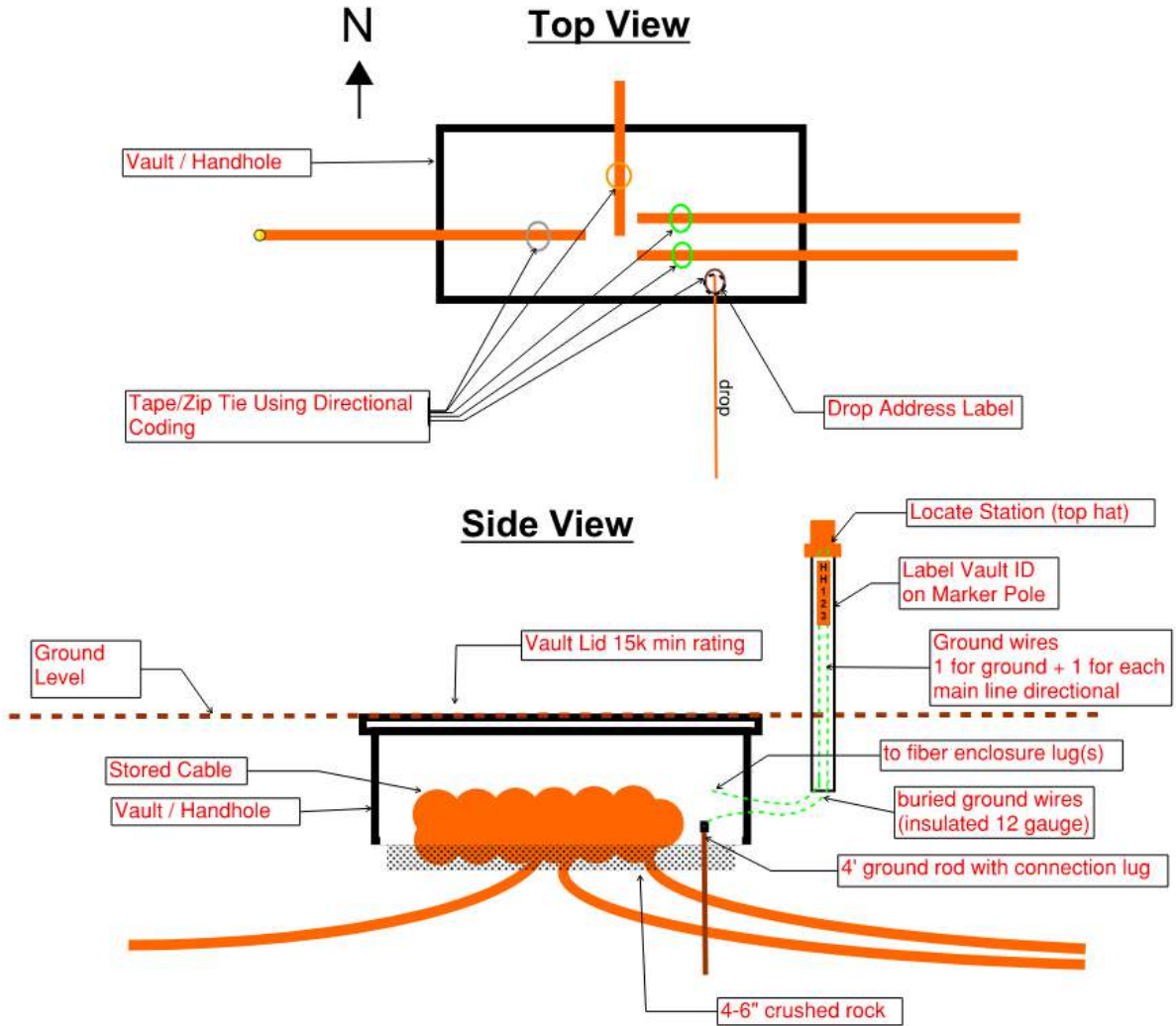


ATTACHMENT B1.5
UNDERGROUND FIBER OPTICAL CABLE INSTALLATION

1. **Installation Guidelines:** Install all materials according to the latest version of the manufacturer's installation procedures of which contractor is solely responsible for obtaining and the industry-accepted installation standards, codes, and practices, or as directed by IdeaTek. Ensure that all materials and installation practices are in accordance with the applicable OSHA requirements as found in 29 Code of Federal Regulations (CFR) Part 1926, Safety and Health Standards for Construction.
2. **Conduit:** Ensure conduit and inner-duct is clean and free from damage prior to installing fiber optic cable.
3. **Depth and Placement Location:** Depth and placement location of installations shall always follow applicable utility permits for the job. Failure to maintain proper depths or placement location will be the sole cost of the Contractor to remedy.
4. **Trench Fill:** Under no circumstances shall any fill for any trench specifically and especially, rock sawed trenches, be filled with any hardened material such as crushed rock or other debris. Rock and debris in a trench WILL damage a fiber optic cable immediately or over time. Contractor must never use anything other than soft fill for any trench. Conduit is recommended for any trench in rock. **Failure to follow this procedure shall result in a \$3,500.00 fee per occurrence plus \$10 per linear foot of damage as liquidated damages and may be deducted from any payment to the contractor.**
5. **Marker Signs / Poles:** Unless otherwise specified in the contractor quote, contractor will be required, as part of his quote, to install fiber optic warning marker signs / poles at each intersection or crossing including railroads, pipelines, roads, highways, bridges, and the like and as required by the application utility construction permit.
6. **Slack Cable Storage:** Provide and store fiber optic cable at each pull box and hand-hole to allow for future splices, additions, or repairs to the fiber network. Store the fiber optic cable without twisting or bending the cable below the minimum bend radius. Store a total of 100 feet of fiber optic cable in handholes, with 50 feet of cable on each side of the cable splice point or as shown in the plans. Store 50 feet of spare fiber optic cable in specified pull boxes.
7. **Pulling:** Install the fiber optic cable by hand or by using a mechanical pulling machine. If a mechanical pulling machine is used, equip the machine with a monitored or recording tension meter. Ensure that at no time the manufacturer's recommended maximum pulling tension is exceeded. Ensure that the central strength member and aramid yarn are attached directly to the pulling eye during cable pulling. Use pulling attachments, such as "basket grip" or "Chinese finger" type, to ensure that the optical and mechanical characteristics are not degraded during the fiber optic cable installation. Ensure that excess cable is coiled in a figure eight and fed manually when pulling through pull boxes and splice boxes by hand. If pulleys and sheaves will be used to mechanically pull through pull boxes and splice boxes, provide a drawing of the proposed layout showing that the cable will never be pulled through a radius less than the manufacturer's minimum bend radius. Use large diameter wheels, pulling sheaves, and cable guides to maintain the appropriate bend radius. Provide tension monitoring at all times during the pulling operation. Ensure that cable pulling lubricant used during installation is recommended by the optical fiber cable manufacturer.
8. **Blowing:** Use either the high-air-speed blowing (HASB) method or the piston method. When

using the HASB method, ensure that the volume of air passing through the conduit does not exceed 600 cubic feet per minute or the conduit manufacturer's recommended air volume, whichever is more restrictive. When using the piston method, ensure that the volume of air passing through the conduit does not exceed 300 cubic feet per minute or the conduit manufacturer's recommended air volume, whichever is more restrictive.

9. **Hand-holes/Vaults:** All hand-holes/vaults must be installed in accordance with the manufacturer's installation procedures including installation practices to ensure no settling of the handhole so that the top of the handhole remains flush and level with the ground line and that handhole does not pinch any cable. Handhole's must also contain inside of the handhole, aggregate fill, a ground rod driven into the ground using industry-accepted installation standards and wiring of a fiber optic test station as detailed below.



10. **Fiber Optic Cable Installation Labeling:** Use cable direction nomenclature as seen on the right to create cable tags for the identification of fiber optic cable. Install cable tags or tape near entrance point and if cable is a dead end, near terminating end. Ensure that the cable tags are permanent labels suitable for outside plant applications and are affixed to all fiber optic cables. Labeling cards for the Contractor's workers are available upon request. **Failure to label any fiber entry point at the time of installation shall result in a \$250.00 fee per occurrence as liquidated damages and may be deducted from any payment to the contractor.**

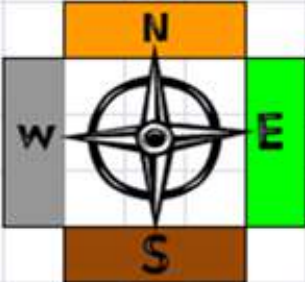
+ CO Side if applicable

Labeling Requirements

1. All cables must be labeled with, at a minimum, a directional color.
2. If applicable, always label the CO side with blue
3. If applicable, always label drops with address
4. Use zip ties or electrical tape
5. **Not labeling cables during installation is a huge unneeded expense for the company and is grounds for disciplinary action. Expect random audits of your work.**

Directional Color Code

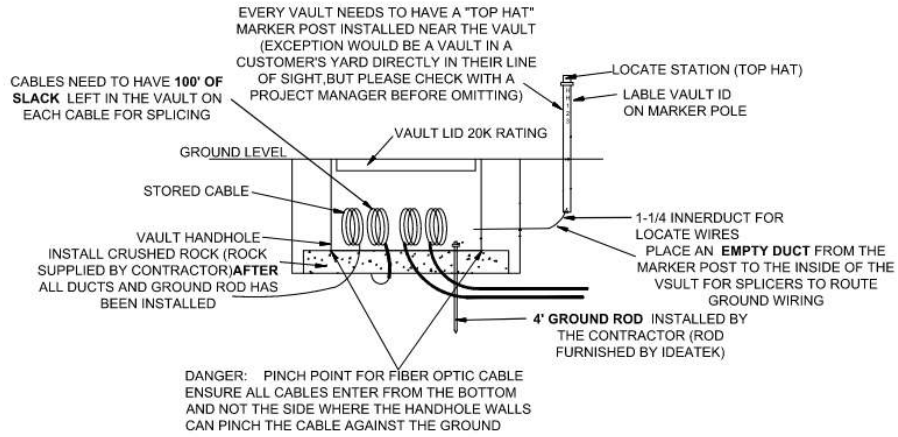
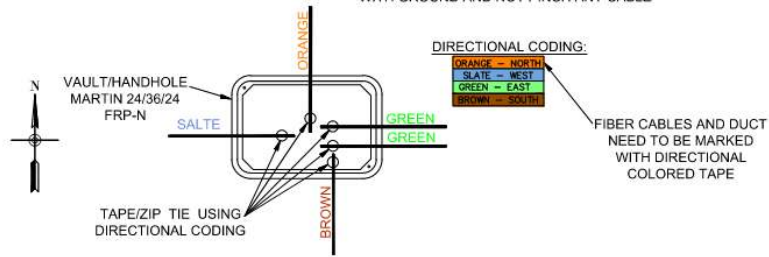
Label the cable for the direction it is headed



The diagram shows a central compass rose with four colored quadrants: North (orange), South (brown), West (grey), and East (green). The letters N, S, W, and E are placed above, below, to the left, and to the right of the compass rose respectively.

STD #: 100002

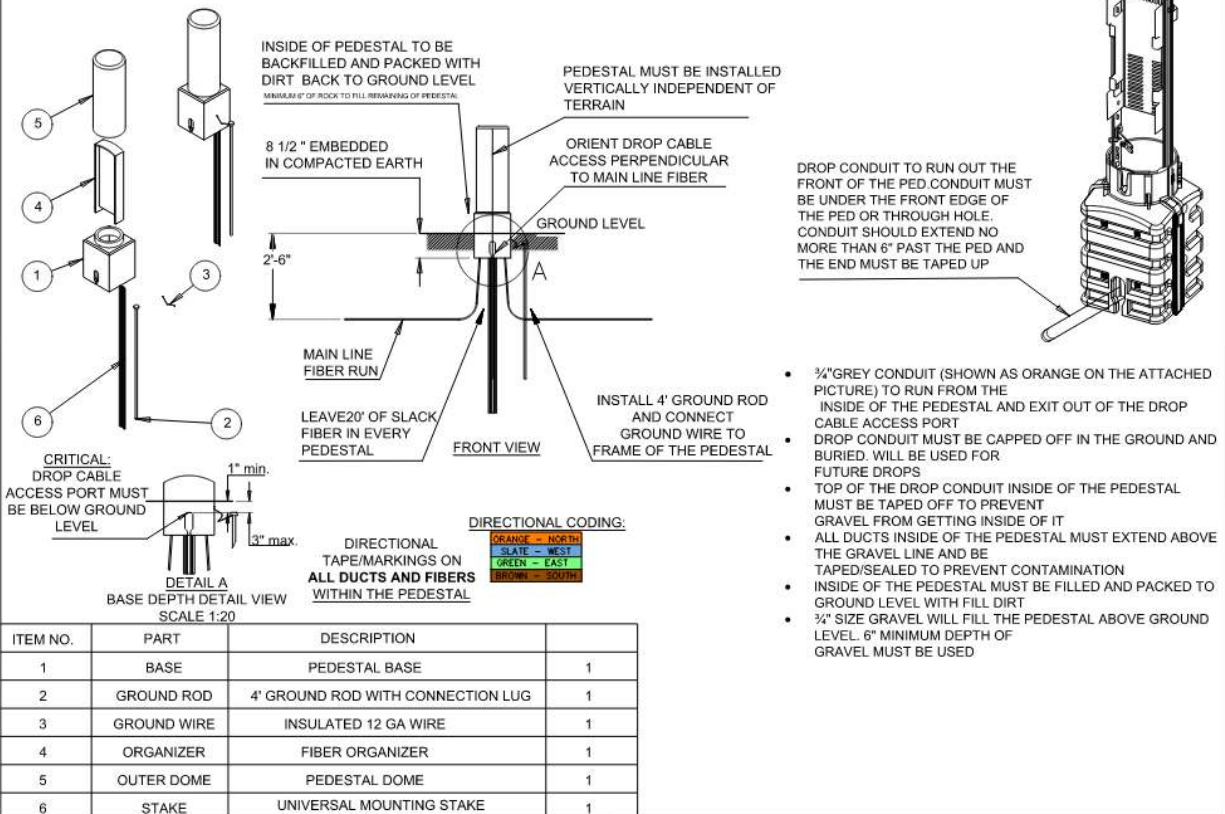
MANHOLES/VULTS MUST BE INSTALLED IN ACCORDANCE WITH PROCEDURES INCLUDING INSTALLATION PRACTICES TO PROTECT THE TOP OF THE HANDHOLE REMAINS FLUSH AND LEVEL WITH GROUND AND NOT PINCH ANY CABLE



THIS DOCUMENT REPRESENTS A PRELIMINARY DESIGN AND SHALL NOT BE USED FOR CONSTRUCTION

STD #: 100001

NOTES:
1. ALWAYS REFERENCE MANUFACTURER
INSTALLATION STANDARDS SPECIFIC TO
THE COMPONENTS USED.



11. IF ANY DAMAGE OCCURS TO AN UNDERGROUND FACILITY OR ITS PROTECTIVE COVERING, THE EXCAVATOR SHALL NOTIFY THE OPERATOR PROMPTLY. IF THE DAMAGE RESULTS IN THE ESCAPE OF ANY FLAMMABLE, TOXIC, OR CORROSIVE GAS OR LIQUID OR ENDANGERS LIFE, HEALTH, OR PROPERTY, THE EXCAVATOR RESPONSIBLE SHALL IMMEDIATELY NOTIFY THE OPERATOR AND THE 911 PUBLIC SAFETY ANSWERING POINT AND TAKE IMMEDIATE ACTION TO PROTECT THE PUBLIC AND PROPERTY.

Pursuant to Article 2 of the MASTER CONSTRUCTION AND INSTALLATION SERVICES AGREEMENT ("Agreement") between IdeaTek Telcom, LLC, and Contractor executed: _____ this Attachment shall be made part of the Agreement.

Acceptance by Contractor to abide by and be bound to these specifications and agreement to the Amendment to the Agreement.:

("Contractor")

By: _____

Print Name:

Its:

Dated: _____