BURIED PLANT—INSTALLATION
TELEPHONE AND POWER IN SAME TRENCH
AND IN SEPARATE TRENCHES IN SAME EASEMENT

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1. GENERAL

1.01 This practice outlines the procedures applicable to:

- buried construction where the telephone and power companies use separate trenches within the same easement for their cables and wires.
- buried construction where the telephone and power companies share a common trench (joint-use).

1.02 This section is reissued to:

- Include shoring information.
- Revise Part 10.

Since changes are extensive, arrows showing changes have been omitted.

1.03 Information covering splicing and the placement of closures, precautions, trenching, etc, is contained in other sections of the 629 Division of the Bell System Practices.

1.04 The following definitions are provided to clarify the meaning of terms used in this practice:

- ***Separate trench*** is the term used to describe two paralleling trenches within the width of a single easement, one containing power cables and the other containing telephone cables and/or service wires.
- Joint buried is the term used to describe the conditions when power and telephone cables and/or service wires are placed in the same trench and being either vertical, horizontal, or random separated.
- ***Vertical separation*** is the term used to describe the separation obtained when power company cables are placed in the bottom of the trench, then backfilled to obtain 12 inches separation between power cables and telephone cables and/or service wires.

- ***Horizontal separation*** is the term used to describe the condition when power and telephone cables are placed in the bottom of the trench at the same depth with 12 inches of separation between facilities. This type of construction is not as desirable as ***vertical separation*** because of difficulties in maintaining separation especially at cable loop locations and because of additional width of trench.

- ***Random separation*** is the term used to describe the conditions obtained when power and telephone cables and/or service wires are placed in the same trench at the same depth, with no deliberate or required clearance or separation between facilities.

1.05 Maintenance to existing plant is covered in Section 629-020-102.

2. PRELIMINARY WORK

2.01 Plan all work so that backfilling can be completed on all open trench each day if practicable. All pipe pushing or augering should be completed prior to the cable installation date. Where conduit is required for any condition in joint buried distribution systems, separate ducts for power and telephone wires must be provided.

2.02 Determine if terrain over the cable route is clear and close to final grade several days in advance of cable installation. If not, make arrangements with the developer to clear and grade the terrain to near final grade so that cables will be at the specified depth after final grading is completed.

2.03 Each company is responsible for timely delivery of reels of cable, wire, and other materials and must observe necessary precautions in safeguarding such materials after delivery.

2.04 Prior to commencing operations, the following Bell System Practices should be reviewed:

620-102-010	Outside Plant Precautions Underground And Buried Work
620-135-010	Guarding Work Areas
629-100-010	Buried Plant—Precautions

3. AUGERING AND PIPE PUSHING

3.01 When augering or pipe pushing is necessary to avoid obstructions or for other reasons, such work should be done in advance of the cable installation date in order to expedite cable installation.

3.02 Pipe pushers and related equipment are covered in the 649 Division of the Bell System Practices.

4. MAIN AND SERVICE TRENCHES (VERTICAL, HORIZONTAL, AND RANDOM)

4.01 The exact route and location of all telephone and power equipment should be marked in advance with approved stakes or equivalent.

4.02 Dig the trench at the depth, width, and location specified on the work order. A typical cross-sectional view of the main trench is shown in Fig. 1. Where the trench cannot be dug as specified, refer the matter to the Engineering office responsible for the job.

Note: Under normal conditions with stable soil, shoring is not required unless excavations are 5 feet or more in depth and employees have occasion to enter them. This 5-foot guide should be modified to shorter depths if unstable soil conditions or rainy weather exists or if heavy equipment or traffic are in proximity to the excavation. Section 622-020-020 covers these requirements.

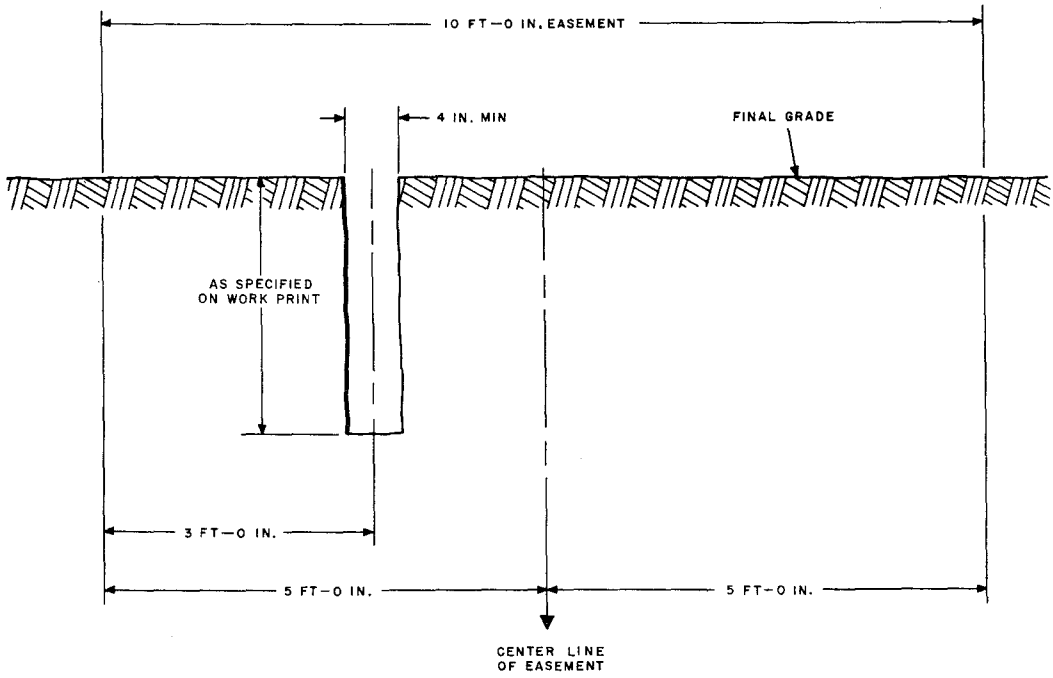


Fig. 1—Typical Cross-Sectional View of Main Trench

4.03 A plan view of a typical residential block provided with buried telephone plant and power service is shown in Fig. 2. If streets are surfaced or carry considerable traffic, it may be

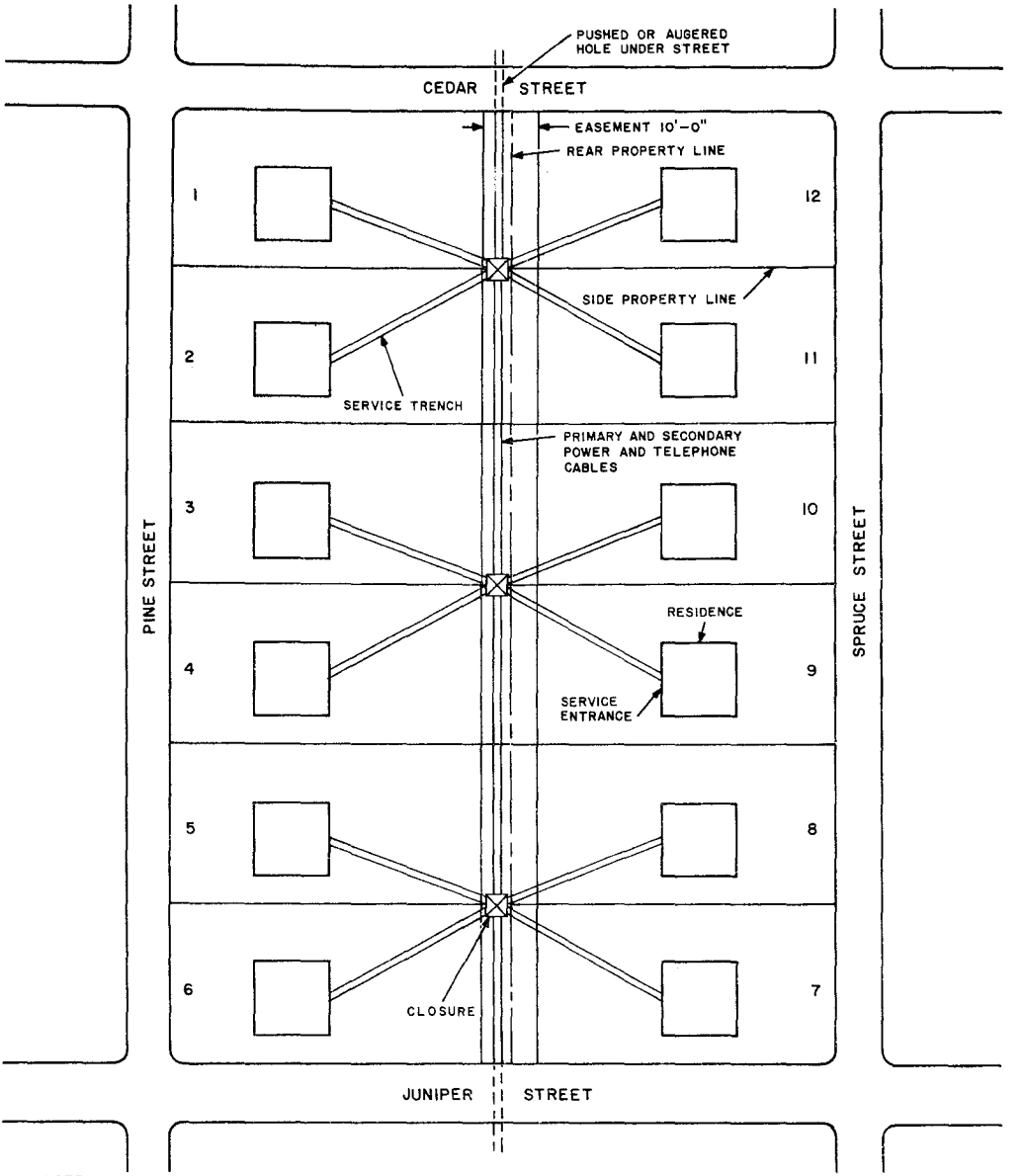


Fig. 2—Typical Plan View of Main and Service Trenches in Rear-Lot Buried Installation

desirable to push or auger under the street for telephone and power service as shown crossing beneath Cedar and Juniper Streets.

4.04 Closures are provided along the cable route to connect service wires to the cable to serve the customer (Fig. 2). See Section 631-600-101 of the Bell System Practices for details on cable closures.

5. CABLE AND SERVICE WIRE INSTALLATION

5.01 The methods to be used in placing the cables will depend on the location of the route, obstructions, terrain, and soil conditions.

5.02 When soil conditions are such that the trench will not cave in, and other conditions permit, place the cable and service wires directly from the reel as it is drawn along the open trench (moving reel method). ***Do not pull the cables taut.***

5.03 When conditions do not permit using the moving reel method (5.02), the cables and service wires may be pulled from stationary reels at the end of a section or at some intermediate point and laid alongside the trench. When sufficient lengths have been laid alongside the trench for the run, including lengths for loops and terminations, place the cables and service wires in the trench. ***Do not pull the cables taut.***

5.04 When sandy or fluid soil conditions are encountered, the cables and service wires should be laid out alongside the cable route sufficiently far away to avoid being damaged by the trencher. Place the cables and wires in the trench as the trencher moves forward. Either moving reel or stationary reel method may be employed, but in either case all cables and service wires to be placed should be laid alongside the cable route before trenching is started.

5.05 Backfill all trenches as soon after cable placing as practical. Backfilling may be done either by machinery or by hand depending on the amount of backfilling required and availability of machinery. Run wheels of a tractor or other machinery over the filled trench to compact the backfill.

Separate Trench

5.06 When using a separate trench in the same easement for power and telephone facilities, follow Section 629-020-012 except for bonding. Bonding shall be in accordance with Part 9 of this section.

Vertical Separation

5.07 When vertical separation is to be maintained between power and telephone facilities, first place only the power cables in the trench. Backfill and tamp 12 inches of soil above the power cables as shown in Fig. 3, then place telephone cables and service wires. It is expected that the power company will handle their facilities except where other local arrangements have been made.

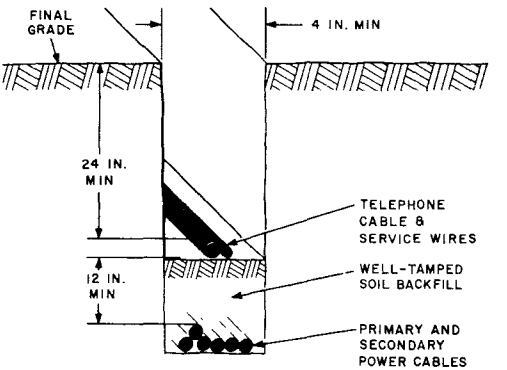


Fig. 3—Cables and Service Wires Placed in Main Trench—Vertical Separation

5.08 When a power company transformer is to be placed over the main trench, provide a bypass trench for the telephone cable as shown in Fig. 4.

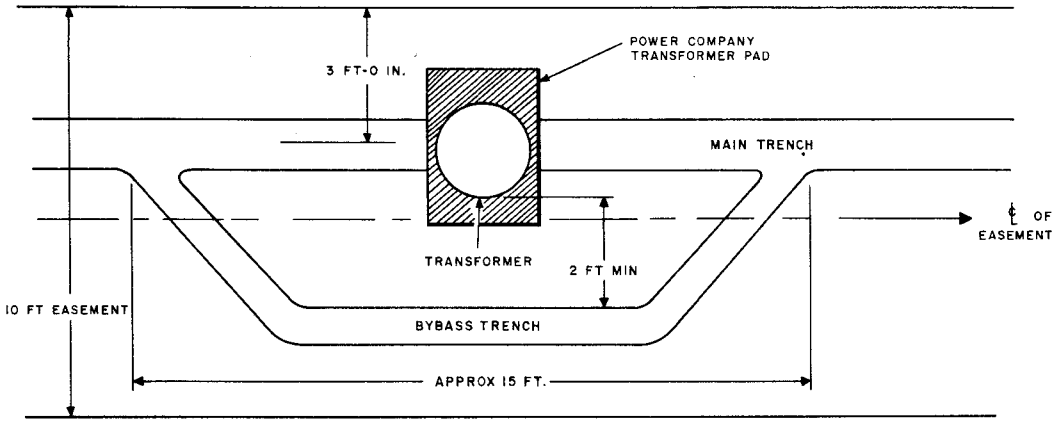


Fig. 4—Bypass Trench Around Transformer

Random Separation

5.09 Place cables as described in 5.02, 5.03, or 5.04 and as shown in Fig. 5 and 6. When a power company transformer is to be placed over the main trench, provide a bypass trench for telephone facilities as shown in Fig. 4.

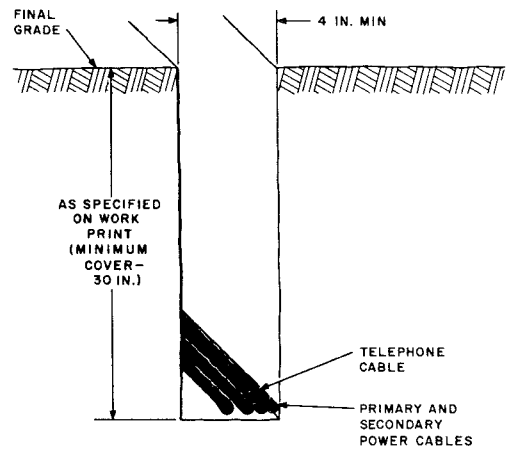


Fig. 5—Primary and Secondary Power Cables and Telephone Cable—Random Separation

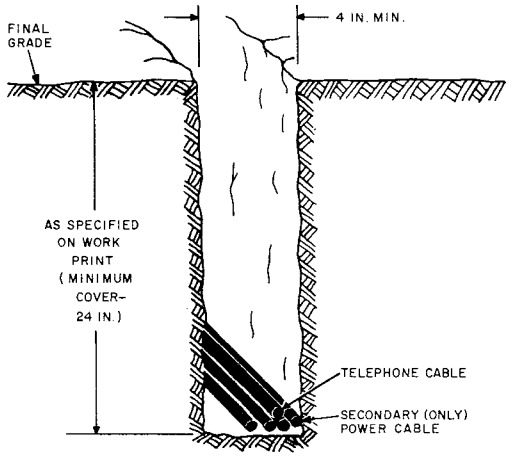


Fig. 6—Secondary Power Cables and Telephone Cable—Random Separation

6. EXTENSION TO EXISTING SYSTEMS

6.01 Accurately locate the path and depth of the cable to be exposed as outlined in Section 634-220-500, 634-220-501 or 634-220-515 before starting excavation.

DANGER: In regard to depth determination, neither the low or high frequency methods outlined in Section 634-220-500 or 634-220-501, respectively, can be relied on to give more than an approximate indication of the depth of cable in joint buried systems.

6.02 Determine the path and depth of the power plant either by power company staking or assume random lay.

6.03 Excavation of joint buried plant may be performed when the ***power company is present*** if ***all*** of the following conditions are met and the following procedure is followed:

CONDITIONS

(a) There is no known or suspected power trouble.

(b) The voltage is known.

(c) Safety headgear and eye protection are worn.

(d) Bell System E insulating gloves are worn.

PROCEDURES

(a) Use of ***wooden handle*** shovel or similar tool having ***equivalent insulating value.***

DANGER: DO NOT USE DIGGING BARS OR TOOLS WITH METAL HANDLES IN THE VICINITY OF JOINT BURIED CABLES.

(b) Start digging at a point 6 to 12 inches to one side of the established path.

(c) When at the depth of the cable dig toward the cables to expose them.

(d) If digging conditions are encountered which require tools other than a shovel, use a wooden handle pick or similar tool having equivalent insulating value.

Power company employees shall be requested to separate or move primary and secondary cables, service leads in main trenches, and secondary leads exceeding 300 volts to ground in service trenches.

6.04 Excavation of joint buried plant may be performed when the ***power company is not present*** if ***all*** of the following conditions are met and the following procedure is followed:

CONDITIONS

(a) There is no known or suspected power trouble.

(b) The voltage has been determined to be less than 300 volts to ground by one of the following methods:

(1) Verification with power company records

(2) Power company staking

(3) Personal positive knowledge of the area, primary route, and transformer location.

(c) Safety headgear and eye protection are worn.

(d) Bell System E insulating gloves are worn.

(e) The power company has been notified and permits these procedures.

(f) The location and depth of the telephone plant has been determined.

(g) The location and depth of the power plant has been determined (power company staking or known joint plant).

(h) The area to be excavated is a secondary trench and not in an industrial or commercial area where the service voltage is likely to exceed 300 volts.

PROCEDURES

(a) Use a ***wooden handle*** shovel or similar tool having ***equivalent insulating value.***

DANGER: DO NOT USE DIGGING BARS OR TOOLS WITH METAL HANDLES IN THE VICINITY OF JOINT BURIED CABLES.

(b) Start digging at a point 6 to 12 inches to one side of the established path.

(c) When at the depth of the cable, dig toward the cables to expose them.

(d) If digging conditions are encountered which require tools other than a shovel, use a wooden handle pick or similar tools having equivalent insulating value.

(e) Separate power and telephone plant using wooden handle of a shovel or a section of tree pruner handle. Do not apply excessive leverage to the exposed plant as this could damage the telephone sheath or the power insulation.

(f) Place dry wooden boards between telephone and power plant and cover power plant with insulating blankets.

In case of known or suspected power trouble, telephone employees shall not excavate, move, separate or in any way handle power cables of any voltage until the power trouble has been cleared.

6.05 Wearing insulating gloves, electrically identify and mark the exposed telephone cables as follows before handling, opening, or cutting.

DANGER: Except in the case of a cut cable, visual identification shall never be attempted. Never assume that a particular cable is a telephone cable because other cables in the trench have been identified by the power representative. Cables must be electrically identified and marked even though they have been identified in an adjacent pit, for the cable may be transposed in the connecting trench.

(a) Using a 76, 146A, or KS-14103 type test set, place a tone at a terminal or central office between one conductor of a pair in one group and a conductor of a pair in a second or different group.

(b) Short these conductors at the distant end; then, using 101B or 105D test set (exploring coil) in conjunction with 147-type amplifier, identify the telephone cable. ***Do not use a ground return with the tone because the telephone cable sheath ground and the power neutral are interconnected and the tone will be picked up on power cable.***

(c) After ***positive*** electrical identification has been made, mark the cable with paper tape or muslin, etc, before any further work commences.

(d) Where telephone cables have been cut and positive identification can be made because the conductors are clearly visible, electrical identification is not required.

6.06 If only the one company is extending its plant, place mechanical protection over the plant not involved in the extension.

6.07 After the cables have been exposed, power digging equipment may be used to extend the trench provided buried power facilities have not been extended in the right-of-way area where telephone plant will be buried.

6.08 Extend the system as specified on the detailed plans.

7. PLACING ABOVEGROUND CLOSURES

7.01 Closures should be placed before backfilling to avoid damaging cables. In the event the trench is backfilled before the closure is placed, uncover all the cables in the trench before placing closure. Remove additional dirt as required to facilitate placement of closure.

7.02 Place the closure in the center of the width of the trench, as shown in Fig. 7.

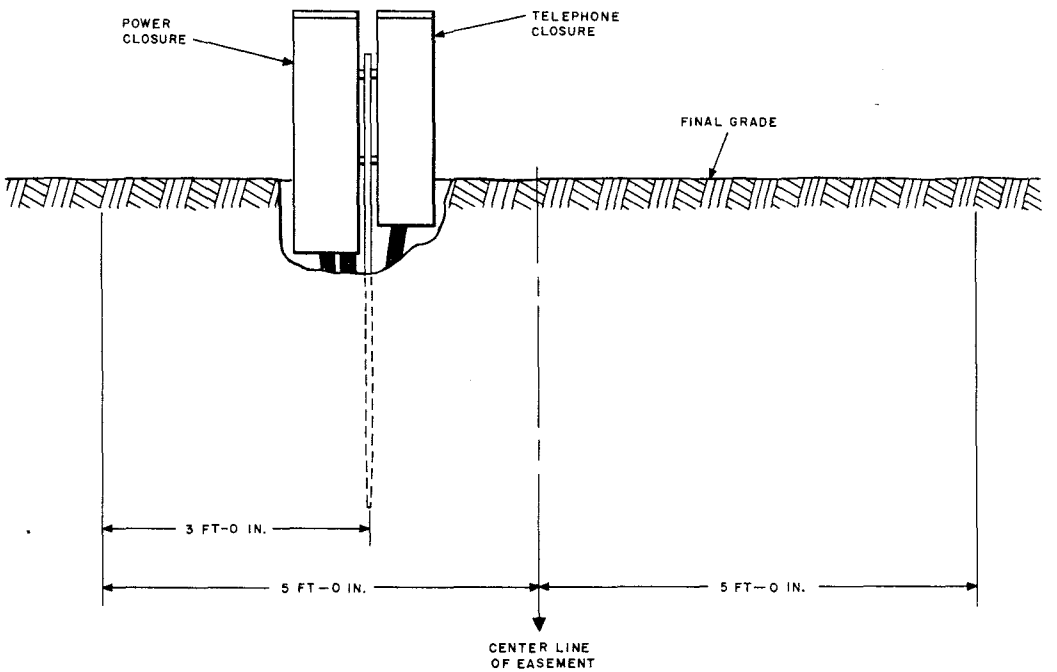


Fig. 7—Placement of Joint-Use Pedestal Closures

8. SPLICE CLOSURE PLACING

8.01 At splice locations where closures are not installed at the time of cable installation, slot the trench at points where a splice is required and bring out the cut cable ends and tie to a temporary stake before backfilling as shown in Fig. 8. This stake should be of sufficient size to support the cable without breaking, and also serve notice to construction equipment operators working in the vicinity.

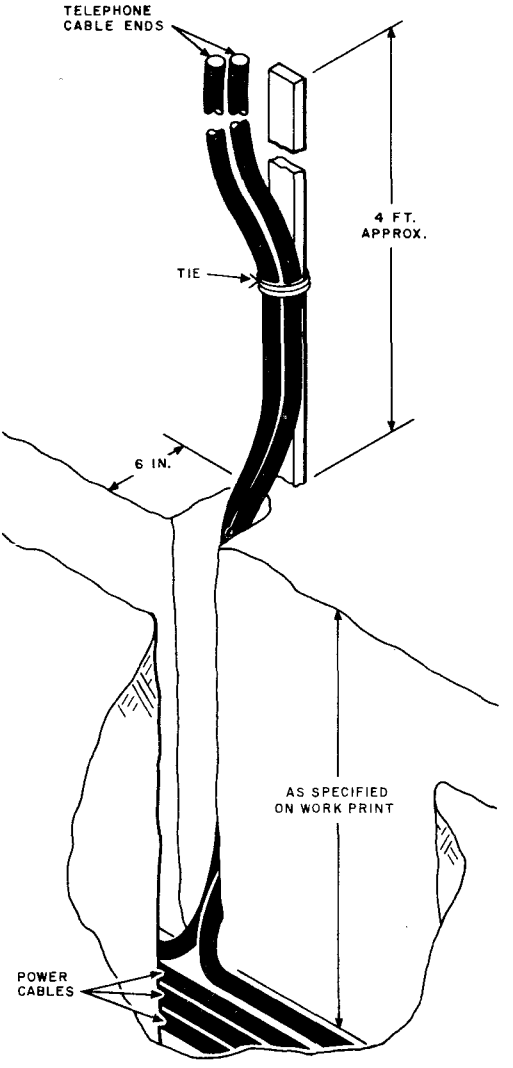
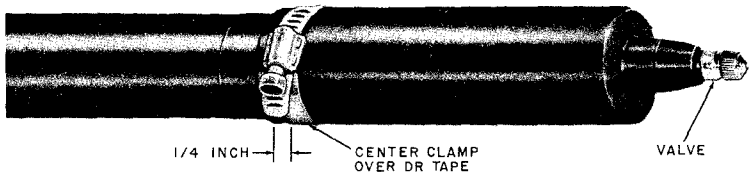


Fig. 8—Main Trench Slotted for Splice Closure Cable Ends

8.02 Protect the cut ends of telephone cables from moisture by placing cable caps of proper size (Fig. 9). If the cable is under gas pressure, the cut ends should be sealed with a cap equipped with a pressure testing valve. After this cap is placed, pressurize the cable. Additional information on cable caps is given in Section 633-505-212.



NOTES:

1. SELECT A CAP SIZE 1/4 INCH, BUT NOT MORE THAN 1/2 INCH LARGER THAN THE OUTSIDE DIAMETER OF THE SHEATH.
2. WRAP TWO LAYERS OF RUBBER OR DR TAPE ON SHEATH WHERE CLAMP IS TO BE TIGHTENED. IF THE CABLE SHEATH IS SCORED, SCUFF SMOOTH WITH A CARDING BRUSH; OTHERWISE, NO SPECIAL CLEANING IS REQUIRED.

Fig. 9—Sealing Cable End With Cable Cap

9. BONDING

GENERAL

9.01 ***The required bonding shall be specified on the detail plans. The construction forces are responsible for the proper implementation of the design, including verification of the bonds.***

9.02 Choose bonding locations to minimize the length of bonding wire and to facilitate the connection to the power neutral. These locations will generally be at the transformer or at power pedestal where the power company employees have access to the power neutral ground wire. Where necessary local arrangements have been made with the power company, bonds may be made directly to primary or secondary neutrals other than at transformers or pedestals. Such bonds may be required where transformer and/or power pedestal locations are more than 1000 feet apart.

9.03 Attachment of the No. 6 AWG insulated copper bond wire to the closure is described in the Bell System Practice covering the particular closure used. A method of connecting the bond wire directly to the shield of nonpressurized buried PIC cables is outlined in Section 629-020-010. Attachment of the bonding wire to the power neutral ground shall be made by the power company.

9.04 Protection considerations pertaining to bonding are outlined in 9.05 through 9.09.

Joint Trench—Random and One-Foot Separation

9.05 Bond telephone cable shield or closure to power neutral ground or power apparatus at the following locations.

(a) At the telephone terminal, pedestal, or buried type cable closure supplying service wires or service cables nearest to each transformer. The bond must be made to the transformer itself, to the primary neutral, or to a secondary neutral or secondary pedestal served from that transformer.

(b) At least at every other terminal, pedestal, or buried type cable closure supplying service wires or service cables. The bond must not be omitted on any two adjacent terminals.

(c) At all aboveground telephone terminals, apparatus cases, and cable closures which are located within 10 feet of any aboveground

power apparatus. Such bonds must be made directly to the aboveground power apparatus.

(d) Not more than 1000 feet apart; ie, no point on the telephone cable shall be more than 500 feet from a bond.

Separate Trenches Three Feet or Less Apart

9.06 Bonding requirements are the same as outlined in 9.03 for joint trench.

Separate Trenches More Than Three Feet Apart

9.07 Bond all aboveground telephone terminals, apparatus cases, and cable closures which are located within 10 feet of any aboveground power apparatus directly to the power apparatus.

Common Right-of-Way with Aerial Power

9.08 Where buried telephone cable is located in the same right-of-way or easement with aerial power line, bond the cable shield or closure to the MGN or secondary neutral vertical down leads located within 10 feet of the power system. Bonds should be made at or near both ends of the exposure and at least once every mile. If the cable is buried on the opposite side of a highway, street, alley, etc, from an aerial power line, bond the cable shield or closure to the power neutral ground wire at all convenient locations where either the power line or telephone cable crosses the highway, street, or alley except that it will not be necessary to place such bonds at more frequent intervals than 1/2 mile separation. It is desirable to have at least one bond per mile in such situations. Where a buried cable closure is placed on a pole having a vertical neutral ground wire, bond the closure to the ground wire.

9.09 Procedures for bonding directly to the telephone cable shield is outlined in Section 629-020-010.

10. VERIFICATION OF BONDS

10.01 Every effort should be made to connect and verify bonds between the telephone cable shield and the electric neutral simultaneously by the telephone company and the electric company at time of installation. When simultaneous bonding is not possible, a system of ***positive reporting*** jointly agreed upon by both companies must be used.

10.02 An example of positive reporting is as follows:

(a) The telephone company shall notify the electric company, ***using a locally designed form,*** that a No. 6 AWG copper bond wire has been attached to the telephone company cable shield and sufficient wire left for connection to the electrical facility.

(b) After the electric company has connected the No. 6 copper bond wire to its multiground neutral system, it shall notify the telephone company by completing the telephone company form and returning it to the telephone company.

TELEPHONE COMPANY EMPLOYEES SHALL NOT CONNECT BONDS TO POWER CABLE PLANT. THIS CONNECTION SHALL BE MADE BY THE POWER COMPANY.

10.03 Joint buried systems shall not be considered completed and ready for use, including temporary service, until all required bonding has been verified. If a completed form has not been received from the electric company, a qualified supervisor shall be responsible for checking to assure that required bonding has been made.