BURIED PLANT
URBAN INSTALLATION
TELEPHONE IN VICINITY OF POWER

Contents

1. GENERAL

1.01 This section covers arrangement of plant, electrical protection requirements, and safety precautions that must be observed when buried telephone facilities are in a common trench with, or are in proximity to, buried power conductors.

1.02 It is reissued to clarify and update the information.

Note: Marginal arrows used to indicate changes are omitted.

1.03 These instructions supplement those in Section 629-100-010, "Buried Plant — Precautions" and Section 629-200-206, "Buried Plant — Placing".

1.04 Special requirements exist for separation and mechanical protection of buried plant in mobile home parks in California. (See 2.04.)

2. TYPES OF INSTALLATIONS

Separate Trench – In Proximity

2.01 Buried telephone plant that is installed in the same utility easement as power, or is within ten feet of buried power conductors, shall be bonded in the same manner as plant installed in a common trench with separation. (See 2.02.) In these types of installations, crossings of telephone and power facilities are unavoidable, and all of the precautions outlined in this section apply.

Common Trench – Planned Separation

2.02 Planned separation requires a clearance of not less than 12 inches of earth, 3 inches of concrete, or 4 inches of brick masonry between power and telephone wires or cables.

- Vertical separation describes 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 wires.

- Horizontal separation describes 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 the

inherent difficulty of maintaining separation, especially at cable loop locations, and because of the additional volume of dirt that must be excavated.

Common Trench – Random Separation

2.03 Random separation means that both telephone and power conductors are in a common trench at the same depth without any required or deliberate clearance. Such installations must meet special bonding and grounding provisions. In California, General Order No. 128 precludes random separation from voltages in excess of 300 volts to ground except where special Public Utilities Commission permission is obtained. When authorized by the Protection Engineer, random spearation may be used in connection with power circuits carrying not over 300 volts to ground (secondary voltage). However, the power circuit must include an effectively grounded neutral conductor (which may be insulated) that is bonded to all grounding conductors, sheaths, shields, or metallic housings of the power system. *Bonding of telephone distribution cable sheath to the power system neutral is required if any portion of the plant (including service wire or cable) is placed using random separation.* (See Part 8.)

2.04 Random separation shall not be used in mobile home parks.

Exposure Classification

2.05 Buried distribution systems are not considered to be subject to the possibility of accidental contact with power conductors unless they are installed with random separation from primary power. However, they may be subject to the effects of lightning, induction, or rise in ground potential due to power system faults.

2.06 For administrative reasons, stations served from buried distribution systems are usually *classified* as exposed and require station protection. This permits the greatest flexibility in the design of outside plant.

2.07 Buried distribution systems that meet *all* of the criteria for unexposed plant may be classified as unexposed, provided the Protection Engineer's concurrence is obtained.

3. FUSE CABLE REQUIREMENTS

3.01 Buried distribution systems that are *classified* as exposed must meet fuse cable requirements at junctions with feeder cables. These requirements are detailed in Section 638-205-015.

3.02 When random spearation from primary power (over 300 volts to ground) is involved, and the telephone cable is 19 or 22 gauge, there is an additional requirement. A fusible link must be installed at the junction of service wires and distribution cable. This is done by piecing-out the service wires with 10-inch lengths of scrap 24-gauge PIC conductors and then joining these to the cable pairs with standard wire connectors.

4. JOB PLANNING

4.01 Prior to receiving the work prints, agreements will have been made with the other utilities covering most of the aspects of the job. Among these agreements are:

(a) Who will do the trenching or portions of trenching.

(b) When our facilities will be placed.

(c) Who will backfill.

(d) Who will place the terminal posts.

(e) How interconnection of bonds will be accomplished.

(f) What portion of the trench we will occupy when separation is to be maintained.

(g) When work will start.

(h) Procedures used to coordinate the job.

(i) Who will coordinate for each utility.

(j) In new developments all of the companies will obtain their necessary easements.

(k) The company responsible for trenching will secure from the developer a signed agreement specifying final grades.

(l) The telephone and power company Engineering Departments will specify on work drawings or work orders the location and depth of the trench for final grades, and show proposed grade changes by developer, if any, and location of all splices, terminals, transformers, etc; also whether the installation is to be on a separate trench, vertical, horizontal or random separation basis.

4.02 Coordination on jobs of this type is extremely important. Failure to do so can impose hardships on all parties involved. If anything unforseen develops, notify the Telephone Company coordinator immediately so that corrective measures can be started.

5. PRELIMINARY WORK

5.01 The company responsible for trenching shall formulate plans for doing the work after sufficient field inspection by all companies to establish what work is required and how it can best be accomplished. In making such plans the requirements of all companies must be considered, as well as the date on which service is required. These requirements must be specified on the work order.

5.02 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 conduits are required for any condition in joint buried distribution systems, separate conduits for power and telephone wires must be provided.

5.03 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.

5.04 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.

6. MAIN AND SERVICE TRENCHES
(Vertical and Random Separation)

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

6.02 Dig the trench at the depth, width, and location specified on the work order. Where the trench cannot be dug as specified, refer the matter to the Engineer.

6.03 If streets are surfaced or carry considerable traffic, it may be desirable to push or auger under the street.

6.04 Closures are provided along the cable route to connect service wires to the cable to serve the customer. See the 631 Division of Bell System Practices (BSPs) for details on cable closures.

7. CABLE AND SERVICE WIRE INSTALLATION

7.01 Methods used to place cables will depend on the location of the route, obstructions, terrain, and soil conditions.

7.02 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 trailer as it is drawn along the open trench. *Do not pull the cables taut.*

7.03 When conditions do not permit using the moving reel method (7.02), 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 for the run, including lengths for loops and terminations, place the cables and service wires in the trench. *Do not pull the cables taut.*

7.04 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 alongise the cable route before trenching is started.

7.05 Backfill all trenches as soon after cable placing as practicable. 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

7.06 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 8 of this section.

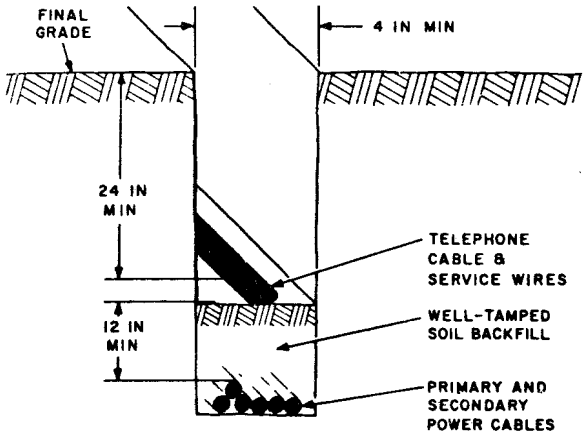
Vertical Separation

7.07 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. 1, then place telephone cables and service wires. It is expected that the power company will handle their facilities.

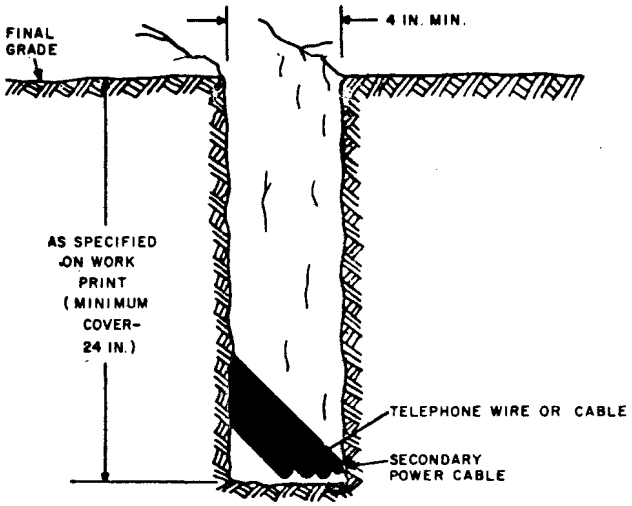
7.08 When a power company transformer is to be placed over the main tench, provide a bypass trench for the telephone cable as shown in Fig. 3.

Random Separation

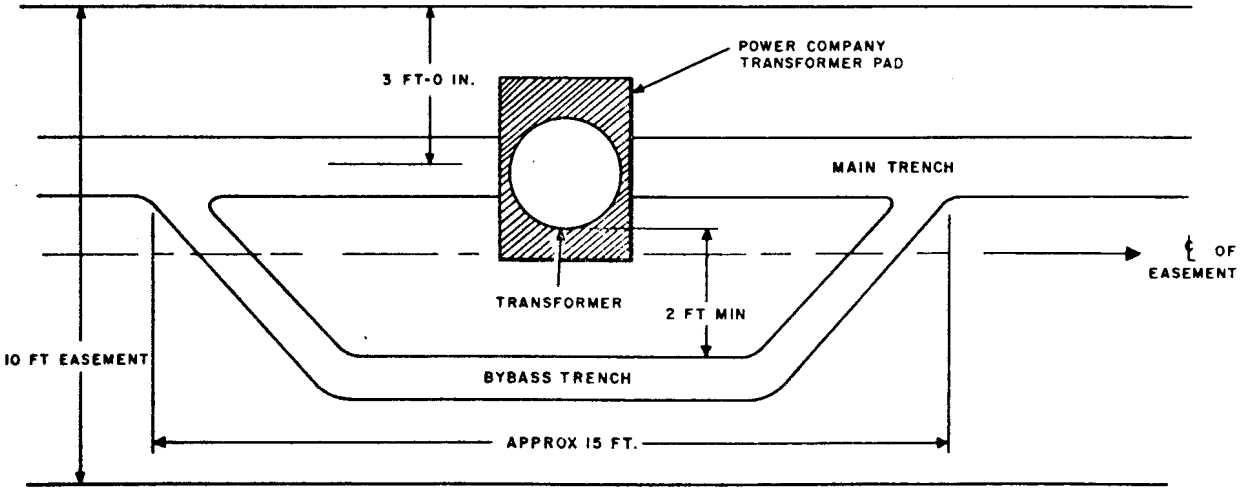
7.09 Place cables and service wires as described in 7.02, 7.03, or 7.04 and as shown in Fig. 2. When a power company transformer is to be placed over the main trench, provide a bypass trench for telephone facilities as shown in Fig. 3.



Cables and Service Wires Placed in Main Trench Vertical Separation
Fig. 1



Secondary Power Cables and Telephone Service Wire or Cables – Random Separation
Fig. 2



Bypass Trench Around Transformer
Fig. 3

8. BONDING AND GROUNDING (Common Trench or in Proximity)

Bonding

8.01 All bonding details that involve the power system will be specified on the work prints. If it is obvious that any of the following general requirements have been omitted, the matter should be referred to the Plant Engineer.

8.02 On random separation jobs, all bonding to the power system must be completed before the power cables are energized.

8.03 Bond telephone cable shield and closures to the power neutral ground wire as indicated in the following paragraphs. Attachment of the bonding wire to the closure is described in the BSP covering the particular closure used. Attachment of the bonding wire to the power neutral ground wire shall be made in accordance with local instructions.

8.04 Telephone cable shield and the power neutral shall be bonded together at all above ground telephone closures and at all transformer locations, except as indicated in 8.05 and 8.06 or where the detail plans specify otherwise. If spacing between transformer locations is 1000 feet or more, additional bonds to the power neutral must be made so that bond points are less than 1000 feet apart.

8.05 Where detail plans indicate that joint-use pedestal closures are to be used, bonding at transformers may be omitted provided the distance between the transformer and each adjacent joint-use pedestal closure is less than 500 feet.

8.06 Where separately mounted telephone closures are used, bonds may be omitted at any closure or transformer if the distance to each adjacent bond point is less than 500 feet. However, a bond should be made at least at every other closure (ie, the bond should not be omitted on any two adjacent closures). A bond must be made at any aboveground closure that is within 10 feet of any aboveground power apparatus.

8.07 Grounding and bonding connections must be free of paint or other foreign matter and must provide for tight metal-to-metal contact. NEVER include a ground or bond wire in the same connector that is used for bonding the shield of service wires.

8.08 Depending upon the local agreement in effect, either the power employee or the telephone employee will connect telephone bonds to the power grounding system. The power system must be de-energized if a telephone employee is to make the connection. NEVER enter power closures for any reason or do work on power equipment.

8.09 On completion of a joint buried job the foreman and a power company representative shall make a joint inspection of all required bonding points to assure that work has been completed.

Grounding

8.10 Normally, no special ground measures other than bonding will be required. When special grounding is required, it will be specified on the work prints.

8.11 Protector grounds shall be installed in accordance with Section 460-100-201. *Remember, the telephone protector ground, the service wire shield, and electrical service ground must be inter-connected at the structure being served.*

8.12 *All grounding and bonding* connections must be securely tightened. This is for the protection of the public, telephone workmen, and telephone plant.

9. MAINTENANCE PRECAUTIONS

General

9.01 Observe all precautions listed in Section 629-100-010.

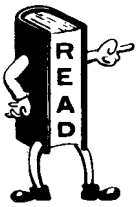
9.02 Do not shift, straighten, or relocate equipment containing power conductors, such as joint pedestals, unless the power company has determined that it is safe to do so.

9.03 *Do not enter power closures or do work on power equipment.*

9.04 Heat and/or the odor of burning insulation is an indication of energized plant.

9.05 If there is any doubt, *Don't Take A Chance.* Notify your supervisor.

9.06 If the nature of the damage sited (such as: an excavation in progress, slide, etc), indicates possible damage to the power conductors, contact the power company to be sure that their plant is clear of trouble before doing any work. If there is trouble in their plant, let them clear it before starting any work.



9.07 *All exposed power cables or conductors must be covered by insulating blankets before working near them.* Have the power company employees place and remove the blankets when possible. If you have to place or remove the blankets, wear insulating gloves, keep clear, and use caution not to come in bodily contact with the power cables or conductors. Do not handle them any more than is absolutely necessary.

9.08 If there is evidence of power system damage, a power company representative shall be responsible for isolating or clearing the power facilities. *Telephone employees shall not work on telephone facilities until the power condition has been cleared.*

9.09 When it is necessary to work in the vicinity of facilities installed with random separation or where it is believed the telephone and power facilities are in proximity, proceed as covered in the following paragraphs.

Excavation

9.10 Before excavating, obtain record information about the installation. Locate both telephone and power facilities on the surface and determine depths as accurately as possible. *In all cases, final determination of the location of telephone facilities shall be by means of approved tools and methods.*

9.11 Advance notice of excavation shall be provided to the other utility so they may take such precautionary action as they deem necessary. In the case of emergency work, the utility performing the digging operations shall notify the other utility as soon as possible.

9.12 It is the responsibility of the utility doing the excavating to determine the location of and to expose the conductors or cables which were installed in a common trench.

9.13 Existing facilities shall be exposed by *hand digging.* use extreme care to avoid damage to cable or conductor insulation. Use only tools that have handles made of wood. *Do not use pneumatic tools or digging bars.*

9.14 If another utility has facilities in the vicinity in addition to those that were installed in the common trench, it is the responsibility of that utility to designate the location of such facilities. If it becomes necessary to expose them, the work is to be done by the utility doing the excavating.

9.15 When the cables or conductors are exposed, they shall be positively identified and protected.

9.16 *INSULATING GLOVES SHALL BE WORN WHEN SEPARATING TELEPHONE CABLES FROM POWER CONDUCTORS OR CABLES.* After separating the power and telephone facilities in the excavation, the cables not being worked on shall be protected from damage by covering with boards or other suitable guards. In addition, power cables shall always be protected by an insulating blanket.

Conductor Identification

9.17 Some power conductors can be identified by their distinctive color, the presence of a concentric neutral, or by ribbon construction. In ribbon-type cable, the individual conductors can become separated, making visual identification uncertain.

9.18 *A POSITIVE ELECTRICAL TEST WITH APPROVED TEST EQUIPMENT MUST BE MADE. NEVER RELY ON A VISUAL EXAMINATION.* Tone must be sent metallically (not grounded) over a selected pair from a convenient and nearby location and the telephone cable identified with test sets such as the 101B Test Set and 147B Amplifier.

9.19 In the case of major damage, identification will usually be obvious. However, tests with the B Voltage Tester must be made before restoration work is started. (See 6.22.)

Bonds and Grounds

9.20 When it is necessary to open a bonding or grounding connection, *wear insulating*

gloves. Watch for arcing when the connection is broken. If arcing is detected, do not attempt to re-establish the connection. Notify your supervisor that the plant is energized. If there is no indication of arcing, make a test with a B Voltage Tester between the cable or service wire shield and ground.

9.21 Bonds and grounds should be re-established as soon as possible. Wear insulating gloves when doing this work. Again, if arcing is detected, do not complete the connection. *Stop the work and notify your supervisor that the plant is energized.*

9.22 Bonds must be placed across new sheath openings before the shield continuity is broken. If the shield is broken at a fault location, test for voltage that might be standing on the shield with the B Voltage Tester. If there is no indication of voltage, establish a bond. *Wear insulating gloves when doing this work.*