality indicated.

B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

C. Use fixture attachments in concealed locations for wall mounted components.

D. At open countertops, mount securely with cleats or steel brackets. Field paint cleats or brackets to match surroundings.

E. Use concealed joint fasteners to align and secure adjoining cabinet units and countertops.

F. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

G. Cabinets With Plumbing at Exterior Walls: Cut 2 inch by 12 inch opening in toe kick at inconspicuous location to allow air cirulation. Verify location with Architect.

H. Hardware: Install hardware in accordance with manufacturer's instructions.
   1. On cabinet doors greater than 60 inches in height, provide at least 3 hinges and 2 catches.

I. Secure cabinets to floor using appropriate angles and anchorages.

J. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

K. Splashes: Provide sealant at all countertop splashes between top of splash and wall. At mechanically fastened endsplashes within 24 inches of sinks or plumbing fixtures provide sealant between endsplash and counter as well as between top of endsplash and wall.

4.03 ADJUSTING

A. Adjust installed work.

B. Adjust moving or operating parts to function smoothly and correctly.

4.04 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

4.05 SCHEDULES

A. See Drawings for location and configuration of cabinets and countertops.

B. AWI Grade: Premium, except where otherwise noted.

C. Wood Cabinets:
   1. Style: Reveal overlay construction.
   2. Face Species: Red oak

D. Laminate Clad Cabinets:
   1. Style: Reveal overlay construction

2. Laminate Color and Patterns: As indicated in Materials List on drawings.

E. Cabinet Hardware:
   1. Finish: US 10 Satin Bronze Finish.
   2. Drawer and Door Pulls:
      a. Product: Stanley No. 167 Colonial, 3 inch C-C.
   3. Cabinet Locks: Keyed with two keys per lock, master keyed
      a. Product: National Camlock 8053 w/ C2016-C2 Plate or National Camlock 8703. Verify keying with Owner.
   4. Catches: Magnetic
   5. Drawer Slides: Standard extension, zinc-plated steel with steel ball bearings and meeting the following requirements:
      a. Side or rail mounted and rated for 75 pounds up to 16 inches in width.
      b. Rail mounted and rated for 100 pounds up to 24 inches in width.
      c. Rail mounted and rated for 150 pounds for drawers wider than 24 inches.
      d. Manufacturer: Knape & Vogt.
   6. Hinges: Amerock LCM 7328-AE self-closing type, Antique English finish.
   7. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards and coordinated self rests, polished chrome or satin chrome finish, for nominal 1 inch spacing adjustments.
      a. Product: No. 255 Steel Standards and No. 256 Steel Brackets manufactured by Knape & Vogt.

F. Laminate Clad Countertops:
   1. Exposed Edge: Rounded hardwood edge, 3/4 inch thick
      a. Color: Match wood in room. If room contains no other wood trim, bullnose shall be Red Oak.
   2. Laminate Color and Patterns: As indicated in Materials List on drawings.

G. Solid Polymer Countertops:
   1. Thickness: 3/4 inch
   2. Edge: 1 1/2 inch stacked bullnose.
   3. Solid Polymer Color and Patterns: See Materials List.

H. Solid Polymer Sills:
   1. Thickness: 1/2 inch.
   2. See drawings for details.

I. Quartz Countertops:
   1. See drawings for locations.

END OF SECTION

SECTION 087100
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for doors.

B. Electrically operated and controlled hardware.

C. Lock cylinders for doors for which hardware is specified in other sections.

1.02 RELATED REQUIREMENTS

A. Section 081113 - Hollow Metal Doors and Frames. Hardware for same.

B. Section 081416 - Flush Wood Doors. Hardware for same.

C. Section 083100 - Access Doors and Panels: Lock cylinders for same.

D. Section 083213 - Sliding Glass Doors: Hardware for same.

E. Section 084313 - Aluminum-Framed Storefronts: Hardware for same.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; current edition; (2010 ADA Standards for Accessible Design).

B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.

D. BHMA A156.1 - American National Standard for Butts and Hinges; Builders Hardware Manufacturers Association, Inc.; 2006 (ANSI/BHMA A156.1).

E. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; Builders Hardware Manufacturers Association; 2011 (ANSI/BHMA A156.2).

F. BHMA A156.3 - American National Standard for Exit Devices; Builders Hardware Manufacturers Association; 2008 (ANSI/BHMA A156.3).

G. BHMA A156.4 - American National Standard for Door Controls - Closers; Builders Hardware Manufacturers Association, Inc.; 2008 (ANSI/BHMA A156.4).

H. BHMA A156.5 - Cylinders and Input Devices for Locks; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.5).

I. BHMA A156.6 - American National Standard for Architectural Door Trim; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.6).

J. BHMA A156.7 - American National Standard for Template Hinge Dimensions; Builders Hardware Manufacturers Association; 2003 (ANSI/BHMA A156.7).

K. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; Builders Hardware Manufacturers Association, Inc.; 2010 (ANSI/BHMA A156.8).

L. BHMA A156.12 - American National Standard for Interconnected Locks; Builders Hardware Manufacturers Association; 2005 (ANSI/BHMA A156.12).

M. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000; Builders Hardware Manufacturers Association; 2012 (ANSI/BHMA A156.13).

N. BHMA A156.14 - American National Standard for Sliding & Folding Door Hardware; Builders Hardware Manufacturers Association; 2007 (ANSI/BHMA A156.14).

O. BHMA A156.15 - American National Standard for Release Devices - Closer Holder, Electromagnetic and Electromechanical; Builders Hardware Manufacturers Association; 2011 (ANSI/BHMA A156.15).

P. BHMA A156.16 - American National Standard for Auxiliary Hardware; Builders Hardware Manufacturers Association; 2008 (ANSI/BHMA A156.16).

Q. BHMA A156.18 - American National Standard for Materials and Finishes; Builders Hardware Manufacturers Association, Inc.; 2012 (ANSI/BHMA A156.18).

R. BHMA A156.21 - American National Standard for Thresholds; Builders Hardware Manufacturers Association; 2009 (ANSI/BHMA A156.21).

S. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2012 (ANSI/BHMA A156.22).

T. BHMA A156.23 - American National Standard for Electromagnetic Locks; Builders Hardware Manufacturers Association, Inc.; 2010 (ANSI/BHMA A156.23).

U. BHMA A156.31 - Electric Strikes and Frame Mounted Actuators; 2007 (ANSI/BHMA A156.31).

V. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2006.

W. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.

X. DHI A115-W series.

Y. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; Door and Hardware Institute; 2004.

Z. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; Door and Hardware Institute; 1993; also in WDHS-1/WDHS-5 Series, 1996.

AA. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.

AB. NFPA 101 - Life Safety Code; National Fire Protection Association; 2012.

AC. NFPA 105 - Installation of Smoke Door Assemblies.

AD. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 1995.

AE. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

AF. UL 10C – Positive Pressure Fire Tests of Door Assemblies; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products onto which door hardware will be installed.

B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

C. Convey Owner's keying requirements to manufacturers.

D. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished specifically for this project. Submittals that contain non-project specific information will be rejected.

C. Shop Drawings:
   1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts,.
   2. Submit manufacturer's parts lists and templates.

D. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.

E. Keying Schedule: Submit for approval of Owner. Separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

G. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance. See Section 017800.

H. Keys: Deliver with identifying tags to site by security shipment direct from hardware supplier.

I. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer. See Section 017800.

1.06 QUALITY ASSURANCE

A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Architect and Construction Manager.

B. Perform work in accordance with the following requirements:
   1. NFPA 101.
   2. NFPA 80.
   3. NFPA 252.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years of documented experience.

D. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with 5 years of experience.

E. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) to assist in the work of this section.

F. Source Limitations: Obtain each type and variety of Door Hardware specified in this Section from a single source, qualified supplier unless otherwise indicated.
   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for requirements applicable to fire rated doors and frames.

B. All Hardware on Fire-Rated Doors: Listed and classified by UL as suitable for the purpose specified and indicated.

C. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

D. Comply with 2010 ADA Standards for Accessible Design:
   1. 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.
   2. Door Closers: Comply with the following maximum opening-force requirements indicated:
      a. Interior Hinged Doors: 5 lbf applied perpendicular to door.
      b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
   3. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.

4. NFPA 101: Comply with the following for means of egress doors:
    a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
5. 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 (neutral pressure at 40" above sill) or UL-10C.
    a. Test Pressure: Positive pressure labeling.
6. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

1.08 PRE-INSTALLATION MEETING

A. Convene one week prior to commencing work of this section.

B. Keying Meeting. Conduct meeting to incorporate the following criteria into the final keying schedule document:
1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

B. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.10 COORDINATION

A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.

B. Furnish templates for door and frame preparation.

C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

D. Coordinate Owner's keying requirements during the course of the Work.

1.11 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion with the following exceptions:
1. Provide twenty five year warranty for manual door closers.
2. Ten years for mortise locks and latches.
3. Ten years for extra heavy duty cylindrical (bored) locks and latches.
4. Five years for exit hardware.

5. Two years for electromechanical door hardware.

1.12 MAINTENANCE PRODUCTS

A. Provide special wrenches and tools applicable to each different or special hardware component.

B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 PRODUCTS

2.01 DOOR HARDWARE - GENERAL

A. Provide all hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets 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 requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
   2. Substitutions: See Section 016000 - Product Requirements.

C. Provide all items of a single type of the same model by the same manufacturer.

D. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to

E. Provide products that comply with the following:
   1. Applicable provisions of federal, state, and local codes.
   2. 2010 ADA Standards for Accessible Design.
   3. ANSI/ICC A117.1, American National Standard for Accessible and Usable Buildings and Facilities.
   4. Applicable provisions of NFPA 101, Life Safety Code.
   5. Fire-Rated Doors: NFPA 80.
   6. All Hardware on Fire-Rated Doors: Listed and classified by UL as suitable for the purpose specified and indicated.
   7. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

F. Electrically Operated and/or Controlled Hardware: Provide all power supplies, power transfer hinges, relays, and interfaces required for proper operation; provide wiring between hardware and control components and to building power connection.

G. Finishes: Identified in schedule.

2.02 HINGES

A. Provide door hardware as indicated in Schedule at end of section.

B. Butt Hinges: Comply with BHMA A156.1 and A156.7; standard weight interior and heavy weight exterior, unless otherwise indicated.

C. Continuous Geared Hinges: ANSI/BHMA A156.26 certified continuous geared hinge with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Provide concealed flush mount (with or without inset), full surface, or half surface, in standard and heavy duty models, as specified in the Hardware Sets. Concealed continuous hinges to be U.L. listed for use on up to and including 90 minute rated door installations and U.L. listed for windstorm components where applicable. Factory cut hinges for door size and provide with removable service power transfer panel where indicated at electrified openings.

2.03 PUSH/PULLS

A. Provide door hardware as indicated in Schedule at end of section.

B. Push/Pulls: Comply with BHMA A156.6. Coordinate and provide proper width and height as required where conflicting hardware dictates.
   1. Push/Pull Plates: Minimum.050 inch thick, 4-inches wide by 16-inches high, with square corners and beveled edges, secured with exposed screws unless otherwise indicated.
   2. Straight Pull Design: Minimum 1-inch round diameter stainless steel bar or tube stock pulls with 2 1/2-inch projection from face of door unless otherwise indicated.
   3. Offset Pull Design: Minimum 1-inch round diameter stainless steel bar or tube stock pulls with 2 1/2-inch projection and offset of 90 degrees unless otherwise indicated.
   4. Push Bars: Minimum 1-inch round diameter horizontal push bars with minimum clearance of 2 1/2-inch projection from face of door unless otherwise indicated.
   5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
   6. Provide push and pull on all doors not specified to have lockset, latchset, exit device, or auxiliary lock unless otherwise indicated.
   7. On solid doors, provide matching push plate and pull plate on opposite faces.

2.04 LOCKS AND LATCHES

A. Provide door hardware as indicated in Schedule at end of section.

B. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
   1. Hardware Sets indicate locking functions required for each door.
   2. If no hardware set is indicated for a swinging door provide an office lockset.
   3. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
   4. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.

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 latchbolts, 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.

D. Cylinders: Original manufacturer cylinders complying with the following:
   1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
   2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
   4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

E. Keying Requirements:
   1. General: Supplier will meet with Owner to finalize keying requirements and obtain final keying instructions in writing.
   2. Key Registration List: Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

F. Keying: Master keyed.
   1. Include construction keying.
   2. Key to existing keying system.
   3. Supply keys in the following quantities:
      a. 5 master keys.
      b. 3 change keys for each lock.

G. Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. Provide construction master keys in quantity as required by project Contractor. Replace construction cores with permanent cores. Furnish permanent cores for installation as directed under specified "Keying Meeting".

H. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

2.05 CYLINDRICAL LOCKSETS

A. Cylindrical Locksets: See hardware schedule at the end of this section.

B. Locking Functions: As defined in BHMA A156.2, and as follows below:

1. Cylindrical Locksets, Grade 1 (Extra-Heavy Duty): ANSI 156.2 Series 4000, Grade 1 certified cylindrical (bored) locksets able to withstand 3000 inch pounds of torque applied to the locked lever without gaining access. Locksets to fit a standard 2 1/8” bore without the use of through-bolts. Lever handles to be made of solid material with no plastic fillers and latch-bolt head to be one-piece stainless steel construction encased within the lock body. Furnish with standard 2 3/4” backset, 1/2" throw latch-bolt (3/4" at rated paired openings), and universal non-handed. Lock trim design as indicated in hardware schedule below.

2.06 MORTISE LOCKSETS

A. Mortise Locksets: See hardware schedule at the end of this section.

B. Locking Functions: As defined in BHMA A156.13, and as follows:

2.07 FLUSHBOLTS

A. Flushbolts: Lever extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.

1. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
2. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

2.08 MAGNETIC LOCKS

A. Magnetic Locks: See hardware schedule at the end of this section.

B. Magnetic Locks: Complying with BHMA A156.23 - American National Standard for Electromagnetic Locks; Builders Hardware Manufacturers Association, Inc.; 2010 (ANSI/BHMA A156.23).

2.09 ELECTRIC STRIKES

A. Electric Strikes: See hardware schedule at the end of this section.

B. Electric Strikes: Complying with BHMA A156.31 and UL listed as a Burglary-Resistant Electric Door Strike; style to suit locks.

2.10 EXIT DEVICES

A. Exit Devices: See hardware schedule at the end of this section.

B. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

1. Fire Exit Removable Mullions: Provide keyed 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 to be used only with exit devices for which they have been tested.

C. Except on fire rated doors, provide exit devices with hex key dogging device to hold the push bar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

D. Flush End Caps: Provide heavy weight impact resistant flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.

E. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty trim with cold forged escutcheons, beveled edges, and four threaded studs for thru-bolts.
   1. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets. Provided free-wheeling type trim where indicated.
   2. Where function of exit device requires a cylinder, provide an interchangeable core type keyed cylinder (Rim or Mortise) as specified in Hardware Sets.

F. Vertical Rod Exit Devices: Provide and install interior surface and concealed vertical rod exit devices as Less Bottom Rod (LBR) unless otherwise indicated.

G. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.

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

I. Rail Sizing: Provide exit device rails factory sized for proper door width application.

J. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

K. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, stabilizers, and mounting brackets as specified in the Hardware Sets. At openings designed for severe wind load conditions due to hurricanes or tornadoes, provide manufacturers approved mullion and accessories to meet applicable state and local windstorm codes.

2.11 CLOSERS

A. Closers: See hardware schedule at the end of this section.

B. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

C. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

D. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with 2010 ADA Standards for Accessible Design.

E. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.

F. Closers: Complying with BHMA A156.4-Grade 1.
   1. Provide surface-mounted, door-mounted closers unless otherwise indicated. Heavy duty.
   2. Spring power adjustment, sizes 1 thru 6.
   3. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body. construction, with adjustable back-check and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

2.12 AUTOMATIC DOOR OPERATORS

A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices. ANSI/BHMA A156.19.
   1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

B. Electro-mechanical Door Operators: Self-contained units powered by permanent magnet DC motor, with closing speed controlled mechanically by gear train, connections for power, activation and safety device wiring, and manual operation including spring closing when power is off.

C. Electro-hydraulic Door Operators: Self-contained low-pressure units with separate cylinders for power and checking, connections for power, activation, and safety device wiring and manual operation including spring closing when power is off.

D. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.

E. Performance Requirements:
   1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
   2. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.

F. Configuration: Surface mounted. Door operators to control single swinging and pair of swinging doors.

G. Operation: Power opening and spring closing operation capable of meeting 2010 ADA Standards for Accessible Design guidelines. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19. When not in automatic mode, door operator to function as manual door closer with fully adjustable opening and closing forces, with or without electrical power.
   1. On-off switch to control power to be key switch operated.

H. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.

I. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.

J. Activation Devices: Provide activation devices in accordance with ANSI/BHMA A156.19 standard, for condition of exposure indicated and for long term, maintenance free operation under normal traffic load operation. Coordinate activation control with electrified hardware and access control interfaces. Activation switches are standard SPST, with optional DPDT availability.

K. Signage: As required by cited ANSI/BHMA A156.19 standard for the type of operator.

2.13 ELECTRONIC ACCESSORIES

A. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

2.14 STOPS AND HOLDERS

A. Stops: Complying with BHMA A156.8; provide a stop for every swinging door, unless otherwise indicated.
   1. Provide wall stops, unless otherwise indicated.
   2. If wall stops are not practical, due to configuration of room or furnishings, provide overhead stop.
   3. Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop unless specifically so stated.

B. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

2.15 GASKETING AND THRESHOLDS

A. Gasketing and Thresholds: See hardware schedule at end of section.

B. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

C. Gaskets: Complying with BHMA A156.22.
   1. On each door in smoke partition, provide smoke gaskets; top, sides, and meeting stile of pairs. If fire/smoke partitions are not indicated on drawings, provide smoke gaskets on each door identified as a "smoke door" and 20-minute rated fire doors.
   2. On wood doors with fire rating more than 20-minutes, provide frame-applied intumescent gaskets.
      a. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.
   3. On each exterior door, provide weatherstripping gaskets, unless otherwise indicated; top, sides, and meeting stiles of pairs.
      a. Where exterior door is also required to have fire or smoke rating, provide gaskets functioning as both smoke and weather seals.
   4. On doors indicated as "sound-rated", "acoustical", or with an STC rating, provide sound-rated gaskets and automatic door bottom; make gaskets completely continuous, do not cut or notch gaskets for installation.
   5. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

D. Thresholds:
   1. At each exterior door, provide a threshold unless otherwise indicated.
   2. Field cut threshold to frame for tight fit.

2.16 PROTECTION PLATES AND ARCHITECTURAL TRIM

A. Protection Plates: See schedule at end of this section.

B. Protection Plates:
   1. Kickplate: Provide on push side of every door with closer, except storefront and all-glass doors unless otherwise indicated.
   2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
   3. Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following.
      a. Stainless Steel: 050-inch thick, with countersunk screw holes (CSK).

4. Fasteners: Provide Provide manufacturer's designated fastener type as specified in the Hardware Schedule.

2.17 FINISHES

A. Finishes: Identified in schedule at end of section.d

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.

B. Verify that electric power is available to power operated devices and of the correct characteristics.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Use templates provided by hardware item manufacturer.

C. Do not install surface mounted items until finishes applied to substrate are complete.

D. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.

E. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

F. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Section 079005: Type A - Silicone Weather Seal Sealant.

G. Mounting heights for hardware from finished floor to center line of hardware item: As listed in Schedule, unless otherwise noted:

1. For steel doors and frames: Comply with DHI "Recommended Locations for Architectural Hardware for Steel Doors and Frames."
2. For wood doors: Comply with DHI "Recommended Locations for Architectural Hardware for Wood Flush Doors."

3.03 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 014000.

B. Provide an Architectural Hardware Consultant to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.04 ADJUSTING

A. Adjust work under provisions of Section 017000.

B. Adjust hardware for smooth operation.

C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.05 CLEANING

A. Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.06 PROTECTION

A. Protect finished Work under provisions of Section 017000.

B. Do not permit adjacent work to damage hardware or finish.

3.07 HARDWARE SCHEDULE

Manufacturer Abbreviations:

1. 00 - Other
2. MK - McKinney
3. RO - Rockwood
4. SA - Sargent
5. AD - Adams Rite
6. HS - HES
7. HO - Horton Automatics
8. NO - Norton
9. RF - Rixson
10. PE - Pemko
11. SU - Securitron

Hardware Schedule

Set: 1.0

Doors: 107Ca, 108Ca, 181Ba, 181Ga, 281Ba, 281Ga

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Push Plate	70C 4" x 16"	US32D	RO
1	Pull Plate	BF 111 x 70C 4"x 16"	US32D	RO
1	Door Closer (hd arm, push side)	281 P10	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO

Set: 2.0

Doors: 180Ba, 180Ga, 280Ba, 280Ga

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Passage Set	28 10U15 LL	US26D	SA
1	Door Closer (hd arm, push side)	281 P10	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 3.0

Doors: 184Ad

1	Continuous Hinge	MCK-14HD	BZ	MK
1	Pull / Push Bar Set	RM251 x BTB x Decorative Ends	US10BE	RO
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EB	SA

Set: 4.0

Doors: 180Dd, 180Eb, 184Ac

2	Continuous Hinge	MCK-14HD	BZ	MK
2	Pull / Push Bar Set	RM251 x BTB x Decorative Ends	US10BE	RO
2	Door Closer (hd arm w/ stop, push side)	281 CPS	EB	SA

Set: 5.0

Doors: 180Lb

2	Continuous Hinge	MCK-14HD	BZ	MK
2	Pull / Push Bar Set	RM251 x BTB x Decorative Ends	US10BE	RO
1	Door Operator (wired into evac system)	4100LE Series	600 x 690	NO

Notes: Automatic Operator and latch retraction wired into Evacuation System

Set: 6.0

Doors: 180Dc, 183Ab

2	Continuous Hinge	MCK-14HD	BZ	MK
2	Pull / Push Bar Set	RM251 x BTB x Decorative Ends	US10BE	RO
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EB	SA
1	Door Operator	4100LE Series	600 x 690	HO
2	Door Switch	C1260-4		HO

Set: 7.0

Doors: 100Ea, 106Ca, 106Da, 180BAa, 180GAa, 203Ea

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Mortise Lock (privacy w/ indicator)	LB 49 8265 LL	US32D	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 8.0

Doors: 102Da

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Passage Set	28 10U15 LL	US26D	SA
1	Overhead Stop	OH900S	US32D	RO
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 9.0

Doors: 203Ha

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Passage Set	28 10U15 LL	US26D	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO

Set: 10.0

Doors: 184Ba

3	Hinge (heavy weight)	T4A3786 5" x 4-1/2"	US26D	MK
1	Passage Set	28 10U15 LL	US26D	SA
1	Door Closer (reg arm, pull side)	281 O	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO
1	Electromagnetic Holder	998 verify voltage	689	RF
1	Gasketing	S88D (head and jambs)		PE

Set: 11.0

Doors: 203Ca

3	Hinge (heavy weight)	T4A3786 5" x 4-1/2"	US26D	MK
1	Classroom Lock	28 10G37 LL RG CMK	US26D	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO

Set: 12.0

Doors: 180Pa

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Passage Set	28 10U15 LL	US26D	SA
1	Door Closer (hd arm, push side)	281 P10	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 13.0

Doors: 101Aa, 102Aa, 103Aa, 105Aa, 105Ab, 106Ea, 107Ba, 107Da, 108Ba, 108Da, 201Ba, 201Ea, 202Aa, 203Aa, 207Ba, 207Bb

1	Hardware	All Hardware by door and Frame Supplier	00

Set: 14.0

Doors: 100Aa, 100Ba, 100Da, 100Fa, 112a, 113Aa, 114Ba, 206Aa, 207Aa, 208Aa, 210Aa, A2-Ra

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Office Lock	28 10G05 LL RG CMK	US26D	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	409	US32D	RO

Set: 15.0

Doors: 100Ca, 101Cb, 101Cc, 104Bb, 114Aa, 201Ca, 201Da, 203Lb

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	28 10G37 LL RG CMK	US26D	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO

Set: 16.0

Doors: 182Ca

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	28 10G37 LL RG CMK	US26D	SA
1	Overhead Stop	OH900S	US32D	RO
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO

Set: 17.0

Doors: 203Ja

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	28 10G37 LL RG CMK	US26D	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO

Set: 18.0

Doors: 115b

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	28 10G37 LL RG CMK	US26D	SA
1	Cylinder (mortise)	DG1 41 CMK	US26D	SA
1	Door Closer (reg arm, pull side)	281 O	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO

Set: 19.0

Doors: 104Ca, 104Cb, 108Ga, 114a, 182Aa, 201Aa, 201Fa, 203La

3	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Security	28 10G16 LL RG CMK	US26D	SA
1	Door Closer (reg arm, pull side)	281 O	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO

Set: 20.0

Doors: 101Ca, 104Ba, 180Ja, 181Da, 201Db, 203Ba

3	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Security	28 10G16 LL RG CMK	US26D	SA
1	Door Closer (reg arm, pull side)	281 O	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 21.0

Doors: 109b, 110b

3	Hinge (heavy weight)	T4A3786 NRP 5" x 4-1/2"	US26D	MK
1	Classroom Lock	28 10G37 LL RG CMK	US26D	SA
1	Door Closer (hd arm, push side)	281 P10	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO

Set: 22.0

Doors: 109a, 110a

3	Hinge (heavy weight)	T4A3786 NRP 5" x 4-1/2"	US26D	MK
1	Classroom Lock	28 10G37 LL RG CMK	US26D	SA
1	Electric Strike (fail secure)	4500C	630	HS
1	Door Operator (wired into evac system)	4100LE Series	600 x 690	NO
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO
1	Gasketing	S88D (head and jambs)		PE
1	ElectroLynx Harness (frame)	QC-C1500P		MK
1	Power Supply	BPS-12/24-1		SU

Notes: Automatic Operator and strike wired into Evacuation System

Set: 23.0

Doors: 106Ma, 107Ma

3	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	28 10G04 LL RG CMK	US26D	SA
1	Door Closer (hd arm, push side)	281 P10	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO

Set: 24.0

Doors: 100c, 106Ga, 107Fa

3	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	28 10G37 LL RG CMK	US26D	SA
1	Door Closer (hd arm, push side)	281 P10	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 25.0

Doors: 101Da, 101Db, 109c, 204b, 206b, 207b, 208b, 210b

3	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	28 10G37 LL RG CMK	US26D	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO

Set: 26.0

Doors: 101Va, 102Va, 103a, 103b, 104a, 105a, 105b, 106Aa, 107Aa, 108Aa, 111a, 116a, 117a, 200a, 200b, 201a, 201b, 202a, 203b, 203Ka, 204a, 205a, 206a, 207a, 208a, 209a, 210a

3	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Security	28 10G16 LL RG CMK	US26D	SA
1	Door Closer (hd arm, push side)	281 P10	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 27.0

Doors: 100b, A1-Ra, A3-Ra

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	28 10G37 LL RG CMK	US26D	SA
1	Door Closer (reg arm, pull side)	281 O	EN	SA

1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO

Set: 28.0

Doors: 106Fa, 107Ea, 108Ea

4	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Dutch Door Surface Bolt	630-4	US26D	RO
1	Classroom Lock	28 10G37 LL RG CMK	US26D	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO
1	Door Stop & Holder	494	US26D	RO

Set: 29.0

Doors: 101Ba, 102Ba, 102Ca, 103Ba, 103Ca, 104Aa, 105Ba, 111Ba, 114Ca, 115Aa, 181Fa, 201Ga, 203Da, 203Fa, 208Ba, 210Ba, 281Aa

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	28 10G04 LL RG CMK	US26D	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO

Set: 30.0

Doors: 104Da

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	28 10G04 LL RG CMK	US26D	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 31.0

Doors: 100a, 181Aa

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	28 10G04 LL RG CMK	US26D	SA
1	Door Closer (reg arm, pull side)	281 O	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO

Set: 32.0

Doors: 108Fa, 108Ma, 180Fa, 180Ma, 180Ra, 180Ua, 280Aa, 280Ka

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	28 10G04 LL RG CMK	US26D	SA
1	Door Closer (reg arm, pull side)	281 O	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 33.0

Doors: 111Aa

3	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	28 10G04 LL RG CMK	US26D	SA
1	Door Closer (hd arm, push side)	281 P10	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO

Set: 34.0

Doors: 180Ca, 180Ha, 180Ka, 280Ca, 280Da, 280Ea, 280Ha

3	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	28 10G04 LL RG CMK	US26D	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 35.0

Doors: 181Ea, 280Fa, 280Mb

3	Hinge (heavy weight)	T4A3786 NRP 5" x 4-1/2"	US26D	MK
1	Storeroom Lock	28 10G04 LL RG CMK	US26D	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 36.0

Doors: 180Ta

6	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
2	Manual Flush Bolt	555	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom Lock	28 10G04 LL RG CMK	US26D	SA
1	Overhead Stop	OH900S	US32D	RO
2	Kickplate	K1050 10" x 1" LDW 4BE CSK	US32D	RO

1	Wall Stop	406	US32D	RO

Set: 37.0

Doors: 113b, 113Ma, 181Ma, 280Ma, 281Ca

6	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
2	Manual Flush Bolt	557	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom Lock	28 10G04 LL RG CMK	US26D	SA
1	Overhead Stop	OH900S	US32D	RO
1	Door Closer (hd arm, push side)	281 P10	EN	SA
2	Kickplate	K1050 10" x 1" LDW 4BE CSK	US32D	RO
2	Wall Stop	406	US32D	RO
1	Gasketing	S88D (head and jambs)		PE
1	Astragal Strip	S772BL		PE

Set: 38.0

Doors: 181Ca

6	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
2	Manual Flush Bolt	557	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom Lock	28 10G04 LL RG CMK	US26D	SA
1	Door Closer (reg arm, pull side)	281 O	EN	SA
2	Kickplate	K1050 10" x 1" LDW 4BE CSK	US32D	RO
2	Wall Stop	406	US32D	RO
1	Gasketing	S88D (head and jambs)		PE
1	Astragal Strip	S772BL		PE

Set: 39.0

Doors: 106Ja

1	Continuous Hinge	MCK-14HD	BZ	MK
1	Cylindrical Lock	28 10G04 LL RG CMK	US10BE	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EB	SA
1	Threshold	171A		PE
1	Sweep	345DNB TKSP8		PE
1	Weatherstripping	Weatherstripping by Door Supplier		00

Set: 40.0

Doors: 203a, ST01b

6	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK

1	Exit Device (fire, svr, nightlatch)	12 NB8710 x 306 Thumbturn x 862 pull	US32D	SA
1	Exit Device (fire, svr, exit only)	12 NB8710	US32D	SA
2	Door Closer (hd arm, push side)	281 P10	EN	SA
2	Kickplate	K1050 10" x 1" LDW 4BE CSK	US32D	RO
2	Electromagnetic Holder	998 verify voltage	689	RF
1	Gasketing	S88D (head and jambs)		PE
1	Astragal Strip	S772BL		PE

Set: 41.0

Doors: 182a

6	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Exit Device (fire, svr, nightlatch)	12 NB8710 x 306 Thumbturn x 862 pull	US32D	SA
1	Exit Device (fire, svr, exit only)	12 NB8710	US32D	SA
2	Door Closer (hd arm, push side)	281 P10	EN	SA
2	Kickplate	K1050 10" x 1" LDW 4BE CSK	US32D	RO
1	Gasketing	S88D (head and jambs)		PE
1	Astragal Strip	S772BL		PE

Set: 42.0

Doors: 183b, 183c, AC1a, AC1b

6	Hinge (heavy weight)	T4A3786 NRP 5" x 4-1/2"	US26D	MK
1	Exit Device (fire, cvr, nightlatch)	12 NB MD8610 x 106 Thumbturn x 862 pull RG CMK	US32D	SA
1	Exit Device (fire, cvr, exit only)	12 NB MD8610	US32D	SA
2	Door Closer (hd arm w/ stop, push side)	281 CPS	EN	SA
2	Kickplate	K1050 10" x 1" LDW 4BE CSK	US32D	RO
2	Electromagnetic Holder	998 verify voltage	689	RF
1	Gasketing	S88D (head and jambs)		PE
1	Astragal Strip	S772BL		PE

Set: 43.0

Doors: ST01c, ST03b

6	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Exit Device (fire, svr, nightlatch)	12 NB8710 x 306 Thumbturn x 862 pull	US32D	SA
1	Exit Device (fire, svr, exit only)	12 NB8710	US32D	SA
2	Door Closer (reg arm, pull side)	281 O	EN	SA
2	Kickplate	K1050 10" x 1" LDW 4BE CSK	US32D	RO

2	Electromagnetic Holder	998 verify voltage	689	RF
1	Gasketing	S88D (head and jambs)		PE
1	Astragal Strip	S772BL		PE

Set: 44.0

Doors: ST03a

6	Hinge (heavy weight)	T4A3786 NRP 5" x 4-1/2"	US26D	MK
1	Exit Device (fire, cvr, nightlatch)	12 NB MD8610 x 106 Thumbturn x 862 pull RG CMK	US32D	SA
1	Exit Device (fire, cvr, exit only)	12 NB MD8610	US32D	SA
2	Door Closer (reg arm, pull side)	281 O	EN	SA
2	Kickplate	K1050 10" x 1" LDW 4BE CSK	US32D	RO
2	Electromagnetic Holder	998 verify voltage	689	RF
1	Gasketing	S88D (head and jambs)		PE
1	Astragal Strip	S772BL		PE

Set: 45.0

Doors: 184a, ST01a

6	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Exit Device (svr, nightlatch)	NB8710 x 306 Thumbturn x 862 pull	US32D	SA
1	Exit Device (svr, exit only)	NB8710	US32D	SA
2	Door Closer (reg arm, pull side)	281 O	EN	SA
2	Kickplate	K1050 10" x 1" LDW 4BE CSK	US32D	RO
2	Electromagnetic Holder	998 verify voltage	689	RF
1	Gasketing	S88D (head and jambs)		PE
1	Astragal Strip	S772BL		PE

Set: 46.0

Doors: 184b, 184c, ST04a

3	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Exit Device (fire, rim, classroom)	12 8813 ETL RG CMK	US32D	SA
1	Door Closer (hd arm, push side)	281 P10	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Wall Stop	406	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 47.0

Doors: 113Mb

3	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK

1	Exit Device (rim, classroom)	8813 ETL RG CMK	US32D	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO

Set: 48.0

Doors: 113Ea

3	Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	28 10G04 LL RG CMK	US26D	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 49.0

Doors: 113a

1	Continuous Hinge	MCK-14HD	BZ	MK
1	Continuous Hinge	MCK-14HD PT	BZ	MK
2	Manual Flush Bolt	555	US10BE	RO
1	Dust Proof Strike	570	US10BE	RO
1	Mortise Lock (storeroom)	8204 LL RG CMK	US10BE	SA
1	Overhead Holder	OH900H	US10B	RO
1	Door Closer (hd arm w/ stop-holder, push sdie)	281 CPSH	EB	SA
1	Threshold	171A		PE
2	Sweep	345DNB TKSP8		PE
1	Weatherstripping	Weatherstripping by Door Supplier		00
1	Astragal	Astragal by Door Supplier		00
1	Cover plate	Special Cover plate for EPT prep		00

Notes: Furture Cardreader, prep for power transfer w/ cover plate

Set: 50.0

Doors: 106b, 107b, 108b

1	Continuous Hinge	MCK-14HD	BZ	MK
1	Exit Device (rim, classroom)	8813 ETL RG CMK	US10BE	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EB	SA
1	Threshold	171A		PE
1	Sweep	345DNB TKSP8		PE
1	Weatherstripping	Weatherstripping by Door Supplier		00

Set: 51.0

Doors: 207c

3	Hinge (heavy weight)	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	28 10G37 LL RG CMK	US26D	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1	Gasketing	S88D (head and jambs)		PE

Set: 52.0

Doors: 106a, 106Va, 107a, 107Va, 108a, 108Va

6	Hinge (heavy weight)	T4A3786 NRP 5" x 4-1/2"	US26D	MK
1	Removable Mullion	L980S	PC	SA
2	Exit Device (fire, rim, classroom)	12 8813 ETL RG CMK	US32D	SA
1	Cylinder (mortise)	DG1 41 CMK	US26D	SA
2	Door Closer (hd arm w/ stop, push side)	281 CPS	EN	SA
2	Kickplate	K1050 10" x 1" LDW 4BE CSK	US32D	RO
1	Gasketing	S88D (head and jambs)		PE
1	Astragal Strip	S772BL		PE

Set: 53.0

Doors: 184Aa

1	Continuous Hinge	MCK-14HD	BZ	MK
1	Exit Device (rim, exit only)	8810	US10BE	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EB	SA
1	Threshold	171A		PE
1	Sweep	345DNB TKSP8		PE
1	Weatherstripping	Weatherstripping by Door Supplier		00

Set: 54.0

Doors: 180Da, 184Ab

2	Continuous Hinge	MCK-14HD	BZ	MK
1	Exit Device (cvr, nightlatch, cyl dog)	16 AD8610 x 106 Thumbturn x 862 pull RG CMK	US10BE	SA
1	Exit Device (cvr, exit only, cyl dog)	16 AD8610 x 862 pull	US10BE	SA
2	Cylinder (mortise)	DG1 41 CMK	US10B	SA
2	Door Closer (hd arm w/ stop, push side)	281 CPS	EB	SA
1	Threshold	171A		PE
2	Sweep	345DNB TKSP8		PE
1	Weatherstripping	Weatherstripping by Door Supplier		00

Set: 55.0

Doors: 180La

2	Continuous Hinge	MCK-14HD PT	BZ	MK
1	Exit Device (cvr, nightlatch, elec latch retraction)	55 56 AD8610 x 106 Thumbturn x 862 pull RG CMK	US10BE	SA
1	Exit Device (cvr, exit only, elec latch retraction)	55 56 AD8610 x 862 pull	US10BE	SA
2	Door Operator (wired into evac system)	4100LE Series	600 x 690	NO
1	Threshold	171A		PE
2	Sweep	345DNB TKSP8		PE
1	Weatherstripping	Weatherstripping by Door Supplier		00
2	Electric Power Transfer	CEPT-10		SU
2	ElectroLynx Harness (frame)	QC-C1500P		MK
2	ElectroLynx Harness (door)	QC-Cxxxx verify length		MK
1	Power Supply	BPS-24-2		SU

Notes: Automatic Operator and latch retraction wired into Evacuation System

Set: 56.0

Doors: 180Db, 183Aa

2	Continuous Hinge	MCK-14HD PT	BZ	MK
1	Exit Device (cvr, nightlatch, cyl dog)	16 AD8610 x 106 Thumbturn x 862 pull RG CMK	US10BE	SA
1	Exit Device (cvr, exit only, cyl dog)	16 AD8610 x 862 pull	US10BE	SA
2	Cylinder (mortise)	DG1 41 CMK	US10B	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EB	SA
2	Door Operator	4100LE Series	600 x 690	HO
1	Threshold	171A		PE
2	Sweep	345DNB TKSP8		PE
1	Weatherstripping	Weatherstripping by Door Supplier		00
2	Door Switch	C1260-4		HO
2	Cover plate	Special Cover plate for EPT prep		00

Notes: Furture Cardreader, prep for EPT w/ cover plate

Set: 57.0

Doors: 180Ea

2	Continuous Hinge	MCK-14HD PT	BZ	MK
1	Exit Device (cvr, nightlatch, cyl dog)	16 AD8610 x 106 Thumbturn x 862 pull RG CMK	US10BE	SA

1	Exit Device (cvr, exit only, cyl dog)	16 AD8610 x 862 pull	US10BE	SA
2	Cylinder (mortise)	DG1 41 CMK	US10B	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EB	SA
2	Door Operator	4100LE Series	600 x 690	HO
1	Threshold	171A		PE
2	Sweep	345DNB TKSP8		PE
1	Weatherstripping	Weatherstripping by Door Supplier		00
1	Door Switch	C1260-4		HO
2	Cover plate	Special Cover plate for EPT prep		00

Notes: Furture Cardreader, prep for EPT w/ cover plate

Set: 58.0

Doors: 180Aa

2	Continuous Hinge	MCK-14HD PT	BZ	MK
2	Concealed Vert Rod Exit	NB 16 AD8610 862	US10BE	SA
2	Cylinder (mortise)	DG1 41 CMK	US10B	SA
2	Door Closer (hd arm w/ stop, push side)	281 CPS	EB	SA
2	Cover plate	Special Cover plate for EPT prep		00

Notes: Future Card Reader, prep for EPT w/ cover plate

Set: 58.1

Doors: 180Ab

2	Continuous Hinge	MCK-14HD PT	BZ	MK
1	Concealed Vert Rod Exit	NB 16 AD8610 106 x 862 RG CMK	US10BE	SA
1	Concealed Vert Rod Exit	NB 16 AD8610 862	US10BE	SA
3	Cylinder (mortise)	DG1 41 CMK	US10B	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EB	SA
1	Door Operator	4100LE Series	600 x 690	HO
2	Door Switch	C1260-4		HO
1	Cover plate	Special Cover plate for EPT prep		00

Notes: Future Card Reader, prep for EPT w/ cover plate
Provide power to automatic operator
Door to be dogged down prior to activating operator

Set: 59.0

Doors: ST03Xa

1	Continuous Hinge	MCK-14HD PT	BZ	MK

1	Exit Device (rim, classroom)	8813 ETL RG CMK	US10BE	SA
1	Door Closer (hd arm w/ stop, push side)	281 CPS	EB	SA
1	Threshold	171A		PE
1	Sweep	345DNB TKSP8		PE
1	Weatherstripping	Weatherstripping by Door Supplier		00
1	Cover plate	Special Cover plate for EPT prep		00

Notes: Furture Cardreader, prep for EPT w/ cover plate

Set: 60.0

Doors: 180b

1	Continuous Hinge	MCK-14HD PT	BZ	MK
1	Multi-Point Lock	ELR AD7016 ETL RG CMK	US10BE	SA
1	Door Operator (wired into evac system)	4100LE Series	600 x 690	NO
1	Threshold	171A		PE
1	Sweep	345DNB TKSP8		PE
1	Weatherstripping	Weatherstripping by Door Supplier		00
1	Electric Power Transfer	CEPT-10		SU
1	ElectroLynx Harness (frame)	QC-C1500P		MK
1	ElectroLynx Harness (door)	QC-Cxxxx verify length		MK
1	Power Supply	BPS-12/24-1		SU

Notes: Automatic Operator and latch retraction wired into evac system.
Door is not part of egress system. Inside locked lever allowed.

END OF SECTION

SECTION 115300
LABORATORY EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Laboratory equipment.

B. Connection to utilities.

C. Service fittings and outlets.

1.02 RELATED REQUIREMENTS

A. Section 064100 - Architectural Wood Casework: Placement of equipment specified in this section on and within cabinetry specified in 064100.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; current edition; (2010 ADA Standards for Accessible Design).

B. 2009 IBC (ANSI A117.1-Accessible and Usable Buildings and Facilities) or 2010 ADA Standards for Accessible Design-whichever is more stringent.

C. ANSI/AIHA 9.5: American National Standard for Laboratory Ventilation.

D. ANSI/ASHRAE 110: Method of Testing Performance of Laboratory Fume Hoods.

E. ANSI 2358.1: Minimum Performance Requirements for Emergency Showers.

F. ASTM A167: Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

G. ASTM A 666: Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

H. ASHRAE 110-95.

I. Architectural Woodwork Institute (AWI): Quality Standards.

J. FS W-C-596: Electrical Power Connector, Plug, Receptacle, and Cable Outlet.

K. NEMA WD 1: General Color Requirements for Wiring Devices.

L. NEMA WD 6: Devices-Dimensional Requirements.

M. NEMA LD 3: High Pressure Decorative Laminates.

N. NFPA 30: Flammable and Combustible Liquids Code.

O. NFPA-45: Standard for Fire Protection for Laboratories Using Chemicals.

P. OSHA 29-CFR-1910.1450: Occupational Exposure to Hazardous Chemicals in Laboratories.

Q. SEFA 1: Laboratory Fume Hoods - Recommended Practices.

R. SEFA 7: Laboratory and Hospital Fixtures--Recommended Practices.

S. SEFA 8: Laboratory Furniture--Casework, Shelving and Tables--Recommended Practices.

T. UL 498: Attachment Plugs and Receptacles.

U. UL 1805: Laboratory Hoods and cabinets, where applicable.

V. UL 3101-1/61010-1.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

B. Coordinate with work of Section 064100 and mechanical and electrical contract documents.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide equipment dimensions and construction, equipment capacities, physical dimensions, utility and service requirements and locations, point loads.

C. Shop Drawings: Indicate equipment locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances, clearances required and installation details.

D. Manufacturer's Installation Instructions: Indicate special installation requirements.

E. Submit Operations, Maintenance and Warranty information under provisions of Section 017800.

F. Operation Data: Include description of equipment operation and required adjusting and testing.

G. Maintenance Data: Identify system maintenance requirements, servicing cycles, lubrication types required and local spare part sources.

H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

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

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for all equipment.

B. Conform to UL requirements for fabrication and installation of electrical equipment.

1.08 PROJECT CONDITIONS

A. For delivery and installation of laboratory casework and equipment, building conditions shall comply with AWI Standard 1700-G-3 and 1700-G-4 and be as follows:
   1. Heating and air conditioning systems providing consistent temperature and humidity conditions to comply with by AWI Standard 1700-G-4 and 1700-G-5.
   2. Relative humidity not less than 40 percent, nor more than 60 percent.
   3. Temperatures not less than 65 degrees F (18 degrees C) and not greater than 80 degrees F (27 degrees C) in areas of casework and equipment installation.
   4. Overhead mechanical, electrical and plumbing rough-in work is complete.
   5. Wet operations complete prior to delivery.
   6. Ceiling grids (with or without ceiling tiles), overhead soffits, ductwork and lighting installed.
   7. Painting complete.

1.09 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a three year period after Date of Substantial Completion.

C. Provide three year manufacturer warranty for standard coverage of all products for time period indicated above.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Additional approved manufacturers:
   1. CampbellRhea.
   2. Kewaunee Scientific Corp.
   3. Shelton.
   4. Substitutions: See Section 016000 - Product Requirements.

2.02 COMPONENTS

A. Equipment: Scheduled at end of this section.

B. Installation Accessories: Provide all rough-in frames, anchors, supports, accessories and closure trim required for complete installation.

2.03 SOURCE QUALITY CONTROL AND TESTS

A. Provide shop inspection and testing for fume hood equipment items.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough-in frames, anchors and supports are accurately placed.

B. Verify utilities are roughed in and ready for installation to equipment.

3.02 PREPARATION

A. Provide rough-in frame and anchors for placement by Section 064100.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with standards required by authority having jurisdiction.

C. Anchor equipment securely in place.

D. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

E. Install countertop and edge surfaces in one plane with flush hairline seams. Locate seams where shown on Shop Drawings.

1. Provide required holes and cutouts for service fittings as shown on Shop Drawings.
2. Seal unfinished edges and cutouts in plastic-laminate countertops.
3. Provide scribe moldings for closures at junctures of countertop, curb, and splash, with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
4. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

F. Touch-up minor damaged surfaces caused during installation. Replace damaged components as directed by Architect.

G. Cover equipment with 4 mil polyethylene and protect from subsequent construction activities.

3.04 INTERFACE WITH OTHER PRODUCTS

A. Coordinate installation of equipment with Section 064100 and mechanical and electrical contract documents.

B. Coordination with mechanical contractor who shall furnish, install and connect drain lines, service piping, vents, re-vents, in-line vacuum breakers, special plumbing fixtures, traps and tailpieces. Work to be completed through, under or along backs of working surfaces as required and complete final connection of services. Assemble, install and make final connections of service fixtures furnished by casework contractor, including service fixtures in fume hoods. Furnish, install and connect fume hood blowers, motors and all related ductwork. Furnish, install and connect service piping within fume hoods, including final connection.

C. Coordination with electrical contractor who shall furnish, install and connect electrical service lines, wire and conduit within the equipment, including reagent racks and fume hoods. Work to be completed through, under or along backs of working surfaces as required and complete final connection of services. Install and make final connections of electrical fixtures provided by casework installer, including electrical fixtures in fume hoods.

D. Coordination with Mechanical, Plumbing and Electrical Contractors: Coordinate work of this Section with work of other Sections including but not limited to:
   1. Water and laboratory gas service fittings, piping, electrical devices, and wiring.
   2. Installation of fittings according to Shop Drawings and manufacturer's written instructions.
   3. Setting bases and flanges of sink and countertop-mounted fittings in sealant recommended by manufacturer of sink or countertop material.
   4. Anchorage of fittings, piping, and conduit to casework, unless otherwise indicated.

3.05 ADJUSTING

A. Adjust operating equipment to efficient operation.

3.06 CLOSEOUT ACTIVITIES

A. Demonstrate equipment operation and maintenance procedures by a qualified manufacturer's representative who shall demonstrate operation and maintenance procedures of the installed equipment to Owner's staff.

3.07 SCHEDULES

A. General Note: Location of each scheduled item below to be verified with architect & owner during shop drawing review process.

B. Countertops: All countertops unless noted otherwise in the following locations. Bio Science 104 and 105, SCC Physiology 116 and 117, Food Science 103, Bio Science 104 & 105, Prep 104c, SCC Physiology 116 & SCC Biology 117.
   1. Molded from a modified epoxy resin. One inch thick. Exposed edges and corners are radiused, and a drip groove is provided under surface in areas where sinks are installed. Curb is 4 inches (102 mm) high.
      a. Color: Black.
   2. Epoxy resin sinks are drop-in style, non-glaring black, and specially modified epoxy resins, molded in one solid piece or optimum physical and chemical resistance. Inside corners are coved and the bottom is dished to the outlet. Outlets are polypropylene with 1 1/2 inch (38 mm) NPS threads.
      a. Sink Size: 16"L x 12"W x 8"D. Provide five (5) sinks in Bio Science 104, four (4) sinks in SCC Physiology 116, and two (2) sinks in SCC Biology 117.
      b. Sink Size: 28"L x 15"W x 11.5"D. Provide one (1) sink in Prep 104C. See Mechanical Drawings for faucet.

C. Service Fixtures: All room perimeter counters, lab stations and teacher instruction desks unless otherwise noted. Coordinate with Mechanical.
   1. Provide service fixtures and fittings that comply with SEFA 7.
   2. Gas and Compressed Air Cocks: Ground key cocks, made from high grade, brass forgings, have integral ten serration, non-slip hose end. ADA accessible wrist blade handles have color-coded index, are one-piece construction, precision ground, and lapped to fit cock chamber. Handle operates with a 1/4 turn, and is spring-loaded for constant pressure and automatic take up.
   3. Multiple Service Fixtures: Triple chrome plated fixtures have one cold water faucet and two ground key cocks for gas and compressed air services. Faucet has a rigid gooseneck, one- wrist blade handle, and serrated hose nozzle with integral vacuum breaker. Ground key cocks have serrated non-slip hose end and color-coded, spring-loaded wing handles.
   4. Vacuum Breakers: Watts NLF-9, or comparable, vacuum breakers are brass with polished chrome plating, screw-in type with stainless steel working parts, and durable rubber diaphragm and disc. Vacuum breaker is for hot or cold faucet and has a primary valve with a soft disc that seat against mating part. The secondary check valve utilizes a soft disc to metal seating. Breaker is tapped 3/8-inch (10 mm) N.P.T. Vacuum breaker is not intended for constant high pressures.
   5. Provide the following fixture configurations as follows:

a. Hot and cold water and gas at combination classroom table/lab bench in Bio Science 105.
b. Hot and cold water and gas at perimeter sinks in Bio Science 105.
c. Hot and cold water, gas, and compressed air at fume hood in Bio Science 105 / Prep 104C and SCC Biology 117.
d. Hot and cold water, gas, and compressed air at Teacher Demo Desk in Bio Science 104, Bio Science 105, and SCC Biology 117.

D. Fume Hood. Basis of Design-Air Master Systems Corp., Eliminator 200 Series.
1. Double-Faced, Dual Access style with metal base cabinets-72 inch W x 57 1/4 inch H x 35 1/2 inch D. The hood shall have the following features:
a. Powder Coat Finish.
b. Full Frame Construction.
c. U.L. Listed Poly Resin Liner.
d. Work surfaces: 1-1/4" thick epoxy resin dished a nominal ¼ inch to contain spills with sink.
e. Red Illuminated Toggle Switch with cover plate.
f. Electrical services: Provide on each front post of hoods. Three wire grounding type receptacles rated at 120v GFI, 20 amperes where specified. Flush Plates: Black acid resistant thermoplastic.
g. LED Lights.
h. Flush-Mount Airfoil.
i. Interior Access to Light.
j. Knock Down Capability.
k. Full Length Finger Lift.
l. Louvered Front for By-Pass.
m. Sash Interlock.
n. Airflow Monitor Sensor and Alarm.
o. Gooseneck Faucet for cold water.
p. Gas and Compressed Air Cocks.
q. Provide all components and equipment for blower, motor and switch for a complete functioning unit.
r. Hood Base. Metal base cabinets. Two units 36 inch H x 42 inch wide by 22 inch deep. Each unit shall have two doors. Finish same as hood. All bases shall meet SEFA requirements.

E. Emergency Eyewash/Shower:
1. See Mechanical.

F. First Aid Kit.
1. First Aid Kit contains a combination of both unit material and bulk packaged products. Kit contains adhesive bandages, adhesive bandages with non-adherent pads, bandage compress, gauze pads, triangle bandages, burn cream, two sizes of stretch bandage, adhesive tape, non-adherent pads, 1 oz. and 4 oz. eye flush with eye pads, eye cup and tape, antiseptic towelettes, cold pack, latex gloves, forceps, scissors, and a First Aid instruction booklet. Kit is housed in a sturdy wall hung metal cabinet. Provide in the following locations:
a. Food Science 103, Bio Science 104 & 105, SCC Physiology 116 & SCC Biology 117.

G. Safety Glass/Goggles Cabinet.
1. A sturdy, reinforced steel cabinet with baked white enamel finish and vandal resistant locking double doors. Equipped with eight (8) universal shelves that will hold either six (6), safety glasses or, five (5) goggles per shelf, for a total of 48 glasses or a total of 40 goggles (glasses and goggles are not included). A built-in germicidal lamp sanitizes the glasses/goggles between wearings, and is fully shielded from the front to prevent

accidental exposure. An automatic 5 minute timer controls the sanitizing period. A seven and half foot long, three-wire grounded cord with plug is mounted on right end. Provide in the following locations:

a. Bio Science 104 & 105, SCC Physiology 116 & SCC Biology 117.

H. Acid/Corrosives Storage Cabinet.

1. Stackable safety storage cabinets are constructed of 1" thick, high density, 9-ply plywood and meet or exceed standards set by OSHA and NFPA. Corrosive storage unit is finished inside and out with blue, epoxy paint; doors have two highly visible black and white safety decals. Flammable storage unit is finished inside and out in safety yellow; doors have red and white decals. The combination flammable and corrosive storage unit is finished inside and out in neutral gray, and appropriate stickers are applied to the doors. All hardware is corrosive resistant; units are equipped with suitable locking mechanisms and have two keys per lock. Provide cabinet stand unit. This unit is available in blue, yellow or gray to coordinate with Stackable Safety Storage Cabinets. Color to match bottom stacked unit as selected.
    a. Two (2) Corrosive Cabinets.
    b. Two (2) Flammable Cabinets.
    c. Two (2) Combination Flammable/Corrosive Cabinets.
2. Provide in the following locations:
    a. Storage 104D.

I. Fire Blanket.

1. Wool blanket smothers flames fast to help minimize burn injuries. Also useful for general first aid. Blanket measures 62" x 84", and is naturally fire retardant, 100% wool. Heavy duty 22-gauge steel cabinet with red enamel finish, mounts on wall. Drop hinge door for quick access. Cabinet measures 19-1/2" H x 17" W x 12" D. Provide in the following locations:
    a. Bio Science 104 & 105, SCC Physiology 116 & SCC Biology 117.

J. Instructors Demonstration Table. The table has two small drawers atop three large drawers and an extra large cupboard under sink. All doors and drawers shall be lockable. Complete with all of the fixtures listed below. Sink and fixtures are located on left side of table. Top is 1 inch thick epoxy resin.

a. Provide in the following locations: Bio Science 104 & 105.
    i. Dimensions (Inches)-96 W x 30D X 36H.
    ii. Fixture: One gooseneck faucet capable of mixing hot and cold water.
    iii. Sink: 18 inch W x 15inch D x 11 inch H, with epoxy sink outlet and strainer.
    iv. Gas: One double gas cock.
    v. Electrical: One duplex AC GFI receptacle.
    vi. Accessories: Two aluminum upright rods; one aluminum crossbar; two rod sockets.

K. Combination Classroom Table/Lab Bench. The combination classroom table/lab bench is 96"W x 50"D x 36"H. The lab table features a 96" x 50" tabletop covered with black epoxy resin countertop. Includes a 12" L x 8" W x 6" D epoxy resin sink with epoxy resin plug with disc strainer, two hot and cold water gooseneck faucets with two gas jets each, and two AC duplex GFIC electrical receptacles. Two 24" W x 16" D x 35" H storage cabinets, located on the opposite side of where the students sit, are equipped with two adjustable shelves allowing for flexible storage. An 18" wide removable panel is located between the storage cabinets and provides access to all utilities.

a. Provide in the following locations: 6 (six) tables in Bio Science 105.

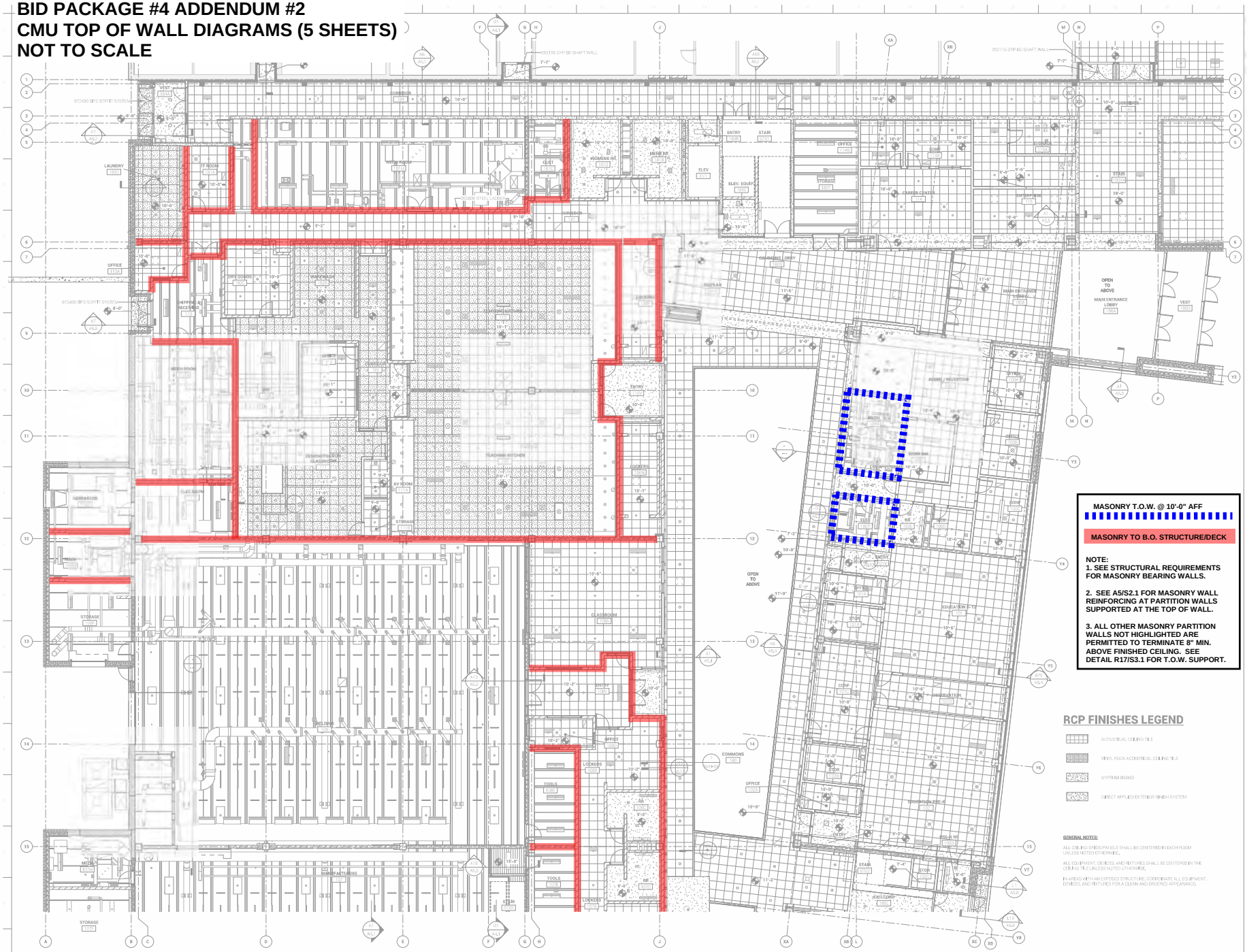
L. Classroom Tables. Provide 6 tables at SCC Physiology Lab 116.

a. Four student table with 1 inch thick epoxy resin top. Heavy duty solid wood construction.
b. Dimensions: 84 inchesW x 30 inchesH x 48 inchesD.

c. Center Cabinet: 24 inches wide. Cabinet with two adjustable shelves for each side of the table.
d. Electrical: Provide two (2) GFIC AC duplex outlets at each end of each table.

END OF SECTION

BID PACKAGE #4 ADDENDUM #2
CMU TOP OF WALL DIAGRAMS (5 SHEETS)
NOT TO SCALE



MASONRY T.O.W. @ 10'-0" AFF

MASONRY TO B.O. STRUCTURE/DECK

NOTE:
1. SEE STRUCTURAL REQUIREMENTS FOR MASONRY BEARING WALLS.

2. SEE A5/S2.1 FOR MASONRY WALL REINFORCING AT PARTITION WALLS SUPPORTED AT THE TOP OF WALL.

3. ALL OTHER MASONRY PARTITION WALLS NOT HIGHLIGHTED ARE PERMITTED TO TERMINATE 8" MIN. ABOVE FINISHED CEILING. SEE DETAIL R17/S3.1 FOR T.O.W. SUPPORT.

RCP FINISHES LEGEND

- ACOUSTICAL CEILING TILE
- VINYL-FACE ACOUSTICAL CEILING TILE
- GYPSUM BOARD
- DIRECT APPLIED EXTERIOR FINISH SYSTEM

GENERAL NOTES:

ALL CEILING SPECIFIC PANELS SHALL BE CENTERED IN EACH ROOM UNLESS NOTED OTHERWISE.

ALL EQUIPMENT, DEVICES, AND FIXTURES SHALL BE CENTERED IN THE CEILING TILE UNLESS NOTED OTHERWISE.

IN AREAS WITH AN EXPOSED STRUCTURE, COORDINATE ALL EQUIPMENT, DEVICES, AND FIXTURES FOR A CLEAN AND ORDERED APPEARANCE.

A1 FIRST FLOOR REFLECTED CEILING PLAN
1/8" = 1'-0"

BVH ARCHITECTS

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F: 402.475.1800
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REVISIONS SCHEDULE		
MARK	DATE	DESCRIPTION

THE CAREER ACADEMY

PROJECT: 113414 DATE: JUNE 4, 2024

FIRST FLOOR RCP - AREA A

NORTH

A2.1A

BID PACKAGE - 4

RCP FINISHES LEGEND

- ACOUSTICAL CEILING TILE
- VINYL FACED ACOUSTICAL CEILING TILE
- GYPSUM BOARD
- DIRECT APPLIED EXTERIOR FINISH SYSTEM

GENERAL NOTES:

ALL CEILING GRID/PANELS SHALL BE CENTERED IN EACH ROOM UNLESS NOTED OTHERWISE.

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IN AREAS WITH AN EXPOSED STRUCTURE, COORDINATE ALL EQUIPMENT, DEVICES, AND FIXTURES FOR A CLEAN AND ORDERED APPEARANCE.

A1 FIRST FLOOR REFLECTED CEILING PLAN - AREA B
1/8" = 1'-0"

BVH ARCHITECTS

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BAHR VERMEER HAECKER ARCHITECTS
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REVISIONS SCHEDULE		
MARK	DATE	DESCRIPTION

THE CAREER ACADEMY

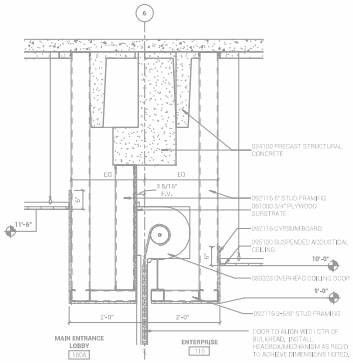
PROJECT: 113414 DATE: JUNE 4, 2014

FIRST FLOOR RCP - AREA B

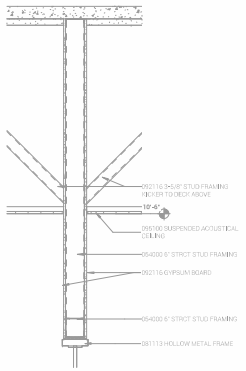
NORTH

A2.1B

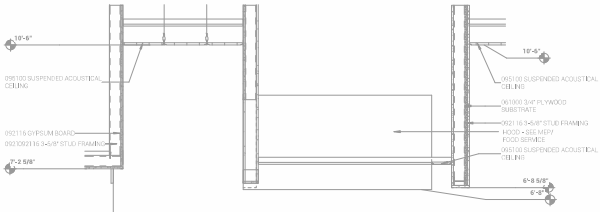
BID PACKAGE - 4



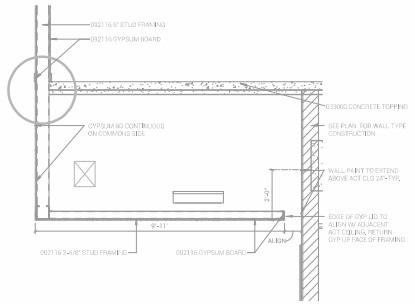
P1 RCP DETAIL - ENTERPRISE GATE
3/4" = 1'-0"



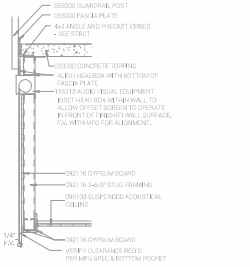
P7 RCP DETAIL - OBSERVATION HEAD
3/4" = 1'-0"



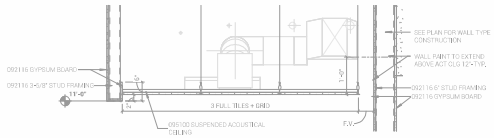
K1 RCP DETAIL - DEMO CR HOOD
3/4" = 1'-0"



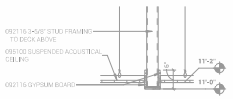
E1 RCP DETAIL - CABOOSE WALL/CEILING
1/2" = 1'-0"



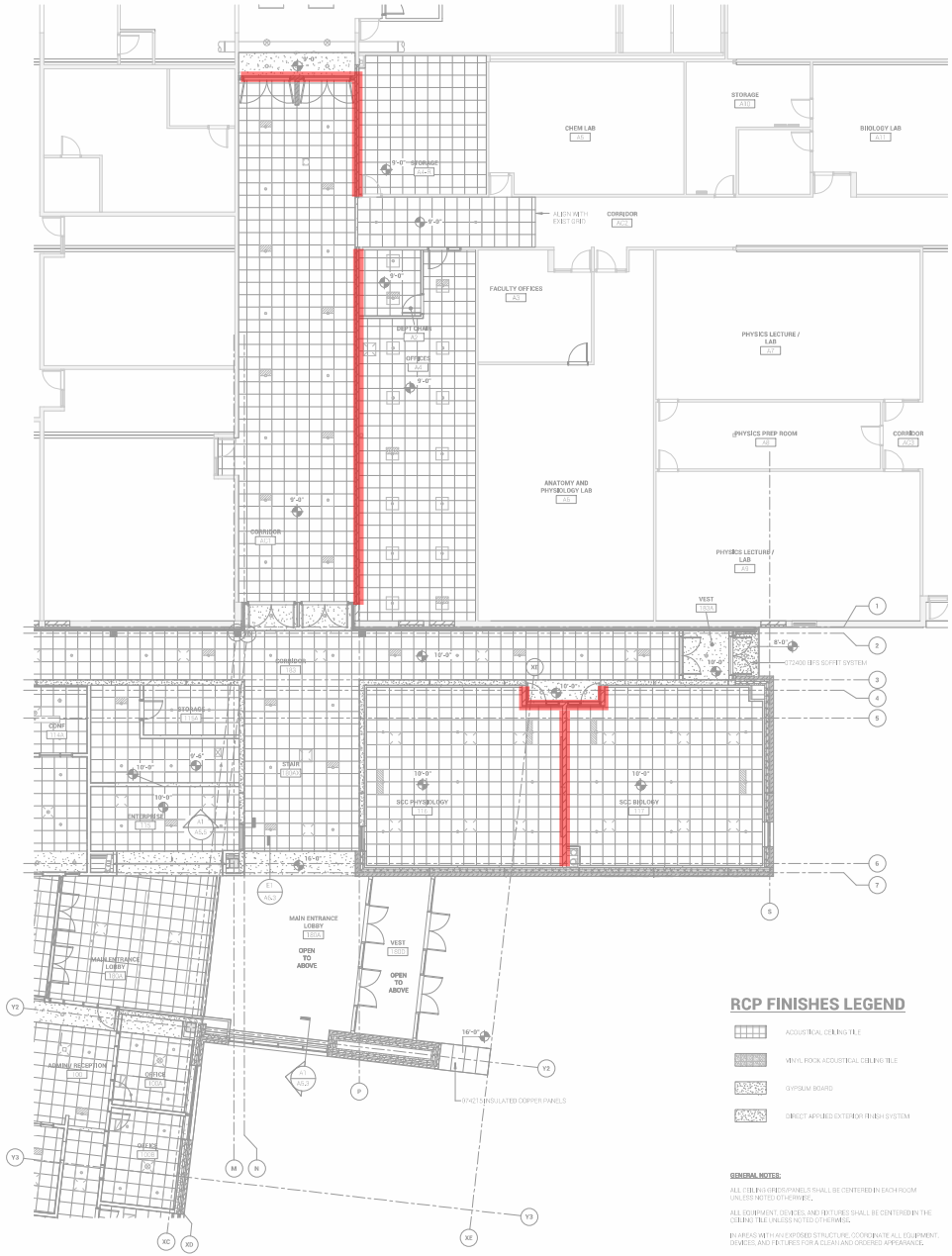
E8 RCP DETAIL - COMMONS SCREEN
3/4" = 1'-0"



A1 RCP DETAIL - WALKWAY CEILING
3/4" = 1'-0"



A8 RCP DETAIL - GRID TRANSITION
3/4" = 1'-0"



A11 FIRST FLOOR REFLECTED CEILING PLAN
1/8" = 1'-0"

RCP FINISHES LEGEND

- ACOUSTICAL CEILING TILE
- VINYL ROCK ACOUSTICAL CEILING TILE
- GYPSUM BOARD
- DIRECT APPLIED EXTERIOR FINISH SYSTEM

GENERAL NOTES:

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IN AREAS WITH AN EXPOSED STRUCTURE, COORDINATE ALL EQUIPMENT, DEVICES, AND FIXTURES FOR A CLEAN AND ORDERED APPEARANCE.

BVH ARCHITECTS

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REVISIONS SCHEDULE		
MARK	DATE	DESCRIPTION

THE CAREER ACADEMY

PROJECT: 113414 DATE: JUNE 4, 2014

FIRST FLOOR RCP - AREA C

NORTH

A2.1C

BID PACKAGE - 4

A1 SECOND FLOOR REFLECTED CEILING PLAN - AREA A

1/8" = 1'-0"

RCP FINISHES LEGEND

- ACOUSTICAL CEILING TILE
- VINYL FACED ACOUSTICAL CEILING TILE
- GYPSUM BOARD
- DIRECT APPLIED EXTERIOR FINISH SYSTEM

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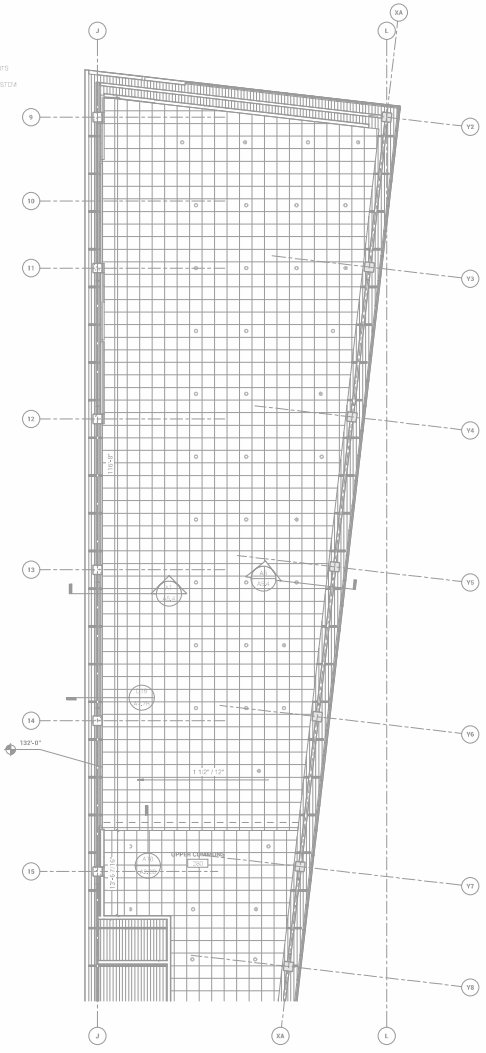

A18 CLERESTORY REFLECTED CEILING PLAN - AREA A

1/8" = 1'-0"

BVH ARCHITECTS

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REVISIONS SCHEDULE		
MARK	DATE	DESCRIPTION

THE CAREER ACADEMY

PROJECT: 113414 DATE: JUNE 4, 2014

SECOND FLOOR & CLERESTORY RCP - AREA A

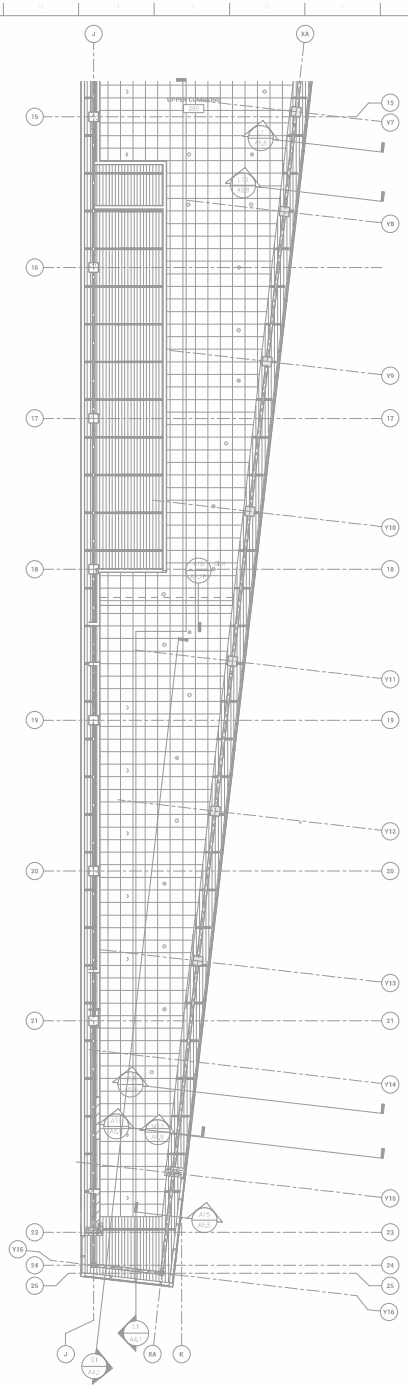
NORTH

A2.2A

BID PACKAGE - 4

A1 SECOND FLOOR REFLECTED CEILING PLAN - AREA B

1/8" = 1'-0"



A13 CLERESTORY REFLECTED CEILING PLAN - AREA B

1/8" = 1'-0"

RCP FINISHES LEGEND

- ACOUSTICAL CEILING TILE
- VINYL ROCK ACOUSTICAL CEILING TILE
- GYPSUM BOARD
- DIRECT APPLIED EXTERIOR FINISH SYSTEM

GENERAL NOTES:

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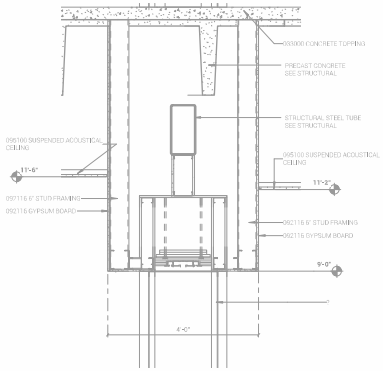
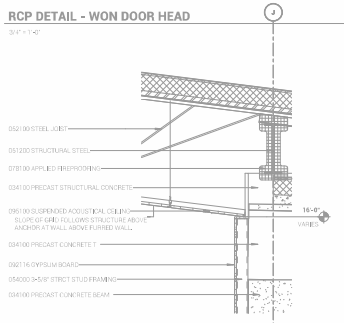


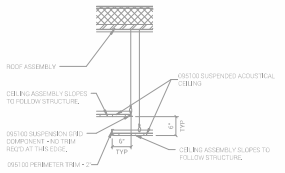
K18 RCP DETAIL - WON DOOR HEAD

3/4" = 1'-0"



D18 SECTION - CLERESTORY ACT WEST WALL TRANSITION

3/4" = 1'-0"



A18 RCP DETAIL - CLERESTORY CLOUD OVERLAP

3/4" = 1'-0"

BVH ARCHITECTS

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REVISIONS SCHEDULE		
MARK	DATE	DESCRIPTION

THE CAREER ACADEMY

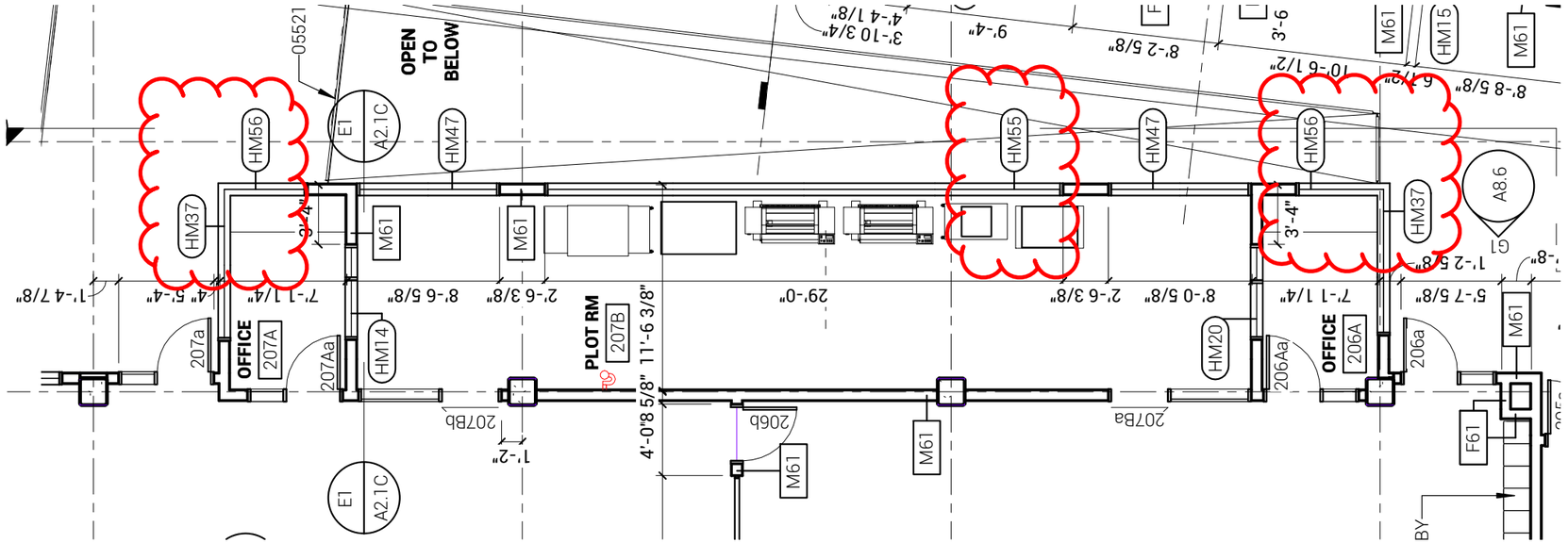
PROJECT: 113414 DATE: JUNE 4, 2014

SECOND FLOOR & CLERESTORY RCP - AREA B

NORTH

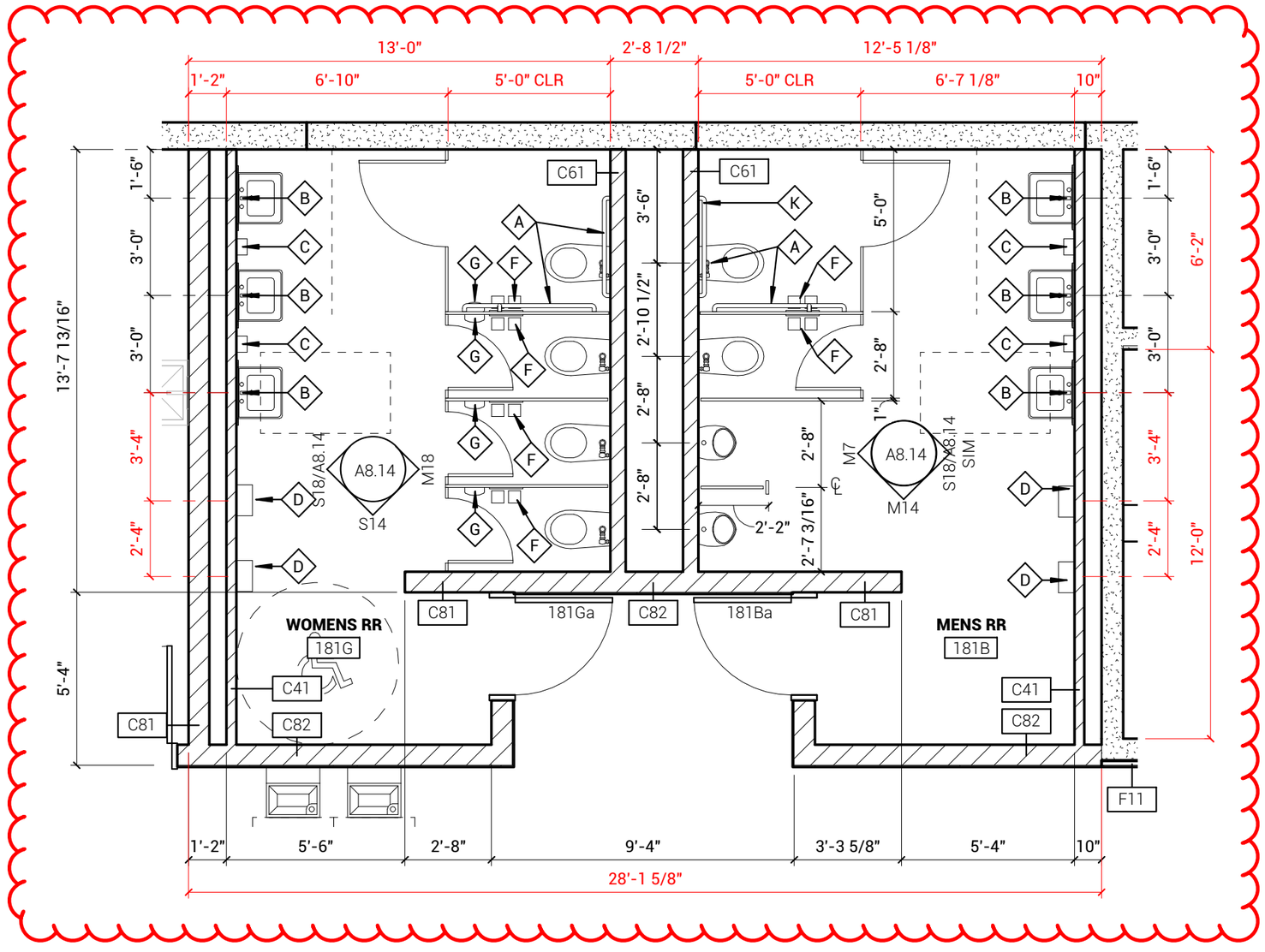
A2.2B

BID PACKAGE - 4



A11 02 - SECOND FLOOR PLAN - AREA B

1/8" = 1'-0"



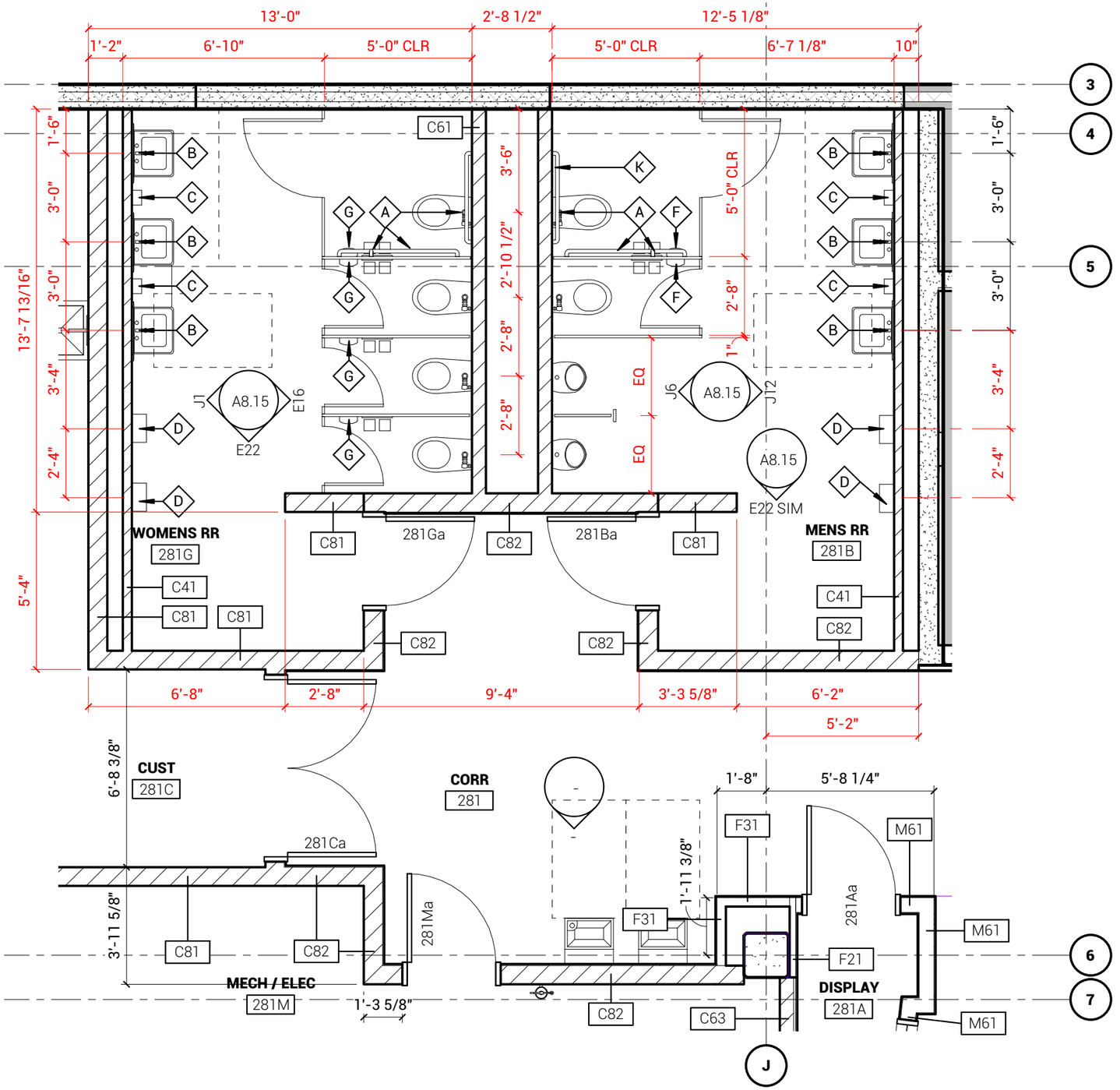
A1/A1.4 ENLARGED PLAN - RR 181

1/4" = 1'-0"

BVH ARCHITECTS

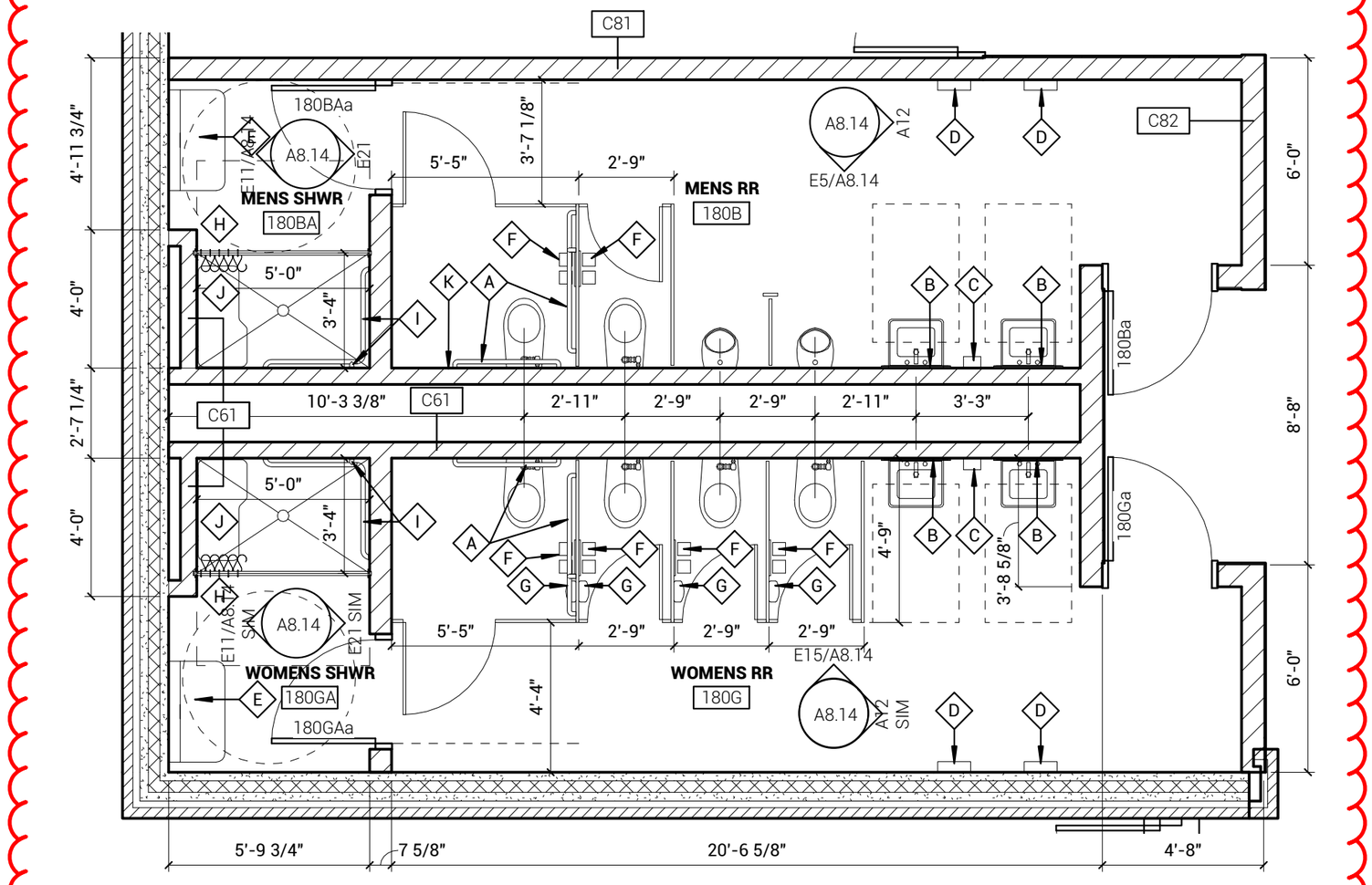
THE CAREER ACADEMY
BID PACKAGE #4 ADDENDUM #2

DATE: 06/19/2014



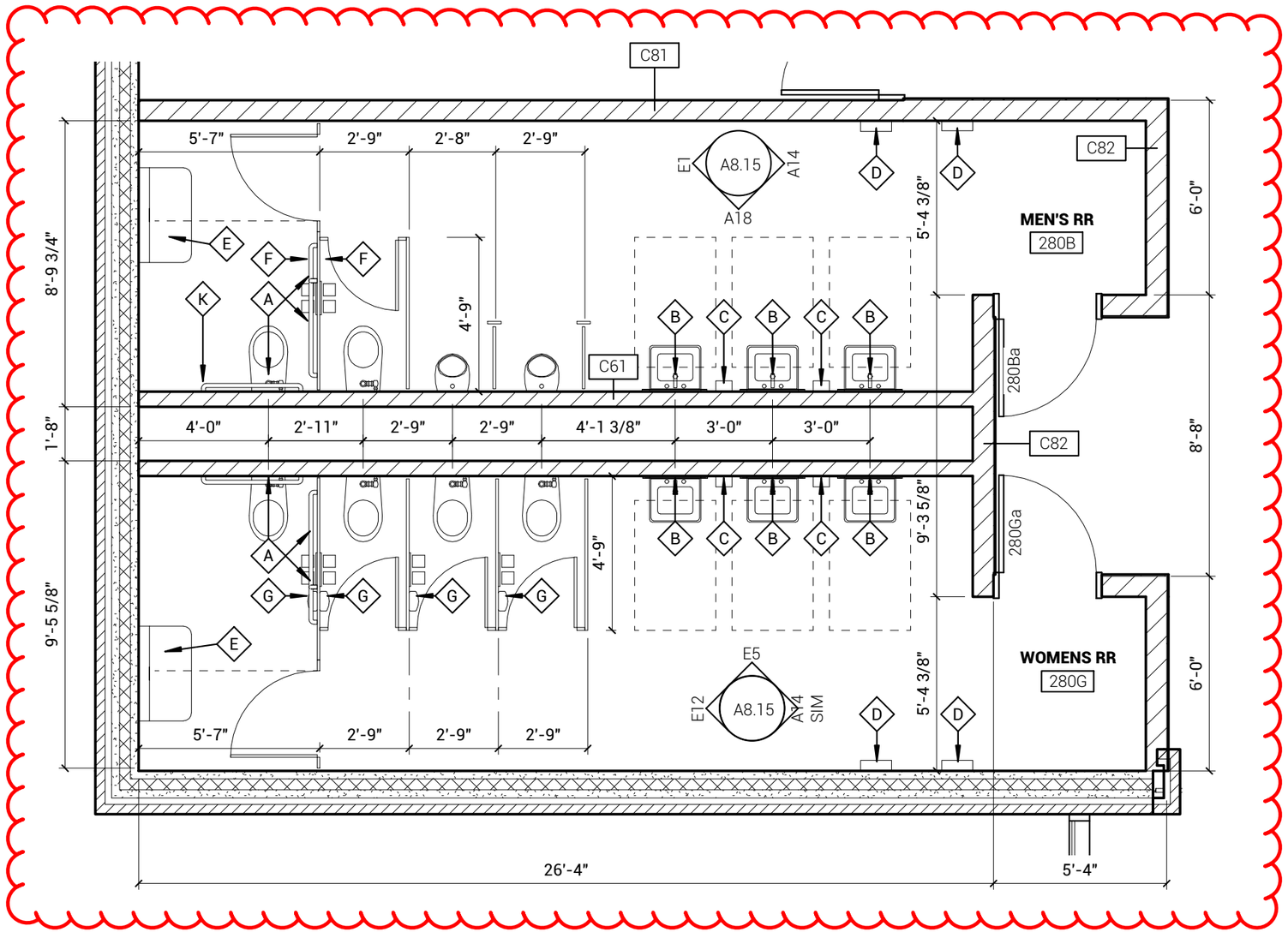
G1/A1.4 ENLARGED PLAN - RR 281

1/4" = 1'-0"



A8/A1.4 ENLARGED PLAN - RR 180

1/4" = 1'-0"

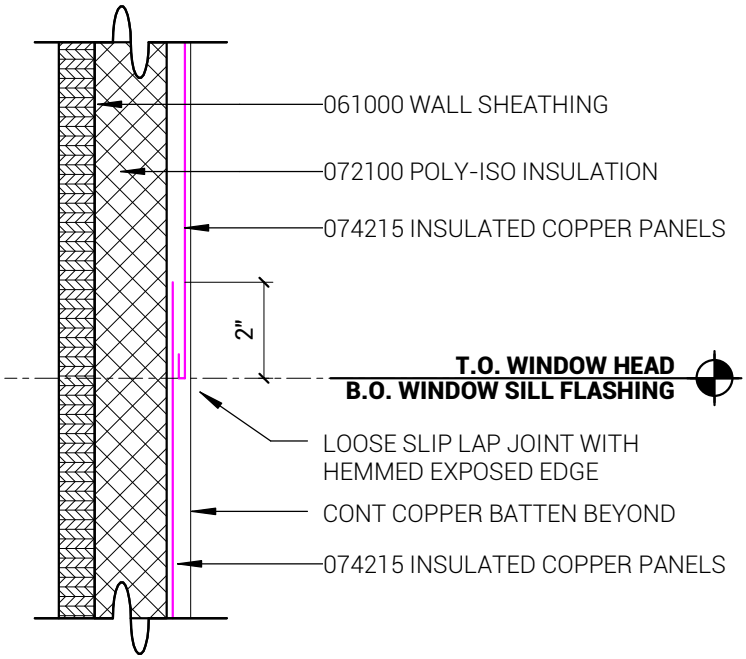


G8/A1.4 ENLARGED PLAN - RR 280

1/4" = 1'-0"

THE CAREER ACADEMY
BID PACKAGE #4 ADDENDUM #2

DATE: 06/19/2014

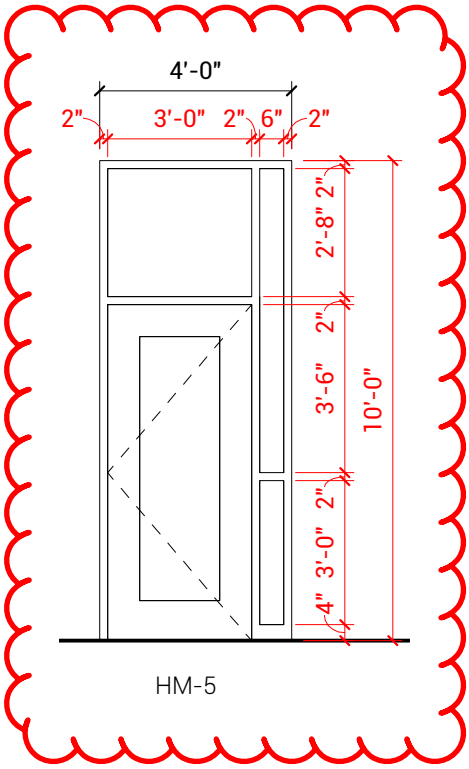


G7/A6.1 DETAIL - COPPER HORIZONTAL SLIP JOINT

3" = 1'-0"

THE CAREER ACADEMY
BID PACKAGE #4 ADDENDUM #2

DATE: 06/19/2014



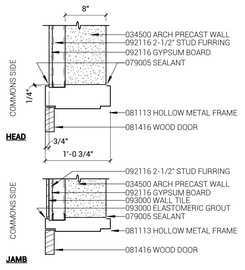
HM-5

A16/A7.1 HM DOOR FRAME ELEVATIONS

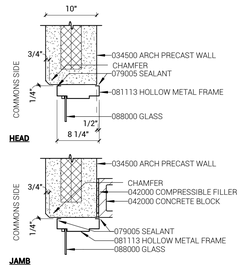
1/4" = 1'-0"

HOLLOW METAL FRAME SCHEDULE			
FRAME TYPE	ROOM	JAMB DEPTH	DETAIL
HM13	CONF 114A	8-1/4"	J
HM13	ADMIN 100	8-1/4"	H
HM14	OFFICE 101A	8-1/4"	J
HM14	OFFICE 201B	8-1/4"	J
HM14	DATABASE 201A	8-1/4"	J
HM14	IT/PROGRAM 201	8-1/4"	J
HM14	OFFICE 207A	8-1/4"	J
HM15	CONF 180J	8-1/4"	J
HM15	CONF 180J	8-1/2"	H
HM15	CONF 104B	8-1/2"	H
HM15	OFFICE 201B	8-1/2"	H
HM15	OFFICE 203A	8-1/4"	J
HM15	OFFICE 201B	8-1/2"	H
HM15	CONF 201D	8-1/2"	H
HM15	OFFICE 201E	8-1/2"	H
HM15	OFFICE 202A	8-1/2"	H
HM15	OFFICE 203A	8-1/4"	J
HM15	CONF 203B	8-1/2"	H
HM15	ENGINEERING 207	8-1/2"	H
HM15	OFFICE 208A	8-1/2"	H
HM15	CONF 203B	8-1/2"	H
HM15	CONF 203B	8-1/4"	J
HM15	CONF 203B	8-1/4"	J
HM15	CONF 203B	8-1/4"	J
HM15	OBSERVE 203D	8-1/4"	J
HM15	TESTING 203C	8-1/4"	J
HM15	TESTING 203C	8-1/4"	J
HM16	OBSERVATION 101D	8-1/4"	J
HM16	OBSERVATION 101D	8-1/4"	J
HM17	CONF 101C	8-1/4"	J
HM18	CONF 101C	8-1/2"	H
HM18	NETWORK 201C	8-1/2"	H
HM18	CONF 201D	8-1/2"	H
HM18	NETWORK 201C	8-1/4"	J
HM19	CONF 104B	8-1/2"	H
HM19	CONF 203B	8-1/2"	H
HM20	OFFICE 102A	8-1/4"	J
HM20	DATABASE 201A	8-1/4"	J
HM20	OFFICE 201E	8-1/4"	J
HM20	IT/PROGRAM 201	8-1/4"	J
HM20	OFFICE 202A	8-1/4"	J
HM20	OFFICE 206A	8-1/4"	J
HM21	OFFICE 101A	8-1/2"	H
HM21	OFFICE 102A	8-1/2"	H
HM21	OFFICE 103A	8-1/2"	H
HM21	OFFICE 105A	8-1/2"	H
HM22	OFFICE 103A	8-1/4"	J
HM22	CLASSROOM 108A	8-1/2"	H
HM22	CLASSROOM 108A	8-1/2"	H
HM22	BUSINESS LAB 209	8-1/2"	H
HM22	BSNS/MRKTNG/MNGT 210	8-1/2"	H
HM23	OFFICE 106E	5-3/4"	L
HM23	OFFICE107D	5-3/4"	L
HM23	OFFICE 108D	5-3/4"	L
HM24	OFFICE 106E	5-3/4"	L
HM25	OFFICE 108D	5-3/4"	L
HM26	OFFICE 106E	8-1/4"	C
HM26	OFFICE 106E	8-1/4"	C
HM26	OFFICE 106E	8-1/4"	C
HM26	OFFICE 106E	8-1/4"	C
HM27	LOCKERS 108B	9-1/2"	F
HM27	LOCKERS 107B	9-1/2"	F
HM27	LOCKERS 108B	9-1/2"	F
HM28	CLASSROOM 106A	8-1/2"	H

HOLLOW METAL FRAME SCHEDULE			
FRAME TYPE	ROOM	JAMB DEPTH	DETAIL
HM28	CLASSROOM 107A	8-1/2"	H
HM28	CLASSEOOM 108A	8-1/2"	H
HM29	CLASSROOM 106A	8-1/2"	H
HM29	CLASSROOM 107A	8-1/2"	H
HM29	CLASSROOM 108A	8-1/2"	H
HM30	CLASSROOM 106A	5-3/4"	L
HM30	CLASSROOM 107A	5-3/4"	L
HM30	CLASSROOM 108A	5-3/4"	L
HM30	OFFICE 112	5-3/4"	L
HM30	OFFICE 112	5-3/4"	L
HM30	DISPLAY 281A	8-1/2"	H
HM31	CLASSROOM 106A	8-1/2"	H
HM31	CLASSROOM 107A	8-1/2"	H
HM31	ADMIN 100	8-1/4"	J
HM31	CLASSROOM 204	8-1/4"	J
HM31	CLASSROOM 205	8-1/4"	J
HM32	CLASSROOM 106A	8-1/2"	H
HM32	CLASSROOM 107A	8-1/2"	H
HM32	CLASSROOM 204	8-1/4"	J
HM32	BUSINESS LAB 209	8-1/2"	H
HM33	CLASSROOM 106A	8-1/2"	H
HM33	CLASSROOM 107A	8-1/2"	H
HM33	CLASSROOM 204	8-1/4"	J
HM33	CLASSROOM 205	8-1/4"	J
HM33	BUSINESS LAB 209	8-1/2"	H
HM34	TEACHING KITCHEN 109	5-3/4"	L
HM34	TEACHING KITCHEN 109	5-3/4"	L
HM35	OFFICE 113A	5-3/4"	G
HM36	DISPLAY 181F	8-1/2"	H
HM37	PLOT RM 207B	8-1/2"	H
HM37	PLOT RM 207B	8-1/2"	H
HM38	CAREER CENTER 114	8-1/2"	H
HM40	SCC PHYSIOLOGY	8-1/2"	B SIM.
HM41	CLASSROOM 200	8-1/4"	J
HM42	DATABASE 201A	8-1/4"	J
HM42	IT/PROGRAM 201	8-1/4"	J
HM43	NETWORK 201C	8-1/2"	H
HM43	TESTING 203C	8-1/2"	H
HM44	CONF 203K	8-1/2"	H
HM44	TESTING 203C	8-1/2"	H
HM45	OBSERVE 203D	8-1/4"	J
HM46	CLASSROOM 205	8-1/4"	J
HM46		8-1/2"	H
HM46	BUSINESS LAB 209	8-1/2"	H
HM47	PLOT RM 207B	8-1/4"	J
HM47	PLOT RM 207B	8-1/4"	J
HM48	ENGINEERING 206	8-1/4"	C
HM48	ENGINEERING 207	8-1/4"	C
HM49	FINANCIAL SERVICES 208	8-1/2"	H
HM49	BSNS/MRKTNG/MNGT 210	8-1/2"	H
HM51	OFFICE 106E	5-3/4"	L
HM52	CLASSROOM 106A	8-1/4"	C
HM52	CLASSROOM 106A	8-1/4"	C
HM52	CLASSROOM 107A	8-1/4"	C
HM52	CLASSROOM 107A	8-1/4"	C
HM52	CLASSROOM 108A	8-1/4"	C
HM52	CLASSROOM 108A	8-1/4"	C
HM54	GRINDING 108G	5-3/4"	L
HM54	GRINDING 108G	5-3/4"	L
HM54	GRINDING 108G	5-3/4"	L
HM55	PLOT RM 207B	8-1/4"	J
HM56	PLOT RM 207B	8-1/2"	H
HM56	PLOT RM 207B	8-1/2"	H



DETAIL A



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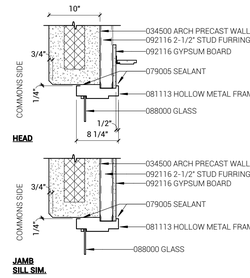

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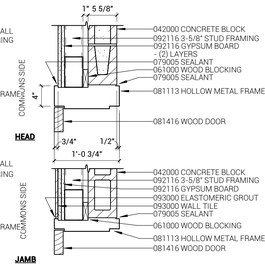

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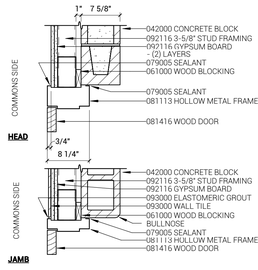

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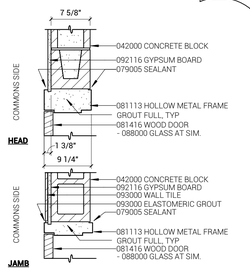

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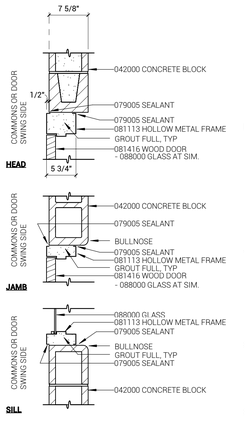

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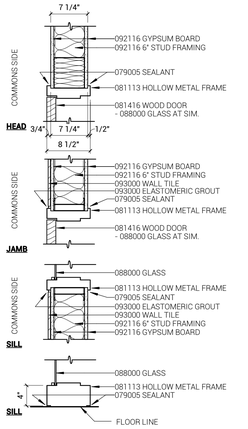

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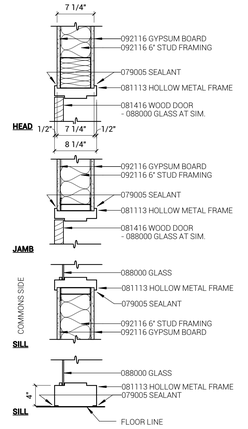

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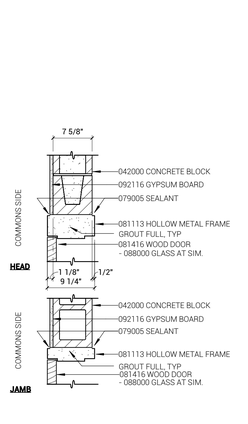

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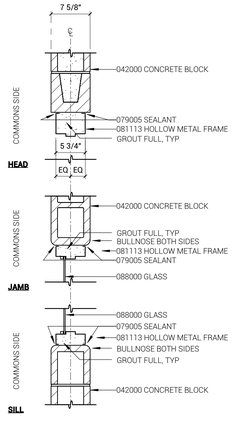


DETAIL L

K8/A7.3 HOLLOW METAL FRAME DETAILS

1" = 1'-0"

EXTERIOR GLAZING LEGEND

TYPE 1 - CLEAR GLAZING

TYPE 3 - OBSCURE (FROSTED) GLAZING

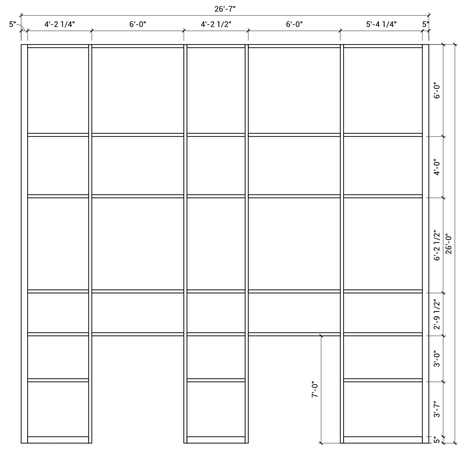
TYPE 2 - SPANDREL GLAZING

GENERAL NOTES:

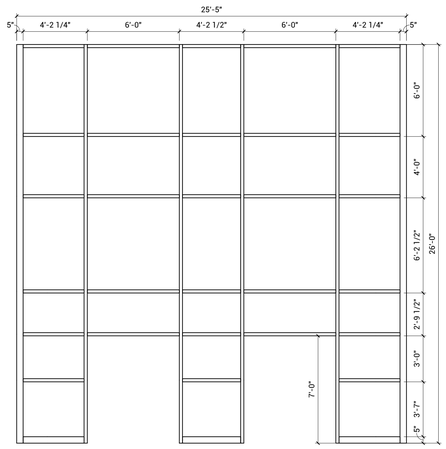
SEE 088000 GLAZING.

SEE SPECIFICATIONS FOR RATED, TEMPERED, AND/OR LAMINATED SAFETY GLAZING REQUIREMENTS.

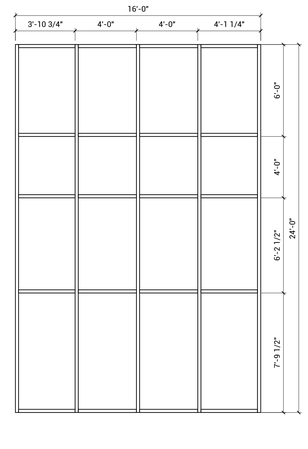
SEE SPECIFICATIONS FOR HARDWARE REQUIREMENTS.



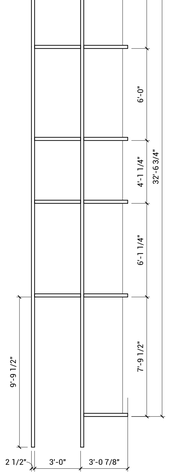
1 C1
1/4" = 1'-0"



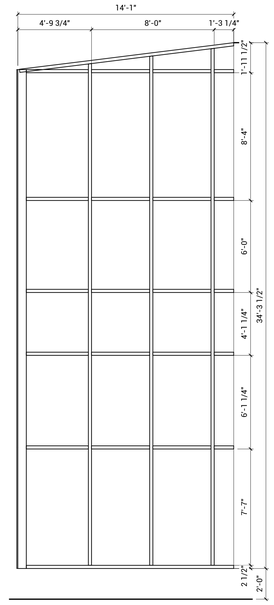
2 C2
1/4" = 1'-0"



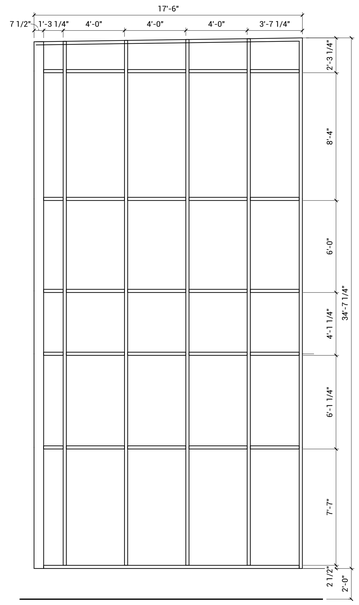
3 C3
1/4" = 1'-0"



4 C4
1/4" = 1'-0"



5 C5
1/4" = 1'-0"



6 C6
1/4" = 1'-0"

BVH ARCHITECTS

ARCHITECT
BAHR VERMEER HAECKER ARCHITECTS
440 N 8TH STREET, STE 100
LINCOLN,NE 68508
V 402.475.4551
F 402.475.0226
BVH.COM

STRUCTURAL ENGINEER
R.D.YOUKER, INC.
1201 O STREET, STE 310
LINCOLN, NE 68508
V 402.477 7640
F 402 477 7631
RDYOUKER.COM

MECHANICAL ENGINEER
ENGINEERING TECHNOLOGIES, INC.
825 M STREET, STE 200
LINCOLN, NE 68508
V 402 476 1273
F 402 476 1274
ETI-ENGINEERS.COM

ELECTRICAL ENGINEER
ENGINEERING TECHNOLOGIES, INC.
825 M STREET, STE 200
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F 402 476 1274
ETI-ENGINEERS.COM

CIVIL ENGINEER
OLSSON ASSOCIATES
1111 LINCOLN MALL, STE 111
LINCOLN, NE 68508
V 402 474 6311
F 402 474 5160
OLSSONASSOCIATES.COM

FOOD SERVICE CONSULTANT
FOODLINES
209 S 9TH STREET
LINCOLN, NE 68508
V 402 475 1787
F 402 475 1800
FOODLINES.NET

REVISIONS SCHEDULE		
MARK	DATE	DESCRIPTION
1	6/19/2014	ADD #2 BP #4

THE CAREER ACADEMY

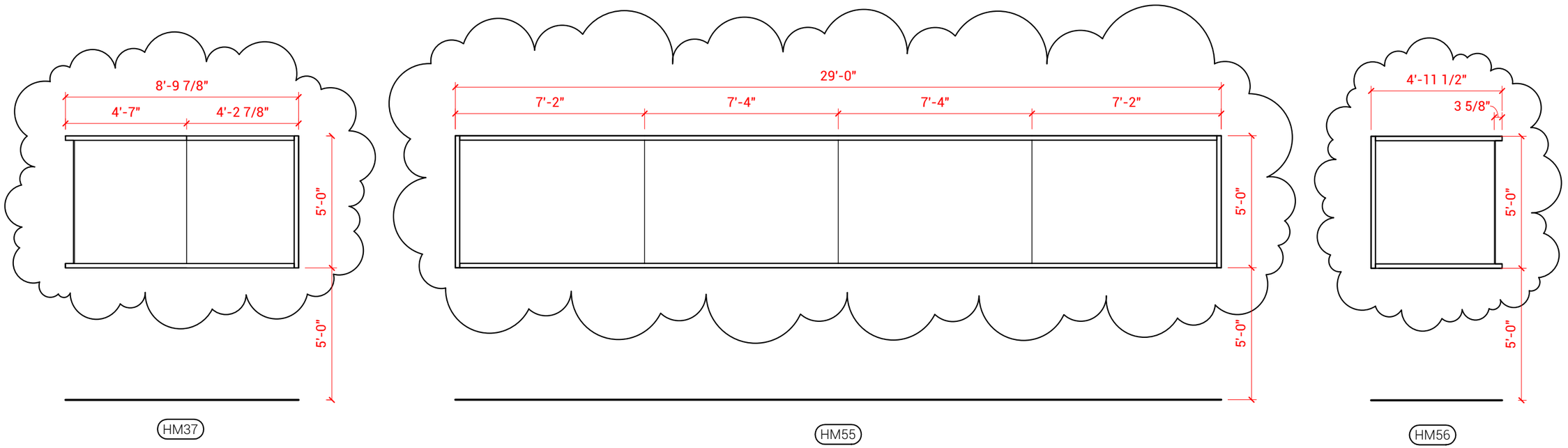
PROJECT: L13414 **DATE:** JUNE 4, 2014

ARCHITECT
DANIEL A. VON
GPHY
A-1702
6-4-2014
STATE OF NEBRASKA

FRAME ELEVATIONS

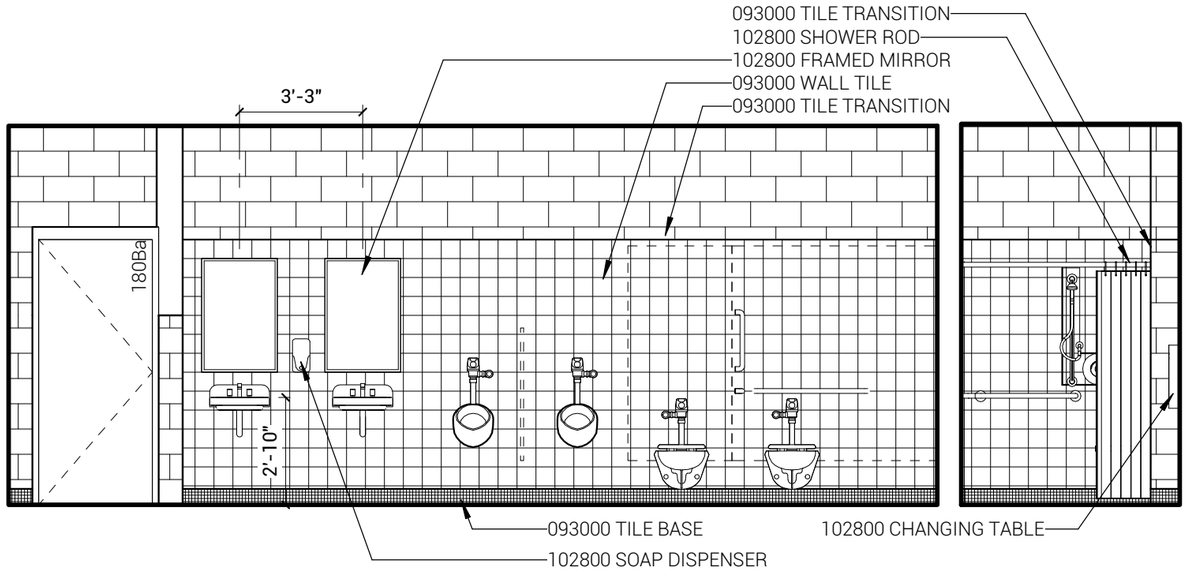
A7.3

BID PACKAGE - 4



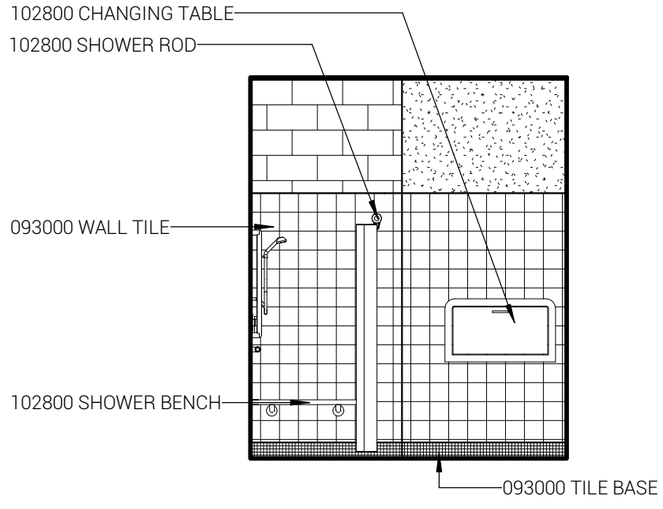
A1/A7.4 HOLLOW METAL WINDOW FRAME ELEVATIONS

1/4" = 1'-0"



E5/A8.14 INT ELEV - MENS RR 180B SOUTH

1/4" = 1'-0"

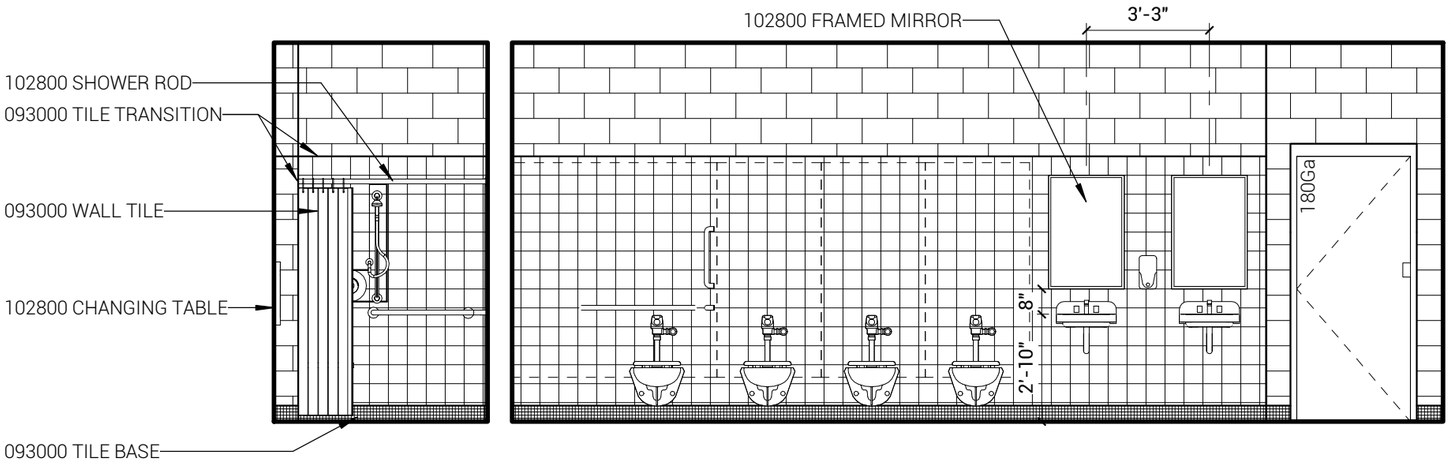


E11/A8.14 INT ELEV - MENS SHOWER 180BA WEST

1/4" = 1'-0"

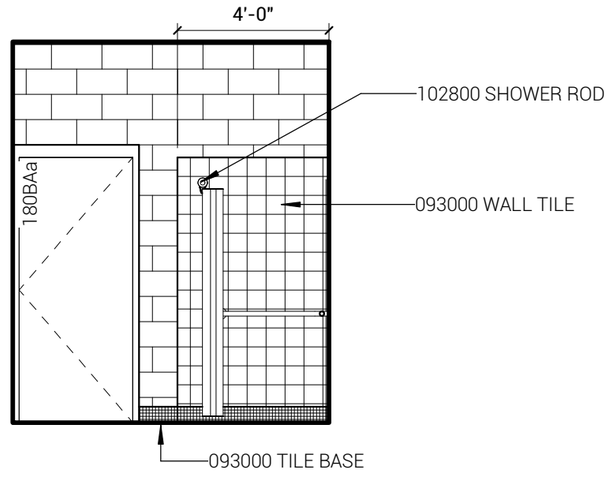
THE CAREER ACADEMY
BID PACKAGE #4 ADDENDUM #2

DATE: 06/19/2014



E15/A8.14 INT ELEV - WOMEN RR 180G NORTH

1/4" = 1'-0" REF SHEET: A8/A1.4 / A1.4



E21 INT ELEV - MENS SHOWER 180BA EAST

1/4" = 1'-0"

DATEISSUED	06/19/2014	ADDENDUM #	2
ENGINEER	Engineering Technologies, Inc. 825 M Street, Suite 200 Lincoln, NE68508	PROJECT	LPS/SCC Career Academy
		ETI PROJECT#	2013-114

The Architect issues this Addendum to all known bidders before receipt of proposals. Bidder shall acknowledge the receipt of this addendum on their proposal sheet and all information contained herein shall become a part of the contract documents.

ADDENDUM:

PRIOR APPROVAL – MECHANICAL

1. The following manufacturers have received prior approval for bidding purposes subject to shop drawing review:
   A. List Equipment Here — List Manufacturer Here

List Equipment Here	List Manufacturer Here
Energy Recovery Units	Innovent, Annexair
Makeup Air Units	Innovent, Annexair
Electronic Mixing Valves	Lawler
Pump Suction Diffusers	Patterson, Armstrong, American Wheatley
Pump Triple Duty Valves	Patterson, Armstrong, American Wheatley
Expansion Tanks	Patterson, Armstrong, American Wheatley
Pump Flex Connectors	American Wheatley
Automatic Flow Control Valves	PRO Hydronic Specialties, Nexus, Flow Design, HCI
HVAC Pumps and Circulators	Patterson, Wilo
Bypass Chemical Feeders	General Treatment Products, Vector
Radiant Floor and Snowmelt Tubing	Heat-Link, Wirsbo, Watts Radiant
Roof Hoods	ACME, Twin City, Loren Cook
Exhaust Fans	ACME
Variable Frequency Drives	Yaskawa
Registers, Grilles, Diffusers	Price Industries, Nailor
Louvers	Greenheck, Air Balance
Dust Collectors/Air Filtration Systems	Micro-Air, Torit Donaldson, Camfil Farr
Spiral Ductwork & Fittings	Spiral Pipe of Texas, Eastern Sheetmetal
Vibration Isolators/Equipment Bases	Vibro-Acoustics
Dampers	Air Balance

SPECIFICATIONS – MECHANICAL

1. Section 22 3000 – Plumbing Equipment
   A. 2.07;C: 72 gpm shall be 52 gpm.

DRAWINGS – MECHANICAL

1. Sheet M1.1A
   A. Waste piping extending to Mud Trap in Construction Trades 106 is to be 3".
   B. Sheet Notes: Sheet Note 22 shall read "See sheet ME1.4 for continuation".
   C. Sheet Notes: Sheet Note 13 shall read "Extend compressed air piping down to 5'-0" AFF. Provide ball valve and quick disconnect fitting as required. Provide "Reelcraft" model 2Z862 hose reel at location shown."
   D. Entry 108V: ES-1 is to be EWS-1.
   E. See attached sheet M1.1A Attachment 1 for piping to EWC-1 on second floor and new location of fixtures in Womens RR 181G and Mens 181B which shifted west.
   F. Grease trap discharge and acceptance piping is to be 4".

LINCOLN: 825 M Street, Suite 200, Lincoln, NE 68508 P 402.476.1273 F 402.476.1274
OMAHA: 1111 N.13th Street, Suite 216,Omaha, NE68102 P 402.330.2772 F 402.330.2630

G. See attached sheet M1.1A attachment 2 for changes to waste and grease waste piping in Teaching Kitchen 110, Teaching Kitchen 109, Demonstration Classroom 111 and Warewash 182B.
H. Waste extending to Area B at south end of Commons 180 shall be 6" .

2. Sheet M1.1B
   A. Construction Trades 106: Mud trap does not require drain in bottom of the trap. Discharge shall be 3" and installed per the detail on sheet M5.2.
   B. Waste piping downstream of Mud Trap is to be 3".
   C. See attached sheet M1.1B Attachment 1 for new plumbing fixture and piping locations in Womens RR 180G and Mens RR 180B.
   D. See attached sheet M1.1B Attachment 2 for new EWS-1 located in Bio Science 104.
   E. Food Science 103: Provide 3" waste from 6" main. See Plumbing Riser on sheet M5.6.
   F. Bio Science 104: Provide 3" waste from 6" main to the first wye and south to the second wye.
   G. Prep 104C: Provide faucet only for KS-1.
   H. Prep 104C: EWS-2 to be changed to EWS-1.
   I. Bio Science 105: EWS-2 to be changed to EWS-1.
   J. Bio Science 105: Provide 3" waste from 6" main to branch turning south that serves the 6 island sinks.
3. Sheet M1.1C
   A. Sheet Notes: Sheet Note 7 shall read "Connect 1/2" gas and compressed air piping to fume hood. Fume hood supplied by others."
   B. See attached sheet M1.1C Attachment 1 for location of new EWS-1 in SCC Physiology 116 and SCC Biology 117, provide piping as required, and provide 1/2" compressed air to fume hood as shown.
4. Sheet M1.2A
   A. See attached sheet M1.2A Attachment 1 for new location of EWC-1 and new location of fixtures inWomens RR 281G and Mens 281B which shifted west.
5. Sheet M2.1A
   A. Mech. Room 113M: Make-up feed system (MU-1) shall be piped only to the supply side of the heat pump loop.
   B. Sheet Notes: Sheet Note 2 shall read "Radiant snow melt tubing manifold under base bid. See detail on sheet M5.1"
6. Sheet M3.1B
   A. See attached sheet M3.1B Attachment 1 for new exhaust ductwork layout in Womens RR 180G and Mens RR 180B.
   B. See attached sheet M3.1B Attachment 2 for new supply diffuser in MFD Room 180U.
7. Sheet M3.2A
   A. See attached sheet M3.2A Attachment 1 for new exhaust ductwork layout in Mech/Elec 281M.
   B. See attached sheet M3.2A Attachment 2 for new supply diffuser and return grille locations in Stor 201G and MFD Room 280K.
8. Sheet M4.1
   A. See attached sheet M4.1 Attachment 1 for new plumbing fixture and piping locations in Womens RR 181G and Mens RR 181B.
   B. See attached sheet M4.1 Attachment 2 for new plumbing fixture and piping locations in Womens RR 281G and Mens RR 281B and addition of note 8 to SS-1 in Cust 281C.
   C. See attached sheet M4.1 Attachment 3 for new plumbing fixture and piping locations in Womens RR 180G and Mens RR 180B.
9. Sheet M4.2
   A. Teaching Kitchen 110 / Teaching Kitchen 109: Provide hose bib (HB-1) for waster located behind Electric Counter Tilting Kettle (205).
   B. See attached sheet M4.2 Attachment 1 for water piping to Electric Counter Tilting Kettle (205).
10. Sheet M5.1
   A. Heat Pump Piping Schematic: Note 1 shall read as follows: (MU-1) J.L. Wingert GL-50E make up feed system and tank to be located in "Mech. Room 113M".
   B. Heat Pump Piping Schematic: Make-up feed system is located in "Mech. 113M".
   C. Heat Pump Manifold Piping Detail (By Mech. Contractor): Remove the word "Both" from the "Loop Field Contractor/Mechanical Contractor Responsibilities" note.
   D. Base Mounted Pump Detail: Mechanical contractor shall provide 4" concrete housekeeping pad.
   E. Heat Pump System Piping Schematic: Mechanical contractor shall provide 4" concrete housekeeping pad for pumps P-1 & P-2 and for make-up feed system (MU-1).
11. Sheet M5.2
   A. Mud Trap Detail: Inlet from floor sink and discharge to sewer shall be 3".
   B. Mud Trap Detail: Mud trap shall be poured by foundation contractor.
   C. Air Compressor Detail is to be removed. Correct detail is shown on sheet M5.1.
   D. Domestic Water Heater Detail: Mechanical contractor shall provide 4" concrete housekeeping pad for each water heater.
12. Sheet M5.3
   A. See attached sheet M5.3 Attachment 1 for items added to Plumbing Fixture Schedule.
   B. KS-2 shall be removed from Plumbing Fixture Schedule.
   C. Pump Schedule: P-6 fluid will be 50% propylene glycol.

LINCOLN: 825 M Street, Suite 200, Lincoln, NE 68508 P 402.476.1273 F 402.476.1274
OMAHA: 4559 S. 133rd Street, Omaha, NE68137 P 402.330.2772 F 402.330.2630

D. Mechanical Equipment Schedule “WWHP-2”: Load side of heat pump shall have 50% propylene glycol.

GENERAL ITEMS – ELECTRICAL

1. Section or Room
   A. List change here

PRIOR APPROVAL – ELECTRICAL

1. The following manufacturers have received prior approval for bidding purposes subject to shop drawing review:

A. List Equipment Here	List Manufacturer Here
Light Fixture #5	Fail-safe
Light Fixture #12	Corelite
Light Fixture #29, 30, 39	Surelite
Light Fixture #41, 53	Illumna
Light Fixture #58	Fail-safe
Light Fixture #59	Illumna
Light Fixture #75	McGraw Edison

SPECIFICATIONS – ELECTRICAL

1. Section 26, 27, 28
   A. Replace all electrical sections with the attached sections.
2. Section 262500 – Feeder and Plug-In-Busway
   A. Paragraph 2.01 Manufactures – General Electric, Siemens and Cutler Hammer are acceptable manufacturers.

DRAWINGS – ELECTRICAL

1. Sheet E1.1A
   A. Adjust light fixtures in Corridor 181 to fit ceiling grid. See attached sheet E1.1A, attachment 1for revised lighting layout.
   B. Adjust light fixtures in Womens RR 181G and Mens RR 181B. See attached sheet E1.1A, attachment 1for revised lighting layout.
2. Sheet E1.1B
   A. Adjust light fixtures and occupancy sensors in Womens RR 180G and Mens RR 180B. See attached sheet E1.1B, attachment 1for revised lighting layout.
   B. Add light fixtures #76 and #77 along with wall occupancy sensor switch to new Mens Shower 180BA and Womens Shower 180GA. See attached sheet E1.1B, attachment 1 for new room locations and lighting layout.
   C. Change light fixture #9 to #78 in Womens RR 180G and Mens RR 180B,
   D. Move wall occupancy sensor switch in MFD Room 180U to new door location. See attached sheet E1.1B, attachment 2 for new door location.
   E. Adjust light fixture and exit sign in alcove north of Food Science 103. See attached sheet E1.1B, attachment 2 for revised lighting layout.
3. Sheet E1.2A
   A. Adjust/remove lights in Mech/Elec 281M, Cust 281C, Womens RR 281G, and Mens RR 281B. See attached sheet E1.2A, attachment 1 for revised lighting layout.
   B. Add light fixtures #20 in Corr 281, above water coolers. See attached sheet E1.2A, attachment 1 for lighting layout.
   C. Move light switch in Cust 281C to new door location. See attached sheet E1.2A, attachment 1 for new door location.
   D. Move pilot light switch in Mech/Elec 281M to new door location. See attached sheet E1.2A, attachment 1 for new door location.
   E. Adjust light fixture in Stor 201G and MFD Room 280K. See attached sheet E1.2A, attachment 2 for revised lighting layout.
   F. Move light switch in Stor 201G to new door location. See attached sheet E1.2A, attachment 2 for new door location.
   G. Add ceiling mounted occupancy sensor (type A) in Stor 201G. See attached sheet E1.2A, attachment 2 for location.
   H. Add wall occupancy sensor switch in MFD Room 280K. See attached sheet E1.2A, attachment 2 for new room location and revised lighting.
4. Sheet E2.1A
   A. Change sheet note 14 to read “Outlets for tv monitor mounted at 96” AFF and 18” AFF. Stub out 1 ¼” conduit from 18” j-box to j-box above. Stub out 1 ¼” conduit from 96” j-box to above accessible ceiling. Junction boxes shall have two gang plaster ring. Provide duplex receptacle at 96” AFF and one duplex receptacle at 18” AFF.
   B. See attached sheet E2.1A, attachment 1 for electrical changes in Admin/Reception 100 and Work Rm 100F.
5. Sheet E2.1B
   A. Add receptacles and data outlets in new MFD Room 180U. See attached sheet E2.1B, attachment 1 for receptacle and data locations.

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B. Change sheet not 44 to read “Outlets for tv monitor mounted at 96” AFF and 18” AFF. Stub out 1 ¼” conduit from 18” j-box to j-box above. Stub out 1 ¼” conduit from 96” j-box to above accessible ceiling. Junction boxes shall have two gang plaster ring. Provide duplex receptacle at 96” AFF and one duplex receptacle at 18” AFF.”

6. Sheet E2.2A
   A. Move wall phone in Cust 281C to new door location. See attached sheet E2.2A, attachment 1 for new door location.
   B. Move receptacles for Water Coolers from Upper Commons 280 to Corr 281. See attached sheet E2.2A, attachment 1 for new water cooler location.
   C. Delete receptacle and circuit in Corr 281 near Mech/Elec 281M. See attached sheet E2.2A, attachment 1 for revised electrical.
   D. Move panels “L7C” and “L7D” to north wall of Stor 201G. See attached sheet E2.2A, attachment 2 for revised electrical.
   E. Add receptacle next to panels “L7C” and “L7D” in Stor 201G. See attached sheet E2.2A, attachment 2 for revised electrical.
   F. Add receptacles and data outlets in new MFD Room 280K. See attached sheet E2.2A, attachment 2 for new room location and revised electrical.
   G. Move receptacle north of speaker strobe in Benchwork 201F to south of speaker strobe. See attached sheet E2.2A, attachment 2 for location of receptacle.
7. Sheet E3.3
   A. Change how the 120 volt circuits under the exhaust hoods are shut down in Teaching Kitchen 109 and 110. See attached sheet E3.3, attachments 1 and 2.
   B. In Teaching Kitchen 110, the following food service equipment shall be “roughed-in” only. Rough-in includes conduit, boxes, and blank coverplate. Delete wiring and circuit breaker for items: 205 and 206. Provide pullstring in conduit.
   C. In Teaching Kitchen 109, the following item 205 shall be “roughed-in” only. Rough-in includes conduit, boxes, and blank coverplate. Delete wiring and circuit breaker.
   D. In Teaching Kitchen 109, the following item 206 under the east hood shall be “roughed-in” only. Rough-in includes conduit, boxes, and blank coverplate. Delete wiring and conduit. Item 206 under west hood shall be installed.
8. Sheet E3.4
   A. Move horn type speaker in Mech/Elec 281M to above new door location. See attached sheet E3.4, attachment 1 for revised electrical.
   B. Move wall phone and receptacle in Mech/Elec 281M to new wall location. See attached sheet E3.4, attachment 1 for revised electrical.
9. Sheet e4.2
   A. Change Kitchen Hood #1, #2, #3, #4 fire suppression system one line diagrams. See attached sheet E4.2, attachments 1 and 2.
10. Sheet E5.1
    A. Light fixtures #76, #77, and #78 have been added. See attached sheet E5.1, attachment 1 for revised light fixture schedule.
11. Sheet E6.1, E6.2, E6.3
    A. The following are minimum Ampere Interrupting Capacity for all panels:
       i. Switchboard “MDG”: 42K
       ii. Panels:

GHA:	14K	GH4:	22K	GL7:	13K	GL8:	17K
GHB:	14K	GH4A:	22K	L7A:	10K	L8A:	13K
GHC:	14K	GL4:	26K	L7B:	10K	L8B:	10K
GHD:	14K	L4A:	22K	L7C:	10K	L8C:	10K
GHE:	14K	L4B:	22K	L7D:	10K	GL2:	22K
GH3:	28K	L4C:	10K	L7E:	10K	L2A:	22K
GH3A:	22K	GH5:	22K	GH6:	22K	L2B:	10K
GL3:	22K	GL5:	16K	GL6:	22K	L2C:	10K
L3A:	22K	L5A:	22K	L6A:	22K	L2D:	10K
L3B:	22K	L5B:	22K	L6B:	22K	L2E:	10K
				L6C:	22K	DC:	10K
				L6D:	10K		

       iii. Switchboard “MDH”: 42K
       iv. Panels:

HHA:	29K	HHF:	14K	HHK:	14K	X1:	10k
HHB:	14K	HHG:	14K	HHL:	14K	X2:	10k
HHC:	14K	HHH:	14K	HHM:	14K	X3:	10k
HHD:	14K	HHI:	14K	MDX:	26k	X4:	10k
HHE:	14K	HHJ:	14K			X5:	10k
						XL1:	10k
						XL2:	10k

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12. Sheet 6.1
    A. Panels “L1B”, “L1C”, “L1D” and “L1E” have been revised. See attached sheet E6.1, attachment 1 for revised panel schedules.
13. Sheet E6.2
    A. Panels “L7C”, “L6B”, and “L5B” have been revised. See attached sheet E6.2, attachment 1 for revised panel schedules.
    B. Panel “L6D” shall be rated for 120/208V, 3 phase.
14. Sheet E7.2
    A. Provide a SPD for Panel “MDX”. SPD shall be Square “D” TVS4EMA16A or equal.

END OF ADDENDUM

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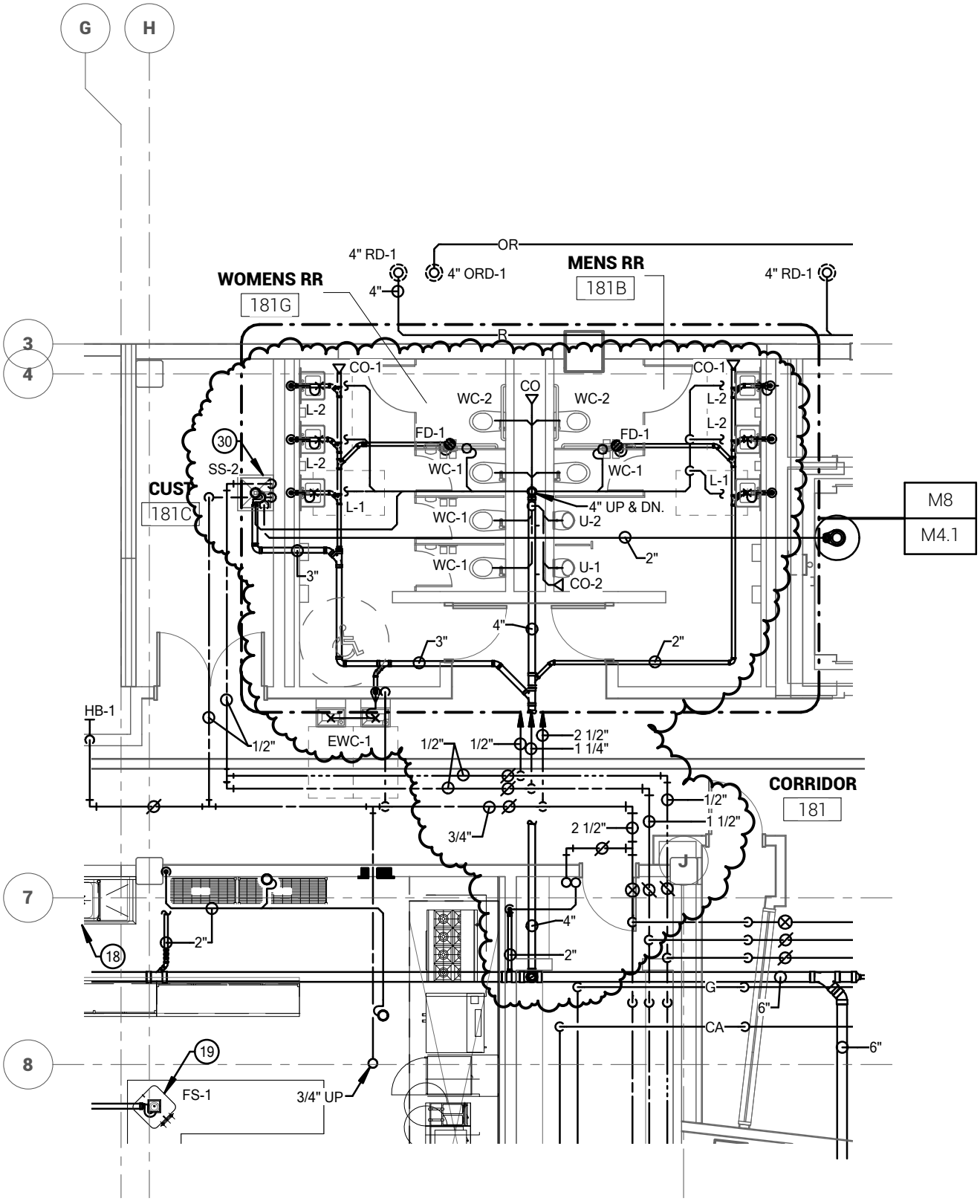

THE CAREER ACADEMY
FIRST FLOOR AREA A - PLUMBING

SCALE:1/8" = 1'-0" | JCT

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ETI ADD #2

SHEET
M1.1A

ATTACHMENT NO.
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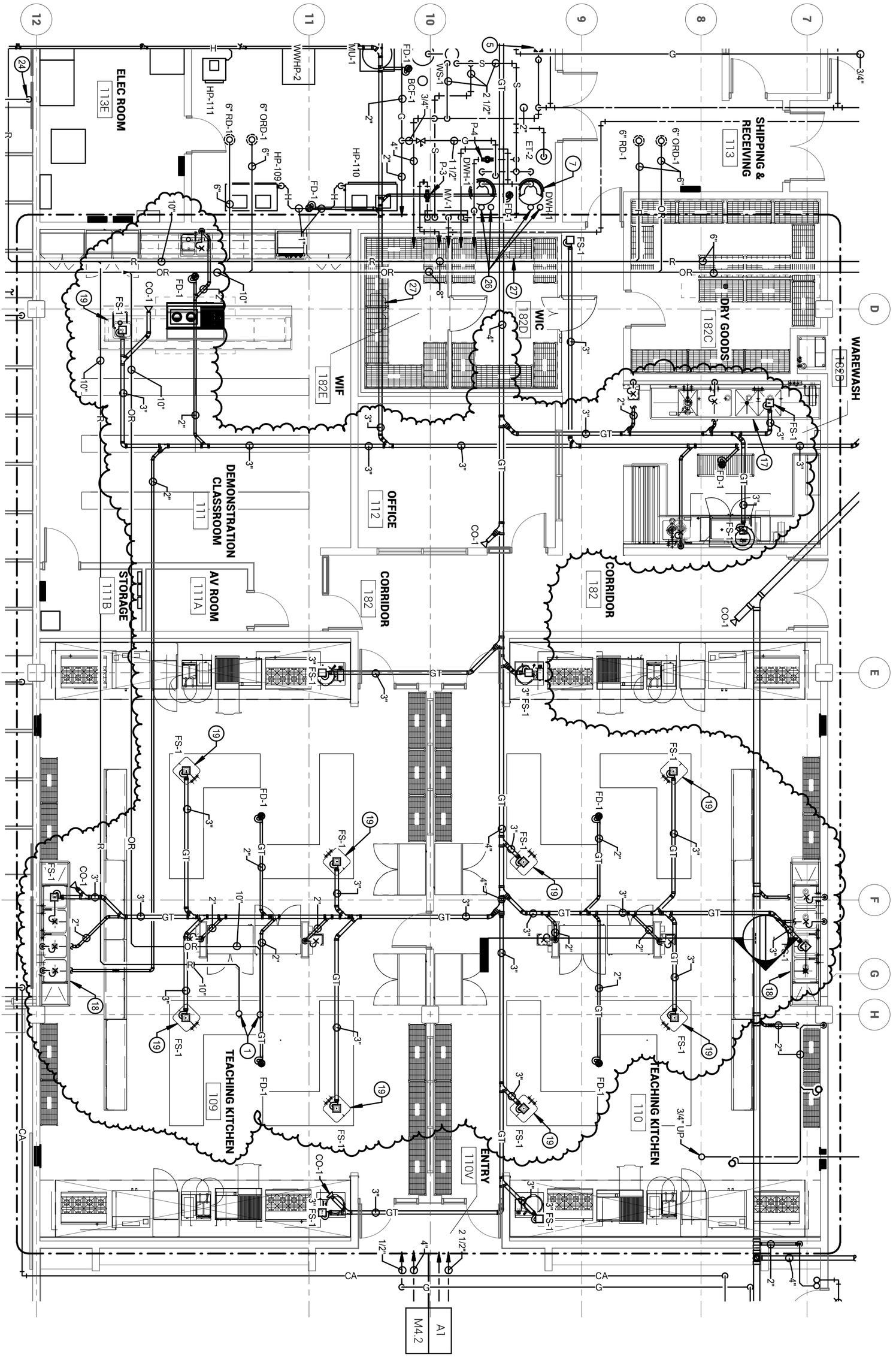

THE CAREER ACADEMY
FIRST FLOOR PLAN AREA A - PLUMBING

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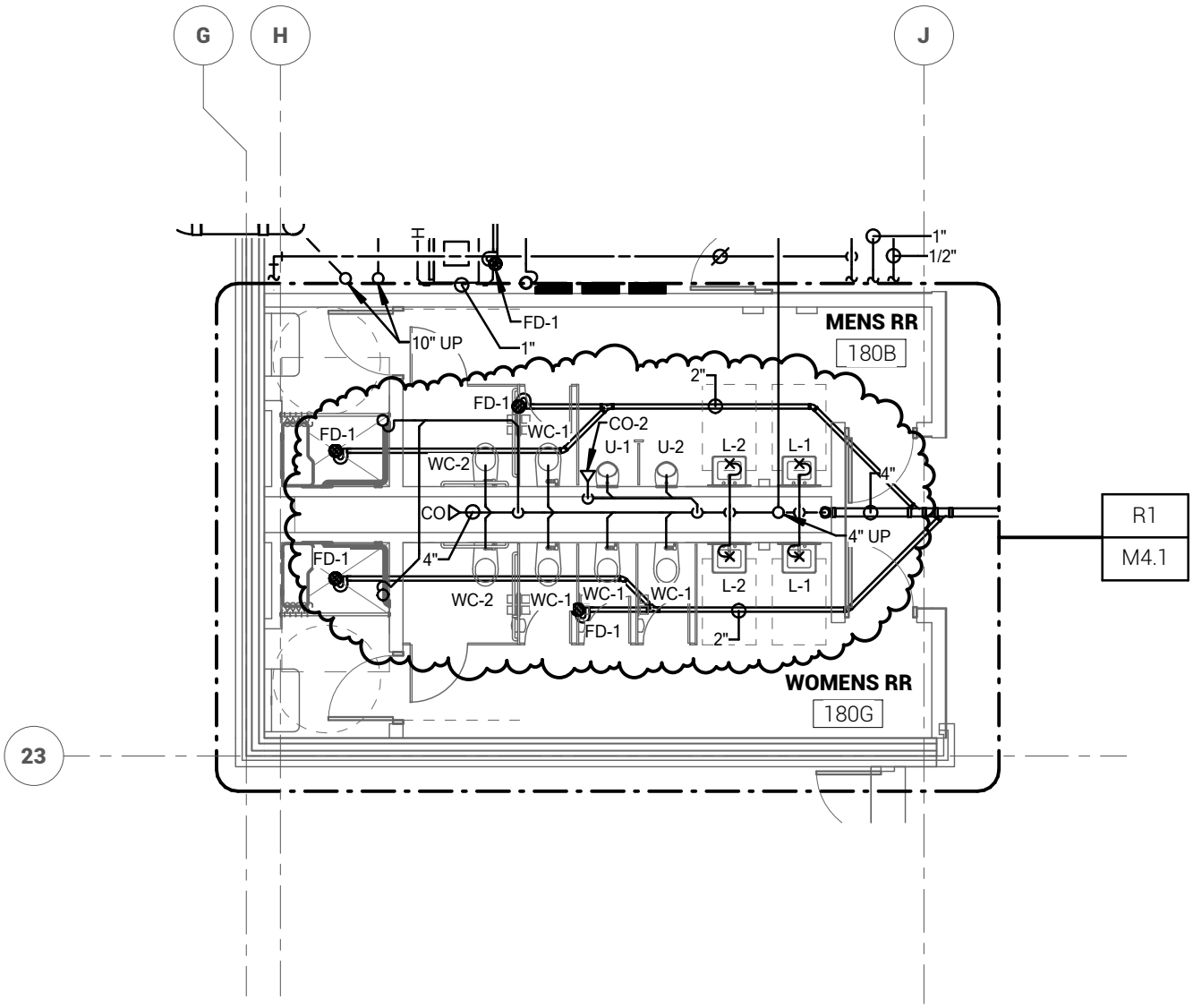
ETI ADD #2
SHEET
M1.1A
ATTACHMENT NO.
2
06/19/2014



THE CAREER ACADEMY FIRST FLOOR AREA B - PLUMBING

SCALE:1/8" = 1'-0" | JCT

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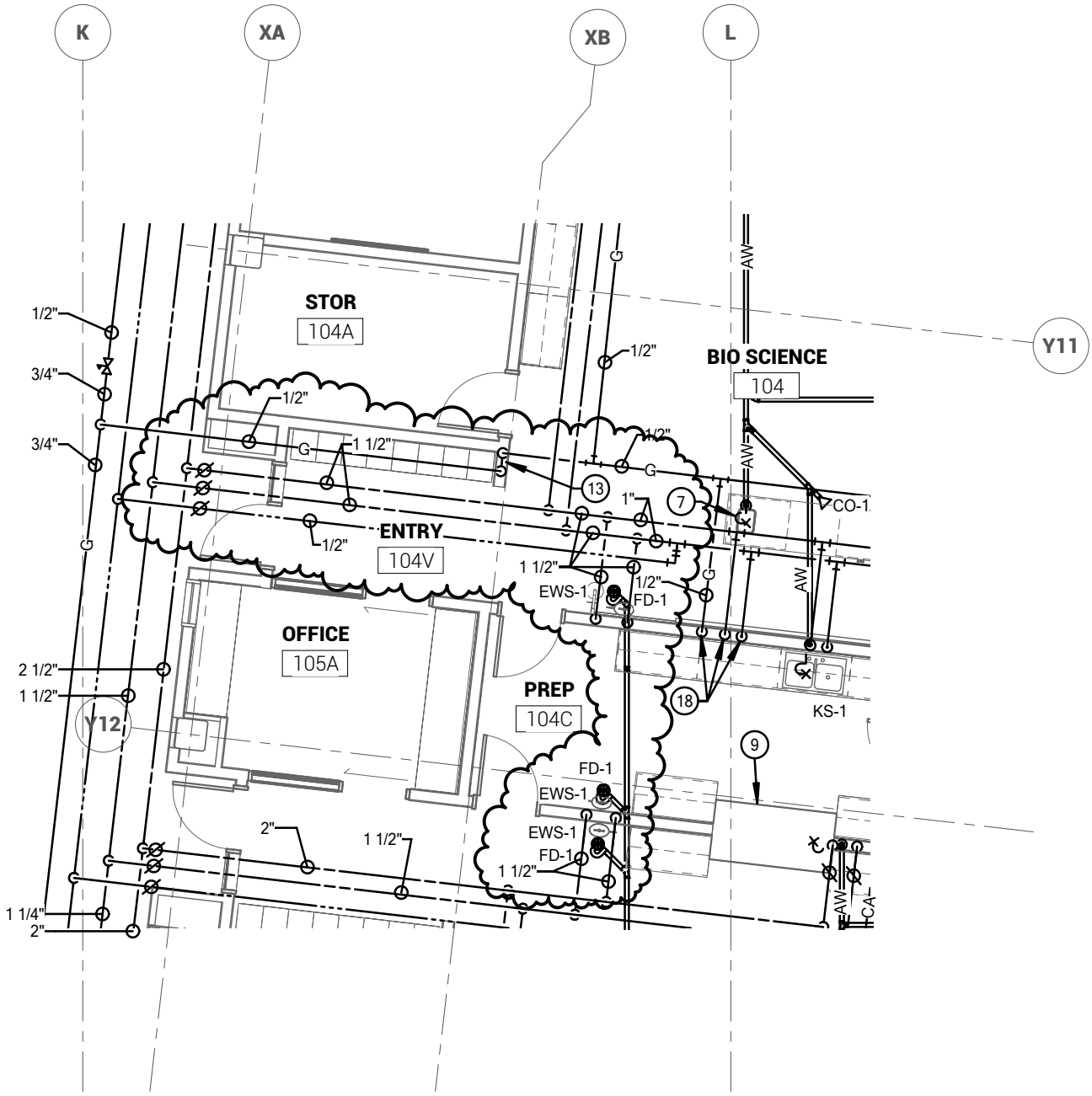
ETI ADD #2

SHEET
M1.1B

ATTACHMENT NO.
1

06/19/2014



THE CAREER ACADEMY
FIRST FLOOR PLAN AREA B - PLUMBING

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M1.1B

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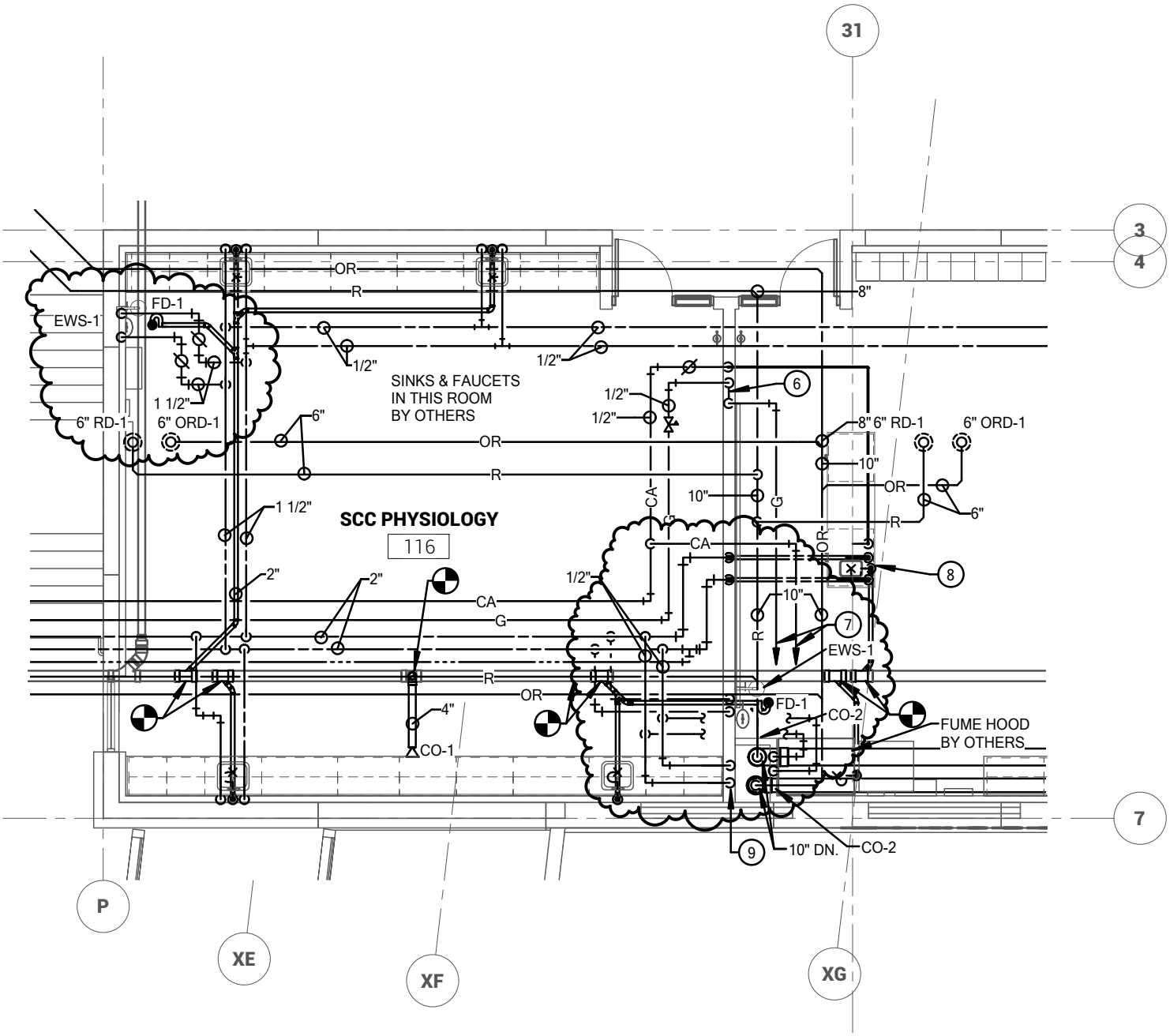

THE CAREER ACADEMY
FIRST FLOOR PLAN AREA C - PLUMBING

SCALE:1/8" = 1'-0" | JCT

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ETI ADD #2

SHEET
M1.1C

ATTACHMENT NO.
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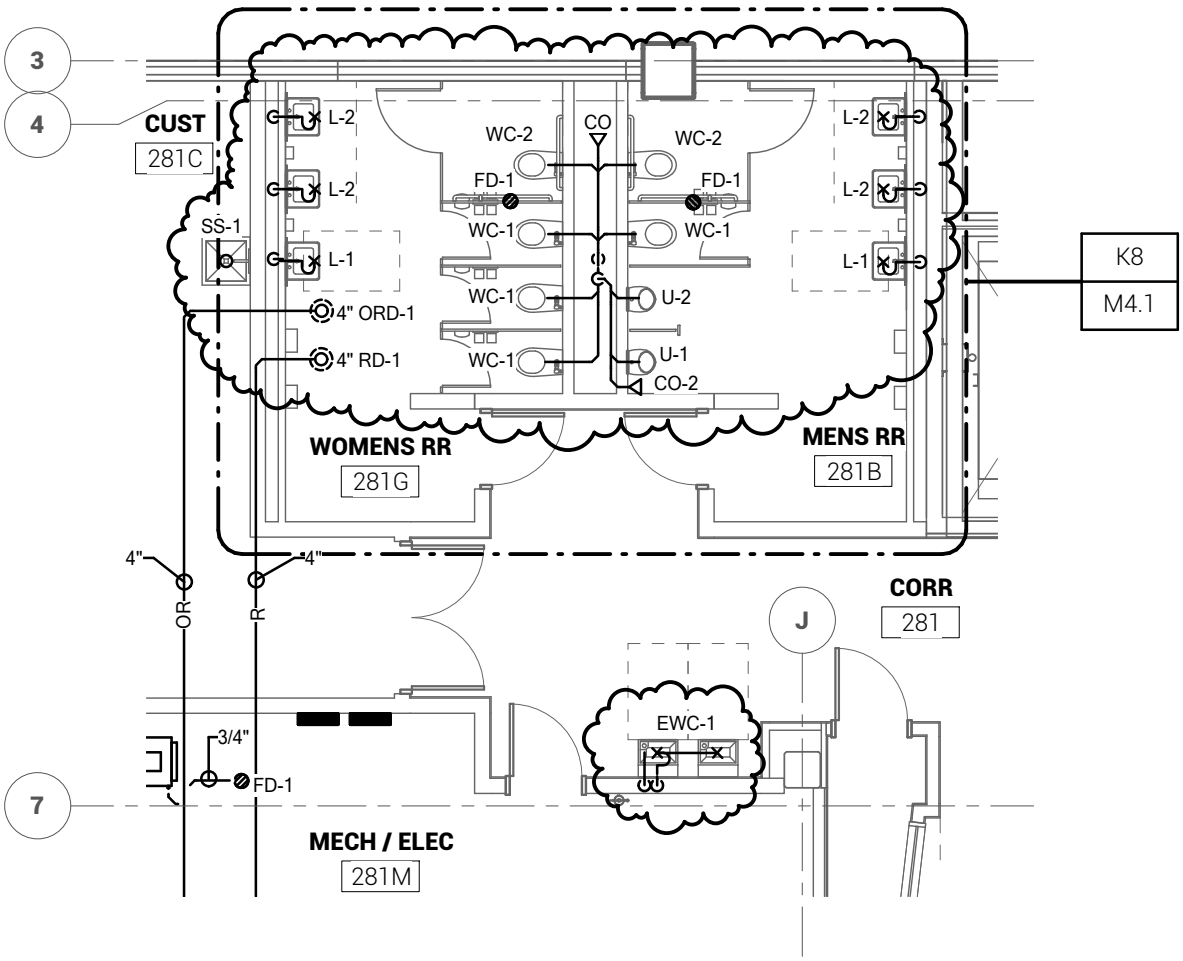
06/19/2014



THE CAREER ACADEMY SECOND FLOOR AREA A - PLUMBING

SCALE:1/8" = 1'-0" | JCT

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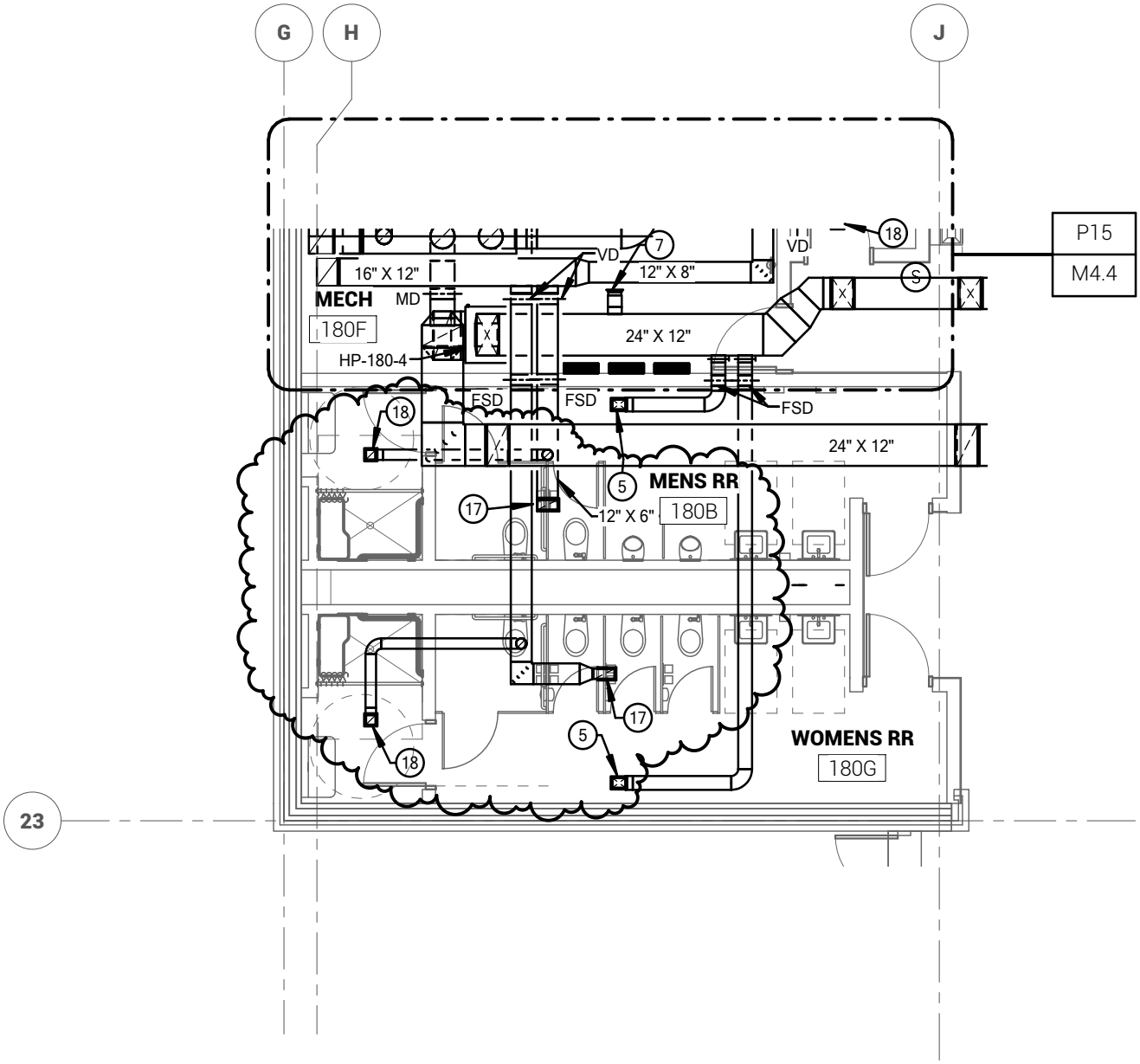
ETI ADD #2

SHEET
M1.2A

ATTACHMENT NO.
1

06/19/2014



THE CAREER ACADEMY
FIRST FLOOR PLAN AREA B - HVAC

SCALE:1/8" = 1'-0" | JCT

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ETI Project No: 2013-114

ETI ADD #2

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M3.1B

ATTACHMENT NO.
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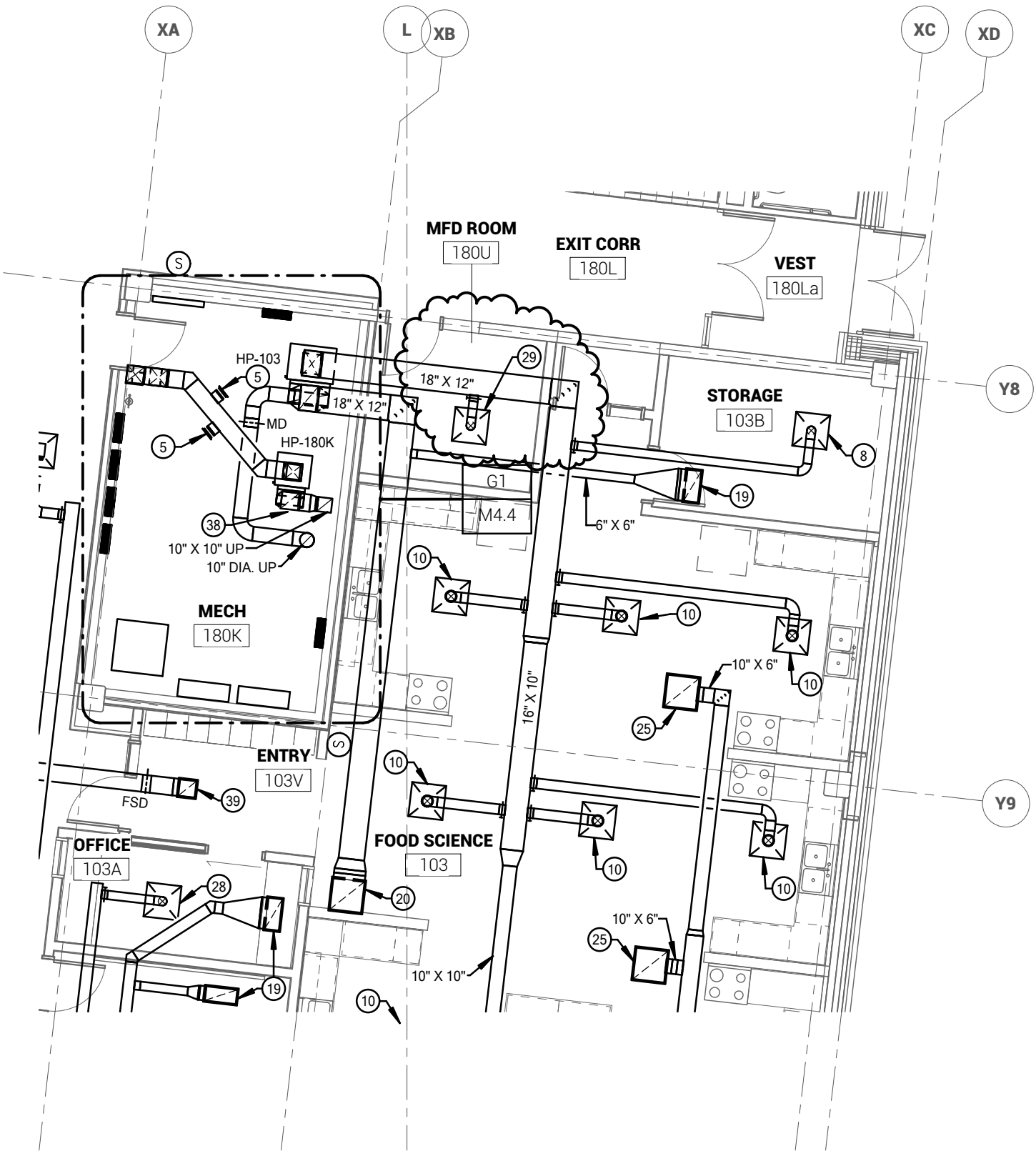
06/19/2014



THE CAREER ACADEMY
FIRST FLOOR PLAN AREA B - HVAC

SCALE:1/8" = 1'-0" | JCT

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ETI ADD #2

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M3.1B

ATTACHMENT NO.
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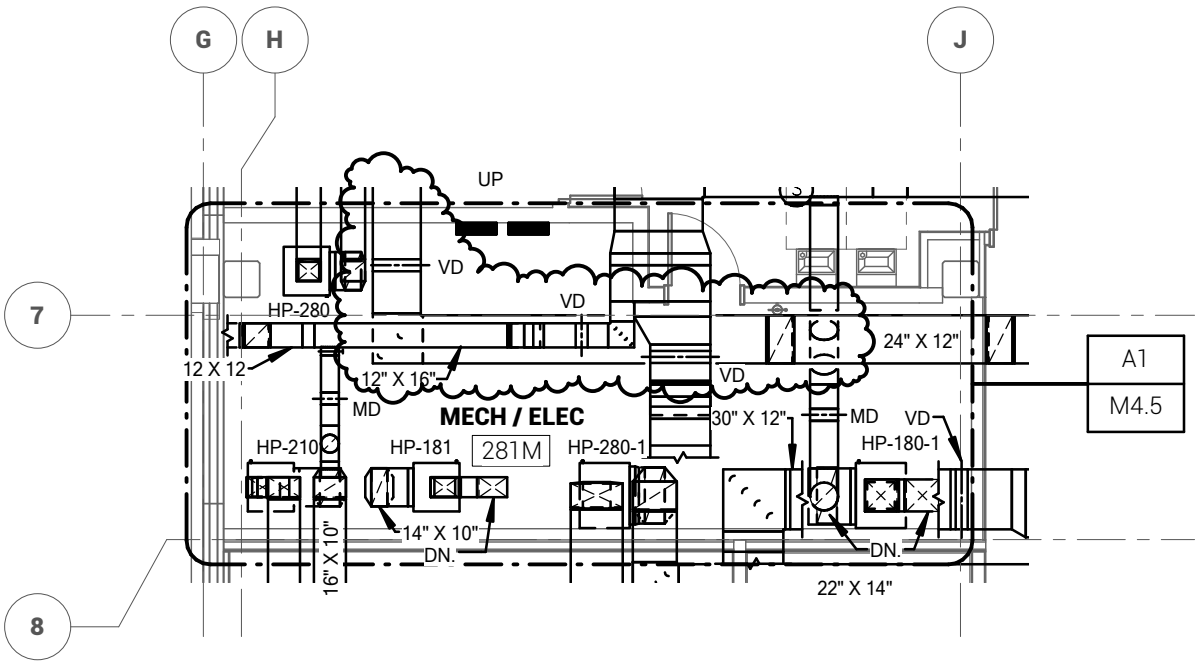

THE CAREER ACADEMY SECOND FLOOR AREA A - HVAC

SCALE:1/8" = 1'-0" | JCT

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ATTACHMENT NO.	1
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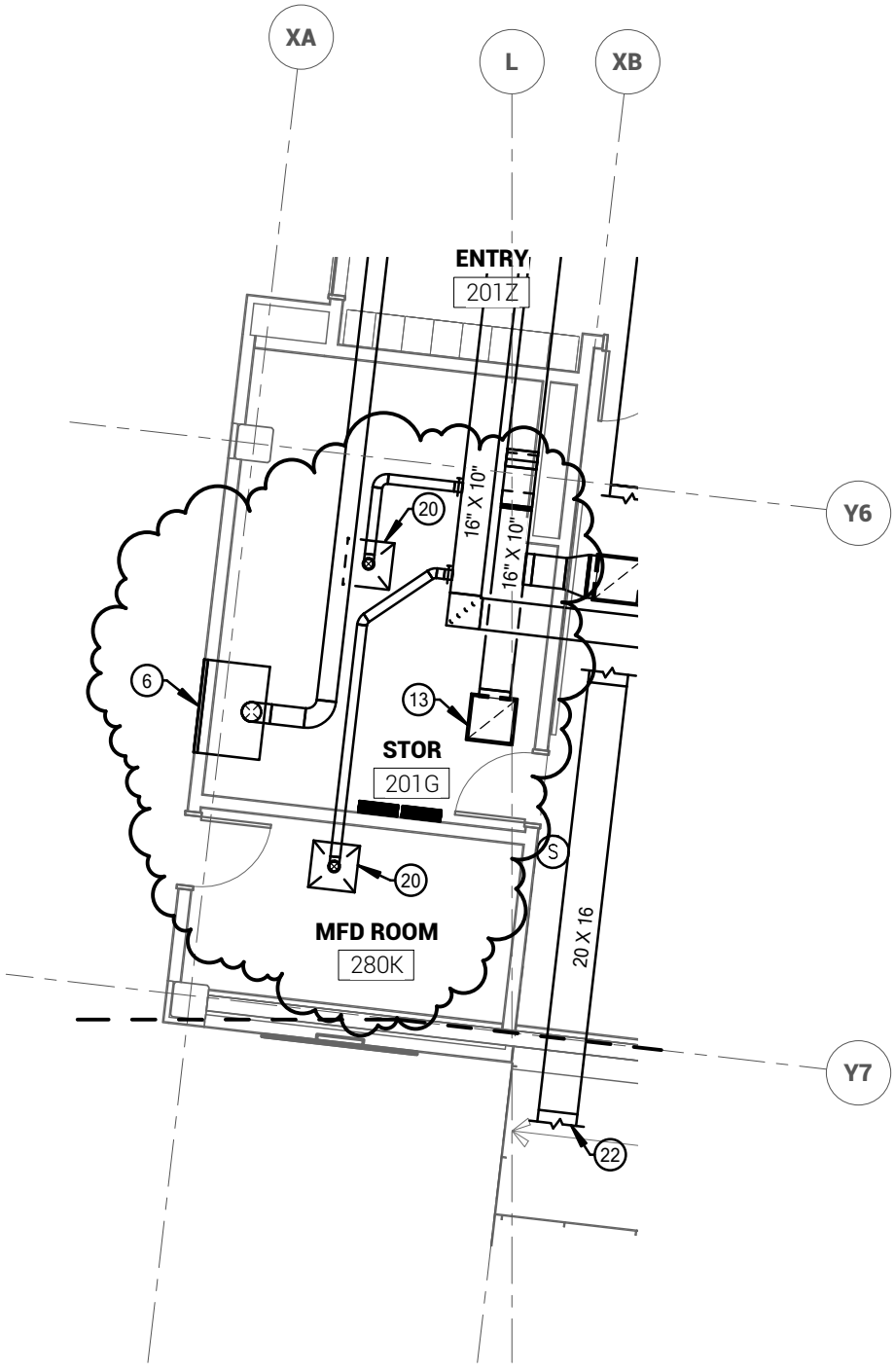

THE CAREER ACADEMY SECOND FLOOR AREA A - HVAC

SCALE:1/8" = 1'-0" | JCT

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M3.2A

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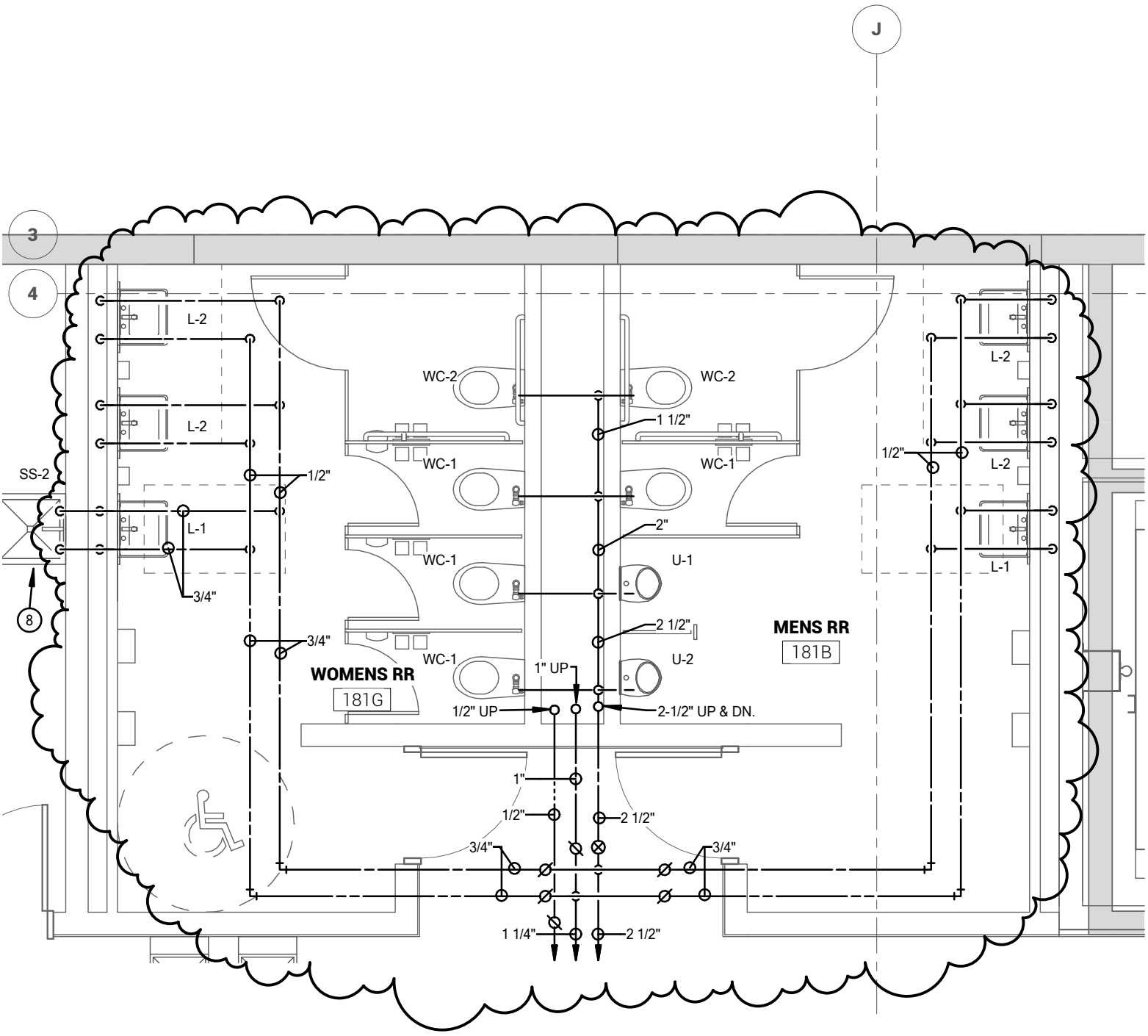

THE CAREER ACADEMY
PARTIAL PLANS WOMENS
181G/MENS 181B DOM. WATER

SCALE:1/4" = 1'-0" | JCT

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ETI Project No: 2013-114

ETI ADD #2

SHEET
M4.1

ATTACHMENT NO.
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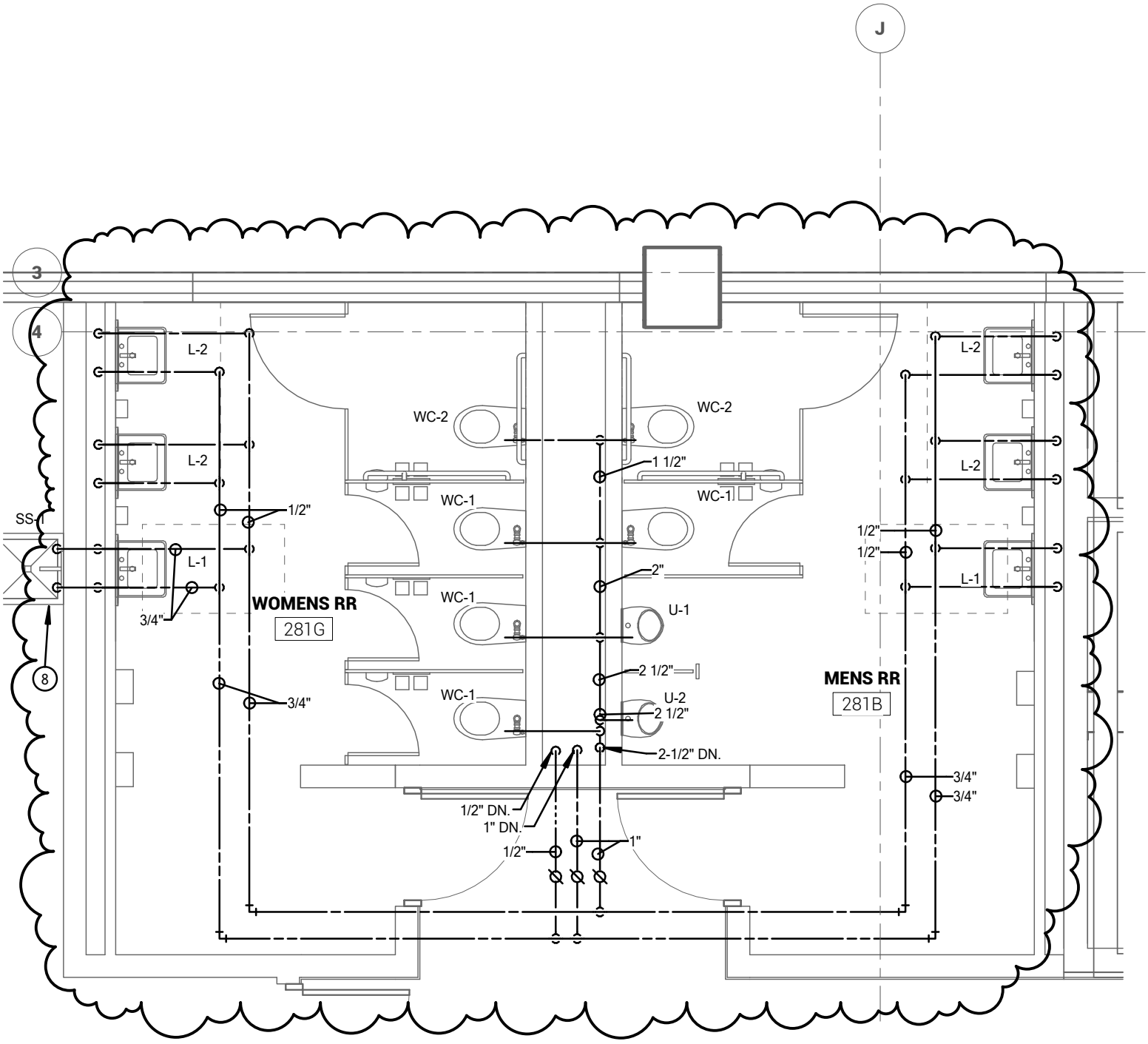

THE CAREER ACADEMY
PARTIAL PLAN WOMENS
281G/MENS 281B - DOM. WATER

SCALE:1/4" = 1'-0" | JCT

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ETI ADD #2

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M4.1

ATTACHMENT NO.
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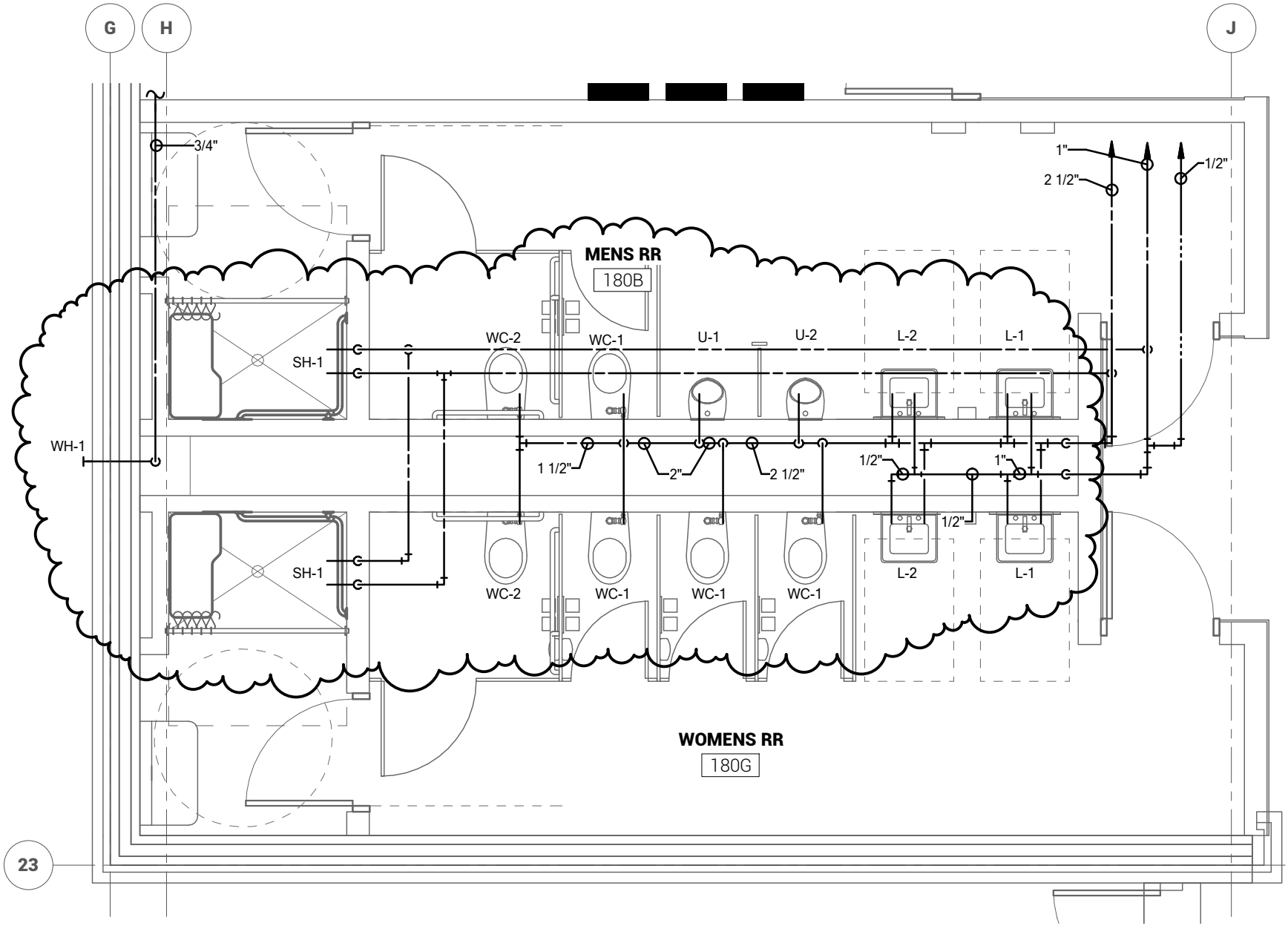
06/19/2014



THE CAREER ACADEMY
PARTIAL PLANS WOMENS RR 180G/MENS RR 180B - DOMESTIC WATER

SCALE:1/8" = 1'-0" | JCT

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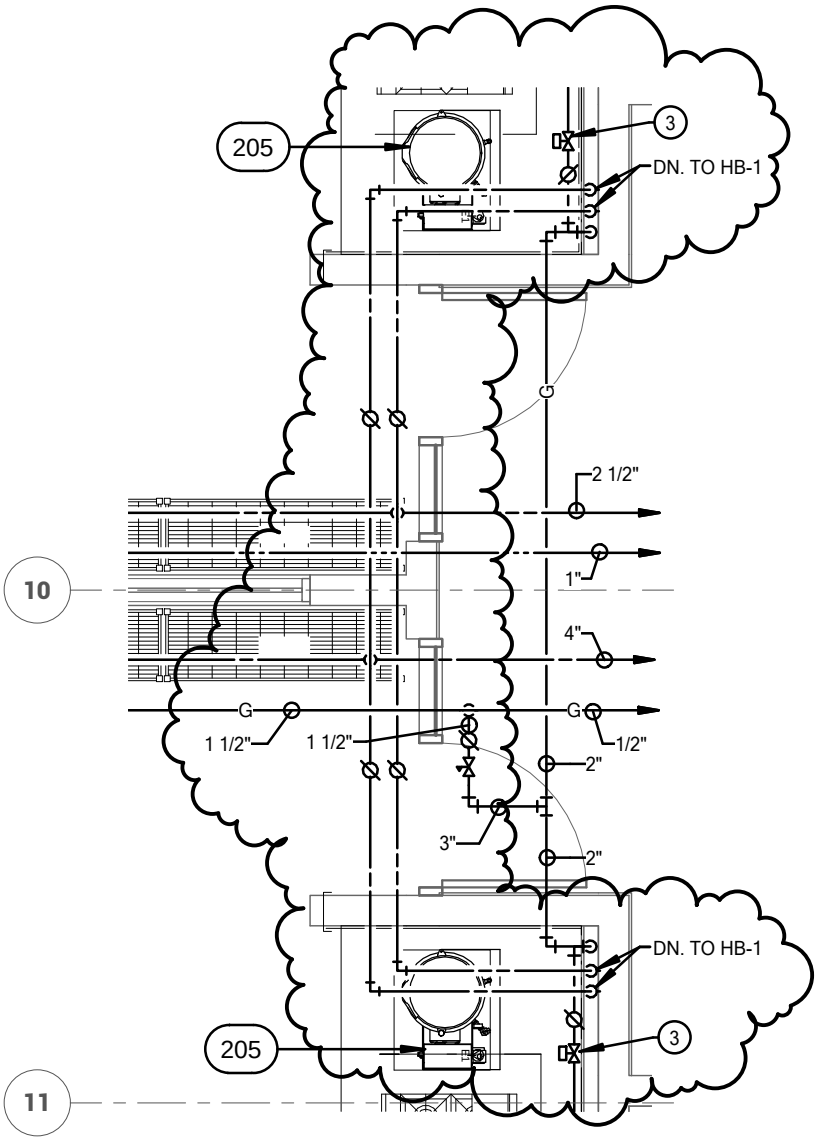
ETI Project No: 2013-114

ETI ADD #2

SHEET
M4.1

ATTACHMENT NO.
3

06/19/2014



THE CAREER ACADEMY
KITCHEN PLAN - ENLARGED

SCALE:1/4" = 1'-0" | JCT

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ETI ADD #2

SHEET
M4.2

ATTACHMENT NO.
1

06/19/2014

PLUMBING FIXTURE SCHEDULE

MARK	FUNCTION	MANUFACTURER AND MODEL	WASTE	VENT	CW	HW
CW-1	CLOTHES WASHER	GUY GREY MODEL T-200-TP.	2"	1-1/2"	1/2"	1/2"
SH-1	SHOWER	ACORN APEX TYPE 5 450 SERIES BARRIER FREE SURFACE MOUNTED SHOWERS. 18 GAGE TYPE 304 STAINLESS STEEL WITH SATIN FINISH, WITH SHOWER HEAD, HAND SHOWER WITH 60" HOSE, DIVERTER VALVE, GRAB BARS. PROVIDE MATCHING STAINLESS STEEL SHROUD AND EXTEND UP TO CEILING. MOUNT SHOWER HEAD AT 6'-0" AFF. PROVIDE FLOOR DRAIN (FD-1) FOR DRAINAGE.	2"	1-1/2"	1/2"	1/2"

THE CAREER ACADEMY
MECHANICAL SCHEDULES AND SYMBOLS

SCALE: NONE | JCT

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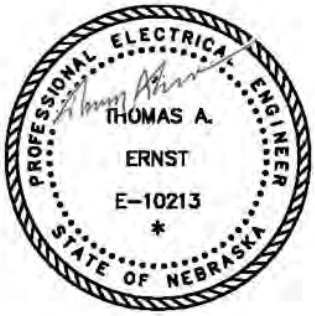
ETI ADD #2
SHEET
M5.3
ATTACHMENT NO.
1
06/19/2014



SECTION 260101

COMMON WORK ELECTRICAL

PART 1 GENERAL

1.01 SCOPE

A. This Section shall apply to all Contractors and Subcontractors that are responsible for Division 26, 27, and 28.

B. The work covered by this Section of the Specifications consists of furnishing all labor and materials (unless otherwise specified) and in performing all operations necessary for the installation of the complete electronic and electrical system as required by terms and conditions of the Contract. The work shall also include the completion of such details of electrical work not mentioned or shown which are necessary for the successful operation of all electrical and electronic systems described on the drawings or required by these Specifications.

C. The work in this Contract involves the installation of new work as well as work on the Site. It shall be this Contractor's responsibility to visit the site so that he may ascertain all existing conditions which may affect the work under his Contract. No additional compensation will be granted for additional work required by this Contractor for his failure to visit the jobsite and determine existing conditions. This Contractor shall provide all labor and materials required to complete the Plans and Specifications for a ready to operate installation.

1.02 DEFINITIONS

A. Where the terms "provide" or "shall be" are used in the Specifications or Plans, they shall be taken to mean, "the Electrical Contractor shall furnish and install".

B. Where the word "electrical" is used in these Specifications and Plans it shall mean both "electrical and electronic" as the case may be.

C. The term "Contractor" used throughout Division 26, 27, and 28 of these Specifications shall be understood to mean the Electrical Contractor.

D. The term "as shown on the drawings" has been omitted from this Specification, but it is shall be understood that the drawings and Specifications compliment one another and items specified shall also meet the criteria set forth on the drawings.

1.03 DRAWINGS

A. The drawings which constitute a part of this Contract indicate the general arrangement of circuits and outlets, locations of switches, panelboards, and other work. The Drawings and Specifications are complimentary each to the other, and what is called for by one shall be binding as if called for by both. Data presented on these drawings are as accurate as planning can determine, but accuracy is not guaranteed and field verification of all dimensions, locations, levels, etc., to suit field conditions is required. Review all Architectural, Structural, and Mechanical Plans and adjust all work to conform to all conditions shown therein. The Architectural Drawings shall take precedence over all other drawings as to dimensions.

1.04 CONFLICTS

A. Any conflict noted between (1) the Drawings; (2) Specifications; or (3) Drawings and Specifications; or (4) between Plans and Codes or Ordinances or (5) between the Plans or Specifications and Manufacturer's installation recommendations shall be immediately brought to the attention of the Architect for clarification. If conflicts are discovered prior to bidding and there is not sufficient time to obtain a clarification from the Architect prior to bidding, the Contractor shall bid the larger quantity or better quality of work. All conflicts shall be brought to the attention of the Architect when discovered and before installation.

B. Contractor shall be responsible to field measure and confirm mounting heights and locations of electrical equipment with respect to counters, radiation, etc. Do not scale distances off the Electrical Plan. Use actual building dimensions from the Architectural Drawings.

1.05 WORK IN EXISTING BUILDINGS

A. All work in existing buildings, indicated on the drawings or specified herein, shall be executed with a minimum amount of interference with the normal activities of the occupants of the building. No services or utilities shall be interrupted without previous scheduling time of the same with the Owner and receipt of his approval. Changing of the electrical system, telephone system, and other major events shall be arranged and be agreeable with the Owner to length and time of downtime. All work shall be scheduled in advance with the Owner and shall not proceed without the Owner's written approval.

B. The Owner shall be notified before starting to weld or cut. Fire extinguishers shall be immediately accessible when welding or cutting with an open flame or arc. Welding or cutting with an open flame or arc must be stopped in a timely fashion before leaving premises.

C. Noisy operations such as those involving use of air hammers, etc., in demolition, or cutting of openings shall be scheduled with the Owner.

D. The Owner will continue to occupy the building and carry on normal activity. Each Contractor shall protect the occupied areas from dust, smoke, etc., by a method approved by the Owner/Engineer.

E. Toilet facilities to be used by construction personnel shall be strictly limited to facilities designated by the Owner. Each Contractor shall instruct his personnel to keep the facilities clean. Failure to do so will cause the Contractor to make other arrangements.

F. If the Owner so requires, the Contractor shall provide portable toilets, located as approved by the Owner.

G. Each Contractor shall be responsible for all cutting and patching required for his work. Patching shall be done in a neat workmanlike manner by craftsmen skilled in the trade involved and shall be prepared to receive paint. Pipe openings through floors and walls may be drilled up to 1" but shall be cored over 1".

1.06 EXAMINATION OF SITE

A. Prior to submitting a bid, this Contractor shall visit the site of the job and ascertain all conditions affecting the proposed electrical installation and make provisions as to the cost thereof. No additional compensation will be granted for additional work required by this Contractor for failure to visit jobsite and determine existing conditions. The Contractor shall verify location and size of existing systems that are to be connected to, routed around, or extended from.

B. The Contractor shall verify with the City and Utility Companies, and Owner, etc., the location of any existing overhead or buried utilities on or near the site. The Contractor shall verify requirements for connecting into existing utilities with the City and Utility Company, and Owner and connect into as required. Failure to determine existing conditions or the nature of new connections will not be considered a basis for the granting of additional compensation.

1.07 PRIOR APPROVAL

A. The Contractors attention is directed to the requirement of "prior approval" for materials to be supplied in this project if they are not specifically designated as a specified manufacturer or approved equal.

B. Prior approval requires that literature be submitted to the Architect a minimum of ten (10) days prior to the bidding date. This submitted material shall be informative enough to allow the Engineer to give approval. This approval is a tentative approval and does not imply anything but approval to bid.

1.08 SHOP DRAWINGS

A. The Contractor shall submit Shop Drawings of all items of equipment listed in this Specification and on the Drawings. Shop Drawings shall also include light fixture, wiring devices, disconnect switches, panels, etc. provided under this Contract. Shop Drawings shall be submitted whether they are the exact specified manufacturer's numbers or a different manufacturer and number.

B. Where an item or portion of the equipment differs from the Specifications, this fact shall be called to the attention of the Engineer to permit evaluation of the alternate item. Approval of the equipment will be only to the degree that the information is shown on the submittal and it shall not be construed to mean approval of items, materials, or details not shown but which are required by the Specification or Plans.

C. Shop Drawings will be approved to the extent of the information shown on the submittal. Approval of an item of equipment cannot be construed to mean approval for components of that item of equipment for which no information is furnished to show compliance with Plans and Specifications. Where additional work, controls, wiring, components, etc., are required to install and or make an operable system, or such controls, wiring components etc., are required by the Plans and Specifications, the approval of these drawings shall not relieve the Contractor from furnishing all items and the quantity required.

D. Shop Drawings shall indicate manufacturer's delivery time for the item after receipt of approval by the Engineer.

1.09 USE OF OTHER THAN SPECIFIED EQUIPMENT

A. All equipment shown on the drawing shall be specified equipment. If the Contractor uses different approved equipment than what was specified, all additional work or components required to make an operable system shall be made without additional cost to the Owner. The Contractor shall be held responsible for selecting different approved equipment so that equipment will fit into the available space provided for the specified equipment.

1.10 PERMITS AND LICENSES

A. Obtain and pay all permits and licenses required and furnish the Architect for the Owner a certificate of final inspection and approval from the Local Authority having jurisdiction over this electrical installation.

1.11 WARRANTY

A. The entire electrical system installed under this Contract shall be left in proper working order. Replace, without additional charge, any work or material (except lamps and materials not furnished by the Electrical Contractor) which develops defects from ordinary wear and tear within one (1) year from the date of acceptance. All new material and equipment shall be warranted against defects in composition, design, or workmanship. Lamps shall be warranted for their published life. Warranty certificates shall be furnished on special equipment.

1.12 PROGRESS OF WORK AND DOWNTIME

A. Order the progress of the electrical work so as to conform to the progress of the work as scheduled in the Specifications and complete the entire installation as soon as the condition of the building will permit. Any cost resulting from defective or ill-timed work performed under this Section shall be borne by this Contractor.

1.13 COORDINATION

A. The Contractor shall confirm dimensions noted and locations of General and Mechanical Contractor's equipment as well as equipment to be furnished by the Owner. Verify all equipment and motor sizes, voltage and connection requirements for equipment furnished by others and wired under this Contract before roughing-in, and provide proper branch circuits and connections as recommended by equipment manufacturers. Coordinate with the other contractors to avoid interference with ductwork, structural members, grilles, cabinetwork, etc. Motors shall not be connected to until verification has been made that motor running protection exists.

B. Where the drawings indicate fixtures and equipment which are to be furnished by others (or Owner) and which require connections to the electrical systems, the Electrical Contractor shall furnish and install all rough-in of conduit, boxes, conductors, disconnect switches, plugs with pigtails, receptacles etc., which are required for the final connections. Rough-in locations and required connections shall be determined from the equipment itself or from the equipment

manufacturer's shop drawings. Final connections to the equipment shall be made by this Contractor.

1.14 CUTTING AND PATCHING

A. Each Contractor shall be responsible for all cutting and patching required for his work. Carefully lay out all work in advance and where cutting, channeling, chasing, or drilling of building surfaces is necessary for the proper installation of electrical equipment, carefully perform this work in a manner approved by the Architect. Patching shall be done in a neat workmanlike manner by craftsmen skilled in the trade involved and shall be prepared to receive paint. Damaged surfaces shall be repaired at no cost to the Owner. Concrete walls shall be cut only with rotary type drilling tools. Openings through floors and walls may be drilled up to 1" but shall be cored over 1". Electrical equipment shall not be cut with torches, and shall be joined only by bolting (i.e., do not weld wireways to panels, etc.).

1.15 INDUSTRY STANDARDS AND CODES

A. The complete installation shall comply with the applicable Local and State wiring ordinances, with the regulations of the latest edition of the National Electrical Code of the National Fire Protection Association (supplements and official interpretations included) and with the requirements of the Power and Telephone Companies furnishing service to this installation. The drawings and specifications take precedence when they are more stringent than codes, ordinances, or statutes in effect, and vice versa. In addition, the following latest industry standards, specifications, and codes are minimum requirements.

1. The National Electrical Manufacturer's Association Standards
2. The National Electrical Safety Code
3. Underwriter's Laboratories, Inc., Standards
4. Life Safety Code, NFPA No. 101
5. International Building Code
6. State Health Department
7. State Building Codes
8. State Fire Codes
9. State Energy Codes
10. City Building Codes
11. City Electrical Codes

B. All work shall be in accordance with State and Local Codes and requirements of Local Utilities. Where the applicable Building Codes and the drawings or specification do not agree, the code shall take precedence, but only in cases where what is shown on the drawings or required by the specifications violates the code. Where there is a Code or Utility Company requirement and drawing or specification discrepancy the Code shall have precedence only when it is more stringent than the item specified or shown on the drawings. Items that are allowable by the Local Building Codes, which are less stringent than that required by the specifications or the drawings the less stringent work, shall not be substituted.

1.16 RESPONSIBILITY OF THE CONTRACTOR

A. The Contractor shall have a State Class "A" Electrical License and shall provide journeymen to work as superintendents and/or foremen on the project. All workmen shall be skilled in their trade or working under someone who is skilled in the trade and responsible for the work involved.

B. The Contractor shall be totally responsible for his portion of the work from the date of his Contract until final acceptance of the building by the Owner, and must repair all damage sustained without cost to the Owner regardless of cause. The Contractor shall use proper care and diligence in bracing and securing all parts of the work against the elements and shall, in all cases, judge as to the amount of protection required. Proper storage of material shall be maintained at all times.

1.17 TEMPORARY LIGHTING AND POWER

A. The Electrical Contractor shall provide electrical wiring and light fixtures for temporary lighting and power in construction areas.

1.18 FIRE AND SMOKE STOPPAGE

A. It shall be the responsibility of this Contractor to maintain the fire and smoke integrity of all walls, ceilings, floors etc., through which his work passes through or into. Fire and smoke barriers shall be provided in and around as required by Codes.

B. Where holes are required to be patched, or conduit, piping, ducts, etc., are required to be patched around, it shall be filled with a material that is UL Classified Standard 1479 for this use and Factory Mutual System approved.

1.19 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall obtain and submit, to the Architect three (3) copies of descriptive literature, maintenance and operation data, parts lists of each item of electrical equipment with names and address of manufacturer and Local Representative, and special operation procedures furnished and installed under this Contract.

B. Manuals shall be typed and bound in 3-ring hardback binders. All three (3) Manuals shall be turned over to the Engineer for approval and distribution to the Owner. Manuals shall be delivered no less than 30 days prior to final acceptance of the building.

C. Manuals shall include, but not be limited to, the following:
   1. Names, addresses and telephone numbers of the manufacturer and local representative who stocks or furnishes repair parts for all items of equipment. This shall be typed on a single page in front of the binder. This Contractor shall not list himself unless he is a listed representative by the Manufacturer's Company and stocks parts.
   2. Manufacturer's Manuals and Parts Lists. Operating and Maintenance Manuals and parts lists furnished by equipment manufacturers shall be included in the Manual.
   3. Shop Drawings. One (1) copy of each approved shop drawing shall be included in the Manual.
   4. Layout drawings of special systems including location of outlets, all devices, components, etc. The system to be included, but not limited to, the following systems:
      a. Voice and Data System
      b. Fire alarm system
      c. Intercom system
   5. Provide index at the front of the manual.

1.20 ACCESS TO EQUIPMENT

A. All control devices, specialties, pull boxes, disconnect switches, and similar equipment shall be so located as to provide for easy access for operation, repair and maintenance. Access shall conform to Local Electric Codes. Access doors shall be provided if devices are concealed.

1.21 TESTS

A. At the completion of his work, the Contractor shall perform the following tests in the presence of the Architect.
   1. Test for short circuits and grounds.
   2. Test to prove correct operation of all equipment.
   3. Check for balance of load on phases, and connect load to balance as closely as possible. Should the Power Company disclose any unfavorable conditions or reactions on the service, the Contractor shall make changes as may be suggested to properly balance the load.

1.22 CLEAN-UP

A. The Contractor shall remove all rubbish and debris resulting from his work daily and shall leave equipment that he installed clean and ready for operation.

1.23 RECORD DRAWINGS

A. Maintain a clean, undamaged set of blue or black line whiteprints of Contract Drawings. Mark the set to show the actual installation where the installation varies from the work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
   1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the work.
   2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
   3. Note related Change Order numbers where applicable.
   4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dated and other identification on the cover of each set.
   5. Turn Record Drawings over to the Owner with the Operation and Maintenance Manuals.

END OF SECTION

SECTION 260501
ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 RELATED REQUIREMENTS

A. Section 017000 - Execution and Closeout Requirements: Additional requirements for alterations work.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that abandoned wiring and equipment serve only abandoned facilities.

B. Demolition drawings are based on casual field observation and existing record documents.

C. Report discrepancies to Architect before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings to be removed.

B. Coordinate utility service outages with utility company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Existing Electrical Service: Maintain existing system in service. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
   2. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove, relocate, and extend existing installations to accommodate new construction.

B. Remove abandoned wiring to source of supply.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

D. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

E. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, poles, and concrete bases and other accessories.

F. Repair adjacent construction and finishes damaged during demolition and extension work.

G. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

END OF SECTION

SECTION 260519
CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Wiring connectors.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 283100 - Fire Detection and Alarm: Fire alarm system conductors and cables.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2009).

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

E. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; National Electrical Manufacturers Association; 2009 (ANSI/NEMA WC 70/ICEA S-95-658).

F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

H. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

I. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

J. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

K. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F (-10 degrees C), unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Nonmetallic-sheathed cable is not permitted.

D. Underground feeder and branch-circuit cable is not permitted.

E. Service entrance cable is not permitted.

F. Armored cable is not permitted.

G. Metal-clad cable is not permitted.

H. Manufactured wiring systems are not permitted.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose indicated.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductors for Grounding and Bonding: Also comply with Section 260526.

H. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.

I. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 75 feet (23 m): 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 150 feet (46 m): 8 AWG, for voltage drop.
         3) 20 A, 277 V circuits longer than 150 feet (46 m): 10 AWG, for voltage drop.

J. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

K. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
   3. Color Code:
      a. 480Y/277 V, 3 Phase, 4 Wire System:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.
4) Neutral/Grounded: Gray.

b. 208Y/120 V, 3 Phase, 4 Wire System:
1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.
4) Neutral/Grounded: White.

c. 240/120 V, 1 Phase, 3 Wire System:
1) Phase A: Black.
2) Phase B: Red.
3) Neutral/Grounded: White.

d. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
1. Feeders and Branch Circuits:
a. Size 10 AWG and Smaller: Solid or stranded. All connectors and lugs shall be listed for use with stranded conductors if stranded conductors are used.
b. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

2.04 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 260526.

C. Wiring Connectors for Splices and Taps:
1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

D. Wiring Connectors for Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
2. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
3. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.

E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

H. Mechanical Connectors: Provide bolted type or set-screw type.

I. Compression Connectors: Provide circumferential type or hex type crimp configuration.

J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as shown on the drawings.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated and routing is not shown, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

D. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
   1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.

G. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.

H. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet (1.5 m) of slack.

I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

K. Make wiring connections using specified wiring connectors.

1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
3. Do not remove conductor strands to facilitate insertion into connector.
4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

L. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

M. Insulate ends of spare conductors using vinyl insulating electrical tape.

N. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

O. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

A. Perform inspection, testing, and adjusting in accordance with Section 014000.

B. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 260526

GROUNDING AND BONDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground bars.

E. Ground rod electrodes.

F. Ground enhancement material.

G. Ground access wells.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

C. Section 265600 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; National Electrical Manufacturers Association; 2007.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Verify exact locations of underground metal water service pipe entrances to building.
2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittals procedures.

B. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding Electrode System:
   1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      a. Provide continuous grounding electrode conductors without splice or joint.
      b. Install grounding electrode conductors in raceway. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
   2. Metal Underground Water Pipe(s):
      a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.
      b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
      c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
   3. Metal Building or Structure Frame:
      a. Provide connection to metal building or structure frame effectively grounded in accordance with NFPA 70 at nearest accessible location.
   4. Concrete-Encased Electrode:
      a. Provide connection to concrete-encased electrode consisting of not less than 20 feet (6.0 m) of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
   5. Ground Rod Electrode(s):
      a. Provide two electrodes unless otherwise indicated or required.
      b. Space electrodes not less than 10 feet (3.0 m) from each other and any other ground electrode.
      c. Where location is not indicated, locate electrode(s) at least 5 feet (1.5 m) outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
      d. Provide ground enhancement material around electrode.
      e. Provide ground access well for each electrode.
   6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
   7. Provide seperate grounding conductor from the generator set to the main building ground bar.
   8. Provide a seperate grounding conductor, size #6 in conduit, from the main building ground bar to each ground bar located at each data rack location.
   9. Main Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
      a. Ground Bar Size: 1/4" x 4" x 16" unless otherwise indicated or required.
      b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.

c. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.

10. Telecommunication Ground Bar (TGB): Provide a 1/4" x 2" x 12" at each data rack location. Extend a #6 AWG conductor in conduit from each TGB back to the Main Ground Bar.

E. Service-Supplied System Grounding:
   1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
   2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.

F. Separately Derived System Grounding:
   1. Separately derived systems include, but are not limited to:
      a. Transformers (except autotransformers such as buck-boost transformers).
   2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
   3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
   4. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
   5. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.

G. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
   2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
   3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
   4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
   5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
   6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
   7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
      a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
   8. Provide insulated bonding conductor to Service Entrance equipment such as CT Cabinets located remotely from the main switchboards.

H. Communications Systems Grounding and Bonding:

1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
    a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
    b. Raceway Size: 3/4 inch (21 mm) unless otherwise indicated or required.
    c. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.

I. Pole-Mounted Luminaires: Also comply with Section 265600.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in addition to requirements of Section 260519:
1. Use insulated copper conductors unless otherwise indicated.
    a. Exceptions:
        1) Use bare copper conductors where installed underground in direct contact with earth.
        2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
2. Size: As indicated.
3. Holes for Connections: As indicated or as required for connections to be made.

E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.

F. Ground Enhancement Material:
1. Description: Factory-mixed conductive material designed for permanent and maintenance-free improvement of grounding effectiveness by lowering resistivity.

G. Ground Access Wells:
1. Description: Open bottom round or rectangular well with access cover for testing and inspection; suitable for the expected load at the installed location.
2. Size: As required to provide adequate access for testing and inspection, but not less than minimum size requirements specified.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 10 inches (250 mm).
4. Cover: Factory-identified by permanent means with word "GROUND".

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as shown on the drawings.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.

D. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

E. Identify grounding and bonding system components in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. Perform inspection, testing, and adjusting in accordance with Section 014000.

B. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

SECTION 260529

HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 260534 - Conduit: Additional support and attachment requirements for conduits.

C. Section 260537 - Boxes: Additional support and attachment requirements for boxes.

D. Section 265600 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.

D. MFMA-4 - Metal Framing Standards Publication; Metal Framing Manufacturers Association; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.05 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel.
   2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
   1. Comply with MFMA-4.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

F. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Secure fasteners according to manufacturer's recommended torque settings.

I. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. Inspect support and attachment components for damage and defects.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 260534

CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Intermediate metal conduit (IMC).

C. PVC-coated galvanized steel rigid metal conduit (RMC).

D. Flexible metal conduit (FMC).

E. Liquidtight flexible metal conduit (LFMC).

F. Electrical metallic tubing (EMT).

G. Rigid polyvinyl chloride (PVC) conduit.

H. Conduit fittings.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 260526 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.

C. Section 260529 - Hangers and Supports for Electrical Systems.

D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

E. Section 312316 - Excavation.

F. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.

G. Section 312323 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); National Electrical Contractors Association; 2006.

F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); National Electrical Contractors Association; 2003.

G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).

H. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; National Electrical Manufacturers Association; 2005.

I. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; National Electrical Manufacturers Association; 2003.

J. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association; 2004.

K. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

M. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

N. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

O. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

P. UL 651 - Schedule 40 and 80 Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

Q. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

R. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
   5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Under Slab on Grade: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
   2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit, intermediate metallic conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
   3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
   4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
   5. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.

D. Embedded Within Concrete:

1. Within Slab on Grade (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
2. Within Slab Above Ground (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
3. Within Concrete Walls Above Ground: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from concrete.

E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

I. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

K. Exposed, Exterior: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit.

L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

M. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
1. Maximum Length: 6 feet (1.8 m).

N. Connections to Vibrating Equipment:
1. Dry Locations: Use flexible metal conduit.
2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.
4. Vibrating equipment includes, but is not limited to:
   a. Transformers.
   b. Motors.

O. Fished in Existing Walls, Where Necessary: Use flexible metal conduit.

2.02 CONDUIT REQUIREMENTS

A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.

B. Fittings for Grounding and Bonding: Also comply with Section 260526.

C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

D. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.

E. Minimum Conduit Size, Unless Otherwise Indicated:
1. Branch Circuits: 3/4 inch (21 mm) trade size.
2. Underground, Exterior: 1 inch (27 mm) trade size.

F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil (1.02 mm).

C. PVC-Coated Fittings:
   1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
   2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
   4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil (1.02 mm).

D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil (0.38 mm).

2.06 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel.

2.07 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel.

2.08 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel.
   3. Connectors and Couplings: Use compression (gland) or set-screw type.
      a. Do not use indenter type connectors and couplings.

2.09 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

B. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install intermediate metal conduit (IMC) in accordance with NECA 101.

E. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.

F. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

G. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. When conduit destination is indicated and routing is not shown, determine exact routing required.
   3. Conceal all conduits unless specifically indicated to be exposed.
   4. Conduits in the following areas may be exposed, unless otherwise indicated:
      a. Electrical rooms.
      b. Mechanical equipment rooms.
      c. Within joists in areas with no ceiling.
   5. Unless otherwise approved, do not route conduits exposed:
      a. Across floors.
      b. Across roofs.
      c. Across top of parapet walls.
      d. Across building exterior surfaces.
   6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.

7. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
8. Route conduits above water and drain piping where possible.
9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
10. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.
11. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:
    a. Heaters.
    b. Hot water piping.
    c. Flues.
12. Group parallel conduits in the same area together on a common rack.

H. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
4. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
5. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).

I. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

J. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture, water, and gases.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

K. Underground Installation:
   1. Provide trenching and backfilling in accordance with Sections 312316 and 312323.
   2. Minimum Cover, Unless Otherwise Indicated or Required:
      a. Underground, Exterior: 24 inches (610 mm).
      b. Under Slab on Grade: 12 inches (300 mm) to bottom of slab.
   3. Provide underground warning tape in accordance with Section 260553 along entire conduit length for service entrance where not concrete-encased.

L. Embedment Within Structural Concrete Slabs (only where approved by Structural Engineer):
   1. Secure conduits to prevent floating or movement during pouring of concrete.

M. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
   1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
   2. Where conduits are subject to earth movement by settlement or frost.

N. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
   1. Where conduits pass from outdoors into conditioned interior spaces.
   2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

O. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.

P. Provide grounding and bonding in accordance with Section 260526.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

D. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 260536

CABLE TRAYS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cable trays and accessories.

B. Firestopping within (not around) cable trays.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping: Firestopping around cable trays.

B. Section 260526 - Grounding and Bonding for Electrical Systems.

C. Section 260529 - Hangers and Supports for Electrical Systems.

1.03 REFERENCES

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.

B. NEMA VE 1 - Metallic Cable Tray Systems; National Electrical Manufacturers Association; 2009.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for fittings and accessories.

C. Shop Drawings: Indicate tray type, dimensions, support points, and finishes.

D. Project Record Documents: Record actual routing of cable tray and locations of supports.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Schneider Electric; Square D Products; Model _____: www.schneider-electric.us.

B. Thomas & Betts Corporation; Model _____: www.tnb.com.

C. Wiremold Company; Model _____: www.wiremold.com.

D. Hubbell.

E. Cooper BLine.

F. Chatsworth Products.

G. Cablofill.

H. Substitutions: See Section 016000 - Product Requirements.

2.02 LADDER-TYPE CABLE TRAY

A. Description: NEMA VE 1, Class 20C ladder type tray.

B. Material: Formed sheet steel, hot-dip galvanized after fabrication in accordance with ASTM A123/A123M, painted with gray epoxy.

C. Inside Width: 12 inches (305 mm).

D. Inside Depth: 3 inches (76.2 mm).

E. Straight Section Rung Spacing: 12 inches (305 mm) on center.

F. Provide manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps.

G. Covers: Flanged, solid, flush cover.

2.03 WIRE BASKET TYPE

A. General: Provide wire basket of types and sizes indicated; if size is not indicated provide 12"W x 4"D basket tray, with connector assemblies, clamp assemblies, connector plates, splice plates and splice bars. Construct units with rounded edges and smooth surfaces; in compliance with applicable standards; and with the following additional construction features.
   1. Materials and Finishes:
      a. Electrozinc plating ASTM B 633.

B. Straight sections shall be furnished in standard lengths and not pieced together.

C. Wire basket supports shall be center support, see drawing for details.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install wire basket as indicated; in accordance with recognized industry practices (NEMA VE-2 2000), to ensure that the cable tray equipment complies with requirements of NEC, and applicable portions of NFPA 70B and NECA's “Standards of Installation” pertaining to general electrical installation practices.
   1. Coordinate wire basket with other electrical and mechanical work as necessary to properly interface installation of wire basket runway with other work.
   2. Provide sufficient space encompassing wire basket to permit access for installing and maintaining cables.

B. Support trays in accordance with Section 260529. Provide supports at each connection point, at the end of each run, and at other points to maintain spacing between supports of 8 feet maximum.

C. Use expansion connectors where required.

D. Provide firestopping under provisions of the specifications to sustain ratings when passing cable tray through fire-rated elements.

E. It shall be the responsibility of this Contractor to maintain the fire and smoke integrity of all walls, ceilings, floors etc., through which his work passes through or into. Fire and smoke barriers shall be provided in and around as required by Codes.

F. Where holes are required to be patched, or conduit, piping, ducts, etc., are required to be patched around, it shall be filled with a material that is UL Classified Standard 1479 for this use and Factory Mutual System approved.

G. Ground and bond cable tray under provisions of Section 260526.
   1. Provide continuity between tray components.
   2. Connections to tray shall be made using mechanical connectors.

END OF SECTION

SECTION 260537

BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).

C. Underground boxes/enclosures.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.

C. Section 260526 - Grounding and Bonding for Electrical Systems.

D. Section 260529 - Hangers and Supports for Electrical Systems.

E. Section 260534 - Conduit:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

F. Section 262726 - Wiring Devices:
   1. Wall plates.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2008 (Revised 2010) (ANSI/NEMA OS 1).

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.

F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. SCTE 77 - Specification for Underground Enclosure Integrity; Society of Cable Telecommunications Engineers; 2013 (ANSI/SCTE 77).

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

J. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use suitable concrete type boxes where flush-mounted in concrete.
   4. Use suitable masonry type boxes where flush-mounted in masonry walls.
   5. Use raised covers suitable for the type of wall construction and device configuration where required.
   6. Use shallow boxes where required by the type of wall construction.
   7. Do not use "through-wall" boxes designed for access from both sides of wall.
   8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
   9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
   10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.

11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.
12. Wall Plates: Comply with Section 262726.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

D. Underground Boxes/Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
2. Size: As indicated on drawings.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches (300 mm).
4. Applications:
a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 8 load rating.
b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 22 load rating.
c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
5. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
a. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency power and normal power systems.

E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

G. Box Locations:
1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100 as required where approved by the Architect.
2. Unless dimensioned, box locations indicated are approximate.
3. Locate boxes so that wall plates do not span different building finishes.
4. Locate boxes so that wall plates do not cross masonry joints.
5. Fire-Resistance-Rated Walls: Install flush-mounted boxes such that the required fire-resistance will not be reduced.

6. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260534.

H. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

I. Install boxes plumb and level.

J. Flush-Mounted Boxes:
   1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
   2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
   3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.

K. Install boxes as required to preserve insulation integrity.

L. Underground Boxes/Enclosures:
   1. Install enclosure on gravel base, minimum 6 inches (150 mm) deep.
   2. Flush-mount enclosures located in concrete or paved areas.
   3. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

M. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

N. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

O. Close unused box openings.

P. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

Q. Provide grounding and bonding in accordance with Section 260526.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 260553

IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Voltage markers.

D. Underground warning tape.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Switchboards:
         1) Identify power source and circuit number. Include location when not within sight of equipment.
         2) Use identification nameplate to identify main overcurrent protective device.
         3) Use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
      b. Panelboards:
         1) Identify voltage and phase.
         2) Identify power source and circuit number. Include location when not within sight of equipment.
         3) Identify main overcurrent protective device. Use identification nameplate for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
         4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces.

5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces. Leave spare circuit breakers in the "OFF" position.

c. Transformers:
1) Identify kVA rating.
2) Identify power source and circuit number. Include location when not within sight of equipment.
3) Identify load(s) served. Include location when not within sight of equipment.

d. Enclosed switches, circuit breakers, and motor controllers:
1) Identify voltage and phase.
2) Identify power source and circuit number. Include location when not within sight of equipment.
3) Identify load(s) served. Include location when not within sight of equipment.

e. Busway:
1) Identify ampere rating.
2) Identify voltage and phase.
3) Identify power source and circuit number. Include location when not within sight of equipment.
4) Provide identification at maximum intervals of 40 feet (12 m).
5) Use identification nameplate to identify load(s) served for each plug-in unit. Include location.

f. Time Switches:
1) Identify load(s) served and associated circuits controlled. Include location.

2. Service Equipment:
a. Use identification nameplate to identify each service disconnecting means.
b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
c. Use identification nameplate at each piece of service equipment to identify the available fault current and the date calculations were performed.

3. Emergency System Equipment:
a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.
b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.

4. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
5. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
6. Use label to identify the circuit number on all receptacles and switch plates.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.

C. Identification for Raceways:
1. Use RED painted conduit for Fire Alarm System conduit.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
a. Indoor Clean, Dry Locations: Use plastic nameplates.
b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.

2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
2. Legend:
a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
a. Equipment Designation: 1/2 inch (13 mm).
5. Color:
a. Normal Power System: White text on black background.

D. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
2. Legend: Power source and circuit number or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch (5 mm).
5. Color: Black text on clear background.

E. Format for Control Device Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
2. Legend: Load controlled or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch (5 mm).
5. Color: Black text on clear background.

F. Format for Fire Alarm Device Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
2. Legend: Designation indicated and device zone or address.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch (5 mm).
5. Color: Red text on white background.

2.03 UNDERGROUND WARNING TAPE

A. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Foil-backed Detectable Type Tape: 3 inches (76 mm) wide, with minimum thickness of 5 mil (0.1 mm), unless otherwise required for proper detection.

C. Legend: Type of service, continuously repeated over full length of tape.

D. Color:
1. Tape for Buried Power Lines: Black text on red background.
2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Enclosure front.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Branch Devices: Adjacent to device.
   6. Interior Components: Legible from the point of access.
   7. Conduits: Legible from the floor.
   8. Conductors and Cables: Legible from the point of access.
   9. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 12" below finished grade.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 260918

LIGHTING CONTROL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Networked switching controls.

B. Programmable switching controls.

C. Remote control switching relays.

D. Remote switches.

E. Power supplies.

F. Relay cabinets.

1.02 RELATED REQUIREMENTS

A. Section 260534 - Conduit.

B. Section 260537 - Boxes: Switch outlets and installation of switch devices.

C. Section 262416 - Panelboards.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. Product Data: Provide data showing dimensions and ratings for components.

B. Shop Drawings: Provide product data for equipment, devices, components, and cabling required for a complete and operational system. Indicate wiring diagrams of system, showing interface with branch circuit wiring, programming schedules and full size layout drawings.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual locations of components and record circuiting, programming and switching arrangements. Provide accurate "as-built" drawings to the owner for correct programming and proper maintenance of the control system. The "as-builts" shall indicate the load controlled by each relay and the relay panel number

E. Maintenance Data: Include replacement parts numbers and location and telephone number where they can be purchased.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

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

1.06 EXTRA MATERIALS

A. Furnish two of each relay type.

B. Furnish two of each cabinet key.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Lighting Control & Design LC&D is the only acceptable manufacture.

2.02 NETWORKED LIGHTING CONTROL

A. Description: Distributed switching control using networking programmable relay panels, with remote computer software for operator interface, programming control sequences, and monitoring.
   1. The lighting control system shall consist of standalone programmable low voltage relay control panels.
   2. Each low voltage lighting control panel shall be microprocessor controlled. Programming shall be accomplished through either the RS-232 port or through the network connection to a CPU employing Lighting Control software.

B. Computer Software: Furnished by Contractor.
   1. Provide software to be installed on multiple computers desginated by the owner. Coordinate installation and programming with Owner's IT department.

C. Software Features:
   1. Capable of being installed in multiple computers.
   2. Data Protection: Full data backup capability.
   3. Operating Schedules: Capacity of 12 for each programmable relay panel and 12 system wide time schedules. System-wide schedules adjust relay panel schedules globally.
   4. Programming: Available from remote computers with software loaded and downloaded to individual programmable relay panels.
   5. Diagnostics: Include diagnostic and testing procedures to enable troubleshooting.
   6. Maintenance Data: Track runtime in minutes and relay operation in cycles.
   7. Warning Flicker: Flash lights 5 minutes before shutting down.
   8. Time Delay: Allow adjustable time delay between scheduled ON-OFF and operation of individual relay.
   9. Egress and Common Area Links: Operate identified relays ON when other circuits in common area are energized; allow adjustable time delay after other circuits de-energize before operating identified relays OFF.
   10. Allow individual relays to be observed and controlled from any computer with software installed.

D. Networking Hardware and Software: Provide Catagory 5 wiring between devices.

E. System Interfaces: Systems shall have the capability of connecting and receiving programming signals through owner network and building automation systems.

2.03 PROGRAMMABLE RELAY PANELS

A. Description: Relay cabinet with power supply, terminal blocks, and logic cards for the specified programming functions.

B. Relays per Panel: As indicated.

C. Programming Functions:
   1. Multiple Switch Control: More than 1 switch can control each relay.
   2. Pilot Status Indication: Signal for indicating relay status at remote location.
   3. Relay Grouping: Allow relays to be grouped for common control.
   4. Scheduling: Allow scheduling of 99 events each capable of switching 1 relay groups according to a programmed time schedule. Allow for up to 12 holidays.
   5. Phone Control: Panel "B" shall contain a modem. Factory telephone support shall be available at no cost to the owner. Factory assistance shall consist of solving programming or application questions concerning the control equipment.

D. Cabinets: Surface-mounted sheet metal cabinets.

2.04 REMOTE CONTROL SWITCHING RELAYS

A. UL Listed 30 Amp @ 277VAC Ballast and HID and 20 Amp Tungsten at 120 Vac. 347V Ballast and HID at 20 amps Latching Relay wit 18,000A SCCR at 277Vac,

B. Relays shall be individually replaceable. Relay terminal blocks shall be capable of accepting two (2) #8AWG wires on both the line and the load side. Systems that do not allow for individual

relay replacement or additions are not acceptable. Relays to be rated for 250,000 operations minimum at a full 30a lighting load. Standard relay shall default to closed at normal power loss, Normally Closed Latching (NCL).

C. Optional relay types available shall include: Normally Open Latching (NOL) relay rated for 250,000 operations, a 600v 2-pole NO and NC and a Single Pole, Double Throw (SPDT) relay.

D. Line Voltage Connections: Clamp type screw terminals.

2.05 REMOTE SWITCHES

A. Wall Switch: Type as scheduled on plans.

B. Key Switches: Match non-key switch ratings.

C. Switch Plates:
   1. Description: as indicated in Section 262726 Wiring Devices.

2.06 RELAY CABINETS

A. Boxes: Galvanized steel with removable endwalls.

B. Interior Panel: Metal, suitable for mounting components, matte white.

C. Fronts: Steel, surface type with concealed trim clamps, door with concealed hinge, and flush lock keyed to match branch circuit panelboard. Finish with gray baked enamel.

D. Metal Barriers: Between wiring of different systems and voltages.

E. Power Terminals: NEMA ICS 4, unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.

F. Signal and Control Terminals: NEMA ICS 4, modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.

G. Ground Bus Terminal Block: Bond each connector to enclosure.

H. Power Supply: NFPA 70, Class 2 transformer, size as required for load.

PART 3 EXECUTION

3.01 INSTALLATION

A. Manufacturers representative shall visit the site to review proper installation procedures of all system components with contractor prior to installation.

B. Install wiring in conduit in accordance with Section 260534:

C. Install relays to be accessible. Allow space for adequate ventilation and circulation of air.

D. **All relays shall be labelled with the load they supply and the circuit number.**

E. Install in accordance with manufacturer's instructions.

F. Install wall sensors, switches and control stations at 48" above finished floor, to center.

G. Program System as indicated on plans and directed by the owner, where discrepancies exist contact the engineer prior to final programming.

H. Start Up: EC shall contact LC&D at least 7 days before turnover of project. LC&D will remotely dial into the lighting control system, run diagnostics and confirm system programming. EC shall be available at the time of dial in to perform any corrections required by LC&D. EC is responsible for coordinating with GC and the owner the installation of a dedicated telephone line or a shared phone line with an automatic Fax/Modem switch. Phone jack to be mounted within 12” of Master LCP. Label jack with phone number. EC to connect phone line from jack to Master LCP.

I. Telephone factory support shall be available at no additional cost to the EC or Owner both during and after the warranty period. Factory to pre-program the lighting control system per plans and approved submittal, to the extent data is available. The specified manufacturer, at no added cost, shall provide additional remote programming via modem as required by the EC or Owner for as long as a phone line is available for the life of the system. Upon request

manufacturer to provide remote dial up software at no added cost to system owner. No exceptions.

J. Coordinate final programming with owner.
   1. Manufacturer shall be responsible for requesting all required infomation from the owner at least 2 weeks prior to arriving on site for programming.

3.02 DEMONSTRATION

A. Demonstrate proper operation of system with owner and engineer present. Demonstration shall be coordinated by the contractor to take place during final punchlists.

B. Conduct walking tour of Project with owner. Briefly describe function, operation, and maintenance of each component.

C. Use submitted operation and maintenance manual as reference during demonstration.

3.03 WARRANTY

A. Manufacturer shall supply a 3-year warranty on all hardware and software. A limited 10-year warranty shall be provided on all relay cards. These warranties will be in affect for all installations. Systems that provide special warranties based on installation shall not be acceptable.

3.04 OWNER PERSONNEL TRAINING

A. Provide minimum 4 hours detailed operation and maintenance instructions and training.

B. Use submitted operation and maintenance manual as reference during training. Supplement with training material as required.

3.05 SCHEDULES

A. Provide to the Owner schedules indicating relay/branch circuit configuration, relay grouping, switch and control station setting, time clock set points and overrides.

END OF SECTION

SECTION 260923

LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Occupancy sensors.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260537 - Boxes.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 260918 - Lighting Control System: Remotely controlled devices for lighting control, including networked lighting controls, programmable relay panels, and remote control switching relays.

E. Section 262726 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and wall plates.

F. Section 265100 - Interior Lighting.

G. Section 265600 - Exterior Lighting.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Fluorescent Ballasts; National Electrical Manufacturers Association; 2011.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
   3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
   4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
   1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

B. Shop Drawings:
   1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.

C. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

A. Provide five year manufacturer warranty for all occupancy sensors.

PART 2 PRODUCTS

2.01 ALL LIGHTING CONTROL DEVICES

A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

C. Products for Switching of Electronic LED fixtures.

2.02 OCCUPANCY SENSORS

A. Manufacturers:
   1. Sensor Switch Inc: www.sensorswitch.com.
   2. WattStopper: www.wattstopper.com.
   3. Greengate.
   4. Leviton.
   5. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

B. All Occupancy Sensors:
   1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
   2. Sensor Technology:
      a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
      b. Ultrasonic Occupancy Sensors: Designed to detect occupancy by sensing frequency shifts in emitted and reflected inaudible sound waves.
      c. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
   3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
   4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
   5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.

6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
7. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
8. Adaptive Technology: Field selectable; capable of self-adjusting sensitivity and time delay according to conditions.
9. Compatibility: Suitable for controlling incandescent lighting, LED low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
10. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on the drawings.
11. Isolated Transformer/Relay for Low Voltage Occupancy Sensors: SPDT dry contacts, ratings as required for interface with system indicated.

C. Wall Switch Occupancy Sensors:
1. All Wall Switch Occupancy Sensors:
   a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
   b. Unless otherwise indicated or required to control the load indicated on the drawings, provide line voltage units with self-contained relay.
   c. Where indicated, provide two-circuit units for control of two separate lighting loads, with separate manual controls and separately programmable operation for each load.
   d. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
   e. Finish: Match finishes specified for wiring devices in Section 262726, unless otherwise indicated.
2. Passive Infrared (PIR) Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet (83.6 sq m).
3. Ultrasonic Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 400 square feet (37.2 sq m).
4. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet (83.6 sq m).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

B. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.

C. Verify that final surface finishes are complete, including painting.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.

E. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of lighting control devices provided under this section.
   1. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.

C. Install lighting control devices in accordance with manufacturer's instructions.

D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

E. Install lighting control devices plumb and level, and held securely in place.

F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 262726.

G. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

H. Occupancy Sensor Locations:
   1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.
   2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet (1.2 m) from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

3.04 FIELD QUALITY CONTROL

A. Inspect each lighting control device for damage and defects.

B. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.

C. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

C. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.

3.06 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of lighting control devices to Architect, and correct deficiencies or make adjustments as directed.

B. Training: Train 's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required. Provide a minimum of two (2) hours of training.
   2. Location: At project site.

END OF SECTION

SECTION 262200

TRANSFORMERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General purpose transformers.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 260526 - Grounding and Bonding for Electrical Systems.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 260534 - Conduit: Flexible conduit connections.

1.03 REFERENCE STANDARDS

A. IEEE C57.94 - Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type General Purpose Distribution and Power Transformers; 1982 (R2006).

B. IEEE C57.96 - Guide for Loading Dry-Type Distribution and Power Transformers; 1999 (R2004).

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

D. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers; 2009.

E. NEMA ST 20 - Dry-Type Transformers for General Applications; National Electrical Manufacturers Association; 1992 (R1997).

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008

G. NEMA TP 1 - Guide for Determining Energy Efficiency for Distribution Transformers; 2002.

H. NEMA TP 2 - Standard Test Method for Measuring the Energy Consumption of Distribution Transformers; 2005.

I. NEMA TP 3 - Standard for the Labeling of Distribution Transformer Efficiency; 2000.

J. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 506 - Standard for Specialty Transformers; Current Edition, Including All Revisions.

L. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.

C. Shop Drawings: Provide dimensioned plan and elevation views of transformers and adjacent equipment with all required clearances indicated.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

1.07 FIELD CONDITIONS

A. Ambient Temperature: Do not exceed 86 degrees F (30 degrees C) average or 104 degrees F (40 degrees C) maximum measured during any 24 hour period during and after installation of transformers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Siemens Industry, Inc: www.usa.siemens.com.

B. Eaton Corporation; Cutler-Hammer Products: www.eaton.com.

C. General Electric Company: www.geindustrial.com.

D. Schneider Electric; Square D Products: www.schneider-electric.us.

E. ACME.

2.02 ALL TRANSFORMERS

A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed and labeled by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
   1. Altitude: Less than 3,300 feet (1,000 m).
   2. Ambient Temperature: Not exceeding 86 degrees F (30 degrees C) average or 104 degrees F (40 degrees C) maximum measured during any 24 hour period.

C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.

D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.

E. Basic Impulse Level: 10 kV.

F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

G. Isolate core and coil from enclosure using vibration-absorbing mounts.

H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.03 GENERAL PURPOSE TRANSFORMERS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.

B. Primary Voltage: See Schedule on Drawings..

C. Secondary Voltage: See Schedule on Drawings..

D. Insulation System and Allowable Average Winding Temperature Rise:
   1. Less than 15 kVA: Class 185 degrees C insulation system with 115 degrees C average winding temperature rise.
   2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

E. Coil Conductors: Continuous copper windings with terminations brazed or welded.

F. Winding Taps:
   1. Less than 3 kVA: None.
   2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.

3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.
4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.

G. Energy Efficiency: Standard efficiency complying with NEMA TP 1.
1. Test efficiency according to NEMA TP 2.
2. Label transformer according to NEMA TP 3.

H. Sound Levels: Standard sound levels complying with NEMA ST 20.

I. Mounting Provisions:
1. Less than 15 kVA: Suitable for wall mounting.
2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
3. Larger than 75 kVA: Suitable for floor mounting.

J. Transformer Enclosure: Comply with NEMA ST 20.
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
2. Construction: Heavy gage steel.
   a. Less than 15 kVA: Totally enclosed, non-ventilated.
   b. 15 kVA and Larger: Ventilated.
3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
4. Provide lifting eyes or brackets.

K. Accessories:
1. Mounting Brackets: Provide manufacturer's standard brackets.
2. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that suitable support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.

C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1.

B. Install transformers in accordance with manufacturer's instructions.

C. Install transformers in accordance with NECA 409 and IEEE C57.94.

D. Use flexible conduit, under the provisions of Section 260534, 2 feet (600 mm) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.

F. Mount floor-mounted transformers on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 033000.

G. Mount floor-mounted transformers using vibration isolators suitable for isolating the transformer noise from the building structure.

H. Provide grounding and bonding in accordance with Section 260526.

I. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.

J. Where not factory-installed, install lugs sized as required for termination of conductors as shown on the drawings.

K. Identify transformers in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection, testing, and adjusting in accordance with Section 014000.

3.04 ADJUSTING

A. Measure primary and secondary voltages and make appropriate tap adjustments.

B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

A. Clean dirt and debris from transformer components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 262413
SWITCHBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Switchboards.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete for supporting foundations and pads.

B. Section 260526 - Grounding and Bonding for Electrical Systems.

C. Section 262701 - Electrical Service Entrance.

D. Section 262813 - Fuses.

1.03 REFERENCE STANDARDS

A. NECA 400 - Standard for Installing and Maintaining Switchboards (ANSI); National Electrical Contractors Association; 2007.

B. NEMA PB 2 - Deadfront Distribution Switchboards; National Electrical Manufacturers Association; 2011.

C. NEMA PB 2.1 - General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less; National Electrical Manufacturers Association; 2007.

D. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide electrical characteristics including voltage, frame size and trip ratings, fault current withstand ratings, and time-current curves of all equipment and components.

C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral, and ground; and switchboard instrument details.

D. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

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

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver in 48 inch maximum width shipping splits, individually wrapped for protection and mounted on shipping skids.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Siemens Industry, Inc: www.sea.siemens.com.

B. Eaton Corporation; Cutler-Hammer Products: www.eaton.com.

C. General Electric Company: www.geindustrial.com.

D. Schneider Electric; Square D Products: www.schneider-electric.us.

2.02 SWITCHBOARDS

A. Description: NEMA PB 2 switchboard with electrical ratings and configurations as indicated and specified.

B. Ratings:
   1. Voltage: 277/480 volts.
   2. Configuration: Three phase, four wire, grounded.
   3. Main Bus: Provide ampere rating as noted on the drawings.
   4. Integrated Equipment Rating: 100,000 rms amperes symmetrical, unless noted otherwise on the drawings.

C. Main Section Devices: Individually mounted and compartmented.

D. Main Circuit Breaker: Shall be fully rated for the rated amperage. 80% rating is not acceptable. Provide GFI protection on main circuit breaker where required by the NEC.

E. Distribution Section Devices: Panel mounted.

F. Bus Material: Copper, standard size.

G. Bus Connections: Bolted, accessible from front for maintenance.

H. Ground Bus: Copper, extend length of switchboard.

I. Molded Case Circuit Breakers: Integral thermal and instantaneous magnetic trip in each pole.
   1. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
   2. Include shunt trip where indicated.
   3. Provide engraved nameplate indicating load on each branch circuit.
   4. Line and Load Terminations: Accessible from the front only of the switchboard, suitable for the conductor materials and sizes indicated.
   5. Future Provisions: Fully equip spaces for future devices with bussing and bus connections, suitably insulated and braced for short circuit currents. Provide continuous current rating as indicated.

J. Enclosure: Type 1 - General Purpose.
   1. Align sections at front and rear.
   2. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.

2.03 POWER METERS

A. Manufacturers: Equal to Square "D" PM820 Digital Power Meter
   1. Current, per phase & neutral
   2. Demand-maximum per phase and neutral
   3. Voltage: L-L, L-N
   4. Real Power 3-phase total KW

B. Provide all CT's and PT's for metering.

PART 3 EXECUTION

3.01 PREPARATION

A. Provide concrete housekeeping pad under the provisions of Section 033000.
   1. Housekeeping pads shall be a minimum of 3.5-inches thick and extend a minimum of 4" past the footprint of the equipment. Edges of pad shall be chamfered.

B. Verify that field measurements are as indicated on shop drawings.

3.02 INSTALLATION

A. Install switchboard in locations shown on drawings.

B. Install in a neat and workmanlike manner.

C. Tighten accessible bus connections and mechanical fasteners after placing switchboard.

3.03 FIELD QUALITY CONTROL

A. Perform field testing in accordance with Section 014000.

B. Inspect and test in accordance with NETA STD ATS, except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.1.

3.04 ADJUSTING

A. Adjust all operating mechanisms for free mechanical movement.

1. Tighten bolted bus connections in accordance with manufacturer's instructions.

3.05 CLEANING

A. Touch up scratched or marred surfaces to match original finish.

END OF SECTION

SECTION 262416

PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Power distribution panelboards.

B. Lighting and appliance panelboards.

C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision D, 2006.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

C. NECA 407 - Standard for Installing and Maintaining Panelboards; National Electrical Contractors Association; 2009.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.

E. NEMA PB 1 - Panelboards; National Electrical Manufacturers Association; 2011.

F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; National Electrical Manufacturers Association; 2007.

G. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

H. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

K. UL 67 - Panelboards; Current Edition, Including All Revisions.

L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

M. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

C. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.08 MAINTENANCE MATERIALS

A. See Section 016000 - Product Requirements, for additional provisions.

B. Furnish two of each panelboard key.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Siemens Industry, Inc: www.sea.siemens.com.

B. Eaton Corporation; Cutler-Hammer Products: www.eaton.com.

C. General Electric Company: www.geindustrial.com.

D. Schneider Electric; Square D Products: www.schneider-electric.us.

2.02 ALL PANELBOARDS

A. Provide products listed and labeled by Underwriters Laboratories Inc. as suitable for the purpose indicated.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

C. Short Circuit Current Rating: 10,000 AIC or as listed on drawings.

D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.

2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
      b. Outdoor Locations: Type 3R.
   2. Boxes: Galvanized steel unless otherwise indicated.
      a. Provide wiring gutters sized to accommodate the conductors to be installed.
   3. Fronts:
      a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
      b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
      c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
   4. Lockable Doors: All locks keyed alike unless otherwise indicated.

J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

2.03 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase and Neutral Bus Material: Copper.
   2. Ground Bus Material: Copper.

D. Circuit Breakers:
   1. Provide bolt-on type.
   2. Provide thermal magnetic circuit breakers unless otherwise indicated.

E. Enclosures:
   1. Provide surface-mounted or flush-mounted enclosures as indicated.
   2. Provide clear plastic circuit directory holder mounted on inside of door.

F. Description: NEMA PB 1, circuit breaker type.

G. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.

H. Minimum integrated short circuit rating:
   1. 240 Volt Panelboards: 10k amperes rms symmetrical, unless noted otherwise on the drawings.
   2. 480 Volt Panelboards: 14k amperes rms symmetrical, unless noted otherwise on the drawings.

I. Molded Case Circuit Breakers: With integral thermal and instantaneous magnetic trip in each pole; UL listed. For air conditioning equipment branch circuits provide circuit breakers UL listed as Type HACR.

J. Circuit Breaker Accessories: Provide auxiliary switches and other accessories as indicated on the drawings.

K. Enclosure: NEMA PB 1, Type 1, unless noted otherwise on the drawings.

L. Cabinet Front: Surface type, fastened with concealed trim clamps, hinged door with flush lock, metal directory frame, finished in manufacturer's standard gray enamel.

M. Series rated panelboards are not acceptable.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
   2. Phase and Neutral Bus Material: Copper.
   3. Ground Bus Material: Copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
   1. Provide surface-mounted or flush-mounted enclosures as indicated.
   2. Provide clear plastic circuit directory holder mounted on inside of door.

F. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

G. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard; provide insulated ground bus where scheduled.

H. Minimum Integrated Short Circuit Rating: As indicated.
   1. 240 Volt Panelboards: 10,000 amperes rms symmetrical, unless noted otherwise on the drawings.
   2. 480 Volt Panelboards: 14k amperes rms symmetrical, unless noted otherwise on the drawings.

I. Molded Case Circuit Breakers: Thermal magnetic trip circuit breakers, bolt-on type, with common trip handle for all poles; UL listed.
   1. Type SWD for lighting circuits.
   2. Type HACR for air conditioning equipment circuits.
   3. Class A ground fault interrupter circuit breakers where scheduled.
   4. Do not use tandem circuit breakers.

J. Enclosure: NEMA PB 1, Type 1, unless noted otherwise on the drawings.

K. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt and less panelboards, 20 inches wide for 480 volt panelboards.

L. Cabinet Front: Flush cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

M. Series rated panelboards are not acceptable.

2.05 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
   1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
   2. Interrupting Capacity:
      a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
         1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.

2) 14,000 rms symmetrical amperes at 480V.

b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.

3. Conductor Terminations:
   a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
6. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install panelboards securely, in a neat and workmanlike manner in accordance with NECA 1 (general workmanship), NECA 407 (panelboards), and NEMA PB 1.1.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required supports in accordance with Section 260529.

E. Install panelboards plumb.

F. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

H. Provide grounding and bonding in accordance with Section 260526.

I. Install all field-installed branch devices, components, and accessories.

J. Install panelboards in accordance with NEMA PB 1.1 and NECA 1.

K. Install panelboards plumb. Install recessed panelboards flush with wall finishes.

L. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.

M. Provide filler plates to cover unused spaces in panelboards.

N. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
   1. Fire detection and alarm circuits.

O. Provide computer-generated circuit directory for each lighting and appliance panelboard, and each power distribution panelboard provided with a door, clearly and specifically indicating the loads served. Identify spares and spaces.

P. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

Q. Provide identification nameplate for each panelboard in accordance with Section 260553.

R. Provide arc flash warning labels in accordance with NFPA 70.

S. Provide spare conduits out of each new recessed panelboard to an accessible location above ceiling. Identify each as SPARE.
   1. Minimum spare conduits: 5 empty 1 inch.

T. Ground and bond panelboard enclosure according to Section 260526.

3.02 FIELD QUALITY CONTROL

A. Perform inspection, testing, and adjusting in accordance with Section 014000.

B. Perform field inspection and testing in accordance with Section 014000.

C. Inspect and test in accordance with NETA STD ATS, except Section 4.

D. Test shunt trips to verify proper operation.

E. Correct deficiencies and replace damaged or defective panelboards or associated components.

F. Perform inspections and tests listed in NETA STD ATS, Section 7.5 for switches, Section 7.6 for circuit breakers.

3.03 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.04 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 262500

FEEDER AND PLUG-IN BUSWAY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Indoor busway and fittings.

B. Plug-in units.

1.02 RELATED REQUIREMENTS

A. Section 260553 - Identification: Identification products and requirements.

B. Section 262813 - Fuses.

1.03 REFERENCE STANDARDS

A. NEMA BU 1 - Busways; National Electrical Manufacturers Association; Latest edition.

B. NEMA BU 1.1 - General Instructions for Proper Handling, Installation, Operation, and Maintenance of Busway Rated 600 Volts or Less; National Electrical Manufacturers Association; Latest edition.

C. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association; Latest edition.

D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene prior to performing field measurements for busway fabrication drawings. Review proposed routing, sequence of installation, and protection requirements for installed busway.

1.05 SUBMITTALS

A. Shop Drawings: Indicate ratings, dimensions and finishes. Include dimensioned layout diagram, installation details and locations of supports and fittings such as firestops and weatherseals. Include details of wall and floor penetrations.

B. Product Data: Provide catalog data for components and plug-in units.

C. Project Record Documents: Record actual busway routing and location of plug-in units.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

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

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect from moisture by using appropriate coverings. Store in dry interior locations.

1.08 FIELD CONDITIONS

A. Do not install until building is closed in and suitable temperature conditions are controlled.

B. Maintain suitable temperature and humidity conditions during and after installation of busway.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Schneider Electric; Square D Products; Model I-Line Busway 200A and 400A, plug-in, CPH5 (200)(400) G: www.schneider-electric.us.

2.02 INDOOR BUSWAY

A. Plug-In Busway: NEMA BU 1, 3 phase, 4-wire low impedance plug-in busway rated 120/208 and 277/480 volts, 60 Hz as indicated on the drawings. Plug-in openings on 24 inch centers

each side, with hinged doors to protect opening where plug-in unit is not installed. Ampere ratings as indicated on the drawings.

B. Conductors: Copper bars, fully insulated except at joints, full neutral, insulated ground bus.

C. Joints: Single bolt type, with silver-plated contact surface for bus and splice plate.

D. Fittings: According to manufacturer's recommendations.

E. Finish: Manufacturer's standard gray enamel.

F. Busway shall be complete with all required components whether listed in the specifications or not including: cable tap box, hangers, and end closures.

2.03 PLUG-IN UNITS

A. Plug-in Units shall be provided in the quantities, voltages, and amperages as indicated below. Installation of the Plug-in Units that are shown on the drawings shall be by the Contractor.

B. Spare Plug-in Units shall be delivered to the Owner in the original shipping containers and palletized or stacked neatly where directed by the Owner.

C. Fuses shall be provided matching the quantity of the installed and spare Plug-in Units.

D. Contractor shall develop a form indicating a material list of equipment turned over to the Owner and the Owner and Contractor shall sign and date the form so that all parties are in agreement and satisfied that the Owner has received the material.

E. Plug-in Units: Compatible with busway; enclosure with hinged door and externally-operatable handle for stick operation, lockable in OFF position; interlock to prevent opening front cover with switch in ON position; insulated grounding stab.
   1. Fusible Switch Assemblies: NEMA KS 1, quick-make, quick-break, load interrupter enclosed knife switch. Fuse Clips: Designed to accommodate Class R fuses.

F. Finish: Manufacturer's standard gray enamel.

2.04 PLUG-IN UNIT QUANTITIES

A. Contractor shall furnish and install the following units:
   1. Twenty-two (22) - fused 30A/3P, 480-volt
   2. Twenty-four (24) - fused 30A/3P, 208-volt
   3. Include fuses for all units

B. Contractor shall furnish to the Owner for future use the following spare units:
   1. Ten (10) - fused 30A/3P, 480-volt
   2. Ten (10) - fused 30A/3P, 208-volt
   3. Five (5) - fused 60A/3P, 480-volt
   4. Five (5) - fused 60A/3P, 208-volt
   5. Twenty (20) - Square "D" PQ100N kits to convert 3-wire unit to 4-wire unit. (for use as 120-volt units)
   6. Include fuses for all units

2.05 SOURCE QUALITY CONTROL

A. Inspect and test according to NEMA BU 1.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that field measurements are as indicated on shop drawings.

B. Sequence work to avoid interferences with building finishes and installation of other products.

3.02 INSTALLATION

A. Install busway in accordance with NEMA BU 1.1 and manufacturer's instructions.

B. Tighten joints using a torque wrench, to manufacturer's specified values.

C. Install busway length with expansion fitting at each location where busway run crosses building expansion joint.

D. Mounting and Support: Mount horizontal busway runs in flatwise position. Support busway at maximum 10 feet intervals as recommended by manufacturer.

E. Provide unistrut and threaded ready rods to meet the intent of the detail on the drawings.

F. Where a Plug-in Unit is shown on the drawings, the Contractor shall install the Plug-in Unit, cord drop, and appropriate plug to match the peice of machinery that is being fed.

G. Contractor shall instruct the Owner on how to install the Plug-in Unit by installing one unit and then observing the Owner install at least one other Plug-in Unit.

H. The spare Plug-in Units and fuses shall be turned over to the Owner.

END OF SECTION

SECTION 262701

ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metering transformer cabinets.

B. Primary Electrical.

C. Secondary Electrical.

D. Transformer Pad.

E. Protective Vehicle Bollards.

1.02 RELATED REQUIREMENTS

A. Section 262413 - Switchboards: Metering transformer compartment.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SYSTEM DESCRIPTION

A. System Characteristics: 480Y/277 volts, three phase, four-wire, 60 Hertz.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section. Review service entrance requirements and details with Utility Company representative.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with utility company written requirements and NFPA 70.

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

PART 2 PRODUCTS

2.01 COMPONENTS

A. Metering Transformer Cabinets: Sheet metal cabinet with hinged door, conforming to utility company requirements, with provisions for locking and sealing.

B. Meter Base: Furnished by utility company.

C. Provide concrete base for transformer per LES requirements. Obtain detail drawings from LES and install pad accordingly. LES shall be contacted to inspect the concrete pad prior to setting the transformer.

D. Electrician shall install vehicle protective bollards around the transformer. The quantity and location shall be confirmed with LES prior to installation. The bollards shown on the drawings are for information only and the exact quantity and locations shall be confirmed with LES.

E. Install the primary electrical conduits from the transformer pad to the property line to the west of the transformer pad. LES shall furnish the conduits for installation by electrician. Provide pull rope in conduits.

F. Provide secondary conduits per LES requirements and drawings.

G. LES will provide the secondary conductors from the transformer to the CT cabinet. The Electrician shall provide the secondary conductors from the CT cabinet to the main switch. The Electrician shall splice the conductors in the CT.

H. Provide bonding conductors from the main ground bus bars in the switchboards to the CT cabinets.

I. Electrician shall provide a 10" x 10" x 6"D water proof lockable junction box next to each electrical revenue meter with 1/2" conduit from junction box to meter socket. This is to allow LES to place relays in junction box for load monitoring by the building energy management system. A 3/4" conduit shall extend from the junction box to inside the building for wiring connections to the energy management system.

J. Other Components: As required by utility company.

PART 3 EXECUTION

3.01 PREPARATION

A. Arrange with utility company to obtain permanent electric service to the Project.

3.02 INSTALLATION

A. Install transformer pad as required by utility company.

B. Bond all Service Equipment per NEC 250 and per Local Codes and AHJ requirements. Provide copper bonding conductors in a secondary electrical conduits between switchboards and remote CT cabinets.

C. Install securely, in a neat and workmanlike manner, as specified in NECA 1.

D. All secondary electrical conduits entering the building shall be sealed against water infiltration into electrical equipment.

END OF SECTION

SECTION 262717

EQUIPMENT WIRING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

A. Section 260534 - Conduit.

B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).

C. Section 260537 - Boxes.

D. Section 262726 - Wiring Devices.

E. Section 262818 - Enclosed Switches.

F. Section 262913 - Enclosed Controllers.

1.03 REFERENCE STANDARDS

A. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2010).

B. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R2008).

C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
   2. Determine connection locations and requirements.

B. Sequencing:
   1. Install rough-in of electrical connections before installation of equipment is required.
   2. Make electrical connections before required start-up of equipment.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

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

PART 2 PRODUCTS

2.01 MATERIALS

A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
   1. Colors: Conform to NEMA WD 1.
   2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
   3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

B. Disconnect Switches: As specified in Section _____ and in individual equipment sections.

C. Wiring Devices: As specified in Section 262726.

D. Flexible Conduit: As specified in Section 260534.

E. Wire and Cable: As specified in Section 260519.

F. Boxes: As specified in Section 260537.

PART 3 EXECUTION

3.01 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Provide cord and cap where field-supplied attachment plug is required.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 262726

WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Wall plates.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260537 - Boxes.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 271005 - Structured Telecommunications Cabling and Enclosures: Communication jacks.

E. Section 26 0553 - Identification for Electrical Systems.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F, 1999.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

D. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2010).

E. NEMA WD 6 - Wiring Device -- Dimensional Specifications; National Electrical Manufacturers Association; 2002 (R2008).

F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

H. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

I. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

J. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
3. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. or testing firm acceptable to authorities having jurisdiction as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hubbell Incorporated; : www.hubbell-wiring.com.

B. Leviton Manufacturing Company, Inc; : www.leviton.com.

C. Pass & Seymour, a brand of Legrand North America, Inc; : www.legrand.us

D. Cooper Wiring Devices: www.cooperwiringdevices.com.

E. Substitutions: See Section 016000 - Product Requirements.

2.02 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFI receptacles with specified weatherproof covers for all receptacles installed outdoors or in damp or wet locations.

D. Provide GFI protection for all receptacles installed within 6 feet (1.8 m) of sinks.

E. Provide GFI protection for all receptacles installed in kitchens.

F. Provide GFI protection for all receptacles serving electric drinking fountains.

G. Unless noted otherwise, do not use combination switch/receptacle devices.

2.03 ALL WIRING DEVICES

A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

B. Finishes:
   1. All Wiring Devices: Gray with stainless steel wall plate unless otherwise indicated.

2.04 WALL SWITCHES

A. All Wall Switches: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

B. Wall Switches: Heavy Duty, AC only general-use snap switch, complying with NEMA WD 6 and WD 1.
   1. Equal to Pass and Seymour PS20AC1.
   2. Body and Handle: Gray plastic with toggle handle.
   3. Indicator Light: Lighted handle type switch; red handle.
   4. Ratings:
      a. Voltage: 120 - 277 volts, AC.
      b. Current: 20 amperes.

C. Switch Types: Single pole, double pole, 3-way, 4-way, and pilot gang.

D. Use lighted toggle switches in all mechanical, electrical equipment rooms and storage rooms.

2.05 RECEPTACLES

A. All Receptacles: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

B. Receptacles: Heavy duty, industrial grade, complying with NEMA WD 6 and WD 1.
   1. Device Body: Gray plastic. (Receptacles on Emergency power shall be red.)
   2. Configuration: NEMA WD 6, type as specified and indicated.
   3. Receptacles shall have back and/or side wiring with tightening screw. Push-on type shall not be allowed.
   4. Receptacle shall be equal to Leviton 5362.
   5. Convenience Receptacles: Type 5 - 20.

C. Duplex Convenience Receptacles.

D. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

E. All 120-volt receptacles in the kitchen shall be GFCI.

F. All receptacles on Emergency Power shall be RED in color.

2.06 WALL PLATES

A. All Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Size: Standard; .
   3. Screws: Metal with slotted heads finished to match wall plate finish.

B. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

C. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

D. "While-in-use" Wall Plates: Gasketed weatherproof coverplates rated 'while-in-use", cast aluminum, with hinged cover.

E. In unfinished areas, use 4 inch square, 1/2 inch raised steel covers.

F. All wall plates shall be labelled with the branch circuit feeding the device: circuit number and panel name.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that floor boxes are adjusted properly.

F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of wiring devices provided under this section.
   1. If a mounting height is indicated on the Drawings the Contractor shall review the Architectural Elevations and Floor Plans and notify the Architect of conflicts prior to rough-in. This is especially important for devices above counters and to avoid conflicts with marker/tack boards and cabinetry.
   2. Mounting Heights: Unless otherwise indicated the height is to the center of the device:
      a. Wall Switches: 48 inches (1.2 m) above finished floor (AFF).
      b. Receptacles: 18 inches (450 mm) above finished floor or as indicated above counter.
      c. Communication Outlets: 18 inches AFF.
      d. Fire Alarm Strobes and Strobe/Horns: 6'-8" to bottom of device AFF.
      e. Fire Alarm Pull Station: 48 inches AFF.
      f. Clock Hanger Receptacles: 80 inches to top of box.
      g. Door Access Boxes: 48 inches AFF.
   3. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
   4. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
   5. Locate wall switches on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.

F. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

G. Unless otherwise indicated, GFI receptacles may be connected to provide feed-through protection to downstream devices. Label such devices to indicate they are protected by upstream GFI protection.

H. Install wiring devices plumb and level with mounting yoke held rigidly in place.

I. Install wall switches with OFF position down.

J. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on right.

K. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

L. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

M. Do not install devices back-to-back on walls.

N. Lighted toggle switches for lighting shall be used in all mechanical/electrical rooms and storage rooms.

O. All outlets shall have ground wire attached to outlet. Self-grounding receptacles shall not be the only means of ground.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection, testing, and adjusting in accordance with Section 014000.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 262813

FUSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fuses.

1.02 RELATED REQUIREMENTS

A. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

B. Section 262413 - Switchboards: Fusible switches.

C. Section 262500 - Feeder and Plug-in Busway.

D. Section 262818 - Enclosed Switches: Fusible switches.

E. Section 262913 - Enclosed Controllers: Fusible switches.

1.03 REFERENCE STANDARDS

A. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2002 (R2007).

B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.

D. UL 248-10 - Low-Voltage Fuses - Part 10: Class L Fuses; Current Edition, Including All Revisions.

E. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
   2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
   3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Fuses: One set(s) of three for each type and size installed.
   3. Fuse Pullers: One set(s) compatible with each type and size installed.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cooper Bussmann, a division of Cooper Industries: www.cooperindustries.com.

B. Mersen (formerly Ferraz Shawmut): ferrazshawmut.mersen.com.

C. Littelfuse, Inc: www.littelfuse.com.

2.02 APPLICATIONS

A. Service Entrance:
   1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
   2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.

B. Feeders:
   1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
   2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.

C. General Purpose Branch Circuits: Class RK1, time-delay.

D. Individual Motor Branch Circuits: Class RK1, time-delay.

2.03 FUSES

A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose indicated.

B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.

C. Provide fuses of the same type, rating, and manufacturer within the same switch.

D. Comply with UL 248-1.

E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.

F. Voltage Rating: Suitable for circuit voltage.

G. Class R Fuses: Comply with UL 248-12.

H. Class L Fuses: Comply with UL 248-10.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Do not install fuses until circuits are ready to be energized.

B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION

SECTION 262818
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 262500 - Feeder and Plug-in Busway.

E. Section 262813 - Fuses.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.

C. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association; 2001 (R2006).

D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

F. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

G. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

H. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

C. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

A. Maintain ambient temperature between -22 degrees F (-30 degrees C) and 104 degrees F (40 degrees C) during and after installation of enclosed switches.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Siemens Industry, Inc: www.usa.siemens.com.

B. Eaton Corporation; Cutler-Hammer Products: www.eaton.com.

C. General Electric Company: www.geindustrial.com.

D. Schneider Electric; Square D Products: www.schneider-electric.us.

E. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break, enclosed safety switches complying with NEMA KS 1, type HD (heavy duty), and listed and labeled as complying with UL 98; ratings, configurations, and features as indicated on the drawings.

B. Provide products listed and labeled by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet (2,000 m).
   2. Ambient Temperature: Between -22 degrees F (-30 degrees C) and 104 degrees F (40 degrees C).

D. Horsepower Rating: Suitable for connected load.

E. Voltage Rating: Suitable for circuit voltage.

F. Short Circuit Current Rating:
   1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

H. Provide with switch blade contact position that is visible when the cover is open.

I. Conductor Terminations: Suitable for use with the conductors to be installed.

J. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

K. Enclosures: Comply with NEMA KS 1 and NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
      b. Outdoor Locations: Type 3R.

2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.

L. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

M. Heavy Duty Switches:
1. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive enclosed safety switches.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install enclosed switches in accordance with manufacturer's instructions.

B. Install enclosed switches securely, in a neat and workmanlike manner in accordance with NECA 1.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required supports in accordance with Section 260529.

E. Install enclosed switches plumb.

F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches (2000 mm) above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 260526.

H. Provide fuses complying with Section 262813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

I. Identify enclosed switches in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection, testing, and adjusting in accordance with Section 014000.

B. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 262913
ENCLOSED CONTROLLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manual motor controllers.

B. Combination Magnetic motor controllers with disconnect.

1.02 RELATED REQUIREMENTS

A. Section 260529 - Hangers and Supports for Electrical Systems.

B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

C. Section 262813 - Fuses.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC; National Electrical Manufacturers Association; 2000 (R2005).

C. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices; National Electrical Manufacturers Association; 2000 (R2010).

D. NEMA ICS 6 - Industrial Control and Systems: Enclosures; National Electrical Manufacturers Association; 1993 (R2006).

E. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association; 2001 (R2006).

F. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

G. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.

C. Maintenance Data: Replacement parts list for controllers.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eaton Corporation; Cutler-Hammer Product: www.eaton.com.

B. General Electric Company: www.geindustrial.com.

C. Schneider Electric; Square D Products: www.schneider-electric.us.

D. Siemens.

2.02 MANUAL CONTROLLERS

A. Fractional Horsepower Manual Controllers: NEMA ICS 2, AC general-purpose, Class A, manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit and toggle operator.

B. Motor Starting Switches: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, without thermal overload unit, with toggle operator.

C. Enclosures: NEMA ICS 6, Type 1, unless noted otherwise on the drawings.

2.03 COMBINATION MAGNETIC MOTOR CONTROLLERS WITH DISCONNECT

A. All automatic motor starters shall contain only a solid-state overload relay. This overload relay shall provide overload, phase unbalance and phase loss protection using current sensing with a trip class of 20. Solid-state overload relay shall be Square "D" Motor Logic series or approved equal.

B. Bimetallic or melting alloy type overload relays shall not be used.

C. All motor starters shall have auto/off/hand selector switch. Motor starter shall not be used as a fire alarm shut down relay. Separate fire alarm relays shall be provided as part of the fire alarm system.

D. Coil control voltage required shall be verified with Mechanical Contractor for interconnection with the Energy Management System.

E. Provide enclosure suitable for the enviroment the starter is installed.

F. Fuse disconnect switch.

2.04 ACCESSORIES

A. Auxiliary Contacts: NEMA ICS 2, 2 field convertible contacts in addition to seal-in contact.

B. Cover Mounted Pilot Devices: NEMA ICS 5, standard duty oiltight type.

C. Pushbuttons: Unguarded type.

D. Indicating Lights: Transformer, incandescent type.

E. Selector Switches: Rotary type.

F. Relays: NEMA ICS 2,.

G. Control Power Transformers: 120 volt secondary, as scheduled, or as recommended by manufacturer if not scheduled. Provide fused primary, secondary, and bond unfused leg of secondary to enclosure.

2.05 DISCONNECTS

A. Combination Controllers: Combine motor controllers with disconnects in common enclosure. Obtain IEC Class 2 coordinated component protection.

B. Fusible Switch Assemblies: NEMA KS 1, enclosed knife switch with externally operable handle. Fuse clips: Designed to accommodate Class R fuses.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install enclosed controllers where indicated, in accordance with manufacturer's instructions.

B. Install securely, in a neat and workmanlike manner, as specified in NECA 1.

C. Provide supports in accordance with Section 260529.

D. Height: 6 ft to operating handle.

E. Provide fuses for fusible switches; refer to Section 262813 for product requirements.

F. Provide engraved plastic nameplates; refer to Section 260553 for product requirements and location.

G. Neatly type label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place label in clear plastic holder.

3.02 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 014000.

B. Inspect and test in accordance with NETA STD ATS, except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.16.1.

END OF SECTION

SECTION 263213
ENGINE GENERATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Packaged engine generator system and associated components and accessories:
   1. Engine and engine accessory equipment.
   2. Alternator (generator).
   3. Generator set control system.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 221005 - Plumbing Piping: Gas piping.

C. Section 233100 - HVAC Ducts and Casings.

D. Section 235100 - Breechings, Chimneys, and Stacks: Engine exhaust piping.
   1. Includes installation of exhaust silencer specified in this section.

E. Section 260526 - Grounding and Bonding for Electrical Systems.

F. Section 260529 - Hangers and Supports for Electrical Systems.

G. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

H. Section 263600 - Transfer Switches.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NECA/EGSA 404 - Standard for Installing Generator Sets; National Electrical Contractors Association; 2007.

C. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2011.

D. NFPA 37 - Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines; 2010.

E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. NFPA 110 - Standard for Emergency and Standby Power Systems; National Fire Protection Association; 2013.

G. UL 1236 - Battery Chargers for Charging Engine-Starter Batteries; Current Edition, Including All Revisions.

H. UL 2200 - Stationary Engine Generator Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate compatibility of generator sets to be installed with work provided under other sections or by others.
      a. Transfer Switches: See Section 263600.
   2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment or other potential obstructions within the spaces dedicated for engine generator system.
   3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Coordinate the work to provide electrical circuits suitable for the power requirements of the actual auxiliary equipment and accessories to be installed.
   5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features. Include alternator starting capabilities, engine fuel consumption rates, and cooling, combustion air, and exhaust requirements.
   1. Include generator set sound level test data.

C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.

D. Manufacturer's factory emissions certification.

E. Source quality control test reports.

F. Provide NFPA 110 required documentation from manufacturer where requested by authorities having jurisdiction, including but not limited to:
   1. Certified prototype tests.
   2. Torsional vibration compatibility certification.
   3. NFPA 110 compliance certification.
   4. Certified rated load test at rated power factor.

G. Manufacturer’s detailed field testing procedures.

H. Maintenance contracts.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Filter Elements: One of each type, including fuel, oil and air.
   3. Extra Belts: One of each type, belt.

1.06 QUALITY ASSURANCE

A. Comply with the following:
   1. NFPA 70 (National Electrical Code).
   2. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for Level 1 system.
   3. NFPA 37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines).

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
   1. Authorized service facilities located within 50-miles of project site.

C. Products: Listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authorities having jurisdiction as suitable for the purpose indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store generator sets in accordance with manufacturer's instructions and NECA/EGSA 404.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's instructions to avoid damage to generator set components, enclosure, and finish.

1.08 WARRANTY

A. Warranty:
   1. Provide a warranty that equals or exceeds the "Comprehensive" Warranty offered by Cummins Power Generation. Warranty shall cover cover parts, travel, and labor for up to 1500 hours of engine run time or five-years whichever comes first.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Packaged Engine Generator Set - Basis of Design: Cummins Power Generation.

B. Packaged Engine Generator Set - Other Acceptable Manufacturers:
   1. Caterpillar Inc: www.cat.com/power-generation.
   2. Kohler Co: www.kohlerpower.com.

C. Products other than basis of design are subject to compliance with specified requirements. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

2.02 PACKAGED ENGINE GENERATOR SYSTEM

A. Provide new engine generator system consisting of all required equipment, sensors, conduit, boxes, wiring, piping, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. System Description:
   1. Application: Emergency/standby.
   2. Configuration: Single packaged engine generator set operated independently (not in parallel).
   3. Total System Power Rating: 150 kW/188 kVA, standby.

C. Packaged Engine Generator Set:
   1. Type: Gaseous (spark ignition).
   2. Voltage: 480Y/277 V, 3 phase, 60 Hz.
   3. Main Line Circuit Breaker:
      a. Type: Thermal magnetic.
      b. Trip Rating: 225 amps.
      c. Features:
         1) Shunt trip.
         2) Auxiliary contacts.

D. Generator Set General Requirements:
   1. Prototype tested in accordance with NFPA 110 for Level 1 systems.
   2. Factory-assembled, with components mounted on suitable base.
   3. List and label engine generator assembly as complying with UL 2200.
   4. Power Factor: Unless otherwise indicated, specified power ratings are at 0.8 power factor for three phase voltages and 1.0 power factor for single phase voltages.
   5. Provide suitable guards to protect personnel from accidental contact with rotating parts, hot piping, and other potential sources of injury.
   6. Main Line Circuit Breakers: Provide factory-installed line side connections with suitable lugs for load side connections.

E. Service Conditions: Provide engine generator system and associated components suitable for operation under the service conditions at the installed location.
   1. Altitude: 1200 feet (_____ m).

F. Starting and Load Acceptance Requirements:
   1. Cranking Method: Cycle cranking complying with NFPA 110 (15 second crank period, followed by 15 second rest period, with cranking limiter time-out after 3 cycles), unless otherwise required.
   2. Cranking Limiter Time-Out: If generator set fails to start after specified cranking period, indicate overcrank alarm condition and lock-out generator set from further cranking until manually reset.
   3. Start Time: Capable of starting and achieving conditions necessary for load acceptance within 10 seconds (NFPA 110, Type 10).
   4. Maximum Load Step: Supports 100 percent of rated load in one step.

G. Exhaust Emissions Requirements:

1. Comply with federal (EPA), state, and local regulations applicable at the time of commissioning; include factory emissions certification with submittals.
2. Do not make modifications affecting generator set factory emissions certification without approval of manufacturer and Engineer. Where such modifications are made, provide field emissions testing as necessary for certification.

H. Sound Level Requirements:
1. Do not exceed 71 dBA when measured at 23 feet (7 m) from generator set in free field (no sound barriers) while operating at full load; include manufacturer's sound data with submittals.

2.03 ENGINE AND ENGINE ACCESSORY EQUIPMENT

A. Provide engine with adequate horsepower to achieve specified power output at rated speed, accounting for alternator efficiency and parasitic loads.

B. Engine Fuel System - Gaseous (Spark Ignition):
1. Fuel Source: Natural gas.
2. Engine Fuel Connections: Provide suitable, approved flexible fuel lines for coupling engine to fuel source.
3. Provide components/features indicated and as necessary for operation and/or required by applicable codes, including but not limited to:
a. Carburetor.
b. Gas pressure regulators.
c. Fuel shutoff control valves.
d. Low gas pressure switches.

C. Engine Starting System:
1. System Type: Electric, with DC solenoid-activated starting motor(s).
2. Battery(s):
a. Battery Type: Lead-acid.
b. Battery Capacity: Size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature; capable of providing cranking through two complete periods of cranking limiter time-outs without recharging.
c. Provide battery rack, cables, and connectors suitable for the supplied battery(s); size battery cables according to manufacturer's recommendations for cable length to be installed.
3. Battery-Charging Alternator: Engine-driven, with integral solid-state voltage regulation.
4. Battery Charger:
a. Provide dual rate battery charger with automatic float and equalize charging modes and minimum rating of 10 amps; suitable for maintaining the supplied battery(s) at full charge without manual intervention.
b. Capable of returning supplied battery(s) from fully discharged to fully charged condition within time required by NFPA 110 for Level indicated while carrying normal loads.
c. Recognized as complying with UL 1236.
d. Furnished with integral overcurrent protection; current limited to protect charger during engine cranking; reverse polarity protection.
e. Provide integral DC output ammeter and voltmeter with five percent accuracy.
f. Provide alarm output contacts as necessary for alarm indications.

D. Engine Speed Control System (Governor):
1. Single Engine Generator Sets (Not Operated in Parallel): Provide electronic isochronous governor for controlling engine speed/alternator frequency.
2. Frequency Regulation, Electronic Isochronous Governors: No change in frequency from no load to full load; plus/minus 0.25 percent at steady state.

E. Engine Lubrication System:

1. System Type: Full pressure, with engine-driven, positive displacement lubrication oil pump, replaceable full-flow oil filter(s), and dip-stick for oil level indication. Provide oil cooler where recommended by manufacturer.
2. **Oil filter shall be spin-on type. Center thru bolt on type is not acceptable.**

F. Engine Cooling System:
1. System Type: Closed-loop, liquid-cooled, with unit-mounted radiator/fan and engine-driven coolant pump; suitable for providing adequate cooling while operating at full load under worst case ambient temperature.
2. Fan Guard: Provide suitable guard to protect personnel from accidental contact with fan.
3. Ducted Radiators: Where ducted radiator air discharge is to be field-installed, provide suitable radiator duct flange/adapter.
4. Coolant Heater: Provide thermostatically controlled coolant heater to improve starting under cold ambient conditions; size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature.

G. Engine Air Intake and Exhaust System:
1. Air Intake Filtration: Provide engine-mounted, replaceable, dry element filter.
2. Engine Exhaust Connection: Provide suitable, approved flexible connector for coupling engine to exhaust system.
3. Provide exhaust thimble to pass through the wall.
4. Exhaust Silencer: Provide critical grade or better exhaust silencer with sound attenuation not less than basis of design; select according to manufacturer's recommendations to meet sound performance requirements, where specified.

H. Spring Isolation:
1. Provide spring type vibration isolators between generator and concrete base.

2.04 ALTERNATOR (GENERATOR)

A. Alternator: 4-pole, 1800 rpm (60 Hz output) revolving field, synchronous generator complying with NEMA MG 1; connected to engine with flexible coupling; voltage output configuration as indicated, with reconnectable leads for 3 phase alternators.

B. Exciter:
1. Exciter Type: Brushless; provide permanent magnet generator (PMG) excitation system; self-excited (shunt) systems are not permitted.
2. PMG Excitation Short-Circuit Current Support: Capable of sustaining 300 percent of rated output current for 10 seconds.
3. Voltage Regulation (with PMG excitation): Plus/minus 0.5 percent for any constant load from no load to full load.

C. Temperature Rise: 105 degrees C Standby..

D. Insulation System: NEMA MG 1, Class H; suitable for alternator temperature rise.

E. Enclosure: NEMA MG 1, drip-proof.

F. Total Harmonic Distortion: Not greater than five percent.

2.05 GENERATOR SET CONTROL SYSTEM

A. Provide microprocessor-based control system for automatic control, monitoring, and protection of generator set. Include sensors, wiring, and connections necessary for functions/indications specified.

B. Control Panel:
1. Control Panel Mounting: Unit-mounted unless otherwise indicated; vibration isolated.
2. Equal to Cummins PowerCommand PCC2100.
3. Generator Set Control Functions:
a. Automatic Mode: Initiates generator set start/shutdown upon receiving corresponding signal from remote device (e.g. automatic transfer switch).
b. Manual Mode: Initiates generator set start/shutdown upon direction from operator.

c. Reset Mode: Clears all faults, allowing generator set restart after a shutdown.
d. Emergency Stop: Immediately shuts down generator set (without time delay) and prevents automatic restarting until manually reset.
e. Cycle Cranking: Programmable crank time, rest time, and number of cycles.
f. Time Delay: Programmable for shutdown (engine cooldown) and start (engine warmup).
g. Voltage Adjustment: Adjustable through range of plus/minus 5 percent.

4. Generator Set Status Indications:
   a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.
   b. Current (Amps): For each phase.
   c. Frequency (Hz).
   d. Real power (W/kW).
   e. Reactive power (VAR/kVAR).
   f. Apparent power (VA/kVA).
   g. Power factor.
   h. Duty Level: Actual load as percentage of rated power.
   i. Engine speed (RPM).
   j. Battery voltage (Volts DC).
   k. Engine oil pressure.
   l. Engine coolant temperature.
   m. Engine run time.
   n. Generator powering load (position signal from transfer switch).
5. Generator Set Protection and Warning/Shutdown Indications:
   a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following protections/indications:
      1) Overcrank (shutdown).
      2) Low coolant temperature (warning).
      3) High coolant temperature (warning).
      4) High coolant temperature (shutdown).
      5) Low oil pressure (shutdown).
      6) Overspeed (shutdown).
      7) Low fuel level (warning).
      8) Low coolant level (warning/shutdown).
      9) Generator control not in automatic mode (warning).
      10) High battery voltage (warning).
      11) Low cranking voltage (warning).
      12) Low battery voltage (warning).
      13) Battery charger failure (warning).
   b. In addition to NFPA 110 requirements, provide the following protections/indications:
      1) High AC voltage (shutdown).
      2) Low AC voltage (shutdown).
      3) High frequency (shutdown).
      4) Low frequency (shutdown).
      5) Overcurrent (shutdown).
   c. Provide contacts for local and remote common alarm.
   d. Provide lamp test function that illuminates all indicator lamps.
6. Other Control Panel Features:
   a. Event log.
   b. Remote monitoring capability via PC.

C. Remote Annunciator:
1. Remote Annunciator Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated. See Sheet E2.1A for location.
2. Generator Set Status Indications:

a. Generator powering load (via position signal from transfer switch).
b. Communication functional.

3. Generator Set Warning/Shutdown Indications:
   a. Comply with NFPA 110 for Level 1 systems including but not limited to the following indications:
      1) Overcrank (shutdown).
      2) Low coolant temperature (warning).
      3) High coolant temperature (warning).
      4) High coolant temperature (shutdown).
      5) Low oil pressure (shutdown).
      6) Overspeed (shutdown).
      7) Low fuel level (warning).
      8) Low coolant level (warning/shutdown).
      9) Generator control not in automatic mode (warning).
      10) High battery voltage (warning).
      11) Low cranking voltage (warning).
      12) Low battery voltage (warning).
      13) Battery charger failure (warning).
   b. Provide audible alarm with silence function.
   c. Provide lamp test function that illuminates all indicator lamps.

2.06 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Perform production tests on generator sets at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.

C. Provide full load test utilizing portable test bank for four hours minimum. Simulate power failure including operation of transfer switch, automatic starting cycle, and automatic shutdown and return to normal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that the ratings and configurations of generator sets and auxiliary equipment are consistent with the indicated requirements.

C. Verify that rough-ins for field connections are in the proper locations.

D. Verify that mounting surfaces are ready to receive equipment.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1.

B. Install products in accordance with manufacturer's instructions.

C. Install generator sets and associated accessories in accordance with NECA/EGSA 404.

D. Arrange equipment to provide minimum clearances and required maintenance access.

E. Unless otherwise indicated, mount generator set on properly sized 6 inch (150 mm) high isolated concrete pad constructed in accordance with Section 033000.

F. Install spring isolation springs between generator set and concrete base.

G. Provide required support and attachment in accordance with Section 260529.

H. All connections to the generator set shall use flexible connections allowing for movement UP/DOWN and SIDE-TO-SIDE.

I. Use manufacturer's recommended oil and coolant, suitable for the worst case ambient temperatures.

J. Provide gas piping in accordance with Section 221005.

K. Provide engine exhaust piping in accordance with Section 235100, where not factory installed.
   1. Include piping expansion joints, piping insulation, thimble, condensation trap/drain, rain cap, hangers/supports, etc. as indicated or as required.
   2. Do not exceed manufacturer's maximum back pressure requirements.

L. Install exhaust silencer in accordance with Section 235100, where not factory installed.

M. Provide grounding and bonding in accordance with Section 260526.

N. Identify system wiring and components in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Provide services of a manufacturer's authorized representative to prepare and start systems and perform inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.

C. Notify Owner and Architect at least two weeks prior to scheduled inspections and tests.

D. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

E. Provide all equipment, tools, and supplies required to accomplish inspection and testing, including load bank and fuel.

F. Preliminary inspection and testing to include, at a minimum:
   1. Inspect each system component for damage and defects.
   2. Verify tightness of mechanical and electrical connections are according to manufacturer's recommended torque settings.
   3. Check for proper oil and coolant levels.

G. Prepare and start system in accordance with manufacturer's instructions.

H. Perform acceptance test in accordance with NFPA 110.

I. Provide field emissions testing where necessary for certification.

J. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.04 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

A. See Section 017900 - Demonstration and Training, for additional requirements.

B. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.

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

D. After successful acceptance test and just prior to Substantial Completion, replace air, oil, and fuel filters.

3.06 PROTECTION

A. Protect installed engine generator system from subsequent construction operations.

3.07 MAINTENANCE

A. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of engine generator system for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.

END OF SECTION

SECTION 263600
TRANSFER SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Automatic Transfer Switches:
   1. Provide one 225-amp, 480/277-volt, 3-pole, with solid-fully rated neutral, Cummings Generation OTPC or equal by Caterpillar or Kohler.

1.02 RELATED REQUIREMENTS

A. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

B. Section 263213 - Engine Generators: Testing requirements.

1.03 REFERENCE STANDARDS

A. NEMA ICS 10 - Industrial Control and Systems: AC Transfer Switch Equipment; National Electrical Manufacturers Association; 2005.

B. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog sheets showing voltage, switch size, ratings and size of switching and overcurrent protective devices, operating logic, short circuit ratings, dimensions, and enclosure details.

C. Operation Data: Instructions for operating equipment under emergency conditions when engine generator is running.

D. Maintenance Data: Routine preventative maintenance and lubrication schedule. List special tools, maintenance materials, and replacement parts.

E. Before the Owner accepts the installation provide a typewritten "sequence of operation" for the generator system describing what dampers, solenoid valves, etc., are to open/close when the generator starts. Provide a clear plastic cover for sequence of operation and secure to the transfer switch. This will be useful for Owner testing and trouble shooting.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.
   1. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 50 miles of Project.
   2. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three years documented experience.

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

1.06 MAINTENANCE SERVICE

A. Provide service and maintenance of transfer switches for one year from Date of Substantial Completion.

1.07 WARRANTY

A. Provide a warranty that equals or exceeds the "Comprehensive" Warranty offered by Cummins Power Generation. Warranty shall cover cover parts, travel, and labor for up to 1500 hours of engine run time or five-years whichever comes first.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cummins/Onan.

B. Caterpiller.

C. Kohler.

2.02 AUTOMATIC TRANSFER SWITCH

A. Description: NEMA ICS 10, automatic transfer switch.

B. Configuration: Electrically operated, mechanically held transfer switch.

C. Withstand Current Rating: 50k rms symmetrical amperes, when used with molded case circuit breaker, unless noted otherwise on the drawings.

2.03 SERVICE CONDITIONS

A. Service Conditions: NEMA ICS 10.

B. Temperature: 80 degree F.

2.04 COMPONENTS

A. Microprocessor based control system. Cummins Level 1 control, Cummings option (C023).

B. Digital Display. Cummins option (M018).

C. Load Power and Load Current Monitoring (M022). Include CT's , PT's as required.
   1. The display shall be able to display the ampereres.

D. Test Switch: Mount in cover of enclosure to simulate failure of normal source.

E. Return to Normal Switch: Mount in cover of enclosure to initiate manual transfer from alternate source to normal source.
   1. Transfer Switch Auxiliary Contacts: 1 normally open; 1 normally closed.
   2. Normal Source Monitor: Monitor each line of normal source voltage and frequency; initiate transfer when voltage drops below 85 percent or frequency varies more than 3 percent from rated nominal value.

F. Alternate Source Monitor: Monitor alternate source voltage and frequency; inhibit transfer when voltage is below 85 percent or frequency varies more than 3 percent from rated nominal value.

G. Enclosure: ICS 10, Type 1, finished with manufacturer's standard enamel.

H. Provide specified automatic transfer switch.

2.05 AUTOMATIC SEQUENCE OF OPERATION

A. Initiate Time Delay to Start Alternate Source Engine Generator: Upon initiation by normal source monitor.

B. Time Delay To Start Alternate Source Engine Generator: 0 to 10 seconds, adjustable.

C. Initiate Transfer Load to Alternate Source: Upon initiation by normal source monitor and permission by alternate source monitor.

D. Time Delay Before Transfer to Alternate Power Source: 0 to 300 seconds, adjustable.

E. Initiate Retransfer Load to Normal Source: Upon permission by normal source monitor.

F. Time Delay Before Transfer to Normal Power: 0 to 30 minutes, adjustable; bypass time delay in event of alternate source failure.

G. Time Delay Before Engine Shut Down: 0 to 30 minutes, adjustable, of unloaded operation.

H. Engine Exerciser: Start engine every 7 days; run for 30 minutes before shutting down. Bypass exerciser control if normal source fails during exercising period.

I. Alternate System Exerciser: Transfer load to alternate source during engine exercising period.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surface is suitable for transfer switch installation.

3.02 PREPARATION

A. Provide housekeeping pads under the provisions of Section 033000.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide engraved plastic nameplates under the provisions of Section 260553.

3.04 FIELD QUALITY CONTROL

A. Provide the services of the manufacturer's technical representative to check out transfer switch connections and operation and place in service.

B. Perform field inspection and testing in accordance with Section 014000.

C. Inspect and test in accordance with NETA STD ATS, except Section 4.

D. Perform inspections and tests listed in NETA STD ATS, Section 7.22.3.

3.05 MANUFACTURER'S FIELD SERVICES

A. Provide the services of the manufacturer's technical representative to check out transfer switch connections and operations and place in service.

3.06 CLOSEOUT ACTIVITIES

A. Demonstrate operation of transfer switch in bypass, normal, and emergency modes.

3.07 MAINTENANCE

A. Provide service and maintenance of transfer switches for one year from Date of Substantial Completion.

END OF SECTION

SECTION 265100

LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires.

B. Exit signs.

C. Ballasts and drivers.

D. Emergency power supply units.

E. Lamps.

F. Luminaire accessories.

1.02 RELATED REQUIREMENTS

A. Section 260537 - Boxes.

B. Section 260923 - Lighting Control Devices: Automatic controls for lighting including occupancy sensors, outdoor motion sensors, time switches, outdoor photo controls, and daylighting controls.

C. Section 262726 - Wiring Devices: Manual wall switches and wall dimmers.

1.03 REFERENCE STANDARDS

A. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; 2011.

B. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Cor 1, 2012).

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

D. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; 2006.

E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; National Electrical Contractors Association; 2006.

F. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; National Electrical Manufacturers Association; 2011.

G. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; National Electrical Manufacturers Association; 2012.

H. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. NFPA 101 - Life Safety Code; National Fire Protection Association; 2012.

J. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

K. UL 935 - Fluorescent-Lamp Ballasts; Current Edition, Including All Revisions.

L. UL 1598 - Luminaires; Current Edition, Including All Revisions.

M. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.

2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer. Provide shop drawings for the following:
1. Light fixtures.
2. Ballasts.
3. Lamps.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Conform to requirements of NFPA 70 and NFPA 101.

1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide two year manufacturer warranty for all linear fluorescent ballasts.

C. Provide five year pro-rata warranty for batteries for emergency lighting units.

D. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products that comply with requirements of NFPA 70 and NFPA 101.

D. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

H. Recessed Luminaires:
1. Ceiling Compatibility: Comply with NEMA LE 4.

2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.

I. Fluorescent Luminaires:
   1. Provide ballast disconnecting means complying with NFPA 70 where required.
   2. Fluorescent Luminaires Controlled by Occupancy Sensors: Provide programmed start ballasts.
   3. Fluorescent Luminaires Controlled by Dual-Level Switching: Provide with two ballasts.
      a. Luminaires with Two Lamps: Each ballast controls one lamp.
      b. Luminaires with Three Lamps: One ballast controls two outer lamps and one ballast controls inner lamp.
      c. Luminaires with Four Lamps: One ballast controls two outer lamps and one ballast controls two inner lamps.

J. LED Luminaire Components: UL 8750 recognized or listed as applicable.

K. Track Lighting Systems: Provide track compatible with specified track heads, with all connectors, power feed fittings, dead ends, hangers and canopies as necessary to complete installation.

L. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.03 LUMINAIRES

A. Furnish products as indicated in Schedule included on the Drawings.

B. Substitutions: See Section 016000 - Product Requirements.

2.04 EXIT SIGNS

A. Description: Exit signs and similar signs for special purpose applications such as area of refuge/rescue assistance.

B. All Exit Signs: Internally illuminated with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
   1. Number of Faces: Single or double as indicated or as required for the installed location.
   2. Directional Arrows: As indicated or as required for the installed location.

2.05 BALLASTS

A. All Ballasts:
   1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
   2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

B. Fluorescent Ballasts:
   1. All Fluorescent Ballasts: Unless otherwise indicated, provide high frequency electronic ballasts complying with ANSI C82.11 and listed and labeled as complying with UL 935.
      a. Inrush Current: Not exceeding peak currents specified in NEMA 410.
      b. Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 10 percent.
      c. Total Harmonic Distortion: Not greater than 10 percent.
      d. Power Factor: Not less than 0.98.
      e. Ballast Factor: Normal ballast factor between 0.85 and 1.15, unless otherwise indicated.
      f. Thermal Protection: Listed and labeled as UL Class P, with automatic reset for integral thermal protectors.
      g. Sound Rating: Class A, suitable for average ambient noise level of 20 to 24 decibels.
      h. Lamp Compatibility: Specifically designed for use with the specified lamp, with no visible flicker.
      i. Lamp Operating Frequency: Greater than 20 kHz, except as specified below.
      j. Lamp Current Crest Factor: Not greater than 1.5.

k. Provide automatic restart capability to restart replaced lamp(s) without requiring resetting of power.
l. Provide end of lamp life automatic shut down circuitry for T5 and smaller diameter lamp ballasts.
m. Surge Tolerance: Capable of withstanding characteristic surges according to IEEE C62.41.2, location category A.
n. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of CFR, Title 47, Part 18, for Class A, non-consumer application.
o. Ballast Marking: Include wiring diagrams with lamp connections.

2. Non-Dimming Fluorescent Ballasts:
   a. Lamp Starting Method:
      1) T8 Lamp Ballasts: Programmed start unless otherwise indicated.
      2) Compact Fluorescent Lamp Ballasts: Programmed start unless otherwise indicated.

C. Dimmable LED Drivers:
1. Dimming Range: Continuous dimming from 100 percent to one percent relative light output unless dimming capability to lower level is indicated, without flicker.
2. Control Compatibility: Fully compatible with the dimming controls to be installed.

2.06 EMERGENCY POWER SUPPLY UNITS

A. Description: Self-contained LED emergency power supply units suitable for use with indicated luminaires, complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

B. Operation: Upon interruption of normal power source, solid-state control automatically switches connected lamp(s) to the emergency power supply for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

C. Diagnostics: Provide accessible and visible multi-chromatic combination test switch/indicator light to display charge, test, and diagnostic status and to manually activate emergency operation.

D. Battery shall be warranted to be free from defect in material and workmanship for a period of five (5) years from the date of manufacture.

2.07 LAMPS

A. Manufacturers:
1. GE Lighting: www.gelighting.com.
2. Philips Lighting Co of NA: www.lighting.philips.com.
3. Osram Sylvania.

B. All Lamps:
1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect to be inconsistent in perceived color temperature.

C. Lamp Types: As specified for each fixture.

D. Provide lamps listed in the Fixture Schedule on the Drawings. Fluorescent T8 lamps shall be 5000 degree K temperature in color 85 CRI unless otherwise listed. Compact fluorescent lamps shall be 5000 degree K temperature in color 82 CRI unless other wise listed. Incandescent lamps shall be inside frosted unless otherwise shown. Lamps shall be new when the building is accepted by the Owner.

E. T8, 32-watt lamps shall be as follows:
   1. Alto II technology
   2. Contain 1.7mg or less of mercury
   3. Initial lumens: 3100
   4. Design lumens: 2950
   5. CRI: 85
   6. Philips Product Number 13989-9, F32T8/ADV850/ALTO or equal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of luminaires provided under this section.

B. Install products according to manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).

D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

E. Suspended Ceiling Mounted Luminaires:
   1. Do not use ceiling tiles to bear weight of luminaires.
   2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
   3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
   4. Secure pendant-mounted luminaires to building structure.
   5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
   6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
   7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.

F. Recessed Luminaires:
   1. Install trims tight to mounting surface with no visible light leakage.
   2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
   3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.

G. Suspended Luminaires:
   1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.

2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
3. Install canopies tight to mounting surface.

H. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

I. Install fixtures securely, in a neat and workmanlike manner.

J. Support luminaires larger than 2 x 4 foot (600 x 1200 mm) size independent of ceiling framing.

K. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.

L. All 2' x 4' recessed fluorescent troffers shall be clipped to the T-grid and independently supported using two wires (same type as ceiling grid wires) from diagonal corners of troffer to structural building support.

M. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

N. Exposed Grid Ceilings: Provide auxiliary members spanning ceiling grid members to support surface mounted luminaires.

O. Install recessed luminaires to permit removal from below.

P. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

Q. Install clips to secure recessed grid-supported luminaires in place.

R. Install wall mounted luminaires, emergency lighting units, and exit signs at height as indicated on Drawings.

S. Install accessories furnished with each luminaire.

T. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within fixture; use flexible conduit.

U. Connect luminaires and exit signs to branch circuit outlets provided under Section 260537 using flexible conduit.

V. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

W. Bond products and metal accessories to branch circuit equipment grounding conductor.

X. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.

Y. Fluorescent Luminaires Controlled by Dual-Level Switching: Connect such that each switch controls the same corresponding lamps in each luminaire.

Z. Fluorescent Emergency Power Supply Units:

AA. Install lamps in each luminaire.

AB. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Perform field inspection in accordance with Section 014000.

D. Operate each luminaire after installation and connection to verify proper operation.

E. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

F. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

C. Aim and adjust fixtures as indicated.

D. Position exit sign directional arrows as indicated.

3.06 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

B. Clean electrical parts to remove conductive and deleterious materials.

C. Remove dirt and debris from enclosures.

D. Clean photometric control surfaces as recommended by manufacturer.

E. Clean finishes and touch up damage.

3.07 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

B. Replace damaged luminaires.

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

3.09 PROTECTION

A. Relamp luminaires that have failed lamps at Substantial Completion.

END OF SECTION

SECTION 265600
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.

B. Poles and accessories.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.

B. Section 260526 - Grounding and Bonding for Electrical Systems.

C. Section 260537 - Boxes.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NECA/IESNA 501 - Recommended Practice for Installing Exterior Lighting Systems; 2006.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 1598 - Luminaires; Current Edition, Including All Revisions.

E. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
   2. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:
   1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
   2. Provide photometric calculations where luminaires are proposed for substitution upon request.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
   1. Poles: Include information on maximum supported effective projected area (EPA) and weight for the design wind speed.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.

H. LED Luminaire Components: UL 8750 recognized or listed as applicable.

2.03 POLES

A. All Poles:
   1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
   2. Structural Design Criteria:
      a. Wind Load: Include effective projected area (EPA) of luminaire(s) and associated supports and accessories to be installed.
         1) Design Wind Speed: 100 miles per hour (161 kph), with gust factor of 1.3.
      b. Dead Load: Include weight of proposed luminaire(s) and associated supports and accessories.
   3. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.
   4. Unless otherwise indicated, provide with the following features/accessories:
      a. Top cap.
      b. Handhole.
      c. Anchor bolts with leveling nuts or leveling shims.
      d. Anchor base cover.

B. Metal Poles: Provide ground lug, accessible from handhole or transformer base.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of luminaires provided under this section.

B. Install products according to manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA/IESNA 501 (exterior lighting).

D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

E. Pole-Mounted Luminaires:
   1. Foundation-Mounted Poles:
      a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 033000.
         1) Install anchor bolts plumb per template furnished by pole manufacturer.
         2) Position conduits to enter pole shaft.
      b. Install foundations plumb.
      c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
      d. Tighten anchor bolt nuts to manufacturer's recommended torque.
      e. Install non-shrink grout between pole anchor base and concrete foundation, leaving small channel for condensation drainage.
      f. Install anchor base covers or anchor bolt covers as indicated.
   2. Grounding:
      a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
      b. Provide supplementary ground rod electrode as specified in Section 260526 at each pole bonded to grounding system as indicated.
   3. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.

F. Install accessories furnished with each luminaire.

G. Bond products and metal accessories to branch circuit equipment grounding conductor.

H. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Luminaires with Field-Rotatable Optics: Position optics according to manufacturer's instructions to achieve lighting distribution as indicated or as directed by Architect.

3.06 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

C. Program lighting controls to operate light fixtures per Owner instructions.

D. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 271005

STRUCTURED CABLING FOR VOICE AND DATA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cabling and pathways inside building(s).

B. Distribution frames, cross-connection equipment, enclosures, and outlets.

C. Grounding and bonding the telecommunications distribution system.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems: Electrical system grounding and bonding.

B. Section 260534 - Conduit.

C. Section 260536 - Cable Trays for Electrical Systems.

1.03 REFERENCE STANDARDS

A. EIA-310 - Cabinets, Racks, Panels, and Associated Equipment; Electronic Industries Association; Revision D, 1992.

B. CEA-310 - Cabinets, Racks, Panels, and Associated Equipment; Consumer Electronics Association; Revision E, 2005.

C. ICEA S-90-661 - Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cable for Use in General Purpose and LAN Communications Wiring Systems; Insulated Cable Engineers Association; 2002.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. TIA-455-21 - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices; Rev A, 1988(R 2002).

F. TIA-492AAAB-A - Detail Specification for 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; 2009.

G. TIA-526-14 - OFSTP-14 - Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant; Rev A, 1998(R2003).

H. TIA/EIA-568-B - Commercial Building Telecommunications Cabling Standard - Current version and all areas that pertain to this project.

I. TIA-569 - Commercial Building Standard for Telecommunications Pathways and Spaces - Current version.

J. TIA/EIA-606 - Administration Standard for the Telecommunications Infrastructure - Current version.

K. ANSI/J-STD-607 - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications - Current version.

L. UL 444 - Communications Cables; Current Edition, Including All Revisions.

M. UL 1863 - Standard for Communications-Circuit Accessories; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Storage and handling requirements and recommendations.
   2. Installation methods.

B. Shop Drawings: Show compliance with requirements on detailed specification sheets of structured cabling materials required for a complete and operational system. This information must be prepared and stamped by BICSI Registered Communications Distribution Designer (RCDD) on the first and last page.

C. Manufacturer Qualifications.

D. Installer Qualifications.

E. Field Test Reports at each outlet.

F. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
   1. Record actual locations of outlet boxes and distribution frames.
   2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
   3. Identify distribution frames and equipment rooms by room number on contract drawings.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.

B. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
   1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
   2. Supervisors and installers factory certified by manufacturers of products to be installed.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Keep stored products clean and dry.

1.07 WARRANTY

A. Correct defective Work within a 2 year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cabling and Equipment:
   1. Systimax - (End to End Solution)
   2. Commscope Uniprise - (End to End Solution)

2.02 SYSTEM DESIGN

A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
   1. Comply with TIA/EIA-568 and TIA/EIA-569, latest editions.
   2. Provide fixed cables and pathways that comply with NFPA 70 and ANSI/J-STD-607 and are UL listed or third party independent testing laboratory certified.
   3. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.

B. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.03 PATHWAYS

A. Conduit: As specified in Section 260534; leave pull cord in all conduit.
   1. 1" minimum size stubbed up to above accessible ceiling with bushing on end of conduit.
   2. In areas without a ceiling cabling shall be installed in conduit.
   3. Install cable sleeves as indicated on drawings. In areas where cables will penetrate through structure and sleeves are not indicated, this contractor will be responsible for installing a conduit sleeve sized to meet a 40% fill rate.

B. J-Hooks:
   1. All cabling shall be supported every 4' to 6'.
   2. Properly support and follow manufacturer recommended fill rates.

C. Cable Trays: As specified in Section 260536 and on drawings for details.

D. Underground Service Entrance: PVC, Type EPC-40 conduit.

2.04 COPPER CABLE AND TERMINATIONS

A. Copper Backbone Cable: TIA/EIA-568 Category 5e solid conductor unshielded twisted pair (UTP), 24 AWG, 100 ohm; 25 pairs formed into 25-pair binder groups.
   1. In plenums, provide NFPA 70 type CMP plenum-rated cable.
   2. Provide cable having conductors twisted at minimum rate of two per foot; actual length and frequency of twists at manufacturer's option.
   3. Color code conductors in accordance with ICEA S-90-661.
   4. Provide as indicated on telecommunications riser diagram. There will be a 25 pair installed to each telecommunications board from IT Room 101A.

B. Copper Horizontal Cable: TIA/EIA-568 Category 6 solid conductor unshielded twisted pair (UTP), 23 AWG, 100 ohm; 4 individually twisted pairs; covered with blue jacket and complying with all relevant parts of and addenda to latest edition of TIA/EIA-568 and UL 444.
   1. In locations other than in plenums, provide NFPA 70 type CMG general purpose, CMR riser-rated, or type CMP plenum-rated cable.
   2. In plenums, provide NFPA 70 type CMP plenum-rated cable.

C. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool.

D. Data Jacks and Connectors: RJ-45, Category 6, non-keyed, terminated with 110-style insulation displacement connectors; high impact thermoplastic housing; complying with same standard as specified horizontal cable and UL 1863.
   1. Performance: 500 mating cycles.
   2. Data Jacks: Install to EIA/TIA 568B standards.
   3. Data jacks shall be gray in color.

E. Wireless Access Points (WAP) - Provide two Category 6 cables and jacks to each WAP indicated on the drawings. The Owner will provide the wireless device. The Owner will provide POE switches to power the device.

F. Camera Outlets - Provide one Category 6 cable and jack at each camera location indicated on the drawings unless otherwise noted on the drawings.

G. Patch Cords - The Owner will provide all copper patch cords. Fiber patch cords to be provided by this Contractor.

2.05 FIBER OPTIC CABLE AND ADAPTORS

A. Fiber Optic Backbone Cable from MDF to Existing Fiber Rack in Existing Building: 24 Strand Fiber, **singlemode** 50/125 um, covered with orange cable jacket and complying with relevant portions of and addenda to latest edition of TIA/EIA-568. All fiber shall meet OM4 rating.
   1. In locations other than in plenums, provide NFPA 70 type OFNR nonconductive-riser-rated or type OFNP nonconductive-plenum-rated cable.
   2. In plenums, provide NFPA 70 type OFNP nonconductive-plenum-rated cable.
   3. Install cable in innerduct.

B. Fiber Optic Backbone Cable from MDF to IDF's: 24 Strand Fiber, **multimode** 50/125 um, complying with TIA-492AAAB; covered with orange cable jacket and complying with relevant portions of and addenda to latest edition of TIA/EIA-568. All fiber shall meet OM4 rating.
   1. In locations other than in plenums, provide NFPA 70 type OFNR nonconductive-riser-rated or type OFNP nonconductive-plenum-rated cable.
   2. In plenums, provide NFPA 70 type OFNP nonconductive-plenum-rated cable.
   3. Install cable in innerduct.

C. Fiber Optic Adapters and Connectors: Provide SC type fiber connectors with a maximum attenuation of 0.3 dB at 1300 nm with less than 0.2 dB change after 500 mating cycles when tested in accordance with TIA-455-21. Place fiber terminations in rack mounted enclosure in Data racks located on each telecommunications rack. See riser diagram for further information.

D. All fiber ends shall be terminated at each end of the cable.

2.06 CROSS-CONNECTION EQUIPMENT

A. Connector Blocks for Category 5e Tie Cabling: Type 66 or 110 insulation displacement connectors; capacity sufficient for cables to be terminated plus 25 percent spare.

B. Patch Panels for Copper Cabling: Category 6, sized to fit EIA standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
   1. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; all patch panels will be 48 ports per standard width panel.
   2. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
   3. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA/EIA-606 using encoded identifiers. Identify room number above each patch panel port.
   4. Provide 2 horizontal wire managements for each patch panel provided.

C. Patch Panels for Copper Voice Tie Cabling: Sized to fit EIA standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
   1. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
   2. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA/EIA-606 using encoded identifiers. Identify room number above each patch panel port.
   3. Provide 2 horizontal wire managements for each patch panel provided.

D. Patch Panels for Fiber Optic Cabling: Sized to fit EIA standard 19 inch wide equipment racks; 0.09 inch thick aluminum.
   1. Adaptors: As specified above under FIBER OPTIC CABLING; maximum of 24 duplex adaptors per standard panel width.
   2. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA/EIA-606 using encoded identifiers.
   3. Provide incoming cable strain relief and routing guides on back of panel.
   4. Provide dust covers for unused adaptors.
   5. Patch Cords: Provide one duplex fiber patch cord for each pair of fiber provided.

2.07 ENCLOSURES

A. Backboards: Interior grade plywood without voids, 3/4 inch thick; provide 2 coats of fire-retardent paint.
   1. Size: As indicated on drawings.

B. Equipment Racks:
   1. Install new 7' freestanding equipment racks where indicated on the drawings. See Telecom Riser and Floor Plans for further information.
   2. All new cable will be routed and terminated on new patch panels installed on equipment racks.
   3. All racks shall be equipped with horizontal and vertical cable management.
   4. Provide 20 amp vertical power surge protection strips for all equipment racks. See data management detail for further information.
   5. Install a #6 AWG ground wire from equipment racks to ground bus bar.

C. Outlet Boxes: For flush mounting in walls; depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
   1. Size, Unless Otherwise Indicated: 4 inches square by 2-1/8 inches deep.
   2. Faceplates: All faceplates will be Stainless steel and contain label cover with the amount of ports required as indicated on the drawings or provide blank gray inserts for any additional ports provided.
      a. All indicated wall phones shall be provide with a wall phone mounting lug faceplates with a 3.28" lug spacing.
      b. Labels: Provide printed labels for all locations. No hand written labels will be allowed.

D. Floor boxes: All cables installed shall be terminated on correct jacks and jacks shall be installed in a plate secured to the box. Coordinate with the electrician and provide appropriate plates for jack installation.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with latest editions and addenda of TIA/EIA-568, TIA/EIA-569, ANSI/J-STD-607, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

3.02 PATHWAYS

A. Install with the following minimum clearances:
   1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
   2. 12 inches from power conduits and cables and panelboards.
   3. 6 inches from fluorescent and high frequency lighting fixtures.
   4. 6 inches from flues, hot water pipes, and steam pipes.

B. Conduit:
   1. Do not install more than 2 (two) 90 degree bends in a single horizontal cable run.
   2. Leave pull cords in place where cables are not initially installed.
   3. Conceal conduit under floor slabs and within finished walls, ceilings, and floors except where specifically indicated to be exposed.
      a. Conduit may remain exposed to view in mechanical rooms, electrical rooms, and telecommunications rooms.
      b. Treat conduit in crawl spaces and under floor slabs as if exposed to view.
      c. Where exposed to view, install parallel with or at right angles to ceilings, walls, and structural members.
      d. Under floor slabs, locate conduit at 12 inches, minimum, below vapor retarder; seal penetrations of vapor retarder around conduit.

C. Grounding and Bonding: Perform in accordance with ANSI/J-STD-607 and NFPA 70.

D. Firestopping: Seal openings around pathway penetrations through fire-rated walls, partitions, floors, and ceilings.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:
   1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
   2. Do not over-cinch or crush cables.
   3. Do not exceed manufacturer's recommended cable pull tension.
   4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
   5. All cables shall be bundled using Velcro straps. Plastic tie-wraps are unacceptable.
   6. Cable management shall be provided between each patch panel.

B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
   1. At Distribution Frames: 120 inches.
   2. At Outlets - Copper: 12 inches.
   3. At Outlets - Optical Fiber: 39 inches.
   4. At WAP's - 120 inches.

C. Copper Cabling:
   1. Category 6: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
   2. For 4-pair cables in conduit, do not exceed cable manufacturer's recommended pull tension.

D. Outlets:
   1. Install at 18" AFF unless noted otherwise on the drawings.

E. Field-Installed Labels: Comply with TIA/EIA-606 using encoded identifiers. Hand written labels will not be accepted. Consult with Lincoln Public Schools Electronics Shop before establishing finalized labeling nomenclature.
   1. Cables: Install color coded labels on both ends within 2" of termination point.
   2. Jacks: Permanent label as indicated below.
   3. Jacks and Cable shall be labeled as indicated below:
      a. 1st alphanumeric to represent Floor and Equipment Room ID letter (1A-1B).
      b. 2nd alphanumeric to represent Data Rack ID# within that room (1-9).
      c. 3rd alphanumeric to represent Patch Panel ID letter on that rack (A-Z).
      d. 4th alphanumeric to represent Port ID# (1-48).
      e. Example 1A-1A1.
      f. Patch Panel Ports: Label with room number.
      g. Lable all racks and patch panels.

3.04 FIELD QUALITY CONTROL

A. Comply with inspection and testing requirements of specified installation standards.

B. Visual Inspection:
   1. Inspect cable jackets for certification markings.
   2. Inspect cable terminations for color coded labels of proper type.
   3. Inspect outlet plates and patch panels for complete labels.

C. Testing - Copper Cabling and Associated Equipment:
   1. Test backbone cables after termination but before cross-connection.
   2. Test backbone cables for DC loop resistance, shorts, opens, intermittent faults, and polarity between connectors and between conductors and shield, if cable has overall shield.
   3. Category 3 Backbone: Perform attenuation test.
   4. Category 6 Links: Perform tests in accordance with all TIA/EIA testing standards for Cat 6 cabling. All test must be performed as a permanent link, channel testing will not be accepted.

D. Testing - Fiber Optic Cabling:
   1. Multimode Backbone: Perform tests in accordance with TIA/EIA-526-14 Method B.

E. Submit Final Test results in a 3-ring binder sleeve included with O&M Manuals to LPS in a readable format on CD Rom.

END OF SECTION

SECTION 275124

INTERCOM SYSTEM

GENERAL CONDITIONS

1.01 THE CONDITIONS OF THE GENERAL CONTRACT (GENERAL, SUPPLEMENTARY AND OTHER CONDITIONS) AND GENERAL REQUIREMENTS ARE HEREBY MADE PART OF THIS SECTION.

A. All bids shall be based on the equipment as specified herein. The catalog numbers and model designations are that of the Dukane Corporation StarCall Plus Communication System.

B. Bidders wishing to submit alternate equipment shall submit to the specifying authority, at least 10 days prior to bid opening. The equipment proposed shall provide a precise functional equivalent system to meet the specifications. Submission for prior approval shall be in accordance with section 6 and 7 of this specification.

1. Subject to shop drawing approval the Rauland Telecenter 21, Care Hawk CH1000, and Bogen Multicom 2000 shall be considered as an equal to the specified system and may be bid as base bid.

1.02 SCOPE OF WORK

A. Furnish and install all equipment, accessories and materials in accordance with these specifications and drawings to provide a complete and operating nonblocking Communications System consisting of Intercommunication, Public Address, Program Distribution, Time Control and Tone Distribution.

B. All rough-in conduits and wall-mounted backboxes shall be furnished and installed under this contract. All backboxes will be furnished and installed by the Systems Contractor. The Systems Contractor shall furnish complete rough-in requirements and furnish all backboxes at such time as required to not impede the progress of the building construction.

1.03 SUBMITTALS

A. The vendor shall provide the following documentation and service:

1. Shop Drawings: 7 sets. These drawings shall include the manufacturer's specifications sheets, including all the component parts.
2. As Built Drawings: 3 sets. These drawings shall include up-to-date drawings that include any changes made to the system during installation. Circuit diagrams and other information necessary for the proper operation and maintenance of the system shall be included.

B. All material and/or equipment necessary for the proper operation of the system, even though not specifically mentioned in the contract documents, shall be deemed part of this contract.

1.04 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of each item of fixed equipment, and show interconnecting wiring.

1.05 OPERATION AND MAINTENANCE DATA

A. Include operator instructions for each required mode of operation, routine trouble shooting procedures, manufacturer's operation and maintenance manual for each item of equipment and accessory, and routine cleaning methods and materials.

1.06 QUALIFICATIONS

A. To establish continuity in manufacturer, systems components shall be the standard product of one manufacturer. Further, an effort shall be made to establish common sources for equipment on all systems. The manufacturer will have a minimum of twenty five (25) years experience in the manufacture of products specified in this Section.

1. The work to be provided under this section consists of furnishing and installing all equipment, cabling and labor required for complete, operable, new, intercommunications, clock, program and tone distribution systems. These systems will be referred to as the " COMMUNICATIONS SYSTEMS" and their supplier as the " SYSTEM CONTRACTOR".

2. All empty conduit and power required for the " COMMUNICATIONS SYSTEM" will be supplied by the "ELECTRICAL CONTRACTOR" as a complete raceway system. Return Air Plenum cable may be used as an option at the electrical contractor's discretion. All Plenum cable shall meet all applicable local and national codes and shall be properly supported in the cable tray system or using cable ties. Under no circumstances shall cable be installed without support or lying directly on the ceiling tiles.

B. The "ELECTRICAL CONTRACTOR" will accept bids from prequalified " SYSTEM CONTRACTORS". Prices from the " SYSTEM CONTRACTOR" will reflect the cost of the " COMMUNICATION SYSTEM" completely installed, but the conduit or raceway for these systems should not be included in this figure. However, if plenum cable is used, it shall be included in the " SYSTEMS CONTRACTORS" price to the "ELECTRICAL CONTRACTOR". The electrical contractor's base bid will include the "BASE BID SYSTEMS" as specified. Should the "ELECTRICAL CONTRACTOR" wish to supply information on alternate systems, see paragraphs 6 and 7.

C. Special Note: Any additional conduit or wire for alternate equipment shall be included in the "ALTERNATE SYSTEM" cost. It is the "ELECTRICAL CONTRACTOR'S" responsibility to thoroughly investigate possible effects of "ALTERNATE EQUIPMENT" on the conduit/raceway/wire system. Conduit will be provided as indicated on the plans. The owner will not pay any additional cost for additional conduit or wire required to implement alternate equipment

D. The " SYSTEM CONTRACTOR" must be a factory authorized representative or distributor of all equipment utilized in the " COMMUNICATIONS SYSTEM". Further, this contractor must have a minimum of five years of experience in the specific application of the equipment proposed for these systems. Provide a letter signed by an officer of the manufacturer attesting to the contractors direct affiliation with the manufacturer.

1.07 QUALIFICATION PROCEDURES

A. Base bids must be submitted on the basis of the specified "BASE BID SYSTEM". Alternate equipment proposals shall not be with base bid proposals or pricing.

B. Alternate equipment; proposals must be specified regarding equipment manufacturer and cost to be added to or deducted from "BASE BID SYSTEM".

C. Alternate equipment proposals must also include:
1. Franchise or Distributor agreement indicating effective date.
2. Notarized letter signed by an officer of the manufacturer, stating that the vendor is an authorized Distributor.
3. List of similar installations in the area of the same manufacturer's equipment.
4. Complete equipment index.
5. Complete engineering data on all equipment proposed and system block diagram.
6. This information must accompany the bid. Failure to submit this information with the bid will constitute grounds to dismiss the "ALTERNATE EQUIPMENT", and the contractors bid will be evaluated on "BASE BID SYSTEM".

D. Proposals for alternate equipment will receive careful and equitable consideration, but must maintain the functional design and operating procedures of the specified system.

E. The owner reserves the right to reject any or all alternate equipment bids and to select the bid that is considered to serve "THE BEST INTEREST OF THE OWNER".

1.08 SUBSTITUTE EQUIPMENT--PRE-QUALIFICATION

A. Only the specified "BASE BID SYSTEM" manufacturer and "ALTERNATE" equipment manufacturers specified herein will be considered. Equipment manufactured by other than those specified will be considered "SUBSTITUTE EQUIPMENT" and must be "PREQUALIFIED".

B. "SUBSTITUTE EQUIPMENT" pre-qualification proposals must be received no later than then (10) working days prior to bid date. These proposals will include the following:
1. Franchise agreement indicating effective date and notarized factory letter.

2. Index of similar installations of the same manufacturer's equipment by this contractor/supplier, installed in the area. This index will list: facility, systems provided, approximate contract amount, personal and business phone numbers.
3. Complete equipment index of equipment proposed for this project. This equipment index will be divided on a system basis giving specific references to associated specified systems. Also, complete engineering data on all indexed equipment with diagrams for system layout or custom components.
4. It should be understood that the owner, architect and /or engineer is under no obligation to prequalify additional (substitute) equipment manufacturers. However, if such PRE-QUALIFICATION is granted, it must be done in addendum.

1.09 REGULATORY REQUIREMENTS

A. The entire installation will comply with all applicable electrical and safety codes. All Central Processor and additional applicable equipment shall be listed by Underwriters' Laboratories and CSA approved. Furnish a copy of the UL listing card with the submittal.

B. All equipment with Digital Apparatus (Microprocessors) that generates and utilizes timing signals at a rate in excess of 10,000 pulses per second to compute and operate must be Federal Communications Commission (FCC) and "DOC" CSA standards C108.8 (Electromagnetic Emissions) approved. Any equipment supplied or installed without the above approvals will not be accepted and will nullify the contract.
   1. Provide documents supporting and verifying this approval.

1.10 MAINTENANCE SERVICE

A. The communication contractor supplying the equipment shall show satisfactory evidence, upon request, that they maintain a fully equipped service organization capable of furnishing adequate inspection and service to the system, including replacement parts. The vendor shall be prepared to offer a service contract for the maintenance of the system after the guarantee period. The bidder shall produce evidence that they have had a fully experienced and established service organization for at least five years and proven satisfactory installations during that time.

B. Furnish service and maintenance of Communication Systems for one year from Date of Substantial Completion.

1.11 COMMUNICATION SYSTEM

A. Furnish and install a microprocessor controlled communication system with all conduit, wire, outlets and equipment as shown on the drawings and as herein specified to provide a complete intercom, program and tone distribution and clock system.

1.12 SYSTEM PARAMETERS

A. The communications system shall be a Dukane StarCall Plus™ local operating network (LON) based, multi-channel, microprocessor controlled communications system. The system shall be capable of simultaneously handling intercom, program, and paging distribution using standard DTMF telephones. The system shall provide the ability to operate and correct digital and/or analog clocks. The system shall provide the ability to distribute tones to different areas of the building and activate other devices or systems based on the time of day, system activity or event. The system shall provide four independent intercom channels between any telephone on the system and loudspeaker(s). One additional simultaneously operating channel shall be provided for distribution of program material. Systems not providing a minimum of four, simultaneous open voice (telephone to speaker) speech paths shall be unacceptable.
   1. System shall provide user programmable architectural room numbering assignments.
   2. System shall provide the ability to assign the same dialing number for both the telephone and associated speaker.
   3. System shall contain a minimum of 32 Multipurpose Zones, which can be assigned and programmed as desired between paging, program, or time zones.
   4. The system shall allow future expansion of the program channels to a total of two individual channels.

5. The system shall provide the individual control of a minimum of 48 inputs from and 48 outputs to external devices.

B. The system shall have the capability for modular capacities of 640 audio ports with associated call-in point. The system shall be expandable to a total of 1024 ports including audio, input and output ports.
   1. All port locations may be assigned to a 3, 4, or 5 digit dial number as available on industry standard telephone keypad.
   2. Systems that are not modular or expandable or require replacement of any previously installed equipment shall not be acceptable.
   3. The system shall be expandable in groups of (4), (8) or (16) ports.

C. The system shall provide a minimum of 26, distinct, user programmable tone events, each of which may be programmed from a selection of up to 22 tone types and two program sources.
   1. These tones may be activated manually from any telephone connected to the system, contact closure or call-in switch or be may activated automatically via the internal master clock.
   2. Each of the system tones shall provide for three programmable attributes, consisting of type, output level and duration.
   3. The following programmable system tones shall be available;
      a. Emergency Page Pre-Announce
      b. Civil Emergency
      c. Auxiliary Alarm
      d. Emergency remind tone
      e. Page pre-announce
      f. Normal remind tone
      g. Custodial Tone
      h. Intercom Pre-Announce
      i. Privacy Tone
      j. Event tones 1 - 16

D. The system shall provide up to two simultaneously operating, non-restrictive, multiple input source, program distribution channels. These programs shall be programmed and distributed from any telephone connected to the system. Systems that require manually operated switchbanks to distribute program material shall not be acceptable.

E. The system shall have 32 user assignable groups for zoned audio paging, class change signals, or program distribution, with any speaker belonging to all zones, some zones or no zone.
   1. The system shall utilize the industry standard 25V method of transmission. Systems utilizing non standard or unorthodox methods such as 45-ohm loudspeakers without transformers shall not be acceptable.
   2. Each loudspeaker may be a member of up to 32 multipurpose zones.

F. All audio functions in the system operate within the following priority scheme.
   1. A Lower priority function cannot interrupt a higher priority event.
   2. A Lower priority event may be interrupted by a higher priority event.
   3. Interrupted lower priority functions (automatic) will be restored after conclusion of the higher priority function.
      a. If an event is initiated while a Page is occurring, the event will be optionally delayed until the Page is complete.
   4. The following priorities are ranked from highest to lowest.
      a. Emergency Intercom
      b. Emergency Page
      c. Civil Emergency
      d. Manual Time Tone and High Priority Event Tone
      e. All Call and Zone Page
      f. Intercom
      g. Custodial Tone

h. Low Priority Event Tone
i. Program Distribution

G. Rooms shall be equipped with push button call-in switches.

H. A group of loudspeakers may be temporarily excluded from receiving Time, Page or Program distribution by temporarily removing the desired station(s) stations from a pre-programmed zone. This feature shall be enabled/disabled from any telephone on the system programmed to allow access to this function.
1. Initiator may cancel this exclusion at any time.
2. A temporary exclusion shall automatically return to the pre-programmed status before the start of class the next day.
3. A group of loudspeakers may at the users discretion be permanently excluded.

I. The system shall contain an integral master clock and programmer, which shall be capable of performing the following functions.
1. Provide 500 discrete time event entries for programming functions based upon;
a. The time of day in hours and minutes.
b. The day or combination of seven (7) days of the week the event is to occur.
c. Selection of any one or any combination of thirty-two (32) zones to be activated.
d. Selection of any one or combination of fort-eight (48) outputs to be activated.
e. Selection of any one or combination of sixteen (16) schedules to allow for maximum flexibility due to special circumstances or seasonal changes.
1) Any combination of sixteen (16) time schedules may be active simultaneously.
f. Time tone event type.
2. The system shall provide sixteen (16) user definable time tone events types. Each time tone event shall use one of these sixteen (16) definable event types. Systems that do not allow or provide definable time tone event types and the selection of different event types for each time event shall not be acceptable. Time tone event types shall be configured from the following variables.
a. One of twenty-five (25) different tone types.
b. Tone output level.
c. Maintained or momentary tone.
d. Tone duration (for momentary tones)
3. The master clock shall provide for automatic daylight savings time and leap year adjustments.
4. Master clock shall correct compatible secondary clocks, analog or digital or both.
5. The system shall provide for an editing and review routine to permit the user to change and edit time event, zones, and schedules.
6. The system shall support “March to Music” allowing pre-selected program material to be distributed according to pre-programmed schedules.

J. The system shall contain self-diagnostics to continually monitor the systems integrity. The system shall be provided with a user-friendly interface for system programming and diagnostics. The GUI will be Windows® based and will run on any IBM® compatible PC that supports Windows®.
1. User or Service Technician may download or upload complete system configuration data and store on a diskette. All system programming shall be stored on the disk for future use. This information may be reloaded at any time either on-site or from a remote location.
2. A copy of the programming and diagnostic software shall be provided to the owner as part of this contract.

K. The system shall contain an Uninterruptible Power Supply sized to run the system for a minimum of five minutes.

1.13 INPUT OUTPUT CONTROL

A. The system shall provide a minimum of fort-eight (48) inputs from and forty-eight (48) outputs to control of external devices and signals, using internal circuitry within the STARCall Plus system.

B. The system shall not require a PC or external memory to perform control of the external devices.

C. Each plug in card shall enable the system to support 48 separate input or 48 separate outputs. Modules may be stacked to increase capacity as desired.

D. Programming of these inputs and outputs is via the RAPID software package. Each of the 48 inputs and outputs may be individually configured.

E. The Input Contact Card, (ICC) shall support dry contact output signaling. Input contacts may be isolated or ground referenced.

F. The Output Contact Card (OCC) shall interface with external equipment such as CCTV Video Camera Controllers, system status indicators, digital message units graphic control panels and a variety of other similarly controlled devices that utilize dry make normally open contacts.
   1. Outputs shall be programmable by user to activate during any desired system activity (e.g. intercom, page, tone, program, time of day, etc.). Outputs may also be manually activated from any telephone connected to the system.

G. Each ICC input port is capable of initiating any desired system activity (e.g. page, tone, program, event, system reset, clock sync, alarm, etc.) including OCC port activation. Each input port provides an optional enable/disable period, programmable by hour, minute, and day-of-week.

H. OCC port action is available in different modes including:
   1. Normal
   2. Pulse
   3. Cycle
   4. Toggle

I. The output port shall support any or all of the following;
   1. Any system timed event.
   2. Any system activity
   3. Any speaker station port, by specific action types
   4. Any telephone port, by specific action types
   5. Any ICC (Input Contact Card) port

J. Each input and output shall be supported on an individual pair of twisted wire.

K. External terminations of ICC and OCC are via customer provided punch blocks utilizing connections to the appropriate card via supplied 15 foot connecting cables with appropriate plug in connectors.

1.14 LOUDSPEAKERS, BAFFLES AND BACKBOXES

A. Flush Mounted Ceiling Speakers.
   1. The loudspeaker shall be a Dukane 5A607. The loudspeaker shall be an eight-inch seamless cone type with an additional cone mounted in the apex of the large cone to extend the high frequency response. The ceramic magnet shall weigh at least 10 ounces. The frequency range shall be from 30 to 20,000 Hz. Normal wattage rating shall be 15 watts with a program rating of 25 watts. Voice coil shall be 1 inch in diameter and 8 ohms impedance. The loudspeaker shall be equipped with a universal matching transformer suitable for use on 25 volt output line with taps of 1/2, 1 or 2 watts or a 70 volt line with taps at 1/2, 1, 2 or 4 watts.
   2. The loudspeaker baffle shall be a Soundolier model 62-8 screw mount or approved equal. Baffle shall be constructed of one piece 24 Ga. CRS. Finish shall be white textured enamel.
   3. Backbox shall be a Soundolier model 96-8 with Soundolier 180-2 channel supports or approved equal. Backbox shall be undercoated to prevent acoustical and mechanical resonance.

B. Surface Mount Speakers

1. Surface wall mounted speaker enclosures shall be Dukane model 6L100. The baffle shall be constructed of reinforced aluminum with a brushed satin finish and shall be designed to project sound from an 8-inch loudspeaker from both sides of the baffle when mounted on a side wall. The baffle shall mount on a standard 4-inch by 4-inch outlet box and shall not protrude more than 12-1/4 inches from the mounting surface. The unit shall be 10-3/4 inches in diameter and 4-3/4 inches deep and shall weigh no more than 2 pounds.
2. Surface ceiling mount speaker enclosures shall be a Soundolier model SM191-78. The enclosure shall be of welded CRS construction and undercoated to minimize mechanical and acoustical resonance. The enclosure shall be finished in a white, rust preventative, semi gloss enamel. The baffle shall be a Soundolier model 164-8 constructed of heavy gauge cold rolled steel with a baked white enamel finish.
3. Loudspeaker shall be a Dukane 5A607. The loudspeaker shall be an eight-inch seamless cone type with an additional cone mounted in the apex of the large cone to extend the high frequency response. The ceramic magnet shall weigh at least 10 ounces. The frequency range shall be from 30 to 20,000 Hz. Normal wattage rating shall be 15 watts with a program rating of 25 watts. Voice coil shall be 1 inch in diameter and 8 ohms impedance. The loudspeaker shall be equipped with a universal matching transformer suitable for use on 25 volt output line with taps of 1/2, 1 or 2 watts or a 70 volt line with taps at 1/2, 1, 2 or 4 watts.

C. Horn Type Speakers
1. Surface mount horn type loudspeakers shall be Dukane model 5A30. The horn loudspeaker shall be a shockproof, weatherproof speaker with a power rating of 15 watts full range a frequency response of 275 to 14,00 Hz and a 110-degree dispersion angle. The loudspeaker shall contain a built-in matching transformer with 70-volt taps at 0.9, 1.8, 3.8, 7.5 and 15 watts and 25 volt taps at 0.48, 0.94, 1.8, 7 and 14 watts. The loudspeaker shall contain a three way adjustable bracket and be finished in beige backed enamel over corrosion resistant coating.
   a. Horn type shall be used in:
      1) Mechanical rooms
      2) Where designated on the Drawings
2. Recessed mount horn speakers shall be Soundolier APF-15T flush mount horn with multitap line matching transformer. Unit shall be double re-entrant type with compression driver mounted within a waterproof housing. Audio power capability shall be 15 watts full range and 20 watts at frequencies above horn cutoff. Frequency response shall be 475 - 14,000 Hz. Sound pressure level shall be 121 dB measured 4' on axis at rated power. Sound dispersion angle shall 160 degrees. The loudspeaker shall have selectable power taps at .48, .94, 1.8, 7 and 15 watts for 25-volt line. Provide with each unit a Soundolier VP-161APF baffle and L20-211 backbox.
   a. The recessed mount horn speakers shall be used outside in the exterior locations.

1.15 CLOCKS

A. Digital Clocks
1. Two-inch digital clocks shall be Dukane model number 24D20. The digital clock shall provide an even intensity, long life display of time in selectable 12 or 24-hour format. The clock shall operate from either a 24 Vac of 15Vdc power supply. The clock shall offer two display modes - Normal and Bright intensity. The clock shall comply with the FCC part 15 class A emissions rules and shall meet requirements for installation in educational, institutional and commercial sites. The clock shall also be ESD - hardened to the IEC 801-2 standard. Clocks shall fit into a standard four or six gang backbox.
   a. Two inch clocks shall be used in:
      1) Classrooms
      2) Offices
      3) Conference rooms
2. Four-inch digital clocks shall be Dukane model number 24D40. The digital clock shall provide an even intensity, long life display of time in selectable 12 or 24-hour format. The clock shall operate from either a 24 Vac of 15Vdc power supply. The clock shall offer two

display modes - Normal and Bright intensity. The clock shall comply with the FCC part 15 class A emissions rules and shall meet requirements for installation in educational, institutional and commercial sites. The clock shall also be ESD - hardened to the IEC 801-2 standard. Clocks shall fit into a standard four or six gang backbox.

a. Four inch clocks shall be used in:
    1) Corridors (Double faced)
    2) Shop Bays

3. Double-faced digital clocks shall contain two Dukane 24D40 four-inch displays and a Dukane 110-1774 wall mount housing or 110-1775 ceiling mount housing.
4. Digital clock power supplies shall be the Dukane model 110-3693 power supply. The power supply shall operate from a rated line voltage of 120 V, 60 Hz. The power supply shall have two separate outputs rated at 24Vrms at 2.5 amps. Power supplies shall mount in a Dukane 145-184 backbox with 110-2190 flush door.
5. Power supplies shall be mounted in Mechanical or Custodial room and be accessible. 120V power has not been shown on the Drawings for these power supplies so Contractor must include the cost for this in their bid.

1.16 AM-FM TUNE AND CD PLAYER

A. The AM-FM Tuner/CD Player with auxiliary input for MP3 players. The unit shall operate on 12Vdc at 0.3 amps, derived from the host system and shall have an output of level of 1-volt rms. into a 600 ohm load. Unit shall have operating features and characteristics listed below.
    1. AM operating frequency range of 530 to 1710 KHz
    2. FM operating frequency range of 87.9 to 107.9 MHz
    3. AM, FM1 and FM2 tuning bands
    4. Auxiliary input for MP3 players
    5. On/Off/Volume control
    6. Five (5) preset station selector buttons
    7. Eject, Fast Forward and Rewind controls
    8. Base and Treble controls
    9. Seek button
    10. Frequency response of 35Hz to 12.5 KHz
    11. Signal to noise ratio of 52dB
    12. WOW and Flutter of 0.12%
    13. Provide antenna on roof with cabling for AM/FM reception.

1.17 INTERCOM RACK

A. Provide a metal enclosed rack with wheels for the main components and install where shown in Equipment 033.

1.18 UNITERUPTABLE POWER SUPPLY

A. Provide an UPS that is sized to supply power to the intercom system for a minimum of five minutes. This will allow system to withstand the weekly generator testing without losing power during switchover.

B. UPS shall have a replaceable battery.

C. UPS shall be rack mounted.

D. UPS battery shall have a five-year warranty.

1.19 WIRE AND CABLE

A. Cable as specified by product manufacture.

1.20 FIELD QUALITY CONTROL

A. Field inspection and testing shall be performed as per the manufactures recommendations.

B. Perform operational test on each item of equipment and on system.

1.21 MANUFACTURER'S FIELD SERVICES

A. Provide manufacturer’s field services for final connections and initialization of the system.

B. Observe installation of Communication system.

C. Provide field technician services to make final signal cable connections to equipment.

D. Prepare and start systems.

1.22 ADJUSTING

A. Adjust controls to achieve proper operations.

B. The specified equipment shall be supplied, installed, adjusted, tested and guaranteed by a factory authorized communications contractor for the products furnished. The vendor is responsible for verifying the completeness of the parts list and the suitability of the equipment to meet the intended purpose of the specifications and to serve the best interests of the owner.

1.23 DEMONSTRATION

A. Provide systems demonstration and instructions on system operation.

B. Manufacturer's field representative shall demonstrate system operation to designated Owner personnel.

C. Conduct walking tours of project and briefly describe function, operation, and maintenance of each component.

D. Use submitted operation and maintenance manual as reference during demonstration and training.

E. Training: Provide the owner with a training program designed to make all administrative control station users familiar with the operation of the communication system.

F. Submit field reports indicating satisfactory installation and testing of system.

1.24 ZONING

A. The zoning of the paging system shall be as follows:
   1. Corridors
   2. Individual Rooms
   3. Shop Bays
   4. Coordinate any others with Owner before installation.

END OF SECTION

SECTION 275132

TELEVISION SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Television service entrance.

B. Television distribution equipment.

C. Cable and accessories.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260534 - Conduit.

C. Section 260537 - Boxes.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SYSTEM DESCRIPTION

A. Contractor shall provide a 4" conduit from Data Room 101A to the CATV pedestal located to the west of the building, see Sheet ME1.4. From Data Room 101A the Contractor shall install a RG-11 to each Telecommunication Board as indicated on Sheet E7.1. Terminate the RG-11 on a 4-way splitter on each Telecommunication Board. This cable and system is for future use. There are no individual TV drops out to individual classrooms or other rooms.

B. Service entrance from local cable utility.

C. Premises wiring for broadband distribution of television signal.

1.05 SUBMITTALS

A. Shop Drawings: Indicate electrical characteristics and connection requirements. Show installation details, cable routing, and system configuration. Include diagram of wiring configuration which shall indicate taps, splitters, etc required for a balanced system.

B. Product Data: Provide showing electrical characteristics and connection requirements for each component.

C. Maintenance Data: Basic trouble-shooting procedures.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70 and cable television utility company.

PART 2 PRODUCTS

2.01 AMPLIFIERS AND CONVERTERS

A. Amplifier: Provide a local utility recommended amplifier in Data Room 101A as required. Provide local utility recommended amplifiers in the system where required to achieve the specified signal levels.

2.02 ACCESSORIES

A. Tap:
   1. Surface mounted, all channel, back-matched tap.
   2. 5 - 1000 MHz Bandwidth

B. Splitter:
   1. Inline, all channel, back-matched splitter.
   2. Through Loss: 3.6 - 4.2 dB for two-way; 7.0 - 8.0 dB for four-way.
   3. 5 - 1000 MHz Bandwidth.

C. Main Distribution Cable:
   1. Description: RG 11/F.
   2. Connector - Install compression style connector.

D. Line Taps:
   1. 5 - 1000 MHz Bandwidth.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install a new RG-11 cable from the television service entrance located in Data Room 101A to each Telecommunications Board located at each data rack location. See Telecommunication Riser Diagram on Sheet E7.1.

C. Provide proper grounding of television system components and wiring back to nearest ground bar.

D. Labeling:
   1. Closet outputs to be labeled with destination room number.
   2. All labels to be legible and permanent. Handwritten labels will not be accepted.

E. Install all equipment and make all final connections required.

3.02 CLOSEOUT ACTIVITIES

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

END OF SECTION

SECTION 283111

ADDRESSABLE FIRE ALARM SYSTEM

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Related Sections:
   1. Division 01 General Requirements
   2. Division 07 Thermal and Moisture Protection, Section 07 8400 Penetration Firestopping
   3. Division 08 Openings, Section 087100 Door Hardware
   4. Division 21 Fire Suppression
   5. Division 23 Heating Ventilating and Air Conditioning Monitoring & Control (HVAC).
   6. Division 23 Direct-Digital Control System for HVAC, Section 230923
   7. Division 26 Electrical, Section 260500 Common Work Results for Electrical

1.02 SUMMARY

A. A fully addressable system shall be installed and connected to the existing Notifier 3030 system.

B. Section Includes:
   1. This specification describes an addressable Fire Detection and alarm signaling system. The control panel shall be intelligent device addressable, analog detecting, low voltage and modular, with digital communication techniques, in full compliance with all applicable codes and standards. The features and capacities described in this specification are required as a minimum for this project and shall be furnished by the successful contractor.
   2. The system shall be in full compliance with National and Local Codes.
   3. The system shall include all required hardware, raceways, interconnecting wiring and software to accomplish the requirements of this specification and the contract drawings, whether or not specifically itemized herein.
   4. All equipment furnished shall be new and the latest state of the art products of a single manufacturer, engaged in the manufacturing and sale of analog fire detection devices for over ten years.
   5. The system as specified shall be supplied, installed, tested and approved by the local Authority Having Jurisdiction, and turned over to the owner in an operational condition.
   6. In the interest of job coordination and responsibilities the installing contractor shall contract with a single supplier for fire alarm equipment, engineering, programming, inspection and tests for the complete system.
   7. Integration with the Building Management System (BMS) for Atrium Smoke Control System. See Section 230993 paragraph 3.12 for infomation.

1.03 DEFINITIONS

A. ASME: American Society of Mechanical Engineers

B. FACP: Fire alarm control panel.

C. FM: FM Global (Factory Mutual)

D. Furnish: To supply the stated equipment or materials.

E. Install: To set in position and connect or adjust for use.

F. LED: Light-emitting diode.

G. NCC: Network Command Center

H. NFPA: National Fire Protection Association. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

I. NICET: National Institute for Certification in Engineering Technologies.

J. Provide: To furnish and install the stated equipment or materials.

K. UL: Underwriters Laboratories

1.04 SYSTEM DESCRIPTION

A. Provide an addition to the existing Notifier 3030 system - The system shall be complete, electrically supervised fire detection with microprocessor based operating system having the following capabilities, features and capacities:
   1. The local system shall provide status indicators and control switches for all of the following functions:
      a. Audible(Voice Evacuation) and visual notification alarm circuit control.
      b. Status indicators for sprinkler system waterflow and valve supervisory devices.
      c. Any additional status or control functions as indicated on the drawings.
   2. Provide Beam Detectors in the Atrium to notify the FA system of smoke in the Atrium. The Fire Alarm system shall then signal the BMS to activate the atrium smoke control sequence.

1.05 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with NFPA 72 and all contract documents and specification requirements.

B. System shall be a complete, supervised, non-coded, addressable multiplex fire alarm system conforming to NFPA 72.

C. The system shall operate in the alarm mode upon actuation of any alarm initiating device. The system shall remain in the alarm mode until all initiating device(s) are reset and the fire alarm control panel is manually reset and restored to normal.

D. The system shall provide the following functions and operating features:
   1. The FACP and auxiliary power panels shall provide power, annunciation, supervision and control for the system.
   2. Provide Class B initiating device circuits.
   3. Strobes shall be synchronized throughout the entire building.
   4. Provide electrical supervision of the primary power (AC) supply, presence of the battery, battery voltage, and placement of system modules within the control panel.
   5. The system shall provide a field test function where one person can test the complete system or a specific area while maintaining full operational function of other areas not being tested. Alarms, supervisory signals, trouble signals shall be logged on the system printer and in system history during the walk-test.
   6. Drill Function - the annunciator and/or panelboard shall have a drill switch that activates audible and visual devices and closes doors but does NOT close dampers or shutdown HVAC equipment.
   7. Alarm functions shall override trouble or supervisory functions. Supervisory functions shall override trouble functions.
   8. Fire alarm signal initiation shall be by one or more of the following devices:
      a. Manual pull station
      b. Heat detector
      c. Addressable area smoke detector
      d. Duct smoke detector - Close dampers indicated; shut down HVAC equipment indicated. Provide shutdown relays and wiring as required.
      e. Automatic sprinkler system water flow switch. Automatic sprinkle alarm shall also intitiate the Atrium Smoke Control Sequence.
      f. Automatic non-water fire suppression system.
      g. Beam detectors. Beam Detector alarm shall also activate the Atrium Smoke Control Sequence.
   9. Activation of any system fire initiating device shall cause the following actions and indications at all basic graphics and multiple detail screens.
      a. Fire Alarm Condition:

1) Sound an audible alarm and display a custom screen/message defining the building in alarm and the specific alarm point initiating the alarm in a graphic display.
2) Log into the system history archives all activity pertaining to the alarm condition.
3) Sound the ANSI 117-1 signal with synchronized audibles and synchronized strobes throughout the facility.
4) Audible signals shall be silenced from the fire alarm control panel by an alarm silence switch. Visual signals shall be programmable to flash until system reset or alarm silencing, as required.
5) A signal dedicated to sprinkler system water flow alarm shall not be silenced while the sprinkler system is flowing at a rate of flow equal to a single head.
6) System operated duct detectors as per local requirements shall accomplish HVAC shut down.
7) Door closure devices shall operate by floor or by local requirements.

b. Supervisory Condition:
1) Display the origin of the supervisory condition report at the local fire alarm control panel graphic LCD display.
2) Activate supervisory audible and dedicated visual signal.
3) Audible signals shall be silenced from the control panel by the supervisory acknowledge switch.
4) Record within system history the initiating device and time of occurrence of the event.

c. Trouble Condition
1) Display at the local fire alarm control panel graphic LCD display, the origin of the trouble condition report.
2) Activate trouble audible and visual signals at the control panel and as indicated on the drawings.
3) Audible signals shall be silenced from the fire alarm control panel by a trouble acknowledge switch.
4) Trouble conditions that have been restored to normal shall be automatically removed from the trouble display queue and not require operator intervention. This feature shall be software selectable and shall not preclude the logging of trouble events to the historical file.
5) Trouble reports for primary system power failure to the master control shall be automatically delayed for a period of time equal to 25% of the system standby battery capacity to eliminate spurious reports as a result of power fluctuations.
6) Record within system history, the occurrence of the event, the time of occurrence and the device initiating the event.

10. Provide Beam Detectors in the Atrium to notify the FA system of smoke in the Atrium. The Fire Alarm system shall then signal the BMS to activate the atrium smoke control sequence.

1.06 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories. Complete manufacturer's catalog data including supervisory power usage, alarm power usage, physical dimensions, and finish and mounting requirements.

B. Power calculations. Battery capacity calculations. Battery size shall be a minimum of 125% of the calculated requirement. Provide the following supporting information:
1. Supervisory power requirements for all equipment.
2. Alarm power requirements for all equipment.
3. Power supply rating justification showing power requirements for each of the system power supplies. Power supplies shall be sized to furnish the total connected load in a worst-case condition plus 20% spare capacity.

4. Voltage drop calculations for wiring runs demonstrating worst-case condition.
5. NAC circuit design shall incorporate a 15% spare capacity for future expansion.
6. Submit manufacturer's requirements for testing Device Loop Card circuits and device addresses prior to connecting to control panel. At a minimum the following tests shall be required; device address, the usage (Alarm, Supervisory etc), environmental compensation, temperature ratings for thermal detectors and smoke detector sensitivities. This requirement shall need approval before any wiring is connected to the control panel.
7. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
    a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
    b. Wiring Diagrams: For power, signal, and control wiring.
    c. Complete drawings covering the following shall be submitted by the contractor for the proposed system:
        1) Floor plans in a CAD compatible format at a scale of 1/8”=1'-0” showing all equipment and raceways, marked for size, conductor count with type and size, showing the percentage of allowable National Electric Code fill used.
        2) Provide a fire alarm system function matrix as referenced by NFPA 72, Figure A-7-5.2.2 (9). Matrix shall illustrate alarm input/out events in association with initiation devices. Matrix summary shall include system supervisory and trouble output functions. Include any and all departures, exceptions, variances or substitutions from these specifications and/or drawings at time of bid.
    d. Installation drawings shop drawings, and an individual experienced with the work specified herein and supervised by NICET level IV technician shall prepare as-built drawings. Include name and certification number of supervising NICET level IV technician as part of the project submittals.
    e. Incomplete submittals shall be returned without review, unless with prior approval of the Engineer.
8. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
    a. Light fixtures.
    b. HVAC registers
    c. Fire protection equipment interfaces
    d. Special suppression system interfaces
9. Qualification Data: For qualified Installer, Applicator, manufacturer, fabricator, professional engineer, testing agency, and factory-authorized service representative.
10. Operation and Maintenance Data: For all fire alarm equipment, to include in operation and maintenance manuals.
11. Software and Firmware Operational Documentation:
    a. Software operating and upgrade manuals.
    b. Program Software Backup: On magnetic media or compact disk, complete with data files.
    c. Device address list.
    d. Printout of software application and graphic screens.
12. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire alarm equipment that fail(s) in materials or workmanship within specified warranty period.
13. Shop Drawings shall be stamped and signed by AHJ prior to submitting for review by the Engineer.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: The publications listed below form a part of this publication to the extent referenced. The publications are referenced in the text by the basic designation only. The

latest version of each listed publication shall be used as a guide unless the authority having jurisdiction has adopted an earlier version.

1. FM Global (Factory Mutual (FM)):FM Approval Guide
2. National Fire Protection Association (NFPA)
    a. NFPA 70 National Electrical Code
    b. NFPA 72 National Fire Alarm Code
    c. NFPA 90A Standard For The Installation of Air Conditioning and Ventilating Systems
    d. NFPA 101 Life Safety Code
    e. NFPA 75
    f. Underwriters' Laboratories, Inc. (UL) equipment standards, Latest Edition
        1) UL Fire Protection Equipment Directory
        2) UL Electrical Construction Materials Directory
        3) UL 38 - Manually Actuated Signaling Boxes for Use With Fire Protection Signaling Systems
        4) UL 228 - Door Holding Devices
        5) UL 268 - Smoke Detectors for Fire Protective Signaling Systems
        6) UL 268A - Smoke Detectors for Duct Application
        7) UL 464 - Audible Signal Appliances
        8) UL 497A - Secondary Protectors for Communications Circuits
        9) UL 521 - Heat Detectors for Fire Protective Signaling Systems
        10) UL 864 - Control Units for Fire Protective Signaling Systems
        11) UL 1283 - Electromagnetic Interference Filters
        12) UL 1449 - Transient Voltage Surge Suppressors
        13) UL 1480 - Speakers for Fire Protective Signaling Systems
        14) UL 1971 - Signaling Devices for the Hearing Impaired
    g. Underwriters Laboratories Canada (ULC)
    h. International Code Council
        1) International Building Code
        2) International Fire Code.
    i. State and Local Building Codes as adopted and/or amended by The Authority Having Jurisdiction, ADA, and/or State and local equivalency standards as adopted by The Authority Having Jurisdiction.
    j. ISO 9002
3. Supplier Qualifications
    a. Provide the services of a factory trained and certified representative or technician, experienced in the installation and operation of the type of system provided. The representative shall be licensed in the State if required by law and be a NICET level II technician. Include name and certification number of NICET level II technician as part of the project submittals.
    b. The technician shall supervise installation, software documentation, adjustment, preliminary testing, final testing and certification of the system. The technician shall provide the required instruction to the owner's personnel in the system operation and maintenance.
    c. The supplier shall furnish evidence they have an experienced service organization, located within 50 miles of the project site, which carries a stock of spare and repair parts for the system being furnished.
4. Installer Qualifications:
    a. Before commencing work, submit data showing that the manufacturer has successfully installed fire alarm systems of the same scope, type and design as specified.
    b. The contractor shall submit copies of all required Licenses and Bonds as required in the State having jurisdiction.
    c. The contractor shall employ on staff a minimum of one NICET level IV technician or a professional engineer, registered in the State of the installation.

d. Contractors unable to comply with the provisions of Qualification of Installers shall present proof of engaging the services of a subcontractor qualified to furnish the required services.

5. Testing Agency Qualifications: Qualified for testing indicated.
6. Source Limitations for fire alarm equipment: Obtain fire alarm equipment from single source.
7. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 50 or less.
   c. Combustion Characteristics: ASTM E 136.
8. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
9. Preinstallation Conference: Conduct conference at Project site.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, and shelf life if applicable.

B. Store materials inside, under cover, above ground, and kept dry and protected from physical damage until ready for use. Remove from site and discard wet or damaged materials.

1.09 PROJECT CONDITIONS

A. Installed products or materials shall be free from any damage including, but not limited to, physical insult, dirt and debris, moisture, and mold damage.

B. Environmental Limitations: Do not deliver or install products or materials until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire alarm equipment that fail(s) in materials or workmanship within specified warranty period.
   1. Warranty Period: 1 year from date of Substantial Completion.

1.11 SERVICE AGREEMENT

A. Technical Support: Beginning with Substantial Completion, provide software support for 1 year.

B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within one year from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
   1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Notifier.

2.02 CONTROL PANEL

A. The fire alarm control panel shall be microprocessor based using multiple microprocessors throughout the system providing rapid processing of smoke detector and other initiation device information to control system output functions.

B. There shall be a watchdog circuit, which shall verify the system processors and the software program. Problems with either the processors or the system program the panel shall activate a trouble signal, and reset the panel.

C. The system modules shall communicate with an RS 485 network communications protocol. All module wiring shall be to terminal blocks, which will plug into the system card cage. Provide as a minimum two Style 4 isolated intelligent Signaling Line Circuits. Install addressable devices evenly on the intelligent Signaling Line Circuits so the load on each circuit is balanced for easy future expansion. All intelligent Signaling Line Circuits shall have 20% spare capacity as a minimum. Installing all addressable devices on one Style 4 isolated intelligent Signaling Line Circuit will not be permitted.

D. System Components:
   1. Provide a Voice Evacuation Fire Alarm system for the new addition and connect to existing Notifier 3030 Fire Alarm System.
   2. System response time from alarm to output shall not exceed three (3) seconds.
   3. To expedite system troubleshooting, the system cards shall have ground fault detection, and diagnostic LED's by card.
   4. All system cards and modules shall have Flash memory for downloading the latest module firmware.
   5. Software Modifications: The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made. Systems that require the use of external programmers or change of EPROMs are not acceptable.

E. POWER SUPPLY
   1. The system Power Supply/Charger (PSC) shall be a 12-amp supply with battery charger. The power supply shall be filtered and regulated. The power supply shall have a minimum of 1 power limited output rated at 4 amps, and a minimum of 1 output rated at 12 amps. The system power supply can be expanded up to 48 amps. The auxiliary power supply module shall share common batteries with the primary power supply. The system power supply shall have 4 relays, 1 for common alarm, one for common trouble and two programmable relays. The power supply shall be rated for 120/240 VAC 50/60 Hz.
   2. The battery charger shall be able to charge the system batteries up to 100 AH batteries. Battery charging shall be microprocessor controlled and programmed with a special software package to select charging rates and battery sizes. An optional Thermistor for monitoring battery temperature to control charging rate shall be available.
   3. The power supply shall have a plug for an AC adapter cable, which allows a technician to plug in a laptop computer for up or down loading program information or test equipment.
   4. Transfer from AC to battery power shall be instantaneous when AC voltage drops to a point where it is not sufficient for normal operation.

2.03 SYSTEM ENCLOSURE

A. Provide the enclosure needed to hold all the cards and modules as specified with at least spare capacity for two cards. The enclosure outer door shall be either black or red. Provide the color as to the local AHJ requirements. The outer doors shall be capable of being a left hand open or a right hand open. The inner door shall have a left hand opening. System enclosure doors shall provide where required ventilation for the modules or cards in the enclosure.

B. Provide system enclosure for all amplifiers. Where required by the manufacturer, provide means for venting heat from the enclosure either by having enclosure sides and top vented or the doors vented.

2.04 INITIATING DEVICES

A. Intelligent Initiation Devices - General
   1. All initiation devices shall be insensitive to initiating loop polarity. Specifically, the devices shall be insensitive to plus/minus voltage connections on either Style 4 or Style 6 circuits.
   2. Smoke Detectors - Addressable

a. The detector shall be guaranteed in writing not to false alarm when configured by the factory trained certified technician. The detector must provide up to 11 different environmental algorithms that allow the detector to provide superior false alarm immunity without the need for additional alarm verification delays.
b. The detector shall have a multicolor LED to streamline system maintenance/inspection by plainly indicating detector status as follows: green for normal operation, amber for maintenance required, red for alarm.
c. The multi-criteria smoke detector shall be an intelligent digital photoelectric detector with a programmable heat detector. Detectors shall be listed for use as open area protective coverage, in duct installation and sampling assembly installation and shall be insensitive to air velocity changes. The detector communications shall allow the detector to provide alarm input to the system and alarm output from the system within four (4) seconds. So as to minimize the effort required by the installing and maintenance technician to appropriately configure the detector to ensure optimal system design, the detectors shall be programmable as application specific. Application settings shall be selected in software for a minimum of eleven environmental fire profiles unique to the devices installed location.
d. The detector shall be designed to eliminate the possibility of false indications caused by dust, moisture, RFI/EMI, chemical fumes and air movement while factoring in conditions of ambient temperature rise, obscuration rate changes and hot/cold smoke phenomenon into the alarm decision to give the earliest possible real alarm condition report.
e. The intelligent smoke detector shall be capable of providing three distinct outputs from the control panel. The outputs shall be from an input of smoke obscuration, a thermal condition or a combination of obscuration and thermal conditions. The detector shall be designed to eliminate calibration errors associated with field cleaning of the chamber.
f. The detector shall support the use of a relay, or LED remote indicator without requiring an additional software address. Low profile, white case shall not exceed 2.5 inches of extension below the finish ceiling.
g. Detector wiring shall not require any special shielded cable. For the detector where required, there shall be available a locking kit and detector guard to prevent unauthorized detector removal.
h. Where required, there shall be available a programmable remote lamp configurable to remotely duplicate the on-board LED status of another system device with the same software address.

3. Heat Detectors - Addressable
   a. Thermal Detectors shall be rated at 135 degrees fixed temperature and 15 degrees per minute rate of rise. Detectors shall be constructed to compensate for the thermal lag inherent in conventional type detectors due to the thermal mass, and alarm at the set point of 135 degrees Fahrenheit. The choice of alarm reporting as a fixed temperature detector or a combination of fixed and rate of rise shall be made in system software and be changeable at any time without the necessity of hardware replacement.
   b. The detectors furnished shall have a listed spacing for coverage up to 2,500 square feet and shall be installed according to the requirements of NFPA 72 for open area coverage.
4. Duct Smoke Detectors - Addressable
   a. For duct detector applications, the smoke detector shall be an intelligent digital photoelectric detector with a programmable heat detector. Detectors shall be listed for use as open area protective coverage, in duct installation and sampling assembly installation and shall be insensitive to air velocity changes.
   b. The detector communications shall allow the detector to provide alarm input to the system and alarm output from the system within four (4) seconds. The detector shall be mounted in a duct detector housing listed for that purpose. The duct detector shall

support the use of a remote test switch, relay or LED remote indicator. The duct detector shall be supplied with the appropriate sampling tubes to fit the installation.

c. Where duct detectors are exposed to the weather a weatherproof enclosure shall be available. The duct housing cover shall include a test port for functional testing of the detector without cover removal. The duct housing shall include a cover removal switch capable of indicating cover removal status to the fire alarm control panel.

5. Detector Bases - Addressable
   a. Detector bases shall be low profile twist lock type with screw clamp terminals and self-wiping contacts. Bases shall be installed on an industry standard, 4" square or octagonal electrical outlet box.
6. Manual Pull Stations - Addressable
   a. Provide addressable manual stations where shown on the drawings, to be flush or surface mounted as required. Manual stations shall contain the intelligence for reporting address, identity, alarm and trouble to the fire alarm control panel. The manual station communications shall allow the station to provide alarm input to the system and alarm output from the system within less than four (4) seconds.
   b. The manual station shall be equipped with terminal strip and pressure style screw terminals for the connection of field wiring. Surface mounted stations where indicated on the drawings shall be mounted using a manufacturer's prescribed matching red enamel outlet box.
7. Addressable Interface Devices
   a. Addressable Interface Devices shall be provided to monitor contacts for such items as water-flow, tamper, and PIV switches connected to the fire alarm system. These interface devices shall be able to monitor a single or dual contacts. An address will be provided for each contact. Where remote supervised relay is required the interface shall be equipped with a SPDT relay rated for 4 amps resistive and 3.5 amps inductive.
   b. A fire sprinkler flow alarm shall initiate the fire alarm system and the fire alarm system shall send a signal to the BMS to activate the smoke control sequence.
8. Beam Detectors
   a. Provide detectors in the Atrium to detect smoke and initiate the smoke control sequence. Beam detector locations are only shown on the drawings for informational purpose. This Contractor shall design the detection coverage and provide Beam Detectors in the quantity and locations as required for a code compliant installation.

2.05 NOTIFICATION APPLIANCES

A. Speaker and Speaker Strobes
   1. Speakers shall be UL Listed under Standard 1480 for Fire Protective Service, and speakers equipped with strobes shall be listed under UL Standard 1971 for Emergency Devices for the Hearing-Impaired
   2. Speaker with strobes shall be certified to meet the requirements of FCC Part 15, Class B
   3. All models shall have listed sound output of up to 93 dB at 10 feet and a listed frequency response of 400 to 4000 Hz
   4. All speakers shall be designed for a field selectable input of either 25 or 70 VRMS, with selectable power taps from 1/8 watt to 8 watts
   5. Speaker shall also incorporate a sealed-back construction
   6. All inputs shall employ terminals that accept #12 to #18 AWG wire sizes
   7. Strobe portion of the appliance shall produce a flash rate of one (1) flash per second, and shall incorporate a Xenon flashtube enclosed in a rugged Lexan® lens
   8. Strobe shall be of low-current design
   9. Strobe intensity, where Multi-Candela appliances are specified, shall have field-selectable settings, and shall be rated per UL Standard 1971 for:
      a. 15/30/75/110cd
      b. 135/185cd
      c. 15/75 single Candela (wall mount)
      d. 15/30/75/95cd or 115/177cd (ceiling mount)

10. Selector switch for selecting the candela shall be tamper resistant
11. The strobes shall not drift out of synchronization at any time during operation
12. Speaker and speaker-strobe appliances shall be designed for indoor surface or flush mounting
13. Speaker and speaker-strobe shall incorporate a speaker-mounting plate with a grille cover, which is secured with two screws for a level finish
14. Grille cover shall mount to standard electrical hardware requiring no additional trim plate or adapter
15. The finish of the speakers and speakers strobes shall be white or red
16. All speaker and speaker-strobe appliances shall be listed for Special Applications: Strobes are designed to flash at 1-flash-per-second minimum over their “Regulated Input Voltage Range”

2.06 ANNUCIATOR

A. Provide an Annuciator at the main entrance of the addition where indicated on the Drawings. Annunciator shall have LCD screen and shall display messages such as troubles, alarms, which device is alarm, etc.

2.07 SPARE COMPONENTS

A. Spare Capacity:
   1. Initiating Device Circuits: Minimum 25 percent spare capacity.
   2. Notification Appliance Circuits: Minimum 25 percent spare capacity.
   3. Master Control Unit: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.02 INSTALLATION

A. Perform work in accordance with the requirements of NFPA 70, NFPA 72 and NECA 1-2006, Standard of Good Workmanship in Electrical Contracting.

B. Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces.

C. Wiring Method: Install cables in raceways except within consoles, cabinets, desks, and counters. Conceal raceway except in unfinished spaces.

D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

E. Provide primary power for each panel from normal/ emergency panels as indicated on the Electrical Power Plans. Power shall be 120 VAC service, transformed through a two-winding, isolation type transformer and rectified to low voltage DC for operation of all circuits and devices.

F. All power extenders shall be mounted in Mechanical Rooms or accessible rooms. Do not mount above ceilings.

G. Make all connection to the BMS for smoke control activation. See also Section 230993 paragraph 3.12.

3.03 BOXES, ENCLOSURES AND WIRING DEVICES

A. Boxes shall be installed plumb and firmly in position.

B. Extension rings with blank covers shall be installed on junction boxes where required.

C. Junction boxes served by concealed conduit shall be flush mounted.

D. Upon initial installation, all wiring outlets, junction, pull and outlet boxes shall have dust covers installed. Dust covers shall not be removed until wiring installation when permanent dust covers or devices are installed.

E. All wiring shall be in conduit and all conduit shall be RED in color.

F. Paint the cover of junction boxes for fire alarm RED.

3.04 CONDUCTORS

A. All circuit conductors shall be installed in conduit, 3/4" minimum size.

B. Each conductor shall be identified as shown on the drawings at each with wire markers at terminal points. Attach permanent wire markers within 2 inches of the wire termination. Marker legends shall be visible.

C. All wiring shall be supplied and installed in compliance with the requirements of the National Electric Code, NFPA 70, Article 760, and that of the manufacturer.

D. Wiring for strobe and audible circuits shall be a minimum 14 AWG, signal line circuits; 18 AWG twisted shielded, speaker circuits; 18 AWG twisted, telephone circuit; 18 AWG twisted shielded.

E. All splices shall be made using solderless connectors. All connectors shall be installed in conformance with the manufacturer recommendations.

F. Crimp-on type spade lugs shall be used for terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for the conductors.

G. The installation contractor shall submit for approval prior to installation of wire, a proposed color code for system conductors to allow rapid identification of circuit types.

H. Wiring within sub panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.

3.05 DEVICES

A. Relays and other devices to be mounted in auxiliary panels are to be securely fastened to avoid false indications and failures due to shock or vibration.

B. Wiring within panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.

C. All devices and appliances shall be mounted to or in an approved electrical box.

3.06 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

B. Permanently label or mark each conductor at both ends with permanent alphanumeric wire markers.

C. A consistent color code for fire alarm system conductors throughout the installation.

3.07 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Testing General:
   1. All Alarm Initiating Devices shall be observed and logged for correct zone and sensitivity. These devices and their bases shall be tagged with adhesive tags located in an area not visible when installed, showing the initials of the installing technician and date.
   2. Wiring runs shall be tested for continuity, short circuits and grounds before system is energized. Resistance, current and voltage readings shall be made as work progresses.
   3. The acceptance inspector shall be notified before the start of the required tests. All items found at variance with the drawings or this specification during testing or inspection by the acceptance inspector shall be corrected.

4. Test reports shall be delivered to the acceptance inspector as completed.
5. All test equipment, instruments, tools and labor required to conduct the system tests shall be made available by the installing contractor. The following equipment shall be a minimum for conducting the tests:
    a. Ladders and scaffolds as required to access all installed equipment.
    b. Multi-meter for reading voltage, current and resistance.
    c. Two way radios, and flashlights.
    d. A manufacturer recommended device for measuring air flow through air duct smoke detector sampling assemblies.
    e. Decibel meter.
    f. In addition to the testing specified to be performed by the installing contractor, the installation shall be subject to test by the acceptance inspector.

3.08 ACCEPTANCE TESTING

A. Owner will need to be present for final inspection and testing of the system.

B. A program matrix shall be prepared by the installing contractor referencing each alarm input to every output function affected as a result of an alarm condition on that input.

C. The installing contractor prior to the ATP shall prepare a complete listing of all device labels for alphanumeric annunciator displays.

D. Loop Resistance Tests: Measure and record the resistance of each circuit with each pair of conductors in the circuit short-circuited at the farthest point from the circuit origin. The tests shall be witnessed by the owner and test results recorded for use at the final acceptance test.

E. Preliminary Testing: Conduct preliminary tests to ensure that all devices and circuits are functioning properly. After preliminary testing is complete, provide a letter certifying that the installation is complete and fully operable. The letter shall state that each initiating and indicating device was tested in place and functioned properly. The letter shall also state that all panel functions were tested and operated properly. The Contractor and an authorized representative from each supplier of equipment shall be in attendance at the preliminary testing to make necessary adjustments.

F. Final Acceptance Test: Notify the owner in writing when the system is ready for final acceptance testing. Submit request for test at least 14 calendar days prior to the test date. A final acceptance test will not be scheduled until meggar test results, the loop resistance test results, and the submittals required in Part 1 are provided to the owner. Test the system in accordance with the procedures outlined in NFPA 72.
    1. Verify that the control unit is in the normal condition as detailed in the manufacturer's operating and maintenance manual.
    2. Test each initiating and indicating device and circuit for proper operation and response. Disconnect the confirmation feature for smoke detectors during tests to minimize the amount of smoke or test gas needed to activate the detector.
    3. Test the system for all specified functions in accordance with the contract drawings and specifications and the manufacturer's operating and maintenance manual.
    4. Visually inspect all wiring.
    5. Verify that all software control and data files have been entered or programmed into the FACP.
    6. Verify that Shop Drawings reflecting as-built conditions are accurate.
    7. Measure the current in circuits to assure that there is the calculated spare capacity for the circuits.
    8. Measure voltage readings for circuits to assure that voltage drop is not excessive.
    9. Measure the voltage drop at the most remote appliance on each notification appliance circuit.
    10. The acceptance inspector shall use the system record drawings in combination with the documents specified in this specification during the testing procedure to verify operation as programmed. In conducting the ATP, the acceptance inspector shall request

demonstration of any or all input and output functions. The items tested shall include but not be limited to the following:

a. System wiring shall be tested to demonstrate correct system response and correct subsequent system operation in the event of:
   1) Open, shorted and grounded signal line circuits.
   2) Open, shorted and grounded notification, releasing circuits.
   3) Primary power or battery disconnected.
b. System notification appliances shall be demonstrated as follows:
   1) All alarm notification appliances actuate as programmed
   2) Audibility and visibility at required levels.
c. System indications shall be demonstrated as follows:
   1) Correct message display for each alarm input at the control display.
   2) Correct annunciator light for each alarm input at each annunciator and graphic display as shown on the drawings.
   3) Correct history logging for all system activity.
d. System off-site reporting functions shall be demonstrated as follows:
   1) Correct zone transmitted for each alarm input
   2) Trouble signals received for disconnect
e. Secondary power capabilities shall be demonstrated as follows:
   1) System primary power shall be disconnected for a period of time as specified herein. At the end of that period, an alarm condition shall be created and the system shall perform as specified for a period as specified.
   2) System primary power shall be restored for forty-eight hours and system-charging current shall be normal trickle charge for a fully charged battery bank.
   3) System battery voltages and charging currents shall be checked at the fire alarm control panel.
f. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

11. Coordinate and test Beam Detector function and Atrium Smoke Control System.

3.09 DOCUMENTATION

A. System documentation shall be furnished to the owner and shall include but not be limited to the following:
   1. System record drawings and wiring details including one set of reproducible drawings, and a CD ROM with copies of the record drawings in DXF format for use in a CAD drafting program.
   2. System operation, installation and maintenance manuals.
   3. System matrix showing interaction of all input signals with output commands.
   4. Documentation of system voltage, current and resistance readings taken during the installation, testing and ATP phases of the system installation.
   5. System program showing system functions, controls and labeling of equipment and devices.

3.10 PROTECTION

A. Remove and replace devices and panel components that are wet, moisture damaged, or mold damaged.

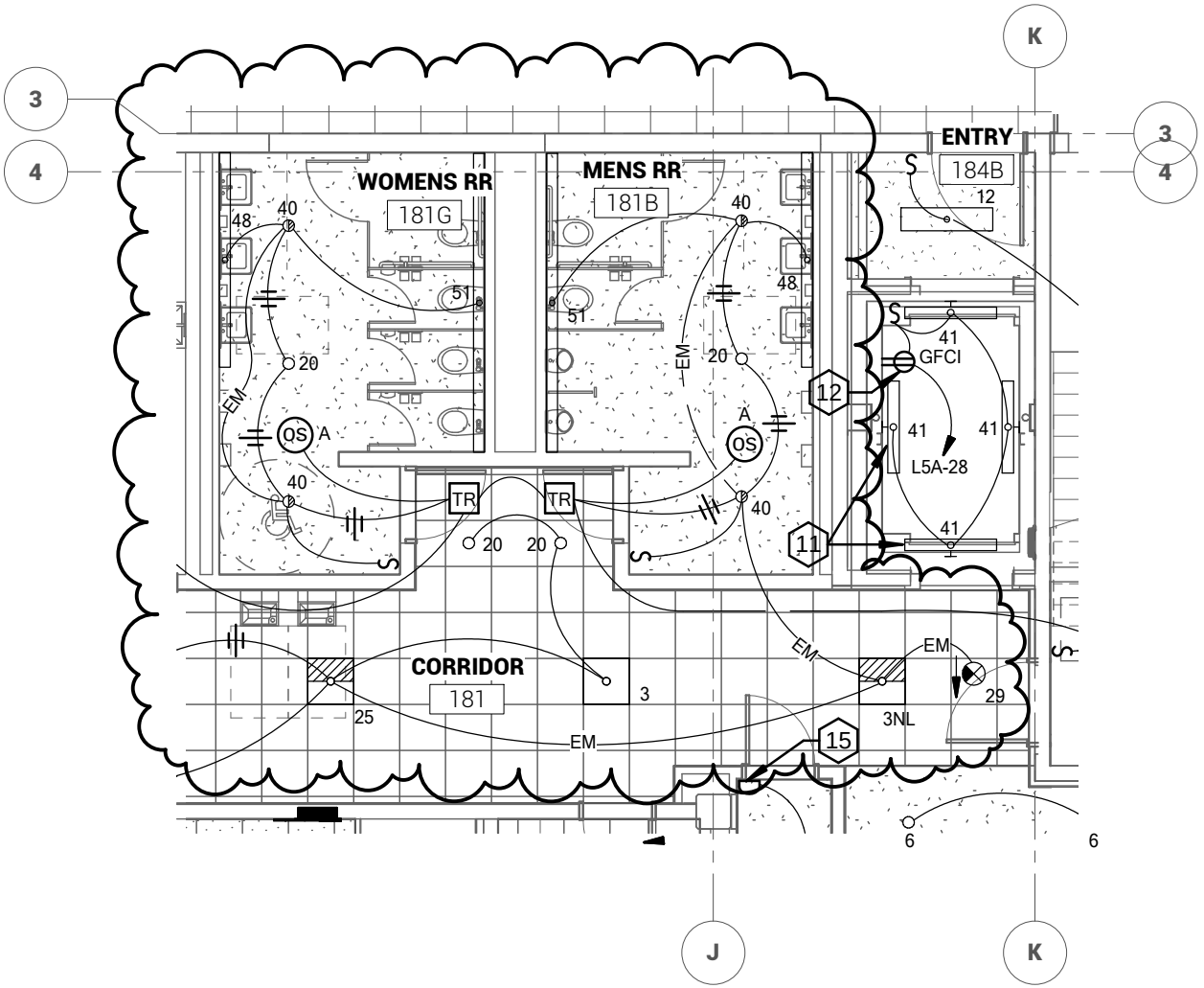
3.11 DEMONSTRATION

A. Instructor: Include in the project the services of an instructor, who shall have received specific training from the manufacturer for the training of other persons regarding the inspection, testing and maintenance of the system provided. The instructor shall train the employees designated by the owner, in the care, adjustment, maintenance, and operation of the fire alarm system.
   1. Training sessions shall cover all aspects of system performance, including system architecture, signaling line circuit configurations, sensor and other initiating device types,

locations, and addresses, fire alarm control panel function key operation, and other functions as designated by the owner.

2. Required Instruction Time: Provide 2 hours of instruction after final acceptance of the system. The instruction shall be given during regular working hours on such dates and times as are selected by the owner.
3. Provide a typeset printed or typewritten instruction card mounted behind a Lexan plastic or glass cover in a stainless steel or aluminum frame. Install the frame in a conspicuous location observable from the FACP. The card shall show those steps to be taken by an operator when a signal is received as well as the functional operation of the system under all conditions, normal, alarm, supervisory and trouble. The instructions shall be approved by the owner.
4. An authorized fire alarm system distributor representative, who has received specific training from the manufacturer, shall conduct all training sessions.

END OF SECTION



THE CAREER ACADEMY
FIRST FLOOR AREA A - LIGHTING

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

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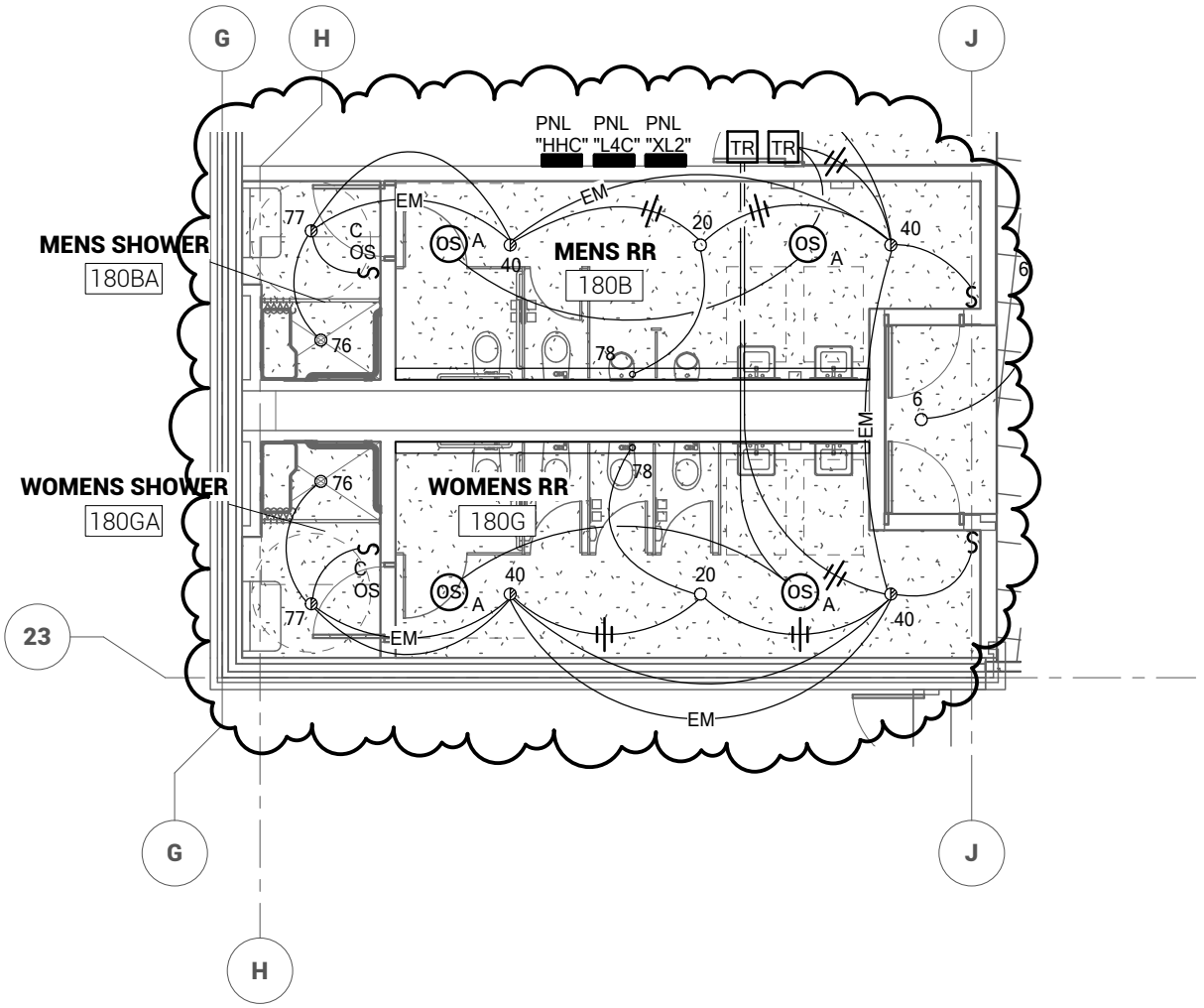
ETI Project No: 2013-114

ETI ADD #2

SHEET
E1.1A

ATTACHMENT NO.
1

06/19/14



THE CAREER ACADEMY
FIRST FLOOR AREA B - LIGHTING

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

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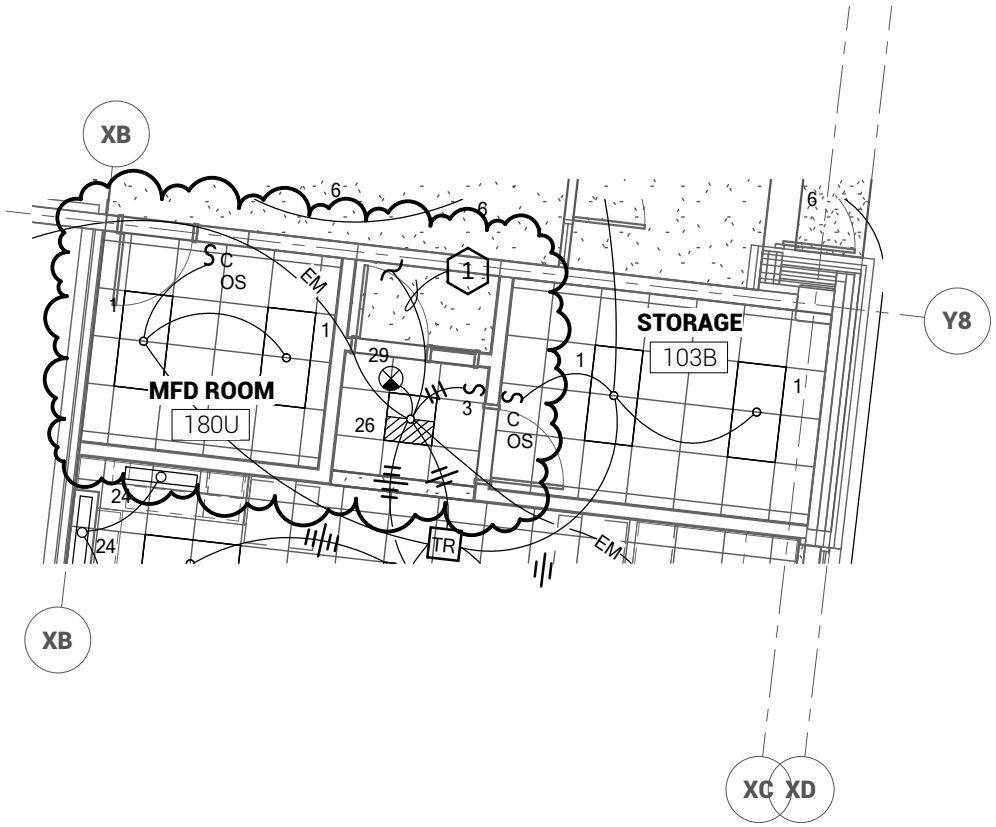
ETI ADD #2

SHEET
E1.1B

ATTACHMENT NO.
1

06/19/14



THE CAREER ACADEMY
FIRST FLOOR AREA B - LIGHTING

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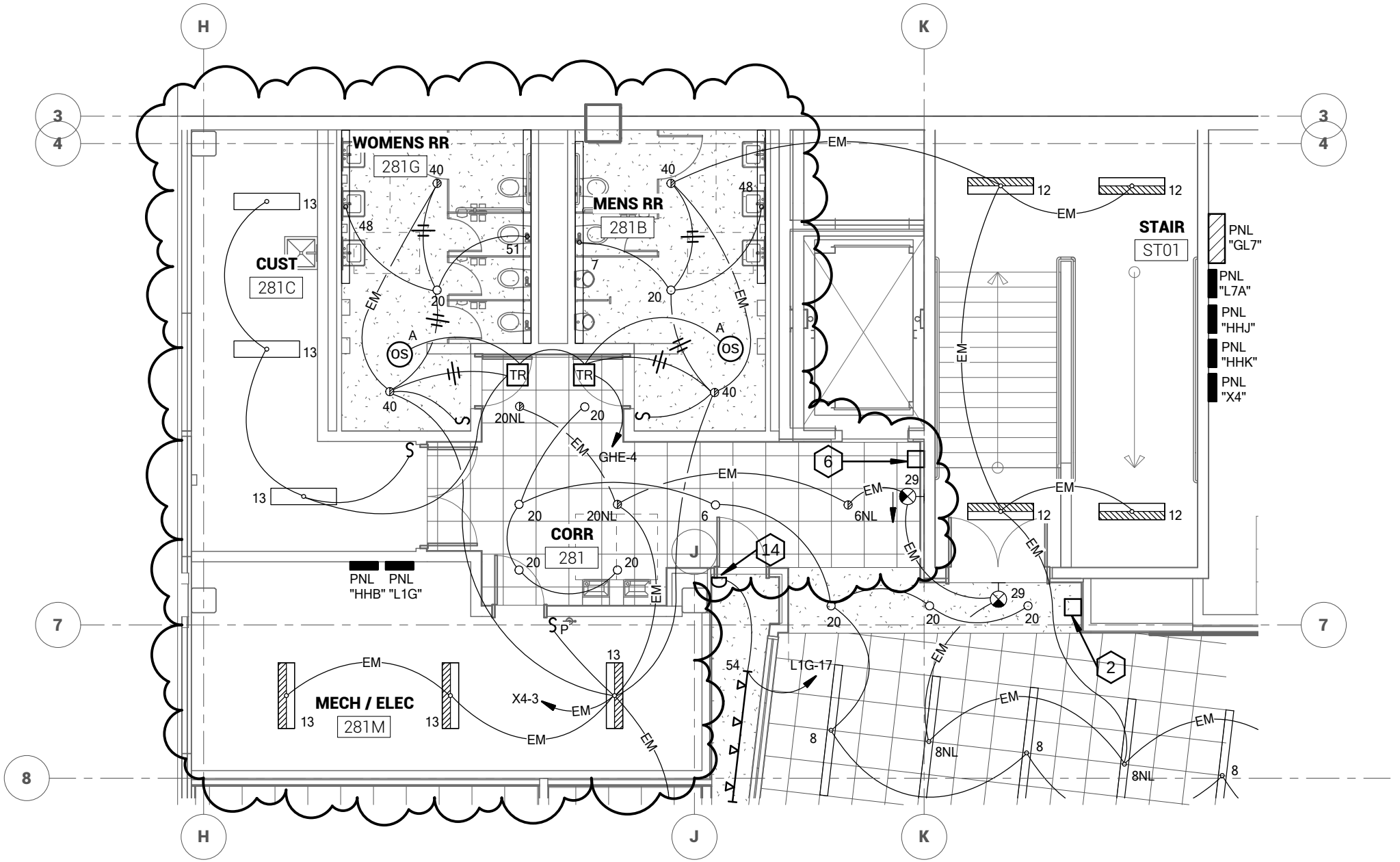
ETI Project No: 2013-114

ETI ADD #2

SHEET
E1.1B

ATTACHMENT NO.
2

06/19/14



THE CAREER ACADEMY
SECOND FLOOR AREA A - LIGHTING

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

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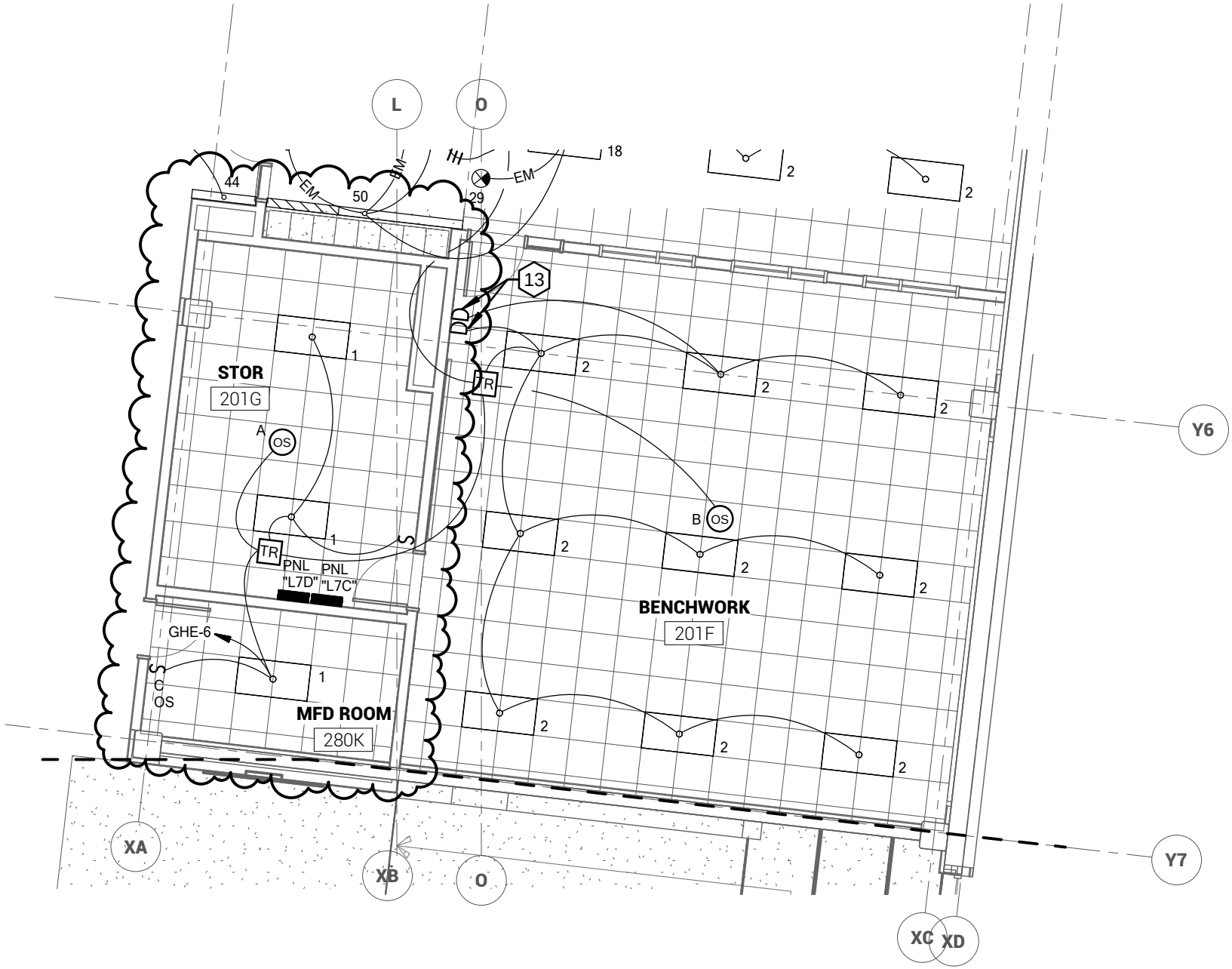
ETI Project No: 2013-114

ETI ADD#2

SHEET
E1.2A

ATTACHMENT NO.
1

06/19/14



THE CAREER ACADEMY
SECOND FLOOR AREA A - LIGHTING

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

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ETI Project No: 2013-114

ETI ADD #2

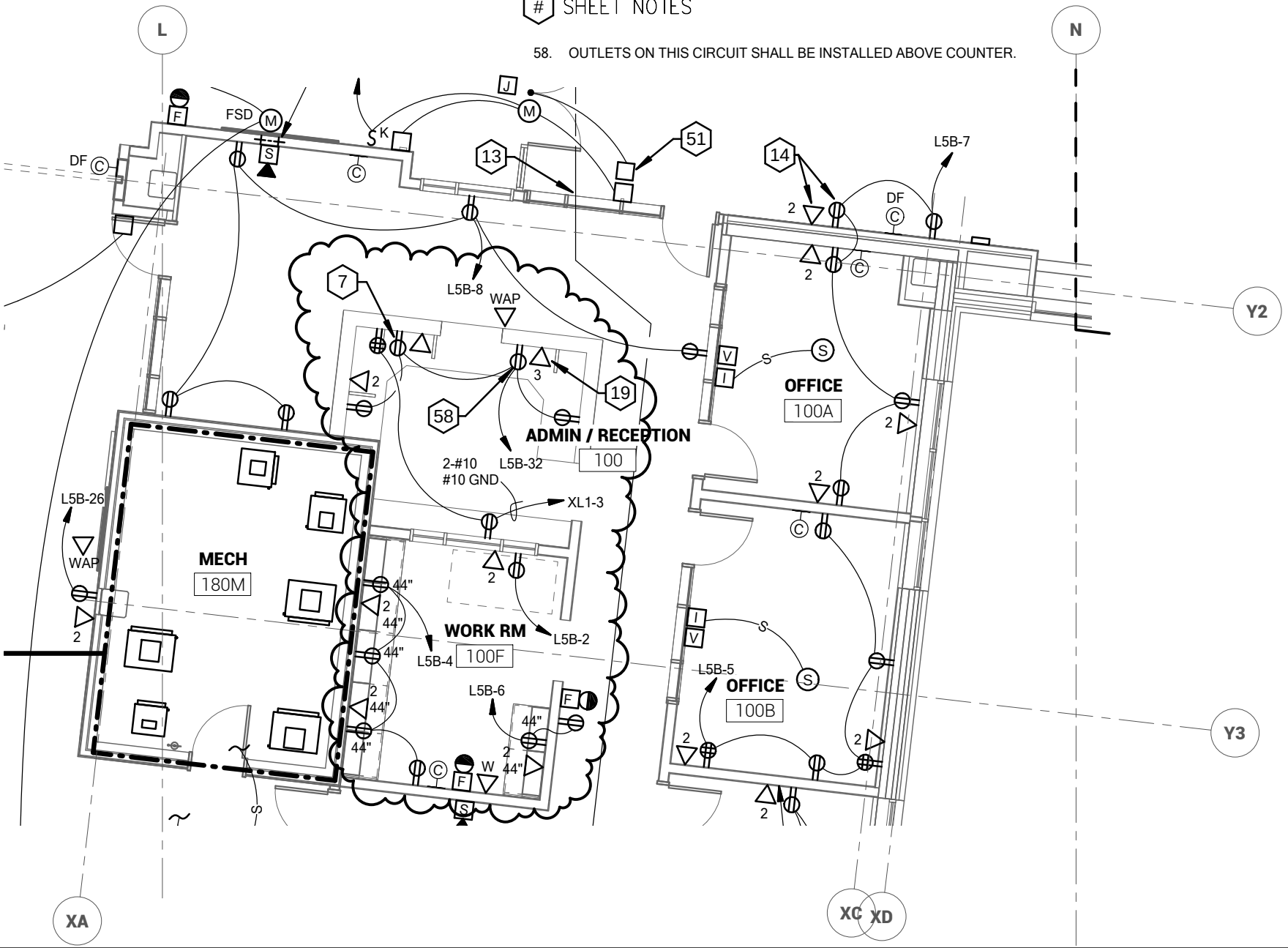
SHEET
E1.2A

ATTACHMENT NO.
2

06/19/14

SHEET NOTES

58. OUTLETS ON THIS CIRCUIT SHALL BE INSTALLED ABOVE COUNTER.



THE CAREER ACADEMY
FIRST FLOOR AREA A - ELECTRICAL

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

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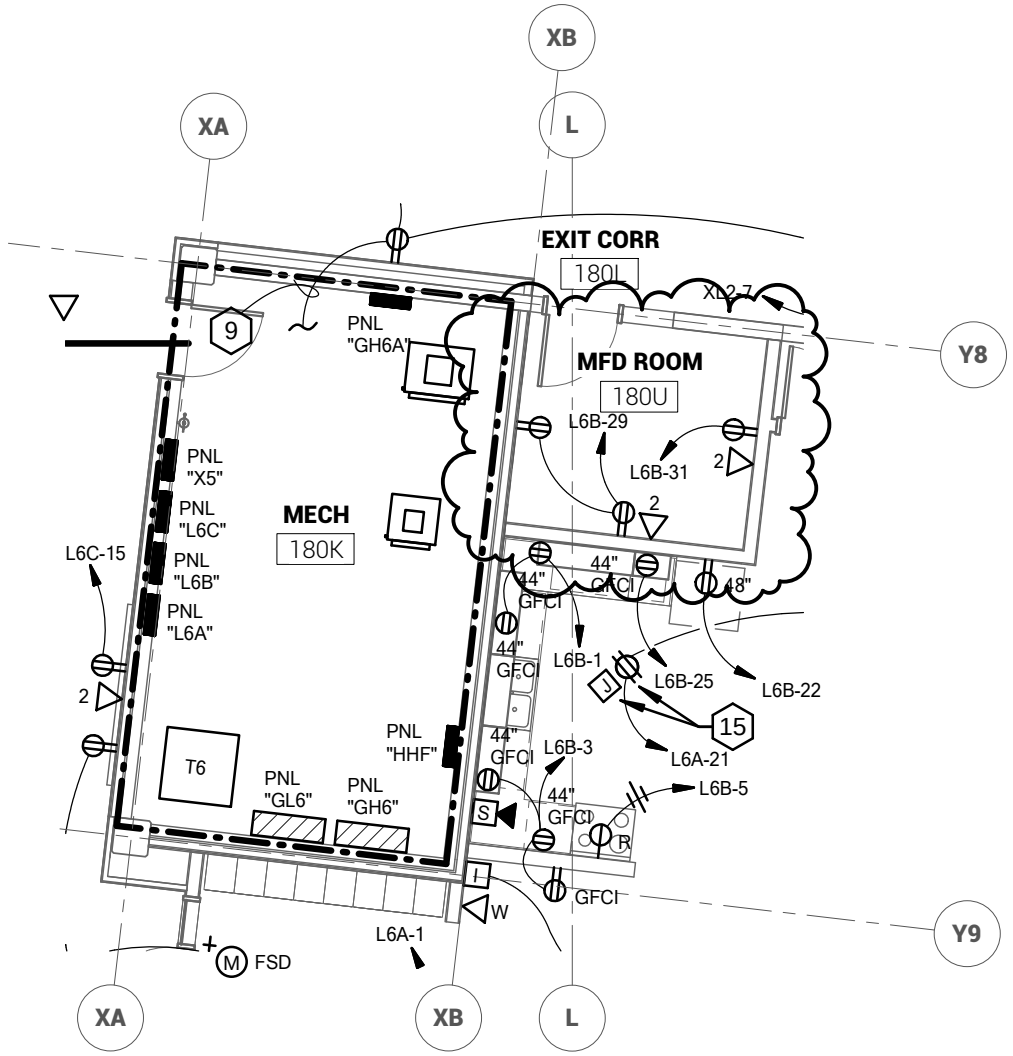
ETI Project No: 2013-114

ETI ADD #2

SHEET
E2.1A

ATTACHMENT NO.
1

06/19/14



THE CAREER ACADEMY
FIRST FLOOR AREA B - ELECTRICAL

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

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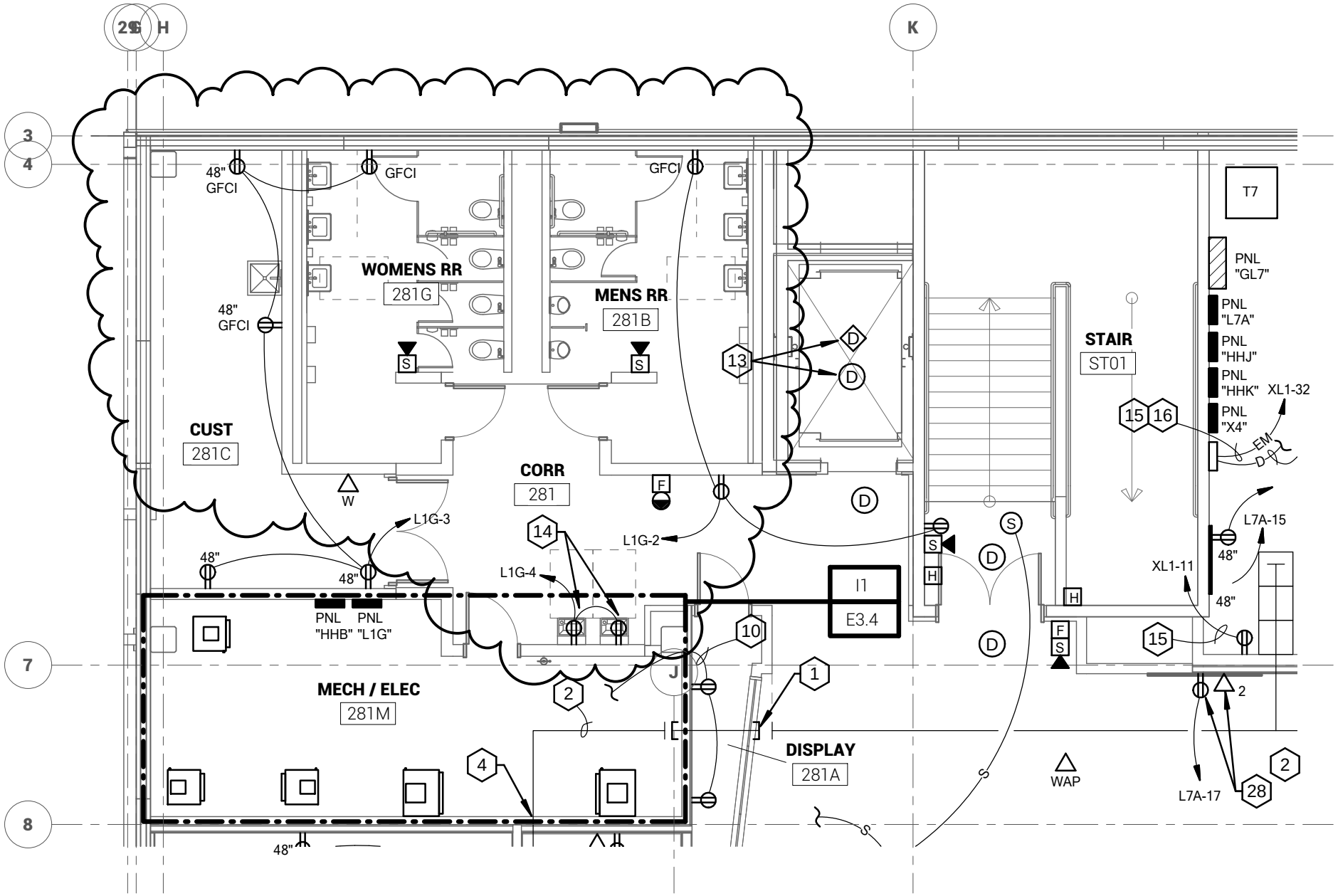
ETI Project No: 2013-114

ETI ADD #2

SHEET
E2.1B

ATTACHMENT NO.
1

06/19/14



THE CAREER ACADEMY
SECOND FLOOR AREA A - ELECTRICAL

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

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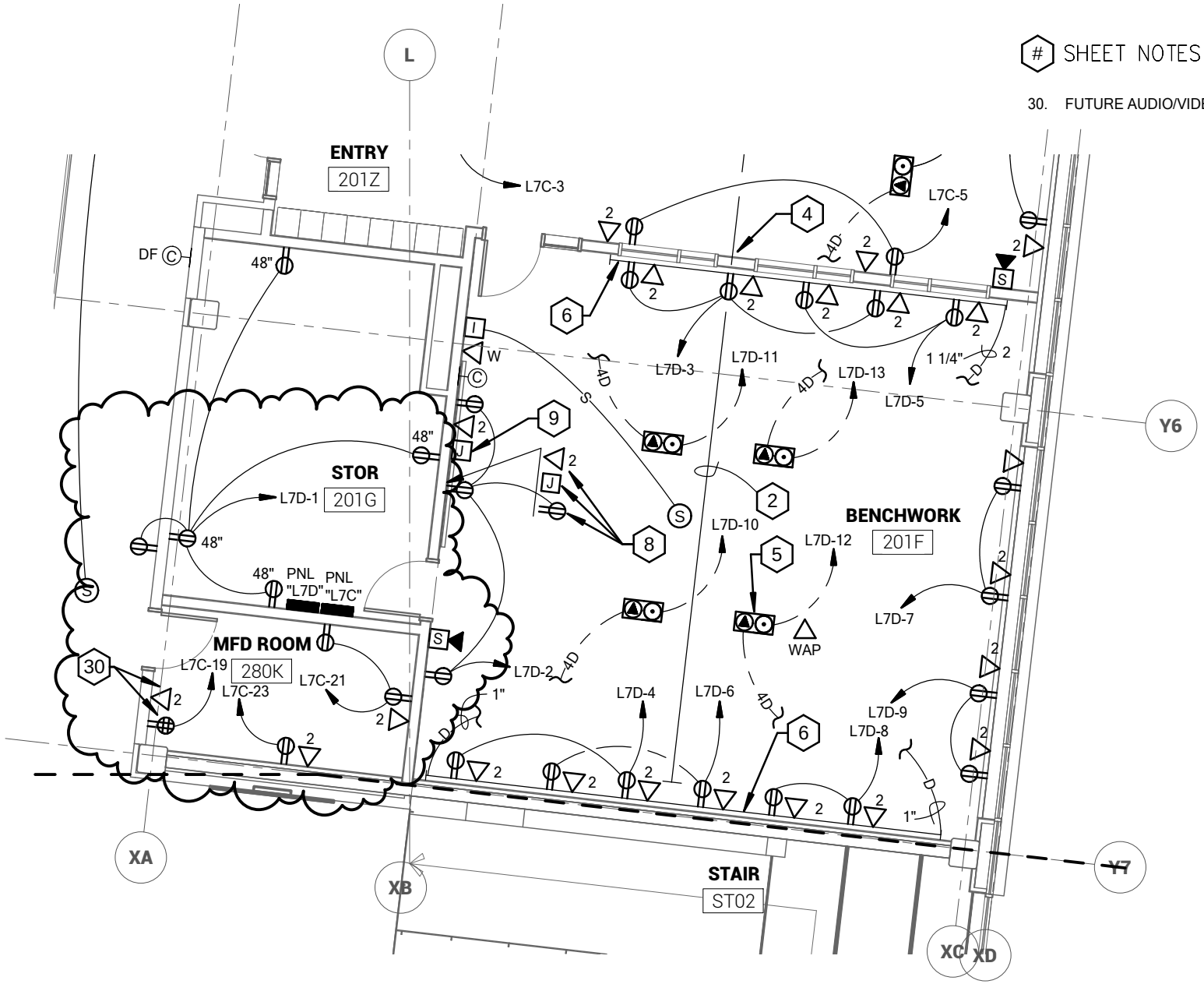
SHEET
E2.2A

ATTACHMENT NO.
1

06/19/14



SHEET NOTES

30. FUTURE AUDIO/VIDEO RACK LOCATION.

THE CAREER ACADEMY
SECOND FLOOR AREA A ELECTRICAL

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

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ETI Project No: 2013-114

ETI ADD#2

SHEET
E2.2A

ATTACHMENT NO.
2

06/19/14

SHEET NOTES

7. PROVIDE 8 POLE MECHANICALLY HELD CONTACTOR MOUNTED IN FLUSH MOUNTED NEMA 1 ENCLOSURE. SQUARE "D" 8903LXF80-V02 (120 VOLT, 2 WIRE CONTROL CIRCUIT).

8. CONNECT THROUGH 8 POLE CONTACTOR MOUNTED NEXT TO ELECTRIC PANEL INDICATED IN CIRCUIT NUMBERS.

E F G H

11 12

KEH-3A KEH-2A KEH-3B KEH-2B

TEACHING KITCHEN
109

L1B-18 L1B-20 L1B-16 L1B-4 L1B-6 L1B-31 L1B-27 L1B-23 L1B-19 L1B-15 L1B-9 L1B-5 L1B-1 L1B-24 L1B-32 L1B-12 L1B-14 L1B-8 L1B-10 L1B-2 L1B-28 L1B-30 L1C-30

L1D-18 L1D-20 L1D-16 L1D-4 L1D-6 L1D-31 L1D-27 L1D-23 L1D-19 L1D-15 L1D-9 L1D-5 L1D-1 L1D-32 L1D-24 L1D-12 L1D-14 L1D-8 L1D-2 L1D-10 L1D-28

205 201 102 203 204 206 207 100

GFCI WAP PNL "L1B" PNL "L1D"

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ETI Project No: 2013-114

ETI ADD #2	SHEET	ATTACHMENT NO.	
	E3.3	1	06/19/14

TSK

THE CAREER ACADEMY
ENLARGED KITCHEN PLANS - ELECTRICAL

SCALE:1/4" = 1'-0"

SHEET NOTES

7. PROVIDE 8 POLE MECHANICALLY HELD CONTACTOR MOUNTED IN FLUSH MOUNTED NEMA 1 ENCLOSURE. SQUARE "D" 8903LXF80-V02 (120 VOLT, 2 WIRE CONTROL CIRCUIT).

8. CONNECT THROUGH 8 POLE CONTACTOR MOUNTED NEXT TO ELECTRIC PANEL INDICATED IN CIRCUIT NUMBERS.

E F G H

7 8 9

PNL "L1C" F

PNL "L1E" S

KEH-4A KEH-1A KEH-4B KEH-1B

L1C-28 L1C-30 L1E-30 L1E-32

L1C-1 L1C-5 L1C-9 L1C-15 L1C-19 L1C-23 L1C-27 L1C-31

L1E-1 L1E-5 L1E-9 L1E-15 L1E-19 L1E-23 L1E-27 L1E-31

206 204 203 102 201 205 207

WAP

L1C-2 L1C-10 L1C-8 L1C-12 L1C-14 L1C-32 L1C-24 L1C-16 L1C-4 L1C-6 L1C-20

L1E-2 L1E-10 L1E-8 L1E-12 L1E-14 L1E-34 L1E-24 L1E-16 L1E-4 L1E-6 L1E-20

GFCI J S

TEACHING KITCHEN

110

100

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ETI Project No: 2013-114

ETI ADD #2 06/19/14

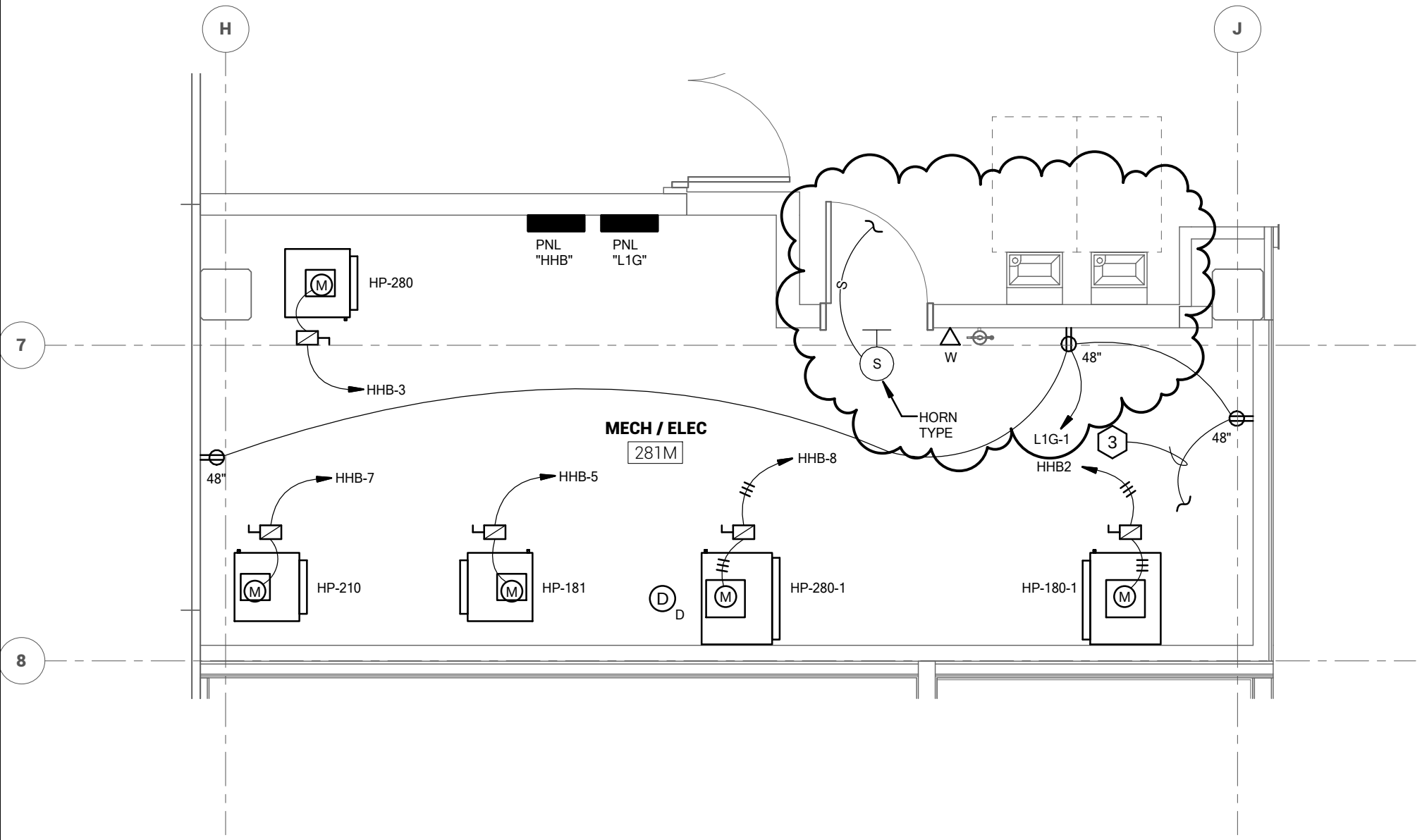
SHEET E3.3

ATTACHMENT NO. 2

TSK

THE CAREER ACADEMY
ENLARGED KITCHEN PLANS - ELECTRICAL

SCALE:1/4" = 1'-0"



THE CAREER ACADEMY
ENLARGED MECH ROOM PLANS

SCALE:1/4" = 1'-0"

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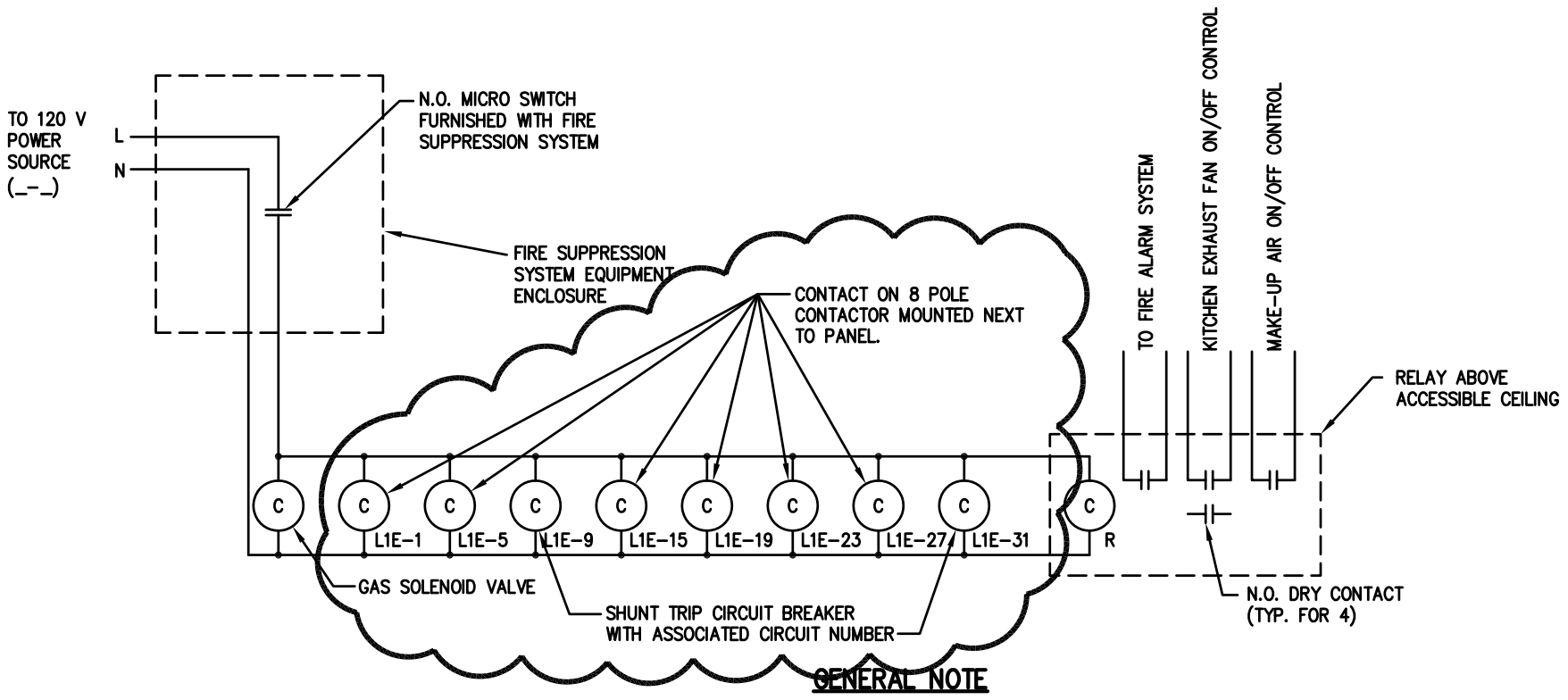
ETI Project No: 2013-114

ETI ADD #2

SHEET
E3.4

ATTACHMENT NO.
1

06/19/14

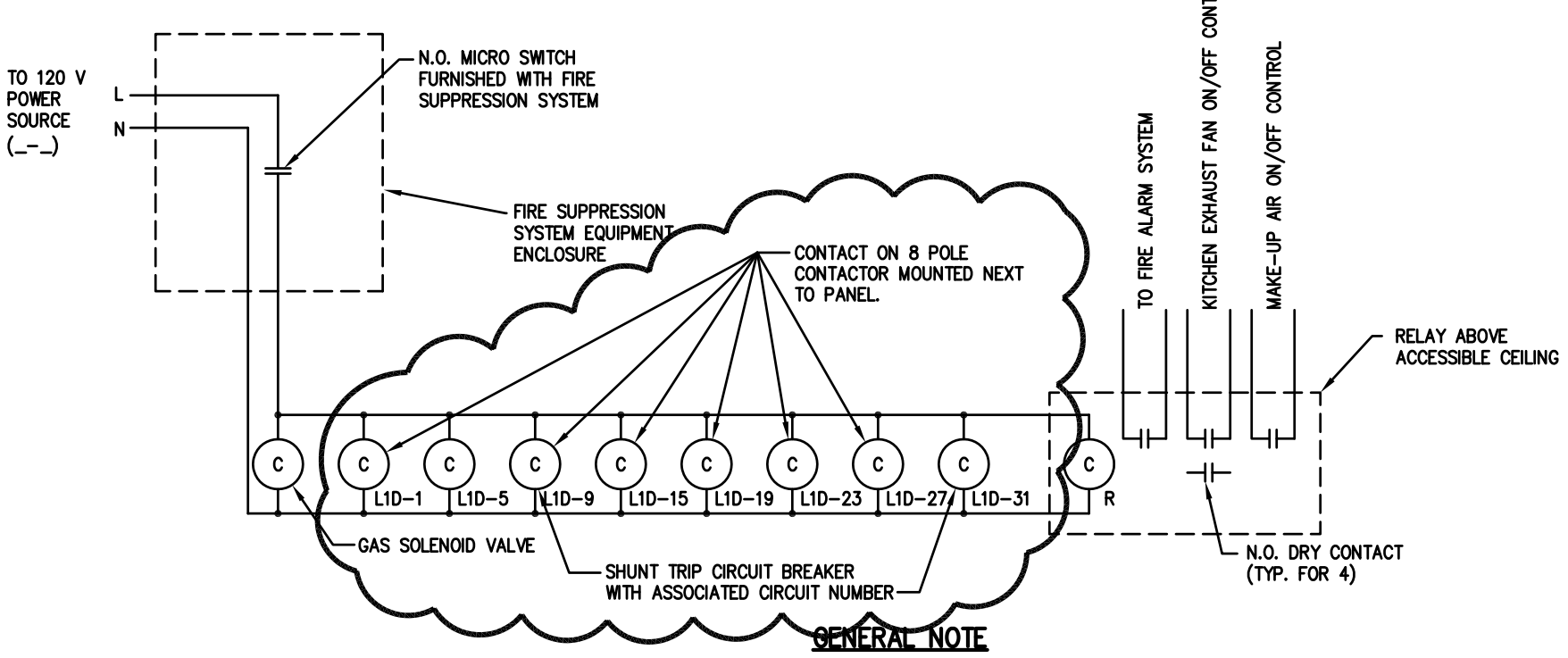


GENERAL NOTE

1. WHEN FIRE SUPPRESSION SYSTEM IS ACTIVATED, THE KITCHEN EQUIPMENT BELOW HOOD SHALL BE DISCONNECTED FROM FUEL (SOLENOID VALVE SHALL CLOSE) AND POWER SOURCE. THE HOOD EXHAUST FAN SHALL CONTINUE TO OPERATE AND SHALL BE CONTROLLED BY THE SUPPRESSION SYSTEM AND THE MAKE-UP AIR UNIT SHALL BE SHUT DOWN. CONNECTION BETWEEN THE FIRE SUPPRESSION SYSTEM, EXHAUST FAN, SOLENOID VALVE, FIRE ALARM SYSTEM, MAKE-UP AIR UNIT, AND SPECIFIED ELECTRICAL EQUIPMENT SHALL BE BY THIS CONTRACTOR.

KITCHEN HOOD #1 FIRE SUPPRESSION SYSTEM
ONE-LINE DIAGRAM (TEACHING KITCHEN 110)

NO SCALE



GENERAL NOTE

1. WHEN FIRE SUPPRESSION SYSTEM IS ACTIVATED, THE KITCHEN EQUIPMENT BELOW HOOD SHALL BE DISCONNECTED FROM FUEL (SOLENOID VALVE SHALL CLOSE) AND POWER SOURCE. THE HOOD EXHAUST FAN SHALL CONTINUE TO OPERATE AND SHALL BE CONTROLLED BY THE SUPPRESSION SYSTEM AND THE MAKE-UP AIR UNIT SHALL BE SHUT DOWN. CONNECTION BETWEEN THE FIRE SUPPRESSION SYSTEM, EXHAUST FAN, SOLENOID VALVE, FIRE ALARM SYSTEM, MAKE-UP AIR UNIT, AND SPECIFIED ELECTRICAL EQUIPMENT SHALL BE BY THIS CONTRACTOR.

KITCHEN HOOD #2 FIRE SUPPRESSION SYSTEM
ONE-LINE DIAGRAM (TEACHING KITCHEN 109)

NO SCALE

THE CAREER ACADEMY
DETAILS

SCALE: NONE | TSK

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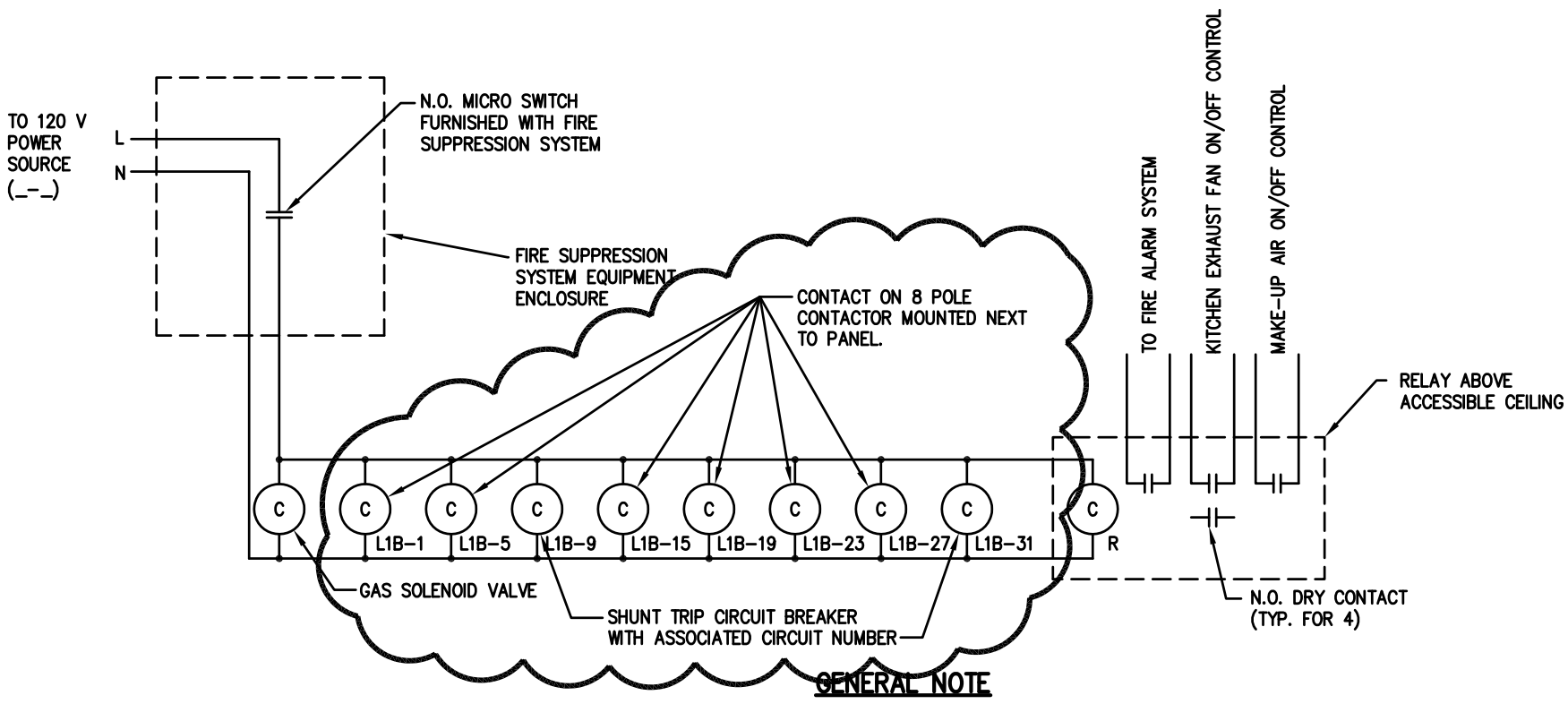
ETI Project No: 2013-114

ADD #2
SHEET E4.2
ATTACHMENT NO. 1
06/19/14

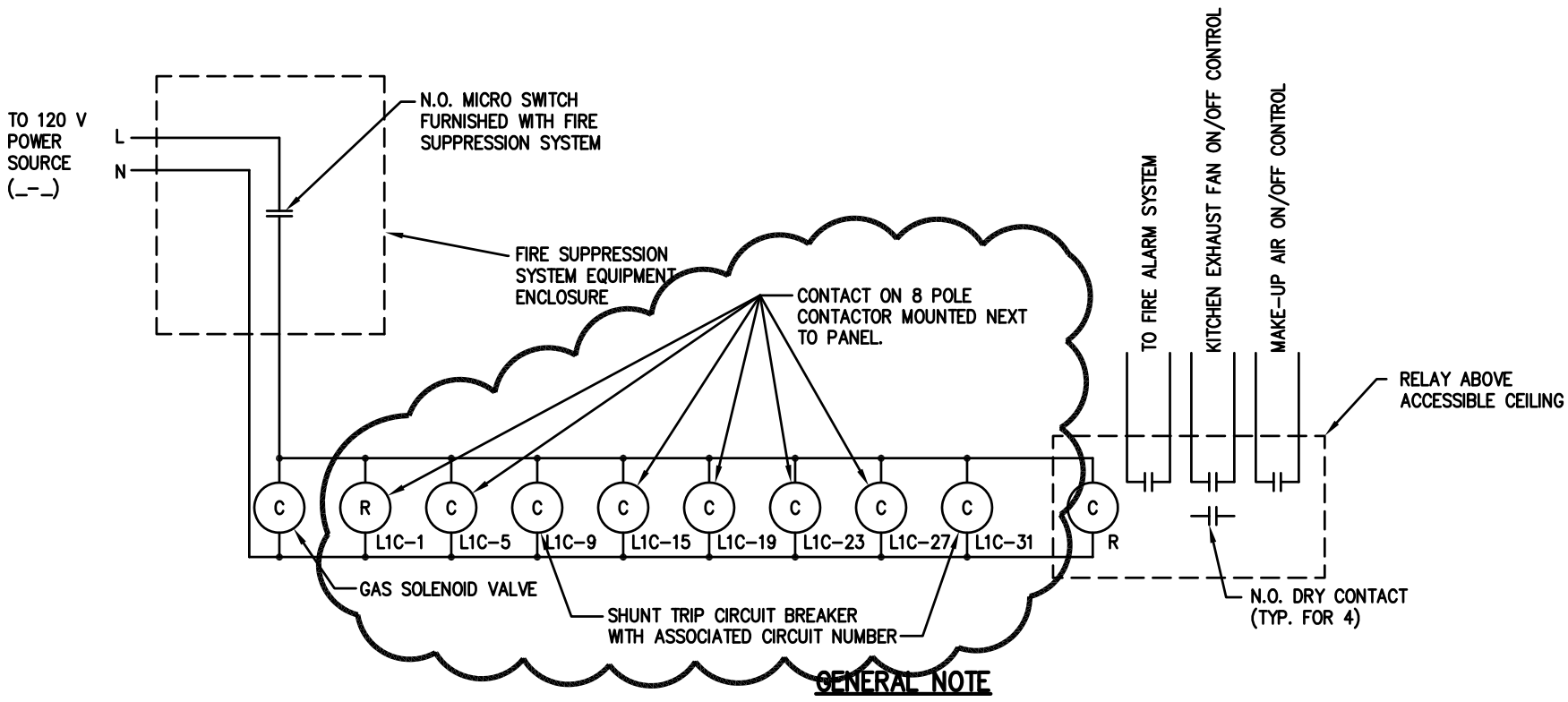


GENERAL NOTE

1. WHEN FIRE SUPPRESSION SYSTEM IS ACTIVATED, THE KITCHEN EQUIPMENT BELOW HOOD SHALL BE DISCONNECTED FROM FUEL (SOLENOID VALVE SHALL CLOSE) AND POWER SOURCE. THE HOOD EXHAUST FAN SHALL CONTINUE TO OPERATE AND SHALL BE CONTROLLED BY THE SUPPRESSION SYSTEM AND THE MAKE-UP AIR UNIT SHALL BE SHUT DOWN. CONNECTION BETWEEN THE FIRE SUPPRESSION SYSTEM, EXHAUST FAN, SOLENOID VALVE, FIRE ALARM SYSTEM, MAKE-UP AIR UNIT, AND SPECIFIED ELECTRICAL EQUIPMENT SHALL BE BY THIS CONTRACTOR.

KITCHEN HOOD #3 FIRE SUPPRESSION SYSTEM
ONE-LINE DIAGRAM (TEACHING KITCHEN 109)

NO SCALE



GENERAL NOTE

1. WHEN FIRE SUPPRESSION SYSTEM IS ACTIVATED, THE KITCHEN EQUIPMENT BELOW HOOD SHALL BE DISCONNECTED FROM FUEL (SOLENOID VALVE SHALL CLOSE) AND POWER SOURCE. THE HOOD EXHAUST FAN SHALL CONTINUE TO OPERATE AND SHALL BE CONTROLLED BY THE SUPPRESSION SYSTEM AND THE MAKE-UP AIR UNIT SHALL BE SHUT DOWN. CONNECTION BETWEEN THE FIRE SUPPRESSION SYSTEM, EXHAUST FAN, SOLENOID VALVE, FIRE ALARM SYSTEM, MAKE-UP AIR UNIT, AND SPECIFIED ELECTRICAL EQUIPMENT SHALL BE BY THIS CONTRACTOR.

KITCHEN HOOD #4 FIRE SUPPRESSION SYSTEM
ONE-LINE DIAGRAM (TEACHING KITCHEN 110)

NO SCALE

THE CAREER ACADEMY
DETAILS

SCALE: NONE | TSK

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ETI Project No: 2013-114

ADD #2
SHEET E4.2
ATTACHMENT NO. 2
06/19/14

LIGHT FIXTURE SCHEDULE

TYPE	DESCRIPTION	LAMP NO.	LAMP TYPE	MOUNTING	MANUFACTURER	CATALOG NUMBER	ACCEPTABLE MANUFACTURERS	NOTES
76	LED RECESSED ROUND SHOWER LIGHT, WET LOCATION RATED, 4100 K COLOR TEMPERATURE, 1000 LUMEN VALUE, 0-10V DIMMING DRIVER, 6" APERTURE, WHITE FLANGE	1	LED	RECESSED	GOTHAM	EVO-41/10-6-DFR-MVOLT	PORTFOLIO, OMEGA, INFINITY	-
77	LED RECESSED ROUND SHOWER LIGHT, WET LOCATION RATED, 4100 K COLOR TEMPERATURE, 1000 LUMEN VALUE, 0-10V DIMMING DRIVER, 6" APERTURE, WHITE FLANGE AND GENERATOR TRANSFER DEVICE	1	LED	RECESSED	GOTHAM	EVO-41/10-6-DFR-MVOLT-BGTD	PORTFOLIO, OMEGA, INFINITY	-
78	RECESSED LINEAR LED LIGHTING SYSTEM, FLUSH FROSTED ACRYLIC LENS, 4 INCH APERTURE, 400 LUMENS/FT, APPROX. 19 FT 11 INCH CONTINUOUS WALL LENGTH, VERIFY EXACT LENGTH IN THE FIELD, 277 VOLT	-	LED 4100K	RECESSED	AXIS	BBRLED-B2-400-40-SO-FL-19FT11INCH-W-277-D	-	-

NOTES:
1. PROVIDE BALLAST DISCONNECT ON ALL FLUORESCENT FIXTURES, PER NEC REQUIREMENTS.
2. PROVIDE TWO (2) BALLASTS FOR ALL FIXTURES REQUIRING "a,b" SWITCHING. "a,b" SWITCHING IS DESIGNATED ON PLANS.

THE CAREER ACADEMY
SCHEDULES

SCALE: NONE | TSK

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ADD #2
SHEET E5.1
ATTACHMENT NO. 1
06/19/14

PANEL SCHEDULE

PANEL "L1B" — VOLTAGE 120 / 208V — PHASE 3Ø — 4 WIRE, SOLID NEUTRAL — 10 KAIC RMS — 225 A — MAIN LUGS — SURFACE MOUNTED

LOAD DESCRIPTION	LOAD VA	LOAD TYPE	BREAKER POLES	BREAKER AMPS	NO.	PHASE	NO.	BREAKER AMPS	BREAKER POLES	LOAD TYPE	LOAD VA	LOAD DESCRIPTION
DOUBLE CONV. OVEN	1,920	X	1	20	1	A	2	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	3	B	4	20	1	R	1,800	RECEPTACLES
DOUBLE CONV. OVEN	1,920	X	1	20	5	C	6	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	7	A	8	20	1	R	1,800	RECEPTACLES
SMOKER OVEN	1,950	X	2	20	9	B	10	20	1	R	1,800	RECEPTACLES
–	1,950	X	–	–	11	C	12	20	1	R	1,800	RECEPTACLES
SHUNT TRIP SPACE	–	–	–	–	13	A	14	20	1	R	1,800	RECEPTACLES
GAS FRYER	865	X	1	20	15	B	16	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	17	C	18	20	1	S	1,000	SPARE
FRYMATE	1,800	X	1	20	19	A	20	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	21	B	22	20	1	R	1,080	REACH-IN REFRIG.
FREEZER BASE	1,045	X	1	20	23	C	24	20	1	R	865	UNDER CNTR REFRIG
SPARE	1,000	S	1	20	25	A	26	20	1	L	900	HOOD LIGHTS
GAS GRIDDLE	120	X	1	20	27	B	28	20	1	X	1,500	CORD REEL
SPARE	1,000	S	1	20	29	C	30	20	1	X	1,500	CORD REEL
TILTING KETTLE	4,000	X	3	50	31	A	32	20	1	R	1,000	CEILING RECEPT
–	4,000	X	–	–	33	B	34	20	1	S	1,000	SPARE
–	4,000	X	–	–	35	C	36	20	1	S	1,000	SPARE
SHUNT TRIP SPACE	–	–	–	–	37	A	38	20	1	S	1,000	SPARE
SPARE	1,000	S	1	20	39	B	40	20	1	S	1,000	SPARE
SPARE	1,000	S	1	20	41	C	42	20	1	S	1,000	SPARE

LOAD INFORMATION

	KVA	AMPS
TOTAL CONNECTED LOAD	61	168
EST. MAX DEMAND	35	98

NOTES:

1. CIRCUIT BREAKER LIB–1, 5, 15, 19, 22, 23, 24 AND 27 SHALL BE GFCI TYPE CIRCUIT BREAKRS.

PANEL SCHEDULE

PANEL "L1D" — VOLTAGE 120 / 208V — PHASE 3Ø — 4 WIRE, SOLID NEUTRAL — 10 KAIC RMS — 225 A — MAIN LUGS — SURFACE MOUNTED

LOAD DESCRIPTION	LOAD VA	LOAD TYPE	BREAKER POLES	BREAKER AMPS	NO.	PHASE	NO.	BREAKER AMPS	BREAKER POLES	LOAD TYPE	LOAD VA	LOAD DESCRIPTION
DOUBLE CONV. OVEN	1,920	X	1	20	1	A	2	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	3	B	4	20	1	R	1,800	RECEPTACLES
DOUBLE CONV. OVEN	1,920	X	1	20	5	C	6	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	7	A	8	20	1	R	1,800	RECEPTACLES
SMOKER OVEN	1,950	X	2	20	9	B	10	20	1	R	1,800	RECEPTACLES
–	1,950	X	–	–	11	C	12	20	1	R	1,800	RECEPTACLES
SHUNT TRIP SPACE	–	–	–	–	13	A	14	20	1	R	1,800	RECEPTACLES
GAS FRYER	865	X	1	20	15	B	16	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	17	C	18	20	1	R	1,800	RECEPTACLES
FRYMATE	1,800	X	1	20	19	A	20	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	21	B	22	20	1	R	1,080	REACH-IN REFRIG.
FREEZER BASE	1,045	X	1	20	23	C	24	20	1	R	865	UNDER CNTR REFRIG
SPARE	1,000	S	1	20	25	A	26	20	1	L	900	HOOD LIGHTS
GAS GRIDDLE	120	X	1	20	27	B	28	20	1	X	1,500	CORD REEL
SPARE	1,000	S	1	20	29	C	30	20	1	X	1,500	CORD REEL
TILTING KETTLE	4,000	X	3	50	31	A	32	20	1	R	1,000	CEILING RECEPT
–	4,000	X	–	–	33	B	34	20	1	S	1,000	SPARE
–	4,000	X	–	–	35	C	36	20	1	S	1,000	SPARE
SHUNT TRIP SPACE	–	–	–	–	37	A	38	20	1	S	1,000	SPARE
SPACE ONLY	–	–	1	20	39	B	40	20	1	–	–	SPACE ONLY
SPACE ONLY	–	–	1	20	41	C	42	20	1	–	–	SPACE ONLY

LOAD INFORMATION

	KVA	AMPS
TOTAL CONNECTED LOAD	57	159
EST. MAX DEMAND	36	101

NOTES:

1. CIRCUIT BREAKER L1D–1, 5, 15, 19, 22, 23, 24 AND 27 SHALL BE GFCI TYPE CIRCUIT BREAKRS.

PANEL SCHEDULE

PANEL "L1C" — VOLTAGE 120 / 208V — PHASE 3Ø — 4 WIRE, SOLID NEUTRAL — 10 KAIC RMS — 225 A — MAIN LUGS — SURFACE MOUNTED

LOAD DESCRIPTION	LOAD VA	LOAD TYPE	BREAKER POLES	BREAKER AMPS	NO.	PHASE	NO.	BREAKER AMPS	BREAKER POLES	LOAD TYPE	LOAD VA	LOAD DESCRIPTION
DOUBLE CONV. OVEN	1,920	X	1	20	1	A	2	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	3	B	4	20	1	R	1,800	RECEPTACLES
DOUBLE CONV. OVEN	1,920	X	1	20	5	C	6	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	7	A	8	20	1	R	1,800	RECEPTACLES
SMOKER OVEN	1,950	X	2	20	9	B	10	20	1	R	1,800	RECEPTACLES
–	1,950	X	–	–	11	C	12	20	1	R	1,800	RECEPTACLES
SHUNT TRIP SPACE	–	–	–	–	13	A	14	20	1	R	1,800	RECEPTACLES
GAS FRYER	865	X	1	20	15	B	16	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	17	C	18	20	1	R	1,800	RECEPTACLES
FRYMATE	1,800	X	1	20	19	A	20	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	21	B	22	20	1	R	1,080	REACH-IN REFRIG.
FREEZER BASE	1,045	X	1	20	23	C	24	20	1	R	865	UNDER CNTR REFRIG
SPARE	1,000	S	1	20	25	A	26	20	1	L	900	HOOD LIGHTS
GAS GRIDDLE	120	X	1	20	27	B	28	20	1	X	1,500	CORD REEL
SPARE	1,000	S	1	20	29	C	30	20	1	X	1,500	CORD REEL
TILTING KETTLE	4,000	X	3	50	31	A	32	20	1	R	1,000	CEILING RECEPT
–	4,000	X	–	–	33	B	34	20	1	S	1,000	SPARE
–	4,000	X	–	–	35	C	36	20	1	S	1,000	SPARE
SHUNT TRIP SPACE	–	–	–	–	37	A	38	20	1	S	1,000	SPARE
SPACE ONLY	–	–	1	20	39	B	40	20	1	–	–	SPACE ONLY
SPACE ONLY	–	–	1	20	41	C	42	20	1	–	–	SPACE ONLY

LOAD INFORMATION

	KVA	AMPS
TOTAL CONNECTED LOAD	57	159
EST. MAX DEMAND	36	101

NOTES:

1. CIRCUIT BREAKER LIC–1, 5, 15, 19, 22, 23, 24 AND 27 SHALL BE GFCI TYPE CIRCUIT BREAKRS.

PANEL SCHEDULE

PANEL "L1E" — VOLTAGE 120 / 208V — PHASE 3Ø — 4 WIRE, SOLID NEUTRAL — 10 KAIC RMS — 225 A — MAIN LUGS — SURFACE MOUNTED

LOAD DESCRIPTION	LOAD VA	LOAD TYPE	BREAKER POLES	BREAKER AMPS	NO.	PHASE	NO.	BREAKER AMPS	BREAKER POLES	LOAD TYPE	LOAD VA	LOAD DESCRIPTION
DOUBLE CONV. OVEN	1,920	X	1	20	1	A	2	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	3	B	4	20	1	R	1,800	RECEPTACLES
DOUBLE CONV. OVEN	1,920	X	1	20	5	C	6	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	7	A	8	20	1	R	1,800	RECEPTACLES
SMOKER OVEN	1,950	X	2	20	9	B	10	20	1	R	1,800	RECEPTACLES
–	1,950	X	–	–	11	C	12	20	1	R	1,800	RECEPTACLES
SHUNT TRIP SPACE	–	–	–	–	13	A	14	20	1	R	1,800	RECEPTACLES
GAS FRYER	865	X	1	20	15	B	16	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	17	C	18	20	1	R	1,800	RECEPTACLES
FRYMATE	1,800	X	1	20	19	A	20	20	1	R	1,800	RECEPTACLES
SPARE	1,000	S	1	20	21	B	22	20	1	R	1,080	REACH-IN REFRIG.
FREEZER BASE	1,045	X	1	20	23	C	24	20	1	R	865	UNDER CNTR REFRIG
SPARE	1,000	S	1	20	25	A	26	20	1	L	900	HOOD LIGHTS
GAS GRIDDLE	120	X	1	20	27	B	28	20	1	X	1,000	WATER COOLER
SPARE	1,000	S	1	20	29	C	30	20	1	X	1,500	CORD REEL
TILTING KETTLE	4,000	X	3	50	31	A	32	20	1	X	1,500	CORD REEL
–	4,000	X	–	–	33	B	34	20	1	R	1,000	CEILING RECEPT
–	4,000	X	–	–	35	C	36	20	1	S	1,000	SPARE
SHUNT TRIP SPACE	–	–	–	–	37	A	38	20	1	S	1,000	SPARE
SPARE	–	–	1	20	39	B	40	20	1	S	1,000	SPARE
SPACE ONLY	–	–	1	20	41	C	42	20	1	S	1,000	SPARE

LOAD INFORMATION

	KVA	AMPS
TOTAL CONNECTED LOAD	59	165
EST. MAX DEMAND	37	103

NOTES:

1. CIRCUIT BREAKER LIE–1, 5, 15, 19, 22, 23, 24, 27 AND 28 SHALL BE GFCI TYPE CIRCUIT BREAKRS.

ADD #2 | SHEET E6.1 | ATTACHMENT NO. 1 | 06/19/14

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ETI Project No: 2013-114

TSK

THE CAREER ACADEMY

PANEL SCHEDULES

SCALE: NONE

PANEL SCHEDULE

PANEL "L7C" — VOLTAGE 120 / 208V — PHASE 3Ø — 4 WIRE, SOLID NEUTRAL — 0 KAIC RMS — 225 A — MAIN LUGS SURFACE MOUNTED

LOAD DESCRIPTION	LOAD VA	LOAD TYPE	BREAKER POLES	BREAKER AMPS	NO.	PHASE	NO.	BREAKER AMPS	BREAKER POLES	LOAD TYPE	LOAD VA	LOAD DESCRIPTION
RECEPTS 201	720	R	1	20	1	A	2	20	1	R	360	RECEPTS 201
RECEPTS 201, 201E, 280	1,440	R	1	20	3	B	4	20	1	R	360	RECEPTS 201
RECEPTS 201	360	R	1	20	5	C	6	20	1	R	360	RECEPTS 201
FLOOR BOX	720	R	1	20	7	A	8	20	1	R	720	FLOOR BOX
FLOOR BOX	720	R	1	20	9	B	10	20	1	R	720	FLOOR BOX
FLOOR BOX	720	R	1	20	11	C	12	20	1	R	720	FLOOR BOX
FLOOR BOX	720	R	1	20	13	A	14	20	1	R	720	FLOOR BOX
FLOOR BOX	720	R	1	20	15	B	16	20	1	R	720	FLOOR BOX
RECEPTS 201	540	R	1	20	17	C	18	20	1	S	1,000	SPARE
RECEPTS 280K	360	R	1	20	19	A	20	20	1	S	1,000	SPARE
RECEPTS 280K	360	R	1	20	21	B	22	20	1	S	1,000	SPARE
RECEPTS 280K	180	R	1	20	23	C	24	20	1	S	1,000	SPARE
SPARE	1,000	S	1	20	25	A	26	20	1	-	-	SPACE ONLY
SPARE	1,000	S	1	20	27	B	28	20	1	-	-	SPACE ONLY
SPARE	1,000	S	1	20	29	C	30	20	1	-	-	SPACE ONLY
SPARE	1,000	S	1	20	31	A	32	20	1	-	-	SPACE ONLY
SPACE ONLY	-	-	1	20	33	B	34	20	1	-	-	SPACE ONLY
SPACE ONLY	-	-	1	20	35	C	36	20	1	-	-	SPACE ONLY
SPACE ONLY	-	-	1	20	37	A	38	20	1	-	-	SPACE ONLY
SPACE ONLY	-	-	1	20	39	B	40	20	1	-	-	SPACE ONLY
SPACE ONLY	-	-	1	20	41	C	42	20	1	-	-	SPACE ONLY

LOAD INFORMATION	KVA	AMPS
TOTAL CONNECTED LOAD	20	56
EST. MAX DEMAND	11	31

NOTES:
1.

PANEL SCHEDULE

PANEL "L6B" — VOLTAGE 120 / 208V — PHASE 3Ø — 4 WIRE, SOLID NEUTRAL — 10 KAIC RMS — 225 A — MAIN LUGS SURFACE MOUNTED

LOAD DESCRIPTION	LOAD VA	LOAD TYPE	BREAKER POLES	BREAKER AMPS	NO.	PHASE	NO.	BREAKER AMPS	BREAKER POLES	LOAD TYPE	LOAD VA	LOAD DESCRIPTION
RECEPTS 103, 103C	720	R	1	20	1	A	2	20	1	R	720	RECEPTS 103, 103B
RECEPTS 103	540	R	1	20	3	B	4	20	1	R	360	RECEPTS 103
RANGE	4,000	X	2	50	5	C	6	50	2	X	4,000	RANGE
-	4,000	X	-	-	7	A	8	-	-	X	4,000	-
RECEPTS 103	360	R	1	20	9	B	10	50	2	X	4,000	RANGE
RECEPTS 107A	540	R	1	20	11	C	12	-	-	X	4,000	-
RECEPTS 107A	540	R	1	20	13	A	14	20	1	R	360	RECEPTS 103
RANGE	4,000	X	2	50	15	B	16	20	1	R	360	RECEPTS 103
-	4,000	X	-	-	17	C	18	20	1	R	540	RECEPTS 103
SHUNT TRIP	-	-	-	-	19	A	20	20	1	R	540	RECEPTS 103
RANGE	4,000	X	2	50	21	B	22	20	1	R	1,200	REFRIGERATOR
-	4,000	X	-	-	23	C	24	20	1	R	1,200	REFRIGERATOR
INCUBATOR	1,000	R	1	20	25	A	26	20	1	S	1,000	RECEPTS 107A
INCUBATOR	1,000	R	1	20	27	B	28	20	1	M	700	EF-4
RECEPTS 180U	360	R	1	20	29	C	30	20	1	S	1,000	SPARE
RECEPTS 180U	180	R	1	20	31	A	32	20	1	S	1,000	SPARE
SPARE	1,000	S	1	20	33	B	34	20	1	S	1,000	SPARE
SPARE	1,000	S	1	20	35	C	36	20	1	S	1,000	SPARE
SPARE	1,000	S	1	20	37	A	38	20	1	-	-	SPACE ONLY
SPARE	1,000	S	1	20	39	B	40	20	1	-	-	SPACE ONLY
SPACE ONLY	-	-	1	20	41	C	42	20	1	-	-	SPACE ONLY

LOAD INFORMATION	KVA	AMPS
TOTAL CONNECTED LOAD	60	167
EST. MAX DEMAND	41	113

NOTES:
1.

PANEL SCHEDULE

PANEL "L5B" — VOLTAGE 120 / 208V — PHASE 3Ø — 4 WIRE, SOLID NEUTRAL — 0 KAIC RMS — 225 A — MAIN LUGS SURFACE MOUNTED

LOAD DESCRIPTION	LOAD VA	LOAD TYPE	BREAKER POLES	BREAKER AMPS	NO.	PHASE	NO.	BREAKER AMPS	BREAKER POLES	LOAD TYPE	LOAD VA	LOAD DESCRIPTION
RECEPTS 180R, 100E, 101	1,080	R	1	20	1	A	2	20	1	R	360	RECEPTS 100F
RECEPTS 100C, 100D,	720	R	1	20	3	B	4	20	1	R	720	RECEPTS 100F
RECEPTS 100B	900	R	1	20	5	C	6	20	1	R	360	RECEPTS 100F
RECEPTS 180S, 100A	900	R	1	20	7	A	8	20	1	R	900	RECEPTS 100
RECEPTS 101	360	R	1	20	9	B	10	20	1	R	720	RECEPTS 101
RECEPTS 101A, 101B, 101, 180	1,080	R	1	20	11	C	12	20	1	R	1,080	RECEPTS 101B
RECEPTS 101C	720	R	1	20	13	A	14	20	1	R	1,260	RECEPTS 102
RECEPTS 102A, 102B, 180	1,260	R	1	20	15	B	16	20	1	R	360	RECEPTS 102
FSD	500	X	1	20	17	C	18	20	1	R	1,000	RECEPTS 101
RECEPTS 100C	540	R	1	20	19	A	20	20	1	R	720	RECEPTS 102
RECEPTS 100C	720	R	1	20	21	B	22	20	1	R	1,000	MONITOR
HDO	500	X	1	20	23	C	24	20	1	R	1,000	MONITOR
DOOR ACCESS	100	X	1	20	25	A	26	20	1	R	1,000	MONITOR
PROJECTOR SCREEN	300	X	1	20	27	B	28	20	1	R	1,000	MONITOR
FLOOR BOX COMMONS	1,000	R	1	20	29	C	30	20	1	R	1,000	MONITOR
FLOOR BOX COMMONS	500	R	1	20	31	A	32	20	1	R	720	RECEPTS 100
SPARE	1,000	S	1	20	33	B	34	20	1	S	1,000	SPARE
SPARE	1,000	S	1	20	35	C	36	20	1	S	1,000	SPARE
SPARE	1,000	S	1	20	37	A	38	20	1	S	1,000	SPARE
SPARE	1,000	S	1	20	39	B	40	20	1	-	-	SPACE ONLY
SPACE ONLY	-	-	1	20	41	C	42	20	1	-	-	SPACE ONLY

LOAD INFORMATION	KVA	AMPS
TOTAL CONNECTED LOAD	31	87
EST. MAX DEMAND	18	49

NOTES:
1.

ADD #2 | SHEET E6.2 | ATTACHMENT NO. 1 | 06/19/14

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ETI Project No: 2013-114

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PANEL SCHEDULES

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SCALE: NONE