SECTION 16711 - 27 05 43 UNDERGROUND DUCTS AND RACEWAY FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes Labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to:

1. Underground conduit for telecommunications
2. Handholes and manholes for telecommunications

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

C. Division 02 00 00 – Site Improvements (concrete work, blacktop, etc.)
D. Division 31 00 00 – Earthwork (excavation, backfill, compaction, etc.)
E. Section 27 05 26 – Grounding and Bonding for Communications Systems
F. Section 27 05 28.33 – Conduits and Backboxes for Communications Systems
G. Section 27 05 53 – Identification for Communications Systems

1.03 REFERENCE STANDARDS

A. National Electrical Code (NEC)

1.04 SUBMITTALS

A. A no more than 1 - 2 foot section of pathway with the manufacturers product information.
B. Pathway manufacturer’s data sheets.
C. Maxcell innerduct sample with manufacturer’s data sheets.
D. Handhole and manhole manufacturer’s data sheets.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.02 RACEWAYS

A. Raceways may be non-metallic (PVC) or galvanized heavy wall (GMC) conduit.
B. Use PVC type for all raceways except where rigid conduit is required.
C. Use PVC Type Schedule 80, plastic duct to meet NEMA TC-2 and NEC-Article 347.
D. Use plastic duct with straight couplings and appropriate cement.
E. Couplings shall be staggered horizontally and vertically.
F. The number, size, raceway duct material and arrangement shall be as indicated on the drawings and/or as specified herein.
G. Furnish and install 4 - 4" building entrance conduits from the building entrance or equipment room to the nearest telecommunications manhole or connection point.
H. All conduits will minimally be 4" in diameter unless otherwise stated on the drawings.
I. Red locatable caution tape shall be installed above all underground conduits.
J. Conduit shall be capped with manufactured caps (Duct Plugs).
K. A Greenlee or equal continuous detectable measuring tape shall be provided with at least 1800lb pull strength in each duct.
L. (1) 4" 3-Cell Maxcell Innerduct will be installed in each 4" conduit the entire length for all runs.

### 2.03 HANDHOLES

A. Handholes shall be constructed of polymer concrete with fiberglass cloth reinforcement.
B. The handholes shall be design with a straight wall design.
C. The handholes depth shall be a minimum of 48 inches with an approximate length and width of 54 by 78 inches.
D. The cover shall be a three piece heavy duty 3 piece flat slab and shall have a service load of 15,000 lbs over a 10" square and shall have a communication logo attached to the top.
E. The cover shall be securable with security bolts (five sided bolts).
F. A five sided wrench shall be provided to the Owner for each hanhole installed.
G. The Handhole Loading Requirements per ANSI/SCTE 77-2002 Specifications for Underground Enclosures Integrity, shall be TIER 15, vertical loads of 15000 lbs and lateral loads of 800 lbs/sgft. TIER 15 is defined as driveway, parking lot, and off-roadway applications subject to occasional non-deliberate heavy vehicular traffic.
H. Handhole Manufacturer: Quazite, PN: PG4872BA48, Description: Open Bottom, Stackable Assembly 48" x 72" PG Style Assembly
I. Cover Manufacturer: Quazite, PN: PG4872HA00, Description: Heavy Duty wW6 x 12 wide flange beam w/6 bolts

### PART 3 - EXECUTION

#### 3.01 EXCAVATION

A. Coordinate the location of raceways and handholes with other services and trades.
B. Have elevations and arrangements verified on job and submitted to the Owners designated NETS engineers before installation.

C. If soil conditions are such that because of the depth or any other reasons the trench/excavation cannot conform to the size of the duct bank, provide forms and bracing as required.

D. Contractor shall open entire length of trench and establish proper grades before beginning installation of any portion of connecting duct runs.

E. Depth of excavation shall be such that the required bury depths are met. NETS Infrastructure Engineer shall approve any deviation from required depths.

F. Maintain a consist depth as much as possible without excessive horizontal variance.

3.02 RACEWAY INSTALLATION

A. All bends must be long, sweeping bends with a min. ten times the internal diameter sweep.

B. In underground raceways, angle couplings and bends alone or in combination with straight sections shall be used for direction changes; direction changes made by skewing straight sections of conduit will not be permitted.

C. Red locatable caution tape shall be installed in two rows 12” above all underground conduits.

D. Conduit shall be capped with manufactured caps (Duct Plugs) when installation is temporarily discontinued.

E. Conduits shall be checked by pulling a round wood or steel test mandrel, sized for each duct from both directions to remove obstructions.

F. Conduits shall be cleaned by passing a wire brush mandrel and/or rubber duct swab (or approved alternative) of appropriate size back and forth until all foreign materials and water are removed.

G. Ducts shall be encased by a concrete envelope, minimum 3” cover on all sides or flowable backfill as specified.

H. Conduit runs shall contain no continuous sections longer than 350 feet, unless specified by NETS Infrastructure Engineers. If runs total more than 350 feet, pull points, (handholes) need to be installed.

I. Conduit shall have no more than 180 degrees of cumulative bends between pull points or more than 90 degrees of bends within any 50 feet.

J. Conduits shall be installed with a maximum of 3” fall per 100 foot run toward handholes and away from buildings.

K. A minimum of 6” of duct shall penetrate into each handhole.

L. Following the requirements of the NEC but minimally separate facilities as follows:

1. Power
   a. 12 in. of well-packed soil or
   b. 4” of masonry or
   c. 3” of Concrete

2. Gas, Oil, Water, etc.
a. 12" when pathways are parallel
b. 6" when crossing

M. A minimum of a 2' 6" bury depth is required. Exceptions may be granted to avoid interference’s with approval of NETS Infrastructure Engineers.

N. Install (1) Maxcell 4” 3 Cell innerduct in each conduit along with measuring tape and plug. Innerduct shall protrude from the plug about 6”.

3.03 NON-METALLIC RACEWAY INSTALLATION

A. Install a threaded adapter when attaching non-metallic raceway to rigid conduit.

B. Protect raceway from deformation during stockpiling and before installation.

C. Only perfectly circular in shape raceway should be used, other configurations will not be permitted.

D. Have joints made with materials provided by and installed per manufacturer’s directions. Comply with manufacturers requirements for bending and cutting.

E. Joints may only be covered with Scotch #88 tape as a temporary seal.

3.04 HANDHOLE INSTALLATION

A. Handholes shall have drainage provisions (e.g., drain holes, open bottom, sump-hole).

B. The handhole excavation shall have bedding material of 6 Inches covering the entire bottom of the excavation and the handhole shall be placed so the top of the handhole is level with the existing grade.

C. When installed without a bottom a 4 inch additional layer of small rock should be installed to prevent mud from intruding into the handhole.

D. Conduits entering a handhole should be aligned on opposite walls and at the same elevation.

E. The conduits shall be run into the handhole as straight a manner as possible.

F. Where handhole enclosures without bottoms are installed, all enclosed conductors shall be listed as suitable for wet locations.

G. Handholes are to be used as pull-through points, no splices shall be installed in them.

H. Handholes shall be installed as shown on the drawings or as directed by the NETS Infrastructure Engineer.

I. The locate wires shall be grounded in accordance to the grounding section.

END OF SECTION 16711 - 27 05 43