



UConn Health Building C Renovation

Addendum 4

Revision #1: February 25, 2016

The following revisions are to be included in the Bid Documents dated December 10, 2015 for the above project. This addendum includes:

- 1 Page of summary text
- 1 Drawing dated 2/23/16
- 9 Specification Pages dated 2/23/16

Item	Description – Changes to Documents	Page 1 of 1
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Drawings Volume #4

- 1.1 E-5.0.1 Reduced Feeder Sizes.

Specifications Volume #3

- 2.1 General Deleted all references to LEED.
- 2.2 264110 Deleted Lightning Protected System in its entirety.
- 2.3 260530 Substituted insulation types XHHW and XHHW-2 for THHN.
- 2.4 260530 Allowed EMT use for 480 and 208 Volt Feeders.
- 2.5 260530 Allowed set screws in lieu of compression type.
- 2.6 262010 Included Siemens as an acceptable manufacturer.
- 2.7 262010 Deleted IR view ports on fusible switchboards.
- 2.8 265010 Allowed the use of Tie-wire for fixture hanging.

Bid Package 26- Electrical

Clarification:

- a. Per drawing E7.0.1, schedules for 125 amps and above for normal feeders only shall be aluminum conductors as indicated. The base bid shall reflect costs for aluminum not copper. Delete note # 2 in its entirety on drawing E7.0.0.
- b. Contractor to include 120 lineal feet for the conduit ductbank that shall connect building C to the Tower. The route shall run outside of the existing MRI building footprint (shown to be removed July 2016). Please refer to revised drawing E-5.0.1 for the number of conduits required.

DIVISION 26

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264110	LIGHTNING PROTECTION SYSTEM
264310	SURGE PROTECTIVE DEVICES
265010	LIGHTING FIXTURES

~~7. Each components of the cable assembly shall contain less than 300 ppm of lead, and shall meet the requirements of LEED for Healthcare MR Credit 4.2.~~

B. Manufacturers

1. Southwire
2. Cerro
3. Encore
4. Service Wire

C. References

1. All wiring shall conform to the National Electrical Code for construction and use.
2. Wiring in hot locations and for recessed fixtures shall have heat-resistant insulations recognized by NEC such as RHH, etc.
3. Conductor type THHW shall meet or exceed the following:
 - a. ASTM B-3 or B-8
 - b. UL
 - c. UL listed as type THHW
4. Conductor types THWN shall meet or exceed the following:
 - a. ASTM B-3 or B-8
 - b. UL Standard 83
 - c. UL listed as type THWN
5. Conductor type XHHW shall meet or exceed the following:
 - a. ASTM B-3 or B-8
 - b. UL 44
 - c. UL listed as type XHHW
6. Conductor type XHHW-2 shall meet or exceed the following:
 - a. ASTM B-3 or B-8
 - b. UL 44
 - c. UL listed as type XHHW-2

D. Insulation types for all conductors shall be as follows:

Description	Location		
	Dry	Damp	Wet
Interior branch circuits #6 AWG and smaller	THHW	THWN	THWN
Interior branch circuits larger than #6 AWG	XHHW THHN	XHHW THHN	XHHW-2 THHN
Interior feeders	XHHW THHN	XHHW/THHN	XHHW-2 THHN
Exterior feeder and exterior branch circuit wiring	XHHW-2 THHN	XHHW-2 THHN	XHHW-2 THHN
Feeders connected to 100% rated circuit breakers	XHHW-2	XHHW-2	XHHW-2

E. Color Coding

1. Color coding of conductors shall match the Owners color coding standard. If no standard color coding system exists, use the following:

208/120 Volts			480/277 Volts		
A Phase	-	Black	A Phase	-	Brown
B Phase	-	Red	B Phase	-	Orange
C Phase	-	Blue	C Phase	-	Yellow
Neutral	-	White	Neutral	-	Grey
Ground	-	Green	Ground	-	Green with Yellow Stripe
Isolated Ground	-	Green with Orange Stripe			

2. Color coding shall be continuous on insulation for all conductors. For conductors larger than #6 where continuous color coding is not available, each conductor shall be marked with color tape at all connections and in all pull, junction and outlet boxes.
3. For 120 volt and 277 volt single phase circuits, Electrical Contractor shall provide additional identification to identify each neutral conductor with its associated phase conductor in all pull, junction and outlet boxes.

2.04 CONDUCTORS, ALUMINUM – 600 VOLTS

- A. All feeder wiring 125 amps and larger shall be manufactured of aluminum, rated at 600 volts, single conductor.
- B. Minimum size shall be 2/0kcMIL.
- C. Wire and cable feeders operating between 50 and 600 volts shall be compact stranded of an 8000 Series aluminum alloy with 600 volt rated insulation.
- D. All wiring shall be installed in conduit.
- E. References
 1. All wiring shall conform to the National Electrical Code for construction and use.
 2. Conductors shall be Type XHHW-2 and shall meet or exceed the following:
 - a. ICEA S-95-658
 - b. NEMA WC-70
 - c. UL 44
 - d. UL listed as type ~~XHHW-2~~XHHW
 - e. Federal Specification A-A-59544

F. Insulation

1. Insulation types for all conductors shall be ~~XHHW-2~~XHHW.

- E. Models 315-325-340-360-400-410-425-475-500-525-575-600 shall incorporate an integral recess known as a "Hex Nut Interlock" designed to accommodate commercially available fasteners to insure proper thread engagement for the class and service of metal hardware. All pressure plates shall have a permanent identification of the manufacturer's name molded into it.
- F. All fasteners shall be sized according to latest Link-Seal® modular seal technical data. Bolts, flange hex nuts shall be:
 - 1. Mild Steel with a 60,000 psi minimum tensile strength and 2-part Zinc Dichromate coating per ASTM B-633 and Organic Coating, tested in accordance with ASTM B-117 to pass a 1,470 hour salt spray test.
- G. Provide Model WS steel sleeves at all wall and floor penetrations. Sleeves shall be Schedule 40 and have integrally water stop sized having a minimum of two inches larger than the outside diameter of the sleeve itself and allowing 1/2" movement between wall forms to resist pour forces.
 - 1. Each sleeve assembly shall have end caps installed at each end of the sleeve so as to prevent deformation during the initial concrete pour, and to facilitate attaching the sleeve to the wall forms. End caps shall remain in place to protect the opening from residual debris and rodent entry prior to pipe insertion.
- H. Conduit penetration seal components and systems shall be domestically manufactured at a plant with a current ISO-9001:2000 registration. Copy of ISO-9001:2000 registrations shall be a submittal item.

2.06 METALLIC CONDUIT

A. General

- 1. Raceways for feeders and branch circuits shall be metallic, rigid metal conduit, intermediate metal conduit (IMC) or electrical metallic tubing (EMT) subject to the restrictions of the National Electrical Code, minimum of 3/4".

B. Electrical Metallic Tubing (EMT)

- 1. EMT shall be permitted for both exposed and concealed work.
- 2. EMT shall not be permitted:
 - a. Where subject to physical damage, including mechanical equipment rooms below 10'-0" AFF.
 - b. In corrosive areas.
 - c. In cinder block construction.
 - d. In hazardous (classified) locations.
 - e. ~~For 480-volt and 208-volt feeders.~~
- 3. Fittings shall be steel compression-set screw type.

C. Intermediate Metal Conduit (IMC)

- 1. IMC shall be permitted under all conditions subject to the restrictions of the National Electrical Code.
- 2. IMC shall not be permitted for non-concrete encased medium voltage feeders.

F. Coordination

1. Coordinate work specified in this section with work provided under other electrical work and the work of other trades.
2. Determine required separation between cable and other work.
3. Determine cable routing to avoid interference with other work.

G. Manufacturer

1. Pentair Thermal Management/Pyrotenax System 1850 2-hour fire rated.

H. Mineral-Insulated Metal-Sheathed Cable

1. Description: ANSI/NFPA 70, Type MI
2. Conductor: Copper
3. Insulation Voltage Rating: 600 volts.
4. Cable Temperature Rating:
 - a. 60 degrees C. for conductors rated 125 amperes and below.
 - b. 75 degrees C. for conductors rated 126 amperes and above.
5. Termination Temp. Rating:
 - a. 60 degrees C. for conductors rated 125 amperes and below.
 - b. 75 degrees C. for conductors rated 126 amperes and above.
6. Insulation Material: Magnesium oxide refractory mineral.
7. Metal-sheath Material: Seamless soft-drawn copper.
8. Fire Rating: Cable assembly, including factory splices and supports shall have a 2 hour fire rating as listed and classified by Underwriters Laboratories, Inc.
9. Overjacket: None required; or PVC if cable is directly buried.
10. Cable sheath shall be marked with conductor size, voltage and UL fire resistant classification number.
- ~~11. Each component of the cable assembly shall contain less than 300 ppm of lead, and shall meet the requirements of LEED for Healthcare MR-Credit 4.2.~~

I. Wiring Connectors And Terminations

1. Cable Termination:
 - a. Pentair Thermal Management/Pyrotenax Model Quick-Term, Installation Sheet 638. Where solid rated lugs are used, approved terminations for this termination shall be provided.
2. Lug Connection for solid copper conductor:
 - a. ILSCO Model Lo-250: #1 AWG through 250 kcMIL
 - b. ILSCO Model CRA-300: 350 kcMIL
 - c. ILSCO Model CRA-400: 500 kcMIL

4. Turns-ratio test results should not deviate more than one-half percent from either the adjacent coils or the calculated ratio.
5. C_H and C_L dissipation-factor/power-factor values will vary due to support insulators and bus work utilized on dry transformers. The following should be expected on C_{HL} power factors:
 - a. Power Transformers: two percent or less
 - b. Distribution Transformers: five percent or less
6. Consult transformer manufacturer's or test equipment manufacturer's data for additional information.
7. If winding-resistance test results vary more than one percent from adjacent windings, consult manufacturer.
8. Typical excitation current test data pattern for three-legged core transformer is two similar current readings and one lower current reading.
9. If core insulation resistance is less than one megohm at 500 volts dc, consult manufacturer.
10. AC overpotential test shall not exceed 75 percent of factory test voltage for one minute duration. DC overpotential test shall not exceed 100 percent of the factory RMS test voltage for one minute duration. The insulation shall withstand the overpotential test voltage applied.

3.02 CABLES - 600 VOLT, 60 AMPERES AND ABOVE

A. Visual and Mechanical Inspection

1. Compare cable data with drawings and specifications.
2. Inspect exposed sections of cables for physical damage and correct connection in accordance with single-line diagram.
3. Verify tightness of accessible bolted connections by calibrated torque wrench in accordance with manufacturer's published data.
4. Inspect compression-applied connectors for correct cable match and indentation.
5. Verify cable color coding with applicable engineer's specifications and National Electrical Code standards.

B. Electrical Tests

1. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential to be 1000 volts dc for one minute.
2. Perform continuity test to insure correct cable connection.

C. Test Values

1. Bolt-torque levels shall be in accordance with manufacturers published data and **recorded**.
2. Minimum insulation-resistance values shall be not less than 50 megohms.
3. Investigate deviations between adjacent phases.

3.03 METAL-ENCLOSED BUSWAYS

A. Visual and Mechanical Inspection

1. Compare equipment nameplate data with drawings and specifications.

- F. The low voltage distribution equipment shall be split into shipping groups for handling as directed by the Electrical Subcontractor or as the manufacturer's limitations dictate. Shipping groups shall be designed to be shipped by truck, rail or ship. Shipping groups shall be bolted to skids. Accessories shall be packaged and shipped separately. Each switchgear shipping group shall be equipped with lifting eyes for handling solely by crane.
- G. The low voltage distribution equipment being stored prior to installation shall be stored so as to maintain the equipment in a clean and dry condition. If stored outdoors, indoor gear shall be covered and heated, and outdoor gear shall be heated.

1.09 ACCEPTABLE MANUFACTURERS

- A. Eaton
- B. General Electric
- C. Square D
- D. Siemens

1.10 SELECTIVE COORDINATION

- A. The emergency distribution system, the elevator distribution system and the fire pump distribution system shall be selectively coordinated to meet the requirements of the National Electrical Code, Articles 620.62, 700.28, and 701.27 and NFPA 20.
- B. For system reliability, the entire normal distribution system shall be coordinated down to 0.10 seconds to the extent practicable.
- C. The switchgear manufacturer shall be responsible to select appropriate overcurrent protective device, fuse and/or circuit breaker frame, sensor and trip sizes for all devices upstream of other devices for a completely coordinated system. Refer to specification 26 0570 for additional information.

1.11 WITHSTAND AND INTERRUPTING RATINGS OF ELECTRICAL COMPONENTS

- A. Calculated available 3 phase and single phase to ground short circuit currents indicated on the drawings are provided for information only to assist in the selection of withstand and interrupting ratings and coordination of devices and equipment.
- B. Prior to submission of shop drawings, the manufacturer shall perform short circuit calculations in accordance with specification section 26 0570 to determine actual available 3 phase and single line to ground short circuit current at each component in the system based on actual equipment, feeder lengths, impedances, etc. of the equipment proposed for this project. Failure to perform the study prior to submission of shop drawings shall not relieve the manufacturer from providing devices that meet the requirements of the final study report.
- C. Each component shall be UL listed and labeled and shall be fully rated to withstand and interrupt calculated available 3 phase and single phase to ground short circuit current levels. Series ratings will not be acceptable.

Switches shall incorporate safety cover interlocks to prevent opening the cover with the switch in the "ON" position or prevent placing the switch in the "ON" position with the cover open. Provide defaeter for authorized personnel. Handles shall have provisions for padlocking and shall clearly indicate the "ON" or "OFF" position. Front cover doors shall be padlockable in the closed position.

2. The 400 through 1200 ampere switches shall be designed to accommodate UL listed shunt trip. Where shown on the drawings, furnish the following accessories:
 - a. UL listed 120 volt AC shunt trip.
 - b. Zero sequence ground protection system including test panel. Ground fault relay shall include separate time and current pick-up adjustments.

~~G. Provide IR view ports for the cable to terminal connections for all fuse compartments in switchboards and large distribution panelboards. View ports shall be round and manufactured by Fluke, Iriss or approved equal. Three inch or four inch shall be provided. The view ports shall be installed at the factory by the equipment manufacturer. The environmental rating of the IR ports shall be equal to or higher than that of the enclosure and must be installed per manufacturer's instructions. In order to allow for proper installation of the view ports, spacing between the feeder breakers may need to be adjusted.~~

H.G. Miscellaneous Devices

1. Each section of the switchboard shall be provided with a space heater thermostatically controlled. Power for the space heaters shall be obtained from a control power transformer within the switchboard. Supply voltage shall be 120 volts AC. Space heaters shall be wired to provide temporary heating during storage.
2. Control power transformers with primary and secondary protection shall be provided as required for proper operation of the equipment.[Control power transformers shall have adequate capacity to supply power to the transformer cooling fans.

I.H. Customer Metering

1. Provide customer metering devices as specified herein. Provide a separate customer metering compartment with front hinged door. Include associated instrument transformers.
2. Current transformers shall be wired to shorting type terminal blocks.
3. Provide potential transformers including primary and secondary fuses with disconnecting means or fused potential taps as the potential source for metering as required.
4. Microprocessor-based metering system.
 - a. Provide a full function electronic meter on all low voltage main devices as indicated on the drawings. The meter shall have the features and functions specified below. The meter shall be UL recognized, CSA certified and also meet ANSI Standard C37.90.
 - b. The meter shall provide direct reading metered or calculated values of the items listed below and shall auto range between Units, Kilo-units, and Mega-units for all metered values. Accuracy indicated below to be of read or calculated values.
 - 1) AC Current (Amperes) in A, B, and C phase, 3 Phase Average and Neutral (N). Accuracy +/- 0.2% (provide phase and neutral current transformer).
 - 2) AC Voltage (Volts) for A-B, B-C, and C-A, Phase Average, A-N, B-N, and C-N and Average Phase to N. Accuracy +/-0.2%.

Where reference to channel supports is made under "Lighting Fixtures" paragraph of this Section, the maximum length of span shall be 10'-0". If longer spans are required, the size and wall thickness of the steel channel support shall be as specifically approved by the Engineer.

B. Lighting Fixtures

1. Furnish, assemble, hang and connect all lighting fixtures. Lighting fixtures shall be as indicated on the drawings.
2. Install each fixture properly and safely. Provide hangers, ~~rods,~~ tie-wire mounting brackets, supports, frames, yokes, support bars and any other equipment required for a complete installation. ~~Refer to Section 260510 for Hangers and Supports.~~
3. Lay-in recessed fixtures in grid type ceilings shall be supported from the underside of roof or floor slab, and utilize hanger ~~tie-wire,~~ as indicated in Section 260510, with attachments to building construction independent of other systems. All fluorescent fixtures shall have a minimum of (2) hangers ~~wire supports~~ and all incandescent fixtures shall have at least one hanger ~~wire support~~. ~~Hanger wire will not be acceptable.~~
4. All lighting fixtures shall be supported from the slab above and shall not be suspended from ducts, piping, equipment, ceiling support system, etc.
5. Where continuous rows of lighting fixtures are installed (pendant mounted), the Electrical Contractor shall furnish and install appropriate mounting channels to properly align fixtures. Use Kindorf or Unistrut channels.
6. Before ordering fixtures, the Electrical Contractor shall verify with the Construction Manager the type of ceilings which shall be used in the various spaces.
7. Coordinate fixture locations and mounting heights with Architectural plans, reflected ceiling plans and other reference data prior to installation.
8. Do not scale electrical drawings for exact location of the lighting fixtures. Consult the architectural reflected ceiling plans for the proper locations of lighting fixtures.
9. Prior to fabrication and submittal of shop drawings, check for adequate headroom and non-interference with other equipment such as ducts, pipes or openings.
10. Pendant or surface mounted fixtures shall be provided with required mounting devices and accessories, including hickeys, stud extensions, ball aligners, canopies and stems. Locations of fixtures in mechanical areas shall be coordinated with the Mechanical Contractor. Mounting stems of pendant fixtures shall be of the correct length to uniformly maintain the fixture heights shown on the drawings. Variation in mounting individual fixtures shall not exceed 1/4 inch. Height shall not vary more than 1/2 inch from the floor mounting height shown on the drawings. Fixtures hung in continuous runs shall be installed absolutely level and in line with each other. Hanging devices shall comply with Code requirements. Use single stem hangers (double stem hangers shall not be acceptable). Threaded rods shall be used to support lighting fixtures in those spaces where no other means of support is attainable, and only if fixtures are installed absolutely level with no looseness for movement, and only if approved by Code.
11. Rigidly align continuous rows of lighting fixtures for true in-line appearance, subject to Architect's approval.
12. Install pendant lighting fixtures plumb and at a height from the floor as specified or indicated on the drawings. In cases where conditions make this impractical, refer to the Architect and install as directed. Use ball aligners and canopies on pendant fixtures unless noted otherwise.
13. Do not install fixtures and/or parts such as finishing plates and trims for recessed fixtures until all plastering and painting that may mar fittings finish has been completed.
14. Housings shall be rigidly installed and adjusted to a neat flush fit with the ceiling or other finished mounting surface.
15. The housings of recessed lighting fixtures shall be adequately protected during installation.

