



**United States  
Department of  
Agriculture**

Rural  
Utilities  
Service

RUS Bulletin 1753F-152  
RUS Form 515c

**September 2001**

# **Specifications and Drawings for Construction of Aerial Plant**

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UNITED STATES DEPARTMENT OF AGRICULTURE  
Rural Utilities Service

**BULLETIN 1753F-152**

**SUBJECT: Specifications and Drawings for Construction of  
Aerial Plant, RUS Form 515c**

Incorporated by reference in 7 CFR 1755.97

**TO:** All Telecommunications Borrowers

RUS Telecommunications Staff

**EFFECTIVE DATE:** September 17, 2001

**OFFICE OF PRIMARY INTEREST:** Outside Plant Branch,  
Telecommunications Standards Division.

**AVAILABILITY:** This bulletin supersedes RUS Bulletin 345-153,  
Specifications and Drawings for Construction of Pole Lines,  
Aerial Cables and Wires, RUS Form 515f, issued May 25, 1989.  
This bulletin can be accessed via the Internet at  
<http://www.usda.gov/rus/telecom/publications/bulletins.htm>

**PURPOSE:** This specification provides Contractors, Engineers, and  
RUS Borrowers with assembly unit descriptions, materials,  
construction and installation, and drawings for aerial plant  
associated with RUS Form 515, Telecommunications System  
Construction Contract.

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Date

**RUS Bulletin 1753F-152**  
**Specifications and Drawings for Construction of**  
**Aerial Plant, RUS Form 515c**

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**ASSEMBLY UNITS:**

    Cable Plant, Aerial

**CABLE:**

    Aerial Cable Plant Construction  
    Assembly Units

**CONSTRUCTION:**

    Aerial Cable Plant  
    Fiber Optic Cable Plant

**POLES LINES:**

    Design of

**POLES:**

    Numbering

**RIGHT-OF-WAY:**

    Clearing and Trimming Assembly Units

**SPECIFICATIONS AND STANDARDS:**

    Outside Plant

**WIRE:**

    Seven Wire Aluminum Clad Steel Strand  
    Steel, 7 Wire Galvanized Strand

**LIST OF CHANGES**

1. Modification of Pole Units from Section 1 to Section A.
2. Elimination of Section C and Section CF.
3. Addition of Section CFO, Self Supporting Filled Fiber Optic Cable Assembly Units.
4. Modification of CO and CW units as follows:
  - (a) Provide for compensation on a per foot basis;
  - (b) Redefined compensation to include the sum of the cable distances between supporting structures as indicated by the sequential foot markings;
  - (c) Specified utility grade galvanized steel strand as the default type.
5. Elimination of suffixes "N" and "R" under Section HA. For ready access splice closures specified under the "R" suffix, a new unit designated HR was created.
6. Addition of Section HR, Ready Access Splice Closure Assembly Unit.
7. Modification of Section HC as follows:
  - (a) Redefined unit to provide compensation on a single pair basis;
  - (b) Created HC5 unit in order to provide compensation for terminating cable pairs on a terminal block within a ready access closure.
8. Modification of Section H0 to provide compensation for testing a fiber.
9. Elimination of section PC and section PDS.
10. Modification of Section PE to indicate utility grade galvanized steel as the default type.
11. Elimination of Section PG. The terminal blocks are now included under Section PM.
12. Modification of PM21 and PM22 to provide for a more generalized description.
13. Addition of PM25, Filled Terminal Block Assembly Unit.
14. Modification of Section R to provide compensation on a per foot basis.

15. In part III, section 2, elimination of information on pole facing.
16. In part III, the Figure 8 cable was changed to describe Self Supporting Fiber Optic Cable.
17. In part III, eliminated references to load coils, pressurized cable, and air-core cable.

For editorial or other minor technical changes, refer to the body of the document.

**Part I - DESCRIPTION OF ASSEMBLY AND PROPOSAL AND  
CONTRACT SECTIONS**

The Contractor's Proposal form is divided into sections and the sections approved for construction shall be listed in the Construction Agreement by the Owner. The sections are as follows:

Section A	-	Pole Units
Section CFO	-	Self Supporting Filled Fiber Optic Cable Assembly Units
Section CO	-	Aerial Filled Fiber Optic Cable Assembly Units
Section CW	-	Aerial Filled Copper Cable Assembly Units
Section HA	-	Aerial Splice Closure Assembly Units
Section HC	-	Copper Splicing Assembly Units
Section HO	-	Fiber Optic Splicing Assembly Units
Section HR	-	Ready Access Closure Assembly Units
Section PE	-	Guy Assembly Units
Section PF	-	Anchor Assembly Units
Section PM	-	Miscellaneous Assembly Units
Section R	-	Right-of-Way Clearing and Trimming Units
Section W	-	Rearrangement Units
Section XX	-	Nonreusable Materials Removal Units
Section XZ	-	Reusable Materials Removal Units

Each assembly unit includes only the materials listed on the corresponding Installation and Construction Guide Drawings or description of unit where no drawing exists. The various installation and construction units, which are included in this Proposal and upon which quotations are required, are defined by the following descriptions:

**Section A - POLE UNITS**

Consists of one (1) pole in place. It does not include the pole top assembly units or other parts attached to the pole. Poles shall be of the height and class as designated by the Engineer. The pole plan, species of timber, kind of preservative and method of treatment are designated in the Proposal.

**Example:**

A35-7    A 35 foot [10.7 meters (m)] class 7 pole.

Section CFO - SELF SUPPORTING FILLED FIBER OPTIC CABLE  
ASSEMBLY UNITS

Consists of one (1) foot (0.305 m) of self supporting filled fiber optic cable in place including all supporting hardware, cable guards, insulating tapes, and bonding of the armor (when present) and supporting member in accordance with the Construction Sheets.

- A. The length of the self supporting cable measured for compensation purposes includes the sum of the cable distances between supporting structures as indicated by the sequential foot markings.
- B. This unit does not include labor and material for fiber splicing, splice closures, housings, or organizers. The labor and material for these items are provided for in other units.
- C. This unit includes the spiraling of the self supporting cable in accordance with the method shown in the Construction Sheets.

Each self supporting filled fiber optic cable unit is listed in accordance with the number of optical fibers. Each unit is prefixed by the letters CFO. The following illustration indicates the method of designating the material required.

CFO16	A self supporting filled fiber optic cable with 16 fibers.
-------	--

Section CO - AERIAL FILLED FIBER OPTIC CABLE ASSEMBLY UNITS

Consists of one (1) foot (0.305 m) of aerial filled fiber optic cable in place including supporting messenger of galvanized steel strand, lashing wire, attachments to strand, bonding of the armor (when present) and strand in accordance with the Construction Sheets.

Options designated by the following suffixes apply:

<u>Suffix</u>	<u>Description</u>
A	Aluminum-clad steel strand.
C	Class C galvanized steel utility grade strand for corrosion areas.

- D Two or more cables are to be initially lashed to the same suspension strand.
- E Cables are lashed to existing strand and cable(s).
- A. The length of aerial cable measured for compensation purposes includes the sum of the cable distances between supporting structures as indicated by the sequential foot markings.
- B. This unit does not include labor and material for fiber splicing, splice closures, housings or organizers. The labor and material for these items are provided for in other units.
- C. Class A galvanized steel utility grade strand shall be provided unless another type is specified by the appropriate suffix.

Each aerial filled fiber optic cable assembly unit is listed in accordance with the number of optical fibers. Each unit is prefixed by the letters CO. The following illustrations indicate the method of designating the material required.

- CO16(6M) An aerial filled fiber optic cable with 16 fibers, supported by 6000 pound (lbs) [26,688 Newtons (N)] Class A galvanized steel utility grade strand.
- CO8E An aerial filled fiber optic cable with 8 fibers, lashed to existing strand and cables(s).

Section CW - AERIAL FILLED COPPER CABLE ASSEMBLY UNITS

Consists of one (1) foot (0.305 m) of aerial filled copper cable in place including supporting messenger of galvanized steel strand, lashing wire, attachments to strand, bonding of the shield and strand in accordance with the Construction Sheets.

Options designated by the following suffixes apply:

<u>Suffix</u>	<u>Description</u>
A	Aluminum-clad steel strand.
C	Class C galvanized steel utility grade strand is required for corrosion areas.
D	Two or more cables are to be initially lashed to the same suspension strand.
E	Cables are to be lashed to existing strand and cable(s).

- H                    Screened cable designated for T1 carrier systems.
- H1C                  Screened cable designated for T1C carrier systems.
- A.    This unit includes labor and material for installation of the splice closure, and other labor and materials for straight splicing cables of the same size and gauge required only for the purpose of joining such cables in one continuous length (reel ends).
- B.    When specified in the Proposal, this unit includes the spiraling of cable around the suspension strand at the locations shown on the Construction Sheets.
- C.    The length of aerial cable measured for compensation purposes includes the sum of the cable distances between supporting structures as indicated by the sequential foot markings.
- D.    Where aerial cables are supported by separate through-bolts on the same pole, messenger bonds required as shown on the Construction Sheets are included as a part of this unit.
- E.    Class A galvanized steel utility grade strand shall be provided unless another type is specified by the appropriate suffix.

Each aerial filled copper cable assembly unit is listed in accordance with the number of pairs and gauge of conductors. Each unit is prefixed by the letters CW. The following illustrations indicate the method of designating the material required.

- |              |  |
|--------------|--|
| CW50-24(6M)  | A 50-pair, 24-gauge aerial filled copper cable supported by 6000 lbs (26,688 N) Class A galvanized steel utility grade strand. |
| CW50-24(6M)C | A 50-pair, 24-gauge aerial filled copper cable supported by 6000 lbs (26,688 N) Class C galvanized steel utility grade strand. |

#### Section HA - AERIAL SPLICE CLOSURE ASSEMBLY UNITS

Consists of an aerial splice closure and the closure manufacturer's provided encapsulating material if required, installed in place and the labor and material for setting up in preparation for installing the closure, such as, opening the sheath or jacket of the cable, bonding of cable shields, filling the closure if required, closing the closure, and, when applicable, pressure testing, all in accordance with the manufacturer's instructions. It also includes all necessary hardware items to support the cable adjacent to the closure and to

terminate the lashing wire. Cable splicing shall be compensated under the appropriate splicing units.

The assembly units are defined as follows:

HAC( )	<u>Aerial Free-Breathing, Nonfilled Closure</u> - A free-breathing, nonfilled splice closure with pair count and gauge for each cable to be spliced.
HAF( )	<u>Aerial Filled Closure</u> - A filled splice closure with pair count and gauge for each cable to be spliced.
HAP( )	<u>Aerial Pressurized Closure</u> - A pressurized splice closure with pair count and gauge for each cable to be spliced.

For Fiber Optic applications use the following suffix:

<u>Suffix</u>	<u>Description</u>
O	Splice closure and organizer for fiber optic cables. The closure manufacturer shall specify the appropriate organizer.

The following illustrations indicate the method of designating the material required.

HAC(100-24)	Aerial free-breathing, nonfilled splice closure enclosing two cable ends with same pair count and gauge.
HAF(100-24)(50-24)	Aerial filled splice closure enclosing two cable ends with different pair counts.
HACO(24)	Aerial free-breathing, nonfilled fiber optic splice closure and organizer capable of accommodating a minimum of 24 fibers.
HAP(100-24)	Aerial pressurized splice closure enclosing two cable ends with same pair count and gauge.
HAPO(12)	Aerial pressurized fiber optic splice closure and organizer capable of accommodating a minimum of 12 fibers.

Section HC - COPPER SPLICING ASSEMBLY UNITS

- HC1 Consists of the labor and material necessary in the wire work and splicing of one (1) cable pair in any cable, including any non-working pair in an existing cable in accordance with RUS Splicing Standard Bulletin 1753F-401 (PC-2) using individual mechanical splicing connectors. The splice may be straight, bridged, or pieced out and bridged. Pairs that are to be tested, capped, or tested and capped, when specified by the Engineer are considered to be part of this unit. Only those pairs on which splicing, testing, and/or capping operations are performed are counted and each pair is counted only once at each location. On aerial inserts, each end of the fuse link is considered as a splice.
- HC3 Consists of the labor and material necessary in the wire work and splicing of one (1) cable pair in any cable, including any non-working pair in an existing cable in accordance with RUS Splicing Standard Bulletin 1753F-401 (PC-2) using splicing modules. The splice may be straight, bridged or pieced out and bridged. Pairs that are to be tested, capped, or tested and capped, when specified by the Engineer are considered to be part of this unit. Only those pairs on which splicing, testing, and/or capping operations are performed are counted and each pair is counted only once at each location. On aerial inserts, each end of the fuse link is considered as a splice.
- HC5 Consists of the labor and material necessary for terminating one (1) pair on a terminal block within a ready access closure, including a non-working pair in existing cables in accordance with RUS Splicing Standard Bulletin 1753F-401 (PC-2). Pairs that are to be tested, when specified by the Engineer, are considered to be part of this unit.

Section HO - FIBER OPTIC SPLICING ASSEMBLY UNITS

Consists of all labor and material necessary to splice and/or test one (1) glass fiber in any cable in accordance with RUS Splicing Standard Bulletin 1753F-401(PC-2). The labor shall include initial measurement, minimizing the attenuation, splicing and stowing the spliced fiber in a fiber organizer. The labor and material for the fiber organizer is part of the appropriate splice closure unit.

<u>Suffix</u>	<u>Description</u>
H01	Fusion Splice
H02	Mechanical Splice
H03	Connector Splice

Section HR - READY ACCESS SPLICE CLOSURE ASSEMBLY UNITS

Consists of a ready access closure containing unprotected filled terminal blocks installed in place and includes the labor and material for setting up in preparation for installing the ready access closure, such as, opening the sheath or jacket of the cable, bonding of cable shields, and closing the closure in accordance with the manufacturer's instructions. It also includes all necessary hardware items to support the cable adjacent to the closure and to terminate the lashing wire. Cable splicing shall be compensated under the appropriate splicing units. When protected filled terminal blocks are to be specified, the unit shall be suffixed by the letter "P".

Ready access closures not containing filled terminal blocks shall be suffixed with the letter "U". Under this option, installation of filled terminal blocks shall be compensated under other units.

The assembly units are defined as follows:

HR1( )( )            A straight splice ready access closure.

HR2( )( )            A branch splice ready access closure.

The first set of parentheses shall indicate the main cable diameter (dia.), in inches (in.) [millimeters (mm)], as shown in the illustration. The second set of parentheses shall indicate the number of terminals within the ready access closure. When the unit is suffixed with the letter "U" the second set of parentheses is not applicable.

The following illustrations indicate the method of designating the material required.

HR1(2.0)(12)            Ready access closure, accommodating a straight splice with a maximum cable diameter of 2.0 in. (50.8 mm), and equipped with filled terminal blocks with a total of 12 terminations.

- HR2(1.0)(6) Ready access closure, accommodating a branch splice with a maximum cable diameter of 1.0 in. (25.4 mm), and equipped with filled terminal blocks with a total of 6 terminations.
- HR1(2.0)U Ready access closure, accommodating a straight splice with a maximum cable diameter of 2.0 in. (50.8 mm), without any terminal blocks installed.

Section PE - GUY ASSEMBLY UNITS

Consists of strand and hardware; and insulators or ground connection where required. For guying purposes, when a cable messenger strand is extended one or more spans to a deadend structure, the strand in each such span shall be considered as an overhead guy for the appropriate size of strand used.

The assembly units are defined as follows:

- |        |   |
|--------|---|
| PE1-2  | Down Guy for 6M strand                              |
| PE1-3  | Down Guy for 10M strand                             |
| PE1-4  | Down Guy for 16M strand                             |
| PE1-2G | Down Guy, Ground Connection Type for 6M strand      |
| PE1-3G | Down Guy, Ground Connection Type for 10M strand     |
| PE1-4G | Down Guy, Ground Connection Type for 16M strand     |
| PE2-2  | Overhead Guy for 6M strand                          |
| PE2-3  | Overhead Guy for 10M strand                         |
| PE2-4  | Overhead Guy for 16M strand                         |
| PE2-2G | Overhead Guy, Ground Connection Type for 6M strand  |
| PE2-3G | Overhead Guy, Ground Connection Type for 10M strand |
| PE2-4G | Overhead Guy, Ground Connection Type for 16M strand |

Note: When the above Guy Assembly Units are to be installed on existing poles, the assembly unit designation is prefixed by the letter "N".

Unless otherwise indicated by an additional suffix, the strand furnished on the Project will be seven-wire, Class A galvanized steel utility grade. The following suffix may be used:

<u>Suffix</u>	<u>Type of Strand</u>
A	Aluminum - Clad steel
C	Class C galvanized steel utility grade

Section PF - ANCHOR ASSEMBLY UNITS

Consists of the anchor with rod, complete and in place, ready for attaching the guy strand.

The assembly units are defined as follows:

PF1-3	Expanding Anchor	-	6,000 lbs	(26,688 N)
PF1-5	Expanding Anchor	-	10,000 lbs	(44,480 N)
PF1-7	Expanding Anchor	-	16,000 lbs	(71,168 N)
PF2-3	Plate Anchor	-	6,000 lbs	(26,688 N)
PF2-5	Plate Anchor	-	10,000 lbs	(44,480 N)
PF2-7	Plate Anchor	-	16,000 lbs	(71,168 N)
PF3-3	Screw Anchor	-	6,000 lbs	(26,688 N)
PF3-5	Screw Anchor	-	10,000 lbs	(44,480 N)
PF3-7	Screw Anchor	-	16,000 lbs	(71,168 N)
PF5-3	Rock Anchor	-	3/4 in. dia. (19 mm)	rod
PF5-4	Rock Anchor	-	1 in. dia. (25.4 mm)	rod
PF6-3	Swamp Anchor	-	10 in. dia. (254 mm)	
PF6-4	Swamp Anchor	-	12 in. dia. (305 mm)	
PF6-5	Swamp Anchor	-	15 in. dia. (381 mm)	

Note: When twineye rods are required for the above anchor assembly units, the unit designation is suffixed by the letter "A".

Section PM - MISCELLANEOUS ASSEMBLY UNITS

Consists of all labor and materials to construct and install the units defined individually below required for the installation and construction of the aerial portions of the Project:

PM1	Pole Lightning Protection Assembly
PM2	Pole Ground Assembly
PM2-1	Auxiliary Ground Rod Assembly
PM2A	Ground wire assembly for bonding aerial cable strand or support wire to electric system neutral or pole ground assembly.
PM4	Cable Extension Arm (Short)
PM4A	Cable Extension Arm (Long)
PM5	Pole Stepping Assembly
PM6	One Wood Pole Key

- PM7 Two Wood Pole Keys
- PM8 One Wood Key and One Metal Expanding Key  
PM9 Two Wood Keys and One Metal Expanding Key
- PM11 Guy Guard
- PM12( ) Consists of all labor and material to install a sidewalk guy arm. The guy, guy guard and anchor assembly units will be specified separately. The length in feet (meters) of a single piece of 2 in.(50.8 mm) galvanized steel pipe shall be indicated in the parentheses.
- PM14 Push Brace Accessories
- PM21 Cable Entrance - Consists of the necessary labor and material to terminate copper and/or fiber optic outside plant cables as shown on the detailed drawings as specified by the Engineer.
- PM22 Grounding System - Consists of the necessary labor and material to construct a grounding system as shown on the detailed drawings as specified by the Engineer. This unit shall include all ground electrodes, trenching, backfilling, bonding the auxiliary ground electrodes to each other and to the primary ground electrodes, and bonding to the master ground bar (MGB).
- PM25( ) Filled Terminal Block Assembly Unit - Consists of an unprotected filled terminal block, mounted in place in a ready access closure (separately specified) and connected to the conductors of the cable as specified by the Engineer. Splicing of the cable conductors shall be in accordance with RUS Splicing Standard Bulletin 1753F-401 (PC-2). The pair count of the terminal block shall be indicated in the parentheses. When protected filled terminal blocks are to be specified, the unit shall be suffixed by the letter "P".
- PM52 Pole Marking, Per Pole, Route and Pole Number.

Section R - RIGHT-OF-WAY CLEARING AND TRIMMING UNITS  
Aerial Plant

A. Clearing Units are defined as follows:

- R1-5 Is one (1) foot (0.305 m) in length and 5 feet (1.52 m) in width (to be measured on one side of the pole line) of actual clearing of right-of-way. The unit applies to clearing right-of-way along new or existing telecommunications pole lines and along existing power pole lines. This includes clearing of underbrush, tree removal, and such tree trimming as may be required to leave an unobstructed right-of-way from the ground up on one side of the line of poles carrying wire or cable. The length of actual clearing shall be measured in a straight line parallel to the line between poles and across the maximum dimension of foliage cleared (not trunk) projected to the ground line. All trees and underbrush across the width of the right-of-way shall be considered to be grouped together as a single length in measuring the total length of clearing. Lengths along the right-of-way in which no trees are to be removed or trimmed or underbrush cleared shall be omitted from the total measurement. This unit includes the removal, or topping (cutting out the top of the tree so that if the remaining portions of the tree fall, they will not endanger the line) at the option of the Contractor, of danger trees outside of the right-of-way when so designated by the Engineer. (Danger trees are defined as dead or leaning trees, which, in falling, would affect the operation of the line.) The Contractor shall not remove or trim shade, fruit, or ornamental trees unless so directed by the Engineer.
- R1-10 Identical to R1-5 except that width is 10 feet (3.05 m).
- R2-5 Identical with R1-5, except that width 10 feet (3.05 m); to be measured 5 feet (1.52m) on each side of the pole line.
- R2-10 Identical with R1-5, except that width 20 feet (6.1 m), to be measured 10 feet (3.05m) on each side of the pole line.

Note: The letter "M" added as a suffix to the above "R" units designates units for reclearing existing right-of-way. With the

exception of the substitution of the word "reclearing" for "clearing", the remaining description of the "R" assembly units applies for the units suffixed with the letter "M".

B. The Trimming Unit is defined as follows:

R3-5 Is one (1) foot (0.305 m) in length and consists of the trimming of foliage and branches from trees growing on or adjacent to the right-of-way so as to provide a clearance of not less than 5 feet (1.52 m) in all directions from telecommunications cable. This unit is measured parallel to the pole line across the maximum width of foliage trimmed. All trees, underbrush or shrubbery across the width trimmed shall be considered to be grouped together as a single length in measuring the total length of trimming. Lengths along the right-of-way in which no trimming is performed shall be omitted from the total measurement. Any trimming included in R1 or R2 right-of-way clearing units, shall not be considered a part of the measurement of the unit. The Contractor shall not trim any shade, fruit or ornamental trees unless so directed by the Engineer. When so designated by the Engineer, a tree may be trimmed of its branches with the trunk left extending into the zone to be trimmed.

#### Section W - REARRANGEMENT UNITS

Specific rearrangement units shall be designated and described by the Engineer on the "List of Special Arrangement Units" table of RUS Form 515. Existing plant assembly units to be rearranged are designated by a prefix "W".

#### Section XX - NONREUSABLE MATERIALS REMOVAL UNITS

These units cover the furnishing of all labor for the removal of construction assembly units from existing lines, and transportation of the removed materials for proper disposal. The Contractor will be permitted to use the most economical method of removing these units. The removal units are designated by the prefix "XX" followed by the assembly unit designation of the unit to be removed.

#### Section XZ - REUSABLE MATERIALS REMOVAL UNITS

These units cover the furnishing of all labor for the removal of construction assembly units from existing lines and all labor and transportation of the removed materials to a location designated by the Owner. The Contractor will be charged by the Owner for

the materials removed under this section at the unit material values shown in column 2 of the "Value and Disposition of Units to be Removed" table of RUS Form 515. The number of units to be charged to the Contractor and the extended value of these units are shown in columns 3 and 4. Such charges will be placed against the Contractor as assembly units are removed and the unit material values will be deducted from the total value of assembly units constructed on this project for determination of the work accomplished for purposes of the monthly progress payments to the Contractor. Of the assembly units listed in the "Value and Disposition of Units to be Removed" table to be removed from existing lines certain units are to be reused in the construction of the project. The quantity of such units to be reused is listed in the "Value and Disposition of Units to be Removed" table, column 5. These units where installed in the project will be inventoried as new assembly units and compensated for at the unit bid prices. The quantity of assembly units listed in column 6 of the "Value and Disposition of Units to be Removed" table is the maximum quantity of removed assembly units that are to be returned to the Owner for credit which will be allowed at the unit material prices in column 2. Column 7 indicates the extended value of the units to be returned to the Owner. The Contractor will be allowed credit for assembly units listed in column 6 which, in the opinion of the Engineer, have not been damaged by the Contractor in removal and handling. Such credits will be allowed the Contractor as the assembly units are returned to a location designated by the Owner and shall be added to the total value of installed assembly units for determination of work accomplished for the purposes of the monthly progress payments to the Contractor. The removal units are specified by the prefix "XZ" followed by the assembly unit designation of the existing assembly unit to be removed.

**Part II - SPECIFICATIONS FOR MATERIALS****1. SCOPE**

This part of the specification is concerned with the various materials required for the construction of the outside aerial cable plant of the rural telecommunications system as shown on the Plans, Specifications, and Construction Sheets.

**2. GENERAL**

All materials used in the construction of the rural telecommunications system except those listed in Paragraph 4 below shall be listed in RUS Informational Publication (IP) 344-2, "List of Materials Acceptable for Use on Telecommunications Systems of RUS Borrowers," unless specific written approval has been granted by the Administrator.

**3. POLES**

**3.1** The pole plan, method of treatment, kind of preservative and general procedure applying to all poles shall be in accordance with the latest RUS specifications for these items in effect at the time the bids are received. All poles shall be framed in accordance with the framing guide attached to the specifications.

**3.2** Poles shall be of the length and American National Standards Institute, Inc. (ANSI) class specified in the Proposal.

**4. MISCELLANEOUS**

Items which do not appear in RUS IP 344-2, "List of Materials Acceptable for Use on Telecommunications Systems of RUS Borrowers," shall be of a quality suitable for the application for which they are intended.

**Part III - SPECIFICATIONS FOR CONSTRUCTION AND INSTALLATION****1. GENERAL**

**1.1** All construction and installation work shall be done in a thorough and workmanlike manner in accordance with the Plans, Specifications and Construction Sheets and shall be subject to acceptance by the Owner and the Administrator.

**1.2** All material to be used in construction of the Project shall be stored so as to be protected from deteriorating effects of the elements.

1.3 All guy strand, suspension strand, aerial cables, and accessory materials used in the construction of the Project shall be handled with care. Each reel of aerial cable shall be inspected for damage. All damage shall be repaired to the satisfaction of the Engineer and in accordance with the methods or other instructions described in the appropriate paragraphs of Part III. If reel wrap is present, the reel wrap shall remain intact on the reel until the cable is ready to be placed.

1.4 Deviations from the Plans, Specifications and Construction Sheets shall not be permitted except upon written permission of the Engineer.

1.5 The latest revision of the National Electrical Safety Code (NESC) and the National Electrical Code (NEC) shall be followed in every case except where local regulations are more stringent, in which case local regulations shall govern.

1.6 The Contractor shall maintain conductor polarity (tip and ring) identification at the main distributing frame, cable terminals, wire terminals, terminal blocks, and in the service entrance, all in accordance with the Specifications and Construction Sheets (see guide drawing 815).

## 2. POLE LINES

2.1 Poles shall be handled carefully. Damaged poles shall not be used.

2.2 The pole hole shall be of sufficient diameter to permit the pole to settle freely to the bottom of the hole without trimming the butt and still have sufficient space between the pole and the sides of the hole to permit proper tamping of the backfill at every point around the pole, and throughout the entire depth of the hole.

**2.3** The setting depth, in feet (or meters), for poles of various lengths shall be as follows:

<u>Length of Pole</u>	<u>Setting in Soil</u>	<u>Setting in Solid Rock</u>
20 (6.10)	4.0 (1.22)	3.0 (0.91)
25 (7.62)	5.0 (1.52)	3.5 (1.07)
30 (9.14)	5.5 (1.68)	3.5 (1.07)
35 (10.67)	6.0 (1.83)	4.0 (1.22)
40 (12.19)	6.0 (1.83)	4.0 (1.22)
45 (13.72)	6.5 (1.98)	4.5 (1.37)
50 (15.24)	7.0 (2.13)	4.5 (1.37)
55 (16.76)	7.5 (2.29)	5.0 (1.52)
60 (18.29)	8.0 (2.44)	5.0 (1.52)

**2.4** The "Setting in Soil" depth as shown in paragraph 2.3, shall apply where poles are to be set in soil only; where there is a layer of soil more than 2 feet (0.61 m) in depth over solid rock; or where the pole in solid rock is not substantially vertical or the diameter of the hole at the surface of the rock exceeds approximately twice the diameter of the pole at the same level.

**2.5** The "Setting in Solid Rock" depth as shown in paragraph 2.3, shall apply where solid rock is encountered at the ground line and where the hole is substantially vertical, approximately uniform in diameter, and large enough to permit the use of tamping bars the full depth of the hole.

**2.6** Where there is a layer of soil 2 feet (0.61 m) or less in depth over solid rock, the depth of the hole shall be the depth of the soil in addition to the depth specified in paragraph 2.3 under "Setting in Solid Rock," provided, however, that such depth shall not exceed the depth specified under "Setting in Soil."

**2.7** On sloping ground the depth of the hole shall be measured from the low side of the hole. Where a pole is to be set on the side of a steep grade where soil erosion appears to be a consideration, the hole should be one (1) foot (0.305 m) deeper than specified in paragraph 2.3 under "Setting in Soil."

**2.8** When an earth boring machine is employed for holes for guyed poles, the bottom of the hole shall be thoroughly tamped to compact any loose earth that may be present.

**2.9** All holes shall be backfilled with soil or small rock and all pole holes in rock shall be inspected and approved by the Engineer before being backfilled.

**2.10** Backfill shall be thoroughly tamped the full depth of the pole hole. Earth must be banked around the pole to a minimum height of 6 in. [15.24 centimeters (cm)] above ground level.

**2.11** Holes in soil for poles at unguyed corners where the pole will not be keyed shall be one (1) foot (0.305 m) deeper than the "Setting in Soil" depth as shown in paragraph 2.3. For holes in solid rock the "Setting in Solid Rock" depth will apply.

**2.12** The Contractor shall be responsible for setting poles in alignment according to the staking sheets. If the Contractor should find stakes out of alignment, the Engineer shall, upon request of the Contractor, realign the stakes according to the construction sheets.

**2.13** Poles shall be set plumb except at corners where they shall be set and raked against the load so that the pole top will be in line after the load is applied. The rake in pole shall not exceed 6 in. (15.24 cm) for each 10 feet (3.05 m) of pole length after the conductors are installed at the required tension. Deadend shall be set so as to be plumb and in line after the load it applied.

**2.14** Pole lightning protection shall be a #6 AWG bare copper wire installed in accordance with assembly unit drawing PM1.

### **3. MOUNTING HARDWARE AND GUYS**

**3.1** All bolts employed for the mounting of hardware items on poles shall be long enough to fully engage the nut (including locknut, where applicable) but shall not extend more than 2 in. (50.8 mm) beyond the nut after the nut is tightened. The ends of bolts shall not be cut.

**3.2** The Engineer shall determine all guy locations and shall specify the type of guy. Guys shall be installed before conductors or cable suspension strands are placed.

### **4. ANCHORS**

**4.1** Anchor assembly units shall be installed at locations designated on the construction sheets.

**4.2** All anchors and rods shall be in line with the load and shall be so installed that the eye of the rod is above grade. Not more than 6 in. (152 mm) of rod shall remain out of the ground after the load is applied.

4.3 When an expansion type anchor is used, the anchor shall be fully expanded and shall be expanded into undisturbed earth before backfilling the anchor hole.

4.4 Backfill shall be thoroughly tamped the full depth of all anchor holes.

4.5 Rock anchors shall be placed in accordance with the detailed instructions of the Engineer. Where a rock is encountered below the surface of the ground, instructions from the Engineer shall be obtained before placing an anchor at that location.

## 5. SELF SUPPORTING FIBER OPTIC CABLE

5.1 Where physical obstructions make it necessary to pull cable along the line from a stationary reel, cable stringing blocks shall be used to support the cable during all placing and tensioning operations. Ladders, cable cars and other equipment shall not be placed on or against the cable.

5.2 Splicing of the optical fibers shall be performed in accordance with RUS Splicing Standard Bulletin 1753F-401 (PC-2). Splicing of the support member shall be performed in accordance with the method specified by the Engineer.

5.3 During installation, maximum pulling tension and minimum bending radius of the self supporting fiber optic cable shall not exceed the cable manufacturer's recommendations.

5.4 Initial stringing tension, maximum permissible span length, and sagging shall be in accordance with the cable manufacturer's recommendations.

5.5 Self supporting fiber optic cable shall be spiraled in accordance with the method shown on Construction Guide Drawing 250-1. Spiraling of the cable shall be performed within 24 hours of the tensioning operation.

5.6 The insulation shall not be removed from the support member except at bonding and ground points; and at points where ends of the support member are terminated in splicing and deadend devices.

5.7 The support member of self supporting fiber optic cable shall be made electrically continuous throughout its entire length.

5.8 At junctions between self supporting fiber optic cable and aerial fiber cable, or buried fiber cable, the support messenger shall be bonded to the aerial cable strand or buried cable armor.

5.9 The support member of self supporting fiber optic cable shall be grounded at locations specified by the Engineer by connecting the support wire to a pole ground wire as shown on the Construction Sheets.

5.10 When specified by the Engineer, the insulation of the support member at deadend fittings, splices and bridged grounding connections shall be restored in accordance with the method shown in Construction Guide Drawing 360.

5.11 Damaged portions of the self supporting fiber optic cable shall be cut out and the support member spliced in accordance with the method specified by the Engineer.

## 6. SUSPENSION STRAND

6.1 The cable shall be installed within a reasonable time after the strand is installed and tensioned. If a delay in installing cable in excess of 24 hours is encountered, temporary dampers shall be installed on the strand.

6.2 When tensioning strand the cable suspension clamps shall be loose enough to allow free movement of the strand.

6.3 Suspension strand shall be placed in accordance with the Construction Sheets and shall be tensioned in accordance with instructions, which shall be furnished, to the Contractor by the Engineer.

6.4 The suspension strand shall be placed on the roadside of the pole line unless otherwise directed by the Engineer.

6.5 In tangent construction, the lip of the suspension strand clamp shall point toward the pole. At angles in the line, the suspension strand clamp lip shall point away from the load.

6.6 In level construction the suspension strand clamp shall be placed in such a manner that it shall hold the strand below the through-bolt. At points where there is an up-pull on the strand, the clamp shall be so placed that it shall support the strand above the through-bolt.

6.7 When a thimbleye bolt is used both to mount the suspension strand clamp and to make the guy attachment, the size of the suspension strand clamp shall be governed by the size of the thimbleye bolt required for the guy.

6.8 The air temperature at the time and place of tensioning the strand shall be determined by means specified by the Engineer.

6.9 The suspension strand shall be made electrically continuous throughout its entire length as indicated on the Construction Sheets.

6.10 Suspension strands shall be bonded to other bare cable suspension strands, and guys on the same pole and grounded by connection to ground leads at locations specified by the Engineer and in the manner specified by the Engineer. Where the strand is to be grounded to a multigrounded neutral on a pole which does not carry a vertical pole ground wire, a #6 AWG bare copper wire shall be left coiled and taped to permit it to be extended up the pole and connected to the multiground neutral by a representative of the power company.

## 7. FILLED AERIAL CABLE

7.1 The Contractor and Engineer shall jointly inspect all reels of cable for damage prior to installation.

7.2 Cable ends shall be kept sealed at all times, i.e., during transportation, in storage, and during cable placement to prevent moisture entry into the cable core. Acceptable cable end caps shall be used for this purpose.

7.3 Cable shall be taken from the reel only as it is placed. Bends of small radii and twists shall be avoided in handling cable.

7.4 If the jacket is deformed in handling the cable, the Engineer shall be notified. If directed by the Engineer, the deformed section of the jacket shall be removed; the insulation and conductors shall be examined and if damaged shall be repaired. The opening in the jacket shall then be closed by means of a suitable enclosure. Repairs so made shall be done in accordance with appropriate specifications.

## 8. FILLED AERIAL CABLE PLACEMENT

8.1 During placing operations, copper cables shall not be bent in a radius less than 10 times the outside diameter of the cable and fiber optic cables shall not be bent in a radius less than 20 times the outside diameter of the cable. Temporary supports where necessary, shall be placed sufficiently close together and proper tensioning of the cable shall be employed to prevent bending in excess of the above requirements.

8.2 In those instances where spiraling of cable is involved, the mounting of closures for purposes of splicing and distribution

shall be accomplished after the spiraling operation has been completed.

**8.3** Cable guards shall be applied over the cable at points of potential abrasion such as at supports, and in locations where tree trimming is not permitted.

**8.4** Cable shall be lashed with lashing wire to the suspension strand by means of a suitable lashing machine.

**8.5** The pitch of the lashing wire may be from 10 to 15 in. (254 to 381 mm) but must be constant for any section of cable of the same size and gauge. For cables of 3/4 in. (19 mm) or larger in diameter, the lashing wire shall be placed with a tension of 35 to 40 lbs (156 to 178 N). Cables having a smaller diameter less than 3/4 in. (19 mm) shall be lashed with a lashing wire tension of 18 to 25 lbs (80 to 111 N).

**8.6** During the placing operation, precautions shall be taken to prevent slippage of the cable sheath or jacket over the core.

**8.7** The cable shall be snug against the suspension strand throughout the span. It shall be supported in a position directly below the strand insofar as possible, except where spiraling has been specified. Where more than one cable is placed on a strand, the cables shall be arranged as shown on the Construction Sheets so that the cables are snug against the suspension strand and against each other.

**8.8** The lashing wire shall be terminated at each pole and the cable shall be supported and protected at the suspension clamp in accordance with the Construction Sheets.

**8.9** At lashing wire terminating points, the tension placed in the lashing wire by the lashing machine shall be maintained. No slack in the lashing wire shall be permitted to run into the span.

**8.10** When lashing wire is spliced in a span, the splice shall be made by means of a compression type splicing sleeve. The completed splice shall be placed on the strand in such a position that it shall not result in damage to the cable sheath or jacket.

**8.11** Where suspension strand attachments such as suspension strand cross-over, suspension strand pull-offs, etc., are encountered in the span, a positive separation shall be provided between the suspension strand attachment and the cable, and the cable shall be supported and protected in accordance with the Construction Sheets.

**8.12** At splices where the cable is not cut, no slack shall be left in the cable. So that no slack can run into the span, the lashing wire shall be securely clamped to the strand until the splice is completed, at which time the lashing wire shall be terminated in accordance with the Construction Sheets.

**8.13** At cut splices in the cable, sufficient overlap shall be provided to permit splicing without piecing out the conductors.

**8.14** Spiraling of lashed cable where specified shall be performed in accordance with the method shown on the Construction Guide Drawing 250. Spiraling of the cable shall be performed within 48 hours of the tensioning operation.

**8.15** Where the new cable is to be lashed to existing strand and cable(s), the preceding requirements for placement of lashed cable shall also be adhered to, except as modified and/or supplemented as follows:

**8.15.1** The cable shall be lashed to the existing strand and cable(s) so that it and the existing cable(s) shall be as snug against the existing strand as is practicable.

Note: If the existing cable is spiraled, the spiraling shall first be removed. The existing cable after unspiraling and the new cable shall then be lashed, without either being spiraled, to the existing strand in the same lashing operation.

**8.15.2** The lashing wire shall be terminated on both sides of all splices and devices in/on the existing cable where interference with the lashing operation is encountered.

**8.15.3** Cable spacers and cable straps, as required, shall be used at all points of lashing wire termination to maintain proper separation and support for the new cable.

**8.15.4** Spacers shall be added to the existing suspension clamp mountings, where required, to maintain proper separation between the cable and the surface of the pole.

**8.15.5** Ready-access closures to be installed on the new cable(s) shall be equipped with extension fittings so that they will be located below and separate from the existing cable.

**8.16.6** The existing lashing wire, fittings and attachments shall be adjusted as necessary to maintain proper security of the new cable and the existing cable, and to maintain adequate separations and clearances.

**9. CABLE SPLICING AND TERMINALS**

**9.1** Splicing for copper cable and fiber optic cable shall be in accordance with RUS Splicing Standard Bulletin 1753F-401 (PC-2).

**9.2** Aerial cable terminals and ready-access closures equipped with filled terminal blocks shall be installed in accordance with the Construction Sheets and connected in accordance with the cable schematic drawings furnished by the Engineer. Splicing shall be performed in accordance with RUS Splicing Standard Bulletin 1753F-401 (PC-2).

**10. CLEARING RIGHT-OF-WAY**

**10.1** In clearing the right-of-way, trees shall be removed or trimmed and underbrush cleared in accordance with the Construction Sheets. Trees fronting the side of the right-of-way shall be trimmed symmetrically unless otherwise directed by the Engineer.

**10.2** Dead trees beyond the right-of-way, which would strike the line in falling, shall be removed.

**10.3** Leaning trees beyond the right-of-way which would strike the line in falling and which would require topping if not removed, may be removed or topped at the option of the Contractor; however, the Contractor shall trim and not remove shade, fruit, or ornamental trees unless otherwise directed by the Engineer.

LIST OF CONSTRUCTION DRAWINGS AND PLANSAssembly Unit Drawings

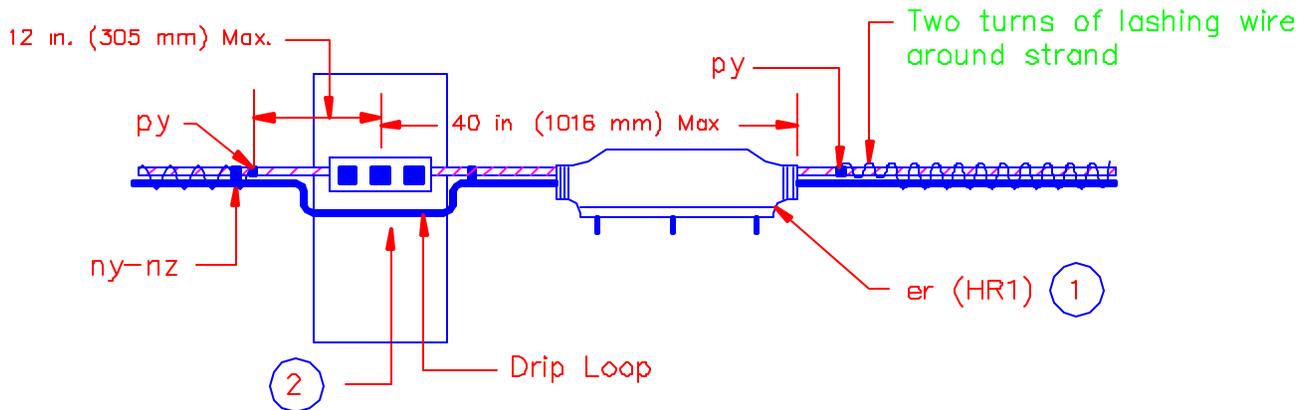
HR1	Ready-Access Enclosure, Lashed Cable Straight Splice
HR2	Ready-Access Enclosure, Lashed Cable Branch Splice
PE1-2, PE1-3, and PE1-4 PE1-2G, PE1-3G, and PE1-4G	Down Guy Down Guy, Ground Connections
PE2-2, PE2-3, and PE2-4 PE2-2G, PE2-3G, and PE2-4G	Overhead Guy Overhead Guy, Ground Connections
PF1-3, PF1-5, and PF1-7 PF3-3, PF3-5, and PF3-7 PF5-3 and PF5-4 PF6-3, PF6-4, and PF6-5	Expanding Anchor Assembly Screw Anchor Assembly Rock Anchor Assembly Swamp Anchor Assembly
PM1	Pole Lightning Protection Assembly
PM2 PM2-1 PM2A	Pole Ground Assembly Auxiliary Ground Rod Assembly Ground Wire Assembly
PM4 PM4A	Cable Extension Arm Assembly (Short) Cable Extension Arm Assembly (Long)
PM5	Pole Stepping Assembly
PM6 and PM7 PM8 and PM9	Pole Key Assemblies Pole Key Assemblies
PM12	Sidewalk Guy Arm Assembly
PM14	Push Brace Accessories
PM52	Pole Marking

Construction Guide Drawings

201	Suspension Strand Mounting
201-1	Self Supporting Filled Fiber Optic Cable Support
202	Suspension Strand Mounting (Pull Away from Pole)
202-1	Suspension Strand Mounting (Pull Against Pole)
202-3	Self Supporting Filled Fiber Optic Cable Support, Corner

203	Suspension Strand Mounting (Corners)
203-1	Self Supporting Filled Fiber Optic Cable Support, Corner
204	Suspension Strand Deadend
206	Branch Suspension Strand
207	Branch Suspension Strand
208	Suspension Strand Pull-Off
209-1	Suspension Strand Bonding
211	False Deadend
212	Strand Layouts
214	Arrangement Details of Cables at Pole Supports
241	Lashed Cable Support at Pole
242	Lashing Wire Terminations
243	Lashing Wire Terminations at Suspension Strand Crossovers
250	Method of Spiraling Aerial Cable
250-1	Method of Spiraling Self Supporting Filled Fiber Optic Cable (Figure 8 Design)
312-1	Aerial Plastic Cable, Details of Wire Connections to Terminal blocks
360	Method of Restoring Insulation on Support Member of Self Supporting Filled Fiber Optic Cable (Figure 8 Design)
812	Guy Hook, Details of Installation
815	Conductor Polarity (Tip and Ring) Diagram (Aerial Plant)

NOTE: On the Assembly Unit or Guide Drawings an asterisk (\*) in the ITEM column indicates items that are no longer listed in RUS IP 344-2, "List of Materials Acceptable for Use on Telecommunications Systems of RUS Borrowers."



Notes:

- ①. Select enclosure size for the main cable diameter from 0.4 to 3.0 in. (10 to 76 mm) and install in accordance with the enclosure manufacturer's instructions.
- ②. Lashed cable supports with the proper size cable spacers shall be used to hold the cable parallel to the strand and clear of the hardware.

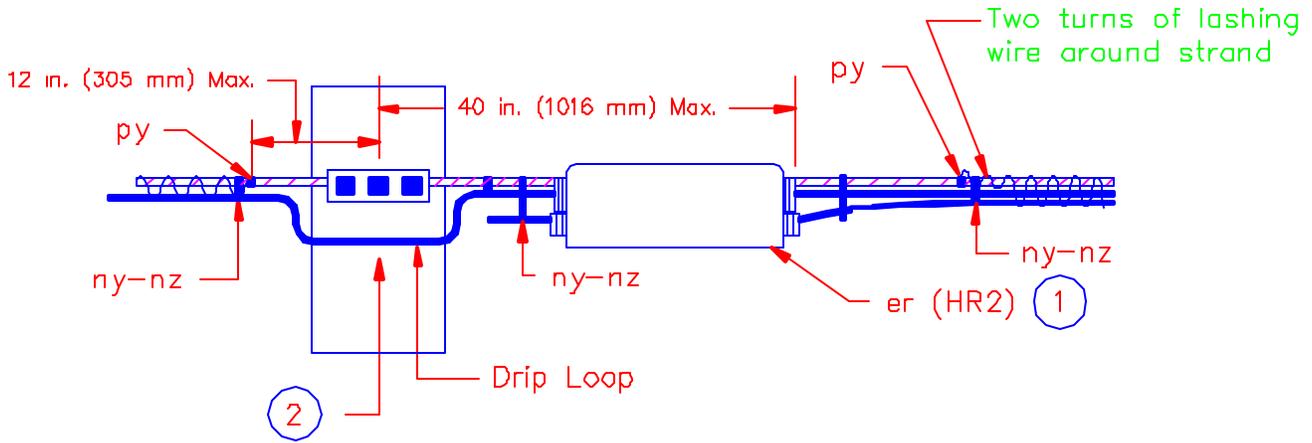
ITEMS	MATERIALS	HR1 NO. REQUIRED
er	Enclosure, ready-access	1
*ny	Spacers, cable	As required
*nz	Supports, lashed cable	As required
*py	Clamps, lashing wire, terminating	As required

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 READY-ACCESS ENCLOSURE  
 LASHED CABLE - STRAIGHT SPLICE

Scale: NTS

March 2001

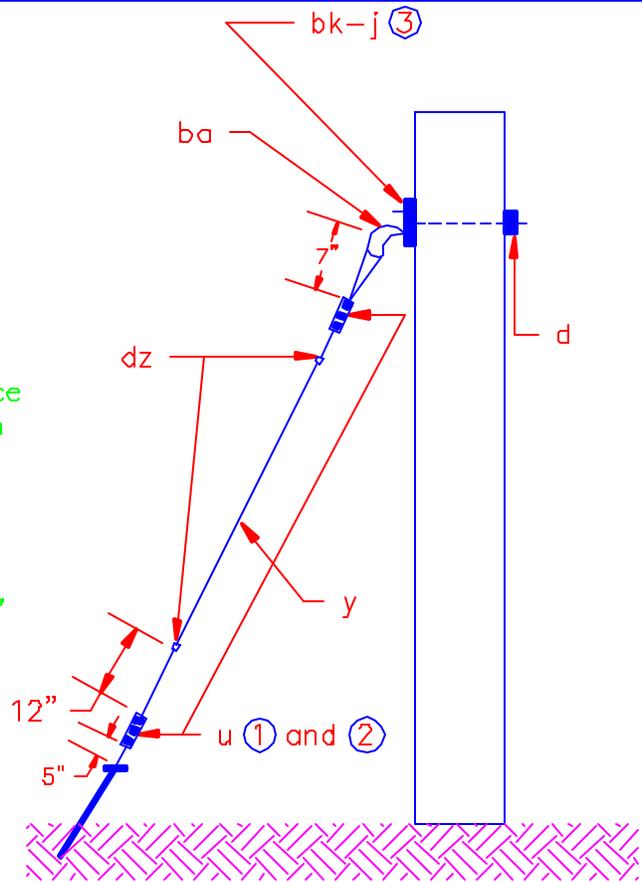
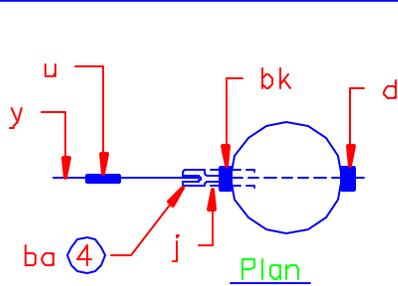
HR1



Notes:

1. Select enclosure size for the main cable diameter from 0.4 to 3.0 in. (10 to 76 mm) and install in accordance with the enclosure manufacturer's instructions.
2. Lashed cable supports with the proper size cable spacers shall be used to hold the cable parallel to the strand and clear of the hardware.

		HR2
ITEMS	MATERIALS	NO. REQUIRED
er	Enclosure, ready-access	1
*ny	Spacers, cable	As required
*nz	Supports, lashed cable	As required
*py	Clamps, lashing wire, terminating	As required
		RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES READY-ACCESS ENCLOSURE LASHED CABLE - BRANCH SPLICE
		Scale: NTS
		March 2001
		HR2



Notes:

- ①. An equivalent guy terminating device (mu) rated to develop the strength of the appropriate guy strand may be used in lieu of the 3-bolt guy clamps listed.
- ②. Where 3-bolt guy clamps are used, place 1 or 2 clamps depending on stand size.
- ③. For 6M sizes of guy strand, omit items bk and j and substitute a 2 1/2" x 2 1/2" x 3/16", 11/16" hole curved washer, item d.
- ④. If a guy hook is used in lieu of a thimbleye bolt refer to Guide Drawing 812 for installation details.
- ⑤. For converting English units to metric units use 1 in. = 25.4 mm and 1 ft = 0.3048 m.

	PE1-2	PE1-3	PE1-4
	6M	10M	16M
	NO. REQ'D	NO. REQ'D	NO. REQ'D

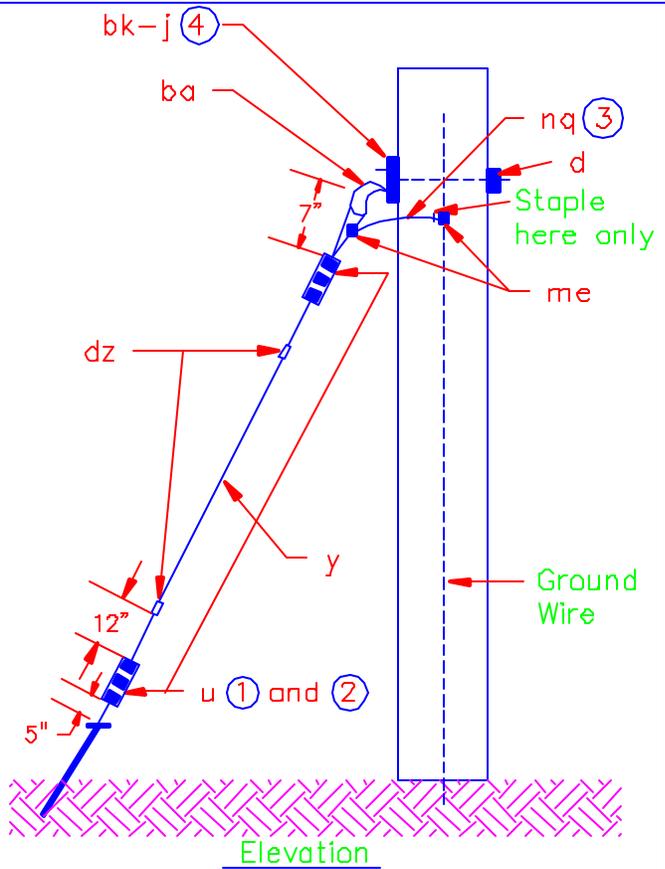
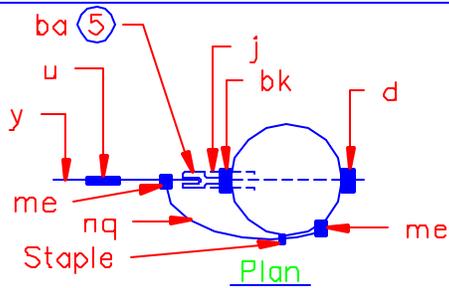
ITEMS	MATERIALS	NO. REQ'D	NO. REQ'D	NO. REQ'D
d	Washers, curved, 3" x 3" x 1/4", 13/16" hole	—	—	1
d	Washers, curved, 2 1/2" x 2 1/2" x 3/16", 11/16" hole	2	1	—
j	Screws, lag, 1/2" x 4"	—	2	2
u	Clamps, guy, 3-bolt	2	2	4
y	Strand, guy	req'd lgth	req'd lgth	req'd lgth
ba	Bolts, angle, thimbleye, 3/4" x req'd length	—	—	1
ba	Bolts, angle, thimbleye, 5/8" x req'd length	1	1	—
bk	Plates, lift, curved, 7" x 2 1/2" x 5/16"	—	—	1
bk	Plates, lift, curved, 7" x 2 1/2" x 1/4"	—	1	—
*dz	Clips, guy	2	2	2

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 DOWN GUY

Scale: NTS

March 2001

PE1-2, -3, -4



Notes:

- ①. An equivalent guy terminating device (mu) rated to develop the strength of the appropriate guy strand may be used in lieu of the 3-bolt guy clamps listed.
- ②. Where 3-bolt guy clamps are used, place 1 or 2 clamps depending on strand size.
- ③. On joint use poles where no vertical pole ground wire is present, leave enough length of #6 AWG copper ground wire (item nq) coiled and taped to enable it to be extended up the pole and connected to a multigrounded neutral by a representative of the power company
- ④. For 6M sizes of guy strand, omit items bk and j and substitute a 2 1/2" x 2 1/2" x 3/16", 11/16" hole curved washer, item d.
- ⑤. If a guy hook is used in lieu of a thimbleye bolt refer to Guide Drawing 812 for installation details.
- ⑥. For converting English units to metric units use 1 in. = 25.4 mm and 1 ft = 0.3048 m.

PE1-2G	PE1-3G	PE1-4G
6M	10M	16M

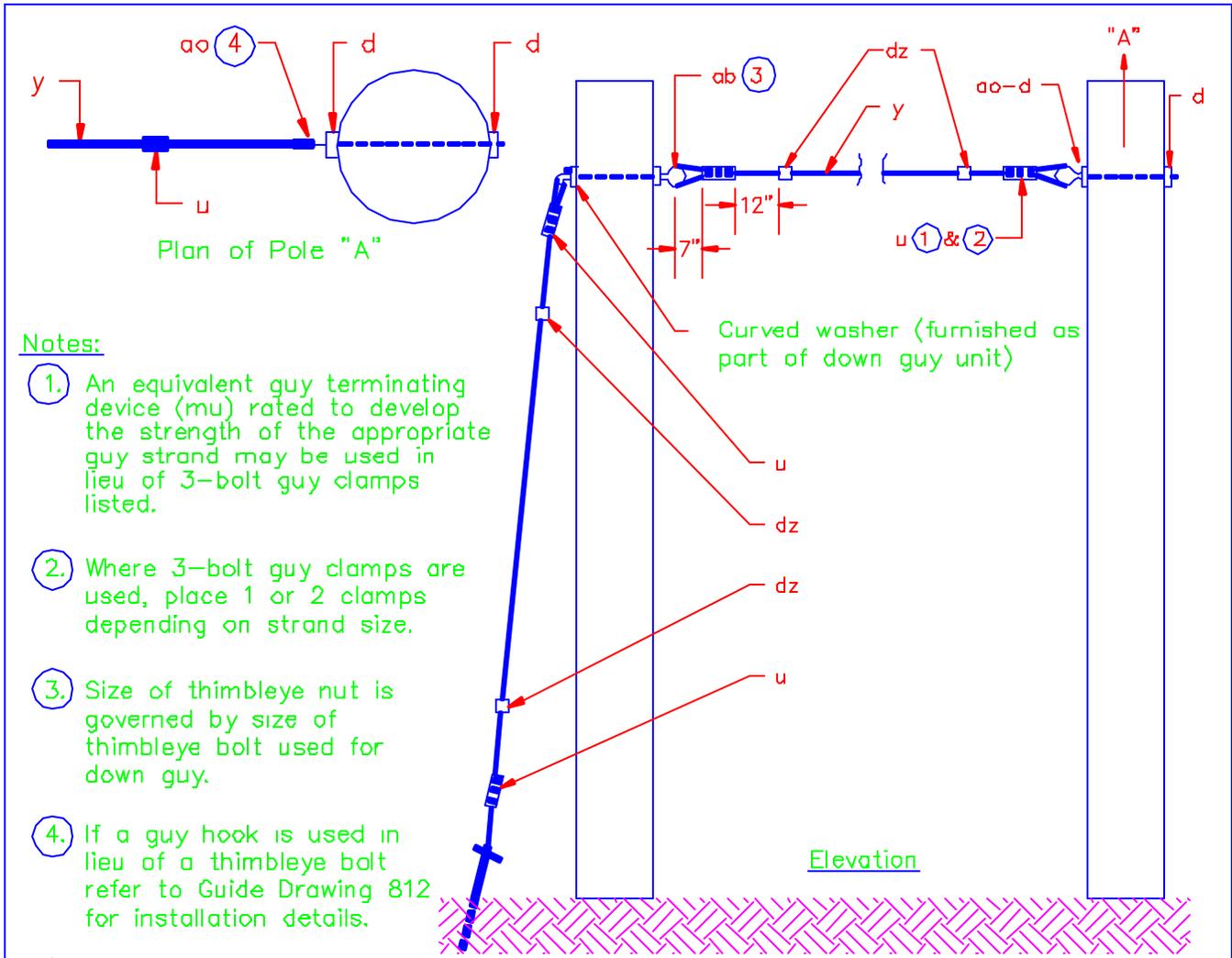
ITEMS	MATERIALS	NO. REQ'D	NO. REQ'D	NO. REQ'D
d	Washers, curved, 3" x 3" x 1/4", 13/16" hole	-	-	1
d	Washers, curved, 2 1/2" x 2 1/2" x 3/16", 11/16" hole	2	1	-
j	Screws, lag, 1/2" x 4"	-	2	2
u	Clamps, guy, 3-bolt	2	2	4
y	Strand, guy	req'd lgth	req'd lgth	req'd lgth
ba	Bolts, angle, thimbleye, 3/4" x req'd length	-	-	1
ba	Bolts, angle, thimbleye, 5/8" x req'd length	1	1	-
bk	Plates, lift, curved, 7" x 2 1/2" x 5/16"	-	-	1
bk	Plates, lift, curved, 7" x 2 1/2" x 1/4"	-	1	-
*dz	Clips, guy	2	2	2
me	Connector, grounding	2	2	2
*nq	Wire, ground, bare #6 AWG copper	req'd lgth	req'd lgth	req'd lgth

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 DOWN GUY, GROUND CONNECTIONS

Scale: NTS

March 2001

PE1-2G, -3G, -4G



Notes:

1. An equivalent guy terminating device (mu) rated to develop the strength of the appropriate guy strand may be used in lieu of 3-bolt guy clamps listed.
2. Where 3-bolt guy clamps are used, place 1 or 2 clamps depending on strand size.
3. Size of thimbleye nut is governed by size of thimbleye bolt used for down guy.
4. If a guy hook is used in lieu of a thimbleye bolt refer to Guide Drawing 812 for installation details.
5. For converting English units to metric units use  
 1 in. = 25.4 mm and  
 1 ft = 0.3048 m.

	PE2-2	PE2-3	PE2-4
	6M	10M	16M

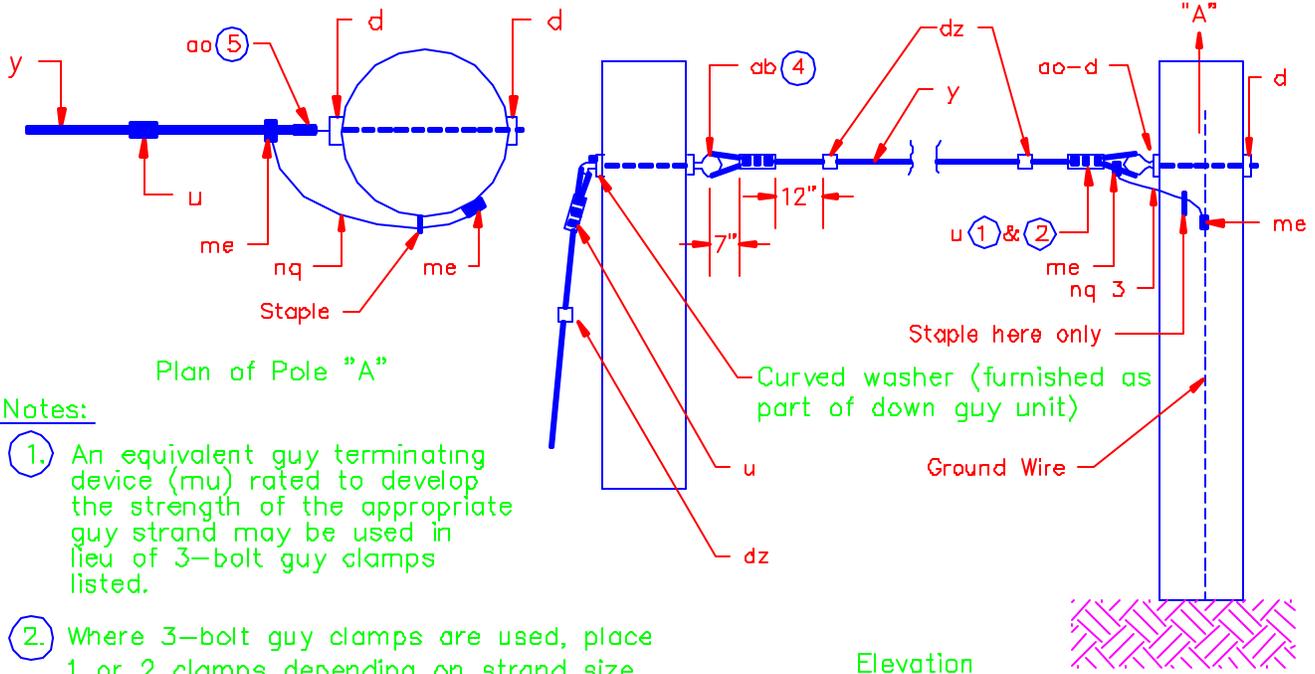
ITEMS	MATERIALS	NO. REQ'D	NO. REQ'D	NO. REQ'D
ab	Nuts, thimbleye	1	1	1
ao	Bolts, thimbleye, 3/4" x req'd lgth.	—	—	1
ao	Bolts, thimbleye, 5/8" x req'd lgth.	1	1	—
d	Washers, curved, 3" x 3" x 1/4", 13/16" hole	—	—	2
d	Washers, curved, 2 1/2" x 2 1/2" x 3/16", 11/16" hole	2	2	—
*dz	Clips, guy	2	2	2
u	Clamps, guy, 3-bolt	2	2	4
y	Strand, guy	req'd lgth	req'd lgth	req'd lgth

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 OVERHEAD GUY

Scale: NTS

March 2001

PE2-2, -3, -4



Notes:

1. An equivalent guy terminating device (mu) rated to develop the strength of the appropriate guy strand may be used in lieu of 3-bolt guy clamps listed.
2. Where 3-bolt guy clamps are used, place 1 or 2 clamps depending on strand size.
3. On joint use poles where no vertical pole ground wire is present, leave enough length of #6 AWG copper ground wire (Item nq) coiled and taped to enable it to be extended up the pole and connected to a multigrounded neutral by a representative of the power company.
4. Size of thimbleye nut is governed by size of thimbleye bolt used for down guy.
5. If a guy hook is used in lieu of a thimbleye bolt refer to Guide Drawing 812 for installation details.

6. For converting English units to metric units use 1 in. = 25.4 mm and 1 ft = 0.3048 m.

	PE2-2G	PE2-3G	PE2-4G
	6M	10M	16M

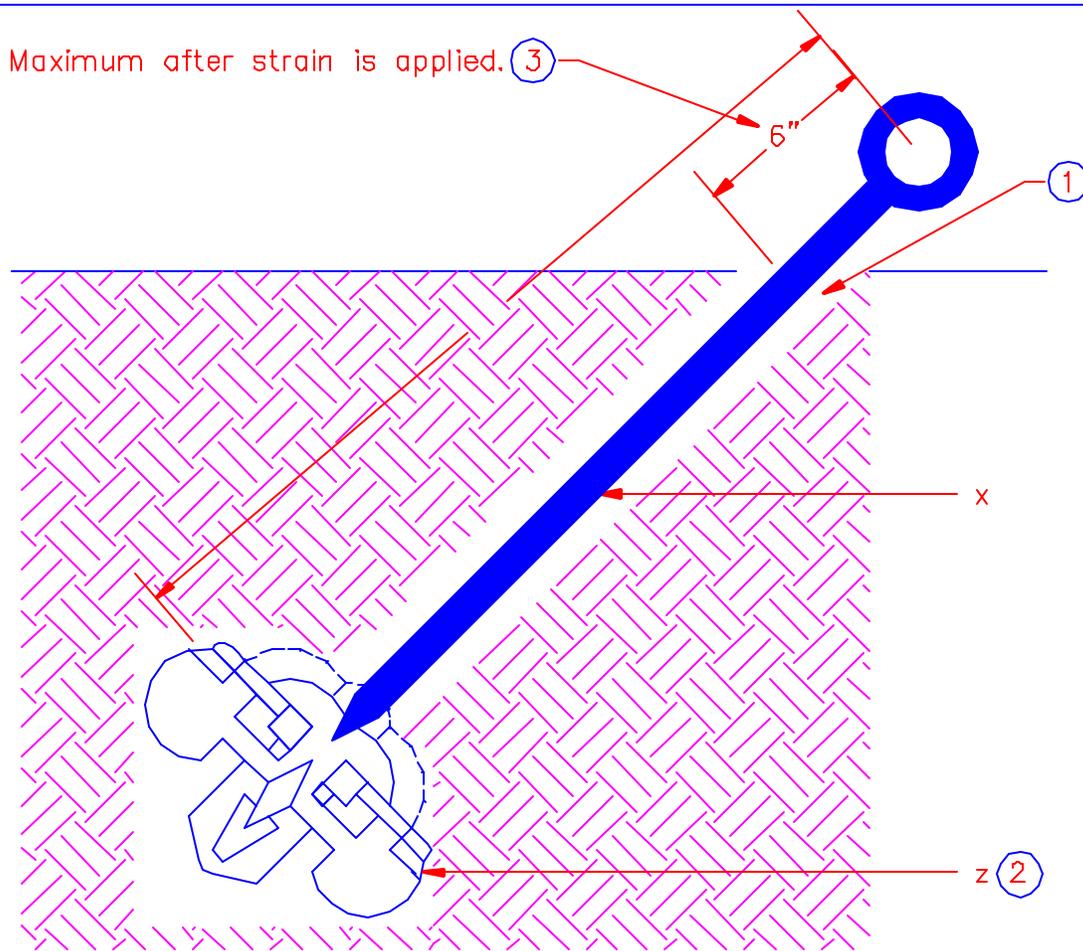
ITEMS	MATERIALS	NO. REQ'D	NO. REQ'D	NO. REQ'D
ab	Nuts, thimbleye	1	1	1
ao	Bolts, thimbleye, 3/4" x req'd lgth.	—	—	1
ao	Bolts, thimbleye, 5/8" x req'd lgth.	1	1	—
d	Washers, curved, 3" x 3" x 1/4", 13/16" hole	—	—	2
d	Washers, curved, 2 1/2" x 2 1/2" x 3/16", 11/16" hole	2	2	—
*dz	Clips, guy	2	2	2
u	Clamps, guy, 3-bolt	2	2	4
y	Strand, guy	req'd lgth	req'd lgth	req'd lgth
me	Connectors, grounding	2	2	2
*nq	Wires, ground, bare #6 AWG copper	req'd lgth	req'd lgth	req'd lgth

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 OVERHEAD GUY, GROUND CONNECTIONS

Scale: NTS

March 2001

PE2-2G, -3G, -4G



Notes:

- ①. Size of hole shall be governed by the diameter of the unexpanded anchor.
- ②. Expand the blades into undisturbed earth.
- ③. Eye of anchor rod shall not be below surface of ground.

④. For converting English units to metric units use 1 in. = 25.4 mm, 1 ft = 0.3048 m, and 1 lbf = 4.448 N.	PF1-3	PF1-5	PF1-7
	6,000 lbf Holding Power	10,000 lbf Holding Power	16,000 lbf Holding Power

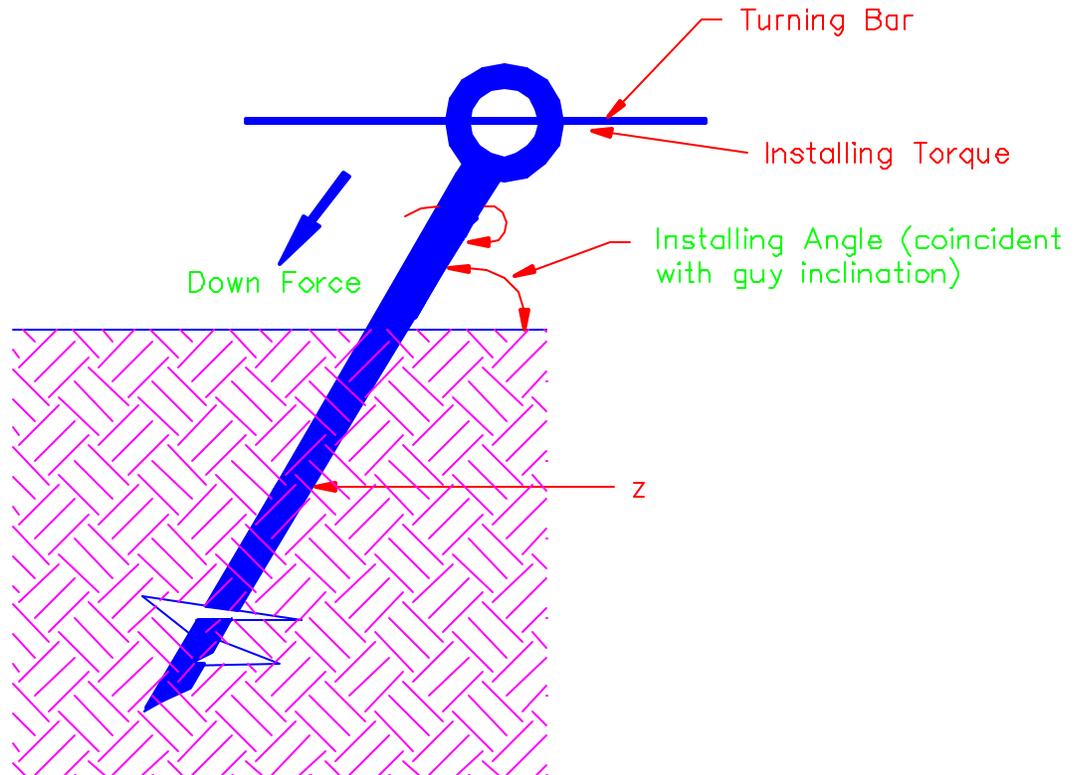
ITEMS	MATERIALS	NO. REQ'D	NO. REQ'D	NO. REQ'D
x	Rod, anchor, thimbleye type, 5/8" x 7'0"	1	—	—
x	Rod, anchor, thimbleye type, 3/4" x 8'0"	—	1	—
x	Rod, anchor, thimbleye type, 1" x 10'0"	—	—	1
z	Anchor, expanding	1	1	1

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 EXPANDING ANCHOR ASSEMBLY

Scale: NTS

March 2001

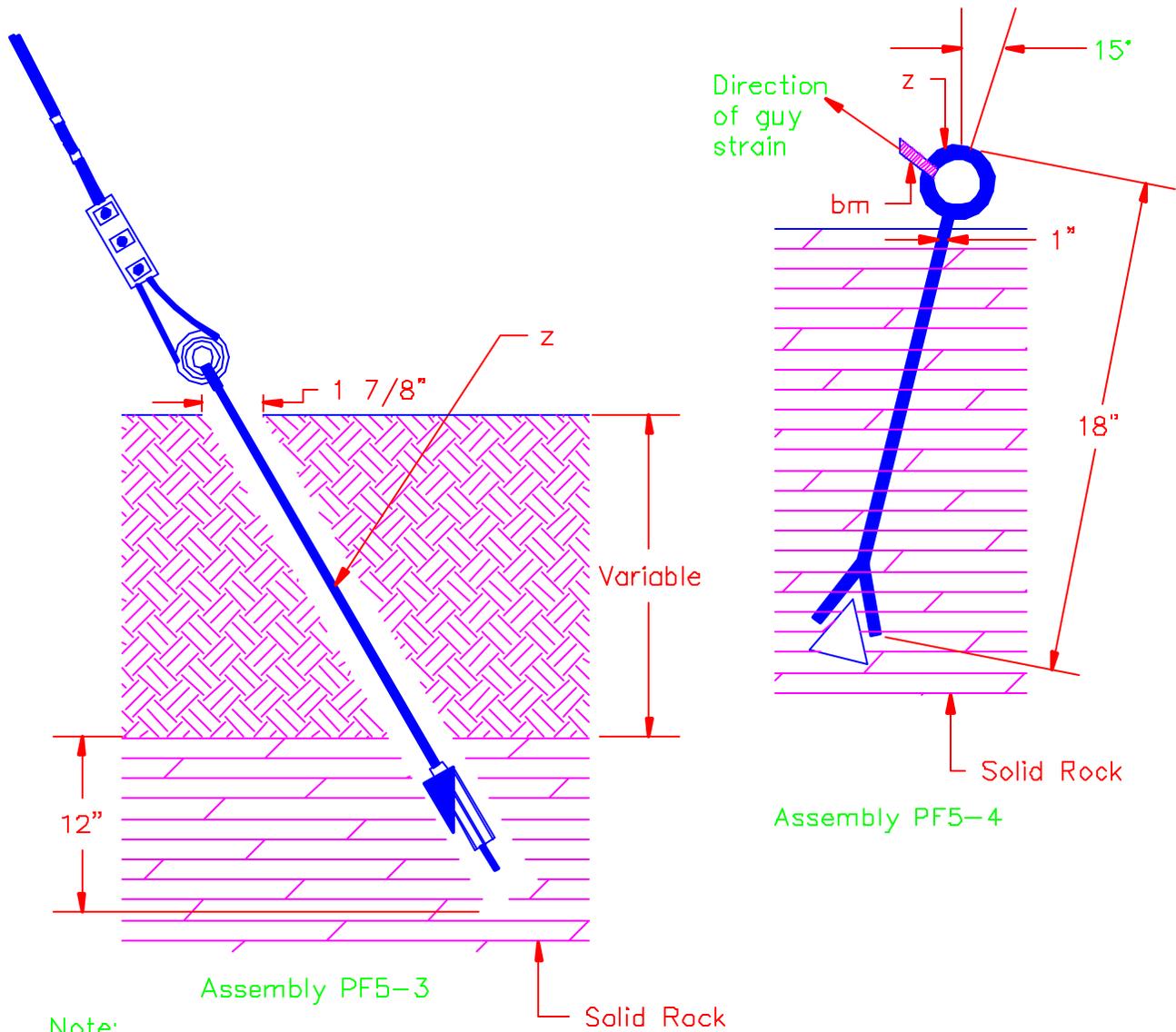
PF1-3, -5, -7



Note:

For converting English units to metric units use 1 in. = 25.4 mm  
 and 1 lbf = 4.448 N.

		PF3-3	PF3-5	PF3-7
		6,000 lbf Holding Power	10,000 lbf Holding Power	16,000 lbf Holding Power
ITEMS	MATERIALS	NO. REQ'D	NO. REQ'D	NO. REQ'D
z	Anchor, screw - 8" (203 mm) helix dia.	1	-	-
z	Anchor, screw - 10" (254 mm) helix dia.	-	1	-
z	Anchor, screw - 12" (305 mm) helix dia.	-	-	1
		RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES SCREW ANCHOR ASSEMBLY		
		Scale: NTS		March 2001
				PF3-3, -5, -7



For converting English units to metric units  
 use 1 in. = 25.4 mm and 1 lbf = 4.448 N.

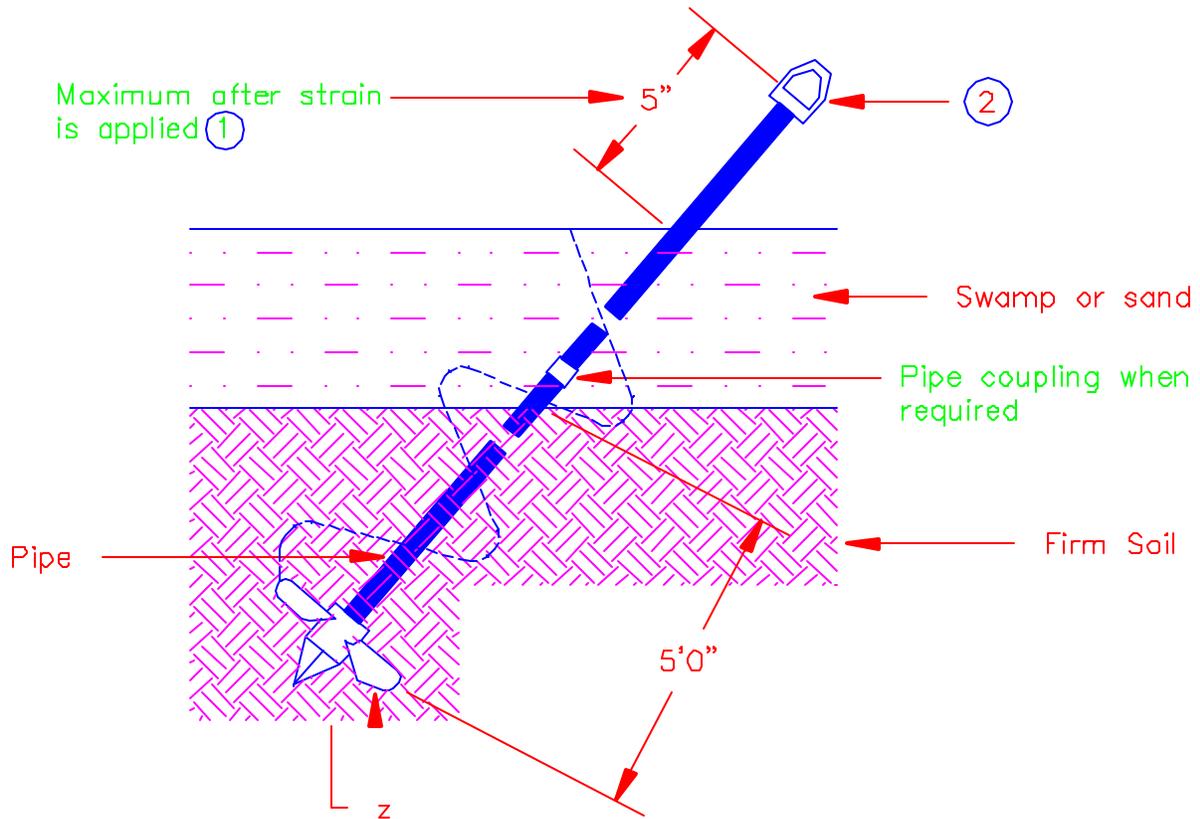
	PF5-3	PF5-4
	16,000 lbf Holding Power	12,000 lbf Holding Power
ITEMS	MATERIALS	NO. REQ'D
z	Anchor, rock, expanding	1
z	Anchor, rock, split wedge type	—
*bm	Thimble, guy	1

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 ROCK ANCHOR ASSEMBLY

Scale: NTS

March 2001

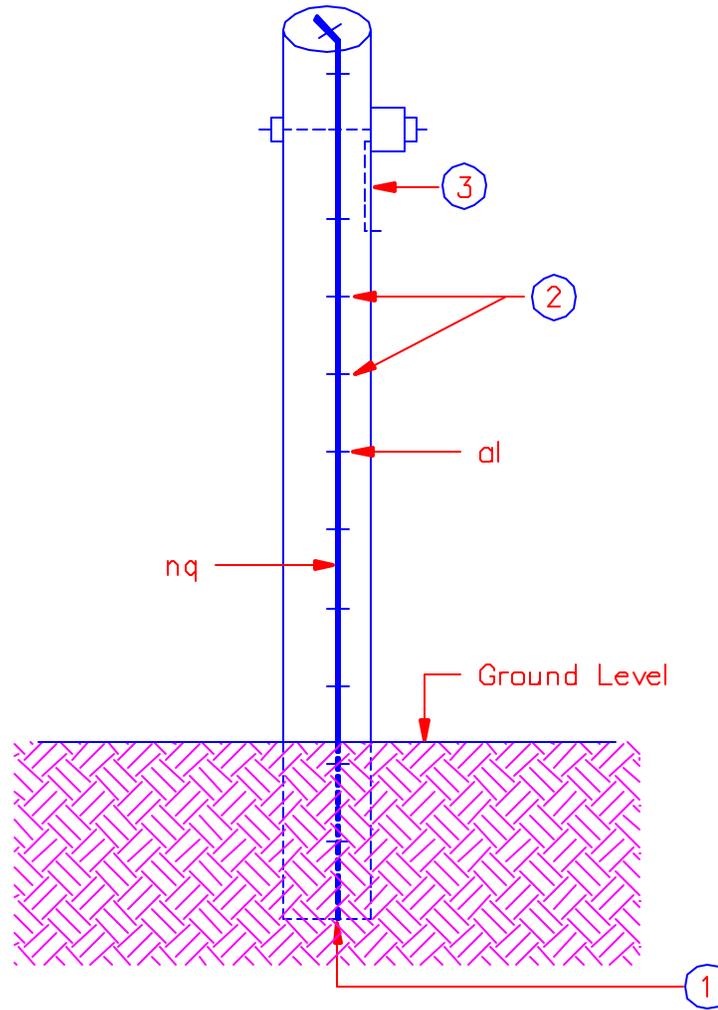
PF5-3, -4



Notes:

- ① Eye of anchor rod shall not be below surface of ground.
- ② Anchor nut is furnished with anchor by manufacturer.
- ③ For converting English units to metric units use 1 in. = 25.4 mm, 1 ft = 0.3048 m, and 1 lbf = 4.448 N.

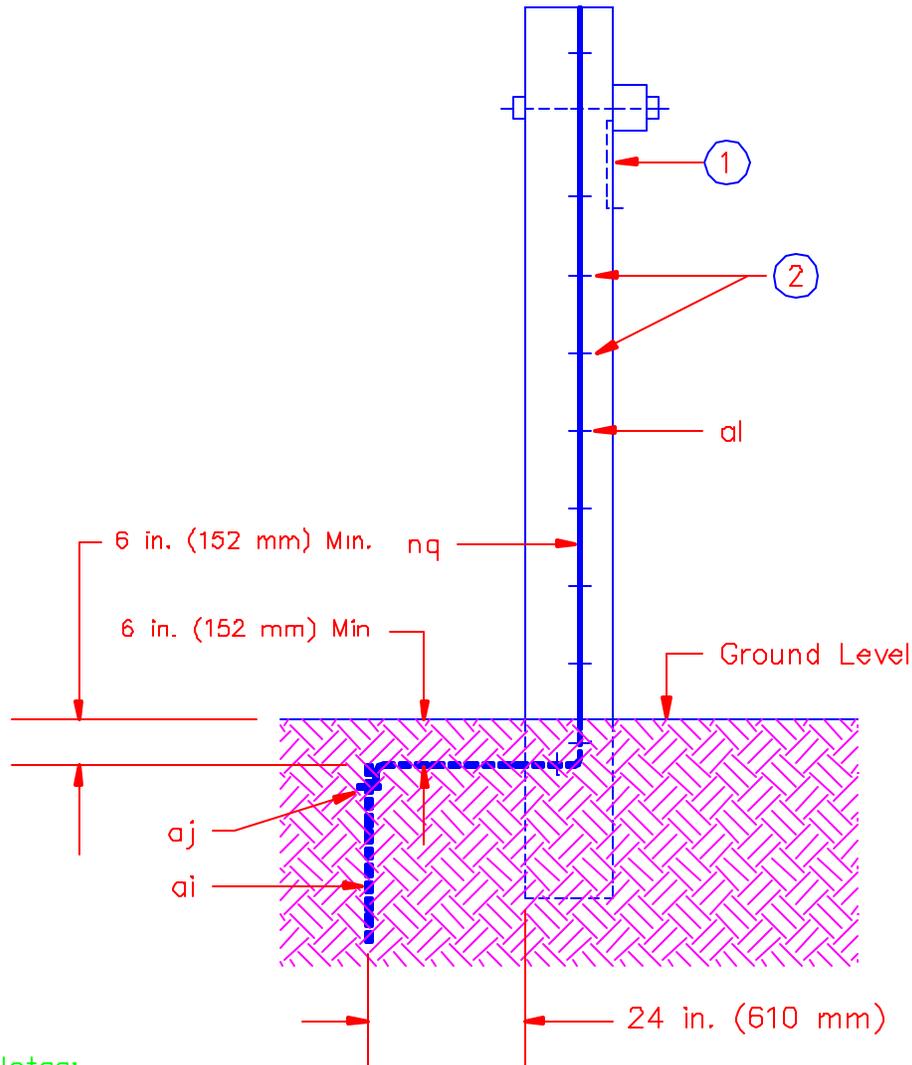
		PF6-3	PF6-4	PF6-5
		6,000 lbf Holding Power	8,000 lbf Holding Power	10,000 lbf Holding Power
ITEMS	MATERIALS	NO. REQUIRED	NO. REQUIRED	NO. REQUIRED
z	Anchor, swamp, 10"	1	—	—
z	Anchor, swamp, 12"	—	1	—
z	Anchor, swamp, 15"	—	—	1
—	Pipe, galvanized, 1 1/2", dia. length as req'd	—	—	—
—	Pipe, galvanized, 2" dia.	—	length as req'd	length as req'd
		RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES SWAMP ANCHOR ASSEMBLY		
		Scale: NTS		March 2001
				PF6-3, -4, -5



Notes:

- ①. Leave a sufficient length of wire at the bottom of the pole to form a "butt" ground.
- ②. Staples on ground wire should be about 18 in. (457 mm) apart.
- ③. Ground wire should clear all hardware by 2 in. (51 mm) minimum and be stapled to maintain this position.

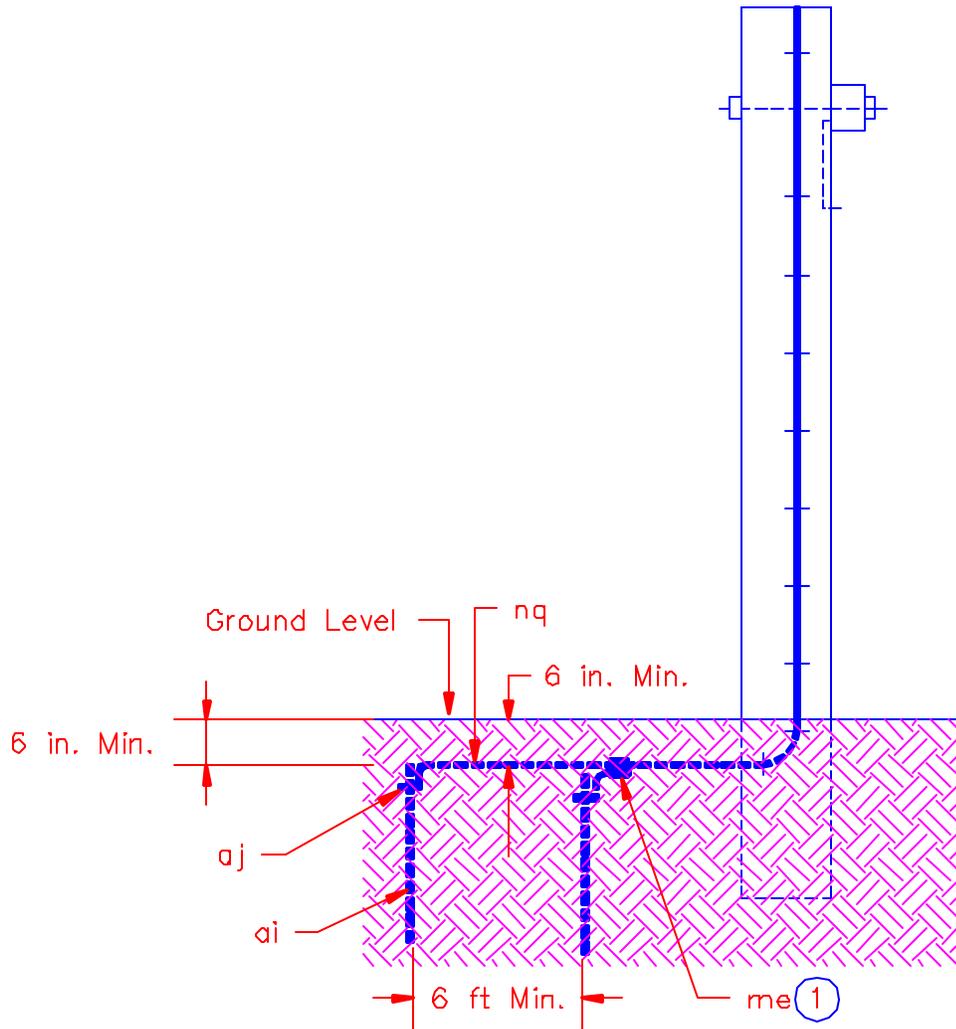
ITEMS	MATERIALS	NO. REQ'D
*nq	Wire, ground, bare, #6 AWG copper	as required
*al	Staples, ground wire	as required
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES POLE LIGHTNING PROTECTION ASSEMBLY		
Scale: NTS		March 2001
		PM1



Notes:

- ①. Ground wire should clear all hardware by 2 in. (51 mm) minimum and be stapled to maintain this position.
- ②. Staples on ground wire should be about 18 in. (457 mm) apart.

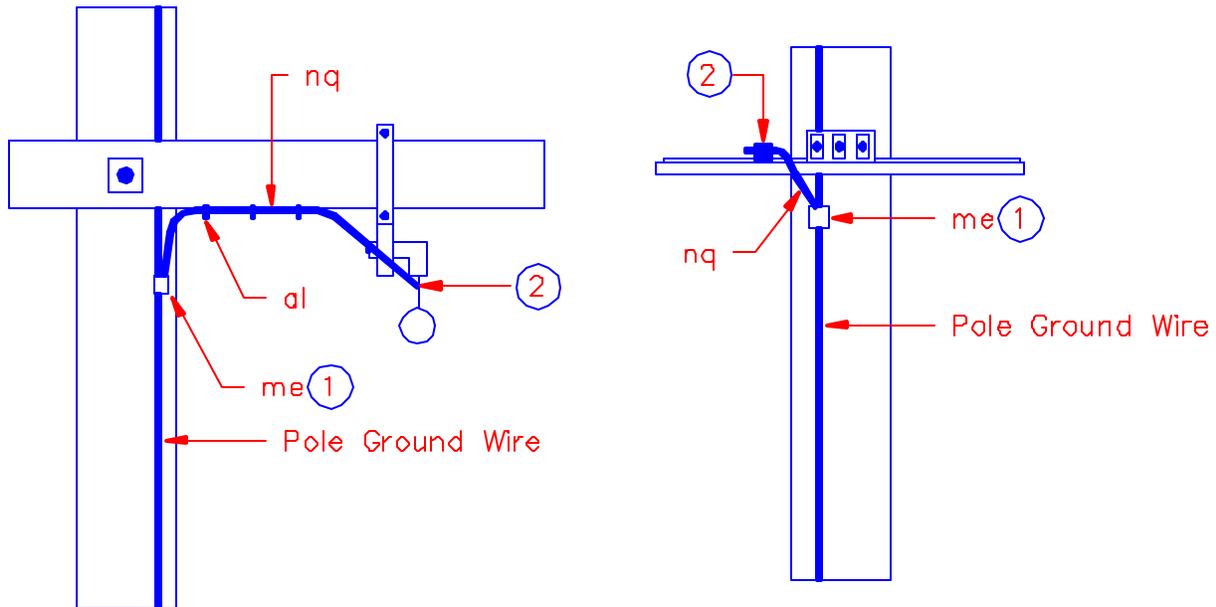
ITEMS	MATERIALS	NO. REQ'D
ai	Rod, ground, 1/2 in. x 5 ft (13 mm x 1.5 m)	1
aj	Clamp, ground rod	1
*nq	Wire, ground, bare, #6 AWG copper	as required
*al	Staples, ground wire	as required
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES POLE GROUND ASSEMBLY		
Scale: NTS		March 2001
		PM2



Notes:

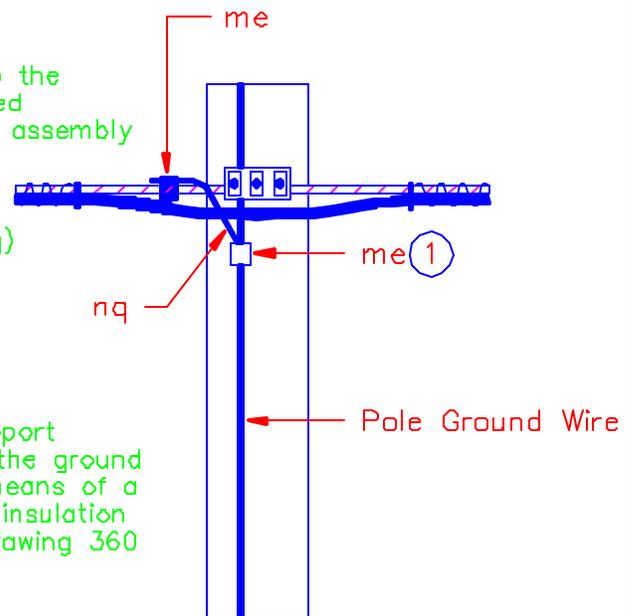
- ①. Connector may be omitted if pole ground wire is extended to last ground rod.
- ②. For converting English units to metric units use 1 in. = 25.4 mm and 1 ft = 0.3048 m.

ITEMS	MATERIALS	NO. REQ'D
ai	Rod, ground, 5/8 in. x 8 ft (16 mm x 2.4 m)	1
aj	Clamps, ground rod	1
*nq	Wire, ground, bare, #6 AWG copper	as required
me	Connector, grounding, compression type	1
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES AUXILIARY GROUND ROD ASSEMBLY		
Scale: NTS		March 2001
		PM2-1

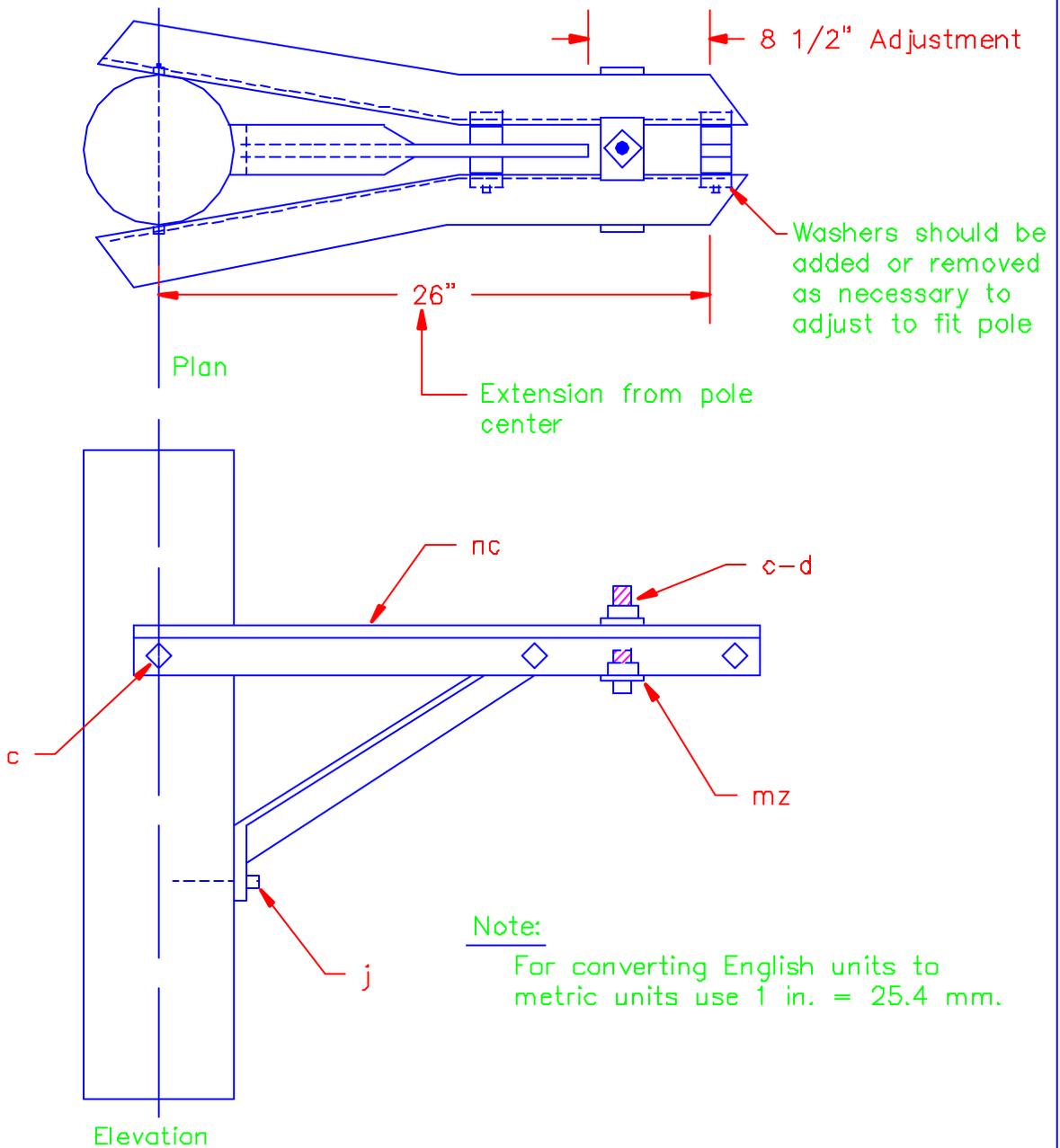


Notes:

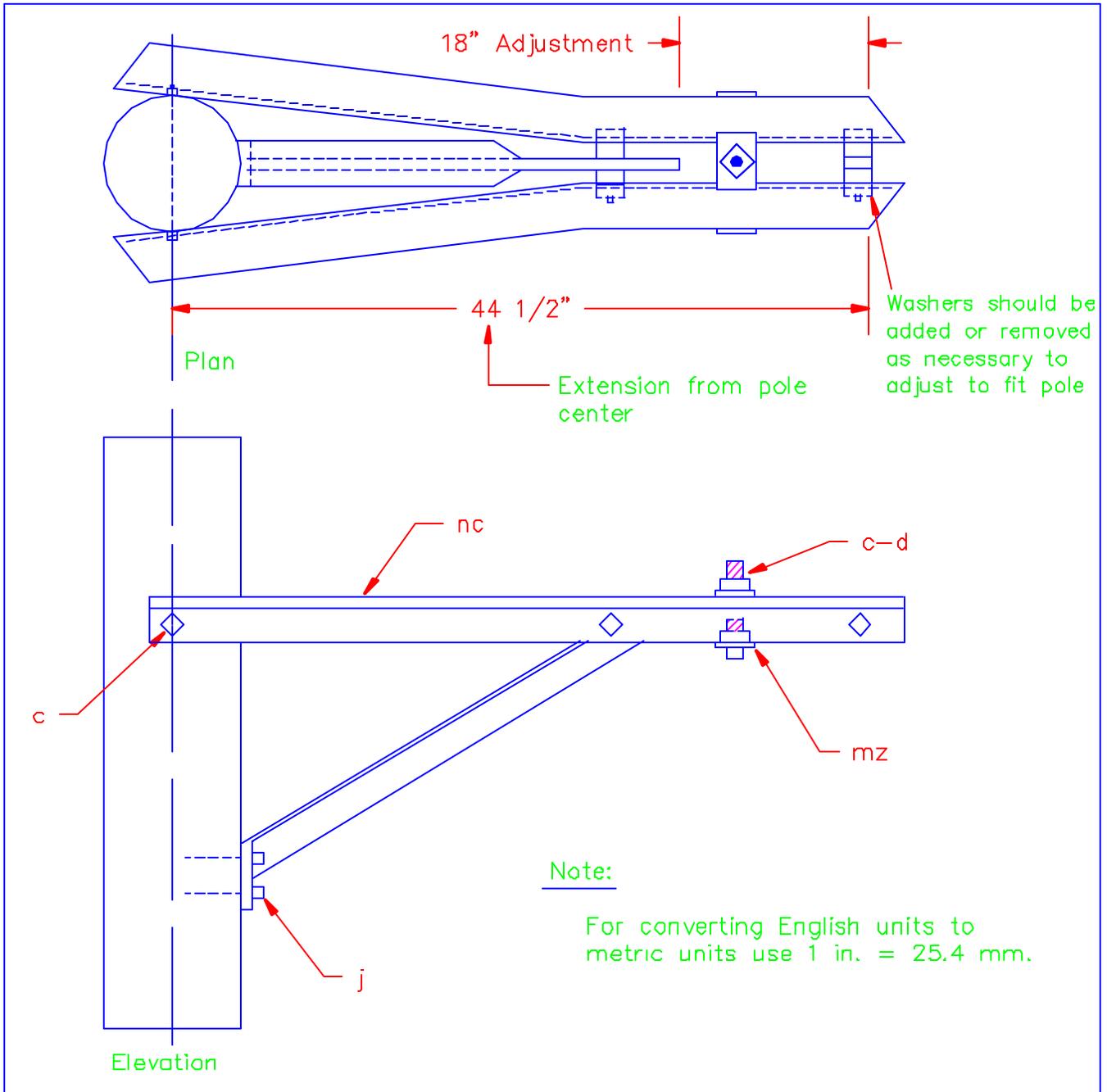
- ① Ground wire (item nq) shall be connected to the vertical pole ground wire of the multigrounded power system neutral or to the pole ground assembly (PM2 unit). If a multigrounded power system neutral is present on the pole but there is no vertical pole ground wire, a sufficient length of bare #6 AWG copper wire (item nq) shall be left coiled and taped to permit it to be extended up the pole and connected to the multigrounded neutral by a representative of the power company.
- ② Carefully remove the insulation from the support wire or the strand to permit connection of the ground wire to the support wire or the strand by means of a grounding connector (item me). Where the insulation is required to be restored, refer to Guide Drawing 360 for restoration details.



ITEMS	MATERIALS	NO. REQ'D
me	Connectors, grounding	2
*nq	Wire, ground, bare, #6 AWG copper	as required
*al	Staples, ground wire	as required
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES GROUND WIRE ASSEMBLY		
Scale: NTS		March 2001
		PM2A



ITEMS	MATERIALS	NO. REQ'D
*nc	Cable, extension arms, short	1
c	Bolts, machine, 5/8" x required length	2
mz	Clamps, cable, suspension	1
j	Screws, lag, 1/2" x 4"	1
d	Washers, flat, 2 1/4" x 2 1/4", 11/16" hole	1
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES CABLE EXTENSION ARM ASSEMBLY (SHORT)		
Scale: NTS		March 2001
		PM4

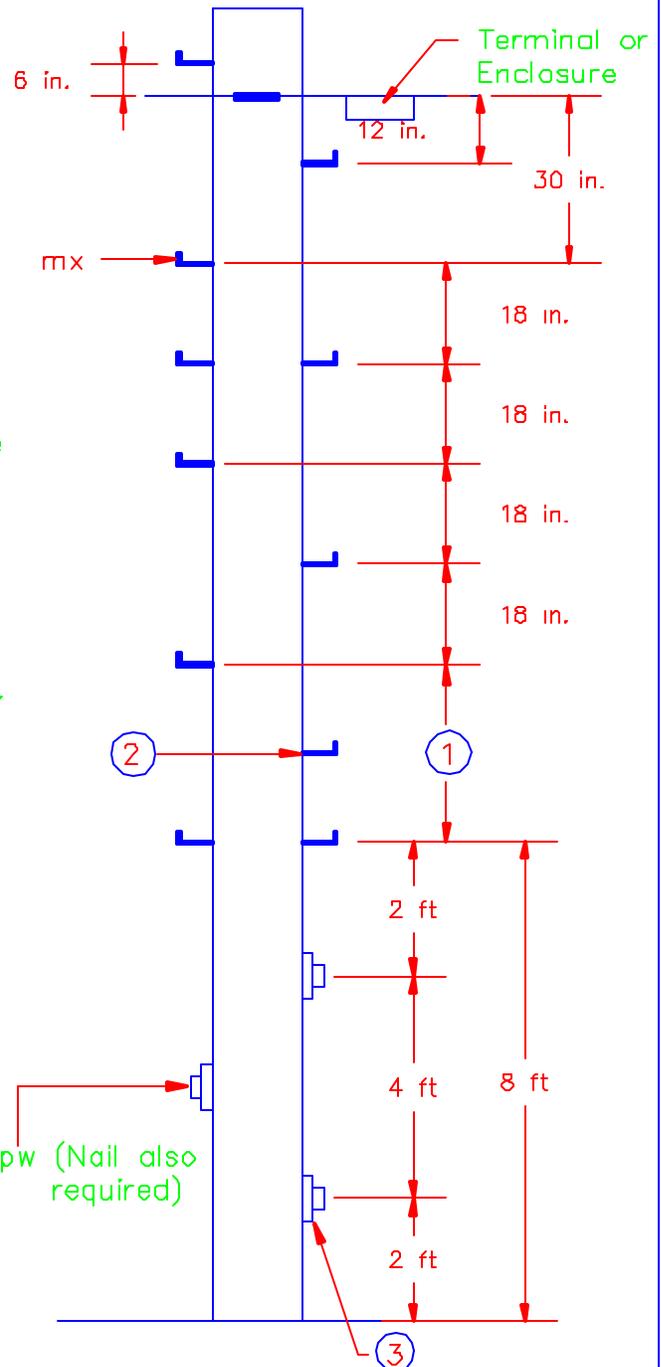


ITEMS	MATERIALS	NO. REQ'D
*nc	Cable, extension arms, long	1
c	Bolts, machine, 5/8" x required length	2
mz	Clamps, cable, suspension	1
j	Screws, lag, 1/2" x 4"	2
d	Washers, flat, 2 1/4" x 2 1/4", 11/16" hole	1
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES CABLE EXTENSION ARM ASSEMBLY (LONG)		
Scale: NTS		March 2001
		PM4A

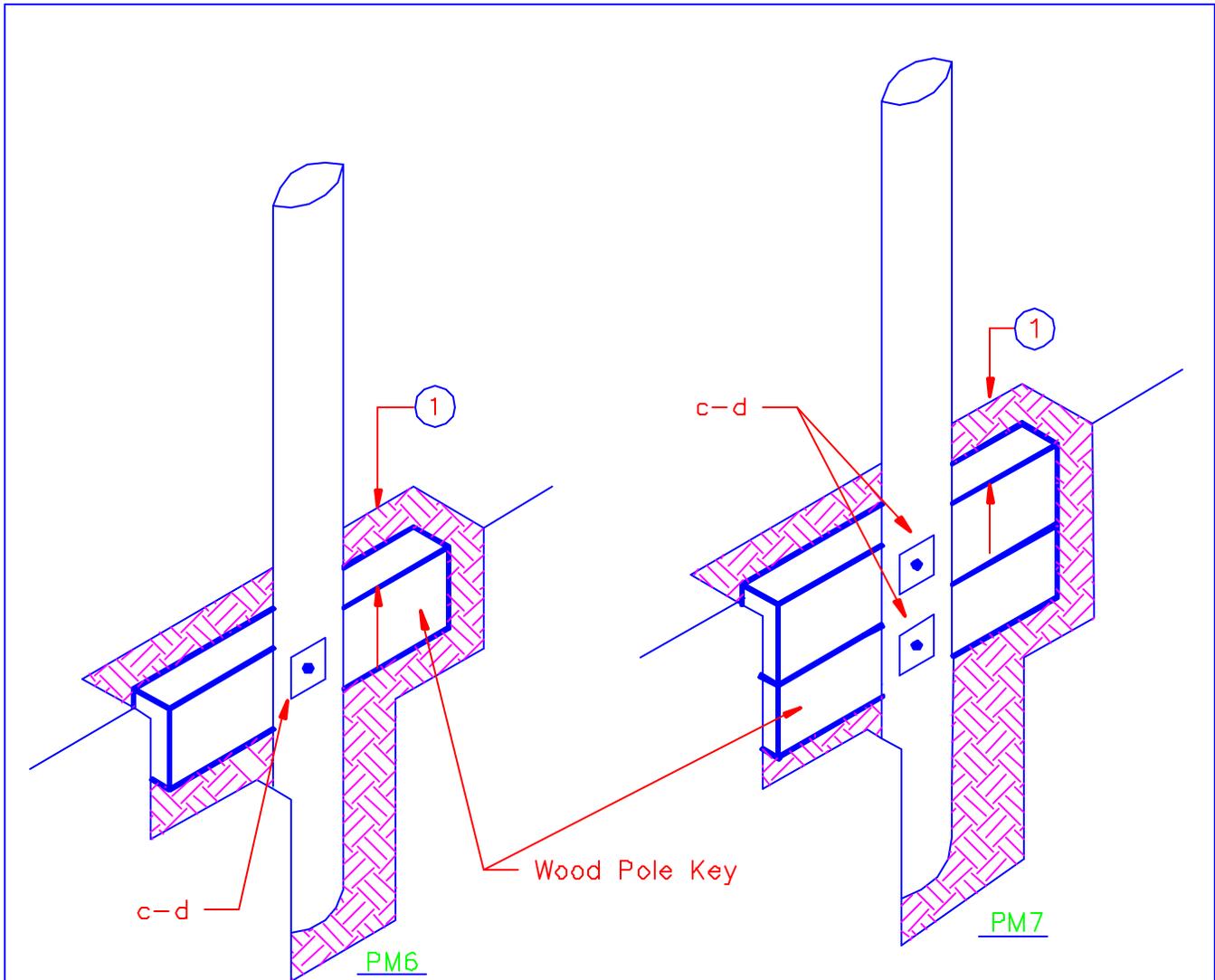
Pole Illustrated is 25 ft Pole Set 5 ft in soil with the Point of Attachment 13 in. from the Top of the Pole.

Notes:

1. Not more than 36 in. and not less than 18 in.
2. Place step 1/2 the distance between steps in Note 1.
3. The first pole plate below the 8 ft set of steps is to be placed on the same side of the pole as the first step above the 8 ft set.
4. When double steps occur at a point where the pole is less than 8 in. in diameter, place one of the steps about 1 in. below the opposite step.
5. Steps should be located in line with the lead unless otherwise specified by the Engineer.
6. 3/8 in. lead holes about 2 in. deep shall be bored in all species of poles to accommodate the lag screws used in mounting detachable step plates.
7. For converting English units to metric units use 1 in. = 25.4 mm and 1 ft = 0.3048 m.



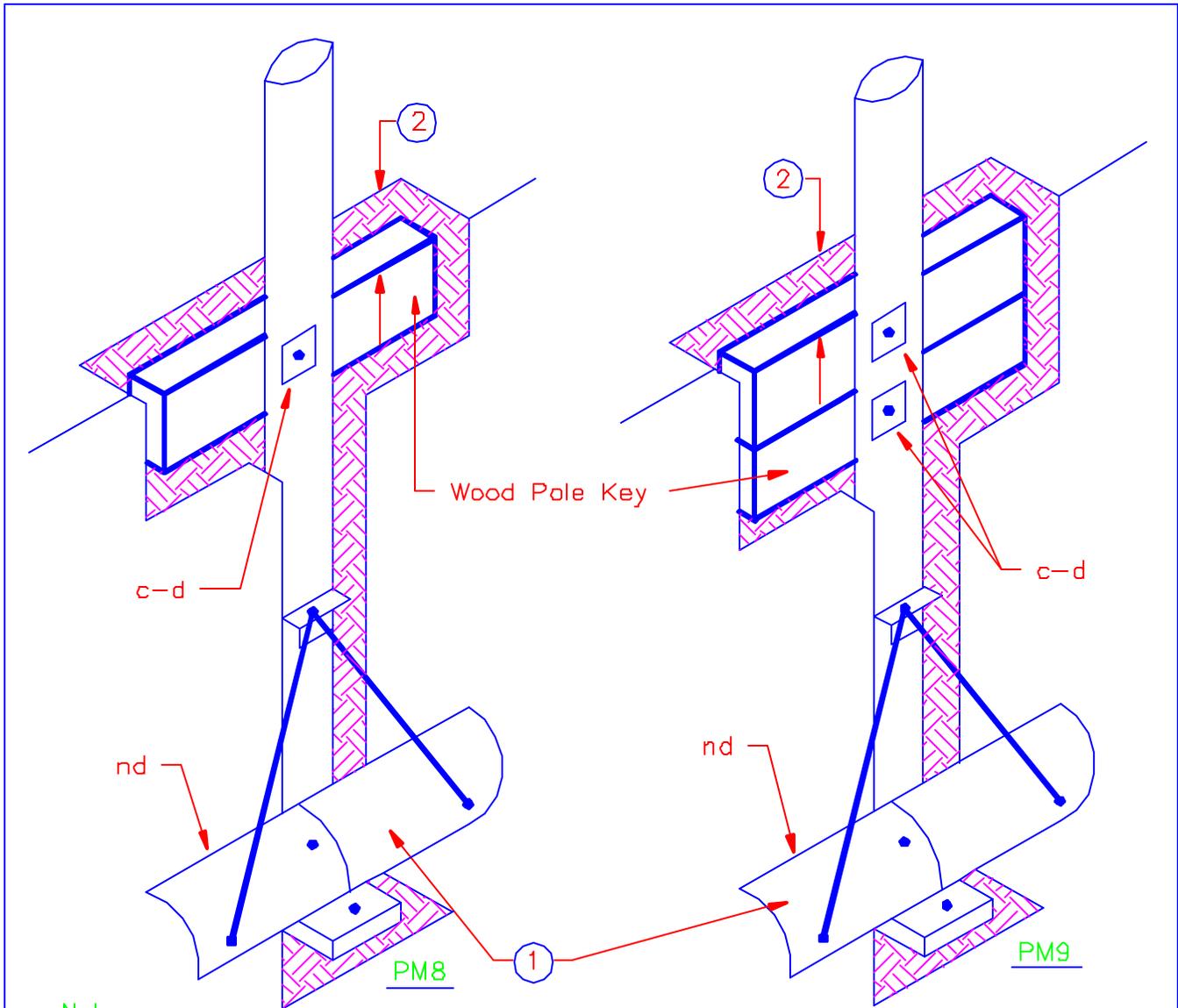
ITEMS	MATERIALS	NO. REQ'D
*mx	Steps, steel pole, 5/8 in. x 10 in.	as required
*pw	Steps, detachable pole (pole plate and lag screw only)	3
-	Nails, #20d galvanized	2
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES POLE STEPPING ASSEMBLY		
Scale: NTS		March 2001
		PM5



Notes:

- ① Wood pole key should be placed 6 in. below the level of the ground.
- ② For converting English units to metric units use 1 in. = 25.4 mm and 1 ft = 0.3048 m.

		PM6	PM7
ITEMS	MATERIALS	NO. REQ'D	NO. REQ'D
c	Bolts, machine, 5/8" x required length	1	2
d	Washers, 2 1/4" x 2 1/4" x 3/16", 11/16" hole	2	4
-	Key, pole, wood, treated, 3" x 12" x 3' 0"	1	2
		RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES POLE KEY ASSEMBLIES	
		Scale: NTS	
		March 2001 PM6, PM7	



Notes:

- ①. Metal pole key shown in expanded position.
- ②. Wood pole key should be placed 6 in. below the level of the ground.
- ③. For converting English units to metric units use  
 1 in. = 25.4 mm and 1 ft = 0.3048 m.

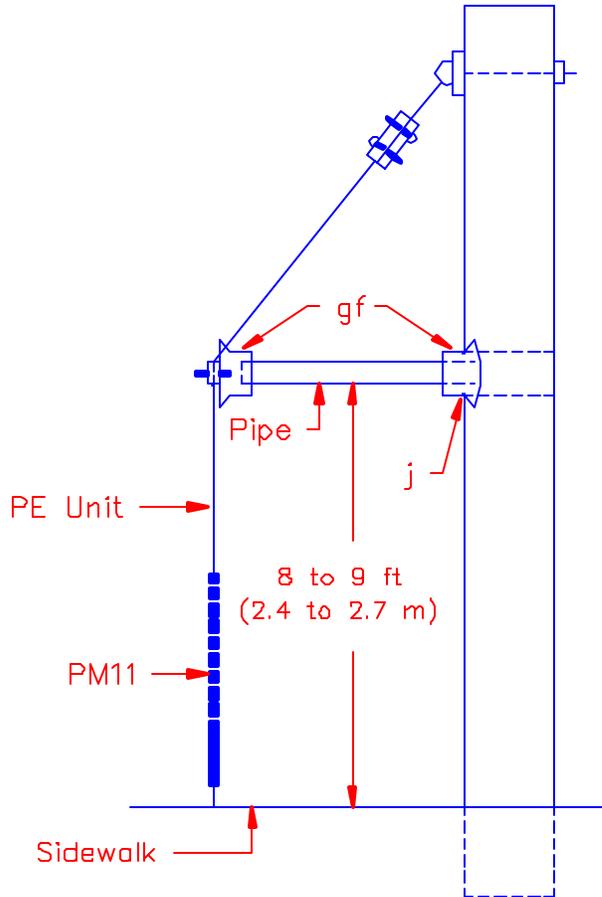
ITEMS	MATERIALS	PM8	PM9
		NO. REQ'D	NO. REQ'D
c	Bolts, machine, 5/8" x required length	1	2
d	Washers, 2 1/4" x 2 1/4" x 3/16", 11/16" hole	2	4
—	Key, pole, wood, treated, 3" x 12" x 3' 0"	1	2
*nd	Key, pole, metal	1	1

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 POLE KEY ASSEMBLIES

Scale: NTS

March 2001

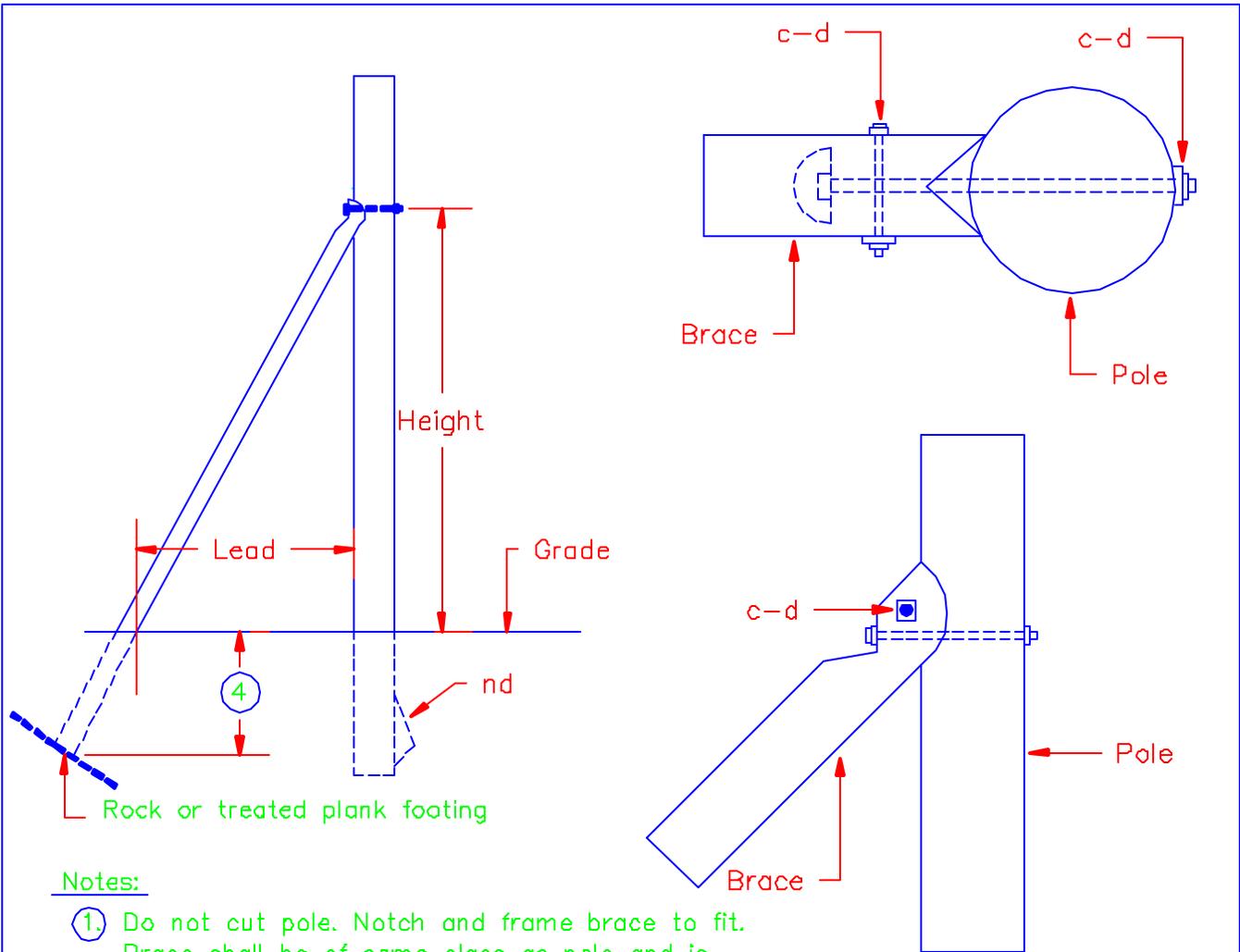
PM8, PM9



Note:

Where two guys are specified, the points of attachment of the two guy strands to the pole shall be separated by a minimum distance of 12 in. (305 mm) and the cable support clamp shall be placed on the thimbleye bolt for the lower guy.

ITEMS	MATERIALS	NO. REQ'D
*gf	Fittings, sidewalk guy arm	2
j	Screws, lag, 1/2 in. x 3 in. (13 mm x 76 mm)	as required
—	Pipe, galvanized steel, 2 in. (51 mm) ID, unthreaded, length as specified	1
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES SIDEWALK GUY ARM ASSEMBLY		
Scale: NTS		March 2001
		PM12



Notes:

- ①. Do not cut pole. Notch and frame brace to fit. Brace shall be of same class as pole and is considered to be a pole unit.
- ②. Lead to height ratio not to be less than 1/3.
- ③. A prefabricated metal push brace bracket, item gb, installed in accordance with the manufacturer's recommendations may be used in lieu of the method shown.
- ④. Depth to be determined by Engineer.
- ⑤. For converting English units to metric units use 1 in. = 25.4 mm and 1 ft = 0.3048 m.

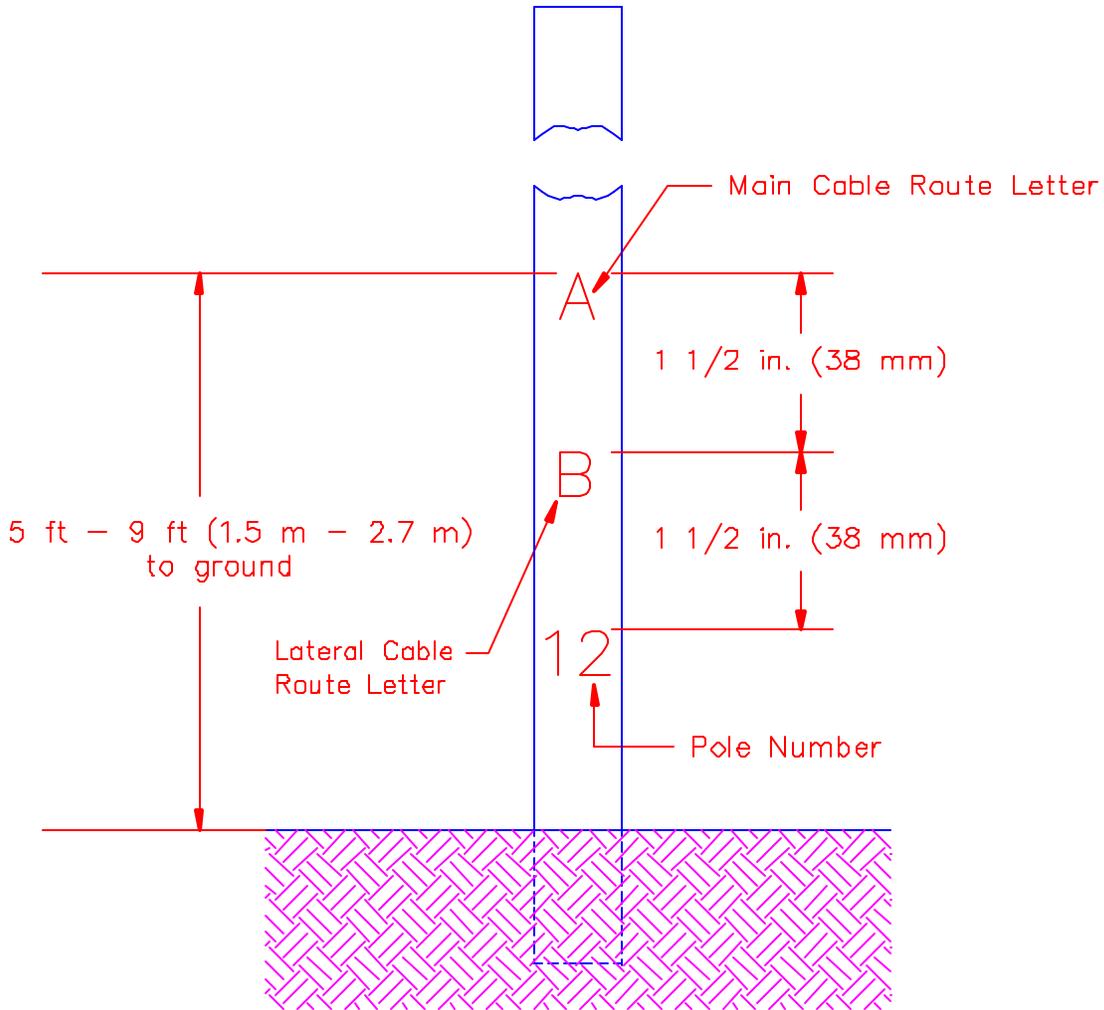
ITEMS	MATERIALS	NO. REQ'D
c	Bolts, machine, 5/8" x required length	2
d	Washers, 2 1/4" x 2 1/4" x 3/16", 11/16" hole	4
*nd	Key, metal, pole	1
-	Plank, treated, 3" x 12" x 3' 0"	1
*gb	Bracket, push brace	See note ③

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 PUSH BRACE ACCESSORIES

Scale: NTS

March 2001

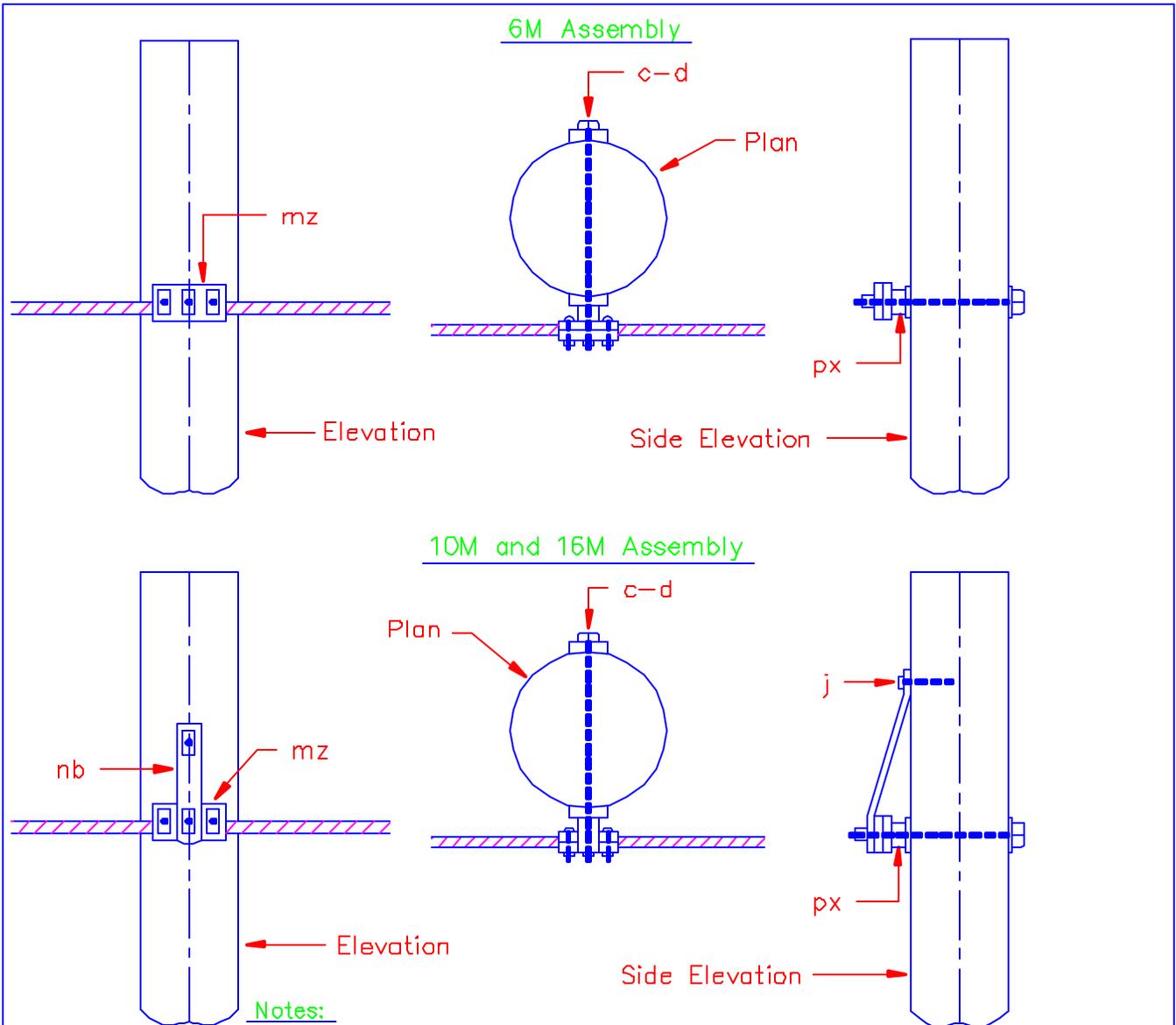
PM14



Notes:

- ①. All numbers and letters shall be installed so that they will face the road.
- ②. Where other pole numbering schemes are used, the Engineer shall revise the above labeling.

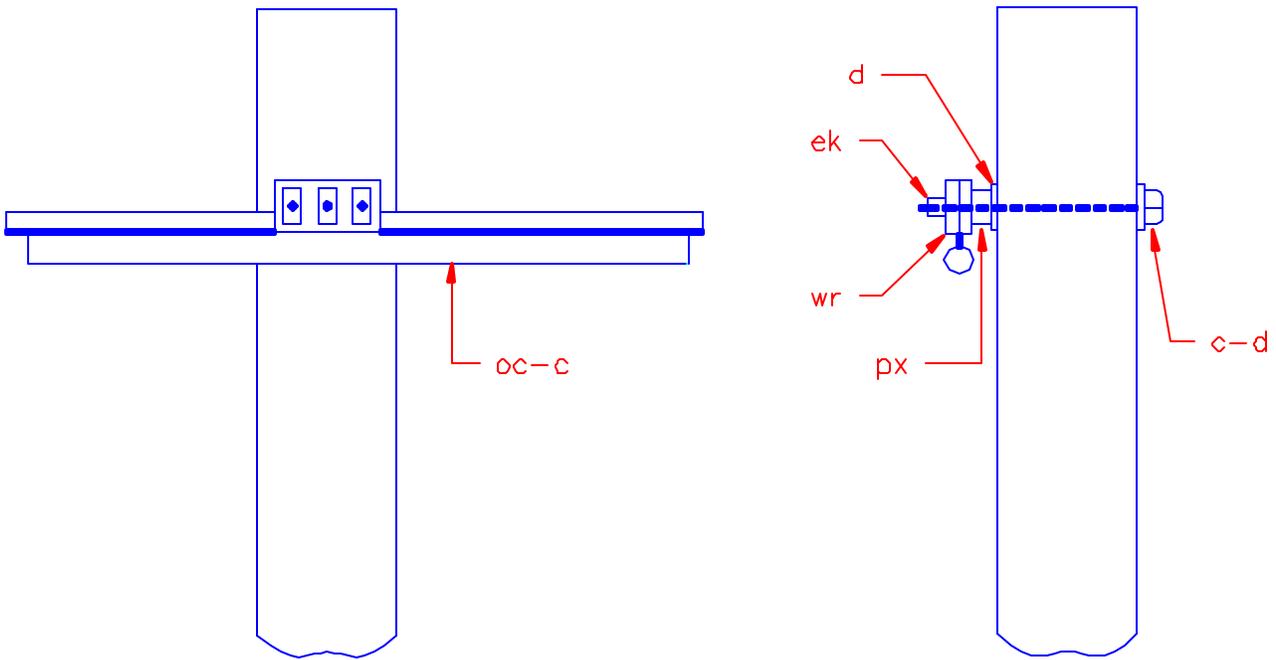
ITEM	MATERIAL	NO. REQ'D
az	Numbers, pole, 1 1/2 in. (38 mm) high	as required
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES POLE MARKING		
Scale: NTS		March 2001
		PM52



Notes:

1. Use for tangent to 15 degrees construction.
2. For converting English units to metric units use 1 in. = 25.4 mm.

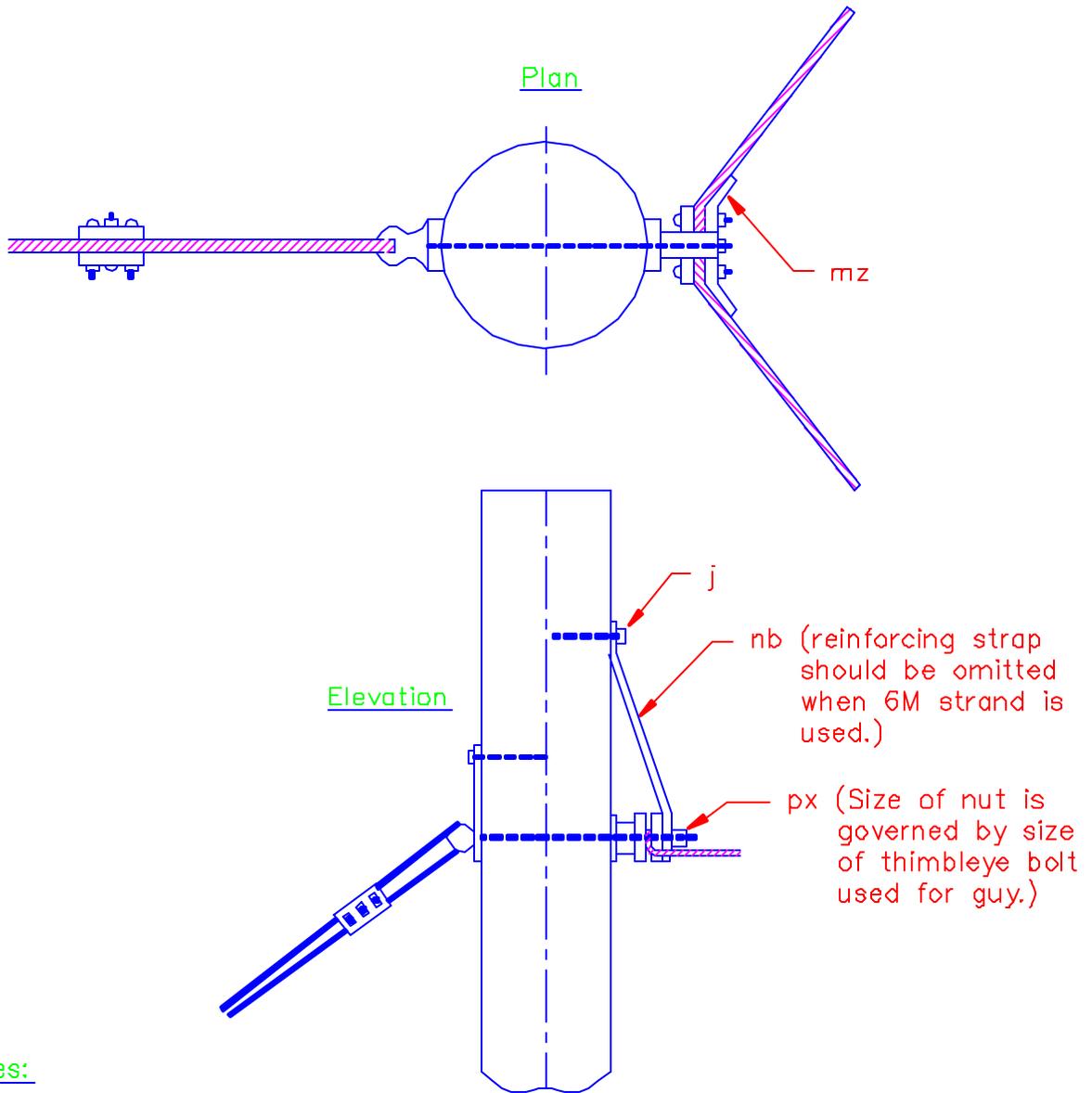
ITEMS	MATERIALS	6M	10M	16M
		NO. REQ'D	NO. REQ'D	NO. REQ'D
c	Bolts, machine, 5/8" x required length	1	1	1
d	Washers, curved, 2 1/2" x 2 1/2" x 3/16", 11/16" hole	2	2	2
j	Screws, lag, 1/2" x 4"	-	1	1
px	Nuts, regular square, 5/8"	1	1	1
mz	Clamps, cable, suspension	1	1	1
nb	Straps, suspension clamp, reinforcement	-	1	1



Notes:

- ①. Use for corners from 0 to 20 degrees.
- ②. Place cable in clamp without removing support wire insulation or slitting web.
- ③. For converting English units to metric units use 1 in. = 25.4 mm.

ITEMS	MATERIALS	NO. REQ'D
oc-c	Cable, filled, fiber optic, self-supporting (figure 8 design)	as required
*wr	Clamp, support, self-supporting, cable	1
c	Bolt, machine, 5/8" x required length	1
d	Washers, 2 1/4" x 2 1/4" x 3/16", 11/16" hole	2
px	Nut, square	1
ek	Locknut, 5/8"	1
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES SELF-SUPPORTING FILLED FIBER OPTIC CABLE SUPPORT		
Scale: NTS		March 2001
		201-1



Notes:

- ① Use for corners from 15 to 60 degrees.
- ② See guy assembly drawings for guying, materials.

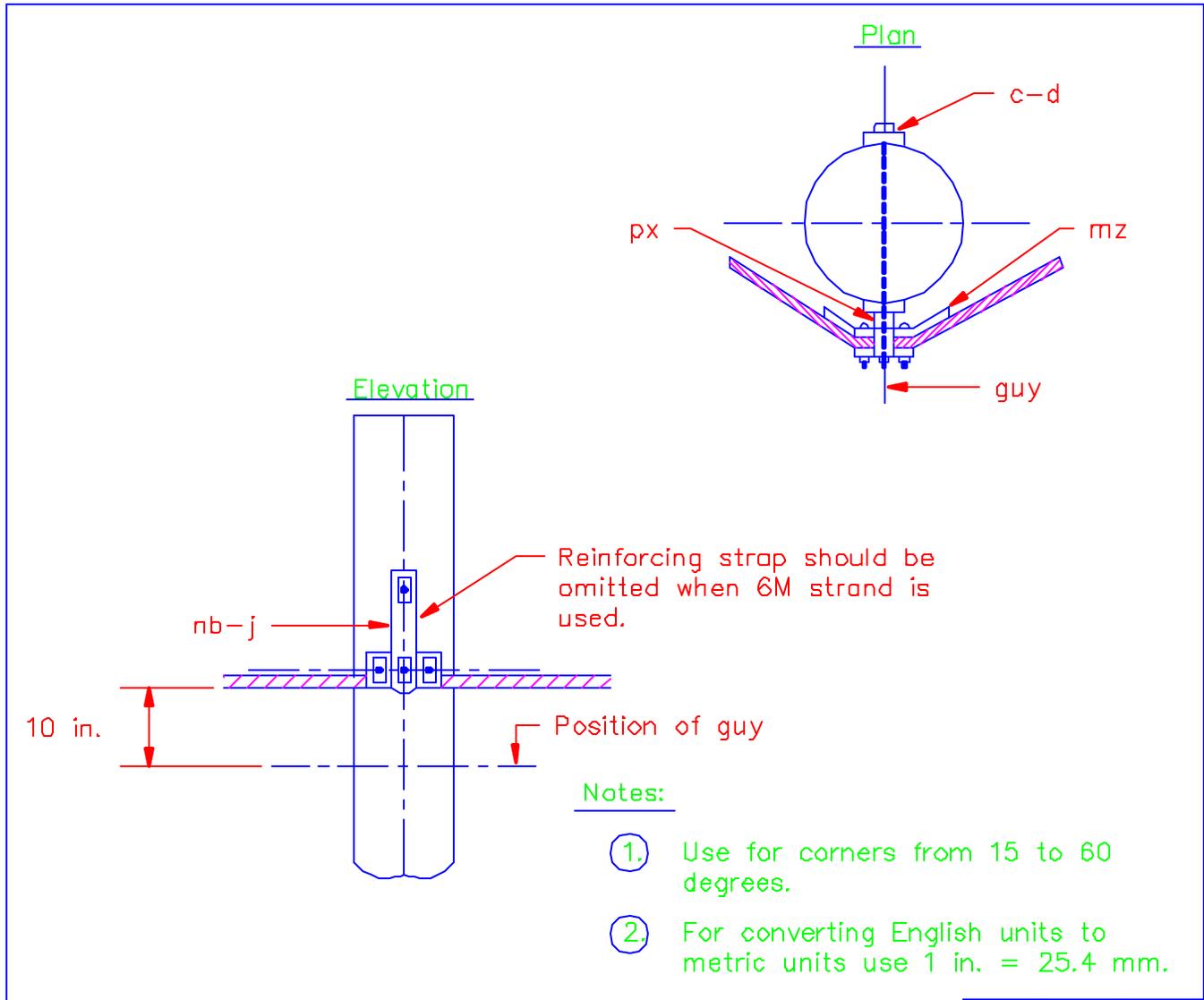
ITEMS	MATERIALS	6M	10M	16M
		NO. REQ'D	NO. REQ'D	NO. REQ'D
j	Screws, lag, 1/2 In x 4 In. (13 mm x 102 mm)	—	1	1
px	Nuts, regular square	1	1	1
mz	Clamps, corner suspension	1	1	1
nb	Straps, suspension clamp, reinforcement	—	1	1

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 SUSPENSION STRAND MOUNTING  
 (PULL AWAY FROM POLE)

Scale: NTS

March 2001

202



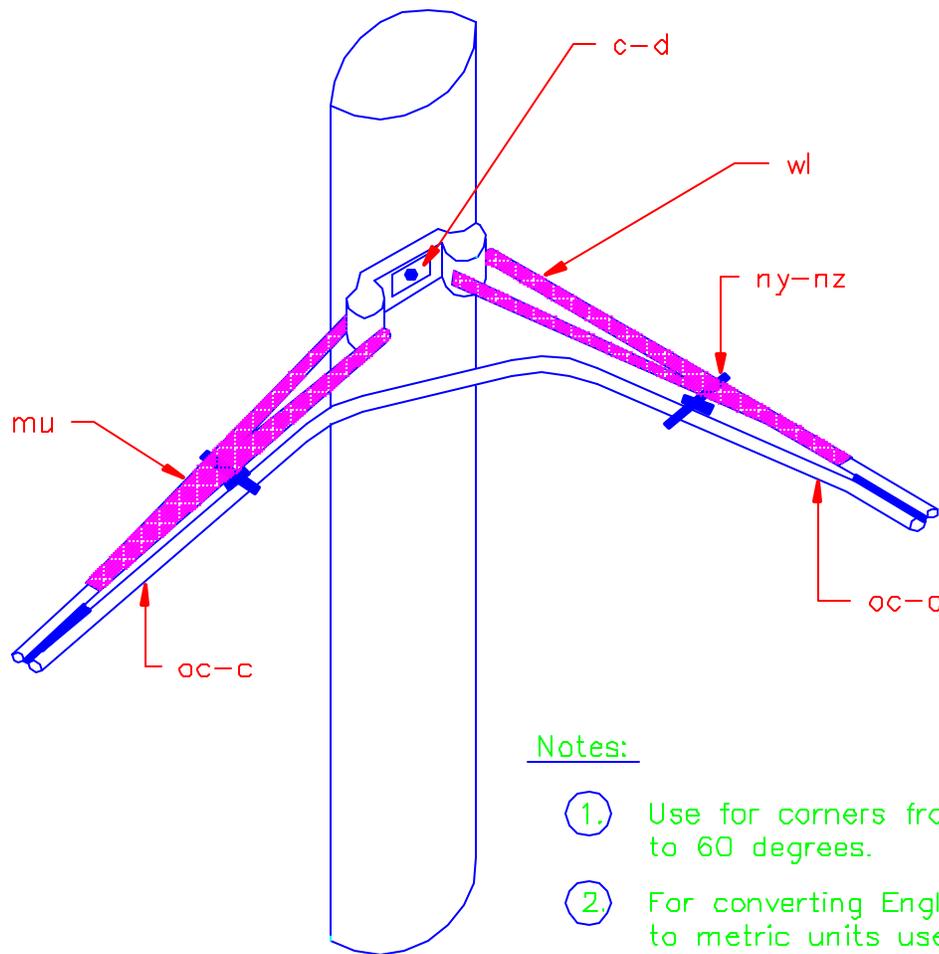
ITEMS	MATERIALS	6M	10M	16M
		NO. REQ'D	NO. REQ'D	NO. REQ'D
c	Bolts, machine, 5/8" x required length	1	1	—
d	Washers, curved, 2 1/2" x 2 1/2" x 3/16", 11/16" hole	1	1	—
px	Nuts, regular square, 5/8"	1	1	—
j	Screws, lag, 1/2" x 4"	—	1	1
nb	Straps, suspension clamp, reinforcement	—	1	1
mz	Clamps, corner suspension	1	1	1
c	Bolts, machine, 3/4" x required length	—	—	1
d	Washers, curved, 3" x 3" x 1/4", 13/16" hole	—	—	2
px	Nuts, regular square, 3/4"	—	—	1

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 SUSPENSION STRAND MOUNTING  
 (PULL AGAINST POLE)

Scale: NTS

March 2001

202-1



Notes:

- ①. Use for corners from 20 to 60 degrees.
- ②. For converting English units to metric units use 1 in. = 25.4 mm.

ITEMS	MATERIALS	NO. REQ'D
oc-c	Cable, filled, fiber optic, self-supporting (figure 8 design)	as required
*wl	Support, double deadend	1
*mu	Sleeves, splicing (deadending, preformed or automatic type)	2
*ny	Spacers, cable	2
*nz	Supports, lashed cable	2
d	Washers, 2 1/4" x 2 1/4" x 3/16", 11/16" hole	1
c	Bolts, machine, 5/8" x required length	1

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 SELF-SUPPORTING FILLED FIBER OPTIC CABLE SUPPORT, CORNER

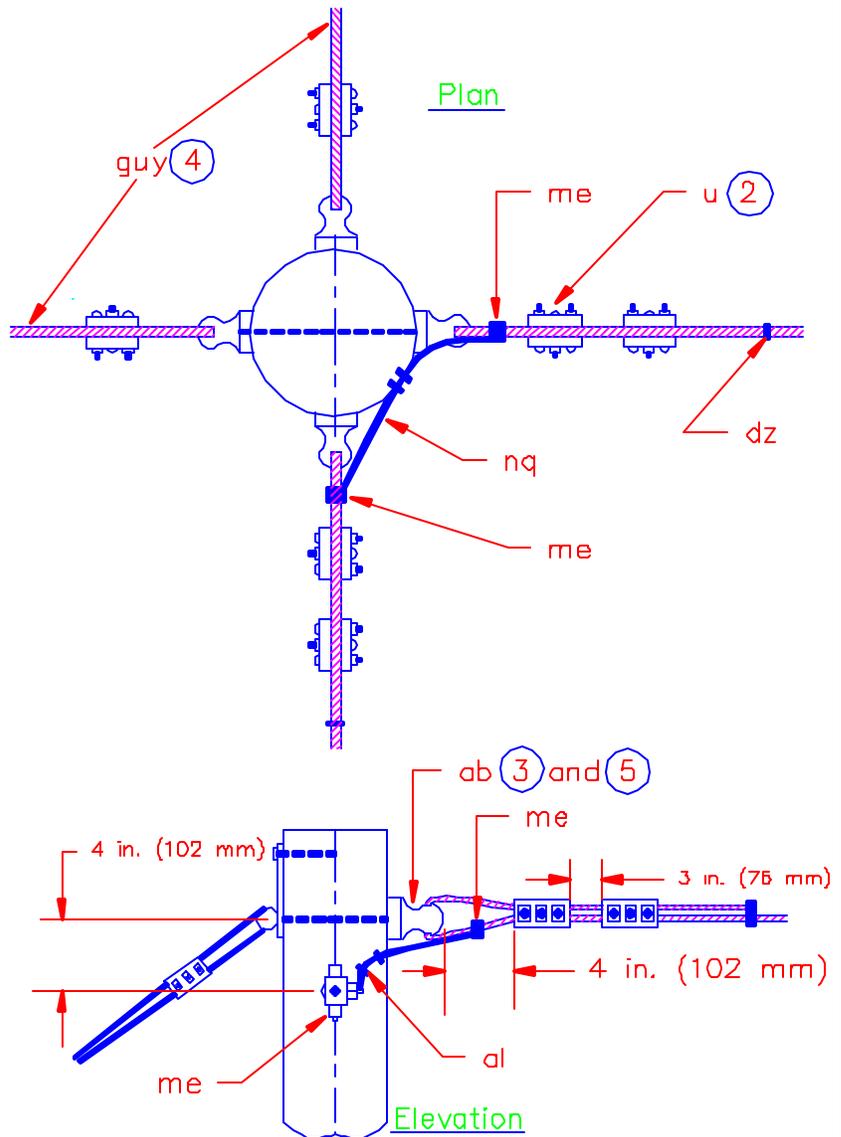
Scale: NTS

March 2001

202-3

Notes:

- ① Use for corners from 60 to 90 degrees.
- ② An equivalent terminating device (mu) rated to provide the strength of the appropriate suspension strand may be used in lieu of 3-bolt guy clamps listed.
- ③ Square nut under eye nut may be omitted when length of bolt thread extending beyond pole is short enough to permit turning eye nut down to curved washer without interfering with the placing of strand.
- ④ Refer to guy assembly drawings PE1-2, -3, -4; PE1-2G, -3G, -4G; PE2-2, -3, -4; and PE2-2G, -3G, -4G for for guying materials.
- ⑤ Size of thimbleye nut is governed by size of thimbleye bolt used for guys.



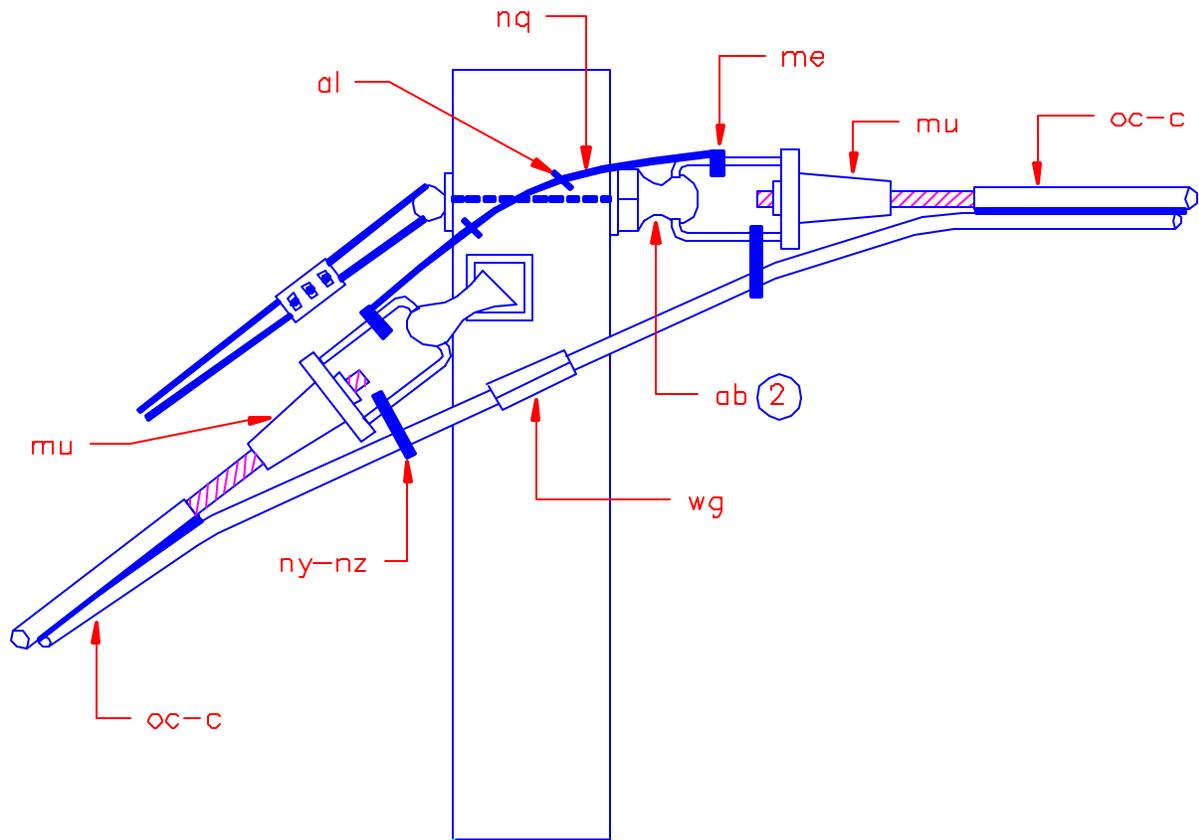
ITEMS	MATERIALS	6M	10M	16M
		NO. REQ'D	NO. REQ'D	NO. REQ'D
u	Clamps, guy, 3-bolt	1	1	2
ab	Nuts, thimbleye	1	1	1
*dz	Clips, guy	1	1	1
me	Connectors, grounding	2	2	2
*al	Staples, ground wire	as req'd	as req'd	as req'd
*nq	Wire, ground, bare, #6 AWG copper	as req'd	as req'd	as req'd

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 SUSPENSION STRAND MOUNTING (CORNERS)

Scale: NTS

March 2001

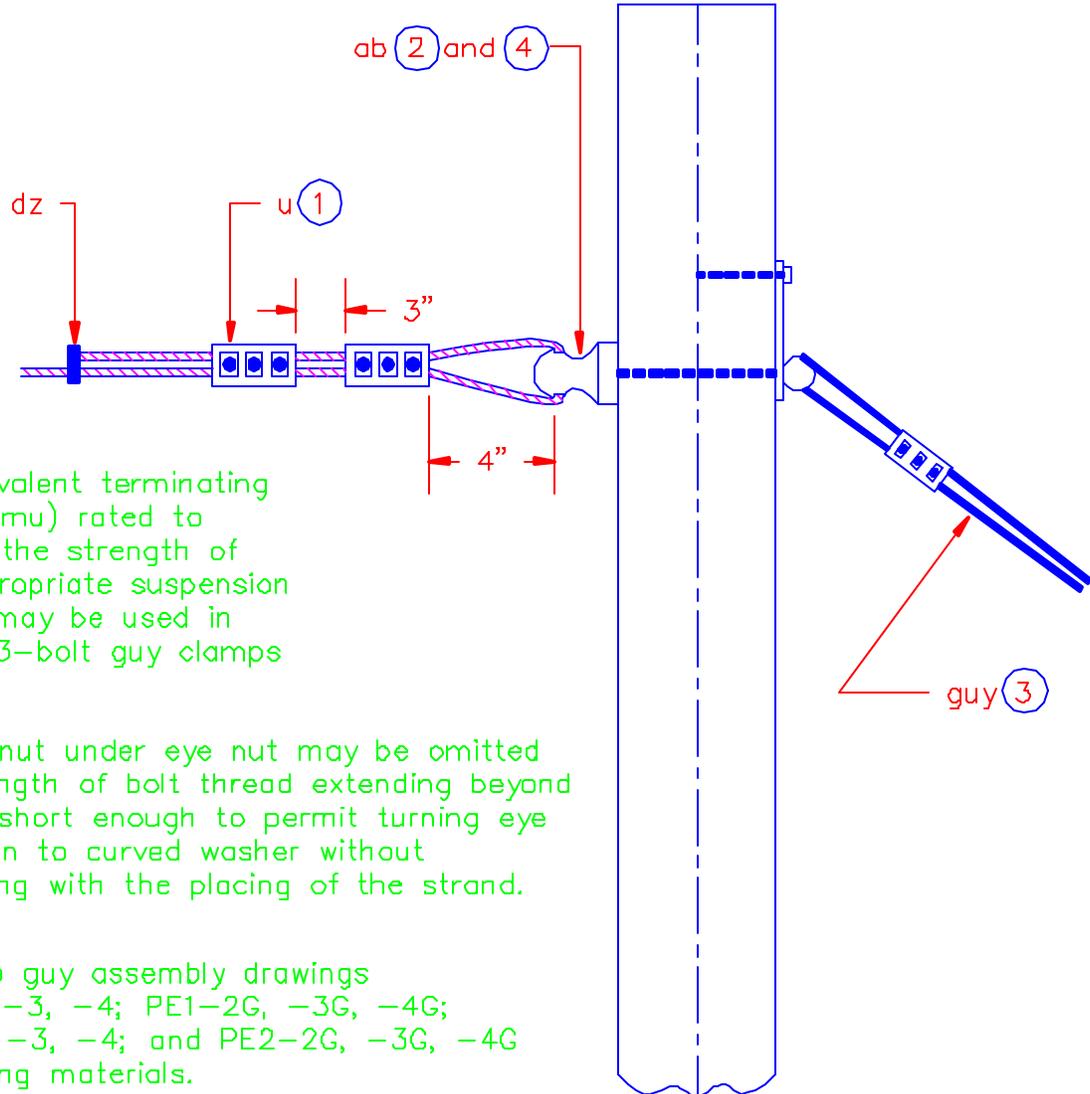
203



Notes:

- ①. Use for corners from 60 to 90 degrees.
- ②. Size of thimbleye nut is governed by size of thimbleye bolt used for guy.

ITEMS	MATERIALS	NO. REQ'D
oc-c	Cable, filled, fiber optic, self-supporting (figure 8 design)	as required
*mu	Sleeves, splicing (deadending, preformed or automatic type)	2
*ny	Spacers, cable	2
*nz	Supports, lashed cable	2
wg	Guard, plastic, cable	1
*nq	Wire, ground, bare, #6 AWG copper	as required
me	Connectors, grounding	2
ab	Nuts, thimbleye	2
*al	Staples, ground wire	as required
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES SELF-SUPPORTING FILLED FIBER OPTIC CABLE SUPPORT, CORNER		
Scale: NTS		March 2001
		203-1



Notes:

1. An equivalent terminating device (mu) rated to provide the strength of the appropriate suspension strand may be used in lieu of 3-bolt guy clamps listed.
2. Square nut under eye nut may be omitted when length of bolt thread extending beyond pole is short enough to permit turning eye nut down to curved washer without interfering with the placing of the strand.
3. Refer to guy assembly drawings PE1-2, -3, -4; PE1-2G, -3G, -4G; PE2-2, -3, -4; and PE2-2G, -3G, -4G for guying materials.
4. Size of thimbleye nut is governed by the size of the thimbleye bolt used for the guys.
5. For converting English units to metric units use 1 in. = 25.4 mm.

Elevation

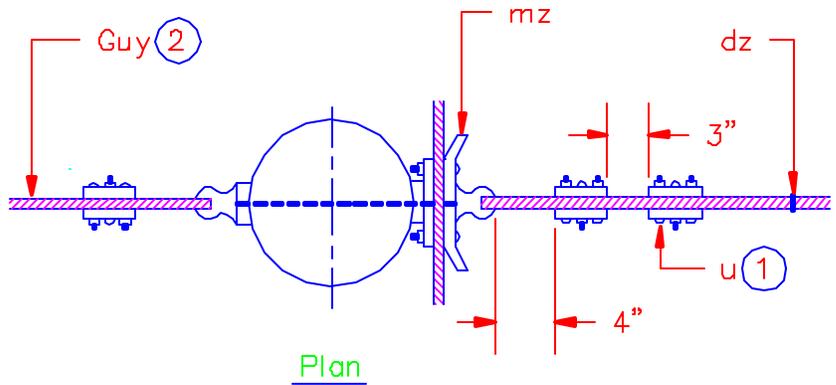
ITEMS	MATERIALS	6M	10M	16M
		NO. REQ'D	NO. REQ'D	NO. REQ'D
u	Clamps, guy, 3-bolt	1	1	2
ab	Nuts, thimbleye	1	1	1
*dz	Clips, guy	1	1	1

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 SUSPENSION STRAND DEADEND

Scale: NTS

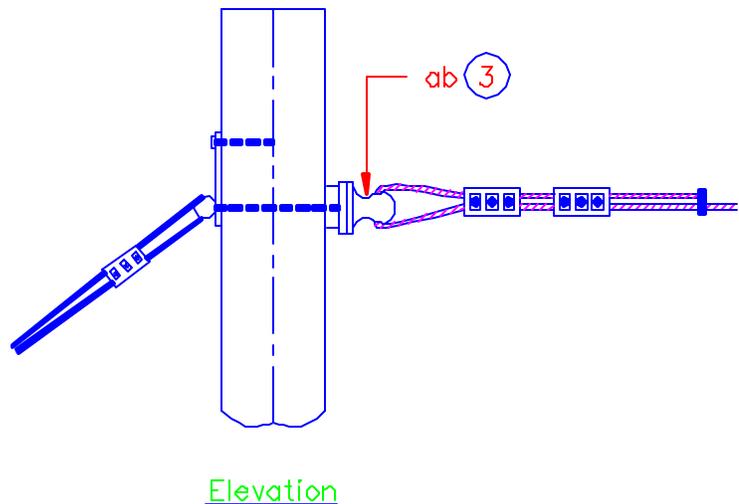
March 2001

204



Notes:

1. An equivalent terminating device (mu) rated to provide the strength of the appropriate suspension strand may be used in lieu of 3-bolt guy clamps listed.
2. Refer to guy assembly drawings PE1-2, -3, -4; PE1-2G, -3G, -4G; PE2-2, -3, -4; and PE2-2G, -3G, -4G for guying materials.
3. Size of thimbleye nut is governed by the size of the thimbleye bolt used for the guys.
4. For converting English units to metric units use 1 in. = 25.4 mm.



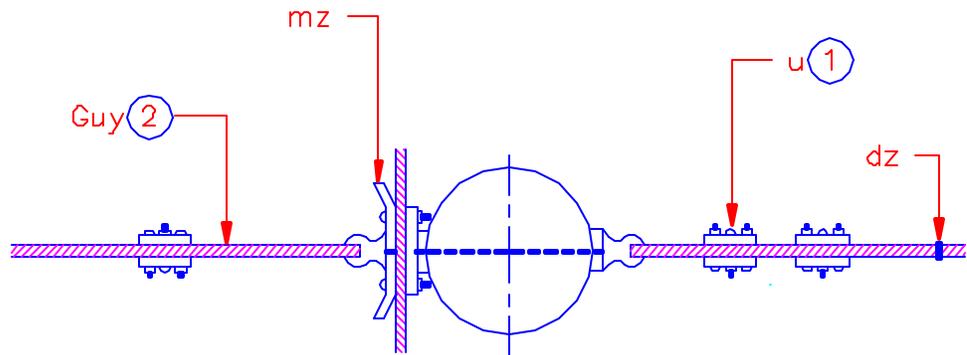
ITEMS	MATERIALS	6M	10M	16M
		NO. REQ'D	NO. REQ'D	NO. REQ'D
u	Clamps, guy, 3-bolt	1	1	2
ab	Nuts, thimbleye	1	1	1
*dz	Clips, guy	1	1	1
mz	Clamps, suspension, corner	1	1	1

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 BRANCH SUSPENSION STRAND

Scale: NTS

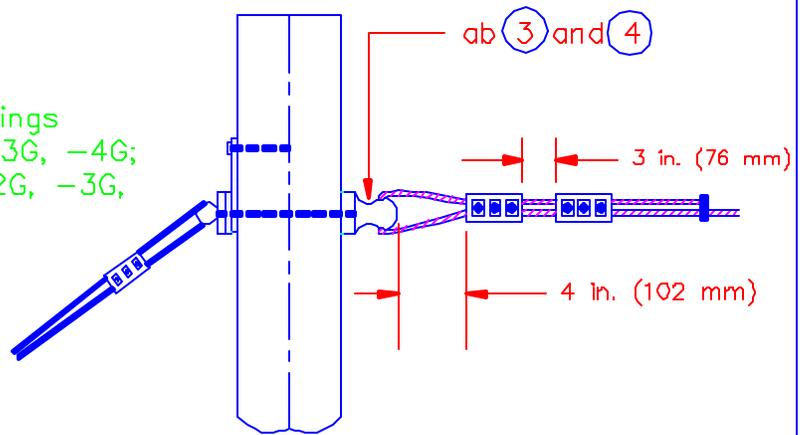
March 2001

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Notes:

- ①. An equivalent terminating device (mu) rated to provide the strength of the appropriate suspension strand may be used in lieu of 3-bolt guy clamps listed.
- ②. Refer to guy assembly drawings PE1-2, -3, -4; PE1-2G, -3G, -4G; PE2-2, -3, -4; and PE2-2G, -3G, -4G for guying materials.
- ③. Size of the thimbleye nut is governed by the size of the thimbleye bolt used for the guys.
- ④. Square nut under eye nut may be omitted when length of bolt thread extending beyond pole is short enough to permit turning eye nut down to curved washer without interfering with the placing of strand.



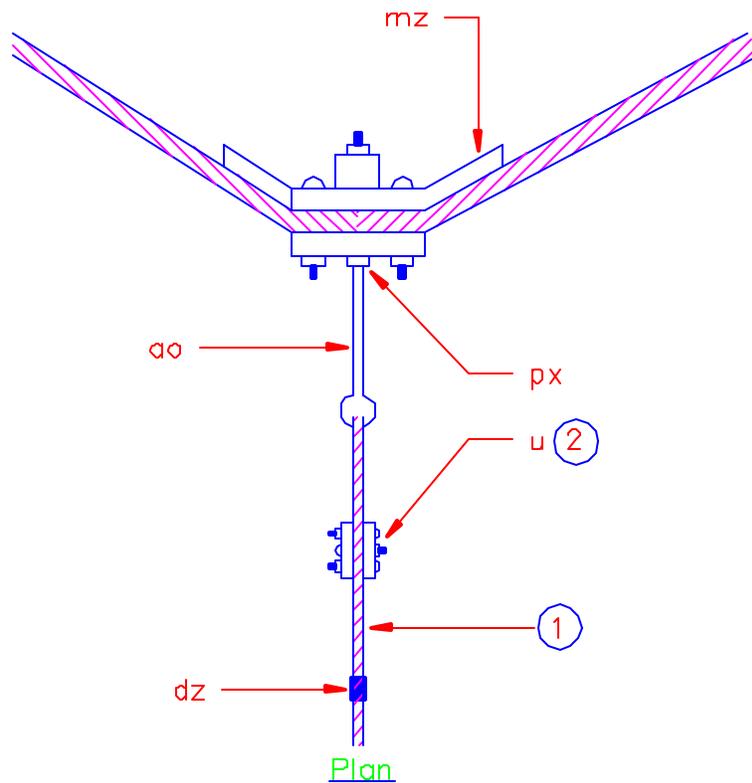
ITEMS	MATERIALS	6M	10M	16M
		NO. REQ'D	NO. REQ'D	NO. REQ'D
u	Clamps, guy, 3-bolt	1	1	2
ab	Nuts, thimbleye	1	1	1
*dz	Clips, guy	1	1	1
mz	Clamps, suspension, corner	1	1	1

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 BRANCH SUSPENSION STRAND

Scale: NTS

March 2001

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Notes:

- ① Assembly unit designations refer to this strand.
- ② An equivalent terminating device (mu) rated to provide the strength of the appropriate suspension strand may be used in lieu of 3-bolt guy clamps listed.

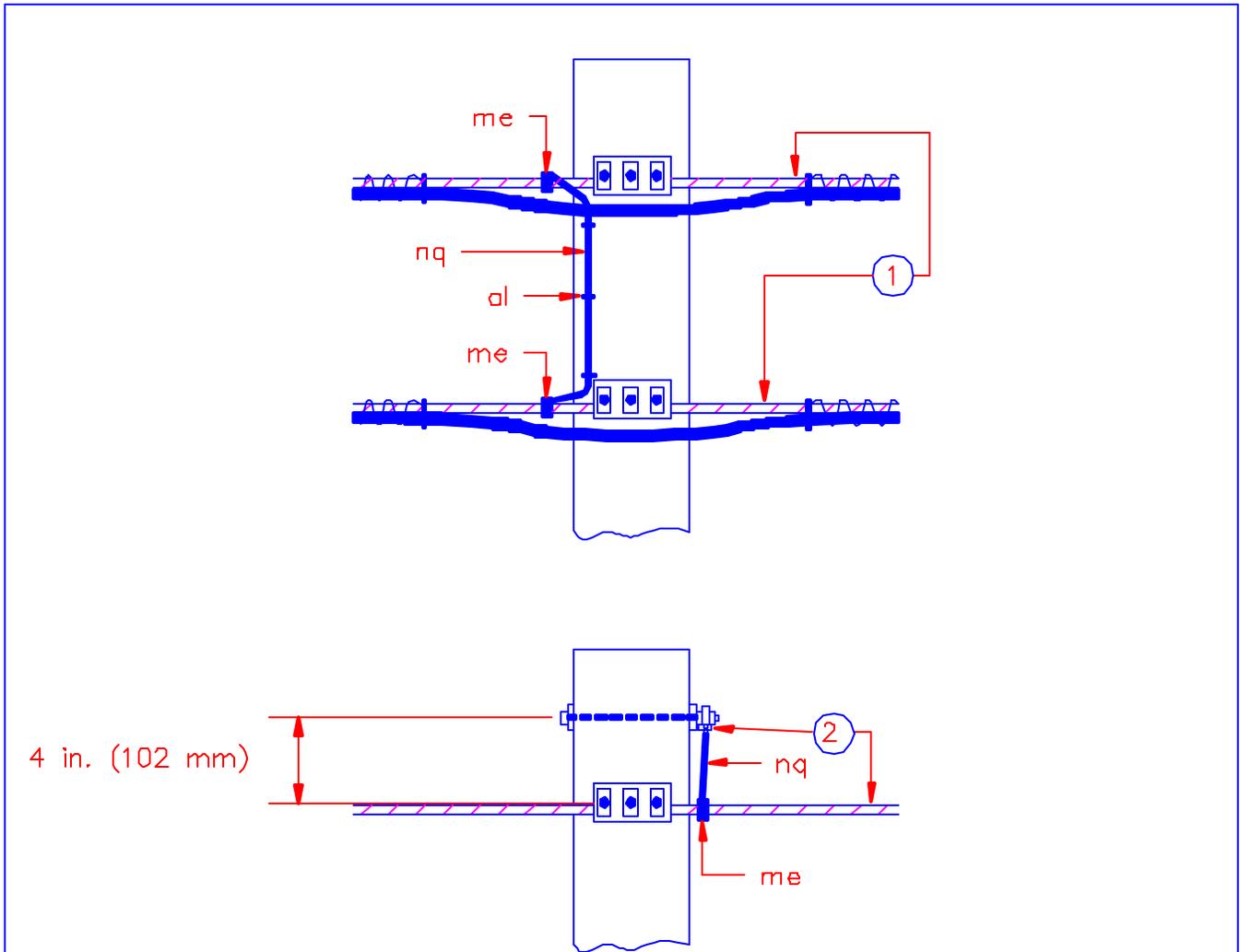
ITEMS	MATERIALS	6M	10M	16M
		NO. REQ'D	NO. REQ'D	NO. REQ'D
mz	Clamps, corner suspension	1	1	1
u	Clamps, guy, 3-bolt	1	1	2
*dz	Clips, guy	—	—	1
ao	Bolts, thimbleye, 3/4 in. (19 mm) diameter	—	—	1
ao	Bolts, thimbleye, 5/8 in. (16 mm) diameter	1	1	—
px	Nuts, regular square, 5/8 in. (16 mm)	1	1	—
px	Nuts, regular square, 3/4 in. (19 mm)	—	—	1

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 SUSPENSION STRAND PULL-OFF

Scale: NTS

March 2001

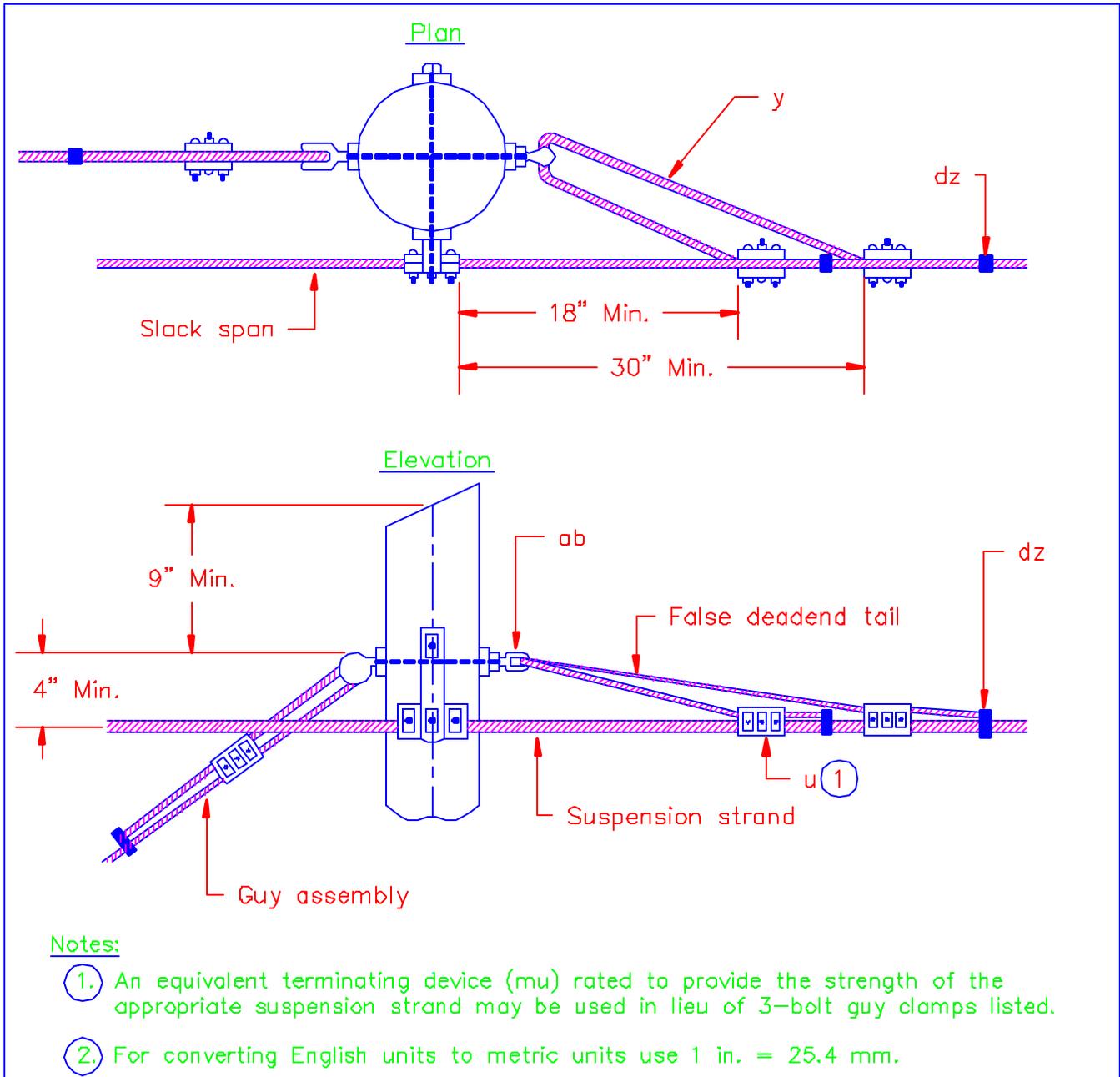
208



Notes:

- ①. On pole lines carrying two strand-mounted cable leads and paralleling each other, the suspension strands shall be bonded at each end of the joint section and at approximately 1/4-mile (402 m) intervals as directed by the Engineer.
- ②. Where two cable leads cross each other at a pole, the two strands shall be bonded as shown.

ITEMS	MATERIALS	NO. REQ'D
me	Connectors, grounding	2
*nq	Wire, ground, bare, #6 AWG copper	as required
*al	Staples, ground wire	as required
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES SUSPENSION STRAND BONDING		
Scale: NTS		March 2001
		209-1



**Notes:**

- ①. An equivalent terminating device (mu) rated to provide the strength of the appropriate suspension strand may be used in lieu of 3-bolt guy clamps listed.
- ②. For converting English units to metric units use 1 in. = 25.4 mm.

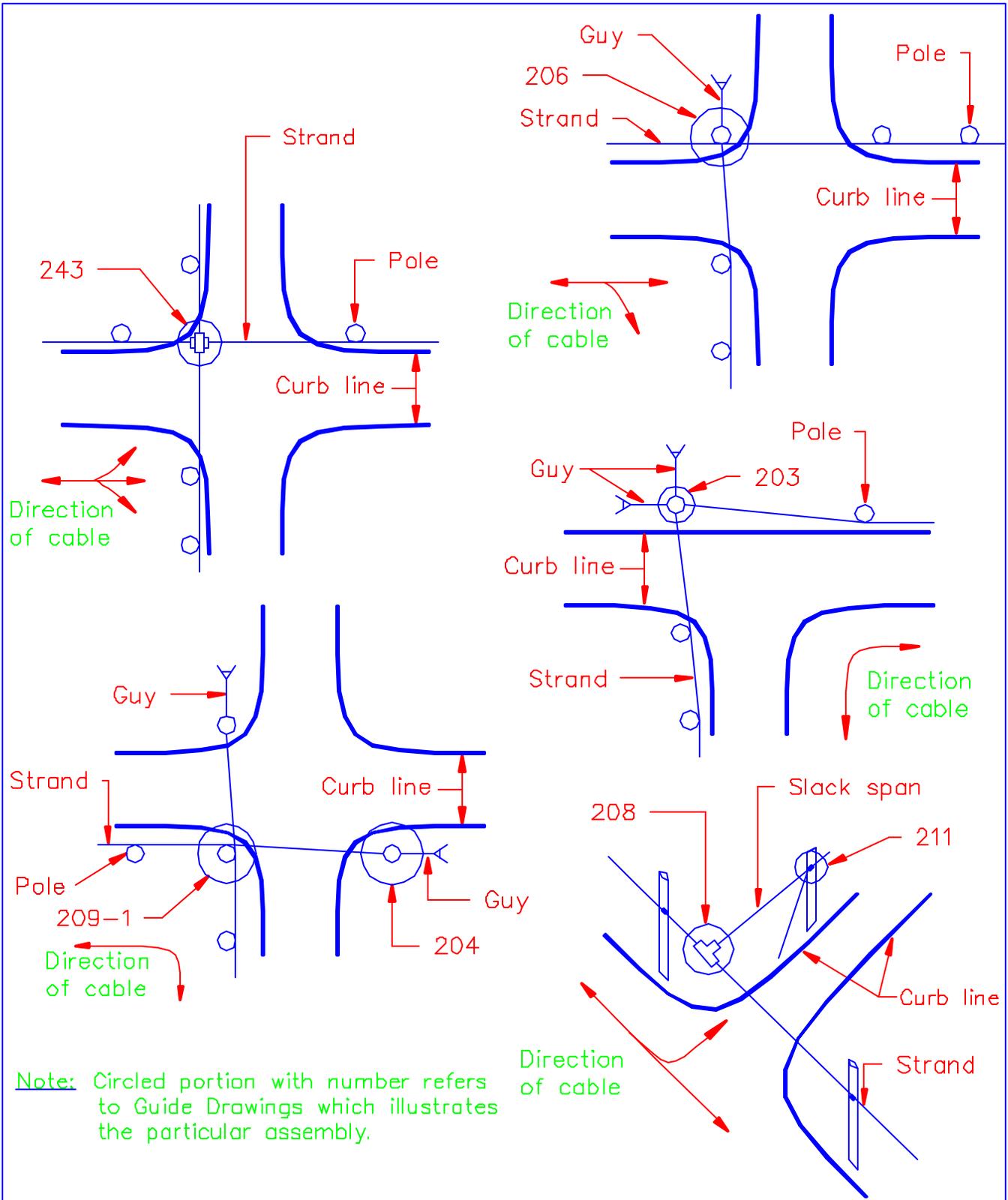
ITEMS	MATERIALS	6M	10M	16M
		NO. REQ'D	NO. REQ'D	NO. REQ'D
u	Clamps, guy, 3-bolt	2	2	2
y	Strand, as required	6M	10M	16M
ab	Nuts, thimbleye, for 5/8 in. (16 mm) bolt	1	1	—
ab	Nuts, thimbleye, for 3/4 in. (19 mm) bolt	—	—	1
*dz	Clips, guy	2	2	2

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 FALSE DEADEND

Scale: NTS

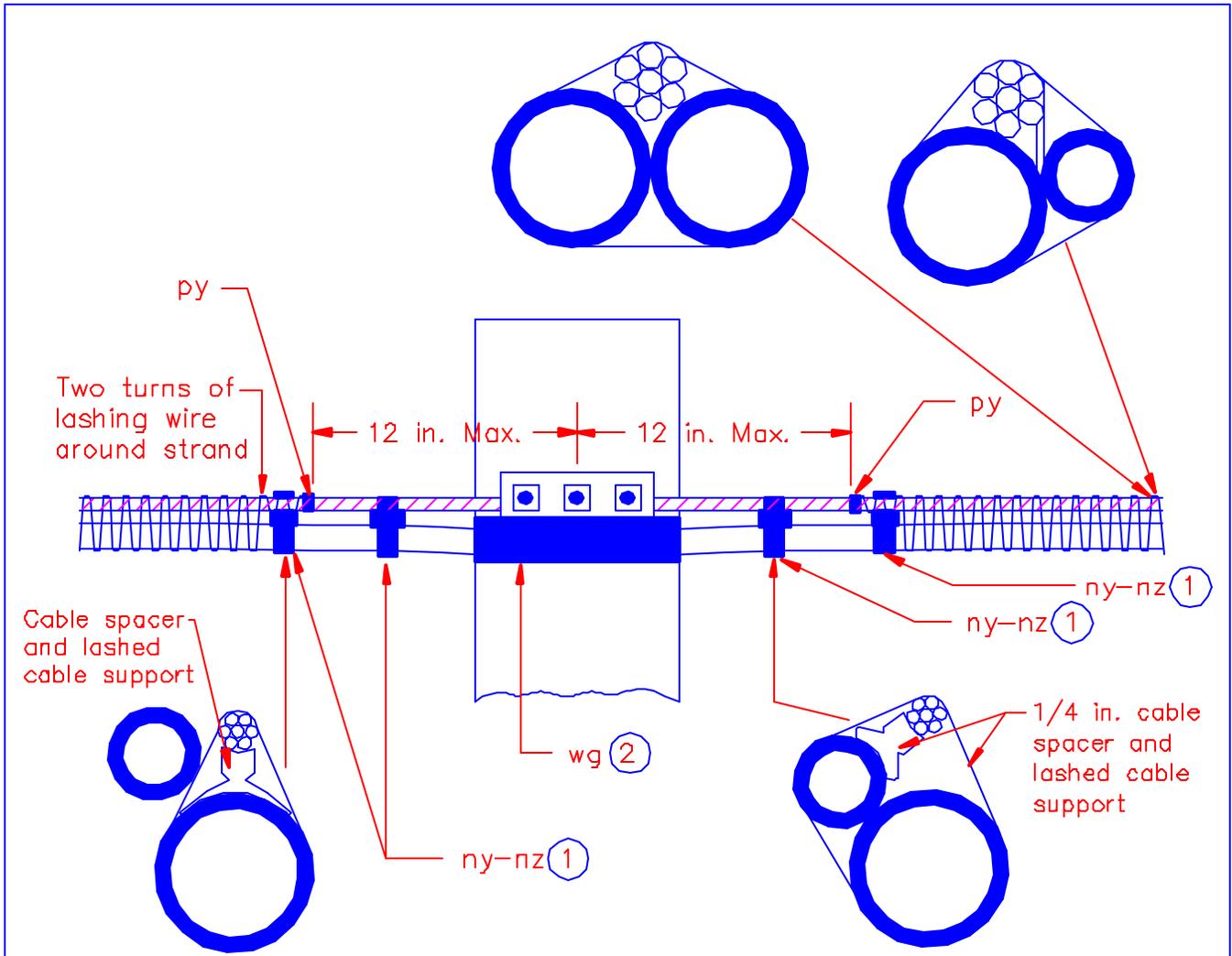
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Note: Circled portion with number refers to Guide Drawings which illustrates the particular assembly.

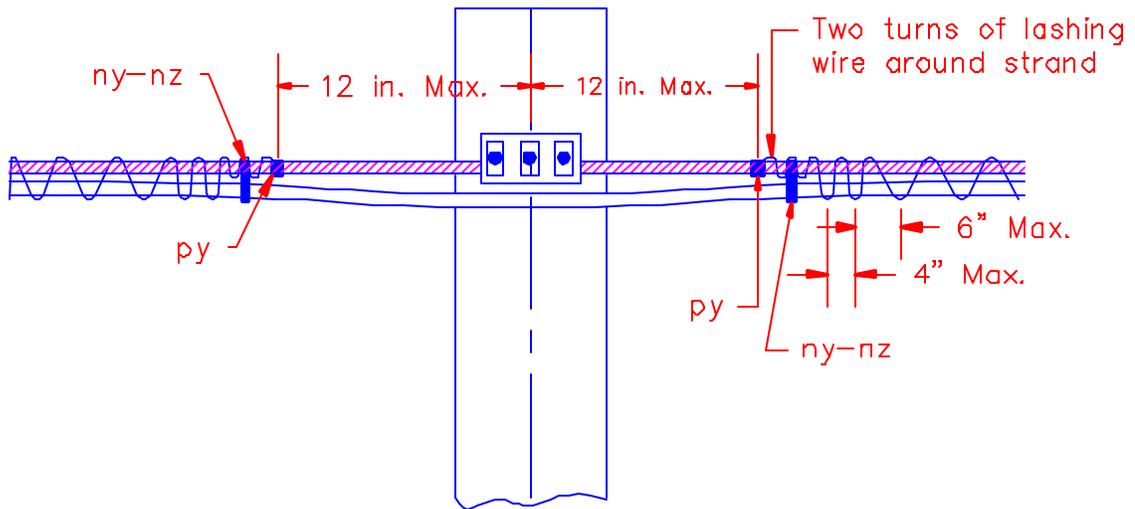
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES STRAND LAYOUTS		
Scale: NTS		March 2001
		212



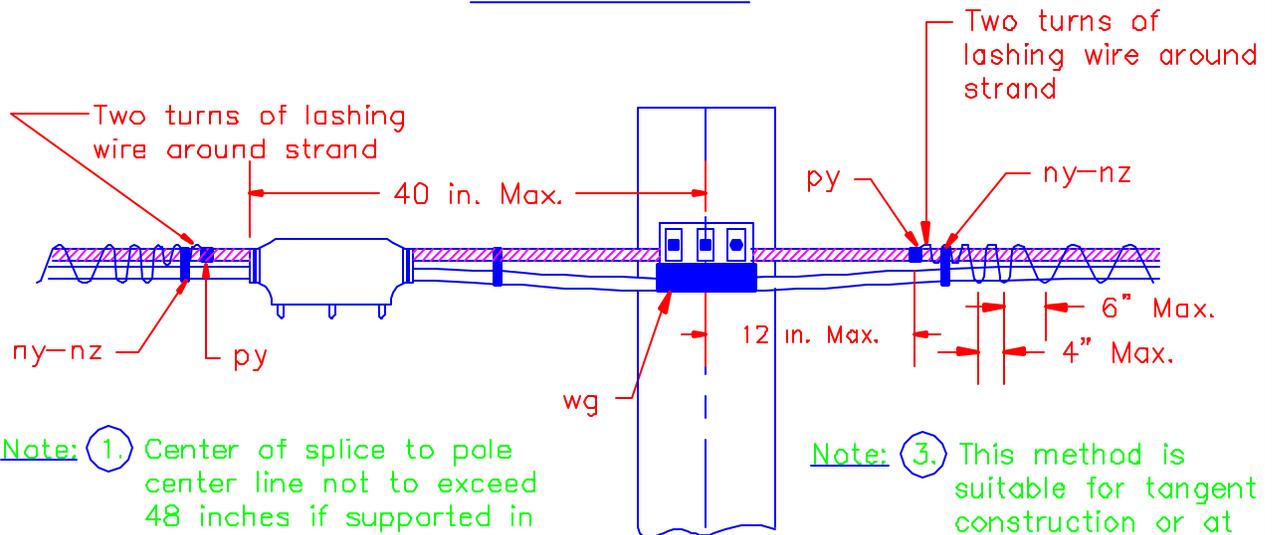
Notes:

- ① Install cable spacers and lashed cable supports as needed to hold cable in position.
- ② Place split cable guard around cable at point of contact with suspension clamp to prevent abrasion of cable. Secure split cable guard to cable by means of 3 full layers of vinyl tape.
- ③ For converting English units to metric units 1 in. = 25.4 mm

ITEMS	MATERIALS
*py	Clamps, terminating, lashing wire
*ny	Spacers, cable, 1/4"
*nz	Supports, lashed cable
wg	Guards, cable, split
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES ARRANGEMENT DETAILS OF CABLES AT POLE SUPPORTS	
Scale: NTS	
March 2001	
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No Splice at Pole



Splice at Pole

Note: ①. Center of splice to pole center line not to exceed 48 inches if supported in this manner. Otherwise treat as a midspan splice.

Note: ③. This method is suitable for tangent construction or at corners where pull is away from pole.

Note: ②. For converting English units to metric units use 1 in. = 25.4 mm.

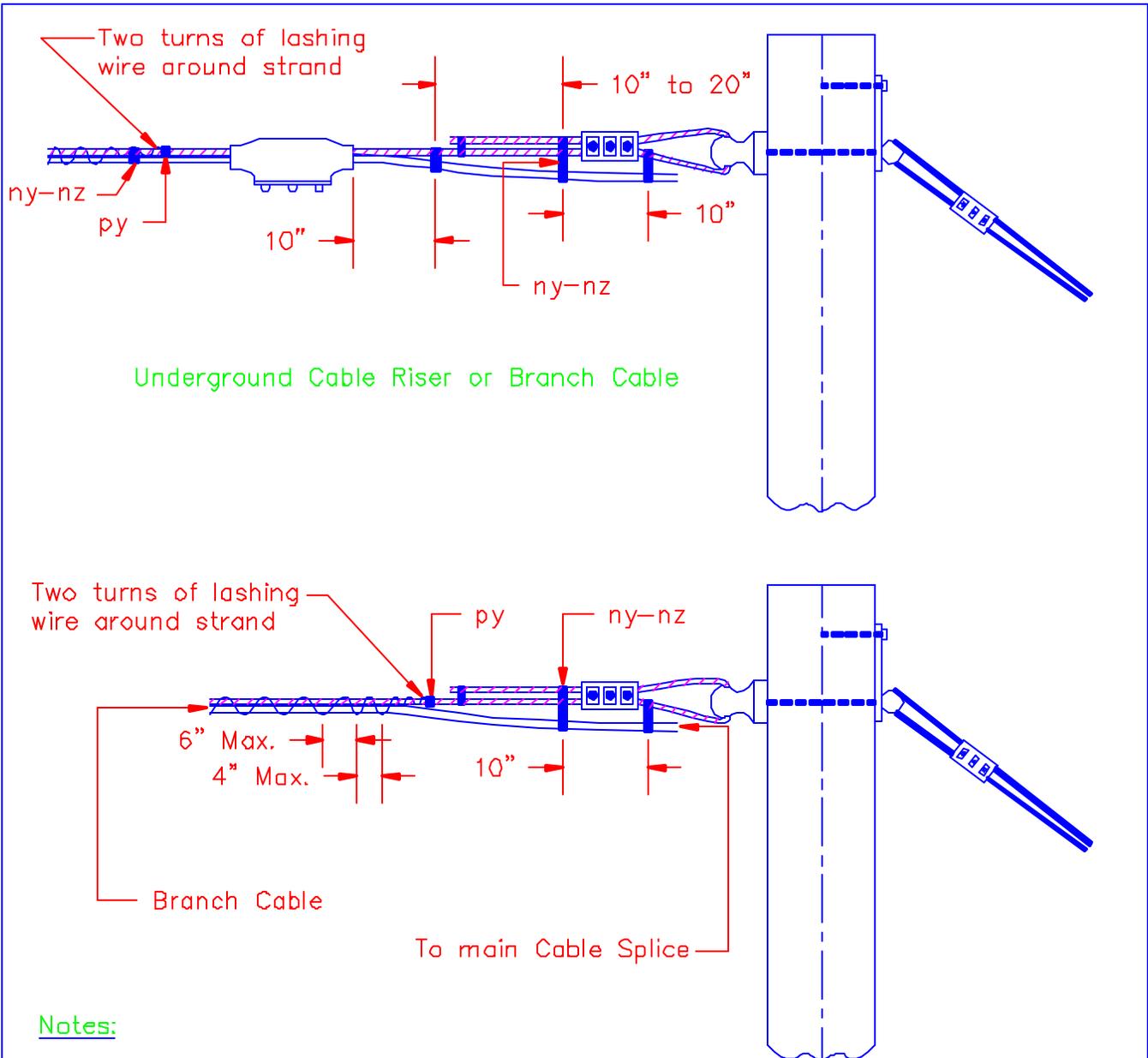
ITEMS	MATERIALS	NO. REQ'D
*ny	Spacers, cable	2
*nz	Supports, lashed cable	2
*py	Clamps, terminating, lashing wire	2
wg	Guard, cable, plastic	1

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 LASHED CABLE SUPPORT AT POLE

Scale: NTS

March 2001

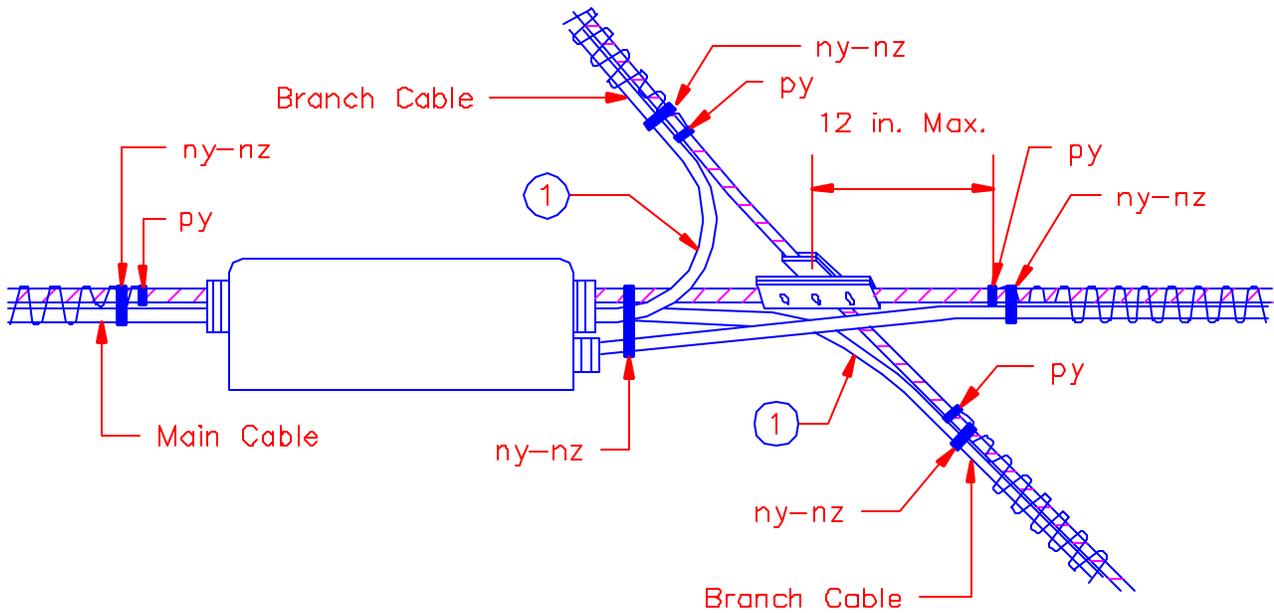
241



Notes:

- ①. For converting English units to metric units use 1 in. = 25.4 mm.
- ②. This method of terminating lashing wire should be used at deadend junction of aerial cable and underground riser, and junction of branch and main cable.

ITEMS	MATERIALS	NO. REQ'D
*ny	Spacers, cable	as required
*nz	Supports, lashed cable	as required
*py	Clamps, terminating, lashing wire	1
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES LASHING WIRE TERMINATIONS		
Scale: NTS		March 2001
		242



Notes:

- ①. The radius of bend shall not be less than 10 times the outside diameter for copper cables. The radius of bend shall not be less than 20 times the outside diameter for fiber optic cables.
- ②. For converting English units to metric units use 1 in. = 25.4 mm.

ITEMS	MATERIALS	NO. REQUIRED
*ny	Spacers, cable	5
*nz	Supports, lashed cable	5
*py	Clamps, terminating, lashing wire	4
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES LASHING WIRE TERMINATIONS AT SUSPENSION STRAND CROSSOVERS		
Scale: NTS		March 2001
		243

Spiraling Operation Detail

Step (1) Place split cable guards. (plastic)

Step (2) Loosen lashing wire clamps as required to allow for movement of lashing wire.

Step (3) Support and position cable as necessary for operation, using truck mounted derrick, block and tackle, or other means.

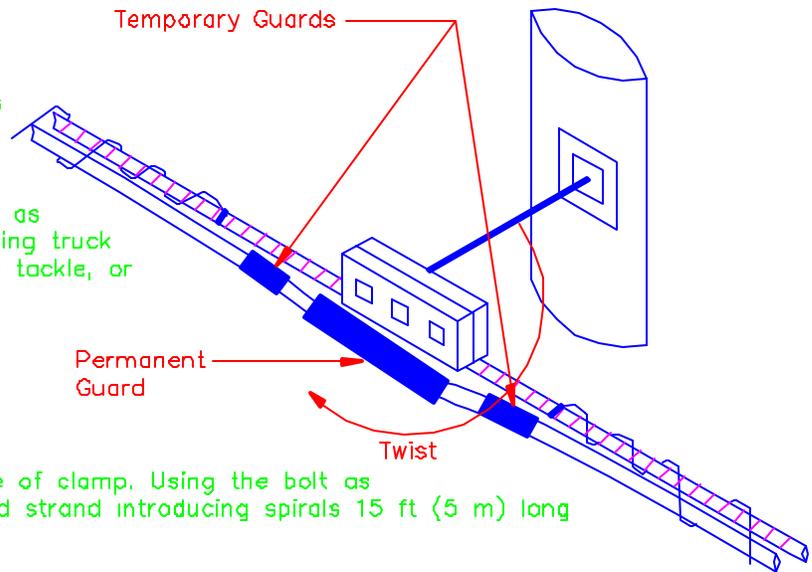
Step (4) Remove suspension clamp from through bolt allowing cable and strand to swing free.

Step (5) Place a bolt in center hole of clamp. Using the bolt as a lever, twist the cable and strand introducing spirals 15 ft (5 m) long in the adjacent spans.

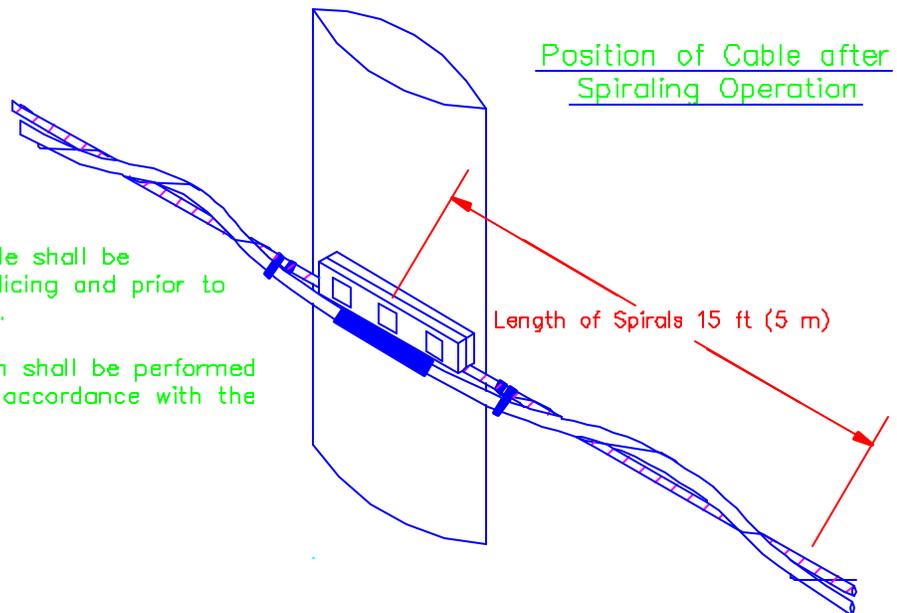
Step (6) In the spiraling operation, lashing wire will tighten in the span on one side of pole and loosen on the other. Lashing wire clamps shall be adjusted to allow for this movement. After spiraling, the lashing wire shall be adjusted, tapping on the strand as the lashing wire is pulled up or adjusted and clamps tightened to hold cable firmly in place.

Step (7) Reattach cable and remove temporary cable guards.

Step (8) A split cable guard shall also be installed on the cable at each tangent pole adjacent to the pole on which spiraling has been performed.



Position of Cable after Spiraling Operation



Notes.

- ① Spiraling of aerial cable shall be performed prior to splicing and prior to mounting of terminals.
- ② The spiraling operation shall be performed on alternate poles in accordance with the steps shown above.

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 METHOD OF SPIRALING AERIAL CABLE

Scale: NTS

March 2001

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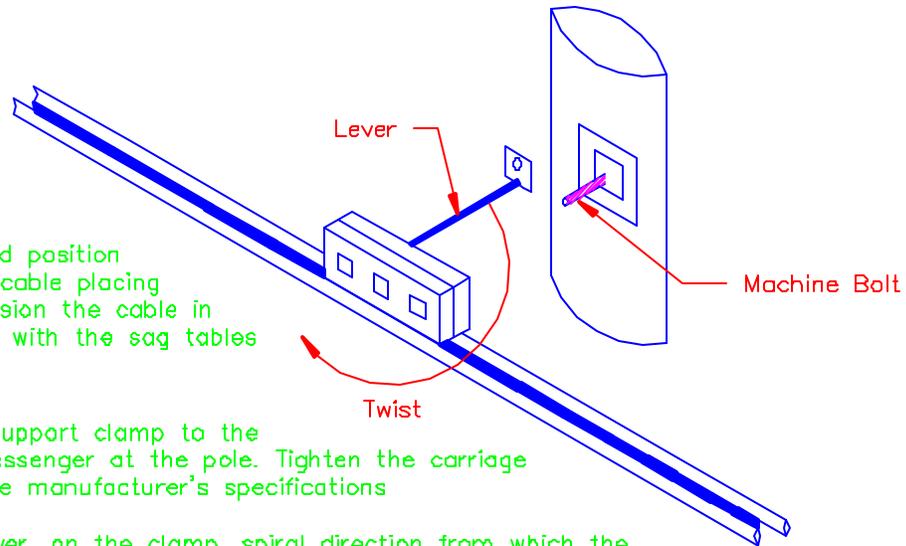
Spiraling Operation Detail

Step (1) Support and position cable with cable placing blocks. Tension the cable in accordance with the sag tables specified

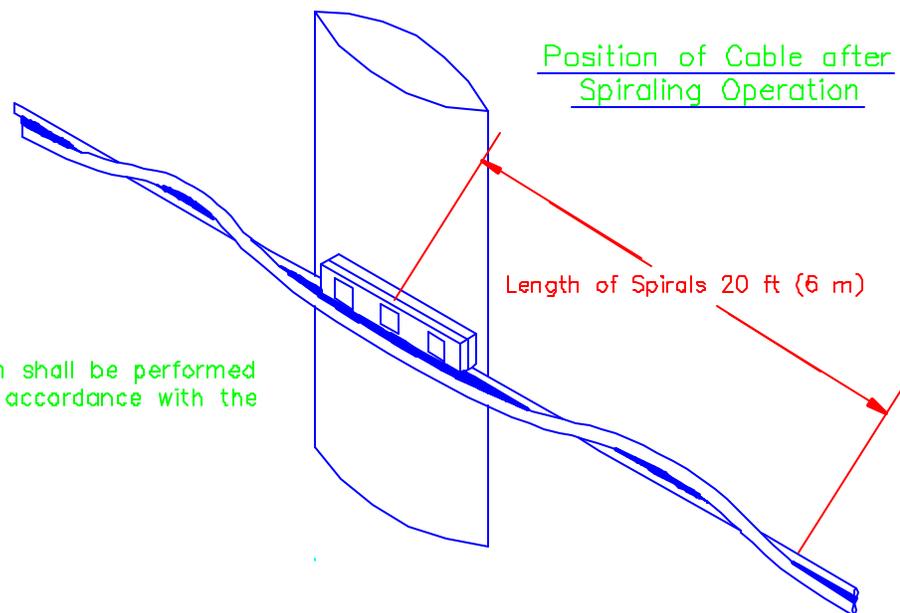
Step (2) Fasten a support clamp to the support messenger at the pole. Tighten the carriage bolts to the manufacturer's specifications

Step (3) Using a lever, on the clamp, spiral direction from which the previous adjacent spiraling operation was performed. If the adjacent spans are unequal, use the shorter span for determining the number of spirals

Step (4) Place the clamp on the machine bolt and tighten nuts to the manufacturer's specifications.



Position of Cable after Spiraling Operation



Note:

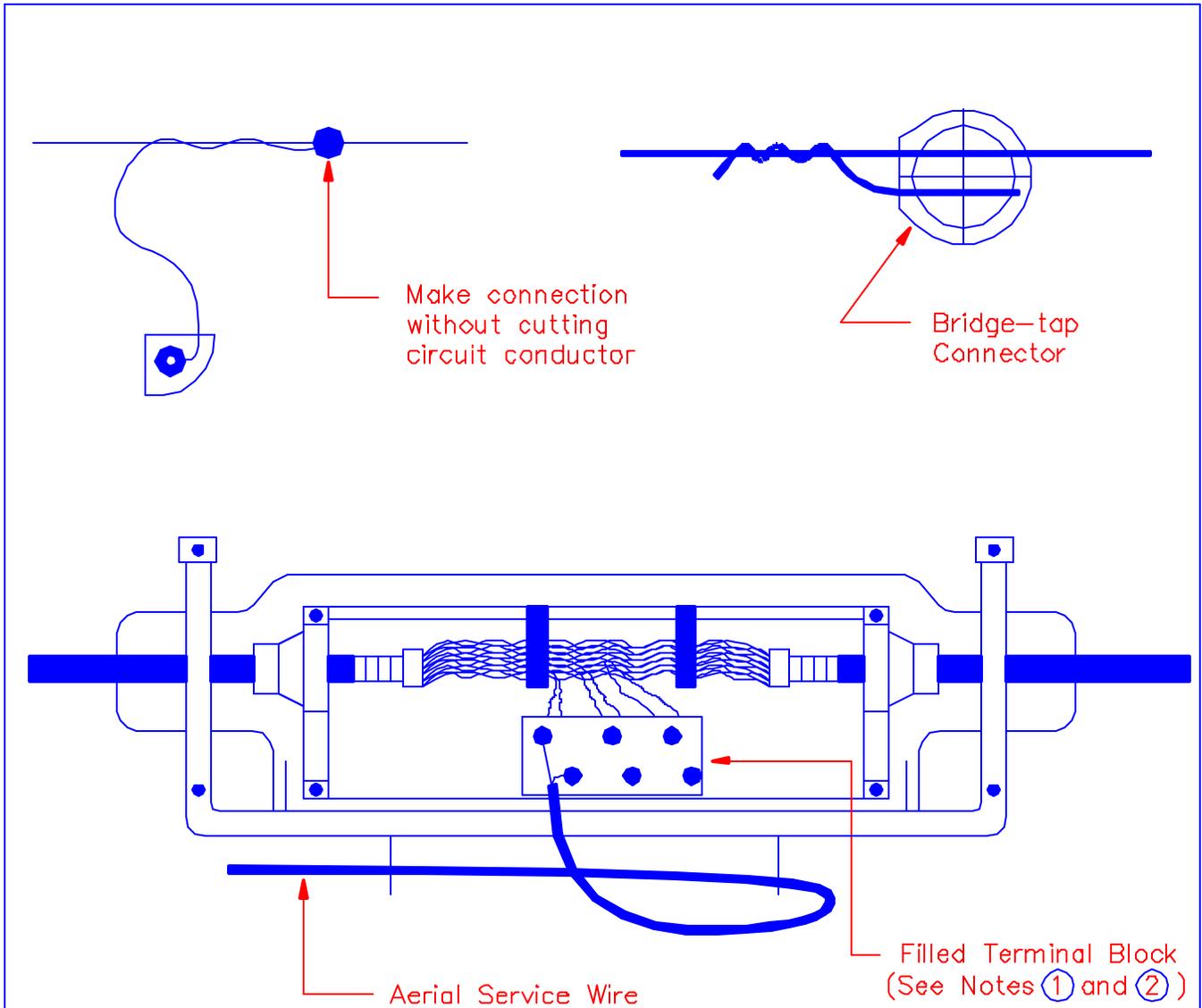
1. The spiraling operation shall be performed on alternate poles in accordance with the steps shown above

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 METHOD OF SPIRALING SELF-SUPPORTING FILLED FIBER  
 OPTIC CABLE (FIGURE 8 DESIGN)

Scale: NTS

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Notes:

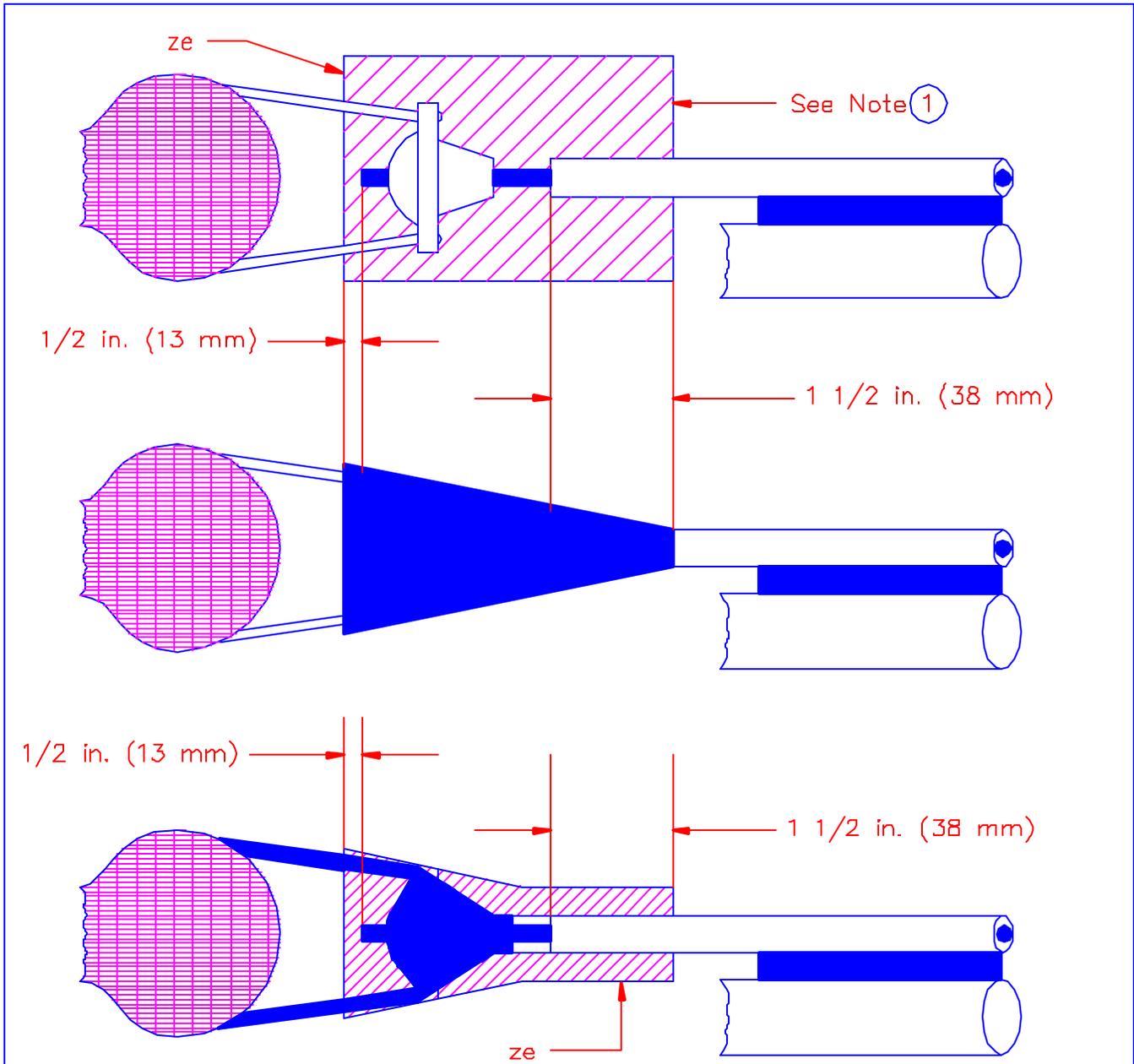
- ① Where aerial service wire connections are made along aerial plastic cable, unprotected filled terminal blocks equipped with lead-out wires shall be used.
- ② Conductors of the aerial service wire shall be connected directly to the binding posts of the filled terminal block.

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
AERIAL PLASTIC CABLE DETAILS OF WIRE  
CONNECTIONS TO FILLED TERMINAL BLOCKS

Scale: NTS

March 2001

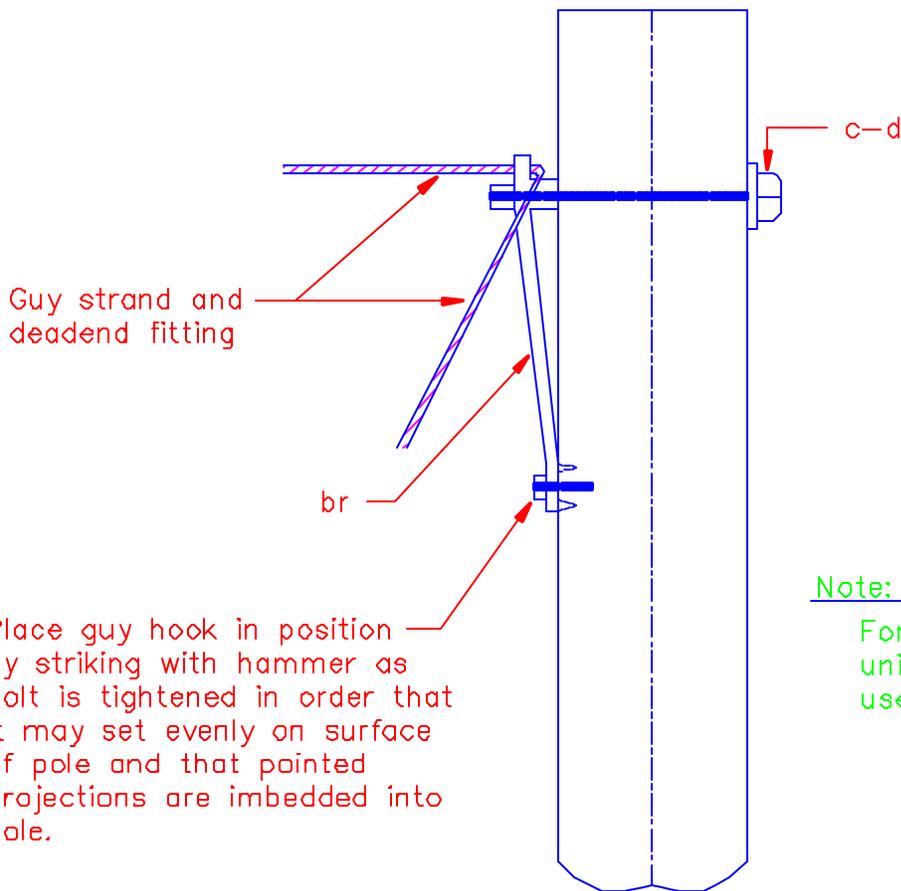
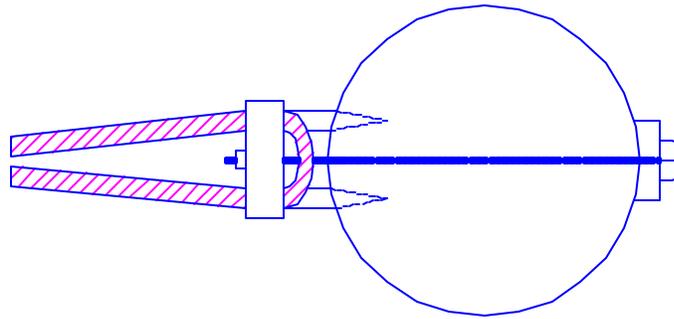
312-1



Note:

1. Mold sealing compound with fingers to provide a tight seal and a neat appearance. Restoration of the insulation on support wire in places other than at deadends shall be accomplished in a similar manner.

ITEM	MATERIAL	NO. REQUIRED
*ze	Compound, sealing	As required
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES METHOD OF RESTORING INSULATION ON SUPPORT MEMBER OF SELF-SUPPORTING FILLED FIBER OPTIC CABLE (FIGURE 8 DESIGN)		Scale: NTS
		March 2001
		360



Place guy hook in position by striking with hammer as bolt is tightened in order that it may set evenly on surface of pole and that pointed projections are imbedded into pole.

Note:

For converting English units to metric units use 1 in. = 25.4 mm.

ITEMS	MATERIALS	6M NO. REQ'D	10M NO. REQ'D	16M NO. REQ'D
br	Hook, guy	1	1	1
c	Bolts, machine, 5/8" x required length	1	1	—
d	Washers, curved, 3" x 3" x 1/4", 13/16" hole	—	—	1
c	Bolts, machine, 3/4" x required length	—	—	1
d	Washers, curved, 2 1/2" x 2 1/2" x 3/16", 11/16" hole	1	1	—

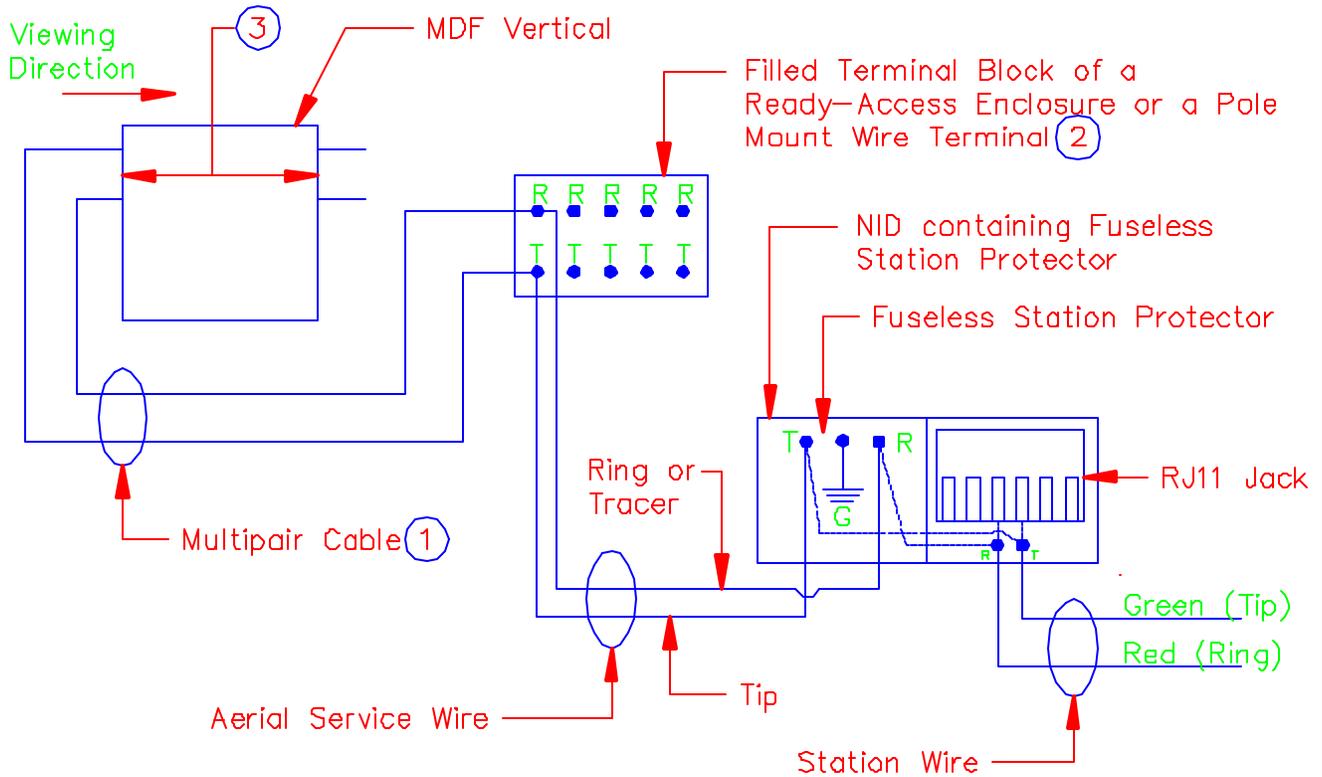
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 GUY HOOK, DETAILS OF INSTALLATION

Scale: NTS

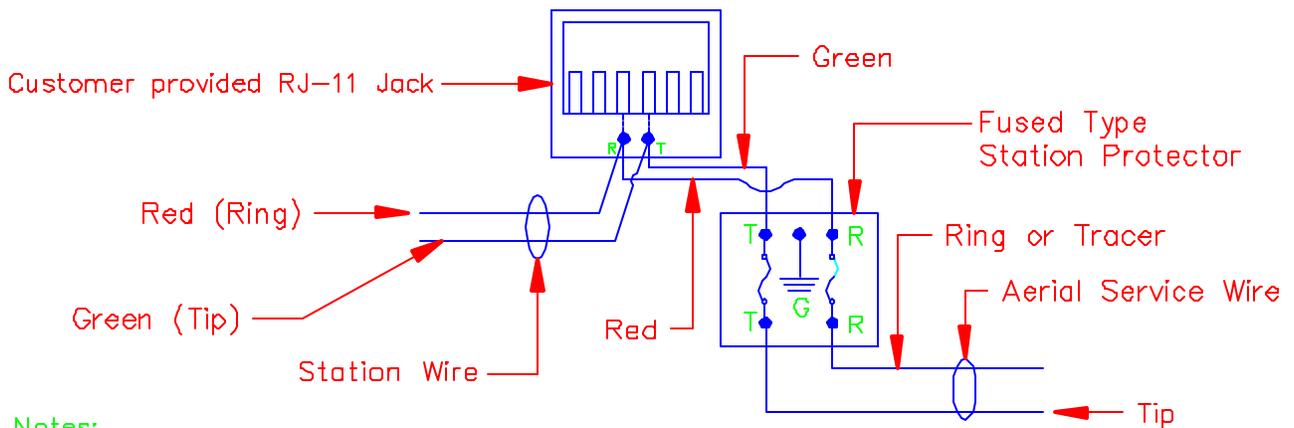
March 2001

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Conductor Polarity Diagram For NID Incorporating Fuseless Station Protector



Conductor Polarity Diagram For Fused Station Protector



Notes:

1. Refer to appropriate cable specifications for tip and ring conductor identification.
2. When facing the cable terminal the positive (tip) is on the left and the negative (ring) is on the right side of the pair.
3. Connections to be made in accordance with the manufacturer's instructions

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES  
 CONDUCTOR POLARITY (TIP AND RING) DIAGRAM  
 (AERIAL PLANT)

Scale: NTS

March 2001

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