HANSEN HALL – LEVEL 300/400 RENOVATIONS PACKAGE



CONSTRUCTION

# SECTION 260533 - CONDUIT

## PART 1 - GENERAL

- 1.1 WORK INCLUDES
  - A. Base and Alternate Bids:
    - 1. Contractor Provide:
      - a. Metal conduit.
      - b. Flexible metal conduit.
      - c. Liquid tight flexible metal conduit.
      - d. Electrical metallic tubing.
      - e. Nonmetal conduit.
      - f. Fittings and conduit bodies.
      - g. Surface Raceway
      - h. Fire seal of all conduit passing through fire partitions.
      - i. Moisture seal all conduit passing through exterior walls, floor slab and roof.

### 1.2 RELATED SECTIONS

- A. Section 260534 Boxes.
- B. Section 260526 Grounding and Bonding.
- C. Section 260529 Supporting Devices.
- D. Section 260553 Electrical Identification.

### 1.3 REFERENCES

- A. ANSI C80.1 Rigid Steel Conduit, Zinc Coated.
- B. ANSI C80.3 Electrical Metallic Tubing, Zinc Coated.
- C. ANSI C80.5 Rigid Aluminum Conduit.
- D. ANSI/NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- E. ANSI/NFPA 70 National Electrical Code, 2005 edition.
- F. NEMA TC 2 Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
- G. NEMA TC 3 PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- H. NEMA TC 13 Electrical Non Metallic Tubing.

HANSEN HALL – LEVEL 300/400 RENOVATIONS PACKAGE

- 1.4 DESIGN REQUIREMENTS
  - A. Conduit Size: ANSI/NFPA 70.

## 1.5 SUBMITTALS

A. Submittals for approval by the engineer are not required for this section except as indicated below. Un-requested submittals will not be processed or reviewed. Non-requirement of submittals is not to be construed as an allowance for substitutions and does not relieve the contractor from full compliance with the plans and specifications.

## 1.6 PROJECT RECORD DOCUMENTS

- A. Accurately record actual routing of conduits 2" and larger.
- B. Accurately record all conduit serving parking lot lighting, landscape lighting, building façade lighting and sign lighting.

## 1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by UL as suitable for purpose specified and shown.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Accept conduit on site. Inspect for damage.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Protect PVC conduit from sunlight.

## 1.9 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

# PART 2 - PRODUCTS

HANSEN HALL – LEVEL 300/400 RENOVATIONS PACKAGE

# 2.1 CONDUIT REQUIREMENTS

- A. Minimum Size: 3/4 inch unless otherwise specified.
- B. Underground Installations:
  - 1. More than Five (5) Feet from Foundation Wall: Use thick wall nonmetallic conduit.
  - 2. Within Five (5) Feet from Foundation Wall: Use rigid steel conduit.
  - 3. Under Slab on Grade: Use thick wall nonmetallic conduit.
  - 4. Minimum Size: 1 inch unless otherwise specified.
- C. Outdoor Locations, Above Grade: Use rigid steel conduit.
- D. Wet and Damp Locations Above Grade: Use rigid steel conduit.
- E. Dry Locations:
  - 1. Concealed: Use electrical metallic tubing or MC Cable, refer to 260519.
  - 2. Exposed: Use electrical metallic tubing, except in the following locations or where prone to damage:
    - a. Mechanical C121
    - b. Fire Pump C124
    - c. Props B141
    - d. Chairs B136
- 2.2 METAL CONDUIT
  - A. Rigid Steel Conduit: ANSI C80.1.
  - B. Intermediate Metal Conduit (IMC): Rigid steel.
  - C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel or malleable iron.

### 2.3 FLEXIBLE METAL CONDUIT

- A. Description: Interlocked steel construction.
- B. Fittings: ANSI/NEMA FB 1.
- 2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT
  - A. Description: Interlocked steel construction with PVC jacket.
  - B. Fittings: ANSI/NEMA FB 1.
- 2.5 ELECTRICAL METALLIC TUBING (EMT)
  - A. Description: ANSI C80.3; galvanized tubing.
  - B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel compression type.

HANSEN HALL – LEVEL 300/400 RENOVATIONS PACKAGE

- 2.6 NONMETALLIC CONDUIT
  - A. Description: NEMA TC 2; Schedule 40 PVC.
  - B. Fittings and Conduit Bodies: NEMA TC 3.

## 2.7 SURFACE RACEWAY

- A. Listing and Labeling: Surface raceways shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Manufacturers:
  - 1. Wiremold / Legrand 4000 Series.
  - 2. Approved equivalent by Panduit Corp.
- C. Dual Channel Surface Metal Raceways: Dual channel Galvanized steel with snap-on covers complying with UL 5. Color to be gray. Full line of fittings must be available in same color as raceway.
  - 1. Color: Grey
- D. Single channel raceways: 2-piece, steel complying with UL5.
  1. Color: Standard paintable surface.

## 2.8 SEALING

- A. Fire Seal
  - 1. Seal penetrations of fire-rated walls, floors or ceilings by raceways for compliance with NEC 300-21. Fill void around raceway. Use heavy wall steel pipe sleeves, anchored to building construction and finished plumb with wall ceiling or floor lines. Acceptable products:
    - a. Spec-Seal SSS
    - b. T & B Flamesafe
    - c. 3M Fire Barrier
  - 2. Smoke and fire stop fittings may be used in lieu of sealant. Acceptable products:
    - a. OZ-Gedney, series CFS
- B. Water Seal
  - 1. Seal penetrations of perimeter walls or floors below grade to prevent entry of water. Use materials compatible with wall or floor construction and approved by Architect/Engineer. Use pre-manufactured fittings.
  - 2. Seal penetrations of roof with flashing compatible with roof design and approved by Roofing System Manufacturer and Architect/Engineer.

#### 2.9 SUPPORTING DEVICES

- A. Suspended conduits less than 1 inch.
  - 1. For exposed construction, provide strap type hangers supported from beam clamps or threaded rods. Hangers manufactured by Minerallac, Midwest Electric, Crouse-Hinds, T &

HANSEN HALL – LEVEL 300/400 RENOVATIONS PACKAGE

B or B-Line are acceptable.

- 2. For conduits suspended above ceilings, anchor to building structural steel. When span exceeds NEC limits, provide channel steel between framing members. Tie wiring of conduit to air ducts, structural steel, piping or other elements not permitted. Plumber's perforated strap not permitted. Do not attach conduit to ceiling support wires.
- B. Suspended Conduit 1 inch or larger
  - 1. Provide threaded rod with U- type hangers for single conduit.
  - 2. Provide trapeze hanger assemblies with Unistrut, Husky, Kindorf or B-Line strut and threaded rod for two or more conduits. Anchor conduits to hanger assembly with split pipe clamps.
  - 3. Anchor threaded rod to inserts in concrete or beam clamps on steel structure.
- C. Surface Mounted Conduit
  - 1. Provide one-hole galvanized steel straps for conduits one inch or less manufactured by Appleton, Steel City, B-Line or Raco. Provide clamp backs on exterior walls below grade or in wet areas.
  - 2. For conduit larger than one inch and all exterior surfaces, use galvanized, malleable iron pipe straps.
  - 3. For multiple conduits, provide channel anchored to wall with conduit attached to channel with split pipe clamps. Provide space for 25% additional conduits.

# PART 3 - EXECUTION

## 3.1 INTERFERENCES

- A. Coordinate work with other contractors so that interference between piping, equipment, structural and electrical work will be avoided.
- B. If interference develops, Architect/Engineer will decide which equipment will be relocated; regardless of which apparatus was installed first.

## 3.2 INSTALLATION

- A. Install all conduit routed below floor within rock base of slab. No conduit shall be run in the slab.
- B. Install nonmetallic conduit in accordance with manufacturer's instructions. Nonmetallic conduits, fittings and accessories shall be of same manufacturer.
- C. Arrange supports to prevent misalignment during wiring installation.
- D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- E. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- F. Fasten conduit supports to building structure and surfaces under provisions of Section 260529.

HANSEN HALL – LEVEL 300/400 RENOVATIONS PACKAGE

Supports shall meet seismic requirements.

- G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports
- H. Do not attach conduit to ceiling support wires.
- I. Arrange conduit to maintain headroom and present neat appearance.
- J. Route exposed conduit parallel and perpendicular to walls.
- K. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- L. Route conduit under slab from point-to-point.
- M. Maintain adequate clearance between conduit and piping.
- N. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- O. Cut conduit square using saw or pipe-cutter; de-burr cut ends.
- P. Bring conduit to shoulder of fittings; fasten securely.
- Q. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- R. Use conduit hubs or sealing lock nuts to fasten conduit to sheet metal boxes in damp and wet locations.
- S. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate or factory elbows for bends in metal conduit larger than 2 inch size.
- T. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- U. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- V. Provide suitable pull-string in each empty conduit except sleeves and nipples.
- W. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- X. Ground and bond conduit under provisions of Section 260526.
- Y. Identify conduit under provisions of Section 260553.
- Z. For conduits larger than 1", a Rigid Steel Conduit elbow will be required when penetrating the floor slab. For 1" and smaller PVC elbows will be allowable.

HANSEN HALL – LEVEL 300/400 RENOVATIONS PACKAGE

# 3.3 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements.
- B. Route conduit through roof openings for ductwork or through suitable roof jack with pitch pocket.
- C. Install conduits to preserve moisture barriers of partitions and other elements.

# END OF SECTION 260533