26 05 41 - UTILITY DUCT BANKS

PART 1 – GENERAL

1.01 SECTION INCLUDES

   A. Concrete encased 12,470V or 4160V power duct banks where indicated on Contract Drawings.
   B. Communication duct banks where indicated on the Contract drawings.
   C. Trenching, concrete encasement and slurry backfill for all power and communications duct banks shall be required.

1.02 RELATED WORK SPECIFIED ELSEWHERE

   A. Excavating and backfilling for utilities: Section 02320.
   B. Concrete: Section 03 30 00.
   C. Manholes and Pullboxes: Section 16312
   D. Grounding: Section 26 05 26.
   E. Underground utilities marking: Section 02505.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

   A. Duct, fittings and spacers:
       1. Carlon, An Indian Head Co.
       2. Queen City Plastics, Inc.
       3. Robintech Inc.
       4. R & G Sloane Manufacturing Co. Inc.
       5. Allied Tube and Conduit.

2.02 MATERIAL AND FABRICATION

   A. PVC duct Schedule 40 (UL listed only): Manufactured in accord with NEMA Standard TC-2 and WC-1094 specifications.
       1. Cemented fittings.

3. Riser sweeps for power and communication ducts shall be rigid galvanized steel or Schedule 80 PVC.

4. Communications conduit shall be Class C Commercial Telephone Duct, 20 feet length, belled on one end, with high tensile strength and good impact qualities. Must conform to requirements for AT&T-8546 and GTE-8343 specifications.

B. Rigid steel conduit, elbows and nipples:
   1. Threaded, hot-dipped galvanized conduit manufactured in accord with ANSI C80.1 and UL 6.
   2. Threaded, hot-dipped galvanized fittings manufactured in accord with ANSI C80.4.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Excavate in accord with Section 02320.

B. Exercise care in excavating, trenching, and working near existing utilities. Hand dig around all energized, pressurized and active campus underground utility lines.

C. Installation of duct banks:
   1. Duct banks for primary electrical power and communication systems shall consist of multiple, single, round bore ducts. Ducts shall consist of PVC Schedule 40 conduits, UL approved only. All fittings and couplings shall be of the same type and manufacturer of the duct, with UL approval.
   2. Galvanized steel conduits installed below grade shall be painted with two coats of Koppers bitumastic paint before installing in ground.
   3. All conduit risers into switchgear pad, transformer pad, communication pull boxes or enclosures shall be rigid galvanized steel and have a radius of 60 in. minimum, unless indicated otherwise on Drawings.
   4. Concrete encased duct bank shall be completely encased in a minimum of 3 in. of concrete. Concrete shall be Class "B" red tint for high voltage power (6 lb. tint per cu. yd.), and Class "B" no tint for communication, 2500 psi at 28 days. Duct banks shall be of a monolithic construction top to bottom and side to side, but not necessarily end to end. All PVC duct shall be protected prior to installation.
5. Prefabricated, interlocking intermediate and base spacers for Schedule 40 PVC conduit shall be used, made of specification grade high-density polyethylene. Spacers shall be installed not more than 5 ft. center-to-center along entire length of duct bank. Each conduit shall be supported by spacers.

6. At connection to manholes, dowel concrete encasement with one No. 4 reinforcing bar 36 in. long per duct.

7. Duct banks shall be securely anchored to prevent movement during placement of concrete.

8. Where connection to bulkhead of duct bank is made to vaults or existing duct banks, the concrete encasement shall be doweled with one No. 4 reinforcement rod 36 in. long per conduit to the existing encasement.

9. Duct bank trench shall be shored, framed and braced for installing ducts. Frames, forms, and braces shall be either wood or steel. Variations in outside dimensions of the completed duct bank shall not exceed 2 in. on the vertical or the horizontal from dimensions shown on Drawings. Remove all forms and bracing after 24 hours and before backfilling.

10. Do not place backfill for a period of at least 24 hours after pouring of concrete. Backfill material shall be a concrete slurry mix to achieve 100% compaction and as shown on the plans.

11. Duct banks shall be laid to a minimum grade slope of 4 in. per 100 ft. This slope may be from one manhole to the next or both ways from a high point between manholes, depending upon the contour of the finished grade. See respective profile drawings.

12. Duct banks shall be installed so that the top of the concrete encasement shall be not less than 36 in. below finished grade or pavement for high voltage power duct bank and 24 in. below grade or pavement for communications duct bank.

13. Changes in direction of runs either vertical or horizontal shall be accomplished by long sweep bends having a minimum radius of curvature of 30 ft., except that manufactured long radius bends may be used in runs of 100 ft. or less on approval from Owner. Duct bank elevation shall be adjusted for duct bank entrances into all manholes and pullboxes. Contractor shall provide, at his own expense, suitable backfill material to bring such excavation to required grade.

14. Communications duct bank shall have no more than 180 degrees of bends between access points including all pullboxes, manholes, vaults, and buildings.
15. Duct joints in concrete encasement may be placed side by side horizontally, but shall be staggered at least 6 in. vertically. All joints shall be made in accord with manufacturer’s recommendations for the particular type of duct and coupling selected. In the absence of specific recommendations, various types of duct joints shall be made by the following method:
   a. Plastic duct connections shall be made by brushing a plastic solvent cement on the inside of a plastic coupling fitting and on the outside of duct’s ends. The duct and fitting shall then be slipped together with a quick one-quarter turn to set the joint.

16. The electrical system ground conductor shall be a minimum No. 4/0 AWG bare stranded copper cast in duct bank 3 inches below top of concrete, entering each manhole, and grounded to a rod and ground ring in each manhole using exothermic method as indicated on Drawings. The electrical system ground shall be connected to substations ground loops. A minimum of 15 ft. pigtail shall be provided at each stub-up location noted on Drawings.

17. After the duct line has been completed, three each nonflexible mandrels not less than 12 inches long having a diameter approximately 1/4 inch less than inside diameter of the duct shall be pulled through each duct; after which a brush with stiff bristles shall be pulled through each duct to make certain that no particles of earth, sand or gravel have been left in the line. Leave a 3/8 inch minimum polypropylene pull rope in each duct for future use.

18. Pavement for roadways, parking lots, pedestrian paths and hardscape shall be saw cut at full depth, in straight and uniform lines, 12 to 18 inches wider than the trench on both sides after completion of the duct bank installation and prior to replacement of paving.

19. Underground utilities marking: Install in accord with Section 02505.

20. Replace all hardscape, landscape, turf and vegetation removed for installation of duct banks to existing condition prior to installation of duct banks and as shown on the project drawings. Take photographs of existing conditions prior to installation of all duct banks.

END OF SECTION 26 05 41