

**DIVISION VI  
STREETLIGHT INSTALLATION AND CONSTRUCTION**

<b>1.</b>	<b>General</b>	
1A.	General .....	VI-1
1B.	Measurements .....	VI-1
1C.	Service Characteristics .....	VI-2
<b>2.</b>	<b>Conduit Installation</b>	
2A.	General .....	VI-2
2B.	Rigid Galvanized Steel Conduit .....	VI-3
2C.	Plastic Conduit .....	VI-3
2D.	Warning Tape.....	VI-4
2E.	Backfilling.....	VI-4
<b>3.</b>	<b>Foundations</b>	
3A.	General .....	VI-4
<b>4.</b>	<b>Cable</b>	
4A.	General .....	VI-5
4B.	Cable Connectors .....	VI-5
4C.	Tape .....	VI-6
<b>5.</b>	<b>Handholes</b>	
5A.	General .....	VI-6
5B.	DDA District.....	VI-6
<b>6.</b>	<b>Lighting Fixtures</b>	
6A.	General .....	VI-6
6B.	DDA District.....	VI-6
<b>7.</b>	<b>Testing</b>	
7A.	General .....	VI-6

**DIVISION VI  
STREETLIGHT INSTALLATION AND CONSTRUCTION**

**1. GENERAL**

**1A. General**

The Contractor shall be an electrician licensed in the City of Ann Arbor. The licensed electrician must be present on the job site during all electrical wiring and shall be available for consultation throughout the project.

The Contractor shall assume all risks and responsibility due to existing soil and ground conditions.

The cost of removal or relocation of any existing streetlight will be the Contractor's responsibility. The removal or relocation of any existing streetlight shall be coordinated through the Transportation Division and the Detroit Edison Company.

The Contractor shall be responsible for maintenance of, and repair of damage as a result of accident or vandalism to, the lighting fixtures, conduit, overhead wires, cable, etc., and all other material installed or to be installed related to, or necessary for, the electrical installation of the project. This shall remain the Contractor's responsibility until the installation is complete, tested and accepted by the Transportation Division.

The City will assume responsibility for conducting Miss Dig inspections of the streetlighting system following the installation of the streetlight cable, provided the installation of the cable is witnessed by the Transportation Division Inspector. The City will mark the location of the cable when a Miss Dig notice is received and the Developer/Contractor will be billed for time and materials as necessary until such time that the system has been accepted by the City.

All factory finished equipment shall be cleaned at the completion of the job by the Contractor. Equipment showing mars or rust shall be refinished by the Contractor in a manner acceptable to the Transportation Division.

**1B. Measurements**

Field measurements necessary for securing materials and fitting the installation to the construction site shall be the responsibility of the Contractor.

Connections to equipment fixtures, etc., shall be made in accordance with the shop drawings and rough-in measurements furnished by the manufacturer of the particular equipment furnished.

**1C. Service Characteristics**

***Secondary Service***

120/240 V, 1 Phase, 25 kVA, 3 wire service from Detroit Edison Company.

Electrical Contractor shall make all secondary connections, except at the Detroit Edison Company transformer.

All work and materials shall be in full accordance with the requirements of the City.

***Grounding***

The entire lighting system shall be permanently and effectively grounded.

All fixtures and poles shall be thoroughly grounded to the ground rod and neutral at each pole as shown on the Plans. At the disconnect cabinet, the Detroit Edison neutral, the disconnect cabinet, and the ground mat system shall all be permanently grounded together.

Ground rods shall be copper clad steel, and shall be either two 1/2-inch diameter round by 6-foot long rods, or one 5/8-inch diameter round by 8-foot long rod, as shown in the Details.

Ground cables shall be #6 AWG, soft drawn, bare, stranded copper wire. Burndy or approved equal pressure-type connectors shall be used to connect the ground cable to poles and electrical equipment. The cable shall be properly attached to the ground rods.

The resistance of the ground rod to ground shall not exceed 25 ohms when tested with a megger. In case the resistance is more than 25 ohms, additional or longer ground rods shall be installed.

***Transformer Pad***

The transformer pad(s) shall be built to Detroit Edison specifications. Work shall be coordinated and approved by Detroit Edison.

**2. CONDUIT INSTALLATION**

**2A. General**

Conduit shall be installed where cable is located under all concrete areas, driveways, and roadways. Where pole bases are located within 5 feet of a conduit run, the conduit shall be extended into and through the pole base. Where cable is to be direct buried, a 2" formed channel in lieu of conduit will be allowed in poured concrete pole bases. This channel is to be formed with a Murray Tube, which is removed after the concrete is poured and begins to set.

Minimum allowable conduit sizes are as follows:

Under concrete areas, etc.	2 inches
Under residential driveways	2 inches
Under roadways and commercial driveways	3 inches

The conduit shall be cut with a hacksaw or other approved tool. The ends shall be square after cutting and the conduit shall be reamed. All conduits must be securely fastened to boxes with locknuts and bushings of an

approved make, care being taken that the full number of threads project into the bushings. The rigid galvanized conduit shall be assembled by means of approved threaded galvanized coupling, unions, and fittings. The proper PVC conduit shall be assembled by means of approved threaded or solvent-welded fittings.

No cables shall be installed in the conduit until all work which might cause damage to the conduits or cables has been completed.

All conduits shall be plugged and kept clean and dry during installation. All conduits shall be wiped out before pulling wire. Spare conduit shall have a nylon pull string pulled through the conduit for future use.

Conduits shall be cut a minimum of 1 inch above the light pole base and not more than 2 inches above the base.

Trenching for conduits may be excavated manually or with mechanical trenching equipment when approved by the City in the form of a street cut permit (see **Division I, Section 1D. Permits** of these Specifications). Where underground utilities are encountered, the trenching shall be done by hand. It is the Contractor's responsibility to have existing utility structures located. Reference is made to Public Act No. 53 of the State of Michigan Legislature (Miss Dig).

All excavation for main conduit shall be of a depth to leave at least 30 inches from the top of the conduit encasement or top of direct buried rigid conduit to grade of top of curb or surrounding terrain. For lateral flexible conduit, the corresponding dimensions shall be 30 inches. The trench shall be graded to handhole and pole location so that the finished conduit run will contain no pockets where water might accumulate or drain into a handhole or pole.

Trenches for single conduit lines shall not be less than six (6) inches or more than twelve (12) inches wide at the bottom of the trench. Trenches for two or more conduits shall be proportionally wider.

The Contractor shall sheet and brace the trenches as required, and shall adequately support all pipes or other structures exposed in trenches if support is necessary to prevent damage.

Should the Transportation Division determine that a spare conduit shall be provided, a nylon pulling line shall be pulled through the conduit for future use.

**2B. Rigid Galvanized Steel Conduit**

Installation of conduit shall comply with the latest revision of Article 346 of the National Electric Code (NEC).

All connections to rigid galvanized steel shall be threaded.

Conduit for service pole risers shall be rigid galvanized steel of the size required by the NEC.

**2C. Plastic Conduit**

Installation of conduit shall comply with the latest revision of Article 347 of the NEC.

**2D. Warning Tape**

The Contractor shall install a 6" wide polyethylene warning tape, 12" above each underground plastic conduit run and above each direct buried cable. The tape shall be placed continuously with overlap where splices are required.

The tape shall be red with "Caution - Buried Electric Line" written on it. Tape shall be Brady Co. Indentoline,

or approved equal.

**2E. Backfilling**

Trenches shall be backfilled and compacted in six (6) inch layers with Class II granular material and compacted to 95 percent of its maximum unit weight at optimum moisture content per the AASHTO T-180 test.

After backfilling, the ground surface shall be left free of ruts and rough spots. The Contractor will be held responsible for maintaining all disturbed surfaces and replacements until final acceptance by the Transportation Division.

**3. FOUNDATIONS**

**3A. General**

No foundations shall be poured or placed until the curb or pavement is in place. The foundations shall be located as shown on the Plans, unless otherwise authorized by the Transportation Division.

Direction of conduit shall be marked on the base by an arrow indicating proper direction.

***Concrete Bases:***

The lower portion of the foundation shall be poured without forms, provided there is no cave-in. When the soil is subject to cave-in, forms shall be used for the entire depth of the foundation. Forms shall be used for the upper portion of the foundation, as shown on the Plans, and shall be finished smooth, with the top surface horizontal and at an elevation 6" above the top of curb, unless otherwise shown on the Plans or established by the Transportation Division. The anchor bolts shall be accurately spaced on the bolt circle and in lines parallel to the curb, unless otherwise shown on the Plans. Should it be necessary to shorten anchor bolts, they shall be saw cut, cleanly and smoothly. The use of a torch to shorten or bend anchor bolts is not permitted.

Ground rods and wires shall be installed as shown on the Details. The ground wire shall be placed inside the foundation. If conduit is extended into the foundation, the ground wire shall be imbedded in the concrete. If a formed channel is used in the foundation in lieu of conduit, the ground wire shall be located in the formed channel. The ground wire shall be wrapped around and properly attached to the ground rods. The ground wire/rod connection shall not be encased in concrete.

Bases and standards shall not be installed on foundations until the concrete has been cured for 7 days and has attained 80 percent of its maximum compressive strength.

No construction rubble, broken sidewalk, or other foreign material will be permitted in place of concrete. Cracked or otherwise deformed foundations will not be acceptable.

Pole foundations shall at all times be properly protected and guarded to prevent injury to persons until the poles are installed.

***Screw-In Bases:***

Screw-in bases shall be installed per the manufacturer's (Chance) specifications as provided in Appendix E.

**4. CABLE**

**4A. General**

All poles shall have a three wire system, including dead ends. Cable in the poles shall be marked to indicate connection to the power source.

After the conduit runs are built, the Contractor shall pull a mandrel 12 inches long (shorter in conduit runs with bends) and 1/2-inch smaller in diameter than the conduit and a suitable swab or cleaning device designated to clear the conduit of small pebbles, etc. The Contractor shall notify the Transportation Division Inspector prior to performing this phase of the work so that the Inspector may be present during this work.

Cable shall be pulled into ducts using a proper cable grip for the purpose. The cable shall be so handled that it is not subjected to excessive strain or kinked when pulled through the conduit. Damaged or kinked cable shall not be used. Where more than one cable is to be installed in a duct, all cables shall be pulled through simultaneously. Splices in ducts will not be permitted.

Cables shall be neatly racked and identified on cable racks in all handholes after being formed to their final position. Cables shall be racked slightly higher than the duct entrances so that they will not rest on the edges of the duct. Cables shall be properly tagged in all handholes and poles. All splices and connections shall be made as described herein and as shown on the Details. Where cable is installed but not immediately spliced, the cable ends shall be thoroughly sealed and racked out of the way of possible danger.

Cable shall extend four inches (minimum) or five inches (maximum) beyond the handhole of the pole. Conduit shall be cut at the base (not to exceed 2 inches above the base).

Printed color code phase identification shall be repeated at all connections. The printing of the conductor coding shall be repeated at all connections. The printing of the conductor coding shall adhere to covering and not be readily removed by rubbing.

#### **4B. Cable Connectors**

Wire brush and approved corrosion inhibiting compound shall be applied to all connections.

All splices shall be accessible through the handhole and shall extend 4-6 inches outside the handhole. No splices will be allowed which are inaccessible inside the pole.

**4C. Tape**

Where Utilco connections are not used, all joints in outlet or junction boxes shall be taped in such manner that the insulating value of the joint or splice will be at least equal to the insulating value of the conductor to which it is applied.

**5. HANDHOLES**

**5A. General**

An area for the handhole shall be excavated and the material disposed of off-site by the Contractor. Handholes shall be placed in a minimum of three inches of Class A concrete. If the conduit is below the handhole, a 90 degree sweep shall be required to terminate into the handhole.

**5B. DDA District**

Handholes located in the DDA District shall be placed in the edge of the concrete sidewalk, outside of the brick pavers. The concrete sidewalk shall be sawcut at existing joints such that the section to be removed is large enough to facilitate the handhole installation. The minimum removal shall be one flag of sidewalk. The conduit shall be placed under the brick pavers next to the existing sidewalk.

**6. LIGHTING FIXTURES**

**6A. General**

The Contractor shall furnish and install all lighting fixtures. Lighting fixtures shall include; all lamps or tubes; transformers; ballasts; starters; supports; hangers; brackets; canopies; globes; and all other parts and devices necessary for complete operation and installation.

Poles shall be set to stand plumb. Plumb shall mean within five inches in thirty feet.

All threaded fittings shall be lubricated with a non-corrosive grease.

**6B. DDA District**

Double lamp fixtures shall be installed such that the fixture is parallel to the street. Perpendicular fixtures will not be permitted.

**7. TESTING**

**7A. General**

The Contractor shall test all circuits as soon as conductors are installed and make final tests in the presence of the Transportation Division Inspector when all the work is complete. If the circuits are not properly controlled, insulated, or damaged the Contractor shall make necessary changes and repairs.