

Design Standards Letter

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Section/Plan No.: None

Subject: Highway Lighting Cable-Conduit

Body

ALL DIVISION, DISTRICT AND URBAN ENGINEERS AND CHIEF COUNSEL

Effective with the April 30, 1964 Letting, all highway lighting plans are to be designed for the use of cable-conduit underground instead of direct burial cable. The purpose of this change is to provide better mechanical protection of the cable as well as a means for pulling cable after installation, when necessary.

Under separate cover you will receive copies of a revised special provision for highway lighting, a revised Standard Drawing No. 70.00, and a new Standard Drawing No. 70.01, ;all dated April 1964, covering details of materials and installation.

Cable-conduit consists of from 1 to 4 insulated single conductor cables, with or without a bare neutral wire, factory installed, in medium density, black polyethylene conduit or duct. Section 15.1.5.8 Circuiting of the Design Manual is applicable to the use of cable-conduit. In addition, the following criteria is suggested:

- (1) Size. In general 1" Cable-Conduit will meet most of our requirements as evidenced by the following table:

MAXIMUM NO. CABLES AVAILABLE IN CABLE-CONDUIT

Conduit Conductor Sizes - AWG. No.

Size #2 #4 #6 #8

1" 2 3 4 4

1 1/4" 3 4 - -

1 1/2" 4 - - -

No more than four (4) factory installed conductors are available in one conduit. One bare neutral wire may be used in addition to the insulated cables.

- (2) Minimum Quantity of any one size of Cable-Conduit with any one

combination of cables is 500 linear feet. For less than 500 feet, two lengths may be used side by side, or additional cables could be pulled into the conduit by the contractor after installation, provided conduit fill does not exceed 50%. In the latter case, the additional conductors would be paid for as conductor cable, and should be so indicated on the plans. The following table shows the maximum number of cables based on 50% fills:

*MAX NO. CABLES IN CONDUIT USING 50% FILL

Conduit Conductor Sizes - AWG. No.

Size #2 #4 #6 #8

1" 3 4 5 7

1 1/4" 5 6 9 12

1 1/2" 6 9 12 17

*No allowance in this table for a neutral wire.

The cable specification has been referenced to IPCEA S-61-402. You will note that Type THW insulation is now permitted in Cable-Conduit and for Pole and Bracket Cable. The new specification should make cable more competitive and more easily available in small quantities.

(3) Handholes will be necessary, in some cases, to provide for splicing and for future cable pulling. On long straight runs, handholes should be provided at 500 foot maximum intervals. Their location around an intersection will be more or less obvious. It would not be desirable to pull or drag the conduit for excessive distances, as where a sharp bend would be necessary, after passing through a steel conduit under pavement. The end of the conduit where the bend occurs would be a desirable location for a handhole. Another would be where it is necessary to cross under pavement to place an odd light in a circuit. Unless a junction box is available near a bridge and where a conduit system is provided on the structure, it will be necessary to construct a handhole off of the end of the structure with rigid steel conduit connecting to the bridge conduit. Junction boxes near the ends of structures should be requested for proposed bridges.

Two types of handholes are shown on Drawing 70.01. The only difference is that Type A is drained to an offset stone drain whereas Type B is drained out through the inslope or fill slope. Type B is preferred and should be specified wherever practicable, skewing the drain pipe, if necessary.

(4) Rigid Steel Conduit will still be required under pavement in accordance with present practice, except that 3" conduit will be necessary for 2 or 3 runs of 1" Cable-Conduit and 3 1/2" for 4.

(5) Trenching & Backfilling. The new special provision and the sections shown on Standard 70.01 covering this item are intended to give the Construction Division better control of this item. There have been some large overruns on construction where rock or material which could not be trenched by machine was encountered and either no quantity or too small a quantity of 21" Trenching and Backfilling was provided for on letting plans. For small quantities, the unit bid prices were usually high, and when no quantity was shown, the agreed price was from 5 to 10 times the price for 24" Trenching and Backfilling.

Provision has been made under Section 70.26.3 of the special provision offer a price five times the price bid for Type II (24") Trenching and Backfilling, if the contract does not contain a unit price for Type III (21") Trenching and Backfilling; however, it is hoped that by careful consideration of material to be trenched in both cuts and fills, the proper types of trenching and backfilling can be shown on the plans. Type I (24") Trenching and Backfilling would only be used where the trenching would be in good soil with no objectionable materials.

After trying various locations for lighting cable, it has been decided that the best location is in the shoulder and near the edge of pavement as shown on Standard 70.01. Plans are to be so designed, unless a stabilized shoulder is in place.

(6) Circuiting. There should be no more than two branches of any one circuit, therefore, some doubling back may be necessary to make a branch continuous, the purpose being to improve the insulation resistance to ground. No more than three lengths of 1" Cable-Conduit can be installed in a lighting pole or pole base. The size of conduits used in a concrete base will depend on the number and location of Cable-Conduits to be installed. You will note that the contractor has the option of casting the Cable-Conduit directly in the concrete base or providing larger conduit as a sleeve. The kind of conduit used as a sleeve will not be specified.

(7) Measurement of Cable-Conduit will be the same as for direct burial cable with a 5% allowance for splicing, etc.

(8) Cost. For estimating purposes, we suggest a unit price of 50 cents per foot for 1" Cable-Conduit with two #8 cables, and 65 cents with four #8 cables. Add five cents per foot per single cable for #6 cables.

If there are any questions, please advise.

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