



*OCC-206-4*

*Installation – Direct Burial  
Guidelines  
Excerpt  
from  
Optical Cable Corporation’s  
INSTALLATION GUIDE*

## **Direct Burial Installation**

Fiber optic cables are available for outdoor use. These cables may be strictly outdoor types or may be indoor/outdoor types which may provide greater versatility in campus type applications. The outdoor cable is quite rugged in order to withstand a harsh environment. One outdoor method of installation is direct burial.

A direct burial installation typically involves heavy machinery and places the optical cable underground in direct contact with the earth and rocks that make up the surrounding soil.

All direct burial cable should contain a corrugated steel armor tape for protection against rough terrain and rodents.

Before digging, all existing underground utilities such as buried cables, pipes, and other structures along the route should be identified and located. Proper right-of-way permits must also be obtained before digging begins.

When direct burying fiber optic cable, special consideration must be taken in regards to the cables minimum bending radius, and maximum pulling strength. Further considerations include the installation temperature and preventing cables twist during the installation. Please refer to the General Guidelines section of the Optical Cable Corporation Installation Guide.

Fiber optic cables should always be buried beneath the frost line. This depth may vary depending on the geographical location of the installation.

## **Types of Direct Burial**

Direct burial applications imply one of two installation methods are being used; trenching or plowing.

### **Trenching**

Trenching can be defined as simply digging a trench, placing the cable in it, and filling the trench back up. This method is

commonly used if multiple cables are to be located in the same area along the same path. Trenching is more time consuming than direct plowing but allows for a more controlled installation. Trenches can be dug by hand or by machine to the required depths.

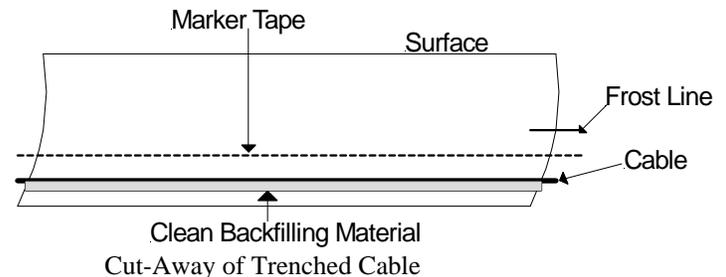
Some advantages of trenching are; lower cost of equipment, digging operation is separate from cable placement, better depth control, and less chance of damaging underground utilities.

Some disadvantages of trenching are; the cable placement is slower than plowing and it is not suitable for all soil and terrain conditions.

Trenching is typically performed by large machinery. However, hand digging may be necessary in some locations. Trenches should be kept as straight as possible. The bottom of the trench should be flat with no large stones.

Once the trench is dug and inspected, clean backfilling material should be placed 9 inches to 12 inches deep on the bottom of the trench to provide protection for the cable and to decrease optical fiber microbending losses.

Once the cable has been laid on the backfill, the trench should be filled in with clean backfill and then earth, with a warning tape placed 12 inches directly above the fiber optic cable. The earth should be mounded over the trench to compensate for future settling. *Caution:* Always move the cable reel along the trench during payout. Never drag the cable from a stationary reel.



Any cables left for future splicing should have protective caps installed on the ends of the cables.

## Plowing

Plowing involves using heavy machinery that plows, or cuts, a groove of the appropriate depth in the ground while simultaneously feeding a single cable into the groove. Plowing a cable into the ground is faster than trenching, but special care needs to be taken to ensure that cable is not damaged during the installation. There are two types of plowing; static and vibration.

### *Static Plowing*

Static plowing simply plows right through the ground like a knife often using multiple tractors to pull it. This method is very fast and effective in open areas and especially when the ground is hard or wet.

### *Vibration Plowing*

A vibratory plow “shakes” as it plows into the ground. A “shaker box” on a plowing attachment causes the plow blade to move up and down while being pulled forward by a tractor (usually smaller than that used in static plowing). This method is best used in smaller, tight areas such as right-of-ways and dense locations. It requires less horsepower or force to pull the plow through the ground and does not typically require an additional tractor to pull it.

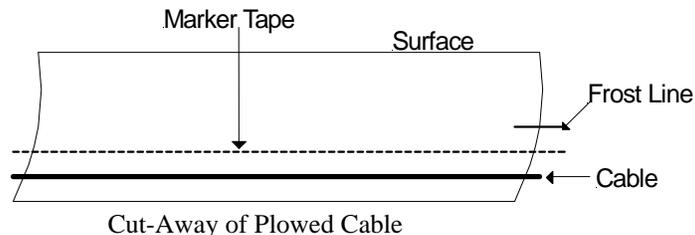
Some advantages of plowing are; speed of installation and less ground disturbance.

Some disadvantages of plowing are; high cost of equipment requires skilled equipment operators, not suitable for all soil and terrain conditions, and the possibility of damaging underground utilities.

During a plow installation, a reel carrier should be used for ease of installing the reel. All rollers or guides in the cable feed system which cause a change in the direction of the cable path must conform to the minimum bend radius of the cable. The cable path inside the feed chute must be clean, free of burrs and sharp or rough edges. The plow should never be raised to

the surface if the plow is not moving. Never back up the plow with cable still in the chute.

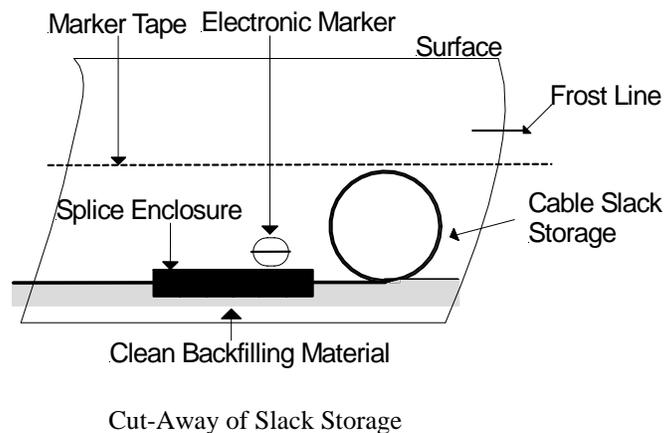
While plowing in the fiber optic cable, warning tape should be placed 12 inches directly above the cable.



Any cables left for future splicing should have protective caps installed on the ends of the cables.

## Direct Buried Splice Enclosures

Excess fiber optic cable should be left at all splice locations along the route. If the splice enclosure is direct buried, the excess cable should be stored in vertical positioned loops that meet the minimum bending radius of the cable. This limits damage to the cable if ground settles or moves when the cable is above the frost line (Optical Cable Corporation strongly recommends that all direct buried cables be installed beneath the frost line).



Underground electronic markers or an above ground marker should be installed at every underground splice location. This significantly reduces time and the possibility of damaging cable when access to the splice location is needed on future projects.