

CONSTRUCTION STANDARDS
MANUAL NO.11

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NEW YORK, NY 10003

DISTRIBUTION ENGINEERING DEPARTMENT
SUBSTATION & EQUIPMENT SECTION

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INSTALLATION OF PRECAST
CONCRETE CONDUIT

FILE: CONSTRUCTION STANDARDS
FIELD MANUAL NO. 11
FIELD MANUAL NO. 17

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INSTALLATION OF PRECAST CONCRETE CONDUIT

1.0 SCOPE

This specification describes the method for installing precast concrete conduit.

2.0 APPLICATION

This specification applies to all Con Edison districts.

3.0 GENERAL

This specification provides for the installation of underground precast concrete conduit suitable for the housing of electric cable. These conduits shall be used and installed by Company forces and contractor personnel for new work and for replacement of conduit.

4.0 DEFINITIONS

- 4.1 Bend - Any change in the direction of the conduit center-line in the horizontal, vertical or any intermediate plane is to be considered as a bend if the change in direction is greater than 5°.
- 4.2 Offset - Any displacement of the conduit center-line parallel to itself is to be considered an offset.
- 4.3 Dip - A dip is a double offset, the second of which returns the conduit center-line to its original alignment.

5.0 MATERIAL

- 5.1 Straight Sections - The conduit material shall be in accordance with Con Edison specification EO-1042. The conduit shall be of a square external cross section and shall have a concentric bore and dimensions as per drawing EO-7875-D.

5.0 MATERIAL (Cont'd)

- 5.2 Bends - Bends shall have a concentric bore and square external cross section along their entire lengths and dimensions as specified on drawing EO-9489-C. The 20 foot radius bends shall be used for primary cables. When field conditions prevent the use of 20 foot radius bends, 10 foot radius bonds may be substituted. The use of 5 foot radius bends shall be restricted to service or mains cables, or primary cable from a street trench to a sidewalk transformer vault. The 3 foot radius bends shall be limited to use on intervault ties.
- 5.3 Split Conduit - When a conduit is field split for installation around existing cable, either singly or in banks of conduit, it shall be secured as shown on drawing EO-9138-C. Two clamps or straps shall be used per conduit length. When clamps are used, the bolt of the clamp shall be faced in a direction so as not to interfere with any adjacent conduit. Stainless steel ties (EO-100,612) can be used as alternates to the clamps. The maximum length of a split conduit run shall be 75 feet.
- 5.4 Couplings - The conduits, which are double male end types, are joined with a force fit plastic coupling as per EO-1179. The plastic coupling, when used for split conduit, shall be cut and wrapped around the ends.

6.0 TRENCH PREPARATION

- 6.1 Excavation of the Trench - The trench shall be excavated so as to provide a nominal cover of 24" over the highest conduit. The bottom of the trench shall be graded smooth and tamped to minimize initial settlement and to avoid "point" support of conduits. All stones projecting into the trench bottom shall be removed, and the voids backfilled before conduits are placed. Where streets are not to final grade, the cover shall be measured from the final grade, or the existing grade, whichever provides the deeper trench. If due to subsurface conditions the cover is less than 20", the duct shall be protected by 3/8" steel plates the same width as the trench. Adjacent plates shall overlap by two inches. Where possible, provide a 4" layer of clean, well-tamped backfill (Type 3/8" as per EO-8085) between the plate and the top of the duct bank. Trench widths shall be in accordance with EO-7907-D.

6.0 TRENCH PREPARATION (Cont'd)

- 6.2 Rock Protection - In rock excavations, the conduits shall be bedded as per the procedure in Con Edison specification EO-1181.

7.0 INSTALLATION

- 7.1 Material Inspection - Prior to installation, an inspection of the general conduit condition shall be made by the installing party, whether it be Company forces or contractor personnel. The inspection will include a random check of sections with a mandrel.
- 7.2 Alignment - The conduit shall be laid in as straight an alignment as possible maintaining concentric bore and flush joints to permit smooth, easy pulling of cable without damage. A maximum permissible offset of 3 inches in any 4 foot of length will be accepted. Standard precast concrete bends shall be used in all cases where greater changes in alignment are necessary. Double male end joints shall have the plastic couplings forced on snugly to provide a tight seal. All bends shall be laid so that they are tangent at the point of joining. Care shall be exercised to prevent the introduction of foreign material.
- 7.3 Formation - The conduits shall be laid in the trench in the recommended formation, specified on drawings EO-7326-B, EO-5571-B and EO-7907-D and as directed by specific layouts. When two or more conduits are installed in a duct bank, the joints must be staggered a minimum of 4 inches, both in the horizontal and vertical directions. When changes in the formation of a bank of conduits within a duct run are necessary, the transition shall be accomplished in as straight an alignment as possible, maintaining continuous earth support under the conduits.

Where specified, gas mains and precast concrete conduits shall be installed in a common trench with clearances as shown on EO-5571-B.

7.0 INSTALLATION (Cont'd)

7.4 Construction of Dips and Offset - An offset in any plane of more than 4.6" is to be made by means of 20 foot radius bends. A maximum of three, 20' radius, 5.625° precast bends are used to change the direction of the duct line, followed by a number of tangent sections of conduit to obtain the required distance of offset and three 20' radius, 5.625° precast bends to return the duct line to a direction parallel to its original direction. Drawing EO-9706-C shows the method of making duct deviations for dips and offsets. The approximate values of the offset and required horizontal distance from the start of the offset to the point of maximum deviation are given for a few possible combinations.

7.4.1 An offset of 4.6" or less may be made by cocking the straight sections of conduit. However, the misalignment of each 4' conduit section is to be limited to 3" as measured at the outer end of the section being installed and at right angles to the projected center-line of the previous section of conduit.

7.5 Points of Entry - Bell end conduits (EO-9799-D) shall be used as the terminal conduit sections for smooth, precise entry into the manhole wall and carefully cement-grouted into position, as indicated on Drawing EO-9508-C.

7.6 Closing - Closing a section of conduits with double male type ends shall be accomplished by the use of adapters. Each adapter has a female end which shall be with a section of straight PVC or fiberglass not longer than 1 foot in length and of the same nominal diameter as the conduit in the run. The PVC or fiberglass conduit shall be encased with a concrete protective coating at least two inches thick.

8.0 BACKFILL - The material, procedure, and testing shall be as described in Con Edison Specification EO-1181.

9.0 INSPECTION AND ACCEPTANCE

9.1 Specification EO-1063 gives the procedures to be followed and the requirements to be met for acceptance of the conduit system.

9.2 Any method used to clean the conduit must be accomplished in a manner that will not damage the smooth bore. Any damaged conduit must be replaced with new conduit.

10.0 REPLACEMENT

- 10.1 Vacant Duct - Repairs to conduits shall not be permitted. All individual damaged or impaired lengths of conduit shall be removed and replaced with new conduit meeting specification requirements.
- 10.2 Loaded Duct - Replacement of conduits which are removed from around existing cables shall be accomplished with precast concrete conduit, field split. Couplings for the field split conduit shall be cut and installed as stated on paragraph 5.4. PVC snap together split conduit as replacement conduit shall be limited to primary cable and it shall be concrete encased.
- 10.3 Adapting - Joining precast concrete conduit with conduits of other diameters or material is not recommended. In exceptional cases where this cannot be avoided, use concrete adapters, as per EO-1042, for this transition.

11.0 PULLING LINES – Pulling line installation is described in Con Edison specification EO-1063.

12.0 PLUGS - Duct ends that do not terminate in manholes or service boxes shall be closed with duct plugs as shown on drawing EO-10864-D. Plugs should be installed at the end of each day's work to prevent entry of foreign material.

13.0 REFERENCE STANDARDS

EO-1042 -----"Precast Concrete Conduit"

EO-1063-----"Preparation of Conduit for Cable
Installation"

EO-1179 -----"Couplings Used with Precast Concrete Conduits"

EO-1181 -----"General Specification for Backfilling of Trench and Small Openings"

EO-4410-C -----"Mandrel for Clearing Ducts"

EO-5571-B -----"Typical Installation One, Two or Four Duct, Electric Subway with
2" to 12" Gas Main in Common Trench"

EO-7326-B -----"Conduit Formations-4" and 5" I.D."

13.0 [EO-7875-D](#) -----"Precast Concrete Duct with thick Male Ends"
REFERENCE SPECIFICATIONS (Cont'd)

[EO-7907-D](#) -----"Trench Excavation for Precast Concrete Ducts"

[EO-8085](#) -----"General Backfill and Bedding Material for Excavation"

[EO-9138-C](#) -----"Clamp for Precast Concrete Ducts"

[EO-9489-C](#) -----"Precast Concrete Conduit Bends Thick Male Ends"

[EO-9508-C](#) -----"Entrances and Recesses in Manhole, Distribution Box, and Vault
Walls"

[EO-9799-D](#) -----"Precast Concrete Conduit Bell End with Thick Male End"

[EO-10,864-D](#) -----"Molded Plastic Plug for Conduit"

[EO-16734-B](#) -----"Test Mandrel for 4 inch and 5 Inch Conduits"

[EO-100,612](#) -----"Purchase Recommendation for Stainless Steel Ties for Field Split
Precast Concrete Ducts"

14.0 ATTACHMENTS

[EO-9706-C](#) -----"Typical Arrangement of Precast Concrete Conduit Showing Permissible Offsets"

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<u>REVISION</u>	<u>FILE</u>
Revised paragraph for allowable cable bends and paragraph for Loaded Duct. Revised document formatting. Field Manual No. 11 –	Construction Standards Manual No. 3 – Section 37 Section 2 Field Manual No. 17 – Section 2