

SECTION 02588

**FOUNDATIONS, CONDUIT AND JUNCTION BOXES FOR HIGHWAY SIGNING
LIGHTING AND SIGNALS**

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SECTION 02588

FOUNDATIONS, CONDUIT AND JUNCTION BOXES FOR HIGHWAY SIGNING LIGHTING AND SIGNALS

PART 1 - GENERAL

1.01 DESCRIPTION

This work shall consist of furnishing, installing, modifying or removing concrete foundations, conduits and junction boxes for highway lighting, highway signing and traffic signals installations in accordance with these specification and in reasonably close conformity with the plans. All traffic control signals and lighting foundations, conduits, and junction boxes shall be approved by the City of Saco Policy Chief. When required by the Policy Chief.

1.02 MATERIALS

The materials furnished by the Contractor shall be new. Where an existing system is to be modified, the existing material shall be removed and abandoned or salvaged as shown on the plans or as directed.

All electrical equipment shall conform to NEMA or UL standards, wherever applicable. In addition to these requirements, all materials and workmanship shall conform to the requirements of: NEC, ASTM Standards, the ANSI, the local electrical utility, and any local ordinances which may apply.

Materials shall meet the requirements specified in the following Subsections of Division 700, Material Details of the current MDOT; Standard Specifications for Highway and Bridges (MDOT Specifications).

Reinforcing Steel	709.01
Precast Concrete Units	712.06
Steel Conduit	715.02
Non-metallic Conduit	715.03
Prewired Conduit	715.04
Metallic Junction and Fuse Box	715.05
Anchor Bolts	715.07

1.03 MISCELLANEOUS MATERIAL

Gravel backfill shall meet the requirements for Aggregate Base-Screened, Subsection 703.06(a), Type A of the Maine Department of Transportation unless shown otherwise on the contract drawings and approved by the City of Saco.

Transformer pads shall conform to the requirements of Central Maine Power.

If grouting is necessary to correct surface irregularities in the top of the concrete foundations, a non-shrink material satisfactory to the City Engineer shall be used.

All concrete foundations shall be constructed of Class A concrete in accordance with the applicable requirements of Section 502 – Structural Concrete of the MDOT Specifications.

1.04 EQUIPMENT LIST AND DRAWINGS

Unless otherwise permitted in writing, the Contractor shall within 30 days following execution of the contract, submit a list of equipment and materials which are to be installed. The Owner shall have this submission reviewed and approved by the City of Saco Police Chief. The list shall include the name of manufacturer, size and identifying number of each item. The list shall be supplemented by such other data as may be required, including detailed scale drawings of proposed minor deviations from the plans. If requested, the Contractor shall submit for review, design data and sample articles of the

material proposed for use. All of the above data shall be submitted in duplicate except samples for testing. Following checking, correcting and reviewing, two complete sets of drawings shall be submitted. The City of Saco will not be liable for material purchased, labor performed, or work delayed prior to such review.

Upon completion of the work, the Contractor shall submit three complete sets of record plans in mylar form showing all construction changes. In accordance with the General Requirements Section of these specifications.

1.05 CONSTRUCTION REQUIREMENTS

All work shall conform to NEC and NESC standards as set forth in the NIST Handbook H-32, except when otherwise noted on the plans or in the Special Provisions.

The Contractor shall be responsible for and shall repair all damage caused to underground drainage structures, utilities or lighting conduit which are encountered during construction.

1.06 CONDUIT

If the trench for conduit is located in wet, spongy or otherwise unsuitable ground, the trench shall be further excavated to a depth sufficient to overcome this condition and shall be backfilled with approved gravel. The gravel shall be compacted in layers not exceeding 200 mm (8 inches), loose measure. The grade of the bottom of the trench shall be parallel to the proposed grade of the conduit.

Trenches for conduits shall be excavated to a width which will permit proper installation of the conduit and to the depth shown on the plans or as directed.

Junction or pull boxes shall be installed as shown on the plans.

Where conduits enter exposed junction boxes, they shall be sloped to drain towards the conduit entrance holes, unless otherwise directed. Weepholes of 6 mm (1/4 inch) diameter shall be placed in all pull boxes, junction boxes and fuse boxes.

After the trench has been excavated as specified, the bottom of the trench shall be prepared with a sand bedding material. After placing the conduit, sand shall be placed around the sides and over the top of the conduit, when shown in the special details. The entire trench shall then be backfilled with approved material, placed in layers not exceeding 200 mm (8 inches), and thoroughly tamped.

All underground conduit shall be placed to at least the depth shown on the plans and shall not interfere with poles, guardrail posts, sign foundations or other objects.

All conduit ends shall be capped with conduit caps until wiring has begun. Prewired conduit shall be sealed during construction to prevent entry of moisture, dirt, or rocks.

The size and type of conduit required will be noted on the plans, except that the minimum size of conduit risers required for traffic signal installations shall be determined by percentage fill in a single conduit, as specified in the latest revision of the NEC. Where more than one conduit is required to be installed in the same location, the conduits may be placed in the same trench.

The weatherhead on conduit risers on utility company poles shall not be less than 300 mm (1 foot) from the utility wires. Conduit risers on utility poles shall be located as required by Central Maine Power.

Within 10 days after completion of each section of conduit, the Contractor, in the presence of the City Engineer, shall rod and pull through each duct a mandrel and brush of a pattern satisfactory to the City Engineer, but which shall not be more than 3 mm (1/8 inch) smaller than the bore of the ducts. Where obstructions in the ducts prevent passage of the mandrel, the Contractor shall, at his own expense, remove and relay those portions of the ducts necessary to clear the obstruction.

The Contractor shall install Number 9 US Steel Wire Gauge galvanized iron pull-wire in all unused conduits. The ends of the wire shall be secured in such manner as to prevent accidental withdrawal of the wire.

1.07 METALLIC CONDUIT INSTALLATION

Conduits shall be of the sizes noted on the plans which are indicated as the nominal inside diameter. All conduits shall be joined with threaded couplings using approved thread sealant. Conduit shall be installed so that it is continuous and watertight between boxes or equipment. Running treads will not be permitted. When necessary, the Contractor shall use an approved electrical union-type coupling. Conduits shall be protected at all times from the entrance of water or other foreign matter. Conduit runs shall be made with as few couplings as standard lengths will permit. The total angle of all bends in one run and the radius of conduit bends shall conform to the NEC requirements. All field bends and offsets shall be made with approved hickey or conduit benders. Pull boxes shall be used wherever necessary to facilitate the installation of the wires.

In making up a run of conduits, all cut ends shall be reamed to remove rough edges and cut threads shall be painted with an approved thread sealant in such a manner that there will be no unprotected surfaces and joints will be watertight. All conduits shall have electrical continuity and shall be adequately grounded.

Conduits to be placed in the concrete superstructure of bridges and similar structures shall be securely supported and fastened, in order to maintain the conduits' position within the concrete superstructure, as shown on the plans. Pull boxes shall be located as shown on the plans. Clearance between conduit runs shall preferably be 50 mm (2 inches), but shall at no time be less than the maximum size of the aggregate used in the embedding concrete. At all joints where relative movement between adjacent parts of a structure can occur, a double "O"-ring expansion coupling, or other approved expansion device shall be installed.

Exposed conduit shall be rigidly and securely fastened with acceptable fasteners or supports, as indicated on the plans or approved. Fasteners or supports shall not be placed more than 1800 mm (6 feet) apart on centers, except as otherwise authorized. Conduits shall generally be supported by an approved spacer at the point of support, so that there is an air space between the conduit and the supporting surface. Ends of conduit runs terminating in a metallic box without a threaded hub shall be provided with a metallic locknut on the outside of the box, lock washer and a galvanized steel flat washer shall be installed between the outside locknut and face of the box.

1.08 POLYVINYLCHLORIDE CONDUIT INSTALLATION

Polyvinylchloride conduit, hereafter call PVC conduit, shall be installed in accordance with the applicable methods as specified in Subsection 626.032 of the current MDOT Specifications for metallic conduits.

PVC conduit shall be made watertight by joining with solvent or in accordance with the manufacturer's specifications.

Conduit shall be bent carefully to avoid damage and without the use of an open flame. Bends sharper than 45 degrees (1/8 bends) will not be permitted in PVC conduit. The total angle of all bends in one run and the radius of bends shall conform to the NEC requirements.

Conduits to be placed in the concrete superstructure of bridges and similar structures shall be securely supported and fastened, in order to maintain the conduits' position within the concrete superstructure, as shown on the plans. Pull boxes shall be located as shown on the plans. Clearance between conduit runs shall preferably be 50 mm (2 inches), but shall at no time be less than the maximum size of the aggregate used in the embedding concrete. At all joints where relative movement between adjacent parts of a structure can occur, a double "O"-ring expansion coupling, or other approved expansion device shall be installed.

To allow for expansion and contraction of PVC conduit during installation of long runs, one end shall be left unconnected or a double "O"-ring expansion coupling shall be inserted near one end of the run until final covering of the conduit is in progress.

Where PVC conduit runs are placed parallel to other conduit runs or cross one over another, they shall be separated by a minimum of 75 mm (3 inches) of sand or soil cushion. This bottom of trenches for PVC conduit shall be lined with a 75 mm (3 inch) minimum bedding of tamped sand or soil prior to laying the conduit. Backfill to a compacted depth of 150 mm (6 inches) above the top of the conduit shall be sand or soil, free from rocks or hard lumps.

At locations shown on the plans, or otherwise designated conduit shall be constructed of schedule 80, PVC non-metallic conduit pipe encased in approved granular material as shown on the detail sheets.

When prewired conduit is installed, only those junction boxes necessary for underground splices shall be installed, unless otherwise directed.

Conduit and wire sides of prewired conduit shall be as shown on the plans.

If the Contractor elects to plow-in the prewired conduit, the plowing shall be done with approved vibratory plowing equipment.

When prewired conduit is installed in a trench, the trench shall be prepared as previously noted in this subsection for PVC conduit.

1.09 CONCRETE FOUNDATIONS

Prior to placing concrete, the required elbows of entrance conduits, reinforcing steel and anchor bolts shall be carefully positioned. The anchor bolt size and the bolt circle diameter shall be determined from data furnished by the supplier of the poles or as shown on the plans. Anchor bolts for use with breakaway couplings, longitudinally grooved-type, shall be 25 mm (1 inch) diameter and shall project between 65 to 75 mm (2 ½ and 3 inches) above the top of the foundation. All other anchor bolts shall be a minimum of 25 mm (1 inch) diameter and shall project sufficiently to accommodate the thickness of the base plus all nuts and washers. The bolt length shall also be sufficient to allow clearances of approximately 13 mm (½ inch) below the leveling nut and 6 mm (¼ inch) above the top nut. At least two threads on each anchor bolt shall project beyond the outside of the nuts holding the plumbed pole.

Foundations shall be constructed of reinforced concrete with anchor bolts in accordance with the applicable requirements of Section 502 – Structural Concrete, Section 503 – Reinforcing Steel of the current MDOT Specifications and in conformity with the dimensions and details shown on the plans or the Contractor's approved design.

If the foundation is located in wet, spongy or otherwise unsuitable material, the hole shall be further excavated to a depth sufficient to overcome this condition and backfilled with aggregate subbase material. The aggregate material shall be firmly compacted in layers not more than 200 mm (8 inches), loose measure. Backfilling of foundation material shall conform to Subsection 206.03 of the current MDOT Specifications.

The surface area around the foundations shall be loamed and seeded in accordance with the requirements of the contract documents.

Concrete foundations designated to be modified or removed shall be modified or removed as shown on the plans. Debris removed has been completed, the area shall be brought to grade by addition of granular material and loam, or by loam only, depending on the extent of modification or removal. The area shall then be seeded in accordance with the contract documents.

Backfilling around the foundations shall conform to the requirements of Section 02220 of these specifications. Backfill material shall be excavated material, unless considered unsatisfactory; in which case the material used for backfilling shall meet the requirements of Aggregate Base-Screened. The finished ground at each foundation shall be graded flush with the top of the foundation, except at

locations where the foundation is protected by guardrail. If required, approved backfill material shall be added to grade the slopes as specified. There will be no additional compensation for furnishing, placing or compacting material flush around the foundation.

When solid rock is encountered at less than the required distance below existing ground level, the construction method shown on the plans shall be followed.

The concrete portion of the foundations exposed to view shall have a troweled finished. A drainage groove shall be formed in the horizontal surface of the foundation. The top of the concrete foundation shall be horizontal.

When the anchor bolt template is removed, the treads of the anchor bolts shall be greased and protected with a metal sleeve, held in position with nuts and washers to be furnished with the bolts. This thread protection shall remain in place until the pole or other equipment is installed.

A copper-clad steel ground rod shall be installed when shown on the plans.

1.10 METHOD OF MEASUREMENT AND PAYMENT

Please refer to Measurement and Payment Section 01025 of these specifications.

---END OF SECTION 02588---