

FIBER OPTIC CONSTRUCTION STANDARDS

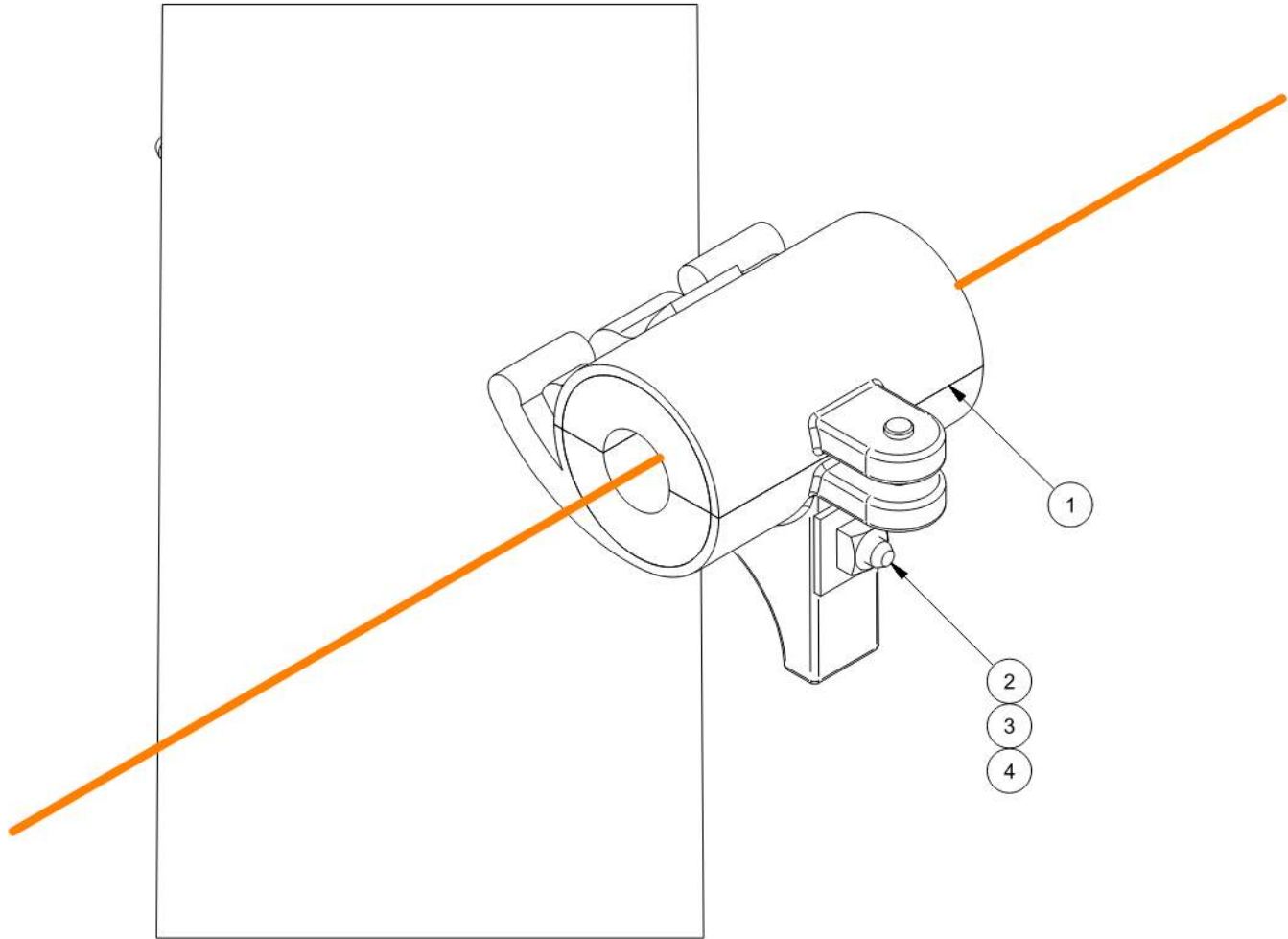


TABLE OF CONTENTS

	COVER PAGE	
	TABLE OF CONTENTS	
	TABLE OF CONTENTS	
4.	FO-1	ADSS TANGENT SUPPORT
5.	FO-1B	ADSS SUPPORT CLAMP
6.	FO-2	ADSS SUSPENSION SUPPORT MOUNTED
7.	FO-3	ADSS SUSPENSION SUSPENSION MOUNTED
8.	FO-EXT	ADSS 12" EXT BRACKET
9.	FO-4	ADSS DEADEND LIMITED TENSION
10.	FO-5	ADSS DEADEND MEDIUM TENSION
11.	FO-6	ADSS DOUBLE DEADEND LIMITED TENSION
12.	FO-7	ADSS DOUBLE DEADEND MEDIUM TENSION
13.	FO-DD1	ADSS SINGLE DEADEND
14.	FO-DD2	ADSS DOUIBLE DEADEND 0-90 DEGREES
15.	FO-8	ADSS STORAGE LOOP (NO SPLICE)
16.	FO-8B	ADSS STORAGE LOOP DEADEND ASSEMBLY
17.	FO-8C	IN-SPAN STORAGE ASSEMBLY
18.	FO-9	ADSS VERTICAL STORAGE LOOP
19.	FO-10	FIBER OPTIC STRAND TANGENT CONNECTION
20.	FO-EXTB	ADSS SUPPORT CLAMP ON BRACKET
21.	FO-EXTC	FIBER OPTIC STRAND CLAMP ON BRACKET
22.	FO-XRM	FIBER OPTIC TANGENT PUPI ARM
23.	FO-ME1	MESSENGER SINGLE DEADEND
24.	FO-ME2	MESSENGER DOUBLE DEADEND
25.	FO-G6	6000# GUY
26.	FO-SP6	6000# SPAN GUY
27.	FO-PA1	PLATE ANCHOR ASSEMBLY
28.	FO-PA2	PLATE ANCHOR INSTALLATION
29.	FO-SA	HELIX/SCREW-IN ANCHORS
30.	FO-RISER	FIBER OPTIC CABLE RISER
31.	FO-HH	VAULT INSTALLATION GUIDELINES
32.	FO-HHLG	30"X48"X36" HANDHOLE
33.	FO-HHSM	17"X30"X24" HANDHOLE
34.	FO-TR	TRENCH & CONDUIT INSTALL GUIDELINES 1
35.	FO-TR2	TRENCH & CONDUIT INSTALL GUIDELINES 2
36.	FO-AFS	AIRFLOW SPOILER
37.	FO-VD	SPIRAL VIBRATION DAMPENER
38.	FO-SP	SPLICING & SPLICE CASES 1
39.	FO-SP2	SPLICING & SPLICE CASES 2
40.	FO-SC1	TYPICAL SPLICE CASES
41.	FO-SC2	TYPICAL SPLICE CASES 2
42.	FO-OHSC1	OH ENTRY TO PREMISE
43.	FO-OHSC2	UG ENTRY TO PREMISE

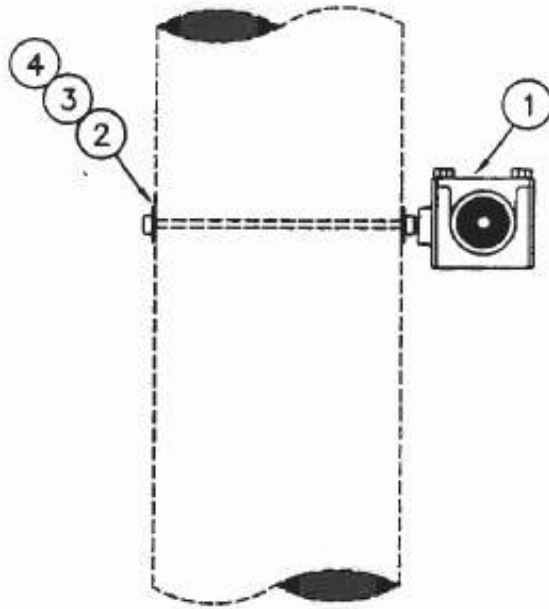
TABLE OF CONTENTS

44.	FO-SL	JOINT USE - STREET LIGHT CLEARANCE
45.	FO-VC	JOINT USE - VERTICAL CLEARANCE REQUIREMENTS
46.	FO-VC1	JOINT USE - VERTICAL CLEARANCE AT POLE
47.	FO-VC2	JOINT USE - VERTICAL MIDSPAN CLEARANCES
48.	FO-GB	GROUNDING AND BONDING
49.	FO-RI	JOINT USE RISER INSTALLATION
50.	FO-CS	JOINT USE CLIMBING SPACE REQUIREMENTS
51.	APPENDIX A - COVER SHEET / TOC	
52.	RUS DRAWING #241	
53.	RUS DRAWING #214	
54.	RUS DRAWING #242	
55.	RUS DRAWING #203	
56.	RUS DRAWING #211	
57.	RUS DRAWING #PM12	
58.	RUS DRAWING #PM2A	
59.	SERVICE DROP STANDARDS COVER SHEET / TOC	
60.	FO-SVCOH	AERIAL SERVICE DROP INSTALLATION
61.	FO-SVCUG	UG SERVICE DROP INSTALLATION-EXISTING RESIDENCE/PREMISE
62.	FO-SVCUG2	UG SERVICE DROP INSTALLATION-NEW CONSTRUCTION
63.	FO-NID	NID INSTALLATION AND GROUNDING



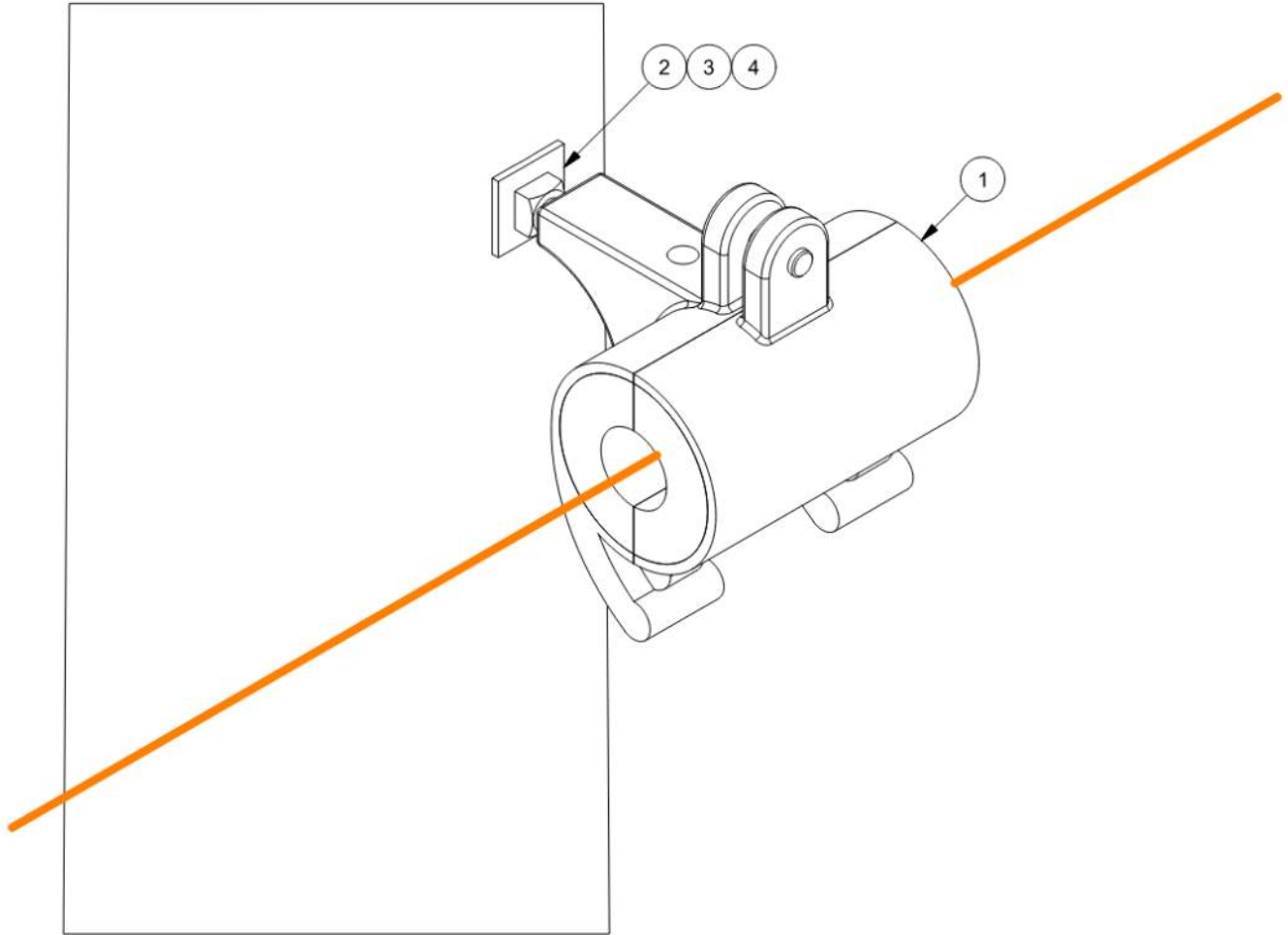
BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	1		SUPPORT UNIT(FOR ADSS FIBER DIA 0.526"–0.575")
2	1		BOLT, DOUBLE ARMING 5/8" x 16"
3	2		WASHER, SQUARE GALVANIZED, 2" x 2" x 3/16"
4	2		5/8" GALVANIZED NUT



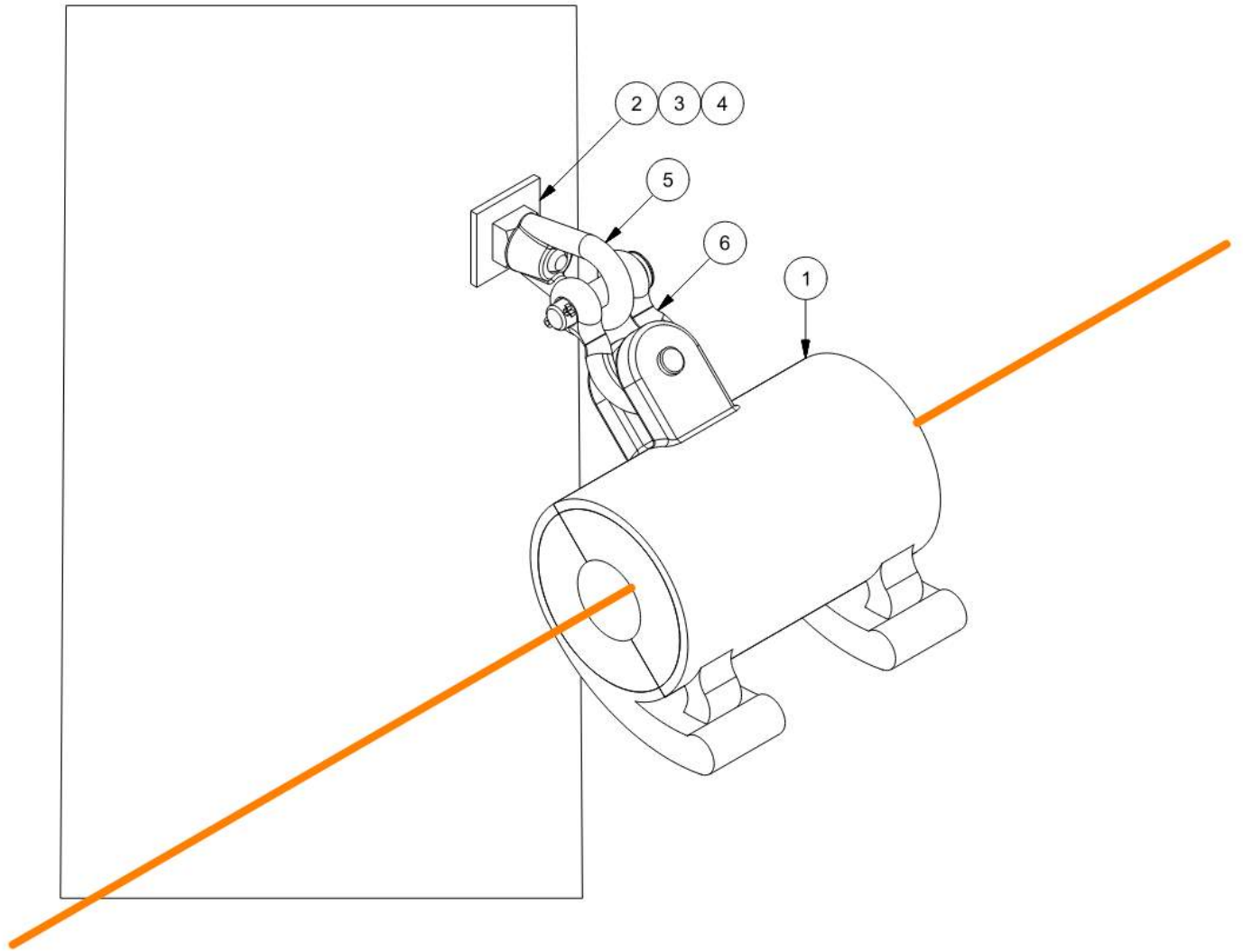
BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	1		FIBER DIELECTRIC SUPPORT 0.65
2	1		BOLT, DOUBLE ARMING 5/8" x 14"
3	2		WASHER, CURVED, 2 1/4" x 3/16" , 11/16" HOLE
4	2		5/8" GALVANIZED NUT



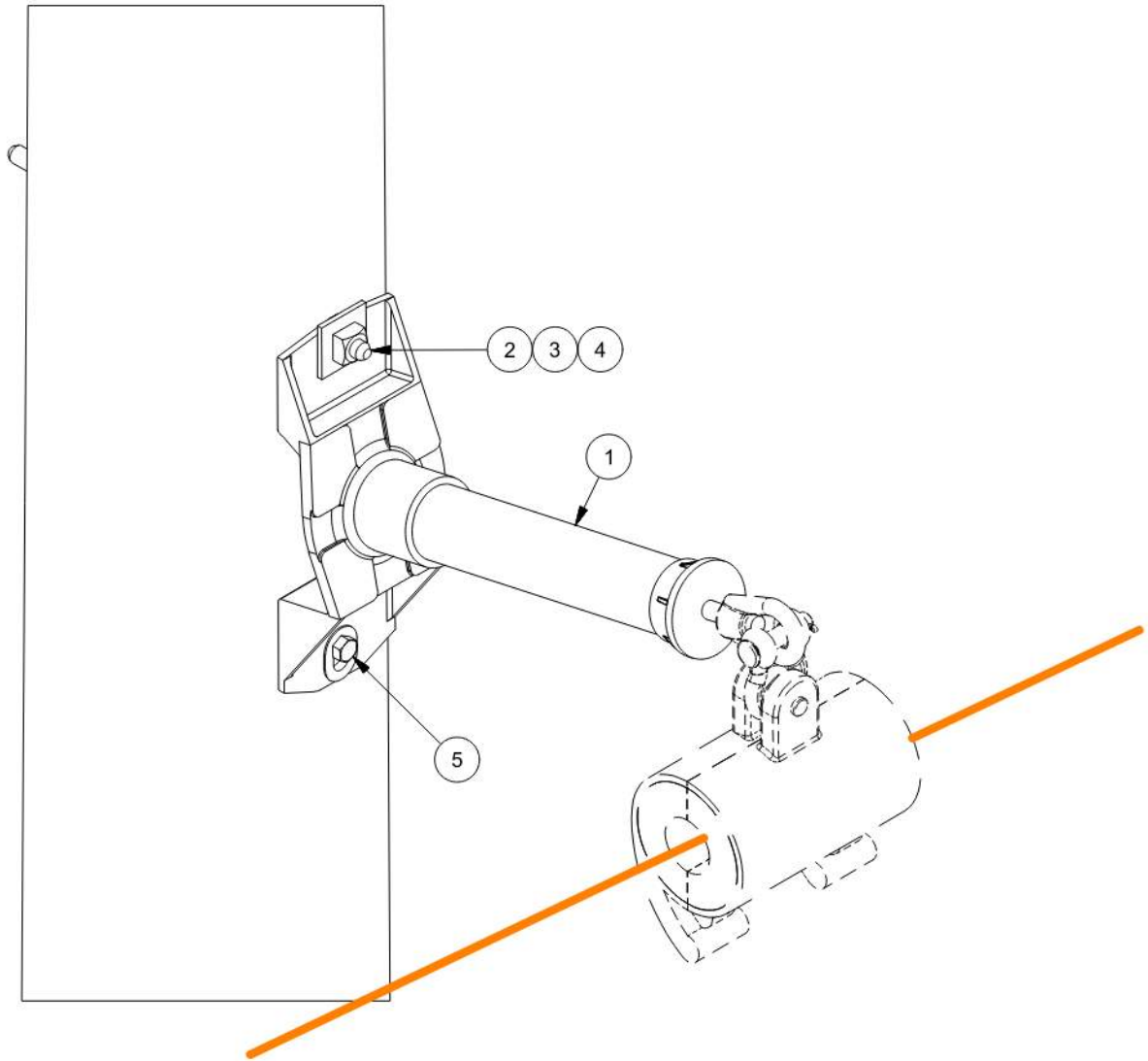
BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	1		SUPPORT MOUNTED-SUSPENSION UNIT WITH ARMOUR
2	1		BOLT, DOUBLE ARMING 5/8" x 16"
3	2		WASHER, SQUARE GALVANIZED, 2" x 2" x 3/16"
4	2		5/8" GALVANIZED NUT



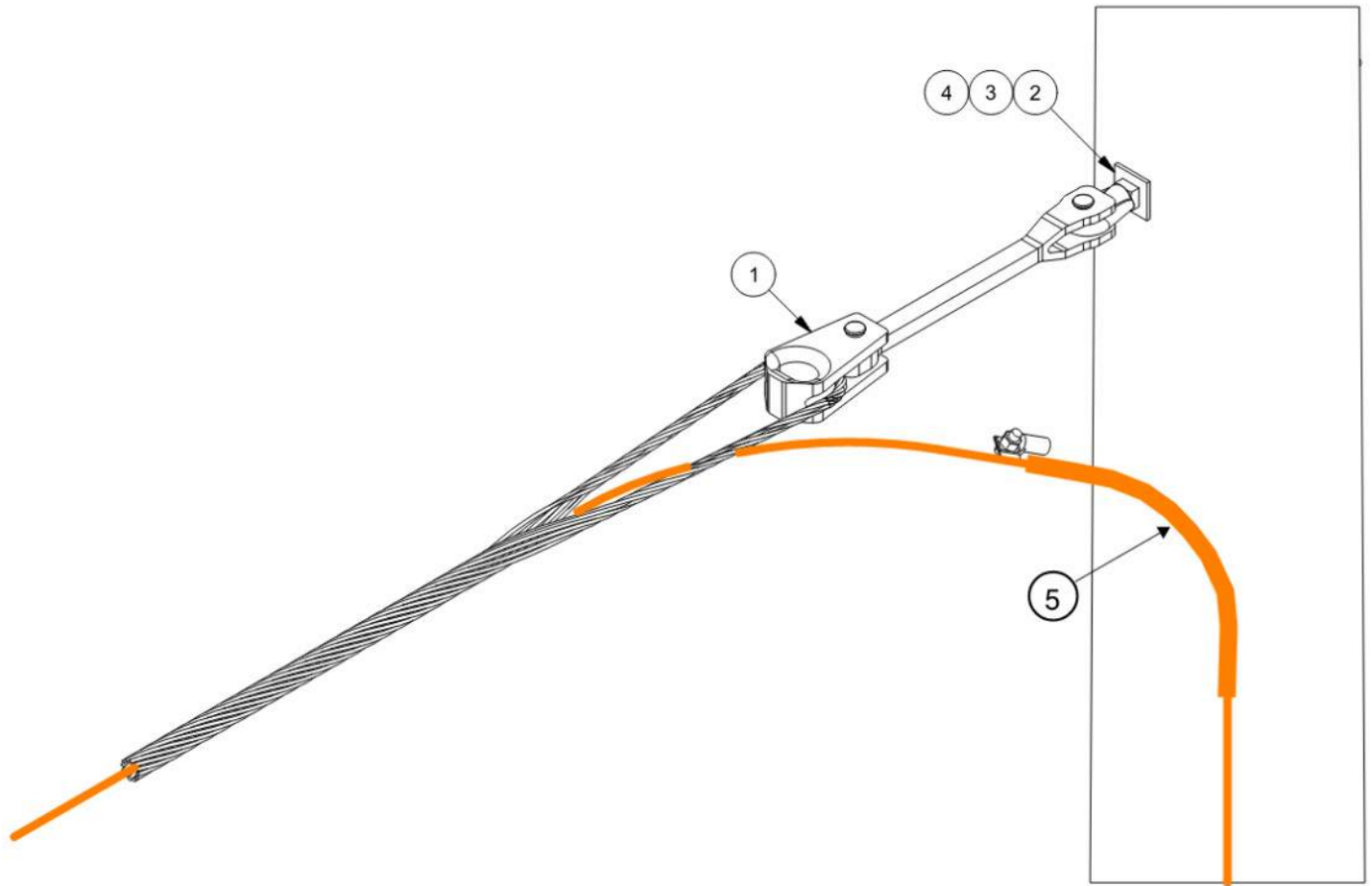
BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	1		FIBER ALUMINUM SUPPORT CLAMP
2	1		BOLT, DOUBLE ARMING 5/8" x 16"
3	2		WASHER, SQUARE GALVANIZED, 2" x 2" x 3/16"
4	2		5/8" GALVANIZED NUT
5	1		5/8" EYE NUT
6	1		1/2" ANCHOR SHACKLE
7			



BILL OF MATERIAL

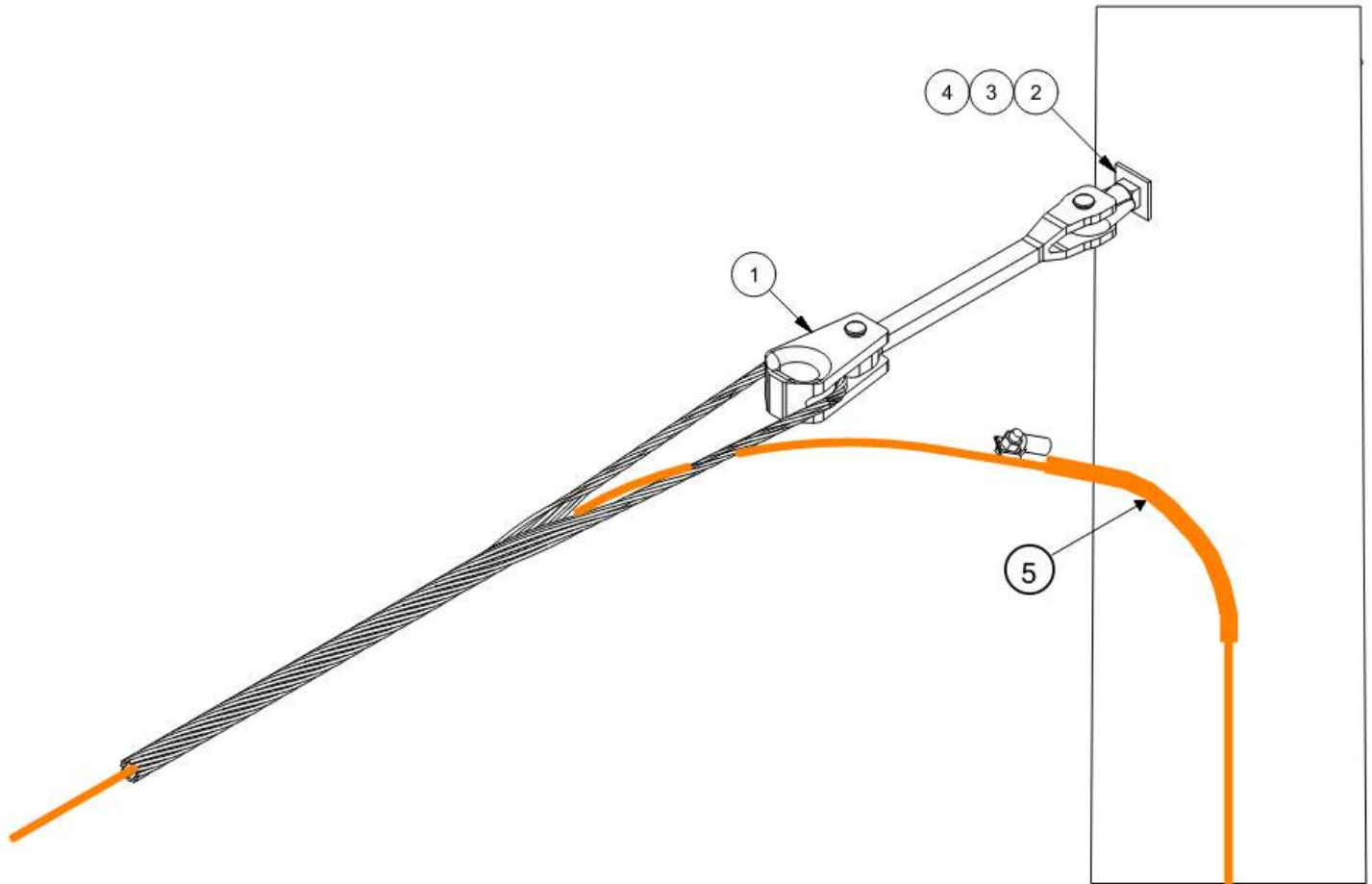
REF#	USE	PART#	DESCRIPTION
1	1		12" EXTENSION BRACKET
2	1		BOLT, DOUBLE ARMING 5/8" x 16"
3	2		WASHER, SQUARE GALVANIZED, 2" x 2" x 3/16"
4	2		5/8" GALVANIZED NUT



MAXIMUM INITIAL TENSION = 1000LBS

BILL OF MATERIAL

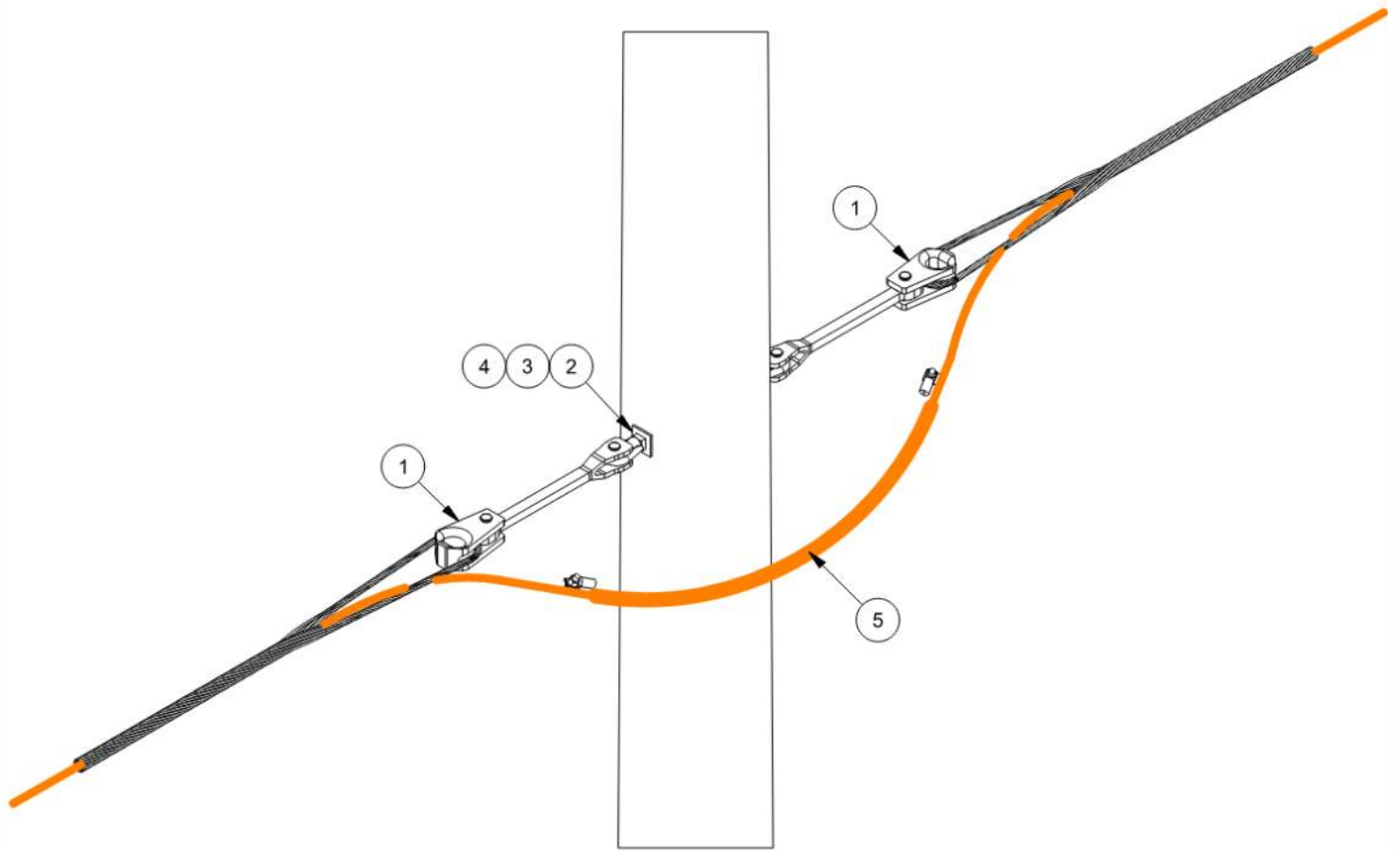
REF#	USE	PART#	DESCRIPTION
1	1		FORMED WIRE DE(FOR ADSS FIBER DIA 0.543--.577") WITH THIMBLE CLEVIS, 14" EXT LINK & 5/8" EYENUT
2	1		BOLT, DOUBLE ARMING 5/8" x 16"
3	2		WASHER, SQUARE GALVANIZED, 2" x 2" x 3/16"
4	2		5/8" GALVANIZED NUT
5	1		CABLE ABRAISION PROTECTOR
6	1		



MAXIMUM INITIAL TENSION = 2000LBS

BILL OF MATERIAL

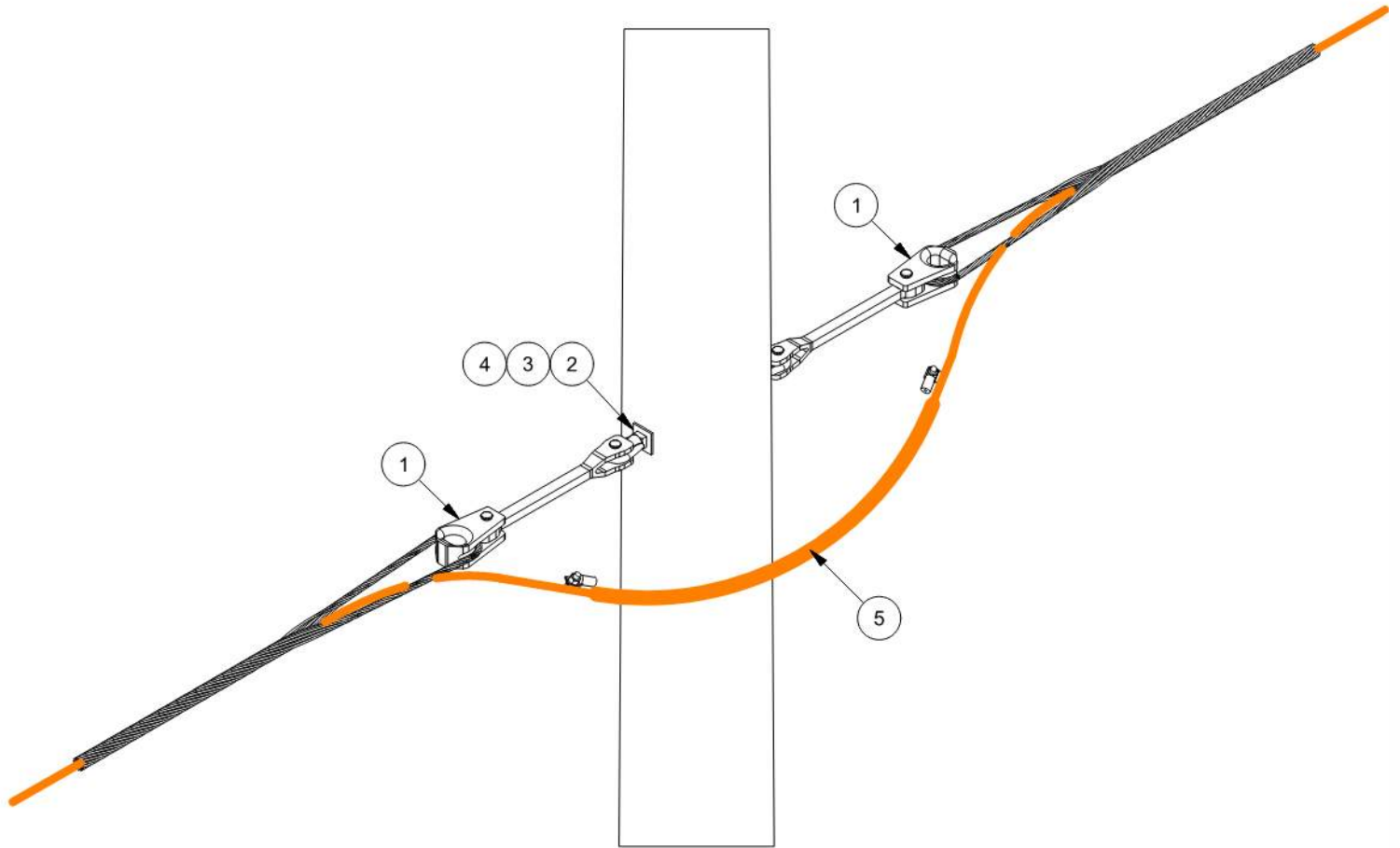
REF#	USE	PART#	DESCRIPTION
1	1		FORMED WIRE DE(FOR ADSS FIBER DIA 0.543--.577") WITH THIMBLE CLEVIS, 14" EXT LINK & 5/8" EYENUT
2	1		BOLT, DOUBLE ARMING 5/8" x 16"
3	2		WASHER, SQUARE GALVANIZED, 2" x 2" x 3/16"
4	2		5/8" GALVANIZED NUT
5	1		CABLE ABRAISON PROTECTOR
6	1		



MAXIMUM INITIAL TENSION = 1000LBS

BILL OF MATERIAL

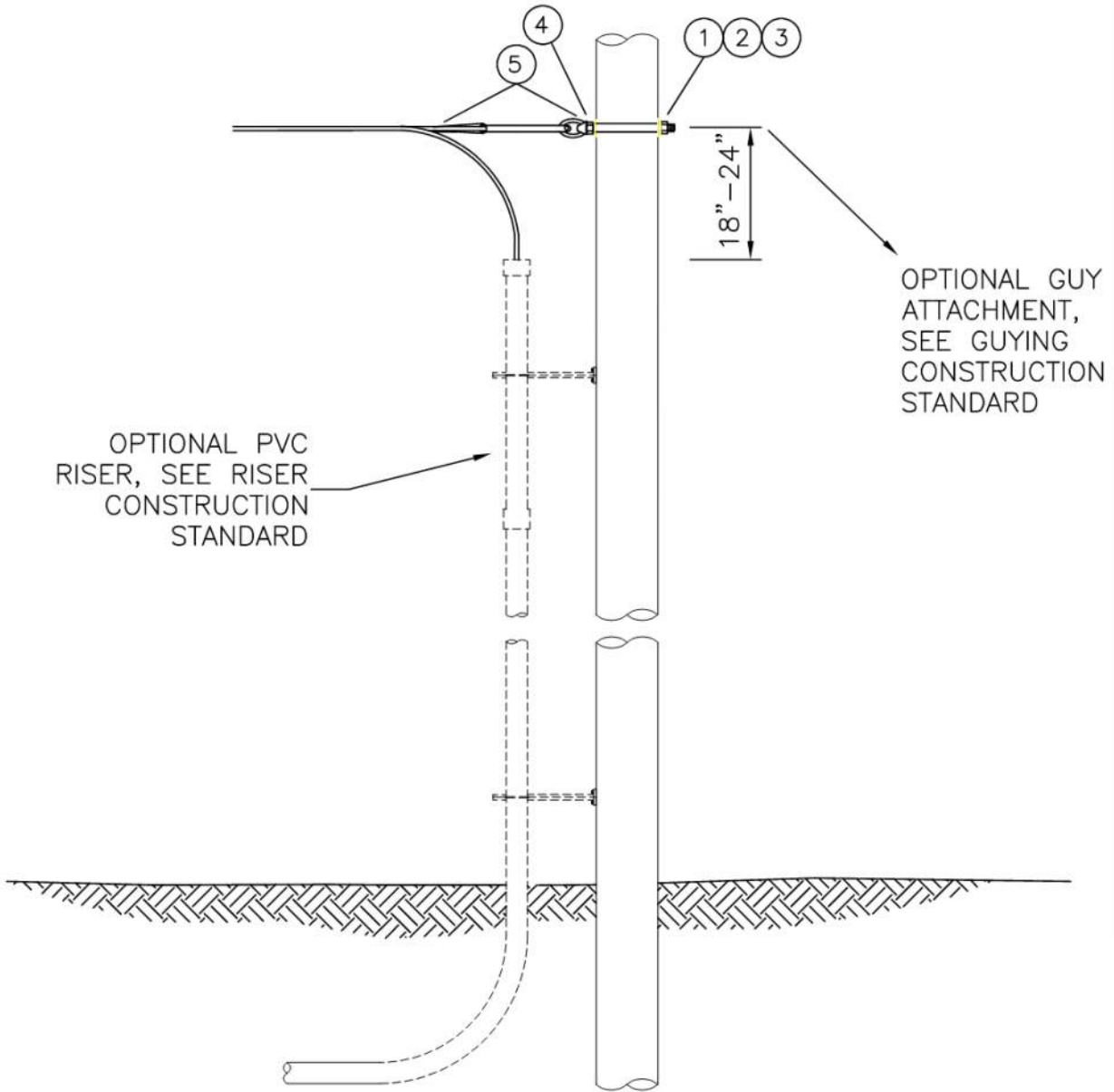
REF#	USE	PART#	DESCRIPTION
1	2		FORMED WIRE DE(FOR ADSS FIBER DIA 0.543--.577") WITH THIMBLE CLEVIS, 14" EXT LINK & 5/8" EYENUT
2	1		BOLT, DOUBLE ARMING 5/8" x 16"
3	2		WASHER, SQUARE GALVANIZED, 2" x 2" x 3/16"
4	2		5/8" GALVANIZED NUT
5	1		CABLE ABRASION PROTECTOR



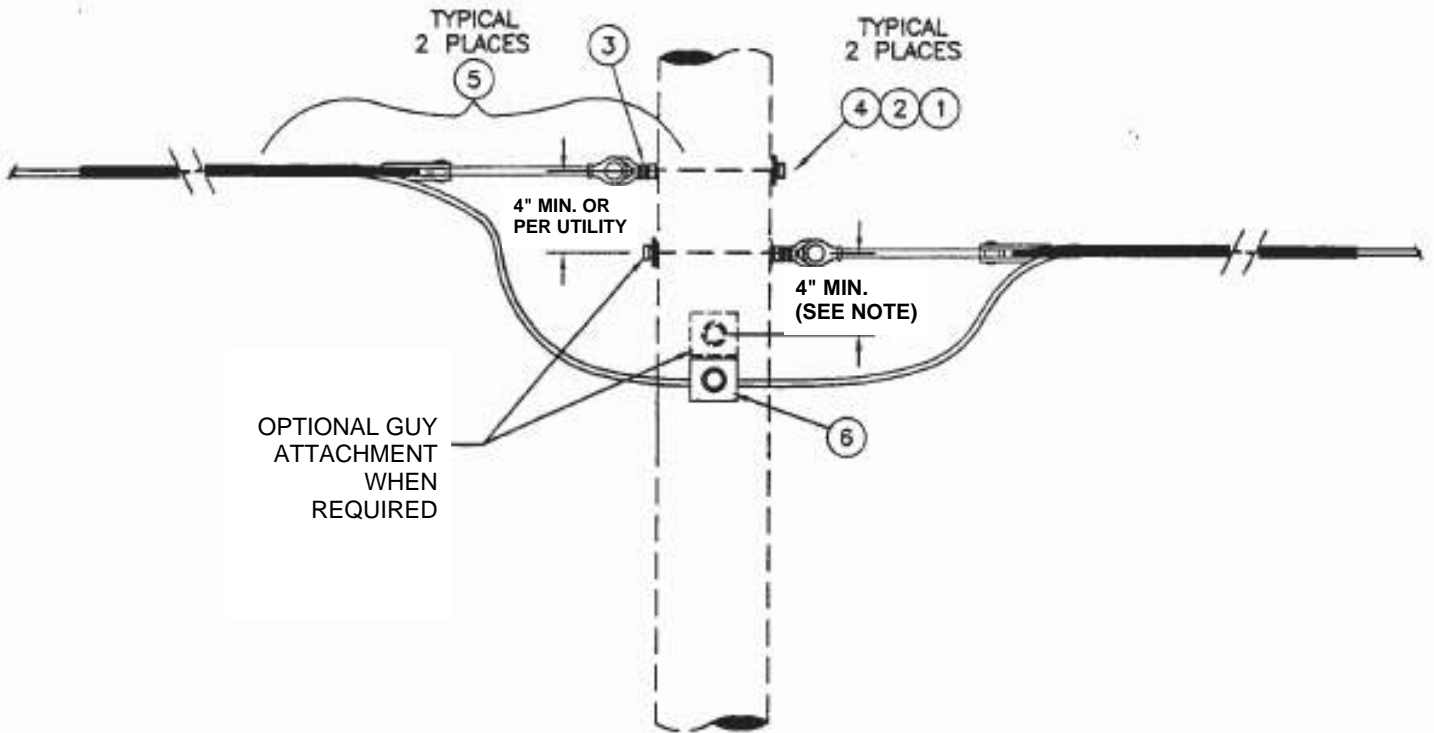
MAXIMUM INITIAL TENSION = 2000LBS

BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	2		FORMED WIRE DE(FOR ADSS FIBER DIA 0.543--.577") WITH THIMBLE CLEVIS, 14" EXT LINK & 5/8" EYENUT
2	1		BOLT, DOUBLE ARMING 5/8" x 16"
3	2		WASHER, SQUARE GALVANIZED, 2" x 2" x 3/16"
4	2		5/8" GALVANIZED NUT
5	1		CABLE ABRASION PROTECTOR
6	1		



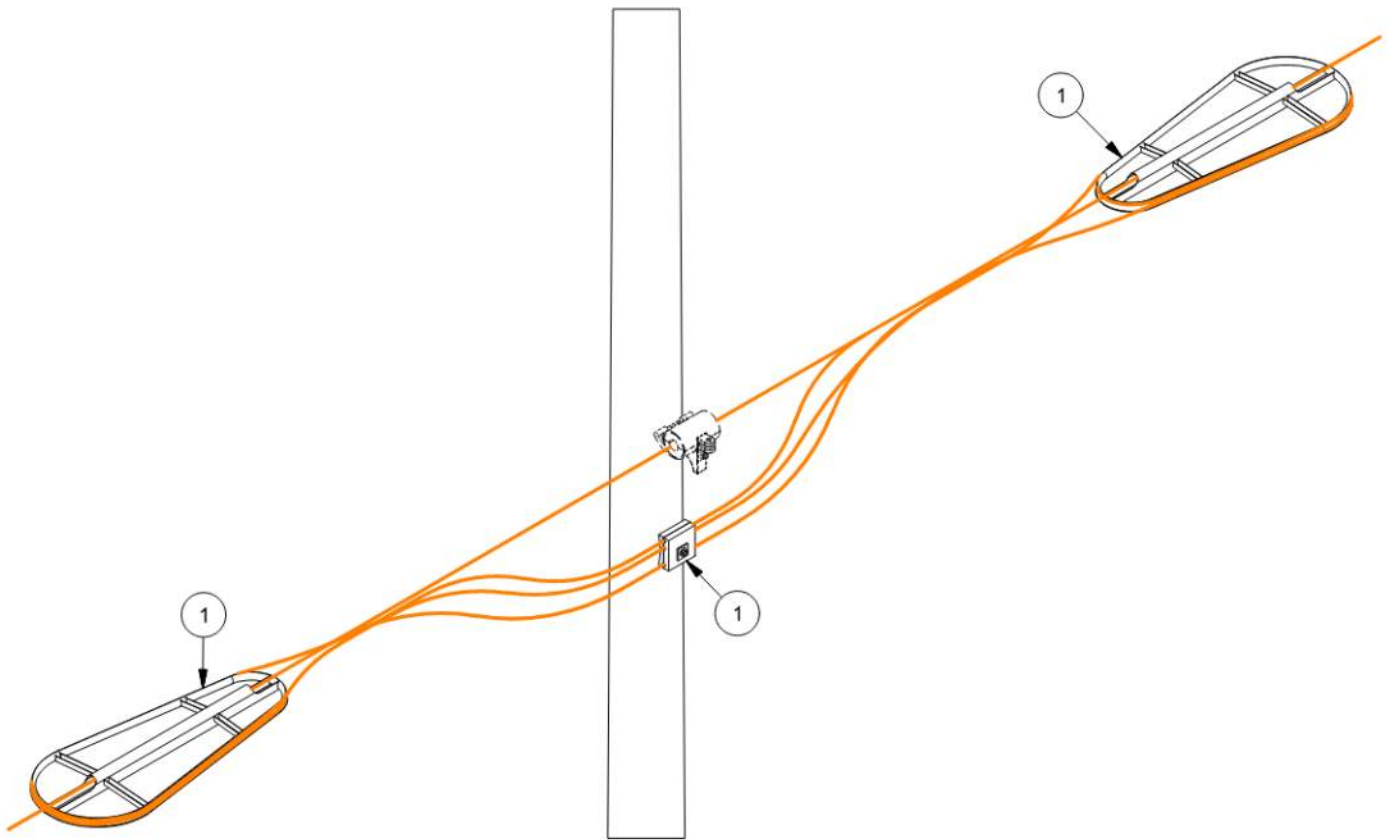
BILL OF MATERIAL			
REF#	USE	PART#	DESCRIPTION
1	1		Bolt, Mach, 5/8" x 12"
2	1		Washer SP Lock Galv 5/8"
3	2		Curved, 2-1/4" x 3/16", 11/16" Hole
4	1		Nuts TE 5/8"
5	1		Fiber Dead-end ADSS 0.6555 Dia.



1. CHECK UTILITY POLE OWNER REQUIREMENTS FOR MINIMUM SEPARATION BETWEEN DRILLED HOLES.

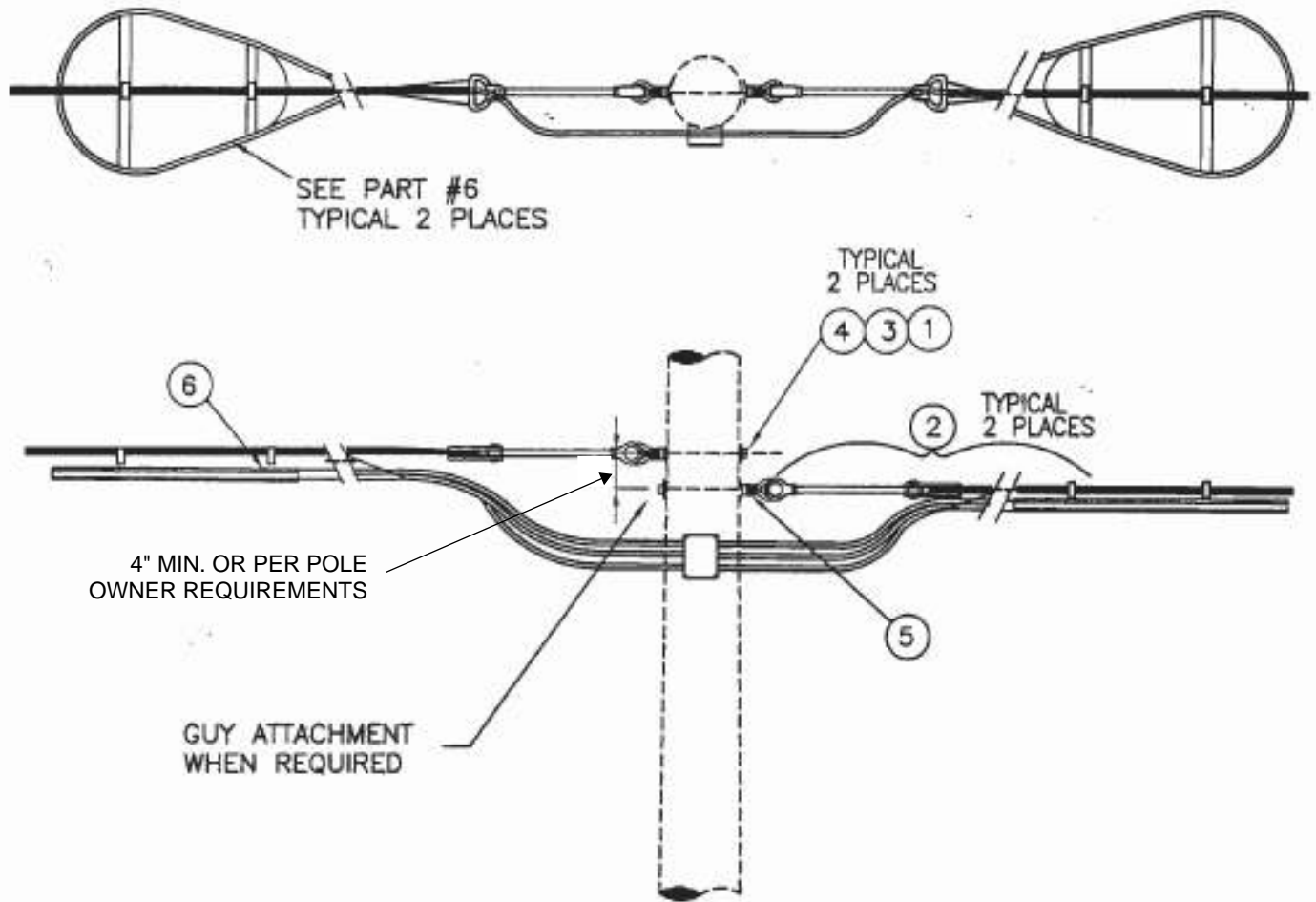
BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	2		Bolt Mach 5/8" x 12"
2	2		Washers, SP Lock, Galv 5/8"
3	2		Nuts Palnut Lock 5/8"
4	2		Curved, 2-1/4" x 3/16", 11/16" Hole
5	2		Fiber Dead-end ADSS 0.6555 DIA
6	1		Fiber, Down-lead Cushion, 0.535



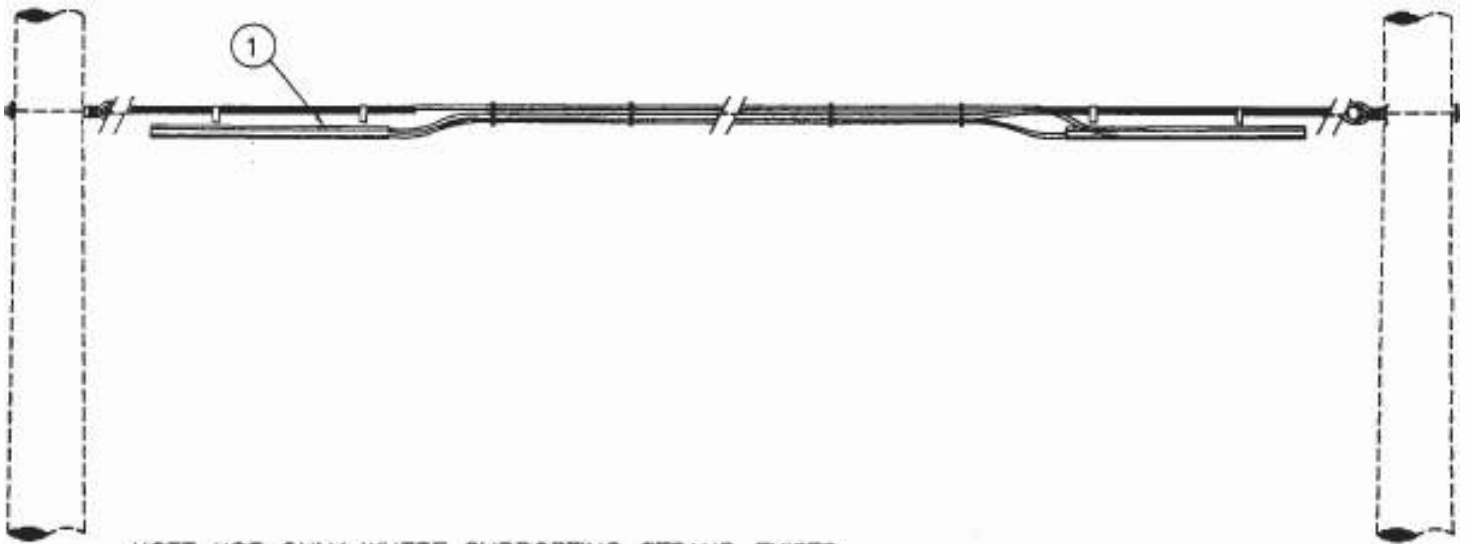
BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	1		IN-SPAN STORAGE SYSTEM FOR ADSS (CABLE SIZE .510"-.575") COMPLETE WITH 2 STORAGE RACKS (HORSE SHOES), ARMOR RODS, CABLE PROTECTION BRACKET, MISC HARDWARE
2	25		8" CABLE TIES
5			
6			



BILL OF MATERIAL

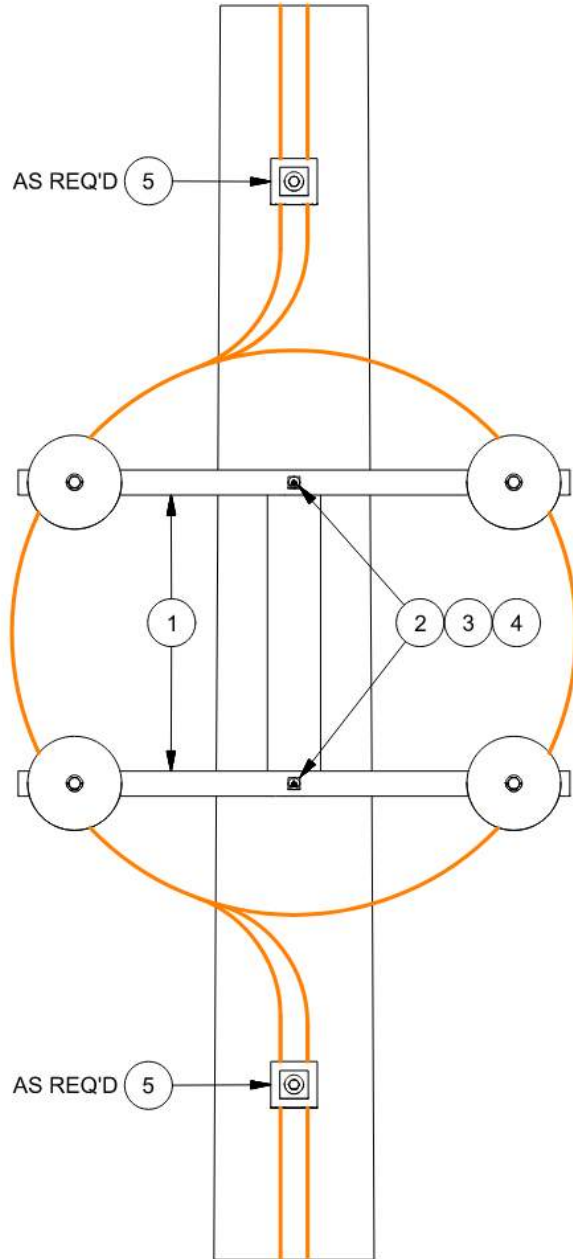
REF#	USE	PART#	DESCRIPTION
1	2		Bolt, Mach, 5/8" x 12"
2	2		Fiber Dead-end ADSS 0.6555 Dia.
3	2		Washers, SP Lock, Galv 5/8"
4	4		Curved, 3" x 3" x 1/4L x 11/16" Hole
5	2		Nuts Palnut Lock 5/8"
6	1		In-Span Storage System, 0.6555



NOTE USE ONLY WHERE SUPPORTING STRAND EXISTS

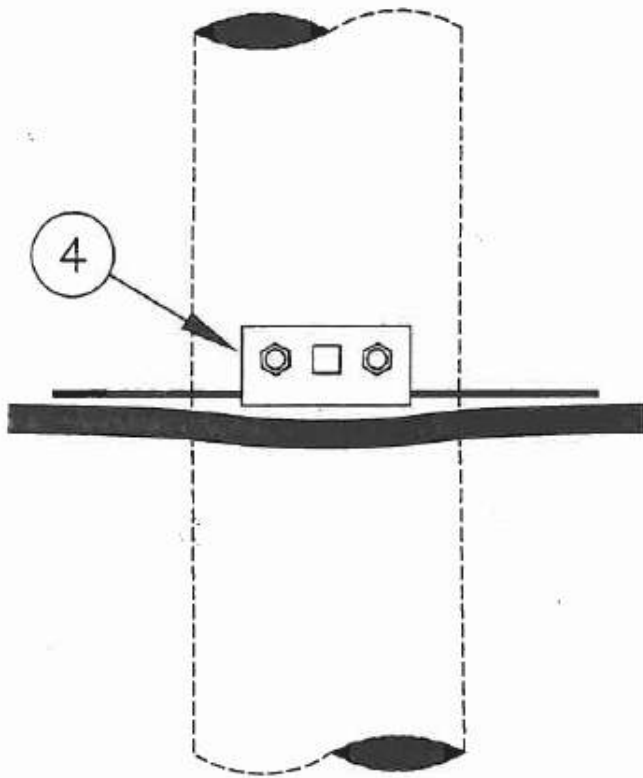
BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	1		In-Span Storage System .650-.730 DIA.
2	AS REQ'D		Cable Ties (Tie Wraps)
1	1		In-Span Storage System .510-.575 DIA.
2	AS REQ'D		Cable Ties (Tie Wraps)

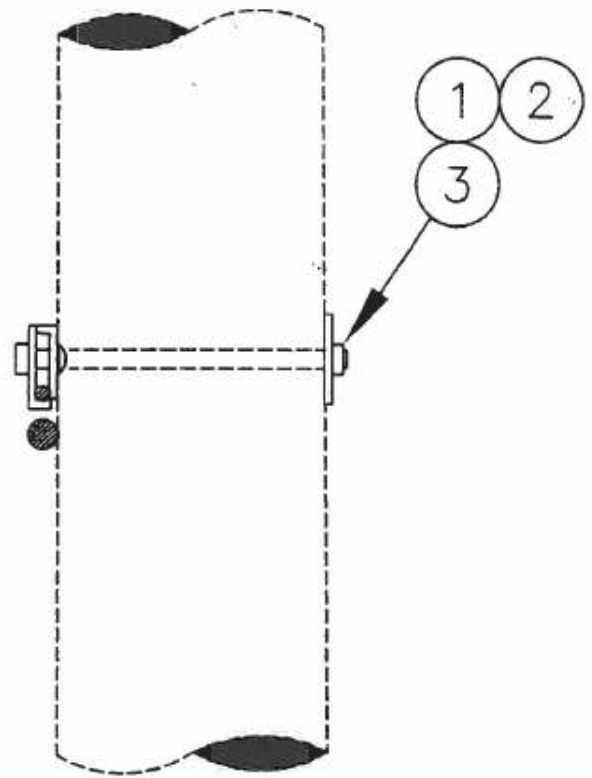


NOTE: TO BE USED ONLY WITH POLE OWNER PERMISSION

BILL OF MATERIAL			
REF#	USE	PART#	DESCRIPTION
1	1		VERTICAL CABLE STORAGE DOUBLE ARM COMPLETE WITH 2 STORAGE ARMS WITH 4 STORAGE SPOOLS CABLE PROTECTION BRACKET, MISC HARDWARE CABLE PROTECTION BRACKET, MISC HARDWARE
2	2		MACHINE BOLT, 5/8" x 14"
3	2		5/8" GALVANIZED NUT
4	4		WASHER, SQUARE GALVANIZED, 2" x 2" x 3/16"
5	3		DOWNLEAD CUSHION WITH HARDWARE



FRONT ELEVATION

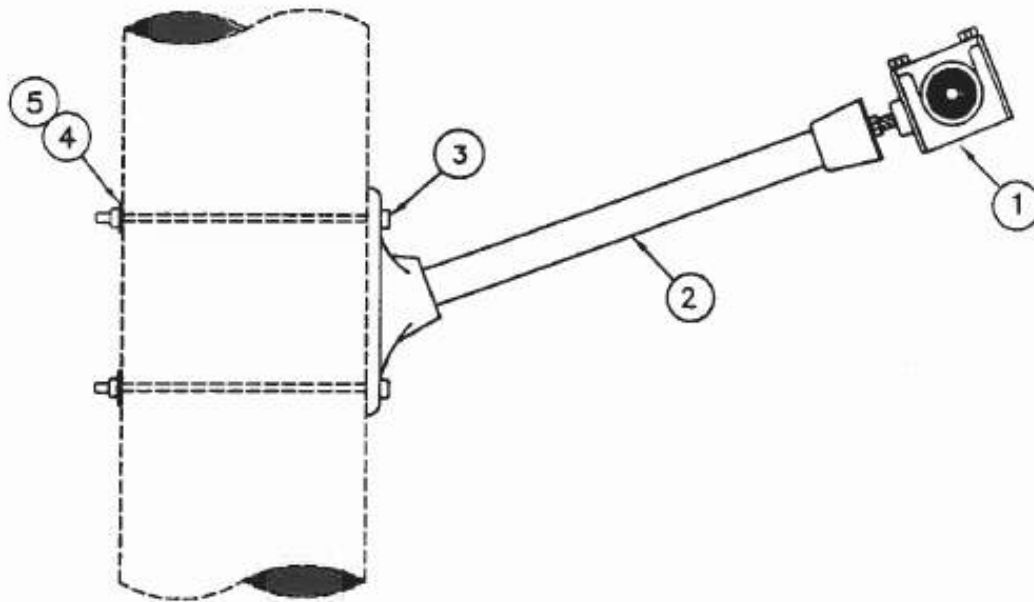


SIDE ELEVATION

***SEE RUS DRAWING NUMBERS
241 & 214 (APPENDIX A, SHEETS
1&2) FOR ADDITIONAL
CONSTRUCTION DETAILS AND
MATERIAL REQUIREMENTS**

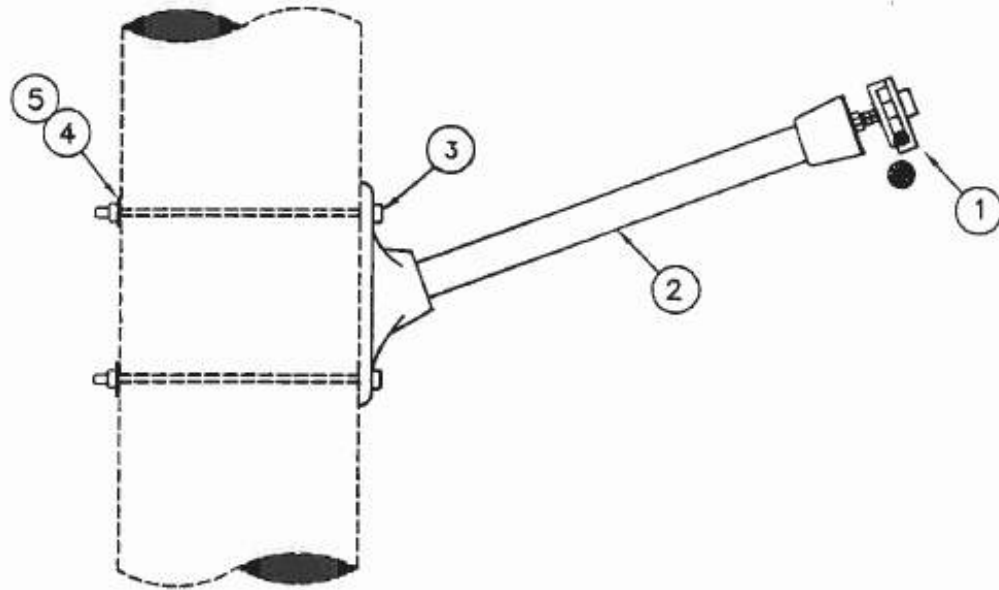
BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	1		Bolt, Mach, 5/8" x 12"
2	1		Washer SP Lock Galv 5/8"
3	1		Curved, 2-1/4" x 3/16", 11/16" Hole
4	1		Clamp, Messenger, Tangent Bolt, Fiber



	Aluma-Form Part #
12"	F1CA-MV-A12-F2
18"	F1CA-MV-A18-F3
24"	F1CA-MV-A24-BF2
30"	F1CA-MV-A30-BF2

BILL OF MATERIAL			
REF#	USE	PART#	DESCRIPTION
1	1		Fiber Dielectric Support 0.65
2	1		Fiber Fiberglass Bracket (specify length per chart)
3	2		Bolt Mach 5/8" x 12"
4	2		Curved, 2-1/4" x 2-1/4" x 3/16" x 11/16" Hole
5	2		Washer SP Lock Galv 5/8"



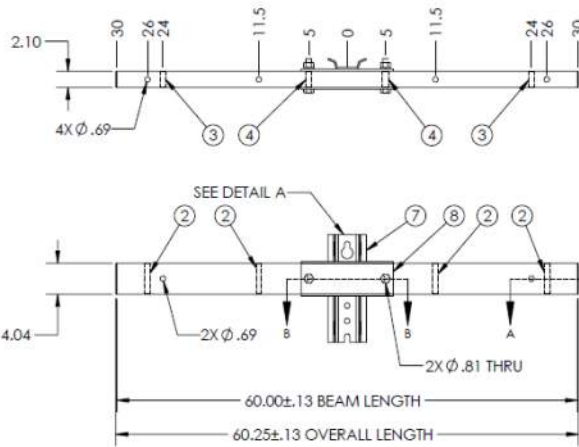
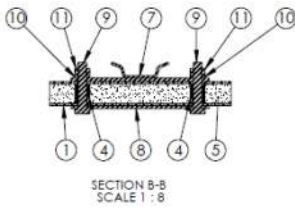
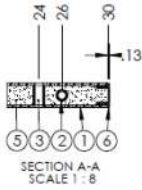
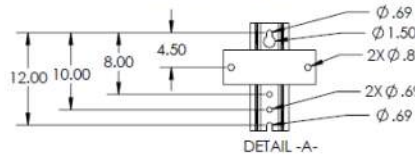
	Aluma-Form Part #
12"	F1CA-MV-A12-F2
18"	F1CA-MV-A18-F3
24"	F1CA-MV-A24-BF2
30"	F1CA-MV-A30-BF2

BILL OF MATERIAL			
REF#	USE	PART#	DESCRIPTION
1	1	390023	Clamp, Messenger, Tangent, Three Bolt, Fiber
2	1	3500	Fiber Fiberglass Bracket
3	2	320260	Bolt Mach 5/8" x 12"
4	2	344116	Curved, 2 1/4" x 2 1/4" x 3/16", 11/16" Hole
5	2	344215	Washer SP Lock Galv 5/8"

ITEM NO.	PART NUMBER	DESCRIPTION	DESCRIPTION 2	QTY
1	FB-060-1000-2	BEAM, PULTRUDED STOCK	SERIES 1000 x 60 in. GRAY	1
2	TG0688-0018	BUSHING	11/16 in x 3-11/16 in	4
3	TG0688-0018	BUSHING	11/16 in x 1-11/16 in	2
4	TG0813-0018	BUSHING	13/16 in x 1-11/16 in	2
5	FOAM	-	-	1
6	EC10-0007-2	END CAP	SERIES 1000, GRAY	2
7	TM-0044	MOUNT ASSEMBLY, TANGENT	SD	1
8	PL-0003	PLATE, FRONT		1
9	HB0750-0005	HEX BOLT	3/4 in - 10 x 4 in	2
10	LW0750-0001	LOCK WASHER	3/4 in	2
11	HN0750-0001	HEX NUT	3/4 in - 10	2

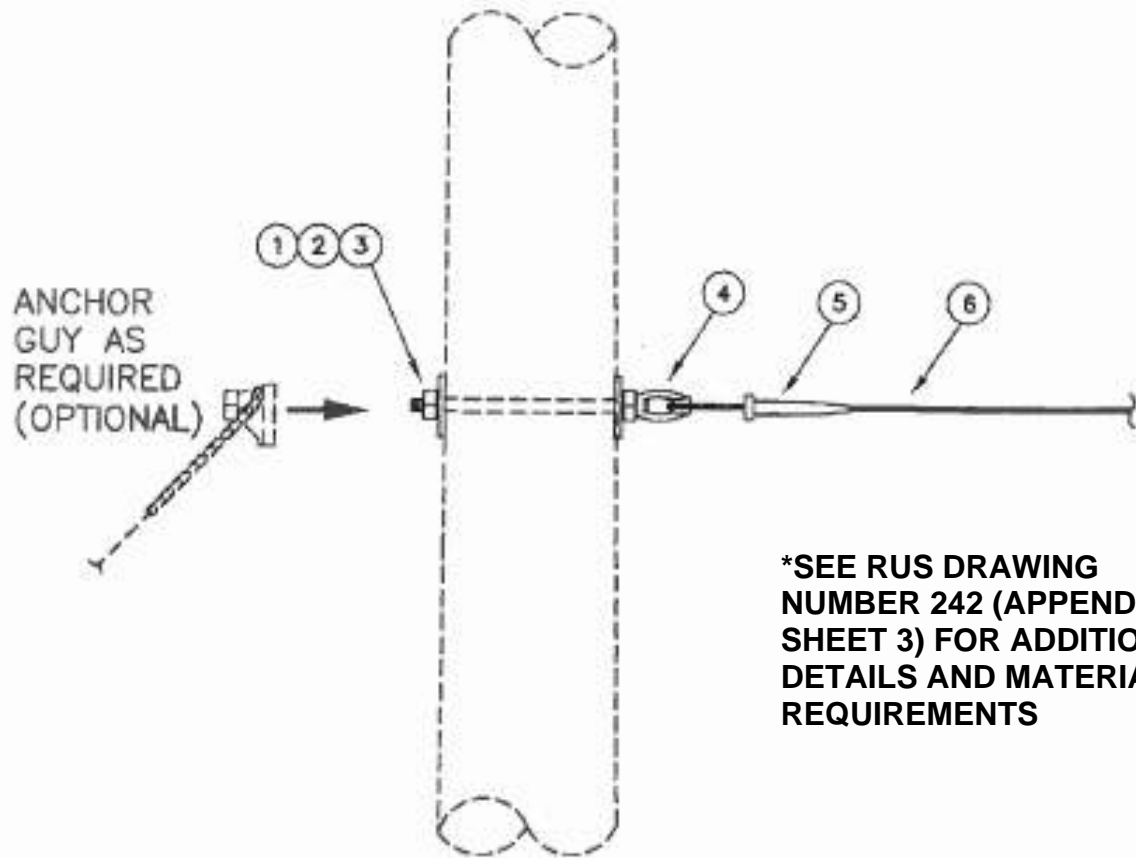
PUPI
www.pupicrossarms.com

REV.	DESCRIPTION	DATE	INITIALS
1.0	ADDED REPLACE PREVIOUS ITEM NOTE III TITLE BLOCK	2011-11-29	EPH
1.1	REDRAWN III SOLIDWORKS	2013-02-04	BAF



BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	1		PUPI Fiberglass Arm, 60"
2	2		Bolt, Mach Sq Head Galv 3/4" x 14" w/ Sq Nut,
3	2		Washer Sq Curved, 3/4" HD Galv 3" x 3" x 1/4
4	2		Washer double coil , 3/4" HD Galv Spring Lock HD Galv



***SEE RUS DRAWING
NUMBER 242 (APPENDIX A,
SHEET 3) FOR ADDITIONAL
DETAILS AND MATERIAL
REQUIREMENTS**

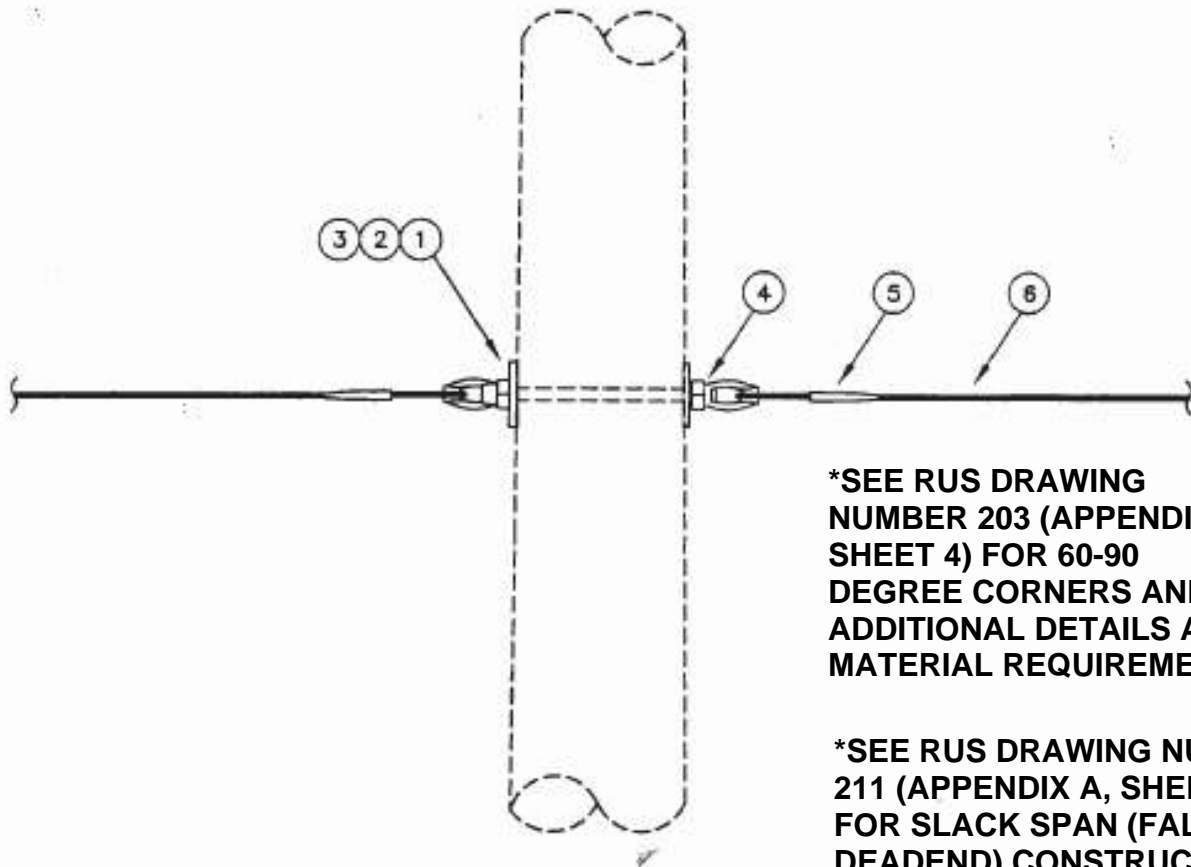
BILL OF MATERIAL			
REF#	USE	PART#	DESCRIPTION

**6,000# Messenger
Single Dead-End**

DATE: 12/2022

FO-ME1

PG 23



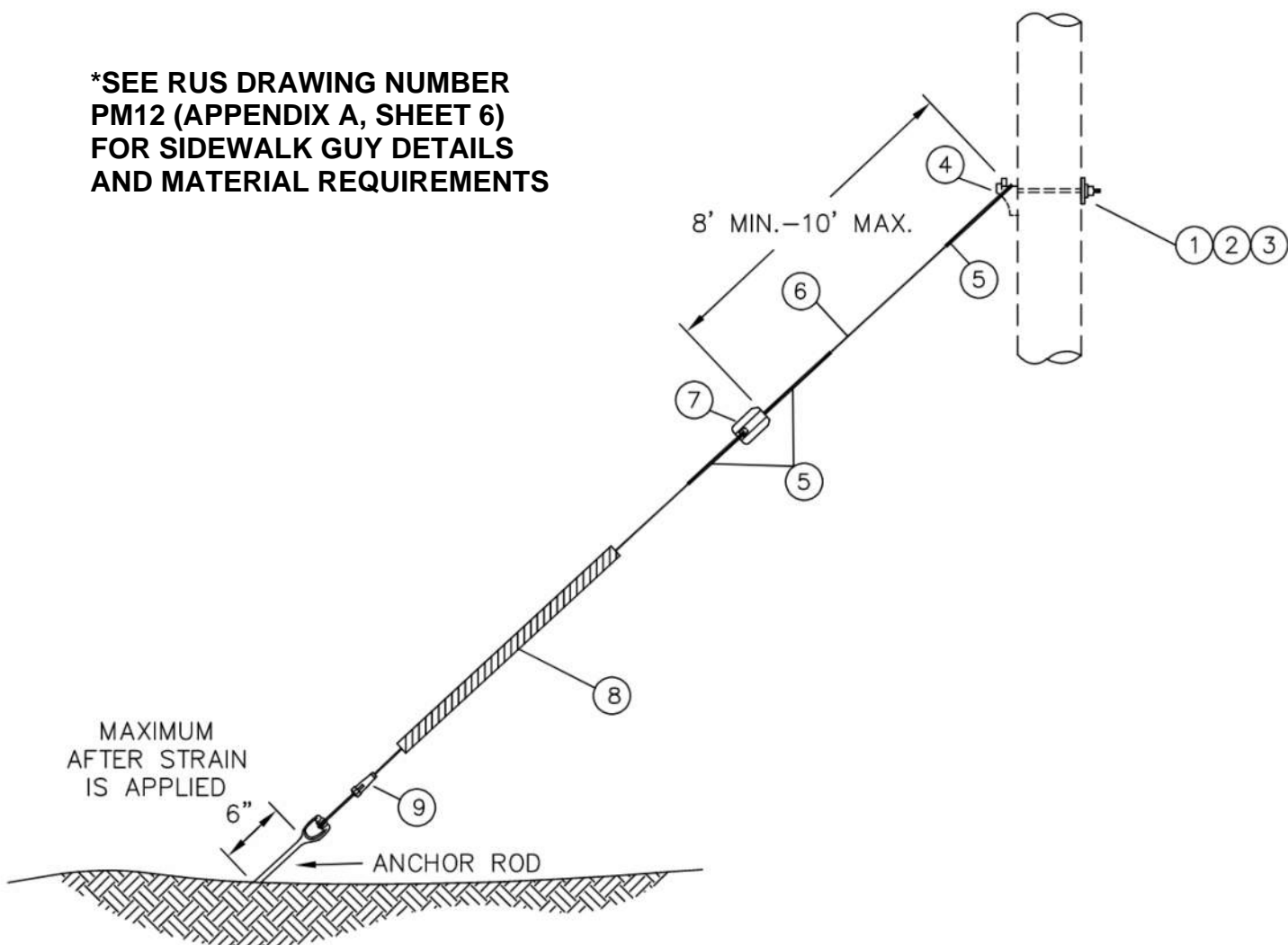
***SEE RUS DRAWING NUMBER 203 (APPENDIX A, SHEET 4) FOR 60-90 DEGREE CORNERS AND ADDITIONAL DETAILS AND MATERIAL REQUIREMENTS**

***SEE RUS DRAWING NUMBER 211 (APPENDIX A, SHEET 5) FOR SLACK SPAN (FALSE DEADEND) CONSTRUCTION DETAILS AND MATERIAL REQUIREMENTS**

BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	1	320075	Bolt DA 5/8" x 14"
2	1	344215	Washers, SP Lock, Galv 5/8"
3	2	344120	Curved, 3" x 3" x 1/4L x 11/16" Hole
4	2	336620	Nuts TE 5/8"
5	1	335360	DE Auto 6m Short Bail
6	A/R	130160	Alumoweld 6m 7 Str

***SEE RUS DRAWING NUMBER PM12 (APPENDIX A, SHEET 6) FOR SIDEWALK GUY DETAILS AND MATERIAL REQUIREMENTS**



1. ONLY ATTACH TO EXISTING ANCHORS WHEN ANCHOR OWNER PERMISSION HAS BEEN GRANTED.
2. INSTALLATION OF NEW ANCHOR LOCATIONS SHALL BE SPECIFIED ON CONSTRUCTION PRINTS OR APPROVED BY NOANET
3. DO NOT ATTACH GUYING TO EXISTING COMMUNICATION ANCHORS.
4. DO NOT ADD AUXILIARY EYE ATTACHMENTS TO EXISTING ANCHORS.

BILL OF MATERIAL

REF #	USE	PART #	DESCRIPTION
1	1		Bolts, Mach, 5/8" x 12"
2	1		Curved, 2-1/4" x 3/16", 11/16" Hole
3	1		Washers, SP Lock, Galv 5/8"
4	1		Guy Hook
5	3		DE Guy Preform 6m
6	A/R		Alumoweld, 6m, 7 Str
7	1		Guy Strain Insulator, 3/8" hole, 4 1/4" length and 2 7/8" dia
8	1		
9	1	DE Auto 6M Short Bail	



Fiber Optic Cable 6,000 # Guy

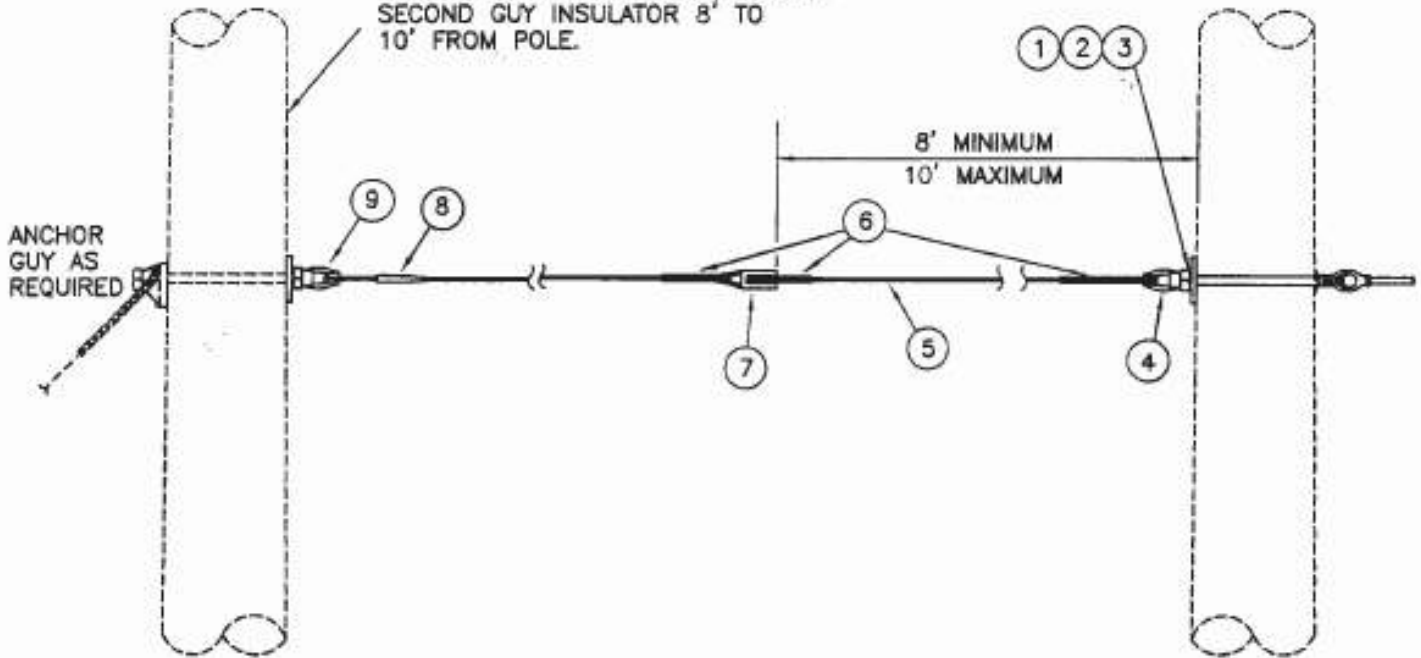
DATE: 06/2023

FO-G6

PG 25

NOTE:

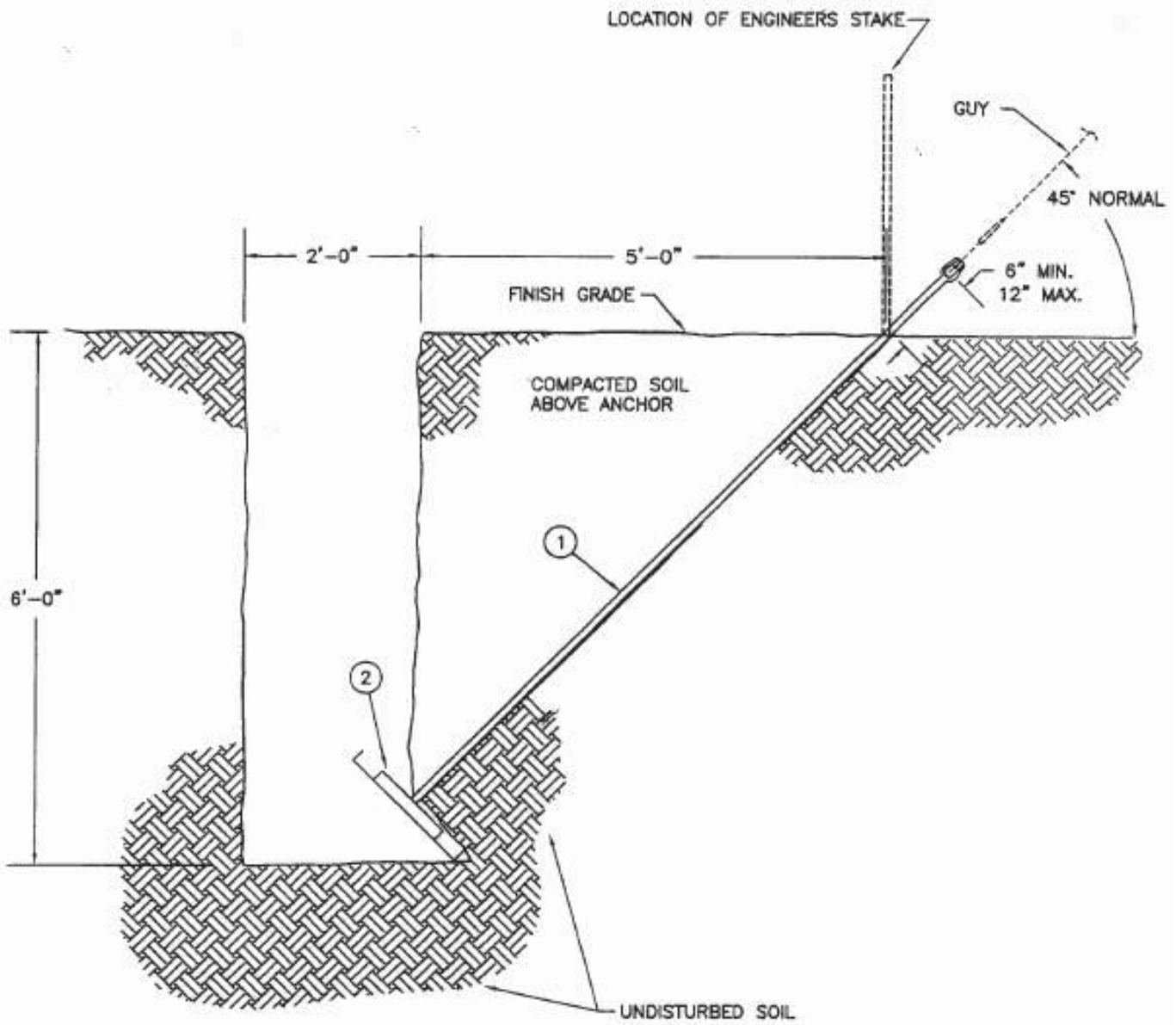
-IF THIS POLE IS A LINE POLE RATHER THAN A GUY STUB, INSTALL SECOND GUY INSULATOR 8' TO 10' FROM POLE.



1. STRAND ATTACHMENT HEIGHT ON UTILITY POLES WILL BE PER CONSTRUCTION DRAWINGS.
2. MINIMUM OF 18' CLEARANCE TO GROUND IS REQUIRED ABOVE ANY TRAVELED ROAD ROAD SURFACE.
3. 40" MINIMUM CLEARANCE TO ANY ENERGIZED CONDUCTOR, NEUTRAL OR AS UTILITY POLE POWER REQUIRES ON CONSTRUCTION DRAWINGS.
4. BOND ALL STRAND TO MULTI GROUND NEUTRAL PROVIDED BY UTILITY POLE OWNER. MAKE STRAND CONTINUOUS BETWEEN OVERHEAD GUY AND DOWN GUY WHENEVER POSSIBLE.
5. TENSION STRAND PER DESIGN REQUIREMENTS SO AS TO NOT OVERBURDEN EXISTING UTILITY COMPANY GUYING.

BILL OF MATERIAL

REF #	USE	PART #	DESCRIPTION
1	1		Bolts, Mach, 5/8" x 12"
2	1		Curved, 2-1/4" x 3/16", 11/16" Hole
3	2		Washers, SP Lock, Galv 5/8"
4	1		Nuts TE 5/8"
5	A/R		Alumoweld, 6m, 7 Str
8	1		DE Auto 6M Short Bail
6	4		DE Guy Preform 6m
7	4		Insul Strain, 504, 6m



BILL OF MATERIAL

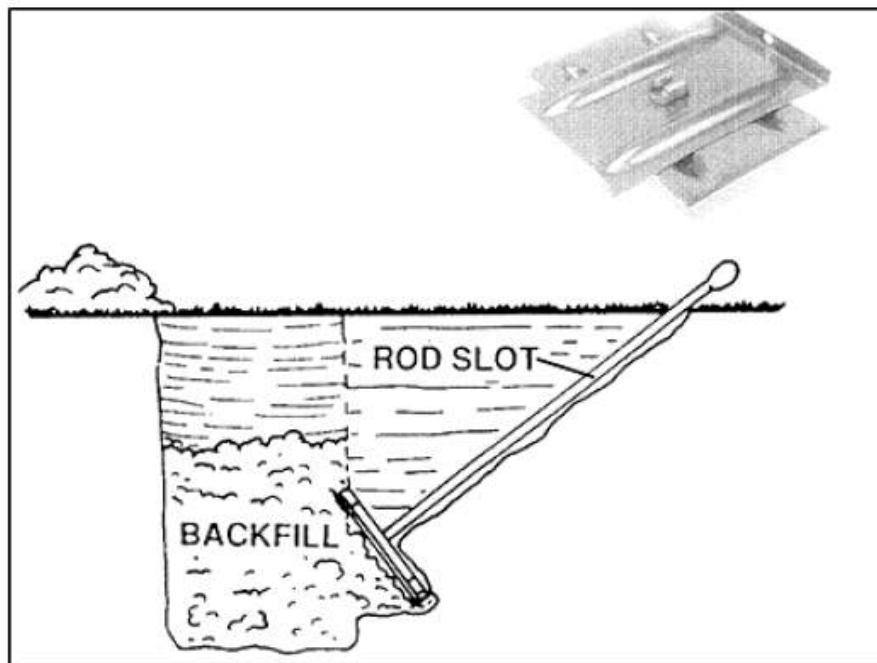
REF#	USE	PART#	DESCRIPTION
1	1		Anchor Rod Twin Eye 3/4" x 8'
2	1		Anchor Cross Plate Type, 16"(includes Nut Retainer)

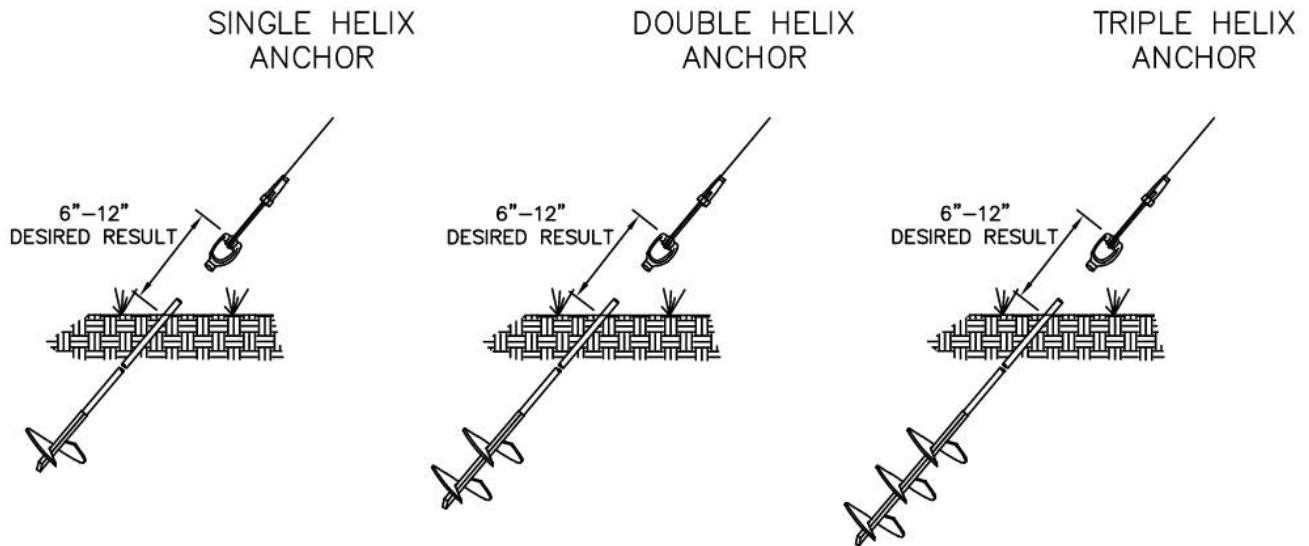
Common Types of Anchors and Installation

Plate Anchor

The Cross-Plate anchor is made for installation in holes drilled by power diggers. Because the size of the hole does not affect holding capacity, the same auger that is used to dig the pole holes on transmission projects can dig the hole. Cross-Plate anchors are installed in a diagonal bored hole, which is undercut so the anchor is at right angles to the guy. A rod trench is either cut with a trenching tool or drilled with a small power auger. Both anchor and rod trench should be refilled and tamped.

Figure 3 - Cross-Plate Anchor





HELIX/SCREW-IN ANCHOR

SCREW-IN ANCHORS ARE RECOMMENDED FOR SOFTER SOIL TYPES, INCLUDING CLASSES 5-7 IN THE SOIL CLASSIFICATION DATA CHART. THEY DO NOT WORK WELL IN ROCKY SOILS. SCREW-IN ANCHORS ARE USUALLY INSTALLED BY A POWER DRIVE MACHINE. SCREW-IN ANCHORS CAN ALSO BE USED IN APPLICATIONS WHERE AN ANCHOR WILL BE EMBEDDED IN CONCRETE.

SOIL CLASSIFICATION DATA

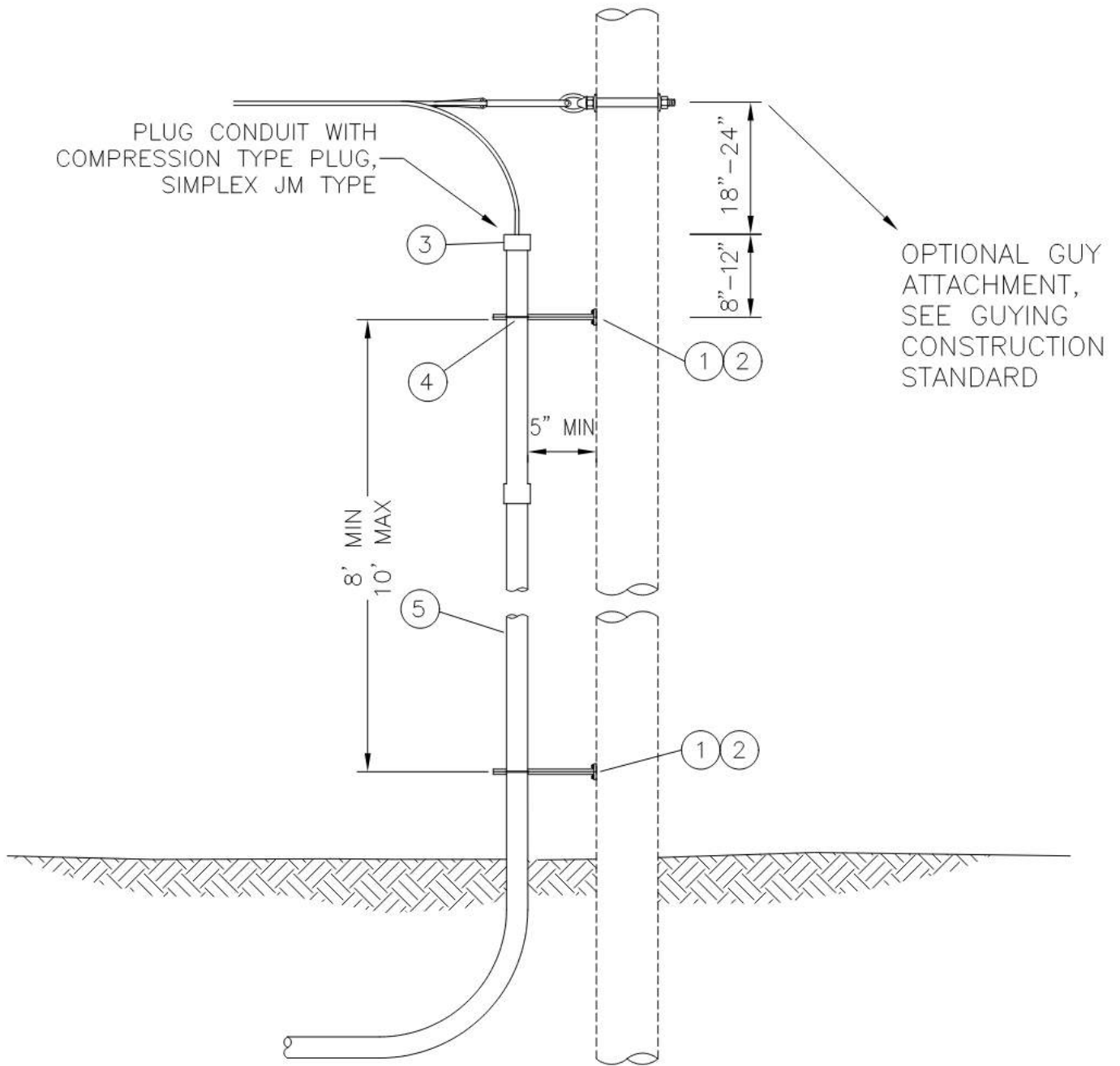
Class	Common Soil-Type Description	Geological Soil Classification	Probe Values in.-lb. (NM)	Typical Blow Count "N" per ASTM-D1586
0	Sound hard rock, unweathered	Granite, Basalt, Massive Limestone	N.A.	N.A.
1	Very dense and/or cemented sands; coarse gravel and cobbles	Caliche, (Nitrate-bearing gravel/rock),	750 - 1600 (85 - 181)	60-100+
2	Dense fine sands; very hard silts and clays (may be preloaded)	Basal till; boulder clay; caliche; weathered laminated rock	600-750 (68 - 85)	45-60
3	Dense sands and gravel; hard silts and clays	Glacial till; weathered shales, schist, gneiss and siltstone	500 - 600 (56 - 68)	35-50
4	Medium dense sand and gravel; very stiff to hard silts and clays	Glacial till; hardpan; marls	400 - 500 (45 - 56)	24-40
5	Medium dense coarse sands and sandy gravels; stiff to very stiff silts and clays	Saprolites, residual soils	300 - 400 (34 - 45)	14-25
6	Loose to medium dense fine to coarse sands to stiff clays and silts	Dense hydraulic fill; compacted fill; residual soils	200 - 300 (23 - 34)	7-14
**7	Loose fine sands; Alluvium; loess; medium - stiff and varied clays; fill	Flood plain soils; lake clays; adobe; gumbo, fill	100 - 200 (11 - 23)	4-8
**8	Peat, organic silts; inundated silts, fly ash very loose sands, very soft to soft clays	Miscellaneous fill, swamp marsh	less than 100 (0 - 11)	0-5

Class 1 soils are difficult to probe consistently and the ASTM blow count may be of questionable value.

**It is advisable to install anchors deep enough, by the use of extensions, to penetrate a Class 5 or 6, underlying the Class 7 or 8 Soils.

BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
	1		Screw Anchor, 16,000lb



BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	2		Screws,Lag, 1/2" x 4"
2	1		Bracket, Conduit Standoff, 8 1/2"
3	1		PVC Bell End, Size per Conduit
4	1		Conduit Clamp, Standoff Bracket, Size per Conduit
5	AS REQD		PVC Conduit - Size per construction print

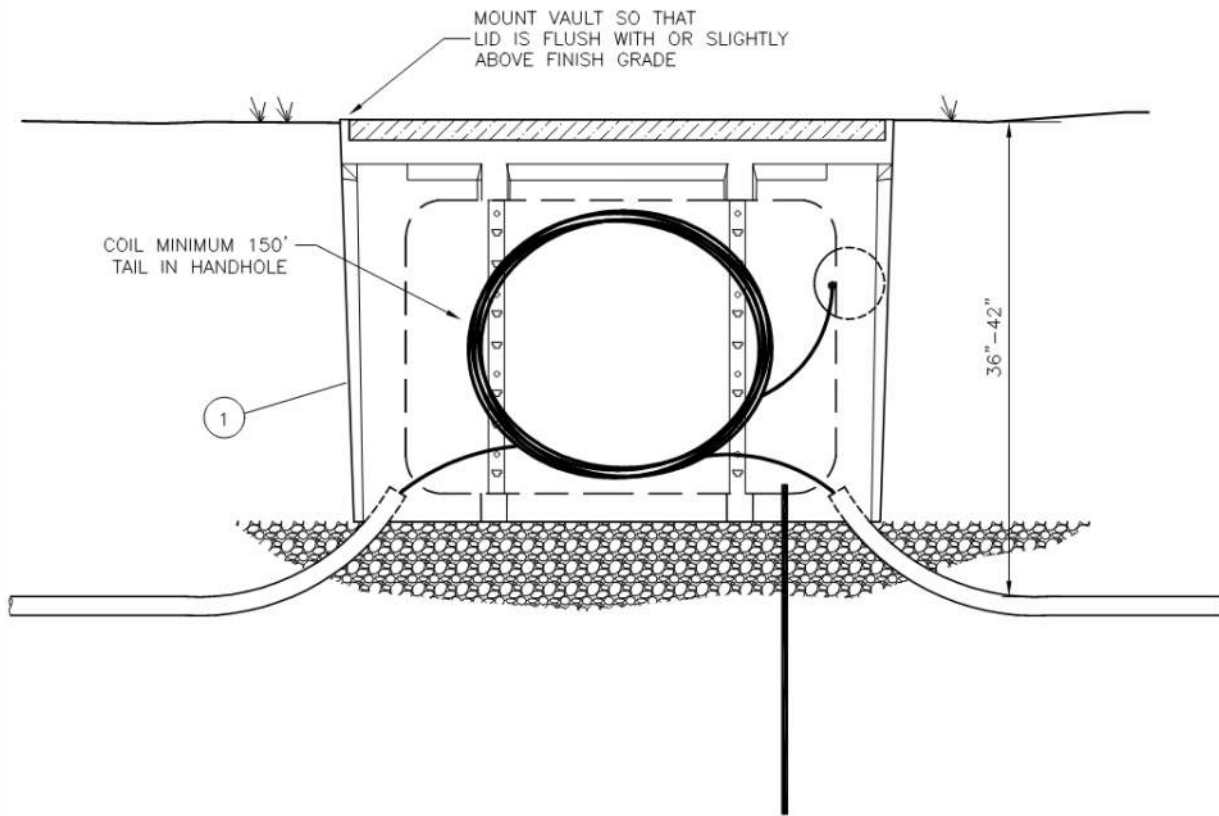
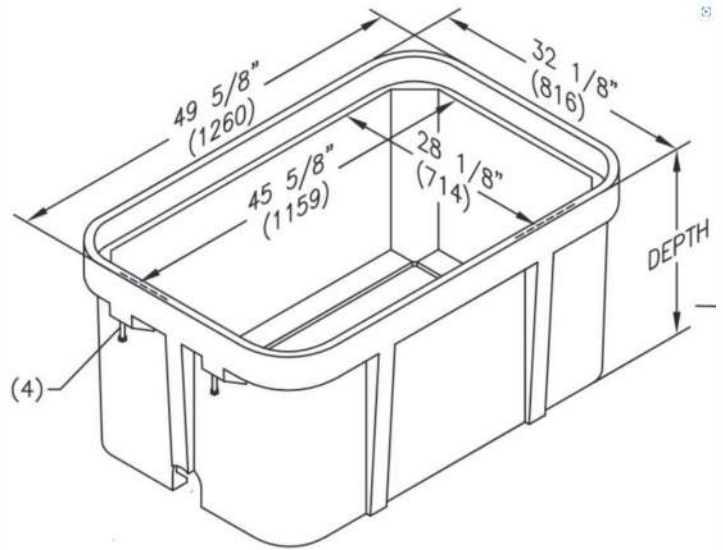
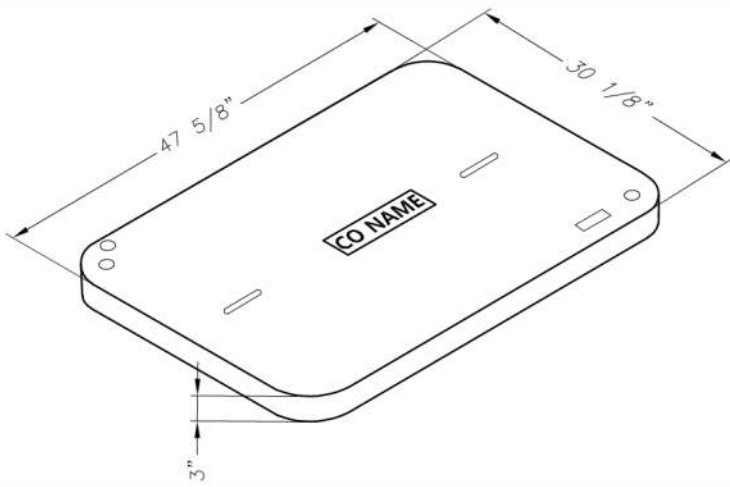
1. VAULTS ARE NEVER TO BE PLACED IN VEHICULAR DRIVING SURFACES. VAULTS ARE RATED FOR H22 LOADING, OCCASIONAL VEHICLE TRAFFIC ONLY.
2. ALL DUCTS ENTERING OR EXITING VAULT WILL BE PLUGGED WITH COMPRESSION TYPE PLUGS, SIMPLEX JM TYPES OR FOAM SEAL CABLES IN DUCTS.
3. VAULTS ARE TO BE PLACED FLUSH WITH GROUND SURFACE NEVER TO CAUSE A TRIP HAZARD.
4. VAULTS TO BE PLACED ON 5/8" MINUS GRAVEL OR WASHED PEA GRAVEL LEVELED AND COMPACTED TO SUPPORT VAULT PLACEMENT. MINIMUM OF 4" OF GRAVEL INSIDE VAULT. WIRE MESH MATERIAL REQUIRED TO COVER THE ENTIRE BOTTOM OF THE VAULT FOR RODENT PROTECTION. WIRE MESH WILL BE PLACED UNDER GRAVEL.
5. ALL INNERDUCT WILL BE EXTENDED DIRECTLY INTO VAULTS FOR FIBER PULLING PURPOSES. INNERDUCT WILL BE HDPE PVC, SDR 9 or 11 ORANGE, SMOOTH OUTSIDE, LONGITUDE RIBBED INSIDE. DUCT WILL NEVER EXTEND MORE THAN 6" INSIDE VAULT WALL. ENTRANCE HOLE THRU SIDE OF VAULT WILL BE DRILLED OR PRESSED.
6. CONDUIT SHALL BE SCHEDULE 40 ORANGE. CONDUITS CAN ENTER THROUGH THE BOTTOM OF THE VAULT, IN A 90 DEGREE FASHION, PLACED IN THE CORNERS OF THE VAULTS.
7. PLACE FIBER CABLE PER MANUFACTURER'S SPECIFICATIONS, NEVER PULLED OR TENSIONED MORE THAN 600 (MRCL) CABLE LOAD POUNDS, BEND RADIUS OF FIBER SHALL BE NO LESS THAN 18". TAG CABLES PER OWNER SPECIFICATIONS.
8. RACKING OF FIBER COIL AND SPLICE CASE IS ALWAYS REQUIRED. UTILIZE UNI-STRUT RACKING AND CABLE SHOES. SECURE SPLICE CASE WITH TIE WRAPS.
9. SECURE VAULT LID WITH PROVIDED LOCK DOWN BOLTS.
10. ALL LARGE VAULTS REQUIRE A GROUND ROD AND MARKER SIGN. GROUND ROD 5/8" x 8' COPPER CLAD AND #6 UNCOATED SOLID SOFT DRAWN COPPER.

MARKER PLACEMENT

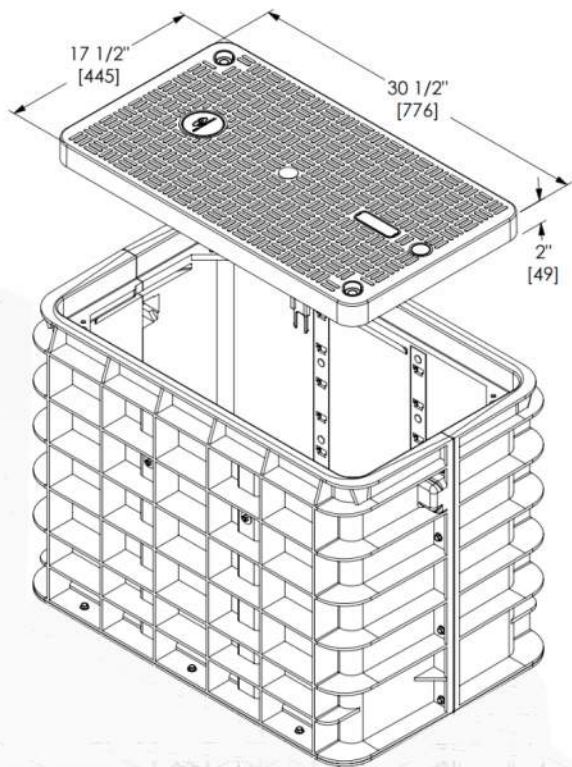


STORAGE AND RACKING

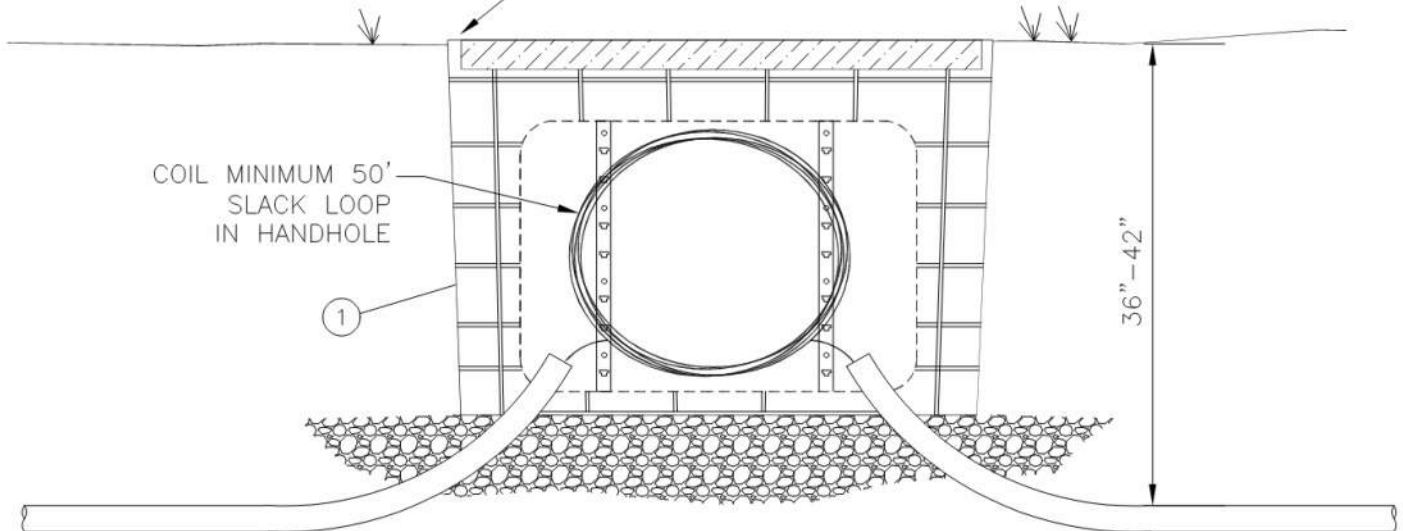




BILL OF MATERIAL			
REF#	USE	PART#	DESCRIPTION
1	1		Fiberglass Handhole 30" x 48" x 36"



MOUNT VAULT SO THAT LID IS FLUSH WITH OR SLIGHTLY ABOVE FINISH GRADE



COIL MINIMUM 50' SLACK LOOP IN HANDHOLE

1

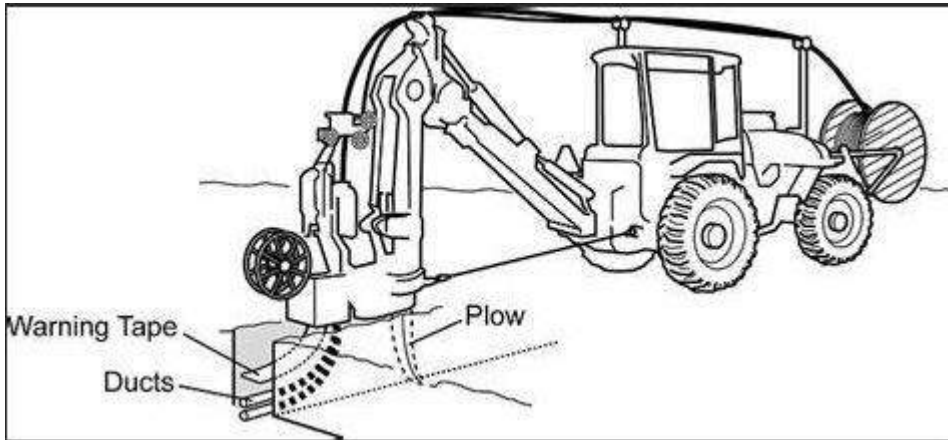
36" - 42"

BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	1		Fiberglass Handhole 17" x 30" x 24"

Trenching and Conduit Installation Requirements:

1. All trenches shall be excavated according to the trench detail and construction design.
2. The trench shall be straight and the bottom smooth, level and free from rocks, obstructions and sharp objects.
3. The conduit shall never be bent or kinked, with a minimum bend radius of 26" in 90degrees. Conduit will be coupled to withstand 125psi blowing pressure.
4. Orange fiber optic warning tape shall be placed at 12" above the conduit in trench and plow construction methods.
5. A minimum of one cable plow ripping pass will be made at full burial depth to ensure the conduit route is clear of obstructions. The plowing operation will be continuously observed for depth and proper feeding of conduit in plow shoot.
6. One foot of separation is required between fiber conduit and any other utilities. (or per joint utility owner)
7. Minimum depth of conduit must be 42"
8. Contractor shall call for utility locates prior to digging.
9. Depths of existing utilities will be potholed for verification of location. Conflicts with existing utilities will be resolved prior to conduit placement.



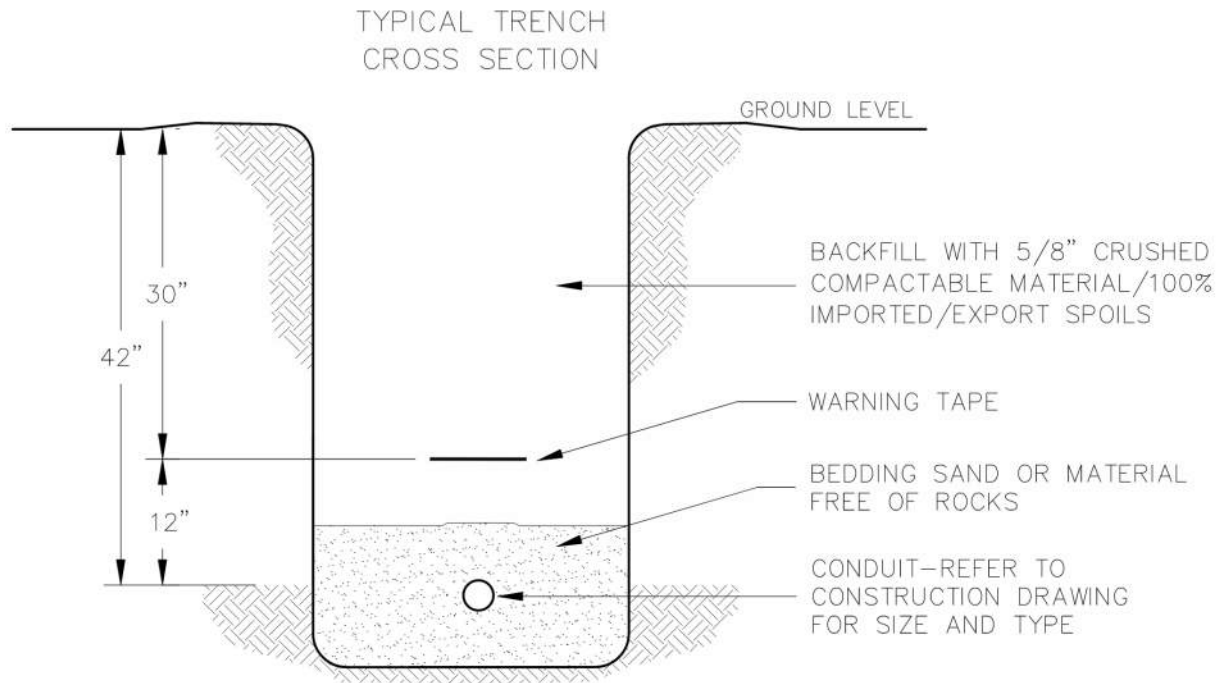
Trenching in Right of Way

1. All State and County Road crossings shall meet the installation requirements outlined in the right of way permit issued by the authority having jurisdiction and construction design.
2. An approved, licensed and bonded excavation contractor must perform all work in the road right of way.
3. Any work in the right of way must meet the erosion and sediment control requirements of the local jurisdiction.

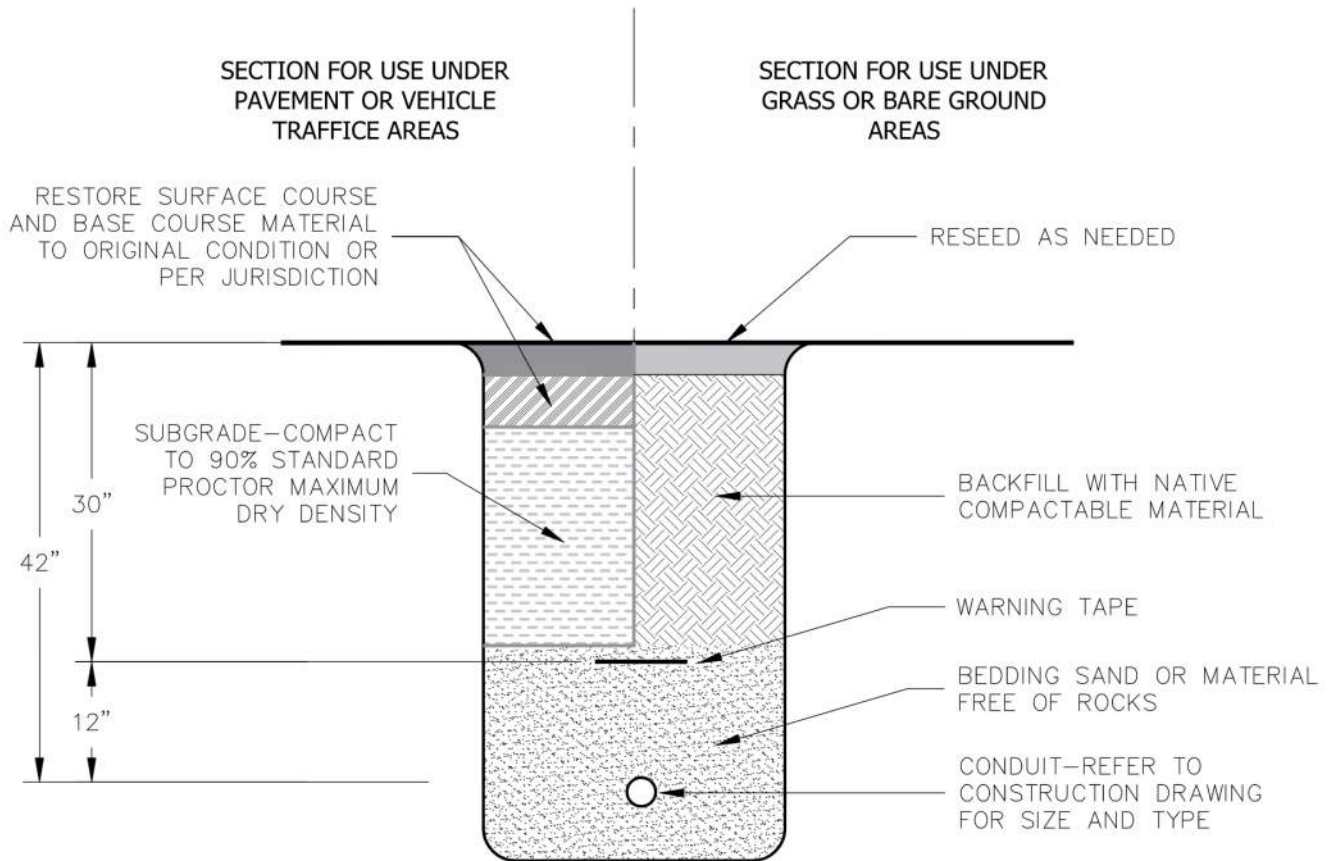
Fiber Installation Requirements:

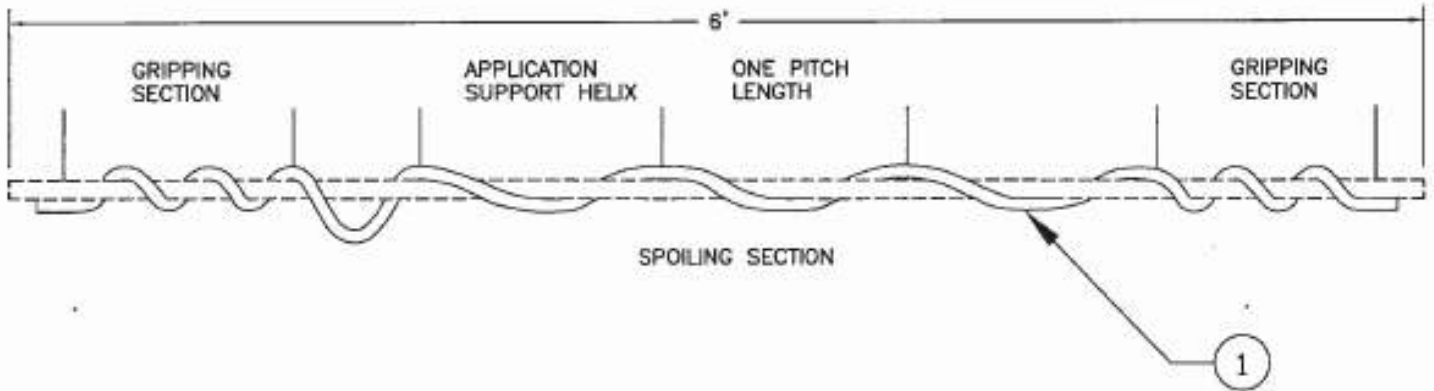
1. Conduit shall always be proofed for integrity prior to placement of fiber optic cable.
2. Cable will never be pulled over 600 pounds of pulling pressure or blowing pressure.
3. Avoid excessive cable twists.
4. Pulling or blowing speeds shall never exceed 150 feet per minute.
5. The use of capstan winches will be calibrated with never to exceed limits of 600lbs of force. Capstans shall be sized to meet the minimum bend radius requirements under tension.
6. Never bend over 15 x OD of cable, or a maximum bend radius of 18".
7. Installation temperature must always stay between -22 and 140 degrees Fahrenheit.
8. Cable pulling lubricant used shall be recommended for cable pulling or blowing. Polywater, hydralube or equivalent. Never use soaps or detergents that cause the cable sheath to breakdown.
9. Refer to design maps for splicing locations. Fiber optic cable is never to be cut except only where designed.
10. Fiber optic cable sequential numbers are required at each pole location and vault wall. Sequential numbers will identify conduit length, and slack left in vaults and at poles.

TYPICAL TRENCH/PLOW SECTION



TRENCH RESTORATION

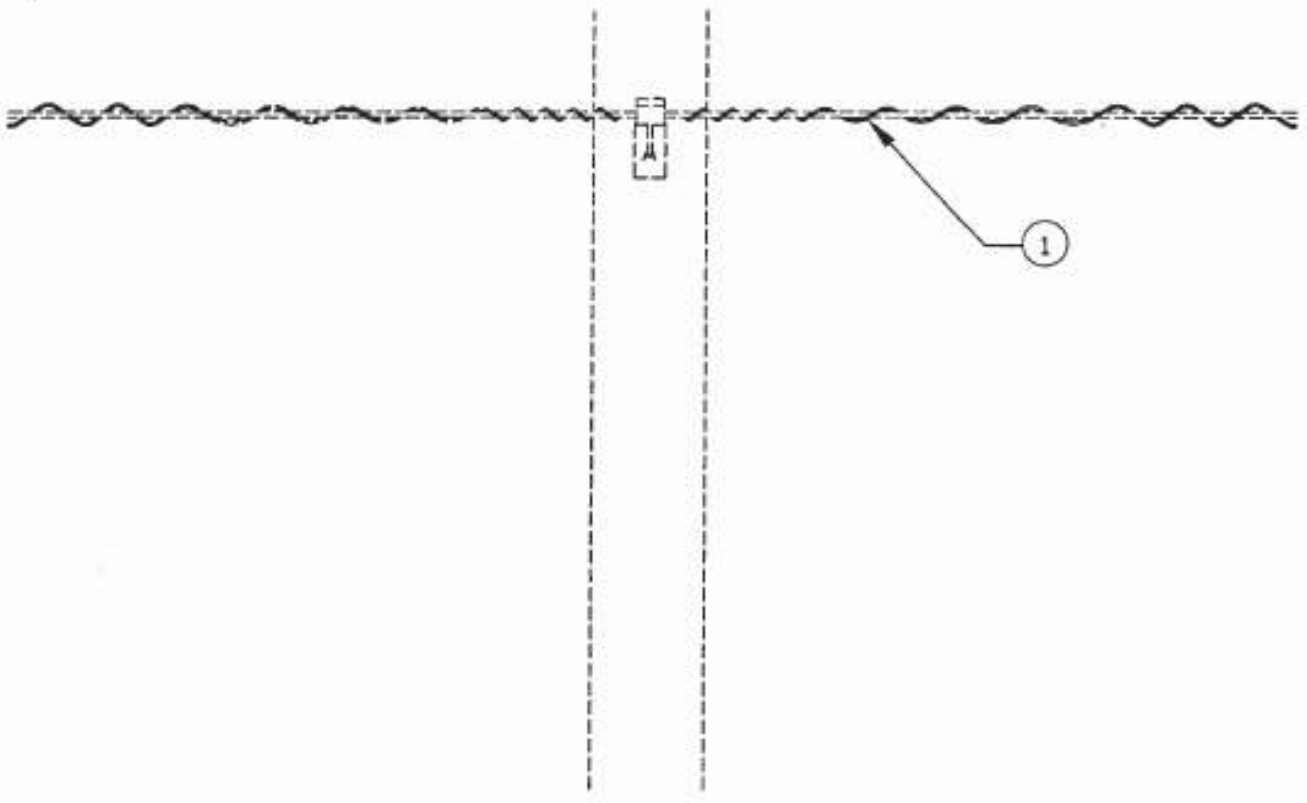




SPAN LENGTH		SPOILERS PER SPAN
FEET	METERS	
120-180	36.6-54.9	3
181-240	55.2-73.2	4
241-300	73.5-91.4	5
301-350	91.7-106.7	6
351-400	106.9-121.9	7
401-450	122.2-137.2	8

APPLICATION: 1/4" MESSENGER +1 .564"-.760" CABLE
 5/16" MESSENGER +1 .373"-.565" CABLE
 MULTIPLE MESSENGER + CABLE .575"-.717" TOTAL

BILL OF MATERIAL			
REF#	USE	PART#	DESCRIPTION
1	1		Air Flow Spoiler, .564" - .760" Diameter (PLP CAT. 5058103)



BILL OF MATERIAL

REF#	USE	PART#	DESCRIPTION
1	1		Fiber Vibration Dampeners, 0.655

Cable Preparation and Storage Requirements:

1. Prepare cables for splicing by laying out flat on ground, reducing twists and bends.
2. For an aerial splice case application the Aerial Slack Loop will be in place prior to splice work taking place.
3. The aerial splice case shall be mounted with aerial adjustable offset brackets for ADSS or Strand and Lash applications.
4. Once splicing is completed, white cable tag to be placed on Cable denoting cable direction. Tag should be no more than 12" from plate on case.
5. Tape cable tails together to form a coil that neatly combines within the vault.
6. Cable bend radius should never be less than 18"
7. In vaults, verify conduits are plugged and visible in the bottom of the vault.
8. Coil cable neatly in the vault placed on cable shoes. Splice case will be supported on shoes with tie wraps.
9. Bond/Ground splice case to the ground rod or cable locator marker station.
10. Tag cable with owner cable tag, visible when vault is open, at top of coil, or in a aerial application at the splice case.
11. The aerial splice case shall be mounted with aerial mounting adjustable offset brackets for ADSS or strand and lash applications. Strap and tie wrap aerial ADSS cable slack. Overlash slack in a strand and application.
12. All aerial splice cases needed to be re-hung and mounted into aerial application within 48 hours of splice work completion



Fiber Splicing Requirements:

1. Cable openings shall match splice case procedures as outlined in manufacturer's requirements.
2. Fiber splicer is required to completely read and understand procedures documented in the coyote products application manual prior to work being performed.
3. Fiber splice will never cut a spliced fiber without check the light activity with a calibrated light detector prior to cutting.
4. No more than 24 fibers per tray.
5. End plates are always to be arranged to allow for additional future cable access.
6. Always flash test the splice case prior to storing case in vault.

Fiber Splicing Documents and Methods of Procedure Notifications:

1. Anytime a splicer is to access an active splice case, place a new splice case on existing lit backbone or lateral fiber, or work requiring splicing fibers in an active panel, a Method of Procedure (MOP) is needed, except for in the case of an outage.
2. A MOP is not needed for OTDR testing or splicing on dark fiber.
3. A MOP will be provided by NoaNet and will be sent to the Network Operations Center (NOC), contractor, and splicer a minimum of 10 business days prior to scheduled work. MOP window will be between 1AM and 5AM.
4. In certain instances, a MOP can be scheduled prior to the 10 day window for emergency needs and fiber repair work. It will be handled on a case-by-case basis depending on necessity of work and what fibers are on existing backbone. MOP will list a description of work, splice cases to be entered, or locations of installation of new splice cases. MOP will also provide a list of active customers on cables being worked on.
5. MOP will list NoaNet Engineer Contact information as well as NOC contact information.
6. NoaNet will provide Splicing Documents (Splice Docs) prior to work taking place. Splice Docs will provide splice locations, fiber splicing assignments, and distances to Cabinet, COLO or other end site location if not splicing back to a NoaNet Cabinet or COLO.
6. Fiber splicer is to always test for light prior to cutting. If light is found on fiber assignments, fiber splicer is to contact NoaNet Engineer before proceeding further.
7. If discrepancies are found regarding distances provided, or large fiber events/breaks on either existing backbone or newly installed fiber, fiber splicer is to contact NoaNet Engineer before MOP window closes as to fix any issues that may arise from said discrepancies.

Fiber Testing and Documentation:

1. Fiber splicer is to notify NOC prior to splice work is to begin, and prior to access to any NoaNet facilities, whether splicing or testing is to take place.
2. Fiber splicer must follow MOP instructions provided. Fiber splicer is to notify NOC and close out ticket once splice work has been completed.
3. Prior to splicing fiber, strands provided on splice docs must be tested on existing fiber and new fiber install to verify distances and any potential breaks or large loss events (greater than a 0.3DB loss and/or high reflection event in case of jumpers placed). As noted previously, if any issues arise NoaNet Engineers need to be notified of issue immediately.
4. Once splicing is complete bi-directional OTDR reports will be required in both 1310nm and 1550nm. OTDR should run for a minimum of 1 minute, and for up to 3 minutes on longer distance reports. On these occasions splicer will be notified of the necessary run times on long distances prior to work taking place.
5. NoaNet will provide splicer with building contact information for customer site. NoaNet will provide access information for splicer to enter NoaNet facilities for testing.
6. All OTDR traces need to be delivered in raw format within 48 hours of splice work completion.

Acceptance of OTDR Testing and Splice Completion:

1. No fiber strand will be accepted that has an individual splice location event greater than 0.3dB (TIA Standard). This only pertains to strands spliced during work window, excludes existing network splices.
2. In certain instances, depending on job and contract for work, the individual splice event standards may be more strict. In these instances NoaNet will notify splicer prior to work taking place.
3. Fiber splice locations with reflections are not acceptable and will be rejected. This does not include connectors used during testing, jumpers at panels, or patch panel ports.
4. When testing with OTDR; fiber optic jumpers and ports to be cleaned every time both prior to OTDR testing and after testing has completed. Port caps always need to be replaced on unused ports after testing has completed. NoaNet may require individual splice locations to be re-spliced to meet standards listed. If this was a new splice, the cost to fix the splice issue that does not meet standards outlined will not be re-imbursed by NoaNet.
5. If splicer does not follow MOP, testing requirements, or bi-directional testing, NoaNet will not re-imburse cost to fix splice issue that arise from not following procedures correctly.
6. Splicer and/or contractor to provide pictures of fiber install on customer premises. Either picture of fiber coiled on backboard if no panel is installed, or picture of mounted term panel after fiber has been spliced and tested. Pictures need to be delivered to NoaNet within 24 hours of being taken.

COYOTE® RUNT Closure

Catalog Number:

8006671 - Standard RUNT (A)
 8006794 - Expanded RUNT (B)
 8006692 - RUS-listed RUNT (C)



COYOTE® ONE Dome Closure

Catalog Number:

COY1-001 - ONE for Buffer Tube (A, B, C)
 COY1-002 - ONE for Ribbon (A, B, C)



Closure Information		
Type	Standard	Expanded
Tray Part Numbers	80807701 - 12 ct. single fusion tray (x3) 80806033 - 12 ct. single fusion tray (x2) 80807114 - 72 ct. ribbon tray (x1)	80807701 - 12 ct. single fusion tray (x6) 80806033 - 12 ct. single fusion tray (x4) 80807114 - 72 ct. ribbon tray (x2)
Dimensions (L x W x H)	14.8" x 8.5" x 3"	14.8" x 8.5" x 4.8"
Ports	3	
Ground Studs	2	
Splice Capacity	36 single fusion or 72 ribbon splices	72 single fusion or 144 ribbon splices

Closure Information	
Tray Part Numbers	80809958 - 24 ct. single fusion tray (x4) 80813152 - 36 ct. single fusion tray (x4) 80808945 - 40 ct. single fusion tray (x2) LGSTR144 - 144 ct. ribbon tray (x2)
Dimensions (L x W x H)	16.0" x 10.8" x 5.7"
Ports	3
Ground Studs	3
Splice Capacity	144 single fusion or 288 ribbon splices

COYOTE® PUP Closure

Catalog Number:

8006622 - PUP for Buffer Tube (6-Port) (D)
 80010515 - PUP for Buffer Tube (4-Port) (E)
 8006621 - PUP for Ribbon (F)
 8006661 - RUS-listed PUP (G)



COYOTE® 6.5" x 17" Dome Closure

Catalog Number:

8006944 - Dome for Buffer Tube (D, E, G)
 8006945 - Dome for Ribbon (F)



Closure Information	
Tray Part Numbers	80807701 - 12 ct. single fusion tray (x6) 80806033 - 12 ct. single fusion tray (x4) 80807114 - 72 ct. ribbon tray (x2)
Dimensions (L x W x H)	17" x 8.5" x 7"
Ports	6 or 4
Ground Studs	6 or 4
Splice Capacity	72 single fusion or 144 ribbon splices

Closure Information	
Tray Part Numbers	80809958 - 24 ct. single fusion tray (x6) 80813152 - 36 ct. single fusion tray (x6) 80808945 - 40 ct. single fusion tray (x3) LGSTR144 - 144 ct. ribbon tray (x3)
Dimensions (Diameter x L)	8.6" x 17.9"
Ports	4
Ground Studs	4
Splice Capacity	216 single fusion or 432 ribbon splices

COYOTE® 6" x 22" Closure

Catalog Number:

- 8006560 - Buffer Tube (6-Port) (H)
- 8006633 - Buffer Tube (4-Port) (I)
- 8006540 - Ribbon (6-Port) (J)
- 8006631 - Ribbon (4-Port) (K)
- 8006587 - Express Buffer (6-Port) (L)
- 8006635 - Express Buffer (4-Port) (M)



COYOTE® 6.5" x 22" Dome Closure

Catalog Number:

- 8006877 - Dome for Buffer Tube (H, I)
- 8006878 - Dome for Ribbon (J, K)
- 8006946 - Dome for Express Buffer Tube (L, M)



Closure Information	
Tray Part Numbers	8001127 - 36 ct. single fusion tray (x6) 80805514 - 36 ct. single fusion tray (x4) 80805515 - 144 ct. ribbon tray (x2)
Dimensions (L x W x H)	22" x 8.5" x 7"
Ports	6 or 4
Ground Studs	6 or 4
Splice Capacity	216 single fusion or 288 ribbon splices

Closure Information	
Tray Part Numbers	80810086 - 36 ct. single fusion tray (x4) LGSTS72 - 72 ct. single fusion tray (x3) LGSTR216 - 216 ct. ribbon tray (x3)
Dimensions (Diameter x L)	8.6" x 22.6"
Ports	4
Ground Studs	4
Splice Capacity	216 single fusion or 648 ribbon splices

COYOTE® 8.5" x 22" Closure

Catalog Number:

- 8006561 - Buffer Tube (6-Port) (N)
- 8006634 - Buffer Tube (4-Port) (O)
- 8006541 - Ribbon (6-Port) (P)
- 8006632 - Ribbon (4-Port) (Q)
- 8006588 - Express Buffer (6-Port) (R)
- 8006636 - Express Buffer (4-Port) (S)



COYOTE® 9.5" x 28" Dome Closure

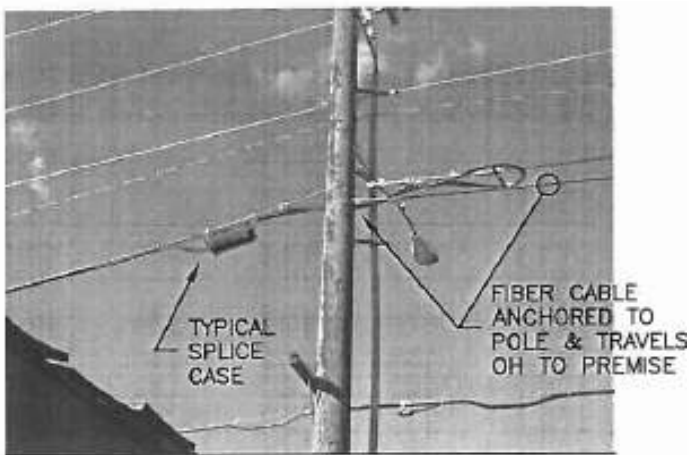
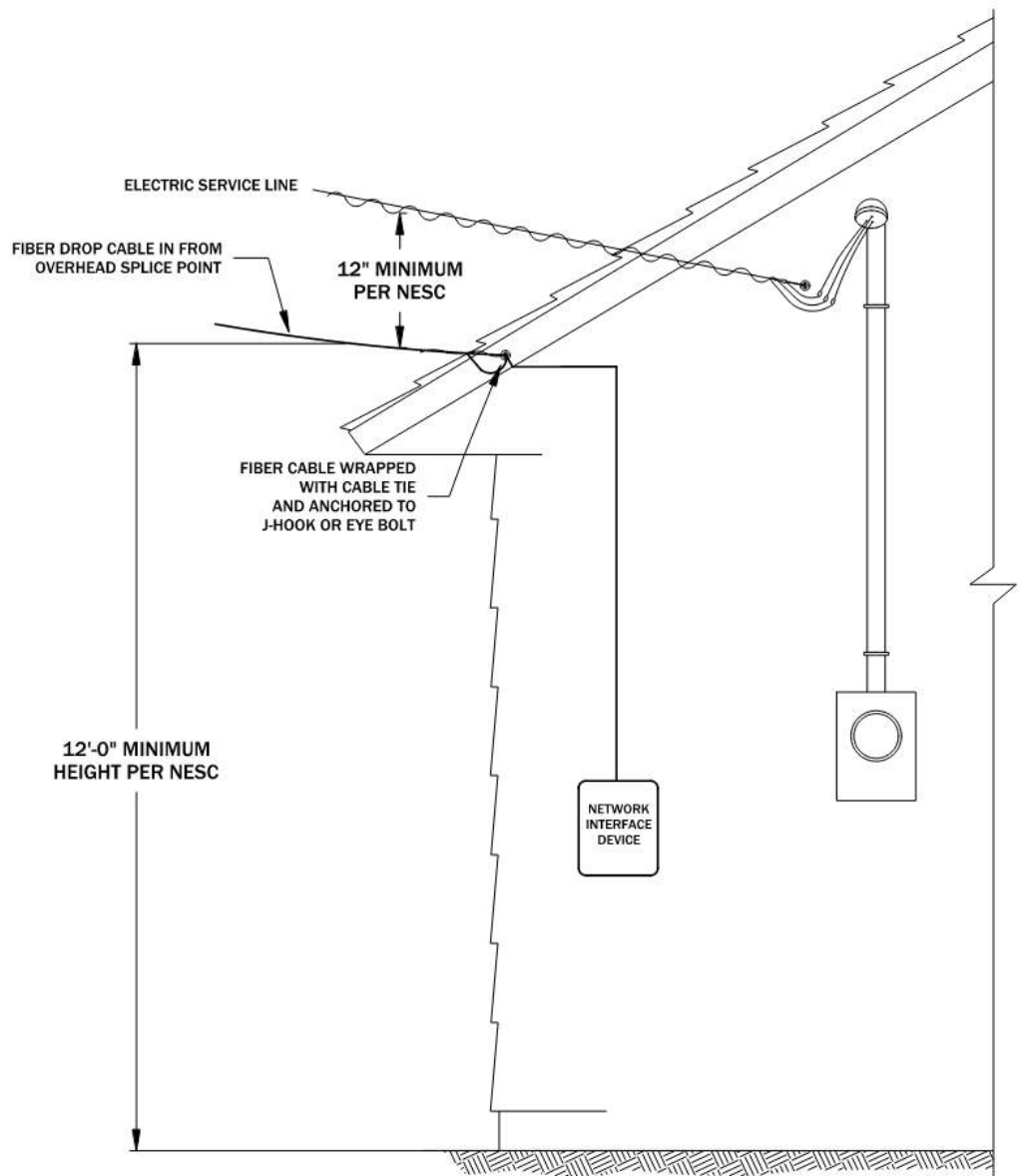
Catalog Number:

- 80061055 - Dome for Buffer Tube (N, O, R, S)
- 80061056 - Dome for Ribbon (P, Q)



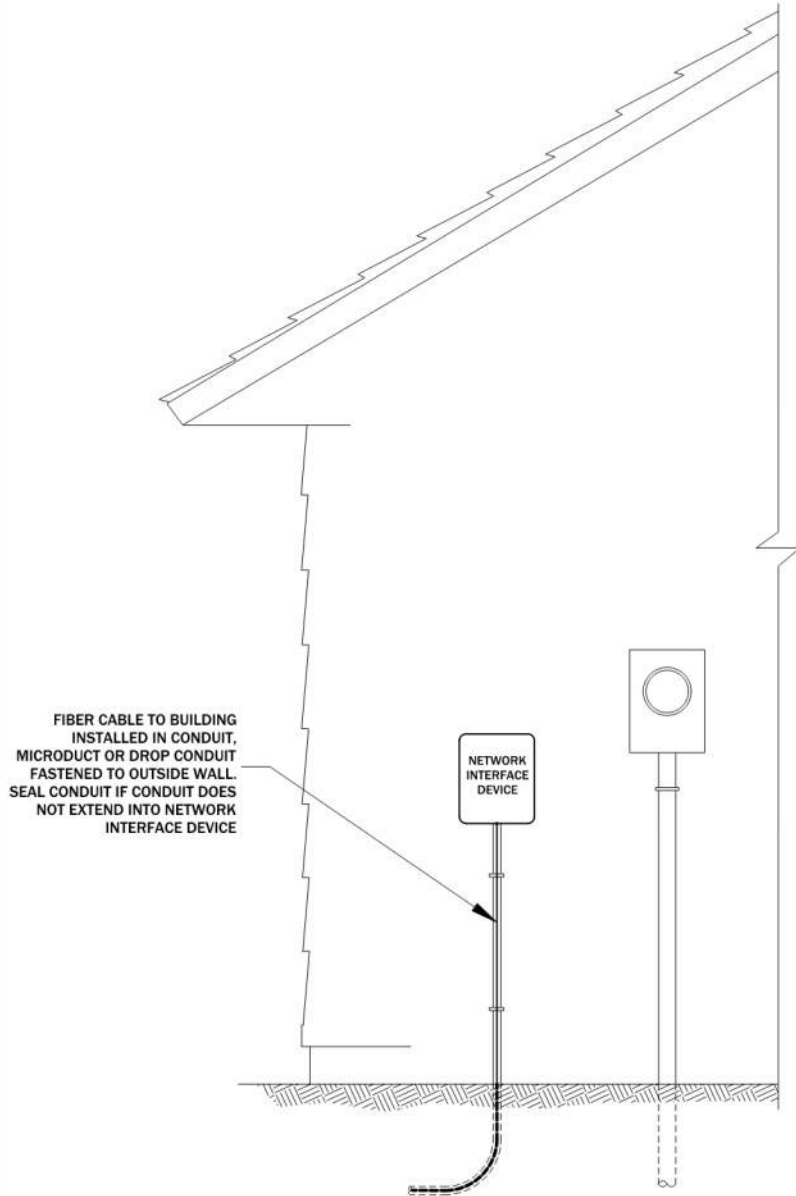
Closure Information	
Tray Part Numbers	8001127 - 36 ct. single fusion tray (x11) 80805514 - 36 ct. single fusion tray (x8) 80805515 - 144 ct. ribbon tray (x4)
Dimensions (L x W x H)	22" x 10.8" x 9.3"
Ports	6 or 4
Ground Studs	6 or 4
Splice Capacity	396 single fusion or 576 ribbon splices

Closure Information	
Tray Part Numbers	80810086 - 36 ct. single fusion tray (x10) LGSTS72 - 72 ct. single fusion tray (x6) LGSTR216 - 216 ct. ribbon tray (x8)
Dimensions (Diameter x L)	13.3" x 29.4"
Ports	7
Ground Studs	7
Splice Capacity	432 single fusion or 1728 ribbon splices

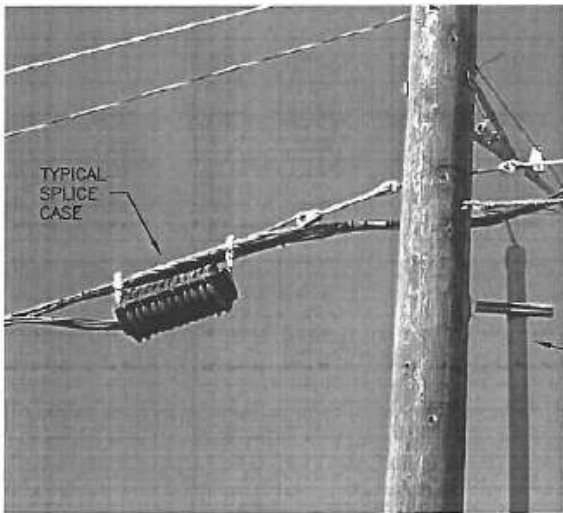


EXAMPLE OF OH SPLICE

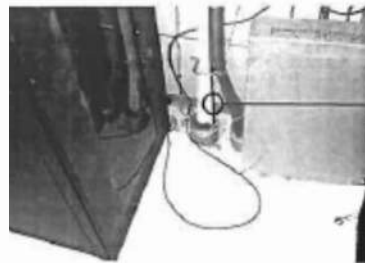
1. FIBER SERVICE DROP MUST MAINTAIN A 12' MINIMUM CLEARANCE ABOVE GRADE AT LOWEST POINT.
2. FIBER SERVICE DROP MUST NOT ATTACH TO ELECTRIC SERVICE WEATHERHEAD.
3. DETAILS SHOWN ARE MINIMUM REQUIREMENTS PER NATIONAL ELECTRIC SAFETY CODE.



COMMERCIAL/BUSINESS SERVICE INSTALLATION

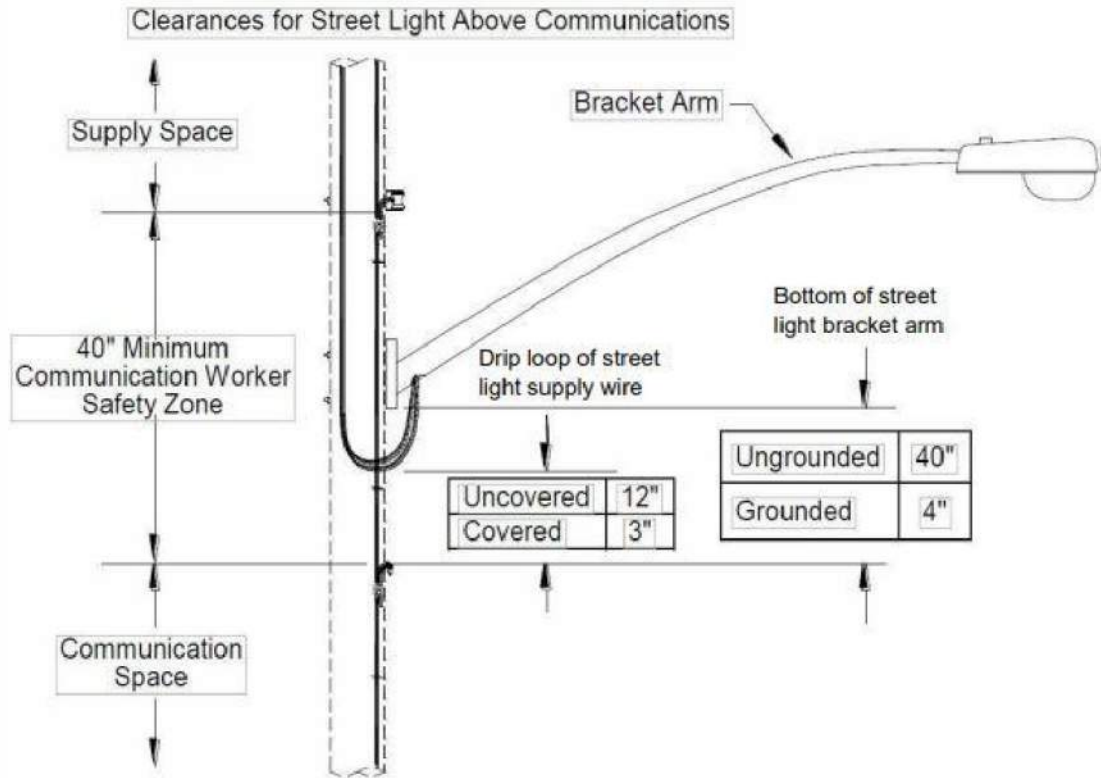


OH SPLICE TO PREMISE VIA RISER

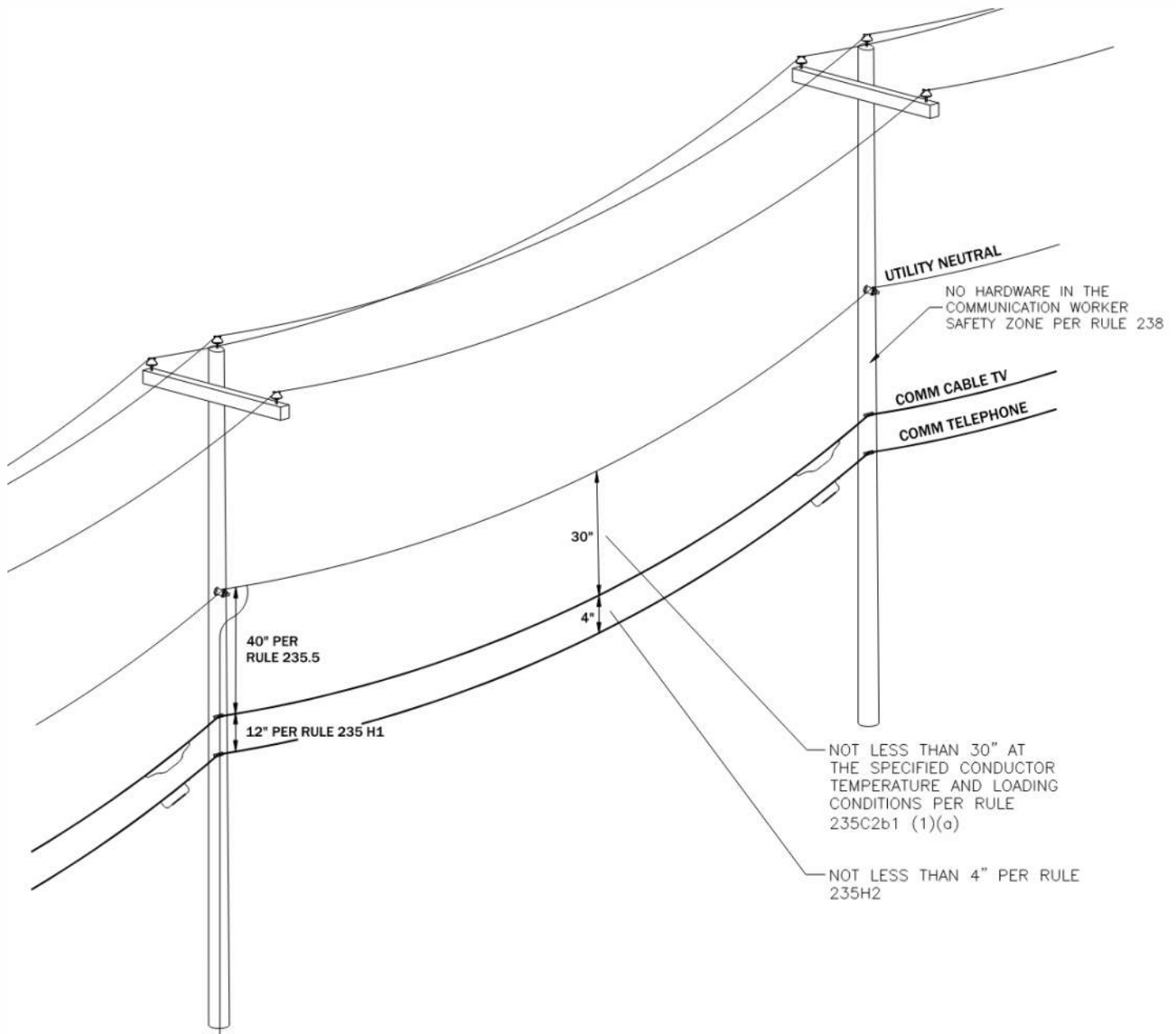


FIBER INTO PREMISE FROM UG CONDUIT

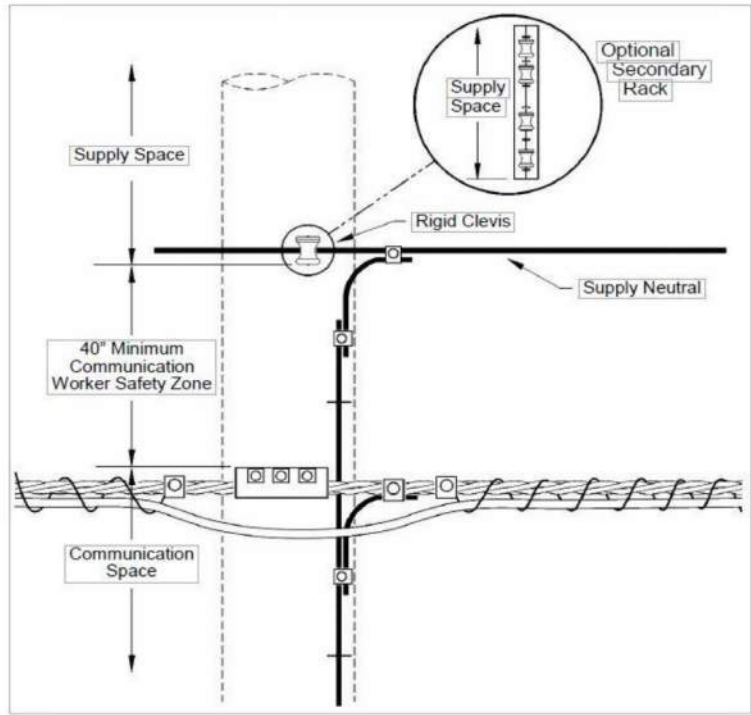
FIBER EXITS SPLICE CASE AND ENTERS RISER TO PREMISE FOR UG SERVICE INTO COMM. ROOM



1. DRIP LOOP MUST BE COVERED BY A SUITABLE NONMETALLIC COVERING THAT EXTENDS 2" BEYOND THE LOOP.

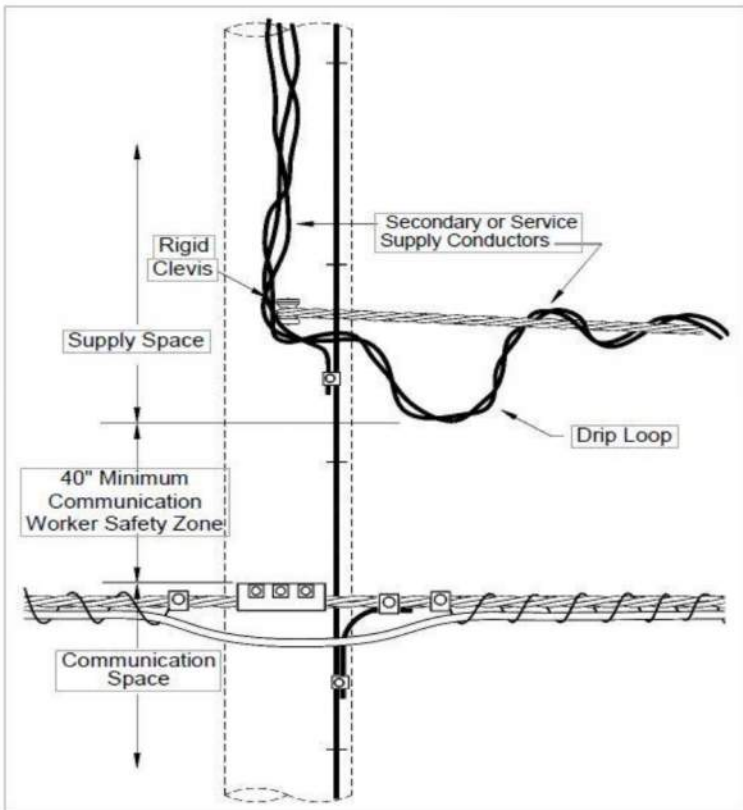


Clearance to Supply Neutral in the Common Position



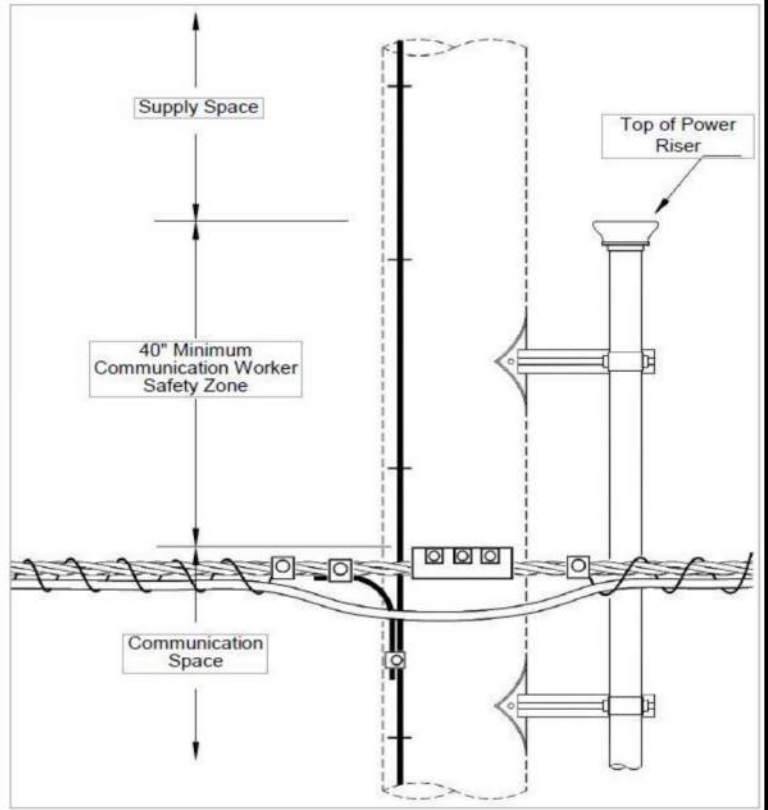
Minimum Clearance*
40 inches

Clearance to Secondary Conductor in the Common Position

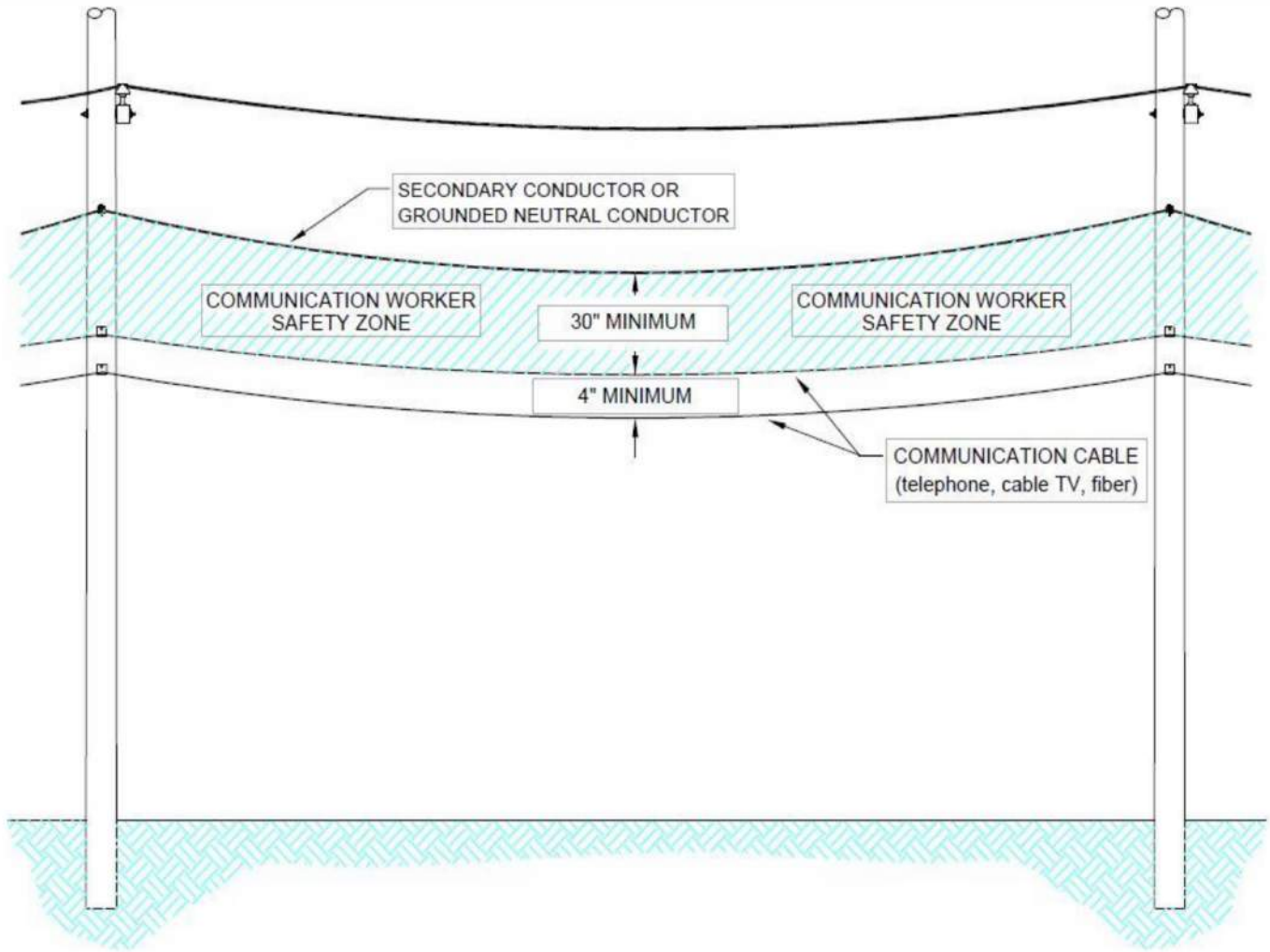


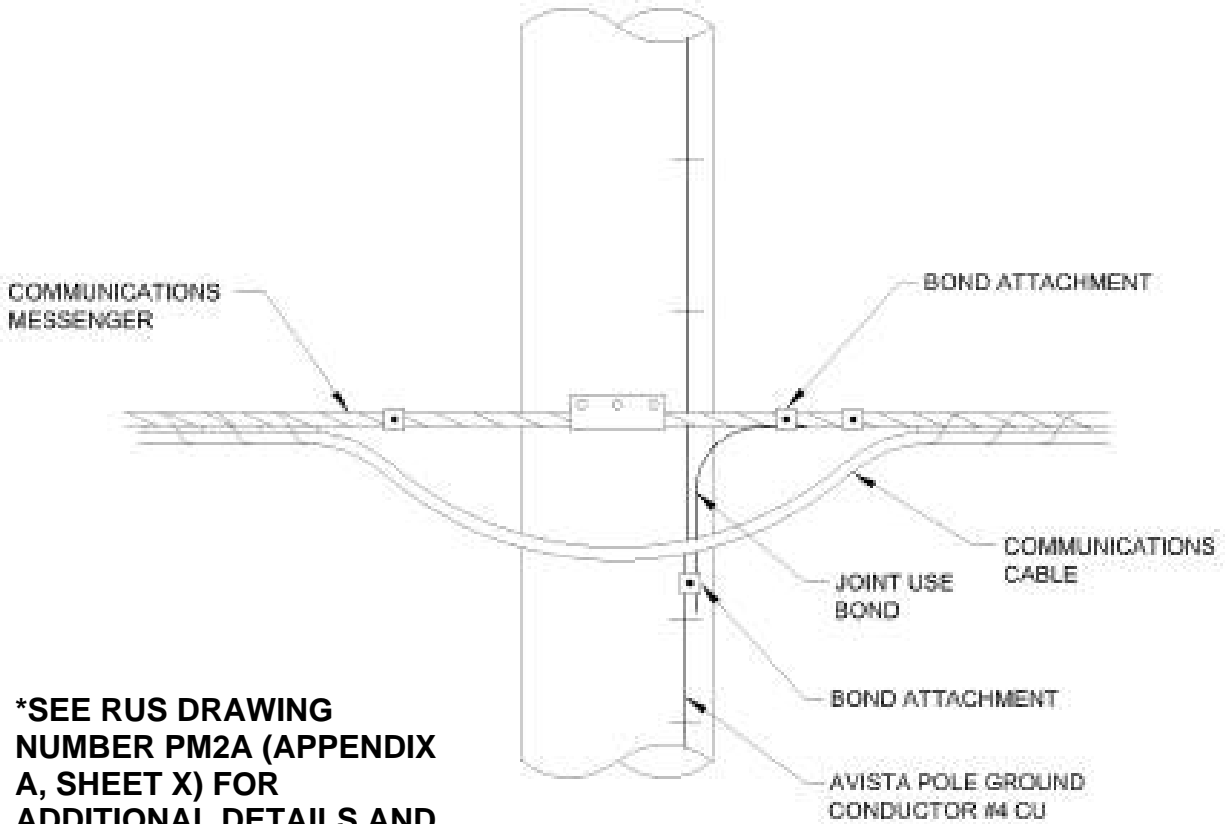
Minimum Clearance
40 inches

Clearance to Power Riser Termination (Top of the Conduit)

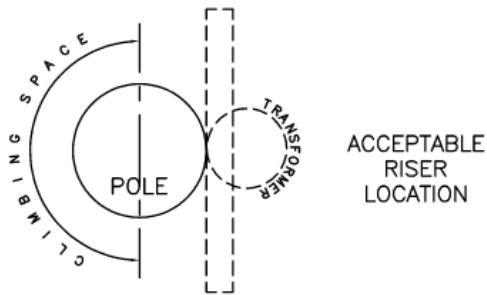
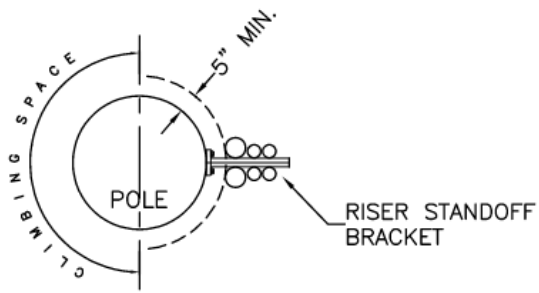


Minimum Clearance
40 inches

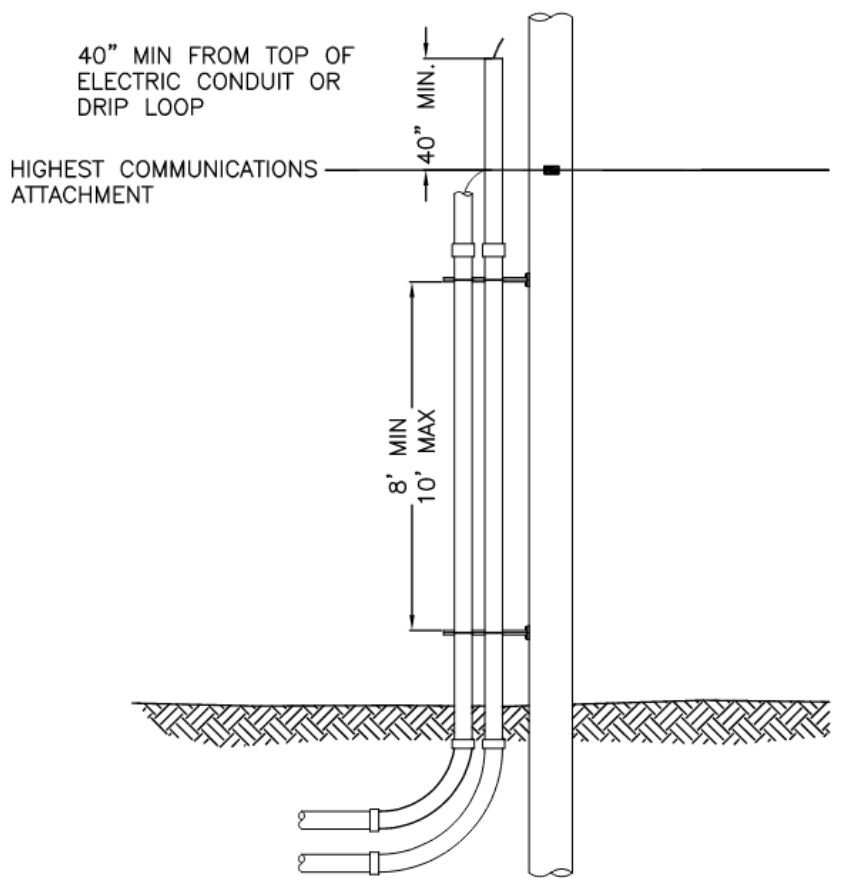




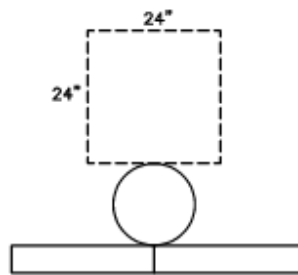
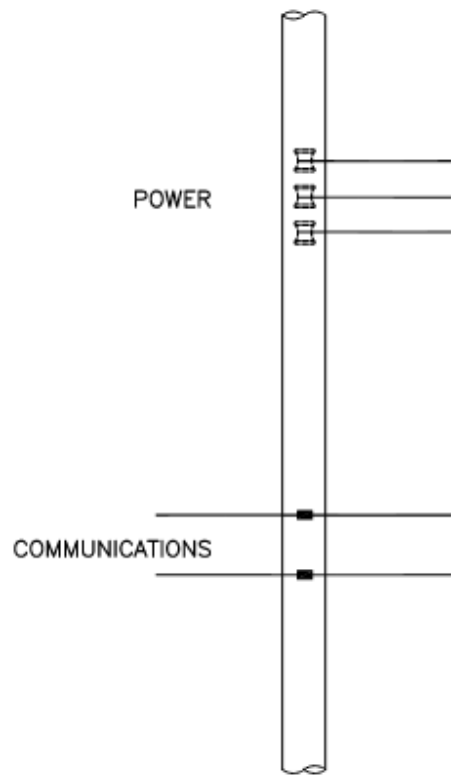
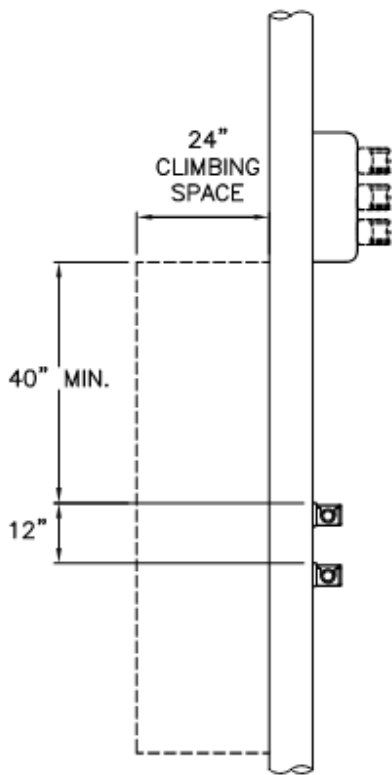
***SEE RUS DRAWING NUMBER PM2A (APPENDIX A, SHEET X) FOR ADDITIONAL DETAILS AND MATERIAL REQUIREMENTS**



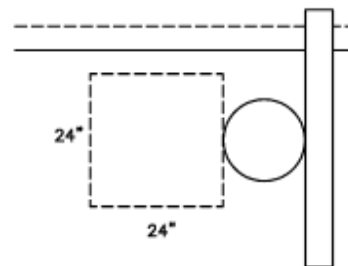
CONDUIT RISER
PLACEMENT
(TOP VIEW)



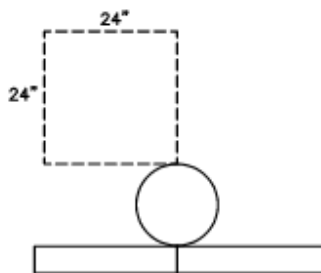
1. NEW RISERS SHALL BE ATTACHED TO EXISTING POWER STAND-OFF BRACKETS WHEN AVAILABLE.



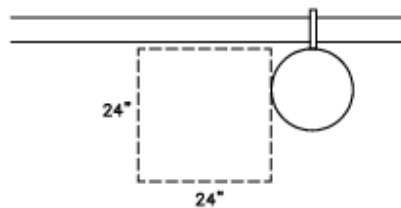
PREFERRED CLIMBING SPACE



CROSSARM CLIMBING SPACE



ACCEPTABLE CLIMBING SPACE

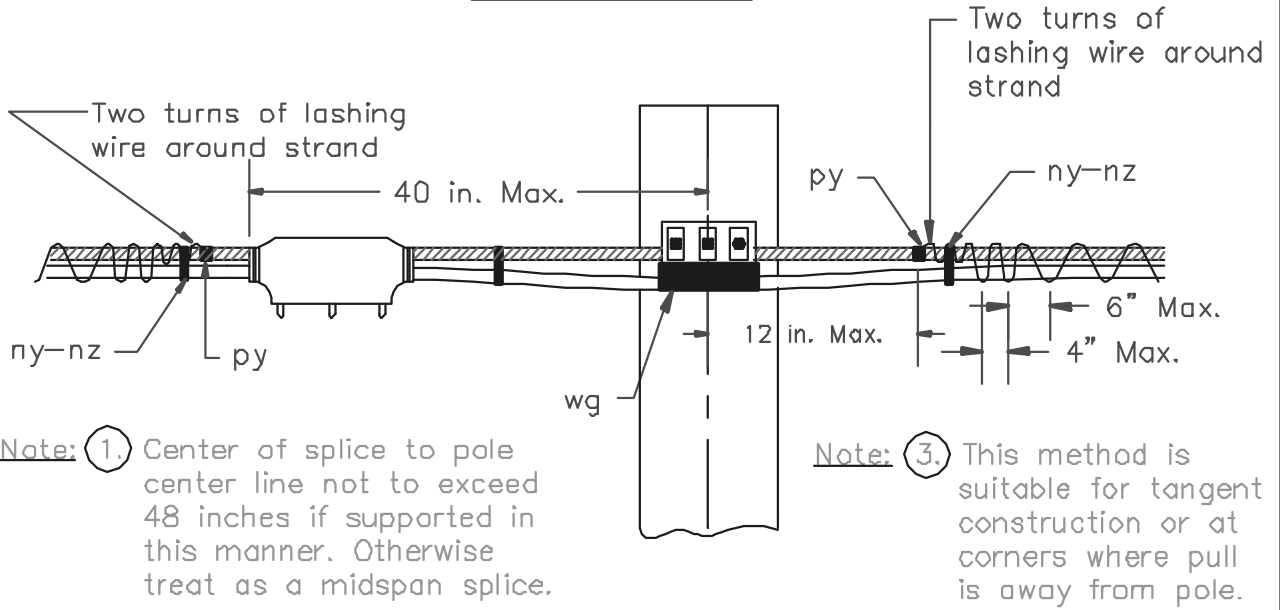
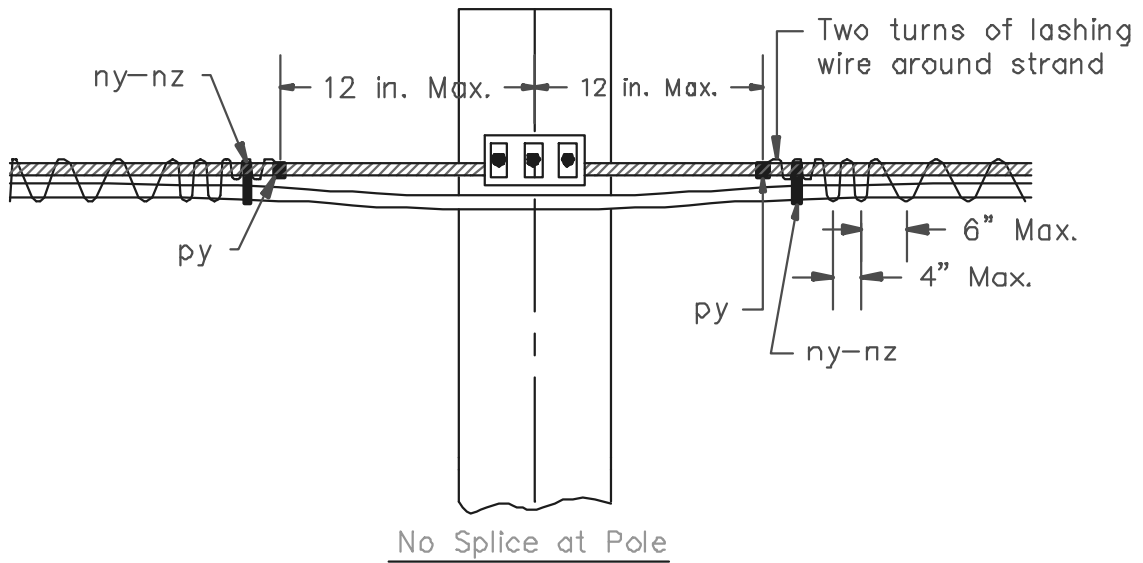


BRACKETS CLIMBING SPACE

**FIBER CONSTRUCTION STANDARD
DRAWINGS**

**APPENDIX A
Supplemental RUS Specification
Drawings**



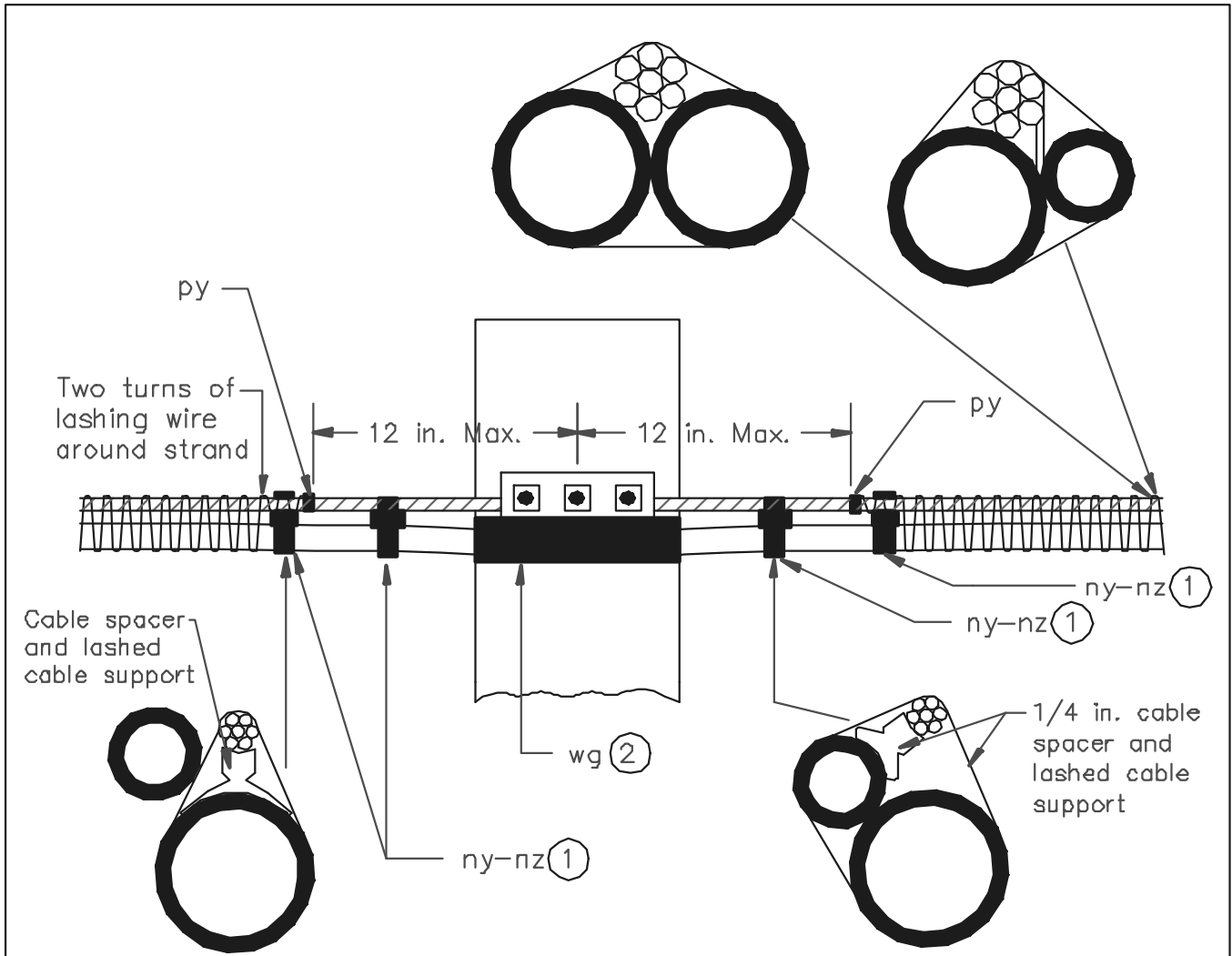


Note: ① Center of splice to pole center line not to exceed 48 inches if supported in this manner. Otherwise treat as a midspan splice.

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.

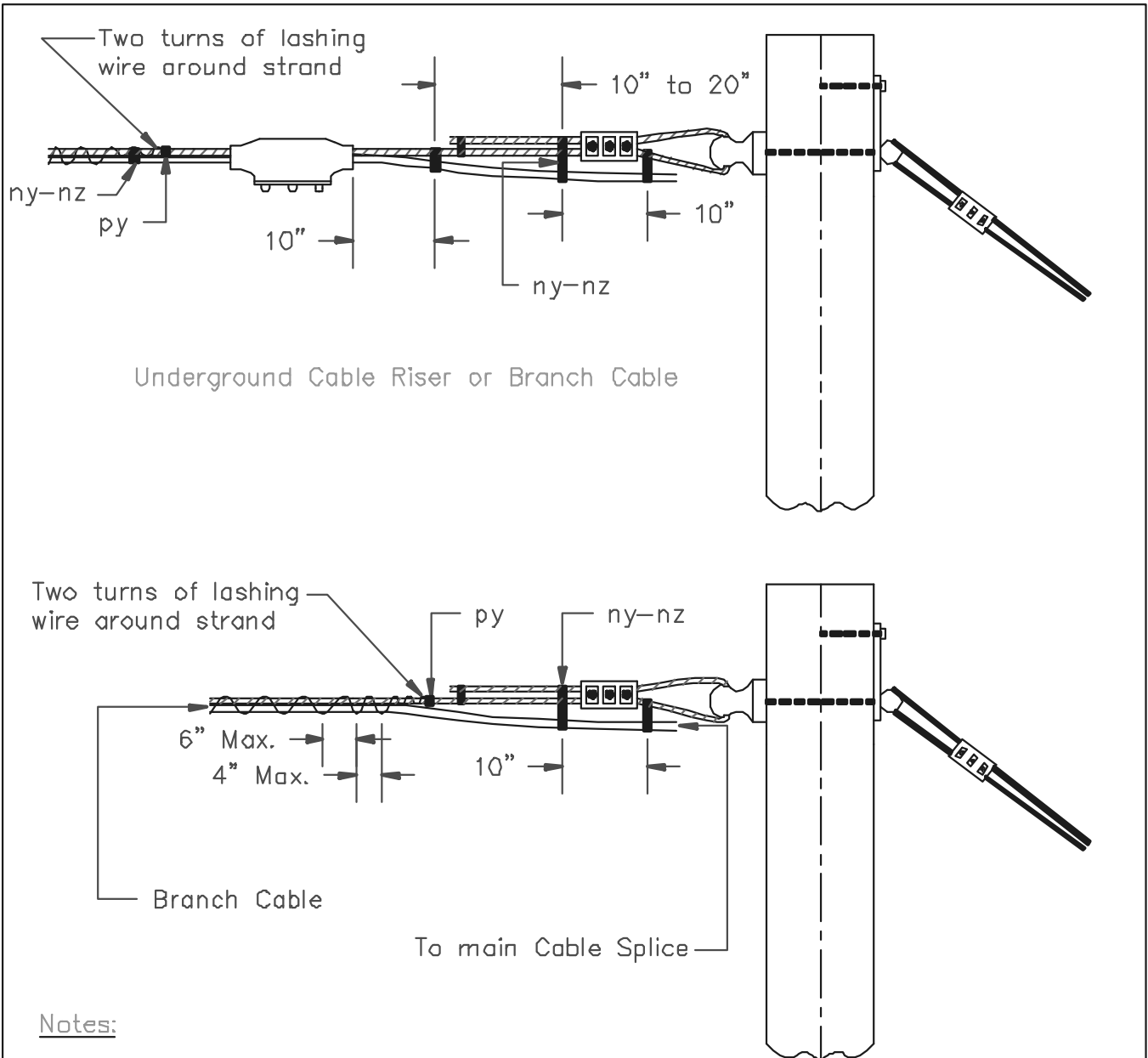
ITEMS	MATERIALS	NO. REQ'D
*ny	Spacers, cable	2
*nz	Supports, lashed cable	2
*py	Clamps, terminating, lashing wire	2
wg	Guard, cable, plastic	1
RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES LASHED CABLE SUPPORT AT POLE		
Scale: NTS		March 2001
		241



Notes:

- ① 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 214	



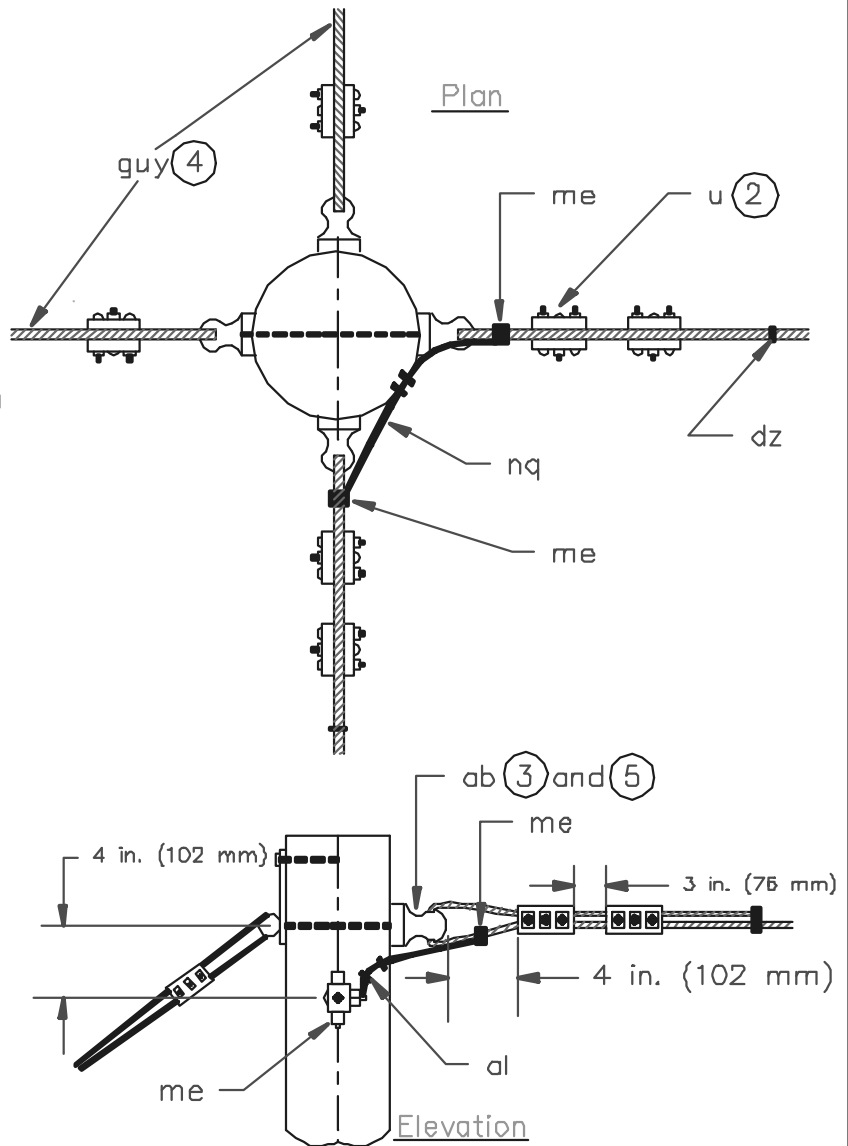
Notes:

- 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. 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.



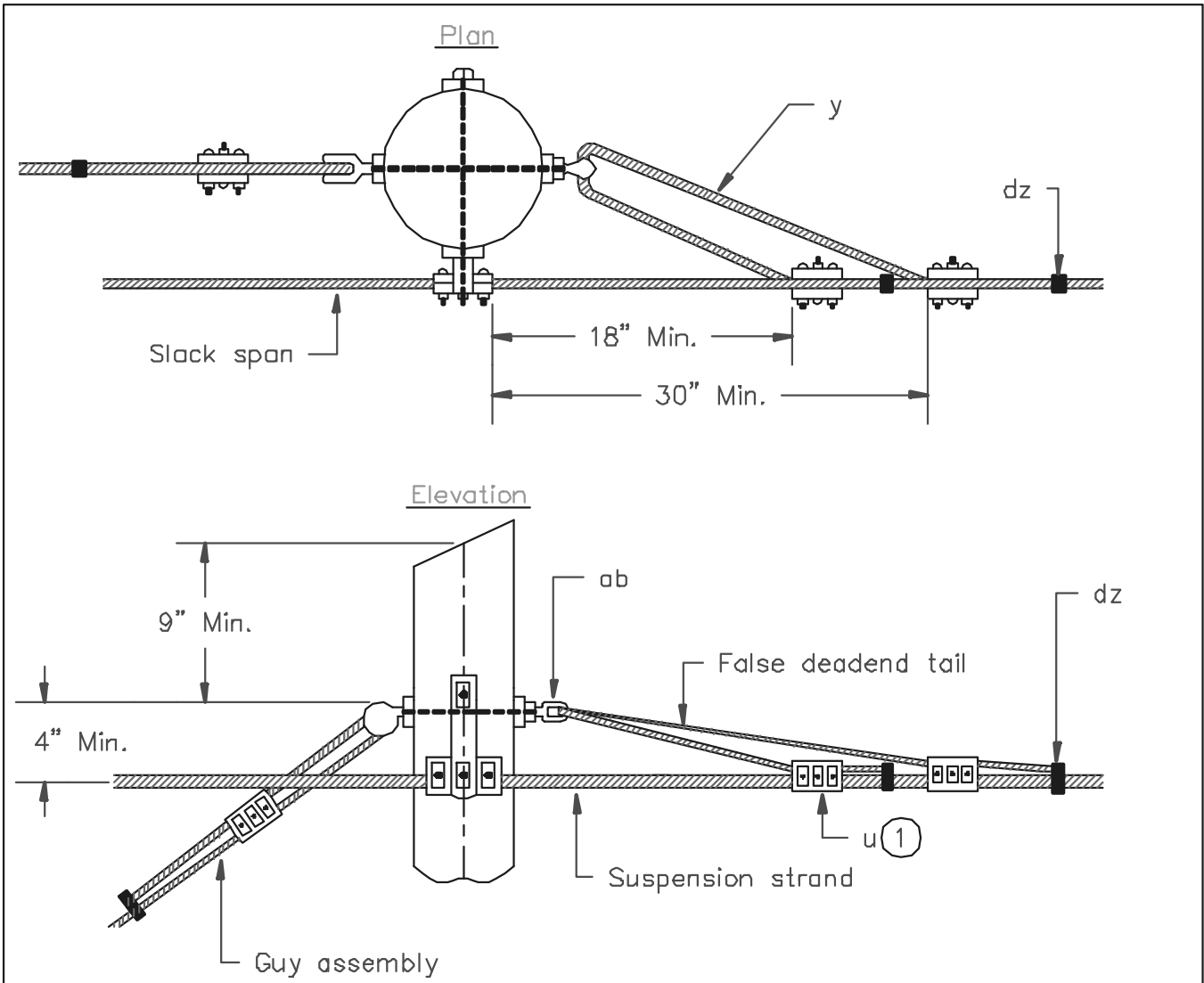
ITEMS	MATERIALS	6M	10M	16M
		NO. REQ'D	NO. REQ'D	NO. REQ'D
u	Clamps, guy, 3-bolt	1	1	2
ab	Nuts, thimbleye	1	1	1
*dz	Clips, guy	1	1	1
me	Connectors, grounding	2	2	2
*al	Staples, ground wire	as req'd	as req'd	as req'd
*nq	Wire, ground, bare, #6 AWG copper	as req'd	as req'd	as req'd

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES
 SUSPENSION STRAND MOUNTING (CORNERS)

Scale: NTS

March 2001

203



Notes:

- ① 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.

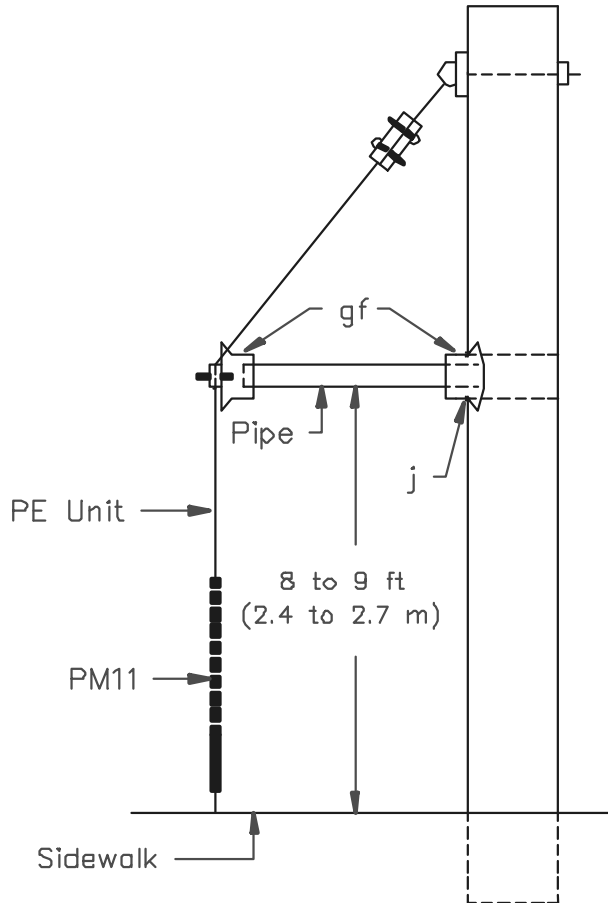
ITEMS	MATERIALS	6M	10M	16M
		NO. REQ'D	NO. REQ'D	NO. REQ'D
u	Clamps, guy, 3-bolt	2	2	2
y	Strand, as required	6M	10M	16M
ab	Nuts, thimbleye, for 5/8 in. (16 mm) bolt	1	1	—
ab	Nuts, thimbleye, for 3/4 in. (19 mm) bolt	—	—	1
*dz	Clips, guy	2	2	2

RURAL TELECOMMUNICATIONS CONSTRUCTION PRACTICES
 FALSE DEADEND

Scale: NTS

March 2001

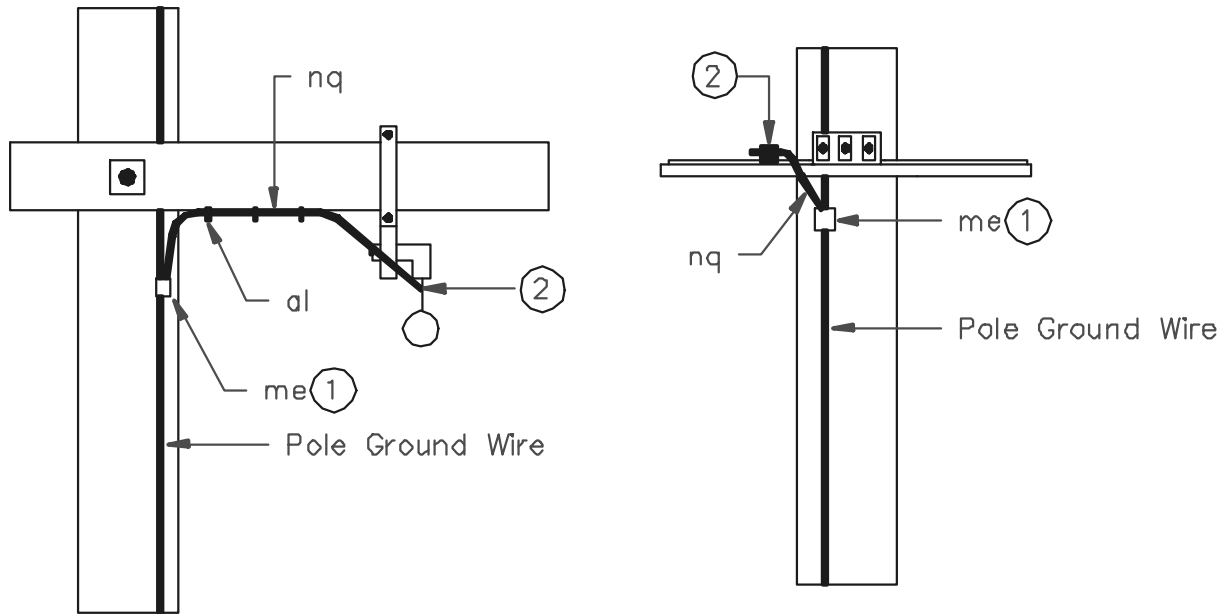
211



Note:

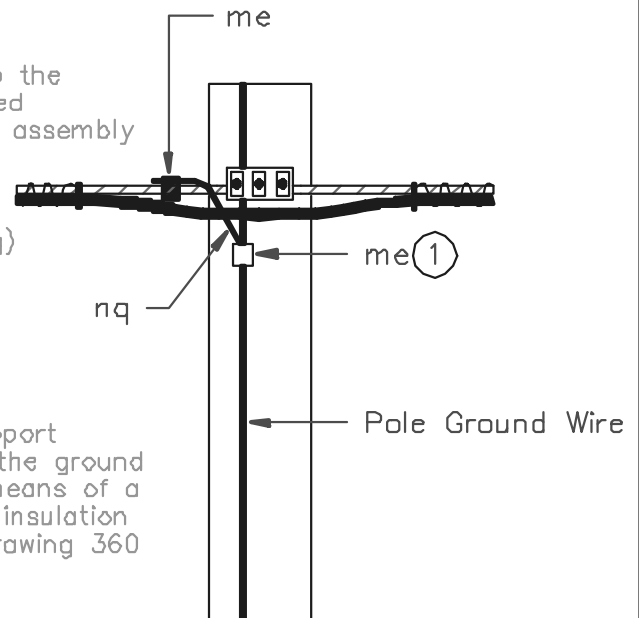
Where two guys are specified, the points of attachment of the two guy strands to the pole shall be separated by a minimum distance of 12 in. (305 mm) and the cable support clamp shall be placed on the thimbleye bolt for the lower guy.

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. 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

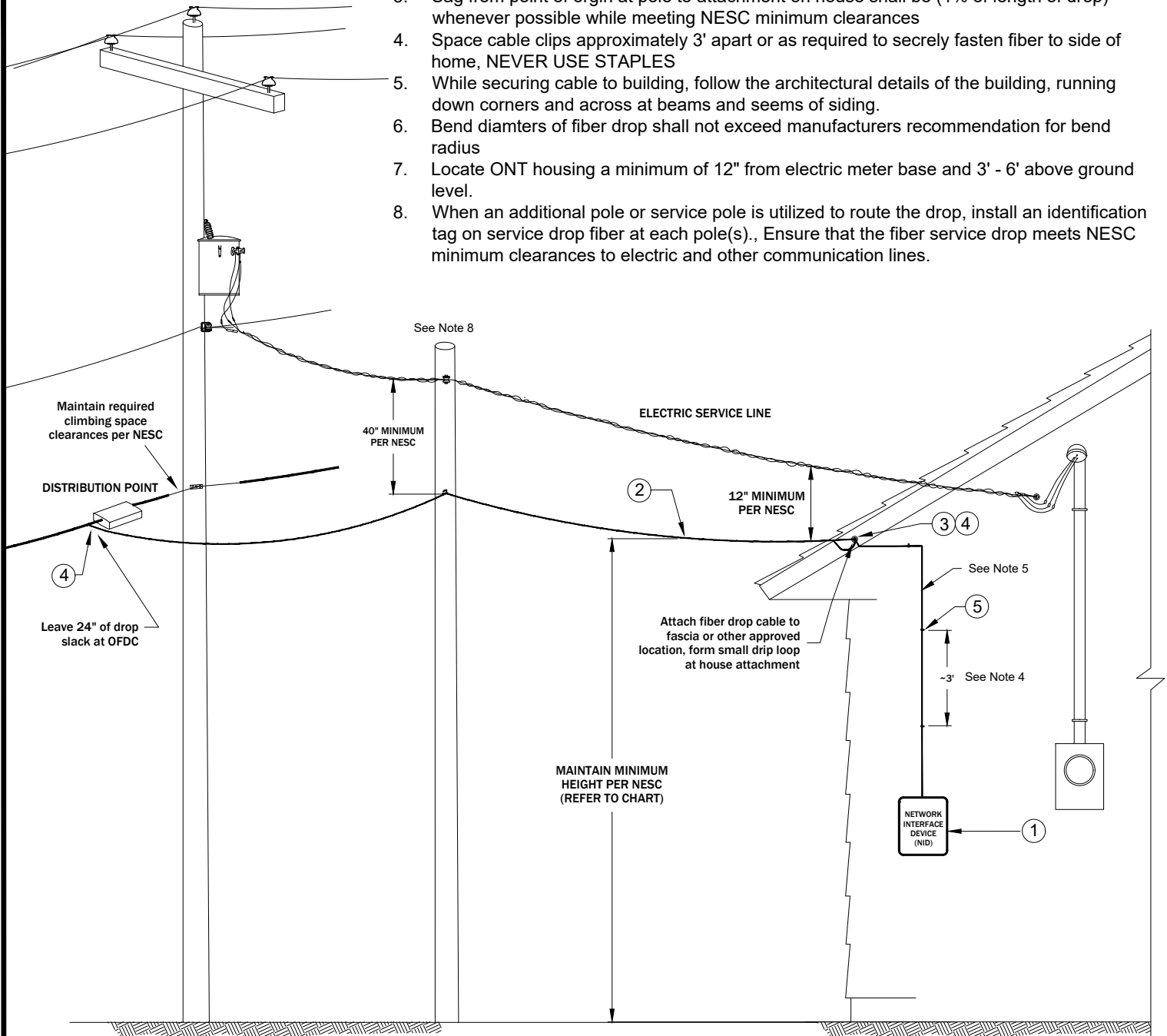
**FIBER CONSTRUCTION STANDARD
DRAWINGS**

**Fiber Service Drop Installation
Specification Drawings**



GENERAL REQUIREMENTS FOR AERIAL FIBER SERVICE DROP INSTALLATION

1. Fiber service drop must maintain minimum clearances above grade at lowest point. Refer to the chart on this page for requirements.
2. Fiber service drop must not attach to electric service weatherhead.
3. Sag from point of origin at pole to attachment on house shall be (1% of length of drop) whenever possible while meeting NESC minimum clearances
4. Space cable clips approximately 3' apart or as required to securely fasten fiber to side of home, NEVER USE STAPLES
5. While securing cable to building, follow the architectural details of the building, running down corners and across at beams and seems of siding.
6. Bend diameters of fiber drop shall not exceed manufacturers recommendation for bend radius
7. Locate ONT housing a minimum of 12" from electric meter base and 3' - 6' above ground level.
8. When an additional pole or service pole is utilized to route the drop, install an identification tag on service drop fiber at each pole(s)., Ensure that the fiber service drop meets NESC minimum clearances to electric and other communication lines.



National Electric Code Minimum Clearance Requirements	
Communication Service Drop to Electric Service Wire in Span	12"
Clearance Over Driveways, Areas Subject to Truck Traffic	15'-6"
Clearance Over City and County Roads*	15'-6"
Clearance Over Washington State Highways - Joint use with Electric	20'
Clearance Over Washington State Highways - Communications Only	24'
Clearance over Pedestrian Traffic Only	12"
Minimum Clearance Lowest Electric to Communications at Pole	40"
Electric Service Drops to Communication Service Drops at Midspan	12"
Vertical Spacing from Comm to Comm at Pole	12"

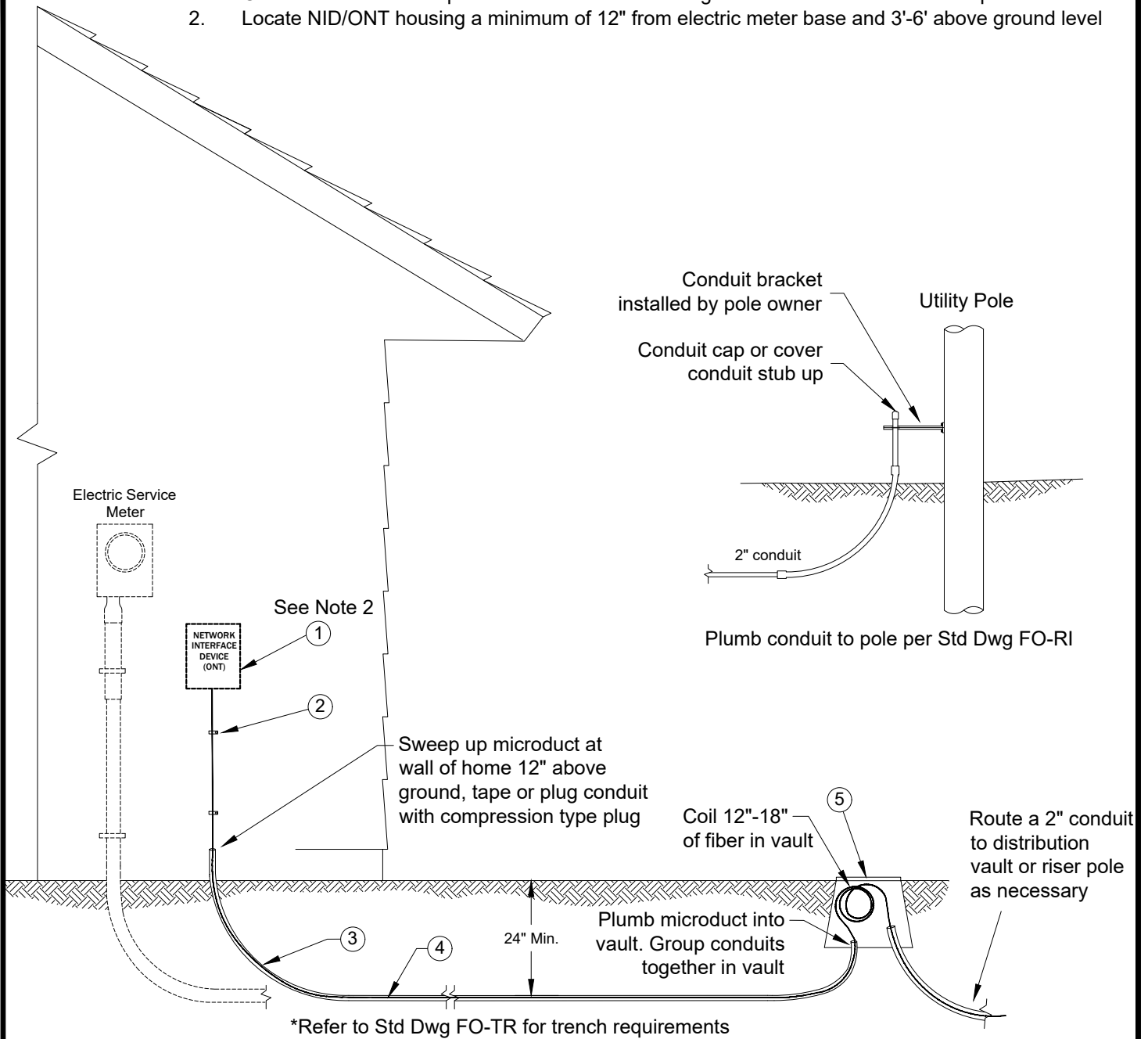
*Additional City and County Minimum Clearance Requirements may Apply.

REQUIRED MATERIAL

ITEM	DESCRIPTION
1	NETWORK INTERFACE DEVICE (NID, ONT HOUSING)
2	3MM FLAT DROP FIBER OPTIC CABLE
3	HOUSE ATTACHMENT
4	WEDGE CLAMP
5	CABLE CLIPS

GENERAL REQUIREMENTS FOR UNDERGROUND FIBER INSTALLATION

1. Conduit route from the point of connection to building should follow the most direct path available
2. Locate NID/ONT housing a minimum of 12" from electric meter base and 3'-6" above ground level



REQUIRED MATERIAL

ITEM	DESCRIPTION
1	OUTDOOR OPTICAL NETWORK TERMINAL (ONT) HOUSING
2	CABLE CLIPS
3	18/14 3/4" LOCATABLE MICRODUCT, WITH PULL STRING
4	3MM FLAT DROP FIBER OPTIC CABLE
5	FIBER HANDHOLE "FLOWERPOT"

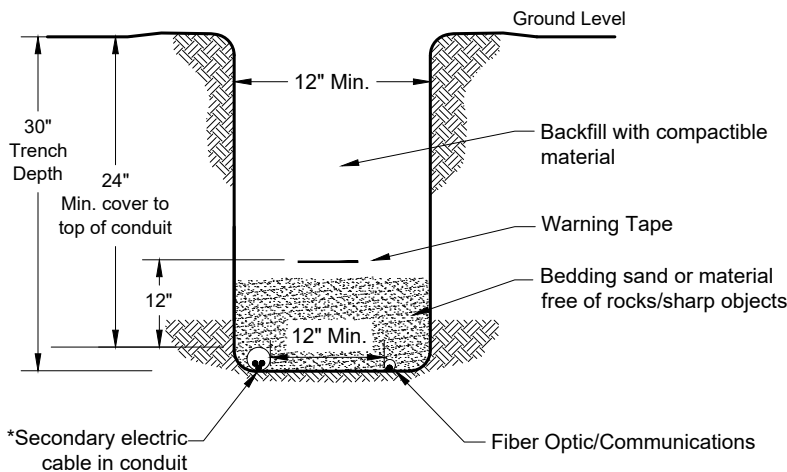
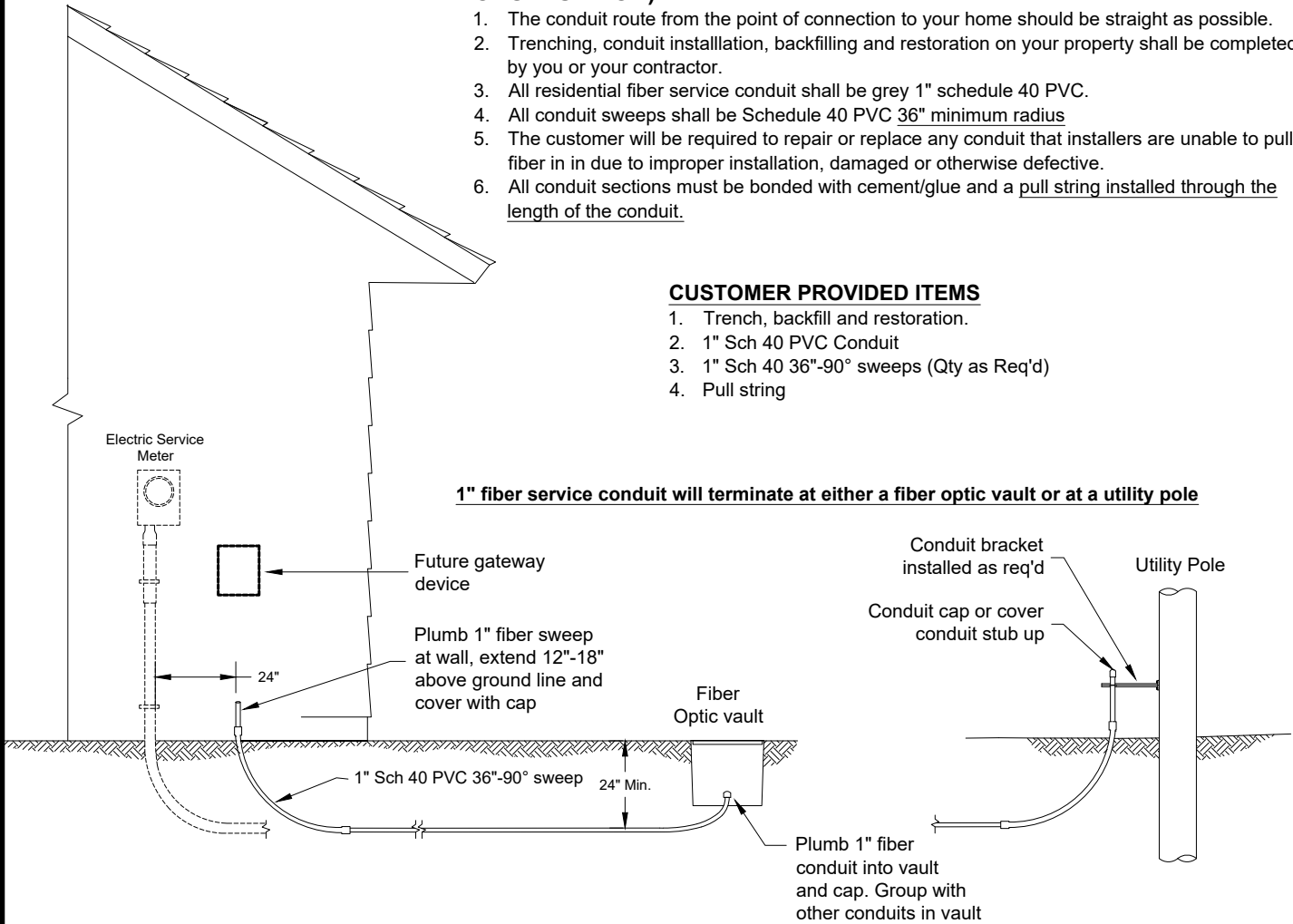
GENERAL REQUIREMENTS FOR FIBER CONDUIT INSTALLATION (NEW CONSTRUCTION)

1. The conduit route from the point of connection to your home should be straight as possible.
2. Trenching, conduit installation, backfilling and restoration on your property shall be completed by you or your contractor.
3. All residential fiber service conduit shall be grey 1" schedule 40 PVC.
4. All conduit sweeps shall be Schedule 40 PVC 36" minimum radius
5. The customer will be required to repair or replace any conduit that installers are unable to pull fiber in in due to improper installation, damaged or otherwise defective.
6. All conduit sections must be bonded with cement/glue and a pull string installed through the length of the conduit.

CUSTOMER PROVIDED ITEMS

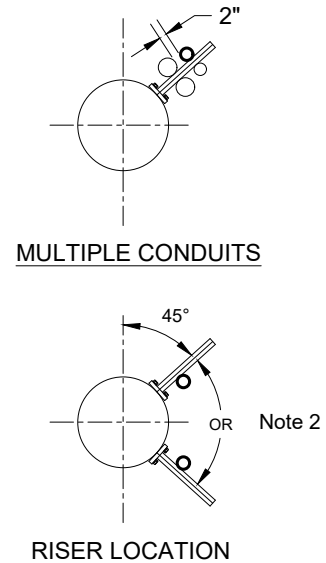
1. Trench, backfill and restoration.
2. 1" Sch 40 PVC Conduit
3. 1" Sch 40 36"-90° sweeps (Qty as Req'd)
4. Pull string

1" fiber service conduit will terminate at either a fiber optic vault or at a utility pole



JOINT TRENCH SECONDARY VOLTAGE ELECTRIC CABLE & FIBER CROSS SECTION

*Refer to utility owners electric trench details for electric service conduit installation requirements.



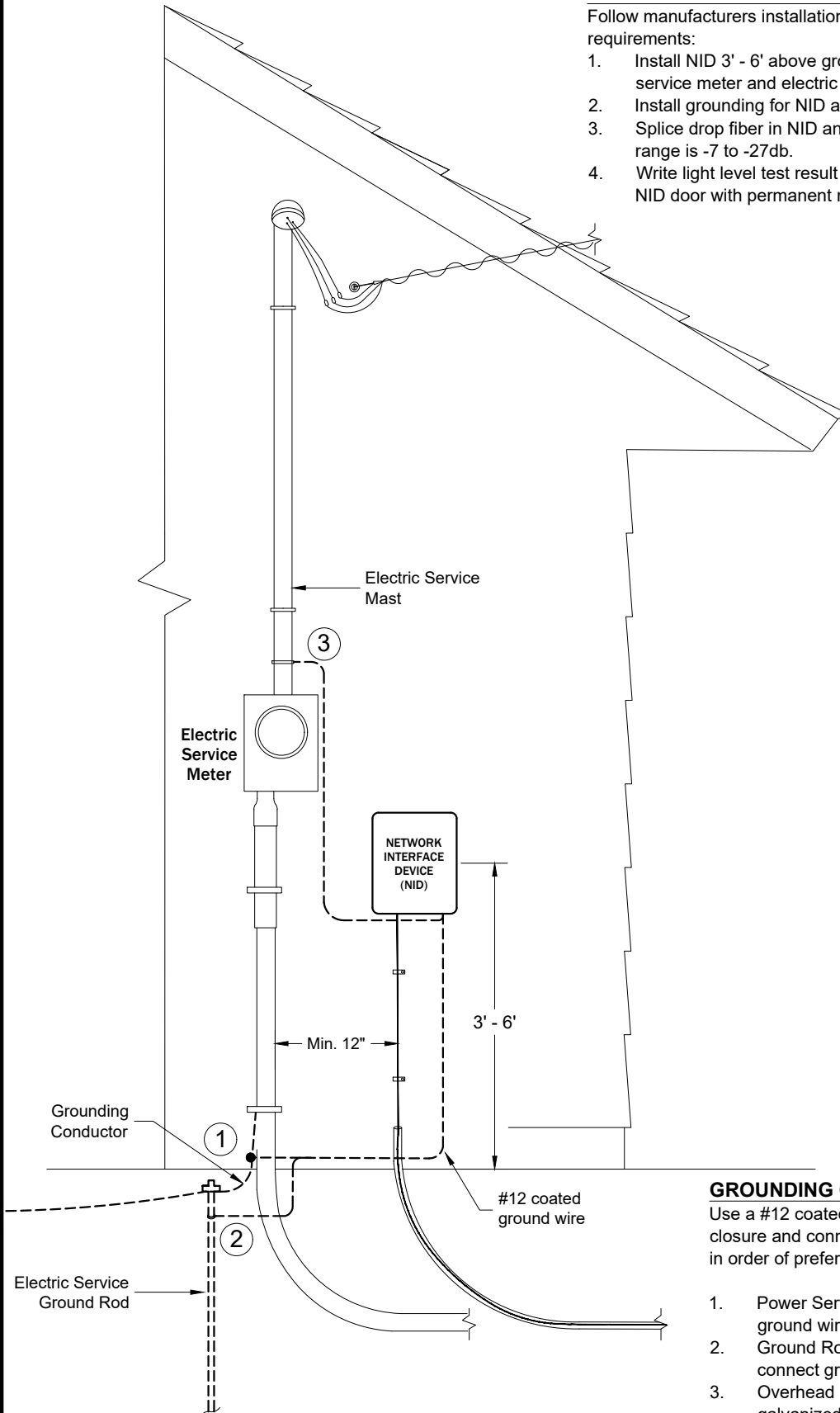
RISER INSTALLATION NOTES

1. If riser brackets exist on pole, stub up conduit at existing brackets.
2. If riser brackets do not exist, verify proper quadrant for conduit placement with Engineering.

NETWORK INTERFACE DEVICE (NID) INSTALLATION

Follow manufacturers installation instructions in addition to these requirements:

1. Install NID 3' - 6' above ground and a minimum of 12" from electric service meter and electric service conduit(s)
2. Install grounding for NID as shown below.
3. Splice drop fiber in NID and test light level. Acceptable light level range is -7 to -27db.
4. Write light level test result and OFDC port number legibly on inside of NID door with permanent marker.



GROUNDING OF ONT CLOSURE

Use a #12 coated ground wire from grounding clamp in closure and connect to one of the following locations (listed in order of preference)

1. Power Service Ground: Use split bolt to connect ground wire to existing service ground
2. Ground Rod Clamp: Use 5/8" ground rod clamp to connect ground wire to existing or new ground rod.
3. Overhead Service Entrance Mast: Use a 12" galvanized bonding strap, strap ground wire to mast.