

SECTION 02730

GENERAL ELECTRICAL WORK

02730.01 GENERAL

A. Description

General electrical work shall include, but not necessarily be limited to, furnishing, installing, and testing for all electrical items.

B. Related Work Included Elsewhere

1. Electrical cable, wire, and connectors; Section 02735.
2. Loop detectors; Section 02742.
3. Loop detector amplifiers; Section 02743.
4. Push buttons; Section 02745.
5. Luminaries and Lamps; Section 02762.

C. Quality Assurance

1. Inspection

The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.

2. Testing

- a. General

The Contractor shall be responsible for furnishing all personnel and equipment required to successfully perform the following tests and shall furnish six certified copies of complete test reports to the County Engineer.

Not less than 30 days prior to the commencement of each required test, the Contractor shall submit to the County Engineer the types, styles, or catalog numbers of all testing equipment to be used for the tests. A written certification shall be included stating when the testing equipment was last calibrated by a MSHA approved testing agency not more than 120 days prior to the date when the tests are to be performed. All tests are to be performed in the presence of the County Engineer. The Contractor shall provide 72 hours notice prior to testing.

Any defect found in the completed installation, in materials, specified

equipment performance, and/or workmanship, as a result of these tests, shall be repaired and/or replaced promptly without any additional cost to the county.

b. Ground Resistance Testing

The ground resistance testing shall use a megger ground tester using the null balance Fall of Potential Method. No corrected reading greater than 25 ohms will be accepted. The Contractor shall submit in writing to the County Engineer a list of readings itemized and identified for all items for which grounding systems are required.

The Contractor shall test cable installed and shall demonstrate to the satisfaction of the County Engineer that all conductors are continuous and free from short circuits and unspecified grounds and that all circuits are properly connected in accordance with the Plans.

c. Circuit Testing

A circuit test to determine the insulation resistance shall be made for all cables of every circuit except those installed in lighting structures. The testing shall conform to the MSHA testing requirements. Units of measurements for reporting shall be expressed in megohms. The cable insulation resistance shall exceed 10 megohms at 500 volts D.C. Except loop detector wire and loop detector lead-in shall have a minimum of 100 megohms at 500 volts D.C.

d. Performance Test

When specified or otherwise required, the Contractor shall furnish the services of the equipment manufacturer's factory-trained servicemen or technicians to start up and/or test the equipment.

A performance test using the design power source shall be conducted prior to Substantial Completion Acceptance. The Contractor shall operate the lighting system, including automatic control equipment and other specified apparatus, or equipment for 30 consecutive days without interruption or failure. If any component fails, it shall be immediately replaced, and the test shall be continued. The contractor shall record each fault, the method and date of correction of each, and the beginning and ending of the 30 day test period. If more than 5% of any system components under test fail, the component shall be replaced and then the 30 day test period shall commence again for the entire system.

e. Illumination Testing

An illumination test shall be conducted by the Contractor for all lighting systems to determine the ground-level illumination characteristics of the lighting installation. The test shall conform to procedures approved by MSHA.

Cost for power necessary to conduct tests will be borne by the Contractor.

D. Submittals**1. Shop Drawings**

The Contractor shall submit to the County Engineer for approval all necessary documents such as detail plans, drawings, photographs, photometric data, schematics, templates, make, model number and specifications of all apparatus and equipment the Contractor proposes to furnish. They shall show clearly the design, construction dimensions, quantities, and any other information as may be necessary or desirable for a proper understanding of the equipment offered. All material sheets, curves, etc. defining the above shall identify the specific project to which the material applies; and if more than one catalog number, style, or type is listed on one sheet, the item to be furnished shall be clearly marked.

The Contractor shall not order electrical material until written approval of the submission is received from the County Engineer. Approval by the County Engineer will not relieve the Contractor of responsibility for erroneous or inconsistent dimensions, notations, omissions, or other errors, or the proper functioning of the complete installation.

2. Certificates

The Contractor shall, upon completion of the work, deliver to the County Engineer a final certificate of approval from the Charles County Permits Department, prior to final payment or Final Acceptance. The Contractor shall apply and pay for all permits, licenses, and inspection fees required. Four copies of certificates of compliance shall be delivered to the County Engineer upon completion of the work.

02730.02 MATERIALS**A. Materials Furnished by the County**

The County will not furnish any materials for general electrical work.

B. Contractor's Options

Not applicable.

C. Detailed Material Requirements

All materials and equipment installed as part of the permanent installation shall be new, UL(Underwriters' Laboratories) listed, or labeled, and shall conform to NFPA 70 (NEC), NESC, MEMA, ISC, and that of all applicable Charles County codes. Insofar as practical, all major items of electrical materials and equipment, such as lamps and luminaries, different parts of lighting standards, etc., shall be produced by the same manufacturer.

02730.03 EXECUTION**A. General**

All installations shall conform to NFPA 70 (NEC), the National Electrical Safety Code, and all applicable State and Charles County Codes governing the work, and to the rules and

regulations of the electrical utility serving the facility. All work shall be performed by or under the direction of a licensed Master Electrician.

B. Grounding System

1. Grounding systems shall conform to the latest edition of the National Electrical Code, latest edition of the National Electric Safety Code (NEC) and as hereinafter specified and/or indicated on the Plans.
2. For ground wire and rod materials, refer to Section 950.06.04 of the "MSHA Standard Specifications for Construction and Materials, (1993)".
3. For installation of grounding systems, refer to Section 804.03 of the "MSHA Standard Specifications for Construction and Materials, (1993)".
4. For testing of grounding systems, refer to Section 02730.01.C.2.

C. Operation of Equipment

1. The Contractor shall lubricate, clean, adjust, and test all equipment and systems in accordance with the manufacturer's instruction prior to initial operation. Equipment shall not be operated unless proper safety devices and controls are operational. The Contractor shall furnish all maintenance and service for equipment which is operated during construction and protect the equipment.
2. Where specified or otherwise required the Contractor shall furnish the services of the manufacturer's factory-trained servicemen or technicians to start up the equipment.
3. Upon completion of the work, the Contractor shall clean and restore all equipment to new conditions.

D. Damage to Other Work

1. Damage

All cutting or damage to existing structures, surfaces or installations shall be repaired at the expense of the Contractor. All such repairs or patching shall be done by mechanics of the appropriate trade and shall be neatly done and in such fashion as to leave no readily apparent joint or change in appearance, and to leave no structural or other weakness.

2. Waterproofed Surfaces

No electrical work shall pierce any waterproofed or dampproofed surface without the permission of the County Engineer and where such condition occurs, the work shall be waterproofed or dampproofed to meet the standards of the original specifications to the satisfaction of the County Engineer.

02730.04 METHOD OF MEASUREMENT

RESERVED FOR FUTURE USE

GENERAL ELECTRICAL WORK

02730-5

02730.05 BASIS OF PAYMENT

RESERVED FOR FUTURE USE

SECTION 02731

ELECTRICAL CONDUIT AND FITTINGS

02731.01 GENERAL

A. Description

Electrical conduit and fittings shall include, but not necessarily be limited to, furnishing conduit and fittings of the types and sizes shown on the Plans and in accordance with the Contract Document or as directed by the County Engineer.

B. Related Work Included Elsewhere

1. Structure excavation; Section 02220.
2. Trench excavation; Section 02250.
3. General electrical work; Section 02730.
4. Precast electrical handboxes; Section 02732.
5. Electrical pull and junction boxes; Section 02733.

C. Quality Assurance

The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.

D. Submittals

Shop drawings shall be submitted as specified in the "General Provisions" for all conduit and fittings supplied. The shop drawings shall include general material information and working drawings giving all conduit sizes and layouts, the overall diameters and cross-sectional areas of the actual conductors to be installed, and the sum of the areas of the conductors in each conduit.

02731.02 MATERIALS

A. Materials Furnished by the County

The County will not furnish any materials for electrical conduit and fittings.

B. Contractor's Options

Not applicable.

C. Detailed Material Requirements

1. Metallic Conduit and Fittings

Refer to Section 921.07.01 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

2. NONMETALLIC CONDUIT AND FITTINGS

Refer to Section 921.07.02 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

3. FLEXIBLE CONDUIT AND FITTINGS

Refer to Section 921.07.02 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

4. PVC COATED METALLIC CONDUIT AND FITTINGS

Refer to Section 921.07.03 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

02731.03 EXECUTION**A. General**

All materials and workmanship shall conform to the rules and regulations of the National Electrical Code (NEC) and that of all applicable Charles County codes.

B. Bends

Bends shall be of long sweep, free from kinks and of such easy curvature as to permit the drawing in of conductors without damage to the conductors. The radius of curvature of the inner edge of bends shall not be less than 10 times the inside diameter of the conduit, except as may be otherwise noted on the Plans or in the "Special Provisions." Conduits shall not be flattened or distorted. The total angle of all bends between any two boxes or fittings shall not exceed two quarter bends. Bends in conduit shall not damage the protective coating.

C. Exposed Conduits

Exposed conduit runs shall be parallel to or at right angles to walls, slabs, girders, etc. and in locations giving greatest accessibility for painting and least accumulation of dirt. All exposed conduit runs shall be attached to steel, masonry, concrete, or timber by galvanized malleable iron or stainless steel straps, clamps, or hangers of an approved type, held at not less than two points by galvanized steel bolts or lag screws. The runs shall be supported at not greater than 10 feet centers on horizontal runs unless otherwise specified and not less than 2 inches clear of the supporting members. Conduits mounted on structural steel members shall be securely clamped to prevent rattling and wear.

Exposed conduits shall be installed with runs parallel or perpendicular to walls and ceilings with right angle turns consisting of symmetrical bends or cast steel fittings. Offsets shall

be avoided where possible, but when required an approved hickey or conduit bending machine shall be used.

D. Capping Conduit Ends

During construction, all ends of conduits shall be capped by a manufactured cap or pipe to prevent introduction of foreign material into conduit. All open ends of conduit provided for future use shall also be capped. All conduits shall be installed so that they will drain, and necessary holes and drains for this purpose shall be made as directed. Prior to the installation of wiring, manufactured caps or plugs shall be removed and an insulated bonding bushing for GRC, or bell-end fittings for PVC conduit installed.

E. Conduit Encasement

All conduits, boxes, etc. to be encased in concrete must be accurately placed and rigidly held in position so that no variation from line or grade occurs when concrete is placed.

Conduits, fittings, and boxes shall be stored under cover and above ground.

Immediately after the encasement of the conduit, each conduit run and all fittings shall be cleared by a pull-through mandrel type device inserted in the presence of the County Engineer to remove spilled concrete and/or debris. Immediately prior to the installation of conductors in any run, the conduits comprising that run shall again be checked. Any and all obstructions shall be removed to the satisfaction of the County Engineer at the Contractor's expense.

F. Conduits, Fittings, and Boxes

Conduit runs shall be made with as few couplings as standard lengths will permit. Rigid steel conduit connections shall be threaded.

Conduits shall have threaded ends coated with an approved material and be of sufficient length so that they will butt squarely and tightly in the coupling. Long running threads will not be permitted. Conduits shall be installed so as to be continuous and watertight between boxes and/or equipment.

Where conduits cross expansion joints in the structure, or where otherwise specified, they shall be provided with expansion fittings of an approved type. The electrical continuity of the conduit runs across the expansion fittings shall be assured by approved fittings.

Nonmetallic conduit shall be connected by a solvent welding process. Fittings for Electric Metallic Tubing (EMT) conduit shall be watertight cast ferrous compression type.

Pull boxes or conduit bodies shall be used at conduit terminations. Conduits terminating in cast iron junction boxes shall be threaded into hubs with bonding screws furnished and installed on the interior of the boxes. Conduits terminating in cast iron junction boxes without hubs shall be secured with two lock nuts with an insulated grounding bushing furnished and installed.

All conduit connections to cabinets or panels shall be made using concentric punched or out holes. Entrances into sheet metal enclosures made using incendiary methods such as oxy-acetylene torches, propane torches, or similar means are absolutely prohibited.

Cabinets, boxes, and enclosures shall be completely cleaned of construction debris such as mortar, concrete, paint splashes, wire clippings, and metal shavings after construction is completed.

All metal surfaces of conduits, fittings, boxes, etc. in contact with concrete encasement shall be painted with one coat of RTCB-5 Tar. All surfaces of conduits, fittings, boxes, supports, etc. exposed to view (material between stringers and above bottom of stringers is not considered exposed to view) shall be painted to match the color of adjacent material. All galvanized surfaces shall be prepared in accordance with Section 09900.03 before the application of any paint.

Conduits terminating at concrete foundations and manholes shall be secured as specified on the plans. All ends unused conduit shall be capped.

After installation, all conduit which will be left empty shall have a pull wire or cord installed. Pull wire or cord shall be made of corrosion resistant material with a minimum breaking strength of 200 pounds.

G. Horizontal Augering Or Jacking

Conduit to be placed under existing pavements or paved shoulders may be installed by horizontal augering or jacking methods subject to the approval of the County Engineer. The Contractor must receive written approval from the County Engineer prior to the commencement of work for other thrust boring methods.

The ducts for installation in augered holes shall be placed in a hole augered under the pavement between the handboxes. The duct shall be installed by pushing in sections and coupling them together as the work progresses. The advance end of the first section of rigid duct shall be capped before pushing it into the augered hole.

The ducts for installation by jacking shall be installed by thrusting sections under the pavement with a hydraulic ram. Sections of rigid duct shall have a pointed nose cap screwed onto the advance end to facilitate penetration.

The Contractor shall avoid disturbing the existing roadway surface or weakening the roadbed. Any damage to the existing pavement structure shall be repaired to the satisfaction of the County Engineer at the Contractor's expense.

H. Trenches and Conduit

Trenches for underground conduits shall be constructed in accordance with the details shown on the Plans and as specified in Section 02250.03.

All conduits shall be supported so that strain is not transmitted to outlet or pull boxes. Supports shall be sufficiently rigid to prevent distortion of conduits during backfilling or wire pulling.

02731.04 METHOD OF MEASUREMENT

RESERVED FOR FUTURE USE

02731.05 BASIS OF PAYMENT

A. General

RESERVED FOR FUTURE USE

B. Electrical Conduit

RESERVED FOR FUTURE USE

SECTION 02732

PRECAST ELECTRICAL HANDBOXES

02732.01 GENERAL

A. Description

Reinforced concrete electrical handboxes shall include, but not necessarily be limited to, the furnishing and installing of reinforced concrete electrical handboxes as shown on the Plans and in accordance with the Contract Documents or as directed by the County Engineer.

B. Related Work Included Elsewhere

1. Adjusting utility structures; Section 02140.
2. Removal of existing pavement, sidewalk, curb and combination curb and gutter; Section 02160.
3. Structure excavation; Section 02220.
4. Selected backfill; Section 02245.
5. Trench excavation, backfill, and compaction; Section 02250.

C. Quality Assurance

The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.

D. Submittals

Submittals shall be as specified in Section 02730.01.

02732.02 MATERIAL

A. Materials Furnished by the County

The County will not furnish any materials for reinforced concrete electrical handboxes.

B. Contractor's Options

Not applicable.

C. Detailed Material Requirements

1. Reinforced Concrete Pipes

Reinforced concrete pipes for use as electrical handboxes shall meet the requirements of AASHTO M 170, Class IV.

2. Handbox Frames and Covers

Gray iron castings for handbox frames and covers shall meet the requirements of ASTM A 48, Class 30B.

02732.03 EXECUTION

A. Excavation

Excavation shall be performed as nearly as practicable to the outside dimensions of the handboxes or to the minimum size required to suit the equipment for jacking or augering the rigid duct under the roadway surface.

B. Backfill

After the handboxes are set to proper grades, excavated spaces around the boxes shall be backfilled with suitable material as indicated on the Plans. The backfill shall be placed and thoroughly compacted in 8-inch layers to the satisfaction of the County Engineer.

02732.04 METHOD OF MEASUREMENT

RESERVED FOR FUTURE USE

02732.05 BASIS OF PAYMENT

A. General

RESERVED FOR FUTURE USE

B. Electrical Handboxes

RESERVED FOR FUTURE USE

SECTION 02733

ELECTRICAL PULL AND JUNCTION BOXES

02733.01 GENERAL

A. Description

Electrical pull and junction boxes shall include, but not necessarily be limited to, furnishing and installing electrical pull and junction boxes on structures, as shown on the Plans and in accordance with the Contract Documents or as directed by the County Engineer.

B. Related Work Included Elsewhere

1. General electrical work; Section 02730.
2. Lighting standards; Sections 02760 and 02761.

C. Quality Assurance

The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.

D. Submittals

Submittals shall be as specified in Section 02730.01.

02733.02 MATERIALS

A. Materials Furnished by the County

The County will not furnish any materials for electrical pull and junction boxes.

B. Contractor's Options

None.

C. Detailed Material Requirements

1. Steel Plate
Steel shall conform to ASTM A36 or ASTM A709, Grade 36.
2. Iron Castings
Gray iron castings shall meet the requirements of ASTM A 48, Class 30B.

3. Box Covers
 - a. Boxes which are encased in concrete shall be provided with covers extending $\frac{1}{2}$ inch beyond the outside dimensions and drilled to match taped holes in the flange.
 - b. Boxes which are to be completely exposed shall be provided with covers meeting the outside dimensions of the box.
 - c. Boxes for exterior underground service shall be furnished with gasketed cover plates.
 - d. Cover shall be secured in position by round head brass or grade 316 stainless steel machine screws.
4. Pull and junction boxes shall be the sizes and types specified but in no case smaller than required by NEC and shall be UL listed as "Raintight." Exterior above ground boxes shall be NEMA 4, weatherproof. Conduit entrance shall be provided with conduit hubs or bosses of sufficient thickness that five full threads of the conduit shall engage the threaded holes in the box.
5. Concrete shall be mix No. 2 unless otherwise specified in the contract documents.

02733.03 EXECUTION

Electrical pull and junction boxes shall be located where and in the manner shown on the Plans. The Contractor shall furnish suitable hardware and accessories to mount the boxes.

Boxes shall be installed so that covers are readily accessible after completion of the installation.

When boxes are set in concrete, they shall be adequately supported to prevent movement during placement of the concrete. The number of unrequired knock-outs shall be kept to a minimum. After installation, the boxes shall be cleaned of any splashed concrete.

02733.04 METHOD OF MEASUREMENT

RESERVED FOR FUTURE USE

02733.05 BASIS OF PAYMENT

RESERVED FOR FUTURE USE

SECTION 02734
CONCRETE FOUNDATIONS

02734.01 GENERAL

A. Description

Concrete foundations shall include, but not necessarily be limited to, the construction of concrete foundations for lighting standard installations and traffic control devices shown on the Plans and in accordance with the Contract Documents, or as directed by the County Engineer. This work shall include excavation, backfilling, placing concrete, and all incidentals necessary to complete the work.

B. Related Work Included Elsewhere

1. Structure excavation; Section 02220.
2. Portland cement concrete; Section 03310.
3. Painting; Section 09900.

C. Quality Assurance

1. The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.
2. Concrete shall meet the quality assurance requirements as specified in Section 03310.

D. Submittals

Shop drawings shall be submitted as specified in the "General Provisions" for all concrete lighting and signal foundations. The shop drawings shall show the overall dimensions of the foundation, reinforcing size and location, and bolt circle data.

02734.02 MATERIALS

A. Materials Furnished by the County

The County will not furnish any materials for concrete foundations.

B. Contractor's Options

Not applicable.

C. Detailed Material Requirements

1. Portland Cement Concrete

Portland cement concrete for concrete foundations shall be Mix No. [3]2 as specified in Section 03310.

2. Grout

Grout shall meet the requirements specified in Section 03600 and shall be non-shrink, non-metallic, and have a compressive strength of at least 3,000 psi at 28 days.

3. Reinforcing Steel

Reinforcing steel shall consist of deformed bars conforming to ASTM A615. Deformed bars shall be epoxy coated. Epoxy powder shall conform to Section 917.02 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

4. Conduit

Refer to Section 921.02 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

5. Anchor Bolts, Nuts, and Washers

High strength bolts, nuts, and washers shall conform to ASTM A325. Galvanizing for hardware shall conform to ASTM A153.

6. Paint

Zinc rich primers shall be applied on shot blast cleaned steel for new structures or sand blast cleaned structures which are to be rehabilitated. Primers shall be self cure inorganic zinc alkyl silicate base or organic vehicle and meet the requirements of SSPC PS 12.00.

Zinc rich primer for galvanized surfaces shall meet the requirements of Federal Specification TT-P-641, Type 11, zinc dust - zinc oxide.

7. Liquid Membrane-Forming Compound

Liquid membrane-forming compounds shall meet the requirements of AASHTO M 148.

Field control testing of the white pigmented curing compound shall be on the basis of weight per gallon. The samples shall not deviate more than plus or minus 0.3 pounds per gallon from the original source sample.

02734.03 EXECUTION**A. General**

Footings, including reinforcement, foundation, and bolt circle data shall be as shown on the Plans or in accordance with approved shop drawings. Anchor bolts shall be plumb. Suitable templates for setting anchor bolts shall be accurately placed and left in place until concrete has obtained its initial set.

Galvanized parts that have been cut or chipped to bare metal shall be repaired as specified in ASTM A780.

B. Excavation

The Contractor shall perform all excavation to neat lines and to the elevations and dimensions shown on the Plans. All excavation work will be inspected and approved by the County Engineer before proceeding with construction.

C. Concrete Placement

It is intended that all concrete be placed against undisturbed earth. However, where the existing ground will not retain its shape during or after augering, or if the excavation should show any tendency to cave in before placing the foundation, the Contractor shall provide and install a corrugated metal pipe to retain the earth and receive the concrete. The pipe shall remain in place.

Concrete shall be mixed, placed and tested as specified in Section 03300.

Tops of foundations shall be screeded to a dense smooth finish. Exposed surfaces shall be cured by use of a liquid membrane curing compound.

D. Backfill

Material used for backfill shall be free from topsoil, loam, organic, frozen, or other undesirable material. No trash shall be allowed to accumulate in the spaces to be backfilled, and these spaces shall be well cleaned before backfill is placed. Backfill material shall be material from the excavation or other sources which shall meet the requirements of Section 02240.02. All backfill shall be carefully compacted in layers not exceeding 8 inches in loose thickness and compacted with mechanical or vibratory compaction equipment to at least 92% of maximum density at a moisture content within 2% of the optimum in accordance with AASHTO T 180, Method C.

02734.04 METHOD OF MEASUREMENT

RESERVED FOR FUTURE USE

02734.05 BASIS OF PAYMENT**A. General**

RESERVED FOR FUTURE USE

B. Concrete Foundation

RESERVED FOR FUTURE USE

SECTION 02735

ELECTRICAL CABLE, WIRE, AND CONNECTORS

02735.01 GENERAL

A. Description

This work shall consist of furnishing and installing loop detector wire and leads, electrical cable, cable ducts, wires, and associated connectors of the type and at the locations specified on the Plans and in accordance with the Contract Documents or as directed by the County Engineer.

B. Related Work Included Elsewhere

1. Trench excavation, backfill, and compaction; Section 02250.
2. General electrical work; Section 02730.
3. Concrete foundations; Section 02734.
4. Loop detectors; Section 02743.

C. Quality Assurance

The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.

D. Submittals

1. Shop Drawings

Shop drawings shall be submitted as specified in the "General Provisions" for all electrical cable, wire, and connectors. The shop drawings shall include the number and size of conductor and general material information.

2. Certificates of Compliance

Certificates of compliance shall be submitted as specified in the "General Provisions" for all electrical cable, wire, and connectors stating that the cable, wire, and connectors meet the requirements specified in Section 02735.02.

02735.02 MATERIALS

A. Materials Furnished by the County

The County will not furnish any materials for electrical cable.

B. Contractor's Options

Not applicable.

C. Detailed Material Requirements

1. Electrical Cable and Wire

Refer to Section 950.06 of the "MSHA Standard Specification for Construction and Materials, (1993)".

2. Connectors

Refer to Section 950.014 of the "MSHA Standard Specification for Construction and Materials, (1993)".

02735.03 EXECUTION**A. General**

The Contractor shall furnish and install copper conductor wire and cable of the types and sizes and at the locations specified in the Contract Documents. No splicing will be permitted for cables unless specified in the Contract Documents. When specified, lighting cable splices will be permitted only in junction and pull boxes and handholes. Cable shall not be installed until the entire related raceway, including manhole, handhole, and foundation system is in place. A 6 foot (2 m) cable slack shall be provided neatly tied, coiled and positioned in the bottom of the handholes and manholes. Eight inch (200 mm) drip loops shall be provided at all overhead entrance points into structures.

B. Direct Burial Cable

Direct burial cable, unless otherwise stated, shall be placed in a trench at a minimum depth of 30 inches below finished grade to the top of the cable.

C. Trench

The trench may be hand dug or plowed.

The trench shall be backfilled and compacted as specified in Sections 02250.03 and 02734.03.

D. Cable in Conduits

Refer to Section 810.03.02 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

E. Preassembled Cable Duct

Refer to Section 810.03.03 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

F. Cable in Lighting Structures

Refer to Section 810.03.04 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

G. Identification Tags

Refer to Section 810.03.05 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

H. Loop Detector Wire and Loop Detector Lead-in

Refer to Section 810.03.06 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

I. Connector Kits

Connector kits shall be furnished and installed as required for the type of cable specified in the Contract Documents and shall conform to the manufactures recommendations.

J. Grounding Wire

Grounding wire shall be furnished and installed as specified in Section 02730.03.B.

02735.04 METHOD OF MEASUREMENT

A. Traffic Signal Electrical Cable

RESERVED FOR FUTURE USE

B. Miscellaneous Electrical Cable

RESERVED FOR FUTURE USE

02735.05 BASIS OF PAYMENT

A. General

RESERVED FOR FUTURE USE

B. Traffic Signal Electrical Cable

RESERVED FOR FUTURE USE

C. Miscellaneous Electrical Cable

RESERVED FOR FUTURE USE