UNDERGROUND CABLE PLACING

OCCUPIED DUCTS

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1. GENERAL

1.01 This section covers the conditions governing the use of occupied ducts for additional cable, the preferred order of selection of such ducts and the method of rodding.

1.02 To rod occupied ducts, it is essential that the rodding equipment have the capability of lateral rod movement through the occupied duct without rotation.

1.03 To have the duct rodder operate at maximum capabilities, a competent craftsman should be assigned and trained to operate the equipment. The craftsman should not rod occupied duct until he has become proficient in rodding unoccupied duct and has become completely familiar with the operations of the rodder.

1.04 Section 649-321-100 covers the description and use of the Champion Duct Rodder. Section 620-135-010 covers the installation of traffic warning devices and Section 620-102-010 outlines precautions to be taken at manhole locations. Section 620-140-501 covers the testing and ventilation of manholes. The precautions outlined in these sections must be followed at all times.

2. PRECAUTIONS

Safety headgear and regular eye protection should be worn at all times.

2.01 Before starting any underground cable placing operation, all personnel must be thoroughly familiar with the 620 Division of the Plant Series Practices. The sections covering the following operations should be given special emphasis:

(a) Guarding and protecting work areas

(b) Testing and ventilating manholes

(c) Precautions pertaining to smoking or use of open flames around manholes

(d) Removing and replacing manhole covers

(e) Signals used in outside plant construction work.

2.02 All personnel involved in placing underground cable must also be familiar with the operation of the equipment and construction apparatus that is to be used.

2.03 Adequate two-way radio communication must be established between the cable feeding location and the pulling equipment prior to starting any pulling operation.

2.04 Practice good housekeeping. Arrange material in the vicinity of the manhole so it will not fall into the manhole or unnecessarily interfere with pedestrian or vehicular traffic.

2.05 Inspect manhole ladders each time before using and replace promptly when found in a deteriorated condition. When the bottom of the ladder is in water or otherwise invisible, remove it for inspection.

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2.06 Each time before using, inspect all pulling irons for significant corrosion and make sure that they are securely anchored.

2.07 If work is done with a truck not equipped with an overhead exhaust and the truck is stationed near a manhole, locate the truck so the exhaust gas will not blow into the manhole or be picked up by the manhole blower.

2.08 Locate gasoline and propane driven generators, blowers, pumps, etc, on the down side of traffic and so that the exhaust fumes will not blow into the manhole.

2.09 Exercise caution when entering and leaving manholes, particularly those located on traveled thoroughfares. Always use a ladder when entering or leaving manholes. Keep hands free of material or tools when ascending or descending ladders. When ascending from manholes always face oncoming traffic. Never use a cable, coil case, or apparatus case as a step.

2.10 When working in a manhole, exercise care to prevent damage to cables while setting up the rodding apparatus or while using tools of any kind.

2.11 Do not place hands on a moving rod, winch line, rope, etc. Where sheave guards are used make certain that they are properly installed as outlined in Section 649-305-101.

2.12 Personnel should not remain in manholes during cable placing operations. Should it be necessary to check the guide tubes, proper alignment, etc, ***prior to starting the pulling operation,*** the craftsman can enter the manhole if:

(a) He remains clear of the equipment and outside the angle formed by the pulling line.

(b) The rod, winch line, steel line, or rope has only enough tension to provide normal alignment of the equipment.

(c) Notification to the pulling crew that a craftsman is going into the manhole.

2.13 Do not rod through manholes. The rodding must be from one manhole to the next adjacent manhole.

2.14 Do not rod into a manhole, vault, interior of a building, exterior of a building, or to a pole until the duct exit has been checked for blockage.

2.15 When rodding a duct having a Y or Z Conduit Coupling, rod toward the split or lateral takeoff end of the coupling so that the rod can not accidentally enter the lateral.

3. PRESURVEY

3.01 The route of the proposed underground cable should be presurveyed, giving special attention to the following:

(a) Adequate information for locating manholes.

(b) Hazardous locations because of traffic conditions.

(c) Heavy traffic conditions that necessitate out-of-hours work operations.

(d) Safeguarding work area including any special precautions required because of traffic or pedestrians.

(e) Adequate space at the manhole for setting up the cable trailer and rodding equipment.

(f) Special permits that may be required. (The permits should be secured in advance and forwarded to the supervisor in charge of the placing operation.)

(g) No stopping or parking areas. (Note the hours that the equipment can be located on the street.)

(h) Manhole facilities and arrangements including:

(1) Duct selection

(2) Conduit runs with a history of sand or mud problems

(3) Conduit runs which are known to have had dig-ups

(4) Water leaks or wet runs

(5) Offsets or splayed conduit conditions

(6) Fluid in manholes, eg, water, gaoline, oil

(7) Pumping requirements.

WATER

- Water in the manholes, when level is the same or higher than the assigned ducts
- Additional pumps required because of the heavy flow of water into the manhole
- Additional drain hoses in areas where proper drain facilities are not available.

GASOLINE OR OIL

- Do not pump until all safety precautions have been taken to guard the craftsman and public (Section 620-145-010). When required, notify fire and police departments for means of removing oil from sidewalk, street, or highways.

(8) Special rigging requirements. No pulling irons; pull through information, eg, duct alignment, etc.

4. CONDITION OF USE

4.01 There are numerous factors governing the potential use of an occupied duct for the placing of additional cable. These include the size and shape of the duct, size of the existing cable, size of the proposed cable and general condition of the conduit structure with particular reference to silt accumulation. It must be kept in mind that an occupied duct can not be rodded as readily as a vacant duct. Rod rotation must be kept to a minimum to avoid damage to the existing cable and, if required, must be done in accordance with Section 649-321-100. Also, because of the presence of the existing cable, the duct cannot be swabbed or cleaned thus generally lessening the usable duct space.

4.02 Where a duct contains two or more cables, further duct rodding shall not be attempted and the duct shall be considered unavailable for the placing of any additional cable.

4.03 Where a duct is unoccupied two or more single tube coaxial cables, up to the capacity of the duct, can be installed simultaneously (with a single cable pulling operation).

4.04 The conditions governing the use of specific sizes and shapes of ducts are covered in 4.05 to 4.09, inclusive.

4.05 ***3-inch Round Duct***

(a) Maximum diameter of the existing cable is limited to 1 3/4 inches to permit rodding.

(b) Sum of the two cable diameters shall not exceed 2.5 inches.

(c) Where the existing cable is a single tube, air-dielectric coaxial, the weight of the second cable shall not exceed 2 pounds per foot.

4.06 ***3 1/2-inch Round Duct***

(a) Maximum diameter of the existing cable is limited to 2 inches to permit rodding.

(b) Sum of the two cable diameters shall not exceed 3.1 inches.

(c) Where the existing cable is a single tube, air-dielectric coaxial, the weight of the second cable shall not exceed 2 pounds per foot.

4.07 ***3 3/8-inch Square Duct***

(a) Maximum diameter of the existing cable is limited to 2 1/2 inches to permit rodding.

(b) Sum of the two cable diameters shall not exceed 3.1 inches.

(c) Where the existing cable is a single tube, air-dielectric coaxial, the weight of the second cable shall not exceed 2 pounds per foot.

4.08 ***4-inch Round Duct***

(a) Maximum diameter of the existing cable is limited to 2 3/4 inches to permit rodding.

(b) Sum of the two cable diameters shall not exceed 3.6 inches.

(c) Where the existing cable is a single tube, air-dielectric coaxial, the weight of the second cable shall not exceed 2 pounds per foot.

4.09 ***3.8-inch (Nominal 4-inch) Square Duct***

(a) Maximum diameter of the existing cable is limited to 3 inches to permit rodding.

(b) Sum of the two cable diameters shall not exceed 3.6 inches.

(c) Where the existing cable is a single tube, air-dielectric coaxial, the weight of the second cable shall not exceed 2 pounds per foot.

5. PREFERRED ORDER OF DUCT SELECTION

5.01 When selecting occupied ducts for rodding, the duct selection should be in the following order of preference:

(1) 4-inch square duct

(2) 4-inch round duct

(3) 3-3/8 inch square duct

(4) 3-1/2 inch round duct

(5) 3-inch round duct

Note: In addition to the size duct listed in (1) through (5), take the factors listed in (6) through (10) into account in determining duct preference.

(6) Ducts containing the smallest cable

(7) Ducts containing lead sheath cables. These cables lay flatter in the duct and will cause less interference to rodding or cable placing.

(8) Ducts containing the last cable placed. The probability is that this duct will be cleaner because of recent swabbing, etc, for the cable placed

(9) Accessibility to duct (for placing duct shoe)

(10) Duct which will cause the least rearrangement of existing facilities in the manhole.

6. RODDING OCCUPIED DUCT

6.01 At the manhole location, whenever possible, the rodding equipment should be placed in line with and on the opposite side of the manhole section to be rodded.

6.02 When the rodding equipment is of the type that requires guide tubes, the guide tube assembly must be a tight compact assembly secured against movement. The occupied duct shoe must be placed on top of and parallel to the existing cable. It must be fully seated in the duct and secured tight against the duct face.

Note: Before placing the occupied duct shoe, to help protect the existing cable, an 18- to 20-inch length of split plastic sheath is placed over the existing cable.

6.03 Before starting the rodding operation, when the rodding equipment is equipped with relief or by-pass valves that limit the amount of thrust, these values should be set at the maximum allowed. See Section 649-321-100.

6.04 During the rodding operation, frequently check the guide tubes to be sure the assembly remains tight. Check the occupied duct shoe to be sure it has not backed away from the duct face. If the assembly has become loose, stop the rodding operation and tighten the assembly.

6.05 During the rodding operation, particularly on long sections, the rod may be stopped due to binding action or wedging. This occurs when the rod becomes wedged between the cable and the duct wall. To relieve the wedging effect, rotate the rod clockwise slowly pulling it back about 20 feet; then push forward without rotation. If this does not relieve the wedging effect, rotate the rod counterclockwise slowly while pulling it back about 20 feet; then push forward without rotation. If wedging persists, retract and obtain another duct.

Note: When the assigned duct cannot be rodded, the choice of another duct should be as outlined in local practices.

6.06 When a blocked or impacted duct is encountered, and if after making 4 or 5 attempts to penetrate the blockage no significant forward progress has been made, stop the operation. Note the distance penetrated from the reset footage meter and retract the rod from the duct.

6.07 Select another and preferably an adjacent duct. (The duct selection should be as outlined in local company practices.) If rodding is successful, note and refer the change in duct

assignment to the proper department. If a blockage is encountered at approximately the same distance as on the first attempt it indicates the possibility of broken conduit. Make no additional duct probes. Report the blockage and move to the next section to be rodded.

6.08 To prevent damage to the cable due to the rod wrapping around the existing cable, lateral movement of the rod through the duct should be maintained. When the rod is stopped due to blockage or impacted ducts, slow alternate clockwise and counterclockwise rotation with forward thrust should be utilized to clear the blockage.

> ***Note:*** When rotation is used to clear a block or impacted duct, rotation at the rodder does not necessarily mean simultaneous rotation at the leader. (A twist may build up in the rod itself between the rodder and the leader.) The rotation of the leader will depend on the distance between the rodder and the leader.

FLEXIBLE GUIDE HOSE

6.09 Flexible guide hoses can be used to rod occupied duct but only under the following conditions:

(a) Where a heavy rodding load is not anticipated.

(b) In relatively new duct (5 years or less) where silting is not anticipated.

(c) In short sections (approximately 300 feet or less) where manholes are normally dry and extensive silting has not been experienced or is not expected.

(d) For short laterals (generally).

6.10 Adjust the rodding equipment so it is in line with and on the opposite side of the section to be rodded and the flexible guide hose is butted firmly against the face of the duct to be rodded. Lash the guide hose firmly to the cable in the occupied duct. Secure the guide hose to the pulling-in iron with a rope line.

During the rodding operation a constant watch must be kept on the flexible guide hose between the duct and rodder, to be certain it has not become dislodged from the duct.

6.11 To pull the cable, air pipe, etc, in with the rodder, after the occupied duct has been rodded, a wire sling must be placed between the leader and cable, air pipe, etc, being pulled. The wire sling should be of sufficient length to allow the cable, pipe, etc, to be pulled flush with or just inside the duct face. (The length of the wire sling should be equal to the total guide pipe length.) Cable or pipe would be damaged if the attempt were made to pull them into or through the guide pipes. When the leader wire sling connection reaches the opening or rodder head (at the rodder), disconnect the wire sling from the leader, and disassemble and remove the guide pipes. Run the rod out, attach the leader to the cable, pipe, etc, and pull into the manhole to provide sufficient length for splicing.

6.12 The rodder shall be used to pull cable, air pipe, etc, into the duct. If the anticipated pull as estimated during the rodding operation, would exceed the maximum pull of the rodder at the leader the operation should be stopped and another duct selected.

> ***Note:*** The pull exerted at the rodder can be appreciably less than that developed at the leader because of friction loss in the guide pipe and duct. The friction loss is further increased when the conduit structure contains 90 degree or S-bends.

6.13 When CA 3131 Gas Feeder Pipe is to be pulled in, a B Pipe Seal (Fig. 1) should be installed in the pipe end to prevent entrance of moisture. The wire sling is placed between the rod leader and B Pipe Seal.

6.14 When the occupied duct contains a coaxial cable (air dielectric), the cable to be pulled in must not exceed a weight of 2 pounds per foot.

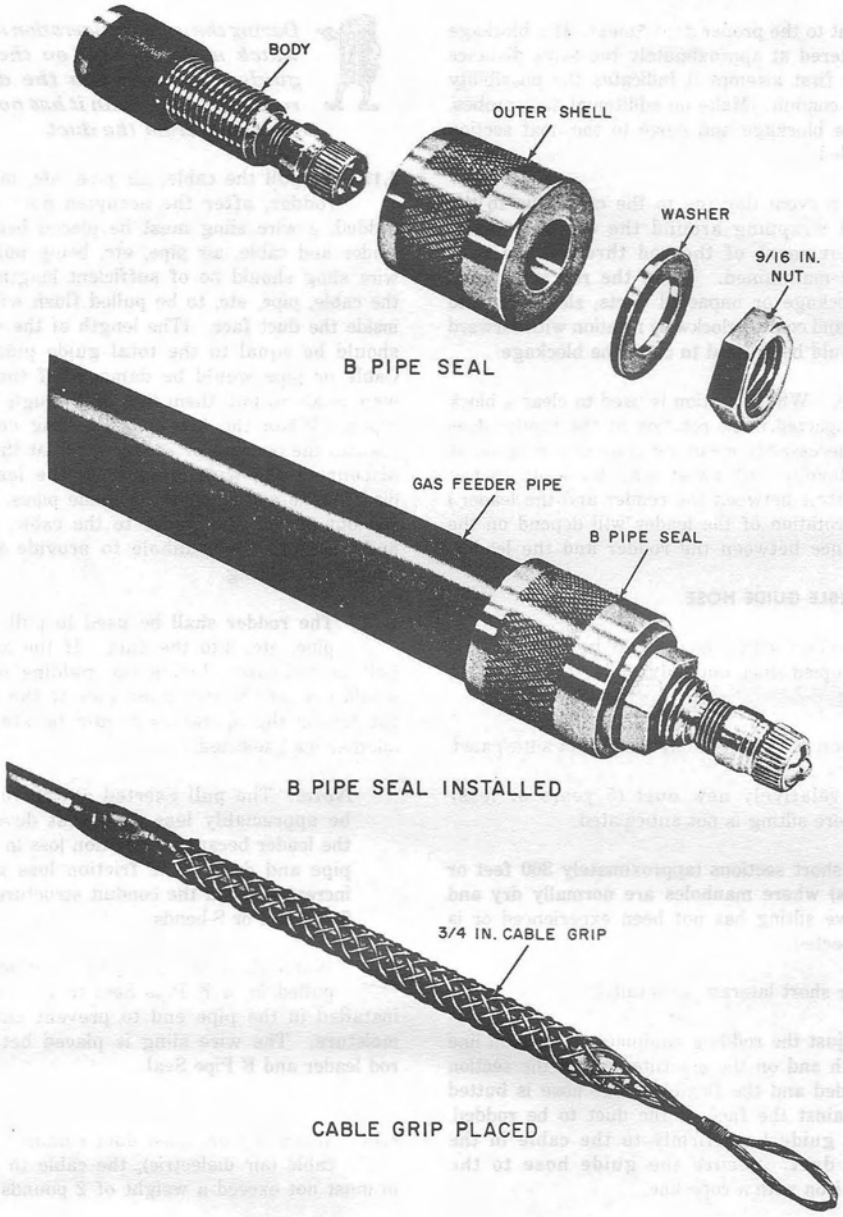

Fig. 1—B Pipe Seal Installed—