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BuildingName
The Description of the Project
P00000000 0000

SPECIFICATION DIVISION 26

NUMBER SECTION DESCRIPTION

DIVISION 26 ELECTRICAL
SECTION 260543 - UNDERGROUND SERVICES FOR ELECTRICAL SYSTEMS

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DIVISION 26 ELECTRICAL
SECTION 260543 - UNDERGROUND SERVICES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

INCLUDE PARAGRAPH 1.1.A AND B IN EVERY SPECIFICATION SECTION. EDIT RELATED SECTIONS 1.1.B TO MAKE IT PROJECT SPECIFIC.

A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections, in particular the Related Sections listed below, apply to this Section.

B. Related Sections:

1. Section 260513 - Medium, Low & Control Voltage Cables
2. Section 260526 - Grounding and Bonding for Electrical
3. Section 260533 - Electrical Materials and Methods

1.2 SUMMARY

A. Provide concrete encased duct banks with manholes and pullholes for medium voltage primary cables and telecommunications/data cables. Provide direct buried ducts and handholes for secondary power cables and site lighting cables.

1.3 DUCT BANK REQUIREMENTS

A. Ducts for concrete encased duct banks shall be Type DB PVC conduits with matching fittings except where galvanized rigid steel conduits and fittings are shown.

B. Ducts for direct burial underground shall be Schedule 40 PVC with matching fittings.

1.4 MANHOLE REQUIREMENTS

A. Manholes shall be precast or cast in place reinforced concrete. Primary manholes shall have inside dimensions of 10’ wide by 10’ long by 7’ high. Communications manholes shall have inside dimensions of 6’ wide by 12’ long by 7’ high.

B. Manholes shall include a cast iron frame with cover, a hot dipped galvanized steel ladder, hot dipped galvanized pulling eyes embedded in the concrete walls opposite each duct entrance and in the floor beneath the cover, and a sealed indentation for use of a portable pump, offset to one side to clear pulling iron.

C. Primary manholes shall contain a minimum of 2 vertical stanchions on each wall. The stanchions shall be Underground Devices CR-36.

D. Primary manholes shall contain cable racks for routing cables between the duct openings. The racks shall be Underground Devices with 20” arms.

E. Telecommunications manholes shall include: 14-"47 Hole" racks, 7 on each long wall, 16-“B” brackets, 4 in each corner, and 24-“S” brackets in side walls.

PART 2 - PRODUCTS

2.1 DUCTS

A. PVC conduit and fittings for encasement in concrete shall be Type DB, UL Labeled for 90 degrees C cables. Carlon or Cantex.

B. PVC conduit and fittings for direct burial, concealed and exposed use shall be Schedule 40, UL Labeled for 90ºC cables. Carlon or Cantex.

C. Galvanized rigid steel conduit shall be hot dipped galvanized inside and outside, in 10’ lengths threaded on both ends. Allied, Republic Steel, Triangle PWC, Wheatland or Western Tube.

D. Steel Casing pipe shall be non-spiral pipe and have a minimum yield strength of 35,000 psi. All joints shall be made leak-proof using full penetration, continuous welds. Welds shall be ground smooth outside and inside (except 22" diameter and less) to prevent conflict with the soil or pipe placement. Steel pipe shall meet the requirements of ASTM A53, Type E or S, Grade B.

1. The following information shall be clearly marked on each length of pipe:
   a. The pipe designation and class (e.g., A53, Type S, Grade B).
   b. The name or trademark of the manufacturer.
   c. Identification of the manufacturing plant.
   d.
2. All pipe furnished shall be subject to inspection on arrival at the job site. The purpose of the inspection shall be to cull and reject pipe that, independent of physical tests specified under the standard specifications designated herein, fails to conform to the requirements of these specifications.
3.
4. 3. Rejected pipe shall be plainly marked by the Inspector and immediately removed from the site of the work by the Contractor, without cost to The University of Michigan.

2.2 MARKER STRIP

A. Marker strip shall be red plastic, 6” wide, and labeled to indicate type of service. Brady or Seaton.

PART 3 - EXECUTION

3.1 DUCT BANK INSTALLATION REQUIREMENTS

A. Concrete encased and direct buried ducts (except site lighting ducts) shall be 4” minimum.

B. Duct banks shall be supported on undisturbed soil or on piers extending down to undisturbed soil.

C. Changes in duct bank direction shall be made with 10’ minimum radius bends for telecommunications, and 20’ minimum radius bends for power. Manufactured sweeps are preferred.

D. Duct banks shall be sloped downward toward manholes and away from buildings a minimum of 6” per 100’. Duct banks shall not contain traps where water may accumulate.

E. End bells shall be installed on primary duct ends where the ducts enter the manholes and buildings. End bells shall be firmly embedded in and flush with the inside surface of the wall.

F. Pull a solid mandrel and a stiff bristled brush through each duct to clean them and insure the absence of kinks and flat spots. A minimum 3-1/4" diameter by 5" minimum long mandrel shall be used for 4" conduit and a minimum 4" diameter by 6" minimum long mandrel shall be used for 5" diameter conduit. The mandrel pull shall be witnessed by the Owner's Representative.

G. Direct buried a 3” thick minimum concrete cover shall protect ducts over the entire length and width of the duct bank.

H. Duct banks shall be marked with a 6” wide red plastic marker strip placed in the backfill approximately 12” above the entire length of the duct bank.

I. All ducts installed by this project shall contain measuring-type pull tape, Greenlee No. 435 or similar. The tape shall be waterproof polyester or nylon, printed with length measurements every foot to indicate the length of the duct, and have a minimum breaking strength of 130 lbs. A minimum of 60" of excess is required at both ends.

3.2 MANHOLE INSTALLATION REQUIREMENTS

A. Manholes shall be accessible by trucks, cable reel trailers and other cable pulling equipment.

B. Underground ducts shall be permanently identified in the manholes and at both ends with numbered tags. Tagging requirements shall be obtained from the Owner’s Electric Shop through the Owner’s Representative.

3.3 GROUNDING

A. Primary duct banks shall be grounded with a No. 4/0 AWG bare stranded copper ground wire that is run within the duct bank and is bonded and grounded at both ends. Conduit shall not be used as the ground conductor.

B. Primary manholes shall be grounded with four ¾" diameter by 10' long ground rods, one driven inside or outside of the manhole at each corner. Connect the ground rods with a No. 4/0 AWG bare, stranded copper ground wire loop. A No. 2 AWG bare stranded copper pigtail from the ground wire loop shall be used to bond together and ground the manhole cover frame, ladder support bracket, concrete inserts, metallic cable racks, duct bank ground conductors, and the shields of any primary cables that are spliced in the manhole.

3.4 FIELD QUALITY CONTROL

A. The University shall assign an agent to coordinate Quality Control associated with activities as outlined throughout Part 3, "Execution".

B. Contractor shall assist with establishing the order, timing, and duration of the activities requiring Quality Control for inclusion in the Project Schedule.

C. The electrical equipment and construction to be observed by the Quality Control Agent include the following:

1. Manholes
2. Spacers
3. Grounding
4. Bell Ends
5. Concrete Pours

D. Provide the Quality Control Agent with reports, lists, forms, plans and drawings described throughout Part 3, "Execution".

E. During the Shop Drawing Submittal Process, submit one set of the Shop Drawings to the Quality Control Agent for Review. Return to the Quality Control Agent one set of the A/E reviewed and stamped Shop Drawings.

F. Correct the incomplete and non-conforming items that are identified by the Quality Control Agent.

END OF SECTION 260543