


General Design Procedures 1-1-1

Substation Communications Conduit..... 1-2-1

General Design Procedures 1-3-1

<p>Communications Construction Standards</p>  <p>PROPRIETARY MATERIAL</p>	<p>DESIGN INDEX</p> <p>1-1</p>	<p>ISSUE DATE: 05-28-09</p> <p>REV. DATE: 0</p> <p>APPROVAL: D.Poore</p> <p>COM-Index-1.doc</p>
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G2500 Communications/Control Cable

- G2501 Communications Cable System is used on the Distribution Substation System for data, voice, telemetry and pilot relaying.
- G2502 Communications Engineering Department determines communications cable requirements. The communications cable requirements are transmitted to Customer and System Improvements through annual budget request. As individual jobs are required for new/rebuild substation projects Communications Engineering will submit a "Distribution Line Design Work Request" for that work.
- G2503 Customer and System Improvements prepares budget estimates for the communications line construction from the budget request and then sends the cost estimate to Communications Engineering.
- G2504 Customer and System Improvements orders communications cable and equipment based on budget estimates and estimated on-hand requirements.
- G2505 Specific Job Order materials required at the time of construction are called up by the Designer through Compatible Units Grid Sketch applications.

G2510 Overhead Communications Cable Design

- G2511 The Job Order Designer determines the communications cable route. Under normal conditions, the route taken is an underbuild on the 69 kV route. If the 69 kV route cannot be utilized, then a route on existing 12 kV poles may be used.
- G2512 Aerial communications cable is normally installed in the commercial telephone cable area of the pole.
- G2513 When the field survey is made, note should be made as to the possibility for paying out the cable on the right-of-way and then laid up on the pole. This is the preferred installation method and should be noted on the Job Order Sketch when it can be used.
- G2514 If the route requires the cable be pulled from a stationary reel, the maximum pull shall be limited by cable tension.
- G2515 (Deleted)
- G2516 (Deleted)
- G2517 Vertical, crossing and structure clearance requirements are shown in the Electrical Clearance Standards book.
- G2518 Sag charts for communications cables are included in the Overhead Distribution & Transmission Sections of this Communications Book. If other size cables are encountered, contact Electric System Planning & Engineering for assistance.
- G2519 If the work will require an outage on the cable, make a note in the "Construction must be scheduled with" area of the C&M Checklist and on the Job Order sketch, instructing the crew to contact Communications Construction prior to construction to arrange for the necessary outages from Systems Operations.

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G2530 Underground Communications Cable Design

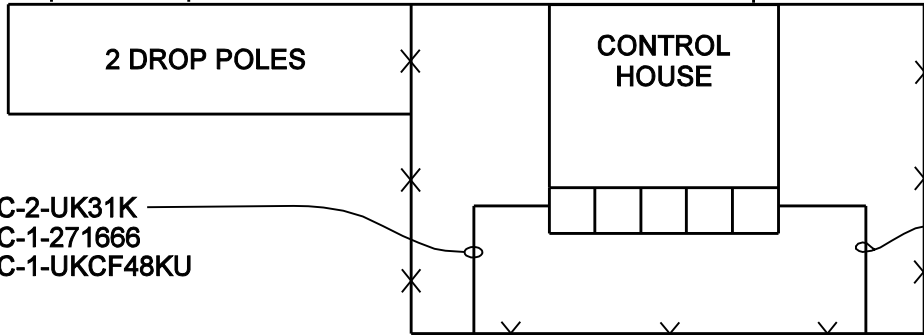
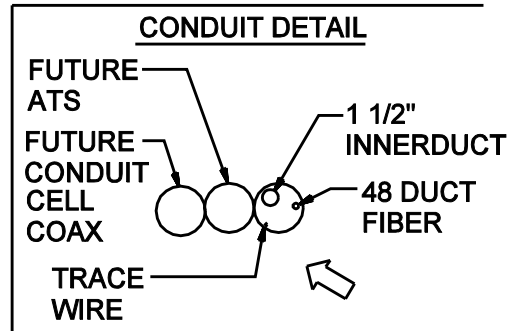
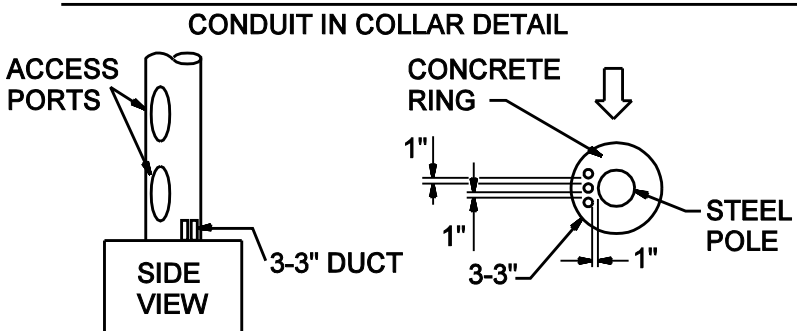
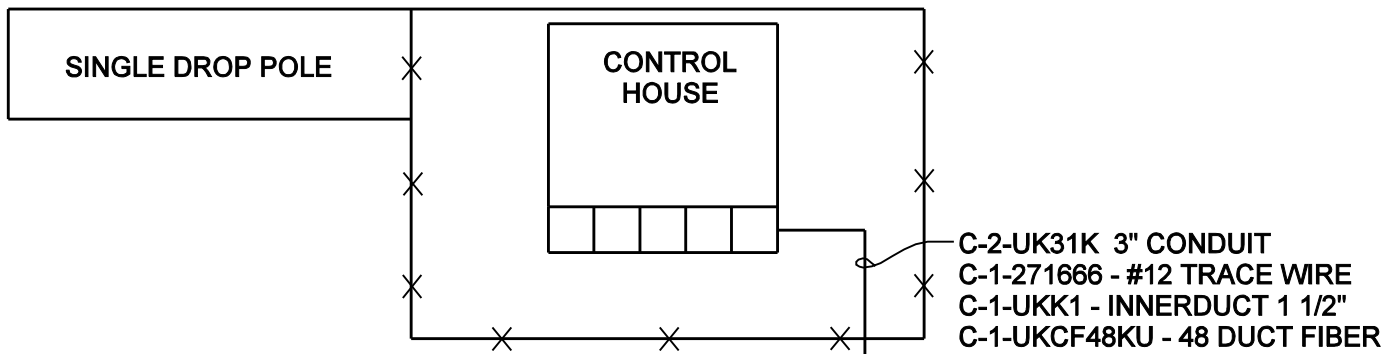
- G2531 The Job Order Designer determines the final communications cable route to utilize common trench with other facilities where possible.
- G2532 The communications cable will normally be installed underground from a pull box in the substation to the first riser pole in the direction the cable is to be routed. The exact pole to be used for the riser will be determined by the lead engineer in the Communications Engineering Department. Refer to G2540 for typical layout drawing.
- G2533 Communications cables shall not be installed in a pullbox or manhole which contains 12 kV circuits, except the first manholes for the substation get-away.
- G2534 The following are general guidelines for the communications conduits within substation property or at road crossings.
1. One three inch plastic conduit is required per cable.
 2. The limitation on pulling distance shall be the manufacturer's specified maximum tension limit of the cable being pulled and/or the conduit side-wall pressure as determined by ESE's "Underground Cable Pulling" computer program.
 3. The conduit is to be placed in a common trench above distribution feeder conduit banks on the field side as shown in the Communications Conduit Installation Instructions, 2-220 (conduit section) of this Communications Standards book. Communications conduits need not be encased except within substation property, at road crossings, for conduit crossings in areas where there is evidence of erosion such as washes or where adequate depth cannot be obtained.
 4. Conduit installation design to begin from the pull box within the substation as provided by Electric System Design.
 5. Conduit to terminate at first riser pole or at point determined by the responsible engineer in the Communications Engineering Department.
 6. Communications cable shall not be installed in a pull box or manhole which contains 12kV circuits.

Exception: When retro-fitting an existing substation feeder getaway, 500 MCM to 750 MCM aluminum or copper, **all dielectric fiber cable** may be installed with the feeder cable in existing conduits.

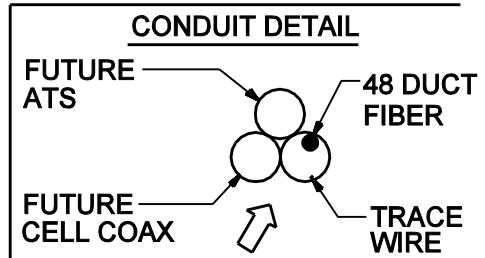
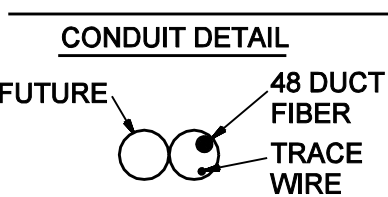
G2535 Pull boxes may be required due to pulling tensions or sidewalk bearing pressure. Refer to 2-120.

G2536 Designer should indicate direction of pull on conduit schematic.

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* LEAVE A MINIMUM 50' COIL OF FIBER AT TERMINATION RACK.




NOTES:

Single Drop Pole

1. Install 3-3" conduit from the drop pole to the cable trench.
2. Install the inner duct, trace wire and the fiber in one of the two ducts leaving the second as future.

Two-Drop Poles

1. Install 2-3" conduit from both drop poles to the cable trench.
2. Install trace wire and fiber in one of the 3" conduits leaving the second as future at both drop pole locations.
3. When a second drop pole is installed inner duct will not be necessary.
 - It is always preferred to have the riser conduit installed in the concrete collar of the drop poles.
 - Leave one inch of space between the riser duct and the pole and one inch of space between the conduits.
 - Always keep the riser duct out from under the access ports.
4. Coordinate conduit number and orientation for Transmission and Substation plans.

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Optical groundwire installation requirements primarily relate to:

- minimum bending radius
- allowable pulling tension
- the need for an anti-twist device during the stringing operation
- the need for hardware and accessories to be specifically designed for use with OPGW

Tension Requirements:

- Installation tension should not exceed 25% of the rated breaking strength.
- Bullwheels should be lined.
- Bullwheel diameter should be 36 inches.

Sheave Diameter:

- Sheaves should be lined.
- The first sheave after the tensioner and the last sheave before the puller should be 24 inches in diameter.
- The diameter of the sheaves located within the spans should be at least 25 times the cable diameter. This assumes a maximum line angle of 30 degrees and a maximum tension of 25% of rated breaking strength.

Pulling:

- The rope used in pulling new construction should have the same lay direction as the OPGW to help prevent twisting.
- An anti-rotational device must be attached to the OPGW when pulling from the reel.

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