GUIDELINES FOR
PLACING BURIED PLANT

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1. GENERAL

1.01 This practice describes methods of placing buried plant.

1.02 This practice has been reissued to include lightguide cable. Since this reissue is a general revision, no change arrows are used to indicate changes.

1.03 All employees working on buried plant shall be familiar with the precautions outlined in Practice 629-100-010.

1.04 Procedures for placing buried plant where the telephone and power companies share a common trench is outlined in Practice 629-020-100.

1.05 It is important for planners and prospective proprietors of lightwave transmission systems to recognize that the key to successful implementation of buried lightguide cable routes lies in the conscientious attention to the details of planning and engineering the route properly, followed by full-time inspection during construction to make sure the effort is not compromised by the use of inappropriate methods or faulty equipment.

1.06 Guidelines for lightguide cable route engineering can be found in Practice 920-400-200.

2. PRESURVEY

2.01 Although a presurvey is necessary for both metallic and lightguide cable, the need for a thorough route survey is perhaps more important in the planning for a lightguide cable project than in planning for any other kind of outside plant construction. The nature and extent of work required along the route before cable placing begins are established during the presurvey. Each section of the route from splice location to splice location ***must be*** prepared properly before cable installation begins. It is very important to identify all conflicts and obstructions along the route at an early stage. These situations influence the preliminary selection of splice locations and bear directly on the overall transmission design of the route.

2.02 The presurvey should be done jointly by engineering and construction personnel.

2.03 One of the objectives of the presurvey is to establish a placing plan for each reel of cable. This may require a combination of construction methods, use of special tools, e.g., an earth saw, or revision of preliminary splice locations.

2.04 Subsurface investigation may be needed and should be done if there is any doubt about conditions which will be encountered during construction.

2.05 Subsurface structures should be located and staked. The Distribution Service Design Engineer (DSDE) should note the location of such structures with the name of the person to contact on the work print.

2.06 The presurvey will also reveal the need for preparatory work at certain locations along the route. The placing of casings needed to negotiate road crossings is an example.

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2.07 The location of splice or load points should also be staked.

2.08 When possible, points where the cable must be fed through pipes or under obstacles should be located near splice points.

2.09 Obstructions along the route may determine the reel lengths that can be installed. The reel lengths should be planned to minimize the number of splices consistent with sound construction practices. Provisions should be made for access and for storing the loops of excess cable when the splice is placed in the pit.

2.10 Proper planning will preclude reel ends falling too close to roads, creeks, or in other undesirable locations.

2.11 Standard cable descriptions and lengths are listed in Division 626 of the AT&T Practices.

3. LOCATION AND DEPTH

3.01 The likelihood of subsequent disturbance and the presence of obstructions along the route are important factors in choosing plant locations.

3.02 When burying in the vicinity of ditches, avoid locations which might interfere with natural drainage and where future cuts may be made. Also avoid areas subject to surface drainage which might result in subsequent soil erosion and possible exposure of the cable.

3.03 Highway and railroad crossings should be made in pipe or conduit. The cable should be bonded as outlined in the 633 Division of AT&T Practices if it contains metallic elements. Conduit construction on railroad right-of-way is covered in Practice 622-300-205.

3.04 Table A lists recommended depths for placing buried plant.

3.05 Under all conditions, the cable should be placed at a depth that will provide adequate protection. The depth may vary considerably with different conditions.

3.06 In cropland and pastures, a cable depth of 36 inches is minimum. The cable should be located at least 12 inches below the maximum depth attained by agricultural equipment.

3.07 In heavily wooded areas and in rocky soil where cultivation will not be a factor, the cable depth need be only sufficient to protect the cable. In such cases, a minimum depth of cover of 18 inches might be sufficient.

3.08 Where less than 24 inches of cover is specified, consideration should be given to the use of wire-armored cable.

3.09 Suspected subsurface conflicts should be noted on the work prints even if detailed information is not available, e.g., the presence of drain tile.

3.10 In crossing streams, the depth required is generally determined by the character of the soil and the nature of the stream bed.

4. PLOWING AND TRENCHING

4.01 The most economical and practical method of cable installation (plowing or trenching) for each section of the route should also be determined during the presurvey. In general, plowing is most desirable in open or rural areas where there are few obstacles to interrupt the progress of the plow train. In urban or suburban areas where there may be obstacles, such as other subsurface utilities or paved road crossings, trenching offers advantages.

4.02 Listed below are some of the advantages and disadvantages of plowing :

Advantages

- High production in open areas.
- May cause less ground disturbance than trenching.

Disadvantages

- Large size and high cost of equipment.
- Success of the operation depends largely on the skill of the plow operator, quality of supervision, and condition of the equipment.
- Not suited for all soil and terrain conditions.

TABLE A

DEPTH OF PLANT

FACILITY	DEPTH OF COVER (IN.) NORMAL (NOTE 1)
Toll, trunk cable	30
Feeder, distribution cable	24
Service wire	12
Lightguide cable	36

Note:

1. Minimum required depth is listed. Greater depth will reduce risk of trouble due to dig ups and should be provided wherever future digging is likely to occur, i.e., under ditches. Trench depth is governed by the NESC (National Electrical Safety Code) (Rule 353D) requirements for power cables:

MAXIMUM VOLTAGE TO GROUND (V)	DEPTH OF COVER (IN.)
0 to 600	24
601 to 50,000	30
50,001 and above	42

Additional requirements for random separation of power cables and communication cables in the same trench are covered in NESC Rule 354C. Communication cables buried with power cables in random separation is permitted up to 20 kV to ground. Over 20 kB requires a 1-foot separation between communication cable and power cable.

- Possible to inflict serious damage to cable or other below-ground structures unknowingly.

4.03 Some of the advantages and disadvantages of trenching are listed below:

Advantages

- Lower cost of the equipment.
- Allows joint use of the trench with other utilities.
- The digging operation is separated from cable placing.
- Better depth control.
- Suitable for congested areas. Crossing of other below-ground structures can be negotiated with minimum risk.
- Possible to place conduit at the same time with little additional expense.

Disadvantages

- Lower productivity rate.
- Not suited for all soil and terrain conditions.

- Restoration more difficult and time consuming.

4.04 If the conditions are suited to either plowing or trenching, there is no reason a particular construction method need be specified.

5. PLACING CABLE

5.01 It is recommended that all air-core cables intended for buried use be maintained under a pressure between 5 and 10 psi while being placed.

5.02 A pressure alarm on the reel end of the cable may be helpful in identifying any sheath damage that might occur while plowing. If the alarm sounds, immediately stop plowing and determine the cause of the alarm.

5.03 When a section of air-core metallic conductor cable must be cut during placing operations, the resulting lengths must be repressurized. Lightguide cable should not be cut during ***plowing*** operations.

5.04 The pressure on buried sections of air-core cable should be checked before splicing begins. Any faults should be located and the cable repaired before splicing work is started.

5.05 Guidelines for placing lightguide cable in a trench can be found in Practice 629-200-205.

5.06 Guidelines for plowing lightguide cable can be found in Practice 629-240-001.

5.07 A full-time qualified inspector should be present during all buried cable placing work.

6. BURIED CABLE TESTING

6.01 Buried lightguide cables are tested in accordance with Practice 640-252-097.

6.02 Inspection of individual fibers in placed cables may be accomplished using an OTDR (Optical Time Domain Reflectometer) such as the KS-22732, L1. The KS-22732, L1 comes equipped with a detailed instruction manual and OTDR operation is described in Practice 640-252-115.

6.03 Buried metallic conductor cables should be tested for continuity and insulation resistance at each reel end in accordance with Practice 629-795-500.

7. SPLICE POINTS

7.01 Splices should be made either in reenterable splice enclosures (constructed from treated lumber, plastic resin, or concrete) or on a buried support (concrete block, treated lumber, or a suitable commercial product). Whatever the method selected, the splice must be supported on a firm foundation of well compacted soil.

7.02 At each splice location, an excavation should be made of sufficient size to accommodate the splice enclosure or splice support. The excavation should be at least 6 inches deeper than the final depth of the splice. Fill the excavation with clean sand, gravel, or crushed stone to slightly above the final grade of the splice. Compact the fill by tamping to the final grade of the splice or splice support. If a reenterable splice enclosure is used, place it in final position.

7.03 After the splice has been made, secure the splice case to the buried support or position it inside the splice enclosure. Fill the excavation with a fine gravel (e.g., pea gravel).

7.04 On lightguide cable routes, all buried splices should be marked with buried electronic markers. Verify the operation of the electronic marker before restoration work begins.

8. ISSUING ORGANIZATION

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