

# LOS RIOS COMMUNITY COLLEGE DISTRICT

1919 Spanos Court, Sacramento, CA 95825  
Phone (916) 568-3071 FAX (916) 568-3145  
Purchasing Department

Sacramento City College American River College Cosumnes River College Folsom Lake College

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## ADDENDUM NO. 1

ISSUE DATE: August 30, 2019

**American River College  
Student Wellness Center**

**LRCCD BID NO. 20002**

Issued By:

LOS RIOS COMMUNITY COLLEGE DISTRICT  
1919 Spanos Court, Sacramento, CA 95825  
Phone (916) 568-3071 Fax (916) 568-3145

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This addendum forms a part to the Contract Documents. The addendum items supersede and supplement all portions of the bidding documents with which it conflicts. All workmanship, materials, appliances and equipment which may be included in the following addendum items shall be of the same relative quality as described for similar work set forth in the general or main specifications of which these addendum items shall be considered a part.

This Addendum has been acknowledged in the space provided on the Bid Form and is considered part of the bid documents.

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This Addendum consists of 31 pages.

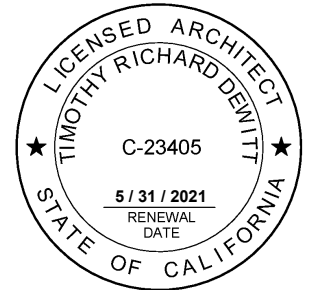
END OF SECTION.



August 30, 2019

**Rainforth Grau Architects Project No. 18-1379**  
DSA File and Application No. 34-C3 / 02-117633

**ADDENDUM NO. 01**  
American River College Student Wellness Center  
Sacramento, California



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Rainforth Grau Architects

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Turley and Associates

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The Engineering Enterprise

1. ALL WORKMANSHIP, MATERIALS, APPLIANCES AND EQUIPMENT which may be included in the following items shall be the same relative quantity as described for similar work set forth in the original or main specifications of which these Addendum items shall be considered a part.
  
2. ADDENDUM DRAWINGS  
The following Addendum drawings modify or supplement the issued bid documents.  
  

AD1-M01	REPLACEMENT TO SHEET M0.1
AD1-M1.0	REPLACEMENT TO SHEET M1.0
AD1-M2.1	REPLACEMENT TO SHEET M2.1
AD1-M5.1	REPLACEMENT TO SHEET M5.1
  
3. PROJECT MANUAL
  - A. Section 09 7200, Wall Coverings
    1. Article 2.3: DELETE Paragraph B, Cork Wall Covering in its entirety.

B. Section 26 0531, Conduit

1. DELETE section in its entirety and REPLACE with Section 26 0531 included with this addendum.

C. Section 26 0533, Boxes

1. DELETE section in its entirety and REPLACE with Section 26 0533 included with this addendum.

4. DRAWINGS

A. Sheet A0.1, Cover Sheet

1. Abbreviations: ADD "OL Occupancy Load" and "OLF. Occupancy Load Factor" included for code review with DSA for project approval. This has no construction impact.

B. Sheet A2.1.1, Demolition Floor Plan & Improvement Floor Plan

1. ADD General Note "6. Walls are 20'-0" height U.O.N."

C. Sheet M0.1, Mechanical, Legend, Schedule & Notes

1. DELETE Sheet M0.1 in its entirety and REPLACE with Sheet AD1-M0.1 included with this addendum.

D. Sheet M1.0, Overall Mechanical Floor Plan

1. DELETE Sheet M1.0 in its entirety and REPLACE with Sheet AD1-M1.0 included with this addendum.

E. Sheet M2.1, Mechanical Floor Plan

1. DELETE Sheet M2.1 in its entirety and REPLACE with Sheet AD1-M2.1 included with this addendum.

F. Sheet M5.1, Mechanical Details & Schematic

1. DELETE Sheet M5.1 in its entirety and REPLACE with Sheet AD1-M5.1 included with this addendum.

\* \* \* END OF ADDENDUM \* \* \*

**PART 1 - GENERAL**

1.1 SUMMARY

- A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
  - 1. Electrical metallic tubing and fittings.
  - 2. Flexible metallic conduit and fittings.
  - 3. Miscellaneous conduit fittings and products.
- B. Related work: Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.
  - 1. Division 03: Cast-in-place concrete. Protective envelope for underground conduit installations.
  - 2. Division 07: Sheet metal flashing and trim.
  - 3. Division 09: Painting. Exposed conduit and other devices.
  - 4. Division 32: Earthwork. Excavation and backfill for conduit and utilities on site.

1.2 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
  - 1. Federal Specifications (FS):
    - FS WW-C-563; Electrical Metallic Tubing.
    - FS WW-C-566; Specification for Flexible Metal Conduit.
    - FS WW-C-581; Specification for Galvanized Rigid Conduit.
    - FS W-C-1094A; Conduit and Conduit Fittings Plastic, Rigid.
  - 2. American National Standards Institute, Inc. (ANSI):
    - ANSI C80.1; Rigid Steel Conduit, Zinc-Coated.
    - ANSI C80.3; Electrical Metallic Tubing, Zinc Coated.
  - 3. Underwriters Laboratories, Inc. (UL):
    - UL 1; Flexible Metal Conduit.
    - UL 6; Rigid Metal Conduit.
    - UL 360; Liquid-Tight Flexible Steel Conduit.
    - UL 514B; Conduit, Tubing, and Cable Fittings.
    - UL 635; Insulating Bushings.
    - UL 797; Electrical Metallic Tubing - Steel.
    - UL 1242; Intermediate Metal Conduit - Steel.

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4. National Electrical Manufacturer Association (NEMA):  
NEMA RN1; PVC Externally coated Galvanized Rigid Steel Conduit.

1.3 SUBMITTALS

- A. Submit in accordance with the requirements of Section 26 00 10: Basic Electrical Requirements the following items:
  1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
  2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
  3. Submit manufacturer's installation instruction. Provide written instructions for raceway products requiring glues, special tools, or specific installation techniques.

1.4 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new and unused, and of current manufacturer.
- B. Only products and applications listed in this Section may be used on the project unless otherwise submitted and approved.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Equal products by the following manufacturers will be considered providing that all features of the specified product are provided:
  1. Metal conduit:
    - a. Allied Tube and Conduit Co.
    - b. Triangle PWC, Inc.
    - c. Western Tube and Conduit Corp.
    - d. Spring City Electrical Manufacturing Co.
    - e. Occidental Coating Co. (OCAL).
    - f. Alflex Corp.
    - g. American Flexible Metal Conduit Co.
    - h. Anaconda.
  2. Fittings:
    - a. Appleton Electric Co.
    - b. OZ/Gedney.
    - c. Thomas & Betts Corp.
    - d. Spring City Electrical Manufacturing Co.

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e. Occidental Coating Co. (OCAL).

B. Substitutions: Under provisions of Section 26 00 10: Basic Electrical Requirements.

**2.2 ELECTRICAL METALLIC TUBING (EMT)**

- A. Conduit: Shall be formed of cold rolled strip steel, electrical resistance welded continuously along the longitudinal seam and hot dip galvanized after fabrication. Conduit shall conform to ANSI C80.3 specifications and shall meet UL requirements.
- B. Set screw type couplings: Electroplated, steel or cast malleable iron, UL listed concrete tight. Use set screw type couplings with four setscrews each of conduit sizes over 2 inches. Setscrews shall be of case hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.
- C. Set screw type connectors: Electroplated steel or cast malleable iron UL listed concrete tight with male hub and insulated plastic throat, 150 degree C temperature rated. Setscrew shall be same as for couplings.
- D. Raintight couplings: Electroplate steel or cast malleable iron; UL listed raintight and concrete tight, using gland and ring compression type construction.
- E. Raintight connectors: Electroplated steel or cast malleable iron, UL listed raintight and concrete tight, with insulated throat, using gland and ring compression type construction.

**2.3 FLEXIBLE METALLIC CONDUIT (FMC)**

- A. Conduit: Shall be fabricated in continuous lengths from galvanized steel strip, spirally wound and formed to provide an interlocking design and conforming to UL 1.
- B. Fittings: Connectors shall be of the single screw clamp variety with steel or cast malleable iron bodies and threaded male hubs with insulated throats. Exception: Pressure cast screw-in connectors shall be acceptable for fixture connection in suspended ceilings and cut-in outlet boxes within existing furred walls.

**2.4 MISCELLANEOUS CONDUIT FITTINGS AND PRODUCTS**

- A. Watertight conduit entrance seals: Steel or cast malleable iron bodies and pressure clamps with PVC sleeve, neoprene sealing grommets and PVC coated steel pressure rings. Fittings shall be supplied with neoprene sealing rings between the body and PVC sleeve.
- B. Watertight cable sealing bushings: One piece, compression molded sealing ring with PVC coated steel pressure disks, stainless steel sealing screws and zinc plated cast malleable iron locking collar.
- C. Expansion fittings: Multi-piece unit comprised of a hot dip galvanized malleable iron or steel body and outside pressure bussing designed to allow a maximum of 4" conduit movement (2" in either direction). Furnish with external braid tinned copper bonding jumper. Unit shall be UL listed for wet or dry locations.
- D. Expansion/deflection couplings: Multi-piece unit comprised of a neoprene sleeve with internal flexible tinned copper braid attached to bronze end couplings with stainless steel bands. Coupling shall accommodate .75-inch deflection, expansion, or contraction in any direction, and allow 30-degree angular deflections. Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber jacket and

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stainless steel jacket clamps. Unit shall comply with UL467 and UL514.  
Manufacturer shall be OZ/Gedney Type DX, Steel City Type EDF or equal.

- E. Fire rated penetration seals:
  - 1. UL building materials directory classified.
  - 2. Conduit penetrations in fire rated separation shall be sealed with a UL classified fill, void or cavity material.
  - 3. The fire rated sealant material shall be the product best suited for each type of penetration, and may be a caulk, putty, composite sheet or wrap/strip.
- F. Standard products not herein specified:
  - 1. Provide listing of standard electrical conduit hardware and fittings not herein specified for approval prior to use or installation, i.e. locknuts, bushings, etc.
  - 2. Listing shall include manufacturers name, part numbers, and a written description of the item indicating type of material and construction.
  - 3. Miscellaneous components shall be equal in quality, material, and construction to similar items herein specified.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Contractor shall thoroughly examine site conditions for acceptance of conduit system installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.

**3.2 APPLICATION**

- A. Electrical metallic tubing (EMT): Shall be used exposed or concealed for interior electrical feeders 4" and smaller, interior power and lighting branch circuits and low tension distribution system where run above suspended ceilings, in concrete slabs and walls not in contact with earth; in stud walls, furred spaces and crawl spaces. EMT shall not be installed exposed below 6 feet above the finish floor except within electrical, communication or signal rooms or closets.
- B. Flexible metallic conduit (FMC): Shall be used only in dry locations for connections from an adjacent outlet box or conduit to all motors, transformers, vibrating equipment or machinery, controllers, solenoid valves, float and flow switches or similar devices, and to lighting fixtures installed in suspended ceilings, minimum sizes shall be 3/4" U.O.N.

**3.3 PREPARATION**

- A. Locations of conduit runs shall be planned in advance of the installation and coordinated with ductwork, plumbing, ceiling and wall construction in the same areas and shall not unnecessarily cross other conduits or pipe, nor prevent removal of ceiling tiles or panels, nor block access to mechanical or electrical equipment.
- B. Where practical, install conduits in groups in parallel vertical or horizontal runs and at elevations that avoid unnecessary offsets.

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- C. All conduits shall be run parallel or at right angles to the centerlines of columns and beams, whether routed exposed, concealed above suspended ceiling or in concrete slabs.
- D. Conduits shall not be placed closer than 12 inches to a flue, parallel hot water, steam line or other heat producing source or three inches from such lines when crossing perpendicular to the runs.
- E. Exposed conduit installation shall not encroach into the ceiling height headroom of walkways, or doorways. Where possible, install horizontal raceway runs above water and below steam piping.
- F. The largest trade size conduits in concrete floor and wall slabs shall not exceed 1/3 the floor or wall thickness, and conduits shall be spaced a minimum of three conduit diameters apart unless otherwise noted on the Drawings. All conduits shall be installed in the center of concrete slabs or wall and shall not be placed between reinforcing steel and the bottom of floor slabs.
- G. In long runs of conduit, provide sufficient pull boxes inside buildings to facilitate pulling wires and cables, with spacing not to exceed 150 feet. Support pull boxes from structure independent of conduit supports. These pull boxes are not shown on the Drawings.
- H. Provide all reasonably inferred standard conduits fitting and products required to complete conduit installation to meet the intended application whether noted, shown, or specified in the contract documents or not.
- I. Connect recessed lighting fixtures to conduit runs with maximum six feet of flexible metal conduit.

**3.4 INSTALLATION**

- A. Install conduit in accordance with manufacturer's written instructions, as shown on drawings and as specified herein.
- B. Minimum Conduit Size: Unless otherwise noted herein or on Drawings, minimum conduit size shall be 3/4" for interior applications and 3/4" for exterior and underground applications.
- C. All conduit sizes shown on the drawings are sized for copper conductors with THHN/THWN insulation. If conductor type or size is changed the contractor shall be responsible for resizing conduits upward to meet Code.
- D. Except in electrical, communication and mechanical rooms, conduit connections to motors and surface cabinets shall be concealed unless exposed work is clearly called for on the Drawings.
- E. Install conduits in complete runs before pulling in cables or wires.
- F. Install conduit free from dented, bruises or deformations. Remove and replace any damaged conduits with new undamaged material.
- G. Conduits shall be well protected and tightly covered during construction using metallic bushings and bushing "pennies" to seal open ends.
- H. In making joints in rigid steel conduit, ream conduit smooth after cutting and threading. Coat all field-threaded joints with UL approved conductive type compound



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to insure low resistance ground continuity through conduit, and to prevent seizing and corrosion.

- I. Clean any conduit in which moisture or any foreign matter has collected before pulling in conductors. Paint all field-threaded joints to prevent corrosion.
- J. In all empty conduits or ducts, install a polyethylene pulling rope.
- K. Conduit systems shall be mechanically and electrically continuous throughout. Install code size, insulated, copper, green-grounding conductors in all conduit runs for branch circuits and feeders. This conductor is not shown on the Drawings. Refer to Section 29 05 26: Grounding and Bonding.
- L. Metallic conduit shall not be in contact with other dissimilar metal pipes (i.e. plumbing).
- M. Make bends with standard conduit bending hand tool or machines. The use of any item not specifically designed for the bending of electrical conduit is strictly prohibited.
- N. A run of conduit between terminations at wire pulling points shall not contain more than the equivalent of four quarter bends (360 degrees, total).

**3.5 PENETRATIONS**

- A. Locate penetrations and holes in advance where they are proposed in the structural sections such as footings, beams, wall, etc. Penetrations are acceptable only when the following occurs:
  - 1. Where shown on the structural drawings.
  - 2. As approved by the Structural Engineer and The Division Of State Architect (DSA) prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
- B. Cutting or holes:
  - 1. Cut holes through concrete, masonry block or brick floors and floors of structure with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Structural Engineer as required by limited working space. Obtain the approval of the Structural Engineer prior to drilling through structural sections.
  - 2. Provide sleeves or "can outs" for cast-in-place concrete floors and walls. Following conduit installation, seal all penetrations using non-iron bearing, chloride free, non-shrinking, dry-pack grouting compounds; or fire rated penetration-sealing materials.
  - 3. Cut holes for conduit penetrations through non-concrete and non-masonry walls, partitions, or floors with a hole saw. The hole shall be only as large as required to accommodate the size of the conduit.
  - 4. Provide single piece escutcheon plates around all exposed conduit penetrations in public places.
- C. Sealing:

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1. Non-rated penetrations: Pack opening around conduits with non-flammable insulating material and seal with gypsum wallboard taping compound.
2. Fire stop: Where conduits, wireways, and other electrical raceways pass through fire rated partitions, walls, smoke partitions, or floor; install a UL classified fire stop material to provide an effective barrier against the spread of fire, smoke and gases. Completely fill and seal clearances between raceways and openings with the fire stop material.

**3.6 TERMINATIONS AND JOINTS**

- A. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings except as otherwise indicated.
- B. Raceways shall be joined using specified couplings or transition couplings where dissimilar raceway systems are joined.
- C. Conduits shall be securely fastened to cabinets, boxes and gutters using two locknuts and an insulating bushing or specified insulated connectors. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors. Install grounding bushings or bonding jumpers on all conduits terminating at concentric or eccentric knockouts.
- D. Conduit terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using specified connectors and hubs.
- E. Stub-up connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; flexible metal conduit may be used 6 inches above the floor. Where equipment connections are not made under this contract, install screwdriver operated threaded flush plugs with floor.
- F. Install specified cable sealing bushings on all conduits originating outside the building walls and terminating in switchgear, cabinets or gutters inside the building. Install cable sealing bushings or raceway seal for conduit terminations in all grade level or below grade exterior pull, junction or outlet boxes.
- G. Install expansion couplings where any conduit crosses a building separation or expansion joint as follows:
  1. Conduits three inches and larger, shall be rigidly secured to the building structure on opposite sides of a building expansion joint, and provided with expansion or deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.
  2. Conduits smaller than three inches shall be rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint. Connect conduits to junction boxes with 15 inches of slack flexible conduit. Flexible conduit shall have a copper green ground-bonding jumper installed. For concrete embedded conduit, use expansion and deflection couplings as specified above for three inches and larger conduits.

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- H. Use short length (maximum of 6ft) of the appropriate FMC or LFMC conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission. Provide liquidtight flexible metal conduit for installation in exterior locations, moisture or humidity-laden atmosphere, corrosive atmosphere, water hose or spray wash-down operations, and locations subject to seepage or dripping of oil, grease or water. Provide a green ground wire with FMC or LFMC conduit.

**3.7 SUPPORTS**

- A. Provide supports for raceways as specified in Section 26 05 29: Electrical Hangers and Supports.
- B. All raceways systems shall be secured to building structures using specified fasteners, clamps and hangers spaced according to the NEC.
- C. Support single runs of conduit using one-hole pipe straps. Where run horizontally on walls in damp or wet locations, install "clamp backs" to space conduit off the surface.
- D. Multiple conduit runs shall be supported using "trapeze" hangers fabricated from specified construction channel, mounted to 3/8-inch diameter, threaded steel rods secured to building structures. Fasten conduit to construction channel with standard one-hole pipe clamps or the equivalent. Provide lateral seismic bracing for hangers.
- E. Individual 3/4" conduits installed above suspended ceilings may be attached to the ceiling's hanger wire using spring steel support clips provided that not more than two conduits are attached to any single support wire.
- F. Support exposed vertical conduit runs at each floor level, independent of cabinets or switches to which they run, by means of acceptable supports.
- G. Fasteners and supports in solid masonry and concrete:
  - 1. Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
  - 2. After concrete installation:
    - a. Steel expansion anchors not less than 1/4 inch bolt size and not less than 1-1/8 inch embedment.
    - b. Power set fasteners not less than 1/4 inch diameter with depth of penetration not less than three inches.
    - c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.
- H. Hollow masonry: Toggle bolts are permitted. Bolts supported only by masonry block are not acceptable.
- I. Metal structures: Use machine screw fasteners or other devices specifically designed and approved for the application.

**- END OF SECTION -**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
  - 1. Wall and ceiling outlet boxes.
  - 2. Pull and junction boxes.
- B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.
  - 1. Division 08: Access doors. Wall and ceiling access doors.

**1.2 REFERENCES**

- A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified.
  - 1. American National Standards Institute/National Electrical Manufacturer Association:
    - ANSI/NEMA OS-1; Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
    - ANSI/NEMA OS-2; Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
    - NEMA 250; Enclosures for Electrical Equipment (1000 volts maximum).
  - 2. Underwriters Laboratories (UL):
    - UL 50; Enclosures for Electrical Equipment.
    - UL 514A; Metallic Outlet Boxes.
    - UL 1773; Termination Boxes.

**1.3 SUBMITTALS**

- A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:
  - 1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
  - 2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
  - 3. Submit Manufacturer's installation instructions.

**1.4 QUALITY ASSURANCE**

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- A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.
- B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.
  - 1. Outlet and junction boxes:
    - a. Spring City Electrical Manufacturing Co.
    - b. Thomas & Betts Corp.
    - c. Raco, Inc.
- B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

**2.2 OUTLET BOXES**

- A. Standard outlet box:
  - 1. Provide galvanized, one-piece die formed or drawn steel, knockout type box of size and configuration best suited to the application indicated on the Drawings.
  - 2. 4-inch square by 2-1/8 inch deep shall be minimum box size.
  - 3. ANSI/NEMA OS 1.
- B. Cast metal outlet body:
  - 1. Provide four inch round, galvanized cast iron alloy with threaded hubs and mounting lugs as required.
  - 2. Provide boxes with cast cover plates of the same material as the box and neoprene cover gaskets.
- C. Conduit outlet body: Provide Cadmium plated cast iron alloy, oblong conduit outlet bodies with threaded conduit hubs and neoprene gasket, cast iron covers.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Contractor shall thoroughly examine Project site conditions for acceptance of box installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

**3.2 PREPARATION**

- A. Install all outlet boxes flush with building walls, ceilings and floors except where boxes are installed in mechanical and electrical rooms, in cabinetry, above accessible ceilings or where exposed Work is called for on the Drawings.

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- B. Install outlet boxes at the locations and elevations indicated on the Drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.
- C. Locate switch outlet boxes on the latch side of doorways unless otherwise indicated.
- D. Locate outlet boxes above hung ceilings having concealed suspension systems, adjacent to openings for removable recessed lighting fixtures.
- E. Do not install outlet boxes back-to-back, separate boxes by at least 6". In fire rated walls separate boxes by at least 24" and wall stud.

**3.3 INSTALLATION**

- A. Install boxes in accordance with Manufacturer's written instructions, as indicated on Drawings and as specified herein.
- B. Locate electrical boxes as indicated on Drawings and as required for splices, taps, wire pulling, equipment connections and Code compliance.
- C. Install junction or pullboxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not indicated on the Drawings.
- D. Install raised covers (plaster rings) on all outlet boxes in stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.
- E. Leave no unused openings in any box. Install close-up plugs as required to seal openings.
- F. Provide an access panel in permanent ceiling or wall where boxes are installed and will be inaccessible.
- G. For boxes mounted in exterior walls, make sure that there is insulation behind outlet boxes to prevent condensation in boxes.
- H. For outlets mounted above counters, benches or backsplashes, coordinate location and mounting heights with built-in units. Adjust mounting height to agree with required location for equipment served.
- I. Use conduit outlet bodies to facilitate pulling of conductors or to make changes in conduit direction only. Do not make splices in conduit outlet bodies.
- J. Add additional sheet rock as necessary to maintain original fire rating of walls where boxes are installed.
- K. Install galvanized steel coverplates on boxes in unfinished areas, above accessible ceilings and on surface mounted outlets.

**3.4 SUPPORTS**

- A. Provide boxes installed in metal stud walls with brackets designed for attaching directly to the studs or mount boxes on specified box supports.

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- B. Mount boxes, installed in suspended ceilings of gypsum board or lath and plaster construction, to 16 gauge metal channel bars attached to main ceiling runners.
- C. Support boxes independently of conduit system.
- D. Support boxes, installed in suspended ceilings supporting acoustical tiles or panels, directly from the structure above wherever pendant mounted lighting fixtures are to be installed from the box.
- E. Support boxes, mounted above suspended acoustical tile ceilings, directly from the structure above.

**- END OF SECTION -**

**PART 1 - GENERAL**

1.1 SUMMARY

- A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
  - 1. Electrical metallic tubing and fittings.
  - 2. Flexible metallic conduit and fittings.
  - 3. Miscellaneous conduit fittings and products.
- B. Related work: Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.
  - 1. Division 03: Cast-in-place concrete. Protective envelope for underground conduit installations.
  - 2. Division 07: Sheet metal flashing and trim.
  - 3. Division 09: Painting. Exposed conduit and other devices.
  - 4. Division 32: Earthwork. Excavation and backfill for conduit and utilities on site.

1.2 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
  - 1. Federal Specifications (FS):
    - FS WW-C-563; Electrical Metallic Tubing.
    - FS WW-C-566; Specification for Flexible Metal Conduit.
    - FS WW-C-581; Specification for Galvanized Rigid Conduit.
    - FS W-C-1094A; Conduit and Conduit Fittings Plastic, Rigid.
  - 2. American National Standards Institute, Inc. (ANSI):
    - ANSI C80.1; Rigid Steel Conduit, Zinc-Coated.
    - ANSI C80.3; Electrical Metallic Tubing, Zinc Coated.
  - 3. Underwriters Laboratories, Inc. (UL):
    - UL 1; Flexible Metal Conduit.
    - UL 6; Rigid Metal Conduit.
    - UL 360; Liquid-Tight Flexible Steel Conduit.
    - UL 514B; Conduit, Tubing, and Cable Fittings.
    - UL 635; Insulating Bushings.
    - UL 797; Electrical Metallic Tubing - Steel.
    - UL 1242; Intermediate Metal Conduit - Steel.



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4. National Electrical Manufacturer Association (NEMA):  
NEMA RN1; PVC Externally coated Galvanized Rigid Steel Conduit.

1.3 SUBMITTALS

- A. Submit in accordance with the requirements of Section 26 00 10: Basic Electrical Requirements the following items:
  1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
  2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
  3. Submit manufacturer's installation instruction. Provide written instructions for raceway products requiring glues, special tools, or specific installation techniques.

1.4 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new and unused, and of current manufacturer.
- B. Only products and applications listed in this Section may be used on the project unless otherwise submitted and approved.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Equal products by the following manufacturers will be considered providing that all features of the specified product are provided:
  1. Metal conduit:
    - a. Allied Tube and Conduit Co.
    - b. Triangle PWC, Inc.
    - c. Western Tube and Conduit Corp.
    - d. Spring City Electrical Manufacturing Co.
    - e. Occidental Coating Co. (OCAL).
    - f. Alflex Corp.
    - g. American Flexible Metal Conduit Co.
    - h. Anaconda.
  2. Fittings:
    - a. Appleton Electric Co.
    - b. OZ/Gedney.
    - c. Thomas & Betts Corp.
    - d. Spring City Electrical Manufacturing Co.

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e. Occidental Coating Co. (OCAL).

B. Substitutions: Under provisions of Section 26 00 10: Basic Electrical Requirements.

**2.2 ELECTRICAL METALLIC TUBING (EMT)**

- A. Conduit: Shall be formed of cold rolled strip steel, electrical resistance welded continuously along the longitudinal seam and hot dip galvanized after fabrication. Conduit shall conform to ANSI C80.3 specifications and shall meet UL requirements.
- B. Set screw type couplings: Electroplated, steel or cast malleable iron, UL listed concrete tight. Use set screw type couplings with four setscrews each of conduit sizes over 2 inches. Setscrews shall be of case hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.
- C. Set screw type connectors: Electroplated steel or cast malleable iron UL listed concrete tight with male hub and insulated plastic throat, 150 degree C temperature rated. Setscrew shall be same as for couplings.
- D. Raintight couplings: Electroplate steel or cast malleable iron; UL listed raintight and concrete tight, using gland and ring compression type construction.
- E. Raintight connectors: Electroplated steel or cast malleable iron, UL listed raintight and concrete tight, with insulated throat, using gland and ring compression type construction.

**2.3 FLEXIBLE METALLIC CONDUIT (FMC)**

- A. Conduit: Shall be fabricated in continuous lengths from galvanized steel strip, spirally wound and formed to provide an interlocking design and conforming to UL 1.
- B. Fittings: Connectors shall be of the single screw clamp variety with steel or cast malleable iron bodies and threaded male hubs with insulated throats. Exception: Pressure cast screw-in connectors shall be acceptable for fixture connection in suspended ceilings and cut-in outlet boxes within existing furred walls.

**2.4 MISCELLANEOUS CONDUIT FITTINGS AND PRODUCTS**

- A. Watertight conduit entrance seals: Steel or cast malleable iron bodies and pressure clamps with PVC sleeve, neoprene sealing grommets and PVC coated steel pressure rings. Fittings shall be supplied with neoprene sealing rings between the body and PVC sleeve.
- B. Watertight cable sealing bushings: One piece, compression molded sealing ring with PVC coated steel pressure disks, stainless steel sealing screws and zinc plated cast malleable iron locking collar.
- C. Expansion fittings: Multi-piece unit comprised of a hot dip galvanized malleable iron or steel body and outside pressure bussing designed to allow a maximum of 4" conduit movement (2" in either direction). Furnish with external braid tinned copper bonding jumper. Unit shall be UL listed for wet or dry locations.
- D. Expansion/deflection couplings: Multi-piece unit comprised of a neoprene sleeve with internal flexible tinned copper braid attached to bronze end couplings with stainless steel bands. Coupling shall accommodate .75-inch deflection, expansion, or contraction in any direction, and allow 30-degree angular deflections. Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber jacket and

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stainless steel jacket clamps. Unit shall comply with UL467 and UL514.  
Manufacturer shall be OZ/Gedney Type DX, Steel City Type EDF or equal.

- E. Fire rated penetration seals:
  - 1. UL building materials directory classified.
  - 2. Conduit penetrations in fire rated separation shall be sealed with a UL classified fill, void or cavity material.
  - 3. The fire rated sealant material shall be the product best suited for each type of penetration, and may be a caulk, putty, composite sheet or wrap/strip.
- F. Standard products not herein specified:
  - 1. Provide listing of standard electrical conduit hardware and fittings not herein specified for approval prior to use or installation, i.e. locknuts, bushings, etc.
  - 2. Listing shall include manufacturers name, part numbers, and a written description of the item indicating type of material and construction.
  - 3. Miscellaneous components shall be equal in quality, material, and construction to similar items herein specified.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Contractor shall thoroughly examine site conditions for acceptance of conduit system installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.

**3.2 APPLICATION**

- A. Electrical metallic tubing (EMT): Shall be used exposed or concealed for interior electrical feeders 4" and smaller, interior power and lighting branch circuits and low tension distribution system where run above suspended ceilings, in concrete slabs and walls not in contact with earth; in stud walls, furred spaces and crawl spaces. EMT shall not be installed exposed below 6 feet above the finish floor except within electrical, communication or signal rooms or closets.
- B. Flexible metallic conduit (FMC): Shall be used only in dry locations for connections from an adjacent outlet box or conduit to all motors, transformers, vibrating equipment or machinery, controllers, solenoid valves, float and flow switches or similar devices, and to lighting fixtures installed in suspended ceilings, minimum sizes shall be 3/4" U.O.N.

**3.3 PREPARATION**

- A. Locations of conduit runs shall be planned in advance of the installation and coordinated with ductwork, plumbing, ceiling and wall construction in the same areas and shall not unnecessarily cross other conduits or pipe, nor prevent removal of ceiling tiles or panels, nor block access to mechanical or electrical equipment.
- B. Where practical, install conduits in groups in parallel vertical or horizontal runs and at elevations that avoid unnecessary offsets.

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- C. All conduits shall be run parallel or at right angles to the centerlines of columns and beams, whether routed exposed, concealed above suspended ceiling or in concrete slabs.
- D. Conduits shall not be placed closer than 12 inches to a flue, parallel hot water, steam line or other heat producing source or three inches from such lines when crossing perpendicular to the runs.
- E. Exposed conduit installation shall not encroach into the ceiling height headroom of walkways, or doorways. Where possible, install horizontal raceway runs above water and below steam piping.
- F. The largest trade size conduits in concrete floor and wall slabs shall not exceed 1/3 the floor or wall thickness, and conduits shall be spaced a minimum of three conduit diameters apart unless otherwise noted on the Drawings. All conduits shall be installed in the center of concrete slabs or wall and shall not be placed between reinforcing steel and the bottom of floor slabs.
- G. In long runs of conduit, provide sufficient pull boxes inside buildings to facilitate pulling wires and cables, with spacing not to exceed 150 feet. Support pull boxes from structure independent of conduit supports. These pull boxes are not shown on the Drawings.
- H. Provide all reasonably inferred standard conduits fitting and products required to complete conduit installation to meet the intended application whether noted, shown, or specified in the contract documents or not.
- I. Connect recessed lighting fixtures to conduit runs with maximum six feet of flexible metal conduit.

**3.4 INSTALLATION**

- A. Install conduit in accordance with manufacturer's written instructions, as shown on drawings and as specified herein.
- B. Minimum Conduit Size: Unless otherwise noted herein or on Drawings, minimum conduit size shall be 3/4" for interior applications and 3/4" for exterior and underground applications.
- C. All conduit sizes shown on the drawings are sized for copper conductors with THHN/THWN insulation. If conductor type or size is changed the contractor shall be responsible for resizing conduits upward to meet Code.
- D. Except in electrical, communication and mechanical rooms, conduit connections to motors and surface cabinets shall be concealed unless exposed work is clearly called for on the Drawings.
- E. Install conduits in complete runs before pulling in cables or wires.
- F. Install conduit free from dented, bruises or deformations. Remove and replace any damaged conduits with new undamaged material.
- G. Conduits shall be well protected and tightly covered during construction using metallic bushings and bushing "pennies" to seal open ends.
- H. In making joints in rigid steel conduit, ream conduit smooth after cutting and threading. Coat all field-threaded joints with UL approved conductive type compound

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to insure low resistance ground continuity through conduit, and to prevent seizing and corrosion.

- I. Clean any conduit in which moisture or any foreign matter has collected before pulling in conductors. Paint all field-threaded joints to prevent corrosion.
- J. In all empty conduits or ducts, install a polyethylene pulling rope.
- K. Conduit systems shall be mechanically and electrically continuous throughout. Install code size, insulated, copper, green-grounding conductors in all conduit runs for branch circuits and feeders. This conductor is not shown on the Drawings. Refer to Section 29 05 26: Grounding and Bonding.
- L. Metallic conduit shall not be in contact with other dissimilar metal pipes (i.e. plumbing).
- M. Make bends with standard conduit bending hand tool or machines. The use of any item not specifically designed for the bending of electrical conduit is strictly prohibited.
- N. A run of conduit between terminations at wire pulling points shall not contain more than the equivalent of four quarter bends (360 degrees, total).

**3.5 PENETRATIONS**

- A. Locate penetrations and holes in advance where they are proposed in the structural sections such as footings, beams, wall, etc. Penetrations are acceptable only when the following occurs:
  - 1. Where shown on the structural drawings.
  - 2. As approved by the Structural Engineer and The Division Of State Architect (DSA) prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
- B. Cutting or holes:
  - 1. Cut holes through concrete, masonry block or brick floors and floors of structure with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Structural Engineer as required by limited working space. Obtain the approval of the Structural Engineer prior to drilling through structural sections.
  - 2. Provide sleeves or "can outs" for cast-in-place concrete floors and walls. Following conduit installation, seal all penetrations using non-iron bearing, chloride free, non-shrinking, dry-pack grouting compounds; or fire rated penetration-sealing materials.
  - 3. Cut holes for conduit penetrations through non-concrete and non-masonry walls, partitions, or floors with a hole saw. The hole shall be only as large as required to accommodate the size of the conduit.
  - 4. Provide single piece escutcheon plates around all exposed conduit penetrations in public places.
- C. Sealing:

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1. Non-rated penetrations: Pack opening around conduits with non-flammable insulating material and seal with gypsum wallboard taping compound.
2. Fire stop: Where conduits, wireways, and other electrical raceways pass through fire rated partitions, walls, smoke partitions, or floor; install a UL classified fire stop material to provide an effective barrier against the spread of fire, smoke and gases. Completely fill and seal clearances between raceways and openings with the fire stop material.

**3.6 TERMINATIONS AND JOINTS**

- A. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings except as otherwise indicated.
- B. Raceways shall be joined using specified couplings or transition couplings where dissimilar raceway systems are joined.
- C. Conduits shall be securely fastened to cabinets, boxes and gutters using two locknuts and an insulating bushing or specified insulated connectors. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors. Install grounding bushings or bonding jumpers on all conduits terminating at concentric or eccentric knockouts.
- D. Conduit terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using specified connectors and hubs.
- E. Stub-up connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; flexible metal conduit may be used 6 inches above the floor. Where equipment connections are not made under this contract, install screwdriver operated threaded flush plugs with floor.
- F. Install specified cable sealing bushings on all conduits originating outside the building walls and terminating in switchgear, cabinets or gutters inside the building. Install cable sealing bushings or raceway seal for conduit terminations in all grade level or below grade exterior pull, junction or outlet boxes.
- G. Install expansion couplings where any conduit crosses a building separation or expansion joint as follows:
  1. Conduits three inches and larger, shall be rigidly secured to the building structure on opposite sides of a building expansion joint, and provided with expansion or deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.
  2. Conduits smaller than three inches shall be rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint. Connect conduits to junction boxes with 15 inches of slack flexible conduit. Flexible conduit shall have a copper green ground-bonding jumper installed. For concrete embedded conduit, use expansion and deflection couplings as specified above for three inches and larger conduits.

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- H. Use short length (maximum of 6ft) of the appropriate FMC or LFMC conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission. Provide liquidtight flexible metal conduit for installation in exterior locations, moisture or humidity-laden atmosphere, corrosive atmosphere, water hose or spray wash-down operations, and locations subject to seepage or dripping of oil, grease or water. Provide a green ground wire with FMC or LFMC conduit.

**3.7 SUPPORTS**

- A. Provide supports for raceways as specified in Section 26 05 29: Electrical Hangers and Supports.
- B. All raceways systems shall be secured to building structures using specified fasteners, clamps and hangers spaced according to the NEC.
- C. Support single runs of conduit using one-hole pipe straps. Where run horizontally on walls in damp or wet locations, install "clamp backs" to space conduit off the surface.
- D. Multiple conduit runs shall be supported using "trapeze" hangers fabricated from specified construction channel, mounted to 3/8-inch diameter, threaded steel rods secured to building structures. Fasten conduit to construction channel with standard one-hole pipe clamps or the equivalent. Provide lateral seismic bracing for hangers.
- E. Individual 3/4" conduits installed above suspended ceilings may be attached to the ceiling's hanger wire using spring steel support clips provided that not more than two conduits are attached to any single support wire.
- F. Support exposed vertical conduit runs at each floor level, independent of cabinets or switches to which they run, by means of acceptable supports.
- G. Fasteners and supports in solid masonry and concrete:
  - 1. Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
  - 2. After concrete installation:
    - a. Steel expansion anchors not less than 1/4 inch bolt size and not less than 1-1/8 inch embedment.
    - b. Power set fasteners not less than 1/4 inch diameter with depth of penetration not less than three inches.
    - c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.
- H. Hollow masonry: Toggle bolts are permitted. Bolts supported only by masonry block are not acceptable.
- I. Metal structures: Use machine screw fasteners or other devices specifically designed and approved for the application.

**- END OF SECTION -**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
  - 1. Wall and ceiling outlet boxes.
  - 2. Pull and junction boxes.
- B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.
  - 1. Division 08: Access doors. Wall and ceiling access doors.

**1.2 REFERENCES**

- A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified.
  - 1. American National Standards Institute/National Electrical Manufacturer Association:
    - ANSI/NEMA OS-1; Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
    - ANSI/NEMA OS-2; Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
    - NEMA 250; Enclosures for Electrical Equipment (1000 volts maximum).
  - 2. Underwriters Laboratories (UL):
    - UL 50; Enclosures for Electrical Equipment.
    - UL 514A; Metallic Outlet Boxes.
    - UL 1773; Termination Boxes.

**1.3 SUBMITTALS**

- A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:
  - 1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
  - 2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
  - 3. Submit Manufacturer's installation instructions.

**1.4 QUALITY ASSURANCE**



**BOXES**  
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- A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.
- B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.
  - 1. Outlet and junction boxes:
    - a. Spring City Electrical Manufacturing Co.
    - b. Thomas & Betts Corp.
    - c. Raco, Inc.
- B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

**2.2 OUTLET BOXES**

- A. Standard outlet box:
  - 1. Provide galvanized, one-piece die formed or drawn steel, knockout type box of size and configuration best suited to the application indicated on the Drawings.
  - 2. 4-inch square by 2-1/8 inch deep shall be minimum box size.
  - 3. ANSI/NEMA OS 1.
- B. Cast metal outlet body:
  - 1. Provide four inch round, galvanized cast iron alloy with threaded hubs and mounting lugs as required.
  - 2. Provide boxes with cast cover plates of the same material as the box and neoprene cover gaskets.
- C. Conduit outlet body: Provide Cadmium plated cast iron alloy, oblong conduit outlet bodies with threaded conduit hubs and neoprene gasket, cast iron covers.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Contractor shall thoroughly examine Project site conditions for acceptance of box installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

**3.2 PREPARATION**

- A. Install all outlet boxes flush with building walls, ceilings and floors except where boxes are installed in mechanical and electrical rooms, in cabinetry, above accessible ceilings or where exposed Work is called for on the Drawings.

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- B. Install outlet boxes at the locations and elevations indicated on the Drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.
- C. Locate switch outlet boxes on the latch side of doorways unless otherwise indicated.
- D. Locate outlet boxes above hung ceilings having concealed suspension systems, adjacent to openings for removable recessed lighting fixtures.
- E. Do not install outlet boxes back-to-back, separate boxes by at least 6". In fire rated walls separate boxes by at least 24" and wall stud.

**3.3 INSTALLATION**

- A. Install boxes in accordance with Manufacturer's written instructions, as indicated on Drawings and as specified herein.
- B. Locate electrical boxes as indicated on Drawings and as required for splices, taps, wire pulling, equipment connections and Code compliance.
- C. Install junction or pullboxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not indicated on the Drawings.
- D. Install raised covers (plaster rings) on all outlet boxes in stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.
- E. Leave no unused openings in any box. Install close-up plugs as required to seal openings.
- F. Provide an access panel in permanent ceiling or wall where boxes are installed and will be inaccessible.
- G. For boxes mounted in exterior walls, make sure that there is insulation behind outlet boxes to prevent condensation in boxes.
- H. For outlets mounted above counters, benches or backsplashes, coordinate location and mounting heights with built-in units. Adjust mounting height to agree with required location for equipment served.
- I. Use conduit outlet bodies to facilitate pulling of conductors or to make changes in conduit direction only. Do not make splices in conduit outlet bodies.
- J. Add additional sheet rock as necessary to maintain original fire rating of walls where boxes are installed.
- K. Install galvanized steel coverplates on boxes in unfinished areas, above accessible ceilings and on surface mounted outlets.

**3.4 SUPPORTS**

- A. Provide boxes installed in metal stud walls with brackets designed for attaching directly to the studs or mount boxes on specified box supports.

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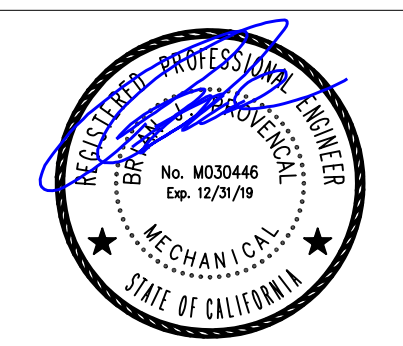
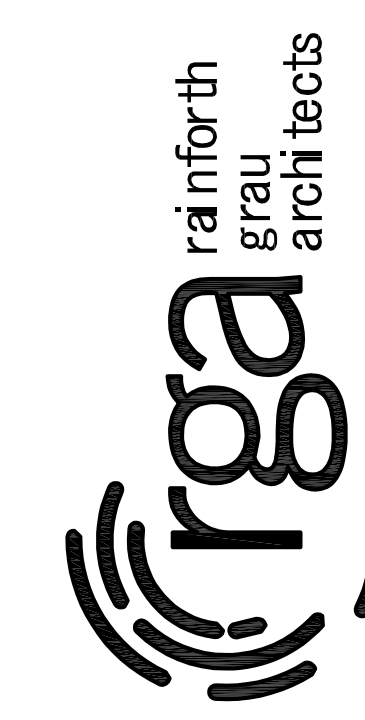
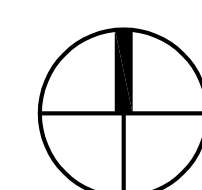
- B. Mount boxes, installed in suspended ceilings of gypsum board or lath and plaster construction, to 16 gauge metal channel bars attached to main ceiling runners.
- C. Support boxes independently of conduit system.
- D. Support boxes, installed in suspended ceilings supporting acoustical tiles or panels, directly from the structure above wherever pendant mounted lighting fixtures are to be installed from the box.
- E. Support boxes, mounted above suspended acoustical tile ceilings, directly from the structure above.

**- END OF SECTION -**





**A** OVERALL MECHANICAL FLOOR PLAN  
SCALE: 1/16" = 1'-0"



<b>TURLEY &amp; ASSOCIATES</b>		<b>MECHANICAL ENGINEERING GROUP, INC.</b>	
2437 Capital Avenue Sacramento, CA 95818		PH: 916-325-1000 FX: 916-325-1075 Email: office@turleyandassociates.com	
Project Engineer	DP	Job Number	02220
Project Manager	DP	Estimate/Quote No.	19-1379
Project Director	DC	Scale	1/16" = 1'-0"

ARC STUDENT WELLNESS CENTER

1	ADDENDUM 1	8-30-2019
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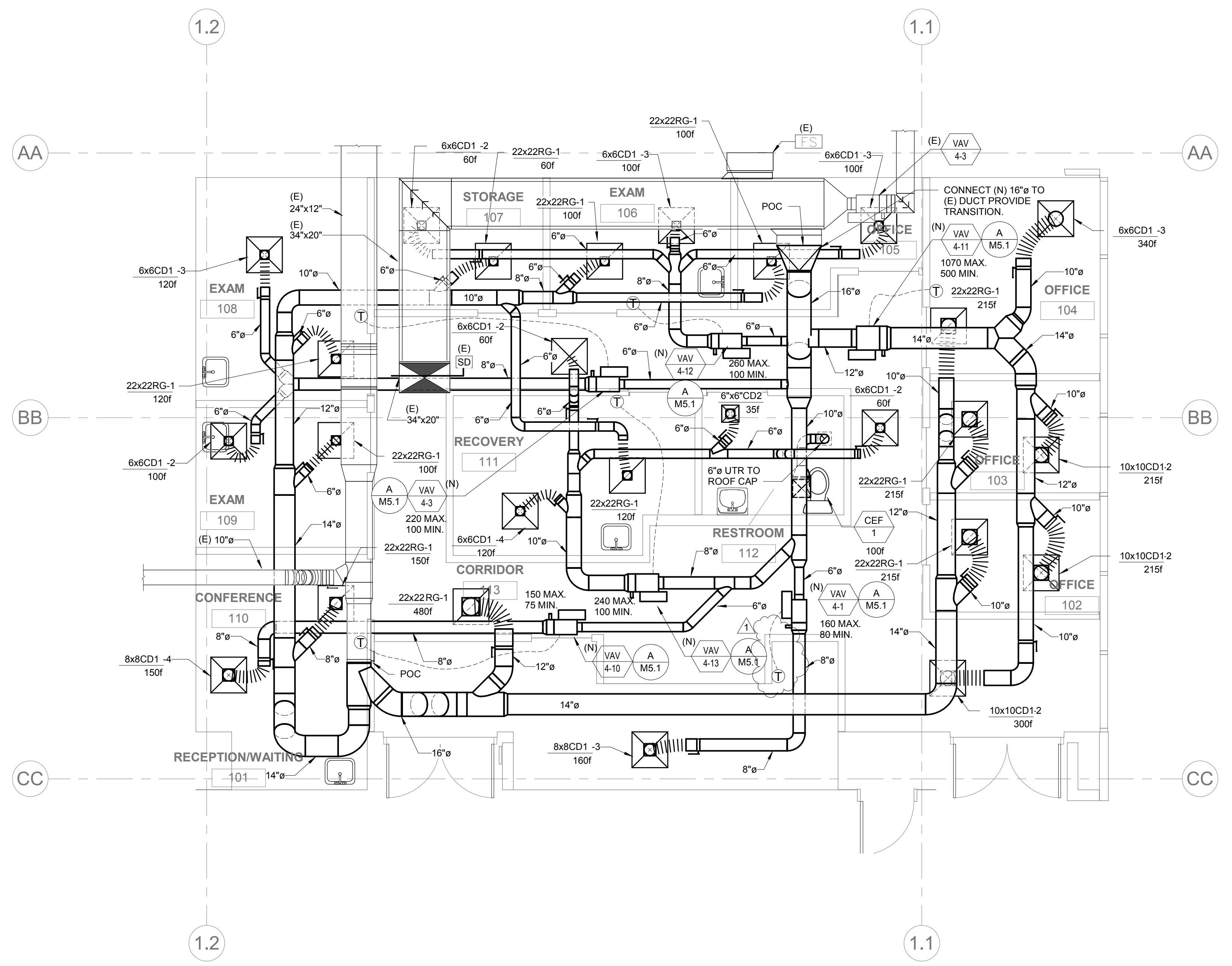
**OVERALL MECHANICAL FLOOR PLAN**

PROJECT NO.	19-1379
DATE:	4/19/07
SHEET	<b>AD1-M1.0</b>



**TURLEY & ASSOCIATES** MECHANICAL ENGINEERING GROUP, INC.  
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Project Engineer	BP	Job Number	18338
Project Manager	BP	Disc Code	
Project Designer	DC	Log#	



**A MECHANICAL FLOOR PLAN**  
SCALE: 1/4" = 1'-0"

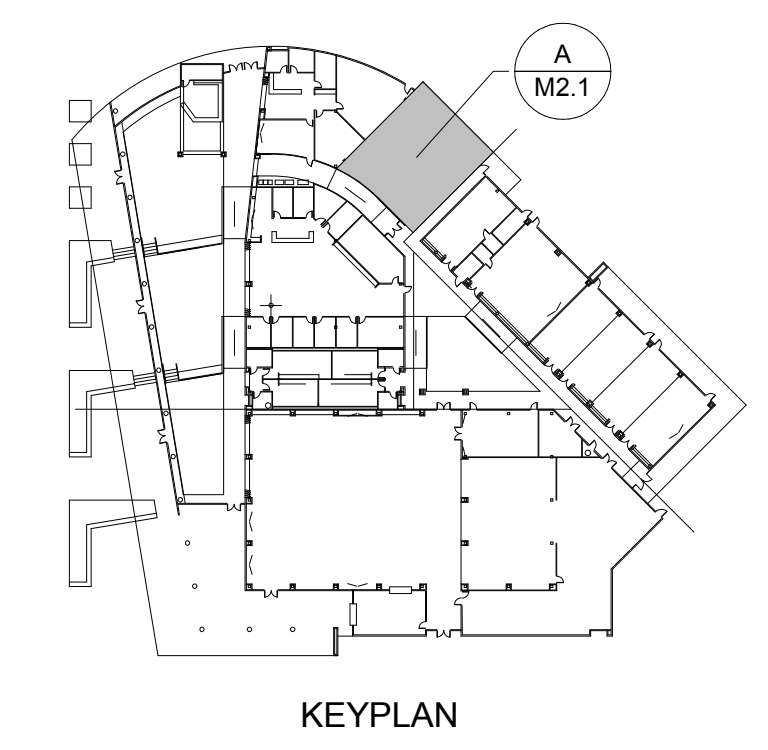


ARC STUDENT WELLNESS CENTER

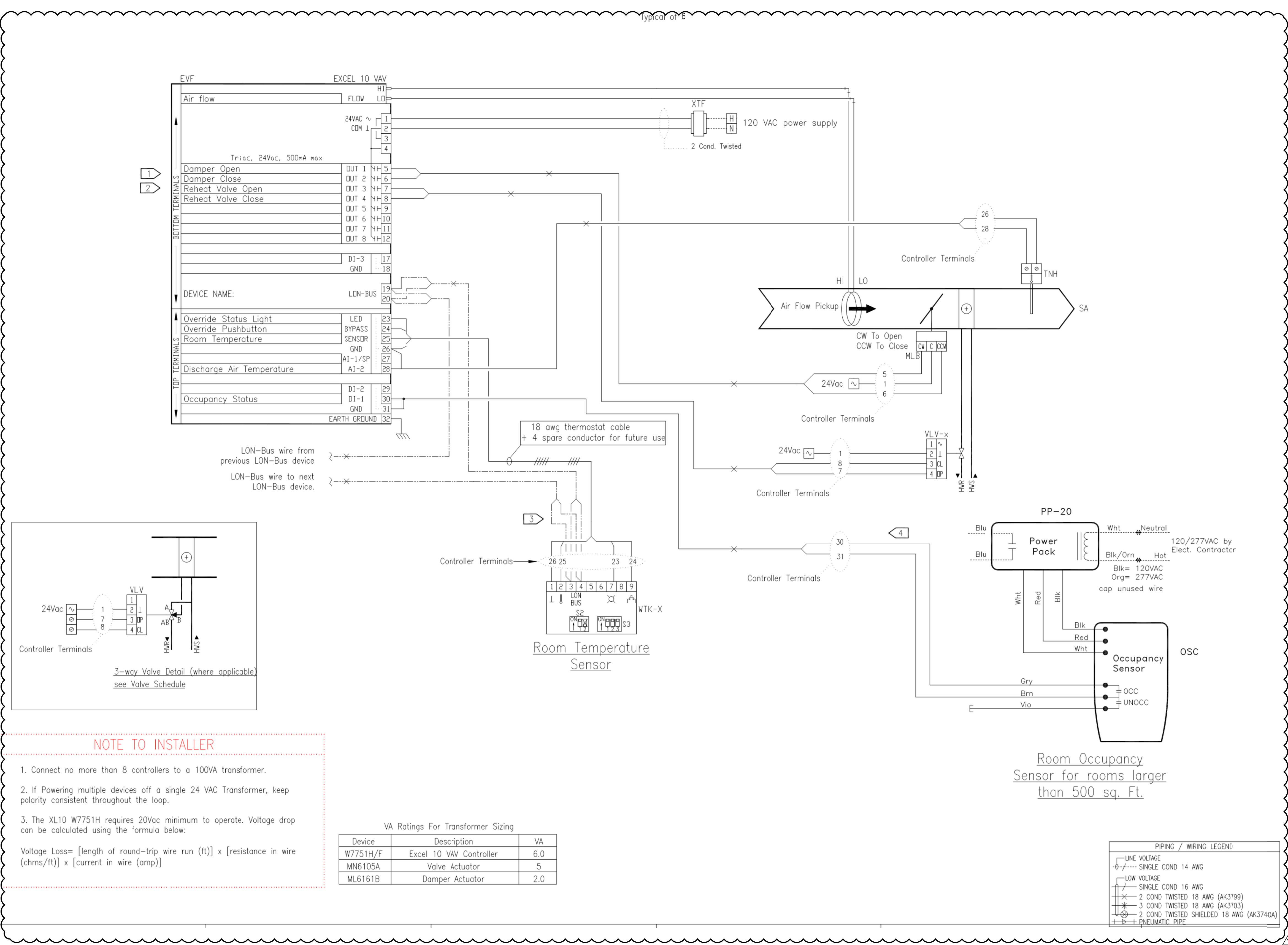
Revision		
1	ADDENDUM 1	8-30-2019

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**MECHANICAL FLOOR PLAN**



PROJECT NO. 18-1379  
DATE: 4/19/07  
SHEET **AD1-M2.1**



**NOTE TO INSTALLER**

1. Connect no more than 8 controllers to a 100VA transformer.
2. If Powering multiple devices off a single 24 VAC Transformer, keep polarity consistent throughout the loop.
3. The XL10 W7751H requires 20vac minimum to operate. Voltage drop can be calculated using the formula below:

Voltage Loss = [length of round-trip wire run (ft)] x [resistance in wire (chms/ft)] x [current in wire (amp)]

VA Ratings For Transformer Sizing

Device	Description	VA
W7751H/F	Excel 10 VAV Controller	6.0
MN6105A	Valve Actuator	5
ML6161B	Damper Actuator	2.0

PIPING / WIRING LEGEND

—	LINE VOLTAGE
—	SINGLE COND 14 AWG
—	LOW VOLTAGE
—	SINGLE COND 16 AWG
—	2 COND TWISTED 18 AWG (AK3799)
—	3 COND TWISTED 18 AWG (AK3703)
—	2 COND TWISTED SHIELDED 18 AWG (AK3740A)
—	PNEUMATIC PIPING

**ZONE GROUP MODE (ZNGRPMODE):**  
THE VAV SHALL BE IN OCCUPIED, UNOCCUPIED, SETBACK, SETUP, WARM-UP, COOL-DOWN MODES BASED ON THE ASSOCIATED AHU MODE.

**ZONE TEMPERATURE SET POINTS:**  
THE VAV SHALL MAINTAIN THE FOLLOWING SET POINTS IN OCCUPIED AND UN-OCCUPIED MODES:

Mode	HEATING SET POINT	COOLING SET POINT
OCCUPIED MODE	69°F (ADJ.)	77°F (ADJ.)
UNOCCUPIED MODE	60°F (ADJ.)	80°F (ADJ.)

WHEN THE BOX IS IN COOL DOWN AND WARM UP MODES AS INDICATED BY ITS ASSOCIATED AHU, THE VAV WILL CONTROL TO OCCUPIED SET POINTS. WHEN THE BOX IS IN WARM UP MODE AND HEATING IS REQUIRED, THE BOX WILL DIRECTLY BE TRIGGERED INTO 2ND STAGE HEATING. THE AIRFLOW SET POINT WILL BE SET TO THE MAXIMUM HEATING SET POINT AND THE DISCHARGE AIR TEMPERATURE SET POINT WILL BE SET TO THE MAXIMUM DISCHARGE AIR TEMPERATURE SET POINT.

**OCCUPANT ADJUSTMENT (RMSPKNB, RMSPMODEL):**  
THE OCCUPANT WILL BE ALLOWED TO CHANGE THE ZONE TEMPERATURE SET POINT FROM 68°F - 76°F. THIS WILL SHIFT THE COOLING AND HEATING SET POINTS ACCORDING TO THE DEAD BAND BETWEEN THEM.

DURING UNOCCUPIED MODE, THE OCCUPANT WILL BE ALLOWED TO PUT THE VAV IN BYPASS MODE FOR 60MIN. FOR THIS PERIOD OF TIME THE VAV WILL OPERATE AS IF IN OCCUPIED MODE.

**DEMAND LIMIT LEVEL (DMDLMTVL):**  
THE VAV SHALL ADJUST THE ABOVE ZONE TEMPERATURE SET POINTS, BASED ON THE DEMAND LIMIT LEVEL DETERMINED BY THE ASSOCIATE AHU CONTROLLER.

**COOLING DEMAND LIMIT SET POINT ADJUSTMENT:**  
THE ACTIVE COOLING SET POINTS FOR ALL ZONES SHALL BE INCREASED WHEN A DEMAND LIMIT IS IMPOSED ON THE ASSOCIATED ZONE GROUP.

1. AT DEMAND LIMIT LEVEL 1, INCREASE SET POINT BY 1°F.
2. AT DEMAND LIMIT LEVEL 2, INCREASE SET POINT BY 2°F.

**HEATING DEMAND LIMIT SET POINT ADJUSTMENT:**  
THE ACTIVE HEATING SET POINTS FOR ALL ZONES SHALL BE DECREASED WHEN A DEMAND LIMIT IS IMPOSED ON THE ASSOCIATED ZONE GROUP.

1. AT DEMAND LIMIT LEVEL 1, DECREASE SET POINT BY 1°F.
2. AT DEMAND LIMIT LEVEL 2, DECREASE SET POINT BY 2°F.

**AIRFLOW SET POINTS:**  
THE VAV SHALL HAVE THE FOLLOWING AIR FLOW SET POINTS.

1. ZONE MAXIMUM COOLING AIRFLOW SET POINT AS SHOWN IN VAV SCHEDULE, MAXAIRFLOWSP.
2. ZONE MINIMUM COOLING AIRFLOW SET POINT AS SHOWN IN VAV SCHEDULE, MINAIRFLOWSP.
3. ZONE MAXIMUM HEATING AIRFLOW SET POINT AS SHOWN IN VAV SCHEDULE, HTGAIRFLOWSP.

**TEMPERATURE CONTROL MODE (EFFCNTRLMODE):**  
THE VAV CONTROL MODE IS DETERMINED BY THE ZONE TEMPERATURE. IF THE ZONE TEMPERATURE IS BELOW THE HEATING SET POINT, THE BOX IS IN HEATING MODE. IF THE ZONE TEMPERATURE IS ABOVE THE COOLING SET POINT, THE BOX IS IN COOLING MODE. WHEN THE ZONE TEMPERATURE IS BETWEEN THE HEATING AND COOLING SET POINTS, THE BOX WILL BE IN DEAD BAND MODE.

**CO2 CONTROL (CO2, EFFAIRFLOWSP, DMPR):**  
DURING OCCUPIED MODE, A PROPORTIONAL CONTROL LOOP WILL BE USED TO MAINTAIN THE SPACE CO2 CONCENTRATION AT 1000PPM. IF THE CO2 LEVEL IS 800PPM THIS LOOP WILL OUTPUT 0%. IF THE CO2 LEVEL IS 1000PPM THIS LOOP WILL OUTPUT 100%. THE AIRFLOW SET POINT FOR THE VAV DAMPER SHALL BE RESET SUCH THAT IF THE OUTPUT IS 0% THE AIRFLOW SET POINT WILL BE THE LOW VENT RATE (SEE SCHEDULE). IF THE OUTPUT IS GREATER OR EQUAL TO 50% THE AIRFLOW SET POINT WILL BE THE HIGH VENT RATE (SEE SCHEDULE).

**DAMPER CONTROL (EFFAIRFLOWSP, DMPR):**  
WHEN THE VAV IS IN COOLING MODE, THE DAMPER SHALL MODULATE BETWEEN THE MINIMUM AND MAXIMUM COOLING AIRFLOW SET POINTS TO SATISFY ZONE TEMPERATURE REQUIREMENTS.

IF THE DISCHARGE AIR TEMPERATURE FROM THE ASSOCIATED AIR HANDLER IS GREATER THAN THE ROOM TEMPERATURE, DAMPER SHALL MAINTAIN MINIMUM COOLING AIRFLOW SET POINT.

WHEN THE IN THE DEAD BAND MODES, THE DAMPER SHALL MAINTAIN THE MINIMUM AIRFLOW SET POINT.

WHEN THE VAV IS IN HEATING MODE, THE BOX WILL GO THROUGH 2 STAGES OF HEATING AS PER THE FOLLOWING LOGIC:

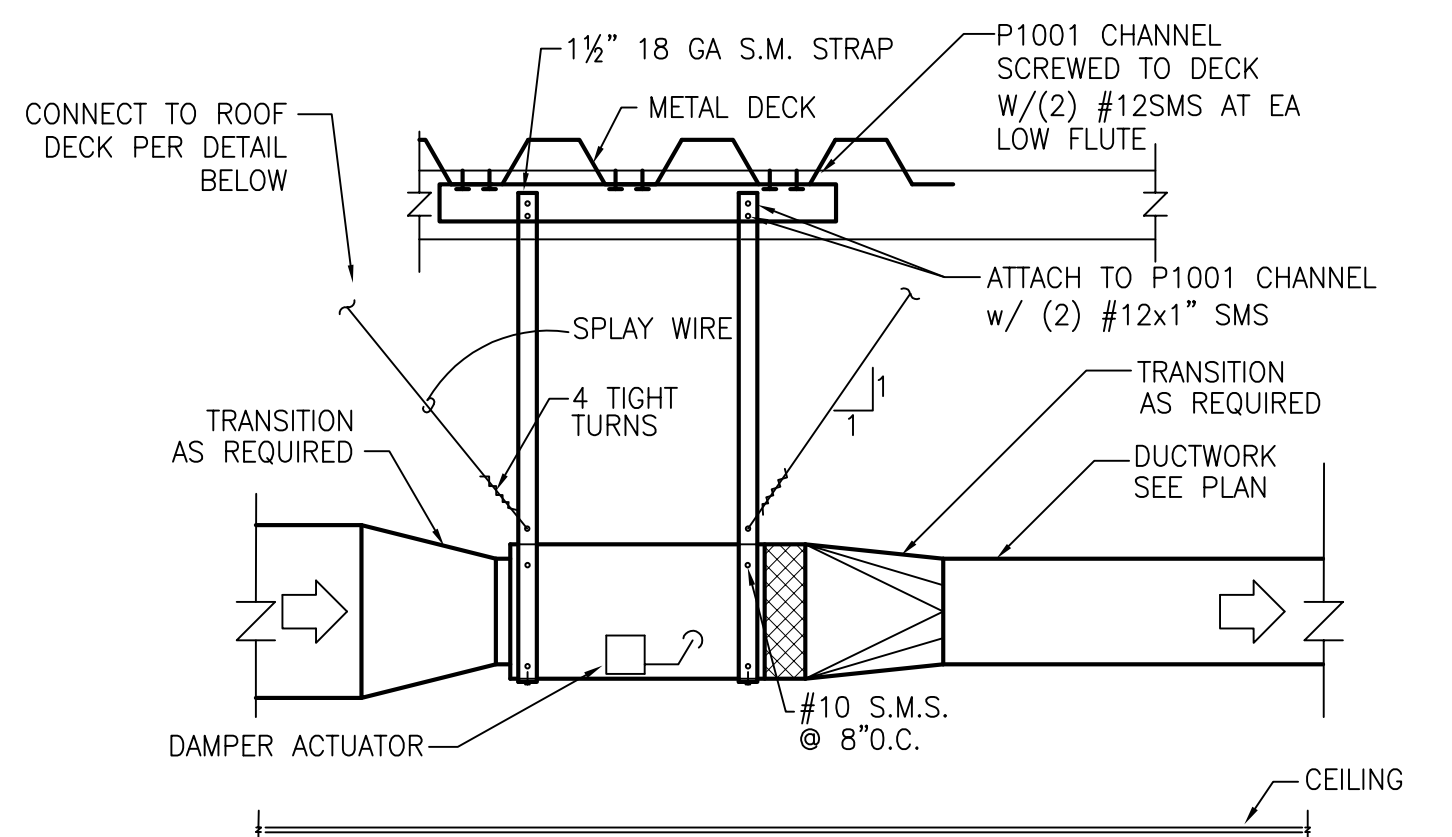
1. 1ST STAGE HEATING:
  - A. THE VAV DAMPER SHALL MAINTAIN MINIMUM COOLING AIRFLOW SET POINT.
2. 2ND STAGE HEATING:
  - A. THE VAV DAMPER SHALL MODULATE TO THE MAXIMUM HEATING AIRFLOW SET POINT.

**HEATING VALVE CONTROL: (EFFDATEMPSP, RHVLV)**  
THE HEATING VALVE WILL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SET POINT WHICH IS DETERMINED BY THE 2 STAGES OF HEATING AS PER THE FOLLOWING LOGIC:

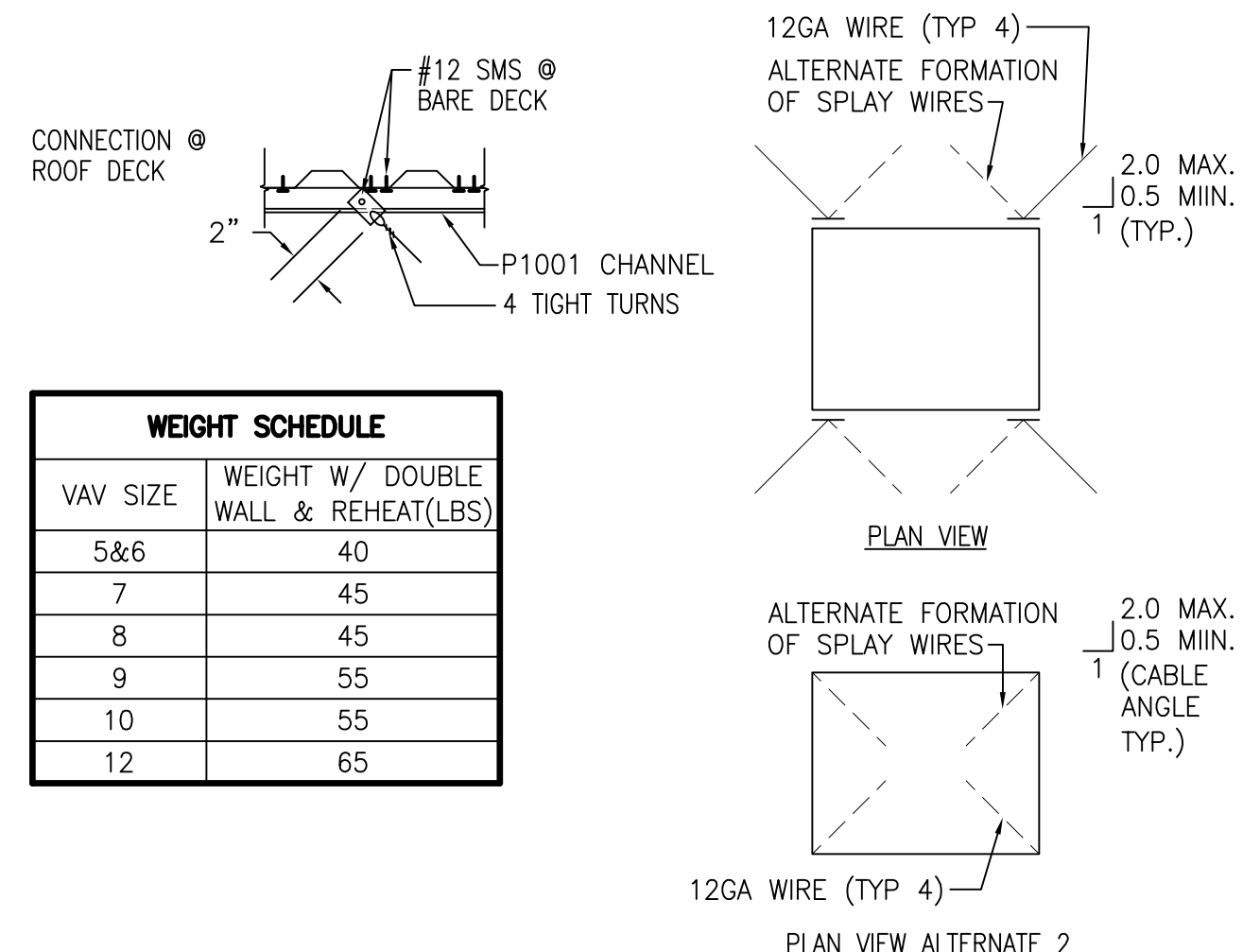
1. 1ST STAGE HEATING:
  - A. THE REHEAT CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN DISCHARGE AIR TEMPERATURE (DAT) SET POINT OF 80°F INITIALLY.
  - B. THE DAT SET POINT WILL BE RESET UP BY TRIM AND RESPOND METHOD. IF THE ZONE TEMPERATURE SET POINT IS NOT MET FOR 10MIN, THE DAT SET POINT WILL BE RESET UP BY 5°F. THE SET POINT WILL BE RESET UP TO A MAXIMUM OF 95°F (ADJ.). IF THE ZONE TEMPERATURE IS SATISFIED, THE HEATING VALVE CAN BE CLOSED AND THE SYSTEM SHOULD BE IN THE DEAD BAND MODE.
2. 2ND STAGE HEATING:
  - A. IF DAT IS MAINTAINED AT SET POINT OF 95°F (ADJ.) AND THE ZONE TEMPERATURE IS NOT AT SET POINT FOR MORE THAN 5MIN, THE VAV DAMPER SHALL MODULATE FROM MINIMUM TO MAXIMUM HEATING AIR FLOW SET POINT TO MEET THE ROOM TEMPERATURE SET POINT. IF ROOM TEMPERATURE IS SATISFIED, THE HEATING VALVE CAN BE CLOSED AND THE SYSTEM SHOULD BE IN THE DEAD BAND MODE.

**SYSTEM REQUESTS:**  
THE VAV BOX WILL SEND COOLING AND HEATING REQUESTS TO THE ASSOCIATED AHU CONTROLLER BASED ON THE ZONE COOLING PID OUTPUT AND ZONE TEMPERATURE. THE VAV BOX WILL SEND PRESSURE REQUESTS TO THE ASSOCIATED AHU BASED ON THE DAMPER PID AND BOX AIRFLOW. THIS IS BASED ON THE FOLLOWING LOGIC:

1. COOLING SAT RESET REQUEST (CLGRSTREQ):
  - A. IF THE COOLING PID IS LESS THAN 85%, NO REQUESTS ARE SENT.
  - B. IF THE COOLING PID IS GREATER THAN 95%, 1 REQUEST IS SENT.
2. STATIC PRESSURE RESET REQUEST (PRESRSTREQ):
  - A. IF THE DAMPER PID IS LESS THAN 85%, NO REQUESTS ARE SENT.
  - B. IF THE DAMPER PID IS GREATER THAN 95%, 1 REQUEST IS SENT.
3. HEATING HWST RESET REQUEST (HWSTRSTREQ):
  - A. IF THE HOT WATER VALVE PID IS LESS THAN 85%, NO REQUESTS ARE SENT.
  - B. IF THE HOT WATER VALVE PID IS GREATER THAN 95%, 1 REQUEST IS SENT.



NOTES:  
1. KEEP UNIT AS HIGH AS POSSIBLE



**ROOF DECK VAV BOX MOUNTING DETAIL**

NO SCALE

**VAV CONTROL DETAIL**

NO SCALE