SECTION 26 05 43 – UNDERGROUND ELECTRICAL WORK

PART 1 - GENERAL

3.1. SUMMARY:
   A. This section details general requirements for underground electrical infrastructure.
   B. Related Sections:
      1. Section 01701 - Building Systems Identification and Labeling
      2. Section 26 00 10 – Electrical Design Criteria

3.2. QUALITY ASSURANCE:
   A. The Engineer of Record is responsible for designing underground raceway system in accordance with applicable portions of NFPA 70 Codes and per good engineering practices.
   B. Electrical components, devices, and accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

3.3. GENERAL REQUIREMENTS:
   A. Underground ducts shall be PVC schedule 40 minimum.
   B. Primary ductbanks, defined as multiple-duct pathways for medium-voltage and low-voltage power feeders, and Telecommunications circuit runs between buildings, shall be nominally sized as 5” ducts.
   C. Primary Telecommunications ductbanks shall contain a minimum of three ducts: (2) 5” telecommunications ducts and (1) 2” Fire Alarm duct.
   D. All primary ductbanks shall contain at least one spare duct; ductbanks shall contain a minimum of two conduits.
   E. Primary electrical power and telecommunications ductbanks shall be concrete-encased.
   F. Primary electrical power ductbanks to include a # 2/0 AWG bare copper grounding conductor, bonded to the grounds within each intermediate manhole and handhole.

3.4. UNDERGROUND RACEWAY APPLICATIONS:
   A. Application - Provide the following installation methods as a minimum for secondary ducts and raceways, defined as individual circuits and raceways. Raceway size shall be minimum 1”.
      1. Electrical Circuits over 600 volts: concrete-encased ducts, 5” minimum.
      2. Building Electric service-entrance conductors: concrete-encased ducts, 4” minimum.
      4. 480/277 volt and 208/120 volt branch circuits: direct-buried PVC Schedule 40 raceways, except under roadways and parking lots.
5. Site lighting circuits: direct-buried PVC Schedule 40 raceways, except under roadways and parking lots.
7. Site lighting circuits, Fire Alarm, Telecommunications, Security circuits and CATV Services under parking lots and roadways: PVC Schedule 80 raceways.
8. Exterior conduit risers and sweeps from underground to ten feet above ground: rigid steel conduit.

3.5. MANHOLES AND HANDHOLES:
   A. Manholes and handholes shall be precast concrete, rated for Class H-20 wheel loading in accordance with AASHTO-HS-20-44 Standard Specifications for Highway Bridges.
   B. Manholes and Handholes shall include knockout access holes in all sides, pulling/lift supports, sump pit, vertical embedded continuous slot inserts; manholes to include access ladder rungs.
   C. Minimum nominal inside dimensions: Manholes: 7'-0" H x 8'-0" W x 8'-0L, Handholes 2'-9" H x 3'-2" W x 4'-6" L, or as otherwise required.
   D. Frames and covers: Heavy-duty cast iron with machined bearing surfaces suitable for truck loading. Frame and cover shall provide at least 30" opening. Covers shall be indented, solid top. Label covers with “ELECTRIC” or “TELEPHONE”, as appropriate.
   E. Hardware shall be galvanized steel. Cable racks shall be heavy-duty with adjustable arms, and free-moving plastic saddle insulators. Provide pulling-in irons opposite initial conduit openings.

PART 2 – PRODUCTS
   Not Used.

PART 3 - EXECUTION:

3.1. DUCTBANK and UNDERGROUND RACEWAY INSTALLATION:
   A. Ductbanks shall be laid to a minimum grade of four inches (100mm) per one hundred feet (30m). Grade (pitch) may be from one manhole to the next, or both ways from a high point between manholes, depending on contour of the finish grade, so that all ducts shall drain water out into the manholes. Ensure no water egress into building by sloping conduits entering building down away from building.
   B. Direct buried conduits and cables shall be installed with a minimum cover of 24 inches.
   C. Conduit bushings shall be used where direct buried cables enter raceway system.
   D. Backfill: Fine select backfill, devoid of decomposable material.
E. Provide detectable polyethylene/metallic warning tape twelve inches above the entire length of underground raceway and cables, including under buildings.

F. Provide expansion fitting on risers from underground to compensate for any lifting or settling due to frost heaves.

G. Spare raceways shall be plugged and sealed watertight at all manholes, handholes, buildings, and structures.

H. Raceways with cables installed within shall be sealed watertight and gastight with appropriate fitting.

I. Seal between raceways and wall or floor where raceways enter the building using appropriate fittings.

J. Ductbanks and raceways crossing over pipelines or under areas subject to high vehicular traffic shall be installed with steel rebar-reinforced concrete encasement.

3.2. MANHOLE AND HANDHOLE INSTALLATION:

A. Manholes and Handholes shall be set on a bed of crushed stone.

B. Where raceways enter manholes, or handholes, terminate raceway with end bell set flush with wall. Seal manhole and handhole raceway openings to reduce water intrusion.

C. Provide brick or masonry chimney to raise opening of manhole or handhole up to finish grade level. The top of covers shall be flush with the finished surfaces.

D. Provide ground rod in each manhole and handhole: bond all exposed metal parts within as well as splice and cable termination grounds.

END OF SECTION