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OVERVIEW

Proper care and handling during installation is critical to the long term reliability of the buried semiflexible coaxial cable network, just as it is when using other types of installation techniques.

The initial installation of a coaxial cable transmission system is a major determining factor in the longevity of the system and degree of continuing maintenance required. During construction, proper attention must be given to the mechanical and environmental factors which can cause degradation and failure.

There are three methods of underground installation: trenching, direct plowing, and vibratory plowing. The following guidelines are intended to provide assistance in method selection and guidance in the construction of a safe and trouble-free coaxial cable installation which avoids initial damage and provides for long term system reliability.

TRENCHING

Trenching is one of the most popular methods for the installation of coaxial cable. It has the least potential for damaging the cable compared to all other underground methods. In addition to easily controlling the depth of cable placement, it allows multiple cables to be placed in the same trench.

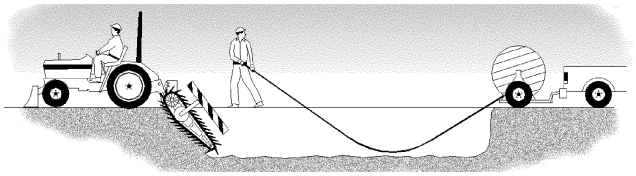
The first step in any underground construction is to locate the installed property of other utilities which may be buried in close proximity to or intersecting the intended coaxial cable route. Most other utilities have a locating service that will mark the specific location of other cables or pipes. A member of the coaxial cable crew should witness the marking to eliminate any possibility of misunderstanding or misinterpreting the marked route. Also, a review of the intended coaxial cable route should be undertaken with the installation crew prior to the beginning of actual trenching.

Necessary equipment includes a trencher (preferably with a back fill blade), a cable payout trailer with proper reel brakes (See Chapter 2, *Aerial Cable Installation*, especially the section on *Reel Braking*), and miscellaneous hand tools.

After the route of installation has been determined, open a trench from the starting device (i.e., first pedestal location) to the next device. For safety, open only a single trench at a time. When streets, driveways and fences are in the path of the intended cable route, boring and hand digging will be required.

After the trench is opened from end to end, it should be inspected and undesirable foreign objects such as large rocks, bricks, bottles, etc. should be removed.

Position the cable reel so that the cable pays off from the bottom of the reel and enters the trench easily and without excess bending (as it would encounter if being paid off from the top of the reel). Reel brakes should be set to provide back tension and prevent cable overrun and possible damage.



Pulling the Cable

A swivel-type pulling grip should be used to attach the pulling line to the cable. A fuse-type breakaway pulling swivel can also be used. These separate at a predetermined level of force which should be selected to match the manufacturer's recommended maximum pulling tension for the cable being pulled.

The cable should be pulled past the destination pedestal location by several feet to accumulate the necessary slack for bending into the pedestal at the completion of the installation. The pedestal can now be installed and the cable carefully formed into place. Be sure to observe the minimum bending radius restrictions for the size of cable being installed.

Cable Protection

When a cable pull has been completed, remove any damage from the end of the cable and make sure approximately 40 inches of undamaged cable remain for connectorization and splicing. Install plastic end caps to protect the cable from moisture exposure (both on the installed cable and on the payout reel). Close and secure the pedestal(s) to prevent accidental cable damage.

Back Filling

Remove all rocks, bricks, or other foreign debris from the back-fill material that might damage the cable, making it vulnerable to the effects of moisture and water. Some locations have specific back-fill requirements, so be sure to check local restrictions and codes.

DIRECT PLOWING

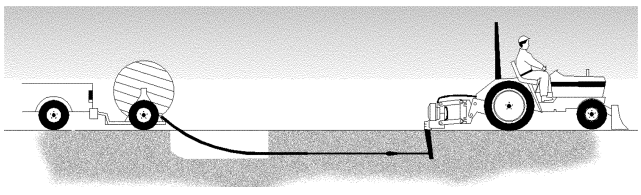
Some companies have determined that the direct plowing method is convenient, fast, and requires a minimum of restoration work (no back filling) after the installation has been completed. This method is generally limited to areas with no known foreign objects such as subterranean rock, foreign debris, etc. It is further limited in that it is impossible to observe the cable or the actual placement environment, making it very difficult to determine the ultimate success of the operation.

With this method, the cable being pulled is actually pulled through the earth along the entire route and a potentially damaging amount of tension may be developed on the cable. Therefore, this method is best used only for conduit or cable-in-conduit installations.

Necessary equipment includes a plow and blade with a bullet/swivel chain combination attached to the bottom of the blade, a cable payout trailer with proper reel brakes (See Section 2, *Aerial Cable Installation,* especially the section on *Reel Braking*), and miscellaneous hand tools.

The installed property of other utilities must first be located and the cable route determined that does not intersect other known installations.

To begin, dig a 2x10 foot starter trench and lower the blade/bullet chain combination into the trench with cable attached to the swivel. The bullet should be at least twice as large as the cable being installed, which will open the ground sufficiently to pull the cable through with a minimum of pulling tension.



A fuse-type breakaway pulling swivel can be used. These separate at a predetermined level of force which should be selected to match the manufacturer's recommended maximum pulling tension for the cable being pulled.

Continue to plow for several feet past the destination pedestal location to allow excess cable for splicing. At this point, stop the plow, lift the plow blade carefully from the ground, and disconnect the cable from the swivel. Inspect the cable for any damage that may have occurred during the plowing process.

Cable Protection

When the plowing section has been completed, remove any damage from the end of the cable and make sure approximately 40 inches of undamaged cable remain to facilitate connectorization and splicing. A hose clamp should be installed on flooded cables to prevent jacket shrinkback. Install plastic end caps to protect the cable from moisture exposure (both on the installed cable and on the payout reel). Close and secure the pedestal(s) to prevent accidental cable damage.

VIBRATORY PLOWING

The vibratory plowing method of installation is often chosen for its efficiency and lack of required restoration work. However, cable routes that intersect roads, driveways or sidewalks should be avoided. This method is satisfactory for use in the installation of cable, conduit, and also cable-in-conduit.

Unlike the direct plowing where the payout reel is stationary, in the vibratory plowing method the payout reel is mounted on the tractor and cable is paid out over the tractor and into a plow chute being trailed behind a vibrating plow.

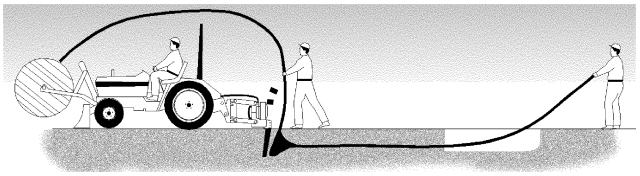
Two types of blade and chute combinations are available: isolated and fixed. An isolated plow is isolated from the vibrating plow blade by linkage that dampens the vibratory action transmitted to the material being plowed. On a fixed chute, the vibrating plow blade and plow chute are integral and both vibrate. Both types can be used without damaging the cable, conduit, or cable-in-conduit. In either case, make sure that the plow chute has a radius of approximately 20 times the diameter of the material being installed.

Before installation, locate installed property of other utilities and design a cable route to avoid them.

To begin the installation procedure, prepare a starter trench to provide access for the plow blade and chute. The starter trench should be about two feet deep, depending on the required plowing depth, and about 6 feet long.

The cable (or conduit or cable-in-conduit) should pay off the top of the reel and over the machine. It must not rub or scrape on edges which could cause damage. As with stationary reel payoff devices, brakes must be used to provide back tension and prevent overruns when plowing is slowed or stopped abruptly.

With the chute gate removed, carefully form and position the cable in the chute then replace the gate. Plowing can commence. Apply a lubricant to the inside gate to reduce friction and tension. Pull about 30 feet of cable from the reel and through the starter trench. The blade and chute can then be lowered into the starter trench. A crew member should hold the cable for the first 50 or so feet of the plowing operation so the loose end is not inadvertently pulled along. A layer of soil may be applied over the cable in the starter trench to help hold it in place.



During the plowing operation, an installation crew member should stand by the machine and guide the cable into the plow chute. The cable should never be forcibly pushed into the plow chute.

Continue to plow for several feet past the pedestal location to allow for excess cable for connectorization, then stop the plow and vibratory action. The gates can be removed and the cable carefully removed from the chute. When the cable is free, the blade and chute can be moved forward and lifted out of the ground.

Cable Protection

When the plowing section has been completed, remove any damage from the end of the cable and make sure there are approximately 40 inches of undamaged cable for connectorization and splicing. A hose clamp should be installed on flooded cables to prevent jacket shrinkback. Install plastic end caps to protect the cable from moisture exposure (both on the installed cable and on the payout reel). Close and secure the pedestal(s) to prevent accidental cable damage.

Please refer to Appendix III, Technical Note 1029A, *Pulling Coax Cables In Conduit*, for guidelines on pulling cable into conduit after it has been installed using any of the above methods.