OVERHEAD DISTRIBUTION STANDARDS

TITLE	TITLE
PURPOSE	**RISER POLES STANDARDS**
DRAWING STANDARDS	1. PRIMARY RISER INSTALLATION UNDERGROUND CREWS
MATERIALS & COMPATIBLE UNITS	2. PRIMARY RISER INSTALLATION OVERHEAD LINE CREWS
GROUNDING	3. SECONDARY RISER INSTALLATIONS
TRANSFORMERS	**PROTECTION**
CLEARANCES	1. HOOK STICK OPERATED DISCONNECT SWITCHES
SAG TABLES	2. 3-PHASE GANG OPERATED LOAD BREAK SWITCHES (LBS)
1. ACSR FULL TENSION	3. DISTRIBUTION AUTOMATION SWITCHES (DAS)
2. ACSR REDUCED TENSION	4. RECLOSERS
3. ACSR SLACK SPAN	**COMMUNICATIONS STANDARDS**
POLES, ANCHORS & GUYING STANDARDS	1. FIBER OPTICS
1. POLES	2. ANTENNAS
2. ANCHORS & GUYS	3. RADIO REPEATER STATION
DISTRIBUTION FRAMING	4. SAG TABLES - MESSENGER W/FIBER CABLE
1. FRAMING SPACING	**CAPACITORS**
2. GENERAL FRAMING INSTRUCTIONS	1. SMART-GRID CAP-BANK, HORIZONTAL FRAMING
3. SINGLE PHASE FRAMING STANDARDS	2. SMART-GRID CAP-BANK, VERTICAL FRAMING
4. TWO PHASE FRAMING STANDARDS	**PLATFORM SUBSTATIONS STANDARDS**
5. THREE PHASE FRAMING STANDARDS	1. CUSTOMER SUBSTATION, 3-PHASE BANK, PLATFORM FRAMING
6. NEUTRAL, SECONDARY & MESSENGER STANDARDS	2. STEP-DOWN SUBSTATION, UNDER-BUILT CIRCUIT, PLATFORM FRAMING
a. SAG TABLES, MULTIPLEX SERVICE DROP, FULL TENSION	3. STEP-DOWN, OPEN B'TWN CIRCUITS, PLATFORM FRAMING
b. SAG TABLES, MULTIPLEX SERVICE DROP, SLACK TENSION	**BANDING EQUIPMENT STANDARDS**
c. SAG TABLES, MULTIPLEX SECONDARY	**TRANSMISSION STANDARDS**
d. SAG TABLES, MESSENGER WITH SECONDARY	1. 69KV SUB-TRANSMISSION, SINGLE ACSR CONDUCTOR FRAMING SECTION
7. AERIAL CABLE STANDARDS	2. 69KV SUB-TRANSMISSION, BUNDLE ACSR CONDUCTOR FRAMING SECTION
LIGHTING	3. 69KV SUB-TRANSMISSION, SINGLE ACSS CONDUCTOR FRAMING SECTION
AERIAL MARKERS	**PRIMARY METERING**

PURPOSE

Purpose

The purpose of this Distribution Standards manual is to provide the basis for standardized, uniform, and consistent engineering, construction and maintenance practices for the Nashville Electric Service (NES) system. The contents of this manual contain minimum requirements used in designing and building a reliable, cost-effective, operable and maintainable distribution system that is to be used in combination with existing facilities.

Scope

The construction standards in this Manual are intended for new installations of electric distribution equipment. Existing overhead and underground facilities are not required to be modified or replaced based on the contents of this manual. However, any additions, alterations, or replacements to existing facilities must comply with both (1) the National Electrical Safety Code (NESC) rules and (2) the construction standards outlined in this Manual.

For situations not covered by this Manual, construction personnel should consult with NES Operating/Engineering Authorities to ensure compliance with NESC Rules and industry best practices.

Intent

Requirements in this manual are mandatory unless otherwise noted. Where a requirement is stated preferred is to be followed insofar as practical. Material and equipment depicted may be somewhat different, but shall have the same function, as provided using the stock numbers and compatible units in this manual.

Requirements in this manual are regarded as mandatory, unless otherwise noted. When a requirement is stated as “preferred”, it shall be followed insofar as practical. Material and equipment depicted may be somewhat different due to material availability or field conditions but shall have the same function.

Authorization

This manual was prepared under the direction of the NES Engineering Department for utilization in the design, construction, operation, and maintenance of the electric distribution facilities of the operating NES system. It is based upon the latest edition of the National Electrical Safety Code (NESC). And is to be used in conjunction with the applicable edition of the NESC and other codes and standards established. The requirements of the applicable codes and standards established by regulatory authority may supersede requirements in this manual or may establish additional requirements not contained herein.

This manual is provided for the exclusive use of the construction of NES facilities by their employees, contractors or other approved parties and is not to be copied or distributed to others without expressed written approval. NES accepts no responsibility for the unauthorized use of the content of this manual.

DRAWING STANDARDS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
3/23/26	Cedric Short	Ronald Reasonover	Tony Richman
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
DRAWING SYMBOLS POLES & ANCHORS	2			
DRAWING SYMBOLS OVERHEAD EQUIPMENT	3			
DRAWING SYMBOLS UNDERGROUND EQUIPMENT	4			
DRAWING ONE-LINE DIAGRAMS UG PMH SWITCHES	5			
DRAWING ONE-LINE DIAGRAMS UG VISTA SWITCHES	6			
DRAWING NOTATIONS FOR EQUIPMENT INSTALLATION	7			
PRIMARY CIRCUIT TYPE SYMBOL NOTATION	8			
1-PHASE TRANSFORMER PHASING, ARRESTER & WIRE NOTATIONS	9			
BASE MAP DRAWING LINES & SYMBOLS	10			
DRAWING SYMBOLS LINE PHASING	11			
STANDARD DRAWING LIGHTING SYMBOLS	12			

EXISTING BLACK	NEW RED	REMOVE GREEN	TEMP BLUE	FUTURE MAGENTA	DRAWING EXAMPLES	DESCRIPTIONS
○	●	○ R	●	●	OPW50-C1 POLE NUMBER R-PW45	INSTALL NES 50-FT CLASS 1 WOOD POLE & REMOVE 45-FT WOOD POLE
○	●	○ R		●	OPC50-H1 POLE NUMBER R-PC50	INSTALL NES 50-FT CLASS H1 CONCRETE POLE & REMOVE 50-FT CONCRETE POLE
⯃	⯃	⯃ R		⯃	OPS50-H1 POLE NUMBER R-PS50	INSTALL NES 55-FT CLASS H1 STEEL POLE & REMOVE 50-FT STEEL POLE
⯃	⯃	⯃ R		⯃	OPR50-H3 POLE NUMBER R-PR50	INSTALL NES 60-FT CLASS H3 WEATHERING STEEL POLE & REMOVE 50-FT WEATHERING STEEL POLE
⊗	⊗	⊗ R		⊗	ATT50-C3 POLE NUMBER ATT R-45	AT&T TO INSTALL 50-FT CLASS 3 WOOD POLE & AT&T TO REMOVE 45-FT WOOD POLE
⊠	⊠	⊠ R		⊠		STEEL NES TOWER
I	I	I R		I		NES STEEL I-BEAM STUB
→	→	→ R	→	→	9'L 28M 1-12M-SDWK w/120" FGI @ BK 1-12M-SDWK w/54" FGI @ NEUT ATTACH 8' SDWK BRACE @ 13'	• LEAD = DISTANCE IN FEET FROM BASE OF POLE TO THE ANCHOR, ANC SIZE = HOLDING CAPACITY OF ANCHOR IN THOUSANDS OF POUNDS, _M = DOWN GUY SIZE IN HOLDING CAPACITY • SDWK INDICATES INSTALL SIDEWALK BRACE GUYING • INSTALL THE SIDEWALK GUY BRACE ATTACHMENT HEIGHT & LENGTH AS NOTED.
⊰	⊰	⊰ R		⊰	TEL	JOINT-USE ANCHOR SET BY TELEPHONE COMPANY
⊰ ⊰					XXX (I or R)-# & SIZE OF GUYS	**ADD OR REMOVE A GUY FROM AN EXISTING ANCHOR.** **XXX- EXISITING TRIPLE-EYE ANCHOR (28M)** **XX-EXISITING TWIN-EYE ANCHOR (15M)** **X- EXISITING SINGLE-EYE ANCHOR (DO NOT USE)**

POLE SETTING DEPTH	SETTING DEPTH 9 FT

POLE RAKING NOTE	RAKE 6" →

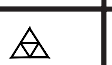
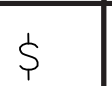
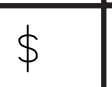
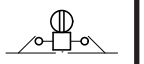
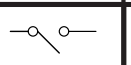
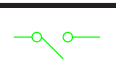
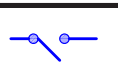
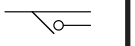
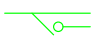
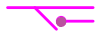
ANGLE OF DEVIATION	4 = 5°

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

DRAWING STANDARDS

NES

DRAWING SYMBOLS POLES & ANCHORS

EXISTING BLACK	NEW RED	REMOVE GREEN	TEMP BLUE	FUTURE MAGENTA	EXAMPLE NOTATIONS	DESCRIPTIONS
					I-25kVA R-25	1Ø OVHD TRANSFORMER kVA SIZE
					I-112kVA 120/208V	3Ø OVHD TRANSFORMER kVA SIZE & SECONARY VOLTAGE
					I-3-100kVA 277/480V	3Ø OVHD BANK XMFR'S kVA SIZE & SECONDARY VOLTAGE OF EACH UNIT
					SW# _____ I – 600 AMP LBS NORMALLY OPEN (CHECK WITH OPERATIONS)	INSTALL 600 AMP GANG OPERATED LOAD BREAK SWITCH
					I– 1 – LBU(S) W/ 100A BARREL(S) FUSED ____ AMPS.	INSTALL 100 AMP LBU & FUSE SIZE
					I– 1 – LBU(S) W/ 300A BLADE(S)	INSTALL 300 AMP LBU WITH BLADES
					I-800A NOVA	OIL SWITCH OR RECLOSER
					SEE THE SWITCH SECTION	MOTOR OPERATED SWITCH SIZE AND ADD ANTENNA SYMBOL IF REMOTE OPERATION IS REQUIRED
					I - 3 -1200A IN-LINE N.O	INSTALL 1200 AMP IN LINE DISC. (NORMALLY OPEN)
					I - 3 -900A LINE TAP	INSTALL 900 AMP LINE TAP DISC.
					I-ANTENNA @ 42' MINIMUM	ANTENNA SYMBOL FOR A REMOTELY OPERATED SWITCH WITH MOUNTING HEIGHT
					SEE THE SWITCH SECTION	3-SHOT TRIPSAVER QUANTITY & SIZE
					I-3-18kV ARR.	PRIMARY LINE ARRESTER WITH GROUNDING ELECTRODE PER QUANTITY AND VOLTAGE
					I-3-200kVAR	CAPACITOR BANK QUANTITY & kVAR SIZE
					I-PM-(1, 2 OR 3)	PRIMARY METER

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

DRAWING STANDARDS

NES

DRAWING SYMBOLS OVERHEAD EQUIPMENT

EXISITING BLACK	NEW RED	REMOVE GREEN	TEMP BLUE	FUTURE MAGENTA	EXAMPLE NOTATIONS	DESCRIPTIONS
SPB	SPB	SPB R	SPB	SPB		SECONDARY PULL BOX
PPB	PPB	PPB R	PPB	PPB		PRIMARY PULL BOX
TC	TC	TC R	TC	TC	UDP 1 1PHASE–4POLE 000–00–000	1PH TERM CABINET
TC	TC	TC R	TC	TC	UDP 1 3PHASE–4POLE 000–00–000	2PH OR 3PH TERM CABINET
S	S	S R	S	S	UDP 1 PMH–6 000–00–000 USE PAD DETAIL UGS–0008 REV A	UG DISTRIBUTION SWITCH
MH	MH	R MH	MH	MH	MH-1	MANHOLE LARGE RECTANGULAR WITH NUMBER
MH	MH	R MH	MH	MH	MH-2	MANHOLE LARGE OCTAGONAL WITH NUMBER
		R			UDP 1 75 000–00–000	1Ø UGRD TRANS- FORMER 14.4/24.9kV to 120/240V PAD # & kVA SIZE
		R			UDP 1 150 kVA 23.9kV 125/216V 000–00–000 FUSE 50 AMPS USE PAD DETAIL UGS–005	3Ø UGRD TRANSFORMER PAD #, kVA SIZE PRMI./SEC. VOLTAGES AS NOTED
			COLOR BLUE			TEMPORARY SERVICE PEDESTAL FOR TEMPORARY UNDERGROUND SERVICES.
					1-3 50'	CONDUIT STUB-OUT FOR FUTURE EXTENSIONS WITH QUANTITY, DIAMETER AND LENGTH
		R			#1AL 200' 1–2.5"	UNDERGROUND PRIMARY CABLE. STATE CABLE SIZE, LENGTH, NUMBER OF CONDUITS AND THE DIAMETER.
					FEED-THRU	FEED THROUGH BUSHING TO BE INSTALLED ON PAD MOUNTED TRANSFORMERS TO PROVIDE Y SPLICE.
6	6					SECONDARY TO A MULTIPLE METER POINT. INDICATE BUILDING NUMBER, WIRE SIZE, CONDUIT SIZE AND LENGTH AND NUMBER OF METERS.

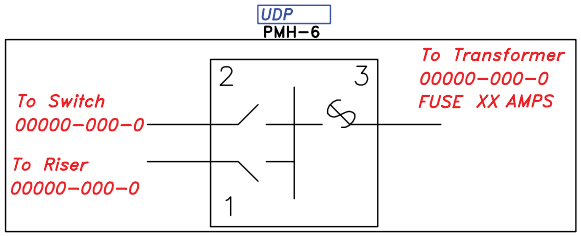
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

DRAWING STANDARDS

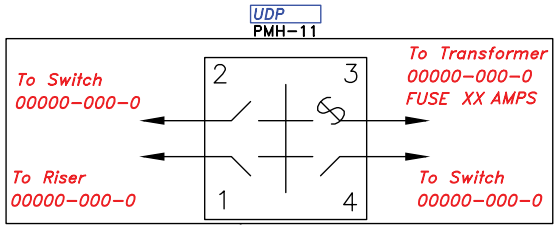
NES

DRAWING SYMBOLS UNDERGROUND EQUIPMENT

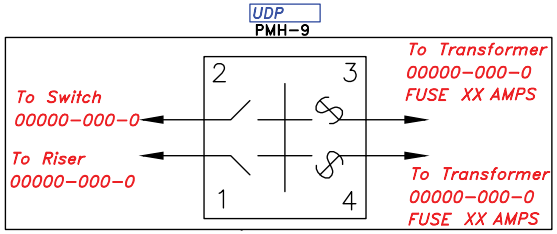
PMH–6
ONE–LINE
NOTES



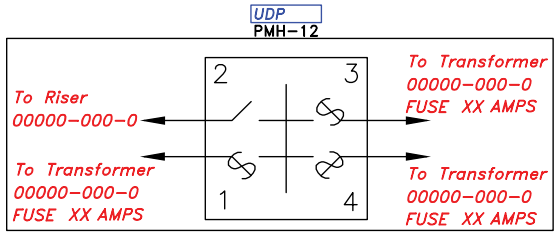
PMH–11
ONE–LINE
NOTES



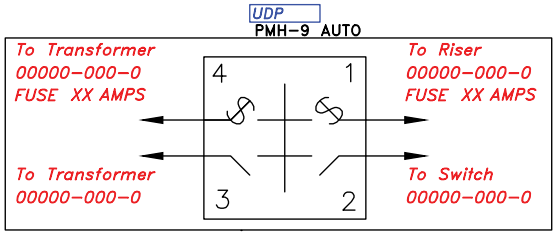
PMH–9
ONE–LINE
NOTES



PMH–12
ONE–LINE
NOTES



PMH–9 AUTO
ONE–LINE
NOTES



UDP 1
PMH–6
000–00–000
USE PAD DETAIL
UGS–0008 REV A

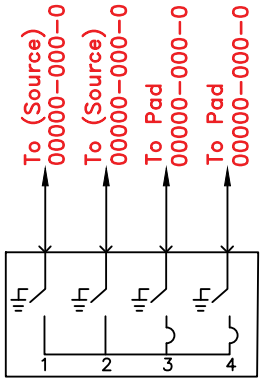
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

DRAWING STANDARDS

NES

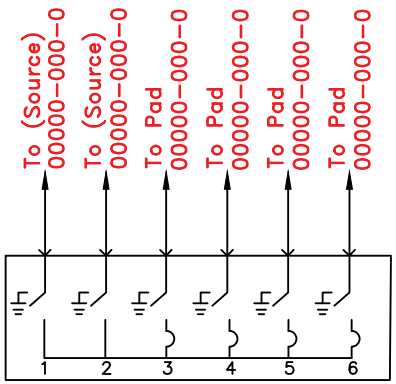
DRAWING ONE-LINE DIAGRAMS
UG PMH SWITCHES

VISTA 422
ONE-LINE
NOTES



VISTA 422
xxx-xx-xxx

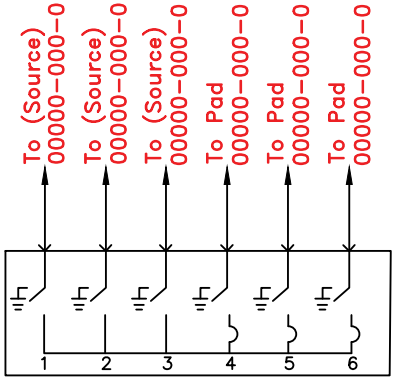
VISTA 624
ONE-LINE
NOTES



VISTA 624
xxx-xx-xxx

UDP 1
VISTA 422
086-31-957
USE PAD DETAIL
UGS-00032B

VISTA 633
ONE-LINE
NOTES



VISTA 633
xxx-xx-xxx

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

DRAWING STANDARDS

NES

DRAWING ONE-LINE DIAGRAMS
UG VISTA SWITCHES

SYMBOLS	DESCRIPTIONS
ODP 1	OVERHEAD DESIGN POINT LOCATION INDICATED ON DRAWING WITH INSTRUCTIONS FOR EQUIPMENT INSTALLATION OR REMOVAL
UDP 1	UNDERGROUND DESIGN POINT LOCATION INDICATED ON DRAWING
000-00-000	EXISTING POLE OR PAD NUMBER: (000-) DESIGNATES THE MAP NUMBER (00-) BLOCK NUMBER WITHIN THE MAP, (000) UNIQUE POLE OR PAD NUMBER.
ODP 1 OPW50-C1 000-00-000 TOP FRAMING 2ND FRAMING 3RD FRAMING R-PW45	OVERHEAD DESIGN POINT INDICATING POLE SIZE, NUMBER, FRAMING FROM TOP DOWN AT A SPECIFIC LOCATION. LIST REMOVAL POLE INFO FOR PLANT REMOVALS
LDP1 000-00-000 SL/6/150	LIGHTING DESIGN POINT. INDICATES THE LIGHTING REQUIREMENTS AT EACH LOCATION ON THE CONSTRUCTION DIAGRAM.
I-2N2ACSR 125'	INSTALL #2 ACSR WITH #2 NEUTRAL WITH SPAN LENGTH
ODP 1 TO ODP 2 I-RS200 - 795 - 3000 I-RS200 - 477 - 2200	OVHD CONDUCTOR INSTALLATION STRINGING CHART(S) PER RULING SPAN, CONDUCTOR & MEDIUM LOADING DESIGN TENSION. SECOND LINE IDENTIFIES THE NEUTRAL CONDUCTOR (SEE PRIMARY SAG TABLES SECTION FOR ALTERNATE NOTATIONS USED)

EXISTING	NEW	REMOVE	TEMP	FUTURE	DESCRIPTIONS
		R			1Ø, 2Ø or 3Ø 4kV W/Neutral
		R			1Ø, 2Ø or 3Ø 13.8/7.96kV W/Neutral
		R			1Ø, 2Ø or 3Ø 23.9kV W/Neutral
		R			3Ø 69kV W/ Static Wire
		R			3Ø 161kV W/ Static Wire
		R			NEUTRAL, SERVICE WIRE, MESSENGER AND NES COMMUNICATION CABLES
		R R			SPAN GUYS NOTATION: (12M SG)
		R		1Ø, 2Ø or 3Ø 5kV Aerial Cable (REMOVAL ONLY)	
2N2ACSR	I-2N2ACSR	R-2N2ACSR	T-2N2ACSR		WIRE SIZE NOTATION SEE NOTES BELOW

Indicate conductor size at regular intervals along the line or in a construction note on drawings where only one wire size is used. Indicate phasing at regular intervals and at every corner. Denote wire size as follows:
(_)-{_}N{_}ACSR FOR ACSR OR AAC. (_)-{_}N{_}CU FOR BSD OR BHD COPPER
(_)-{_}N{_}ALAC FOR AERIAL CABLE
(_)-{_}AT FOR TRIPLEX SERVICE WIRE (_)-{_}AQ FOR QUADRAPLEX SERVICE WIRE
Use notation (I-2-4/0AQ) PARALLEL for multiple service wire runs.
(_)-{_}OPW CU FOR OPEN WIRE COPPER SECONDARY SERVICE WIRES.
NOTE SPAN LENGHTS IN EACH SPAN.

A B C	A B C	PHASING - CROSSARM CONSTRUCTION	THREE PHASE LINE, STANDARD CONSTRUCTIONAND THREE PHASE LINE WITH NEUTRALON THE CROSSARM
A B C top	top A B C top	PHASING - VERTICAL CONSTRUCTION	VERTICAL THREE PHASE LINE WITH TOP DOWN PHASE ROTATION
A C	A C	PHASING - CROSSARM CONSTRUCTION	TWO PHASE LINE OR SINGLE PHASE LINE WITH THE NEUTRAL ON THE CROSSARM
A C top	top A C top	PHASING - VERTICAL CONSTRUCTION	VERTICAL TWO PHASE LINE WITH TOP DOWN PHASE ROTATION
A	A	PHASING - VERTICAL CONSTRUCTION	SINGLE PHASE LINE
		CONDUCTOR DEADEND	INDICATE SURGE ARRESTER TYPE ON DRAWING
		CONDUCTOR DEADEND WITH CIRCUIT OPEN	INDICATE SURGE ARRESTER TYPE ON DRAWING
		CONDUCTOR DEADEND WITH CLOSED CIRCUIT	
		CHANGE IN CONDUCTOR SIZE AND/OR # OF Ø	
		MESSENGER WITH SERVICE	SIZE INDICATED ON DRAWING (12M-MESS)

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

DRAWING STANDARDS

NES

PRIMARY CIRCUIT TYPE SYMBOL NOTATION

EXISTING	NEW	DESCRIPTIONS	
	1	TRANSFORMER STOCK NUMBER AND TAP SETTING INDICATOR.	TABLE OF STOCK NUMBERS AND TAP SETTINGS IS ON DRAWING(S)
A	A	4kV & 23.9kV TRANSFORMER PHASE INDICATION.	USED ONLY ON MULTIPHASE CIRCUITS. MAY BE A, B OR C
A C	A C	13.8kV TRANSFORMER PHASE INDICATION.	USED ONLY ON MULTIPHASE CIRCUITS. MAY BE A, B OR C
	I-3-12kV	INDICATES INSTALLING QUANTITY & VOLTAGE OF PRIMARY ARRESTER WITH DRIVEN GROUND ROD OR EQUIVALENT ELEC-TRODE. SYMBOL ONLY REQUIRED WITH TRANSFORMERS OR EQUIPMENT WITHOUT MULTI-GROUNDED NEUTRAL.	

EXISTING	NEW	REMOVE	TEMP	DESCRIPTIONS
FIB	FIB	R-FIB		INSTALL NES FIBER OPTIC CABLE PER TYPE WITH SPAN LENGTH EXAMPLE: I-12M W/ 96CT 150'
CC		R-CC		COPPER CONTROL CABLE
1/0ALAC	I-1/0ALAC	R-1/0ALAC		INDICATES WIRE SIZE ON DRAWINGS AERIAL CABLE INSTALLATION
12M MESS	I-12M MESS	R-12M MESS		12M MESSENGER NOTATION (6M NOT TO BE INSTALLED AS MESSENGER)
3-4/0AQ PARALLEL	I-3-4/0AQ PARALLEL	R-3-4/0AQ PARALLEL	T-3-4/0AQ PARALLEL	NOTATION FOR PARALLEL SERVICE WIRES
4/0AQ	I-4/0AQ	R-4/0AQ	T-4/0AQ	NOTATION FOR SERVICE WIRES

CONSTRUCTION NOTE(S):

GENERAL CONSTRUCTION NOTE BOX FOR NON-STANDARD DIRECTION.

CAUTION NOTES TO EMPHASIZE HAZARDS TO BE MADE IN RED.

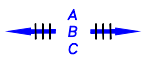
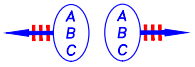
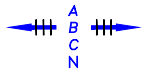
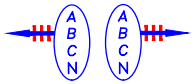
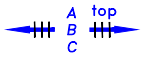
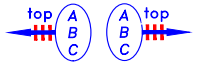
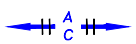
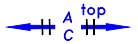
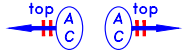
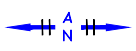
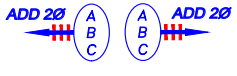
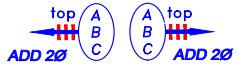
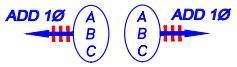
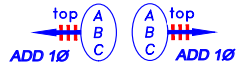
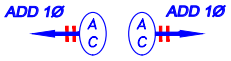
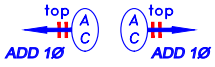
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

DRAWING STANDARDS

NES

1P TRANSFORMER PHASING, ARRESTER & WIRE NOTATIONS

SYMBOL	DESCRIPTIONS
CP	CUSTOMER POLE
TVA	TVA TOWER WITH NUMBER PROVIDED BY GIS MAPPING FOR COORDINATION BETWEEN SYSTEM OPERATIONS AND TVA DISPACT
TVA	TVA CIRCUIT NAME PROVIDED BY GIS MAPPING
X X	FENCE LINE
PL	PROPERTY LINE
ROW	RIGHT-OF-WAY LINE
	RAILROAD - SINGLE TRACK
	RAILROAD - DOUBLE TRACK
	STREET BOUNDARIES
W	WATER LINES
S	SEWER LINES
T	UNDERGROUND COMMUNICATIONS
G	GAS LINES
	TRIM TREES TO CLEAR LINES, STATE IF PERMISSION WAS OBTAINED ALONG WITH THE PROPERTY OWNER'S NAME AND TELEPHONE NUMBER
N	NORTH ARROW INDICATING DIRECTION ON DRAWING
FUTURE	FUTURE NES FACILITIES. DRAW THE APPROPRIATE SYMBOL USING THE LINE TYPE AND FUTURE EQUIPMENT AUTOCAD LAYER. (MAGENTA COLOR)
TP	TRAFFIC AND PARKING SIGNAL POLE
	ROADWAY SIGNAGE AND BILLBOARDS
TEMP	CUSTOMER TEMPORARY METER STRUCTURE LOCATION

EXISTING	NEW	DESCRIPTIONS
		3Ø CROSSARM CONSTRUCTION
		3Ø CROSSARM CONSTRUCTION NEUTRAL ON THE ARM
		3Ø VERTICAL CONSTRUCTION
		2Ø CROSSARM CONSTRUCTION
		2Ø VERTICAL CONSTRUCTION
		1Ø VERTICAL CONSTRUCTION
		1Ø CROSSARM CONSTRUCTION NEUTRAL ON THE ARM
		1Ø TRANSFORMER 4, 7.96 & 23.9kV PRIMARY
		1Ø TRANSFORMER 13.8kV PRIMARY
		3Ø CROSSARM CONSTRUCTION, ADD 2Ø TO EXISTING 1Ø
		3Ø VERTICAL CONSTRUCTION ADD 2Ø TO EXISTING 1Ø
		3Ø CROSSARM CONSTRUCTION, ADD 1Ø TO EXISTING 2Ø
		3Ø VERTICAL CONSTRUCTION ADD 1Ø TO EXISTING 2Ø
		2Ø CROSSARM CONSTRUCTION NEUTRAL BELOW ARM, ADD 1Ø TO EXISTING 1Ø
		2Ø VERTICAL CONSTRUCTION ADD 1Ø TO EXISTING 1Ø

Note: Distribution Planning to provide phasing information

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

DRAWING STANDARDS

NES

DRAWING SYMBOLS
LINE PHASING

EXISTING BLACK	NEW RED	REMOVE GREEN	TEMP BLUE	FUTURE MAGENTA	EXAMPLE NOTATIONS	DESCRIPTIONS
					SL/6/250	STREET LIGHT / MASTARM LENGTH / WATTAGE
					LSTAND/AL/27 POLE NUMBER SL/8/150	STREET LIGHT & MASTARM MTD ON ALUMINUM POLE
					LPW35 POLE NUMBER P400/2	PRIVATE LIGHT & MASTARM MOUNTED ON WOOD POLE
					INSTALLED BY OTHERS MAINTAINED BY NES	HIGH MAST INTERSTATE LIGHT
					SL/250/MONGOOSE	MONGOOSE
					LSTD-HADCO-16 POLE NUMBER L15HPS-H/ACORN/BL/V	DECORATIVE
						OFFSET
					SL/1000/FLOOD	FLOOD
						HIGH MAST
					SL/150/WALLPACK	WALL PACK
					SL/250/SHOE BOX	SHOE BOX
					LRE-2P60A-PC	CONTROL STATION
						DISCONNECT

LIGHTING REMOVAL NOTATION:
The notation for lighting removals will be R_-P_HHC# The first_being light type, P(private) or L (street light). The second_will be pole type W (Wood) or S (steel) the actual pole height and class will follow.

Example: RL-PW40 or RP-PW35

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

DRAWING STANDARDS

NES

STANDARD DRAWING LIGHTING SYMBOLS

MATERIALS AND COMPATIBLE UNITS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
3/23/26	Cedric Short	Ronald Reasonover	Tony Richman
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
DISTRIBUTION INSULATORS - STANDARD INSULATION LEVELS	2			
DISTRIBUTION INSULATORS - STANDARD INSULATION APPLICATIONS	3			
TYPICAL MATERIALS - CONDUCTOR CLAMPS	4			
TYPICAL MATERIALS - GUY MATERIALS	5			
TYPICAL MATERIALS - SECONDARY AND NEUTRAL SUPPORTS	6			
BOLTED CONNECTIONS - STANDARD INSTALLATION REQUIREMENTS	7			
A307 BOLT DETAIL W/DBL COIL SPRING WASHER	8			
CROSSARM AND BRACE STOCK LISTING	9			
WOOD CROSSARM DETAIL	10			
TANGENT FIBERGLASS CROSSARM DETAIL	11			
DEAD-END FIBERGLASS CROSSARM DETAIL	12			
TANGENT STEEL CROSSARM DETAIL	13			
DEAD-END STEEL CROSSARM DETAIL	14			
ALLEY ARM STEEL CROSSARM DETAIL	15			
BEARING PLATES FOR STEEL ALLEY ARM, WOOD POLE DETIAL	16			
WILDLIFE PROTECTION	17			

STANDARD INSULATION LEVELS

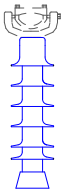
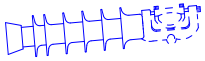
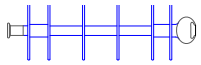
Basic impulse level (BIL) is the degree of insulation necessary to withstand momentary increases in voltage on a powerline. These voltage rises are usually caused by lightning strokes and switching surges. A flashover, or short circuit to the ground, can occur if the voltage exceeds the structure's BIL. In most cases the arcing will continue until a device interrupts the Alternating Current (AC) in the powerline. To reduce the number of these type outages, NES has adopted a standard BIL of 300kV on all distribution circuits. This higher BIL has the added benefit of reducing the number of animal related outages by increasing the separation distances between the conductors and a grounded surface. Even when wet, wood and fiberglass supports add to a structure's overall BIL. The approximate BIL of wood or fiberglass is 100kV/ft. The table below shows NES' standard insulators and the supporting materials on which they may be installed.

INSTALLATION NOTES

A minimum 35kV class insulator must be used whenever distribution lines are attached to conductive structures. Conductive structures are steel support arms, steel poles, and concrete poles. Steel crossarms or conductor supports must be grounded. See the grounding section of the plate book for details.
A 25kV class insulator may be used on non-conductive wood or fiberglass supports and wood poles.

CAUTION

AT DISTRIBUTION VOLTAGES, THE WOOD OR FIBERGLASS SUPPORTS CAN PROVIDE ENOUGH INSULATION TO KEEP THE LINE IN SERVICE EVEN IF THE INSULATOR IS DAMAGED. ALWAYS USE CAUTION WHEN CLIMBING OR APPROACHING ANY UNGROUNDED BRACKETS OR BASES.

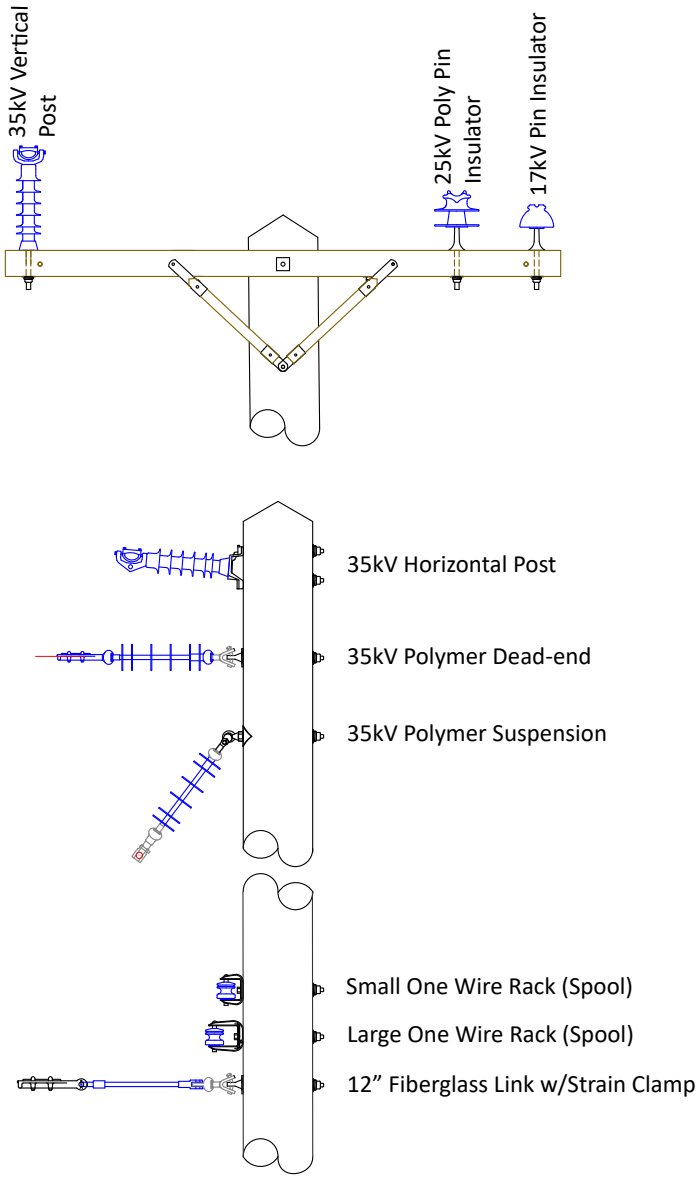
ITEM	NEW INSTALL - INSULATOR DETAILS			
	NAME	BIL KV (pos/neg)	LENGTH	STOCK CODE
	17kV Pin	105/130	4.5”	242100000
	25kV Poly Pin	146/176	5.6”	242190000
	35kV Vert. Post	230/310	16.9	240974000 Note 1
	35kV Horiz. Post	230/310	16.9	240976000 Note 1
	35kV Poly DE & Susp.	320/330	17”	242752000

NOTES

1. See Pg. 4 for **Trunion Clamp** wire size ranges.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

INSULATOR APPLICATIONS			
INSULATOR TYPE	WIRE SIZE	STANDARD APPLICATION	C.U.
17kV Pin	6-477	WOOD CROSSARMS, TO DESIGNATE THE SYSTEM NEUTRAL	N/A
25kV Poly Pin	6-4/0	WOOD AND FIBERGLASS CROSSARMS OR BRACKETS ON WOOD POLES	OI25PN
35kV Vertical Post	6-1351	ALL POLE TYPES ALL CROSSARM TYPES STEEL OR ALUMINUM BRACKETS	OI35VP
35kV Horizontal Post	6-1351	ALL POLE TYPES VERTICAL LINE CONSTRUCTION	OI35HP
35kV Polymer Dead-End	6-1351	ALL POLE TYPES ALL CROSSARM TYPES STEEL OR ALUMINUM BRACKETS	OI35DE
35kV Polymer Suspension	4-1351	ALL POLE TYPES ALL CROSSARM TYPES STEEL OR ALUMINUM BRACKETS	OI35SU
Small One-Wire Rack	6-#2	ALL CROSSARMS AND POLES ON NEUTRALS AND SECONDARIES	OSR1W
Large One-Wire Rack	1/0-795	ALL CROSSARMS AND POLES ON NEUTRALS AND SECONDARIES	OSR1WL
12” Fiberglass Link Stick	477-1351	ALL POLE TYPES	OFGI-12



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

DISTRIBUTION INSULATORS
STANDARD INSULATOR APPLICATIONS

SUSPENSION CLAMPS					
WIRE RANGE	MAX. ANGLE	MAX. LOAD	TORQUE	STOCK CODE	COMP. UNIT
2-4/0	60º	18,000 LBS	40 FT-LBS	221600000	OCLP-SU2-40
336-477	60º	18,000 LBS	40 FT-LBS	221500000	OCLP-SU477
795	60º	25,000 LBS	60 FT-LBS	221620000	OCLP-SU795
1351	60º	25,000 LBS	60 FT-LBS	221624000	OCLP-SU1351

TRUNNION CLAMPS (CLAMP TOPS)					
WIRE RANGE	MAX. ANGLE	MAX. LOAD	TORQUE	STOCK CODE	COMP. UNIT
4 - 4/0	30º	2,800 LBS	40 FT-LBS	221870000	OCLP-TOP4-40
336 - 477	30º	2,800 LBS	40 FT-LBS	221890000	OCLP-TOP477
795 - 1351	30º	2,800 LBS	40 FT-LBS	221900000	OCLP-TOP795

STRAIN CLAMPS (DEAD-END CLAMPS)					
WIRE RANGE	MAX. ANGLE	MAX. LOAD	TORQUE	STOCK CODE	COMP. UNIT
6 - 2/0	N/A	8,000 LBS	40 FT-LBS	221000000	OCLP-STR6-20
4/0 - 477	N/A	10,000 LBS	40 FT-LBS	221040000	OCLP-STR477
795	N/A	12,000 LBS	60 FT-LBS	221080000	OCLP-STR795
1351	N/A	14,000 LBS	60 FT-LBS	221117000	OCLP-STR1351
1/0 - 4/0 CU	N/A	18,000 LBS	60 FT-LBS	221120000	OCLP-STR40CU

FIBERGLASS LINK STICKS				
DESCRIPTION	MAX. TENSION	DWG CODES	STOCK CODE	COMP. UNIT
INSUL GUY STRN/FIB GLASS 54”	21,000 LBS	NONE	240750000	OFGI-54
INSUL GUY STRN/FIB GLASS 120”	21,000 LBS	NONE	240780000	OFGI-120

GUYING NAMING CONVENTIONS			
DESCRIPTION	DWG CODES	STOCK CODE	COMP. UNIT
12,000 LB SPAN GUY, 3/8” EHS GALV	12M-SG	016041000	OGS12
6,000 LB SPAN GUY, 5/16” GALV	6M-SG	016020000	OGS6
12,000 LB DOWN GUY, 3/8” EHS GALV	12M	016041000	OGD12
6,000 LB DOWN GUY, 5/16” UTILITY GALV	6M	016020000	OGD6

Screw Anchor

ANCHORS		SCREW	EXPANDING	ROCK	
DESCRIPTION	DWG CODES	STOCK CODE			COMP. UNIT
28,000 LB HOLDING CAPACITY ANCHOR	28M	180180000	180160000	180300000	OA28M
32,000 LB HOLDING CAPACITY ANCHOR	32M	180200000	180165000	180320000	OA32M

Expansion Anchor

Rock Anchor

NOTES

1. Pole crews may have to substitute anchor types to compensate for subsurface soil conditions.
2. As a standard, engineering will issue screw or power installed anchors with every job.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

MATERIALS AND COMPATIBLE UNITS

NES

TYPICAL MATERIALS
GUY MATERIALS

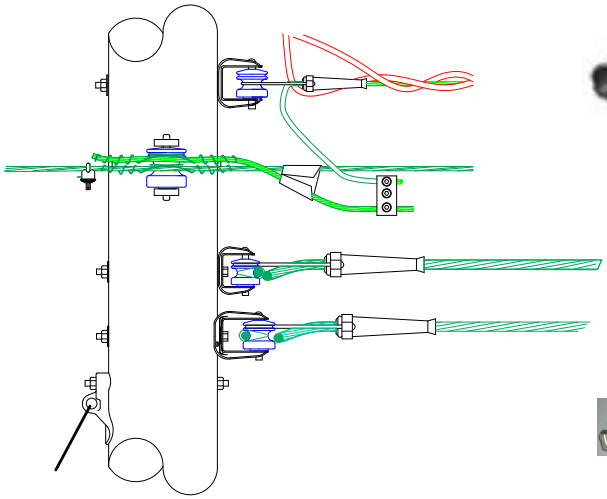
NEUTRAL AND SECONDARY ATTACHMENTS

The system neutral attaches to a pole using a one wire rack. A secondary clevis fitted with a spool insulator constitute a one wire rack, there are two sizes. A **Small Rack,** w/ANSI 53-2 spool is rated at 1,500 lbs. of design tension. The **Large Rack,** w/ANSI 53-4 spool is rated at 2,250 lbs. of design tension.

ATTACHMENT OF WIRES

One wire racks may be used to support the system neutral on through lines up to 795 ACSR and may be used for dead-ending lines FROM #6 CU up to 1/0 ACSR. Through lines may be tied to the racks with preformed wire ties, #4BSD AL tie wire for aluminum conductors or #6BSD CU for copper conductors.

NEUTRAL EQUIPMENT		
DESCRIPTION	**STOCK CODE**	**COMP. UNIT**
RACK SECONDARY 1W SMALL	184000000	OSR1W
RACK SECONDARY 1W LARGE	184003000	OSR1WL
STRANDVISE ACSR 2	230600000	TRUCK STOCK
STRANDVISE ACSR 1/0	230601000	TRUCK STOCK
STRANDVISE ACSR 336	230602000	ONDE-336
STRANDVISE CU 6	230650000	TRUCK STOCK
STRANDVISE CU 4	230651000	TRUCK STOCK
STRANDVISE CU 2	230651500	TRUCK STOCK
CLAMP STRAIN 1/0-4/0 CU	221120000	OCLP-STR40CU
CLAMP STRAIN 300/500CU DE	221180000	SES30/50CDEO
CLAMP STRAIN 795AL D END	221080000	OCLP-STR795
TRIPLEX DEAD-END 6-2ACSR	221940000	OCAT-2-HW
TRIPLEX DEAD-END 2/0-4/0ACSR	221940000	OCAT-40-HW



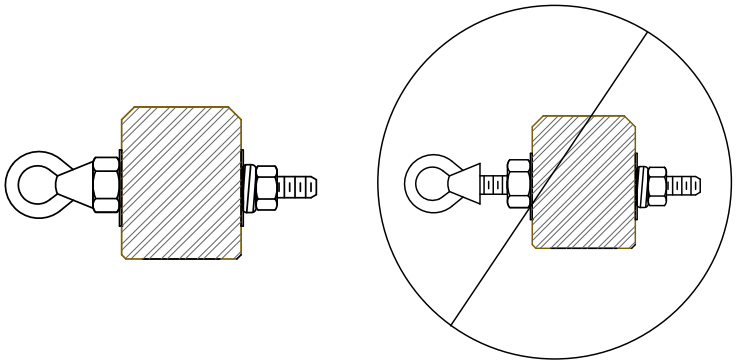
STRAIN CLAMP

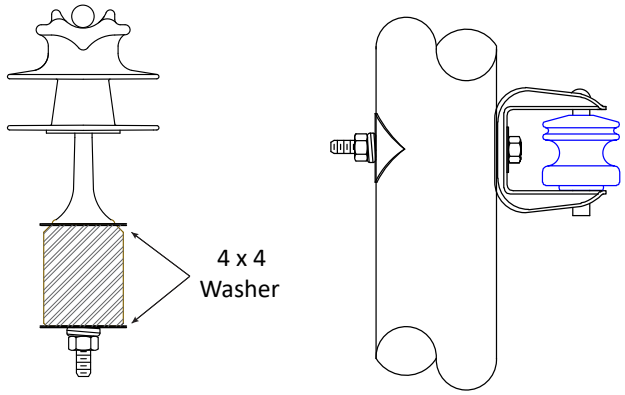
TRIPLEX DEAD END

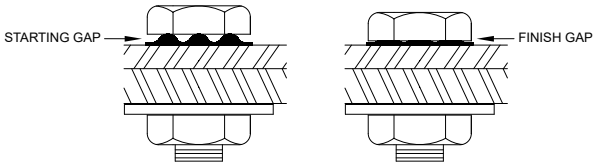
STRANDVICE WITH FLEXIBLE BAIL

NEUTRAL DEAD-ENDS

The preferred method to dead-end the system neutral is with an automatic strandvice. These strandvices are purchased with a flexible bail that can be looped around the spool insulator. It is not acceptable to loop the wire around the spool insulator and use vice or bolted connectors to restrain the wire. When strandvices are not available; use a strain clamp, fiberglass link stick combination to attach the wire to the pole. Do not use these on primary conductors.







DIRECT TENSION INDICATOR (DTI)

BOLTED CONNECTIONS

All bolts used for mechanical load bearing connections must be double nutted or have double coil spring washers to prevent loosening. This is illustrated in the drawing to the left. This applies to eye-nuts as well as double arming nuts.

There should never be any portion of exposed bolt between the eye-nut and the pole or crossarm.

Always use flat or curved washers between the nut or the bolt head and the arm or pole.

The minimum torque value for any bolted connection for support of equipment is 60 ft-lbs. The turn of the nut method for tightening fasteners is acceptable when torque wrench is not available.

Insulator mounting studs and pins must have double coil spring washers. The use of 4" square washers on top and bottom of crossarm are also required to increase bearing capacity.

Use spring washers on A307 bolts (i.e., 1/2" cariage, 5/8" and 3/4" machine and DA bolts). High strength A325 1" bolts require a jam nut or DTI washer to ensure consistent tension.

BANDING

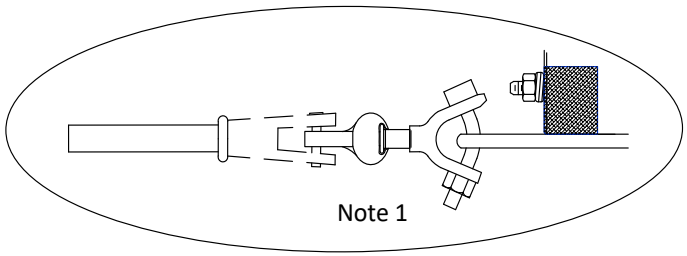
Bands may be used to substitute for bolts however; care must be taken to avoid exceeding the breaking strength of the bands. Consult Engineer prior to substitution for hardware application.

CONDUCTOR DEAD-ENDS

While strain insulators have high strength when in pure tension they are relatively weak in bending or when being twisted. The usual failure occurs on the insulator end fittings at the mounting pin. Installing a Y-clevis ball and socket eye combination gives this insulator the freedom of movement to prevent damage from extreme conditions.

A Y-clevis ball and socket eye is required under the following conditions:

1. Dead-ending conductors into or suspending conductors from steel mounting plates, tees or vangs.
2. Dead-ends and suspension lines on eyebolts for conductors larger than 1/0 ACSR.



NOTES

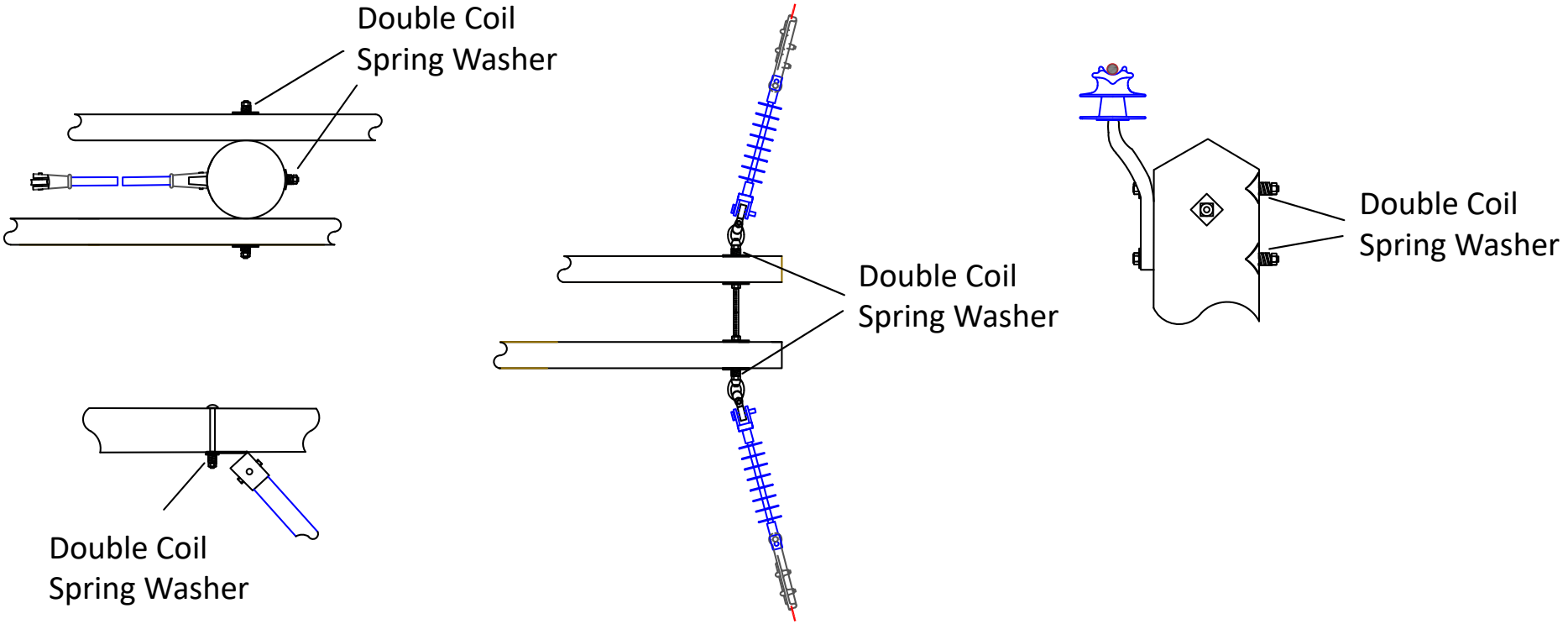
1. The socket-eye is not required on insulators with a socket end fitting.
2. See Bolted Connections and Washer information in the General Framing section.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

BOLTED CONNECTIONS STANDARD INSTALLATION REQUIREMENTS

A307 Type Bolt Detail
w/Dbl Coil Spring Washer



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

A307 BOLT DETAILS
W/DBL COIL SPRING WASHER

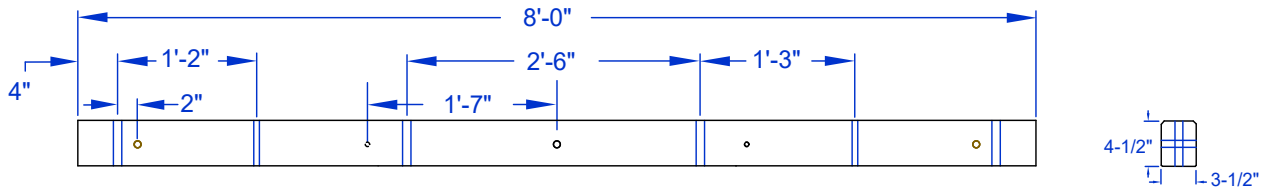
CROSSARM STOCK LISTING

CROSSARMS					BRACES		
DESCRIPTION	MOUNTING BOLT DIAMETER	ARM END BOLT DIAMETER	STOCK NUMBER	C.U.	LENGTH	MOUNTING BOLT DIAMETER	STOCK NUMBER
X-ARM WOOD 3-1/2" x 4-1/2" x 8'	5/8"	5/8"	040050000	OXW8	38"	5/8"	180650000
X-ARM WOOD 4" x 5" x 10'	3/4"	3/4"	040220000	OXW10	60"	5/8"	180660000
X-ARM WOOD 4" x 5" x 10' ALLEY	3/4'	3/4"	040220000	O3WA-HL-SB	120"	5/8"	180520000
X-ARM WOOD 4" x 5" x 17'	3/4"	3/4"	040280000	OXW17	60"	5/8"	180660000
X-ARM WOOD 4-3/4" x 5-3/4" x 10'	3/4"	3/4"	040320000	03WD-DD-795	60"	5/8"	180660000
X-ARM STEEL 4" x 4" x 9'-4"	3/4"	3/4"	040754000	OXS10			NONE
X-ARM STEEL 4" x 6" x 9'-4"	1"	3/4"	040755000	OXS10HD			NONE
X-ARM STEEL ALLEY 8' BRACELESS	1"		040760000	OXS8A			NONE
X-ARM WEATH. STEEL 4" x 4" x 9'-4"	3/4"	3/4"	040801000	OXR10			NONE
X-ARM WEATH. STEEL 4" x 6" x 9'-4"	1"	3/4"	040809000	OXR10HD			NONE
X-ARM ALLEY, WEATH. STEEL 8' BRACELESS	1"		040800000	OXR8A			NONE
X-ARM 3-5/8" x 4-5/8" x 10' FIBERGLASS	3/4"	3/4"	040400000	OXF10			NONE
X-ARM 4" x 6" x 10' FIBERGLASS	3/4"	3/4"	040410000	OXF10HD			NONE

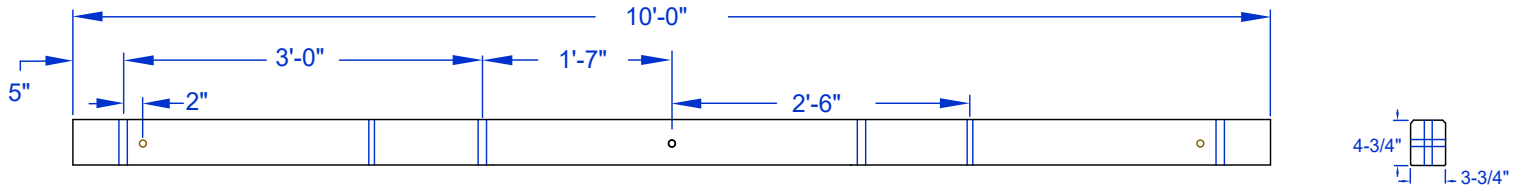
CROSSARM BRACES AND POLE BRACE STOCK LISTING

DESCRIPTION	MOUNTING BOLT DIAMETER	CARRIAGE BOLT DIAMETER	STOCK NUMBER	REMOVAL ONLY
BRACE ALLEY ARM 6 FT	5/8"	1/2"	180500000	Y
BRACE ALLEY ARM 10 FT	5/8"	1/2"	180520000	Y
BRACE POLE PUSH	3/4"	N/A	180560000	
BRACE X-ARM WOOD 23KV PAIR	5/8"	1/2"	180650000	
BRACE X-ARM WOOD/7 FT ARM PAIR	5/8"	1/2"	180654000	Y
BRACE X-ARM WOOD 69KV PAIR	5/8"	1/2"	180660000	
WOOD POLE BEARING PLATE WITH WASHERS	1"	N/A	183520000	

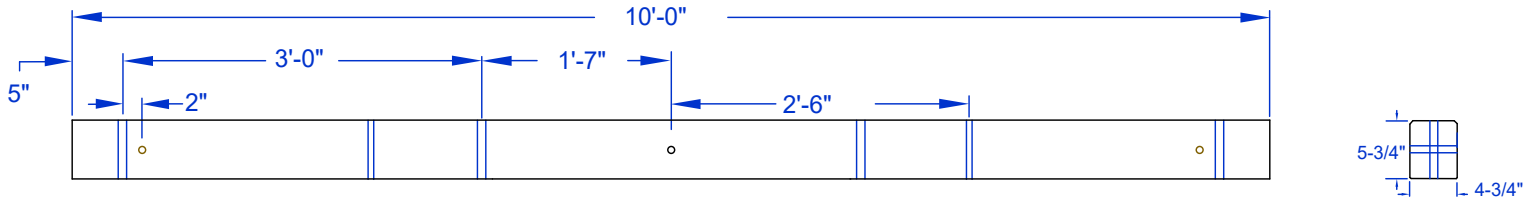
3-1/2” x 4-1/2” x 8-FOOT - STANDARD ARM



4” x 5” x 10-FOOT - STANDARD ARM



4-3/4” x 5-3/4” x 10-FOOT - STANDARD ARM



8-foot Crossarms:
Hole diameters are 9/16 for Brace bolts
Hole diameters are 11/16” for Mounting and DA bolts
Hole diameters are 13/16 for Insulators

10-foot Crossarms:
Hole diameters are 9/16 for Brace bolts
Hole diameters are 13/16” for Insulators, Mounting and DA bolts

MATERIALS			
DESCRIPTION	QTY	STOCK CODE	COMP. UNIT
X-ARM WOOD 3-1/2” X 4-1/2” X 8’	1	040050000	OXW8
X-ARM WOOD 4” X 5” X 10’	1	040220000	OXW10
X-ARM WOOD 4-3/4” X 5-3/4” X 10’	1	040320000	OXW10HD

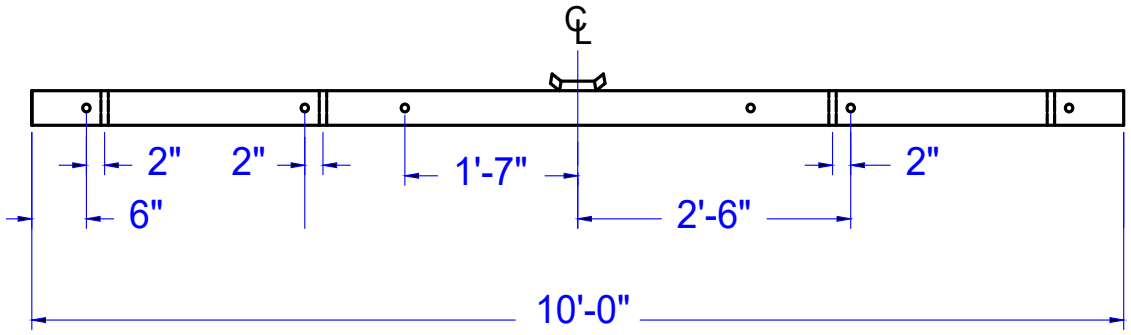
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

MATERIALS AND COMPATIBLE UNITS

NES

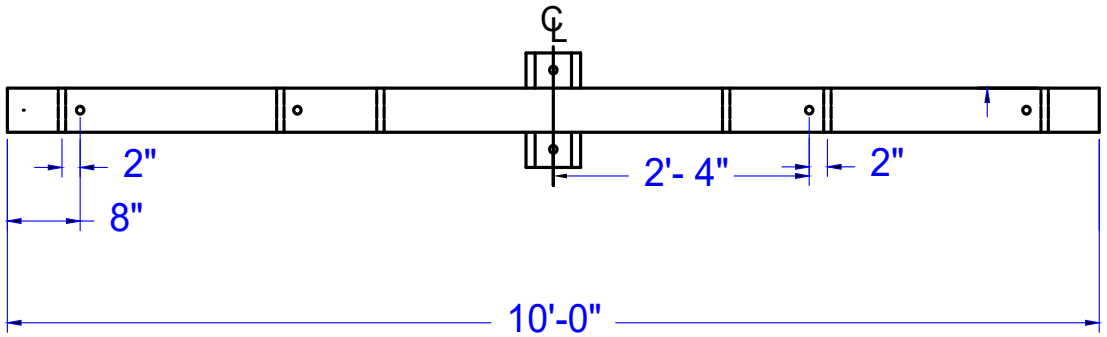
WOOD CROSSARM DETAIL

3-5/8" X 4-5/8" X 10' STANDARD FIBERGLASS CROSSARM

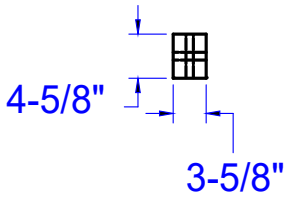


TOP VIEW

Hole diameters are 13/16” for Insulators, Mounting and DA bolts



FRONT VIEW



SIDE VIEW

MATERIALS			
DESCRIPTION	QTY	STOCK CODE	COMP. UNIT
X-ARM FIBERGLASS 3-5/8” x 4-5/8” x 10’	1	040400000	OXF10

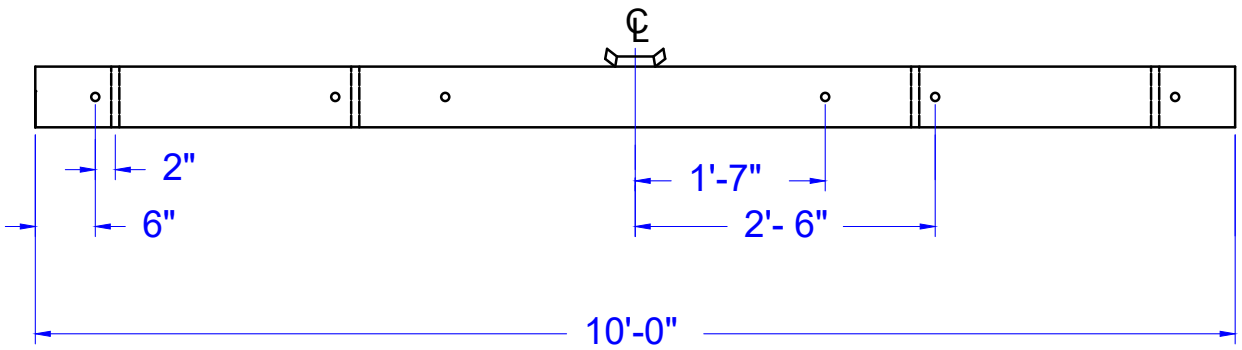
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

MATERIALS AND COMPATIBLE UNITS

NES

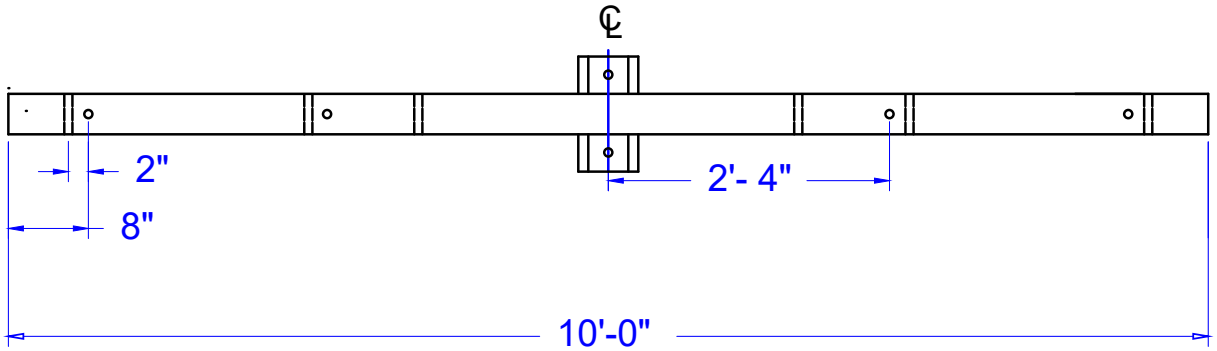
TANGENT
FIBERGLASS CROSSARM
DETAIL

4" X 6" X 10'-0" DEAD-END CROSSARM

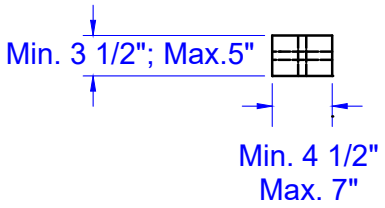


TOP VIEW

Hole diameters are 13/16”



FRONT VIEW



SIDE VIEW

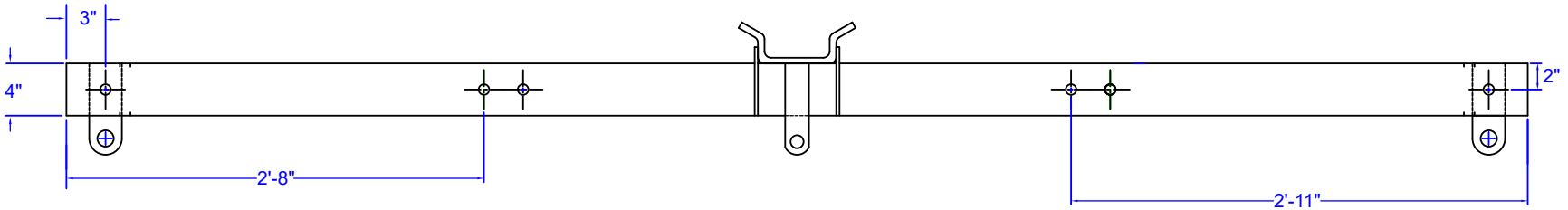
MATERIALS			
DESCRIPTION	QTY	STOCK CODE	COMP. UNIT
X-ARM FIBERGLASS 4” x 6” x 10’	1	040410000	OXF10HD

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

MATERIALS AND COMPATIBLE UNITS

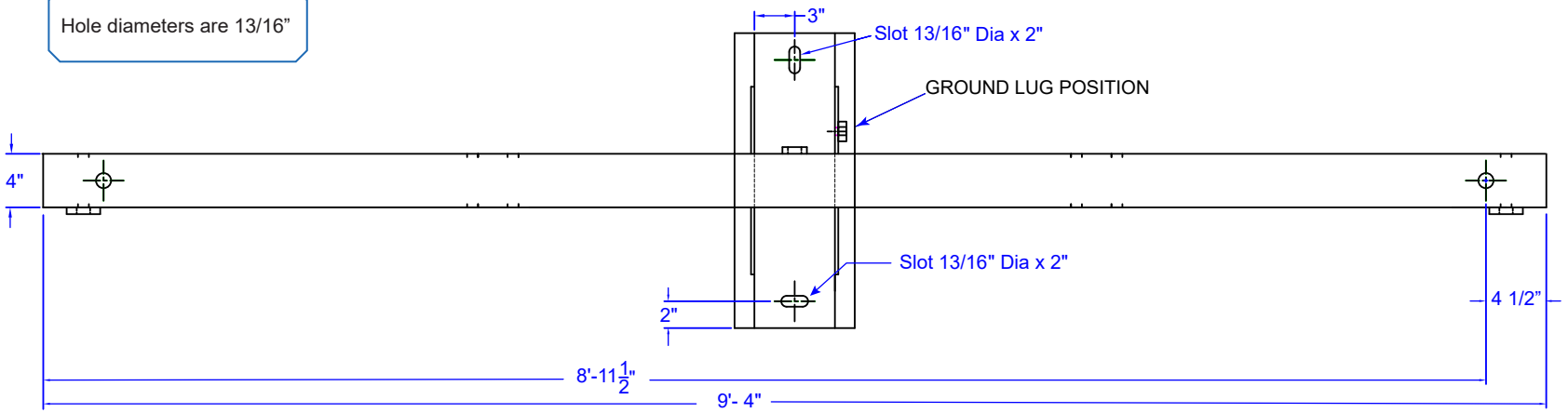
NES

DEAD-END
FIBERGLASS CROSSARM
DETAIL

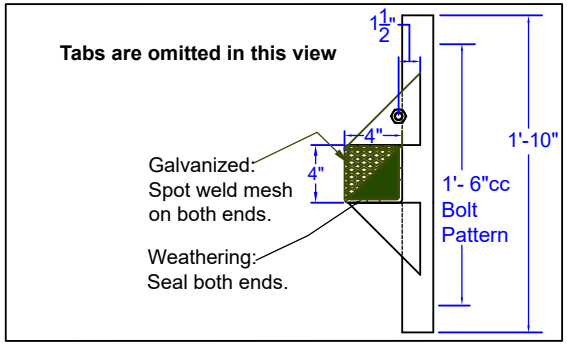


TOP VIEW

Hole diameters are 13/16”



FRONT VIEW



SIDE VIEW

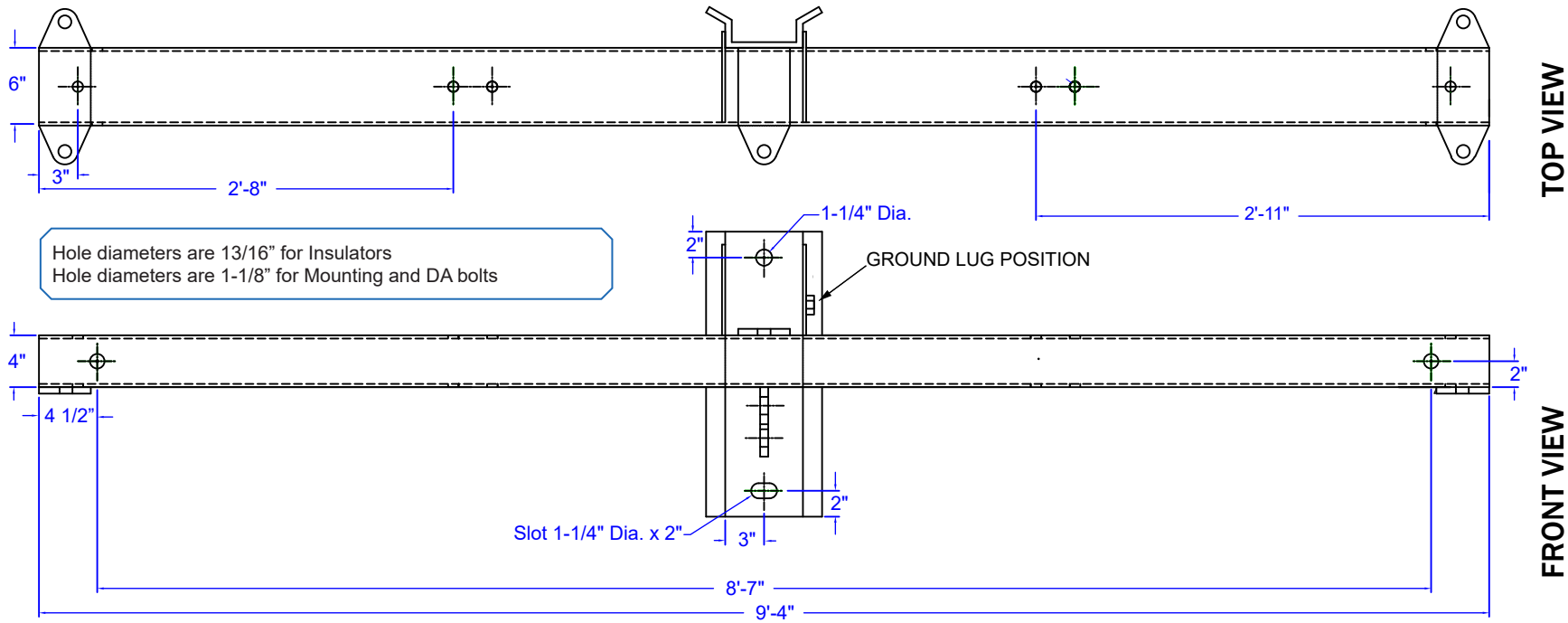
MATERIALS			
DESCRIPTION	QTY	STOCK CODE	COMP. UNIT
X-ARM STEEL 4” x 4” x 9’-4”	1	040754000	OXS10

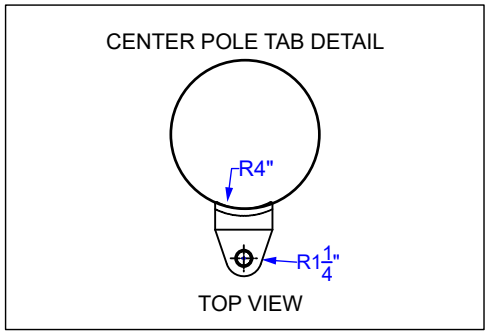
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

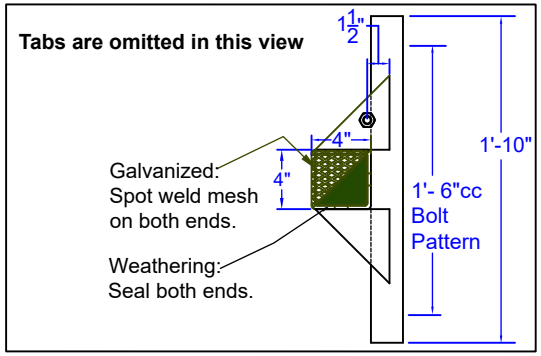
MATERIALS AND COMPATIBLE UNITS

NES

TANGENT STEEL CROSSARM DETAIL







SIDE VIEW

MATERIALS			
DESCRIPTION	QTY	STOCK CODE	COMP. UNIT
X-ARM STEEL 4" x 6" x 9'-4"	1	040755000	OXS10HD

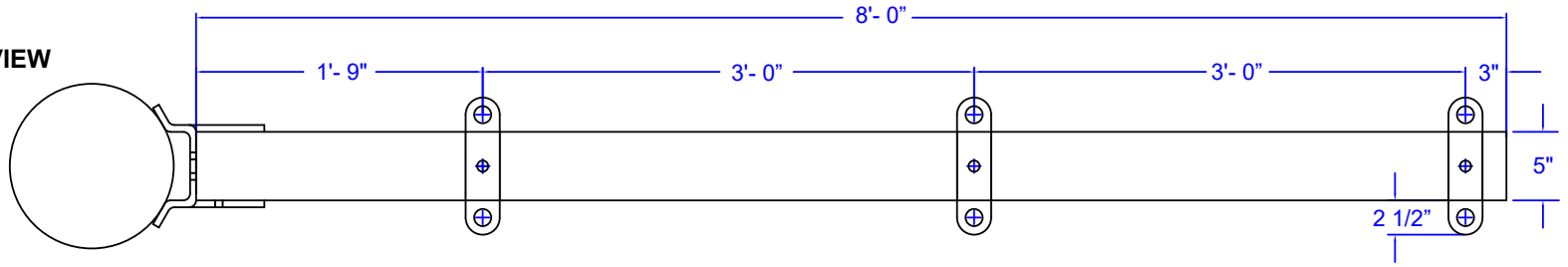
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

DEAD-END STEEL CROSSARM DETAIL

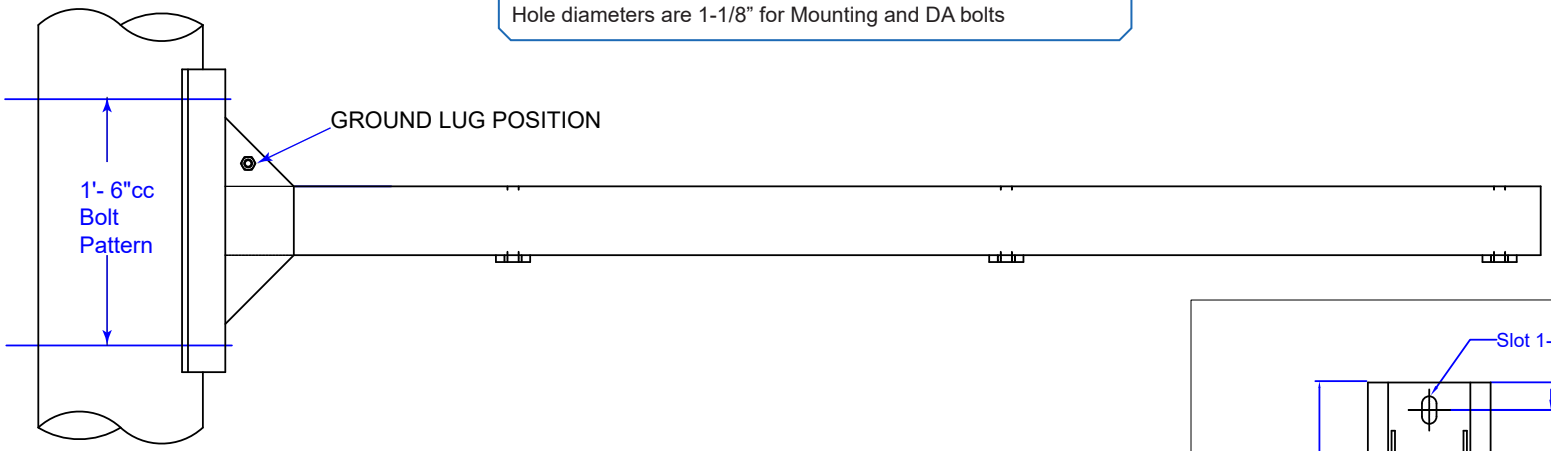
MATERIALS AND COMPATIBLE UNITS

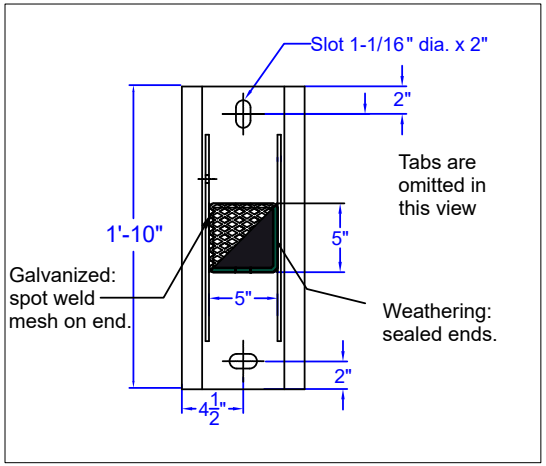
TOP VIEW



FRONT VIEW

Hole diameters are 13/16" for Insulators
Hole diameters are 1-1/8" for Mounting and DA bolts





SIDE VIEW

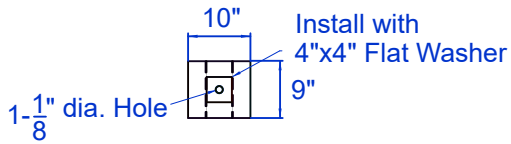
MATERIALS			
DESCRIPTION	QTY	STOCK CODE	COMP. UNIT
X-ARM STEEL ALLEY 8' BRACELESS	1	040760000	OXS8A

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

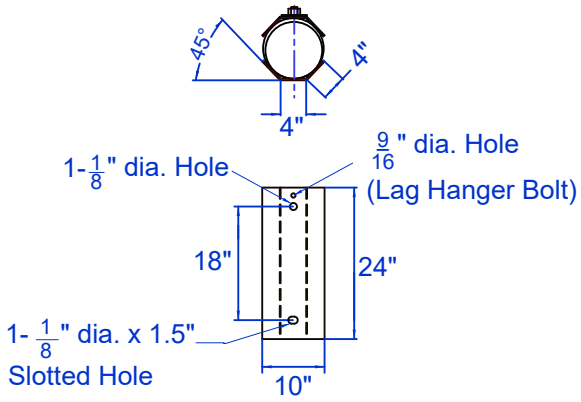
MATERIALS AND COMPATIBLE UNITS

NES

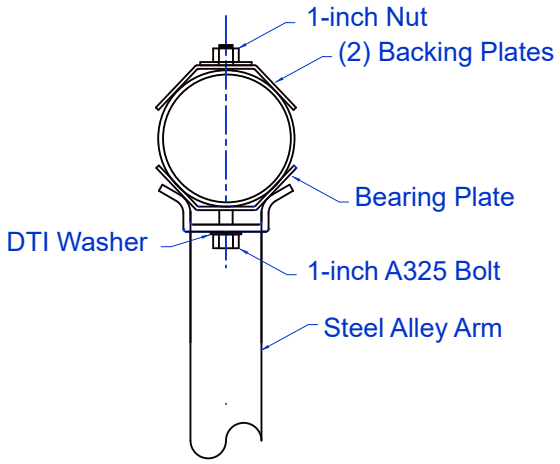
ALLEY ARM STEEL CROSSARM DETAIL

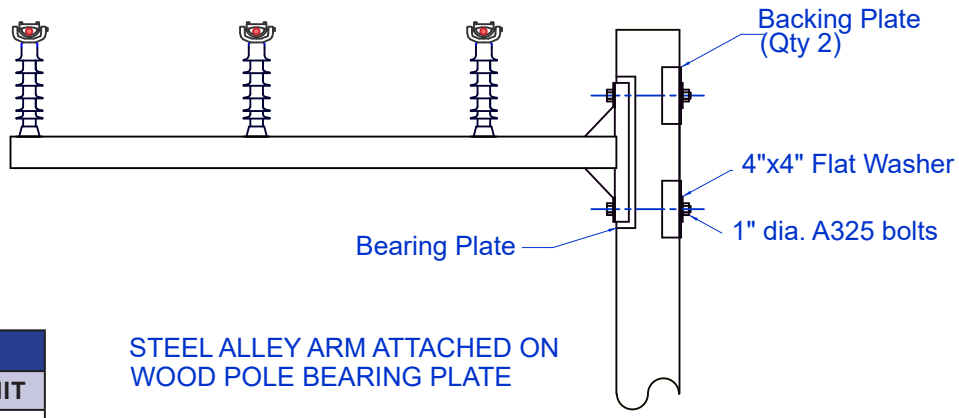


BACKING PLATE WASHER



WOOD POLE BEARING PLATE





STEEL ALLEY ARM ATTACHED ON
WOOD POLE BEARING PLATE

MATERIALS			
DESCRIPTION	QTY	STOCK CODE	COMP. UNIT
X-ARM STEEL ALLEY 8' BRACELESS	1	040760000	OXS8A
WOOD POLE, BEARING PLATE W/9" X 10" WASHERS	1	183520000	OBPLATE-ARM

REV.	ENG.	DESCRIPTION OF CHANGE	DATE
3/23	CS	Updated Object Colors to Standard	3/23/26

MATERIALS AND COMPATIBLE UNITS

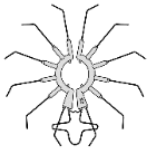
NES

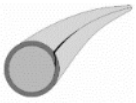
BEARING PLATES FOR STEEL ALLEY ARM WOOD POLE DETAIL

NEST PLATFORM		
DESCRIPTION	STOCK CODE	COMP. UNIT
WILDLIFE PLATFORM RAPTOR PROTECTOR-OSPREY NEST	466445010	OWP-NEST

See Framing Spacing section for Nest framing details.

ANIMAL GUARDS		
DESCRIPTION	STOCK CODE	COMP. UNIT
WILDLIFE PROTECTIVE COVER – SMALL BUSHINGS	466450000	OT-SMBSHCVR
WILDLIFE PROTECTION GUARD ELECTROSTATIC	466450010	--
WILDLIFE PROTECTIVE COVER – LARGE BUSHINGS	466450100	OT-LGBSHCVR
WILDLIFE PROTECTIVE COVER – X-LARGE BUSHINGS	446450200	--
WILDLIFE PROTECTIVE COVER – OIL SWITCH	466451000	OSW-OBSHCVR
WILDLIFE PROTECTIVE COVER – STINGER	466452000	--
WILDLIFE PROTECTIVE COVER – INSULATOR	466453000	OI-1INSCVR
WILDLIFE PROTECTIVE COVER – DOUBLE PIN	466454000	OI-2INSCVR





REV.	ENG.	DESCRIPTION OF CHANGE	DATE

MATERIALS AND COMPATIBLE UNITS

NES

WILDLIFE PROTECTION

GROUNDING SPECIFICATIONS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
GROUNDING, GENERAL PROCEDURES	3			
GROUNDING STANDARDS, APPLYING NESC RULES	4			
GROUNDING MATERIALS, STOCK ITEMS	5			
GROUND WIRE LOCATION, GENERAL DETAILS	6			
GROUNDING POLE, GROUND ROD DETAIL	7			
GROUNDING, DRIVEN ROD INSTALLATION	8			
GROUND WIRE & GUARD REQUIREMENTS	9			
GROUNDING CONDUCTOR, EQUIPMENT BONDING	10			
GROUNDING DETAILS, BOND WIRE	11			
GROUNDING, GUYS, MESSENGERS, STATIC WIRE & LIGHTS	12			
GROUNDING DETAILS, ARRESTER STATION	13			
GROUND WIRE, WOOD & CONCRETE POLES	14			
GROUNDING DETAIL, PRIMARY WYE TRANSFORMER	15			
GROUNDING DETAIL, PRIMARY DELTA TRANSFORMER	16			
GROUNDING DETAIL, ARRESTER STRAP	17			
GROUNDING, ELECTRONIC CONTROL DEVICES	18			
GROUNDING DETAILS, TOUCH POTENTIAL	19			

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
GROUNDING DISTRIBUTION, WOOD POLE	20			
GROUNDING DISTRIBUTION, CONCRETE POLE	21			
GROUNDING DISTRIBUTION, STEEL POLE	22			
GROUNDING TRANSMISSION, WOOD POLE	23			
GROUNDING TRANSMISSION, CONCRETE POLE	24			
GROUNDING TRANSMISSION, EMBEDDED STEEL POLE	25			
GROUND DETAIL, CONCRETE FOUNDATION	26			
GROUND ENHANCED MATERIAL, CONCRETE FOUNDATION	27			
GROUND ENHANCING MATERIAL, COUNTERPOISE SYSTEM	28			
GROUNDING ROCK ENVIRONMENT, ENHANCED BACKFILL	29			
GROUNDING ROCK ENVIRONMENT, COUNTERPOISE SYSTEM	30			
GROUNDING STANDARD, PORTABLE SWITCH MATS	31			
GROUNDING SWITCHES, WOOD POLES	32			
GROUNDING SWITCHES, CONCRETE POLES	33			
GROUNDING SWITCHES, STEEL POLES	34			
GROUNDING STANDARD, MOTOR OPERATED SWITCH	35			
GROUND STANDARD, SWITCH PLATFORM	36			

Grounding General Procedures

Based on the NESC Grounding definitions: the NES 13.8kV system is rarely an **Effectively Grounded Circuit**, since the presence of a neutral doesn't guarantee that it is tied to the source transformer at the substation. Two limited areas were used in the 1970's with Wye Grounded 7.96 kV transformers out of Green Hills and Edgehill Substations. Per the NESC definitions that most of the existing 13.8 kV circuits are either **Multi-grounded** or **Unigrounded** delta systems. The 4 kV and 23.9 kV systems are Wye Grounded circuits with the neutral tied to the source transformers. The original 13.8 kV circuits were used as Sub-transmission system for the 4 kV substations; thus, no neutral was installed for the Delta-Wye 4 kV Substation transformer banks.

NESC Definitions

Effectively Grounded is defined by providing a bond to an effectively grounded neutral conductor or to a grounding system designed to minimize hazard to a person by having low impedance ground to promptly operate circuit protective devices.

Effectively Grounded Neutral is comprised with a conductor that is intentionally connected to the **source transformer** having capacity to carry available fault current and permit prompt operation of circuit protection.

Multi-grounded system (**NESC Rule 096C**) is composed of a neutral conductor with sufficient ampacity interconnected made electrodes or existing electrodes at each transformer location along a circuit of not less than 4 points per mile of the entire circuit. The service point grounding electrodes are excluded as part of the electrode count per mile. There is no specified ground resistance required for a multi-grounded system.

Unigrounded grounding (**NESC Rule 096D**) states that the ground resistance of an electrode used for single-grounded system should meet Rule 096A and should not exceed **25 Ohms** resistance. With NESC Rule 096A requiring a grounding system shall be designed to minimize hazard to personnel and shall have resistances to ground low enough to permit prompt operation of circuit protective devices.

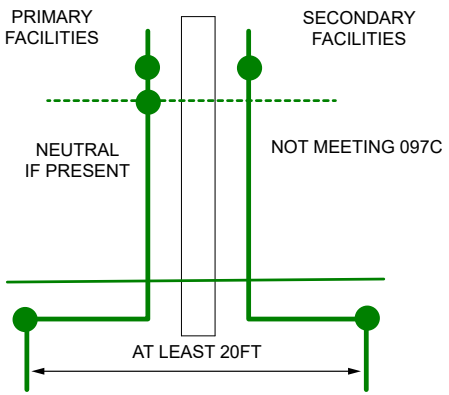
Applicable NESC Rules

NESC Rule 097B – Allows a single pole grounding conductor and single grounding electrode (driven ground) is present at each surge arrester location then the Static wire, Primary and Secondary neutrals can be bonded.

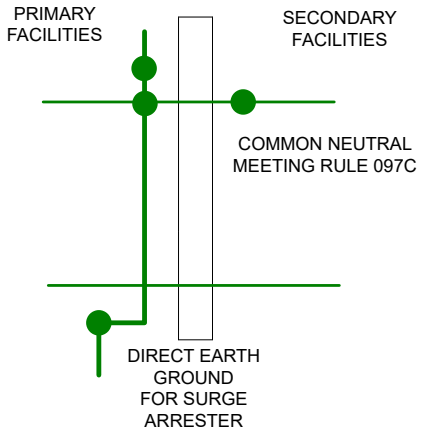
NESC Rule 097C- Primary and Secondary circuits utilizing a single conductor (common neutral) must have at least four ground connections per mile of line, exclusive of ground connections at customer's service entrance.

NESC Rule 097D - Separation of grounding conductors requires either the Primary or Secondary grounding conductor of a **Single-grounded** systems to use insulated covered ground wires with **at least 600-Volt insulation**. Unigrounded (13.8kV) Primary circuits require separation of Primary surge arrester grounding from Secondary electrodes with a **minimum of 20-foot separation if no multi-grounded neutral** is present.

Rule 093C1 - NES 13.8kV is often a Single Grounded system (no neutral present). When this condition exists the Short-time ampacity of grounding conductor to the electrode must be based on the time current characteristics of the fault protective device (i.e., fuse, recloser, relay). If available fault current cannot be readily determined, then the grounding conductor must be sized to meet the full load capacity supplied by the supply transformer.



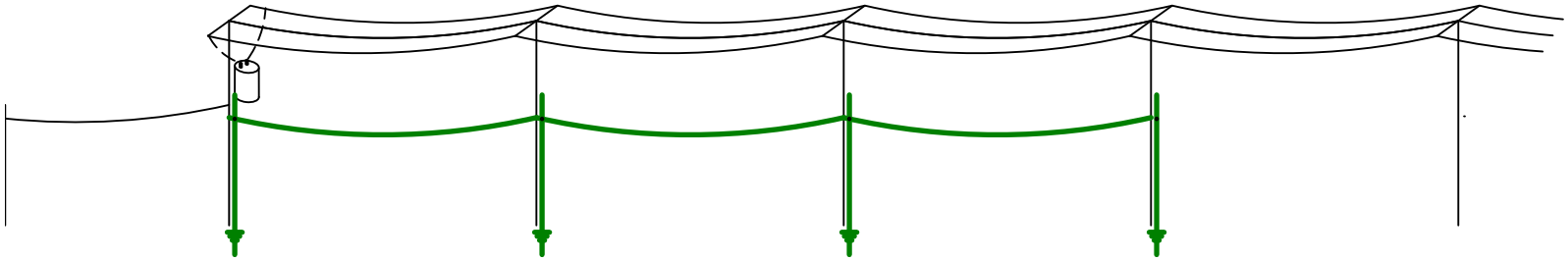
The General Rule: Required for delta, single-grounded, unigrounded, and where the neutral does NOT meet Rule 097C; Interconnection of the grounding conductors or electrodes is prohibited.



Exemption Under Rule 097B: Interconnection of grounding conductors is allowed if the common neutral meets Rule 097C and a direct earth ground connection is maintained at the site for the surge arrester(s).

Multi-grounded Neutral Installation

To avoid separate grounding practices for 13.8 kV Delta facilities from “Wye-Grounded” systems a Multi-grounded Neutral should be installed. **Recommend installing a multi-grounded neutral bonded along with adequate pole ground to driven ground rods on least (4) poles from all 13.8kV Delta transformer and other equipment arrester installations**. If practicable, it is desired to tie all neutrals available back to the nearest neutral system to improve overall system performance.



COMMON GROUNDING STOCK ITEMS		
MATERIAL LIST		
STOCK NUMBER	DESCRIPTION	UNIT OF ISSUE
101141000	CONDUIT GALV 1” UGUARD	EA
011160000	CABLE CU BSD 4	FT
011210000	CABLE CU BSD 2 7S	FT
060330000	GRATING SW GND MAT 3X4 20982	EA
181600000	GROUND ENHACING MATERIAL	EA
182640000	MOULDING PLASTIC 1/2	FT
184380000	ROD GROUND CW 5/ 8X8	EA
220425000	CLAMP, GROUND STEEL POLE 2-2/0	EA
220500000	CLAMP GR ROD 8-2 CU	EA
223480000	CONN GRD 4-2 TO 4-2 CU	EA
223620000	CONN SQZE 4/0-4 CU	EA
228320000	SLEEVE NICOP 4	EA
228340000	SLEEVE NICOP 4 OFFSET	EA
228390000	SLEEVE NICOP 2 STR	EA
228400000	SLEEVE NICOP 2 OFFSET	EA
465700000	STAPLE COPPERWELD	EA
465740000	STAPLE PLASTIC MOULDING	EA
223480000	GRD CONN #4-2 TO #4-2 CU CABLE, AMP WRENCH-LOK	EA
223486000	GRD CONN #2 TO 4/0 CU CABLE AMP WRENCH-LOK	EA
223490000	GRD CONN 2/0 OR 5/8” GND ROD	EA
223494000	GRD CONN 4/0 TO 4/0 MCM CU. CABLE AND 4/0 MCM CU. CABLE AND 4/0 MCM. TO 5/8” GRD ROD	EA
223496000	GRD CONN 500 TO 4/0 MCM COPPER CABLE	EA
223498000	GRD CONN 500 MCM TO 500 MCM CU. CABLE	EA

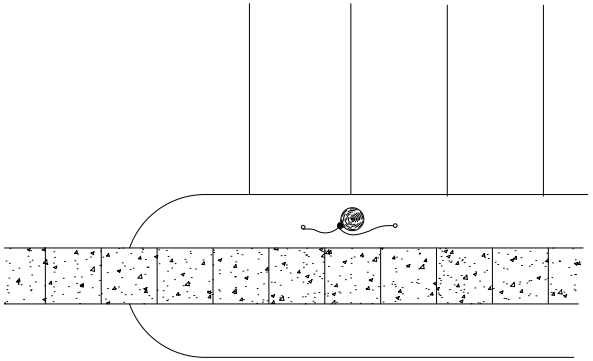
All new installations must have a system neutral of appropriate ampacity. The latest revision of the NESC rule 096-C states, “The neutral, which shall be of sufficient size and ampacity for the duty involved, shall be connected to a made or existing electrode at each transformer location and at a sufficient number of additional points with made or existing electrodes to total not less than four grounds in each 1 mile of the entire line, not including grounds at individual services.”

Sufficient size is the ampacity necessary to prevent damage to the neutral conductor during a fault condition until the protective device removes the circuit from service.

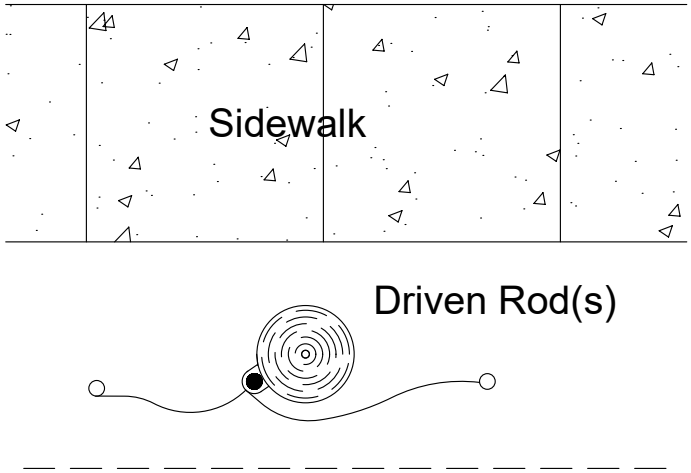
All grounding conductors must have one-fifth the ampacity of the conductor to which they are connected. The grounding conductor is the wire from the device or neutral to the grounding electrode or ground rod. Ground Wire Table 1 states the minimum ground wire sizes. (NESC rule 093-C2).

Wood poles should have the ground wire installed on a quadrant of the pole opposite the climbing space and all communication cables. The ground wire must be covered with plastic molding where it passes into the climbing space and from the ground line to eight feet up the pole.

Installation of pole ground wires to be located on roadside of poles away from oncoming traffic in an orderly manner to provide climbing space on the opposite side of the pole.



Protect Pole by Location



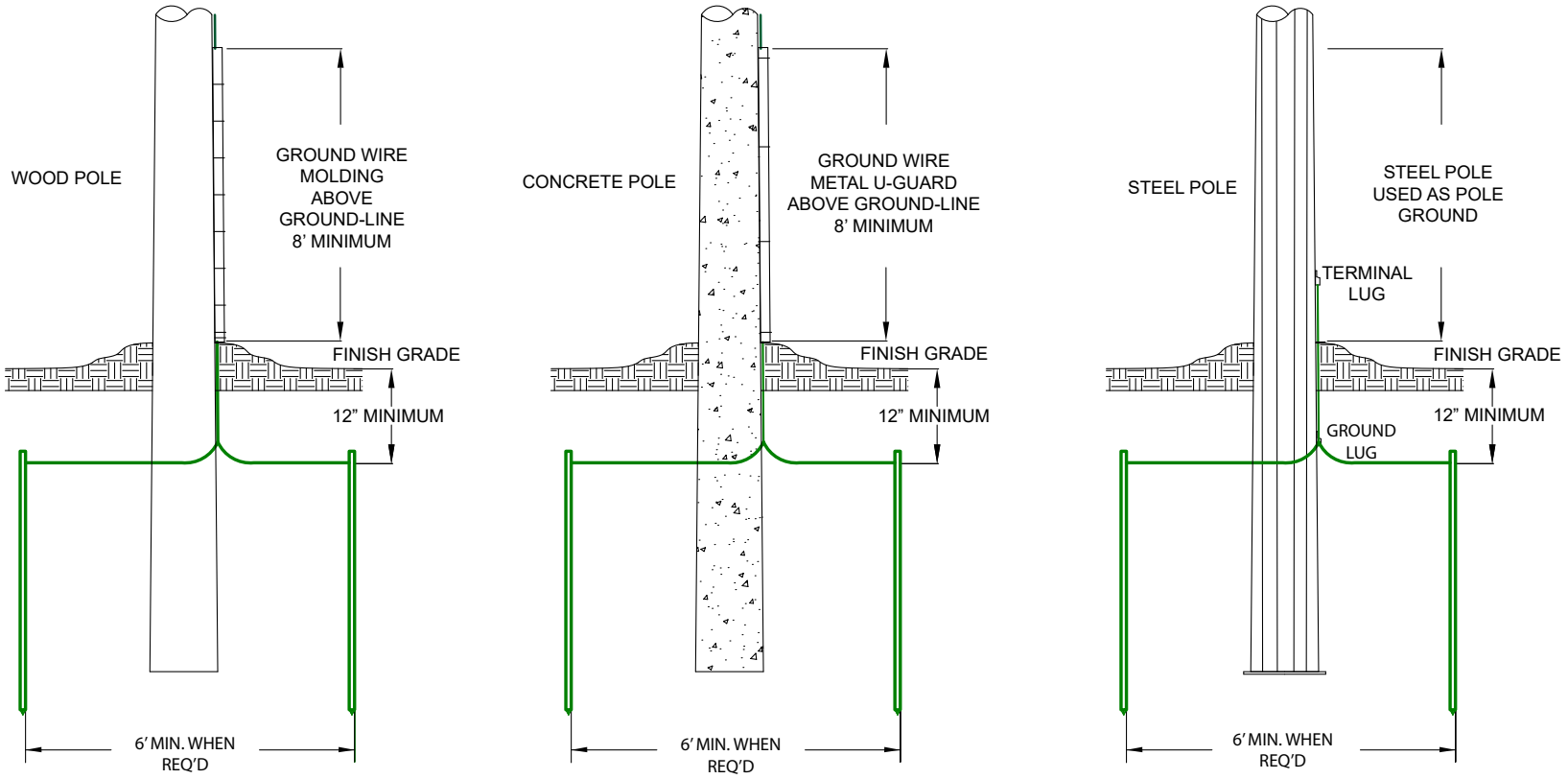
For the safety of the public and per the NESC rule 093-C7 all conductive, but non-energized, objects within reach of potentially live components shall be interconnected to the grounding system. This includes fences, guardrails, street signs and any other metallic object.

For the safety of our line crews, all metal brackets, supports and crossarms must
be bonded to the pole ground on wood, concrete, and composite material poles. Severe injury or death may result from the failure to follow this policy.

Made electrodes per NESC Rule 094 should penetrate below the frost-line into permanently moist soil conditions. The NES standard is a single driven ground rod with an adequate pole ground tied to a multi-grounded neutral system for most distribution poles.

Equipment requiring ground resistance not to exceed 25 Ohms may be connected to driven ground rod system or counterpoise systems shown detailed in this section (i.e., Electronic Controlled Reclosers, Smart Cap-banks, DA switches, Transmission circuits).

Poles requiring 25 Ohms or less resistance may require additional ground rods, not less than six-foot apart, until the resistance is achieved. The allowance to stop driving rods after the 2nd rod, has been eliminated from the current edition of the NESC.



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

GROUNDING POLE GROUND ROD DETAIL

Installing Grounding Electrodes

Made electrodes are comprised from 5/8-inch diameter steel rods of eight feet in length ground rods meeting **NESC Rule 094** driven flush or below the groundline. The option for installing counterpoise system in shallow bedrock environments may be installed.

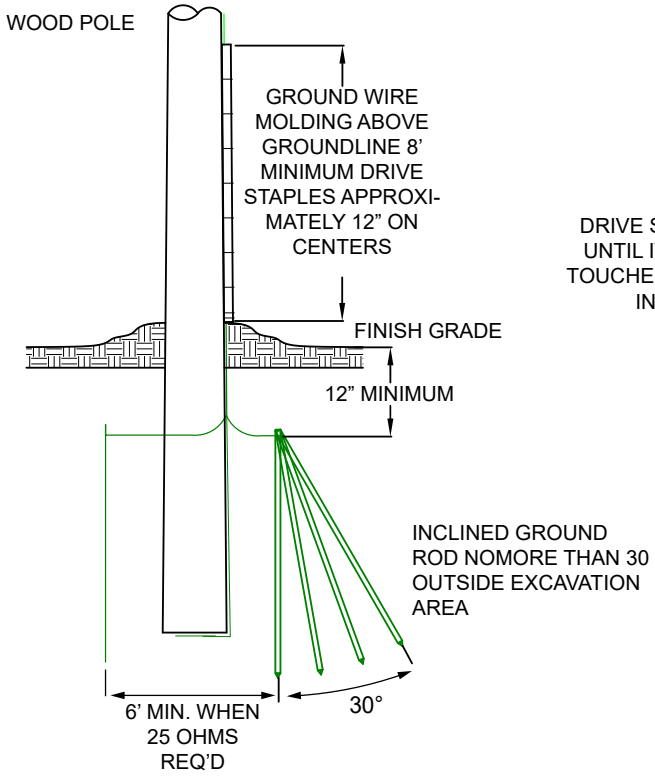
Ground rods shall be driven outside the area of excavation. When rock is encountered rods may be driven at an angle as described below. In solid rock conditions a counterpoise system may be warranted.

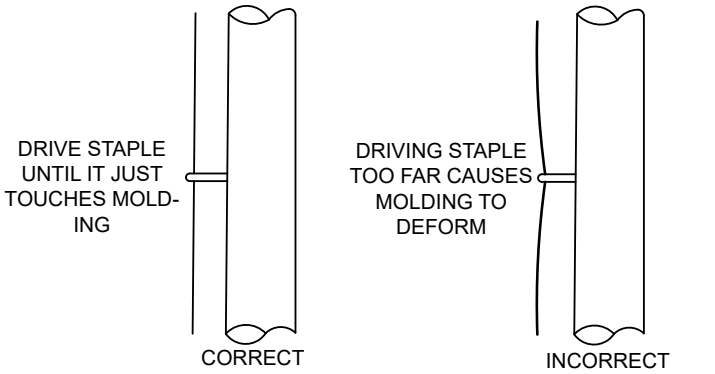
Counterpoise grounding or ground enhancement material must be used if rock prevents the installation of a ground rod. Please refer to the appropriate sections of this manual for installation instructions. It is a crew decision on how best to ground the equipment whenever a ground rod cannot be driven.

NESC Rule 092B requires that the grounding connections be made at the source transformer and the line side of all service equipment. Each transformer pole shall be grounded with a driven ground rod outside the area disturbed by excavation. **When an additional ground rod is required to achieve the 25 Ohms or less resistance, the rods must be separated by 6- feet (i.e., transmission pole, transformer, recloser, cap-bank, etc.).**

The Inverted "V" configuration may improve grounding performance by installing ground rods driven at a 30° angle to achieve lower resistance from a common entry point no closer than 12 inches at the top of the rods. This method may reduce the disruption around the poles set in Urban Environments with limited space (i.e., sidewalks, parking lots, etc.). Using this method ground resistance should be checked to confirm installation meets the resistance required.

On wood poles, plastic molding must be installed at the ground line, in the communications area and in the climbing space. This molding protects the public and operations personnel from transient voltages that occur during unbalanced loading. Proper care should be taken in not deforming the molding as shown below will reduce these protective properties.





DETAIL SHOWING METHOD OF STAPLING MOLDING

CU CODE	OG-GRD	MATERIAL ITEM LIST	
STOCK	**QTY**	**DESCRIPTION**	**UNIT**
101141000	1	CONDUIT GALV 1” UGUARD	EACH

GROUND WIRE TABLE 1	
PRIMARY WIRE SIZE	**MINIMUM GROUND WIRE SIZE**
#6-1/0	#6CU
4/0-477	#4CU
795-1351	#2CU
16MCW STATIC	#4CU
MESSENGERS	#6CU

GROUNDING NOTE:
ARRESTER GROUNDS WITH 795ACSR CIRCUITS REQUIRE #2 CU POLE GROUNDS TO DRIVEN GROUND ROD

U-GUARD COVER INSTALLED OVER GROUND WIRE ON CONCRETE POLE

NESC Rule 93D – Single Grounded (NES 13.8kV) systems require guarding conductors unless installation is not readily accessible by the public. Thus, covered grounding conductors must be installed for separation during fault conditions from the pole ground to the supply space. **Recommend preventing theft by installing Metal U-guards with the first eight feet minimum above the groundline on all, switch, cap-bank, 13.8 or 69 kV, and concrete poles to ensure grounds remain present. Metal U-guards do not require to be bonded to pole ground since they do not enclose the ground wire completely.**

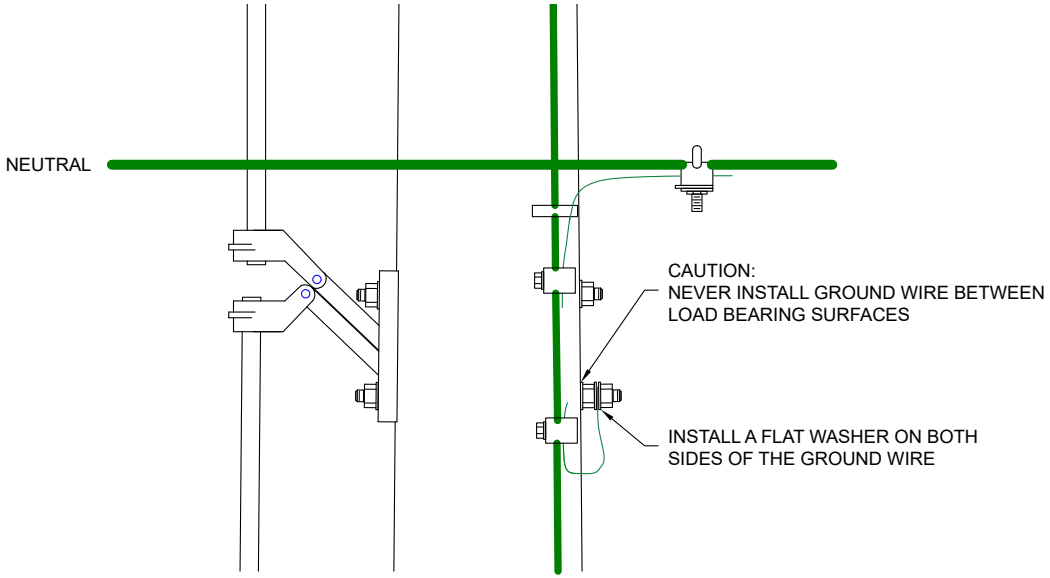
However, the use of metal conduits to protect ground wires must be bonded at each end to the pole ground (i.e., substation style riser poles).

The design of the 69 kV Sub-transmission system insulation and phase spacing is based on achieving **25 Ohms or less grounding resistance** at each pole. Interconnection of static to pole ground with neutral grounding preferred to provide multi-grounded neutral system.

Bonding of Equipment to Grounding Conductor

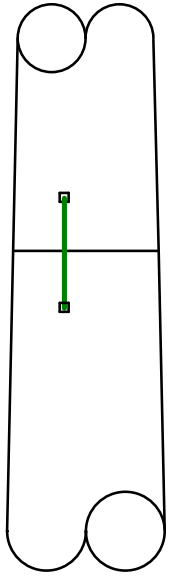
Any appropriately sized vise, compression, U-bolt, eyebolt, or wedge connector may be used to attach the equipment ground to the grounding conductor. Use Ground Wire Table 2 to determine the correct conductor size for bonding the device to the grounding conductor.

Ring type terminal connectors or proper grounding lugs are preferred to attach the ground wire when a threaded insert is on the equipment.

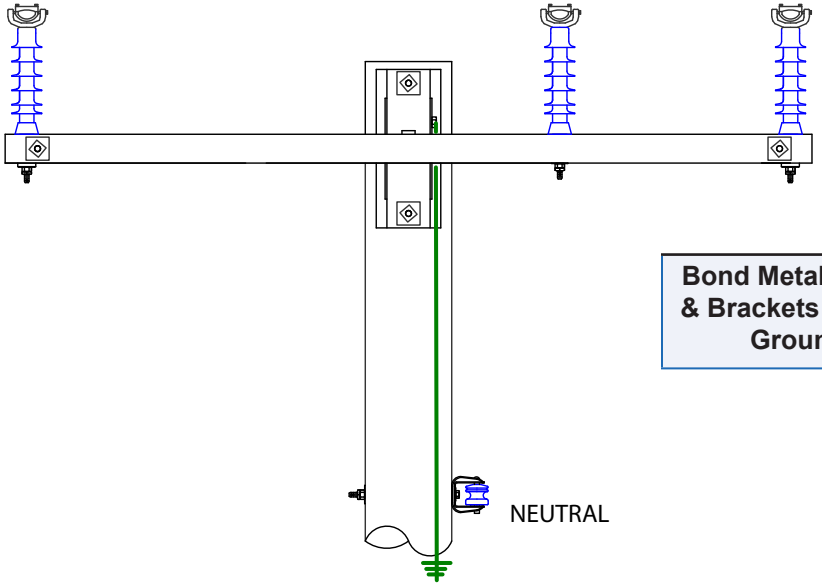


Install a bond wire to ground all steel arms, metal brackets, luminaires mast arms, all steel pole slip-joints, neutrals, messengers, and guys between pole grounds for equipotential grounding on all type of poles. Bonding to the pole ground will assist in protection of equipment in the event of a fault. Minimum sizes based on circuit ampacities or equipment are provided in Tables 1 and 2 below.

GROUND WIRE TABLE 2	
EQUIPMENT TYPE	**MINIMUM GROUND WIRE SIZE**
Transformer tank grounds	#4CU
Any metal supports carrying energized conductors	BASED ON WIRE SIZE, SEE TABLE 1
Street light mast arms	#6CU
Platform substation bases, switch bases	#2CU
Surge arresters, without the ground straps	#6CU
Reclosers	#2CU



Bond Steel Pole Section Joints



Bond Metal Xarms & Brackets to Pole Ground

Grounding Guys

Bond all down guys and span guy attachments to the pole grounds.

Johnny balls or Guy Strain Insulators are required on guys and span guys installed on the 4kV system due to limited fault current protection detection at source. These insulators must be installed between the neutral and above any communication cables to meet the clearances for "**Worker Safety Zone**".

Guy insulators shall be positioned to limit the likelihood of any portion of an anchor guy becoming energized within 8 feet of the ground level in the event that the anchor guy becomes slack or breaks.

Guy strain insulators are required on any portion of the 13.8 kV system where a continuous effectively grounded system neutral is not present. (This is a NESC requirement for uni-grounded systems, requires grounding to source transformer) per **NESC Rule 092-B**.

When long fiberglass link sticks are used to pass guys near energized conductors, bond the guy above insulator of all guys to the pole ground. If the section of guy wire below the link stick is within reaching distance of the pole, it must also be bonded to the pole ground.

Grounding Messengers and Static Wires

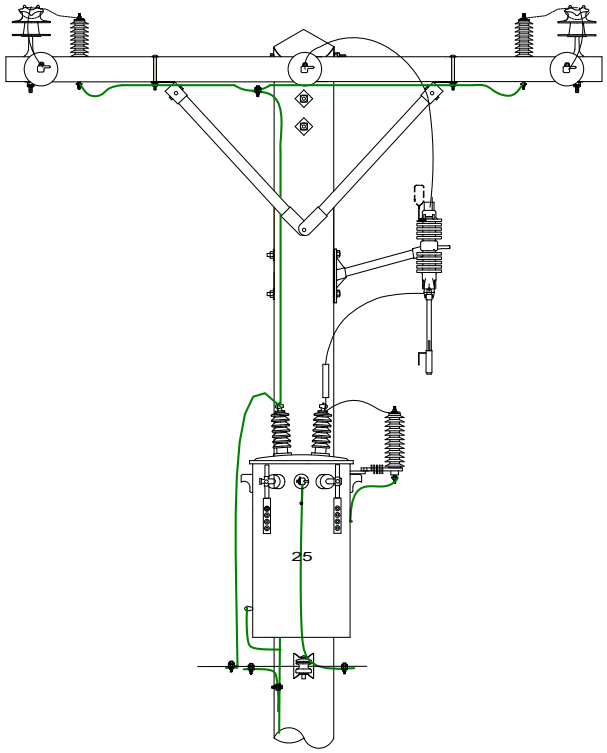
All messengers are to be bonded to available pole ground tied to grounding electrode at 1,200 foot intervals. This is true regardless of the type of cable the messenger supports. The static wire must be bonded to the pole ground at every pole.

Grounding Street Lights

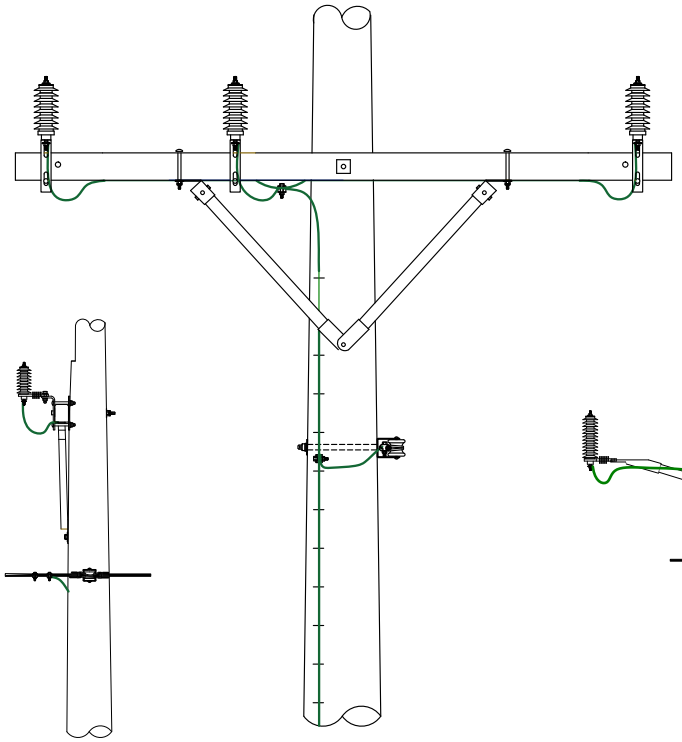
Street light mast-arms that are to be placed within twelve inches (12") of a communication cable must have a visible connection from the mast arms to the pole ground. Recommended practice is to ground all street light mast arms to the pole ground to provide equipotential grounding of all metal brackets.

Lighting standards (metal poles) must be bonded to a ground rod. Conductive objects within reaching distance of the light standard must also be bonded to the ground rod, per NESC Rule 093C7.

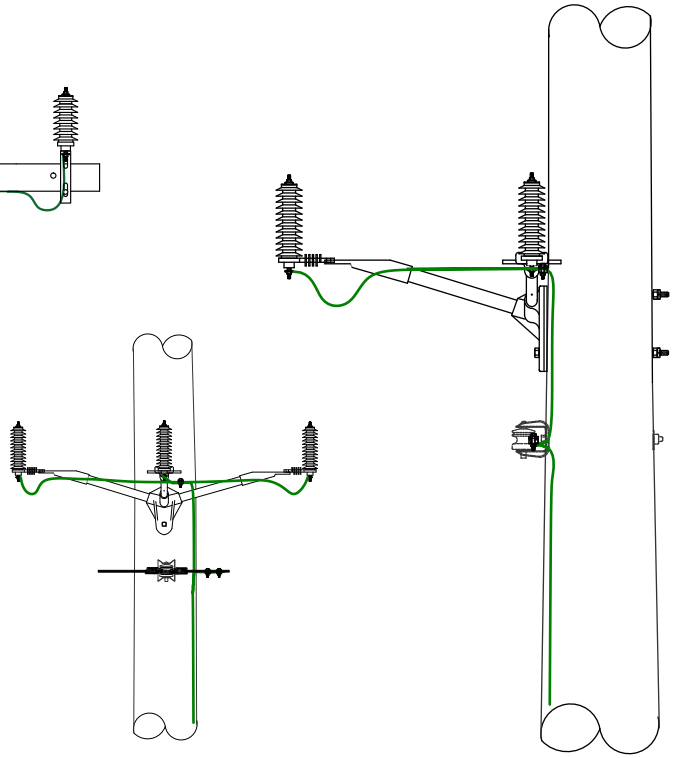
Arrester ground leads to be as short as practical and attached securely by means of staples or clips to avoid hanging into energized equipment below the arrester. All line or transformer arresters require an effectively grounding driven ground rod.



TRANSFORMER WITH ARRESTER STATION



CROSSARM ARRESTER STATION



FIBERGLASS BRACKET ARRESTER STATION

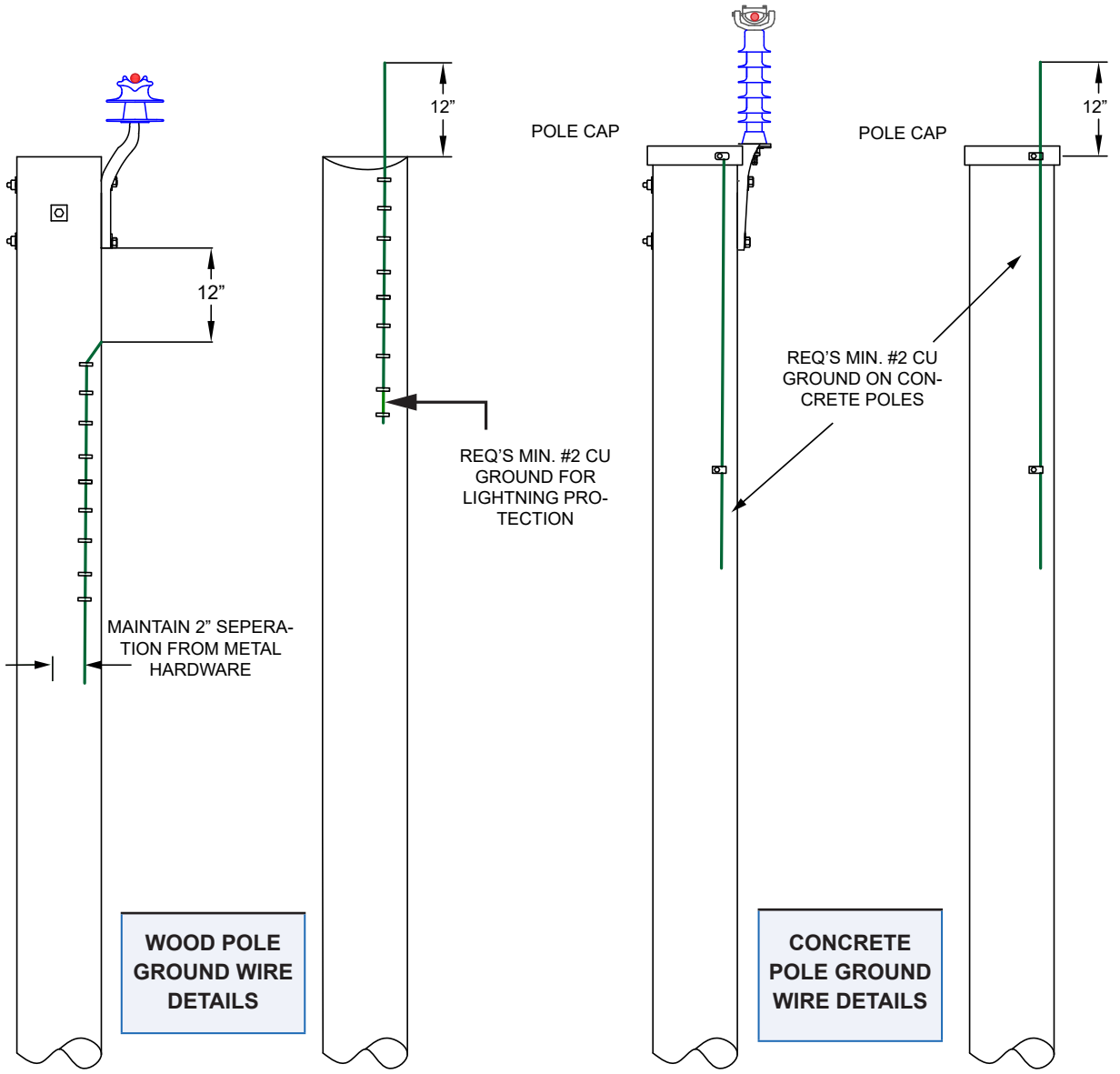
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

GROUNDING DETAILS
ARRESTER STATION

NOTES

1. The purpose of this installation is to prevent pole damage from lightning strikes with min #2 cu groundwire.
2. Extending the ground wire 12” above the pole is required on all concrete and wood transmission poles.
3. Install a ground wire on distribution poles in areas where there is a high occurence of lightning related damage.
4. Copperweld staples must be used to fix the ground wire to wood poles. Staples must be installed on six inch (6”) centers where the ground wire passes through the energized conductors.
5. Install staples on six inch (6”) centers from the ground line to minimum of 8 feet height of pole. Elsewhere the staples maybe installed on 24” centers.



WOOD POLE GROUND WIRE DETAILS

CONCRETE POLE GROUND WIRE DETAILS

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

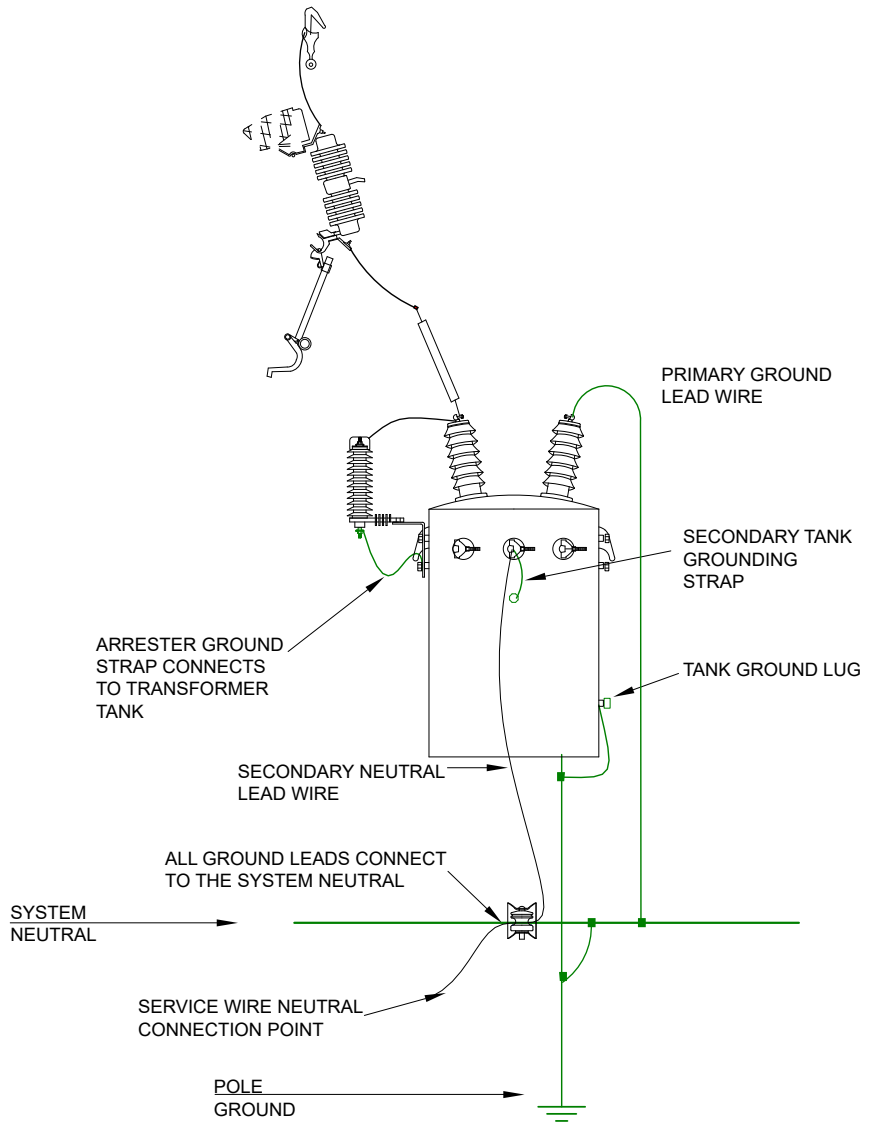
NES

GROUND WIRE WOOD & CONCRETE POLES

NOTES

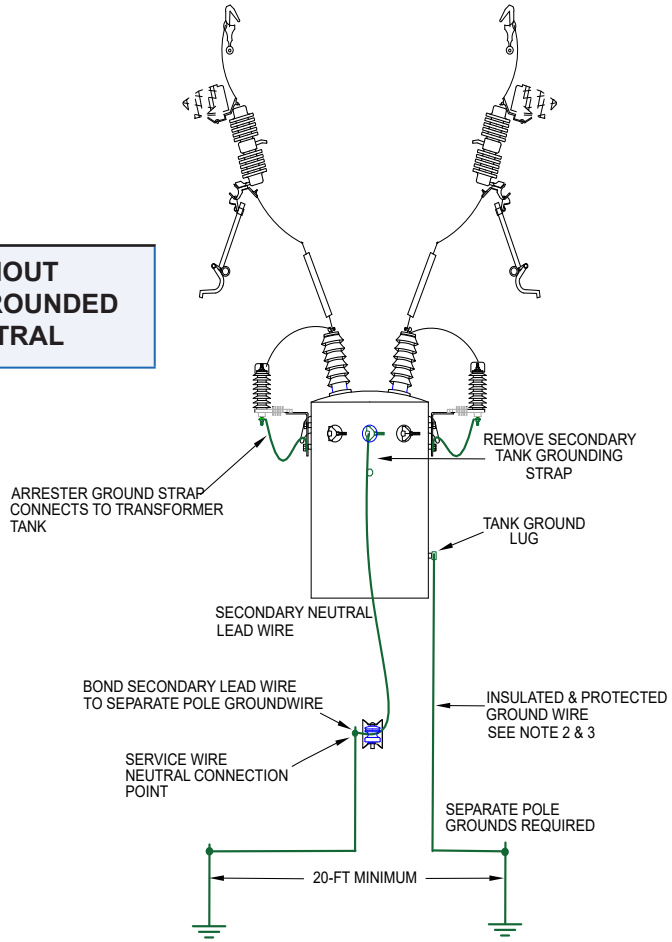
Caution:

1. The transformer Primary Ground Lead Wire must be kept separate and distinct from secondary or transformer ground leads tied to the system neutral.
2. Never cut the Primary Grond Lead Wire of an energized transformer to avoid full potential voltage at its open point.

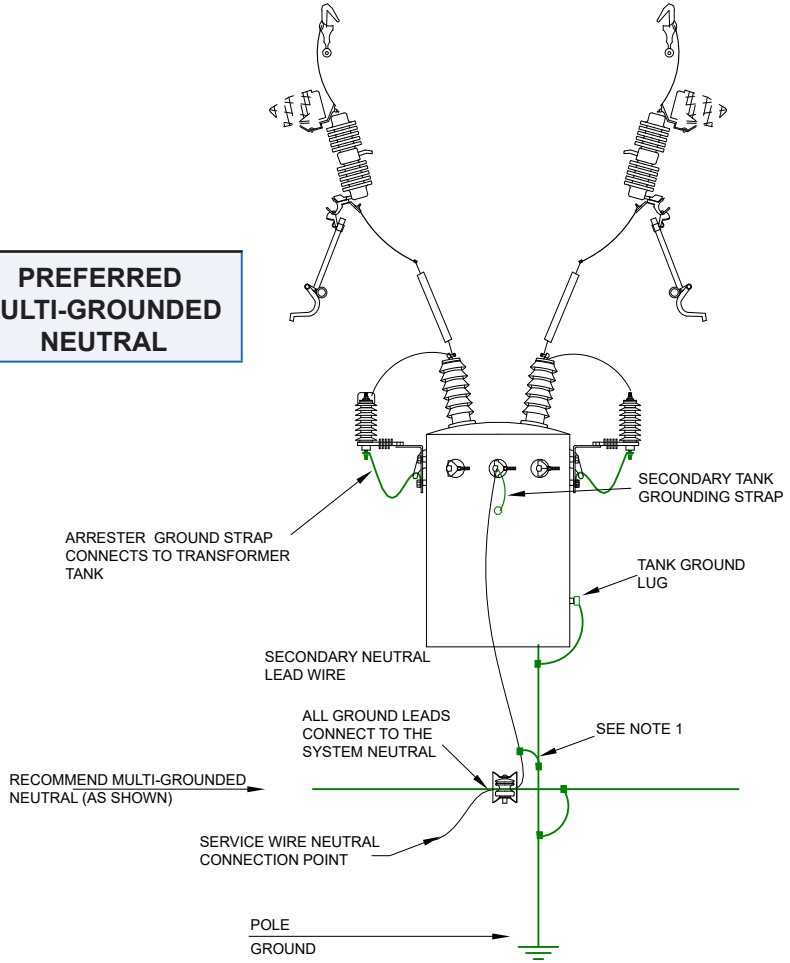


REV.	ENG.	DESCRIPTION OF CHANGE	DATE

WITHOUT MULTI-GROUNDED NEUTRAL



PREFERRED MULTI-GROUNDED NEUTRAL



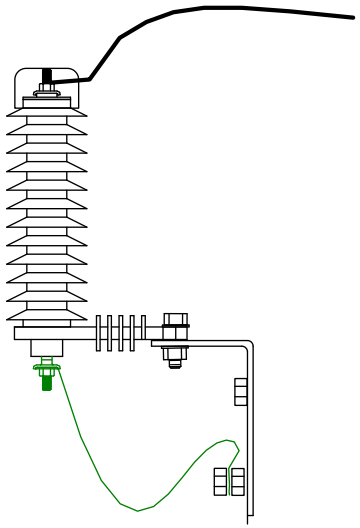
NOTES

1. Standard installation of a Multi-grounded Neutral per requirement on page 4 of the Grounding section is shown in the detail to avoid additional grounding electrodes.
2. NESC Rule 097D: Delta circuits without a multi-grounded neutral system require separate grounds between delta primary arresters and from the secondary and equipment ground system. The primary arrester pole ground wire requires a 600 V insulation with a separate grounding electrode 20-foot apart from the secondary grounding electrode.
3. Unigrounded (Delta) Primary arrester system requires 2-inch separation between all hardware associated with the secondary neutral ground and the tank/arrester pole ground. On steel poles, isolate the primary arrester ground with insulated ground wire atteched to pole to the isolated electrode; include protection of the ground wire with Metal U-guard, a minimum of 8-feet above groundline (see Unigrounded definition on Pg. 3).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

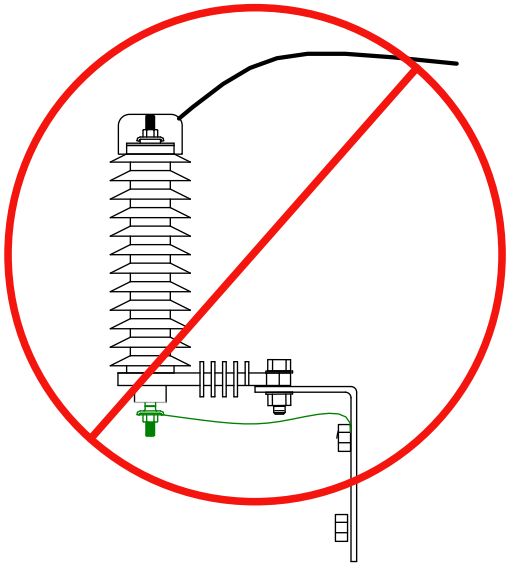
NES

GROUNDING DETAIL PRIMARY DELTA TRANSFORMER



CORRECT INSTALLATION

ARRESTER GROUND STRAP
MUST HAVE SUFFICIENT SLACK
TO ALLOW THE ISOLATOR TO
CLEAR A FAULTED ARRESTER



INCORRECT INSTALLATION

NOTES

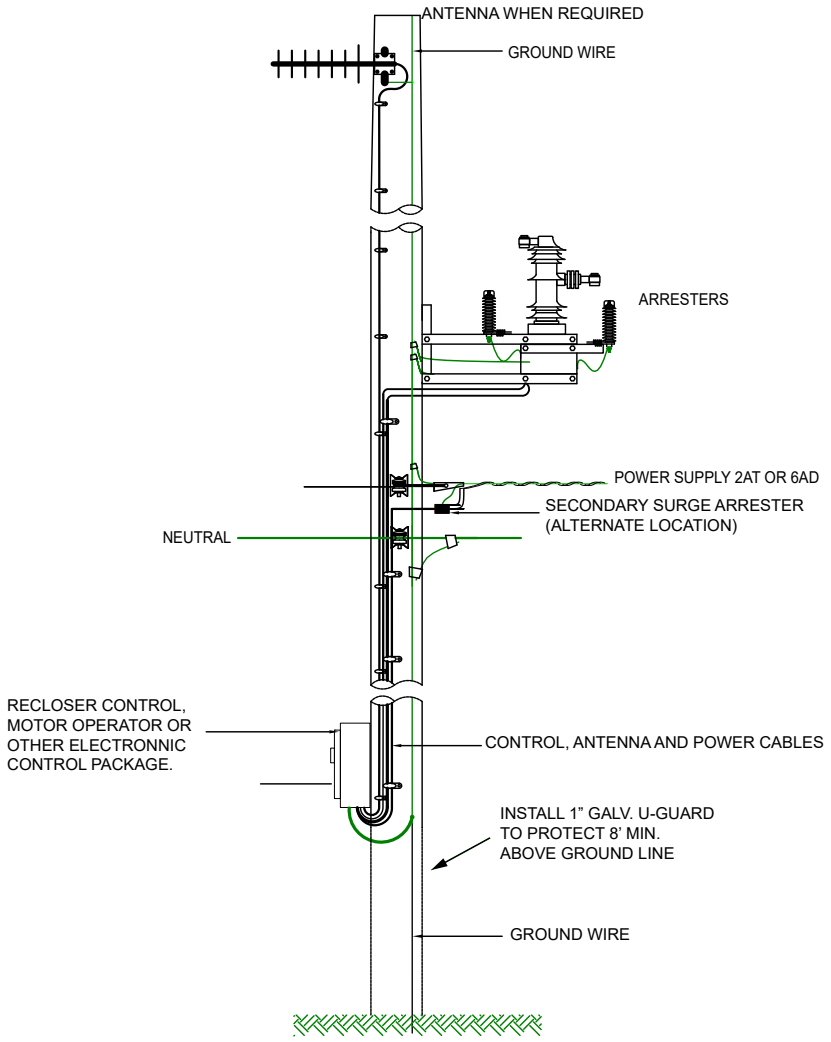
1. Arresters must be installed on all overhead devices such as transformers, switches, capacitor banks and reclosers.
2. Arresters are required at all dead-ends and line openings. Install arresters on both sides of any switch, regardless of its open or closed status.
3. Arresters recommended to be installed at a rate of four (4) per mile per phase on circuits that do not have devices with arresters for increased performance.
4. Arresters are required on all riser poles. Riser poles on the 23.9kV system must have a riser pole class of arrester.

ARRESTER VOLTAGE CLASS	MCOV MAXIMUM CONTINUOUS OPERATING VOLTAGE	APPLICATIONS:
3kV HD	2.55kV	All 4kV SYSTEM DEVICES AND RISER POLES
12kV HD	10.2kV	ALL 13.8kV SYSTEM DEVICES AND RISER POLES
18kV HD	15.3kV	ALL 23.9kV SYSTEM DEVICES EXCEPT RISER POLES
18kV RISER	15.3kV	ALL 23.9kV RISER POLES

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NOTES

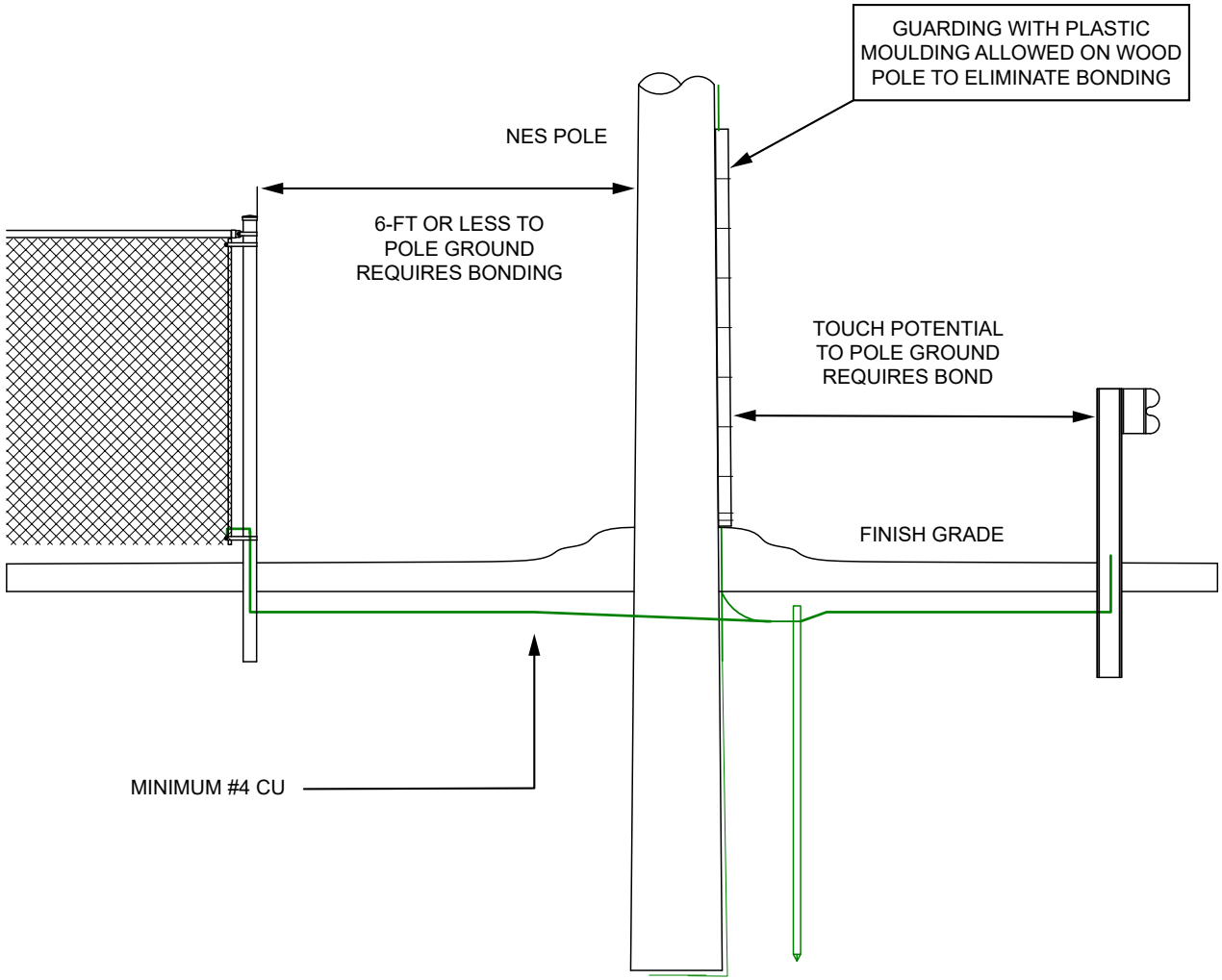
1. Install a #2 CU ground wire the length of the pole, when an electronic control or motor operator is attached to any type of switch. For electronic performance. Use covered groundwire on steel poles.
2. Tie all grounds to the grounding conductor or ground wire. This includes the switch handle on motor operated switches.
3. Install arresters on both sides of the recloser and the bypass switch.
4. Ground the antenna and the bracket.
5. Follow the manufacturer's installation instructions for any switch or electronic control.
6. Install a secondary arrester on the low voltage power supply to control box.
7. Preferred ground resistance is 25 Ohms or less. Install a second ground rod if 25 Ohms is not achieved with the first rod. No other grounding is required after two rods have been installed if multigrounded neutral is present.
8. NES will use a portable grounding mat to create an operator's zone of equal potential. The operator must be standing on the mat before operating the switch. Refer to the NES safety manual for full instructions.



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

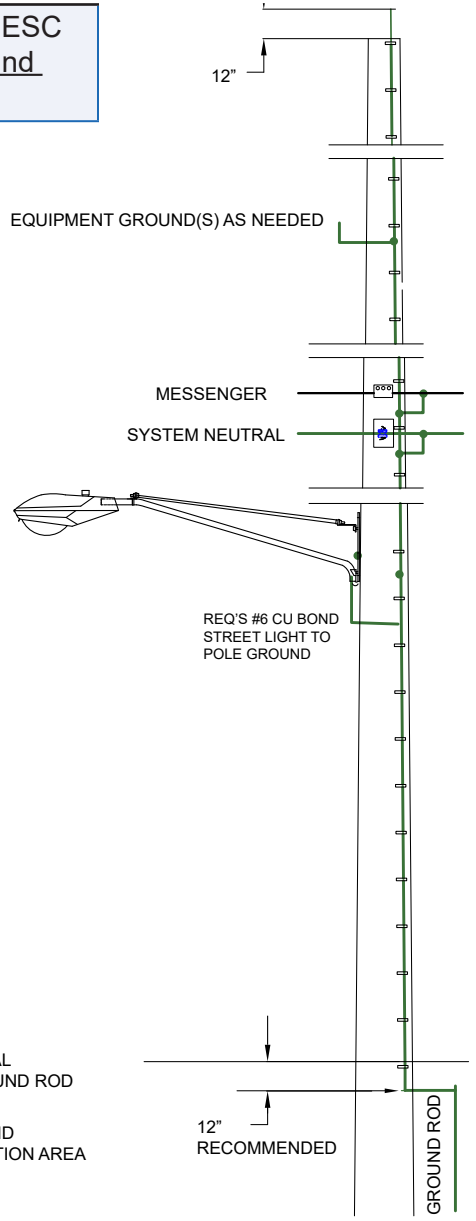
NOTES

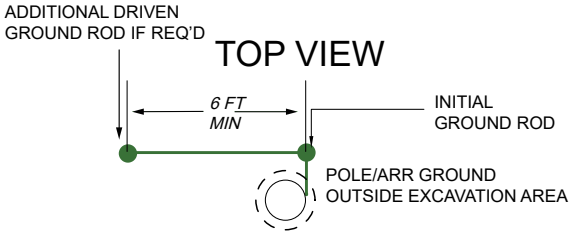
1. Per the NESC Rule 093-C7, NES must bond all conductive objects within reaching distance of NES' power facilities to its grounding system. This is necessary to avoid a dangerous difference in potential voltage between the objects.
2. A terminal lug tied to any convenient bolt is an acceptable method. If necessary, drill a 9/16" hole in an inconspicuous place and attach the ground lug with a 1/2" stainless steel bolt.
3. This rule includes, but is not limited to:
   - Street lights
   - Fences
   - Roads signs
   - Mail boxes
   - Gates
4. Communication companies are responsible to install and or provide a means to bond the grounds from their enclosures to NES' equipment.



FRM. CODE OGR-WP	MATERIAL ITEM LIST		
QTY	**DESCRIPTION**	**STOCK**	**UNIT**
55	CABLE CU BSD 4	011160000	FT
2	ROD GROUND CW 5/8X8	184380000	EA
3	CLAMP GR ROD 8-2 CU	220500000	EA
1	SLEEVE NICOP 4	228320000	EA
1	SLEEVE NICOP 4 OFFSET	228340000	EA
1	SLEEVE NICOP 2 STR	228390000	EA
1	SLEEVE NICOP 2 OFFSET	228400000	EA
60	STAPLE COPPERWELD	465700000	EA
14	STAPLE PLASTIC MOULDING	465740000	EA

Conditional grounding requirements per NESC Rule 094 shown on Grounding Pole, Ground Rod Detail, page 7 of this section.





NOTES

1. Staples may be two feet (2’) apart except in the following areas where they must be six inches (6”) apart:
   - From the ground line to eight feet up the pole.
   - Anywhere the ground wire passes open energized conductors.
2. Bond all metal attachments to the ground wire with ground wire per tables 1&2.
3. In areas where frequent lightning damage to poles occurs, extend the ground wire twelve inches (12”) above the pole top.
4. Ground rods must be installed in undisturbed soil below ground line.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

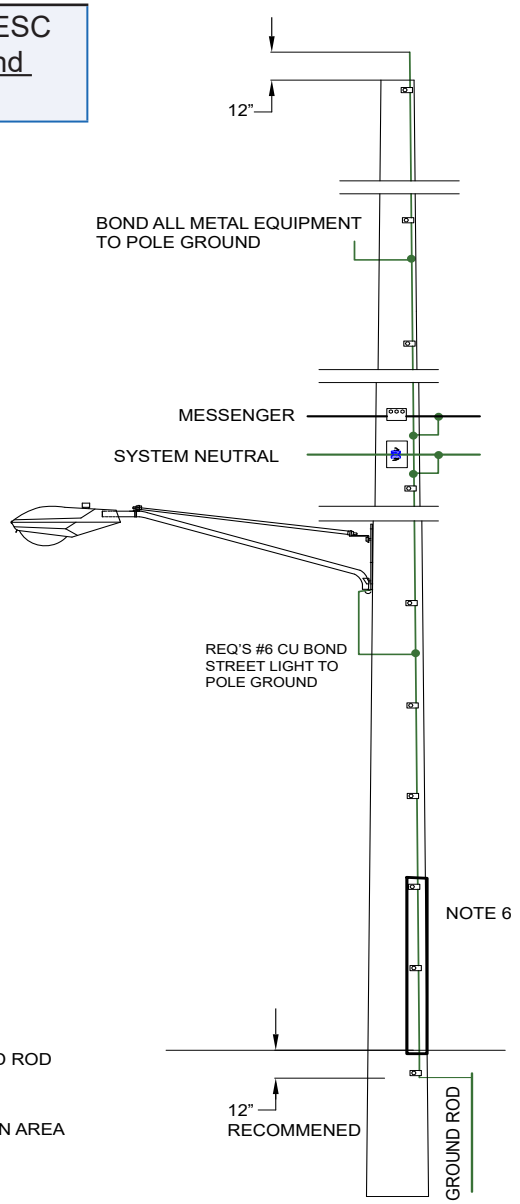
GROUNDING DISTRIBUTION WOOD POLE

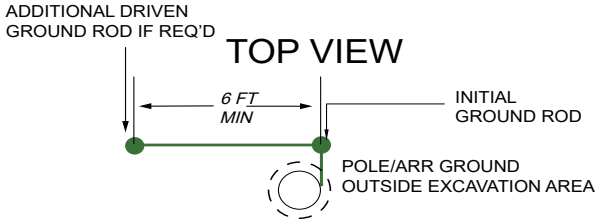
FRM. CODE OGR-CP

MATERIAL ITEM LIST

QTY	DESCRIPTION	STOCK	UNIT
55	CABLE CU BSD 2 7S	011210000	FT
2	ROD GROUND CW 5/8X8	184380000	EA
3	CLAMP GR ROD 8-2 CU	220500000	EA
1	SLEEVE NICOP 4	228320000	EA
1	SLEEVE NICOP 4 OFFSET	228340000	EA
1	SLEEVE NICOP 2 STR	228390000	EA
1	SLEEVE NICOP 2 OFFSET	228400000	EA
1	GALV 1” U-GUARD	101141000	EA

Conditional grounding requirements per NESC Rule 094 shown on Grounding Pole, Ground Rod Detail, page 7 of this section.





NOTES

1. Attach the ground wire to the pole using the clips provided on concrete pole.
2. Bond all metal pole attachments to the ground wire with ground wire per Tables 1&2.
3. All concrete poles must have the ground wire extended a minimum of twelve inches (12”) above the top of the pole.
4. Minimum ground wire size = #2 CU Required on concrete poles.
5. Ground rods must be installed in undisturbed soil below ground line.
6. Install metal U-guard from below ground line for a minimum of 8 feet height of of concrete pole.

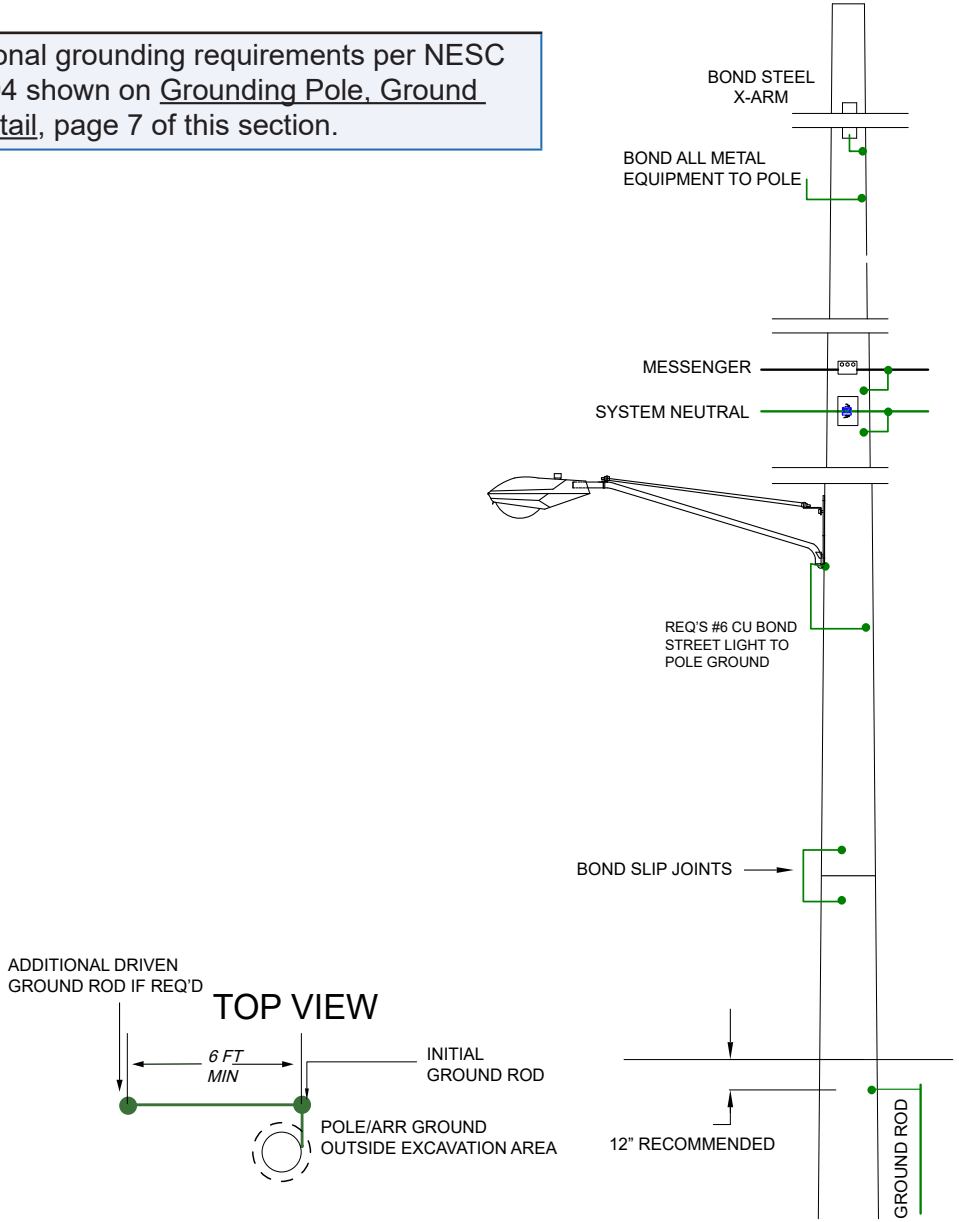
RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

GROUNDING DISTRIBUTION CONCRETE POLE

FRM. CODE OGR-SP	MATERIAL ITEM LIST		
QTY	**DESCRIPTION**	**STOCK**	**UNIT**
20	CABLE CU BSD 2 7S	011210000	FT
2	ROD GROUND CW 5/8X8	184380000	EA
5	CLAMP, GROUND STEEL POLE 2-2/0	220425000	EA
3	CLAMP GR ROD 8-2 CU	220500000	EA
1	SLEEVE NICOP 4	228320000	EA
1	SLEEVE NICOP 4 OFFSET	228340000	EA
1	SLEEVE NICOP 2 STR	228390000	EA
1	SLEEVE NICOP 2 OFFSET	228400000	EA

Conditional grounding requirements per NESC Rule 094 shown on Grounding Pole, Ground Rod Detail, page 7 of this section.



GALVANIZED POLES NOTES

1. The pole provides sufficient conductivity to eliminate the need for an external ground wire for most applications.
2. Equipment is bonded to the pole with connectors that screw into inserts located every five feet (5') along the length of the pole.
3. Lightning arrester grounds may be bonded directly to the pole.
4. Use the ground connectors to support insulated ground wire when it is required for special electronic equipment controls (i.e, reclosers, cap, banks, etc...)

WEATHERING STEEL POLES NOTES

1. All metal attachments must be bonded to the pole ground inserts. There are no exceptions because the protective coating on the steel is highly resistive therefore requiring this additional step.
2. Additionally, the sections of the poles must be strapped over. Stainless steel nuts are provided for the ground connectors at the slip joints.
3. Arresters must be connected to a ground insert by means of a copper jumper.
4. Weathering steel must be treated much the same as wood poles.
5. Ground rods must be installed in undisturbed soil.

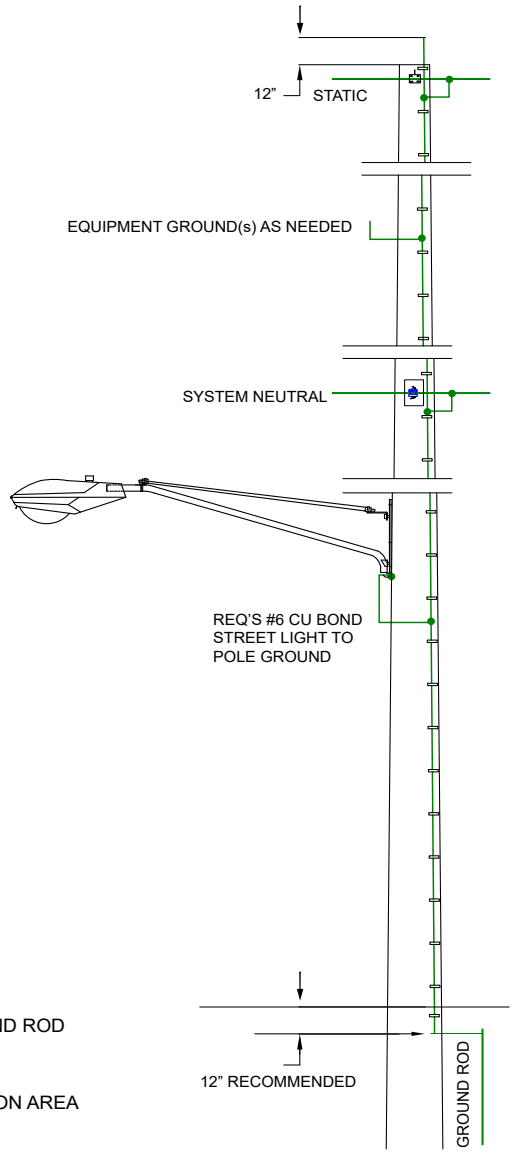
RE	ENG.	DESCRIPTION OF CHANGE	DATE

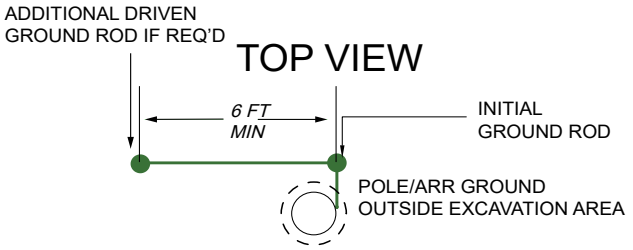
NES

GROUNDING DISTRIBUTION STEEL POLE

FRM. CODE OGR-WTP	MATERIAL ITEM LIST		
QTY	DESCRIPTION	STOCK	UNIT
110	CABLE CU BSD 2 7S	011210000	FT
20	MOULDING PLASTIC 1/2	182640000	EA
2	ROD GROUND CW 5/8X8	184380000	EA
5	CLAMP GR ROD 8-2 CU	220500000	EA
2	SLEEVE NICOP 4	228320000	EA
2	SLEEVE NICOP 4 OFFSET	228340000	EA
2	SLEEVE NICOP 2 STR	228390000	EA
2	SLEEVE NICOP 2 OFFSET	228400000	EA
100	STAPLE COPPERWELD	465700000	EA
25	STAPLE PLASTIC MOULDING	465740000	EA

Requires 25 Ohms or less Resistance





NOTES

1. Staples may be two feet (2') apart except in the following areas where they must be six inches (6") apart:
   -From the ground line to eight feet up the pole.
   -Anywhere the ground wire passes open energized conductors.
2. Bond all metal pole attachments to the ground wire.
3. Extend the ground wire twelve inches(12") above the pole top.
4. Minimum ground wire size required is #2 CU.

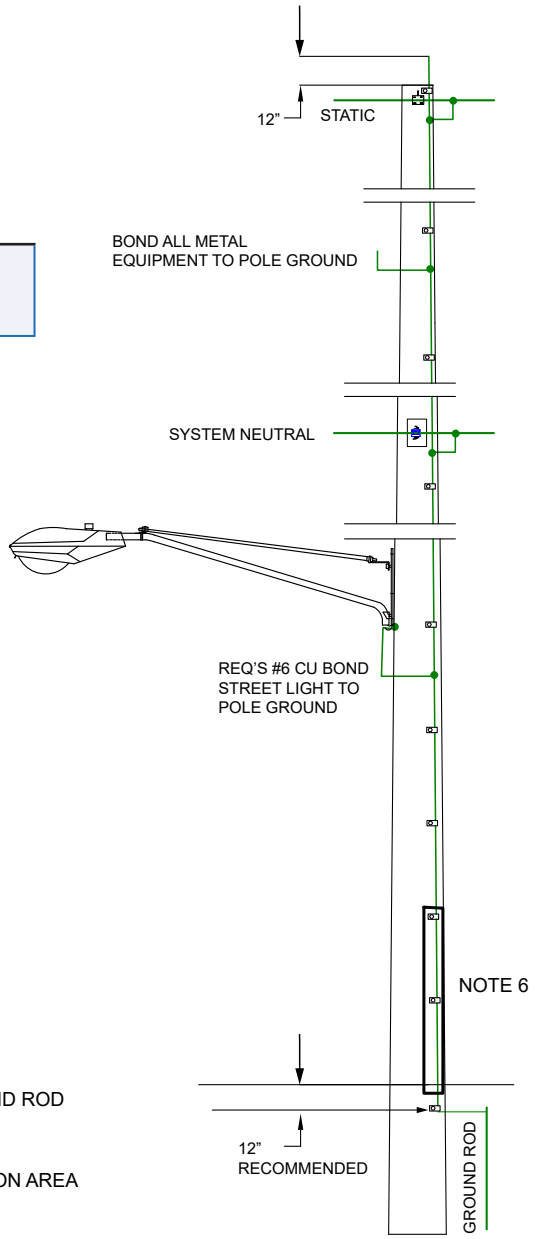
RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

GROUNDING TRANSMISSION WOOD POLE

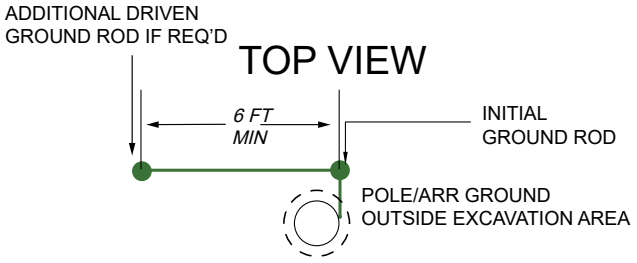
FRM. CODE OGR-CTP	MATERIAL ITEM LIST		
QTY	**DESCRIPTION**	**STOCK**	**UNIT**
110	CABLE CU BSD 2 7S	0112100	FT
2	ROD GROUND CW 5/8X8	1843800	EA
3	CLAMP GR ROD 8-2 CU	2205000	EA
1	SLEEVE NICOP 4	2283200	EA
1	SLEEVE NICOP 4 OFFSET	2283400	EA
1	SLEEVE NICOP 2 STR	2283900	EA
1	SLEEVE NICOP 2 OFFSET	2284000	EA
1	GALV 1” U-GUARD	101141000	EA

Requires 25 Ohms or less Resistance



NOTES

1. Attach the ground wire to the pole using the provided clips.
2. Bond all metal pole attachments to the ground wire.
3. All concrete transmission poles must have the ground wire extended a minimum of twelve inches (12”) above the top of the pole.
4. Minimum ground wire size required is #2 CU.
5. Ground rods must be installed in undisturbed soil below ground line.
6. Install metal U-guard from below ground line, to a minimum height of 8 feet on concrete poles.



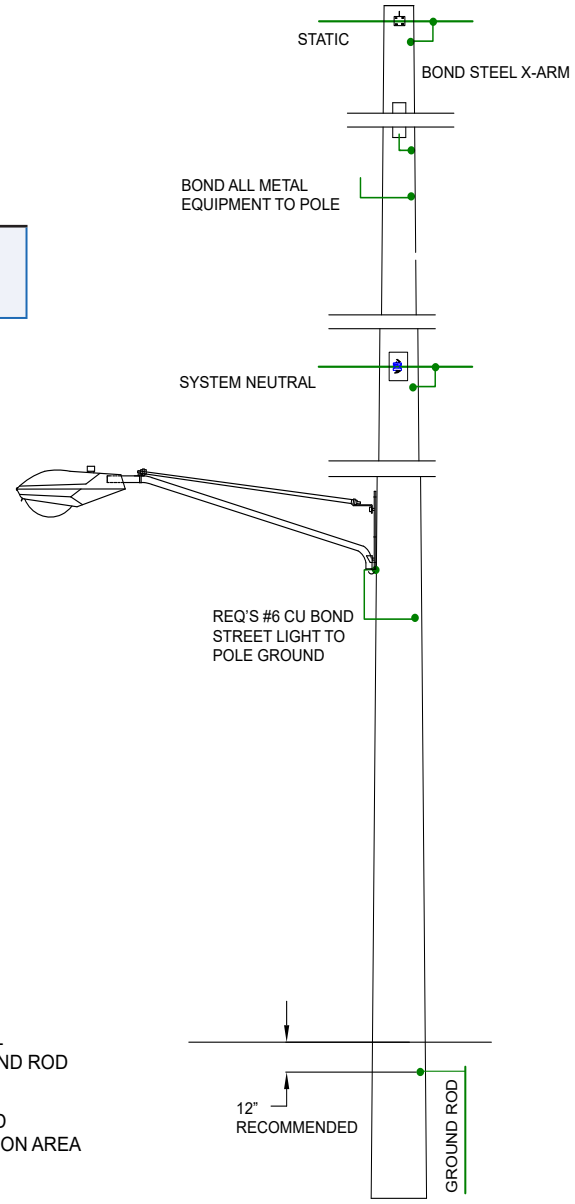
RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

GROUNDING TRANSMISSION CONCRETE POLE

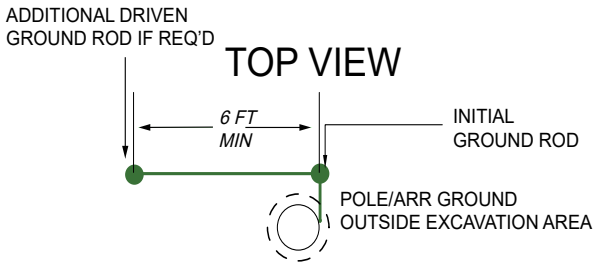
FRM. CODE OGR-STP	MATERIAL ITEM LIST		
QTY	**DESCRIPTION**	**STOCK**	**UNIT**
35	CABLE CU BSD 2 7S	0112100	FT
2	ROD GROUND CW 5/8X8	1843800	EA
8	CLAMP, GROUND STEEL POLE 2-2/0	2204250	EA
3	CLAMP GR ROD 8-2 CU	2205000	EA
2	SLEEVE NICOP 4	2283200	EA
2	SLEEVE NICOP 4 OFFSET	2283400	EA
2	SLEEVE NICOP 2 STR	2283900	EA
2	SLEEVE NICOP 2 OFFSET	2284000	EA
1	SLEEVE NICOP 2 OFFSET	101141000	EA

Requires 25 Ohms or less Resistance



NOTES

1. The pole provides sufficient conductivity to eliminate the need for an external ground wire.
2. Equipment will be bonded to the pole with connectors that screw into inserts that are located every five feet (5') along the length of the pole.
3. Bond metal arms, brackets, messengers, and guys to steel pole.
4. Lightning arrester grounds may be bonded directly to the pole.
5. Use the ground connectors to support insulated ground wire when it is required for special electronic controls (i.e, reclosers, cap, banks, etc...) and equipment.
6. Ground rods must be installed in undisturbed soil below ground line.

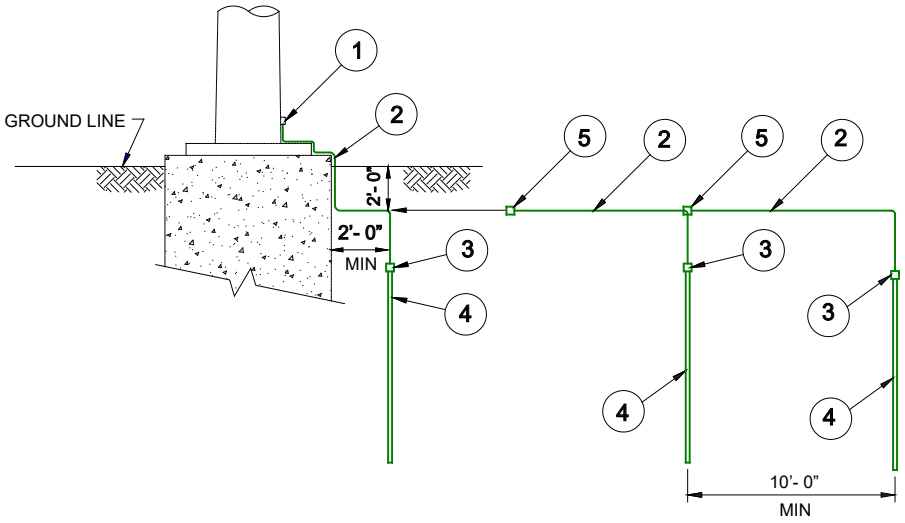


RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

GROUNDING TRANSMISSION EMBEDDED STEEL POLE

FRM. CODE	GRD-STD	GRD-STD-EXT	MATERIAL ITEM LIST		
ITEM	QTY		DESCRIPTION	STOCK #	UNIT
1	1	-	CLAMP, GROUND STEEL POLE 2-2/0	220420000	EA
2	12	12	CABLE CU BSD 2 7S	011210000	FT
3	1	1	CLAMP GR ROD 8-2 CU	220500000	EA
4	1	1	ROD GROUND CW 5/8X8	184380000	EA
5	-	1	CONN. SQZE-ON 4/0-4 CU	223620000	EA



GRD-STD
STANDARD GROUNDING ASSEMBLY

GRD-STD-EXT
STANDARD GROUNDING ASSEMBLY
(GROUNDING EXTENSION)

NOTES

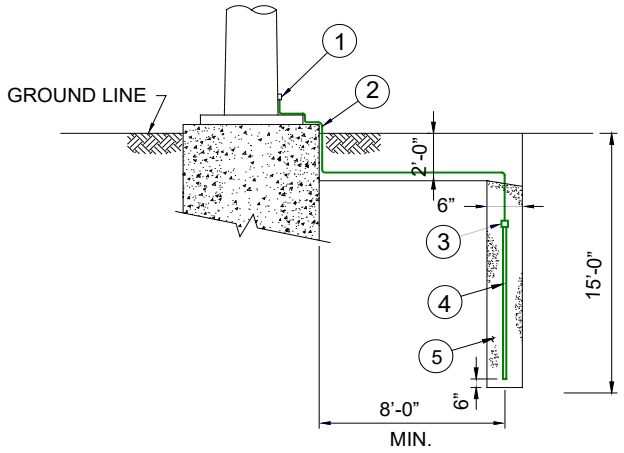
1. Material details when grounding transmission structures with suitable soils.
2. Extensions may be added as necessary to achieve the maximum allowable ground resistance of 25 Ohms.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

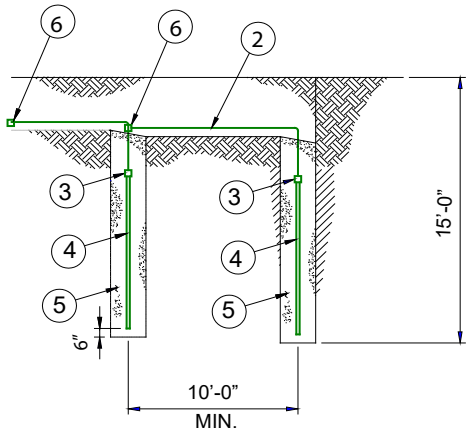
NES

GROUND DETAIL
CONCRETE FOUNDATION

FRM. CODE	GRD-VERT	GRD-VERT-EXT	MATERIAL ITEM LIST		
ITEM	QTY		DESCRIPTION	STOCK #	UNIT
1	1	-	CLAMP, GROUND STEEL POLE 2-2/0	220420000	EA
2	15	15	CABLE CU COV 2 7S MED DRAWN	012200000	FT
3	1	1	CLAMP GR ROD 8-2 CU	220500000	EA
4	1	1	ROD GROUND CW 5/8X8	184380000	EA
5	3	3	GROUND ENHANCEMENT MATERIAL	181600000	EA
6	-	1	CONN. SQZE-ON 4/0-4 CU	223620000	EA



GRD-VERT
ENHANCED GROUNDING ASSEMBLY
(VERTICAL)



GRD-VERT-EXT
ENHANCED GROUNDING ASSEMBLY
(VERTICAL EXTENSION)

TRANSMISSION TOWER ENHANCE GROUNDING SYSTEM NOTES

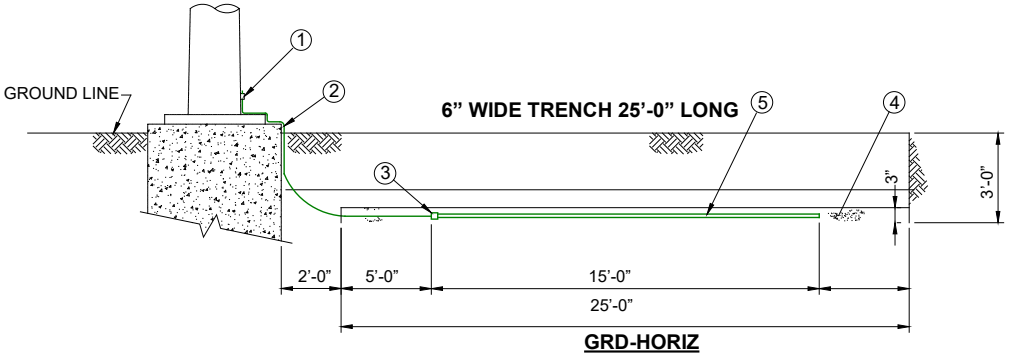
1. Material details when grounding transmission structures with rock areas.
2. Extensions may be added as necessary to achieve the maximum allowable ground resistance of 25 Ohms

RE	ENG.	DESCRIPTION OF CHANGE	DATE

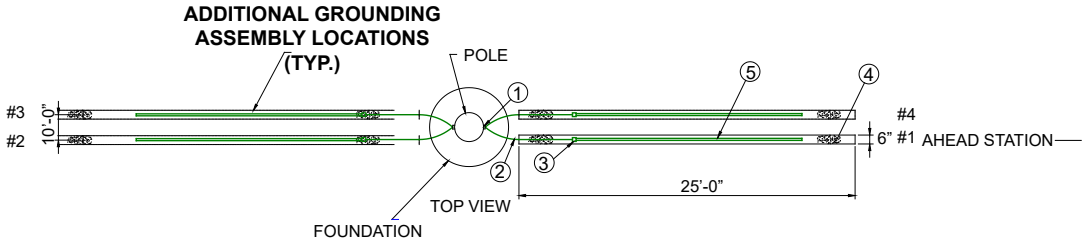
NES

GROUND ENHANCED MATERIAL CONCRETE FOUNDATION

FRM. CODE	GRD-HORIZ	GRD-HORIZ-EXT	MATERIAL ITEM LIST		
ITEM	QTY		DESCRIPTION	STOCK #	UNIT
1	1	-	CLAMP, GROUND STEEL POLE 2-2/0	220420000	EA
2	15	15	CABLE CU COV 2 7S MED DRAWN	012200000	FT
3	1	1	CONN. SQZE-ON 4/0-4 CU	223620000	EA
4	4	4	GRD ENHANCEMENT MATERIAL (50LB)	181600000	EA
5	25	25	CABLE CU BSD 4/0 19S	011260000	FT



GRD-HORIZ
ENHANCE GROUNDING ASSEMBLY
(HORIZONTAL)



GRD-HORIZ-EXT
ENHANCE GROUNDING ASSEMBLY
(HORIZONTAL EXTENSION)

NOTES

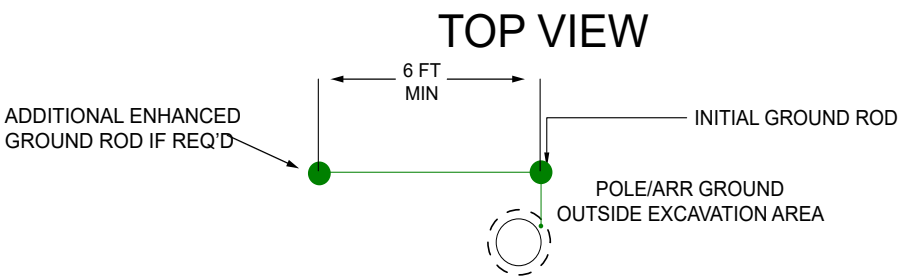
1. Use the following items when grounding transmission towers in rock areas where ground rods can not be installed.
2. Up to three (3) extensions may be added as necessary to achieve the maximum allowable ground resistance of 25 Ohms.
3. Grounds should be installed in line with the conductors.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

GROUND ENHANCING MATERIAL COUNTERPOISE SYSTEM

FRM. CODE OGR-BKFL	MATERIAL ITEM LIST		
QTY	**DESCRIPTION**	**STOCK**	**UNIT**
1	GROUND ENHANCEMENT MATERIAL	181600000	EA



VERTICAL INSTALLATION NOTES

1. Drill the earth hole to a depth that completely buries the ground rod using a minimum diameter drill bit.
2. Suspend ground rod in center of hole to be filled.
3. Pour the ground enhancement material up to the ground wire clamp and wire being careful to not cover these. No tamping is necessary.

USE OF GROUND ENHANCING BACKFILL MATERIAL NOTES

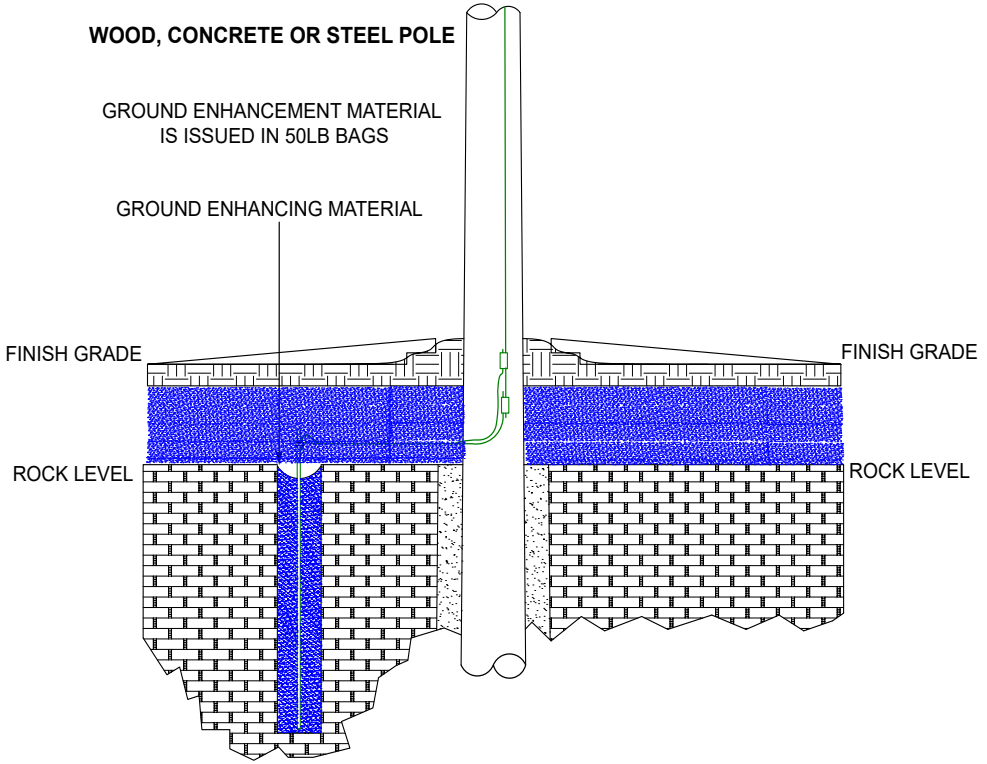
1. Ground enhancement material requires only minimum instruction for proper application. No special tools are needed. Care should be exercised to use insulated conductors as they exit the fill material.

HORIZONTAL CONSTRUCTION NOTES

1. Pour enhancement material into horizontal trench until level of ground wire is reached.
2. Lay ground wire on top of grounding enancement slurry.
3. Pour in additional ground enhancing material until the ground wire is covered to desired height.

HORIZONTAL GRID CONSTRUCTION NOTES

1. Entire grounding system should be surrounded by the grounding material.
2. Conductors should be insulated as they exit the material column.



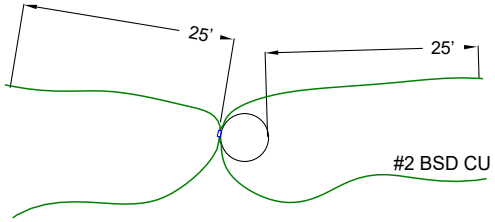
RE	ENG.	DESCRIPTION OF CHANGE	DATE

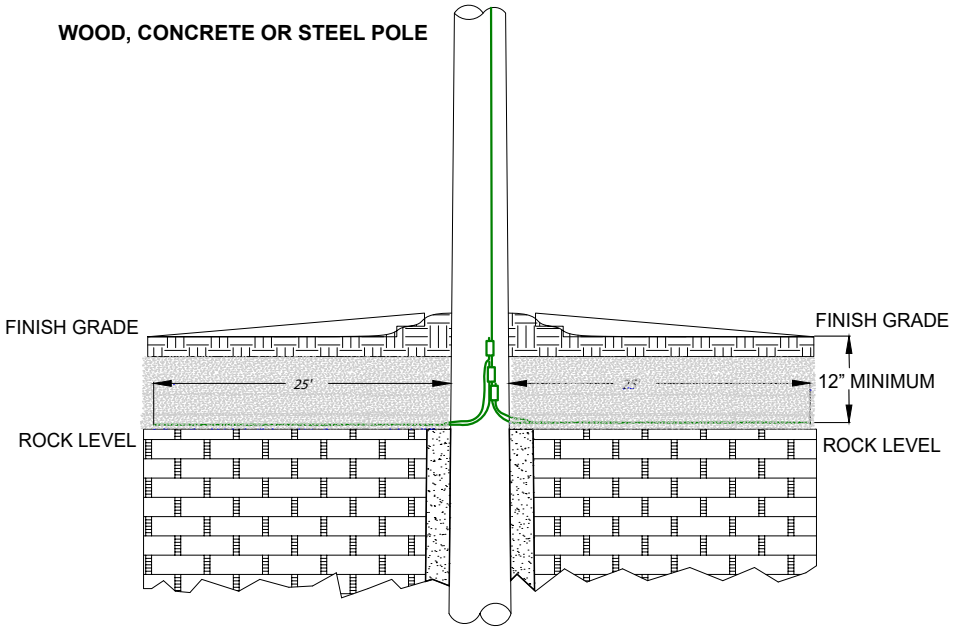
NES

GROUNDING
ROCK ENVIRONMENT
ENHANCED BACKFILL

FRM. CODE OGR-CNTP	MATERIAL ITEM LIST		
QTY	DESCRIPTION	STOCK	UNIT
110	CABLE CU BSD 2 7S	011210000	FT
2	CONN GRD 4-2 TO 4-2 CU	223480000	EA
2	SLEEVE NICOP 4	228320000	EA
2	SLEEVE NICOP 4 OFFSET	228340000	EA
2	SLEEVE NICOP 2 STR	228390000	EA
2	SLEEVE NICOP 2 OFFSET	228400000	EA

TOP VIEW





NOTES

1. The installation of this type of ground will only occur in areas where solid rock prevents the installation of any ground rods.
2. Requires min. #2 BSD CU ground wire below grade portion of system.
3. The decision for the substitution of a counterpoise ground for ground rods will be made by the operations crews at the time of installation.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

GROUNDING
ROCK ENVIRONMENT
COUNTERPOISE SYSTEM

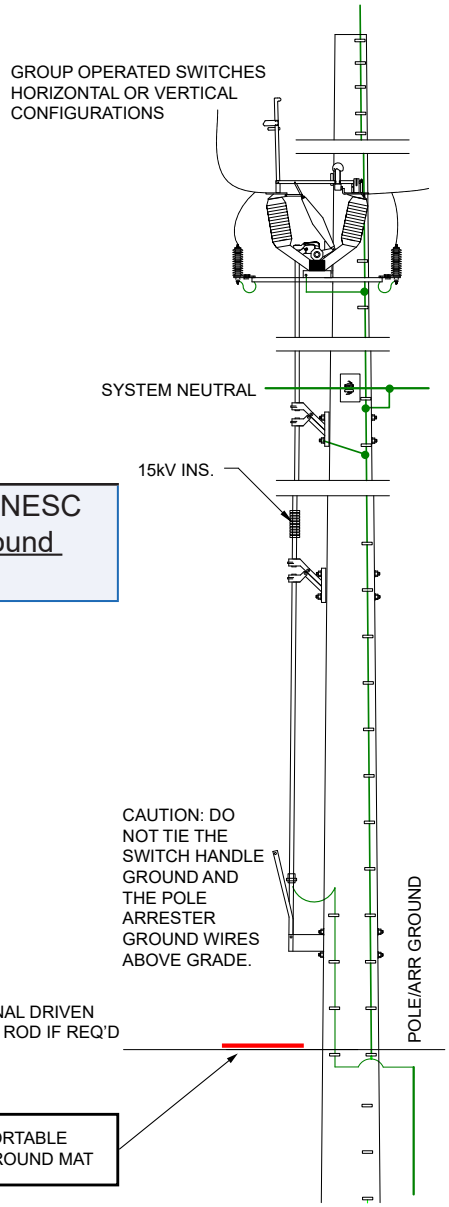
NOTES

1. Portable grounding mats are used to create a zone of equal potential around a person operating a switch. They are intended to reduce dangerous step potentials that could occur during a switching operation. As of September 2005 NES will use these mats in place of the questionable grounding grids shown on the subsequent pages.
2. It is required that this device be connected to the switch operating handle anytime that a distribution switch is opened or closed.
3. This device is to be used on any distribution system switch that does not have a clearly visible ground mat.
4. Refer to the NES safety manual for exact procedures regarding the use of this device.

MATERIAL ITEM LIST

QTY	DESCRIPTION	STOCK	UNIT
100	CABLE CU BSD 2 7S	011210000	FT
20	MOULDING PLASTIC 1/2	182640000	FT
2	CONN GRD 4-2 TO 4-2 CU	223480000	EA
2	SLEEVE NICOP 4	228320000	EA
2	SLEEVE NICOP 4 OFFSET	228340000	EA
2	SLEEVE NICOP 2 STR	228390000	EA
2	SLEEVE NICOP 2 OFFSET	228400000	EA
60	STAPLE COPPERWELD	465700000	EA
20	STAPLE PLASTIC MOULDING	465740000	EA
2	ROD GROUND CW 5/8X8	184380000	EA

Conditional grounding requirements per NESC Rule 094 shown on Grounding Pole, Ground Rod Detail, page 7 of this section.



NOTES

1. Follow typical wood pole grounding details with the following exceptions:
   -Do not tie the switch operating pipe to the pole ground below the insulator.
   -Minimum wire size is #2 CU.
2. The switch operating handle ground must be separate from the pole ground above the finish grade.
3. Preferred ground resistance is 25 Ohms or less. Install a second ground rod if 25 Ohms is not achieved with the first rod. No other grounding is required after two rods have been installed if multigrounded neutral is present.
4. Portable grounding mats will be used to provide an equal potential zone for the operator.
5. Ground rods must be installed in undisturbed soil below ground line.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

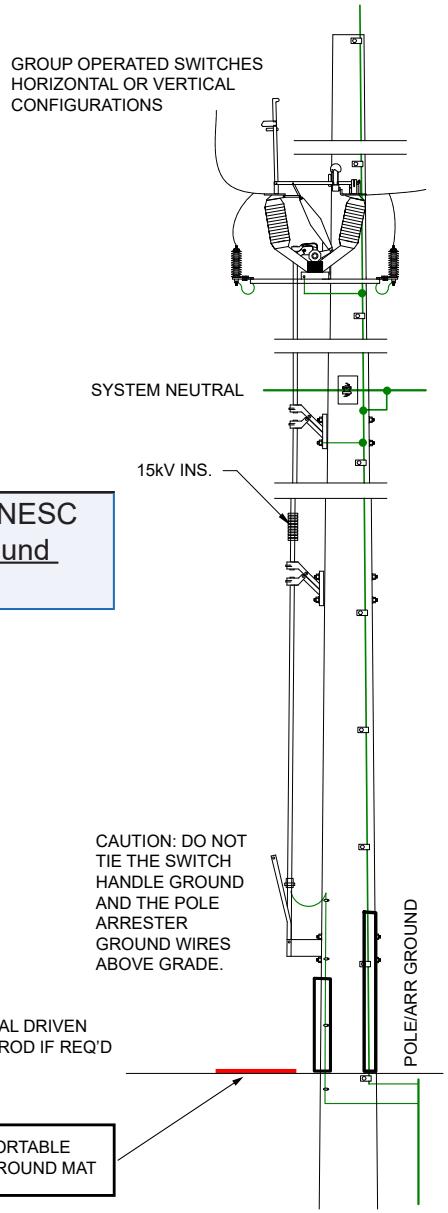
GROUNDING SWITCHES WOOD POLES

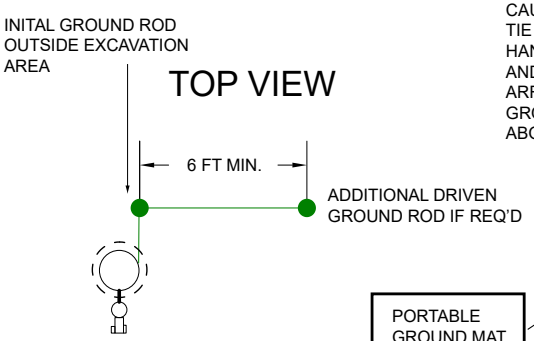
GROUNDING SPECIFICATIONS

MATERIAL ITEM LIST

QTY	DESCRIPTION	STOCK	UNIT
60	CABLE CU BSD 2 7S	011210000	FT
1	CONN GRD 4-2 TO 4-2 CU	223480000	EA
2	SLEEVE NICOP 4	228320000	EA
2	SLEEVE NICOP 4 OFFSET	228340000	EA
2	SLEEVE NICOP 2 STR	228390000	EA
2	SLEEVE NICOP 2 OFFSET	228400000	EA
2	ROD GROUND CW 5/8X8	184380000	EA
1	GALV 1" U-GUARD	101141000	EA

Conditional grounding requirements per NESC Rule 094 shown on Grounding Pole, Ground Rod Detail, page 7 of this section.





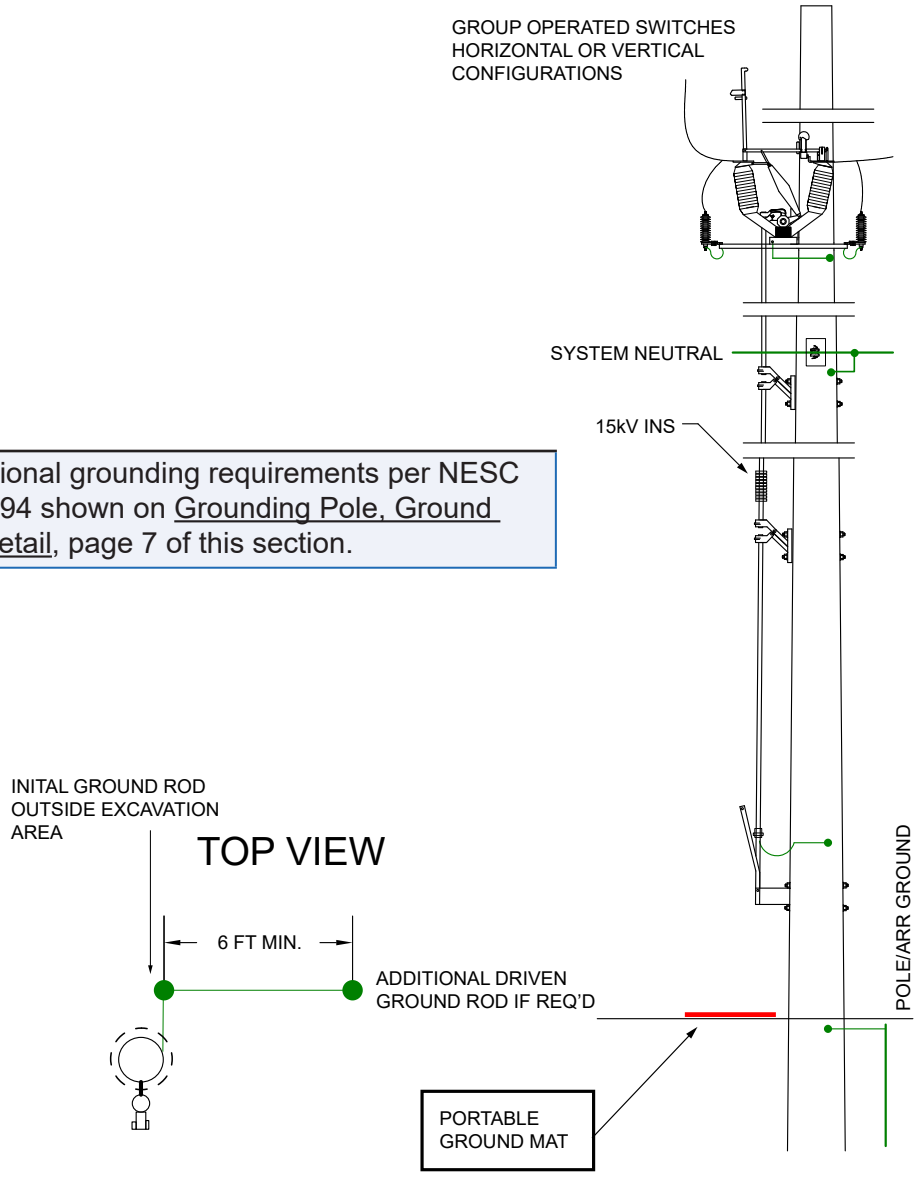
NOTES

1. Follow typical concrete pole grounding details with the following exceptions:
   -Do not tie the switch operating pipe to the pole ground below the insulator.
   -Minimum wire size is #2 CU.
2. The switch operating handle ground must be separate from the pole ground above the finish grade.
3. Bond all other equipment to the pole ground wire.
4. Preferred ground resistance is 25 Ohms or less. Install a second ground rod if 25 Ohms is not achieved with the first rod. No other grounding is required after two rods have been installed if multigrounded neutral is present.
5. Portable grounding mats will be used to provide an equal potential zone for the operator.
6. Ground rods must be installed in undisturbed soil below ground line.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

MATERIAL ITEM LIST

QTY	DESCRIPTION	STOCK	UNIT
10	CABLE CU BSD 2 7S	011210000	FT
6	CLAMP, GROUND STEEL POLE 2-2/0	220425000	EA



Conditional grounding requirements per NESC Rule 094 shown on Grounding Pole, Ground Rod Detail, page 7 of this section.

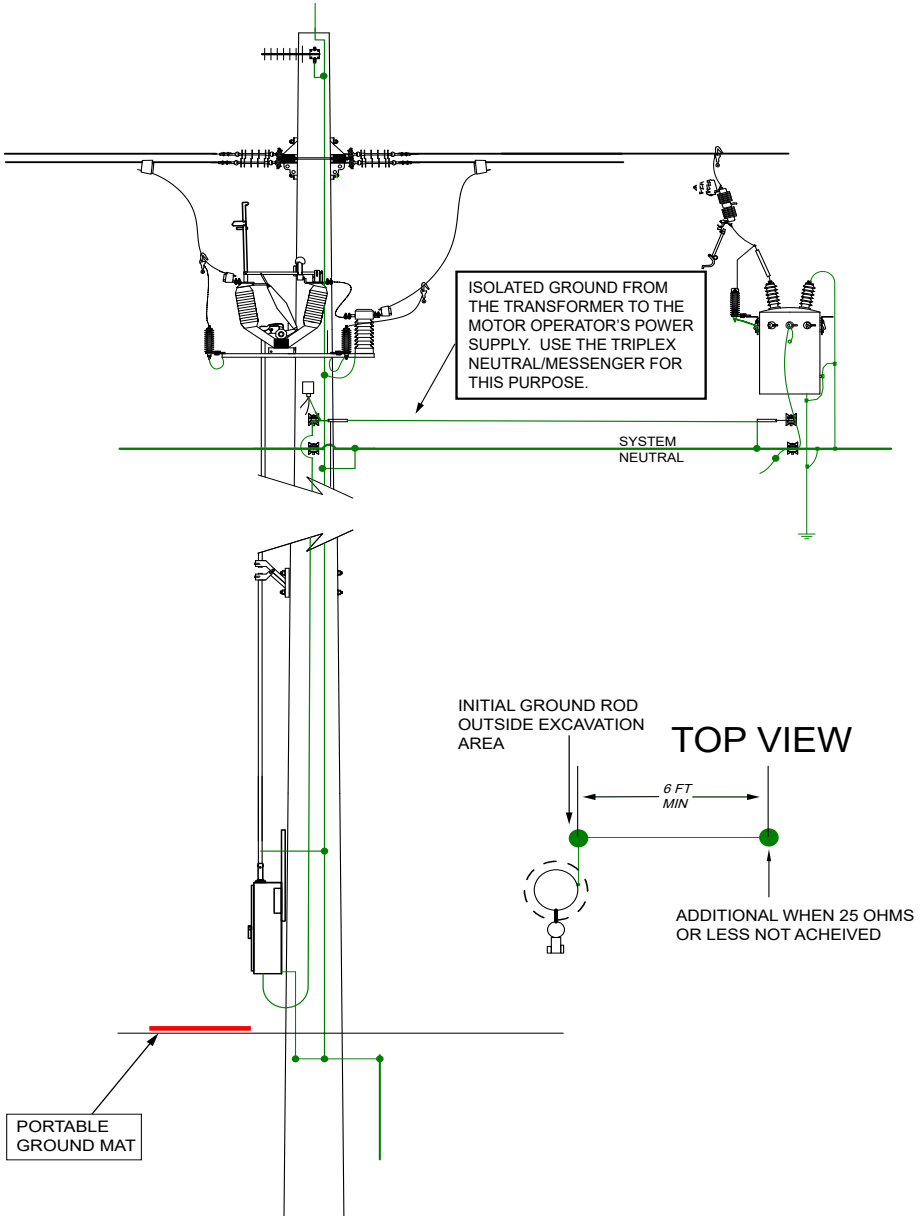
NOTES

1. Galvanized steel poles provide sufficient conductivity to eliminate the need for an external ground wire. Weathering steel poles must have all attachments bonded to the pole and the pole sections bonded together with copper jumpers.
2. Equipment will be bonded to the pole with connectors that screw into inserts that are located every five feet (5') along the length of the pole and at slip joints on weathering steel poles.
3. Use the ground connectors to support insulated ground wire when it is required for special electronic controls and equipment.
4. Lightening arresters may be bonded to the switch base.
5. Preferred ground resistance is 25 Ohms or less. Install a second ground rod if 25 Ohms is not achieved with the first rod. No other grounding is required after two rods have been installed if multigrounded neutral is present.
6. Ground rods must be installed in undisturbed soil flush or below groundline.
7. Portable grounding mats will be used to provide an equal potential zone for the operator.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

GROUNDING SWITCHES STEEL POLES



MATERIAL ITEM LIST

QTY	DESCRIPTION	STOCK	UNIT
100	CABLE CU BSD 2 7S	011210000	FT
2	ROD GROUND CW 5/8X8	184380000	EA
10	CLAMP, GROUND STEEL POLE 2-2/0	220425000	EA
3	CLAMP GR ROD 8-2 CU	220500000	EA
2	SLEEVE NICOP 4	228320000	EA
2	SLEEVE NICOP 4 OFFSET	228340000	EA
2	SLEEVE NICOP 2 STR	228390000	EA
2	SLEEVE NICOP 2 OFFSET	228400000	EA

NOTES

1. #2 CU ground wire must be installed from the antenna to the ground grid even if the motor operator is installed on a steel pole. Use the ground connectors to support insulated ground wire. Ground top to antenna and base to pole when 20-ft Aluminum Mast is installed.
2. Lightning arrester grounds may be bonded directly to the switch base.
3. Preferred ground resistance is 25 Ohms or less. It is not necessary to drive additional grounds if 25 Ohms is not achieved with a multi-ground neutral system.
4. Install arresters on both sides of the switch. Leads on the hot and ground side of the arresters must be as short as possible.
5. A secondary arrester must be installed inside the control or motor operated unit.
6. Portable grounding mats will be used to provide an equal potential zone for the operator.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

GROUNDING SPECIFICATIONS

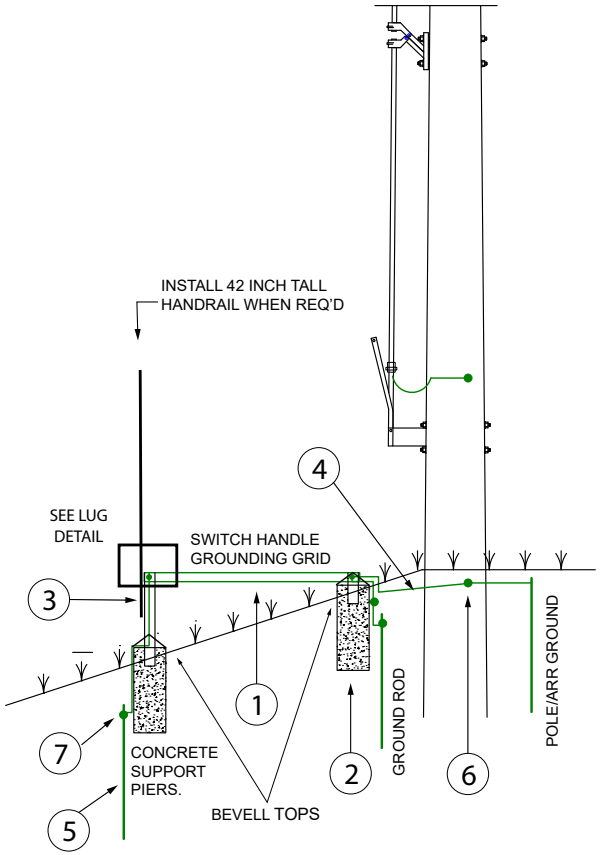
NES

GROUNDING STANDARD MOTOR OPERATED SWITCH

FRM. CODE	OGR-SH-SLP	MAJOR AND MINOR MATERIAL ITEM LIST		
ITEM	QTY	DESCRIPTION	STOCK #	UNIT
1	1	GRATING SW GND MAT 3X4 20982	060330000	EA
2	1	CONCRETE-GENERAL DESIGN BIN	509000000	CY
3	1	STEEL ANGLE 3”X3”X0.25”X10’	500641500	EA

TRUCK STOCK ITEMS

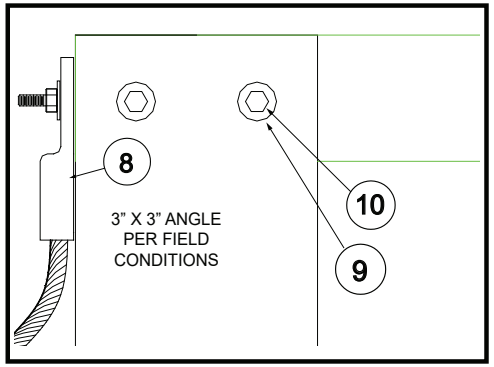
ITEM	QTY	DESCRIPTION	STOCK	UNIT
4	10	CABLE CU BSD 2 7S	011210000	FT
5	5	ROD GROUND CW 5/8X8	184380000	EA
6	1	CLAMP, GROUND STEEL POLE 2-2/0	220425000	EA
7	5	CLAMP GRD ROD 8-2 CU	220500000	EA
8	6	TERM 2CU 1H; LUG, TERMINAL, #2 STRANDED	231950000	EA
9	34	WASHERS SS BVL SPG 1/2H	209700000	EA
10	17	BOLT MACHINES SS 1/2 X 1-3/4”	204370000	EA

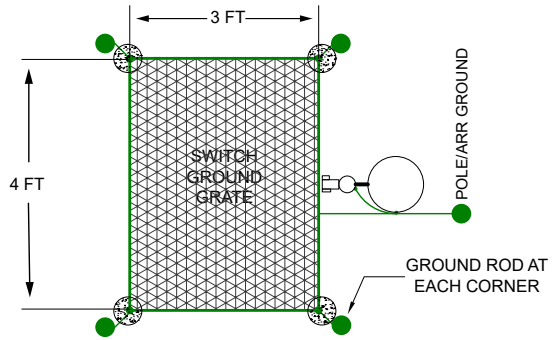


NOTES

1. Whenever the ground slope exceeds ~15% a ground grid should be installed on piers to create a level platform for the switch operator. 15% is defined as 18” of rise in 10-ft of run.
2. Steps and a hand rail may be required for a severe change in elevation. The addition of steps is not considered standard construction and should be avoided.
3. The grate must have all four (4) corners grounded.
4. The T&D crew is responsible for coordinating the installation of the grate with Construction Support Crew
5. The concrete must extend above the ground line to protect the metal leg and bevelled to draw pier top.

Ground Lug Detail





TOP VIEW

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

GROUND STANDARD SWITCH PLATFORM

TRANSFORMERS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
3/23/26	Cedric Short	Ronald Reasonover	Tony Richman
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
SINGLE PHASE TRANSFORMER CHART	3			
THREE PHASE, 4 WIRE, TRANSFORMER CHART	4			
THREE PHASE, 3 WIRE, TRANSFORMER CHART	5			
FUSING CHART	6			
FUSED DISCONNECTS, LBU & CLF DETAILS	7			
PRIMARY CONNECTOR CLAMP DETAILS	8			
SECONDARY CONNECTOR, RESIDENTIAL SERVICE DETAILS	9			
SECONDARY CONNECTOR, COMMERCIAL SERVICE DETAILS	10			
SECONDARY CONNECTOR INSTALLATION DETAILS	11			
SECONDARY CONNECTOR SELECTION CHART	12			
SINGLE PHASE PRIMARY WYE CONNECTIONS	13			
TWO PHASE PRIMARY DELTA CONNECTIONS	14			
SINGLE PHASE, 3-PHASE BANK, PRIMARY CONNECTIONS	15			
SELF CONTAINED, THREE PHASE ,PRIMARY CONNECTIONS	16			
SECONDARY LOAD CURRENT RATINGS, SINGLE UNITS	17			
SECONDARY LOAD CURRENT RATINGS, BANKED UNITS	18			
STANDARD SECONDARY CONDUCTOR RATINGS	19			
WIRING DIAGRAM, PRIMARY WYE 120/240V 1- PHASE SERVICE	20			
WIRING DIAGRAM, PRIMARY DELTA 120/240V 1-PHASE SERVICE	21			

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
WIRING DIAGRAM, DELTA-DELTA 240V OR 480V SERVICES	22			
WIRING DIAGRAM, 4 BUSHING, WYE-DELTA 240V OR 480V SERVICES	23			
WIRING DIAGRAM, DELTA-WYE 208Y/120V OR 480Y/277V SERVICES	24			
WIRING DIAGRAM, 4 BUSHING, WYE-WYE 208Y/120V OR 480Y/277V SERVICES	25			
3 WIRE, 3 PHASE 4KV BANKED TRANSFORMERS 240V OR 480V SECONDARY	26			
4 WIRE, 3 PHASE 4KV BANKED TRANSFORMERS WITH 120/208V SECONDARY	27			
4 WIRE, 3 PHASE 4KV BANKED 4 BUSHING TRANSFORMERS WITH 120/208V SECONDARY	28			
3 WIRE, 3 PHASE 13.8KV BANKED TRANSFORMER WITH 240V OR 480V SECONDARY	29			
4 WIRE, 3 PHASE 13.8KV BANKED TRANSFORMERS WITH 120/208V SECONDARY	30			
4 WIRE, 3 PHASE 13.8KV BANKED TRANSFORMERS WITH 277/480V SECONDARY	31			
3 WIRE, 3 PHASE 13.8KV BANKED 4 BUSHING TRANSFORMERS WITH 240/480V SECONDARY	32			
4 WIRE, 3 PHASE 13.8KV BANKED 4 BUSHING TRANSFORMERS WITH 120/208V SECONDARY	33			
3 WIRE, 3 PHASE 23.9KV BANKED TRANSFORMER WITH 240V OR 480V SECONDARY	34			
4 WIRE, 3 PHASE 23.9KV BANKED TRANSFORMERS WITH 120/208V SECONDARY	35			
4 WIRE, 3 PHASE 23.9KV BANKED TRANSFORMERS WITH 277/480V SECONDARY	36			
3 WIRE, 3PHASE 23.9KV BANKED 4 BUSHING TRANSFORMER WITH 240V OR 480V SECONDARY	37			
4 WIRE, 3 PHASE 23.9KV BANKED 4 BUSHING TRANSFORMER WITH 120/208V SECONDARY	38			

TRANSFORMER COMPATIBLE UNITS FOR OVERHEAD APPLICATIONS

SINGLE PHASE

PHASE TO PHASE LINE VOLTAGES TO SECONDARY VOLTAGE

				SPECIAL APPLICATIONS	
Transformer kVA	4kV to 120/240	13.8kV to 120/240	23.9kV to 120/240	7.96kV to 120/240	2.4kV to 120/240
15	OT0414	OT8014	OT8014	n/a	OT0414
25	OT0416	OT8016	OT8016	OT2216	OT0416
37.5	OT0420	OT8020	OT8020	n/a	OT0420
50	OT0424	OT8024	OT8024	OT2224	OT0424
75	OT0426	OT8026	OT8026	n/a	OT0426
100	OT0428	OT8028	OT8028	OT2228	OT2228
167	OT0434	OT8034	OT8034	OT2234	OT2234

SPECIAL APPLICATIONS

Transformer kVA	4kV to 240/480	13.8kV to 240/480	23.9kV to 240/480	7.96kV to 240/480	2.4kV to 240/480
25	OT0616	OT8216	OT8216	n/a	OT0616
37.5	OT0620	OT8220	OT8220	n/a	OT0620
50	OT0624	n/a	n/a	n/a	OT0624
75	N/A	OT8226	OT8226	n/a	n/a
100	OT0628	OT8228	OT8228	n/a	OT0628
167	N/A	OT8234	OT8234	n/a	n/a

STEP DOWN STATIONS - PRIMARY VOLTAGE TO SECONDARY VOLTAGE

Transformer kVA & Mounting	13.2kV to 2.4/4.16kV	13.8kV to 2.4/4.16kV	14.4kV to 2.4/4.16kV	23.9/13.8kV to 7.96x13.8kV
100 PLATFORM	OT4128	n/a	n/a	n/a
167 POLE MOUNT	OT4034	n/a	n/a	n/a
167 PLATFORM	OT4034	n/a	OT7734	n/a
250 POLE MOUNT	n/a	OT6440	n/a	n/a
250 PLATFORM	OT4140	OT6540	OT7740	n/a
333 PLATFORM	OT4146	OT6546	n/a	n/a
500 PLATFORM	n/a	OT6552	n/a	OT9052

NOTES

1. For all special application transformers check the stock level and location.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

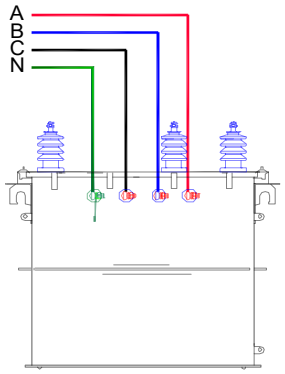
NES

SINGLE PHASE
TRANSFORMER CHART

TRANSFORMER COMPATIBLE UNITS FOR OVERHEAD APPLICATIONS

4 WIRE THREE PHASE SERVICES

SELF CONTAINED, 4-WIRE, 3-PHASE TRANSFORMERS

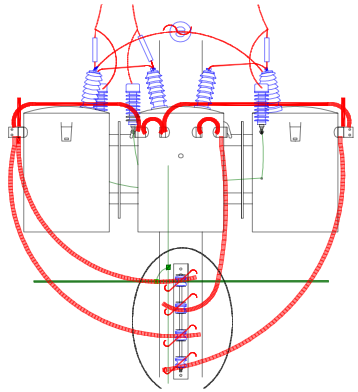


Transformer kVA	4kV 208Y/120	13.8kV 208Y/120	23.9kV 208Y/120	4kV 480Y/277	13.8kV 480Y/277	23.9kV 480Y/277
30	OT1218	OT4918	n/a	OT1818	n/a	OT8818
45	OT1222	OT4922	OT8422	OT1822	OT6222	OT8822
75	OT1226	OT4926	OT8426	OT1826	OT6226	OT8826
112.5	OT1230	OT4930	OT8430	OT1830	OT6230	OT8830
150*	OT1232	OT4932	OT8432	OT1832	OT6232	OT8832
225*	OT1238	OT4938	OT8438	OT1838	OT6238	OT8838
300*	n/a	OT4943	OT8443	OT1843	OT6243	OT8843

*Self contained 3-Phase units, 150kVA and above, are rectangular.

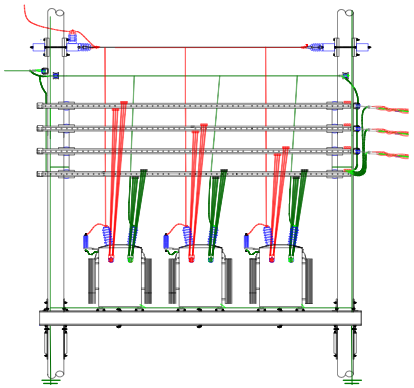
BANKED, SINGLE PHASE TRANSFORMERS, 4-WIRE, 3-PHASE

FOR SERVICES REQUIRING TRANSFORMERS 300kVA AND LOWER; ALWAYS USE SELF-CONTAINED TRANSFORMERS. BANKING BELOW 500kVA SHOULD ONLY OCCUR IF SELF-CONTAINED UNITS ARE UNAVAILABLE.



Transformer kVA	4kV 208Y/120	13.8kV 208Y/120	23.9kV 208Y/120	13.8kV 480Y/277	23.9kV 480Y/277
3-15(45)	OT0414	OT8014	OT8014	n/a	n/a
3-25(75)	OT0416	OT8016	OT8016	n/a	n/a
3-37.5(112.5)	OT0420	OT8020	OT8020	n/a	n/a
3-50(150)	OT0424	OT8024	OT8024	n/a	n/a
3-75(225)	OT0426	OT8026	OT8026	OT5826	OT5826
3-100(300)	OT0428	OT8028	OT8028	OT5828	OT5828
3-167(500)	OT0434	OT8034	OT8034	OT5834	OT5834

CUSTOMER PLATFORM SUBSTATIONS FOR 4-WIRE 3-PHASE SERVICES UP TO 1500kVA



ENGINEERING NOTE:
THE CU'S BELOW INCLUDE ONLY ONE TRANSFORMER. THE PLATFORM AND ALL OTHER APPURTENANCES ARE CALLED FOR SEPARATELY.

Transformer kVA	13.8kV 208Y/120	23.9kV 208Y/120	13.8kV 480Y/277	23.9kV 480Y/277
3-250(750)	n/a	n/a	OT5840	OT5840
3-333(1000)	OT4846	OT4846	OT5846	OT5846
3-500(1500)	OT4852	OT4852	OT5852	OT5852

NOTES

1. Check stock for transformer quatities and locations.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

THREE PHASE (4 WIRE) TRANSFORMER CHART

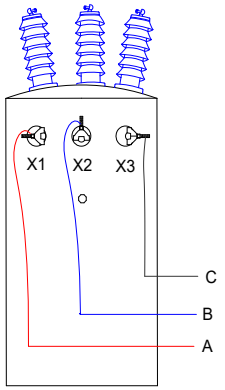
TRANSFORMER COMPATIBLE UNITS FOR OVERHEAD APPLICATIONS

3 WIRE THREE PHASE SERVICES

SELF CONTAINED, 3-WIRE, 3-PHASE TRANSFORMERS

Transformer kVA	4kV 240 or 480	13.8kV 240 or 480	23.9kV 240 or 480
30	OT1618	OT5518	OT8618
45	OT1622	OT5522	OT8622
75	n/a	OT5526	OT8626
112.5	OT1630	OT5530	OT8630
150*	OT1632	OT5532	OT8632
225*	n/a	OT5538	OT8638

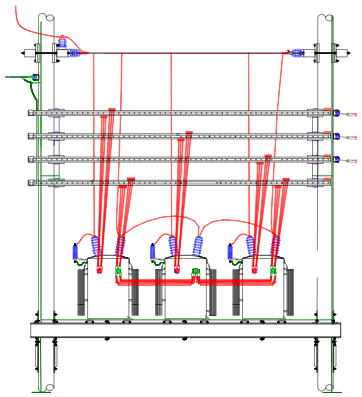
*Self contained 3-Phase units, 150kVA and above, are rectangular.



CUSTOMER PLATFORM SUBSTATIONS FOR 3-WIRE 3-PHASE SERVICES UP TO 1500kVA

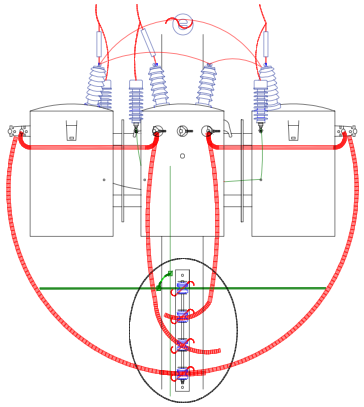
ENGINEERING NOTE:
THE CU'S BELOW INCLUDE ONLY ONE TRANSFORMER. THE PLATFORM AND ALL OTHER APPURTENANCES ARE CALLED FOR SEPARATELY.

Transformer kVA	13.8kV 240 or 480	23.9kV 240 or 480
3-250(750)	OT5440	OT5440
3-333(1000)	OT5446	OT5446
3-500(1500)	OT5452	OT5452



BANKED SINGLE PHASE TRANSFORMERS, 3 WIRE, 3-PHASE

NOTE: FOR SERVICES REQUIRING TRANSFORMERS 300kVA AND LOWER; ALWAYS USE SELF-CONTAINED TRANSFORMERS. BANKING BELOW 500kVA SHOULD ONLY OCCUR IF SELF-CONTAINED UNITS ARE UNAVAILABLE.



Transformer kVA	4kV 240	13.8kV 240	23.9kV 240	4kV 480	13.8kV 480	23.9kV 480
3-15(45)	OT0414	OT8014	OT8014	n/a	n/a	n/a
3-25(75)	OT0416	OT8016	OT8016	OT0616	n/a	n/a
3-37.5(112.5)	OT0420	OT8020	OT8020	OT0620	OT8220	OT8220
3-50(150)	OT0424	OT8024	OT8024	OT0624	n/a	n/a
3-75(225)	OT0426	OT8026	OT8026	n/a	OT8226	OT8226
3-100(300)	OT0428	OT8028	OT8028	OT0628	OT8228	OT8228
3-167(500)	OT0434	OT8034	OT8034	n/a	OT8234	OT8234

NOTES

1. Check stock for transformer quatities and locations.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

THREE PHASE (3 WIRE) TRANSFORMER CHART

PRIMARY FUSE CHART

SINGLE PHASE TRANSFORMERS

kVA	2.4kV PHASE TO GROUND		7.96kV PHASE TO GROUND		13.8kV PHASE TO PHASE OR PHASE TO GROUND	
	FULL LOAD AMPS	FUSE SIZE & TYPE	FULL LOAD AMPS	FUSE SIZE & TYPE	FULL LOAD AMPS	FUSE SIZE & TYPE
5	2.1	4-D	0.6	1-D	0.4	1-D
7.5	3.1	5-D	0.9	1.5-D	n/a	n/a
10	4.2	7-D	1.3	2-D	0.7	1.5-D
15	6.2	10-D	1.9	4-D	1.1	2-D
25	10.4	20-D	3.1	7-D	1.8	3-D
37.5	15.6	25-K	4.7	10-D	2.7	5-D
50	20.8	40-K	6.3	10-D	3.6	7-D
75	31.2	50-K	9.4	15-D	5.4	10-D
100	41.7	65-K	12.5	25-K	7.3	15-D
150	62.5	80-K	18.8	30-K	10.9	20-D
167	69.6	100-K	21	30-K	12.1	20-D
200	n/a	n/a	25.1	40-K	14.5	25-K
250	n/a	n/a	31.4	50-K	18.1	30-K
333	n/a	n/a	41.8	65-K	24.1	40-K
400	n/a	n/a	50.3	80-K	29	50-K
500	n/a	n/a	62.8	100-K	36.2	65-K

PRIMARY FUSE CHART

THREE PHASE TRANSFORMERS

kVA	4.16kV PHASE TO PHASE		13.8kV PHASE TO PHASE		23.9kV PHASE TO PHASE	
	FULL LOAD AMPS	FUSE SIZE & TYPE	FULL LOAD AMPS	FUSE SIZE & TYPE	FULL LOAD AMPS	FUSE SIZE & TYPE
15	2.1	4-D	0.6	1-D	0.4	1-D
30	4.1	7-D	1.3	2-D	0.7	1.5-D
45	6.3	10-D	1.9	4-D	1.1	2-D
75	10.4	20-D	3.1	7-D	1.8	3-D
112.5	15.6	25-K	4.7	10-D	2.7	5-D
150	20.8	40-K	6.3	10-D	3.6	7-D
225	31.3	50-K	9.4	15-D	5.4	10-D
300	41.7	65-K	12.6	25-K	7.3	15-D
450	62.5	80-K	18.8	30-K	10.9	20-D
500	69.4	100-K	20.9	30-K	12.1	20-D
600	n/a	n/a	25.1	40-K	14.5	25-K
750	n/a	n/a	31.4	50-K*	18.1	30-K*
1000	n/a	n/a	41.9	65-K*	24.2	40-K*
1200	n/a	n/a	50.3	85-K	29	50-K
1500	n/a	n/a	62.8	100-K*	36.3	65-K*
2000	n/a	n/a	83.8	140-K	48.4	80-K
2500	n/a	n/a	104.7	140-K*	60.5	100-K*
5000	n/a	n/a	209.4	200-K	120.9	140-K

Three phase transformer fuse chart applies for both standalone and banked configurations. (Platform substations are not included)

*FUSE AS BELOW WHEN A LOW SIDE RECLOSER IS USED

MATERIAL LIST

kVA	13.8 - 4.16kV	23.9 - 4.16kV	23.9 - 13.8kV
750	80-K	40-K	65-K
1000	100-K	65-K	80-K
1500	140-K	80-K	100-K
2000	200-K	100-K	n/a

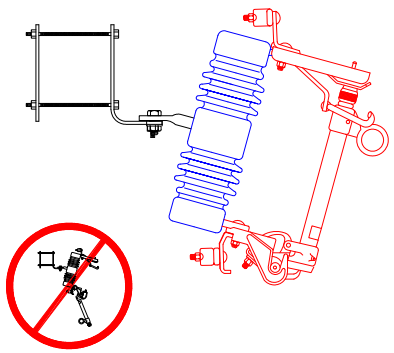
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

FUSING CHART

100A CUTOUT

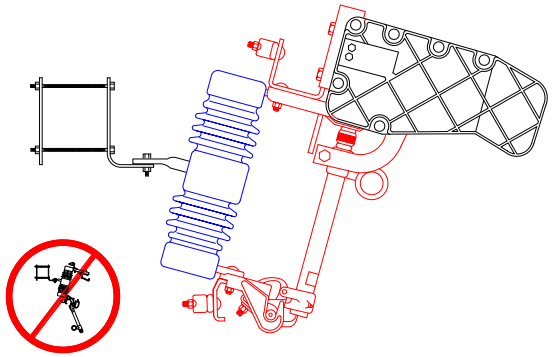


CAUTION:
Never leave the fuse holder with the open end facing up. Water will cause the inside of the tube to swell preventing the fuse from clearing a fault.

MATERIAL LIST			
QTY	DESCRIPTION	STOCK NUMBER	CU CODE
1	CUTOUT 100A 14.4/24.9KV	143410000	OCO100-TRF
1	FUSE LINK 3-100 AMP	TRUCK STOCK	
REPAIR AND ADDITIONAL PARTS			
	CAP CHANCE 100 AMP	142580000	
	FUSE HOLDER 100 AMP UNIVERSAL	144807000	

STANDARD APPLICATIONS:
Transformers and sideline taps that are fused for a transformer where the poles are inaccessible to trucks. When fusing a sideline for a transformer, the transformer must be clearly visible from the fuse pole.

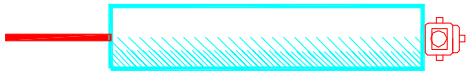
100A LBU CUTOUT



MATERIAL LIST			
QTY	DESCRIPTION	STOCK NUMBER	CU CODE
1	CUTOUT 100A 14.4/24.9KV LB	143450000	OCO100L-TRF
1	FUSE LINK 3-100 AMP	TRUCK STOCK	
REPAIR AND ADDITIONAL PARTS			
	HOLDER 100 A LBU ABB	144800000	
	CAPS EXPENDABLE SS 100A	142600000	

STANDARD APPLICATIONS:
All transformers 37.5 kVA or larger. All 3 phase transformers.
All transformers located within a one mile radius of the substation their fed from.
All transformers under transmission lines.
All transformers on substation feeder circuits (795 or larger wire). All steel poles.
As required by Distribution Planning on side lines.

CLF



Install a 25 Amp current limiting fuse on all 7.96kV, 13.8kV and 23.9kV transformers that use 25 Amp, or smaller, k or d link fuses.

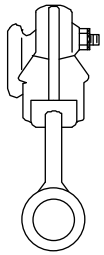
Install a 40 Amp current limiting fuse on transformers fused up to 40 Amps.

Do not install CLF's on any 4kV transformers.

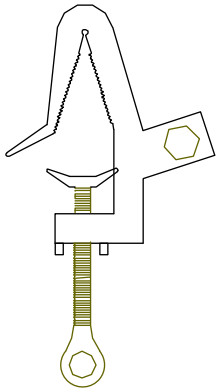
MATERIAL LIST			
QTY	DESCRIPTION	STOCK NUMBER	CU CODE
1	CURRENT LIMITING FUSE 1-25A	260300000	OCLF15-25
1	CURRENT LIMITING FUSE 30-40A	260310000	OCLF15-40

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

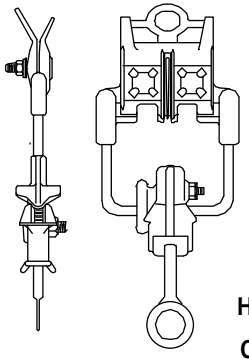
TRUCK STOCK PRIMARY CONNECTORS	
STOCK NUMBER	DESCRIPTION
220650000	HOT LINE CLAMP #6 - 1/0
220680000	HOT LINE CLAMP 1 - 266
220700000	HOT LINE CLAMP 2 - 8 COPPER



TRUCK STOCK PRIMARY CONNECTORS	
STOCK NUMBER	DESCRIPTION
220690000	HOT LINE CLAMP #4 - 4/0 VJAW
220692000	HOT LINE CLAMP 336 - 636 VJAW
220694000	HOT LINE CLAMP 636 - 1033 VJAW



TRUCK STOCK PRIMARY CONNECTORS	
STOCK NUMBER	DESCRIPTION
220860000	STIRRUP CLAMP #4 - 4/0, 3/8” TAP
220880000	STIRRUP CLAMP 336 - 795, 1/2” TAP
220900000	STIRRUP CLAMP 400 - 1431, 1/2” MTAP



STIRRUP CLAMP

HOT LINE CLAMP

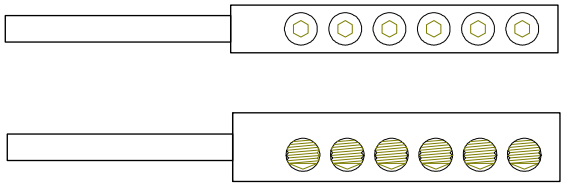
See recommended torque values on Page 12.

HOT LINE CLAMP SELECTION CHART FOR TRANSFORMER INSTALLATIONS									
WIRE SIZE	#6 CU	#4 CU	#2 AL/CU	1/0 AL/CU	4/0 AL/CU	336 ACSR	477 ACSR	795 ACSR	1351 AAC
HOT LINE CLAMP, STOCK #	220650000	220650000	220690000	220690000	220690000	220692000	220692000	220694000	220680000
STIRRUP CLAMP, STOCK #	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	220900000

NOTES

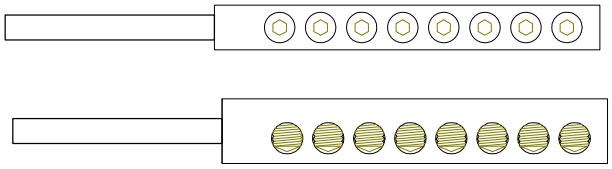
1. Clean conductors with a wire brush prior to installation.
2. Use inhibiting compound when combining copper conductors with aluminum connectors.
3. Hot line clamps may be used on all side-line or equipment taps where the connecting conductors are within the clamps range. (Caution: connections of conductors larger than 4/0 ACSR must be made with an appropriately sized “shoot on” or bolted wedge connector.)

REV.	ENG.	DESCRIPTION OF CHANGE	DATE



TRUCK STOCK SECONDARY CONNECTOR	
STOCK NUMBER	**DESCRIPTION**
224166000	**CONNECTOR, TRANSFORMER STUD 6H 250MCM**
APPLICATIONS	
FOR CONNECTING THE HOT LEGS OF SERVICE WIRES UP TO 250mcm TO THE TRANSFORMER SECONDARY BUSHINGS SINGLE PHASE TRANSFORMERS <37.5KVA THREE PHASE TRANSFORMERS < 225kVA	

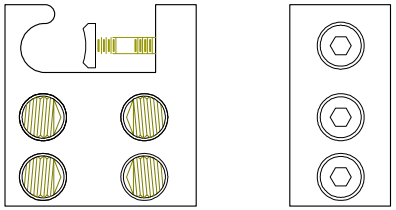
See recommended torque values on Page 12.



TRUCK STOCK SECONDARY CONNECTOR	
STOCK NUMBER	**DESCRIPTION**
224168000	**CONNECTOR, TRANSFORMER STUD 8H 250MCM**
APPLICATIONS	
FOR CONNECTING THE HOT LEGS OF SERVICE WIRES UP TO 250mcm TO THE TRANSFORMER SECONDARY BUSHINGS SINGLE PHASE TRANSFORMERS 37.5KVA - 100KVA	

See recommended torque values on Page 12.

SLOT IS FOR THE MAINLINE.
HOLES ARE FOR THE SERVICE TAPS.



TRUCK STOCK SECONDARY CONNECTOR	
STOCK NUMBER	**DESCRIPTION**
224165500	**CONNECTOR, TRANS. SLOTTED MAIN 4 HOLE TAP**
APPLICATIONS	
THIS CONNECTOR IS TO BE USED TO CONNECT THE NEUTRALS OF MULTIPLE SERVICES TO A TRANSFORMER NEUTRAL LEAD WIRE. IT MAY ALSO BE USED TO REPLACE THE COMPRESSION CONNECTORS THAT ATTACH THE HOT LEGS OF THE SERVICE TO THE TRANSFORMER SECONDARY LEAD WIRES.	

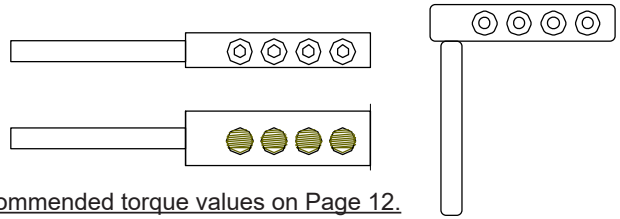
See recommended torque values on Page 12.

NOTES

1. NES specifications require that these connectors be plated or coated to allow the use of both copper and aluminum conductors.
2. Any failed connector must be saved and returned to standards engineering for analysis.

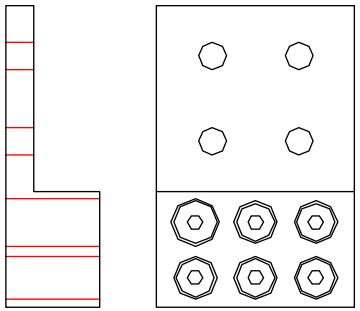
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRUCK STOCK SECONDARY CONNECTOR	
STOCK NUMBER	**DESCRIPTION**
224167000	**CONNECTOR, TRANSFORMER STUD 4H 500MCM**
APPLICATIONS	
100kVA SINGLE PHASE TRANSFORMERS 75-300kVA THREE PHASE TRANSFORMERS	



See recommended torque values on Page 12.

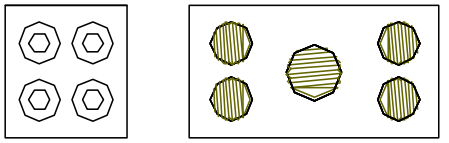
TRUCK STOCK SECONDARY CONNECTOR	
STOCK NUMBER	**DESCRIPTION**
224163000	**CONNECTOR, TRANSFORMER SPADE**
APPLICATIONS	
ANY TRANSFORMER WITH SECONDARY SPADES USUALLY 167-500KVA SINGLE PHASE TRANSFORMERS	



See recommended torque values on Page 12.

TRUCK STOCK SECONDARY CONNECTOR	
STOCK NUMBER	**DESCRIPTION**
223306000	**CONNECTOR, COMMERCIAL OVERHEAD FIVE HOLE INCLUDES INSULATING COVER**
APPLICATIONS	
ANY OVERHEAD COMMERCIAL SERVICE SECONDARY. MAY BE INSTALLED AT THE WEATHER HEAD, SECONDARY RISER OR TRANSFORMER.	
WIRE RANGES	
CENTER HOLE	750MCM-1/0
TAP HOLES	500MCM-#2

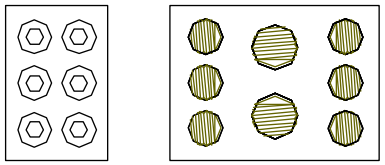
INCLUDES INSULATING COVER



See recommended torque values on Page 12.

TRUCK STOCK SECONDARY CONNECTOR	
STOCK NUMBER	**DESCRIPTION**
223308000	**CONNECTOR, COMMERCIAL OVERHEAD EIGHT HOLE INCLUDES INSULATING COVER**
APPLICATIONS	
ANY OVERHEAD COMMERCIAL SERVICE SECONDARY. MAY BE INSTALLED AT THE WEATHER HEAD, SECONDARY RISER OR TRANSFORMER.	
WIRE RANGES	
CENTER HOLE	750MCM-1/0
TAP HOLES	500MCM-#2

INCLUDES INSULATING COVER

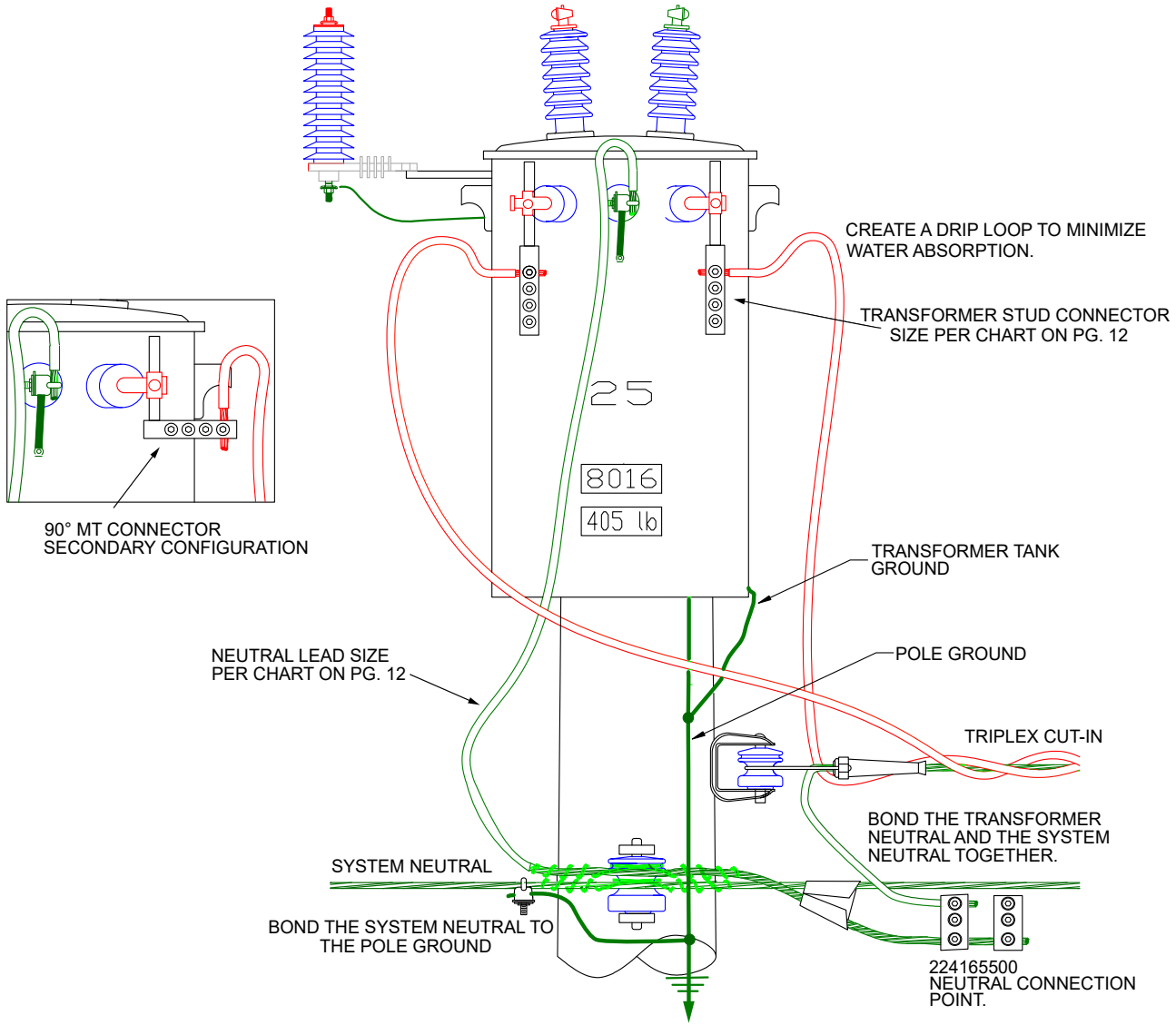


See recommended torque values on Page 12.

NOTES

1. NES specifications require that these connectors be plated or coated to allow the use of both copper and aluminum conductors.
2. Any failed connector must be saved and returned to standards engineering for analysis.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE



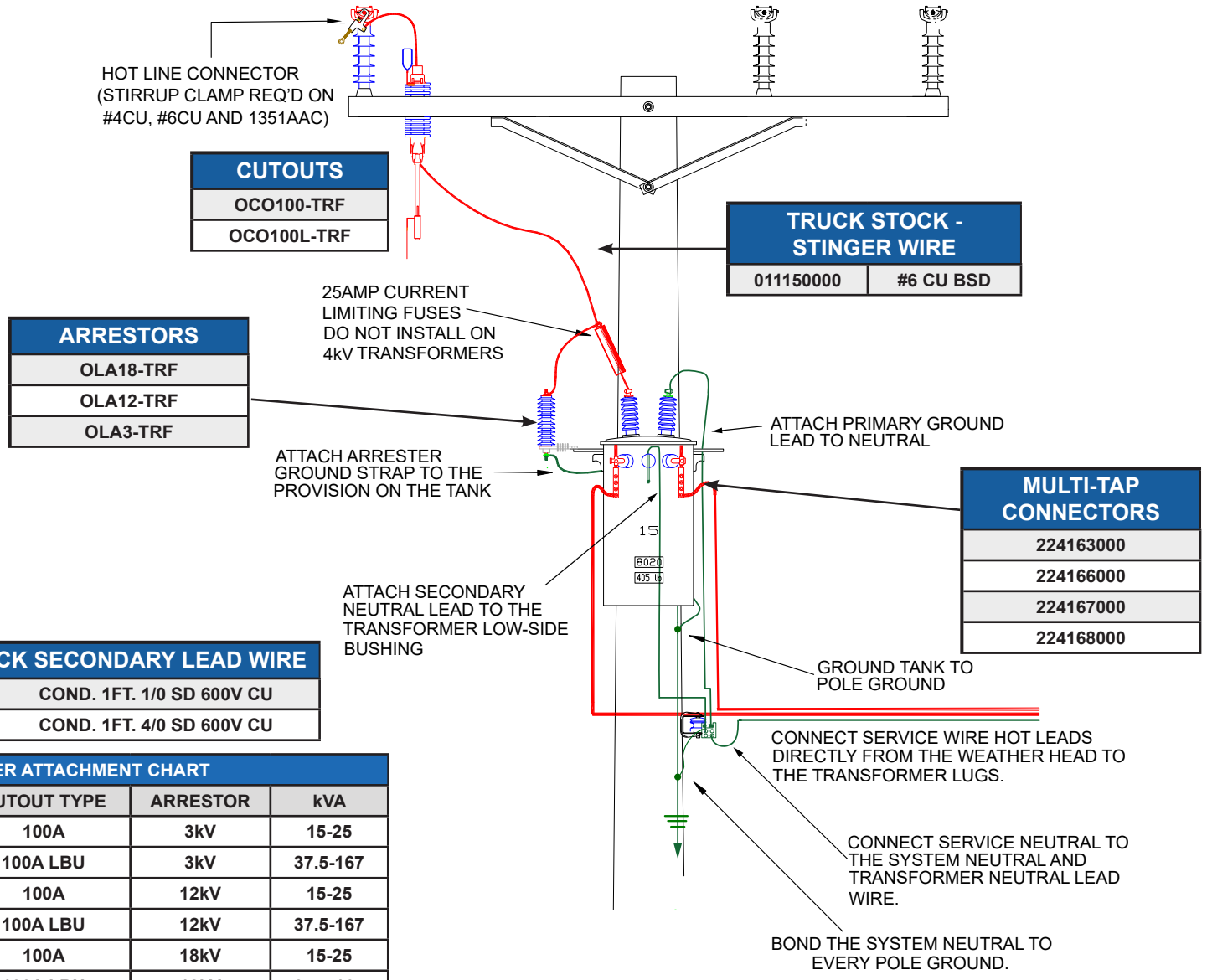
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SECONDARY CONNECTOR INSTALLATION DETAILS

SINGLE PHASE TRANSFORMERS						
TRANSFORMER	SECONDARY PHASE		SECONDARY NEUTRAL		NEUTRAL LEAD	
SIZE (kVA)	CONNECTOR		CONNECTOR		WIRE SIZE	
	QTY	STOCK NUMBER	QTY	STOCK NUMBER	QTY	STOCK NUMBER
10	2	224166000	1	224165500	10 FT.	1/0CU WP
15	2	224166000	1	224165500	10FT.	1/0CU WP
25	2	224166000	2	224165500	10 FT.	1/0CU WP
37.5	2	224168000	3	224165500	10 FT.	4/0CU WP
50	2	224168000	3	224165500	10 FT.	4/0CU WP
75	2	224168000	3	224165500	10 FT.	4/0CU WP
100	2	224167000	3	224165500	10 FT.	4/0 CU WP
167	3-6	224163000	1-2	224163000	n/a	SERVICE WIRE
250	3-6	224163000	1-2	224163000	n/a	SERVICE WIRE
333	3-6	224163000	1-2	224163000	n/a	SERVICE WIRE
500	3-6	224163000	1-2	224163000	n/a	SERVICE WIRE
THREE PHASE TRANSFORMERS						
TRANSFORMER	SECONDARY PHASE		SECONDARY NEUTRAL		NEUTRAL LEAD	
SIZE (kVA)	CONNECTOR		CONNECTOR		WIRE SIZE	
	QTY	STOCK NUMBER	QTY	STOCK NUMBER	QTY	STOCK NUMBER
30	3	224166000	1	223306000	10 FT.	1/0CU WP
45	3	224166000	1	223306000	10 FT.	1/0CU WP
75	3	224167000	1	224167000	10 FT.	4/0CU WP

RECOMMEND TORQUE VALUES FOR SET-SCREW & HOT-LINE CONNECTORS		
Wire Size	Torque (Inch-Pounds)	Torque (Foot-Pounds)
#6-#4	100	9
#2	150	13
1/0-2/0	200	17
4/0	250	21
250MCM	300	25
300-350MCM	350	30
500-700MCM	450	38
750-1000MCM	500	42



TRUCK STOCK SECONDARY LEAD WIRE	
011806000	COND. 1FT. 1/0 SD 600V CU
011808000	COND. 1FT. 4/0 SD 600V CU

SINGLE PHASE TRANSFORMER ATTACHMENT CHART					
CU CODE	VOLTAGE	CLF SIZE	CUTOUT TYPE	ARRESTOR	kVA
OTC4	4kV	n/a	100A	3kV	15-25
OTC4L	4kV	n/a	100A LBU	3kV	37.5-167
OTC13	7.96*	25	100A	12kV	15-25
OTC13L	7.96*	25	100A LBU	12kV	37.5-167
OTC23	23.9kV	25	100A	18kV	15-25
OTC23L	23.9kV	25	100A LBU	18kV	37.5-167

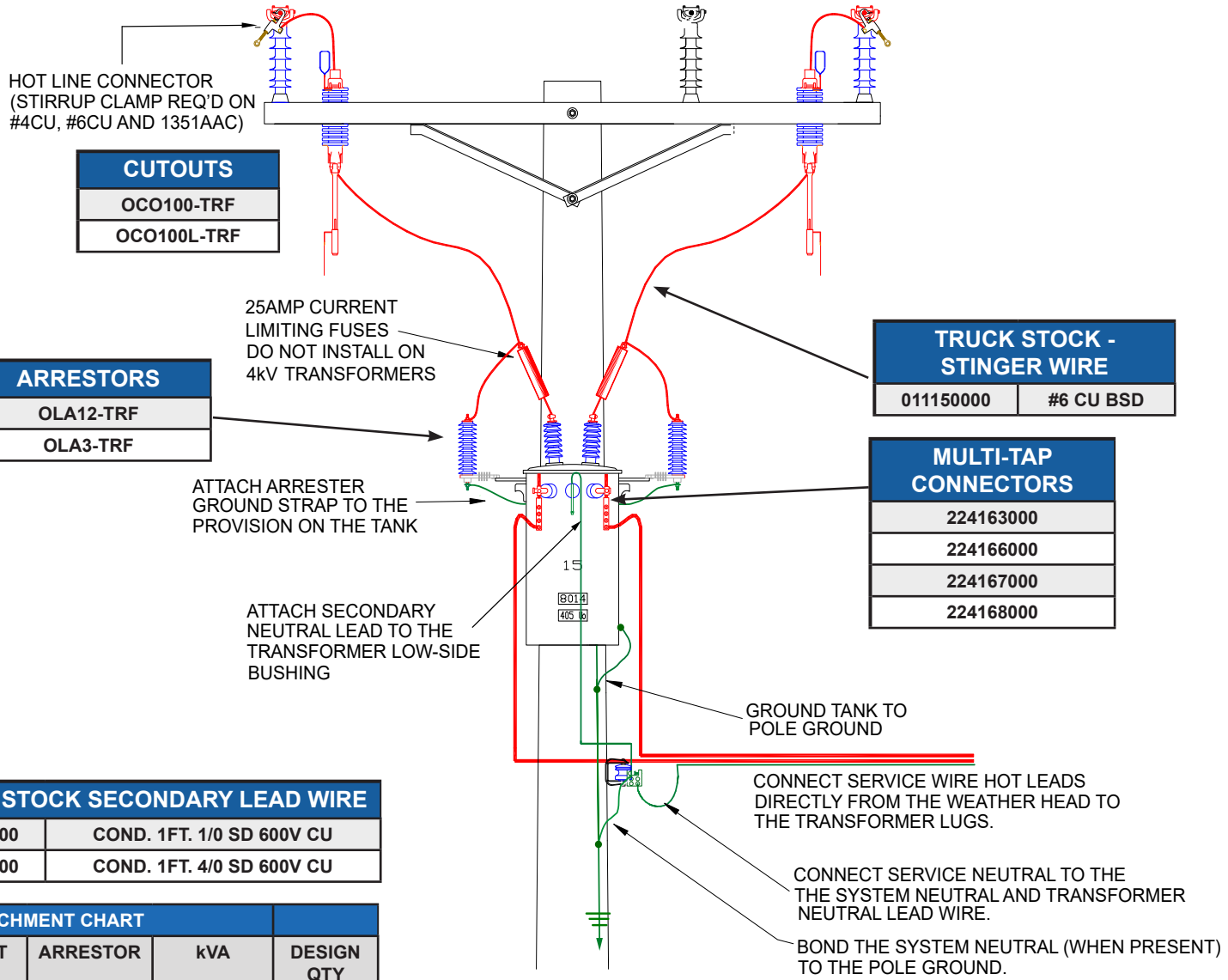
**PHASE TO GROUND VOLTAGE*

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

SINGLE PHASE
PRIMARY WYE CONNECTIONS



CUTOUTS
OCO100-TRF
OCO100L-TRF

ARRESTORS
OLA12-TRF
OLA3-TRF

TRUCK STOCK - STINGER WIRE	
011150000	#6 CU BSD

MULTI-TAP CONNECTORS
224163000
224166000
224167000
224168000

TRUCK STOCK SECONDARY LEAD WIRE	
011806000	COND. 1FT. 1/0 SD 600V CU
011808000	COND. 1FT. 4/0 SD 600V CU

TWO PHASE TRANSFORMER ATTACHMENT CHART						
CU CODE	VOLTAGE	CLF SIZE	CUTOUT TYPE	ARRESTOR	kVA	DESIGN QTY
OTC4	2.4kV	n/a	100A	3kV	10-25	2
OTC4L	2.4kV	n/a	100A LBU	3kV	37.5-167	2
OTC13	13.8kV	25	100A	12kV	15-25	2
OTC13L	13.8kV	25	100A LBU	12kV	37.5-167	2

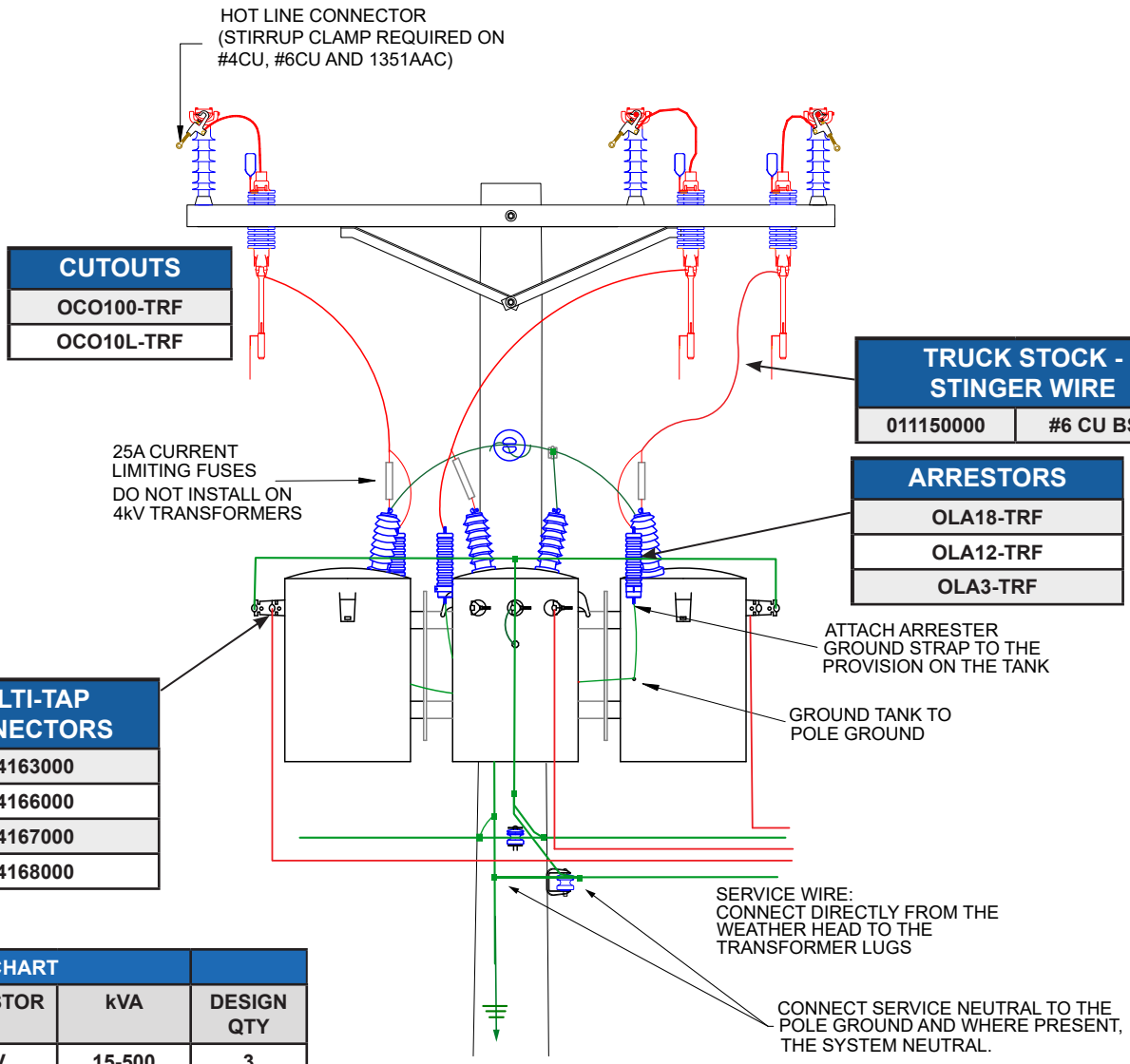
NOTES

1. See Grounding detail on Pg.16 of Grounding Plate for Uniground (Delta) requirements without a system neutral.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

TWO PHASE PRIMARY DELTA CONNECTIONS



CUTOUTS
OCO100-TRF
OCO10L-TRF

TRUCK STOCK - STINGER WIRE	
011150000	#6 CU BSD

ARRESTORS
OLA18-TRF
OLA12-TRF
OLA3-TRF

MULTI-TAP CONNECTORS
224163000
224166000
224167000
224168000

TRANSFORMER BRACKETS		
DESCRIPTION	STOCK NO.	C.U.
MOUNTING BRKT 3 - 15 kVA	061780000	OTR3
MOUNTING BRKT 25 - 50 kVA	061800000	OTR25
MOUNTING BRKT 75 - 167 kVA	061820000	OTR75
This framing requires a 3-phase wrap-around mounting bracket.		

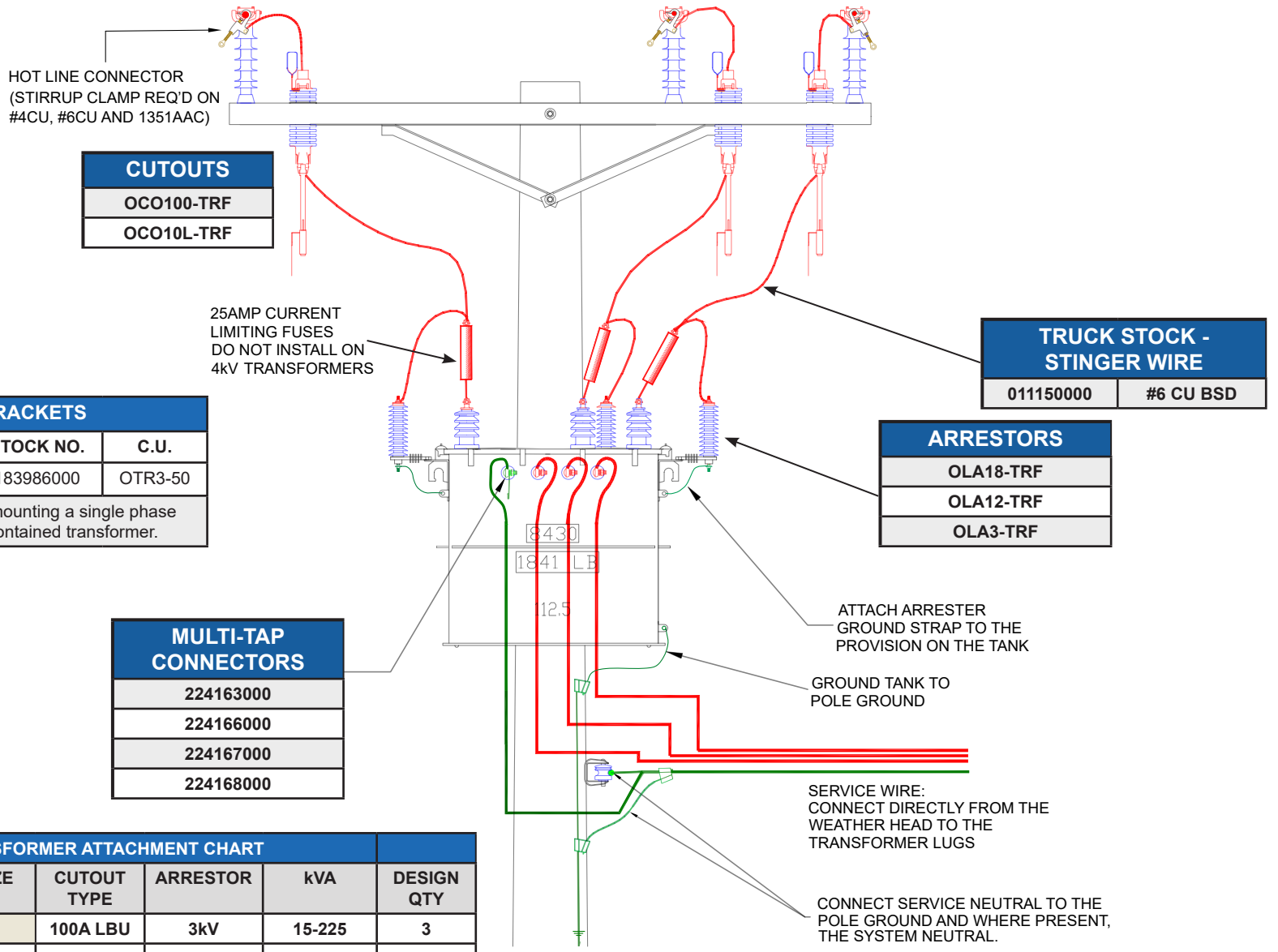
THREE PHASE TRANSFORMER ATTACHMENT CHART						
CU CODE	VOLTAGE	CLF SIZE	CUTOUT TYPE	ARRESTOR	kVA	DESIGN QTY
OTC4L	4kV	n/a	100A LBU	3kV	15-500	3
OTC13L	13.8kV	25	100A LBU	12kV	15-500	3
OTC23L	23.9kV	25	100A LBU	18kV	15-500	3

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

SINGLE PHASE 3-PHASE BANK PRIMARY CONNECTIONS



CUTOUTS
OCO100-TRF
OCO10L-TRF

TRUCK STOCK - STINGER WIRE	
011150000	#6 CU BSD

ARRESTORS
OLA18-TRF
OLA12-TRF
OLA3-TRF

MULTI-TAP CONNECTORS
224163000
224166000
224167000
224168000

TRANSFORMER BRACKETS		
DESCRIPTION	STOCK NO.	C.U.
1PH XFMR OFFSET BKT	183986000	OTR3-50
Single phase offset brkt. used when mounting a single phase transformer, with a three phase self-contained transformer.		

THREE PHASE TRANSFORMER ATTACHMENT CHART						
CU CODE	VOLTAGE	CLF SIZE	CUTOUT TYPE	ARRESTOR	kVA	DESIGN QTY
OTC4L	4kV	n/a	100A LBU	3kV	15-225	3
OTC13L	13.8kV	25	100A LBU	12kV	15-225	3
OTC23L	23.9kV	25	100A LBU	18kV	15-300	3

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

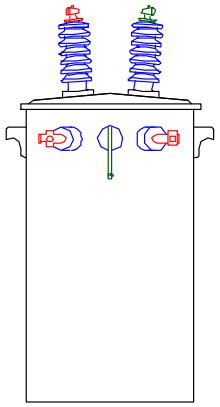
TRANSFORMERS

NES

SELF CONTAINED THREE PHASE PRIMARY CONNECTIONS

SINGLE PHASE TRANSFORMERS

SECONDARY VOLTAGE 120-240V, 3W, SINGLE PHASE	
XFMR SIZE	AMPS @ 100% OF RATING
10	42
15	63
25	104
37.5	156
50	208
75	313
100	417
167	696

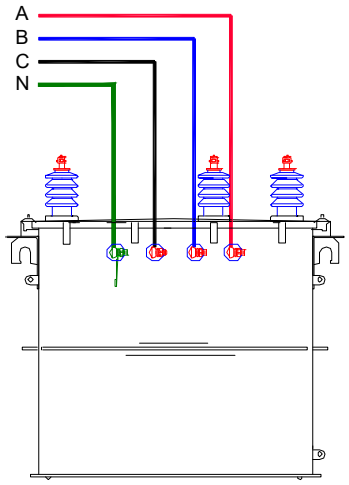


Formulas:
Single Phase: AMPS = WATTS/VOLTS
Three Phase: AMPS = WATTS/VOLTS*1.732*PF

WHERE:
VOLTAGE = PHASE TO PHASE VOLTAGE
WATTS = NAME PLATE RATING OF THE XFMR
AMPS = FULL LOAD CURRENT
PF = POWER FACTOR = 0.95 FOR ALL TABLES

SELF-CONTAINED 3 PHASE UNITS

AMPS @ 100% OF RATING			
	SECONDARY VOLTAGE		
XFMR SIZE	208Y/120V 4W, 3 PHASE	480Y/277V 4W, 3 PHASE 480V DELTA 3W, 3 PHASE	240V DELTA 3W 3 PHASE
30	84	38	76
45	127	57	114
75	211	95	190
112	317	142	285
150	422	190	380
225	633	285	570
300	844	380	760



NOTES

1. Current ratings are based on Full Continuous Loads for secondary terminals.

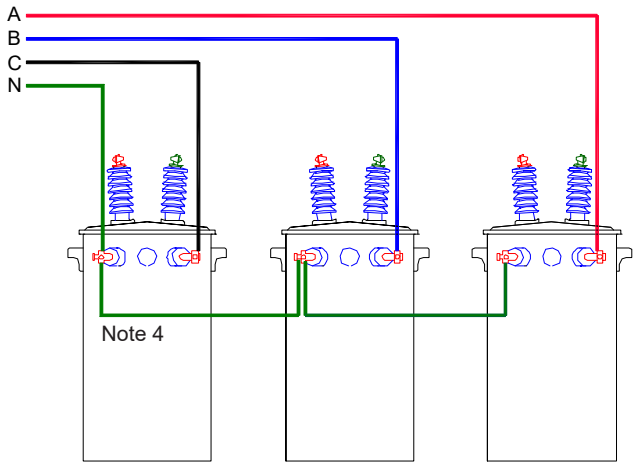
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

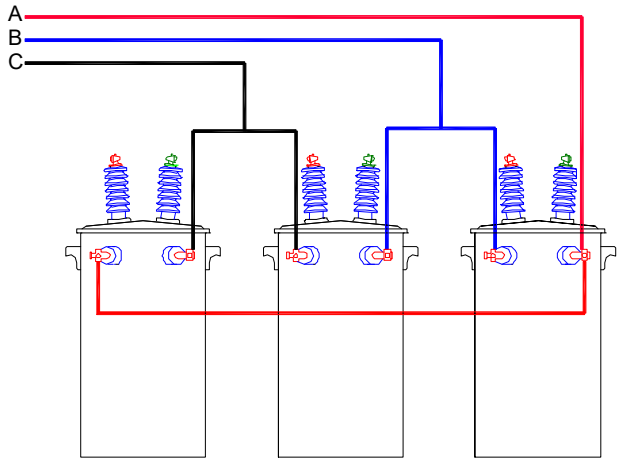
NES

SECONDARY LOAD CURRENT RATINGS
SINGLE UNITS

WYE - BANKED TRANSFORMER - SECONDARY WIRING							
100% TRANSFORMER LOAD (95% POWER FACTOR)							
COVERED COPPER WIRE							
XFMR	BANK	208Y/120V 4W/3-PHASE (AMPS)	QTY	SECONDARY WIRING	480Y/277V 4W/3-PHASE (AMPS)	QTY	SECONDARY WIRING
(3) 15	45	131	1	4/0	57	1	4/0
(3) 25	75	219	1	4/0	95	1	4/0
(3) 37.5	112.5	329	1	300 MCM	142	1	4/0
(3) 50	150	438	1	500 MCM	190	1	4/0
(3) 75	225	657	1	750MCM	285	1	4/0
(3) 100	300	877	1	1000 MCM	380	1	300 MCM
(3) 167	500	1,461	2	750 MCM	633	1	750MCM



DELTA - BANKED TRANSFORMER - SECONDARY WIRING							
100% TRANSFORMER LOAD (95% POWER FACTOR)							
COVERED COPPER WIRE							
XFMR	BANK	240V 3W/3-PHASE (AMPS)	QTY	SECONDARY WIRING	480V 3W/3-PHASE (AMPS)	QTY	SECONDARY WIRING
(3) 15	45	114	1	4/0	57	1	4/0
(3) 25	75	190	1	4/0	95	1	4/0
(3) 37.5	112.5	285	1	4/0	142	1	4/0
(3) 50	150	380	1	300 MCM	190	1	4/0
(3) 75	225	570	1	500 MCM	285	1	4/0
(3) 100	300	760	1	750MCM	380	1	300 MCM
(3) 167	500	1,266	2	750 MCM	633	1	750MCM



NOTES

1. Current ratings are based on Full Continuous Loads for secondary terminals.
2. Secondary wire ampacity shown on page 19.
3. Secondary wire is Covered Copper Conductor, 90°C/30°C Ambient.
4. Neutral bus conductor is required to be the same as the phase wiring conductor.

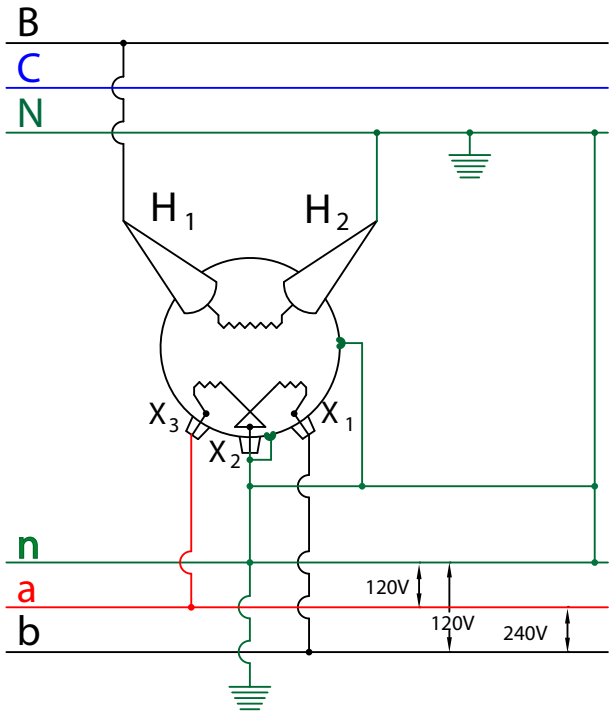
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

CONDUCTOR RATINGS									
ALUMINUM TRIPLEX		ALUMINUM QUADRIPLEX		BARE COPPER		WEATHER PROOF COPPER		BARE ALUMINUM	
AMBIENT 40°C OR 104°F CONDUCTOR 90°C OR 195°F		AMBIENT 40°C OR 104°F CONDUCTOR 90°C OR 195°F		AMBIENT 25°C OR 77°F CONDUCTOR 90°C OR 195°F		AMBIENT 30°C OR 86°F CONDUCTOR 90°C OR 195°F		AMBIENT 30°C OR 86°F CONDUCTOR 90°C OR 195°F	
WIRE SIZE	MAX AMPS	WIRE SIZE	MAX AMPS	WIRE SIZE	MAX AMPS	WIRE SIZE	MAX AMPS	WIRE SIZE	MAX AMPS
#2	150	#2	135	#6	125	#6	95	#4	130
1/0	205	2/0	205	#4	170	#4	125	#2	175
4/0	315	4/0	275	#2	230	#2	170	1/0	230
		336	370	1/0	310	1/0	230	4/0	350
				4/0	480	2/0	265	336MCM	510
				300MCM	610	4/0	360	477MCM	625
				500MCM	810	300MCM	445	795MCM	860
				750MCM	1040	500MCM	620	1351MCM	1175
				1000MCM	1240	750MCM	785		
						1000MCM	935		

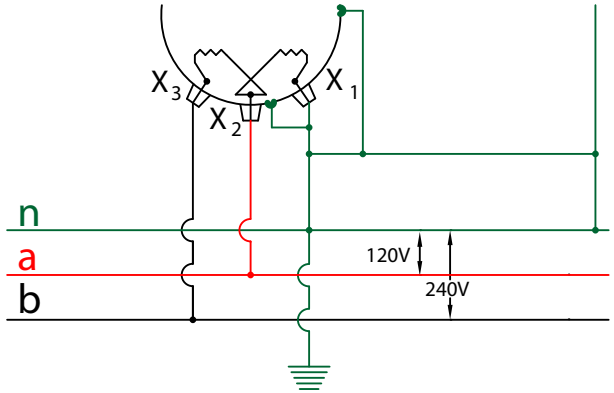
NOTES

1. Secondary continuous conductor ratings are based on temperatures with a 2-ft/sec wind velocity.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE



WARNING: FULL AMPACITY NEUTRAL IS REQUIRED FOR THIS CONFIGURATION



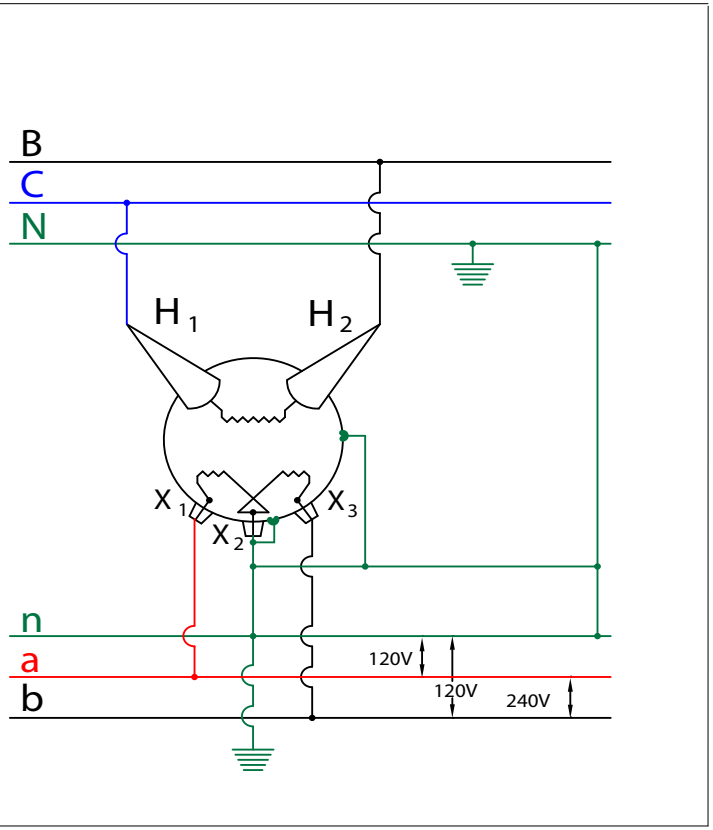
240 VOLT TO GROUND SERVICE WITH 120 VOLT TAP.
STREET LIGHT APPLICATIONS

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

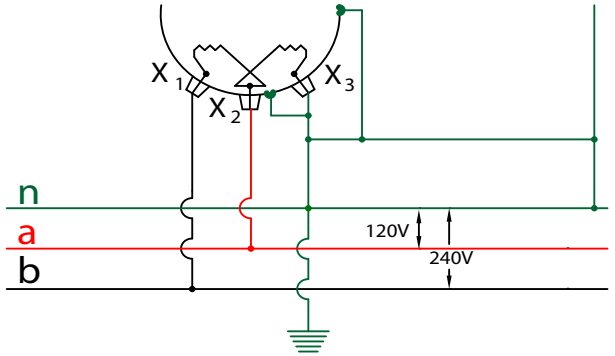
TRANSFORMERS

NES

WIRING DIAGRAM
PRIMARY WYE
120/240V - 1 PH SERVICE



WARNING: FULL AMPACITY NEUTRAL IS REQUIRED FOR THIS CONFIGURATION



240 VOLT TO GROUND SERVICE WITH 120 VOLT TAP. STREET LIGHT APPLICATIONS

NOTES

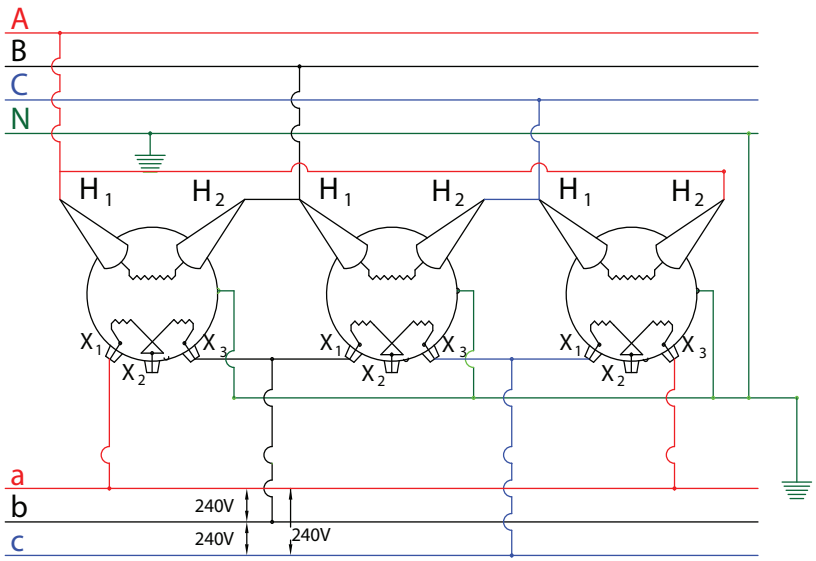
1. See Grounding detail on Pg.16 of Grounding Plate for Uniground (Delta) requirements without a system neutral.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

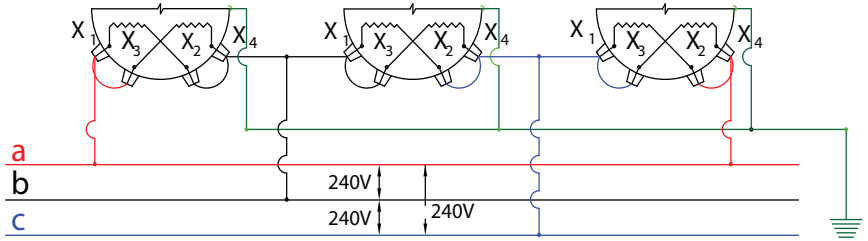
NES

WIRING DIAGRAM PRIMARY DELTA 120/240V - 1 PH SERVICE



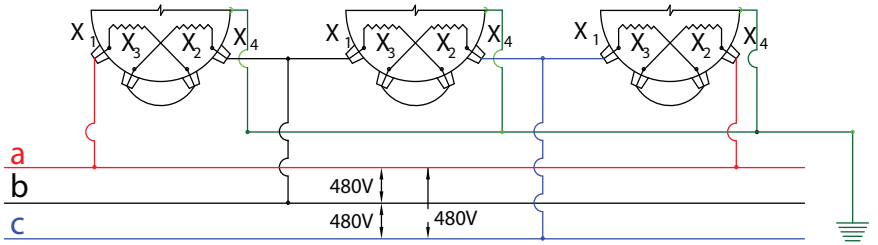
*ALL BANKED UNITS MUST HAVE MATCHING POLARITY

SECONDARY VOLTAGE RATING - 240V



*ALL BANKED UNITS MUST HAVE MATCHING POLARITY

SECONDARY VOLTAGE RATING - 480V



*ALL BANKED UNITS MUST HAVE MATCHING POLARITY

NOTES

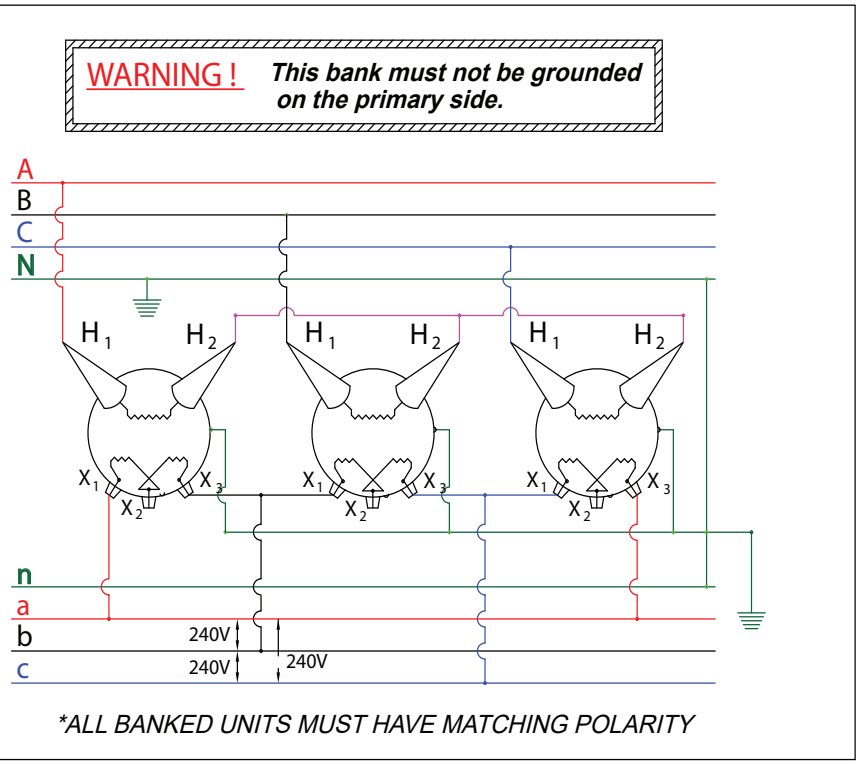
1. 240V & 480V Services are to be used **only** for replacements.
2. Caution is to be used that all transformer low side polarity match when banking transformers.

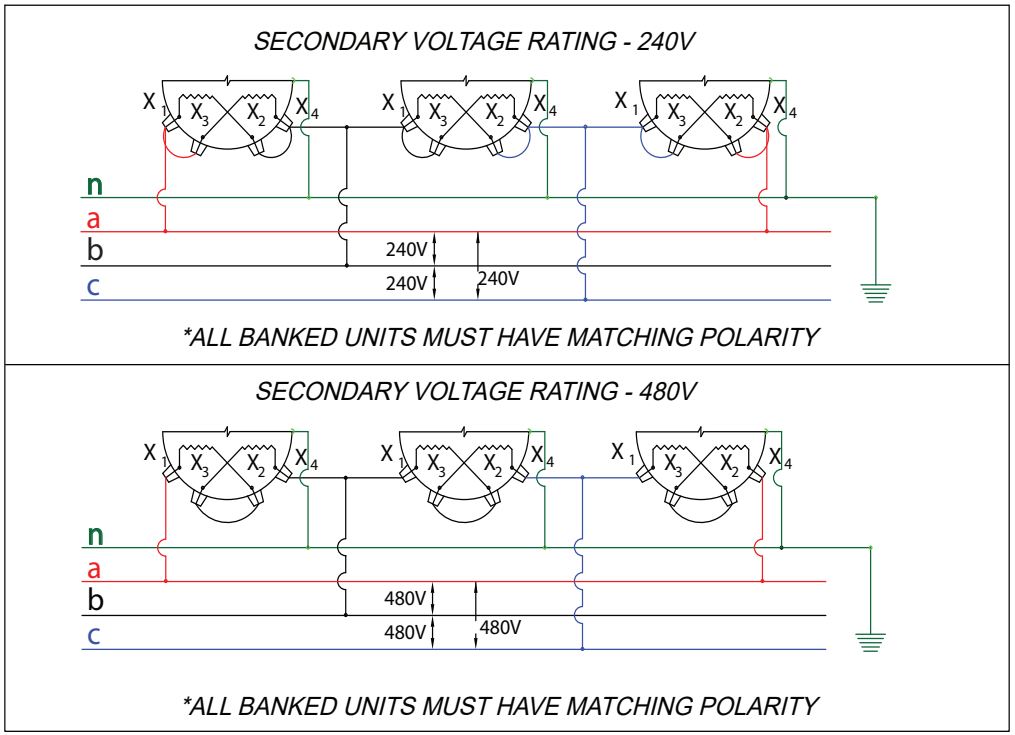
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

WIRING DIAGRAM
DELTA-DELTA
240V OR 480V SERVICES





NOTES

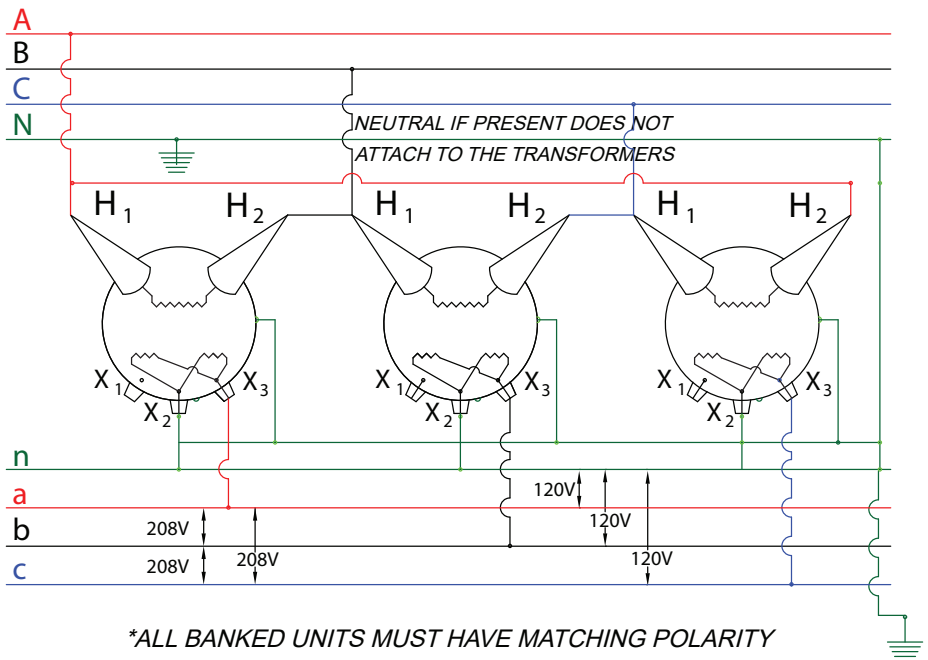
1. 240V & 480V Services are to be used **only** for replacements.
2. Caution is to be used that all transformer low side polarity match when banking transformers.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

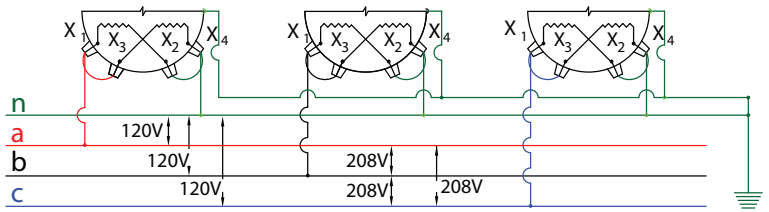
NES

WIRING DIAGRAM
WYE-DELTA
240V OR 480V SERVICES



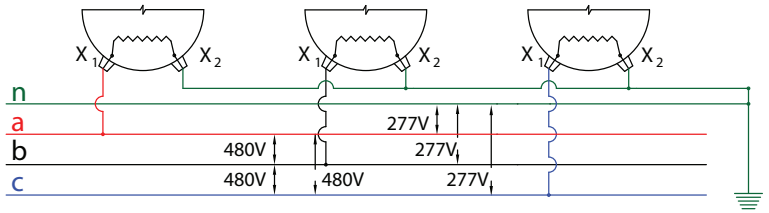
*ALL BANKED UNITS MUST HAVE MATCHING POLARITY

SECONDARY VOLTAGE RATING - 208Y/120V



*ALL BANKED UNITS MUST HAVE MATCHING POLARITY

SECONDARY VOLTAGE RATING - 480Y/277V



*ALL BANKED UNITS MUST HAVE MATCHING POLARITY

NOTES

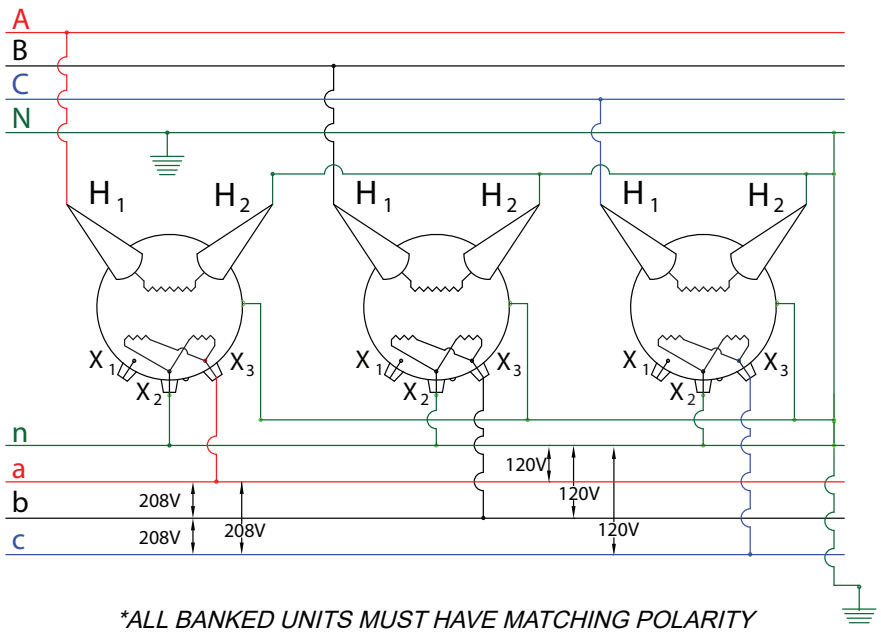
1. Caution is to be used that all transformer low side polarity match when banking transformers.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

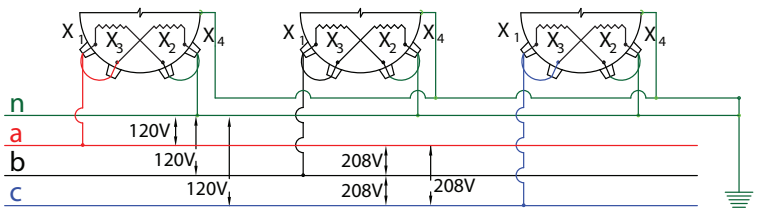
NES

WIRING DIAGRAM
DELTA-WYE
208Y/120V OR 480Y/277V SERVICES



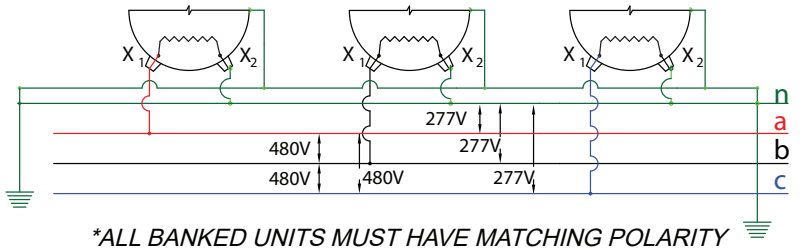
*ALL BANKED UNITS MUST HAVE MATCHING POLARITY

SECONDARY VOLTAGE RATING - 208Y/120V



*ALL BANKED UNITS MUST HAVE MATCHING POLARITY

SECONDARY VOLTAGE RATING - 480Y/277V



*ALL BANKED UNITS MUST HAVE MATCHING POLARITY

NOTES

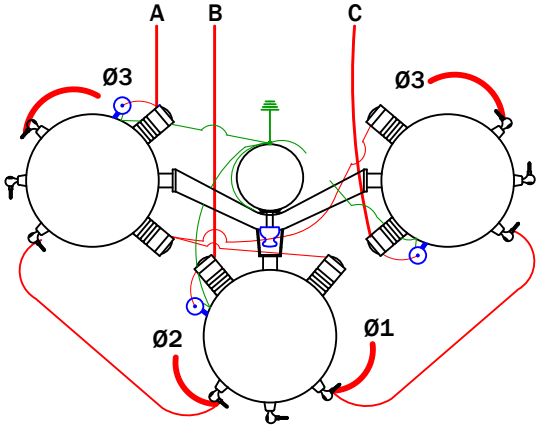
1. Caution is to be used that all transformer low side polarity match when banking transformers.

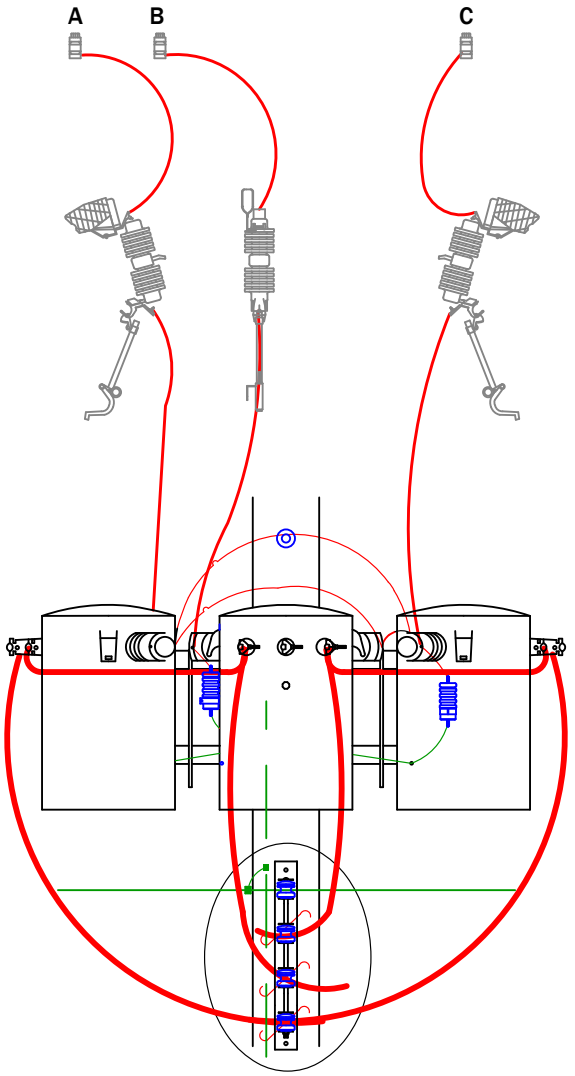
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

WIRING DIAGRAM
WYE-WYE
208Y/120V OR 480Y/277V SERVICES





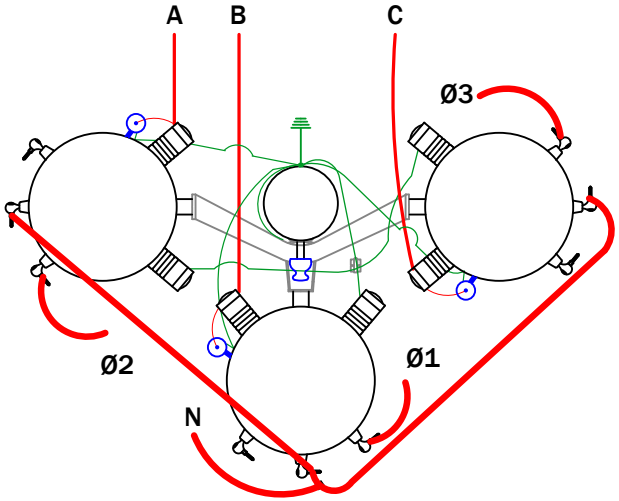
NOTES

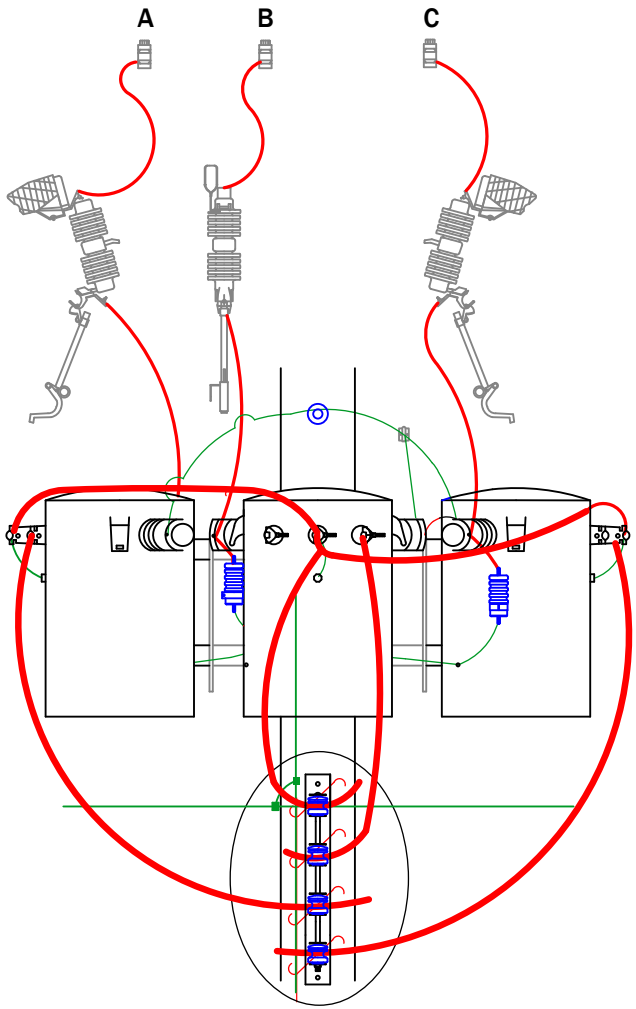
1. Maximum transformer size is 167kVA

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

3 WIRE, 3 PHASE
4KV BANKED TRANSFORMERS





NOTES

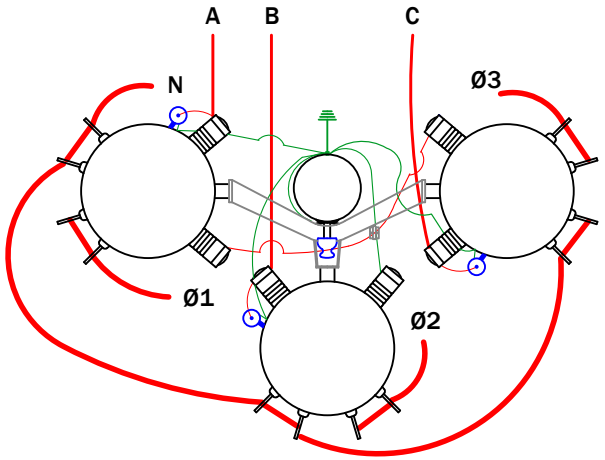
1. Maximum transformer size is 167kVA

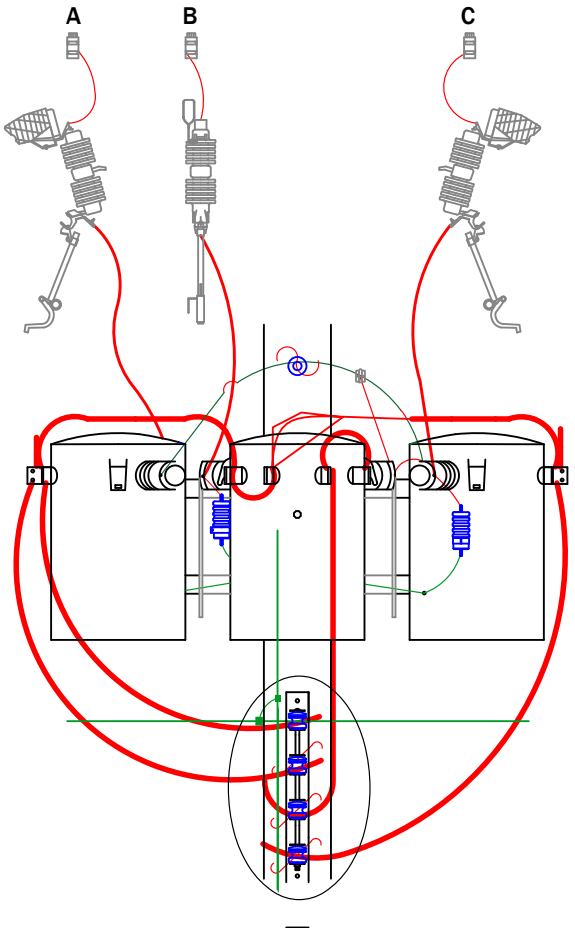
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

4 WIRE, 3 PHASE, 4KV BANKED TRANSFORMERS WITH 120/208V SECONDARY





NOTES

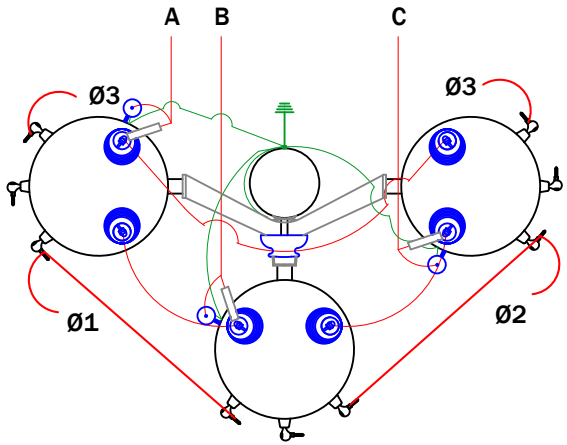
1. Maximum transformer size is 167kVA

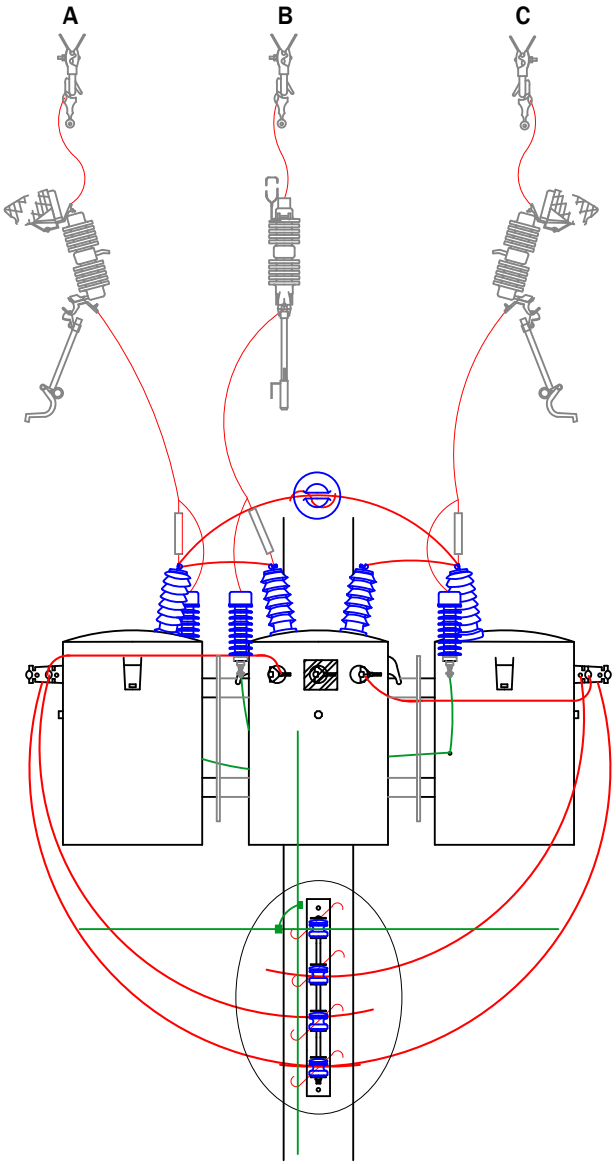
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

4 WIRE, 3 PHASE, 4KV BANKED
4 BUSHING TRANSFORMERS
WITH 120/208V SECONDARY





NOTES

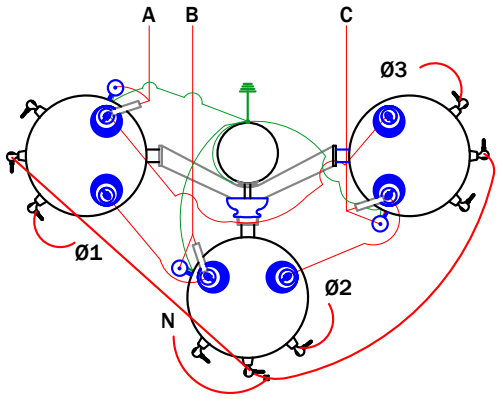
1. Maximum transformer size is 167kVA

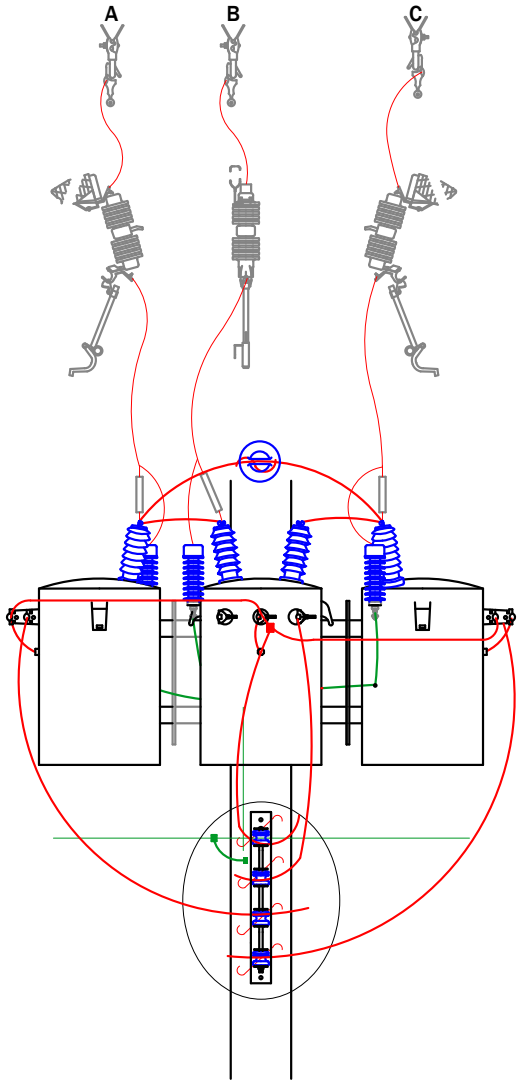
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

3 WIRE, 3 PHASE 13.8KV BANKED TRANSFROMERS WITH 240V OR 480V SECONDARY





NOTES

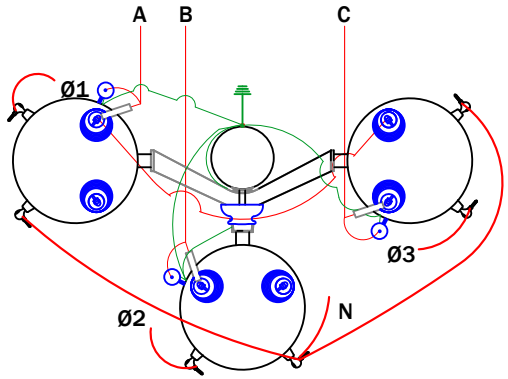
1. Maximum transformer size is 167kVA

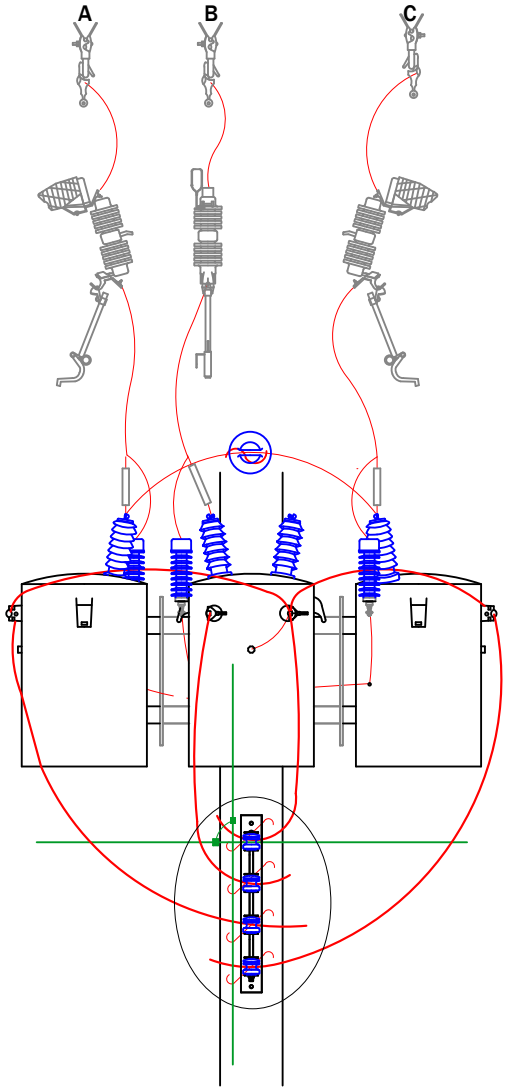
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

4 WIRE, 3 PHASE 13.8KV BANKED TRANSFORMERS WITH 120/208V SECONDARY





NOTES

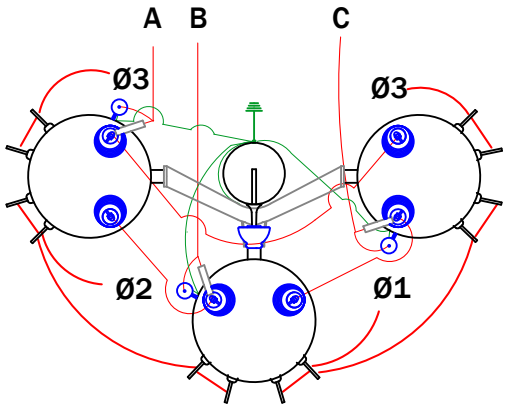
1. Maximum transformer size is 167kVA

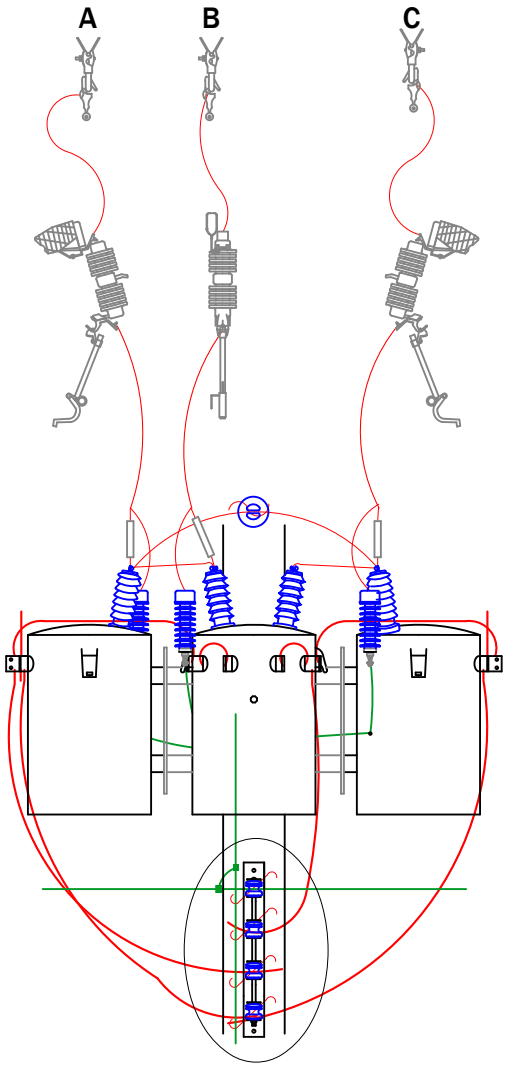
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

4 WIRE, 3 PHASE 13.8KV BANKED TRANSFORMERS WITH 277/480V SECONDARY





NOTES

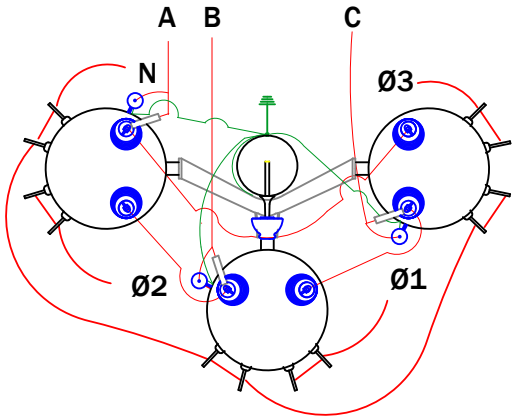
1. Maximum transformer size is 167kVA

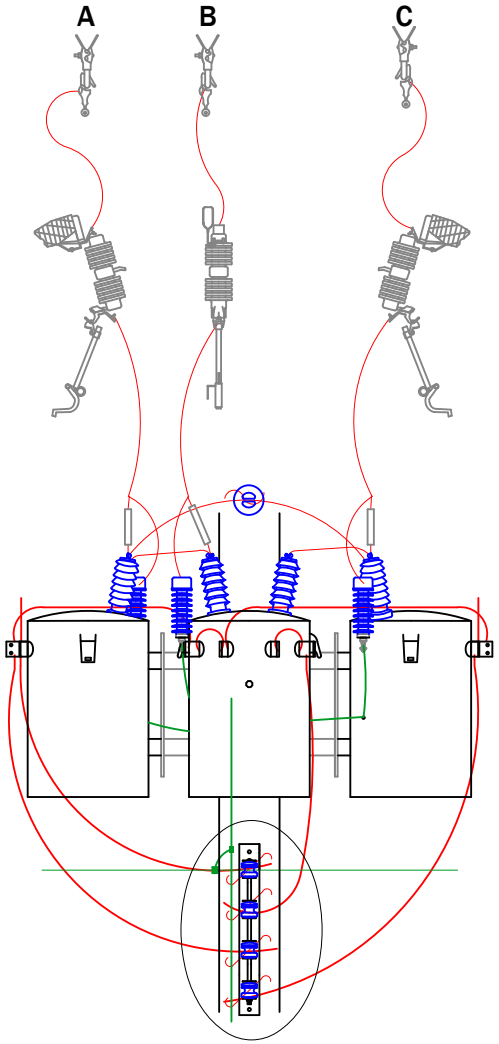
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

3 WIRE, 3 PHASE 13.8KV BANKED
4 BUSHING TRANSFROMERS
WITH 240V OR 480V SECONDARY





NOTES

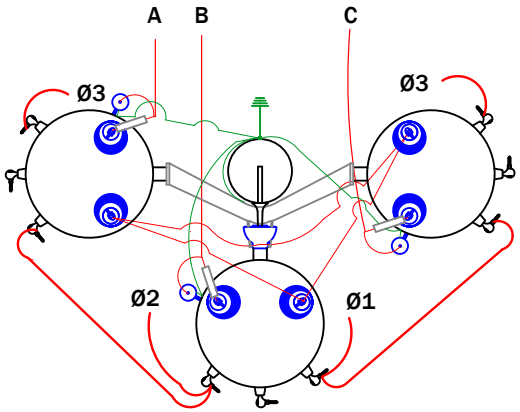
1. Maximum transformer size is 167kVA

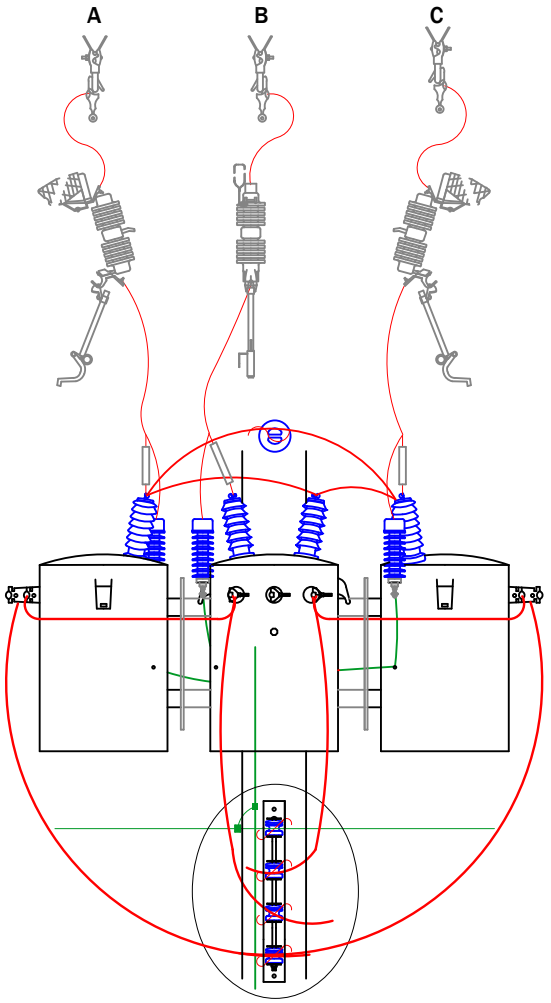
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

4 WIRE, 3 PHASE, 13.8KV BANKED
4 BUSHING TRANSFORMERS
WITH 120V OR 208V SECONDARY





NOTES

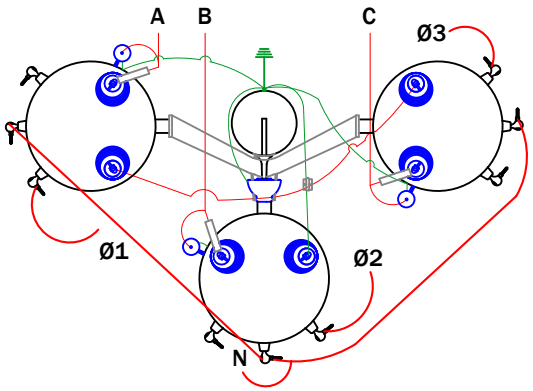
1. Maximum transformer size is 167kVA

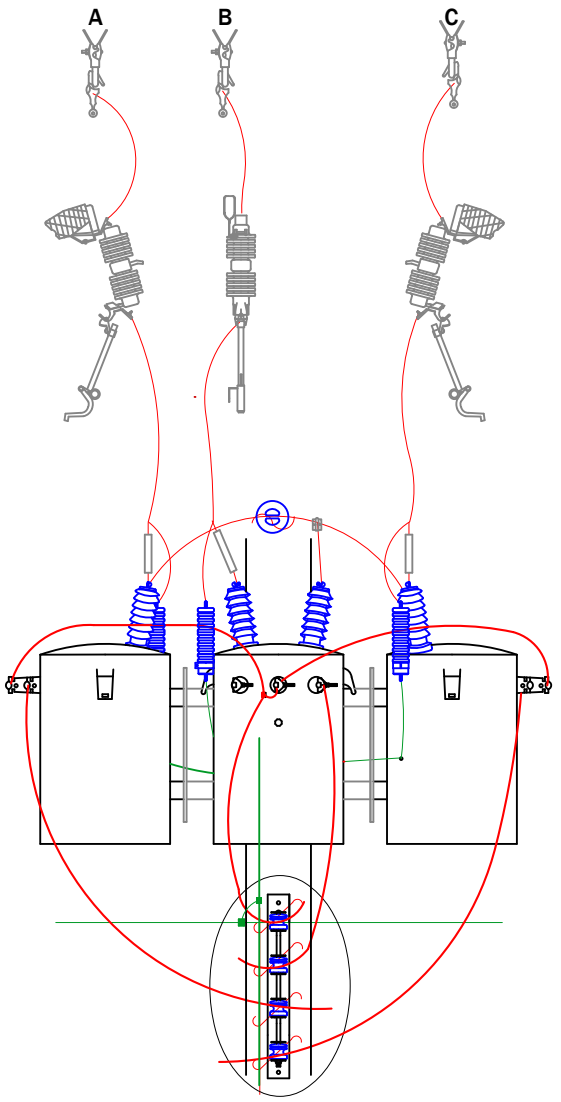
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

3 WIRE, 3 PHASE 23.9KV
BANKED TRANSFROMERS
WITH 240V OR 480V SECONDARY





NOTES

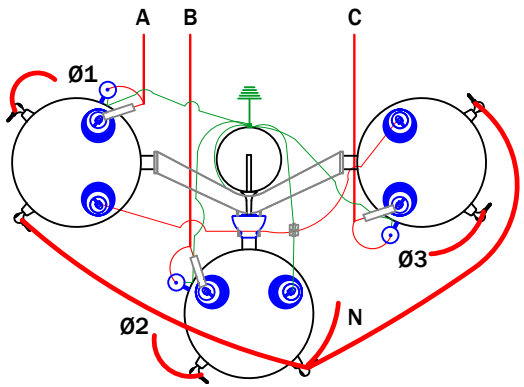
1. Maximum transformer size is 167kVA

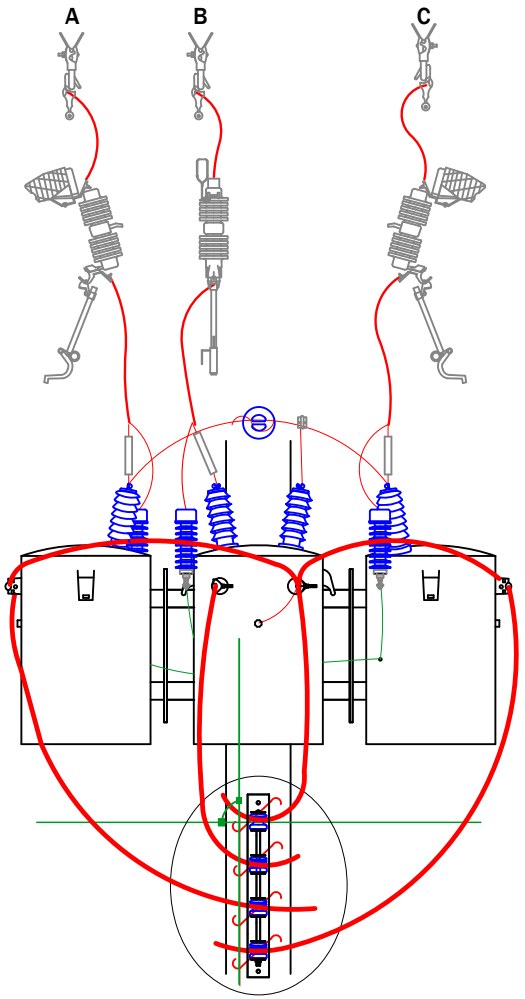
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

4 WIRE, 3 PHASE 23.9KV BANKED TRANSFROMERS WITH 120/208V SECONDARY





NOTES

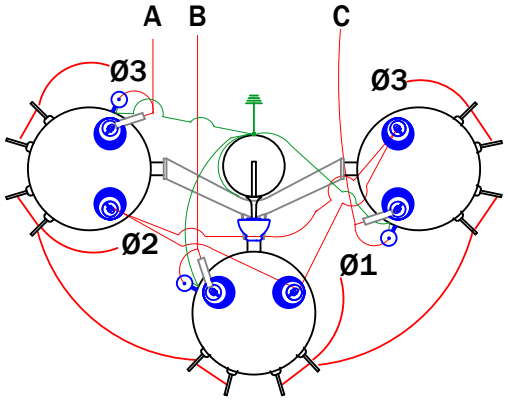
1. Maximum transformer size is 167kVA

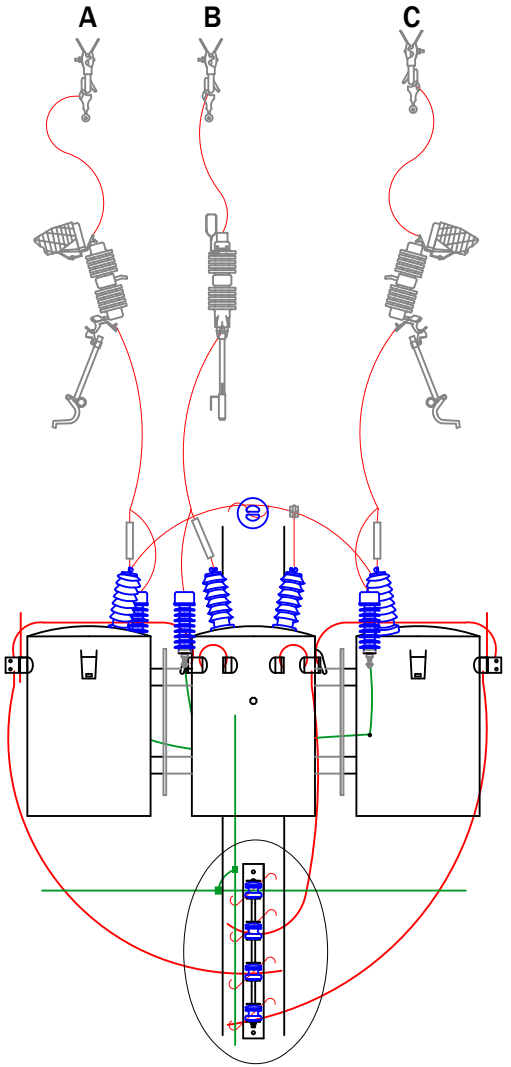
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSFORMERS

NES

4 WIRE, 3 PHASE 23.9KV BANKED TRANSFROMERS WITH 277/480V SECONDARY

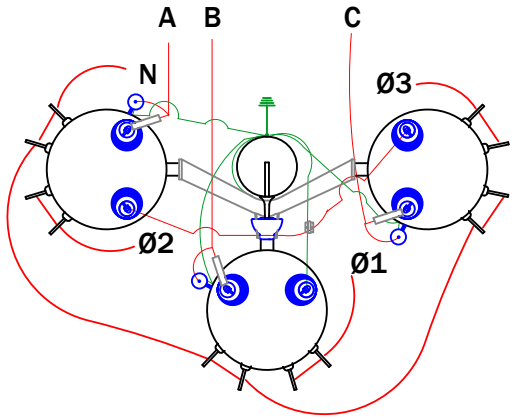


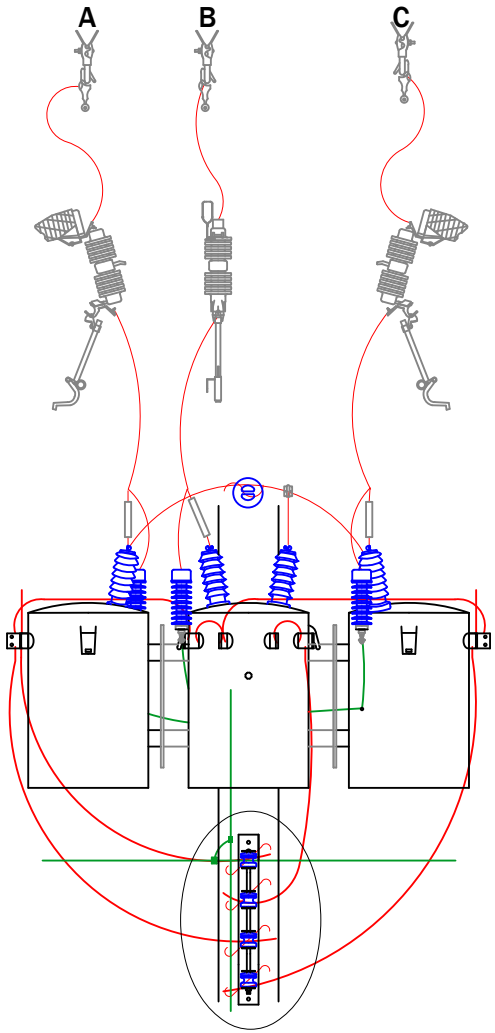


REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

3 WIRE, 3 PHASE 23.9KV BANKED 4 BUSHING TRANSFROMERS WITH 240V OR 480V SECONDARY





REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

4 WIRE, 3 PHASE 23.9KV BANKED 4 BUSHING TRANSFROMERS WITH 120/208V SECONDARY

TRANSMISSION AND DISTRIBUTION CLEARANCES

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
VERTICAL CLEARANCE TABLE WIRES & CABLES NESC REFERENCES	2			
VERTICAL CLEARANCE DETAILS WIRES & CABLES ABOVE GROUND OR RAIL	3			
VERTICAL CLEARANCE DETAILS SERVICE WIRE OVER RESIDENTIAL DRIVEWAY	4			
CLEARANCE DETAILS WIRES & CABLES FROM RESIDENTIAL BUILDING	5			
CLEARANCE DETAILS WIREES & CABLES FROM COMMERICAL BUILDING	6			
CLEARANCE DETAILS CONDUCTOR BLOW-OUT FROM BUILDING	7			
CLEARANCE DETAILS SERVICE WIRE WINDOWS & PARAPETS	8			
CLEARANCE TABLE WIRES & CABLES ON SAME STRUCTURE	9			
CLEARANCE DETAILS COMMUNICATIONS & ATTACHMENTS ON SAME STRUCTURE	10			
VERTICAL CLEARANCE DETIALS BETWEEN LINES SAME SUPPORTING STRUCTURES	11			
VERTICAL CLEARANCE DETAILS MID-SPAN CROSSING DIFFERENT SUPPORTING STRUCTURES	12			
CLEARANCE DETAILS FOR NAVIGABLE WATERWAYS & SWIMMING POOLS	13			
CLEARANCE DETAILS CURBSIDE & OTHER SUPPORTING STRUCTURES	14			
CLEARANCE DETAILS POLES LOCATED WITHIN SIDEWALK	15			
CLEARANCE DETAILS POLES LOCATED ADJACENT TO SIDEWALK	16			
CLEARANCE DETAILS SIDEWALK REQUIREMENTS	17			
CLEARANCE DETAILS MINIMUM TREE TRIMMING PER TREE SPECIES	18			
CLEARANCE DETAILS ADJACENT OR CROSSING BELOW CATWALK	19			

Wires, conductors, or cables above ground, road, and rail in feet	Reference; NESC or Other	161 kV	69 kV	Distribution	Secondary	Multiplex Secondary	N, G, M, Comm, Fiber
CSX Railroads	CSX	33.8	30.7	30.0 @ 23.9kV 28.0 @ 13.8kV	27	27	25
Roads, Right of Way and Likely to have traffic	Table 232-1	23.2	20.1	18.5	16.5	16	15.5
Control Access Highway	Recommended Design Clearance	31	28	26.5	24	24	24
Driveway, Parking Lot, Alley	Table 232-1	23.2	20.1	18.5	16.5	16	15.5
Obstructed or Unlikely to have traffic	Recommended Design Clearance	23.2	20.1	18.5	16.5	16	15.5
Farms[1]	Table 232-1	23.2	20.1	18.5	16.5	16	15.5
Pedestrian Only	Table 232-1	19.2	16.1	14.5	12.5	12	9.5
Pedestrian Only service drop at Residential buildings	Limited to 150 V to ground	-	-	-	10.5	10	-

Note 1: When designing a line to accommodate oversized vehicles, these clearance values shall be increased by the difference between the known height of the oversized vehicle and 14 ft.

Wires, conductors or cables above water surfaces in feet	NESC Table	161 kV	69 kV	Distribution	Secondary	Multiplex Secondary	N, G, M, Comm, Fiber
Not suitable for sail boating, or sail boating prohibited[2]	Table 232-1	21.7	18.6	17	15	14.5	14
Sailboats allowed, water area < 20 acres	Table 232-1	25.2	22.1	20.5	18.5	18	17.5
Sailboats allowed, water area 20 –200 acres	Table 232-1	33.2	30.1	28.5	26.5	26	25.5
Sailboats allowed, water area 200—2000 acres	Table 232-1	39.2	36.1	34.5	32.5	32	31.5
Sailboats allowed, water area > 2000 acres	Table 232-1	45.2	42.1	40.5	38.5	38	37.5
Water areas with established boat ramps	Table 232-1	Add 5 ft. to applicable clearance allowed in above rows for Sailboats per body of water.					
Swimming Pools[3]	Table 234-3	29.6	26.6	25	23	22..5	22

Note 2: Where the U.S. Army Corps of Engineers, or the state, or surrogate thereof has issued a crossing permit, clearances of that permit shall govern.

Note 3: Metro Health Department rules on commercial pools have defined the pool enclosure as the permiter fencing for design clearances.

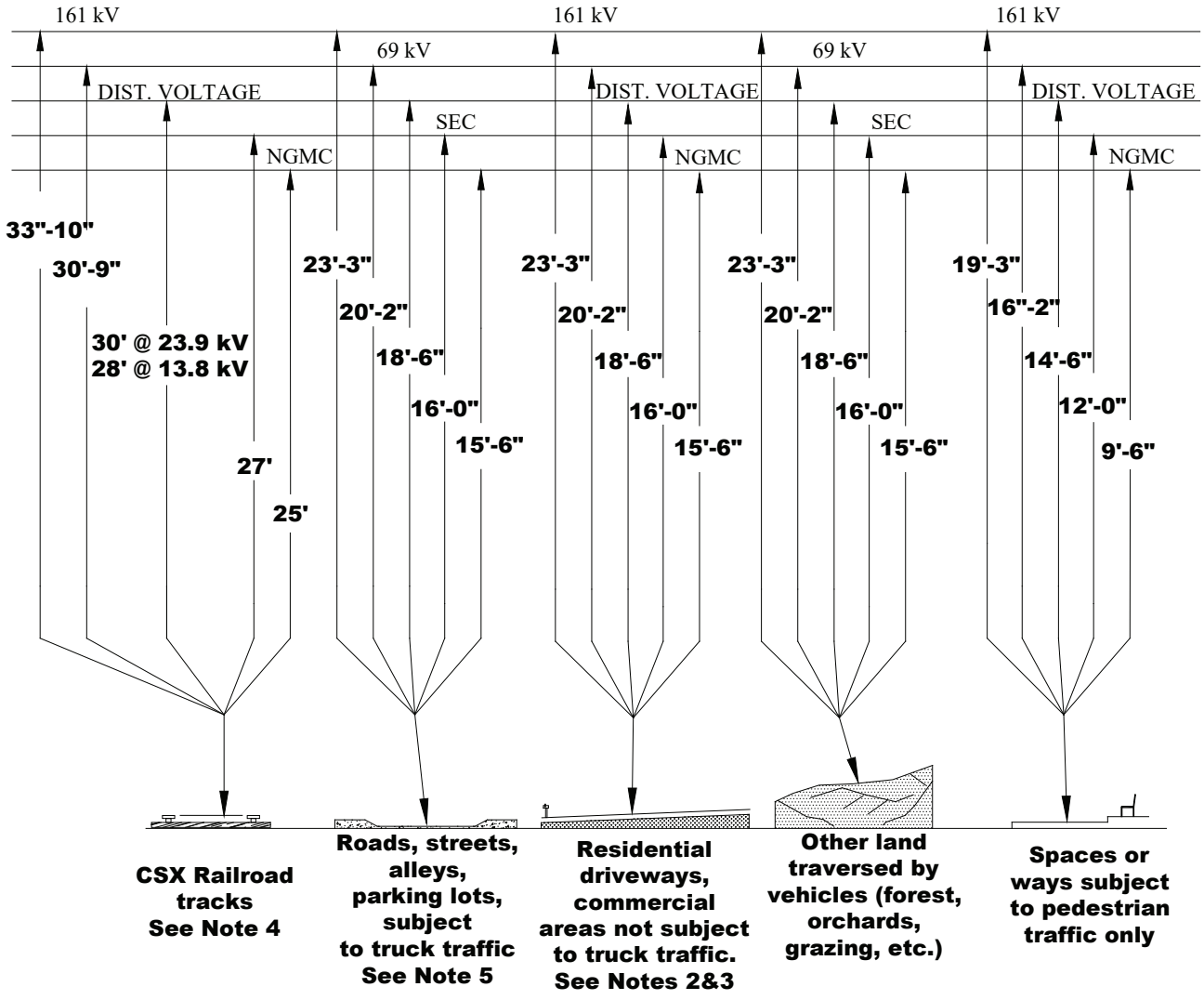
Wires, conductors, or cables above roads, catwalks or ramps in feet	NESC Table	161 kV	69 kV	Distribution	Secondary	Multiplex Secondary	N, G, M, Comm, Fiber
Roofs or projections not accessible to pedestrians	Table 234-1	17.2	14.1	12.5	10.5	3.5	3
Balconies or roofs readily accessible to pedestrians, catwalks	Table 234-1	19.2	16.1	14.5	10.5	10	9.5
Over roofs, ramps, and loading docks accessible to vehicles but not truck traffic	Table 234-1	19.2	16.1	14.5	10.5	10	9.5
Over roofs, ramps, decks, and loading docks accessible to truck traffic	Table 234-1	23.2	20.1	18.5	16.5	16	15.5

LEGEND

4kV thru 23.9kV - DIST. VOLTAGE
Multiplex Secondary - SEC
Neutral, Guys, Messenger & Communication - NGMC

NOTES

1. These clearances meet or exceed the National Electrical Safety Code (NESC) Table 232-1 at Worst case Final sag. Clearances shall be increased as needed to meet all other relevant code requirements starting with the lowest wire or cable.
2. New Construction: If a truck over 8' is not reasonably expected, the Multiplex service drop clearance may be reduced to 12'-6" worst case sag.
3. Make Ready: Where the height of attachment to a building does not permit Multiplex service drops to meet this value, clearances may be reduced to 12'-0" worst case sag for a service drop, or 10'-0" worst case sag for a drip loop.
4. Railroad clearances shown are specified by CSX Design and Construction Standards. Clearances of any line within 1,000 feet of a bridge, trestle or large culvert shall not be less than 50'-0" above the rail. If crossing a rail other than CSX, consult that rail owner or NESC, whichever is greater clearance.
5. Service drops over roadways may be reduced to 16' at worst case sag per NESC Table 232-1.
6. Secondary clearances are for Multiplex, triplex or quadruplex. Add six inches (6") for Open-wire secondary.

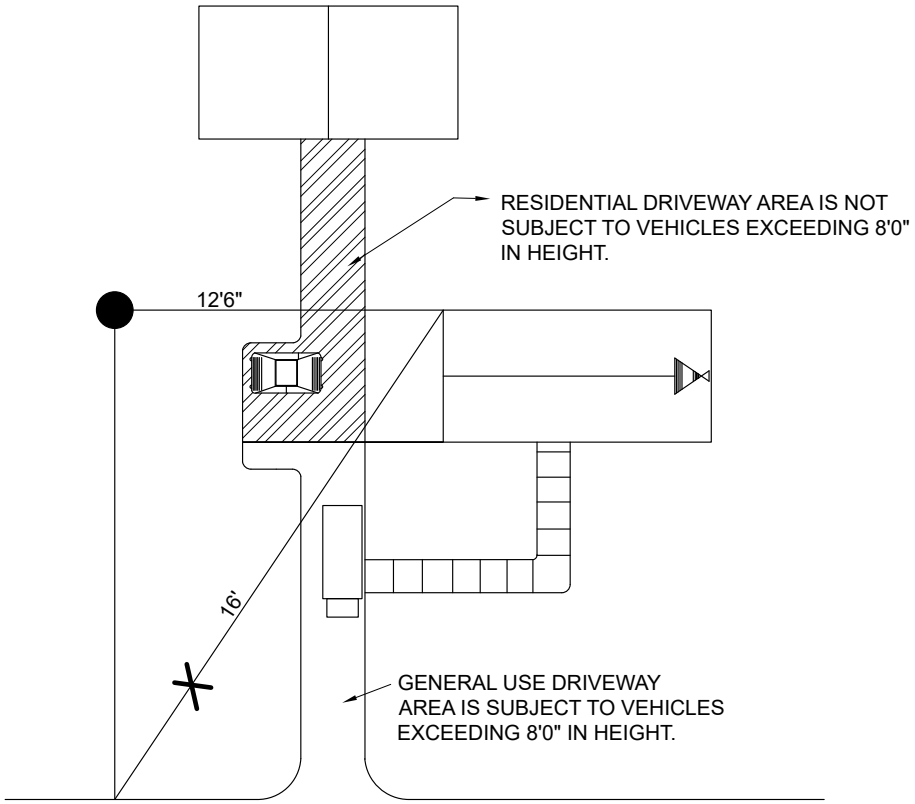


REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION AND DISTRIBUTION CLEARANCES

NES

VERTICAL CLEARANCE DETAILS WIRES & CABLES ABOVE GROUND OR RAIL



- GENERAL USE DRIVE WAY AREA IS SUBJECT TO VEHICLES EXCEEDING 8'0" IN HEIGHT.
- RESIDENTIAL USE DRIVE WAY AREA IS NOT SUBJECT TO VEHICLES EXCEEDING 8'0" .

NOTES

1. Residential driveway exception allows for 12-ft. service heights crossing the driveway if there are no vehicles taller than 8-ft. expected.
2. Consider customer's future plans for the property when designing these jobs.

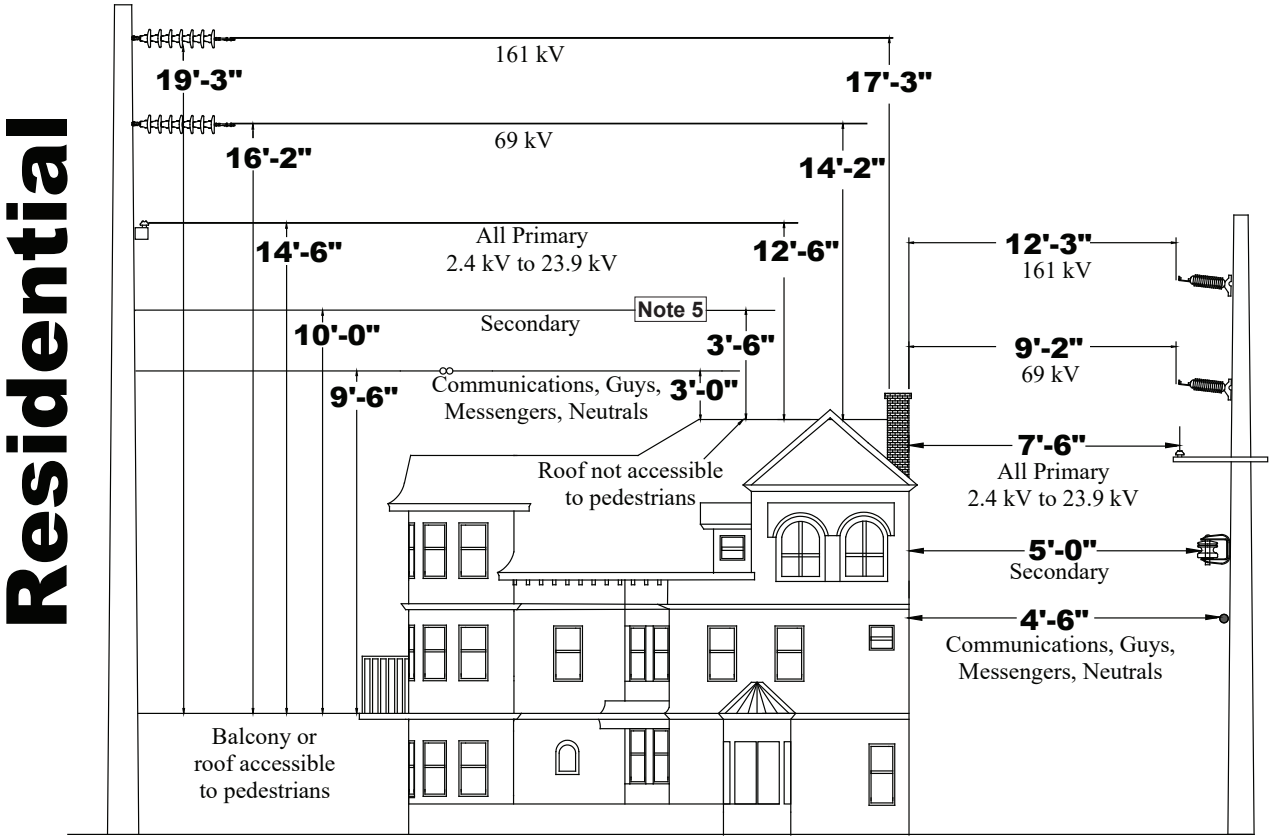
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION AND DISTRIBUTION CLEARANCES

NES

VERTICAL CLEARANCE DETAILS SERVICE WIRE OVER RESIDENTIAL DRIVEWAY

Residential



NOTES

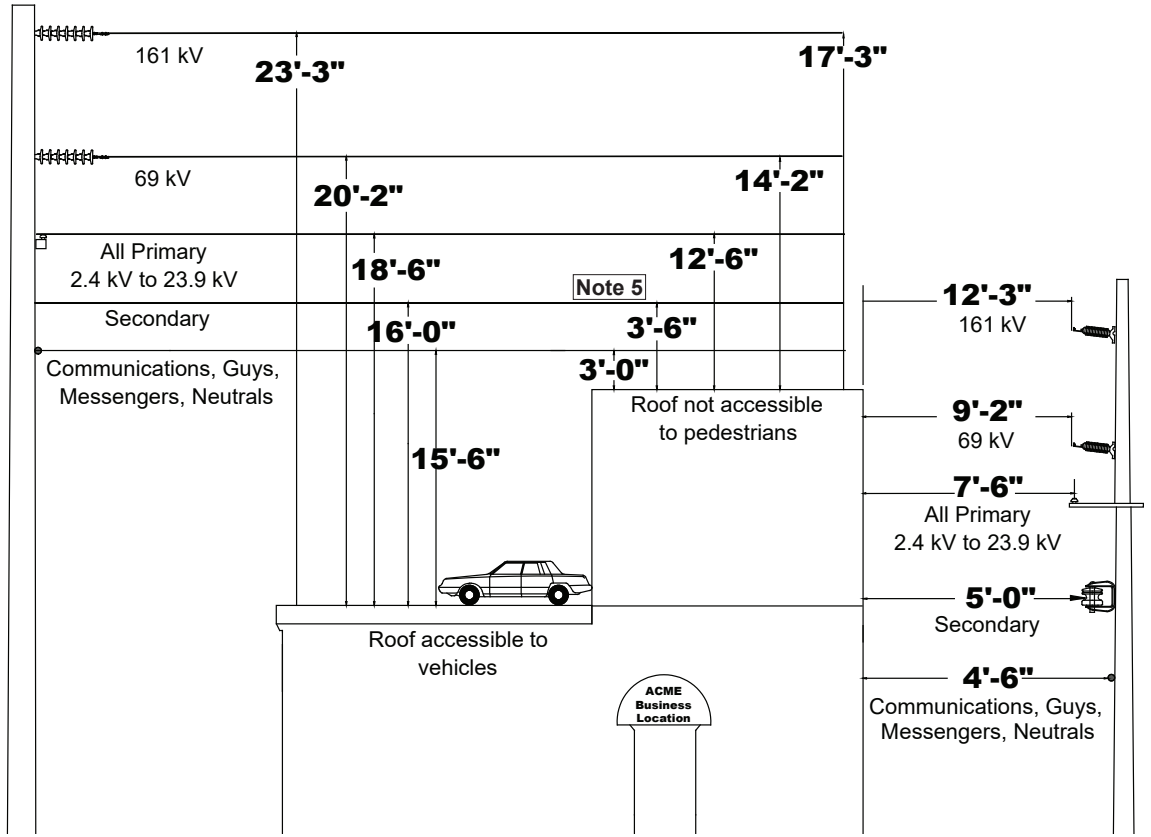
1. These clearances meet or exceed the National Electrical Safety Code (NESC), Table 234-1 at Worst case Final sag.
2. Conductors on suspension insulators may require additional clearance. Clearance is a function of span length and sag at 60° F.
3. Pedestrian access applies if the roof can be reached by window, ramp, stairway, doorway or permanent ladder.
4. Vehicle clearances apply if vehicles which are 8' or greater in height are allowed.
5. Vertical secondary distances are for Multiplex, triplex or quadruplex. Add six inches (6") for Open-wire secondary except for roofs not accessible to pedestrians requires a minimum of 10'-6".
6. Horizontal distances are the same for Multiplex and Open-wire secondary except for clearance to chimney may be reduced to 3'-6" for Multiplex conductors.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

CLEARANCE DETAILS WIRES & CABLES FROM RESIDENTIAL BUILDING

Commercial



NOTES

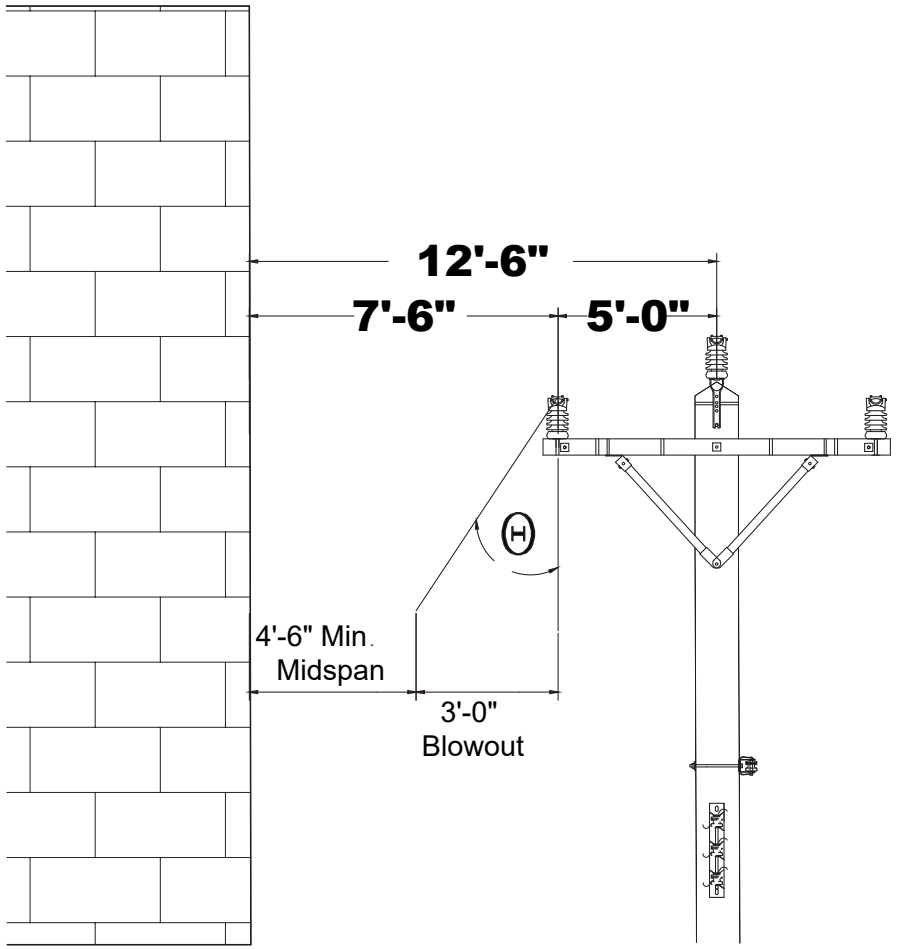
1. These clearances meet or exceed the National Electrical Safety Code (NESC), Table 234-1 at Worst case Final sag.
2. Conductors on suspension insulators may require additional clearance. Clearance is a function of span length and sag at 60° F.
3. Pedestrian access applies if the roof can be reached by window, ramp, stairway, doorway or permanent ladder.
4. Vehicle clearances apply if vehicles which are 8’ or greater in height are allowed.
5. Vertical secondary distances are for Multiplex, triplex or quadruplex. Add six inches (6”) for Open-wire secondary except for roofs not accessible to pedestrians requires a minimum of 10’-6”.
6. Horizontal distances are the same for Multiplex and Open-wire secondary except for clearance to chimney may be reduced to 3’-6” for Multiplex conductors.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

CLEARANCE DETAILS WIRES & CABLES FROM COMMERCIAL BUILDINGS

Code Name	ACSR Size	Maximum span in feet, for 3 ft blowout distance			
		150 ft ruling span	200 ft ruling span	250 ft ruling span	300 ft ruling span
SPARROW	#2 AWG	247	219	212	208
RAVEN	1/0 AWG	222	214	211	210
PENGUIN	4/0 AWG	239	241	242	244
PELICAN	477 MCM	229	240	248	253
COOT	795 MCM	233	246	256	263
COLUMBINE	1351.5 MCM	274	289	300	309



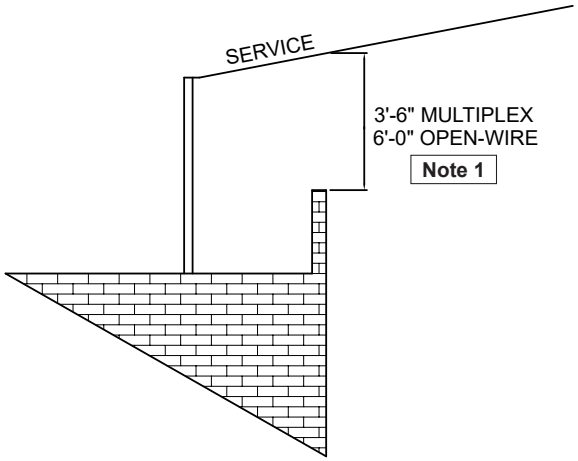
NOTES

1. NESC Rule 234.C.1.b the clearance between conductors displaced by wind and buildings must be 4'- 6". Table above includes 3'- 0" blowout allowance based on NES Standard conductor sag.
2. All conductor cables are pulled at specific tensions to maintain correct final sags.
3. Wind load @ 50 MPH per NESC Rule 234.A.2.
   Wind force = 6 lbs/ft² (cable diameter in ft.)
   Θ (sag rotation angle) = tan-1 (wind force/cable weight)
   Blowout = Final Sag x sin (Θ)
4. Where Final Sag x sin (Θ) ≤ 3 feet was determined for each conductor and ruling span using SAG10.

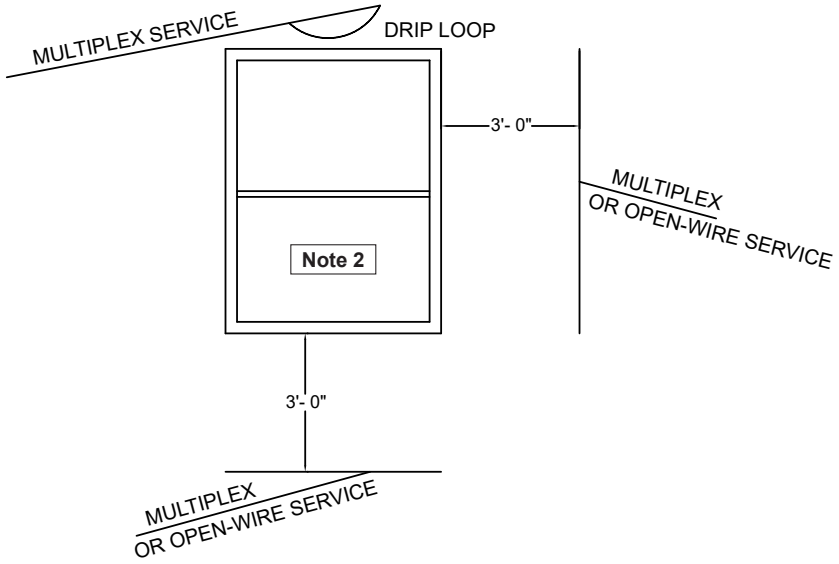
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

CLEARANCE DETAILS CONDUCTOR BLOW-OUT FROM BUILDING



SERVICE WIRE CLEARANCE FROM PARAPET WALL



SERVICE WIRE CLEARANCE FROM WINDOWS

NOTES

1. Vertical clearances above railings, walls, or parapets around balconies, decks, or roofs, must exceed the following clearances:
   a) 3.5 feet for Multiplex service or Open-wire meeting less than 300 V phase-to-phase.
   b) 6.0 feet for Open-wire conductors exceeding 300 V phase-to-phase.
2. Clearance does not apply to service-drop Multiplex conductors meeting Rule 230C3 above the top level of a window. Not required for windows that are not designed to open.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

CLEARANCE DETAILS SERVICE WIRE WINDOWS & PARAPETS

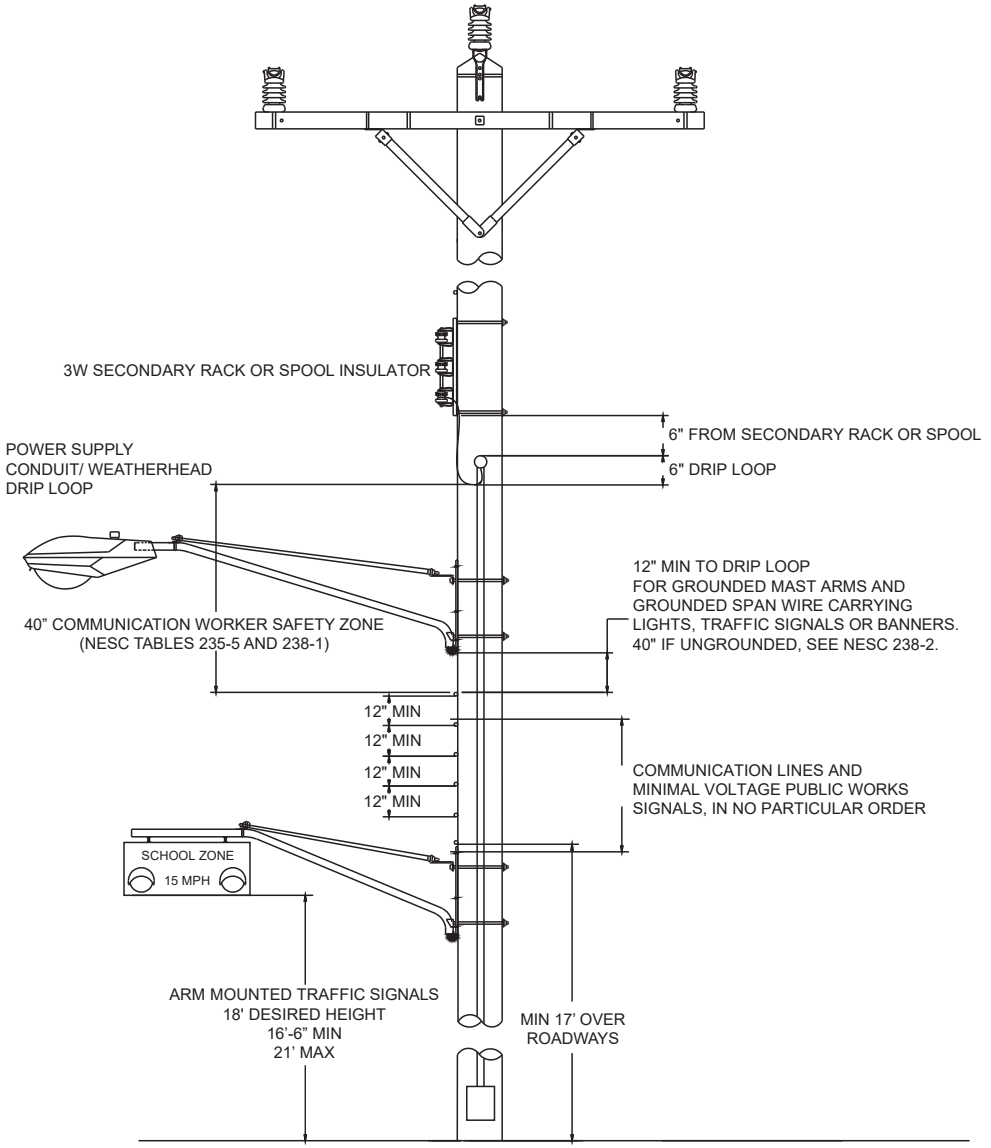
NESC Table 235-6: Clearance from lines (inches)		Clearances in any direction at or near supports, and to vertical or lateral conductors, service drops, or guy wires attached to same supporting structure													
		Circuit phase-to-phase voltage (kV)													
		Comm. to Comm.	Comm. to Neutral	Neutral		0 to 8.7		13.8		23.9		69		161	
1	Clearance separation wire to wire														
		NESC	NESC	Rec'md.	Min.	Rec'md.	Min.	Rec'md.	Min.	Rec'md.	Min.	Rec'md.	Min.	Rec'md.	Min.
a.	Communication[1]	12	40	see NESC Table 238-1 for Communication clearance											
b.	Of the same circuit	3.0	3.0	3	3.0	8	3.0	8	4.3	8	6.8	72	NA	126	NA
c.	Of other circuits	Top Wire	Voltage (kV)	0		4		13.8		23.9		69.0		161.0	
	Bottom Wire		0	3	2.5	9	3.5	9	5.9	9	8.3	ENGR	36.3	ENGR	58.6
			4			18	4.5	18	6.8	18	9.3		37.2		59.5
			14					18	9.2	18	11.7		39.6		61.9
			24							18	14.1		42.0		64.4
			69										53.0		75.3
			161												97.6
2.0	Span or guy wires, or messengers attached to same structure														
a.	guy or messenger	3.0	6.0	9	6.0	18	6.0	18	7.3	18	9.8	42	20.8	72	43.8
b.	with guy strain insulator (reduce 25%)	2.3	4.5	6	4.5	9	4.5	9	5.5	9	7.4	36	15.6	54	32.8
3.0	Surface of support arms														
		3.0	3.0	3	3.0	6	3.0	6	4.0	6	6.0	42	14.8	72	33.2
4.0	Surface of structures at the support														
a.	On jointly used structures	---	5.0	6	5.0	9	5.0	9	6.0	9	8.0	42	16.8	72	35.2
b.	All other	3.0	---		---		3.0		4.0		6.0		14.8		33.2
5.0	Service Drops in the span														
a.	Communication	12.0	12.0	30	30.0	48	30.0	48	32.0	48	36.1	120	54.6	168	91.4
b.	Supply	---	30.0	12	12.0	30	12.0	30	14.0	30	18.1	120	36.6	168	73.4

Note 1: When the neutral is on the crossarm, the conductor is at the same height as the neutral. In this condition, neutral to communications clearance is min. 48".

Note 2 : On jointly used structures, guys that pass within 12 in of supply conductors, and likewise pass within 12 in of communication cables, shall be protected with a suitable insulating covering where the guy passes the supply conductors, unless the guy is effectively grounded or insulated with a strain insulator at a point below the lowest supply conductor and above the highest communication cable

NOTES

1. These clearances meet or exceed the National Electrical Safety Code (NESC), applicable rule appears on drawing.
2. These distances are minimums. NESC Rule 235 H requires clearances between lines of different communication companies to be at least four inches (4”) anywhere in the span. NESC Rule 235H also requires spacing between messengers supporting communications cables to be at least 12 inches. This may necessitate spacing at the pole greater than the NESC minimum shown.



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION AND DISTRIBUTION CLEARANCES

NES

CLEARANCE DETAILS COMMUNICATIONS & ATTACHMENTS ON SAME STRUCTURE

Design Vertical Clearances for Cables between Supporting Structures						
Upper Cable	Lower Cable	Mid-span Clearance		NESC Rule	Sag Condition	Worst Case over lower level
		Recommend	NESC			
		(in)	(in)			
69 kV	Distribution[4]	48	44	235-C.2.a	Final over Initial	212°F over 90°F
69 kV	Distribution Pole Top	78	73	234-G.1	Final over Initial	212°F over pole top
Distribution	Distribution	30	18	235-C.2.b.1.b[Note1]	Final over Initial	212°F over 90°F
Distribution	Neutral	24	18	235-C.2.b.1.b[Note1]	Final over Initial	120°F over 0°F
Distribution	Distribution Pole Top	54	54	234-B.2[Note2]	Final over Initial	212°F over insulator
Neutral	Service/ Others Pole	30	30	234-B.2[Note2&3]	Final over Initial	120°F over pole top
Distribution	Communication	48	42	235-C.1.b[Note1]	Final over Initial	212°F over 90°F
Neutral	Communication	30	30	235-C.1.b[Note1]	Final over Initial	120°F over 0°F

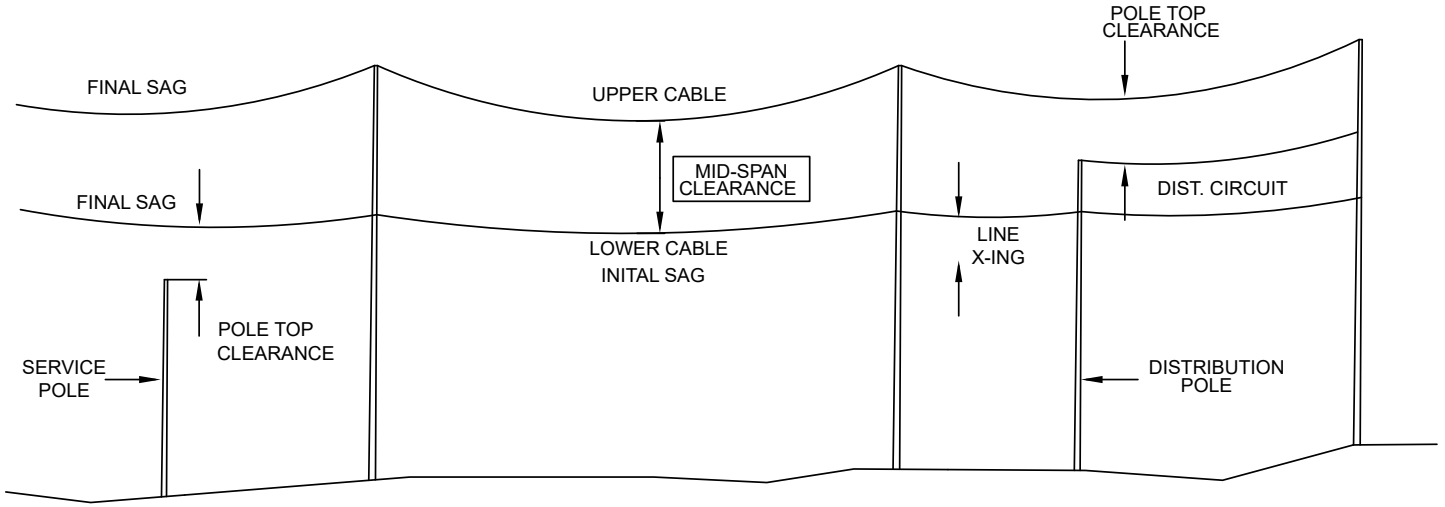
Note 1: Distance in span are 75% of minimum required Attachment Clearance at Support

Note 2: Wires, conductors, or cables of one line passing near a lighting support, traffic signal support, antenna support, a supporting structure of a second line, or intermediate poles in skip-span construction, without being attached. Vertical Clearances may be reduced to 2-ft for guys, messengers, insulated communication lines multi-grounded neutrals, or multiplex supply cables less than 300V per Exception 1 in Rule 234-B.2.

Note 3: The vertical clearance of 54-inches has been reduced by 2-ft if the wires, conductors, or cables above and the supporting structure of another line below are operated and maintained by the same utility per Exception 2 in Rule 234-B.2.

Note 4: Distribution line voltages range from 4kV, 13.8kV and 23.9kV.

Note 5: All clearances are based on Same Utility operating electrical circuits. Joint use electric poles require minimum addition of 2-ft more seperation.

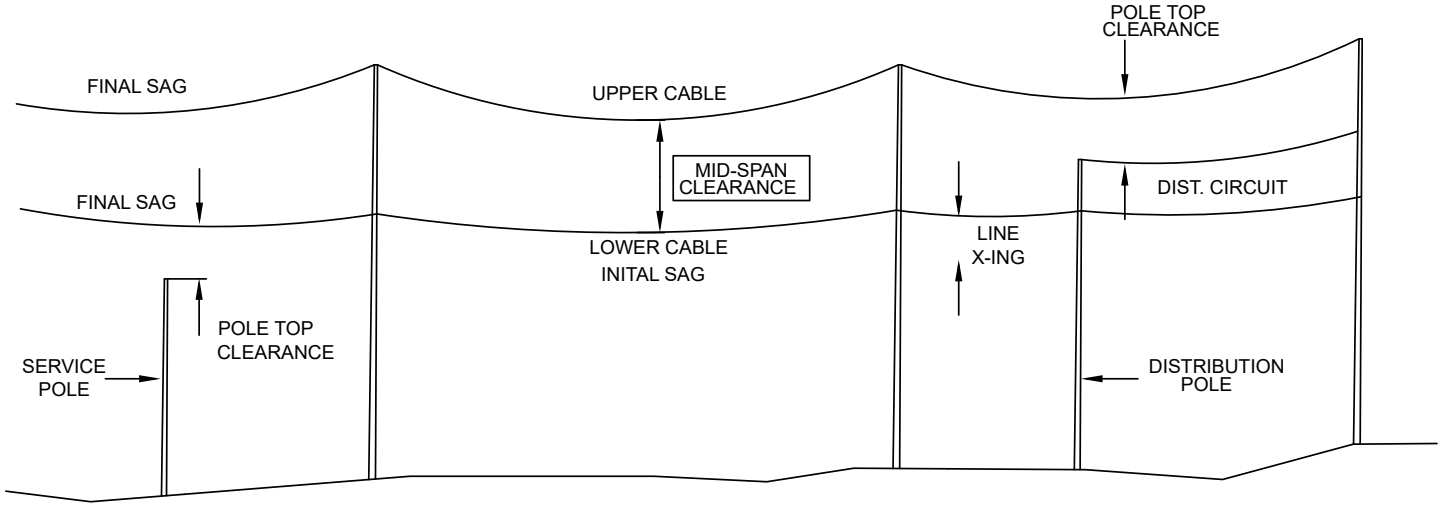


REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

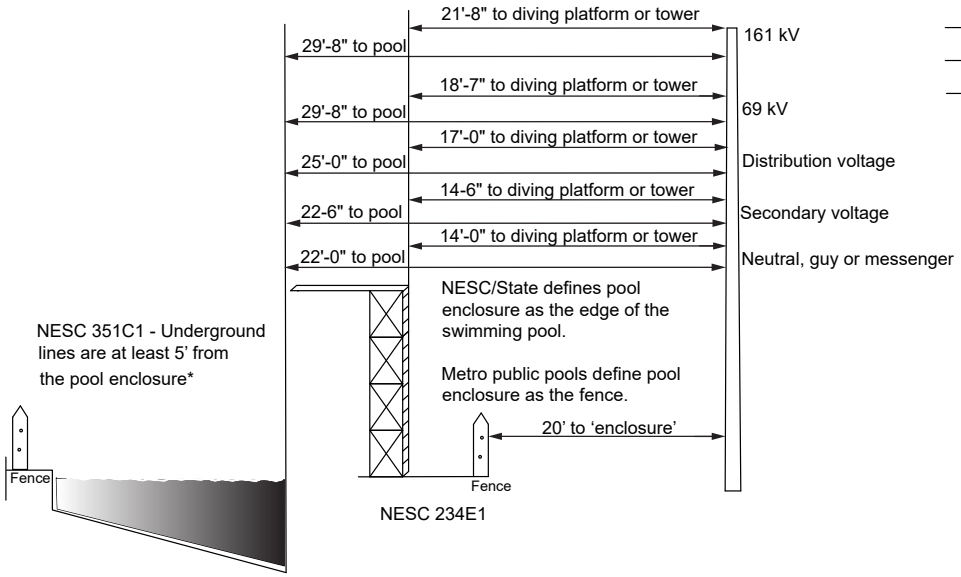
VERTICAL CLEARANCE DETAILS BETWEEN LINES SAME SUPPORTING STRUCTURE

Mid-span Crossing cables from different supporting structures - Table 233-1						
Upper Cable	Lower Cable	Mid-span Clearance		NESC Rule	Sag Condition	Worst Case over lower level
		Recommend (in)	NESC (in)			
Distribution	Distribution	54	24	233-C.1	Final over Initial	212°F over 90°F
Distribution	Communication[1]	60	60	233-C.1	Final over Initial	212°F over 90°F
Neutral	Neutral[2]	6	0	233-C.1	Final over Initial	120°F over 0°F
Neutral	Communication	30	24	233-C.1	Final over Initial	120°F over 0°F
Open-wie Secondary	Communication	54	48	233-C.1	Final over Initial	120°F over 0°F
Multiplex Secondary	Communication	30	24	233-C.1	Final over Initial	120°F over 0°F
Note 1: This clearance may be reduced to 4-ft where supply conductors of 750V to 8.7kV cross a communication line more than 6-ft horizontally from a communications structure.						
Note 2: No clearance is specified between guys or span wires that are electrically interconnected.						

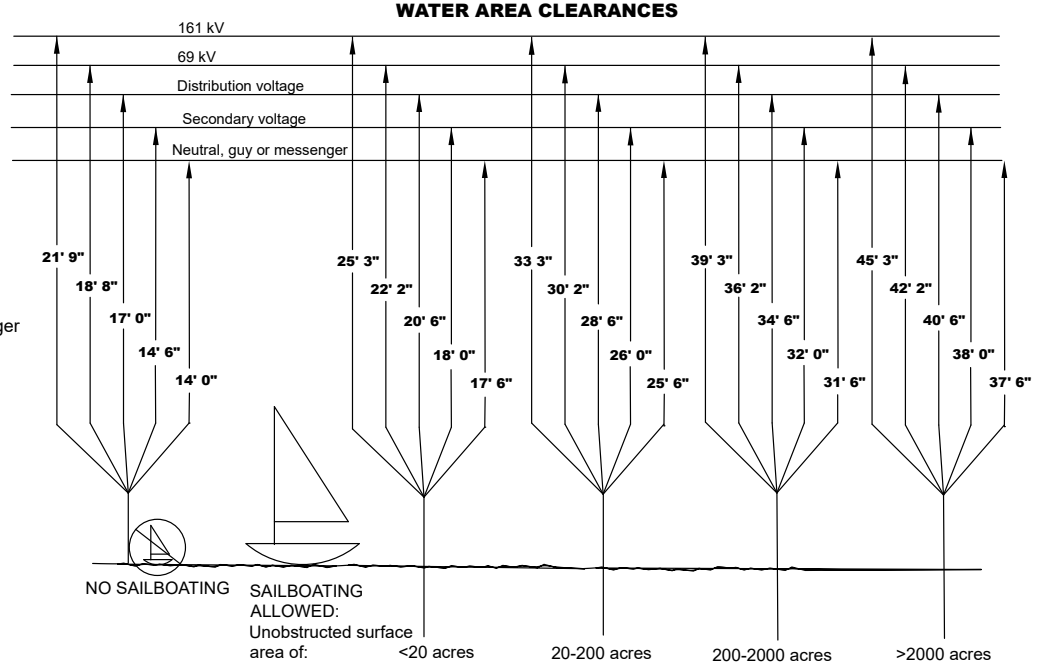


REV.	ENG.	DESCRIPTION OF CHANGE	DATE

SWIMMING POOL CLEARANCES

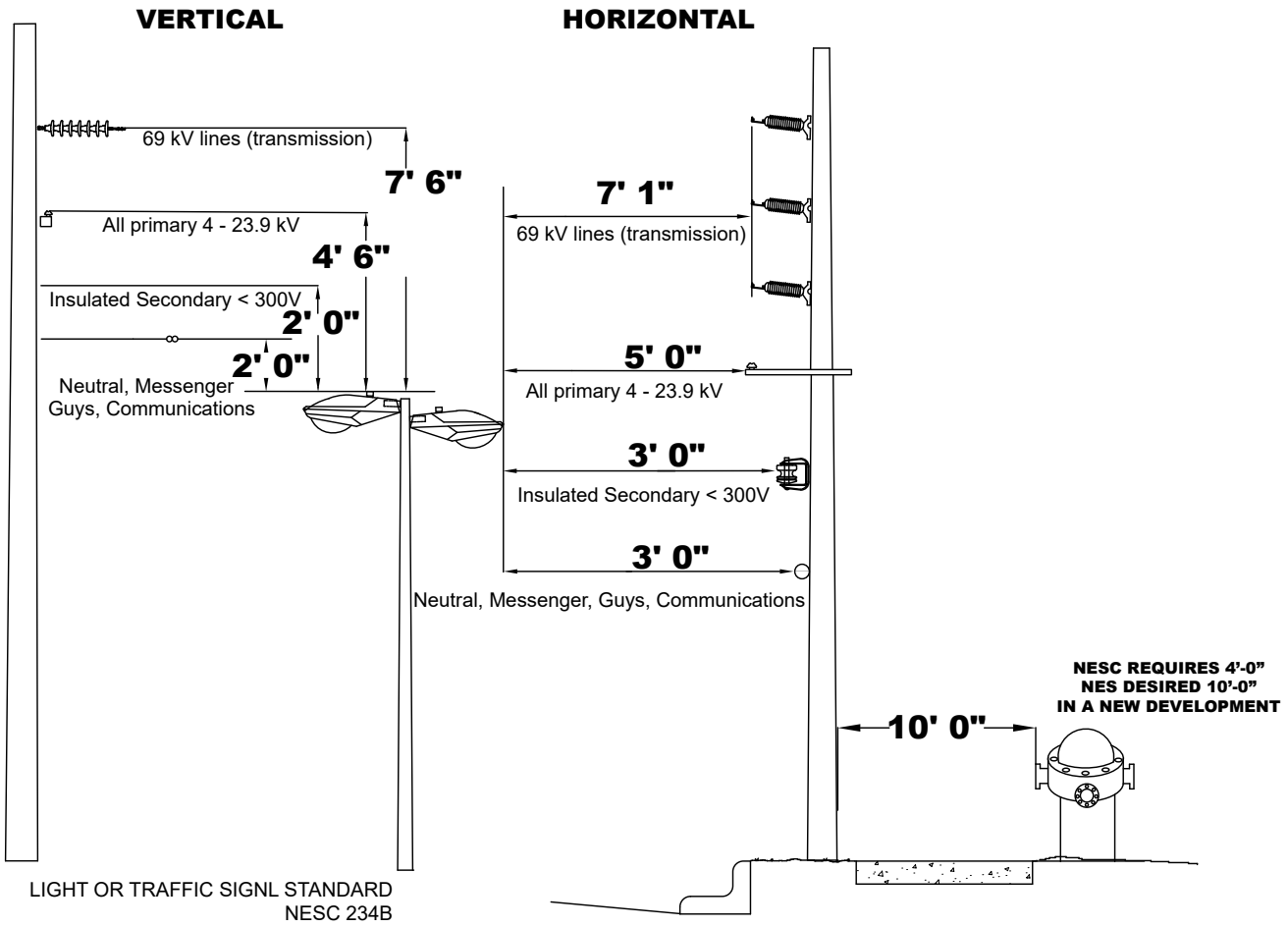


WATER AREA CLEARANCES



NOTES

1. These clearances meet or exceed the National Electrical Safety Code (NESC), Table 232-1.
2. NESC clearances are in ANY direction from water level, edge of pool, base of diving platform or anchored raft.
3. NES does not allow overhead services over swimming pools. Services must have a minimum horizontal clearance of ten feet (10') from the inside wall edge of the pool.
4. For boat ramps and associated rigging area, add five feet (5') to the applicable "Sail Boating Allowed" clearance.
5. For NESC clearance purposes, spas (including whirlpools, hot-tubs, or other similar installations not suitable for swimming) are not considered as swimming pools covered by Rule 234E.
6. Secondary clearances are for triplex or quadruplex. Add six inches (6") for open-wire secondary.



LIGHT OR TRAFFIC SIGNL STANDARD
NESC 234B

NOTES

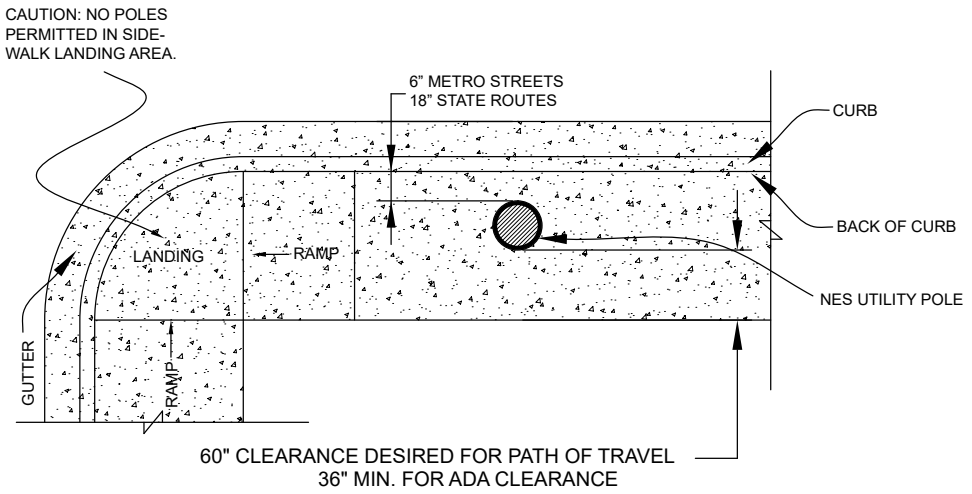
1. These clearances meet or exceed in NESC Rule 234B, Table 234-1.
2. All Clearances taken from the closest portion of the line to the closest point of the object.
3. Secondary clearances shown for Multi-plex wire. Add six inches (6") for Open-wire secondary
4. Horizontal clearances do not take blowout into account.
5. Consult Transmission Group for 69kV and 161 kV clearances. NERC regulations may override NESC.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

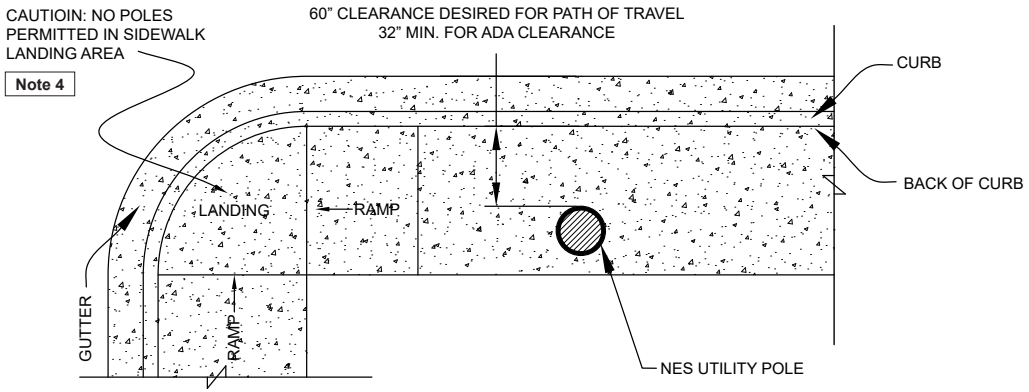
NES

CLEARANCE DETAILS CURBSIDE & OTHER SUPPORTING STRUCTURES

CURB SIDE POLE IN SIDEWALK DETAIL



POLE IN BACK OF SIDEWALK DETAIL



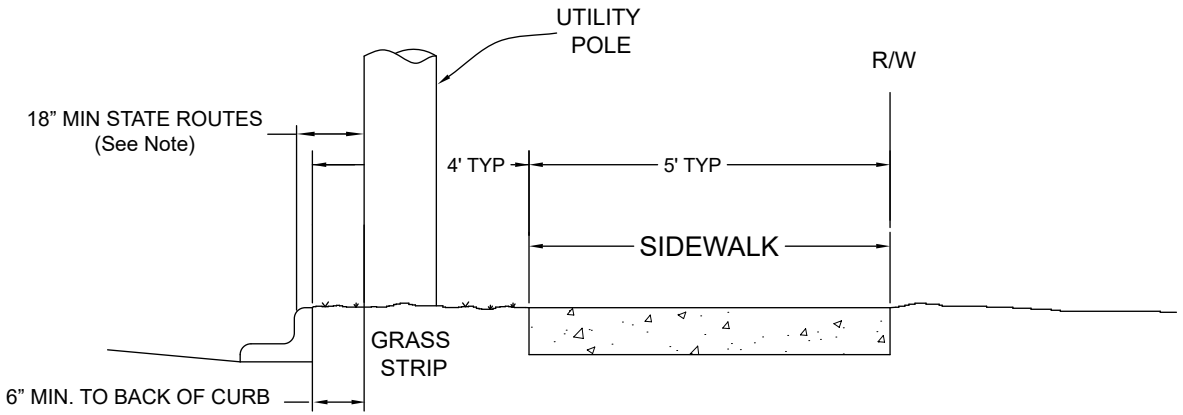
NOTES

1. Set pole required distance from back of curb based on governing roadway standards.
2. Maintain 60” clearance on sidewalk for pedestrian path of travel where practical. Minimum clearance is 32”, since even large-diameter poles would not block passageway for more than 24”.
3. One-half expansion joints to be used around pole.
4. For poles in ramps contact the NDOT to coordinate pole placement.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

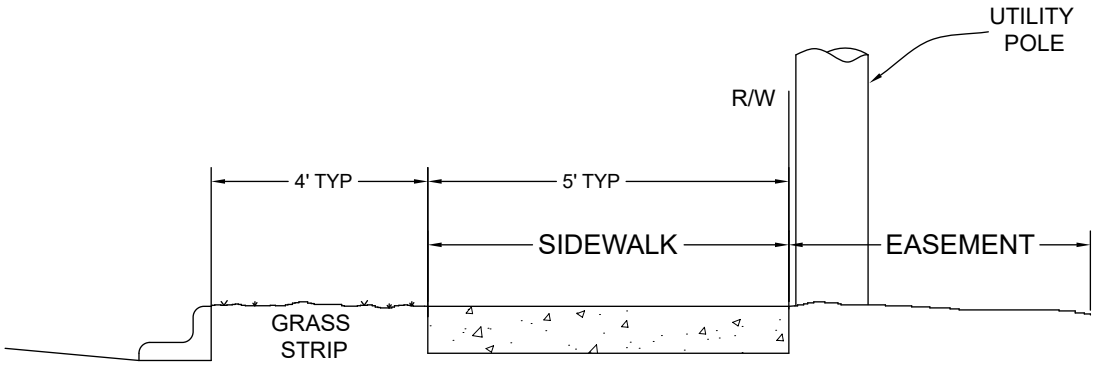
CLEARANCE DETAILS POLES LOCATED WITHIN SIDEWALK



TYPICAL URBAN STREET

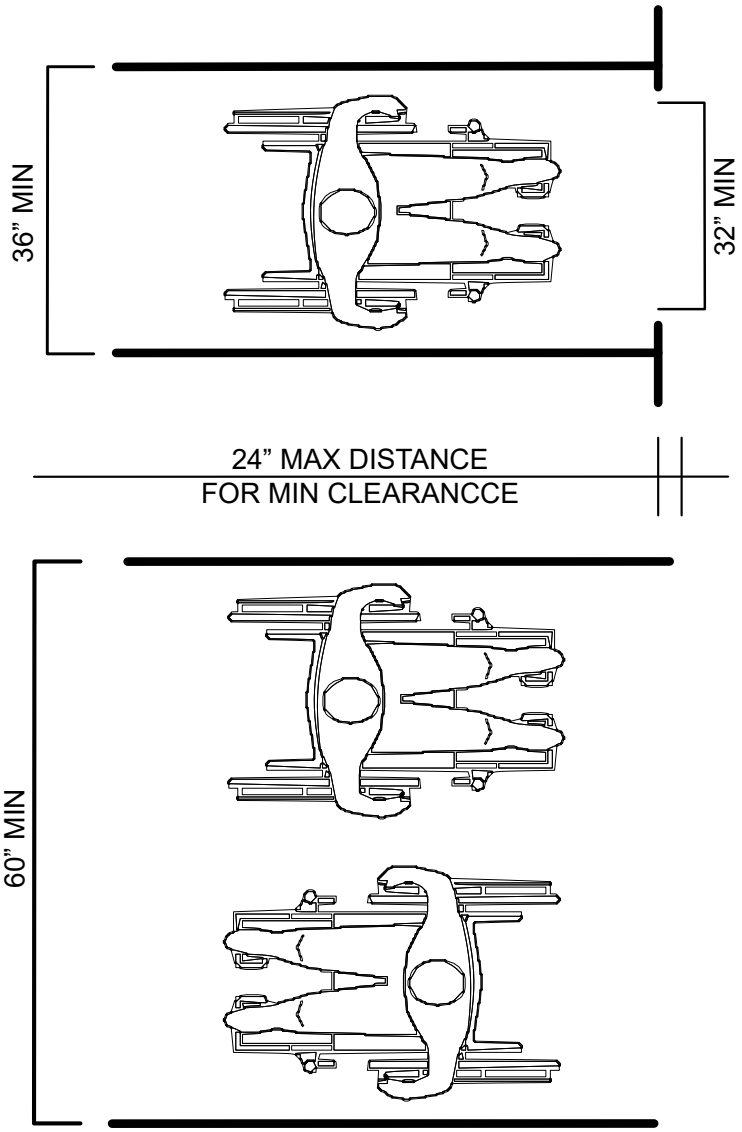
NOTES

1. Poles should be set back from curb so passing traffic will clear to a height up to 15'.
2. Set pole required distance from back of curb based on governing roadway standards. 18" for TDOT is minimum, but permitted clearances will override.
3. Maintain 60" clearance on sidewalk for pedestrian path of travel where practical. Minimum clearance is 32", since even large-diameter poles would not block passageway for more than 24".



PREFERRED METHOD (NEW DEVELOPMENTS)
(EASEMENTS)

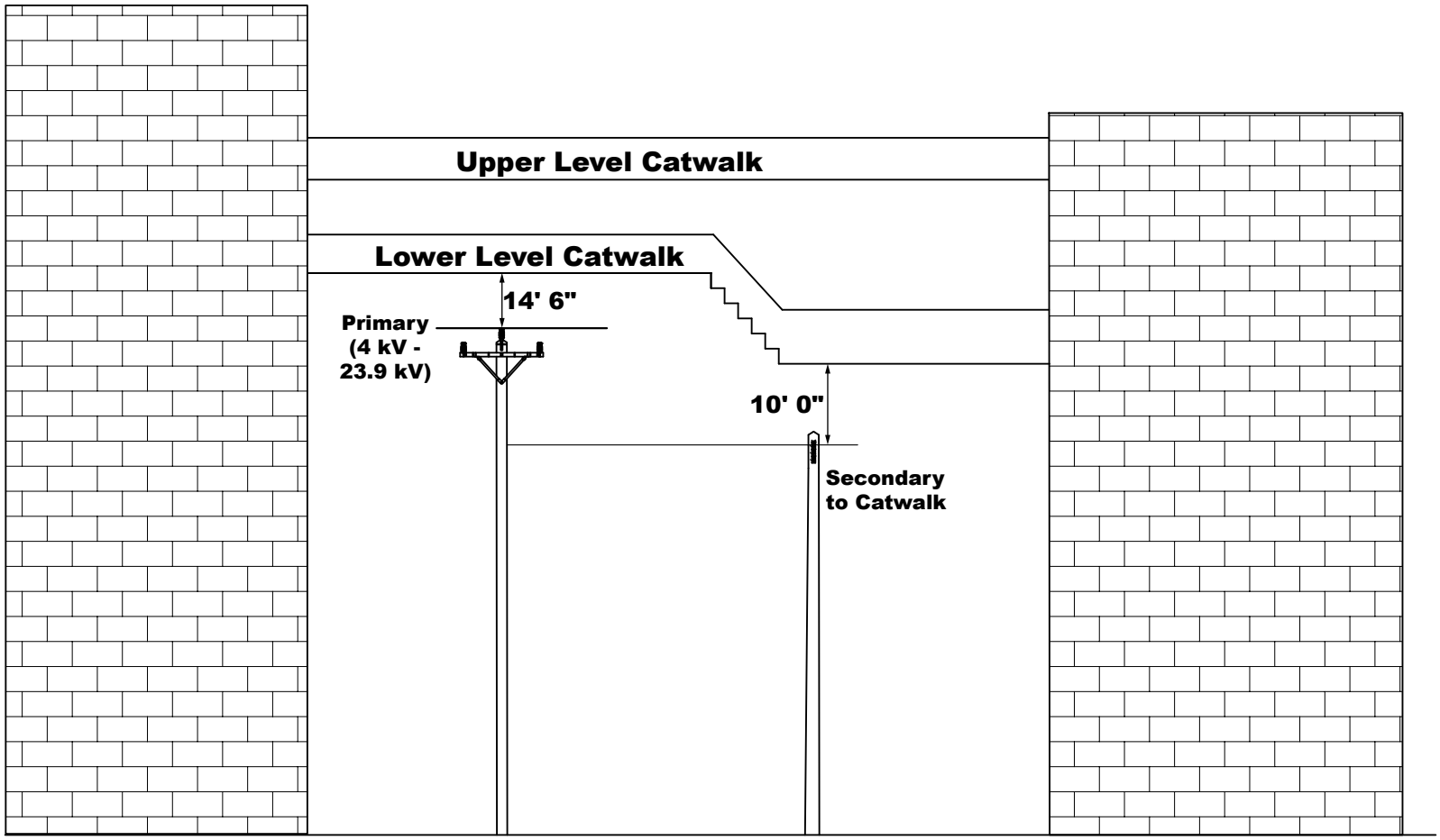
REV.	ENG.	DESCRIPTION OF CHANGE	DATE



NOTES

1. Americans with Disabilities Act (ADA) guidelines state the minimum clear passage width for a single weelchair passage shall be 36”. If the passageway is blocked for a distance of less than 24”, this may be reduced to 32”. The clear passage for two wheelchairs passing each other is 60”.
2. Metro Davidson County interprets ADA guidelines as a 60” clearance on sidewalks. NES will make every effort to meet this, however the minimum ADA requirements may need to be used in crowded urban areas. If the pole diameter is less than 24”, there must be a 32” passageway, otherwise there must be at least 36”.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE



NOTES

1. These clearances meet or exceed the National Electrical Safety Code (NESC), Table 234-1, 2.B.1.
2. Secondary clearances are for Multiplex and secondary wires. Add 6” for open wire secondary.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION AND DISTRIBUTION CLEARANCES

NES

CLEARANCE DETAILS ADJACENT OR CROSSING BELOW CATWALK

PRIMARY SAG TABLES

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
GENERAL NOTES	4			
SAG TABLE DETAILS	5			
SAG TABLES, ACSR FULL TENSION	6			
SAG TABLE, RULING SPAN 150-FT, #2 ACSR @ FULL TENSION	7			
SAG TABLE, RULING SPAN 150-FT, 1/0 ACSR @ FULL TENSION	8			
SAG TABLE, RULING SPAN 150-FT, 4/0 ACSR @ FULL TENSION	9			
SAG TABLE, RULING SPAN 150-FT, 336 ACSR @ FULL TENSION	10			
SAG TABLE, RULING SPAN 150-FT, 477 ACSR @ FULL TENSION	11			
SAG TABLE, RULING SPAN 150-FT, 795 ACSR @ FULL TENSION	12			
SAG TABLE, RULING SPAN 200-FT, #2 ACSR @ FULL TENSION	13			
SAG TABLE, RULING SPAN 200-FT, 1/0 ACSR @ FULL TENSION	14			
SAG TABLE, RULING SPAN 200-FT, 4/0 ACSR @ FULL TENSION	15			
SAG TABLE, RULING SPAN 200-FT, 336 ACSR @ FULL TENSION	16			
SAG TABLE, RULING SPAN 200-FT, 477 ACSR @ FULL TENSION	17			
SAG TABLE, RULING SPAN 200-FT, 795 ACSR @ FULL TENSION	18			
SAG TABLE, RULING SPAN 200-FT, 1351 AAC @ FULL TENSION	19			
SAG TABLE, RULING SPAN 250-FT, #2 ACSR @ FULL TENSION	20			
SAG TABLE, RULING SPAN 250-FT, 1/0 ACSR @ FULL TENSION	21			
SAG TABLE, RULING SPAN 250-FT, 4/0 ACSR @ FULL TENSION	22			

49TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
SAG TABLE, RULING SPAN 250-FT, 336 ACSR @ FULL TENSION	23			
SAG TABLE, RULING SPAN 250-FT, 477 ACSR @ FULL TENSION	24			
SAG TABLE, RULING SPAN 250-FT, 795 ACSR @ FULL TENSION	25			
SAG TABLE, RULING SPAN 250-FT, 1351 AAC @ FULL TENSION	26			
SAG TABLE, RULING SPAN 300-FT, #2 ACSR @ FULL TENSION	27			
SAG TABLE, RULING SPAN 300-FT, 1/0 ACSR @ FULL TENSION	28			
SAG TABLE, RULING SPAN 300-FT, 4/0 ACSR @ FULL TENSION	29			
SAG TABLE, RULING SPAN 300-FT, 336 ACSR @ FULL TENSION	30			
SAG TABLE, RULING SPAN 300-FT, 477 ACSR @ FULL TENSION	31			
SAG TABLE, RULING SPAN 300-FT, 795 ACSR @ FULL TENSION	32			
SAG TABLE, RULING SPAN 300-FT, 1351 AAC @ FULL TENSION	33			
SAG TABLES, ACSR REDUCED TENSION	34			
SAG TABLE, RULING SPAN 100-FT, #2 ACSR @ REDUCED TENSION	35			
SAG TABLE, RULING SPAN 100-FT, 1/0 ACSR @ REDUCED TENSION	36			
SAG TABLE, RULING SPAN 100-FT, 4/0 ACSR @ REDUCED TENSION	37			
SAG TABLE, RULING SPAN 100-FT, 336 ACSR @ REDUCED TENSION	38			
SAG TABLE, RULING SPAN 100-FT, 477 ACSR @ REDUCED TENSION	39			
SAG TABLE, RULING SPAN 100-FT, 795 ACSR @ REDUCED TENSION	40			
SAG TABLE, RULING SPAN 150-FT, #2 ACSR @ REDUCED TENSION	41			
SAG TABLE, RULING SPAN 150-FT, 1/0 ACSR @ REDUCED TENSION	42			
SAG TABLE, RULING SPAN 150-FT, 4/0 ACSR @ REDUCED TENSION	43			
SAG TABLE, RULING SPAN 150-FT, 336 ACSR @ REDUCED TENSION	44			
SAG TABLE, RULING SPAN 150-FT, 477 ACSR @ REDUCED TENSION	45			
SAG TABLE, RULING SPAN 150-FT, 795 ACSR @ REDUCED TENSION	46			
SAG TABLE, RULING SPAN 150-FT, 1351AAC @ REDUCED TENSION	47			

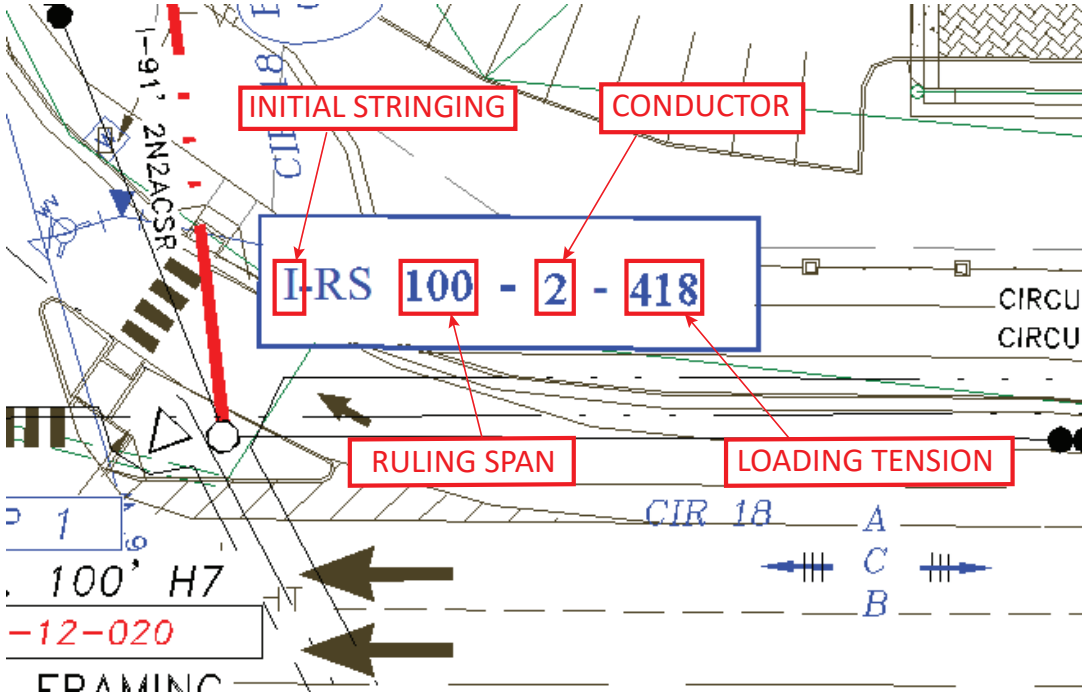
PRIMARY SAG TABLES

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
SAG TABLES, ACSR SLACK SPAN	48			
SAG TABLE, RULING SPAN 50-FT, #2 ACSR @ SLACK SPAN	49			
SAG TABLE, RULING SPAN 50-FT, 1/0 ACSR @ SLACK SPAN	50			
SAG TABLE, RULING SPAN 50-FT, 4/0 ACSR @ SLACK SPAN	51			
SAG TABLE, RULING SPAN 50-FT, 336 ACSR @ SLACK SPAN	52			
SAG TABLE, RULING SPAN 50-FT, 477 ACSR @ SLACK SPAN	53			
SAG TABLE, RULING SPAN 50-FT, 795 ACSR @ SLACK SPAN	54			
SAG TABLE, RULING SPAN 100-FT, #2 ACSR @ SLACK SPAN	55			
SAG TABLE, RULING SPAN 100-FT, 1/0 ACSR @ SLACK SPAN	56			
SAG TABLE, RULING SPAN 100-FT, 4/0 ACSR @ SLACK SPAN	57			
SAG TABLE, RULING SPAN 100-FT, 336 ACSR @ SLACK SPAN	58			
SAG TABLE, RULING SPAN 100-FT, 477 ACSR @ SLACK SPAN	59			
SAG TABLE, RULING SPAN 100-FT, 795 ACSR @ SLACK SPAN	60			

GENERAL NOTES

1. Sag charts shown in this section are “initial stringing” charts. They are used by line crews to install conductor. Final sag charts are located in the Overhead Conductor section of the Customer Engineering Design Manual. Sag Charts for restringing existing wire can be found in the Engineering Design Manual.
2. Sag charts should be indicated on all drawings. Situations other than those included in this section should be extremely rare, and should have the stringing charts included on the drawing.
3. All framing plates are based on a maximum span length of 350 feet (regardless of conductor size). The “Ruling Span” is selected by rounding up or down. For example, if the ruling span is calculated to be 278 feet, this would be rounded up to a 300 foot ruling span. If the ruling span is 271 feet it rounded down to a 250 foot ruling span.
4. Sag charts shall be noted for each design tension. If a full tension span transitions to a slack span, both sag charts shall be indicated. The sag charts are indicated by (I) for install, (RS) for ruling span, the ruling span, the conductor, and the design tension. In the example below #2 ACSR is being installed at half tension (417 lbs). Therefore the sag chart will be identified as I-RS100-2-417.



DRAWING STRINGING CHART NOTATION EXAMPLES

I–RS200–4/0–1550
I–RS200–1/0–985

I–RS250–2–835
I–FULL TENSION

I–RS50–2–83
I–SLACK TENSION

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

GENERAL NOTES

Design Tension (NOT stringing tension).

DRAWING CODE	WIRE NAME
I-RS150-2-835 #2ACSR	SPARROW

Area = 0.0608 Sq. in., Diameter = 0.316 in, Weight = 0.091 lb/G, RTS = 2850 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4.00	0.20	0.581	1.96	835	1.96	835*
32	0.25	0.00	0.00	0.267	1.37	546	1.26	598
0	0.00	0.00	0.00	0.091	0.40	640	0.38	682
15	0.00	0.00	0.00	0.091	0.48	534	0.43	601
30	0.00	0.00	0.00	0.091	0.59	433	0.49	518
60				91	0.98	261	0.73	352
90				91	1.57	163	1.18	216
120	0.00	0.00	0.00	0.091	1.99	128	1.79	143
167.0	0.00	0.00	0.00	0.091	2.40	107	2.34	110
212.0	0.00	0.00	0.00	0.091	2.78	92	2.71	95

**Design Condition*

Worst Case Neutral Final Sag @ 120 Deg. F

Table for Engineering use.

Worst Case Primary Cond. Final Sag @ 212 Deg. F

NESC Medium Loading Case.

Initial Stringing Tension @ 60 Deg. F

Stringing Table Using Initial Sag -- Ruling Span = 150Ft

Special Load Zone -- Max Tension = 835 lb

**Design: 835 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	682	518	463	407	352	301	255	216	185
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100	0- 3	0- 3	0- 3	0- 4	0- 4	0- 5	0- 6	0- 7	0- 8
110	0- 3	0- 4	0- 4	0- 5	0- 5	0- 6	0- 7	0- 8	0- 9
120	0- 3	0- 4	0- 5	0- 5	0- 6	0- 7	0- 8	0-10	0-11
130	0- 4	0- 5	0- 5	0- 6	0- 7	0- 8	0-10	0-11	1- 1
140	0- 4	0- 6	0- 6	0- 7	0- 8	0- 9	0-11	1- 1	1- 3
150	0- 5	0- 6	0- 7	0- 8	0- 9	0-11	1- 1	1- 3	1- 5
160	0- 6								1- 7
170	0- 6								1-10
180	0- 7								2- 0
190	0- 8	0-10	0-11	1- 1	1- 2	1- 5	1- 8	1-11	2- 3
200	0- 9	0-11	1- 0	1- 2	1- 4	1- 7	1-10	2- 2	2- 6

"TRUE" SAG BASED ON 150-FT RULING SPAN. OTHER SPANS ARE APPROXIMATE BASED ON RULING SPAN.

Table for Line Crew use.

Ex: Sag #2 ACSR @ Full Tension, using a 150-FT Ruling Span(RS).
Temp. is 70°F in a 120-FT span.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE DETAILS

SAG TABLES

ACSR

FULL TENSION

DRAWING CODE	WIRE NAME
I-RS150-2-835	SPARROW

Area = 0.0608 Sq. in., Diameter = 0.316 in, Weight = 0.091 lb/G, RTS = 2850 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4.00	0.20	0.581	1.96	835	1.96	835*
32	0.25	0.00	0.00	0.267	1.37	546	1.26	598
0	0.00	0.00	0.00	0.091	0.40	640	0.38	682
15	0.00	0.00	0.00	0.091	0.48	534	0.43	601
30	0.00	0.00	0.00	0.091	0.59	433	0.49	518
60	0.00	0.00	0.00	0.091	0.98	261	0.73	352
90	0.00	0.00	0.00	0.091	1.57	163	1.18	216
120	0.00	0.00	0.00	0.091	1.99	128	1.79	143
167.0	0.00	0.00	0.00	0.091	2.40	107	2.34	110
212.0	0.00	0.00	0.00	0.091	2.78	92	2.71	95

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150Ft

Special Load Zone -- Max Tension = 835 lb

**Design: 835 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	682	518	463	407	352	301	255	216	185
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100	0- 3	0- 3	0- 3	0- 4	0- 4	0- 5	0- 6	0- 7	0- 8
110	0- 3	0- 4	0- 4	0- 5	0- 5	0- 6	0- 7	0- 8	0- 9
120	0- 3	0- 4	0- 5	0- 5	0- 6	0- 7	0- 8	0-10	0-11
130	0- 4	0- 5	0- 5	0- 6	0- 7	0- 8	0-10	0-11	1- 1
140	0- 4	0- 6	0- 6	0- 7	0- 8	0- 9	0-11	1- 1	1- 3
150	0- 5	0- 6	0- 7	0- 8	0- 9	0-11	1- 1	1- 3	1- 5
160	0- 6	0- 7	0- 8	0- 9	0-10	1- 0	1- 2	1- 5	1- 7
170	0- 6	0- 8	0- 9	0-10	1- 0	1- 2	1- 4	1- 7	1-10
180	0- 7	0- 9	0-10	0-11	1- 1	1- 3	1- 6	1- 9	2- 0
190	0- 8	0-10	0-11	1- 1	1- 2	1- 5	1- 8	1-11	2- 3
200	0- 9	0-11	1- 0	1- 2	1- 4	1- 7	1-10	2- 2	2- 6

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN 150-FT
#2 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS150-1/0-985	RAVEN

Area = 0.0968 Sq. in., Diameter = 0.398 in, Weight = 0.145 lb/G, RTS = 4380 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.658	1.88	985	1.88	985*
32.0	0.25	0.00	0.00	0.346	1.53	635	1.41	690
0.0	0.00	0.00	0.00	0.145	0.55	738	0.52	789
15.0	0.00	0.00	0.00	0.145	0.69	588	0.61	672
30.0	0.00	0.00	0.00	0.145	0.89	456	0.73	557
60.0	0.00	0.00	0.00	0.145	1.46	280	1.13	362
90.0	0.00	0.00	0.00	0.145	2.04	200	1.67	244
120.0	0.00	0.00	0.00	0.145	2.33	176	2.21	185
167.0	0.00	0.00	0.00	0.145	2.72	150	2.69	152
212.0	0.00	0.00	0.00	0.145	3.07	133	3.04	134

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150 Ft

Special Load Zone -- Max Tension = 985 lb

**Design: 985lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	788	557	485	419	362	313	274	244	219
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	0- 3	0- 4	0- 5	0- 6	0- 7	0- 7	0- 8	0- 9	0-10
110.0	0- 4	0- 5	0- 6	0- 7	0- 8	0- 9	0-10	0-11	1- 0
120.0	0- 4	0- 6	0- 7	0- 8	0- 9	0-10	1- 0	1- 1	1- 3
130.0	0- 5	0- 7	0- 8	0- 9	0-11	1- 0	1- 2	1- 4	1- 5
140.0	0- 6	0- 8	0- 9	0-11	1- 0	1- 2	1- 4	1- 6	1- 8
150.0	0- 7	0- 9	0-11	1- 0	1- 2	1- 4	1- 6	1- 9	1-11
160.0	0- 8	0-10	1- 0	1- 2	1- 4	1- 6	1- 9	1-11	2- 2
170.0	0- 8	1- 0	1- 1	1- 3	1- 6	1- 9	1-11	2- 2	2- 5
180.0	0- 9	1- 1	1- 3	1- 5	1- 8	1-11	2- 2	2- 5	2- 9
190.0	0-10	1- 3	1- 5	1- 7	1-10	2- 2	2- 5	2- 9	3- 0
200.0	1- 0	1- 4	1- 6	1- 9	2- 1	2- 4	2- 8	3- 0	3- 4

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

DRAWING CODE	WIRE NAME
I-RS150-4/0-1550	PENGUIN

Area = 0.1939 Sq. in., Diameter = 0.563 in, Weight = 0.291 lb/G, RTS = 8350 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.849	1.58	1509	1.54	1550*
32.0	0.25	0.00	0.00	0.544	1.48	1033	1.34	1138
0.0	0.00	0.00	0.00	0.291	0.63	1306	0.59	1396
15.0	0.00	0.00	0.00	0.291	0.80	1023	0.70	1166
30.0	0.00	0.00	0.00	0.291	1.04	789	0.86	950
60.0	0.00	0.00	0.00	0.291	1.63	503	1.33	615
90.0	0.00	0.00	0.00	0.291	2.19	373	1.89	434
120.0	0.00	0.00	0.00	0.291	2.49	329	2.40	341
167.0	0.00	0.00	0.00	0.291	2.88	285	2.84	289
212.0	0.00	0.00	0.00	0.291	3.22	254	3.18	258

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150 Ft

Special Load Zone -- Max Tension = 1550 lb

**Design: 1550 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	1395	950	821	709	615	540	481	434	397
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	0- 4	0- 5	0- 6	0- 7	0- 8	0- 9	0-10	0-11	1- 0
110.0	0- 4	0- 6	0- 7	0- 8	0- 9	0-10	0-11	1- 1	1- 2
120.0	0- 5	0- 7	0- 8	0- 9	0-11	1- 0	1- 2	1- 3	1- 4
130.0	0- 6	0- 8	0- 9	0-11	1- 0	1- 2	1- 4	1- 5	1- 7
140.0	0- 7	0-10	0-11	1- 1	1- 2	1- 4	1- 6	1- 8	1-10
150.0	0- 8	0-11	1- 0	1- 2	1- 4	1- 7	1- 9	1-11	2- 1
160.0	0- 9	1- 0	1- 2	1- 4	1- 7	1- 9	2- 0	2- 2	2- 5
170.0	0-10	1- 2	1- 4	1- 6	1- 9	2- 0	2- 3	2- 6	2- 8
180.0	0-11	1- 3	1- 6	1- 8	1-11	2- 3	2- 6	2- 9	3- 0
190.0	1- 0	1- 5	1- 8	1-11	2- 2	2- 6	2- 9	3- 1	3- 4
200.0	1- 1	1- 7	1-10	2- 1	2- 5	2- 9	3- 1	3- 5	3- 9

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 150 FT
4/0 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS150-336-1980	MERLIN

Area = 0.2789 Sq. in., Diameter = 0.684 in, Weight = 0.365 lb/G, RTS = 8680 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	0.965	1.5	1812	1.37	1980*
32	0.25	0.00	0.00	0.655	1.48	1243	1.27	1454
0	0.00	0.00	0.00	0.365	0.61	1689	0.53	1948
15	0.00	0.00	0.00	0.365	0.8	1286	0.65	1591
30	0.00	0.00	0.00	0.365	1.07	961	0.82	1248
60	0.00	0.00	0.00	0.365	1.74	592	1.39	737
90	0.00	0.00	0.00	0.365	2.35	437	2.05	502
120	0.00	0.00	0.00	0.365	2.88	357	2.62	392
167	0.00	0.00	0.00	0.365	3.36	306	3.32	309
212	0.00	0.00	0.00	0.365	3.64	283	3.6	286

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150 Ft

Special Load Zone -- Max Tension = 1980 lb

**Design: 1980 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	1948	1248	1044	872	737	635	559	501	457
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	0- 3	0- 5	0- 6	0- 7	0- 8	0- 9	0-10	0-11	1- 0
110.0	0- 4	0- 6	0- 7	0- 8	0- 9	0-11	1- 0	1- 2	1- 3
120.0	0- 5	0- 7	0- 8	0-10	0-11	1- 1	1- 3	1- 4	1- 6
130.0	0- 5	0- 8	0- 9	0-11	1- 1	1- 3	1- 5	1- 7	1- 9
140.0	0- 6	0- 9	0-11	1- 1	1- 3	1- 5	1- 8	1-10	2- 0
150.0	0- 7	0-10	1- 0	1- 3	1- 5	1- 8	1-11	2- 1	2- 3
160.0	0- 8	1- 0	1- 2	1- 5	1- 8	1-11	2- 2	2- 4	2- 7
170.0	0- 9	1- 1	1- 4	1- 7	1-10	2- 1	2- 5	2- 8	2-11
180.0	0-10	1- 3	1- 5	1- 9	2- 1	2- 4	2- 8	3- 0	3- 3
190.0	0-11	1- 4	1- 7	1-11	2- 3	2- 8	3- 0	3- 4	3- 8
200.0	1- 0	1- 6	1- 9	2- 2	2- 6	2-11	3- 4	3- 8	4- 0

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 150 FT
336 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS150-477-2200	PELICAN

Area = 0.3955 Sq. in., Diameter = 0.814 in, Weight = 0.518 lb/G, RTS = 11800 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.155	1.62	2003	1.48	2200*
32.0	0.25	0.00	0.00	0.849	1.73	1381	1.52	1573
0.0	0.00	0.00	0.00	0.518	0.82	1785	0.69	2115
15.0	0.00	0.00	0.00	0.518	1.09	1334	0.89	1645
30.0	0.00	0.00	0.00	0.518	1.42	1024	1.16	1257
60.0	0.00	0.00	0.00	0.518	2.08	701	1.82	803
90.0	0.00	0.00	0.00	0.518	2.65	551	2.42	602
120.0	0.00	0.00	0.00	0.518	3.13	466	2.94	496
167.0	0.00	0.00	0.00	0.518	3.57	409	3.54	412
212.0	0.00	0.00	0.00	0.518	3.85	380	3.81	383

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150 Ft

Special Load Zone -- Max Tension = 2200 lb

**Design: 2200 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	2115	1257	1061	913	802	719	654	602	560
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	0- 4	0- 7	0- 8	0- 9	0-10	0-11	1- 0	1- 1	1- 2
110.0	0- 5	0- 8	0- 9	0-11	1- 0	1- 2	1- 3	1- 4	1- 5
120.0	0- 6	0- 9	0-11	1- 1	1- 2	1- 4	1- 6	1- 7	1- 8
130.0	0- 7	0-11	1- 1	1- 3	1- 5	1- 7	1- 9	1-10	2- 0
140.0	0- 8	1- 1	1- 3	1- 5	1- 7	1-10	2- 0	2- 2	2- 4
150.0	0- 9	1- 2	1- 5	1- 8	1-10	2- 1	2- 3	2- 6	2- 8
160.0	0-10	1- 4	1- 7	1-10	2- 1	2- 4	2- 7	2-10	3- 0
170.0	0-11	1- 6	1-10	2- 1	2- 4	2- 8	2-11	3- 2	3- 5
180.0	1- 0	1- 9	2- 0	2- 4	2- 8	3- 0	3- 3	3- 6	3- 9
190.0	1- 2	1-11	2- 3	2- 7	2-11	3- 4	3- 7	3-11	4- 3
200.0	1- 3	2- 1	2- 6	2-11	3- 3	3- 8	4- 0	4- 4	4- 8

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 150 FT
477 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS150-795-3000	COOT

Area = 0.6416 Sq. in., Diameter = 1.040 in, Weight = 0.805 lb/G, RTS = 16800 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.511	1.67	2539	1.42	3000*
32.0	0.25	0.00	0.00	1.206	1.87	1813	1.54	2201
0.0	0.00	0.00	0.00	0.805	0.97	2324	0.74	3049
15.0	0.00	0.00	0.00	0.805	1.29	1753	0.96	2371
30.0	0.00	0.00	0.00	0.805	1.64	1384	1.24	1823
60.0	0.00	0.00	0.00	0.805	2.28	993	1.90	1191
90.0	0.00	0.00	0.00	0.805	2.83	801	2.50	906
120.0	0.00	0.00	0.00	0.805	3.31	686	3.02	751
167.0	0.00	0.00	0.00	0.805	3.95	574	3.71	612
212.0	0.00	0.00	0.00	0.805	4.49	506	4.27	531

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150 Ft

Special Load Zone -- Max Tension = 3049 lb

**Design: 3000 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	3049	1823	1551	1346	1191	1072	979	905	844
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	0- 4	0- 7	0- 8	0- 9	0-11	1- 0	1- 1	1- 2	1- 3
110.0	0- 5	0- 9	0-10	0-11	1- 1	1- 2	1- 3	1- 5	1- 6
120.0	0- 6	0-10	1- 0	1- 1	1- 3	1- 5	1- 6	1- 8	1- 9
130.0	0- 7	1- 0	1- 2	1- 4	1- 6	1- 8	1- 9	1-11	2- 1
140.0	0- 8	1- 1	1- 4	1- 6	1- 8	1-11	2- 1	2- 3	2- 5
150.0	0- 9	1- 3	1- 6	1- 9	1-11	2- 2	2- 4	2- 7	2- 9
160.0	0-11	1- 5	1- 8	1-11	2- 2	2- 5	2- 8	2-11	3- 1
170.0	1- 0	1- 8	1-11	2- 2	2- 6	2- 9	3- 0	3- 3	3- 6
180.0	1- 1	1-10	2- 2	2- 6	2- 9	3- 1	3- 4	3- 8	3-11
190.0	1- 3	2- 0	2- 5	2- 9	3- 1	3- 5	3- 9	4- 1	4- 4
200.0	1- 4	2- 3	2- 8	3- 0	3- 5	3-10	4- 2	4- 6	4-10

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 150 FT
795 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS200-2-835	SPARROW

Area = 0.0608 Sq. in., Diameter = 0.316 in, Weight = 0.091 lb/G, RTS = 2850 lb

Span = 200.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4.00	0.20	0.581	3.48	835	3.48	835*
32	0.25	0.00	0.00	0.267	2.73	489	2.52	530
0	0.00	0.00	0.00	0.091	1.06	430	0.90	506
15	0.00	0.00	0.00	0.091	1.31	347	1.06	429
30	0.00	0.00	0.00	0.091	1.63	279	1.28	356
60	0.00	0.00	0.00	0.091	2.36	193	1.89	241
90	0.00	0.00	0.00	0.091	3.06	149	2.62	174
120	0.00	0.00	0.00	0.091	3.53	129	3.30	138
167.0	0.00	0.00	0.00	0.091	4.00	114	3.93	116
212.0	0.00	0.00	0.00	0.091	4.44	103	4.36	105

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 200 Ft

Special Load Zone -- Max Tension = 835 lb

**Design: 835 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	506	356	312	273	240	213	192	174	160
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
130.0	0- 5	0- 7	0- 8	0- 9	0-10	0-11	1- 1	1- 2	1- 3
140.0	0- 6	0- 8	0- 9	0-10	1- 0	1- 1	1- 2	1- 4	1- 5
150.0	0- 7	0- 9	0-10	1- 0	1- 1	1- 3	1- 5	1- 6	1- 8
160.0	0- 7	0-10	1- 0	1- 1	1- 3	1- 5	1- 7	1- 9	1-10
170.0	0- 8	1- 0	1- 1	1- 3	1- 5	1- 7	1- 9	1-11	2- 1
180.0	0- 9	1- 1	1- 3	1- 5	1- 7	1- 9	2- 0	2- 2	2- 4
190.0	0-10	1- 2	1- 4	1- 7	1- 9	2- 0	2- 2	2- 5	2- 7
200.0	0-11	1- 4	1- 6	1- 8	1-11	2- 2	2- 5	2- 8	2-11
210.0	1- 0	1- 5	1- 8	1-11	2- 2	2- 5	2- 8	2-11	3- 2
220.0	1- 2	1- 7	1-10	2- 1	2- 4	2- 7	2-11	3- 2	3- 6
230.0	1- 3	1- 9	2- 0	2- 3	2- 7	2-10	3- 2	3- 6	3-10
240.0	1- 4	1-11	2- 2	2- 5	2- 9	3- 1	3- 6	3-10	4- 2
250.0	1- 5	2- 0	2- 4	2- 8	3- 0	3- 4	3- 9	4- 2	4- 6
260.0	1- 7	2- 2	2- 6	2-10	3- 3	3- 8	4- 1	4- 6	4-10

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN 200-FT
#2 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS200-1/0-985	RAVEN

Area = 0.0968 Sq. in., Diameter = 0.398 in, Weight = 0.145 lb/G, RTS = 4380 lb

Span = 200.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.658	3.34	985	3.34	985*
32.0	0.25	0.00	0.00	0.346	2.92	594	2.73	634
0.0	0.00	0.00	0.00	0.145	1.46	497	1.26	574
15.0	0.00	0.00	0.00	0.145	1.80	403	1.51	481
30.0	0.00	0.00	0.00	0.145	2.16	336	1.80	403
60.0	0.00	0.00	0.00	0.145	2.88	252	2.46	295
90.0	0.00	0.00	0.00	0.145	3.52	206	3.11	233
120.0	0.00	0.00	0.00	0.145	3.87	188	3.71	196
167.0	0.00	0.00	0.00	0.145	4.33	168	4.29	169
212.0	0.00	0.00	0.00	0.145	4.74	153	4.71	154

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 200 Ft

Special Load Zone -- Max Tension = 985 lb

**Design: 985lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	574	402	360	324	294	270	250	233	218
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
130.0	0- 7	0-10	0-11	1- 0	1- 1	1- 2	1- 3	1- 4	1- 5
140.0	0- 8	0-11	1- 0	1- 2	1- 3	1- 4	1- 6	1- 7	1- 8
150.0	0- 9	1- 1	1- 2	1- 4	1- 5	1- 7	1- 8	1-10	1-11
160.0	0-10	1- 2	1- 4	1- 6	1- 7	1- 9	1-11	2- 0	2- 2
170.0	0-11	1- 4	1- 6	1- 8	1-10	2- 0	2- 2	2- 4	2- 5
180.0	1- 1	1- 6	1- 8	1-10	2- 0	2- 3	2- 5	2- 7	2- 9
190.0	1- 2	1- 8	1-10	2- 1	2- 3	2- 6	2- 8	2-10	3- 0
200.0	1- 4	1-10	2- 1	2- 3	2- 6	2- 9	2-11	3- 2	3- 4
210.0	1- 5	2- 0	2- 3	2- 6	2- 9	3- 0	3- 3	3- 6	3- 8
220.0	1- 7	2- 3	2- 6	2- 9	3- 0	3- 3	3- 7	3-10	4- 1
230.0	1- 9	2- 5	2- 8	3- 0	3- 4	3- 7	3-11	4- 2	4- 5
240.0	1-10	2- 8	2-11	3- 3	3- 7	3-11	4- 3	4- 6	4-10
250.0	2- 0	2-10	3- 2	3- 6	3-11	4- 3	4- 7	4-11	5- 3
260.0	2- 2	3- 1	3- 5	3-10	4- 2	4- 7	4-11	5- 4	5- 8

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 200 FT
1/0 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS200-4/0-1550	PENGUIN

Area = 0.1939 Sq. in., Diameter = 0.563 in, Weight = 0.291 lb/G, RTS = 8350 lb

Span = 200.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.849	2.80	1518	2.74	1550*
32.0	0.25	0.00	0.00	0.544	2.67	1019	2.48	1097
0.0	0.00	0.00	0.00	0.291	1.43	1016	1.28	1136
15.0	0.00	0.00	0.00	0.291	1.76	825	1.53	951
30.0	0.00	0.00	0.00	0.291	2.13	684	1.83	797
60.0	0.00	0.00	0.00	0.291	2.84	512	2.49	585
90.0	0.00	0.00	0.00	0.291	3.49	417	3.14	464
120.0	0.00	0.00	0.00	0.291	3.90	374	3.73	391
167.0	0.00	0.00	0.00	0.291	4.36	335	4.31	338
212.0	0.00	0.00	0.00	0.291	4.77	306	4.73	309

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 200 Ft

Special Load Zone -- Max Tension = 1550 lb

**Design: 1550 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	1136	797	713	643	585	537	497	464	436
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
130.0	0- 7	0-10	0-11	1- 0	1- 1	1- 2	1- 3	1- 4	1- 5
140.0	0- 8	0-11	1- 1	1- 2	1- 3	1- 4	1- 6	1- 7	1- 8
150.0	0- 9	1- 1	1- 2	1- 4	1- 5	1- 7	1- 8	1-10	1-11
160.0	0-10	1- 3	1- 4	1- 6	1- 8	1- 9	1-11	2- 1	2- 2
170.0	1- 0	1- 4	1- 6	1- 8	1-10	2- 0	2- 2	2- 4	2- 5
180.0	1- 1	1- 6	1- 8	1-11	2- 1	2- 3	2- 5	2- 7	2- 9
190.0	1- 2	1- 8	1-11	2- 1	2- 3	2- 6	2- 8	2-10	3- 1
200.0	1- 4	1-10	2- 1	2- 4	2- 6	2- 9	3- 0	3- 2	3- 5
210.0	1- 5	2- 1	2- 4	2- 6	2- 9	3- 0	3- 3	3- 6	3- 9
220.0	1- 7	2- 3	2- 6	2- 9	3- 1	3- 4	3- 7	3-10	4- 1
230.0	1- 9	2- 5	2- 9	3- 0	3- 4	3- 8	3-11	4- 2	4- 6
240.0	1-11	2- 8	3- 0	3- 4	3- 7	3-11	4- 3	4- 7	4-10
250.0	2- 1	2-11	3- 3	3- 7	3-11	4- 3	4- 7	4-11	5- 3
260.0	2- 2	3- 2	3- 6	3-10	4- 3	4- 7	5- 0	5- 4	5- 8

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 200 FT
4/0 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS200-336-1980	MERLIN

Area = 0.2789 Sq. in., Diameter = 0.684 in, Weight = 0.365 lb/G, RTS = 8680 lb

Span = 200.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	0.965	2.63	1835	2.44	1980*
32	0.25	0.00	0.00	0.655	2.61	1257	2.3	1426
0	0.00	0.00	0.00	0.365	1.33	1375	1.09	1667
15	0.00	0.00	0.00	0.365	1.69	1083	1.35	1354
30	0.00	0.00	0.00	0.365	2.09	874	1.68	1088
60	0.00	0.00	0.00	0.365	2.9	631	2.47	741
90	0.00	0.00	0.00	0.365	3.61	506	3.23	566
120	0.00	0.00	0.00	0.365	4.24	431	3.9	468
167	0.00	0.00	0.00	0.365	4.99	367	4.81	380
212	0.00	0.00	0.00	0.365	5.33	343	5.29	346

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 200 Ft

Special Load Zone -- Max Tension = 1980 lb

**Design: 1980 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	1667	1088	945	831	740	669	612	565	527
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
130.0	0- 6	0- 9	0-10	1- 0	1- 1	1- 2	1- 4	1- 5	1- 6
140.0	0- 7	0-10	1- 0	1- 1	1- 3	1- 5	1- 6	1- 7	1- 9
150.0	0- 8	1- 0	1- 2	1- 3	1- 5	1- 7	1- 9	1-10	2- 0
160.0	0- 9	1- 1	1- 3	1- 5	1- 7	1- 9	1-11	2- 1	2- 3
170.0	0-10	1- 3	1- 5	1- 8	1-10	2- 0	2- 2	2- 4	2- 7
180.0	0-11	1- 5	1- 7	1-10	2- 0	2- 3	2- 6	2- 8	2-10
190.0	1- 0	1- 7	1- 9	2- 0	2- 3	2- 6	2- 9	2-11	3- 2
200.0	1- 2	1- 9	2- 0	2- 3	2- 6	2- 9	3- 0	3- 3	3- 6
210.0	1- 3	1-11	2- 2	2- 6	2- 9	3- 1	3- 4	3- 7	3-10
220.0	1- 4	2- 1	2- 5	2- 8	3- 0	3- 4	3- 8	3-11	4- 3
230.0	1- 6	2- 3	2- 7	2-11	3- 4	3- 8	4- 0	4- 4	4- 7
240.0	1- 7	2- 5	2-10	3- 2	3- 7	4- 0	4- 4	4- 8	5- 0
250.0	1- 9	2- 8	3- 1	3- 6	3-11	4- 4	4- 8	5- 1	5- 5
260.0	1-11	2-11	3- 4	3- 9	4- 3	4- 8	5- 1	5- 6	5-11

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 200 FT
336 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS200-477-2200	PELICAN

Area = 0.3955 Sq. in., Diameter = 0.814 in, Weight = 0.518 lb/G, RTS = 11800 lb

Span = 200.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.155	2.84	2032	2.63	2200*
32.0	0.25	0.00	0.00	0.849	2.97	1431	2.68	1586
0.0	0.00	0.00	0.00	0.518	1.79	1450	1.48	1746
15.0	0.00	0.00	0.00	0.518	2.20	1180	1.84	1408
30.0	0.00	0.00	0.00	0.518	2.60	995	2.24	1159
60.0	0.00	0.00	0.00	0.518	3.36	773	3.02	859
90.0	0.00	0.00	0.00	0.518	4.01	646	3.72	698
120.0	0.00	0.00	0.00	0.518	4.60	564	4.34	598
167.0	0.00	0.00	0.00	0.518	5.28	492	5.18	501
212.0	0.00	0.00	0.00	0.518	5.61	463	5.58	466

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 200 Ft

Special Load Zone -- Max Tension = 2200 lb

**Design: 2200 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	1746	1159	1035	937	858	794	741	697	659
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
130.0	0- 8	1- 0	1- 1	1- 3	1- 4	1- 5	1- 6	1- 7	1- 8
140.0	0- 9	1- 2	1- 3	1- 5	1- 6	1- 8	1- 9	1-10	2- 0
150.0	0-11	1- 4	1- 5	1- 7	1- 9	1-11	2- 0	2- 2	2- 3
160.0	1- 0	1- 6	1- 8	1-10	2- 0	2- 2	2- 3	2- 5	2- 7
170.0	1- 1	1- 8	1-10	2- 0	2- 3	2- 5	2- 7	2- 9	2-11
180.0	1- 3	1-10	2- 1	2- 3	2- 6	2- 8	2-10	3- 1	3- 3
190.0	1- 5	2- 1	2- 4	2- 6	2- 9	3- 0	3- 2	3- 5	3- 7
200.0	1- 6	2- 3	2- 7	2-10	3- 1	3- 4	3- 6	3- 9	4- 0
210.0	1- 8	2- 6	2-10	3- 1	3- 4	3- 8	3-11	4- 2	4- 5
220.0	1-10	2- 9	3- 1	3- 5	3- 8	4- 0	4- 3	4- 6	4-10
230.0	2- 0	3- 0	3- 4	3- 8	4- 0	4- 4	4- 8	5- 0	5- 3
240.0	2- 2	3- 3	3- 8	4- 0	4- 5	4- 9	5- 1	5- 5	5- 8
250.0	2- 4	3- 6	3-11	4- 4	4- 9	5- 2	5- 6	5-10	6- 2
260.0	2- 7	3-10	4- 3	4- 9	5- 2	5- 7	5-11	6- 4	6- 8

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 200 FT
477 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS200-795-3000	COOT

Area = 0.6416 Sq. in., Diameter = 1.040 in, Weight = 0.805 lb/G, RTS = 16800 lb

Span = 200.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.511	2.94	2568	2.52	3000*
32.0	0.25	0.00	0.00	1.206	3.17	1902	2.68	2255
0.0	0.00	0.00	0.00	0.805	2.08	1940	1.54	2609
15.0	0.00	0.00	0.00	0.805	2.49	1615	1.91	2114
30.0	0.00	0.00	0.00	0.805	2.90	1391	2.30	1749
60.0	0.00	0.00	0.00	0.805	3.63	1111	3.09	1305
90.0	0.00	0.00	0.00	0.805	4.27	944	3.79	1064
120.0	0.00	0.00	0.00	0.805	4.84	833	4.41	915
167.0	0.00	0.00	0.00	0.805	5.64	716	5.26	767
212.0	0.00	0.00	0.00	0.805	6.31	640	5.97	676

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 200 Ft

Special Load Zone -- Max Tension = 3000 lb

**Design: 3000 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	2609	1748	1566	1421	1304	1209	1130	1063	1006
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
130.0	0- 8	1- 0	1- 2	1- 3	1- 4	1- 5	1- 7	1- 8	1- 9
140.0	0-10	1- 2	1- 4	1- 5	1- 7	1- 8	1- 9	1-11	2- 0
150.0	0-11	1- 4	1- 6	1- 8	1- 9	1-11	2- 1	2- 2	2- 4
160.0	1- 0	1- 6	1- 8	1-10	2- 0	2- 2	2- 4	2- 6	2- 7
170.0	1- 2	1- 8	1-11	2- 1	2- 3	2- 5	2- 7	2- 9	2-11
180.0	1- 3	1-11	2- 1	2- 4	2- 7	2- 9	2-11	3- 1	3- 3
190.0	1- 5	2- 1	2- 4	2- 7	2-10	3- 1	3- 3	3- 6	3- 8
200.0	1- 7	2- 4	2- 7	2-11	3- 2	3- 4	3- 7	3-10	4- 1
210.0	1- 9	2- 7	2-11	3- 2	3- 5	3- 9	4- 0	4- 3	4- 5
220.0	1-11	2-10	3- 2	3- 6	3- 9	4- 1	4- 4	4- 8	4-11
230.0	2- 1	3- 1	3- 5	3- 9	4- 1	4- 5	4- 9	5- 1	5- 4
240.0	2- 3	3- 4	3- 9	4- 1	4- 6	4-10	5- 2	5- 6	5-10
250.0	2- 5	3- 8	4- 1	4- 6	4-10	5- 3	5- 7	6- 0	6- 4
260.0	2- 8	3-11	4- 5	4-10	5- 3	5- 8	6- 1	6- 5	6-10

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 200 FT
795 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS200-1351-4500	COLUMBINE

Area = 1.0620 Sq. in., Diameter = 1.340 in, Weight = 1.269 lb/G, RTS = 23400 lb

Span = 200.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	2.067	2.46	4204	2.30	4500*
32.0	0.25	0.00	0.00	1.763	2.77	3190	2.51	3517
0.0	0.00	0.00	0.00	1.269	1.63	3892	1.45	4374
15.0	0.00	0.00	0.00	1.269	2.05	3090	1.78	3574
30.0	0.00	0.00	0.00	1.269	2.49	2547	2.15	2947
60.0	0.00	0.00	0.00	1.269	3.31	1920	2.95	2155
90.0	0.00	0.00	0.00	1.269	4.02	1581	3.68	1726
120.0	0.00	0.00	0.00	1.269	4.65	1369	4.33	1467
167.0	0.00	0.00	0.00	1.269	5.50	1157	5.22	1218
212.0	0.00	0.00	0.00	1.269	6.22	1024	5.97	1066

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 200 Ft

Special Load Zone -- Max Tension = 4500 lb

**Design: 4500 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	4373	2946	2623	2363	2154	1983	1842	1725	1625
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
130.0	0- 8	0-11	1- 1	1- 2	1- 3	1- 5	1- 6	1- 7	1- 8
140.0	0- 9	1- 1	1- 3	1- 4	1- 6	1- 7	1- 9	1-10	1-11
150.0	0-10	1- 3	1- 5	1- 7	1- 8	1-10	2- 0	2- 1	2- 3
160.0	1- 0	1- 5	1- 7	1- 9	1-11	2- 1	2- 3	2- 5	2- 6
170.0	1- 1	1- 7	1- 9	2- 0	2- 2	2- 4	2- 6	2- 8	2-10
180.0	1- 3	1- 9	2- 0	2- 3	2- 5	2- 8	2-10	3- 0	3- 2
190.0	1- 4	2- 0	2- 3	2- 6	2- 8	2-11	3- 2	3- 4	3- 7
200.0	1- 6	2- 2	2- 6	2- 9	3- 0	3- 3	3- 6	3- 9	3-11
210.0	1- 8	2- 5	2- 9	3- 0	3- 3	3- 7	3-10	4- 1	4- 4
220.0	1-10	2- 8	3- 0	3- 3	3- 7	3-11	4- 3	4- 6	4- 9
230.0	2- 0	2-11	3- 3	3- 7	3-11	4- 3	4- 7	4-11	5- 3
240.0	2- 2	3- 2	3- 6	3-11	4- 3	4- 8	5- 0	5- 4	5- 8
250.0	2- 4	3- 5	3-10	4- 3	4- 8	5- 1	5- 5	5-10	6- 2
260.0	2- 6	3- 8	4- 2	4- 7	5- 0	5- 5	5-10	6- 3	6- 8

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 200 FT
1351 AAC @ FULL TENSION

I-RS200-1351-4500

DRAWING CODE	WIRE NAME
I-RS250-2-835	SPARROW

Area = 0.0608 Sq. in., Diameter = 0.316 in, Weight = 0.091 lb/G, RTS = 2850 lb

Span = 250.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4.00	0.20	0.581	5.45	835	5.45	835*
32	0.25	0.00	0.00	0.267	4.60	454	4.33	483
0	0.00	0.00	0.00	0.091	2.66	268	2.17	327
15	0.00	0.00	0.00	0.091	3.09	230	2.55	278
30	0.00	0.00	0.00	0.091	3.51	203	2.97	240
60	0.00	0.00	0.00	0.091	4.30	166	3.79	188
90	0.00	0.00	0.00	0.091	5.01	142	4.56	156
120	0.00	0.00	0.00	0.091	5.49	130	5.25	136
167.0	0.00	0.00	0.00	0.091	6.01	118	5.94	120
212.0	0.00	0.00	0.00	0.091	6.49	110	6.41	111

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 250 Ft

Special Load Zone -- Max Tension = 835 lb

**Design: 835 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	327	240	219	202	188	175	165	156	148
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
170.0	1- 1	1- 5	1- 6	1- 8	1-10	1-11	2- 0	2- 2	2- 3
180.0	1- 2	1- 7	1- 9	1-10	2- 0	2- 2	2- 3	2- 5	2- 6
190.0	1- 4	1- 9	1-11	2- 1	2- 3	2- 5	2- 6	2- 8	2-10
200.0	1- 5	1-11	2- 1	2- 4	2- 6	2- 8	2-10	2-11	3- 1
210.0	1- 7	2- 2	2- 4	2- 6	2- 9	2-11	3- 1	3- 3	3- 5
220.0	1- 9	2- 4	2- 7	2- 9	3- 0	3- 2	3- 5	3- 7	3- 9
230.0	1-11	2- 7	2- 9	3- 0	3- 3	3- 6	3- 8	3-11	4- 1
240.0	2- 1	2- 9	3- 0	3- 3	3- 6	3- 9	4- 0	4- 3	4- 6
250.0	2- 3	3- 0	3- 3	3- 7	3-10	4- 1	4- 4	4- 7	4-10
260.0	2- 5	3- 3	3- 7	3-10	4- 2	4- 5	4- 8	5- 0	5- 3
270.0	2- 7	3- 6	3-10	4- 2	4- 6	4- 9	5- 1	5- 4	5- 8
280.0	2- 9	3- 9	4- 1	4- 5	4-10	5- 2	5- 5	5- 9	6- 1
290.0	3- 0	4- 0	4- 5	4- 9	5- 2	5- 6	5-10	6- 2	6- 6
300.0	3- 2	4- 4	4- 9	5- 1	5- 6	5-11	6- 3	6- 7	6-11
310.0	3- 5	4- 7	5- 0	5- 5	5-10	6- 3	6- 8	7- 1	7- 5
320.0	3- 7	4-11	5- 4	5-10	6- 3	6- 8	7- 1	7- 6	7-11

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN 250-FT
#2 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS250-1/0-985	RAVEN

Area = 0.0968 Sq. in., Diameter = 0.398 in, Weight = 0.145 lb/G, RTS = 4380 lb

Span = 250.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.658	5.23	985	5.23	985*
32.0	0.25	0.00	0.00	0.346	4.76	570	4.53	598
0.0	0.00	0.00	0.00	0.145	3.19	355	2.80	405
15.0	0.00	0.00	0.00	0.145	3.61	314	3.18	356
30.0	0.00	0.00	0.00	0.145	4.00	283	3.57	318
60.0	0.00	0.00	0.00	0.145	4.74	239	4.31	263
90.0	0.00	0.00	0.00	0.145	5.41	210	4.99	227
120.0	0.00	0.00	0.00	0.145	5.81	195	5.61	202
167.0	0.00	0.00	0.00	0.145	6.31	180	6.28	181
212.0	0.00	0.00	0.00	0.145	6.77	168	6.74	169

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 250 Ft

Special Load Zone -- Max Tension = 985 lb

**Design: 985lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	405	318	297	279	263	250	238	227	218
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
170.0	1- 4	1- 8	1-10	1-11	2- 0	2- 2	2- 3	2- 4	2- 5
180.0	1- 6	1-11	2- 0	2- 2	2- 3	2- 5	2- 6	2- 8	2- 9
190.0	1- 8	2- 1	2- 3	2- 5	2- 6	2- 8	2-10	2-11	3- 1
200.0	1-10	2- 4	2- 6	2- 8	2-10	2-11	3- 1	3- 3	3- 4
210.0	2- 0	2- 7	2- 9	2-11	3- 1	3- 3	3- 5	3- 7	3- 9
220.0	2- 3	2-10	3- 0	3- 2	3- 5	3- 7	3- 9	3-11	4- 1
230.0	2- 5	3- 1	3- 3	3- 6	3- 8	3-11	4- 1	4- 3	4- 5
240.0	2- 7	3- 4	3- 7	3- 9	4- 0	4- 3	4- 5	4- 8	4-10
250.0	2-10	3- 7	3-10	4- 1	4- 4	4- 7	4-10	5- 0	5- 3
260.0	3- 1	3-11	4- 2	4- 5	4- 8	4-11	5- 2	5- 5	5- 8
270.0	3- 4	4- 2	4- 6	4- 9	5- 1	5- 4	5- 7	5-10	6- 1
280.0	3- 7	4- 6	4-10	5- 2	5- 5	5- 9	6- 0	6- 4	6- 7
290.0	3-10	4-10	5- 2	5- 6	5-10	6- 2	6- 5	6- 9	7- 1
300.0	4- 1	5- 2	5- 7	5-11	6- 3	6- 7	6-11	7- 3	7- 6
310.0	4- 4	5- 6	5-11	6- 4	6- 8	7- 0	7- 4	7- 9	8- 1
320.0	4- 8	5-11	6- 4	6- 8	7- 1	7- 6	7-10	8- 3	8- 7

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 250 FT
1/0 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS250-4/0-1550	PENGUIN

Area = 0.1939 Sq. in., Diameter = 0.563 in, Weight = 0.291 lb/G, RTS = 8350 lb

Span = 250.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.849	4.36	1525	4.28	1550*
32.0	0.25	0.00	0.00	0.544	4.21	1011	3.98	1068
0.0	0.00	0.00	0.00	0.291	2.78	818	2.49	913
15.0	0.00	0.00	0.00	0.291	3.21	709	2.87	794
30.0	0.00	0.00	0.00	0.291	3.62	628	3.25	700
60.0	0.00	0.00	0.00	0.291	4.40	517	4.01	568
90.0	0.00	0.00	0.00	0.291	5.10	447	4.72	483
120.0	0.00	0.00	0.00	0.291	5.60	407	5.36	425
167.0	0.00	0.00	0.00	0.291	6.12	372	6.07	375
212.0	0.00	0.00	0.00	0.291	6.59	346	6.54	349

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 250 Ft

Special Load Zone -- Max Tension = 1550 lb

**Design: 1550 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	913	700	648	605	567	535	507	482	461
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
170.0	1- 2	1- 7	1- 8	1- 9	1-11	2- 0	2- 1	2- 3	2- 4
180.0	1- 4	1- 9	1-10	2- 0	2- 1	2- 3	2- 4	2- 6	2- 7
190.0	1- 6	1-11	2- 1	2- 3	2- 4	2- 6	2- 8	2- 9	2-11
200.0	1- 8	2- 1	2- 3	2- 5	2- 7	2- 9	2-11	3- 1	3- 2
210.0	1-10	2- 4	2- 6	2- 8	2-10	3- 0	3- 2	3- 4	3- 6
220.0	2- 0	2- 7	2- 9	2-11	3- 2	3- 4	3- 6	3- 8	3-10
230.0	2- 2	2-10	3- 0	3- 3	3- 5	3- 8	3-10	4- 0	4- 3
240.0	2- 4	3- 0	3- 3	3- 6	3- 9	4- 0	4- 2	4- 5	4- 7
250.0	2- 6	3- 4	3- 7	3-10	4- 1	4- 4	4- 6	4- 9	5- 0
260.0	2- 9	3- 7	3-10	4- 1	4- 5	4- 8	4-11	5- 2	5- 5
270.0	2-11	3-10	4- 2	4- 5	4- 9	5- 0	5- 3	5- 7	5-10
280.0	3- 2	4- 1	4- 5	4- 9	5- 1	5- 4	5- 8	5-11	6- 3
290.0	3- 5	4- 5	4- 9	5- 1	5- 5	5- 9	6- 1	6- 5	6- 8
300.0	3- 8	4- 9	5- 1	5- 5	5-10	6- 2	6- 6	6-10	7- 2
310.0	3-10	5- 0	5- 5	5-10	6- 2	6- 7	6-11	7- 4	7- 8
320.0	4- 1	5- 4	5- 9	6- 2	6- 7	7- 0	7- 5	7- 9	8- 2

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 250 FT
4/0 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS250-336-1980	MERLIN

Area = 0.2789 Sq. in., Diameter = 0.684 in, Weight = 0.365 lb/G, RTS = 8680 lb

Span = 250.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	0.965	4.06	1858	3.81	1980*
32	0.25	0.00	0.00	0.655	4.03	1272	3.65	1406
0	0.00	0.00	0.00	0.365	2.5	1142	2.06	1385
15	0.00	0.00	0.00	0.365	2.98	959	2.47	1154
30	0.00	0.00	0.00	0.365	3.45	827	2.93	975
60	0.00	0.00	0.00	0.365	4.34	658	3.84	743
90	0.00	0.00	0.00	0.365	5.13	557	4.68	610
120	0.00	0.00	0.00	0.365	5.84	490	5.44	526
167	0.00	0.00	0.00	0.365	6.82	419	6.48	441
212	0.00	0.00	0.00	0.365	7.25	395	7.22	396

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 250 Ft

Special Load Zone -- Max Tension = 1980 lb

**Design: 1980 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	1385	975	882	805	743	690	647	609	577
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
170.0	1- 0	1- 5	1- 6	1- 8	1-10	1-11	2- 1	2- 2	2- 4
180.0	1- 1	1- 7	1- 9	1-11	2- 0	2- 2	2- 4	2- 6	2- 7
190.0	1- 3	1- 9	1-11	2- 1	2- 3	2- 5	2- 7	2- 9	2-11
200.0	1- 4	1-11	2- 1	2- 4	2- 6	2- 8	2-10	3- 0	3- 2
210.0	1- 6	2- 1	2- 4	2- 6	2- 9	2-11	3- 2	3- 4	3- 6
220.0	1- 8	2- 4	2- 7	2- 9	3- 0	3- 3	3- 5	3- 8	3-10
230.0	1- 9	2- 6	2- 9	3- 0	3- 4	3- 6	3- 9	4- 0	4- 3
240.0	1-11	2- 9	3- 0	3- 4	3- 7	3-10	4- 1	4- 4	4- 7
250.0	2- 1	3- 0	3- 3	3- 7	3-11	4- 2	4- 5	4- 9	5- 0
260.0	2- 3	3- 2	3- 6	3-10	4- 2	4- 6	4-10	5- 1	5- 5
270.0	2- 5	3- 5	3-10	4- 2	4- 6	4-10	5- 2	5- 6	5-10
280.0	2- 7	3- 9	4- 1	4- 6	4-10	5- 3	5- 7	5-11	6- 3
290.0	2-10	4- 0	4- 5	4-10	5- 3	5- 7	6- 0	6- 4	6- 8
300.0	3- 0	4- 3	4- 8	5- 2	5- 7	6- 0	6- 5	6- 9	7- 2
310.0	3- 2	4- 6	5- 0	5- 6	5-11	6- 5	6-10	7- 3	7- 8
320.0	3- 5	4-10	5- 4	5-10	6- 4	6-10	7- 3	7- 9	8- 2

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 250 FT
336 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS250-477-2200	PELICAN

Area = 0.3955 Sq. in., Diameter = 0.814 in, Weight = 0.518 lb/G, RTS = 11800 lb

Span = 250.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.155	4.38	2062	4.11	2200*
32.0	0.25	0.00	0.00	0.849	4.51	1471	4.16	1594
0.0	0.00	0.00	0.00	0.518	3.20	1264	2.76	1468
15.0	0.00	0.00	0.00	0.518	3.67	1104	3.22	1258
30.0	0.00	0.00	0.00	0.518	4.11	985	3.68	1102
60.0	0.00	0.00	0.00	0.518	4.93	823	4.53	894
90.0	0.00	0.00	0.00	0.518	5.66	717	5.30	765
120.0	0.00	0.00	0.00	0.518	6.32	642	6.00	677
167.0	0.00	0.00	0.00	0.518	7.24	561	6.97	583
212.0	0.00	0.00	0.00	0.518	7.63	532	7.60	535

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 250 Ft

Special Load Zone -- Max Tension = 2200 lb

**Design: 2200 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	1468	1101	1019	951	893	844	801	764	731
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
170.0	1- 4	1- 9	1-11	2- 0	2- 2	2- 3	2- 5	2- 6	2- 7
180.0	1- 6	1-11	2- 1	2- 3	2- 5	2- 6	2- 8	2- 9	2-11
190.0	1- 8	2- 2	2- 4	2- 6	2- 8	2-10	3- 0	3- 1	3- 3
200.0	1-10	2- 5	2- 7	2- 9	2-11	3- 1	3- 3	3- 5	3- 7
210.0	2- 0	2- 8	2-10	3- 1	3- 3	3- 5	3- 7	3- 9	3-11
220.0	2- 2	2-11	3- 1	3- 4	3- 7	3- 9	3-11	4- 2	4- 4
230.0	2- 5	3- 2	3- 5	3- 8	3-11	4- 1	4- 4	4- 6	4- 9
240.0	2- 7	3- 5	3- 8	4- 0	4- 3	4- 6	4- 8	4-11	5- 2
250.0	2-10	3- 9	4- 0	4- 4	4- 7	4-10	5- 1	5- 4	5- 7
260.0	3- 0	4- 0	4- 4	4- 8	4-11	5- 3	5- 6	5- 9	6- 0
270.0	3- 3	4- 4	4- 8	5- 0	5- 4	5- 8	5-11	6- 3	6- 6
280.0	3- 6	4- 8	5- 0	5- 5	5- 9	6- 1	6- 5	6- 8	7- 0
290.0	3- 9	5- 0	5- 5	5- 9	6- 2	6- 6	6-10	7- 2	7- 6
300.0	4- 0	5- 4	5- 9	6- 2	6- 7	6-11	7- 4	7- 8	8- 0
310.0	4- 3	5- 8	6- 2	6- 7	7- 0	7- 5	7-10	8- 2	8- 7
320.0	4- 7	6- 1	6- 7	7- 0	7- 6	7-11	8- 4	8- 9	9- 1

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 250 FT
477 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS250-795-3000	COOT

Area = 0.6416 Sq. in., Diameter = 1.040 in, Weight = 0.805 lb/G, RTS = 16800 lb

Span = 250.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.511	4.51	2620	3.94	3000*
32.0	0.25	0.00	0.00	1.206	4.76	1983	4.12	2291
0.0	0.00	0.00	0.00	0.805	3.55	1771	2.77	2269
15.0	0.00	0.00	0.00	0.805	4.01	1568	3.24	1944
30.0	0.00	0.00	0.00	0.805	4.45	1415	3.70	1703
60.0	0.00	0.00	0.00	0.805	5.25	1201	4.56	1380
90.0	0.00	0.00	0.00	0.805	5.96	1057	5.34	1180
120.0	0.00	0.00	0.00	0.805	6.61	954	6.04	1043
167.0	0.00	0.00	0.00	0.805	7.53	838	7.03	898
212.0	0.00	0.00	0.00	0.805	8.33	759	7.87	803

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 250 Ft

Special Load Zone -- Max Tension = 3000 lb

**Design: 3000 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	2268	1702	1575	1469	1379	1302	1236	1178	1127
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
170.0	1- 4	1- 9	1-11	2- 0	2- 2	2- 3	2- 5	2- 6	2- 7
180.0	1- 6	1-11	2- 1	2- 3	2- 5	2- 7	2- 8	2-10	2-11
190.0	1- 8	2- 2	2- 4	2- 6	2- 8	2-10	3- 0	3- 2	3- 3
200.0	1-10	2- 5	2- 7	2- 9	3- 0	3- 2	3- 4	3- 6	3- 7
210.0	2- 0	2- 8	2-10	3- 1	3- 3	3- 5	3- 8	3-10	4- 0
220.0	2- 2	2-11	3- 2	3- 4	3- 7	3- 9	4- 0	4- 2	4- 4
230.0	2- 5	3- 2	3- 5	3- 8	3-11	4- 2	4- 4	4- 7	4- 9
240.0	2- 7	3- 5	3- 9	4- 0	4- 3	4- 6	4- 9	5- 0	5- 2
250.0	2-10	3- 9	4- 0	4- 4	4- 7	4-10	5- 2	5- 5	5- 7
260.0	3- 0	4- 0	4- 4	4- 8	5- 0	5- 3	5- 7	5-10	6- 1
270.0	3- 3	4- 4	4- 8	5- 0	5- 4	5- 8	6- 0	6- 3	6- 7
280.0	3- 6	4- 8	5- 1	5- 5	5- 9	6- 1	6- 5	6- 9	7- 1
290.0	3- 9	5- 0	5- 5	5-10	6- 2	6- 7	6-11	7- 3	7- 7
300.0	4- 0	5- 4	5-10	6- 3	6- 7	7- 0	7- 4	7- 9	8- 1
310.0	4- 4	5- 9	6- 2	6- 8	7- 1	7- 6	7-10	8- 3	8- 8
320.0	4- 7	6- 1	6- 7	7- 1	7- 6	8- 0	8- 5	8-10	9- 2

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 250 FT
795 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS250-1351-4500	COLUMBINE

Area = 1.0620 Sq. in., Diameter = 1.340 in, Weight = 1.269 lb/G, RTS = 23400 lb

Span = 250.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	2.067	3.85	4195	3.59	4500*
32.0	0.25	0.00	0.00	1.763	4.20	3286	3.84	3592
0.0	0.00	0.00	0.00	1.269	2.89	3428	2.52	3935
15.0	0.00	0.00	0.00	1.269	3.40	2917	2.96	3348
30.0	0.00	0.00	0.00	1.269	3.89	2551	3.42	2897
60.0	0.00	0.00	0.00	1.269	4.79	2074	4.32	2296
90.0	0.00	0.00	0.00	1.269	5.58	1779	5.15	1930
120.0	0.00	0.00	0.00	1.269	6.30	1578	5.89	1687
167.0	0.00	0.00	0.00	1.269	7.30	1363	6.93	1435
212.0	0.00	0.00	0.00	1.269	8.15	1221	7.81	1274

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 250 Ft

Special Load Zone -- Max Tension = 4500 lb

**Design: 4500 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	3934	2896	2658	2460	2294	2153	2032	1927	1836
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
170.0	1- 2	1- 7	1- 9	1-11	2- 0	2- 2	2- 4	2- 5	2- 6
180.0	1- 4	1-10	2- 0	2- 2	2- 3	2- 5	2- 7	2- 9	2-10
190.0	1- 6	2- 0	2- 2	2- 4	2- 6	2- 8	2-10	3- 0	3- 2
200.0	1- 8	2- 3	2- 5	2- 7	2-10	3- 0	3- 2	3- 4	3- 6
210.0	1-10	2- 5	2- 8	2-11	3- 1	3- 4	3- 6	3- 8	3-10
220.0	2- 0	2- 8	2-11	3- 2	3- 5	3- 7	3-10	4- 0	4- 3
230.0	2- 2	2-11	3- 2	3- 5	3- 8	3-11	4- 2	4- 5	4- 7
240.0	2- 4	3- 2	3- 6	3- 9	4- 0	4- 3	4- 6	4- 9	5- 0
250.0	2- 7	3- 6	3- 9	4- 1	4- 4	4- 8	4-11	5- 2	5- 5
260.0	2- 9	3- 9	4- 1	4- 5	4- 9	5- 0	5- 4	5- 7	5-11
270.0	3- 0	4- 0	4- 5	4- 9	5- 1	5- 5	5- 9	6- 1	6- 4
280.0	3- 2	4- 4	4- 9	5- 1	5- 6	5-10	6- 2	6- 6	6-10
290.0	3- 5	4- 8	5- 1	5- 6	5-10	6- 3	6- 7	7- 0	7- 4
300.0	3- 8	5- 0	5- 5	5-10	6- 3	6- 8	7- 1	7- 5	7-10
310.0	3-11	5- 4	5- 9	6- 3	6- 8	7- 2	7- 7	7-11	8- 4
320.0	4- 2	5- 8	6- 2	6- 8	7- 2	7- 7	8- 1	8- 6	8-11

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SAG TABLE
RULING SPAN - 250 FT
1351 AAC @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS300-2-835	SPARROW

Area = 0.0608 Sq. in., Diameter = 0.316 in, Weight = 0.091 lb/G, RTS = 2850 lb

Span = 300.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4.00	0.20	0.581	7.85	835	7.85	835*
32	0.25	0.00	0.00	0.267	6.95	433	6.64	453
0	0.00	0.00	0.00	0.091	5.09	202	4.48	228
15	0.00	0.00	0.00	0.091	5.52	186	4.94	208
30	0.00	0.00	0.00	0.091	5.93	173	5.37	191
60	0.00	0.00	0.00	0.091	6.70	153	6.20	165
90	0.00	0.00	0.00	0.091	7.41	139	6.95	148
120	0.00	0.00	0.00	0.091	7.90	130	7.65	134
167.0	0.00	0.00	0.00	0.091	8.45	122	8.38	123
212.0	0.00	0.00	0.00	0.091	8.96	115	8.88	116

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 300Ft

Special Load Zone -- Max Tension = 835 lb

**Design: 835 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	228	191	181	173	165	159	153	147	142
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
220.0	2- 5	2-11	3- 1	3- 3	3- 4	3- 6	3- 8	3- 9	3-11
230.0	2- 8	3- 2	3- 4	3- 6	3- 8	3-10	4- 0	4- 2	4- 3
240.0	2-11	3- 6	3- 8	3-10	4- 0	4- 2	4- 4	4- 6	4- 8
250.0	3- 2	3- 9	4- 0	4- 2	4- 4	4- 6	4- 8	4-10	5- 0
260.0	3- 5	4- 1	4- 3	4- 6	4- 8	4-11	5- 1	5- 3	5- 5
270.0	3- 8	4- 5	4- 7	4-10	5- 1	5- 3	5- 6	5- 8	5-10
280.0	3-11	4- 9	5- 0	5- 2	5- 5	5- 8	5-11	6- 1	6- 4
290.0	4- 3	5- 1	5- 4	5- 7	5-10	6- 1	6- 4	6- 6	6- 9
300.0	4- 6	5- 5	5- 8	6- 0	6- 3	6- 6	6- 9	7- 0	7- 3
310.0	4-10	5- 9	6- 1	6- 4	6- 8	6-11	7- 2	7- 6	7- 9
320.0	5- 2	6- 2	6- 6	6- 9	7- 1	7- 5	7- 8	7-11	8- 3
330.0	5- 6	6- 7	6-11	7- 3	7- 6	7-10	8- 2	8- 5	8- 9
340.0	5-10	6-11	7- 4	7- 8	8- 0	8- 4	8- 8	9- 0	9- 3
350.0	6- 2	7- 4	7- 9	8- 1	8- 6	8-10	9- 2	9- 6	9-10
360.0	6- 6	7- 9	8- 2	8- 7	9- 0	9- 4	9- 8	10- 1	10- 5
370.0	6-10	8- 3	8- 8	9- 1	9- 6	9-10	10- 3	10- 7	11- 0
380.0	7- 3	8- 8	9- 1	9- 7	10- 0	10- 5	10-10	11- 2	11- 7

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN 300-FT
#2 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS300-1/0-985	RAVEN

Area = 0.0968 Sq. in., Diameter = 0.398 in, Weight = 0.145 lb/G, RTS = 4380 lb

Span = 300.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.658	7.53	985	7.53	985*
32.0	0.25	0.00	0.00	0.346	7.04	555	6.79	575
0.0	0.00	0.00	0.00	0.145	5.50	297	5.06	323
15.0	0.00	0.00	0.00	0.145	5.91	276	5.46	299
30.0	0.00	0.00	0.00	0.145	6.30	259	5.86	279
60.0	0.00	0.00	0.00	0.145	7.04	232	6.60	248
90.0	0.00	0.00	0.00	0.145	7.72	212	7.29	224
120.0	0.00	0.00	0.00	0.145	8.15	201	7.93	206
167.0	0.00	0.00	0.00	0.145	8.69	188	8.66	189
212.0	0.00	0.00	0.00	0.145	9.19	178	9.15	179

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 300 Ft

Special Load Zone -- Max Tension = 985 lb

**Design: 985lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	323	279	267	257	247	239	231	224	217
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
220.0	2- 9	3- 2	3- 4	3- 6	3- 7	3- 9	3-10	4- 0	4- 1
230.0	3- 0	3- 6	3- 8	3- 9	3-11	4- 1	4- 2	4- 4	4- 5
240.0	3- 3	3- 9	3-11	4- 1	4- 3	4- 5	4- 7	4- 8	4-10
250.0	3- 7	4- 1	4- 3	4- 5	4- 7	4- 9	4-11	5- 1	5- 3
260.0	3-10	4- 5	4- 8	4-10	5- 0	5- 2	5- 4	5- 6	5- 8
270.0	4- 2	4- 9	5- 0	5- 2	5- 5	5- 7	5- 9	5-11	6- 1
280.0	4- 5	5- 2	5- 4	5- 7	5- 9	6- 0	6- 2	6- 5	6- 7
290.0	4- 9	5- 6	5- 9	6- 0	6- 2	6- 5	6- 8	6-10	7- 1
300.0	5- 1	5-11	6- 2	6- 5	6- 8	6-10	7- 1	7- 4	7- 7
310.0	5- 5	6- 4	6- 7	6-10	7- 1	7- 4	7- 7	7-10	8- 1
320.0	5-10	6- 8	7- 0	7- 3	7- 7	7-10	8- 1	8- 4	8- 7
330.0	6- 2	7- 2	7- 5	7- 9	8- 0	8- 4	8- 7	8-10	9- 2
340.0	6- 6	7- 7	7-11	8- 2	8- 6	8-10	9- 1	9- 5	9- 8
350.0	6-11	8- 0	8- 4	8- 8	9- 0	9- 4	9- 8	10- 0	10- 3
360.0	7- 4	8- 6	8-10	9- 2	9- 7	9-11	10- 3	10- 6	10-10
370.0	7- 9	8-11	9- 4	9- 9	10- 1	10- 5	10- 9	11- 2	11- 6
380.0	8- 2	9- 5	9-10	10- 3	10- 8	11- 0	11- 5	11- 9	12- 1

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 300 FT
1/0 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS300-4/0-1550	PENGUIN

Area = 0.1939 Sq. in., Diameter = 0.563 in, Weight = 0.291 lb/G, RTS = 8350 lb

Span = 300.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.849	6.25	1530	6.17	1550*
32.0	0.25	0.00	0.00	0.544	6.09	1006	5.84	1049
0.0	0.00	0.00	0.00	0.291	4.61	712	4.24	773
15.0	0.00	0.00	0.00	0.291	5.06	648	4.67	702
30.0	0.00	0.00	0.00	0.291	5.49	597	5.09	645
60.0	0.00	0.00	0.00	0.291	6.29	521	5.88	557
90.0	0.00	0.00	0.00	0.291	7.03	466	6.63	495
120.0	0.00	0.00	0.00	0.291	7.61	431	7.32	449
167.0	0.00	0.00	0.00	0.291	8.18	402	8.13	404
212.0	0.00	0.00	0.00	0.291	8.69	378	8.64	380

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 300 Ft

Special Load Zone -- Max Tension = 1550 lb

**Design: 1550 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	773	644	611	582	557	534	513	494	477
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
220.0	2- 4	2- 9	2-11	3- 1	3- 2	3- 4	3- 6	3- 7	3- 9
230.0	2- 6	3- 0	3- 2	3- 4	3- 6	3- 8	3-10	3-11	4- 1
240.0	2- 9	3- 4	3- 6	3- 8	3-10	4- 0	4- 2	4- 3	4- 5
250.0	3- 0	3- 7	3- 9	3-11	4- 2	4- 4	4- 6	4- 8	4-10
260.0	3- 3	3-10	4- 1	4- 3	4- 6	4- 8	4-10	5- 0	5- 2
270.0	3- 6	4- 2	4- 5	4- 7	4-10	5- 0	5- 3	5- 5	5- 7
280.0	3- 9	4- 6	4- 9	4-11	5- 2	5- 5	5- 7	5-10	6- 0
290.0	4- 0	4-10	5- 1	5- 4	5- 6	5- 9	6- 0	6- 3	6- 5
300.0	4- 3	5- 2	5- 5	5- 8	5-11	6- 2	6- 5	6- 8	6-11
310.0	4- 7	5- 6	5- 9	6- 1	6- 4	6- 7	6-10	7- 1	7- 4
320.0	4-10	5-10	6- 2	6- 5	6- 9	7- 0	7- 4	7- 7	7-10
330.0	5- 2	6- 2	6- 6	6-10	7- 2	7- 6	7- 9	8- 1	8- 4
340.0	5- 6	6- 7	6-11	7- 3	7- 7	7-11	8- 3	8- 7	8-10
350.0	5-10	7- 0	7- 4	7- 8	8- 1	8- 5	8- 9	9- 1	9- 5
360.0	6- 2	7- 4	7- 9	8- 2	8- 6	8-11	9- 3	9- 7	9-11
370.0	6- 6	7- 9	8- 2	8- 7	9- 0	9- 5	9- 9	10- 1	10- 6
380.0	6-10	8- 2	8- 8	9- 1	9- 6	9-11	10- 3	10- 8	11- 1

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 300 FT
4/0 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS300-336-1980	MERLIN

Area = 0.2789 Sq. in., Diameter = 0.684 in, Weight = 0.365 lb/G, RTS = 8680 lb

Span = 300.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.965	5.79	1879	5.49	1980*
32.0	0.25	0.00	0.00	0.655	5.75	1285	5.31	1391
0.0	0.00	0.00	0.00	0.365	4.09	1004	3.51	1172
15.0	0.00	0.00	0.00	0.365	4.62	889	4.02	1021
30.0	0.00	0.00	0.00	0.365	5.13	802	4.54	905
60.0	0.00	0.00	0.00	0.365	6.07	678	5.52	745
90.0	0.00	0.00	0.00	0.365	6.91	595	6.42	641
120.0	0.00	0.00	0.00	0.365	7.69	536	7.23	569
167.0	0.00	0.00	0.00	0.365	8.78	469	8.38	491
212.0	0.00	0.00	0.00	0.365	9.41	438	9.37	440

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 300 Ft

Special Load Zone -- Max Tension = 1980 lb

**Design: 1980 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	1172	905	842	789	744	705	670	640	613
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
220.0	1-11	2- 6	2- 8	2-10	3- 0	3- 2	3- 4	3- 6	3- 8
230.0	2- 1	2- 9	2-11	3- 1	3- 3	3- 6	3- 8	3-10	4- 0
240.0	2- 3	2-11	3- 2	3- 4	3- 7	3- 9	4- 0	4- 2	4- 4
250.0	2- 6	3- 2	3- 5	3- 8	3-11	4- 1	4- 4	4- 6	4- 8
260.0	2- 8	3- 5	3- 8	3-11	4- 2	4- 5	4- 8	4-10	5- 1
270.0	2-11	3- 9	4- 0	4- 3	4- 6	4- 9	5- 0	5- 3	5- 6
280.0	3- 1	4- 0	4- 3	4- 7	4-10	5- 1	5- 5	5- 8	5-11
290.0	3- 4	4- 3	4- 7	4-11	5- 2	5- 6	5- 9	6- 0	6- 4
300.0	3- 7	4- 7	4-11	5- 3	5- 7	5-10	6- 2	6- 6	6- 9
310.0	3- 9	4-11	5- 3	5- 7	5-11	6- 3	6- 7	6-11	7- 2
320.0	4- 0	5- 2	5- 7	6- 0	6- 4	6- 8	7- 0	7- 4	7- 8
330.0	4- 3	5- 6	5-11	6- 4	6- 9	7- 1	7- 6	7-10	8- 2
340.0	4- 7	5-10	6- 4	6- 9	7- 2	7- 6	7-11	8- 3	8- 8
350.0	4-10	6- 3	6- 8	7- 2	7- 7	8- 0	8- 5	8- 9	9- 2
360.0	5- 1	6- 7	7- 1	7- 6	8- 0	8- 5	8-10	9- 3	9- 8
370.0	5- 4	6-11	7- 6	8- 0	8- 5	8-11	9- 4	9-10	10- 3
380.0	5- 8	7- 4	7-10	8- 5	8-11	9- 5	9-11	10- 4	10-10

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 300 FT
336 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS300-477-2200	PELICAN

Area = 0.3955 Sq. in., Diameter = 0.814 in, Weight = 0.518 lb/G, RTS = 11800 lb

Span = 300.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.155	6.24	2087	5.92	2200*
32.0	0.25	0.00	0.00	0.849	6.37	1501	5.98	1600
0.0	0.00	0.00	0.00	0.518	5.00	1168	4.48	1302
15.0	0.00	0.00	0.00	0.518	5.48	1064	4.98	1171
30.0	0.00	0.00	0.00	0.518	5.95	982	5.46	1068
60.0	0.00	0.00	0.00	0.518	6.80	858	6.36	917
90.0	0.00	0.00	0.00	0.518	7.59	770	7.19	813
120.0	0.00	0.00	0.00	0.518	8.31	704	7.94	736
167.0	0.00	0.00	0.00	0.518	9.34	627	9.01	649
212.0	0.00	0.00	0.00	0.518	9.90	591	9.87	593

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 300 Ft

Special Load Zone -- Max Tension = 2200 lb

**Design: 2200 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	1302	1067	1010	960	916	877	843	812	784
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
220.0	2- 5	3- 0	3- 2	3- 4	3- 6	3- 7	3- 9	3-11	4- 1
230.0	2- 8	3- 3	3- 5	3- 7	3- 9	3-11	4- 1	4- 3	4- 5
240.0	2-11	3- 6	3- 9	3-11	4- 1	4- 4	4- 6	4- 8	4-10
250.0	3- 2	3-10	4- 1	4- 3	4- 6	4- 8	4-10	5- 0	5- 3
260.0	3- 5	4- 2	4- 5	4- 7	4-10	5- 0	5- 3	5- 5	5- 8
270.0	3- 8	4- 6	4- 9	5- 0	5- 2	5- 5	5- 8	5-10	6- 1
280.0	3-11	4-10	5- 1	5- 4	5- 7	5-10	6- 1	6- 4	6- 6
290.0	4- 3	5- 2	5- 5	5- 9	6- 0	6- 3	6- 6	6- 9	7- 0
300.0	4- 6	5- 6	5-10	6- 1	6- 5	6- 8	7- 0	7- 3	7- 6
310.0	4-10	5-11	6- 2	6- 6	6-10	7- 2	7- 5	7- 9	8- 0
320.0	5- 2	6- 3	6- 7	6-11	7- 3	7- 7	7-11	8- 3	8- 6
330.0	5- 6	6- 8	7- 0	7- 5	7- 9	8- 1	8- 5	8- 9	9- 1
340.0	5-10	7- 1	7- 6	7-10	8- 3	8- 7	8-11	9- 3	9- 7
350.0	6- 2	7- 6	7-11	8- 4	8- 8	9- 1	9- 6	9-10	10- 2
360.0	6- 6	7-11	8- 4	8- 9	9- 3	9- 7	10- 0	10- 5	10- 9
370.0	6-10	8- 4	8-10	9- 3	9- 9	10- 2	10- 7	11- 0	11- 4
380.0	7- 3	8-10	9- 4	9- 9	10- 3	10- 9	11- 2	11- 7	12- 0

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 300 FT
477 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS300-795-3000	COOT

Area = 0.6416 Sq. in., Diameter = 1.040 in, Weight = 0.805 lb/G, RTS = 16800 lb

Span = 300.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.511	6.37	2673	5.67	3000*
32.0	0.25	0.00	0.00	1.206	6.63	2050	5.87	2316
0.0	0.00	0.00	0.00	0.805	5.36	1692	4.41	2054
15.0	0.00	0.00	0.00	0.805	5.84	1553	4.93	1841
30.0	0.00	0.00	0.00	0.805	6.29	1441	5.42	1674
60.0	0.00	0.00	0.00	0.805	7.14	1271	6.34	1432
90.0	0.00	0.00	0.00	0.805	7.92	1147	7.17	1265
120.0	0.00	0.00	0.00	0.805	8.63	1053	7.94	1143
167.0	0.00	0.00	0.00	0.805	9.66	941	9.04	1006
212.0	0.00	0.00	0.00	0.805	10.56	862	9.98	911

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 300 Ft

Special Load Zone -- Max Tension = 3000 lb

**Design: 3000 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	2052	1672	1580	1500	1430	1368	1313	1263	1219
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
220.0	2- 5	2-11	3- 1	3- 3	3- 5	3- 7	3- 9	3-11	4- 0
230.0	2- 8	3- 3	3- 5	3- 7	3- 9	3-11	4- 1	4- 3	4- 5
240.0	2-10	3- 6	3- 9	3-11	4- 1	4- 3	4- 6	4- 8	4-10
250.0	3- 1	3-10	4- 0	4- 3	4- 5	4- 8	4-10	5- 0	5- 2
260.0	3- 4	4- 1	4- 4	4- 7	4-10	5- 0	5- 3	5- 5	5- 8
270.0	3- 7	4- 5	4- 8	4-11	5- 2	5- 5	5- 8	5-10	6- 1
280.0	3-11	4- 9	5- 0	5- 4	5- 7	5-10	6- 1	6- 3	6- 6
290.0	4- 2	5- 1	5- 5	5- 8	6- 0	6- 3	6- 6	6- 9	7- 0
300.0	4- 5	5- 6	5- 9	6- 1	6- 5	6- 8	6-11	7- 3	7- 6
310.0	4- 9	5-10	6- 2	6- 6	6-10	7- 1	7- 5	7- 8	8- 0
320.0	5- 1	6- 2	6- 7	6-11	7- 3	7- 7	7-11	8- 2	8- 6
330.0	5- 5	6- 7	7- 0	7- 4	7- 9	8- 1	8- 5	8- 9	9- 1
340.0	5- 9	7- 0	7- 5	7-10	8- 2	8- 7	8-11	9- 3	9- 7
350.0	6- 1	7- 5	7-10	8- 3	8- 8	9- 1	9- 5	9-10	10- 2
360.0	6- 5	7-10	8- 4	8- 9	9- 2	9- 7	10- 0	10- 5	10- 9
370.0	6- 9	8- 3	8- 9	9- 3	9- 8	10- 1	10- 7	11- 0	11- 4
380.0	7- 1	8- 9	9- 3	9- 9	10- 3	10- 8	11- 1	11- 7	12- 0

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 300 FT
795 ACSR @ FULL TENSION

DRAWING CODE	WIRE NAME
I-RS300-1351-4500	COLUMBINE

Area = 1.0620 Sq. in., Diameter = 1.340 in, Weight = 1.269 lb/G, RTS = 23400 lb

Span = 300.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	2.067	5.52	4215	5.17	4500*
32.0	0.25	0.00	0.00	1.763	5.89	3371	5.45	3645
0.0	0.00	0.00	0.00	1.269	4.49	3180	3.96	3609
15.0	0.00	0.00	0.00	1.269	5.04	2835	4.48	3191
30.0	0.00	0.00	0.00	1.269	5.56	2571	4.99	2864
60.0	0.00	0.00	0.00	1.269	6.52	2194	5.97	2396
90.0	0.00	0.00	0.00	1.269	7.39	1938	6.86	2085
120.0	0.00	0.00	0.00	1.269	8.18	1751	7.68	1863
167.0	0.00	0.00	0.00	1.269	9.30	1541	8.84	1620
212.0	0.00	0.00	0.00	1.269	10.27	1397	9.85	1456

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 300 Ft

Special Load Zone -- Max Tension = 4500 lb

**Design: 4500 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	3607	2862	2682	2528	2394	2277	2174	2082	2000
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
220.0	2- 2	2- 9	2-11	3- 1	3- 3	3- 5	3- 7	3- 9	3-11
230.0	2- 4	3- 0	3- 2	3- 4	3- 7	3- 9	3-11	4- 1	4- 3
240.0	2- 7	3- 3	3- 5	3- 8	3-10	4- 1	4- 3	4- 5	4- 7
250.0	2- 9	3- 6	3- 9	4- 0	4- 2	4- 5	4- 7	4-10	5- 0
260.0	3- 0	3- 9	4- 0	4- 3	4- 6	4- 9	5- 0	5- 2	5- 5
270.0	3- 3	4- 1	4- 4	4- 7	4-10	5- 1	5- 4	5- 7	5-10
280.0	3- 6	4- 5	4- 8	5- 0	5- 3	5- 6	5- 9	6- 0	6- 3
290.0	3- 9	4- 8	5- 0	5- 4	5- 7	5-11	6- 2	6- 5	6- 9
300.0	4- 0	5- 0	5- 4	5- 8	6- 0	6- 4	6- 7	6-11	7- 2
310.0	4- 3	5- 4	5- 9	6- 1	6- 5	6- 9	7- 1	7- 4	7- 8
320.0	4- 7	5- 9	6- 1	6- 6	6-10	7- 2	7- 6	7-10	8- 2
330.0	4-10	6- 1	6- 6	6-11	7- 3	7- 8	8- 0	8- 4	8- 8
340.0	5- 2	6- 5	6-11	7- 4	7- 8	8- 1	8- 6	8-10	9- 3
350.0	5- 5	6-10	7- 3	7- 9	8- 2	8- 7	9- 0	9- 5	9- 9
360.0	5- 9	7- 3	7- 9	8- 2	8- 8	9- 1	9- 6	9-11	10- 4
370.0	6- 1	7- 8	8- 2	8- 8	9- 1	9- 7	10- 1	10- 6	10-11
380.0	6- 5	8- 1	8- 7	9- 1	9- 7	10- 1	10- 7	11- 1	11- 6

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 300 FT
1351 AAC @ FULL TENSION

SAG TABLES

ACSR

REDUCED TENSION

DRAWING CODE	WIRE NAME
I-RS100-2-417	SPARROW

Area = 0.0608 Sq. in., Diameter = 0.316 in, Weight = 0.091 lb/G, RTS = 2850 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.581	1.74	417	1.74	417*
32.0	0.25	0.00	0.00	0.267	1.61	207	1.57	213
0.0	0.00	0.00	0.00	0.091	0.92	123	0.84	136
15.0	0.00	0.00	0.00	0.091	1.16	98	1.06	107
30.0	0.00	0.00	0.00	0.091	1.36	84	1.28	89
60.0	0.00	0.00	0.00	0.091	1.72	66	1.66	69
90.0	0.00	0.00	0.00	0.091	1.99	57	1.96	58
120.0	0.00	0.00	0.00	0.091	2.15	53	2.12	54
167.0	0.00	0.00	0.00	0.091	2.38	48	2.35	49
212.0	0.00	0.00	0.00	0.091	2.59	44	2.56	45

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100Ft

Special Load Zone -- Max Tension = 417 lb

**Design: 417 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	136	89	81	74	69	64	61	58	56
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
60.0	0- 4	0- 6	0- 7	0- 7	0- 8	0- 8	0- 9	0- 9	0- 9
70.0	0- 5	0- 8	0- 9	0-10	0-10	0-11	1- 0	1- 0	1- 0
80.0	0- 7	0-10	0-11	1- 0	1- 1	1- 2	1- 3	1- 4	1- 4
90.0	0- 9	1- 1	1- 2	1- 3	1- 5	1- 6	1- 7	1- 8	1- 8
100.0	0-11	1- 4	1- 5	1- 7	1- 8	1-10	1-11	2- 0	2- 1
110.0	1- 1	1- 7	1- 9	1-11	2- 1	2- 2	2- 4	2- 5	2- 6
120.0	1- 3	1-11	2- 1	2- 3	2- 5	2- 7	2- 9	2-10	2-11
130.0	1- 5	2- 2	2- 5	2- 8	2-10	3- 0	3- 3	3- 4	3- 5

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN 100-FT
#2 ACSR @ REDUCED TENSION

DRAWING CODE	WIRE NAME
I-RS100-1/0-492	RAVEN

Area = 0.0968 Sq. in., Diameter = 0.398 in, Weight = 0.145 lb/G, RTS = 4380 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.658	1.69	486	1.67	492*
32.0	0.25	0.00	0.00	0.346	1.66	261	1.59	272
0.0	0.00	0.00	0.00	0.145	1.08	168	0.95	190
15.0	0.00	0.00	0.00	0.145	1.30	140	1.18	154
30.0	0.00	0.00	0.00	0.145	1.49	122	1.38	132
60.0	0.00	0.00	0.00	0.145	1.82	100	1.72	106
90.0	0.00	0.00	0.00	0.145	2.05	88	2.01	90
120.0	0.00	0.00	0.00	0.145	2.21	82	2.19	83
167.0	0.00	0.00	0.00	0.145	2.44	75	2.42	75
212.0	0.00	0.00	0.00	0.145	2.64	69	2.62	69

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 492 lb

**Design: 492lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	190	132	121	113	106	100	95	90	87
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
60.0	0- 5	0- 6	0- 7	0- 7	0- 8	0- 8	0- 9	0- 9	0-10
70.0	0- 6	0- 9	0- 9	0-10	0-11	0-11	1- 0	1- 0	1- 1
80.0	0- 8	0-11	1- 0	1- 1	1- 2	1- 2	1- 3	1- 4	1- 5
90.0	0-10	1- 2	1- 3	1- 4	1- 5	1- 6	1- 7	1- 8	1- 9
100.0	1- 0	1- 5	1- 6	1- 8	1- 9	1-10	2- 0	2- 1	2- 2
110.0	1- 2	1- 8	1-10	2- 0	2- 1	2- 3	2- 4	2- 6	2- 7
120.0	1- 5	2- 0	2- 2	2- 4	2- 6	2- 8	2-10	2-11	3- 1
130.0	1- 8	2- 4	2- 7	2- 9	2-11	3- 1	3- 3	3- 5	3- 7

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 100 FT
1/0 ACSR @ REDUCED TENSION

DRAWING CODE	WIRE NAME
I-RS100-4/0-775	PENGUIN

Area = 0.1939 Sq. in., Diameter = 0.563 in, Weight = 0.291 lb/G, RTS = 8350 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.849	1.42	749	1.37	775*
32.0	0.25	0.00	0.00	0.544	1.48	460	1.39	488
0.0	0.00	0.00	0.00	0.291	0.91	400	0.80	453
15.0	0.00	0.00	0.00	0.291	1.13	321	1.01	359
30.0	0.00	0.00	0.00	0.291	1.34	272	1.22	299
60.0	0.00	0.00	0.00	0.291	1.70	215	1.58	230
90.0	0.00	0.00	0.00	0.291	1.95	187	1.90	192
120.0	0.00	0.00	0.00	0.291	2.11	173	2.09	174
167.0	0.00	0.00	0.00	0.291	2.34	156	2.32	157
212.0	0.00	0.00	0.00	0.291	2.55	143	2.53	144

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 775 lb

**Design: 775 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	453	299	270	248	230	215	203	192	184
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
60.0	0- 4	0- 6	0- 6	0- 7	0- 7	0- 8	0- 8	0- 9	0- 9
70.0	0- 5	0- 8	0- 8	0- 9	0-10	0-10	0-11	1- 0	1- 0
80.0	0- 7	0-10	0-11	1- 0	1- 1	1- 1	1- 2	1- 3	1- 4
90.0	0- 8	1- 0	1- 2	1- 3	1- 4	1- 5	1- 6	1- 7	1- 8
100.0	0-10	1- 3	1- 5	1- 6	1- 7	1- 9	1-10	1-11	2- 0
110.0	1- 0	1- 6	1- 8	1-10	1-11	2- 1	2- 3	2- 4	2- 5
120.0	1- 2	1-10	2- 0	2- 2	2- 4	2- 6	2- 8	2- 9	2-11
130.0	1- 5	2- 1	2- 4	2- 6	2- 9	2-11	3- 1	3- 3	3- 5

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 100 FT
4/0 ACSR @ REDUCED TENSION

DRAWING CODE	WIRE NAME
I-RS100-336-990	MERLIN

Area = 0.2789 Sq. in., Diameter = 0.684 in, Weight = 0.365 lb/G, RTS = 8680 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4.00	0.20	0.965	1.28	943	1.22	990*
32	0.25	0.00	0.00	0.655	1.39	592	1.31	628
0	0.00	0.00	0.00	0.365	0.73	622	0.64	716
15	0.00	0.00	0.00	0.365	0.99	460	0.88	516
30	0.00	0.00	0.00	0.365	1.24	369	1.14	402
60	0.00	0.00	0.00	0.365	1.65	276	1.57	290
90	0.00	0.00	0.00	0.365	2.00	228	1.94	236
120	0.00	0.00	0.00	0.365	2.26	203	2.23	205
167	0.00	0.00	0.00	0.365	2.46	186	2.44	188
212	0.00	0.00	0.00	0.365	2.65	173	2.63	174

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 990 lb

**Design: 990 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	733	408	357	321	293	270	252	237	225
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
60.0	0- 3	0- 5	0- 6	0- 7	0- 7	0- 8	0- 8	0- 9	0- 9
70.0	0- 4	0- 7	0- 8	0- 9	0-10	0-10	0-11	1- 0	1- 0
80.0	0- 5	0- 9	0-10	0-11	1- 0	1- 1	1- 2	1- 3	1- 4
90.0	0- 7	0-11	1- 1	1- 2	1- 4	1- 5	1- 6	1- 7	1- 8
100.0	0- 8	1- 2	1- 4	1- 6	1- 7	1- 9	1-10	2- 0	2- 1
110.0	0-10	1- 5	1- 7	1- 9	1-11	2- 1	2- 3	2- 4	2- 6
120.0	0-11	1- 8	1-11	2- 1	2- 3	2- 6	2- 8	2-10	3- 0
130.0	1- 1	1-11	2- 2	2- 5	2- 8	2-11	3- 1	3- 4	3- 6

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 100 FT
336 ACSR @ REDUCED TENSION

DRAWING CODE	WIRE NAME
I-RS100-477-1100	PELICAN

Area = 0.3955 Sq. in., Diameter = 0.814 in, Weight = 0.518 lb/G, RTS = 11800 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.155	1.38	1049	1.31	1100*
32.0	0.25	0.00	0.00	0.849	1.52	698	1.45	732
0.0	0.00	0.00	0.00	0.518	0.94	690	0.84	768
15.0	0.00	0.00	0.00	0.518	1.19	545	1.10	591
30.0	0.00	0.00	0.00	0.518	1.41	459	1.33	487
60.0	0.00	0.00	0.00	0.518	1.80	360	1.73	374
90.0	0.00	0.00	0.00	0.518	2.13	305	2.07	313
120.0	0.00	0.00	0.00	0.518	2.36	275	2.34	278
167.0	0.00	0.00	0.00	0.518	2.56	254	2.54	256
212.0	0.00	0.00	0.00	0.518	2.74	237	2.72	239

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 1100 lb

**Design: 1100 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	768	487	440	403	374	350	330	313	298
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50.0	0- 3	0- 4	0- 5	0- 5	0- 6	0- 6	0- 6	0- 7	0- 7
60.0	0- 4	0- 6	0- 7	0- 7	0- 8	0- 8	0- 9	0- 9	0-10
70.0	0- 5	0- 8	0- 9	0-10	0-11	0-11	1- 0	1- 1	1- 1
80.0	0- 7	0-11	1- 0	1- 1	1- 2	1- 3	1- 4	1- 4	1- 5
90.0	0- 9	1- 1	1- 3	1- 4	1- 5	1- 6	1- 8	1- 9	1-10
100.0	0-11	1- 4	1- 6	1- 8	1- 9	1-11	2- 0	2- 1	2- 3
110.0	1- 1	1- 8	1-10	2- 0	2- 2	2- 3	2- 5	2- 7	2- 8
120.0	1- 3	1-11	2- 2	2- 4	2- 6	2- 8	2-10	3- 0	3- 2
130.0	1- 6	2- 3	2- 6	2- 9	3- 0	3- 2	3- 4	3- 7	3- 9
140.0	1- 8	2- 8	2-11	3- 2	3- 5	3- 8	3-11	4- 1	4- 4
150.0	1-11	3- 0	3- 4	3- 8	3-11	4- 3	4- 6	4- 8	4-11

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 100 FT
477 ACSR @ REDUCED TENSION

I-RS100-477-1100

DRAWING CODE	WIRE NAME
I-RS100-795-1500	COOT

Area = 0.6416 Sq. in., Diameter = 1.040 in, Weight = 0.805 lb/G, RTS = 16800 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.511	1.28	1473	1.26	1500*
32.0	0.25	0.00	0.00	1.206	1.46	1031	1.43	1053
0.0	0.00	0.00	0.00	0.805	0.87	1157	0.83	1208
15.0	0.00	0.00	0.00	0.805	1.13	892	1.09	925
30.0	0.00	0.00	0.00	0.805	1.36	738	1.33	759
60.0	0.00	0.00	0.00	0.805	1.77	570	1.74	581
90.0	0.00	0.00	0.00	0.805	2.11	478	2.08	485
120.0	0.00	0.00	0.00	0.805	2.40	420	2.38	424
167.0	0.00	0.00	0.00	0.805	2.81	359	2.79	362
212.0	0.00	0.00	0.00	0.805	3.15	320	3.13	323

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 1500 lb

**Design: 1500 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	1208	759	684	626	580	543	511	484	461
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50.0	0- 3	0- 4	0- 5	0- 5	0- 6	0- 6	0- 6	0- 7	0- 7
60.0	0- 4	0- 6	0- 7	0- 7	0- 8	0- 9	0- 9	0- 9	0-10
70.0	0- 5	0- 8	0- 9	0-10	0-11	0-11	1- 0	1- 1	1- 1
80.0	0- 7	0-11	1- 0	1- 1	1- 2	1- 3	1- 4	1- 4	1- 5
90.0	0- 9	1- 1	1- 3	1- 4	1- 5	1- 7	1- 8	1- 9	1-10
100.0	0-10	1- 4	1- 6	1- 8	1- 9	1-11	2- 0	2- 1	2- 3
110.0	1- 1	1- 8	1-10	2- 0	2- 2	2- 3	2- 5	2- 7	2- 8
120.0	1- 3	1-11	2- 2	2- 4	2- 6	2- 9	2-11	3- 0	3- 2
130.0	1- 5	2- 3	2- 6	2- 9	3- 0	3- 2	3- 4	3- 7	3- 9
140.0	1- 8	2- 8	2-11	3- 2	3- 5	3- 8	3-11	4- 1	4- 4
150.0	1-11	3- 0	3- 4	3- 8	3-11	4- 3	4- 6	4- 9	4-11

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 100 FT
795 ACSR @ REDUCED TENSION

I-RS100-795-1500

DRAWING CODE	WIRE NAME
I-RS150-2-417	SPARROW

Area = 0.0608 Sq. in., Diameter = 0.316 in, Weight = 0.091 lb/G, RTS = 2850 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.581	3.93	417	3.93	417*
32.0	0.25	0.00	0.00	0.267	3.79	199	3.74	201
0.0	0.00	0.00	0.00	0.091	3.12	82	3.04	84
15.0	0.00	0.00	0.00	0.091	3.35	76	3.28	78
30.0	0.00	0.00	0.00	0.091	3.56	72	3.48	74
60.0	0.00	0.00	0.00	0.091	3.90	66	3.84	67
90.0	0.00	0.00	0.00	0.091	4.20	61	4.17	62
120.0	0.00	0.00	0.00	0.091	4.38	59	4.35	59
167.0	0.00	0.00	0.00	0.091	4.65	55	4.62	56
212.0	0.00	0.00	0.00	0.091	4.90	52	4.86	53

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150Ft

Special Load Zone -- Max Tension = 417 lb

**Design: 417 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	84	74	71	69	67	65	63	61	61
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	1- 5	1- 7	1- 8	1- 8	1- 9	1-10	1-10	1-11	1-11
110.0	1- 8	1-11	2- 0	2- 1	2- 1	2- 2	2- 3	2- 3	2- 4
120.0	2- 0	2- 3	2- 4	2- 5	2- 6	2- 7	2- 8	2- 9	2- 9
130.0	2- 4	2- 8	2- 9	2-10	2-11	3- 0	3- 1	3- 2	3- 3
140.0	2- 8	3- 1	3- 2	3- 3	3- 5	3- 6	3- 7	3- 8	3- 9
150.0	3- 1	3- 6	3- 8	3- 9	3-11	4- 0	4- 1	4- 3	4- 3
160.0	3- 6	4- 0	4- 2	4- 3	4- 5	4- 6	4- 8	4- 9	4-10
170.0	3-11	4- 6	4- 8	4-10	5- 0	5- 1	5- 3	5- 5	5- 6
180.0	4- 5	5- 1	5- 3	5- 5	5- 7	5- 9	5-11	6- 1	6- 2
190.0	4-11	5- 7	5-10	6- 0	6- 2	6- 5	6- 7	6- 9	6-10
200.0	5- 5	6- 3	6- 5	6- 8	6-10	7- 1	7- 3	7- 6	7- 7

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN 150-FT
#2 ACSR @ REDUCED TENSION

DRAWING CODE	WIRE NAME
I-RS150-1/0-492	RAVEN

Area = 0.0968 Sq. in., Diameter = 0.398 in, Weight = 0.145 lb/G, RTS = 4380 lb

Span = 10.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.658	3.79	489	3.77	492*
32.0	0.25	0.00	0.00	0.346	3.76	260	3.68	265
0.0	0.00	0.00	0.00	0.145	3.18	129	3.02	135
15.0	0.00	0.00	0.00	0.145	3.40	120	3.25	126
30.0	0.00	0.00	0.00	0.145	3.58	114	3.47	118
60.0	0.00	0.00	0.00	0.145	3.93	104	3.82	107
90.0	0.00	0.00	0.00	0.145	4.20	97	4.14	99
120.0	0.00	0.00	0.00	0.145	4.38	94	4.36	94
167.0	0.00	0.00	0.00	0.145	4.64	88	4.63	89
212.0	0.00	0.00	0.00	0.145	4.89	84	4.87	84

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150 Ft

Special Load Zone -- Max Tension = 492 lb

**Design: 492lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	135	118	114	110	107	104	101	99	96
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	1- 5	1- 7	1- 8	1- 8	1- 9	1- 9	1-10	1-11	1-11
110.0	1- 8	1-11	2- 0	2- 0	2- 1	2- 2	2- 3	2- 3	2- 4
120.0	2- 0	2- 3	2- 4	2- 5	2- 6	2- 7	2- 7	2- 8	2- 9
130.0	2- 4	2- 8	2- 9	2-10	2-11	3- 0	3- 1	3- 2	3- 3
140.0	2- 8	3- 1	3- 2	3- 3	3- 4	3- 6	3- 7	3- 8	3- 9
150.0	3- 1	3- 6	3- 8	3- 9	3-10	4- 0	4- 1	4- 2	4- 3
160.0	3- 6	4- 0	4- 2	4- 3	4- 5	4- 6	4- 8	4- 9	4-10
170.0	3-11	4- 6	4- 8	4-10	4-11	5- 1	5- 3	5- 4	5- 6
180.0	4- 5	5- 1	5- 3	5- 5	5- 6	5- 8	5-10	6- 0	6- 2
190.0	4-11	5- 7	5-10	6- 0	6- 2	6- 4	6- 6	6- 8	6-10
200.0	5- 5	6- 3	6- 5	6- 8	6-10	7- 0	7- 3	7- 5	7- 7

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 150 FT
1/0 ACSR @ REDUCED TENSION

DRAWING CODE	WIRE NAME
I-RS150-4/0-775	PENGUIN

Area = 0.1939 Sq. in., Diameter = 0.563 in, Weight = 0.291 lb/G, RTS = 8350 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.849	3.15	760	3.09	775*
32.0	0.25	0.00	0.00	0.544	3.22	476	3.11	492
0.0	0.00	0.00	0.00	0.291	2.61	313	2.43	337
15.0	0.00	0.00	0.00	0.291	2.85	288	2.70	304
30.0	0.00	0.00	0.00	0.291	3.06	268	2.92	280
60.0	0.00	0.00	0.00	0.291	3.45	238	3.32	247
90.0	0.00	0.00	0.00	0.291	3.76	218	3.68	223
120.0	0.00	0.00	0.00	0.291	3.96	207	3.94	208
167.0	0.00	0.00	0.00	0.291	4.25	193	4.23	194
212.0	0.00	0.00	0.00	0.291	4.51	182	4.49	183

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150 Ft

Special Load Zone -- Max Tension = 775 lb

**Design: 775 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	337	280	268	257	247	238	230	223	216
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	1- 1	1- 4	1- 5	1- 6	1- 6	1- 7	1- 7	1- 8	1- 9
110.0	1- 4	1- 7	1- 8	1- 9	1-10	1-11	1-11	2- 0	2- 1
120.0	1- 7	1-11	2- 0	2- 1	2- 2	2- 3	2- 4	2- 5	2- 6
130.0	1-10	2- 3	2- 4	2- 5	2- 6	2- 8	2- 9	2-10	2-11
140.0	2- 2	2- 7	2- 8	2-10	2-11	3- 0	3- 2	3- 3	3- 4
150.0	2- 6	3- 0	3- 1	3- 3	3- 4	3- 6	3- 7	3- 9	3-10
160.0	2-10	3- 4	3- 6	3- 8	3-10	3-11	4- 1	4- 3	4- 4
170.0	3- 2	3-10	4- 0	4- 2	4- 4	4- 6	4- 7	4- 9	4-11
180.0	3- 7	4- 3	4- 5	4- 8	4-10	5- 0	5- 2	5- 4	5- 6
190.0	3-11	4- 9	4-11	5- 2	5- 4	5- 7	5- 9	5-11	6- 2
200.0	4- 4	5- 3	5- 6	5- 9	5-11	6- 2	6- 5	6- 7	6- 9

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 150 FT
4/0 ACSR @ REDUCED TENSION

DRAWING CODE	WIRE NAME
I-RS150-336-990	MERLIN

Area = 0.2789 Sq. in., Diameter = 0.684 in, Weight = 0.365 lb/G, RTS = 8680 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4.00	0.20	0.965	2.84	958	2.75	990*
32	0.25	0.00	0.00	0.655	2.95	625	2.85	649
0	0.00	0.00	0.00	0.365	2.24	459	2.09	492
15	0.00	0.00	0.00	0.365	2.52	407	2.38	431
30	0.00	0.00	0.00	0.365	2.78	369	2.65	387
60	0.00	0.00	0.00	0.365	3.25	316	3.14	327
90	0.00	0.00	0.00	0.365	3.67	280	3.58	288
120	0.00	0.00	0.00	0.365	4.05	254	3.97	260
167	0.00	0.00	0.00	0.365	4.35	237	4.33	238
212	0.00	0.00	0.00	0.365	4.59	224	4.57	225

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150 Ft

Special Load Zone -- Max Tension = 990 lb

**Design: 990 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	501	392	368	347	330	315	301	289	279
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	1- 0	1- 3	1- 4	1- 4	1- 5	1- 6	1- 7	1- 8	1- 8
110.0	1- 2	1- 6	1- 7	1- 8	1- 9	1-10	1-11	2- 0	2- 0
120.0	1- 5	1- 9	1-10	1-11	2- 1	2- 2	2- 3	2- 4	2- 5
130.0	1- 7	2- 0	2- 2	2- 3	2- 5	2- 6	2- 7	2- 9	2-10
140.0	1-10	2- 4	2- 6	2- 8	2- 9	2-11	3- 0	3- 2	3- 3
150.0	2- 2	2- 8	2-10	3- 0	3- 2	3- 4	3- 6	3- 7	3- 9
160.0	2- 5	3- 1	3- 3	3- 5	3- 7	3- 9	3-11	4- 1	4- 3
170.0	2- 9	3- 5	3- 8	3-11	4- 1	4- 3	4- 5	4- 8	4-10
180.0	3- 1	3-10	4- 1	4- 4	4- 7	4- 9	5- 0	5- 2	5- 5
190.0	3- 5	4- 4	4- 7	4-10	5- 1	5- 4	5- 7	5- 9	6- 0
200.0	3- 9	4- 9	5- 1	5- 4	5- 8	5-11	6- 2	6- 5	6- 8

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 150 FT
336 ACSR @ REDUCED TENSION

DRAWING CODE	WIRE NAME
I-RS150-477-1100	PELICAN

Area = 0.3955 Sq. in., Diameter = 0.814 in, Weight = 0.518 lb/G, RTS = 11800 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.155	3.05	1068	2.96	1100*
32.0	0.25	0.00	0.00	0.849	3.21	745	3.11	768
0.0	0.00	0.00	0.00	0.518	2.58	565	2.46	593
15.0	0.00	0.00	0.00	0.518	2.85	513	2.73	535
30.0	0.00	0.00	0.00	0.518	3.08	473	2.98	490
60.0	0.00	0.00	0.00	0.518	3.52	415	3.43	426
90.0	0.00	0.00	0.00	0.518	3.91	373	3.83	381
120.0	0.00	0.00	0.00	0.518	4.27	342	4.20	348
167.0	0.00	0.00	0.00	0.518	4.54	322	4.52	323
212.0	0.00	0.00	0.00	0.518	4.78	306	4.76	307

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150 Ft

Special Load Zone -- Max Tension = 1100 lb

**Design: 1100 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	592	490	465	444	426	409	394	381	369
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	1- 2	1- 4	1- 5	1- 6	1- 7	1- 8	1- 8	1- 9	1-10
110.0	1- 4	1- 8	1- 9	1-10	1-11	1-11	2- 0	2- 1	2- 2
120.0	1- 7	1-11	2- 1	2- 2	2- 3	2- 4	2- 5	2- 6	2- 7
130.0	1-11	2- 3	2- 5	2- 6	2- 7	2- 9	2-10	2-11	3- 0
140.0	2- 2	2- 8	2- 9	2-11	3- 0	3- 2	3- 3	3- 5	3- 6
150.0	2- 6	3- 0	3- 2	3- 4	3- 6	3- 7	3- 9	3-10	4- 0
160.0	2-10	3- 5	3- 7	3- 9	3-11	4- 1	4- 3	4- 5	4- 7
170.0	3- 2	3-10	4- 1	4- 3	4- 5	4- 7	4-10	5- 0	5- 1
180.0	3- 7	4- 4	4- 7	4- 9	5- 0	5- 2	5- 4	5- 7	5- 9
190.0	4- 0	4-10	5- 1	5- 4	5- 6	5- 9	6- 0	6- 2	6- 5
200.0	4- 5	5- 4	5- 7	5-11	6- 2	6- 5	6- 7	6-10	7- 1

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 150 FT
477 ACSR @ REDUCED TENSION

DRAWING CODE	WIRE NAME
I-RS150-795-1500	COOT

Area = 0.6416 Sq. in., Diameter = 1.040 in, Weight = 0.805 lb/G, RTS = 16800 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.511	2.91	1460	2.84	1500*
32.0	0.25	0.00	0.00	1.206	3.12	1090	3.03	1120
0.0	0.00	0.00	0.00	0.805	2.48	913	2.37	954
15.0	0.00	0.00	0.00	0.805	2.75	824	2.65	855
30.0	0.00	0.00	0.00	0.805	3.00	755	2.91	779
60.0	0.00	0.00	0.00	0.805	3.46	656	3.38	672
90.0	0.00	0.00	0.00	0.805	3.87	587	3.79	599
120.0	0.00	0.00	0.00	0.805	4.24	536	4.17	545
167.0	0.00	0.00	0.00	0.805	4.77	477	4.71	483
212.0	0.00	0.00	0.00	0.805	5.23	435	5.17	440

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150 Ft

Special Load Zone -- Max Tension = 1500 lb

**Design: 1500 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	954	779	738	702	671	644	620	598	578
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	1- 1	1- 4	1- 5	1- 6	1- 6	1- 7	1- 8	1- 9	1- 9
110.0	1- 4	1- 7	1- 8	1- 9	1-10	1-11	2- 0	2- 1	2- 2
120.0	1- 7	1-11	2- 0	2- 1	2- 2	2- 4	2- 5	2- 6	2- 7
130.0	1-10	2- 3	2- 4	2- 6	2- 7	2- 8	2- 9	2-11	3- 0
140.0	2- 1	2- 7	2- 9	2-10	3- 0	3- 1	3- 3	3- 4	3- 5
150.0	2- 5	2-11	3- 1	3- 3	3- 5	3- 7	3- 8	3-10	4- 0
160.0	2- 9	3- 4	3- 6	3- 9	3-11	4- 1	4- 2	4- 4	4- 6
170.0	3- 1	3- 9	4- 0	4- 2	4- 5	4- 7	4- 9	4-11	5- 1
180.0	3- 6	4- 3	4- 6	4- 8	4-11	5- 1	5- 4	5- 6	5- 8
190.0	3-10	4- 9	5- 0	5- 3	5- 6	5- 8	5-11	6- 2	6- 4
200.0	4- 3	5- 3	5- 6	5- 9	6- 1	6- 4	6- 7	6- 9	7- 0

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 150 FT
795 ACSR @ REDUCED TENSION

DRAWING CODE	WIRE NAME
I-RS150-1351-2500	COLUMBINE

Area = 1.0620 Sq. in., Diameter = 1.340 in, Weight = 1.269 lb/G, RTS = 23400 lb

Span = 150.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	2.067	2.35	2479	2.33	2500*
32.0	0.25	0.00	0.00	1.763	2.61	1902	2.56	1936
0.0	0.00	0.00	0.00	1.269	1.84	1939	1.79	1999
15.0	0.00	0.00	0.00	1.269	2.18	1641	2.11	1693
30.0	0.00	0.00	0.00	1.269	2.48	1438	2.41	1481
60.0	0.00	0.00	0.00	1.269	3.03	1180	2.96	1208
90.0	0.00	0.00	0.00	1.269	3.50	1021	3.44	1041
120.0	0.00	0.00	0.00	1.269	3.93	911	3.86	926
167.0	0.00	0.00	0.00	1.269	4.52	793	4.46	804
212.0	0.00	0.00	0.00	1.269	5.02	714	4.97	722

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 150 Ft

Special Load Zone -- Max Tension = 2500 lb

**Design: 2500 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	1998	1480	1371	1282	1207	1143	1088	1040	997
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	0-10	1- 1	1- 2	1- 3	1- 4	1- 5	1- 6	1- 7	1- 8
110.0	1- 0	1- 4	1- 5	1- 6	1- 8	1- 9	1-10	1-11	2- 0
120.0	1- 2	1- 7	1- 8	1-10	1-11	2- 0	2- 2	2- 3	2- 4
130.0	1- 5	1-10	2- 0	2- 2	2- 3	2- 5	2- 6	2- 7	2- 9
140.0	1- 7	2- 2	2- 4	2- 6	2- 7	2- 9	2-11	3- 0	3- 2
150.0	1-10	2- 5	2- 8	2-10	3- 0	3- 2	3- 4	3- 6	3- 7
160.0	2- 1	2- 9	3- 0	3- 3	3- 5	3- 7	3- 9	3-11	4- 1
170.0	2- 4	3- 2	3- 5	3- 7	3-10	4- 1	4- 3	4- 5	4- 8
180.0	2- 7	3- 6	3- 9	4- 1	4- 4	4- 6	4- 9	5- 0	5- 2
190.0	2-11	3-11	4- 3	4- 6	4- 9	5- 1	5- 4	5- 7	5-10
200.0	3- 3	4- 4	4- 8	5- 0	5- 4	5- 7	5-11	6- 2	6- 5

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 150 FT
1351 AAC @ REDUCED TENSION

SAG TABLES

ACSR

SLACK SPAN

DRAWING CODE	WIRE NAME
I-RS50-2-83	SPARROW

Area = 0.0608 Sq. in., Diameter = 0.316 in, Weight = 0.091 lb/G, RTS = 2850 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.581	2.20	83	2.20	83*
32.0	0.25	0.00	0.00	0.267	2.23	38	2.23	38
0.0	0.00	0.00	0.00	0.091	2.13	13	2.13	13
15.0	0.00	0.00	0.00	0.091	2.17	13	2.17	13
30.0	0.00	0.00	0.00	0.091	2.21	13	2.21	13
60.0	0.00	0.00	0.00	0.091	2.28	13	2.28	13
90.0	0.00	0.00	0.00	0.091	2.32	12	2.32	12
120.0	0.00	0.00	0.00	0.091	2.36	12	2.36	12
167.0	0.00	0.00	0.00	0.091	2.41	12	2.41	12
212.0	0.00	0.00	0.00	0.091	2.47	12	2.47	12

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50Ft

Special Load Zone -- Max Tension = 83 lb

**Design: 83lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	13	13	13	13	13	12	12	12	12
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
30.0	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-11
40.0	1- 5	1- 5	1- 6	1- 6	1- 6	1- 6	1- 6	1- 6	1- 6
50.0	2- 2	2- 3	2- 3	2- 4	2- 4	2- 4	2- 4	2- 4	2- 4
60.0	3- 1	3- 3	3- 3	3- 4	3- 4	3- 4	3- 4	3- 5	3- 5
70.0	4- 3	4- 5	4- 5	4- 6	4- 6	4- 7	4- 7	4- 7	4- 7

DRAWING CODE	WIRE NAME
I-RS50-1/0-100	RAVEN

Area = 0.0968 Sq. in., Diameter = 0.398 in, Weight = 0.145 lb/G, RTS = 4380 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.658	2.09	99	2.07	100*
32.0	0.25	0.00	0.00	0.346	2.12	51	2.10	52
0.0	0.00	0.00	0.00	0.145	2.02	23	1.99	23
15.0	0.00	0.00	0.00	0.145	2.06	22	2.04	22
30.0	0.00	0.00	0.00	0.145	2.11	22	2.08	22
60.0	0.00	0.00	0.00	0.145	2.18	21	2.16	21
90.0	0.00	0.00	0.00	0.145	2.22	21	2.21	21
120.0	0.00	0.00	0.00	0.145	2.26	20	2.25	20
167.0	0.00	0.00	0.00	0.145	2.32	20	2.31	20
212.0	0.00	0.00	0.00	0.145	2.38	19	2.37	19

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50 Ft

Special Load Zone -- Max Tension = 100 lb

**Design: 100lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	23	22	22	21	21	21	21	21	20
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
30.0	0- 9	0- 9	0-10	0-10	0-10	0-10	0-10	0-10	0-10
40.0	1- 4	1- 4	1- 5	1- 5	1- 5	1- 5	1- 5	1- 5	1- 6
50.0	2- 0	2- 1	2- 2	2- 2	2- 2	2- 3	2- 3	2- 3	2- 3
60.0	2-11	3- 1	3- 1	3- 2	3- 2	3- 2	3- 3	3- 3	3- 3
70.0	4- 0	4- 2	4- 2	4- 3	4- 4	4- 4	4- 4	4- 5	4- 5

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 50 FT
1/0 ACSR @ SLACK SPAN

DRAWING CODE	WIRE NAME
I-RS50-4/0-130	PENGUIN

Area = 0.1939 Sq. in., Diameter = 0.563 in, Weight = 0.291 lb/G, RTS = 8350 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.849	2.08	129	2.05	130*
32.0	0.25	0.00	0.00	0.544	2.12	81	2.09	82
0.0	0.00	0.00	0.00	0.291	2.02	45	1.99	46
15.0	0.00	0.00	0.00	0.291	2.06	44	2.04	45
30.0	0.00	0.00	0.00	0.291	2.11	44	2.08	44
60.0	0.00	0.00	0.00	0.291	2.17	42	2.16	42
90.0	0.00	0.00	0.00	0.291	2.22	41	2.21	41
120.0	0.00	0.00	0.00	0.291	2.26	41	2.25	41
167.0	0.00	0.00	0.00	0.291	2.32	40	2.31	40
212.0	0.00	0.00	0.00	0.291	2.38	39	2.37	39

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50 Ft

Special Load Zone -- Max Tension = 130 lb

**Design: 130 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	46	44	43	43	42	42	41	41	41
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
30.0	0- 9	0- 9	0-10	0-10	0-10	0-10	0-10	0-10	0-10
40.0	1- 4	1- 4	1- 5	1- 5	1- 5	1- 5	1- 5	1- 5	1- 6
50.0	2- 0	2- 1	2- 2	2- 2	2- 2	2- 3	2- 3	2- 3	2- 3
60.0	2-11	3- 1	3- 1	3- 1	3- 2	3- 2	3- 3	3- 3	3- 3
70.0	3-11	4- 2	4- 2	4- 3	4- 4	4- 4	4- 4	4- 5	4- 5

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 50 FT
4/0 ACSR @ SLACK SPAN

DRAWING CODE	WIRE NAME
I-RS50-336-150	MERLIN

Area = 0.2789 Sq. in., Diameter = 0.684 in, Weight = 0.365 lb/G, RTS = 8680 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4.00	0.20	0.965	2.02	150	2.02	150*
32	0.25	0.00	0.00	0.655	2.07	100	2.07	100
0	0.00	0.00	0.00	0.365	1.97	58	1.97	58
15	0.00	0.00	0.00	0.365	2.01	57	2.01	57
30	0.00	0.00	0.00	0.365	2.06	56	2.06	56
60	0.00	0.00	0.00	0.365	2.13	54	2.13	54
90	0.00	0.00	0.00	0.365	2.17	53	2.17	53
120	0.00	0.00	0.00	0.365	2.21	52	2.21	52
167	0.00	0.00	0.00	0.365	2.28	51	2.27	51
212	0.00	0.00	0.00	0.365	2.33	49	2.33	49

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50 Ft

Special Load Zone -- Max Tension = 150 lb

**Design: 150 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	58	56	55	54	54	53	53	53	52
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
30.0	0- 9	0- 9	0- 9	0-10	0-10	0-10	0-10	0-10	0-10
40.0	1- 4	1- 4	1- 5	1- 5	1- 5	1- 5	1- 5	1- 5	1- 5
50.0	2- 0	2- 1	2- 2	2- 2	2- 2	2- 2	2- 2	2- 3	2- 3
60.0	2-11	3- 0	3- 1	3- 1	3- 1	3- 2	3- 2	3- 2	3- 2
70.0	3-11	4- 1	4- 2	4- 2	4- 3	4- 3	4- 3	4- 4	4- 4

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 50 FT
336 ACSR @ SLACK SPAN

DRAWING CODE	WIRE NAME
I-RS50-477-175	PELICAN

Area = 0.3955 Sq. in., Diameter = 0.814 in, Weight = 0.518 lb/G, RTS = 11800 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.155	2.08	175	2.08	175*
32.0	0.25	0.00	0.00	0.849	2.12	126	2.12	126
0.0	0.00	0.00	0.00	0.518	2.03	80	2.03	80
15.0	0.00	0.00	0.00	0.518	2.07	79	2.07	79
30.0	0.00	0.00	0.00	0.518	2.11	77	2.11	77
60.0	0.00	0.00	0.00	0.518	2.18	75	2.18	75
90.0	0.00	0.00	0.00	0.518	2.22	73	2.22	73
120.0	0.00	0.00	0.00	0.518	2.26	72	2.26	72
167.0	0.00	0.00	0.00	0.518	2.33	70	2.32	70
212.0	0.00	0.00	0.00	0.518	2.38	69	2.38	69

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50 Ft

Special Load Zone -- Max Tension = 175 lb

**Design: 175 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	80	77	76	75	74	74	73	73	73
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
30.0	0- 9	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10
40.0	1- 4	1- 5	1- 5	1- 5	1- 5	1- 5	1- 5	1- 6	1- 6
50.0	2- 1	2- 2	2- 2	2- 2	2- 3	2- 3	2- 3	2- 3	2- 3
60.0	3- 0	3- 1	3- 2	3- 2	3- 2	3- 2	3- 3	3- 3	3- 3
70.0	4- 0	4- 2	4- 3	4- 4	4- 4	4- 4	4- 5	4- 5	4- 5

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 50 FT
477 ACSR @ SLACK SPAN

DRAWING CODE	WIRE NAME
I-RS50-795-230	COOT

Area = 0.6416 Sq. in., Diameter = 1.040 in, Weight = 0.805 lb/G, RTS = 16800 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.511	2.07	230	2.07	230*
32.0	0.25	0.00	0.00	1.206	2.11	180	2.11	180
0.0	0.00	0.00	0.00	0.805	2.02	125	2.02	125
15.0	0.00	0.00	0.00	0.805	2.06	123	2.06	123
30.0	0.00	0.00	0.00	0.805	2.10	120	2.10	120
60.0	0.00	0.00	0.00	0.805	2.18	116	2.18	116
90.0	0.00	0.00	0.00	0.805	2.26	112	2.26	112
120.0	0.00	0.00	0.00	0.805	2.34	109	2.34	109
167.0	0.00	0.00	0.00	0.805	2.45	104	2.45	104
212.0	0.00	0.00	0.00	0.805	2.55	100	2.55	100

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50 Ft

Special Load Zone -- Max Tension = 230 lb

**Design: 230 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	125	120	118	117	115	114	113	112	110
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
30.0	0- 9	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10
40.0	1- 4	1- 5	1- 5	1- 5	1- 5	1- 5	1- 6	1- 6	1- 6
50.0	2- 1	2- 2	2- 2	2- 2	2- 3	2- 3	2- 3	2- 4	2- 4
60.0	2-11	3- 1	3- 1	3- 2	3- 2	3- 3	3- 3	3- 4	3- 4
70.0	4- 0	4- 2	4- 3	4- 3	4- 4	4- 5	4- 5	4- 6	4- 6

DRAWING CODE	WIRE NAME
I-RS100-2-165	SPARROW

Area = 0.0608 Sq. in., Diameter = 0.316 in, Weight = 0.091 lb/G, RTS = 2850 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.581	4.44	165	4.44	165*
32.0	0.25	0.00	0.00	0.267	4.46	75	4.46	75
0.0	0.00	0.00	0.00	0.091	4.25	27	4.24	27
15.0	0.00	0.00	0.00	0.091	4.33	26	4.33	26
30.0	0.00	0.00	0.00	0.091	4.41	26	4.41	26
60.0	0.00	0.00	0.00	0.091	4.55	25	4.55	25
90.0	0.00	0.00	0.00	0.091	4.63	25	4.63	25
120.0	0.00	0.00	0.00	0.091	4.71	24	4.71	24
167.0	0.00	0.00	0.00	0.091	4.83	24	4.83	24
212.0	0.00	0.00	0.00	0.091	4.94	23	4.94	23

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100Ft

Special Load Zone -- Max Tension = 165 lb

**Design: 165lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	27	26	26	25	25	25	25	25	24
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
70.0	2- 1	2- 2	2- 3	2- 3	2- 3	2- 3	2- 4	2- 4	2- 4
80.0	2- 9	2-10	2-11	2-11	2-11	3- 0	3- 0	3- 0	3- 0
90.0	3- 6	3- 7	3- 8	3- 8	3- 9	3- 9	3- 9	3- 9	3-10
100.0	4- 3	4- 5	4- 6	4- 7	4- 7	4- 7	4- 8	4- 8	4- 8
110.0	5- 2	5- 5	5- 5	5- 6	5- 7	5- 7	5- 7	5- 8	5- 8

DRAWING CODE	WIRE NAME
I-RS100-1/0-190	RAVEN

Area = 0.0968 Sq. in., Diameter = 0.398 in, Weight = 0.145 lb/G, RTS = 4380 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.658	4.38	189	4.36	190*
32.0	0.25	0.00	0.00	0.346	4.42	99	4.39	99
0.0	0.00	0.00	0.00	0.145	4.22	43	4.17	44
15.0	0.00	0.00	0.00	0.145	4.31	42	4.26	43
30.0	0.00	0.00	0.00	0.145	4.39	42	4.34	42
60.0	0.00	0.00	0.00	0.145	4.53	40	4.49	41
90.0	0.00	0.00	0.00	0.145	4.60	40	4.60	40
120.0	0.00	0.00	0.00	0.145	4.68	39	4.67	39
167.0	0.00	0.00	0.00	0.145	4.80	38	4.79	38
212.0	0.00	0.00	0.00	0.145	4.91	37	4.90	37

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 190 lb

**Design: 190lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	44	42	41	41	40	40	40	40	39
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
70.0	2- 1	2- 2	2- 2	2- 3	2- 3	2- 3	2- 3	2- 3	2- 4
80.0	2- 9	2-10	2-10	2-11	2-11	2-11	3- 0	3- 0	3- 0
90.0	3- 5	3- 7	3- 7	3- 8	3- 8	3- 9	3- 9	3- 9	3- 9
100.0	4- 3	4- 5	4- 5	4- 6	4- 6	4- 7	4- 7	4- 8	4- 8
110.0	5- 1	5- 4	5- 4	5- 5	5- 6	5- 6	5- 7	5- 7	5- 8

DRAWING CODE	WIRE NAME
I-RS100-4/0-250	PENGUIN

Area = 0.1939 Sq. in., Diameter = 0.563 in, Weight = 0.291 lb/G, RTS = 8350 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	0.849	4.31	248	4.28	250*
32.0	0.25	0.00	0.00	0.544	4.37	157	4.34	158
0.0	0.00	0.00	0.00	0.291	4.18	88	4.13	89
15.0	0.00	0.00	0.00	0.291	4.26	86	4.21	87
30.0	0.00	0.00	0.00	0.291	4.35	84	4.30	85
60.0	0.00	0.00	0.00	0.291	4.49	82	4.45	82
90.0	0.00	0.00	0.00	0.291	4.56	80	4.56	80
120.0	0.00	0.00	0.00	0.291	4.64	79	4.63	79
167.0	0.00	0.00	0.00	0.291	4.76	77	4.75	77
212.0	0.00	0.00	0.00	0.291	4.88	75	4.87	75

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 250 lb

**Design: 250 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	88	85	84	83	82	81	81	80	80
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
70.0	2- 1	2- 2	2- 2	2- 2	2- 3	2- 3	2- 3	2- 3	2- 3
80.0	2- 8	2- 9	2-10	2-10	2-11	2-11	2-11	2-11	3- 0
90.0	3- 5	3- 6	3- 7	3- 7	3- 8	3- 8	3- 9	3- 9	3- 9
100.0	4- 2	4- 4	4- 5	4- 5	4- 6	4- 6	4- 7	4- 7	4- 7
110.0	5- 0	5- 3	5- 4	5- 5	5- 5	5- 6	5- 6	5- 7	5- 7

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PRIMARY SAG TABLES

NES

SAG TABLE
RULING SPAN - 100 FT
4/0 ACSR @ SLACK SPAN

DRAWING CODE	WIRE NAME
I-RS100-336-290	MERLIN

Area = 0.2789 Sq. in., Diameter = 0.684 in, Weight = 0.365 lb/G, RTS = 8680 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4.00	0.20	0.965	4.2	290	4.19	290*
32	0.25	0.00	0.00	0.655	4.27	193	4.26	194
0	0.00	0.00	0.00	0.365	4.07	113	4.07	113
15	0.00	0.00	0.00	0.365	4.16	110	4.16	111
30	0.00	0.00	0.00	0.365	4.25	108	4.24	108
60	0.00	0.00	0.00	0.365	4.4	104	4.4	105
90	0.00	0.00	0.00	0.365	4.52	102	4.51	102
120	0.00	0.00	0.00	0.365	4.6	100	4.59	100
167	0.00	0.00	0.00	0.365	4.72	98	4.71	98
212	0.00	0.00	0.00	0.365	4.83	95	4.82	96

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 290 lb

**Design: 290 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	112	108	107	105	104	103	102	101	101
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
70.0	2- 0	2- 1	2- 2	2- 2	2- 2	2- 3	2- 3	2- 3	2- 3
80.0	2- 8	2- 9	2- 9	2-10	2-10	2-11	2-11	2-11	2-11
90.0	3- 4	3- 6	3- 6	3- 7	3- 7	3- 8	3- 8	3- 8	3- 9
100.0	4- 1	4- 3	4- 4	4- 5	4- 5	4- 6	4- 6	4- 7	4- 7
110.0	5- 0	5- 2	5- 3	5- 4	5- 4	5- 5	5- 6	5- 6	5- 6

DRAWING CODE	WIRE NAME
I-RS100-477-340	PELICAN

Area = 0.3955 Sq. in., Diameter = 0.814 in, Weight = 0.518 lb/G, RTS = 11800 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.155	4.28	340	4.28	340*
32.0	0.25	0.00	0.00	0.849	4.36	245	4.36	245
0.0	0.00	0.00	0.00	0.518	4.17	156	4.17	156
15.0	0.00	0.00	0.00	0.518	4.26	153	4.25	153
30.0	0.00	0.00	0.00	0.518	4.34	150	4.33	150
60.0	0.00	0.00	0.00	0.518	4.49	145	4.49	145
90.0	0.00	0.00	0.00	0.518	4.61	142	4.60	142
120.0	0.00	0.00	0.00	0.518	4.68	139	4.67	140
167.0	0.00	0.00	0.00	0.518	4.80	136	4.79	136
212.0	0.00	0.00	0.00	0.518	4.91	133	4.90	133

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 340 lb

**Design: 340 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	156	150	148	146	145	143	142	141	140
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
70.0	2- 1	2- 2	2- 2	2- 3	2- 3	2- 3	2- 3	2- 3	2- 4
80.0	2- 8	2-10	2-10	2-11	2-11	2-11	3- 0	3- 0	3- 0
90.0	3- 5	3- 7	3- 7	3- 8	3- 8	3- 9	3- 9	3- 9	3- 9
100.0	4- 3	4- 5	4- 5	4- 6	4- 6	4- 7	4- 7	4- 8	4- 8
110.0	5- 1	5- 3	5- 4	5- 5	5- 6	5- 6	5- 7	5- 7	5- 8

DRAWING CODE	WIRE NAME
I-RS100-795-445	COOT

Area = 0.6416 Sq. in., Diameter = 1.040 in, Weight = 0.805 lb/G, RTS = 16800 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.511	4.27	445	4.27	445*
32.0	0.25	0.00	0.00	1.206	4.36	349	4.36	349
0.0	0.00	0.00	0.00	0.805	4.18	243	4.18	243
15.0	0.00	0.00	0.00	0.805	4.26	238	4.26	238
30.0	0.00	0.00	0.00	0.805	4.34	234	4.34	234
60.0	0.00	0.00	0.00	0.805	4.49	226	4.49	226
90.0	0.00	0.00	0.00	0.805	4.65	218	4.65	218
120.0	0.00	0.00	0.00	0.805	4.79	212	4.79	212
167.0	0.00	0.00	0.00	0.805	5.01	203	5.01	203
212.0	0.00	0.00	0.00	0.805	5.22	195	5.21	195

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 445 lb

**Design: 445 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	241	233	230	227	224	222	220	217	215
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
70.0	2- 1	2- 2	2- 2	2- 3	2- 3	2- 3	2- 3	2- 4	2- 4
80.0	2- 9	2-10	2-10	2-11	2-11	2-11	3- 0	3- 0	3- 1
90.0	3- 5	3- 7	3- 7	3- 8	3- 8	3- 9	3- 9	3-10	3-10
100.0	4- 3	4- 5	4- 5	4- 6	4- 6	4- 7	4- 8	4- 8	4- 9
110.0	5- 1	5- 4	5- 4	5- 5	5- 6	5- 7	5- 7	5- 8	5- 9

POLES, ANCHORS & GUYING STANDARDS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
POLES				
WOOD POLE SPECIFICATION	3			
IN-SERVICE WOOD POLE INSPECTION TAGS	4			
IN-SERVICE WOOD POLE REJECT TAGS	5			
GALVANIZED STEEL POLE SPECIFICATIONS	6			
WEATHERING STEEL POLE SPECIFICATIONS	7			
STEEL POLE APPLICATION GUIDELINES	8			
CONCRETE POLE SPECIFICATIONS	9			
POLE SETTING AND BACKFILL REQUIREMENTS	10			
POLE SETTING AND BACKFILL REQUIREMENTS CONTINUED	11			
STEEL STUB, DIRECT BURIED, GRAVEL BACKFILL	12			
STEEL STUB, CONCRETE PIER FOUNDATION	13			
STUB POLE FOUNDATION, REBAR QTY & SPACING	14			
STEEL STUB GUYING HARDWARE	15			
ANCHORS & GUYS	16			
GUY AND ANCHOR INSTALLATION REQUIREMENTS	17			
ANCHOR NAMING CONVENTIONS & MATERIALS	18			
ANCHOR CAPACITIES, POWER SCREW ANCHORS	19			
ANCHOR CAPACITIES, SPREADING ANCHORS	20			

TABLE OF CONTENTS

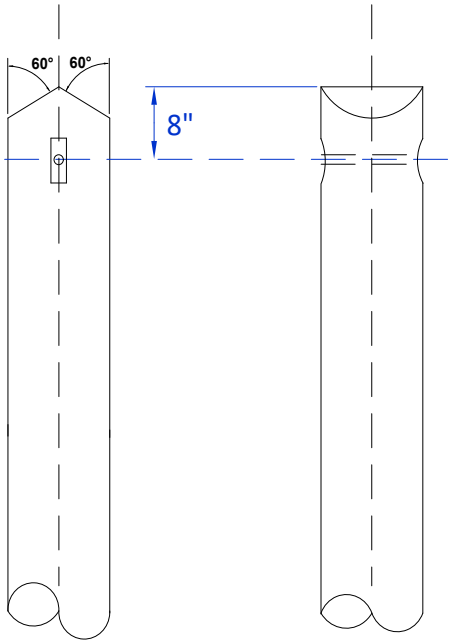
TITLE	PAGE	REV	DATE	DESCRIPTION
ANCHOR CAPACITIES, ROCK ANCHORS	21			
STANDARD GUYING APPLICATION NAMING CONVENTIONS	22			
GUYING MATERIALS	23			
WOOD POLE 6,000LB DOWN GUY	24			
WOOD POLE 12,000LB DOWN GUY	25			
STEEL OR CONCRETE POLE 6,000 & 12,000 LB DOWN GUY	26			
STEEL, CONCRETE, & WOOD POLE DOUBLE 12,000LB DOWN GUY	27			
WOOD POLE 6,000LB SINGLE SPAN GUY	28			
WOOD POLE 12,000LB SINGLE SPAN GUY	29			
STEEL OR CONCRETE POLE 6,000LB SINGLE SPAN GUY	30			
STEEL OR CONCRETE POLE 12,000LB SINGLE SPAN GUY	31			
WOOD POLE 6,000LB DOUBLE SPAN GUY	32			
STEEL OR CONCRETE POLE 6,000LB DOUBLE SPAN GUY	33			
STEEL AND CONCRETE POLE DOUBLE SPAN GUY 12,000LB	34			
WOOD OR STEEL POLE 12,000LB SIDEWALK GUY	35			
WOOD OR STEEL POLE 12,000LB DOUBLE SIDEWALK GUY	36			
FIBERGLASS GUY STRAIN INSULATORS	37			
INSULATED DOWN GUY IN POWER SPACE-ASSEMBLY	38			
INSULATED DOWN GUY THROUGH COMMUNICATION SPACE-ASSEMBLY	39			
INSULATED SPAN GUY IN POWER SPACE ASSEMBLY	40			
INSULATED SPAN GUY FROM POWER SPACE TO BELOW COMM. SPACE-ASSEMBLY	41			
INSULATED SPAN GUY FROM POWER SPACE TO ABOVE COMM. SPACE-ASSEMBLY	42			

HEIGHT (FT)	WOOD CLASS EQUIVALENT	GL MOMENT CAPACITY (FT-KIPS)	INSTALLATION CU & DWG CODE	STOCK #	REMOVAL CU & DWG CODE	STREET LGT INSTALL CU & DWG CODE	STREET LGT REMOVAL CU & DWG CODE	PRIVATE LGT INSTALL CU & DWG CODE	PRIVATE LGT REMOVAL CU & DWG CODE
WOOD POLES									
30	C6 (Priv. Lighting)	34	LPW30	050300000	--	LPW30	RL-PW30	PPW30	RP-POLE 30
35	C4	66	OPW35-C4	050350000	ROPW35-C4	LPW35	RL-PW35	PPW35	RP-POLE 35
35	C1	123	OPW35-C1	050351000	ROPW35-C1	--	--	--	--
40	C4	76	OPW40-C4	050400000	ROPW40-C4	LPW40	RL-PW40	PPW40	RP-POLE 40
45	C2	135	OPW45-C2	050450000	ROPW45-C2	LPW45	RL-PW45	PPW45	RP-POLE 45
50	C1	184	OPW50-C1	050500000	ROPW50-C1	LPW50	RL-PW50	--	--
55	C1	204	OPW55-C1	050550000	ROPW55-C1	LPW55	RL-PW55	PPW55	RP-POLE 55
60	C1	225	OPW60-C1	050600000	ROPW60-C1	LPW60	RL-PW60	--	--
65	C1	245	OPW65-C1	050650000	ROPW65-C1	LPW65	RL-PW65	--	--

POLE EMBEDMENT DEPTH

The embedment depth of standard pole sizes in “good” soil conditions is 10% of pole height + 2 ft. However, deeper embedment may be required based on site conditions or pole application. Minimum setting depths are listed on page 10.

“Good Soil” is defined as very dense, well graded sand; hard clay; dense-well graded, fine and coarse sand as described in Soil Classifications on page 11.



NOTES

1. Gains are shaved slightly concave, approximately 1/2” deep.
2. All holes are bored 11/16-inch diameter.

IN-SERVICE WOOD POLE INSPECTION TAGS

Wood poles that have been included in an in-service inspection and treatment program will be tagged accordingly by the contractor that performed the work.

The following are illustrations of the various types of weatherproof tags used and an explanation as to when they are used. Tags shall be placed 5’ to 6’ above groundline on the road side of the pole, below the NES pole identification tag. There may be multiple tags present if the pole has been inspected more than one time.

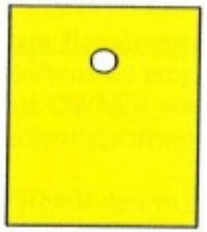
This round tag represents an inspection via a full 18” excavation and treatment with an approved paste. The tag shows the contractor’s name and the actual year the work was performed.

This oval tag is used whenever a sound and bore or partial excavate inspection takes place. The tag shows the contractor’s name and the actual year the work was performed.

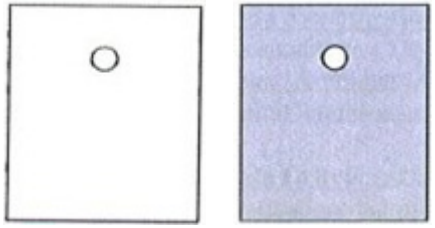
This tag is used whenever internal treatment is injected into a pole. This tag will be used in conjunction with one or more of the above tags depending on the type of inspection performed.

This tag is an example of a fumigant treatment tag. This be tag shall used whenever MITC-FUME is applied to a pole. This tag will be used in conjunction with one of the above tags depending on the type of inspection performed.

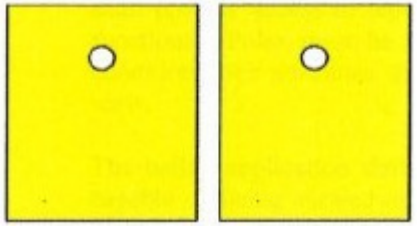
REJECT TAGS



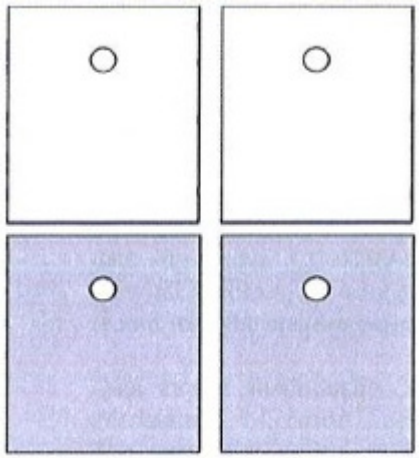
One yellow reject tag is used to denote that the pole is a reinforceable reject.



One white tag or one silver tag may be used to denote that the pole is a non-reinforceable reject.

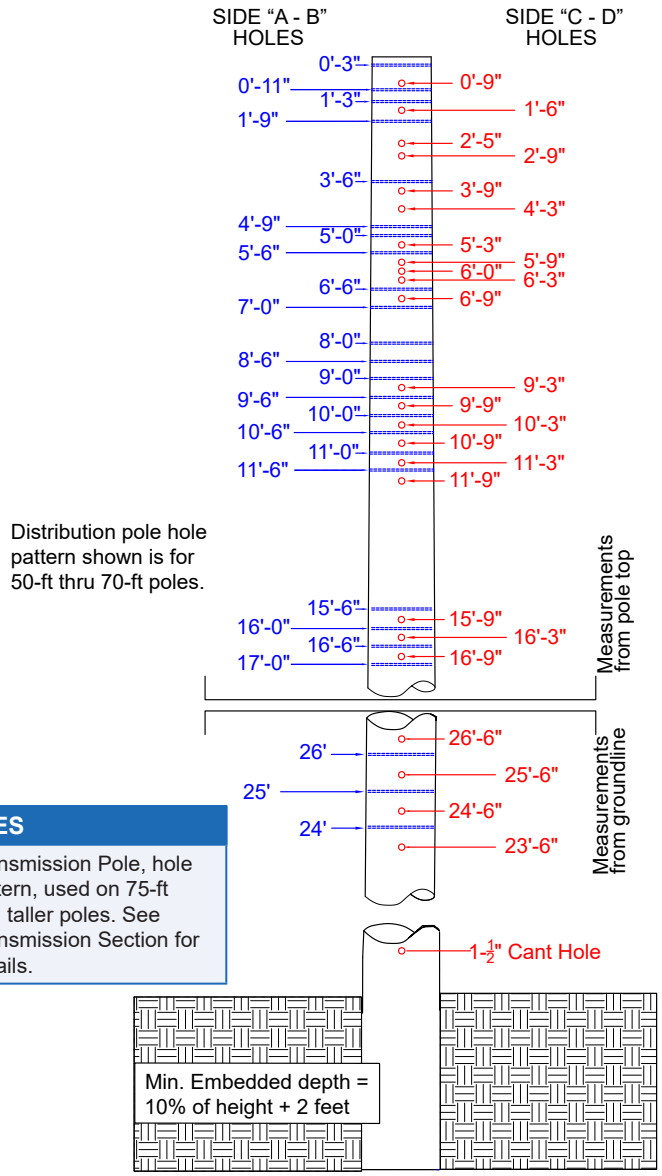


Two yellow tags are used to denote a **danger or priority** pole is reinforceable.



Two white tags or two silver tags may be used to denote a **priority** pole that is non-reinforceable.

HEIGHT (FT)	WOOD CLASS EQUIVALENT	GL MOMENT CAPACITY (FT-KIPS)	INSTALL CU & DWG CODE	STOCK #	REMOVAL CU &DWG CODE
GALVANIZED STEEL POLES					
33	Stub, Self-Supporting	750	OPS33-750	050213300	ROPS33-750
35	Stub, Self-Supporting	1200	OPS35-1200	050213500	ROPS35-1200
35	C3	53	OPS35-53	050203500	ROPS35-C3
40	C3	62	OPS40-C3	050204000	ROPS40-C3
45	C3	71	OPS45-C3	050204500	ROPS45-C3
50	C1	120	OPS50-C1	050204600	ROPS50-C1
50	H1	143	OPS50-H1	050205000	ROPS50-H1
50	H3	199	OPS50-H3	050205100	ROPS50-H3
55	H1	159	OPS55-H1	050205500	ROPS55-H1
60	H3	243	OPS60-H3	050206100	ROPS60-H3
60	H5	325	OPS60-H5	050206300	ROPS60-H5
60	H8	471	OPS60-H8	050206380	ROPS60-H8
65	H3	265	OPS65-H3	050206600	ROPS65-H3
65	H5	354	OPS65-H5	050206700	ROPS65-H5
65	H8	513	OPS65-H8	052068000	ROPS65-H8
70	H3	287	OPS70-H3	050207000	ROPS70-H3
70	H5	383	OPS70-H5	050207700	ROPS70-H5
75	H3	309	OPS75-H3	050207600	ROPS75-H3
80	H4	384	OPS80-H4	050208000	ROPS80-H4
80	H7	570	OPS80-H7	050208200	ROPS80-H7
80	H9	716	OPS80-H9	050208300	ROPS80-H9
85	H4	409	OPS85-H4	050208500	ROPS85-H4
90	H4	435	OPS90-H4	050209000	ROPS90-H4
90	H7	645	OPS90-H7	050209200	ROPS90-H7
90	H9	810	OPS90-H9	050209300	ROPS90-H9
95	H4	460	OPS95-H4	050209600	ROPS95-H4
100	H4	486	OPS100-H4	050210400	ROPS100-H4
100	H7	721	OPS100-H7	050210700	ROPS100-H7
100	H9	905	OPS100-H9	050210900	ROPS100-H9
110	H9	1049	OPS110-H9	050211900	ROPS110-H9



Distribution pole hole pattern shown is for 50-ft thru 70-ft poles.

NOTES

1. Transmission Pole, hole pattern, used on 75-ft and taller poles. See Transmission Section for details.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

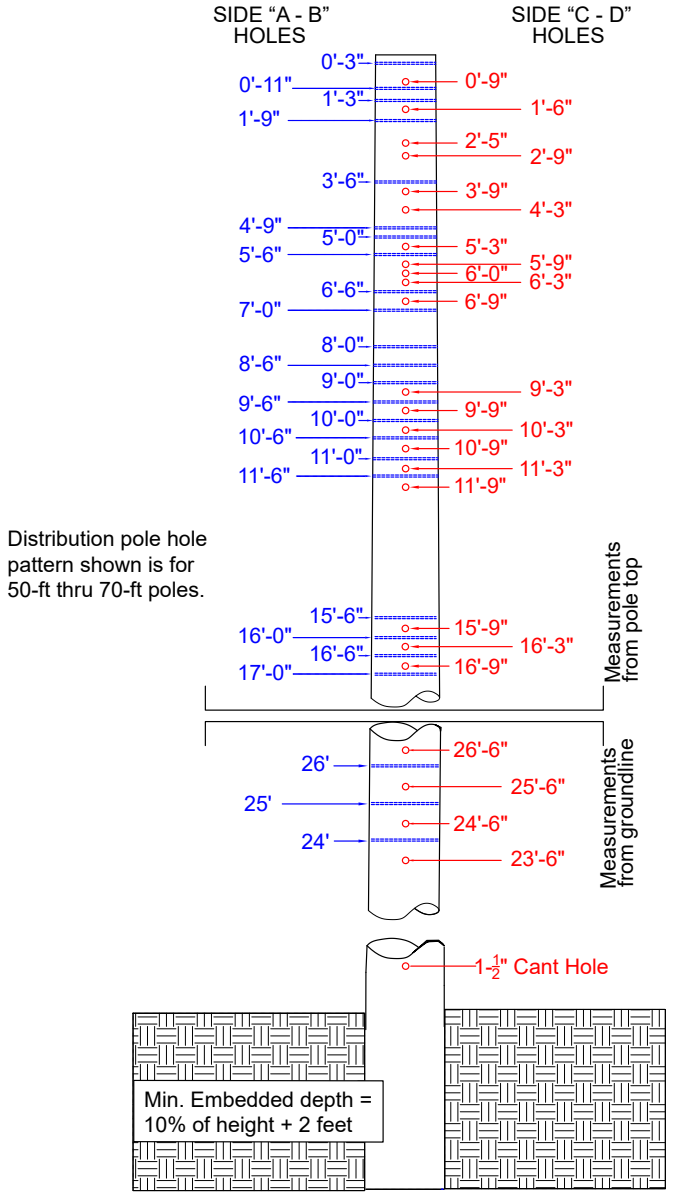
GALVANIZED STEEL POLE SPECIFICATIONS

HEIGHT (FT)	WOOD CLASS EQUIVALENT	GL MOMENT CAPACITY (FT-KIPS)	INSTALLATION COMP. UNIT	STOCK #	REMOVAL CU & DWG.CODE
WEATHERING STEEL POLES					
40	C3	62	OPR40-C3	052040030	ROPR40-C3
45	C1	106	OPR45-C1	052045030	ROPR45-C1
50	H1	143	OPR50-H1	052050010	ROPR50-H1
50	H3	199	OPR50-H3	052050030	ROPR50-H3
55	H1	159	OPR55-H1	052055010	ROPR55-H1
60	H3	243	OPR60-H3	052060030	ROPR60-H3
60	H5	325	OPR60-H5	052060050	ROPR60-H5
60	H8	471	OPR60-H8	052060080	ROPR60-H8
65	H5	354	OPR65-H5	052065050	ROPR65-H5
65	H8	513	OPR65-H8	052065070	ROPR65-H8
80	H4	384	OPR80-H4	052080040	ROPR80-H4
85	H4	409	OPR85-H4	052085040	ROPR85-H4
90	H4	435	OPR90-H4	052090040	ROPR90-H4
95	H4	460	OPR95-H4	052095040	ROPR95-H4

POLE EMBEDMENT DEPTH

The embedment depth of standard pole sizes in “good” soil conditions is 10% of pole height + 2 ft. However, deeper embedment may be required based on site conditions or pole application. Minimum setting depths are listed on page 10.

“Good Soil” is defined as very dense, well graded sand; hard clay; dense-well graded, fine and coarse sand as described in Soil Classifications on page 11.



Distribution pole hole pattern shown is for 50-ft thru 70-ft poles.

NOTES

1. Transmission Pole, hole pattern, used on 75-ft and taller poles. See Transmission Section for details.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WEATHERING STEEL POLE SPECIFICATIONS

The NES standard application recommends that concrete or steel poles to be installed per the following

1. Primary Riser poles
    a. Consideration should be given to install steel poles for multiple UG Secondary service conduit applications to reduce the difficulties with pole replacements in the future.
2. Gang Operated Switch poles
3. 69kV Sub-transmission poles
4. Multi-circuit Primary poles (4kv under build not included)
5. NESC Loading Case exceeds wood pole design criteria

Galvanized poles are the primary steel type to be used in rural, industrial, commercial, or multi-story mixed-use developments. Weathering Steel poles are set primarily in Residential neighborhood environments with minimal vegetation.

Weathering (Corten) steel has the unique characteristic that, under proper conditions, corrodes by forming a dense and tightly adherent oxide barrier that seals out the atmosphere and slows further corrosion. This contrasts with steels that form a course, porous and flaky oxide (rust) which allows the atmosphere to continue penetrating the steel. Generally, Corten steel will patina or rust within six months of atmospheric exposure. Most weathering steel types need wet/dry weather cycles to develop and oxidize. Experience has shown to take up to two years to complete this oxidation process.

Although cleaning and handling of the material can affect the short-term appearance of the product, the overall resistance to corrosion and ultimate appearance of weathering steel is not affected by cleanliness. The appearance, texture, and maturity of this oxide coating depend on time, degree of exposure, and atmospheric environment.

Recommended applications are not to install weathering steel poles in locations as follows:

- Near major highways that are frequently salted in the winter
- In wetland or rough vegetated terrain
- In concrete sidewalks

Weathering steel arms must be bonded to the pole or the pole ground using grounding inserts which are welded to the arms. The rust coating is highly resistive and thus the arm must be grounded even if installed on steel poles.

Multi-section weathering steel poles must have a ground strap across the joint. NES requires steel pole manufacturers to provide stainless steel ground inserts at the joint and every five feet along the pole.

For consistency it is recommended that all metal brackets and arms be grounded to the pole ground. This includes Wood, Concrete, Weathering and Galvanized poles. The practice provides equipotential grounding and increases structure protection (i.e., concrete pole damage due to phase-to-ground faults).

HEIGHT (FT)	WOOD CLASS EQUIVALENT	GL MOMENT CAPACITY (FT-KIPS)	INSTALLATION COMP. UNIT	DWG CODE	STOCK #	REMOVAL CU & DRAWING CODE
CONCRETE POLES (POLES ARE NO LONGER STOCKED & ARE ONLY ORDERED ON DEMAND)						
50	H1	143	OPC50	OPC50-C1	050005000	RO-PC50-60
55	H1	160	OPC55	OPC55-C1	050005500	RO-PC50-60
60	H1	176	OPC60	OPC60-H1	050006000	RO-PC50-60
65	H1	191	OPC65	OPC65-H1	050006500	RO-PC65-75
70	H3	228	OPC70	OPC70-H3	050007000	RO-PC65-75
75	H3	310	OPC75	OPC75-H3	050007500	RO-PC65-75
80	H4	385	OPC80	OPC80-H4	050008000	RO-PC80-100
85	H4	410	OPC85	OPC85-H4	050008500	RO-PC80-100
90	H4	435	OPC90	OPC90-H4	050009000	RO-PC80-100
95	H4	461	OPC95	OPC95-H4	050009500	RO-PC80-100
100	H4	486	OPC100	OPC100-H4	050010000	RO-PC80-100

POLE EMBEDMENT DEPTH

The embedment depth of standard pole sizes in “good” soil conditions is 10% of pole height + 2 ft. However, deeper embedment may be required based on site conditions or pole application. Minimum setting depths are listed on page 10.

“Good Soil” is defined as very dense, well graded sand; hard clay; dense-well graded, fine and coarse sand as described in Soil Classifications on page 11.

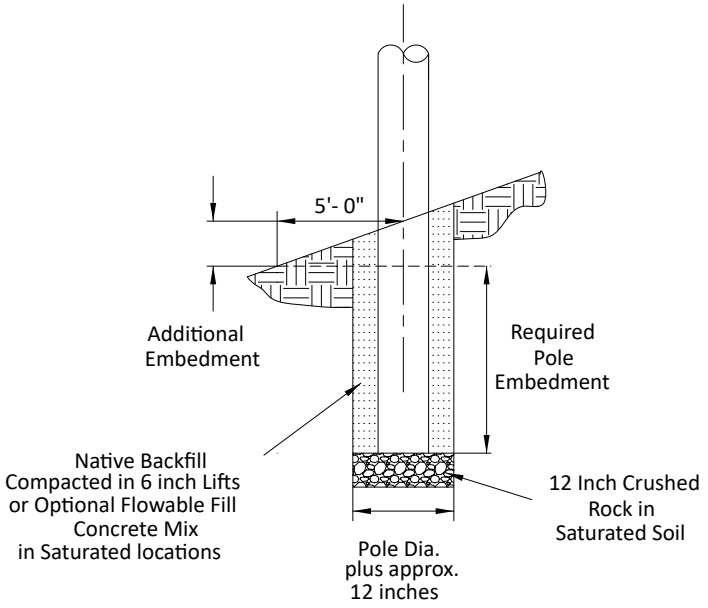
Pole Locations

1) The line construction crew shall check structure locations prior to erecting structures. Review site location for UG utility conflicts per TN-One-Call markings. Poles and specified assemblies must be erected at locations shown on the Engineer's drawings. Contact Engineer if conflicts arise to determine modifications that may be needed prior to excavation.
2) Tangent structures must be erected as shown on the Engineer's drawings. The poles must be placed on the survey centerlines within ¼ of pole diameter of center.
3) Angle structures must be placed so that pole top framing aligns with the bisector of the line angle. Align anchors with pole top framing to make guys align with angle bisector.
4) For dead-end structures in which the line angle is 0 degrees, the structures must be placed on the survey centerline. Align anchors with pole top framing to make guys align with previous structure.

Excavation, Setting, and Backfill

1) Unless otherwise indicated on the drawings by the Engineer, all poles must be embedded in soil to a minimum depth of 10 percent of the pole length plus 2 feet and not to exceed 3 inches deeper.

2) Where the ground is sloping 90 degrees to centerline, the embedded depth of pole structures must be measured from 5'-0" offset from centerline on the low side of the pole.



LENGTH OF POLE (FT)	SETTING DEPTH (FT)	LENGTH OF POLE (FT)	SETTING DEPTH (FT)
35	5.5	75	9.5
40	6.0	80	10.0
45	6.5	85	10.5
50	7.0	90	11.0
55	7.5	95	11.5
60	8.0	100	12.0
65	8.5	105	12.5
70	9.0	110	13.0

3) Locations when the Engineer may require extra setting depths other than minimum standard should be under consideration, but not limited to:

   a) Areas where extra embedment depths are required are next to streams, rivers, or bodies of water where a high water table fluctuation is probable.
   b) Locations using heavy class poles to increase safety or support unguyed angles where a portion of the loading is relatively permanent.
   c) Riser poles where others will be excavating below the ground line for conduits to attach to pole.
   d) Locations where underground utilities such as gas, water or sewer will be located next to pole. Recommend no utilities be placed within minimum of 3 foot of poles to allow for future excavation for pole replacement.

Caution: deep sewer placements often create poor excavation conditions adjacent to poles, due to gravel backfills by the utility contractors. Recommend underground utilities deeper than 4 feet below ground line use flowable fill concrete backfill at pole locations.

4) Excavated pole holes must be a minimum of 8 inches wider than the butt diameter of the pole for air-tamping equipment.

Excavation, Setting, and Backfill (continued)

5) Accumulated water must be removed from the hole prior to setting the pole. Any soil or crushed stone added to level the bottom of the holes must be tamped before the pole is set in the hole.

6) Backfill material must be compactible and suitable for providing a dense compacted soil mass, free of voids, not frozen, and free of stones larger than 2 inches. Where native soil is not suitable for backfill, the crew shall furnish suitable granular imported material for this purpose. Flowable fill concrete maybe used in saturated soil locations with Engineer's approval. Crushed stone base may be required with extra depth to increase ground holding capacity for heavy vertical loaded poles.

   a) Poor soil conditions discovered during excavation should be evaluated (very soft clay, soft clay, or loose sands).
   b) Suitable granular backfill material may use gravel-mixed backfill with less than 2 inch size stones of less than 50 percent of backfill composition mixed with firm clay soil, or flowable fill concrete maybe used in place of native backfill.
   c) All stone backfill is not recommended since grounding electrodes must be driven outside of excavated areas with all stone backfill mixtures.

SOIL CLASSIFICATIONS TABLE

COHESIVE SOILS (CLAY)		COHESIONLESS SOILS (SAND)	
TERM	FIELD TEST	TERM	FIELD TEST
Very Soft	Squeezes between fingers when fist is closed	Loose	Easily penetrated with 1/2-in reinforcing rod pushed by hand
Soft	Easily molded by fingers	Firm	Easily penetrated with 1/2-in reinforcing rod driven w/5 lb hammer
Firm	Molded by strong pressure of fingers	Dense	Penetrated 1 foot with 1/2-in reinforcing rod driven w/5 lb hammer
Stiff	Dented by strong pressure of fingers	Very Dense	Penetrated only a few inches with 1/2-in reinforcing rod driven w/5 lb hammer
Very Stiff	Dented only slightly by finger pressure		
Hard	Dented only slightly by pencil point		

7) Poles must be set plumb before the backfill is placed; and after placing the backfill, the poles must remain plumb. If the poles are out of plumb, the backfill must be removed and replaced. Plumbing of poles by pushing or pulling the structure must not be permitted.

   a) Unguyed angle poles: Raking pole tops according to Engineer's drawings prior to placement of backfill is often required on unguyed angle structures. The design theory for pole rake is based on normal 60 degree temperature for conductors at initial stringing tensions. Thus, pole rotation below the groundline must resist the pole rotation by compaction of the pole backfill.
   b) Guyed angles poles: Raking pole tops toward bisector and dead-end anchors shall be raked one-inch for each 10-feet of pole above groundline.

8) Backfill must be placed around the pole in layers not exceeding 6 inches in depth, with each layer mechanically tamped before the next layer is added. The backfill must be compacted to a density equal to or greater than that of the surrounding undisturbed soil. When approved by the NES Field Supervisor, surplus excavated soil may be carefully spread and leveled on the surface of the ground near the structure and in a manner to minimize damage to the grass areas or other foliage.

9) Backfilling and compaction must be done at a rate no faster than one laborer shoveling fill and two others using mechanical air-tamps or pneumatic tampers.

10) Native soil should be banked up and tamped around the pole to a height no greater than 6 inches above the natural grade and must be sloped away from the pole. In urban areas, consideration should be taken to not leave excavated spoils that will affect pedestrian traffic or cause disturbance to sidewalks, streets, or storm drains inlets.

11) After completion of wire stringing, all poles must be reinspected to check that poles remain plumb and the backfill has not settled. The backfill must be re-tamped at any pole location where the backfill shows settlement or movement. If required, the backfill must be completely dug out, the pole readjusted if necessary, and the backfill re-tamped.

CAUTION: UNGUYED STEEL STUB SETTING SOIL CONDITIONS MUST BE EVALUATED TO ENSURE HOLDING CAPACITY UNDER CONSTANT LOADS.

BACKFILL REQUIREMENTS:

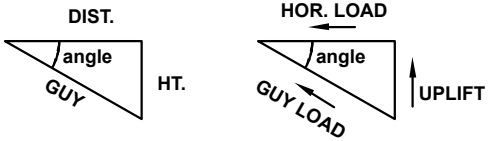
If the stub pole is set in a hole with undisturbed soil conditions, it is acceptable to backfill around the pole with well-graded stone (#4 stone or approved equivalent). The stone should be placed in lifts no greater than 12 inches and mechanically tamped using a vibratory compaction device until stone is densified. If the hole is drilled and exposes poor soil conditions (i.e., wet, unstable side walls, soft, etc.) then backfill should consist of a cementitious material (concrete, flowable fill, polyset or other type approved equivalent). Where varying soil conditions are encountered, the worst soil conditions shall dictate the backfill requirements. **In NO case shall soil be used as backfill** around a self-supporting stub pole.

MINIMUM NESC CLEARANCE HEIGHTS

Item	Pole Height Above Ground	NESC Table 232-1	Lowest Guy Height Above Ground
	(FT.)	Nature of Activity	(Ft.)
A	17.5	Truck Traffic	15.5[1]
A	15.5	Trucks Unlikely	13.5[1]
Note 1: Dimensions based on 6-Vang (1,000 ft-k Stub Pole)			

STUB POLE DIRECT BURIED DEPTH

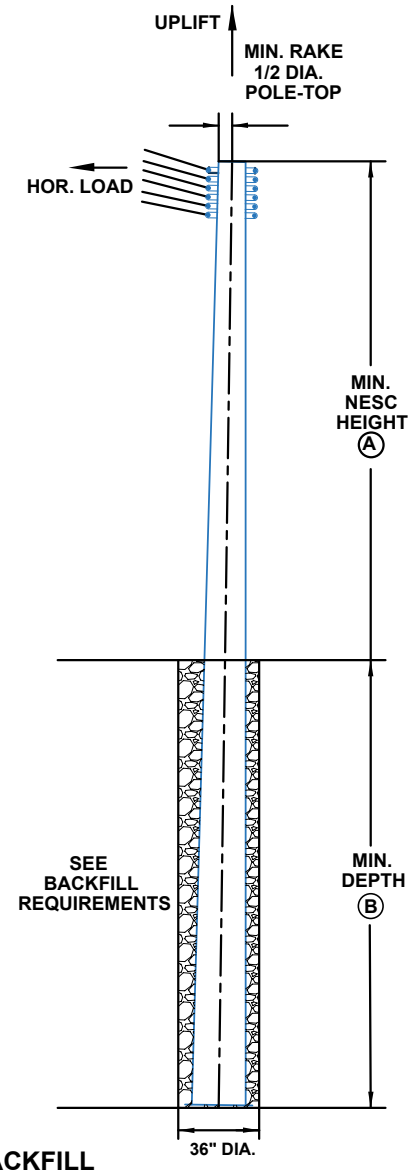
Item	Steel Stub Pole	Req'd Stub Depth	Pier Shaft Dia.	Stub Pole Weight	Soil Uplift[4] Resistance	Total Uplift Resistance
	Moment (ft-k)	(ft)	(in)	(lb)	(lb)	(lb)
B	1,200	15	36	4,550	38,170	42,720
B	750	13	36	2,850	28,670	31,520
Note 2: Minimum Stub Embedded Depth Average Soil						
Note 3: Based on Gravel Friction to Soil Coef. = 0.1; using Sandy Clay Soil: 30° Friction Angle & Dry Unit Wt. = 120 pcf						
Note 4: Recommend consulting with Civil Engineering Group for evaluation conditions to determine if in Excessive Uplift requires concrete pier foundation						



$$GUY = \frac{DIST.}{COS\ (angle)} \qquad GUY\ LOAD = \frac{HOR.\ LOAD}{COS\ (angle)}$$

$$DIST. = \frac{HT.}{TAN\ (angle)} \qquad HOR.\ LOAD = \frac{UPLIFT}{TAN\ (angle)}$$

$$GUY = \frac{HT.}{SIN\ (angle)} \qquad GUY\ LOAD = \frac{UPLIFT}{SIN\ (angle)}$$



STEEL STUB - DIRECT BURIED GRAVEL BACKFILL

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL STUB DIRECT BURIED GRAVEL BACKFILL

STUB POLE FOUNDATION DEPTH

Item	Steel Stub Pole	Rebar Size	Rebar Dia.	Rebar Type	Rebar Circle	Rebar Spacing	Rebar Item Qty.
	Moment (ft-k)	#	(in)	(ksi)	(in)	(in)	
A	1,200	11	1.41	60	45.4	11.5	12
A	750	9	1.13	60	45.1	11.5	12
B	Tie Ring	4	0.5	60	44.0	18 max	Varies[1]
C	Tie Bars	4	0.5	60	NA	18 max	Varies[1]

Note 1: Quantity varies with depth of foundation (max. spacing).

REINFORCEMENT REQUIREMENTS[2]

Item	Anchor bolt type	Rebar Size	Embedded Length	Lap Length
	Moment (ft-k)	#	(in)	(in)
D	1,200	11	54	70
E	750	9	34	44

Note 2: Min. 5,000 psi Concrete Compressive Strength

Note 3: Pier type foundation 54-inch minimum Diameter

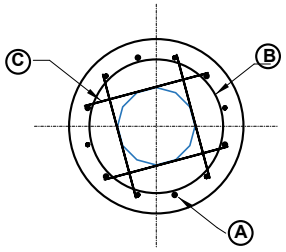
Note 4: Concrete cover btw'n rebar to soil 3-inch min.

MINIMUM NESC CLEARANCE HEIGHTS

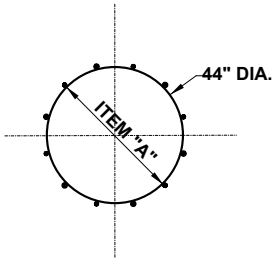
Item	Pole Height Above Ground	NESC Table 232-1	Lowest Guy Height Above Ground
	(FT.)	Nature of Activity	(Ft.)
F	17.5	Truck Traffic	15.5[1]
F	15.5	Trucks Unlikely	13.5[1]

Note 5: Dimensions based on 6-Vang (1,200 ft-k Stub Pole)

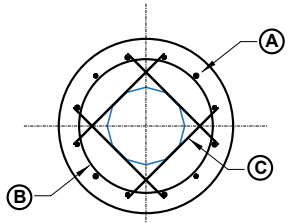
STEEL STUB CONCRETE PIER FOUNDATION



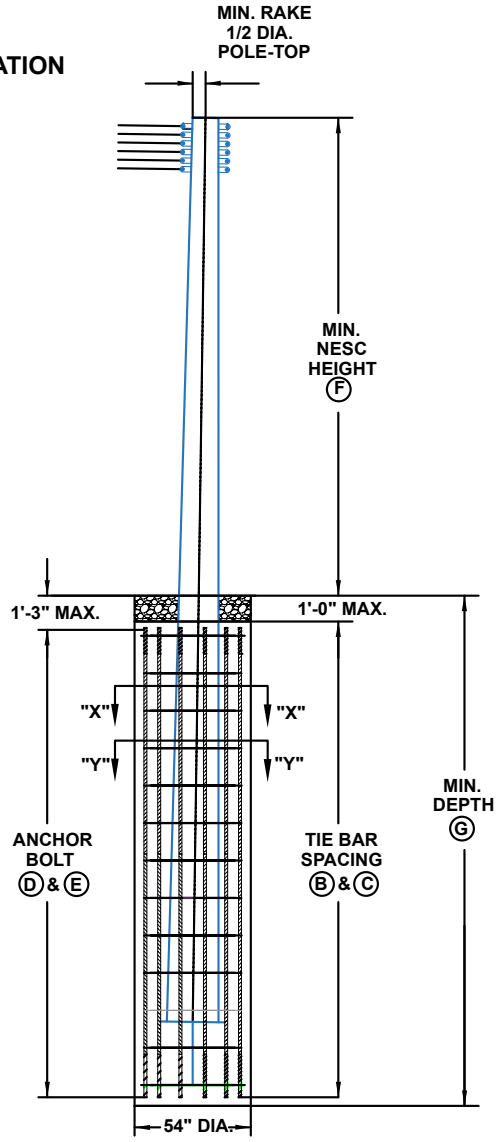
TIE BAR DETAIL
SECTION "X-X"



TIE RING DETAIL



ALTERNATE
TIE BAR DETAIL
SECTION "Y-Y"



STUB POLE FOUNDATION DEPTH

Item	Steel Stub Pole	Req'd Stub Depth	Pier Shaft Dia.	Pier Shaft Below Grnd.[8]	Concrete Foundation Weight	Stub Pole Weight	Steel Rebar Weight	Uplift Dead Weight	Soil Uplift[7] Resistance	Total Uplift Resistance
	Moment (ft-k)	(ft)	(in)	(ft)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)
G	1,200	16[6]	54	21	48,429	4,550	1,233	54,212	69,937	124,150
G	750	14[6]	54	18	41,510	2,850	674	45,034	51,383	96,417

Note 6: Minimum Stub Concrete Embeded Depth required due to Anchor Rebar Moment Capacity.

Note 7: Based on Concrete Friction to Soil Coef. = 0.2; using Inorganic Clay Soil: 20o Friction Angle & Saturated Unit Wt. = 55 pcf

Note 8: Recommend consulting with Civil Engineering Group for evaluation of site conditions to determine final pier depth.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

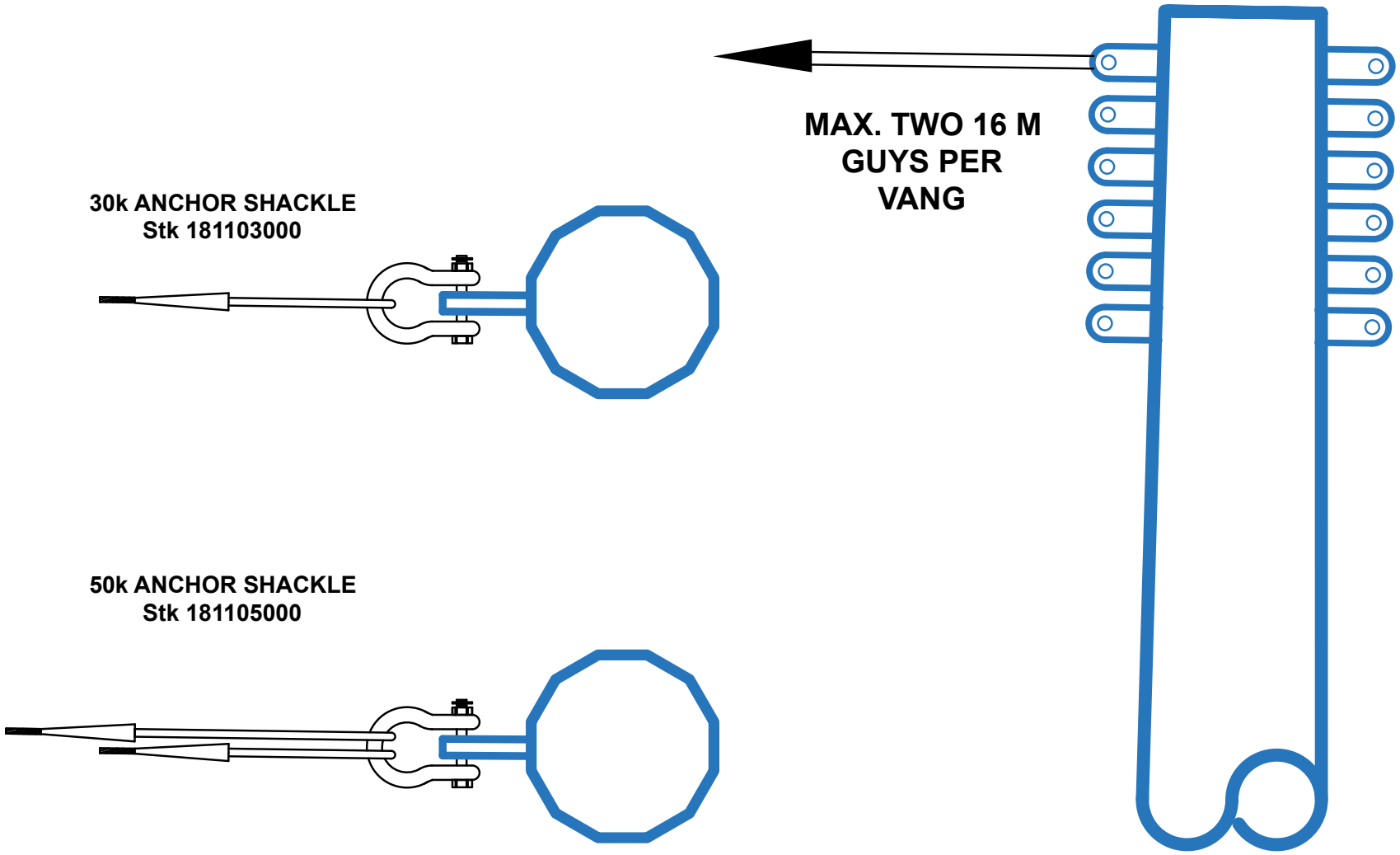
STEEL STUB CONCRETE PIER FOUNDATION

STUB POLE FOUNDATION - REBAR QTY & SPACING REQ'D								
Steel Stub Pole Moment (ft-k)	Rebar Size #	Rebar Spacing (in)	Rebar Area (in^2)	Rebar Type (ksi)	Rebar Capacity (Kips)	Rebar Qty	Rebar Moment Resistant (ft-k)	Hole Min. Dia. (in)
1,200	11	45.4	1.56	60	93.6	12		52.8
MA_{1-7}	11	45.4	1.56	60	93.6	2	354.2	
MA_{2-6}	11	39.3	1.56	60	93.6	4	613.5	
MA_{3-5}	11	22.7	1.56	60	93.6	4	354.2	
M_{total}	11						1,322	52.8
Rebar centered on Neutral Axis								

STUB POLE FOUNDATION - REBAR QTY & SPACING REQ'D								
Steel Stub Pole Moment (ft-k)	Rebar Size #	Rebar Spacing (in)	Rebar Area (in^2)	Rebar Type (ksi)	Rebar Capacity (Kips)	Rebar Qty	Rebar Moment Resistant (ft-k)	Hole Min. Dia. (in)
1,200	11	45.4	1.56	60	93.6	12		52.8
MA_{1-7}	11	43.9	1.56	60	93.6	4	684.3	
MA_{2-6}	11	32.1	1.56	60	93.6	4	500.9	
MA_{3-5}	11	11.8	1.56	60	93.6	4	183.3	
M_{total}	11						1,369	52.8
Rebar rotated 15 degrees from Neutral Axis								

STUB POLE FOUNDATION - REBAR QTY & SPACING REQ'D								
Steel Stub Pole Moment (ft-k)	Rebar Size #	Rebar Spacing (in)	Rebar Area (in^2)	Rebar Type (ksi)	Rebar Capacity (Kips)	Rebar Qty	Rebar Moment Resistant (ft-k)	Hole Min. Dia. (in)
750	9	44.0	1.0	60	60	12		52.5
MA_{1-7}	9	44.0	1.0	60	60	2	220.0	
MA_{2-6}	9	38.1	1.0	60	60	4	381.1	
MA_{3-5}	9	22.0	1.0	60	60	4	220.0	
M_{total}	9						821	52.5
Rebar centered on Neutral Axis								

STUB POLE FOUNDATION - REBAR QTY & SPACING REQ'D								
Steel Stub Pole Moment (ft-k)	Rebar Size #	Rebar Spacing (in)	Rebar Area (in^2)	Rebar Type (ksi)	Rebar Capacity (Kips)	Rebar Qty	Rebar Moment Resistant (ft-k)	Hole Min. Dia. (in)
750	9	44.0	1.0	60	60	12		52.5
MA_{1-7}	9	42.5	1.0	60	60	4	425.0	
MA_{2-6}	9	31.1	1.0	60	60	4	311.1	
MA_{3-5}	9	11.4	1.0	60	60	4	113.9	
M_{total}	9						850	52.5
Rebar rotated 15 degrees from Neutral Axis								



STEEL STUB - GUY HARDWARE

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL STUB
GUYING HARDWARE

ANCHORS

AND

GUYS

GUYS AND ANCHORS

Guys and anchors must be installed at locations shown on the drawings provided by the engineer. Anchor locations shall be staked by the NES engineer. Contact engineer if anchor stakes are missing or appear to be in wrong locations.

The line construction crew shall check structure locations prior to erecting structures. Review site location for UG utility conflicts per TN-One-Call markings. Contact Engineer if conflicts arise to determine modifications that may be needed prior to excavation.

GENERAL INSTALLATION REQUIREMENTS

1) Anchor rods must be installed in line with the guy wire and installed so that no more than six inches of rod (including eye) remain out of the ground after guy tension is applied.

2) Installation of anchor rods for the projection of the Strandvise guy attachments shall not be buried. The use of long bail Strandvise may be used to attach guy assembly above earth when the eye is partially buried. Note: Copperweld guys attached with Strandvise may corrode due to dissimilar metal parts (aluminum, steel, and copper) coming in contact with vegetation or soils in wet locations.

3) Anchors must be of the acceptable NES Standards having equivalent holding capacity per the type, size, and depth. Anchor rod with extensions attachments should be installed such that no more than six inches of rod (including eye) remain out of the ground after guy tension is applied.

4) Power Installed Screw Anchors are specified on Engineers drawings and shall be installed with the appropriate size and type of equipment in accordance with the manufacturer's recommendations. Screw anchors provide there holding strength by penetrating undisturbed soil at minimum depths shown in the NES Standard drawing. Extensions may be required to reach firmer soil layers when torsional resistance has not been achieved. Screw anchors must not be reversed to meet the requirements of project of the rods above the ground.

5) Line construction crew may substitute anchor with NES Standard Expanding Bust Anchor with equivalent capacity as specified on the Engineers drawing. Bust anchors shall be placed in a minimum diameter hole to install the anchor before the anchor is spread. The anchor must be impacted such that the spreader is fully expanded and pierces the undisturbed soil surrounding the excavation. The holes must be backfilled and tamped in the same manner as is required for pole backfilling. Only suitable native soil or approved imported granular material must be used for anchor backfill (see Suitable Granular Backfill in Pole Backfill requirements on Pg. 11).

6) Rock Anchors shown in the NES Standard drawings may be utilized when bust anchors are not an appropriate substitution. Often, bust anchors maybe installed by expanding the anchor between rock layers to achieve holding capacity. Expanding Wedge style Rock Anchors in the NES Standard drawings shall be installed in solid rock only at the discretion of the NES T&D Field Supervisor.

8) Guys shall be installed and attached to the structures as specified before conductors are strung. Each guy must be pretensioned to remove any slack in the guy (no more than 10% of guy strength). Guys shall be re-tensioned after the conductors, messengers, and overhead ground wires are installed to plumb the poles and to equalize tensions in the guys. If slack guys are found, they must be readjusted so that all guys in any structure have approximately equal tension. The final tension in the guys and the plumb of the poles must meet the approval of the NES T&D Field Supervisor.

ANCHOR NAMING CONVENTIONS					
DWG. CODE	ANCHORS	CU CODE	SCREW	EXPANDING	ROCK
15M	15,000 Lbs. HOLDING CAPACITY ANCHOR	OA15M	180170000	180120000	
28M	28,000 Lbs. HOLDING CAPACITY ANCHOR	OA28M	180180000	180160000	
32M	32,000 Lbs. HOLDING CAPACITY ANCHOR	OA32M	180200000	180165000	
28M	53” ROCK ANCHOR	No CU, used at Pole Supervisor’s discretion			180300000
28MR	96” ROCK ANCHOR	No CU, used at Pole Supervisor’s discretion			180320000

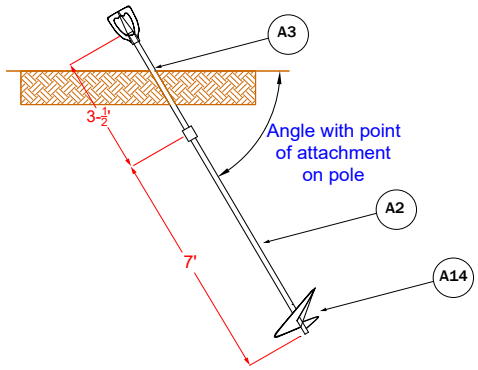
ANCHOR MATERIALS		
DRAWING ITEM	DESCRIPTION	STOCK NUMBER
A1	GUY ADAPTER, TRIPLEYE, FOR 1-1/2" ROD	182400000
A2	ROD SCREW ANCHOR 3/4 X 7	184170000
A3	ROD, EXTENSION W/COUPLING, 3/4" X 3.5'	184175000
A4	ROD ANCHOR TWIN 3/4X8	184180000
A5	ROD, SCREW ANCHOR, 1" X 7'	184210000
A6	ROD, EXTENSION W/COUPLING, 1" X 3.5'	184215000
A7	ROD, EXTENSION 1-1/2 X 3-1/2	184216000
A8	ROD ANCHOR TRIP 1X8	184220000
A9	ROD ANCHOR TRIP 1X10	184260000
A10	ROD ANCHOR TRIP 1-1/4X10	184280000
A11	ANCHOR 135SQ IN 1WAY	180120000
A12	ANCHOR 300SQ IN 4WAY	180160000
A13	ANCHOR 300 SQ IN 4 WAY 1-1/4	180165000
A14	ANCHOR, SCREW, 10" HELIX	180170000
A15	ANCHOR, SCREW, 14" HELIX	180180000
A16	ANCHOR, DBL HELIX, 10"-12"	180200000
A17	ANCHOR ROCK 1X53	180300000
A18	ANCHOR ROCK 1X96	180320000

NOTES

1. Screw type anchors are used for engineering designs. The pole crew may substitue another anchor type if necessary due to soil conditions encountered.

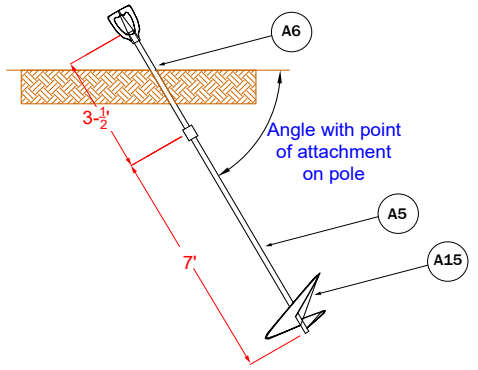
ANCHOR: 10-Inch Helical Screw Type
ROD: 3/4-Inch Diameter x 7-Foot Length
ATTACHMENT: Twin-eye Eyenut
RATING: 15,000 lbs.

15M ANCHOR		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
A14	**1**	ANCHOR, SCREW, 10" HELIX	180170000
A2	**1**	ROD SCREW ANCHOR 3/4 X 7	184170000
A3	**TRUCK STK**	ROD, EXTENSION W/ COUPLING, 3/4" X 3.5'	184175000



ANCHOR: 14-Inch Helical Screw Type
ROD: 1-Inch Diameter x 7-Foot Length
ATTACHMENT: Triple-eye Eyenut
RATING: 28,000 lbs.

28M ANCHOR		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
A15	**1**	ANCHOR, SCREW, 14" HELIX	180180000
A5	**1**	ROD SCREW ANCHOR 1" X 7'	184210000
A6	**TRUCK STK**	ROD, EXTENSION W/ COUPLING, 1" X 3.5'	184215000

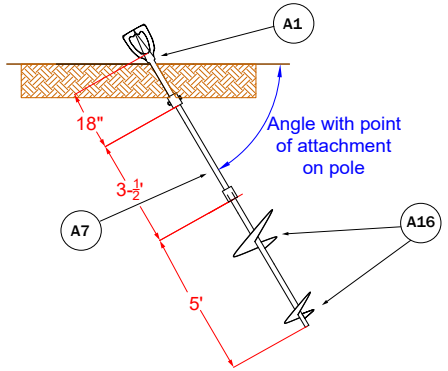


NOTES

1. The loads shown on this page represent the full capacity of each anchor in firm clay, sand, gravel, clay pan and compact sandy loam. Reduce these loads by 20% when setting anchors in soft clay, loose or poorly compacted sand, wet clay or soft clayey silt.
2. After applying loads, anchor eye must not exceed six inches (6") above the ground line.
3. Use any number of extensions to achieve the maximum holding capacity in poor soil.

ANCHOR: Double Helical Screw Type, One 12-Inch & One 10-Inch
ROD: 1-1/2 Inch Sq. Shaft x 10-Foot Length
ATTACHMENT: Twin-eye Guy Adapter
RATING: 32,000 lbs.

32M ANCHOR		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
A16	**1**	ANCHOR, DBL HELIX, 10"-12"	180200000
A1	**1**	GUY ADAPTER, TRIPLEYE, FOR 1-1/2" ROD	182400000
A7	**TRUCK STK**	ROD, EXTENSION 1-1/2 X 3-1/2	184216000



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

ANCHOR CAPACITIES
POWER SCREW ANCHORS

ANCHOR: 135 Sq. Inch Bust Type
ROD: 3/4-Inch Diameter x 8-Foot Length
ATTACHMENT: Forged Triple-eye
RATING: 15,000 lbs.

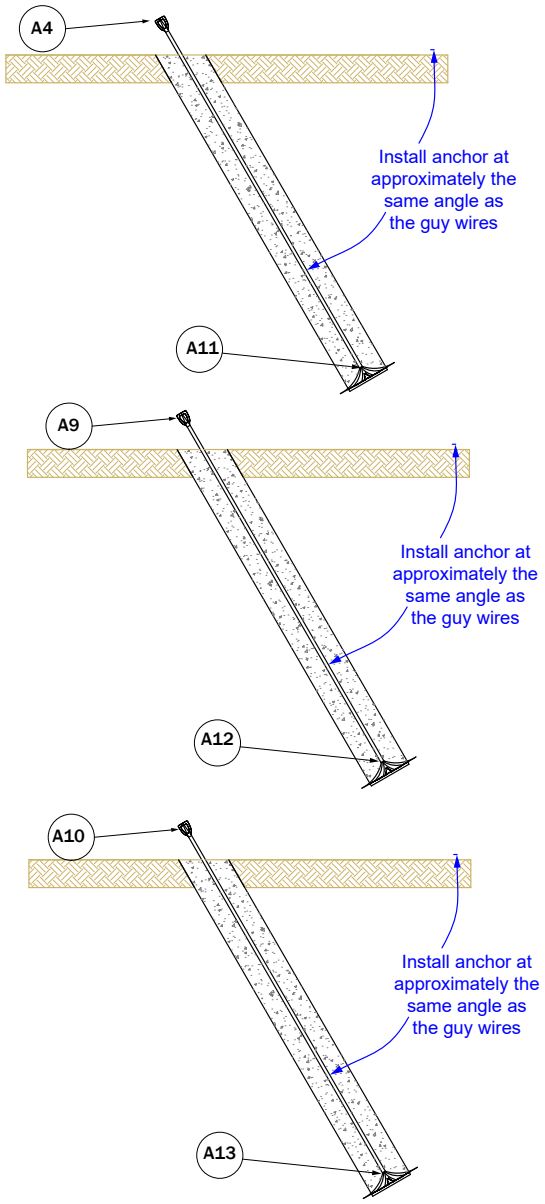
Substitute for 15M ANCHOR		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
A11	1	ANCHOR 135SQ IN 1 WAY	180120000
A4	1	ROD ANCHOR TWIN 3/4X8	184180000

ANCHOR: 300 Sq. Inch Bust Type
ROD: 1-Inch Diameter x 10-Foot Length
ATTACHMENT: Forged Triple-eye
RATING: 28,000 lbs.

Substitute for 28M ANCHOR		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
A12	1	ANCHOR 300SQ IN 4WAY	180160000
A9	1	ROD ANCHOR TRIP 1X10	184260000

ANCHOR: 300 Sq. Inch Bust Type
ROD: 1-1/4 Inch Diameter x 10-foot Length
ATTACHMENT: Forged Triple-eye
RATING: 32,000 lbs.

Substitute for 32M ANCHOR		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
A13	1	ANCHOR 300SQ IN 4WAY 1-1/4	180165000
A10	1	ROD ANCHOR TRIP 1 1/4X10	184280000



NOTES

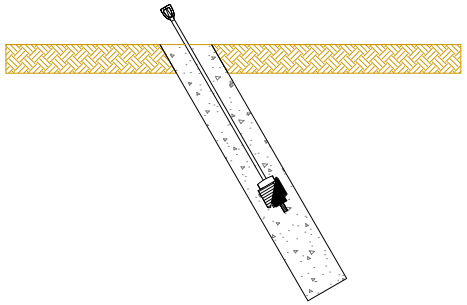
1. The loads shown on this page represent the full capacity of each anchor in firm clay, sand, gravel, clay pan and compact sandy loam. Reduce these loads by 20% when setting anchors in soft clay, loose or poorly compacted sand, wet clay or soft clayey silt.
2. After applying loads, anchor eye must not exceed six inches (6”) above the ground line.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

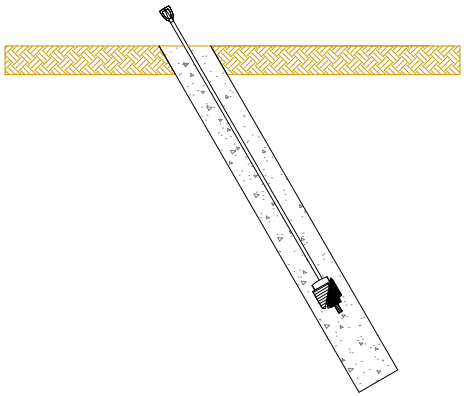
ANCHOR CAPACITIES SPREADING ANCHORS

ANCHOR: Rock Type
ROD: 1-Inch Diameter x 53-inch Length
ATTACHMENT: Forged Triple-eye
RATING: 28,000 lbs.



Substitute for 28M ANCHOR		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
A17	**1**	ANCHOR ROCK 1X53	18030000

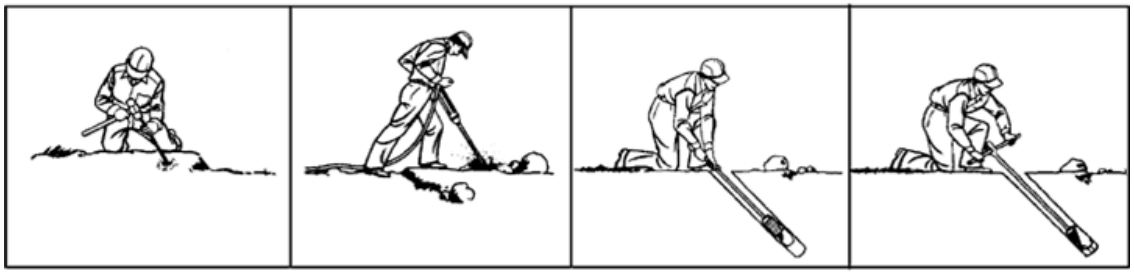
ANCHOR: Rock Type
ROD: 1-Inch Diameter x 96-inch Length
ATTACHMENT: Forged Triple-eye
RATING: 28,000 lbs.



Substitute for 28M ANCHOR		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
A18	**1**	ANCHOR ROCK 1X96	180320000

NOTES

1. Ultimate strength ratings apply to properly installed anchors only. Failure to install within 5° of alignment with the guy load will significantly lower strength.
2. Eye must protrude from ground line no more than six inches (6”) after load has been applied.
3. 3. Rock bit must be installed in a minimum of three feet (3’) solid rock to obtain full holding power.
4. Recommended minimum installation depth is 12” in solid rock.



Drill hole by hand . . . | . . . or with power tool | . . . push anchor into hole | . . . turn rod to expand.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

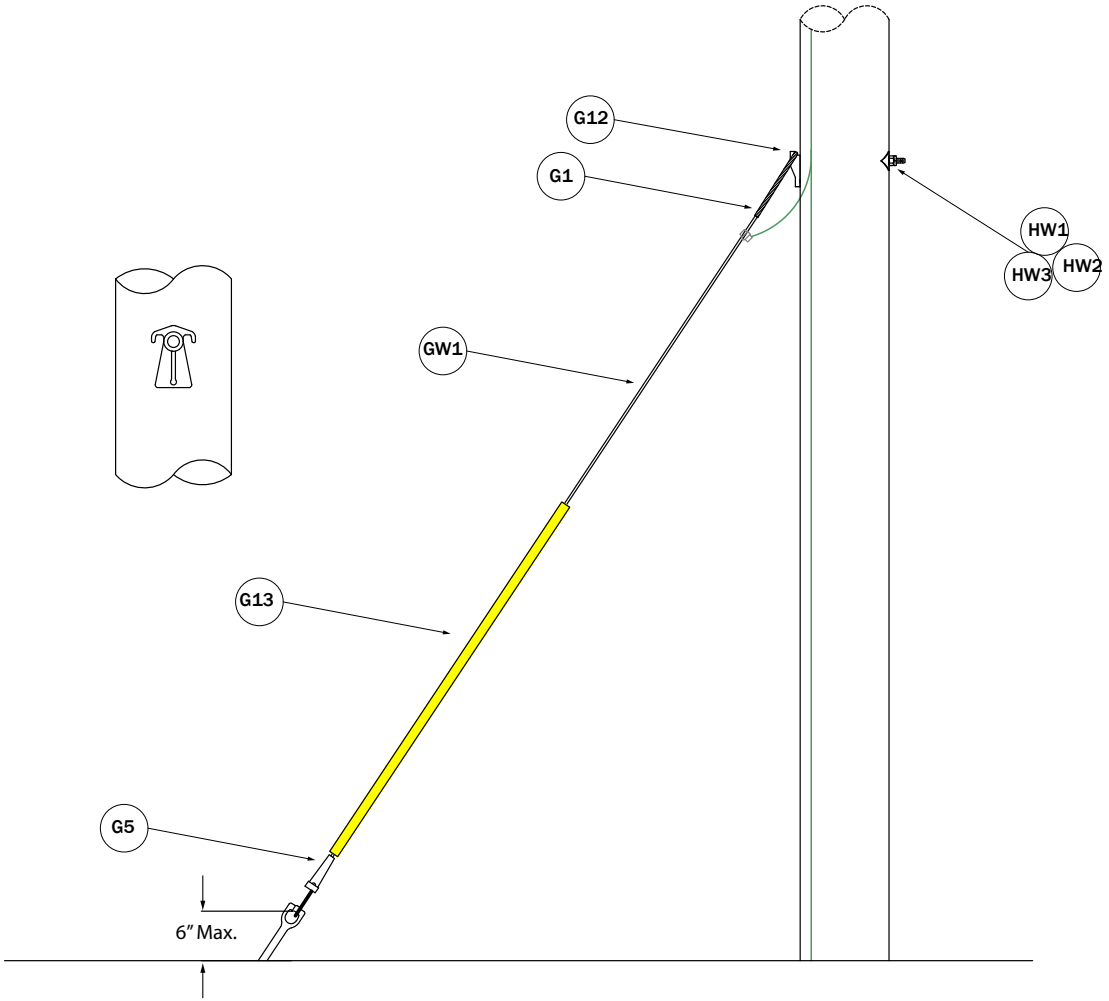
ANCHOR CAPACITIES ROCK ANCHORS

GUYING NAMING CONVENTIONS				
DRAWING CODES	DESCRIPTION	C.U.	STOCK NUMBER	
6M	6,000 LBS. DOWN GUY WOOD POLE	OGD6	016020000	5/16” GALV
12M	12,000 LBS. DOWN GUY WOOD POLES	OGD12	016041000	3/8” EHS GALV
6MS	6,000 LBS.SPAN GUY STEEL/CONC. POLES	OGD6-S	016020000	5/16” GALV
12M	12,000 LBS. DOWN GUY STEEL/CONC. POLES	OGD12-S	016041000	3/8” EHS GALV
2-12M	2-12,000 LBS. DOWN GUYS STEEL/WOOD POLE	OGD12DBL-S	016041000	3/8” EHS GALV
6M	6,000 LBS. SPAN GUY WOOD	OGS6	016020000	5/16” GALV
12M	12,000 LBS. SPAN GUY WOOD POLES	OGS12	016041000	3/8” EHS GALV
6MS	6,000 LBS. SPAN GUY STEEL/CONC. POLES	OGS6-S	016020000	5/16” GALV
2-6M	DOUBLE 6,000 LBS. SPAN GUY WOOD	OGS6DBL	016020000	5/16” GALV
2-6MS	DOUBLE 6,000 LBS. SPAN GUY STEEL/CONC.	OGS6DBL-S	016020000	5/16” GALV
2-12MS	DOUBLE 12,000 LBS. SPAN GUY STEEL/CONC.	OGS12DBL-S	016041000	3/8” EHS GALV
12M-SDWK	12,000 LBS. SIDEWALK GUY WOOD OR STEEL	OGSW12	016041000	3/8” EHS GALV
12M-SDWK	DOUBLE 12,000 LBS. SIDEWALK GUY WOOD OR STEEL	OGSW12-2	016041000	3/8” EHS GALV
54” FG STICK	54” FIBERGLASS INSULATOR	OFGI-54	240750000	
120” FG STICK	120” FIBERGLASS INSULATOR	OFGI-120	240780000	

MATERIALS		
DWG ITEM #	**DESCRIPTION**	**STOCK #**
GUYING MATERIALS (WIRE)		
GW1	WIRE GALV GUY 5/16	16020000
GW2	WIRE GALV GUY 3/8 COILS	16040000
	WIRE GALV GUY 3/8 REEL	16041000
GUYING MATERIALS (DEAD–ENDS)		
G1	DEADEND PREFORMED 5/16	230120000
G2	DEADEND PREFORMED 3/8	230140000
G3	DEAD END TEE FOR GUYING	230180000
G4	DEAD END AND GUYING TEE, 1" BOLTS	230190000
G5	STRANDVISE GUY 5/16	231100000
G6	STRANDVISE GUY 5/16 LONG BAIL	231105000
G7	STRANDVISE GUY 3/8	231120000
G8	STRANDVISE GUY 3/8 LONG BAIL	231125000
G9	STRANDVISE PULLING HOOK	231160000
G10	PLATE POLE EYE	183800000
G11	PLATE POLE SIDEWALK GUY	183900000
G12	HOOK GUY 3/4 MACH BOLT	182440000
G13	MARKER GUY/YELLOW	181920000
G14	ANCHOR SHACKLE 30K	181103000

MATERIALS		
DWG ITEM #	**DESCRIPTION**	**STOCK #**
GUYING MATERIALS (THIMBLE AND CLEVIS)		
CL2	CLEVIS THIMBLEYE LARGE	181520000
CL3	CLEVIS Y EYE, 90 DEGREE	181210000
GUYING MATERIALS (HARDWARE)		
HW1	BOLT MACH 3/4 X LENGTH (AS REQ'D)	204xxxxxx
HW2	3/4" DBL COIL SPRING WASHER	206580000
HW3	WASHER SQ CURVED 3 1/4"	209520000
HW4	BOLT MACHINE 1 X LENGTH (AS REQ'D)	20428xxxx
HW5	WASHER SQ CURVED 4" FOR 1" BOLTS	209530000
HW6	PIPE GALV 2	464650000
HW7	PLATE CL fitt sw gy sing	183540000
HW8	PLATE CL fitt sw gy DBLE	183560000
HW9	SCREW LAG 3/8" X 2 1/2" GALV	208530000
GUYING MATERIALS (INSULATORS)		
IG1	INSUL GUY STRN/FIB GLASS 54 IN	240750000
IG2	INSUL GUY STRN/FIB GLASS 120 IN	240780000

6M GUY CU CODE: OGD6		MATERIAL LIST	
ITEM	QTY	DESCRIPTION	STOCK #
GW1	50’	WIRE GALV GUY 5/16	016020000
G13	1	MARKER GUY/YELLOW	181920000
G12	1	HOOK GUY 3/4 MACH BOLT	182440000
HW1	1	BOLT MACH 3/4 X REQ. LENGTH	2041_____
HW2	1	3/4” DBL COIL SPRING WASHER	206580000
HW3	1	WASHER SQ CURVED 3 1/4	209520000
G1	1	DEADEND PREFORMED 5/16	230120000
G5	1	STRANDVISE GUY 5/16	231100000



NOTES

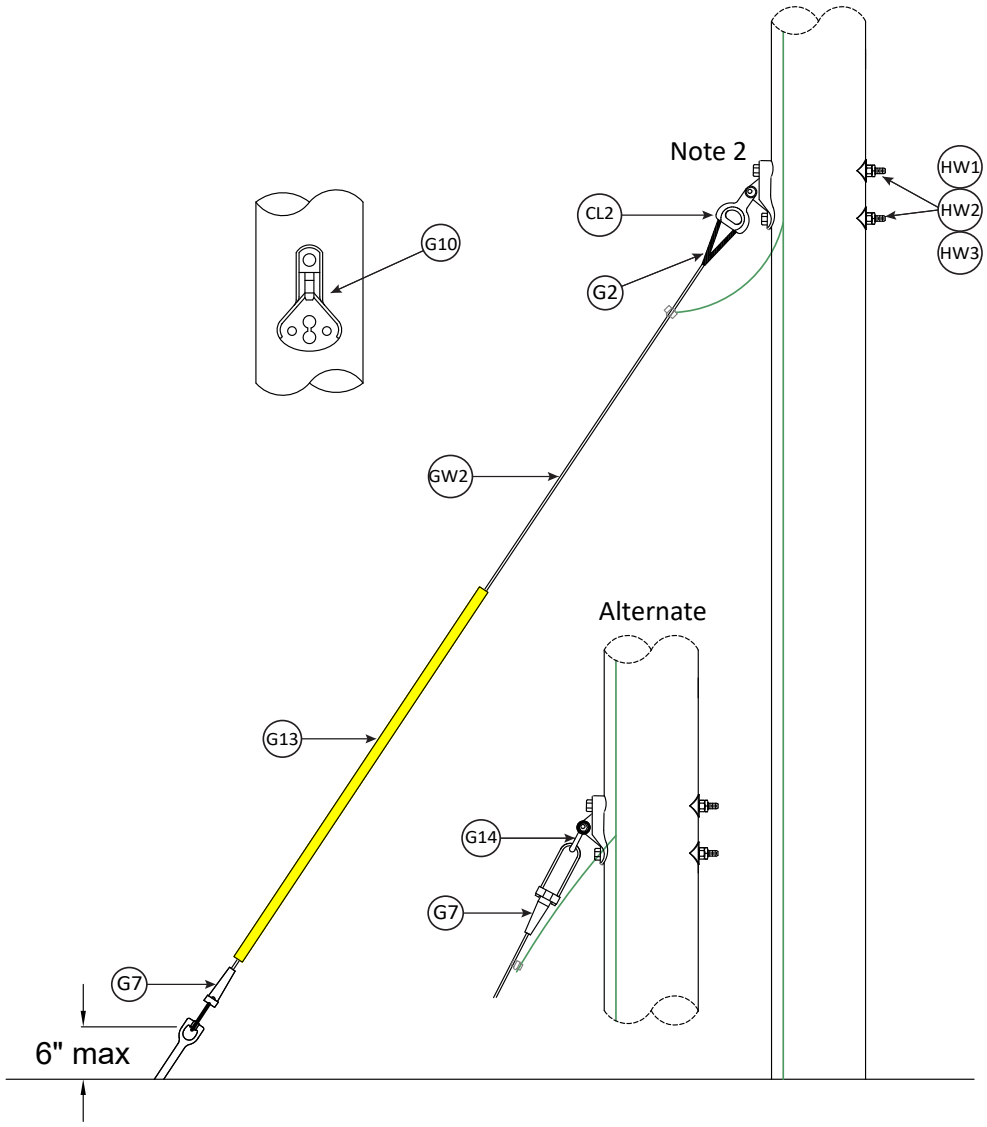
1. Install yellow guy markers on all guy installations.
2. Ground guys per the Grounding section of the Plate Book.
3. Preformed dead end may be substituted with an automatic dead end/strandvise.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
6000 LB DOWN GUY

12M GUY CU CODE: OGD12		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
GW2	**50'**	WIRE GALV GUY 3/8 COILS	**016040000**
G14	**1**	ANCHOR SHACKLE 30K	**181103000**
CL2	**1**	CLEVIS THIMBLEYE LARGE	**181520000**
G13	**1**	MARKER GUY/YELLOW	**181920000**
G10	**1**	PLATE POLE EYE	**183800000**
HW1	**2**	BOLT MACH 3/4 X REQ. LENGTH	**2041_____**
HW2	**2**	3/4" DBL COIL SPRING WASHER	**206580000**
HW3	**2**	WASHER SQ CURVED 3 1/4	**209520000**
G2	**1**	DEADEND PREFORMED 3/8	**230140000**
G7	**1**	STRANDVISE GUY 3/8	**231120000**



NOTES

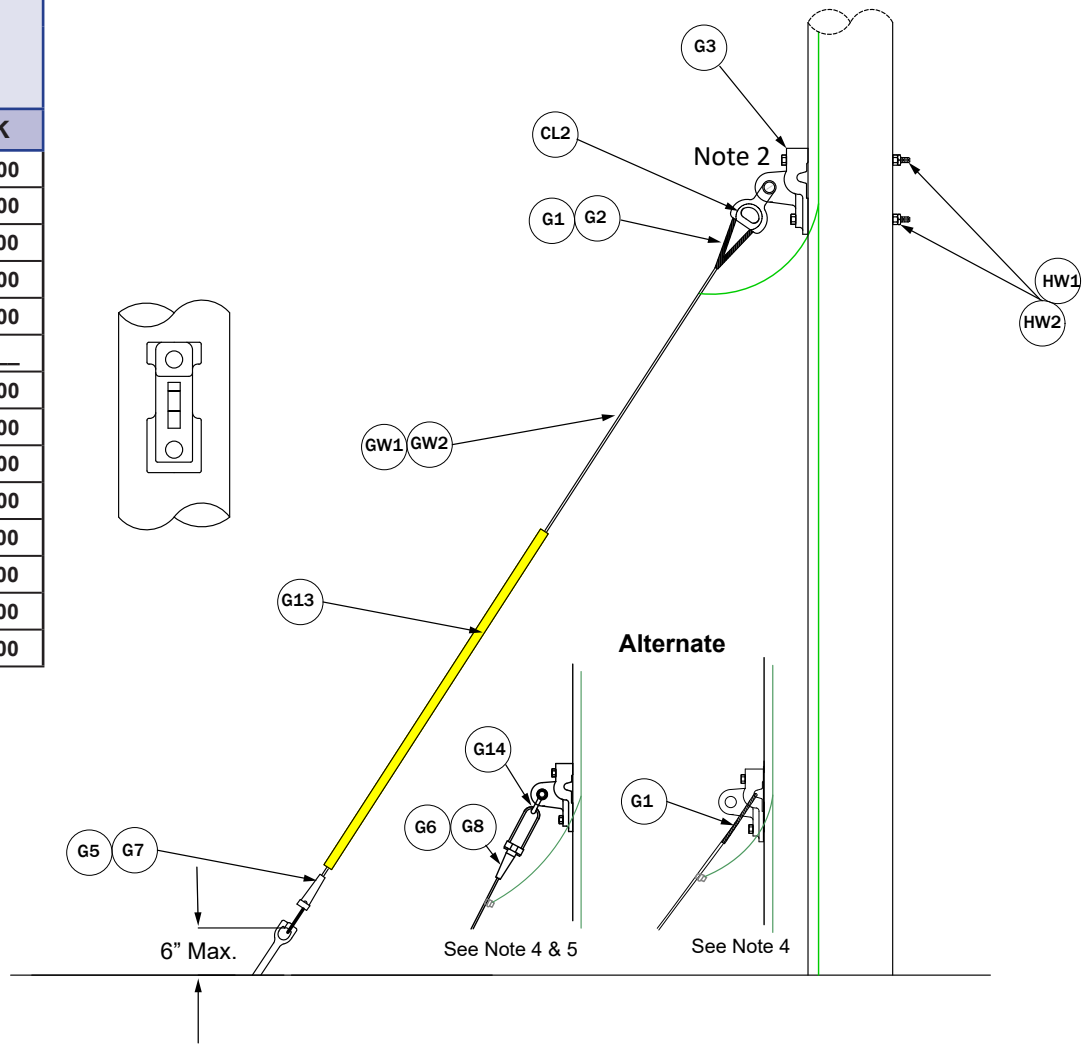
1. Install yellow guy markers on all guy installations.
2. Install Fiberglass Strain Insulators as req'd. Refer to Pg 37 for more detail.
3. Ground guys per the Grounding section of the Plate Book.
4. Preformed dead end may be substituted with an automatic dead end/strandvise.
5. A thimbleye clevis may be substituted for the anchor shackle.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
12,000 LB DOWN GUY

	6M GUY	12M GUY	MATERIAL LIST	
	CU CODE: OGD6-S	CU CODE: OGD12-S		
ITEM #	QTY	QTY	DESCRIPTION	STOCK
GW1	50’	-	WIRE GALV GUY 5/16	016020000
GW2	-	50’	WIRE GALV GUY 3/8 COILS	016040000
G14	1	1	ANCHOR SHACKLE 30K	181103000
CL2	-	1	CLEVIS THIMBLEYE LARGE	181520000
G13	1	1	MARKER GUY/YELLOW	181920000
HW1	2	2	BOLT MACH 3/4 X REQ. LENGTH	2041_____
HW2	2	2	3/4” DBL COIL SPRING WASHER	206580000
G1	1	-	DEADEND PREFORMED 5/16	230120000
G2	-	1	DEADEND PREFORMED 3/8	230140000
G3	1	1	DEAD END TEE FOR GUYING	230180000
G5	1	-	STRANDVISE GUY 5/16	231100000
G6	1	-	STRANDVISE GUY 5/16 LONG BAIL	231105000
G7	-	1	STRANDVISE GUY 3/8	231120000
G8	-	1	STRANDVISE GUY 3/8 LONG BAIL	231125000



NOTES

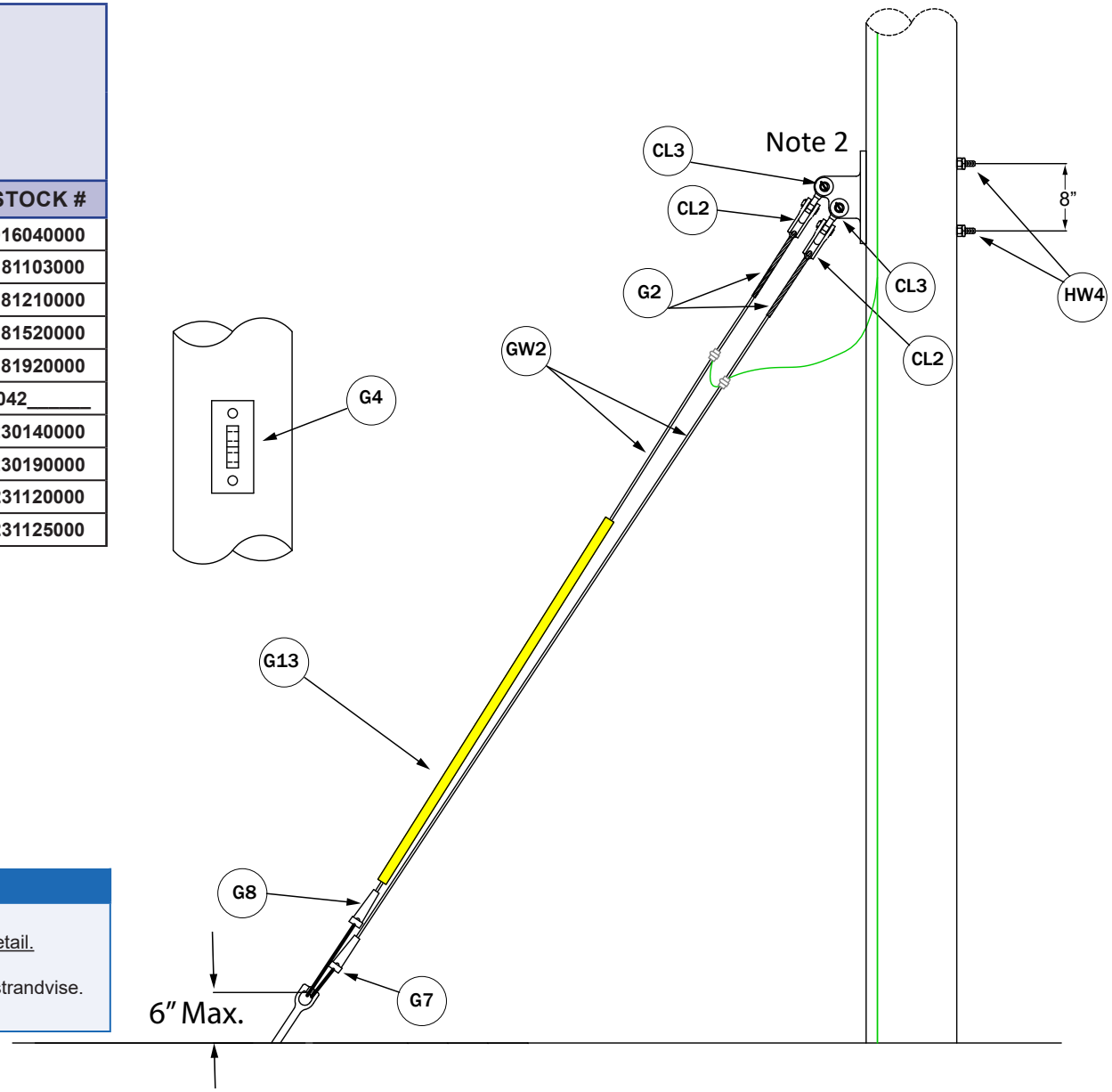
1. Install yellow guy markers on all guy installations.
2. Install Fiberglass Strain Insulators as req’d. Refer to Pg 37 for more detail.
3. Ground guys per the Grounding section of the Plate Book.
4. Preformed dead end may be substituted with an automatic dead end/strandvise.
5. A thimbleye clevis may be substituted for the anchor shackle.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL OR CONCRETE POLE 6,000 & 12,000 LB DOWN GUY

2-12M GUYS CU CODE: OGD12DBL	MATERIAL LIST		
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
GW2	100’	WIRE GALV GUY 3/8 COILS	016040000
G14	2	ANCHOR SHACKLE 30K	181103000
CL3	2	CLEVIS Y EYE, 90 DEGREE	181210000
CL2	2	CLEVIS THIMBLEYE LARGE	181520000
G13	1	MARKER GUY/YELLOW	181920000
HW4	2	BOLT MACH 1 X REQ. LENGTH	2042_____
G2	2	DEADEND PREFORMED 3/8	230140000
G4	1	DEAD END AND GUYING TEE, 1” BOLTS	230190000
G7	1	STRANDVISE GUY 3/8	231120000
G8	1	STRANDVISE GUY 3/8 LONG BAIL	231125000



NOTES

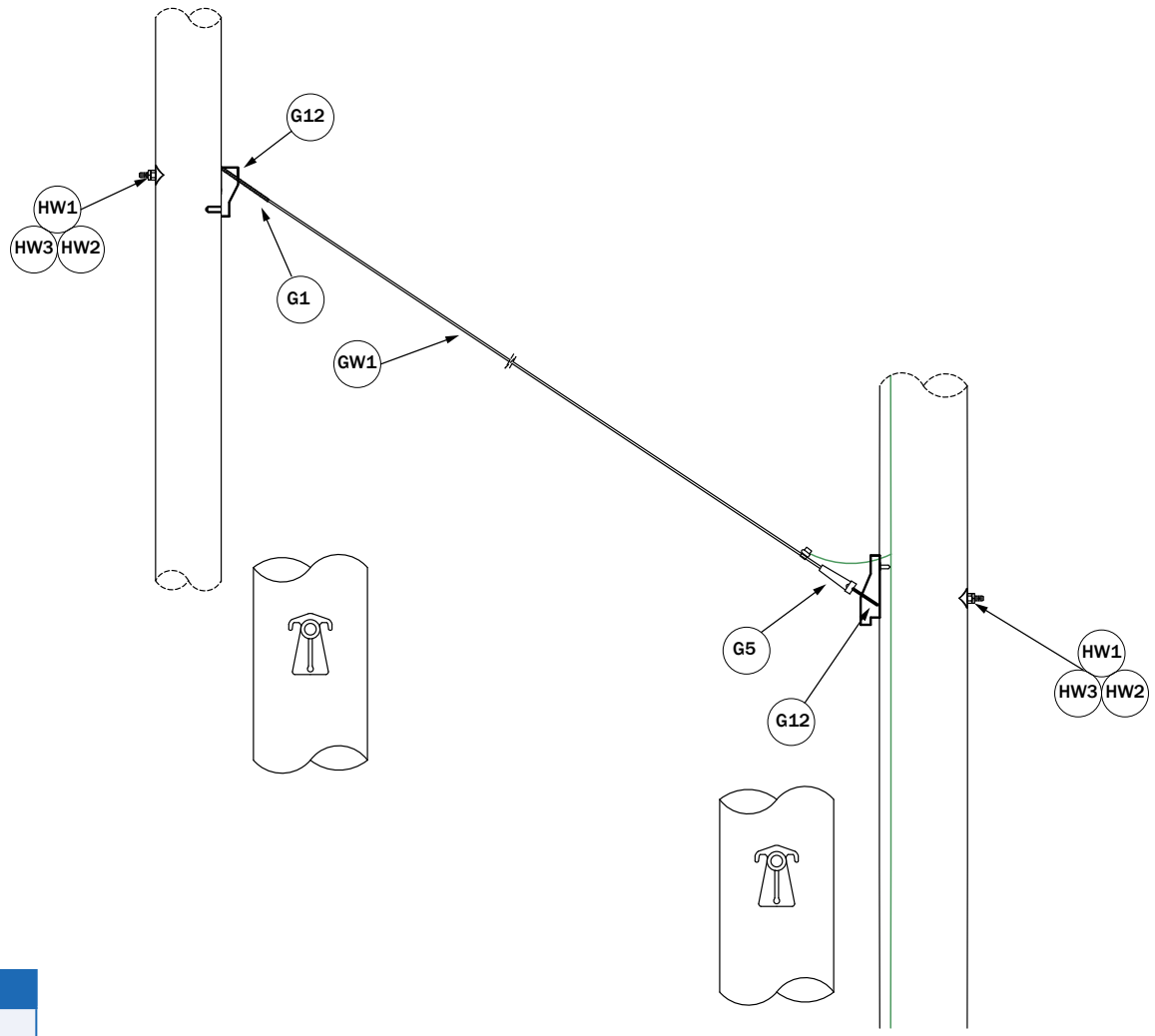
1. Install yellow guy markers on all guy installations.
2. Install Fiberglass Strain Insulators as req’d. Refer to Pg 37 for more detail.
3. Ground guys per the Grounding section of the Plate Book.
4. Preformed dead end may be substituted with an automatic dead end/strandvise.
5. A thimbleye clevis may be substituted for the anchor shackle.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL, CONCRETE & WOOD POLE
DOUBLE 12,000 LB DOWN GUY

6M SPAN GUY CU CODE: OGS6		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
GW1	100’	WIRE GALV GUY 5/16	016020000
G12	2	HOOK GUY 3/4 MACH BOLT	182440000
HW1	2	BOLT MACH 3/4 X REQ. LENGTH	2041_____
HW2	2	3/4” DBL COIL SPRING WASHER	206580000
HW3	2	WASHER SQ CURVED 3 1/4	209520000
G1	1	DEADEND PREFORMED 5/16	230120000
G5	1	STRANDVISE GUY 5/16	231100000



NOTES

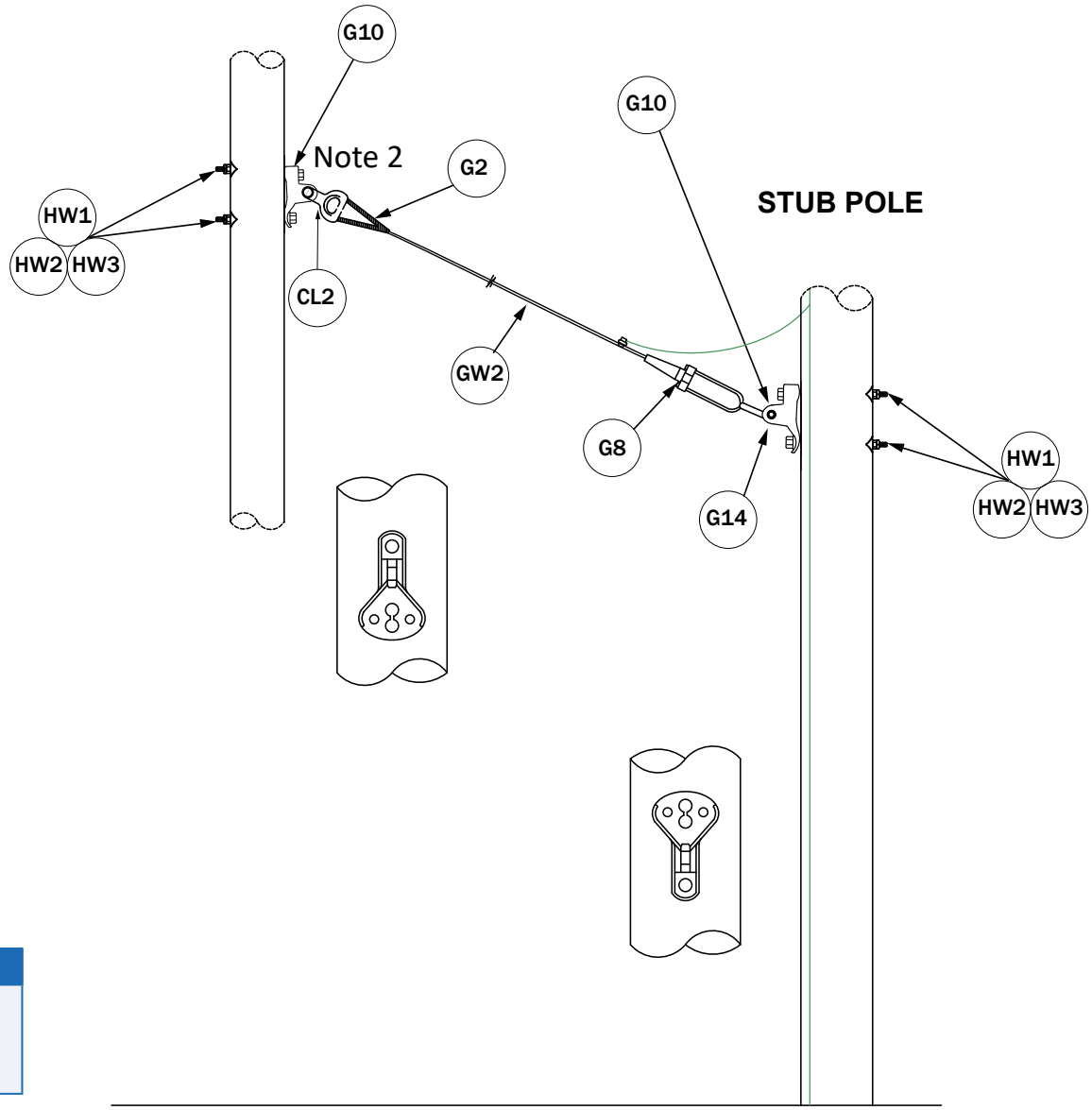
1. Performed dead end may be substituted with an automatic dead end/strandvise.
2. Ground guys per the Grounding section of the Plate Book.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
6,000 LB SINGLE SPAN GUY

12M SPAN GUY CU CODE: OGS12		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
GW2	100’	WIRE GALV GUY 3/8 COILS	016040000
G14	1	ANCHOR SHACKLE 30K	181103000
CL2	1	CLEVIS THIMBLEYE LARGE	181520000
G10	2	PLATE POLE EYE	183800000
HW1	4	BOLT MACH 3/4 X REQ. LENGTH	2041_____
HW2	4	3/4” DBL COIL SPRING WASHER	206580000
HW3	4	WASHER SQ CURVED 3 1/4	209520000
G2	1	DEADEND PREFORMED 3/8	230140000
G11	1	STRANDVISE GUY 3/8 LONG	231125000



NOTES

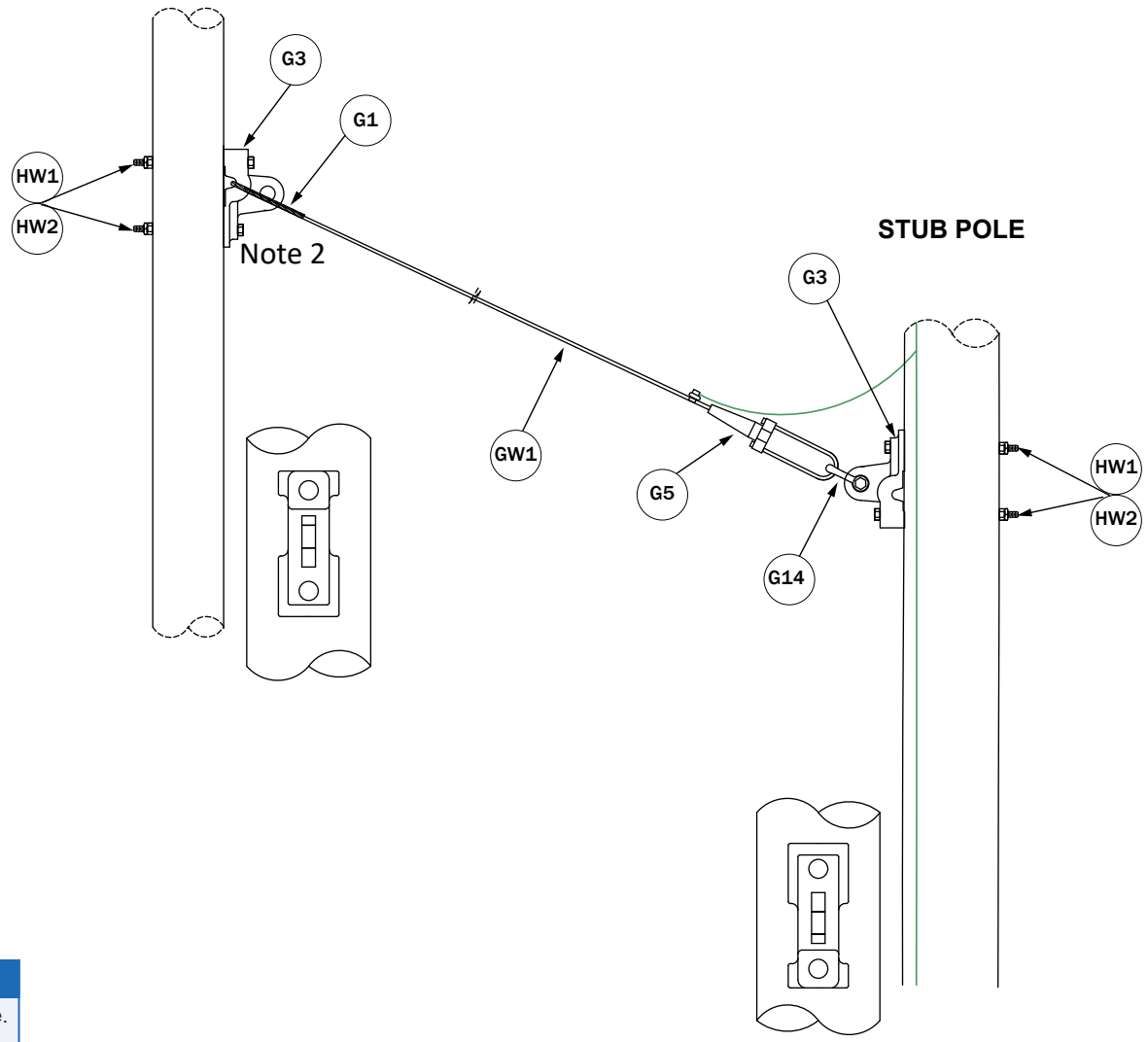
1. Preformed dead end may be substituted with an automatic dead end/strandvise.
2. Install Fiberglass Strain Insulators as req’d. Refer to Pg 37 for more detail.
3. Ground guys per the Grounding section of the Plate Book.
4. A thimbleye clevis may be substituted for the anchor shackle.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
12,000 LB SINGLE SPAN GUY

6M SPAN GUY CU CODE: OGS6-S		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
GW1	100’	WIRE GALV GUY 5/16	016020000
G14	1	ANCHOR SHACKLE 30K	181103000
HW1	4	BOLT MACH 3/4 X REQ. LENGTH	2041_____
HW2	4	3/4” DBL COIL SPRING WASHER	206580000
G1	1	DEADEND PREFORMED 5/16	230120000
G3	2	DEAD END TEE FOR GUYING	230180000
G5	1	STRANDVISE GUY 5/16	231100000



NOTES

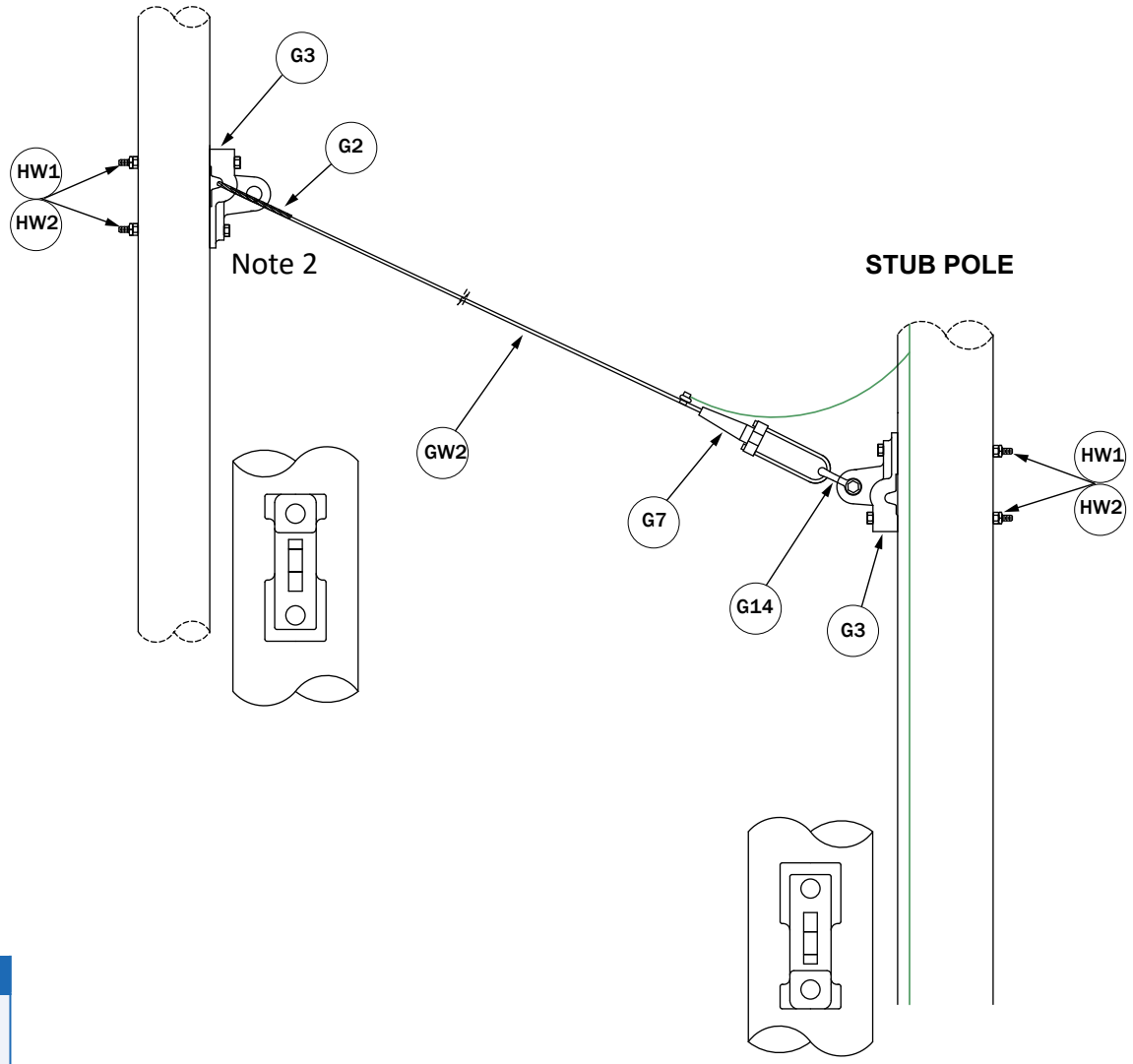
1. Preformed dead end may be substituted with an automatic dead end/strandvise.
2. Install Fiberglass Strain Insulators as req’d. Refer to Pg 37 for more detail.
3. Ground guys per the Grounding section of the Plate Book.
4. A thimbleye clevis may be substituted for the anchor shackle.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL OR CONCRETE POLE
6,000 LB SINGLE SPAN GUY

12M SPAN GUY CU CODE: OGS12-S		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
GW2	100’	WIRE GALV GUY 3/8 COILS	016040000
G14	1	ANCHOR SHACKLE 30K	181103000
HW1	4	BOLT MACH 3/4 X REQ. LENGTH	2041_____
HW2	4	3/4” DBL COIL SPRING WASHER	206580000
G2	1	DEADEND PREFORMED 3/8	230140000
G3	2	DEAD END TEE FOR GUYING	230180000
G7	1	STRANDVISE GUY 3/8	231120000



NOTES

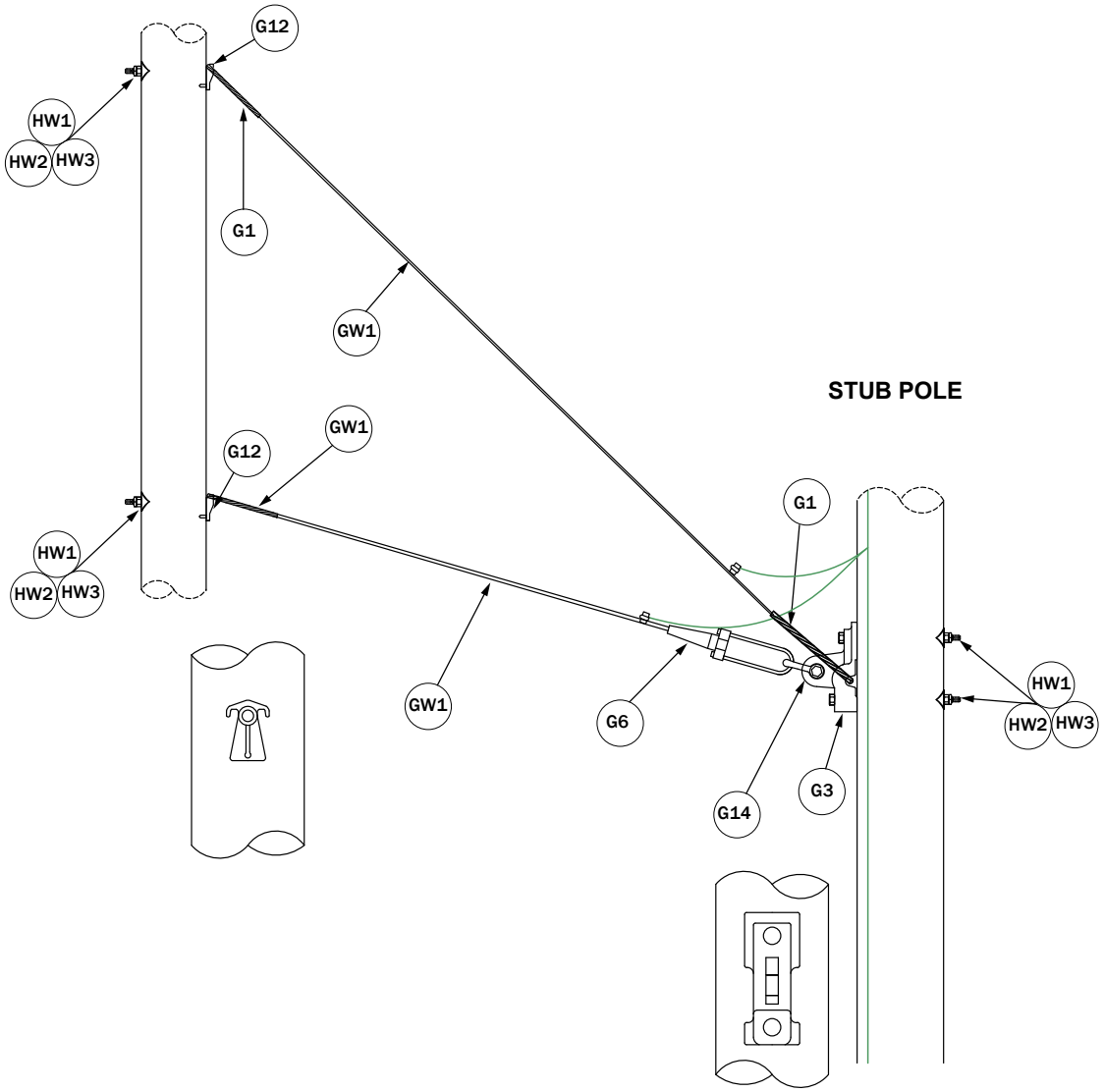
1. Preformed dead end may be substituted with an automatic dead end/strandvise.
2. Install Fiberglass Strain Insulators as req’d. Refer to Pg 37 for more detail.
3. Ground guys per the Grounding section of the Plate Book.
4. A thimbleye clevis may be substituted for the anchor shackle.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL OR CONCRETE POLE
12,000 LB SINGLE SPAN GUY

2-6M SPAN GUYS CU CODE: OGS6DBL	MATERIAL LIST		
ITEM #	QTY	DESCRIPTION	STOCK #
GW1	200’	WIRE GALV GUY 5/16	016020000
G14	1	ANCHOR SHACKLE 30K	181103000
G12	2	HOOK GUY 3/4 MACH BOLT	182440000
HW1	4	BOLT MACH 3/4 X REQ. LENGTH	2041_____
HW2	4	3/4” DBL COIL SPRING WASHER	206580000
HW3	4	WASHER SQ CUEVED 3 1/4	209520000
G1	2	DEADEND PREFORMED 5/16	230120000
G3	1	DEAD END TEE FOR GUYING	230180000
G6	1	STRANDVISE GUY 5/16 LONG	231105000



NOTES

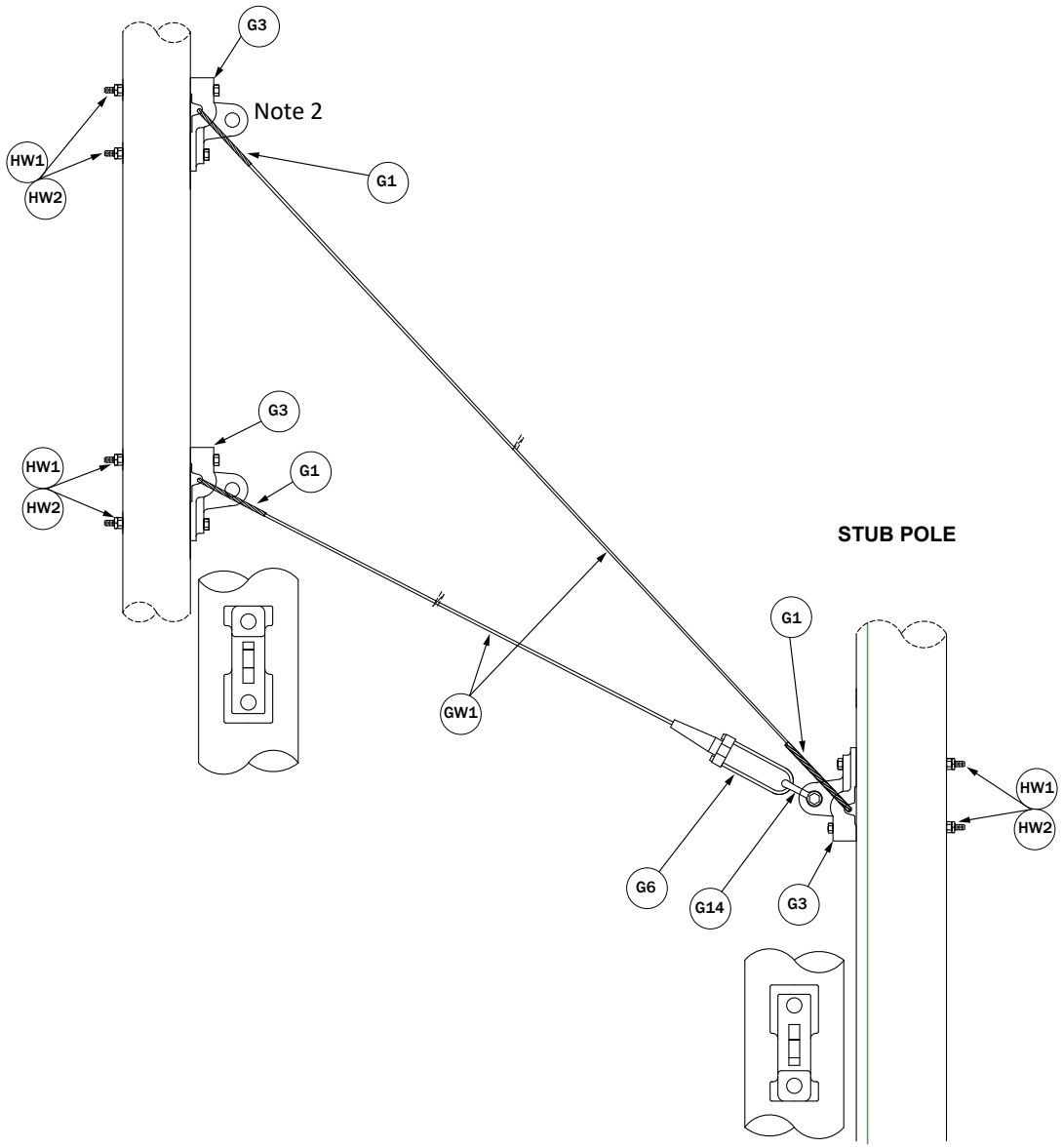
1. Preformed dead end may be substituted with an automatic dead end/strandvise.
2. Ground guys per the Grounding section of the Plate Book.
3. A thimbleye clevis may be substituted for the anchor shackle.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
6,000 LB DOUBLE SPAN GUY

2-6M SPAN GUYS CU CODE: OGS6DBL-S		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
GW1	200’	WIRE GALV GUY 5/16	016020000
G14	1	ANCHOR SHACKLE 30K	181103000
HW1	6	BOLT MACH 3/4 X REQ. LENGTH	2041_____
HW2	6	3/4” DBL COIL SPRING WASHER	206580000
G1	2	DEADEND PREFORMED 5/16	230120000
G3	3	DEAD END TEE FOR GUYING	230180000
G6	2	STRANDVISE GUY 5/16 LONG	231105000



NOTES

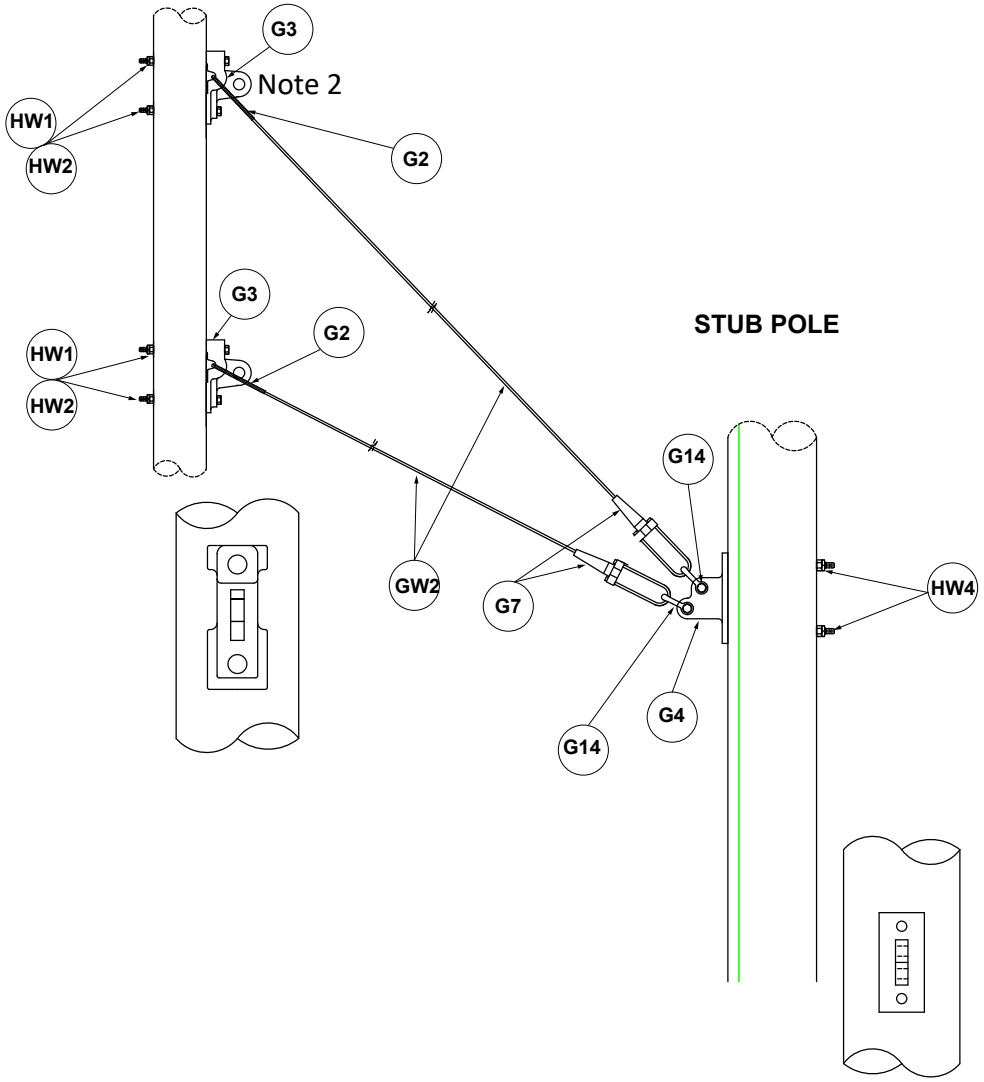
1. Preformed dead end may be substituted with an automatic dead end/strandvise.
2. Install Fiberglass Strain Insulators as req’d. Refer to Pg 37 for more detail.
3. Ground guys per the Grounding section of the Plate Book.
4. A thimbleye clevis may be substituted for the anchor shackle.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL OR CONCRETE POLE
6,000 LB DOUBLE SPAN GUY

2-12M SPAN GUYS CU CODE: OGS12DBL-S		MATERIAL LIST	
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
GW2	100’	WIRE GALV GUY 3/8 COILS	016040000
G14	1	ANCHOR SHACKLE 30K	181103000
HW1	4	BOLT MACH 3/4 X REQ. LENGTH	2041_____
HW4	2	BOLT MACH 1 X REQ. LENGTH	2042_____
HW2	4	3/4” DBL COIL SPRING WASHER	206580000
G2	2	DEADEND PREFORMED 3/8	230140000
G3	2	DEAD END TEE FOR GUYING	230180000
G4	1	DEAD END AND GUYING TEE, 1" BOLTS	230190000
G7	2	STRANDVISE GUY 3/8	231120000



NOTES

1. Preformed dead end may be substituted with an automatic dead end/strandvise.
2. Install Fiberglass Strain Insulators as req’d. Refer to Pg 37 for more detail.
3. Ground guys per the Grounding section of the Plate Book.
4. A thimbleye clevis may be substituted for the anchor shackle.

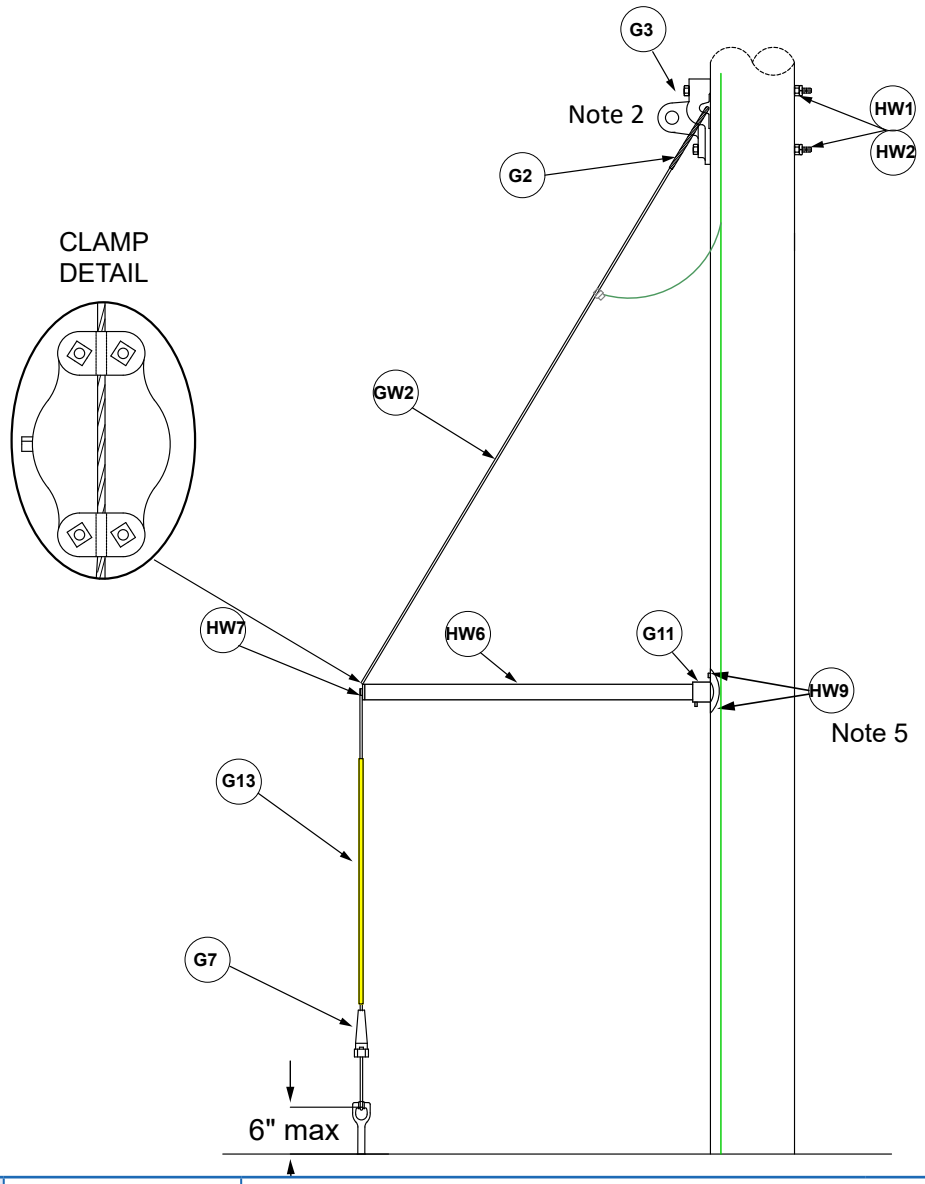
RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL AND CONCRETE POLE
DOUBLE SPAN GUY 12,000LB

12M SDWK GUY CU CODE: OGSW12, OGSW12-S	MATERIAL LIST		
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
GW2	60’	WIRE GALV GUY 3/8 COILS	016040000
G14	1	ANCHOR SHACKLE 30K	181103000
G13	1	MARKER GUY/YELLOW	181920000
HW7	1	PLATE CL FITT SW GY SING	183540000
G11	1	PLATE POLE SIDEWALK GUY	183900000
HW1	2	BOLT MACH 3/4 X REQ. LENGTH	2041_____
HW2	2	3/4” DBL COIL SPRING WASHER	206580000
HW9	2	SCREW LAG 3/8X2 1/2 GALV	208530000
G2	1	DEADEND PREFORMED 3/8	230140000
G3	1	DEAD END TEE FOR GUYING	230180000
G7	1	STRANDVISE GUY 3/8	231120000
HW6	10’	PIPE GALV 2	464650000

Two-inch Sidewalk Brace Strength Table	
Brace Length (ft)	**Capacity (lbs)**
4	39,610
6	17,604
8	9,902
10	6,338
12	4,401



NOTES

1. Length of pipe and mounting height to be specified on the construction drawing.
2. Install Fiberglass Strain Insulators as req’d. Refer to Pg 37 for more detail.
3. Install yellow guy markers on all installations.
4. Preformed dead end may be substituted with an automatic dead end/strandvise.
5. Substitute lag screws with bolts on steel poles.
6. Ground guys per the Grounding section of the Plate Book.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

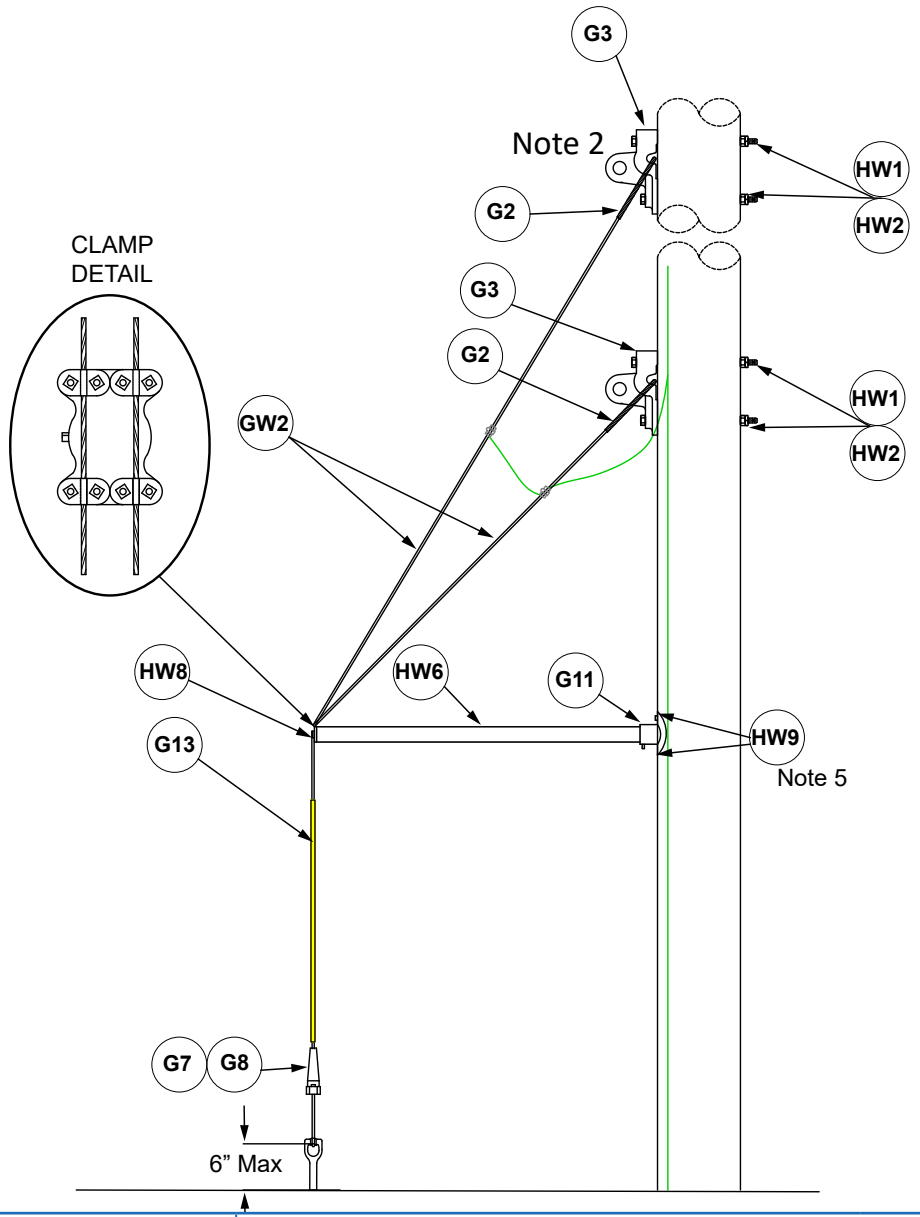
WOOD OR STEEL POLE
12,000 LB SIDEWALK GUY

12M SDWK GUY CU CODE: OGSW12-2, OGSW12-2S	MATERIAL LIST		
ITEM #	**QTY**	**DESCRIPTION**	**STOCK #**
GW2	120’	WIRE GALV GUY 3/8 COILS	016040000
G14	1	ANCHOR SHACKLE 30K	181103000
G13	1	MARKER GUY/YELLOW	181920000
HW8	1	PLATE CL FITT SW GY DBLE	183560000
G11	1	PLATE POLE SIDEWALK GUY	183900000
HW1	4	BOLT MACH 3/4 X REQ. LENGTH	2041_____
HW2	4	3/4” DBL COIL SPRING WASHER	206580000
HW9	2	SCREW LAG 3/8X2 1/2 GALV	208530000
G2	2	DEADEND PREFORMED 3/8	230140000
G3	2	DEAD END TEE FOR GUYING	230180000
G7	1	STRANDVISE GUY 3/8	231120000
G8	1	STRANDVISE GUY 3/8 LONG BAIL	231125000
HW6	10’	PIPE GALV 2	464650000

Two-inch Sidewalk Brace Strength Table	
Brace Length (ft)	**Capacity (lbs)**
4	39,610
6	17,604
8	9,902
10	6,338
12	4,401

NOTES

1. Length of pipe and mounting height to be specified on the construction drawing.
2. Install Fiberglass Strain Insulators as req’d. Refer to Pg 37 for more detail.
3. Install yellow guy markers on all installations.
4. Preformed dead end may be substituted with an automatic dead end/strandvise.
5. Substitute lag screws with bolts on steel poles.
6. Ground guys per the Grounding section of the Plate Book.

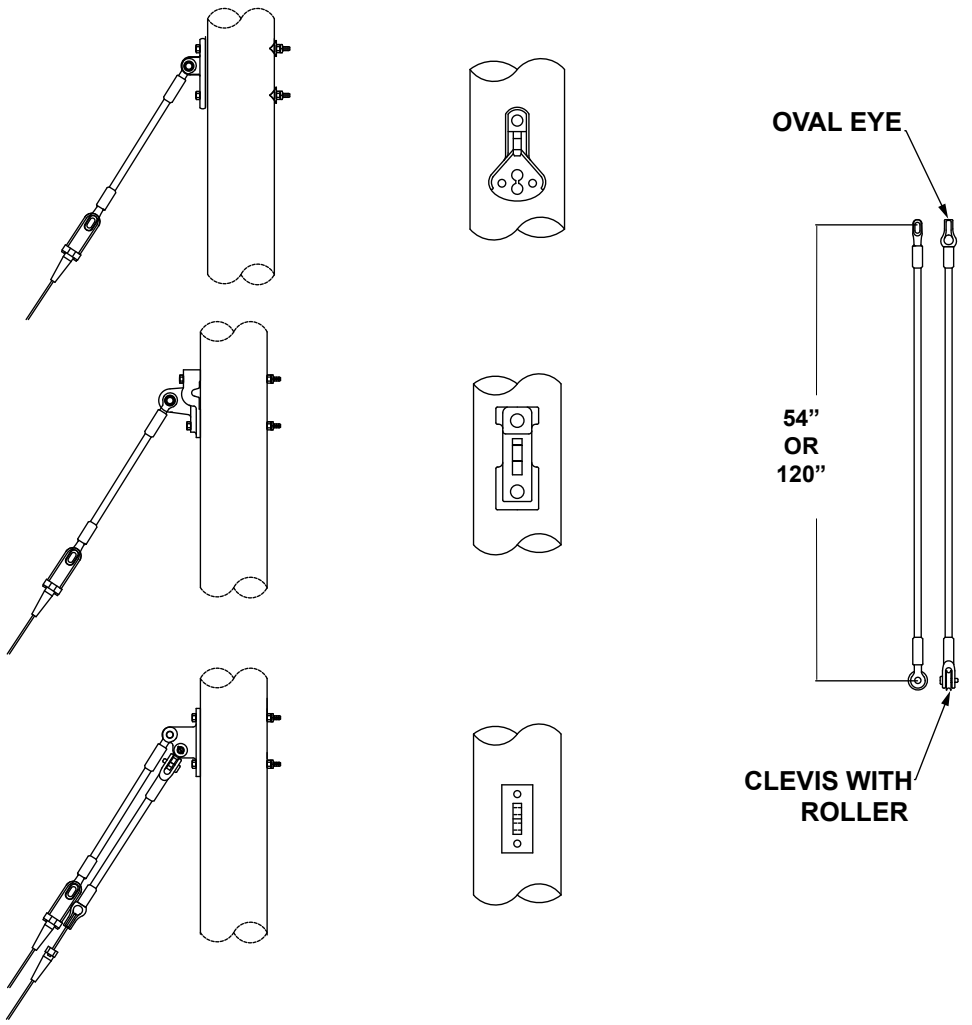


RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD OR STEEL POLE
12,000 LB DOUBLE SIDEWALK GUY

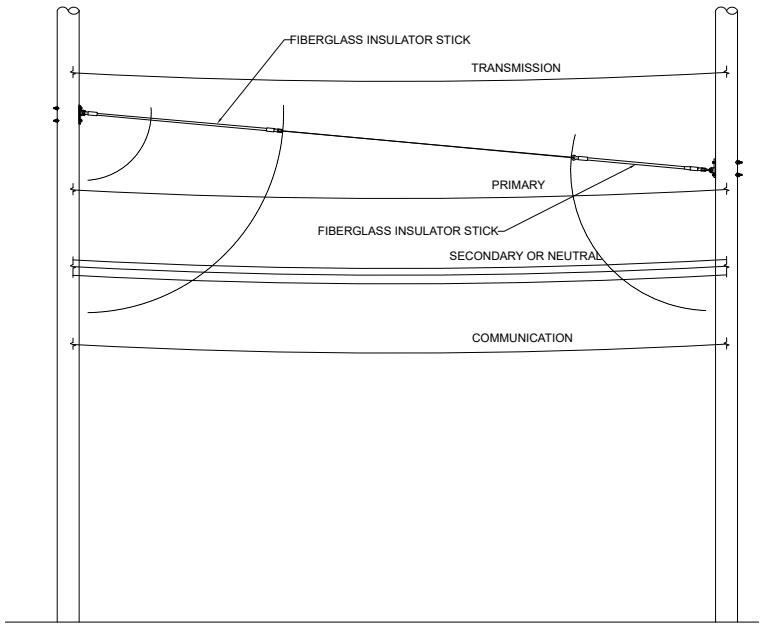
	54” FG STICK	120” FG STICK	MATERIAL LIST	
	CU CODE: OFGI-54	CU CODE: OFGI-120		
ITEM #	QTY	QTY	DESCRIPTION	STOCK
IG1	1		INSUL GUY STRN/FIB GLASS 54 IN	240750000
IG2		1	INSUL GUY STRN/FIB GLASS 120IN	240780000



NOTES

1. The insulators are stocked in 54” and 120” lengths. These are used when guys pass through energized conductors at any voltage, or any circumstance where clearance between down guys and energized conductors is needed.
2. See Framing Spacing section for recommnded minimum guy strain insulator phase-to-ground clearances on page 12.
3. Guy Strain Insulators must be used on all guys for the following system voltages: 4.16kV & 7.96kV Wye or 13.8kV Delta
4. 21,000 lbs. rated strength insulators required.

CU CODES TO CREATE THIS DOWN GUY				
QTY	INSULATED 6,000LB DOWN GUY ON WOOD POLE	INSULATED 6,000LB DOWN GUY ON STEEL POLE	INSULATED 12,000LB DOWN GUY ON WOOD POLE	INSULATED 12,000LB DOWN GUY ON STEEL POLE
1	OGD6	OGD6-S	OGD12	OGD12-S
1	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120



NOTES

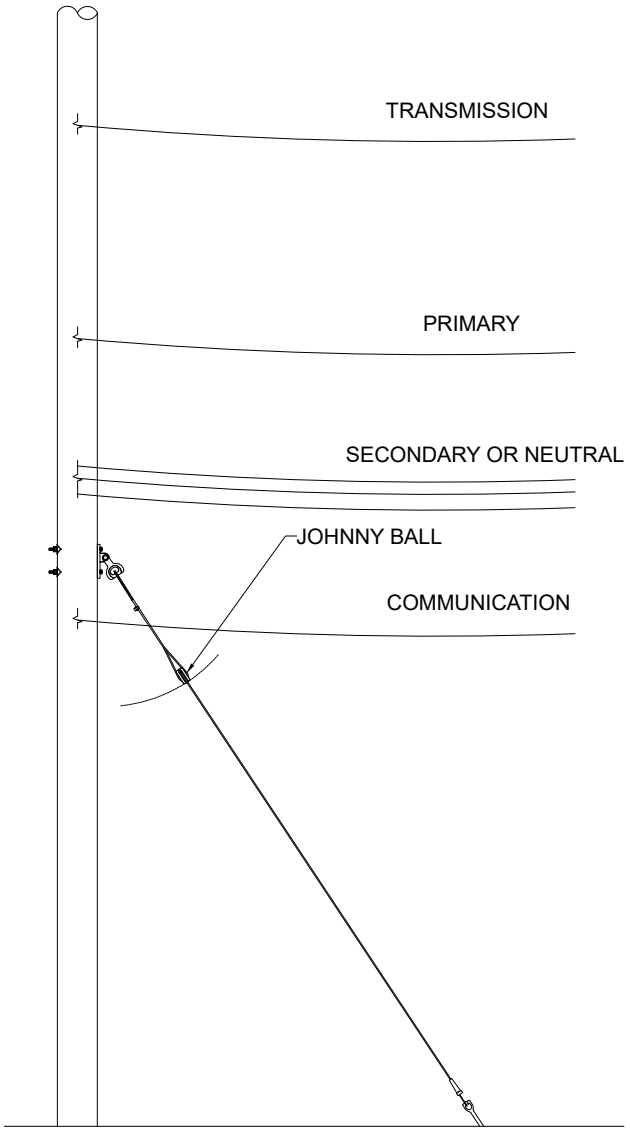
1. Insulator stick is to be positioned to prevent contact with multiple voltages at rest and in the event of failure. If required multiple insulating sticks may be linked together.
2. Insulating the guy at highest attachment point, while grounding the lower portion is the preferred installation practice. This practice eliminates need for modifying a guy with additional insulators when adding risers, transformers, under-built circuits, etc., below the level of the conductors for which the guy insulators were originally installed.
3. Any ungrounded portion of guys with insulators shall be positioned so as to limit the likelihood of any portion of an anchor guy becoming energized within 8-ft of the ground level in the event that the anchor guy becomes slack or breaks.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

INSULATED DOWN GUY IN POWER SPACE ASSEMBLY

CU CODES TO CREATE THIS DOWN GUY				
QTY	INSULATED 6,000LB DOWN GUY ON WOOD POLE	INSULATED 6,000LB DOWN GUY ON STEEL POLE	INSULATED 12,000LB DOWN GUY ON WOOD POLE	INSULATED 12,000LB DOWN GUY ON STEEL POLE
1	OGD6	OGD6-S	OGD12	OGD12-S
1	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120



NOTES

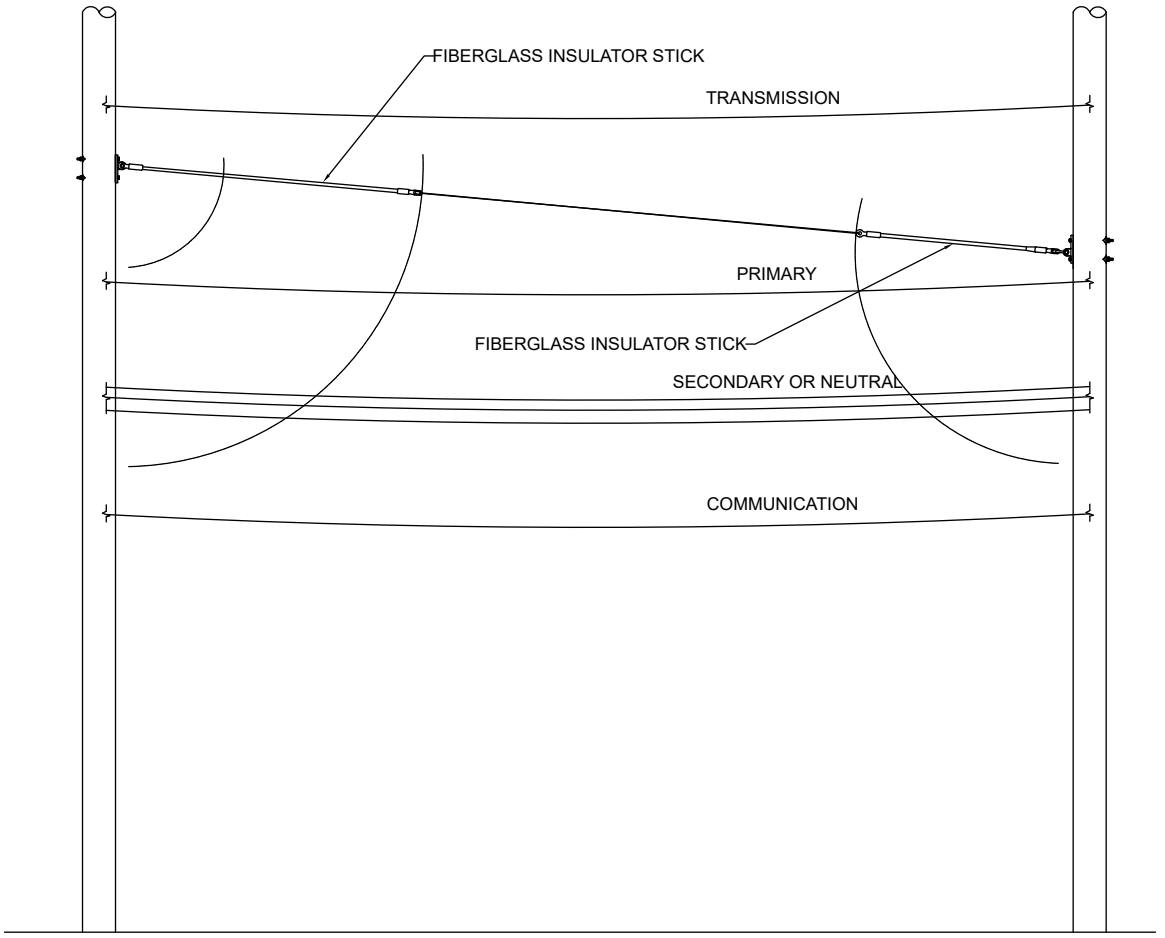
1. Insulator stick is to be positioned to prevent contact with multiple voltages at rest and in the event of failure. If required multiple insulating sticks may be linked together.
2. Any ungrounded portion of guys with insulators shall be positioned so as to limit the likelihood of any portion of an anchor guy becoming energized within 8-ft of the ground level in the event that the anchor guy becomes slack or breaks.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

INSULATED DOWN GUY THROUGH COMMUNICATION SPACE-ASSEMBLY

CU CODES TO CREATE THIS DOWN GUY				
QTY	INSULATED 6,000LB DOWN GUY ON WOOD POLE	INSULATED 6,000LB DOWN GUY ON STEEL POLE	INSULATED 12,000LB DOWN GUY ON WOOD POLE	INSULATED 12,000LB DOWN GUY ON STEEL POLE
1	OGS6	OGS6-S	OGS12	OGS12-S
2	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120



NOTES

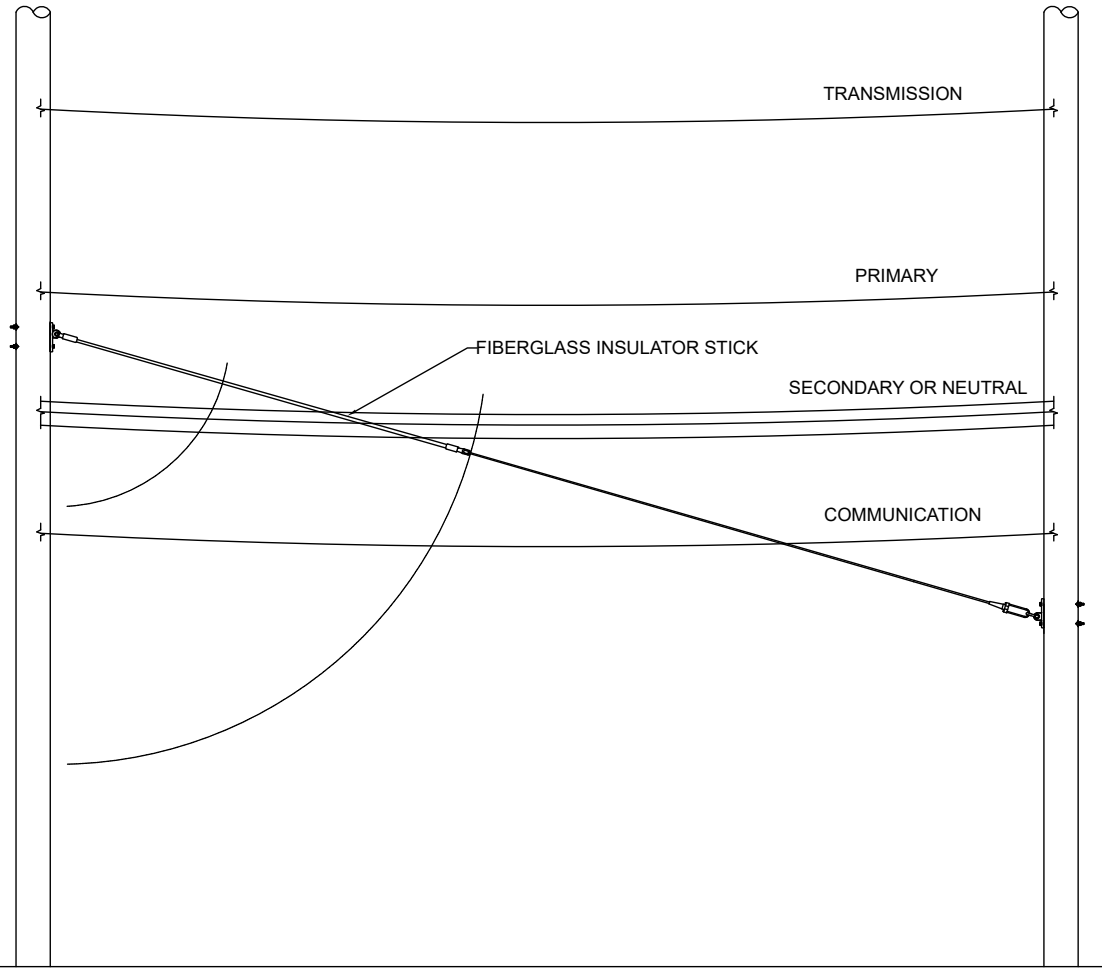
1. Insulator sticks to be positioned to isolate different voltages at rest and in case of span guy failure.
2. See Framing Spacing section for recommended minimum guy strain insulator phase-to-ground clearances on page 12.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

INSULATED SPAN GUY IN POWER SPACE ASSEMBLY

CU CODES TO CREATE THIS DOWN GUY				
QTY	INSULATED 6,000LB DOWN GUY ON WOOD POLE	INSULATED 6,000LB DOWN GUY ON STEEL POLE	INSULATED 12,000LB DOWN GUY ON WOOD POLE	INSULATED 12,000LB DOWN GUY ON STEEL POLE
1	OGS6	OGS6-S	OGS12	OGS12-S
1	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120



NOTES

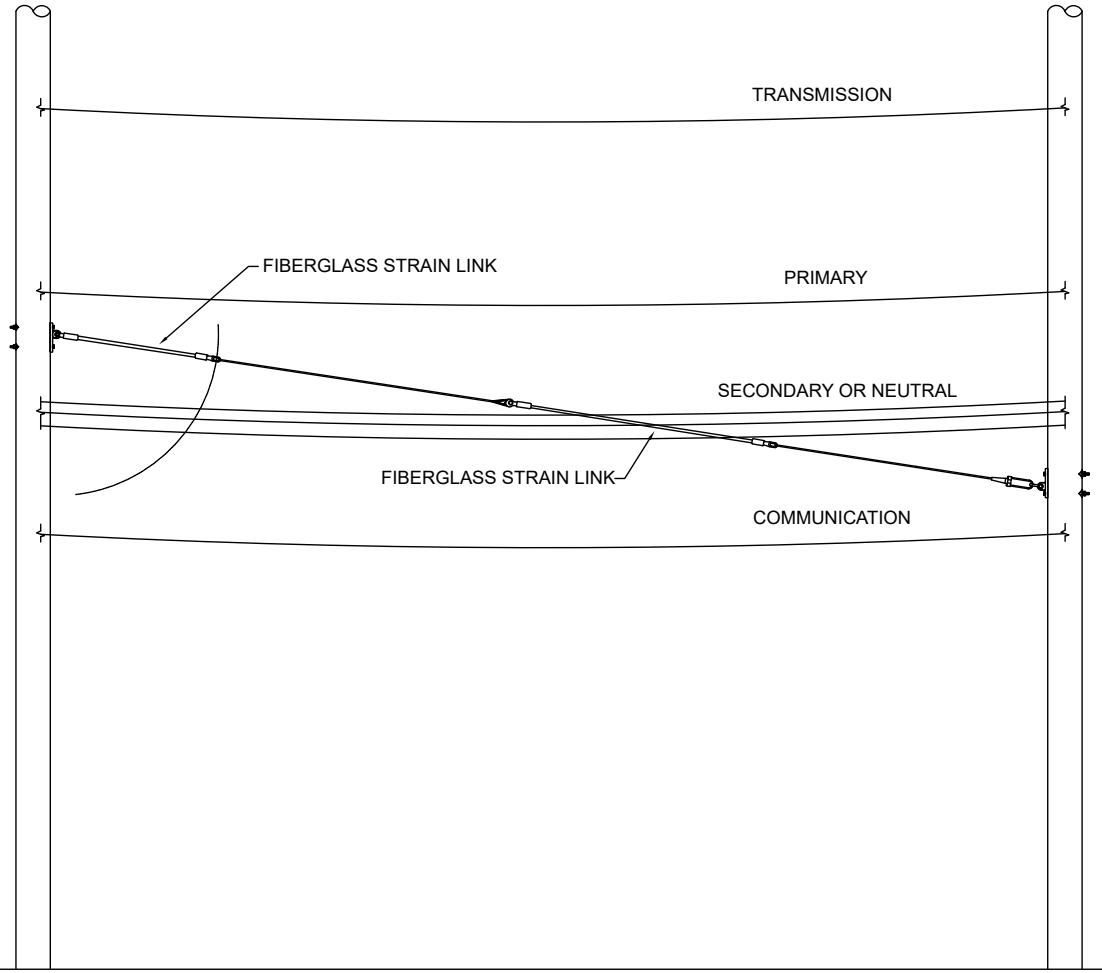
1. Insulator stick to be positioned to isolate different voltages at rest and in case of span guy failure.
2. See Framing Spacing section for recommended minimum guy strain insulator phase-to-ground clearances on page 12.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

INSULATED SPAN GUY FROM POWER SPACE TO BELOW COMM. SPACE-ASSEMBLY

CU CODES TO CREATE THIS DOWN GUY				
QTY	INSULATED 6000LB DOWN GUY ON WOOD POLE	INSULATED 6000LB DOWN GUY ON STEEL POLE	INSULATED 12000LB DOWN GUY ON WOOD POLE	INSULATED 12000LB DOWN GUY ON STEEL POLE
1	OGS6	OGS6-S	OGS12	OGS12-S
1	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120	OFGI-54 AND/OR OFGI-120



NOTES

1. Insulator stick to be positioned to isolate different voltages at rest and in case of span guy failure.
2. See Framing Spacing section for recommended minimum guy strain insulator phase-to-ground clearances on page 12.

RE	ENG.	DESCRIPTION OF CHANGE	DATE

NES

INSULATED SPAN GUY FROM POWER SPACE TO ABOVE COMM. SPACE-ASSEMBLY

FRAMING SPACING STANDARDS

APPROVALS

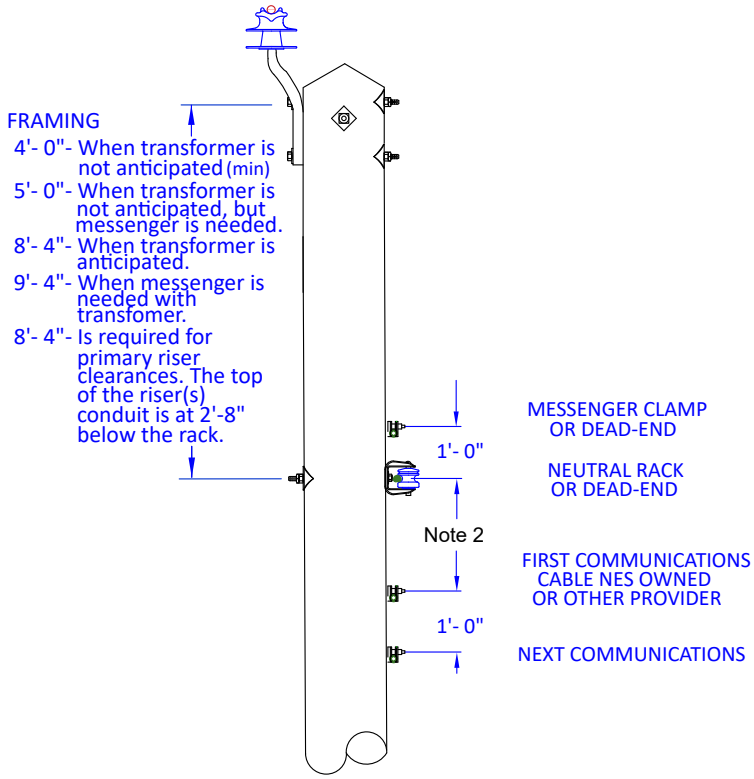
ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

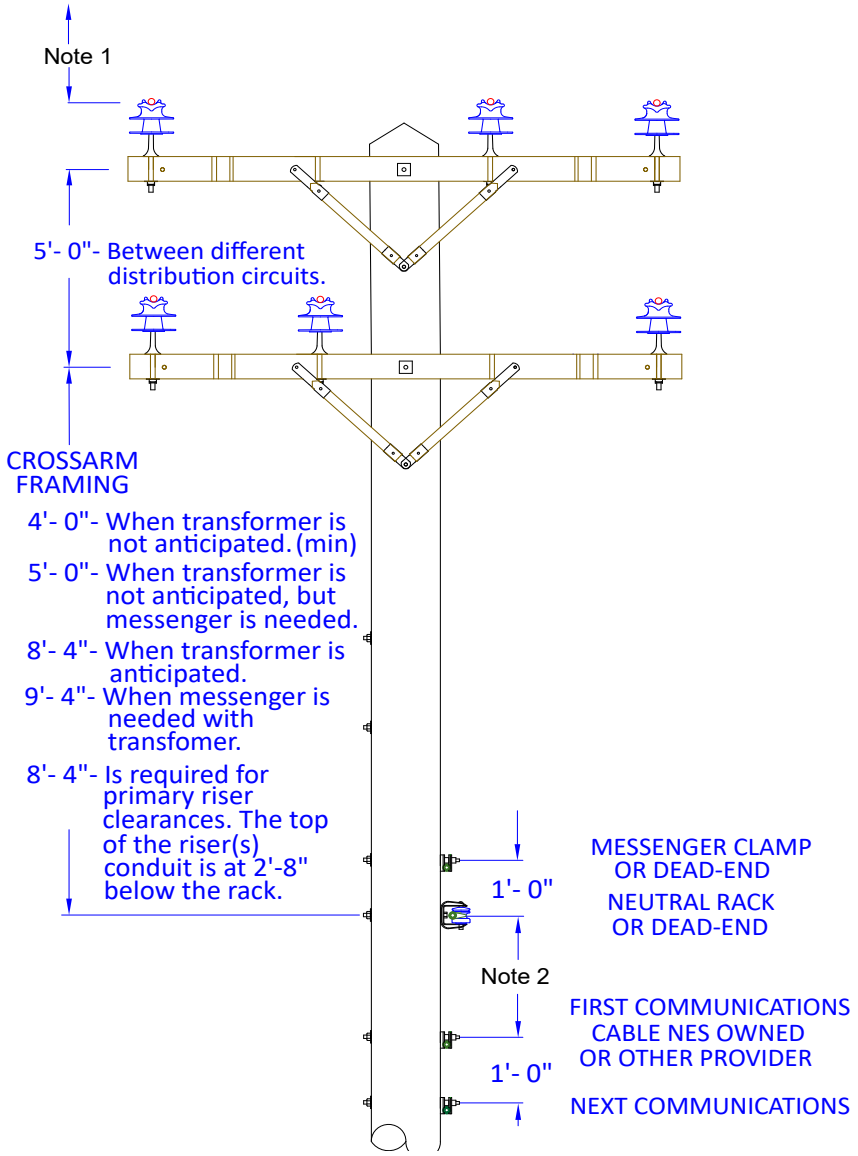
TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
SPACING REQUIREMENTS, SAME STRUCTURE, 1PH VERT & CROSSARM CONSTRUCTION	2			
SPACING REQUIREMENTS, SAME STRUCTURE, VERTICAL CONSTRUCTION	3			
SPACING REQUIREMENTS BUCK ARMS AND SIDELINE TAPS	4			
SPACING REQUIEMENTS FOR ARRESTER AND CUTOUT BRACKETS	5			
SPACING REQUIREMENTS TRANSFORMERS AND CUTOUTS	6			
SPACING REQUIREMENTS SPLIT BOLTS	7			
SPACING REQUIREMENTS, GUY WIRE ATTACHMENTS, POLE TOPS	8			
SPACING REQUIREMENTS, GUY WIRE ATTACHMENTS, NEUTRAL AND MESSENGER	9			
SPACING REQUIREMENTS, GUY WIRE ATTACHMENTS, VERTICAL CONSTRUCTION	10			
SPACING REQUIREMENTS, GUY WIRE ATTACHMENTS, STEEL POLES	11			
SPACING REQUIREMENTS GUYS AND GUY STRAIN INSULATORS	12			
SPACING REQUIREMENTS BETWEEN BOLTS	13			
RAPTOR NEST FRAMINIG	14			

MINIMUM ATTACHMENT SPACING FOR CONDUCTORS AND CABLES ON THE SAME STRUCTURE

Special circumstances, such as changes in elevation or long spans, may require increased separation distances.
Any deviation from these distances will be marked on the construction drawings.





NOTES

1. Refer to the 69kV Transmission Section for clearances to the lowest 69kV phase conductor.
2. 40” Communication Worker Safety Zone. See NESC Tables 235-5 and 238-1 for more detail.

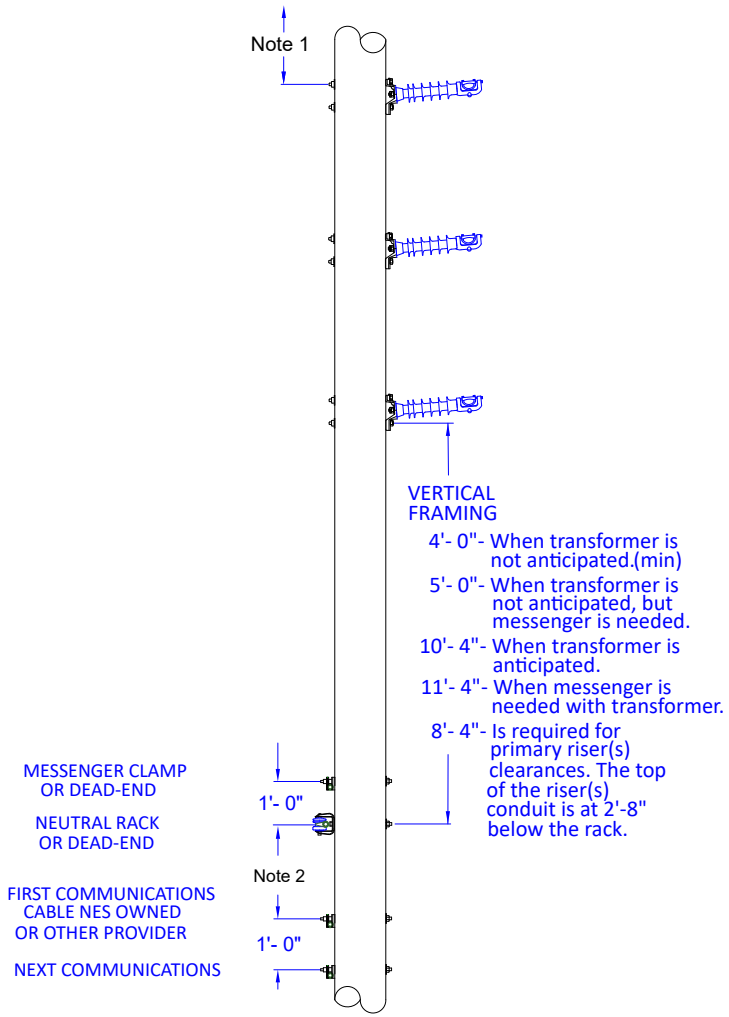
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

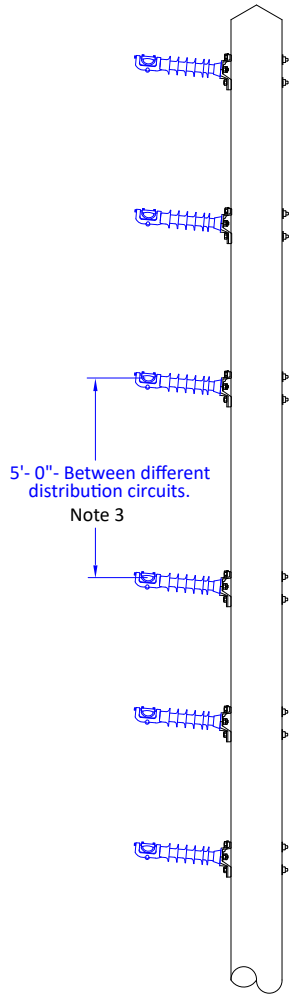
NES

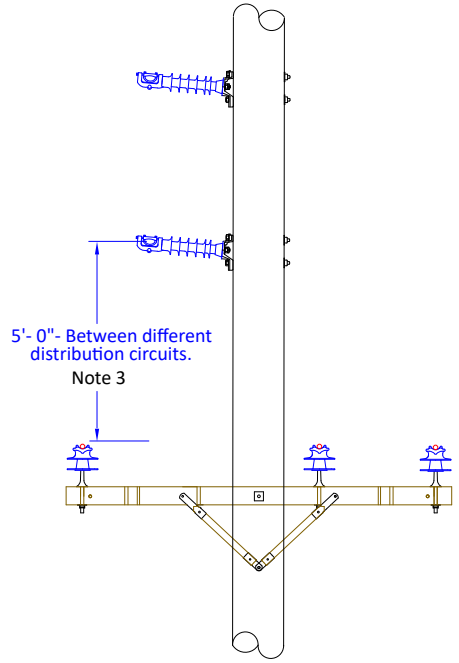
SPACING REQUIREMENTS SAME STRUCTURE 1PH VERT & CROSSARM CONSTRUCTION

MINIMUM ATTACHMENT SPACING FOR CONDUCTORS AND CABLES ON THE SAME STRUCTURE

Special circumstances, such as changes in elevation or long spans, may require increased separation distances.
Any deviation from these distances will be marked on the construction drawings.







NOTES

1. Refer to the 69kV Transmission Section for clearances to the lowest 69kV phase conductor.
2. 40" Communication Worker Safety Zone. See NESC Tables 235-5 and 238-1 for more detail.
3. Distance b'twn circuits of different supply companies is set at 10' minimum.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

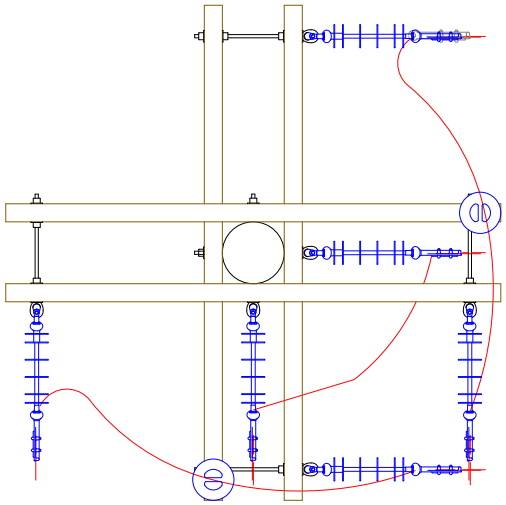
FRAMING SPACING STANDARDS

NES

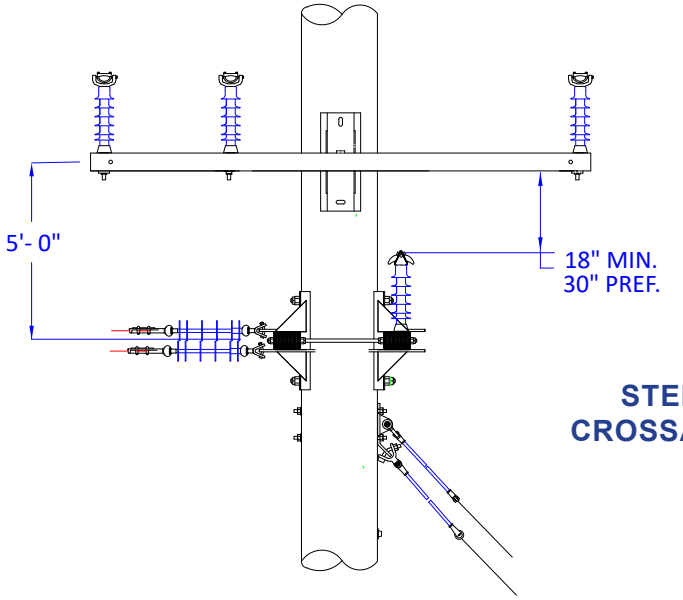
SPACING REQUIREMENTS
SAME STRUCTURE
VERTICAL CONSTRUCTION

MINIMUM ATTACHMENT SPACING FOR CORNER POLES

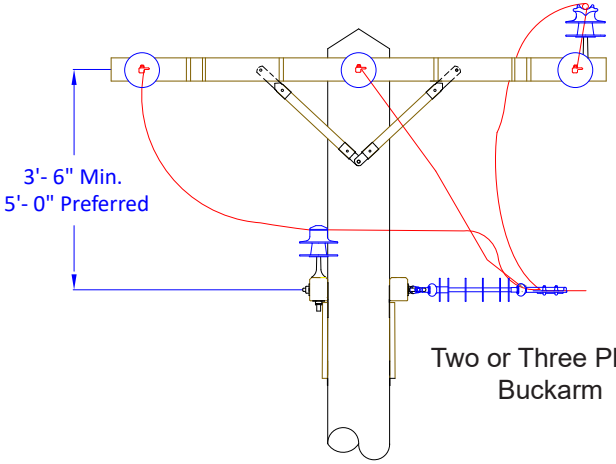
The drawings below indicate the minimum vertical separation between main line circuits, taps and corner poles. The figures below indcate the framing spacing greater than the NESC Rules. Per NESC Table 235-5, the clearance between conductors to exceed 18" for 13.8kV and 23.9kV circuits. Long spans may require increased separation distances. These special circumstances will be noted on the construction drawings.



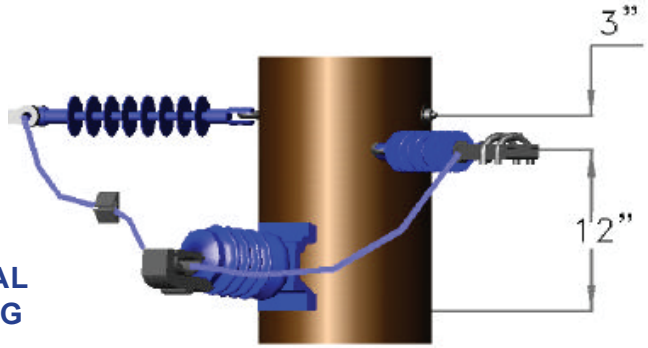
WOOD OR FIBERGLASS CROSSARMS



STEEL CROSSARMS



Two or Three Phase Buckarm



VERTICAL FRAMING

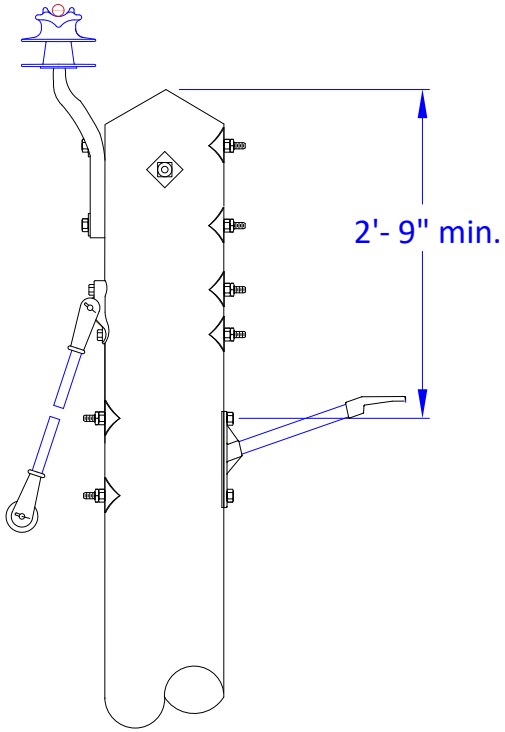
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

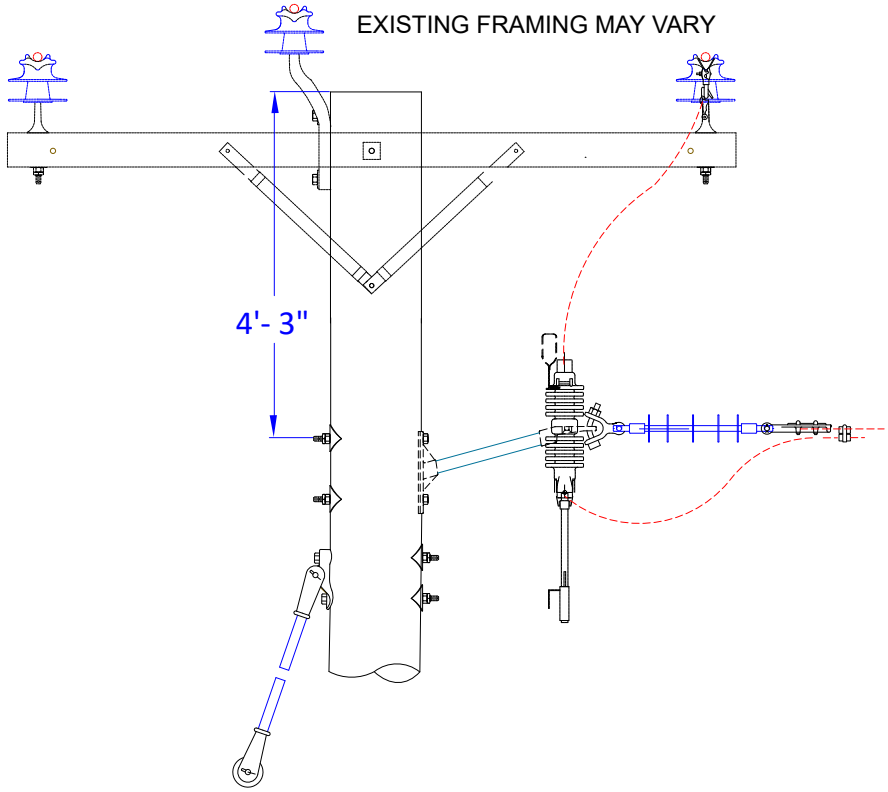
NES

SPACING REQUIREMENTS BUCK ARMS AND SIDELINE TAPS

ARRESTER AND CUTOUT BRACKET MOUNTING POSITION

These diagrams indicate the separation from the top of pole to the arrester and cutout brackets. The position of the bolt holes take into account the height of the device being attached to the arrester and cutout bracket.





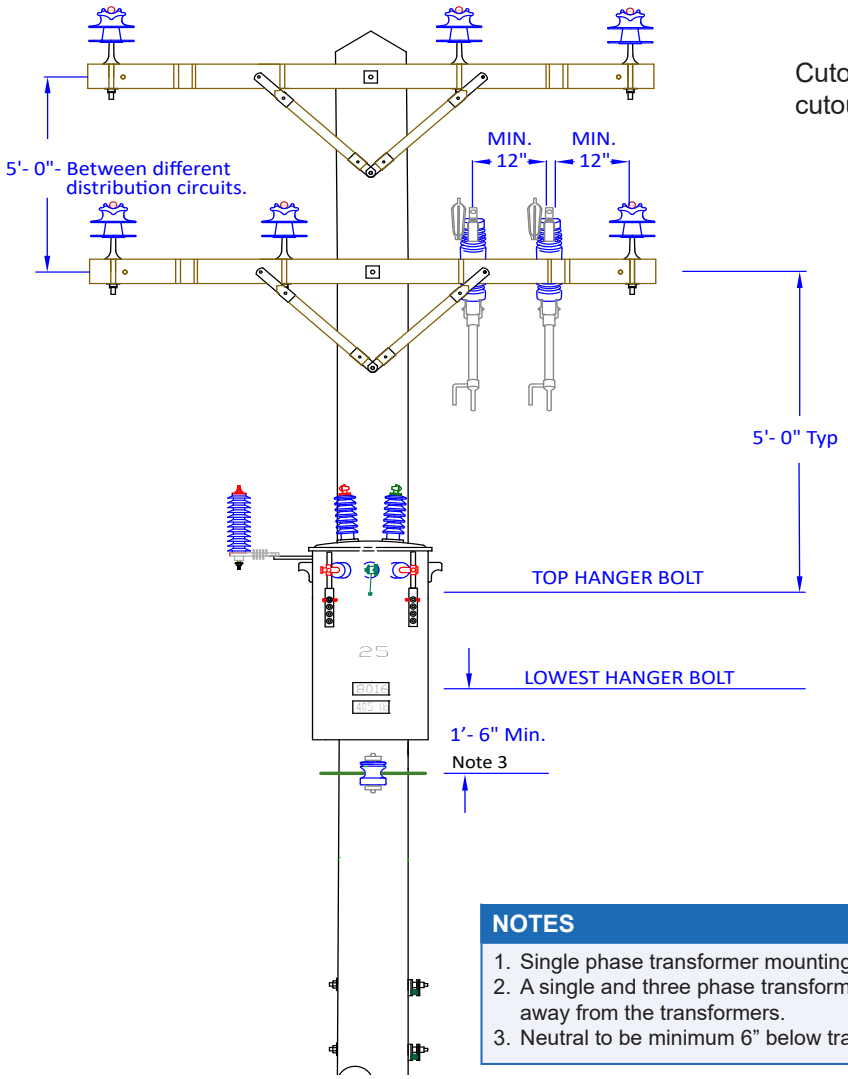
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SPACING REQUIREMENTS
ARRESTER AND CUTOUT BRACKETS

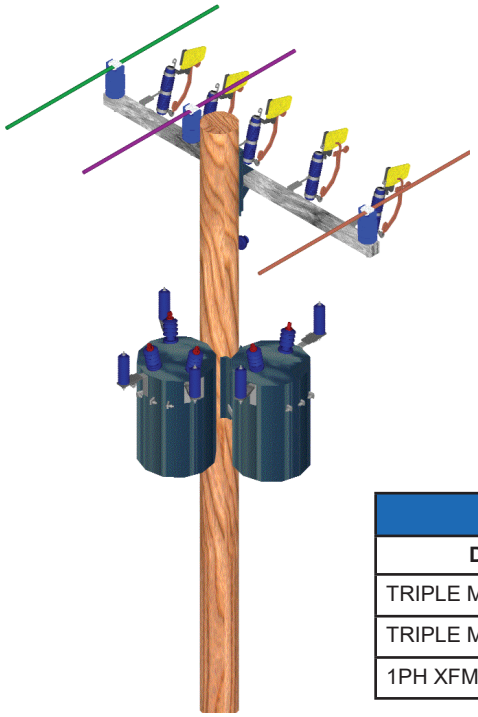
TRANSFORMER MOUNTING

Transformers vary greatly in size and shape therefore it is impossible to give exact mounting positions or a drilling pattern. NES's specifications require mounting brackets that accept hole spacing of 12", 24" and 36". The transformers must be mounted as low as possible within the designated area on the pole. This is necessary for ease of maintenance and installation of services.



CUTOUT INSTALLATION

Cutouts must be separated from conductors and each other by a minimum 12". Mount cutouts opposite the transformer, on the lowest crossarm, on multiple circuit poles.



TRANSFORMER BRACKETS		
DESCRIPTION	**STOCK NO.**	**C.U.**
TRIPLE MOUNTING BKT	061800000	OTR25
TRIPLE MOUNTING BKT	061820000	OTR75
1PH XFMR OFFSET BKT	183986000	OTR3-100

NOTES

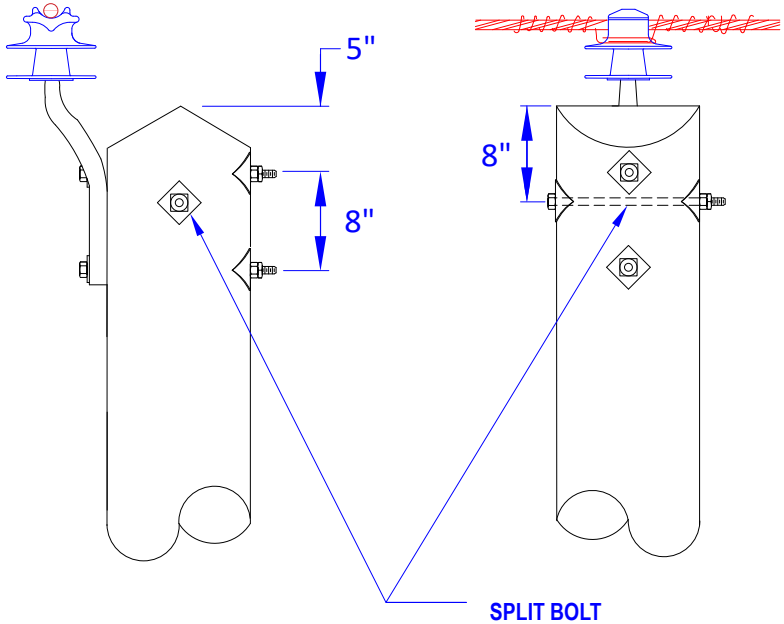
1. Single phase transformer mounting bracket req'd for added spacing, NES Stock Code #183986000.
2. A single and three phase transformer installation on the same pole. Note the position of the cutouts, away from the transformers.
3. Neutral to be minimum 6" below transformer (or next available hole 6" or greater on steel poles).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

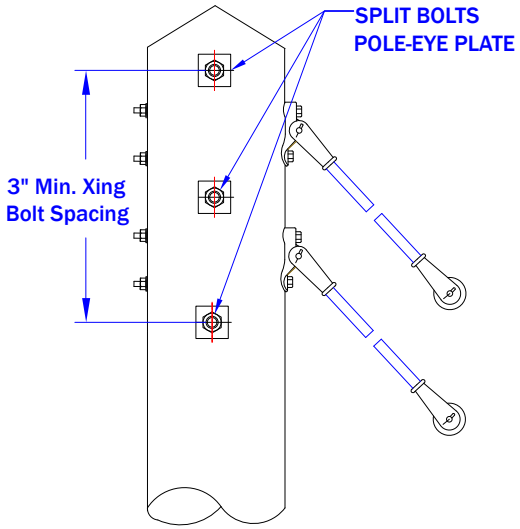
NES

SPACING REQUIREMENTS TRANSFORMERS AND CUTOUTS

WOOD POLES - POLE TOP PIN CONSTRUCTION



WOOD POLES - MULTIPLE GUY WIRE ATTACHMENTS



SPLIT BOLT REQUIREMENTS FOR WOOD POLES

Split bolts are used to prevent cracking in wood poles caused by high vertical or bending loads.

Split bolts must be installed on all pole top brackets regardless of the size wire. Install split bolts on guy plates when the anchor is less than 15' from the base of the pole or any time multiple guy wires are required at one position.

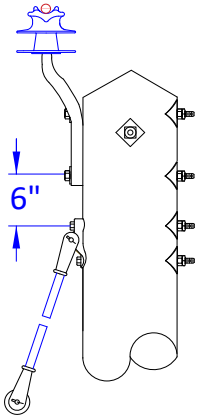
Split bolts are required on all stub poles with multiple guy wires.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

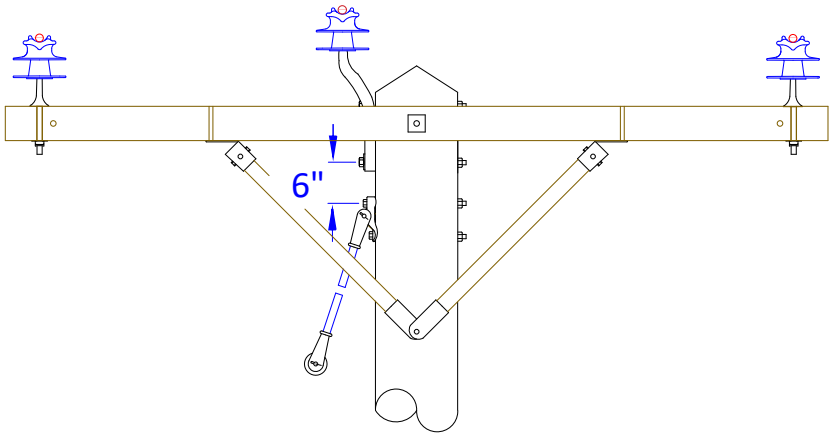
STANDARD GUY PLATE ATTACHMENT POSITION

The following drawings indicate where to position the guy wire attachments relative to the wire supports. The installation of Fiberglass Guy Strain Insulators are to be used on all new construction.

ATTACHMENT POINTS FOR GUYS PLACED ON THE BISECTOR OF ANGLES OR DEAD-ENDS

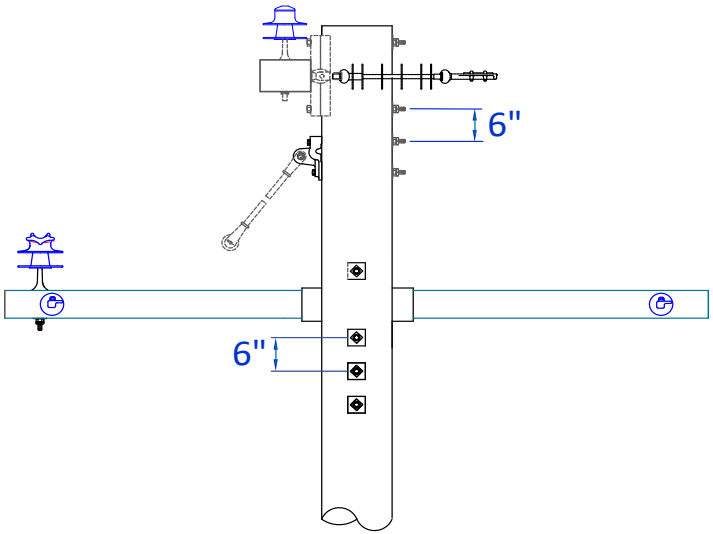


Guy Attachment - Pole Top Pin



Guy Attachment - Crossarm Construction

Place the guy attachment 6” from the bottom PTP or xarm mounting bolt on standard wood pole construction.



Guy Attachment - Buckarm Construction

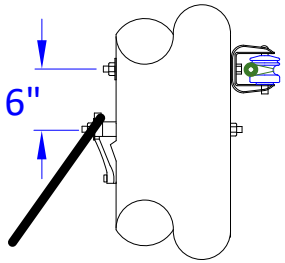
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

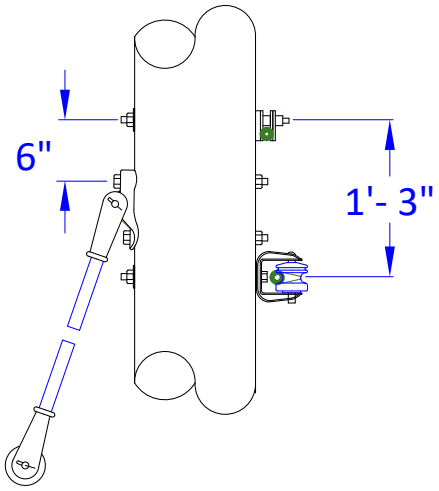
SPACING REQUIREMENTS
GUY WIRE ATTACHMENTS
POLE TOPS

STANDARD GUY PLATE ATTACHMENT POSITION

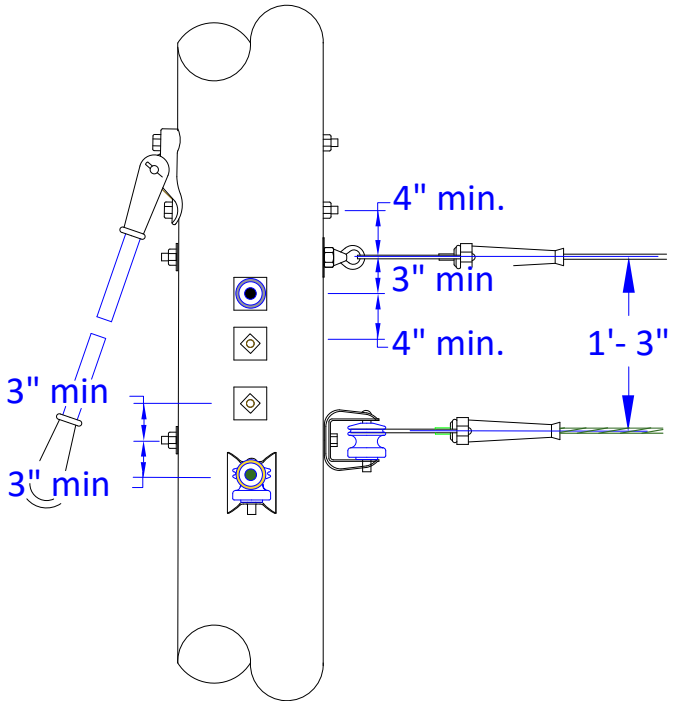
The following drawings indicate where to position the guy wire attachments relative to the wire supports. The installation of Fiberglass Guy Strain Insulators are to be used on all new construction.



Guying the System Neutral



Guying a Messenger and System Neutral

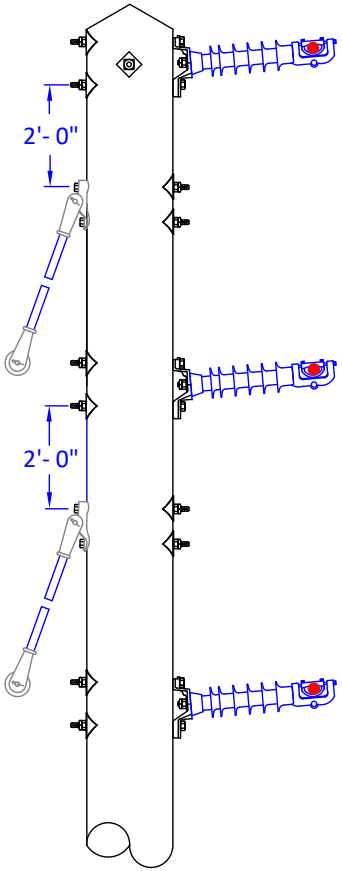


SECONDARY GUYING ON CORNER POLES

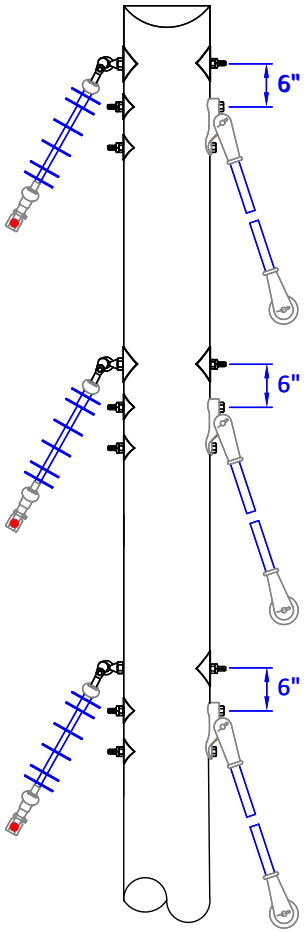
The diagram above shows the minimum separation of the guys and secondary conductor supports on corner poles. The minimum separation of bolt centers is 3" when crossing and 4" in the same direction (see page 13). Guy attachment plates vary in length, thus the separation may have to be increased. Never exceed 12" from the conductor attachment point to the guy attachment point.

STANDARD GUY ATTACHMENT POINTS FOR VERTICAL FRAMING

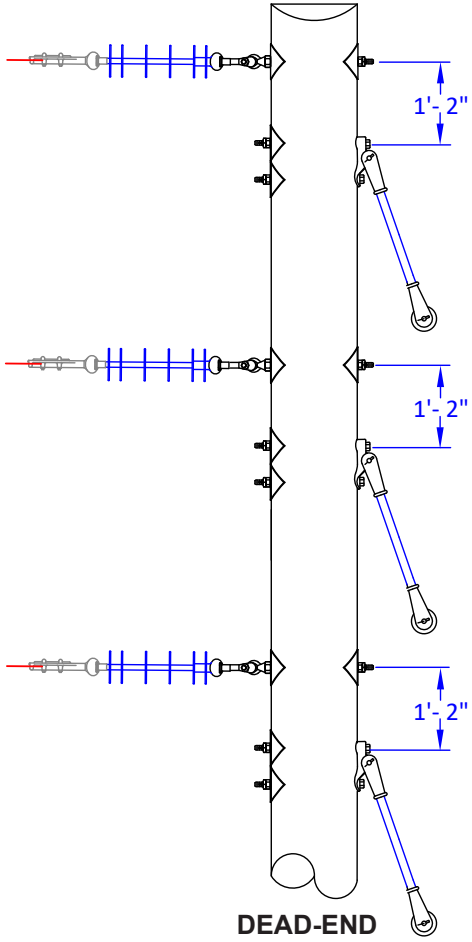
The drawings below indicate the Max. spacing for guys on wood poles for vertical or phase over phase framing. The installation of Fiberglass Guy Strain Links are to be used on all new constructiion.



VERTICAL LINE ANGLE



SUSPENSION ANGLE



DEAD-END

NOTES

1. Minimum separation of bolt centers may be reduced to 4” as needed for height considerations.

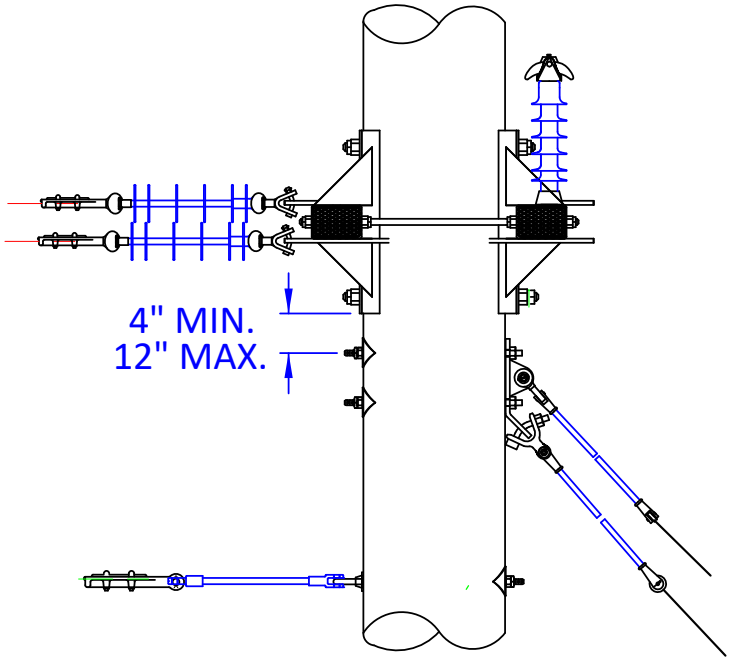
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

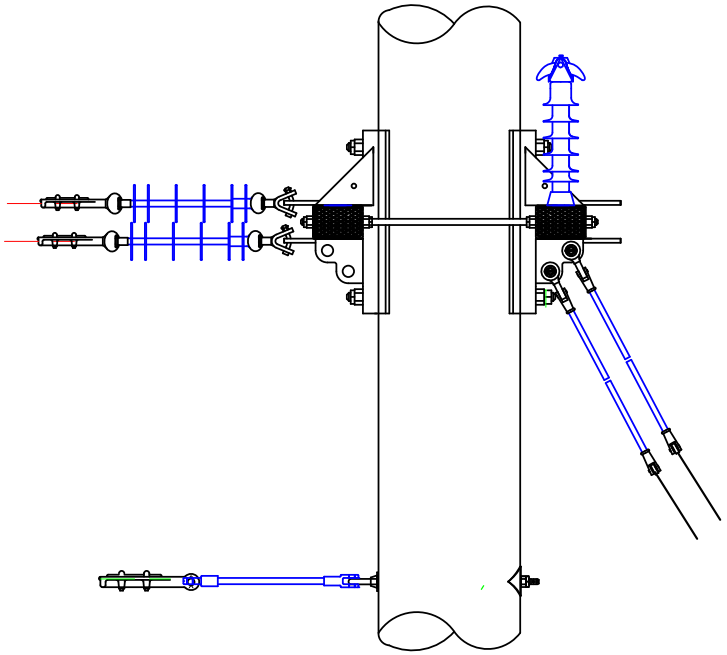
SPACING REQUIREMENTS
GUY WIRE ATTACHMENTS
VERTICAL CONSTRUCTION

GUY POSITION FOR STEEL DEAD-ENDS OR BUCK ARMS

Since BIL is provided entirely by the insulators on steel and concrete poles, separation of guys from the attachment points is not a requirement for improved system reliability. Guys may be attached at any convenient point above or below the conductor attachment. Do not use the same bolt to hold the guy and the conductor to the pole if the guy plate attaches to the pole with a single bolt. Never exceed 12” of separation between the load and the guys unless the pole is specially designed for the loads. These special cases must be noted on the construction drawings.



TRADITIONAL FRAMING



FRAMING - GUY ATTACHMENT ON ARMS

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

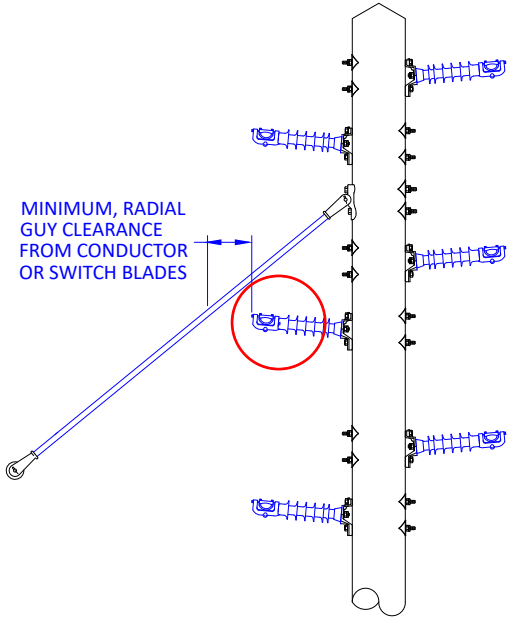
FRAMING SPACING STANDARDS

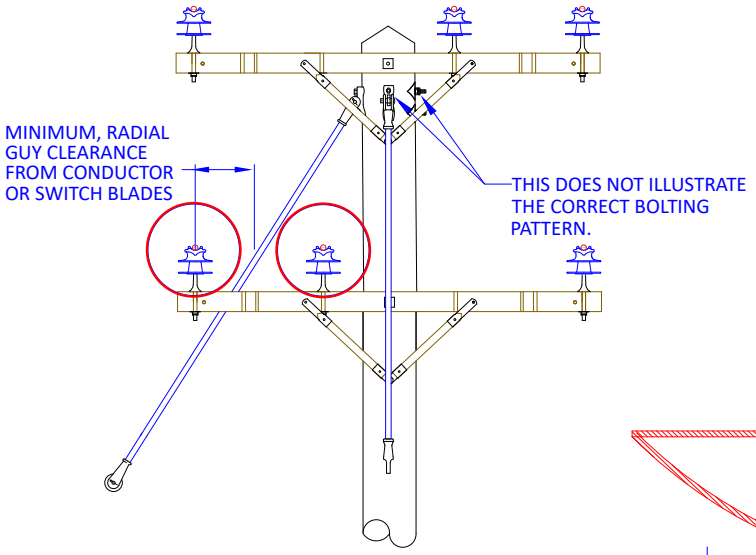
NES

SPACING REQUIREMENTS
GUY WIRE ATTACHMENTS
STEEL POLES

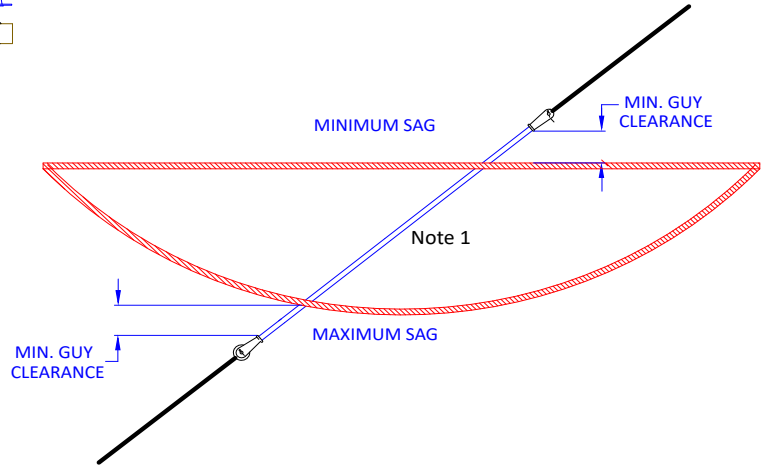
SEPARATION OF GUYS AND SPAN GUYS FROM CONDUCTORS

All guy wires attached to a structure within the primary area and those located above secondary conductors shall have a fiberglass link stick attached. Guys that pass between or near an energized conductor shall have it's fiberglass link stick positioned such that the conductor will not contact the link stick. The length and positioning of the fiberglass link sticks must protect the line over the full range of conductor sag. The fiberglass link sticks are only effective for momentary contact with an energized conductor, therefore, reducing the NESC clearance can degrade the fiberglass insulators mechanical and electrical properties. Clearances vary per voltage (NESC rule 235).





MINIMUM GUY TO PHASE CLEARANCE (INCHES)			
ITEM	DISTRIBUTION	69KV	161KV
Guy	18	42	Note 2
Guy w/FG Link	9	36	Note 2



FIBERGLASS LINK STICKS				
DWG. CODE	DESCRIPTION	STOCK NUMBER	C.U.	MAX. TENSION RATING
NONE	INSUL GUY STRAIN/FIB GLASS 54IN	240750000	OFGI-54	21,000 LBS.
NONE	INSUL GUY STRAIN/FIB GLASS 120IN	240780000	OFGI-120	21,000 LBS.

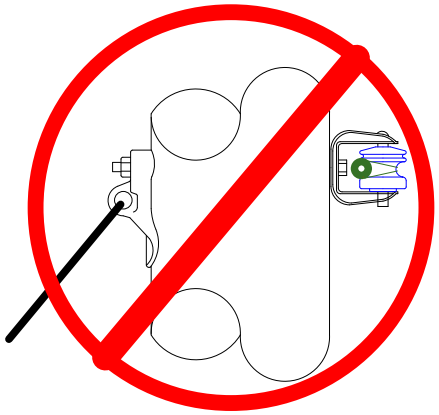
NOTES

1. The middle of a span crossing may require more than one link stick.
2. Contact Transmision Engineering for 161 kV Clearances.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SPACING REQUIREMENTS
GUY STRAIN INSULATORS

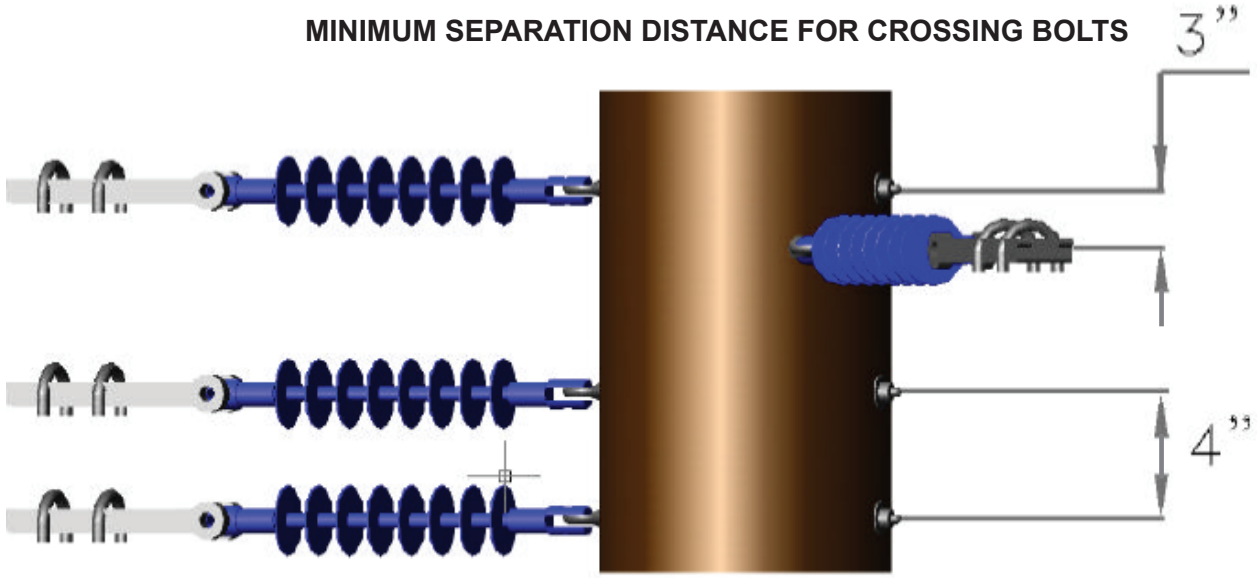


CAUTION NOTE:

For added safety, **ON SINGLE BOLT GUY ATTACHMENTS ONLY**, it is preferred that the guy be attached with a separate bolt from the conductor supports. Crossarms with built in guy plates and two-bolt guy plates are exceptions to this policy.

This procedure is only for added safety in the event that one of the bolts should fail.

MINIMUM SEPARATION DISTANCE FOR CROSSING BOLTS



MINIMUM SEPARATION DISTANCE BOLTS IN THE SAME PLANE

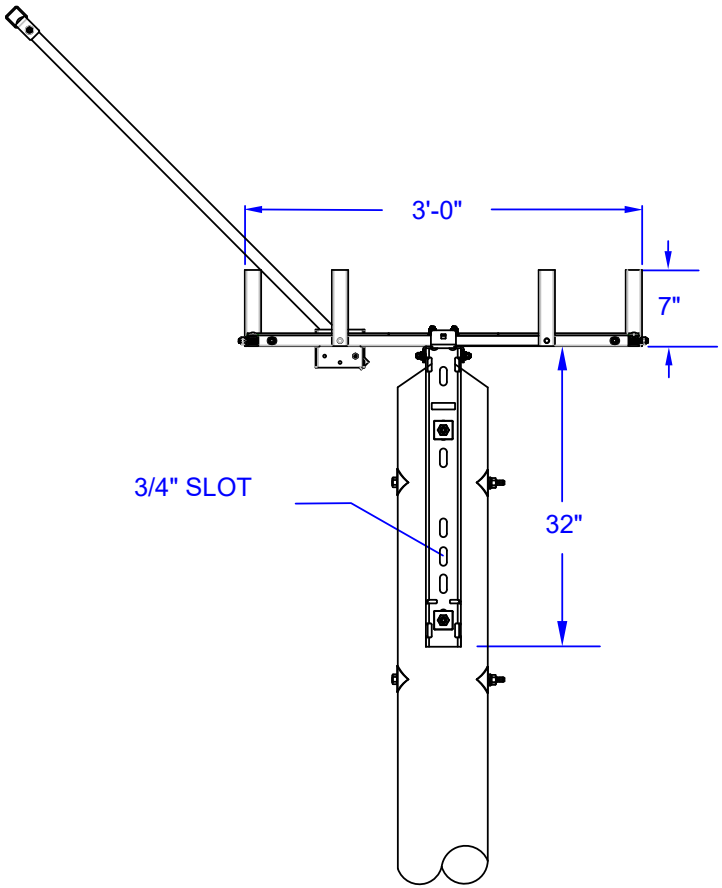
NOTES

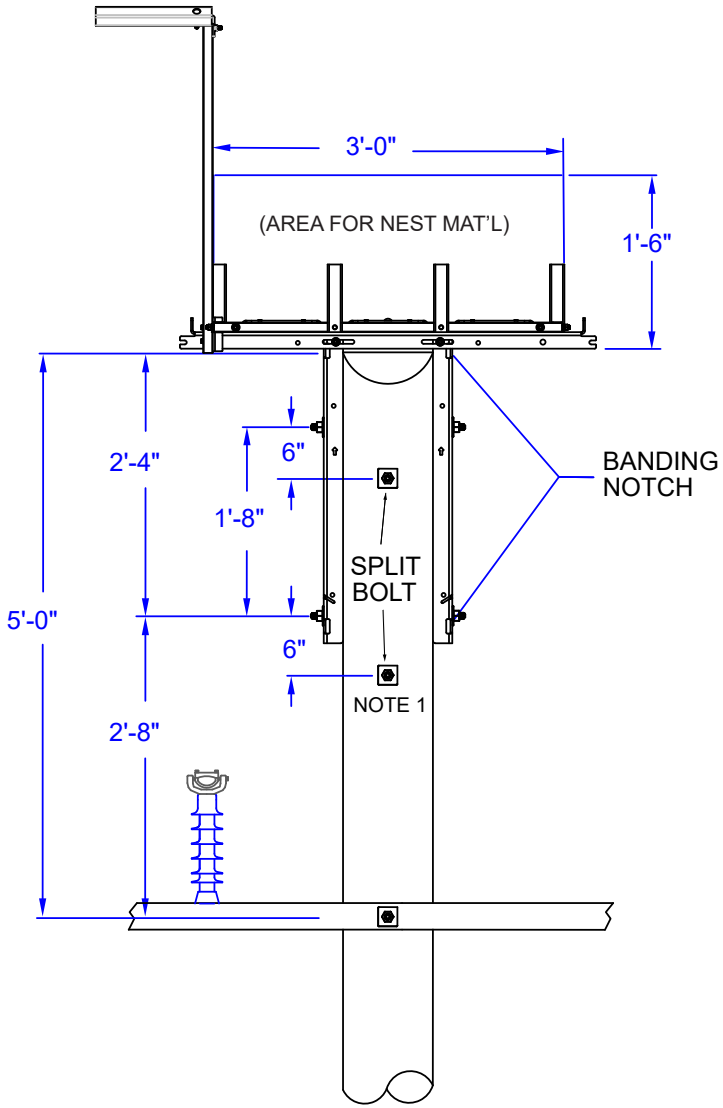
1. Never drill holes in wood poles closer together than shown in the drawing to the right. Doing so may create a weak point in the wood that could cause the pole to break during severe storm circumstances.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SPACING REQUIREMENTS
BOLT SEPARATION





NEST PLATFORM		
DESCRIPTION	STOCK NO.	C.U.
WILDLIFE PLATFORM RAPTOR PROTECTOR-OSPREY NEST	466445010	OWP-NEST

NOTES

1. Split bolts shall be used on all wood poles.
2. Use 5/8-inch mounting bolts with flat/curved washers and dbl coil spring lock washers.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

RAPTOR NEST FRAMING

FRAMING SPACING STANDARDS

GENERAL FRAMING INSTALLATION

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
FRAMING NAME CODES	3			
POLE FRAMING EXAMPLES	4			
POLE-TOP FRAMING	5			
INSULATOR LIMITS 25KV TIE-TOP PIN DETAIL	6			
INSULATOR LIMITS 35KV POST DETAIL	7			
NEUTRAL FRAMING LIMITS	8			
FRAMING SELECTION	9			
NESC GRADES OF CONSTRUCTION & VEGETATION MANAGEMENT	10			
FRAMNG ANGLE LIMITATION CHART	11			
BOLTED CONNECTIONS	12			
WASHER AND LOCK WASHER APPLICATIONS	13			
HIGH STRENGTH BOLT PRE-TENSION	14			
WOOD XARMS & BRACES LIMITS	15			
STEEL XARMS LIMITS	16			
STEEL ALLEY ARM MOUNTED ON WOOD POLE	17			
35KV VERTICAL FRAMING INSULATOR LIMITS	18			

GENERAL FRAMING INSTALLATION

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
18-INCH FIBERGLASS BRACKET & EYE NUT XARM LIMITS	19			
CONDUCTOR MID-SPAN CLEARANCE	20			
UNBALANCED AND INCLINED SPANS	21			
INCLINED SPANS	22			
VERTICAL UPLIFT	23			
LINE ARRESTER APPLICATION	24			

Note: Structure Material code “S” denotes both steel or concrete poles since both are treated the same with regards to hardware. Weathering steel is denoted by the letter R for rusted steel. Use the same angle charts for steel Xarms on concrete or steel poles.

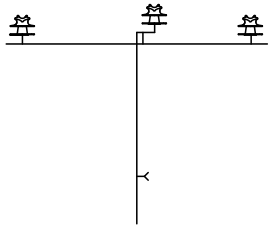
TABLE 1: POLE FRAMING CODES

SPACE 1 IS ALWAYS O FOR OVERHEAD AND IS ALWAYS INCLUDED ON CONSTRUCTION DRAWINGS

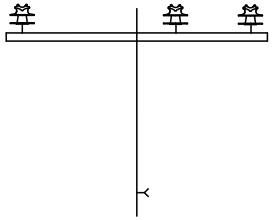
SPACE 2		SPACE 3		SPACES 4-5		SPACES 6-7		SPACES 8-12	
Phasing		Structure Material		Construction Type		Framing Type		Conductor Range	
CODE	NAME	CODE	NAME	CODE	NAME	CODE	NAME	CODE	NAME
1	Single	W	Wood	S-	Single Arm	PT	Pole Top	-6	#6CU-1/0AL
2	Two	S	Steel/Conc.	D-	Double Arm	HL	Horizontal Line	-40	4/0AL
3	Three	F	Fiberglass	A-	Alley Arm	DD	Double Dead-End	-477	336-477AL
		R	Wthr. Steel	V-	Vertical	DE	Dead-End	-795	795AL
				X-	Existing Arm(s)	BK	Buck Arm	-1351	1351
						SU	Suspension		
						EX	Line Extension		
						VL	Vertical Line		
						ET	Vertical Construction Equipment Tap		
						SB	Slack Buck		
						TAP	Side Line Extension		

TABLE 2: POLE FRAMING EXAMPLES

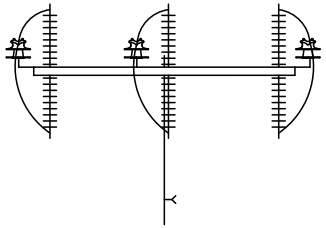
PT- SINGLE POLE TOP FRAMING
Crossarm and Vertical Const.
Pin and Post Insulators



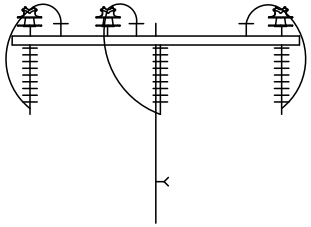
HL- HORIZONTAL LIINE
Crossarm Pin and Post Insulators



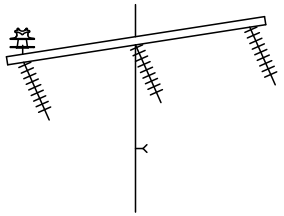
DD- DOUBLE DEAD-END
Crossarm and Vertical Const.
Pin and Post Insulators



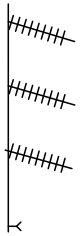
DE- DEAD-END
Crossarm and Vertical Const.
Pin and Post Insulators



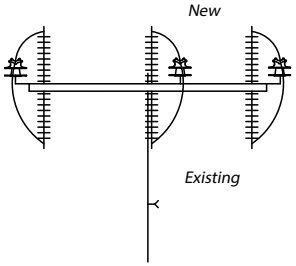
BK- BUCK ARM
Crossarm and Vertical Const.
Pin and Post Insulators



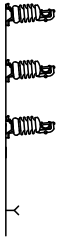
SU- SUSPENSION INSULATORS
Vertical Const.
Strain Insulators



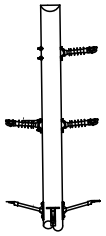
EX- LINE EXTENSION
Crossarm and Vertical Const.
Strain Insulators



VL- VERTICAL LINE
Vertical Const.
Post Insulators



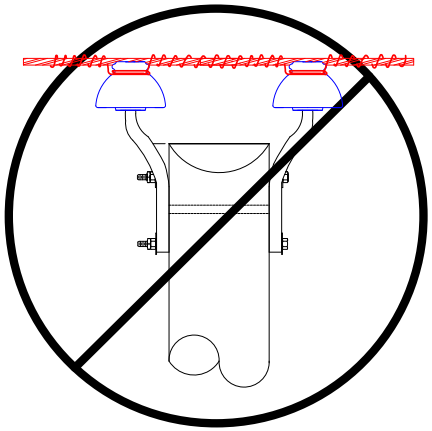
ET- EQUIPMENT TAP
For Vertical Const. to install
stingers to transformers, etc.



Dbl Pole-top Framing:

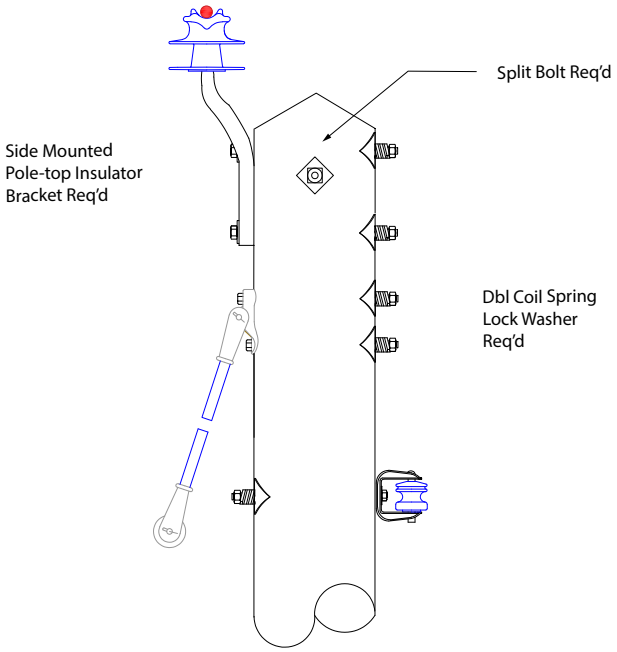
In this edition of this plate book the elimination of Double Pole-top framing for new construction framing has been implemented. This change is to reduce the possibility of split pole tops due to hole conflicts installing the split bolts through the pre-drill gain holes.

"Not for New Construction"



Single Pole-top Framing:

In the Framing Plates, the Single Pole-top insulator brackets are to be side-mounted away from the roof with the split bolt in the gain hole to safeguard the insulator connection. Per manufactures testing, a single steel pole-top pin has the capacity of 1,200 lbs. when mounted adequately to achieve its capacity. The 500 lbs. design limit controls pin deflection without overloading the pole compressive strength when mounted on the side of the pole.



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

GENERAL FRAMING INSTALLATION

NES

POLE-TOP FRAMING

Insulators:

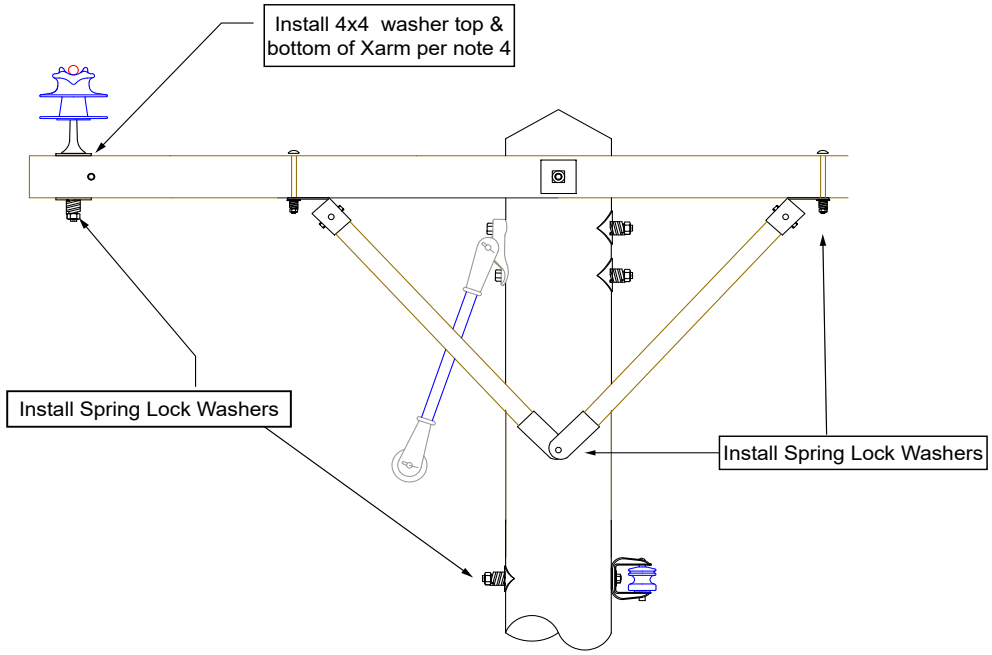
The following information provides the loading limitation of insulators based on wood & fiberglass xarms or steel material type on x-arms and brackets.

Insulator on Wood or Fiberglass	Horizontal Capacity (lbs.)
Pole-top Pin	500
Dbl Pole-top Pin	NA
Xarm Pin	500
Dbl Xarm Pin	1,000
Pole-top Post	800
Dbl Pole-top Post	NA
Xarm Post	800
Dbl Xarm Post	1,600

Insulator on Steel	Horizontal Capacity (lbs.)
Pole-top Post	1,000
Dbl Pole-top Post	NA
Xarm Post	1,000
Dbl Xarm Post	2,000

25kV Tie-top Pin Insulators:

The 25 kV Tie -top Insulators rating has been **increased from 250 to 500 lbs**. on Wood and Fiberglass x-arms based on **using 4x4 inch square washers between the pin and mounting hardware**.



NOTES

1. Conductor size ranges #6 CU to 1/0 ACSR
2. Max . Angle shown for 350-ft span Worst-case NESC Loads.
3. Guying for permitted loading to be specified per Engineer.
4. Install two 4x4 Washers per Insulator Xarm Pin.
5. See the Framing Spacing section for alternate neutral spacing.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

INSULATOR LIMITS
25KV TIE-TOP PIN DETAIL

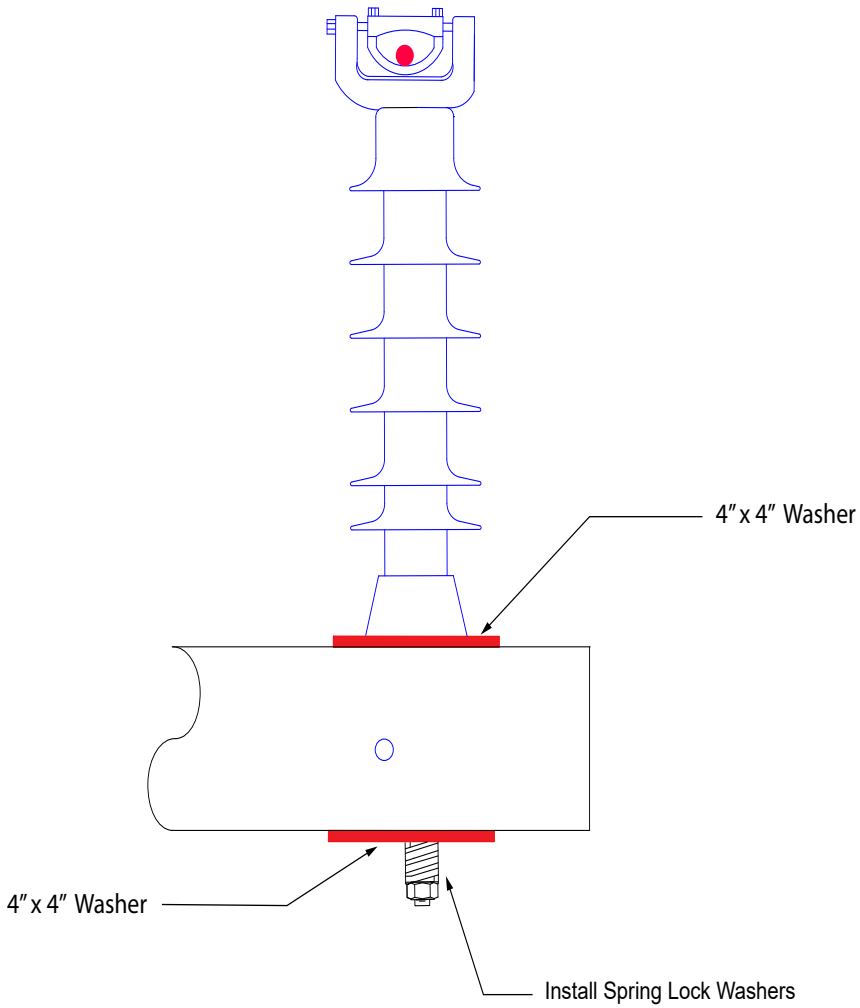
The 35kV polymer insulator base is smaller than the previous 23kV porcelain posts used on wood xarms, and these polymer posts are 70% taller than older porcelain post used. The increased height of the 35kV insulator results with the **need to install 4x4 inch square washers** to resist the applied compressive stress on wood and fiberglass x-arms.

Based on limited wood compressive resistance, wood xarms can crush below the washer when the horizontal insulator loads are applied to the taller polymer insulators. The “Working Loads” applied at the maximum line angles without the NESC Weather Cases or Overload Capacity Safety Factors, will be below this bearing stress limit by **installing 4x4 inch square washers on top and bottom of the x-arms.**

The insulator connections with 4x4 washers meet the minimum loading cases required by the NESC, but increased deflection of the polymer insulators may occur during the service life of the installation on large conductors at maximum angles.

The Insulator angle restrictions based on clamp or tie-top position are listed below. The trunnion clamps restrict take off angles of 15 degrees each way and the tie-top have been increased from 30 to 45-degree angles. Double dead-ends are set at maximum of 60 degrees for guying on the line bisector angle for most structures. Exceeding these angles can cause DE strain insulator swinging to close to the xarms. Suspension insulators are rated for maximum of 60 degrees based on the clamps stocked.

Insulator Framing	Deflection Angle limit (deg)
Vertical or Horizontal Clamp Post	30
Vertical Tie Top	45
Dbl. Dead-end	60
Suspension	60
Caution Note: Exceeding these angles can cause DE strain insulator swinging too close to the xarms.	



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

INSULATOR LIMITS
35KV POST DETAIL

NES has changed stock from the ANSI 53-2 Spool Insulator used in conjunction with both 1-wire rack small and large. The framing plates are using the **4,500 lbs. rated ANSI 53-4 Spool Insulator** in the 1-WIRE-L framing type where specified.

The table below shows the required insulator attachment type under the framing code. Requires using an eyebolt with suspension clamp with an insulator for **SU Framing**. The framing is using Double Dead-end plates (**DD Framing**) and Dead-ends (**DE Framing**) should be mounted with eyebolt for all 3-phase framing with minimum of 4/0 Neutrals.

Neutral Type per Framing Style

Span=350ft	Conductor Worst Case Load (lbs.)			PT or HL	Dbl HL	VL	SU	DD	DE
Neutral Wire Size	Tension	Wind @ 350-ft	Long. Unbalance						
#2 ACSR	1,400	22	77	1-WIRE	1-WIRE	1-WIRE	1-WIRE-L	1-WIRE-L	1-WIRE-L
1/0 ACSR	1,667	27	92	1-WIRE	1-WIRE	1-WIRE	1-WIRE-L	1-WIRE-L	1-WIRE-L
4/0 ACSR	2,513	38	138	1-WIRE-L	1-WIRE-L	1-WIRE-L	EYENUT 5/8	DDE-BKT	EYENUT 5/8
477 ACSR	3,487	55	192	1-WIRE-L	1-WIRE-L	1-WIRE-L	EYENUT 5/8	DDE-BKT	EYENUT 5/8
795 ACSR	4,561	70	251	1-WIRE-L	1-WIRE-L	1-WIRE-L	EYENUT 5/8	DDE-BKT	EYENUT 5/8

Neutral Suspension Insulator Swing Chart w/ 12-Inch FG Stick

Neutral Size	Span (ft)	Min. Deflection Angle (Deg)	Full Tension @120° Final Sag (lbs.)	Vert. Rotation Angle (Deg)	Hor. Swing (in.)	Vertical Drop (in.)
#2 ACSR	**350**	**30**	130	58.1	**23.8**	**14.8**
1/0 ACSR	**350**	**30**	201	59.7	**24.2**	**14.1**
4/0 ACSR	**350**	**30**	431	63.4	**25.0**	**12.5**
477 ACSR	**350**	**30**	704	62.3	**24.8**	**13.0**
795 ACSR	**350**	**27**	1,053	59.3	**24.1**	**14.3**

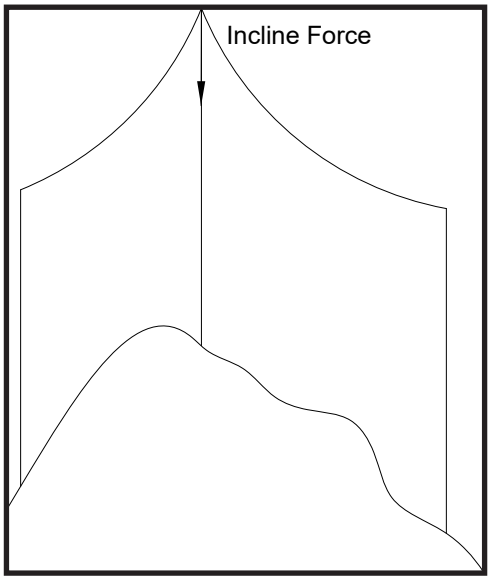
Note: Worst Case span using Conductor Tension from 300-ft Span Sag Charts (produces more conservative values than if using 350-ft span)

NOTES

See the Neutral, Secondary section for 1-wire rack limitations with shared neutrals or secondary wires.

Engineering drawings are to specify the framing based on the number of phases, conductor tension, line angles, wind spans, material types, and right-of-way or clearance constraints. The framing plates are organized in the order from tangent to the largest angle allowable for either wood or steel pole applications. Basic ranges are given for **PT to HL or VL up to SU** framings.

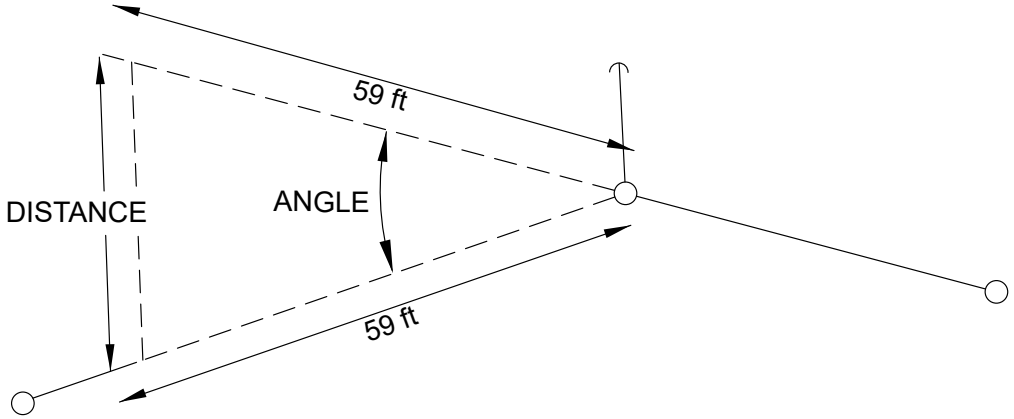
Caution Note: Should be used when transitioning from **HL or VL** framing to **SU** framing to ensure that the minimum conductor swing angles are met during **emergency repairs**. If uncertain that the suspension insulator at the minimum deflection angle will achieve the minimum pole clearances on the plate, then use **DDE** framing at vertical framed poles that are the highest point between the adjacent structures.



Consider Double Dead-end framing with large conductors due to incline span force applied to suspension insulators

During **emergency replacement of poles** the estimation of line deflection angle can be performed using a measuring tape applying the “Law of Cosine” as shown below. An “Azimuth” compass may be used with caution to avoid magnetic attraction to metal objects or magnetic fields from underground utilities that can cause measurement errors.

How to measure line deflection angle without survey equipment:



Method #3: Law of Cosines Method. Measure 59 feet from the pole on each line, as shown. Measure the distance between these two points. This distance is approximately equal to the degree of the angle.

NESC Grades of Construction

Grade "C" Construction – for ordinary streets and is used for most designs.

Grade "B" Construction – required when constructed such that the structure has the potential for falling into Navigable Waterways (i.e., Cumberland River), Control Access Highways (i.e., Interstates or fenced sections of state highways), and Railroads. Basically, wherever the failure can disrupt Interstate Commerce.

Recommended that Primary 13.8 kV or 23.9 kV Double Circuit Feeder lines be installed per Grade "B" Construction requirements for increased reliability. All 69 kV and 161 kV Transmission lines are required to be constructed to meet or exceed Grade "B" Construction.

Vegetation Management per NESC Rule 218

A. 1 - Vegetation management should be performed around electrical supply and communication lines as experience has shown to be necessary. Vegetation that may damage ungrounded electrical conductors should be pruned or removed.

A. 2 - Until pruning or removal has been achieved, the conductor should be separated from the tree with suitable dielectric materials or devices to avoid conductor damage by abrasion and grounding of the circuit through the tree.

B. 1 - At Grade "B" line crossings, railroad crossings, limited-access highway crossings, or navigable waterways requiring crossing permits.

B. 2 - The Grade "B" line crossing span and the adjoining span on each side of the crossing should be kept free from over-hanging or decayed trees or limbs that otherwise might fall into the line.

Maximum angles in chart are to be used during Emergency restoration when Engineering designs aren't available. The single-phase and two-phase plates show the limited angle range based on 1/0 ACSR conductor for 350-ft wind spans.

The following chart is to be used for specific conductors used with three-phase framing plates without engineering designs. The line angles are listed on the 1-phase and 2-phase framing plates are limited to 1/0 ACSR conductors.

350-Ft Wind Span			3-Phase Framing - Max Angles per NESC Rule 250 - Medium Loading, Extreme Ice or Extreme Wind 90 MPH																			
Construction Type			Angle Range (Degrees)																			
			Vertical Framing - Wood or Steel Poles						Wood or Fiberglass X-arm[2]						Steel Xarm - Wood or Steel Poles							
Cond.	Lbs.	NESC Rule	PT1	VL	SU	DD	DE	BK	PT[1]	HL[1]	Dbl HL	DD	DE	BK	PT	HL	Dbl HL	WOOD[3] O3SS-DD	WOOD O3SD-DD	STEEL O3SS-DD	WOOD O3SA-DD	STEEL O3SA-DD	DE	BK
2 ACSR	835	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-37	0-58	0	0	0-30	0-30	0-30	0-60	0-60	0-60	0-60	0-60	0	0
		Grade "B"	NA	0-30	30-60	0-60	0	0	NA	NA	0-32	0-39	0	0	0-30	0-30	0-30	0-56	0-60	0-60	0-60	0-60	0	0
1/0 ACSR	985	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-31	0-48	0	0	0-30	0-30	0-30	0-54	0-60	0-60	0-60	0-60	0	0
		Grade "B"	NA	0-30	30-60	0-60	0	0	NA	NA	0-26	0-32	0	0	0-26	0-26	0-30	0-46	0-60	0-60	0-60	0-60	0	0
4/0 ACSR	1,550	Grade "C"	0-8	0-30	30-60	0-60	0	0	0-8	0-8	0-20	0-31	0	0	0-22	0-22	0-30	0-34	0-53	0-60	0-60	0-60	0	0
		Grade "B"	NA	0-30	30-60	0-60	0	0	NA	NA	0-15	0-20	0	0	0-15	0-15	0-30	0-27	0-46	0-60	0-54	0-60	0	0
336 ACSR	1,980	Grade "C"	0-5	0-30	30-60	0-60	0	0	0-5	0-5	5-16	0-25	0	0	0-16	0-16	0-30	0-28	0-42	0-60	0-50	0-60	0	0
		Grade "B"	NA	0-30	30-60	0-60	0	0	NA	NA	0-11	0-15	0	0	0-11	0-11	0-29	0-21	0-35	0-60	0-41	0-60	0	0
477 ACSR	2,200	Grade "C"	0-4	0-30	30-60	0-60	0	0	0-4	0-4	0-13	0-22	0	0	0-12	0-12	0-30	0-24	0-37	0-60	0-44	0-60	0	0
		Grade "B"	NA	0-30	30-60	0-60	0	0	NA	NA	0-9	0-13	0	0	0-9	0-9	0-26	0-18	0-30	0-49	0-36	0-60	0	0
795 ACSR	3,000	Grade "C"	NA	0-22	22-60	0-60	0	0	NA	NA	0-19	0-22[5]	0	0	0-6	0-6	0-24	0-16	0-28	0-51	0-33	0-60	0	0
		Grade "B"	NA	0-22	22-60	0-60	0	0	NA	NA	0-13	0-12[5]	0	0	0-6	0-6	0-18	0-12	0-21	0-42	0-25	0-60	0	0
1351 AAC	4,500	Grade "C"	NA	0-14	14-60	0-60	0	0	NA	NA	0-10[5]	0-14[5]	0	0	NA	NA	0-14	NA	0-24[4]	0-60[4]	PLS-CADD Model for non-level spans up to 250-ft		0[4]	0[4]
		Grade "B"	NA	0-14	14-60	0-60	0	0	NA	NA	0-7[5]	0-7[5]	0	0	NA	NA	0-10	NA	0-18[4]	0-53[4]			0[4]	0[4]
Construction Type			Angle Range (Degrees)																			
			Vertical Framing						Wood or Fiberglass X-arm[2]						Steel Xarm with 35 kV Post Insulators							
Cond.	Lbs.	NESC Rule	PT1	VL	SU	DD	DE	BK	PT[1]	HL[1]	Dbl HL	DD	DE	BK	PT	HL	Dbl HL	WOOD[3] O3SS-DD	WOOD O3SD-DD	STEEL O3SS-DD	WOOD O3SA-DD	STEEL O3SA-DD	DE	BK
6 BHD	550	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-45	0-60	0	0	0-30	0-30	0-30	0-60	0-60	0-60	0-60	0-60	0	0
		Grade "B"	NA	0-30	30-60	0-60	0	0	NA	NA	0-45	0-60	0	0	0-30	0-30	0-30	0-60	0-60	0-60	0-60	0-60	0	0
4 BHD	700	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-45	0-60	0	0	0-30	0-30	0-30	0-60	0-60	0-60	0-60	0-60	0	0
		Grade "B"	NA	0-30	30-60	0-60	0	0	NA	NA	0-40	0-48	0	0	0-30	0-30	0-30	0-60	0-60	0-60	0-60	0-60	0	0
2 BHD	950	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-33	0-52	0	0	0-30	0-30	0-30	0-58	0-60	0-60	0-60	0-60	0	0
		Grade "B"	NA	0-30	30-60	0-60	0	0	NA	NA	0-28	0-35	0	0	0-28	0-28	0-30	0-49	0-60	0-60	0-60	0-60	0	0
1/0 BHD	1,315	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-25	0-38	0	0	0-27	0-27	0-30	0-42	0-60	0-60	0-60	0-60	0	0
		Grade "B"	NA	0-30	30-60	0-60	0	0	NA	NA	0-19	0-24	0	0	0-19	0-19	0-30	0-34	0-56	0-60	0-60	0-60	0	0
4/0 BHD	2,700	Grade "C"	0-4	0-30	30-60	0-60	0	0	0-4	0-4	0-12	0-20	0	0	0-14	0-14	0-30	0-23	0-35	0-60	0-41	0-60	0	0
		Grade "B"	NA	0-30	30-60	0-60	0	0	NA	NA	0-9	0-11	0	0	0-9	0-9	0-22	0-16	0-26	0-49	0-30	0-60	0	0
300 BHD	3,000	Grade "C"	0-4	0-22	22-60	0-60	0	0	0-4	0-4	0-11	0-18	0	0	0-13	0-13	0-27	NA	0-31	0-56	0-36	0-60	0	0
		Grade "B"	NA	0-22	22-60	0-60	0	0	NA	NA	0-7	0-10	0	0	0-7	0-7	0-19	NA	0-23	0-42	0-27	0-60	0	0

Note 1: Single Tie-top Pin Insulators not to be used with NESC Grade "B" Construction

Note 2: Angle Listed for Three Phase Xarm Construction using 10-ft Xarms

Note 3: Wood Pole Framing limitations with Single 4x6 DDE Steel Xarm on Wood Pole

Note 4: Requires Double 4"x6" Steel Xarms - 1351 AAC conductor

Note 5: Requires 5"x 6"x 10 ft Heavy Duty Wood Xarms - 795 ACSR or 1351 AAC

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

FRAMING ANGLE LIMITATION CHART

5/8-in Dia. A307 - Grade "A" Bolts

Dia. =	0.63	inch
Net area =	0.21	sq. inches
Threads in Shear Plane		

Applied Tension (KIPS)	Applied Ft (KSI)	One Bolt Shear (KIPS)	Allowable Fv (KSI)	Two Bolt Shear (KIPS)
1.00	4.66	5.76	26.80	11.51
2.00	9.31	5.65	26.29	11.29
3.00	13.97	5.46	25.40	10.91
4.00	18.63	5.18	24.11	10.35
5.00	23.28	4.80	22.33	9.59
6.00	27.94	4.28	19.95	8.57
7.00	32.59	3.59	16.70	7.17
8.00	37.25	2.55	11.89	5.11

ft less than or = Fy = 36 ksi
Ft = 41.5 ksi "allowable tension stress"

The following tables provide the Combined Stress loading limits applied to the bolted connections used in all the framing plates.

Wood xarms, braces, insulators, pole-eye plates, DE-TEE for guying, and brackets use 5/8-inch or 3/4-inch A307 Square-head bolts.

Connections for Steel xarms and Double guy plates require High Strength A325 Hex-head 1-inch bolts are Stocked by NES.

3/4-in Dia. A307 - Grade "A" Bolts

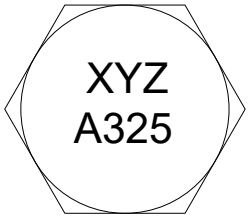
Dia. =	0.75	inch
Net area =	0.31	sq. inches
Threads in Shear Plane		

Applied Tension (KIPS)	Applied Ft (KSI)	One Bolt Shear (KIPS)	Allowable Fv (KSI)	Two Bolt Shear (KIPS)
1.00	3.23	8.32	26.89	16.63
2.00	6.47	8.24	26.65	16.48
3.00	9.70	8.11	26.23	16.22
4.00	12.93	7.93	25.63	15.85
5.00	16.17	7.68	24.84	15.37
6.00	19.40	7.37	23.85	14.75
7.00	22.64	6.99	22.61	13.98
8.00	25.87	6.52	21.09	13.05
9.00	29.10	5.95	19.23	11.89
10.00	32.34	5.23	16.91	10.46
11.00	35.57	4.30	13.90	8.59
12.00	38.80	2.96	9.56	5.92

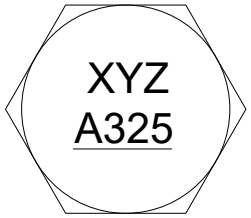
ft less than or = Fy = 36 ksi
Ft = 41.5 ksi "allowable tension stress"

Grade A325 High Strength Bolts

Type 1



Type 3



1-in Dia. A325 - Grade "5" Bolts

Dia. =	1.00	inch
Net area =	0.55	sq. inches
Threads in Shear Plane		

Applied Tension (KIPS)	Applied Ft (KSI)	One Bolt Shear (KIPS)	Allowable Fv (KSI)	Two Bolt Shear (KIPS)
1.00	1.82	25.94	47.19	51.89
2.00	3.64	25.92	47.15	51.84
3.00	5.46	25.88	47.07	51.76
4.00	7.28	25.82	46.97	51.64
5.00	9.09	25.75	46.83	51.50
6.00	10.91	25.66	46.67	51.32
7.00	12.73	25.55	46.48	51.10
8.00	14.55	25.43	46.25	50.85
9.00	16.37	25.29	45.99	50.57
10.00	18.19	25.13	45.70	50.25
11.00	20.01	24.95	45.38	49.90
12.00	21.83	24.75	45.02	49.51
13.00	23.65	24.54	44.63	49.08
14.00	25.46	24.31	44.21	48.61
15.00	27.28	24.05	43.75	48.10
16.00	29.10	23.78	43.25	47.56
17.00	30.92	23.48	42.71	46.97
18.00	32.74	23.17	42.14	46.33
19.00	34.56	22.83	41.52	45.65
20.00	36.38	22.46	40.86	44.92
21.00	38.20	22.07	40.15	44.15
22.00	40.02	21.66	39.39	43.32
23.00	41.84	21.21	38.59	42.43
24.00	43.65	20.74	37.73	41.48
25.00	45.47	20.24	36.81	40.47
26.00	47.29	19.70	35.83	39.39
30.00	54.57	17.13	31.15	34.25
35.00	63.66	12.49	22.72	24.98

ft less than or = Fy = 81 ksi
Ft = 72.6 ksi "allowable tension stress"

The Standard framing of bolted connections of wood components are based on the material properties in the table below reduced by the appropriate NESC Strength Reduction factors:

Wood Strengths	(psi)
Comp Parallel Grain	7,200
Comp Perp. Grain	800
Shear Parallel Grain	1,130
Shear Perp. Grain	3,190

Washers

Standard 2 ¼-inch Square washers are used with 5/8-inch bolts when mounting metal brackets. Also, 2 ¼-inch small washers are allowed with 5/8" diameter DA bolts used on 1-phase xarms assemblies. These small washers allow the lower dead-end tension use with small conductors before crushing the outer wood fibers.

Larger washers are required for all 3/4-inch bolted connections to wood or fiberglass xarms. Use 3 ½ inch sq. curved or square 4-inch sq. flat washers to reduce the crushing of wood or fiberglass surfaces.

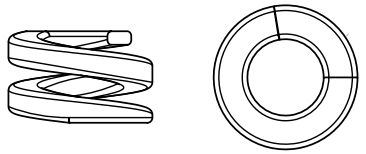
Bolt Connection Limits on Wood Poles or Xarms		
Washer	D.A Bolt Size	Tension (lbs.)
2.25"x2.25"	5/8"	2,630
3.5"x3.5"	3//4"	5,960
4"x4"	3/4"	7,800

Lock Washer

The plates specify Installing Double Coil Spring Lock Washers using 1/2-inch, 5/8-inch, and 3/4-inch A307 bolts, used when installing Double-Arming (D.A.) or machine bolts for xarms, and insulator mounting brackets accordingly. These Spring-Coil type lock washers are to replace Pal-nuts to better withstand loosening of nuts on wood x-arms, braces and insulator applications.

A307 Bolts: Carriage, Square Head and DA bolts stocked by NES are recommended to use Double Coil Spring Lock Washers to insure the maintain tension in the bolts and hardware stays in-place.

DOUBLE COIL
SPRING WASHER



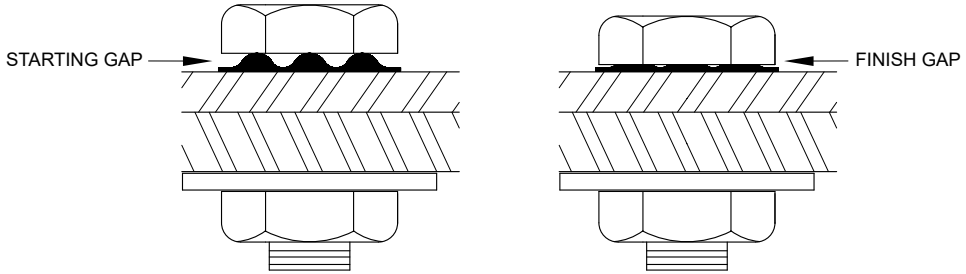
A325 High Strength 1-inch bolts are used without coil spring washers and are to be tightened to ensure steel xarms and guying attachments perform appropriately. The use of A325 bolts with combined loading in conjunction on steel dead-end or alley type xarms mounted on steel pole or wood poles with bearing plates **require pre-tensioning bolts**.

All steel xarm framing with 1-inch A325 bolted connections are treated as **Slip-critical connections**. The use of A325 bolts with combined loading in conjunction on steel dead-end or alley type xarms mounted on steel pole or wood poles with bearing plates **require pre-tensioned bolts**. Wood xarms use A307 bolted connections to wood poles are treated as bearing type connections.

Slip-critical bolts must be pre-tensioned to transfer shear through the washer or plate connection. Do **not** reuse high Strength bolts that have been pre-tensioned.

High Strength Bolts

Pre-Tensioning High Strength bolts using the Turn-of-Nut Method is limited to short bolts less than 12 times the bolt diameter (see below).



DIRECT TENSION INDICATOR (DTI)

NOTE

DTI Inicator does not make it more difficult to tension bolt, merely shows the high strength bolt has been properly tensioned when the gap has been reduced sufficiently.

Table 8.2 Nut Rotation from Snug-Tight Condition for Turn-of-Nut Pretensioning [a,b]

Bolt Length [c]	Dispositions of Outer Faces of Bolted Parts		
	Both faces normal to bolt axis	One face normal to bolt axis, other sloped not more than 1:20 [d]	Both faces sloped not more than 1:20 from normal to bolt axis [d]
Not more than $4d_b$	1/2 turn	1/2 turn	2/3 turn
More than $4d_b$ but no more than $8d_b$	1/2 turn	2/3 turn	5/8 turn
More than $8d_a$ but no more than $12d_a$	2/3 turn	5/8 turn	1 turn

[a] Nut rotation is relative to bolt regardless of the element (nut or bolt) being turned. For required nut rotations of 1/2 turn and less, the tolerance is plus or minus 30 degrees; for required nut rotations of 2/3 turn and more, the tolerance is plus or minus 45 degrees.

[b] Applicable only to joints in which all aterial within the grip is steel

[c] When the bolt length exceeds $12d_b$, the required nut rotation shall be determined by actual testing in a suitable tension calibrator that stimulates the conditions of solidly fitting steel.

[d] Beveled washer not used.

Pre-Tensioning High Strength bolts: Preferred method to insure A325 bolted connections don't loosen is to achieve the recommended minimum torque to apply the pre-tension load by using **Direct Tension Indicator washers**.

Fiberglass xarms are used with concrete or steel poles but can be installed on wood poles without any reduction of angle ratings.

Wood xarms are primarily used with wood pole applications.

The following limits are used for the following **Wood xarm** and **Wood Pole Double Arming Mounting bolts**:

Single Thru-Bolt @ Wood Pole - Shear Capacity (lbs.)				
Pole Class	D.A. Bolt Size	Shear Load Allowed per Bolt		
		Grade "C"	Grade "B"	Extreme
C4	5/8"	1,893	1,447	1,663
C3	5/8"	2,062	1,577	1,812
C2	5/8"	2,260	1,728	1,985
C4	3/4"	2,271	1,737	1,995
C3	3/4"	2,475	1,893	2,174
C2	3/4"	2,712	2,074	2,383
C1	3/4"	2,915	2,230	2,561
C4	1"	3,028	2,316	2,660
C3	1"	3,300	2,523	2,899
C2	1"	3,616	2,765	3,177
C1	1"	3,887	2,973	3,415

Single Wood Xarm - Shear Capacity (lbs.)				
Xarm	D.A. Bolt Size	3 Phase - Shear Load Allowed		
		Grade "C"	Grade "B"	Extreme
3.5"x 4.5"	5/8"	2,600	2,016	2,328
3.75" x 4.75"	3/4"	3,282	2,511	2,895
4.75" x 5.75"	3/4"	4,158	3,177	3,669

Bolt Connection Limits on Wood Poles or Xarms		
Washer	D.A. Bolt Size	Tension (lbs.)
2.25"x2.25"	5/8"	2,630
3.5"x3.5"	3/4"	5,960
4"x4"	3/4"	7,800

Wood Braces:

The braces stocked by NES are 38-inch horizontal spread used with 8-foot Xarms and 60-inch horizontal spread used with 10-foot Xarms. Installation of Double Coil Spring Lock Washers with braces required to prevent braces from loosening throughout life of service.
Manufacturing tests provide the compressive capacity ratings used in the framing plates.

Brace Capacity	(lbs.)
38-inch	4,135
60-inch	7,250

NOTE

Installation of Double Coil Spring Lock Washers with braces required to prevent braces from loosening throughout life of service.

Steel xarms are used on concrete or steel poles based on conductor size, or when the Engineer specifies higher conductor tenstions. Steel xarms can be installed on wood poles with reductions of line deflection angles as specified on the **Framing Angle Limitation Chart**(s).

The following limits are used for the following **Steel xarm** size and type:

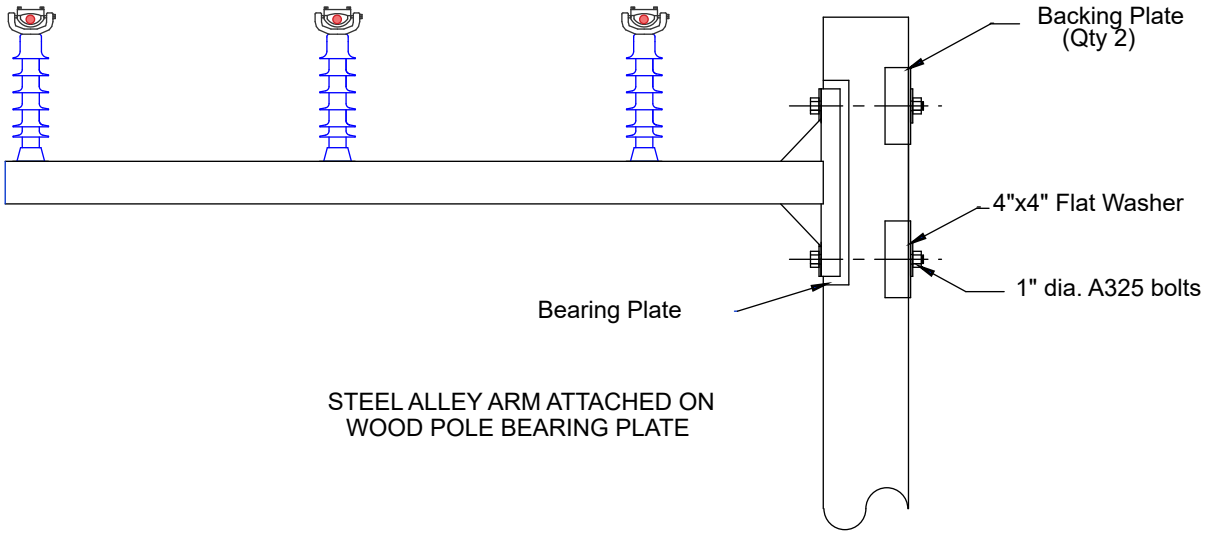
Steel Xarm 4”x6” - Framing Limits			
Framing Type	Conductor Load (lbs.)		
	Vertical	Horizontal	Dead-end
O3SS-DD	1,200	4,000	4,500
O3SS-BK	900	500	5,000
O3SS-DE	900	500	5,000
O3SD-DD	2,400	8,000	9,000
O3SD-BK	1,800	1,000	10,000
O3SD-DE	1,800	1,000	10,000
Requires 1-inch A325 bolts with guys attached to Xarm for Dead-end loading unbalance.			

Steel Xarm 4”x6” - Framing Limits			
Framing Type	Conductor Load (lbs.)		
	Vertical	Horizontal	Dead-end
O3SS-HL	1,650	1,000	500
O3SS-BK	1,650	2,000	1,000
O3SD-DD	1,650	5,300	3,500
Using 3/4-inch A307 bolt xarm mounted on wood or steel poles.			

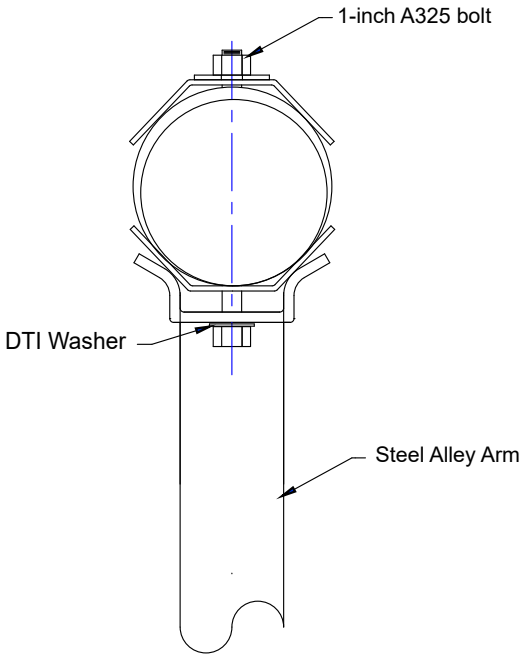
Steel Alley Xarm Framing Limits			
Framing Type	Conductor Load (lbs.)		
	Vertical	Horizontal	Dead-end
O3SA-HL	850	1,000	500
O3SA-DE	1,300	6,000	520
Requires 1-inch A325 bolt xarm for loading unbalance with steel pole.			
Bearing Plates required on Wood Poles			

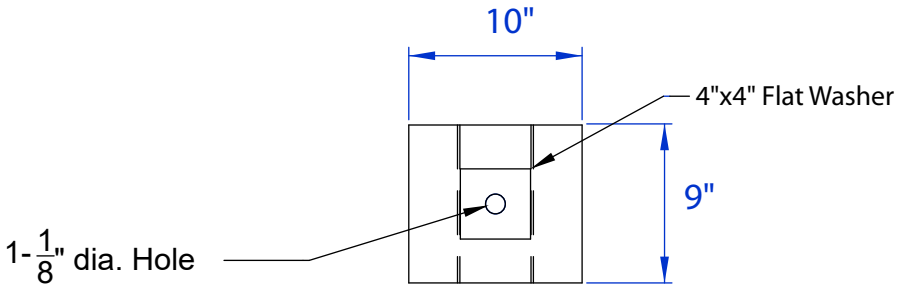
Caution Note: Bonding Steel xarms to pole ground **required on all pole types** with minimum ground wire as specified in **Grounding Section - Table 1** per circuit ampacity. The following limits are used for the following Steel xarm size and type:

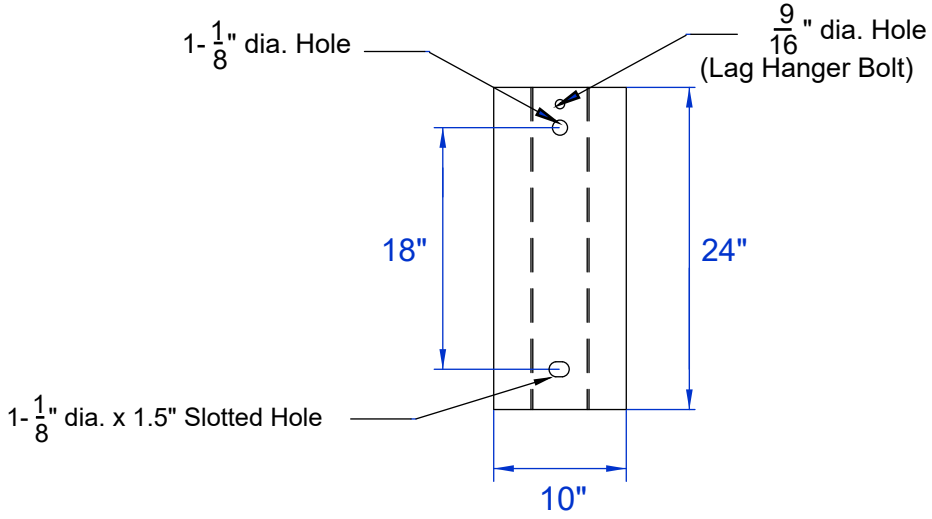
Steel Alley arms mounted on wood poles require **Metal Bearing and Backing plates** to resist the crushing of the wood poles at attachments.



STEEL ALLEY ARM ATTACHED ON
WOOD POLE BEARING PLATE







REV.	ENG.	DESCRIPTION OF CHANGE	DATE

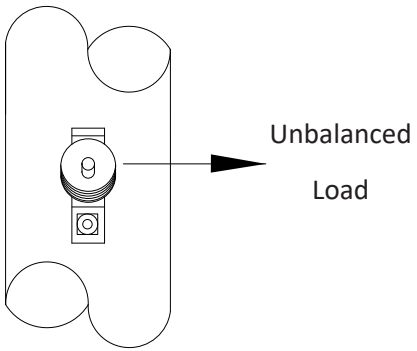
NES

STEEL ALLEY ARM MOUNTED ON WOOD POLE

Horizontal Insulators on VL Framing

Vertical framing uses brackets that limit insulators when installing on wood poles. The long insulators increase the stress applied to the wood pole are limited in the table below.

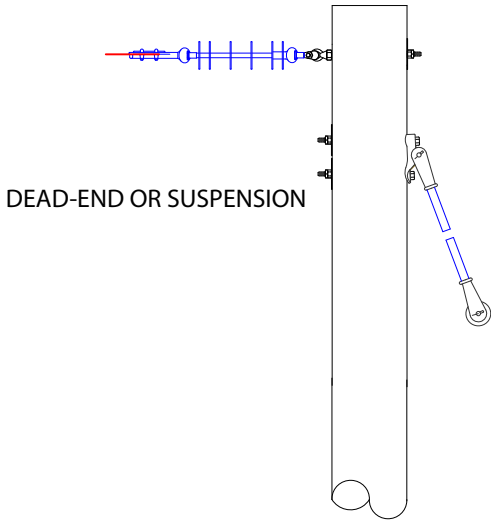
35kV Polymer Insulator	
Horizontal Insulator Mounting Bracket	Wood Pole Unbalance Limit
Grade "C"	(lbs.)
2-inch	170
9-inch	325
Grade "B"	(lbs.)
2-inch	130
9-inch	250
Post Insulator Capacity (lbs.)	
Vertical	Longitudinal
1,000	2,000



Vertical Suspension or Vertical Dead-end framing

Strain insulators are mounted to eye-nuts with thru bolts with 3.5-inch curved washers on wood poles with the loading limits in the table below:

Strain Insulator Framing Limits			
Framing Type	**Conductor Load (lbs.)**		
	Vertical	Horizontal	Tension
OxxV-SU	1,250	1,250	8,000
OxxV-DE	1,250	1,250	8,000
Using 5/8-inch A307 bolt for loading on wood or steel poles.			

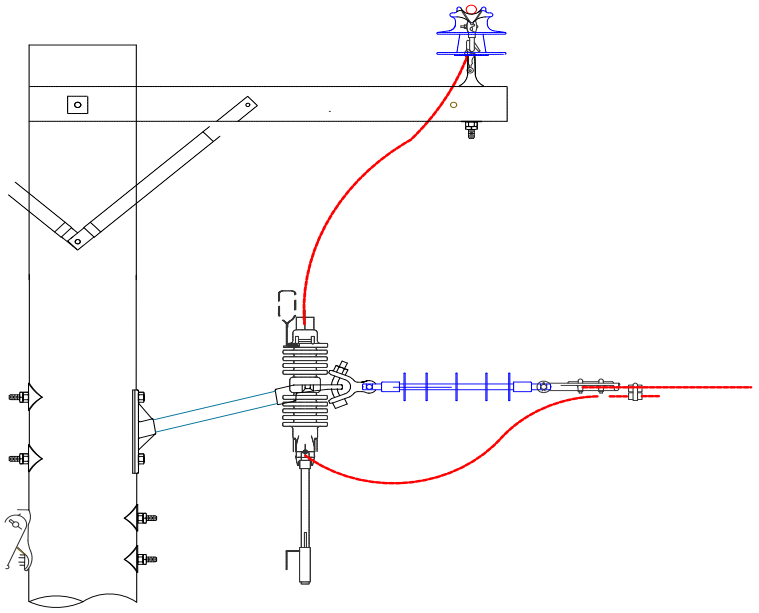


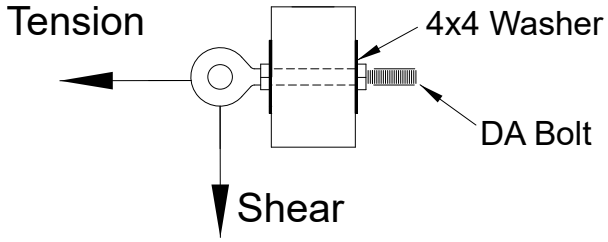
The use of fiberglass arrestor/cutout brackets for dead-end insulators should only be installed in-line of the conductor to minimize unbalanced in the pole mounting connection. The framing plates recommend installing only small single-phase conductors directly in tension and to be used to support fused disconnects in jumper positions.

18-inch Bracket Loads (lbs.)		
Vertical	**Horizontal**	**Dead-End**
1,200	325	1,000

Single Eye-Nut Limit thru DDE Xarm (lbs.)		
Conductor	**Horizontal Shear**	**Vertical Shear**
2 ACSR	526	180
1/0 ACSR	521	233
4/0 ACSR	538	359
336 ACSR	557	439
477 ACSR	546	565
795 ACSR	744	805
1351 AA	713	1,170
Note: Not recommend at Max. line angles with Unbalanced Loads ≥ 4,000 lbs.		

EXISTING FRAMING MAY VARY





REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

18-INCH FIBERGLASS BRACKET & EYE NUT XARM LIMITS

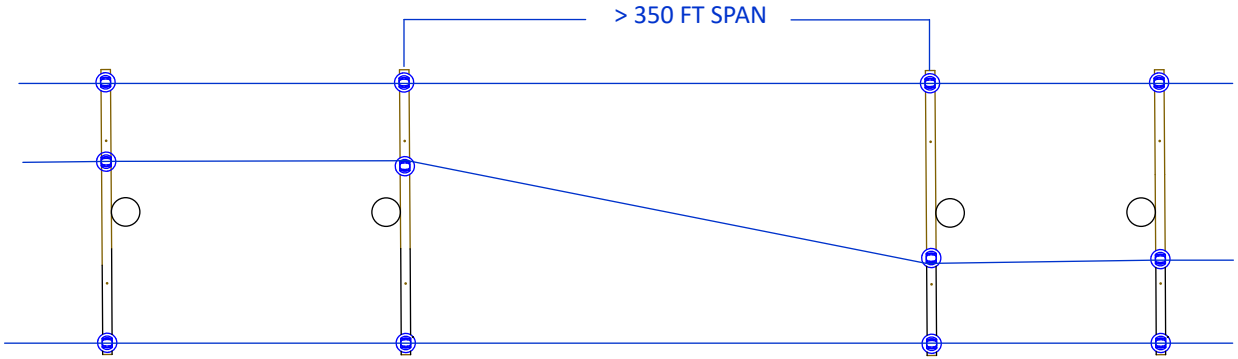
Orientation of phase conductors can affect the conductor clearances at the mid-span. Caution is to be used when maintaing minimum phase clearances according to NESC Rule 235B.

Conductor temperature based on 60 deg. F temperature Final Sag in Table below.

Horizontal Clearances between Line Conductors

Voltage Between Conductors (kV)	Wire Size #2 or larger (from NESC table 235-3)						Wire Size smaller than #2 (old copper) (from NESC table 235-2)					
	Sag (in.)						Sag (in.)					
	36.00	48.00	72.00	96.00	120.00	240.00	36.00	48.00	72.00	96.00	120.00	240.00
	Horizontal Clearance (in)						Horizontal Clearance (in)					
4.16	15.10	17.25	20.84	23.88	26.55	37.03	15.24	21.04	29.24	35.53	40.83	60.62
7.96	16.24	18.39	21.98	25.02	27.69	38.17	16.38	22.18	30.38	36.67	41.97	61.76
13.80	18.00	20.14	23.74	26.77	29.44	39.92	18.13	23.93	32.13	38.42	43.72	63.52
23.90	21.03	23.17	26.77	29.80	32.47	42.95	21.16	26.96	35.16	41.45	46.75	66.55
69.00	34.56	36.70	40.30	43.33	46.00	56.48	34.69	40.49	48.69	54.98	60.28	80.08
161.00	62.16	64.30	67.90	70.93	73.60	84.08	62.29	68.09	76.29	82.58	87.88	107.68
Calculated from NESC rule 235B.1.b.1&2: Clearance = 0.3(kV) + 8√S/12 for Greater than #2, 0.3x(kV) + 4.04√S-24 for less than #2												

Orientation of the center phase with the alternating of HL framing to achieve maximum clearance recommended on spans greater than 350 ft.



Unbalanced Spans

Based on an engineering study of 1.5 times span unbalanced of adjacent spans produces the following results using PLS-Cadd computer program test cases for a sample of conductors. Consideration of the line unbalance loads should be used on when to double xarms or install double dead-ends to reduce xarm rolling.

Unbalanced Span		1351AAC	795ACSR	4/0ACSR	2ACSR
SPAN (ft)	SPAN (ft)	UNBAL (lbs)	UNBAL (lbs)	UNBAL (lbs)	UNBAL (lbs)
100	150	120	90	60	50
150	225	160	110	80	70
200	300	180	120	80	80
250	375	200	130	80	80

Inclined Spans

The xarm framings are designed to resist the maximum of 20-ft change with the largest conductor types with the maximum spans and deflection angle combined. The charts below show the Incline Span Factors due to the slope of the inclines for a sample of conductors. Shorter spans affected by abrupt elevation changes as shown approximately five times that of a level span.

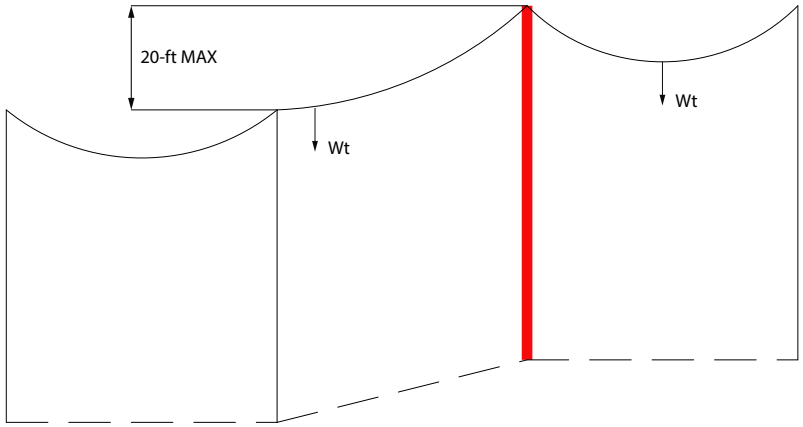
1351 AAC			
SPAN (FT)	VERT. WT. LEVEL SPAN (LBS)	VERT. WT. SPAN ELEVATED 20FT (LBS)	INCLINE SPAN FACTOR
100	350	2,050	5.86
150	520	1,650	3.17
200	680	1,540	2.26
250	850	1,540	1.81
300	1020	1,590	1.56
350	1190	1,680	1.41
400	1360	1,780	1.31

4/0 ACSR			
SPAN (FT)	VERT. WT. LEVEL SPAN (LBS)	VERT. WT. SPAN ELEVATED 20FT (LBS)	INCLINE SPAN FACTOR
100	120	560	4.67
150	170	470	2.76
200	220	440	2.00
250	270	450	1.67
300	320	470	1.47
350	380	500	1.32
400	430	540	1.26

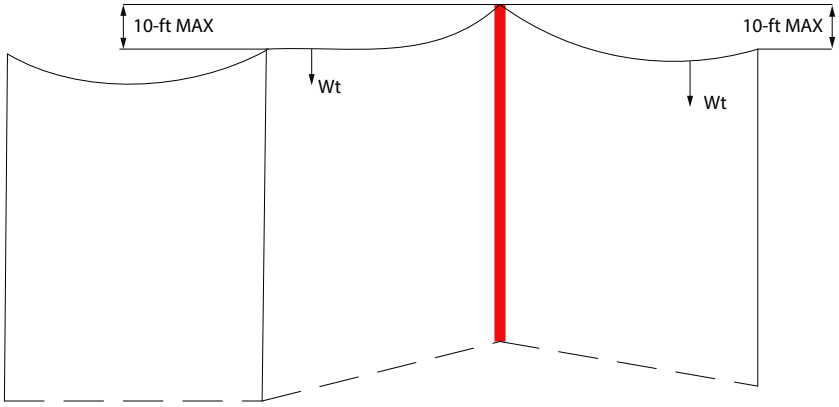
795 ACSR			
SPAN (FT)	VERT. WT. LEVEL SPAN (LBS)	VERT. WT. SPAN ELEVATED 20FT (LBS)	INCLINE SPAN FACTOR
100	240	1,220	5.08
150	360	1,010	2.81
200	470	970	2.06
250	590	980	1.66
300	700	1,030	1.47
350	820	1,100	1.34
400	930	1,180	1.27

#2 ASCR			
SPAN (FT)	VERT. WT. LEVEL SPAN (LBS)	VERT. WT. SPAN ELEVATED 20FT (LBS)	INCLINE SPAN FACTOR
100	60	270	4.50
150	90	230	2.56
200	120	220	1.83
250	140	220	1.57
300	170	240	1.41
350	190	250	1.32
400	220	270	1.23

The impacts of the inclined spans shown below were used as a guide to predict the impact of conductor loads on the structures shown in red on the following illustrations.



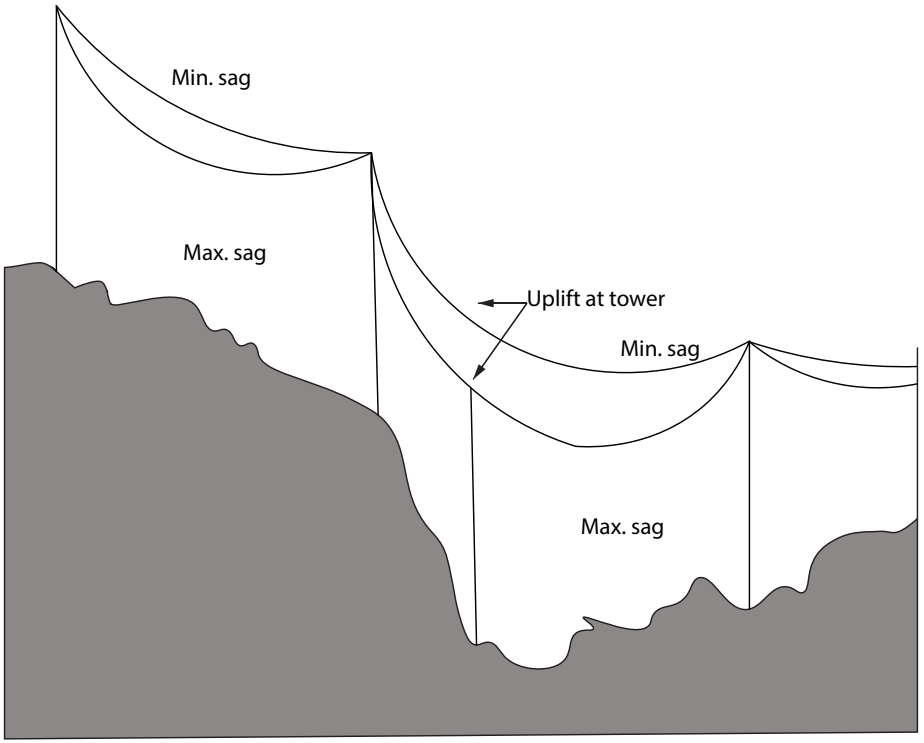
Increased vertical forces created by inclined span due to 20 ft elevation change shown in red above.



$$Y = 432.05\ (X)^{-0.992}$$

The conductor resulatant loading is predicted by the emperical formula based engineering study using PLS-Cadd analysis of the sample conductors:

The maximum combined vertical change of 20 ft was used to calculate slope impact on xarms assemblies. The formula below was derived with X = weight span and Y = Incline Span Factor to predict the vertical loads to evaluate xarms and braces for any conductor.



Caution is to be used with inclined spans creating vertical uplift on the lower height structures. The tension resulatant overrides the conductor weight pulling away from tie top insulators. Suspension insulators can twist upwards or bell insulators begin to rattle and create radio interferance. Double Dead-end or Trunion clamp style post insulators can secure conductors to resist uplift conditions. The 50 lbs. uplift limit set for tie-top insulators and 500 lbs. uplift limt for posts in the Design Guidelines.

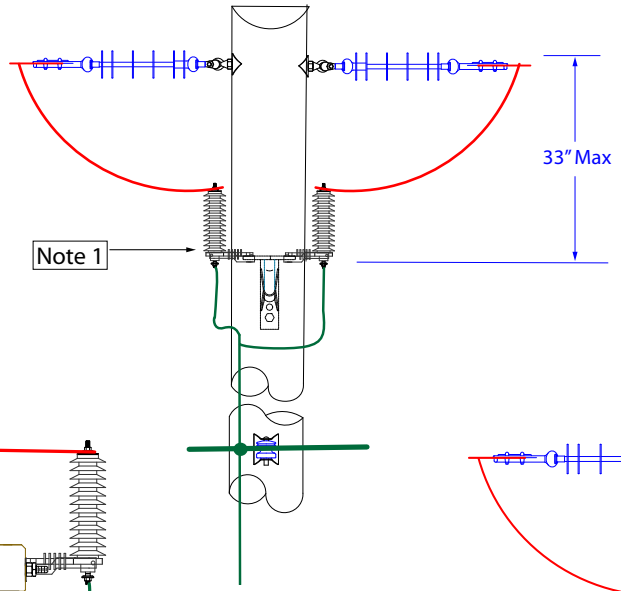
Uplift occurs when the weight span affects the structure with negative force. On steeply inclined spans, the low point of the sag may fall beyond the lower support of the catnery curve of a conductor. This indicates that the conductor in the up hill span is applying an upward force at the lower insulator attachment. The amount of upward force is equal to the weight of the conductor from the lower support to the low point in the sag. If the upward pull of the up hill span is greater than the downward load of the next adjacent span uplift will occur. Uplift typically happens with colder temperatures, or as a result of increased conductor tension during replacements with taller adjacent poles. Maintaining similar pole heights or installing double dead-end insulators are recommended to prevent uplift.

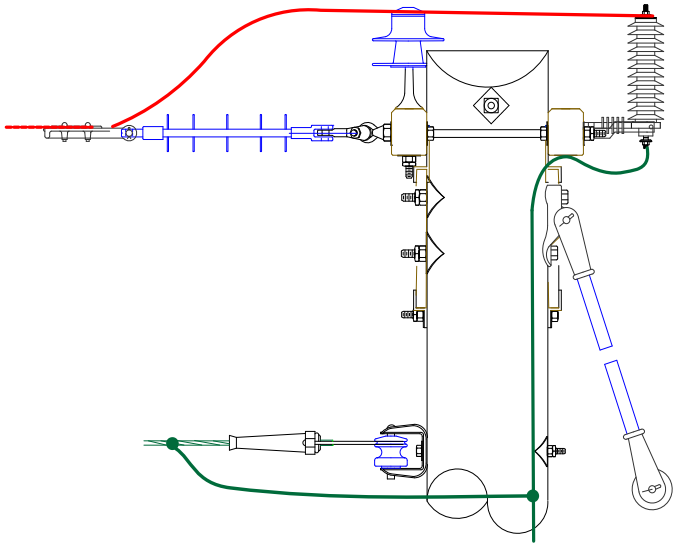
Lightning protection of equipment and circuits is critical in the performance of the distribution circuits. The amount of resistance in the driven grounding electrode directly affects the arrestors clearing time. Line crews are to install arrestors at all conductor dead-ends, fixed open-points, and switch openings. Mounting arrestors directly to equipment for Gang Operated switches and Reclosers is preferred method of protection at the open points.

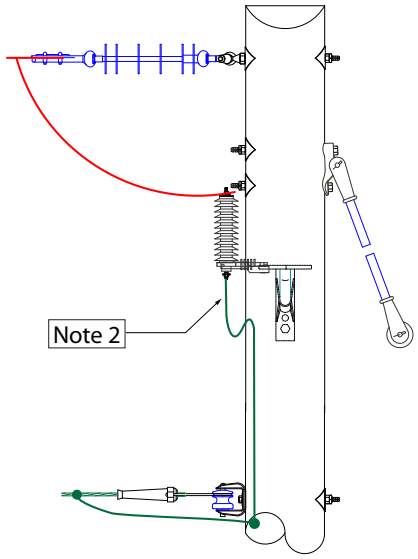
Shown below are general **line arrester** locations for overhead distribution circuit protection:

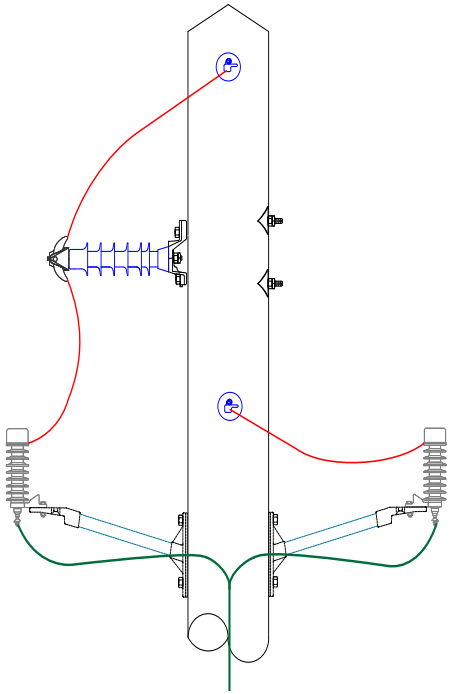
NOTES

1. Arresters to maintain minimum 8 inch air-gap separation between live parts when sharing support arm for same circuit.
2. Arrester ground slack loops to be as short as possible to eliminate hanging into equipment mounted below.









REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

LINE ARRESTER APPLICATION

SINGLE PHASE FRAMING STANDARDS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
3/23/26	Cedric Short	Ronald Reasonover	Tony Richman
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
WOOD POLE FRAMING INDEX	3			
STEEL POLE FRAMING INDEX	4			
STANDARD FRAMING ANGLES, 1PH CONSTRUCTION, WOOD POLE	5			
WOOD POLE, VERTICAL CONSTRUCTION POLE TOP PIN	6			
WOOD POLE, VERTICAL CONSTRUCTION SINGLE PHASE VERTICAL LINE	7			
WOOD POLE, VERTICAL CONSTRUCTION SUSPENSION INSULATOR	8			
WOOD POLE, VERTICAL CONSTRUCTION DOUBLE DEAD-END	9			
WOOD POLE, VERTICAL CONSTRUCTION SINGLE DEAD-END	10			
WOOD POLE, VERTICAL CONSTRUCTION SINGLE PHASE LINE EXTENSION	11			
WOOD POLE, VERTICAL CONSTRUCTION BUCK LINE ON FIBERGLASS BRACKET	12			
WOOD POLE, SINGLE CROSSARM HORIZONTAL CONSTRUCTION	13			
WOOD POLE, DOUBLE CROSSARM HORIZONTAL CONSTRUCTION	14			
WOOD POLE, DOUBLE CROSSARM CONSTRUCTION DOUBLE DEAD-END	15			
WOOD POLE, DOUBLE CROSSARM CONSTRUCTION SINGLE DEAD-END	16			
WOOD POLE, DOUBLE CROSSARM CONSTRUCTION LINE EXTENSION	17			

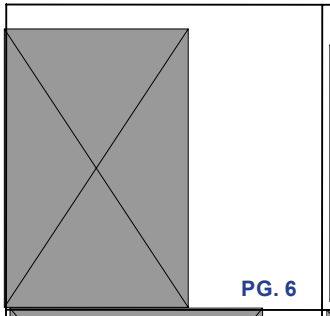
SINGLE PHASE FRAMING STANDARDS

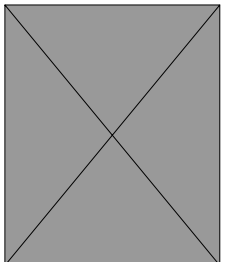
APPROVALS

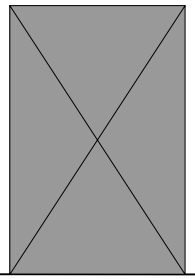
ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER

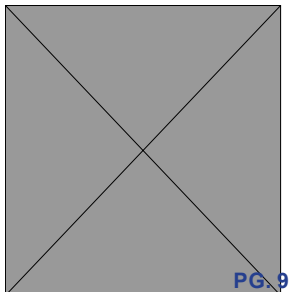
TABLE OF CONTENTS

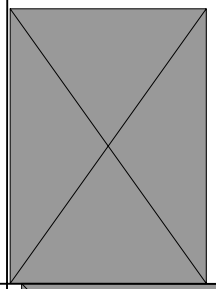
TITLE	PAGE	REV	DATE	DESCRIPTION
STANDARD FRAMING ANGLES, 1PH CONSTRUCTION, STEEL POLE	18			
STEEL POLE, VERTICAL CONSTRUCTION POLE TOP PIN	19			
STEEL POLE, VERTICAL CONSTRUCTION SINGLE PHASE VERTICAL LINE	20			
STEEL POLE, VERTICAL CONSTRUCTION SUSPENSION INSULATOR	21			
STEEL, POLE VERTICAL CONSTRUCTION DOUBLE DEAD-END	22			
STEEL POLE, VERTICAL CONSTRUCTION SINGLE DEAD-END	23			
STEEL POLE, VERTICAL CONSTRUCTION SINGLE PHASE LINE EXTENSION	24			
STEEL POLE, VERTICAL CONSTRUCTION BUCK LINE ON FIBERGLASS BRACKET	25			
STEEL POLE, SINGLE CROSSARM HORIZONTAL CONSTRUCTION	26			
STEEL POLE, DOUBLE CROSSARM HORIZONTAL CONSTRUCTION	27			
STEEL POLE, DOUBLE CROSSARM CONSTRUCTION DOUBLE DEAD-END	28			
STEEL POLE, SINGLE CROSSARM CONSTRUCTION SINGLE DEAD-END	29			
STEEL POLE, DOUBLE CROSSARM CONSTRUCTION LINE EXTENSION	30			
STEEL POLE, EXISTING CROSSARM CONSTRUCTION SIDE LINE EXTENSION	31			

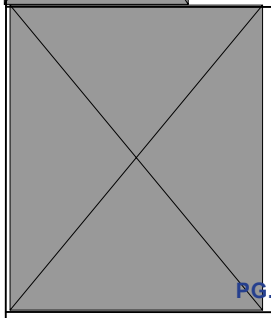


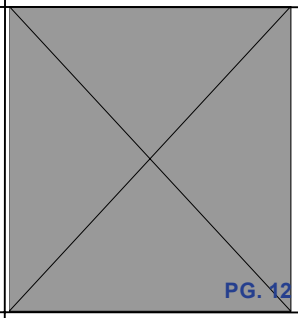


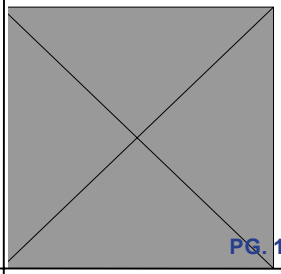


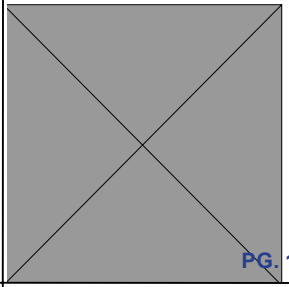


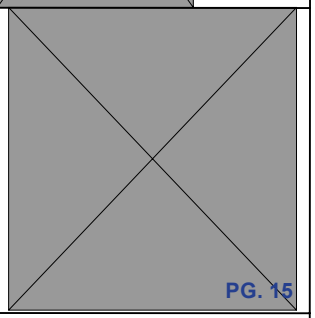


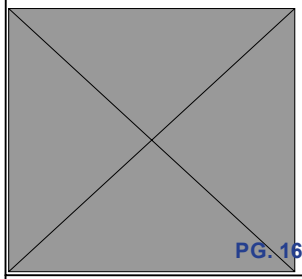


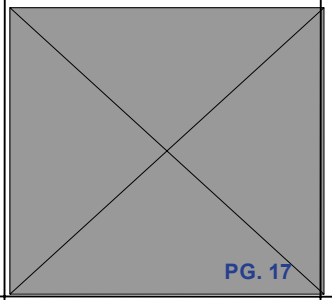










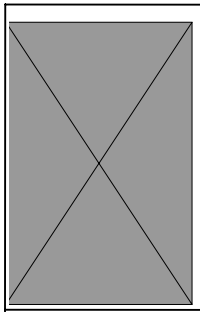


REV.	ENG.	DESCRIPTION OF CHANGE	DATE

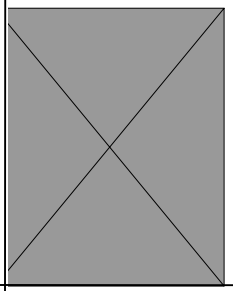
NES

WOOD POLE FRAMING INDEX

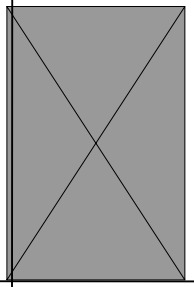
SINGLE PHASE FRAMING STANDARDS



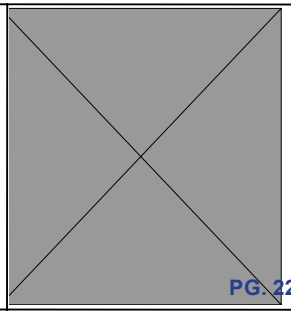
PG. 19



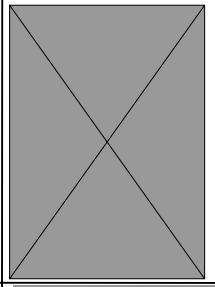
PG. 20



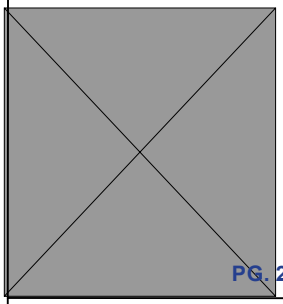
PG. 21



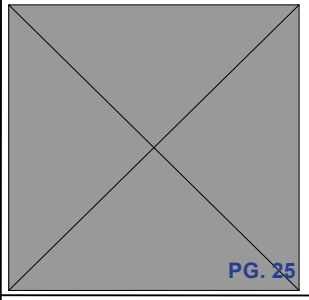
PG. 22



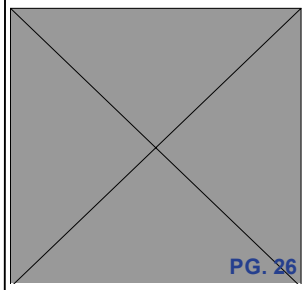
PG. 23



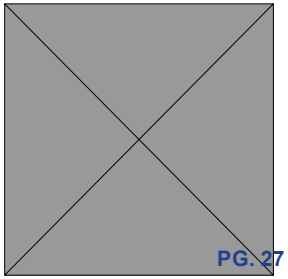
PG. 24



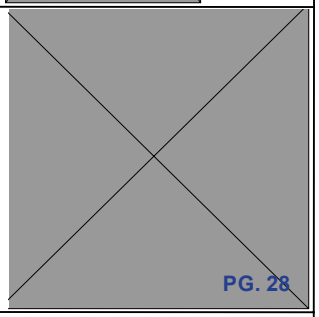
PG. 25



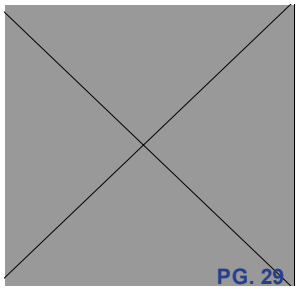
PG. 26



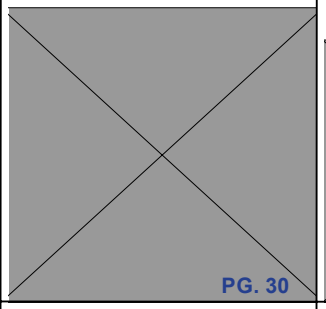
PG. 27



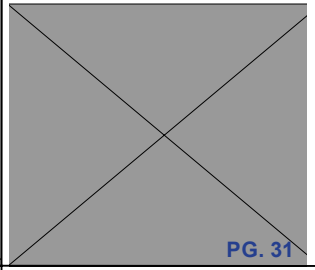
PG. 28



PG. 29



PG. 30



PG. 31

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
FRAMING INDEX

SINGLE PHASE FRAMING STANDARDS

1-PHASE FRAMING - MAXIMUM ANGLES

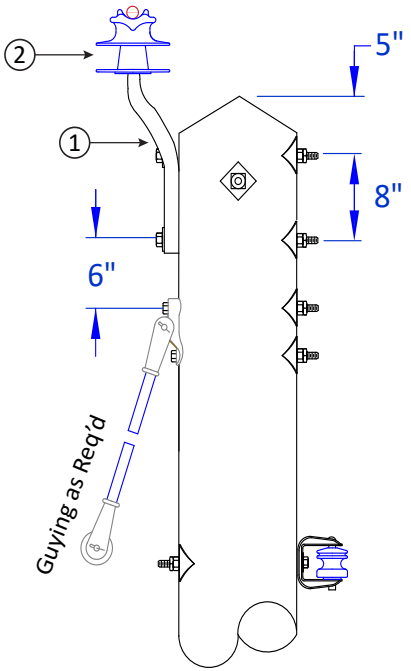
350 FOOT WIND SPAN			MAXIMUM ANGLES PER NESC RULE 250- MEDIUM LOADING, EXTREME ICE, OR EXTREME WIND 90 MPH										
CONSTRUCTION TYPE			ANGLE RANGE (DEGREES)										
			VERTICAL FRAMING - WOOD POLE						HORIZONTAL CONSTRUCTION - WOOD POLE				
CONDUCTOR	DESIGN TENSION (LBS.)	NESC RULE	POLE TOP (PT)	VERTICAL LINE (VL)	SUSPENSION (SU)	DOUBLE DEAD-END (DD) / EXTENSION (EX)	DEAD-END (DE)	BUCK (BK)	HORIZONTAL LINE (HL)	DOUBLE HORIZONTAL LINE (D-HL)	DOUBLE DEAD-END (DD) / EXTENSION (EX)	DEAD-END (DE)	BUCK (BK)
2 ACSR	835	Grade “C”	0-10	0-30	30-60	0-60	0	0	0-10	0-37	0-58	0	0
		Grade “B”	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-32	0-39	0	0
1/0 ACSR	985	Grade “C”	0-10	0-30	30-60	0-60	0	0	0-10	0-31	0-48	0	0
		Grade “B”	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-26	0-32	0	0
6 BHD	550	Grade “C”	0-10	0-30	30-60	0-60	0	0	0-10	0-45	0-60	0	0
		Grade “B”	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-45	0-60	0	0
4 BHD	700	Grade “C”	0-10	0-30	30-60	0-60	0	0	0-10	0-45	0-60	0	0
		Grade “B”	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-40	0-48	0	0
2 BHD	950	Grade “C”	0-10	0-30	30-60	0-60	0	0	0-10	0-33	0-52	0	0
		Grade “B”	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-28	0-35	0	0
NOTES			1. Single Tie-top Pin Insulators not to be used with NESC Grade “B” Construction										

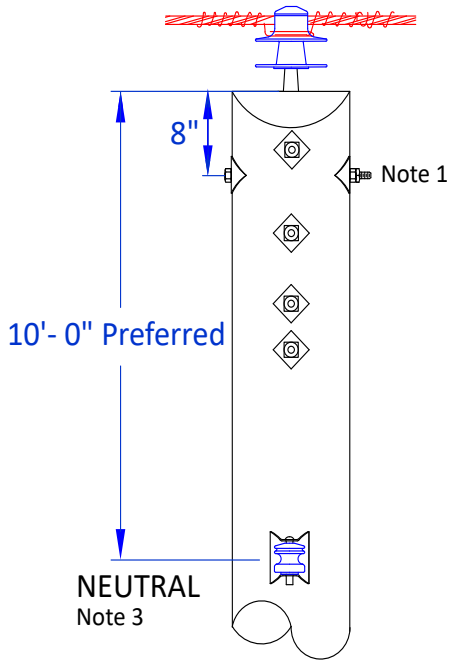
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

FRM. CODE	O1WV-PT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	PIN, POLE TOP 1” X 21” OFFSET	183100000
2	1	PIN TOP INSUL. POLY 25KV	242190000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
4	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
5	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
4	5/8” DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000

WOOD POLES
O1WV-PT
0°- 10°





NOTES

1. Split bolts are required on all wood poles with pole top insulator brackets.
2. Conductor size range #6 CU to 1/0 ACSR.
3. See the Framing Spacing section for alternate neutral spacing.
4. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
5. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

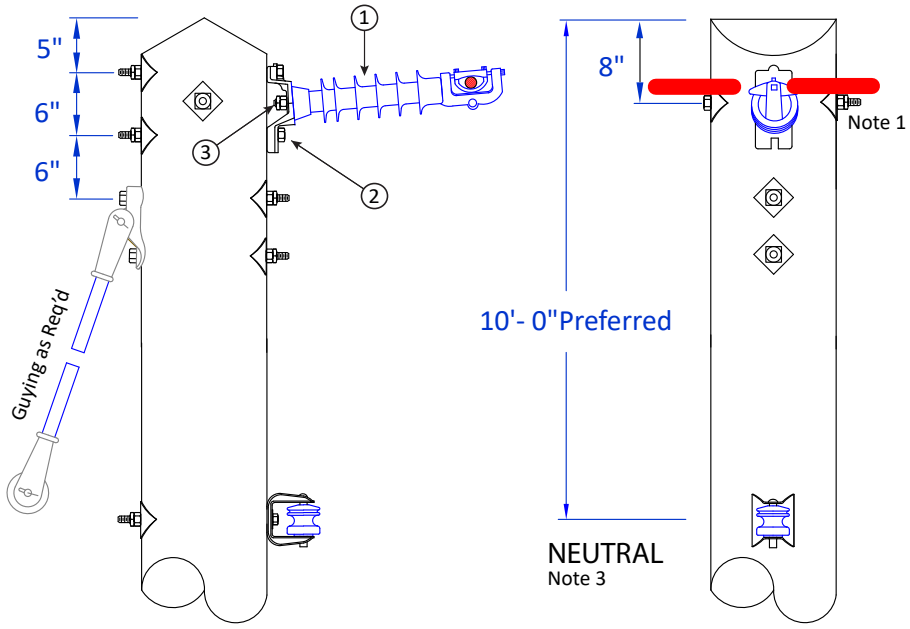
NES

WOOD POLE VERTICAL CONSTRUCTION POLE TOP PIN

FRM. CODE	O1WV-VL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	INSUL LP HOR CLP/TP 35KV	240976000
2	1	BRKT INSUL/HOR LP SHORT	180746000
3	1	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
4	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
5	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
4	5/8” DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000
1	CLAMP TOP AL 4-4/0	221870000

WOOD POLES
O1WV-VL
0°- 30°



NOTES

1. Split bolts are required on all wood poles with pole top insulator brackets.
2. Conductor size range #6 CU to 1/0 ACSR.
3. See the Framing Spacing section for alternate neutral spacing.
4. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
5. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

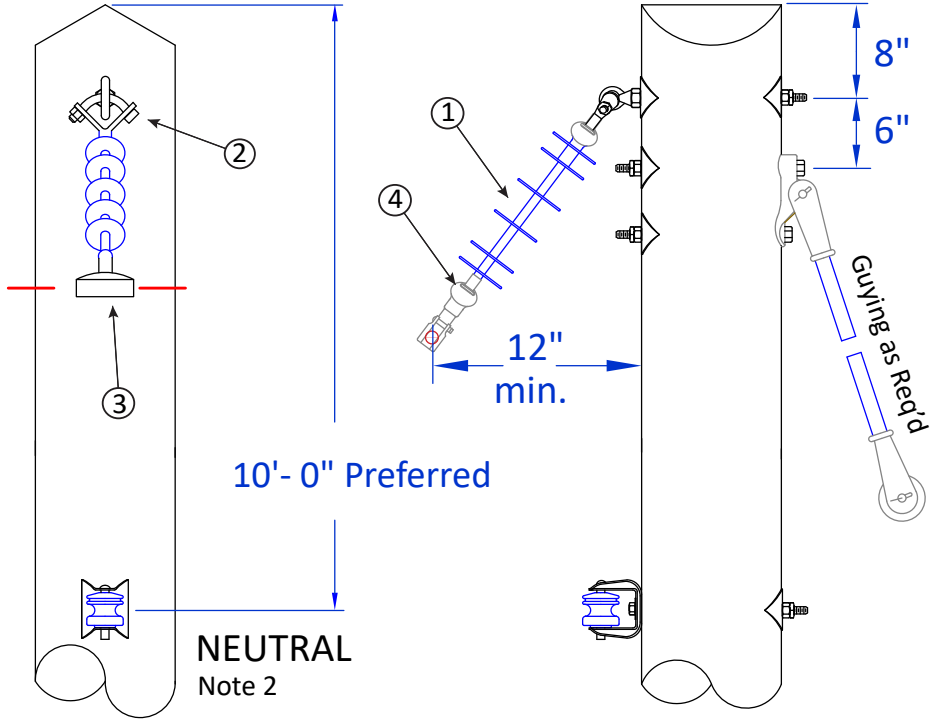
NES

WOOD POLE
VERTICAL CONSTRUCTION
SINGLE PHASE VERTICAL LINE

FRM. CODE	O1WV-SU	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	1	CLEVIS Y-BALL	181208000
3	1	CLAMP SUSP 2 - 1/0	221550000
4	1	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
2	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
3	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
1	NUT OVAL EYE 5/8"	206400000
2	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000

WOOD POLES
O1WV-SU
30°- 60°



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
4. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

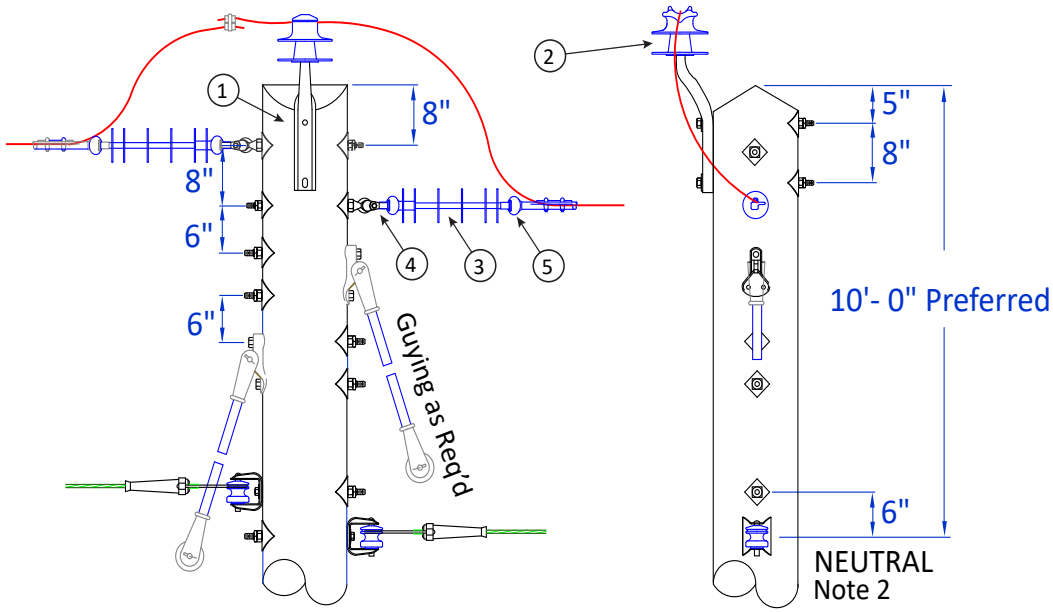
NES

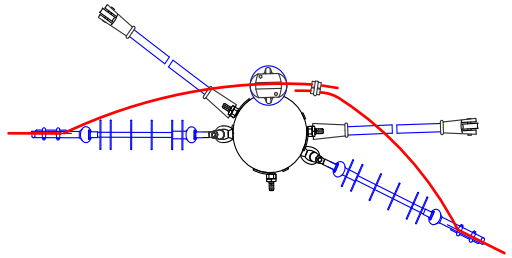
WOOD POLE VERTICAL CONSTRUCTION SUSPENSION INSULATOR

FRM. CODE	O1WV-DD	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	PIN, POLE TOP 1" X 21" OFFSET	183100000
2	1	PIN TOP INSUL. POLY 25KV	242190000
3	2	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
4	2	CLEVIS Y-BALL	181208000
5	2	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
6	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
8	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
2	NUT OVAL EYE 5/8"	206400000
6	5/8" DBL COIL SPRING WASHER	206570000
2	RACK SECONDARY 1W/LARGE	184003000
2	INSUL RACK SPOOL – LARGE	242480000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
2	FLEX BAIL STRANDVISE #2 ACSR	230600000

WOOD POLES
O1WV-DD
0°- 60°





NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
4. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

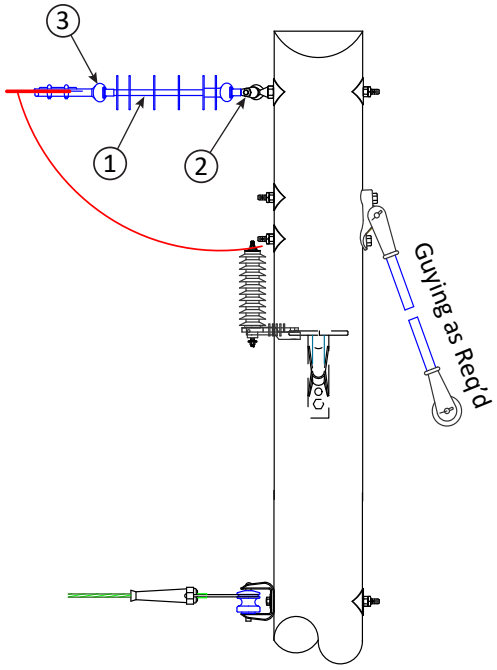
NES

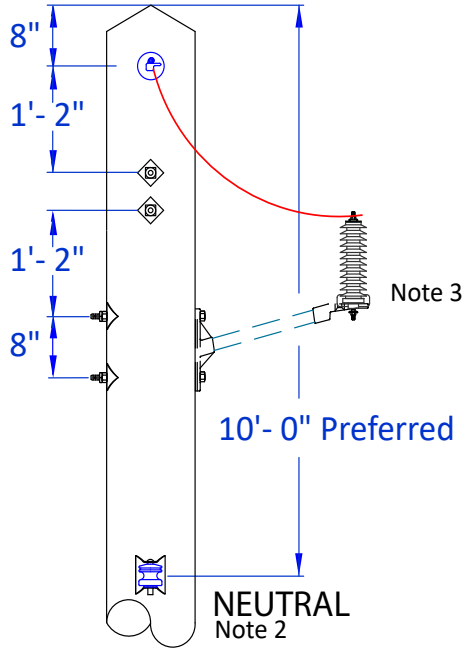
WOOD POLE VERTICAL CONSTRUCTION DOUBLE DEAD-END

FRM. CODE	O1WV-DE	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	1	CLEVIS Y-BALL	181208000
3	1	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
2	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
3	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
1	NUT OVAL EYE 5/8"	206400000
2	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000
1	CLAMP STRAIN 6-2/0 ACSR	221000000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

WOOD POLES
O1WV-DE





NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Arrester with bracket shown are called for separately as req'd.
4. Guying for permitted loading to be specified per Engineer.
5. **Click here** to go to Framing Angle Chart, Page 5.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

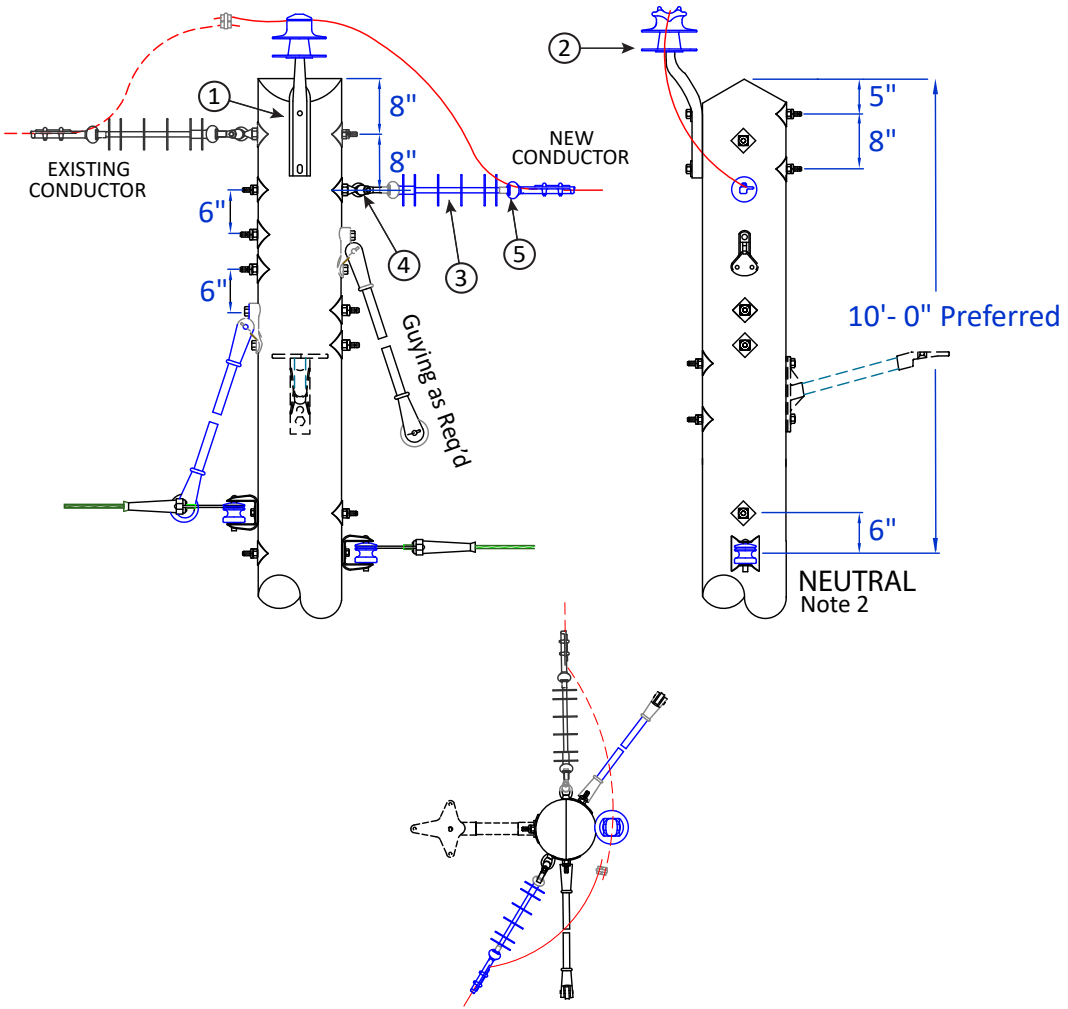
NES

WOOD POLE
VERTICAL CONSTRUCTION
SINGLE DEAD-END

FRM. CODE	O1WV-EX	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	PIN, POLE TOP 1” X 21” OFFSET	183100000
2	1	PIN TOP INSUL. POLY 25KV	242190000
3	1	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
4	1	CLEVIS Y-BALL	181208000
5	1	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
2	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
3	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
1	NUT OVAL EYE 5/8”	206400000
2	5/8” DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000
1	CLAMP STRAIN 6-2/0 ACSR	221000000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

WOOD POLES
O1WV-EX
0°- 60°



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Max. Angle shown for 350-ft span Worst-case NESC Loads.**Click here** to go to Framing Angle Chart, Page 5.
4. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

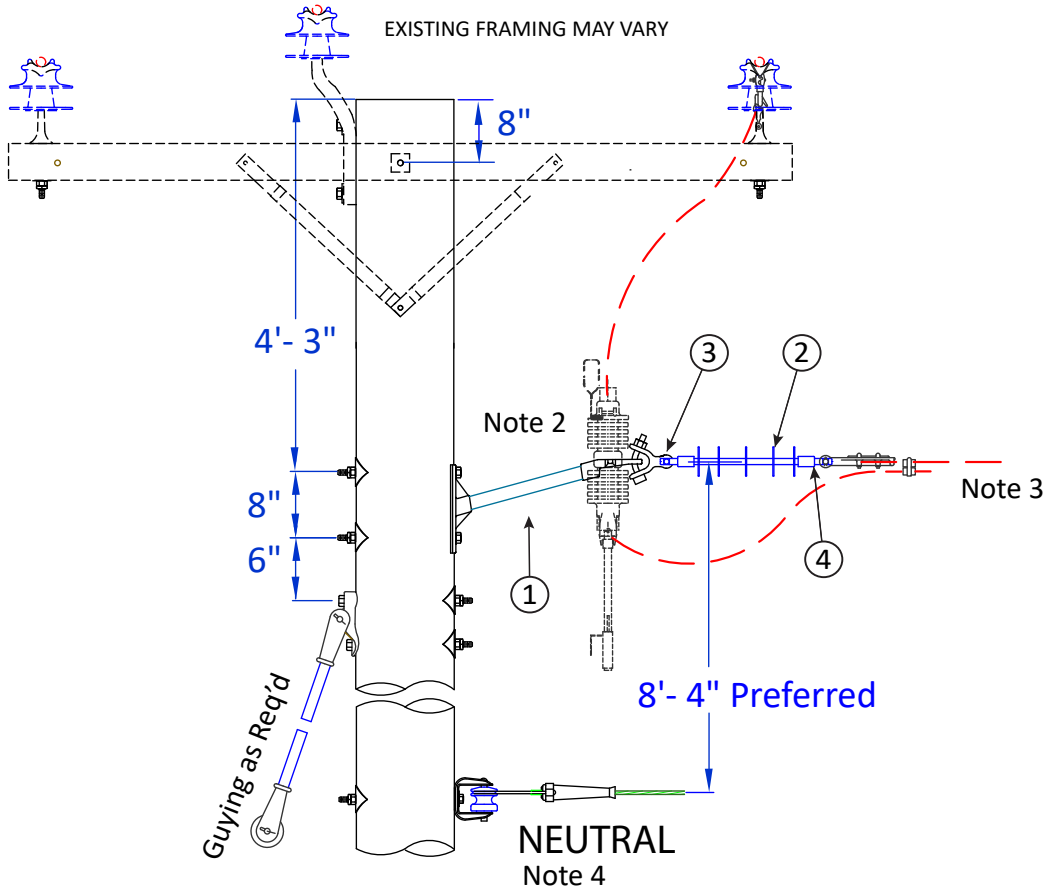
NES

WOOD POLE VERTICAL CONSTRUCTION SINGLE PHASE LINE EXTENSION

FRM. CODE	O1FV- BK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	BRKT INS/CO/ARR 18 IN FIBERGLASS	180745000
2	1	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
3	1	CLEVIS Y-BALL	181208000
4	1	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
3	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
3	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
3	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000
1	CLAMP STRAIN 6-2/0 ACSR	221000000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

O1FV-BK



NOTES

1. Framing used on all pole types.
2. LBU shown is not included in CU.
3. Conductor size range #6 CU to 1/0 ACSR.
4. See the Framing Spacing section for alternate neutral spacing.
5. Guying for permitted loading to be specified per Engineer.
6. **Click here** to go to Framing Angle Chart, Page 5.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

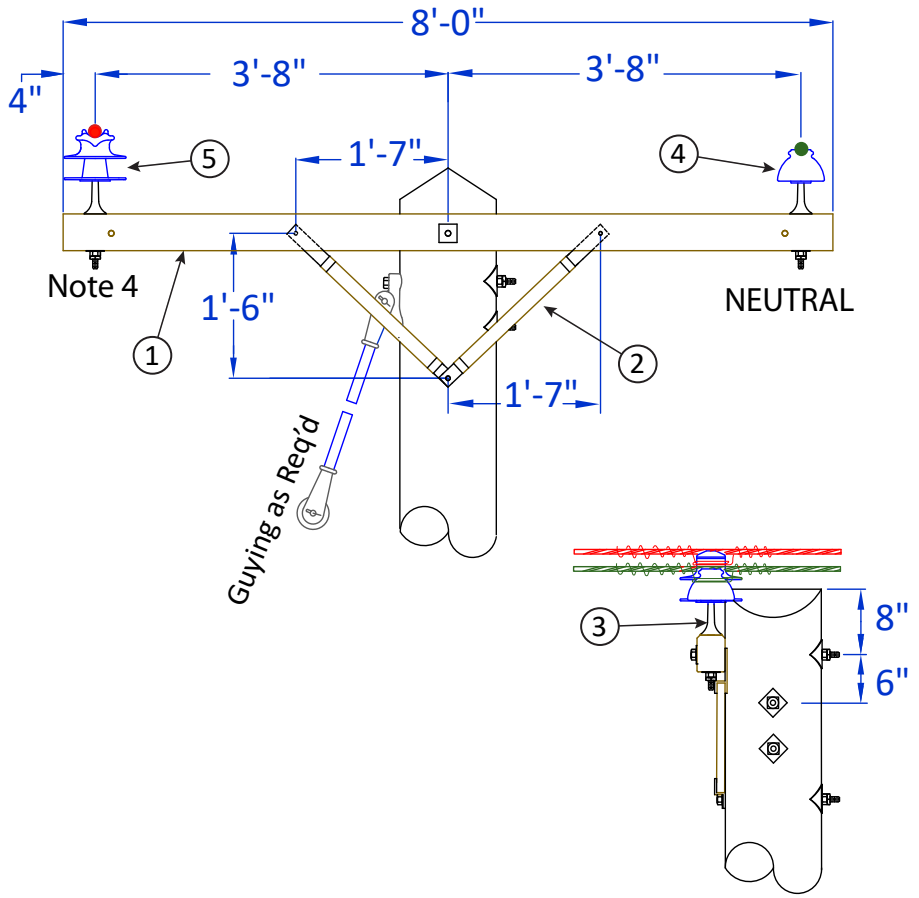
NES

WOOD POLE
VERTICAL CONSTRUCTION
BUCK LINE ON FIBERGLASS BRACKET

FRM. CODE	O1WS-HL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	X-ARM 3-1/2” X 4-1/2” X 8’ WOOD	040050000
2	1	BRACE X-ARM WOOD 23KV PAIR	180650000
3	2	PIN STEEL 1 W/ 3/4” X 6 1/2” SHANK	183170000
4	1	INSUL PIN GRAY 17KV	242100000
5	1	PIN TOP INSUL. POLY 25KV	242190000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
2	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
2	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
4	WASHER SQ FLAT 4", 13/16" HOLE	209640000
2	5/8” DBL COIL SPRING WASHER	206570000
2	3/4" DBL COIL SPRING WASHER	206580000
2	BOLT CARRIAGE 1/2" X 6	201360000
2	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
2	1/2" DBL COIL SPRING WASHER	206560000

WOOD POLES
O1WS-HL
0°- 10°



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
3. Guying for permitted loading to be specified per Engineer.
4. Install two 4x4 Washers per Insulator Xarm Pin.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

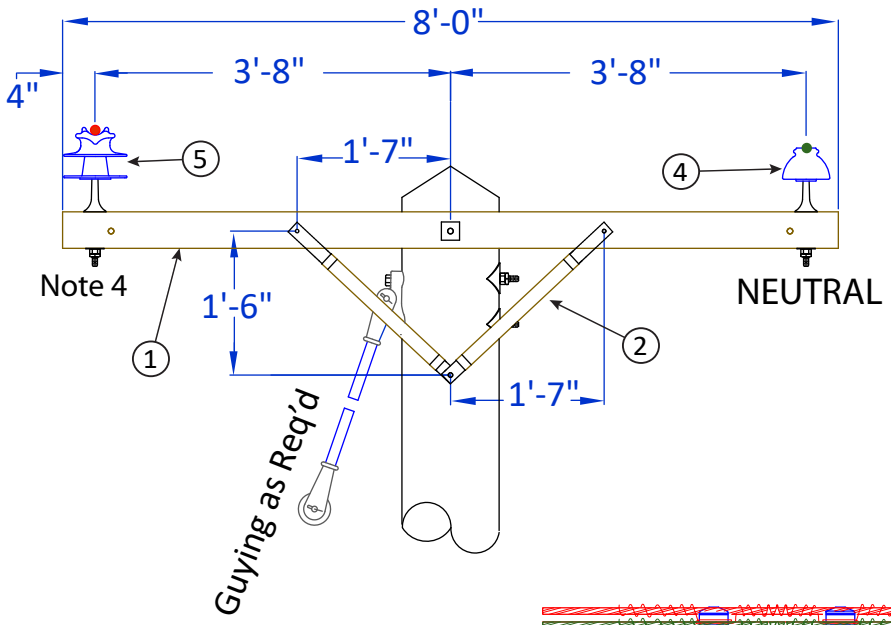
NES

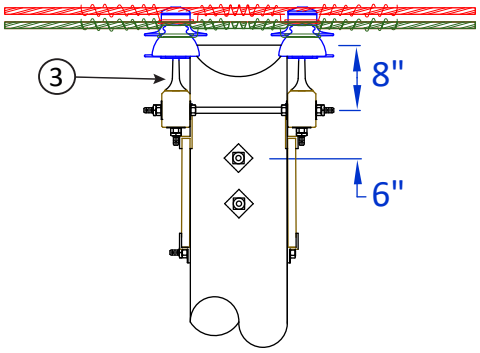
WOOD POLE
HORIZONTAL CONSTRUCTION
SINGLE CROSSARM

FRM. CODE	O1WD-HL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 3-1/2" X 4-1/2" X 8' WOOD	040050000
2	2	BRACE X-ARM WOOD 23KV PAIR	180650000
3	4	PIN STEEL 1 W/ 3/4" X 6-1/2" SHANK	183170000
4	2	INSUL PIN GRAY 17KV	242100000
5	2	PIN TOP INSUL. POLY 25KV	242190000

O1WD-HL	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
3	BOLT DA 5/8" X REQUIRED LENGTH	201_____
1	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
1	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
10	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
8	WASHER SQ FLAT 4", 13/16" HOLE	209640000
6	5/8" DBL COIL SPRING WASHER	206570000
4	3/4" DBL COIL SPRING WASHER	206580000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000

WOOD POLES
O1WD-HL
0°- 37°





NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
3. Guying for permitted loading to be specified per Engineer.
4. Install two 4x4 Washers per Insulator Xarm Pin.

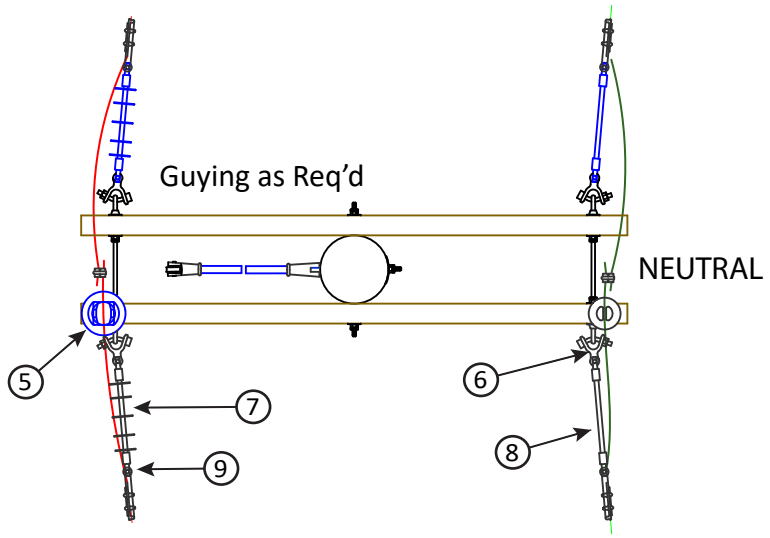
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

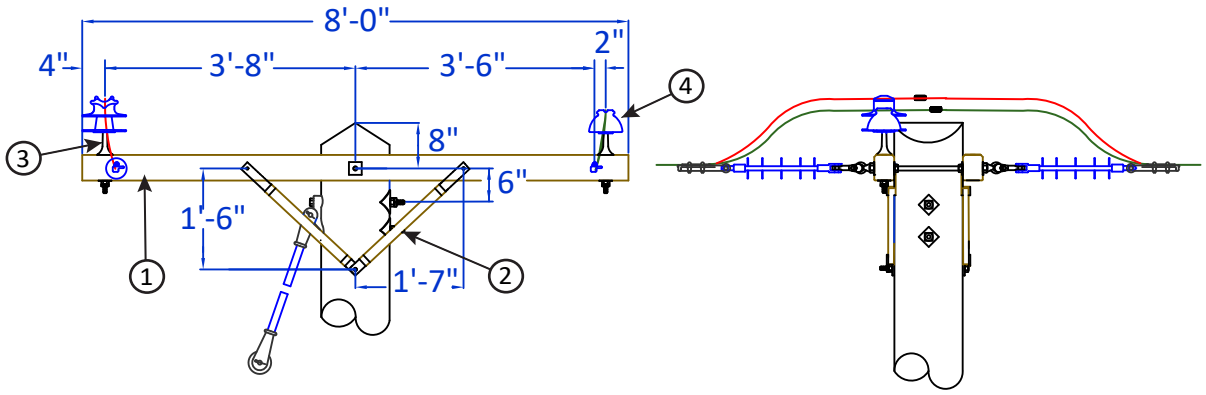
WOOD POLE
HORIZONTAL CONSTRUCTION
DOUBLE CROSSARM

FRM. CODE	O1WD-DD	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 3-1/2" X 4-1/2" X 8' WOOD	040050000
2	2	BRACE X-ARM WOOD 23KV PAIR	180650000
3	2	PIN STEEL 1 W/ 3/4" X 6-1/2" SHANK	183170000
4	1	INSUL PIN GRAY 17KV	242100000
5	1	PIN TOP INSUL. POLY 25KV	242190000
6	2	CLEVIS Y-EYE, 90 DEGREE	181210000
	2	CLEVIS Y-BALL	181208000
7	2	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
8	2	INSUL GUY STRN/FIB GLASS 12 IN	240840000
9	2	SOCKET EYE	184140000

O1WD-DD	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
3	BOLT DA 5/8" X REQUIRED LENGTH	201_____
1	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
1	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
10	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
4	NUT OVAL EYE 5/8"	206400000
6	5/8" DBL COIL SPRING WASHER	206570000
2	3/4" DBL COIL SPRING WASHER	206580000
4	CLAMP STRAIN 6-2/0 ACSR	221000000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000



WOOD POLES
O1WD-DD
0°- 58°



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
3. Guying for permitted loading to be specified per Engineer.

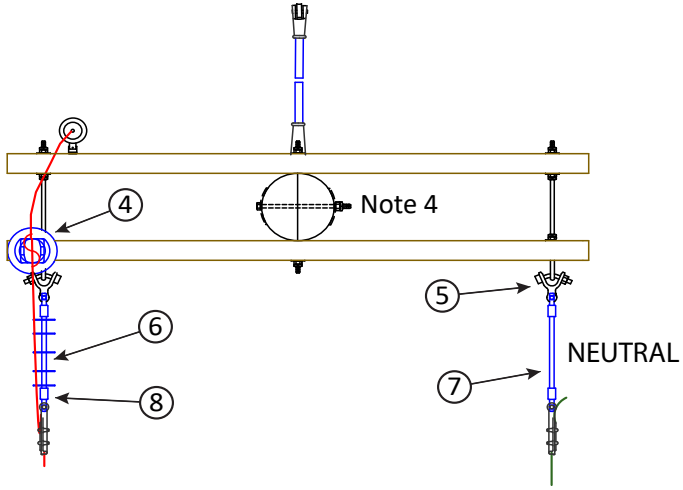
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

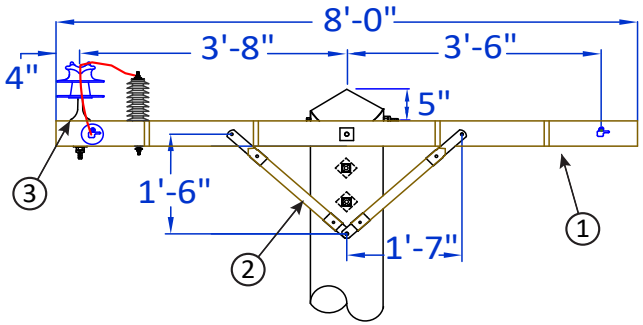
NES

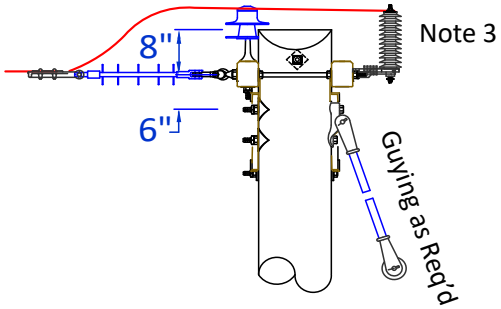
WOOD POLE
DOUBLE CROSSARM CONSTRUCTION
DOUBLE DEAD-END

FRM. CODE	O1WD-DE	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 3-1/2” X 4-1/2” X 8’ WOOD	040050000
2	2	BRACE X-ARM WOOD 23KV PAIR	180650000
3	1	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
4	1	PIN TOP INSUL. POLY 25KV	242190000
5	1	CLEVIS Y EYE, 90 DEGREE	181210000
	1	CLEVIS Y-BALL	181208000
6	1	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
7	1	INSUL GUY STRN/FIB GLASS 12 IN	240840000
8	1	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
3	BOLT DA 5/8” X REQUIRED LENGTH	201_____
2	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
3	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
10	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
2	NUT OVAL EYE 5/8”	206400000
6	5/8” DBL COIL SPRING WASHER	206570000
1	3/4" DBL COIL SPRING WASHER	206580000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000







WOOD POLES
O1WD-DE

NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Guying for permitted loading to be specified per Engineer.
3. Arrester with bracket shown are called for separately as req’d.
4. Split bolt required for this installation.
5. **Click here** to go to Framing Angle Chart, Page 5.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

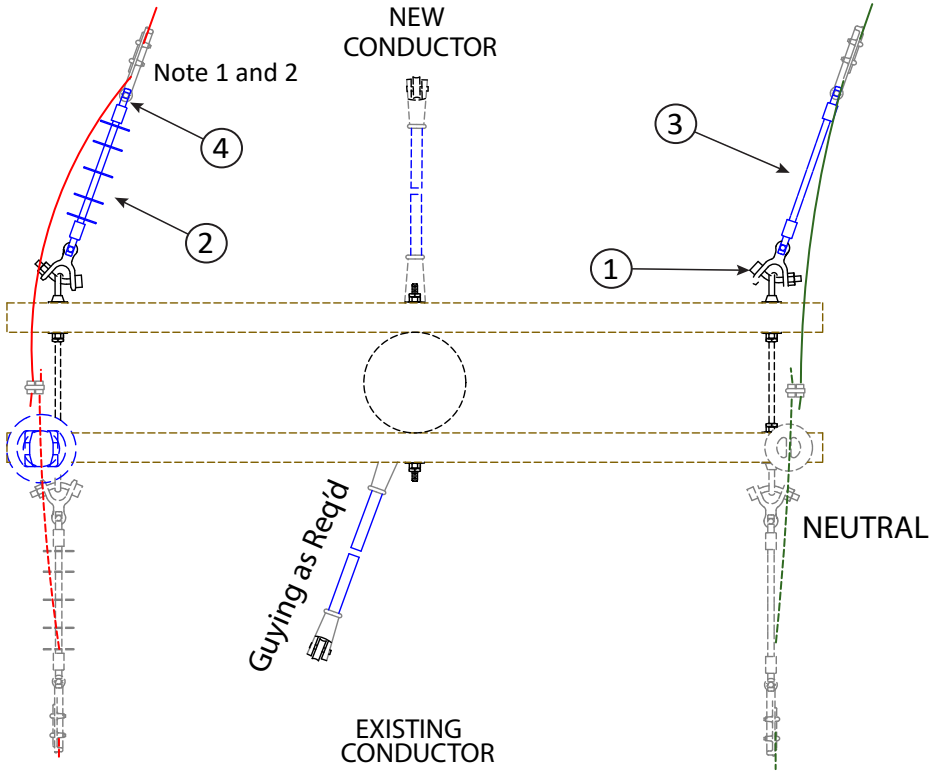
NES

WOOD POLE
DOUBLE CROSSARM CONSTRUCTION
SINGLE DEAD-END

FRM. CODE	O1WX-EX	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	CLEVIS Y EYE, 90 DEGREE	181210000
	1	CLEVIS Y-BALL	181208000
2	1	IINSUL SUSP 35KV POLY, SOCKET BALL	242752000
3	1	INSUL GUY STRN/FIB GLASS 12 IN	240840000
4	1	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
2	NUT OVAL EYE 5/8”	206400000
2	CLAMP STRAIN 6-2/0 ACSR	221000000

WOOD POLES
O1WX-EX
0°- 58°



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
3. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
DOUBLE CROSSARM CONSTRUCTION
LINE EXTENSION

1-PHASE FRAMING - MAXIMUM ANGLES

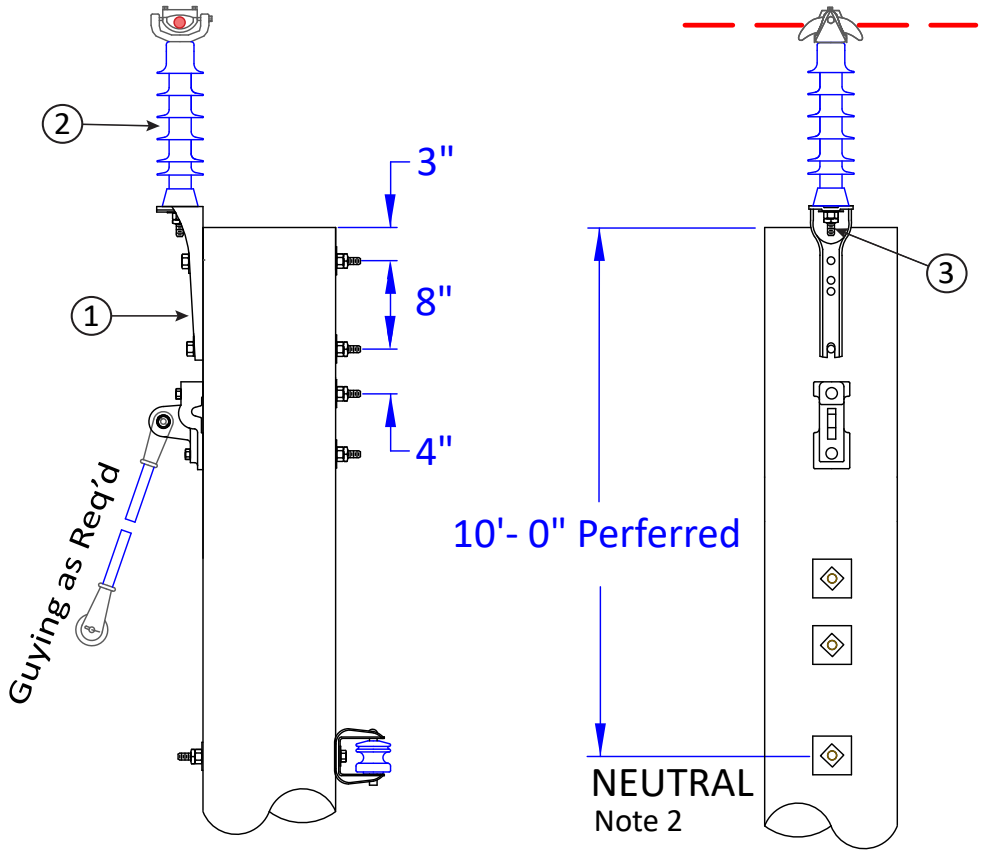
350 FOOT WIND SPAN			MAXIMUM ANGLES PER NESC RULE 250- MEDIUM LOADING, EXTREME ICE, OR EXTREME WIND 90 MPH										
CONSTRUCTION TYPE			ANGLE RANGE (DEGREES)										
			VERTICAL FRAMING - STEEL POLE						HORIZONTAL CONSTRUCTION - STEEL POLE				
CONDUCTOR	DESIGN TENSION (LBS.)	NESC RULE	POLE TOP (PT)	VERTICAL LINE (VL)	SUSPENSION (SU)	DOUBLE DEAD-END (DD) / EXTENSION (EX)	DEAD-END (DE)	BUCK (BK)	HORIZONTAL LINE (HL)	DOUBLE HORIZONTAL LINE (D-HL)	DOUBLE DEAD-END (DD) / EXTENSION (EX)	DEAD-END (DE)	BUCK (BK)
2 ACSR	835	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-37	0-58	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-32	0-39	0	0
1/0 ACSR	985	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-31	0-48	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-26	0-32	0	0
6 BHD	550	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-45	0-60	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-45	0-60	0	0
4 BHD	700	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-45	0-60	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-40	0-48	0	0
2 BHD	950	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-33	0-52	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-28	0-35	0	0
NOTES			1. Single Tie-top Pin Insulators not to be used with NESC Grade "B" Construction										

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

FRM. CODE	O1SV-PT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	PIN POLE TOP/POST INSUL	183060000
2	1	INSUL LP VER CLP/TP 35 KV	240974000
3	1	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
3	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
3	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
3	5/8” DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000
1	CLAMP TOP AL 4-4/0	221870000

STEEL POLES
O1SV-PT
0°- 10°



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 18.
4. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

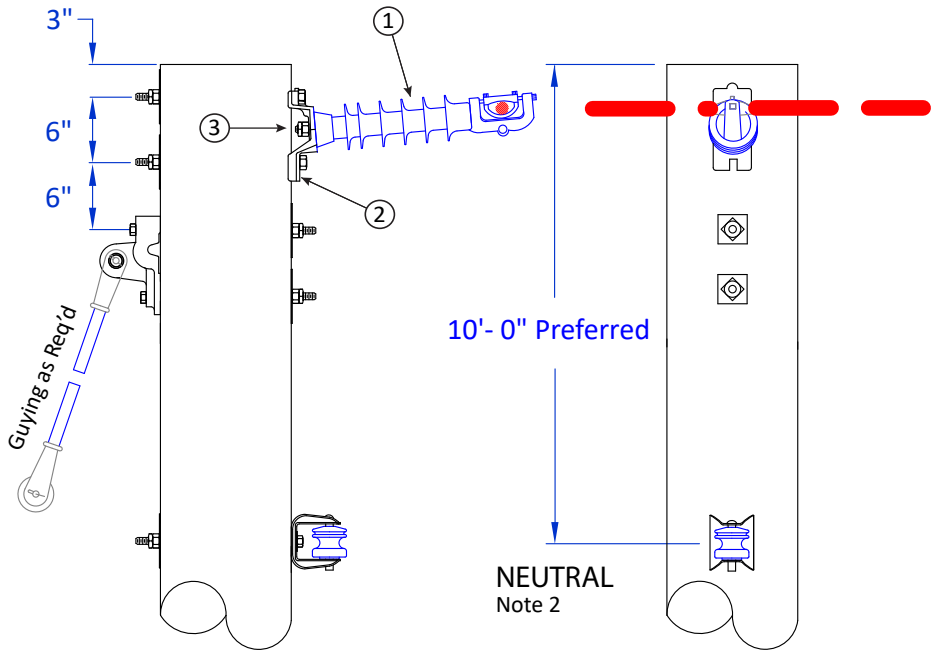
NES

STEEL POLE VERTICAL CONSTRUCTION POLE TOP PIN

FRM. CODE	O1SV-VL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	INSUL LP HOR CLP/TP 35KV	240976000
2	1	BRKT INSUL/HOR LP SHORT	180746000
3	1	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
3	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
3	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
3	5/8” DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000
1	CLAMP TOP AL 4-4/0	221870000

STEEL POLES
O1SV-VL
0°- 30°



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 18.
4. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

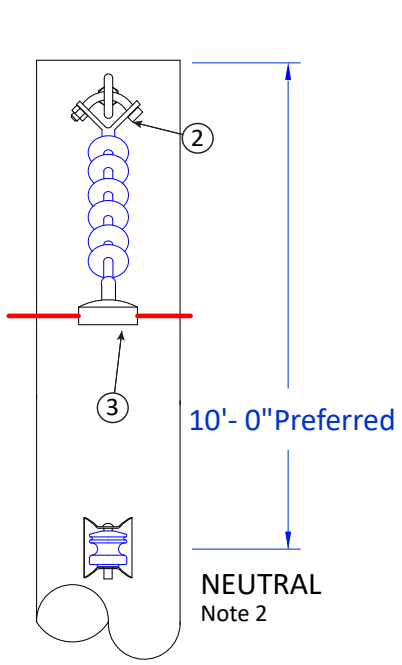
NES

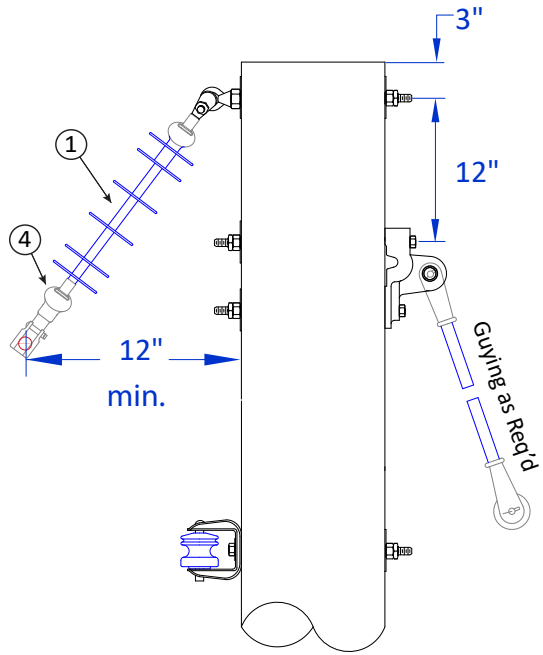
STEEL POLE
VERTICAL CONSTRUCTION
SINGLE PHASE VERTICAL LINE

FRM. CODE	O1SV-SU	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	1	CLEVIS Y-BALL	181208000
3	1	CLAMP SUSP 2 - 1/0	221550000
4	1	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
2	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
3	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
1	NUT OVAL EYE 5/8"	206400000
2	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000

STEEL POLES
O1SV-SU
30°- 60°





NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 18.
4. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

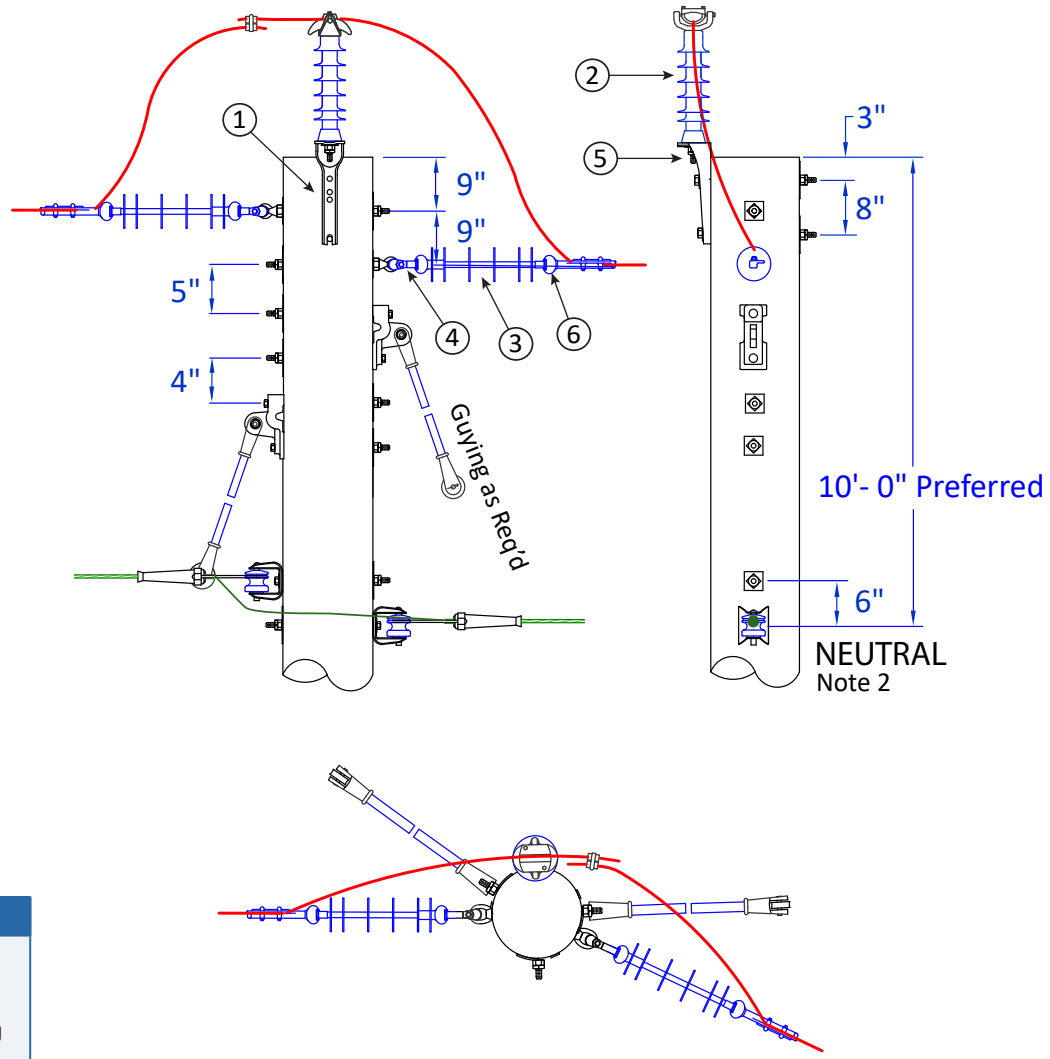
NES

STEEL POLE
VERTICAL CONSTRUCTION
SUSPENSION INSULATOR

FRM. CODE	O1SV-DD	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	PIN POLE TOP/POST INSUL	183060000
2	1	INSUL LP VER CLP/TP 35 KV	240974000
3	2	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
4	2	CLEVIS Y-BALL	181208000
5	1	BOLT STUD 3/4" X 3" SHORT/LP INSUL	204780000
6	2	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
6	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
8	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
2	NUT OVAL EYE 5/8"	206400000
6	5/8" DBL COIL SPRING WASHER	206570000
2	RACK SECONDARY 1W/LARGE	184003000
2	INSUL RACK SPOOL – LARGE	242480000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
2	FLEX BAIL STRANDVISE #2 ACSR	230600000
1	CLAMP TOP AL 4-4/0	221870000

STEEL POLES
O1SV-DD
0°- 60°



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 18.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

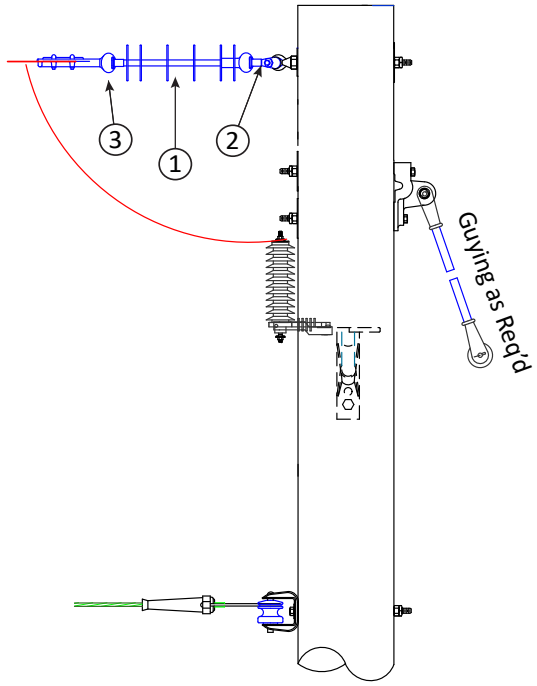
NES

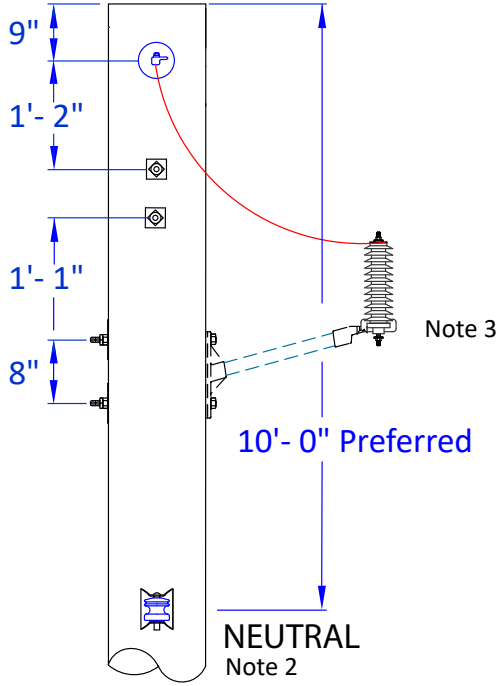
STEEL POLE
VERTICAL CONSTRUCTION
DOUBLE DEAD-END

FRM. CODE	O1SV-DE	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	1	CLEVIS Y-BALL	181208000
3	1	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
2	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
3	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
1	NUT OVAL EYE 5/8"	206400000
2	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000
1	CLAMP STRAIN 6-2/0 ACSR	221000000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

STEEL POLES
O1SV-DE





NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Arrester with bracket shown are called for separately as req'd.
4. Guying for permitted loading to be specified per Engineer.
5. **Click here** to go to Framing Angle Chart, Page 18.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

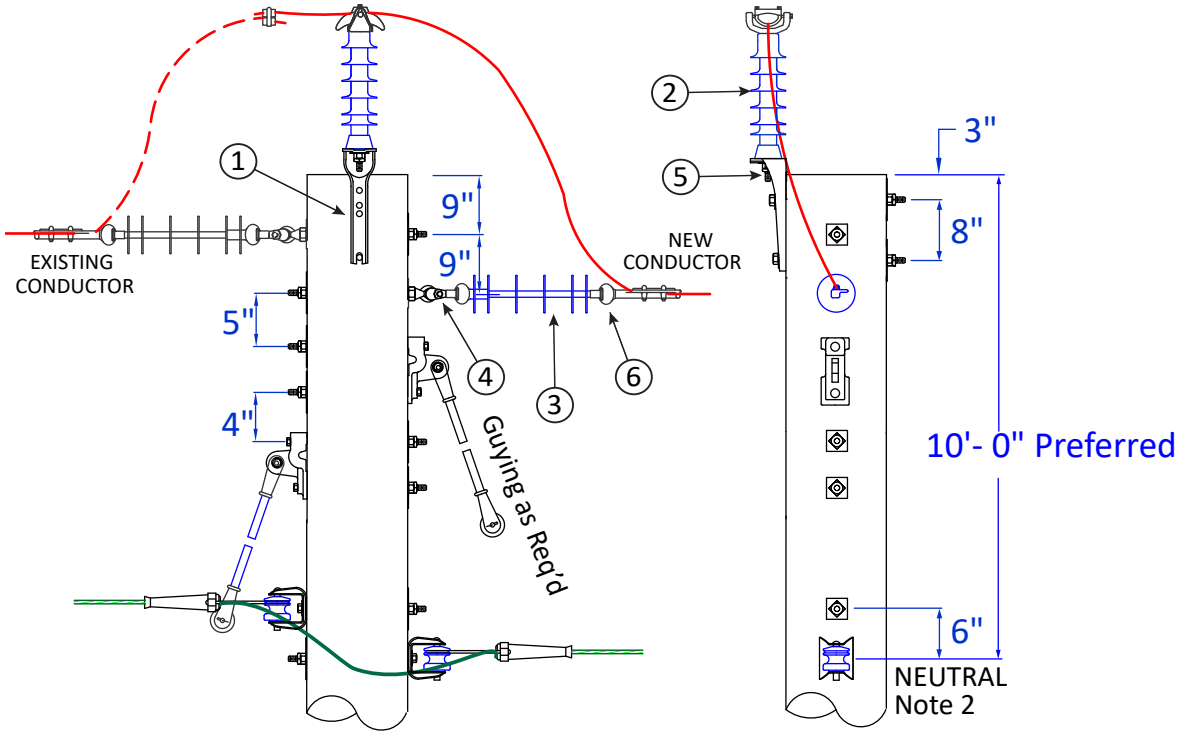
NES

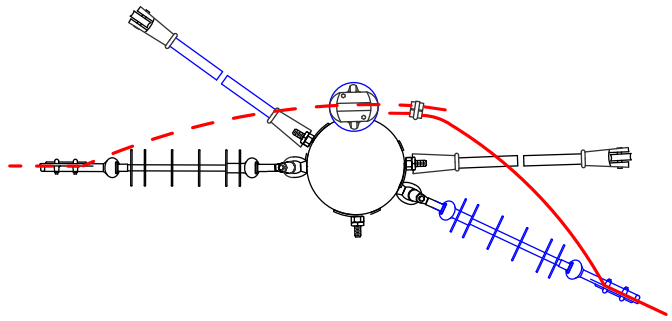
STEEL POLE
VERTICAL CONSTRUCTION
SINGLE DEAD-END

FRM. CODE	O1SV-EX	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	PIN POLE TOP/POST INSUL	183060000
2	1	INSUL LP VER CLP/TP 35 KV	240974000
3	1	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
4	1	CLEVIS Y-BALL	181208000
5	1	BOLT STUD 3/4" X 3" SHORT/LP INSUL	204780000
6	1	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
2	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
3	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
1	NUT OVAL EYE 5/8"	206400000
2	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000
1	CLAMP STRAIN 6-2/0 ACSR	221000000
1	CLAMP TOP AL 4-4/0	221870000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

STEEL POLES
O1SV-EX
0°- 60°





NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 18.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

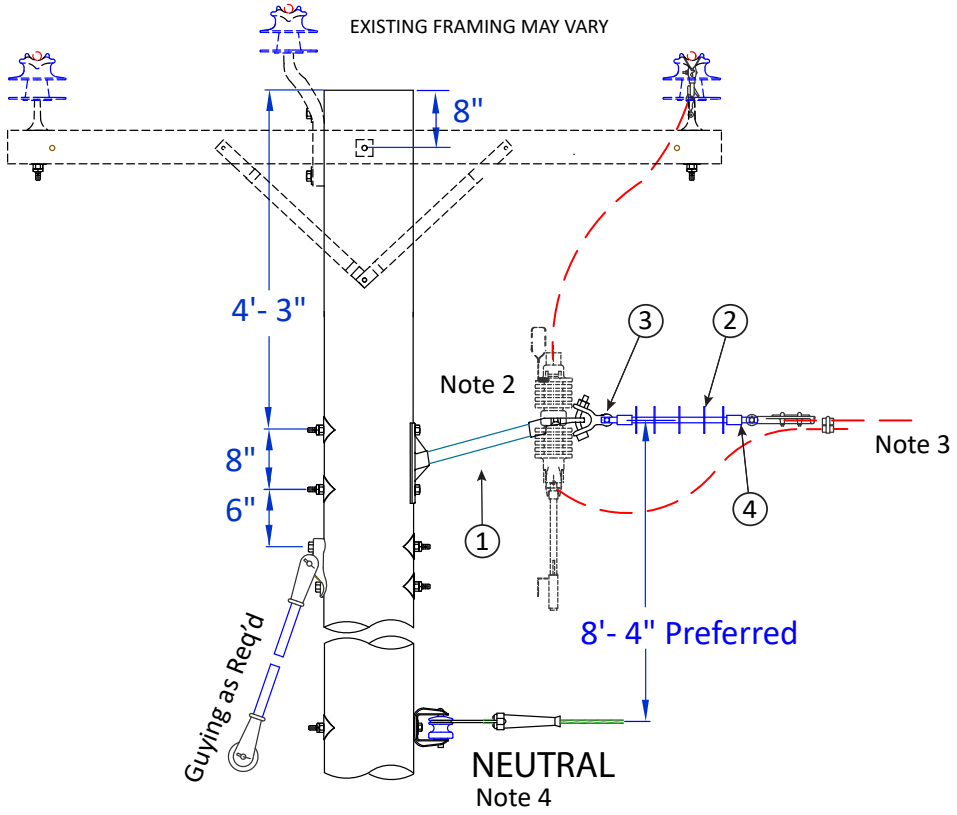
NES

STEEL POLE
VERTICAL CONSTRUCTION
SINGLE PHASE LINE EXTENSION

FRM. CODE	O1FV- BK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	BRKT INS/CO/ARR 18 IN FIBERGLASS	180745000
2	1	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
3	1	CLEVIS Y-BALL	181208000
4	1	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
3	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
3	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
3	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000
1	CLAMP STRAIN 6-2/0 ACSR	221000000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

O1FV-BK



NOTES

1. Framing used on all pole types.
2. LBU shown is not included in CU.
3. Conductor size range #6 CU to 1/0 ACSR.
4. See the Framing Spacing section for alternate neutral spacing.
5. Guying for permitted loading to be specified per Engineer.
6. **Click here** to go to Framing Angle Chart, Page 18.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

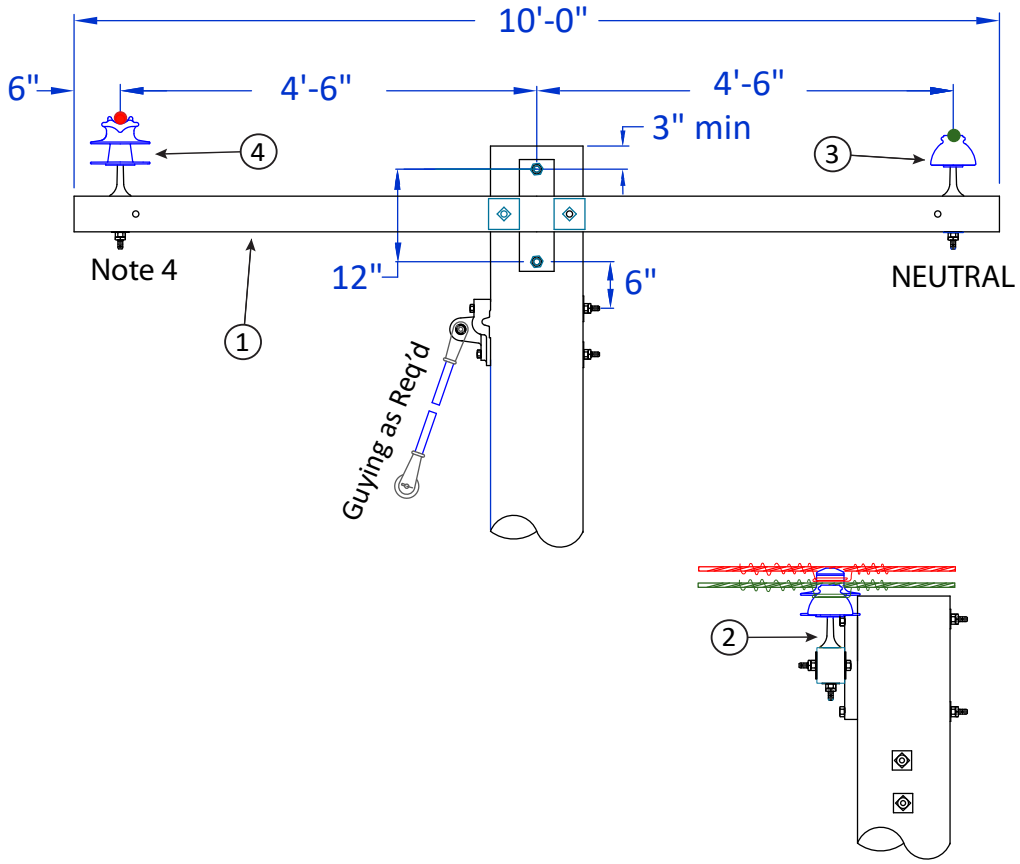
NES

STEEL POLE
VERTICAL CONSTRUCTION
BUCK LINE ON FIBERGLASS BRACKET

FRM. CODE	O1FS-HL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	X-ARM 3-5/8” X 4-5/8” X 10’ FIBERGLASS	040400000
2	2	PIN STEEL 1 W/ 3/4” X 6 1/2” SHANK	183170000
3	1	INSUL PIN GRAY 17KV	242100000
4	1	PIN TOP INSUL. POLY 25KV	242190000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
2	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
2	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
4	WASHER SQ FLAT 4", 13/16" HOLE	209640000
2	5/8” DBL COIL SPRING WASHER	206570000
2	3/4" DBL COIL SPRING WASHER	206580000

STEEL POLES
O1FS-HL
0°- 10°



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads.**Click here** to go to Framing Angle Chart, Page 18.
3. Guying for permitted loading to be specified per Engineer.
4. Install two 4x4 Washers per Insulator Xarm Pin.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

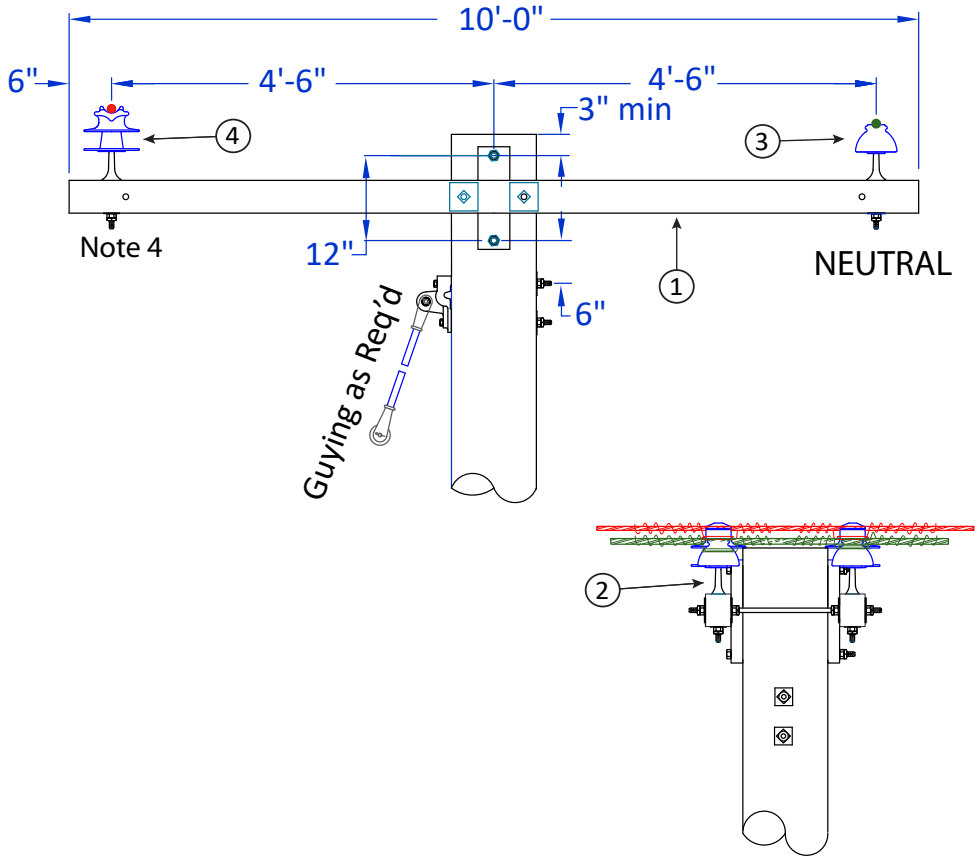
NES

STEEL POLE HORIZONTAL CONSTRUCTION SINGLE CROSSARM

FRM. CODE	O1FD-HL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 3-5/8" X 4-5/8" X 10' FIBERGLASS	040400000
2	4	PIN STEEL 1 W/ 3/4" X 6-1/2" SHANK	183170000
3	2	INSUL PIN GRAY 17KV	242100000
4	2	PIN TOP INSUL. POLY 25KV	242190000

	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
2	BOLT DA 5/8" X REQUIRED LENGTH	201_____
2	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
10	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
8	WASHER SQ FLAT 4", 13/16" HOLE	209640000
6	5/8" DBL COIL SPRING WASHER	206570000
4	3/4" DBL COIL SPRING WASHER	206580000

STEEL POLES
O1FD-HL
0°- 45°



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 18.
3. Guying for permitted loading to be specified per Engineer.
4. Install two 4x4 Washers per Insulator Xarm Pin.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

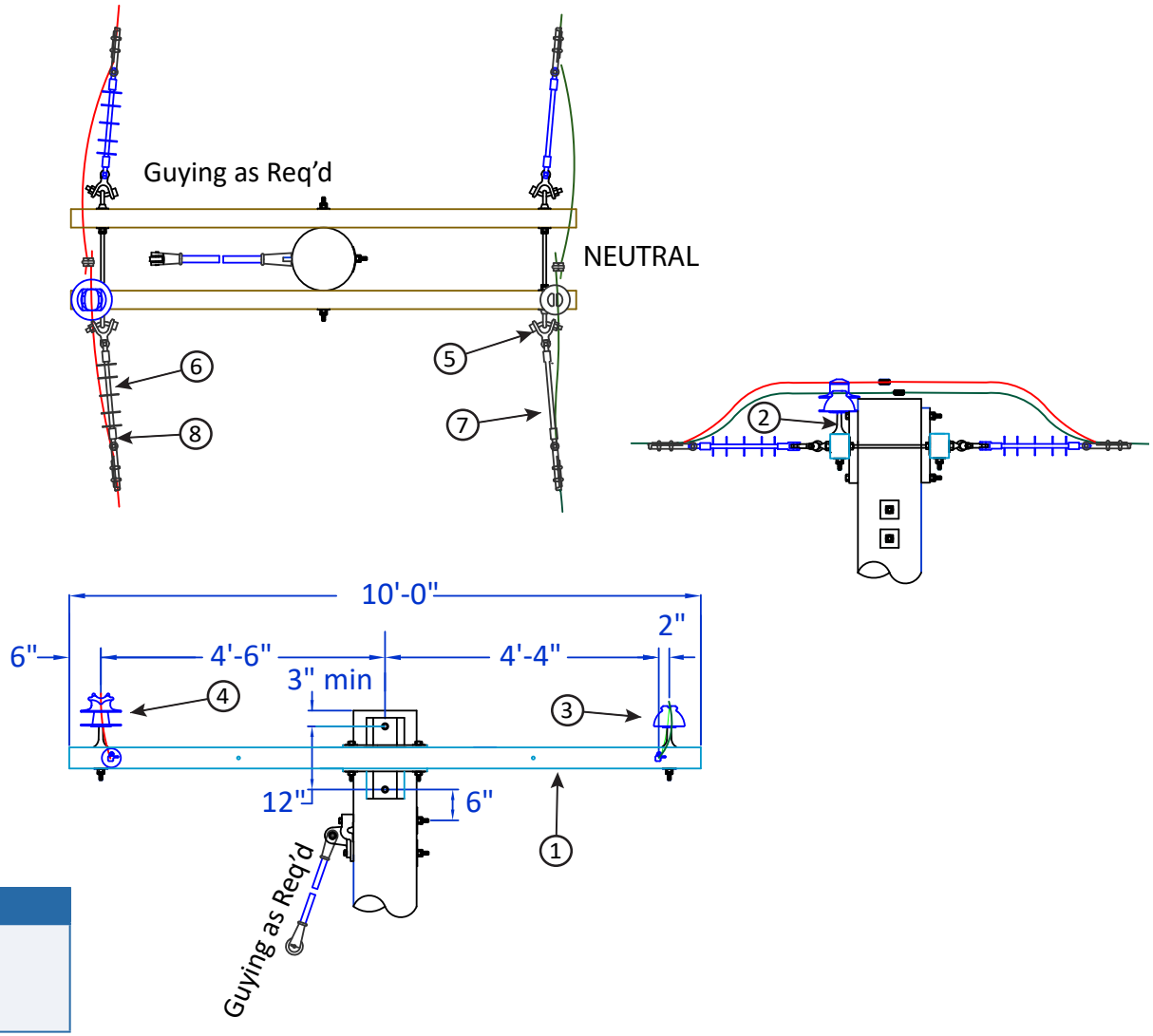
NES

STEEL POLE
HORIZONTAL CONSTRUCTION
DOUBLE CROSSARM

FRM. CODE	O1FD-DD	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 3-5/8" X 4-5/8" X 10' FIBERGLASS	040400000
2	2	PIN STEEL 1 W/ 3/4" X 6-1/2" SHANK	183170000
3	1	INSUL PIN GRAY 17KV	242100000
4	1	PIN TOP INSUL. POLY 25KV	242190000
5	2	CLEVIS Y-EYE, 90 DEGREE	181210000
	2	CLEVIS Y-BALL	181208000
6	2	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
7	2	INSUL GUY STRN/FIB GLASS 12 IN	240840000
8	2	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
2	BOLT DA 5/8" X REQUIRED LENGTH	201_____
2	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
10	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
4	NUT OVAL EYE 5/8"	206400000
6	5/8" DBL COIL SPRING WASHER	206570000
2	3/4" DBL COIL SPRING WASHER	206580000
4	CLAMP STRAIN 6-2/0 ACSR	221000000

STEEL POLES
O1FD-DD
0°- 60°



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 18.
3. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

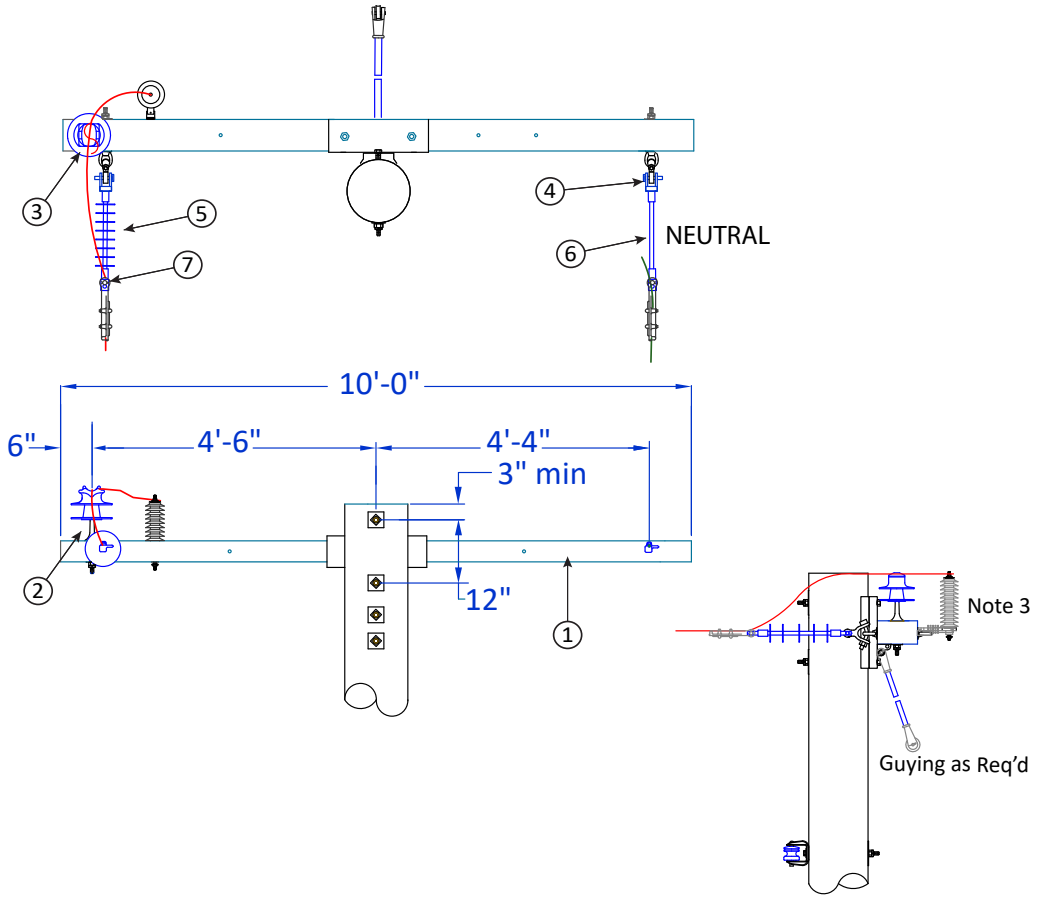
NES

STEEL POLE
DOUBLE CROSSARM CONSTRUCTION
DOUBLE DEAD-END

FRM. CODE	O1FS-DE	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	X-ARM 4” X 6” X 10’ FIBERGLASS	040410000
2	1	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
3	1	PIN TOP INSUL. POLY 25KV	242190000
4	1	CLEVIS Y EYE, 90 DEGREE	181210000
	1	CLEVIS Y-BALL	181208000
5	1	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
6	1	INSUL GUY STRN/FIB GLASS 12 IN	240840000
7	1	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
2	BOLT MACHINE 3/4” X REQUIRED LENGTH	204_____
2	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
2	NUT OVAL EYE 3/4”	206420000
3	3/4" DBL COIL SPRING WASHER	206580000
2	CLAMP STRAIN 6-2/0 ACSR	221000000

STEEL POLES
O1FS-DE



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Guying for permitted loading to be specified per Engineer.
3. Arrester with bracket shown are called for separately as req’d.
4. **Click here** to go to Framing Angle Chart, Page 18.
5. Limit 1 (12M) or 2 (6M) guys to fiberglass crossarm brackets.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

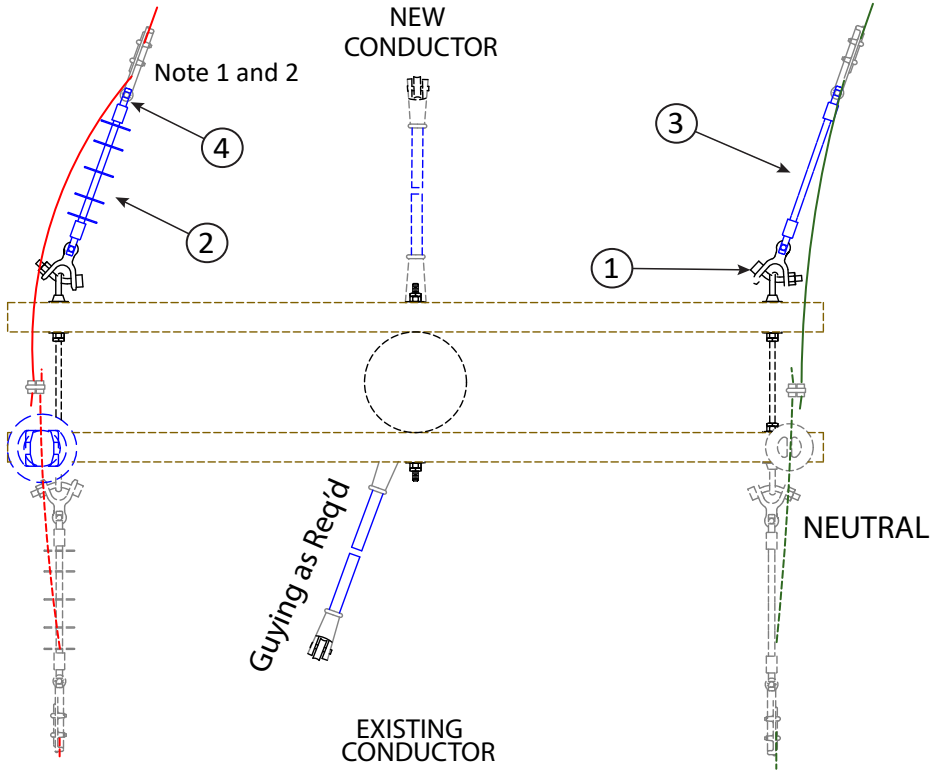
NES

STEEL POLE
SINGLE CROSSARM CONSTRUCTION
SINGLE DEAD-END

FRM. CODE	O1FX-EX	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	CLEVIS Y EYE, 90 DEGREE	181210000
	1	CLEVIS Y-BALL	181208000
2	1	IINSUL SUSP 35KV POLY, SOCKET BALL	242752000
3	1	INSUL GUY STRN/FIB GLASS 12 IN	240840000
4	1	SOCKET EYE	181440000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
2	NUT OVAL EYE 5/8”	206400000
2	CLAMP STRAIN 6-2/0 ACSR	221000000

STEEL POLES
O1FX-EX
0°- 60°



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 18.
3. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

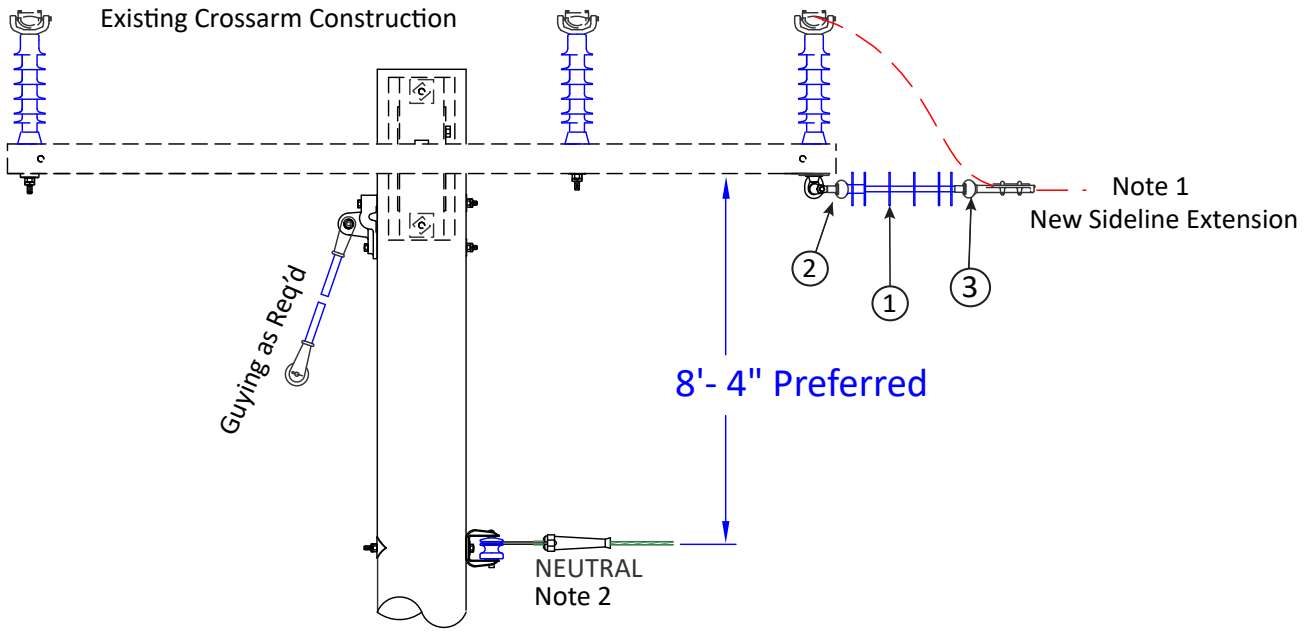
NES

STEEL POLE
DOUBLE CROSSARM CONSTRUCTION
LINE EXTENSION

FRM. CODE	O1SX-TAP	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
2	1	CLEVIS Y-EYE, 90 DEGREE	181210000
2	1	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
1	NUT OVAL EYE 3/4”	206420000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000
1	CLAMP STRAIN 6-2/0 ACSR	221000000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

STEEL POLES
O1SX-TAP



NOTES

1. Conductor size range #6 CU to 1/0 ACSR (1,000 lbs. Max. Tension).
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
EXISTING CROSSARM CONSTRUCTION
SIDE LINE EXTENSION

TWO PHASE FRAMING STANDARDS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
3/23/26	Cedric Short	Ronald Reasonover	Tony Richman
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

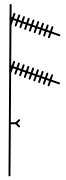
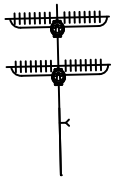
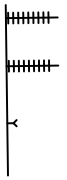
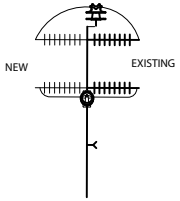
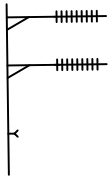
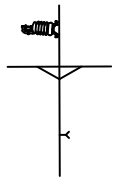
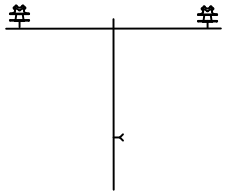
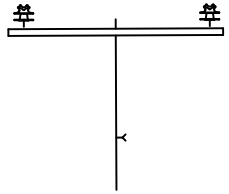
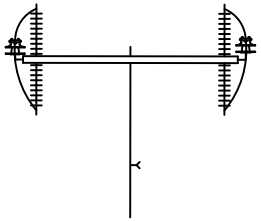
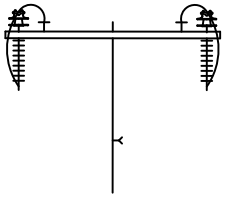
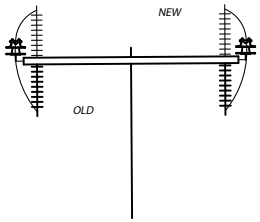
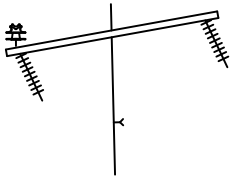
TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
WOOD FRAMING INDEX	3			
STEEL FRAMING INDEX	4			
STANDARD FRAMING ANGLES, 2 PH CONSTRUCTION, WOOD POLE	5			
WOOD POLE, VERTICAL CONSTRUCTION, POLE TOP PIN	6			
WOOD POLE, VERTICAL CONSTRUCTION, VERTICAL LINE	7			
WOOD POLE, VERTICAL CONSTRUCTION, SUSPENSION INSULATOR	8			
WOOD POLE, VERTICAL CONSTRUCTION, DOUBLE DEAD-END	9			
WOOD POLE, VERTICAL CONSTRUCTION, SINGLE DEAD-END	10			
WOOD POLE, VERTICAL CONSTRUCTION, LINE EXTENSION	11			
WOOD POLE, VERTICAL CONSTRUCTION, FIBERGLSS BRACKETS WITH BUCK LINE	12			
WOOD POLE, VERTICAL CONSTRUCTION, EQUIPMENT TAP	13			
WOOD POLE, SINGLE CROSSARM CONSTRUCTION, HORIZONTAL LINE	14			
WOOD POLE, DOUBLE CROSSARM CONSTRUCTION, HORIZONTAL LINE	15			
WOOD POLE, DOUBLE CROSSARM CONSTRUCTION, DOUBLE DEAD-END	16			
WOOD POLE, DOUBLE CROSSARM CONSTRUCTION, SINGLE DEAD-END	17			
WOOD POLE, DOUBLE CROSSARM CONSTRUCTION, LINE EXTENSION	18			
WOOD POLE, DOUBLE CROSSARM CONSTRUCTION, BUCK ARM OR SIDE LINE PULL OFF	19			

TWO PHASE FRAMING STANDARDS

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
STANDARD FRAMING ANGLES, 2PH CONSTRUCTION, STEEL POLE	20			
STEEL POLE, VERTICAL CONSTRUCTION, POLE TOP PIN	21			
STEEL POLE, VERTICAL CONSTRUCTION, VERTICAL LINE	22			
STEEL POLE, VERTICAL CONSTRUCTION, SUSPENSION INSULATOR	23			
STEEL POLE, VERTICAL CONSTRUCTION, DOUBLE DEAD-END	24			
STEEL POLE, VERTICAL CONSTRUCTION, SINGLE DEAD-END	25			
STEEL POLE, VERTICAL CONSTRUCTION, LINE EXTENSION	26			
STEEL POLE, VERTICAL CONSTRUCTION, FIBERGLSS BRACKETS WITH BUCK LINE	27			
STEEL POLE, VERTICAL CONSTRUCTION, EQUIPMENT TAP	28			
STEEL POLE, SINGLE CROSSARM CONSTRUCTION, HORIZONTAL LINE	29			
STEEL POLE, DOUBLE CROSSARM CONSTRUCTION, HORIZONTAL LINE	30			
STEEL POLE, DOUBLE CROSSARM CONSTRUCTION, DOUBLE DEAD-END	31			
STEEL POLE, SINGLE CROSSARM CONSTRUCTION, SINGLE DEAD-END	32			
STEEL POLE, SINGLE CROSSARM CONSTRUCTION, LINE EXTENSION	33			
STEEL POLE, SINGLE CROSSARM CONSTRUCTION, BUCK ARM OR SIDE LINE PULL OFF	34			

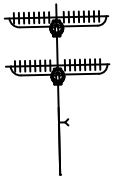
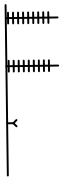
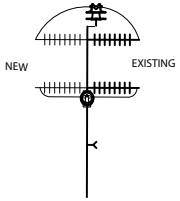
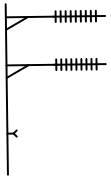
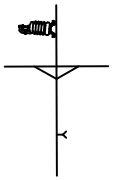
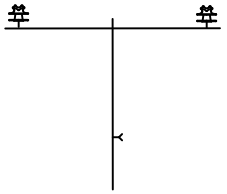
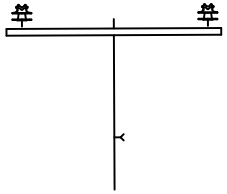
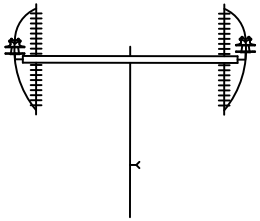
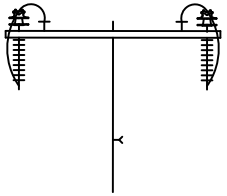
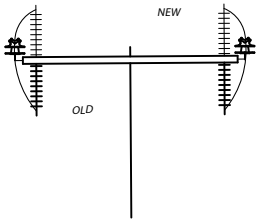
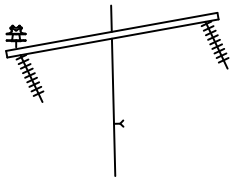
02WV-PT PG. 6	02WV-VL PG. 7	 02WV-SU PG.8	 02WV-DD PG. 9	 02WV-DE PG. 10
 02WV-EX PG. 11	 02FV-BK PG. 12	 02WV-ET PG. 13	 02WS-HL PG. 14	 02WD-HL PG. 15
 02WD-DD PG. 16	 02WD-DE PG. 17	 02WX-EX PG. 18	 02WD-BK PG. 19	

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TWO PHASE FRAMING STANDARDS

NES

WOOD POLE FRAMING INDEX

02SV-PT PG. 21	02SV-VL PG. 22	02SV-SU PG. 23	 02SV-DD PG. 24	 02SV-DE PG. 25
 02SV-EX PG. 26	 02FV-BK PG. 27	 02SV-ET PG. 28	 02FS-HL PG. 29	 02FD-HL PG. 30
 02FD-DD PG. 31	 02FS-DE PG. 32	 02FX-EX PG. 33	 02FS-BK PG. 34	

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TWO PHASE FRAMING STANDARDS

NES

STEEL POLE FRAMING INDEX

2-PHASE FRAMING - MAXIMUM ANGLES

350 FOOT WIND SPAN			MAXIMUM ANGLES PER NESC RULE 250- MEDIUM LOADING, EXTREME ICE, OR EXTREME WIND 90 MPH										
CONSTRUCTION TYPE			ANGLE RANGE (DEGREES)										
			VERTICAL FRAMING - WOOD POLE						HORIZONTAL CONSTRUCTION - WOOD POLE				
CONDUCTOR	DESIGN TENSION (LBS.)	NESC RULE	POLE TOP (PT)	VERTICAL LINE (VL)	SUSPENSION (SU)	DOUBLE DEAD-END (DD) / EXTENSION (EX)	DEAD-END (DE)	BUCK (BK)	HORIZONTAL LINE (HL)	DOUBLE HORIZONTAL LINE (D-HL)	DOUBLE DEAD-END (DD) / EXTENSION (EX)	DEAD-END (DE)	BUCK (BK)
2 ACSR	835	Grade “C”	0-10	0-30	30-60	0-60	0	0	0-10	0-37	0-58	0	0
		Grade “B”	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-32	0-39	0	0
1/0 ACSR	985	Grade “C”	0-10	0-30	30-60	0-60	0	0	0-10	0-31	0-48	0	0
		Grade “B”	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-26	0-32	0	0
6 BHD	550	Grade “C”	0-10	0-30	30-60	0-60	0	0	0-10	0-45	0-60	0	0
		Grade “B”	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-45	0-60	0	0
4 BHD	700	Grade “C”	0-10	0-30	30-60	0-60	0	0	0-10	0-45	0-60	0	0
		Grade “B”	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-40	0-48	0	0
2 BHD	950	Grade “C”	0-10	0-30	30-60	0-60	0	0	0-10	0-33	0-52	0	0
		Grade “B”	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-28	0-35	0	0
NOTES			1. Single Tie-top Pin Insulators not to be used with NESC Grade “B” Construction										

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TWO PHASE FRAMING STANDARDS

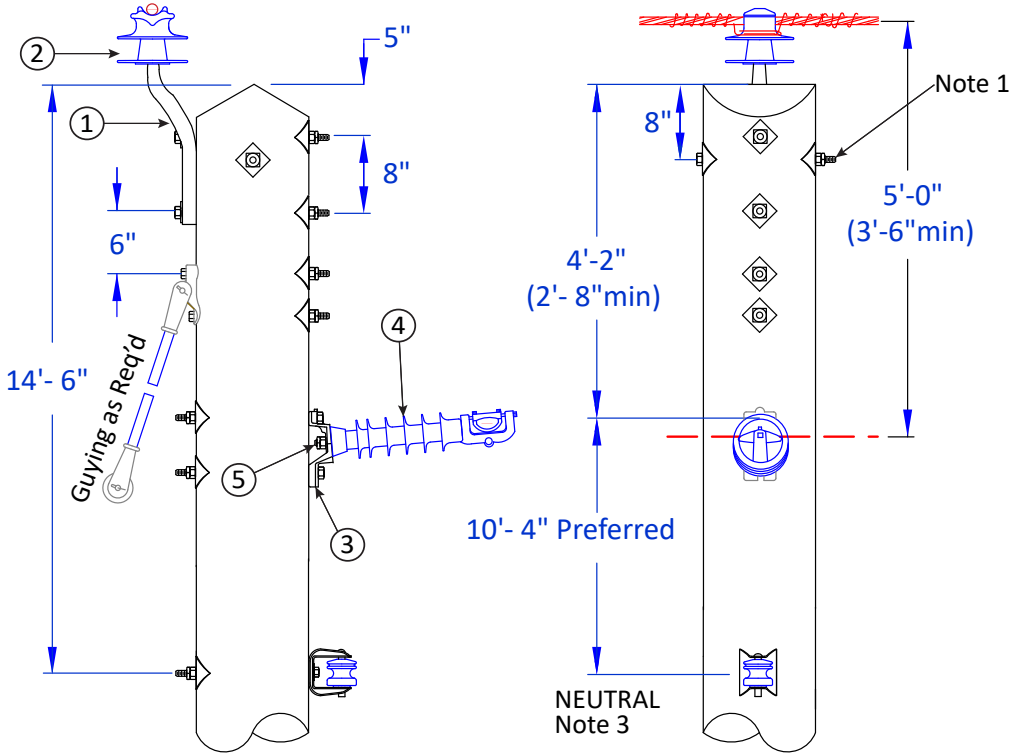
NES

STANDARD FRAMING ANGLES
WOOD POLE

FRM. CODE	O2WV-PT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	PIN POLE TOP 1” x 21” OFFSET	183100000
2	1	PIN TOP INSUL. POLY 25KV	242190000
3	1	BRKT INSUL/HOR LP SHORT	180746000
4	1	INSUL LP HOR CLP/TP 35KV	240976000
5	1	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
6	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
7	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
6	5/8” DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

WOOD POLES
O2WV-PT
0˚ - 10˚



NOTES

1. Split bolts are required on all wood poles with pole top insulator brackets.
2. Conductor size range #6 CU to 1/0 ACSR.
3. See the Framing Spacing section for alternate neutral spacing.
4. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
5. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

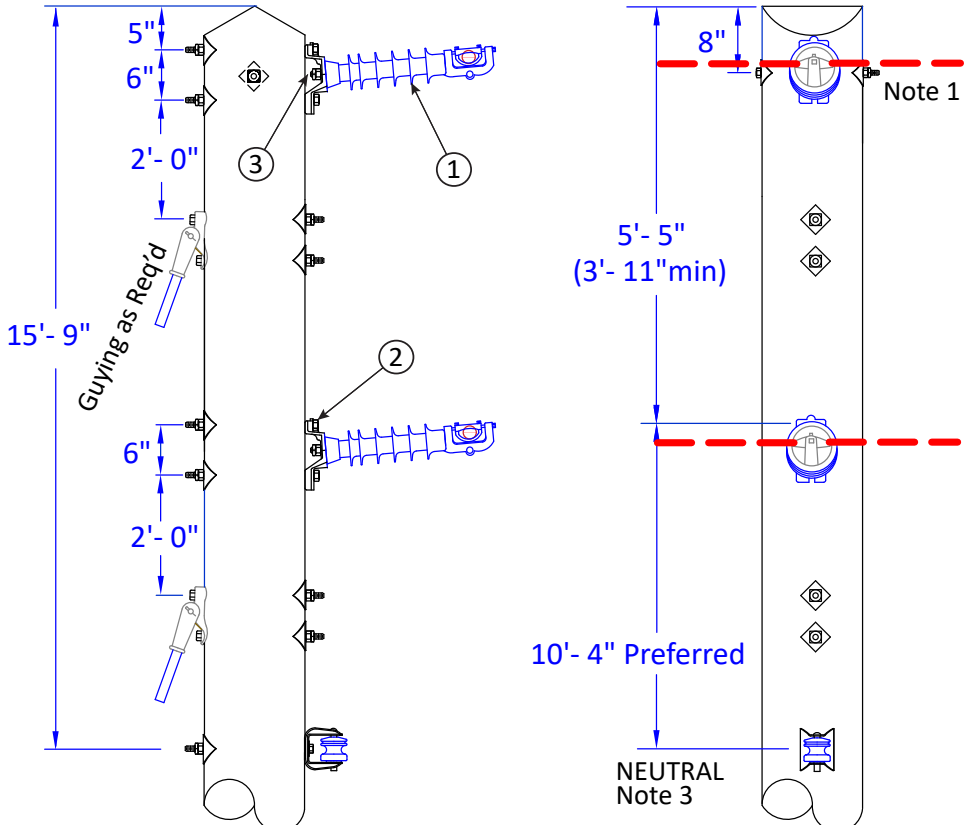
NES

WOOD POLE VERTICAL CONSTRUCTION POLE TOP PIN

FRM. CODE	O2WV-VL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	INSUL LP HOR CLP/TP 35KV	240976000
2	2	BRKT INSUL/HOR LP SHORT	180746000
3	2	BOLT STUD 3/4" X 3" SHORT/LP INSUL	204780000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
6	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
7	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
6	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
2	CLAMP TOP AL 4-4/0	221870000

WOOD POLES
O2WV-VL
0˚ - 30˚



NOTES

1. Split bolts are required on all wood poles with pole top insulator brackets.
2. Conductor size range #6 CU to 1/0 ACSR.
3. See the Framing Spacing section for alternate neutral spacing.
4. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
5. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

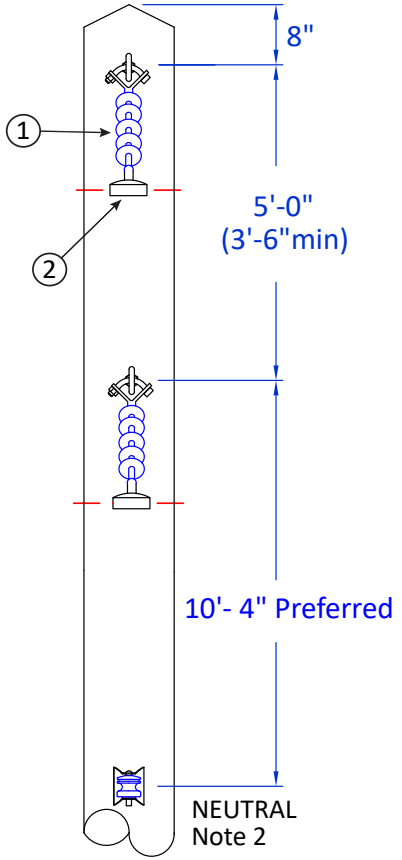
NES

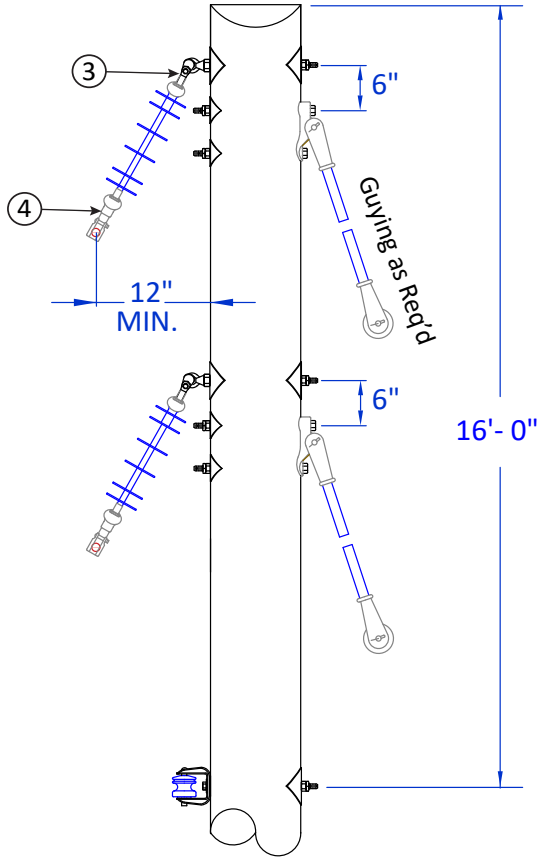
WOOD POLE
VERTICAL CONSTRUCTION
VERTICAL LINE

FRM. CODE	O2WV-SU	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	2	CLAMP SUSP 2 - 1/0	221550000
3	2	CLEVIS Y-BALL	181208000
4	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
5	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
2	NUT OVAL EYE 5/8"	206400000
3	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

WOOD POLES
O2WV-SU
30˚ - 60˚





NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
4. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

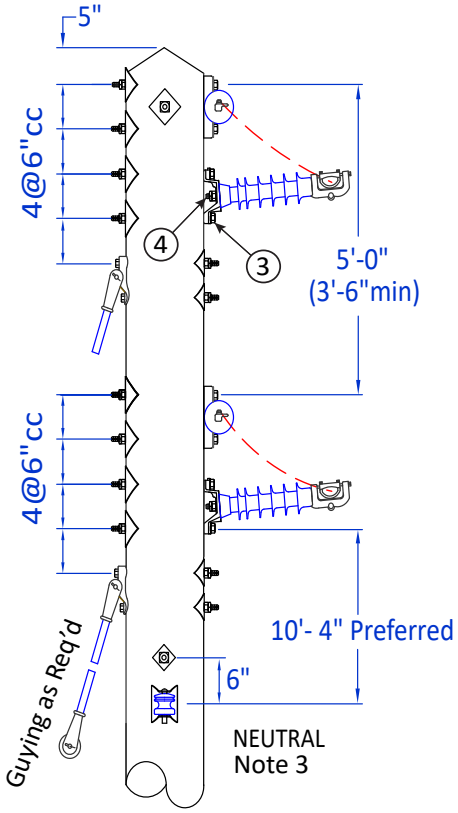
NES

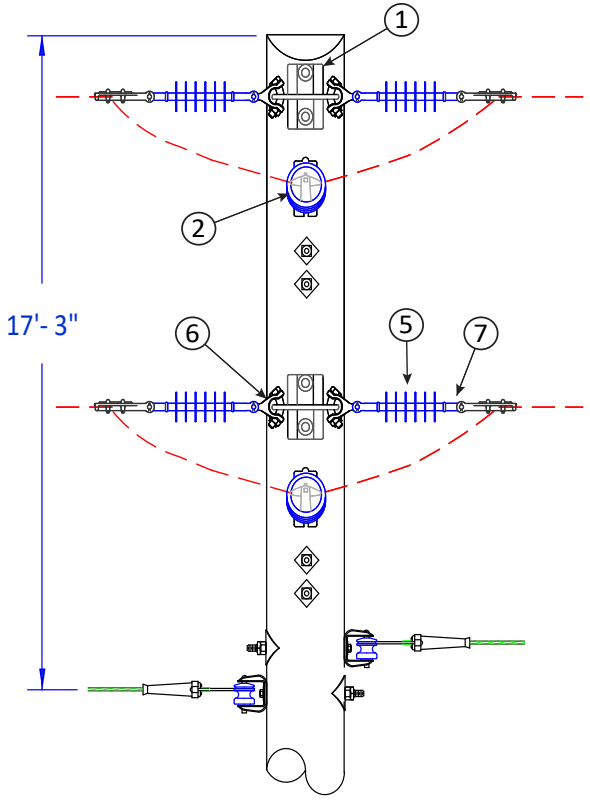
WOOD POLE VERTICAL CONSTRUCTION SUSPENSION INSULATOR

FRM. CODE	O2WV-DD	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	BRACKET, DOUBLE DEAD-END ANGLE	180780000
2	2	INSUL LP HOR CLP/TP 35KV	240976000
3	2	BRKT INSUL/HOR LP SHORT	180746000
4	2	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000
5	4	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
6	4	CLEVIS Y-BALL	181208000
7	4	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
6	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
4	BOLT MACHINE3/4” X REQUIRED LENGTH	204_____
10	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
4	5/8” DBL COIL SPRING WASHER	206570000
6	3/4" DBL COIL SPRING WASHER	206580000
4	CLAMP STRAIN 6-2/0 ACSR	221000000
2	RACK SECONDARY 1W/LARGE	184003000
2	INSUL RACK SPOOL - LARGE	242480000
2	FLEX BAIL STRANDVISE #2 ACSR	230600000
2	CLAMP TOP AL 4-4/0	221870000

WOOD POLES
O2WV-DD
0˚ - 60˚





NOTES

1. Split bolts are required on all wood poles with pole top brackets.
2. Conductor size range #6 CU to 1/0 ACSR.
3. See the Framing Spacing section for alternate neutral spacing.
4. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
5. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

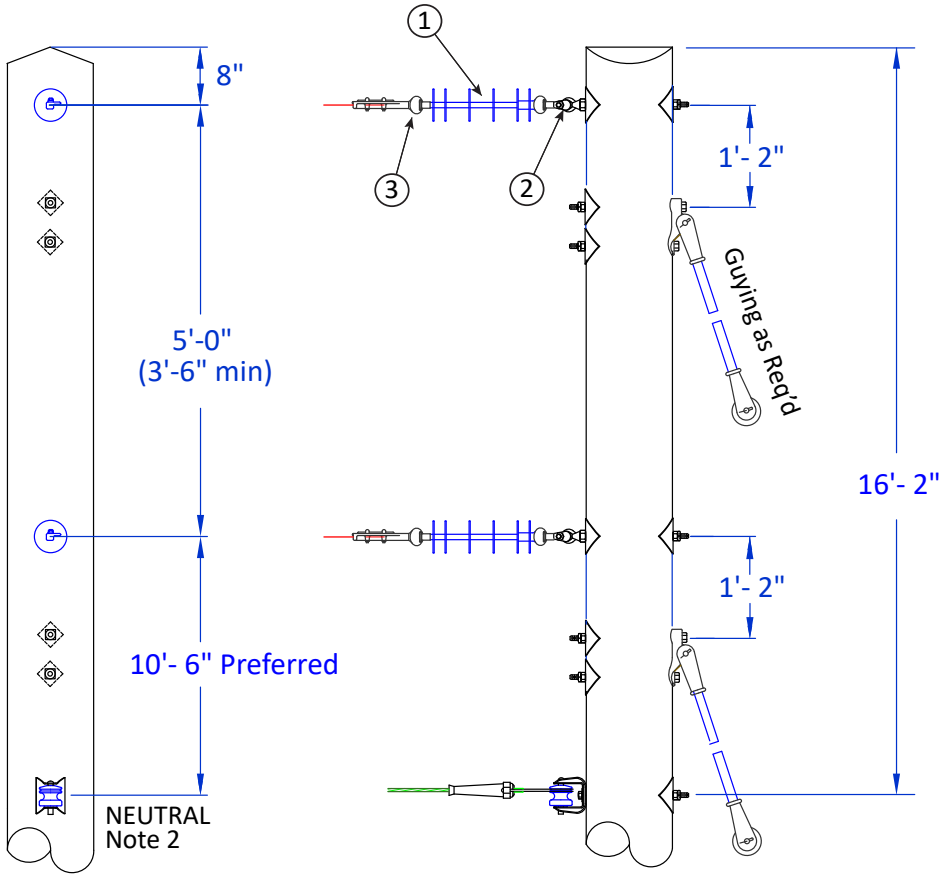
NES

WOOD POLE VERTICAL CONSTRUCTION DOUBLE DEAD-END

FRM. CODE	O2WV-DE	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	2	CLEVIS Y-BALL	181208000
3	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
5	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
2	NUT OVAL EYE 5/8"	206400000
3	5/8" DBL COIL SPRING WASHER	206570000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

WOOD POLES
O2WV-DE



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. **Click here** to go to Framing Angle Chart, Page 5.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

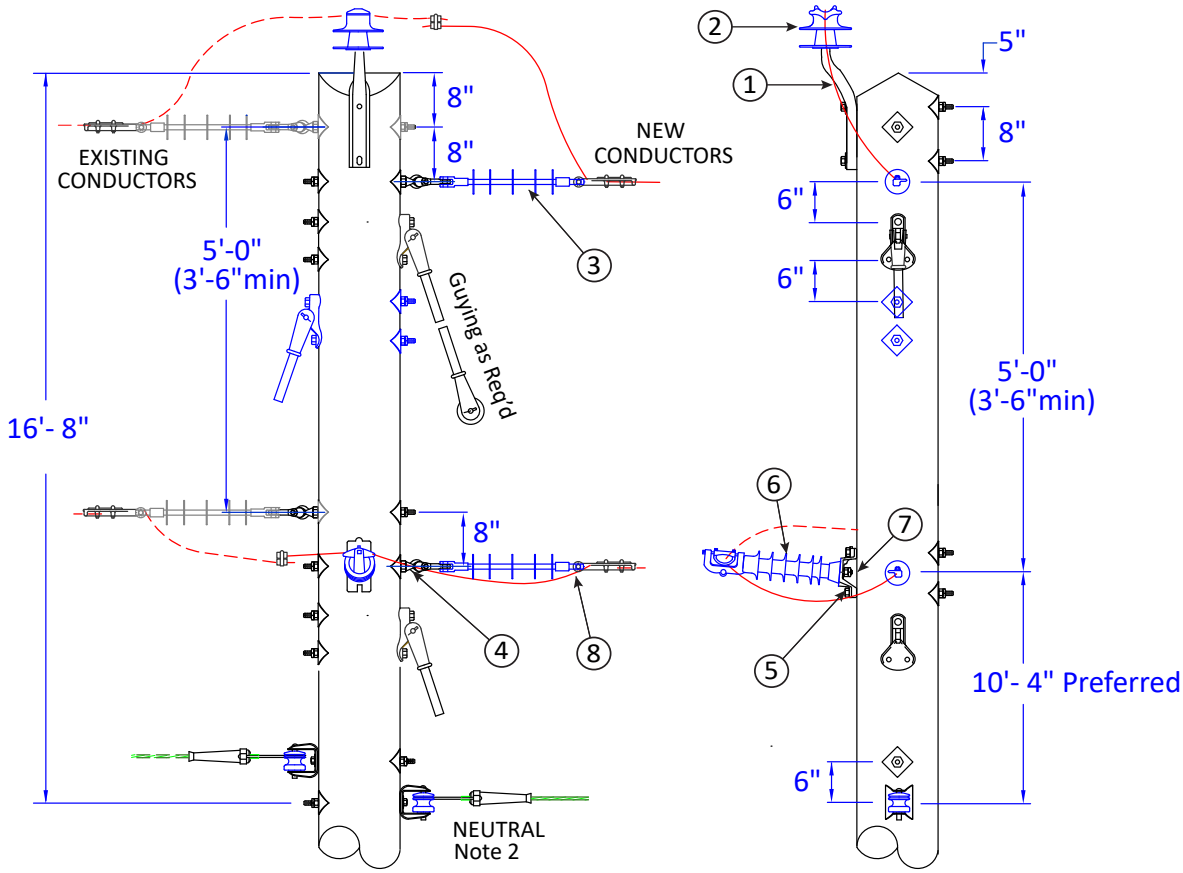
NES

WOOD POLE
VERTICAL CONSTRUCTION
SINGLE DEAD-END

FRM. CODE	O2WV-EX	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	PIN POLE TOP 1” x 21” OFFSET	183100000
2	1	PIN TOP INSUL. POLY 25KV	242190000
3	2	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
4	2	CLEVIS Y-BALL	181208000
5	1	BRKT INSUL/HOR LP SHORT	180746000
6	1	INSUL LP HOR CLP/TP 35KV	240976000
7	1	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000
8	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
7	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
2	NUT OVAL EYE 5/8”	206400000
9	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
7	5/8” DBL COIL SPRING WASHER	206570000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000
1	CLAMP TOP AL 4-4/0	221870000

WOOD POLES
O2WV-EX
0˚ - 60˚



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

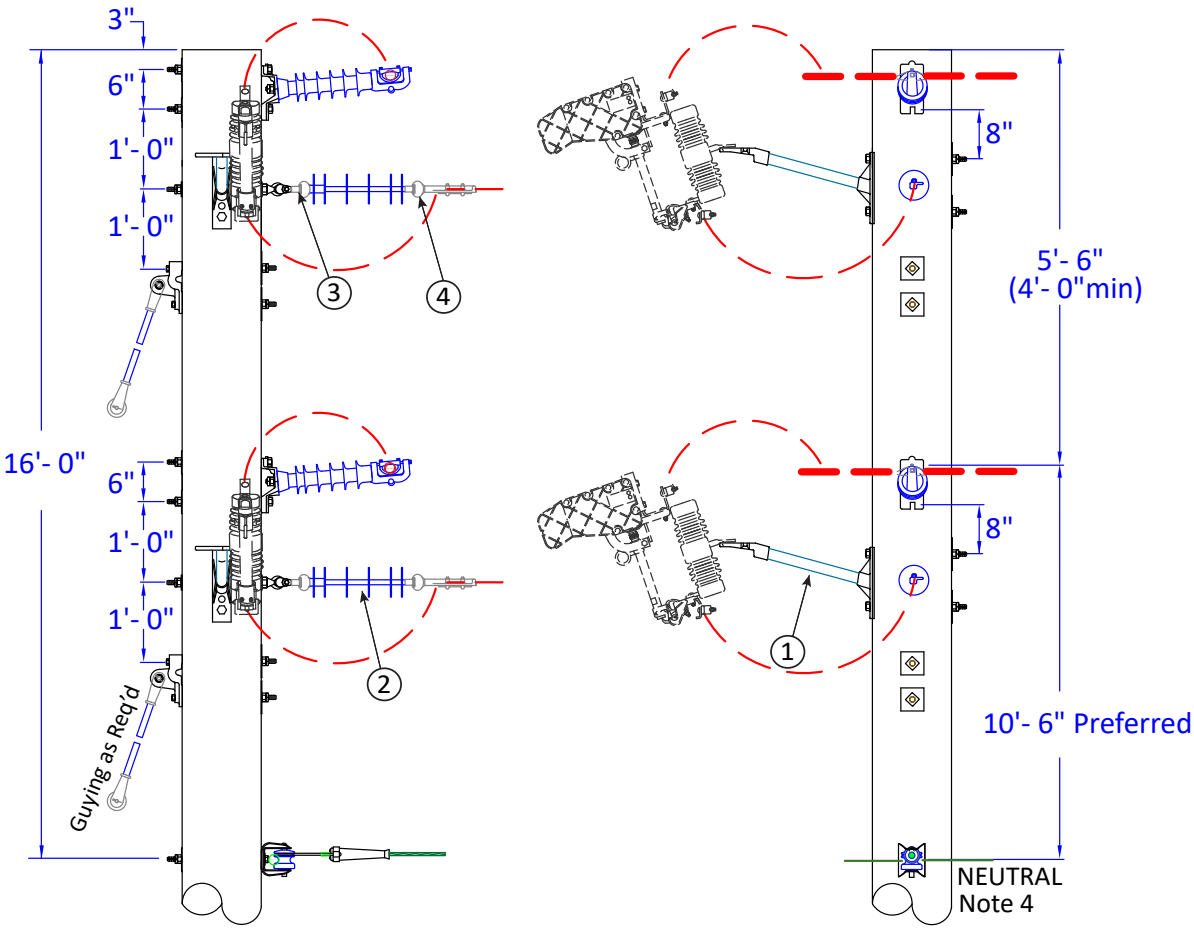
NES

WOOD POLE VERTICAL CONSTRUCTION LINE EXTENSION

FRM. CODE	O2FV-BK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	BRKT INS/CO/ARR 18 IN FIBERGLASS	180745000
2	2	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
3	2	CLEVIS Y-BALL	181208000
4	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
4	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
4	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
4	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
4	5/8" DBL COIL SPRING WASHER	206570000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

ALL POLE TYPES
O2FV-BK



NOTES

1. Framing used on all pole types.
2. LBU shown is not included in CU.
3. Conductor size range #6 CU to 1/0 ACSR.
4. See the Framing Spacing section for alternate neutral spacing.
5. Guying for permitted loading to be specified per Engineer.
6. **Click here** to go to Framing Angle Chart, Page 5.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TWO PHASE FRAMING STANDARDS

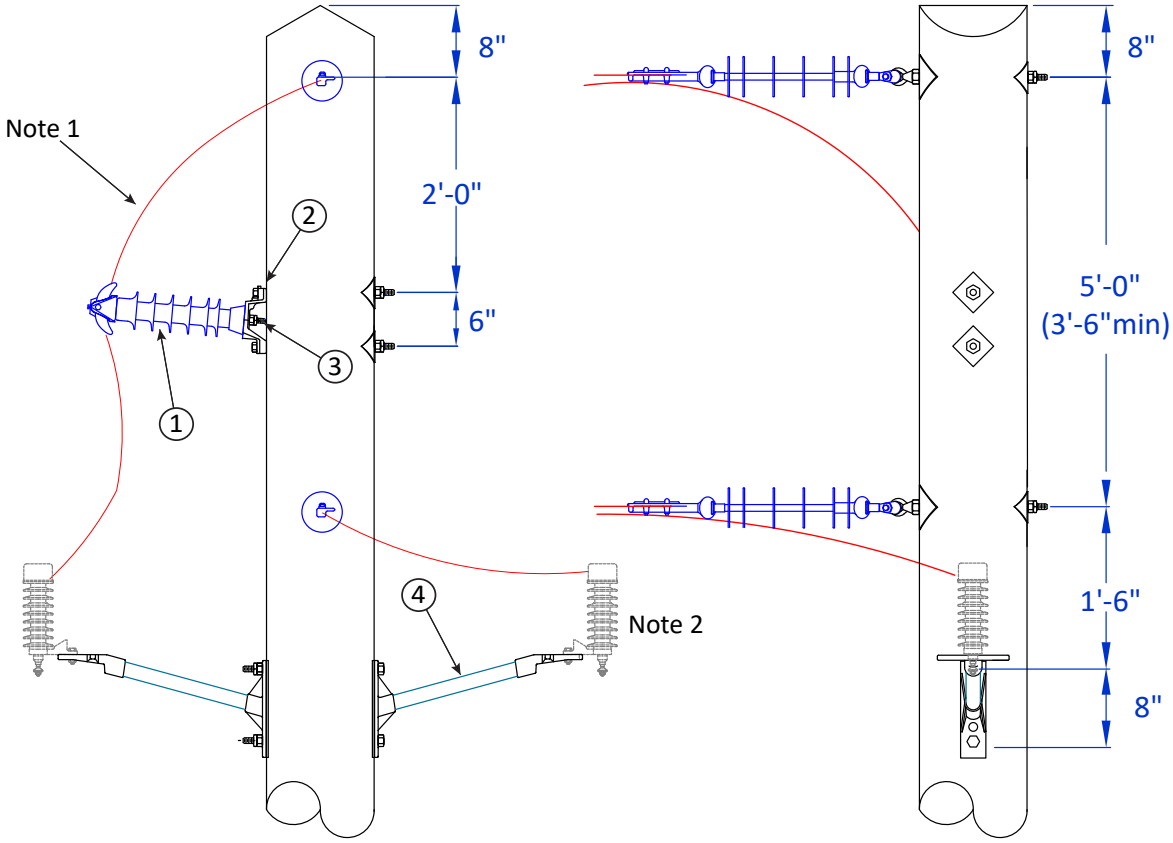
NES

WOOD POLE
VERTICAL CONSTRUCTION
FIBERGLSS BRACKETS WITH BUCK LINE

FRM. CODE	O2WV-ET	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	INSUL LP VER CLP/TP 35 KV	240974000
2	1	BRKT INSUL/HOR LP SHORT	180746000
3	1	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000
4	2	BRKT INS/CO/ARR 18 IN FIBERGLASS	180745000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
4	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
2	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
4	5/8” DBL COIL SPRING WASHER	206570000
1	CLAMP TOP AL 4-4/0	221870000

WOOD POLES
O2WV-ET



NOTES

1. Min. stinger wire size #4 Cu BSD
2. Arrestors and/or cutouts are called for separately as req’d.
3. Consider wildlife protection based on environment.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

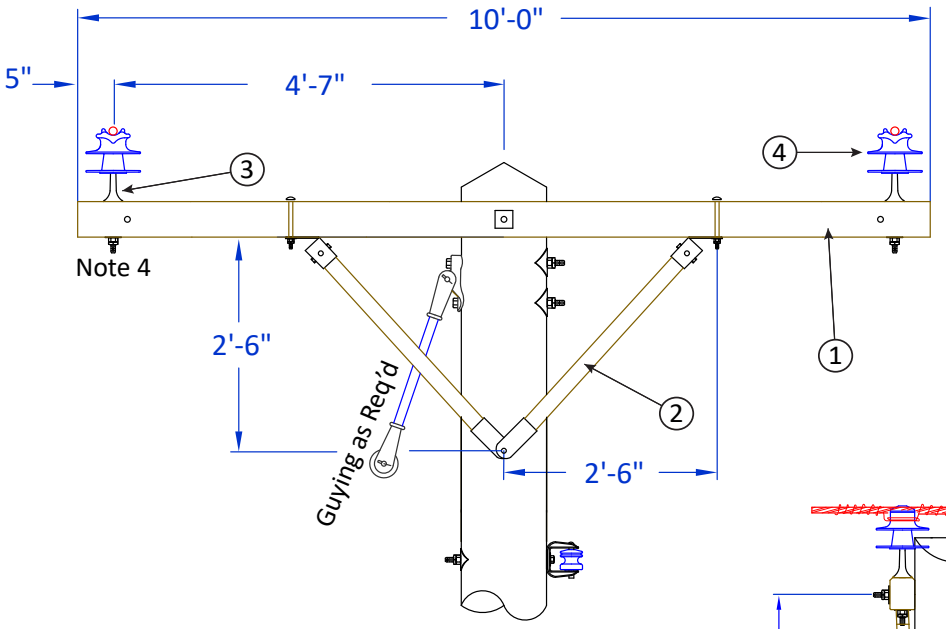
WOOD POLE VERTICAL CONSTRUCTION EQUIPMENT TAP

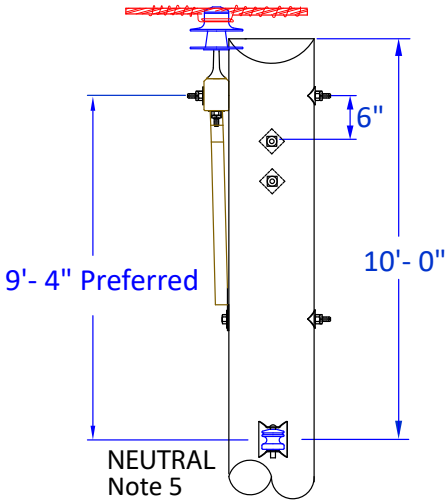
TWO PHASE FRAMING STANDARDS

FRM. CODE	O2WS-HL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	X-ARM 4” X 5” X 10’	040220000
2	1	BRACE X-ARM WOOD 69KV PAIR	180660000
3	2	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
4	2	PIN TOP INSUL. POLY 25KV	242190000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
3	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
1	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
4	WASHER SQ FLAT 4", 13/16" HOLE	209640000
3	5/8” DBL COIL SPRING WASHER	206570000
2	3/4" DBL COIL SPRING WASHER	206580000
2	BOLT CARRIAGE 1/2" X 6	201360000
2	WASHER SQ FLAT 2”, 9/16” HOLE	209600000
2	1/2” DBL COIL SPRING WASHER	206560000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

WOOD POLES
O2WS-HL
0˚ - 10˚





NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
3. Guying for permitted loading to be specified per Engineer.
4. Install two 4x4 Washers per Insulator Xarm Pin.
5. See the Framing Spacing section for alternate neutral spacing.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

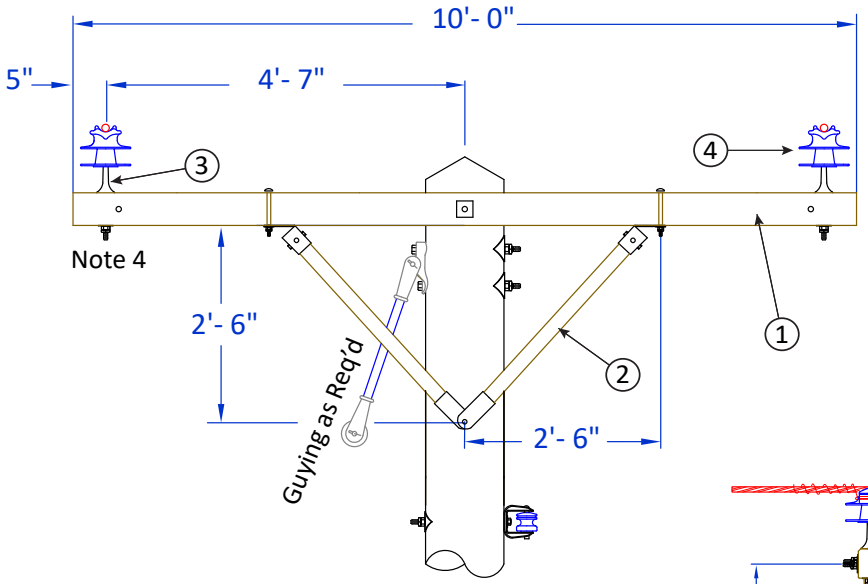
NES

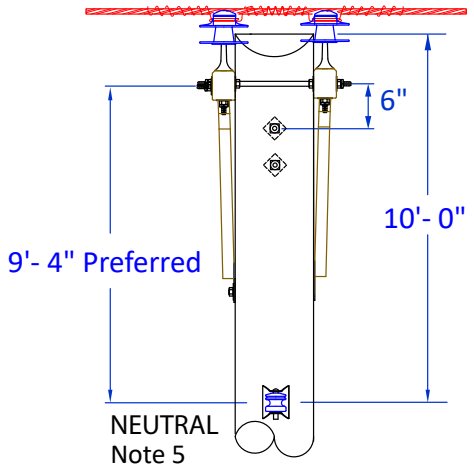
WOOD POLE
SINGLE CROSSARM CONSTRUCTION
HORIZONTAL LINE

FRM. CODE	O2WD-HL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 4” X 5” X 10’	040220000
2	2	BRACE X-ARM WOOD 69KV PAIR	180660000
3	4	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
4	4	PIN TOP INSUL. POLY 25KV	242190000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	BOLT DA 5/8” X REQUIRED LENGTH	201_____
2	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
2	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
10	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
8	WASHER SQ FLAT 4", 13/16" HOLE	209640000
7	5/8” DBL COIL SPRING WASHER	206570000
4	3/4" DBL COIL SPRING WASHER	206580000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

WOOD POLES
O2WD-HL
8˚ - 37˚





NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
3. Guying for permitted loading to be specified per Engineer.
4. Install two 4x4 Washers per Insulator Xarm Pin.
5. See the Framing Spacing section for alternate neutral spacing.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
DOUBLE CROSSARM CONSTRUCTION
HORIZONTAL LINE

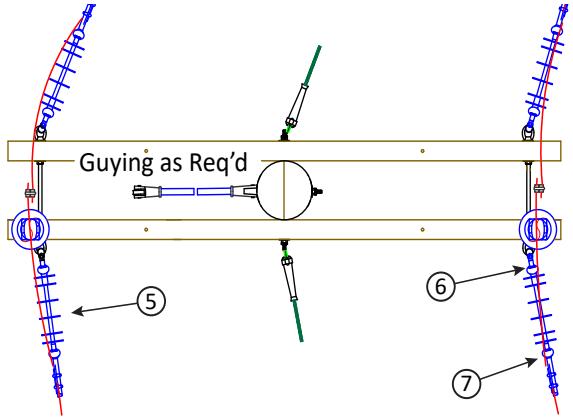
FRM. CODE	O2WD-DD	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 4” X 5” X 10’	040220000
2	2	BRACE X-ARM WOOD 69KV PAIR	180660000
3	2	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
4	2	PIN TOP INSUL. POLY 25KV	242190000
5	4	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
6	4	CLEVIS Y-BALL	181208000
7	4	SOCKET EYE	181440000

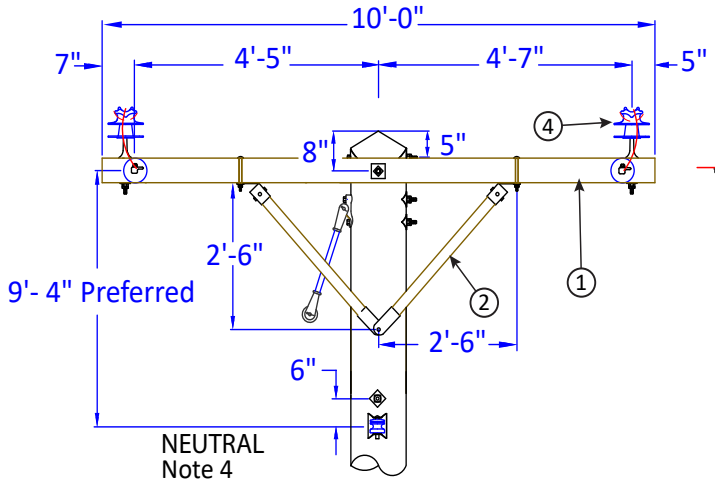
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	BOLT DA 5/8” X REQUIRED LENGTH	201_____
4	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
4	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
10	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
4	NUT OVAL EYE 5/8”	206400000
9	5/8” DBL COIL SPRING WASHER	206570000
2	3/4" DBL COIL SPRING WASHER	206580000
4	CLAMP STRAIN 6-2/0 ACSR	221000000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000
2	RACK SECONDARY 1W/LARGE	184003000
2	INSUL RACK SPOOL - LARGE	242480000
2	FLEX BAIL STRANDVISE #2 ACSR	230600000

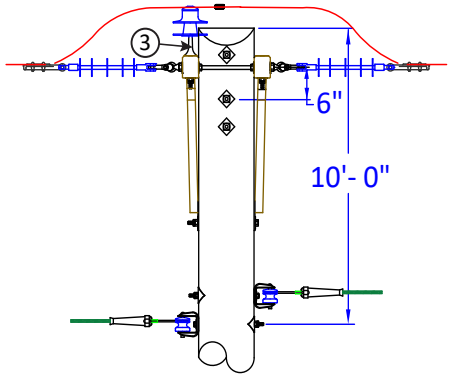
NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
3. Guying for permitted loading to be specified per Engineer.
4. See the Framing Spacing section for alternate neutral spacing.

WOOD POLES
O2WD-DD
0˚ - 58˚







REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TWO PHASE FRAMING STANDARDS

NES

WOOD POLE
DOUBLE CROSSARM CONSTRUCTION
DOUBLE DEAD-END

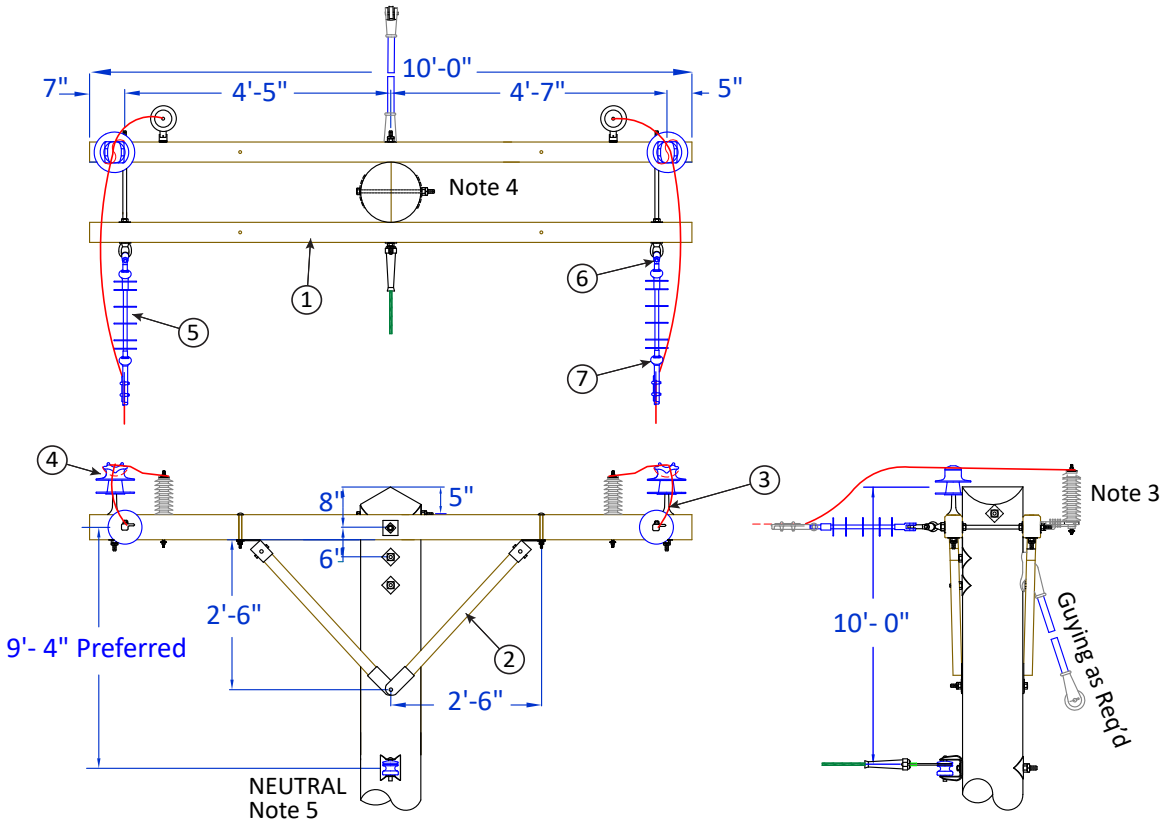
FRM. CODE	O2WD-DE	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 4” X 5” X 10’	040220000
2	2	BRACE X-ARM WOOD 69KV PAIR	180660000
3	2	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
4	2	PIN TOP INSUL. POLY 25KV	242190000
5	2	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
6	2	CLEVIS Y-BALL	181208000
7	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	BOLT DA 5/8” X REQUIRED LENGTH	201_____
3	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
4	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
10	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
2	NUT OVAL EYE 5/8”	206400000
8	5/8” DBL COIL SPRING WASHER	206570000
2	3/4" DBL COIL SPRING WASHER	206580000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Guying for permitted loading to be specified per Engineer.
3. Arrester with bracket shown as called for separately as req’d.
4. Split bolt required for this installation.
5. See the Framing Spacing section for alternate neutral spacing.
6. **Click here** to go to Framing Angle Chart, Page 5.

WOOD POLES
O2WD-DE



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TWO PHASE FRAMING STANDARDS

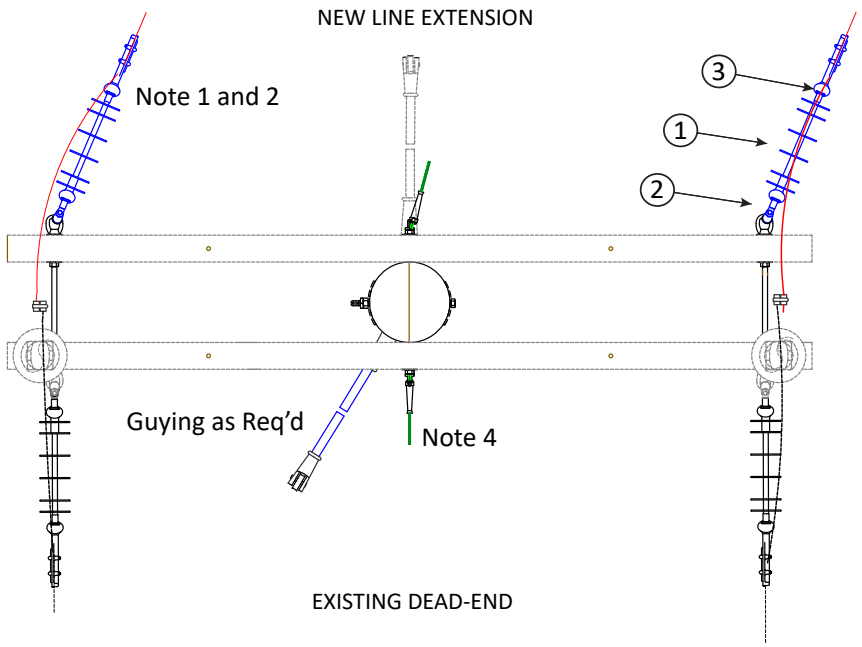
NES

WOOD POLE
DOUBLE CROSSARM CONST.
SINGLE DEAD-END

FRM. CODE	O2WX-EX	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	2	CLEVIS Y-BALL	181208000
3	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	NUT OVAL EYE 5/8”	206400000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000
1	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
1	5/8” DBL COIL SPRING WASHER	206570000
1	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000

WOOD POLES
O2WX-EX
0˚ - 58˚



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 5.
3. Guying for permitted loading to be specified per Engineer.
4. See the Framing Spacing section for alternate neutral spacing.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
DOUBLE CROSSARM CONSTRUCTION
LINE EXTENSION

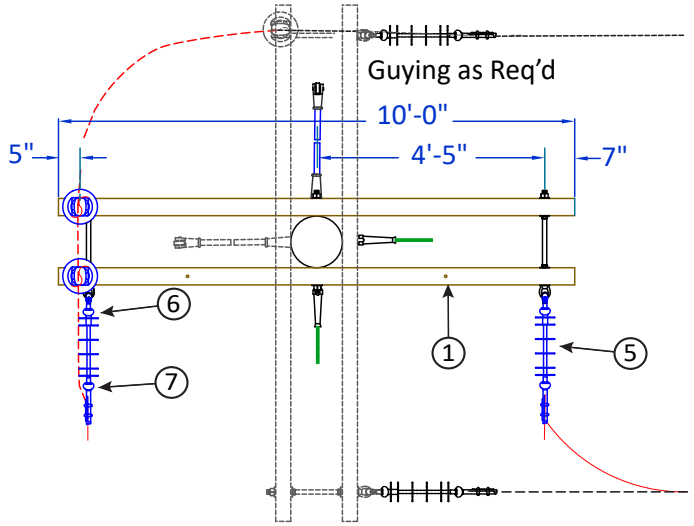
FRM. CODE	O2WD-BK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 4” X 5” X 10’	040220000
2	2	BRACE X-ARM WOOD 69KV PAIR	180660000
3	2	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
4	2	PIN TOP INSUL. POLY 25KV	242190000
5	2	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
6	2	CLEVIS Y-BALL	181208000
7	2	SOCKET EYE	181440000

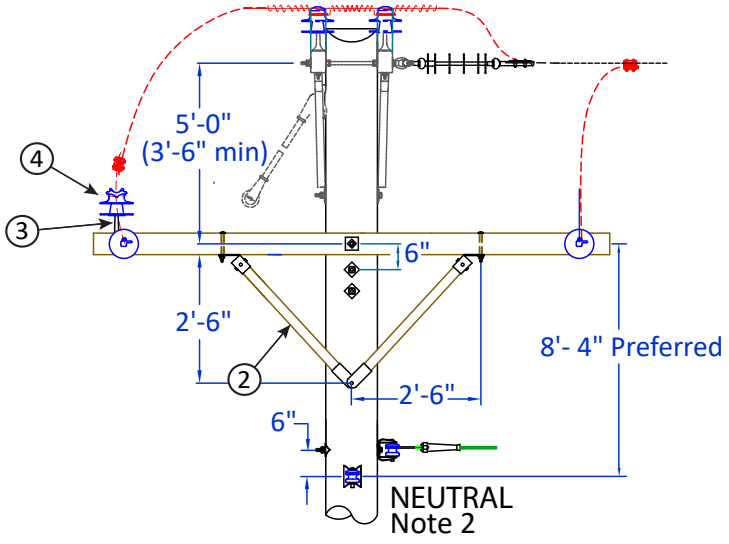
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	BOLT DA 5/8” X REQUIRED LENGTH	201_____
2	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
2	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
10	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
2	NUT OVAL EYE 5/8”	206400000
8	5/8” DBL COIL SPRING WASHER	206570000
1	3/4" DBL COIL SPRING WASHER	206580000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. **Click here** to go to Framing Angle Chart, Page 5.

WOOD POLES
O2WD-BK





REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
DOUBLE CROSSARM CONST.
BUCK ARM OR SIDE LINE PULL OFF

TWO PHASE FRAMING STANDARDS

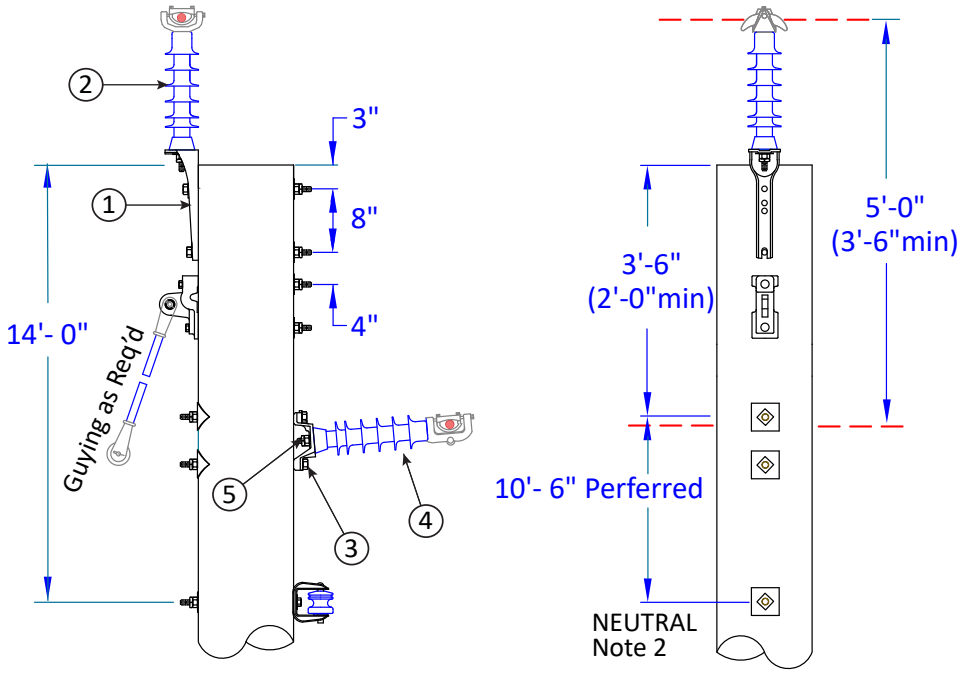
2-PHASE FRAMING - MAXIMUM ANGLES

350 FOOT WIND SPAN			MAXIMUM ANGLES PER NESC RULE 250- MEDIUM LOADING, EXTREME ICE, OR EXTREME WIND 90 MPH										
CONSTRUCTION TYPE			ANGLE RANGE (DEGREES)										
			VERTICAL FRAMING - STEEL POLE						HORIZONTAL CONSTRUCTION - STEEL POLE				
CONDUCTOR	DESIGN TENSION (LBS.)	NESC RULE	POLE TOP (PT)	VERTICAL LINE (VL)	SUSPENSION (SU)	DOUBLE DEAD-END (DD) / EXTENSION (EX)	DEAD-END (DE)	BUCK (BK)	HORIZONTAL LINE (HL)	DOUBLE HORIZONTAL LINE (D-HL)	DOUBLE DEAD-END (DD) / EXTENSION (EX)	DEAD-END (DE)	BUCK (BK)
2 ACSR	835	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-37	0-58	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-32	0-39	0	0
1/0 ACSR	985	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-31	0-48	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-26	0-32	0	0
6 BHD	550	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-45	0-60	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-45	0-60	0	0
4 BHD	700	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-45	0-60	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-40	0-48	0	0
2 BHD	950	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-33	0-52	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	0-28	0-35	0	0
NOTES			1. Single Tie-top Pin Insulators not to be used with NESC Grade "B" Construction										

FRM. CODE	O2SV-PT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	PIN POLE TOP/POST INSUL	183060000
2	1	INSUL LP VER CLP/TP 35KV	240974000
3	1	BRKT INSUL/HOR LP SHORT	180746000
4	1	INSUL LP HOR CLP/TP 35KV	240976000
5	2	BOLT STUD 3/4" X 3" SHORT/LP INSUL	204780000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
5	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
5	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
5	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
2	CLAMP TOP AL 4-4/0	221870000

STEEL POLES
O2SV-PT
0˚ - 10˚



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 20.
4. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

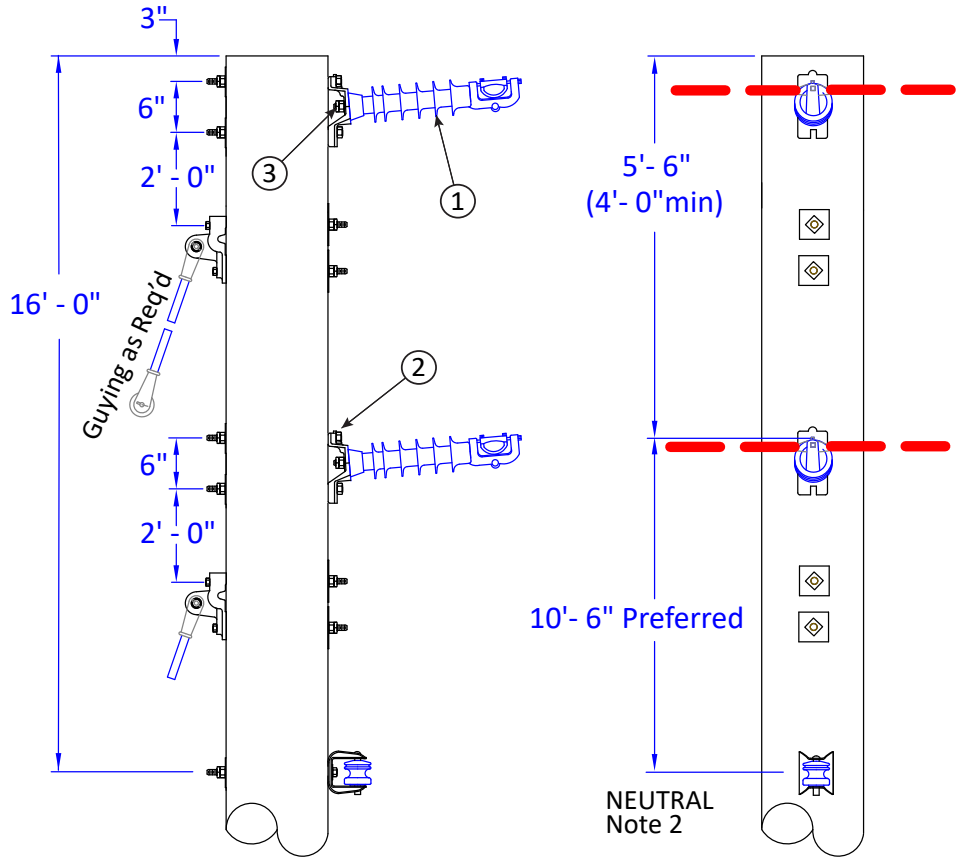
NES

STEEL POLE
VERTICAL CONSTRUCTION
POLE TOP PIN

FRM. CODE	O2SV-VL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	INSUL LP HOR CLP/TP 35KV	240976000
2	2	BRKT INSUL/HOR LP SHORT	180746000
3	2	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
5	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
5	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
5	5/8” DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
2	CLAMP TOP AL 4-4/0	221870000

STEEL POLES
O2SV-VL
0˚ - 30˚



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 20.
4. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

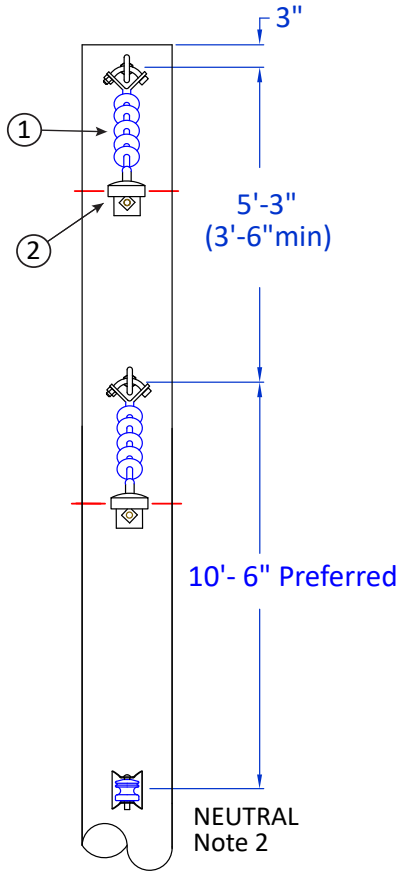
NES

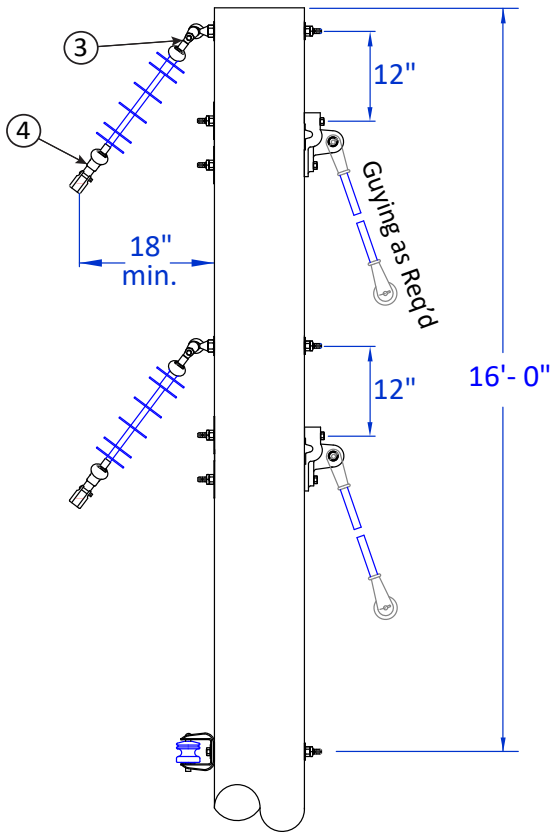
STEEL POLE
VERTICAL CONSTRUCTION
VERTICAL LINE

FRM. CODE	O2SV-SU	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	2	CLAMP SUSP 2 - 1/0	221550000
3	2	CLEVIS Y-BALL	181208000
4	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
5	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
2	NUT OVAL EYE 5/8"	206400000
3	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000

STEEL POLES
O2SV-SU
30˚ - 60˚





NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 20.
4. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

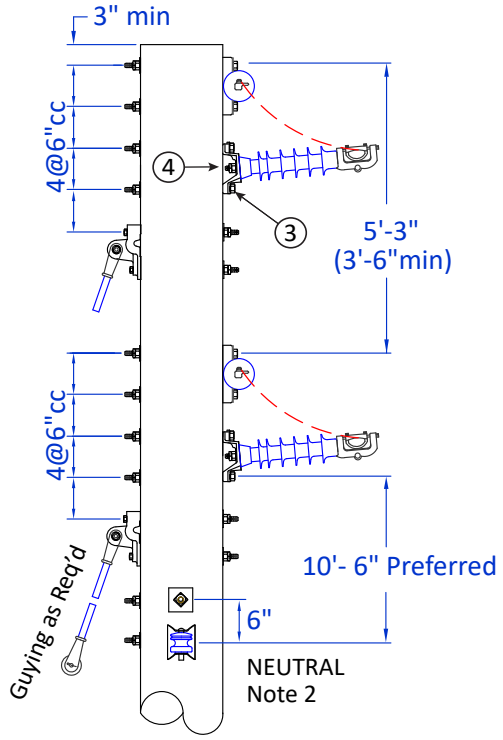
NES

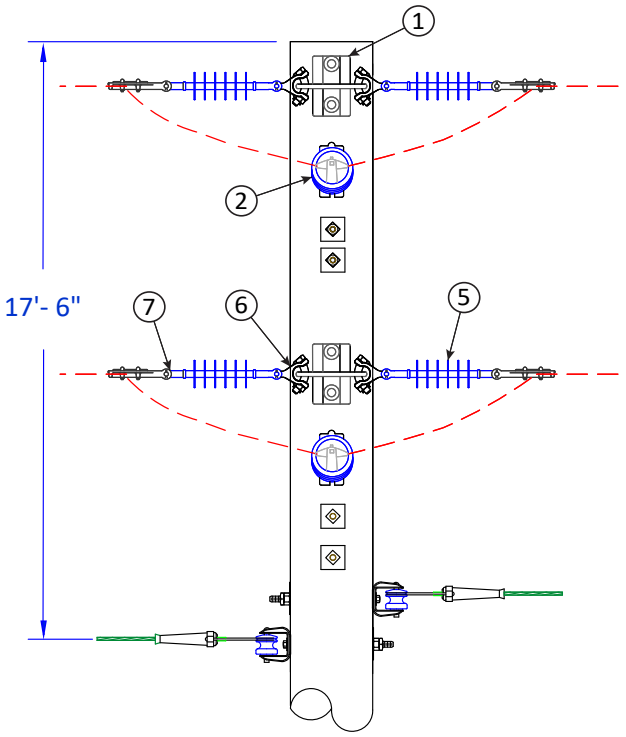
STEEL POLE
VERTICAL CONSTRUCTION
SUSPENSION INSULATOR

FRM. CODE	O2SV-DD	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	BRACKET, DOUBLE DEAD-END ANGLE	180780000
2	2	INSUL LP HOR CLP/TP 35KV	240976000
3	2	BRKT INSUL/HOR LP SHORT	180746000
4	2	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000
5	4	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
6	4	CLEVIS Y-BALL	181208000
7	4	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
6	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
4	BOLT MACHINE3/4” X REQUIRED LENGTH	204_____
10	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
4	5/8” DBL COIL SPRING WASHER	206570000
6	3/4" DBL COIL SPRING WASHER	206580000
4	CLAMP STRAIN 6-2/0 ACSR	221000000
2	RACK SECONDARY 1W/LARGE	184003000
2	INSUL RACK SPOOL - LARGE	242480000
2	FLEX BAIL STRANDVISE #2 ACSR	230600000
2	CLAMP TOP AL 4-4/0	221870000

STEEL POLES
O2SV-DD
0˚ - 60˚





NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 20.
4. Guying for permitted loading to be specified per Engineer.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TWO PHASE FRAMING STANDARDS

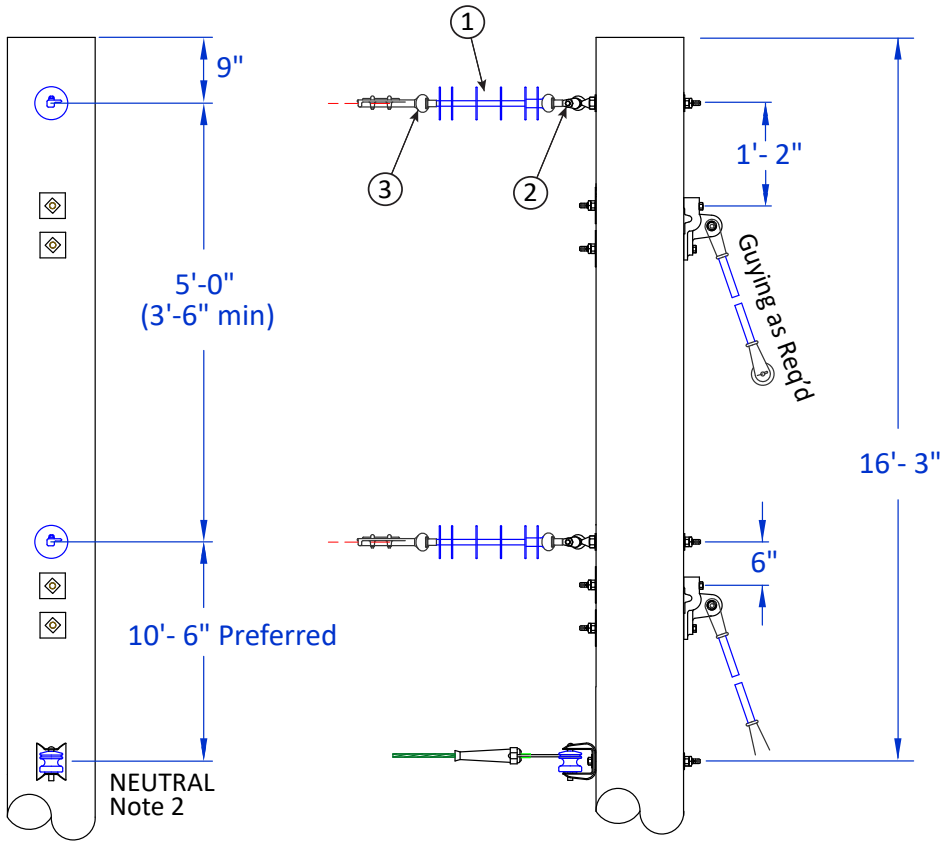
NES

STEEL POLE
VERTICAL CONSTRUCTION
DOUBLE DEAD-END

FRM. CODE	O2SV-DE	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	2	CLEVIS Y-BALL	181208000
3	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
5	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
2	NUT OVAL EYE 5/8"	206400000
3	5/8" DBL COIL SPRING WASHER	206570000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

STEEL POLES
O2SV-DE



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. **Click here** to go to Framing Angle Chart, Page 20.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

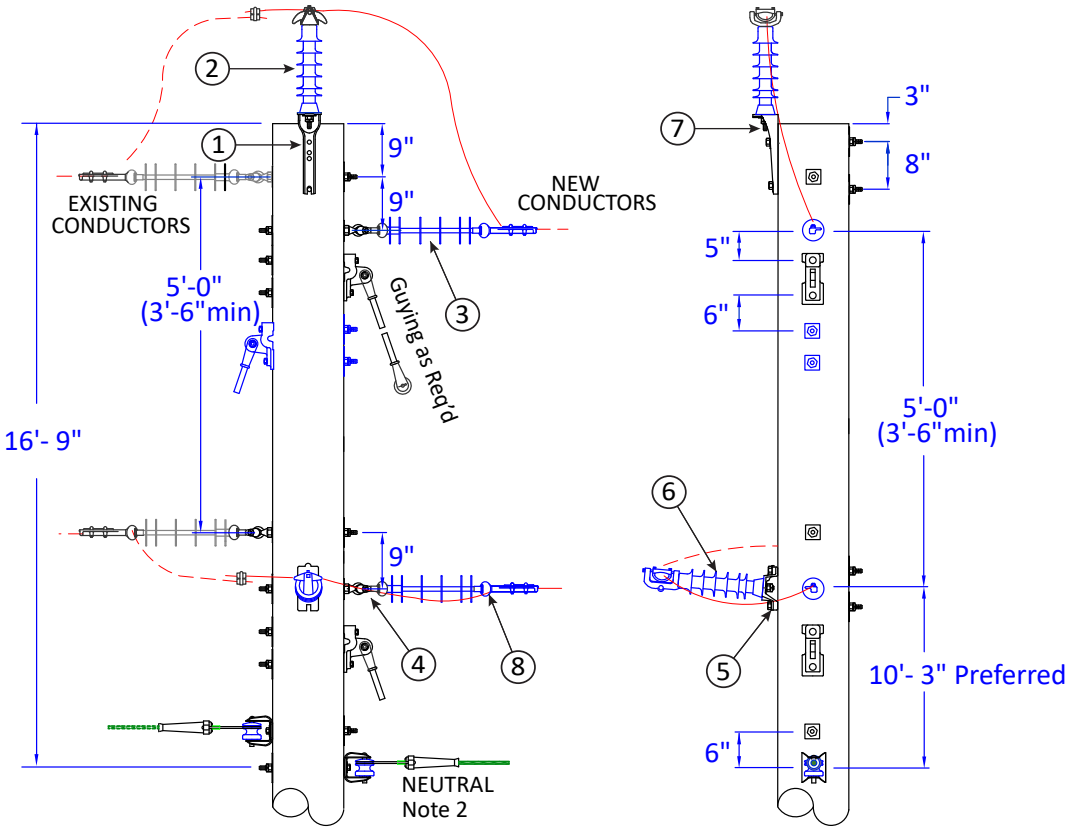
NES

STEEL POLE
VERTICAL CONSTRUCTION
SINGLE DEAD-END

FRM. CODE	O2SV-EX	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	PIN POLE TOP/POST INSUL	183060000
2	1	INSUL LP VER CLP/TP 35KV	240974000
3	2	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
4	2	CLEVIS Y-BALL	181208000
5	1	BRKT INSUL/HOR LP 23 KV SHORT	180746000
6	1	INSUL LP HOR CLP/TP 35KV	240976000
7	2	BOLT STUD 3/4" X 3" SHORT/LP INSUL	204780000
8	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
7	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
2	NUT OVAL EYE 5/8"	206400000
9	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
7	5/8" DBL COIL SPRING WASHER	206570000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000
2	CLAMP TOP AL 4-4/0	221870000

STEEL POLES
O2SV-EX
0˚ - 60˚



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 20.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

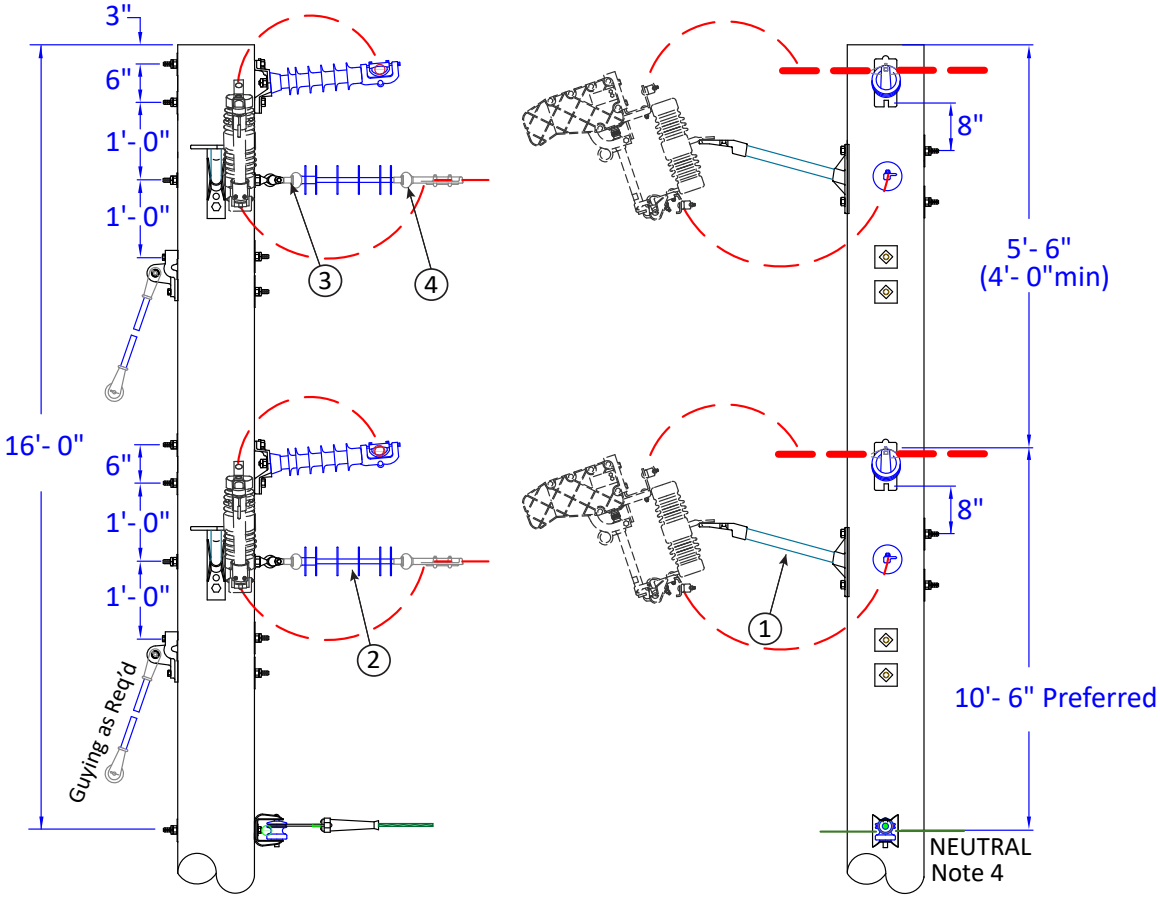
NES

STEEL POLE
VERTICAL CONSTRUCTION
LINE EXTENSION

FRM. CODE	O2FV-BK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	BRKT INS/CO/ARR 18 IN FIBERGLASS	180745000
2	2	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
3	2	CLEVIS Y-BALL	181208000
4	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
6	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
8	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
8	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
6	5/8" DBL COIL SPRING WASHER	206570000
2	NUT OVAL EYE 5/8"	206400000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

ALL POLE TYPES
O2FV-BK



NOTES

1. Framing used on all pole types.
2. LBU shown is not included in CU.
3. Conductor size range #6 CU to 1/0 ACSR.
4. See the Framing Spacing section for alternate neutral spacing.
5. Guying for permitted loading to be specified per Engineer.
6. **Click here** to go to Framing Angle Chart, Page 20.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TWO PHASE FRAMING STANDARDS

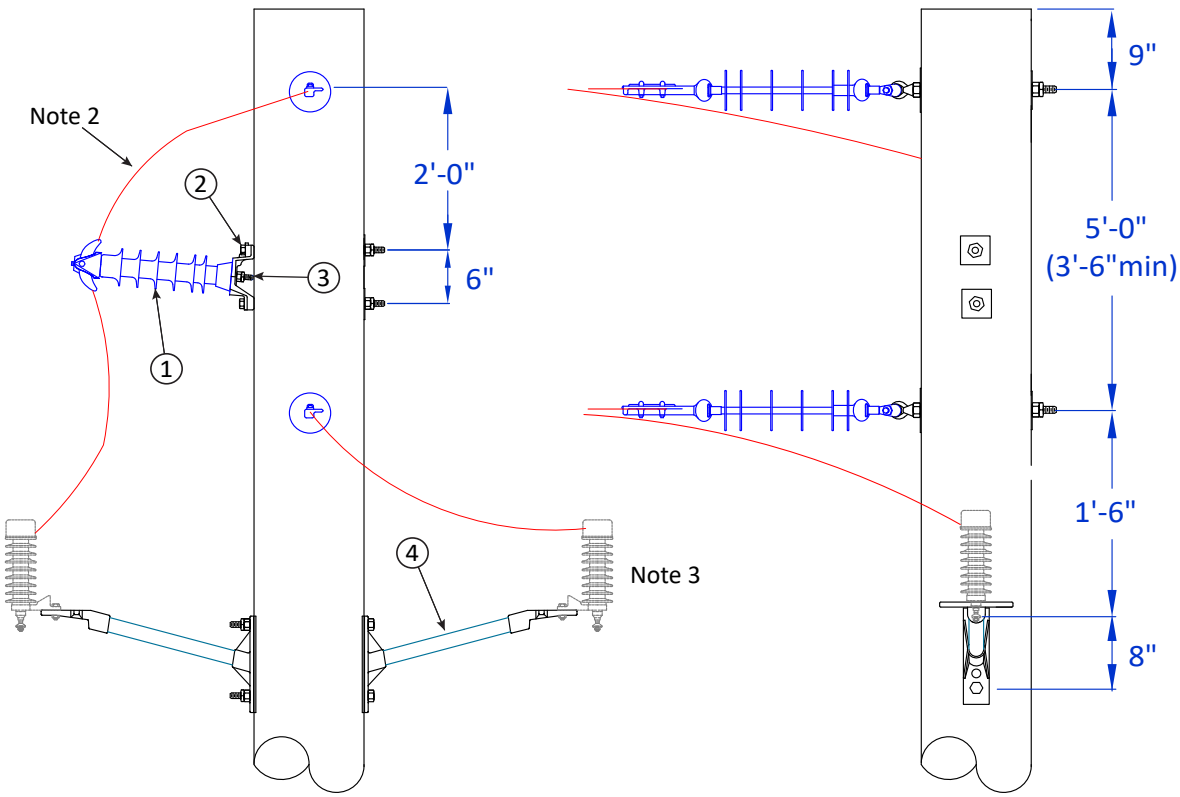
NES

STEEL POLE
VERTICAL CONSTRUCTION
FIBERGLSS BRACKETS WITH BUCK LINE

FRM. CODE	O2SV-ET	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	INSUL LP VER CLP/TP 35 KV	240974000
2	1	BRKT INSUL/HOR LP SHORT	180746000
3	1	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000
4	2	BRKT INS/CO/ARR 18 IN FIBERGLASS	180745000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
4	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
2	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
4	5/8” DBL COIL SPRING WASHER	206570000
1	CLAMP TOP AL 4-4/0	221870000

STEEL POLES
O2SV-ET



NOTES

1. Wire size should be limited to 1/0 ACSR
2. Min. stinger wire size #4 Cu BSD
3. Arrestors and/or cutouts are called for separately as req’d.
4. Consider wildlife protection based on environment.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

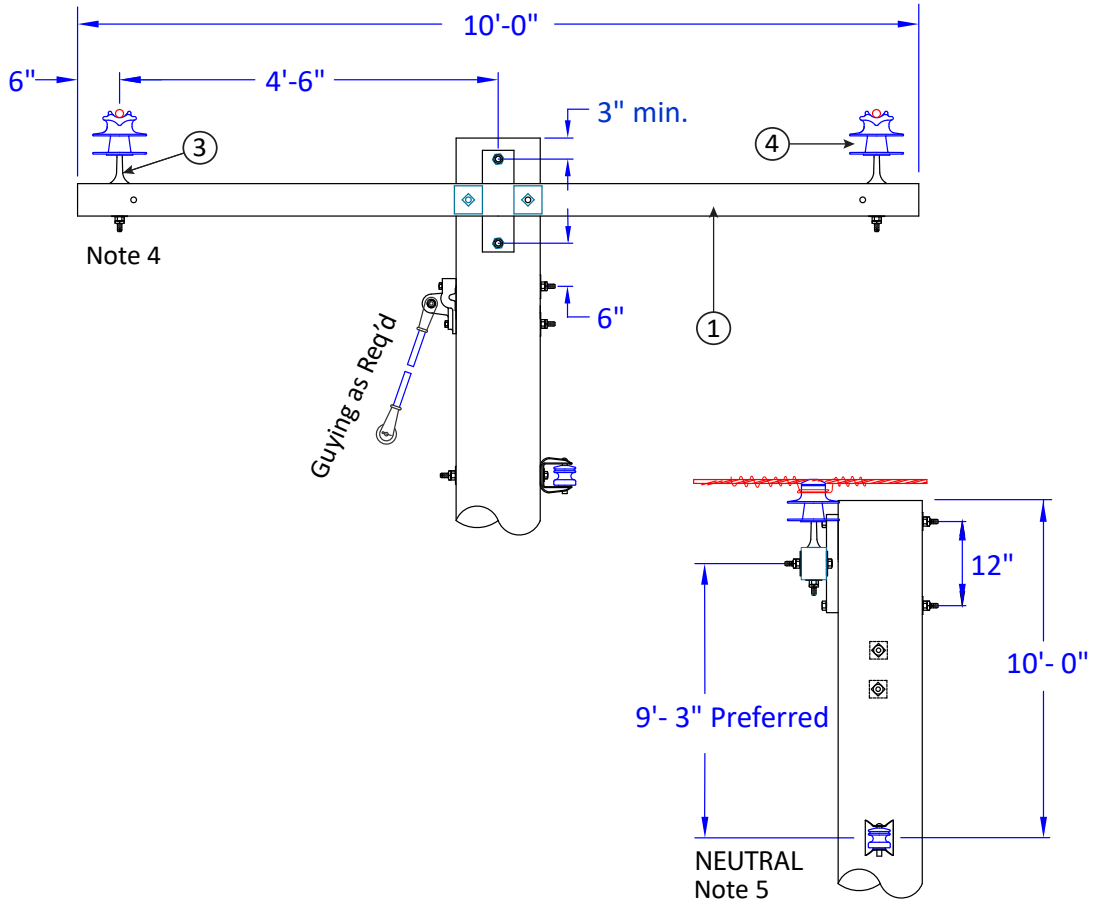
NES

STEEL POLE VERTICAL CONSTRUCTION EQUIPMENT TAP

FRM. CODE	O2FS-HL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	X-ARM 3-5/8” X 4-5/8” X 10’ FIBERGLASS	040400000
2	2	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
3	2	PIN TOP INSUL. POLY 25KV	242190000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
3	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
4	WASHER SQ FLAT 4", 13/16" HOLE	209640000
3	5/8” DBL COIL SPRING WASHER	206570000
2	3/4" DBL COIL SPRING WASHER	206580000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

STEEL POLES
O2FS-HL
0˚ - 10˚



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 20.
3. Guying for permitted loading to be specified per Engineer.
4. Install two 4x4 Washers per Insulator Xarm Pin.
5. See the Framing Spacing section for alternate neutral spacing.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

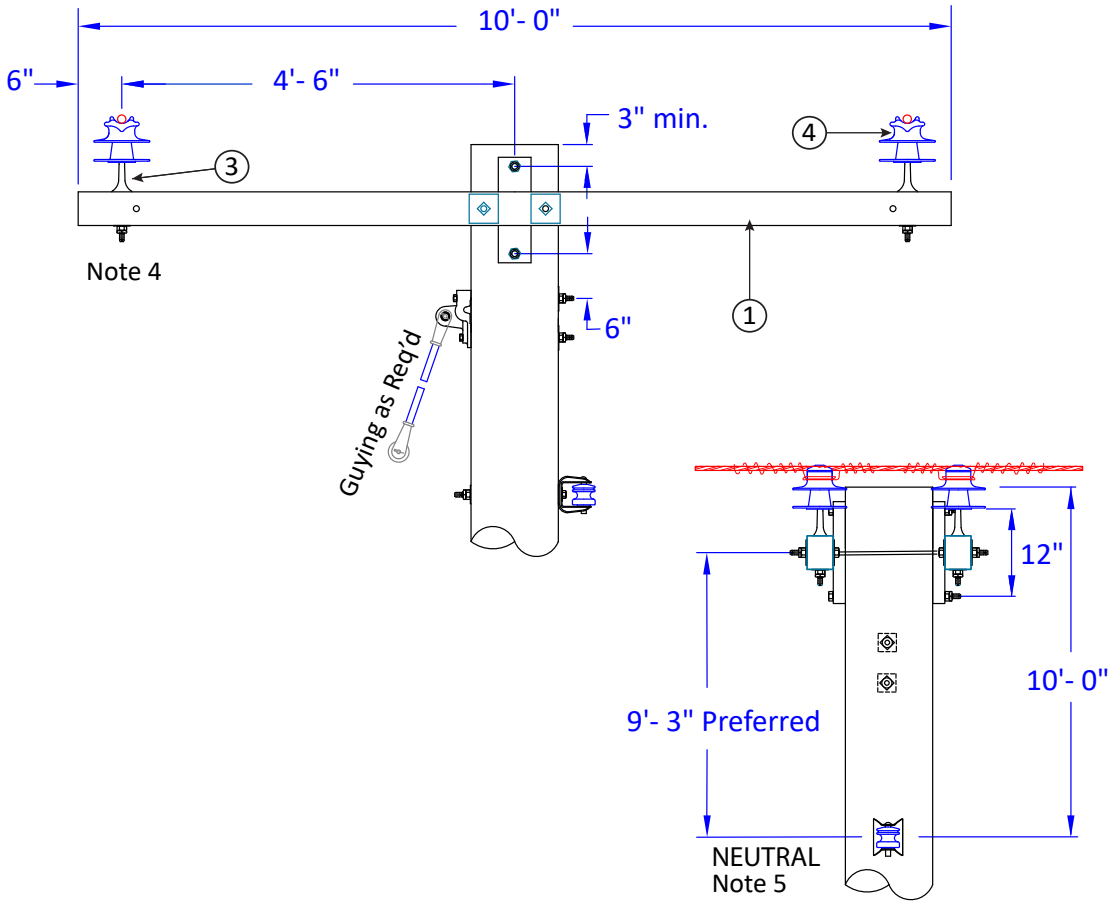
NES

STEEL POLE
SINGLE CROSSARM CONSTRUCTION
HORIZONTAL LINE

FRM. CODE	O2FD-HL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 3-5/8" X 4-5/8" X 10' FIBERGLASS	040400000
2	4	PIN STEEL 1 W/ 3/4" X 6-1/2" SHANK	183170000
3	4	PIN TOP INSUL. POLY 25KV	242190000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	BOLT DA 5/8" X REQUIRED LENGTH	201_____
3	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
11	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
8	WASHER SQ FLAT 4", 13/16" HOLE	209640000
7	5/8" DBL COIL SPRING WASHER	206570000
4	3/4" DBL COIL SPRING WASHER	206580000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

STEEL POLES
O2FD-HL
0˚ - 37˚



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 20.
3. Guying for permitted loading to be specified per Engineer.
4. Install two 4x4 Washers per Insulator Xarm Pin.
5. See the Framing Spacing section for alternate neutral spacing.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

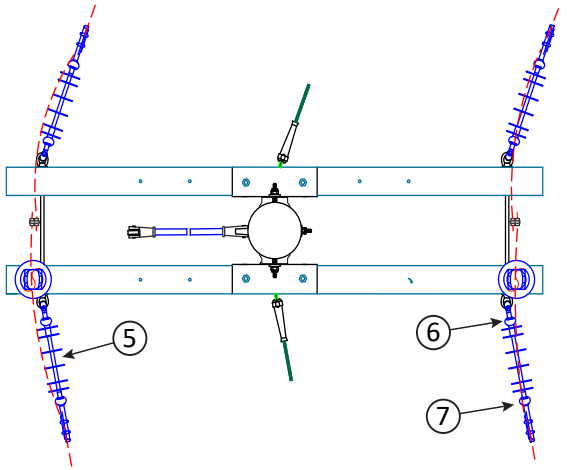
NES

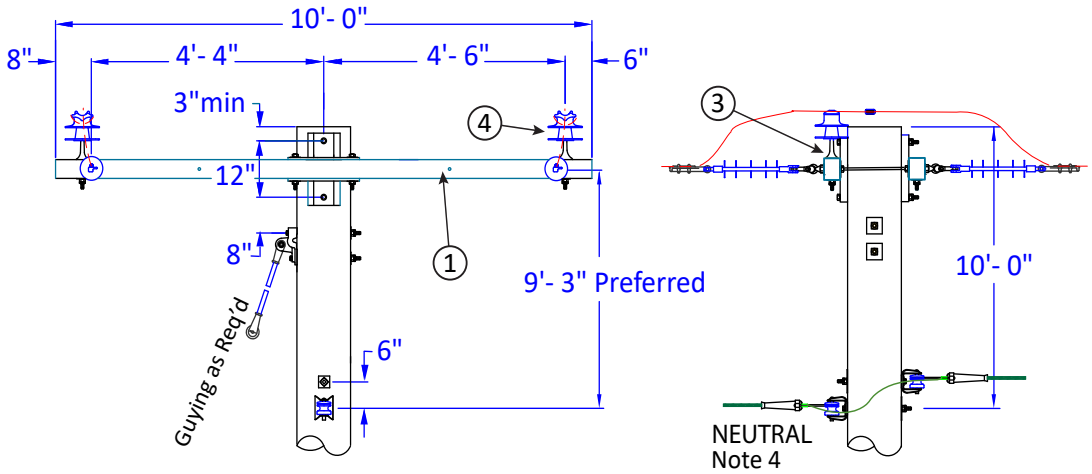
STEEL POLE
DOUBLE CROSSARM CONSTRUCTION
HORIZONTAL LINE

FRM. CODE	O2FD-DD	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 4” X 6” X 10’ FIBERGLASS	040410000
2	2	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
3	2	PIN TOP INSUL. POLY 25KV	242190000
4	4	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
5	4	CLEVIS Y-BALL	181208000
6	4	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	BOLT DA 5/8” X REQUIRED LENGTH	201_____
4	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
4	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
4	NUT OVAL EYE 5/8”	206400000
8	5/8” DBL COIL SPRING WASHER	206570000
2	3/4" DBL COIL SPRING WASHER	206580000
4	CLAMP STRAIN 6-2/0 ACSR	221000000
2	RACK SECONDARY 1W/LARGE	184003000
2	INSUL RACK SPOOL - LARGE	242480000
2	FLEX BAIL STRANDVISE #2 ACSR	230600000

STEEL POLES
O2FD-DD
0˚ - 58˚





NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 20.
3. Guying for permitted loading to be specified per Engineer.
4. See the Framing Spacing section for alternate neutral spacing.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

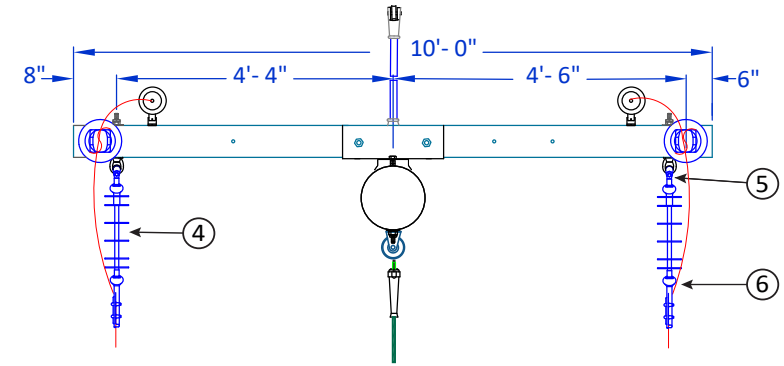
NES

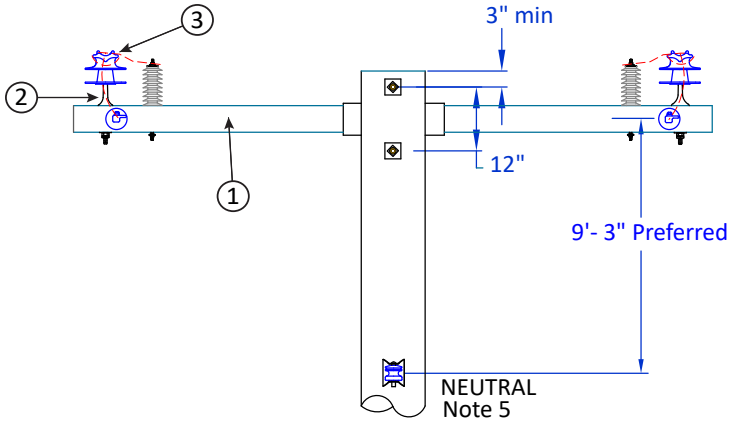
STEEL POLE
DOUBLE CROSSARM CONSTRUCTION
DOUBLE DEAD-END

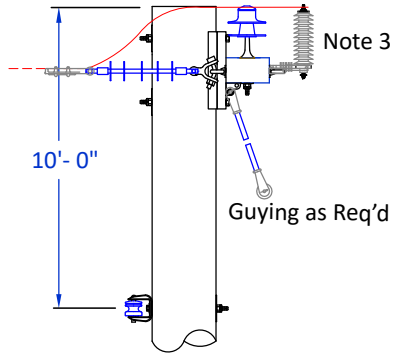
FRM. CODE	O2FS-DE	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	X-ARM 4” X 6” X 10’ FIBERGLASS	040410000
2	2	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
3	2	PIN TOP INSUL. POLY 25KV	242190000
4	2	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
5	2	CLEVIS Y-BALL	181208000
6	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	BOLT MACHINE 3/4” X REQUIRED LENGTH	204_____
1	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
3	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
2	NUT OVAL EYE 5/8”	206400000
3	5/8” DBL COIL SPRING WASHER	206570000
4	3/4" DBL COIL SPRING WASHER	206580000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000

STEEL POLES
O2FS-DE







NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Guying for permitted loading to be specified per Engineer.
3. Arrester with bracket shown are called for separately as req’d.
4. See the Framing Spacing section for alternate neutral spacing.
5. **Click here** to go to Framing Angle Chart, Page 20.
6. Limit (1) 12M guy or (2) 6M guys to fiberglass crossarm brackets.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

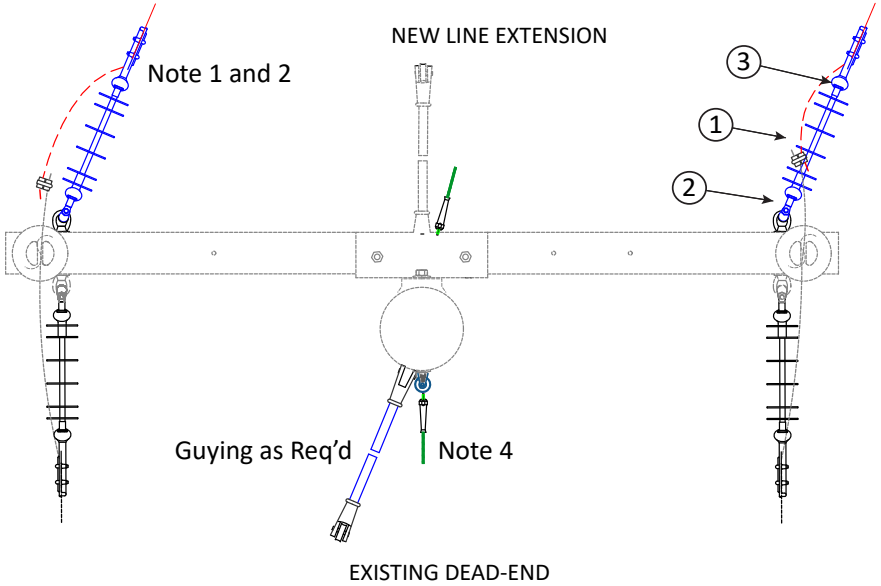
NES

STEEL POLE
SINGLE CROSSARM CONST.
SINGLE DEAD-END

FRM. CODE	O2FX-EX	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	2	CLEVIS Y-BALL	181208000
3	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	NUT OVAL EYE 5/8”	206400000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000
1	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
1	5/8” DBL COIL SPRING WASHER	206570000
1	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000

STEEL POLES
O2FX-EX
0˚ - 58˚



NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads. **Click here** to go to Framing Angle Chart, Page 20.
3. Guying for permitted loading to be specified per Engineer.
4. See the Framing Spacing section for alternate neutral spacing.

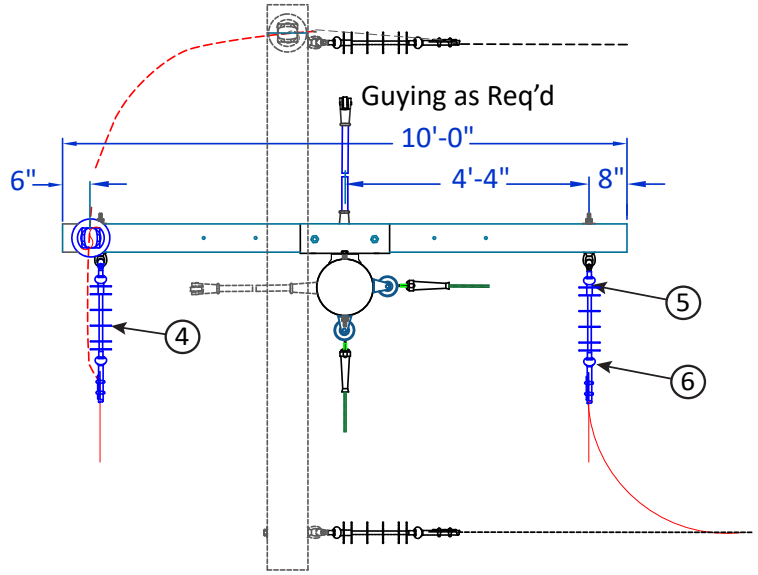
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

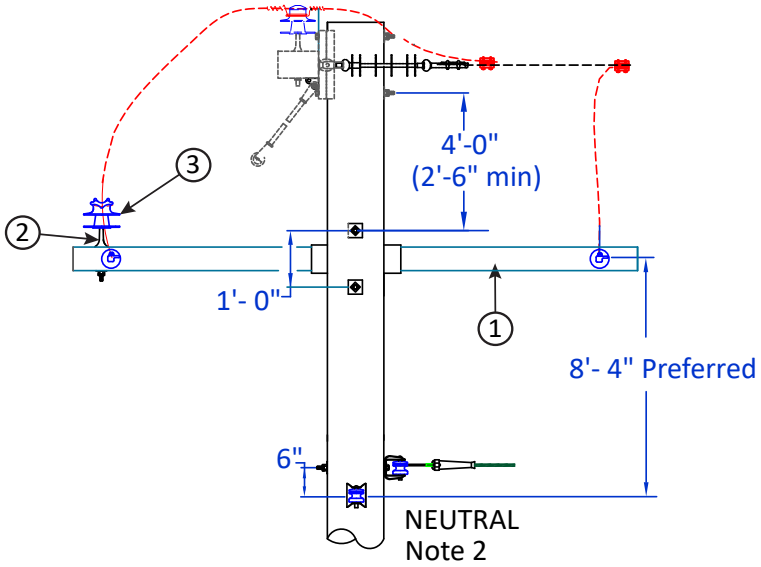
NES

STEEL POLE
SINGLE CROSSARM CONSTRUCTION
LINE EXTENSION

FRM. CODE	O2FS-BK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	X-ARM 4” X 6” X 10’ FIBERGLASS	040410000
2	2	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
3	2	PIN TOP INSUL. POLY 25KV	242190000
4	2	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
5	2	CLEVIS Y-BALL	181208000
6	2	SOCKET EYE	181440000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	BOLT MACHINE 3/4” X REQUIRED LENGTH	204_____
1	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
3	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
2	NUT OVAL EYE 5/8”	206400000
1	5/8” DBL COIL SPRING WASHER	206570000
4	3/4" DBL COIL SPRING WASHER	206580000
2	CLAMP STRAIN 6-2/0 ACSR	221000000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000





STEEL POLES
O2FS-BK

NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. **Click here** to go to Framing Angle Chart, Page 20.
5. Limit (1) 12M guy or (2) 6M guys to fiberglass crossarm brackets.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
SINGLE CROSSARM CONST.
BUCK ARM OR SIDE LINE PULL OFF

THREE PHASE FRAMING STANDARDS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
3/23/26	Cedric Short	Ronald Reasonover	Tony Richman
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
WOOD POLE FRAMING INDEX	4			
STEEL POLE FRAMING INDEX	5-6			
WOOD POLE, VERT/WOOD XARM - FRAMING ANGLE, ALUMINUM CONDUCTOR	7			
WOOD POLE, VERT/WOOD XARM - FRAMING ANGLE, COPPER CONDUCTOR	8			
WOOD POLE, VERTICAL CONSTRUCTION, POLE TOP PIN	9			
WOOD POLE, VERTICAL CONSTRUCTION, VERTICAL LINE	10			
WOOD POLE, VERTICAL CONSTRUCTION, SUSPENSION	11			
WOOD POLE, VERTICAL CONSTRUCTION, DOUBLE DEAD-END	12			
WOOD POLE, VERTICAL CONSTRUCTION, DEAD-END	13			
WOOD POLE, VERTICAL CONSTRUCTION, LINE EXTENSION	14			
WOOD POLE, VERTICAL CONSTRUCTION, BUCK OR SIDE LINE TAP	15			
WOOD POLE, VERTICAL CONSTRUCTION, EQUIPMENT TAP	16			
WOOD POLE, SINGLE XARM CONST, POLE TOP PIN	17			
WOOD POLE, SINGLE XARM CONST, HORIZONTAL LINE PIN	18			
WOOD POLE, DOUBLE XARM CONST, HORIZONTAL LINE PIN	19			
WOOD POLE, DOUBLE XARM CONST, HORIZONTAL LINE POST	20			
WOOD POLE, DOUBLE XARM CONST, DOUBLE DEAD-END	21			
WOOD POLE, DOUBLE XARM CONST, DOUBLE DEAD-END, HEAVY DUTY	22			
WOOD POLE, DOUBLE XARM CONST, DEAD-END	23			

THREE PHASE FRAMING STANDARDS

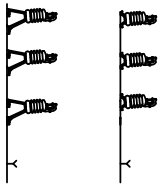
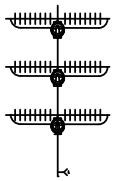
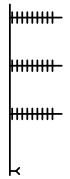
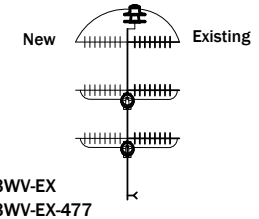
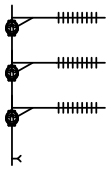
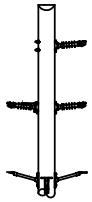
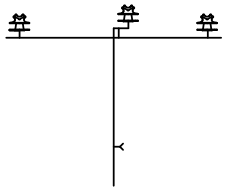
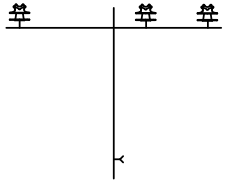
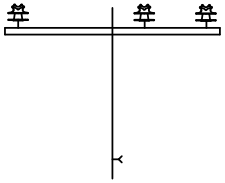
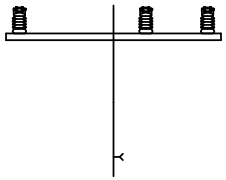
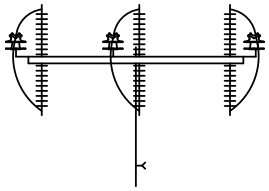
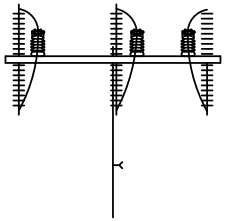
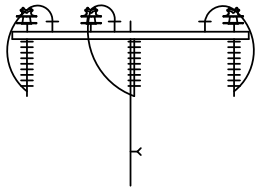
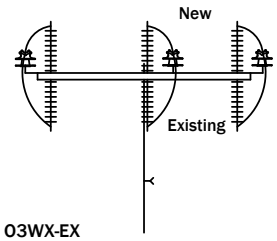
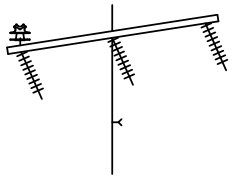
TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
WOOD POLE, DOUBLE XARM CONST, LINE EXTENSION	24			
WOOD POLE, XARM CONST, BUCK ARM	25			
STEEL POLE, VERT/FG XARM - FRAMING ANGLE, ALUMINUM CONDUCTOR	26			
STEEL & WOOD POLE, STEEL XARM - FRAMING ANGLE, ALUMINUM CONDUCTOR	27			
STEEL POLE, VERT/FG XARM - FRAMING ANGLE, COPPER CONDUCTOR	28			
STEEL & WOOD POLE, STEEL XARM - FRAMING ANGLE, COPPER CONDUCTOR	29			
STEEL POLE, VERT. CONSTRUCTION, POLE TOP POST	30			
STEEL POLE, VERTICAL CONST, VERTICAL LINE	31			
STEEL POLE, VERTICAL CONST, SUSPENSION	32			
STEEL POLE, VERTICAL CONST, DOUBLE DEAD-END	33			
STEEL POLE, VERTICAL CONST, DEAD-END	34			
STEEL POLE, VERTICAL CONST, LINE EXTENSION	35			
STEEL POLE, VERTICAL CONST, BUCK OR SIDE LINE TAP	36			
STEEL POLE, VERTICAL CONSTRUCTION, EQUIPMENT TAP	37			
STEEL POLE, SINGLE FIBERGLASS XARM CONST, POLE TOP PIN	38			
STEEL POLE, SINGLE FIBERGLASS XARM CONST, HORIZONTAL LINE	39			
STEEL POLE, DOUBLE FIBERGLASS XARM CONST, HORIZONTAL LINE	40			
STEEL POLE, DOUBLE FIBERGLASS XARM CONST, DOUBLE DEAD-END	41			
STEEL POLE, SINGLE FIBERGLASS XARM CONST, DEAD-END	42			
STEEL POLE, SINGLE FIBERGLASS XARM CONST, LINE EXTENSION	43			
STEEL POLE, FIBERGLASS XARM CONST, BUCK ARM	44			
STEEL POLE, STEEL ALLEY ARM CONST, HORIZONTAL LINE	45			
STEEL POLE, STEEL ALLEY ARM CONST,DOUBLE DEAD-END	46			

THREE PHASE FRAMING STANDARDS

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
STEEL POLE, STEEL ALLEY ARM CONST, SLACK BUCK	47			
STEEL POLE, SINGLE STEEL XARM CONST, POLE TOP POST	48			
STEEL POLE, SINGLE STEEL XARM CONST, HORIZONTAL LINE	49			
STEEL POLE, DOUBLE STEEL XARM CONST, HORIZONTAL LINE	50			
STEEL POLE, SINGLE STEEL XARM CONST, DOUBLE DEAD-END	51			
STEEL POLE, SINGLE STEEL XARM CONST, OFFSET DOUBLE DEAD-END	52			
STEEL POLE, DOUBLE STEEL XARM CONST, DOUBLE DEAD-END	53			
STEEL POLE, SINGLE STEEL XARM CONST, DEAD-END	54			
STEEL POLE, DOUBLE STEEL XARM CONST, DEAD-END	55			
STEEL POLE, STEEL XARM CONST, LINE EXTENSION	56			
STEEL POLE, SINGLE STEEL XARM CONST, BUCK ARM	57			
STEEL POLE, DOUBLE STEEL XARM CONST, BUCK ARM	58			

<table>
<tr>
<td>
03WV-PT
03WV-PT-477 Page 9</td>
<td> 
03WV-VL
03WV-VL-477
03WV-VL-795
03WV-VL1351 Page 10</td>
<td>
03WV-SU
03WV-SU-795
03WV-SU1351 Page 11</td>
<td> 
03WV-DD
03WV-DD-477
03WV-DD-795
03WV-DD1351 Page 12</td>
<td> 
03WV-DE
03WV-DE-477
03WV-DE-795
03WV-DE1351 Page 13</td>
</tr>
<tr>
<td> 
03WV-EX
03WV-EX-477
03WV-EX-795
03WV-EX-1351 Page 14</td>
<td> 
03FV-BK
03FV-BK-477 Page 15</td>
<td> 
Equipment tap for
vertically framed poles
03WV-ET Page 16</td>
<td> 
03WS-PT Page 17</td>
<td> 
03WS-HL Page 18</td>
</tr>
<tr>
<td> 
03WD-HL Page 19</td>
<td> 
03WD-HL-795
03WD-HL1351 Page 20</td>
<td> 
03WD-DD
03WD-DD-477 Page 21</td>
<td> 
03WD-DD-795
03WD-DD1351 Page 22</td>
<td> 
03WD-DE
03WD-DE-477 Page 23</td>
</tr>
<tr>
<td> 
03WX-EX
03WX-EX-477 Page 24</td>
<td> 
03WD-BK
03WD-BK-477 Page 25</td>
<td></td>
<td></td>
<td></td>
</tr>
</table>

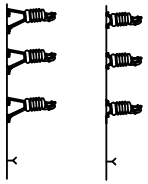
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

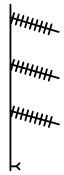
WOOD POLE FRAMING INDEX

THREE PHASE FRAMING STANDARDS

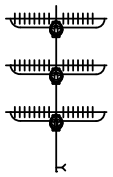
03SV-PT
03SV-PT-477
Page 30



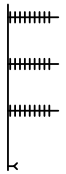
03SV-VL
03SV-VL-477
03SV-VL-795
03SV-VL1351
Page 31



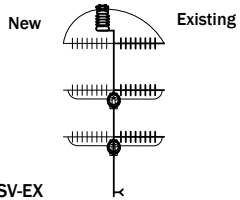
03SV-SU
03SV-SU-795
03SV-SU1351
Page 32



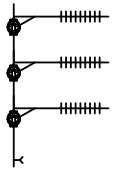
03SV-DD
03SV-DD-477
03SV-DD-795
03SV-DD1351
Page 33



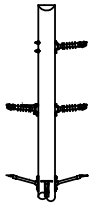
03SV-DE
03SV-DE-477
03SV-DE-795
03SV-DE1351
Page 34



03SV-EX
03SV-EX-477
03SV-EX-795
03SV-EX1351
Page 35

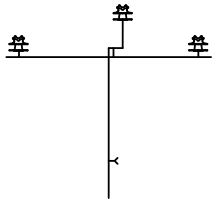


03FV-BK
03FV-BK-477
Page 36

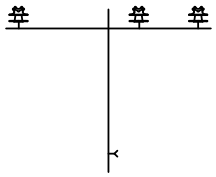


Equipment tap for
vertically framed poles

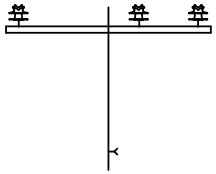
03SV-ET
Page 37



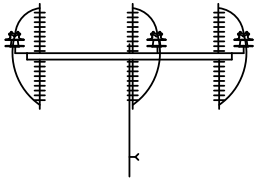
03FS-PT
Page 38



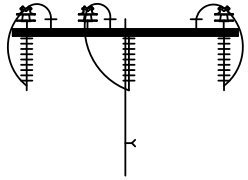
03FS-HL
Page 39



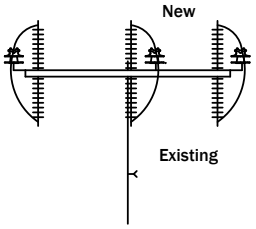
03FD-HL
Page 40



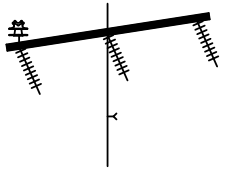
03FD-DD
03FD-DD-40
Page 41



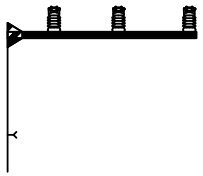
03FS-DE
03FS-DE-40
Page 42



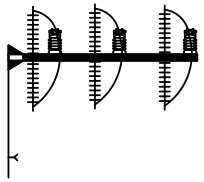
03FX-EX
03FX-EX-40
Page 43



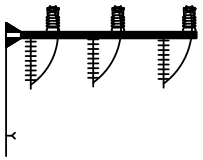
03FS-BK
03FS-BK-40
Page 44



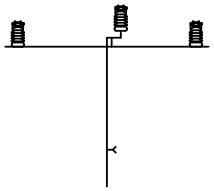
03SA-HL
03SA-HL-477
03SA-HL-795
Page 45



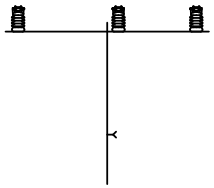
03SA-DD
03SA-DD-477
03SA-DD-795
03SA-DD1351
Page 46



03SA-SB
03SA-SB-477
03SA-SB-795
Page 47



03SS-PT-477
03SS-PT-795
Page 48



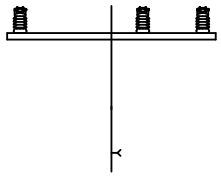
03SS-HL-477
03SS-HL-795
Page 49

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

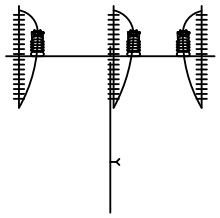
NES

STEEL POLE FRAMING INDEX

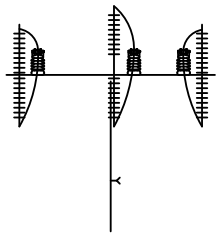
THREE PHASE FRAMING STANDARDS



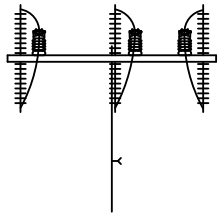
03SD-HL-477
03SD-HL-795 Page 50



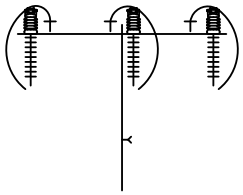
03SS-DD-477
03SS-DD-795 Page 51



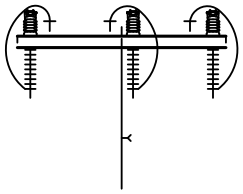
03SS-0DD477
03SS-0DD795 Page 52



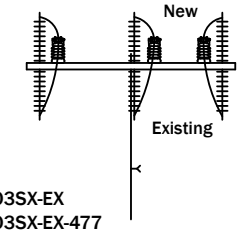
03SD-DD-477
03SD-DD-795
03SD-DD1351 Page 53



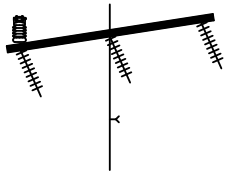
03SS-DE-477
03SS-DE-795 Page 54



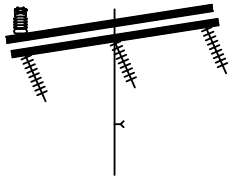
03SD-DE1351 Page 55



03SX-EX
03SX-EX-477
03SX-EX-795
03SX-EX1351 Page 56



03SS-BK-477
03SS-BK-795 Page 57



03SD-BK1351 Page 58

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

THREE PHASE FRAMING STANDARDS

NES

STEEL POLE
FRAMING INDEX

3-PHASE FRAMING - MAXIMUM ANGLES

350 FOOT WIND SPAN			MAXIMUM ANGLES PER NESC RULE 250- MEDIUM LOADING, EXTREME ICE, OR EXTREME WIND 90 MPH											
CONSTRUCTION TYPE			ANGLE RANGE (DEGREES)											
			VERTICAL FRAMING - WOOD POLE						HORIZONTAL CONSTRUCTION - WOOD POLE[2]					
CONDUCTOR	DESIGN TENSION (LBS.)	NESC RULE	POLE TOP (PT)	VERT. LINE (VL)	SUSPENSION (SU)	DOUBLE DEAD-END (DD) or EXTENSION (EX)	DEAD END (DE)	BUCK (BK)	POLE TOP (PT)	HORIZ. LINE (HL)	DBL HORIZ. LINE (D-HL)	DOUBLE DEAD-END (DD) or EXTENSION (EX)	DEAD END (DE)	BUCK (BK)
2 ACSR	835	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-37	0-58	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-32	0-39	0	0
1/0 ACSR	985	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-31	0-48	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-26	0-32	0	0
4/0 ACSR	1550	Grade "C"	0-8	0-30	30-60	0-60	0	0	0-8	0-8	0-20	0-31	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-15	0-20	0	0
336 ACSR	1980	Grade "C"	0-5	0-30	30-60	0-60	0	0	0-5	0-5	0-16	0-25	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-11	0-15	0	0
477 ACSR	2200	Grade "C"	0-4	0-30	30-60	0-60	0	0	0-4	0-4	0-13	0-22	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-9	0-13	0	0
795 ACSR	3000	Grade "C"	NA[1]	0-22	22-60	0-60	0	0	NA[1]	NA[1]	0-19	0-22[3]	0	0
		Grade "B"	NA[1]	0-22	22-60	0-60	0	0	NA[1]	NA[1]	0-13	0-12[3]	0	0
1351 AAC	4500	Grade "C"	NA[1]	0-14	14-60	0-60	0	0	NA[1]	NA[1]	0-10[3]	0-14[3]	0	0
		Grade "B"	NA[1]	0-14	14-60	0-60	0	0	NA[1]	NA[1]	0-7[3]	0-7[3]	0	0

NOTES

1. Single Tie-top Pin Insulators not to be used with NESC Grade "B" Construction.
2. Angle Listed for Three Phase Xarm Construction using 10-Ft Xarms.
3. Requires 5"x6"x10-Ft Heavy Duty Wood Xarms - 795 ACSR or 1351 AAC.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
VERT/WOOD XARM - FRAMING ANGLE
ALUMINUM CONDUCTOR

3-PHASE FRAMING - MAXIMUM ANGLES

350 FOOT WIND SPAN			MAXIMUM ANGLES PER NESC RULE 250- MEDIUM LOADING, EXTREME ICE, OR EXTREME WIND 90 MPH											
CONSTRUCTION TYPE			ANGLE RANGE (DEGREES)											
			VERTICAL FRAMING - WOOD POLE						HORIZONTAL CONSTRUCTION - WOOD POLE[2]					
CONDUCTOR	DESIGN TENSION (LBS.)	NESC RULE	POLE TOP (PT)	VERT. LINE (VL)	SUSPENSION (SU)	DOUBLE DEAD-END (DD) / EXTENSION (EX)	DEAD-END (DE)	BUCK (BK)	POLE TOP (PT)	HORIZ. LINE (HL)	DOUBLE HORIZONTAL LINE (D-HL)	DOUBLE DEAD-END (DD) / EXTENSION (EX)	DEAD-END (DE)	BUCK (BK)
6 BHD	550	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-45	0-60	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-45	0-60	0	0
4 BHD	700	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-45	0-60	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-40	0-48	0	0
2 BHD	950	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-33	0-52	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-28	0-35	0	0
1/0 BHD	1315	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-25	0-38	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-19	0-24	0	0
4/0 BHD	2700	Grade "C"	0-4	0-30	30-60	0-60	0	0	0-4	0-4	0-12	0-20	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-9	0-11	0	0
300 BHD	3000	Grade "C"	0-4	0-22	22-60	0-60	0	0	0-4	0-4	0-11	0-18	0	0
		Grade "B"	NA[1]	0-22	22-60	0-60	0	0	NA[1]	NA[1]	0-7	0-10	0	0

NOTES

1. Single Tie-top Pin Insulators not to be used with NESC Grade "B" Construction.
2. Angle Listed for Three Phase Xarm Construction using 10-Ft Xarms.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
VERT/WOOD XARM - FRAMING ANGLE
COPPER CONDUCTOR

FRM. CODE	O3WV-PT	O3WV-PT-477	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	PIN, POLE TOP 1” X 21” OFFSET	183100000
2	1	1	PIN TOP INSUL. POLY 25KV	242190000
3	2	2	INSUL LP HOR CLP/TP 35KV	240976000
4	2	2	BRKT INSUL/HOR LP SHORT	180746000
5	2	2	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000
6	2	-	CLAMP TOP AL 4-4/0	221870000
	-	2	CLAMP TOP 4/0-477	204780000

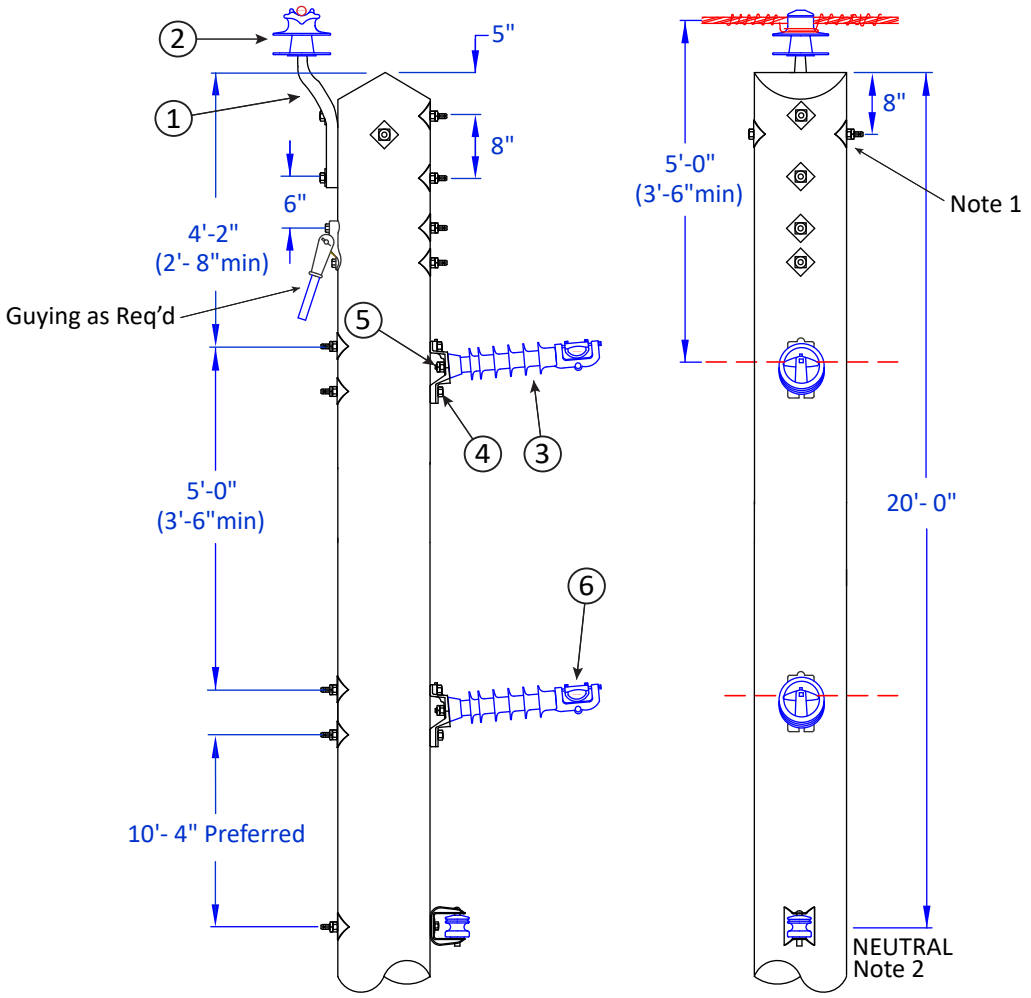
	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
8	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
9	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
8	5/8” DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000

WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3WV-PT	6-1/0
O3WV-PT-477	4/0-477

NOTES

1. Split bolts are required on all wood poles with pole top insulator brackets.
2. See the Framing Spacing section for alternate neutral spacing.
3. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.
4. Guying for permitted loading to be specified per Engineer.

WOOD POLES
O3WV-PT



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
VERTICAL CONSTRUCTION
POLE TOP PIN

WOOD POLES
O3WV-VL

MAJOR AND MINOR MATERIAL ITEM LIST

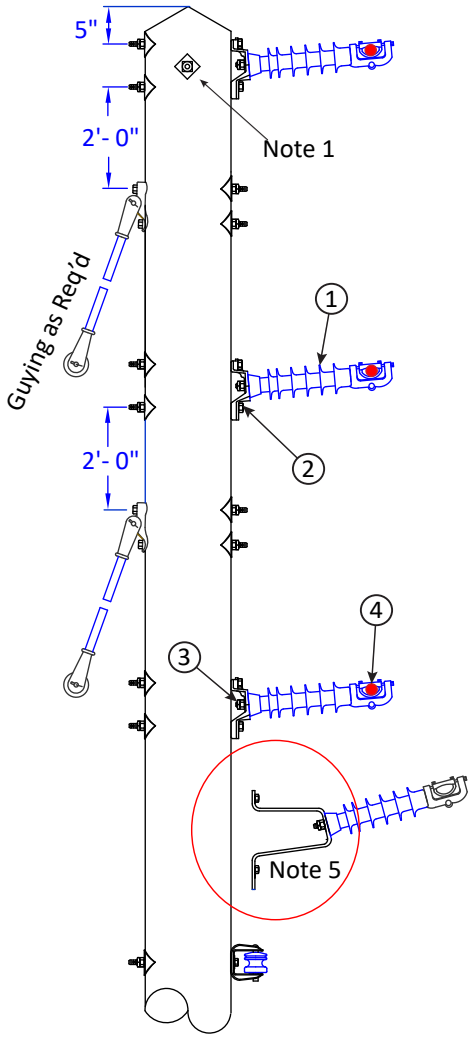
FRM. CODE	O3WV-VL	O3WV-VL-477	O3WV-VL-795	O3WV-VL-1351		
ITEM #	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	3	3	3	3	INSUL LP HOR CLP/TP 35KV	240976000
2	3	3	3	-	BRKT/INSUL/HOR LP SHORT	180746000
	-	-	-	3	BRKT/INSUL/HOR LP LONG	180748000
3	3	3	3	3	BOLT STUD 3/4" X 3" SHORT/LP INSUL	204780000
4	-	-	3	3	CLAMP TOP AL 4-4/0	221870000
	3	-	-	-	CLAMP TOP AL 4/0-477	221890000
	-	3	-	-	CLAMP TOP AL 795MCM	221900000

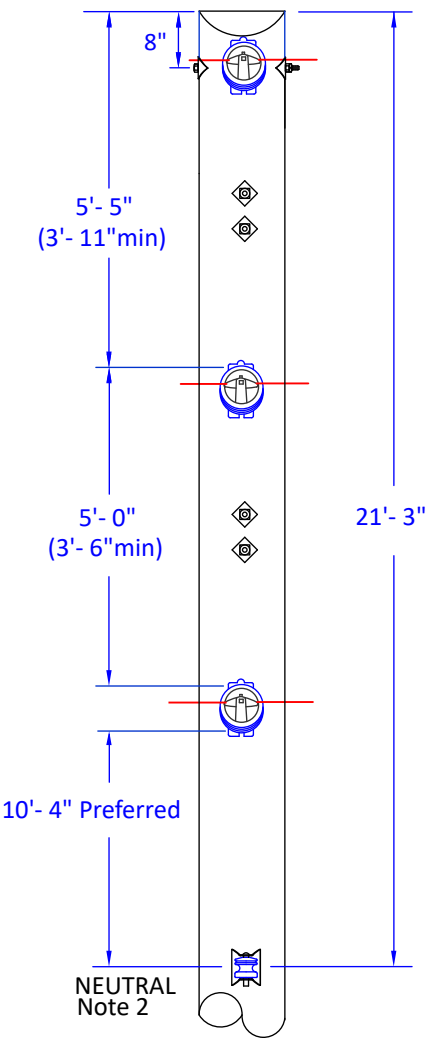
TRUCK STOCK ITEMS

QTY	DESCRIPTION	STOCK #
8	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
9	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
8	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000

WIRE SIZE TABLE

FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3WV-VL	6-4/0	O3WV-VL-795	795
O3WV-VL-477	4/0-477	O3WV-VL-1351	1351





NOTES

1. Split bolts are required on all wood poles with pole top insulator brackets.
2. See the Framing Spacing section for alternate neutral spacing.
3. Max. Angle shown for 350-ft span Worst-case NESC Loads.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.
5. 10" Insulator brackets (Item 2) are only required with 1351AA.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
VERTICAL CONSTRUCTION
VERTICAL LINE

FRM. CODE	O3WV-SU	O3WV-SU-477	O3WV-SU-795	O3WV-SU-1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	3	3	3	3	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	3	3	3	3	CLEVIS Y-BALL	181208000
3	3	3	3	3	SOCKET EYE	181440000
4	4	-	-	-	CLAMP SUSP 2 - 1/0 AL EZ	221550000
	-	4	1	-	CLAMP SUSP 337-477	221150000
	-	-	3	1	CLAMP SUSP 4/0-795 AL EZ	221610000
	-	-	-	3	CLAMP SUSP 1351 KCM	221625000
5	1	1	1	1	INSUL GUY STRAIN/FIB GLASS 12”	240840000
6	1	1	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

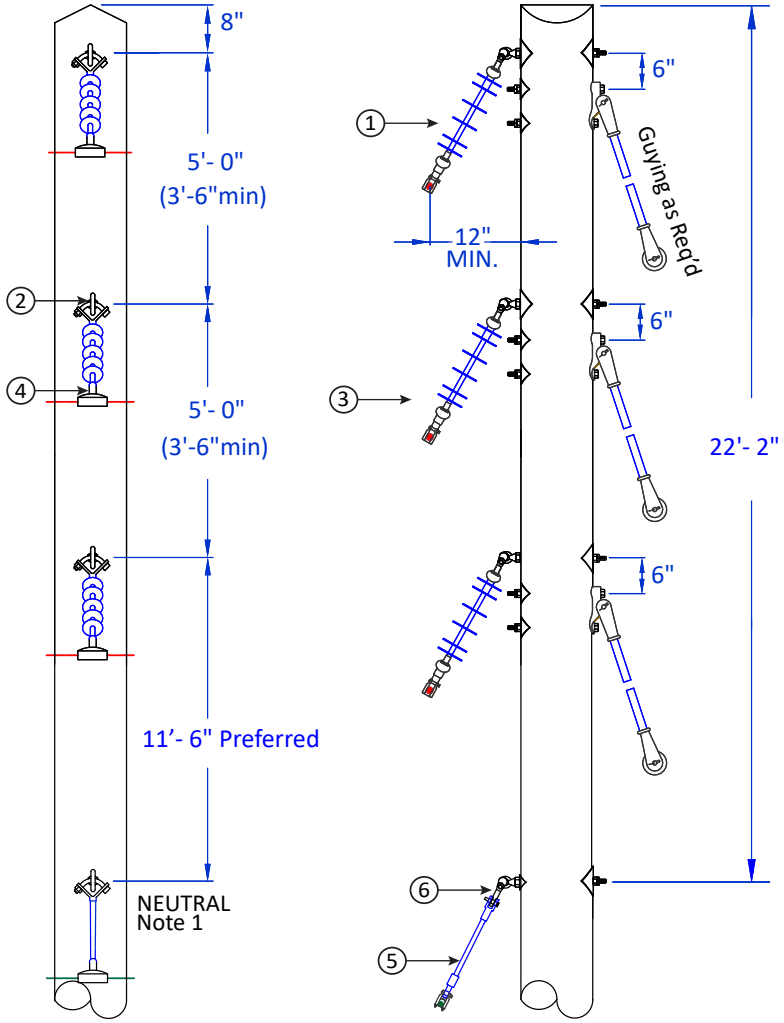
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
4	BOLT DA 3/4” X REQUIRED LENGTH	201_____
8	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
4	NUT OVAL EYE 3/4”	206420000
4	5/8” DBL COIL SPRING WASHER	206570000

WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3WV-SU	6-4/0	O3WV-SU-795	795
O3WV-SU-477	4/0-477	O3WV-SU-1351	1351

NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. Max. Angle shown for 350-ft span Worst-case NESC Loads.
3. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.

WOOD POLES
O3WV-SU



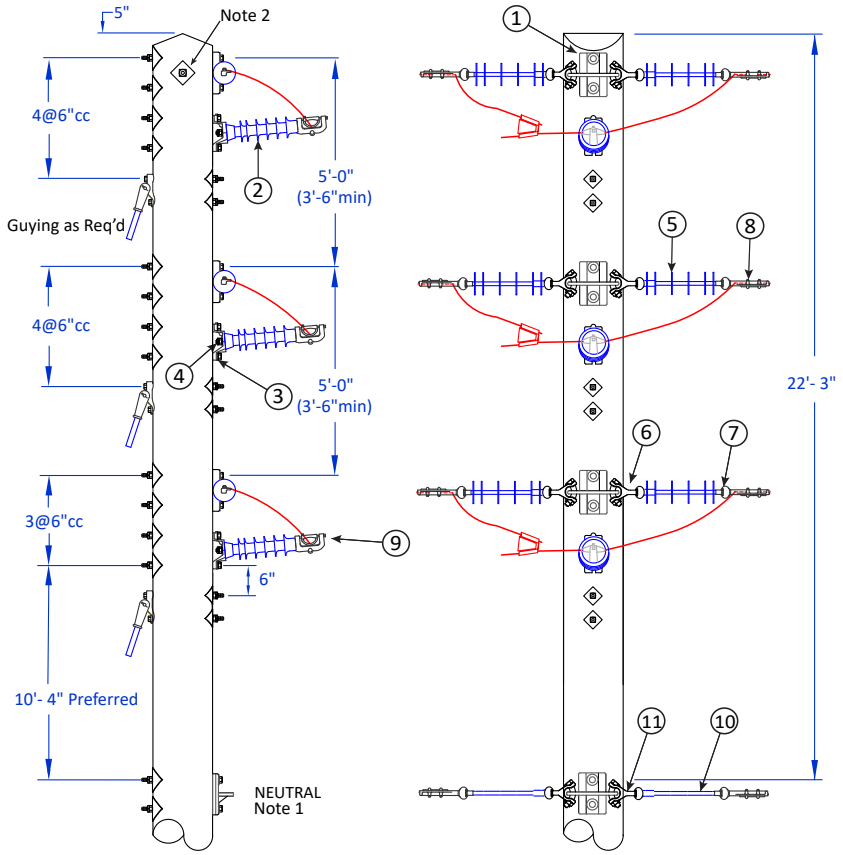
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
VERTICAL CONSTRUCTION
SUSPENSION

FRM. CODE	O3WV-DD	O3WV-DD-477	O3WV-DD-795	O3WV-DD-1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	4	4	4	4	BRACKET, DOUBLE DEAD-END ANGLE	180780000
2	3	3	3	3	INSUL LP HOR CLP/TP 35KV	240976000
3	3	3	3	3	BRKT INSUL/HOR LP SHORT	180746000
4	3	3	3	3	BOLT STUD 3/4"X3" SHORT/LP INSUL	204780000
5	6	6	6	6	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
6	6	6	6	6	CLEVIS Y-BALL	181208000
7	6	6	6	6	SOCKET EYE	181440000
8	8	-	-	-	CLAMP STRAIN 6 - 2/0 ACSR	221000000
	-	8	2	-	CLAMP STRAIN 477MCM-AL	221040000
	-	-	6	2	CLAMP STRAIN 795 AL D END	221080000
	-	-	-	6	CLAMP STRAIN 1351 61 AAC DE	221117000
9	3	-	-	-	CLAMP TOP 4-4/0	221870000
	-	3	-	-	CLAMP TOP 4/0-477	221890000
	-	-	3	3	CLAMP TOP 795MCM	221900000
10	2	2	2	2	INSUL GUY STRAIN/FIB GLASS 12"	240840000
11	2	2	2	2	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
8	BOLT MACHINE 3/4" X REQUIRED LENGTH	204_____
16	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
8	3/4" DBL COIL SPRING WASHER	206420000
7	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
6	5/8" DBL COIL SPRING WASHER	206570000



WOOD POLES
O3WV-DD

WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3WV-DD	6-2/0	O3WV-DD-795	795
O3WV-DD-477	4/0-477	O3WV-DD-1351	1351

NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. Split bolts are required on all wood poles with pole top brackets.
3. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.
4. On double dead-end framing, line openings will be noted on the dwg. w/note to install LA's.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
VERTICAL CONSTRUCTION
DOUBLE DEAD-END

FRM. CODE	O3WV-DE	O3WV-DE-477	O3WV-DE-795	O3WV-DE-1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	3	3	3	3	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	3	3	3	3	CLEVIS Y-BALL	181208000
3	3	3	3	3	SOCKET EYE	181440000
4	4	-	-	-	CLAMP STRAIN 6 - 2/0 ACSR	221000000
	-	4	1	-	CLAMP STRAIN 477MCM-AL	221040000
	-	-	3	1	CLAMP STRAIN 795 AL D END	221080000
	-	-	-	3	CLAMP STRAIN 1351 61 AAC DE	221117000
5	1	1	1	1	INSUL GUY STRAIN/FIB GLASS 12”	240840000
6	1	1	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

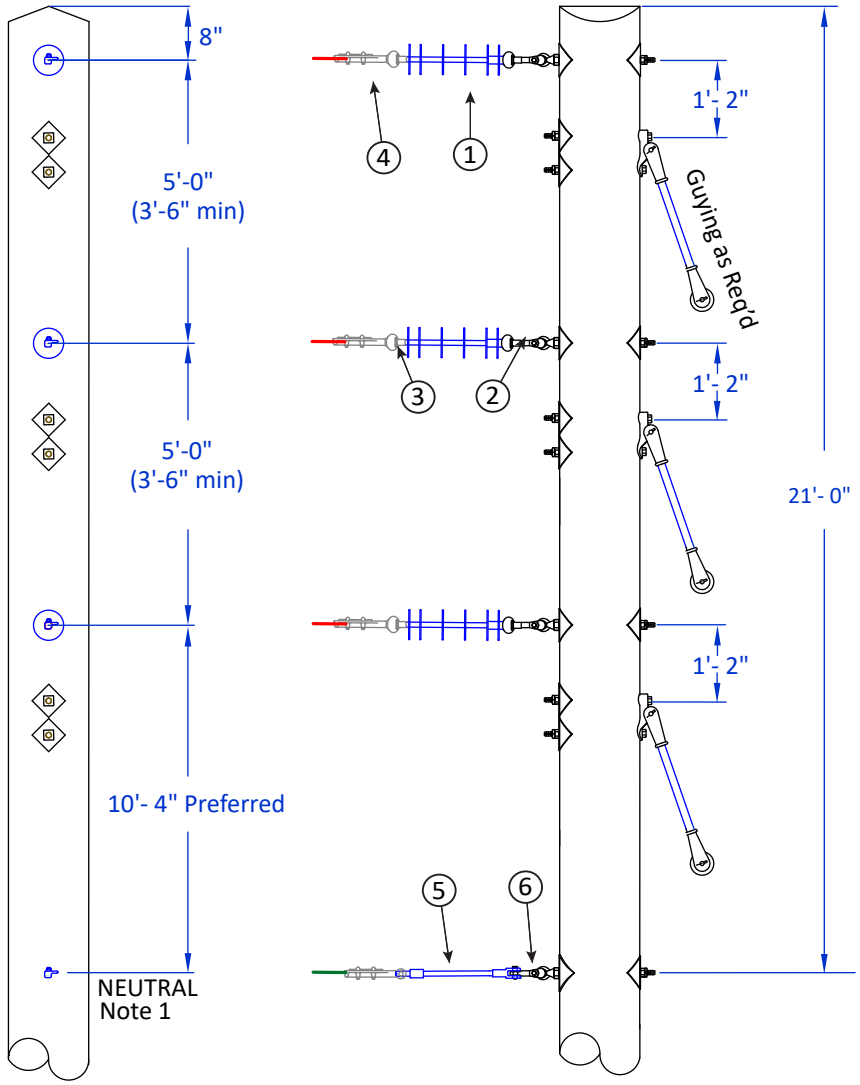
	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
4	BOLT DA 3/4” X REQUIRED LENGTH	201_____
8	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
4	NUT OVAL EYE 5/8”	206400000
4	3/4” DBL COIL SPRING WASHER	206420000

WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3WV-DE	6-2/0	O3WV-DE-795	795
O3WV-DE-477	4/0-477	O3WV-DE-1351	1351

NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. For lightning arrester application see Plate O3WV-ET.
3. Guying for permitted loading to be specified per Engineer.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.

WOOD POLES
O3WV-DE



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
VERTICAL CONSTRUCTION
DEAD-END

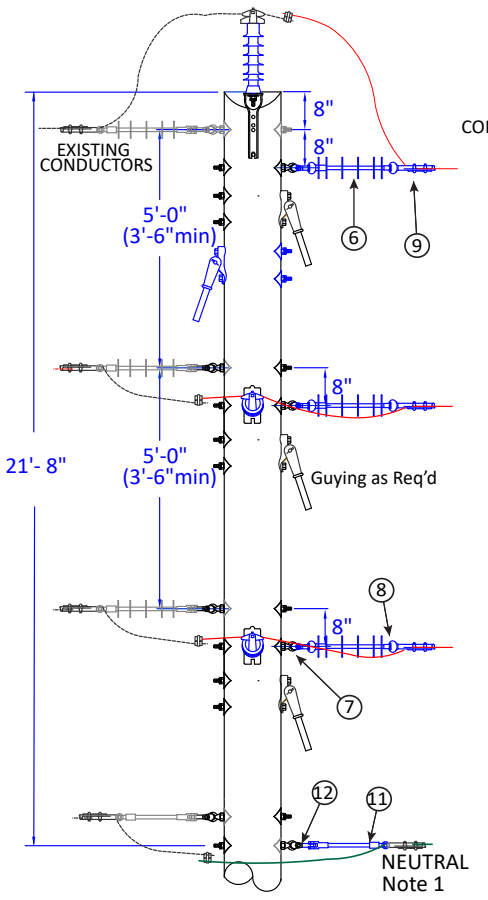
WOOD POLES
O3WV-EX

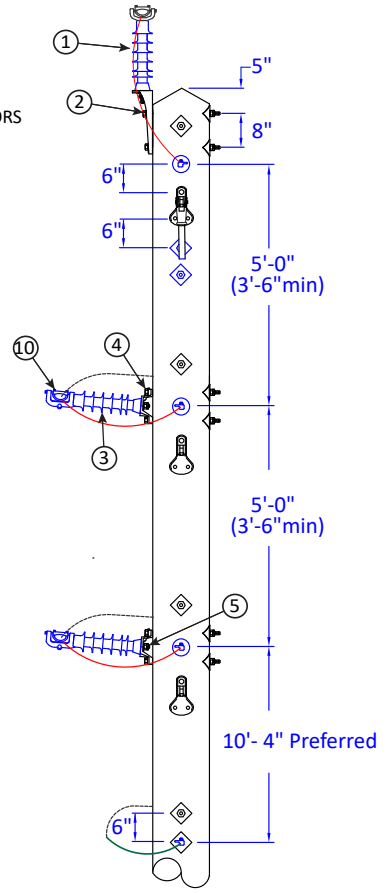
MAJOR AND MINOR MATERIAL ITEM LIST

FRM. CODE	O3WV-EX	O3WV-EX-477	O3WV-EX-795	O3WV-EX-1351		
ITEM #	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	1	1	INSUL LP VER CLP/TP 35KV	240974000
2	1	1	1	1	PIN POLE TOP/POST INSUL	183060000
3	2	2	2	2	INSUL LP HOR CLP/TP 35KV	240976000
4	2	2	2	2	BRKT INSUL/HOR LP SHORT	180746000
5	3	3	3	3	BOLT STUD 3/4"X3" SHORT/LP INSUL	204780000
6	3	3	3	3	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
7	3	3	3	3	CLEVIS Y-BALL	181208000
8	3	3	3	3	SOCKET EYE	181440000
9	4	-	-	-	CLAMP STRAIN 6 - 2/0 ACSR	221000000
	-	4	1	-	CLAMP STRAIN 477MCM-AL	221040000
	-	-	3	1	CLAMP STRAIN 795 AL D END	221080000
	-	-	-	3	CLAMP STRAIN 1351 61 AAC DE	221117000
10	3	-	-	-	CLAMP TOP 4-4/0	221870000
	-	3	-	-	CLAMP TOP 4/0-477	221890000
	-	-	3	3	CLAMP TOP 795MCM	221900000
11	1	1	1	1	INSUL GUY STRAIN/FIB GLASS 12"	240840000
12	1	1	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS

QTY	DESCRIPTION	STOCK #
4	BOLT DA 3/4" X REQUIRED LENGTH	201_____
4	NUT OVAL EYE 3/4"	206420000
4	3/4" DBL COIL SPRING WASHER	206420000
6	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
6	5/8" DBL COIL SPRING WASHER	206570000
20	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000





NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.
3. Guying for permitted loading to be specified per Engineer.

WIRE SIZE TABLE

FRAMING CODE	WIRE SIZE
O3WV-DE	6-2/0
O3WV-DE-477	4/0-477
O3WV-DE-795	795
O3WV-DE-1351	1351

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE VERTICAL CONSTRUCTION LINE EXTENSION

FRM. CODE	O3FV-BK	O3FV-BK-477	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	DESCRIPTION	STOCK #
1	3	3	BRKT INS/CO/ARR 18 IN FIBERGLASS	180745000
2	3	3	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
3	3	3	CLEVIS Y-BALL	181208000
4	3	3	SOCKET EYE	181440000
5	4	1	CLAMP STRAIN 6 - 2/0 ACSR	221000000
	-	3	CLAMP STRAIN 477MCM-AL	221040000
6	1	1	INSUL GUY STRAIN/FIB GLASS 12”	240840000
7	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

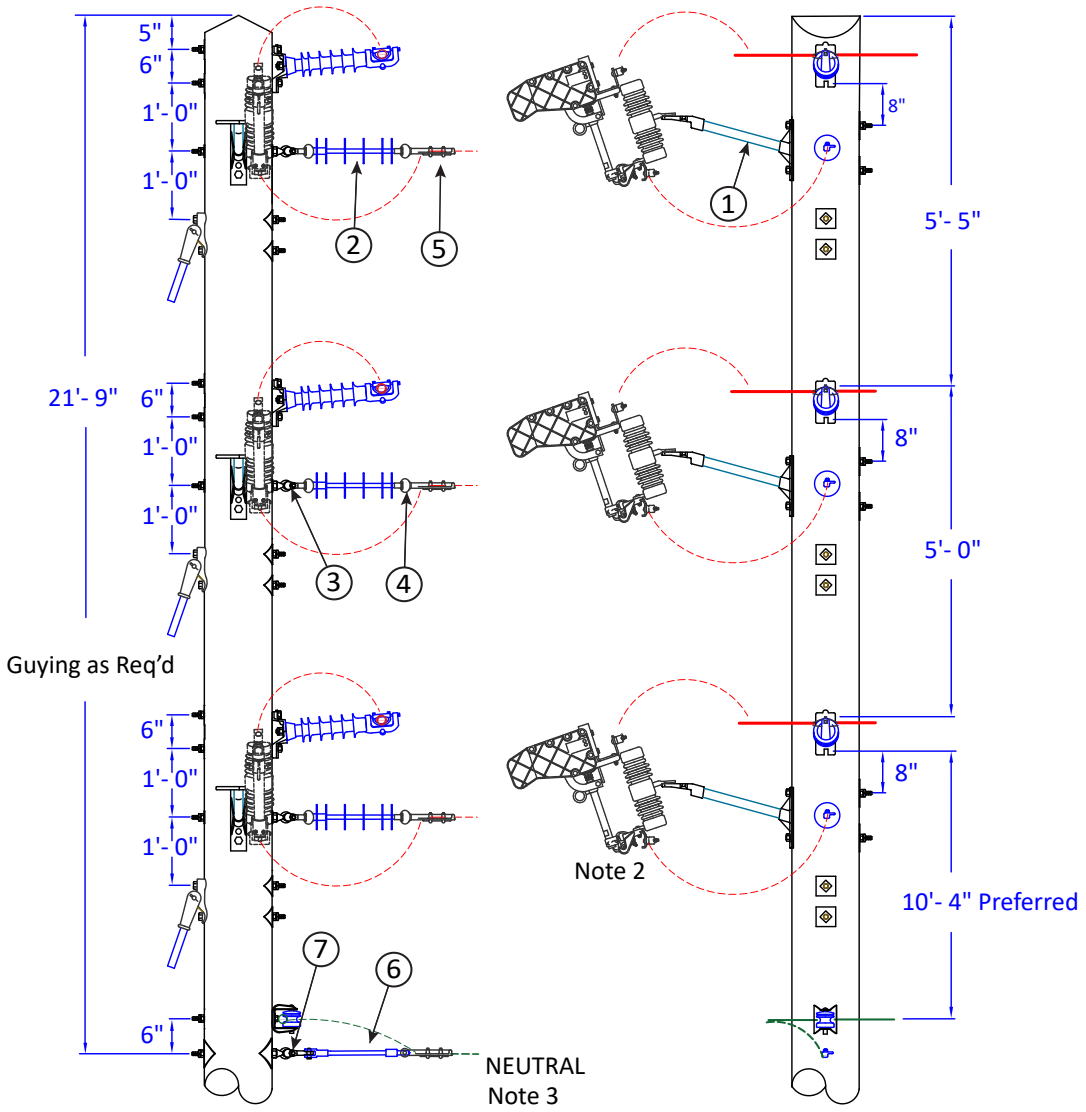
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
10	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
14	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
10	5/8” DBL COIL SPRING WASHER	206570000

WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3FV-BK	6-2/0	O3FV-BK-477	4/0-477

NOTES

1. Framing used on all pole types.
2. LBU shown is not included in CU.
3. See the Framing Spacing section for alternate neutral spacing.
4. Guying for permitted loading to be specified per Engineer.
5. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.

WOOD POLES
O3FV-BK



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

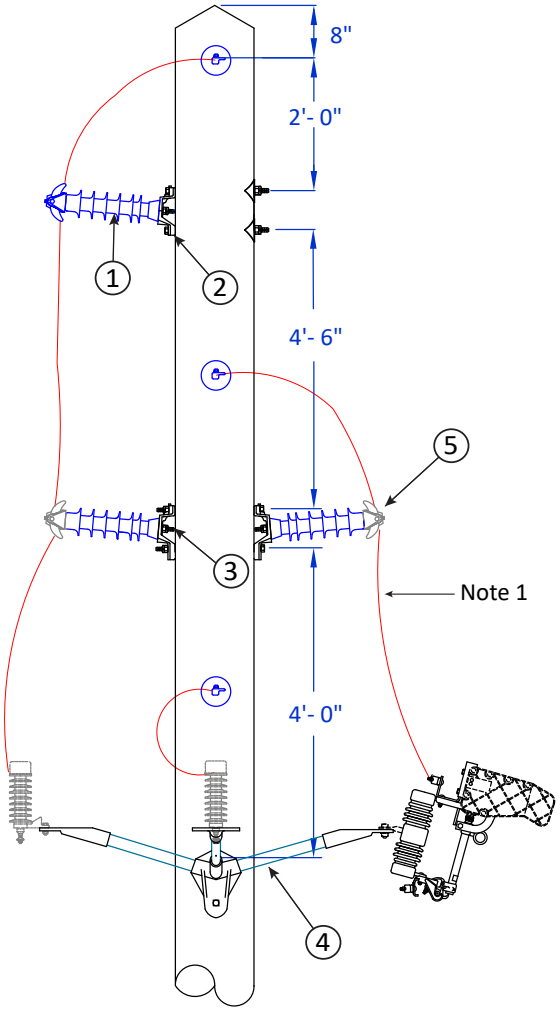
NES

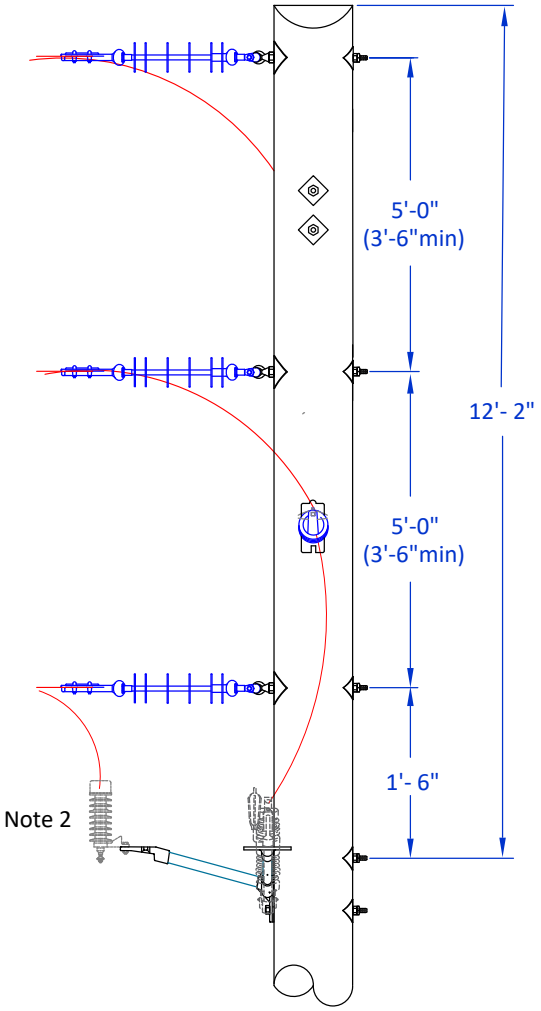
WOOD POLE VERTICAL CONSTRUCTION BUCK OR SIDE LINE TAP

FRM. CODE	O3WV-ET	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	3	INSUL LP HOR CLP/TP 35 KV	240976000
2	3	BRKT INSUL/HOR LP SHORT	180746000
3	3	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000
4	1	MOUNT CUTOUT 3PH CURVED	182700000
5	3	CLAMP TOP 4-4/0	221870000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
6	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
4	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
6	5/8” DBL COIL SPRING WASHER	206570000

WOOD POLES
O3WV-ET





NOTES

1. Min. stinger wire size #4 Cu BSD
2. Arrestors and/or cutouts are called for separately as req’d.
3. Consider wildlife protection based on environment.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

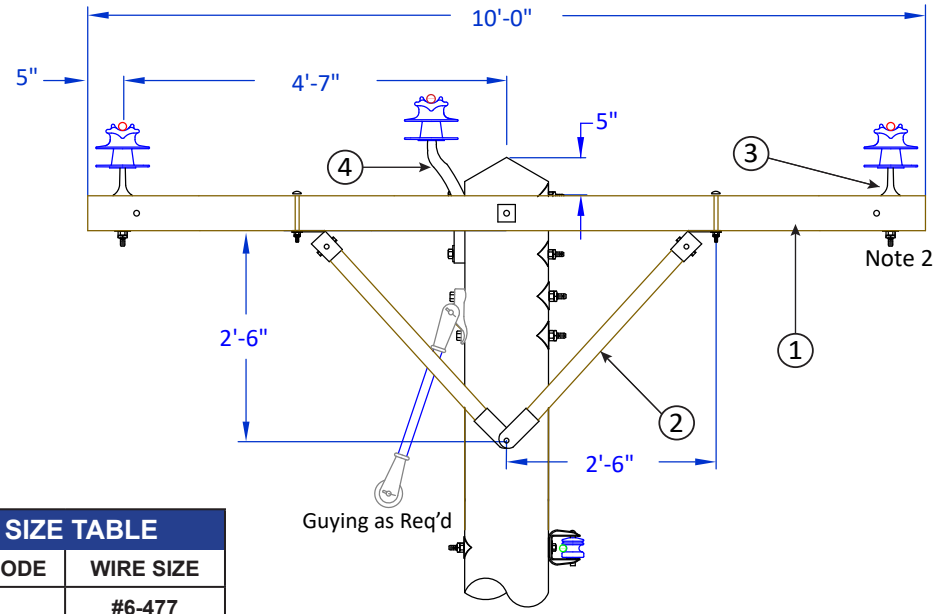
NES

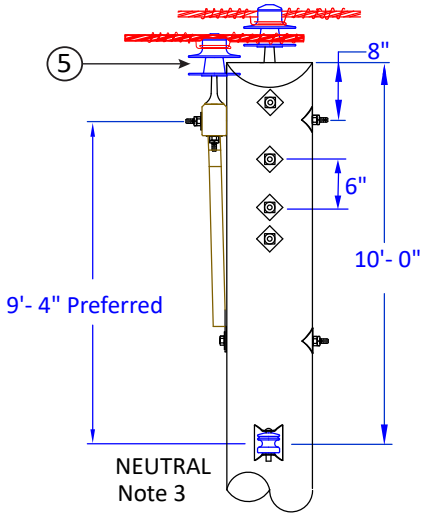
WOOD POLE
VERTICAL CONSTRUCTION
EQUIPMENT TAP

FRM. CODE	O3WS-PT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	X-ARM 4” X 5” X 10’	040220000
2	1	BRACE X-ARM WOOD 69KV PAIR	180660000
3	2	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
4	1	PIN POLE TOP 1” x 21” OFFSET	183100000
5	3	PIN TOP INSUL. POLY 25KV	242190000

WOOD POLES
O3WS-PT

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
1	BOLT DA 3/4” X REQUIRED LENGTH	201_____
4	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
5	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
5	WASHER SQ FLAT 4", 13/16" HOLE	209640000
5	5/8” DBL COIL SPRING WASHER	206570000
3	3/4" DBL COIL SPRING WASHER	206580000
2	BOLT CARRIAGE 1/2" X 6	201360000
2	WASHER SQ FLAT 2”, 9/16” HOLE	209600000
2	1/2” DBL COIL SPRING WASHER	206560000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000





WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3WS-PT	#6-477

NOTES

1. Guying for permitted loading to be specified per Engineer.
2. Install two 4x4 Washers per Insulator Xarm Pin.
3. See the Framing Spacing section for alternate neutral spacing.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

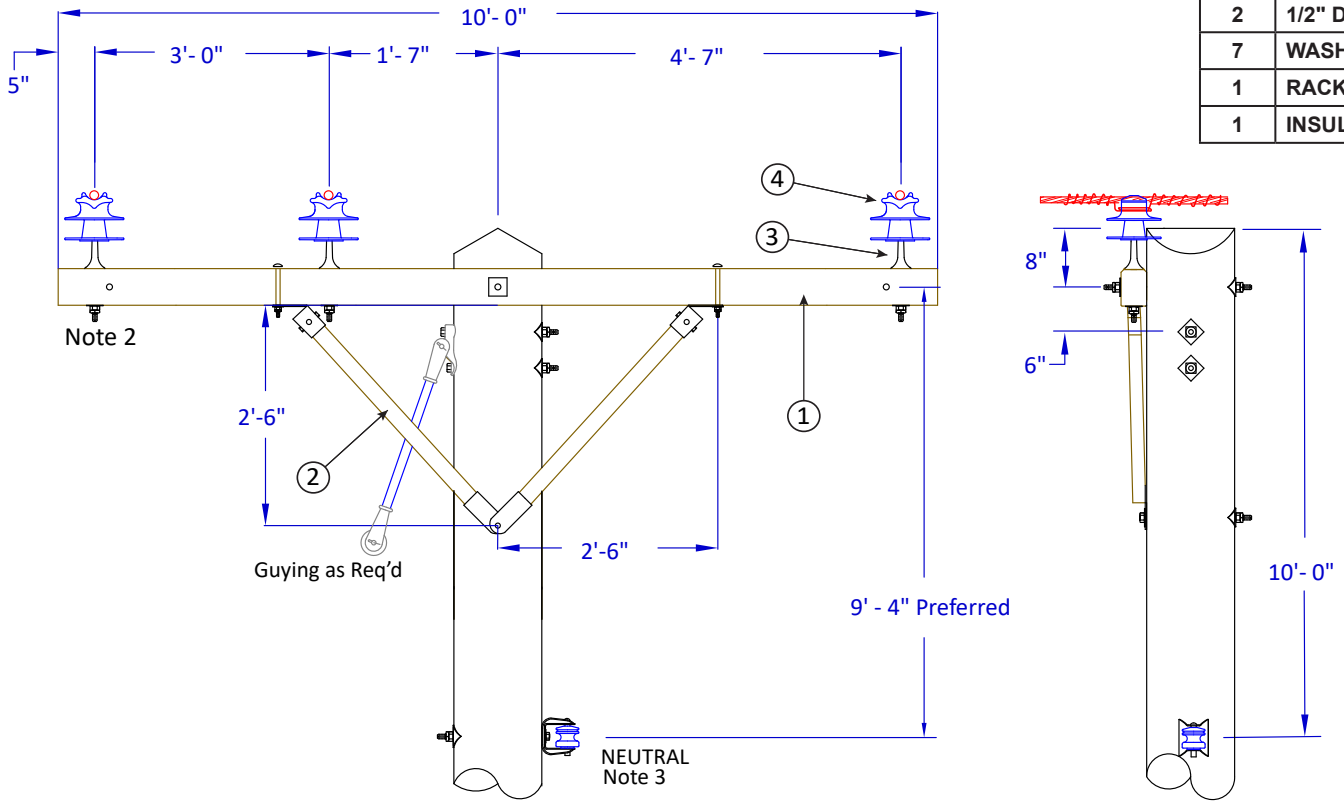
NES

WOOD POLE
SINGLE CROSSARM CONSTRUCTION
POLE TOP PIN

FRM. CODE	O3WS-HL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	X-ARM 4” X 5” X 10’ WOOD	040220000
2	1	BRACE X-ARM WOOD 69KV PAIR	180660000
3	3	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
4	3	PIN TOP INSUL. POLY 25KV	242190000

WOOD POLES
O3WS-HL

	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
1	BOLT DA 3/4” X REQUIRED LENGTH	201_____
2	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
3	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
2	5/8” DBL COIL SPRING WASHER	206570000
4	3/4" DBL COIL SPRING WASHER	206580000
2	BOLT CARRIAGE 1/2" X 6	201360000
2	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
2	1/2" DBL COIL SPRING WASHER	206560000
7	WASHER SQ FLAT 4”, 13/16” HOLE	209640000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000



WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3WS-HL	#6-477

NOTES

1. Guying for permitted loading to be specified per Engineer.
2. Install two 4x4 Washers per Insulator Xarm Pin.
3. See the Framing Spacing section for alternate neutral spacing.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

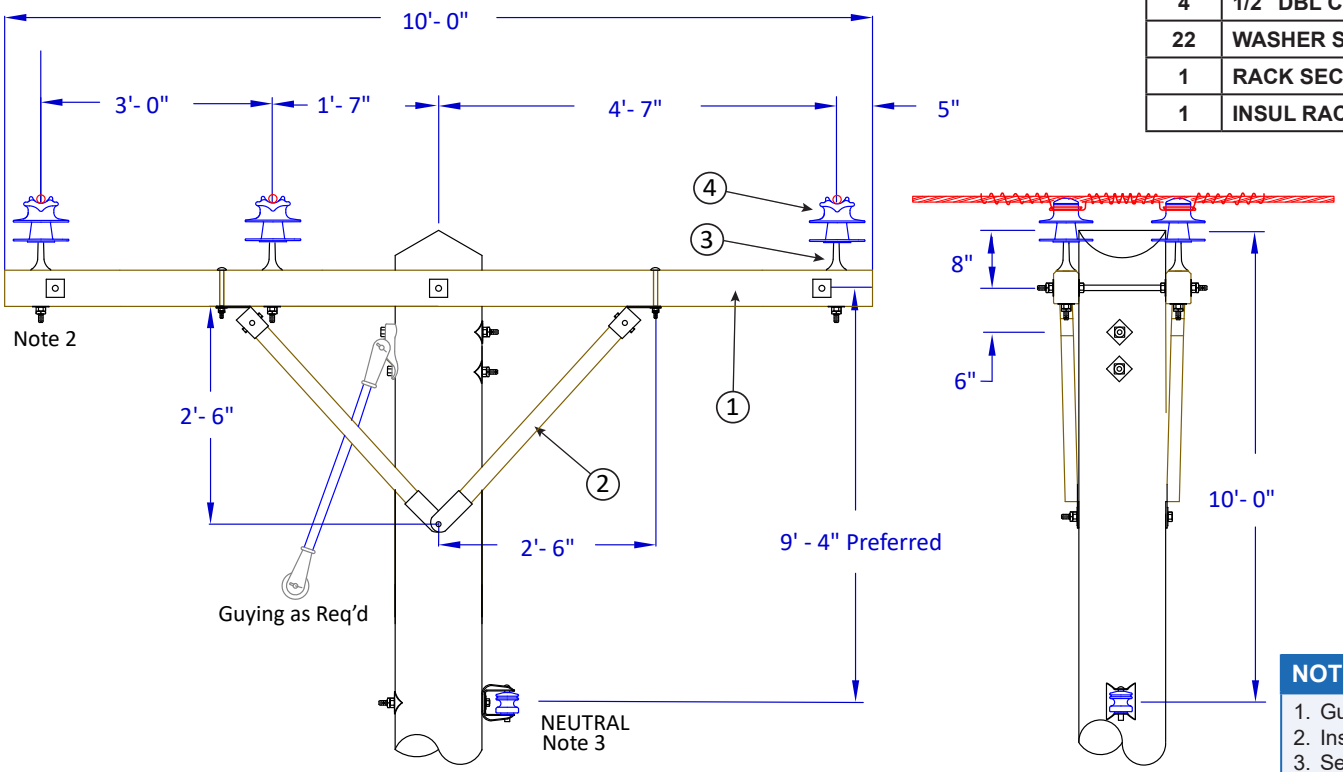
NES

WOOD POLE
SINGLE CROSSARM CONSTRUCTION
HORIZONTAL LINE PIN

FRM. CODE	O3WD-HL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 4” X 5” X 10’ WOOD	040220000
2	2	BRACE X-ARM WOOD 69KV PAIR	180660000
3	6	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
4	6	PIN TOP INSUL. POLY 25KV	242190000

WOOD POLES
O3WD-HL

	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
3	BOLT DA 3/4” X REQUIRED LENGTH	201_____
2	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
1	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
2	5/8” DBL COIL SPRING WASHER	206570000
18	3/4" DBL COIL SPRING WASHER	206580000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000
22	WASHER SQ FLAT 4”, 13/16” HOLE	209640000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000



WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3WD-HL	#6-477

NOTES

1. Guying for permitted loading to be specified per Engineer.
2. Install two 4x4 Washers per Insulator Xarm Pin.
3. See the Framing Spacing section for alternate neutral spacing.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.

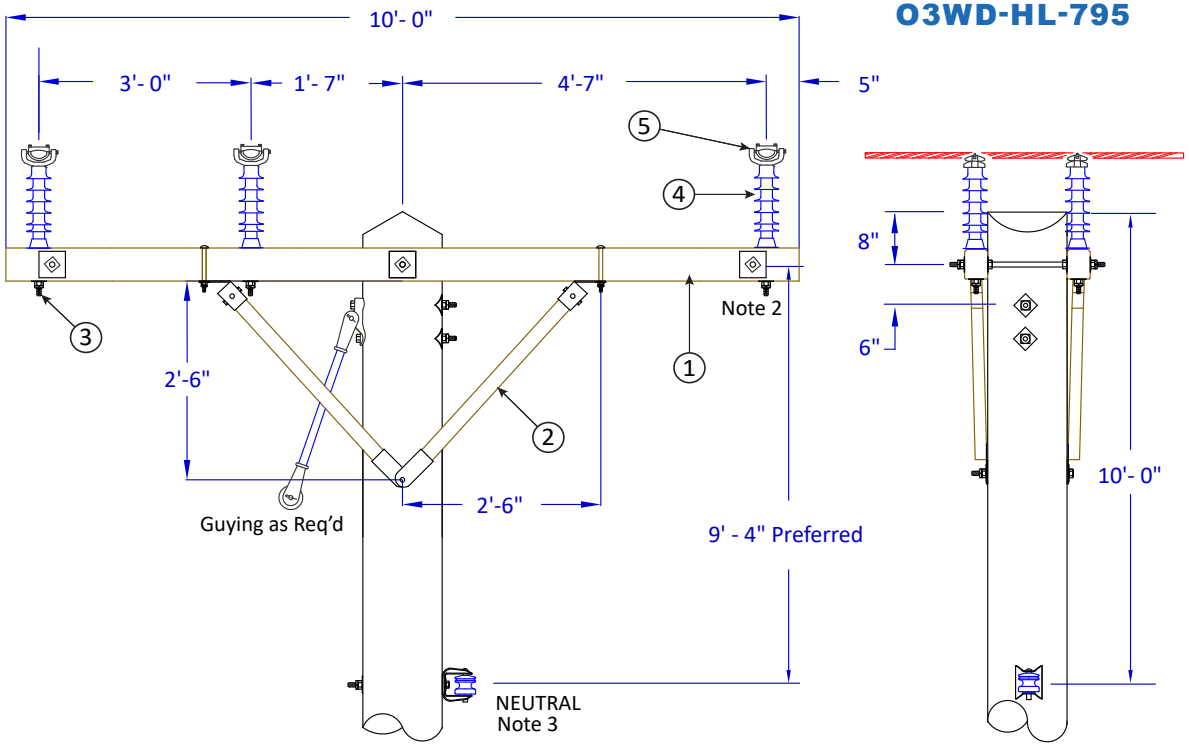
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
DOUBLE CROSSARM CONSTRUCTION
HORIZONTAL LINE PIN

FRM. CODE	O3WD-HL-795	O3WD-HL-1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	QTY	DESCRIPTION	STOCK #
1	2	-	X-ARM 4” X 5” X 10’	040220000
	-	2	X-ARM 4-3/4” X 5-3/4” X10’	040320000
2	2	2	BRACE X-ARM WOOD 69KV PAIR	180660000
3	6	6	BOLT STUB 3/4” X 8” LONG/LP INSUL	204790000
4	6	6	INSUL LP VER CLP/TP 35KV	240976000
5	6	6	CLAMP TOP 795MCM	221900000

WOOD POLES
O3WD-HL-795



	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
3	BOLT DA 3/4” X REQUIRED LENGTH	201_____
2	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
1	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
2	5/8” DBL COIL SPRING WASHER	206570000
16	3/4" DBL COIL SPRING WASHER	206580000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000
22	WASHER SQ FLAT 4”, 13/16” HOLE	209640000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3WD-HL-795	795
O3WD-HL-1351	1351

NOTES

1. Guying for permitted loading to be specified per Engineer.
2. Install two 4x4 Washers per Insulator Xarm Pin.
3. See the Framing Spacing section for alternate neutral spacing.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

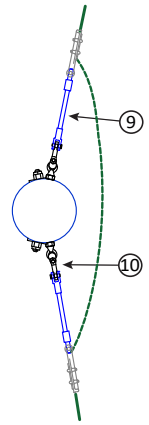
NES

WOOD POLE
DOUBLE CROSSARM CONSTRUCTION
HORIZONTAL LINE POST

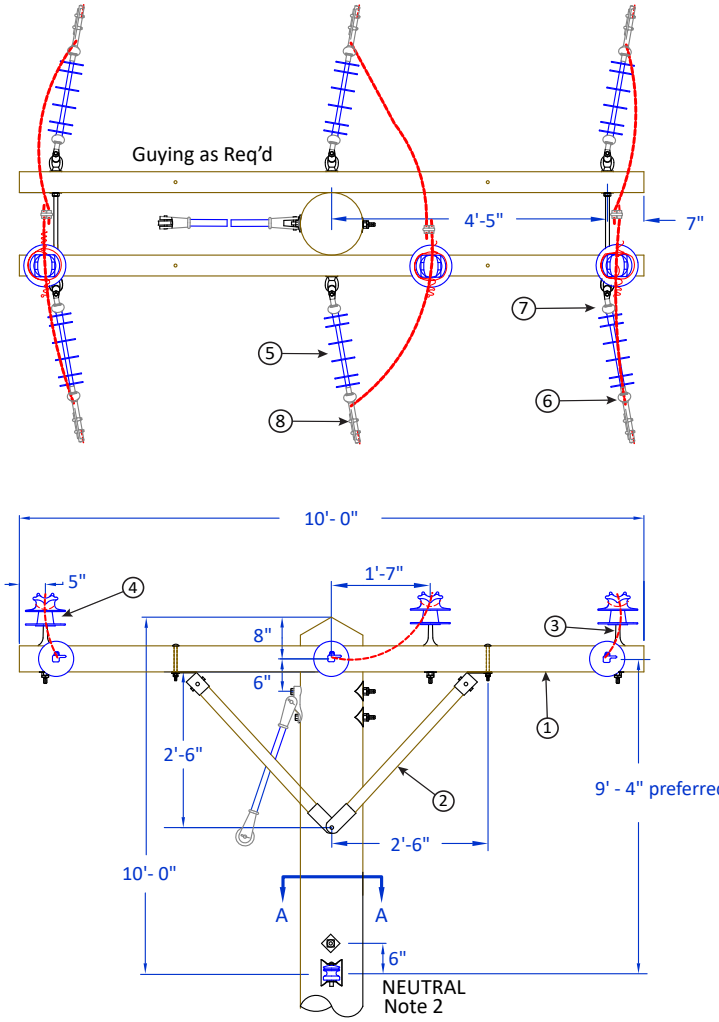
WOOD POLES
O3WD-DD

FRM. CODE	O3WD-DD	O3WD-DD-477	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	QTY	DESCRIPTION	STOCK #
1	2	2	X-ARM 4" X 5" X 10'	040220000
2	2	2	BRACE X-ARM WOOD 69KV PAIR	180660000
3	3	3	PIN STEEL 1" W/3/4" X 6-1/2" SHANK	183170000
4	3	3	PIN TOP INSUL. POLY 25KV	242190000
5	6	6	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
6	6	6	SOCKET EYE	181440000
7	6	6	CLEVIS Y-BALL	181208000
8	8	2	CLAMP STRAIN 6 - 2/0 ACSR	221000000
	-	6	CLAMP STRAIN 477MCM AL	221040000
9	2	2	INSUL GUY STRAIN/FIB GLASS 12"	240840000
10	2	2	CLEVISY-EYE, 90 DEGREE	181210000

	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
3	BOLT DA 3/4" X REQUIRED LENGTH	201_____
3	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
3	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
10	WASHER SQ FLAT 4", 13/16" HOLE	209640000
3	5/8" DBL COIL SPRING WASHER	206570000
10	3/4" DBL COIL SPRING WASHER	206580000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000
6	NUT OVAL EYE 3/4"	206420000



Section "A-A"



WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3WD-DD	6 - 2/0
O3WD-DD-477	4/0 - 477

Lorem ipsum

NOTES

1. Guying for permitted loading to be specified per Engineer.
2. See the Framing Spacing section for alternate neutral spacing.
3. On double dead-end framing, line openings will be noted on the drawing along with a note to install arresters.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

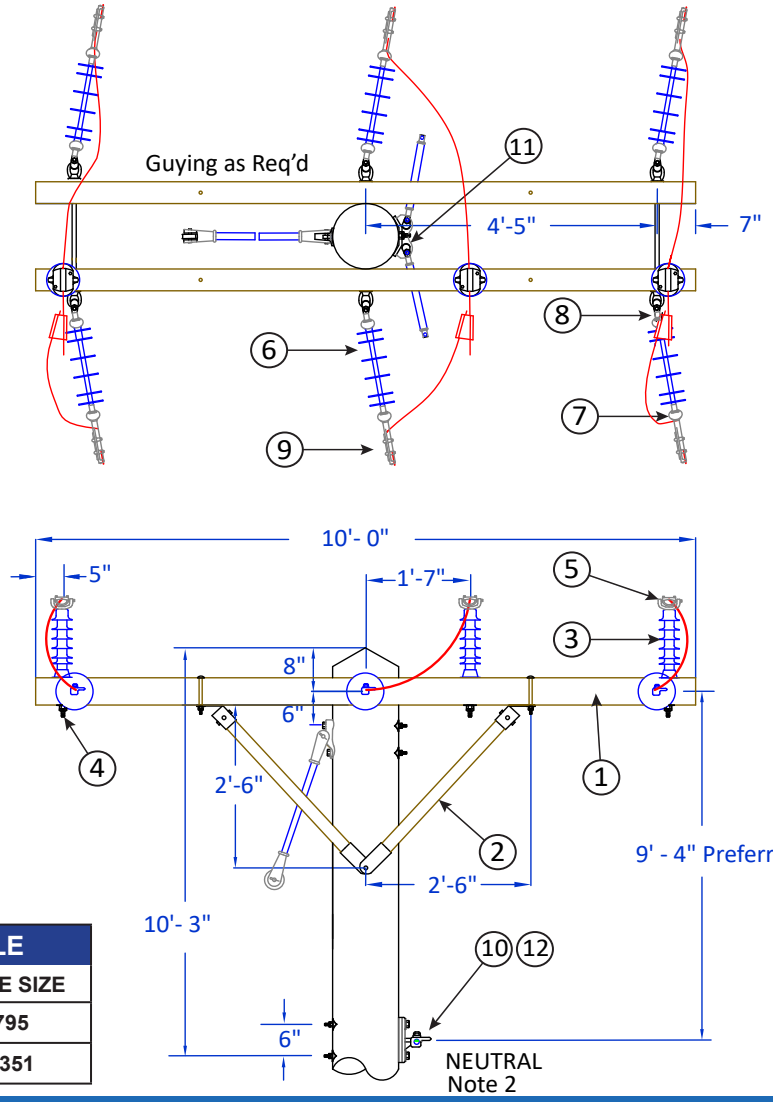
WOOD POLE
CROSSARM CONSTRUCTION
DOUBLE DEAD-END

WOOD POLES
O3WD-DD-795

FRM. CODE	O3WD-DD-795	O3WD-DD-1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	QTY	DESCRIPTION	STOCK #
1	2	2	X-ARM 4-3/4" X 5-3/4" X 10'	040320000
2	2	2	BRACE X-ARM WOOD 69KV PAIR	180660000
3	3	3	INSUL LP VER CLP/TP 35KV	240976000
4	3	3	BOLT STUB 3/4" X 8" LONG/LP INSUL	204790000
5	3	3	CLAMP TOP 795MCM	221900000
6	6	6	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
7	6	6	SOCKET EYE	181440000
8	6	6	CLEVIS Y-BALL	181208000
9	1	-	CLAMP STRAIN 477MCM-AL	221040000
	6	2	CLAMP STRAIN 795AL D-END	221080000
	-	6	CLAMP STRAIN 1351 61AAC DE	221117000
10	2	2	INSUL GUY STRAIN/FIB GLASS 12"	240840000
11	1	1	BRACKET, DOUBLE DEAD-END ANGLE	180780000
12	2	2	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS

	DESCRIPTION	STOCK #
3	BOLT DA 3/4" X REQUIRED LENGTH	201_____
2	BOLT MACHINE 3/4" X REQUIRED LENGTH	204_____
2	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
10	WASHER SQ FLAT 4", 13/16" HOLE	209640000
2	5/8" DBL COIL SPRING WASHER	206570000
10	3/4" DBL COIL SPRING WASHER	206580000
6	NUT OVAL EYE 3/4"	206420000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000



WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3WD-DD-795	795
O3WD-DD-1351	1351

NOTES

1. Guying for permitted loading to be specified per Engineer.
2. See the Framing Spacing section for alternate neutral spacing.
3. On double dead-end framing, line openings will be noted on the drawing along with a note to install arresters.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart.

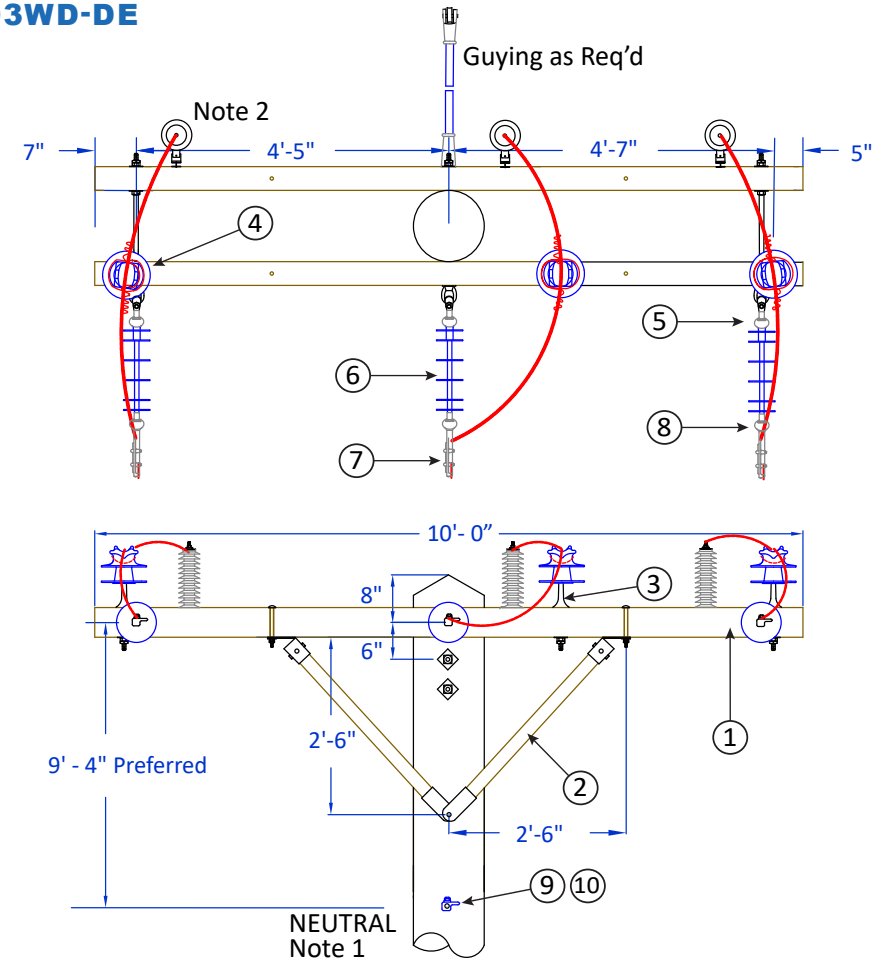
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
DOUBLE CROSSARM CONSTRUCTION
DOUBLE DEAD-END, HEAVY DUTY

FRM. CODE	O3WD-DE	O3WD-DE-477	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	QTY	DESCRIPTION	STOCK #
1	2	2	X-ARM 4” X 5” X 10’	040220000
2	2	2	BRACE X-ARM WOOD 69KV PAIR	180660000
3	3	3	PIN STEEL 1”W/3/4”X 6-1/2” SHANK	183170000
4	3	3	INSUL PIN TYPE GRAY 27KV	242190000
5	3	3	CLEVIS Y-BALL	181208000
6	3	3	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
7	4	1	CLAMP STRAIN 6-2/0 ACSR	221000000
	-	3	CLAMP STRAIN 477MCM - AL	221040000
8	3	3	SOCKET EYE	181440000
9	1	1	INSUL GUY STRAIN/FIB GLASS 12”	240840000
10	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

WOOD POLES
O3WD-DE



	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
3	BOLT DA 3/4” X REQUIRED LENGTH	201_____
2	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
2	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
10	WASHER SQ FLAT 4”, 7/8” HOLE	209640000
2	5/8” DBL COIL SPRING WASHER	206570000
10	3/4" DBL COIL SPRING WASHER	206580000
3	NUT OVAL EYE 3/4”	206420000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000

WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3WD-DE	6-2/0	O3WD-DE-477	4/0-477

NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. Guying for permitted loading to be specified per Engineer.
3. Arrester with bracket shown are called for separately as req’d.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE
DOUBLE CROSSARM CONSTRUCTION
DEAD-END

FRM. CODE	O3WX-EX	O3WX-EX-477	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	QTY	DESCRIPTION	STOCK #
1	3	3	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	3	3	CLEVIS Y-BALL	181208000
3	3	3	SOCKET EYE	181440000
4	4	1	CLAMP STRAIN 6-2/0 ACSR	221000000
	-	3	CLAMP STRAIN 477MCM-AL	221040000
5	1	1	INSUL GUY STRAIN/FIB GLASS 12"	240840000
6	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

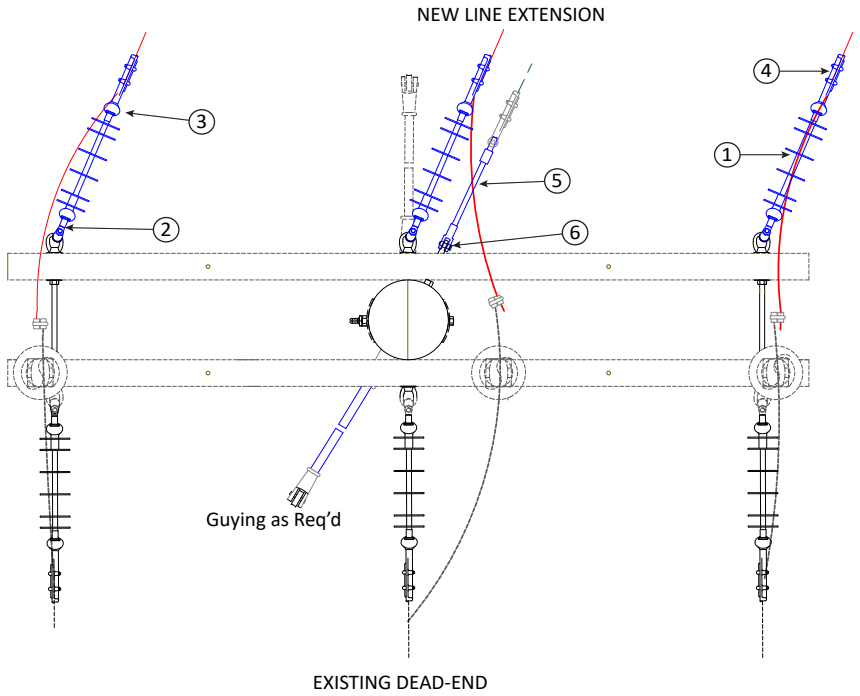
	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
3	NUT OVAL EYE 3/4"	206420000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000
1	FLEX BAIL STRANDVISE #2 ACSR	230600000
1	BOLT MACHINE 5/8" X REQ'D LENGTH	203_____
1	5/8" DBL COIL SPRING WASHER	206570000
1	NUT OVAL EYE 5/8"	206400000

WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3WX-EX	6-2/0
O3WX-EX-477	4/0-477

NOTES

1. Guying for permitted loading to be specified per Engineer.
2. See the Framing Spacing section for alternate neutral spacing.
3. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.

WOOD POLES
O3WX-EX



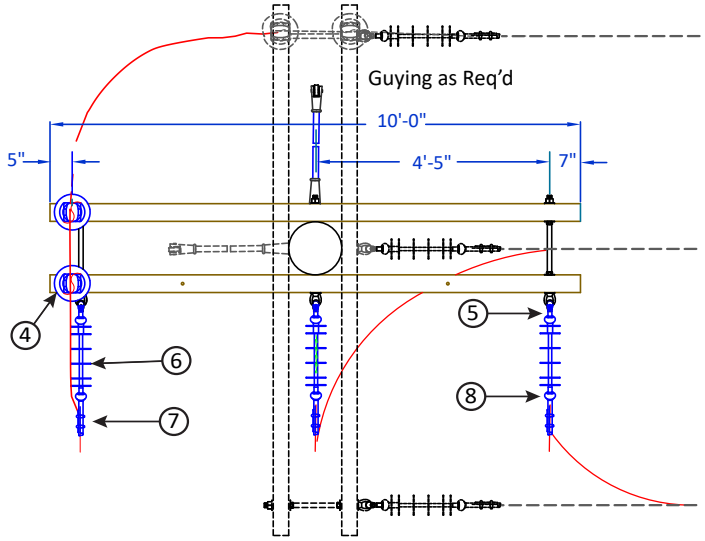
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

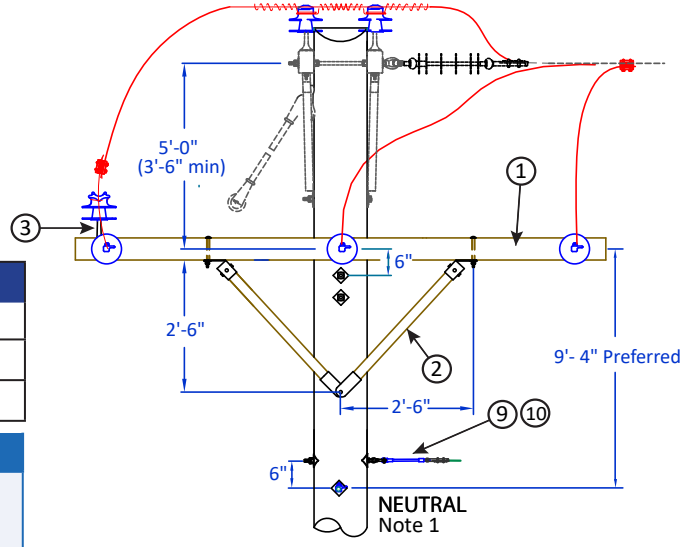
WOOD POLE
DOUBLE CROSSARM CONSTRUCTION
LINE EXTENSION

FRM. CODE	O3WD-BK	O3WD-BK-477	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	QTY	DESCRIPTION	STOCK #
1	2	2	X-ARM 4” X 5” X 10’	040220000
2	2	2	BRACE X-ARM WOOD 69KV PAIR	180660000
3	4	4	PIN STEEL 1”W/3/4”X 6-1/2” SHANK	183170000
4	4	4	INSUL PIN TYPE GRAY 27KV	242190000
5	3	3	CLEVIS Y-BALL	181208000
6	3	3	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
7	3	-	CLAMP STRAIN 6-2/0 ACSR	221000000
	-	3	CLAMP STRAIN 477MCM - AL	221040000
8	3	3	SOCKET EYE	181440000
9	1	1	INSUL GUY STRAIN/FIB GLASS 12”	240840000
10	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

WOOD POLES
O3WD-BK



	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
3	BOLT DA 3/4” X REQUIRED LENGTH	201_____
2	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
2	WASHER SQ CURVED 3-1/4”, 13/16” HOLE	209520000
10	WASHER SQ FLAT 4”, 7/8” HOLE	209640000
2	5/8” DBL COIL SPRING WASHER	206570000
10	3/4" DBL COIL SPRING WASHER	206580000
3	NUT OVAL EYE 3/4”	206420000
4	BOLT CARRIAGE 1/2" X 6	201360000
4	WASHER, SQ FLAT 2", 9/16" HOLE	209600000
4	1/2" DBL COIL SPRING WASHER	206560000



WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3WD-BK	6-2/0
O3WD-BK-477	4/0-477

NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. Guying for permitted loading to be specified per Engineer.
3. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 7.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WOOD POLE CROSSARM CONSTRUCTION BUCK ARM

3-PHASE FRAMING - MAXIMUM ANGLES

350 FOOT WIND SPAN			MAXIMUM ANGLES PER NESC RULE 250- MEDIUM LOADING, EXTREME ICE, OR EXTREME WIND 90 MPH											
CONSTRUCTION TYPE			ANGLE RANGE (DEGREES)											
			VERTICAL FRAMING						FIBERGLASS X-ARM[2]					
CONDUCTOR	DESIGN TENSION (LBS.)	NESC RULE	POLE TOP (PT)	VERT. LINE (VL)	SUSPENSION (SU)	DOUBLE DEAD-END (DD) or EXTENSION (EX)	DEAD END (DE)	BUCK (BK)	POLE TOP (PT)	HORIZ. LINE (HL)	DBL HORIZ. LINE (D-HL)	DOUBLE DEAD-END (DD) or EXTENSION (EX)	DEAD END (DE)	BUCK (BK)
2 ACSR	835	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-37	0-58	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-32	0-39	0	0
1/0 ACSR	985	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-31	0-48	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-26	0-32	0	0
4/0 ACSR	1550	Grade "C"	0-8	0-30	30-60	0-60	0	0	0-8	0-8	0-20	0-31	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-15	0-20	0	0
336 ACSR	1980	Grade "C"	0-5	0-30	30-60	0-60	0	0						
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0						
477 ACSR	2200	Grade "C"	0-4	0-30	30-60	0-60	0	0						
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0						
795 ACSR	3000	Grade "C"	NA[1]	0-22	22-60	0-60	0	0						
		Grade "B"	NA[1]	0-22	22-60	0-60	0	0						
1351 AAC	4500	Grade "C"	NA[1]	0-14	14-60	0-60	0	0						
		Grade "B"	NA[1]	0-14	14-60	0-60	0	0						

MAXIMUM 4/0 ACSR conductor tension allowed on Fiberglass Xarms in this edition of the Plate book.

NOTES

1. Single Tie-top Pin Insulators not to be used with NESC Grade "B" Construction.
2. Angle Listed for Three Phase Xarm Construction using 10-Ft Xarms.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

3-PHASE FRAMING - MAXIMUM ANGLES

350 FOOT WIND SPAN			MAXIMUM ANGLES PER NESC RULE 250- MEDIUM LOADING, EXTREME ICE, OR EXTREME WIND 90 MPH									
CONSTRUCTION TYPE			ANGLE RANGE (DEGREES)									
			STEEL XARM - WOOD OR STEEL POLES									
CONDUCTOR	DESIGN TENSION (LBS.)	NESC RULE	POLE TOP (PT)	HORIZ. LINE (HL)[3,4]	DOUBLE HORIZONTAL LINE (D-HL)	WOOD POLE[1] O3SS-DD	WOOD POLE O3SD-DD	STEEL POLE O3SS-DD	WOOD POLE[4] O3SA-DD	STEEL POLE O3SA-DD	DEAD-END (DE)	BUCK (BK)
2 ACSR	835	Grade "C"	0-30	0-30	0-30	0-60	0-60	0-60	0-60	0-60	0	0
		Grade "B"	0-30	0-30	0-30	0-56	0-60	0-60	0-60	0-60	0	0
1/0 ACSR	985	Grade "C"	0-30	0-30	0-30	0-54	0-60	0-60	0-60	0-60	0	0
		Grade "B"	0-26	0-26	0-30	0-46	0-60	0-60	0-60	0-60	0	0
4/0 ACSR	1550	Grade "C"	0-22	0-22	0-30	0-34	0-53	0-60	0-60	0-60	0	0
		Grade "B"	0-15	0-15	0-30	0-27	0-46	0-60	0-54	0-60	0	0
336 ACSR	1980	Grade "C"	0-16	0-16	0-30	0-28	0-42	0-60	0-50	0-60	0	0
		Grade "B"	0-11	0-11	0-29	0-21	0-35	0-60	0-41	0-60	0	0
477 ACSR	2200	Grade "C"	0-12	0-12	0-30	0-24	0-37	0-60	0-44	0-60	0	0
		Grade "B"	0-9	0-9	0-26	0-18	0-30	0-49	0-36	0-60	0	0
795 ACSR	3000	Grade "C"	0-6	0-6	0-24	0-16	0-28	0-51	0-33	0-60	0	0
		Grade "B"	0-6	0-6	0-18	0-12	0-21	0-42	0-25	0-60	0	0
1351 AAC	4500	Grade "C"	NA	NA	0-14	NA	0-24[2]	0-60[2]	PLS-CADD model for non-level spans up to 250-ft.		0[2]	0[2]
		Grade "B"	NA	NA	0-10	NA	0-18[2]	0-53[2]			0[2]	0[2]

NOTES

1. Framing limitations with Single 4x6 Double Dead-End Steel Xarm on Wood Pole.
2. Requires Double 4x6 Steel Xarms - 1351 AAC Conductor.
3. HL Framing limits also apply to Steel Alley Arm construction.
4. Bearing plates and oversized washers req'd when using Steel Alley Arms on Wood poles.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL & WOOD POLE
STEEL XARM - FRAMING ANGLE
ALUMINUM CONDUCTOR

3-PHASE FRAMING - MAXIMUM ANGLES

350 FOOT WIND SPAN			MAXIMUM ANGLES PER NESC RULE 250- MEDIUM LOADING, EXTREME ICE, OR EXTREME WIND 90 MPH											
CONSTRUCTION TYPE			ANGLE RANGE (DEGREES)											
			VERTICAL FRAMING						FIBERGLASS X-ARM[2]					
CONDUCTOR	DESIGN TENSION (LBS.)	NESC RULE	POLE TOP (PT)	VERT. LINE (VL)	SUSPENSION (SU)	DOUBLE DEAD-END (DD) / EXTENSION (EX)	DEAD-END (DE)	BUCK (BK)	POLE TOP (PT)	HORIZ. LINE (HL)	DOUBLE HORIZONTAL LINE (D-HL)	DOUBLE DEAD-END (DD) / EXTENSION (EX)	DEAD-END (DE)	BUCK (BK)
6 BHD	550	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-45	0-60	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-45	0-60	0	0
4 BHD	700	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-45	0-60	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-40	0-48	0	0
2 BHD	950	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-33	0-52	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-28	0-35	0	0
1/0 BHD	1315	Grade "C"	0-10	0-30	30-60	0-60	0	0	0-10	0-10	0-25	0-38	0	0
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0	NA[1]	NA[1]	0-19	0-24	0	0
4/0 BHD	2700	Grade "C"	0-4	0-30	30-60	0-60	0	0	Maximum 1/0 BHD conductor tension allowed on Fiberglass Xarms in this edition of the Plate book.					
		Grade "B"	NA[1]	0-30	30-60	0-60	0	0						
300 BHD	3000	Grade "C"	0-4	0-22	22-60	0-60	0	0						
		Grade "B"	NA[1]	0-22	22-60	0-60	0	0						

NOTES

1. Single Tie-top Pin Insulators not to be used with NESC Grade "B" Construction.
2. Angle Listed for Three Phase Xarm Construction using 10-Ft Xarms.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
VERT/FG XARM - FRAMING ANGLE
COPPER CONDUCTOR

3-PHASE FRAMING - MAXIMUM ANGLES

350 FOOT WIND SPAN			MAXIMUM ANGLES PER NESC RULE 250- MEDIUM LOADING, EXTREME ICE, OR EXTREME WIND 90 MPH									
CONSTRUCTION TYPE			ANGLE RANGE (DEGREES)									
			STEEL XARM - WOOD OR STEEL POLES									
CONDUCTOR	DESIGN TENSION (LBS.)	NESC RULE	POLE TOP (PT)	HORIZ. LINE (HL)[2,3]	DOUBLE HORIZONTAL LINE (D-HL)	WOOD POLE[1] O3SS-DD	WOOD POLE O3SD-DD	STEEL POLE O3SS-DD	WOOD POLE[3] O3SA-DD	STEEL POLE O3SA-DD	DEAD-END (DE)	BUCK (BK)
6 BHD	550	Grade "C"	0-30	0-30	0-30	0-60	0-60	0-60	0-60	0-60	0	0
		Grade "B"	0-30	0-30	0-30	0-60	0-60	0-60	0-60	0-60	0	0
4 BHD	700	Grade "C"	0-30	0-30	0-30	0-60	0-60	0-60	0-60	0-60	0	0
		Grade "B"	0-30	0-30	0-30	0-60	0-60	0-60	0-60	0-60	0	0
2 BHD	950	Grade "C"	0-30	0-30	0-30	0-58	0-60	0-60	0-60	0-60	0	0
		Grade "B"	0-28	0-28	0-30	0-49	0-60	0-60	0-60	0-60	0	0
1/0 BHD	1315	Grade "C"	0-27	0-27	0-30	0-42	0-60	0-60	0-60	0-60	0	0
		Grade "B"	0-19	0-19	0-30	0-34	0-56	0-60	0-60	0-60	0	0
4/0 BHD	2700	Grade "C"	0-14	0-14	0-30	0-23	0-35	0-60	0-41	0-60	0	0
		Grade "B"	0-9	0-9	0-22	0-16	0-26	0-49	0-30	0-60	0	0
300 BHD	3000	Grade "C"	0-13	0-13	0-27	NA	0-31	0-56	0-36	0-60	0	0
		Grade "B"	0-7	0-7	0-19	NA	0-23	0-42	0-27	0-60	0	0

NOTES

1. Framing limitations with Single 4x6 Double Dead-End Steel Xarm on Wood Pole.
2. HL Framing limits also apply to Steel Alley Arm construction.
3. Bearing plates and oversized washers req'd when using Steel Alley Arms on Wood poles.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL & WOOD POLE
STEEL XARM - FRAMING ANGLE
COPPER CONDUCTOR

FRM. CODE	O3SV-PT	O3SV-PT-477	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	PIN POLE TOP/POST INSUL	183060000
2	1	1	INSUL LP VER CLP/TP 35KV	240974000
3	2	2	BRKT INSUL/HOR LP SHORT	180746000
4	2	2	INSUL LP HOR CLP/TP 35KV	240976000
5	3	3	BOLT STUD 3/4" X 3" SHORT/LP INSUL	204780000
6	3	-	CLAMP TOP 4-4/0	221870000
	-	3	CLAMP TOP 4/0-477	221890000

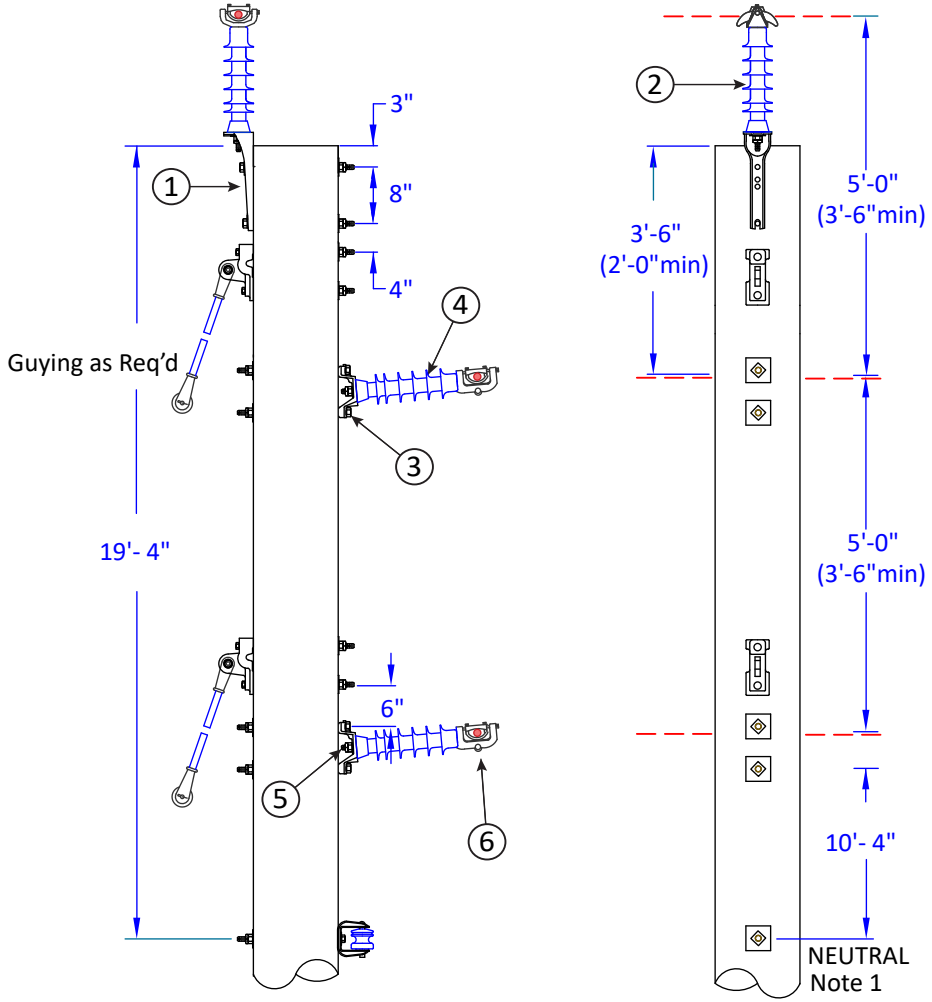
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
7	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
7	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
7	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3SV-PT	6-1/0
O3SV-PT-477	4/0-477

NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.
3. Guying for permitted loading to be specified per Engineer.

STEEL POLES
O3SV-PT



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
VERTICAL CONSTRUCTION
POLE TOP POST

FRM. CODE	O3SV-VL	O3SV-VL-477	O3SV-VL-795	O3SV-VL-1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	3	3	3	3	INSUL LP HOR CLP/TP 35KV	240976000
2	3	3	3	-	BRKT INSUL/HOR LP SHORT	180746000
	-	-	-	3	BRKT INSUL/HOR LP LONG	180748000
3	3	3	3	3	BOLT STUD 3/4" X 3" SHORT/LP INSUL	204780000
4	3	-	-	-	CLAMP TOP 4-4/0	221870000
	-	3	-	-	CLAMP TOP 4/0-477	221890000
	-	-	3	3	CLAMP TOP AL 795MCM	221900000

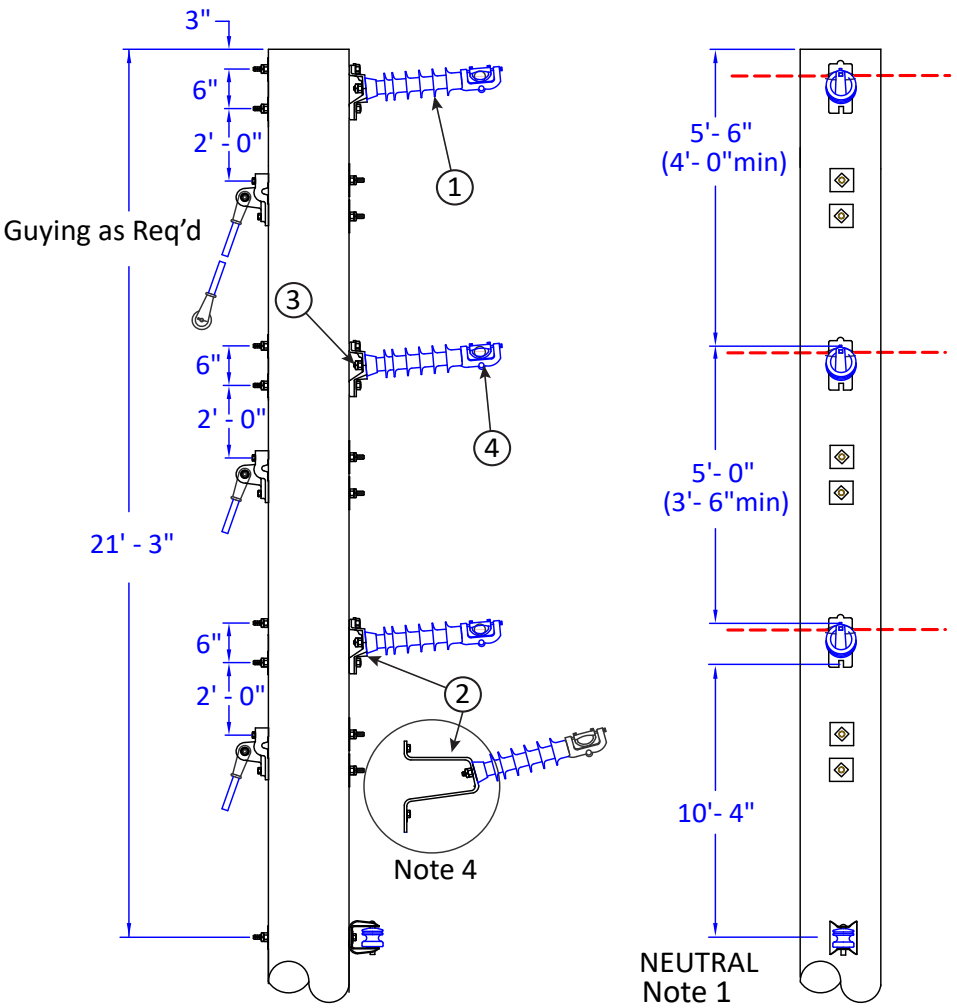
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
7	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
7	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
7	5/8" DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SV-PT	6-1/0	O3SV-VL-795	795
O3SV-PT-477	4/0-477	O3SV-VL-1351	1351

NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.
3. Guying for permitted loading to be specified per Engineer.
4. 10" Insulator brackets (Item 2) are only required with 1351AA.

STEEL POLES
O3SV-VL



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
VERTICAL CONSTRUCTION
VERTICAL LINE

FRM. CODE	O3SV-SU	O3SV-SU-795	O3SV-SU-1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	3	3	3	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	3	3	3	CLEVIS Y-BALL	181208000
3	3	3	3	SOCKET EYE	181440000
4	3	-	-	CLAMP SUSP 2 - 1/0	221550000
	-	3	-	CLAMP SUSP 4/0-795 AL EZ	221610000
	-	-	3	CLAMP SUSP AL 1351 KCM	221625000
5	1	1	1	INSUL GUY STRAIN/FIB GLASS 12”	240840000
6	1	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

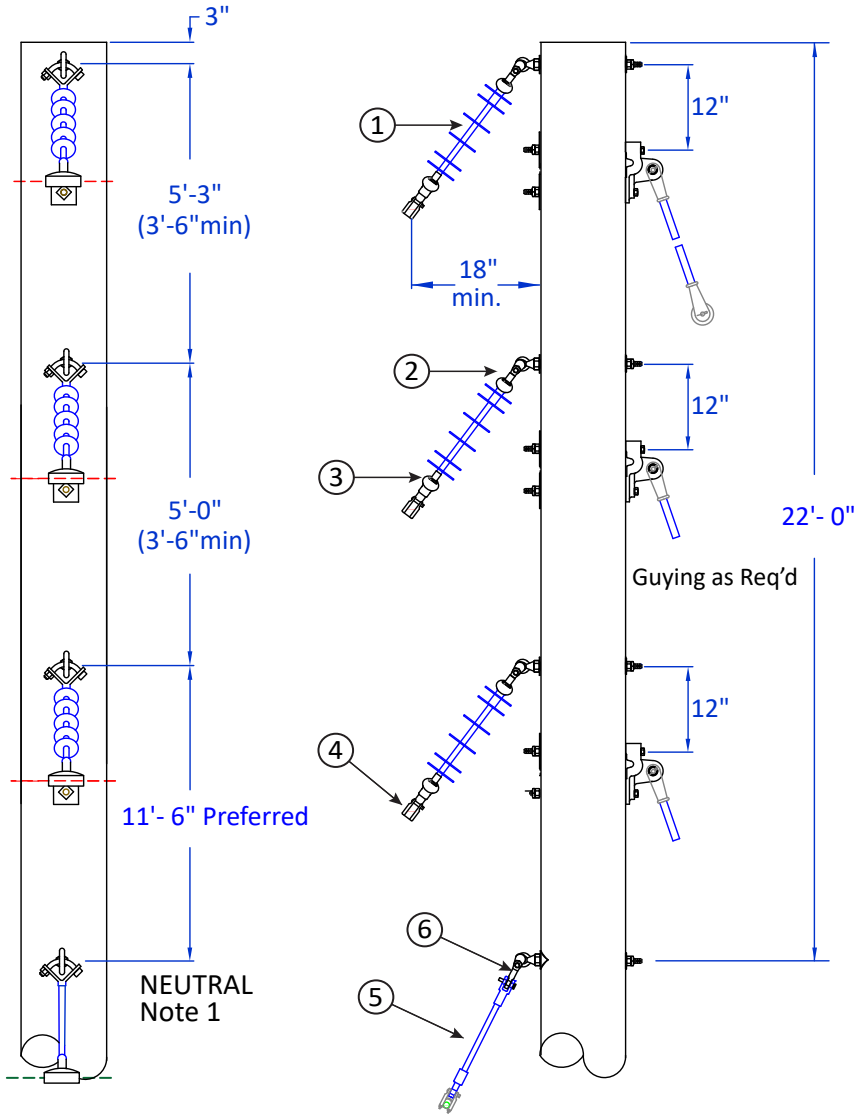
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
4	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
8	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
4	NUT OVAL EYE 5/8”	206400000
4	5/8” DBL COIL SPRING WASHER	206570000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL – LARGE	242480000

WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SV-SU	#2-1/0	O3SV-SU-1351	1351
O3SV-SU-795	4/0-795		

NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.
3. Guying for permitted loading to be specified per Engineer.

STEEL POLES
O3SV-SU



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
VERTICAL CONSTRUCTION
SUSPENSION

STEEL POLES
O3SV-DD

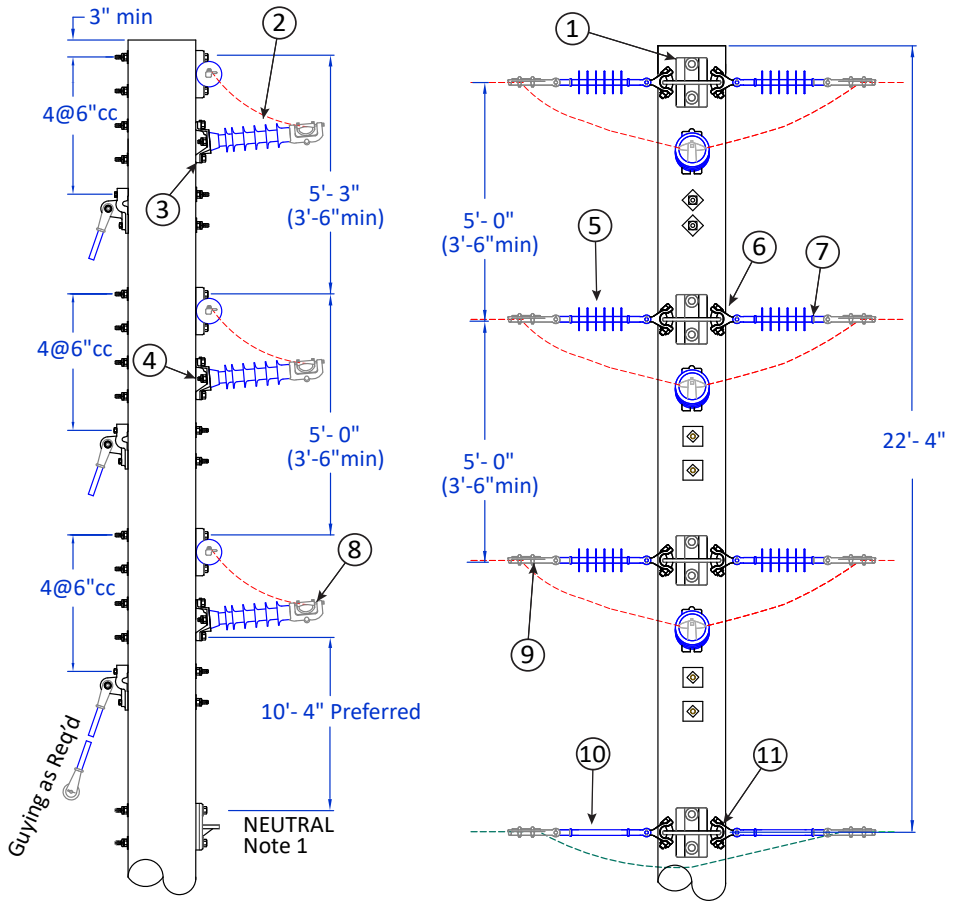
FRM. CODE	O3SV-DD	O3SV-DD-477	O3SV-DD-795	O3SV-DD-1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	4	4	4	4	BRACKET, DOUBLE DEAD-END ANGLE	180780000
2	3	3	3	3	INSUL LP HOR CLP/TP 35KV	240976000
3	3	3	3	3	BRKT INSUL/HOR LP SHORT	180746000
4	3	3	3	3	BOLT STUD 3/4" X 3" SHORT/LP INSUL	204780000
5	6	6	6	6	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
6	6	6	6	6	CLEVIS Y-BALL	181208000
7	6	6	6	6	SOCKET EYE	181440000
8	3	-	-	-	CLAMP TOP AL 4-4/0	221870000
	-	3	-	-	CLAMP TOP 4/0-477	221890000
9	8	2	-	-	CLAMP STRAIN 6-2/0 ACSR	221000000
	-	6	2	-	CLAMP STRAIN 477 MCM AL	221040000
	-	-	6	2	CLAMP STRAIN 795AL D END	221080000
	-	-	-	6	CLAMP STRAIN 1351 61 AAC DE	221170000
10	2	2	2	2	INSUL GUY STRAIN/FIB GLASS 12"	240840000
11	2	2	2	2	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS

QTY	DESCRIPTION	STOCK #
6	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
8	BOLT MACHINE 3/4" X REQUIRED LENGTH	204_____
8	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
6	WASHER SQ 4 x 4 FLAT, 13/16" HOLE	209640000
6	5/8" DBL COIL SPRING WASHER	206570000
8	3/4" DBL COIL SPRING WASHER	206580000

WIRE SIZE TABLE

FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SV-DD	6-2/0	O3SV-DD-795	795
O3SV-DD-477	4/0-477	O3SV-DD-1351	1351



NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. On double dead-end framing, line openings will be noted on the drawing along with a note to install arresters.
3. Substitute 18" FG brackets below each suspension insulator if this framing is used for a line opening (see General Framing Plate, for arrester detail).
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
VERTICAL CONSTRUCTION
DOUBLE DEAD-END

FRM. CODE	O3SV-DE	O3SV-DE-477	O3SV-DE-795	O3SV-DE-1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	3	3	3	3	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
2	3	3	3	3	CLEVIS Y-BALL	181208000
3	3	3	3	3	SOCKET EYE	181440000
4	4	1	-	-	CLAMP STRAIN 6-2/0 ACSR	221000000
	-	3	1	-	CLAMP STRAIN 477 MCM AL	221040000
	-	-	3	1	CLAMP STRAIN 795AL D END	221080000
	-	-	-	3	CLAMP STRAIN 1351 61 AAC DE	221170000
5	1	1	1	1	INSUL GUY STRAIN/FIB GLASS 12”	240840000
6	1	1	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

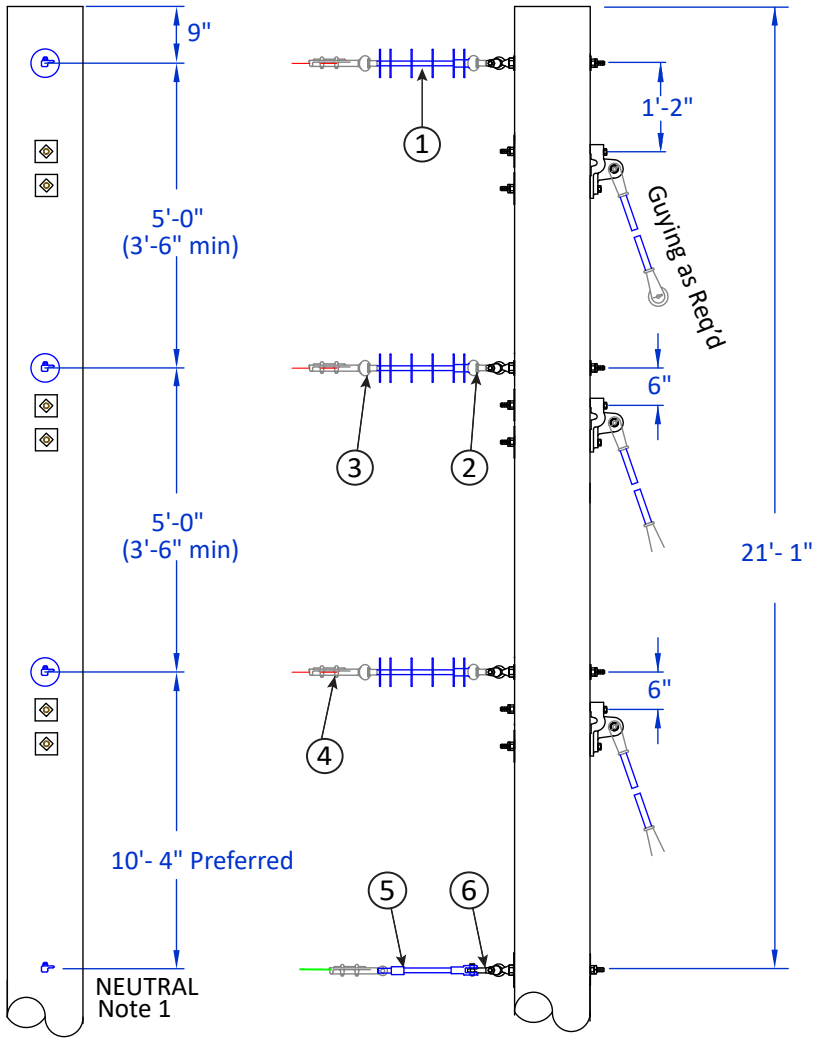
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
4	BOLT MACHINE3/4” X REQUIRED LENGTH	204_____
8	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
4	NUT OVAL EYE 3/4”	206420000
4	3/4" DBL COIL SPRING WASHER	206580000

WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SV-DD	6-2/0	O3SV-DD-795	795
O3SV-DD-477	4/0-477	O3SV-DD-1351	1351

NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. Use O3SV-ET Plate for arrester bkt and arrester placement.
3. Guying for permitted loading to be specified per Engineer.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.

STEEL POLES
O3SV-DE



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

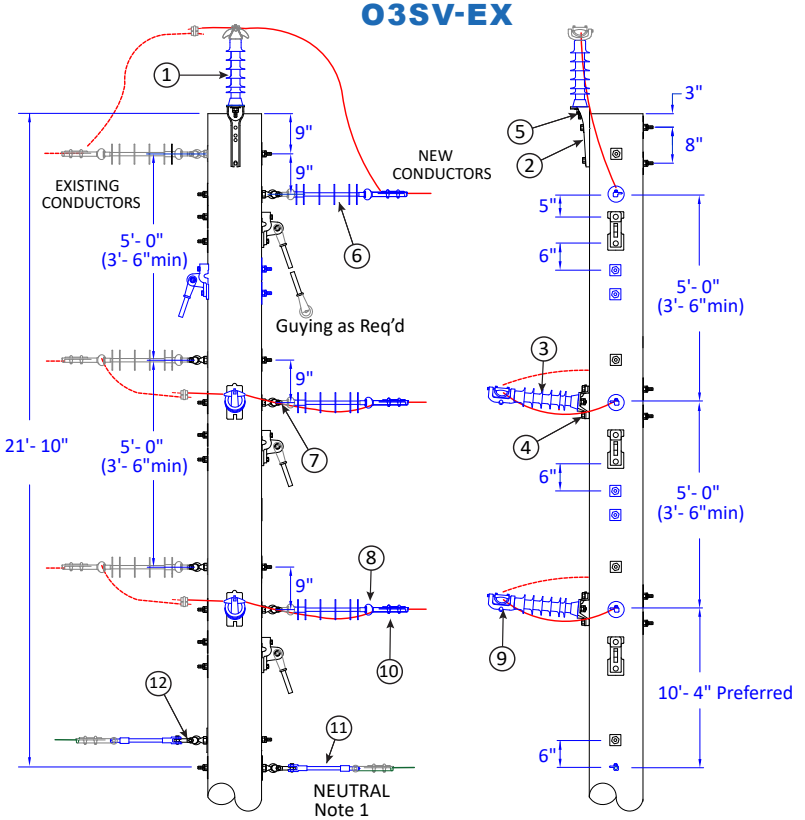
STEEL POLE
VERTICAL CONSTRUCTION
DEAD-END

FRM. CODE	O3SV-EX	O3SV-EX-477	O3SV-EX-795	O3SV-EX-1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	1	1	INSUL LP VER CLP/TP 35KV	240974000
2	1	1	1	1	PIN POLE TOP/POST INSUL	183060000
3	2	2	2	2	INSUL LP HOR CLP/TP 35KV	240976000
4	2	2	2	2	BRKT INSUL/HOR LP SHORT	180746000
5	3	3	3	3	BOLT STUD 3/4" X 3" SHORT/LP INSUL	204780000
6	3	3	3	3	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
7	3	3	3	3	CLEVIS Y-BALL	181208000
8	3	3	3	3	SOCKET EYE	181440000
9	3	-	-	-	CLAMP TOP AL 4-4/0	221870000
	-	3	-	-	CLAMP TOP 4/0-477	221890000
	-	-	3	3	CLAMP TOP AL 795MCM	221900000
10	4	1	-	-	CLAMP STRAIN 6-2/0 ACSR	221000000
	-	3	1	-	CLAMP STRAIN 477 MCM AL	221040000
	-	-	3	1	CLAMP STRAIN 795AL D END	221080000
	-	-	-	3	CLAMP STRAIN 1351 61 AAC DE	221170000
11	1	1	1	1	INSUL GUY STRAIN/FIB GLASS 12"	240840000
12	1	1	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS

QTY	DESCRIPTION	STOCK #
6	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
8	BOLT MACHINE3/4" X REQUIRED LENGTH	204_____
8	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
6	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
6	5/8" DBL COIL SPRING WASHER	206570000
8	3/4" DBL COIL SPRING WASHER	206580000

STEEL POLES
O3SV-EX



WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SV-EX	6-2/0	O3SV-EX-795	795
O3SV-EX-477	4/0-477	O3SV-EX-1351	1351

NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. Guying for permitted loading to be specified per Engineer.
3. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.
4. Framing to be used on Galvanized or Rustic Steel

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

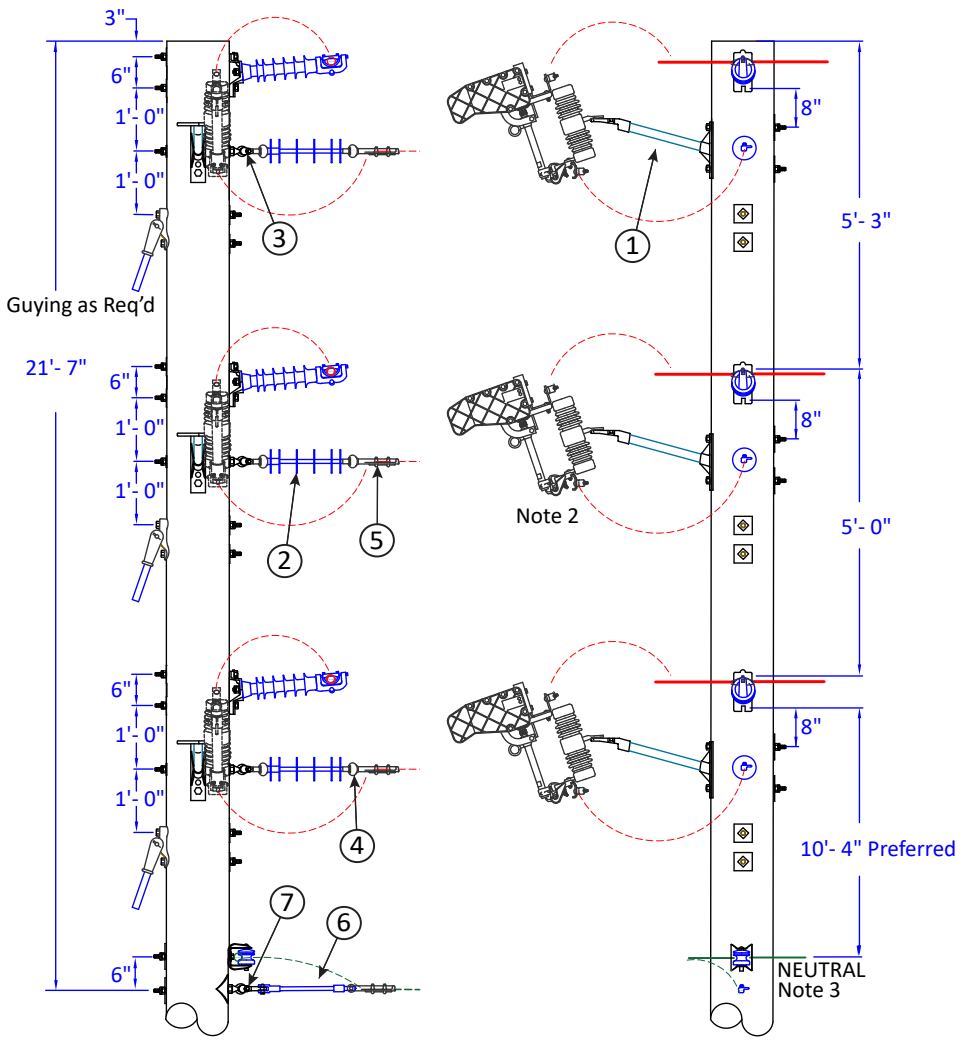
STEEL POLE
VERTICAL CONSTRUCTION
LINE EXTENSION

STEEL POLES
O3FV-BK

FRM. CODE	O3FV-BK	O3FV-BK-477	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	DESCRIPTION	STOCK #
1	3	3	BRKT INS/CO/ARR 18 IN FIBERGLASS	180745000
2	3	3	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
3	3	3	CLEVIS Y-BALL	181208000
4	3	3	SOCKET EYE	181440000
5	4	1	CLAMP STRAIN 6 - 2/0 ACSR	221000000
	-	3	CLAMP STRAIN 477MCM-AL	221040000
6	1	1	INSUL GUY STRAIN/FIB GLASS 12"	240840000
7	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
10	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
14	WASHER SQ CURVED 3-1/4", 13/16" HOLE	209520000
10	5/8" DBL COIL SPRING WASHER	206570000

WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3FV-BK	6-2/0	O3FV-BK-477	4/0-477



NOTES

1. Framing used on all pole types.
2. LBU shown is not included in CU, but is called for separately.
3. See the Framing Spacing section for alternate neutral spacing.
4. Guying for permitted loading to be specified per Engineer.
5. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

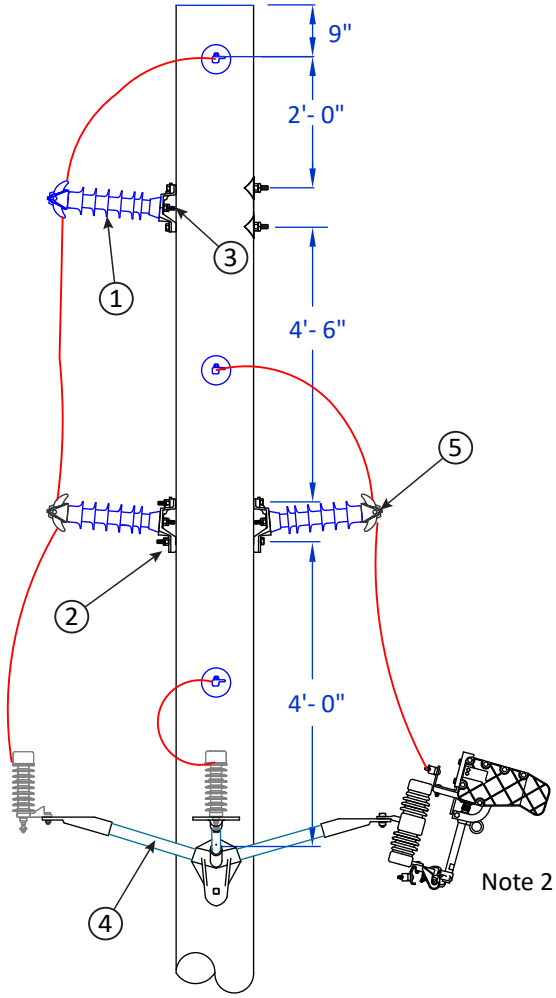
NES

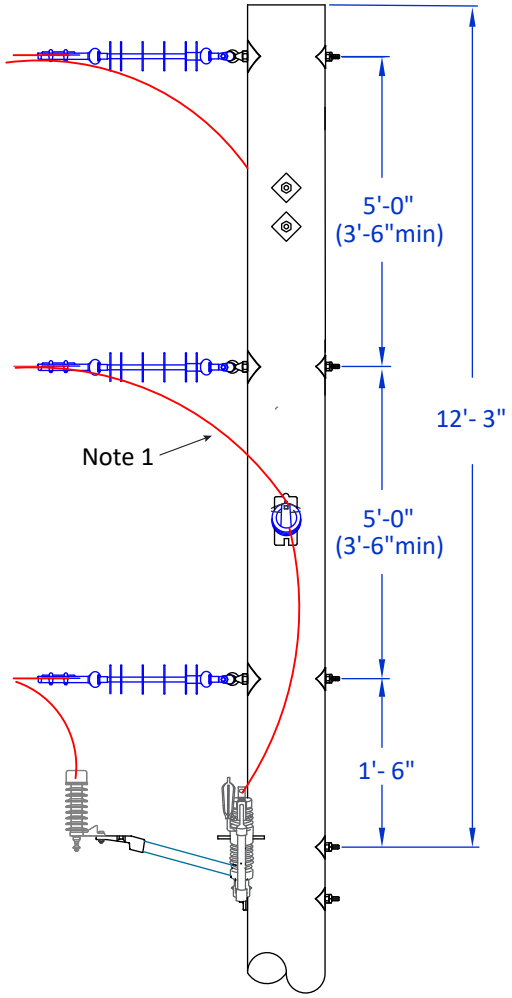
STEEL POLE
VERTICAL CONSTRUCTION
BUCK OR SIDE LINE TAP

FRM. CODE	O3SV-ET	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	3	INSUL LP HOR CLP/TP 35 KV	240976000
2	3	BRKT INSUL/HOR LP SHORT	180746000
3	3	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000
4	1	MOUNT CUTOUT 3PH CURVED	182700000
5	3	CLAMP TOP 4-4/0	221870000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
6	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
5	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
6	5/8” DBL COIL SPRING WASHER	206570000

STEEL POLES
O3SV-ET





NOTES

1. Min. stinger wire size #4 Cu BSD
2. Arrestors and/or cutouts are called for separately as req’d.
3. Consider wildlife protection based on environment.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

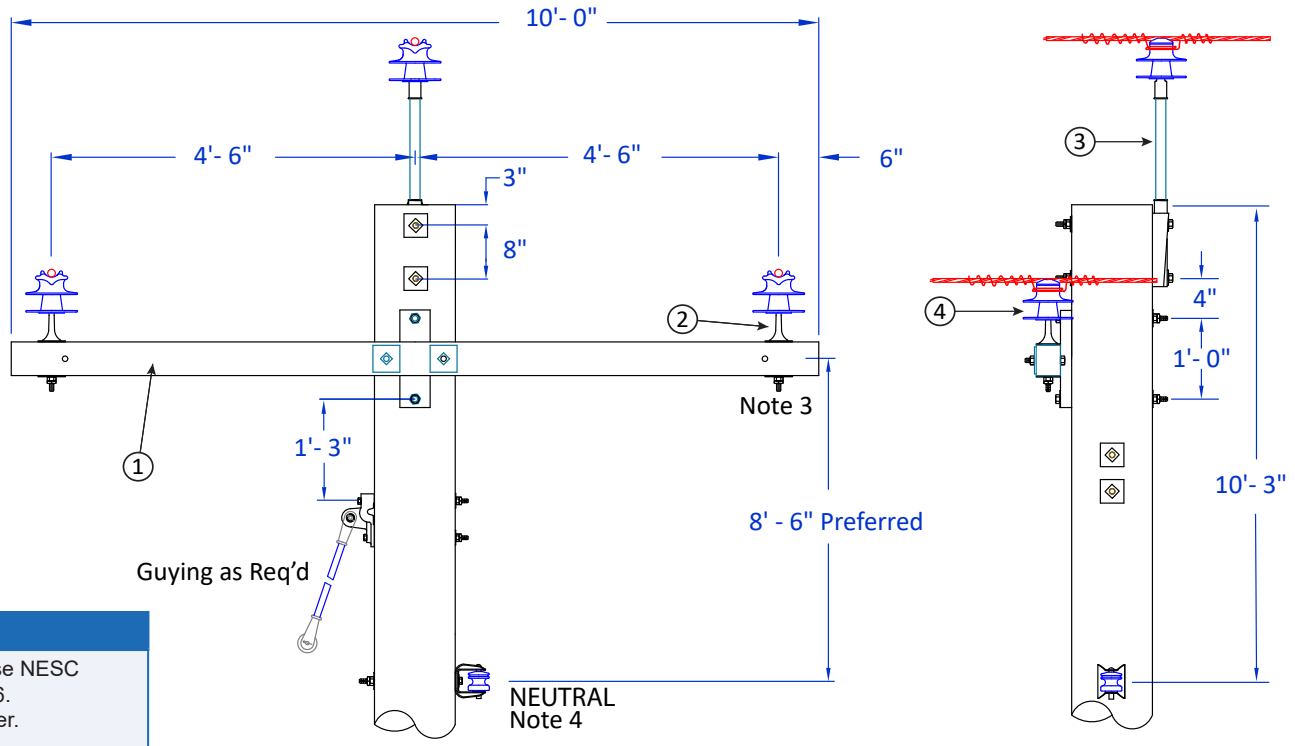
NES

STEEL POLE
VERTICAL CONSTRUCTION
EQUIPMENT TAP

FRM. CODE	O3FS-PT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	X-ARM 3-5/8” X 4-5/8” X 10’ FIBERGLASS	040400000
2	2	PIN STEEL 1 W/ 3/4” X 6 1/2” SHANK	183170000
3	1	PIN POLE TOP FIBERGLASS	183050000
4	3	PIN TOP INSUL. POLY 25KV	242190000

	TRUCK STOCK ITEMS	
QTY	DESCRIPTION	STOCK #
5	BOLT MACHINE 5/8” X REQUIRED LENGTH	203_____
5	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
4	WASHER SQ FLAT 4", 13/16" HOLE	209640000
5	5/8” DBL COIL SPRING WASHER	206570000
2	3/4" DBL COIL SPRING WASHER	206580000
1	RACK SECONDARY 1/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

STEEL POLES
O3FS-PT



WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3FS-PT	6-4/0 ACSR

NOTES

1. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.
2. Guying for permitted loading to be specified per Engineer.
3. Install two 4x4 Washers per Insulator Xarm Pin.
4. See the Framing Spacing section for alternate neutral spacing.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

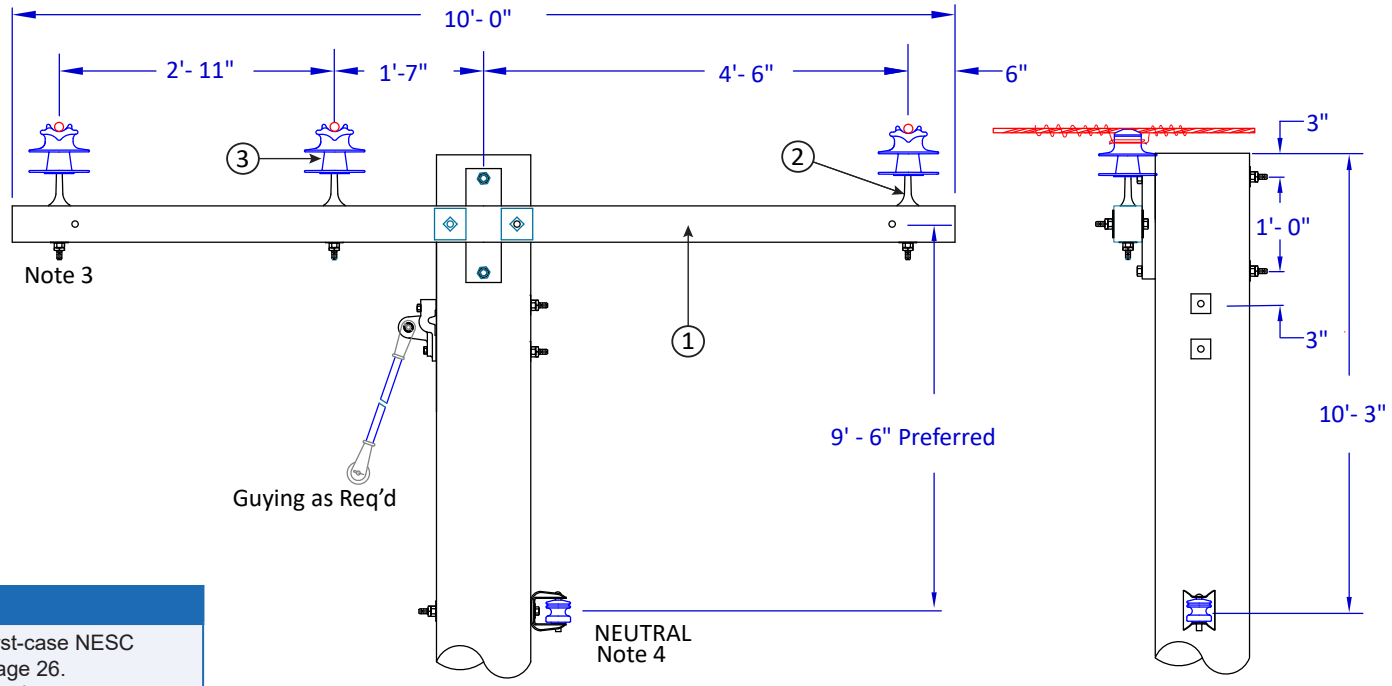
NES

STEEL POLE
SINGLE FIBERGLASS XARM CONST.
POLE TOP PIN

FRM. CODE	O3FS-HL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	X-ARM 3-5/8" X 4-5/8" X 10' FIBERGLASS	040400000
2	3	PIN STEEL 1 W/ 3/4" X 6-1/2" SHANK	183170000
3	3	PIN TOP INSUL. POLY 25KV	242190000

	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
3	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
3	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
6	WASHER SQ FLAT 4", 13/16" HOLE	209640000
3	5/8" DBL COIL SPRING WASHER	206570000
3	3/4" DBL COIL SPRING WASHER	206580000
1	RACK SECONDARY 1/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

STEEL POLES
O3FS-HL



WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3FS-HL	6-4/0 ACSR

NOTES

1. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.
2. Guying for permitted loading to be specified per Engineer.
3. Install two 4x4 Washers per Insulator Xarm Pin.
4. See the Framing Spacing section for alternate neutral spacing.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

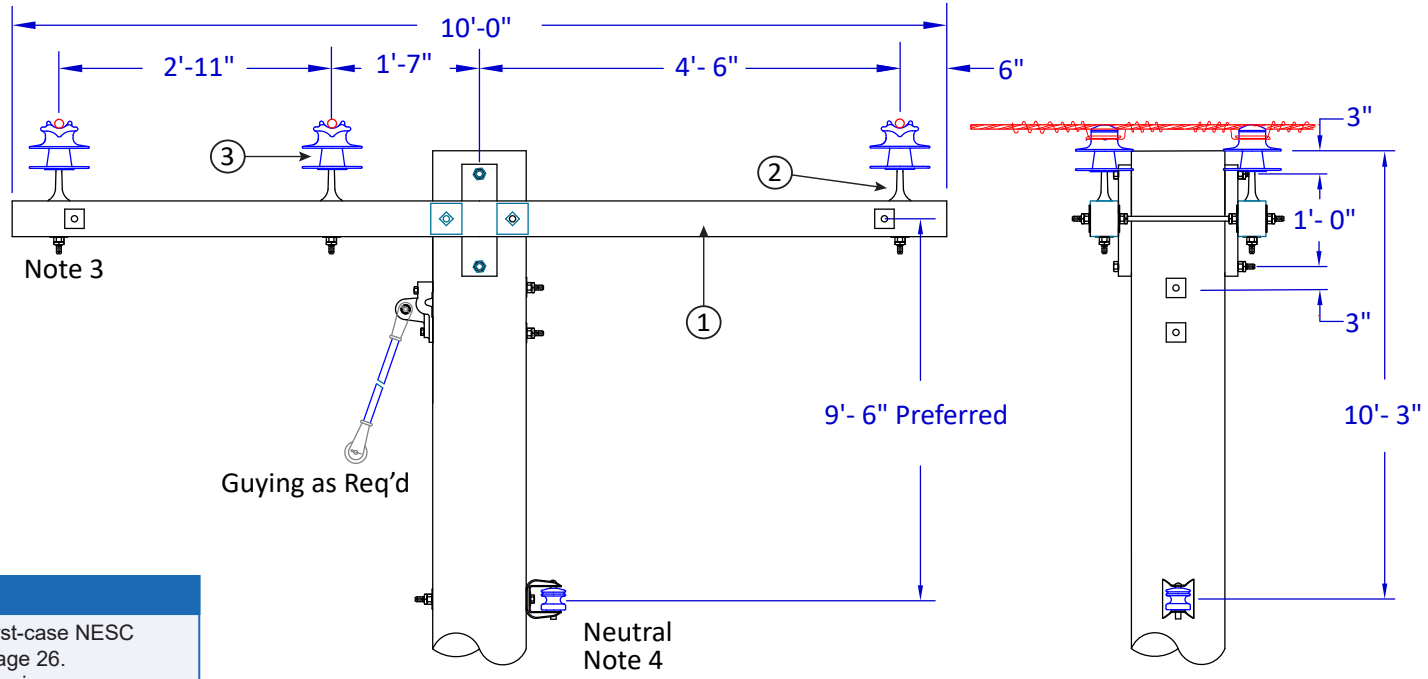
NES

STEEL POLE
SINGLE FIBERGLASS XARM CONST.
HORIZONTAL LINE

FRM. CODE	O3FD-HL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 3-5/8" X 4-5/8" X 10' FIBERGLASS	040400000
2	6	PIN STEEL 1 W/ 3/4" X 6-1/2" SHANK	183170000
3	6	PIN TOP INSUL. POLY 25KV	242190000

	TRUCK STOCK ITEMS	
	DESCRIPTION	STOCK #
3	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
2	BOLT DA 5/8" XREQ'D LENGTH	201_____
9	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
12	WASHER SQ FLAT 4", 13/16" HOLE	209640000
8	5/8" DBL COIL SPRING WASHER	206570000
6	3/4" DBL COIL SPRING WASHER	206580000
1	RACK SECONDARY 1/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

STEEL POLES
O3FD-HL



WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3FD-HL	6-4/0 ACSR

NOTES

1. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.
2. Guying for permitted loading to be specified per Engineer.
3. Install two 4x4 Washers per Insulator Xarm Pin.
4. See the Framing Spacing section for alternate neutral spacing.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
DOUBLE FIBERGLASS XARM CONST.
HORIZONTAL LINE

FRM. CODE	O3FD-DD	O3FD-DD-40	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	DESCRIPTION	STOCK #
1	2	2	X-ARM 4" X 6" X 10' FIBERGLASS	040410000
2	3	3	PIN STEEL 1 W/ 3/4" X 6-1/2" SHANK	183170000
3	3	3	PIN TOP INSUL. POLY 25KV	242190000
4	6	6	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
5	6	6	CLEVIS Y-BALL	181208000
6	6	6	SOCKET EYE	181440000
7	6	-	CLAMP STRAIN 6-2/0 ACSR	221000000
	-	6	CLAMP STRAIN 477MCM AL	221040000
8	2	2	INSUL GUY STRAIN/FIB GLASS 12"	240840000
9	2	2	CLEVIS Y-EYE, 90 DEGREE	181210000

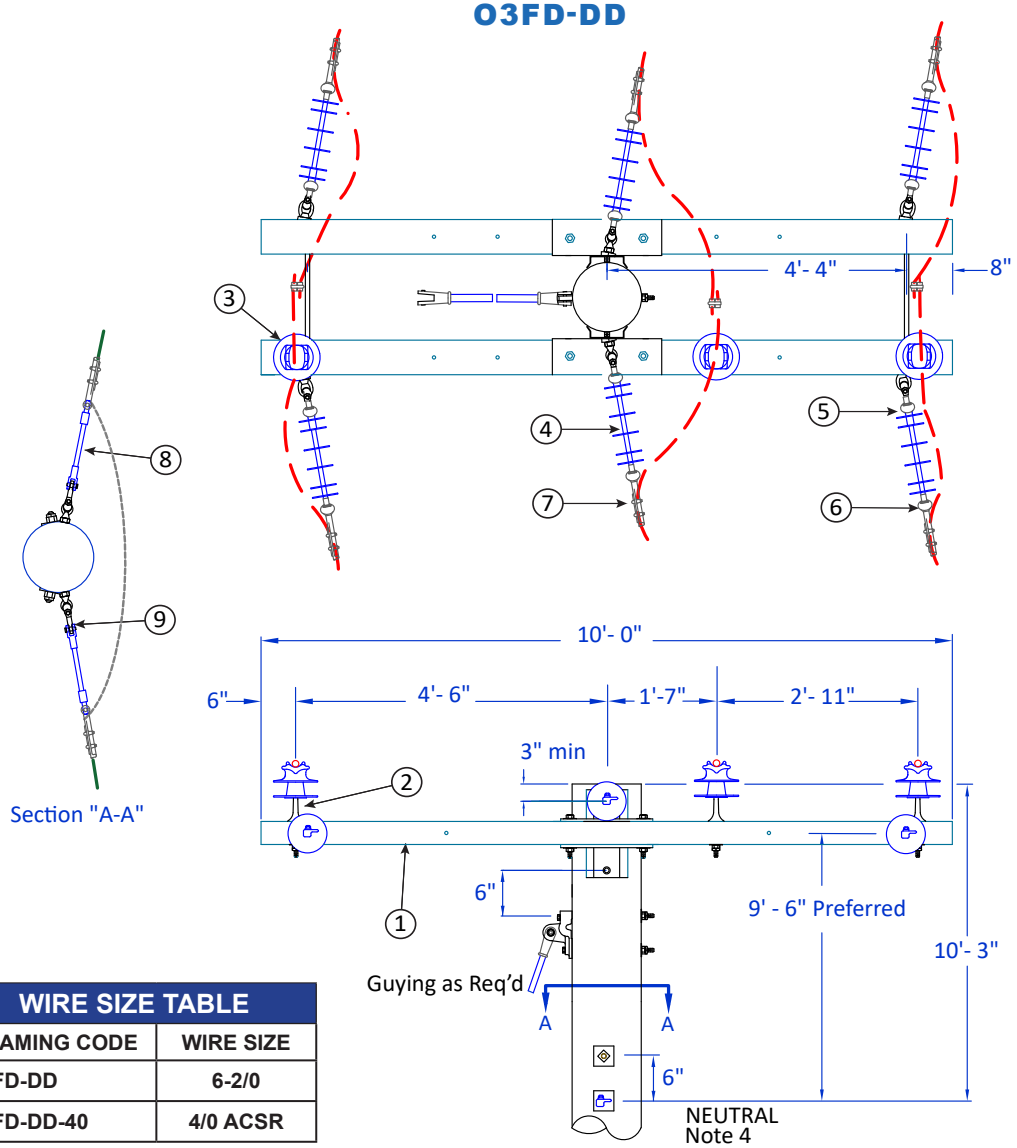
TRUCK STOCK ITEMS

QTY	DESCRIPTION	STOCK #
4	BOLT DA 3/4" X REQUIRED LENGTH	201_____
2	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
12	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
6	NUT OVAL EYE 3/4"	206420000
2	NUT OVAL EYE 5/8"	206400000
2	5/8" DBL COIL SPRING WASHER	206570000
3	3/4" DBL COIL SPRING WASHER	206580000

NOTES

1. This framing requires heavy duty fiberglass crossarms.
2. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.
3. Guying for permitted loading to be specified per Engineer.
4. See the Framing Spacing section for alternate neutral spacing.
5. On double dead-end framing, line openings will be noted on the drawing along with a note to install arresters.

STEEL POLES
O3FD-DD



WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3FD-DD	6-2/0
O3FD-DD-40	4/0 ACSR

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
DOUBLE FIBERGLASS XARM CONST
DOUBLE DEAD-END

FRM. CODE	O3FS-DE	O3FS-DE-40	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	X-ARM 4" X 6" X 10' FIBERGLASS	040410000
2	3	3	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
3	3	3	CLEVIS Y-BALL	181208000
4	3	3	SOCKET EYE	181440000
5	3	-	CLAMP STRAIN 6-2/0 ACSR	221000000
	-	3	CLAMP STRAIN 477MCM AL	210400000
6	1	1	INSUL GUY STRAIN/FIB GLASS 12"	240840000
7	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

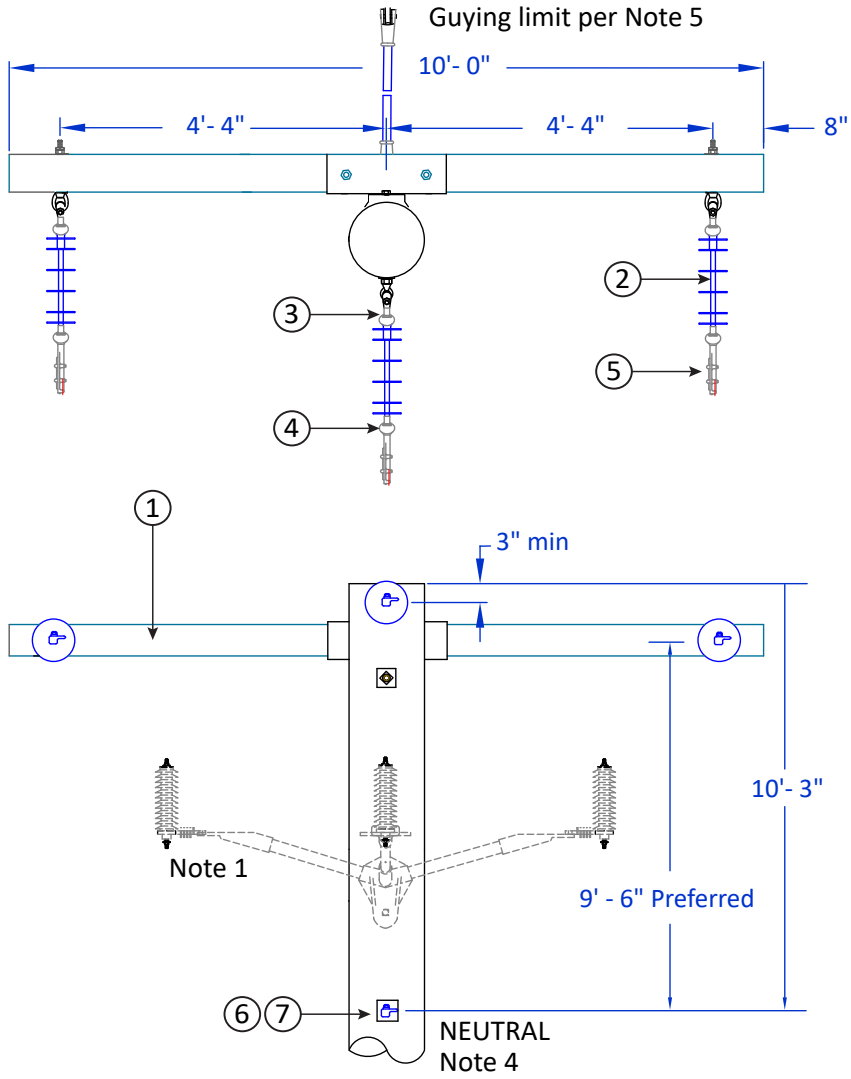
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	BOLT MACHINE 3/4" X REQUIRED LENGTH	204_____
4	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
4	NUT OVAL EYE 3/4"	206420000
3	3/4" DBL COIL SPRING WASHER	206580000

WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3FS-DE	6-2/0	O3FS-DE-40	4/0 ACSR

NOTES

1. Equipment bracket and arresters called for separately.
2. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.
3. Guying for permitted loading to be specified per Engineer.
4. See the Framing Spacing section for alternate neutral spacing.
5. Limit (1) 12M guy or (2) 6M guys to fiberglass crossarm brackets.

STEEL POLES
O3FS-DE



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
SINGLE FIBERGLASS XARM CONST
DEAD-END

FRM. CODE	O2FS-EX	O2FS-EX-40	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	DESCRIPTION	STOCK #
1	3	3	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
2	3	3	CLEVIS Y-BALL	181208000
3	3	3	SOCKET EYE	181440000
4	3	-	CLAMP STRAIN 6-2/0 ACSR	221000000
	-	3	CLAMP STRAIN 477MCM AL	221040000
5	1	1	INSUL GUY STRAIN/FIB GLASS 12"	240840000
6	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000
7	3	3	PIN STEEL 1 W/ 3/4" X 6-1/2" SHANK	183170000
8	3	3	PIN TOP INSUL. POLY 25KV	242190000

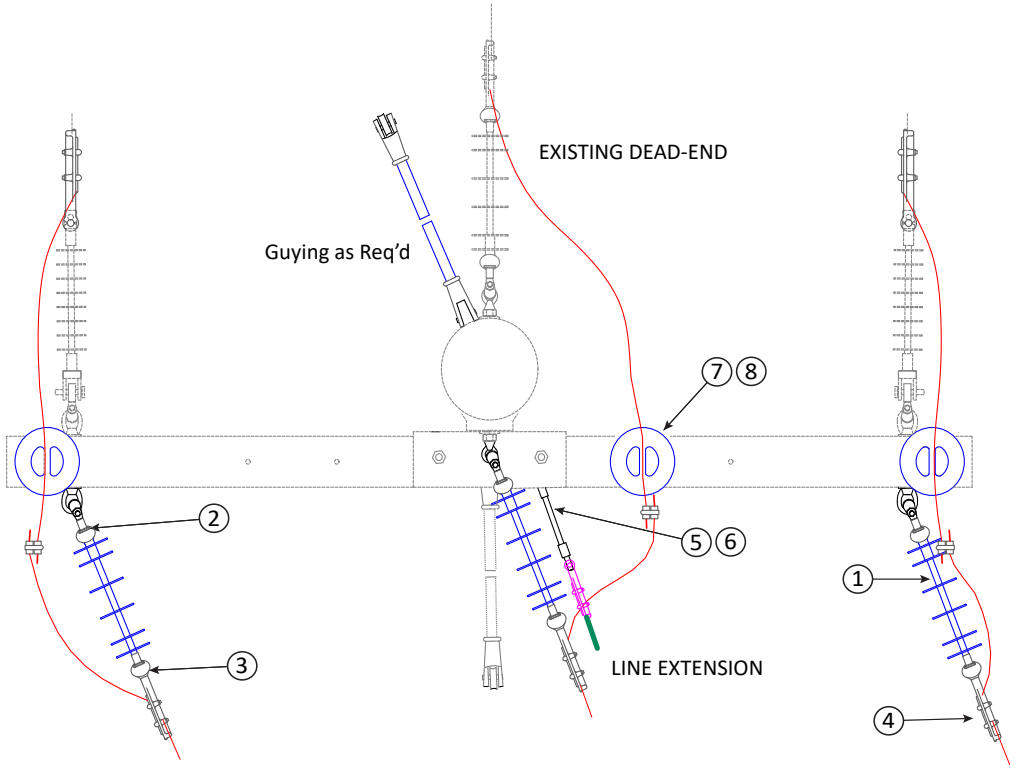
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	NUT OVAL EYE 5/8"	206400000
1	BOLT MACHINE 5/8" X REQUIRED LENGTH	203_____
1	5/8" DBL COIL SPRING WASHER	206570000
1	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000

WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3FX-EX	6-2/0
O3FX-EX-40	4/0 ACSR

NOTES

1. Conductor size range #6 CU to 1/0 ACSR.
2. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.
3. Guying for permitted loading to be specified per Engineer.
4. See the Framing Spacing section for alternate neutral spacing.

STEEL POLES
O3FX-EX



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
SINGLE FIBERGLASS XARM CONST
LINE EXTENSION

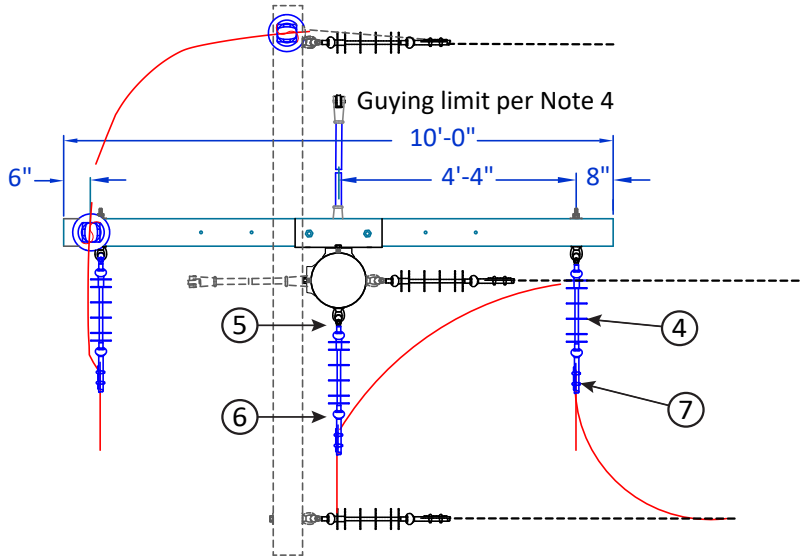
FRM. CODE	O3FS-BK	O3FS-BK-40	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	X-ARM 4” X 6” X 10’ FIBERGLASS	040410000
2	2	2	PIN STEEL 1 W/ 3/4” X 6-1/2” SHANK	183170000
3	2	2	PIN TOP INSUL. POLY 25KV	242190000
4	3	3	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
5	3	3	CLEVIS Y-BALL	181208000
6	3	3	SOCKET EYE	181440000
7	3	-	CLAMP STRAIN 6-2/0 ACSR	221000000
	-	3	CLAMP STRAIN 477MCM AL	221040000
8	1	1	INSUL GUY STRAIN/FIB GLASS 12”	240840000
9	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
3	BOLT MACHINE 3/4” X REQUIRED LENGTH	204_____
4	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
4	NUT OVAL EYE 3/4”	206420000
3	3/4” DBL COIL SPRING WASHER	206580000

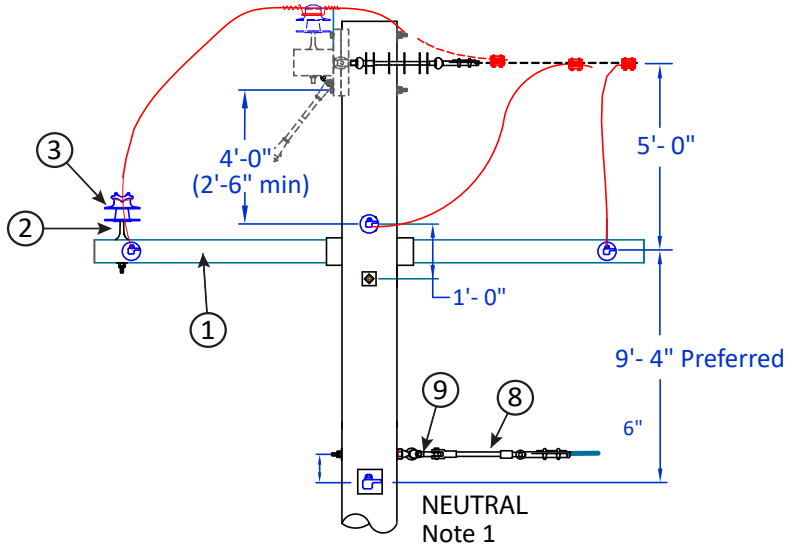
WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3FS-BK	6-2/0	O3FS-BK-40	4/0 ACSR

NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. Guying for permitted loading to be specified per Engineer.
3. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 26.
4. Limit (1) 12M guy or (2) 6M guys to fiberglass crossarm brackets.



STEEL POLES
O3FS-BK



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
FIBERGLASS XARM CONSTRUCTION
BUCK ARM

FRM. CODE	O3SA-HL	O3SA-HL-477	O3SA-HL-795	O3RA-HL	O3RA-HL-477	O3RA-HL-795	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY			QTY			DESCRIPTION	STOCK #
1	1	1	1				X-ARM STEEL ALLEY LONG BRACELESS	040760000
				1	1	1	X-ARM WEATHERING STEEL ALLEY	040800000
2	2	2	2	2	2	2	BOLT MACHINE 1” X 14”	204281400
3	3	3	3	3	3	3	BOLT STUD 3/4” X 8” LONG/LP INSUL	204790000
4	3	3	3	3	3	3	INSUL LP VERT CLP/TP 35KV	240974000
5	3	-	-	3	-	-	CLAMP TOP 4-4/0	221870000
	-	3	-	-	3	-	CLAMP TOP 4/0-477	221890000
	-	-	3	-	-	3	CLAMP TOP AL 795MCM	221900000

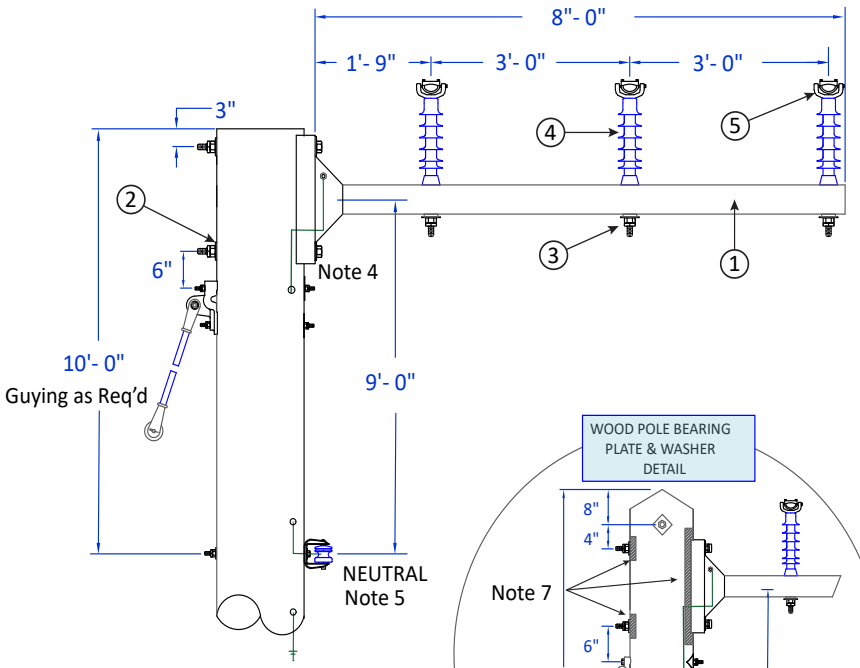
TRUCK STOCK ITEMS

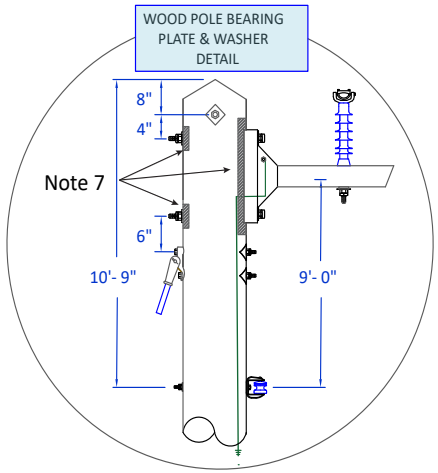
QTY	DESCRIPTION	STOCK #
2	WASHER SQ FLAT 4” FOR 1” BOLTS	209650000
3	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
4	3/4” DBL COIL SPRING WASHER	206580000
1	RACK SECONDARY 1W/LARGE	184003000
1	BOLT MACHINE 3/4” X REQUIRED LENGTH	204_____

WOOD POLE INSTALLATION MATERIAL

DESCRIPTION	STOCK NO.	C.U.
WOOD POLE, BEARING PLATE W/9” X 10” WASHERS	183520000	OBPLATE-ARM

STEEL POLES
O3SA-HL





NOTES

1. Unbalance limit is 325 lbs. per phase design tension.
2. Max. span length of 350 ft.and max. vertical change of 20 ft.
3. Rake pole 4” minimum away from arm, unless specified by Engineer.
4. All steel arms must be bonded to pole ground.
5. See the Framing Spacing section for alternate neutral spacing.
6. Guying for permitted loading to be specified per Engineer.
7. Bearing plates w/oversized backing washers are req’d on Wood Poles (see General Framing section).
8. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.

WIRE SIZE TABLE

FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SA-HL	4-1/0	O3RA-HL	4-1/0
O3SA-HL-477	4/0-477	O3RA-HL-477	4/0-477
O3SA-HL-795	795-1351	O3RA-HL-795	795-1351

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
STEEL ALLEY ARM CONST
HORIZONTAL LINE

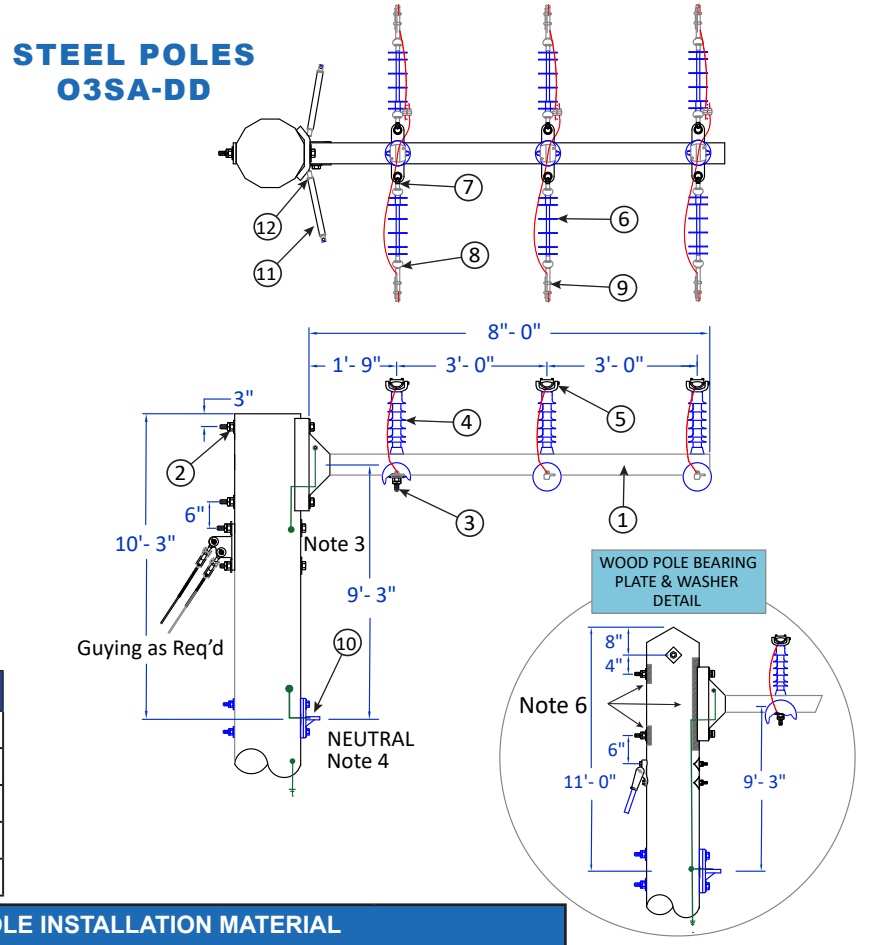
MAJOR AND MINOR MATERIAL ITEM LIST

FRM. CODE	O3SA-DD	O3SA-DD-477	O3SA-DD-795	O3SA-DD1351	O3RA-DD	O3RA-DD-477	O3RA-DD-795	O3RA-DD1351		
ITEM	QTY				QTY				DESCRIPTION	STOCK #
1	1	1	1	1					X-ARM STEEL ALLEY LONG BRACELESS	040760000
					1	1	1	1	X-ARM WEATHERING STEEL ALLEY	040800000
2	2	2	2	2	2	2	2	2	BOLT MACHINE 1" X 14"	204281400
3	3	3	3	3	3	3	3	3	BOLT STUD 3/4" X 8" LONG/LP INSUL	204790000
4	3	3	3	3	3	3	3	3	INSUL LP VERT CLP/TP 35KV	240974000
5	3	-	-	-	3	-	-	-	CLAMP TOP 4-4/0	221870000
	-	3	-	-	-	3	-	-	CLAMP TOP 4/0-477	221890000
	-	-	3	3	-	-	3	3	CLAMP TOP AL 795MCM	221900000
6	6	6	6	6	6	6	6	6	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
7	6	6	6	6	6	6	6	6	CLEVIS Y-BALL	181208000
8	6	6	6	6	6	6	6	6	SOCKET EYE	181440000
9	8	2	-	-	8	2	-	-	CLAMP STRAIN 6-2/0	221000000
	-	6	2	-	-	6	2	-	CLAMP STRAIN 477MCM-AL	221040000
	-	-	6	2	-	-	6	2	CLAMP STRAIN 795AL D END	221080000
	-	-	-	6	-	-	-	6	CLAMP STRAIN 1351 61 AAC DE	2211170000
10	1	1	1	1	1	1	1	1	BRACKET, DOUBLE DEAD-END ANGLE	180780000
11	2	2	2	2	2	2	2	2	INSUL GUY STRAIN/FIB GLASS 12"	240840000
12	2	2	2	2	2	2	2	2	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS

QTY	DESCRIPTION	STOCK #
2	WASHER SQ FLAT 4" FOR 1" BOLTS	209650000
3	WASHER SQ FLAT 4", 13/16" HOLE	209640000
3	3/4" DBL COIL SPRING WASHER	206580000

STEEL POLES
O3SA-DD



NOTES

1. Dead-end unbalanced limit is 500 lbs. per phase design tension.
2. Rake pole 4" minimum away from arm, unless specified by Engineer.
3. All steel arms must be bonded to pole ground.
4. See the Framing Spacing section for alternate neutral spacing.
5. Guying for permitted loading to be specified per Engineer.
6. Bearing plates w/oversized backing washers are req'd on Wood Poles (see General Framing section).
7. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.

WIRE SIZE TABLE

FRAMING CODE	WIRE SIZE
O3xA-DD	6-2/0
O3xA-DD-477	4/0-477
O3xA-DD-795	795
O3xA-DD1351	1351

WOOD POLE INSTALLATION MATERIAL

DESCRIPTION	STOCK NO.	C.U.
WOOD POLE, BEARING PLATE W/9" X 10" WASHERS	183520000	OBPLATE-ARM

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
STEEL ALLEY ARM CONST
DOUBLE DEAD-END

FRM. CODE	O3SA-SB	O3SA-SB-477	O3SA-SB-795	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	1	X-ARM STEEL ALLEY LONG BRACELESS	040760000
2	2	2	2	BOLT MACHINE 1” X 14”	204281400
3	3	3	3	BOLT STUD 3/4” X 8” LONG/LP INSUL	204790000
4	3	3	3	INSUL LP VERT CLP/TP 35KV	240974000
5	3	-	-	CLAMP TOP 4-4/0	221870000
	-	3	-	CLAMP TOP 4/0-477	221890000
	-	-	3	CLAMP TOP AL 795MCM	221900000
6	3	3	3	INSUL SUSP 35 KV POLY, SOCKET BALL	242752000
7	3	3	3	CLEVIS Y-BALL	181208000
8	3	3	3	SOCKET EYE	181440000
9	3	-	-	CLAMP STRAIN 6-2/0	221000000
	-	3	-	CLAMP STRAIN 477MCM-AL	221040000
	-	-	3	CLAMP STRAIN 795AL D END	221080000
10	1	1	1	INSUL GUY STRAIN/FIB GLASS 12”	240840000
11	1	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

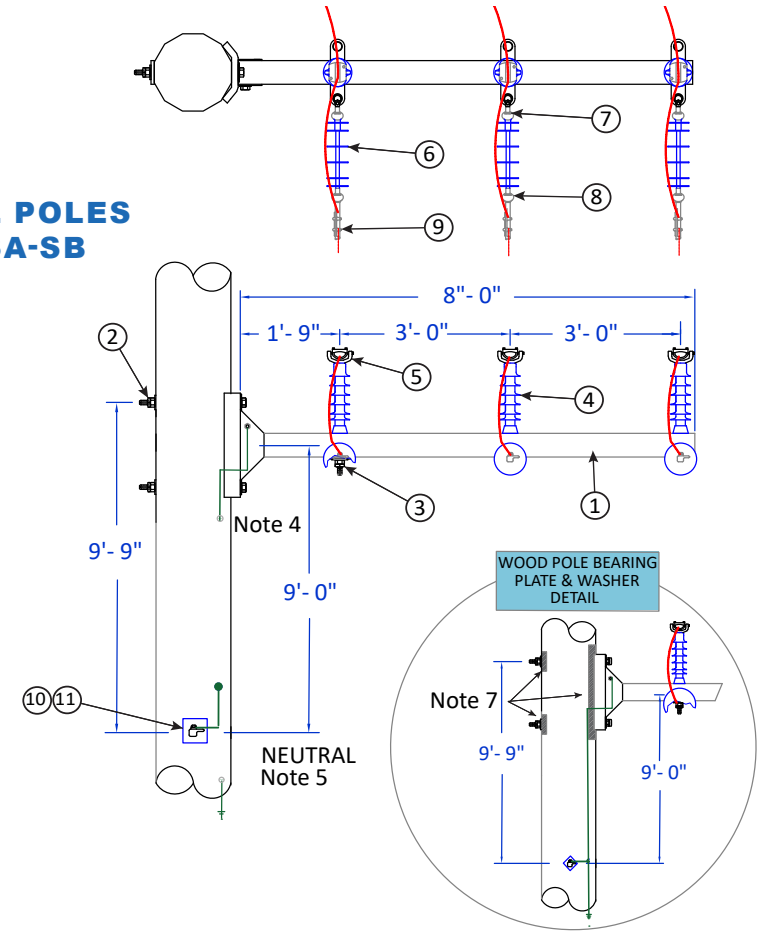
WOOD POLE INSTALLATION MATERIAL		
DESCRIPTION	STOCK NO.	C.U.
WOOD POLE, BEARING PLATE W/9” X 10” WASHERS	183520000	OBPLATE-ARM

NOTES

1. Dead-end limit is 500 lbs. per phase design tension.
2. Max. span length of 100 ft.and max. verticall change of 20 ft.
3. Rake pole 4” minimum away from arm, unless specified by Engineer.
4. All steel arms must be bonded to pole ground.
5. See the Framing Spacing section for alternate neutral spacing.
6. Guying for permitted loading to be specified per Engineer.
7. Bearing plates w/oversized backing washers are req’d on Wood Poles (see General Framing section).
8. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	WASHER SQ FLAT 4” FOR 1” BOLTS	209650000
3	WASHER SQ FLAT 4”, 13/16” HOLE	209640000
3	3/4” DBL COIL SPRING WASHER	206580000

STEEL POLES
O3SA-SB



WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
O3SA-SB	6-2/0
O3SA-SB-477	4/0-477
O3SA-SB-795	795-1351

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

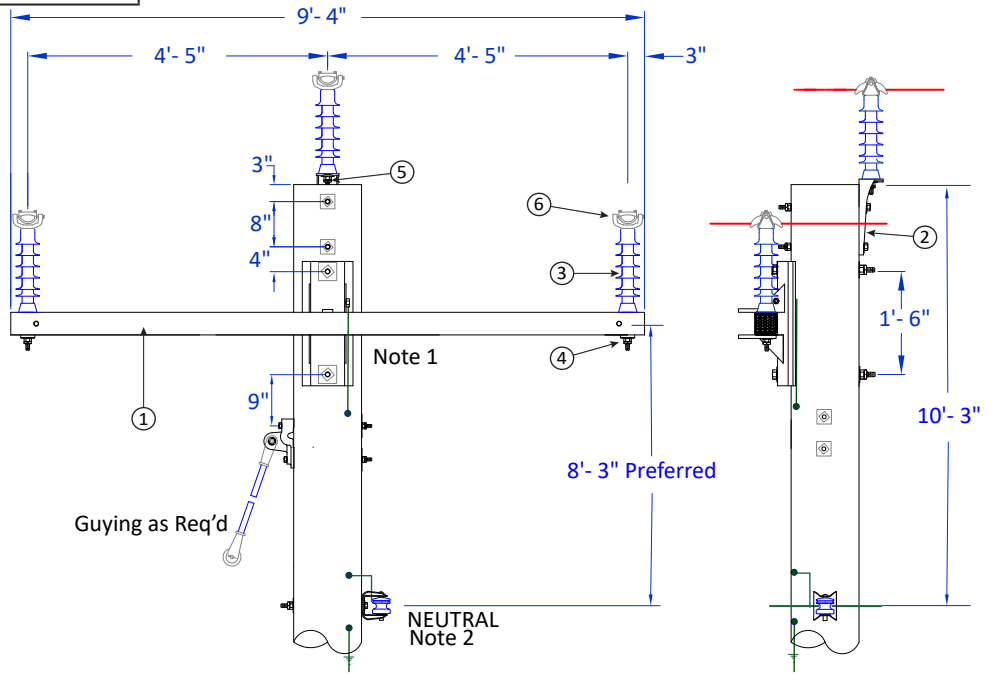
NES

STEEL POLE
STEEL ALLEY ARM CONST
SLACK BUCK

FRM. CODE	O3SS-PT-477	O3SS-PT-795	O3RS-PT	O3RS-PT-477	O3RS-PT-795	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	-	-	-	X-ARM STEEL 4” X 4” X 9’- 4”	040754000
	-	-	1	1	1	X-ARM WEATH STEEL 4” X 4” X 9’- 4”	040801000
2	1	1	1	1	1	PIN POLE TOP/POST INSUL	183060000
3	3	3	3	3	3	INSUL LP VER CLP/TOP 35KV	240974000
4	2	2	2	2	2	BOLT STUD 3/4” X8” LONG/LP INSUL	204790000
5	1	1	1	1	1	BOLT STUD 3/4” X 3” SHORT/LP INSUL	204780000
6	-	-	3	-	-	CLAMP TOP 4-4/0	221870000
	3	-	-	3	-	CLAMP TOP 4/0-477	221890000
	-	3	-	-	3	CLAMP TOP AL 795MCM	221900000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
1	BOLT MACHINE 5/8” X REQ’D LENGTH	203_____
2	BOLT MACHINE 3/4” X REQ’D LENGTH	204_____
5	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
1	5/8” DBL COIL SPRING WASHER	206570000
2	3/4” DBL COIL SPRING WASHER	206580000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

STEEL POLES
O3SS-PT



WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SS-PT-477	4/0-477	O3RS-PT	4-4/0
O3SS-PT-795	795-1351	O3RS-PT-477	4/0-477
-	-	O3RS-PT-795	795-1351

NOTES

1. All steel arms must be grounded to pole ground.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

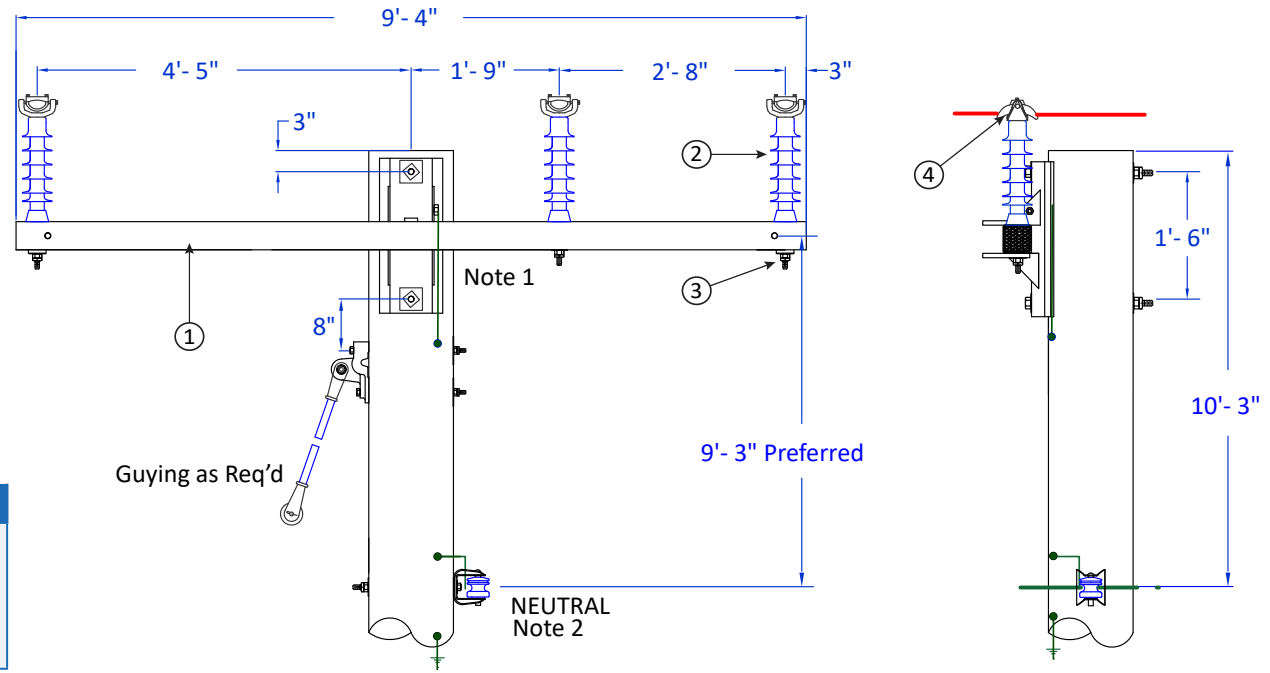
NES

STEEL POLE
SINGLE STEEL XARM CONST
POLE TOP POST

FRM. CODE	O3SS-HL-477	O3SS-HL-795	O3RS-HL	O3RS-HL-477	O3RS-HL-795	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	-	-	-	X-ARM STEEL 4” X 4” X 9’- 4”	040754000
	-	-	1	1	1	X-ARM WEATH STEEL 4” X 4” X 9’- 4”	040801000
2	3	3	3	3	3	INSUL LP VER CLP/TOP 35KV	240974000
3	3	3	3	3	3	BOLT STUD 3/4” X8” LONG/LP INSUL	204790000
4	-	-	3	-	-	CLAMP TOP 4-4/0	221870000
	3	-	-	3	-	CLAMP TOP 4/0-477	221890000
	-	3	-	-	3	CLAMP TOP AL 795MCM	221900000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
1	BOLT MACHINE 5/8” X REQ’D LENGTH	203_____
2	BOLT MACHINE 3/4” X REQ’D LENGTH	204_____
6	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
1	5/8” DBL COIL SPRING WASHER	206570000
5	3/4” DBL COIL SPRING WASHER	206580000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

STEEL POLES
O3SS-HL



WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SS-HL-477	4/0-477	O3RS-HL	4-4/0
O3SS-HL-795	795-1351	O3RS-HL-477	4/0-477
-	-	O3RS-HL-795	795-1351

NOTES

1. All steel arms must be grounded to pole ground.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

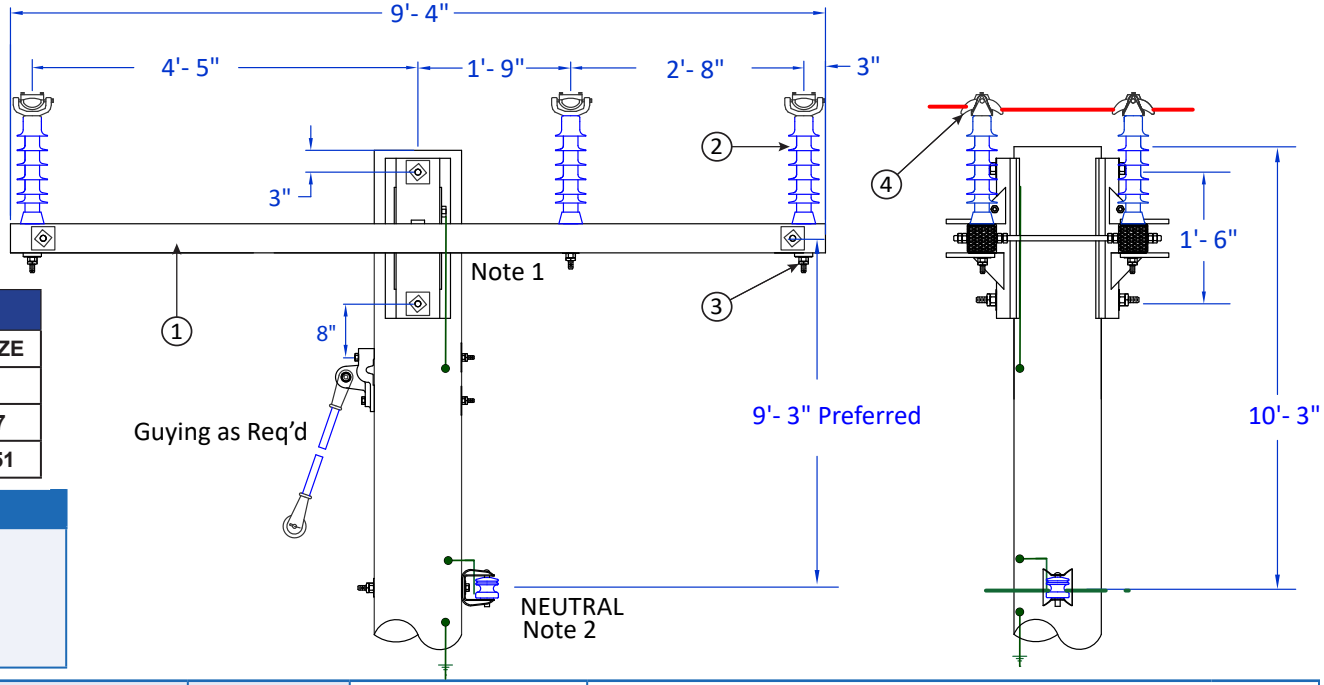
NES

STEEL POLE
SINGLE STEEL XARM CONST
HORIZONTAL LINE

FRM. CODE	O3SD-HL-477	O3SD-HL-795	O3RD-HL	O3RD-HL-477	O3RD-HL-795	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	2	2	-	-	-	X-ARM STEEL 4” X 4” X 9’- 4”	040754000
	-	-	2	2	2	X-ARM WEATH STEEL 4” X 4” X 9’- 4”	040801000
2	6	6	6	6	6	INSUL LP VER CLP/TOP 35KV	240974000
3	6	6	6	6	6	BOLT STUD 3/4” X8” LONG/LP INSUL	204790000
4	-	-	6	-	-	CLAMP TOP 4-4/0	221870000
	6	-	-	6	-	CLAMP TOP 4/0-477	221890000
	-	6	-	-	6	CLAMP TOP AL 795MCM	221900000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
1	BOLT MACHINE 5/8” X REQ’D LENGTH	203_____
2	BOLT MACHINE 3/4” X REQ’D LENGTH	204_____
9	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
1	5/8” DBL COIL SPRING WASHER	206570000
8	3/4” DBL COIL SPRING WASHER	206580000
1	RACK SECONDARY 1W/LARGE	184003000
1	INSUL RACK SPOOL - LARGE	242480000

STEEL POLES
O3SD-HL



WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SD-HL-477	4/0-477	O3RD-HL	4-4/0
O3SD-HL-795	795-1351	O3RD-HL-477	4/0-477
-	-	O3RD-HL-795	795-1351

NOTES

1. All steel arms must be grounded to pole ground.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
DOUBLE STEEL XARM CONST
HORIZONTAL LINE

FRM. CODE	O3SS-DD-477	O3SS-DD-795	O3RS-DD	O3RS-DD-477	O3RS-DD-795	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	-	-	-	X-ARM STEEL 4” X 4” X 9’- 4”	040754000
	-	-	1	1	1	X-ARM WEATH STEEL 4” X 4” X 9’- 4”	040801000
2	2	2	2	2	2	BOLT MACHINE 1” X 14”	204281400
3	3	3	3	3	3	INSUL LP VER CLP/TOP 35KV	240974000
4	3	3	3	3	3	BOLT STUD 3/4” X8” LONG/LP INSUL	204790000
5	6	6	6	6	6	CLEVIS Y-BALL	181208000
6	6	6	6	6	6	INSUL SUS 35 KV POLY, SOCKET BALL	242752000
7	6	6	6	6	6	SOCKET EYE	181440000
8	-	-	8	-	-	CLAMP STRAIN 6-2/0	221000000
	8	2	-	8	2	CLAMP STRAIN 477MCM-AL	221040000
	-	6	-	-	6	CLAMP STRAIN 795AL D END	221080000
9	-	-	3	-	-	CLAMP TOP AL 4-4/0	221870000
	3	-	-	3	-	CLAMP TOP 4/0-477	221890000
	-	3	-	-	3	CLAMP TOP AL 795MCM	221900000
10	1	1	1	1	1	BRACKET, DOUBLE DEAD-END ANGLE	180780000
11	2	2	2	2	2	INSUL GUY STRAIN/FIBERGLASS 12”	240840000
12	2	2	2	2	2	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS

QTY	DESCRIPTION	STOCK #
4	WASHER SQ FLAT 4” FOR 1” BOLTS	209650000
2	BOLT MACHINE 3/4” X REQ’D LENGTH	204_____

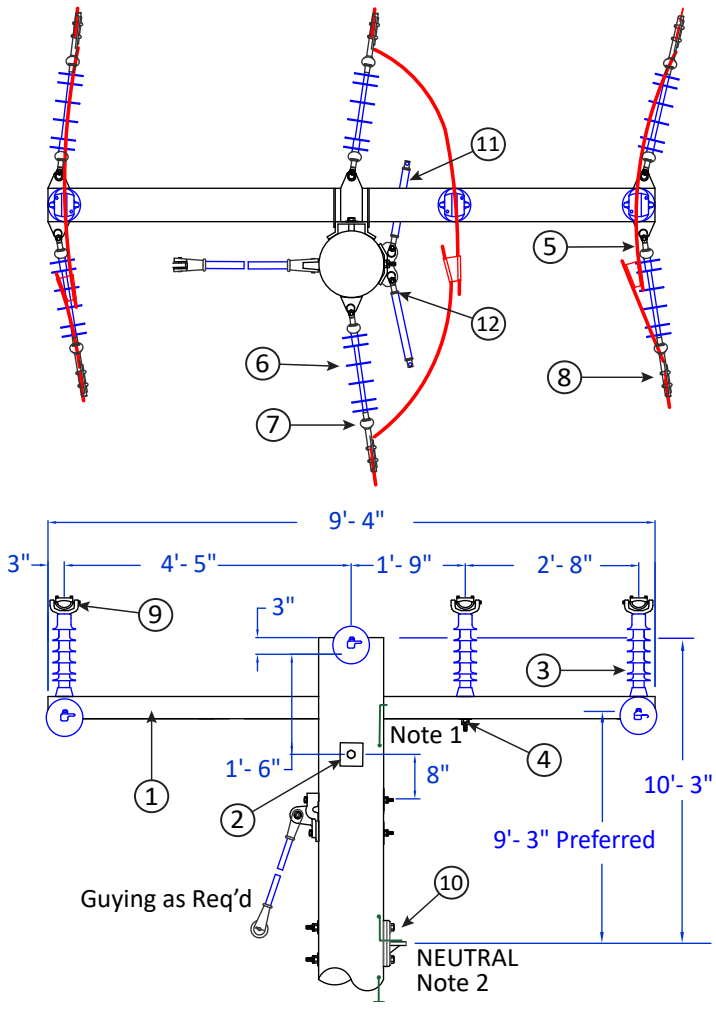
WIRE SIZE TABLE

FRAMING CODE	WIRE SIZE
O3RS-DD	6-2/0
O3xS-DD-477	4/0-477
O3xS-DD-795	795-1351

NOTES

1. All steel arms must be grounded to pole ground.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.
5. Reduced deflection angles when attached to wood poles. See Gen. Framing

STEEL POLES
O3SS-DD



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
SINGLE STEEL XARM CONST
DOUBLE DEAD-END

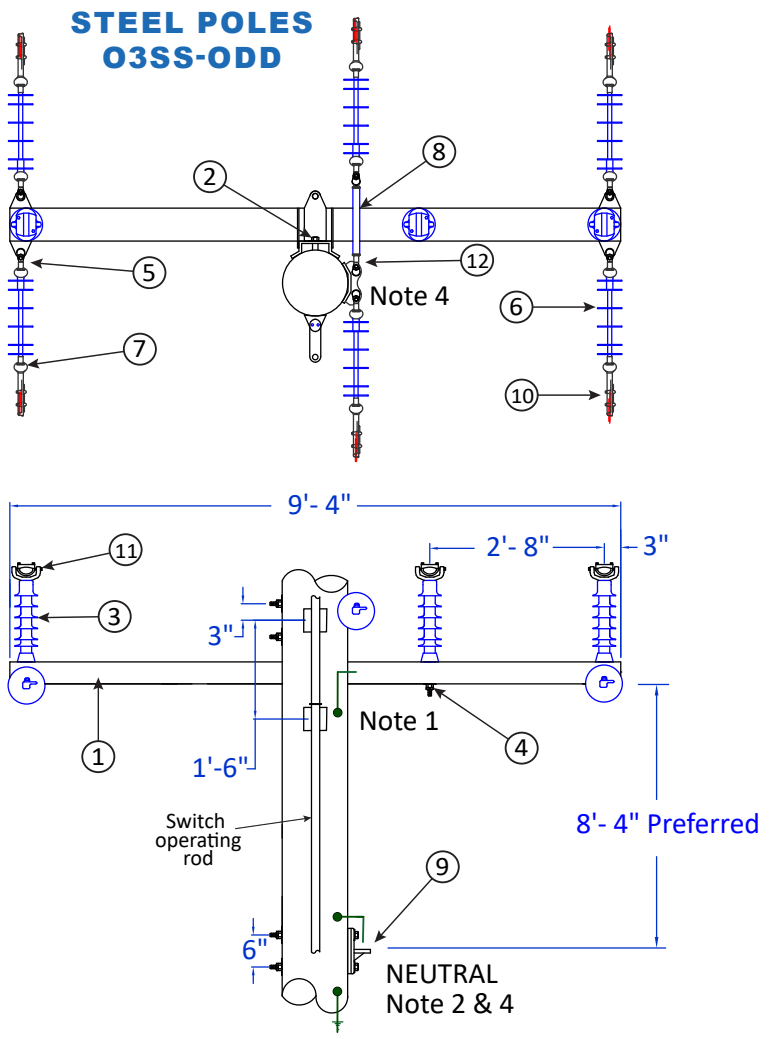
FRM. CODE	O3SS-ODD-477	O3SS-ODD-795	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	X-ARM STEEL 4" X 4" X 9'- 4"	040754000
2	2	2	BOLT MACHINE 1" X 14"	204281400
3	3	3	INSUL LP VER CLP/TOP 35KV	240974000
4	3	3	BOLT STUD 3/4" X8" LONG/LP INSUL	204790000
5	6	6	CLEVIS Y-BALL	181208000
6	6	6	INSUL SUS 35 KV POLY, SOCKET BALL	242752000
7	6	6	SOCKET EYE	181440000
8	3	3	INSUL GUY STRAIN/FIBERGLASS 12"	240840000
9	2	2	BRACKET, DOUBLE DEADEND ANGLE	180780000
	8	2	CLAMP STRAIN 477MCM-AL	221040000
	-	6	CLAMP STRAIN 795AL D END	221080000
11	3	-	CLAMP TOP 4/0-477	221890000
	-	3	CLAMP TOP AL 795MCM	221900000
12	3	3	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS

QTY	DESCRIPTION	STOCK #
2	BOLT MACHINE 3/4" X REQ'D LENGTH	204_____
5	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
2	WASHER SQ FLAT 4" FOR 1" BOLTS	209650000

NOTES

1. All steel arms must be grounded to pole ground.
2. See the Framing Spacing section for alternate neutral spacing.
3. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.
4. DDE-BRKT used for underbuild circuit with switch handle conflict.



WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SS-ODD-477	4/0-477	O3SS-ODD-795	795-1351

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

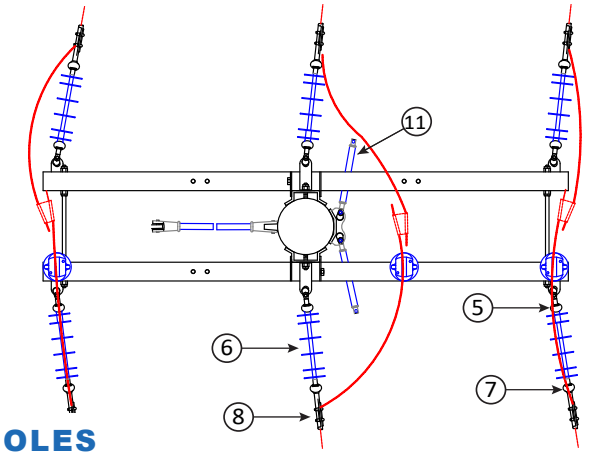
STEEL POLE
SINGLE STEEL XARM CONST
OFFSET DOUBLE DEAD-END

MAJOR AND MINOR MATERIAL ITEM LIST

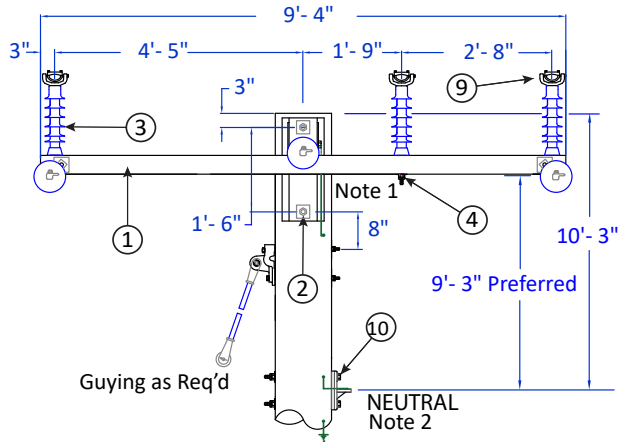
FRM. CODE	O3SD-DD-477	O3SD-DD-795	O3SD-DD-1351	O3RD-DD	O3RD-DD-477	O3RD-DD-795	O3RD-DD-1351		
ITEM	QTY	QTY	QTY	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	2	2	-	-	-	-	-	X-ARM STEEL 4" X 4" X 9'- 4"	040754000
	-	-	2	-	-	-	-	X-ARM STEEL 4" X 6" X 9'- 4"	040755000
	-	-	-	2	2	2	-	X-ARM WEATH STEEL 4" X 4" X 9'- 4"	040801000
	-	-	-	-	-	-	2	X-ARM WEATH STEEL 4" X 6" X 9'- 4"	040809000
2	-	-	2	-	-	-	2	BOLT MACHINE 1" X 14"	204281400
3	3	3	3	3	3	3	3	INSUL LP VER CLP/TOP 35KV	240974000
4	3	3	3	3	3	3	3	BOLT STUD 3/4" X8" LONG/LP INSUL	204790000
5	6	6	6	6	6	6	6	CLEVIS Y-BALL	181208000
6	6	6	6	6	6	6	6	INSUL SUS 35 KV POLY, SOCKET BALL	242752000
7	6	6	6	6	6	6	6	SOCKET EYE	181440000
8	2	-	-	6	2	-	-	CLAMP STRAIN 6-2/0	221000000
	6	2	-	-	6	2	-	CLAMP STRAIN 477MCM-AL	221040000
	-	6	2	-	-	6	2	CLAMP STRAIN 795AL D END	221080000
	-	-	6	-	-	-	6	CLAMP STRAIN 1351 61 AAC DE	221117000
9	-	-	-	3	-	-	-	CLAMP TOP AL 4-4/0	221870000
	6	-	-		6	-		CLAMP TOP 4/0-477	221890000
	-	6	6	-	-	6	6	CLAMP TOP AL 795MCM	221900000
10	1	1	1	1	1	1	1	BRACKET, DOUBLE DEADEND ANGLE	180780000
11	2	2	2	2	2	2	2	INSUL GUY STRAIN/FIBERGLASS 12"	240840000
12	2	2	2	2	2	2	2	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS

QTY	DESCRIPTION	STOCK #
4	WASHER SQ FLAT 4" FOR 1" BOLTS	209650000
4	BOLT DA 3/4" X REQ'D LENGTH	201_____
10	WASHER SQ FLAT 2-1/4", 13/16" HOLE	209620000
2	3/4" DBL COIL SPRING WASHER	206580000



STEEL POLES
O3SD-DD



NOTES

1. All steel arms must be grounded to pole ground.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.
5. On double dead-end framing, line openings will be noted on the drawing along with a note to add arresters.

WIRE SIZE TABLE

FRAMING CODE	WIRE SIZE
O3RS-DD	6-2/0
O3xS-DD-477	4/0-477
O3xS-DD-795	795
O3xS-DD-1351	1351

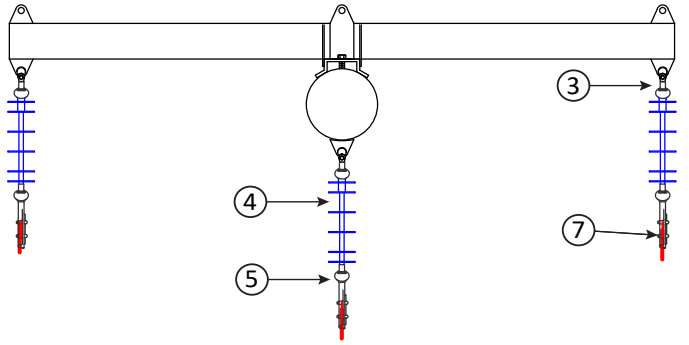
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
DOUBLE STEEL XARM CONST
DOUBLE DEAD-END

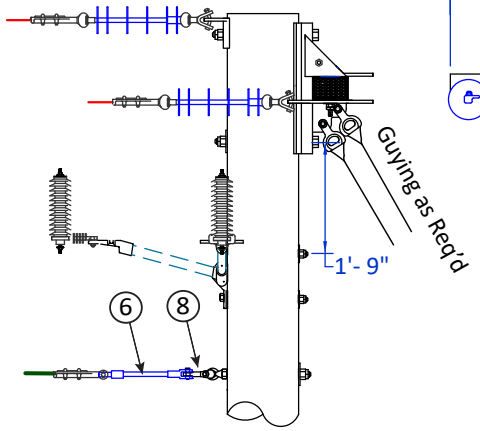
FRM. CODE	O3SS-DE-477	O3SS-DE-795	O3RS-DE	O3RS-DE-477	O3RS-DE-795	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	-	-	-	X-ARM STEEL 4” X 6” X 9’- 4”	040755000
	-	-	1	1	1	X-ARM WEATH STEEL 4” X 6” X 9’- 4”	040809000
2	2	2	2	2	2	BOLT MACHINE 1” X 14”	204281400
3	3	3	3	3	3	CLEVIS Y-BALL	181208000
4	3	3	3	3	3	INSUL SUS 35 KV POLY, SOCKET BALL	242752000
5	3	3	3	3	3	SOCKET EYE	181440000
6	1	1	1	1	1	INSUL GUY STRAIN/FIBERGLASS 12”	240840000
7	-	-	4	-	-	CLAMP STRAIN 6-2/0 ACSR	221000000
	4	1	-	4	1	CLAMP STRAIN 477MCM-AL	221040000
	-	3	-	-	3	CLAMP STRAIN 795AL D END	221080000
8	1	1	1	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

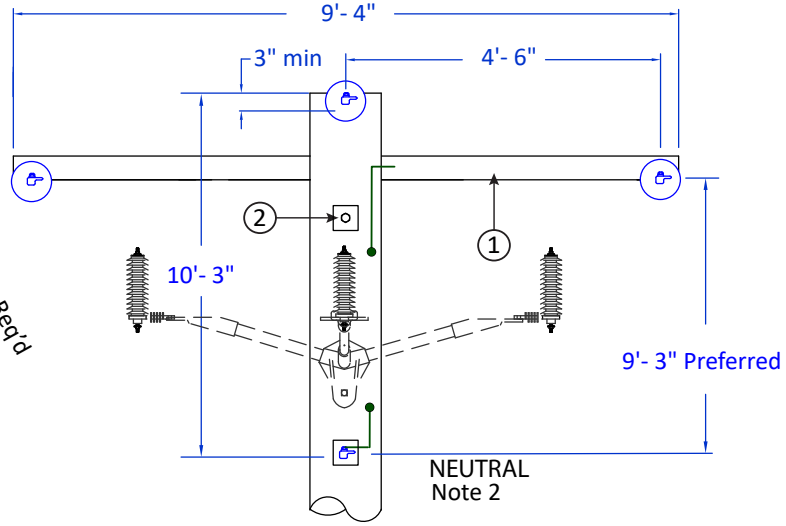
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	WASHER SQ FLAT 4” FOR 1” BOLTS	209650000
1	BOLT MACHINE 3/4” X REQ’D LENGTH	204_____
1	3/4” DBL COIL SPRING WASHER	206580000
2	WASHER SQ FLAT 2 1/4”, 13/16” HOLE	209620000
1	NUT OVAL EYE 3/4”	206420000



STEEL POLES
O3SS-DE

WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SS-DE-477	4/0-477	O3RS-DE	4-1/0
O3SS-DE-795	795	O3RS-DE-477	4/0-477
-	-	O3RS-DE-795	795





NOTES

1. All steel arms must be grounded to pole ground.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.
5. Center phase tab is included with crossarm.
6. 3 Phase bracket and arresters called for separately.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

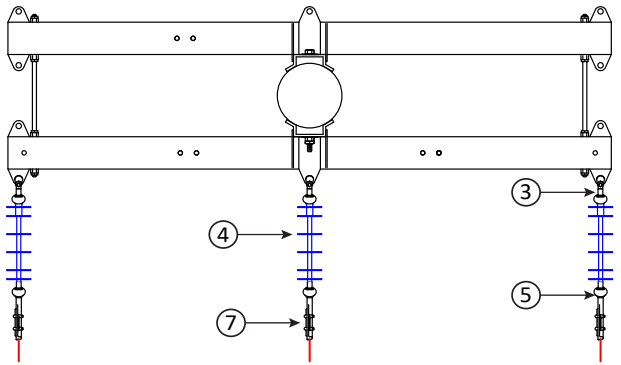
STEEL POLE
SINGLE STEEL XARM CONST
DEAD-END

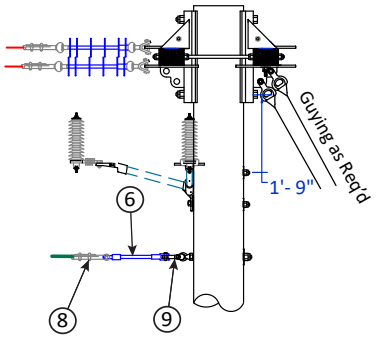
FRM. CODE	O3SD-DE1351	O3RD-DE1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	DESCRIPTION	STOCK #
1	2	-	X-ARM STEEL 4" X 6" X 9'- 4"	040755000
	-	2	X-ARM WEATH STEEL 4" X 6" X 9'- 4"	040809000
2	2	2	BOLT MACHINE 1" X 14"	204281400
3	3	3	CLEVIS Y-BALL	181208000
4	3	3	INSUL SUS 35 KV POLY, SOCKET BALL	242752000
5	3	3	SOCKET EYE	181440000
6	1	1	INSUL GUY STRAIN/FIBERGLASS 12"	240840000
7	3	3	CLAMP STRAIN 1351 61 AAC DE	221117000
8	1	1	CLAMP STRAIN 795AL D END	221080000
9	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

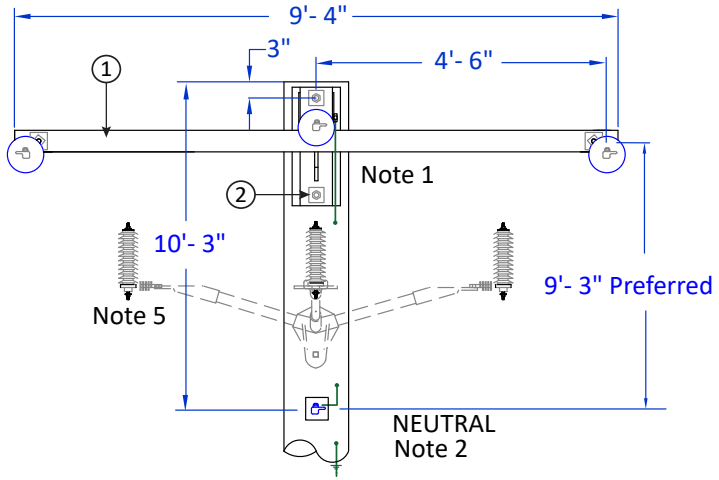
TRUCK STOCK ITEMS

QTY	DESCRIPTION	STOCK #
3	WASHER SQ FLAT 4" FOR 1" BOLTS	209650000
1	BOLT MACHINE 3/4" X REQ'D LENGTH	204_____
1	3/4" DBL COIL SPRING WASHER	206580000
2	WASHER SQ FLAT 2 1/4", 13/16" HOLE	209620000
1	NUT OVAL EYE 3/4"	206420000

STEEL POLES
O3SD-DE1351







NOTES

1. All steel arms must be grounded to pole ground.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.
5. 3 Phase bracket and arresters called for separately.

WIRE SIZE TABLE

FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SD-DE1351	1351	O3RD-DE1351	1351

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

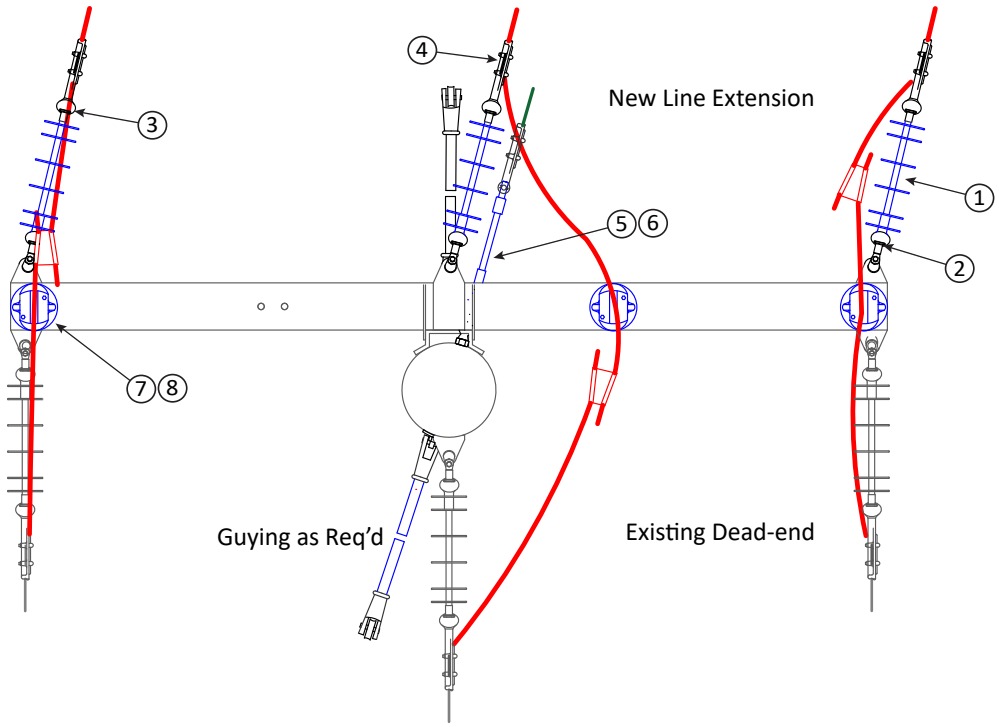
STEEL POLE
DOUBLE STEEL XARM CONST
DEAD-END

FRM. CODE	O3SX-EX	O3SX-EX-477	O3SX-EX-795	O3SX-EX-1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	3	3	3	3	INSUL SUS 35 KV POLY, SOCKET BALL	242752000
2	3	3	3	3	CLEVIS Y-BALL	181208000
3	3	3	3	3	SOCKET EYE	181440000
4	4	1	-	-	CLAMP STRAIN 6-2/0 ACSR	221000000
	-	3	1	-	CLAMP STRAIN 477MCM-AL	221040000
	-	-	3	1	CLAMP STRAIN 795AL D END	221080000
	-	-	-	3	CLAMP STRAIN 1351 61 AAC DE	221117000
5	1	1	1	1	INSUL GUY STRAIN/FIBERGLASS 12”	240840000
6	1	1	1	1	CLEVIS -EYE, 60 DEGREE	181210000
7	3	3	3	3	BOLT STUD 3/4” X 8” LONG/LP INSUL	204790000
8	3	3	3	3	INSUL LP VER CLP/TOP 35KV	240974000

TRUCK STOCK ITEMS

QTY	DESCRIPTION	STOCK #
1	BOLT MACHINE 3/4” X REQ’D LENGTH	204_____
1	3/4” DBL COIL SPRING WASHER	206580000
2	WASHER SQ FLAT 2 1/4”, 13/16” HOLE	209620000
1	NUT OVAL EYE 3/4”	206420000

STEEL POLES
O3SX-EX



NOTES

1. See the Framing Spacing section for alternate neutral spacing.
2. Guying for permitted loading to be specified per Engineer.
3. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.
4. Framing used on Galvanized or Rustic Steel Xarms.

WIRE SIZE TABLE

FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SX-EX	6-1/0	O3SX-EX-477	4/0-477
O3SX-EX-795	795	O3SX-EX-1351	1351

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

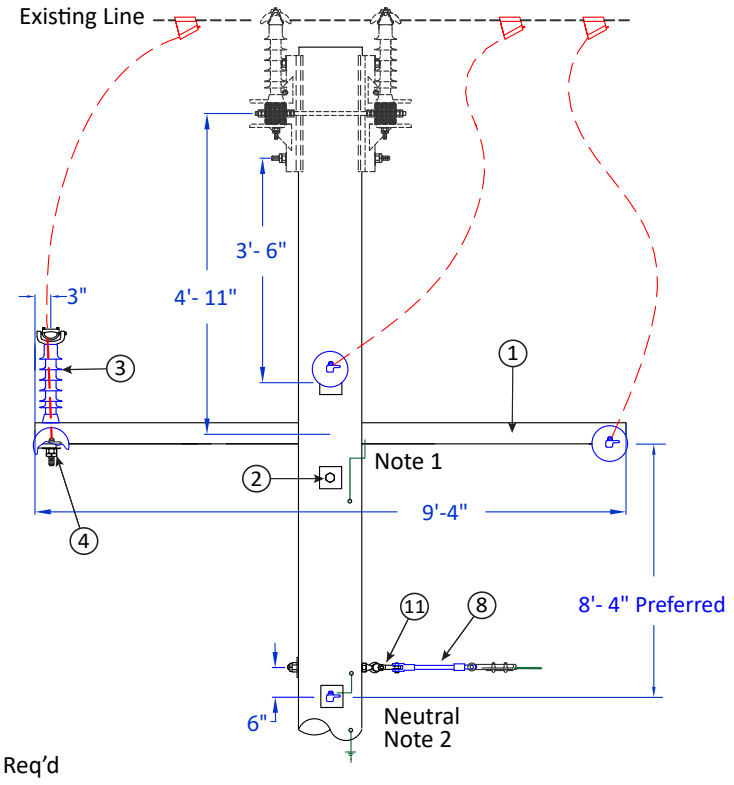
NES

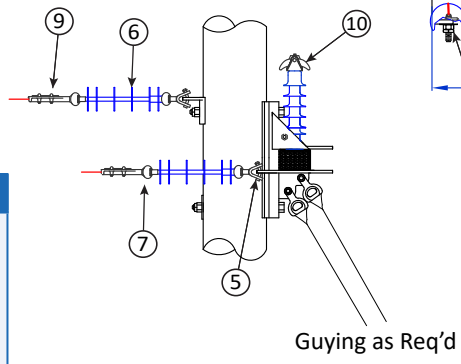
STEEL POLE
STEEL XARM CONST
LINE EXTENSION

FRM. CODE	O3SS-BK-477	O3SS-BK-795	O3RS-BK	O3RS-BK-477	O3RS-BK-795	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	QTY	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	-	-	-	X-ARM STEEL 4” X 6” X 9’- 4”	040755000
	-	-	1	1	1	X-ARM WEATH STEEL 4” X 6” X 9’- 4”	040809000
2	2	2	2	2	2	BOLT MACHINE 1” X 14”	204281400
3	1	1	1	1	1	INSUL LP VER CLP/TP 35KV	240974000
4	1	1	1	1	1	BOLT STUD 3/4” X 8” LONG/LP INSUL	204790000
5	3	3	3	3	3	CLEVIS Y-BALL	181208000
6	3	3	3	3	3	INSUL SUS 35 KV POLY, SOCKET BALL	242752000
7	3	3	3	3	3	SOCKET EYE	181440000
8	1	1	1	1	1	INSUL GUY STRAIN/FIBERGLASS 12”	240840000
9	1	-	4	1	-	CLAMP STRAIN 6-2/0 ACSR	221000000
	3	1	-	3	1	CLAMP STRAIN 477MCM-AL	221040000
	-	3	-	-	3	CLAMP STRAIN 795AL D END	221080000
10	-	-	1	-	-	CLAMP TOP 4-4/0	221870000
	1	-	-	1	-	CLAMP TOP 4/0-477	221890000
	-	1	-	-	1	CLAMP TOP AL 795	221900000
11	1	1	1	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	WASHER SQ FLAT 4” FOR 1” BOLTS	209650000
1	BOLT MACHINE 3/4” X REQ’D LENGTH	204_____
1	3/4” DBL COIL SPRING WASHER	206580000
2	WASHER SQ FLAT 2 1/4”, 13/16” HOLE	209620000
1	NUT OVAL EYE 3/4”	206420000

STEEL POLES
O3SS-BK





WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SS-BK-477	4/0-477	O3RS-BK	4-1/0
O3SS-BK-795	795	O3RS-BK-477	4/0-477
-	-	O3RS-BK-795	795

NOTES

1. All steel arms must be grounded to pole ground.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads. **Click here** to go to Framing Angle chart, Page 27.
5. Center phase tab is included with crossarm.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

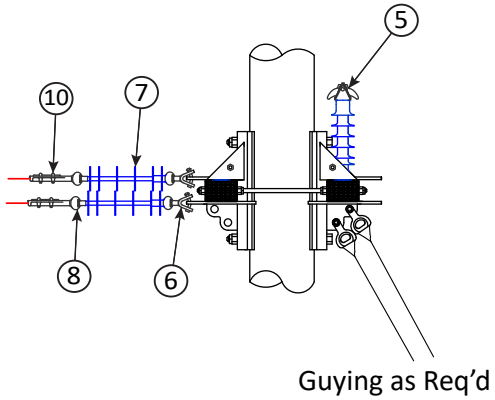
NES

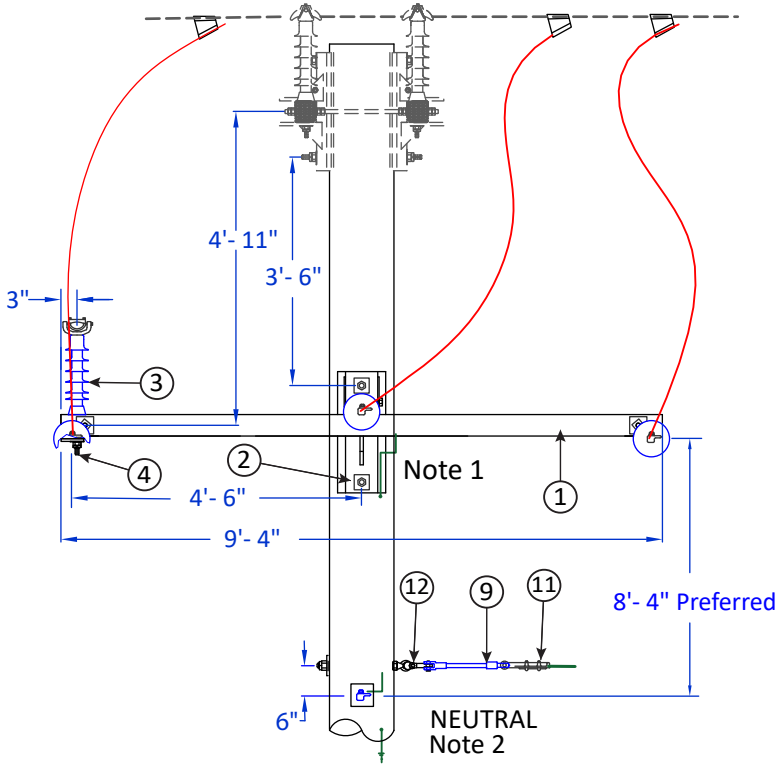
STEEL POLE
SINGLE STEEL XARM CONST
BUCK ARM

FRM. CODE	O3SD-BK1351	O3RD-BK1351	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	QTY	DESCRIPTION	STOCK #
1	2	-	X-ARM STEEL 4” X 6” X 9’- 4”	040755000
	-	2	X-ARM WEATH STEEL 4” X 6” X 9’- 4”	040809000
2	2	2	BOLT MACHINE 1” X 14”	204281400
3	1	1	INSUL LP VER CLP/TP 35KV	240974000
4	1	1	BOLT STUD 3/4” X 8” LONG/LP INSUL	204790000
5	1	1	CLAMP TOP AL 795MCM	221900000
6	3	3	CLEVIS Y-BALL	181208000
7	3	3	INSUL SUS 35 KV POLY, SOCKET BALL	242752000
8	3	3	SOCKET EYE	181440000
9	1	1	INSUL GUY STRAIN/FIBERGLASS 12”	240840000
10	3	3	CLAMP STRAIN 1351 61 AAC DE	221117000
11	1	1	CLAMP STRAIN 795AL D END	221080000
12	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	WASHER SQ FLAT 4” FOR 1” BOLTS	209650000
1	BOLT MACHINE 3/4” X REQ’D LENGTH	204_____
1	3/4” DBL COIL SPRING WASHER	206580000
2	WASHER SQ FLAT 2 1/4”, 13/16” HOLE	209620000
1	NUT OVAL EYE 3/4”	206420000

STEEL POLES
O3SD-BK1351





WIRE SIZE TABLE			
FRAMING CODE	WIRE SIZE	FRAMING CODE	WIRE SIZE
O3SD-BK1351	1351	O3RD-BK1351	1351

NOTES

1. All steel arms must be grounded to pole ground.
2. See the Framing Spacing section for alternate neutral spacing.
3. Guying for permitted loading to be specified per Engineer.
4. Framing limited per conductor for 350-ft span Worst-case NESC loads.**Click here** to go to Framing Angle chart, Page 27.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEEL POLE
DOUBLE STEEL XARM CONST
BUCK ARM

NEUTRAL, SECONDARY & MESSENGER STANDARDS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	*Henry Dunning*	*Ronald Reasonover*	*Leonard Leech*

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
NEUTRAL MATERIALS	3			
NEUTRAL ATTACHMENT, TANGENT SPOOL RACK	4			
NEUTRAL ATTACHMENT, SUSPENSION	5			
NEUTRAL ATTACHMENT, DEAD-END	6			
NEUTRAL SPOOL RACK, COMBINED SERVICE DROP LIMITS	7			
SPOOL RACK, SECONDARY, FRAMING DETAILS	8			
SPOOL RACK ,SECONDARY, FRAMING DIAGRAMS	9			
SPOOL RACK, SERVICES & SECONDARY LIMITS	10			
MESSENGER WIRE SIZE AND MATERIAL TABLE	11			
MESSENGER FRAMING, TANGENT & SMALL ANGLE	12			
MESSENGER FRAMING, DEAD-END & DBL DEAD-END	13			
SAG TABLES, MULTIPLEX SERVICE DROP, FULL TENSION	14			
SAG TABLE, MULTIPLEX SERVICE DROP, #6AD @ FULL TENSION	15			
SAG TABLE, MULTIPLEX SERVICE DROP, #2AD @ FULL TENSION	16			
SAG TABLE, MULTIPLEX SERVICE DROP, #2AT @ FULL TENSION	17			
SAG TABLE, MULTIPLEX SERVICE DROP, 1/0AT @ FULL TENSION	18			
SAG TABLE, MULTIPLEX SERVICE DROP, 4/0AT @ FULL TENSION	19			
SAG TABLE, MULTIPLEX SERVICE DROP, #2AQ @ FULL TENSION	20			
SAG TABLE, MULTIPLEX SERVICE DROP, 2/0AQ @ FULL TENSION	21			

NEUTRAL, SECONDARY & MESSENGER STANDARDS

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
SAG TABLE, MULTIPLEX SERVICE DROP, 4/0AQ @ FULL TENSION	22			
SAG TABLE, MULTIPLEX SERVICE DROP, 336AQ @ FULL TENSION	23			
SAG TABLES, MULTIPLEX SERVICE DROP, SLACK TENSION	24			
SAG TABLE, MULTIPLEX SERVICE DROP, #6AD @ SLACK TENSION	25			
SAG TABLE, MULTIPLEX SERVICE DROP, #2AD @ SLACK TENSION	26			
SAG TABLE, MULTIPLEX SERVICE DROP, #2AT @ SLACK TENSION	27			
SAG TABLE, MULTIPLEX SERVICE DROP, 1/0AT @ SLACK TENSION	28			
SAG TABLE, MULTIPLEX SERVICE DROP, 4/0AT @ SLACK TENSION	29			
SAG TABLE, MULTIPLEX SERVICE DROP, #2AQ @ SLACK TENSION	30			
SAG TABLE, MULTIPLEX SERVICE DROP, 2/0AQ @ SLACK TENSION	31			
SAG TABLE, MULTIPLEX SERVICE DROP, 4/0AQ @ SLACK TENSION	32			
SAG TABLE, MULTIPLEX SERVICE DROP, 336AQ @ SLACK TENSION	33			
SAG TABLES, MULTIPLEX SECONDARY, FULL TENSION	34			
SAG TABLE, MULTIPLEX SECONDARY, #6AD @ FULL TENSION	35			
SAG TABLE, MULTIPLEX SECONDARY, #2AD @ FULL TENSION	36			
SAG TABLE, MULTIPLEX SECONDARY, #2AT @ FULL TENSION	37			
SAG TABLE, MULTIPLEX SECONDARY, 1/0AT @ FULL TENSION	38			
SAG TABLE, MULTIPLEX SECONDARY, 4/0AT @ FULL TENSION	39			
SAG TABLES, MESSENGER WITH SECONDARY, FULL TENSION	40			
SAG TABLE, 12M MESSENGER W/SECONDARY, #2 AT @ FULL TENSION	41			
SAG TABLE, 12M MESSENGER W/SECONDARY, 4/0 AT @ FULL TENSION	42			

GENERAL NOTES

1. All new lines, regardless of voltage, must have a system neutral.
2. Whenever maintenance is performed on the 13.8kV system, a system neutral of appropriate size should be added (See Grounding Plate, Installing a Multi-grounded Neutral on Pg. 4).
3. NES policy requires that the system neutral be mounted on an insulated spool, fiberglass stick or bell type insulator. This is necessary to distinguish the neutral from other pole attachments.
4. Always connect the system neutral to the ground wire. See the grounding section for exact details.

NEUTRAL WIRE SIZE MATERIAL LIST

FRAMING ITEM	DESCRIPTION	STOCK #
N1	RACK SECONDARY 1W	184000000
	RACK SECONDARY 1W/LARGE	184003000
N2	INSUL RACK SPOOL	242470000
	INSUL RACK SPOOL LRG	242480000
N3	CLEVIS Y-EYE, 90 DEGREE	181210000
N4	CLAMP STRAIN 1/0-4/0 CU	221120000
	CLAMP STRAIN 300/500CU DE WOSE	221180000
	CLAMP STRAIN (2) 300/500 DE	221182000
	CLAMP STRAIN 795AL D END	221080000
N5	INSUL GUY STRN/FIB GLASS 12 IN	240840000
N6	STRANDVISE ACSR 2	230600000
	STRANDVISE ACSR 1/0	230601000
	STRANDVISE CU 6	230650000
	STRANDVISE CU 4	230651000
	STRANDVISE CU 2	230651500
N7	CLAMP SUSP 2 - 1/0 AL EZ	221550000
	CLAMP SUSP 337-477	221500000
	CLAMP SUSP 4/0-795 AL EZ	221610000

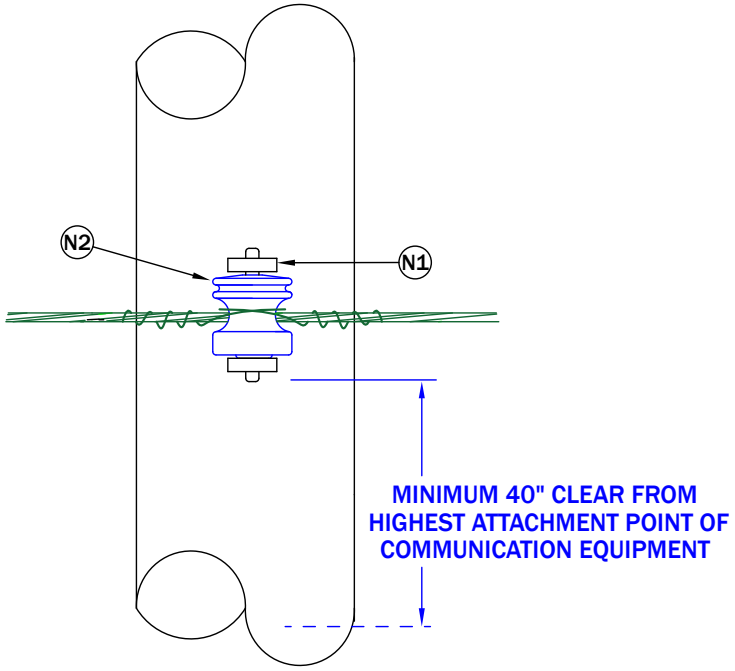
NEUTRAL FRAMING MATERIAL LIST

DESCRIPTION	STOCK #
CABLE AL/CU BSD AVERAGE	010395000
CONNECTOR,COMPRESSION,AVERAGE	223305000
CONNECTOR, PERCUSSION AVERAGE	224099900
CARTRIDGE, PERCUSSION AVERAGE	224143100
BOLT MACH AVERAGE 5/8 LONG	203_____
BOLT MACH AVERAGE 3/4 LONG	204_____
5/8" DBL COIL SPRING WASHER	206570000
3/4" DBL COIL SPRING WASHER	206580000
WASHER SQ FLAT 3/4 H	209620000
WASHER SQ CURVED 3 1/4	209520000
BOLT DA AVERAGE 5/8	201_____
BOLT DA AVERAGE 3/4	201_____
NUT OVAL EYE 5/8	206400000
NUT OVAL EYE 3/4	206420000

NEUTRAL WIRE SIZE TABLE

PRIMARY CONDUCTOR	SYSTEM NEUTRAL CONDUCTOR
2ACSR	2ACSR
1/0ACSR	2ACSR
4/0ACSR	1/0ACSR
336ACSR	4/0ACSR
477ACSR	4/0ACSR
795ACSR	477ACSR
1351 AAC	795ACSR
#6BHD	#6CU BHD OR WP
#4CU BHD	#6CU BHD OR WP
#2CU BHD	#4CU BHD OR WP
1/0 CU	#2CU BHD OR WP
4/0CU	#2CU BHD OR WP

FRM. CODE	OSR1W	OSR1WL	MATERIAL LIST	
ITEM #	QTY	QTY	DESCRIPTION	STOCK #
TRUCK STOCK ITEMS				
N1	1	-	RACK SECONDARY 1W	184000000
	-	1	RACK SECONDARY 1W/LARGE	184003000
N2	1	-	INSUL RACK SPOOL	242470000
	-	1	INSUL RACK SPOOL LRG	242480000
	5’	5’	CABLE AL/CU BSD AVERAGE	010395000
	1	1	CONNECTOR,COMPRESSION,AVERAGE	223305000
	1	1	CONNECTOR, PERCUSSION AVERAGE	224099900
	1	1	CARTRIDGE, PERCUSSION AVERAGE	224143100
	1	1	BOLT MACH AVERAGE 5/8 LONG	203_____
	1	1	5/8” DBL COIL SPRING WASHER	206570000
	1	1	WASHER SQ FLAT 3/4 H	209620000
	1	1	WASHER SQ CURVED 3 1/4	209520000



WIRE SIZE TABLE	
FRAMING CODE	WIRE SIZE
OSR1W	#6 - #2
OSR1WL	1/0-795

NOTES

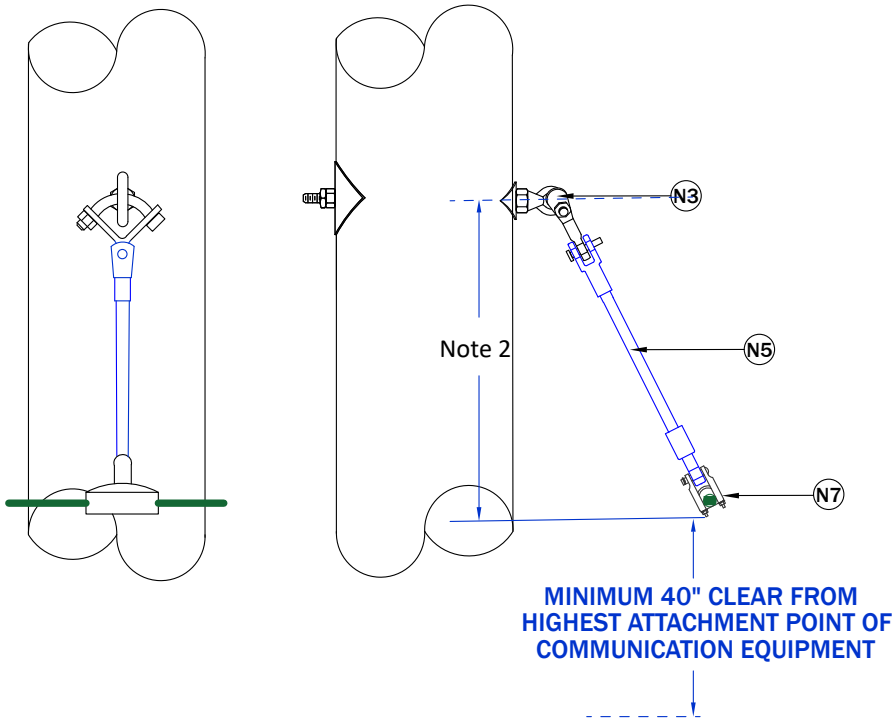
1. Conductor should be installed behind the spool, inside the rack.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

NEUTRAL ATTACHMENT TANGENT - SPOOL RACK

FRM. CODE	ONSU	ONSU-477	ONSU-795	MATERIAL LIST	
ITEM #	QUANTITY			DESCRIPTION	STOCK #
MINOR MATERIALS					
N3	1	1	1	CLEVIS Y-EYE, 90 DEGREE	181210000
N5	1	1	1	INSUL GUY STRN/FIB GLASS 12 IN	240840000
N7	1	-	-	CLAMP SUSP 2 - 1/0 AL EZ	221550000
	-	1	-	CLAMP SUSP 337-477	221500000
	-	-	1	CLAMP SUSP 4/0-795 AL EZ	221610000
TRUCK STOCK ITEMS					
-	1	1	1	BOLT MACH AVERAGE 5/8 LONG	203_____
-	1	1	1	5/8" DBL COIL SPRING WASHER	206570000
-	1	1	1	WASHER SQ FLAT 3/4 H	209620000
-	1	1	1	WASHER SQ CURVED 3 1/4	209520000
-	1	1	1	NUT OVAL EYE 5/8	206400000



Neutral Suspension Insulator Swing Chart w/ 12-Inch FG Stick - Vertical Drop

Neutral Size	Bare Conductor (lb/ft)	Span (ft)	Vertical Rotation Angle (Deg)	Horiz. Swing (in.)	Vertical Drop (in.)
#2 ACSR	0.091	350	58.1	23.8	14.8
1/0 ACSR	0.145	350	59.7	24.2	14.1
4/0 ACSR	0.291	350	63.4	25.0	12.5
477 ACSR	0.518	350	62.3	24.8	13.0
795 ACSR	0.805	350	59.3	24.1	14.3
Note: Final Sag @ 120° F					

NOTES

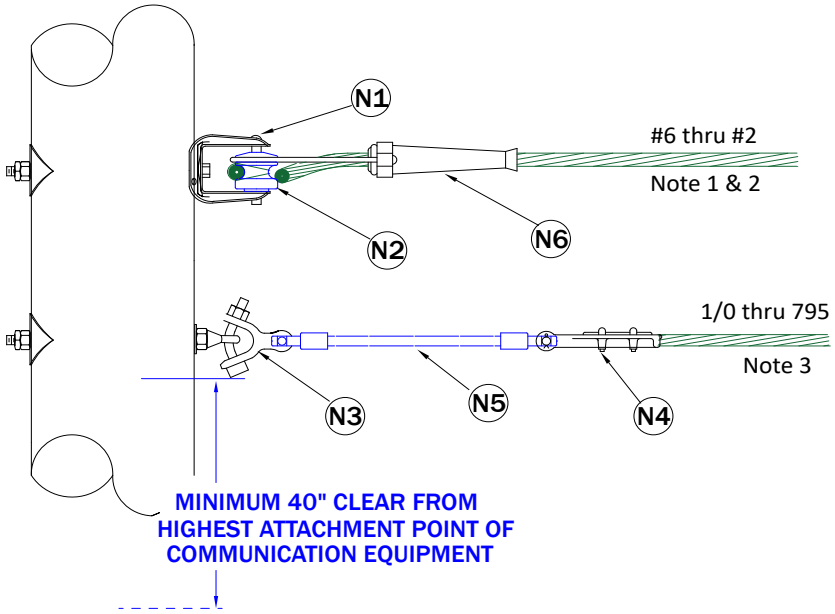
1. Maximum angle of 60 degrees for 4/0 to 795 conductors.
2. Clearance increase due to vertical drop during high temperature case.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

NEUTRAL ATTACHMENT SUSPENSION

FRM. CODE	ONDE-6CU	ONDE-4CU	ONDE-2CU	ONDE-2	ONDE-1/0	ONDE-4/0	ONDE-336	ONDE-477	ONDE-795	MATERIAL LIST	
ITEM #	QUANTITY									DESCRIPTION	STOCK #
MINOR MATERIALS											
N3	-	-	-	-	-	-	-	-	1	CLEVIS Y-EYE, 90 DEGREE	181210000
N4	-	-	-	-	-	1	-	-	1	CLAMP STRAIN 6 - 2/0 ACSR	221000000
	-	-	-	-	-	-	1	1	1	CLAMP STRAIN 4/0 - 477MCM-AL	221040000
	-	-	-	-	-	-	-	-	1	CLAMP STRAIN 795AL D END	221080000
N5	-	-	-	-	-	-	-	-	1	INSUL GUY STRN/FIB GLASS 12 IN	240840000
TRUCK STOCK ITEMS											
N1	1	1	1	1	-	-	-	-	-	RACK SECONDARY 1W	184000000
	-	-	-	-	-	-	-	-	-	RACK SECONDARY 1W/LARGE	184003000
N2	1	1	1	1	-	-	-	-	-	INSUL RACK SPOOL	242470000
	-	-	-	-	-	-	-	-	-	INSUL RACK SPOOL LG	242480000
N6	1	-	-	-	-	-	-	-	-	STRANDVISE CU 6	230650000
	-	1	-	-	-	-	-	-	-	STRANDVISE CU 4	230651000
	-	-	1	-	-	-	-	-	-	STRANDVISE CU 2	230651500
	-	-	-	1	-	-	-	-	-	STRANDVISE ACSR 2	230600000
-	1	1	1	1	-	-	-	-	-	BOLT MACH AVERAGE 5/8 LONG	203_____
-	1	1	1	1	-	-	-	-	-	5/8" DBL COIL SPRING WASHER	206570000
-	-	-	-	-	2	2	2	2	2	3/4" DBL COIL SPRING WASHER	206580000
-	1	1	1	1	2	2	2	2	2	WASHER SQ FLAT 3/4 H	209620000
-	1	1	1	1	2	2	2	2	2	WASHER SQ CURVED 3 1/4	209520000
-	-	-	-	-	1	1	1	1	1	NUT OVAL EYE 3/4	206420000
-	-	-	-	-	1	1	1	1	1	BOLT DA AVERAGE 3/4	201_____



NOTES

1. Maximum wire sizes #6 thru #2 are allowed with Small Spool Rack Insulator hardware.
2. Neutral wire sizes 1/0 and larger, require a Dead-End on an Oval Eye bolt hardware.

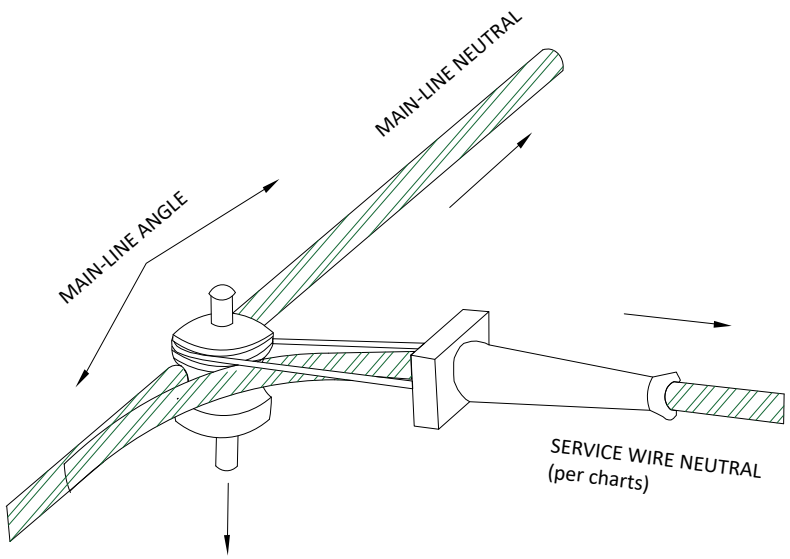
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

NEUTRAL ATTACHMENT DEAD-END

Spool Insulator Loading Limitations

Insulator spool rack limitations are based on 350-foot spans at Worst Case loads per NESC Weather Cases. Angle limitations are set by the framing plates per the conductor size. The following charts identify the maximum number of full tension service wires sharing the spool insulator.



Limit the sharing of Mainline Neutral up to 4/0 ACSR with Buck line Neutral to # 2 ACSR Full Tension or equivalent reduced tension. Use Buck Mount Framing for Mainline Neutrals larger than 4/0 ACSR.

The following charts are to be used to determine the maximum number of service wires that may share Neutral Insulator Spool Racks.

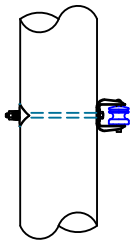
 # Service Wire(s) with Mainline Neutral

	Neutral	Qty	Service Size
Large 1-Wire Spool Rack	#2 ACSR	3	1/0 AT
	#2 ACSR	2	4/0 AT
	#2 ACSR	2	2/0 AQ
	#2 ACSR	1	4/0 AQ
	1/0 ACSR	3	2 AT
	1/0 ACSR	2	4/0 AT
	1/0 ACSR	2	2/0 AQ
	1/0 ACSR	1	4/0 AQ
	4/0 ACSR	3	2 AT
	4/0 ACSR	2	4/0 AT
	4/0 ACSR	2	2/0 AQ
	4/0 ACSR	1	4/0 AQ
	477 ACSR	2	1/0 AT
	477 ACSR	1	4/0 AT
	477 ACSR	1	2/0 AQ
	477 ACSR	1	4/0 AQ
	795 ACSR	2	1/0 AT
	795 ACSR	1	4/0 AT
	795 ACSR	1	2/0 AQ
	795 ACSR	N/A	4/0 AQ

The Smaller Neutral rack size limits the number of service wire attachments as follows:

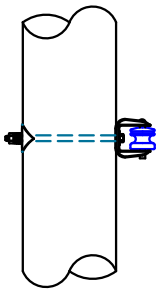
 # Service Wire(s) with Mainline Neutral

	Neutral	Qty	Service Size
Small 1-Wire Spool Rack	#2 ACSR	2	1/0 AT
	#2 ACSR	1	4/0 AT
	#2 ACSR	1	2/0 AQ
	#2 ACSR	1	4/0 AQ
	1/0 ACSR	2	2 AT
	1/0 ACSR	1	4/0 AT
	1/0 ACSR	1	2/0 AQ
	1/0 ACSR	N/A	4/0 AQ
	4/0 ACSR	1	1/0 AT
	4/0 ACSR	N/A	4/0 AT
	4/0 ACSR	1	2/0 AQ
	4/0 ACSR	N/A	4/0 AQ

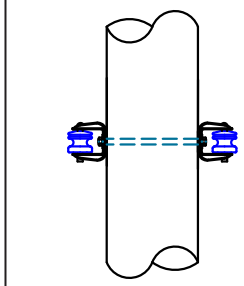


SINGLE MOUNT

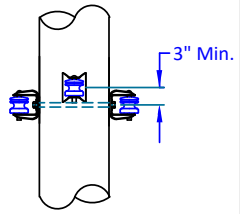
SINGLE MOUNT FRAMING		FIGURE "A"
Qty	Material Description	Stock #
1	Insul Spool Rack	242470000
	Large Insul. Spool Rack	242480000
1	Rack Secondary 1W	184000000
	Rack Secondary 1W/Large	184003000
1	5/8 Thru-Bolt	203_____
1	Washer Sq Curved 3-1/4"	209520000
1	5/8" Dbl Coil Spring Washer	206570000



BACK TO BACK MOUNT FRAMING		FIGURE "B"
Qty	Material Description	Stock #
2	Insul Spool Rack	242470000
	Large Insul. Spool Rack	242480000
2	Rack Secondary 1W	184000000
	Rack Secondary 1W/Large	184003000
1	5/8 Thru-Bolt	203_____



BUCK MOUNT FRAMING		FIGURE "C"
Qty	Material Description	Stock #
2	Insul Spool Rack	242470000
	Large Insul. Spool Rack	242480000
2	Rack Secondary 1W	184000000
	Rack Secondary 1W/Large	184003000
2	5/8 Thru-Bolt	203_____
2	Washer Sq Curved 3-1/4"	209520000
2	5/8" Dbl Coil Spring Washer	206570000



JUNCTION MOUNT

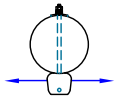
JUNCTION MOUNT FRAMING		FIGURE "D"
Qty	Material Description	Stock #
3	Insul Spool Rack	242470000
	Large Insul. Spool Rack	242480000
3	Rack Secondary 1W	184000000
	Rack Secondary 1W/Large	184003000
2	5/8 Thru-Bolt	203_____
1	Washer Sq Curved 3-1/4"	209520000
1	5/8" Dbl Coil Spring Washer	206570000

SECONDARY LIMITATIONS			
MULTIPLEX	TENSION	INSULATOR	ANSI
Type	(lbs.)	Spool Size	Class
6AD	650	SMALL	53-2
2AD	1,100	SMALL	53-2
2AT	1,049	SMALL	53-2
1/0AT	1,449	SMALL	53-2
4/0AT	2,400	LARGE	53-4

NOTES

1. Framing material details illustrate neutral & secondary rack orientations.
2. Mounting for each spool rack size to be selected accordingly per the charts on the following pages.

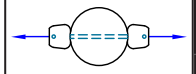
REV.	ENG.	DESCRIPTION OF CHANGE	DATE



TANGENT LINE

STRAIGHT LINE

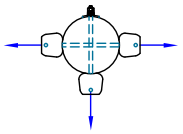
Use Figure “A” if balanced or Figure “B” if unbalanced



DOUBLE DEAD-END

DBL DEAD END

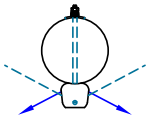
Use Figure “B”



3-WAY JUNCTION

3-WAY BUCK

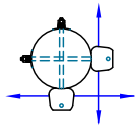
Use Figure “D” with unbalanced conductors in straight line



BISECT - ANGLE

ANGLE

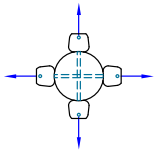
Use Figure “A” with Bisect angle.
If angle exceeds 60° use Figure “C”



CROSSOVER

CROSSOVER

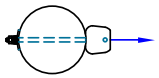
Use Figure “C” with balanced conductors in straight line



4-WAY JUNCTION

4-WAY BUCK

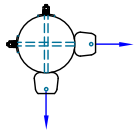
Use Figure “B” with balanced conductors in straight line



DEAD-END

DEAD-END

Use Figure “A”



2-WAY JUNCTION

2-WAY BUCK

Use Figure “C”

SECONDARY SELECTION TABLE			
MULTI-PLEX	FRAMING COMPATIBLE UNIT		
Type	Tangent	Angle	DE
6AD	OSR1W	OSR1W	OSR1W
2AD	OSR1W	OSR1W	OSR1W
2AT	OSR1W	OSR1W	OSR1W
1/0AT	OSR1W	OSR1W	OSR1W
4/0AT	OSR1W	(see note 2)	OSR1WL

NOTES

1. Selection of Spool Insulator Rack is shown in the Compatible Unit Selection table.
2. 4/0AT Secccondary installation requires Large Spool Insulator Rack with angles greater than 20 degrees.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SPOOL RACK SECONDARY FRAMING DIAGRAMS

FULL TENSION SECONDARY WIRE

The following charts are to be used to determine the maximum number of Mainline Secondary wires that may share Secondary Insulator Spool Racks

# Secondary Wire(s) per Small Spool Rack		
	Service	Qty
Small 1-Wire Spool Rack	6AD	2
	2AD	1
	2AT	1
	1/0AT	1
	4/0AT	N/A
	2AQ	N/A
	2/0AQ	N/A
	4/0AQ	N/A
	336AQ	N/A
Per RS250 Stringing Charts		

# Secondary Wire(s) per Large Spool Rack		
	Service	Qty
Large 1-Wire Spool Rack	6AD	3
	2AD	2
	2AT	2
	1/0AT	1
	4/0AT	1
	2AQ	N/A
	2/0AQ	N/A
	4/0AQ	N/A
	336AQ	N/A
Per RS250 Stringing Charts		

FULL TENSION SERVICE DROP

The following charts are to be used to determine the maximum number of Full Tension service Drops that may share Service Insulator Spool Racks.

# Service Wire(s) per Small Spool Rack		
	Service	Qty
Small 1-Wire Spool Rack	6AD	4
	2AD	4
	2AT	4
	1/0AT	3
	4/0AT	3
	2AQ	4
	2/0AQ	3
	4/0AQ	2
	336AQ	1
Per RS100 Stringing Charts		

# Service Wire(s) per Large Spool Rack		
	Service	Qty
Large 1-Wire Spool Rack	6AD	4
	2AD	4
	2AT	4
	1/0AT	4
	4/0AT	4
	2AQ	4
	2/0AQ	4
	4/0AQ	3
	336AQ	2
Per RS100 Stringing Charts		

SLACK TENSION SERVICE DROP

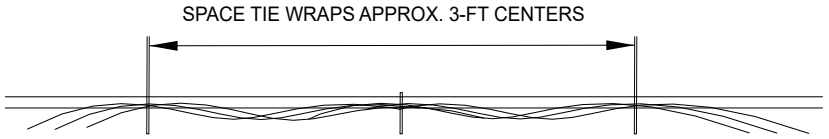
The following charts are to be used to determine the maximum number of Slack Tension Service Drops that may share Service Insulator Spool Racks.

# Service Wire(s) per Small Spool Rack		
	Service	Qty
Small 1-Wire Spool Rack	6AD	4
	2AD	4
	2AT	4
	1/0AT	4
	4/0AT	4
	2AQ	4
	2/0AQ	4
	4/0AQ	4
	336AQ	3
Per RS50 Stringing Charts		

# Service Wire(s) per Large Spool Rack		
	Service	Qty
Large 1-Wire Spool Rack	6AD	6
	2AD	6
	2AT	6
	1/0AT	6
	4/0AT	4
	2AQ	6
	2/0AQ	6
	4/0AQ	4
	336AQ	4
Per RS50 Stringing Charts		

MESSENGER NAMING CONVENTION			
Drawing Code	Description	Stock #	CU
12M-MESS	WIRE GALVANIZED, GUY 3/8” REEL	016041000	OMSGR12

MESSENGER ATTACHMENT MATERIAL LIST	
TRUCK STOCK MATERIALS	
STOCK #	DESCRIPTION
221660000	CLAMP SUSP MESS 2 BOLT CURVED
220600000	CLP SUSP MESS 2-BOLT STRAIGHT
221660000	CLAMP SUSP MESS 2 BOLT CURVED
231120000	STRANDVISE GUY 3/8
220800000	CLAMP MIDSPAN
361420000	CABLE TIE, NYLON, LARGE/OUTDOOR
204075000	BOLT MACH AVERAGE 3/4 LONG
209620000	WASHER SQ FLAT 3/4 H
201695000	BOLT DA AVERAGE 3/4
209520000	WASHER SQ CURVED 3 1/2
206580000	3/4” DBL COIL SPRING WASHER
206420000	NUT OVAL EYE 3/4

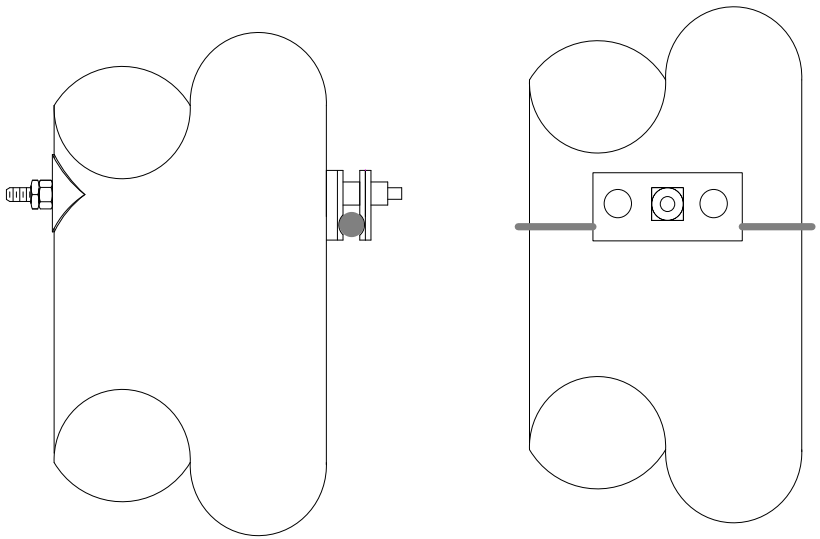


NOTES

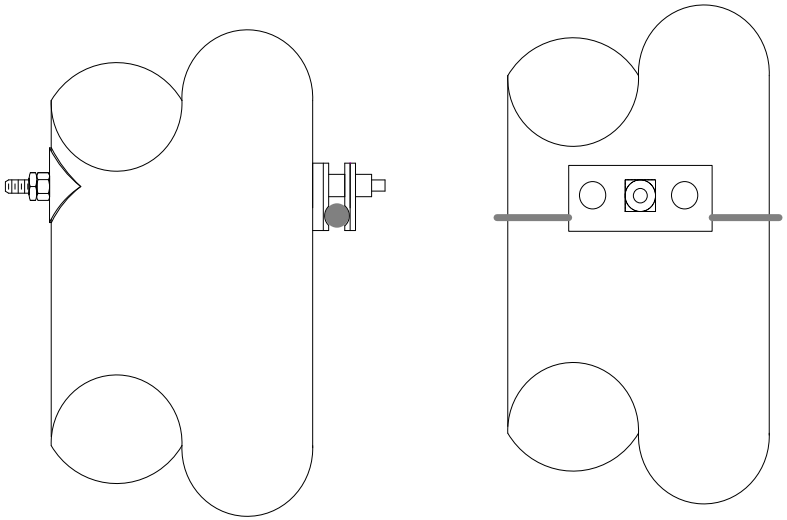
1. Only 3/8-inch, Extra High Strength (EHS) Galvanized guy wire is the standard messenger to be installed.
2. Stringing the messenger to tension, per the stringing chart, is required to maintain clearances.
3. Guy all messenger angles and dead-ends per the Engineering Installation drawings.

CU CODE	OMSGR-T	
MATERIAL LIST		
Qty	Description	Stock #
1	CLP SUSP MESS 2-BOLT STRAIGHT	220600000
1	WASHER SQ FLAT 3/4 H	209620000
1	5/8” DBL COIL SPRING WASHER	206570000
1	BOLT MACH AVERAGE 5/8 LONG	203775000

CU CODE	OMSGR-A	
MATERIAL LIST		
Qty	Description	Stock #
1	CLP SUSP MESS 2-BOLT STRAIGHT	220600000
1	WASHER SQ FLAT 3/4 H	209620000
1	5/8” DBL COIL SPRING WASHER	206570000
1	BOLT MACH AVERAGE 5/8 LONG	203775000



0 TO 5 DEGREES



5 TO 60 DEGREES

NOTES

1. Refer to Grounding Plate Book for the bonding of messengers to ground/neutral conductors.

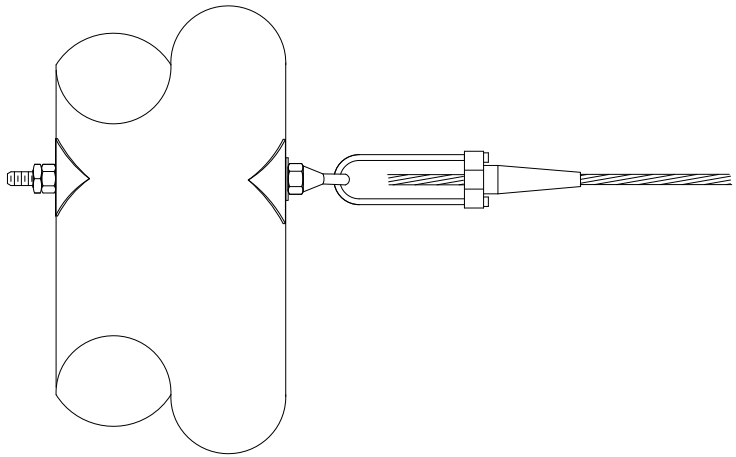
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NEUTRAL, SECONDARY & MESSENGER STANDARDS

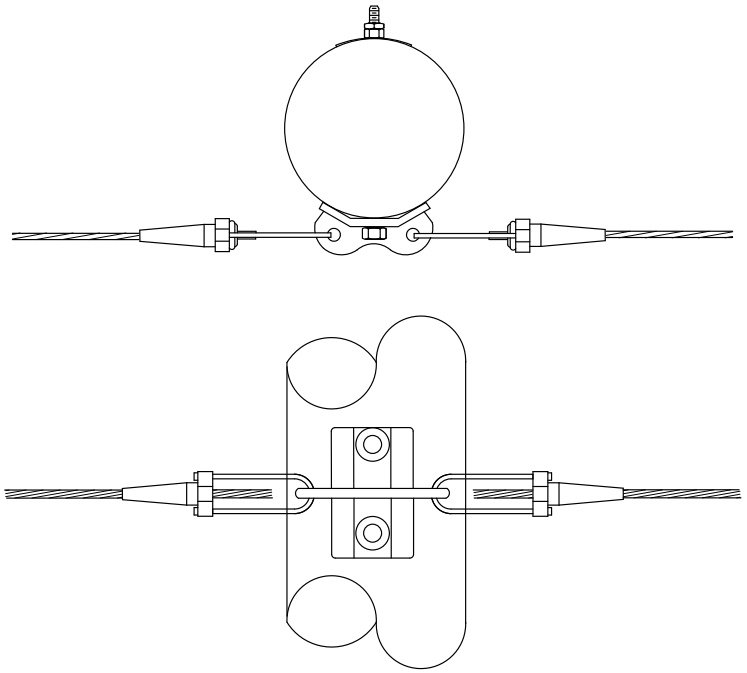
NES

MESSENGER FRAMING
TANGENT & SMALL ANGLE

CU CODE	OMSGR-DE	
MATERIAL LIST		
Qty	Description	Stock #
1	STRANDVISE GUY 3/8	231120000
1	BOLT MACH AVERAGE 3/4 LONG	204075000
1	NUT OVAL EYE 3/4	206420000
1	3/4” DBL COIL SPRING WASHER	206580000
2	WASHER SQ FLAT 3/4 H	209620000



CU CODE	OMSGR-DDE	
MATERIAL LIST		
Qty	Description	Stock #
1	BRACKET, DBL DEADEND ANGLE	180780000
2	STRANDVISE GUY 3/8	231120000
2	BOLT MACH AVERAGE 3/4 LONG	204075000
2	3/4” DBL COIL SPRING WASHER	206580000
2	WASHER SQ FLAT 3/4 H	209620000



NOTES

1. Refer to Grounding Plate Book for the bonding of messengers to ground/neutral conductors.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

MESSENGER FRAMING
DEAD-END & DBL DEAD-END

SAG TABLES

MULTIPLEX SERVICE DROP

FULL TENSION

DRAWING CODE	WIRE NAME/TYPE
I-RS100-6AD-235	SHEPHERD/XLPE

Area = 0.0240 Sq. in., Diameter = 0.472 in, Weight = 0.077 lb/G, RTS = 1190 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	0.643	3.44	235	3.44	235
32	0.25	0	0	0.301	3.29	115	3.25	117
0	0	0	0	0.077	2.9	33	2.81	34
15	0	0	0	0.077	3.01	32	2.93	33
30	0	0	0	0.077	3.11	31	3.03	32
60	0	0	0	0.077	3.29	29	3.22	30*
90	0	0	0	0.077	3.45	28	3.4	28
120	0	0	0	0.077	3.55	27	3.52	27

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100Ft

Special Load Zone -- Max Tension = 235 lb

**Design: 30 lb @ 60 Deg F, 0.00 in ice, 0.00 psf Wind, Intial Sag*

H Tens	34	32	31	31	30	29	29	28	28
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50	0-9	0-10	0-10	0-10	0-10	0-10	0-11	0-11	0-11
75	1-7	1-9	1-9	1-10	1-10	1-11	1-11	1-11	2-0
100	2-10	3-1	3-2	3-2	3-3	3-4	3-5	3-5	3-6
125	4-5	4-9	4-11	5-0	5-1	5-2	5-3	5-4	5-5
150	6-5	6-10	7-0	7-2	7-4	7-5	7-7	7-9	7-10

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NEUTRAL, SECONDARY & MESSENGER STANDARDS

NES

SAG TABLE
MULTIPLEX SERVICE DROP
#6AD @ FULL TENSION

DRAWING CODE	WIRE NAME/TYPE
I-RS100-2AD-300	CHOW/XLPE

Area = 0.0608 Sq. in., Diameter = 0.698 in, Weight = 0.181 lb/G, RTS = 2850 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	0.821	3.44	300	3.44	300
32	0.25	0	0	0.476	3.44	174	3.43	174
0	0	0	0	0.181	3.13	73	3.12	73
15	0	0	0	0.181	3.24	70	3.23	70
30	0	0	0	0.181	3.34	68	3.32	68
60	0	0	0	0.181	3.51	65	3.5	65*
90	0	0	0	0.181	3.67	62	3.67	62
120	0	0	0	0.181	3.76	60	3.76	61

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100Ft

Special Load Zone -- Max Tension = 300 lb

**Design: 65 lb @ 60 Deg F, 0.00 in ice, 0.00 psf Wind, Intial Sag*

H Tens	73	68	67	66	65	64	63	62	61
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50	0-10	0-10	0-11	0-11	0-11	0-11	0-11	0-11	1-0
75	10-10	1-11	1-11	2-0	2-0	2-0	2-1	2-1	2-1
100	3-2	3-4	3-5	3-6	3-6	3-7	3-8	3-8	3-9
125	4-11	5-3	5-4	5-5	5-6	5-7	5-8	5-9	5-10
150	7-1	7-6	7-8	7-10	7-11	8-1	8-2	8-4	8-5

DRAWING CODE	WIRE NAME/TYPE
I-RS100-2AT-283	COCKLE/XLPE

Area = 0.0382 Sq. in., Diameter = 0.750 in, Weight = 0.233 lb/G, RTS = 1860 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	0.885	3.94	283	3.94	283
32	0.25	0	0	0.544	3.90	175	3.88	176
0	0	0	0	0.233	3.63	81	3.59	82
15	0	0	0	0.233	3.71	79	3.67	80
30	0	0	0	0.233	3.79	77	3.75	78
60	0	0	0	0.233	3.94	74	3.91	75*
90	0	0	0	0.233	4.08	72	4.06	72
120	0	0	0	0.233	4.22	70	4.20	70

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 283 lb

**Design: 75 lb @ 60 Deg F, 0.00 in ice, 0.00 psf Wind, Intial Sag*

H Tens	81	78	77	76	75	74	73	72	71
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50.0	0-11	1-0	1-0	1-0	1-0	1-0	1-1	1-1	1-1
75.0	2-1	2-2	2-2	2-3	2-3	2-3	2-4	2-4	2-4
100.0	3-8	3-10	3-10	3-11	3-11	4-0	4-1	4-1	4-2
125.0	5-8	5-11	6-0	6-1	6-2	6-3	6-4	6-5	6-6
150.0	8-2	8-6	8-7	8-9	8-10	9-0	9-1	9-2	9-4

DRAWING CODE	WIRE NAME/TYPE
I-RS100-1/0AT-353	JANTHINA/XLPE

Area = 0.0608 Sq. in., Diameter = 0.950 in, Weight = 0.376 lb/G, RTS = 2850 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	1.091	3.89	353	3.89	353
32	0.25	0	0	0.749	3.90	242	3.89	242
0	0	0	0	0.376	3.65	129	3.63	130
15	0	0	0	0.376	3.73	127	3.71	127
30	0	0	0	0.376	3.81	124	3.79	125
60	0	0	0	0.376	3.96	119	3.94	120*
90	0	0	0	0.376	4.10	115	4.09	116
120	0	0	0	0.376	4.24	112	4.23	112

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100Ft

Special Load Zone -- Max Tension = 353 lb

**Design: 120lb @ 60 Deg F, 0.00 in ice, 0.00 psf Wind, Intial Sag*

H Tens	130	124	123	121	120	118	117	115	114
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50.0	0-11	1-0	1-0	1-0	1-0	1-0	1-1	1-1	1-1
75.0	2-1	2-2	2-2	2-3	2-3	2-3	2-4	2-4	2-4
100.0	3-8	3-10	3-11	3-11	4-0	4-0	4-1	4-2	4-2
125.0	5-9	6-0	6-1	6-2	6□ 2	6-3	6-4	6-5	6-6
150.0	8-3	8-7	8-8	8-10	8-11	9-1	9-2	9-3	9-5

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SAG TABLE
MULTIPLEX SERVICE DROP
1/0AT @ FULL TENSION

DRAWING CODE	WIRE NAME/TYPE
I-RS100-4/0AT-397	CERAPUS/XLPE

Area = 0.1221 Sq. in., Diameter = 1.260 in, Weight = 0.699 lb/G, RTS = 5310 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.507	4.82	394	4.79	397
32.0	0.25	0.00	0.00	1.168	4.87	303	4.83	305
0.0	0.00	0.00	0.00	0.699	4.70	188	4.64	190
15.0	0.00	0.00	0.00	0.699	4.76	185	4.72	187
30.0	0.00	0.00	0.00	0.699	4.83	183	4.78	184
60.0	0.00	0.00	0.00	0.699	4.95	178	4.90	180*
90.0	0.00	0.00	0.00	0.699	5.06	174	5.02	176
120.0	0.00	0.00	0.00	0.699	5.13	172	5.13	172

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100Ft

Special Load Zone -- Max Tension = 397 lb

**Design: 180 lb @ 60 Deg F, 0.00 in ice, 0.00 psf Wind, Intial Sag*

H Tens	189	183	182	180	179	177	176	175	173
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50.0	1-2	1-3	1-3	1-3	1-3	1-3	1-3	1-4	1-4
75.0	2-8	2-9	2-9	2-9	2-10	2-10	2-10	2-10	2-11
100.0	4-8	4-10	4-10	4-11	4-11	5-0	5-0	5-1	5-1
125.0	7-4	7-6	7-7	7- 8	7-9	7-9	7-10	7-11	7-1
150.0	10-6	10-10	10-11	11-0	11- 1	11- 2	11-3	11-5	11-6

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NEUTRAL, SECONDARY & MESSENGER STANDARDS

NES

SAG TABLE
MULTIPLEX SERVICE DROP
4/0AT @ FULL TENSION

DRAWING CODE	WIRE NAME/TYPE
I-RS100-2AQ-297	PALOMINO/XLPE

Area = 0.0608 Sq. in., Diameter = 0.870 in, Weight = 0.355 lb/G, RTS = 2850 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.038	4.40	297	4.40	297
32.0	0.25	0.00	0.00	0.703	4.42	200	4.41	201
0.0	0.00	0.00	0.00	0.355	4.20	106	4.19	107
15.0	0.00	0.00	0.00	0.355	4.28	104	4.27	105
30.0	0.00	0.00	0.00	0.355	4.35	103	4.34	103
60.0	0.00	0.00	0.00	0.355	4.48	100	4.47	100*
90.0	0.00	0.00	0.00	0.355	4.61	97	4.61	97
120.0	0.00	0.00	0.00	0.355	4.72	95	4.72	95

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100Ft

Special Load Zone -- Max Tension = 297lb

**Design: 100 lb @ 60 Deg F, 0.00 in ice, 0.00 psf Wind, Intial Sag*

H Tens	106	103	102	100	99	98	98	97	96
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50.0	1-1	1-1	1-2	1-2	1-2	1-2	1-2	1-2	1-2
75.0	2-5	2-6	2-6	2-6	2-7	2-7	2-7	2-8	2-8
100.0	4-3	4-5	4□ 5	4-6	4-6	4-7	4-7	4-8	4-8
125.0	6-7	6-10	6-11	7-0	7-0	7-1	7-2	7-3	7-4
150.0	9-6	9-10	9-11	10-0	10-2	10-3	10-4	10-5	10-6

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NEUTRAL, SECONDARY & MESSENGER STANDARDS

NES

SAG TABLE
MULTIPLEX SERVICE DROP
#2AQ @ FULL TENSION

DRAWING CODE	WIRE NAME/TYPE
I-RS100-2/0AQ-450	GRULLO/XLPE

Area = 0.1221 Sq. in., Diameter = 1.230 in, Weight = 0.697 lb/G, RTS = 5310 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.493	4.21	446	4.18	450*
32.0	0.25	0.00	0.00	1.157	4.26	342	4.21	346
0.0	0.00	0.00	0.00	0.697	4.06	216	4.00	219
15.0	0.00	0.00	0.00	0.697	4.13	212	4.08	215
30.0	0.00	0.00	0.00	0.697	4.21	209	4.15	211
60.0	0.00	0.00	0.00	0.697	4.34	202	4.29	205
90.0	0.00	0.00	0.00	0.697	4.48	196	4.42	199
120.0	0.00	0.00	0.00	0.697	4.56	193	4.55	193

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100Ft

Special Load Zone -- Max Tension = 450 lb

**Design: 450 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	218	210	208	206	204	202	200	198	196
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50.0	1-0	1-1	1-1	1-1	1-1	1-1	1-2	1-2	1-2
100.0	4-0	4-2	4-3	4-3	4-4	4-4	4-5	4-6	4-6
125.0	6-4	6-6	6-7	6-8	6-9	6-10	6-11	6-11	7-0
150.0	9-1	9-5	9-6	9-7	9-9	9-10	9-11	10-0	10-1

DRAWING CODE	WIRE NAME/TYPE
I-RS100-4/0AQ-650	APPALOOSA/XLPE

Area = 0.1939 Sq. in., Diameter = 1.490 in, Weight = 1.063 lb/G, RTS = 8350 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	1.936	3.79	642	3.74	650*
32.0	0.25	0.00	0.00	1.604	3.85	524	3.80	531
0.0	0.00	0.00	0.00	1.063	3.64	367	3.58	373
15.0	0.00	0.00	0.00	1.063	3.72	359	3.66	365
30.0	0.00	0.00	0.00	1.063	3.80	352	3.74	357
60.0	0.00	0.00	0.00	1.063	3.95	338	3.89	344
90.0	0.00	0.00	0.00	1.063	4.10	327	4.03	332
120.0	0.00	0.00	0.00	1.063	4.19	319	4.17	321

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 650 lb

**Design: 650 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	372	356	351	347	342	338	334	330	326
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50.0	0-11	1-0	1-0	1-0	1-0	1-0	1-0	1-1	1-1
75.0	2-1	2-2	2-2	2-2	2-3	2-3	2-3	2-4	2-4
100.0	3-7	3-9	3-10	3-11	3-11	4-0	4-0	4-1	4-1
125.0	5-8	5-11	6-0	6-1	6-2	6-2	6-3	6-4	6-5
150.0	8-1	8-6	8-7	8-8	8-10	8-11	9-0	9-2	9-3

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SAG TABLE
MULTIPLEX SERVICE DROP
4/0AQ @ FULL TENSION

DRAWING CODE	WIRE NAME/TYPE
I-RS100-336AQ-850	BRONCO/XLPE

Area = 0.2789 Sq. in., Diameter = 0.684 in, Weight = 0.365 lb/G, RTS = 8680 lb

Span = 100.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15.0	0.25	4.00	0.20	3.550	5.31	845	5.28	850
32.0	0.25	0.00	0.00	2.869	5.36	677	5.33	681
0.0	0.00	0.00	0.00	1.568	5.19	382	5.15	385
15.0	0.00	0.00	0.00	1.568	5.25	377	5.21	380
30.0	0.00	0.00	0.00	1.568	5.32	373	5.28	376
60.0	0.00	0.00	0.00	1.568	5.44	365	5.40	367*
90.0	0.00	0.00	0.00	1.568	5.56	357	5.53	359
120.0	0.00	0.00	0.00	1.568	5.68	350	5.65	352

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 100 Ft

Special Load Zone -- Max Tension = 839 lb

**Design: 367 lb @ 60 Deg F, 0.00 in ice, 0.00 psf Wind, Intial Sag*

H Tens	88	86	85	84	84	83	83	83	82
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50.0	1-4	1-4	1-5	1-5	1-5	1-5	1-5	1-5	1-5
75.0	3-0	3-1	3-1	3-1	3-1	3-2	3-2	3-2	3-2
100.0	5-3	5-5	5-5	5-6	5-6	5-7	5-7	5-7	5-7
125.0	8-2	8-5	8-6	8-7	8-7	8-8	8-8	8-9	8-9
150.0	11-10	12-2	12-3	12-4	12-5	12-6	12-7	12-7	12-8

SAG TABLES

MULTIPLEX SERVICE DROP

SLACK TENSION

DRAWING CODE	WIRE NAME/TYPE
I-RS50-6AD-162	SHEPHERD/XLPE

Area = 0.0240 Sq. in., Diameter = 0.472 in, Weight = 0.077 lb/G, RTS = 1190 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	0.643	1.24	162	1.24	162
32	0.25	0	0	0.301	1.2	79	1.18	80
0	0	0	0	0.077	0.94	26	0.91	26
15	0	0	0	0.077	1.03	23	1	24
30	0	0	0	0.077	1.1	22	1.08	22
60	0	0	0	0.077	1.23	20	1.21	20*
90	0	0	0	0.077	1.32	18	1.31	18
120	0	0	0	0.077	1.38	17	1.37	18

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50Ft

Special Load Zone -- Max Tension = 162 lb

**Design: 20 lb @ 60 Deg F, 0.00 in ice, 0.00 psf Wind, Intial Sag*

H Tens	26	22	21	21	20	19	19	18	18
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
25	0-3	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-5
50	0-11	1-1	1-2	1-2	1-3	1-3	1-4	1-4	1-5

DRAWING CODE	WIRE NAME/TYPE
I-RS50-2AD-167	CHOW/XLPE

Area = 0.0608 Sq. in., Diameter = 0.698 in, Weight = 0.181 lb/G, RTS = 2850 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	0.821	1.54	167	1.54	167*
32	0.25	0	0	0.476	1.57	95	1.56	95
0	0	0	0	0.181	1.41	40	1.41	40
15	0	0	0	0.181	1.47	39	1.47	39
30	0	0	0	0.181	1.53	37	1.53	37
60	0	0	0	0.181	1.63	35	1.63	35
90	0	0	0	0.181	1.69	34	1.69	34
120	0	0	0	0.181	1.74	33	1.74	33

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50Ft

Special Load Zone -- Max Tension = 167 lb

**Design: 167 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	40	37	36	36	35	34	34	34	33
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
25	0-5	0-5	0-5	0-5	0-5	0-5	0-6	0-6	0-6
50	1-5	1-7	1-7	1-8	1-8	1-8	1-9	1-9	1-9

DRAWING CODE	WIRE NAME/TYPE
I-RS50-2AT-136	COCKLE/XLPE

Area = 0.0382 Sq. in., Diameter = 0.750 in, Weight = 0.233 lb/G, RTS = 1860 lb								
Span = 50.0 Ft -- Special Load Zone								
DESIGN POINTS					**FINAL**		**INITIAL**	
TEMP (°F)	**ICE (in.)**	**WIND (psf)**	**K (lb/ft)**	**WEIGHT (lb/ft)**	**SAG (Ft)**	**TENSION (lb)**	**SAG (Ft)**	**TENSION (lb)**
15	0.25	4	0.2	0.885	2.05	136	2.05	136*
32	0.25	0	0	0.544	2.06	83	2.06	83
0	0	0	0	0.233	1.94	38	1.94	38
15	0	0	0	0.233	1.99	37	1.99	37
30	0	0	0	0.233	2.03	36	2.03	36
60	0	0	0	0.233	2.10	35	2.10	35
90	0	0	0	0.233	2.17	34	2.17	34
120	0	0	0	0.233	2.21	33	2.21	33
**Design Condition*								

Stringing Table Using Initial Sag -- Ruling Span = 50Ft									
Special Load Zone -- Max Tension = 136 lb									
**Design: 136 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*									
H Tens	38	36	36	35	35	34	34	34	33
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
25	0-6	0-7	0-7	0-7	0-7	0-7	0-7	0-7	0-7
50	2-0	2-1	2-1	2-1	2-2	2-2	2-2	2-2	2-3

DRAWING CODE	WIRE NAME/TYPE
I-RS50-1/0AT-149	JANTHINA/XLPE

Area = 0.0608 Sq. in., Diameter = 0.950 in, Weight = 0.376 lb/G, RTS = 2850 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	1.091	2.31	149	2.31	149*
32	0.25	0	0	0.749	2.33	101	2.33	101
0	0	0	0	0.376	2.23	53	2.23	53
15	0	0	0	0.376	2.27	52	2.27	52
30	0	0	0	0.376	2.31	51	2.31	51
60	0	0	0	0.376	2.38	50	2.38	50
90	0	0	0	0.376	2.43	49	2.43	49
120	0	0	0	0.376	2.47	48	2.47	48

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50Ft

Special Load Zone -- Max Tension = 149 lb

**Design: 149 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	53	51	51	50	50	49	49	48	48
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
25	0-7	0-7	0-7	0-8	0-8	0-8	0-8	0-8	0-8
50	2-3	2-4	2-4	2-5	2-5	2-5	2-6	2-6	2-6

DRAWING CODE	WIRE NAME/TYPE
I-RS50-4/0AT-188	CERAPUS/XLPE

Area = 0.1221 Sq. in., Diameter = 1.260 in, Weight = 0.699 lb/G, RTS = 5310 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.20	1.507	2.55	187	2.53	188*
32	0.25	0	0.00	1.168	2.57	143	2.56	144
0	0	0	0.00	0.699	2.49	89	2.47	89
15	0	0	0.00	0.699	2.53	87	2.51	88
30	0	0	0.00	0.699	2.56	86	2.54	87
60	0	0	0.00	0.699	2.62	84	2.60	85
90	0	0	0.00	0.699	2.66	83	2.66	83
120	0	0	0.00	0.699	2.69	82	2.69	82

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50Ft

Special Load Zone -- Max Tension = 188 lb

**Design: 188 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	89	86	85	85	84	84	83	83	82
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
25	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-8
50	2-6	2-7	2-7	2-8	2-8	2-8	2-8	2-8	2-9

DRAWING CODE	WIRE NAME/TYPE
I-RS50-2AQ-125	PALOMINO/XLPE

Area = 0.0608 Sq. in., Diameter = 0.870 in, Weight = 0.355 lb/G, RTS = 2850 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	1.038	2.63	125	2.62	125*
32	0.25	0	0	0.703	2.65	84	2.65	84
0	0	0	0	0.355	2.56	44	2.56	44
15	0	0	0	0.355	2.60	43	2.60	43
30	0	0	0	0.355	2.63	43	2.63	43
60	0	0	0	0.355	2.69	42	2.69	42
90	0	0	0	0.355	2.73	41	2.73	41
120	0	0	0	0.355	2.77	41	2.77	41

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50Ft

Special Load Zone -- Max Tension = 125 lb

**Design: 125 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	43	42	42	42	41	41	41	41	41
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
25	0-8	0-8	0-8	0-8	0-9	0-9	0-9	0-9	0-9
50	2-7	2-8	2-8	2-9	2-9	2-9	2-9	2-9	2-9

DRAWING CODE	WIRE NAME/TYPE
I-RS50-2/0AQ-225	GRULLO/XLPE

Area = 0.1221 Sq. in., Diameter = 1.230 in, Weight = 0.697 lb/G, RTS = 5310 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	1.493	2.10	223	2.09	225*
32	0.25	0	0	1.157	2.14	171	2.12	172
0	0	0	0	0.697	2.04	108	2.01	109
15	0	0	0	0.697	2.08	105	2.05	107
30	0	0	0	0.697	2.12	103	2.10	105
60	0	0	0	0.697	2.19	100	2.17	101
90	0	0	0	0.697	2.24	98	2.23	98
120	0	0	0	0.697	2.28	96	2.27	97

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50Ft

Special Load Zone -- Max Tension = 225 lb

**Design: 225 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	109	104	103	102	101	100	99	98	97
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
25	0-7	0-7	0-7	0-7	0-7	0-7	0-7	0-7	0-7
50	2-1	2-2	2-2	2-2	2-3	2-3	2-3	2-3	2-3

DRAWING CODE	WIRE NAME/TYPE
I-RS50-4/0AQ- 300	APPALOOSA/XLPE

Area = 0.1939 Sq. in., Diameter = 1.490 in, Weight = 1.063 lb/G, RTS = 8350 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	1.936	2.05	297	2.03	300*
32	0.25	0	0	1.604	2.08	242	2.07	244
0	0	0	0	1.063	1.99	168	1.96	171
15	0	0	0	1.063	2.03	165	2.00	167
30	0	0	0	1.063	2.07	161	2.05	163
60	0	0	0	1.063	2.14	156	2.12	158
90	0	0	0	1.063	2.19	153	2.19	153
120	0	0	0	1.063	2.23	150	2.23	150

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50Ft

Special Load Zone -- Max Tension = 300 lb

**Design: 300 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	170	163	161	159	157	155	154	152	151
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
25	0-6	0-7	0-7	0-7	0-7	0-7	0-7	0-7	0-7
50	2-0	2-1	2-1	2-2	2-2	2-2	2-2	2-3	2-3

DRAWING CODE	WIRE NAME/TYPE
I-RS50-336AQ- 450	BRONCO/XLPE

Area = 0.2789 Sq. in., Diameter = 0.684 in, Weight = 0.365 lb/G, RTS = 8680 lb

Span = 50.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	3.550	2.50	448	2.49	450*
32	0.25	0	0	2.869	2.53	358	2.52	359
0	0	0	0	1.568	2.44	202	2.43	203
15	0	0	0	1.568	2.48	200	2.47	200
30	0	0	0	1.568	2.51	197	2.51	198
60	0	0	0	1.568	2.58	192	2.57	193
90	0	0	0	1.568	2.64	187	2.64	188
120	0	0	0	1.568	2.69	184	2.69	184

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 50Ft

Special Load Zone -- Max Tension = 450 lb

**Design: 450 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	47	46	45	45	45	45	44	44	44
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
25	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-8
50	2-6	2-6	2-7	2-7	2-7	2-7	2-7	2-8	2-8

SAG TABLES

MULTIPLEX SECONDARY

FULL TENSION

DRAWING CODE	WIRE NAME/TYPE
I-RS250-6AD- 650	SHEPHERD/XLPE

Area = 0.0240 Sq. in., Diameter = 0.472 in, Weight = 0.077 lb/G, RTS = 1190 lb

Span = 250.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	0.643	7.75	650	7.75	650*
32	0.25	0	0	0.301	6.38	370	5.59	422
0	0	0	0	0.077	3.84	157	2.3	261
15	0	0	0	0.077	4.17	144	2.53	238
30	0	0	0	0.077	4.49	134	2.78	217
60	0	0	0	0.077	5.06	119	3.35	180
90	0	0	0	0.077	5.35	113	3.97	151
120	0	0	0	0.077	5.63	107	4.61	131

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 250Ft

Special Load Zone -- Max Tension = 650 lb

**Design: 650 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	261	217	203	191	180	169	160	151	144
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
150	0-10	1-0	1-1	1- 2	1-3	1-4	1-5	1-6	1-7
200	1-6	1-10	1-11	2-1	2-2	2-4	2-5	2-7	2-9
250	2-4	2-10	3-0	3-2	3-5	3-7	3-10	4-0	4-3
300	3-4	4-0	4-4	4-7	4-10	5-2	5-6	5-9	6-1

DRAWING CODE	WIRE NAME/TYPE
I-RS250-2AD- 1100	CHOW/XLPE

Area = 0.0608 Sq. in., Diameter = 0.698 in, Weight = 0.181 lb/G, RTS = 2850 lb

Span = 250.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	0.821	5.84	1100	5.84	1100*
32	0.25	0	0	0.476	5.10	730	4.79	777
0	0	0	0	0.181	3.05	465	2.51	563
15	0	0	0	0.181	3.38	418	2.77	510
30	0	0	0	0.181	3.72	380	3.06	462
60	0	0	0	0.181	4.40	322	3.69	384
90	0	0	0	0.181	5.04	281	4.34	326
120	0	0	0	0.181	5.64	251	4.98	285

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 250Ft

Special Load Zone -- Max Tension = 1100 lb

**Design: 1100 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	563	462	433	407	383	362	343	326	311
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
150	0-11	1-2	1-3	1-4	1-4	1-5	1-6	1-7	1-8
200	1-8	2-0	2-2	2-3	2-5	2-6	2-8	2-10	2-11
250	2-7	3-1	3-4	3-6	3-9	3-11	4-2	4-5	4-7
300	3-8	4-5	4-9	5-1	5-4	5-8	6-0	6-4	6-7

DRAWING CODE	WIRE NAME/TYPE
I-RS250-2AT- 1049	COCKLE/XLPE

Area = 0.0382 Sq. in., Diameter = 0.750 in, Weight = 0.233 lb/G, RTS = 1860 lb

Span = 250.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	0.885	6.61	1049	6.61	1049
32	0.25	0	0	0.544	5.66	752	5.12	831
0	0	0	0	0.233	3.48	524	2.66	684
15	0	0	0	0.233	3.73	489	2.80	651
30	0	0	0	0.233	3.99	457	2.95	618
60	0	0	0	0.233	4.52	403	3.29	553*
90	0	0	0	0.233	5.06	360	3.70	493
120	0	0	0	0.233	5.59	326	4.15	439

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 250Ft

Special Load Zone -- Max Tension = 1049 lb

**Design: 553 lb @ 60 Deg F, 0.00 in ice, 0.00 psf Wind, Intial Sag*

H Tens	683	617	595	574	553	532	512	492	474
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
150	1-0	1-1	1-2	1-2	1-3	1-3	1-4	1-4	1-5
200	1-9	1-11	2-0	2-1	2-2	2-3	2-4	2-5	2-6
250	2-8	3-0	3-1	3-3	3-4	3-6	3-7	3-9	3-11
300	3-11	4-3	4-5	4-7	4-9	5-0	5-2	5-4	5-7

DRAWING CODE	WIRE NAME/TYPE
I-RS250-1/0AT- 1449	JANTHINA/XLPE

Area = 0.0608 Sq. in., Diameter = 0.950 in, Weight = 0.376 lb/G, RTS = 2850 lb

Span = 250.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	1.091	6.01	1422	5.90	1449
32	0.25	0	0	0.749	5.4	1086	4.93	1189
0	0	0	0	0.376	3.55	828	2.90	1013
15	0	0	0	0.376	3.8	773	3.06	962
30	0	0	0	0.376	4.07	723	3.23	911
60	0	0	0	0.376	4.6	640	3.61	815*
90	0	0	0	0.376	5.13	573	4.04	728
120	0	0	0	0.376	5.66	520	4.51	652

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 250Ft

Special Load Zone -- Max Tension = 1449 lb

**Design: 815 lb @ 60 Deg F, 0.00 in ice, 0.00 psf Wind, Intial Sag*

H Tens	1013	911	878	846	815	784	755	727	700
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
150	1-1	1-2	1-3	1-4	1-4	1-5	1-5	1-6	1-7
200	1-11	2-1	2-2	2-3	2-4	2-5	2-6	2-8	2-9
250	2-11	3-3	3-5	3-6	3-8	3-9	3-11	4-1	4-3
300	4-3	4-8	4-10	5-1	5-3	5-5	5-8	5-10	6-1

DRAWING CODE	WIRE NAME/TYPE
I-RS250-4/0AT- 2133	CERAPUS/XLPE

Area = 0.1221 Sq. in., Diameter = 1.260 in, Weight = 0.699 lb/G, RTS = 5310 lb

Span = 250.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	1.507	5.67	2080	5.53	2133*
32	0.25	0	0	1.168	5.42	1684	5.07	1800
0	0	0	0	0.699	3.99	1369	3.51	1555
15	0	0	0	0.699	4.26	1282	3.71	1471
30	0	0	0	0.699	4.53	1205	3.92	1392
60	0	0	0	0.699	5.08	1076	4.37	1250
90	0	0	0	0.699	5.62	973	4.84	1129
120	0	0	0	0.699	6.13	891	5.32	1027

**Design Condition*

Stringing Table Using Initial Sag -- Ruling Span = 250Ft

Special Load Zone -- Max Tension = 2133 lb

**Design: 2133 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

H Tens	1555	1392	1342	1296	1250	1207	1167	1129	1092
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
150	1-3	1-5	1-6	1-6	1-7	1-8	1-8	1-9	1-10
200	2-3	2-6	2-7	2-8	2-10	2-11	3-0	3-1	3-2
250	3-6	3-11	4-1	4-3	4-4	4-6	4-8	4-10	5-0
300	5-1	5-8	5-10	6-1	6-4	6-6	6-9	7-0	7-2

SAG TABLES

12M MESSENGER W/SECONDARY

FULL TENSION

DRAWING CODE	WIRE NAME/TYPE
I-RS200-12M W/#2AT- 3800	COCKLE/XLPE

Conductor: 3/8 x 7Stranded Steel - EHS

Area = 0.0729 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb

Span = 200.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
0	0	0	0	0.273	--	--	0.38	3560
15	0	0	0	0.273	--	--	0.4	3383
30	0	0	0	0.273	--	--	0.43	3207
60	0	0	0	0.273	--	--	0.48	2857
90	0	0	0	0.273	--	--	0.54	2511
120	0	0	0	0.273	--	--	0.63	2172
167	0	0	0	0.273	--	--	0.82	1664
212	0	0	0	0.273	--	--	1.11	1227
Above: Initial data prior to cable installation								
Below: 1 Non-supporting cable(s) added,Dia. = 0.73 in., Wt = 0.228 lb/ft + 0.000 lb/ft								
15	0.25	4	0.2	1.428	1.88	3800	1.88	3800*
32	0.25	0	0	1.007	1.48	3407	1.47	3428
0	0	0	0	0.506	0.7	3589	0.7	3602
15	0	0	0	0.506	0.74	3407	0.74	3430
30	0	0	0	0.506	0.78	3225	0.78	3259
60	0	0	0	0.506	0.88	2866	0.87	2921
90	0	0	0	0.506	1.01	2517	0.98	2591
120	0	0	0	0.506	1.16	2181	1.11	2274
167	0	0	0	0.506	1.49	1700	1.39	1815
212	0	0	0	0.506	1.92	1322	1.76	1441

Stringing Table Using Initial Sag -- Ruling Span = 200Ft

Special Load Zone -- Max Tension = 3800 lb

**Design: 3800lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

Below: 1 Non-Supporting Cable(s) Added, Dia=1.250in, Wt=0.692lb/G + 0.000lb/G

H Tens	3567	3215	3098	2981	2865	2749	2633	2518	2404
(lbs)	----	----	----	----	----	----	----	----	----
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
160.0	0-3	0-4	0-4	0-4	0-4	0-4	0-4	0-5	0-5
180.0	0-4	0-5	0-5	0-5	0-5	0-5	0-6	0-6	0-6
200.0	0-5	0-6	0-6	0-6	0-6	0-6	0-7	0-7	0-7
220.0	0-6	0-7	0-7	0-7	0-7	0-8	0-8	0-8	0-9
240.0	0-7	0-8	0-8	0-8	0-9	0-9	0-9	0-10	0-10
260.0	0-8	0-9	0-9	0-10	0-10	0-11	0-11	1-0	1-0
280.0	0-10	0-11	0-11	0-11	1-0	1-0	1-1	1-1	1-2
300.0	0-11	1-0	1-0	1-1	1-1	1-2	1-3	1-3	1-4
320.0	1-0	1-2	1-2	1-3	1-3	1-4	1-4	1- 5	1-6
340.0	1-2	1-3	1-4	1-4	1-5	1-6	1-7	1-7	1-8
360.0	1-3	1-5	1-6	1-6	1-7	1-8	1-9	1-10	1-11

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NEUTRAL, SECONDARY & MESSENGER STANDARDS

NES

SAG TABLE
12M MESSENGER W/SECONDARY
#2AT @ FULL TENSION

DRAWING CODE	WIRE NAME/TYPE
I-RS200-12M W/ 4/0AT- 4800	CERAPUS/XLPE

Conductor: 3/8 x 7Stranded Steel - EHS

Area = 0.0729 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb

Span = 200.0 Ft -- Special Load Zone

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/ft)	WEIGHT (lb/ft)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
0	0	0	0	0.273	--	--	0.31	4439
15	0	0	0	0.273	--	--	0.32	4264
30	0	0	0	0.273	--	--	0.3	4088
60	0	0	0	0.273	--	--	0.37	3736
90	0	0	0	0.273	--	--	0.4	3383
120	0	0	0	0.273	--	--	0.45	3032
167	0	0	0	0.273	--	--	0.55	2488
212	0	0	0	0.273	--	--	0.69	1984
Above: Initial data prior to cable installation								
Below: 3 Non-supporting cable(s) added,Dia. = 0.67 in., Wt = 0.231 lb/ft + 0.000 lb/ft								
15.0	0.25	4	0.2	2.04	2.13	4800	2.13	4800*
32.0	0.25	0	0	1.621	1.83	4430	1.82	4456
0.0	0	0	0	0.965	1.06	4543	1.06	4563
15.0	0	0	0	0.965	1.11	4365	1.10	4398
30.0	0	0	0	0.965	1.15	4189	1.14	4234
60.0	0	0	0	0.965	1.26	3842	1.23	3908
90.0	0	0	0	0.965	1.38	3504	1.35	3587
120.0	0	0	0	0.965	1.52	3178	1.47	3275
167.0	0	0	0	0.965	1.79	2699	1.72	2813
212.0	0	0	0	0.965	2.11	2292	2.00	2412

Stringing Table Using Initial Sag -- Ruling Span = 200Ft

Special Load Zone -- Max Tension = 4800 lb

**Design: 4800lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

Below: 1 Non-Supporting Cable(s) Added, Dia=1.250in, Wt=0.692lb/G + 0.000lb/G

H TENS	4439	4088	3971	3854	3736	3618	3501	3383	3266
(lbs)	----	----	----	----	----	----	----	----	----
TEMP °F>	0	30	40	50	60	70	80	90	100
SAG	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
SPAN	----	----	----	----	----	----	----	----	----
160.0	0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-4	0-4
180.0	0-3	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-5
200.0	0-4	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-6
220.0	0-5	0-5	0-5	0-6	0-6	0-6	0-6	0-6	0-7
240.0	0-6	0-6	0-6	0-7	0-7	0-7	0-7	0-7	0-8
260.0	0-7	0-7	0-7	0-8	0-8	0-8	0-8	0-9	0-9
280.0	0-8	0-8	0-9	0-9	0-9	0-9	0-10	0-10	0-10
300.0	0-9	0-10	0-10	0-10	0-10	0-11	0-11	0-11	1-0
320.0	0-10	0-11	0-11	0-11	1-0	1-0	1-1	1-1	1-1
340.0	0-11	1-0	1-0	1-1	1-1	1-2	1-2	1-2	1-3
360.0	1-0	1-1	1-2	1-2	1-3	1-3	1-4	1-4	1-5

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NEUTRAL, SECONDARY & MESSENGER STANDARDS

NES

SAG TABLE
12M MESSENGER W/SECONDARY
4/0 AT @ FULL TENSION

AERIAL CABLE FRAMING

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
FRAMING INDEX	3			
FRAMING NAME CODES & ANGLE LIMITATION CHARTS	4			
SPACER CABLE INSTALLATION	5			
SPACER CABLE & MESSENGER DETAILS	6			
CABLE & MESSENGER, SPLICE DETAILS	7			
TRANSFORMER CONNECTION, DETAILS	8			
SINGLE PHASE FRAMING 0 TO 5 DEGREES ANGLE	9			
SINGLE PHASE FRAMING 5 TO 30 DEGREES ANGLE	10			
SINGLE PHASE FROMING 30 TO 90 DEGREES ANGLE	11			
SINGLE PHASE FRAMING, SINGLE DEADEND	12			
SINGLE PHASE FRAMING, DOUBLE DEADEND	13			
SINGLE PHASE FRAMING, BUCK	14			
SINGLE PHASE X-ARM FRMING W/TAP	15			
TWO PHASE FRAMING 0 TO 5 DEGREES ANGLE	16			
TWO PHASE FRAMING 5 TO 30 DEGREES ANGLE	17			
TWO PHASE FRAMING 30 TO 90 DEGREES ANGLE	18			
TWO PHASE FRAMING, SINGLE DEADEND	19			
TWO PHASE FRAMING, DOUBLE DEADEND	20			
TWO PHASE FRAMING, BUCK	21			

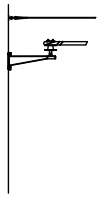
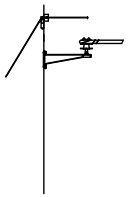
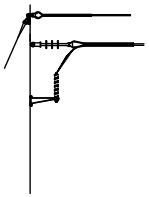
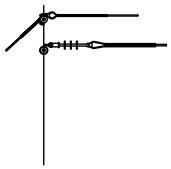
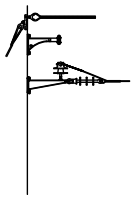
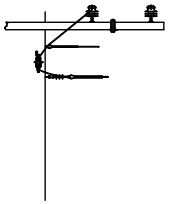
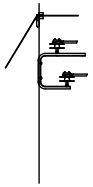
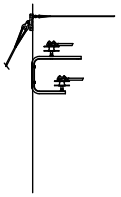
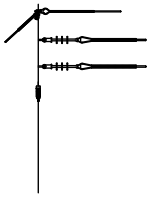
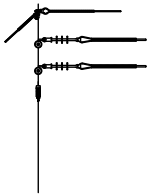
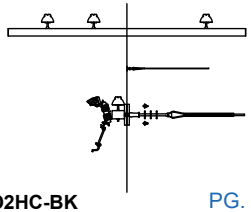
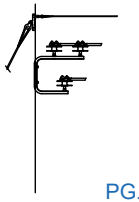
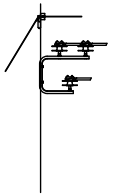
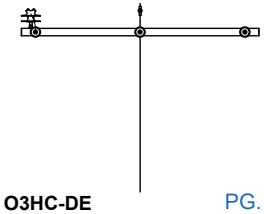
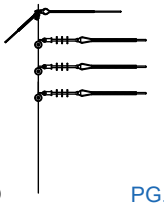
AERIAL CABLE

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
THREE PHASE FRAMING 0 TO 5 DEGREES ANGLE	22			
THREE PHASE FRAMING 5 TO 30 DEGREES ANGLE	23			
THREE PHASE FRAMING 30 TO 90 DEGREES ANGLE	24			
THREE PHASE FRAMING CONSTRUCTION, SINGLE DEADEND	25			
THREE PHASE FRAMING, DOUBLE DEADEND	26			

O1HC-SU PG. 9	 O1HC-A1 PG. 10	 O1HC-A2 PG. 11	 O1HC-DE PG. 12	 O1HC-DD PG. 13
 O1HC-BK PG. 14	 O1HC-TP PG. 15	O2HC-SU PG. 16	 O2HC-A1 PG. 17	 O2HC-A2 PG. 18
 O2HC-DE PG. 19	 O2HC-DD PG. 20	 O2HC-BK PG. 21	O3HC-SU PG. 22	 O3HC-A1 PG. 23
 O3HC-A2 PG. 24	 O3HC-DE PG. 25	 O3HC-DD PG. 26		

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

AERIAL CABLE

NES

FRAMING INDEX

DRAWING FRAMING CODE - HENDRIX SPACER CABLE SYSTEM								
SPACE 1	SPACE 2		SPACE 3-5		SPACES 6-7		SPACES 8-11	
	Phasing		Covered Cable Designation		Framing Type		Wire Size	
CODE	CODE	NAME	CODE	NAME	CODE	NAME	CODE	NAME
O	1	Single	HC	Hendrix Cable	SU	Suspension/Tangent Bracket 0° TO 5°	-10	1/0 AL
	2	Two			A1	Angle 5° to 30°		
	3	Three			A2	Angle 30° to 90°		
					DD	Double Dead End		
					DE	Dead End		
					BK	Buck Arm		
					TP	Single Phase Tap off Open Wire Circuit		

MAXIMUM LINE ANGLES FOR ALL GRADES OF CONSTRUCTION AND ALL WIND SPANS				
ALL FRAMINGS ARE THE SAME FOR WOOD, STEEL AND CONCRETE POLES				
NUMBER OF PHASES	LINE ANGLE	FRAMING CODE	FRAMING DESCRIPTION	PAGE NUMBER
1	0° TO 5°	O1HC-SU	SINGLE PHASE 0 TO 5 DEGREES ANGLE	8
1	5° TO 30°	O1HC-A1	SINGLE PHASE 5 TO 30 DEGREES ANGLE	9
1	30° TO 90°	O1HC-A2	SINGLE PHASE 30 TO 90 DEGREES ANGLE	10
1	0°	O1HC-DE	SINGLE PHASE SINGLE DEADEND	11
1	0° TO 180°	O1HC-DD	SINGLE PHASE DOUBLE DEADEND O TO 180 DEGREES ANGLE	12
1	0°	O1HC-BK	SINGLE PHASE BUCK OFF EXISTING SINGLE PHASE HC LINE	13
1	0°	O1HC-TP	SINGLE PHASE TAP	14
2	0° TO 5°	O2HC-SU	TWO PHASE 0 TO 5 DEGREES ANGLE	15
2	5° TO 30°	O2HC-A1	TWO PHASE 5 TO 30 DEGREES ANGLE	16
2	30° TO 90°	O2HC-A2	TWO PHASE 30 TO 90 DEGREES ANGLE	17
2	0°	O2HC-DE	TWO PHASE SINGLE DEADEND	18
2	0° TO 180°	O2HC-DD	TWO PHASE DOUBLE DEADEND 0 TO 180 DEGREES ANGLE	19
2	0°	O2HC-BK	TWO PHASE BUCK	20
3	0° TO 5°	O3HC-SU	THREE PHASE 0 TO 5 DEGREES ANGLE	21
3	5° TO 30°	O3HC-A1	THREE PHASE 5 TO 30 DEGREES ANGLE	22
3	30° TO 90°	O3HC-A2	THREE PHASE 30 TO 90 DEGREES ANGLE	23
3	0°	O3HC-DE	THREE PHASE SINGLE DEADEND	24
3	0° TO 180°	O3HC-DD	THREE PHASE DOUBLE DEADEND O TO 180 DEGREES ANGLE	25

INITIAL MESSENGER STRINGING TENSION

NOTES:
1.) Initial tension for messenger only (before attaching spacers and cables).
2.) A dynamometer is recommended for use in determining messenger tension.
3.) The final system sag data given is based on the initial tension at 60°F.

INITIAL MESSENGER STRINGING SAG

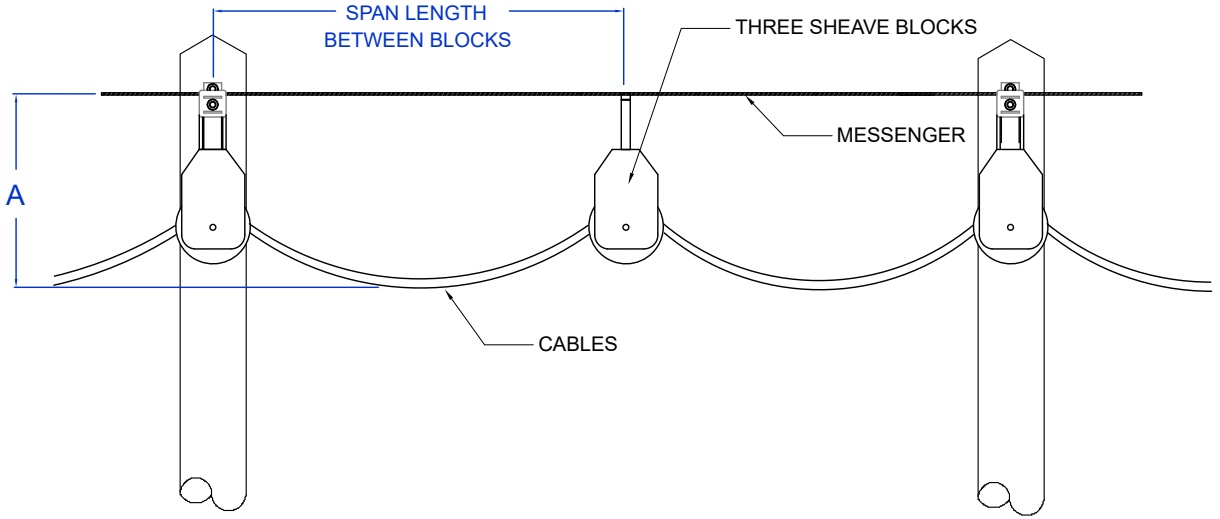
NOTES:
1.) Initial tension for messenger only (before attaching spacers and cables). If a dynomometer is not available to determine initial messenger tension, the following tables will yield the proper tension based on span length and ambient temperature during installation.
2.) The 2500 lb. initail tension table shown to the right, should be used for systems rated 25kV and above.

STRINGING TENSION CHART
HENDRIX 052 AWA - MESSENGER

Initial Tension @ 60°F = 2500 lbs.					
Temp °F	0°	30°	60°	90°	120°
Span Length (ft)	Stringing Sag (inches)				
100	1	2	2	3	4
125	2	3	4	5	7
150	3	4	5	6	9
175	4	5	6	9	12
200	6	7	8	11	15
225	7	9	11	14	19
250	9	11	13	17	22
275	11	13	16	21	26
300	13	15	19	24	30

SAG CHART

Initial Sag - Between Sheave Blocks (Dim. A)			
Temp °F	30°	60°	90°
Span Length (ft)	*Stringing Sag (inches)		
100	2.5	3	3.5
125	3.5	4	4.5
150	4.5	5	5.5
175	5.5	6	6.5
200	6.5	7	7.5
225	7.5	8	8.5
250	8.5	9	9.5
*Areas w/expected low temp. of -20°			



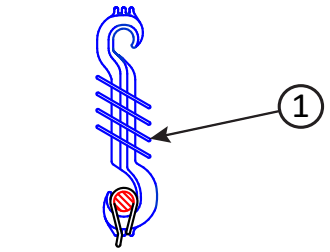
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

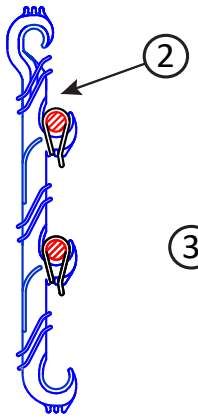
SPACER CABLE INSTALLATION

HENDRIX AERIAL CABLE			
CABLE SPACERS			
ITEM	CU	DESCRIPTION	STOCK NUMBER
1		SPACER AERIAL CABLE SINGLE PHASE	230400000
2		SPACER, AERIAL CABLE, 3 PHASE, VERT.	230410500
3		SPACER AERIAL CABLE THREE PHASE	230410000
4	OCAC-10-CC	CONDUCTOR, 1/0 AL, 25KV COVERED CABLE	103850000
5	OMSGR052-AWA	052 AWA MSGR/NEUTRAL (17,000 LBS RBS)	010660000

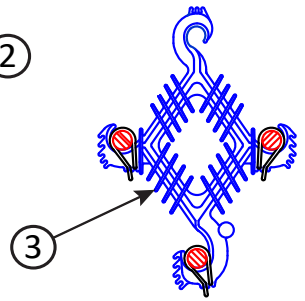
STRINGING TENSION CHART HENDRIX 052 AWA - MESSENGER										
TEMP	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
TENSION (LBS.)	3670	3428	3241	3050	2867	2680	2500	2306	2119	1930



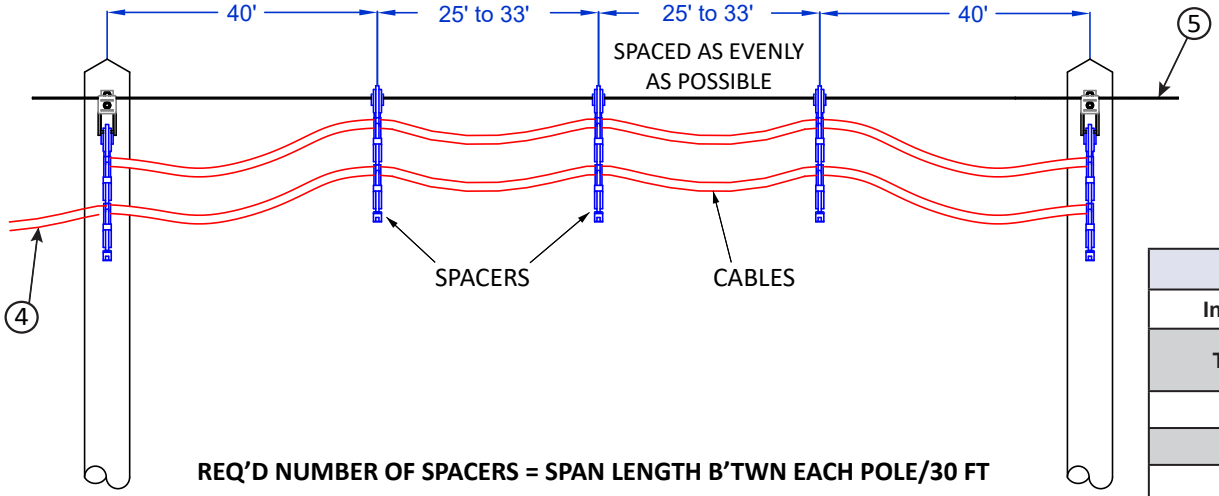
SINGLE PHASE SPACER



TWO PHASE SPACER



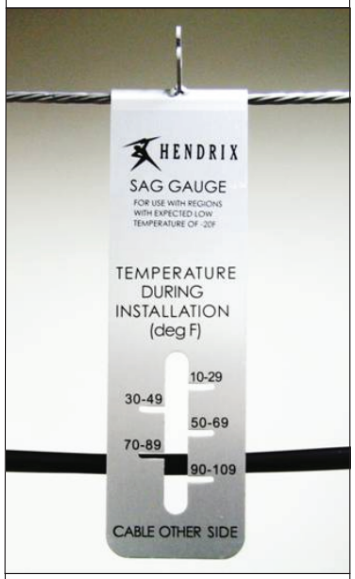
THREE PHASE SPACER



REQ'D NUMBER OF SPACERS = SPAN LENGTH B'TWN EACH POLE/30 FT

SAG CHART	
Inital Sag - Between Spacers	
Temp. °F	*Stringing Sag (inches)
10 - 20	3
30 - 40	4
50 - 60	5
70 - 80	6
90 - 100	7
110 - 120	8
*Areas w/expected low temp. of -20°	

HENDRIX SG-1
SAG GAUGE



NES STOCK# 283450700

NOTES

1. Use Hendrix SG-1 Sag Gauge to set the proper conductor sag during spacer cable installation.
2. Hang Sag Gauge on the messenger at the mid-point between roll-by blocks.
3. During sagging, align the top of the cable to the slot marked with the current ambient temperature.

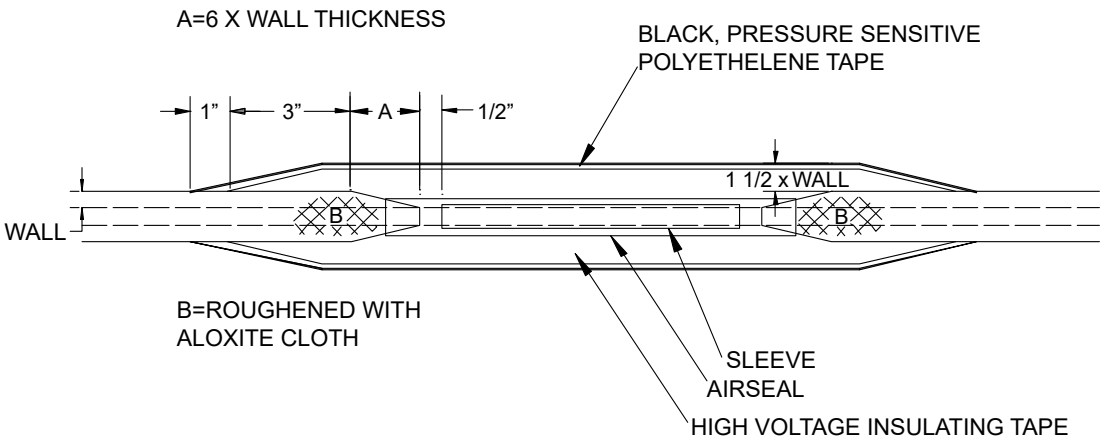
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SPACER CABLE & MESSENGER DETAILS

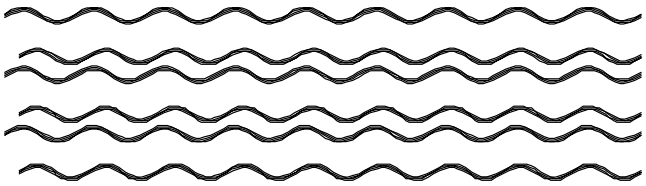
TYPICAL SPLICE DETAIL

MATERIAL LIST	
STOCK NUMBER	DESCRIPTION
227720000	SLEEVE, JUMPER ACSR/AL 1/0
400100000	AIR SEAL
402320000	TAPE SELF BOND 1-1/2" X 30'X.030"
402250000	TAPE ELECTRICAL VINYL



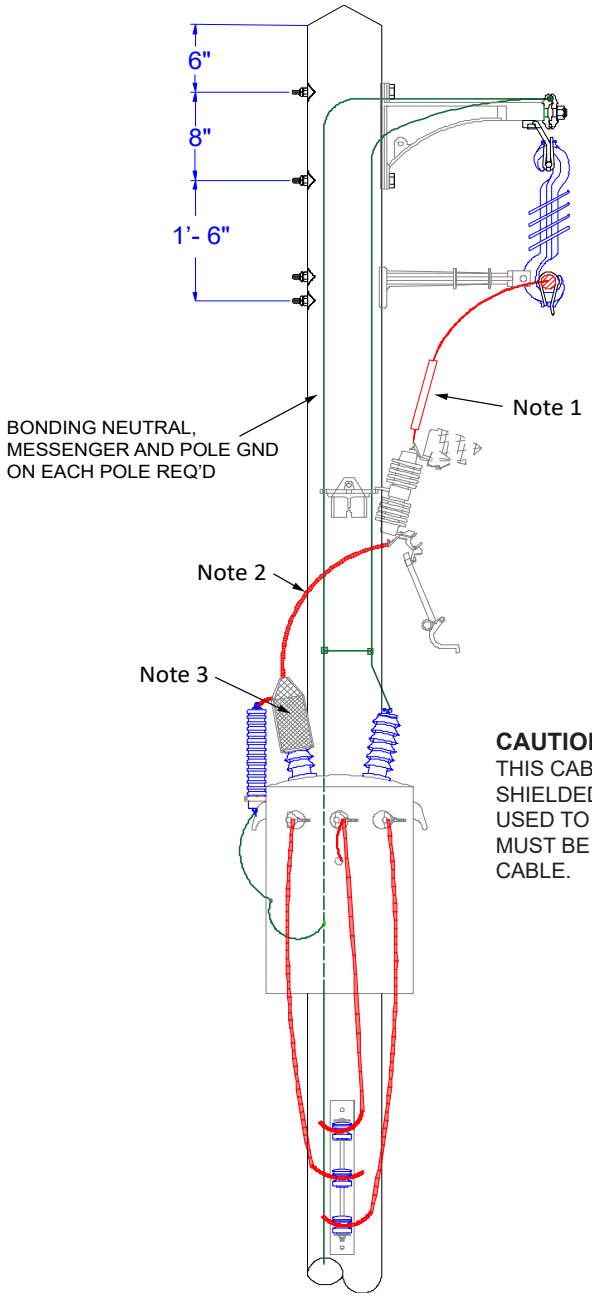
PRE-FORMED MESSENGER SPLICE

MATERIAL LIST	
STOCK NUMBER	DESCRIPTION
184820000	SPLICE. PRE-FORMED FOR 052 MESS.



PERCISSION WEDGE CONNECTOR

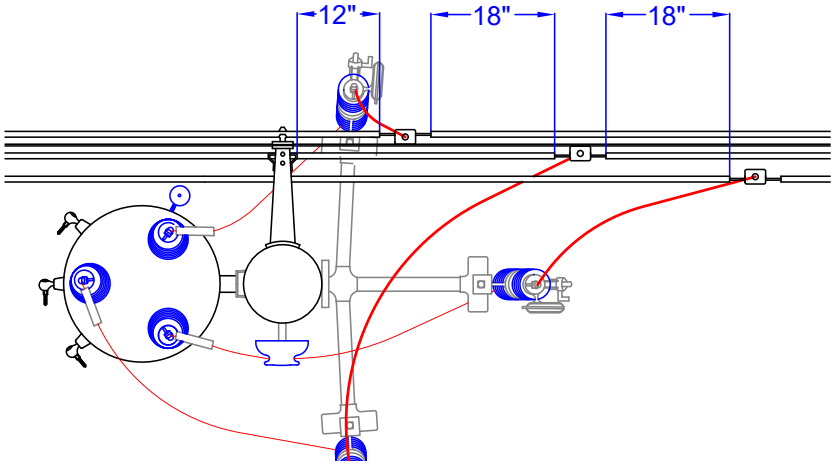
CONNECTOR SELECTION GUIDE			
MATERIAL LIST			
STOCK NUMBER	CATALOG NUMBER	WIRE TYPES	SHELL TYPE
224107000	600446	#4 CU BSD TO 052 AWAC MESSENGER	BLUE
224103000	602283-1	#4 CU, 7 STRANDS TO 1/0 AL CABLE	WHITE
224112000	600459	052 AWAC MESS. TO 052 AWAC MESS.	BLUE
224106000	600403	1/0 AL CABLE TO 1/0 AL CABLE	BLUE
224140000	69338-1	BLUE SHELL	
224143000	69338-5	WHITE SHELL	



CAUTION NOTE:
THIS CABLE IS INSULATED, HOWEVER, NOT SHIELDED, THEREFORE THE SAME PRECAUTIONS USED TO WORK ENERGIZED BARE CONDUCTORS MUST BE APPLIED WHEN WORKING WITH THIS CABLE.

TRUCK STOCK ITEMS		
QTY	**DESCRIPTION**	**STOCK #**
2	BOLT MACHINE 5/8X10	203800000
2	5/8" DBL COIL SPRING WASHER	206570000
2	WASHER SQ FLAT 3/4 H	209620000
1	SCREW LAG 1/2X4 GALV	208540000
1	CABLE CU BSD 4	011160000
1	CABLE CU 5KV RINC 4 1/C (BIRD GUARD)	022340000
2	CONN TERM 4-3 3/8 STUD N/INS	224030000
1	WILDLIFE PROTECTIVE COVER SM BUSHING	466450000

TAP SEPARATION SPACING



NOTES

1. CLF is to be installed on the cutout to allow installation of animal protection at the transformers.
2. Use 5kV cable from the cutout to the transformer bushing and from the transformer bushing to the arrester (Stock #022340000).
3. Install Bushing Wildlife Cover on all Transformers (see Materials Section, Pg. 17).
4. Breaks in the insulation of this cable must be fully covered with tape to restore the insulation level of the cable.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

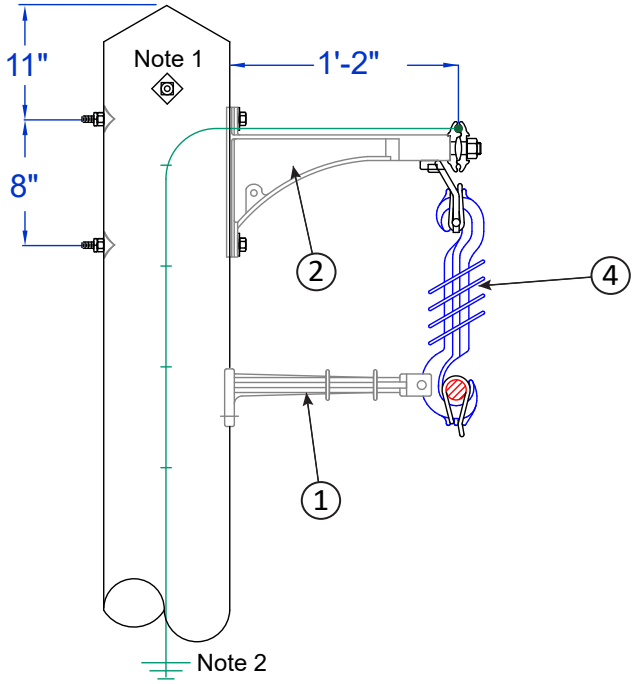
TRANSFORMER CONNECTION DETAILS

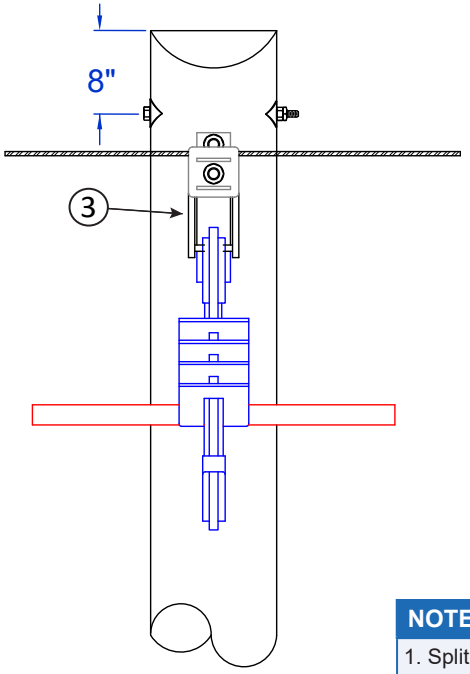
AERIAL CABLE

FRM. CODE	O1HC-SU	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BRACKET AERIAL CABLE ANTI-SWAY	180675000
2	1	BRACKET AERIAL CABLE MESS 14	180675500
3	1	BRACKET AERIAL CABLE STIRRUP	180676000
4	1	SPACER AERIAL CABLE SINGLE PHA	230400000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
50'	CABLE CU BSD 4	011160000
1	ROD GROUND CW 5/8X8	184380000
2	BOLT MACHINE 5/8X10	203800000
2	5/8" DBL COIL SPRING WASHER	206570000
1	SCREW LAG 1/2X4 GALV	208540000
2	WASHER SQ FLAT 3/4 H	209620000
1	CLAMP GROUND TRAN 10/1	220420000
1	CLAMP GR ROD 8-2 CU	220500000
1	CONNECTOR, COMPRESSION,AVERAGE	223305000
1	CONN COMP 6 2-6 2 NO 1	223320000
1	CONN PERC WEDGE 2/0 - 4	224107000

O1HC-SU
0° TO 5°





NOTES

1. Split bolts are required on all wood poles.
2. Bonding the neutral, messenger and pole ground on each pole is req'd.

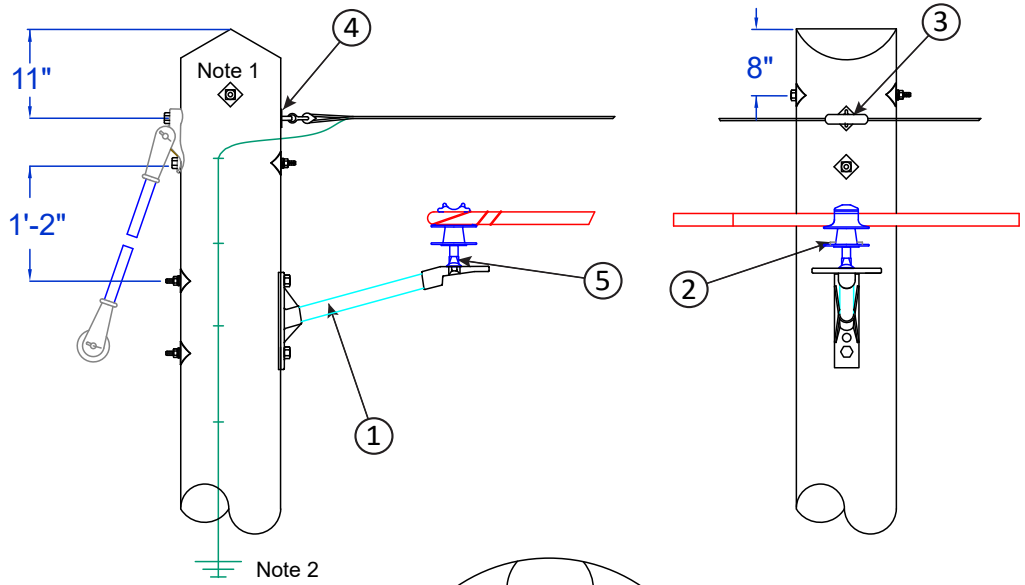
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

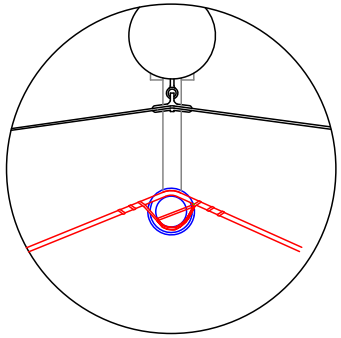
NES

SINGLE PHASE FRAMING
0 TO 5 DEGREES ANGLE

O1HC-A1

5° TO 30°





TOP VIEW

FRM. CODE	O1HC-A1	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BRKT INS/CO/ARR 18 IN	180744000
2	1	INSUL PIN 25KV 1 POLY	242185000
3	1	CLAMP SUSP AL 2-4/0	221600000
4	1	BOLT SHOULDER EYE 3/4X14	202620000
5	1	PIN STEEL 1-3/4" W/SHORT SHANK	183175000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
1	ROD GROUND CW 5/8X8	184380000
1	CONN PERC WEDGE 2/0 - 4	224107000
2	CLAMP GROUND TRAN 10/1	220420000
1	CLAMP GR ROD 8-2 CU	220500000
2	BOLT MACH AVERAGE 5/8 LONG	203775000
2	CONNECTOR, COMPRESSION, AVERAGE	223305000
3	CABLE AL BSD 4 COV	010425000
1	CONN COMP 6 2-6 2 NO 1	223320000
1	3/4” DBL COIL SPRING WASHER	206580000
50'	CABLE CU BSD 4	011160000
3	5/8” DBL COIL SPRING WASHER	206570000
3	WASHER SQ FLAT 3/4 H	209620000
1	ROD GROUND CW 5/8X8	184380000

NOTES

1. Split bolts are required on all wood poles.
2. Bonding the neutral, messenger and pole ground on each pole is req’d.

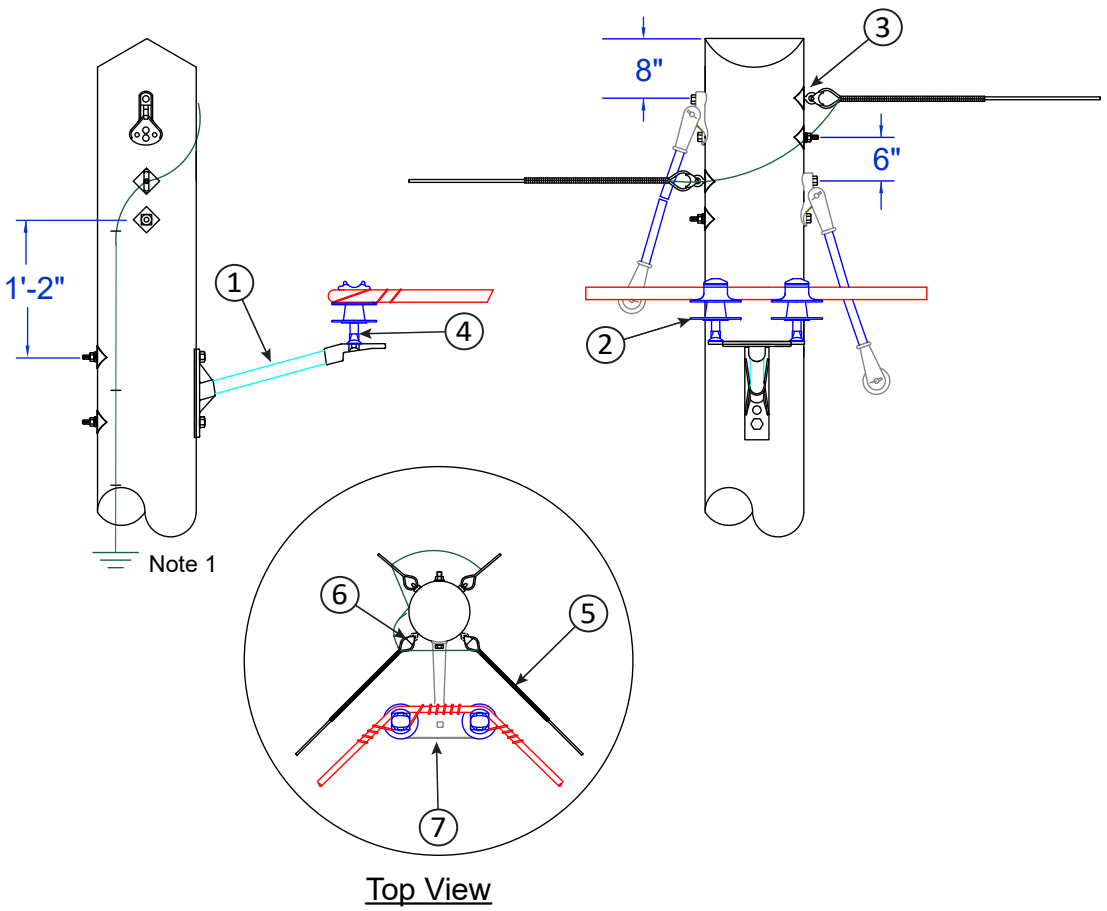
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SINGLE PHASE FRAMING
5 TO 30 DEGREE ANGLE

AERIAL CABLE

O1HC-A2
30° TO 90°



FRM. CODE	O1HC-A2	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BRKT INS/CO/ARR 18 IN	183175000
2	2	INSUL PIN 25KV 1 POLY	230175000
3	2	BOLT SHOULDER EYE 3/4X14	181520000
4	2	PIN STEEL 1-3/4" W/SHORT SHANK	183175000
5	2	DEAD END, PREFORMED FOR 052AWA	230175000
6	2	CLEVIS THIMBLE-EYE LARGE	181520000
7	2	DBL INSUL PLATE, HENDRIX TYPE 2IP	

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	CLAMP GROUND TRAN 10/1	220420000
2	BOLT MACH AVERAGE 5/8 LONG	203775000
2	CONNECTOR,COMPRESSION,AVERAGE	223305000
6	CABLE AL BSD 4 COV	010425000
3	3/4” DBL COIL SPRING WASHER	206580000
50'	CABLE CU BSD 4	011160000
2	5/8” DBL COIL SPRING WASHER	206570000
2	WASHER SQ FLAT 3/4 H	209620000
1	ROD GROUND CW 5/8X8	184380000
1	CLAMP GR ROD 8-2 CU	220500000

NOTES

1. Bonding the neutral, messenger and pole ground on each pole is req’d.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

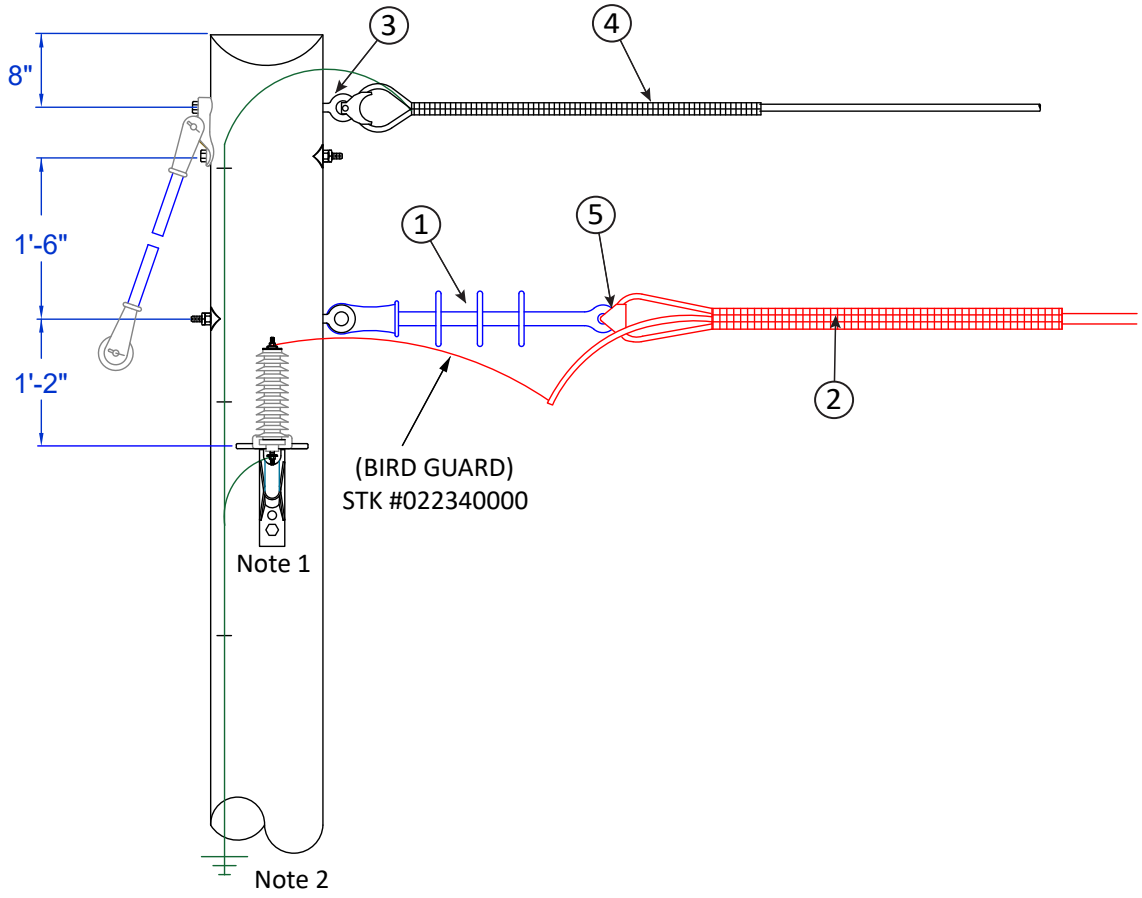
NES

SINGLE PHASE FRAMING
30 TO 90 DEGREE ANGLE

FRM. CODE	O1HC-DD	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	INSUL SUSP 25KV/ONE PIECE POLY	242750000
2	1	DEAD END PREFORMED POLY CABLE	230170000
3	1	BOLT SHOULDER EYE 3/4X14	202620000
4	1	DEAD END PREFORMED FOR 052 AWA	230175000
5	2	CLEVIS THIMBLEYE LARGE	181520000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	NUT PALNUT GALV 3/4	206540000
50'	CABLE CU B$D 4	011160000
1	BOLT DA AVERAGE 5/8	201485000
1	5/8" DBL COIL SPRING WASHER	206570000
1	CLAMP GR ROD 8-2 CU	220500000
1	ROD GROUND CW 5/8X8	184380000

O1HC-DE



NOTES

1. Brackets and arresters are called for separately.
2. Bonding the neutral, messenger and pole ground on each pole is req'd.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

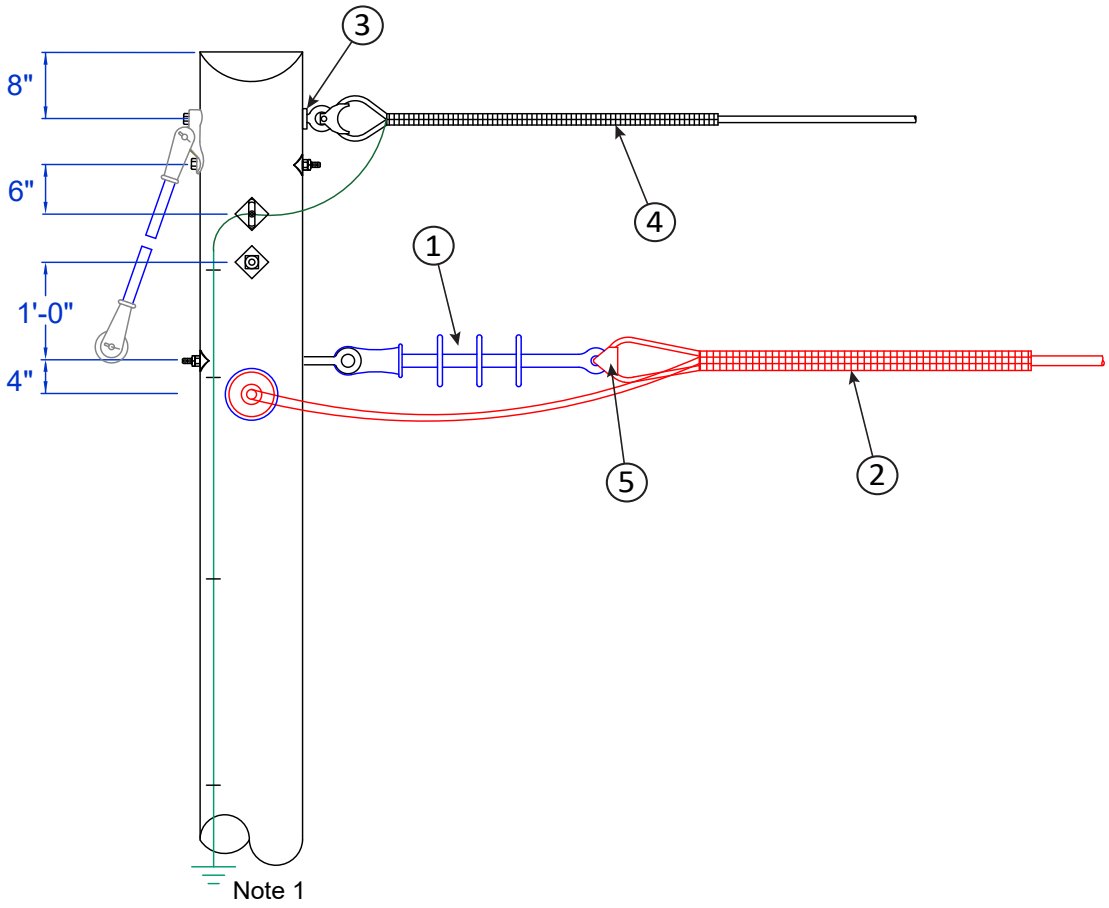
SINGLE PHASE FRAMING
SINGLE DEADEND

AERIAL CABLE

O1HC-DD

FRM. CODE	O1HC-DD	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	INSUL SUSP 25KV/ONE PIECE POLY	242750000
2	2	DEAD END PREFORMED POLY CABLE	230170000
3	2	BOLT SHOULDER EYE 3/4X14	202620000
4	2	DEAD END PREFORMED FOR 052 AWA	230175000
5	4	CLEVIS THIMBLEYE LARGE	181520000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
4	NUT PALNUT GALV 3/4	206540000
50'	CABLE CU BSD 4	011160000
2	BOLT DA AVERAGE 5/8	201485000
2	DBL COIL SPRING WASHER GALV 5/8	206520000
1	ROD GROUND CW 5/8X8	184380000
1	CLAMP GR ROD 8-2 CU	220500000



NOTES

1. Bonding the neutral, messenger and pole ground on each pole is req'd.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SINGLE PHASE FRAMING
DOUBLE DEADEND

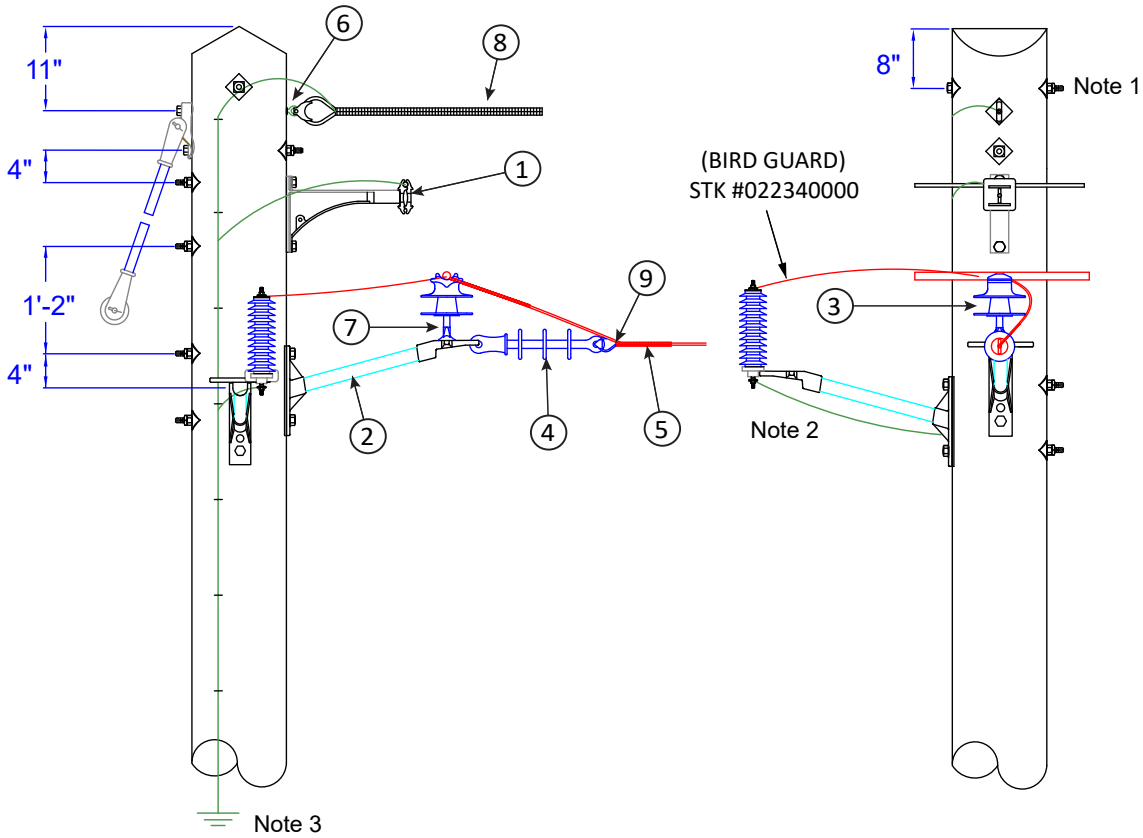
FRM. CODE	O1HC-DK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BRACKET AERIAL CABLE MESS 14	180675500
2	1	BRKT INS/CO/ARR 18 IN	180744000
3	1	INSUL PIN 25KV 1 POLY	242185000
4	1	INSUL SUSP 25KV/ONE PIECE POLY	242750000
5	1	DEAD END PREFORMED POLY CABLE	230170000
6	1	BOLT SHOULDER EYE 3/4X14	202620000
7	1	PIN STEEL 1-3/4" W/SHORT SHANK	183175000
8	1	DEAD END PREFORMED FOR 052 AWA	230175000
9	2	CLEVIS THIMBLEYE LARGE	181520000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	CLAMP GROUND TRAN 10/1	220420000
2	BOLT MACH AVERAGE 5/8 LONG	203775000
2	BOLT MACHINE 5/8X10	203800000
2	CONNECTOR, COMPRESSION, AVERAGE	223305000
3'	CABLE AL BSD 4 COV	010425000
3	3/4” DBL COIL SPRING WASHER	206580000
50'	CABLE CU BSD 4	011160000
4	5/8” DBL COIL SPRING WASHER	206570000
4	WASHER SQ FLAT 3/4 H	209620000
1	ROD GROUND CW 5/8X8	184380000
1	CLAMP GR ROD 8-2 CU	220500000

NOTES

1. Split bolts are required on all wood poles.
2. Arresters and brackets are called for separately.
3. Bonding the neutral, messenger and pole ground on each pole is req’d.

O1HC-BK



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

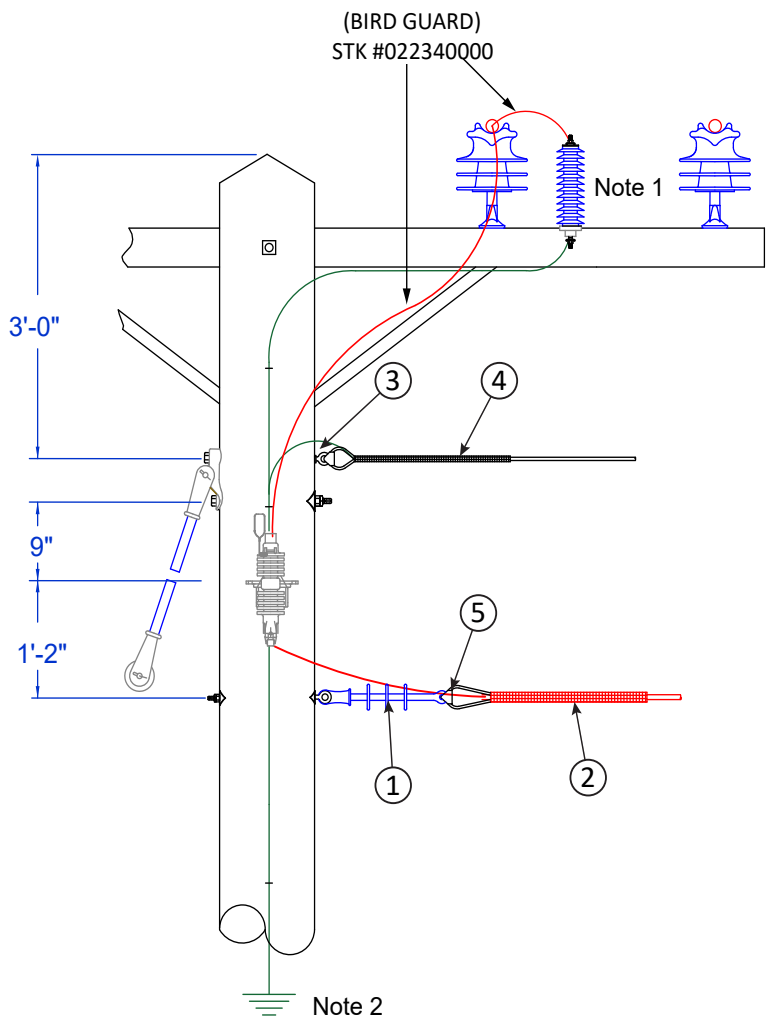
NES

SINGLE PHASE FRAMING
BUCK

FRM. CODE	O1HC-TP	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	INSUL SUSP 25KV/ONE PIECE POLY	242750000
2	1	DEAD END PREFORMED POLY CABLE	230170000
3	1	BOLT SHOULDER EYE 3/4X14	202620000
4	1	DEAD END PREFORMED FOR 052 AWA	230175000
5	2	CLEVIS THIMBLEYE LARGE	181520000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	3/4” DBL COIL SPRING WASHER	206580000
50	CABLE CU BSD 4	011160000
1	BOLT DA AVERAGE 5/8	201485000
1	5/8” DBL COIL SPRING WASHER	206570000
1	ROD GROUND CW 5/8X8	184380000
1	CLAMP GR ROD 8-2 CU	220500000

O1HC-TP



NOTES

1. Brackets and arresters are called for separately.
2. Bonding the neutral, messenger and pole ground on each pole is req’d.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

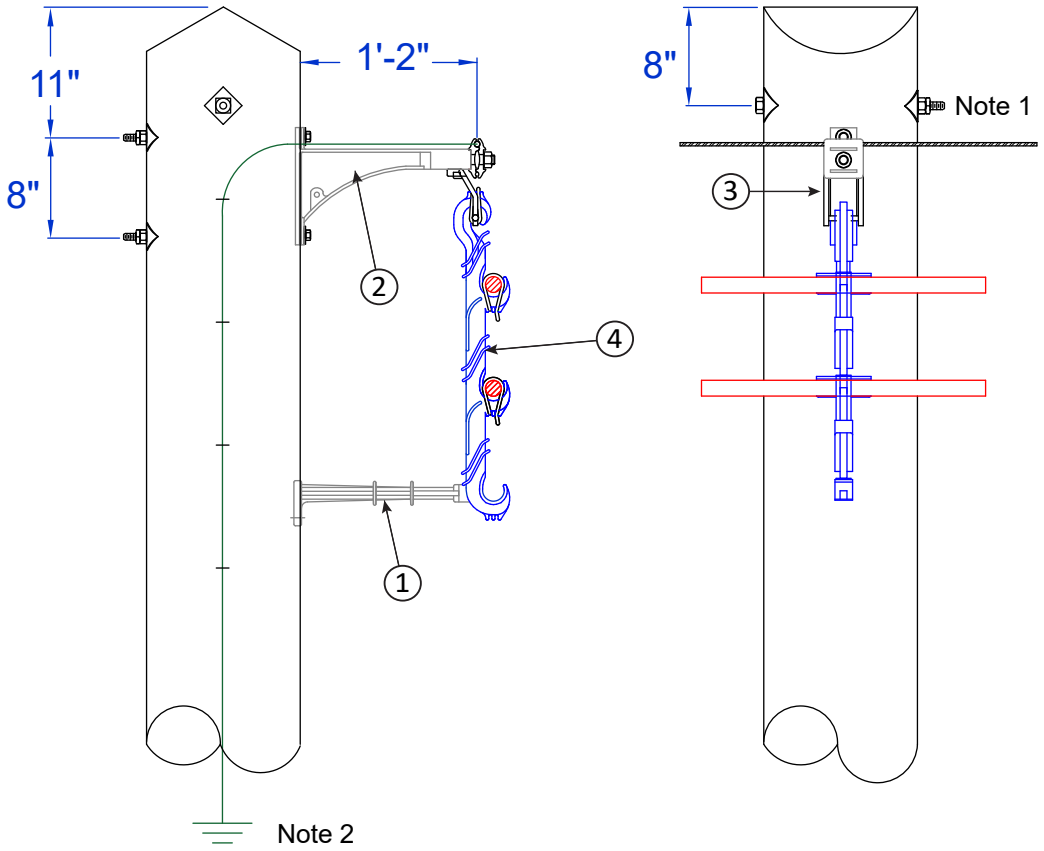
SINGLE PHASE XARM FRAMING W/TAP

AERIAL CABLE

FRM. CODE	O2HC-SU	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BRACKET AERIAL CABLE ANTI-SWAY	180675000
2	1	BRACKET AERIAL CABLE MESS 14	180675500
3	1	BRACKET AERIAL CABLE STIRRUP	180676000
4	1	SPACER, AERIAL CABLE, 3 P VERT	230410500

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
50'	CABLE CU BSD 4	011160000
1	ROD GROUND CW 5/8X8	184380000
2	BOLT MACHINE 5/8X10	203800000
2	5/8" DBL COIL SPRING WASHER	206570000
1	SCREW LAG 1/2X4 GALV	208540000
2	WASHER SQ FLAT 3/4 H	209620000
1	CLAMP GROUND TRAN 10/1	220420000
1	CLAMP GR ROD 8-2 CU	220500000
1	CONNECTOR,COMPRESSION,AVERAGE	223305000
1	CONN COMP 6 2-6 2 NO 1	223320000
1	CONN PERC WEDGE 2/0 - 4	224107000
1	ROD GROUND CW 5/8X8	184380000
1	CLAMP GR ROD 8-2 CU	220500000

O2HC-SU
0° TO 5°



NOTES

1. Split bolts are required on all wood poles.
2. Bonding the neutral, messenger and pole ground on each pole is req'd.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

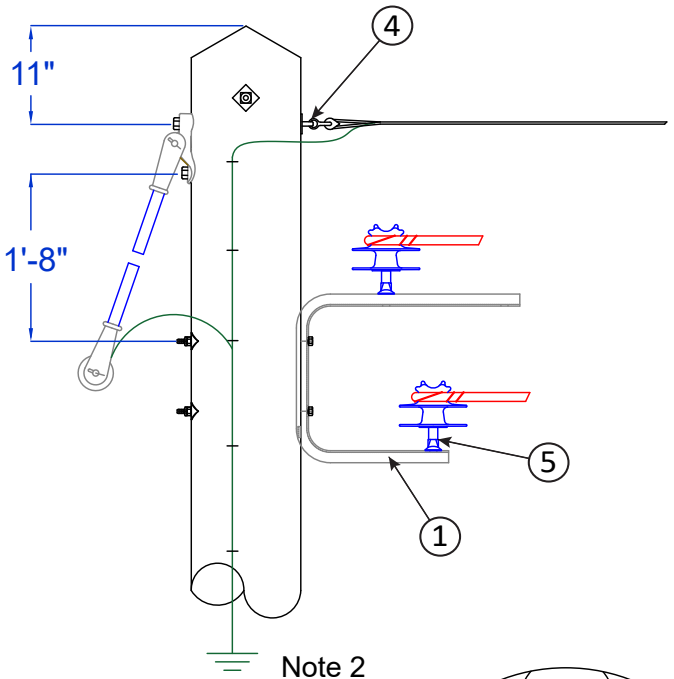
NES

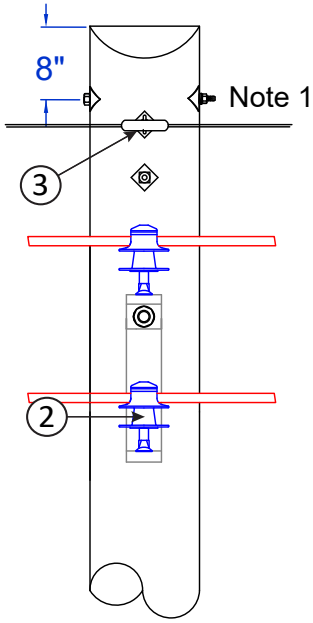
TWO PHASE FRAMING
0 TO 5 DEGREE ANGLE

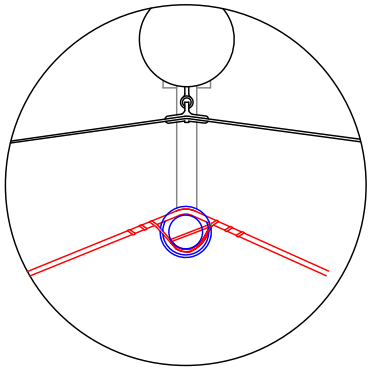
FRM. CODE	02HC-A1	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BRACKET AERIAL CABLE ANGLE 3P	180674000
2	2	INSUL PIN 25KV 1 POLY	242185000
3	1	CLAMP SUSP AL 2-4/0	221600000
4	1	BOLT SHOULDER EYE 3/4X14	202620000
5	1	PIN STEEL 1-3/4" W/SHORT SHANK	183175000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
1	ROD GROUND CW 5/8X8	184380000
1	CONN PERC WEDGE 2/0 - 4	224107000
2	CLAMP GROUND TRAN 10/1	220420000
1	CLAMP GR ROD 8-2 CU	220500000
2	BOLT MACH AVERAGE 5/8 LONG	203775000
2	CONNECTOR, COMPRESSION, AVERAGE	223305000
6'	CABLE AL BSD 4 COV	010425000
1	CONN COMP 6 2-6 2 NO 1	223320000
1	3/4" DBL COIL SPRING WASHER	206580000
50'	CABLE CU BSD 4	011160000
3	NUT PALNUT GALV 5/8	206520000
3	WASHER SQ FLAT 3/4 H	209620000
1	ROD GROUND CW 5/8X8	184380000

O2HC-A1
5° TO 30°







Top View

NOTES

1. Split bolts are required on all wood poles.
2. Bonding the neutral, messenger and pole ground on each pole is req'd.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

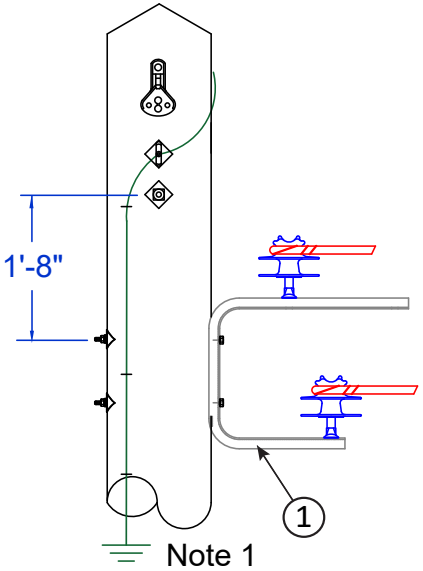
NES

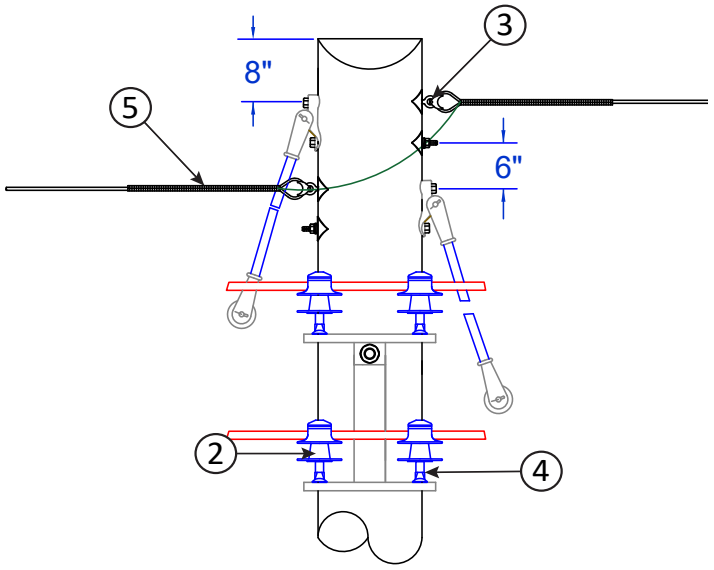
TWO PHASE FRAMING
5 TO 30 DEGREES ANGLE

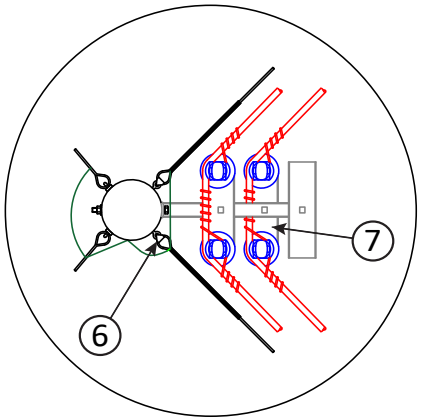
FRM. CODE	O1HC-A2	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BRACKET AERIAL CABLE ANGLE 3P	180674000
2	4	INSUL PIN 25KV 1 POLY	242185000
3	2	BOLT SHOULDER EYE 3/4X14	202620000
4	4	PIN STEEL 1-3/4" W/SHORT SHANK	183175000
5	2	DEAD END PREFORMED FOR 052 AWA	230175000
6	2	CLEVIS THIMBLEYE LARGE	181520000
7	2	DBL INSUL PLATE, HENDRIX TYPE 2IP	

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	CLAMP GROUND TRAN 10/1	220420000
2	BOLT MACH AVERAGE 5/8 LONG	203775000
2	CONNECTOR, COMPRESSION, AVERAGE	223305000
12'	CABLE AL BSD 4 COV	010425000
2	3/4” DBL COIL SPRING WASHER	206580000
50'	CABLE CU BSD 4	011160000
2	5/8” DBL COIL SPRING WASHER	206570000
2	WASHER SQ FLAT 3/4 H	209620000
1	ROD GROUND CW 5/8X8	184380000
1	CLAMP GR ROD 8-2 CU	220500000

O2HC-A2
30° TO 90°







Top View

NOTES

1. Bonding the neutral, messenger and pole ground on each pole is req’d.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

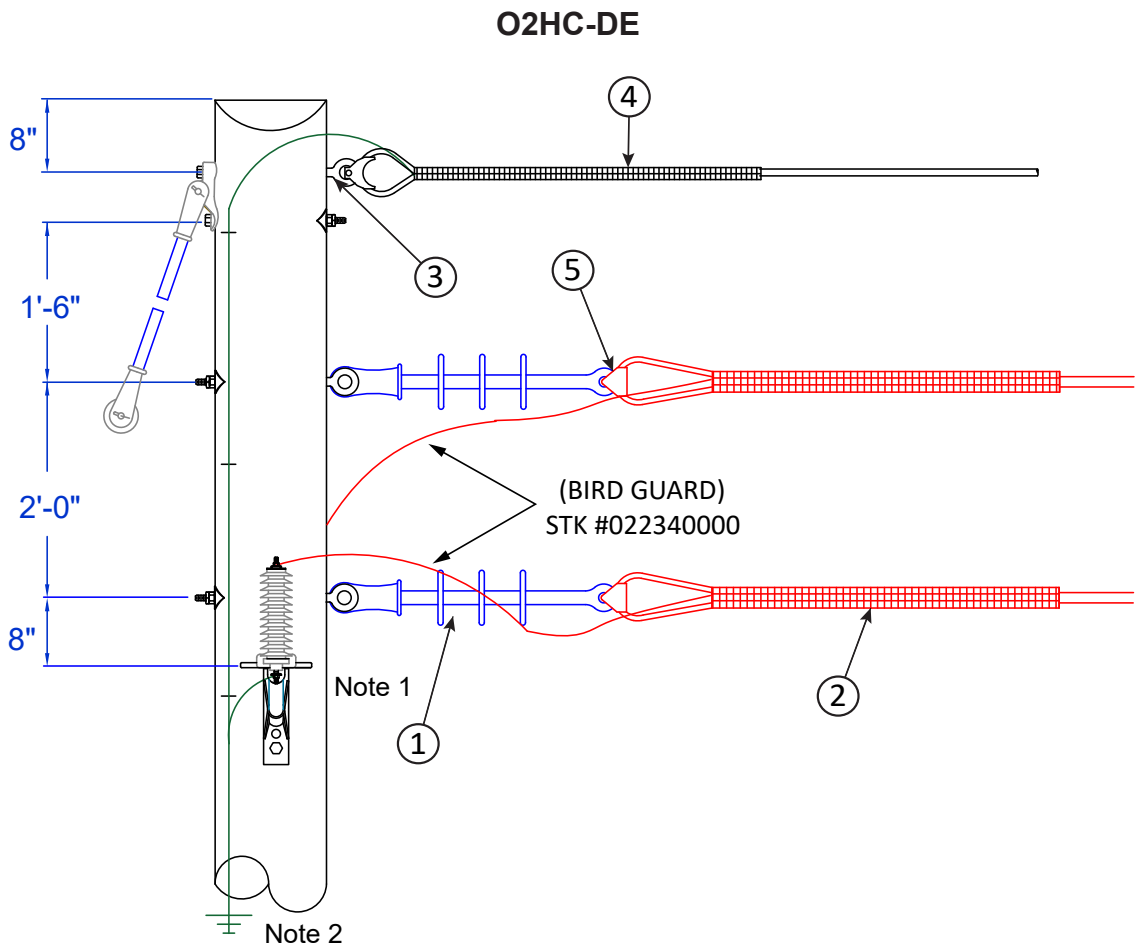
NES

TWO PHASE FRAMING
30 TO 90 DEGREES ANGLE

AERIAL CABLE

FRM. CODE	O2HC-DE	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	INSUL SUSP 25KV/ONE PIECE POLY	242750000
2	2	DEAD END PREFORMED POLY CABLE	230170000
3	1	BOLT SHOULDER EYE 3/4X14	202620000
4	1	DEAD END PREFORMED FOR 052 AWA	230175000
5	3	CLEVIS THIMBLEYE LARGE	181520000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	BOLT MACH AVERAGE 3/4 LONG	204075000
2	CONNECTOR,COMPRESSION,AVERAGE	223305000
2	3/4” DBL COIL SPRING WASHER	206580000
6	WASHER SQ CURVED 3 1/2	209520000
4	WASHER SQ FLAT 3/4 H	209620000
1	ROD GROUND CW 5/8X8	184380000
50'	CABLE CU BSD 4	011160000
1	CLAMP GR ROD 8-2 CU	220500000
6	BOLT DA AVERAGE 3/4	201695000
6	NUT OVAL EYE 3/4	206420000



NOTES

1. Brackets and arresters are called for separately.
2. Bonding the neutral, messenger and pole ground on each pole is req’d.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

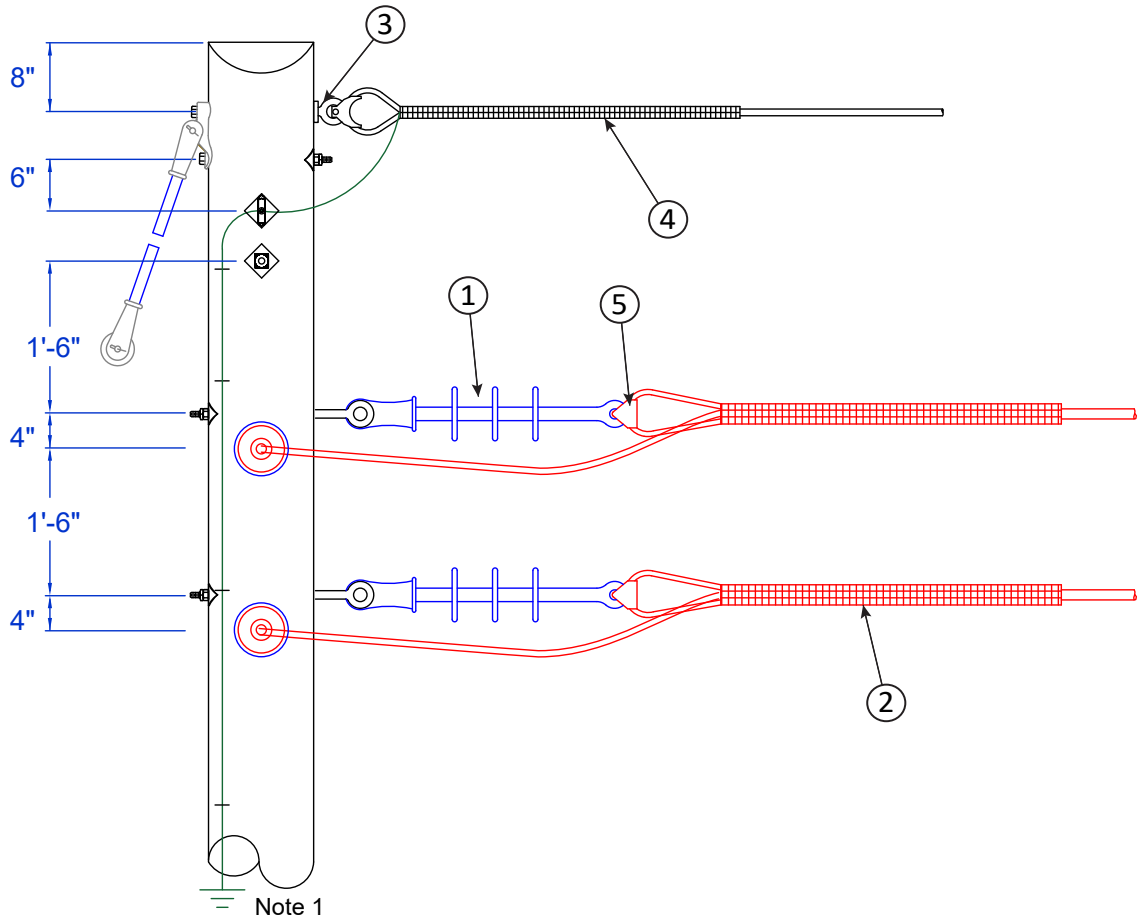
NES

TWO PHASE FRAMING SINGLE DEADEND

FRM. CODE	O2HC-DD	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	4	INSUL SUSP 25KV/ONE PIECE POLY	242750000
2	4	DEAD END PREFORMED POLY CABLE	230170000
3	2	BOLT SHOULDER EYE 3/4X14	202620000
4	2	DEAD END PREFORMED FOR 052 AWA	230175000
5	6	CLEVIS THIMBLEYE LARGE	181520000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	BOLT MACH AVERAGE 3/4 LONG	204075000
2	CONNECTOR, COMPRESSION, AVERAGE	223305000
4	BOLT DA AVERAGE 3/4	201695000
4	NUT OVAL EYE 3/4	206420000
2	3/4" DBL COIL SPRING WASHER	206580000
6	WASHER SQ CURVED 3 1/2	209520000
4	WASHER SQ FLAT 3/4 H	209620000
1	ROD GROUND CW 5/8X8	184380000
50	CABLE CU BSD 4	011160000
1	CLAMP GR ROD 8-2 CU	220500000

O2HC-DD



NOTES

1. Bonding the neutral, messenger and pole ground on each pole is req'd.

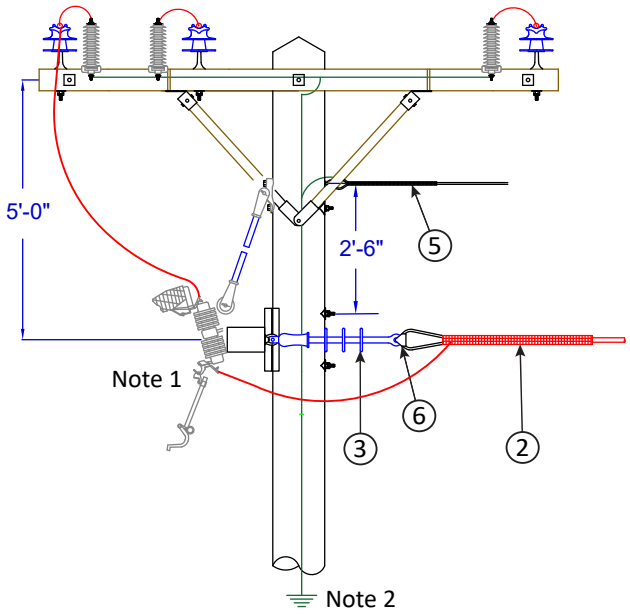
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

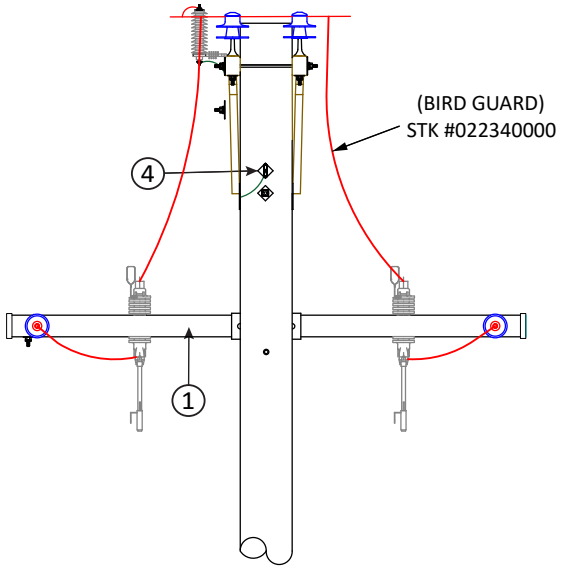
TWO PHASE FRAMING DOUBLE DEADEND

FRM. CODE	O2HC-BK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	X-ARM 4X5X10 FIBERGLASS	040410000
2	2	PREFORMED DEAD-END GRIP FOR 1/0 AERIAL CABLE	230170000
3	2	25KV POLYMER SUSPENSION INSULATOR	230750000
4	1	BOLT SHOULDER EYE 3/4X14	202620000
5	1	DEAD END PREFORMED FOR 052 AWA	230175000
6	3	CLEVIS THIMBLEYE LARGE	181520000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	BOLT CARRIAGE 1/2X6	201360000
1	BOLT MACH AVERAGE 3/4 LONG	204075000
2	BOLT MACH AVERAGE 5/8 LONG	203775000
12	CABLE AL/CU BSD AVERAGE	010395000
2	CONNECTOR,COMPRESSION,AVERAGE	223305000
2	1/2” DBL COIL SPRING WASHER	206500000
2	3/4” DBL COIL SPRING WASHER	206580000
4	5/8” DBL COIL SPRING WASHER	206570000
6	WASHER SQ CURVED 3 1/2	209520000
4	WASHER SQ FLAT 3/4 H	209620000
2	WASHER SQ FLAT 9/16 H	209600000
1	ROD GROUND CW 5/8X8	184380000
50'	CABLE CU BSD 4	011160000



O2HC-BK



NOTES

1. Cutouts and arresters are called for separately.
2. Bonding the neutral, messenger and pole ground on each pole is req’d.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

AERIAL CABLE

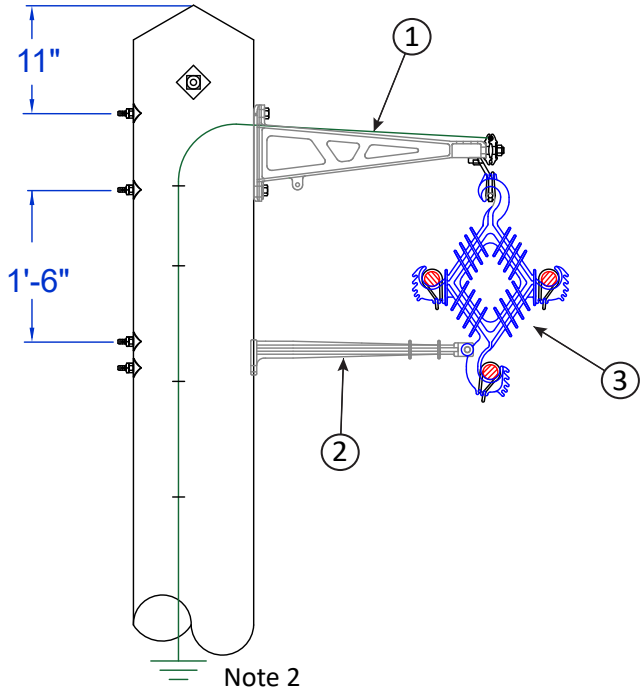
NES

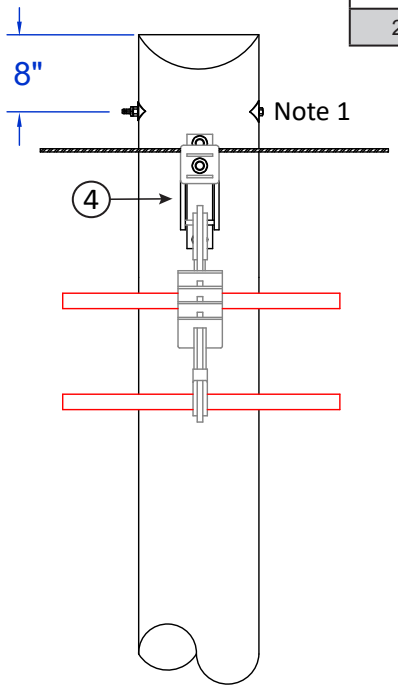
TWO PHASE FRAMING
BUCKARM

FRM. CODE	03HC-SU	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BRACKET AERIAL CABLE MESS 24"	180675700
2	1	BRACKET AERIAL CABLE ANTI- SWAY	180675300
3	1	SPACER AERIAL CABLE THREE PHASE	230410000
4	1	BRACKET AERIAL CABLE STIRRUP	180676000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
1	ROD GROUND CW 5/8X8	184380000
1	CONN PERC WEDGE 2/0 - 4	224107000
1	CLAMP GROUND TRAN 10/1	220420000
1	CLAMP GR ROD 8-2 CU	220500000
2	BOLT MACHINE 5/8X10	203800000
1	SCREW LAG 1/2X4 GALV	208540000
1	CONNECTOR, COMPRESSION, AVERAGE	223305000
1	CONN COMP 6 2-6 2 NO 1	223320000
50'	CABLE CU BSD 4	011160000
2	5/8" DBL COIL SPRING WASHER	206520000
2	WASHER SQ FLAT 3/4 H	209620000

O3HC-SU
0° TO 5°





NOTES

1. Split bolts are required on all wood poles.
2. Bonding the neutral, messenger and pole ground on each pole is req'd.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

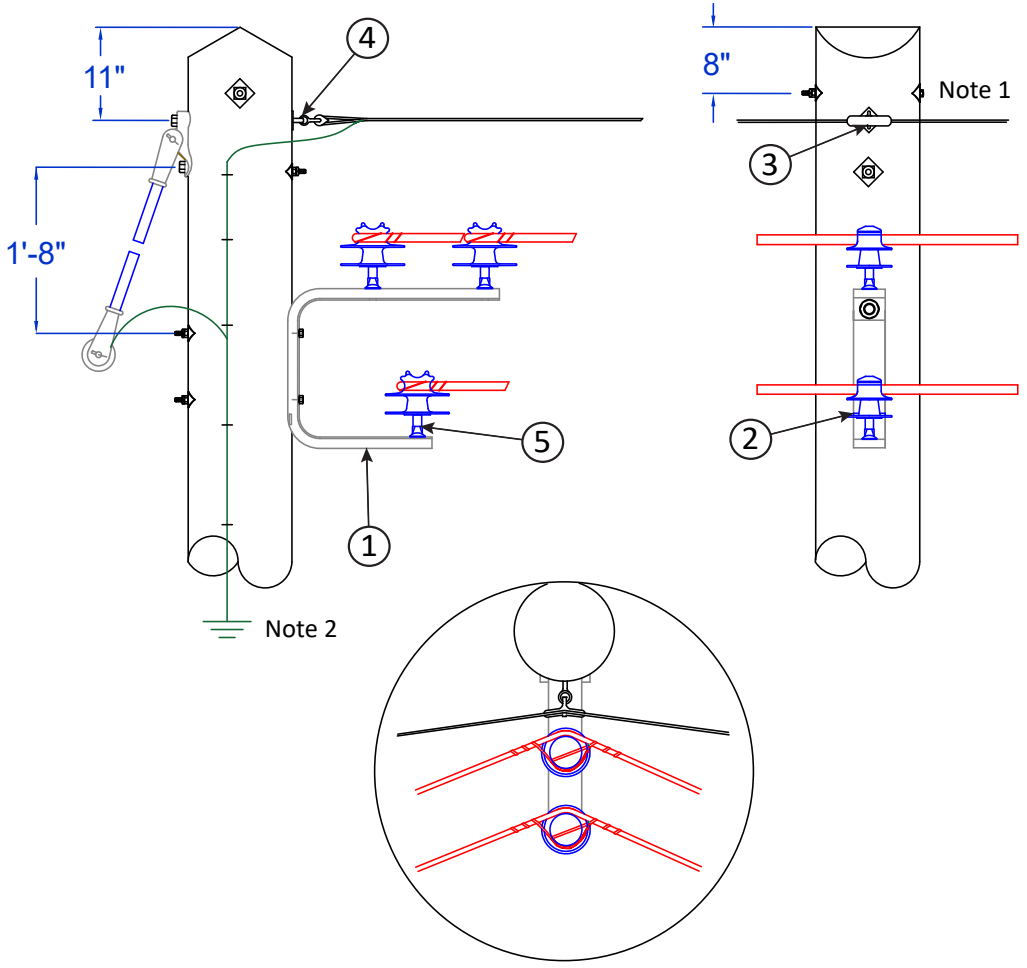
NES

THREE PHASE FRAMING 0 TO 5 DEGREES ANGLE

FRM. CODE	O3HC-A1	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BRACKET AERIAL CABLE ANGLE 3P	180674000
2	3	INSUL PIN 25KV 1 POLY	242185000
3	1	CLAMP SUSP AL 2-4/0	221600000
4	1	BOLT SHOULDER EYE 3/4X14	202620000
5	3	PIN STEEL 1-3/4" W/SHORT SHANK	183175000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	BOLT CARRIAGE 1/2X6	201360000
1	BOLT MACH AVERAGE 3/4 LONG	204075000
4	BOLT MACH AVERAGE 5/8 LONG	203775000
2	CONNECTOR,COMPRESSION, AVERAGE	223305000
2	1/2" DBL COIL SPRING WASHER	206500000
2	3/4" DBL COIL SPRING WASHER	206580000
4	5/8" DBL COIL SPRING WASHER	206570000
6	WASHER SQ CURVED 3 1/2	209520000
4	WASHER SQ FLAT 3/4 H	209620000
2	WASHER SQ FLAT 9/16 H	209600000
1	ROD GROUND CW 5/8X8	184380000
50'	CABLE CU BSD 4	011160000
9'	CABLE AL BSD 4 COV	010425000

O3HC-A1
5° TO 30°



NOTES

1. Split bolts are required on all wood poles.
2. Bonding the neutral, messenger and pole ground on each pole is req'd.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

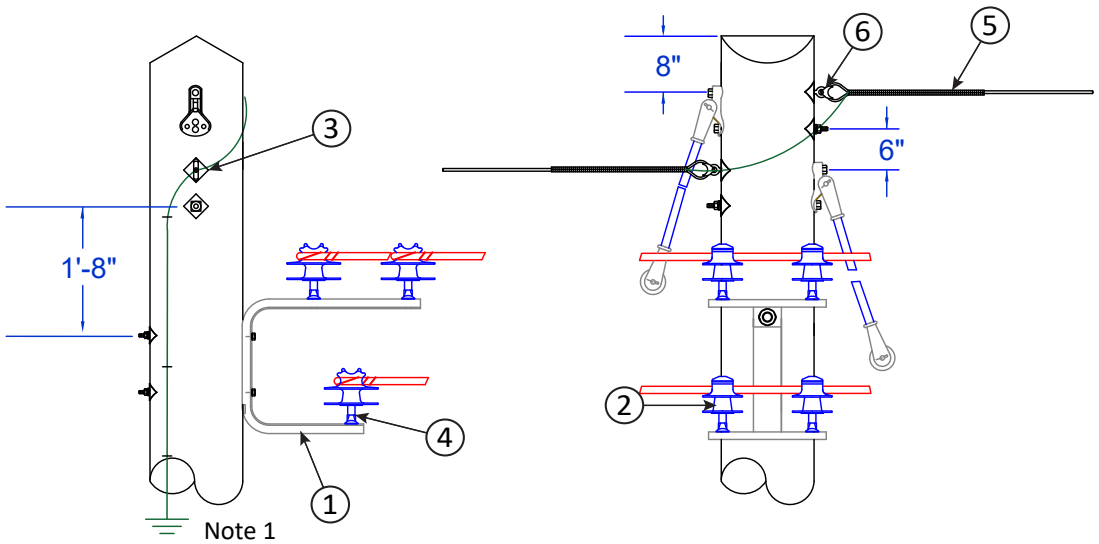
NES

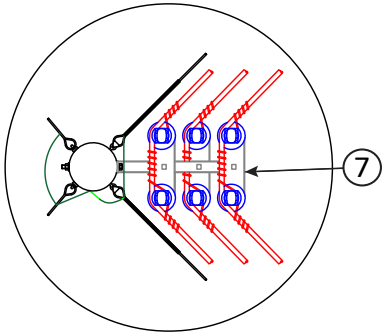
THREE PHASE FRAMING
5 TO 30 DEGREES ANGLE

FRM. CODE	O3HC-A2	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BRACKET AERIAL CABLE ANGLE 3P	180674000
2	3	INSUL PIN 25KV 1 POLY	242185000
3	2	BOLT SHOULDER EYE 3/4X14	202620000
4	3	PIN STEEL 1-3/4" W/SHORT SHANK	183175000
5	2	DEAD END PREFORMED FOR 052 AWA	230175000
6	2	CLEVIS THIMBLEYE LARGE	181520000
7	3	DOUBLE INSULATOR PLATE TYPE 2IP	

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
1	ROD GROUND CW 5/8X8	184380000
1	CONN PERC WEDGE 2/0 - 4	224107000
1	CLAMP GROUND TRAN 10/1	220420000
1	CLAMP GR ROD 8-2 CU	220500000
2	BOLT MACHINE 5/8X10	203800000
1	CONNECTOR, COMPRESSION, AVERAGE	223305000
9'	CABLE AL BSD 4 COV	010425000
1	CONN COMP 6 2-6 2 NO 1	223320000
5	3/4" DBL COIL SPRING WASHER	206580000
48	CABLE CU BSD 4	011160000
2	5/8" DBL COIL SPRING WASHER	206570000
2	WASHER SQ FLAT 3/4 H	209620000
50'	CABLE CU BSD 4	011160000

O3HC-A2
30° TO 90°





Top View

NOTES

1. Bonding the neutral, messenger and pole ground on each pole is req'd.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

THREE PHASE FRAMING
30 TO 90 DEGREES ANGLE

AERIAL CABLE

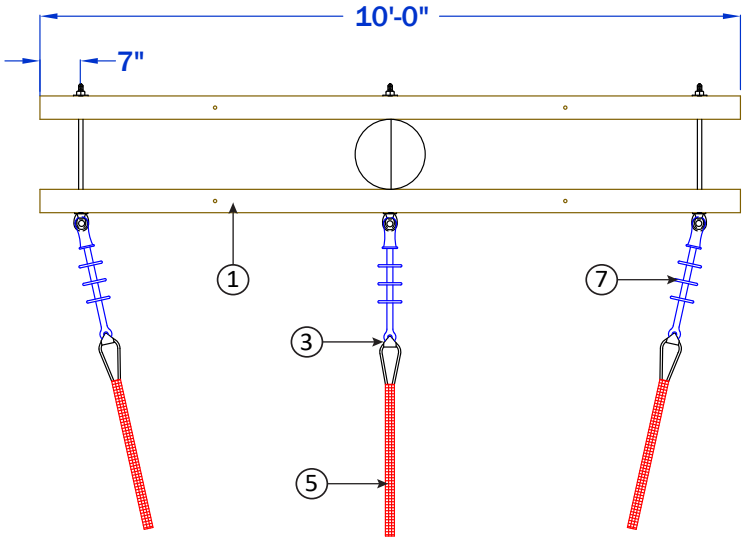
FRM. CODE	O3HC-DE	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 4X5X10	040220000
2	2	BRACE X-ARM WOOD 69KV PAIR	180660000
3	4	CLEVIS THIMBLEYE LARGE	181520000
4	1	DEAD END PREFORMED FOR 052 AWA	230175000
5	3	DEAD END PREFORMED POLY CABLE	230170000
6	1	BOLT SHOULDER EYE 3/4X14	202620000
7	3	INSUL SUSP 25KV/ONE PIECE POLY	242750000

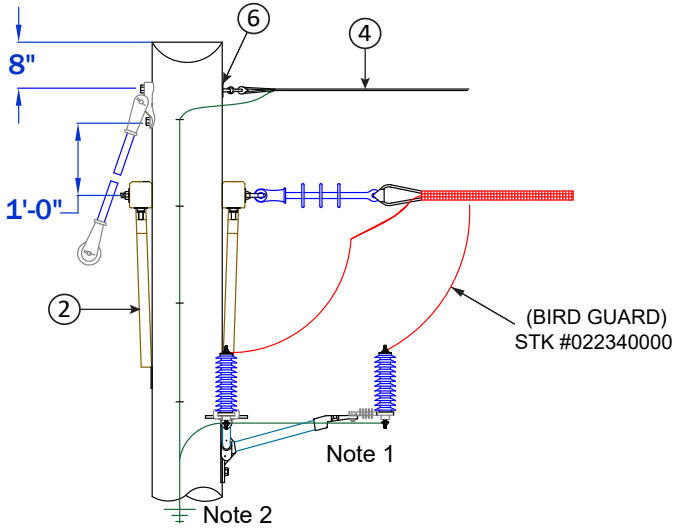
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
50'	CABLE CU BSD 4	011160000
1	ROD GROUND CW 5/8X8	084380000
4	BOLT CARRIAGE 1/2X6	201360000
3	BOLT DA AVERAGE 3/4	201695000
1	BOLT MACH AVERAGE 5/8	203775000
3	NUT OVAL EYE 3/4	206420000
4	1/2" DBL COIL SPRING WASHER	206500000
2	5/8" DBL COIL SPRING WASHER	206570000
11	3/4" DBL COIL SPRING WASHER	206580000
4	WASHER SQ FLAT 9/16 H	209600000
10	WASHER SQ FLAT 3/4 H	209620000
1	CLAMP GR ROD 8-2 CU	220500000
1	CONN COMP 6 2-6 2 NO 1	223320000
1	CONN PERC WEDGE 2/0 - 4	224107000
1	BOLT DA AVERAGE 5/8	201485000
1	ROD GROUND CW 5/8X8	184380000

NOTES

1. Brackets and arresters are called for separately.
2. Bonding the neutral, messenger and pole ground on each pole is req'd.

O3HC-DE





REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

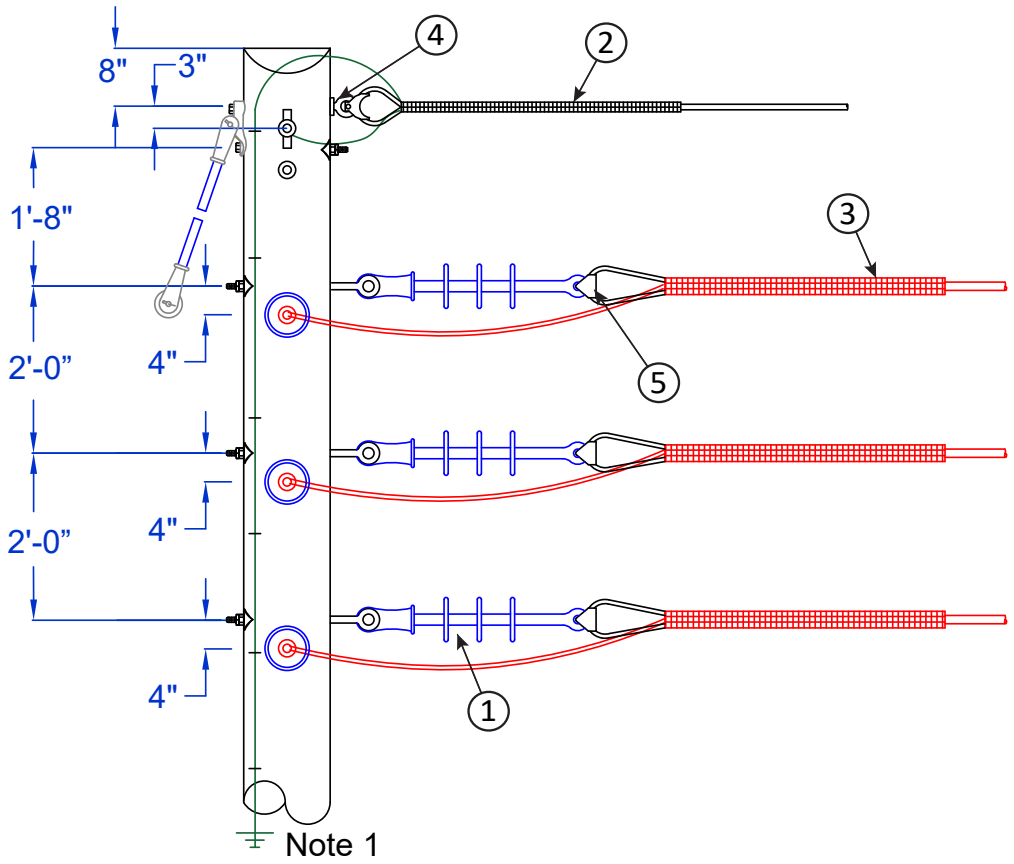
THREE PHASE FRAMING SINGLE DEADEND

AERIAL CABLE

FRM. CODE	O3HC-DD	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	6	INSUL SUSP 25KV/ONE PIECE POLY	242750000
2	2	DEAD END PREFORMED FOR 052 AWA	230175000
3	6	DEAD END PREFORMED POLY CABLE	230170000
4	2	BOLT SHOULDER EYE 3/4X14	202620000
5	8	CLEVIS THIMBLEYE LARGE	181520000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
1	BOLT MACH AVERAGE 3/4 LONG	204075000
6	BOLT DA AVERAGE 3/4	201695000
6	NUT OVAL EYE 3/4	206420000
2	CONNECTOR, COMPRESSION, AVERAGE	223305000
8	3/4” DBL COIL SPRING WASHER	206580000
6	WASHER SQ CURVED 3 1/2	209520000
4	WASHER SQ FLAT 3/4 H	209620000
50'	CABLE CU BSD 4	011160000
1	ROD GROUND CW 5/8X8	184380000

O3HC-DD



NOTES

1. Bonding the neutral, messenger and pole ground on each pole is req’d.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

THREE PHASE FRAMING DOUBLE DEADEND

AERIAL CABLE

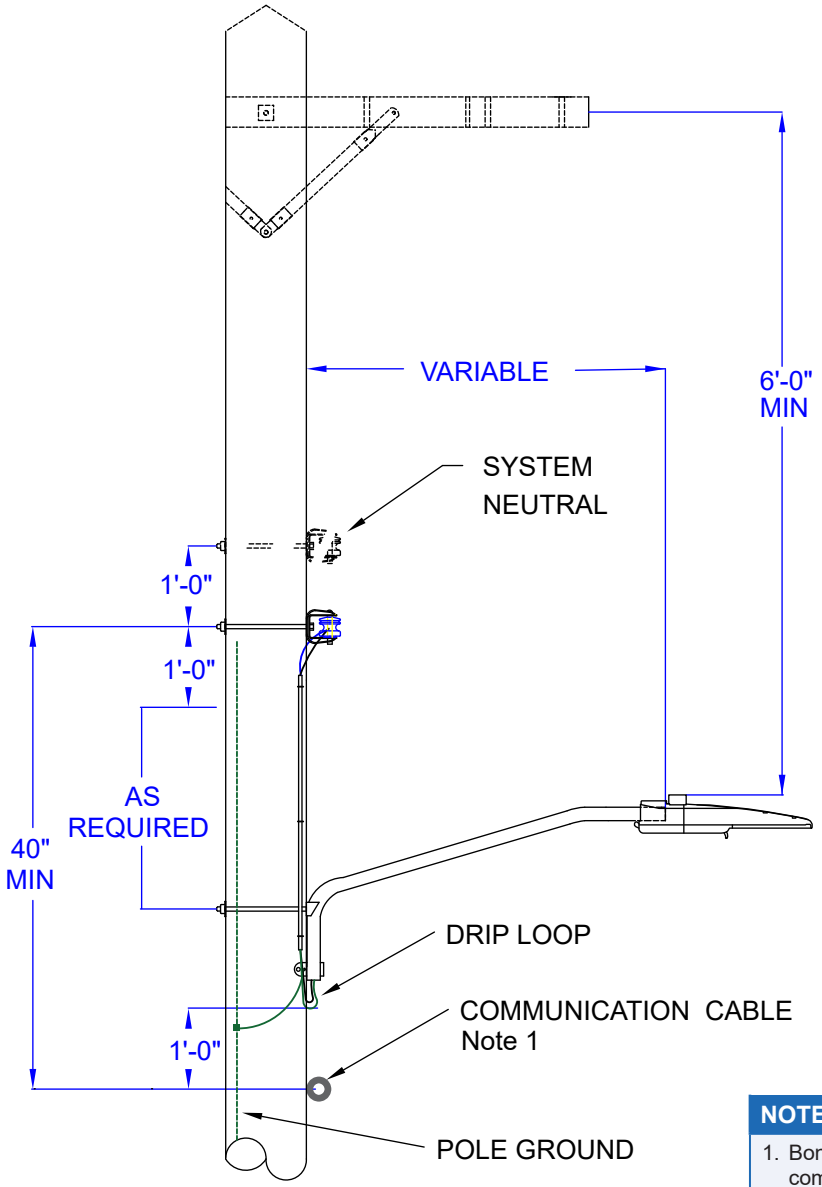
LIGHTING

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	*Henry Dunning*	*Ronald Reasonover*	*Leonard Leech*

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
GENERAL FRAMING	2			
LED, COBRAHEAD, WITH 2' OR 4' MAST ARM	3			
LED, COBRAHEAD, WITH 6', 8' OR 10' MAST ARM	4			
LED, COBRAHEAD, WITH 12' OR 14' MAST ARM	5			
LED, OFFSET, SINGLE ARM	6			
LED DECORATIVE, TEARDROP ON OH POLE	7			
LIGHTING MATERIALS	8			
LED DECORATIVE POST TOP	9			
LED DECORATIVE, TEARDROP ON UG POLE	10			
LED COBRAHEAD, UG POLE WITH ARM	11			
LED OFFSET, UG POLE WITH TENON TOP	12			
LED COBRAHEAD, DAVIT POLE	13			
LIGHTING CONDUCTOR	14			
LIGHTING CONTROLS	15			
LIGHTING CONTROL STATION AND POLE RELOCATION	16			



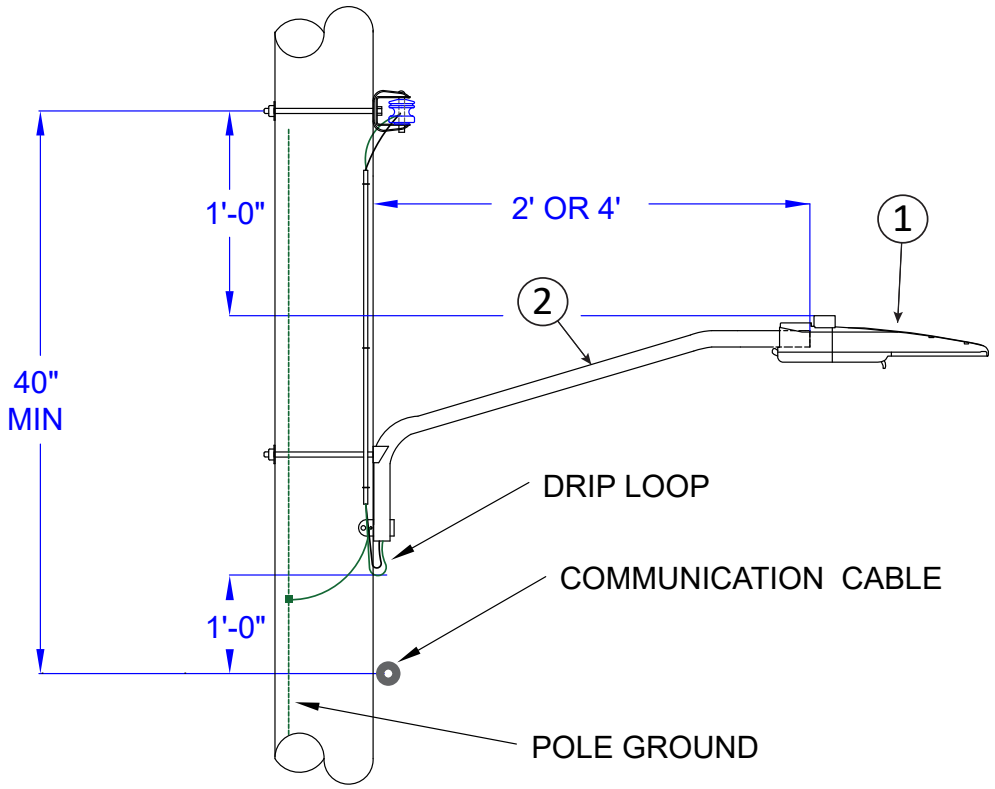
NOTES

1. Bonding metal, light mast arm to the pole ground is req'd to reduce communication below 40-inch (See Grounding Section).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

GENRAL FRAMING



ASSEMBLY CODES				
LED LUMINAIRES				
MOUNTING HEIGHT	5500L 25' +/- 5'	10000L 28' +/- 5'	20000L 32' +/- 5'	35000L 35' +/- 5'
MAST ARM				
2 FT	SL/2/5LED	SL/2/10LED	SL/2/20LED	SL/2/35LED
4 FT	SL/4/5LED	SL/4/10LED	SL/4/20LED	SL/4/35LED

ASSEMBLY CODE STRUCTURE

Street Lighting Section
Mastarm Length
Luminaire Size (Lumens)

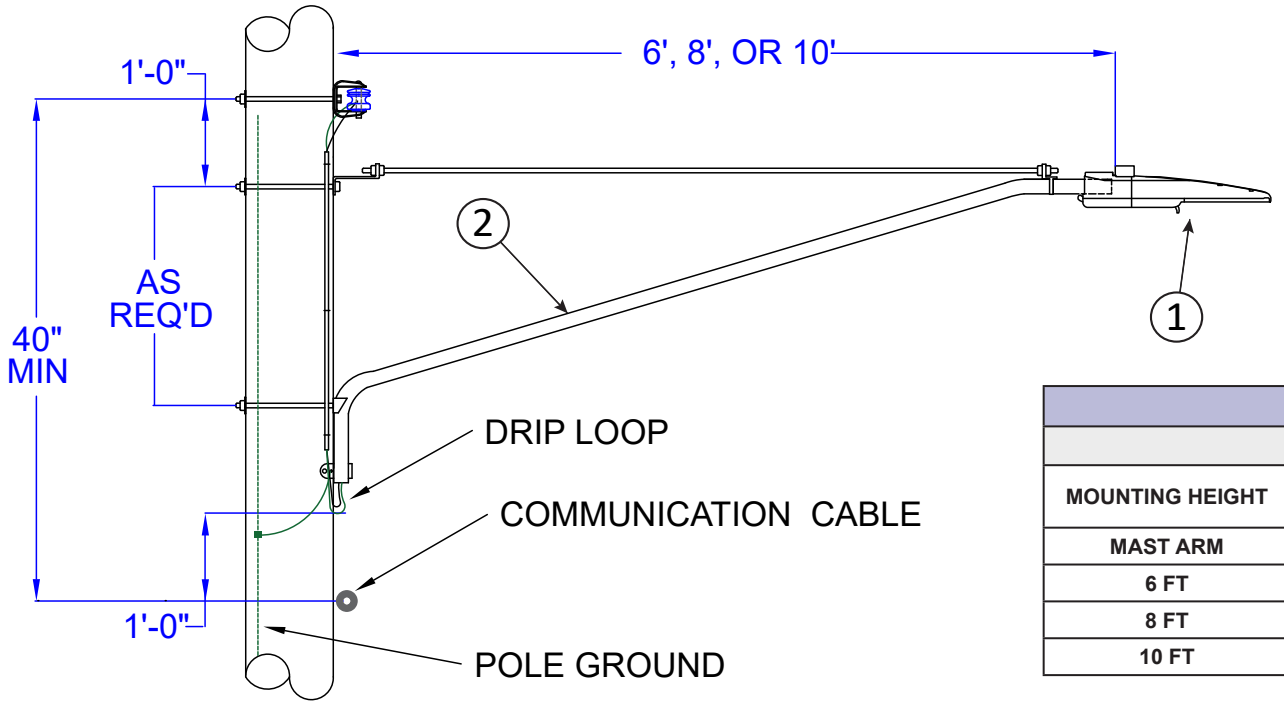
SL/XX/XXX

ITEM	LIGHT FIXTURE	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
1	5L COBRAHEAD	303446050	L5500LED	P5500LED	RL-5500LED	RP-5500LED
	10L COBRAHEAD	303446100	L10000LED	P10000LED	RL-10000LED	RP-10000LED
	20L COBRAHEAD	303446200	L20000LED	P20000LED	RL-20000LED	RP-20000LED
	35L COBRAHEAD	303446350	L35000LED	P35000LED	RL-35000LED	RP-35000LED
ITEM	MAST ARM	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
2	2 FT	304402000	L2	P2FTMA	RL-MA2	RP-MA2
	4 FT	304404000	L4	P4FTMA	RL-MA4	RP-MA4

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

LED COBRAHEAD
2' OR 4' MAST ARM



ASSEMBLY CODES				
LED LUMINAIRES				
MOUNTING HEIGHT	5500L 25' +/- 5'	10000L 28' +/- 5'	20000L 32' +/- 5'	35000L 35' +/- 5'
MAST ARM				
6 FT	SL/6/5LED	SL/6/10LED	SL/6/20LED	SL/6/35LED
8 FT	SL/8/5LED	SL/8/10LED	SL/8/20LED	SL/8/35LED
10 FT	SL/10/5LED	SL/10/10LED	SL/10/20LED	SL/10/35LED

ASSEMBLY CODE STRUCTURE

Street Lighting Section
Mastarm Length
Luminaire Size (Lumens)

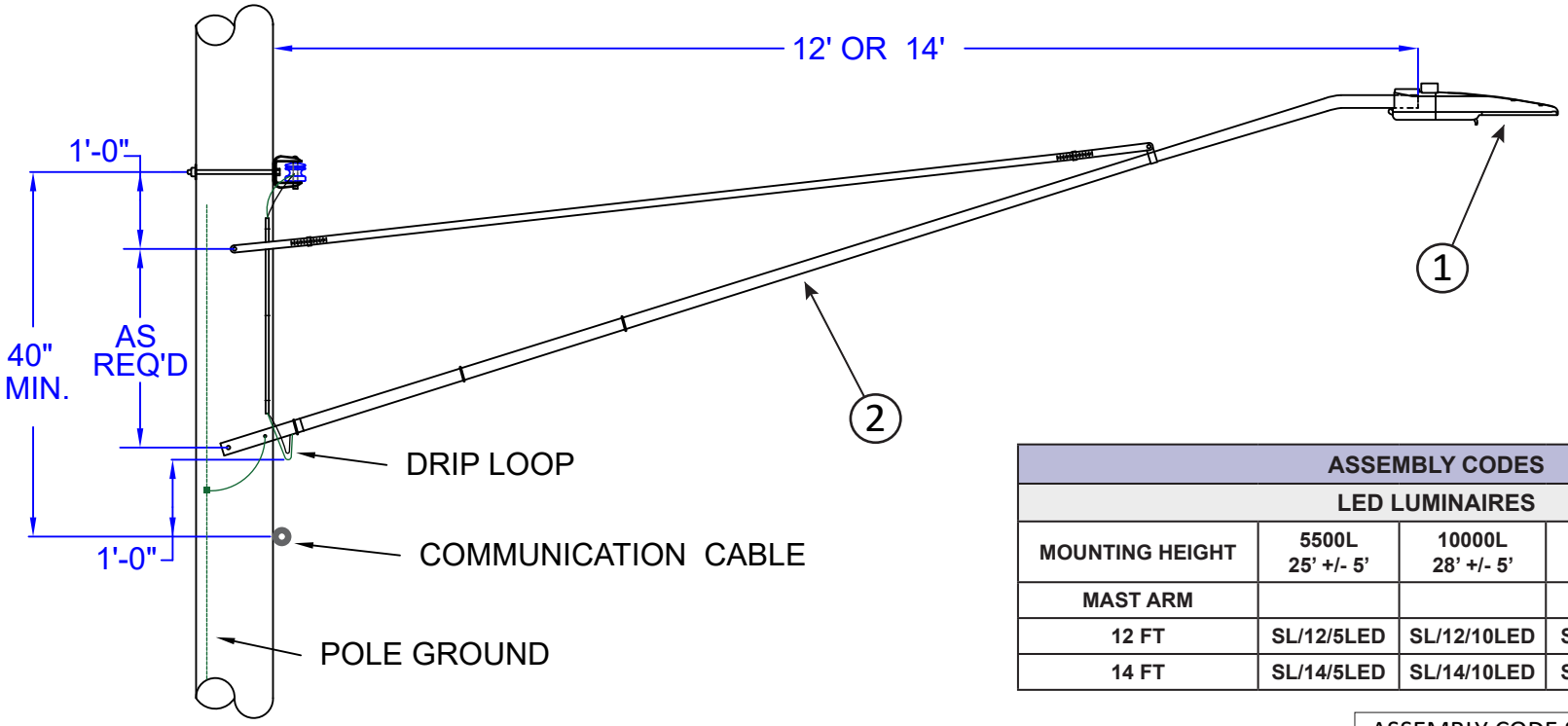
SL/XX/XXX

ITEM	LIGHT FIXTURE	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
1	5L COBRAHEAD	303446050	L5500LED	P5500LED	RL-5500LED	RP-5500LED
	10L COBRAHEAD	303446100	L10000LED	P10000LED	RL-10000LED	RP-10000LED
	20L COBRAHEAD	303446200	L20000LED	P20000LED	RL-20000LED	RP-20000LED
	35L COBRAHEAD	303446350	L35000LED	P35000LED	RL-35000LED	RP-35000LED
ITEM	MAST ARM	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
2	6 FT	304406000	L6	P6FTMA	RL-MA6	RP-MA6
	8 FT	304408000	L8	P8FTMA	RL-MA8	RP-MA8
	10 FT	304410000	L10	P10FTMA	RL-MA10	RP-MA10

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

LED COBRAHEAD
6', 8' OR 10' MAST ARM



ASSEMBLY CODES				
LED LUMINAIRES				
MOUNTING HEIGHT	5500L 25' +/- 5'	10000L 28' +/- 5'	20000L 32' +/- 5'	35000L 35' +/- 5'
MAST ARM				
12 FT	SL/12/5LED	SL/12/10LED	SL/12/20LED	SL/12/35LED
14 FT	SL/14/5LED	SL/14/10LED	SL/14/20LED	SL/14/35LED

ASSEMBLY CODE STRUCTURE

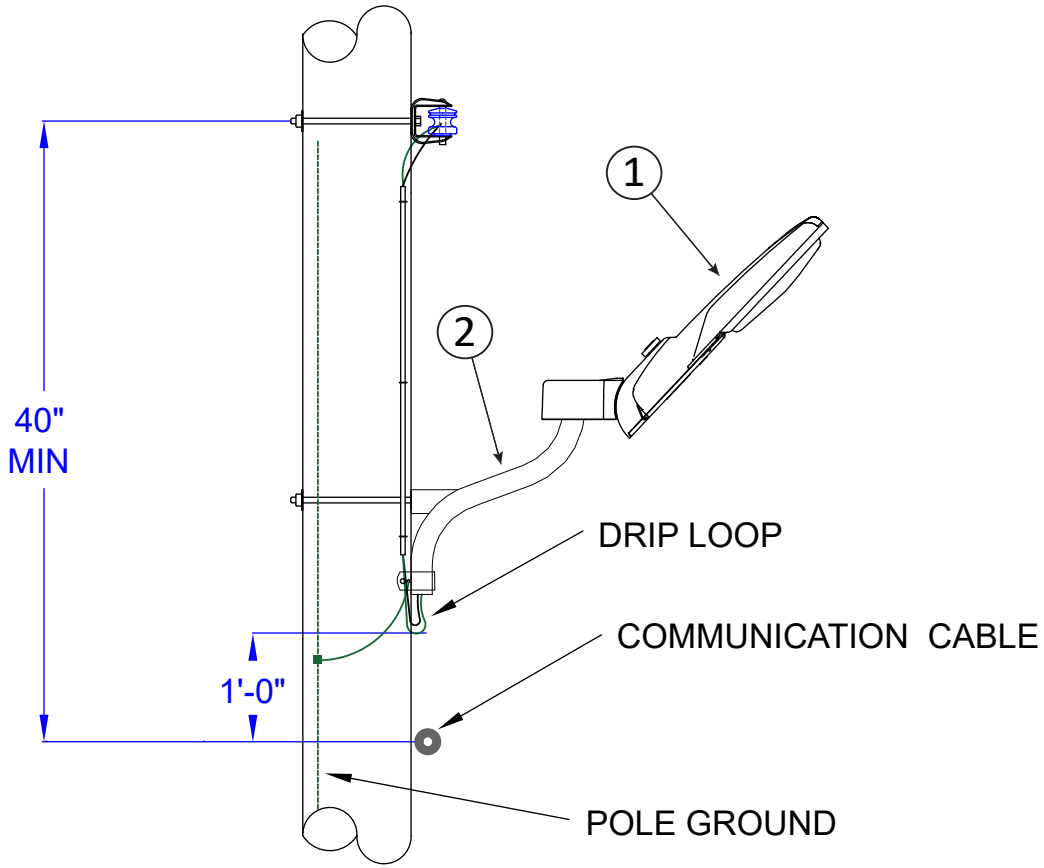
Street Lighting Section
Mastarm Length
Luminaire Size (Lumens)
SL/XX/XXX

ITEM	LIGHT FIXTURE	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
1	5L COBRAHEAD	303446050	L5500LED	P5500LED	RL-5500LED	RP-5500LED
	10L COBRAHEAD	303446100	L10000LED	P10000LED	RL-10000LED	RP-10000LED
	20L COBRAHEAD	303446200	L20000LED	P20000LED	RL-20000LED	RP-20000LED
	35L COBRAHEAD	303446350	L35000LED	P35000LED	RL-35000LED	RP-35000LED
ITEM	MAST ARM	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
2	12 FT	304412000	L12	P12FTMA	RL-MA12	RP-MA12
	14 FT	304414000	L14	P14FTMA	RL-MA14	RP-MA14

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

LED COBRAHEAD
12' OR 14' MAST ARM



ASSEMBLY CODES	
LED LUMINAIRES	
MOUNTING HEIGHT	30000L 34' +/- 5'
SINGLE ARM	SL/30L/OFFSET

ASSEMBLY CODE STRUCTURE

Street Lighting Section
Luminaire Size (Lumens)
Luminaire Style

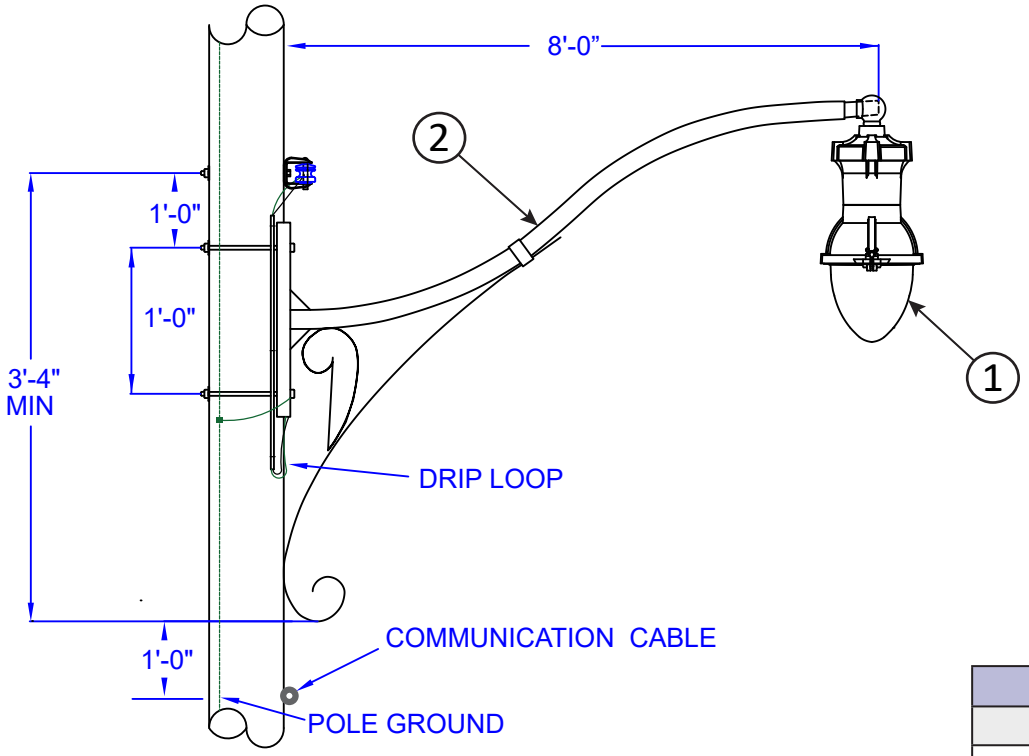
SL/XX/XXX

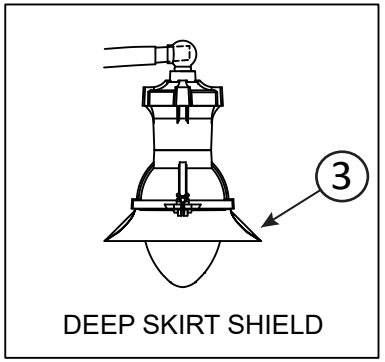
ITEM	LIGHT FIXTURE	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
1	30L OFFSET	303445300	L30KLED-MONG	P30000LEDMG	RL-LM30LDMG	RP30000LEDMG
ITEM	MAST ARM	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
2	FLOOD LIGHT / OFFSET	305915000	LMA-FLOOD	P-MSTARM-IN	RL-MA-FLOOD	RP-MSTARM-IN
	OFFSET CONCRETE POLE	305916000	LMA-OFS-C/S	RL-MA-OFS-CS	--	--

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

LED OFFSET
SINGLE ARM





ASSEMBLY CODES			
LED LUMINAIRES			
MOUNTING HEIGHT	10000L 28' +/- 5'	13000L 28' +/- 5'	20000L 35' +/- 5'
8 FT DECORATIVE	SL/8DEC/ 10L/TEARDROP	SL/8DEC/ 13L/TEARDROP	SL/8DEC/ 20L/TEARDROP

ITEM	LIGHT FIXTURE	STOCK CODE	ST. LGT'G CU	ST. LGT REM CU
1	10L TEARDROP	303448100	L10000LED-TD	RL-LM10LEDTD
	13L TEARDROP H'VILLE	303448130	L13000LEDHTD	RL-LM13LEDTD
	20L TEARDROP	303448200	L20000LED-TD	--
ITEM	MAST ARM	STOCK CODE	ST. LGT'G CU	ST. LGT REM CU
2	8 FT DECORATIVE ARM	304510300	LMA-1TD-WP	--
ITEM	SHIELD	STOCK CODE	ST. LGT'G CU	ST. LGT REM CU
3	DEEP SKIRT SHIELD	302106000	LGLARESHLDTD	--

ASSEMBLY CODE STRUCTURE

Street Lighting Section
Mastarm Length
Luminaire Size (Lumens)
Luminaire Style

SL/XX/XXX/XXXX

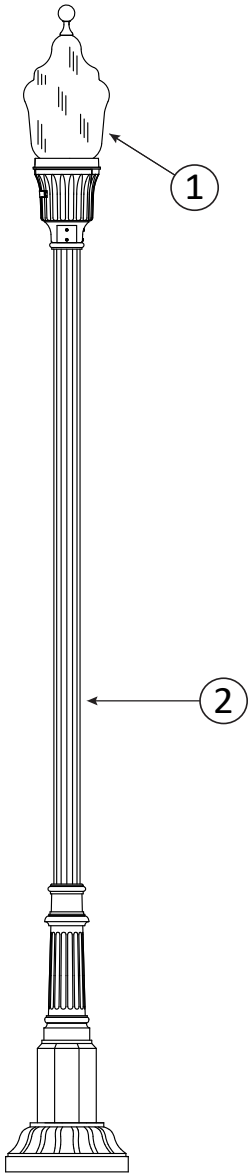
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

LIGHTING

NES

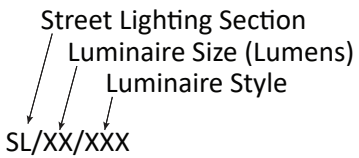
LED DECORATIVE TEARDROP ON OH POLE

MAST ARM CU CODE								MATERIAL ITEM LIST	
L2	L4	L6	L8	L10	L12	L14	LMA-FLOOD		
QUANTITY								DESCRIPTION	STOCK #
1’	1’	1’	1’	1’	1’	1’	1’	CABLE, CU #4 BSD	011160000
10’	10’	15’	15’	15’	20’	20’	10’	CABLE, CU, 600V, #12, 1/C BLACK	021950000
10’	10’	15’	15’	15’	20’	20’	10’	CABLE, CU, 600V, #12, 1/C WHITE	021960000
3’	3’	3’	3’	3’	3’	3’	3’	MOULDING, PLASTIC, 1/2”	182640000
1	1	1	1	1	1	1	1	BOLT, MACHINE, 3/8” X 1”	203020000
1	1	2	2	2	2	2	1	BOLT, MACHINE, 5/8” X REQ’D LENGTH	2037XXXX
1	1	2	2	2	2	2	1	5/8” DBL COIL SPRING WASHER	206570000
2	2	2	2	2	2	2	2	LAG, SCREW, GALV., 3/8” X 2-1/2”	208530000
1	1	1	1	1	1	1	1	WASHER, SQUARE, CURVED, 3-1/2”	209520000
1	1	1	1	1	1	1	1	WASHER, SS, ROUND, FLAT, 3/8”	209730000
2	2	2	2	2	2	2	2	CONNECTOR, COMPRESSION, 6-2/14-8	223310000
1	1	1	1	1	1	1	1	CONNECTOR, COMPRESSION, 6-2/6-2	223320000
1	-	-	-	-	-	-		MASTARM, AL, 2” X 2’, POLE MOUNT	304402000
-	1	-	-	-	-	-		MASTARM, AL, 2” X 4’, POLE MOUNT	304404000
-	-	1	-	-	-	-		MASTARM, AL, 2” X 6’, POLE MOUNT	304406000
-	-	-	1	-	-	-		MASTARM, AL, 2” X 8’, POLE MOUNT	304408000
-	-	-	-	1	-	-		MASTARM, AL, 2” X 10’, POLE MOUNT	304410000
-	-	-	-	-	1	-		MASTARM, AL, 2” X 12’, POLE MOUNT	304412000
-	-	-	-	-	-	1		MASTARM, AL, 2” X 14’, POLE MOUNT	304414000
-	-	-	-	-	-	-	1	MASTARM, FLOOD/OFFSET (MONGOOSE), POLE MOUNT	305915000
-	-	-	-	-	3	3	-	CABLE TIE, NYLON AVERAGE	361425000
3	3	3	3	3	3	3	3	STAPLE, PLASTIC MOULDING	465740000



ITEM	LIGHT FIXTURE	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
1	5L GULCH	303441550	L4700LED-GL		RL-LM4700-GL	
	9L GLOBE	303442090	L9000LED-GLB		--	
	10L GRANVILLE	303443100	L10LED-GRNV		RL10LED-GRNV	
	10L WASHINGTON	303447100	L10000LEDWSH		RL-LM10000-W	
	17L WASHINGTON	303447170	L17000LEDWSH		--	
ITEM	**POLE**	**STOCK CODE**	**STREET LIGHTING CU**	**PRIVATE LIGHTING CU**	**STREET LGT REMOVAL CU**	**PRIVATE LGT REMOVAL CU**
2	10' HEARTHSTONE	306900000	LSTD-10-HS		RL-STD-10HS	
	12' BRENTWOOD GRAND	306910000	LSTD-BWOOD		RL-PA12-GRND	
	12' FLUTED	306910500	LSTD-12-BLK		--	
	12' CHURCH ST	306921000	LSTD-CHSTMPW		RL-STD-CH12	
	12' BURTON HILLS HADCO	306925000	LSTD-HDCO12		RL-PA12-BH	
	12 STERNBERG	306930400	LSTD-15H-STB		RL-STD-15STB	
	16' HADCO TRADITIONAL	306993000	LSTD-HDCO16		RLSTD-HDCO16	
	16' GULCH	306940000	LSTD-GULCH		RL-STD-GUL16	

ASSEMBLY CODE STRUCTURE



EXAMPLE: SL/10L/GRANVILLE
MOUNTING HEIGHT IS PER POLE HEIGHT

NOTES

1. Refer to NES Lighting Guidelines for underground lighting installation details.
2. Light and pole shown are examples only.

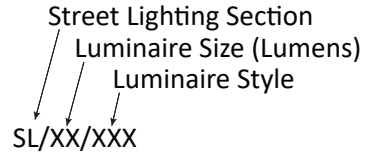
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

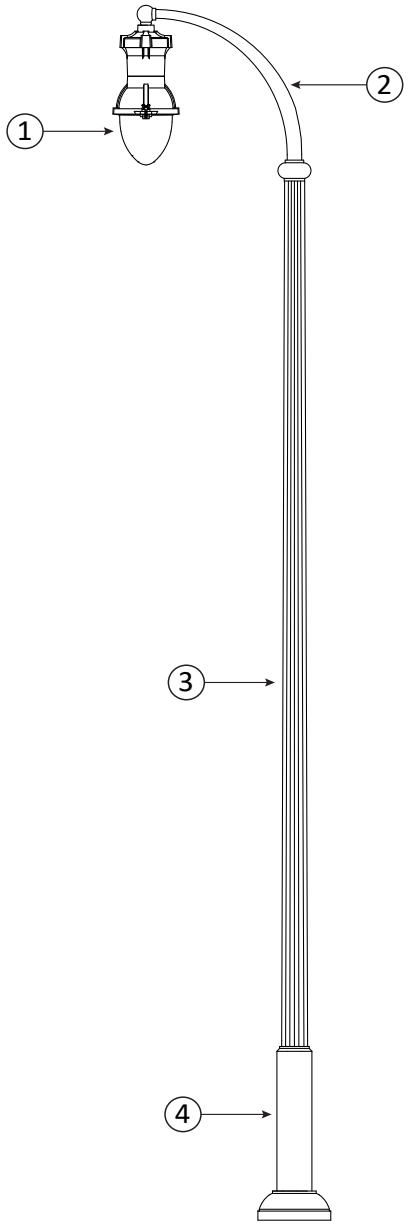
LED DECORATIVE POST TOP

ITEM	LIGHT FIXTURE	STOCK CODE	STREET LIGHTING CU	STREET LGT REMOVAL CU
1	10L TEARDROP	303448100	L10000LED-TD	RL-LM10LEDTD
	13L TEARDROP H'VILLE	303448130	L13000LEDHTD	RL-LM13LEDTD
	20L TEARDORP	303448200	L20000LED-TD	--
ITEM	**MAST ARM**	**STOCK CODE**	**STREET LIGHTING CU**	**STREET LGT REMOVAL CU**
2	TEARDROP	304510100	LMA-1TEARDRP	RL-MA1TD
	DOUBLE TEARDROP	304510200	LMA-CR-DBL	RL-MA-CRDBL
	S TEARDROP VANDY	304410000	LMA-1TDVANDY	RL-MA1TDV
ITEM	**POLE**	**STOCK CODE**	**STREET LIGHTING CU**	**STREET LGT REMOVAL CU**
3	23 FT TEARDROP POLE	307790100	LSTD-POLE-TD	RL-PA23-TD
ITEM	**BASE COVER**	**STOCK CODE**	**STREET LIGHTING CU**	**STREET LGT REMOVAL CU**
4	TEARDROP BASE COVER	307100100	LSTD-BASE-TD	RL-TDBASE

ASSEMBLY CODE STRUCTURE



EXAMPLE: SL/20L/TEARDROP
MOUNTING HEIGHT IS PER POLE HEIGHT



NOTES

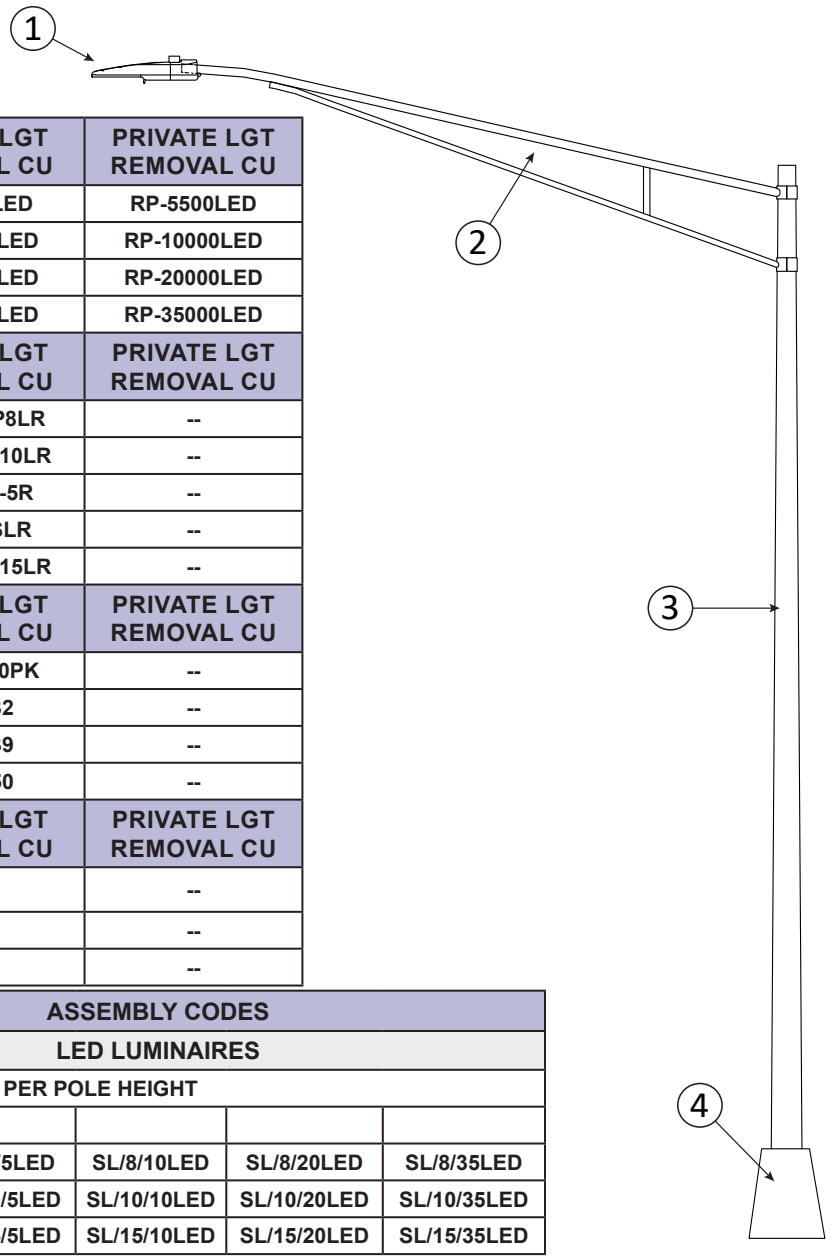
1. Refer to NES Lighting Guidelines for underground lighting installation details.
2. Light, pole, arm and base shown are examples only.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

LED DECORATIVE TEARDROP ON UG POLE

ITEM	LIGHT FIXTURE	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
1	5L COBRAHEAD	303446050	L5500LED	P5500LED	RL-5500LED	RP-5500LED
	10L COBRAHEAD	303446100	L10000LED	P10000LED	RL-10000LED	RP-10000LED
	20L COBRAHEAD	303446200	L20000LED	P20000LED	RL-20000LED	RP-20000LED
	35L COBRAHEAD	303446350	L35000LED	P35000LED	RL-35000LED	RP-35000LED
ITEM	**MAST ARM**	**STOCK CODE**	**STREET LIGHTING CU**	**PRIVATE LIGHTING CU**	**STREET LGT REMOVAL CU**	**PRIVATE LGT REMOVAL CU**
2	8 FT LOW RISE	304922000	LMA-STP8LR	--	RL-MASTP8LR	--
	10 FT LOW RISE	304926000	LMA-STP10LR	--	RL-MASTP10LR	--
	10 FT HIGH RISE	304930000	L10MA5R	--	RL-MA10-5R	--
	15 FT LOW RISE	304938000	LMA-15LR	--	RL-MA1SLR	--
	15 FT HIGH RISE	304942000	LMA-STP15HR	--	RL-MASTP15LR	--
ITEM	**POLE**	**STOCK CODE**	**STREET LIGHTING CU**	**PRIVATE LIGHTING CU**	**STREET LGT REMOVAL CU**	**PRIVATE LGT REMOVAL CU**
3	20 FT AL POLE	307018000	LSTD-20-P&K	--	RL-STD-20PK	--
	32 FT AL POLE	306952000	LAP	--	RL-PA32	--
	40 FT AL POLE	306960000	LAP-I65-39	--	RL-PA39	--
	50 FT AL POLE	307016000	LPA50	--	RL-PA50	--
ITEM	**BASE**	**STOCK CODE**	**STREET LIGHTING CU**	**PRIVATE LIGHTING CU**	**STREET LGT REMOVAL CU**	**PRIVATE LGT REMOVAL CU**
4	TB2-17	300380000	LTBASE3800	--	--	--
	TB1-17	300382000	LTBASE3820	--	--	--
	TB3-17	300386000	LTBASE3860	--	--	--



ASSEMBLY CODES				
LED LUMINAIRES				
MOUNTING HEIGHT - PER POLE HEIGHT				
MAST ARM				
8 FT	SL/8/5LED	SL/8/10LED	SL/8/20LED	SL/8/35LED
10 FT	SL/10/5LED	SL/10/10LED	SL/10/20LED	SL/10/35LED
15 FT	SL/15/5LED	SL/15/10LED	SL/15/20LED	SL/15/35LED

NOTES

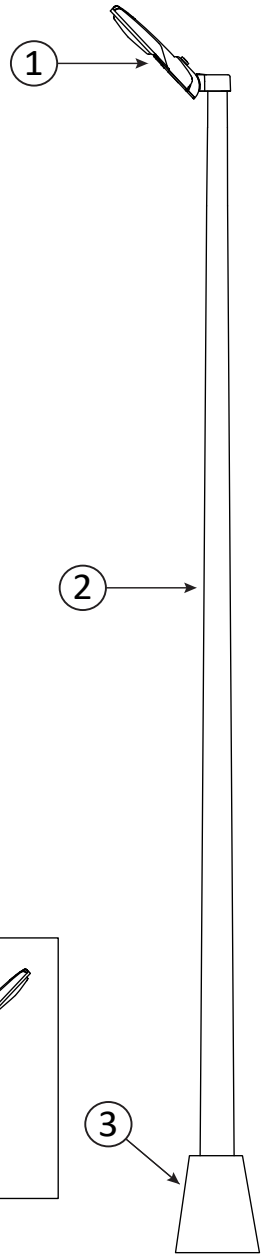
1. Refer to NES Lighting Guidelines for underground lighting installation details.
2. Light, pole and base shown are examples only.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

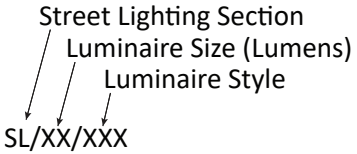
NES

LED COBRAHEAD UG POLE WITH ARM

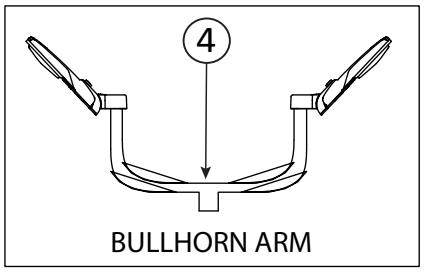
ITEM	LIGHT FIXTURE	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
1	14L BLACK MONGOOSE	303445140	L14LED-MG-B	--	RL-LM14-MG-B	--
	30L OFFSET	303445300	L30KLED-MONG	P30000LEDMG	RL-LM30LDMG	RP30000LEDMG
ITEM	**POLE**	**STOCK CODE**	**STREET LIGHTING CU**	**PRIVATE LIGHTING CU**	**STREET LGT REMOVAL CU**	**PRIVATE LGT REMOVAL CU**
2	40 FT AL POLE	306960000	LAP-I65-39	--	RL-PA39	--
	40 FT AL POLE BRONZE	306954000	LAP-40-BZ	--	RL-PA40-RBRZ	--
	50 FT AL POLE	307017000	LSTD-50-LEX	--	RL-STD-50LEX	--
	30 FT AL POLE BLACK	307590500	LSTD-WE-BLK	--	RL-PA30-RBLK	--
ITEM	**BASE**	**STOCK CODE**	**STREET LIGHTING CU**	**PRIVATE LIGHTING CU**	**STREET LGT REMOVAL CU**	**PRIVATE LGT REMOVAL CU**
3	TB2-17	300380000	LTBASE3800	--	--	--
	TB1-17	300382000	LTBASE3820	--	--	--
	TB1-17 BLACK	300382500	LTBASE3825	--	--	--
	TB3-17	300386000	LTBASE3860	--	--	--
	TB3-17 BRONZE	300386500	LTBASE3865	--	--	--
ITEM	**MAST ARM**	**STOCK CODE**	**STREET LIGHTING CU**	**PRIVATE LIGHTING CU**	**STREET LGT REMOVAL CU**	**PRIVATE LGT REMOVAL CU**
4	BULLHORN	300662000	LMA-BH	--	--	--
	BULLHORN BRONZE	300662500	LMA-BH-BZ	PMA-BH-BZ	--	--



ASSEMBLY CODE STRUCTURE



EXAMPLE: SL/14L/BLACK MONGOOSE
MOUNTING HEIGHT IS PER POLE HEIGHT



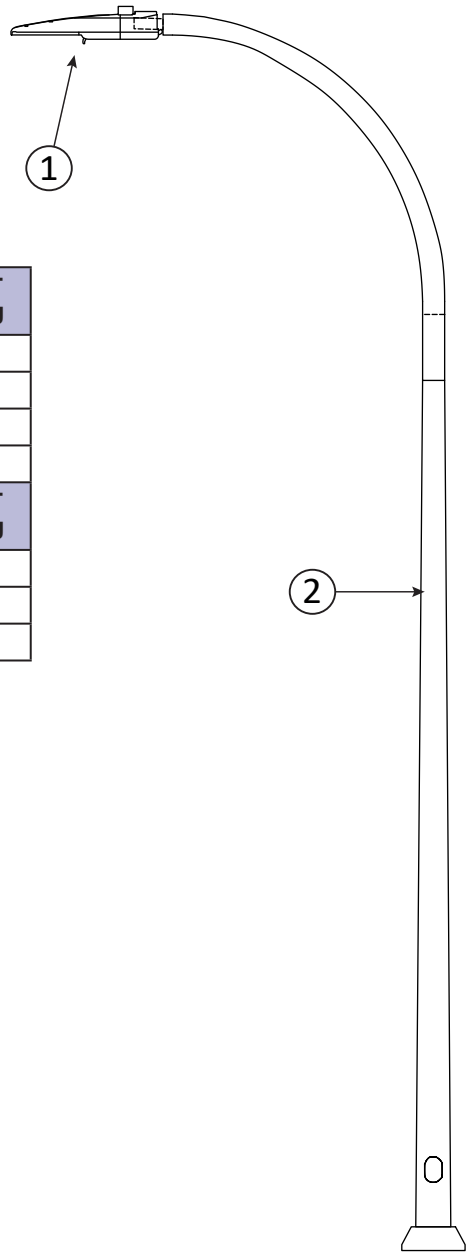
NOTES

1. Refer to NES Lighting Guidelines for underground lighting installation details.
2. Light, pole, arm and base shown are examples only.
3. Light, pole, arm and base color shall match.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

LED OFFSET
UG POLE WITH TENON TOP



ITEM	LIGHT FIXTURE	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
1	5L COBRAHEAD	303446050	L5500LED	P5500LED	RL-5500LED	RP-5500LED
	10L COBRAHEAD	303446100	L10000LED	P10000LED	RL-10000LED	RP-10000LED
	20L COBRAHEAD	303446200	L20000LED	P20000LED	RL-20000LED	RP-20000LED
	35L COBRAHEAD	303446350	L35000LED	P35000LED	RL-35000LED	RP-35000LED
ITEM	**POLE**	**STOCK CODE**	**STREET LIGHTING CU**	**PRIVATE LIGHTING CU**	**STREET LGT REMOVAL CU**	**PRIVATE LGT REMOVAL CU**
2	33 FT DAVIT POLE	307010000	LDAVIT	--	RL-PA33DAVIT	--
	33 FT TWIN DAVIT POLE	307010200	LDAVIT-2ARM	--	RL-DAV-2ARM	--
	45 FT DAVIT POLE	307012000	LDAVIT45	--	--	--

ASSEMBLY CODE STRUCTURE

Street Lighting Section
Luminaire Size (Lumens)
Luminaire Style

SL/XX/XXX

EXAMPLE: SL/20L/DAVIT
MOUNTING HEIGHT IS PER POLE HEIGHT

NOTES

1. Refer to NES Lighting Guidelines for underground lighting installation details.
2. Light and pole shown are examples only.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

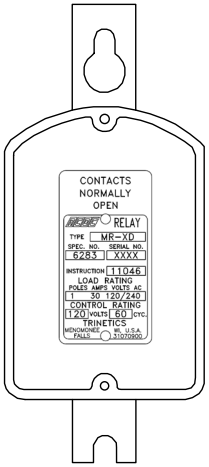
LED COBRAHEAD DAVIT POLE

WIRE SIZE	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
OVERHEAD CONDUCTOR					
6 AD	010600000	LCAD-6	P6AD	RL-CAD-6	RP-6AD
2 AD	010650000	LCAD-2	P2AD	RL-CAD-2	RP-2AD
2 AT	010900000	LCAT-2	P2AT	RL-CAT-2	RP-2AT
2 AQ	010720000	LCAQ-2	--	RL-CAQ-2	--
1/0 AT	010920000	LCAT-1/0	--	RL-CAT-1/0	--
4/0 AT	010940000	LCAT-4/0	--	RL-CAT-4/0	--
4 CU BHD	010970000	--	--	RL-CCH-4	--
6 CU WP	012020000	LCCI-6	--	RL-CCI-6	--
4 CU WP	012040000	LCCI-4	--	RL-CCI-4	--
UNDERGROUND CONDUCTOR					
4 AL XLP	020300000	LXLP-4AL	PWIRE-4	RL-XLP-AL-4	--
2 AL XLP	020320000	LXLP-2AL	--	RL-XLP-AL-2	--
2/0 AL XLP	020350000	LXLP-AL2/0	--	RL-XLP-AL2/0	--
2C10 CU	021540000	LCCU-10-2/C	--	RL-CCU-102C	--
3C10 CU	021560000	LCCU-3/C	--	RL-CCU-103C	--
3C16 CU SO	021810000	LWIRE-3C	--	RL-SO-16-3C	--
12 CU BLACK	021950000	LCCU-12-B	PCCU-12-B	RL-CCU-12B	--
12 CU WHITE	021960000	LCCU-12-W	PCCU-12-W	RL-CCU-12W	--
12 CU GREEN	021965000	LCCU-12-G	PCCU-12-G	RL-CCU-12G	--
10 CU USE	021970000	LCCU-10-USE	--	RL-CCU-10USE	--
2C10 CU XLP	021980000	LCCU-10X-2C	--	RL-XLP-102C	--
6 CU XLP BLACK	022130000	LCCU-6XLP-8	--	RL-XLP-CU-6B	--
6 CU XLP WHITE	02213S000	LCCU-6XLP-W	--	RL-XLP-CU-6W	--
6 CU XLP GREEN	022136000	LCCU-6XLP-G	--	RL-XLP-CU-6G	--
4 CU XLP	022140000	LCCU-4-XLP	--	RL-XLP-CU-4	--
2 CU XLP	022160000	LCCU-2-XLP	--	RL-XLP-CU-2	--
4/0 CU XLP	022210000	LCCU-4/0-XLP	--	RL-XLP-CU4/0	--
750 CU SKV	022510000	--	--	RL-CU-SK-750	--

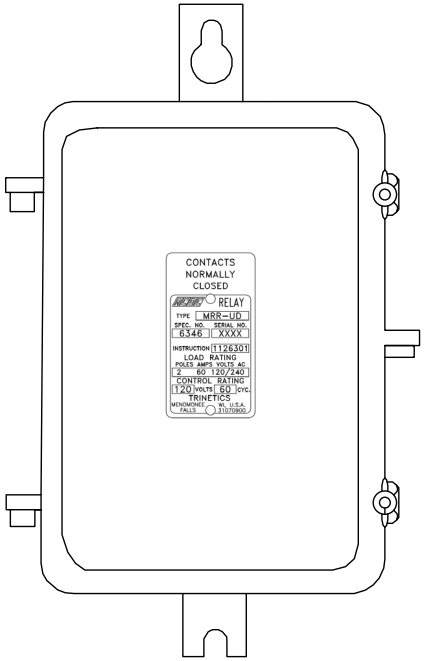
DESCRIPTION	STOCK CODE	STREET LIGHTING CU	PRIVATE LIGHTING CU	STREET LGT REMOVAL CU	PRIVATE LGT REMOVAL CU
PHOTOCELLS					
SMART PHOTOCELL	301210000	LPE-NETLC	PPE-NETLC	RLPE-NETLC	RPPE-NETLC
LONG LIFE PHOTOCELL	301225000	--	--	--	--
SHORTING CAP	301500000	--	--	--	--
BUTTON PHOTOCONTROL	301240000	--	--	--	--
RELAYS					
DOWNTOWN CASCADE RELAY	306430000	LRE-1P-30A	--	--	--
DOWNTOWN CONTROL RELAY	306422000	LRE-29-60A	--	--	--
POLE MOUNTED CONTROL RELAY	306424500	LRE-2P60A-PC	--	--	--

301210000

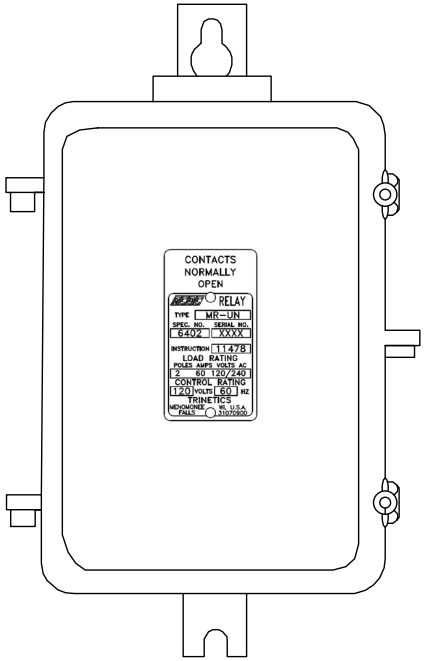
301225000



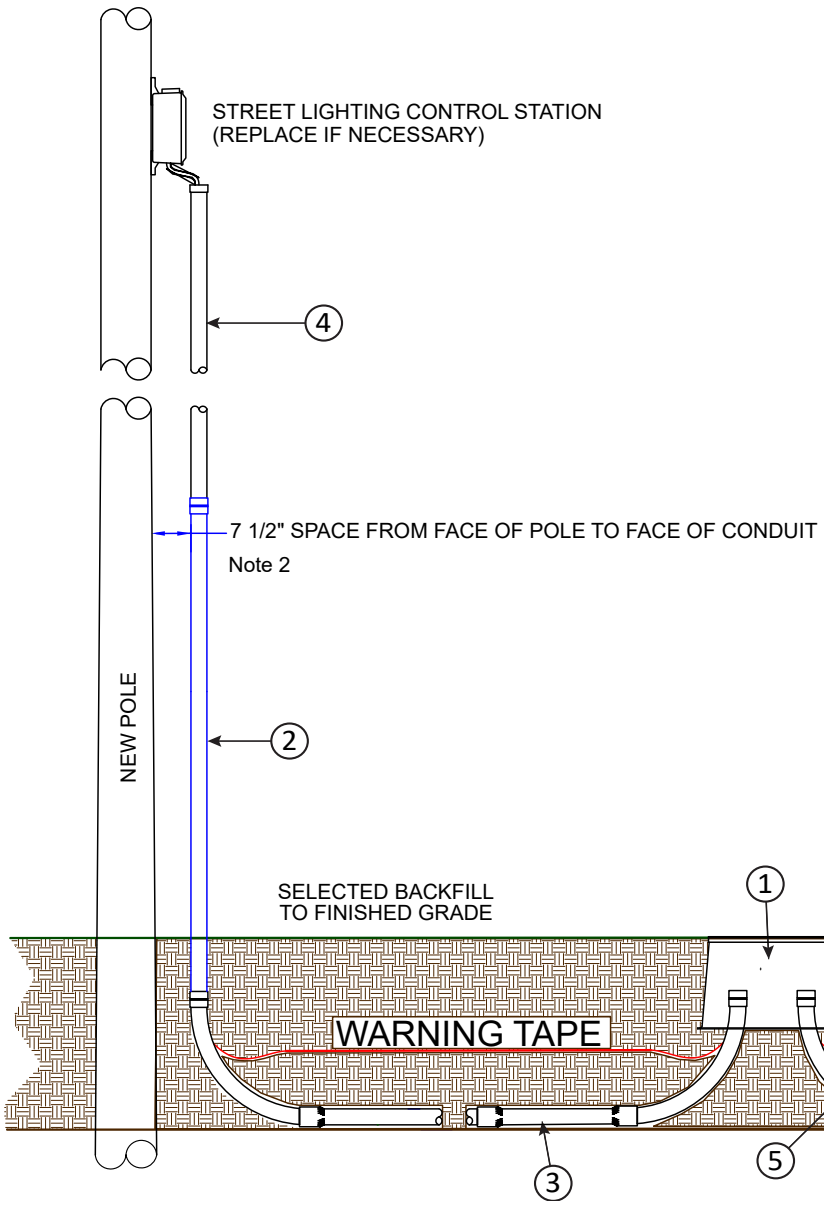
306430000

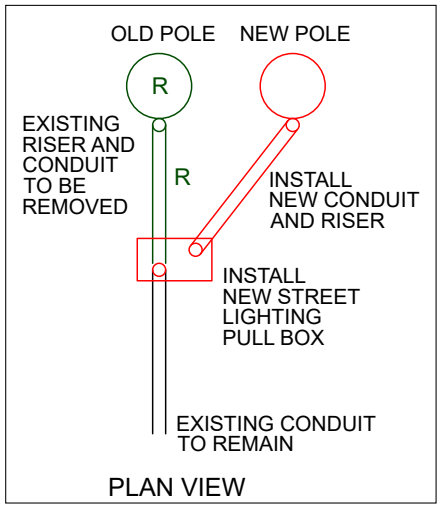


306422000



306424500





MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	STOCK #	CU
1	1	STREET LIGHTING PULL BOX, 13X24	060020500	LPLBX-13X24T
2	10 FT	2 IN GALVANIZED CONDUIT	101200000	LGAL-2
3	AS NEEDED	2 IN, SCH 40 PVC CONDUIT	103200000	LPVC-2
4	AS NEEDED	2 IN, SCH40 PVC CONDUIT, RISER	103272000	LRISER-2
5	3	2 IN, SCH 80 PVC ELBOW, 24 IN RADIUS	103702000	LPVCE-2SR-80

NOTES

1. Install wire equal to or larger than existing street lighting circuit.
2. Install adapters and brackets as needed (see Secondary Riser Section for details).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

LIGHTING CONTROL STATION & POLE RELOCATION

AERIAL MARKERS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
GENERAL INFORMATION	2			
POWER LINE MARKER BALLS	3			
AIRCRAFT WARNING LIGHT MULTIPLE LIGHT INSTALLATIONS	4			
AIRCRAFT WARNING LIGHT ASSEMBLY DETAIL	5			
AIRCRAFT WARNING LIGHT MATERIAL TABLE	6			
AIRCRAFT WARNING LIGHT MATERIAL TABLE (CONT.)	7			

GENERAL NOTES

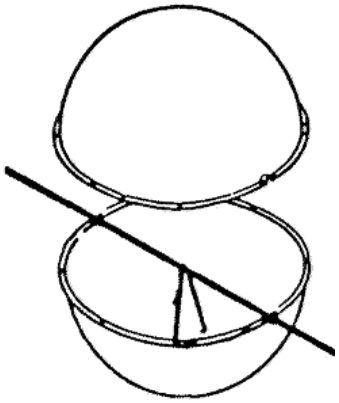
1. All Government Agencies and Private Customers, must submit a written request for the installation of any aerial obstruction markers. The request should include the quantity and placement requirements to meet all government regulations.
2. When these items are being placed to indicate lines that are within the approach path of any aircraft landing strip or helicopter pad, the FAA must inspect each installation and submit an approval letter to NES stating that the installation meets all air safety requirements.
3. Private Customers requesting installations around private fields should obtain FAA approval and placement instructions. Customers are responsible for all costs to facilitate installation of the markers.
4. At NES's discretion, these markers may be placed on any lines where contact from foreign objects is a concern but federal regulations do not mandate their installation. These applications may include construction zones where cranes are operating near lines or marinas where sailboats are moved near lines.

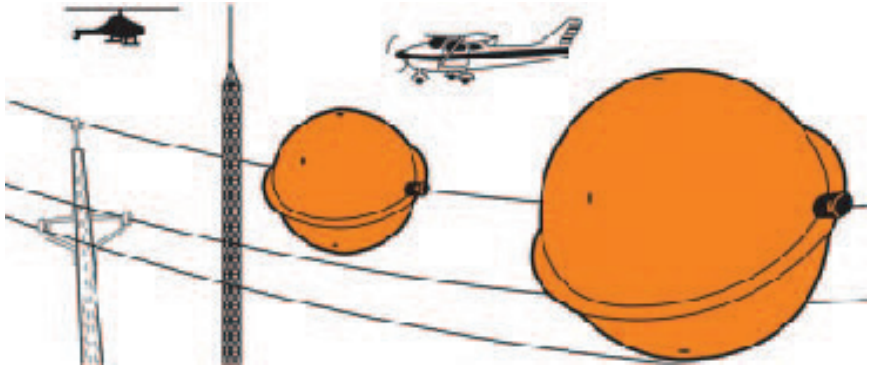
FEDERAL AVIATION ADMINISTRATION (FAA) CONTACT

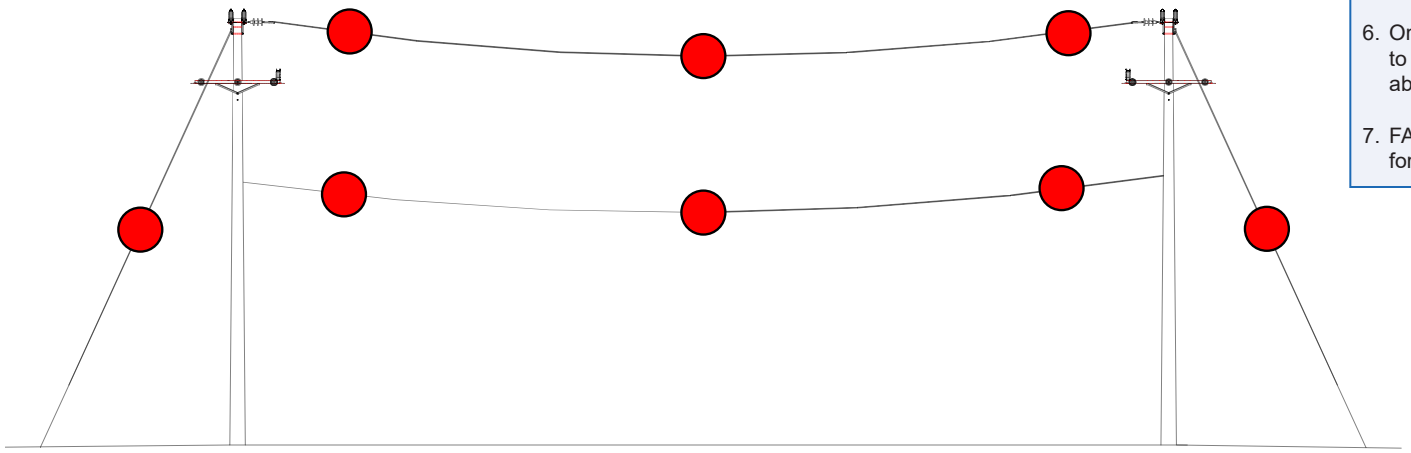
Robert Cope
Aviation Safety Inspector

FSDO 03
#2 International Plaza
Suite 700
Nashville, TN 37217

(615) 781-5433
Fax(615) 781-5436







NOTES

General Guidelines:

1. In situations when NES is installing these markers for added protection of our facilities, place a marker within 50-ft of each pole and one in the middle of the span.
2. Markers should be placed on the highest conductor or static wire where approaching aircraft are the concern.
3. Markers should be placed on the lowest conductor and/or neutral when clearance from tall objects is the concern.
4. Markers may also be required on guy wires around heliports.
5. Marker Balls are Special Order items. When ordering for projects or replacement of existing markers, the wire size must be given for each unit be ordered.
6. Order the proper size armor rods with the marker balls to protect the OHGW, power conductor, or guy wire from abrasion due to wind-induced conductor motion.
7. FAA Regulations require markers of not less than 36-inches for use on lines crossing rivers, lakes or canyons.

CU CODE	OMARKER	
QTY	SYSTEM VOLTAGE (kV)	STOCK #
1	Aerial Power Line Marker 20” Diameter Ball; Orange	500856900
2	OLAB-LINEMAN	N/A

NOTES

1. Engineering to apply NESC Overload Capacity Factor (OCF) for conductor loads.
2. NESC Table 250-3(b) values are provided for Span range (50 ft ≤ S < 250 ft) using the Wire Gust Response Factor (GRF = 0.86).

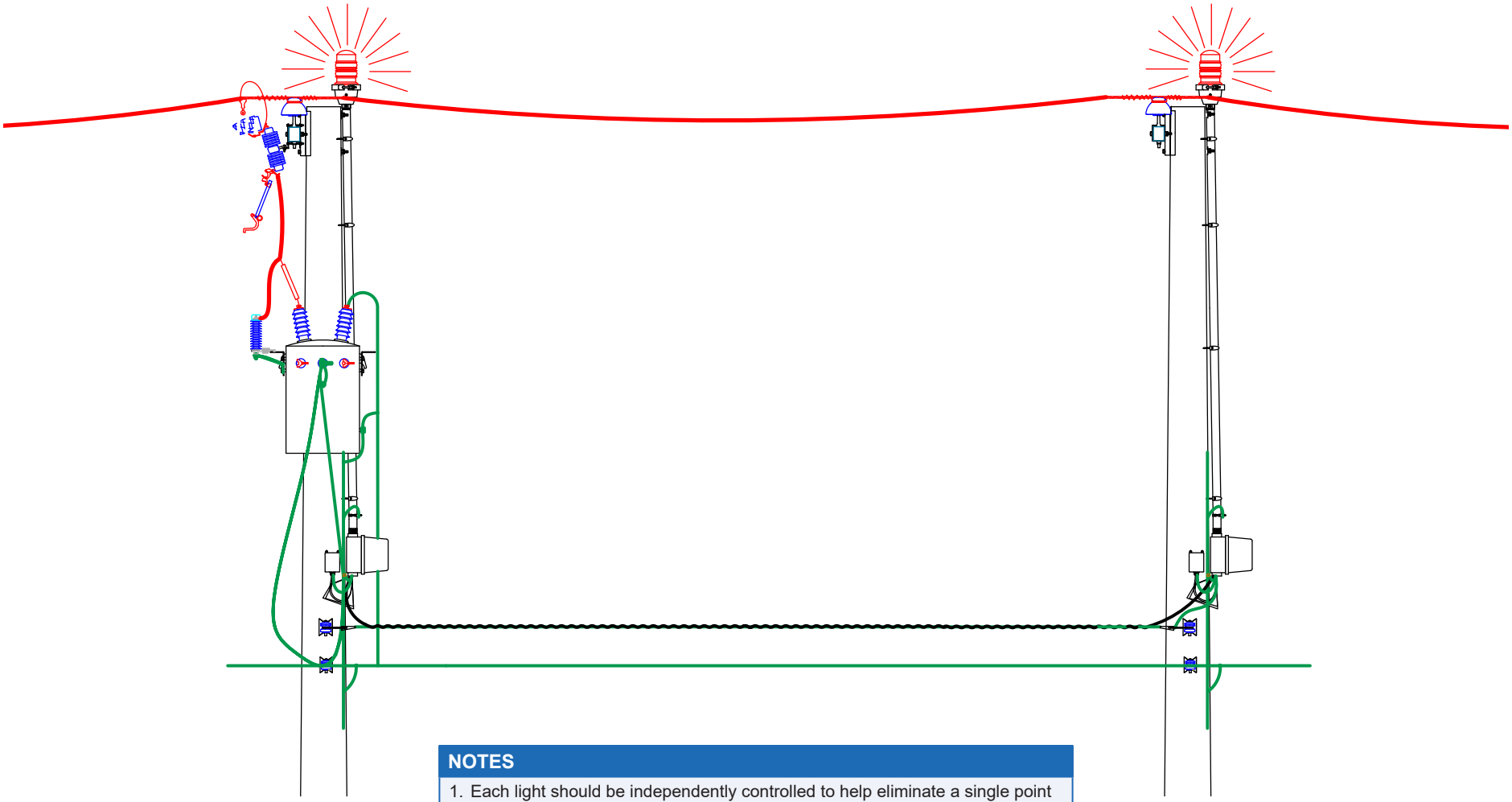
20-INCH AERIAL MARKER BALL - NESC RULES

LOAD CASES[1]	WIND SPEED (MPH)	NESC WIND (PSF)	WIND LOAD (LBS)	VERTICAL LOAD (LBS)	RESULTANT LOAD (LBS)
NESC RULE 250B - MED. LOADING	40	4	9	47	48
NESC RULE 250C - EXTREME WIND[2]	90	21	39	25	46
NESC RULE 250D - EXTREME ICE	30	2	5	97	97

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

POWER LINE MARKER BALLS



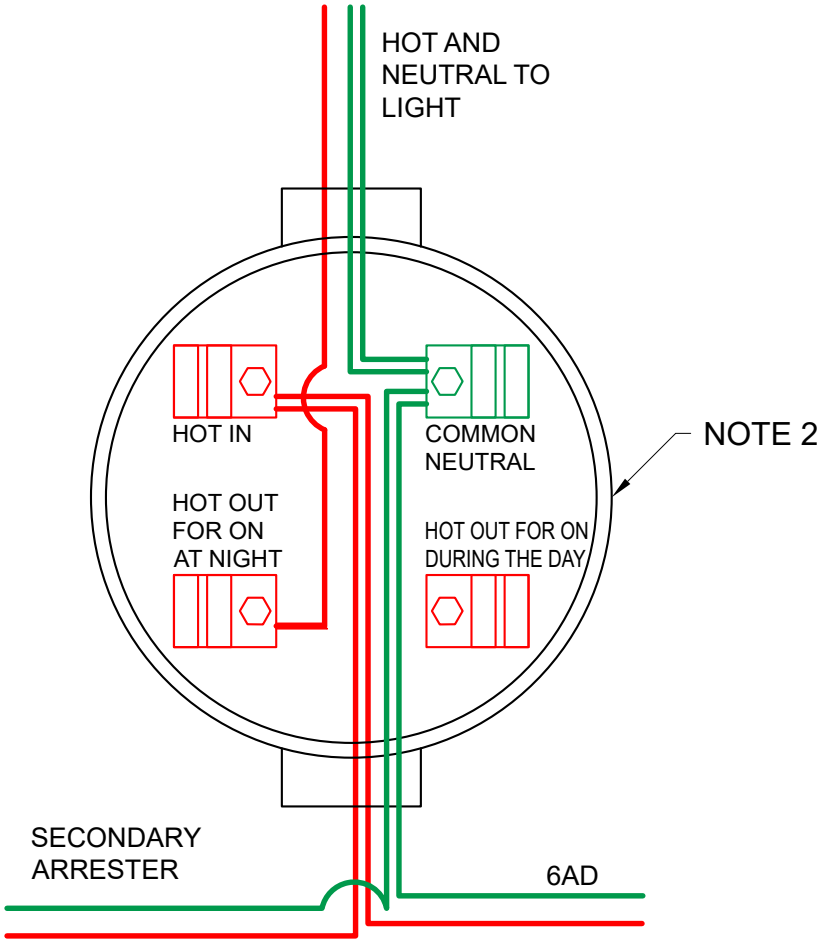
NOTES

1. Each light should be independently controlled to help eliminate a single point of failure on multiple light installations.
2. The basic assembly includes wire, conduit and straps for a standard distribution pole. Additional quantities of these items need to be called for on taller structures such as transmission poles.
3. The typical wiring schematic is shown on page 5. Always refer to the manufacturer's instructions for wiring schematics.
4. Low voltage cables must be inside conduit through the power space.

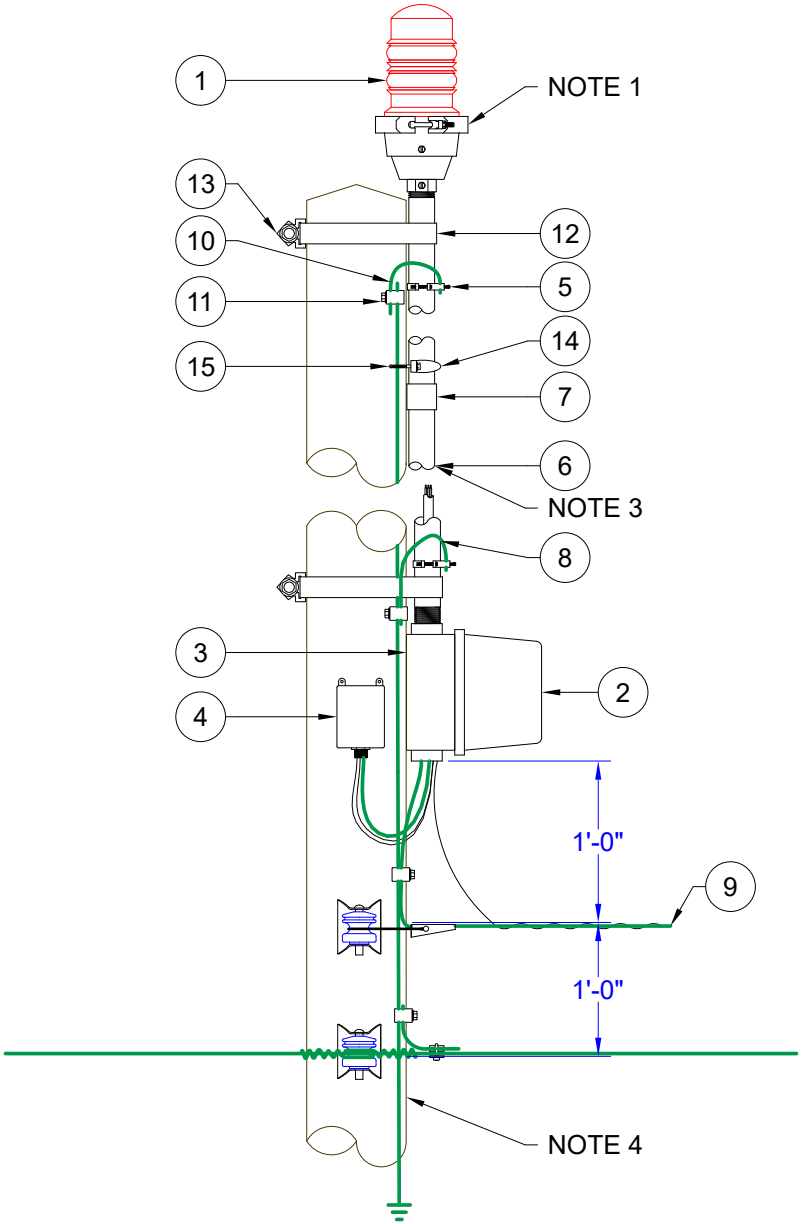
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

AIRCRAFT WARNING LIGHT MULTIPLE LIGHT INSTALLATIONS



CONTROL WIRING SCHEMATIC



NOTES

1. Red Steady Burning Aircraft Warning light used in these installations.
2. The typical wiring schematic is shown above. Always refer to the manufacturer'sinstructions for wiring schematics.
3. Low voltage cables must be inside conduit through the power space.
4. Bond light and conduit to pole ground meeting the Grounding section.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

AIRCRAFT WARNING LIGHT ASSEMBLY DETAIL

AIRCRAFT WARNING LIGHT - MATERIAL ITEM LIST

LINE CREW - WORK ORDER

ITEM #	STOCK #	COMPATIBLE UNIT	DESCRIPTION	QUANTITY
TASK: INSTALL RED STEADY BURNING LIGHT				
1	302960000	LOAL-ASSM-S	AERIAL OBSTRUCTION LIGHT (RED)	1
2	306390000		PE CONTROL WITH INTEGRATED 30A 120V RELAY	1
3	170087500		SOCKET METER ROUND 5 TERMINAL	1
4	140100000		SECONDARY ARRESTER	1
5	220440000		PIPE GROUND CONNECTOR 1/2”-1”	2
TASK: INSTALL 1” GAL CONDUIT FOR LIGHT				
6	101140000	LGAL-1	CONDUIT, GALV, 1", (PER FOOT)	30 FT OR AS REQ’D
7	101940000	LGCLP-1	CONDUIT COUPLING, GALV, 1”, PER CONDUIT	4 OR AS REQ'D
TASK: INSTALL CONTROL WIRE IN CONDUIT				
8	021560000	OCCI-3C-10	CAPACITOR, CABLE, CONTROL, #10, 3/C	35 FT OR AS REQ’D
TASK: INSTALL POWER TO LIGHT				
9	010600000	OCAD-6	CABLE AL DUPLEX 6 6N	200 FT OR AS REQ’D
TASK: INSTALL CONDUIT GROUND BONDING WIRE				
OLAB-LINEMAN		**LABOR ONLY ITEM**		**2**
10	011160000	Truck Stock Items	CABLE CU BSD 4	AS NEEDED
11	222680000	Truck Stock Items	CONNECTOR 4 CU	AS NEEDED
TASK: INSTALL BANDING FOR CONCRETE/STEEL POLES				
OLAB-LINEMAN		**LABOR ONLY ITEM**		**4**
12	183983000	Truck Stock Items	POLE BAND SS 1.25	AS NEEDED
13	183987000	Truck Stock Items	POLE BAND FASTENING EQUIP.	AS NEEDED
TASK: INSTALL CONDUIT CLAMPS FOR WOOD POLES				
14	106560000	Truck Stock Items	STRAP PIPE 1” WITH 1 HOLE	AS NEEDED
15	208100000	Truck Stock Items	SCREW LAG 3/8X2 STEEL ZINC	AS NEEDED

AIRCRAFT WARNING LIGHT - MATERIAL ITEM LIST

LINE CREW - WORK ORDER				
ITEM #	**STOCK #**	**COMPATIBLE UNIT**	**DESCRIPTION**	**QUANTITY**
TASK: INSTALL DRIVEN GROUND ROD & POLE GROUND WIRE (AS REQ'D)				
OLAB-LINEMAN		**LABOR ONLY ITEM**		**4**
NOT SHOWN	011160000	Truck Stock Items	CABLE CU BSD 4	AS NEEDED
	222680000	Truck Stock Items	CONNECTOR 4 CU	2
	184380000	Truck Stock Items	ROD GROUND CW 5/8X8	2
	220500000	Truck Stock Items	CLAMP GR ROD 8-2 CU	3

NOTES

1. Use OMARKER LITE Standard Estimate in Ellipse Materials Management System.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

RISER POLE STANDARDS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
3/23/26	Cedric Short	Ronald Reasonover	Tony Richman
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
PRIMARY RISER CONDUIT MATERIAL	3			
PRIMARY RISER NAMING CONVENTION	4			
PRIMARY RISER INSTALLATION UNDERGROUND CREWS	5			
PRIMARY RISER UG CREW MATERIAL DETAILS	6			
PRIMARY RISER UG CREW MATERIAL LIST	7			
PRIMARY RISER UG CREW MATERIAL LIST (CONT.)	8			
PRIMARY RISER UG CREW TRUCK STOCK DETAILS	9			
PRIMARY RISER UG CREW TRUCK STOCK LIST	10			
PRIMARY RISER INSTALLATION OVERHEAD LINE CREWS	11			
PRIMARY RISER LINE CREW TAP CONNECTOR LIST	12			
PRIMARY RISER LINE CREW TRUCK STOCK LIST	13			
PRIMARY RISER LINE CREW TRUCK STOCK LIST (CONT.)	14			
100 AMP (#1 AL) SINGLE PHASE HORIZONTAL FRAMING	15			
100 AMP (#1 AL) SINGLE PHASE VERTICAL FRAMING	16			
100 AMP (#1 AL) TWO PHASE HORIZONTAL FRAMING	17			
100 AMP (#1 AL) TWO PHASE VERTICAL FRAMING	18			
100 AMP (#1 AL) THREE PHASE HORIZONTAL FRAMING	19			

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
100 AMP (#1 AL) THREE PHASE VERTICAL FRAMING	20			
200 AMP (4/0 AL) THREE PHASE HORIZONTAL FRAMING	21			
200 AMP (4/0 AL) THREE PHASE VERTICAL FRAMING	22			
300 AMP (500 AL) THREE PHASE HORIZONTAL FRAMING	23			
300 AMP (500 AL) THREE PHASE VERTICAL FRAMING	24			
400 AMP (500 CU) THREE PHASE HORIZONTAL FRAMING	25			
400 AMP (500 CU) THREE PHASE VERTICAL FRAMING	26			
600 AMP (750 CU) THREE PHASE HORIZONTAL FRAMING	27			
600 AMP (750 CU) THREE PHASE VERTICAL FRAMING	28			
900 AMP (PARALLEL 750 CU) THREE PHASE HORIZONTAL FRAMING	29			
1200 AMP (PARALLEL 750 CU) THREE PHASE HORIZONTAL FRAMING	30			
SECONDARY RISERS INSTALLATIONS	31			
SECONDARY RISER CONDUIT DETAIL	32			
SECONDARY RISER MATERIAL LIST	33			
SECONDARY RISER MATERIAL LIST (CONT.)	34			
SECONDARY RISER SINGLE PHASE RISER DETAIL	35			
SECONDARY RISER THREE PHASE RISER DETAIL	36			
SECONDARY RISER SERVICE CONNECTORS	37			

CONDUIT MATERIAL TYPES

- **GALVANIZED STEEL:** NES specifies hot-dipped Galvanized Rigid steel Conduit (GRC) for metal conduit applications. GRC is required for elbows and exposed 10-ft conduit section above ground line with SCH 80 PVC extension up riser poles.
- **PVC (Polyvinyl Chloride):** NES specifies both Schedule 40 and Schedule 80 rigid PVC conduit. It is sometimes referred to as "plastic." Schedule 40 and 80 PVC have the same outer diameter, Schedule 80 has a thicker wall, thus provides a smaller inside diameter. All electrical conduits are to meet NEMA TC2 Standards using GRC or Schedule 80 PVC required when conduits are exposed to physical damage.

GALVANIZED PRIMARY CONDUIT SIZES AND RELATED MATERIAL STOCK NUMBERS

CONDUIT SIZE	CONDUIT TYPE	STANDARD CONDUIT USE	RISER CABLE APPLICATIONS	PRIMARY RISER CU NAME	CONDUIT STK # (ISSUED PER FT)	CONDUIT WT. (LB / 10-FT)	STD ELBOW STK #	COUPLING STK #
2-1/2-INCH	GALV	RISER	(1) # 1 AL	URISERP-2.5	101220000	56	102300000	102020000
3-INCH	GALV	RISER	(2) # 1 AL NOTE 2	URISERP-3	101240000	73	102330000	102040000
4-INCH	SCH 80 PVC	RISER	(3) #1 OR 4/0 (MIN) AL OR CU	URISERP-4	103274000	23	NA	103514000
	GALV	ELBOW		NA	101280000	104	102410000	102080000
5-INCH	SCH 80 PVC	RISER	(3) 4/0 - 500 (min) AL OR CU	URISERP-5	103275000	32	NA	103516000
	GALV	ELBOW		NA	101300000	140	102480000	102100000
6-INCH	SCH 80 PVC	RISER	(3) 500 -750 AL OR CU	URISERP-6	103276000	41	NA	103418000
	GALV	ELBOW		NA	101310000	184	102490000	102110000

SHADED ITEMS ABOVE MATERIALS ARE PVC USED WITH STANDARD RISER APPLICATIONS

NOTES

1. Minimum 24-Inch Radius Elbows for 2 thru 4-Inch conduits. Requires 36-Inch radius elbows for 5 & 6 inch conduits.
2. Separation of conductor phases in multiple conduits results in heating conduits due to Hysteresis and reduces current carrying capacities.
3. Conduit diameters are based on 25 kV EPR Rubber insulation with Concentric Neutrals Jacketed cable (see UG Plate book for cable specifications).
4. Tape Shield 750 CU cable without concentric neutral requires minimum 5-inch conduit (not for new construction).

DRAWING FRAMING CODES, OVERHEAD WORK

SPACES 1-3	SPACE 4		SPACE 5		SPACES 6-9		SPACES 10-12	
	PHASES		CONSTRUCTION TYPE		MAXIMUM AMPACITY/PROTECTIVE DEVICE TYPE		ARRESTER VOLTAGE	
	CODE	NAME	CODE	NAME	CODE	NAME	CODE	NAME
ORI	1	SINGLE	H	HORIZONTAL	1L	100A LBU	-18	18KV RISER CLASS ARRESTER (23.9Y/13.8KV)
	2	TWO	V	VERTICAL	2L	200A LBU	-12	12KV ARRESTER (13.8KV DELTA)
	3	THREE			3L	300A LBU	-3	3KV ARRESTER (4.16/2.4KV)
					4D	400A SMD-40 FUSE HOLDER		
					6L	600A GANG OPERATED SWITCH		
					9D	900A LINE TAP DISCONNECT		
					12L	1200A GANG OPERATED SWITCH		
					12D	1200A DISCONNECT		

DRAWING FRAMING CODES, UNDERGROUND WORK

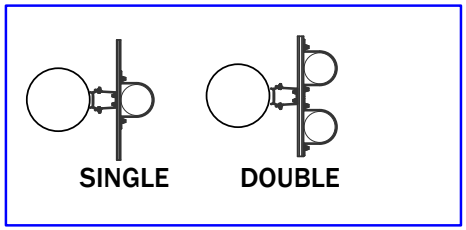
SPACES 1-7	SPACES 9-12	
URISERP	CONDUIT DIAMETER AND NUMBER ON POLE	
	CODE	NAME
	-2	SINGLE 2” CONDUIT
	-25	SINGLE 2-1/2” CONDUIT
	-25D	DOUBLE 2-1/2” CONDUITS (FOR 23.9 2Φ OR LIMITED 13.8KV BELOW 50A) NOTE 1
	-3	SINGLE 3” CONDUIT
	-4	SINGLE 4” CONDUIT
	-5	SINGLE 5” CONDUIT WITH TERMINATOR FOR 500MCM OR LARGER CONDUCTOR
	-5 40	SINGLE 5” CONDUIT WITH TERMINATOR FOR #1 TO 4/0 CONDUCTOR
	-5D	DOUBLE 5” CONDUIT
	-6	SINGLE 6” CONDUIT
	-6D	DOUBLE 6” CONDUIT

NOTES

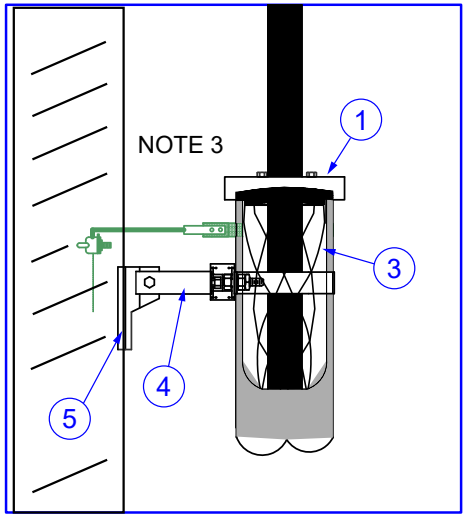
1. Separation of circuit conductor phases in ferromagnetic conduits results in heating conductors due to magnetic induction and reduces current carrying capacities.

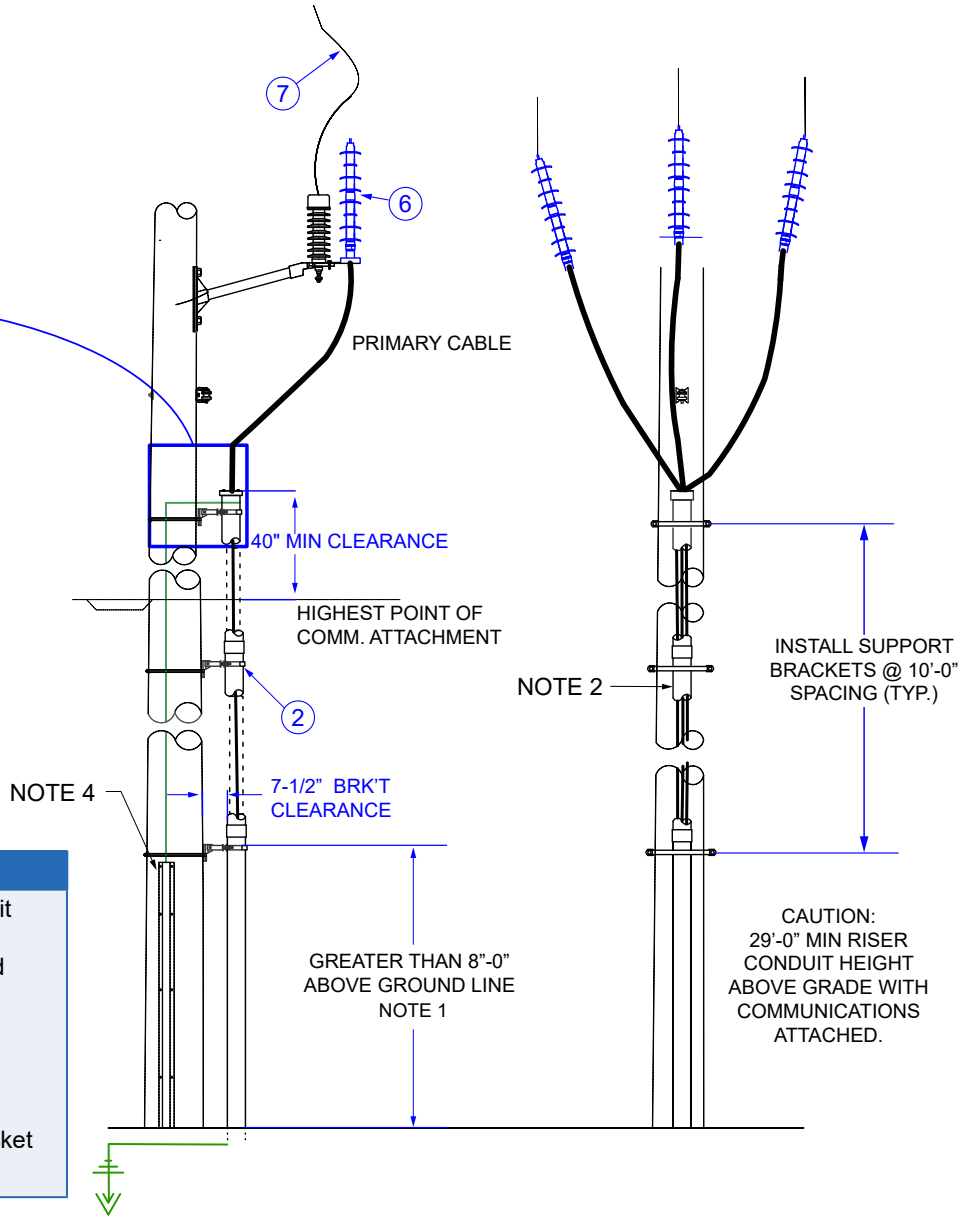
PRIMARY RISER INSTALLATION
UNDERGROUND CREWS

STANDOFF BRACKET TOP VIEW



STANDOFF BRACKET DETAILS





NOTES

1. Customer to install lowest 10-foot section using Rigid Galvanized Elbow and conduit with 7-1/2 Inch clearance from the pole surface.
2. All Primary conduits to be Rigid Galvanized or Schedule 80 PVC conduits extended from 10-foot section Rigid Galvanized conduit installed at the ground line.
3. Ground each end of metal conduit to pole ground above grade and 6-inches below grade for equal potential grounding.
4. Install 1-inch metal u-guard over any exposed pole ground wire from below grade extending above grade protecting pole ground wire.
5. Engineer to consult UG Crew prior to installing riser terminations above 50-foot bucket truck working height.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

PRIMARY RISER UG CREW MATERIAL DETAILS

RISER SIZE:	1Φ 100A	2Φ 100A	3Φ 100A	3Φ 200A	3Φ 300A	3Φ 400A	3Φ 600A	Not standard	3Φ 900A	3Φ 1200A	UG CREW MATERIAL ITEMS (THE ITEM CODE NUMBERS USED ON EACH RISER FRAMING PLATES)		
RISER FRAMING CU:	URISERP-25	URISERP-3	URISERP-4	URISERP-5 40	URISERP-5		URISERP-6	URISER-5D	URISERP-6	URISERP-6D	MAJOR AND MINOR MATERIALS (QTY BASED ON 50-FOOT POLE)		
ITEM #	QUANTITY										DESCRIPTION AND MATERIAL NOTES	STOCK #	
1											CONDUIT VENT/SUPPORT 2" #1 25KV 1H	402485000	
	1										CONDUIT VENT/SUPPORT 2.5" #1 25KV 1H	402495000	
		1									CONDUIT VENT/SUPPORT 3" #1 25KV 2H	402520000	
			1								CONDUIT VENT/SUPPORT 4" #1-4/0 25KV 3H	402580000	
				1							CONDUIT VENT/SUPPORT 5" #1-4/0-25KV 3H	402672000	
					1	1		2			CONDUIT VENT/SUPPORT 5" 500-750-25KV 3H	402670000	
							1		1	2	CONDUIT VENT/SUPPORT 6" 4/0-750-25KV 3H	402675000	
2	20'										GALVANIZED CONDUIT 2-1/2"	101220000	
		20'									GALVANIZED CONDUIT 3"	101240000	
			20'								SCH 80 PVC CONDUIT 4"	103274000	
				20'	20'	20'		40'			SCH 80 PVC CONDUIT 5"	103275000	
							20'		20'	40'	SCH 80 PVC CONDUIT 6"	103276000	
3	1										RISER GRIP 2 X 1.00 - 1.25 DIA (1-#1 AL)	401350000	
		1									RISER GRIP 3 X 1.75 - 2.00 DIA (2-#1 AL)	401370000	
			1								RISER GRIP 4 X 2.00 - 2.50 DIA (3-#1 AL)	401420000	
				1							RISER GRIP 5 X 3.00 - 3.50 DIA (3-4/0 AL/CU)	401460000	
					1	1		2			RISER GRIP 5 X 3.50 - 4.00 DIA (3-500 AL/CU)	401470000	
							1		1	2	RISER GRIP 6 X 3.50 - 4.00 DIA (3-750 CU)	401475000	

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

PRIMARY RISER UG CREW MATERIAL LIST

RISER POLE STANDARDS

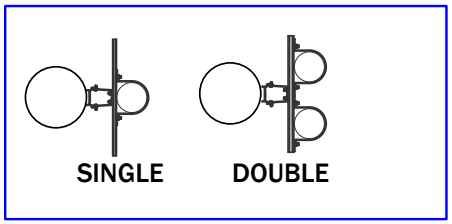
RISER SIZE:	Not standard	1Φ 100A	2Φ 100A	3Φ 100A	3Φ 200A	3Φ 300A	3Φ 400A	3Φ 600A	Not standard	3Φ 900A	3Φ 1200A	UG CREW MATERIAL ITEMS (THE ITEM CODE NUMBERS USED ON EACH RISER FRAMING PLATES)		
RISER FRAMING CU:	URISERP-2	URISERP-25	URISERP-3	URISER-4	URISERP-5 40	URISERP-5		URISERP-6	URISER-5D	URISERP-6	URISERP-6D	MAJOR AND MINOR MATERIALS (QTY BASED ON 50-FOOT POLE)		
ITEM #	QUANTITY											DESCRIPTION AND MATERIAL NOTES	STOCK #	
4	3											STRAP KIT 2" FOR STANDOFF BRACKET INST.	062800000	
		3										STRAP KIT 2-1/2" FOR STANDOFF BRACKET INST.	062810000	
			3									STRAP KIT 3" FOR STANDOFF BRACKET INST.	062820000	
				3								STRAP KIT 4" FOR STANDOFF BRACKET INST.	062840000	
					3	3	3		6			STRAP KIT 5" FOR STANDOFF BRACKET INST.	062850000	
								3		3	6	STRAP KIT 6" FOR STANDOFF BRACKET INST.	062860000	
5	3	3	3	3	3	3	3	3	3	3	3	CONDUIT STANDOFF BRACKET	060050000	
6	1	1	1	1								CABLE TERMINATOR #1	402678000	
					1							CABLE TERMINATOR 4/0	402680000	
						1	1	1	2	1	2	CABLE TERMINATOR 500/750	402700000	
7	10'	10'	20'	30'								#6 BARE SOFT-DRAWN COPPER (STINGER)	011150000	
					30'							#2 BARE SOFT-DRAWN COPPER (STINGER)	011210000	
						30'						1/0 BARE HARD-DRAWN COPPER (STINGER)	011060000	
							30'					4/0 BARE SOFT-DRAWN COPPER (STINGER)	011260000	
								30'	60'			500 BARE MEDIUM-DRAWN COPPER (STINGER)	011140000	
										30'		750 BARE SOFT-DRAWN COPPER (STINGER)	011300000	
											60'	1000 BARE SOFT-DRAWN COPPER (STINGER)	011320000	

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

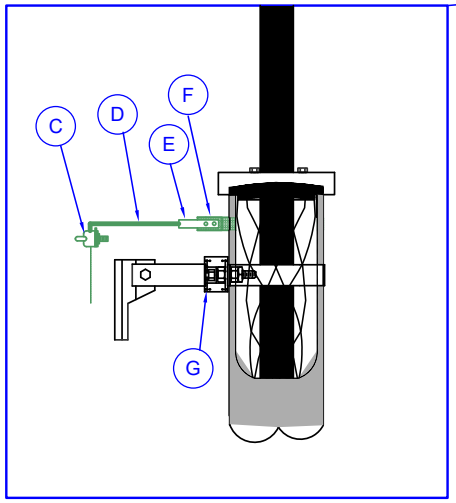
NES

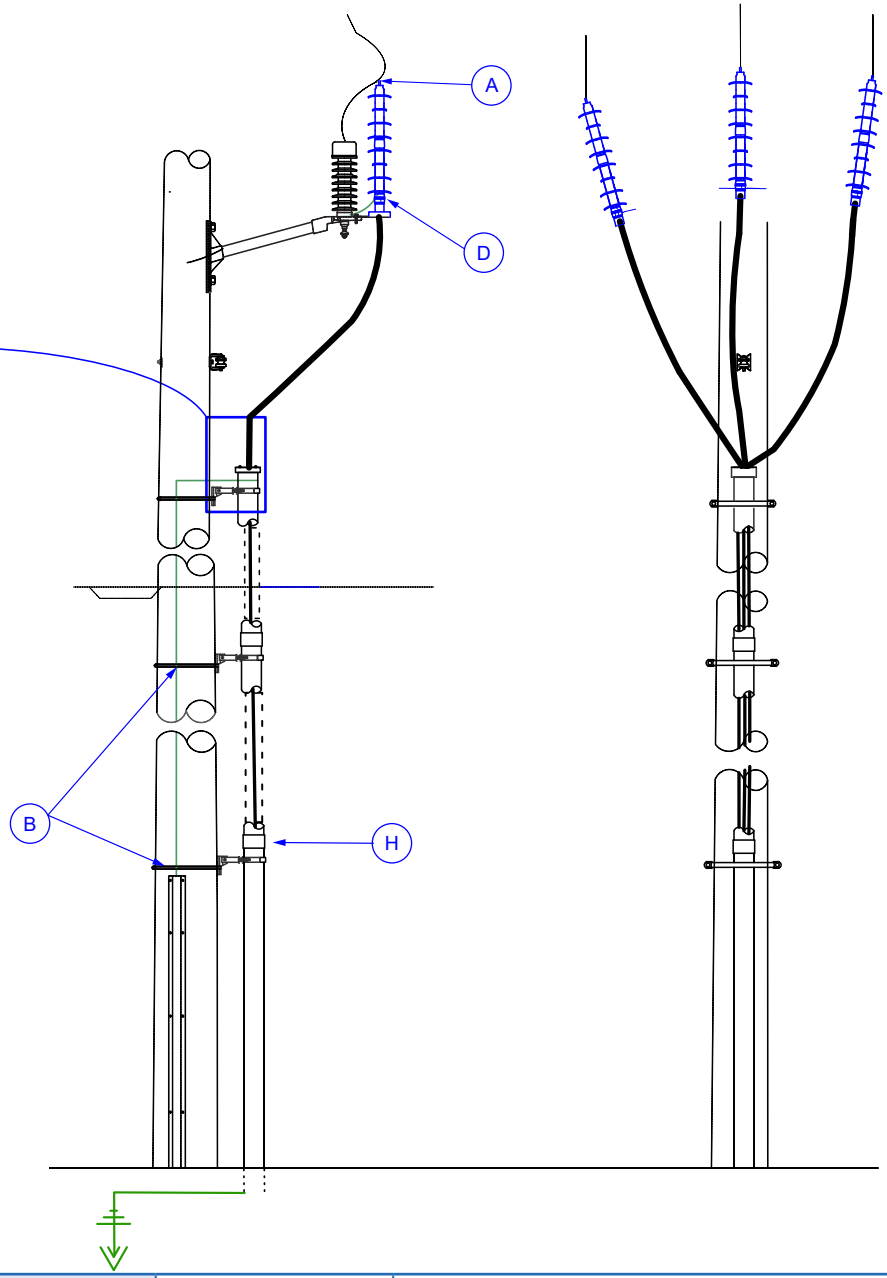
PRIMARY RISER UG CREW MATERIAL LIST (CONT.)

STANDOFF BRACKET TOP VIEW



STANDOFF BRACKET DETAILS





REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

PRIMARY RISER
UG CREW
TRUCK STOCK DETAILS

RISER SIZE:	1Φ 100A		2Φ 100A		3Φ 100A	3Φ 200A	3Φ 300A	3Φ 400A	3Φ 600A standard	Not standard	3Φ 900A	3Φ 1200A	UG CREW MATERIAL ITEMS (THE ITEM CODE LETTERS USED ON EACH RISER FRAMING PLATES)		
RISER FRAMING CU:	URISERP-2	URISERP-25	URISERP-3	URISER-25D	URISERP-4	URISERP-5 40	URISERP-5		URISERP-6	URISER-5D	URISERP-6	URISERP-6D	TRUCK STOCK MATERIALS (QTY BASED ON 50-FOOT POLE)		
A	1	1	1	2	1								VICE CONNECTOR #2CU (“BUTTON” CONNECTOR)	222720000	
						1							TWO-BOLT CONNECTOR 4/0	222760000	
							1	1					TWO-BOLT CONNECTOR 500	222800000	
									1	2	1	2	TWO-BOLT CONNECTOR 750	222820000	
B	3	3	3	3	3	3	3	3	3	3	3	3	POLE BAND SS 3/4” POLE BAND FASTENING EQUIPMENT 3/4”	183982500 183983600	
C	2	2	2	2	2	2	2	2	2	2	2	2	CONN GRD 4-2 TO 4-2 CU	223480000	
D	4’	4’	4’	4’	4’	4’	4’	4’	4’	4’	4’	4’	CABLE CU BSD 2 7S	011210000	
E	2	2	2	4	2	2	2	4	2	4	2	4	TERM COMP 2-1 AL/CU 2H	222722000	
F	2’	2’	2’	4’	2’	2’	2’	4’	2’	4’	2’	4’	BAR CU BUS 1/8 X 1 IN (GRND STRAP BY NES SHOP).	320120000	
G	10’	10’	10’	10’	10’	10’	10’	10’	10’	10’	10’	10’	CHANNEL 4 WAY T-SLOT ISSUED PER 10-FT LENGTH (CUT AS REQ’D)	060070000	
H		1		2									COUPLING FOR 2-1/2” GALV CONDUIT	102020000	
			1										COUPLING FOR 3” GALV CONDUIT	102040000	
					1								COUPLING FOR 4” GALV CONDUIT	103514000	
						1	1	1		2			COUPLING FOR 5” GALV CONDUIT	103516000	
									1		1	2	COUPLING FOR 6” GALV CONDUIT	103418000	

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

RISER POLE STANDARDS

NES

PRIMARY RISER
UG CREW
TRUCK STOCK LIST

PRIMARY RISER INSTALLATION
OVERHEAD LINE CREWS

RISER SIZE>>	100A	200A	300A	400A	600A	900A	1200A
MIN.STINGER>>	#6 BSD CU	#2 BSD CU	1/0 BSD CU	4/0 BSD CU	500 BSD CU	750 BSD CU	1000 BSD CU
MAIN LINE SIZE:	TAP CONNECTOR STOCK NUMBERS						
#6	220840000 (STIRRUP)	220840000 (STIRRUP)	N/A	N/A	N/A	N/A	N/A
	22065000 (HL CLAMP)	22065000 (HL CLAMP)					
#4	220840000 (STIRRUP)	220840000 (STIRRUP)					
	22065000 (HL CLAMP)	22065000 (HL CLAMP)					
#2	220840000 (STIRRUP)	220840000 (STIRRUP)					
	22065000 (HL CLAMP)	22065000 (HL CLAMP)					
1/0	220840000 (STIRRUP)	220860000 (STIRRUP)	220840000 (STIRRUP)				
	22065000 (HL CLAMP)	22065000 (HL CLAMP)	22068000 (HL CLAMP)				
4/0	220860000 (STIRRUP)	220860000 (STIRRUP)	220860000 (STIRRUP)	220860000 (STIRRUP)			
	22065000 (HL CLAMP)	22065000 (HL CLAMP)	22068000 (HL CLAMP)	22068000 (HL CLAMP)			
336	220880000 (STIRRUP)	220880000 (STIRRUP)	220880000 (STIRRUP)	220880000 (STIRRUP)			
	22065000 (HL CLAMP)	22065000 (HL CLAMP)	22068000 (HL CLAMP)	22068000 (HL CLAMP)			
477	220880000 (STIRRUP)	220880000 (STIRRUP)	220880000 (STIRRUP)	220880000 (STIRRUP)	224123000 (AMPACT)		
	22065000 (HL CLAMP)	22065000 (HL CLAMP)	22068000 (HL CLAMP)	22068000 (HL CLAMP)			
795	220880000 (STIRRUP)	220880000 (STIRRUP)	220880000 (STIRRUP)	220880000 (STIRRUP)	224126000 (AMPACT)	224127000 (AMPACT)	224127000 (AMPACT)
	22065000 (HL CLAMP)	22065000 (HL CLAMP)	22068000 (HL CLAMP)	22068000 (HL CLAMP)			
1351	220900000 (STIRRUP)	220900000 (STIRRUP)	220900000 (STIRRUP)	220900000 (STIRRUP)	224130000 (AMPACT)	224131000 (AMPACT)	224131500 (AMPACT)
	22065000 (HL CLAMP)	22065000 (HL CLAMP)	22068000 (HL CLAMP)	22068000 (HL CLAMP)			

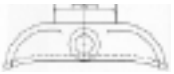
TAP CONNECTOR MATERIALS		
DESCRIPTION	STOCK #	
HOT LINE CLAMP 6-1/0	220650000	
HOT LINE CLAMP 1-266	220680000	
STIRRUP CLAMP 2-2/0 3/8” TAP	220840000	
STIRRUP CLAMP 4-4/0 3/8” TAP	220860000	
STIRRUP CLAMP 336-795 1/2” TAP	220880000	
STIRRUP CLAMP 400-1431 1/2” TAP	220900000	
CONN WEDGE 350 - 4/0 ;CONNECTOR, WEDGE	224117000	
CONN WEDGE 350 - 350 ;CONNECTOR, WEDGE.	224118000	
CONN WEDGE 500/477-1/0 ;CONNECTOR, WEDGE	224120000	
CONNECTOR, WEDGE ;CONNECTOR, WEDGE 500 A	224121000	
CONN WEDGE 500/477 - 350 ;CONNECTOR, WED	224122000	
CONN WEDGE 500/477 - 500/477 ;CONNECTOR,	224123000	
CONN WEDGE 795-2 ;CONNECTOR, WEDGE	224123800	
CONN WEDGE 795-1/0 ;CONNECTOR, WEDGE	224123900	
CONN WEDGE 750/795 - 4/0 ;CONNECTOR, WED	224124000	
CONN WEDGE 750/795-300/350 ;CONNECTOR, W	224125000	
CONN WEDGE 750/795-500/477 ;CONNECTOR, W	224126000	
CONN WEDGE 750/795-750/795 ;CONNECTOR, W	224127000	

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

RISER POLE STANDARDS

NES

PRIMARY RISER LINE CREW TAP CONNECTOR LIST

FRAMING CU	ORI1H1L	ORI1V1L	ORI2H1L	ORI2V1L	ORI3H1L	ORI3V1L	ORI3H2L	ORI3V2L	ORI3H3L	ORI3V3L	ORI3H4D	ORI3H6L	ORI3V6L	ORI3H9D	ORI3H12L	**OVERHEAD CREW TRUCK STOCK** (THE ITEM CODE LETTERS ARE USED ON EACH RISER FRAMING PLATES)		
ITEM	**QUANTITY**															**DESCRIPTION AND MATERIAL NOTES**	**STOCK #**	**PHOTO**
TRUCK STOCK ITEMS																		
A	SEE PREVIOUS PAGE															TAP CONNECTORS (PAGE 12)	SEE PREVIOUS PAGE	
B	1	1	2	2	3	3	3	3	N/A							FUSE LINK (SIZE RANGE 1A - 20A)	261051000 thru 261065000	
																FUSE LINK (SIZE RANGE 25A - 100A)	261067000 thru 261083000	
	N/A															FUSE LINK (SIZE RANGE 140A - 200A)	261086000 - 261089000	
C	7	10	11	14	18	18	18	18	18	18	15	15	15	27	27	#4 BSD CU (GROUND WIRE)	011160000	NOTE 1
																#2 BSD CU (GROUND WIRE)	011210000	
D	1	1	2	2	3	3	3	3	3	3	3	3	3	6	6	H-TYPE PARALLEL GROVE CONN. (AS REQ'D)	223310000 thru 223440000	
E	6	6	10	8	10	10	10	10	10	10	5	15	15	18	18	5/8" MACHINE BOLT	203780000 thru 203980000	
											5	5	5	8	8	5/8" DBL COIL SPRING WASHER	206570000	
											5	17	17	20	20	2-1/4" SQ FLAT WASHER W/ 3/4" DIA. HOLE	209620000	
F				1		3		3		3			3			JUMPER POST CLAMP TOP 4-4/0	221870000	
																JUMPER POST CLAMP TOP 4/0-477	221890000	

NOTES

1. Minimum grounding bond wire and pole ground wire per the Grounding section of the Plate book based on Tables 1 & 2 as shown on page 9-11.

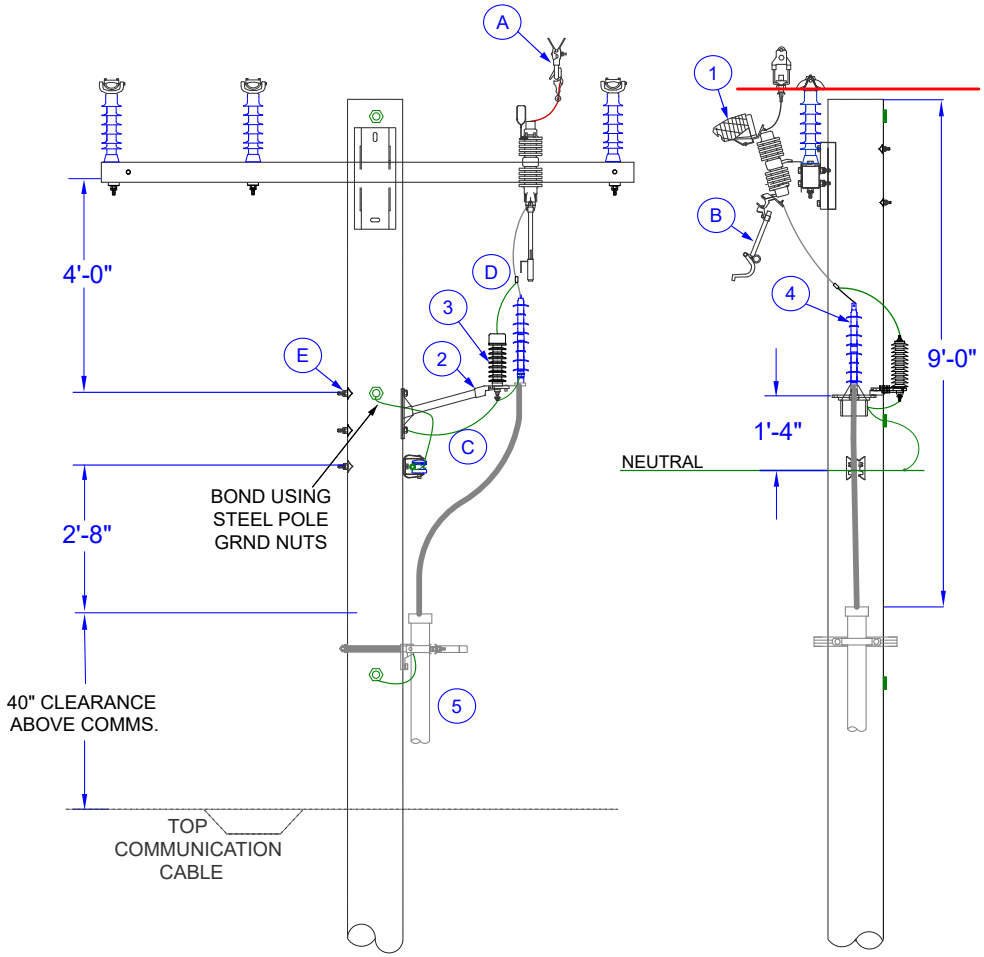
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

PRIMARY RISER LINE CREW TRUCK STOCK LIST

FRAMING CU	ORI1H1L	ORI1V1L	ORI2H1L	ORI2V1L	ORI3H1L	ORI3V1L	ORI3H2L	ORI3V2L	ORI3H3L	ORI3V3L	ORI3H4D	ORI3H6L	ORI3V6L	ORI3H9D	ORI3H12L	**OVERHEAD CREW TRUCK STOCK** **(THE ITEM CODE LETTERS ARE USED ON EACH RISER FRAMING PLATES)**		
ITEM	**QUANTITY**															**DESCRIPTION AND MATERIAL NOTES**	**STOCK #**	**PHOTO**
TRUCK STOCK ITEMS																		
G	N/A									SEE PROTECTION SECTION - SWTICH PLATES FOR QUANTITY & DETAILS						3/4” MACHINE BOLT (FOR SWITCH)	204010000 THRU 204280000	
H																1/2” x 1-3/4” LONG SS MACHINE BOLT (900 AMP IN-LINE SWITCH)	204370000	
I																1/2 x 2” LONG SS MACHINE BOLT (900 AMP IN-LINE SWITCH)	204372000	
J																3/4” DBL COIL SPRING WASHER	206580000	
K																SQUARE CURVED WASHER, 1” HOLE (FOR SWITCH)	209530000	
L																SQUARE CURVED WASHER, 13-16” HOLE (FOR SWITCH)	209520000	
M																PERCUSSION WEDGE CONNECTOR	224100000 THRU 224133000	
																PERCUSSION CARTRIDGE	224140000 THRU 224143000	
																PERCUSSION LUG, 2 HOLE	233850000 THRU 233852000	

DRAWING CODE:	ORI1H1L-18	ORI1H1L-3	MAJOR AND MINOR MATERIALS		
SYSTEM VOLTAGE	23.9kV	4kV			
LINE DEPARTMENT MATERIALS					
Item	**QTY**		**Description**	**Stock #**	**CU**
1	1	1	LOAD-BREAK CUTOUT, 100A	143450000	ORI1H1L
2	1	1	FIBERGLASS BRACKET, 18"	180745000	
3	1	-	ARRESTER, 18kV RISER POLE	140310000	OLA18R
	-	-	ARRESTER 12kV DIST GRAY	140180000	OLA12
	-	1	ARRESTER 3kV DIST GRAY	140120000	OLA3
(Stinger Wire is not listed) --- see Note 1					
C&M DEPARTMENT MATERIALS					
4	1	1	TERMINATOR CABLE #1	402678000	UCN-CTRM1
5	1	1	Riser materials listed on page 6 & 7		URISERP-25



NOTES

1. Stinger wire minimum #4 CU (classified as truck stock).
2. Letter item characters for truck stock list on pages 10,12 & 13.

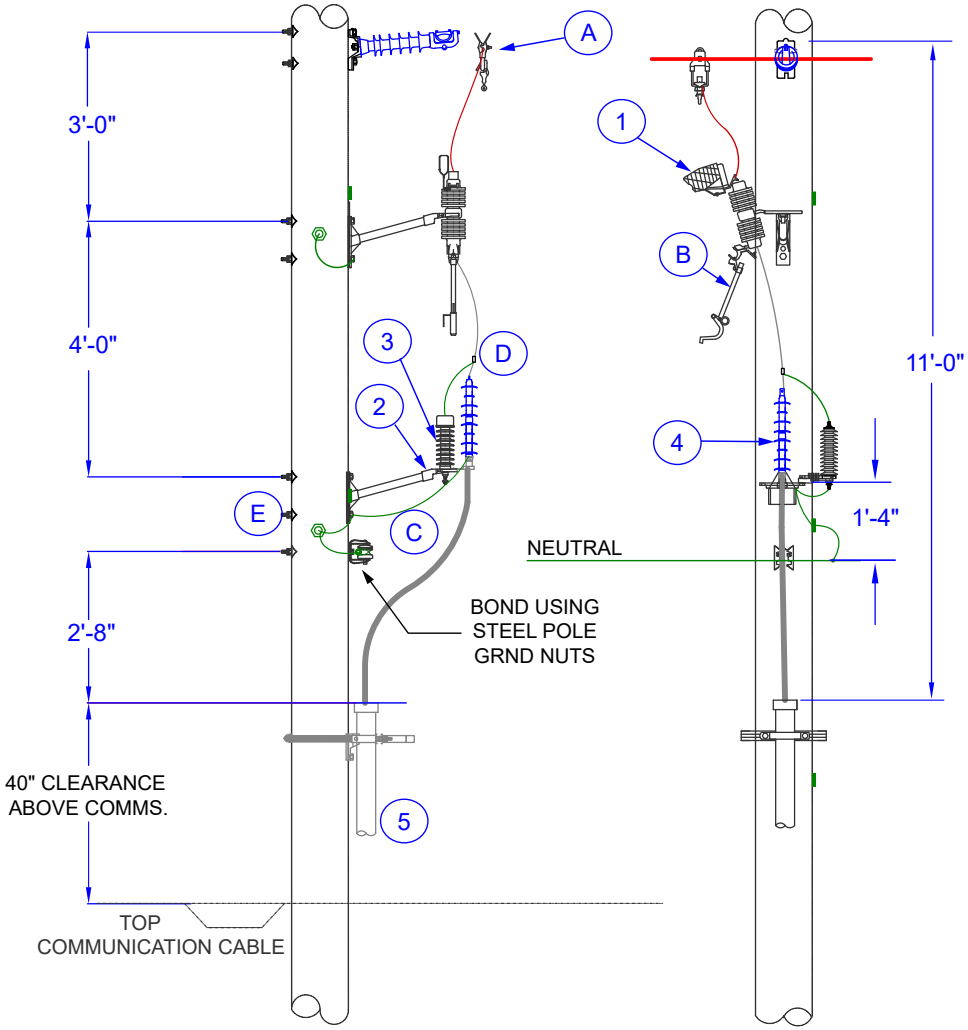
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

100 AMP (#1 AL) SINGLE PHASE HORIZONTAL FRAMING

DRAWING CODE:	ORI1V1L-18	ORI1V1L-3	MAJOR AND MINOR MATERIALS
SYSTEM VOLTAGE	23.9kV	4kV	

LINE DEPARTMENT MATERIALS					
Item	**QTY**		**Description**	**Stock #**	**CU**
1	1	1	LOAD-BREAK CUTOUT, 100A	143450000	ORI1V1L
2	2	2	FIBERGLASS BRACKET, 18”	180745000	
3	1	-	ARRESTER, 18kV RISER POLE	140310000	OLA18R
	-	1	ARRESTER 3kV DIST GRAY	140120000	OLA3
(Stinger Wire is not listed) --- see Note 1					
C&M DEPARTMENT MATERIALS					
4	1	1	TERMINATOR CABLE #1	402678000	UCN-CTRM1
5	1	1	Riser materials listed on page 6 & 7		URISERP-25



NOTES

1. Stinger wire minimum #4 CU (classified as truck stock).
2. Letter item characters for truck stock list on pages 10,12 & 13.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

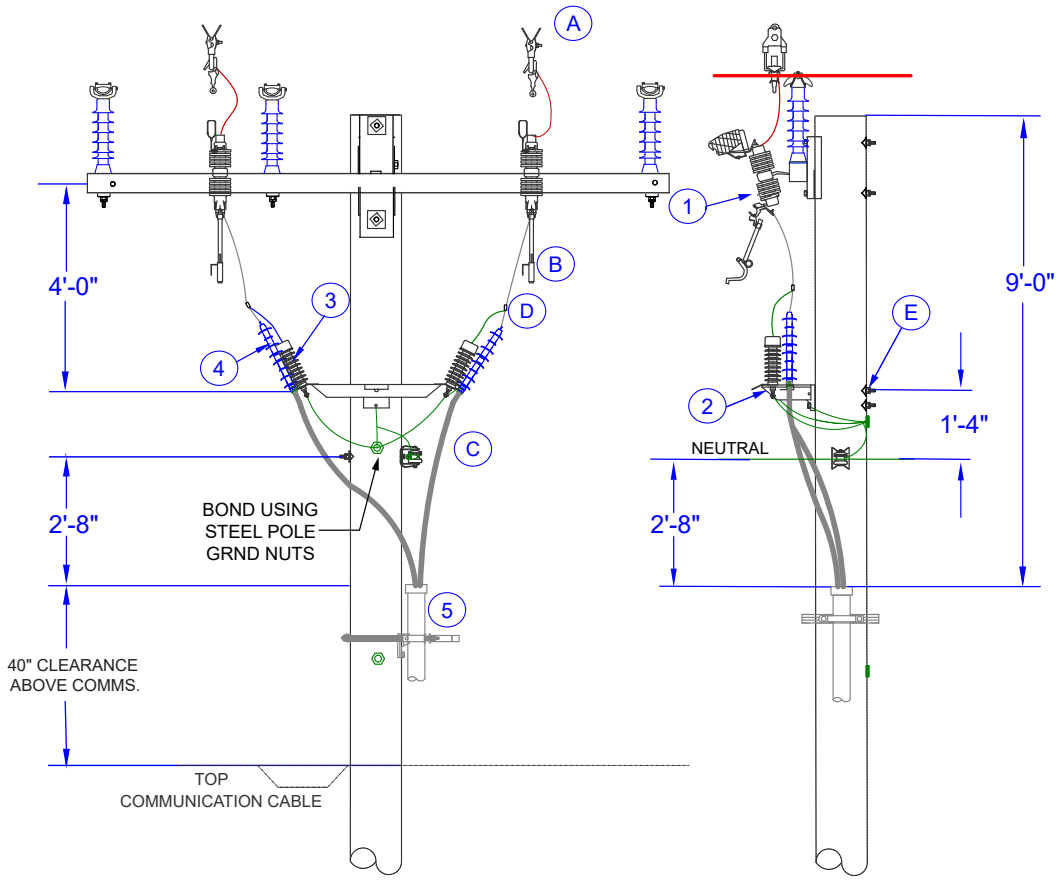
NES

100 AMP (#1 AL) SINGLE PHASE VERTICAL FRAMING

RISER POLE STANDARDS

ORI1V1L

DRAWING CODE:	ORI2H1L-18	ORI2H1L-12	ORI2H1L-3	MAJOR AND MINOR MATERIALS		
SYSTEM VOLTAGE	23.9kV	13.8kV	4kV			
LINE DEPARTMENT MATERIALS						
Item	**QTY**			**Description**	**Stock #**	**CU**
1	2	2	2	LOAD-BREAK CUTOUT, 100A	143450000	ORI2H1L
2	1	1	1	3 PHASE EQUIPMENT MOUNT	182710000	
3	2	-	-	ARRESTER, 18kV RISER POLE	140310000	OLA18R
	-	2	-	ARRESTER 12kV DIST GRAY	140180000	OLA12
	-	-	2	ARRESTER 3kV DIST GRAY	140120000	OLA3
(Stinger Wire is not listed) --- see Note 1						
C&M DEPARTMENT MATERIALS						
4	2	2	2	TERMINATOR CABLE #1	402678000	UCN-CTRM1
5	1	1	1	Riser mtr'l listed on page 6 & 7		URISERP-3



NOTES

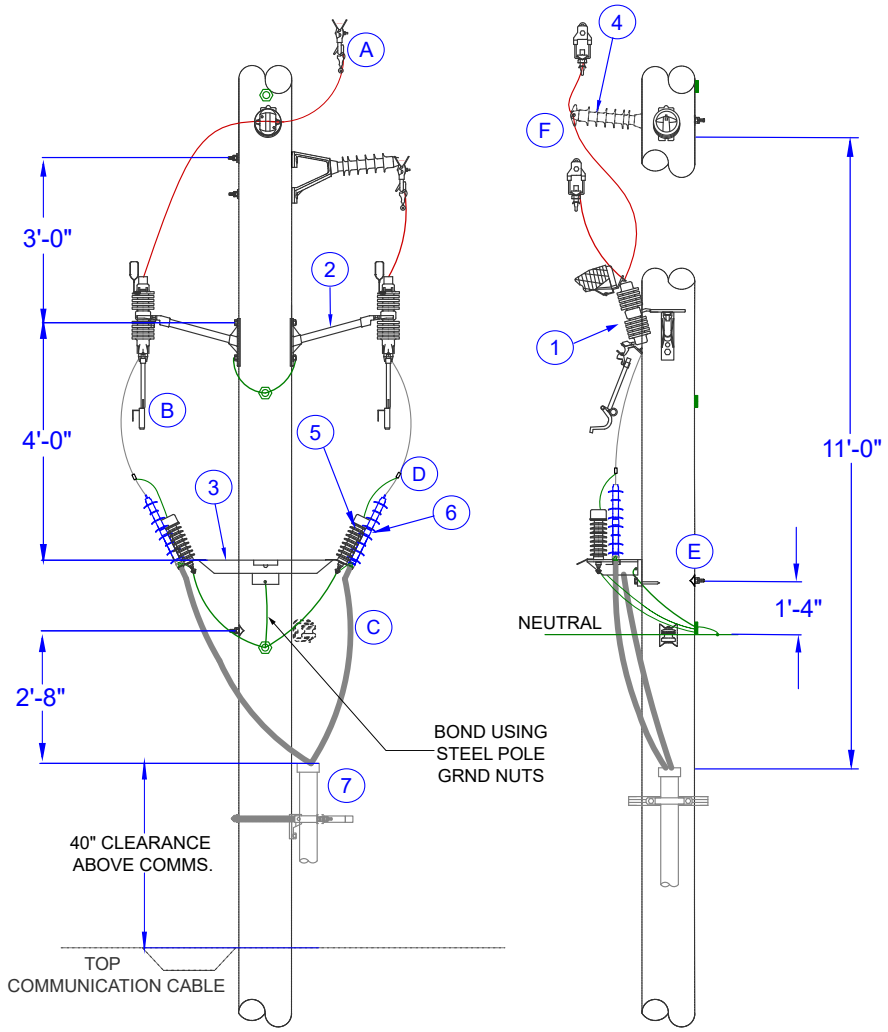
1. Stinger wire minimum #4 CU (classified as truck stock).
2. Letter item characters for truck stock list on pages 10,12 & 13.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

100 AMP (#1 AL) TWO PHASE HORIZONTAL FRAMING

DRAWING CODE:	ORI2V1L-18	ORI2V1L-12	ORI2V1L-3	MAJOR AND MINOR MATERIALS		
SYSTEM VOLTAGE	23.9kV	13.8kV	4kV			
LINE DEPARTMENT MATERIALS						
Item	**QTY**			**Description**	**Stock #**	**CU**
1	2	2	2	LOAD-BREAK CUTOUT, 100A	143450000	ORI2V1L
2	2	2	2	FIBERGLASS BRACKET, 18"	182710000	
3	1	1	1	3 PHASE EQUIPMENT MOUNT	182710000	
4	1	1	1	VERTICAL LINE POST INSULATOR	240974000	
5	2	-	-	ARRESTER, 18kV RISER POLE	140310000	OLA18R
	-	2	-	ARRESTER 12kV DIST GRAY	140180000	OLA12
	-	-	2	ARRESTER 3kV DIST GRAY	140120000	OLA3
(Stinger Wire is not listed) --- see Note 1						
C&M DEPARTMENT MATERIALS						
6	2	2	2	TERMINATOR CABLE #1	402678000	UCN-CTRM1
7	1	1	1	Riser materials listed on page 6 & 7		URISERP-3



NOTES

1. Stinger wire minimum #4 CU (classified as truck stock).
2. Letter item characters for truck stock list on pages 10,12 & 13.

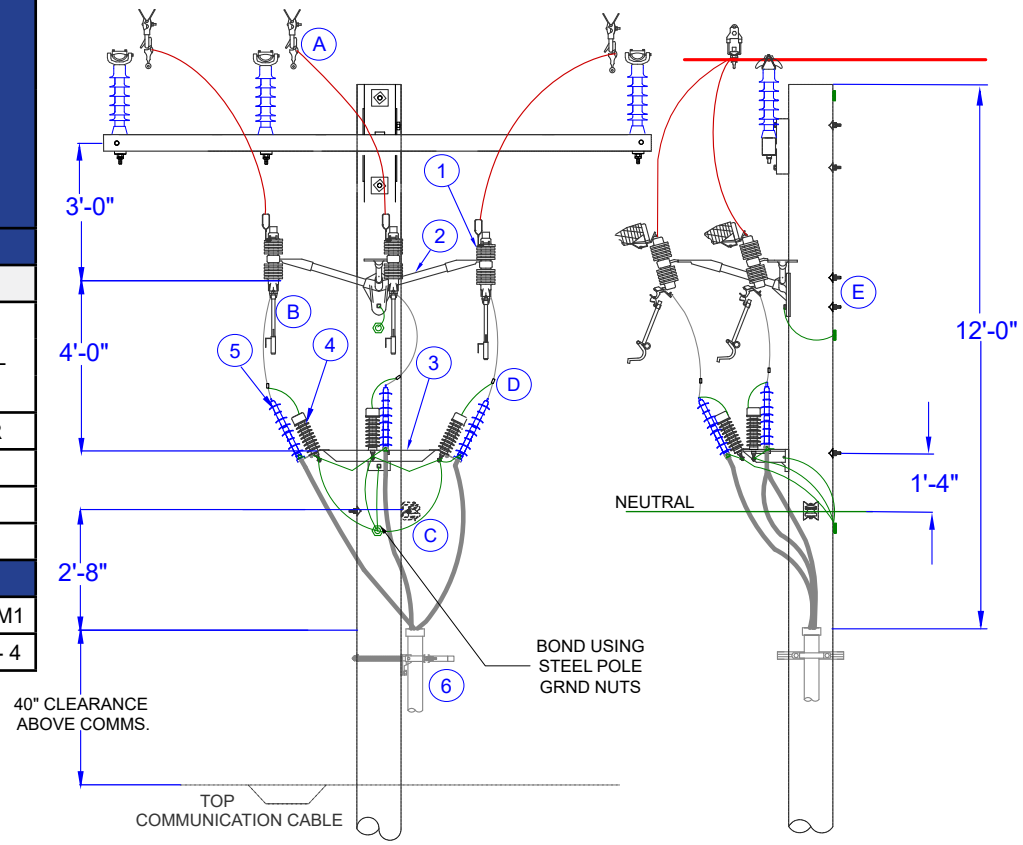
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

100 AMP (#1 AL) TWO PHASE VERTICAL FRAMING

DRAWING CODE:	ORI3H1L-18	ORI3H1L-12	ORI3H1L-3	MAJOR AND MINOR MATERIALS
SYSTEM VOLTAGE	23.9kV	13.8kV	4kV	

LINE DEPARTMENT MATERIALS						
Item	QTY			Description	Stock #	CU
1	3	3	3	LOAD-BREAK CUTOUT, 100A	143450000	ORI3H1L
2	1	1	1	3PH CURVED CUTOUT MOUNT	182700000	
3	1	1	1	3 PHASE EQUIPMENT MOUNT	182710000	
4	3	-	-	ARRESTER, 18kV RISER POLE	140310000	OLA18R
	-	3	-	ARRESTER 12kV DIST GRAY	140180000	OLA12
	-	-	3	ARRESTER 3kV DIST GRAY	140120000	OLA3
(Stinger Wire is not listed) --- see Note 1						
C&M DEPARTMENT MATERIALS						
5	3	3	3	TERMINATOR CABLE #1	402678000	UCN-CTRM1
6	1	1	1	Riser materials listed on page 6 & 7		URISERP- 4



NOTES

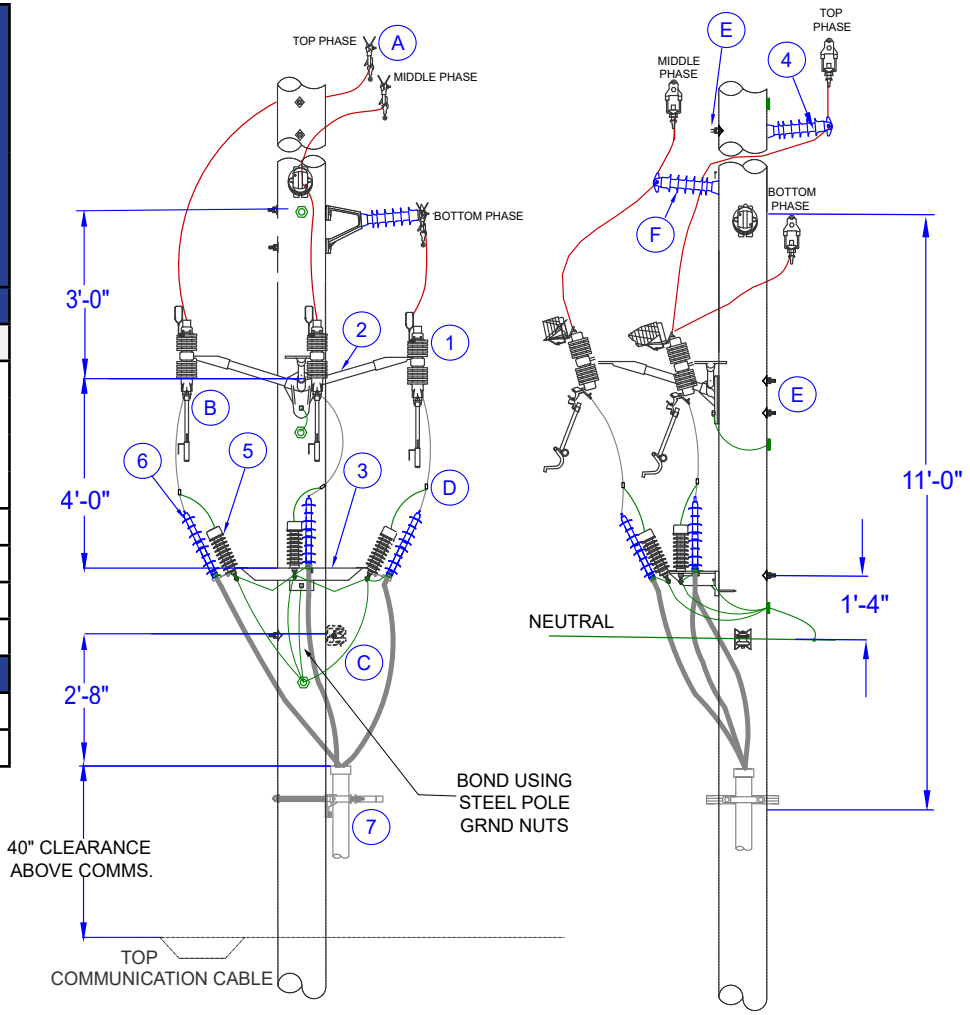
1. Stinger wire minimum #4 CU (classified as truck stock).
2. Letter item characters for truck stock list on pages 10,12 & 13.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

100 AMP (#1 AL) THREE PHASE HORIZONTAL FRAMING

DRAWING CODE:	ORI2V1L-18	ORI2V1L-12	ORI2V1L-3	MAJOR AND MINOR MATERIALS		
SYSTEM VOLTAGE	23.9kV	13.8kV	4kV			
LINE DEPARTMENT MATERIALS						
Item	**QTY**			**Description**	**Stock #**	**CU**
1	3	3	3	LOAD-BREAK CUTOUT, 100A	143450000	ORI3V1L
2	1	1	1	3PH CURVED CUTOUT MOUNT	182700000	
3	1	1	1	3 PHASE EQUIPMENT MOUNT	182710000	
4	3	3	3	VERTICAL LINE POST INSULATOR	240974000	
5	3	-	-	ARRESTER, 18kV RISER POLE	140310000	OLA18R
	-	3	-	ARRESTER 12kV DIST GRAY	140180000	OLA12
	-	-	3	ARRESTER 3kV DIST GRAY	140120000	OLA3
(Stinger Wire is not listed) --- see Note 1						
C&M DEPARTMENT MATERIALS						
6	3	3	3	TERMINATOR CABLE #1	402678000	UCN-CTRM1
7	1	1	1	Riser materials listed on page 6 & 7		URISERP- 4



NOTES

1. Stinger wire minimum #4 CU (classified as truck stock).
2. Letter item characters for truck stock list on pages 10,12 & 13.

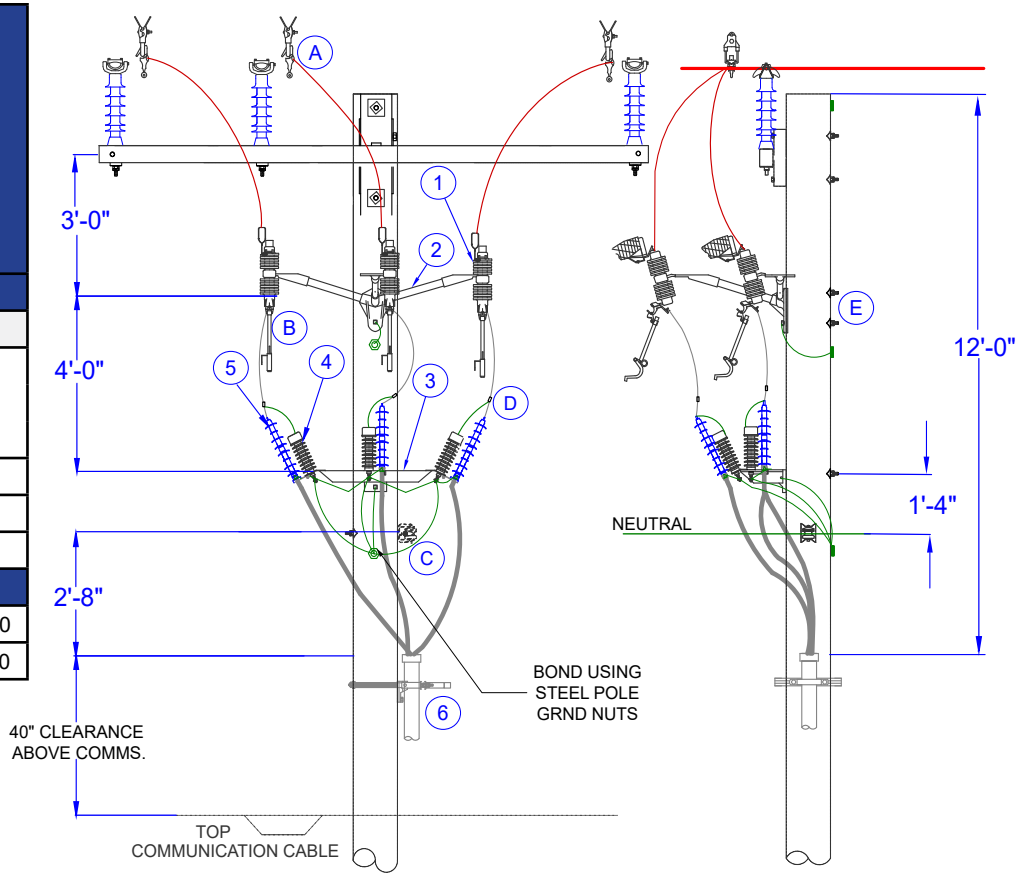
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

100 AMP (#1 AL) THREE PHASE VERTICAL FRAMING

DRAWING CODE:	ORI3H2L-18	ORI3H2L-12	MAJOR AND MINOR MATERIALS
SYSTEM VOLTAGE	23.9kV	13.8kV	

LINE DEPARTMENT MATERIALS					
Item	**QTY**		**Description**	**Stock #**	**CU**
1	3	3	CUTOUT 200A LOAD BREAK	143454000	ORI3H2L
2	1	1	3PH CURVED CUTOUT MOUNT	182700000	
3	1	1	3PH TERM/ARR MOUNT	182710000	
4	3	-	ARR LTG 18KV RISER POLE	140310000	OLA18R
	-	3	ARR LTG 12KV DIST GRAY	140180000	OLA12
(Stinger Wire is not listed) --- see Note 1					
C&M DEPARTMENT MATERIALS					
5	3	3	TERMINATOR CABLE 4/0	402680000	UCN-CTRM40
6	1	1	Riser materials listed on page 6 & 7		URISERP5-40



NOTES

1. Line Crew Stinger wire minimum #2 Bare CU (classified as truck stock).
2. Letter item characters for truck stock list on pages 10,12 & 13.

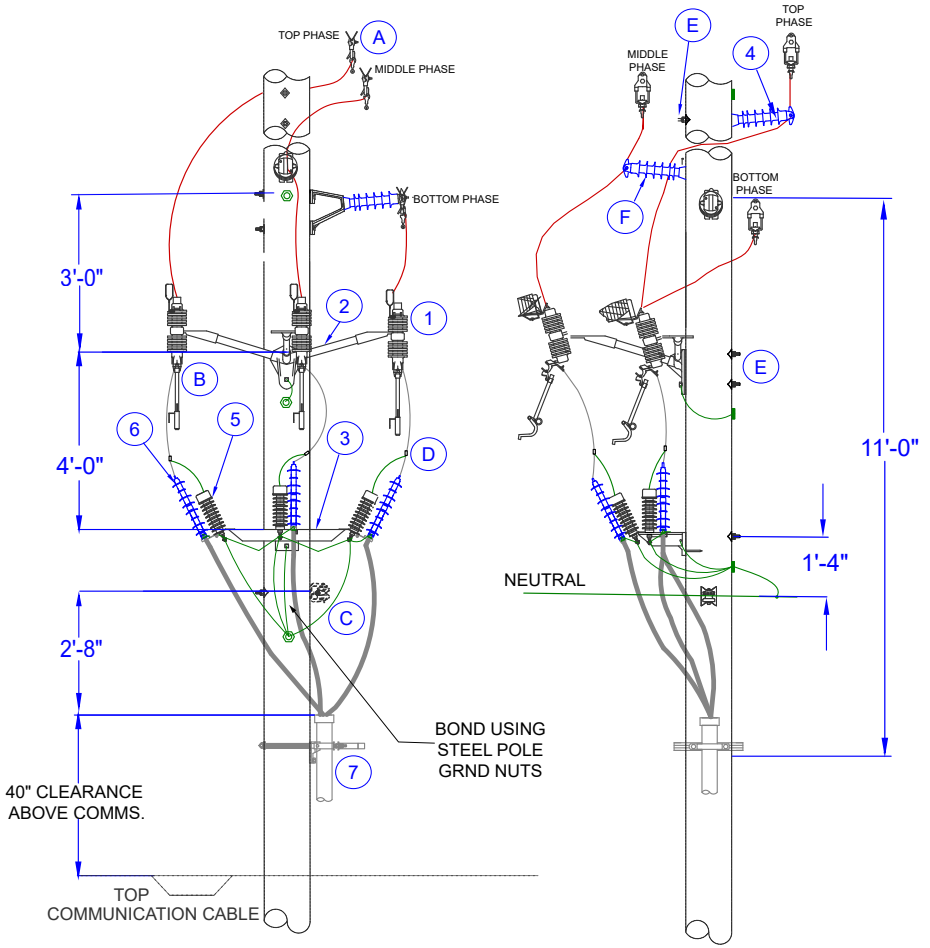
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

200 AMP (4/0 AL) THREE PHASE HORIZONTAL FRAMING

DRAWING CODE:	ORI3V2L-18	ORI3V2L-12	MAJOR AND MINOR MATERIALS
SYSTEM VOLTAGE	23.9kV	13.8kV	

LINE DEPARTMENT MATERIALS					
Item	**QTY**		**Description**	**Stock #**	**CU**
1	3	3	CUTOUT 200A LOAD BREAK	143454000	ORI3V2L
2	1	1	3PH CURVED CUTOUT MOUNT	182700000	
3	1	1	3PH TERM/ARR MOUNT	182710000	
4	3	3	VERTICAL LINE POST INSULATOR	240974000	
5	3	-	ARR LTG 18KV RISER POLE	140310000	OLA18R
	-	3	ARR LTG 12KV DIST GRAY	140180000	OLA12
	--	--	ARRESTER 3KV DIST GRAY	140120000	OLA3
(Stinger Wire is not listed) --- see Note 1					
C&M DEPARTMENT MATERIALS					
6	3	3	TERMINATOR CABLE 4/0	402680000	UCN-CTRM40
7	1	1	Riser materials listed on page 6 & 7		URISERP5-40



NOTES

1. Line Crew Stinger wire minimum #2 Bare CU (classified as truck stock).
2. Letter item characters for truck stock list on pages 10,12 & 13.

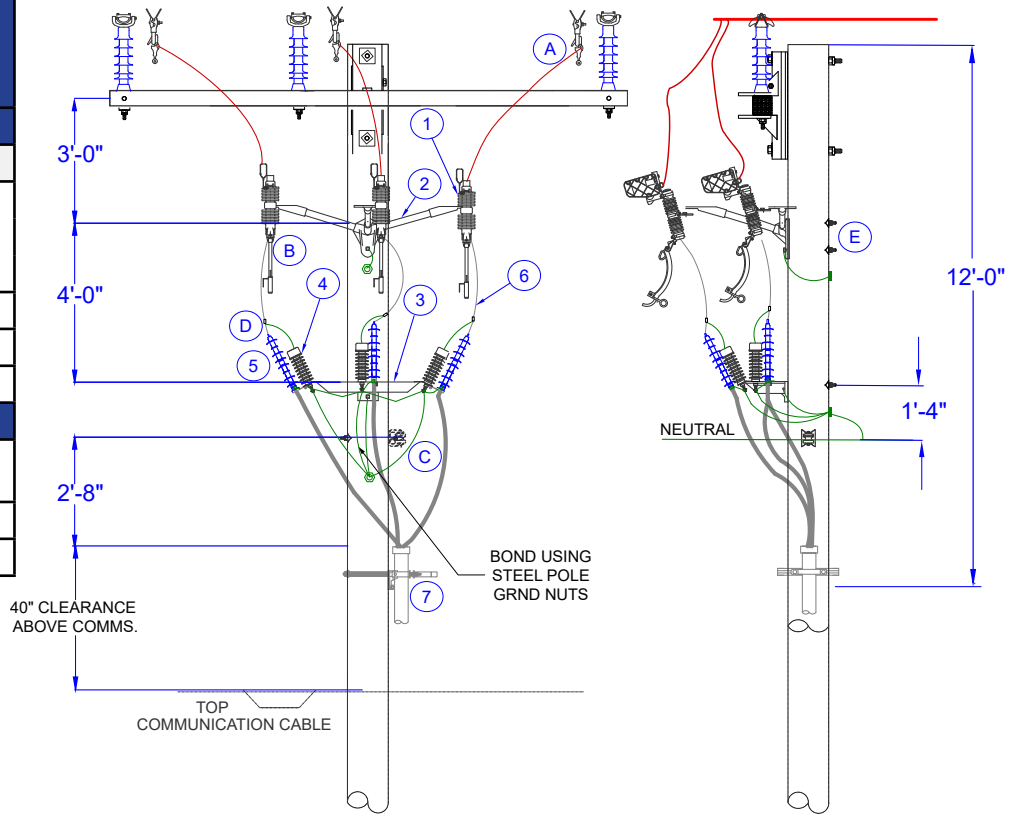
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

200 AMP (4/0 AL) THREE PHASE VERTICAL FRAMING

DRAWING CODE:	ORI3H3L-18	ORI3H3L-12	MAJOR AND MINOR MATERIALS
SYSTEM VOLTAGE	23.9kV	13.8kV	

LINE DEPARTMENT MATERIALS					
Item	**QTY**		**Description**	**Stock #**	**CU**
1	3	3	DISCONNECT 300A 14.4/24.9KV LB	144606000	ORI3H3L
2	1	1	3PH CURVED CUTOUT MOUNT	182700000	
3	1	1	3PH TERM/ARR MOUNT	182710000	
4	3	-	ARR LTG 18KV RISER POLE	140310000	OLA18R
	-	3	ARR LTG 12KV DIST GRAY	140180000	OLA12
(Stinger Wire is not listed) --- see Note 1					
C&M DEPARTMENT MATERIALS					
5	3	3	TERMINATOR CABLE 500/750-25KV URD	402700000	UCN-CTRM500
6	30’	30’	CABLE CU BHD 1/0 7S (STINGER)	011060000	UCCH10
7	1	1	Riser materials listed on page 6 & 7		URISERP-5



NOTES

1. Line Crew Stinger wire minimum 1/0 Bare CU (classified as truck stock).
2. Letter item characters for truck stock list on pages 10,12 & 13.

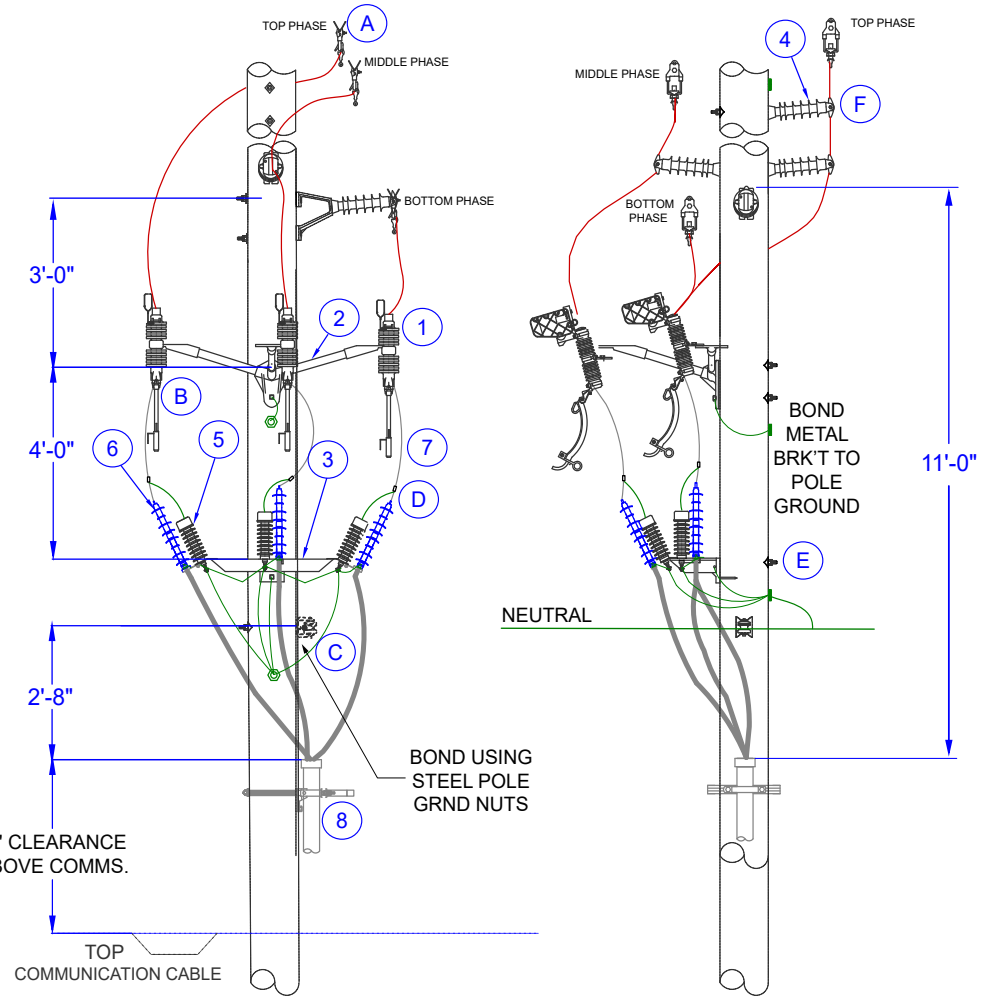
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

300 AMP (500 AL) THREE PHASE HORIZONTAL FRAMING

DRAWING CODE:	ORI3V3L-18	ORI3V3L-12	MAJOR AND MINOR MATERIALS
SYSTEM VOLTAGE	23.9kV	13.8kV	

LINE DEPARTMENT MATERIALS					
Item	**QTY**		**Description**	**Stock #**	**CU**
1	3	3	CUTOUT, 300A, 14.4/24.9KV, LB	144606000	ORI3V3L
2	1	1	3PH CURVED CUTOUT MOUNT	182700000	
3	1	1	3PH TERM/ARR MOUNT	182710000	
4	3	3	VERTICAL LINE POST INSULATOR	240974000	
5	1	-	ARR LTG 18KV RISER POLE	140310000	OLA18R
	-	1	ARR LTG 12KV DIST GRAY	140180000	OLA12
(Stinger Wire is not listed) --- see Note 1					
C&M DEPARTMENT MATERIALS					
6	1	1	TERMINATOR CABLE 500/750-25KV URD	402700000	UCN-CTRM500
7	30’	30’	CABLE CU BHD 1/0 7S (STINGER)	011060000	UCCH10
8	1	1	Riser materials listed on page 6 & 7		URISERP-5



NOTES

1. Line Crew Stinger wire minimum 1/0 Bare CU (classified as truck stock).
2. Letter item characters for truck stock list on pages 10,12 & 13.

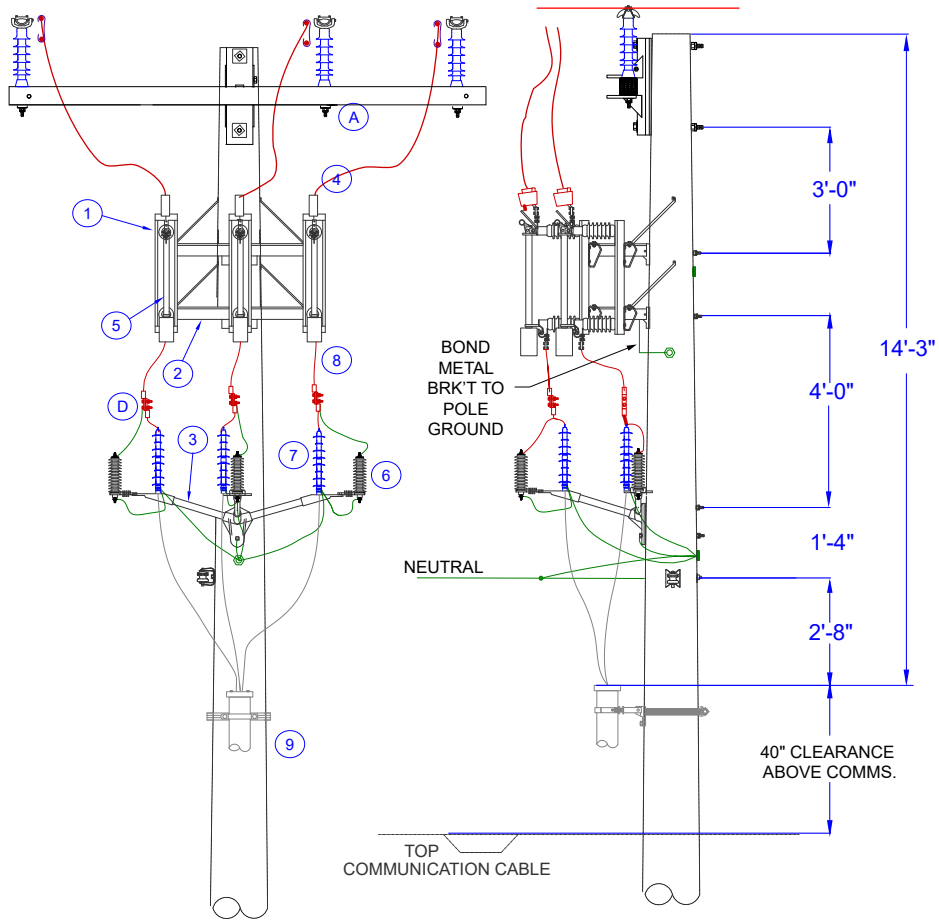
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

300 AMP (500AL) THREE PHASE VERTICAL FRAMING

DRAWING CODE:	ORI3H4D-18	ORI3H4D-12	MAJOR AND MINOR MATERIALS
SYSTEM VOLTAGE	23.9kV	13.8kV	

LINE DEPARTMENT MATERIALS					
Item	**QTY**		**Description**	**Stock #**	**CU**
1	3	3	SMD-40 400A DISCONNECT	150366000	ORI3H4D
2	2	2	SMD-40 MOUNT	182705000	
3	1	1	3PH CURVED CUTOUT MOUNT	182700000	
4	15'	15'	CABLE CU BSD 4/0 7S (STINGER)	011260000	
5	QTY: 3 SELECT TYPE (NOTE 4)		FUSE REFILL, 250A STANDARD SPEED	263474500	OFP250STD
			FUSE REFILL, 300A STANDARD SPEED	263475500	OFP300STD
			FUSE REFILL, 300A SLOW SPEED	263475000	OC0PF300SLO
			FUSE REFILL, 400A SLOW SPEED	263476000	OFP400SLO
6	3	-	ARR LTG 18KV RISER POLE	140310000	OLA18R
	-	3	ARR LTG 12KV DIST GRAY	140180000	OLA12
(Stinger Wire is not listed) --- see Note 1					
C&M DEPARTMENT MATERIALS					
7	3	3	TERMINATOR CABLE 500/750-25KV URD	402700000	UCN-CTRM500
8	15'	15'	CABLE CU BSD 4/0 7S (STINGER)	012600000	UCCS40
9	1	1	Riser materials listed on page 6 & 7		URISERP-5
NOTE 3	QTY: 3 SELECT TYPE (NOTE 4)		FUSE REFILL, 250A STANDARD SPEED	263474500	OFP250STD
			FUSE REFILL, 300A STANDARD SPEED	263475500	OFP300STD
			FUSE REFILL, 300A SLOW SPEED	263475000	OC0PF300SLO
			FUSE REFILL, 400A SLOW SPEED	263476000	OFP400SLO



NOTES

1. Line Crew Stinger wire minimum 4/0 Bare CU per Material list.
2. Letter item characters for truck stock list on pages 10,12 & 13.
3. Issue spare fuses to be mounted on pole in storage conduits.
4. SMD-40 Fuses limited stock items that may be require re-ordering.

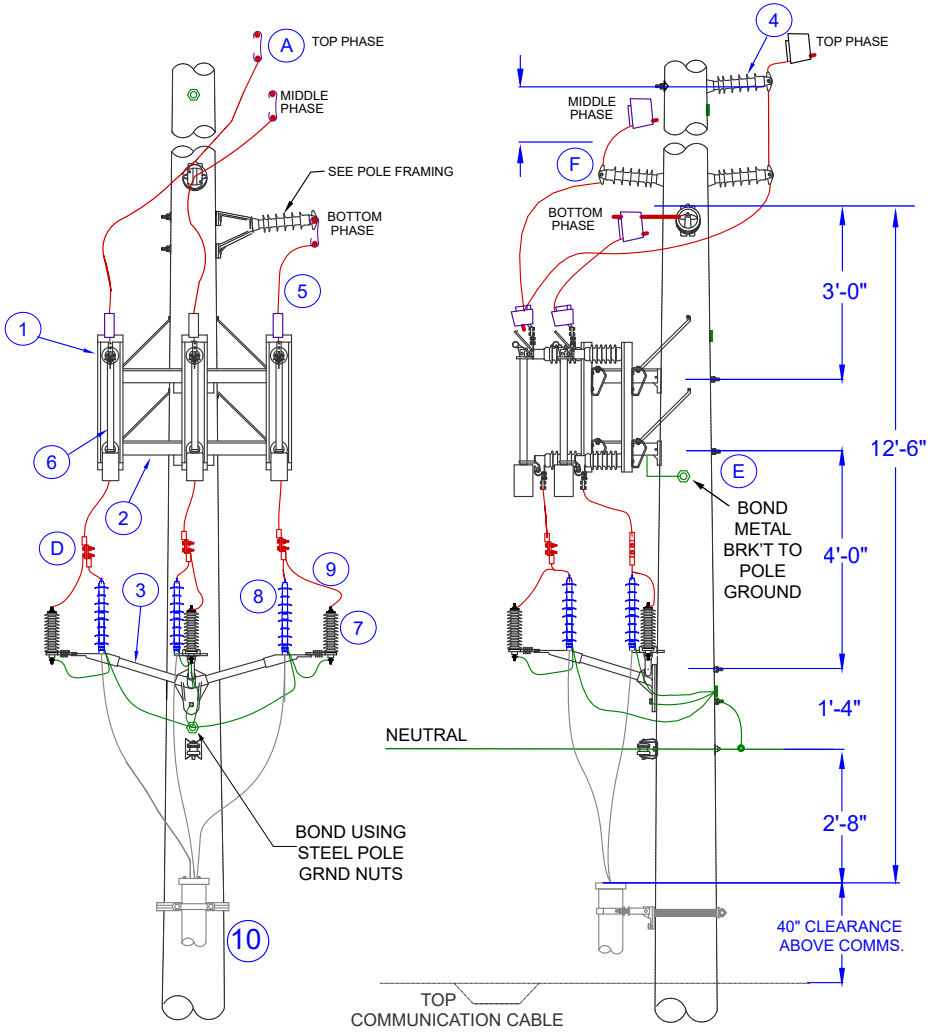
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

400 AMP (500 CU) THREE PHASE HORIZONTAL FRAMING

DRAWING CODE:	ORI3V4D-18	ORI3V4D-12	MAJOR AND MINOR MATERIALS
SYSTEM VOLTAGE	23.9kV	13.8kV	

LINE DEPARTMENT MATERIALS					
Item	**QTY**		**Description**	**Stock #**	**CU**
1	3	3	DISCONNECT 25KV 400A SMD-40	150366000	ORI3V4D
2	2	2	MOUNT FOR SMD-40	182705000	
3	1	1	3PH CURVED CUTOUT MOUNT	182700000	
4	3	3	VERTICAL LINE POST INSULATOR	240974000	
5	30'	30'	CABLE CU BSD 4/0 7S (STINGER)	011260000	
6	QTY: 3 SELECT TYPE (NOTE 4)		FUSE REFILL, 250A STANDARD SPEED	263474500	OFP250STD
			FUSE REFILL, 300A STANDARD SPEED	263475500	OFP300STD
			FUSE REFILL, 300A SLOW SPEED	263475000	OC0PF300SLO
			FUSE REFILL, 400A SLOW SPEED	263476000	OFP400SLO
7	3	-	ARR LTG 18KV RISER POLE	140310000	OLA18R
	-	3	ARR LTG 12KV DIST GRAY	140180000	OLA12
(Stinger Wire is not listed) --- see Note 1					
C&M DEPARTMENT MATERIALS					
8	3	3	TERMINATOR CABLE 500/750-25KV URD	402700000	UCN-CTRM500
9	15'	15'	CABLE CU BSD 4/0 7S (STINGER)	012600000	UCCS40
10	1	1	Riser materials listed on page 6 & 7		URISERP-5
NOTE 3	QTY: 3 SELECT TYPE (NOTE 4)		FUSE REFILL, 250A STANDARD SPEED	263474500	OFP250STD
			FUSE REFILL, 300A STANDARD SPEED	263475500	OFP300STD
			FUSE REFILL, 300A SLOW SPEED	263475000	OC0PF300SLO
			FUSE REFILL, 400A SLOW SPEED	263476000	OFP400SLO



NOTES

1. Line Crew Stinger wire minimum 4/0 Bare CU per Material list.
2. Letter item characters for truck stock list on pages 10,12 & 13.
3. Issue spare fuses to be mounted on pole in storage conduits.
4. SMD-40 Fuses limited stock items that may be require re-ordering.

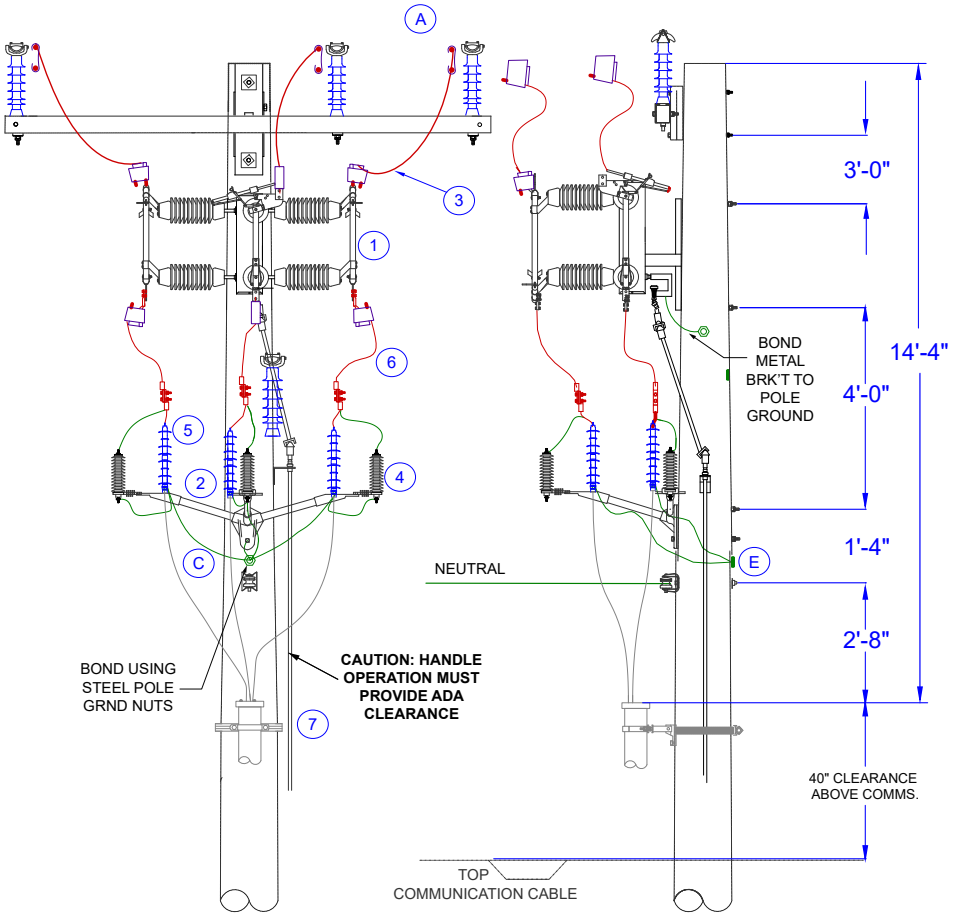
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

400 AMP (500 CU) THREE PHASE VERTICAL FRAMING

DRAWING CODE:	ORI3H6L-18	ORI3H6L-12	MAJOR AND MINOR MATERIALS
SYSTEM VOLTAGE	23.9kV	13.8kV	

LINE DEPARTMENT MATERIALS					
Item	**QTY**		**Description**	**Stock #**	**CU**
1	1	1	600A LOAD BREAK SWITCH	151834000	ORI3H6L
2	1	1	3PH CURVED CUTOUT MOUNT	182700000	
3	15'	15'	CABLE CU BMD 500 19S (STINGER)	011140000	
4	3	-	ARR LTG 18KV RISER POLE	140310000	OLA18R
	-	3	ARR LTG 12KV DIST GRAY	140180000	OLA12
C&M DEPARTMENT MATERIALS					
5	3	3	TERMINATOR CABLE 500/750-25KV URD	402700000	UCN-CTRM750
6	15'	15'	CABLE CU BMD 500 19S (STINGER)	011140000	OCCM-500
7	1	1	Riser materials listed on page 6 & 7		URISERP-6



NOTES

1. Line Crew Stinger wire minimum 500 MCM Bare CU per Material list.
2. Letter item characters for truck stock list on pages 10, 12 & 13.
3. Refer to Plate Book Switch Section for 600A Riser Style load-break switch installation details.

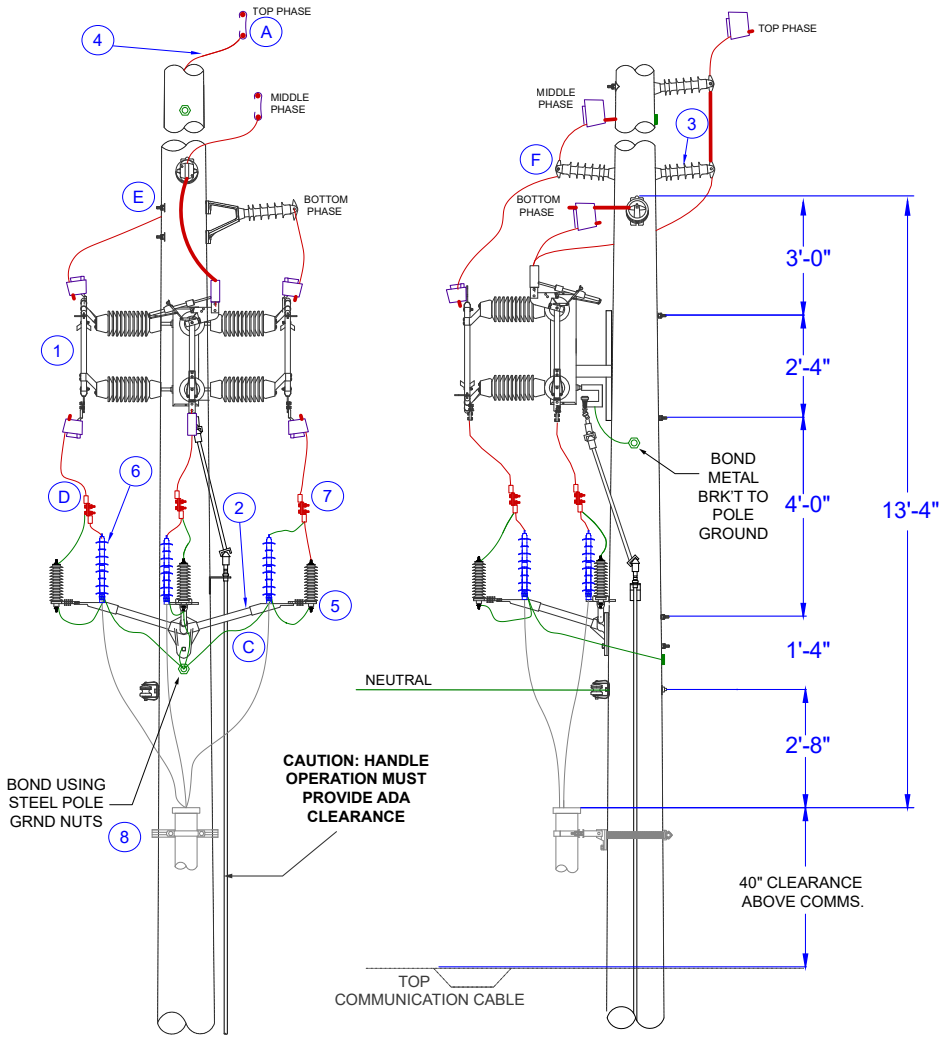
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

600 AMP (750 CU) THREE PHASE HORIZONTAL FRAMING

DRAWING CODE:	ORI3V6L-18	ORI3V6L-12	MAJOR AND MINOR MATERIALS
SYSTEM VOLTAGE	23.9kV	13.8kV	

LINE DEPARTMENT MATERIALS					
Item	**QTY**		**Description**	**Stock #**	**CU**
1	1	1	600A LOAD BREAK SWITCH	151834000	ORI3V6L
2	1	1	3PH CURVED CUTOUT MOUNT	182700000	
3	3	3	VERTICAL LINE POST INSULATOR	240974000	
4	15’	15’	CABLE CU BMD 500 19S (STINGER)	011140000	
5	3	-	ARR LTG 18KV RISER POLE	140310000	OLA18R
	-	3	ARR LTG 12KV DIST GRAY	140180000	OLA12
C&M DEPARTMENT MATERIALS					
6	3	3	TERMINATOR CABLE 500/750-25KV URD	402700000	UCN-CTRM750
7	15’	15’	CABLE CU BMD 500 19S (STINGER)	011140000	OCCM-500
8	1	1	Riser materials listed on page 6 & 7		URISERP-6



NOTES

1. Line Crew Stinger wire minimum 500 MCM Bare CU per Material list.
2. Letter item characters for truck stock list on pages 10, 12 & 13.
3. Refer to Plate Book Switch Section for 600A Riser Style load-break switch installation details.

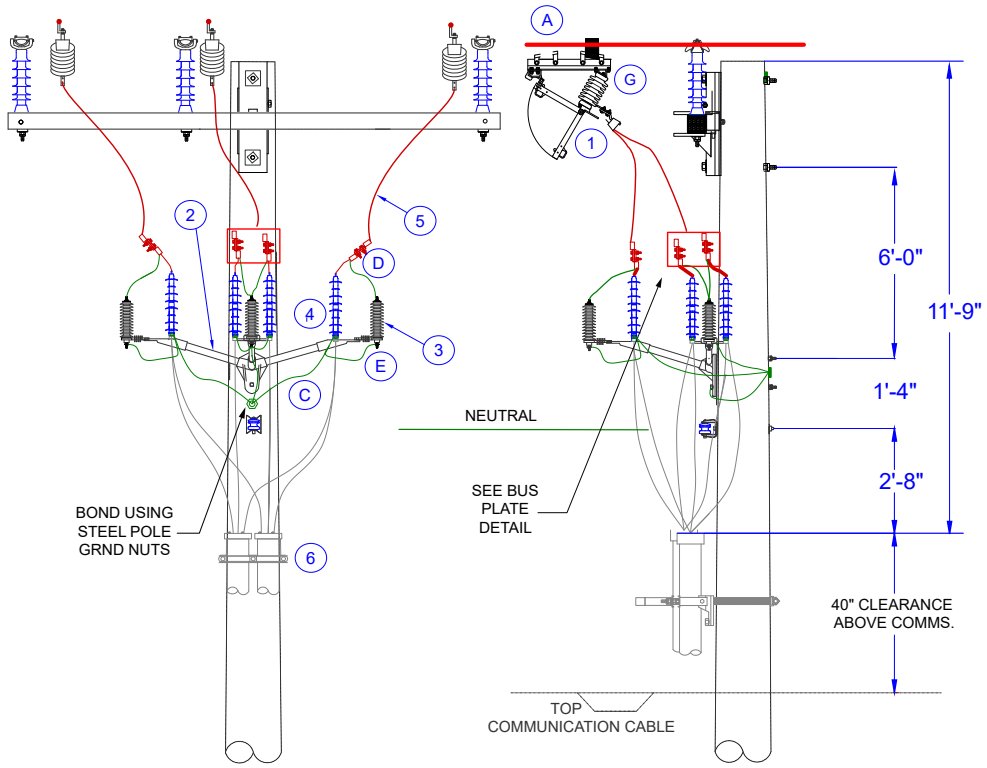
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

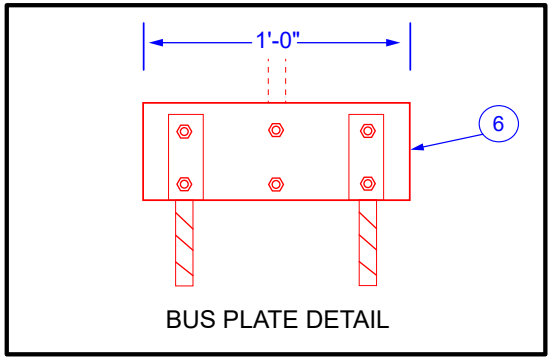
NES

600 AMP (750 CU) THREE PHASE VERTICAL FRAMING

DRAWING CODE:	ORI3H9D-18	ORI3H9D-12	MAJOR AND MINOR MATERIALS
SYSTEM VOLTAGE	23.9kV	13.8kV	

LINE DEPARTMENT MATERIALS					
Item	**QTY**		**Description**	**Stock #**	**CU**
1	3	3	SWITCH LINE TAP 900A	151250000	ORI3H9D
2	1	1	3PH CURVED CUTOUT MOUNT	182700000	
3	3	-	ARR LTG 18KV RISER POLE	140310000	OLA18R
	-	3	ARR LTG 12KV DIST GRAY	140180000	OLA12
C&M DEPARTMENT MATERIALS					
4	6	6	TERMINATOR CABLE 750-25KV URD	402700000	UCN-CTRM750
5	30’	30’	750 BSD COPPER CABLE (STINGER)	011300000	UCCS750
6	1’	1’	BAR CU BUS 1/2” X 5”	320200000	UBUS.5X5
7	1	1	Riser materials listed on page 6 & 7		URISERP-6D





BUS PLATE DETAIL

NOTES

1. Line Crew Stinger wire minimum 750 MCM Bare CU per Material list.
2. Letter item characters for truck stock list on pages 10, 12 & 13.
3. Refer to Plate Book Switch Section for 900A Line-Tap switch installation details.

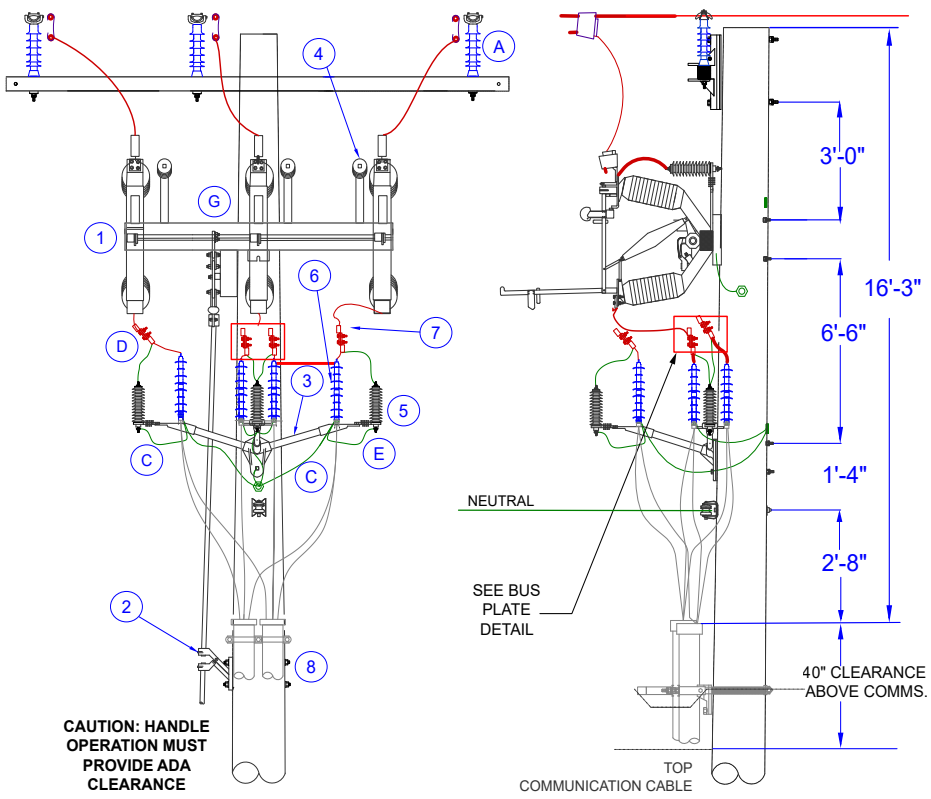
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

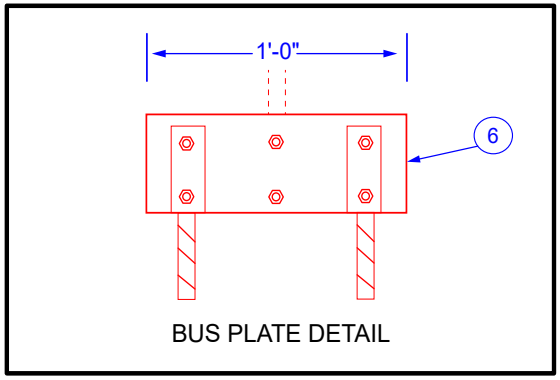
NES

900 AMP (PARALLEL 750 CU) THREE PHASE HORIZONTAL FRAMING

DRAWING CODE:	ORI3H12L-18	ORI3H12L-12	MAJOR AND MINOR MATERIALS
SYSTEM VOLTAGE	23.9kV	13.8kV	

LINE DEPARTMENT MATERIALS					
Item	**QTY**		**Description**	**Stock #**	**CU**
1	1	1	1200A LOAD BREAK SWITCH FOR RISERS	151844000	ORI3H12L
2	1	1	COUPLER, SPRING LOADED FOR 1200A SW	150154000	
3	1	1	3PH CURVED CUTOUT MOUNT	182700000	
4	3	-	18KV MAIN LINE ARRESTER	140320000	OLA18
	-	3	12KV MAIN LINE ARRESTER	140180000	OLA12
5	3	-	18KV RISER ARRESTER	140310000	OLA18R
	-	3	12KV RISER ARRESTER	140180000	OLA12
C&M DEPARTMENT MATERIALS					
6	6	6	TERMINATOR CABLE 750-25KV URD	402700000	UCN-CTRM750
7	30’	30’	1000MCM BSD COPPER (STINGER WIRE)	011320000	UCCS1000
8	1’	1’	BAR CU BUS 1/2” X 5”	320200000	UBUS.5X5
9	1	1	Riser materials listed on page 6 & 7		URISERP-6D





NOTES

1. Line Crew Stinger wire minimum 1000 MCM Bare CU per Material list.
2. Letter item characters for truck stock list on pages 10, 12 & 13.
3. Refer to Plate Book Switch Section for 1200A horizontal load-break switch installation details.

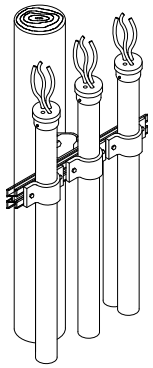
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

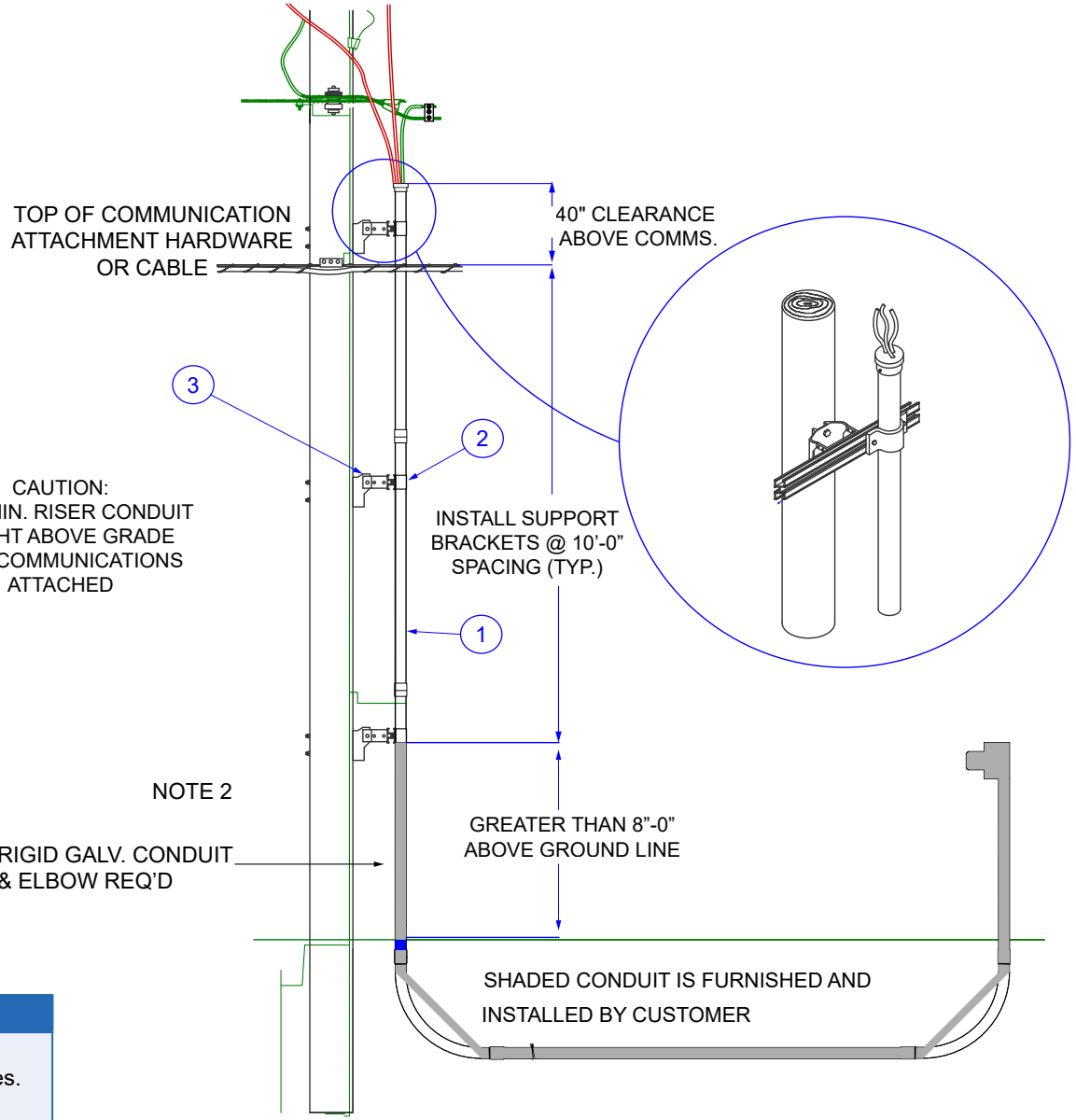
NES

1200 AMP (PARALLEL 750 CU) THREE PHASE HORIZONTAL FRAMING

SECONDARY RISER INSTALLATIONS

Maximum 3 Risers Per Pole





NOTES

1. The maximum of 3 risers per pole is the standard guideline. Recommend using secondary pull box for more than three services.
2. Customer to install lowest 10-foot section using Rigid Galvanized Elbow and conduit with 7-1/2 inch clearance from the pole surface.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SECONDARY RISER CONDUIT DETAIL

RISER POLE STANDARDS

CABLE SIZE:	2/0AT	2/0AT	4/0AT	350AT	500AT	4/0AQ	500AQ	UG SECONDARY MATERIAL ITEMS (THE ITEM CODE NUMBERS USED ON SECONDARY RISER FRAMING PLATE)		
RISER FRAMING CU:	UVRISER-2	UVRISER-3	UVRISER-3	UVRISER-3	UVRISER-3	UVRISER-4	UVRISER-4	**MAJOR AND MINOR MATERIALS** (QTY BASED ON 50-FOOT POLE)		
ITEM #	QUANTITY							DESCRIPTION AND MATERIAL NOTES	STOCK #	PICTURE
1	20’							CONDUIT PVC SCH 80 2”	103272000	
		20’	20’	20’	20’			CONDUIT PVC SCH 80 3”	103273000	
						20’	20’	CONDUIT PVC SCH 80 4”	103274000	
2	3							STRAP 2 INCH KIT/STANDOFF BRKT	062800000	
		3	3	3	3			STRAP 3 INCH KIT/STANDOFF BRKT	062820000	
						3	3	STRAP 4 INCH KIT/STANDOFF BRKT	062840000	
3	3	3	3	3	3	3	3	CONDUIT STANDOFF BRACKET	060050000	

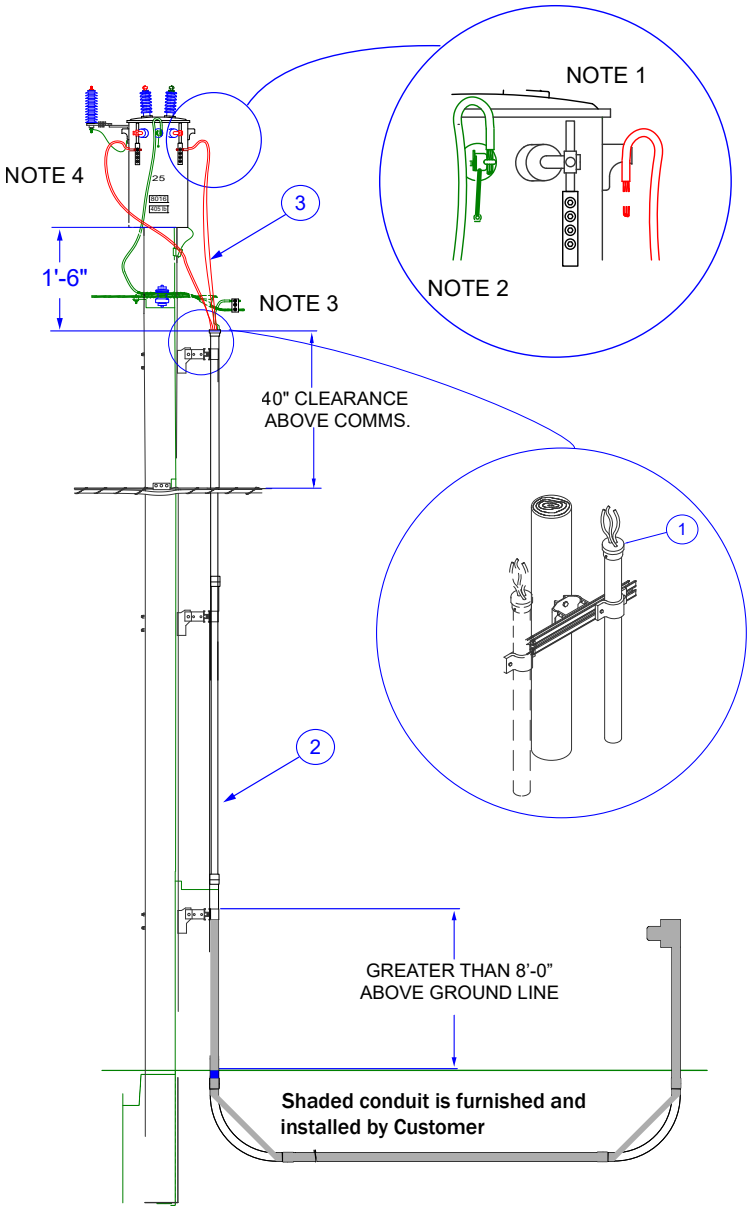
CABLE SIZE:	2/0AT	2/0AT	4/0AT	350AT	500AT	4/0AQ	500AQ	UG SECONDARY MATERIAL ITEMS (THE ITEM CODE LETTERS USED ON SECONDARY RISER FRAMING PLATE)		
RISER FRAMING CU:	UVRISER-2	UVRISER-3	UVRISER-3	UVRISER-3	UVRISER-3	UVRISER-4	UVRISER-4	**TRUCK STOCK MATERIAL** (QTY BASED ON 50-FOOT POLE)		
TRUCK STOCK MATERIAL ITEMS										
A	4 (167-500 KVA 3PH + 1 NTL)							TRANSFORMER SPADE 4H #2-600MCM	224163000	
	2 (10-25KVA)					3 (30-150KVA)		TRANSFORMER SPADE 6H #6-250MCM	224166000	
				2 (100KVA)		3 (225-300KVA)		TRANSFORMER SPADE 4H 1/0-500MCM	224167000	
	2 (37.5-75KVA)							TRANSFORMER SPADE 8H #6-250MCM	224168000	
	1 (10-100KVA NEUTRAL)							15-100KVA TRANSFORMER CONN 4 H SERVICE CONNECTOR	224165500	
	1	1	1	1	1	1	1	30-45 KVA TRANSFORMER NEUT. 5H SERVICE CONNECTOR	223306000	
						1	1	75 KVA TRANSFORMER SPADE NEUT. CONNECTOR - 4H 1/0-500MCM	224167000	
B	2	2	2	2	2	2	2	CONN GRD 4-2 TO 4-2 CU	223480000	
C	4’	4’	4’	4’	4’	4’	4’	CABLE CU BSD 2 7S	011210000	
D	2	2	2	2	4	4	4	TERM COMP 2-1 AL/CU 2H	222722000	
E	2’	2’	2’	2’	4’	4’	4’	BAR CU BUS 1/8 X 1 IN (GROUND STRAP BY NES SHOP)	320120000	
F	10’	10’	10’	10’	10’	10’	10’	CHANNEL 4 WAY T-SLOT ISSUED PER 10-FT LENGTH (CUT AS REQ’D)		
G	6	6	6	6	6	6	6	5/8” MACHINE BOLT	203780000 THRU 203980000	
								5/8” DBL COIL SPRING WASHER	206570000	
								2-1/4” SQ FLAT WASHER W/ 3/4” DIA. HOLE	209620000	

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SECONDARY RISER MATERIAL LIST (CONT.)

DRAWING CODE:	UVRISER-2	UVRISER-3				MAJOR AND MINOR MATERIALS		
SERVICE SIZE	2/0AT	2/0AT	4/0AT	350AT	500AT			
ITEM	QTY					DESCRIPTION	STOCK #	CU
1	1	-	-	-	-	2” COND. TERM. 2/0AT 3H	402490000	UVTERM2-20T
	-	1	-	-	-	3” COND. TERM. 2/0AT 3H	402530000	UVTERM3-20T
	-	-	1	-	-	3” COND. TERM. 4/0AT 3H	402530000	UVTERM3-40T
	-	-	-	1	-	3” COND. TERM. 350AT 3H	402540000	UVTERM3-350T
	-	-	-	-	1	3” COND. TERM. 500AT 3H	402540000	UVTERM3-500T
2	1	-	-	-	-	2” SECONDARY RISER (SEE MATERIALS PAGES 33-34)		UVRISER-2
	-	1	1	1	1	3” SECONDARY RISER (SEE MATERIALS PAGES 33-34)		UVRISER-3
	3	3	3	3	3	CONDUIT STANDOFF BRACKET	060050000	UR-STANDOFF
3	AS REQUIRED					UG 2/0 AL TPXD	020350000	UVAT-20
						UG 4/0 AL TPXD	020381000	UVAT-40
						UG 350 AL TPXD	020395000	UVAT-350
						UG 500 AL TPXD	020410000	UVAT-500



NOTES

1. Always create a drip loop to minimize water absorption when using the multi-tap connectors.
2. Never install aluminum conductors in transformer bushing connectors.
3. Secondary and neutral connections are part of the transformer compatible unit.
4. Neutral lead is soft-drawn insulated copper, 1/0 (stock #011806000) or 4/0 (stock #011808000) per the Transformer section.

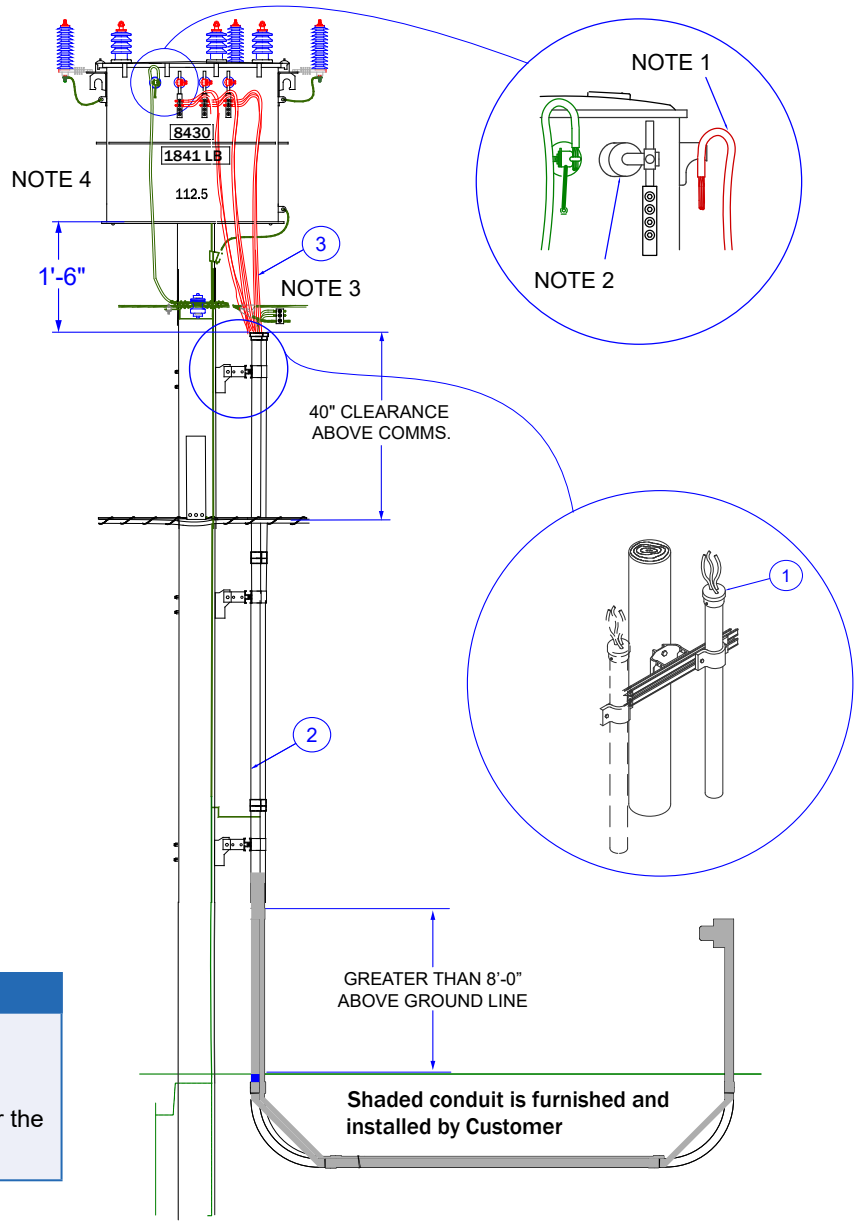
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

RISER POLE STANDARDS

NES

SECONDARY RISER SINGLE PHASE RISER DETAIL

DRAWING CODE:	UVRISER-3		MAJOR AND MINOR MATERIALS		
SERVICE SIZE	4/0AQ	500AQ			
ITEM			DESCRIPTION	STOCK #	CU
1	1	-	4” COND. TERM. 4/0AQ 4H	402570000	UVTERM4-40Q
	-	1	4” COND. TERM. 500AQ 4H	402585000	UVTERM4-500Q
2	1	2	4” SECONDARY RISER-SEE PAGE 33-34 FOR MATERIAL LIST		UVRISER-4
	3	3	CONDUIT STANDOFF BRACKET	060050000	UR-STANDOFF
3	AS REQUIRED		UG 4/0 AL QPXD	020382000	UVAQ-40
			UG 500 AL QPXD	020430000	UVAQ-500



NOTES

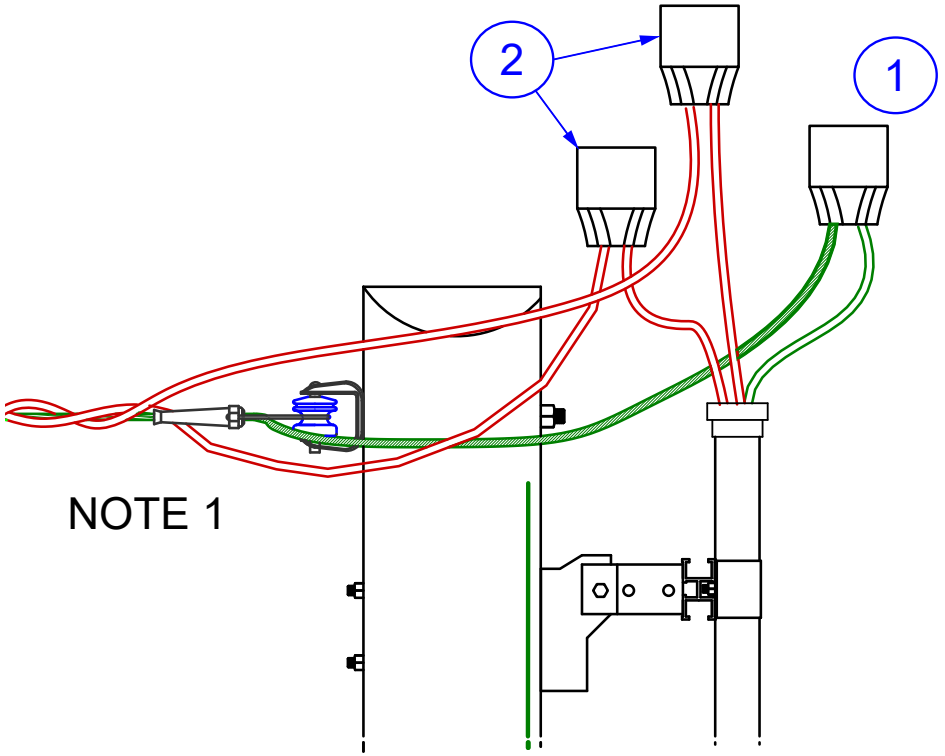
1. Always create a drip loop to minimize water absorption when using the multi-tap connectors.
2. Never install aluminum conductors in transformer bushing connectors.
3. Secondary and neutral connections are part of the transformer compatible unit.
4. Neutral lead is soft-drawn insulated copper, 1/0 (stock #011806000) or 4/0 (stock #011808000) per the Transformer section

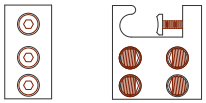
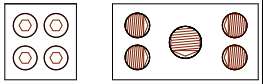
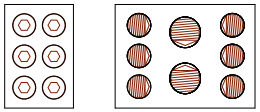
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

RISER POLE STANDARDS

NES

SECONDARY RISER THREE PHASE RISER DETAIL



TRUCK STOCK SECONDARY CONNECTOR		
ITEM	STOCK #	DESCRIPTION
1	224165500 	SERVICE TAP CONNECTOR, SLOTTED MAIN #2-250, (4) HOLE #6-3/0
2 SELECT ONE	223306000 	CONNECTOR, (1) MAIN 1/0-750, (4) HOLE #2-500, WITH INSULATING COVER
	223308000 	CONNECTOR, MAIN (2) 1/0-750, (6) HOLE 32-500, WITH INSULATING COVER

RECOMMEND TORQUE VALUES FOR SECONDARY CONNECTORS		
WIRE SIZE	TORQUE	
	(INCH-LBS)	(FOOT-LBS)
#6-#4	100	9
#2	150	13
1/0-2/0	200	17
4/0	250	21
250MCM	300	25
300-350MCM	350	30
500-700MCM	450	38
750-1000MCM	500	42

NOTES

1. See Secondary Connector details in the Transformer section.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
3/23/26	Cedric Short	Ronald Reasonover	Tony Richman
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
HOOK STICK OPERATED DISCONNECT SWITCHES	4			
100 AMP FUSE & 100 LBU FUSE CUTOUT DETAILS	5			
200 AMP LBU CUTOUTS & SMD-40 FUSE CUTOUT DETAILS	6			
300 AMP & 600 AMP BLADE DISCONNECT DETAILS	7			
900 AMP & 1200 AMP IN-LINE BLADE DISCONNECT DETAILS	8			
TWIN POST BLADE & LINE-TAP DISCONNECT DETAILS	9			
LINE-TAP CLAMPS & ARRESTER DETAILS	10			
100 AMP & 200 AMP LBU CUTOUT FRAMING	11			
SMD-40 POWER FUSE CUTOUT FRAMING	12			
300 AMP LBU BLADE CUTOUT FRAMING	13			
1200 AMP TWIN POST DISCONNECT FRAMING	14			
900 AMP IN-LINE DISCONNECT FRAMING	15			
1200 AMP IN-LINE SWITCH DISCONNECT FRAMING	16			
900 AMP LINE-TAP DISCONNECT FRAMING	17			
3-PHASE GANG OPERATED LOAD BREAK SWITCHES (LBS)	18			
GANG OPERATED SWITCH FRAMING INDEX	19			
GANG OPERATED SWITCH FRAMING INDEX (CONT'D)	20			
IN-CIRCUIT, GANG OPERATED SWITCH FRAMING LIMITS	21			
600 AMP VERTICAL LBS, IN-CIRCUIT FRAMING	22			

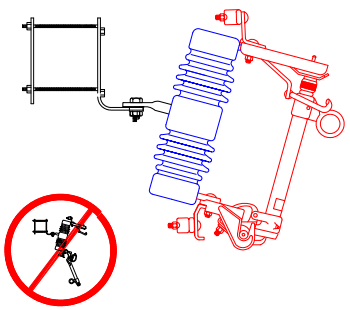
TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
600 AMP HORIZONTAL LBS, UNDER-CIRCUIT FRAMING	23			
600 AMP HORIZONTAL LBS, IN-CIRCUIT FRAMING	24			
600 AMP HORIZONTAL LBS, OVER-CIRCUIT FRAMING	25			
600 AMP, TIE-CIRCUIT LBS, FRAMING	26			
600 AMP HORIZONTAL LBS, BOTTOM-CIRCUIT FRAMING	27			
600 AMP HORIZONTAL LBS, TOP-CIRCUIT FRAMING	28			
1200 AMP VERTICAL LBS, IN-CIRCUIT FRAMING	29			
1200 AMP HORIZONTAL LBS, UNDER-CIRCUIT FRAMING	30			
1200 AMP HORIZONTAL LBS, IN-CIRCUIT FRAMING	31			
1200 AMP HORIZONTAL LBS, OVER-CIRCUIT FRAMING	32			
1200 AMP, TIE-CIRCUIT LBS, FRAMING	33			
1200 AMP HORIZONTAL LBS, BOTTOM-CIRCUIT FRAMING	34			
1200 AMP HORIZONTAL LBS, TOP-CIRCUIT FRAMING	35			
900 AMP ALLEY ARM LBS, UNDER CIRCUIT FRAMING	36			
600 AMP (S&C) HORIZONTAL, ROTATING SIDE BREAK, MATERIAL DETAILS	37			
600 AMP (BRGS) VERT. POLE, ROTATING VERT. BREAK, MATERIAL DETAILS	38			
600 AMP (S&C) VERT. POLE, ROTATING VERT. BREAK, MATERIAL DETAILS	39			
600 AMP (BRGS) NARROW RISER, ROTATING VERT. BREAK, MATERIAL DETAILS	40			
600 AMP (S&C) RISER POLE, ROTATING VERT. BREAK, MATERIAL DETAILS	41			
1200 AMP HORIZONTAL, RECIPROCATING VERT. BREAK, MATERIAL DETAILS	42			
1200 AMP (S&C) VERT. POLE, ROTATING HORIZONTAL BREAK, MATERIAL DETAILS	43			
1200 AMP (S&C) RISER POLE, RECIPROCATING VERT. BREAK, MATERIAL DETAILS	44			

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
DAS AUTOMATION SWITCHES	45			
DAS SWITCH, 800 AMP FRAMING, 4/0 - 795 ACSR	46			
DAS SWITCH, 800 AMP MATERIAL, WORK ORDER TABLE	47			
DAS SWITCH, 800 AMP MATERIAL, WORK ORDER TABLE (CONT'D)	48			
RECLOSERS	49			
RECLOSER POWER SOURCE LOCATION INFORMATION	50			
INTELLIRUPTER MOUNTING INSTRUCTIONS	51			
INTELLIRUPTER 800 AMP, RECLOSER FRAMING, 4/0 - 795 ACSR	52			
INTELLIRUPTER 800 AMP, RECLOSER MATERIAL, WORK ORDER TABLE	53			
INTELLIRUPTER 300 AMP, RECLOSER FRAMING, #2 - 1/0 ACSR	54			
INTELLIRUPTER 300 AMP, RECLOSR MATERIAL, WORK ORDER TABLE	55			
NOVA 800 AMP, RECLOSER FRAMING, 4/0 - 795 ACSR	56			
NOVA 800 AMP, RECLOSER MATERIAL, WORK ORDER TABLE	57			
NOVA 800 AMP, RECLOSER MATERIAL, WORK ORDER TABLE (CONT'D)	58			
SOUTHERN STATES 800 AMP, RECLOSER FRAMING, 4/0 - 795 ACSR	59			
SOUTHERN STATES 800 AMP, RECLOSER MATERIAL, WORK ORDER TABLE	60			
SOUTHERN STATES 800 AMP, RECLOSER MATERIAL, WORK ORDER TABLE (CONT'D)	61			
SOUTHERN STATES 300 AMP, RECLOSER FRAMING, #2 - 1/0 ACSR	62			
SOUTHERN STATES 300 AMP, RECLOSER MATERIAL, WORK ORDER TABLE	63			
VIPER 800 AMP, RECLOSER FRAMING, 4/0 - 795 ACSR	64			
VIPER 800 AMP, RECLOSER MATERIAL, WORK ORDER TABLE	65			
VIPER 800 AMP, RECLOSER MATERIAL, WORK ORDER TABLE (CONT'D)	66			

HOOK STICK OPERATED DISCONNECT SWITCHES

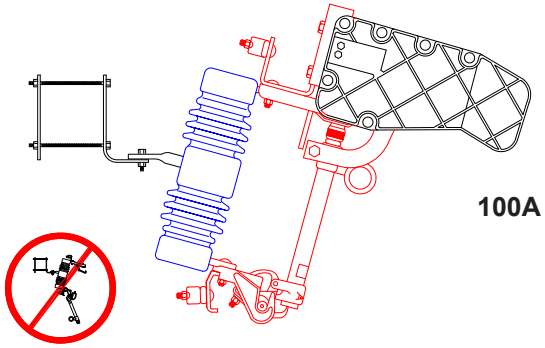


100A CUTOUT

CAUTION:
Never leave the fuse holder with the open end facing up. Water will cause the inside of the tube to swell preventing the fuse from clearing a fault.

MATERIAL LIST			
QTY	DESCRIPTION	STOCK NUMBER	CU CODE
1	CUTOUT 100A 14.4/24.9KV	143410000	OCO100 OCO100-TRF
1	FUSE LINK 3-100 AMP	TRUCK STOCK	
REPAIR AND ADDITIONAL PARTS			
	CAP CHANCE 100 AMP	142580000	
	FUSE HOLDER 100 AMP UNIVERSAL	144807000	

STANDARD APPLICATIONS:
Transformers and sideline taps that are fused for a transformer where the poles are inaccessible to trucks. When fusing a sideline for a transformer, the transformer must be clearly visible from the fuse pole.



100A LBU CUTOUT

MATERIAL LIST			
QTY	DESCRIPTION	STOCK NUMBER	CU CODE
1	CUTOUT 100A 14.4/24.9KV LB	143450000	OCO100L OCO100L-TRF
1	FUSE LINK 3-100 AMP	TRUCK STOCK	
REPAIR AND ADDITIONAL PARTS			
	HOLDER 100 A LBU ABB	144800000	
	CAPS EXPENDABLE SS 100A	142600000	

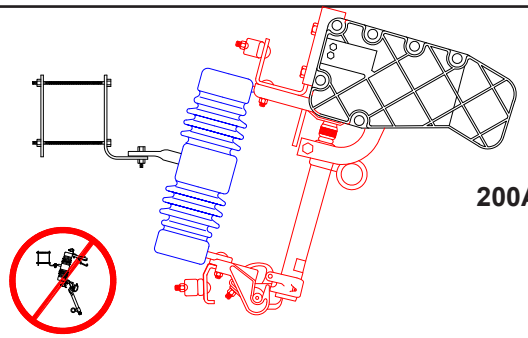
STANDARD APPLICATIONS:
All transformers larger than 25 kVA.
All transformers located within a one mile radius of the source substation.
All transformers on steel poles or below Transmission lines.
All transformers on substation feeder circuits 795 or larger.
As required by Distribution Planning.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

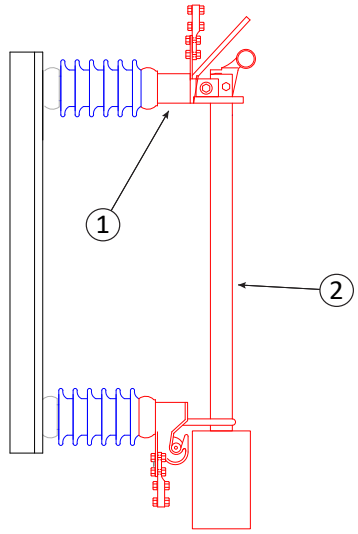
100 AMP FUSE & 100 LBU CUTOUT DETAILS



200A LBU CUTOUT

MATERIAL LIST			
QTY	DESCRIPTION	STOCK NUMBER	CU CODE
1	CUTOUT 200A 14.4/24.9KV LB	143454000	OCO200L OCO200L-TRF
1	FUSE LINK 140-200 AMP	TRUCK STOCK	
REPAIR AND ADDITIONAL PARTS			
	HOLDER 200 A LBU ABB	144805000	
	CAPS EXPENDABLE SS 200A	142620000	

STANDARD APPLICATIONS:
As required by Distribution Planning for sectionalizing side lines and on some platform substations.



400A SMD-40

FRM. CODE	OFP250STD	OFP300STD	OFP300SLO	OFP400SLO	SMD-40 POWER FUSE MATERIAL ITEM LIST	
ITEM #	QUANTITY				DESCRIPTION	STOCK #
1	1	1	1	1	DISCONNECT 25KV 400A SMD-40	150366000
2	1				FUSE REFILL 250E 23KV SMU-40 STD	263474500
		1			FUSE REFILL 300E 23KV SMU-40 STD	263475500
			1		FUSE REFILL 300E 23KV SMU-40 SLOW	263475000
				1	FUSE REFILL 400E 23KV SMU-40 SLOW	263476000

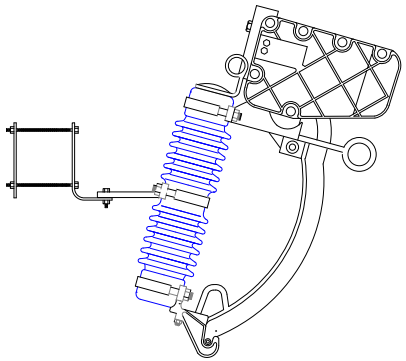
STANDARD APPLICATIONS:
Used on high current riser poles

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

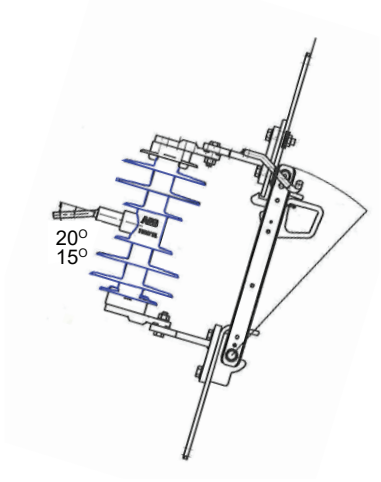
200 AMP LBU & SMD-40 FUSE CUTOUTS DETAILS



LOAD BREAK UNIT
W/300A BLADE

MATERIAL LIST			
QTY	DESCRIPTION	STOCK NUMBER	CU CODE
1	DISC 300A 14.4/24.9KV LB	144606000	OSWD3L
REPAIR AND ADDITIONAL PARTS			
	BLADE 300A LBU ABB	144806000	

STANDARD APPLICATIONS:
Used as required on sidelines, in-lines, bypasses



600A LB UNIT

FRM. CODE	OSWD6	600A LB UNIT MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	DISCONNECT, 600 AMP, 14.4/24.9 KV	151220000

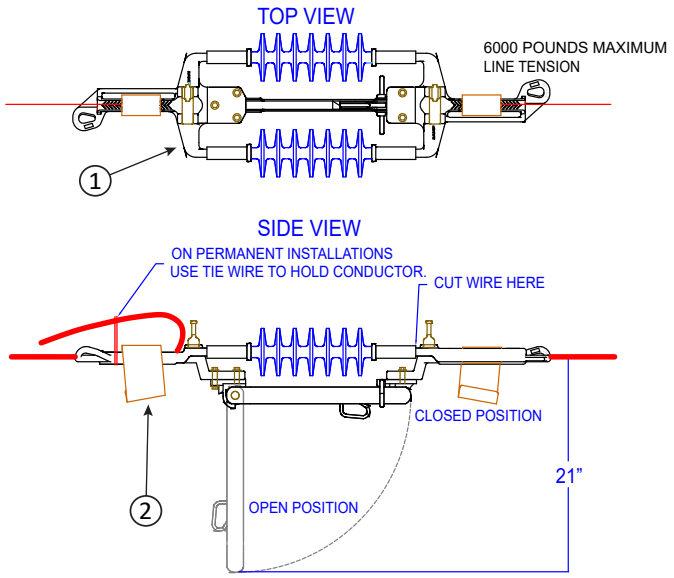
STANDARD APPLICATIONS:
Used as required on sidelines, in-lines, bypasses

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

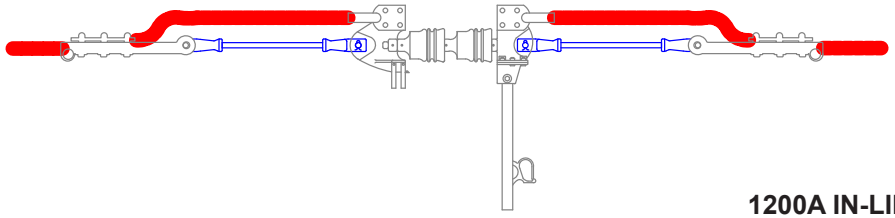
NES

300AMP & 600 AMP BLADE DISCONNET DETAILS



900A IN-LINE SWITCH

FRM. CODE	OSWD9-NL4/0	OSWD9-NL336	OSWD9-NL477	OSWD9-NL795	900A IN-LINE SWITCH MATERIAL ITEM LIST	
ITEM #	QTY				DESCRIPTION	STOCK #
1	1	1	-	-	SWITCH DISC 900A INLINE 336 ACSR	151234000
		-	1	-	SWITCH DISC 900A INLINE 477 ACSR	151235000
		-	-	1	SWITCH DISC 900A INLINE 795 ACSR	151236000
2	2				CONN PERC 4/0 ACSR	224133090
		2	-	-	CONN PERC 336 ACSR	224134000
		-	2	-	CONN PERC 477 ACSR	224135000
		-	-	2	CONN PERC 795 ACSR	224136000
TRUCK STOCK						
-	-	2	2	2	CONN PERC CARTRIDGE YELLOW	224142000
-	2	-	-	-	CONN PERC CARTRIDGE BLUE	224140000



1200A IN-LINE SWITCH

MATERIAL LIST			
QTY	DESCRIPTION	STOCK NUMBER	CU CODE
1	SWCH DISC 1200A 23KV INLINE	151240000	OSWD12-INL
2	INSUL GUY STRN/FIB GLASS 12 IN	240840000	
2	CLAMP STRAIN 1351.5 61 AAC DE	221117000	
REPAIR AND ADDITIONAL PARTS			
2	CONN PERC CARTRIDGE YELLOW	224142000	
2	CONN PERC WEDGE 1351-750/795	224131000	
2	TERMINAL LUG PERC 4 HOLE 795	233858000	
8	BOLT MACHINE SS 1/2X2	204372000	

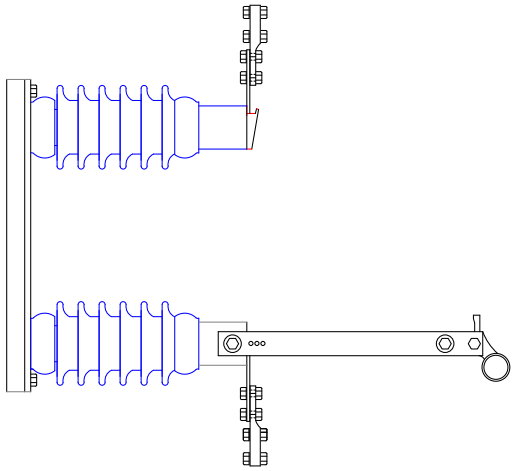
STANDARD APPLICATIONS:
Used as required at Substation feeder taps.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

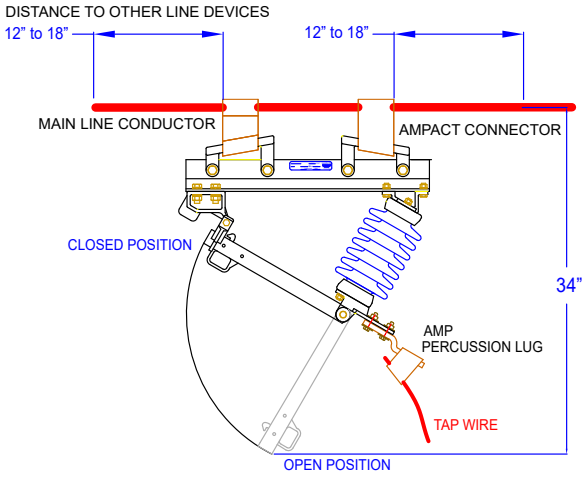
NES

900 AMP & 1200 AMP IN-LINE BLADE DISCONNECT DETAILS



1200A TWIN POST DISCONNECT SWITCH

FRM. CODE	OSWD12	1200A DISCONNECT SWITCH MATERIAL ITEM LIST	
ITEM #		DESCRIPTION	STOCK #
		SWITCH DISC 600A 23kV	151220000
	1	SWITCH DISC 1200A 34KV	151230000
		TERMINAL LUG PERC 2H 477	233851000
	2	TERMINAL LUG PERC 4 HOLE 795	233858000
		CONN PERC WEDGE 500/477 - 500/477	224123000
	2	CONN PERC WEDGE 1351-750/795	224131000
	2	CONN PERC CARTRIDGE YELLOW	224142000
	8	BOLT MACHINE SS 1/2X2	204372000



900A LINE TAP SWITCH

MATERIAL LIST			
QTY	DESCRIPTION	STOCK NUMBER	CU CODE
1	SWITCH DISCONNECT LINE TAP 900A	151250000	OSWD9-LT
TRUCK STOCK			
3	CONN PERC CARTRIDGE YELLOW	224142000	
2	BOLT MACHINE SS 1/2X2	204372000	

STANDARD APPLICATIONS:
Used as required on riser poles, substation risers and recloser bypas switches.

SWITCH CONNECTOR TO MAINLINE CONDUCTOR	
WIRE SIZE	CONNECTOR STOCK NUMBER
4/0 ACSR	224121000
336 ACSR	224122000
477 ACSR	224123000
795 ACSR	224126000
795 ACSS	N/A
1351 AAC	224130000

SWITCH CONNECTOR TO TAP CONDUCTOR		
TAP WIRE SIZE	CONNECTOR STOCK NUMBER	LUG STOCK NUMBER
4/0 AL/CU	224121000	233850000
300/350 AL/CU	224122000	233851000
477/500 AL/CU	224123000	233851000
750/795 AL/CU	224126000	233852000

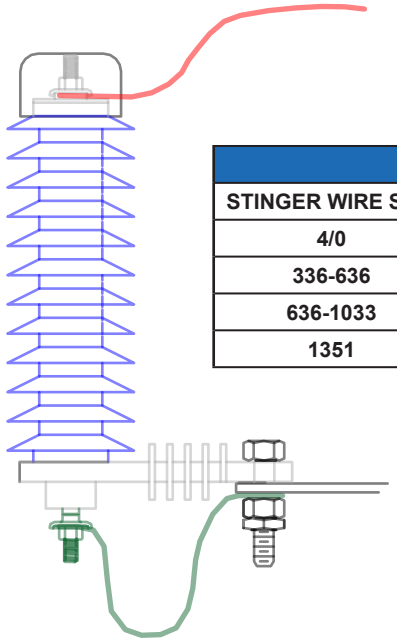
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

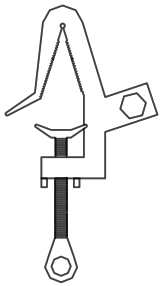
TWIN POST BLADE & LINE-TAP DISCONNECT DETAILS

FRM. CODE	OLA3	OLA12	OLA18	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QUANTITY			DESCRIPTION	STOCK #
1	6	-	-	ARR LTG 3KV DIST GRAY	140120000
	-	6	-	ARR LTG 12KV DIST GRAY	140180000
	-	-	6	ARR LTG 18KV DIST GRAY	140320000

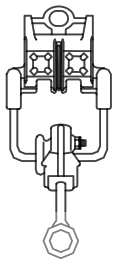


ARRESTOR CONNECTION TABLE		
STINGER WIRE SIZE	HOT LINE CLAMP	STIRRUP CLAMP
4/0	220690000	N/A
336-636	220692000	N/A
636-1033	220694000	N/A
1351	220680000	220900000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
6	CLP HOT LINE 2-8	220700000
6	CLP HT LN VJAW 1033-636	220694000
6	CLP HT LN VJAW 4/0-4	220690000
6	CLP HT LN VJAW 636-336	220692000
6	CLP HT LN 1-266AL/CU TAP	220680000
6	CLP HT LN 6-1/0AL TAP	220650000
6	CLP STRP 2-2/0AL 3/8 TAP	220840000
6	CLP STRP 336-795 1/2 TAP	220880000
6	CLP STRP 4-4/0AL 3/8 TAP	220860000
6	CLP STRP 400-1431 1/2 TAP	220900000



POWER GRIP CLAMP MAY BE USED WITHOUT A STIRRUP CLAMP.



STIRRUP CLAMP

HOT LINE CLAMP

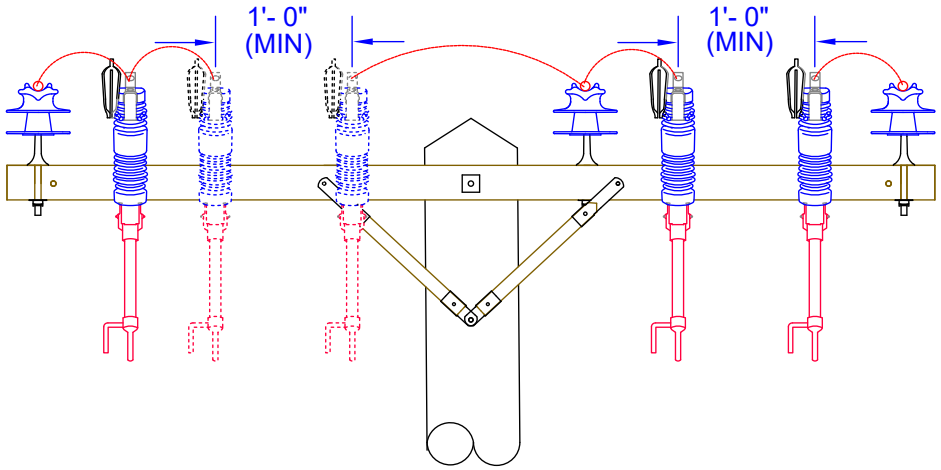
NOTES

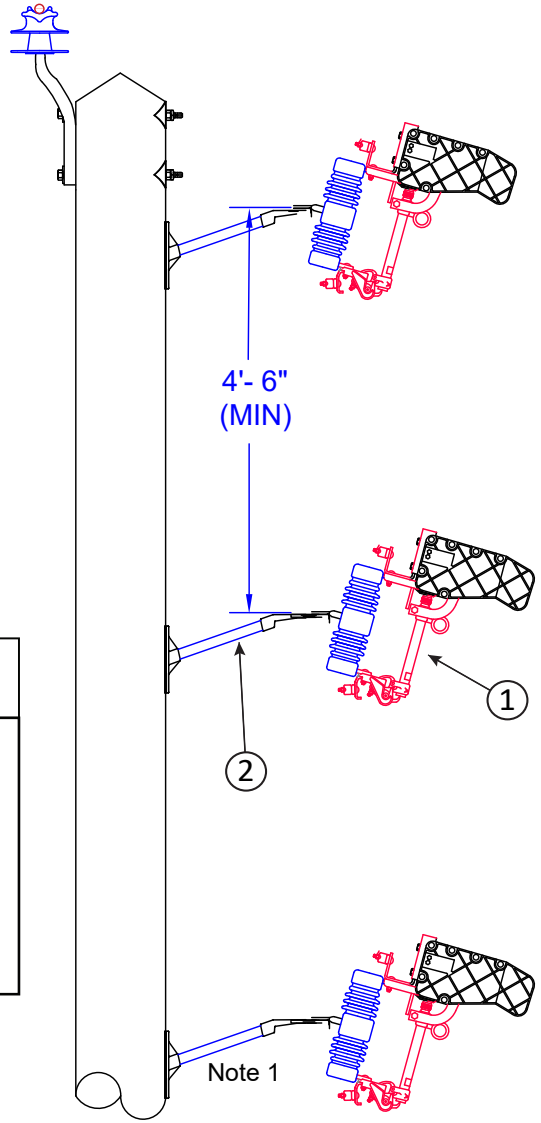
1. Install arresters on each side of gang operated switches for Normally Closed and Normally Open installations.
2. Arresters may be grounded directly to metal switch base provided adequate CU bond wire is installed per the Grounding section.
3. Install wildlife protective cover (see Material section).
4. Allow ample slack in ground strap to allow the isolator to clear a faulty arrester.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

LINE TAP CLAMPS & ARRESTER DETAILS





DRAWING SYMBOL USED WITH NOTATIONS
I - 3 - LBU(S) W/100A BARREL(S) Fused ___ AMPS

MATERIAL LIST				
ITEM #	QTY	DESCRIPTION	STOCK NUMBER	CU
1	AS REQ'D	CUTOUT 100A 14.4/24.9KV LB	143450000	OCO100L
		CUTOUT 200A 14.4/24.9KV LB	143454000	OCO200L
2	AS REQ'D	18" CUTOUT/ARRESTER BRACKET	180745000	OBAC

NOTES

1. 18" Arrester/Cutout Brackets called for separately (CU Name: OBAC).
2. See Vertical Framing Plates for preferred cutout bracket installation.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

100 AMP & 200 AMP LBU CUTOUT FRAMING

PROTECTION

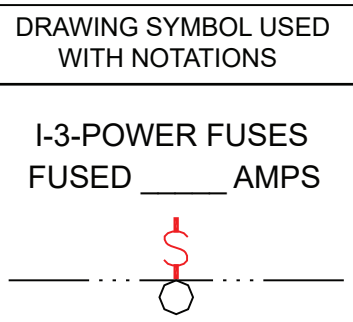
OCO___

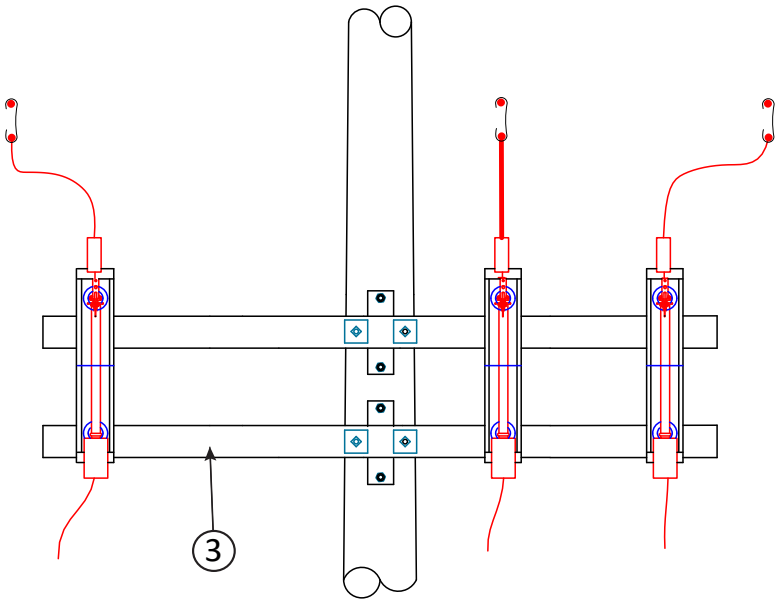
FRM. CODE	OCOPF250STD	OCOPF300STD	OCOPF300SLO	OCOPF400SLO	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QUANTITY				DESCRIPTION	STOCK #
1	3	3	3	3	DISCONNECT 25KV 400A SMD-40	150366000
	3	-	-	-	FUSE REFILL 250E 23KV SMU-40 STD	263474500
	-	3	-	-	FUSE REFILL 300E 23KV SMU-40 STD	263475500
	-	-	3	-	FUSE REFILL 300E 23KV SMU-40 SLOW	263475000
	-	-	-	3	FUSE REFILL 400E 23KV SMU-40 SLOW	263476000
2	30’	30’	30’	30’	CABLE CU BHD 4/0 7S REEL	011100000
3	2	2	2	2	X-ARM 3 5/8 X 4 5/8 X 10 FIBERGLASS	040400000

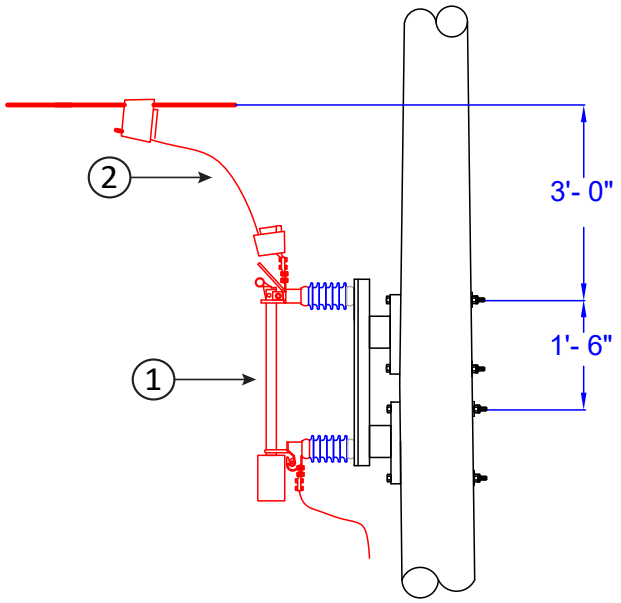
TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
1	WASHER SQ FLAT 3/4 H	209620000
1	BOLT MACH AVERAGE 5/8 LONG	203775000
1	WASHER SQ CURVED 3 1/2	209520000
6	BOLT MACHINE SS 1/2X2	204372000
3	TERMINAL LUG PERC 2H 477	233851000
2	CONN PERC CARTRIDGE YELLOW	224142000

DRAWING SYMBOL USED WITH NOTATIONS

I-3-POWER FUSES
FUSED _____ AMPS







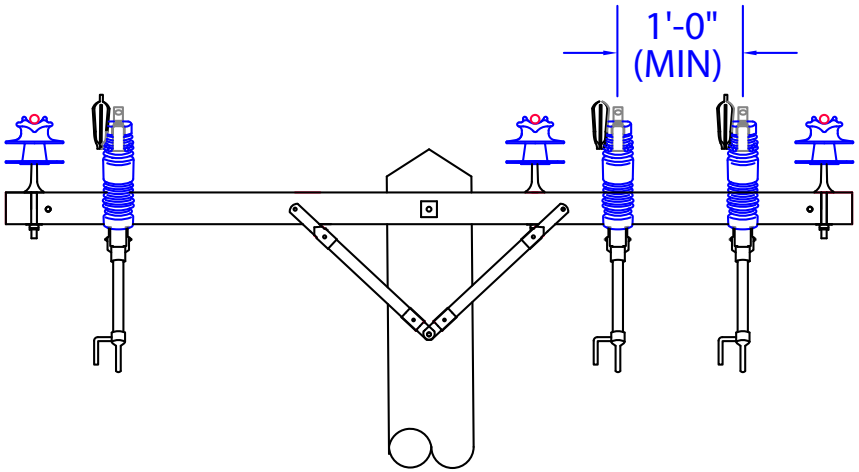
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

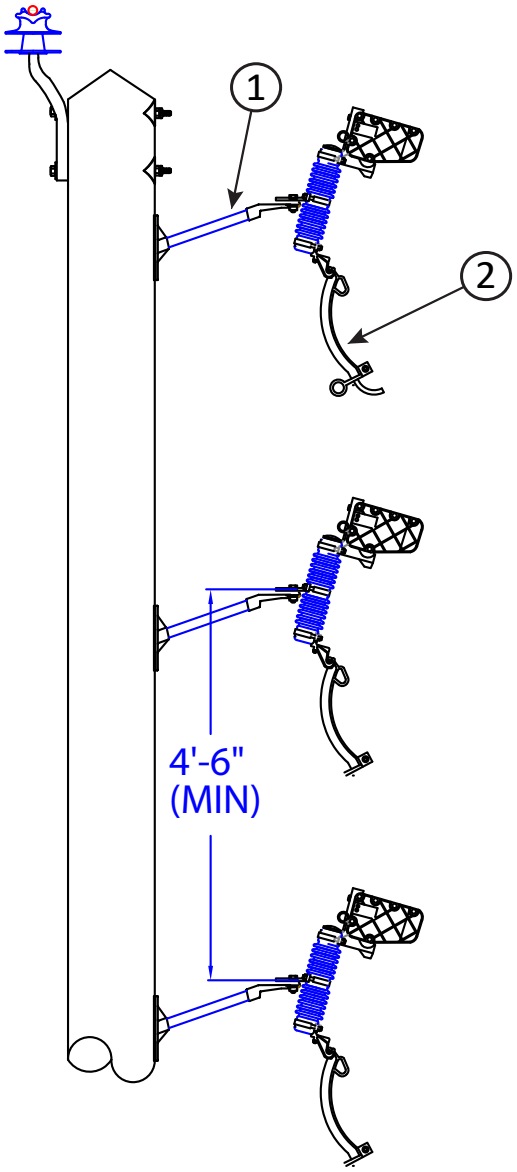
PROTECTION

NES

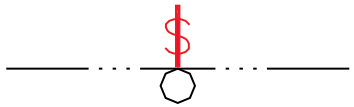
SMD-40 POWER FUSE CUTOUT FRAMING

OCOPF___





DRAWING SYMBOL USED WITH NOTATIONS
I- __ - LBU(s) W/ 300A Blade(s)



MATERIAL LIST				
ITEM #	QTY	DESCRIPTION	STOCK NUMBER	CU
1	AS REQ'D	18" CUTOUT/ARRESTER BRACKET	180745000	OBAC
2	AS REQ'D	DISC 300A 14.4/24.9KV LB	143450000	OSWD3L

NOTES

1. 18" Arrester/Cutout Brackets called for separately (CU Name: OBAC).
2. See Vertical Framing Plates for preferred cutout bracket installation.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

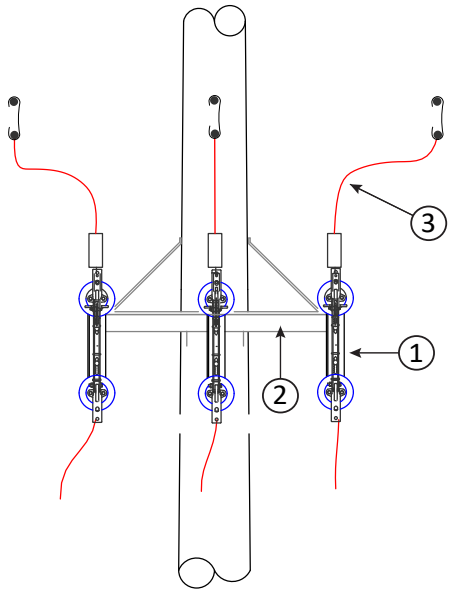
300 AMP LBU BLADE CUTOUT FRAMING

PROTECTION

OSWD3L

MAJOR AND MINOR MATERIAL ITEM LIST

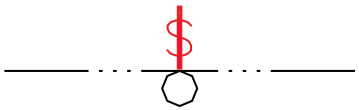
ITEM #		DESCRIPTION	STOCK #	CU
1	3	SWITCH DISC 1200A 34KV	151230000	OSWD12
2	1	MOUNT FOR MOUNTING 1512300 DISC	182705000	OBCA-SUB
3	30’	CABLE CU BSD 1000 MCM 61S	011320000	OCCS-1000

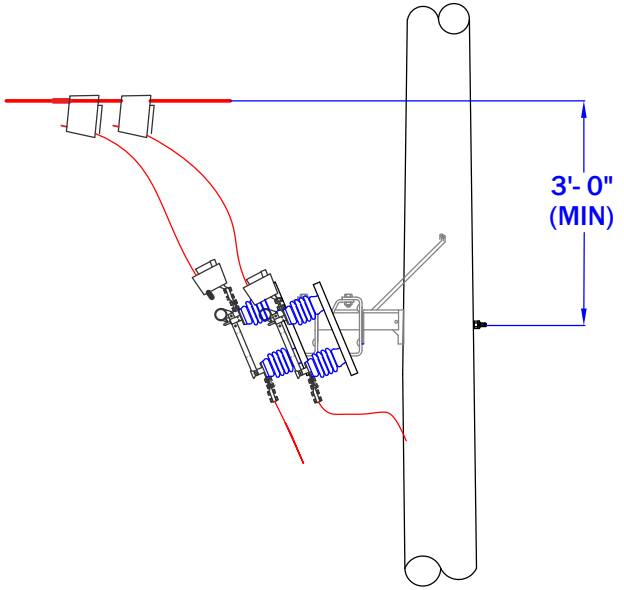


TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK#
1	WASHER SQ FLAT 3/4 H	209620000
1	BOLT MACH AVERAGE 5/8 LONG	203775000
1	WASHER SQ CURVED 3 1/2	209520000
6	BOLT MACHINE SS 1/2X2	204372000
2	CONN PERC CARTRIDGE YELLOW	224142000

DRAWING SYMBOL USED WITH NOTATIONS

I-3-1200 AMP





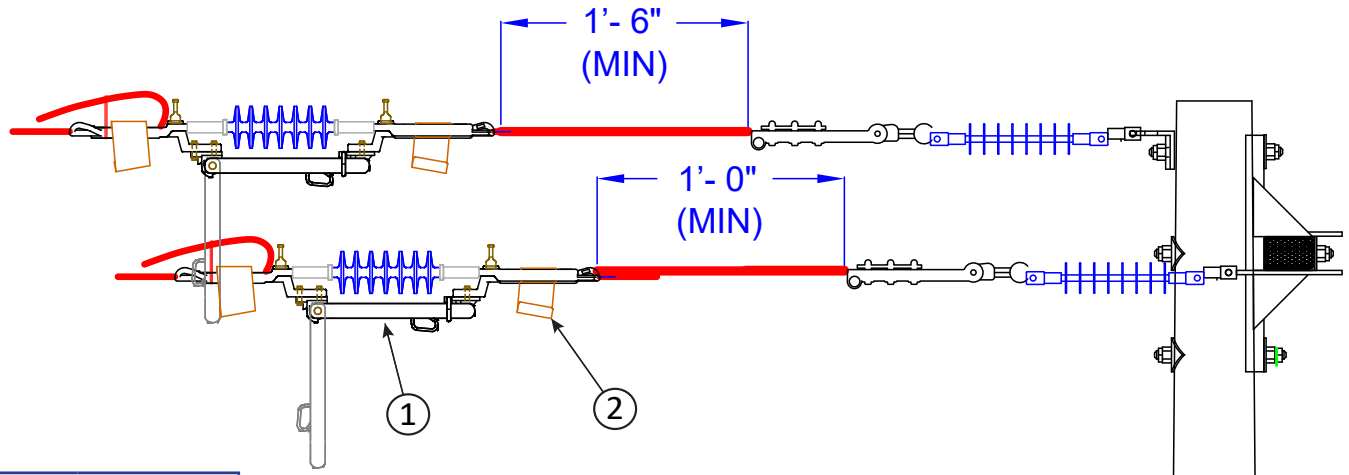
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

1200 AMP TWIN POST DISCONNECT FRAMING

PROTECTION

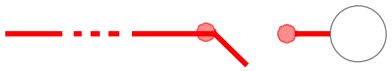
OSWD12



FRM. CODE	OSWD9-NL4/0	OSWD9-NL336	OSWD9-NL477	OSWD9-NL795	900A IN-LINE SWITCH MATERIAL ITEM LIST	
ITEM #		QTY			DESCRIPTION	STOCK #
1	1	1	-	-	SWITCH DISC 900A INLINE 336 ACSR	151234000
		-	1	-	SWITCH DISC 900A INLINE 477 ACSR	151235000
		-	-	1	SWITCH DISC 900A INLINE 795 ACSR	151236000
2	2				CONN PERC 4/0 ACSR	224133090
		2	-	-	CONN PERC 336 ACSR	224134000
		-	2	-	CONN PERC 477 ACSR	224135000
		-	-	2	CONN PERC 795 ACSR	224136000
TRUCK STOCK						
-	-	2	2	2	CONN PERC CARTRIDGE YELLOW	224142000
-	2	-	-	-	CONN PERC CARTRIDGE BLUE	224140000

DRAWING SYMBOL USED WITH NOTATIONS

I-3-900 AMP IN-LINES



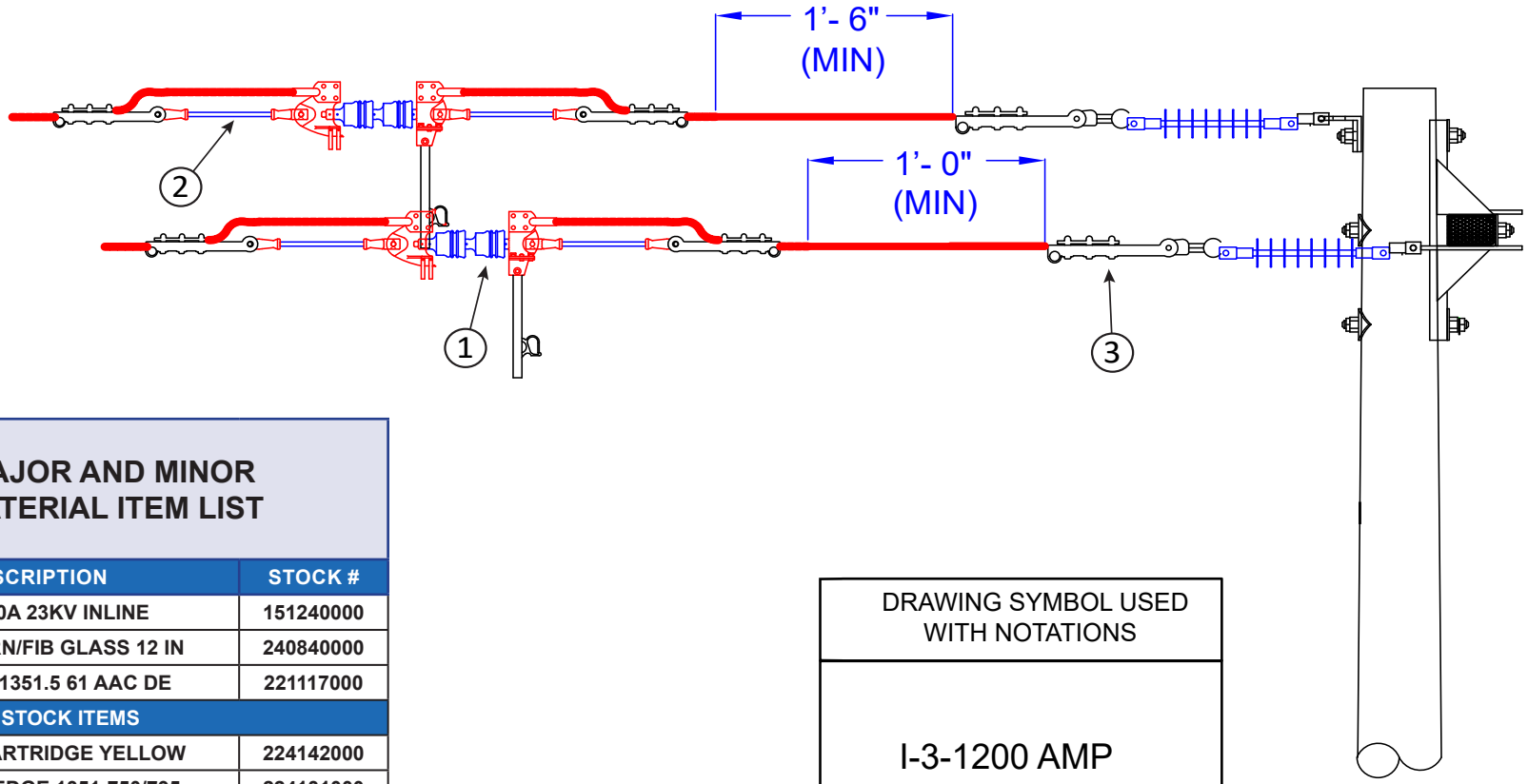
NOTES

1. When creating the line opening, cut the wire as close to one side of the switch as possible to help prevent bird caging the wire.
2. The connectors on this switch must not be reused. After the initial installation the connectors will not provide enough compression to hold the cable into the switch.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

900 AMP IN-LINE DISCONNECT FRAMING



FRM. CODE	OSWD12-INL	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	SWCH DISC 1200A 23KV INLINE	151240000
2	2	INSUL GUY STRN/FIB GLASS 12 IN	240840000
3	2	CLAMP STRAIN 1351.5 61 AAC DE	221117000
TRUCK STOCK ITEMS			
	2	CONN PERC CARTRIDGE YELLOW	224142000
	2	CONN PERC WEDGE 1351-750/795	224131000
	2	TERMINAL LUG PERC 4 HOLE 795	233858000
	8	BOLT MACHINE SS 1/2X2	204372000

DRAWING SYMBOL USED WITH NOTATIONS

I-3-1200 AMP IN-LINES

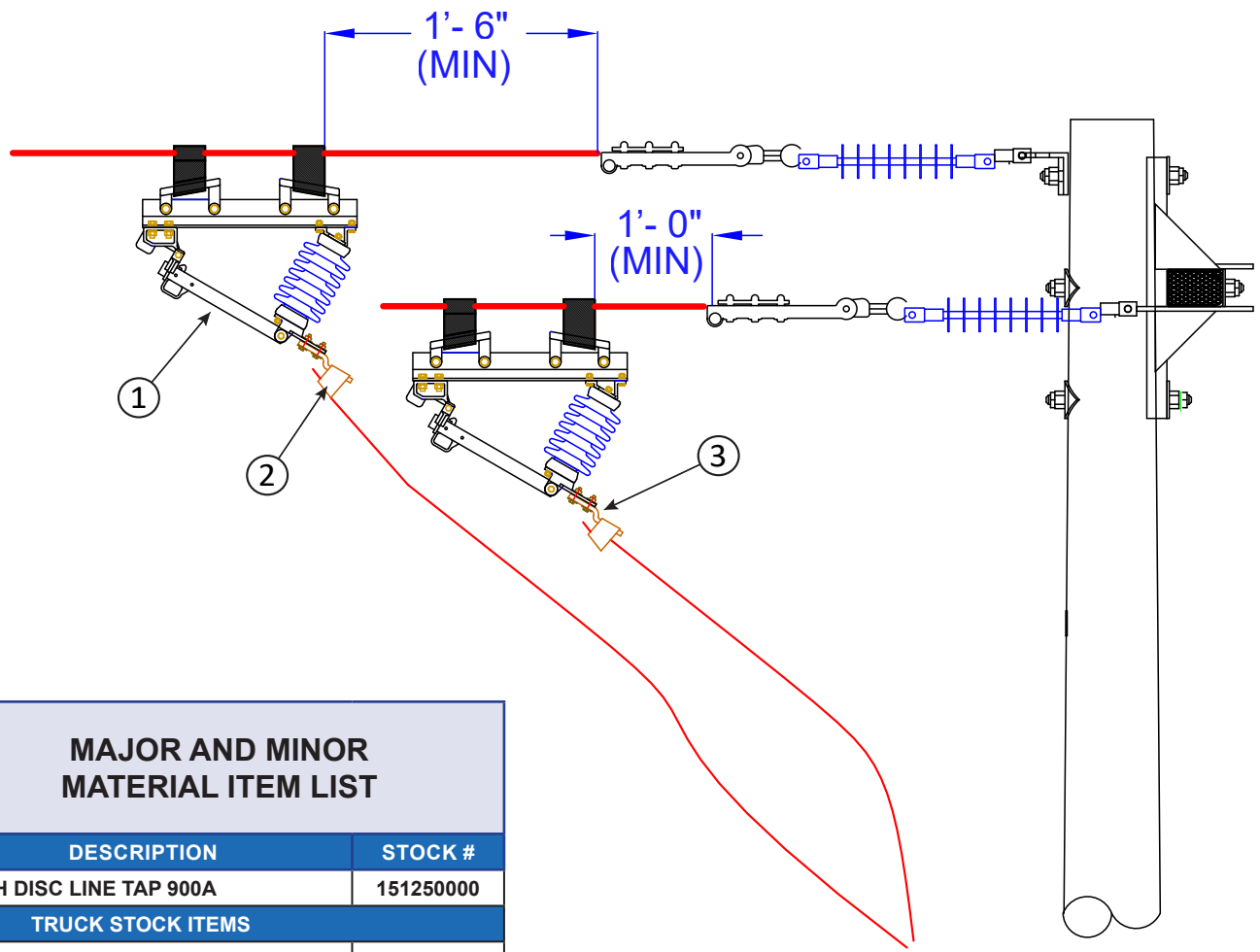
NOTES

1. 1200 amp in-line switches have a tendency to roll when closed with a hot stick. These switches should be installed as close to the pole as possible to reduce the amount of conductor movement.
2. Used with 1351 AA Substation Get-Away feeders.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

1200A IN-LINE SWITCH DISCONNECT FRAMING



FRM. CODE	OSWD9-LT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	SWCH DISC LINE TAP 900A	151250000
TRUCK STOCK ITEMS			
2	3	CONN PERC CARTRIDGE YELLOW	224142000
3	2	BOLT MACHINE SS 1/2X2	204372000

DRAWING SYMBOL USED WITH NOTATIONS

I-3-900 AMP LINE TAPS

NOTES

1. This 900 Amp Line-tap switch has a 1200 amp Emergency Rating for up to 8 hours.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

900 AMP LINE-TAP DISCONNECT FRAMING

3 PHASE GANG OPERATED LOAD BREAK SWITCHES (LBS)

GROUP OPERATED SWITCH FRAMING CODES							
SPACES 1-3 ARE ALWAYS (OSW) FOR OVERHEAD , SWITCH							
SPACES 4 & 5		SPACE 6		SPACES 7 - 9		SPACES 10 - 12	
AMPERAGE		BASE ORIENTATION		POSITION OF SWITCH		SWITCH ACCESSORIES	
CODE	NAME	CODE	NAME	CODE	NAME	CODE	NAME
6	600A	H	HORIZONTAL	-UC	UNDER CIRCUIT	-M	MOTOR OPERATED
9	900A	V	VERTICAL	-NC	IN CIRCUIT	-MS	REMOTE SCADA CONTROLLED
12	1200A	R	RISER	-OC	OVER CIRCUIT		
				-CT	CIRCUIT TIE		
				-BC	IN BOTTOM CIRCUIT		
				-TC	IN TOP CIRCUIT		

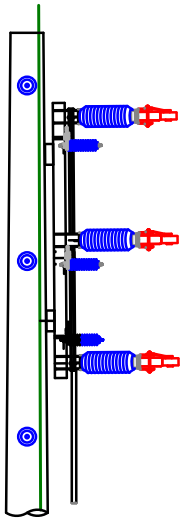
OSW6V-NC, PG. 22

OSW12V-NC, PG. 29

600 AMP OR
1200 AMP LBS

VERTICAL SWITCH
IN THE CIRCUIT

STANDARD INSTALLATION
FOR SWITCHES INSTALLED
IN VERTICAL CIRCUITS.



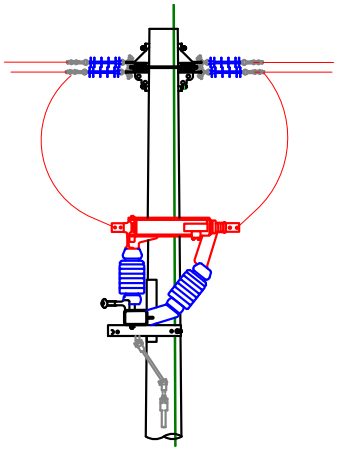
OSW6H-UC, PG. 23

OSW12H-UC, PG. 30

600 AMP OR
1200 AMP LBS

HORIZONTAL SWITCH
INSTALLED UNDER THE
CIRCUIT.

STANDARD
INSTALLATION TYPE



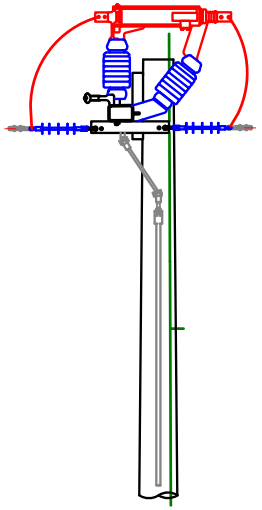
OSW6H-NC, PG. 24

OSW12H-NC, PG. 31

600 AMP OR
1200 AMP LBS

HORIZONTAL SWITCH
IN THE CIRCUIT

CONFIGURATION FOR LIMITED
CLEARANCE AREA. SWITCH
BASE MUST HAVE BRACES ON
WOOD POLES.



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

GANG OPERATED SWITCH
FRAMING INDEX

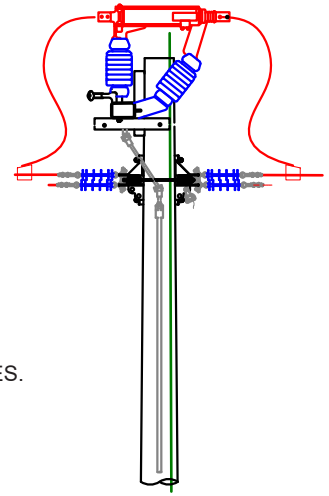
OSW6H-OC, PG. 25

OSW12H-OC, PG. 32

600 AMP OR
1200 AMP LBS

HORIZONTAL SWITCH
INSTALLED OVER THE
CIRCUIT.

STANDARD
INSTALLATION ON
POLES WITH LARGE ANGLES.



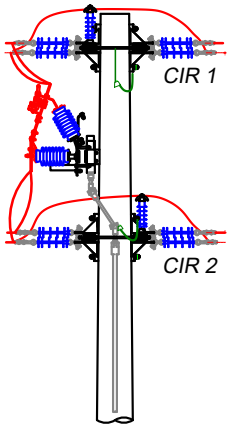
OSW6R-CT, PG. 26

OSW12R-CT, PG. 33

600 AMP OR
1200 AMP LBS

RISER SWITCH
IN THE CIRCUIT

STANDARD
INSTALLATION
FOR TYING 2 CIRCUITS
ON THE SAME POLE



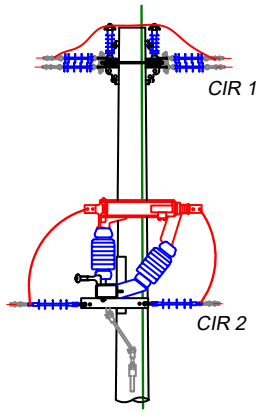
OSW6H-BC, PG. 27

OSW12H-BC, PG. 34

600 AMP OR
1200 AMP LBS

HORIZONTAL SWITCH
IN THE BOTTOM CIRCUIT
OF A DOUBLE CIRCUIT
LINE

SWITCH BASE MUST
BE BRACED ON WOOD
POLES.



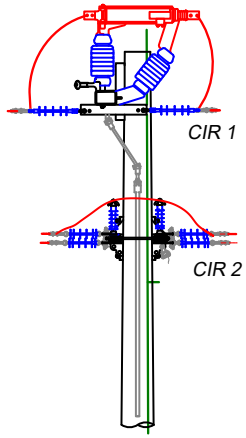
OSW6H-TC, PG. 28

OSW12H-TC, PG. 35

600 AMP OR
1200 AMP LBS

HORIZONTAL SWITCH
IN THE TOP CIRCUIT
OF A DOUBLE CIRCUIT
LINE

SWITCH BASE MUST
BE BRACED ON
WOOD POLES.

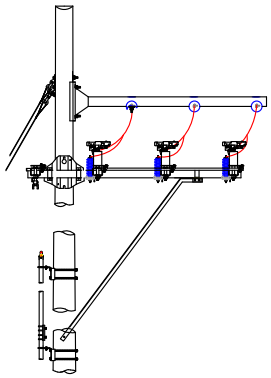


OSW9LAA, PG. 36

900 AMP LBS

HORIZONTAL SWITCH
ON AN ALLEY ARM
MOUNTED UNDER THE
CIRCUIT

SWITCH BASE MUST
BE BRACED ON ALL
POLES.



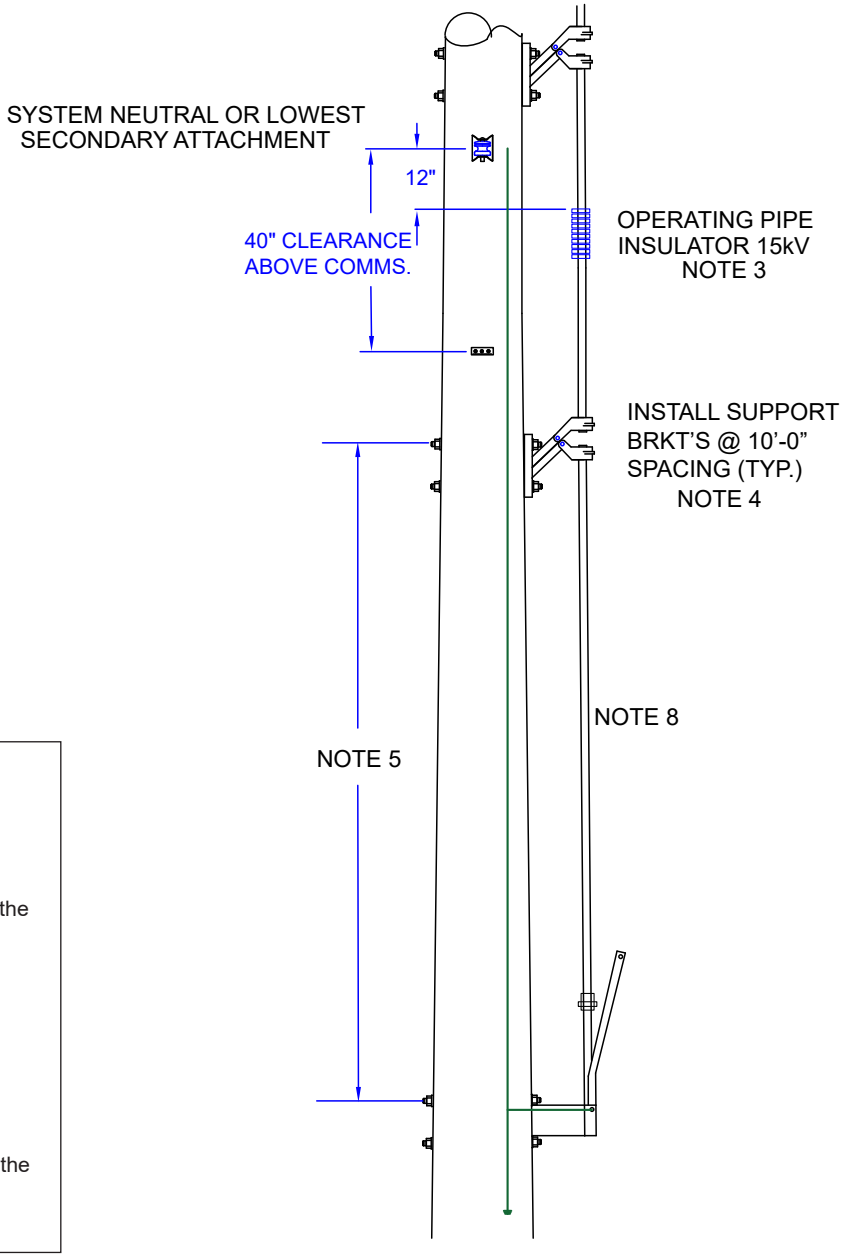
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

GANG OPERATED SWITCH FRAMING INDEX (CONT)

IN-CIRCUIT FRAMING ANGLE LIMITATION CHART GANG OPERATED SWITCHES								
WIRE SIZE	GRADE B				GRADE C			
	WIND SPAN				WIND SPAN			
	200’	250’	300’	350’	200’	250’	300’	350’
	MAXIMUM LINE ANGLE ALLOWED WHEN CONDUCTOR IS ATTACHED TO SWITCH							
4/0ACSR	13º	11º	10º	9º	22º	21º	19º	18º
336ACSR	9º	8º	7º	6º	17º	15º	14º	13º
477ACSR	8º	7º	6º	5º	15º	13º	12º	11º
795ACSR	5º	4º	3º	2º	10º	9º	8º	7º
1351AAC	WIRE TENSION EXCEEDS THE SWITCH BASE RATING				5º	5º	4º	3º



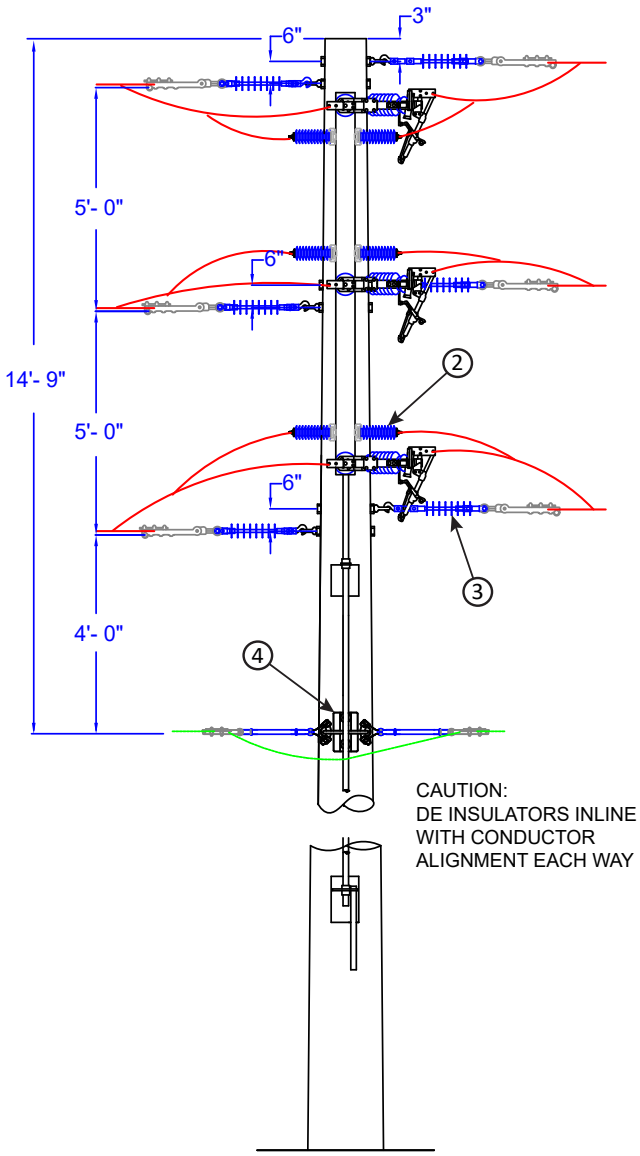
GENERAL INSTALLATION NOTES:

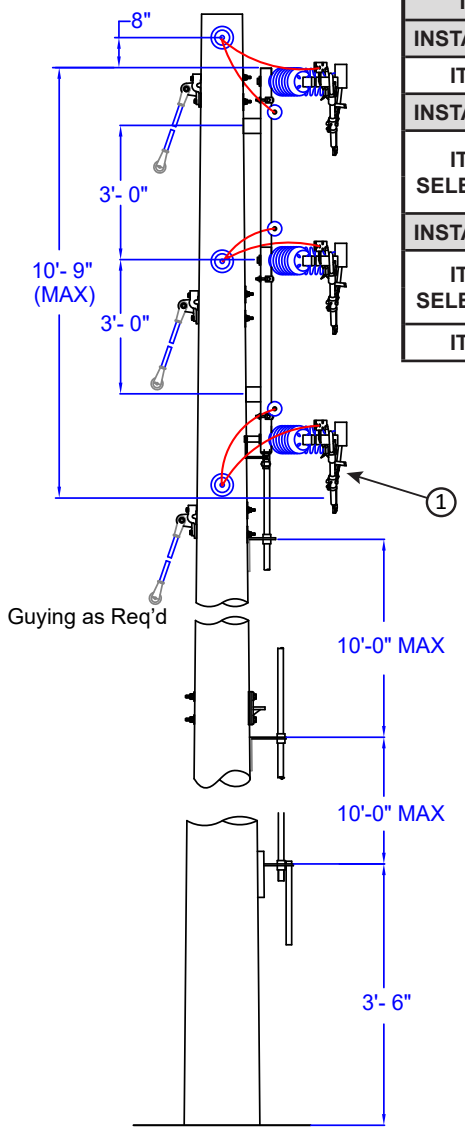
1. Install all new switches on concrete or steel poles of appropriate strength for the loading conditions.
2. Existing wood poles having adequate strength per the NESC Loading Requirements may be used when agreed upon with Engineering and Operations. Install with 60-inch braces to support switch on wood poles.
3. Switches, mounted on all pole types, require insulators in the operating pipe. Position the insulator between the neutral and the upper most communication cable.
4. The operating pipe must have a support bracket every 10-ft.
5. The minimum distance between the handle and the first pipe support is 8’-0”.
6. NEVER install an insulator in the operating pipe of a motor operated switch. This is true regardless of the type of pole.These insulators are not rated to withstand the extreme stresses created by the motor operator.
7. Reference the Grounding Specification section for details of bonding sizes and locations for all pole types or grounding electrode(s) installation.
8. Portable Grounding Switch Mats are used per the Grounding Specifications section.
9. Install the proper arresters per circuit voltage to guard all potential phase open points.
10. Arresters may be grounded directly to the metal switch base provided adequate CU bond wire is installed to the pole ground per the Grounding section.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

IN-CIRCUIT GANG OPERATED SWITCH FRAMING LIMITS





LINE DEPARTMENT TASKS			
TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH			
ITEM 1	OSW6LV	600A LBS VERTICAL	1
INSTALL ARRESTERS			
ITEM 2 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL FRAMING			
ITEM 3 SELECT ONE	O3SV-EX	3 PHASE; STEEL, VERT. EXT #2 - 2/0	2
	O3SV-EX-477	3 PHASE; STEEL, VERT. EXT 4/0-477	2
ITEM 4	OB-DDE	BRACKET, DBL DEADEND ANGLE	1

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 600 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS_____
POLE NUMBER
OSW6LV-NC
O3SV-EX-____

I-6-12kV SUR. ARR.

NOTES

1. See the chart on Pg. 21 for maximum line angles when the conductor is attached to the switch.
2. See Switch Details and Material List on Pg. 38.

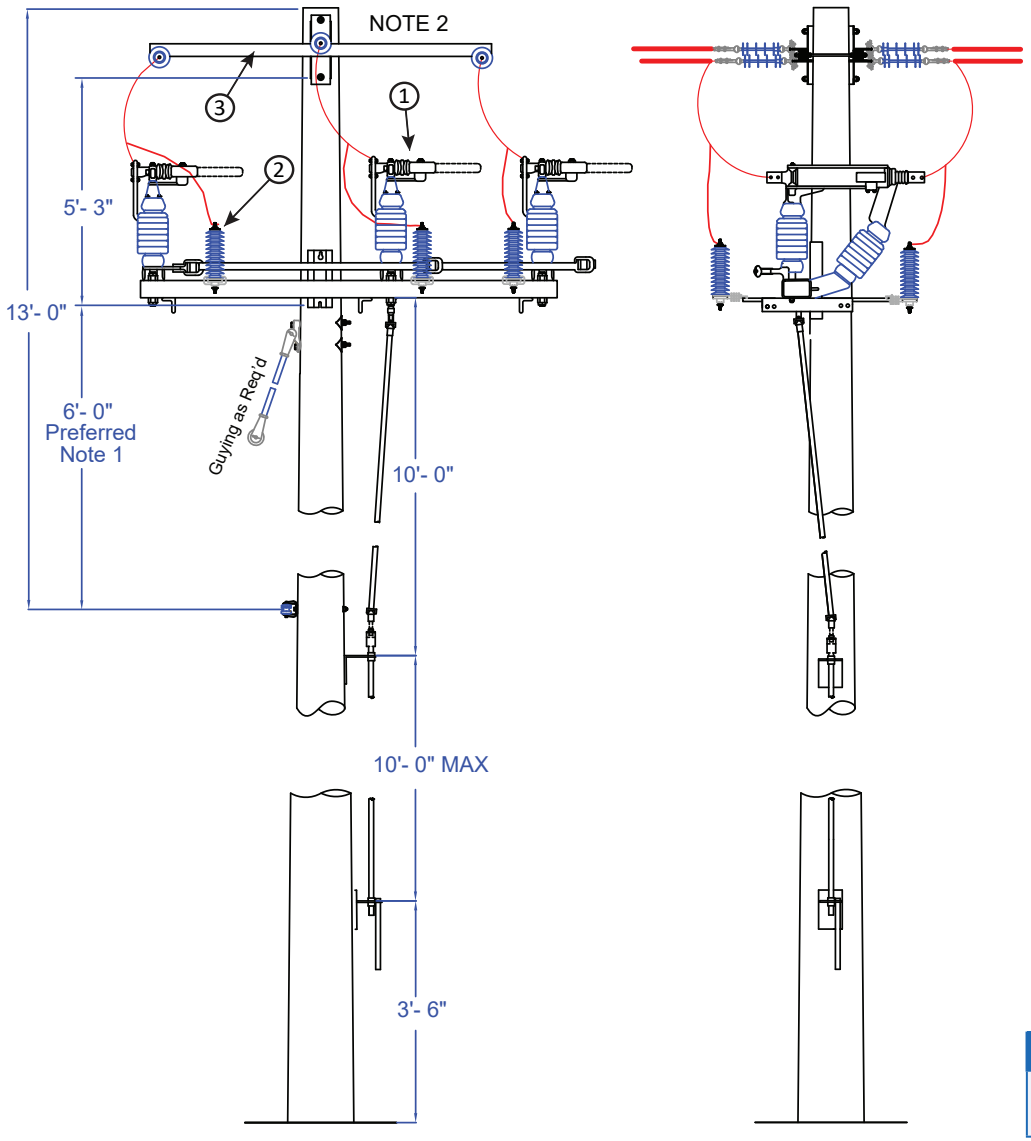
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

600 AMP VERTICAL LBS IN-CIRCUIT FRAMING

OSW6LV-NC



LINE DEPARTMENT TASKS			
TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH			
ITEM 1	OSW6LH	600A LBS HORIZONTAL	1
INSTALL ARRESTERS			
ITEM 2 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL FRAMING			
ITEM 3	VARIES	BASED ON CONDUCTOR & LINE ANGLE PER THE 3 PHASE FRAMING SECTION.	AS REQ'D

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 600 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS____
POLE NUMBER
O3SS-DD-477
OSW6LH-UC

I-6-12kV SUR. ARR.

NOTES

1. Measurement allows for bucket access between neutral and switch.
2. Engineer to evaluate pole-top deflection & strength to support conductor loading above switch.

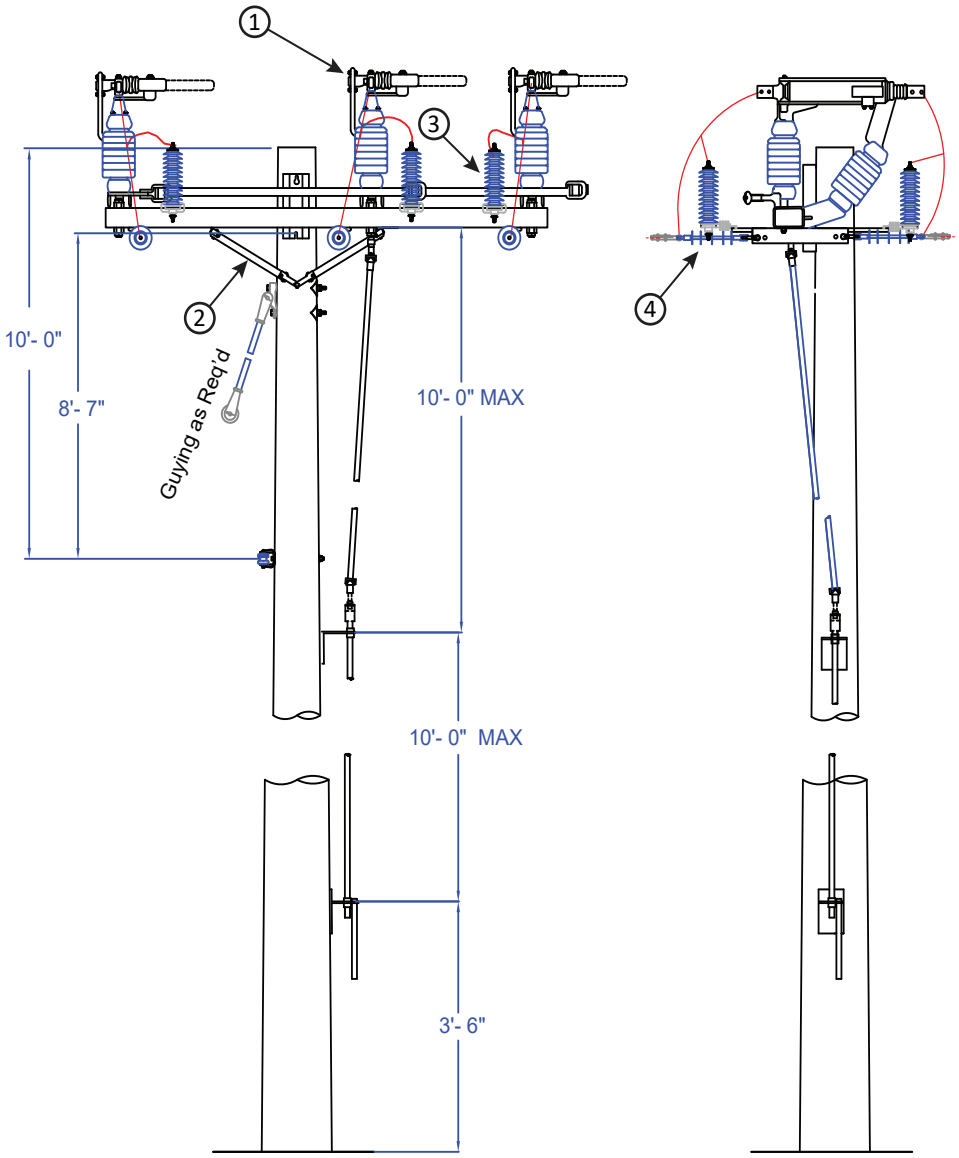
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

600 AMP HORIZONTAL LBS UNDER-CIRCUIT FRAMING

OSW6LH-UC



LINE DEPARTMENT TASKS			
TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH			
ITEM 1	OSW6LH	600A LBS HORIZONTAL	1
INSTALL XARM BRACES WHEN INSTALLED ON WOOD POLE			
ITEM 2	OBRW60	BRACE, WOOD, PAIR, 60" SPACING	1
INSTALL ARRESTERS			
ITEM 3 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL CONDUCTOR DEAD-ENDS			
ITEM 4 SELECT ONE	O3SX-EX	3 PH, STEEL, HORIZ. EXTENSION 6 - 2/0	2
	O3SX-EX-477	3 PH, STEEL, HORIZ. EXTENSION 4/0 - 477	2

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 600 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS____
POLE NUMBER
OSW6LH-NC

I-6-12kV SUR. ARR.

NOTES

1. This configuration requires xarm braces on the switch base.
2. See the chart on Pg. 21 for maximum line angles when the conductor is attached to the switch..

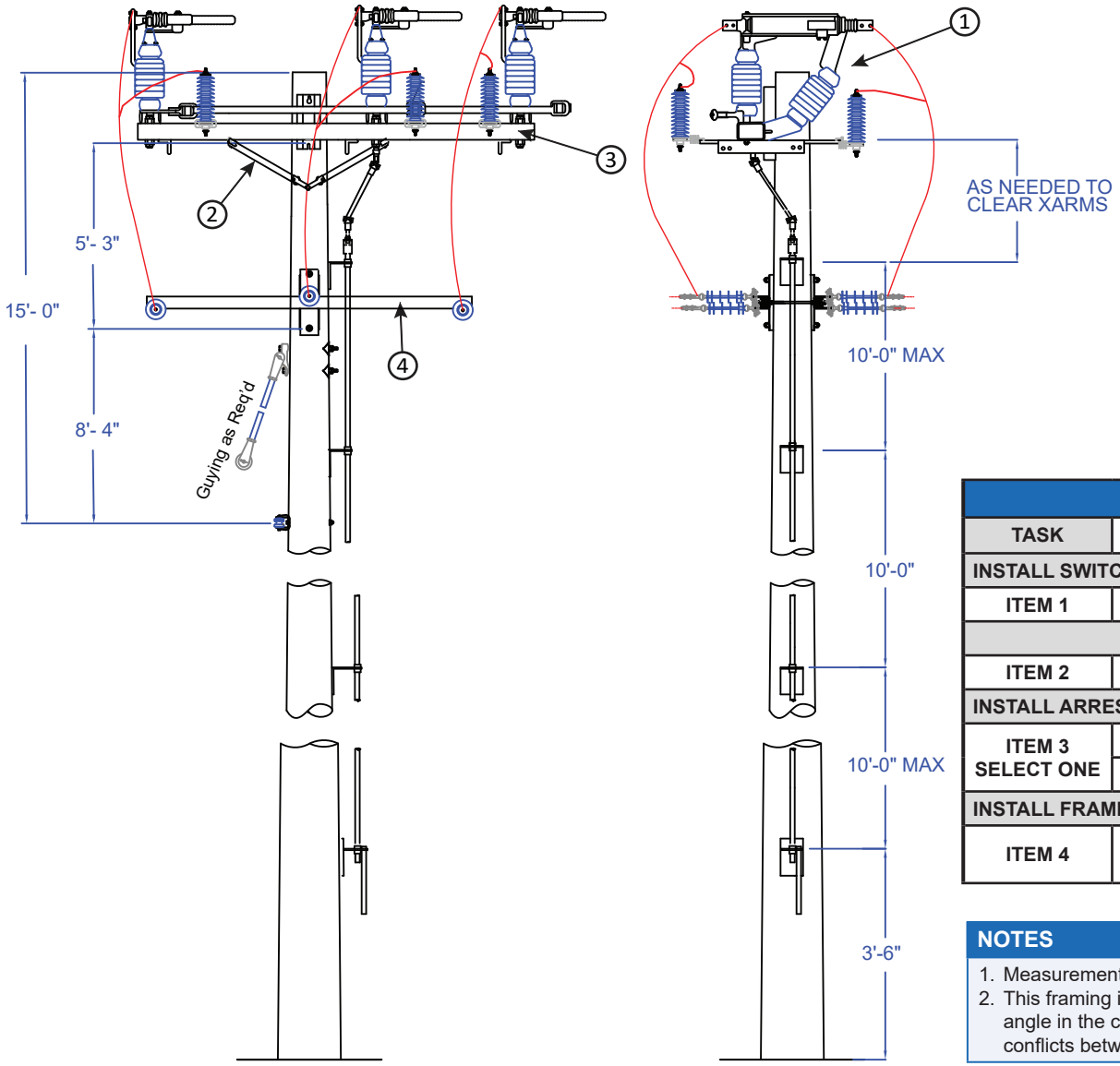
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

600 AMP HORIZONTAL LBS IN-CIRCUIT FRAMING

OSW6LH-NC



DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 600 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS_____
POLE NUMBER
OSW6LH-OC
O3SS-DD-477

I-6-12kV SUR. ARR.

LINE DEPARTMENT TASKS

TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH			
ITEM 1	OSW6LH	600A LBS HORIZONTAL	1
ITEM 2	OBRW60	BRACE, WOOD, PAIR, 60" SPACING	1
INSTALL ARRESTERS			
ITEM 3 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL FRAMING			
ITEM 4	VARIES	BASED ON CONDUCTOR & LINE ANGLE PER THE 3 PHASE FRAMING SECTION.	AS REQ'D

NOTES

1. Measurement allows for bucket access between neutral and crossarm.
2. This framing is to be used only when the switch must be installed at a location where the angle in the conductor exceeds the rating of the switch's base. This framing prevents conflicts between the guys and the switch.

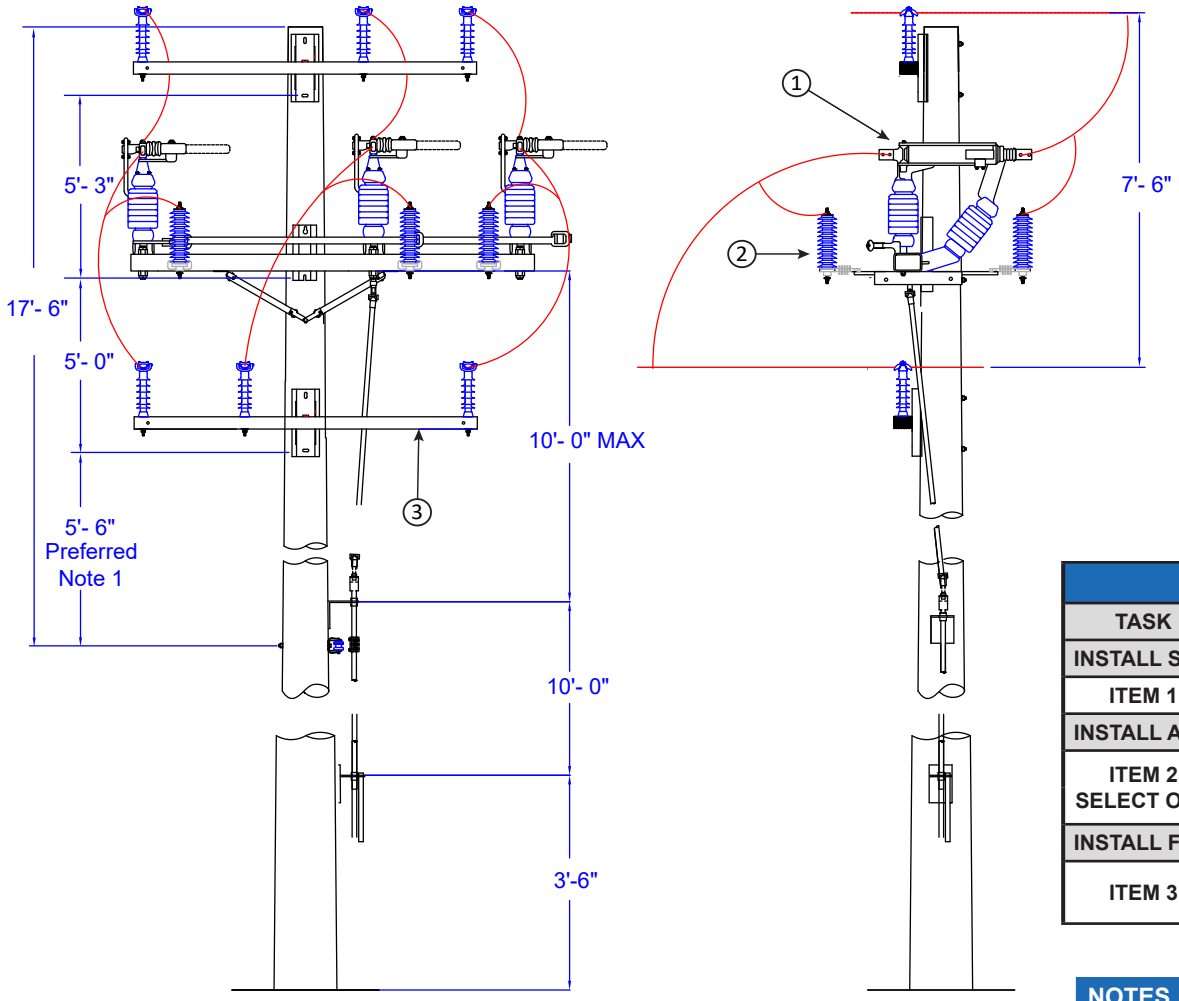
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

600 AMP HORIZONTAL LBS OVER-CIRCUIT FRAMING

OSW6LH-OC



DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 600 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS____
POLE NUMBER
O3FS-___
OSW6LH-CT
O3FS-___

I-6-12kV SUR. ARR.

LINE DEPARTMENT TASKS

TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH			
ITEM 1	OSW6LH	600A LBS HORIZONTAL	1
INSTALL ARRESTERS			
ITEM 2 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL FRAMING			
ITEM 3	VARIES	BASED ON CONDUCTOR & LINE ANGLE PER THE 3 PHASE FRAMING SECTION.	AS REQ'D

NOTES

1. Measurement allows for bucket access between neutral and crossarm.

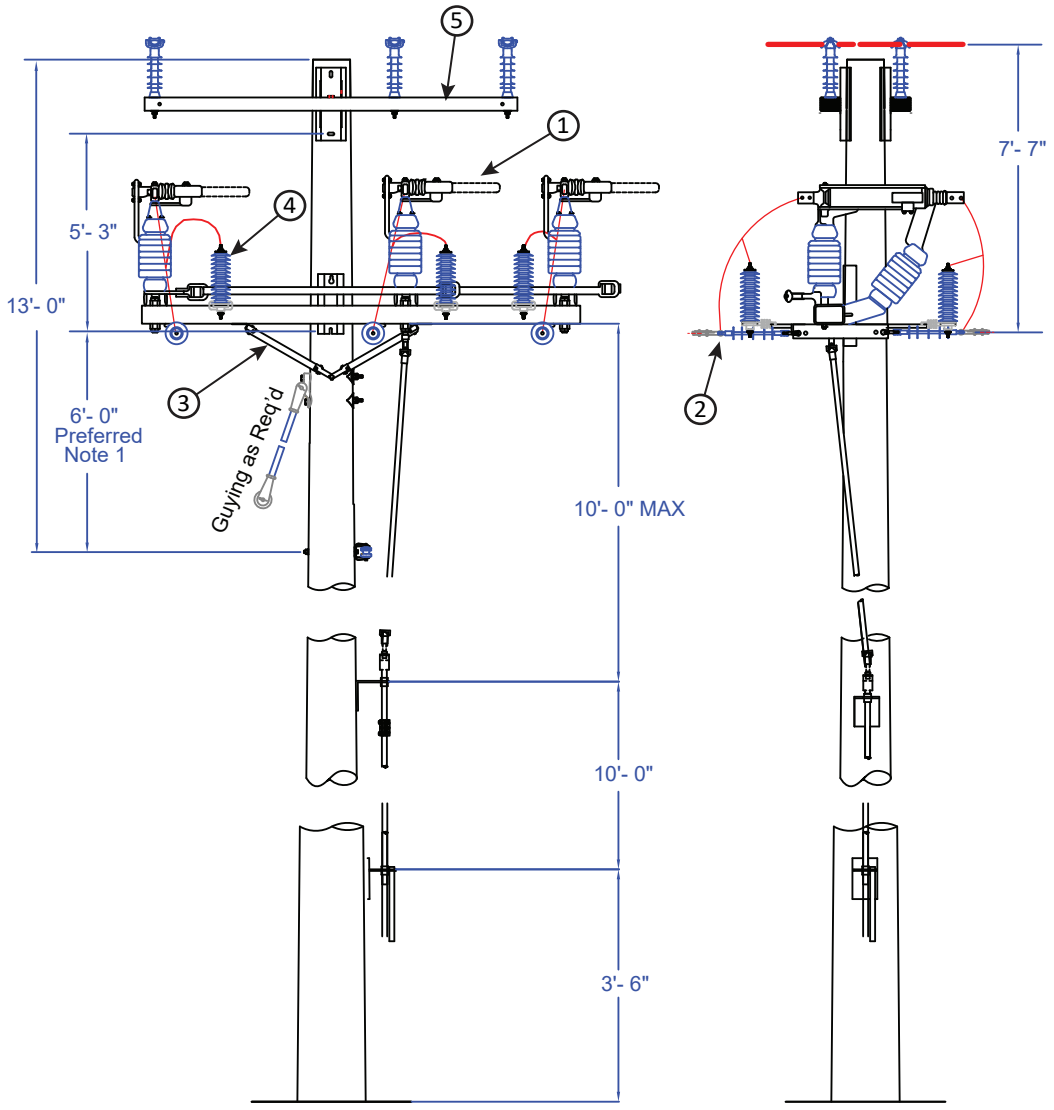
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

600 AMP TIE-CIRCUIT LBS FRAMING

OSW6LH-CT



LINE DEPARTMENT TASKS			
TASK	**CU**	**DESCRIPTION**	**QTY**
INSTALL SWITCH			
ITEM 1	**OSW6LH**	**600A LBS HORIZONTAL**	**1**
ITEM 2 SELECT ONE	**O3SX-EX**	**3 PH, STEEL, HORIZ. EXTENSION 6 - 2/0**	**2**
	O3SX-EX-477	**3 PH, STEEL, HORIZ. EXTENSION 477**	**2**
	O3SX-EX-795	**3 PH, STEEL, HORIZ. EXTENSION 795**	**2**
INSTALL XARM BRACES WHEN INSTALLED ON WOOD POLES			
ITEM 3	**OBRW60**	**BRACE, WOOD, PAIR, 60" SPACING**	**1**
INSTALL ARRESTERS			
ITEM 4 SELECT ONE	**OLA18**	**18kV SURGE ARRESTERS FOR 23.9kV AREA**	**6**
	OLA12	**12kV SURGE ARRESTERS FOR 13.8kV AREA**	**6**
INSTALL FRAMING			
ITEM 5	**VARIES**	**BASED ON CONDUCTOR & LINE ANGLE PER THE 3 PHASE FRAMING SECTION.**	**AS REQ'D**

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 600 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS_____
POLE NUMBER
O3FD-____
OSW6LH-BC

I-6-12kV SUR. ARR.

NOTES

1. Measurement allows for bucket access between neutral and switch.
2. This configuration requires xarm braces on the switch base.
3. See the chart on Pg. 21 for maximum line angles when the conductor is attached to the switch base.

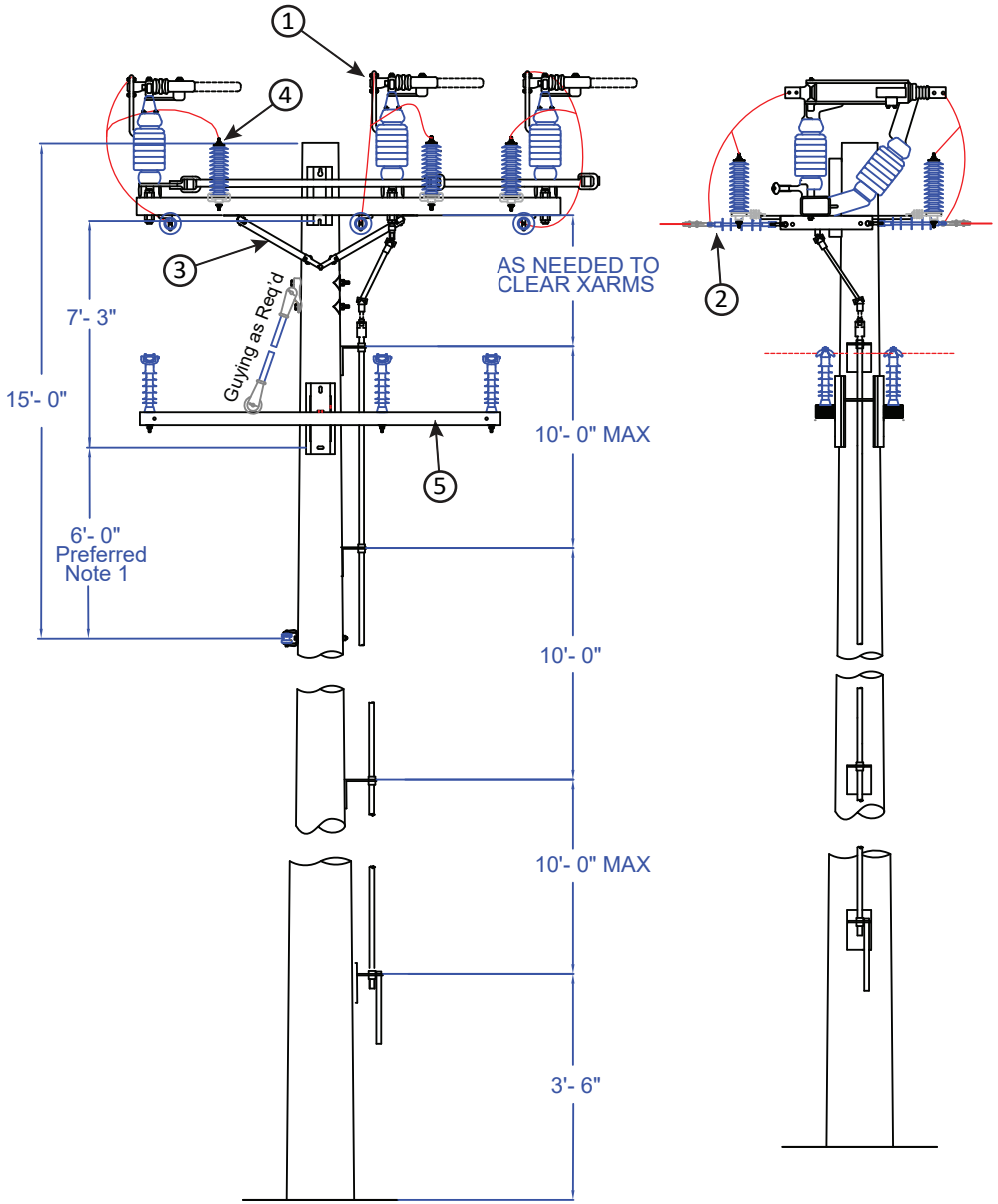
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

600 AMP HORIZONTAL LBS BOTTOM-CIRCUIT FRAMING

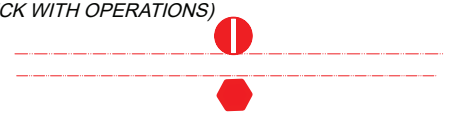
OSW6LH-BC



LINE DEPARTMENT TASKS			
TASK	**CU**	**DESCRIPTION**	**QTY**
INSTALL SWITCH			
ITEM 1	OSW6LH	600A LBS HORIZONTAL	1
ITEM 2 SELECT ONE	O3SX-EX	3 PH, STEEL, HORIZ. EXTENSION 6 - 2/0	2
	O3SX-EX-477	3 PH, STEEL, HORIZ. EXTENSION 477	2
	O3SX-EX-795	3 PH, STEEL, HORIZ. EXTENSION 795	2
INSTALL XARM BRACES WHEN INSTALLED ON WOOD POLES			
ITEM 3	OBRW60	BRACE, WOOD, PAIR, 60" SPACING	1
INSTALL ARRESTERS			
ITEM 4 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL FRAMING			
ITEM 5	VARIES	BASED ON CONDUCTOR & LINE ANGLE PER THE 3 PHASE FRAMING SECTION.	AS REQ'D

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 600 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)



OPS_____
POLE NUMBER
OSW6LH-TC
O3FD-_____

I-6-12kV SUR. ARR.

NOTES

1. Measurement allows for bucket access between neutral and crossarm.
2. This configuration requires xarm braces on the switch base.
3. See the chart on Pg. 21 for maximum line angles when the conductor is attached to the switch.

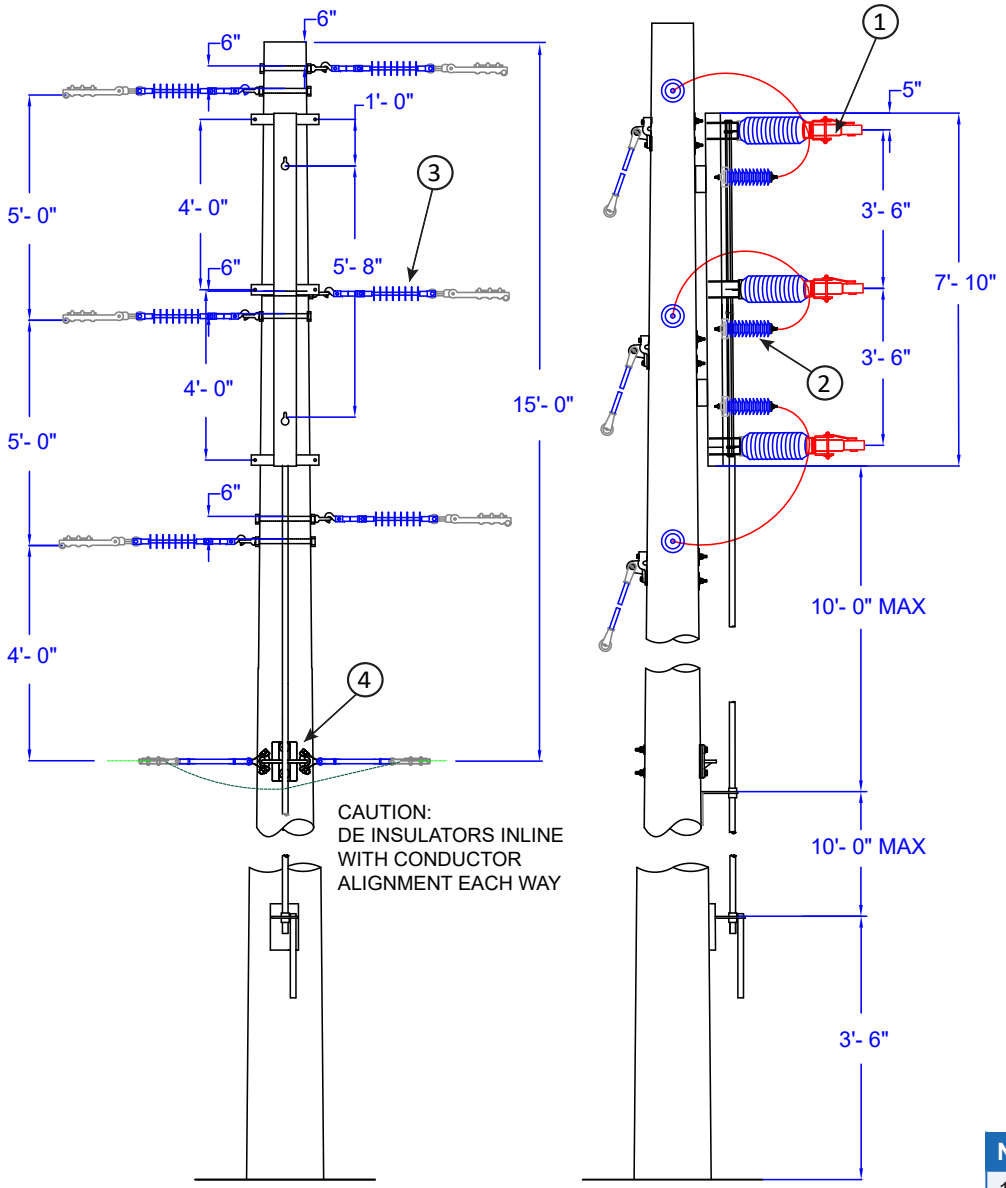
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

600 AMP HORIZONTAL LBS TOP-CIRCUIT FRAMING

OSW6LH-TC



LINE DEPARTMENT TASKS			
TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH			
ITEM 1	OSW12LV	1200A LBS VERTICAL	1
INSTALL ARRESTERS			
ITEM 2 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL FRAMING			
ITEM 3 SELECT ONE	O3SV-EX-477	3 PH, STEEL, VERTICAL EXTENSION 477	2
	O3SV-EX-795	3 PH, STEEL, VERTICAL EXTENSION 795	2
	O3SV-EX-1351	3 PH, STEEL, VERTICAL EXTENSION 1351	2
ITEM 4	OB-DDE	BRACKET, DBL DEADEND ANGLE	1

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 1200 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS_____
POLE NUMBER
OSW12LV-NC
O3SV-EX-_____

I-6-12kV SUR. ARR.

NOTES

1. See the chart on Pg. 21 for maximum line angles when the conductor is attached to the switch.

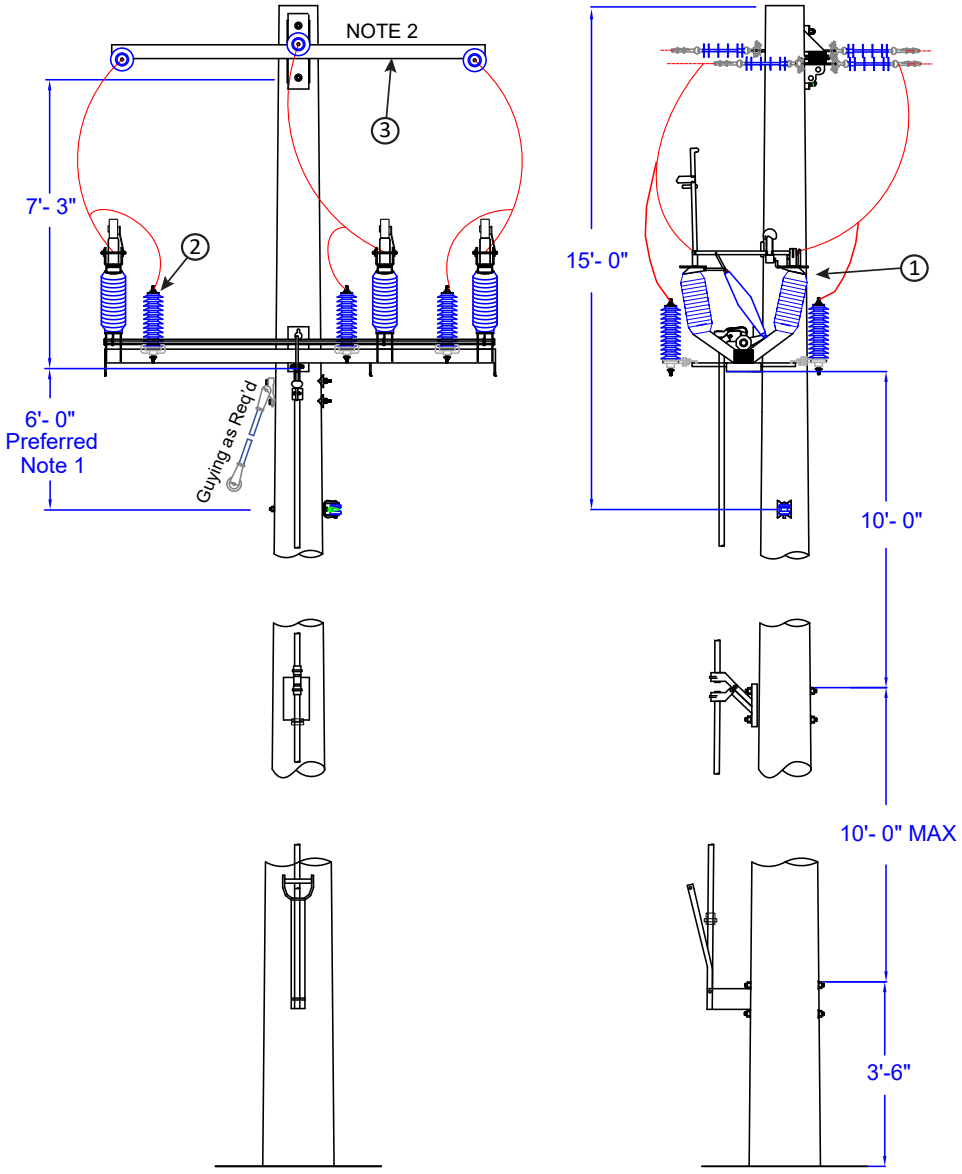
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

1200 AMP VERTICAL LBS IN-CIRCUIT FRAMING

OSW12LV-NC



LINE DEPARTMENT TASKS			
TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH			
ITEM 1	OSW12LH	1200A LBS HORIZONTAL	1
INSTALL ARRESTERS			
ITEM 2 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL FRAMING			
ITEM 3 SELECT ONE	O3SS-DD-477	3 PH, STEEL, HOR., SNG ARM, DDE 4/0-477	1
	O3SS-DD-795	3 PH, STEEL, HOR., SNG ARM, DDE 795	1
	O3SS-DD1351	3 PH, STEEL, HOR., DBL ARM, DDE 1351	1

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 1200 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS_____
POLE NUMBER
O3SS-DD-795
OSW12LH-UC
I-6-18kV SUR. ARR.

NOTES

1. Measurement allows for bucket access between neutral and switch.
2. Engineer to evaluate pole-top deflection & strength to support conductor loading above switch.

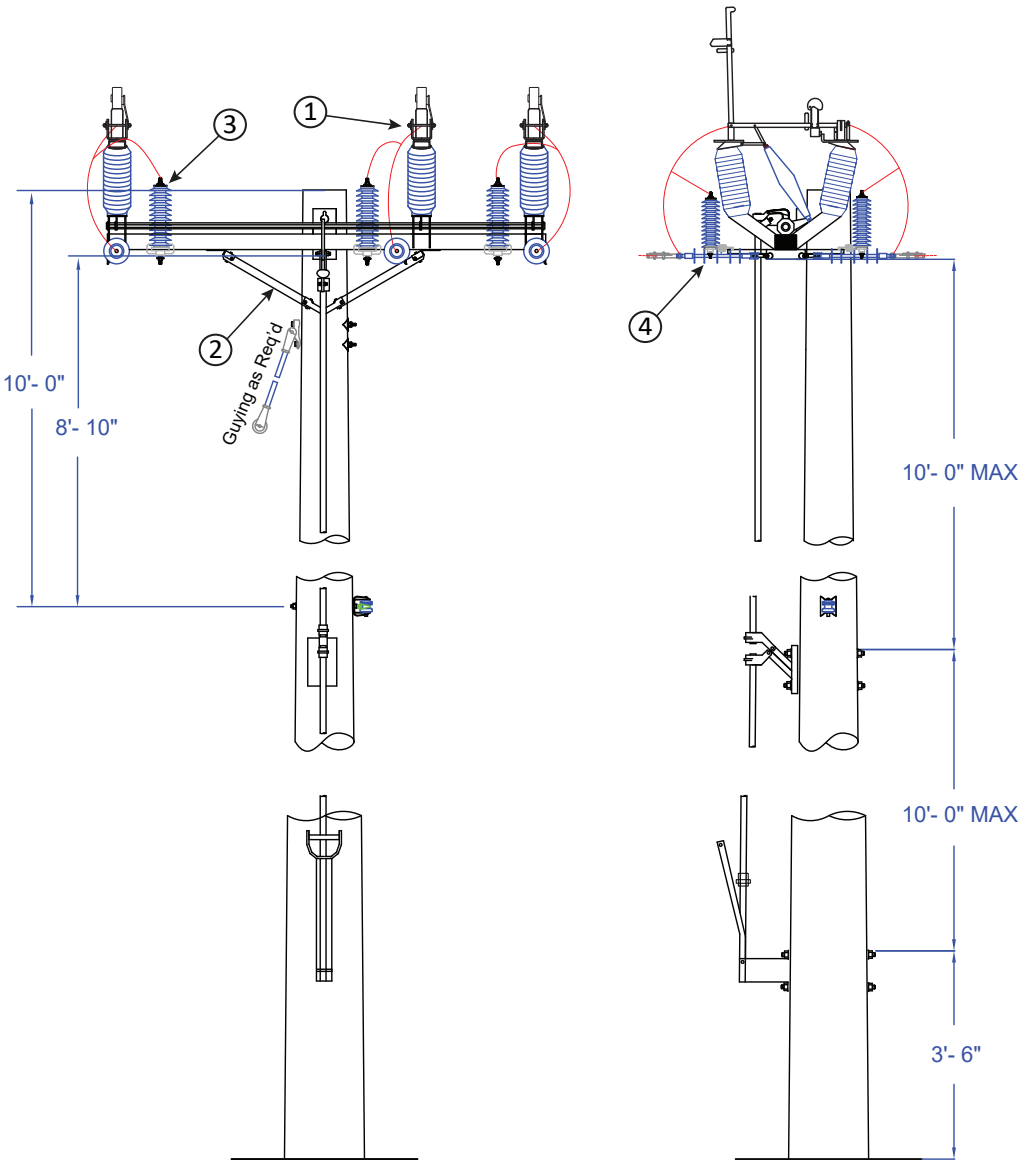
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

1200 AMP HORIZONTAL LBS UNDER-CIRCUIT FRAMING

OSW12LH-UC



LINE DEPARTMENT TASKS			
TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH			
ITEM 1	OSW12LH	1200A LBS HORIZONTAL	1
INSTALL XARM BRACES WHEN INSTALLED ON A WOOD POLE			
ITEM 2	OBRW60	BRACE, WOOD, PAIR, 60" SPACING	1
INSTALL ARRESTERS			
ITEM 3 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL CONDUCTOR DEAD-ENDS TO THE SWITCH			
ITEM 4 SELECT ONE	O3SX-EX	3 PH, STEEL, HORIZ. EXTENSION 6 -2/0	2
	O3SX-EX-477	3 PH, STEEL, HORIZ. EXTENSION 4/0 - 477	2

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 1200 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS_____
POLE NUMBER
OSW12LH-NC

I-6-18kV SUR. ARR.

NOTES

1. This configuration requires xarm braces on the switch base.
2. See the chart on Pg. 21 for maximum line angles when the conductor is attached to the switch.

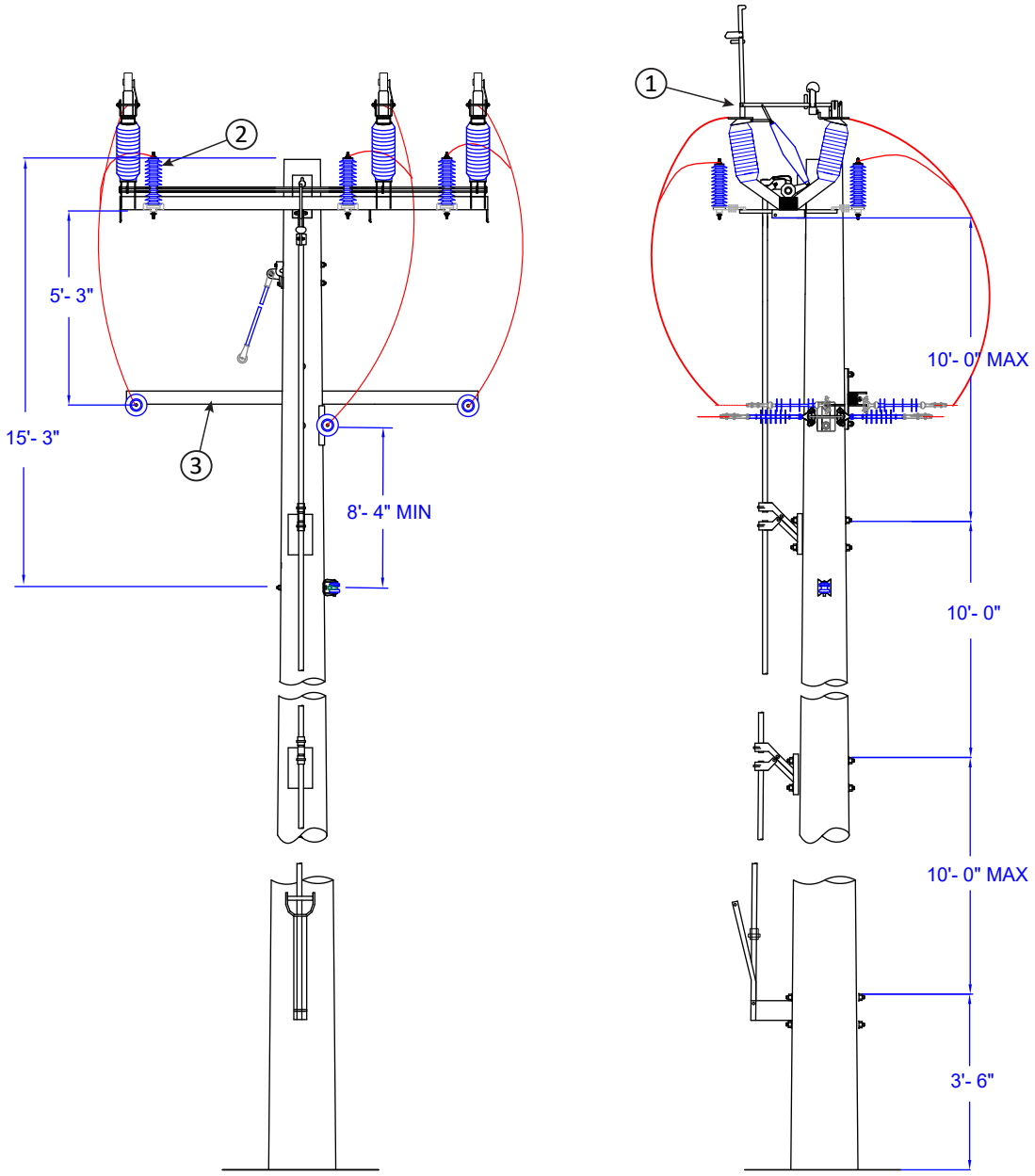
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

1200 AMP HORIZONTAL LBS IN-CIRCUIT FRAMING

OSW12LH-NC



LINE DEPARTMENT TASKS			
TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH			
ITEM 1	OSW12LH	1200A LBS HORIZONTAL	1
INSTALL ARRESTERS			
ITEM 2 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL FRAMING			
ITEM 3 SELECT ONE	O3SS-ODD-477	3 PHASE, STEEL, HORIZ. DDE 4/0-477	1
	O3SS-ODD-795	3 PHASE, STEEL, HORIZ. DDE 795	1
	O3SS-ODD-1351	3 PHASE, STEEL, HORIZ. DDE 1351	1

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 1200 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS_____
POLE NUMBER
OSW12LH-OC
O3SS-ODD-795

I-6-18kV SUR. ARR.

NOTES

1. Measurement allows for bucket access between neutral and crossarm.
2. This framing is to be used only when the switch must be installed at a location where the angle in the conductor exceeds the rating of the switch's base. This framing prevents conflicts between the guys and the switch.
3. The center phase conductor must be offset from the center line of the pole to clear rthe operating pipe.

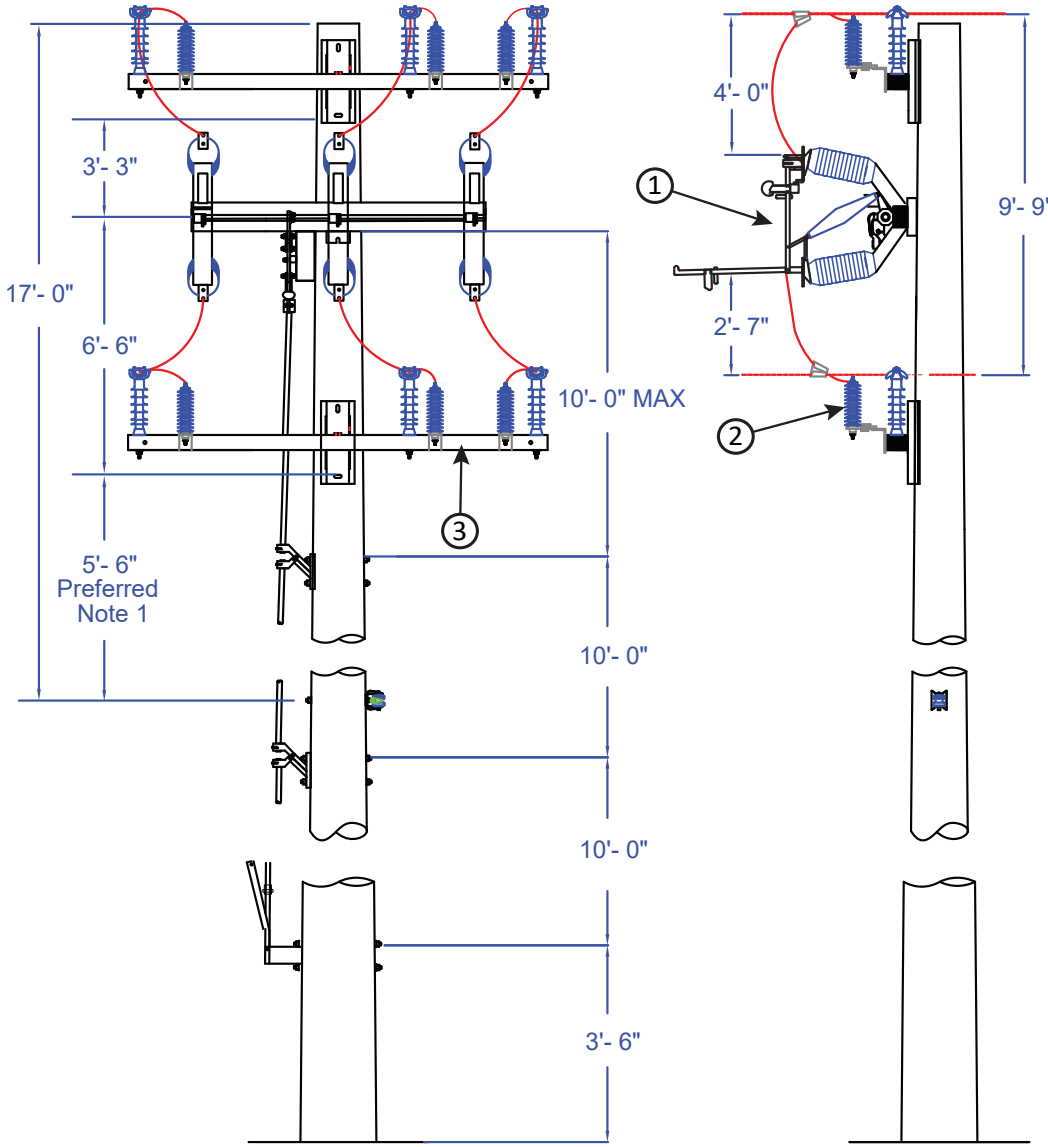
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

1200 AMP HORIZONTAL LBS OVER-CIRCUIT FRAMING

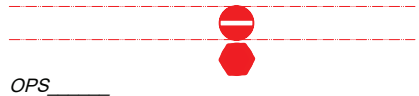
OSW12LH-OC



LINE DEPARTMENT TASKS			
TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH			
ITEM 1	OSW12LR	1200A LBS RISER OR CIRCUIT TIE	1
INSTALL ARRESTERS			
ITEM 2 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL FRAMING			
ITEM 3	VARIES	BASED ON CONDUCTOR & LINE ANGLE PER THE 3 PHASE FRAMING SECTION.	AS REQ'D

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 1200 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)



OPS_____
POLE NUMBER
O3SS-____
OSW12LH-CT
O3SS-____

I-6-18kV SUR. ARR.

NOTES

1. Measurement allows for bucket access between neutral and crossarm.

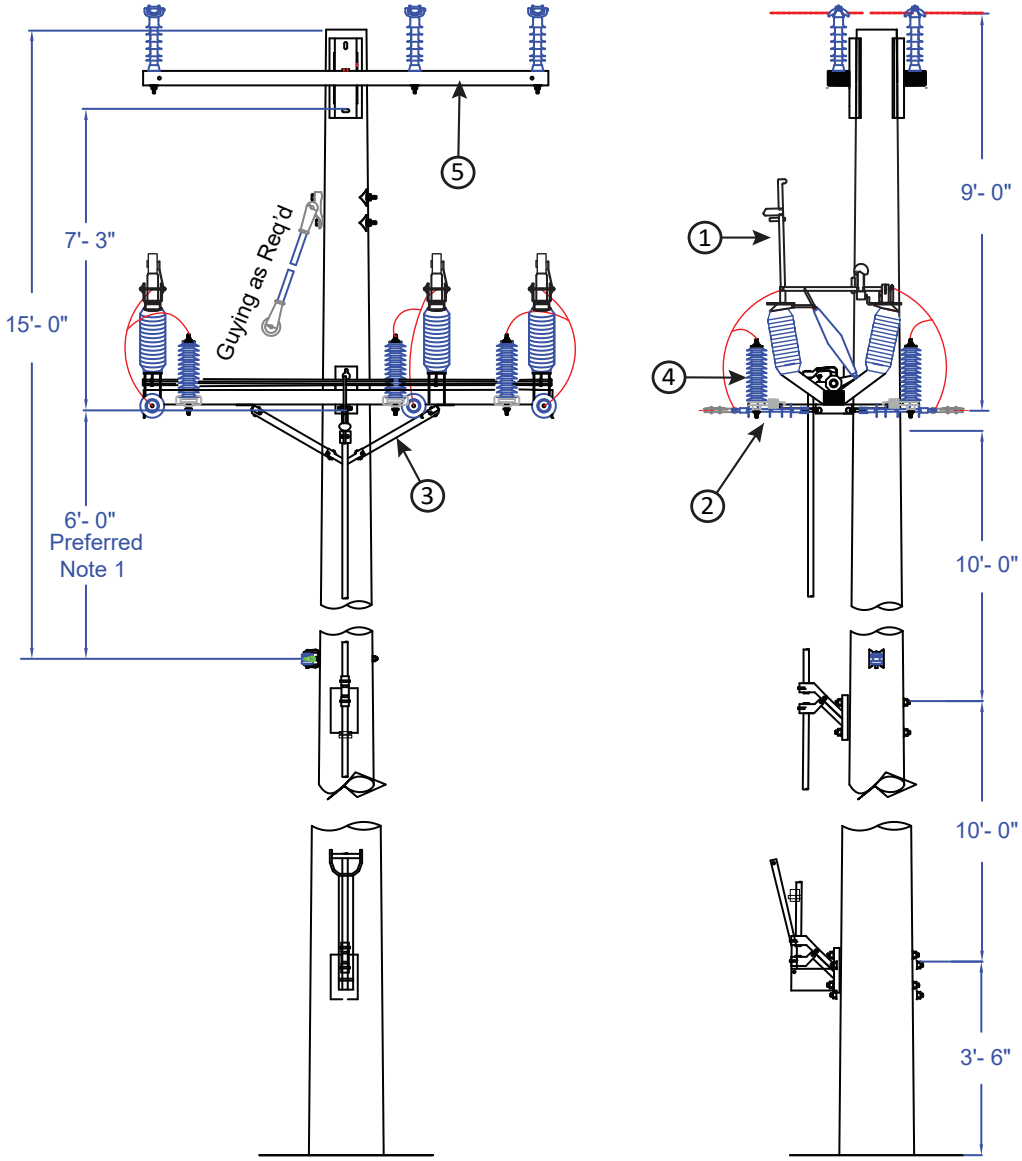
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

1200 AMP TIE-CIRCUIT LBS FRAMING

OSW12LH-CT



LINE DEPARTMENT TASKS			
TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH			
ITEM 1	OSW12LH	1200A LBS HORIZONTAL	1
ITEM 2 SELECT ONE	O3SX-EX	3 PH, STEEL, HORIZ. EXTENSION 6 - 2/0	2
	O3SX-EX-477	3 PH, STEEL, HORIZ. EXTENSION 477	2
	O3SX-EX-795	3 PH, STEEL, HORIZ. EXTENSION 795	2
INSTALL XARM BRACES WHEN INSTALLED ON A WOOD POLE			
ITEM 3	OBRW60	BRACE, WOOD, PAIR, 60" SPACING	1
INSTALL ARRESTERS			
ITEM 4 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL FRAMING			
ITEM 5	VARIES	BASED ON CONDUCTOR & LINE ANGLE PER THE 3 PHASE FRAMING SECTION.	AS REQ'D

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 1200 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS_____
POLE NUMBER
O3SD-_____
OSW12LH-BC

I-6-18kV SUR. ARR.

NOTES

1. Measurement allows for bucket access between neutral and switch.
2. This configuration requires xarm braces on the switch base.
3. See the chart on Pg. 21 for maximum line angles when the conductor is attached to the switch base.

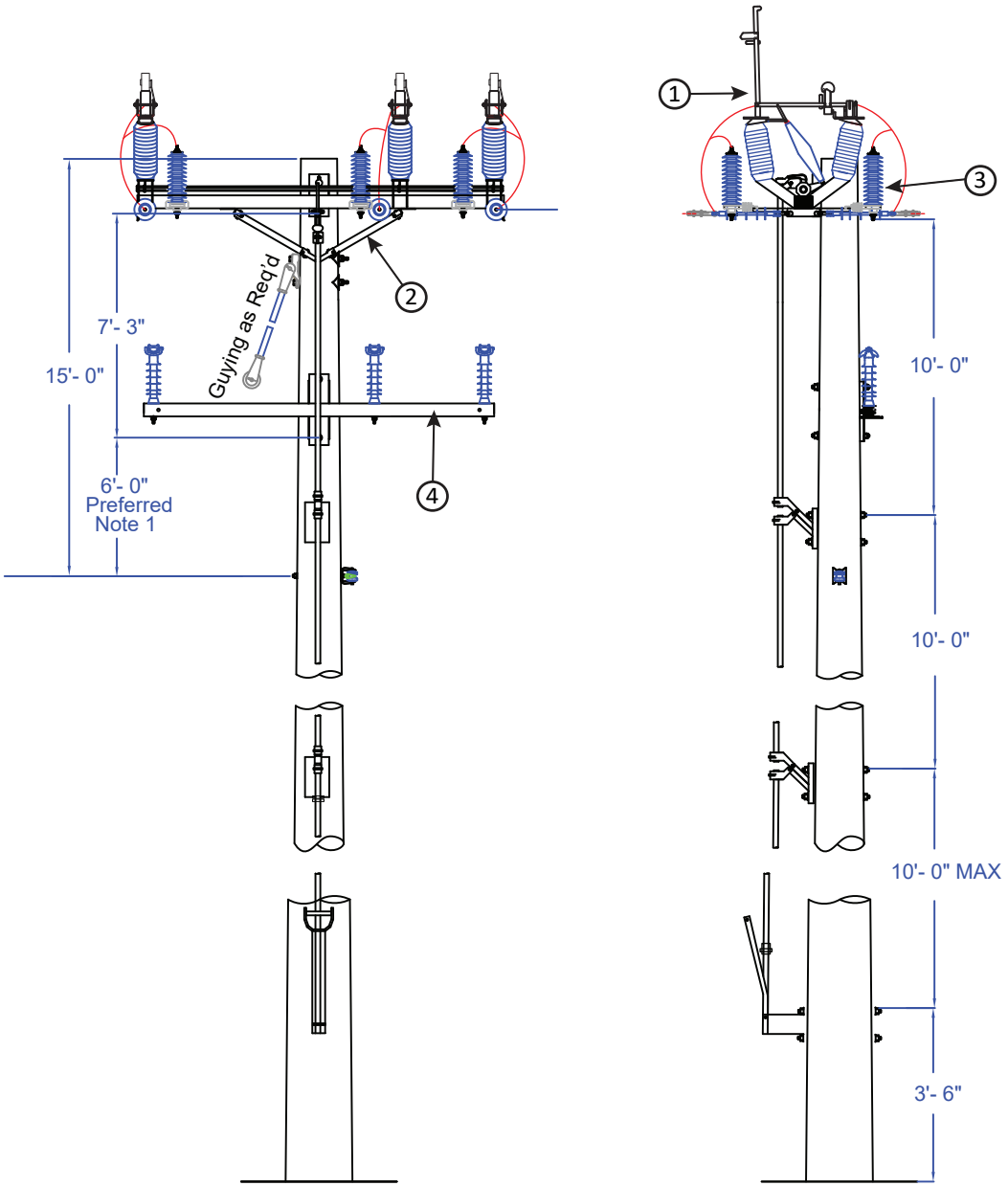
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

1200 AMP HORIZONTAL LBS BOTTOM-CIRCUIT FRAMING

OSW12LH-BC



LINE DEPARTMENT TASKS			
TASK	**CU**	**DESCRIPTION**	**QTY**
INSTALL SWITCH			
ITEM 1	**OSW12LH**	**1200A LBS HORIZONTAL**	**1**
	O3SX-EX	**3 PH, STEEL, HORIZ. EXTENSION 6 - 2/0**	**2**
	O3SX-EX-477	**3 PH, STEEL, HORIZ. EXTENSION 477**	**2**
	O3SX-EX-795	**3 PH, STEEL, HORIZ. EXTENSION 795**	**2**
INSTALL XARM BRACES WHEN INSTALLED ON WOOD POLES			
ITEM 2	**OBRW60**	**BRACE, WOOD, PAIR, 60" SPACING**	**1**
INSTALL ARRESTERS			
ITEM 3 SELECT ONE	**OLA18**	**18kV SURGE ARRESTERS FOR 23.9kV AREA**	**6**
	OLA12	**12kV SURGE ARRESTERS FOR 13.8kV AREA**	**6**
INSTALL FRAMING			
ITEM 4	**VARIES**	**BASED ON CONDUCTOR & LINE ANGLE PER THE 3 PHASE FRAMING SECTION.**	**AS REQ'D**

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 1200 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS_____
POLE NUMBER
OSW12LH-TC
O3SS-_____

I-6-18kV SUR. ARR.

NOTES

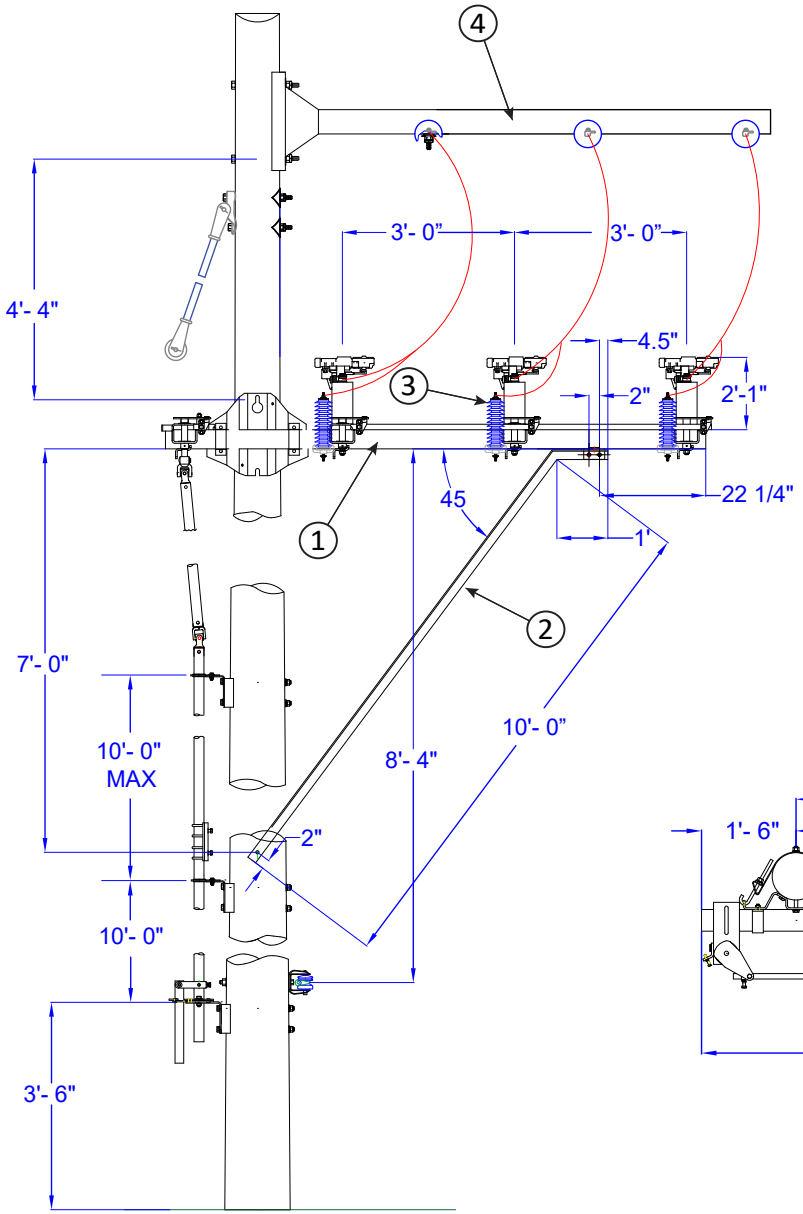
1. Measurement allows for bucket access between neutral and crossarm.
2. This configuration requires xarm braces on the switch base.
3. See the chart on Pg. 21 for maximum line angles when the conductor is attached to the switch base.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

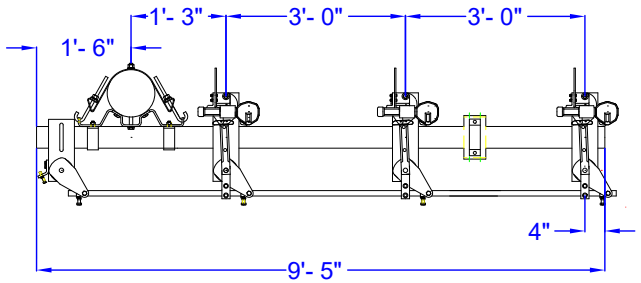
PROTECTION

NES

1200 AMP HORIZONTAL LBS TOP-CIRCUIT FRAMING



LINE DEPARTMENT TASKS			
TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH—INCLUDES ALLEY ARM BRACE			
ITEM 1	OSW9LAA INCLUDES BRACE	SWITCH, 900A, LD BRK. GANG OP. ALLEY AR	1
ITEM 2		BRACE ALLEY ARM 10 (ITEM # 180520000)	N/A
INSTALL ARRESTERS			
ITEM 3 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL FRAMING			
ITEM 4	03SA-DD-795	3 PHASE; STEEL, ALLEY ARM; DDE 795	1



TOP VIEW DETAIL

DRAWING SYMBOL USED WITH NOTATIONS

SW#
I - 900 AMP LBS
NORMALLY OPEN
(CHECK WITH OPERATIONS)

OPS_____
POLE NUMBER
O3SS-DD-477
OSW9LAA-UC

I-6-12kV SUR. ARR.

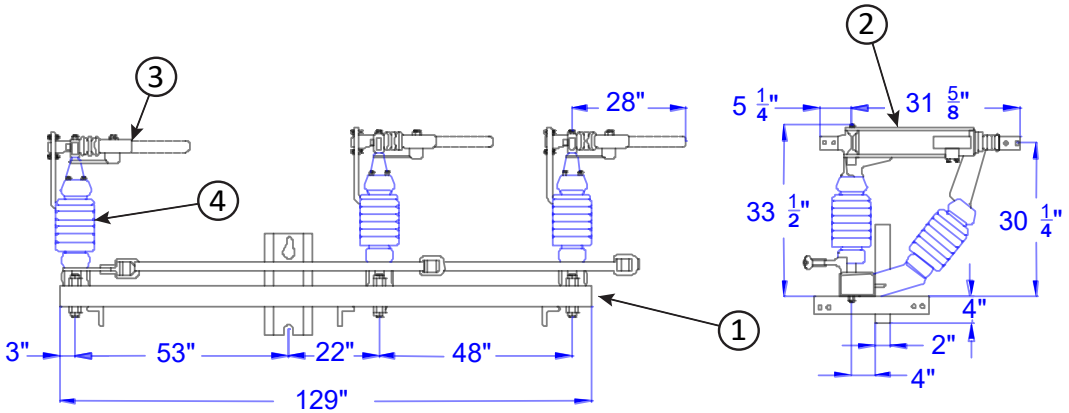
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

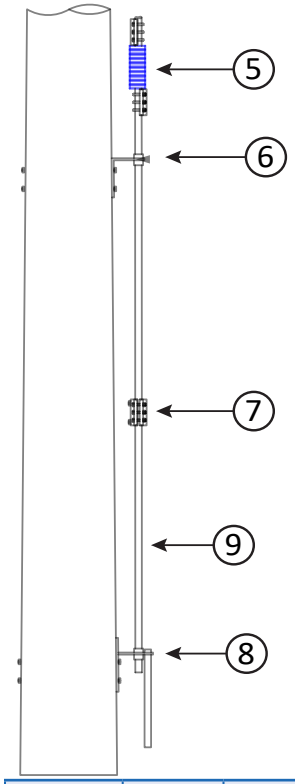
PROTECTION

NES

900AMP ALLEY ARM LBS UNDER-CIRCUIT FRAMING

OSW9LAA-UC





TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	BOLT MACH AVERAGE 3/4 LONG	204075000
12	BOLT MACHINE SS 1/2X1 3/4	204370000
2	3/4" DBL COIL SPRING WASHER	206580000
2	WASHER SQ CURVED 1	209530000
12	WASHER SQ FLAT 3/4 H	209620000
6	CONNECTOR, PERCUSSION AVERAGE	224099900
6	CARTRIDGE, PERCUSSION AVERAGE	224143100
6	LUG, PERCUSSION, AVERAGE	233849900
8	BOLT MACH AVERAGE 5/8 LONG	203775000
8	WASHER SQ CURVED 3 1/2	209520000
8	5/8" DBL COIL SPRING WASHER	206570000

VOLTAGE RATING: 34.5KV NOMINAL, 38KV MAX., 200KV BIL
CURRENT RATINGS: 600 AMPS CONTINUOUS AND INTERRUPTING
940 AMP 8 HOUR OVERLOAD CAPABILITY AT 104 DEGREES F
3 SECOND 25,000 AMP RMS ASYMMETRICAL
40,000 AMP MOMENTARY RMS ASYMMETRICAL
15,000 AMPS RMS ASYMMETRICAL ONE-TIME FAULT CLOSING DUTY CYCLE.

MECHANICAL STRENGTH: CONDUCTOR TENSION LOADS
MAXIMUM DEAD-END TENSION WHEN CONDUCTOR TENSION IS BALANCED
ON BOTH SIDES OF THE SWITCH = 8000LBS
MAXIMUM UNBALANCED DEAD-END TENSION LOAD = 2000LBS

FRM. CODE	OSW6LH	MATERIAL LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	600 AMP LOAD BREAK SWITCH HORIZ.	151830000
SPARE PARTS LIST			
2	AS REQ	SW PT S&C 600A BLADE ASSY	152020000
3	AS REQ	SW PT S&C 600A INTERRUPTER	152024000
4	AS REQ	SW PT S&C 600A POST INSULATOR	152025000
5	AS REQ	SW PT S&C 600A FIBERGLASS SHAFT	152022000
6	AS REQ	SW PT BRIDGES 600A PIPE GUIDES	152013000
7	AS REQ	COUPLER 1 1/2 FOR AB SW HANDLE	150152000
8	AS REQ	SW PT S&C 600A HANDLE ASSY	152023000
9	AS REQ	PIPE GALVANIZED 1-1/2" DIAMETER	464640000
10	AS REQ	BRAID, CU/TINNED, 400A, 24"	400155000

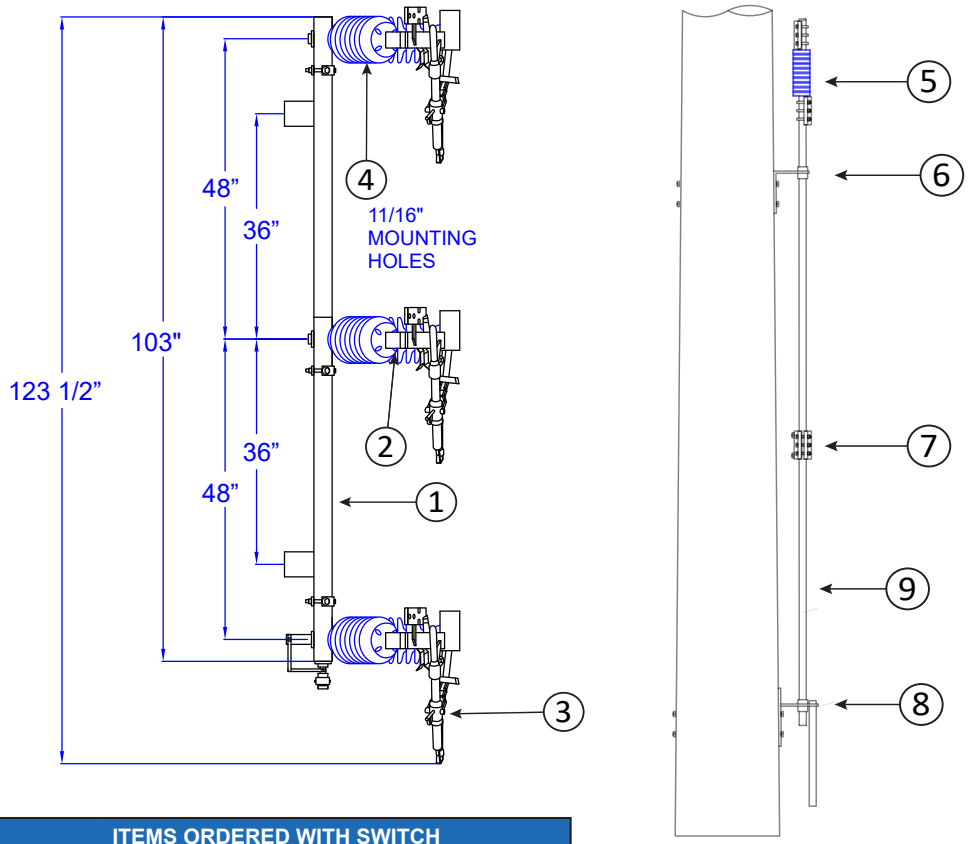
ITEMS ORDERED WITH SWITCH	
QTY	DESCRIPTION
40'	OPERATING PIPE 1-1/2"
2	UNIVERSAL JOINT
3	PIPE GUIDE ASSEMBLY
1	OPERATING HANDLE
1	HANDLE GROUND STRAP
3	BRACKETS FOR MOUNTING 6 ARRESTERS
1	INSULATOR FOR OPERATING PIPE
3	INTERRUPTERS
1	FIBERGLASS OPERATING PIPE SECTION

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

600A (S&C) HORIZONTAL ROTATING SIDE BREAK MATERIAL DETAILS



FRM. CODE	OSW6LV	MATERIAL LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	600 AMP LOAD BREAK SWITCH VERT.	151832000
SPARE PARTS LIST			
2	AS REQ	SW PT BRIDGES 600A BLADE ASSY	152010000
3	AS REQ	SW PT BRIDGES 600A INTERRUPTER	152015000
4	AS REQ	SW PT BRIDGES 600A INSULATOR	152014000
5	AS REQ	SW PT S&C 600A FIBERGLASS SHAFT	152022000
6	AS REQ	SW PT BRIDGES 600A PIPE GUIDES	152013000
7	AS REQ	COUPLER 1 1/2 FOR AB SW HANDLE	150152000
8	AS REQ	SW PT BRIDGES 600A HANDLE ASSY	152012000
9	AS REQ	PIPE GALVANIZED 1-1/2” DIAMETER	464640000
10	AS REQ	BRAID, CU/TINNED, 400A, 24"	400155000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
12	BOLT MACHINE SS 1/2X1 3/4	204370000
12	WASHER SQ FLAT 3/4 H	209620000
12	3/4” DBL COIL SPRING WASHER	206580000
6	CONNECTOR, PERCUSSION AVERAGE	224099900
6	CARTRIDGE, PERCUSSION AVERAGE	224143100
6	LUG, PERCUSSION, AVERAGE	233849900
10	BOLT MACH AVERAGE 5/8 LONG	203775000
10	WASHER SQ CURVED 3 1/2	209520000
10	5/8” DBL COIL SPRING WASHER	206570000

ITEMS ORDERED WITH SWITCH	
QTY	DESCRIPTION
40’	OPERATING PIPE 1-1/2”
2	UNIVERSAL JOINT
3	PIPE GUIDE ASSEMBLY
1	OPERATING HANDLE
1	HANDLE GROUND STRAP
6	BRACKETS FOR MOUNTING 6 ARRESTERS
1	INSULATOR FOR OPERATING PIPE
3	INTERRUPTERS
1	FIBERGLASS OPERATING PIPE SECTION

VOLTAGE RATING: 34.5KV NOMINAL, 38KV MAX., 200KV BIL
CURRENT RATINGS: 900 AMPS CONTINUOUS
1100 AMP 8 HOUR OVERLOAD CAPABILITY AT 104°F
3 SECOND 25,000 AMP RMS ASYMMETRICAL
40,000 AMP MOMENTARY RMS ASYMMETRICAL
20,000 AMPS RMS ASYMMETRICAL ONE-TIME FAULT CLOSING DUTY CYCLE.

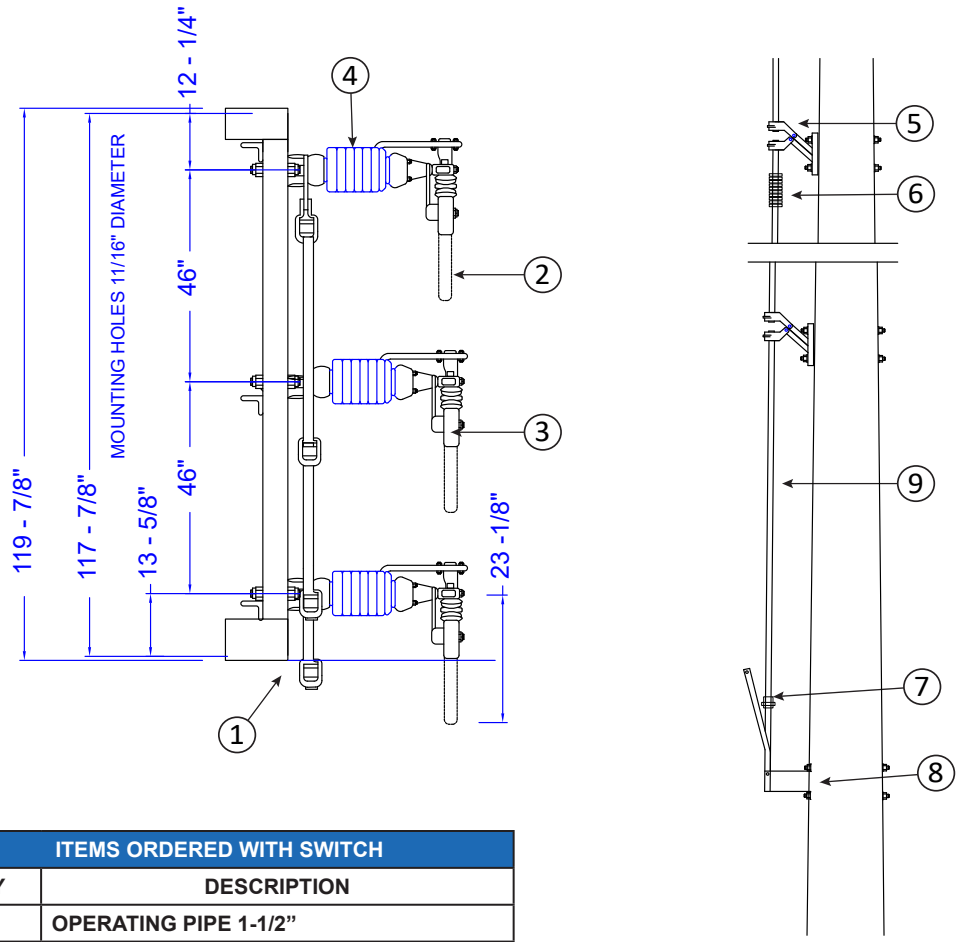
MECHANICAL STRENGTH: CONDUCTOR TENSION LOADS
MAXIMUM DEAD-END TENSION WHEN CONDUCTOR TENSION IS BALANCED
ON BOTH SIDES OF THE SWITCH = 8000LBS
MAXIMUM UNBALANCED DEAD-END TENSION LOAD = 2000LBS

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

600 AMP (BRGS) VERTICAL POLE ROTATING VERTICAL BREAK MATERIAL DETAILS



FRM. CODE	OSW6LV	MATERIAL LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	600 AMP LOAD BREAK SWITCH VERT.	151832000
		SPARE PARTS LIST	
2	AS REQ	SW PT S&C 600A BLADE ASSY	152020000
3	AS REQ	SW PT S&C 600A INTERRUPTER	152024000
4	AS REQ	SW PT S&C 600A POST INSULATOR	152025000
5	AS REQ	COUPLER 1.25" SPRING LOADED S&C	150154000
6	AS REQ	SW PT S&C 600A FIBERGLASS SHAFT	152022000
7	AS REQ	COUPLER 1 1/4 FOR AB SW HANDLE	150150000
8	AS REQ	SW PT S&C 1200A HANDLE ASSY	152031000
9	AS REQ	PIPE GALVANIZED 1-1/4" DIAMETER	464630000
10	AS REQ	BRAID, CU/TINNED, 400A, 24"	400155000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
12	BOLT MACHINE SS 1/2X1 3/4	204370000
12	WASHER SQ FLAT 3/4 H	209620000
12	3/4" DBL COIL SPRING WASHER	206580000
6	CONNECTOR, PERCUSSION AVERAGE	224099900
6	CARTRIDGE, PERCUSSION AVERAGE	224143100
6	LUG, PERCUSSION, AVERAGE	233849900
10	BOLT MACH AVERAGE 5/8 LONG	203775000
10	WASHER SQ CURVED 3 1/2	209520000
10	5/8" DBL COIL SPRING WASHER	206570000

ITEMS ORDERED WITH SWITCH	
QTY	DESCRIPTION
40'	OPERATING PIPE 1-1/2"
2	UNIVERSAL JOINT
3	PIPE GUIDE ASSEMBLY
1	OPERATING HANDLE
1	HANDLE GROUND STRAP
3	BRACKETS FOR MOUNTING 6 ARRESTERS
1	INSULATOR FOR OPERATING PIPE
3	INTERRUPTERS
1	FIBERGLASS OPERATING PIPE SECTION

VOLTAGE RATING: 34.5KV NOMINAL, 38KV MAX., 200KV BIL
CURRENT RATINGS: 600 AMPS CONTINUOUS
940 AMP 8 HOUR OVERLOAD CAPABILITY AT 104° F
3 SECOND 25,000 AMP RMS ASYMMETRICAL
40,000 AMP MOMENTARY RMS ASYMMETRICAL
15,000 AMPS RMS ASYMMETRICAL ONE-TIME FAULT CLOSING DUTY CYCLE.

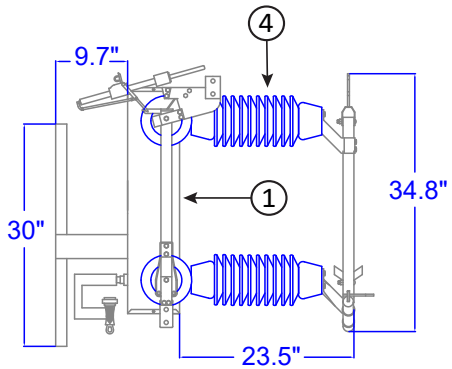
MECHANICAL STRENGTH: CONDUCTOR TENSION LOADS
MAXIMUM DEAD-END TENSION WHEN CONDUCTOR TENSION IS BALANCED
ON BOTH SIDES OF THE SWITCH = 8000LBS
MAXIMUM UNBALANCED DEAD-END TENSION LOAD = 2000LBS

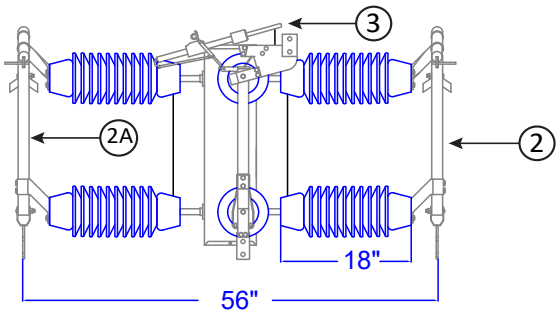
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

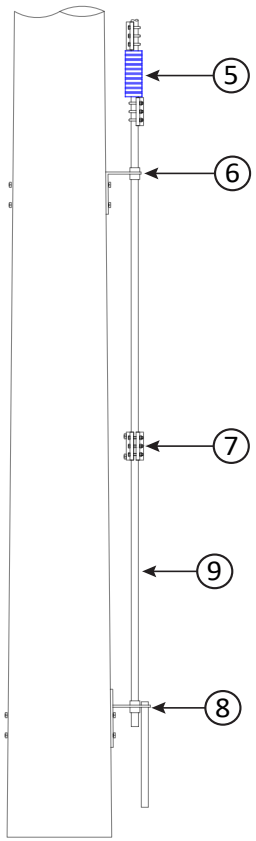
PROTECTION

NES

600 AMP (S&C) VERTICAL POLE ROTATING VERTICAL BREAK MATERIAL DETAILS







FRM. CODE	OSW6LR	MATERIAL LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	600 AMP LOAD BREAK SWITCH, RISER	151834000
SPARE PARTS LIST			
2	AS REQ	SW PT BRIDGES 900A BLADE ASSY RH	
2A	AS REQ	SW PT BRIDGES 900A BLADE ASSY RH	
3	AS REQ	SW PT BRIDGES 600A INTERRUPTER	152015000
4	AS REQ	SW PT BRIDGES 600A INSULATOR RISER	
5	AS REQ	SW PT S&C 600A FIBERGLASS SHAFT	152022000
6	AS REQ	SW PT BRIDGES 600A PIPE GUIDES	152013000
7	AS REQ	COUPLER 1 1/2 FOR AB SW HANDLE	150152000
8	AS REQ	SW PT BRIDGES 600A HANDLE ASSY	152012000
9	AS REQ	PIPE GALVANIZED 1-1/2" DIAMETER	464640000
10	AS REQ	BRAID, CU/TINNED, 400A, 24"	400155000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
12	BOLT MACHINE SS 1/2X1 3/4	204370000
12	WASHER SQ FLAT 3/4 H	209620000
12	3/4" DBL COIL SPRING WASHER	206580000
6	CONNECTOR, PERCUSSION AVERAGE	224099900
6	CARTRIDGE, PERCUSSION AVERAGE	224143100
6	LUG, PERCUSSION, AVERAGE	233849900
10	BOLT MACH AVERAGE 5/8 LONG	203775000
10	WASHER SQ CURVED 3 1/2	209520000
10	5/8" DBL COIL SPRING WASHER	206570000

ITEMS ORDERED WITH SWITCH	
QTY	DESCRIPTION
40'	OPERATING PIPE 1-1/2"
2	UNIVERSAL JOINT
3	PIPE GUIDE ASSEMBLY
1	OPERATING HANDLE
1	HANDLE GROUND STRAP
3-6	BRACKETS FOR MOUNTING 6 ARRESTERS
1	INSULATOR FOR OPERATING PIPE
3	INTERRUPTERS
1	FIBERGLASS OPERATING PIPE SECTION

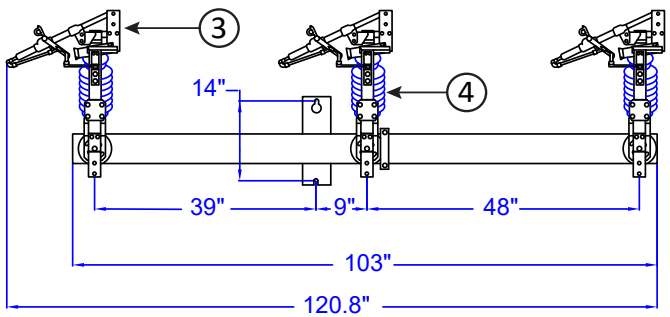
VOLTAGE RATING: 34.5KV NOMINAL, 38KV MAX., 200KV BIL
CURRENT RATINGS: 900 AMPS CONTINUOUS
1100 AMP 8 HOUR OVERLOAD CAPABILITY AT 104^{O} F
3 SECOND 25,000 AMP RMS ASYMMETRICAL
40,000 AMP MOMENTARY RMS ASYMMETRICAL
20,000 AMPS RMS ASYMMETRICAL ONE-TIME FAULT CLOSING DUTY CYCLE.

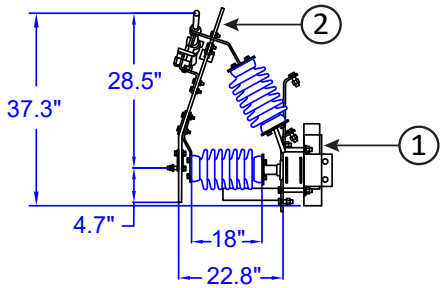
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

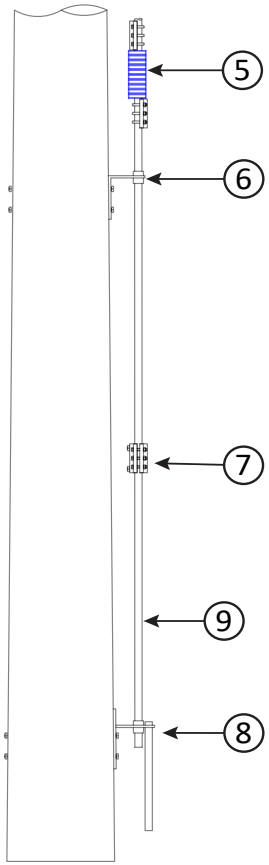
PROTECTION

NES

600A (BRGS) NARROW RISER ROTATING VERTICAL BREAK MATERIAL DETAILS







FRM. CODE	OSW6LR	MATERIAL LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	600 AMP LOAD BREAK SWITCH, RISER	151834000
SPARE PARTS LIST			
2	AS REQ	SW PT BRIDGES 600A BLADE ASSY	152010000
3	AS REQ	SW PT BRIDGES 600A INTERRUPTER	152015000
4	AS REQ	SW PT BRIDGES 600A INSULATOR	152014000
5	AS REQ	SW PT S&C 600A FIBERGLASS SHAFT	152022000
6	AS REQ	SW PT BRIDGES 600A PIPE GUIDES	152013000
7	AS REQ	COUPLER 1 1/2 FOR AB SW HANDLE	150152000
8	AS REQ	SW PT BRIDGES 600A HANDLE ASSY	152012000
9	AS REQ	PIPE GALVANIZED 1-1/2" DIAMETER	464640000
10	AS REQ	BRAID, CU/TINNED, 400A, 24"	400155000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
12	BOLT MACHINE SS 1/2X1 3/4	204370000
12	WASHER SQ FLAT 3/4 H	209620000
12	3/4" DBL COIL SPRING WASHER	206580000
6	CONNECTOR, PERCUSSION AVERAGE	224099900
6	CARTRIDGE, PERCUSSION AVERAGE	224143100
6	LUG, PERCUSSION, AVERAGE	233849900
10	BOLT MACH AVERAGE 5/8 LONG	203775000
10	WASHER SQ CURVED 3 1/2	209520000
10	5/8" DBL COIL SPRING WASHER	206570000

ITEMS ORDERED WITH SWITCH	
QTY	DESCRIPTION
42'	OPERATING PIPE 1-1/2"
2	UNIVERSAL JOINT
3	PIPE GUIDE ASSEMBLY
1	OPERATING HANDLE
1	HANDLE GROUND STRAP
3-6	BRACKETS FOR MOUNTING 6 ARRESTERS
1	INSULATOR FOR OPERATING PIPE
3	INTERRUPTERS
1	FIBERGLASS OPERATING PIPE SECTION

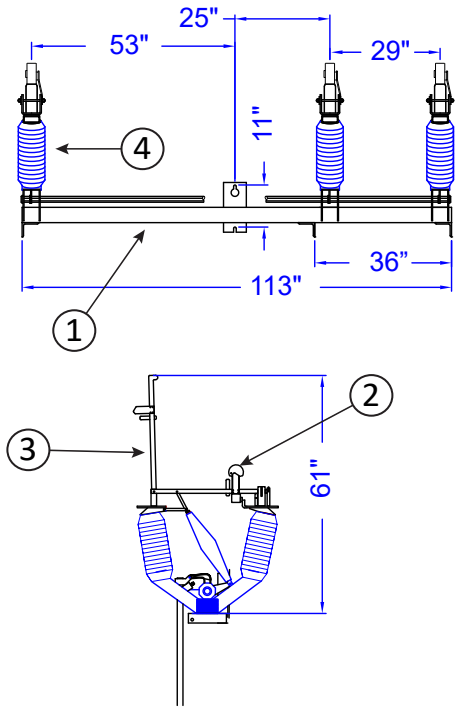
VOLTAGE RATING: 34.5KV NOMINAL, 38KV MAX., 200KV BIL
CURRENT RATINGS: 900 AMPS CONTINUOUS
1100 AMP 8 HOUR OVERLOAD CAPABILITY AT 104^{O} F
3 SECOND 25,000 AMP RMS ASYMMETRICAL
40,000 AMP MOMENTARY RMS ASYMMETRICAL
20,000 AMPS RMS ASYMMETRICAL ONE-TIME FAULT CLOSING DUTY CYCLE.

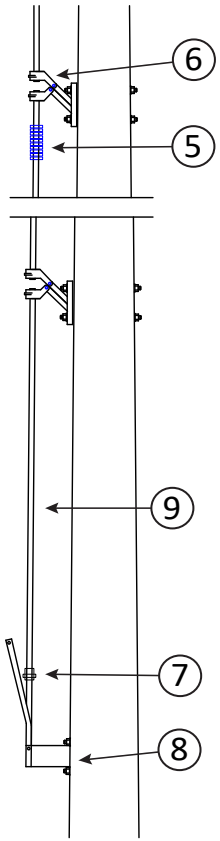
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

600A (S&C) RISER POLE ROTATING VERTICAL BREAK MATERIAL DETAILS





FRM. CODE	OSW12LH	MATERIAL LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	1200 AMP LOAD BREAK SWITCH HORIZ.	151840000
		SPARE PARTS LIST	
2	AS REQ	SW PT S&C 1200A INTERRUPTER	152032000
3	AS REQ	SW PT S&C 1200A BLADE ASSY	152030000
4	AS REQ	SW PT S&C 1200A POST INSULATOR	152033000
5	AS REQ	SW PT S&C FIBERGLASS SHAFT	152022000
6	AS REQ	COUPLER 1.25" SPRING LOADED S&C	150154000
7	AS REQ	COUPLER 1 1/4 FOR AB SW HANDLE	150150000
8	AS REQ	SW PT S&C 1200A HANDLE ASSY	152031000
9	AS REQ	PIPE GALVANIZED 1-1/4" DIAMETER	464630000
10	AS REQ	BRAID, CU/TINNED, 400A, 24"	400155000

ITEMS ORDERED WITH SWITCH	
QTY	DESCRIPTION
40'	OPERATING PIPE 1-1/4"
2	UNIVERSAL JOINT
3	PIPE GUIDE ASSEMBLY
1	OPERATING HANDLE
1	HANDLE GROUND STRAP
3	BRACKETS FOR MOUNTING 6 ARRESTERS
1	INSULATOR FOR OPERATING PIPE
3	INTERRUPTERS

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	BOLT MACH AVERAGE 3/4 LONG	204075000
12	BOLT MACHINE SS 1/2X1 3/4	204370000
2	3/4" DBL COIL SPRING WASHER	206580000
2	WASHER SQ CURVED 1	209530000
12	WASHER SQ FLAT 3/4 H	209620000
6	CONNECTOR, PERCUSSION AVERAGE	224099900
6	CARTRIDGE, PERCUSSION AVERAGE	224143100
6	LUG, PERCUSSION, AVERAGE	233849900
10	BOLT MACH AVERAGE 5/8 LONG	203775000
10	WASHER SQ CURVED 3 1/2	209520000
10	5/8" DBL COIL SPRING WASHER	206570000

VOLTAGE RATING: 34.5KV NOMINAL, 38KV MAX., 200KV BIL
CURRENT RATINGS: 900 AMPS CONTINUOUS
1100 AMP 8 HOUR OVERLOAD CAPABILITY AT 104° F
3 SECOND 25,000 AMP RMS ASYMMETRICAL
40,000 AMP MOMENTARY RMS ASYMMETRICAL
20,000 AMPS RMS ASYMMETRICAL ONE-TIME FAULT CLOSING DUTY CYCLE.
MECHANICAL STRENGTH: CONDUCTOR TENSION LOADS
MAXIMUM DEAD-END TENSION WHEN CONDUCTOR TENSION IS BALANCED ON BOTH SIDES OF THE SWITCH = 8000LBS
MAXIMUM UNBALANCED DEAD-END TENSION LOAD = 2000LBS
MAXIMUM TRANSVERSE LOAD = 1000LBS

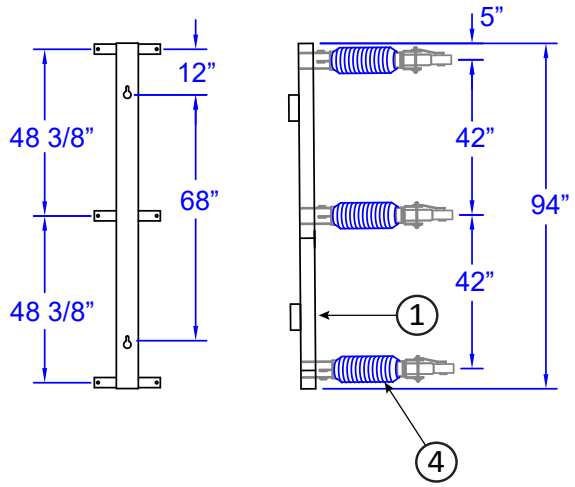
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

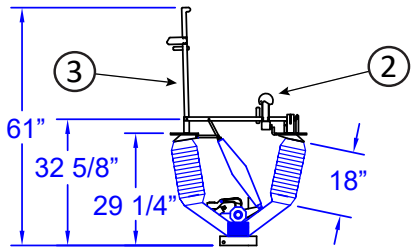
PROTECTION

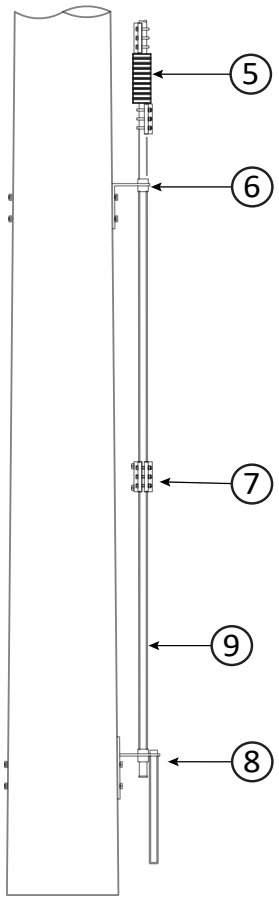
NES

1200 AMP HORIZONTAL RECIPROCATING VERTICAL BREAK MATERIAL DETAILS

OSW12LH







FRM. CODE	OSW12LV	MATERIAL LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	1200 AMP LOAD BREAK SWITCH VERT.	151845000
		SPARE PARTS LIST	
2	AS REQ	SW PT S&C 1200A INTERRUPTER	152032000
3	AS REQ	SW PT S&C 1200A BLADE ASSY	152030000
4	AS REQ	SW PT S&C 1200A POST INSULATOR	152033000
5	AS REQ	SW PT S&C FIBERGLASS SHAFT	152022000
6	AS REQ	SW PT BRIDGES 600A PIPE GUIDES	152013000
7	AS REQ	COUPLER 1 1/2 FOR AB SW HANDLE	150152000
8	AS REQ	SW PT S&C 600A HANDLE ASSY	152023000
9	AS REQ	PIPE GALVANIZED 1-1/2” DIAMETER	464640000
10	AS REQ	BRAID, CU/TINNED, 400A, 24"	400155000

ITEMS ORDERED WITH SWITCH	
QTY	DESCRIPTION
40’	OPERATING PIPE 1-1/4”
2	UNIVERSAL JOINT
3	PIPE GUIDE ASSEMBLY
1	OPERATING HANDLE
1	HANDLE GROUND STRAP
3	BRACKETS FOR MOUNTING 6 ARRESTERS
1	INSULATOR FOR OPERATING PIPE
3	INTERRUPTERS
1	FIBERGLASS OPERATING PIPE SECTION

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	BOLT MACH AVERAGE 3/4 LONG	204075000
12	BOLT MACHINE SS 1/2X1 3/4	204370000
2	3/4” DBL COIL SPRING WASHER	206580000
2	WASHER SQ CURVED 1	209530000
12	WASHER SQ FLAT 3/4 H	209620000
6	CONNECTOR, PERCUSSION AVERAGE	224099900
6	CARTRIDGE, PERCUSSION AVERAGE	224143100
6	LUG, PERCUSSION, AVERAGE	233849900
10	BOLT MACH AVERAGE 5/8 LONG	203775000
10	WASHER SQ CURVED 3 1/2	209520000
10	5/8” DBL COIL SPRING WASHER	206570000

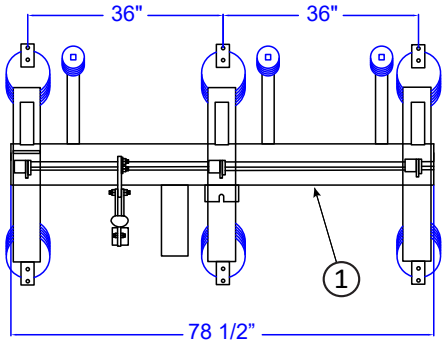
VOLTAGE RATING: 34.5KV NOMINAL, 38KV MAX., 200KV BIL
CURRENT RATINGS: 1200 AMPS CONTINUOUS
3 SECOND 25,000 AMP RMS ASYMMETRICAL
40,000 AMP MOMENTARY RMS ASYMMETRICAL
30,000 AMPS RMS ASYMMETRICAL ONE-TIME FAULT CLOSING DUTY CYCLE.
MECHANICAL STRENGTH: CONDUCTOR TENSION LOADS
MAXIMUM DEAD-END TENSION WHEN CONDUCTOR TENSION IS BALANCED ON BOTH SIDES OF THE SWITCH = 8000LBS
MAXIMUM UNBALANCED DEAD-END TENSION LOAD = 2000LBS
MAXIMUM TRANSVERSE LOAD = 1000LBS

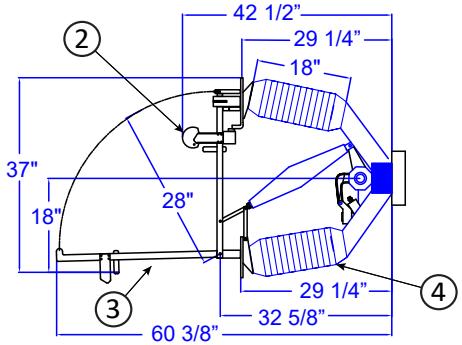
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

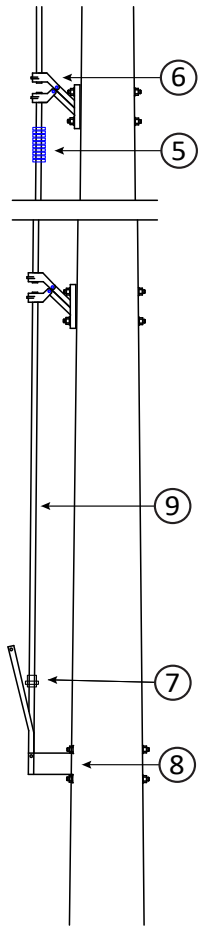
PROTECTION

NES

1200 AMP (S&C) VERTICAL POLE ROTATING HORIZONTAL MATERIAL DETAILS







FRM. CODE	OSW12LR	MATERIAL LIST	
ITEM #	QTY	DESCRIPTION	STOCK #
1	1	SW LB 1200A 35KV 3PGO VB VERT W/S RISER	151844000
		SPARE PARTS LIST	
2	AS REQ	SW PT S&C 1200A INTERRUPTER	152032000
3	AS REQ	SW PT S&C 1200A BLADE ASSY	152030000
4	AS REQ	SW PT S&C 1200A POST INSULATOR	152033000
5	AS REQ	SW PT S&C FIBERGLASS SHAFT	152022000
6	AS REQ	COUPLER 1.25" SPRING LOADED S&C	150154000
7	AS REQ	COUPLER 1 1/4 FOR AB SW HANDLE	150150000
8	AS REQ	SW PT S&C 1200A HANDLE ASSY	152031000
9	AS REQ	PIPE GALVANIZED 1-1/4” DIAMETER	464630000
10	AS REQ	BRAID, CU/TINNED, 400A, 24"	400155000

TRUCK STOCK ITEMS		
QTY	DESCRIPTION	STOCK #
2	BOLT MACH AVERAGE 3/4 LONG	204075000
12	BOLT MACHINE SS 1/2X1 3/4	204370000
2	3/4” DBL COIL SPRING WASHER	206580000
2	WASHER SQ CURVED 1	209530000
12	WASHER SQ FLAT 3/4 H	209620000
6	CONNECTOR, PERCUSSION AVERAGE	224099900
6	CARTRIDGE, PERCUSSION AVERAGE	224143100
6	LUG, PERCUSSION, AVERAGE	233849900
10	BOLT MACH AVERAGE 5/8 LONG	203775000
10	WASHER SQ CURVED 3 1/2	209520000
10	5/8” DBL COIL SPRING WASHER	206570000

ITEMS ORDERED WITH SWITCH	
QTY	DESCRIPTION
40’	OPERATING PIPE 1-1/4”
2	UNIVERSAL JOINT
3	PIPE GUIDE ASSEMBLY
1	OPERATING HANDLE
1	HANDLE GROUND STRAP
3	BRACKETS FOR MOUNTING 6 ARRESTERS
1	INSULATOR FOR OPERATING PIPE
3	INTERRUPTERS

VOLTAGE RATING: 34.5KV NOMINAL, 38KV MAX., 200KV BIL
CURRENT RATINGS: 1200 AMPS CONTINUOUS
3 SECOND 25,000 AMP RMS ASYMMETRICAL
40,000 AMP MOMENTARY RMS ASYMMETRICAL
30,000 AMPS RMS ASYMMETRICAL ONE-TIME FAULT CLOSING DUTY CYCLE.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

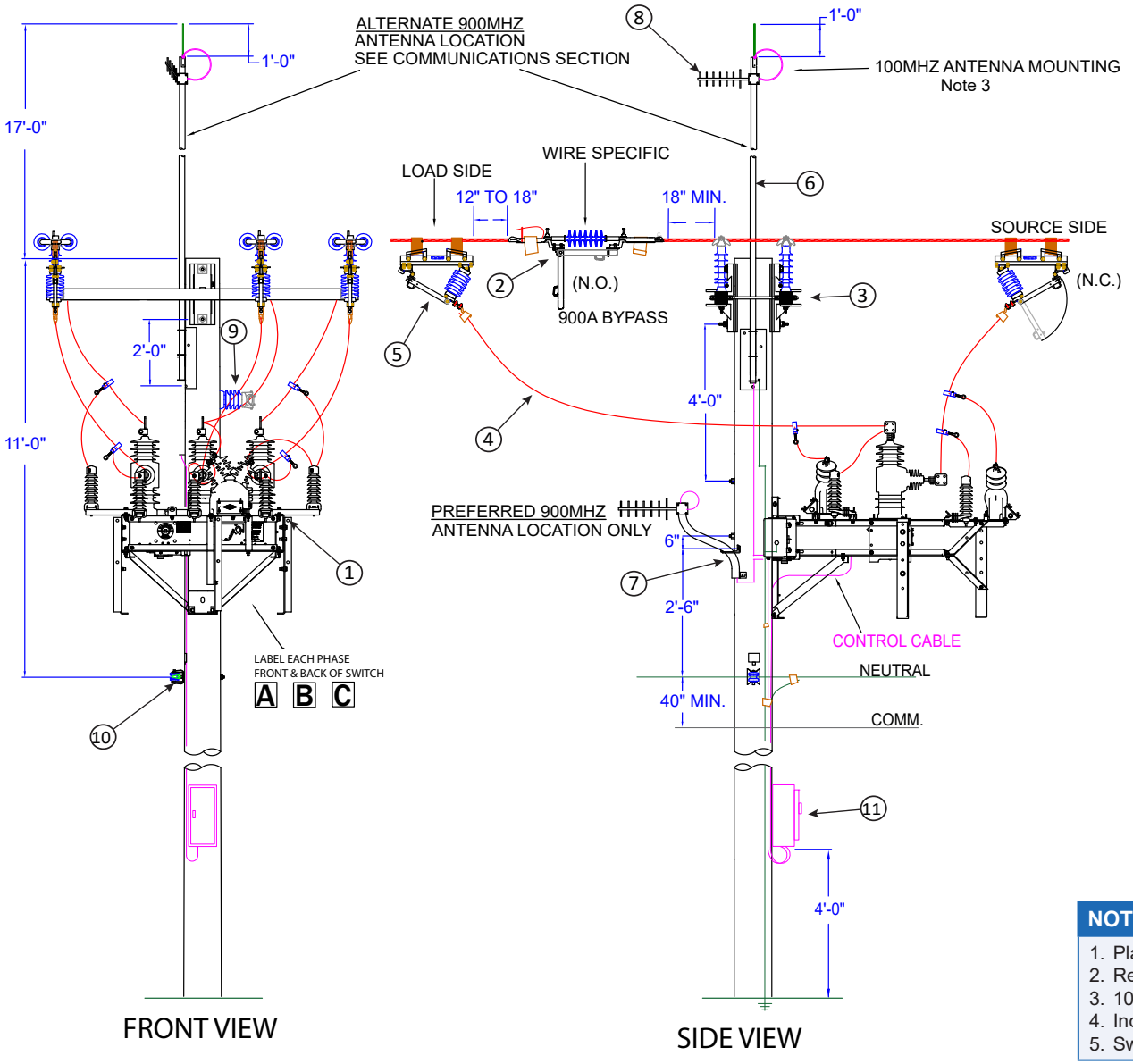
PROTECTION

NES

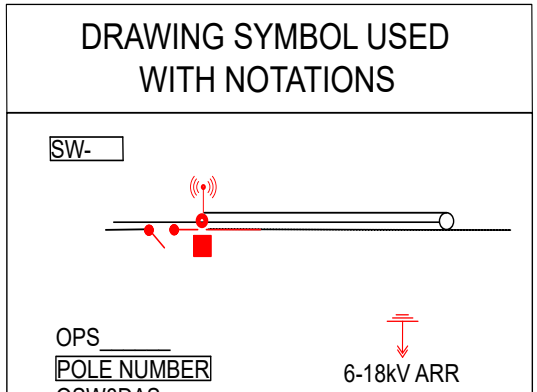
1200 AMP (S&C) RISER POLE RECIPROCATING VERTICAL BREAK MATERIAL DETAILS

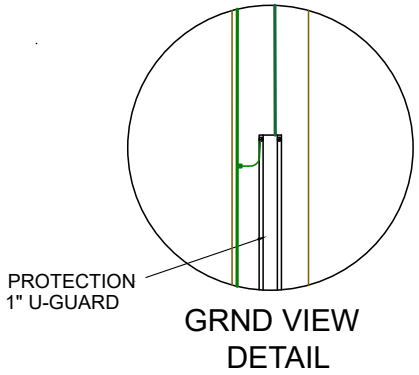
OSW12LR

DISTRIBUTION AUTOMATION SWITCHES



DRAWING SYMBOL USED WITH NOTATIONS





GRND VIEW
DETAIL

NOTES

1. Planning group will determine required antenna type (100mhz or 900mhz)
2. Refer to the Grounding Section for switch grounding details.
3. 100MHZ Antenna is req'd to mount above circuit.
4. Include wildlife protection on stinger cover (Truck stock #466452000).
5. Switch must be oriented properly toward the source side of the circuit.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

DAS SWITCH
800AMP FRAMING
4/0 - 795 ACSR

OSW8DAS

LINE CREW WORK ORDER

TASK	CU	DESCRIPTION	QTY
INSTALL SWITCH			
ITEM 1	OR-DAS800A	27KV 800A EATON DAS SWITCH	1
INSTALL BYPASS SWITCH (WIRE SIZE DEPENDENT) SEE SWITCH PLATE FOR TRUCK STOCK			
ITEM 2 SELECT ONE	OSWD9-NL795	900A AMPACT IN-LINE DISCONNECT 795 ACSR	3
	OSWD9-NL477	900A AMPACT IN-LINE DISCONNECT 477 ACSR	
	OSWD9-NL336	900A AMPACT IN-LINE DISCONNECT 336 ACSR	
	OSWD9-NL4/0	900A AMPACT IN-LINE DISCONNECT 4/0 ACSR	
INSTALL FRAMING			
ITEM 3	VARIES	BASED ON CONDUCTOR & LINE ANGLE PER THE 3 PHASE FRAMING SECTION.	AS REQ'D
INSTALL STINGER WIRE			
ITEM 4	OCCM-500	CONDUCTOR 1 FT. 500 CU BARE MEDIUM DRAWN	100'
INSTALL ISOLATOR SWITCHES (SEE SWITCH PLATE FOR TRUCK STOCK)			
ITEM 5	OSWD9-LT	SWITCH, DISCONNECT, 900A LINE TAP	6
INSTALL ANTENNA (WHEN REQUIRED ABOVE CIRCUIT) - SEE COMMUNICATIONS SECTION			
ITEM 6	OANT-MAST20	ANTENNA MAST, 20' ALUMINUM	1
INSTALL ANTENNA BRACKET (PREFERRED) - SEE COMMUNICATIONS SECTION			
ITEM 7	OANTENABKR	ANTENNA MOUNTING BRACKET	1
INSTALL ANTENNA - SEE COMMUNICATIONS SECTION			
ITEM 8	OANTENNA	YAGI ANTENNA, 900MHZ	1
	OANTENNAVHF	YAGI ANTENNA, 100MHZ	
INSTALL JUMPER POST			
ITEM 9	OI35HP	35KV HOR. JUMPER POST INSULATOR	1
	OBHP-2	BRACKET, OFFSET, HORIZONTAL, 2"	1

TRUCK STOCK MATERIAL ITEM LIST

STOCK #	DESCRIPTION	QTY
461982010	DECAL, LETTER A	2
461982020	DECAL, LETTER B	2
461982030	DECAL, LETTER C	2
204_____	BOLT MACHINE 3/4" LENGTH AS REQ'D	2
206580000	3/4" DBL COIL SPRING WASHER	2
203_____	BOLT MACHINE 5/8" LENGTH AS REQ'D	2
206570000	5/8" DBL COIL SPRING WASHER	2
209520000	WASHER SQ CURVED 3-1/4"	2
209620000	WASHER SQ FLAT 2-1/4"	2
224121000	CONN PERC WEDGE 477 - 4/0 (BYPASS)	12*
224123000	CONN WEDGE 477 - 477 (BYPASS)	12*
233310000	TERMINAL UBOLT 300-500 4H (RECLOSER)	12
(*) Select wedge connectors per conductor size		

NOTES

1. See Communications section for 100 MHZ or 900 MHZ Radio Materials on pages 15 or 16 based on antenna position.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

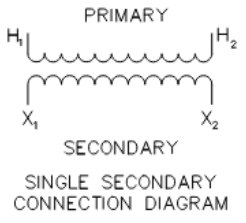
PROTECTION

NES

DAS SWITCH
800 AMP MATERIAL
WORK ORDER TABLE

LINE CREW WORK ORDER (CONT'D)			
TASK	CU	DESCRIPTION	QTY
INSTALL NEUTRAL SUPPORT - SEE NEUTRAL SECTION			
ITEM 10 SELECT AS REQ'D	OSR1WL	LARGE ONE WIRE RACK	1
	OB-DDE	BRACKET, DBL DEADEND, ANGLE	1
	ONDE-____	NEUTRAL ATTACHMENT	2
FACTORY INSTALLED PT'S (REFERENCE ONLY - SEE DETAIL)			
NOT SHOWN	MP-120-P	XFMR, POTENTIAL, 1-14,400/120 25KV OD	2
INSTALL GROUND GRID PER GROUNDING SECTION SPECIFICATIONS			
	OLAB-POLEMAN	LABOR ONLY	5 HRS
C&M WORK ORDER (COMPATIBLE UNITS IN COMMUNICATION SECTION)			
INSTALL CONTROLS AND WIRING - SEE COMMUNICATIONS SECTION			
ITEM 11	C97CONT-651	SEL 651R RECLOSER CONTROL	1
INSTALL ANTENNA (WHEN REQUIRED ABOVE CIRCUIT) - SEE COMMUNICATIONS SECTION			
		SEE COMMUNICATIONS SECTION, PAGE 15	1
INSTALL ANTENNA BRACKET (PREFERRED) - SEE COMMUNICATIONS SECTION			
		SEE COMMUNICATIONS SECTION, PAGE 16	1
TEST SECTION WORK ORDER			
PROGRAM CONTROL			
	OLAB-TEST	LABOR ONLY	4 HRS

DOUBLE BUSING POTENTIAL TRANSFORMER
14.4/24.9Y KV (STK# 956404000)



NOTES

1. See Communications section for 100 MHZ or 900 MHZ Radio Materials on pages 15 or 16 based on antenna position.

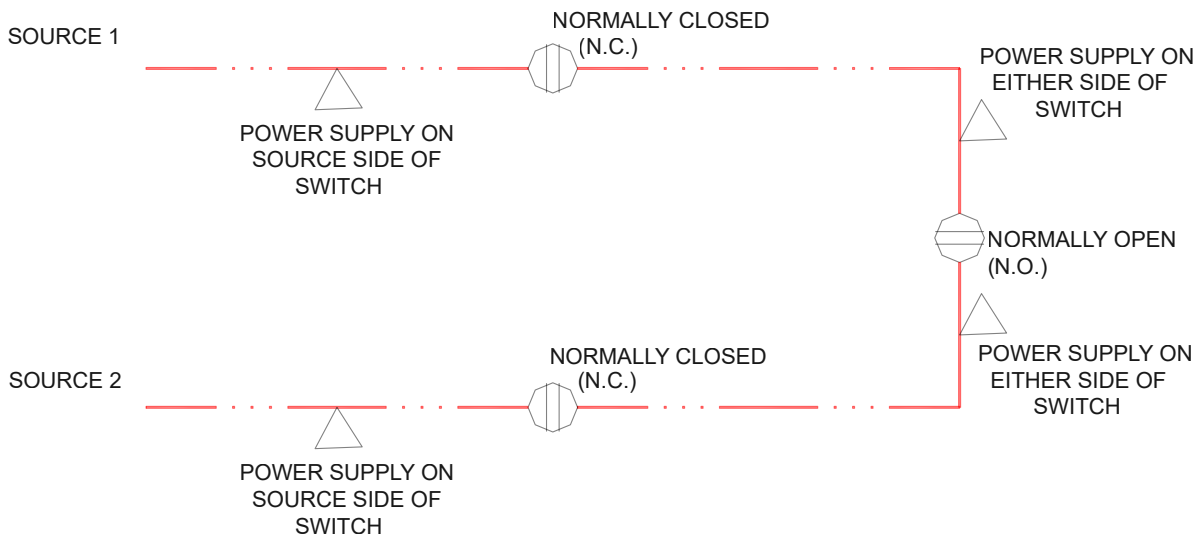
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

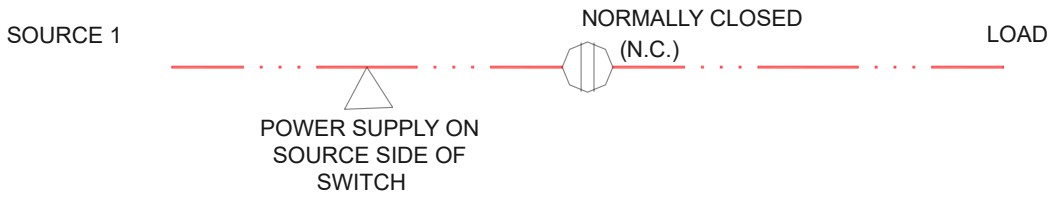
DAS SWITCH
800 AMP MATERIAL
WORK ORDER TABLE (CONT'D)

RECLOSERS

LOOP FEED TRANSFORMER PLACEMENT



RADIAL FEED TRANSFORMER PLACEMENT



NOTES

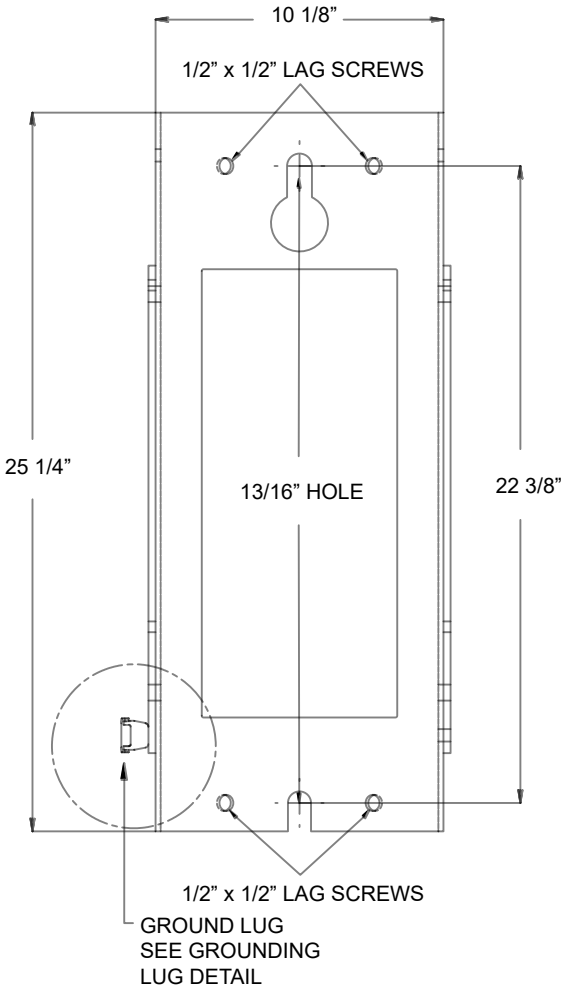
1. Reclosers needing an external Power supply to operate the control units require #2AT, using white or blue tape to mark the insulated neutral leg of the Triplex wire.
2. Where possible, the transformer should be a single span from the switch pole.
3. The 2AT may be installed 12” above (preferred) or below the system neutral provided adequate clearance is maintained between other pole attachments.
4. See the diagram above for the positioning of transformers in the circuit relative to the source and load sides of the switch.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

RECLOSER POWER SOURCE LOCATION INFORMATION

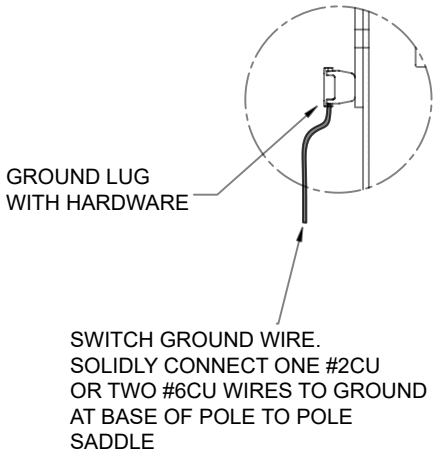
POLE SADDLE DETAIL



MOUNTING INSTRUCTIONS

1. Drill (2) 13/16” dia. holes in the pole for the top & bottom spaced 22 3/8” for the pole saddle.
2. Install (2) 3/4” dia. through-bolts into the holes just drilled. Secure the bolts loosely with suitably sized square washers under the nuts. Place spring-type washers between the square washers and the nuts. Place flat washers between the pole saddle and the bolt heads. The heads of the bolts are to project approximately 3” from the face of the pole.
3. Lower the IntelliRupter slightly so it bears on the through-bolts and fully tighten the through bolts.
4. Install (4) 1/2” x 2” (min.) lag screw at each of the four corners.

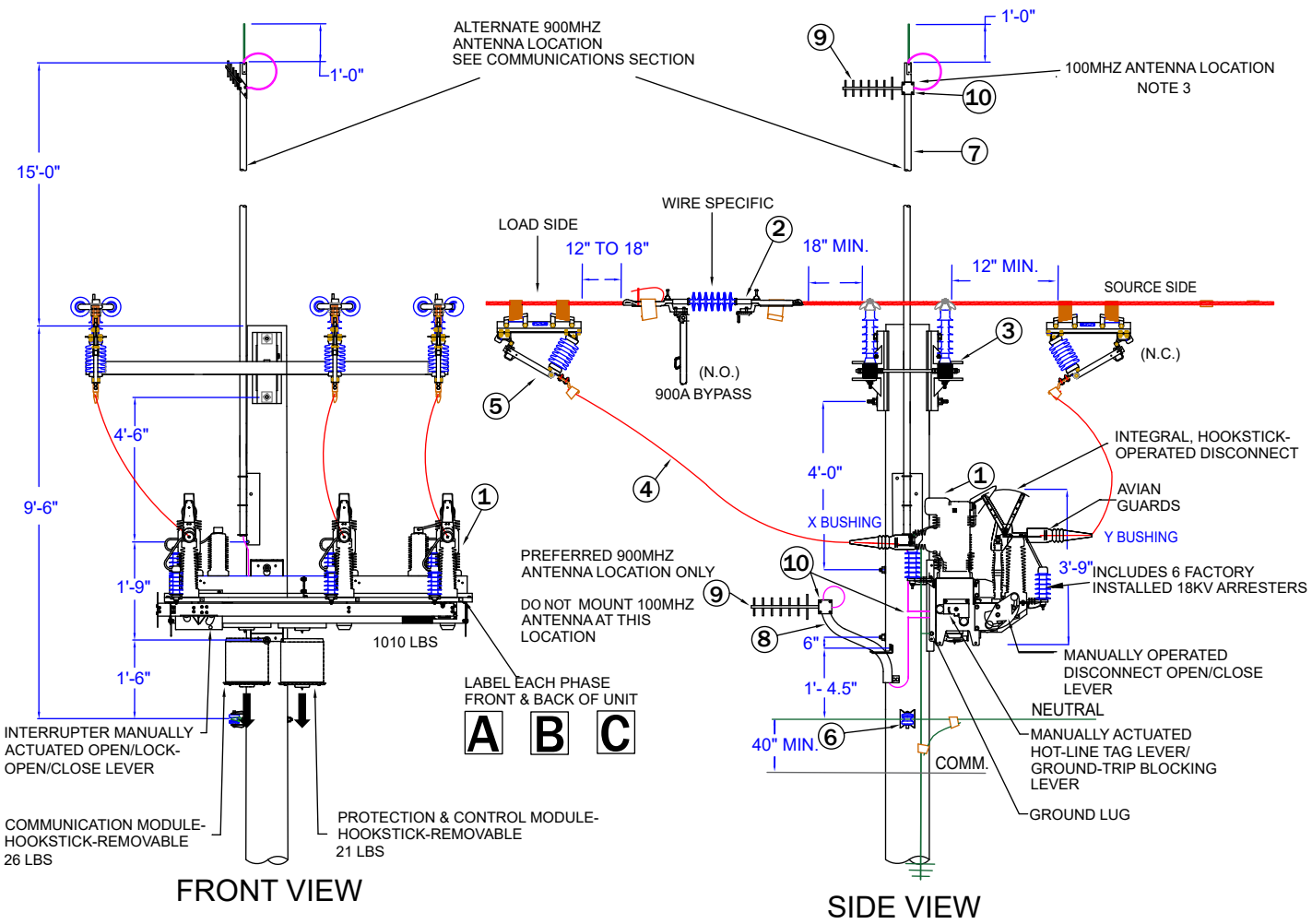
GROUNDING LUG DETAIL



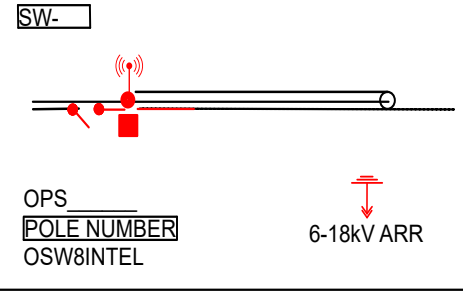
NOTES

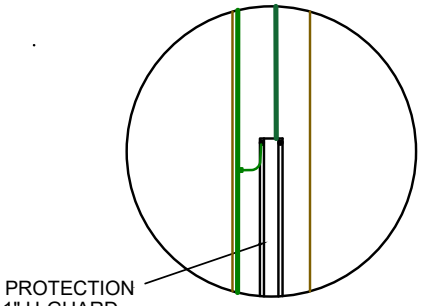
1. Check the framing drawing prior to mounting the recloser to determine the “X” and “Y” bushing orientation relative to the load and the source sides of the circuit.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE



DRAWING SYMBOL USED WITH NOTATIONS





GRND VIEW
DETAIL

NOTES

1. Planning group will determine required antenna type (100mhz or 900mhz)
2. Refer to the Grounding Section for switch grounding details.
3. 100MHZ Antenna is req'd to mount above the circuit.
4. Include wildlife protection on stinger cover (Truck Stock #466452000).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

INTELLIRUPTER 800 AMP RECLOSER FRAMING 4/0-795 ACSR

PROTECTION

OSW8INTEL

LINE CREW WORK ORDER

TASK	CU	DESCRIPTION	QTY
INSTALL 800A INTELLIRUPTOR			
ITEM 1	OR-INTEL800	27kV, 800A INTELLIRUPTER	1
INSTALL BYPASS SWITCH (WIRE SIZE DEPENDENT) SEE SWITCH PLATE FOR TRUCK STOCK			
ITEM 2 SELECT ONE	OSWD9-NL795	900A AMPACT IN-LINE DISCONNECT 795 ACSR	3
	OSWD9-NL477	900A AMPACT IN-LINE DISCONNECT 477 ACSR	
	OSWD9-NL336	900A AMPACT IN-LINE DISCONNECT 336 ACSR	
	OSWD9-NL4/0	900A AMPACT IN-LINE DISCONNECT 4/0 ACSR	
INSTALL FRAMING			
ITEM 3	VARIES	BASED ON CONDUCTOR & LINE ANGLE PER THE 3 PHASE FRAMING SECTION.	AS REQ'D
INSTALL STINGER WIRE			
ITEM 4	OCCM-500	CONDUCTOR 1 FT. 500 CU BARE MEDIUM DRAWN	70'
INSTALL ISOLATOR SWITCHES (SEE SWITCH PLATE FOR TRUCK STOCK)			
ITEM 5	OSWD9-LT	SWTICH, DISCONNECT, 900A LINE TAP	6
INSTALL NEUTRAL SUPPORT - SEE NEUTRAL SECTION			
ITEM 6 SELECT AS REQ'D	OSR1WL	LARGE ONE WIRE RACK	1
	OB-DDE	BRACKET, DBL DEADEND, ANGLE	1
	ONDE-____	NEUTRAL ATTACHMENT	2
INSTALL ANTENNA MAST 20' (WHEN REQ'D ABOVE CIRCUIT) - SEE COMMUNICATIONS SECTION			
ITEM 7	OANT-MAST20	ANTENNA MAST, 20' , ALUMINUM	1
INSTALL ANTENNA BRACKET (PREFERRED) - SEE COMMUNICATIONS SECTION			
ITEM 8	OANTENABKR	ANTENNA MOUNTING BRACKET	1
INSTALL ANTENNA - SEE COMMUNICATIONS SECTION			
ITEM 9 SELECT ONE	OANTENNA	YAGI ANTENNA, 900MHZ	1
	OANTENNAVHF	YAGI ANTENNA, 100MHZ	
INSTALL WEATHERPROOFING — SEE COMMUNICATIONS SECTION			
ITEM 10	ORADPROOF	RADIO CONNECTION/SPLICE WEATHERPROOFING	2
INSTALL GROUND GRID PER GROUNDING SECTION SPECIFICATIONS			
OLAB-POLEMAN		LABOR ONLY	5HRS

TEST SECTION WORK ORDER

PROGRAM CONTROL		
OLAB-TEST	LABOR ONLY	4 HRS

TRUCK STOCK MATERIAL ITEM LIST

STOCK #	DESCRIPTION	QTY
461982010	DECAL, LETTER A	2
461982020	DECAL, LETTER B	2
461982030	DECAL, LETTER C	2
204_____	BOLT MACHINE 3/4" LENGTH AS REQ'D	2
206580000	3/4" DBL COIL SPRING WASHER	2
203_____	BOLT MACHINE 5/8" LENGTH AS REQ'D	2
206570000	5/8" DBL COIL SPRING WASHER	2
209520000	WASHER SQ CURVED 3-1/4"	2
209620000	WASHER SQ FLAT 2-1/4"	2
224121000	CONN PERC WEDGE 477 - 4/0 (BYPASS)	12*
224123000	CONN WEDGE 477 - 477 (BYPASS)	12*
224126000	CONN WEDGE 795- 477 (BYPASS)	12*
(*) Select wedge connectors per conductor size		

NOTES

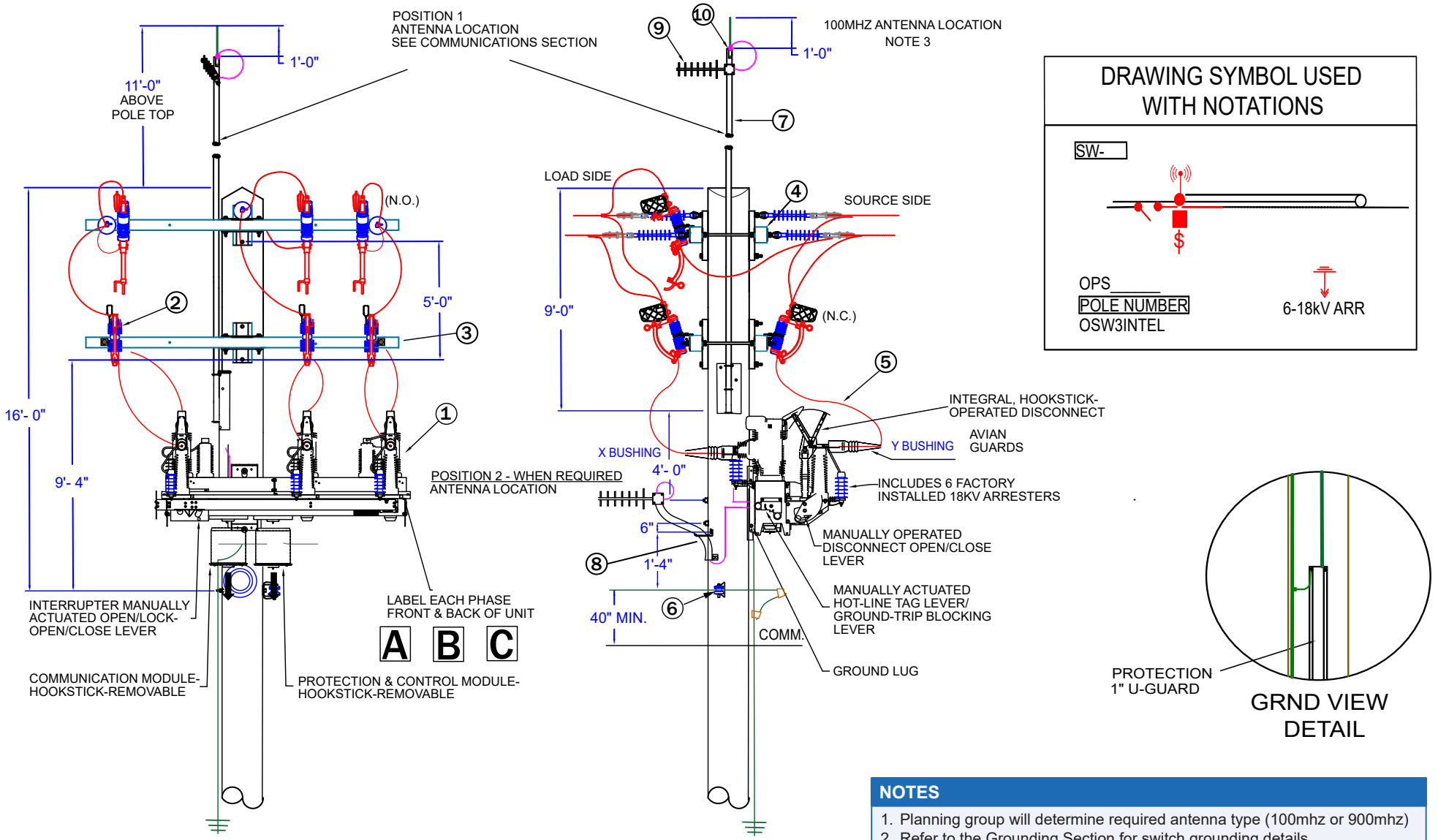
1. See Communications section for 100 MHZ or 900 MHZ Radio Materials on pages 15 or 16 based on antenna position.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

INTELLIRUPTER 800 AMP RECLOSER MATERIAL WORK ORDER TABLE



FRONT VIEW

SIDE VIEW

DRAWING SYMBOL USED WITH NOTATIONS

GRND VIEW
DETAIL

NOTES

1. Planning group will determine required antenna type (100mhz or 900mhz)
2. Refer to the Grounding Section for switch grounding details.
3. 100MHZ Antenna is req'd to mount above circuit.
4. Include wildlife protection on stinger cover (Truck Stock #466452000).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

INTELLIRUPTER 300 AMP RECLOSER FRAMING #2 - 1/0 ACSR

PROTECTION

OSW3INTEL

LINE CREW WORK ORDER

TASK	CU	DESCRIPTION	QTY
INSTALL 800A INTELLIRUPTOR			
ITEM 1	OR-INTEL800	27kV, 800A INTELLIRUPTER	1
INSTALL BYPASS SWITCH (WIRE SIZE DEPENDENT) SEE SWITCH PLATE FOR TRUCK STOCK			
ITEM 2	OSW3DL	SWITCH, DISCONNECT, 300A LB	9
INSTALL FALSE ARMS FOR CUOUTS			
ITEM 3	OFX10	X-ARM FIBERGLASS, 3 5/8" X 4 5/8 " X 10'	2
INSTALL FRAMING (SEE 3PH FRAMING PLATE FOR TRUCK STOCK, FOR STEEL & WOOD POLES)			
ITEM 4	O3FD-DD	FIBERGLASS, DBL CROSSARM, DBL DEAD-END	1
INSTALL STINGER WIRE			
ITEM 5	OCCH-10	CONDUCTOR 1 FT. 1/0CU BHD	70'
INSTALL NEUTRAL SUPPORT - SEE NEUTRAL SECTION			
ITEM 6 SELECT AS REQ'D	OSR1WL	LARGE ONE WIRE RACK	1
	OB-DDE	BRACKET, DBL DEADEND, ANGLE	1
	ONDE-_____	NEUTRAL ATTACHMENT	2
INSTALL ANTENNA MAST 20' (WHEN REQ'D ABOVE CIRCUIT) - SEE COMMUNICATIONS SECTION			
ITEM 7	OANT-MAST20	ANTENNA MAST, 20' , ALUMINUM	1
INSTALL ANTENNA BRACKET (PREFERRED) - SEE COMMUNICATIONS SECTION			
ITEM 8	OANTENABKR	ANTENNA MOUNTING BRACKET	1
INSTALL ANTENNA - SEE COMMUNICATIONS SECTION			
ITEM 9 SELECT ONE	OANTENNA	YAGI ANTENNA, 900MHZ	1
	OANTENNAVHF	YAGI ANTENNA, 100MHZ	
INSTALL WEATHERPROOFING — SEE COMMUNICATIONS SECTION			
ITEM 10	ORADPROOF	RADIO CONNECTION/SPLICE WEATHERPROOFING	2
INSTALL GROUND GRID PER GROUNDING SECTION SPECIFICATIONS			
OLAB-POLEMAN		LABOR ONLY	5 HRS

TEST SECTION WORK ORDER

PROGRAM CONTROL		
OLAB-TEST	LABOR ONLY	4 HRS

TRUCK STOCK MATERIAL ITEM LIST

STOCK #	DESCRIPTION	QTY
461982010	DECAL, LETTER A	2
461982020	DECAL, LETTER B	2
461982030	DECAL, LETTER C	2
204_____	BOLT MACHINE 3/4" LENGTH AS REQ'D	2
206580000	3/4" DBL COIL SPRING WASHER	2
203_____	BOLT MACHINE 5/8" LENGTH AS REQ'D	2
206570000	5/8" DBL COIL SPRING WASHER	2
209520000	WASHER SQ CURVED 3-1/4"	2
209620000	WASHER SQ FLAT 2-1/4"	2
224121000	CONN PERC WEDGE 477 - 4/0 (BYPASS)	12*
224123000	CONN WEDGE 477 - 477 (BYPASS)	12*
224126000	CONN WEDGE 795- 477 (BYPASS)	12*
(*) Select wedge connectors per conductor size		

NOTES

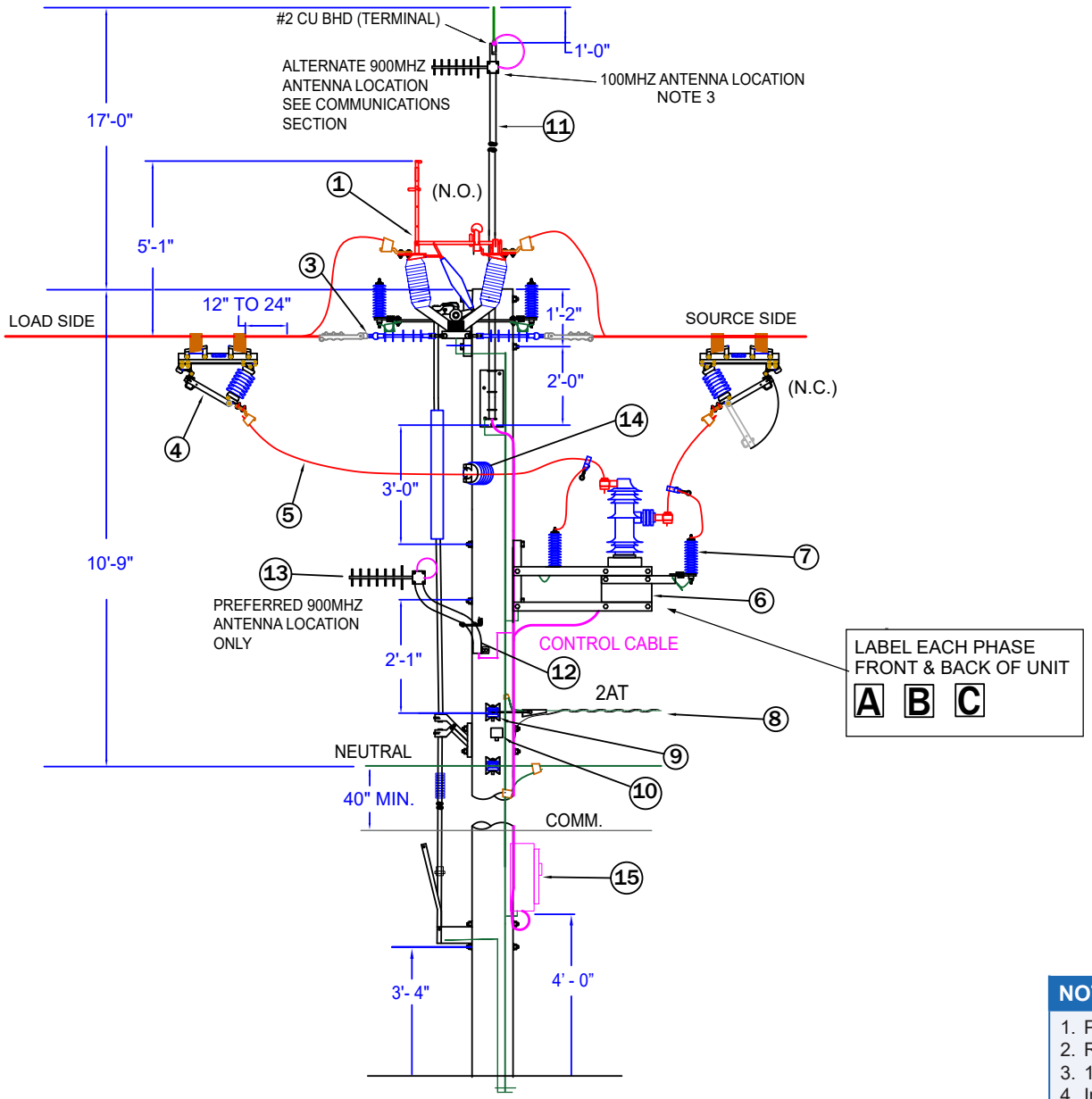
1. See Communications section for 100 MHZ or 900 MHZ Radio Materials on pages 15 or 16 based on antenna position.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

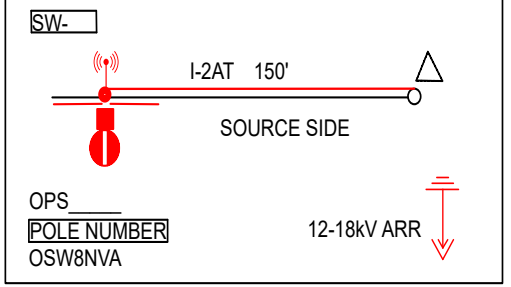
PROTECTION

NES

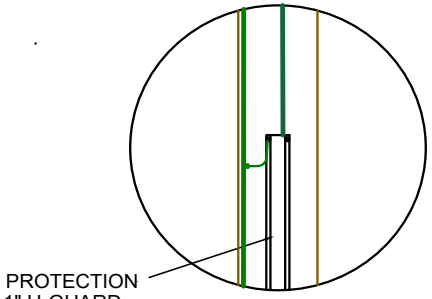
INTELLIRUPTER 300 AMP RECLOSER MATERIAL WORK ORDER TABLE



DRAWING SYMBOL USED WITH NOTATIONS



CAUTION: SEE PAGE 49 FOR EXTERNAL POWER SUPPLY REQUIREMENTS.



GRND VIEW DETAIL

NOTES

1. Planning group will determine required antenna type (100mhz or 900mhz)
2. Refer to the Grounding Section for switch grounding details.
3. 100MHZ Antenna is req'd to mount above circuit.
4. Include wildlife protection on stinger cover (Truck stock #466452000).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

NOVA 800A RECLOSER FRAMING 4/0 - 795 ACSR

PROTECTION

OSW8NVA

LINE CREW WORK ORDER

TASK	CU	DESCRIPTION	QTY
INSTALL BYPAS SWITCH			
ITEM 1	OSW12LH	1200A LBS HORIZONTAL	1
INSTALL SWITCH SUPPORTS OR BRACES			
ITEM 2	OBRW60	BRACE, WOOD, PAIR 60" SPACING (WOOD POLE ONLY)	1
INSTALL CONDUCTOR DEAD-ENDS			
ITEM 3 SELECT ONE	O3SX-EX-477	3 PHASE, STEEL, HORIZONTAL EXTENSION 4/0-477	2
	O3SX-EX-795	3 PHASE, STEEL, HORIZONTAL EXTENSION 795	2
INSTALL ISOLATOR SWITCHES			
ITEM 4	OSWD9-LT	SWITCH, DISCONNECT, 900A LINE TAP	6
INSTALL STINGER WIRE			
ITEM 5	OCCM-500	CONDUCTOR 1 FT. 500 CU BARE MEDIUM DRAWN	100'
INSTALL VACUUM OR OIL SWITCH			
ITEM 6	OR-NVA800A	RECLOSER GAS 27KV 800A KYLE-NOVA	1
INSTALL ARRESTERS			
ITEM 7 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	6
INSTALL SERVICE WIRE FOR SWITCH CONTROLS			
ITEM 8	OCAT-2	#2 ALUMINUM TRIPLEX	AS REQ'D
	OSR1WL	LARGE ONE WIRE RACK	AS REQ'D
INSTALL NEUTRAL AND SERVICE WIRE SUPPORTS - SEE NEUTRAL & SECONDARY SECTIONS			
ITEM 9 SELECT AS REQ'D	OSR1WL	LARGE ONE WIRE RACK	1
	OB-DDE	BRACKET, DBL DEAD-END ANGLE	1
	ONDE-____	NEUTRAL ATTACHMENT	2
INSTALL TRANSFORMER IF ONE IS NOT AVAILABLE			
SELECT ONE	OT8014	TRANSFORMER 14.4/24.9KV TO 120/240V 15kVA	1
	OTC13L	XFMR PRIMARY CONNECTION 13.8kV SYSTEM	2
	OTC23L	XFMR PRIMARY CONNECTION 23.9kV SYSTEM	1
INSTALL SECONDARY LIGHTNING ARRESTER			
ITEM 10	OLA240VCONT	ARRESTER SECONDARY 120/240V	1

TRUCK STOCK MATERIAL ITEM LIST

STOCK #	DESCRIPTION	QTY
461982010	DECAL, LETTER A	2
461982020	DECAL, LETTER B	2
461982030	DECAL, LETTER C	2
204_____	BOLT MACHINE 3/4" LENGTH AS REQ'D	2
206580000	3/4" DBL COIL SPRING WASHER	2
203_____	BOLT MACHINE 5/8" LENGTH AS REQ'D	2
206570000	5/8" DBL COIL SPRING WASHER	2
209520000	WASHER SQ CURVED 3-1/4"	2
209620000	WASHER SQ FLAT 2-1/4"	2
224121000	CONN PERC WEDGE 477 - 4/0 (BYPASS)	12*
224123000	CONN WEDGE 477 - 477 (BYPASS)	12*
224126000	CONN WEDGE 795- 477 (BYPASS)	12*
(*) Select wedge connectors per conductor size		

NOTES

1. See Communications section for 100 MHZ or 900 MHZ Radio Materials on pages 15 or 16 based on antenna position.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PROTECTION

NES

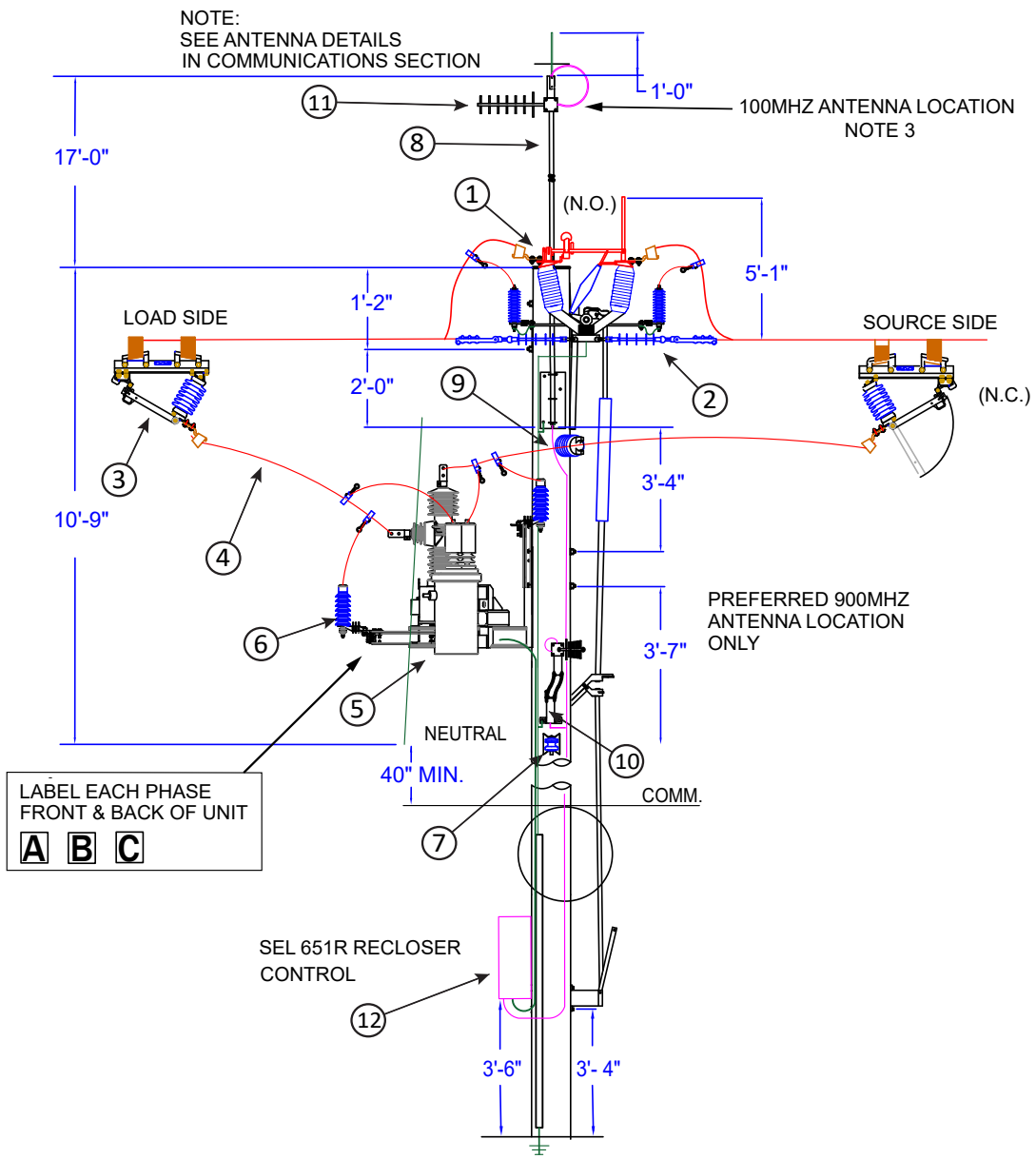
NOVA 800 AMP RECLOSER MATERIAL WORK ORDER TABLE

LINE CREW WORK ORDER (CONT'D)			
TASK	CU	DESCRIPTION	QTY
INSTALL ANTENNA (WHEN REQUIRED ABOVE CIRCUIT) - SEE COMMUNICATIONS SECTION			
ITEM 11	OANT-MAST20	ANTENNA MAST, 20' , ALUMINUM	1
INSTALL ANTENNA - SEE COMMUNICATIONS SECTION			
ITEM 12	OANTENABKR	ANTENNA MOUNTING BRACKET	1
ANTENNA			
ITEM 13 SELCT ONE	OANTENNA	YAGI ANTENNA, 900MHZ	1
	OANTENNAVHF	YAGI ANTENNA, 100MHZ	
INSTALL JUMPER POST			
ITEM 14	OI35HP	35KV HOR. JUMPER POST INSULATOR	1
	OBHP-2	BRACKET, OFFSET, HORIZONTAL, 2"	1
INSTALL GROUND GRID PER GROUNDING SECTION SPECIFICATIONS			
	OLAB-POLEMAN	LABOR ONLY	5 HRS
C&M WORK ORDER (COMPATIBLE UNITS IN COMMUNICATIONS SECTION)			
INSTALL CONTROLS AND WIRING			
ITEM 15	C97CNT-FRM6	CONTROL RECLOSER FORM 6	1
INSTALL COAX CABLE (SEE COMMUNICATION SECTION, PAGES 15 & 16)			
TEST SECTION WORK ORDER			
PROGRAM CONTROL			
	OLAB-TEST	LABOR ONLY	4 HRS

NOTES

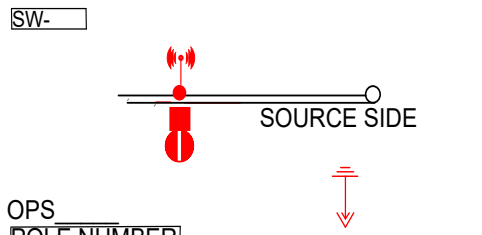
1. See Communications section for 100 MHZ or 900 MHZ Radio Materials on pages 15 or 16 based on antenna position.

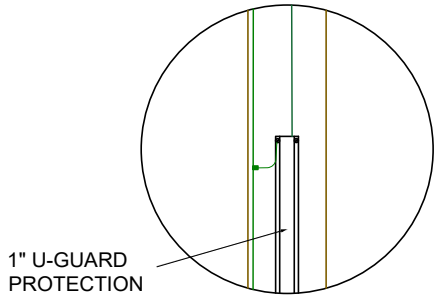
REV.	ENG.	DESCRIPTION OF CHANGE	DATE



SIDE VIEW

DRAWING SYMBOL USED WITH NOTATIONS





GRND VIEW
DETAIL

NOTES

1. Planning group will determine required antenna type (100mhz or 900mhz)
2. Refer to the Grounding Section for switch grounding details.
3. 100MHZ Antenna is req'd to mount above circuit.
4. Include wildlife protection on stinger cover (Truck stock #466452000).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SOUTHERN STATES 800AMP RECLOSER FRAMING 4/0 - 795 ACSR

LINE CREW WORK ORDER			
TASK	CU	DESCRIPTION	QTY
INSTALL BYPASS SWITCH			
ITEM 1	OSW12LH	1200A LBS HORIZONTAL	1
INSTALL CONDUCTOR DEAD-ENDS			
ITEM 2 SELECT ONE	O3SX-EX-477	3 PHASE, STEEL, HORIZ. EXTENSION 4/0-477	2
	O3SX-EX-795	3 PHASE, STEEL, HORIZ. EXTENSION 795	2
INSTALL ISOLATOR SWITCHES			
ITEM 3	OSWD9-LT	SWITCH, DISCONNECT, 900A LINE TAP	6
INSTALL STINGER WIRE			
ITEM 4	OCCM-500	CONDUCTOR 1 FT. 500 CU BARE MEDIUM DRAWN	100’
INSTALL SOUTHERN STATES RECLOSER			
ITEM 5	OR-SOSTA27KV	SOUTHERN STATES 27KV RECLOSER	1
INSTALL ARRESTERS			
ITEM 6 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	12
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	12
INSTALL NEUTRAL SUPPORT - SEE NEUTRAL SECTION			
ITEM 7 SELECT AS REQ’D	OSR1WL	LARGE ONE WIRE RACK	1
	OB-DDE	BRACKET, DBL DEAD-END ANGLE	1
	ONDE-____	NEUTRAL ATTACHMENT	2
INSTALL ANTENNA (WHEN REQUIRED ABOVE CIRCUIT) - SEE COMMUNICATIONS SECTION			
ITEM 8	OANT-MAST20	ANTENNA MAST, 20’ , ALUMINUM	1
INSTALL JUMPER POST			
ITEM 9	OI35HP	35KV HOR. JUMPER POST INSULATOR	1
	OBHP-2	BRACKET, OFFSET, HORIZONTAL, 2”	1

TRUCK STOCK MATERIAL ITEM LIST		
STOCK #	DESCRIPTION	QTY
461982010	DECAL, LETTER A	2
461982020	DECAL, LETTER B	2
461982030	DECAL, LETTER C	2
204_____	BOLT MACHINE 3/4” LENGTH AS REQ'D	2
206580000	3/4” DBL COIL SPRING WASHER	2
203_____	BOLT MACHINE 5/8” LENGTH AS REQ'D	2
206570000	5/8” DBL COIL SPRING WASHER	2
209520000	WASHER SQ CURVED 3-1/4”	2
209620000	WASHER SQ FLAT 2-1/4”	2
224121000	CONN PERC WEDGE 477 - 4/0 (BYPASS)	12*
224123000	CONN WEDGE 477 - 477 (BYPASS)	12*
233310000	TERMINAL UBOLT 300-500 4H (RECLOSER)	12
233760000	TERMINAL UBOLT 795 ACSR 4H (SWITCH)	6
(*) Select wedge connectors per conductor size		

NOTES

1. See Communications section for 100 MHZ or 900 MHZ Radio Materials on pages 15 or 16 based on antenna position.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

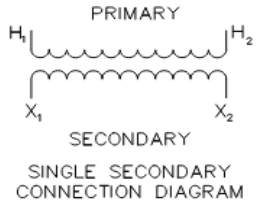
PROTECTION

NES

SOUTHERN STATES 800A RECLOSER MATERIAL WORK ORDER TABLE

LINE CREW WORK ORDER (CONT'D)			
TASK	CU	DESCRIPTION	QTY
INSTALL ANTENNA BRACKET (PREFERRED) - SEE COMMUNICATIONS SECTION			
ITEM 10	OANTENABKR	ANTENNA MOUNTING BRACKET	1
INSTALL ANTENNA			
ITEM 11 SELECT ONE	OANTENNA	YAGI ANTENNA, 900MHZ	1
	OANTENNAVHF	YAGI ANTENNA, 100MHZ	
FACTORY INSTALLED PT'S (REFERENCE ONLY - SEE DETAIL)			
NOT SHOWN	MP-120-P	XFMR, POTENTIAL, 1-14,400/120 25KV OD	2
INSTALL GROUND GRID PER GROUNDING SECTION SPECIFICATIONS			
	OLAB-POLEMAN	LABOR ONLY	5 HRS
TEST SECTION WORK ORDER			
PROGRAM CONTROL			
	OLAB-TEST	LABOR ONLY	4 HRS
C&M WORK ORDER			
INSTALL CONTROLS AND WIRING - SEE COMMUNICATIONS SECTION			
ITEM 12	C97CONT-651	SEL 651R RECLOSER CONTROL	1

DOUBLE BUSING POTENTIAL TRANSFORMER
14.4/24.9Y KV (STK# 956404000)



SINGLE SECONDARY
CONNECTION DIAGRAM

NOTES

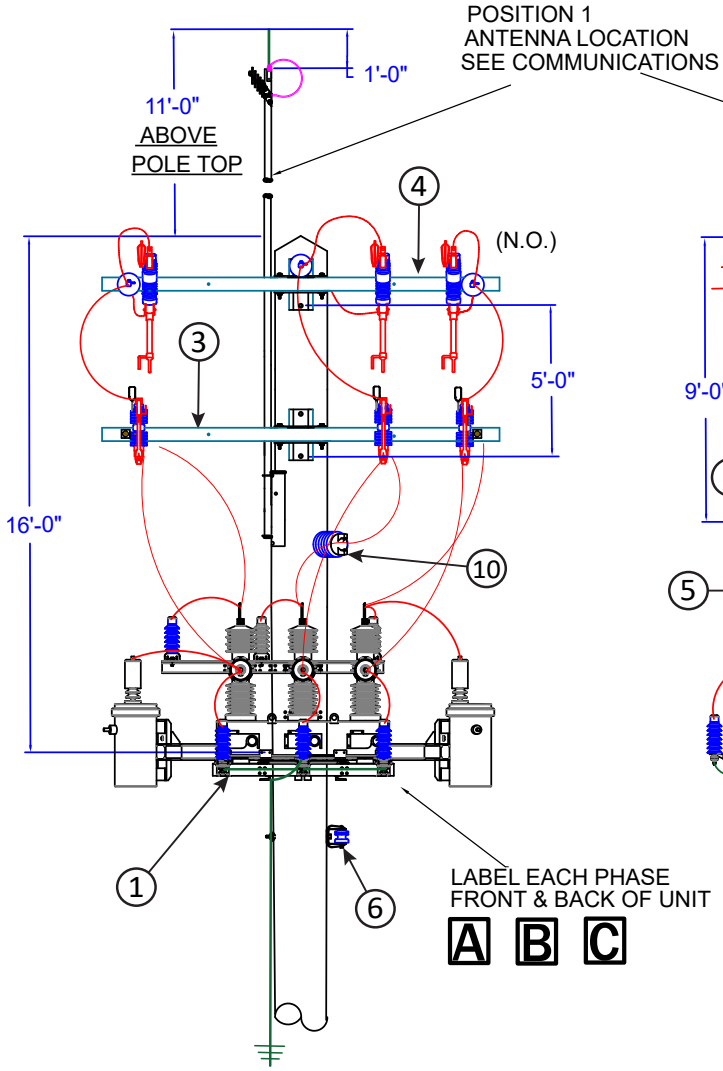
1. See Communications section for 100 MHZ or 900 MHZ Radio Materials on pages 15 or 16 based on antenna position.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

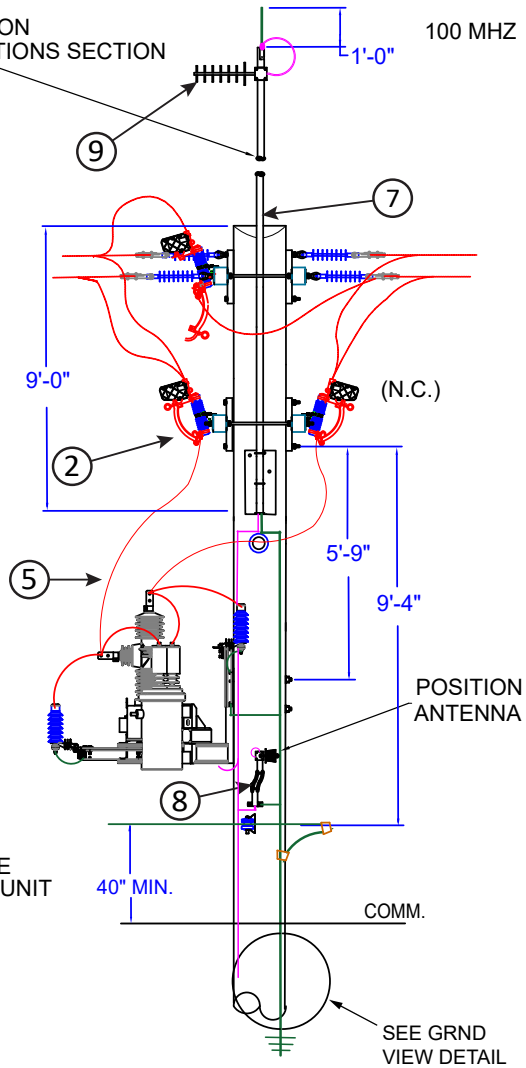
PROTECTION

NES

SOUTHERN STATES 800A RECLOSER MATERIAL WORK ORDER TABLE (CONT'D)

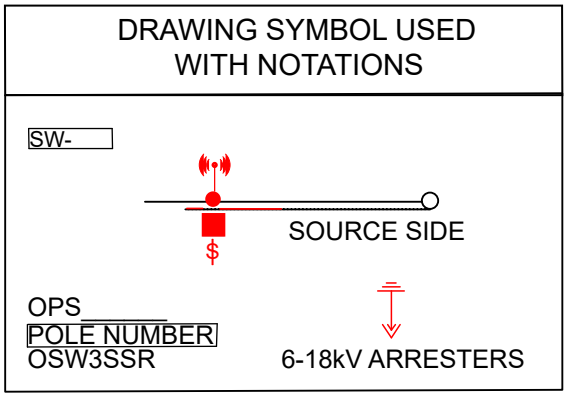


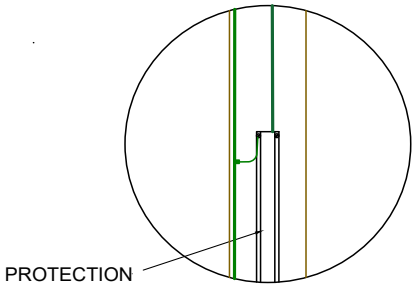
FRONT VIEW



SIDE VIEW

DRAWING SYMBOL USED WITH NOTATIONS





GRND VIEW DETAIL

NOTES

1. Planning group will determine required antenna type (100mhz or 900mhz)
2. Refer to the Grounding Section for switch grounding details.
3. 100MHZ Antenna is req'd to mount above circuit.
4. Include wildlife protection on stinger cover (Truck Stock #466452000).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SOUTHERN STATES 300 AMP RECLOSER FRAMING #2 - 1/0 ACSR

LINE CREW WORK ORDER

TASK	CU	DESCRIPTION	QTY
INSTALL 800A INTELLIRUPTOR			
ITEM 1	OR-INTEL800	27kV, 800A INTELLIRUPTER	1
INSTALL BYPASS SWITCH (WIRE SIZE DEPENDENT) SEE SWITCH PLATE FOR TRUCK STOCK			
ITEM 2	OSW3DL	SWITCH, DISCONNECT, 300A LB	9
INSTALL FALSE ARMS FOR CUTOUTS			
ITEM 3	OFX10	X-ARM FIBERGLASS, 3 5/8" X 4 5/8" X 10'	2
INSTALL FRAMING (SEE 3PH FRAMING PLATE FOR TRUCK STOCK, FOR STEEL & WOOD POLES)			
ITEM 4	O3FD-DD	FIBERGLASS, DBL CROSSARM, DBL DEAD-END	1
INSTALL STINGER WIRE			
ITEM 5	OCCH-10	CONDUCTOR 1 FT. 1/0CU BHD	70'
INSTALL NEUTRAL SUPPORT - SEE NEUTRAL SECTION			
ITEM 6 SELECT AS REQ'D	OSR1WL	LARGE ONE WIRE RACK	1
	OB-DDE	BRACKET, DBL DEAD-END ANGLE	1
	ONDE-____	NEUTRAL ATTACHMENT - "PER NEUTRAL SECTION"	2
INSTALL ANTENNA MAST 20' (WHEN REQUIRED ABOVE CIRCUIT) - SEE COMMUNICATIONS SECTION			
ITEM 7	OANT-MAST20	ANTENNA MAST, 20' , ALUMINUM	1
INSTALL ANTENNA BRACKET (PREFERRED) - SEE COMMUNICATIONS SECTION			
ITEM 8	OANTENABKR	ANTENNA MOUNTING BRACKET	1
INSTALL ANTENNA - SEE COMMUNICATIONS SECTION			
ITEM 9 SELECT ONE	OANTENNA	YAGI ANTENNA, 900MHZ	1
	OANTENNAVHF	YAGI ANTENNA, 100MHZ	
INSTALL JUMPER POST			
ITEM 10	OI35HP	35KV HOR. JUMPER POST INSULATOR	1
	OBHP-2	BRACKET, OFFSET, HORIZONTAL, 2"	1
FACTORY INSTALLED PT'S (REFERENCE ONLY - SEE DETAIL)			
NOT SHOWN	MP-120-P	XFMR, POTENTIAL, 1-14,400/120 25KV OD	2
INSTALL GROUND GRID PER GROUNDING SECTION SPECIFICATIONS			
OLAB-POLEMAN		LABOR ONLY	5 HRS

NOTES

1. See Communications section for 100 MHZ or 900 MHZ Radio Materials on pages 15 or 16 based on antenna position.

TEST SECTION WORK ORDER

PROGRAM CONTROL		
OLAB-TEST	LABOR ONLY	4 HRS

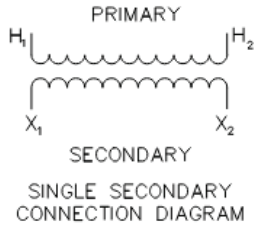
C&M WORK ORDER

INSTALL CONTROLS & WIRING (SEE COMMUNICATIONS SECTION)		
C97CONT-651	SEL 651R RECLOSER CONTROL	1

TRUCK STOCK MATERIAL ITEM LIST

STOCK #	DESCRIPTION	QTY
461982010	DECAL, LETTER A	2
461982020	DECAL, LETTER B	2
461982030	DECAL, LETTER C	2
204_____	BOLT MACHINE 3/4" LENGTH AS REQ'D	2
206580000	3/4" DBL COIL SPRING WASHER	2
203_____	BOLT MACHINE 5/8" LENGTH AS REQ'D	2
206570000	5/8" DBL COIL SPRING WASHER	2
209520000	WASHER SQ CURVED 3-1/4"	2
209620000	WASHER SQ FLAT 2-1/4"	2
224121000	CONN PERC WEDGE 477 - 4/0 (BYPASS)	12*
224123000	CONN WEDGE 477 - 477 (BYPASS)	12*
233310000	TERMINAL UBOLT 300-500 4H (RECLOSER)	12
233760000	TERMINAL UBOLT 795 ACSR 4H (SWITCH)	6
(*) Select wedge connectors per conductor size		

DOUBLE BUSING POTENTIAL TRANSFORMER
14.4/24.9Y KV (STK# 956404000)



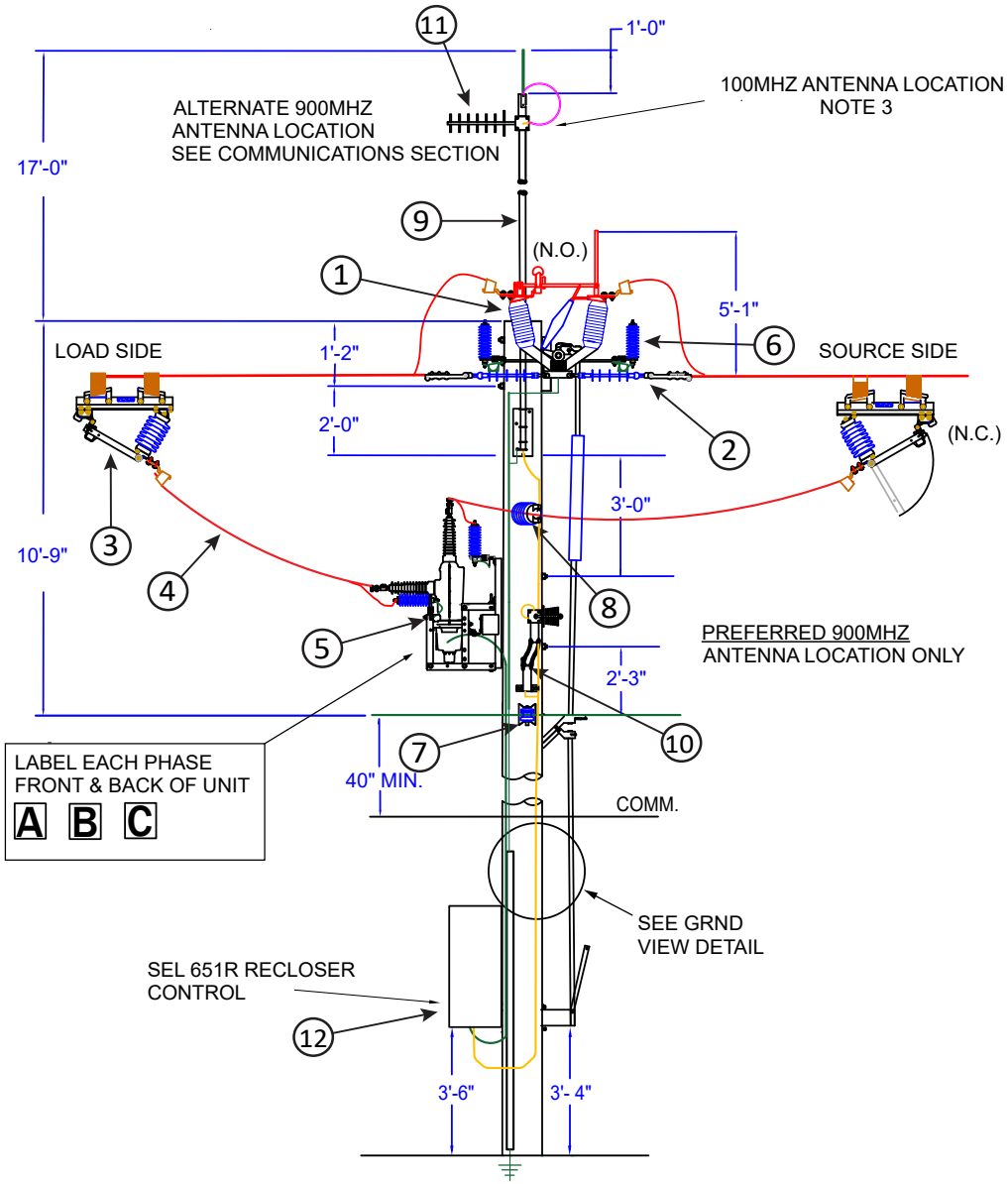
SINGLE SECONDARY CONNECTION DIAGRAM

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

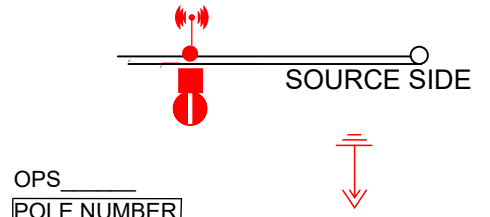
PROTECTION

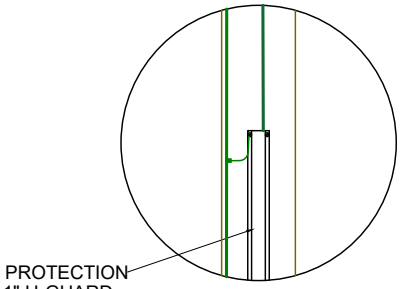
NES

SOUTHERN STATES 300 AMP RECLOSER MATERIAL WORK ORDER TABLE



DRAWING SYMBOL USED WITH NOTATIONS





GRND VIEW DETAIL

NOTES

1. Planning group will determine required antenna type (100mhz or 900mhz)
2. Refer to the Grounding Section for switch grounding details.
3. 100MHZ Antenna is req'd to mount above circuit.
4. Include wildlife protection on stinger cover (Truck stock #466452000).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

VIPER 800 AMP RECLOSER FRAMING 4/0 - 795 ACSR

LINE CREW WORK ORDER

TASK	CU	DESCRIPTION	QTY
INSTALL BYPAS SWITCH			
ITEM 1	OSW12LH	1200A LBS HORIZONTAL	1
INSTALL CONDUCTOR DEAD-ENDS			
ITEM 2 SELECT ONE	O3SX-EX-477	3 PHASE, STEEL, HORIZONTAL EXTENSION 4/0-477	2
	O3SX-EX-795	3 PHASE, STEEL, HORIZONTAL EXTENSION 795	2
INSTALL ISOLATOR SWITCHES			
ITEM 3	OSWD9-LT	SWITCH, DISCONNECT, 900A LINE TAP	6
INSTALL STINGER WIRE			
ITEM 4	OCCM-500	CONDUCTOR 1 FT. 500 CU BARE MEDIUM DRAWN	100’
INSTALL VACUUM OR OIL SWITCH			
ITEM 5	OR-GWVIPRST	G&W VIPER SWITCH	1
INSTALL ARRESTERS			
ITEM 6 SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	12
	OLA12	12kV SURGE ARRESTERS FOR 13.8kV AREA	12
INSTALL NEUTRAL SUPPORT - SEE NEUTRAL SECTION			
ITEM 7 SELECT AS REQ’D	OSR1WL	LARGE ONE WIRE RACK	1
	OB-DDE	BRACKET, DBL DEAD-END ANGLE	1
	ONDE-____	NEUTRAL ATTACHMENT	2
INSTALL JUMPER POST			
ITEM 8	OI35HP	35KV HOR. JUMPER POST INSULATOR	1
	OBHP-2	BRACKET, OFFSET, HORIZONTAL, 2”	1
INSTALL ANTENNA (WHEN REQUIRED ABOVE CIRCUIT) - SEE COMMUNICATIONS SECTION			
ITEM 9	OANT-MAST20	ANTENNA MAST, 20’ , ALUMINUM	1
INSTALL ANTENNA BRACKET (PREFERRED) - SEE COMMUNICATIONS SECTION			
ITEM 10	OANTENABKR	ANTENNA MOUNTING BRACKET	1
INSTALL ANTENNA			
ITEM 11 SELECT ONE	OANTENNA	YAGI ANTENNA, 900MHZ	1
	OANTENNAVHF	YAGI ANTENNA, 100MHZ	

TRUCK STOCK MATERIAL ITEM LIST

STOCK #	DESCRIPTION	QTY
461982010	DECAL, LETTER A	2
461982020	DECAL, LETTER B	2
461982030	DECAL, LETTER C	2
204_____	BOLT MACHINE 3/4” LENGTH AS REQ'D	2
206580000	3/4” DBL COIL SPRING WASHER	2
203_____	BOLT MACHINE 5/8” LENGTH AS REQ'D	2
206570000	5/8” DBL COIL SPRING WASHER	2
209520000	WASHER SQ CURVED 3-1/4”	2
209620000	WASHER SQ FLAT 2-1/4”	2
224121000	CONN PERC WEDGE 477 - 4/0 (BYPASS)	12*
224123000	CONN WEDGE 477 - 477 (BYPASS)	12*
224126000	CONN WEDGE 795- 477 (BYPASS)	12*
(*) Select wedge connectors per conductor size		

NOTES

1. See Communications section for 100 MHZ or 900 MHZ Radio Materials on pages 15 or 16 based on antenna position.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

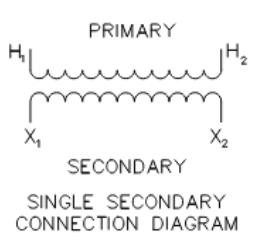
PROTECTION

NES

VIPER 800 AMP
RECLOSER MATERIAL
WORK ORDER TABLE

LINE CREW WORK ORDER (CONT'D)			
TASK	CU OR STOCK #	DESCRIPTION	QTY
INSTALL PT'S ON FACTORY MOUNTING BRK'T (SEE DETAIL)			
NOT SHOWN	MP-120-P	XFMR, POTENTIAL, 1-14,400/120 25KV OD	2
INSTALL GROUND GRID PER GROUNDING SECTION SPECIFICATIONS			
	OLAB-POLEMAN	LABOR ONLY	5 HRS
C&M WORK ORDER			
INSTALL CONTROLS AND WIRING - SEE COMMUNICATIONS SECTION			
ITEM 12	C97CONT-651	SEL 651R RECLOSER CONTROL	1
TEST SECTION WORK ORDER			
PROGRAM CONTROL			
	OLAB-TEST	LABOR ONLY	4 HRS

DOUBLE BUSING POTENTIAL TRANSFORMER
14.4/24.9Y KV (STK# 956404000)



NOTES

1. See Communications section for 100 MHZ or 900 MHZ Radio Materials on pages 15 or 16 based on antenna position.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS STANDARDS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
FIBER OPTICS	3			
OVERHEAD CABLE NAMING CONVENTIONS	4			
CABLE MESSENGER FRAMING DETAILS	5			
SPLICE AND STORAGE LOOP DETAILS	6			
UG FIBER MATERIAL COMPATIBLE UNITS	7			
UG FIBER AND TRACER WIRE, RISER DETAILS	8			
UG FIBER AND TRACER WIRE, PULL BOX DETAILS	9			
UG FIBER W/DUCT RUN, RISER DETAILS	10			
UG FIBER W/DUCT RUN, PULL BOX DETAILS	11			
ANTENNAS	12			
SCADA ANTENNA MAST DETAIL	13			
20' ANTENNA MAST INSTALLATION, CAPACITOR BANK	14			
20' ANTENNA MAST INSTALLATION, DA SWITCH & RECLOSER	15			
ANTENNA MOUNTING BRACKET DETAIL	16			
RADIO REPEATER STATION	17			
REPEATER STATION FRAMING DETAIL	18			
REPEATER STATION SERVICE RISER DETAIL	19			
REPEATER STATION COMPATIBLE UNITS	20			
REPEATER STATION SCHEMATIC	21			

TABLE OF CONTENTS

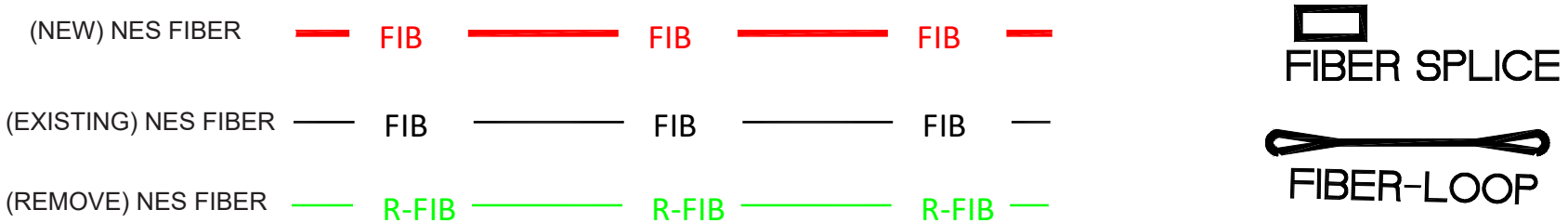
TITLE	PAGE	REV	DATE	DESCRIPTION
SAG TABLES - MESSENGER W/FIBER OPTIC CABLE	22			
SAG TABLE, RULING SPAN 50-FT, 12M W/FIBER @ REDUCED TENSION	23			
SAG TABLE, RULING SPAN 100-FT, 12M W/FIBER @ REDUCED TENSION	24			
SAG TABLE, RULING SPAN 100-FT, 12M W/FIBER @ FULL TENSION	25			
SAG TABLE, RULING SPAN 150-FT, 12M W/FIBER @ FULL TENSION	26			
SAG TABLE, RULING SPAN 200-FT, 12M W/FIBER @ FULL TENSION	27			
SAG TABLE, RULING SPAN 250-FT, 12M W/FIBER @ FULL TENSION	28			
SAG TABLE, RULING SPAN 300-FT, 12M W/FIBER @ FULL TENSION	29			

FIBER OPTIC CABLE

INSTALLATION DETAILS

FIBER OVERHEAD NAMING CONVENTIONS

DRAWING CODES	DESCRIPTION	C.U.	STOCK NUMBER
12M MESS w/NES FIBER OPTIC CABLE (24 CT) xxx'	FIBER OPTIC CBL 24 SM OVERLASHED	OFIB-24	024502000
12M MESS w/NES FIBER OPTIC CABLE (96 CT) xxx'	FIBER OPTIC CBL 96 SM SELF-SUPPORTING	OFIB-96	024502100
12M MESS w/NES FIBER OPTIC CABLE (96 CT) xxx'	FIBER OPTIC CBL 96 SM LOOSE TUBE (REQUIRES MSGR)	OFIB-96LT	024502300
12M MESS w/NES FIBER OPTIC CABLE (144 CT) xxx'	FIBER OPTIC CBL 144 SM SELF-SUPPORTING	OFIB-144	024502400
12M MESS w/NES FIBER OPTIC CABLE (216 CT) xxx'	FIBER OPTIC CBL 216 SM LOOSE TUBE (REQUIRES MSGR)	OFIB--216	024501100
12M MESS w/NES FIBER OPTIC CABLE (288 CT) xxx'	FIBER OPTIC CBL 288 SM LOOSE TUBE (REQUIRES MSGR)	OFIB--288	024501200
12M-MESS	MESSENGER WIRE 3/8" COILS	OMSGR12	016040000
*	WIRE FOR LASHING COMM CABLES TO MSGR	OSPIN-WIRE	016080000
FIBER LOOP	IN SPAN STORAGE LOOP FOR FIBER OPTICS	CFO-LOOP	367350000
FIBER SPLICE 48	CAPSULE, SPLICE ENCL FOR 48 SPLICES	CFO-SE-048	367583000
RACK SPLICE 144	RACK MOUNT, SPLICE ENCL FOR 144 SPLICES	CFO-SE-144	367582000
FIBER SPLICE 288	CAPSULE, SPLICE ENCL FOR 288 SPLICES	CFO-SE-B288	400386000
FIBER SPLICE 576	CAPSULE, SPLICE ENCL FOR 576 SPLICES	CFO-SE-D576	400385000



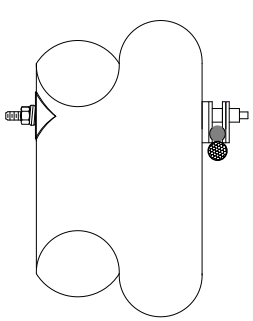
NOTES

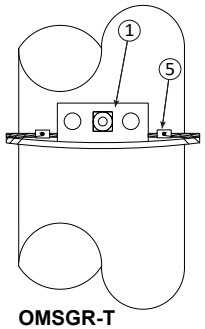
1. Standard Fiber installations are to be overlashed on 12M messenger unless specified by the Engineer. All messenger is to be installed per Sag Tables beginning on Page 22 of this section.
2. Attach messenger 12" above next highest communication cable unless noted otherwise. 40" of clearance must be maintained between NES neutral/secondary.
3. Tag NES fiber w/communication #100 Ownership tag.
4. Bond messenger to steel poles and to pole grounds.
5. Repair any missing pole grounds and protect with 1" steel u-guard.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

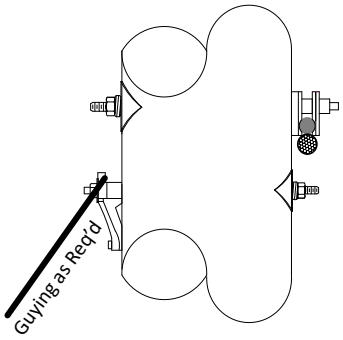
NES

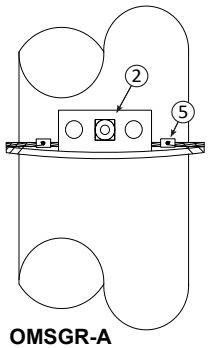
OVERHEAD CABLE NAMING CONVENTIONS



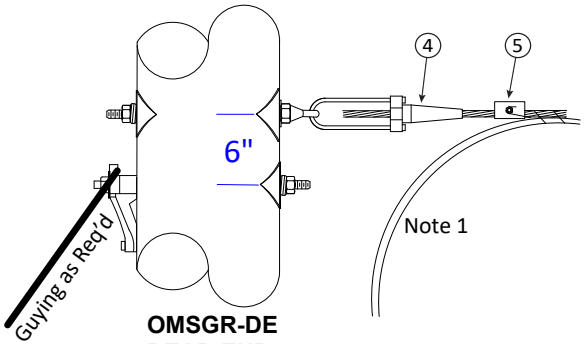


OMSGR-T
0° TO 5° ANGLES

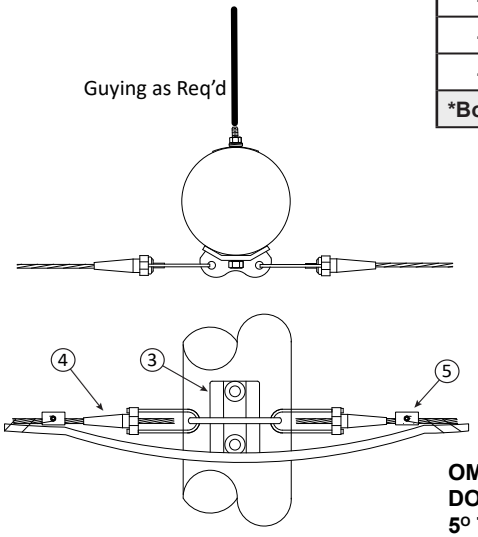




OMSGR-A
5° TO 60° ANGLES



OMSGR-DE
DEAD END



OMSGR-DDE
DOUBLE DEAD END
5° TO 60° ANGLES

FRM. CODE	OMSGR-T	OMSGR-A	OMSGR-DE	OMSGR-DDE	FIBER OPTIC OVERHEAD FRAMING MATERIAL ITEM LIST	
ITEM #	QUANTITY				DESCRIPTION	STOCK #
1	1	-	-	-	TWO BOLT CLAMP TANGENT	220600000
2	-	1	-	-	TWO BOLT CLAMP CURVED	221660000
3	-	-	-	1	BRACKET, DOUBLE DEADEND ANGLE	180780000
TRUCK STOCK ITEMS						
4	-	-	1	2	STRANDVISE GUY 3/8	231100000
5	2	2	1	2	LASHING CLAMP	220250000
-	-	-	1	2	BOLT DA AVERAGE 3/4	204XXXXX
-	-	-	1	-	NUT OVAL EYE 3/4	206420000
-	1	1	-	-	BOLT MACH AVERAGE 5/8	203XXXXX
-	1	1	-	-	5/8" DBL COIL SPRING WASHER	206570000
-	1	1	1	2	WASHER SQ FLAT 3/4 H	209620000
-	1	1	1	2	WASHER SQ CURVED 3 1/2	209520000
-	*	*	*	*	POLE BAND SS 1.25	183983000
-	2*	2*	2*	2*	POLE BAND FASTENING EQUIP.	183987000
-	1*	1*	1*	2*	POLE BAND ALL PURPOSE BRACKET	183984000

*Bolting is preferred on steel poles. Banding may be used per Banding section.

NOTES

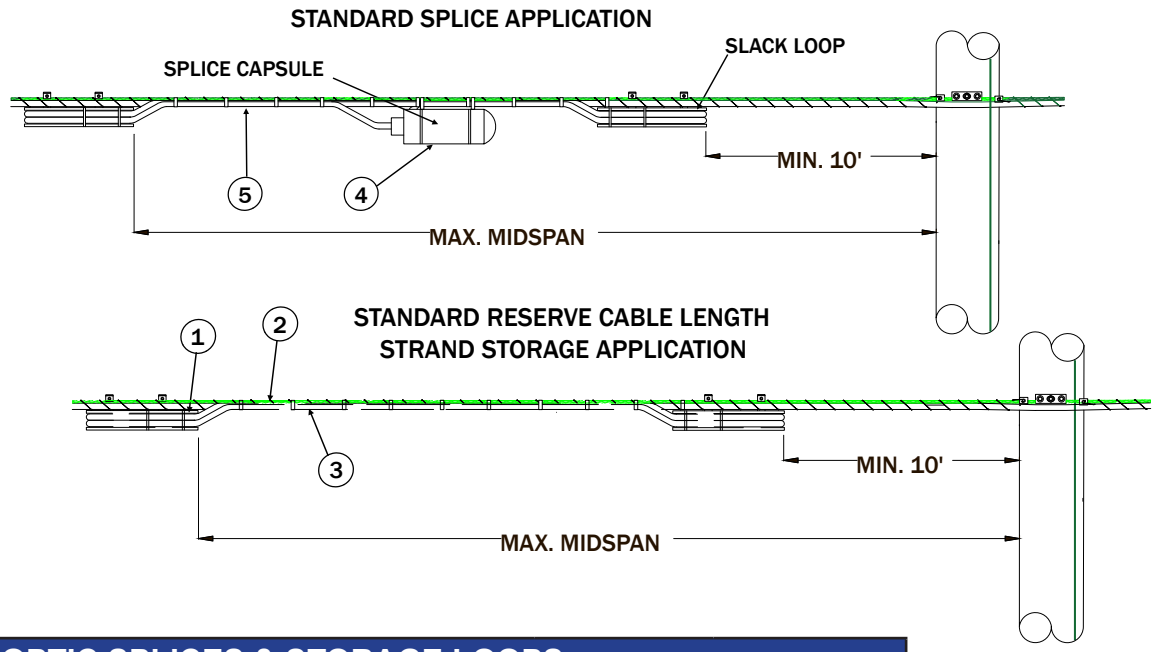
1. Dbl DE framing with two back-to-back DE Eye-bolts limited (0 - 5 degree angles).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

CABLE MESSENGER FRAMING DETAILS



FIBER OPTIC SPLICES & STORAGE LOOPS MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	C.U.	STOCK NO.
1 SELECT ONE	2	IN SPAN FIBER OPTIC STORAGE SYSTEM (FOR 24 CNT)	CFO-LOOP	367350000
		IN SPAN FIBER OPTIC STORAGE SYSTEM (FOR 96 CNT AND ABOVE)	CFO-LOOP144	367251500
2	#FT	WIRE GALV GUY 3/8 REEL	OMSGR12	016041000
3	# REELS	WIRE FOR LASHING COMM CABLES TO MSGR (1000 FT PER REEL)	OSPIN-WIRE	016080000
4 SELECT ONE	1	CAPSULE, SPLICE ENCL FOR 288 SPLICES	CFO-SE-B288	400386000
		CAPSULE, SPLICE ENCL FOR 576 SPLICES	CFO-SE-D576	400385000
5 SELECT ONE	#FT	FIBER OPTIC CBL 24 SM OVERLASHED	OFIB-24	024502000
		FIBER OPTIC CBL 96 SM LOOSE TUBE (REQUIRES MSGR)	OFIB-96LT	024502300
		FIBER OPTIC CBL 96 SM SELF-SUPPORTING	OFIB-96	024502100
		FIBER OPTIC CBL 144 SM SELF-SUPPORTING	OFIB-144	024502400
		FIBER OPTIC CBL 216 SM LOOSE TUBE (REQUIRES MSGR)	OFIB-216	024501100
		FIBER OPTIC CBL 288 SM LOOSE TUBE (REQUIRES MSGR)	OFIB-288	024501200

NOTES

1. Include one OSPIN-WIRE compatible unit for every 1000 ft of fiber cable.
2. Include two fiber loops spaced 75 ft apart for every 2000 ft of fiber, or at major road crossing.
3. Install slack loop with 200 ft of fiber.
4. Splice capsules require 100 ft coils with (2) coils at each location.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

SPLICE AND STORAGE LOOP DETAILS

FRM.CODE	UFIBRISR-2S	UFIBRISR-2L	UG FIBER & TRACER WIRE RISER MATERIAL ITEM LIST		
ITEM	QTY		DESCRIPTION	C.U.	STOCK NO.
1	1		TERMINATOR 2 FIBER 1H 24,96 (O.52" DIA)	N/A	402484400
		1	TERMINATOR 2 FIBER 1H 144 (0.66" DIA)	N/A	402484500
2	1	1	COND PLAS ADAP FEM 2	N/A	103290000
3	30'	30'	CONDUIT PVC SCH 80 2"	N/A	103272000
4	3	3	STRAP 2 INCH KIT/STANDOFF BRKT	N/A	062800000
5	3	3	BRACKET CONDUIT STANDOFF	N/A	060050000
TRUCK STOCK ITEMS NOT INCLUDED IN UFIBRISER CU'S					
	10'	10'	CHANNEL 4 WAY T-SLOT/10 FT	Truck Stock	060070000
	6	6	5/8" DBL COIL SPRING WASHER	Truck Stock	206570000
	2'	2'	BAR CU BUS 1/8 X 1 IN	Truck Stock	320120000
	2	2	TERM COMP 2-1 AL/CU 2H	Truck Stock	231760000
	4'	4'	CABLE CU BSD 2 7S	Truck Stock	011210000
	2	2	CONN GRD 4-2 TO 4-2 CU	Truck Stock	223480000
GROUNDING ITEMS					
	4	4	ROD GROUND CW 5/8X8	Truck Stock	184380000
	8	8	GRD CONN 1/0 OR 5/8" GND ROD	Truck Stock	223490000
	20'	20'	CABLE CU BSD 2 7S	Truck Stock	011210000
	2	2	GRD CONN #4 - 2 TO #4 - 2 CU CABLE	Truck Stock	223480000

UG FIBER & TRACER WIRE PULL BOX MATERIAL ITEM LIST				
ITEM	QTY	DESCRIPTION	C.U.	STOCK NO.
6	2	FIBER TRACER WIRE PULL BOX 9W X 11L X 6D	UFTWBX-9X11	060019000
7	1	ELECTRIC PULL BOX 30W X 48L X 24D	NPLBX-30X48	060042000
8	1	CONDUIT, ELBOW, PVC, 2" STD RAD.	UPVCL2-STDR	103548000
9	3	CONDUIT, ELBOW, PVC, 1.25" STD RAD.	UPVCL1.25	103486000
10	FT	CONDUIT, PVC SCH 80 3"	UPVC80-3	103273000
11	FT	CONDUIT, PVC SCH 80 2"	UPVC80-2	103272000
12	FT	CONDUIT, PVC SCH 40 1.25"	UPVC40-1.25	103180000
13	SELECT ONE #FT	MAXCELL 3" 3-CELL FABRIC BLACK	ND-NRD-3-BLK	105783000
		MAXCELL 3" 3-CELL FABRIC BLUE	ND-NRD-3-BLU	105784000
		MAXCELL 3" 3-CELL FABRIC RED	ND-NRD-3-RED	105782000
14	SELECT ONE #FT	24 COUNT FIBER OPTIC CABLE	UFIB-24	024502000
		96 COUNT FIBER OPTIC CABLE	UFIB-96	024502100
		144 COUNT FIBER OPTIC CABLE	UFIB-144	024502400
		216 COUNT FIBER OPTIC CABLE	UFIB-216	024501100
		288 COUNT FIBER OPTIC CABLE	UFIB-288	024501200
15	FT	UG LOCATE, TRACER WIRE, GREEN	C9TRCWIRE	021965000
MINOR MATERIAL ITEMS				
16	1	COND PLAS ADAP FEM 3" (AS REQ'D)	N/A	103310000
17	1	COND PLAS ADAP FEM 2" (AS REQ'D)	N/A	103290000
18	1	COND PLAS ADAP FEM 1.25" (AS REQ'D)	N/A	103486000
19	1	3" DIA, PVC JNCT BOX ADAPTER	N/A	103310000
20	1	2" DIA, PVC JNCT BOX ADAPTER	N/A	103350000
21	1	1.25" DIA, PVC JNCT BOX ADAPTER	N/A	103346000
22	1	TERMINAL BLOCK CONNECTOR	N/A	224165500

NOTES

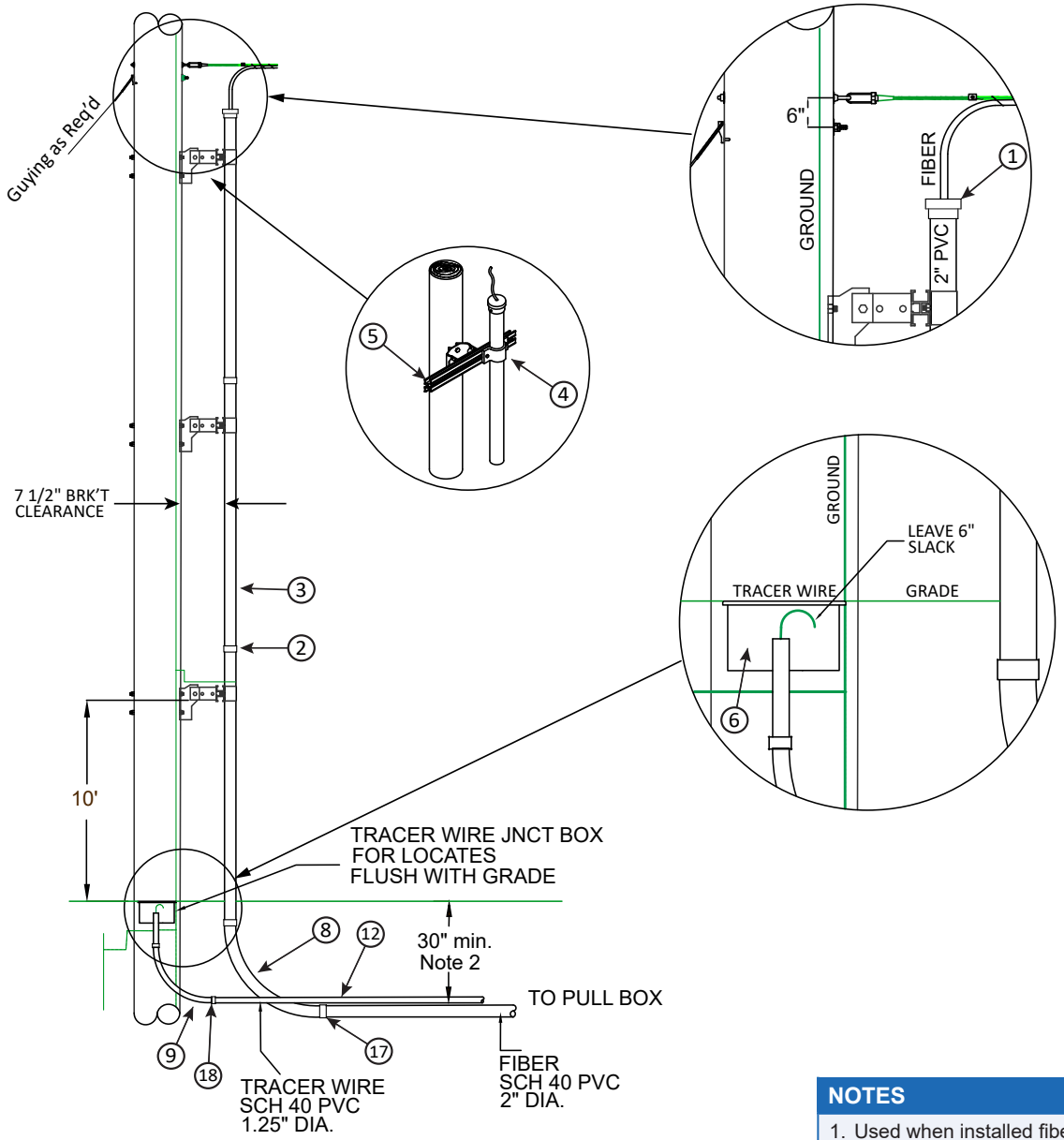
1. Used when installed fiber duct is run separately from the electrical duct run.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

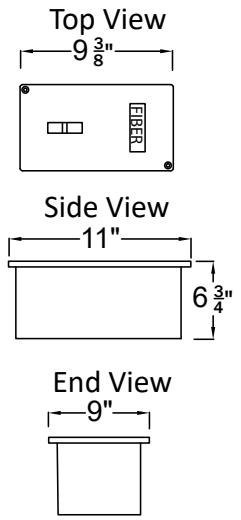
COMMUNICATIONS

NES

UG FIBER MATERIAL COMPATIBLE UNITS



Tracer Wire Pull Box Detail



NOTES

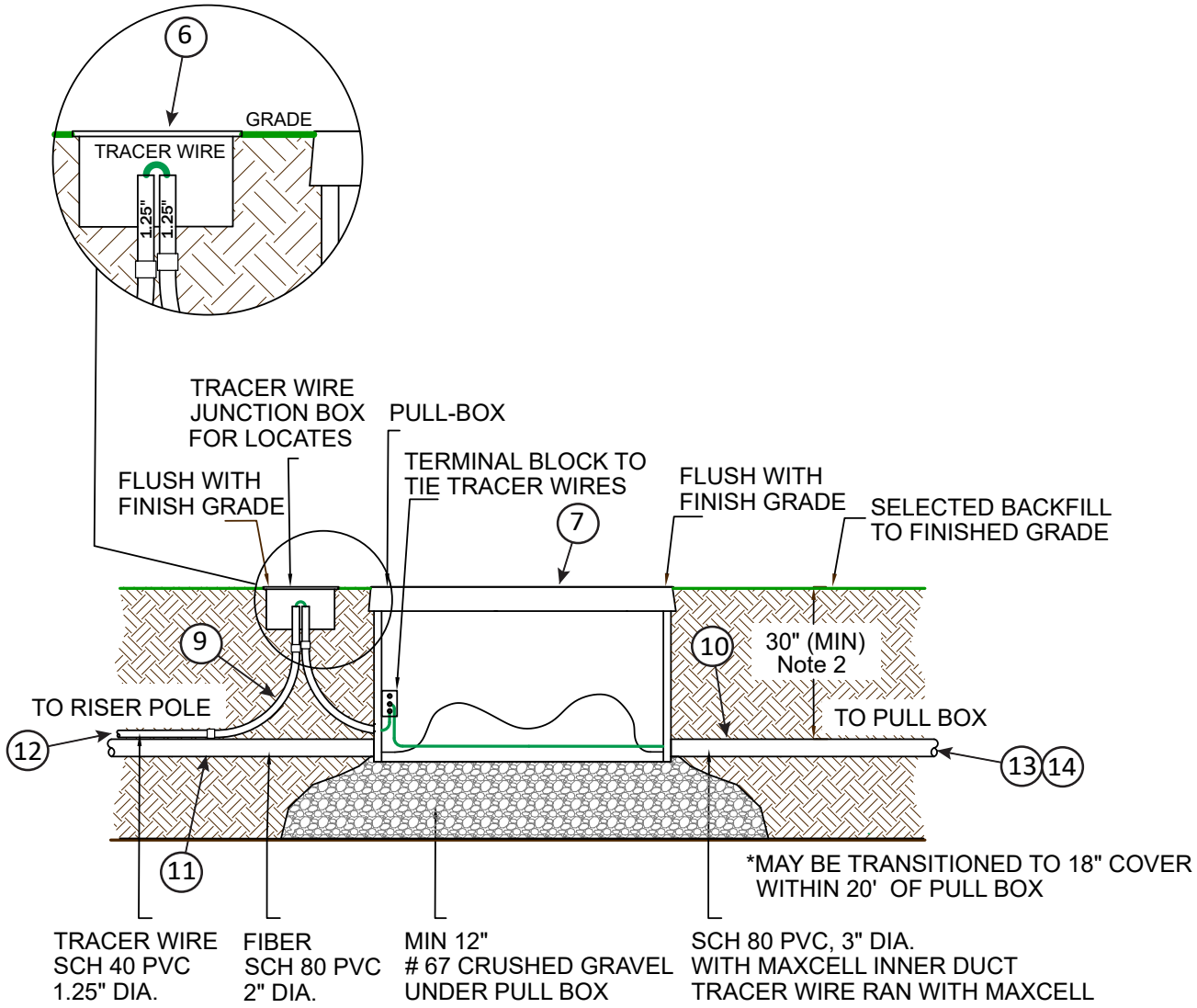
1. Used when installed fiber duct is run separately from the electrical duct run.
2. 42" minimum cover under the street. 12" minimum separation from other utilities.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

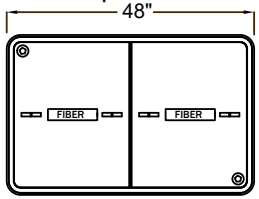
NES

UG FIBER & TRACER WIRE RISER DETAILS

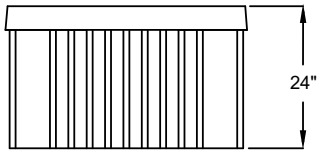


UG Fiber Cable Pull Box Detail

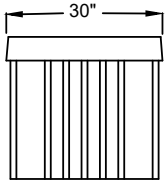
Top View



Side View



End View



NOTES

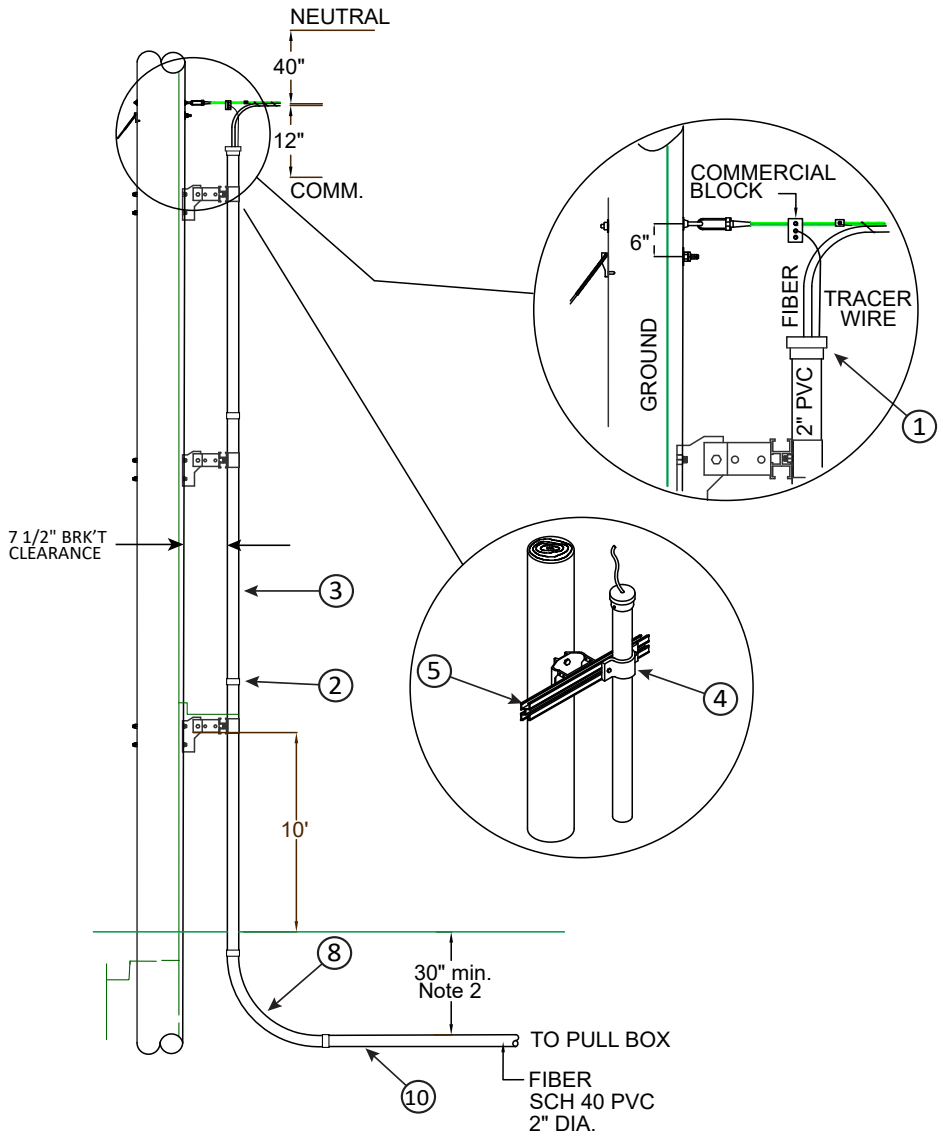
1. Used when installed fiber duct is run separately from the electrical duct run.
2. 42” minimum cover under the street. 12” minimum separation from other utilities.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

UG FIBER & TRACER WIRE PULL BOX DETAILS



FRM.CODE	UFIBRISR-2S	UFIBRISR-2L	UG FIBER W/DUCT RUN RISER MATERIAL ITEM LIST		
ITEM	**QTY**		**DESCRIPTION**	**C.U.**	**STOCK NO.**
1	1		TERMINATOR 3 FIBER 1H 24,96 (O.52" DIA)	N/A	402484400
		1	TERMINATOR 3 FIBER 1H 144 (0.66" DIA)	N/A	402484500
2	1	1	COND PLAS ADAP FEM 2	N/A	103290000
3	30'	30'	CONDUIT PVC SCH 80 2"	N/A	103272000
4	3	3	STRAP 2 INCH KIT/STANDOFF BRKT	N/A	062800000
5	3	3	BRACKET CONDUIT STANDOFF	N/A	060050000
TRUCK STOCK ITEMS NOT INCLUDED IN UFIBRISER CU'S					
	10'	10'	CHANNEL 4 WAY T-SLOT/10 FT	Truck Stock	060070000
	6	6	5/8" DBL COIL SPRING WASHER	Truck Stock	206570000
	2'	2'	BAR CU BUS 1/8 X 1 IN	Truck Stock	320120000
	2	2	TERM COMP 2-1 AL/CU 2H	Truck Stock	231760000
	4'	4'	CABLE CU BSD 2 7S	Truck Stock	011210000
	2	2	CONN GRD 4-2 TO 4-2 CU	Truck Stock	223480000
GROUNDING ITEMS					
	4	4	ROD GROUND CW 5/8X8	Truck Stock	184380000
	8	8	GRD CONN 1/0 OR 5/8" GND ROD	Truck Stock	223490000
	20'	20'	CABLE CU BSD 2 7S	Truck Stock	011210000
	2	2	GRD CONN #4 - 2 TO #4 - 2 CU CABLE	Truck Stock	223480000

NOTES

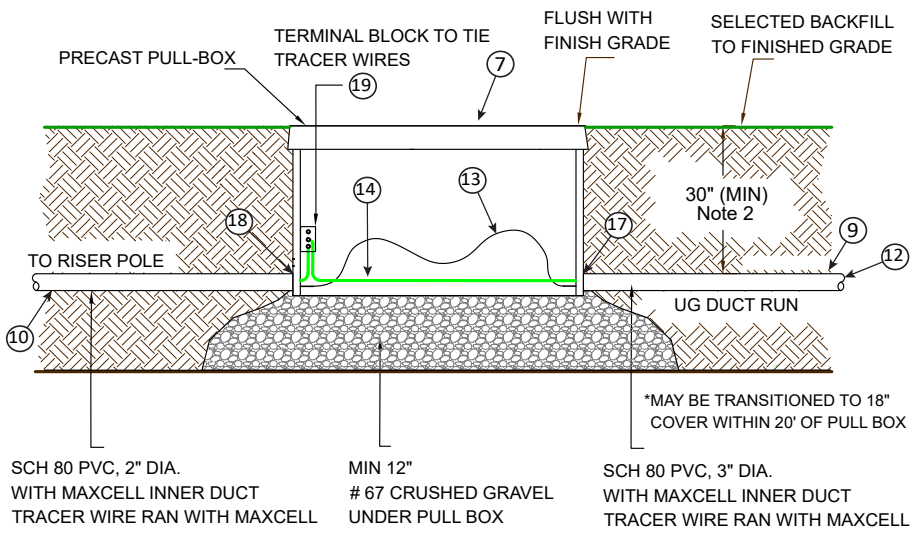
1. Used when installed fiber cable is within the electrical duct run.
2. 42" minimum cover under the street. 12" minimum separation from other utilities.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

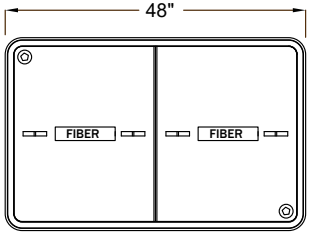
UG FIBER W/DUCT RUN
RISER DETAILS



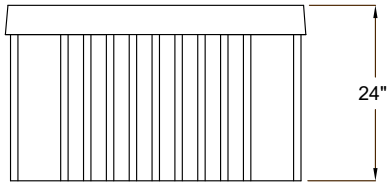
UG FIBER W/DUCT RUN
PULL BOX MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	C.U.	STOCK NO.
7	1	ELECTRIC PULL BOX 30W X 48L X 24D	NPLBX-30X48	060042000
8	1	CONDUIT, ELBOW, PVC, 2" STD RADIUS	UPVCL2-STDR	103548000
9	FT	CONDUIT, PVC SCH 80 3"	UPVC80-3	103273000
10	FT	CONDUIT, PVC SCH 80 2"	UPVC80-2	103272000
12	SELECT ONE #FT	MAXCELL 3" 3-CELL FABRIC BLACK	ND-NRD-3-BLK	105783000
		MAXCELL 3" 3-CELL FABRIC BLUE	ND-NRD-3-BLU	105784000
		MAXCELL 3" 3-CELL FABRIC RED	ND-NRD-3-RED	105782000
13	SELECT ONE #FT	24 COUNT FIBER OPTIC CABLE	UFIB-24	024502000
		96 COUNT FIBER OPTIC CABLE	UFIB-96	024502100
		144 COUNT FIBER OPTIC CABLE	UFIB-144	024502400
		216 COUNT FIBER OPTIC CABLE	UFIB-216	024501100
		288 COUNT FIBER OPTIC CABLE	UFIB-288	024501200
14	FT	UG LOCATE, TRACER WIRE, GREEN	C9TRCWIRE	021965000
MINOR MATERIAL ITEMS				
15	1	COND PLAS ADAP FEM 3" (AS REQ'D)	N/A	103310000
16	1	COND PLAS ADAP FEM 2" (AS REQ'D)	N/A	103290000
17	1	3" DIA, PVC JNCT BOX ADAPTER	N/A	103310000
18	1	2" DIA, PVC JNCT BOX ADAPTER	N/A	103350000
19	1	TERMINAL BLOCK CONNECTOR	N/A	224165500

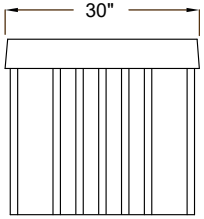
Top View



Side View



End View



NOTES

1. Used when installed fiber cable is within the electrical duct run.
2. 42" minimum cover under the street. 12" minimum separation from other utilities.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

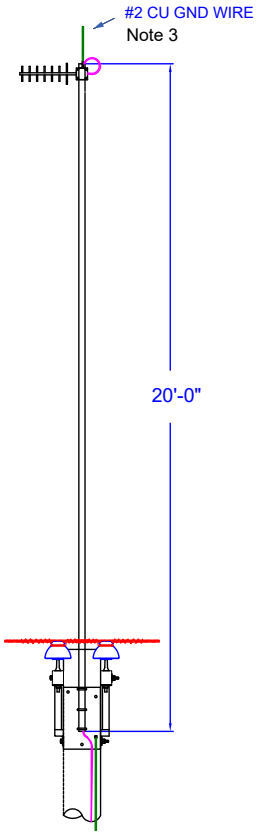
UG FIBER W/DUCT RUN
PULL BOX DETAILS

ANTENNAS

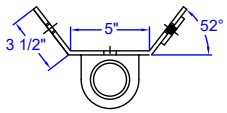
INSTALLATION DETAILS

LINE DEPARTMENT WORK ORDER			
TASK	ANTENNA MAST INSTALL, POLE MOUNT		
QTY	DESCRIPTION	C.U.	STOCK NO.
1	ANTENNA MAST, POLE MOUNT 20' (IF ABOVE PRIMARY)	OANT-MAST20	180372000

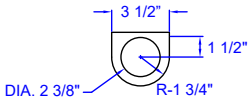
C&M WORK ORDER			
TASK	LABOR TO FABRICATE ANTENNA MAST ASSEMBLY		
5 HRS	LABOR ONLY TO BUILD THIS PART	ULAB-CONST	N/A



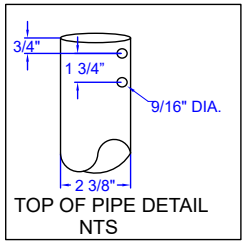
ANTENNA MAST ASSEMBLY VIEW



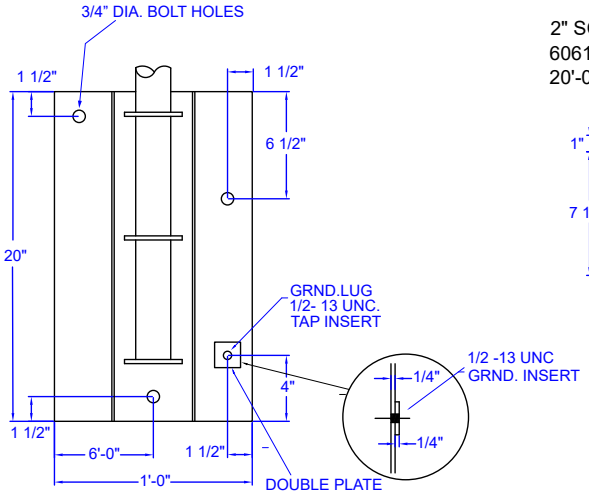
TOP VIEW



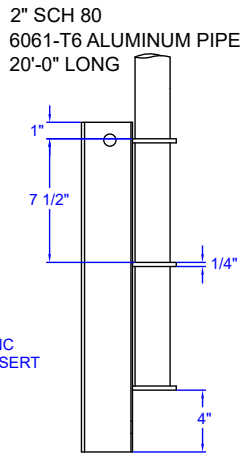
BRACKET DETAIL



TOP OF PIPE DETAIL
NTS

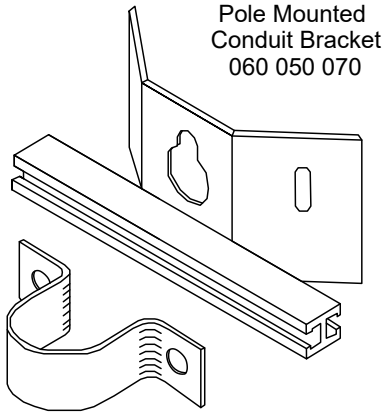


FRONT VIEW



SIDE VIEW

LINE DEPARTMENT WORK ORDER		
TASK	ANTENNA MAST SUPPORT, AS NEEDED	
QTY	DESCRIPTION	C.U.
1	ANTENNA MAST SUPPORT, BRACKET	OANT-MAST-BKT


Pole Mounted
Conduit Bracket
060 050 070

2" Conduit Strap
062 800 000

NOTES

1. Material specified to be 6061-T6 grade aluminum, 2' schedule 80 structural pipe and 1/4" plate.
2. Weld continuous fillet welds all around surface contacts to develop strength for plate mounting to poles.
3. #2 Cu ground wire provides lightning terminal 12-inches above mast.
4. Mast allows for mounting either 100MHZ or 900 MHZ Antenna.
5. Recommend using support bracket near top of pole to dampen the antenna mast.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

SCADA ANTENNA MAST DETAIL

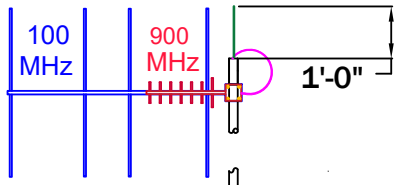
MAJOR & MINOR MATERIAL ITEM LIST		
QTY	DESCRIPTION	STOCK NO.
2	RADIO CONN PLUG TYPE N 1/2	347084500
95	RADIO CABLE COAX 1/2	347083800
1	RADIO ANTENNA 152/158 YAGI	347070100
	RADIO ANTENNA 928/952 YAGI	347083600
1	RADIO 100 MHZ REMOTE 4RF APRISA SR+	347083150
	RADIO 900 MHZ REMOTE 4RF APRISA SR+	347083260
1	RADIO SPLICE WP KIT	347081500
2	CONN SOLDER SHELL MALE DB9	343215000
2	CONN HOOD DB9 EM1	343212000
1	CABLE CONTROL (50') 32 PIN VIPER ST..	341084300
1	ANTENNA MAST 20' ALUMINUM	180372000
2	HOLDER FUSE 0-30A	150300000
8	STRAP PIPE 1", SINGLE HOLE	106560000
8	STRAP PIPE 1/2", SINGLE HOLE	106520000
20	CONDUIT PLAS FLEXIBLE 1 INCH	103040000
40	CABLE CU CONT STA 3/C	021560000
10	CABLE CU 12 COND RS232	021785000
65	CABLE CU SONT STA 2/C	021540000
40	CABLE CU #2 (FT)	011000000
2	RADIO GROUND STRAP KIT—1/2 INCH COAX ANTENNA CABLE	347081200
1	GRIP RISER 2 X 1.0 –1.24	401350000
1	CONDUIT GALV 1" U-GUARD	101141000

TRUCK STOCK MATERIAL ITEM LIST		
QTY	DESCRIPTION	STOCK NO.
1	TERM COMP LUG #2 & #1 AL/CU 2H	231760000
2	BOLT MACHINE SS FH 1/2 IN X 1-1/2 IN	204320000

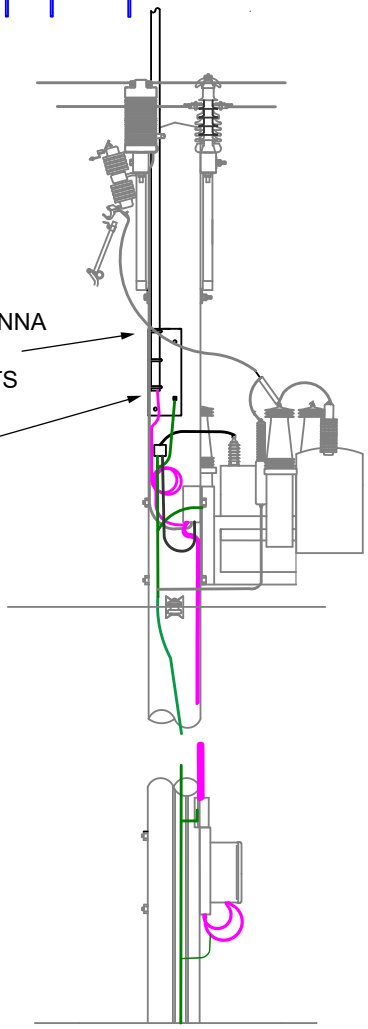
NOTES

1. Reference Capacitor and Protection Plate Book sections for relative mounting heights and cable connections to equipment.

INSTALL ANTENNA WIRE INSIDE MAST. USE CAP GRIP TO KEEP WIRE IN CONDUIT.



C&M WORK ORDER		
TASK	INSTALL CONTROLLS AND WIRING	
QTY	DESCRIPTION	C.U.
SELECT ONE	100 MHZ RADIO	CRADAPR1ANT
	900 MHZ RADIO	CRADAPR9ANT
100'	COAX CABLE 1/2" FROM RADIO TO YAGI ANTENNA	CCX-CBL-1/2



LINE CREW WORK ORDER		
TASK	INSTALL ANTENNA	
QTY	DESCRIPTION	C.U.
SELECT ONE	YAGI ANTENNA, 900MHZ	OANTENNA
	YAGI ANTENNA, 100MHZ	OANTENNAVHF
1	ANTENNA MAST, POLE MOUNT 20'	OANT-MAST20
1	RADIO SPLICE WEATHERPROOFING KIT	ORADPROOF
*Planning group will determine required antenna type (100MHZ or 900MHZ)		

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

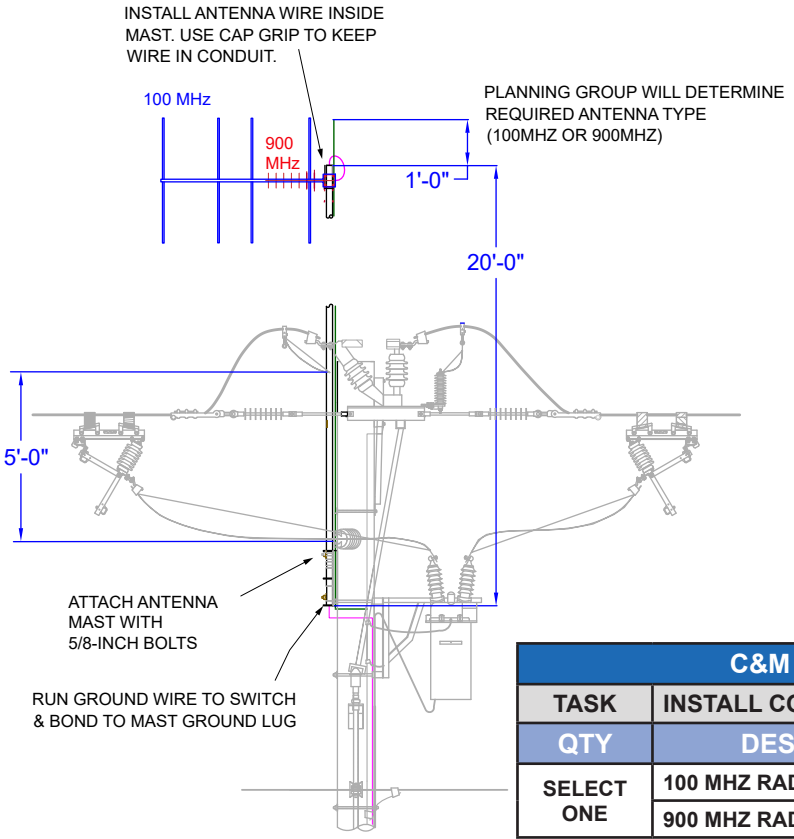
20' ANTENNA MAST INSTALLATION CAPACITOR BANK

MAJOR & MINOR MATERIAL ITEM LIST		
QTY	DESCRIPTION	STOCK NO.
2	RADIO CONN PLUG TYPE N 1/2	347084500
95	RADIO CABLE COAX 1/2	347083800
1	RADIO ANTENNA 152/158 YAGI	347070100
	RADIO ANTENNA 928/952 YAGI	347083600
1	RADIO 100 MHZ REMOTE 4RF APRISA SR+	347083150
	RADIO 900 MHZ REMOTE 4RF APRISA SR+	347083260
1	RADIO SPLICE WP KIT	347081500
2	CONN SOLDER SHELL MALE DB9	343215000
2	CONN HOOD DB9 EM1	343212000
1	CABLE CONTROL (50') 32 PIN VIPER ST..	341084300
1	ANTENNA MAST 20' ALUMINUM	180372000
2	HOLDER FUSE 0-30A	150300000
8	STRAP PIPE 1", SINGLE HOLE	106560000
8	STRAP PIPE 1/2", SINGLE HOLE	106520000
20	CONDUIT PLAS FLEXIBLE 1 INCH	103040000
40	CABLE CU CONT STA 3/C	021560000
10	CABLE CU 12 COND RS232	021785000
65	CABLE CU SONT STA 2/C	021540000
40	CABLE CU #2 (FT)	011000000
2	RADIO GROUND STRAP KIT—1/2 INCH COAX ANTENNA CABLE	347081200
1	GRIP RISER 2 X 1.0 –1.24	401350000
1	CONDUIT GALV 1" U-GUARD	101141000

TRUCK STOCK MATERIAL ITEM LIST		
QTY	DESCRIPTION	STOCK NO.
1	TERM COMP LUG #2 & #1 AL/CU 2H	231760000
2	BOLT MACHINE SS FH 1/2 IN X 1-1/2 IN	204320000

NOTES

1. Reference Capacitor and Protection Plate Book sections for relative mounting heights and cable connections to equipment.



C&M WORK ORDER		
TASK	INSTALL CONTROLLS AND WIRING	
QTY	DESCRIPTION	C.U.
SELECT ONE	100 MHZ RADIO	CRADAPR1ANT
	900 MHZ RADIO	CRADAPR9ANT
100'	COAX CABLE 1/2" FROM RADIO TO YAGI ANTENNA	CCX-CBL-1/2

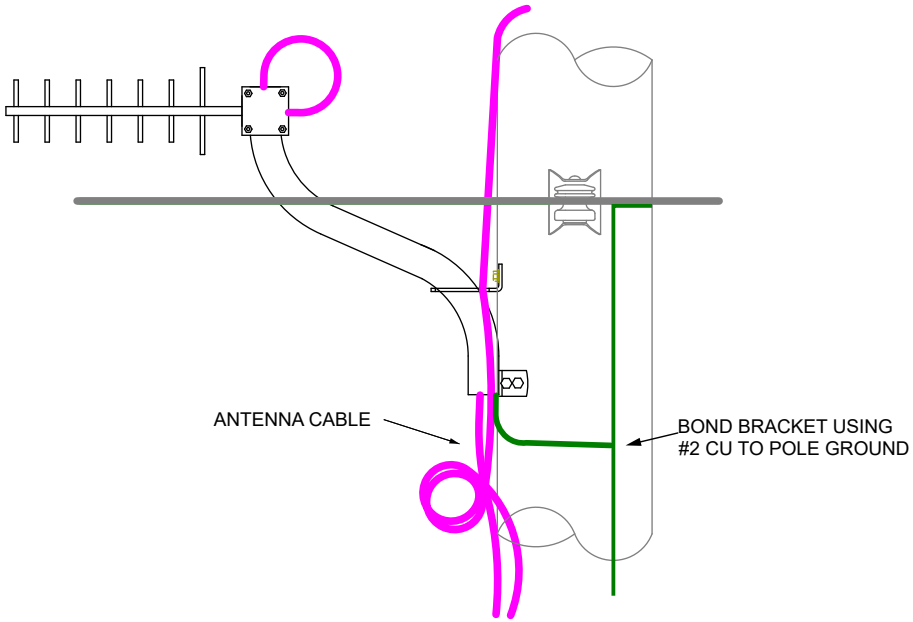
LINE CREW WORK ORDER		
TASK	INSTALL ANTENNA	
QTY	DESCRIPTION	C.U.
SELECT ONE	YAGI ANTENNA, 900MHZ	OANTENNA
	YAGI ANTENNA, 100MHZ	OANTENNAVHF
1	ANTENNA MAST, POLE MOUNT 20'	OANT-MAST20
1	RADIO SPLICE WEATHERPROOFING KIT	ORADPROOF
*Planning group will determine required antenna type (100MHZ or 900MHZ)		

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

20' ANTENNA MAST INSTALLATION DA SWITCH & RECLOSER



MAJOR & MINOR MATERIAL ITEM LIST		
QTY	**DESCRIPTION**	**STOCK NO.**
2	RADIO CONN PLUG TYPE N 1/2	347084500
95	RADIO CABLE COAX 1/2	347083800
1	RADIO ANTENNA 928/952 YAGI	347083600
1	RADIO 900 MHZ REMOTE 4RF APRISA SR+	347083260
1	RADIO SPLICE WP KIT	347081500
2	CONN SOLDER SHELL MALE DB9	343215000
2	CONN HOOD DB9 EM1	343212000
1	CABLE CONTROL (50') 32 PIN VIPER ST..	341084300
1	ANTENNA MASTARM BRACKET	305915000
2	HOLDER FUSE 0-30A	150300000
8	STRAP PIPE 1", SINGLE HOLE	106560000
20	CONDUIT PLAS FLEXIBLE 1 INCH	103040000
40	CABLE CU CONT STA 3/C	021560000
10	CABLE CU 12 COND RS232	021785000
65	CABLE CU SONT STA 2/C	021540000
40	CABLE CU #2 (FT)	011000000
2	RADIO GROUND STRAP KIT—1/2 INCH COAX ANTENNA CABLE	347081200
1	GRIP RISER 2 X 1.0 –1.24	401350000
1	CONDUIT GALV 1" U-GUARD	101141000

LINE CREW WORK ORDER		
TASK	**INSTALL ANTENNA**	
QTY	**DESCRIPTION**	**C.U.**
SELECT ONE	YAGI ANTENNA, 900MHZ	OANTENNA
	YAGI ANTENNA, 100MHZ	OANTENNAVHF
SELECT ONE	ANTENNA MOUNTING BRACKET	OANTENABKR
1	RADIO SPLICE WEATHERPROOFING KIT	ORADPROOF
*Planning group will determine required antenna type (100MHZ or 900MHZ)		

C&M WORK ORDER		
TASK	**INSTALL CONTROLLS AND WIRING**	
QTY	**DESCRIPTION**	**C.U.**
SELECT ONE	100 MHZ RADIO	CRADAPR1ANT
	900 MHZ RADIO	CRADAPR9ANT
100'	COAX CABLE 1/2" FROM RADIO TO YAGI ANTENNA	CCX-CBL-1/2

NOTES

1. Reference Capacitor and Protection Plate Book sections for relative mounting heights and cable connections to equipment.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

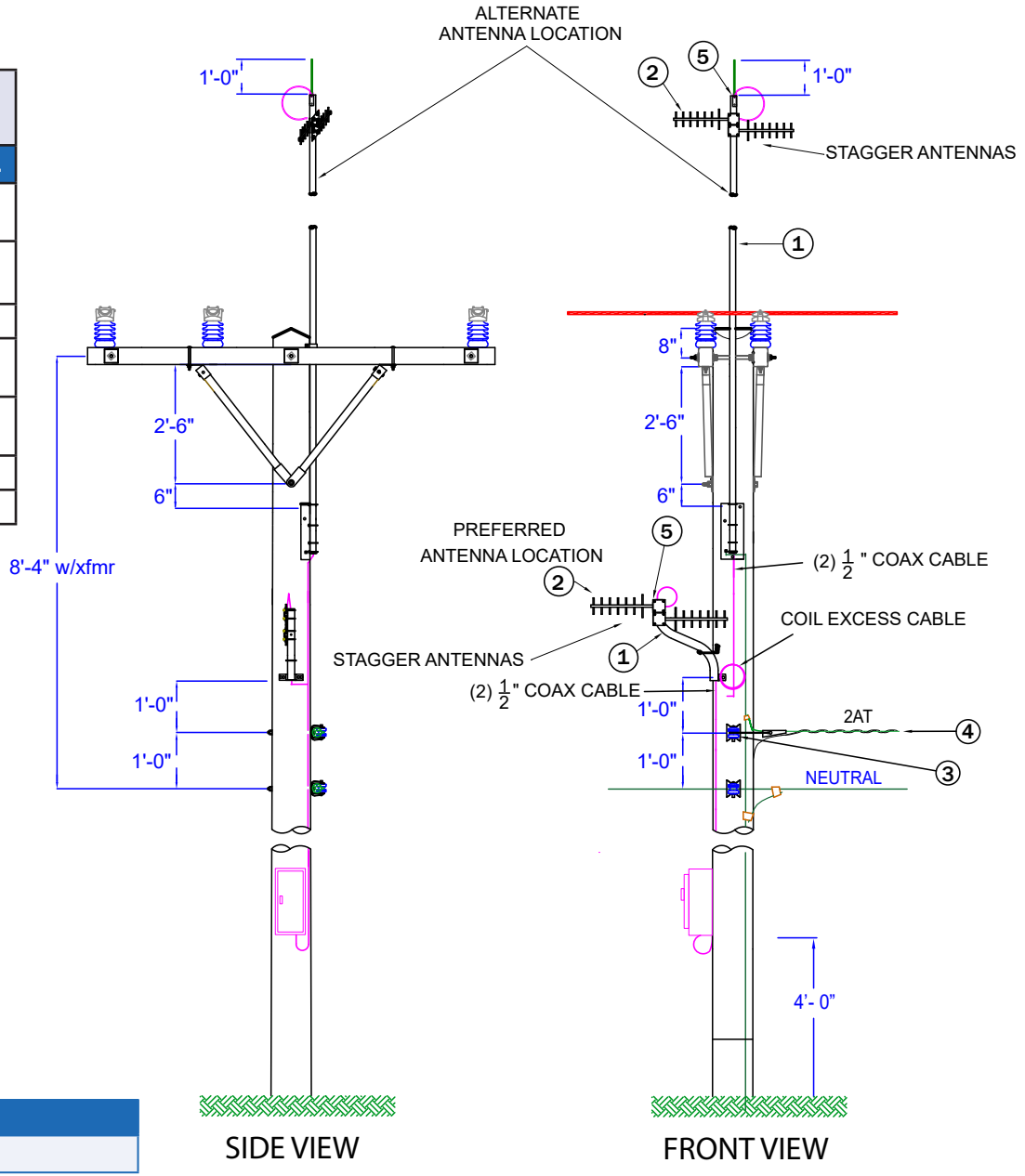
NES

ANTENNA MOUNTING BRACKET DETAIL

RADIO REPEATER STATION

INSTALLATION DETAILS

REPEATER STATION MAJOR & MINOR MATERIAL ITEM LIST				
ITEM	QTY	DESCRIPTION	C.U.	STOCK NO.
1	SELECT ONE	ANTENNA MAST, POLE MOUNT, 20' , (WHEN REQUIRED)	OANT-MAST20	180372000
		ANTENNA MOUNTING BRACKET (PREFERRED)	OANTENABKR	305915000
2	2	YAGI ANTENNA	OANTENNA	347083600
3	SELECT ONE	SMALL ONE WIRE RACK	OSR1W	184000000
		LARGE ONE WIRE RACK	OSR1WL	184003000
4	FT	#2 ALUMINUM TRIPLEX	OCAT-2	010900000
5	2	WEATHERPROOFING	ORADPROOF	347081500



NOTES

1. Service Riser Details can be found on the next page.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

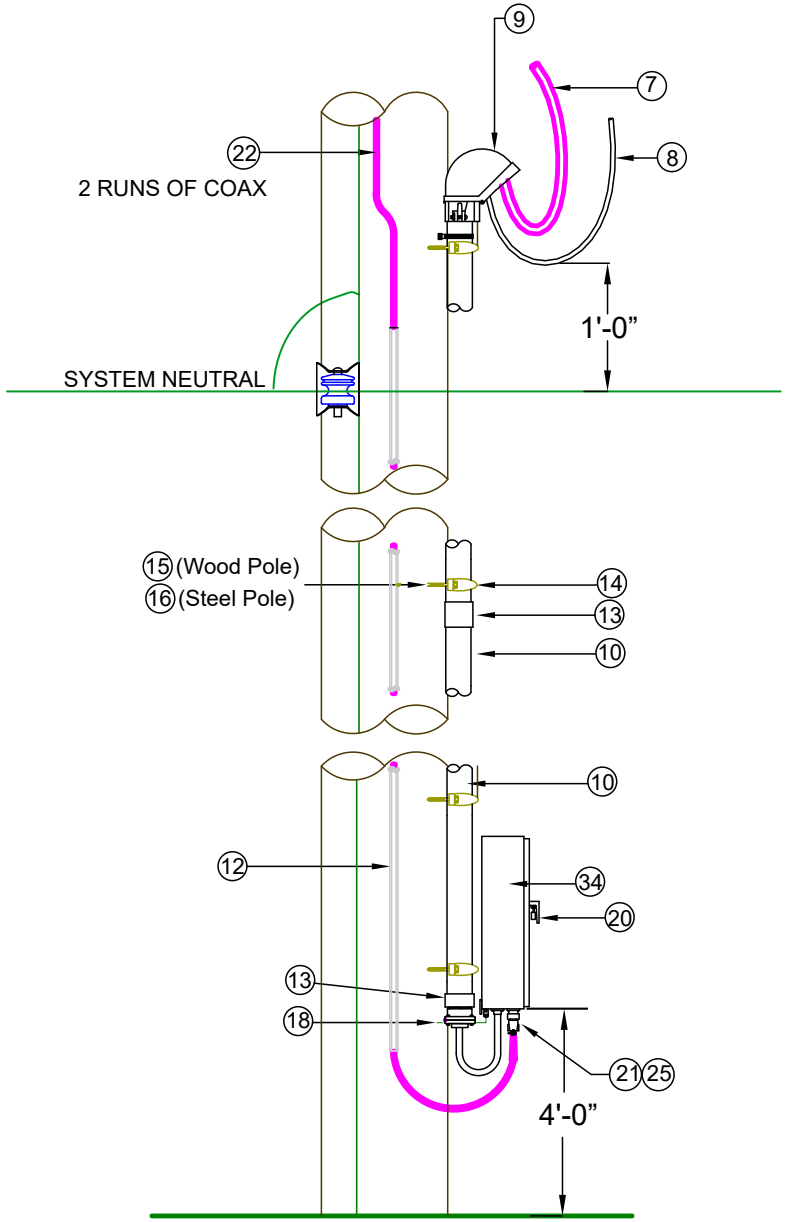
COMMUNICATIONS

NES

REPEATER STATION FRAMING DETAIL

REPEATER STATION
MAJOR & MINOR MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	C.U.	STOCK NO.
6	2	COUPLER, 1” PVC	LPCLP-1	103484000
7	40’	POWER CABLE 2 CONDUCTOR #10AWG	CCCS-2C-10	21540000
8	60’	POWER CABLE 3 CONDUCTOR #10AWG	CCCS-3C-10	21560000
9	1	WEATHER HEAD FOR 1” DUCT	CPVC-1-WH	105516000
10	30’	1” SCHEDULE 40 PVC	ND1-40	103170000
11	1	GRIP RISER 2 X 1.-1.24	N/A	401350000
12	3	CONDUIT GALV 1" UGUARD	OG-GRD	101141000
TRUCK STOCK				
	WOOD	STEEL		
13	1	1	TREADED 1” PVC PIPE COUPLER	N/A	103370000
14	6	6	PIPE STRAP	N/A	106620000
15	10	-	LAG BOLT 1/2” X 4”	N/A	208540000
16	-	10	SHEET METAL SCREWS	N/A	208564000
17	10	10	PLASTIC WIRE TIES	N/A	361420000
18	4’	4’	GROUND WIRE #4AWG BSD	N/A	011160000
19	2	-	GROUND CONNECTOR 2-6 AL/CU	N/A	222540000
20	1	1	PADLOCK	N/A	284210000



NOTES

1. Stock items listed on next page.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

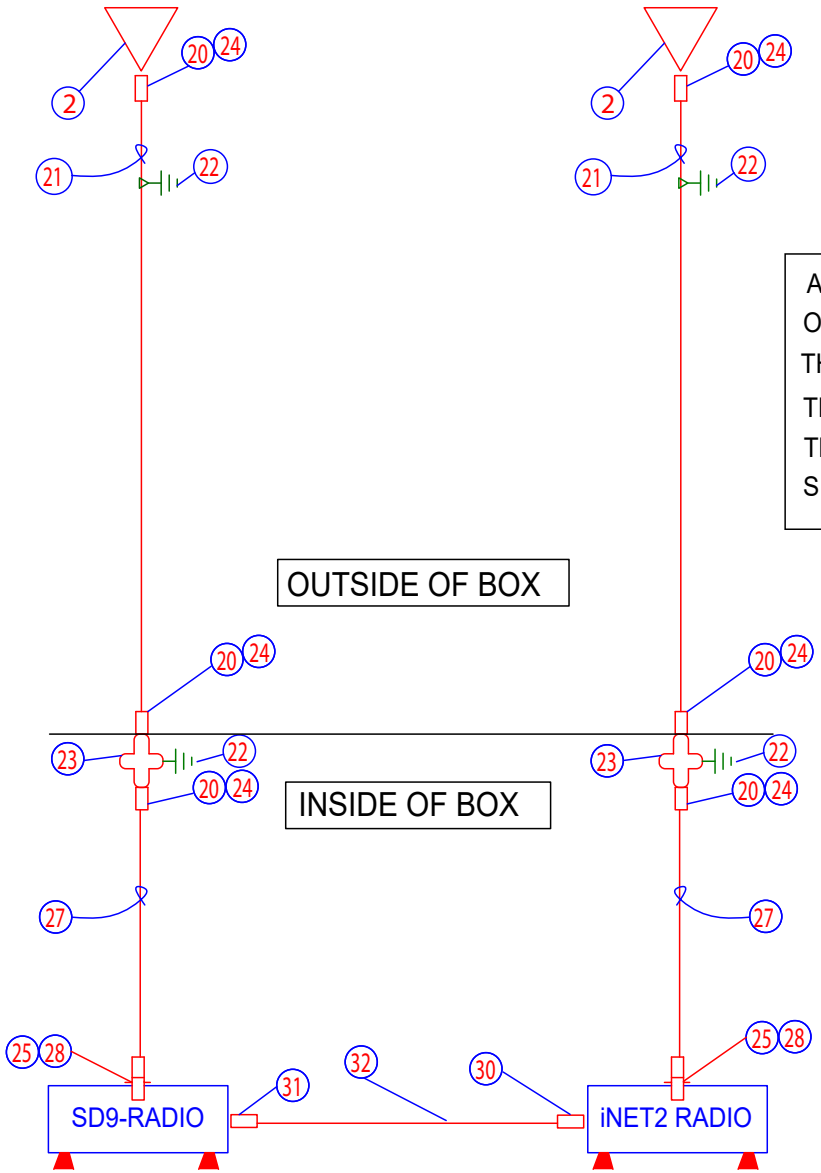
REPEATER STATION
SERVICE RISER DETAIL

C&M WORK ORDER				
ITEM	QTY	DESCRIPTION	C.U.	STOCK NO.
21	4	N MALE CONN FOR 1/2”	CCX-P-N-1/2	347084500
22	200	1/2” COAX FOR REMOTE SITES (PER FT)	CCX-CBL-1/2	347084500
23	4	GROUNDING KIT, W 1 HOLE LUG, FOR 1/2” CABLE	CCOAX-GS-1/2	347083800
24	2	LIGHTING ARRESTORS	CRAD-CX-PROT	347081200
25	2	WEATHERPROOFING	CRAD-W/PROOF	347081500
26	1	REMOTE RADIO-SD9	CXCVR-SD9	347083010
27	30	STRAP PIPE 3/8 1 HOLE	SCS.375	106500000
28	2	RADIO CABLE COAX 1/2” 3 FT JUMP	CCOAXJUMP3FT	347084100
29	2	ADAPTER RADIO TNC MALE TO N FEMALE	CRADJUMP	341108100
30	1	REMOTE RADIO-iNET II	CXCVR-ENET	347084850
31	1	CONNECTOR SOLDER SHELL FEMALE DB9	CCONN-FS-DB9	343214000
32	1	CONNECTOR SOLDER SHELL MALE DB9	CCONN-MS-DB9	343215000
33	3	CABLE FOR DB9 CONNECTORS (PER FT)	N/A	N/A
34	1	CABINET RADIO NEMA 4X 24”H X 24”W X 8”D	N/A	341074000

NOTES

1. Items listed are shown on the previous page.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE



ALL OF THIS EQUIPMENT WILL BE INSTALLED AT THE REPEATER SITE ON THE SAME POLE. BOTH RADIOS CAN BE IN THE SAME CABINET. THE SD9 RADIO WILL COMMUNICATE WITH THE TOWER SITE AND THE INET2 RADIO WILL COMMUNICATE WITH THE REMOTE SITE. THE REMOTE SITE WILL HAVE THE SAME SETUP AT THE INET2 RADIO SITE.

NOTES

1. Weatherproofing - use to seal and protect connections, splices, and jumper-to-antenna interfaces from the environment and prevent vibration.
2. Grounding Kits - use at the top and bottom of the installation at the building entrance and at 200 ft. intervals. Ground to tower.
3. Use mast for pole top installations.
4. Length of cable will be determined by location

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

REPEATER STATION SCHEMATIC

SAG TABLES

MESSENGER WITH FIBER OPTIC CABLE

DRAWING CODE

I-RS50-12M W/FIBER-350

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 10800 lb

Span = 50.0 Ft -- Special Load Zone

Initial data prior to cable installation

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/G)	WEIGHT (lb/G)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
0	MESSENGER ONLY NO ICE NO WIND NO FIBER CABLES			0.273	INITIAL STRINGING INSTALLATION ONLY		2.18	40
15				0.273			2.20	39
30				0.273			2.22	39
60				0.273			2.26	38
90				0.273			2.30	37
120				0.273			2.34	37
167				0.273			2.40	36
212				0.273			2.45	35

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 10800 lb

Span = 50.0 Ft -- Special Load Zone

3 Non-Supporting Cable(s) Added, Dia= 0.670 in ,Wt= 0.148lb/G+0.000lb/G

DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/G)	WEIGHT (lb/G)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	0.273	2.24	350	2.24	350*
32	0.25	0	0	0.273	2.25	247	2.25	247
0	0	0	0	0.273	2.19	103	2.19	103
15	0	0	0	0.273	2.21	102	2.21	102
30	0	0	0	0.273	2.23	101	2.23	101
60	0	0	0	0.273	2.27	99	2.27	100
90	0	0	0	0.273	2.31	98	2.31	98
120	0	0	0	0.273	2.35	96	2.34	96

Stringing Table Using Initial Sag "Messenger only"
Ruling Span = 50Ft

Special Load Zone -- Max Tension = 350 lb

**Design: 350 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

Sag Prior to Attaching Cables, Qty= 3 Dia= 0.670 in Wt= 0.148lb/G+0.000lb/G

H Tens	39	39	38	38	38	38	37	37	37
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
30.0	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10
40.0	1-5	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6
50.0	2-3	2-3	2-3	2-3	2-4	2-4	2-4	2-4	2-4
60.0	3-2	3-3	3-3	3-3	3-4	3-4	3-4	3-4	3-4
70.0	4-4	4-5	4-5	4-5	4-6	4-6	4-6	4-7	4-7

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

SAG TABLE
RULING SPAN - 50 FT
12M W/FIBER @ REDUCED TENSION

DRAWING CODE
I-RS100-12M W/FIBER-700

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb								
Span = 100.0 Ft -- Special Load Zone								
Initial data prior to cable installation								
DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/G)	WEIGHT (lb/G)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
0	MESSENGER ONLY NO ICE NO WIND NO FIBER CABLES			0.273	INITIAL STRINGING INSTALLATION ONLY		4.26	81
15				0.273			4.31	80
30				0.273			4.35	79
60				0.273			4.43	78
90				0.273			4.51	76
120				0.273			4.59	75
167				0.273			4.71	73
212				0.273			4.83	71

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb								
Span = 100.0 Ft -- Special Load Zone								
3 Non-Supporting Cable(s) Added, Dia= 0.670 in ,Wt= 0.148lb/G+0.000lb/G								
DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/G)	WEIGHT (lb/G)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	2.488	4.48	700	4.48	700*
32	0.25	0	0	1.765	4.48	496	4.47	497
0	0	0	0	0.717	4.33	208	4.3	210
15	0	0	0	0.717	4.37	207	4.34	208
30	0	0	0	0.717	4.41	205	4.39	206
60	0	0	0	0.717	4.49	201	4.47	202
90	0	0	0	0.717	4.57	198	4.55	199
120	0	0	0	0.717	4.65	194	4.62	195

Stringing Table Using Initial Sag "Messenger only"
Ruling Span = 100Ft

Special Load Zone -- Max Tension = 700 lb

**Design: 700 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

Sag Prior to Attaching Cables, Qty= 3 Dia= 0.670 in Wt= 0.148lb/G+0.000lb/G

H Tens	80	79	78	78	77	77	76	76	75
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50.0	1-1	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2
75.0	2-5	2-6	2-6	2-6	2-6	2-7	2-7	2-7	2-7
100.0	4-4	4-5	4-5	4-5	4-6	4-6	4-6	4-7	4-7
125.0	6-9	6-10	6-11	6-11	7-0	70	7-1	7-1	7-1
150.0	9-8	9-10	9-11	10-0	10-1	10-1	10-2	10-3	10-3

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

SAG TABLE
RULING SPAN - 100 FT
12M W/FIBER @ REDUCED TENSION

DRAWING CODE

I-RS100-12M W/FIBER-2200

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb								
Span = 100.0 Ft -- Special Load Zone								
Initial data prior to cable installation								
DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/G)	WEIGHT (lb/G)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
0	MESSENGER ONLY NO ICE NO WIND NO FIBER CABLES			0.273	INITIAL STRINGING INSTALLATION ONLY		0.24	1445
15				0.273			0.27	1285
30				0.273			0.30	1130
60				0.273			0.41	841
90				0.273			0.57	599
120				0.273			0.80	427
167				0.273			1.19	286
212				0.273			1.53	223

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb								
Span = 100.0 Ft -- Special Load Zone								
3 Non-Supporting Cable(s) Added, Dia= 0.670 in ,Wt= 0.148lb/G+0.000lb/G								
DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/G)	WEIGHT (lb/G)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	2.488	1.41	2200	1.41	2200*
32	0.25	0	0	1.765	1.25	1759	1.24	1780
0	0	0	0	0.717	0.59	1518	0.57	1571
15	0	0	0	0.717	0.65	1370	0.63	1433
30	0	0	0	0.717	0.73	1233	0.69	1304
60	0	0	0	0.717	0.9	999	0.83	1077
90	0	0	0	0.717	1.09	822	1	894
120	0	0	0	0.717	1.29	694	1.19	755

Stringing Table Using Initial Sag "Messenger only"
Ruling Span = 100Ft

Special Load Zone -- Max Tension = 2200 lb

**Design: 2200 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

Sag Prior to Attaching Cables, Qty= 3 Dia= 0.670 in Wt= 0.148lb/G+0.000lb/G

H Tens	1445	1130	1030	933	841	754	672	599	533
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
50.0	0-1	0-1	0-1	0-2	0-2	0-2	0-2	0-2	0-2
75.0	0-2	0-3	0-3	0-3	0-3	0-4	0-4	0-4	0-5
100.0	0-3	0-4	0-4	0-5	0-5	0-6	0-7	0-7	0-8
125.0	0-5	0-6	0-7	0-7	0-8	0-9	0-10	0-11	1-1
150.0	0-7	0-9	0-9	0-10	0-11	1-1	1-2	1-4	1-6

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

SAG TABLE
RULING SPAN - 100 FT
12M W/FIBER @ FULL TENSION

DRAWING CODE

I-RS150-12M W/FIBER-2500

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb									Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb								
Span = 150.0 Ft -- Special Load Zone									Span = 150.0 Ft -- Special Load Zone								
Initial data prior to cable installation									3 Non-Supporting Cable(s) Added, Dia= 0.670 in ,Wt= 0.148lb/G+0.000lb/G								
DESIGN POINTS					FINAL		INITIAL		DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/G)	WEIGHT (lb/G)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)	TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/G)	WEIGHT (lb/G)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
0	MESSENGER ONLY NO ICE NO WIND NO FIBER CABLES			0.273	INITIAL STRINGING INSTALLATION ONLY		0.69	1114	15	0.25	4	0.2	2.488	2.8	2500	2.8	2500*
15				0.273			0.78	980	32	0.25	0	0	1.765	2.54	1956	2.52	1974
30				0.273			0.90	858	0	0	0	0	0.717	1.48	1362	1.41	1426
60				0.273			1.17	655	15	0	0	0	0.717	1.6	1259	1.52	1325
90				0.273			1.50	513	30	0	0	0	0.717	1.73	1168	1.64	1233
120				0.273			1.83	419	60	0	0	0	0.717	1.99	1015	1.88	1075
167				0.273			2.33	330	90	0	0	0	0.717	2.25	896	2.12	950
212				0.273			2.75	280	120	0	0	0	0.717	2.51	804	2.37	851

Stringing Table Using Initial Sag "Messenger only"
Ruling Span = 150Ft

Special Load Zone -- Max Tension = 2500 lb

**Design: 2500 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

Sag Prior to Attaching Cables, Qty= 3 Dia= 0.670 in Wt= 0.148lb/G+0.000lb/G

H Tens	1114	858	783	716	655	601	554	513	477
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
100.0	0-4	0-5	0-6	0-6	0-7	0-7	0-8	0-8	0-9
125.0	0-6	0-8	0-9	0-9	0-10	0-11	1-0	1-1	1-2
150.0	0-9	0-11	1-0	1-1	1-3	1-4	1-5	1-6	1-8
175.0	1-0	1-3	1-5	1-6	1-8	1-9	1-11	2-1	2-3
200.0	1-3	1-8	1-9	1-11	2-2	2-4	2-6	2-8	2-11

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

SAG TABLE
RULING SPAN - 150 FT
12M W/FIBER @ FULL TENSION

DRAWING CODE
I-RS200-12M W/FIBER-2800

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb								
Span = 200.0 Ft -- Special Load Zone								
Initial data prior to cable installation								
DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/G)	WEIGHT (lb/G)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
0	MESSENGER ONLY NO ICE NO WIND NO FIBER CABLES			0.273	INITIAL STRINGING INSTALLATION ONLY		1.52	898
15				0.273			1.70	803
30				0.273			1.89	721
60				0.273			2.30	594
90				0.273			2.70	505
120				0.273			3.10	441
167				0.273			3.67	373
212				0.273			4.16	328

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb								
Span = 200.0 Ft -- Special Load Zone								
3 Non-Supporting Cable(s) Added, Dia= 0.670 in ,Wt= 0.148lb/G+0.000lb/G								
DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/G)	WEIGHT (lb/G)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	2.488	4.45	2800	4.45	2800*
32	0.25	0	0	1.765	4.08	2166	4.05	2182
0	0	0	0	0.717	2.69	1333	2.58	1390
15	0	0	0	0.717	2.85	1258	2.73	1315
30	0	0	0	0.717	3.01	1192	2.88	1246
60	0	0	0	0.717	3.33	1078	3.18	1128
90	0	0	0	0.717	3.64	986	3.48	1030
120	0	0	0	0.717	3.95	910	3.78	949

Stringing Table Using Initial Sag "Messenger only"
Ruling Span = 200Ft

Special Load Zone -- Max Tension = 2800 lb

**Design: 2800 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

Sag Prior to Attaching Cables, Qty= 3 Dia= 0.670 in Wt= 0.148lb/G+0.000lb/G

H Tens	898	721	674	632	594	561	531	505	481
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
125.0	0-8	0-9	0-10	0-11	0-11	1-0	1-1	1-1	1-2
175.0	1-2	1-6	1-7	1-8	1-10	1-11	2-0	2-1	2-3
225.0	2-0	2-5	2-7	2-9	2-11	3-1	3-4	3-6	3-8
275.0	2-11	3-7	3-10	4-2	4-5	4-8	4-11	5-2	5-5
325.0	4-1	5-0	5-5	5-9	6-1	6-6	6-10	7-2	7-6

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

SAG TABLE
RULING SPAN - 200 FT
12M W/FIBER @ FULL TENSION

DRAWING CODE
I-RS250-12M W/FIBER-3200

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb								
Span = 250.0 Ft -- Special Load Zone								
Initial data prior to cable installation								
DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/G)	WEIGHT (lb/G)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
0	MESSENGER ONLY NO ICE NO WIND NO FIBER CABLES			0.273	INITIAL STRINGING INSTALLATION ONLY		2.28	936
15				0.273			2.50	853
30				0.273			2.74	780
60				0.273			3.21	665
90				0.273			3.68	579
120				0.273			4.14	516
167				0.273			4.81	444
212				0.273			5.40	396

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb								
Span = 250.0 Ft -- Special Load Zone								
3 Non-Supporting Cable(s) Added, Dia= 0.670 in ,Wt= 0.148lb/G+0.000lb/G								
DESIGN POINTS					FINAL		INITIAL	
TEMP (°F)	ICE (in.)	WIND (psf)	K (lb/G)	WEIGHT (lb/G)	SAG (Ft)	TENSION (lb)	SAG (Ft)	TENSION (lb)
15	0.25	4	0.2	2.488	6.09	3200	6.09	3200*
32	0.25	0	0	1.765	5.57	2478	5.54	2494
0	0	0	0	0.717	3.8	1477	3.66	1534
15	0	0	0	0.717	3.98	1409	3.83	1464
30	0	0	0	0.717	4.17	1346	4.01	1399
60	0	0	0	0.717	4.53	1237	4.36	1286
90	0	0	0	0.717	4.9	1146	4.71	1190
120	0	0	0	0.717	5.25	1069	5.06	1109

Stringing Table Using Initial Sag "Messenger only"
Ruling Span = 250Ft

Special Load Zone -- Max Tension = 3200 lb

**Design: 3200 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*

Sag Prior to Attaching Cables, Qty= 3 Dia= 0.670 in Wt= 0.148lb/G+0.000lb/G

H Tens	936	780	737	699	664	633	605	579	556
Temp °F>	0	30	40	50	60	70	80	90	100
Sag	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In	Ft-In
Span	----	----	----	----	----	----	----	----	----
125.0	0-7	0-9	0-9	0-10	0-10	0-11	0-11	1-0	1-0
175.0	1-2	1-5	1-6	1-6	1-7	1-8	1-9	1-10	1-11
225.0	1-11	2-3	2-5	2-6	2-8	2-9	2-11	3-0	3-2
275.0	2-10	3-4	3-7	3-9	3-11	4-1	4-4	4-6	4-8
325.0	3-11	4-8	4-11	5-2	5-6	5-9	6-0	6-3	6-6

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

SAG TABLE
RULING SPAN - 250 FT
12M W/FIBER @ FULL TENSION

DRAWING CODE
I-RS300-12M W/FIBER-3400

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb								
Span = 300.0 Ft -- Special Load Zone								
Initial data prior to cable installation								
DESIGN POINTS					**FINAL**		**INITIAL**	
TEMP (°F)	**ICE (in.)**	**WIND (psf)**	**K (lb/G)**	**WEIGHT (lb/G)**	**SAG (Ft)**	**TENSION (lb)**	**SAG (Ft)**	**TENSION (lb)**
0	**MESSENGER ONLY NO ICE NO WIND NO FIBER CABLES**			**0.273**	**INITIAL STRINGING INSTALLATION ONLY**		**3.93**	**782**
15				**0.273**			**4.20**	**731**
30				**0.273**			**4.47**	**688**
60				**0.273**			**5.00**	**615**
90				**0.273**			**5.50**	**559**
120				**0.273**			**5.98**	**514**
167				**0.273**			**6.69**	**460**
212				**0.273**			**7.33**	**420**

Area = 0.0792 Sq. in., Diameter = 0.360 in, Weight = 0.273 lb/G, RTS = 15400 lb								
Span = 300.0 Ft -- Special Load Zone								
3 Non-Supporting Cable(s) Added, Dia= 0.670 in ,Wt= 0.148lb/G+0.000lb/G								
DESIGN POINTS					**FINAL**		**INITIAL**	
TEMP (°F)	**ICE (in.)**	**WIND (psf)**	**K (lb/G)**	**WEIGHT (lb/G)**	**SAG (Ft)**	**TENSION (lb)**	**SAG (Ft)**	**TENSION (lb)**
15	**0.25**	**4**	**0.2**	**2.488**	**8.26**	**3400**	**8.26**	**3400***
32	**0.25**	**0**	**0**	**1.765**	**7.64**	**2606**	**7.59**	**2621**
0	**0**	**0**	**0**	**0.717**	**5.61**	**1440**	**5.43**	**1487**
15	**0**	**0**	**0**	**0.717**	**5.82**	**1389**	**5.63**	**1434**
30	**0**	**0**	**0**	**0.717**	**6.02**	**1341**	**5.83**	**1385**
60	**0**	**0**	**0**	**0.717**	**6.43**	**1257**	**6.23**	**1297**
90	**0**	**0**	**0**	**0.717**	**6.82**	**1184**	**6.62**	**1221**
120	**0**	**0**	**0**	**0.717**	**7.21**	**1121**	**7**	**1155**

Stringing Table Using Initial Sag "Messenger only" Ruling Span = 300Ft									
Special Load Zone -- Max Tension = 3400 lb									
**Design: 3400 lb @ 15 Deg F, 0.25 in ice, 4.00 psf Wind, Intial Sag*									
Sag Prior to Attaching Cables, Qty= 3 Dia= 0.670 in Wt= 0.148lb/G+0.000lb/G									
H Tens	**781**	**687**	**661**	**637**	**615**	**595**	**576**	**559**	**543**
Temp °F>	**0**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
Sag	**Ft-In**	**Ft-In**	**Ft-In**	**Ft-In**	**Ft-In**	**Ft-In**	**Ft-In**	**Ft-In**	**Ft-In**
Span	**----**	**----**	**----**	**----**	**----**	**----**	**----**	**----**	**----**
200.0	**1-9**	**2-0**	**2-1**	**2-2**	**2-3**	**2-4**	**2-5**	**2-6**	**2-7**
250.0	**2-9**	**3-2**	**3-3**	**3-5**	**3-6**	**3-8**	**3-9**	**3-10**	**4-0**
300.0	**4-0**	**4-6**	**4-8**	**4-10**	**5-0**	**5-3**	**5-5**	**5-7**	**5-8**
350.0	**5-5**	**6-2**	**6-4**	**6-7**	**6-10**	**7-1**	**7-4**	**7-6**	**7-9**
400.0	**7-0**	**8-0**	**8-4**	**8-7**	**8-11**	**9-3**	**9-6**	**9-10**	**10-1**

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

COMMUNICATIONS

NES

SAG TABLE
RULING SPAN - 300 FT
12M W/FIBER @ FULL TENSION

CAPACITORS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
3/23/26	Cedric Short	Ronald Reasonover	Tony Richman
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
SMART-GRID CAP-BANK CONSTRUCTION NOTES	2			
FUSING CHART	3			
SMART-GRID CAP-BANK HORIZONTAL FRAMING	4			
20’ ANTENNA MAST INSTALLATION ABOVE PRIMARY CIRCUIT	5			
ANTENNA BRACKET INSTALLATION BELOW PRIMARY CIRCUIT	6			
CONTROL BOX & POLE GROUNDING DETAILS	7			
SMART-GRID CAP-BANK HORIZONTAL FRAMING ANTENNA ABOVE PRIMARY	8			
SMART-GRID CAP-BANK HORIZONTAL FRAMING ANTENNA BELOW PRIMARY	9			
SMART-GRID CAP-BANK HORIZONTAL FRAMING DOUBLE CIRCUIT	10			
SMART-GRID CAP-BANK HORIZONTAL FRAMING MATERIAL LIST	11			
SMART-GRID CAP-BANK HORIZONTAL FRAMING WORK ORDER TABLE	12			
SMART-GRID CAP-BANK VERTICAL FRAMING	13			
SMART-GRID CAP-BANK VERTICAL FRAMING LIMITS	14			
SMART-GRID CAP-BANK VERTICAL CAP-BANK FRAMING ANTENNA ABOVE PRIMARY	15			
SMART-GRID CAP-BANK VERTICAL FRAMING ANTENNA BELOW PRIMARY	16			
SMART-GRID CAP-BANK VERTICAL FRAMING MATERIAL LIST	17			
SMART-GRID CAP-BANK VERTICAL FRAMING WORK ORDER TABLE	18			

Cap-Bank Construction Notes

1. Provide or check the ground resistance to provide a pole ground of 25 Ohms or less as specified per a Standard Grounding Electrode installation. The ground resistance must be checked prior to attaching the pole ground (#2 CU) to a system neutral.

   Reference the Grounding Section to select the Grounding Electrode method:
   Driven ground rod
   Counterpoising
   Ground enhancing material

2. Provide four copies of the As-built drawing to the following groups for record keeping purposes.

   Label each copy to the following groups:
   Engineer
   Distribution Planning
   Test
   Mapping

3. All grounding connections are to be made up prior to connecting any live line connections as specified in the Grounding Section.

   Minimum ground sizes are as follows:

   Pole Ground wire (#2 CU)
   Cap-bank Ground wire (#2 CU)
   Arrester Ground wire (#4 CU)
   Antenna Mast Ground wire (#2 CU)
   Control Box Ground wire. (#4 CU)
   Current Sensor (#2 CU)

4. The Current and Voltage Sensor is **polarity sensitive** and must be oriented such that the source end of the conductor enters on the H1 side as marked on the device before connecting to the fused cutout disconnect serving the cap-bank.

5. The cap-bank mounted 1 kVA Potential Transformer (PT) to be on the same phase as the Current Sensor. This PT service requires a separate LBU fused cutout for isolating the control system from the line tap LBU's.

6. Connect Cap-bank ground wire from the Neutral Current sensor ring and tie to a Multi-ground Neutral and pole grounding electrode per the Grounding Section.

7. Position the Antenna at the height and azimuth direction angle as shown on the drawing with the communication cable attached to the pole behind the control box. Mount the control box approximately 5-foot above grade and positioned away from vehicles and pedestrian areas to avoid conflicts.

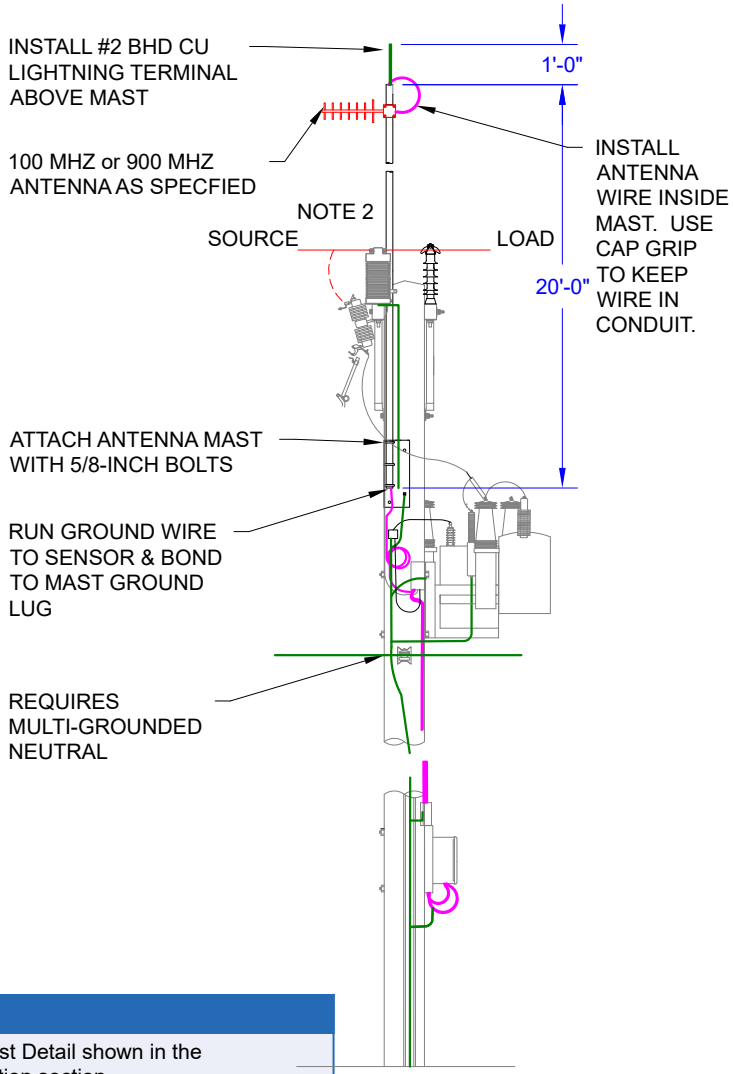
8. Use minimum #4 BHD CU stinger wires from bottom of fuse disconnects to CLF's to be mounted at the Vacuum Switches on the Cap-bank. Line terminal studs range from #6 to 2/0 with a maximum torque limit per the manufacturer's specifications.

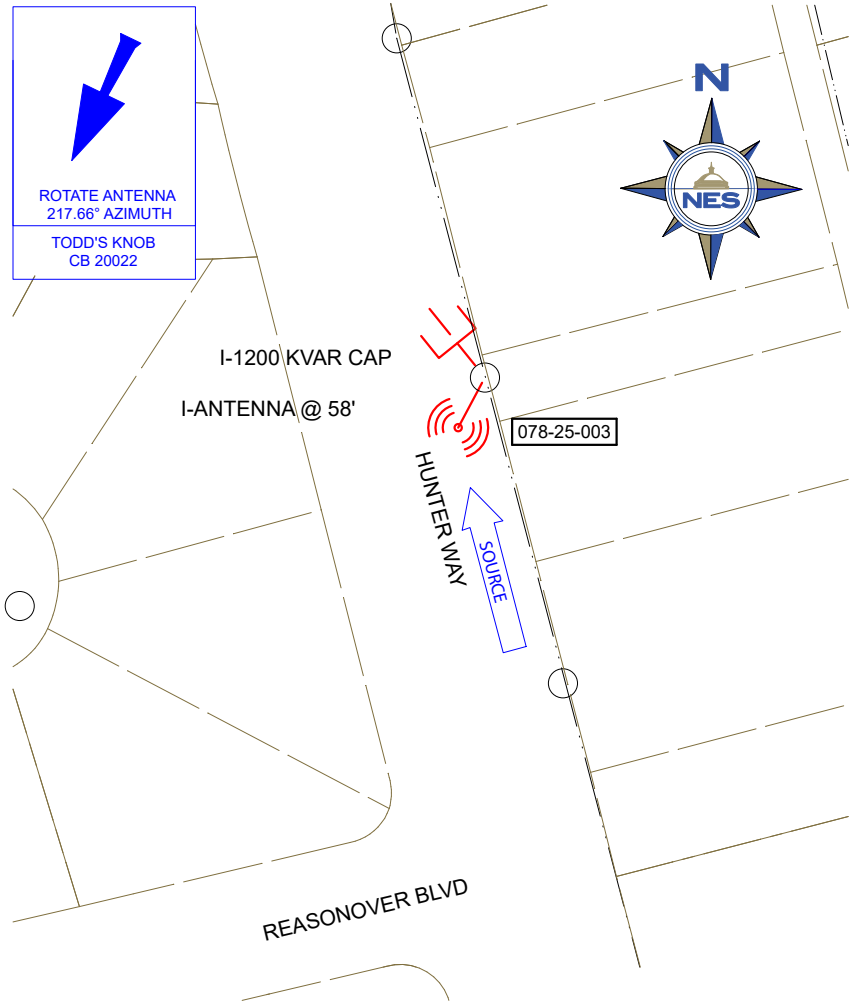
9. Lightening Arresters to be mounted to Cap-bank rack with stingers connected ahead of the CLF's.

CAPACITOR FUSE SIZE AND TYPE						
3-PHASE	SYSTEM VOLTAGE (kV)					
BANK	2.4 DELTA	4.16 WYE	13.8 kV DELTA		23.9 kV WYE	
kVAR SIZE	2.4kV CAPS	2.4kV CAPS	7.96kV CAPS		13.8 kV CAPS	
	K OR D UNK	K OR D LINK	K OR D LINK	CLF	K OR D LINK	CLF
15	10D					
25	15D					
45	10D	7D	3D	25		
75	15D	10D				
90	20D	15D	7D	25		
120	25K	20D				
135		25K	7D	25		
150		25K				
165		30K				
180		30K	10D	25		
195		40K				
210		40K				
225		40 K				
240		50 K				
300		50 K	10D	25		
600			25K	25	20D	25
900			40K	40	25K	25
1200			50K	40	30K	40

FUSE SIZE	STOCK NUMBER
1D	261051000
1.5D	261051500
2D	261052000
3D	261053000
4D	261054000
5D	261055000
7D	261057000
10D	261060000
15D	261063000
20D	261065000
25K	261067000
30K	261069000
40K	261072000
50K	261074000
65K	261077000
80K	261080000
100K	261083000
140K	261086000
200K	261089000
25A CLF	260300000
40A CLF	260310000

SMART-GRID CAP-BANK HORIZONTAL FRAMING





DRAWING EXAMPLE

NOTES

1. Antenna Mast Detail shown in the Communication section.
2. Install pipe strap to pole top providing damping support to antenna mast.

ENGINEERING NOTE:

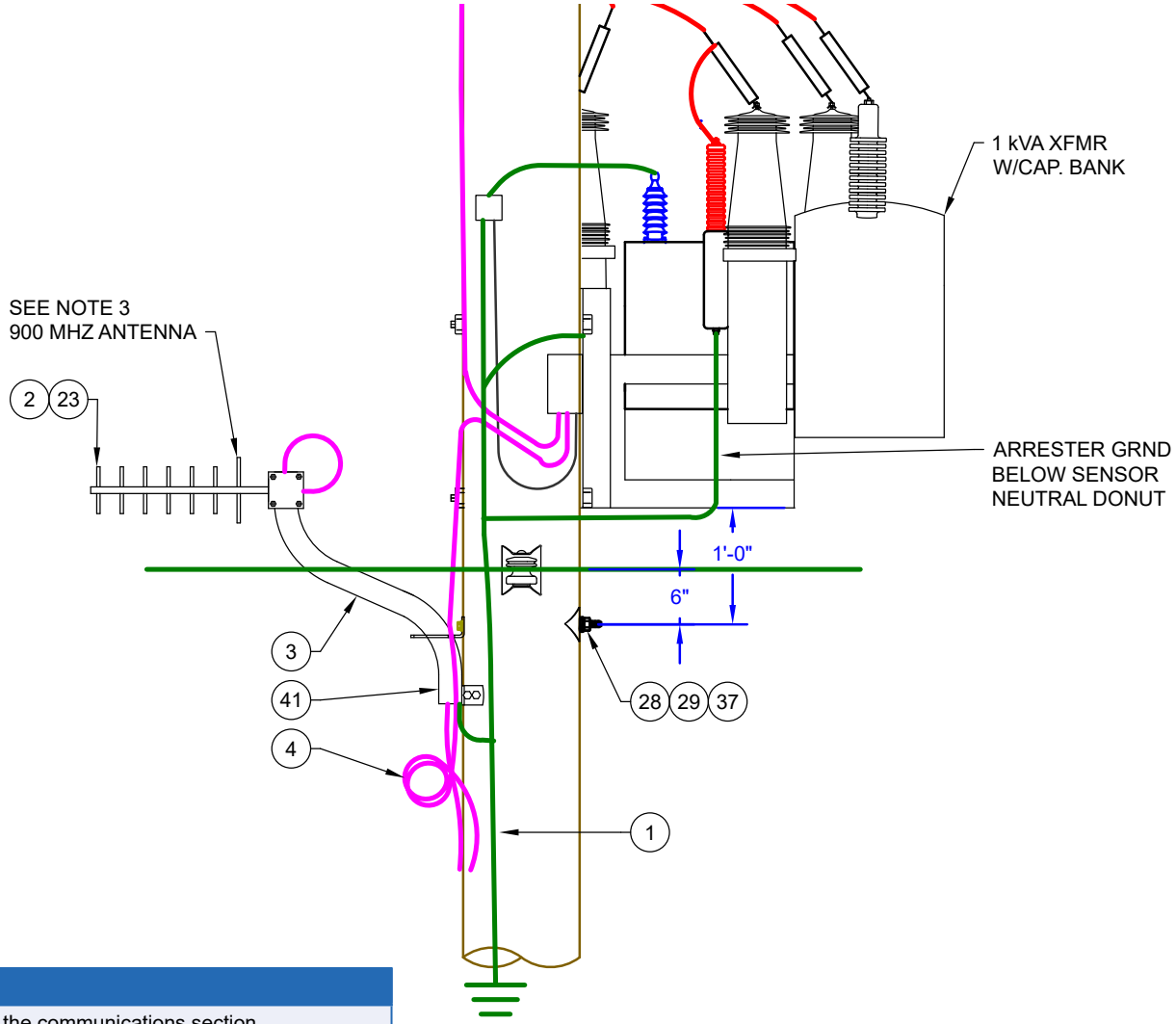
1. Provide circuit source direction, antenna mounting height and direction on drawing.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

20' ANTENNA MAST INSTALLATION ABOVE PRIMARY CIRCUIT

CAPACITORS



NOTES

1. Antenna mounting bracket shown in the communications section.
2. See page 11 for Material Items.
3. Mounted on this bracket limited to 900 MHZ type.

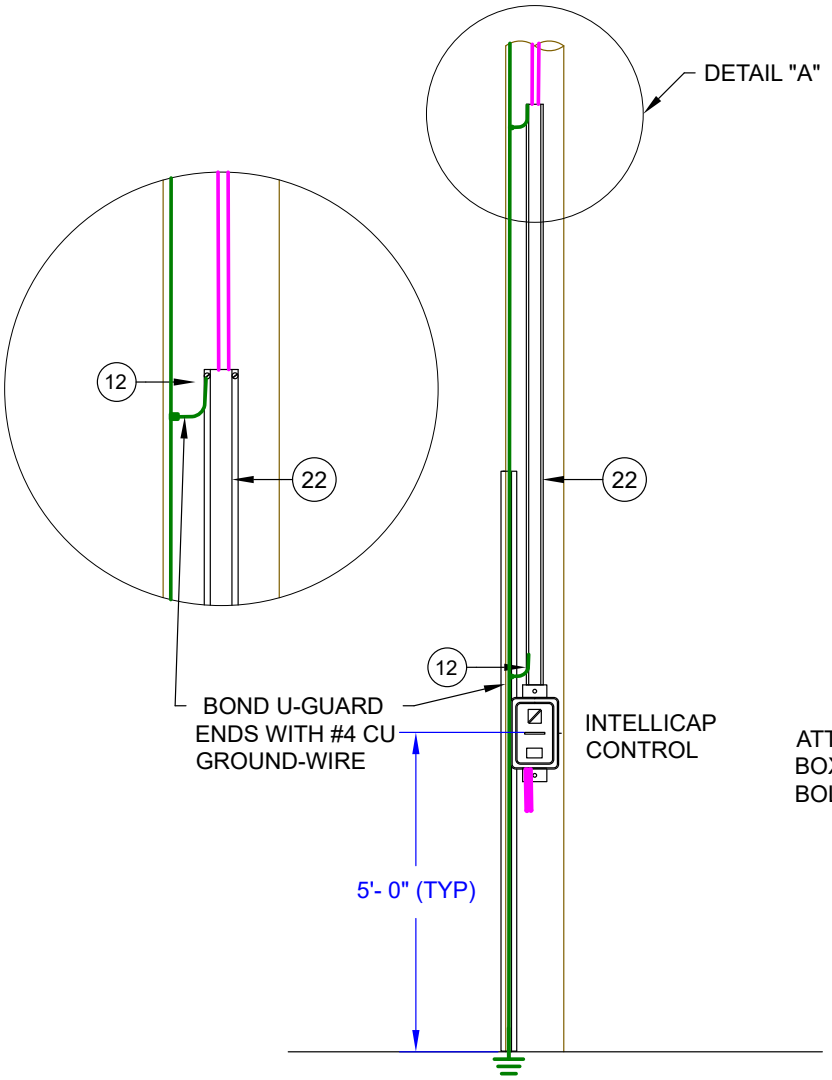
ENGINEERING NOTE

1. Provide circuit source direction, antenna mounting height and direction on drawing.

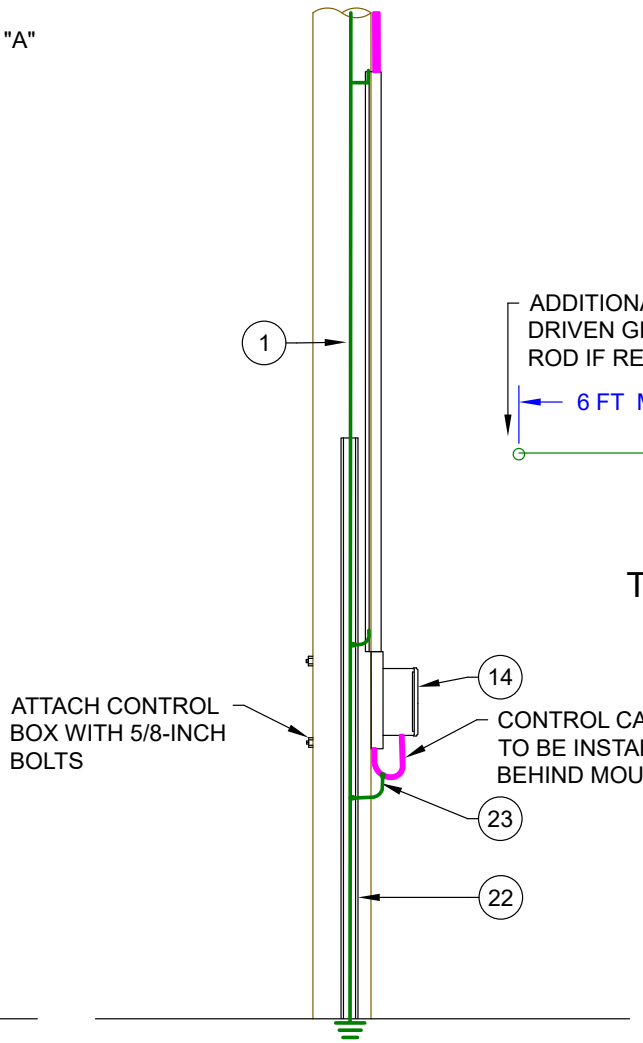
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

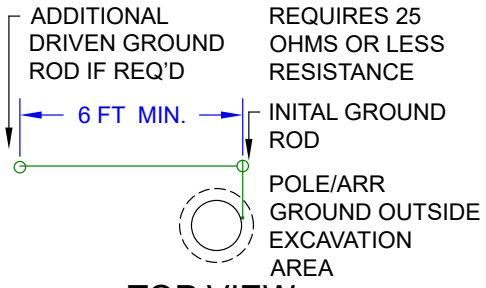
ANTENNA BRACKET INSTALLATION BELOW PRIMARY CIRCUIT



BACK VIEW



LOWER SIDE VIEW



TOP VIEW

NOTES

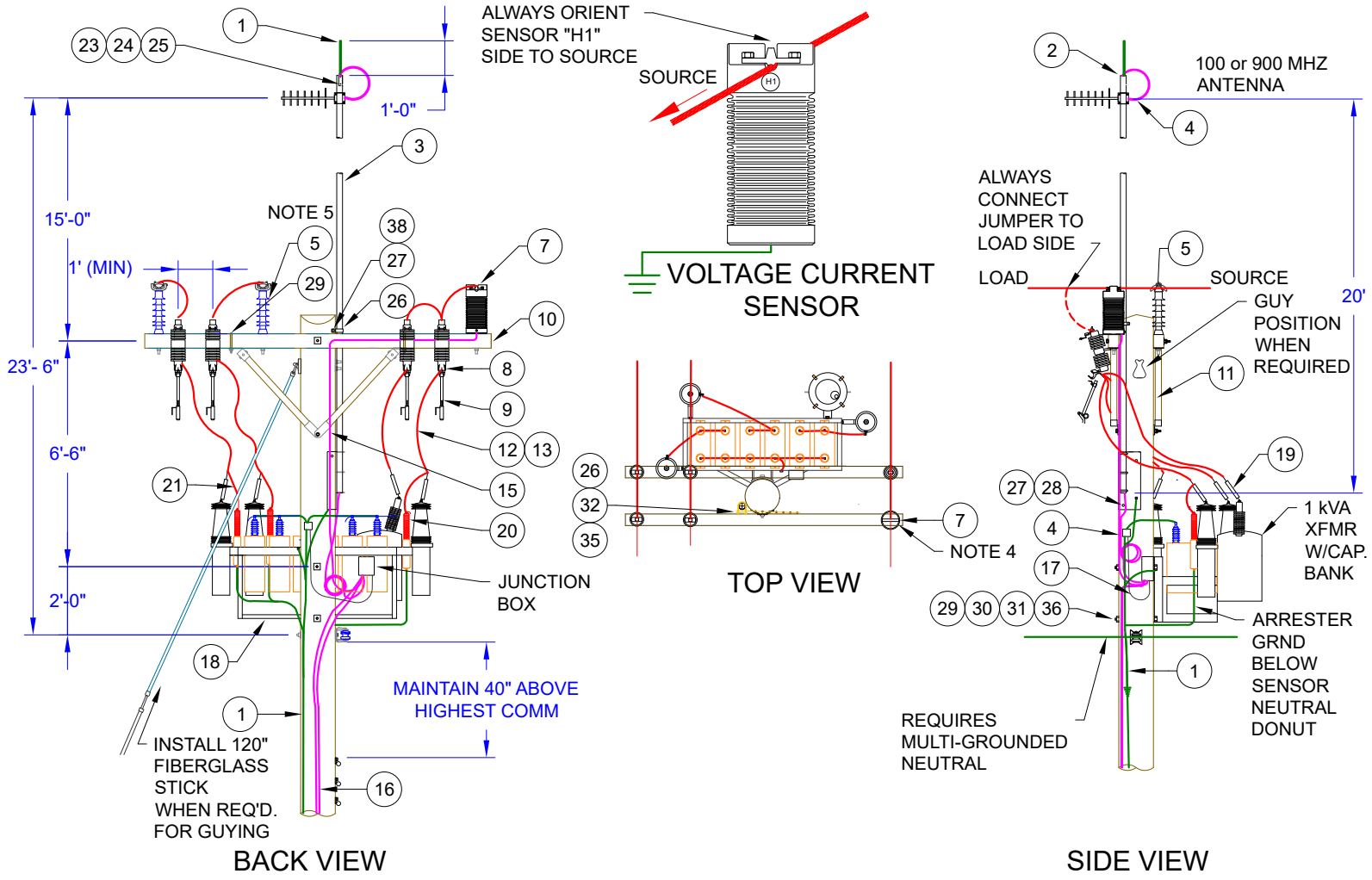
1. See Smart-Grid Cap-bank construction notes on page 2.
2. See page 11 for Material Items.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

CAPACITORS

NES

CONTROL BOX & POLE GROUNDING DETAILS



NOTES

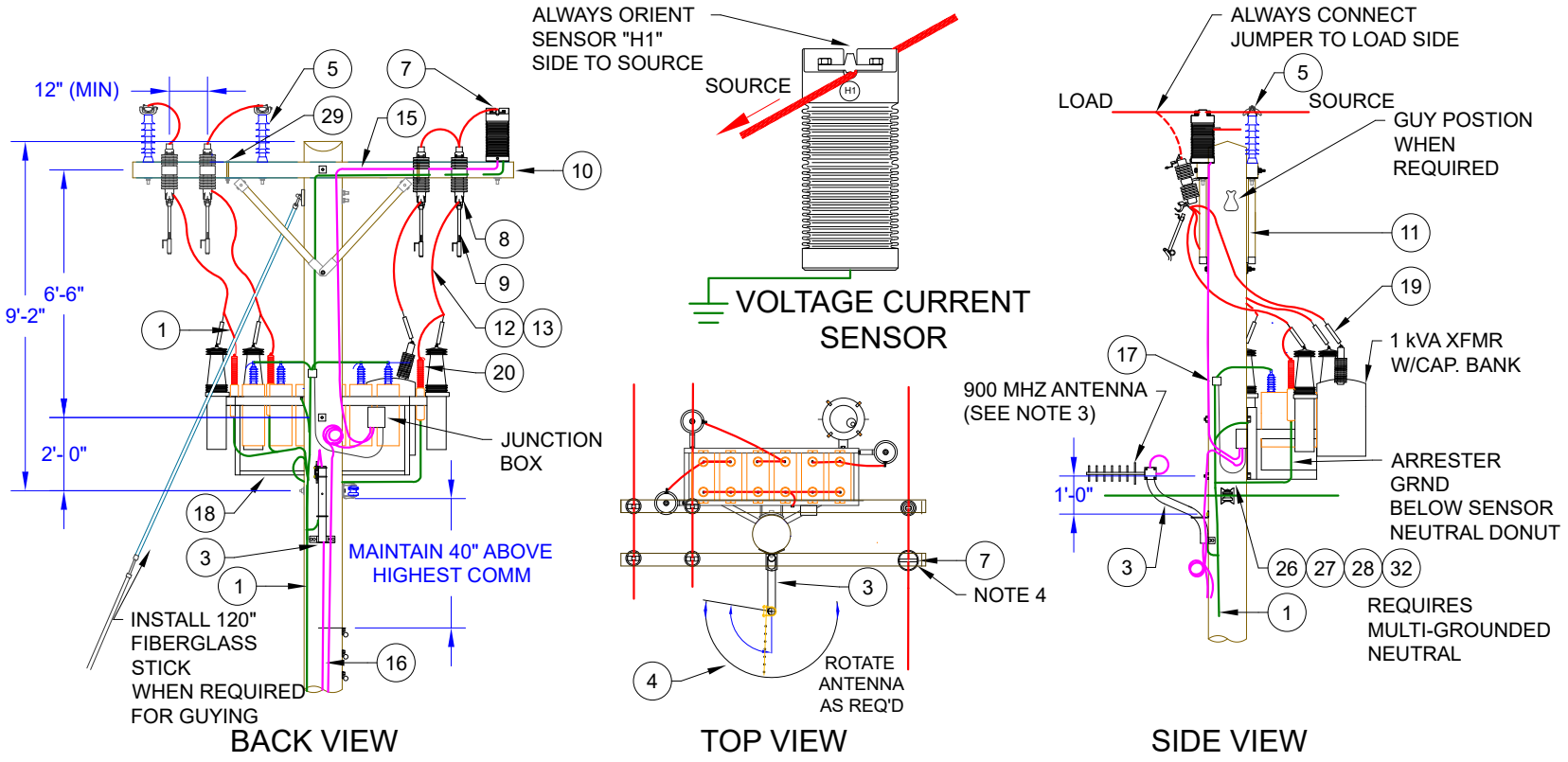
1. See Smart-Grid Cap-bank construction notes on page 2.
2. See page 11 for Material Items.
3. See page 5 for Antenna Mounting installation above circuit.
4. Current and Voltage Sensor is polarity sensitive align H1 side toward source.
5. Install pipe strap to pole top providing damping support to antenna mast.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

CAPACITORS

NES

SMART-GRID CAP-BANK HORIZONTAL FRAMING ANTENNA ABOVE PRIMARY



NOTES

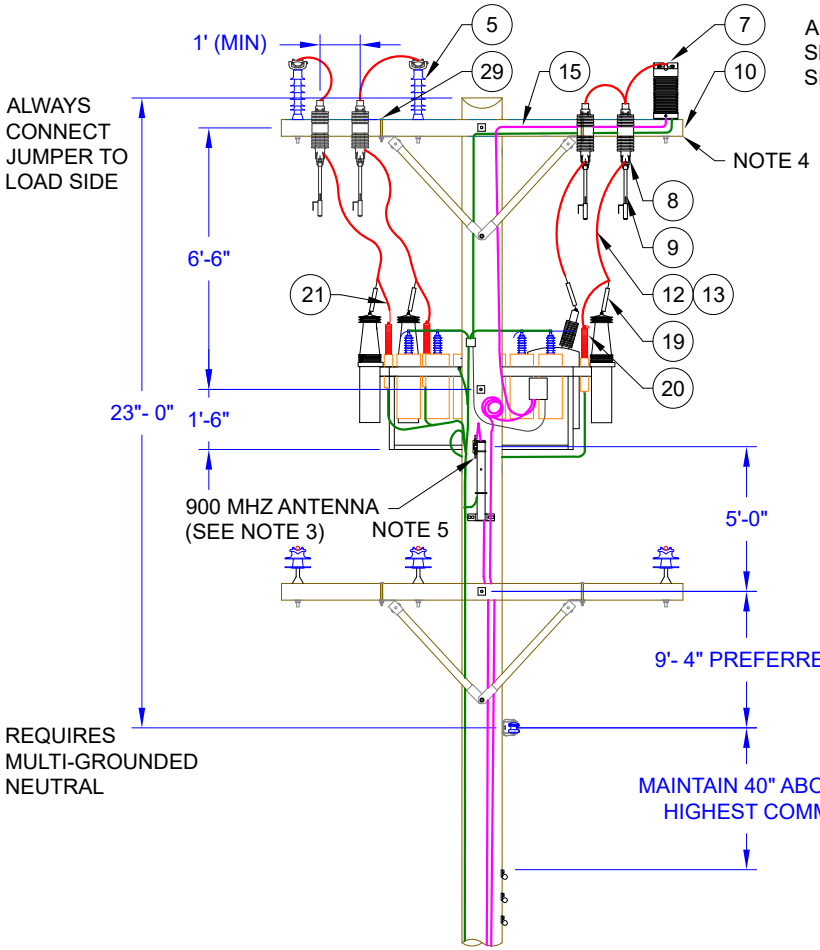
1. See Smart-Grid Cap-bank construction notes on page 3.
2. See page 11 for Material Items.
3. See page 6 for Antenna Mounting Bracket detail.
4. Current and Voltage Sensor is polarity sensitive align H1 side toward source.

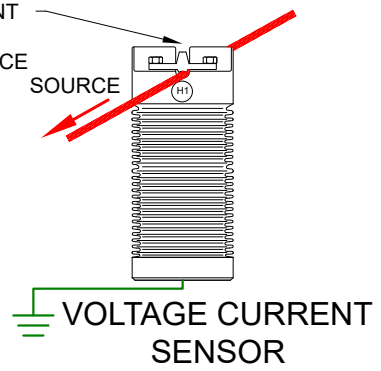
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

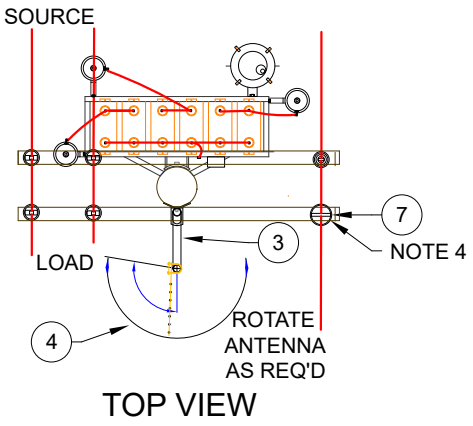
NES

SMART-GRID CAP-BANK HORIZONTAL FRAMING ANTENNA BELOW PRIMARY

CAPACITORS







NOTES

1. See Smart-Grid Cap-bank construction notes on page 2.
2. See page 11 for Material Items.
3. See page 9 for Framing with Antenna Mounting installation below circuit.
4. Current and Voltage Sensor is polarity sensitive align H1 side toward source.
5. Install center phase insulator on field side for bucket access preferred.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SMART-GRID CAP-BANK HORIZONTAL FRAMING DOUBLE CIRCUIT

CAPACITORS

TYPICAL MATERIAL LIST

ITEM	STOCK #	DESCRIPTION	QTY
1	011000000	CABLE CU BHD #2 (FT)	50
2	401350000	GRIP RISER 2 X 1.0-1.24	1
3 Select One	180372000	ANTENNA MAST / MOUNT I.D. X 20 FT L SCH 80 PIPE (6061-T6 GR ALUM.) (IF ABOVE PRIMARY)	1
	305915000	ANTENNA MOUNTING BRACKET (IF BELOW PRIMARY)	1
4 Select One	181097020	50' ANTENNA REMOTE W/COAX CABLE (IF BELOW PRIMARY)	1
	181097010	65' ANTENNA REMOTE W/COAX CABLE (IF ABOVE PRIMARY)	1
5	240974000	INSUL LINE POST VERT CLAMP TOP 35 KV	5
7 Select One	181098220	CAP-BANK CURRENT SENSOR 15 KV	1
	181098230	CAP-BANK CURRENT SENSOR 25KV	1
8	143410000	CUTOUT 100A 14.4/24/9KV	4
9	SEE PAGE 3	SELECT FUSE LINK PER VOLTAGE & KVAR SIZE	4
10	SEE NOTE 1	3-PHASE O3XD-HL-XXX FRAMING	1
11	180660000	BRACE X-ARM WOOD 60-INCH PAIR (AS REQ'D)	2
12	010970000	CABLE CU BHD #4 (FT)	30
13	466452000	WILDLIFE PROTECTION COVER STINGER PER FT	18
14	181097250	CAPACITOR BANK CONTROL INTELLICAP 2000	1
15	181097110	CAPACITOR BANK CABLE JUNC. BOX/CURRENT SENSOR	1
16	181097230	CAPACITOR BANK CONTROL BOX CABLE TO JUNC. BOX	1
17	181098270	CAPACITOR BANK SENSOR NEUTRAL DONUT	1
18 Select One	96597100	CAPACITOR BANK, POLE-TYPE, 1200 KVAR, 23.9 KV	1
	96597070	CAPACITOR BANK, POLE-TYPE, 600 KVAR, 23.9 KV	1
	96597080	CAPACITOR BANK, POLE-TYPE, 1200 KVAR, 13.8 KV	1
	96597060	CAPACITOR BANK, POLE-TYPE, 600 KVAR, 13.8 KV	1
19	SEE PAGE 3	SELECT CLF PER VOLTAGE & KVAR SIZE	4

TYPICAL MATERIAL LIST

ITEM	STOCK #	DESCRIPTION	QTY
20 Select One	140320000	ARRESTER LTG 18KV DIST GRAY FOR 23.9 KV	3
	140180000	ARRESTER LTG 12KV DIST GRAY FOR 13.8 KV	3
21	022340000	ARRESTER STINGER CABLE—CU 5KV RINC # 4 1/C—BIRD GUARD (FT)	9
22	101141000	U-GUARD MOLDING - POLE GRND - GALV 1"	2
23	347081200	RADIO GROUND STRAP KIT—1/2 INCH COAX ANTENNA CABLE	2

TRUCK STOCK ITEMS

ITEM	STOCK #	DESCRIPTION	QTY
24	231760000	TERM COMP LUG #2 & #1 AL/CU 2H	1
25	204320000	BOLT MACHINE SS FH 1/2 IN X 1-1/2 IN	2
26	209700000	WASHER SS BEVEL SPRING 1/2 IN HOLE	2
27	106620100	STRAP PIPE 2 IN-2 HOLE	1
28	206570000	5/8" DBL COIL SPRING WASHER	8
29	201_____	BOLT D.A. 5/8 X REQ'D LENGTH	4
30	206580000	3/4" DBL COIL SPRING WASHER	10
31	201_____	BOLT D.A. 3/4 X REQ'D LENGTH	5
32	209620000	WASHER SQ FLAT 3/4 H	12
33	201360000	BOLT CARRIAGE 1/2 X 6	4
34	206560000	1/2" DBL COIL SPRING WASHER	6
35	201_____	BOLT D.A. 1/2 X REQ'D LENGTH	2
36	209600000	WASHER SP FLAT 9/16 H	4
37	209520000	WASHER SQ CURVED 3 1/2	7
38	208530000	SCREW LAG 3/8X2 1/2 GALV	2

NOTES

1. Crossarm framing to be specified on Engineering drawing per conductor span and angle.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

CAPACITORS

NES

SMART-GRID CAP-BANK HORIZONTAL FRAMING MATERIAL LIST

LINE DEPARTMENT WORK ORDER

TASK	CU	DESCRIPTION	QTY
INSTALL CAPACITORS OR CAPACITOR BANK			
SELECT ONE	OSG-CB2312	SMT GRD CAP BNK ASSM 23.9KV 1200 KVAR	1
	OSG-CB236	SMT GRD CAP BNK ASSM 23.9KV 600 KVAR	1
	OSG-CB1312	SMT GRD CAP BNK ASSM 13.8kV 1200 KVAR	1
	OSG-CB136	SMT GRD CAP BNK ASSM 13.8kV 600 KVAR	1
INSTALL ANTENNA			
SELECT ONE	OANTENNA	YAGI ANTENNA, 900 MHZ	1
	OANTENNAVHF	ANTENNA, 100 MHZ	
SELECT ONE	OSG-CBANT65	SMT GRD CAP BNK ANTENNA CBL KIT (IF ABOVE PRI)	1
	OSG-CBANT50	SMT GRD CAP BNK ANTENNA CBL KIT (IF BELOW PRI)	1
SELECT ONE	OANT-MAST20	ANTENNA MAST, POLE MOUNT 20' (IF ABOVE PRI)	1
	OANTENABKR	ANTENNA MOUNTING BRACKET (IF BELOW PRI)	1
INSTALL ISOLATOR SWITCHES			
	OCO100L	CUTOUT, 100A, 14.4/24.9kV, LB	4
INSTALL ARRESTERS			
SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV	3
	OLA12	12kV SURGE ARRESTERS FOR 13.8 kV	3
INSTALL GROUNDING ELECTRODES (25 OHMS OR LESS)			
	OLAB-POLEMAN	LABOR - INSTALL GROUNDING ELECTRODE	8 HRS

C&M CONTROL CREW WORK ORDER

TASK	CU	DESCRIPTION	QTY
	ULAB-CONST	LABOR - INSTALL ANTENNA & CONTROLS	8 HRS

TEST SECTION WORK ORDER

TEST CONTROLS & ANTENNA RECEPTION			
	OLAB-TEST	LABOR, TEST ENGINEER / TECH	2 HRS

NOTES

1. See Communications section for 100 MHZ or 900 MHZ Materials on pages 14 or 16 based on antenna position.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

CAPACITORS

NES

SMART-GRID CAP-BANK HORIZONTAL FRAMING WORK ORDER TABLE

SMART-GRID CAP-BANK VERTICAL FRAMING

VERTICAL FRAMING ANGLE CHART

350-FT WIND SPAN - NESC GRADE "C"[1]

CONDUCTOR SIZE	DESIGN TENSION LBS.	HORIZONTAL ANGLE DEG.[2]
ACSR CONDUCTOR		
2 ACSR	835	0-20
1/0 ACSR	985	0-16
4/0 ACSR	1,550	0-10
336 ACSR	1,980	0-7
477 ACSR	2,200	0-5
795 ACSR	3,000	0-2
COPPER CONDUCTORS		
6 BHD	550	0-30
4 BHD	700	0-24
2 BHD	950	0-18
1/0 BHD	1,315	0-13
4/0 BHD	2,700	0-7
300 BHD	3,000	0-5

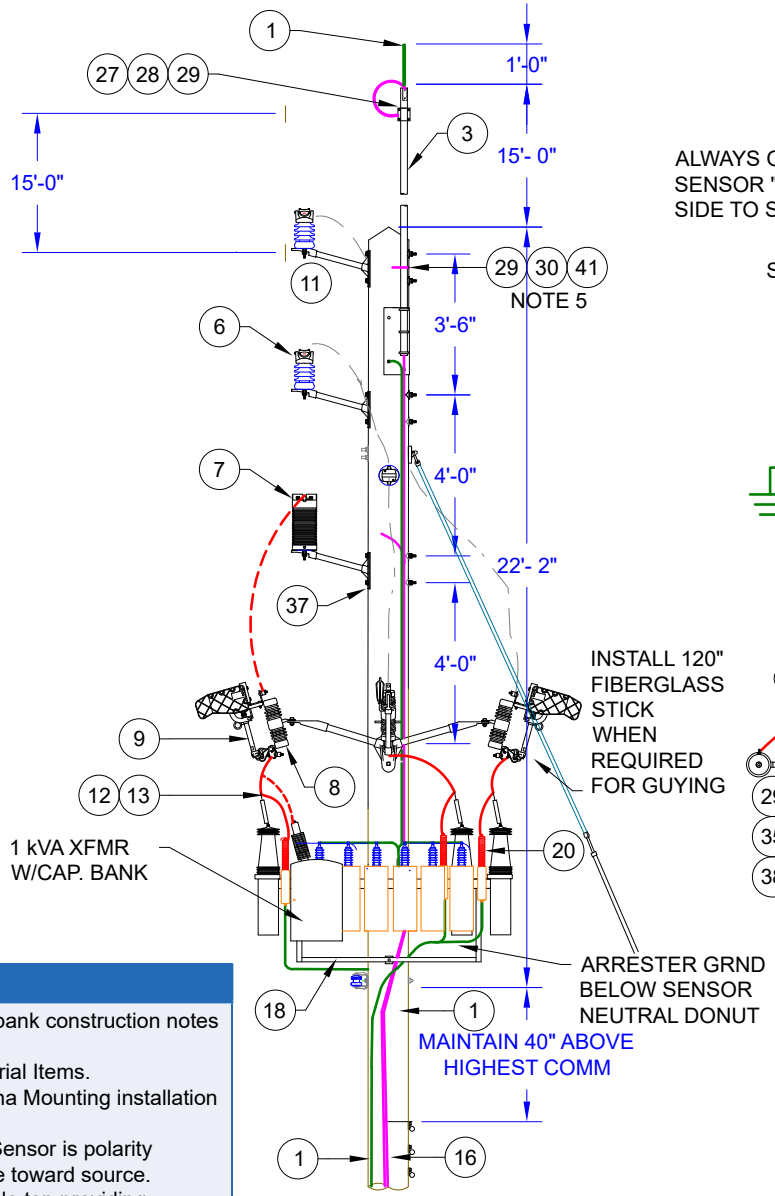
LOADING LIMITS ON VERTICAL 35 kV INSULATOR BRK'T FRAMING

HORIZONTAL (LBS)	VERTICAL (LBS)	LONGITUDINAL (LBS)
500	1,200	325

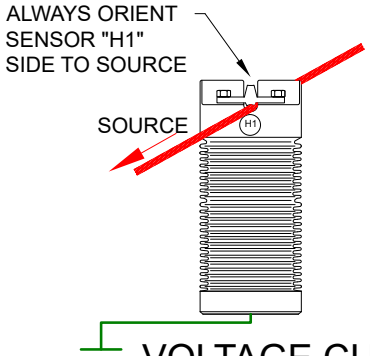
NOTES

1. Grade “B” Construction not allowed with Post Insulator on Brk’t framing.
2. Cap-Bank Vertical framing with 35kV Vertical Post Insulator mounted on 18" FG Arrestor Brk't.

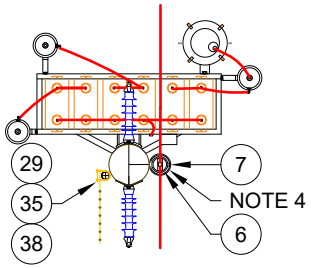
REV.	ENG.	DESCRIPTION OF CHANGE	DATE



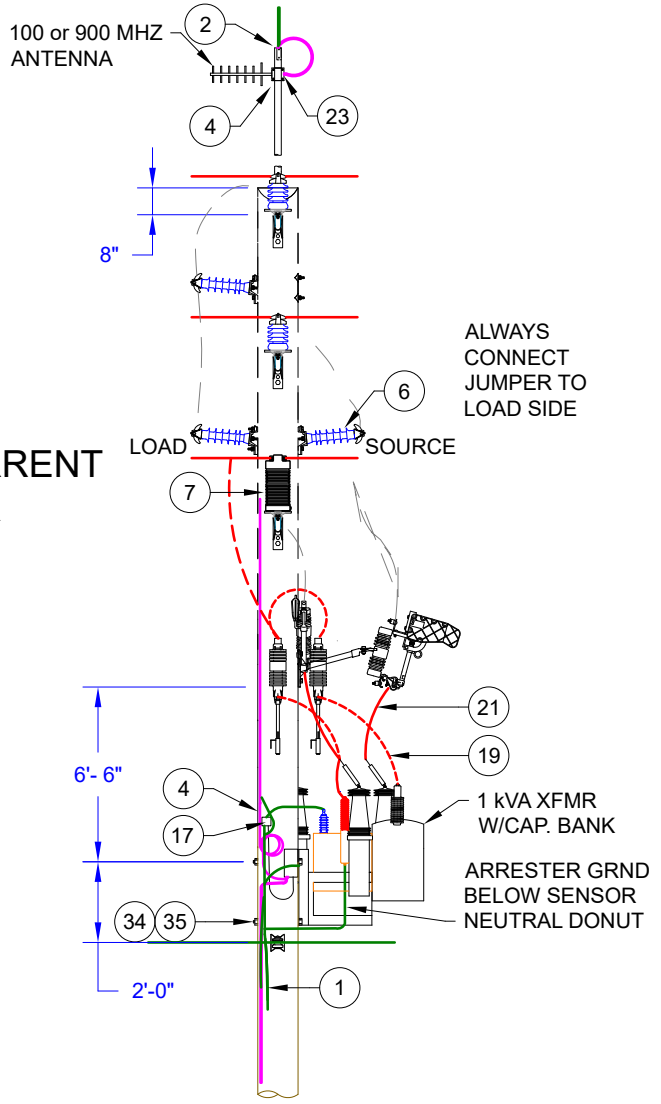
FRONT VIEW



VOLTAGE CURRENT SENSOR



TOP VIEW



SIDE VIEW

NOTES

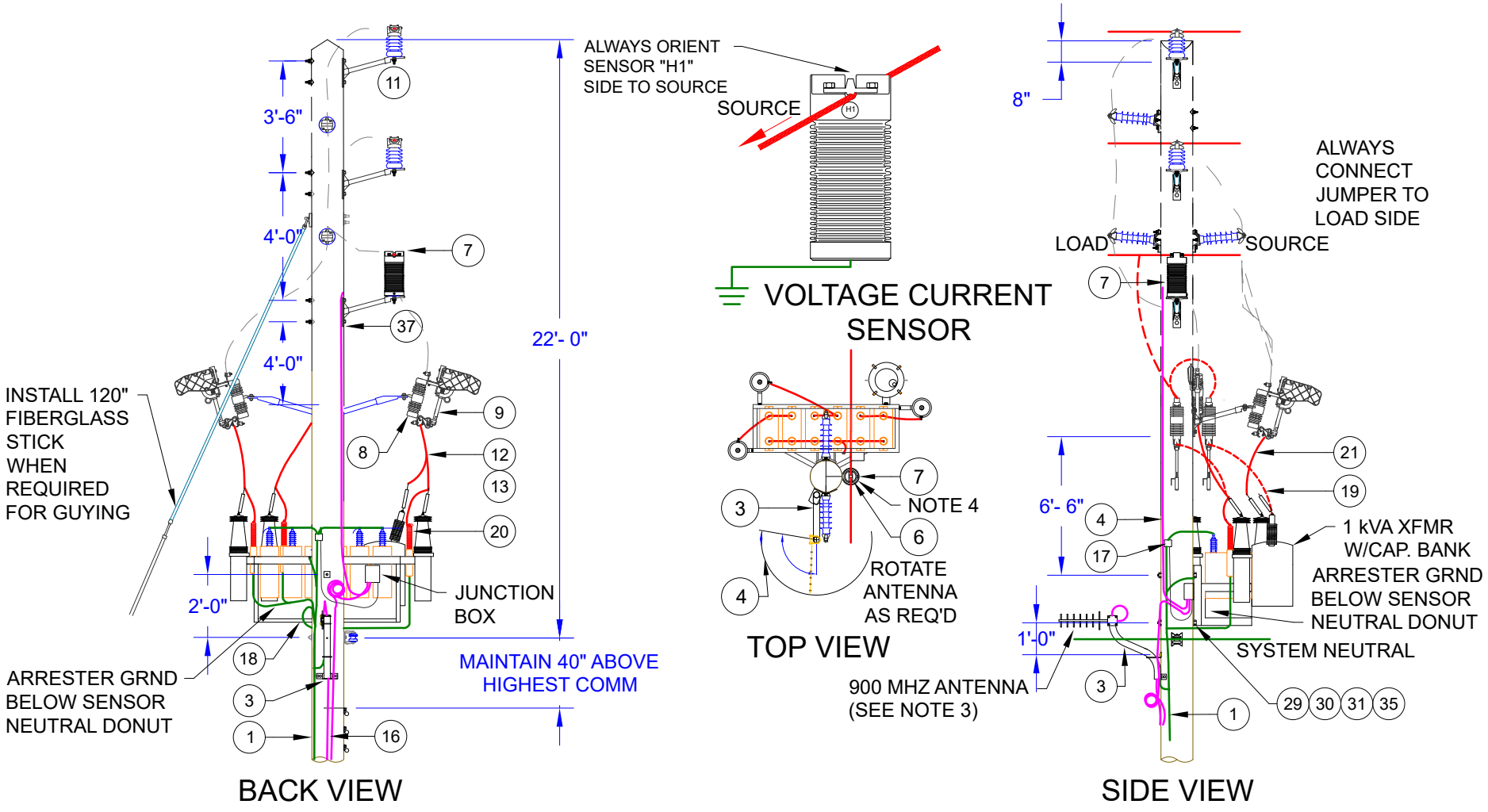
1. See Smart-Grid Cap-bank construction notes on page 2.
2. See page 17 for Material Items.
3. See page 5 for Antenna Mounting installation above circuit.
4. Current and Voltage Sensor is polarity sensitive align H1 side toward source.
5. Install pipe strap to pole top providing damping support to antenna mast.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SMART-GRID CAP-BANK VERTICAL FRAMING ANTENNA ABOVE PRIMARY

CAPACITORS



NOTES

1. See Smart-Grid Cap-bank construction notes on page 2.
2. See page 17 for Material Items.
3. See page 6 for Antenna Mounting Bracket detail.
4. Current and Voltage Sensor is polarity sensitive align H1 side toward source.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

CAPACITORS

NES

SMART-GRID CAP-BANK
VERTICAL FRAMING
ANTENNA BELOW PRIMARY

TYPICAL MATERIAL LIST

ITEM	STOCK #	DESCRIPTION	QTY
1	011000000	CABLE CU BHD #2 (FT)	50
2	401350000	RISER GRIP 2 X 1.0 - 2.4	1
3 Select One	180372000	ANTENNA MAST / MOUNT I.D. X 20 FT L SCH 80 PIPE (6061-T6 GRADE ALUM.) (IF ABOVE PRIMARY)	1
	305915000	ANTENNA MOUNTING BRACKET (IF BELOW PRIMARY)	1
4 Select One	181097020	50' ANTENNA REMOTE W/COAX CABLE (IF BELOW PRIMARY)	1
	181097010	65' ANTENNA REMOTE W/COAX CABLE (IF ABOVE PRIMARY)	1
5	240976000	INSUL LP HOR CLP/TP 35KV	5
7 Select One	181098220	CAP-BANK CURRENT SENSOR 15 KV	1
	181098230	CAP-BANK CURRENT SENSOR 25KV	1
8	143410000	CUTOUT 100A 14.4/24/9KV	4
9	SEE PAGE 3	SELECT FUSE LINK PER VOLTAGE & KVAR SIZE	4
10	182700000	MOUNT CUTOUT BRKT 3PH FG	1
11	180745000	BRKT INS/CO/ARR 18-INCH FIBERGLASS	1
12	010970000	CABLE CU BHD #4 (FT)	30
13	466452000	WILDLIFE PROTECTION COVER STINGER (FT)	18
14	181097250	CAPACITOR BANK CONTROL INTELLICAP 2000	1
15	181097110	CAPACITOR BANK CABLE JUNC. BOX/CURRENT SENSOR	1
16	181097230	CAPACITOR BANK CONTROL BOX CABLE TO JUNC. BOX	1
17	181098270	CAPACITOR BANK SENSOR NEUTRAL DONUT	1
18 Select One	96597100	CAPACITOR BANK, POLE-TYPE, 1200 KVAR, 23.9 KV	1
	96597070	CAPACITOR BANK, POLE-TYPE, 600 KVAR, 23.9 KV	1
	96597080	CAPACITOR BANK, POLE-TYPE, 1200 KVAR, 13.8 KV	1
	96597060	CAPACITOR BANK, POLE-TYPE, 600 KVAR, 13.8 KV	1
19a	SEE PAGE 3	SELECT CLF PER VOLTAGE & KVAR SIZE	4
20 Select One	140320000	ARRESTER LTG 18KV DIST GRAY for 23.9 kV	3
	140180000	ARRESTER LTG 12KV DIST GRAY for 13.8 kV	3

TYPICAL MATERIAL LIST

ITEM	STOCK #	DESCRIPTION	QTY
21	022340000	ARRESTER STINGER CABLE—CU 5KV RINC # 4 1/C—BIRD GUARD (FT)	9
22	101141000	U-GUARD MOLDING - POLE GRND - GALV 1"	2
23	347081200	RADIO GROUND STRAP KIT—1/2 INCH COAX ANTENNA CABLE	2
24	204780000	BOLT STUD 3/4" X 3" SHORT/LP INSUL	3
25	221870000	CLAMP TOP AL 4/0-477	5
26	180746000	BRKT INSUL/HOR LP 23KV	3

TRUCK STOCK ITEMS

ITEM	STOCK #	DESCRIPTION	QTY
27	231760000	TERM COMP LUG #2 & #1 AL/CU 2H	1
28	204320000	BOLT MACHINE SS FH 1/2 IN X 1-1/2 IN	2
29	209700000	WASHER SS BEVEL SPRING 1/2 IN HOLE	2
30	106620100	STRAP PIPE 2 IN-2 HOLE	1
31	206570000	5/8" DBL COIL SPRING WASHER	8
32	201_____	BOLT D.A. 5/8 X REQ'D LENGTH	4
33	206580000	3/4" DBL COIL SPRING WASHER	10
34	201_____	BOLT D.A. 3/4 X REQ'D LENGTH	5
35	209620000	WASHER SQ FLAT 3/4 H	12
36	201360000	BOLT CARRIAGE 1/2 X 6	4
37	206560000	1/2" DBL COIL SPRING WASHER	6
38	201_____	BOLT D.A. 1/2 X REQ'D LENGTH	2
39	209600000	WASHER SP FLAT 9/16 H	4
40	209520000	WASHER SQ CURVED 3 1/2	7
41	208530000	SCREW LAG 3/8 X 2 1/2 GALV	2

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SMART-GRID CAP-BANK VERTICAL FRAMING MATERIAL LIST

LINE DEPARTMENT WORK ORDER

TASK	CU	DESCRIPTION	QTY
INSTALL CAPACITORS OR CAPACITOR BANK			
SELECT ONE	OSG-CB2312	SMT GRD CAP BNK ASSM 23.9KV 1200 KVAR	1
	OSG-CB236	SMT GRD CAP BNK ASSM 23.9KV 600 KVAR	1
	OSG-CB1312	SMT GRD CAP BNK ASSM 13.8kV 1200 KVAR	1
	OSG-CB136	SMT GRD CAP BNK ASSM 13.8kV 600 KVAR	1
INSTALL ANTENNA			
SELECT ONE	OANTENNA	YAGI ANTENNA, 900 MHZ	1
	OANTENNAVHF	ANTENNA, 100 MHZ	
SELECT ONE	OSG-CBANT65	SMT GRD CAP BNK ANTENNA CBL KIT (IF ABOVE PRI)	1
	OSG-CBANT50	SMT GRD CAP BNK ANTENNA CBL KIT (IF BELOW PRI)	1
SELECT ONE	OANT-MAST20	ANTENNA MAST, POLE MOUNT 20' (IF ABOVE PRI)	1
	OANTENABKR	ANTENNA MOUNTING BRACKET (IF BELOW PRI)	1
INSTALL ISOLATOR SWITCHES			
	OCO100L	CUTOUT, 100A, 14.4/24.9kV, LB	3
INSTALL ARRESTERS			
SELECT ONE	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	3
	OLA12	12kV SURGE ARRESTERS FOR 13.8 kV AREA	3
INSTALL GROUNDING ELECTRODES (25 OHMS OR LESS)			
	OLAB-POLEMAN	LABOR - INSTALL GROUNDING ELECTRODE	8 HRS

C&M CONTROL CREW WORK ORDER

TASK	CU	DESCRIPTION	QTY
	ULAB-CONST	LABOR - INSTALL ANTENNA & CONTROLS	8 HRS

TEST SECTION WORK ORDER

TEST CONTROLS & ANTENNA RECEPTION			
	OLAB-TEST	LABOR, TEST ENGINEER / TECH	2 HRS

NOTES

1. See Communications section for 100 MHZ or 900 MHZ Materials on pages 14 or 16 based on antenna position.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

PLATFORM SUBSTATION STANDARDS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
3/23/26	Cedric Short	Ronald Reasonover	Tony Richman
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
GENERAL INSTRUCTIONS & SECD'RY STINGER WIRES	2			
PLATFORM 3-PH BANK TRANSFORMER CHART	3			
CUSTOMER SUBSTATION 3-PHASE BANK PLATFORM FRAMING	4			
SECTION A-A DETAIL SECONDARY BUS	5			
SECTION B-B DETAIL PRIMARY BUS	6			
SECTION C-C DETAIL FUSED CUTOUTS	7			
WIRING DETAIL SECONDARY BUS	8			
STEP-DOWN SUBSTATION UNDER-BUILT CIRCUIT PLATFORM FRAMING	9			
SECTION A-A DETAL PLATFORM BUS	10			
SECTION B-B DETAIL PLATFORM CUTOUTS	11			
SECTION C-C DETAIL PLATFORM NEUTRAL BUS	12			
SECTION D-D DETAIL FALSE & DEAD-END ARMS	13			
STEP-DOWN SUBSTATION OPEN BTW'N CIRCUITS PLATFORM FRAMING	14			
SECTION A-A DETAIL PLATFORM BUS*	15			
SECTION B-B DETAIL FALSE & CUTOUT ARMS	16			
SECTION C-C DETAIL PLATFORM NEUTRAL BUS*	17			
SECTION D-D DETAIL FALSE ARMS	18			
SECTION E-E DETAIL DEAD-END ARMS	19			

GENERAL NOTES:

1. The neutral wire must be equal in current capacity to the phase wires on all four wire, three phase substations.
2. The substation drawing dimensions are a general guide for construction. These dimensions may be varied to fit conditions at the installation location. Requires using a water level or equivalent device level equipment between the poles. The transformer platform must be horizontal to insure the oil is level inside the transformer.
3. Arresters are required on the high and low voltage bushings of step-down transformers. Arresters must be appropriate for the high and low voltages.
4. Install minimum #4 CU for bonding ground wire for metal brackets. Requires #2 CU pole / arrester grounds tied to grounding electrode with 25 Ohms or less resistance (see Grounding section for grounding electrode installation methods).
5. Three wire, three phase substations are used only for replacement or upgrades of existing services. All new installations are four wire three phase.
6. Check the inventory for availability of these Platform style transformers.

WYE - BANKED TRANSFORMER - SECONDARY WIRING							
TRANSFORMER LOAD (95% POWER FACTOR)							
COVERED COPPER WIRE							
XFMR SIZE	XFMR BANK	208/120 V 4-WIRE 3-PHASE (AMPS)	QTY	SECONDARY WIRING	480Y/277 V 4-WIRE 3-PHASE (AMPS)	QTY	SECONDARY WIRING
(3) 250	750	2,191	3	750MCM	950	2	500MCM
(3) 333	1000	2,922	4	750MCM	1,266	2	750MCM
(3) 500	1500	4,383	6	750MCM	1,899	3	750MCM

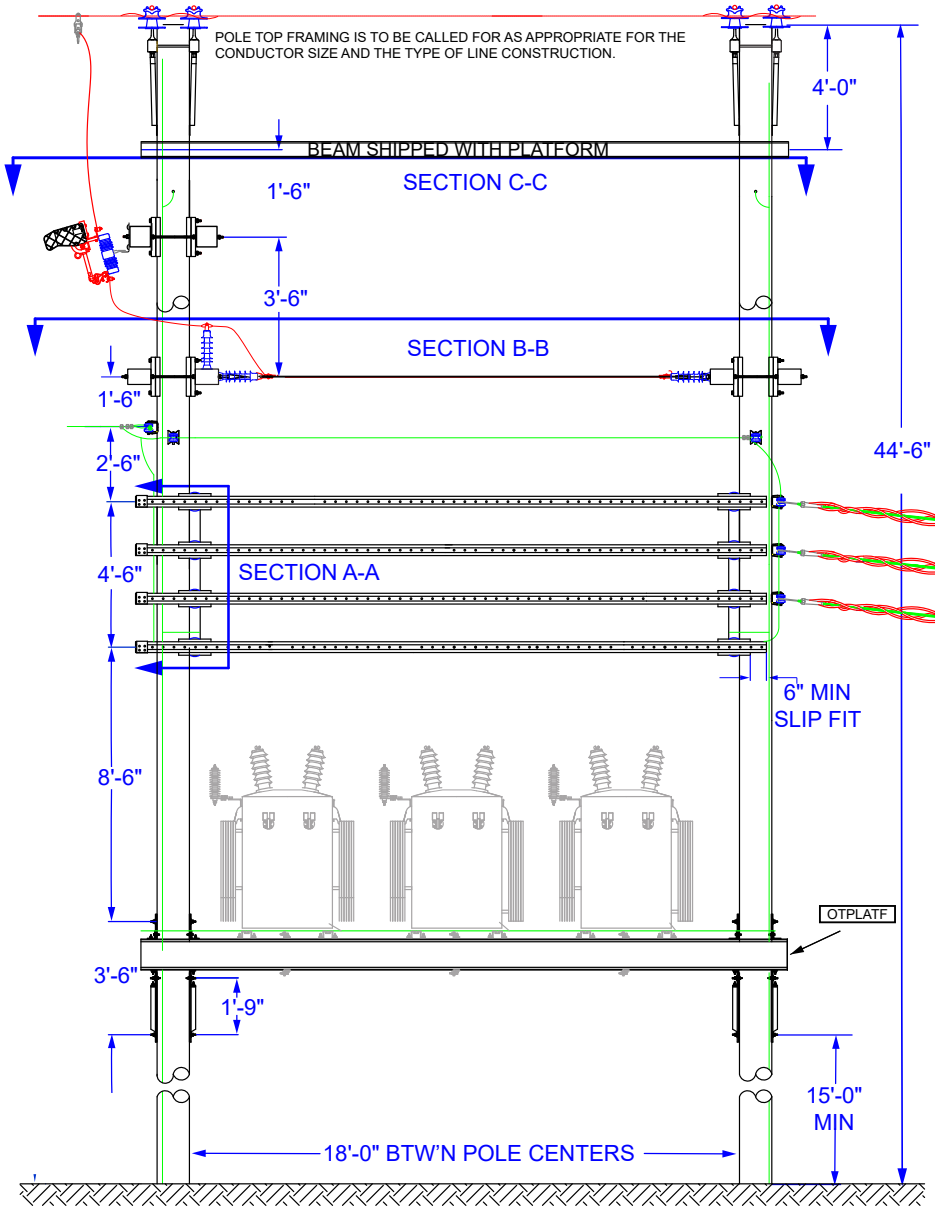
DELTA - BANKED TRANSFORMER - SECONDARY WIRING							
100% TRANSFORMER LOAD (95% POWER FACTOR)							
COVERED COPPER WIRE							
XFMR BANK	XFMR SIZE	240 3-WIRE 3-PHASE (AMPS)	QTY	SECONDARY WIRING	480 3-WIRE 3-PHASE (AMPS)	QTY	SECONDARY WIRING
(3) 250	750	1,899	3	750MCM	950	2	500MCM
(3) 333	1000	2,532	4	750MCM	1,266	2	750MCM
(3) 500	1500	3,798	5	750MCM	1,899	3	750MCM

CAUTION NOTE: INTEGRAL WEB BUS 4,440 AMP EMERGENCY RATING @ 100 DEGREES CELSIUS

TRANSFORMER COMPATIABLE UNITS - PLATFORM SUBSTATIONS						
4W / 3-PHASE SERVICES			PRIMARY & SECONDARY VOLTAGE			
XFMR	SIZE	BANK	13.8 kV	23.9 kV	13.8 kV	23.9 kV
QTY	kVA	kVA	208/120 V	208/120 V	480/277 V	480/277 V
3	250	750	OT4840	OT4840	OT5840	OT5840
3	333	1,000	OT4846	OT4846	OT5846	OT5846
3	500	1,500	OT4852	OT4852	OT5852	OT5852

TRANSFORMER COMPATIABLE UNITS - PLATFORM SUBSTATIONS				
3W / 3-PHASE SERVICES			PRIMARY & SECONDARY VOLTAGE	
XFMR	SIZE	BANK	13.8 kV	23.9 kV
QTY	kVA	kVA	240 V Δ or 480 V Δ	240 V Δ or 480 V Δ
3	250	750	OT5440	OT5440
3	333	1,000	OT5446	OT5446
3	500	1,500	OT5452	OT5452

TRANSFORMER COMPATIABLE UNITS - PLATFORM SUBSTATIONS						
STEP-DOWN XFMRS			PRIMARY & SECONDARY VOLTAGE			
XFMR	SIZE	BANK	13.2 Kv	13.8 kV	14.4 kV	23.9 / 13.8 kV
QTY	kVA	kVA	2.4 / 4.16 kV	2.4 / 4.16 kV	2.4 / 4.16 kV	7.96 x 13.8 kV
3	250	750	OT4140	OT6540	OT7740	NA
3	333	1,000	OT4146	OT6546	NA	NA
3	500	1,500	NA	OT6552	NA	OT9052



SECONDARY SERVICE NOTES:

1. SERVICE CONDUCTOR MAY BE PLACED ON EITHER POLE.
2. USE HEAVY CLASS POLES AND/OR GUYING TO SUPPORT THE SERVICE WIRE.
3. LOCATE SUBSTATION NEAR THE SERVICE ENTRANCE TO MINIMIZE VOLTAGE DROP.

SECONDARY BUS NOTE:

POSITION THE BUS CONNECTORS TO ALIGN THE LEAD WIRES WITH THE TRANSFORMER SECONDARY BUSHINGS. THIS MAY REQUIRE DRILLING THE INTEGRAL WEB AFTER IT IS INSTALLED ON THE POLES.

CAUTION:
ALL SECONDARY LEADS INCLUDING THOSE USED FOR THE NEUTRAL MUST BE SIZED FOR THE FULL CAPACITY OF THE TRANSFORMERS (SEE PAGE 2).

BALANCE THE NUMBER OF WIRES ATTACHED TO THE TOP AND BOTTOM OF EACH BUS BAR. THIS PREVENTS LOCALIZED HIGH TEMPERATURES CAUSED BY CURRENT.

MULTI-GROUNDED NEUTRAL REQ'D

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

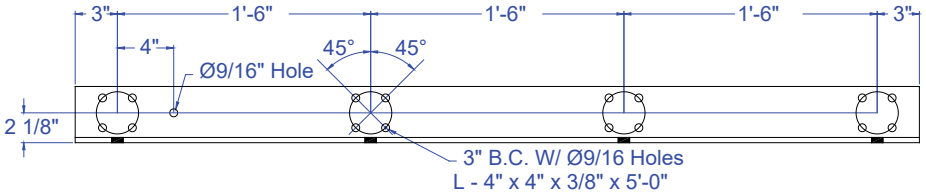
CUSTOMER SUBSTATION 3-PHASE BANK PLATFORM FRAMING

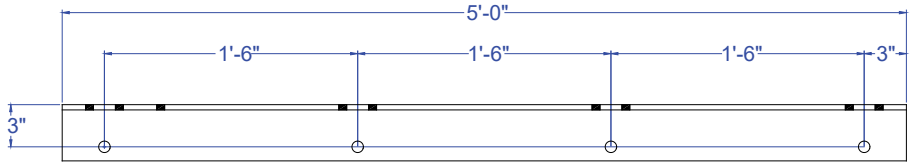
SECONDARY BUS MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	STOCK #
1	80’	IWBC AL 4X4X5/16	325800000
2	8	INSUL BUS SUP 10KV POLY	240105000
3	8	CLAMP BUS SUP 4 IWBC 3 BC	320900000
4	10’	ANGLE AL BUS 4 X 4 X 3/8 IN	320030000
5 Select One	360’	CABLE CU COV 500 MCM 37S	012340000
	360’	CABLE CU COV 750 MCM 61S	012360000
6	14	TERMINAL LUG AL 4 IWBC 4 HOLE	233630000

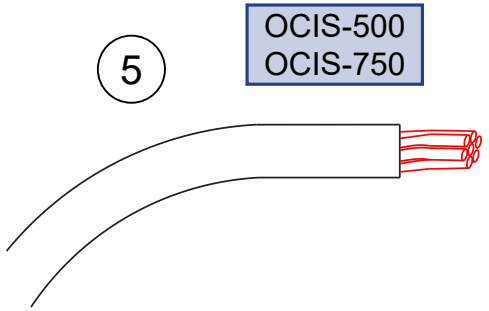
TRUCK STOCK ITEMS

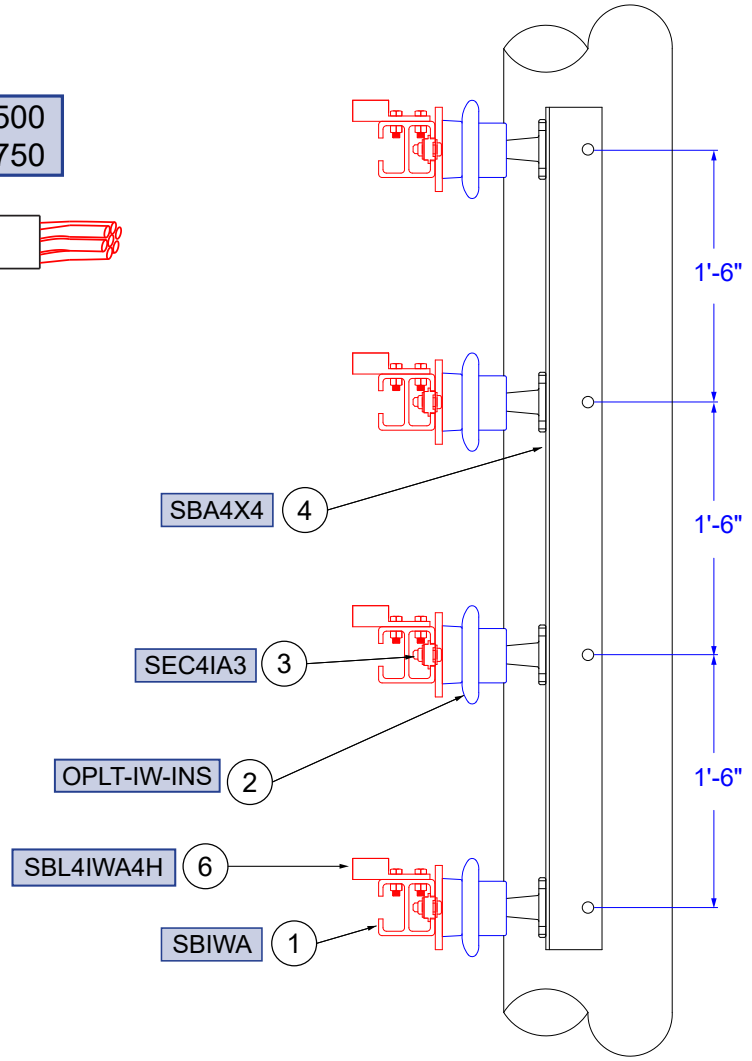
ITEM	QTY	DESCRIPTION	STOCK #
	14	CONN TRANSF SPADE 3C	224163000
	110	WASHER SS RD FLAT 1/2	209740000
	32	BOLT MACHINE SS 1/2X1	204340000
	56	BOLT MACHINE SS FH 1/2X1 1/2	204320000
	8	BOLT MACHINE AVERAGE 3/4”	204_____





INSULATOR ANGLE SUPPORT BRACKET
SHOP DETAIL - ITEM 4





REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

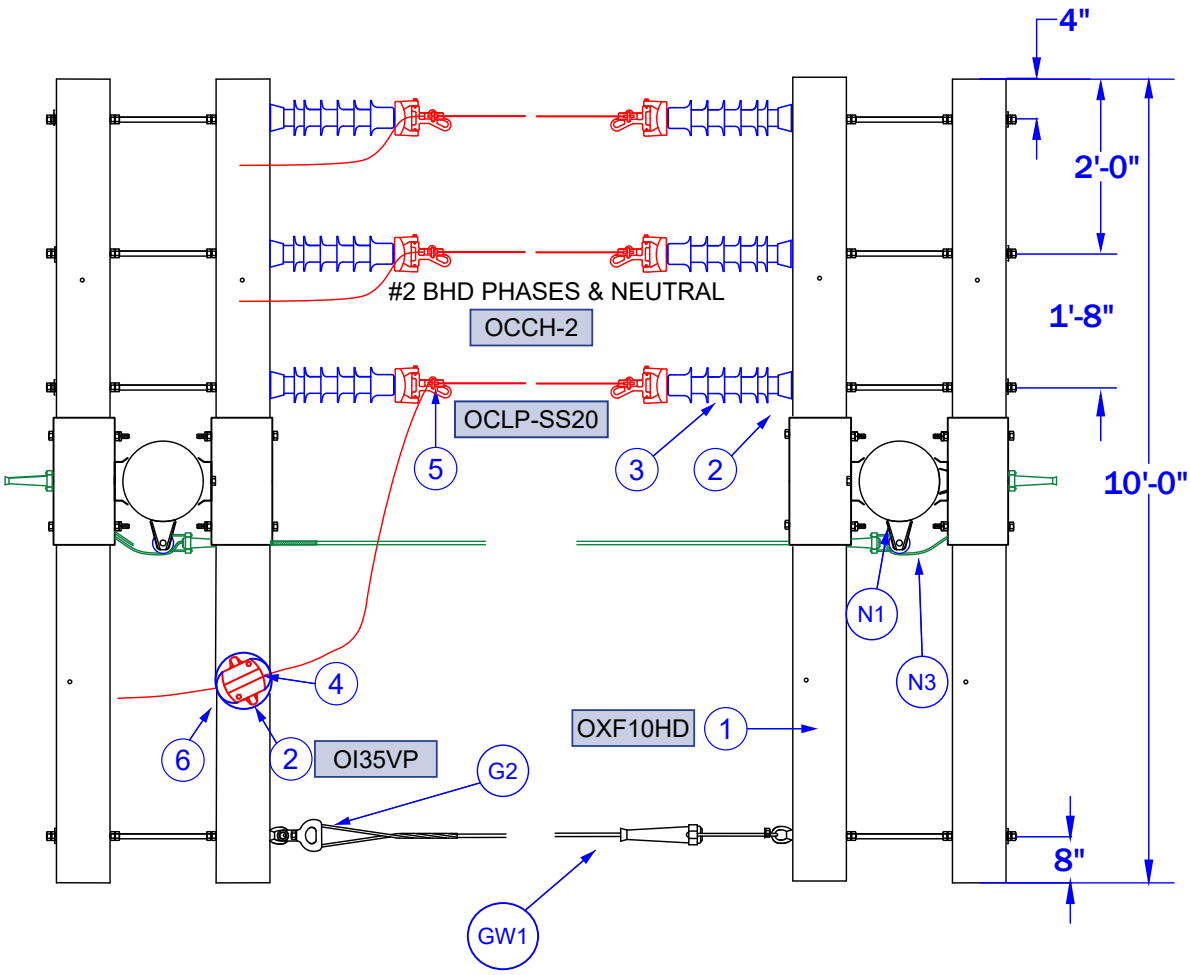
SECTION A-A DETAIL SECONDARY BUS

PRIMARY BUS
MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	STOCK #
1	4	X-ARM 4 X 6 X 10 FIBERGLASS	040410000
2	7	INSUL LP VER CLP/TP 35 KV	240974000
3	6	CLAMP SS DEAD-END 6-2/0	220820000
4	1	CLAMP TOP AL 4-4/0	221870000
5	180’	CABLE CU BHD 2 7S REEL	011000000
6	1	BOLT STUD 3/4 X 8 LONG/LP INSUL	204790000
CL1	1	CLEVIS THIMBLEYE LARGE	181520000
GW1	20’	WIRE GALV GUY 5/16	016020000

TRUCK STOCK ITEMS

ITEM	QTY	DESCRIPTION	STOCK #
G2	1	DEADEND PREFORMED 5/16	230120000
G8	1	STRANDVISE GUY 5/16	231100000
N1	3	RACK SECONDARY 1W	184000000
		RACK SECONDARY 1W/LARGE	184003000
N2	3	INSUL RACK SPOOL	242470000
		INSUL RACK SPOOL LG	242480000
	2	NUT OVAL EYE 3/4	206420000
	32	DBL COIL SPRING WASHER 3/4	206580000
	12	BOLT DA AVERAGE 3/4	201_____
	34	WASHER SQ FLAT 3/4 H	209620000
	3	WASHER SQ CURVED 3 1/2	209520000
	3	BOLT MACH AVERAGE 5/8 LONG	203_____
	3	5/8” DBL COIL SPRING WASHER	206570000
	8	BOLT MACHINE AVERAGE 3/4”	204_____



NOTE

1. See Neutral Framing section for selection of Insulator and Rack materials.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

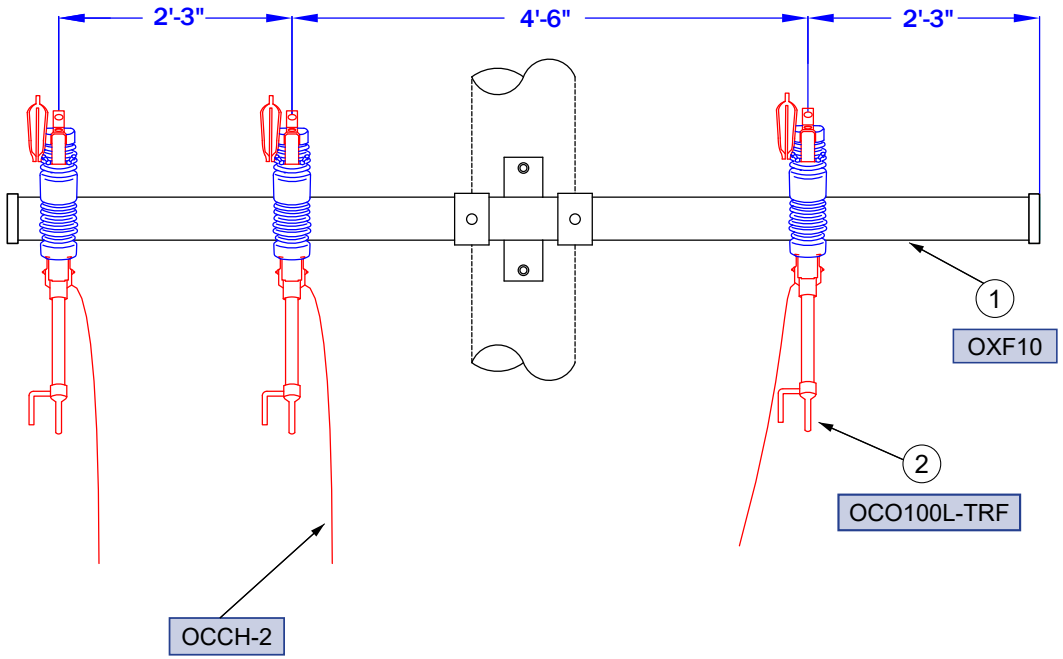
SECTION B-B DETAIL
PRIMARY BUS

CUTOUT & ARMS
MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 3-5/8 X 4-5/8 X 10' FIBERGLASS	040400000
2	3	CUTOUT 100A 14.4/24.9KV LB USED ON TRF	143450000
		CUTOUT 200A 14.4/24.9KV LB USED ON TRF	143454000

TRUCK STOCK ITEMS

ITEM	QTY	DESCRIPTION	STOCK #
	60'	CABLE CU BSD 2 7S	011210000
	2	BOLT MACH AVERAGE 5/8 LONG	203_____
	2	DBL COIL SPRING WASHER 5/8	206570000
	8	WASHER SQ FLAT 3/4 H	209620000



Fuse Chart									
	1500kVA			1000kVA			750kVA		
Primary Voltage	CUTOUT	FUSE SIZE	CLF	CUTOUT	FUSE SIZE	CLF	CUTOUT	FUSE SIZE	CFL
23.9kV	OCO100L-TRF	65K	N/A	OCO100L-TRF	40K	40	OCO100L-TRF	30K	40
13.8kV	OCO100L-TRF	100K	N/A	OCO100L-TRF	65K	N/A	OCO100L-TRF	50K	N/A

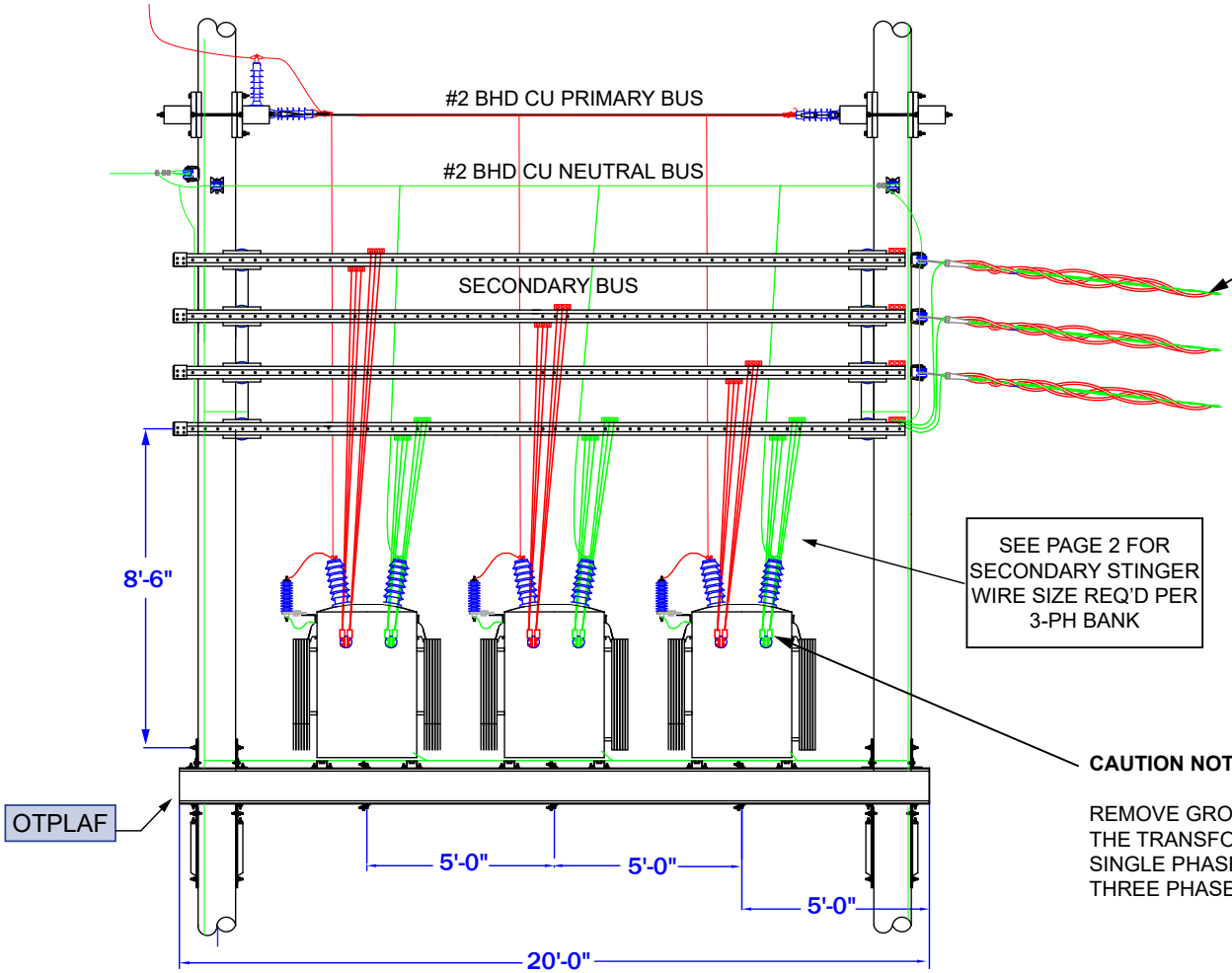
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SECTION C-C DETAIL
FUSED CUTOUTS

GENERAL NOTES:

1. The aluminum platform is rated for 9,000 pounds per transformer position.
2. When the number of leads from the transformer exceeds three, distribute the number of conductors equally over the bus bar.
3. From the transformer bushing to the neutral bus bar, the secondary neutral leads must be same quantity of equal conductor to provide the same capacity as the hot legs.
4. See the Transformer section for Wiring Diagrams of the Single Phase Transformer Bank configuration as required for the secondary service voltage.
5. The drawing is for illustration purposes only. The actual quantity of service wires and connections must be determined for the specific application.
6. Voltage Drop may increase the number of service wires between the platform and the customer's service point.
7. Primary Arresters are required on all high voltage bushings of the transformers based on 13.8kV Delta or 23.9kV Wye installations.



SERVICE CONDUCTORS NOTE:

WHEN QUADRUPLEX SERVICE CONDUCTORS ARE USED, EACH CONDUCTOR LEG MUST HAVE AN A, B, AND C PHASE.

OPEN WIRE TYPE SERVICES ARE RATED @ 95% DUE TO PHASE SEPERATION.

SEE PAGE 2 FOR SECONDARY STINGER WIRE SIZE REQ'D PER 3-PH BANK

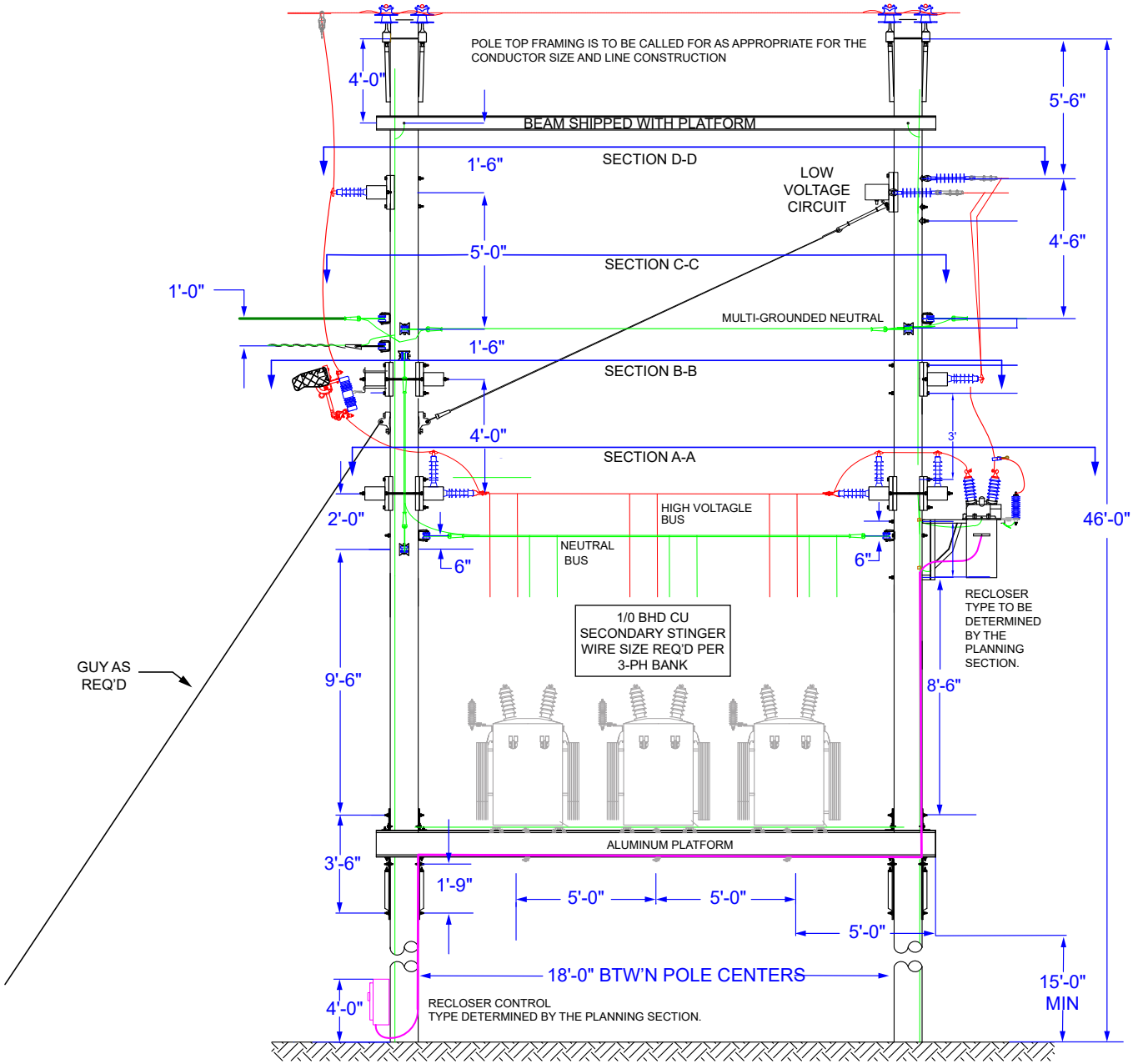
CAUTION NOTE:

REMOVE GROUND STRAP FROM NEUTRAL BUSHING TO THE TRANSFORMER TANK IS REQUIRED FOR EACH SINGLE PHASE TRANSFORMER WHEN BANKED FOR A THREE PHASE SERVICE.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

WIRING DETAIL SECONDARY BUS



INSTALL THE APPROPRIATE TRANSFORMERS, FUSES, AND ARRESTERS TO MEET THE VOLTAGE REQUIREMENTS.

THE PLATFORM'S MAXIMUM WEIGHT LIMIT IS 9000 POUNDS PER TRANSFORMER.

CAUTION:
TEST THE OUTPUT VOLTAGE OF THE STATION PRIOR TO CLOSING RECLOSER. SOME XFMRS HAVE DUAL VOLTAGE SWITCH THAT CAN DOUBLE THE LOW VOLTAGE OUTPUT OF THE SUBSTATION.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STEP-DOWN SUBSTATION UNDER-BUILT CIRCUIT PLATFORM FRAMING

PLATFORM SUBSTATION STANDARDS

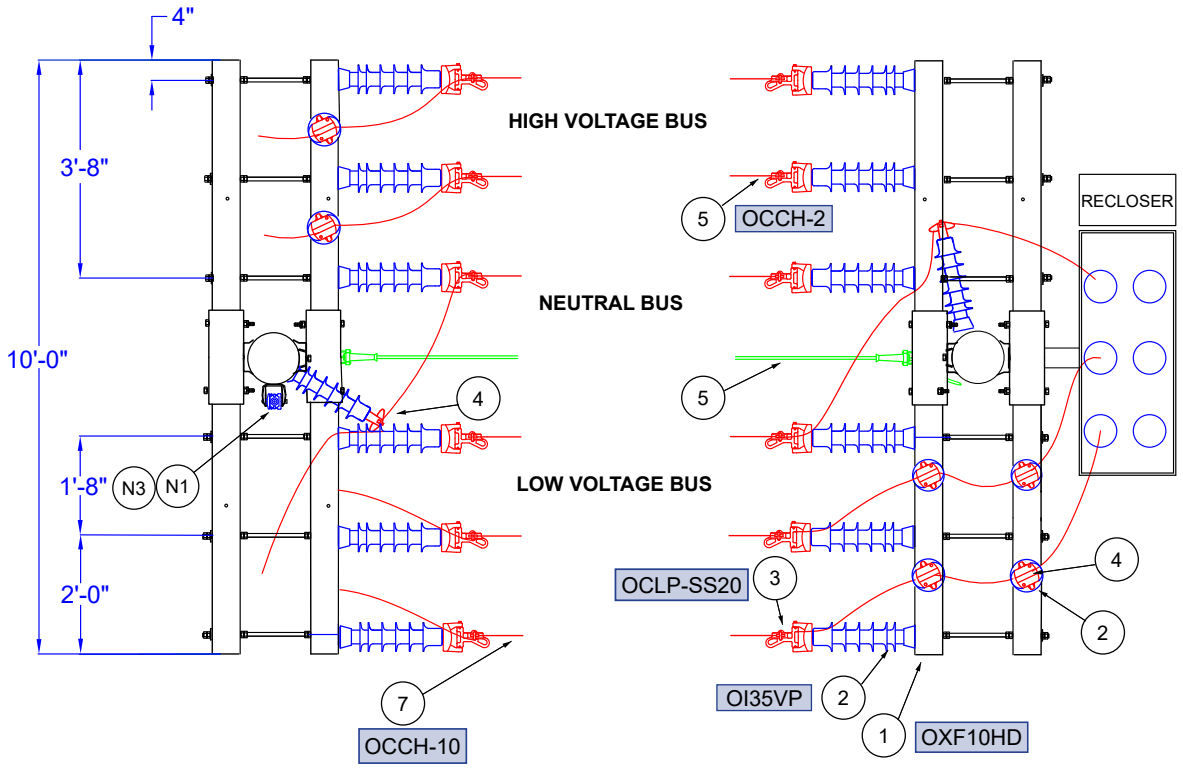
OPLATF-PRI1

PLATFORM BUS
MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	STOCK #
1	4	X-ARM FIBERGLASS 4 X 6 X 10	040410000
2	20	INSUL LP VER CLP/TP 35KV	240974000
3	12	CLAMP SS DEAD-END 6-2/0	220820000
4	8	CLAMP TOP AL 4-4/0	221870000
5	180’	CABLE CU BHD 2 7S REEL	011000000
6	6	BOLT STUD 3/4 X 8 LONG/LP INSUL	204790000
7	180’	CABLE CU BHD 1/0 7S REEL	011060000

TRUCK STOCK ITEMS

ITEM	QTY	DESCRIPTION	STOCK #
N1	3	RACK SECONDARY 1W	184000000
		RACK SECONDARY 1W/LARGE	184003000
N2	3	INSUL RACK SPOOL	242470000
		INSUL RACK SPOOL LG	242480000
	52	DBL COIL SPRING WASHER 3/4	206570000
	18	BOLT DA AVERAGE 3/4	204_____
	50	WASHER SQ FLAT 3/4 H	209620000
	4	WASHER SQ CURVED 3 1/2	209520000
	3	BOLT MACH AVERAGE 5/8 LONG	203_____
	3	DBL COIL WASHER 5/8	206570000



CONTROL CREW WO TO INCLUDE RECLOSER CONTROLS		
CU	DESCRIPTION	QTY
INSTALL CONTROLS AND WIRING		
C97CNT-FRM6	CONTROL RECLOSER FORM 6	1

LINE DEPARTMENT WO TO INCLUDE RECLOSER		
CU	DESCRIPTION	QTY
INSTALL RECLOSER		
OR-NVA800A	RECLOSER GAS 27KV 800A KYLE-NOVA	1
INSTALL ARRESTERS ON RECLOSER		
OLA3	3kV SURGE ARRESTERS FOR 4kV CIRCUIT	3
OLA12	12kV SURGE ARRESTERS FOR 13.8/7.96kV CIRCUIT	3
OLA18	18kV SURGE ARRESTERS FOR 23.9kV CIRCUIT	3
INSTALL SECDR’Y LIGHTING ARRESTER AHEAD OF CONTROLS		
OLA240VCONT	ARRESTER SECONDARY 120/240V	1

NOTE

1. See Neutral Framing section for selection of Insulator and Rack materials.
2. See the Recloser section for installation and Material details.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

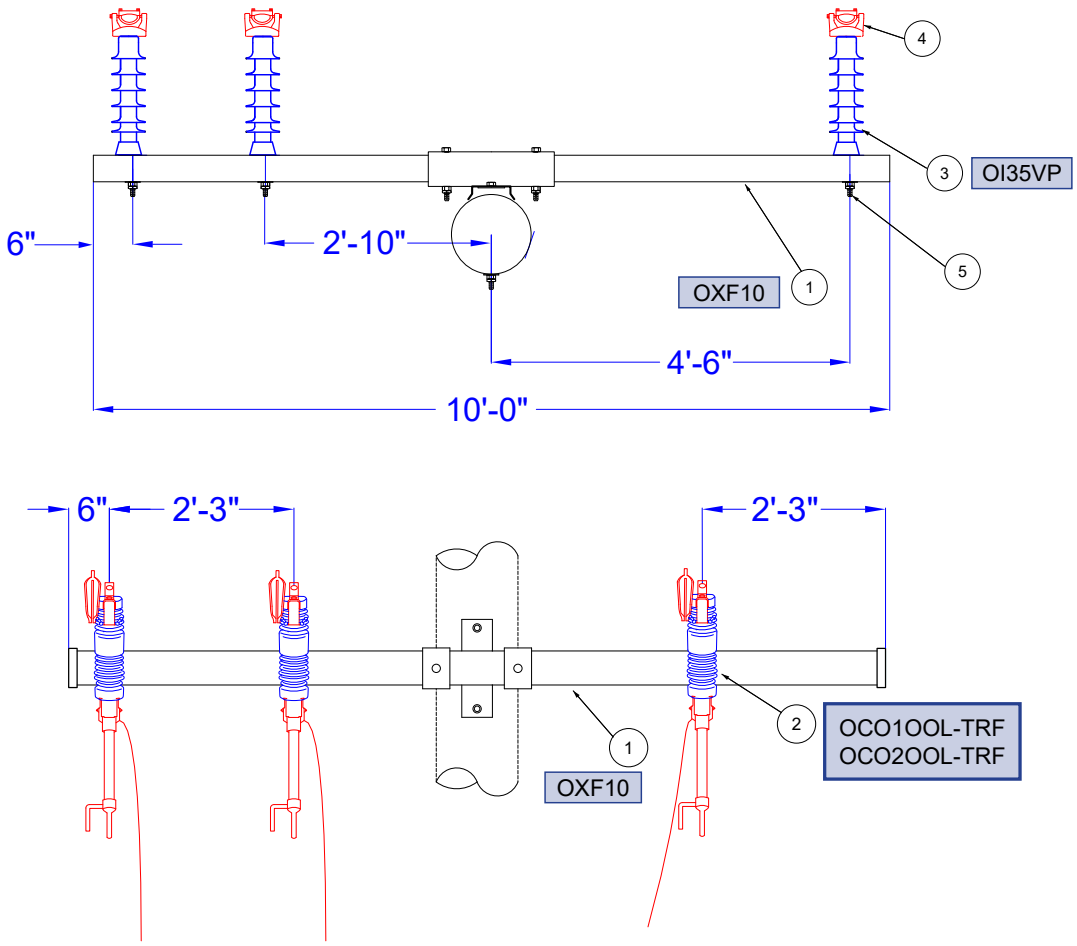
SECTION A-A DETAIL
PLATFORM BUS

CUTOUT & ARMS
MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	STOCK #
1	3	X-ARM 3-5/8 X 4-5/8 X 10 FIBERGLASS	040400000
2	3	CUTOUT 100A 14.4/24.9KV LB	143450000
3	3	INSUL LP VER CLP/TP 23KV	240950000
4	3	CLAMP TOP AL 4-4/0	221870000
5	3	BOLT STUD 3/4 X 8 LONG/LP INSUL	204790000

TRUCK STOCK ITEMS

ITEM	QTY	DESCRIPTION	STOCK #
	4	BOLT MACH AVERAGE 5/8 LONG	203_____
	4	DBL COIL SPRING WASHER 5/8	206570000
	8	WASHER SQ FLAT 3/4 H	209620000



FUSE CHART PER TRANSFORMER VOLTAGE

	1500kVA			1000kVA			750kVA		
Primary Voltage	CUTOUT	FUSE SIZE	CLF	CUTOUT	FUSE SIZE	CLF	CUTOUT	FUSE SIZE	CFL
23.9kV-4kV	OCO100L-TRF	80K	N/A	OCO100L-TRF	65K	N/A	OCO100L-TRF	40K	40
13.8kV-4kV	OCO200L-TRF	140K	N/A	OCO100L-TRF	100K	N/A	OCO100L-TRF	80K	N/A
23.9kV-13.8kV	OCO100L-TRF	100K	N/A	OCO100L-TRF	80K	N/A	OCO100L-TRF	65K	40

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SECTION B-B DETAIL
FALSE & CUTOUT ARMS

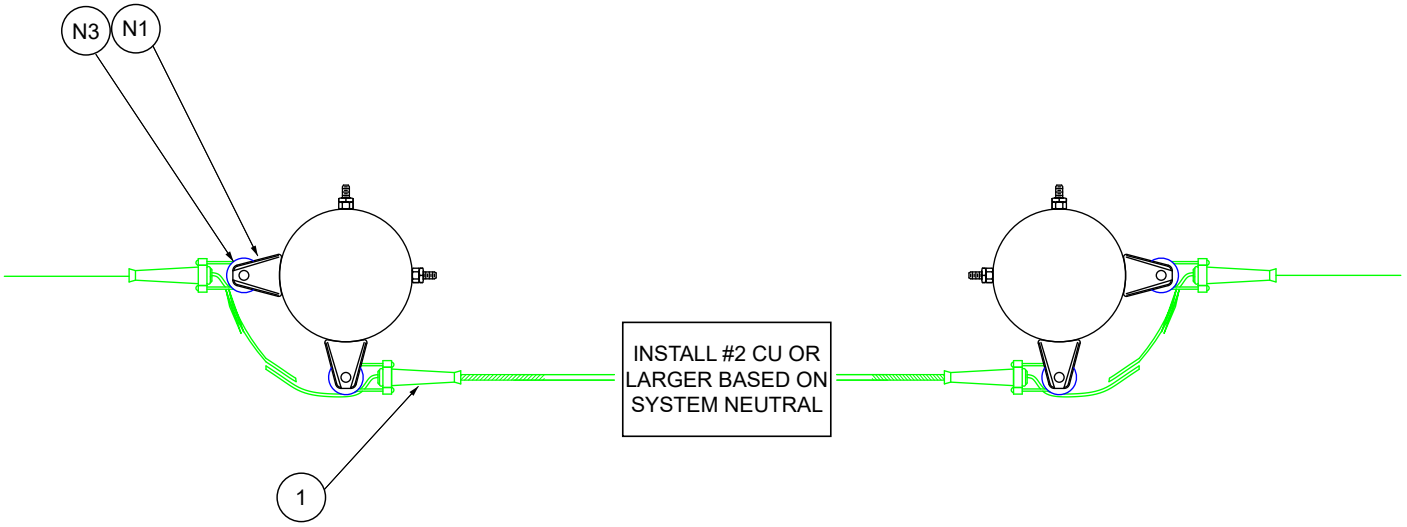
NEUTRAL BUS
MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	STOCK #
N1	4	RACK SECONDARY 1W	184000000
		RACK SECONDARY 1W/LARGE	184003000
N2	4	INSUL RACK SPOOL	242470000
		INSUL RACK SPOOL LG	242480000
1	4	STRANDVISE ALUM OR COPPER	2306_____

TRUCK STOCK ITEMS

ITEM	QTY	DESCRIPTION	STOCK #
	4	DBL COIL SPRING WASHER	206570000
	4	BOLT MACH AVERAGE 5/8 LONG	203_____
	4	WASHER SQ CURVED 3 1/2	209520000

ITEM 1 STOCK NUMBERS	
STRANDVISE CU 6	230650000
STRANDVISE CU 4	230651000
STRANDVISE CU 2	230651500
STRANDVISE ACSR 2	230600000
STRANDVISE ACSR 1/O	230601000
CLAMP STRAIN 6-2/0 ACSR	221000000
CLAMP STRAIN 4/0-277 AL	221040000



NOTE

1. See Neutral Framing section for selection of Insulator and Rack materials.

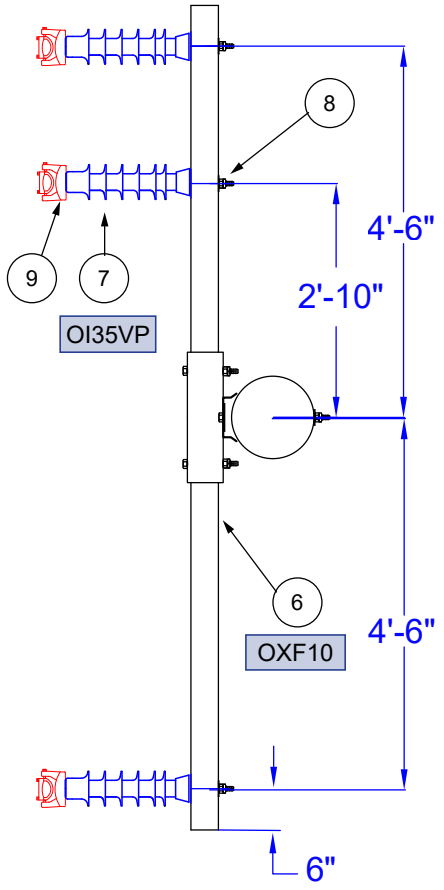
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

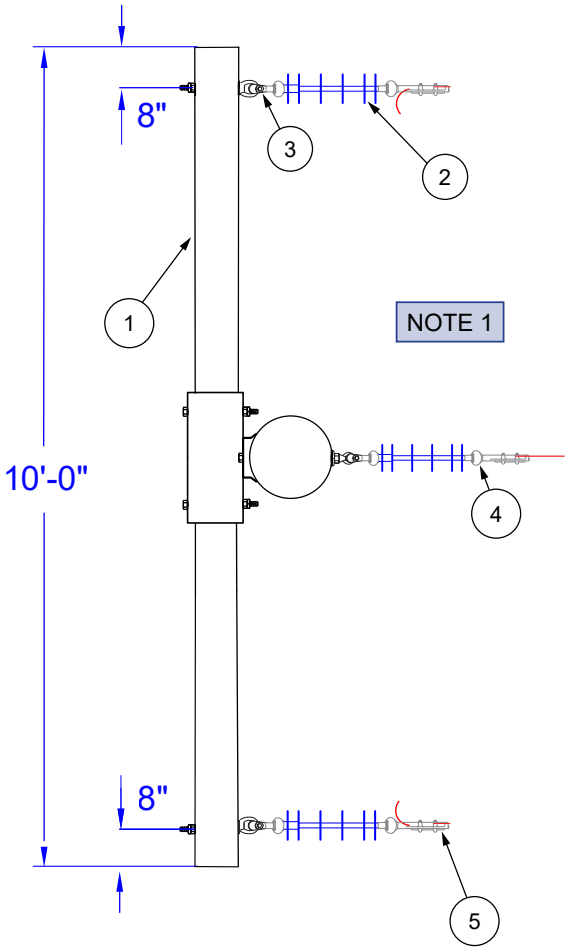
NES

SECTION C-C DETAIL
PLATFORM NEUTRAL BUS

FRM. CODE	O3FS-DE	O3FS-DE-40	DEAD-END ARM MATERIAL ITEM LIST	
ITEM	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	X-ARM 4" X 6" X 10' FIBERGLASS	040410000
2	3	3	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
3	3	3	CLEVIS Y BALL	181208000
4	3	3	SOCKET EYE	181440000
5	3	-	CLAMP STRAIN 6-2/0 ACSR	221000000
	-	3	CLAMP STRAIN 477MCM AL	221040000

FALSE ARM MATERIAL ITEM LIST			
ITEM	QTY	DESCRIPTION	STOCK #
6	1	X-ARM 3-5/8 X 4-5/8 X 10 FIBERGLASS	040400000
7	3	INSUL LP VER CLP/TP 23KV	240950000
8	3	BOLT STUD 3/4 X 8 LONG/LP INSUL	204790000
WIRE SIZE DEPENDANT TRUCK STOCK ITEMS			
9	3	CLAMP TOP AL 4-4/0	221870000
TRUCK STOCK ITEMS			
ITEM	QTY	DESCRIPTION	STOCK #
	5	DBL COIL SPRING WASHER 3/4	206580000
	2	BOLT DA AVERAGE 3/4	204_____
	4	WASHER SQ FLAT 3/4 H	209620000
	4	WASHER SQ CURVED 3 1/2	209520000
	2	BOLT MACH AVERAGE 5/8 LONG	203_____
	2	DBL COIL SPRING WASHER 5/8	206570000





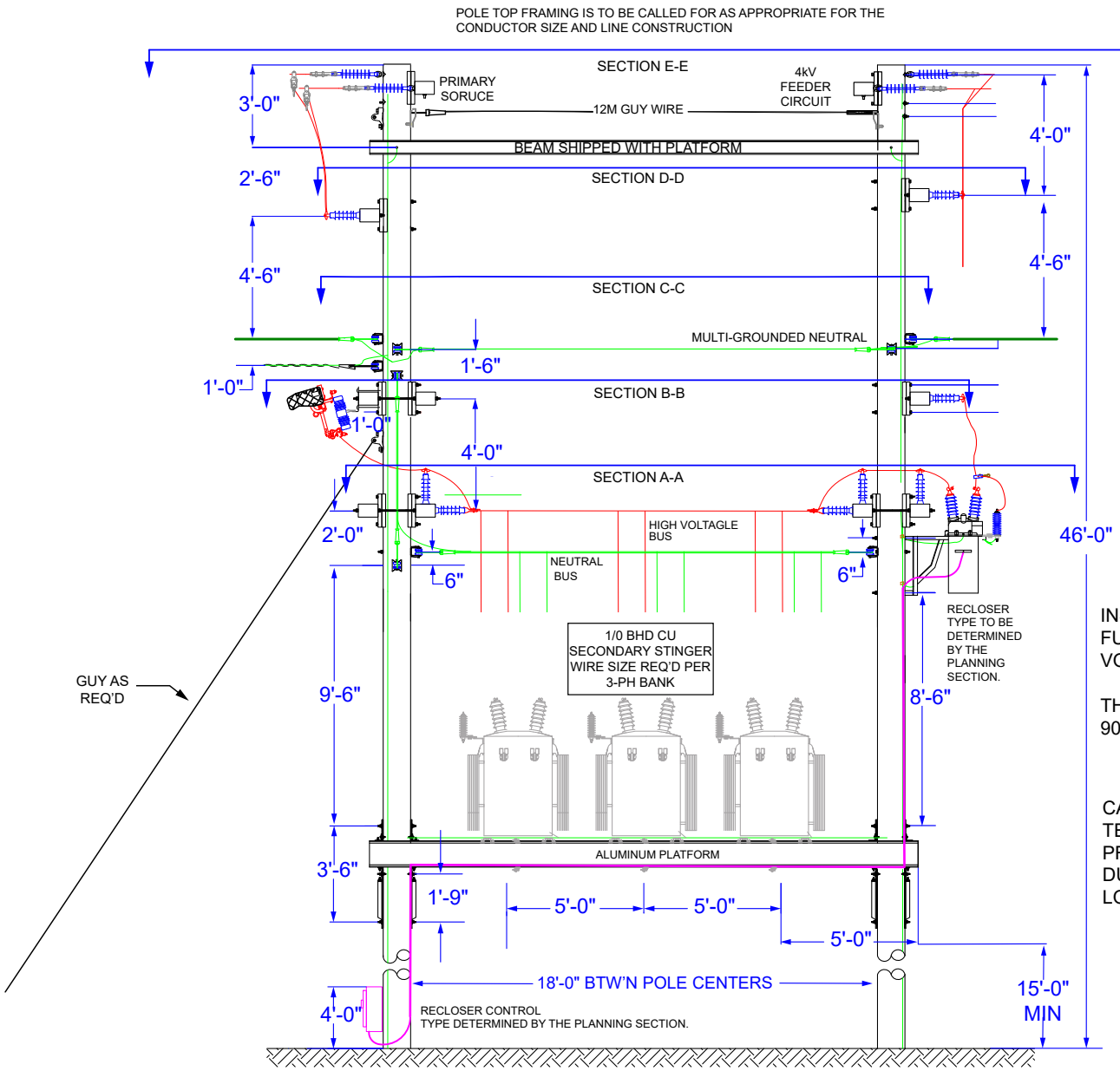
NOTE

1. Engineer to select Dead-end Xarm per low-side conductor

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SECTION D-D DETAIL FALSE & DEAD-END ARMS



INSTALL THE APPROPRIATE TRANSFORMERS, FUSES, AND ARRESTERS TO MEET THE VOLTAGE REQUIREMENTS.

THE PLATFORM'S MAXIMUM WEIGHT LIMIT IS 9000 POUNDS PER TRANSFORMER.

CAUTION:
TEST THE OUTPUT VOLTAGE OF THE STATION PRIOR TO CLOSING RECLOSER. SOME XFMRS HAVE DUAL VOLTAGE SWITCH THAT CAN DOUBLE THE LOW VOLTAGE OUTPUT OF THE SUBSTATION.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

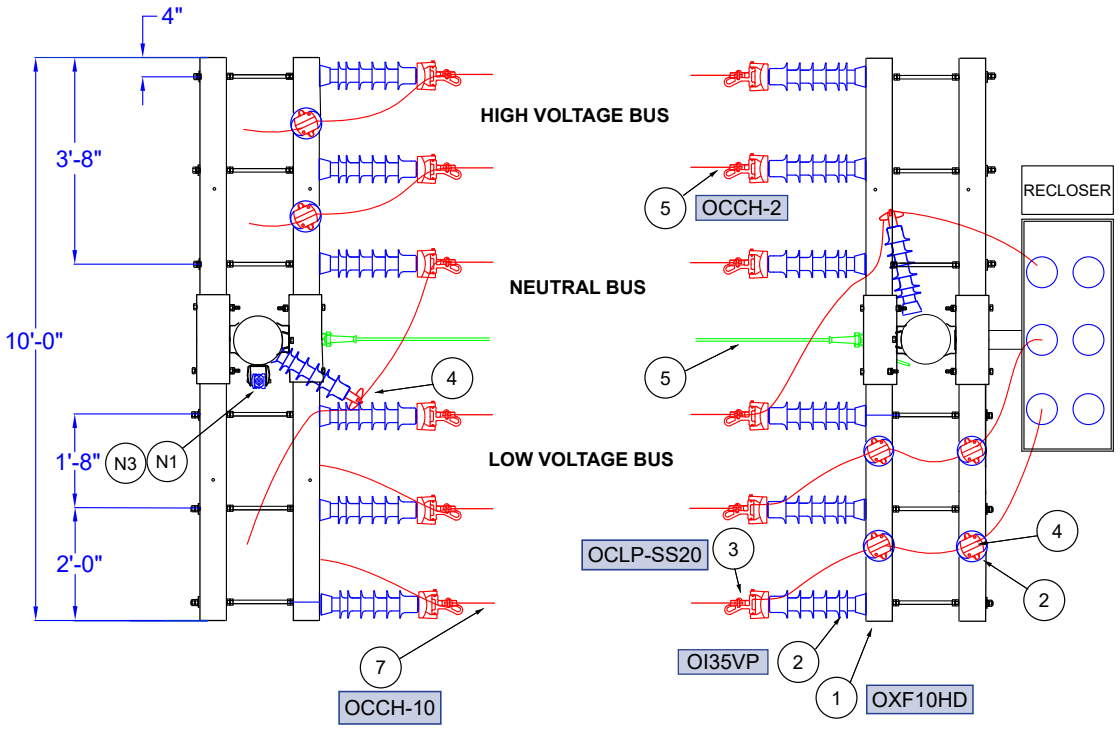
STEP-DOWN SUBSTATION OPEN BTW'N CIRCUITS PLATFORM FRAMING

PLATFORM BUS
MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	STOCK #
1	4	X-ARM FIBERGLASS 4 X 6 X 10	040410000
2	18	INSUL LP VER CLP/TP 35KV	240974000
3	12	CLAMP SS DEAD-END 6-2/0	220820000
4	8	CLAMP TOP AL 4-4/0	221870000
5	180’	CABLE CU BHD 2 7S REEL	011000000
6	6	BOLT STUD 3/4 X 8 LONG/LP INSUL	204790000
7	180’	CABLE CU BHD 1/0 7S REEL	011060000

TRUCK STOCK ITEMS

ITEM	QTY	DESCRIPTION	STOCK #
N1	3	RACK SECONDARY 1W	184000000
		RACK SECONDARY 1W/LARGE	184003000
N2	3	INSUL RACK SPOOL	242470000
		INSUL RACK SPOOL LG	242480000
	52	DBL COIL SPRING WASHER 3/4	206580000
	18	BOLT DA AVERAGE 3/4	
	50	WASHER SQ FLAT 3/4 H	209620000
	4	WASHER SQ CURVED 3 1/2	209520000
	3	BOLT MACH AVERAGE 5/8 LONG	
	3	DBL COIL SPRING WASHER 5/8	206570000



CONTROL CREW WO TO INCLUDE RECLOSER CONTROLS		
CU	DESCRIPTION	QTY
INSTALL CONTROLS AND WIRING		
C97CNT-FRM6	CONTROL RECLOSER FORM 6	1

LINE DEPARTMENT WO TO INCLUDE RECLOSER		
CU	DESCRIPTION	QTY
INSTALL RECLOSER		
OR-NVA800A	RECLOSER GAS 27KV 800A KYLE-NOVA	1
INSTALL ARRESTERS ON RECLOSER		
OLA3	3kV SURGE ARRESDTER FOR 4kV CIRCUIT	3
OLA12	12kV SURGE ARRESTERS FOR 13.8/7.96kV CIRCUIT	3
OLA18	18kV SURGE ARRESTERS FOR 23.9kV CIRCUIT	3
INSTALL SECONDARY LIGHTNING ARRESTER AHEAD OF CONTROLS		
OLA240VCONT	ARRESTER SECONDARY 120/240V	1

NOTE

1. See Neutral Framing section for selection of Insulator and Rack materials.
2. See the Recloser section for installation and Materials details.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

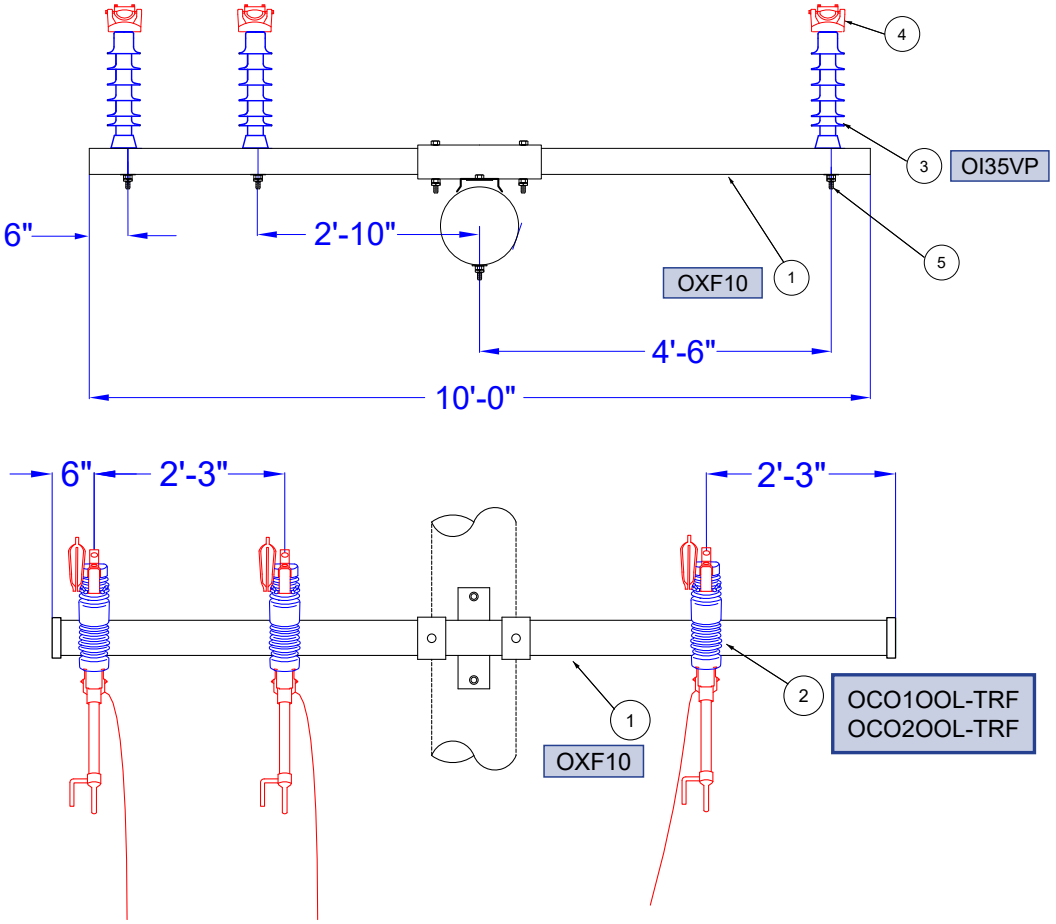
SECTION A-A DETAIL
PLATFORM BUS*

CUTOUT & ARMS
MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	STOCK #
1	3	X-ARM 3-5/8 X 4-5/8 X 10 FIBERGLASS	040400000
2	3	CUTOUT 100A 14.4/24.9KV LB	143450000
3	3	INSUL LP VER CLP/TP 23KV	240950000
4	3	CLAMP TOP AL 4-4/0	221870000
5	3	BOLT STUD 3/4 X 8 LONG/LP INSUL	204790000

TRUCK STOCK ITEMS

ITEM	QTY	DESCRIPTION	STOCK #
	4	BOLT MACH AVERAGE 5/8 LONG	203_____
	4	DBL COIL SPRING WASHER 5/8	206570000
	8	WASHER SQ FLAT 3/4 H	209620000



FUSE CHART PER TRANSFORMER VOLTAGE

	1500kVA				1000kVA			750kVA		
Primary Voltage	**CUTOUT**	**FUSE SIZE**	**CLF**	**CUTOUT**	**FUSE SIZE**	**CLF**	**CUTOUT**	**FUSE SIZE**	**CFL**
23.9kV-4kV	OCO100L-TRF	80K	N/A	OCO100L-TRF	65K	N/A	OCO100L-TRF	40K	40
13.8kV-4kV	OCO200L-TRF	140K	N/A	OCO100L-TRF	100K	N/A	OCO100L-TRF	80K	N/A
23.9kV-13.8kV	OCO100L-TRF	100K	N/A	OCO100L-TRF	80K	N/A	OCO100L-TRF	65K	40

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

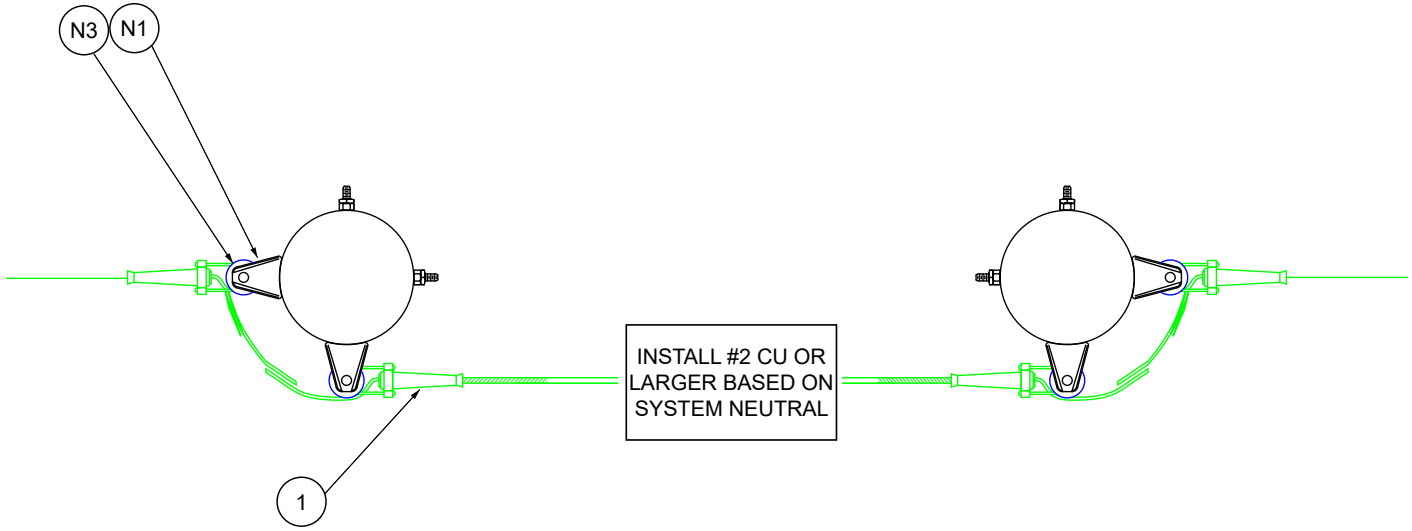
NES

SECTION B-B DETAIL
FALSE & CUTOUT ARMS

NEUTRAL BUS
MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	STOCK #
N1	4	RACK SECONDARY 1W	184000000
N3	4	INSUL RACK SPOOL	242480000
1	4	STRANDVISE; ALUMINUM OR COPPER	2306_____
TRUCK STOCK ITEMS			
ITEM	**QTY**	**DESCRIPTION**	**STOCK #**
	4	DBL COIL SPRING WASHER 5/8	206570000
	4	BOLT MACH AVERAGE 5/8 LONG	203_____
	4	WASHER SQ CURVED 3 1/2	209520000

ITEM 1 STOCK NUMBERS	
STRANDVISE CU 6	230650000
STRANDVISE CU 4	230651000
STRANDVISE CU 2	230651500
STRANDVISE ACSR 2	230600000
STRANDVISE ACSR 1/O	230601000
CLAMP STRAIN 6-2/0 ACSR	221000000
CLAMP STRAIN 4/0-277 AL	221040000



NOTE

1. See Neutral Framing section for selection of Insulator and Rack materials.

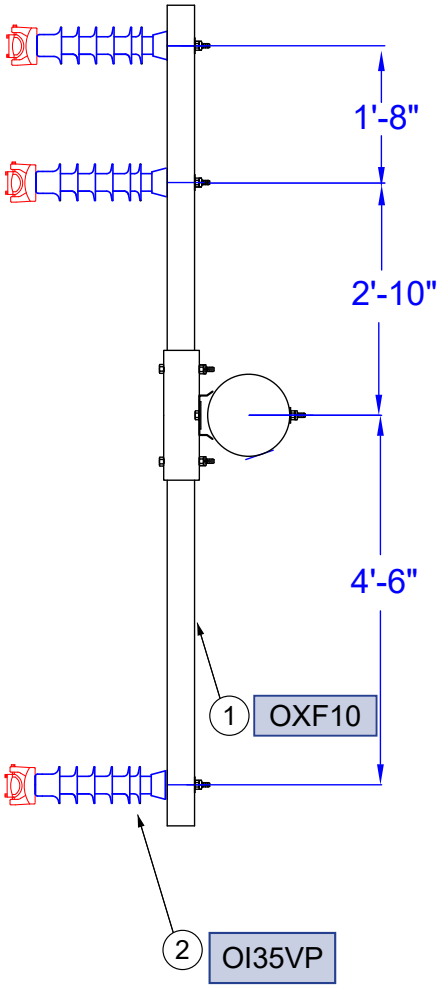
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

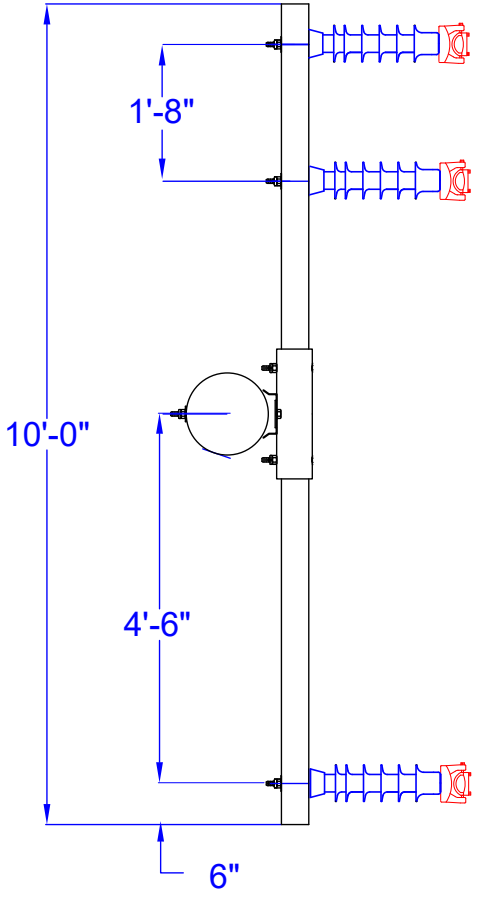
FALSE ARM
MATERIAL ITEM LIST

ITEM	QTY	DESCRIPTION	STOCK #
1	2	X-ARM 3-5/8 X 4-5/8 X 10 FIBERGLASS	040400000
2	6	INSUL LP VER CLP/TP 23KV	240950000
3	6	CLAMP TOP AL 4-4/0	221870000
4	6	BOLT STUD 3/4 X 8 LONG/LP INSUL	204790000

TRUCK STOCK ITEMS

ITEM	QTY	DESCRIPTION	STOCK #
	5	NUT PALNUT GALV 3/4	206540000
	5	BOLT DA AVERAGE 3/4	204_____
	15	WASHER SQ FLAT 3/4 H	209620000
	4	WASHER SQ CURVED 3 1/2	209520000
	4	BOLT MACH AVERAGE 5/8 LONG	203_____
	4	DBL COIL SPRING WASHER 5/8	206570000



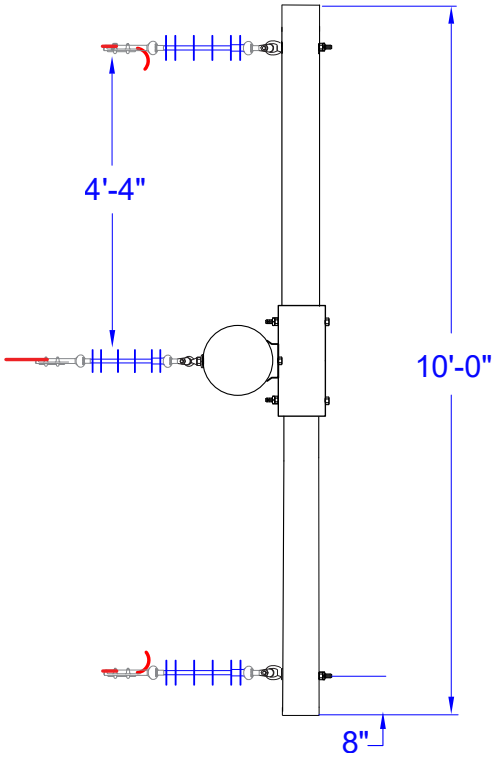


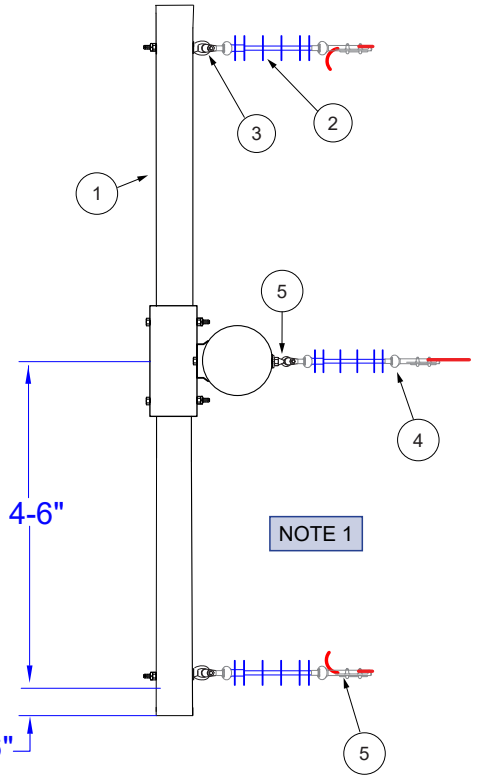
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SECTION D-D DETAIL
FALSE ARMS

FRM. CODE	O3FS-DE	O3FS-DE-40	DEAD-END ARM MATERIAL ITEM LIST	
ITEM	QTY	QTY	DESCRIPTION	STOCK #
1	1	1	X-ARM 4” X 6” X 10’ FIBERGLASS	040410000
2	3	3	INSUL SUSP 35KV POLY, SOCKET BALL	242752000
3	3	3	CLEVIS Y BALL	181208000
4	3	3	SOCKET EYE	181440000
5	1	1	CLAMP STRAIN 6-2/0 ACSR	221000000
	2	2	CLAMP STRAIN 477MCM AL	221040000
TRUCK STOCK ITEMS				
ITEM	QTY	QTY	DESCRIPTION	STOCK #
	3	3	BOLT MACHINE 3/4” X REQUIRED LENGTH	204_____
	4	4	WASHER SQ FLAT 2-1/4”, 13/16” HOLE	209620000
	4	4	NUT OVAL EYE 3/4”	206420000
	3	3	3/4” DBL COIL SPRING WASHER	206580000





NOTE

1. Engineer to select each pole Dead-end Xarm framing per high & low side conductor.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

SECTION E-E DETAIL DEAD-END ARMS

BANDING EQUIPMENT STANDARDS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
STOCK NUMBER AND COMPATIBLE UNIT TABLES	2			
STAINLESS STEEL BAND 3/4” WIDE WITH FASTENER	3			
STAINLESS STEEL BAND 1-1/4” WIDE WITH FASTENER	4			
STAINLESS STEEL BAND ALL PURPOSE BRACKET	5			
STAINLESS STEEL BAND INSULATOR MOUNTING BRACKET	6			
STAINLESS STEEL BAND TRANSFORMER BRACKET	7			
CHAIN BAND 15,000LB MAXIMUM CAPACITY	8			
CHAIN BAND 30,000LB MAXIMUM CAPACITY	9			
CHAIN BAND GUY WRAP INSTALLATION	10			
CHAIN BAND 15,000LB ALL PURPOSE BRACKET	11			

BANDING STOCK ITEMS		
DRAWING ITEM	DESCRIPTION	STOCK NUMBER
B1	POLE BAND SS 3/4	183982500
B2	POLE BAND FASTENING EQUIPMENT .75”	183983600
B3	POLE BAND SS 1.25	183983000
B4	POLE BAND FASTENING EQUIP.	183987000
B5	POLE BAND ALL PURPOSE BRACKET 1.25	183984000
B6	POLE BAND POST INS BRACKET	183985000
B7	POLE BAND TRANS MTG BRACKET	183986000
B8	POLE BAND ASSEMBLY 15,000LB	183988000
B9	POLE BAND EYE LINK 15,000LB	183988400
B10	POLE BAND LINK 15,00LB.	183988600
B11	POLE BAND CLEVE EYE 15,000LB	183988200
B12	POLE BAND ASSEMBLY 30,000LB	183989000
B13	POLE BAND EYE LINK 30,000LB	183989200
B14	POLE BAND LINK 30,000LB.	183989400
B15	POLE BAND ALL PURPOSE BRACKET 15,000LB	183989500

CU LIST	DESCRIPTION
OBAND-15K	BAND 15K LB WITH EYE LINK FOR 10” DIA PO”
OBAND-15K-EL	BAND 15K LB EYE LINK
OBAND-15K-G	BAND 15K LB CLEVE EYE FOR GUY WRAPPING
OBAND-15K-L	BAND 15K LB LINK
OBAND-15K-B	BAND 15K LB ALL PURPOSE BRACKET
OBAND-30K	BAND 30K LB WITH EYE LINK FOR 12 DIA PO”
OBAND-30K-EL	BAND 30K LB EYE LINK
OBAND-30K-L	BAND 30K LB LINK
OBAND-AP-B	BAND, 1.25, SS, FAST. & ALL PURPOSE BRACEKT
OBAND-INS-B	BAND, 1.25, SS, FAST. & INSULATOR BRACKET
OBAND-TRF-B	BAND, 1.25, SS, FAST. & TRANS. BRACKET

TRUCK STOCK		
DRAWING ITEM	DESCRIPTION	STOCK NUMBER
B1	POLE BAND SS 3/4	183982500
B2	POLE BAND FASTENING EQUIPMENT .75”	183983600

NOTES

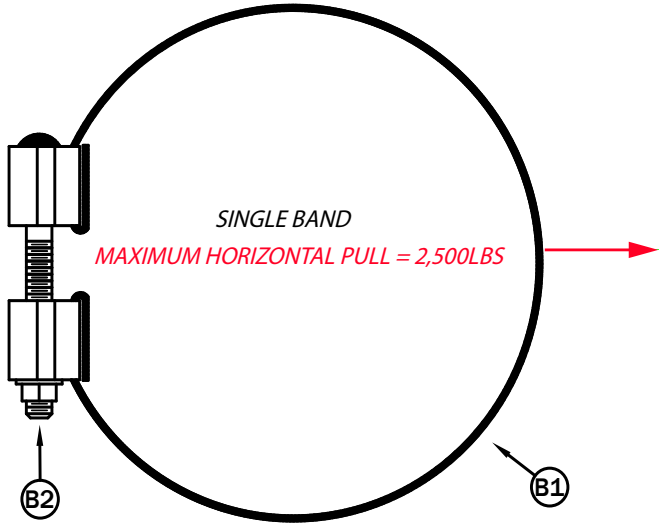
1. Use this band for sreet lights, conduit stand-off brackets and each other light duty applications.

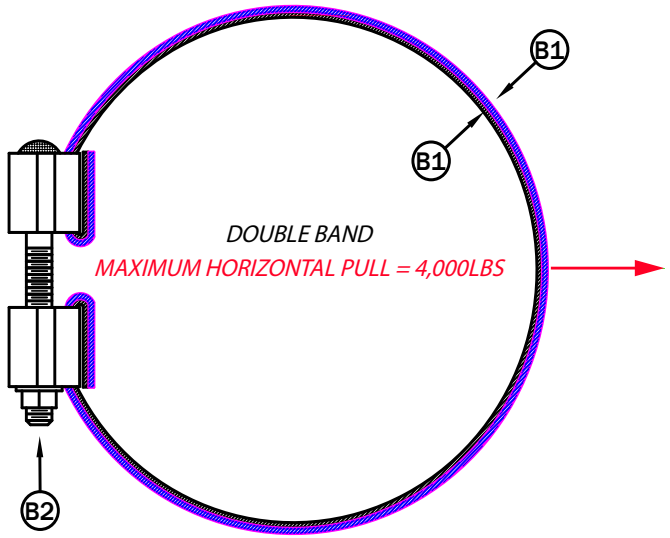
CAUTION NOTES:

THE BAND FASTENER MUST BE ON THE OPPOSITE SIDE OF THE POLE TO THE LOAD. IN ANY OTHER POSTION THE BANDS CAN SLIP OUT OF THE FASTENER.

DO NOT USE THIS TYPE OF BAND ON A WOOD POLE. SHRINKAGE OF THE WOOD WILL ALLOW THE BAND TO SLIP OUT OF THE FASTENER.

NEVER USE THIS TYPE OF BANDING FOR GUYING





INCHES OF BAND REQUIRED FOR A GIVEN POLE DIAMETER	
POLE DIAMETER	BAND LENGTH
8”	30”
10”	36”
12”	44”
14”	48”
16”	56”
18”	62”
20”	68”
22”	74”
24”	80”
26”	88”
28”	94”
30”	100”
32”	106”
34”	112”
36”	118”
38”	124”
40”	130”
42”	136”
44”	144”
46”	150”
48”	156”

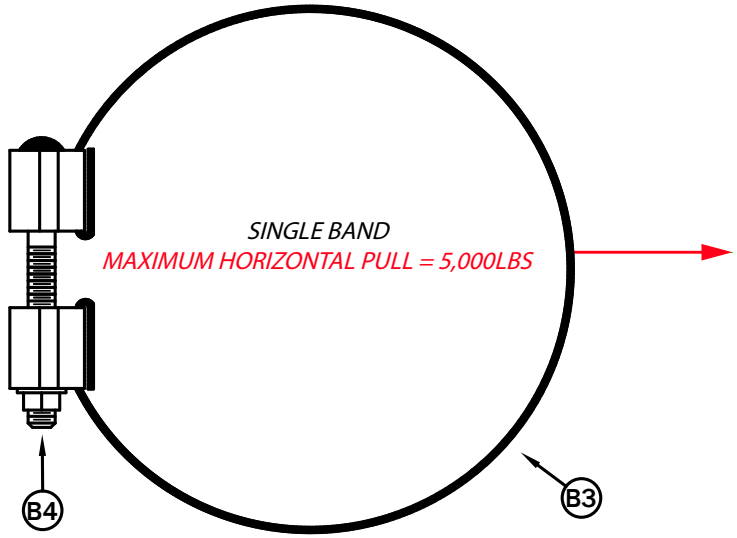
TRUCK STOCK		
DRAWING ITEM	DESCRIPTION	STOCK NUMBER
B3	POLE BAND SS 1.25	183983000
B4	POLE BAND FASTENING EQUIPMENT	183987000

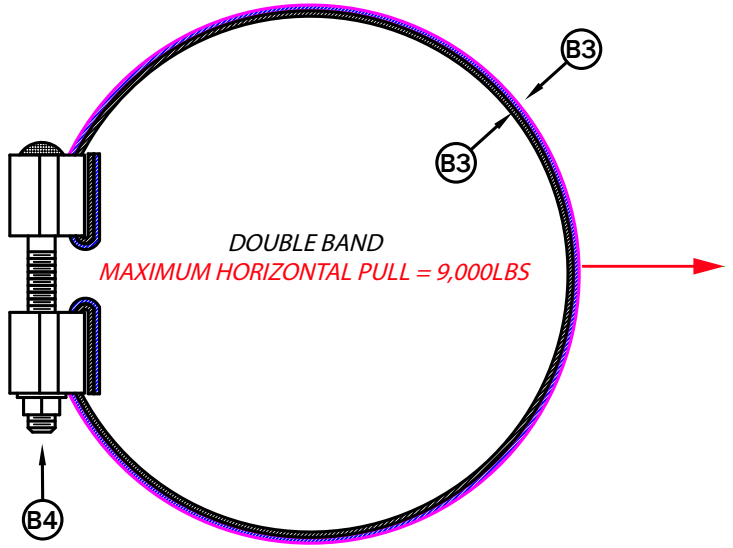
CAUTION NOTES:

THE BAND FASTENER MUST BE ON THE OPPOSITE SIDE OF THE POLE TO THE LOAD. IN ANY OTHER POSTION THE BANDS CAN SLIP OUT OF THE FASTENER.

DO NOT USE THIS TYPE OF BAND ON A WOOD POLE. SHRINKAGE OF THE WOOD WILL ALLOW THE BAND TO SLIP OUT OF THE FASTENER.

NEVER USE THIS TYPE OF BANDING FOR GUYING

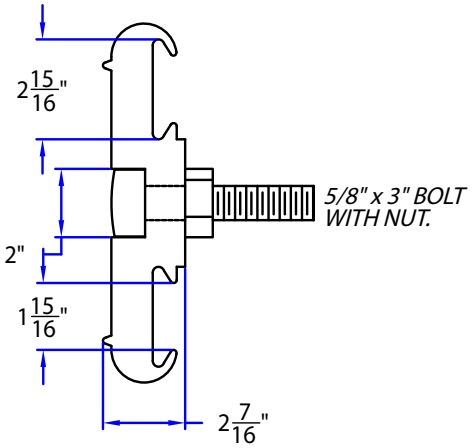


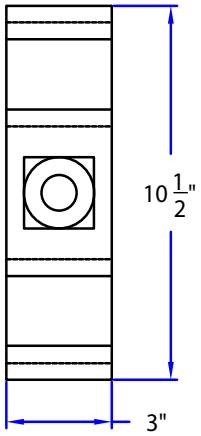


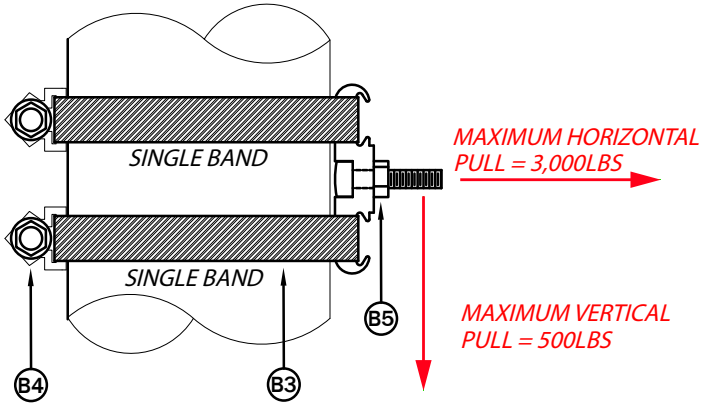
INCHES OF BAND REQUIRED FOR A GIVEN POLE DIAMETER	
POLE DIAMETER	BAND LENGTH
8”	30”
10”	36”
12”	44”
14”	48”
16”	56”
18”	62”
20”	68”
22”	74”
24”	80”
26”	88”
28”	94”
30”	100”
32”	106”
34”	112”
36”	118”
38”	124”
40”	130”
42”	136”
44”	144”
46”	150”
48”	156”

FRM. CODE	OBAND-AP-B	MAJOR AND MINOR MATERIAL ITEM LIST		
ITEM	QTY	DESCRIPTION	STOCK #	C.U.
B5	1	POLE BAND ALL PURPOSE BRACKET 1.25	183984000	OBAND-AP-B

TRUCK STOCK			
DRAWING ITEM	QTY	DESCRIPTION	STOCK NUMBER
B3	AS REQ.	POLE BAND SS 1.25	183983000
B2	2	POLE BAND FASTENING EQUIPMENT	183983600







CAUTION NOTE:

THE BAND FASTENER MUST BE ON THE OPPOSITE SIDE OF THE POLE TO THE LOAD. IN ANY OTHER POSITION TE BANDS CAN SLIP OUT OF THE FASTENER.

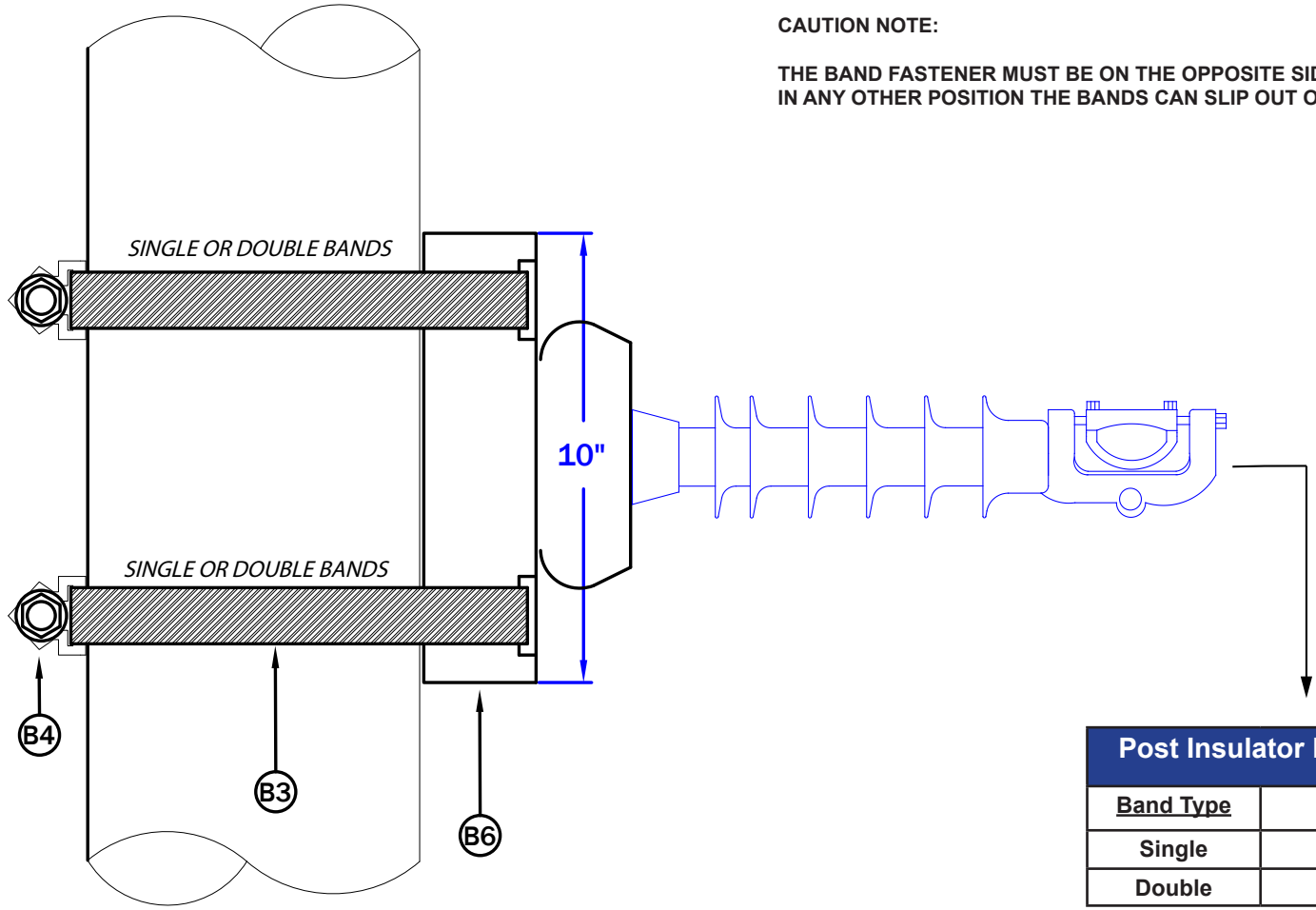
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

FRM. CODE	OBAND-INS-B	MAJOR AND MINOR MATERIAL ITEM LIST		
ITEM	QTY	DESCRIPTION	STOCK #	C.U.
B6	1	POLE BAND POST NS BRACKET	183985000	OBAND-INS-B

TRUCK STOCK			
DRAWING ITEM	QTY	DESCRIPTION	STOCK NUMBER
B3	AS REQ.	POLE BAND SS 1.25	183983000
B2	2	POLE BAND FASTENING EQUIPMENT	183987000

CAUTION NOTE:

THE BAND FASTENER MUST BE ON THE OPPOSITE SIDE OF THE POLE TO THE LOAD. IN ANY OTHER POSITION THE BANDS CAN SLIP OUT OF THE FASTENER.



Post Insulator Loading Chart (lbs.)		
Band Type	23 kV	35 kV
Single	875	420
Double	1750	840

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STAINLESS STEEL BAND INSULATOR MOUNTING BRACKET

FRM. CODE	OBAND-TRF-B	MAJOR AND MINOR MATERIAL ITEM LIST		
ITEM	QTY	DESCRIPTION	STOCK #	C.U.
B7	1	POLE BAND TRANS MTG BRACKET	183986000	OBAND-TRF-B

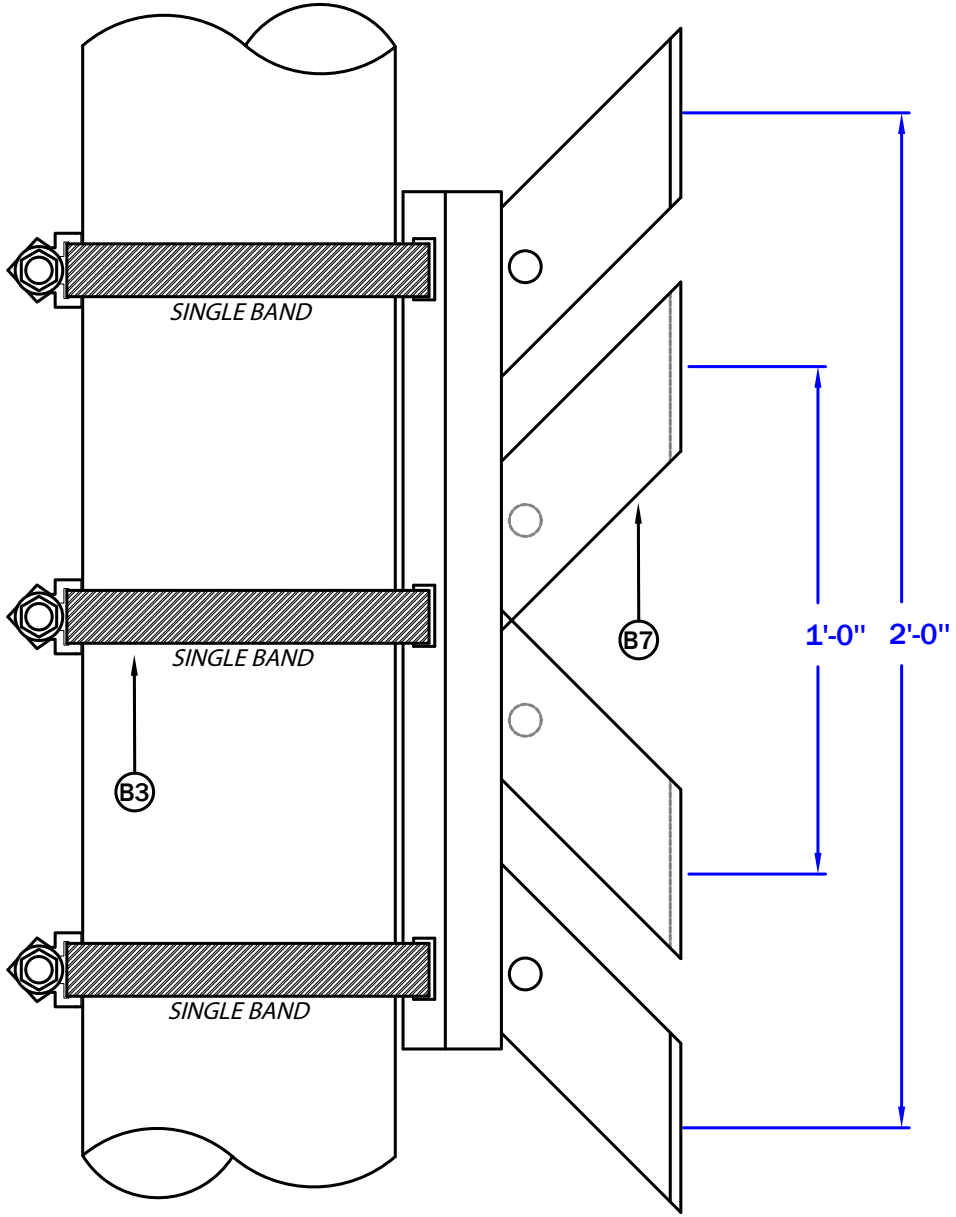
TRUCK STOCK			
DRAWING ITEM	QTY	DESCRIPTION	STOCK NUMBER
B3	AS REQ.	POLE BAND SS 1.25	183983000
B4	2	POLE BAND FASTENING EQUIPMENT	183987000

GENERAL NOTES:

Maximum Transformer Sizes (kVA)		
Type	Amorphous Core	Other
1-Phase	75	100
3-Phase	NA	75

CAUTION NOTE:

THE BAND FASTENER MUST BE ON THE OPPOSITE SIDE OF THE POLE TO THE LOAD. IN ANY OTHER POSTION THE BANDS CAN SLIP OUT OF THE FASTENER.



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

STAINLESS STEEL BAND TRANSFORMER BRACKET

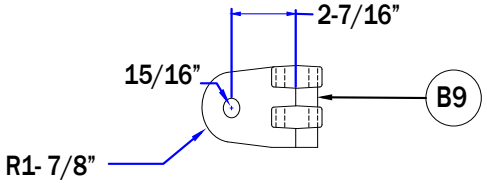
FRM. CODE	OBAND-15K	MAJOR AND MINOR MATERIAL ITEM LIST		
ITEM	QTY	DESCRIPTION	STOCK #	C.U.
B8	1	BAND 15K LB WITH EYE LINK FOR 10” DIA POLE	183988000	OBAND-15K
ADDITIONAL ITEMS				
B9	1	BAND 15K LB EYE LINK	183988400	OBAND-15K-EL
B10	1	BAND 15K LB LINK	183988600	OBAND-15K-L

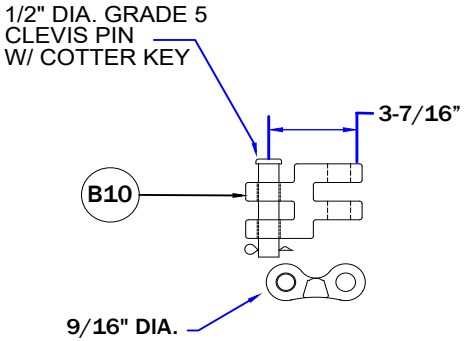
NOTES

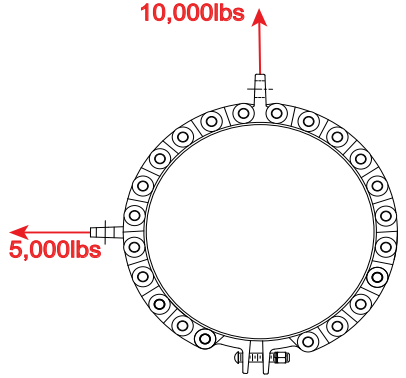
1. Chain bands differ from the stainless steel bands in that the load may be applied to the band at any point regardless of the fastener’s position.
2. Loads may be applied at multiple points on the same band by adding eye links.
3. The load may be applied at any vertical angle.
4. The number of links in the band equals the pole diameter in inches.
5. The band is ordered to fit a 10” diameter pole. Two links must be added to fit a 12” diameter pole.

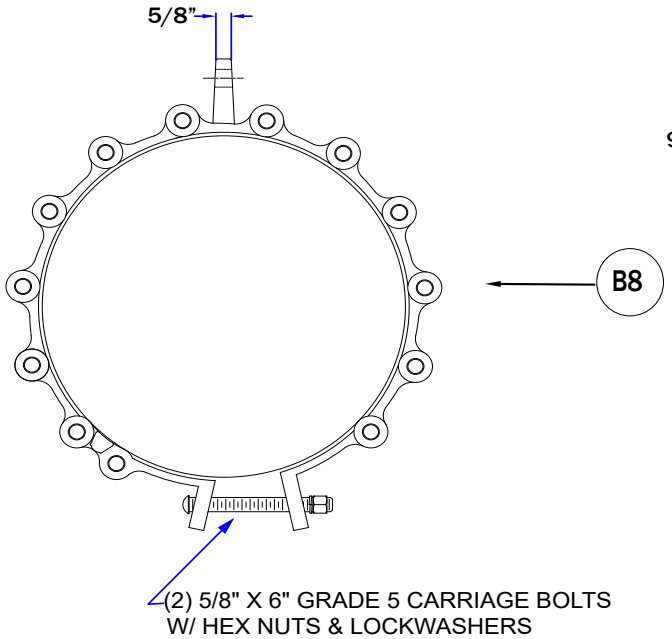
CAUTION NOTE:

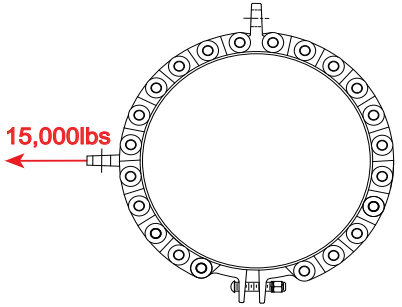
WHILE LOADS MAY BE APPLIED AT MULTIPLE POINTS ALONG THE BAND, THE SUM OF THE LOADS MUST NOT EXCEED THE MAXIMUM LOAD RATING OF THE BAND.











REV.	ENG.	DESCRIPTION OF CHANGE	DATE

BANDING EQUIPMENT STANDARDS

NES

CHAIN BAND
15,000LB MAXIMUM CAPACITY

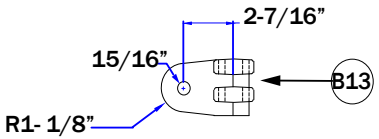
FRM. CODE	OBAND-30K	MAJOR AND MINOR MATERIAL ITEM LIST		
ITEM	QTY	DESCRIPTION	STOCK #	C.U.
B12	1	POLE BAND ASSEMBLY 30,000	183989000	OBAND-30K
ADDITIONAL ITEMS				
B13	1	POLE BAND EYE LINK 30,000LB	183989200	OBAND-30K-EL
B14	1	POLE BAND LINK 30,000LB	183989400	OBAND-30K-L
B11	1	POLE BAND CLEVE EYE 15,000LB	183988200	OBAND--15K-G

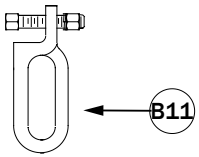
NOTES

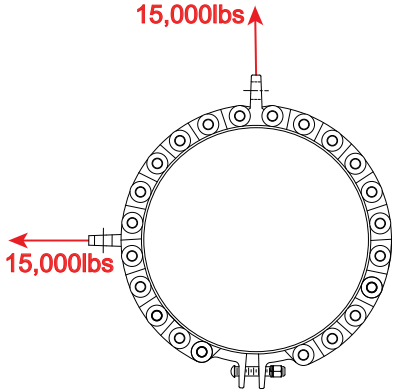
1. Chain bands differ from the stainless steel bands in that the load may be applied to the band at any point regardless of the fastener's position.
2. Loads may be applied at multiple points on the same band by adding eye links.
3. The load may be applied at any vertical angle.
4. The number of links in the band equals the pole diameter in inches.
5. The band is ordered to fit a 10" diameter pole. Two links must be added to fit a 12" diameter pole.

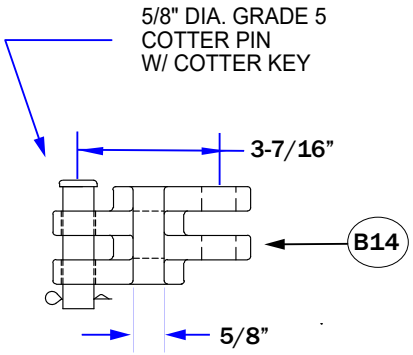
CAUTION NOTE:

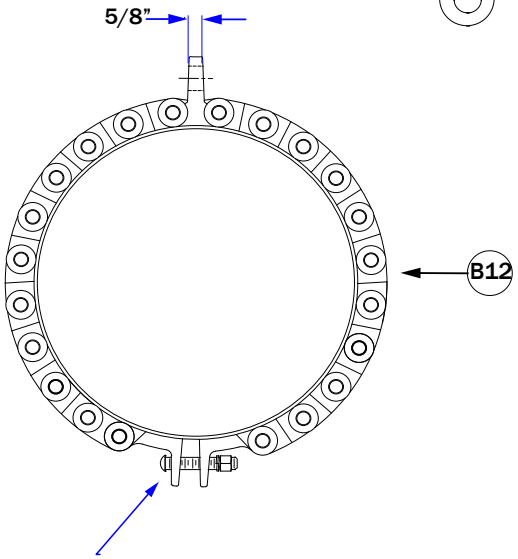
WHILE LOADS MAY BE APPLIED AT MULTIPLE POINTS ALONG THE BAND, THE SUM OF THE LOADS MUST NOT EXCEED THE MAXIMUM LOAD RATING OF THE BAND.

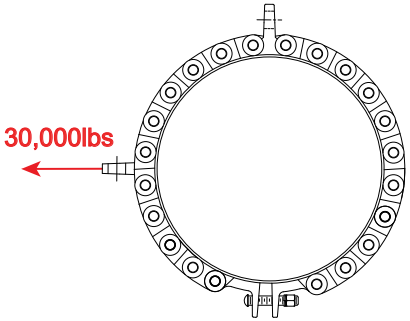












W/ HEX NUTS & LOCKWASHERS
(2) 5/8" X 6" GRADE 5 CARRIAGE BOLTS W/ HEX NUTS & LOCKWASHERS

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

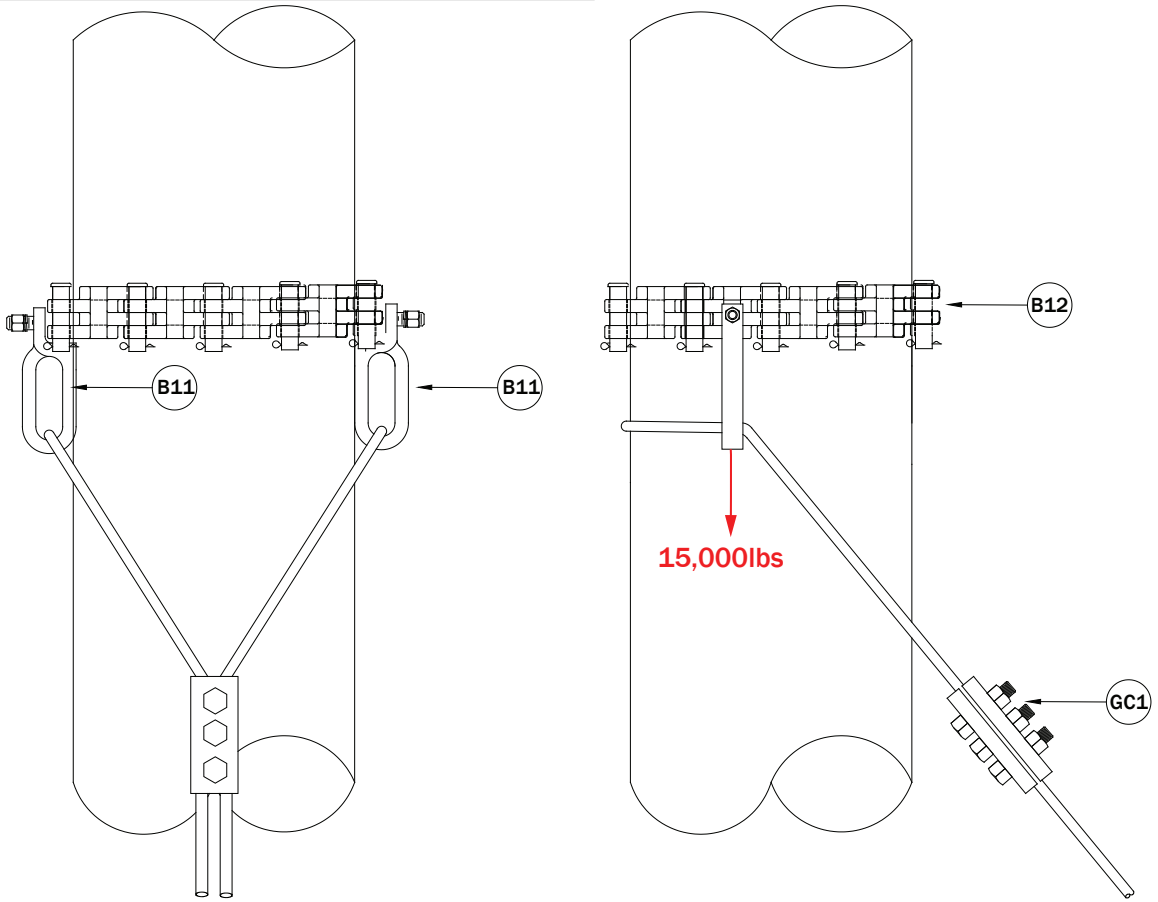
NES

CHAIN BAND
30,000LB MAXIMUM CAPACITY

FRM. CODE	OBAND-30K-G	MAJOR AND MINOR MATERIAL ITEM LIST		
ITEM	QTY	DESCRIPTION	STOCK #	C.U.
B12	1	POLE BAND ASSEMBLY 30,000	183989000	OBAND-30K
B11	2	POLE BAND CLEVE EYE 15,000LB	183989200	OBAND-15K-G
GC1	1	CLAMP GUY 3 BOLT LARGE	220640000	

NOTES

1. Use this installation to apply two guys at the same position.
2. Guy must be wrapped around the pole as shown below. Never dead-end the guy in the celvis-eye.



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

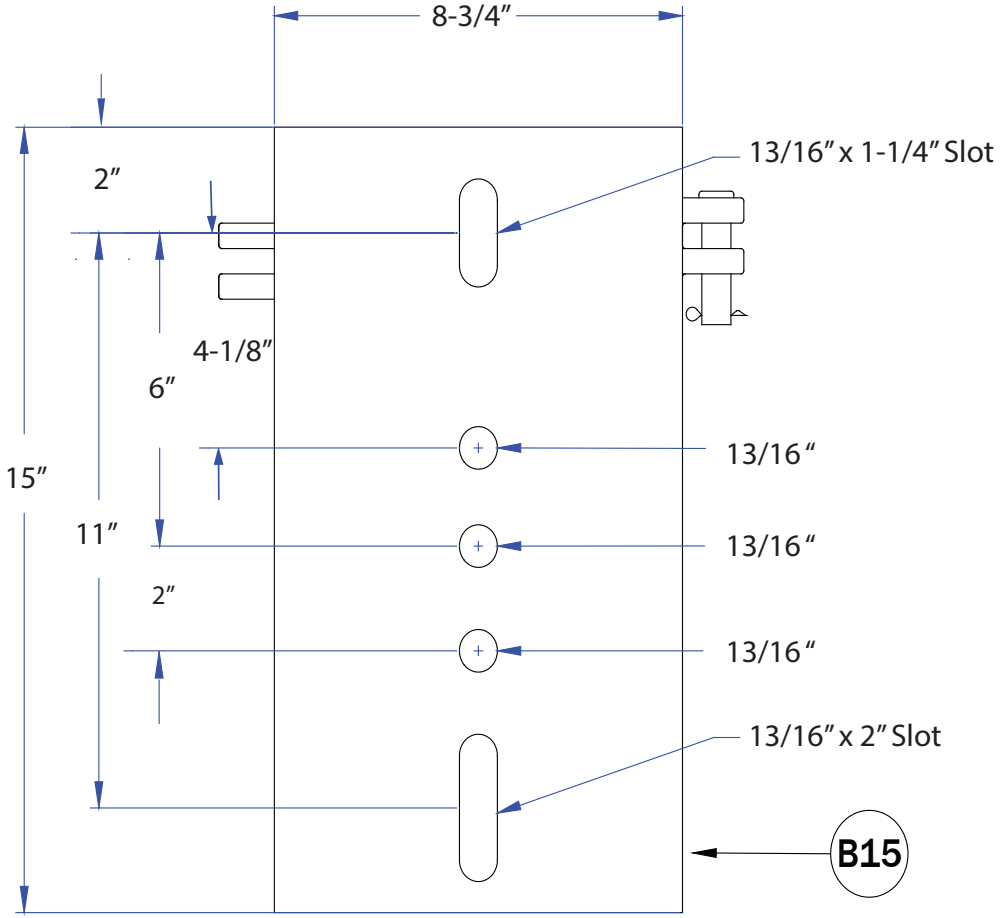
NES

CHAIN BAND GUY WRAP INSTALLATION

FRM. CODE	OBAND-15K-AB	MAJOR AND MINOR MATERIAL ITEM LIST		
ITEM	QTY	DESCRIPTION	STOCK #	C.U.
B8	1	BAND 15K LB WITH EYE LINK FOR 10” DIA POLE	183989000	OBAND-15K
B15	1	POLE BAND ALL PURPOSE BRACKET 15,000LB	183988200	OBAND-15K-B

NOTES

This bracket is suitable for mounting any type of NES equipment that weighs less than 15,000lbs to steel or concrete poles. The equipment hole spacing may require the use of two brackets.



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

CHAIN BAND 15,000LB ALL PURPOSE BRACKET

TRANSMISSION STANDARDS

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
3/23/26	Cedric Short	Ronald Reasonover	Tony Richman
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
NAMING CONVENTION AND GENERAL NOTES	3			
FRAMING INDEX SINGLE ACSR	4			
FRAMING INDEX BUNDLED ACSR	5			
FRAMING INDEX SINGLE ACSS	6			
69kV SUB-TRANSMISSION, SINGLE ACSR CONDUCTOR, FRAMING SECTION	7			
0° TO 15° ANGLE DELTA FRAMING HORIZONTAL POST INSULATORS	8			
0° TO 15° ANGLE TRANSITIONAL FRAMING HORIZONTAL POST INSULATORS	9			
0° TO 15° ANGLE OFFSET FRAMING HORIZONTAL POST INSULATORS	10			
0° TO 20° ANGLE VERTICAL FRAMING HORIZONTAL POST INSULATORS	11			
20° TO 60° ANGLE VERTICAL SUSPENSION INSULATORS	12			
0° TO 60° ANGLE DAVIT ARMS W/ SUSPENSION INSULATORS	13			
0° TO 10° ANGLE DOUBLE DEAD-END	14			
0° TO 10° ANGLE DOUBLE DEAD-END (MTR'LS)	15			
10° TO 60° ANGLE DOUBLE DEAD-END	16			
10° TO 60° ANGLE DOUBLE DEAD-END (MTR'LS)	17			
60° TO 90° ANGLE DOUBLE DEAD-END	18			
60° TO 90° ANGLE DOUBLE DEAD-END (MTR'LS)	19			
60° TO 90° ANGLE DOUBLE DEAD-END USING CHAIN BANDS	20			
60° TO 90° ANGLE DOUBLE DEAD-END USING CHAIN BANDS (MTR'LS)	21			

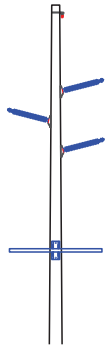
TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
0° TO 10° ANGLE TRANSITIONAL DOUBLE DEAD-END	22			
69 kV SUB-TRANSMISSION, BUNDLED ACSR CONDUCTOR, FRAMING SECTION	23			
0° TO 5° ANGLE DELTA FRAMING BUNDLED CONDUCTOR	24			
0° TO 5° ANGLE VERTICAL FRAMING BUNDLED CONDUCTOR	25			
0° TO 20° ANGLE HORIZONTAL POST INSULATORS BUNDLED CONDUCTOR	26			
20° TO 60° ANGLE SUSPENSION INSULATORS BUNDLED CONDUCTOR	27			
0° TO 60° ANGLE DAVIT ARMS W/ SUSP. INS. BUNDLED CONDUCTOR	28			
0° TO 10° ANGLE DOUBLE DEAD-END BUNDLED CONDUCTOR	29			
0° TO 10° ANGLE DOUBLE DEAD-END BUNDLED CONDUCTOR(MTR'LS)	30			
10° TO 60° ANGLE DOUBLE DEAD-END BUNDLED CONDUCTOR	31			
10° TO 60° ANGLE DOUBLE DEAD-END BUNDLED CONDUCTOR (MTR'LS)	32			
60° TO 90° ANGLE DOUBLE DEAD-END BUNDLED CONDUCTOR	33			
60° TO 90° ANGLE DOUBLE DEAD-END BUNDLED CONDUCTOR (MTR'LS)	34			
60° TO 90° ANGLE DDE BUNDLED CONDUCTOR CHAIN BANDS	35			
60° TO 90° ANGLE DDE BUNDLED CONDUCTOR CHAIN BANDS (MTR'LS)	36			
69 kV SUB-TRANSMISSION, SINGLE ACSS CONDUCTOR, FRAMING SECTION	37			
0° TO 15° ANGLE DELTA FRAMING HORIZONTAL POST INSULATORS	38			
0° TO 20° ANGLE VERTICAL FRAMING HORIZONTAL POST INSULATORS	39			
20° TO 35° ANGLE VERTICAL SUSPENSION INSULATORS	40			
36° TO 60° ANGLE VERTICAL SUSPENSION INSULATORS	41			
0° TO 35° ANGLE DAVIT ARMS W/ SUSPENSION INSULATORS	42			
36° TO 60° ANGLE DAVIT ARMS W/ SUSPENSION INSULATORS	43			
0° TO 10° ANGLE DOUBLE DEAD-END	44			
0° TO 10° ANGLE DOUBLE DEAD-END (MTR'LS)	45			
10° TO 60° ANGLE DOUBLE DEAD-END	46			
10° TO 60° ANGLE DOUBLE DEAD-END (MTR'LS)	47			
60° TO 90° ANGLE DOUBLE DEAD-END	48			
60° TO 90° ANGLE DOUBLE DEAD-END (MTR'LS)	49			

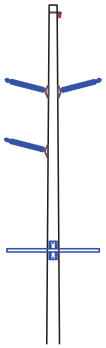
TABLE 1: POLE FRAMING CODES FOR TRANSMISSION SECTION									
SPACE 1 IS ALWAYS (T) FOR TRANSMISSION LINE STRUCTURES									
SPACE 2-3		SPACE 2-3		SPACE 4		SPACE 4		SPACES 5-6	
VOLTAGE		VOLTAGE		LINE CONFIGURATION		LINE CONFIGURATION		FRAMING TYPE	
CODE	DESCRIPTION	CODE	DESCRIPTION	CODE	DESCRIPTION	CODE	DESCRIPTION	CODE	DESCRIPTION
69	69kV	D	DELTA	DA	DAVIT ARM	05	5º ANGLE MAX.	-CT	COOT (795 ACSR)
		T	TRANSITIONAL	DD	DOUBLE DEAD END	10	10º ANGLE MAX.	-CT2	BUNDLED COOT (795 ACSR)
		V	VERTICAL	HP	HORIZONTAL LINE POST	15	15º ANGLE MAX.	-DK	DRAKE (795 ACSS)
				OF	OFFSET FRAMING	20	20º ANGLE MAX.		
				SA	SUSPENSION ANGLE	35	35º ANGLE MAX.		
						60	60º ANGLE MAX.		
						90	90º ANGLE MAX.		
						CB	CHAIN BANDS		

GENERAL NOTES:

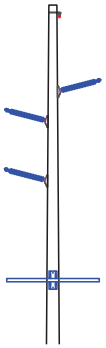
1. **This plate book section only specifies how to frame transmission structures as they are requested on construction drawings. Refer to the appropriate sections of the plate book for instructions on installation of grounding, guys and standard spacing between other lines or objects.**
2. **Use chain bands when the angle of the line does not allow installation of conductors on the flats of the poles.**
3. **The Line Crew may substitute chain bands to reduce drilling at the discretion of the Project Engineer.**
4. **Do not exceed band loading as indicated in the Banding Equipment section of the plate book.**
5. **Refer to the manufacture's instructions for the installation of all connectors and clamps.**
6. **All ACSR hardware and jumpers meet, or exceed, maximum thermal line rating of 100º Celsius (212º Fahrenheit).**
7. **All ACSS hardware and jumpers meet, or exceed, maximum thermal line rating of 250º Celsius (482º Fahrenheit).**
8. **Refer to the Poles, Anchors, and Guying Standards section of the Plate book for guying hardware and materials.**
9. **Refer to the Grounding Specification section of the Plate book. The design of the 69 kV Sub-transmission system insulation and phase spacing is based on achieving 25 Ohms or less grounding resistance at each pole. Interconnection of static to pole ground with neutral grounding preferred to provide multi-grounded neutral system.**



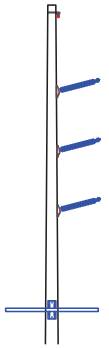
T69DHP15-CT PAGE 8



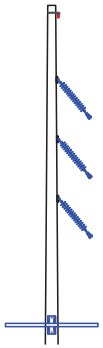
T69THP15-CT PAGE 9



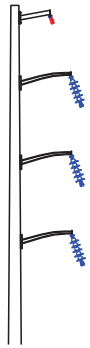
T69TOF15-CT PAGE 10



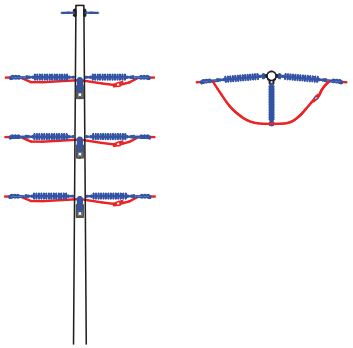
T69VHP15-CT PAGE 11



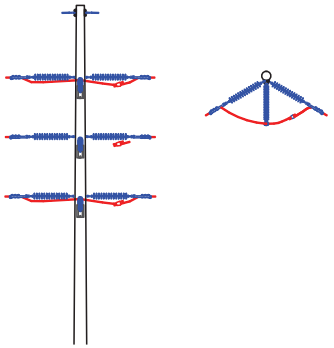
T69VSA60-CT PAGE 12



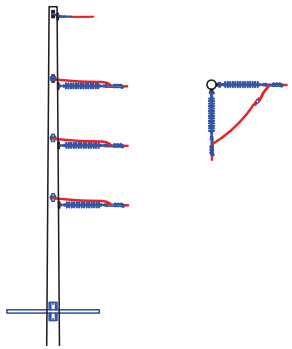
T69VDA60-CT PAGE 13



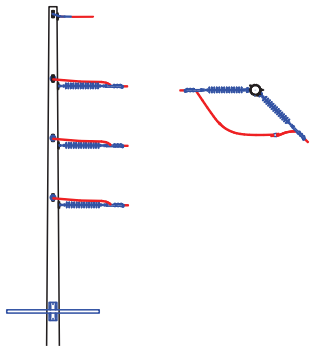
T69VDD10-CT PAGE 14-15



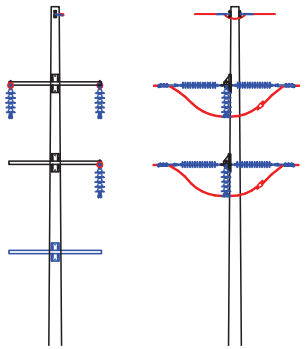
T69VDD60-CT PAGE 16-17



T69VDD90-CT PAGE 18-19



T69VDDCB-CT PAGE 20-21



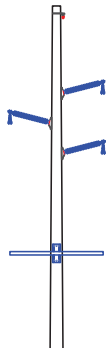
T69TDD10-CT PAGE 22

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

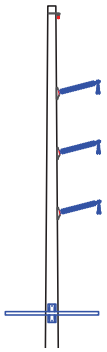
TRANSMISSION STANDARDS

NES

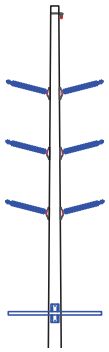
FRAMING INDEX
SINGLE ACSR



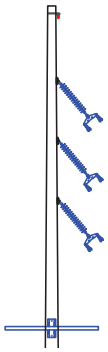
T69DHP05-CT2 PAGE 24



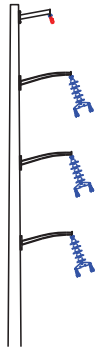
T69VHP05-CT2 PAGE 25



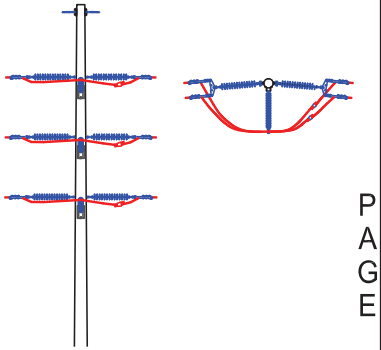
T69VHP20-CT2 PAGE 26



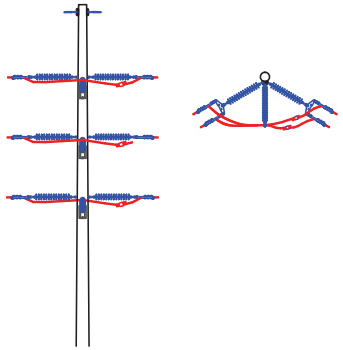
T69VSA60-CT2 PAGE 27



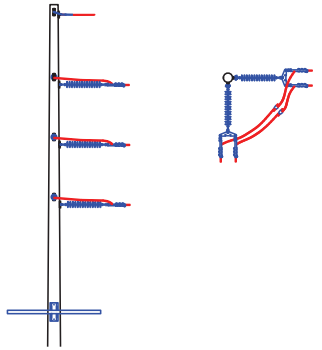
T69VDA60-CT2 PAGE 28



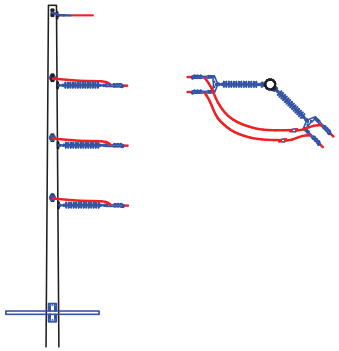
T69VDD10-CT2 PAGE 29-30



T69VDD60-CT2 PAGE 31-32



T69VDD90-CT2 PAGE 33-34

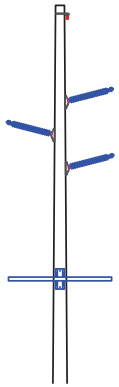


T69VDDCB90-CT2 PAGE 35-36

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

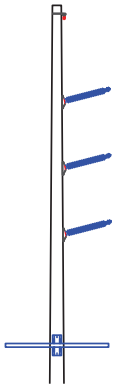
NES

FRAMING INDEX
BUNDLED ACSR



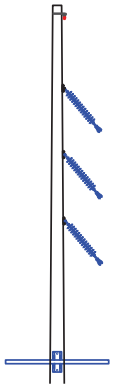
T69DHP15-DK

PAGE 38



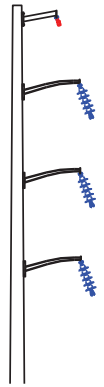
T69VHP20-DK

PAGE 39



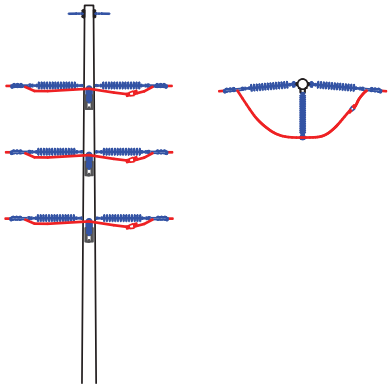
T69VSA35-DK
T69VSA60-DK

PAGE 40-41



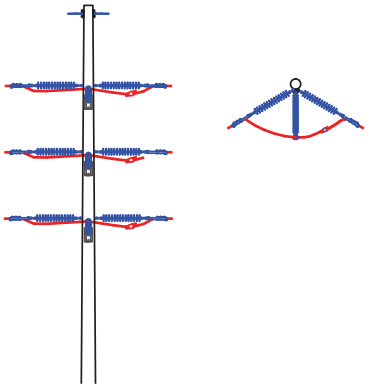
T69VDA35-DK
T69VDA60-DK

PAGE 42-43



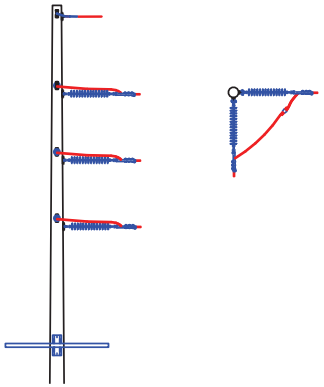
T69VDD10-DK

PAGE 44-45



T69VDD60-DK

PAGE 46-47



T69VDD90-DK

PAGE 48-49

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

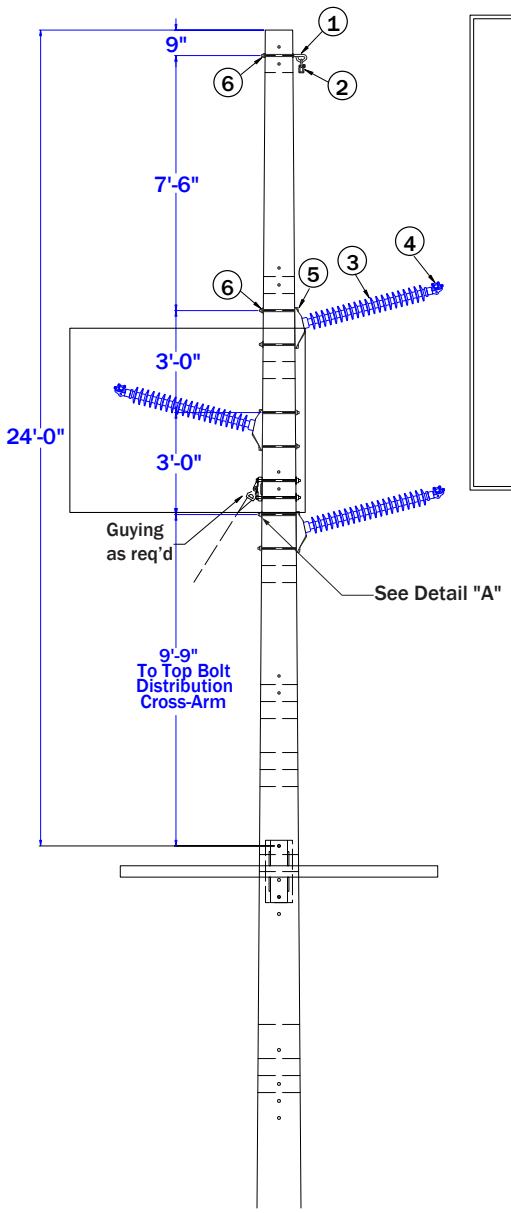
TRANSMISSION STANDARDS

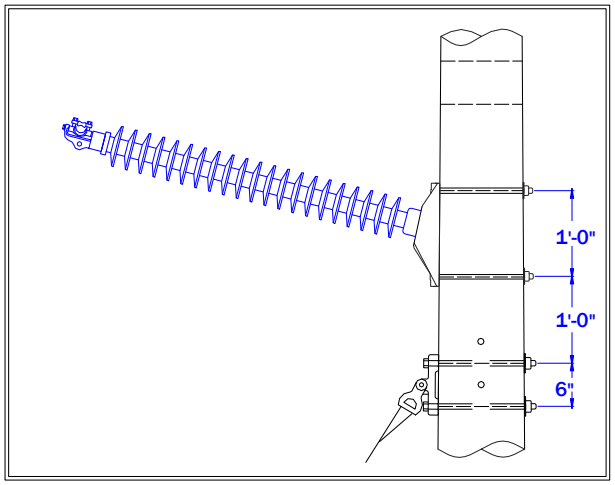
NES

FRAMING INDEX
SINGLE ACSS

69 KV SUB-TRANSMISSION SINGLE ACSR CONDUCTOR FRAMING SECTION

FRM. CODE	T69DHP15-CT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BOLT, OHGW SUPPORT, 3/4" X 14"	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	3	INSUL, HORIZ LINE POST, TRUNNION 115/69 KV	240996000
4	3	CLAMP, TRUNNION, 795 KCM COOT ACSR	221900000
5	6	BOLT, 3/4" MACHINE (VARIOUS LENGTHS)	204_____
6	7	LOCK NUT 3/4" HEX	206270000





DETAIL "A"

ENGINEERING NOTES:
The delta or triangular arrangement of the conductors is the most efficient in terms reducing line losses and maximizing pole space. Use this configuration wherever angle limits and field phase clearances are within design limits.

NOTE

1. Requires 25 Ohms or less grounding resistance at structure.

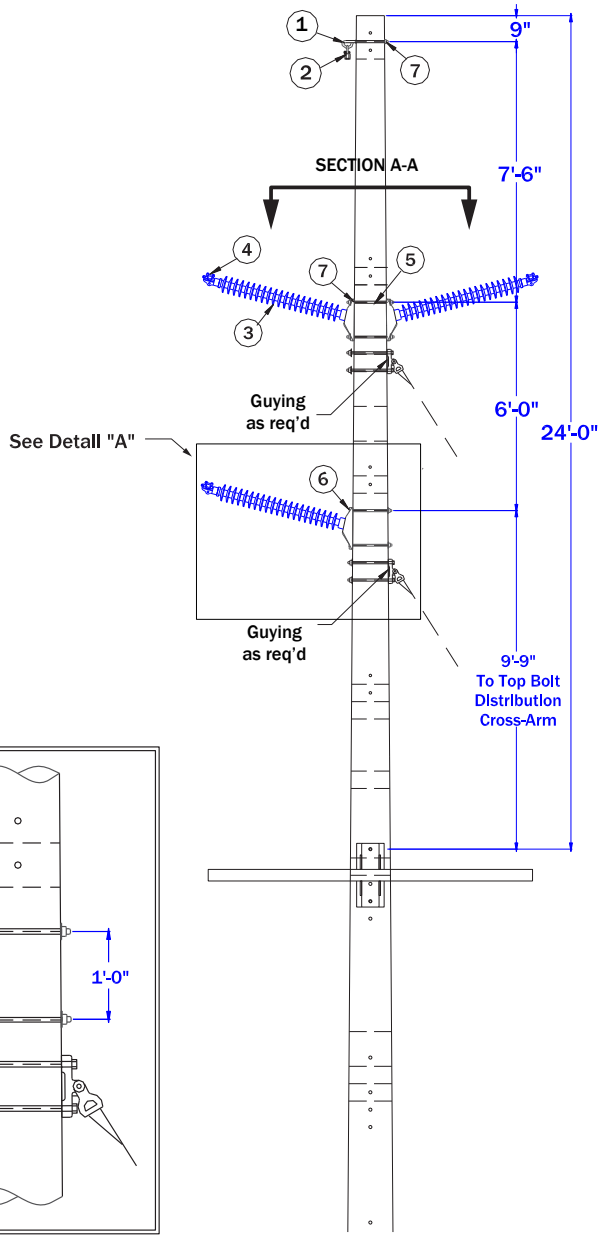
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

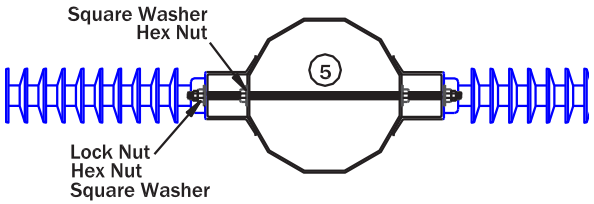
TRANSMISSION STANDARDS

NES

0° TO 15° ANGLE DELTA FRAMING HORIZONTAL POST INSULATORS

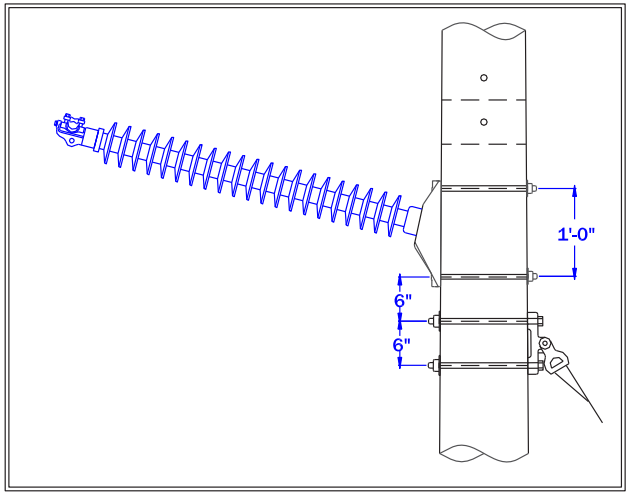
FRM. CODE	T69THP15-CT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BOLT, OHGW SUPPORT, 3/4" X 14"	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	3	INSUL, HORIZ LINE POST, TRUNNION 115/69 KV	240996000
4	3	CLAMP, TRUNNION, 795 KCM COOT ACSR	221900000
5	2	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
6	2	BOLT, 3/4" MACHINE (VARIOUS LENGTHS)	204_____
7	7	LOCK NUT 3/4" HEX	206270000





SECTION "A-A"

DETAIL "A"



NOTE

1. Requires 25 Ohms or less grounding resistance at structure.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

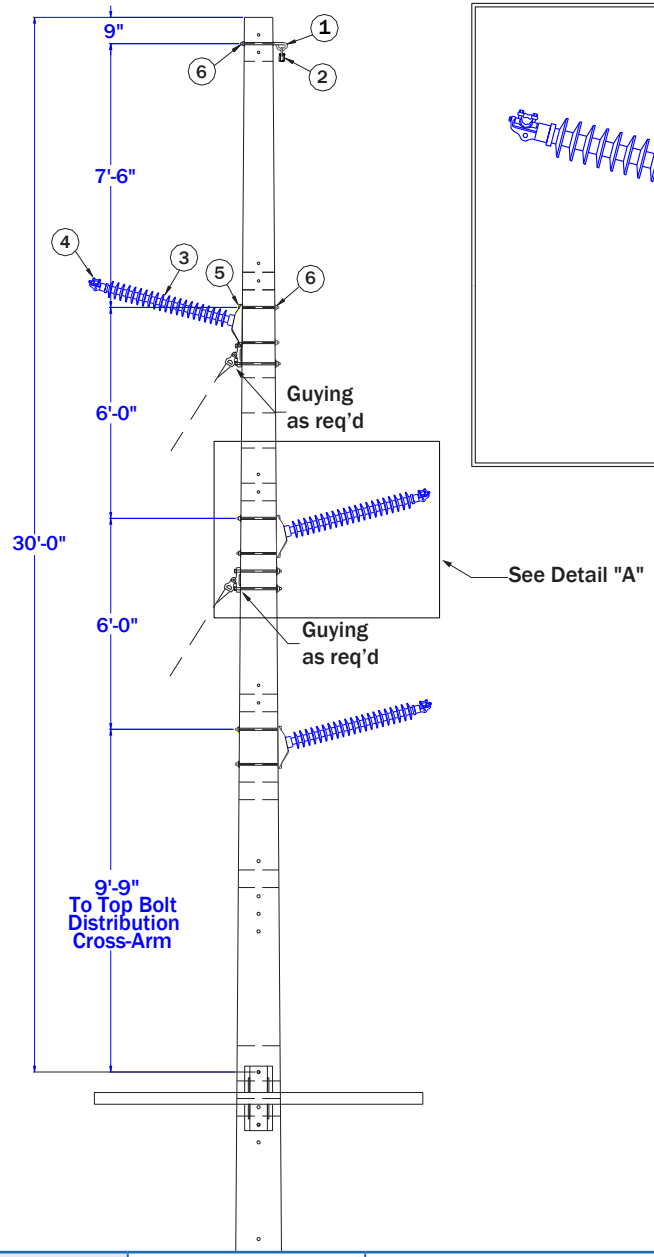
TRANSMISSION STANDARDS

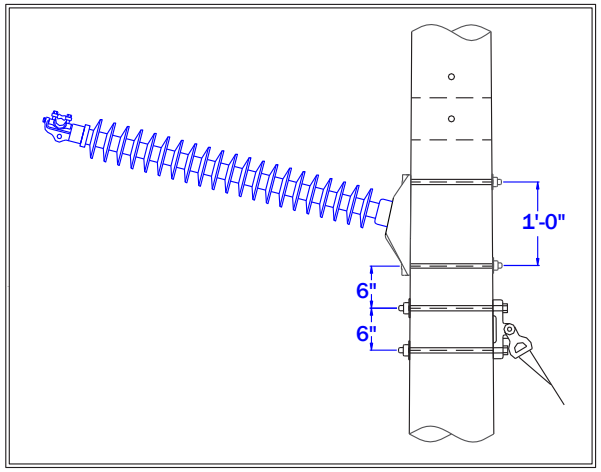
NES

0° TO 15° ANGLE TRANSITIONAL FRAMING HORIZONTAL POST INSULATORS

T69THP15-CT

FRM. CODE	T69TOF15-CT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	**QTY**	**DESCRIPTION**	**STOCK #**
1	1	BOLT, OHGW SUPPORT, 3/4" X 14"	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	3	INSUL, HORIZ LINE POST, TRUNNION 115/69 KV	240996000
4	3	CLAMP, TRUNNION, 795 KCM COOT ACSR	221900000
5	6	BOLT, 3/4" MACHINE (VARIOUS LENGTHS)	204_____
6	7	LOCK NUT 3/4" HEX	206270000





DETAIL "A"

NOTE

1. Requires 25 Ohms or less grounding resistance at structure.

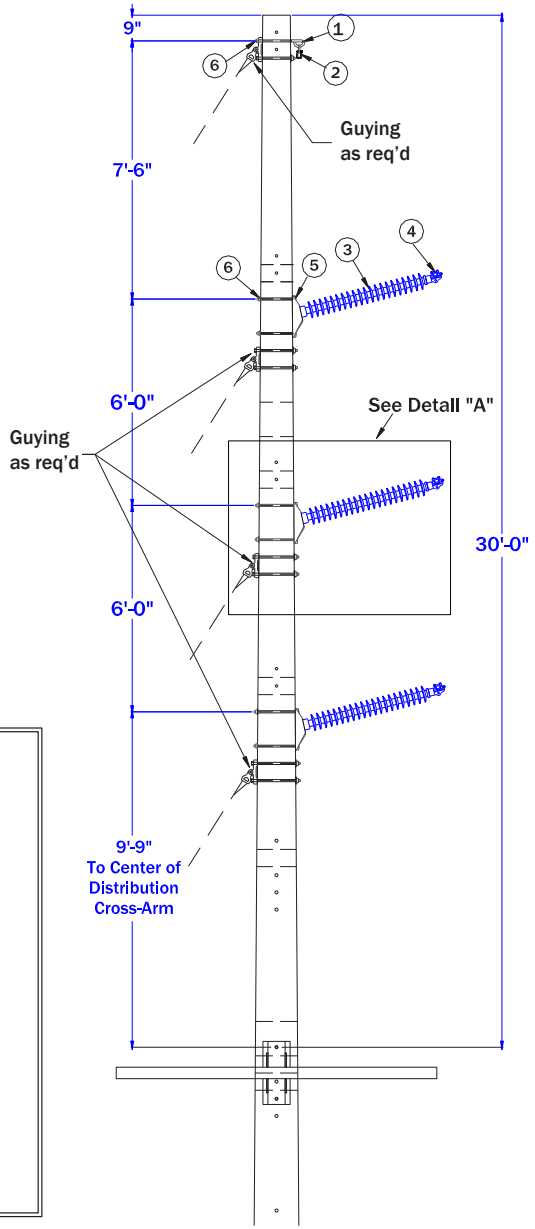
MAINTENANCE ONLY

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

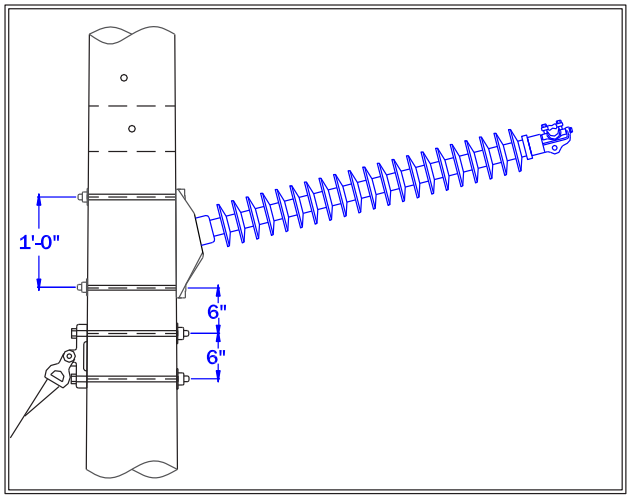
NES

0° TO 15° ANGLE OFFSET FRAMING HORIZONTAL POST INSULATORS

FRM. CODE	T69VHP20-CT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	**QTY**	**DESCRIPTION**	**STOCK #**
1	1	BOLT, OHGW SUPPORT, 3/4” X 14”	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	3	INSUL, HORIZ LINE POST, TRUNNION 115/69 KV	240996000
4	3	CLAMP, TRUNNION, 795 KCM COOT ACSR	221900000
5	6	BOLT, 3/4" MACHINE (VARIOUS LENGTHS)	204_____
6	7	LOCK NUT 3/4" HEX	206270000



DETAIL "A"



NOTE

1. Requires 25 Ohms or less grounding resistance at structure.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

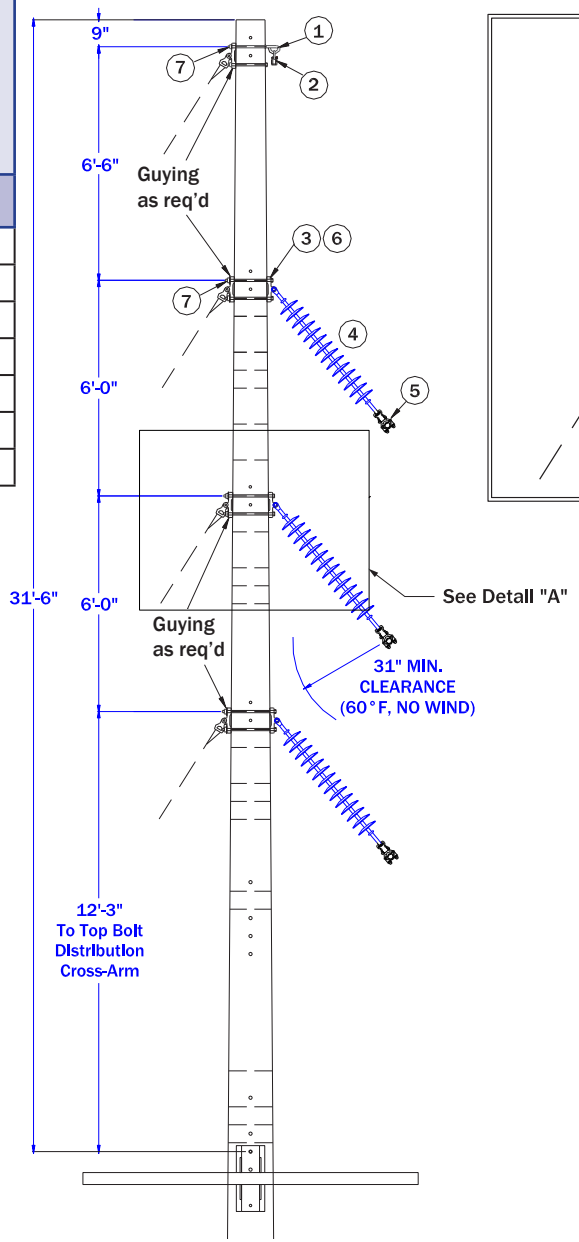
TRANSMISSION STANDARDS

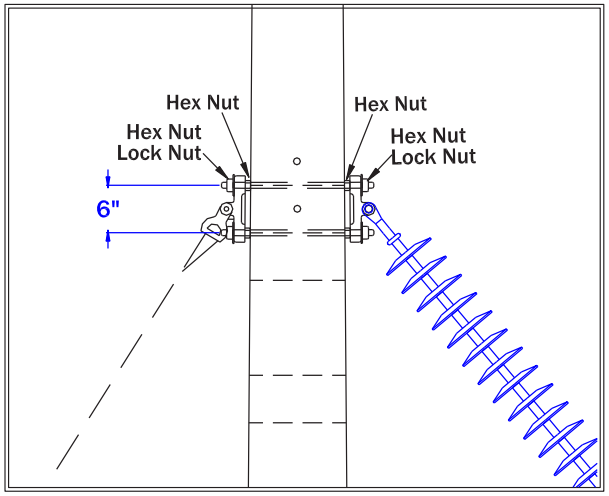
NES

0° TO 20° ANGLE VERTICAL FRAMING HORIZONTAL POST INSULATORS

T69VHP15-CT

FRM. CODE	T69VSA60-CT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BOLT, OHGW SUPPORT, 3/4” X 14”	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	3	DEAD END TEE	230180000
4	3	INSUL, SUSP 115/69KV, Y-CLEVIS/BALL	242758000
5	3	CLAMP, SUSP, 795 KCM COOT ACSR	221620000
6	6	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
7	13	LOCK NUT 3/4" HEX	206270000





DETAIL "A"

NOTE

1. Requires 25 Ohms or less grounding resistance at structure.

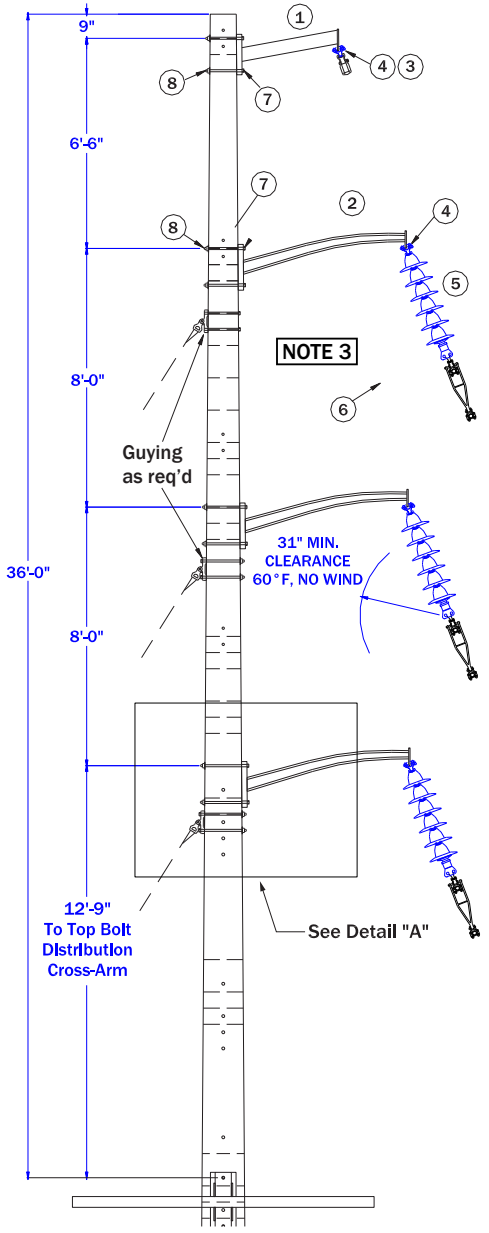
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION STANDARDS

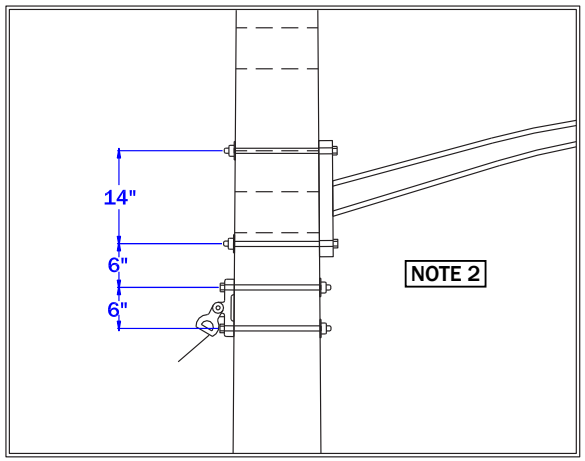
NES

20° TO 60° ANGLE VERTICAL SUSPENSION INSULATORS

FRM. CODE	T69VDA60-CT	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	DAVIT ARM, LIGHT DUTY, 3FT	042010000
2	3	DAVIT ARM, MEDIUM DUTY, 5 FT	042020000
3	1	CLAMP SUSP 2-4/0 AL/CU	221820000
4	4	Y-CLEVIS BALL	181208000
5	18	INSUL, SUSP, 30K, 10" BELL	242730000
6	3	CLAMP, SUSP, 795 KCM COOT ACSR	221620000
7	8	BOLT, MACHINE, 3/4" (VARIOUS LENGTHS)	204_____
8	8	LOCK NUT 3/4" HEX	206270000



DETAIL "A"



NOTE

1. Requires 25 Ohms or less grounding resistance at structure.
2. Banding bottom bolt position allowed on Davit Arms with approval of Engineer.

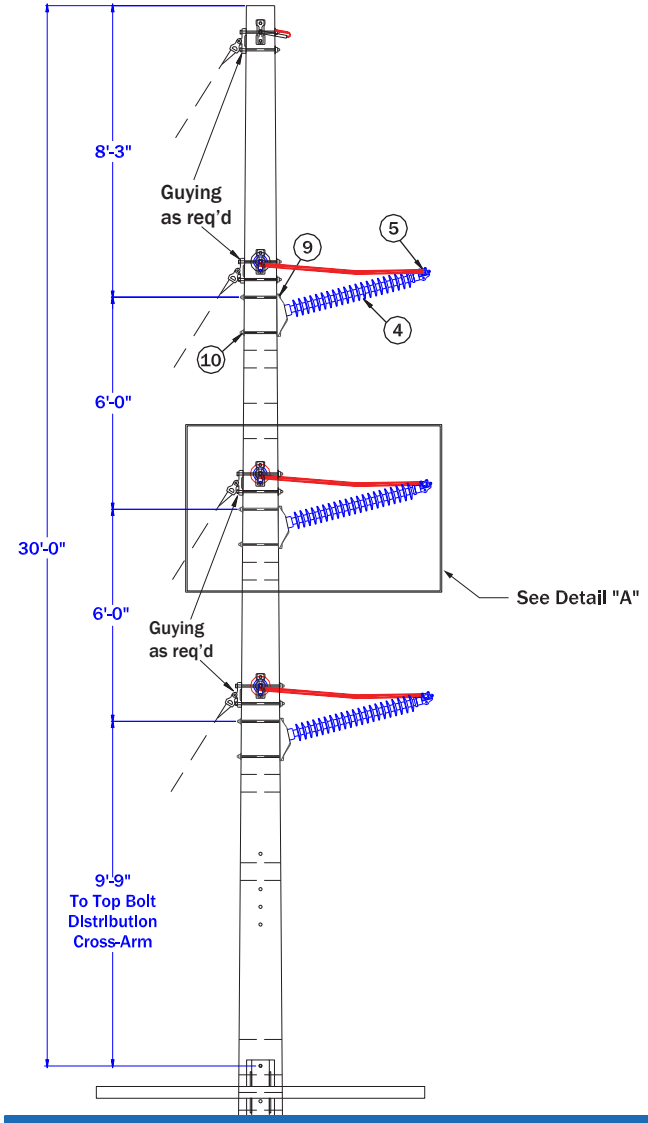
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

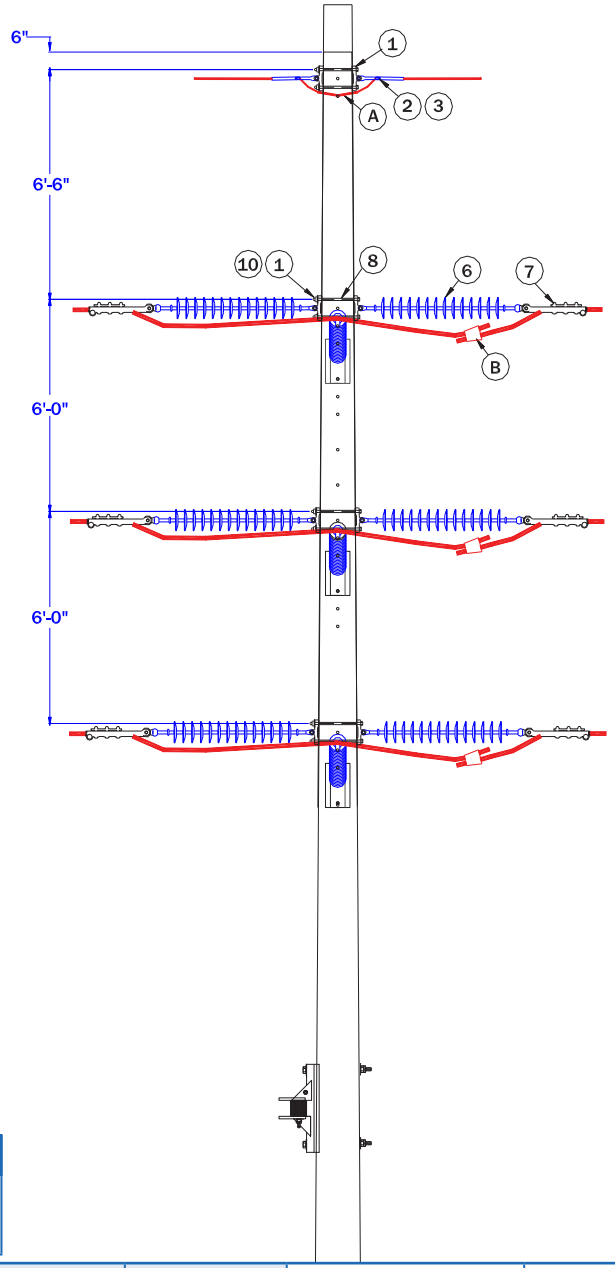
TRANSMISSION STANDARDS

NES

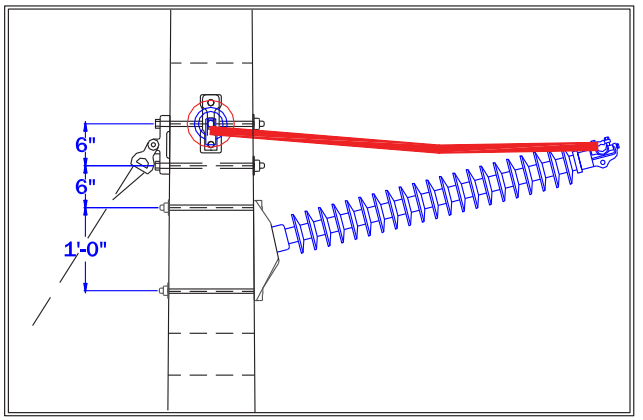
0° TO 60° ANGLE DAVIT ARMS W/ SUSPENSION INSULATORS

T69VDA60-CT





DETAIL "A"



NOTE

1. Requires 25 Ohms or less grounding resistance at structure.
2. See next page for Material Item List

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

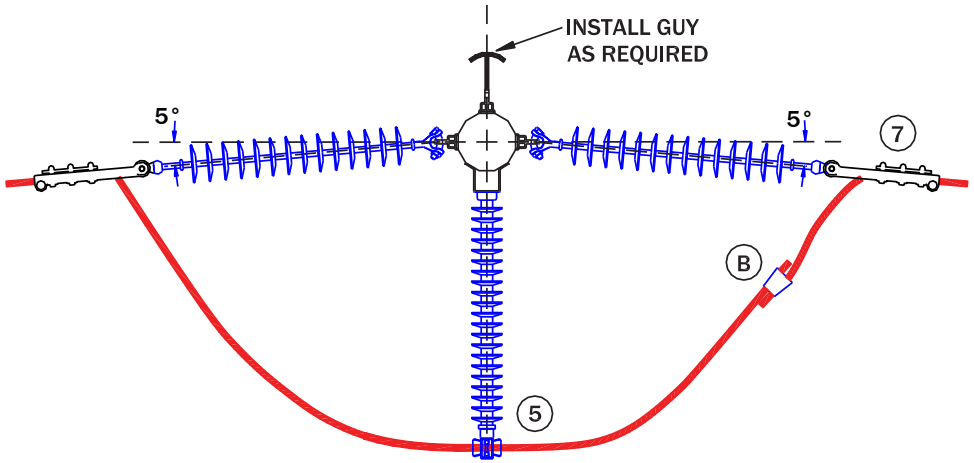
NES

0° TO 10° ANGLE DOUBLE DEAD-END

TRANSMISSION STANDARDS

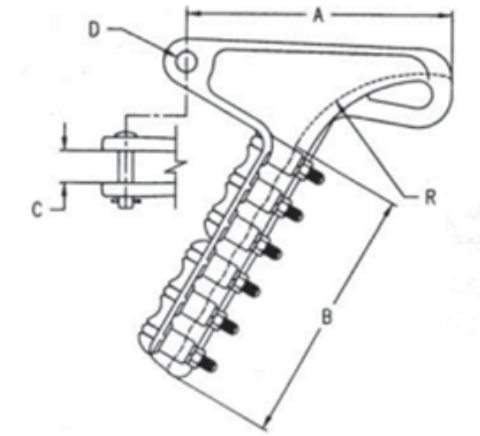
T69VDD10-CT

FRM. CODE	T69VDD10-CT	MAJOR AND MINOR MATERIALS	
ITEM	QTY	DESCRIPTION	STOCK #
1	8	DEAD END TEE	230180000
2	2	Y-CLEVIS BALL	181208000
3	2	CLAMP STRAIN 1/0-4/0	221120000
4	3	INSUL, HORIZ LINE POST, TRUNNION 115/69 KV	240996000
5	3	CLAMP, TRUNNION, 795 KCM COOT ACSR	221900000
6	6	INSUL, SUSP, 115/69KV, Y-CLEVIS/BALL	242758000
7	6	QUADRANT CLAMP STRAIN 795 36/1 ACSR	221100000
8	8	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
9	6	BOLT, 3/4" MACHINE (VARIOUS LENGTHS)	204_____
10	22	LOCK NUT 3/4" HEX	206270000
TRUCK STOCK ITEMS			
ITEM	QTY	DESCRIPTION	STOCK #
A	1	CONNECTOR WEDGE 1/0-1/0	224106000
B	3	CONNECTOR WEDGE 795-795 (DO NOT USE ON ACSS)	224127000



TOP VIEW

QUADRANT STRAIN CLAMP - 795 COOT ACSR					
DIM.	A	B	C	D	R
(IN)	14.31	13.69	1.50	0.75	7.50

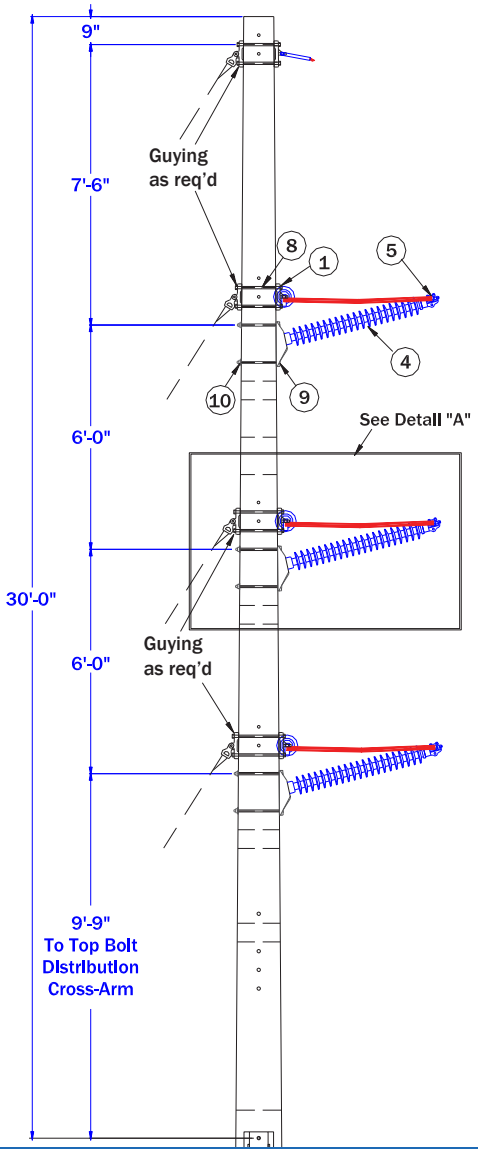


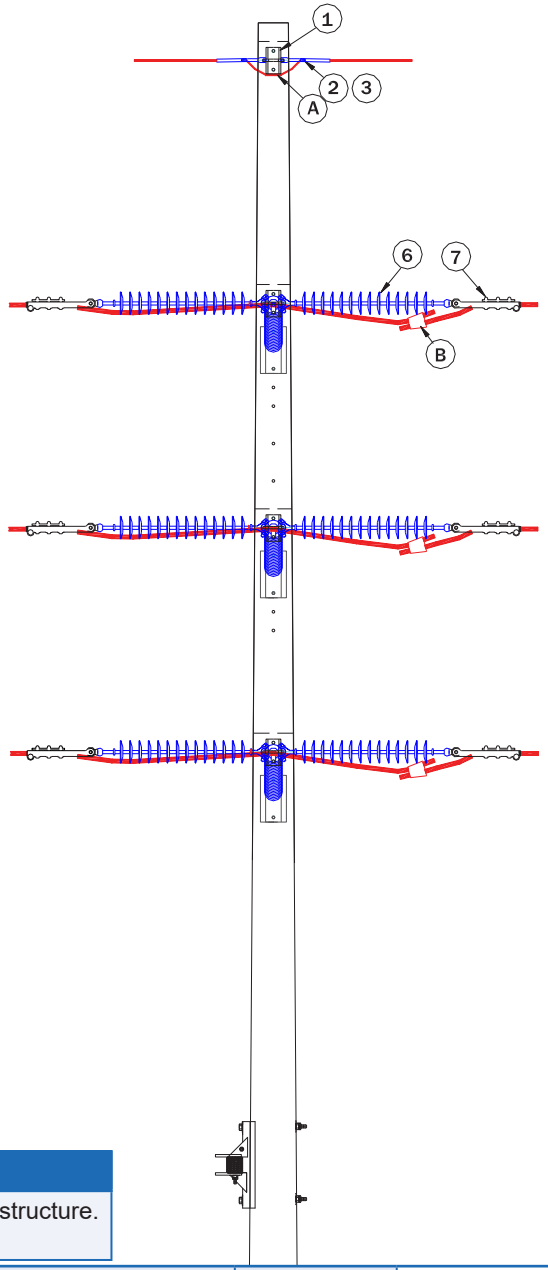
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION STANDARDS

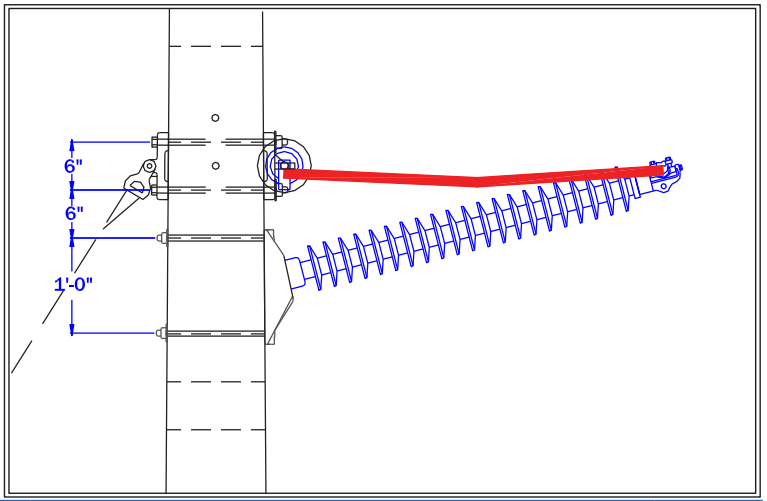
NES

0° TO 10° ANGLE DOUBLE DEAD-END (MTR'LS)





DETAIL "A"



NOTE

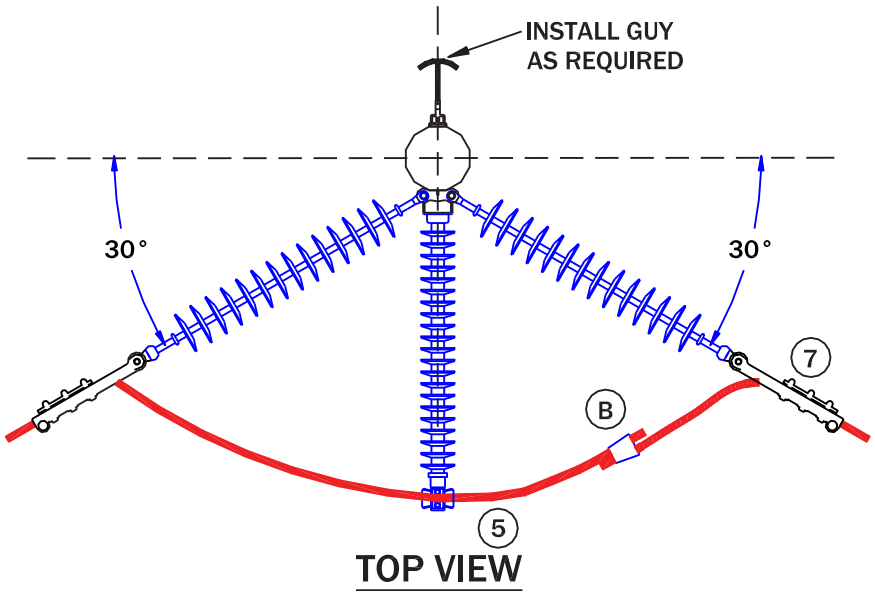
1. Requires 25 Ohms or less grounding resistance at structure.
2. See next page for Material Item List

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

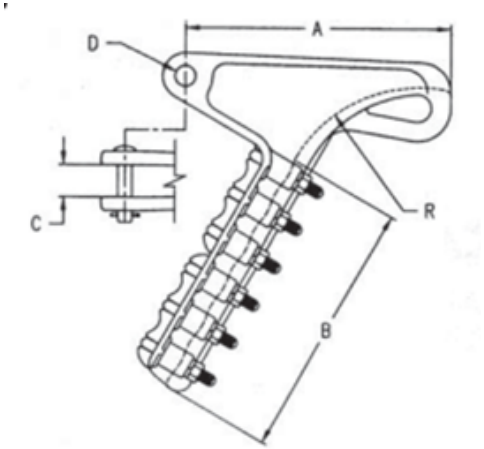
10° TO 60° ANGLE DOUBLE DEAD-END

FRM. CODE	T69VDD60-CT	MAJOR AND MINOR MATERIALS	
ITEM	QTY	DESCRIPTION	STOCK #
1	4	BRACKET, DOUBLE DEAD-END ANGLE	180780000
2	2	Y-CLEVIS BALL	181208000
3	2	CLAMP STRAIN 1/0-4/0	221120000
4	3	INSUL, HORIZ LINE POST, TRUNNION 115/69 KV	240996000
5	3	CLAMP, TRUNNION, 795 KCM COOT ACSR	221900000
6	6	INSUL, SUSP, 115/69KV, Y-CLEVIS/BALL	242758000
7	6	QUADRANT CLAMP STRAIN 795 36/1 ACSR	221100000
8	8	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
9	6	BOLT, 3/4" MACHINE (VARIOUS LENGTHS)	204_____
10	22	LOCK NUT 3/4" HEX	206270000
TRUCK STOCK ITEMS			
ITEM	QTY	DESCRIPTION	STOCK #
A	1	CONNECTOR WEDGE 1/0-1/0	224106000
B	3	CONNECTOR WEDGE 795-795 (DO NOT USE ON ACSS)	224127000



TOP VIEW

QUADRANT STRAIN CLAMP - 795 COOT ACSR					
DIM.	A	B	C	D	R
(IN)	14.31	13.69	1.50	0.75	7.50



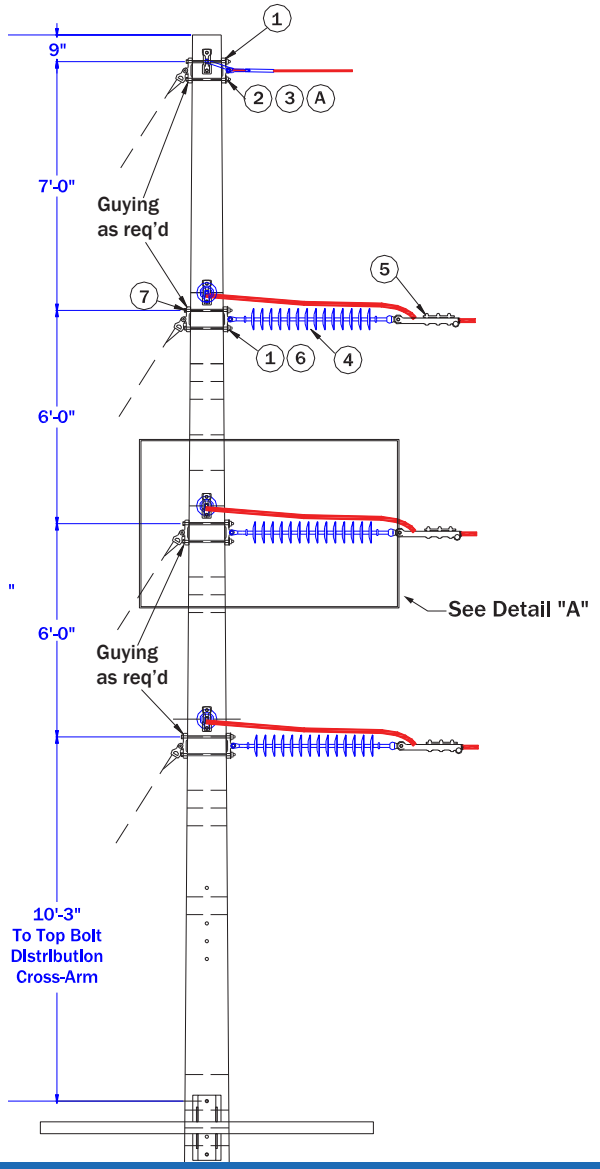
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

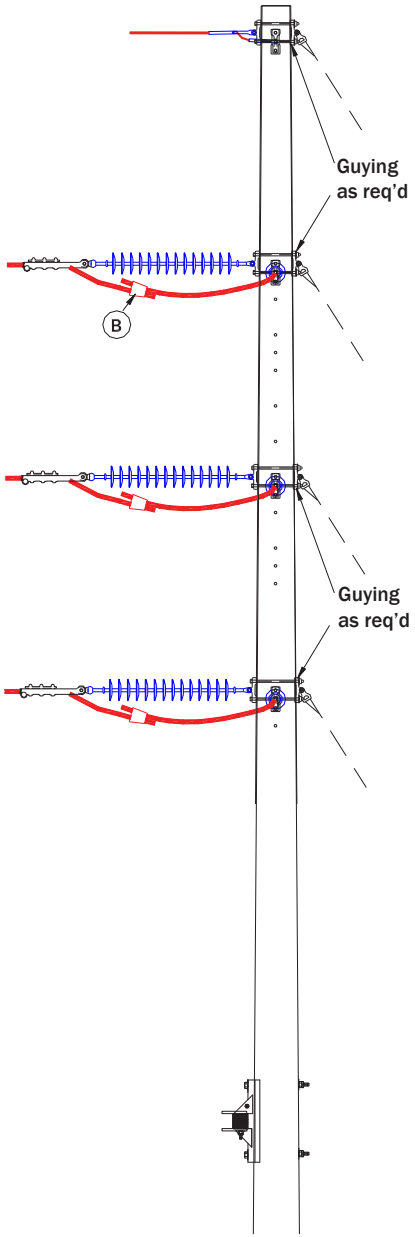
TRANSMISSION STANDARDS

NES

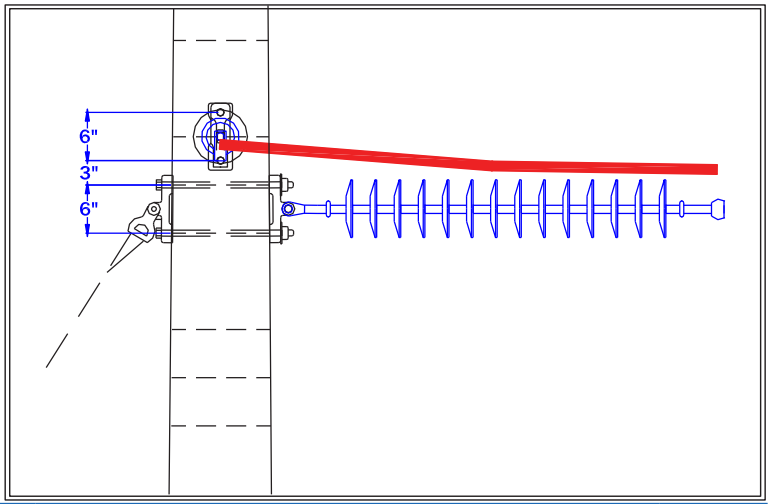
10° TO 60° ANGLE DOUBLE DEAD-END (MTR'LS)

T69VDD60-CT





DETAIL "A"



NOTE

1. Requires 25 Ohms or less grounding resistance at structure.
2. See next page for Material Item List

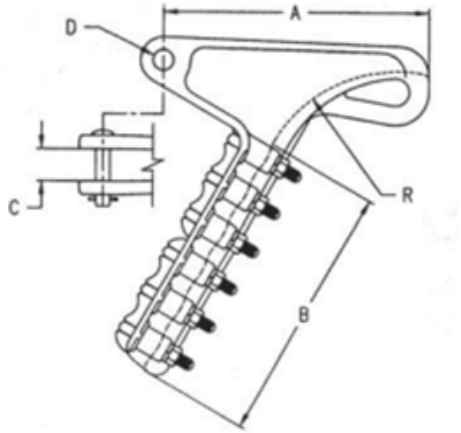
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

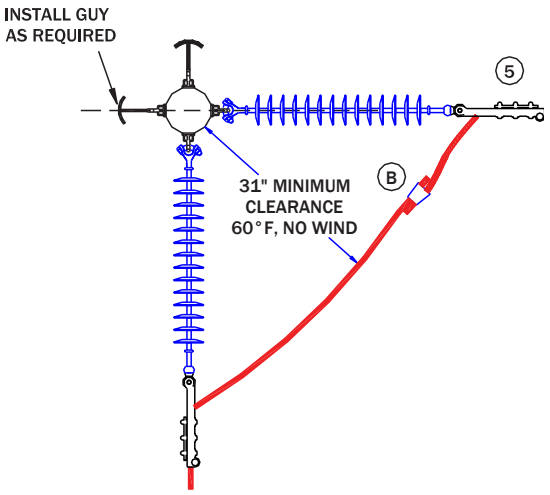
NES

60° TO 90° ANGLE DOUBLE DEAD-END

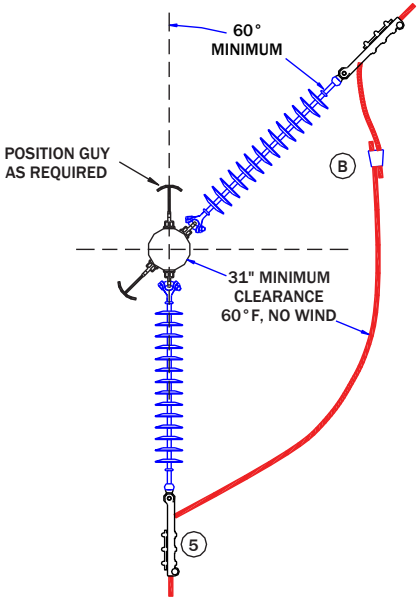
FRM. CODE	T69VDD90-CT	MAJOR AND MINOR MATERIALS	
ITEM	QTY	DESCRIPTION	STOCK #
1	8	DEAD END TEE	230180000
2	2	Y-CLEVIS BALL	181208000
3	2	CLAMP STRAIN 1/0-4/0	221120000
4	6	INSUL, SUSP, 115/69KV, Y-CLEVIS/BALL	242758000
5	6	QUADRANT CLAMP STRAIN 795 36/1 ACSR	221100000
6	16	BOLT, DOUBLE ARMING 3/4" (VARIOUS LENGTHS)	201_____
7	32	LOCK NUT 3/4" HEX	206270000
TRUCK STOCK ITEMS			
ITEM	QTY	DESCRIPTION	STOCK #
A	1	CONNECTOR WEDGE 1/0-1/0	224106000
B	3	CONNECTOR WEDGE 795-795 (DO NOT USE ON ACSS)	224127000

QUADRANT STRAIN CLAMP - 795 COOT ACSR					
DIM.	A	B	C	D	R
(IN)	14.31	13.69	1.50	0.75	7.50





TOP VIEW - 90 ANGLE



TOP VIEW - 60 ANGLE

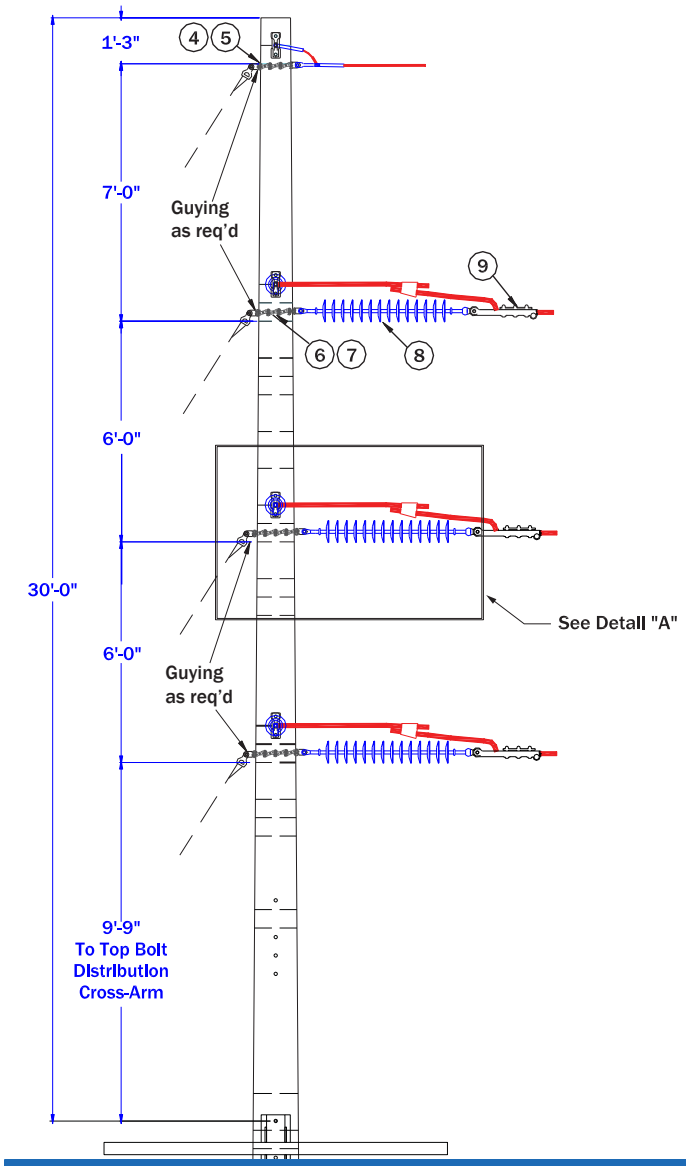
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

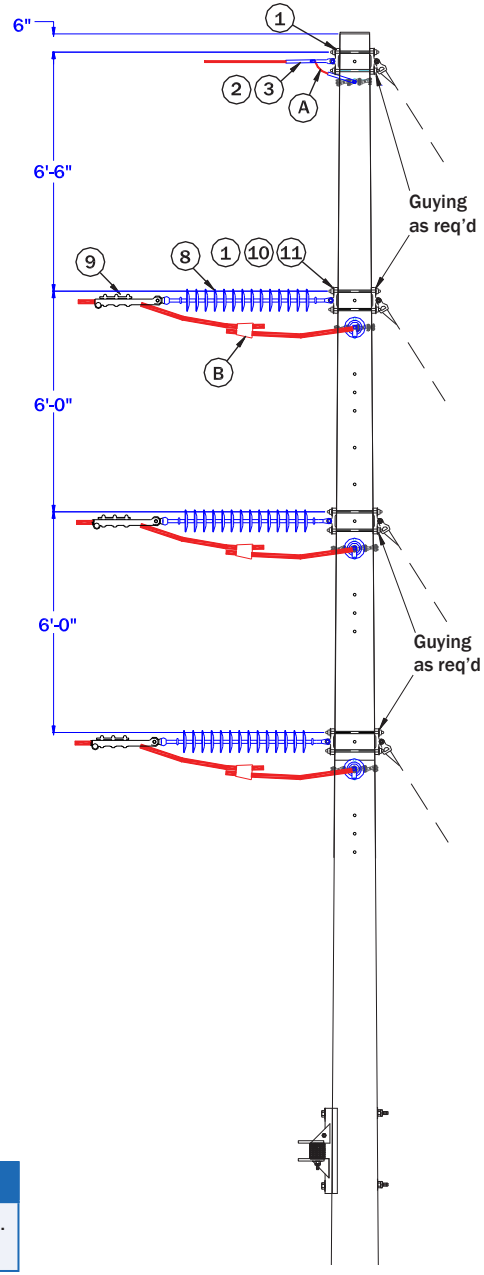
TRANSMISSION STANDARDS

NES

60° TO 90° ANGLE DOUBLE DEAD-END (MTR'LS)

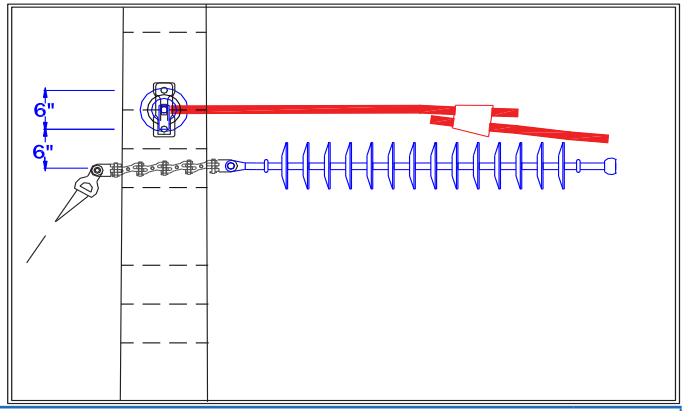
T69VDD90-CT





PREFERRED ON CONCRETE POLES

DETAIL "A"



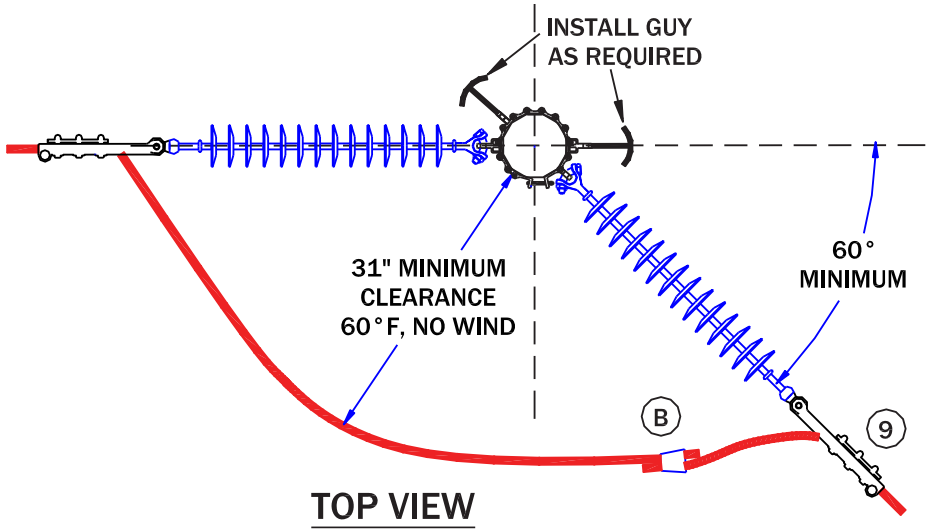
NOTE

1. Requires 25 Ohms or less grounding resistance at structure.
2. See next page for Material Item List

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

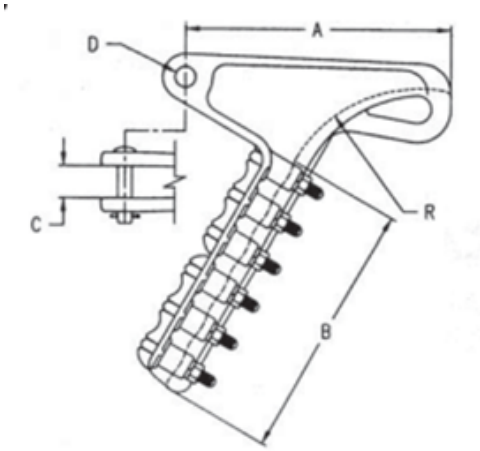
60° TO 90° ANGLE DOUBLE DEAD-END USING CHAIN BANDS

FRM. CODE	T69VDDCB-CT	MAJOR AND MINOR MATERIALS	
ITEM	QTY	DESCRIPTION	STOCK #
1	4	DEAD END TEE	230180000
2	2	Y-CLEVIS BALL	181208000
3	2	CLAMP STRAIN 1/0-4/0	221120000
4	1	POLE BAND ASSEMBLY, 15,000 LB	183988000
5	1	POLE BAND EYE LINK, 15,000 LB	183988400
6	3	POLE BAND ASSEMBLY, 30,000 LB	183989000
7	3	POLE BAND EYE LINK, 30,000 LB	183989200
8	6	INSUL, SUSP, 115/69KV, Y-CLEVIS/BALL	242758000
9	6	QUADRANT CLAMP STRAIN 795 36/1 ACSR	221100000
10	8	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
11	16	LOCK NUT 3/4" HEX	206270000
TRUCK STOCK ITEMS			
ITEM	QTY	DESCRIPTION	STOCK #
A	1	CONNECTOR WEDGE 1/0-1/0	224106000
B	3	CONNECTOR WEDGE 795-795 (DO NOT USE ON ACSS)	224127000



TOP VIEW

QUADRANT STRAIN CLAMP - 795 COOT ACSR					
DIM.	A	B	C	D	R
(IN)	14.31	13.69	1.50	0.75	7.50



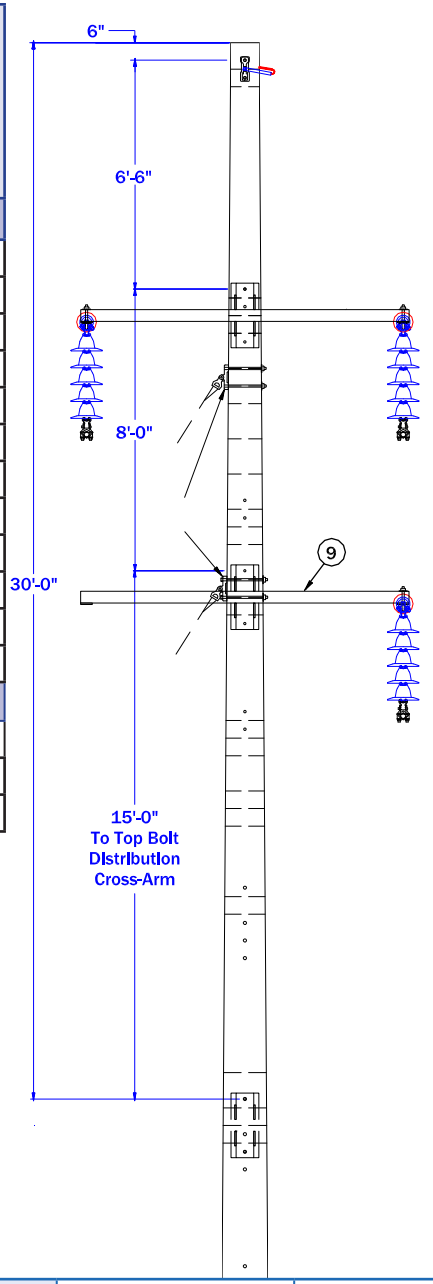
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

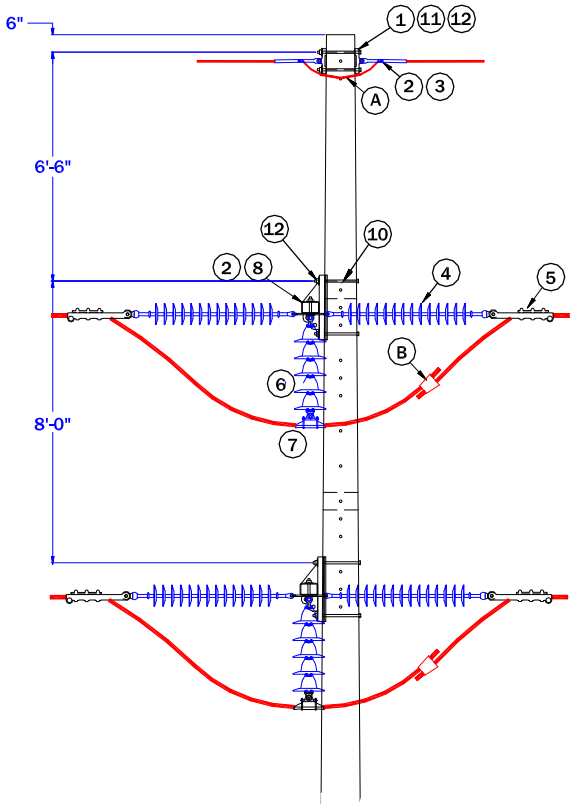
TRANSMISSION STANDARDS

NES

60° TO 90° ANGLE DOUBLE DEAD-END USING CHAIN BANDS (MTR'LS)

FRM. CODE	T69TD10-CT	MAJOR AND MINOR MATERIALS	
ITEM	QTY	DESCRIPTION	STOCK #
1	2	DEAD END TEE	230180000
2	5	Y-CLEVIS BALL	181208000
3	2	CLAMP STRAIN 1/0-4/0	221120000
4	6	INSUL, SUSP, 115/69KV, Y-CLEVIS/BALL	242758000
5	6	CLAMP, STRAIN, 795 KCM COOT ACSR	221080000
6	15	INSUL, SUSP, 30K, 10" BELL	242730000
7	3	CLAMP, SUSP, 795 KCM COOT ACSR	221620000
8	3	EYEBOLT, D.A., 3/4" X 8"	202600000
9	2	X-ARM STEEL 4 X 6 X 9'-4"	040755000
10	4	BOLT, 3/4" MACHINE (VARIOUS LENGTHS)	204_____
11	2	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
12	8	LOCK NUT 3/4" HEX	206270000
TRUCK STOCK ITEMS			
ITEM	QTY	DESCRIPTION	STOCK #
A	1	CONNECTOR WEDGE 1/0-1/0	224106000
B	3	CONNECTOR WEDGE 795-795 (DO NOT USE ON ACSS)	224127000





NOTE

1. Requires 25 Ohms or less grounding resistance at structure.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION STANDARDS

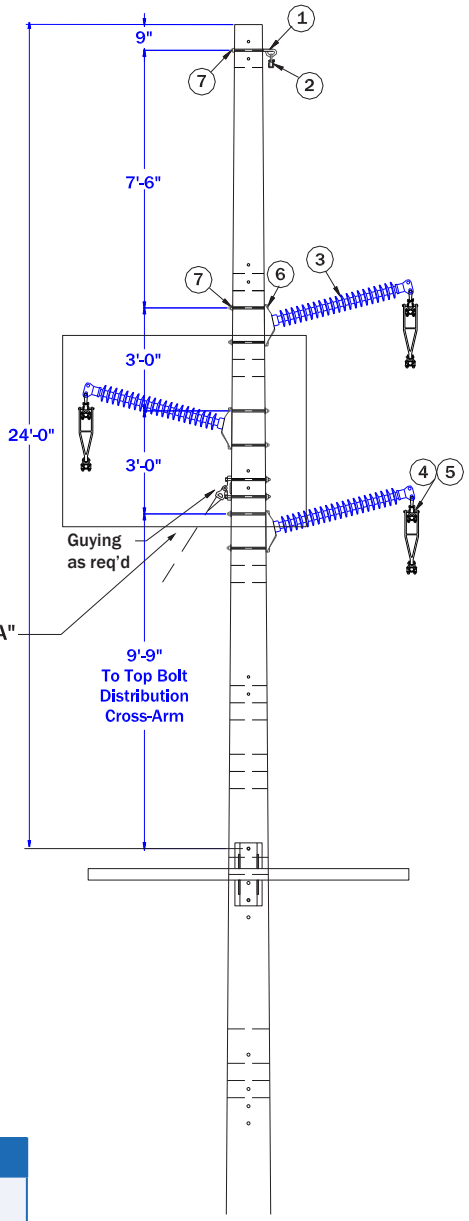
NES

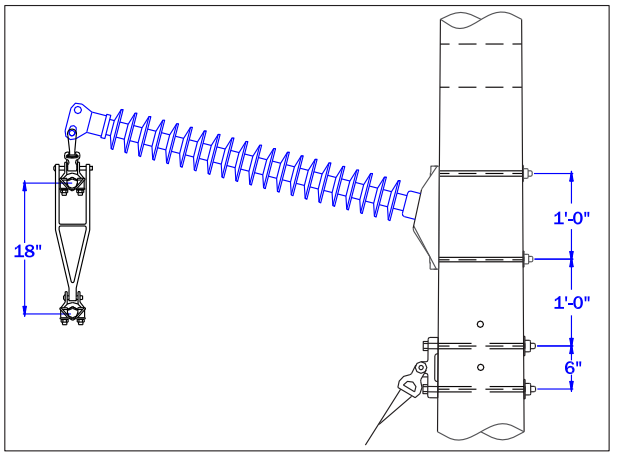
0° TO 10° ANGLE TRANSITIONAL DOUBLE DEAD-END

T69TDD10-CT

69 KV SUB-TRANSMISSION BUNDLED ACSR CONDUCTOR FRAMING SECTION

FRM. CODE	T69DHP05-CT2	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BOLT, OHGW SUPPORT, 3/4” X 14”	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	3	INSUL, HORIZ LINE POST, BLADE 115/69 KV	240995000
4	3	Y-CLEVIS BALL	181208000
5	3	CLAMP SUSP ASSY 795 KCM COOT W/ VERT YOKE	221640000
6	6	BOLT, 3/4” MACHINE (VARIOUS LENGTHS)	
7	7	LOCK NUT 3/4" HEX	206270000





DETAIL "A"

NOTE

1. The delta or triangular arrangement of the conductors is the most efficient in terms reducing line losses and maximizing pole space. Use this configuration wherever angle limits and field phase clearances are within design limits.

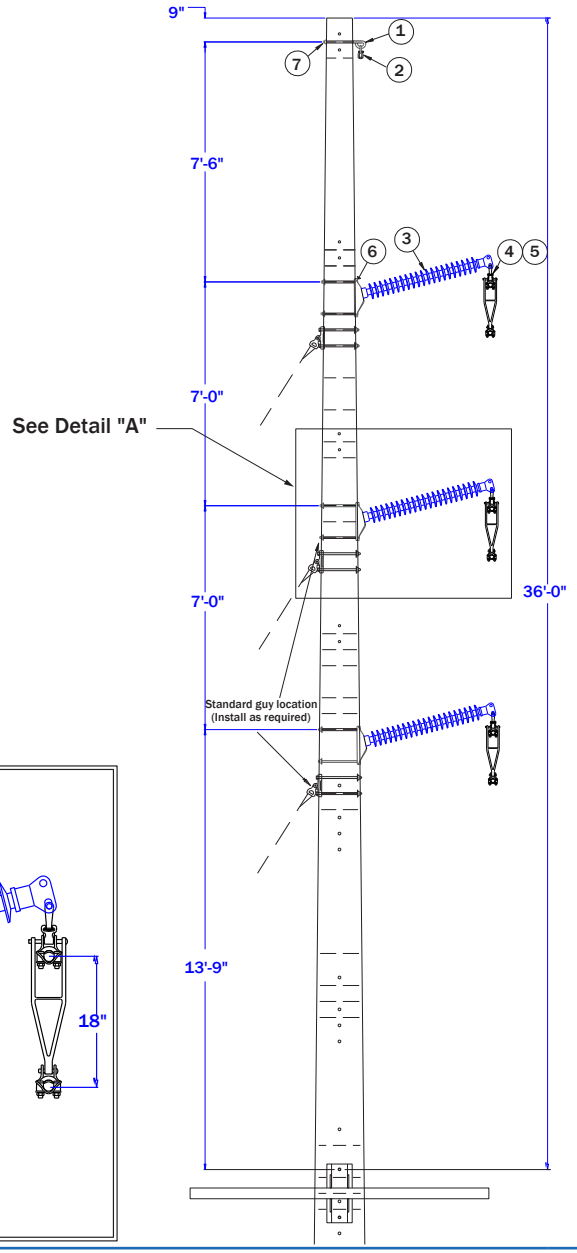
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION STANDARDS

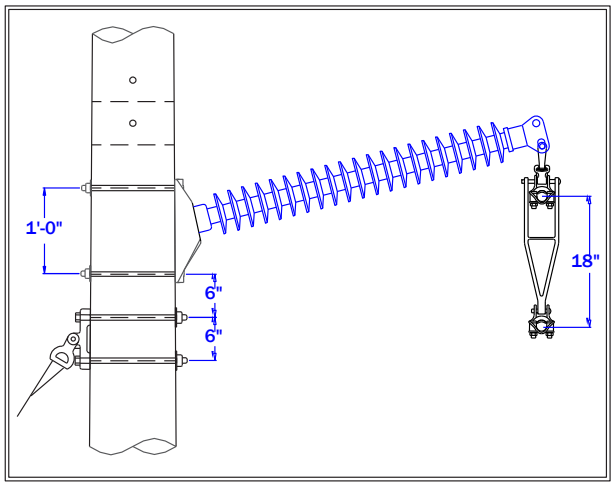
NES

0° TO 5° ANGLE DELTA FRAMING BUNDLED CONDUCTOR

FRM. CODE	T69VHP05-CT2	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BOLT, OHGW SUPPORT, 3/4” X 14”	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	3	INSUL, HORIZ LINE POST, BLADE 115/69 KV	240995000
4	3	Y-CLEVIS BALL	181208000
5	3	CLAMP SUSP ASSY 795 KCM COOT W/ VERT YOKE	221640000
6	6	BOLT, 3/4” MACHINE (VARIOUS LENGTHS)	204_____
7	7	LOCK NUT 3/4" HEX	206270000



DETAIL "A"



NOTE

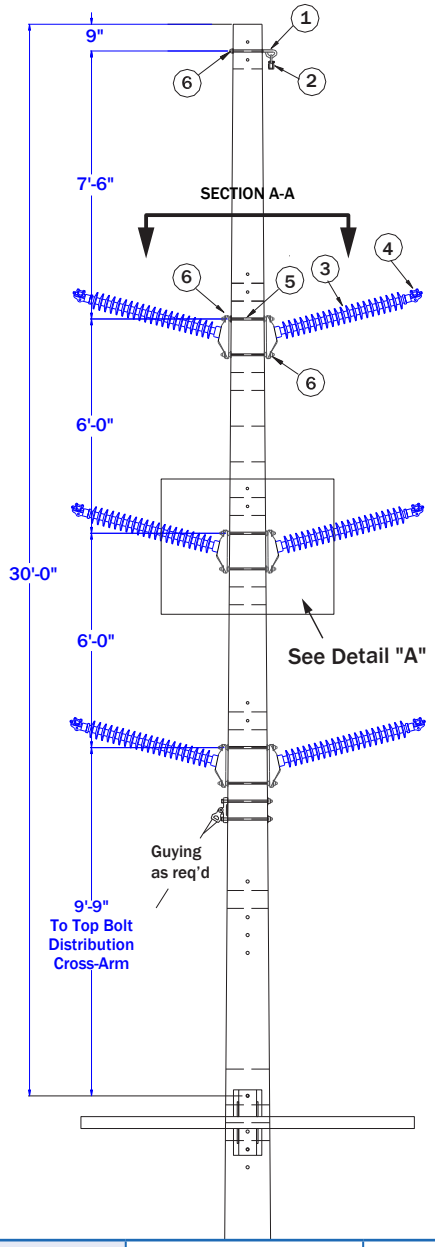
1. Requires 25 Ohms or less grounding resistance at structure.

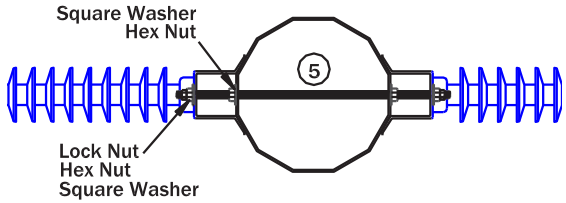
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

0° TO 5° ANGLE VERTICAL FRAMING BUNDLED CONDUCTOR

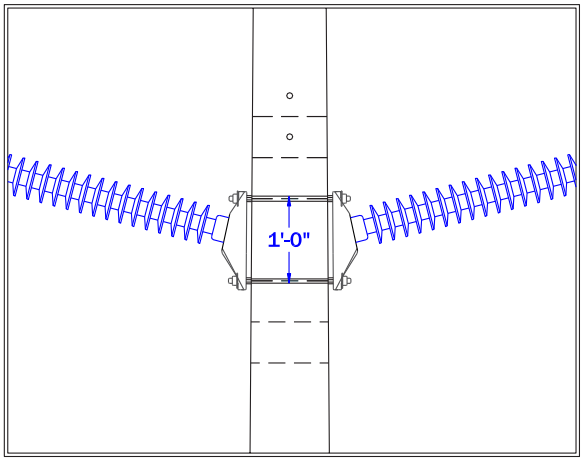
FRM. CODE	T69VHP20-CT2	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BOLT, OHGW SUPPORT, 3/4" X 14"	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	6	INSUL, HORIZ LINE POST, TRUNNION 115/69 KV	240996000
4	6	CLAMP, TRUNNION, 795 KCM COOT ACSR	221900000
5	6	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
6	13	LOCK NUT 3/4" HEX	206270000





SECTION "A-A"

DETAIL "A"



MAINTENANCE ONLY

NOTE

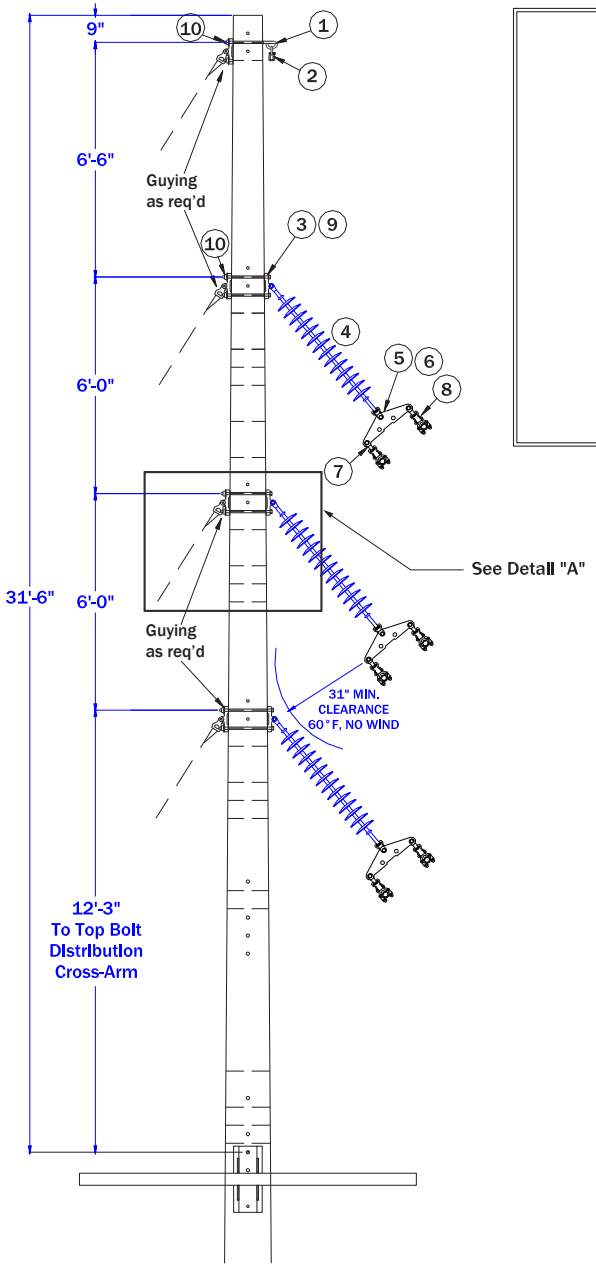
1. Requires 25 Ohms or less grounding resistance at structure.

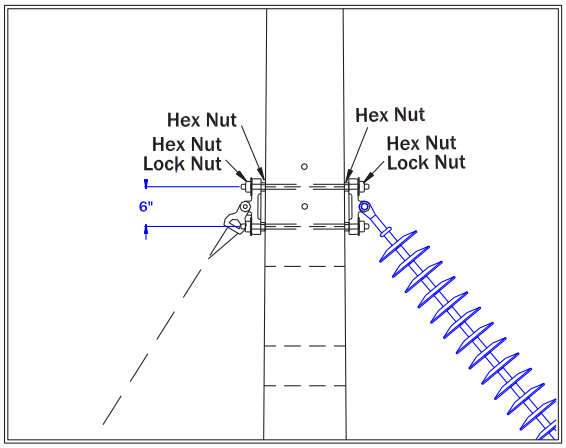
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

0° TO 20° ANGLE HORIZONTAL POST INSULATORS BUNDLED CONDUCTOR

FRM. CODE	T69VSA60-CT2	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BOLT, OHGW SUPPORT, 3/4" X 14"	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	3	DEAD END TEE	230180000
4	3	INSUL, SUSP 115/69KV, Y-CLEVIS/BALL	242758000
5	3	Y-CLEVIS SOCKET, 30,000LB	181212000
6	3	YOKE PLATE	183970000
7	6	Y-CLEVIS BALL	181208000
8	6	CLAMP, SUSP, 795 KCM COOT ACSR	221620000
9	6	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
10	13	LOCK NUT 3/4" HEX	206270000





DETAIL "A"

NOTE

1. Requires 25 Ohms or less grounding resistance at structure.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

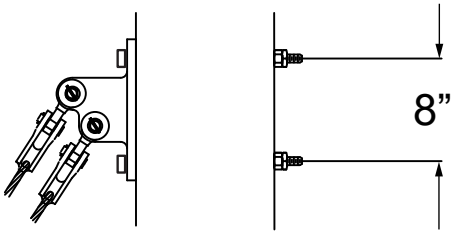
TRANSMISSION STANDARDS

NES

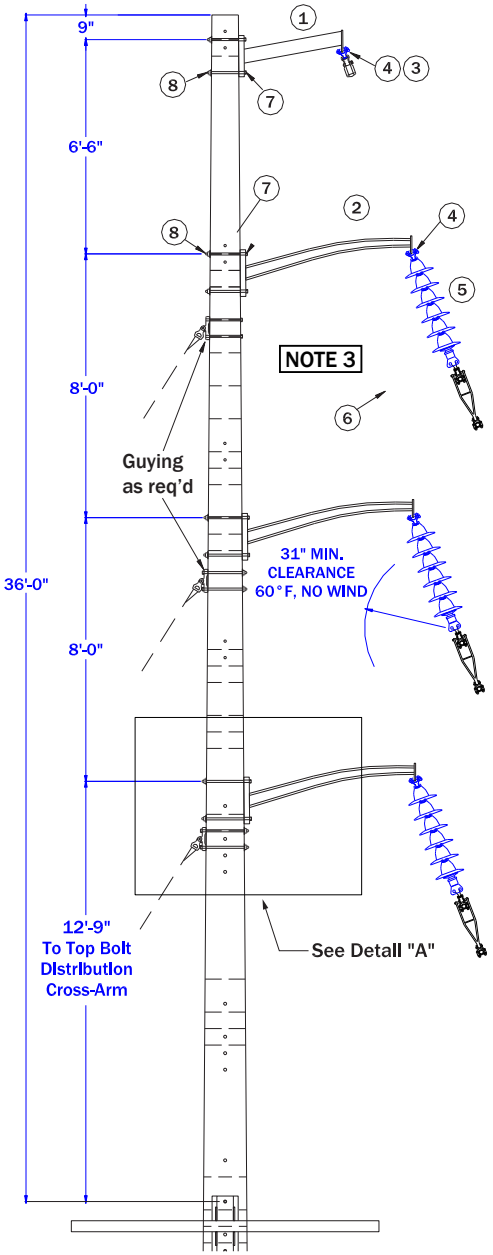
20° TO 60° ANGLE SUSPENSION INSULATORS BUNDLED CONDUCTOR

FRM. CODE	T69VDA60-CT2	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	DAVIT ARM, LIGHT DUTY, 3 FT	042010000
2	3	DAVIT ARM, MEDIUM DUTY, 5 FT	042020000
3	1	CLAMP SUSP 2-4/0 AL/CU	221820000
4	18	INSUL, SUSP, 30K, 10" BELL	242730000
5	3	Y-CLEVIS SOCKET, 30,000LB	181212000
6	3	YOKE PLATE	183970000
7	7	Y-CLEVIS BALL	181208000
8	6	CLAMP, SUSP, 795 KCM COOT ACSR	221620000
9	8	BOLT, MACHINE, 3/4" (VARIOUS LENGTHS)	204_____
10	8	LOCK NUT 3/4" HEX	206270000

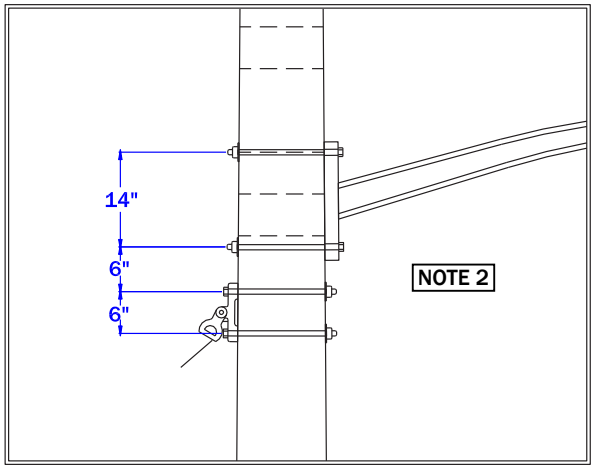
NOTE 3
CAUTION: ALTERNATE DOUBLE GUYING TEE MOUNTS USING 1-INCH DIA. HIGH STRENGTH A325 BOLTS



OGD12DBL



DETAIL "A"



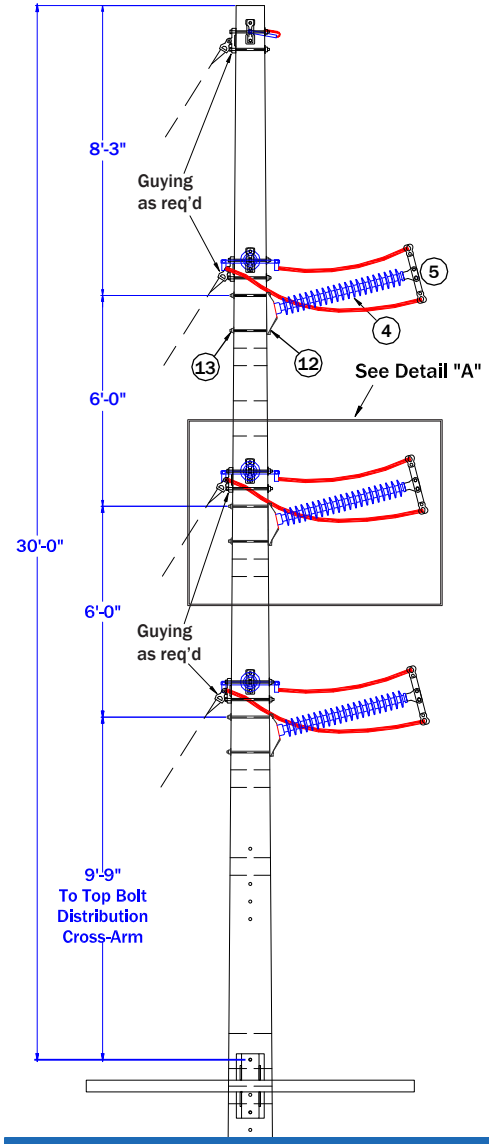
NOTE

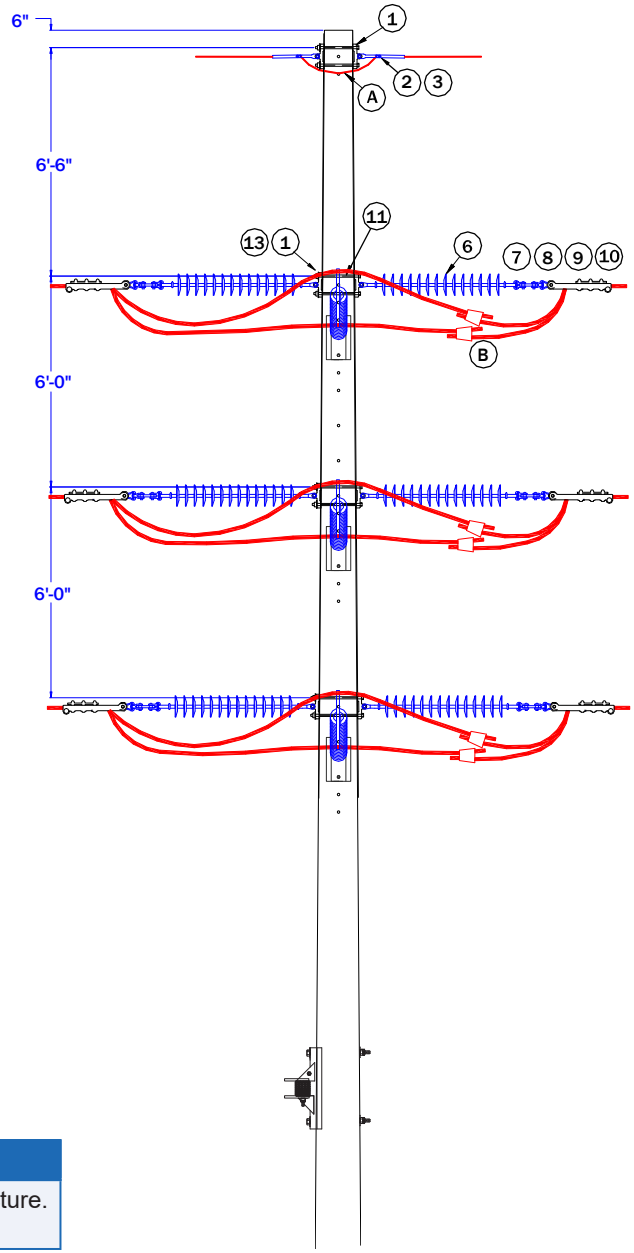
1. Requires 25 Ohms or less grounding resistance at structure.
2. Banding bottom bolt position allowed on Davit Arms with approval of Engineer.
3. Consult with Transmission Line Engineer on Alternate Dbl Guy Bracket bolts (see A325 High Strength Bolts in the General Framing section pg.12).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

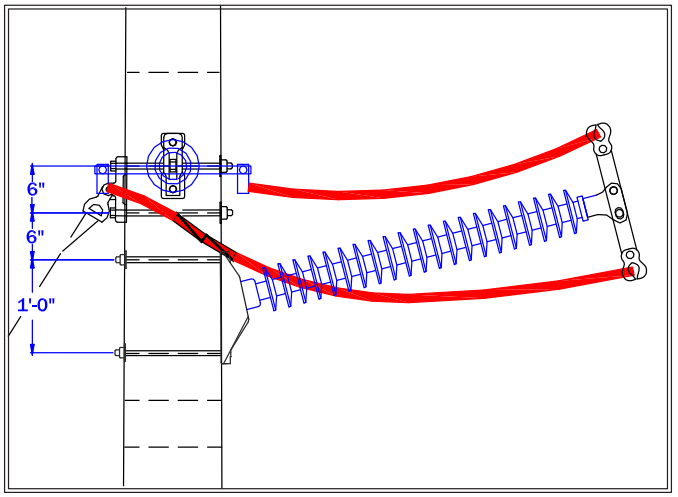
NES

0° TO 60° ANGLE DAVIT ARMS W/ SUSP. INS. BUNDLED CONDUCTOR





DETAIL "A"



NOTE

1. Requires 25 Ohms or less grounding resistance at structure.
2. See next page for Material Item List

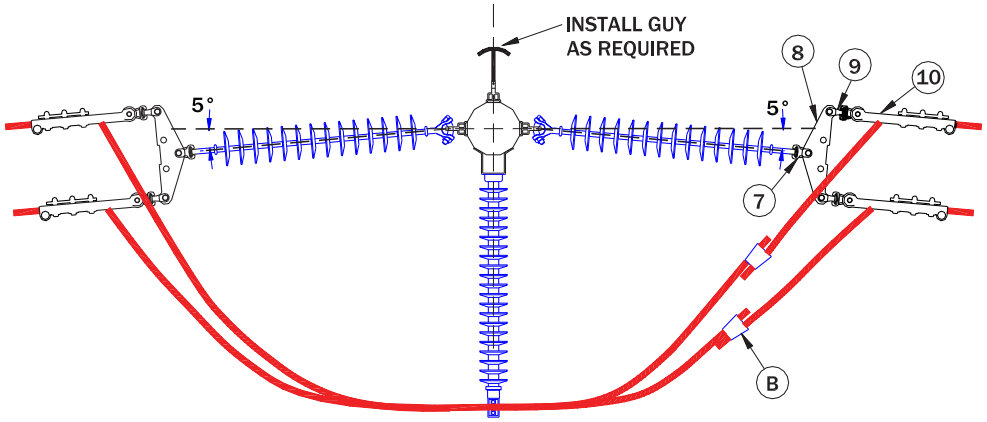
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

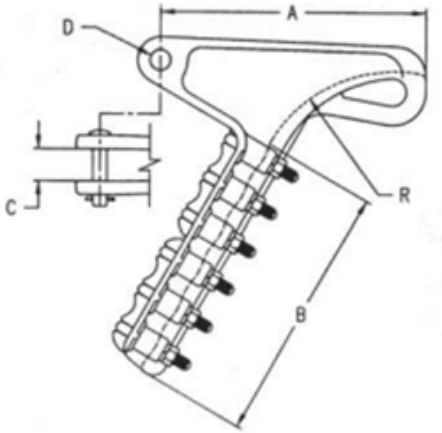
0° TO 10° ANGLE DOUBLE DEAD-END BUNDLED CONDUCTOR

FRM. CODE	T69VDD10-CT2	MAJOR AND MINOR MATERIALS	
ITEM	QTY	DESCRIPTION	STOCK #
1	8	DEAD END TEE	230180000
2	2	Y-CLEVIS BALL	181208000
3	2	CLAMP STRAIN 1/0-4/0	221120000
4	3	INSUL, HORIZ LINE POST, BLADE 115/69 KV	240995000
5	3	CLAMP SPACER BUNDLED 795 KCM COOT ACSR	220780000
6	6	INSUL, SUSP, 115/69KV, Y-CLEVIS/BALL	242758000
7	6	CLEVIS SOCKET, SHORT	181420000
8	6	YOKE PLATE	183970000
9	12	CLEVIS BALL	181240000
10	12	QUADRANT CLAMP STRAIN 795 36/1 ACSR	221100000
11	8	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
12	6	BOLT, 3/4" MACHINE, (VARIOUS LENGHTS)	204_____
13	22	LOCK NUT 3/4" HEX	206270000
TRUCK STOCK ITEMS			
ITEM	QTY	DESCRIPTION	STOCK #
A	1	CONNECTOR WEDGE 1/0-1/0	224106000
B	6	CONNECTOR WEDGE 795-795	224127000

QUADRANT STRAIN CLAMP - 795 COOT ACSR					
DIM.	A	B	C	D	R
(IN)	14.31	13.69	1.50	0.75	7.50



TOP VIEW



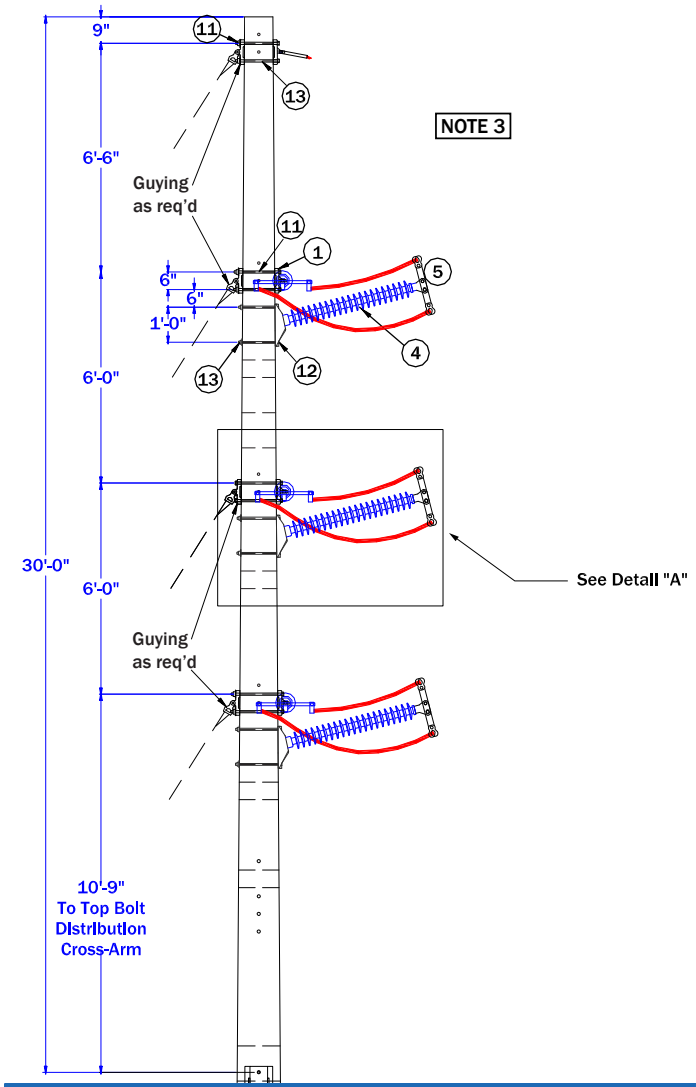
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

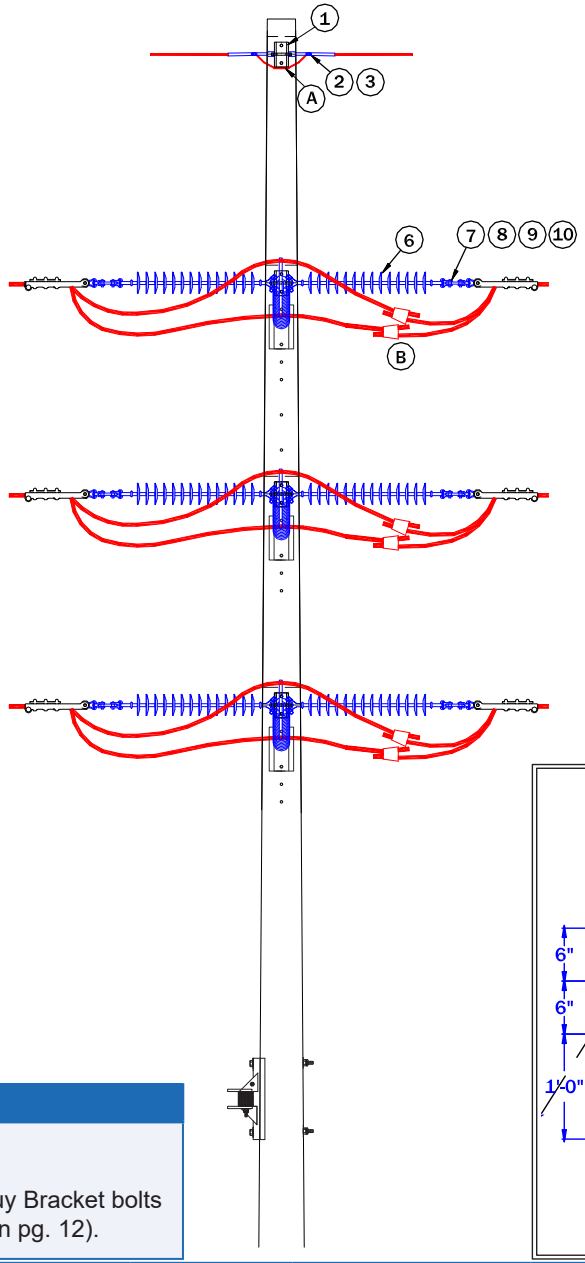
TRANSMISSION STANDARDS

NES

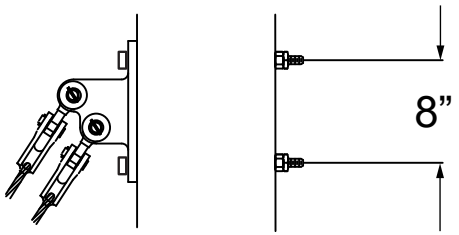
0° TO 10° ANGLE DOUBLE DEAD-END BUNDLED CONDUCTOR (MTR'LS)

T69VDD10-CT2



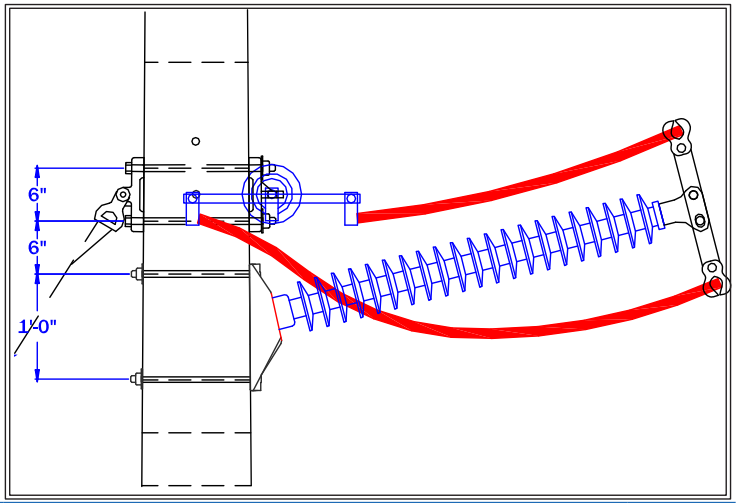


NOTE 3
CAUTION: ALTERNATE DOUBLE GUYING TEE MOUNTS USING 1-INCH DIA. HIGH STRENGTH A325 BOLTS



OGD12DBL

DETAIL "A"



NOTE

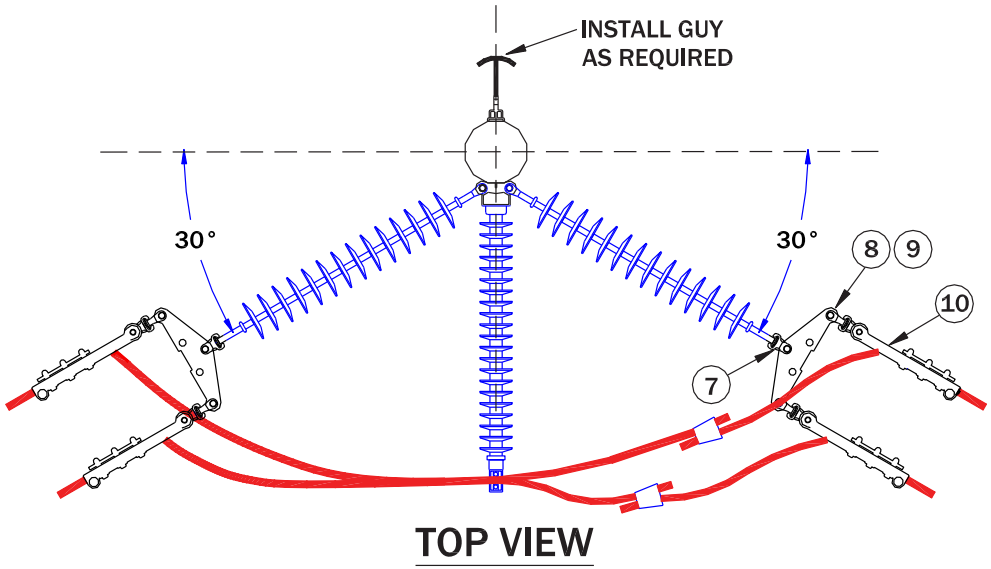
1. Requires 25 Ohms or less grounding resistance at structure.
2. See next page for Material Item List.
3. Consult with Transmission Line Engineer on Alternate Dbl Guy Bracket bolts (see A325 High Strength Bolts in the General Framing section pg. 12).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

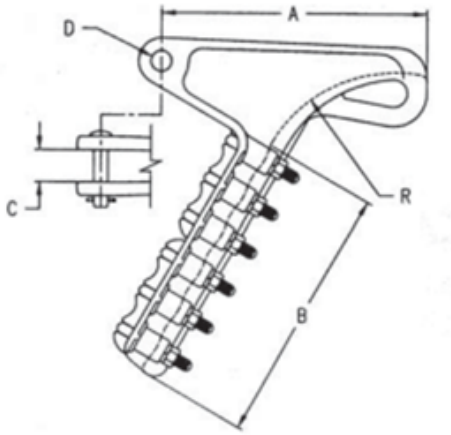
10° TO 60° ANGLE DOUBLE DEAD-END BUNDLED CONDUCTOR

FRM. CODE	T69VDD6-CT2	MAJOR AND MINOR MATERIALS	
ITEM	QTY	DESCRIPTION	STOCK #
1	4	BRACKET, DOUBLE DEAD-END ANGLE	180780000
2	2	Y-CLEVIS BALL	181208000
3	2	CLAMP STRAIN 1/0-4/0	221120000
4	3	INSUL, HORIZ LINE POST, BLADE 115/69 KV	240995000
5	3	CLAMP SPACER BUNDLED 795 KCM COOT ACSR	220780000
6	6	INSUL, SUSP, 115/69KV, Y-CLEVIS/BALL	242758000
7	6	CLEVIS SOCKET, SHORT	181420000
8	6	YOKE PLATE	183970000
9	12	CLEVIS BALL	181240000
10	12	QUADRANT CLAMP STRAIN 795 36/1 ACSR	221100000
11	8	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
12	6	BOLT, 3/4" MACHINE, (VARIOUS LENGHTS)	204_____
13	22	LOCK NUT 3/4" HEX	206270000
TRUCK STOCK ITEMS			
ITEM	QTY	DESCRIPTION	STOCK #
A	1	CONNECTOR WEDGE 1/0-1/0	224106000
B	3	CONNECTOR WEDGE 795-795 (DO NOT USE ON ACSS)	224127000



TOP VIEW

QUADRANT STRAIN CLAMP - 795 COOT ACSR					
DIM.	A	B	C	D	R
(IN)	14.31	13.69	1.50	0.75	7.50

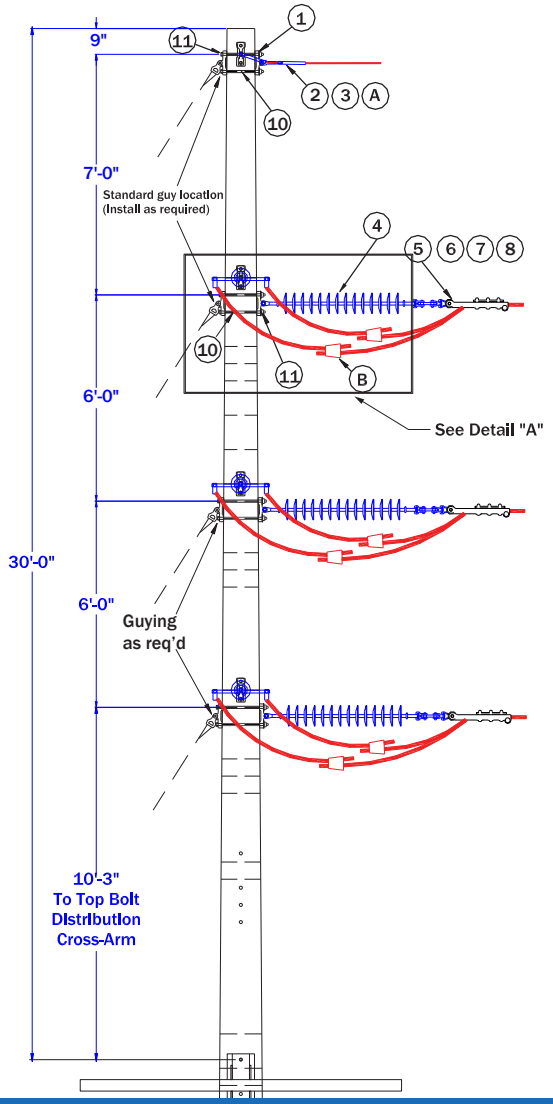


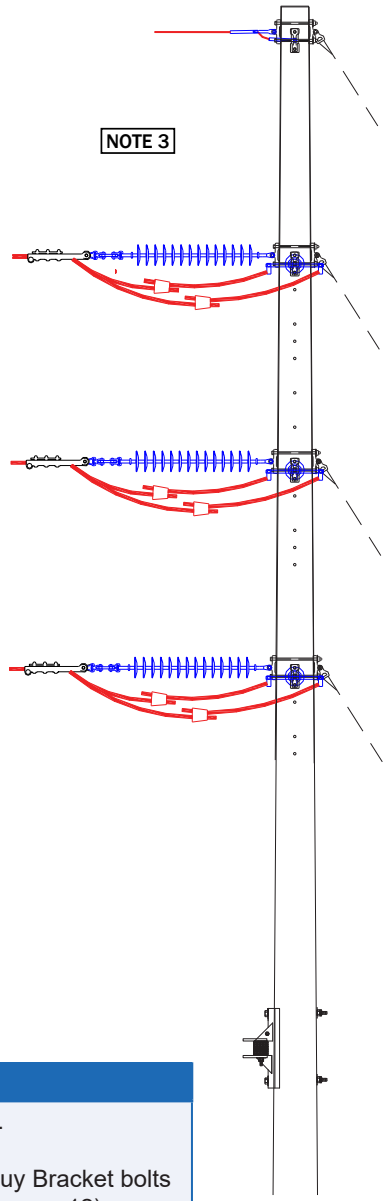
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION STANDARDS

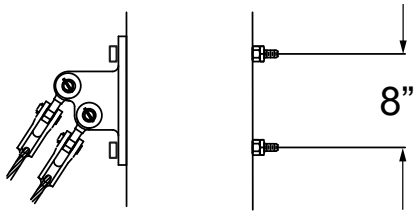
NES

10° TO 60° ANGLE DOUBLE DEAD-END BUNDLED CONDUCTOR (MTR'LS)



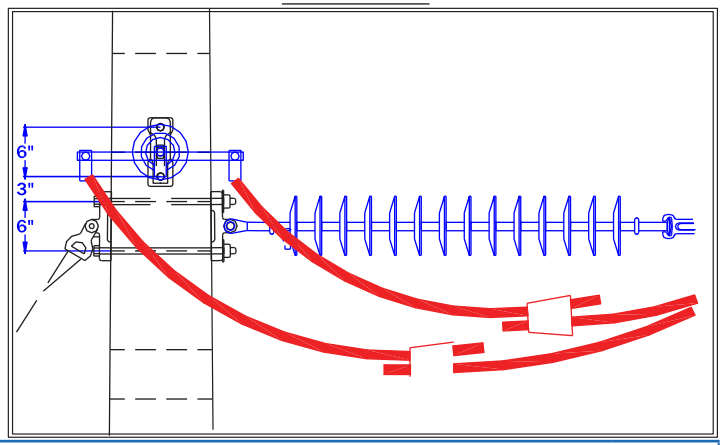


NOTE 3
CAUTION: ALTERNATE DOUBLE GUYING TEE MOUNTS USING 1-INCH DIA. HIGH STRENGTH A325 BOLTS



OGD12DBL

DETAIL "A"



NOTE

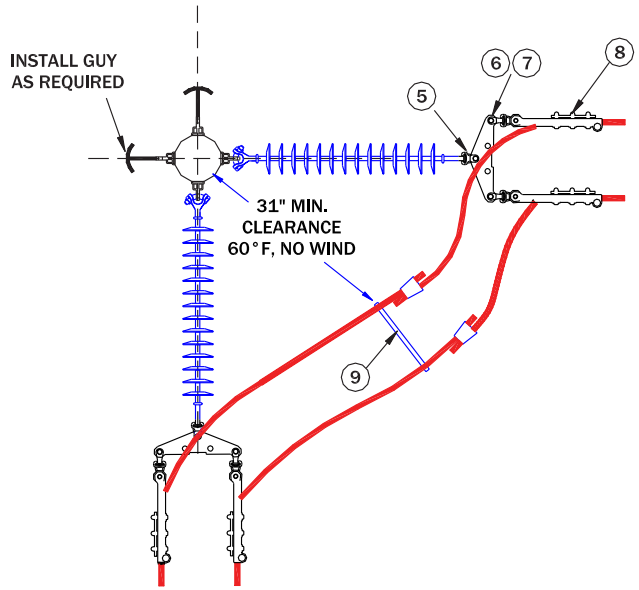
1. Requires 25 Ohms or less grounding resistance at structure.
2. See next page for Material Item List.
3. Consult with Transmission Line Engineer on Alternate Dbl Guy Bracket bolts (see A325 High Strength Bolts in the General Framing section pg. 12).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

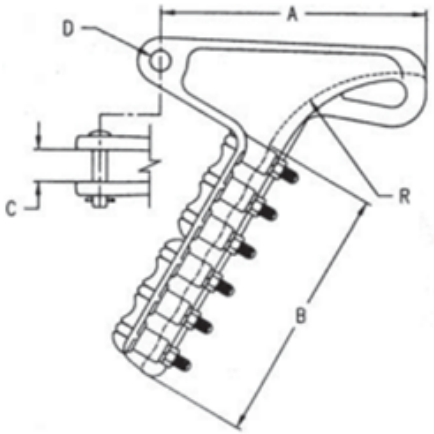
60° TO 90° ANGLE DOUBLE DEAD-END BUNDLED CONDUCTOR

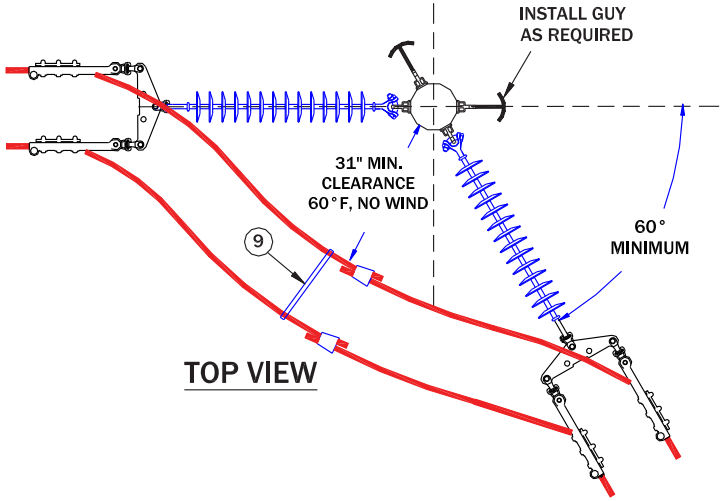
FRM. CODE	T69VDD90-CT2	MAJOR AND MINOR MATERIALS	
ITEM	QTY	DESCRIPTION	STOCK #
1	8	DEAD END TEE	230180000
2	2	Y-CLEVIS BALL	181208000
3	2	CLAMP STRAIN 1/0-4/0	221120000
4	6	INSUL, SUSP, 115/69KV, Y-CLEVIS/BALL	242758000
5	6	CLEVIS SOCKET, SHORT	181420000
6	6	YOKE PLATE	183970000
7	12	CLEVIS BALL	181240000
8	12	QUADRANT CLAMP STRAIN 795 36/1 ACSR	221100000
9	3	CLAMP, BUNDLED CONDUCTOR 795 ACSR	220770000
10	16	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
11	32	LOCK NUT 3/4" HEX	206270000
TRUCK STOCK ITEMS			
ITEM	QTY	DESCRIPTION	STOCK #
A	1	CONNECTOR WEDGE 1/0-1/0	224106000
B	6	CONNECTOR WEDGE 795-795	224127000



TOP VIEW

QUADRANT STRAIN CLAMP - 795 COOT ACSR					
DIM.	A	B	C	D	R
(IN)	14.31	13.69	1.50	0.75	7.50



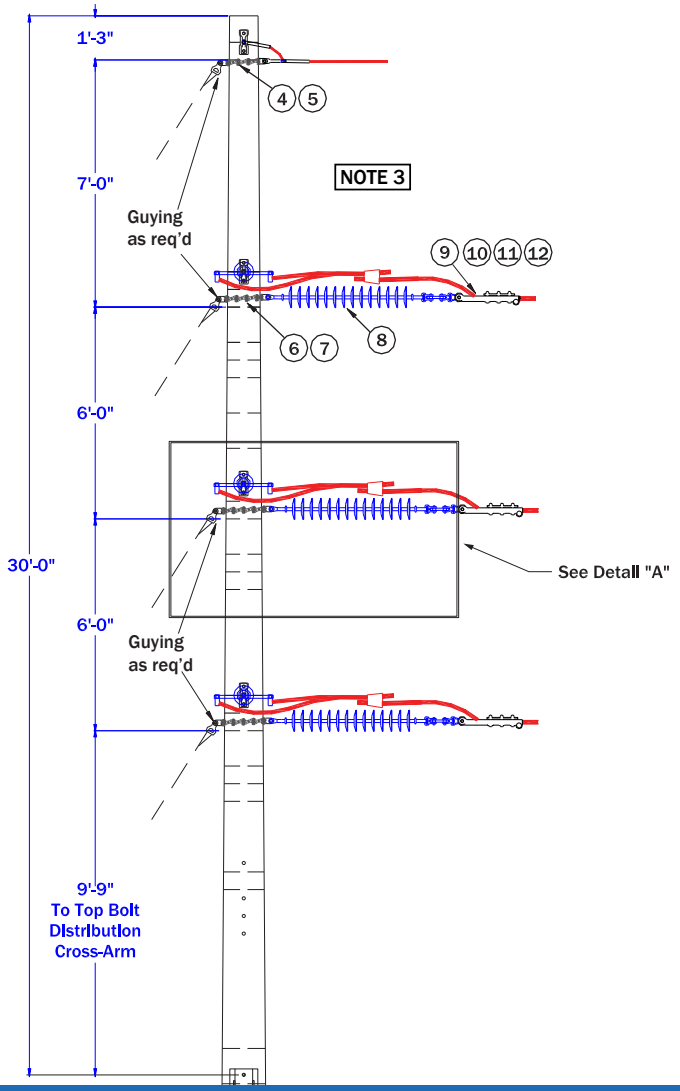


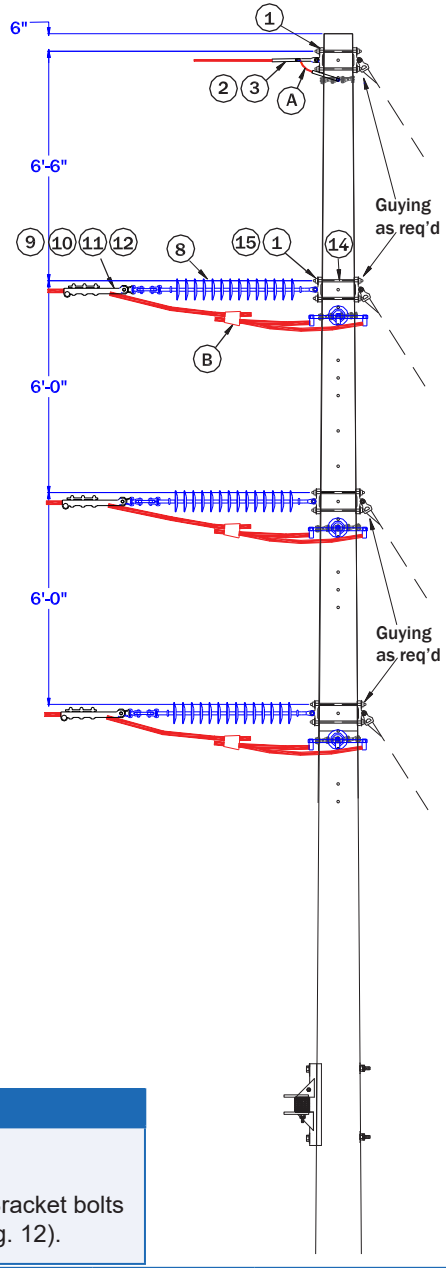
TOP VIEW

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

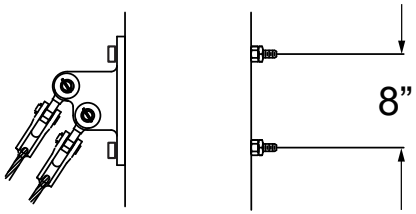
NES

60° TO 90° ANGLE DOUBLE DEAD-END BUNDLED CONDUCTOR (MTR'LS)



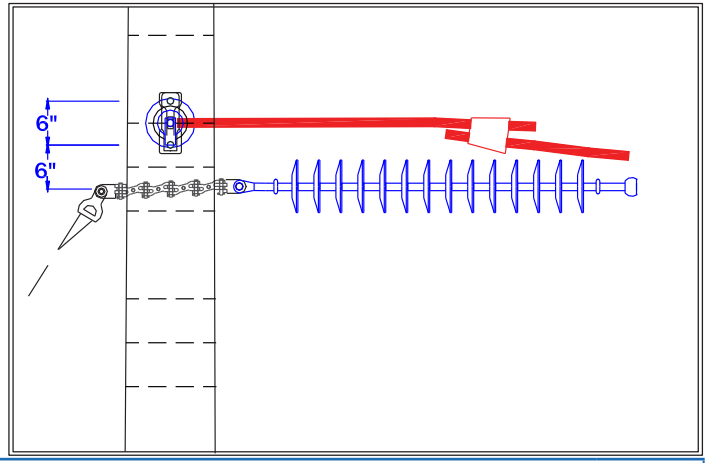


NOTE 3
CAUTION: ALTERNATE DOUBLE GUYING TEE MOUNTS USING 1-INCH DIA. HIGH STRENGTH A325 BOLTS



OGD12DBL

DETAIL "A"



NOTE

1. Requires 25 Ohms or less grounding resistance at structure.
2. See next page for Material Item List.
3. Consult with Transmission Line Engineer on Alternate Dbl Guy Bracket bolts (see A325 High Strength Bolts in the General Framing section pg. 12).

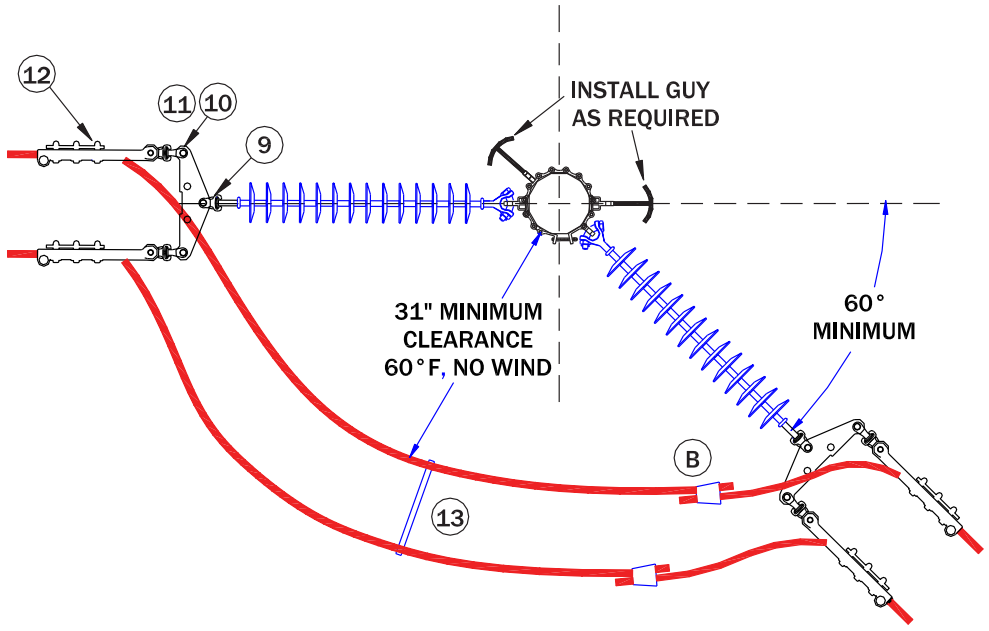
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

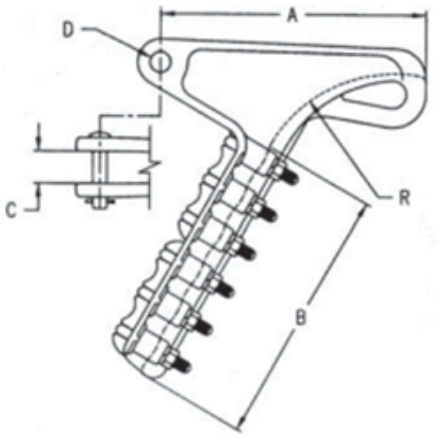
60° TO 90° ANGLE DDE BUNDLED CONDUCTOR CHAIN BANDS

FRM. CODE	T69VDDCB90-CT2	MAJOR AND MINOR MATERIALS	
ITEM	QTY	DESCRIPTION	STOCK #
1	4	DEAD END TEE	230180000
2	2	Y-CLEVIS BALL	181208000
3	2	CLAMP STRAIN 1/0-4/0	221120000
4	1	POLE BAND ASSEMBLY, 15,000 LB	183988000
5	1	POLE BAND EYE LINK, 15,000 LB	183988400
6	3	POLE BAND ASSEMBLY, 30,000 LB	183989000
7	3	POLE BAND EYE LINK, 30,000 LB	183989200
8	6	INSUL, SUSP, 115/69KV, Y-CLEVIS/BALL	242758000
9	6	CLEVIS SOCKET SHORT	181420000
10	6	YOKE PLATE	183970000
11	12	CLEVIS BALL	181240000
12	12	QUADRANT CLAMP STRAIN 795 36/1 ACSR	221100000
13	3	CLAMP, BUNDLED CONDUCTOR 795 ACSR	220770000
14	8	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
15	16	LOCK NUT 3/4" HEX	206270000
TRUCK STOCK ITEMS			
ITEM	QTY	DESCRIPTION	STOCK #
A	1	CONNECTOR WEDGE 1/0-1/0	224106000
B	6	CONNECTOR WEDGE 795-795	224127000

QUADRANT STRAIN CLAMP - 795 COOT ACSR					
DIM.	A	B	C	D	R
(IN)	14.31	13.69	1.50	0.75	7.50



TOP VIEW



REV.	ENG.	DESCRIPTION OF CHANGE	DATE

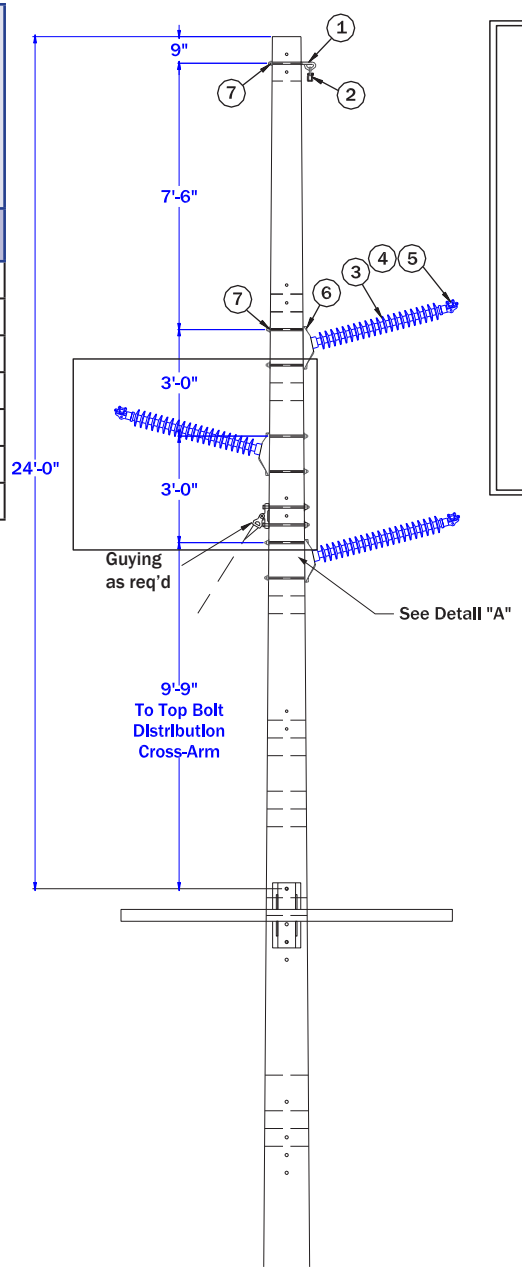
TRANSMISSION STANDARDS

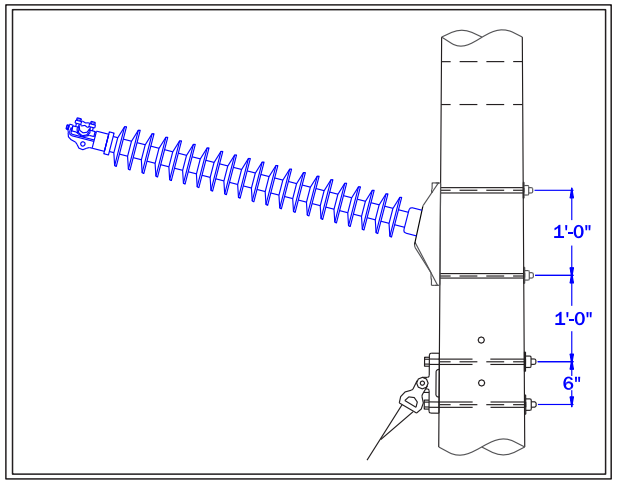
NES

60° TO 90° ANGLE DDE BUNDLED CONDUCTOR CHAIN BANDS(MTR'LS)

69 KV SUB TRANSMISSION SINGLE ACSS CONDUCTOR FRAMING SECTION

FRM. CODE	T69DHP15-DK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BOLT, OHGW SUPPORT, 3/4" X 14"	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	3	INSUL, HORIZ LINE POST, TRUNNION 115/69 KV	240996000
4	3	CLAMP, TRUNNION, 795 KCM DRAKE ACSS	221930000
5	3	ARMOR ROD, 795 KCM DRAKE ACSS	184881000
6	6	BOLT, 3/4" MACHINE (VARIOUS LENGTHS)	204_____
7	7	LOCK NUT 3/4" HEX	206270000





DETAIL "A"

NOTE

1. The delta or triangular arrangement of the conductors is the most efficient in terms reducing line losses and maximizing pole space. Use this configuration wherever angle limits and field phase clearances are within design limits.

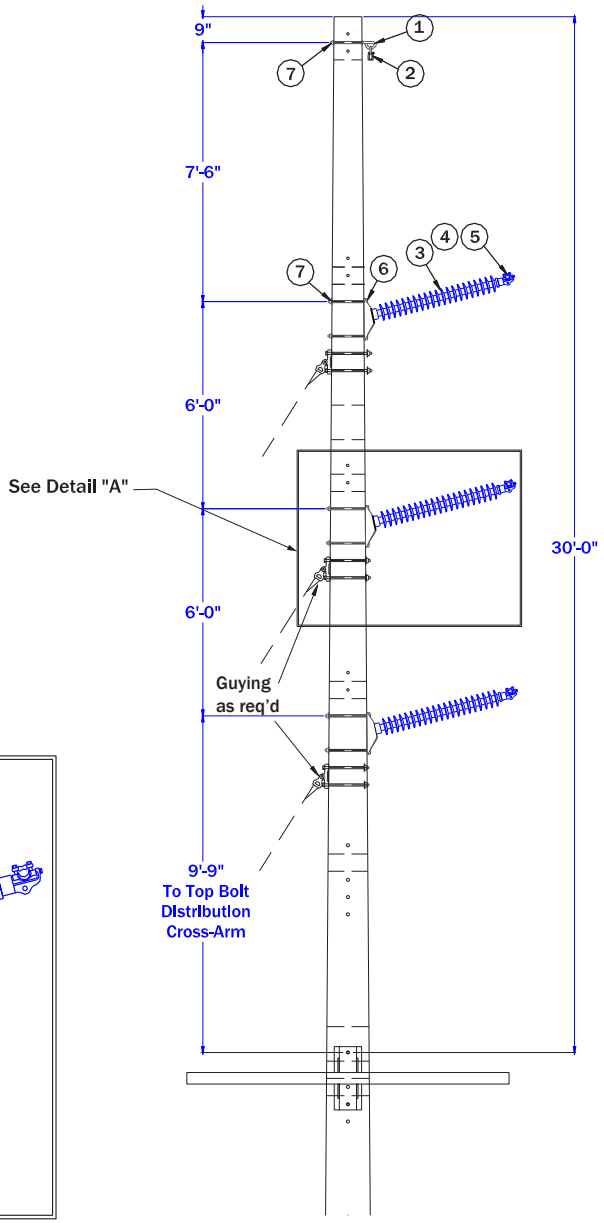
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION STANDARDS

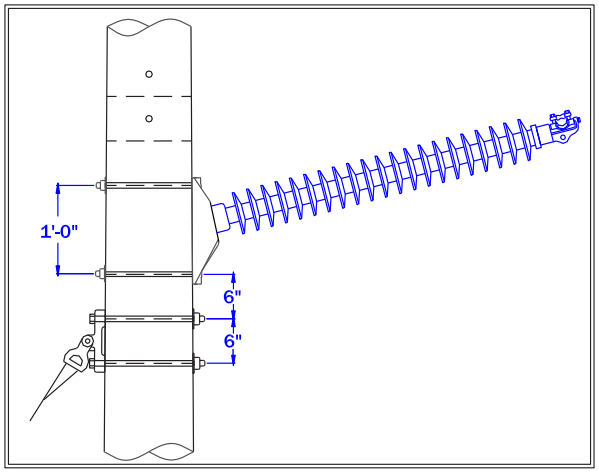
NES

0° TO 15° ANGLE DELTA FRAMING HORIZONTAL POST INSULATORS

FRM. CODE	T69VHP20-DK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BOLT, OHGW SUPPORT, 3/4” X 14”	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	3	INSUL, HORIZ LINE POST, TRUNNION 115/69 KV	240996000
4	3	CLAMP, TRUNNION, 795 KCM DRAKE ACSS	221930000
5	3	ARMOR ROD, 795 KCM DRAKE ACSS	184881000
6	6	BOLT, 3/4" MACHINE (VARIOUS LENGTHS)	204_____
7	7	LOCK NUT 3/4" HEX	206270000



DETAIL "A"



NOTE

1. Requires 25 Ohms or less grounding resistance at structure.

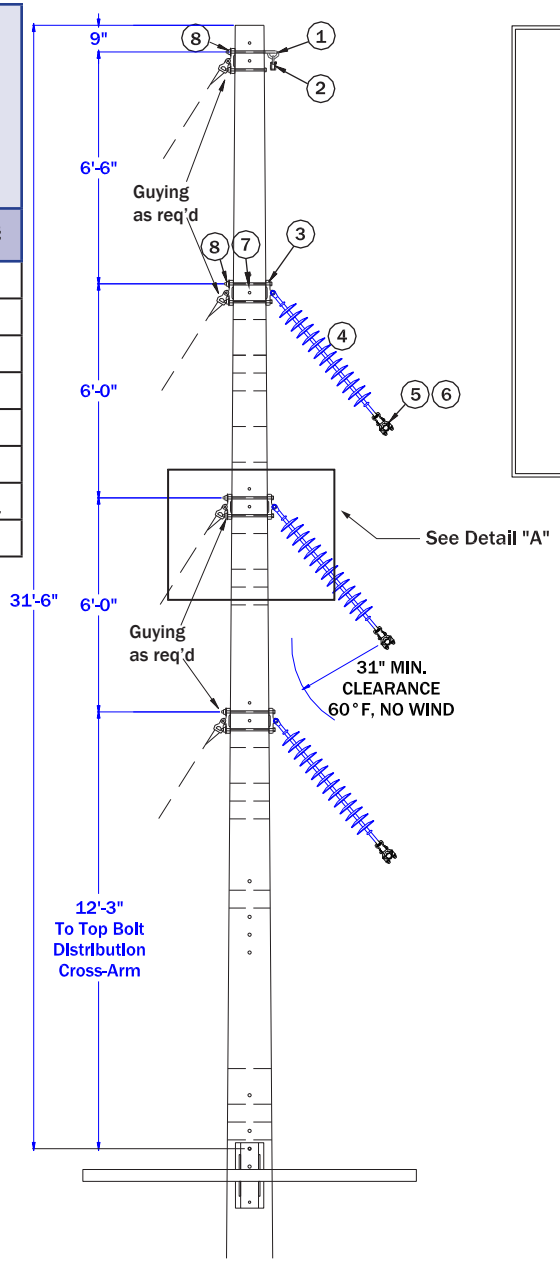
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

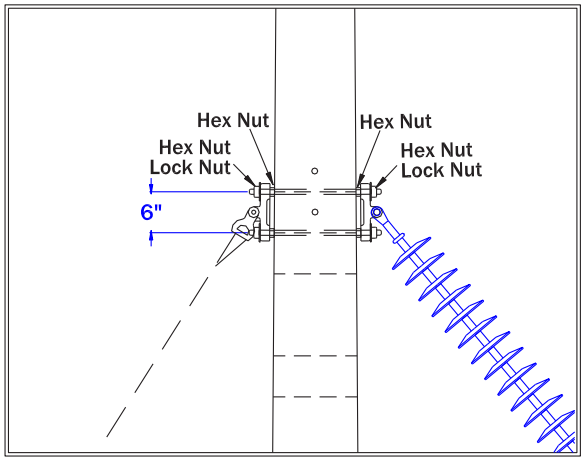
TRANSMISSION STANDARDS

NES

0° TO 20° ANGLE VERTICAL FRAMING HORIZONTAL POST INSULATORS

FRM. CODE	T69VSA35-DK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BOLT, OHGW SUPPORT, 3/4" X 14"	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	3	DEAD END TEE	230180000
4	3	INSUL, SUSP 115/69KV, Y-CLEVIS/BALL	242758000
5	3	SOCKET EYE	181484000
6	3	CLAMP SUSPENSION 795 ACSS/AW & 959.6 ACSS/TW	221959000
7	6	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
8	13	LOCK NUT 3/4" HEX	206270000





DETAIL "A"

NOTE

1. Requires 25 Ohms or less grounding resistance at structure.

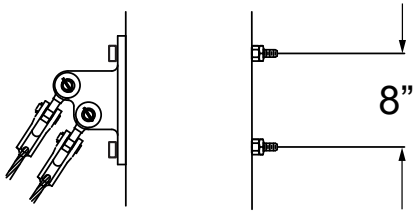
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION STANDARDS

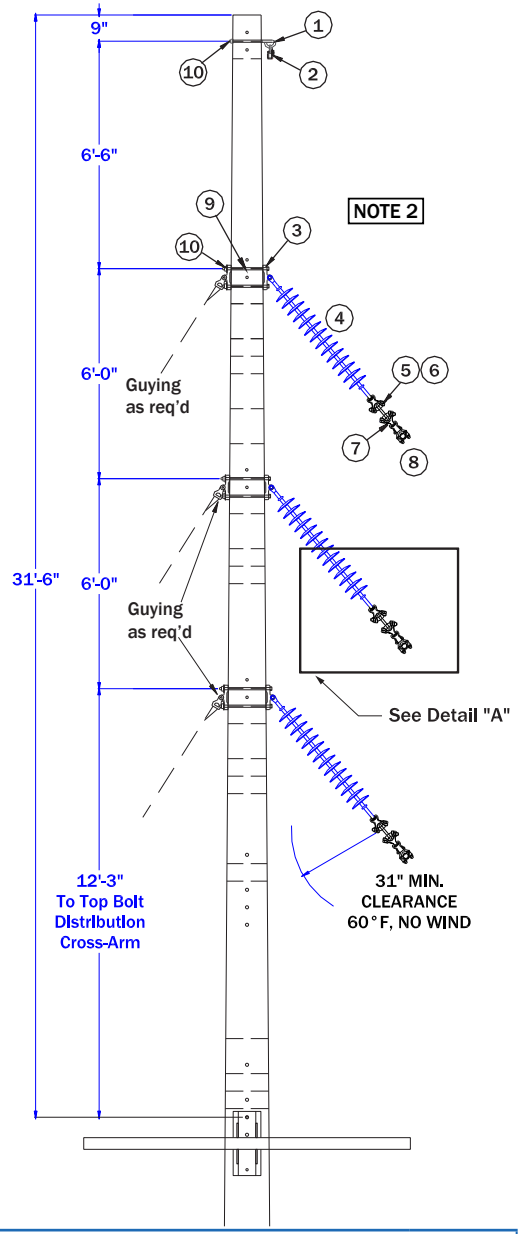
20° TO 35° ANGLE VERTICAL SUSPENSION INSULATORS

FRM. CODE	T69VSA60-DK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	BOLT, OHGW SUPPORT, 3/4" X 14"	204940000
2	1	CLAMP SUSP 2-4/0 AL/CU	221820000
3	3	DEAD END TEE	230180000
4	3	INSUL, SUSP 115/69KV, Y-CLEVIS/BALL	242758000
5	3	Y-CLEVIS SOCKET, 30,000 LB	181212000
6	3	YOKE PLATE	183970000
7	6	Y-CLEVIS EYE	181959000
8	6	CLAMP SUSPENSION 795 ACSS/AW & 959.6 ACSS/TW	221959000
9	6	BOLT, DOUBLE ARMING 3/4" (VARIOUS LENGTHS)	201_____
10	13	LOCK NUT 3/4" HEX	206270000

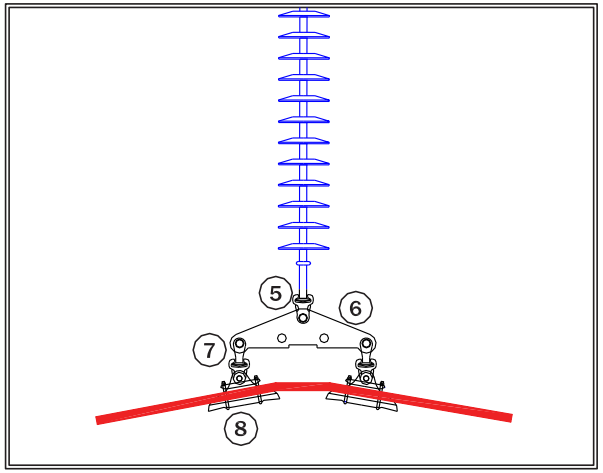
NOTE 2
CAUTION: ALTERNATE DOUBLE GUYING TEE MOUNTS USING 1-INCH DIA. HIGH STRENGTH A325 BOLTS



OGD12DBL



DETAIL "A"

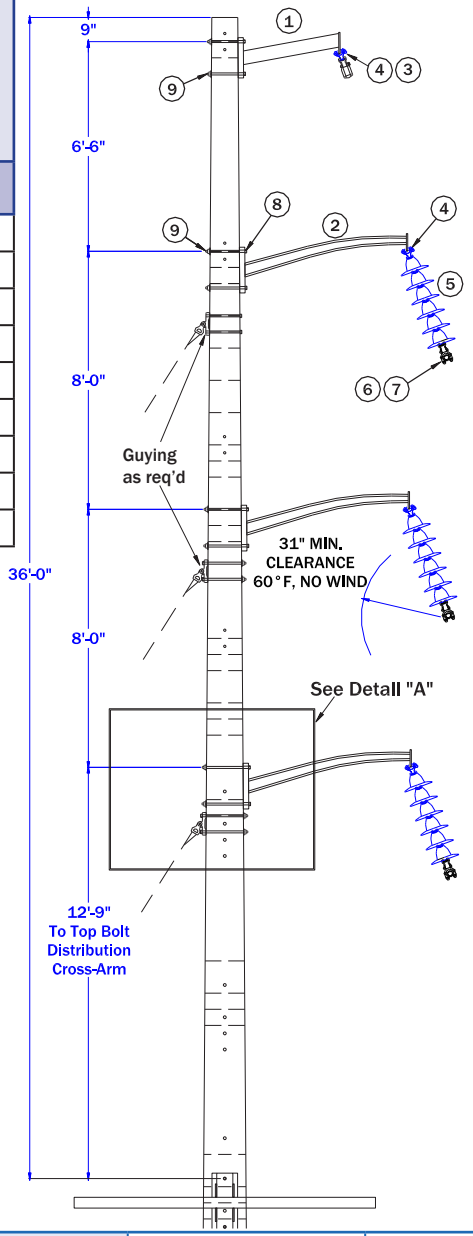


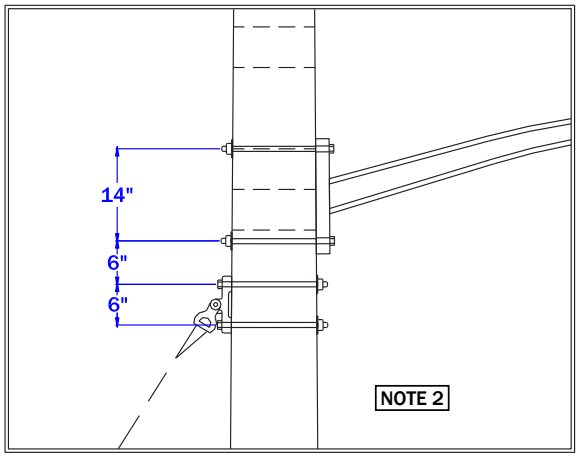
NOTES

1. Requires 25 Ohms or less grounding resistance at structure.
2. Consult with Transmission Line Engineer on Alternate Dbl Guy Bracket bolts (see A325 High Strength Bolts in the General Framing section pg.12).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

FRM. CODE	T69VDA35-DK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	DAVIT ARM, LIGHT DUTY, 3FT	042010000
2	3	DAVIT ARM, MEDIUM DUTY, 5 FT	042020000
3	1	CLAMP SUSP 2-4/0 AL/CU	221820000
4	4	Y-CLEVIS BALL	181208000
5	18	INSUL, SUSP, 30K, 10" BELL	242730000
6	3	SOCKET EYE	181484000
7	3	CLAMP SUSPENSION 795 ACSS/AW & 959.6 ACSS/TW	221959000
8	8	BOLT, MACHINE, 3/4" (VARIOUS LENGTHS)	204_____
9	8	LOCK NUT 3/4" HEX	206270000





DETAIL "A"

NOTE

1. Requires 25 Ohms or less grounding resistance at structure.

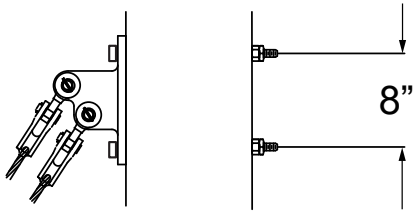
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

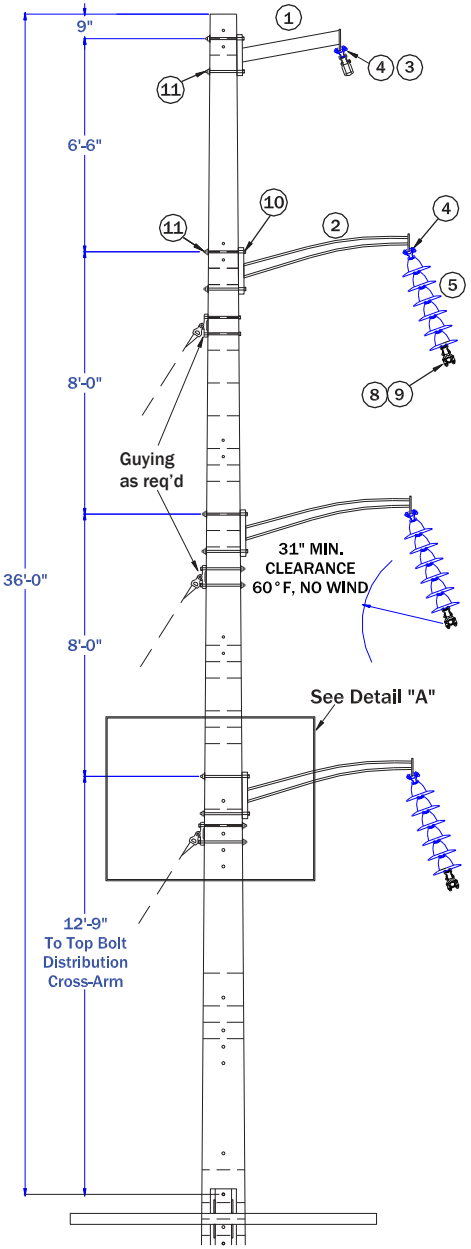
0° TO 35° ANGLE DAVIT ARMS W/ SUSPENSION INSULATORS

FRM. CODE	T69VDA60-DK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	1	DAVIT ARM, LIGHT DUTY, 3FT	042010000
2	3	DAVIT ARM, MEDIUM DUTY, 5 FT	042020000
3	1	CLAMP SUSP 2-4/0 AL/CU	221820000
4	4	Y-CLEVIS BALL	181208000
5	18	INSUL, SUSP, 30K, 10" BELL	242730000
6	3	Y-CLEVIS SOCKET, 30,000 LB	181212000
7	3	YOKE PLATE	183970000
8	6	SOCKET EYE	181484000
9	6	CLAMP SUSPENSION 795 ACSS/AW & 959.6 ACSS/TW	221959000
10	8	BOLT, MACHINE, 3/4" (VARIOUS LENGTHS)	204_____
11	8	LOCK NUT 3/4" HEX	206270000

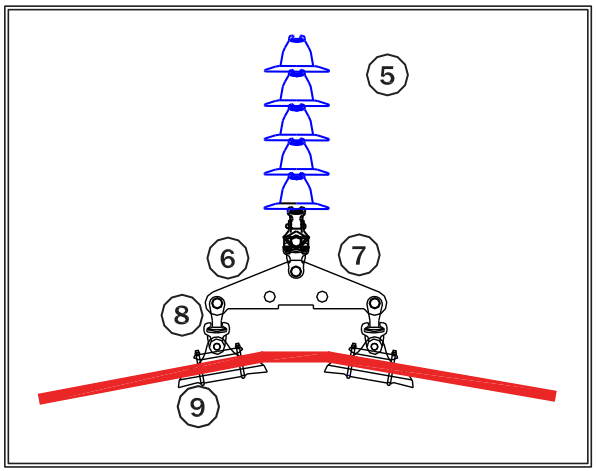
NOTE 2
CAUTION: ALTERNATE DOUBLE GUYING TEE MOUNTS USING 1-INCH DIA. HIGH STRENGTH A325 BOLTS



OGD12DBL



DETAIL "A"



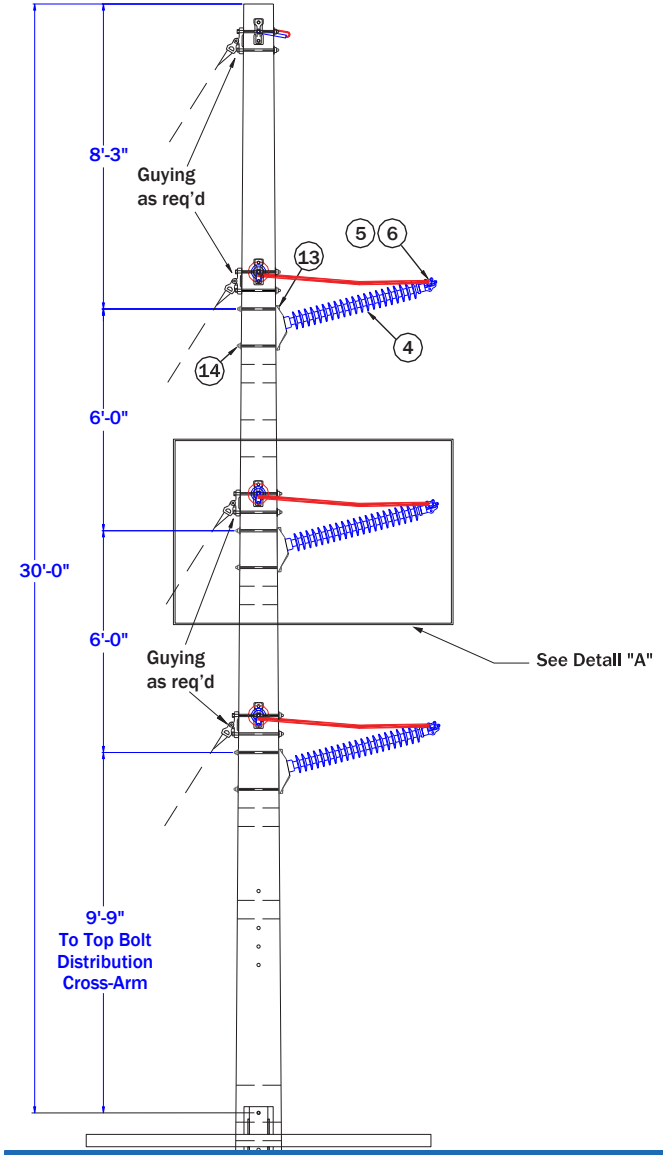
NOTES

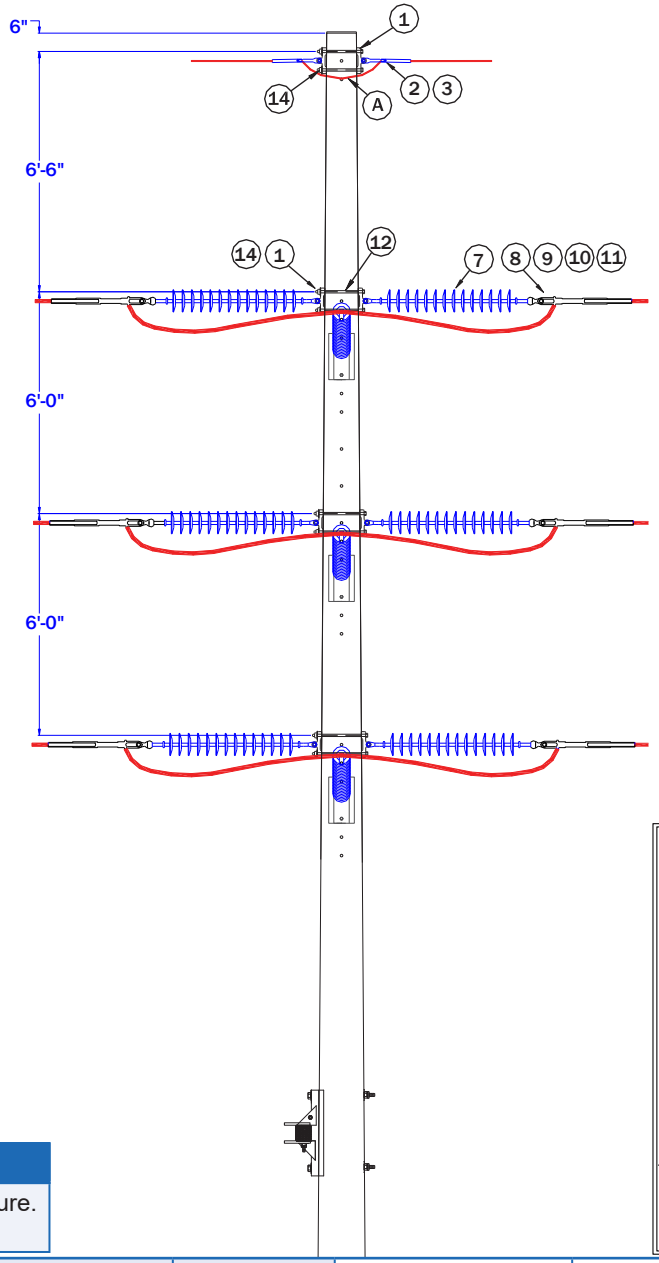
1. Requires 25 Ohms or less grounding resistance at structure.
2. Consult with Transmission Line Engineer on Alternate Dbl Guy Bracket bolts (see A325 High Strength Bolts in the General Framing section pg.12).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

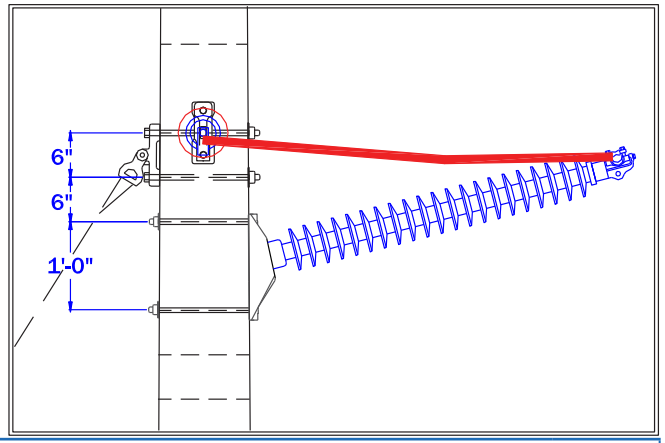
NES

36° TO 60° ANGLE DAVIT ARMS W/ SUSPENSION INSULATORS





DETAIL "A"



NOTE

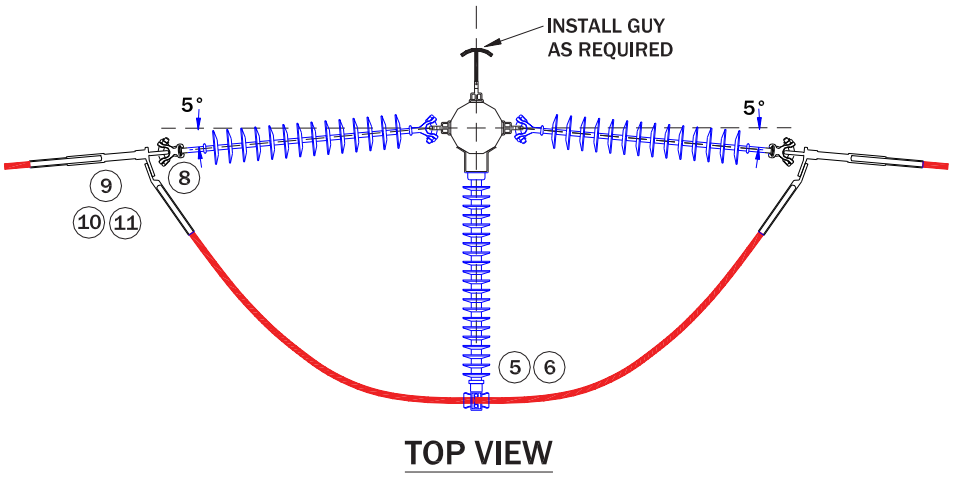
1. Requires 25 Ohms or less grounding resistance at structure.
2. See next page for Material Item List

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

0° TO 10° ANGLE DOUBLE DEAD-END

FRM. CODE	T69VDD10-DK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	8	DEAD END TEE	230180000
2	2	Y-CLEVIS BALL	181208000
3	2	CLAMP STRAIN 1/0-4/0	221120000
4	3	INSUL, HORIZ LINE POST, TRUNNION 115/69 KV	240996000
5	3	CLAMP, TRUNNION, 795 KCM DRAKE ACSS	221930000
6	3	ARMOR TAP, 795 ACSS	184885000
7	6	INSUL, SUSP, 115/69KV, Y-CLEVIS/BALL	242758000
8	6	Y-CLEVIS SOCKET, 30,000 LB	181212000
9	6	COMPRESSION DEADEND, 795 KCM DRAKE ACSS	221310000
10	12	JOINT COMPOUND, HIGH TEMP., FOR COMPRESSION FITTINGS	400501000
11	2	JOINT COMPOUND, HIGH TEMP., FOR BOLTED CONNECTIONS	400500000
12	8	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
13	6	BOLT, 3/4" MACHINE, (VARIOUS LENGTHS)	204_____
14	22	LOCK NUT 3/4" HEX	206270000



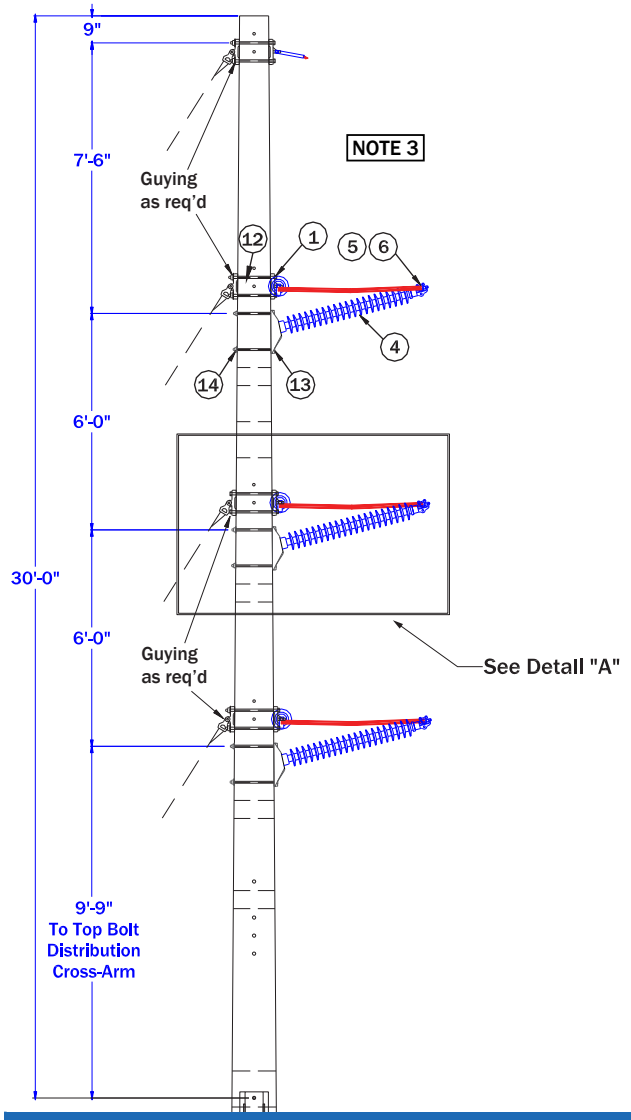
TOP VIEW

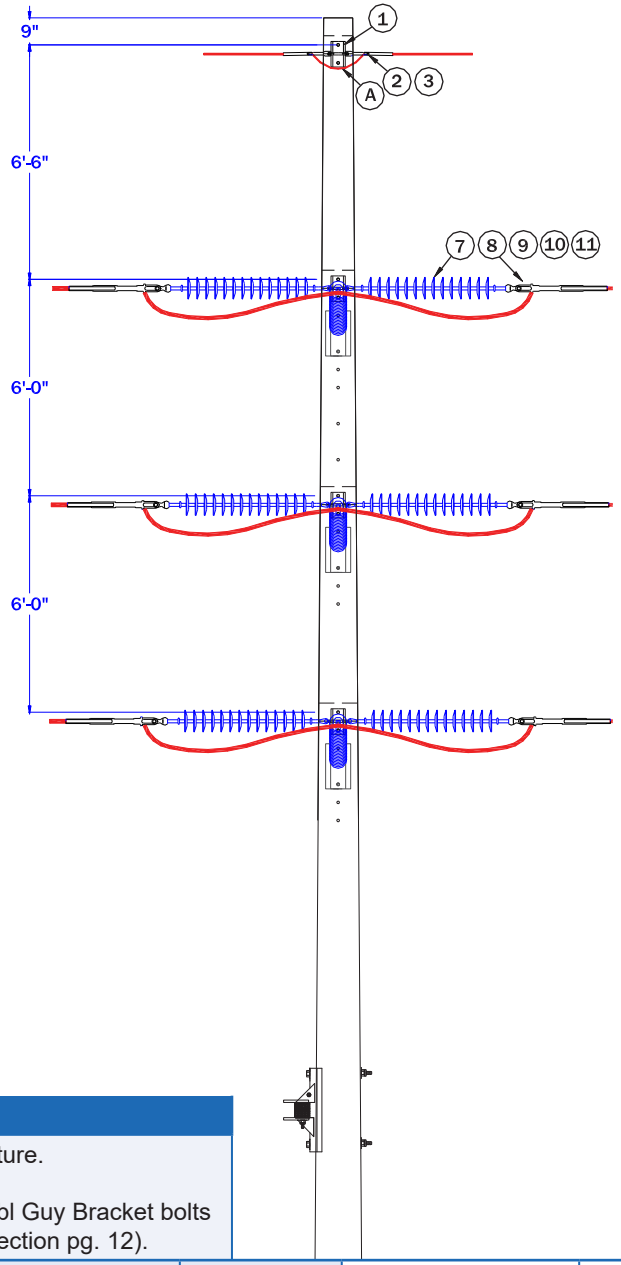
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION STANDARDS

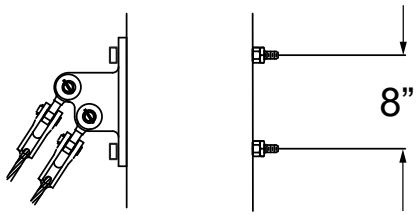
NES

0° TO 10° ANGLE DOUBLE DEAD-END (MTR'LS)



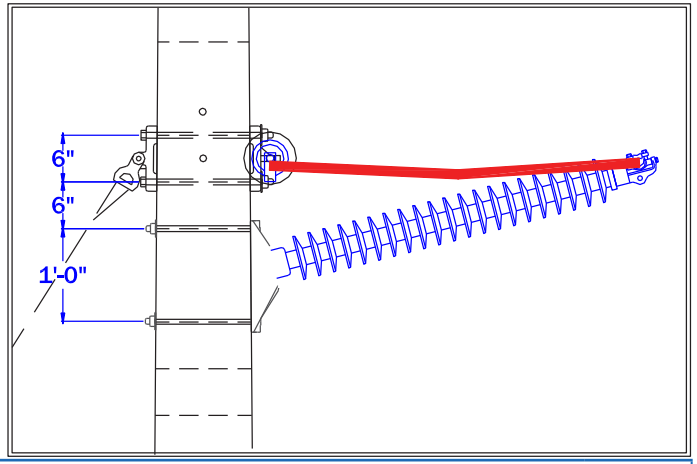


NOTE 3
CAUTION: ALTERNATE DOUBLE GUYING TEE MOUNTS USING 1-INCH DIA. HIGH STRENGTH A325 BOLTS



OGD12DBL

DETAIL "A"



NOTE

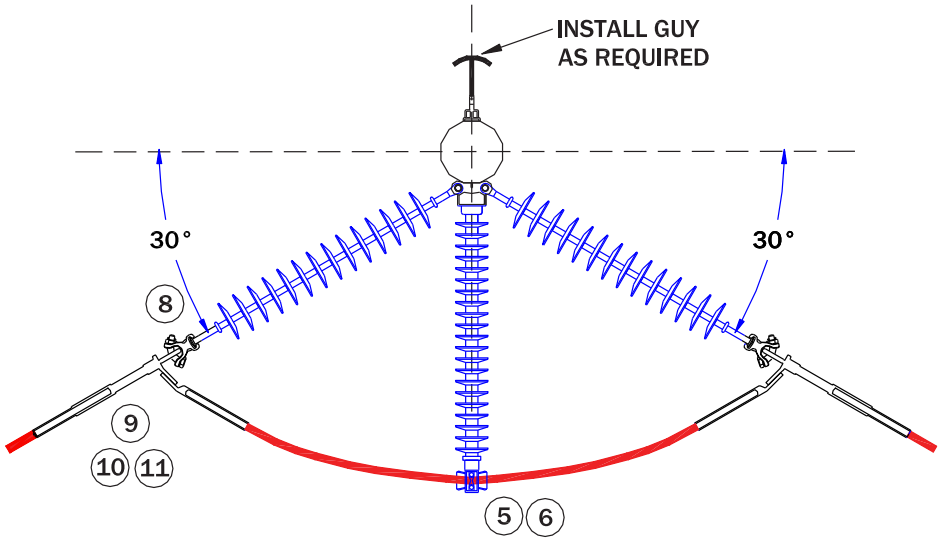
1. Requires 25 Ohms or less grounding resistance at structure.
2. See next page for Material Item List.
3. Consult with Transmission Line Engineer on Alternate Dbl Guy Bracket bolts (see A325 High Strength Bolts in the General Framing section pg. 12).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

10° TO 60° ANGLE DOUBLE DEAD-END

FRM. CODE	T69VDD60-DK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	4	BRACKET, DOUBLE DEAD-END ANGLE	180780000
2	2	Y-CLEVIS BALL	181208000
3	2	CLAMP STRAIN 1/0-4/0	221120000
4	3	INSUL, HORIZ LINE POST, TRUNNION 115/69 KV	240996000
5	3	CLAMP, TRUNNION, 795 KCM DRAKE ACSS	221930000
6	3	ARMOR TAP, 795 ACSS	184885000
7	6	INSUL, SUSP, 115/69KV, Y-CLEVIS/BALL	242758000
8	6	Y-CLEVIS SOCKET, 30,000 LB	181212000
9	6	COMPRESSION DEADEND, 795 KCM DRAKE ACSS	221310000
10	12	JOINT COMPOUND, HIGH TEMP., FOR COMPRESSION FITTINGS	400501000
11	2	JOINT COMPOUND, HIGH TEMP., FOR BOLTED CONNECTIONS	400500000
12	8	BOLT, DOUBLE ARMING, 3/4" (VARIOUS LENGTHS)	201_____
13	6	BOLT, 3/4" MACHINE (VARIOUS LENGTHS)	204_____
14	22	LOCK NUT 3/4" HEX	206270000
TRUCK STOCK ITEMS			
ITEM	QTY	DESCRIPTION	STOCK #
A	1	CONNECTOR WEDGE 1/0-1/0	224106000



TOP VIEW

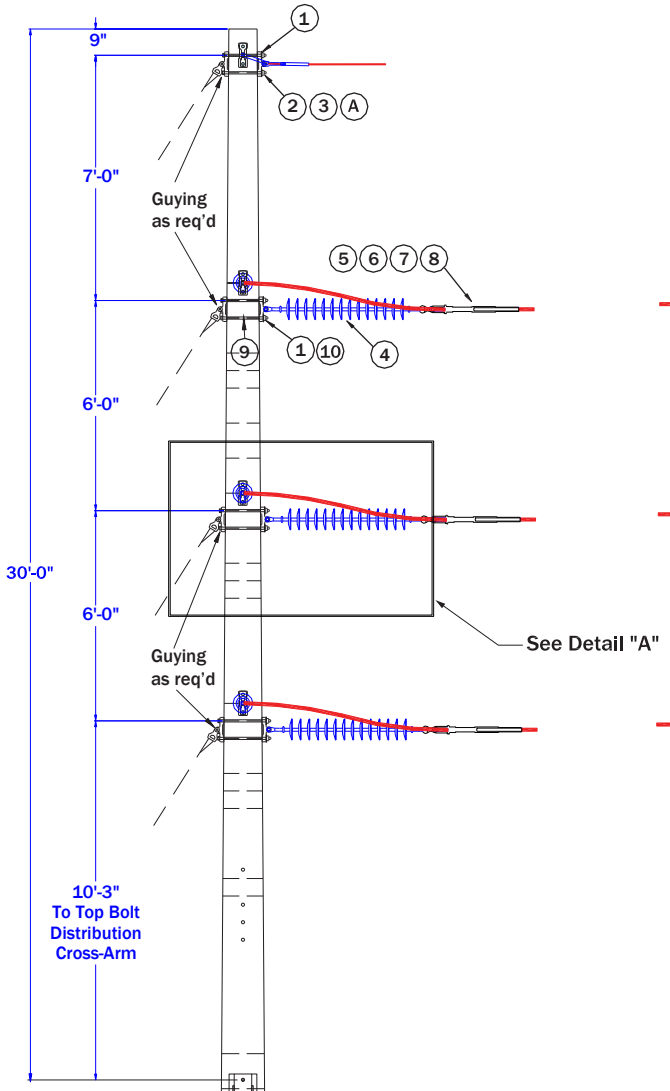
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

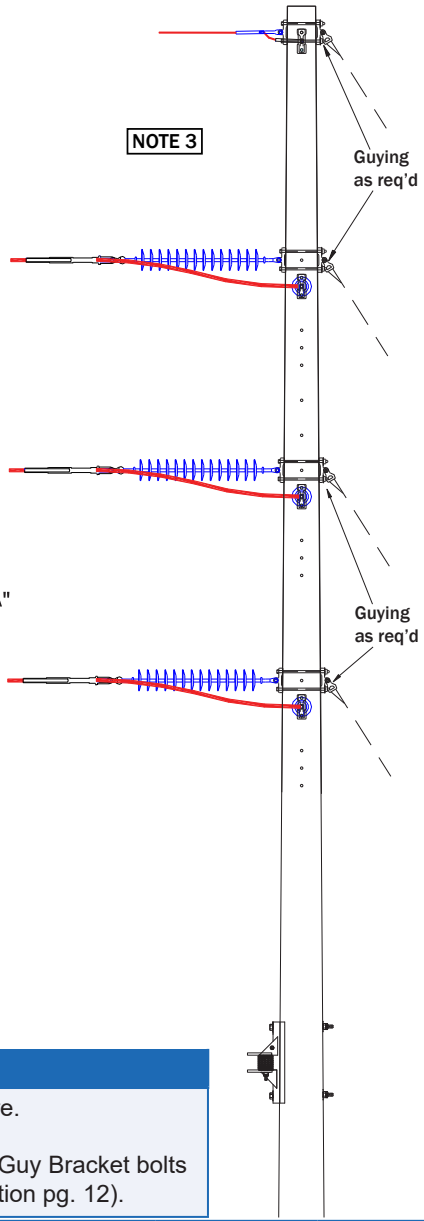
TRANSMISSION STANDARDS

NES

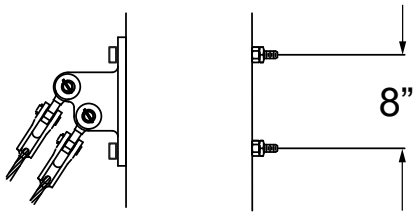
10° TO 60° ANGLE DOUBLE DEAD-END (MTR'LS)

T69VDD60-DK



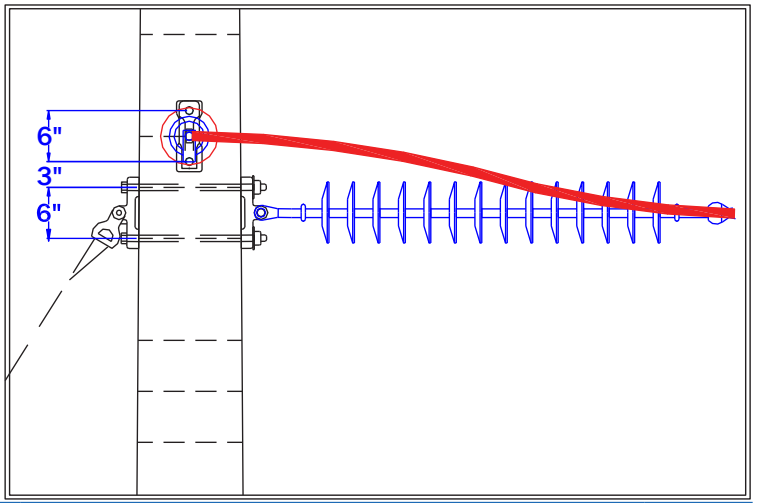


NOTE 3
CAUTION: ALTERNATE DOUBLE GUYING TEE MOUNTS USING 1-INCH DIA. HIGH STRENGTH A325 BOLTS



OGD12DBL

DETAIL "A"



NOTE

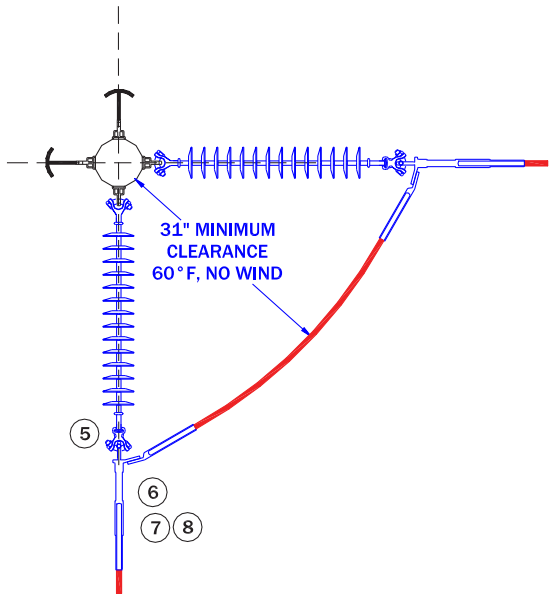
1. Requires 25 Ohms or less grounding resistance at structure.
2. See next page for Material Item List.
3. Consult with Transmission Line Engineer on Alternate Dbl Guy Bracket bolts (see A325 High Strength Bolts in the General Framing section pg. 12).

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

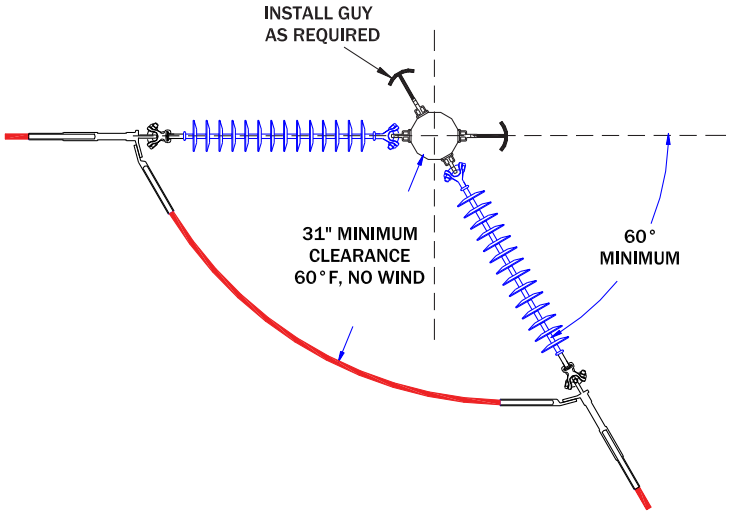
NES

60° TO 90° ANGLE DOUBLE DEAD-END

FRM. CODE	T69VDD90-DK	MAJOR AND MINOR MATERIAL ITEM LIST	
ITEM	QTY	DESCRIPTION	STOCK #
1	8	DEAD END TEE	230180000
2	2	Y-CLEVIS BALL	181208000
3	2	CLAMP STRAIN 1/0-4/0	221120000
4	6	INSUL, SUSP, 115/69KV, Y-CLEVIS/BALL	242758000
5	6	Y-CLEVIS SOCKET, 30,000 LB	181212000
6	6	COMPRESSION DEADEND, 795 KCM DRAKE ACSS	221310000
7	12	JOINT COMPOUND, HIGH TEMP., FOR COMPRESSION FITTINGS	400501000
8	2	JOINT COMPOUND, HIGH TEMP., FOR BOLTED CONNECTIONS	400500000
9	16	BOLT, DOUBLE ARMING 3/4" (VARIOUS LENGTHS)	201_____
10	32	LOCK NUT 3/4" HEX	206270000
TRUCK STOCK ITEMS			
ITEM	QTY	DESCRIPTION	STOCK #
A	1	CONNECTOR WEDGE 1/0-1/0	224106000



TOP VIEW - 90 ANGLE



TOP VIEW - 60 ANGLE

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

TRANSMISSION STANDARDS

NES

60° TO 90° ANGLE DOUBLE DEAD-END (MTR'LS)

T69VDD90-DK

PRIMARY METERING

APPROVALS

ISSUE DATE	ENGINEER	SUPERVISOR	MANAGER
2/3/25	Henry Dunning	Ronald Reasonover	Leonard Leech

TABLE OF CONTENTS

TITLE	PAGE	REV	DATE	DESCRIPTION
GENERAL NOTES & COPPER JUMPER AMPACITY	2			
1-PHASE METER 23.9 kV (WYE) STANDARD FRAMING	3			
1-PHASE METER 23.9 kV (WYE) STANDARD MATERIALS	4			
3-PHASE METER 13.8 kV (DELTA) STANDARD FRAMING	5			
3-PHASE METER 13.8 kV (DELTA) STANDARD MATERIALS	6			
3-PHASE METER 23.9 kV (WYE) STANDARD FRAMING	7			
3-PHASE METER 23.9 kV (WYE) STANDARD MATERIALS	8			
3-PHASE METER 23.9 kV (WYE) 800 AMP FRAMING	9			
3-PHASE METER 23.9kV (WYE) 800A STANDARD MATERIALS	10			

GENERAL NOTES

LINE CREW

1. Coordinate with Meter Department to provide Meter Cluster prior to scheduling line work.
2. The Line crew installs the Primary Meter Cluster on the load side of the pole toward the customer's service.
3. Use #2 or larger copper conductor for all jumpers for high side connections to Metering Cluster based on metered line amperage.

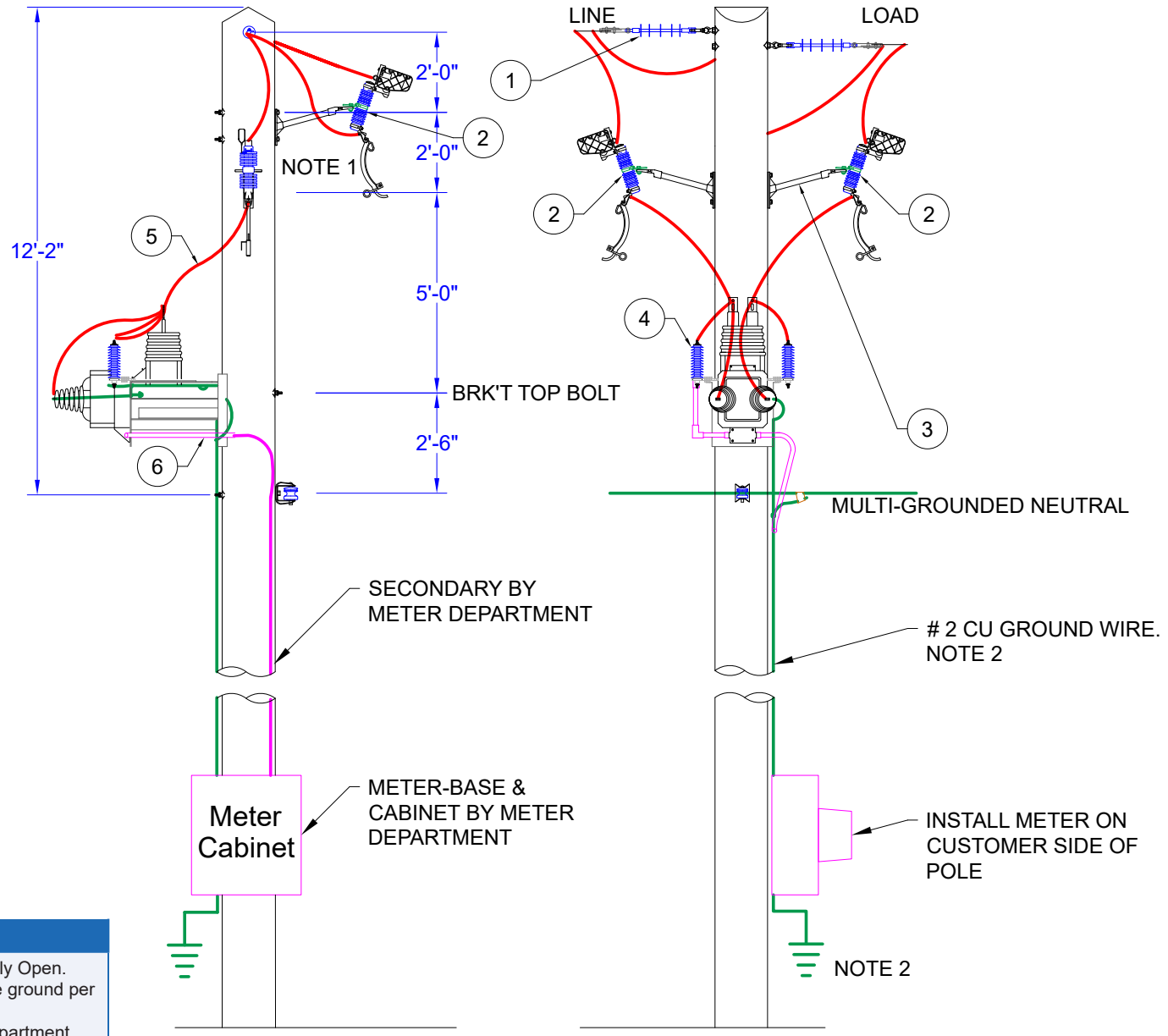
METER DEPARTMENT

1. Assemble the Primary Meter cluster for the specific customers point of service.
2. Construct low voltage wiring and pole mounted meter base.

ENGINEERING

1. Coordinate the protection scheme (Fuse type or Recloser) with Distribution/Protection Engineering Group.
2. Select the proper jumper and By-pass switch for the line service amperage as required.
3. Create Meter Department Work Order to capture changes for materials and labor (All estimates to include Meter installation cost).

COPPER WIRE AMPACITY RATING	
BARE COPPER	
AMBIENT 25°C OR 77°F CONDUCTOR 90°C OR 195°F	
WIRE SIZE	**MAX AMPS**
#6	125
#4	170
#2	230
1/0	310
4/0	480
300MCM	610
500MCM	810
1000MCM	1240



NOTES

1. By-Pass Disconnect Switch Normally Open.
2. Install grounding electrode and pole ground per the Grounding section.
3. Meter cluster provided by Meter Department.

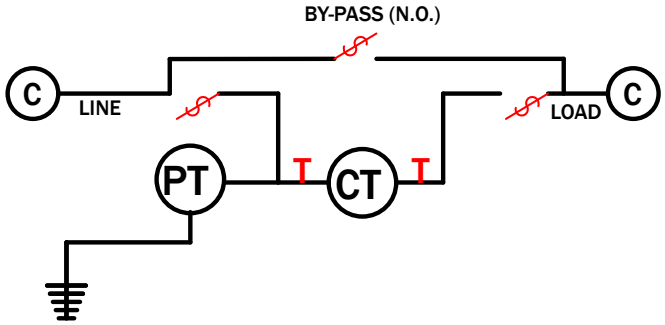
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

1-PHASE METER
23.9 KV (WYE)
STANDARD FRAMING

PRIMARY METERING

LINE DEPARTMENT WORK				
TASK	**CU**	**DESCRIPTION**	**QTY**	**COMMENTS**
INSTALL FRAMING				
ITEM 1	O1WV-DE	FRM 1P, WOOD, VERT, 2-1/0; WD, DBL DEAD END	2	
INSTALL METERING EQUIPMENT BY-PASS & ISOLATION SWITCHES				
ITEM 2	OSWD3L	SWITCH, DISCONNECT, 300A LB	3	
INSTALL CUTOUT BRACKETS				
ITEM 3	OBAC	BRACKET, ARRESTER AND CUTOUT, FG, 18",CB"	3	
INSTALL ARRESTERS				
ITEM 4	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	2	SELECT ONE
	OLA3	3kV SURGE ARRESTERS FOR 4kV AREA	2	
INSTALL JUMPER WIRES				
ITEM 5	OCCH-2	CABLE CU BHD 2 7S (100 OR 200 AMP)	30	SELECT ONE
	OCCH-10	CABLE CU BHD 1/0 7S (300 AMP)	30	
INSTALL METERING EQUIPMENT				
	OLAB-LINEMAN	LABOR ONLY	10	
INSTALL POLE GROUNDING ELECTRODES				
	OLAB-POLEMAN	LABOR ONLY	5	
METER DEPT TASKS				
INSTALL PRIMARY METER				
ITEM 6	N/A	METER MTR'L & LABOR COST PROVIDED BY METER DEPARTMENT		



ONE-LINE DIAGRAM

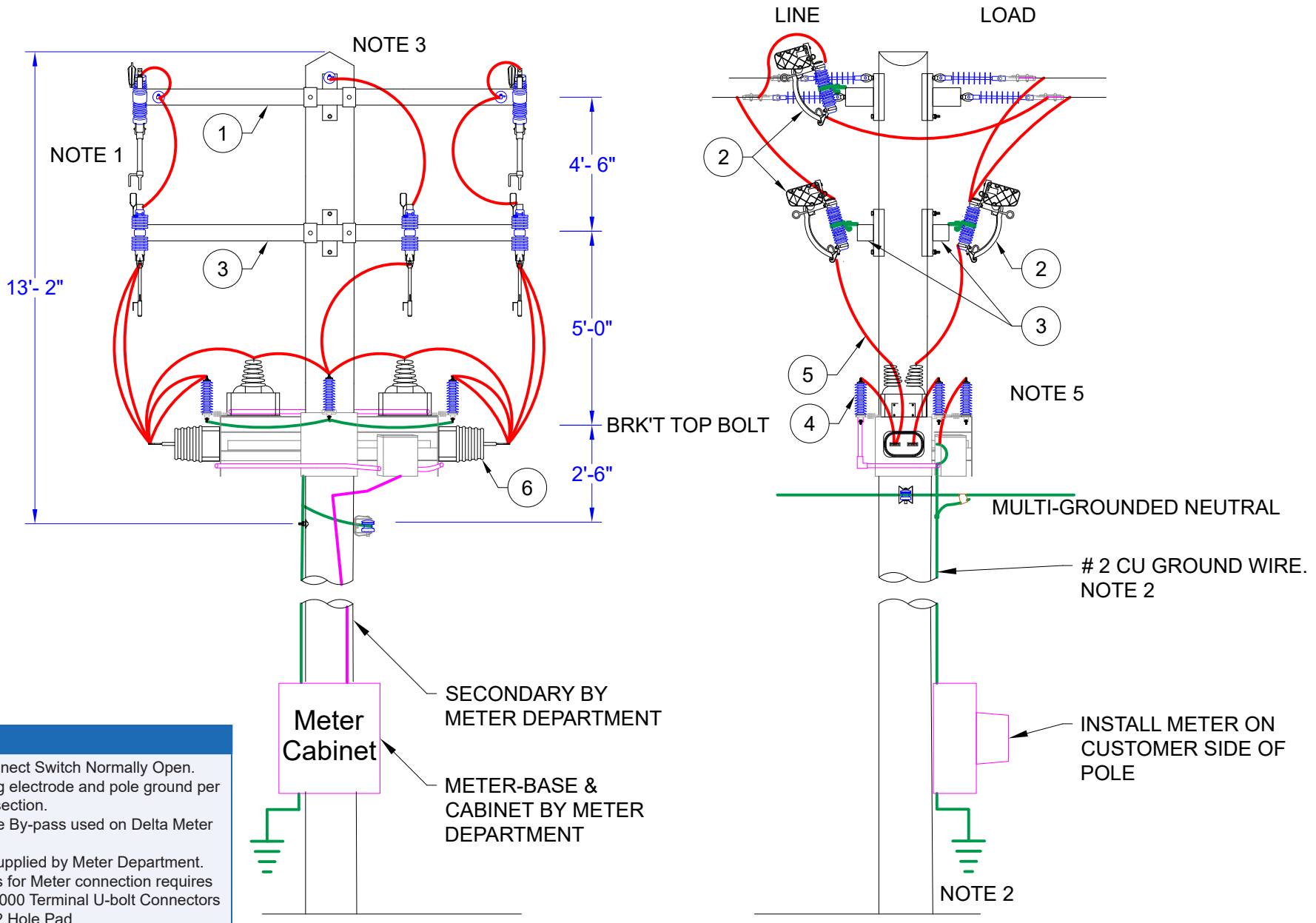
NOTES

1. Meter Cluster supplied by Meter Department.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

1-PHASE METER
23.9 KV (WYE)
STANDARD MATERIALS



NOTES

1. By-Pass Disconnect Switch Normally Open.
2. Install grounding electrode and pole ground per the Grounding section.
3. No center phase By-pass used on Delta Meter Framing.
4. Meter Cluster supplied by Meter Department.
5. 500 CU jumpers for Meter connection requires Stock # 233300000 Terminal U-bolt Connectors (300-500) with 2 Hole Pad.

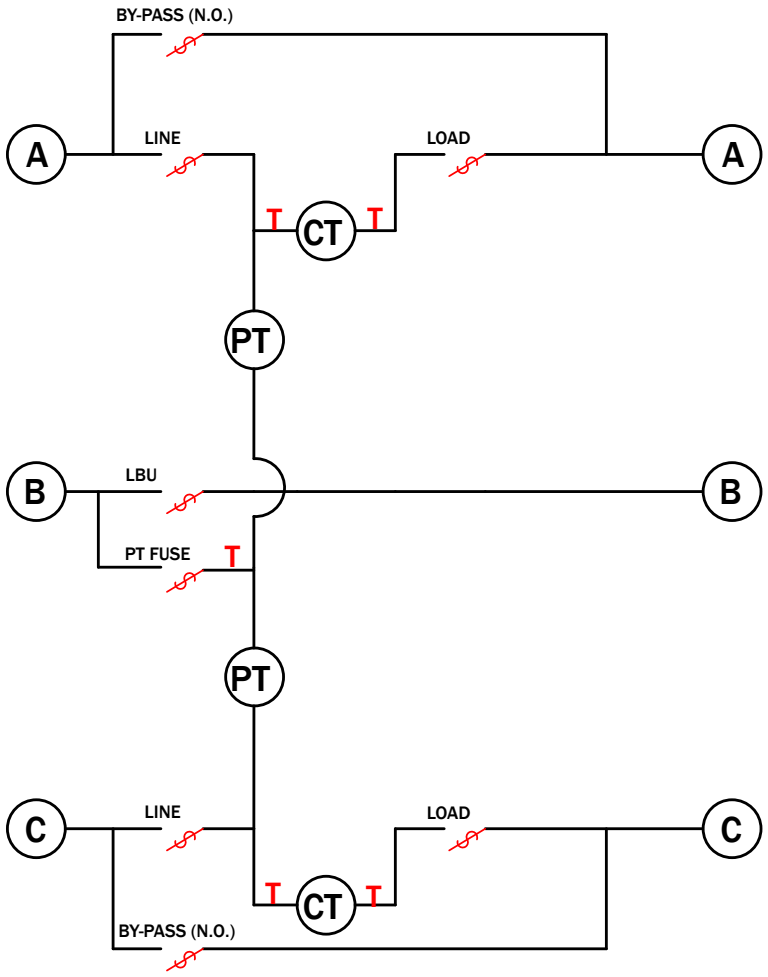
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

3-PHASE METER
13.8 KV (DELTA)
STANDARD FRAMING

PRIMARY METERING

LINE DEPARTMENT WORK				
TASK	**CU**	**DESCRIPTION**	**QTY**	**COMMENTS**
INSTALL FRAMING				
ITEM 1	O3xx-DD-xxx	SELECT FRAMING BASED ON LINE CONDUCTOR	1	
INSTALL METERING EQUIPMENT BY-PASS & ISOLATION SWITCHES				
ITEM 2	OSWD3L	SWITCH, DISCONNECT, 300A LBU	8	SELECT ONE
	OSWD6	SWITCH, DISCONNECT, 600A CUTOUT	8	
INSTALL CROSSARMS FOR CUTOUTS				
ITEM 3	OXF10	X-ARM, FG, SINGLE,BRACELESS, STD. DUTY	2	
INSTALL CROSSARMS FOR CUTOUTS				
ITEM 4	OLA12	12 kV SURGE ARRESTERS FOR 13.8kV AREA	6	
INSTALL STINGER WIRE				
ITEM 5	OCCH-2	CABLE CU BHD 2 7S (100 OR 200 AMP)	90	SELECT ONE
	OCCH-10	CABLE CU BHD 1/0 7S (300 AMP)		
	OCCM-500	CABLE CU BMD 500 MCM 19S (600 AMP)		
INSTALL METERING EQUIPMENT				
	OLAB-LINEMAN	LABOR ONLY	10	
INSTALL POLE GROUNDING ELECTRODES				
	OLAB-POLEMAN	LABOR ONLY	5	
METER DEPARTMENT WORK				
INSTALL PRIMARY METER				
ITEM 6	N/A	METER MTR'L & LABOR COST PROVIDED BY METER DEPARTMENT		



ONE-LINE DIAGRAM

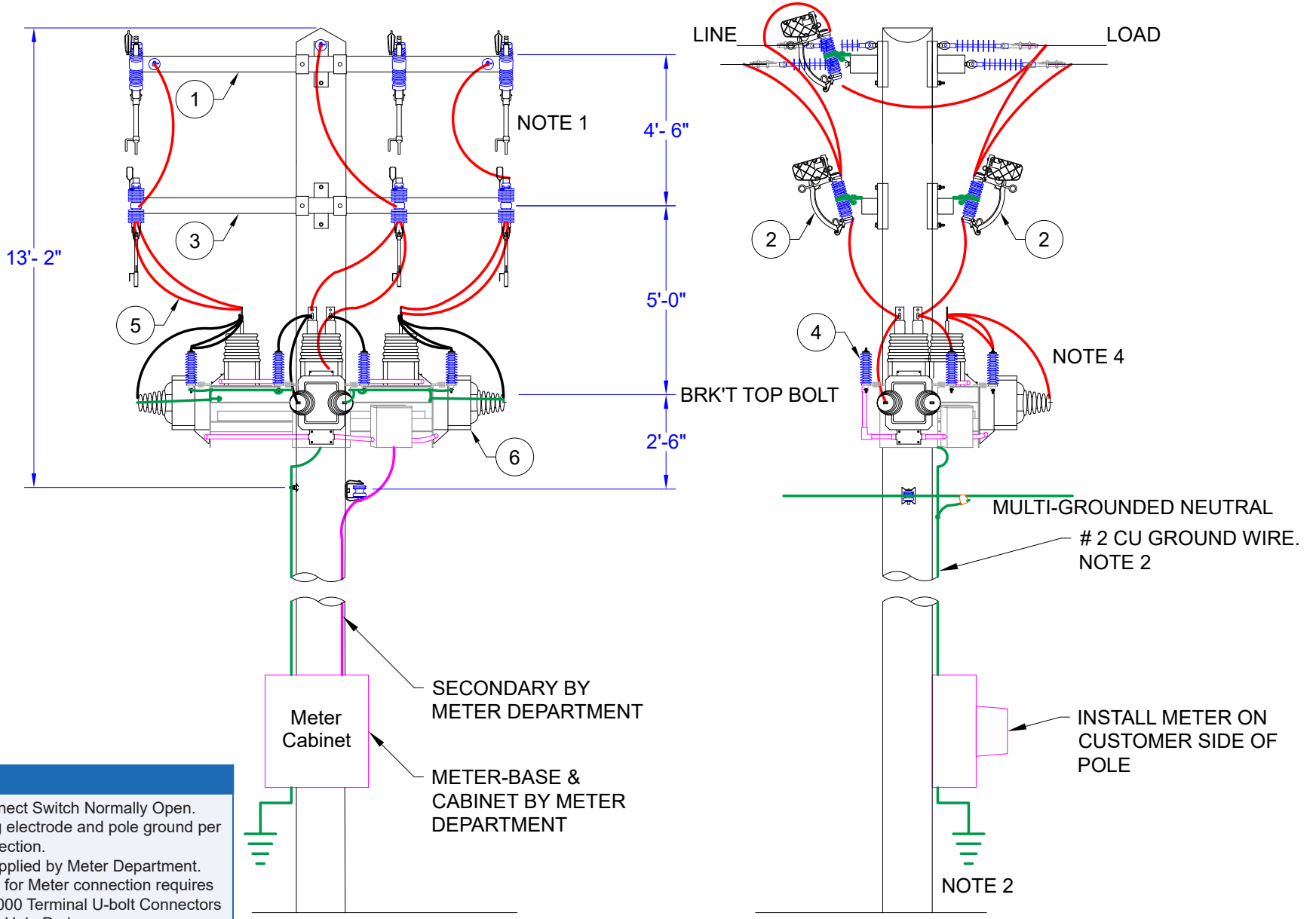
NOTES

1. Meter Cluster supplied by Meter Department.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

3-PHASE METER
13.8 KV (DELTA)
STANDARD MATERIALS



NOTES

1. By-Pass Disconnect Switch Normally Open.
2. Install grounding electrode and pole ground per the Grounding section.
3. Meter cluster supplied by Meter Department.
4. 500 CU jumpers for Meter connection requires Stock # 233300000 Terminal U-bolt Connectors (300-500) with 2 Hole Pad.

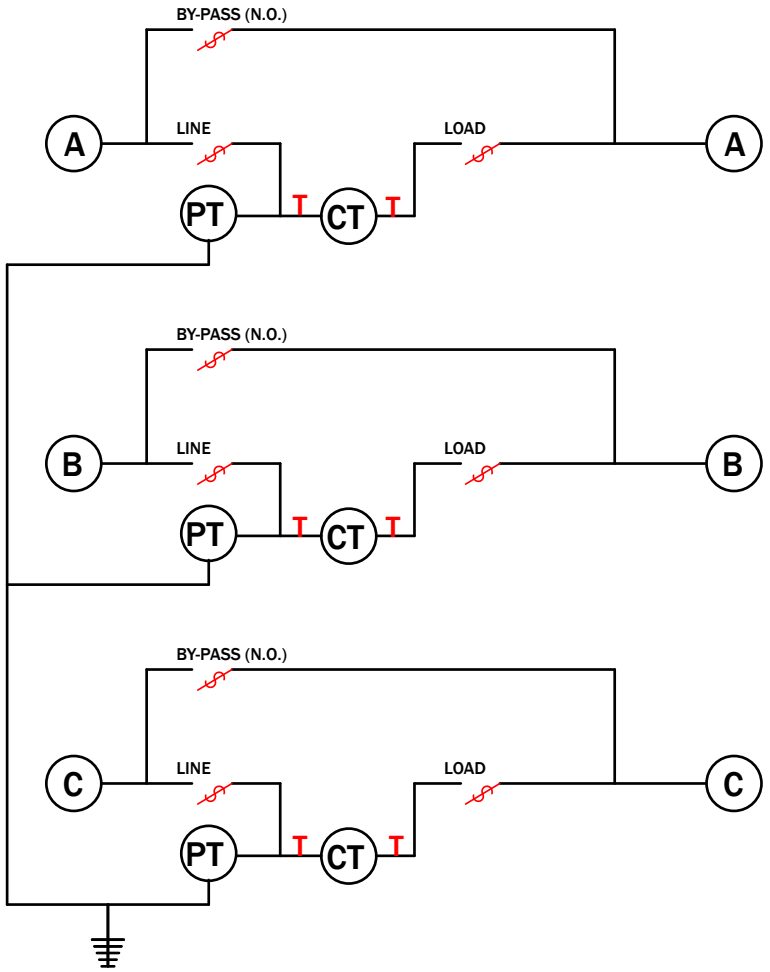
REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

3-PHASE METER
23.9 KV (WYE)
STANDARD MATERIALS

PRIMARY METERING

LINE DEPARTMENT WORK				
TASK	**CU**	**DESCRIPTION**	**QTY**	**COMMENTS**
INSTALL FRAMING				
ITEM 1	O3xx-DD-xxx	SELECT FRAMING BASED ON LINE CONDUCTOR	1	
INSTALL METERING EQUIPMENT BY-PASS & ISOLATION SWITCHES				
ITEM 2	OSWD3L	SWITCH, DISCONNECT, 300A LBU	9	SELECT ONE
	OSWD6	SWITCH, DISCONNECT, 600A CUTOUT	9	
INSTALL CROSSARMS FOR CUTOUTS				
ITEM 3	OXF10	X-ARM, FG, SINGLE,BRACELESS, STD. DUTY	2	
INSTALL ARRESTERS				
ITEM 4	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6	SELECT ONE
	OLA3	3kV SURGE ARRESTERS FOR 4kV AREA	6	
INSTALL STINGER WIRE				
ITEM 5	OCCH-2	CABLE CU BHD 2 7S (100 OR 200 AMP)	90	SELECT ONE
	OCCH-10	CABLE CU BHD 1/0 7S (300 AMP)		
	OCCM-500	CABLE CU BMD 500 MCM 19S (600 AMP)		
INSTALL METERING EQUIPMENT				
	OLAB-POLEMAN	LABOR ONLY	5	
INSTALL POLE GROUNDING ELECTRODES				
	OLAB-LINEMAN	LABOR ONLY	10	
METER DEPARTMENT WORK				
INSTALL PRIMARY METER				
ITEM 6	N/A	METER MTR'L & LABOR COST PROVIDED BY METER DEPARTMENT		



ONE-LINE DIAGRAM

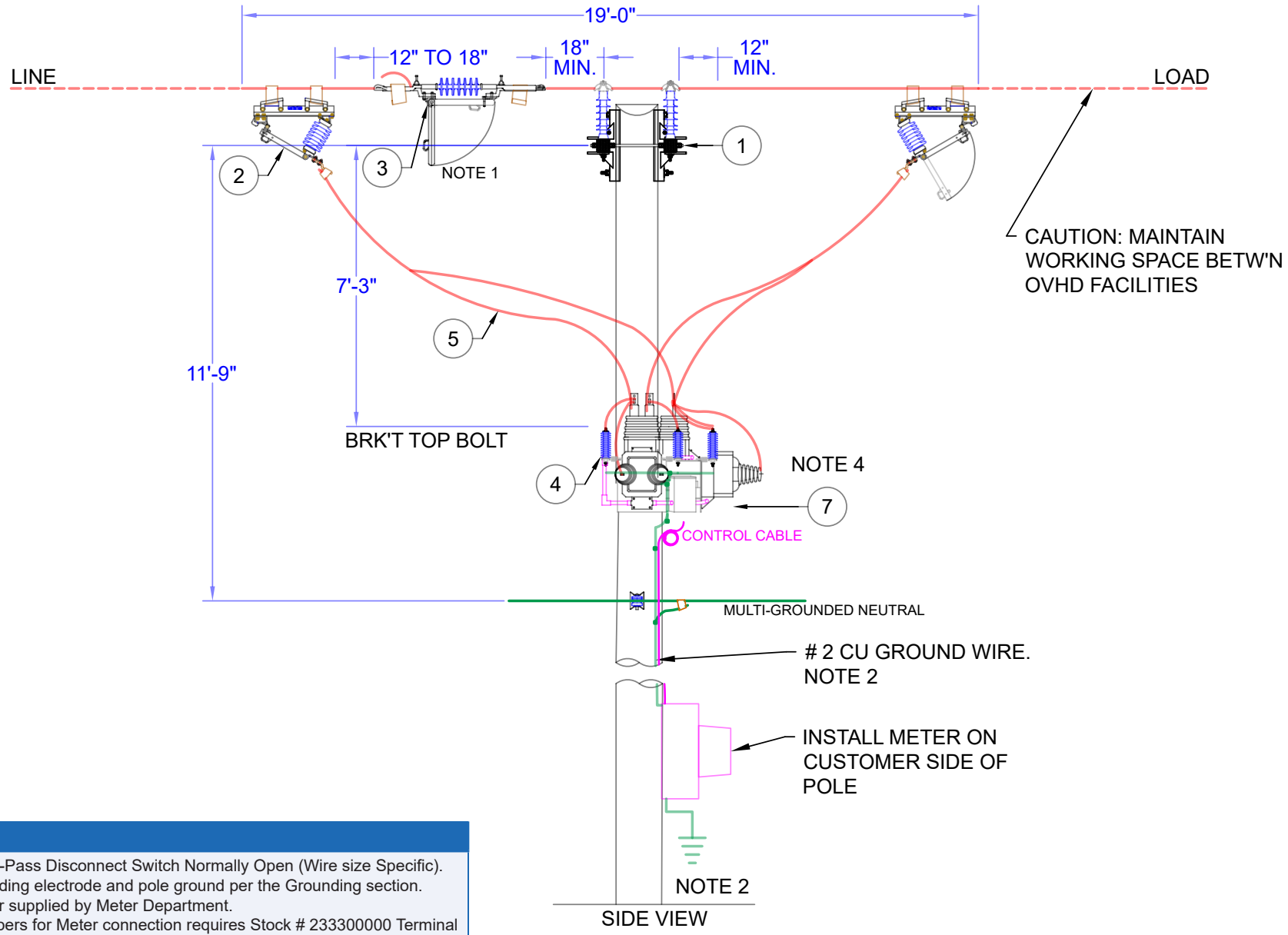
NOTES

1. Meter Cluster supplied by Meter Department.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

3-PHASE METER
23.9 KV (WYE)
STANDARD MATERIALS



NOTES

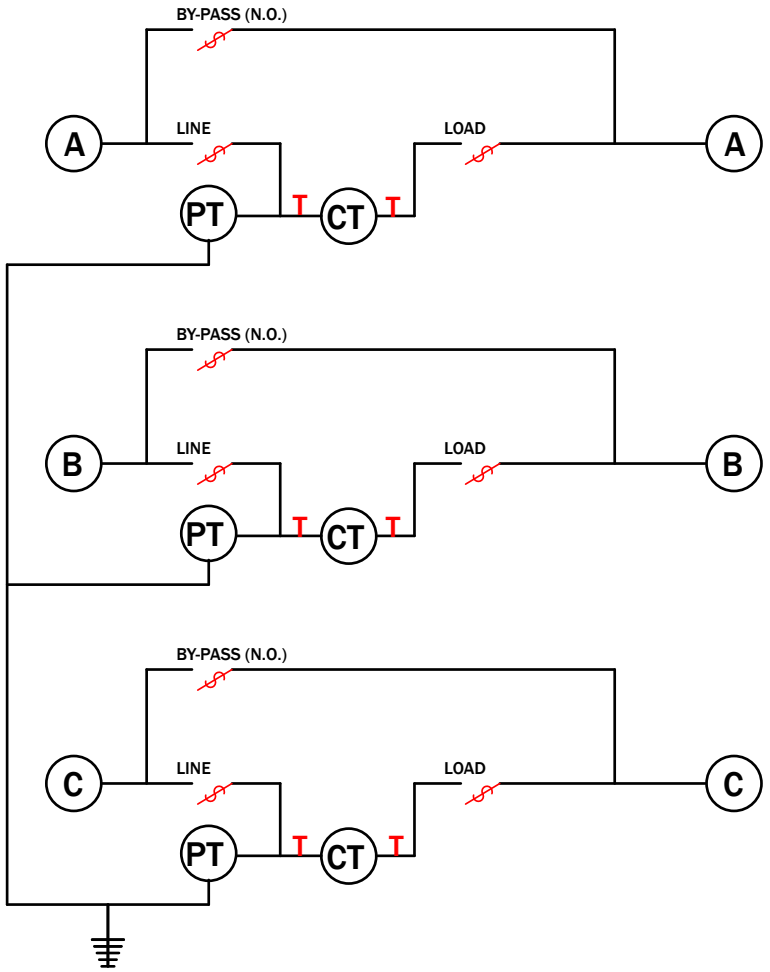
1. 900 AMP By-Pass Disconnect Switch Normally Open (Wire size Specific).
2. Install grounding electrode and pole ground per the Grounding section.
3. Meter cluster supplied by Meter Department.
4. 500 CU jumpers for Meter connection requires Stock # 233300000 Terminal U-bolt Connectors (300-500) with 2 Hole Pad.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

3-PHASE METER
23.9 KV (WYE)
800 AMP FRAMING

LINE DEPARTMENT WORK				
TASK	**CU**	**DESCRIPTION**	**QTY**	**COMMENTS**
INSTALL FRAMING				
ITEM 1	O3xx-HL-xxx	SELECT FRAMING BASED ON LINE CONDUCTOR	2	
INSTALL METERING EQUIPMENT BY-PASS SWITCHES				
ITEM 2	OSWD9-NL336	SWITCH, DISCONNECT, 900A IN LINE 336ACSR	3	SELECT ONE
	OSWD9-NL477	SWITCH, DISCONNECT, 900A IN LINE 477ACSR	3	
	OSWD9-NL795	SWITCH, DISCONNECT, 900A IN LINE 795ACSR	3	
INSTALL METERING EQUIPMENT ISOLATION SWITCHES				
ITEM 3	OSWD9-LT	SWITCH, DISCONNECT, 900A LINE TAP	6	
INSTALL ARRESTERS				
ITEM 4	OLA18	18kV SURGE ARRESTERS FOR 23.9kV AREA	6	SELECT ONE
	OLA3	3kV SURGE ARRESTERS FOR 4kV AREA	6	
INSTALL STINGER WIRE				
ITEM 5	OCCM-500	CABLE CU BMD 500 MCM 19S	90	
INSTALL METERING EQUIPMENT				
	OLAB-LINEMAN	LABOR ONLY	10	
INSTALL POLE GROUNDING ELECTRODES				
	OLAB-POLEMAN	LABOR ONLY	5	
METER DEPARTMENT WORK				
INSTALL PRIMARY METER				
ITEM 7	N/A	METER MTR'L & LABOR COST PROVIDED BY METER DEPARTMENT		



ONE-LINE DIAGRAM

NOTES

1. Meter Cluster supplied by Meter Department.

REV.	ENG.	DESCRIPTION OF CHANGE	DATE

NES

3-PHASE METER
23.9 KV (WYE)
800 AMP MATERIALS