PROJECT DESIGN CRITERIA

Calico – Grassy Mountain 34.5kV Distribution Line

Calico Resources Corp.

Vale, OR
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DESIGN CRITERIA DOCUMENT REVISION PAGE

Project Name: Calico – Grassy Mountain 34.5kV Distribution Line
Project Number: 10415316

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Status	Rev No.	Date	Prepared By	Pages	Description of Changes	Approved Name and Date
Preliminary	0	04-05-19	HDR/MAN	1-4	Document Origination	
Preliminary	1	04-30-21	HDR/DJW	1-5	Added Section 7 “Avian Protection & Mitigation” Added Appendices A,B, &C	
30% Design	2	02-28-25	HDR/BAP	1-12	Updated Design Criteria Document per NESC & IPC standards	

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Tables

Figures

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Appendices

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1. Description

HDR Transmission was tasked with creating a PLS-CADD model and submittal package for Paramount Nevada Gold in conjunction with Idaho Power to connect a new 34.5kV distribution line from the existing Idaho Power Hope substation to the location of the Calico Mine substation.

The estimated 25-mile distribution and transmission line can be labeled with 2 distinct portions. The first 6 miles of the line has been designated as the rebuild section that ranges from Hope Substation to structure number 131. Survey information that relates to the initial 6 miles of the route was provided by Global Mapper NED Data. The remaining 19 miles of the line are designated as the new construction 34.5kV distribution line. Survey information that relates to the remaining portion of the route was provided by Paramount Nevada Gold via drone LiDAR and contours.

It is assumed that the rebuild section will utilize the existing 69kV and 12.5kV conductors and hardware where applicable as well as replace all A poles to accommodate the new 34.5kV distribution that is to be installed. Certain poles have been identified that require self-supporting steel poles while the rest will be replaced with Douglass Fir wood poles between class 4 and class H2. Additional structures were spotted and deemed necessary to maintain clearances between then 34.5kV circuit and then 12.5kV circuit for the roughly 1.5 miles of the rebuild route that follows Central Oregon Highway.

2. Codes and Standards

The design will comply with the requirements of the codes and standards of the National Electrical Safety Code (NESC), 2023 Edition, Idaho Power Company 2024 Overhead Manual and the Idaho Power Company 2024 Transmission Manual. Where this Design Criteria document differs from these standards, this document will govern the design.

Software Versions Used in Design:

- PLS-CADD Version 19.01
- AutoCAD 2024

3. Supporting Structures

The line shall be constructed using guyed wood pole structures. These structures shall be designed using Douglas Fir poles and will be based on standard Idaho Power Company structure types. The conductor will be supported using polymer insulators on all structures. Laminated wood will be used for switch poles. Tangent structures will be directly embedded 10% of the pole length plus 2 feet unless otherwise specified at specific structure locations on the plan and profile and staking tables. Backfill material shall be select backfill or an engineer approved alternative.

The framing for the new construction distribution line was based on Idaho Power standards for new 34.5kV structures with avian protection and utilize Grade C construction standards. Idaho Power classifies all of their structure framing into 3 avian protection zones. Zone 1 designated structures

have NO avian protection. Zone 2 designated structures are protected for hawks and owls. Zone 3 designated structures are protected for any type of bird including eagles. Calico-Grassy Mountain was designed for Zone 3 avian protection. The following structure types were utilized in the design process and were modified based on avian safe standards:

- Typical tangent structures (3-ϕ Tangent – 10’ Crossarm 2-Up) for 34.5kV construction: Overhead Distribution Manual 11-20-06 & 11-20-07
    - Basic structure framing is considered to be Zone 2 avian safe.
    - All structures in this category were design modified to adhere to the specifications for 10’ crossarms outlined in Overhead Distribution Manual 11-33-01 to obtain Zone 3 avian protection
- Typical angle structures (3-ϕ Angle – Double Crossarm 3-Up) for 34.5kV construction up to 10.9° angles for 336 AAC conductor: Overhead Distribution Manual 11-22-26 & 11-22-27
    - Guying is required and was modeled with the assumption of 1/2" EHS guy wire and helical screw anchors.
    - Basic structure framing is NOT considered to be avian safe
    - All structures falling under this category were design modified to utilize insulator covers as outlined in Overhead Distribution Manual 11-34-01and 11-31-03 to obtain Zone 3 avian protection
- Typical inline deadend structures (3-ϕ Angle– Double Deadend 3-Up) for 34.5kV construction up to 30.0° angles for 336 AAC conductor: Overhead Distribution Manual 11-22-28 & 11-22-29
    - Bisecting angle guys are utilized when appropriate for this type of deadend. Any guying will consist of 1/2" EHS steel and helical screw anchors.
    - Basic structure framing is designated as Zone 1 avian protection.
    - All structure falling under this category will require modifications outlined in Overhead Distribution Manual 11-34-05 to obtain Zone 3 avian protection.
- Typical deadend structure (3-ϕ Deadend – Corner for 336 or 795) for 34.5kV construction: Overhead Distribution Manual 11-21-06 & 11-21-07
    - Guying is required and was modeled with the assumption of 1/2" EHS guy wire and helical screw anchors.
    - Basic structure framing designated as Zone 1 avian protection
    - All structures falling under this category were design modified as outlined in Overhead Distribution Manual 11-33-03 to obtain Zone 3 avian protection.

The framing for the rebuild portion of this project is based on a combination of Idaho Power standards due to triple circuit structures being atypical. The existing structures that are being replaced on this line consist of one 69kV transmission circuit and one 12.5kV distribution underbuild circuit from structure 1 to structure 51 and utilize Grade B construction standards. Both circuits originate from Hope Substation. It is assumed that all existing poles will be replaced and relocated to appropriate locations that adhere to Idaho Power standards for Transmission construction with the assumption that existing equipment (neutral connections, transformers, fuses, etc.) on the poles will be reused once a pole replacement has been made.

- Typical tangent structures are based from Transmission Manual 01-350-01 and Overhead Manual 11-25-02. The spacing between the existing 69kV circuit and the new 34.5kV circuit was designated to be 10’-0” and the spacing between the 34.5kV circuit and the existing 12.5kV circuit was designated to be at minimum 9’-0”.
    - All structures require Zone 3 avian protection modifications that will include insulator covers.
- There is no 34.5kV inline deadend framing called out for all structures between structure 1 and structure 51.

The remaining rebuild portion of the line from structures 52 – 132 will include a new 34.5kV circuit and the continuation of the existing 12.5kV circuit and utilize Grade C construction standards. The typical framing for the new 34.5kV circuit was based on the Overhead Distribution Manual 11-25-02. To adhere to the required Zone 3 avian protection requirements, Overhead Distribution Manual 11-34-06 was utilized.

The referenced Idaho Power framing standards can be found in Appendix A – Idaho Power Structure Framing Standards.

The referenced Idaho Power avian protection standards, structure modifications, and wildlife protection materials can be found in Appendix B – Idaho Power Avian Protection Standards

4. Route Consideration

The beginning of the route will originate at Hope substation, roughly 7 miles from Vale, OR, and follow existing transmission and distribution lines that are owned by Idaho Power. The current route will follow along Central Oregon highway until Hope Road. From that point on, the route will continue through private land, crossing over Recla Drive up to Russell and Fulleton Road. The remainder of the route will follow Russell Road which eventually turns into Cow Hollow Road. Permitting for this route has not been completed making this route tentative and subject to change.

For the new construction distribution line, there were multiple things to take into consideration to spot and designate structure locations. The following were examined:

- The existing access road alignment that continues off of Russell Rd and Cow Hollow Rd.
- A new road alignment will be constructed to allow for access to new the Calico – Grassy Mountain mine built by Paramount Nevada Gold. The new road alignment has been provided and is included in the PLS-CADD model. The alignment follows the existing alignment with slight deviations that provide for easier mining truck access. The new construction distribution line maintains Idaho Power and NESC clearances for guys and structures based on the provided road alignment AutoCad file.
- The terrain that the existing and new road alignment traverses is comprised of rolling hills as well as water wash outs. Due to the close proximity of these washouts/trenches to the new line, structure spotting was optimized to avoid these areas with as much buffer as possible.
- Due to permitting restrictions from BLM, there is a permitting area that confined the new design to be roughly within a 300’ width area that is 150’ from the centerline of the existing road.

5. Weather Cases

Table 1. Weather Cases

Weather Case	Ice in	Ice Density lbs/ft^3	Wind psf (mph)	Temperature °F
NESC Medium [1]	0.25	56	4 (39.5)	15
NESC Extreme Wind [2]	None		20.7 (90)	60
NESC Concurrent Ice & Wind	0.25	56	4.1 (40)	15
32 Deg F/ 0.25" ice	0.25	56	None	32
145 Deg F	None		None	145 wire, 90 ambient
185 Deg F	None		None	185 wire, 90 ambient
212 Deg F	None		None	212 wire, 90 ambient
NESC Blowout 6 PSF	None		6 (48.41)	60
No Wind (Swing 1)	None		None	60
Moderate Wind (Swing 2)	None		6 (48.41)	32
Moderate Wind (Swing 3)	None		6 (48.41)	60
High Wind (Swing 4)	None		14.63 (75.6)	60
Deflection	None		2 (27.95)	60
Galloping (Swing)	0.5	56	2 (27.95)	32
Galloping (Sag)	0.5	56	None	32
Cold Uplift	None		None	0
NESC Tension Limit	None		None	15

1. Constant K = 0.20 lbs/ft
2. NESC 2023 'Wire Wind Height Adjust Model.'

6. Loading Criteria – Grade B & C Construction

A. Wood Poles & Laminated Wood Poles

Table 2. Wood Pole Loading Criteria

Load Case	Weather Case	Cable Condition	Overload Capacity Factors (OCF)			Strength Reduction Factors				
			Wind	Wire Tension	Vertical	LAM Poles	Wood Poles	Wood Crossarms	Guy & Cable Wire	Conductor Support Hardware
RULE 250B GRADE B (1)(7)	NESC Medium	Initial	2.50	1.65	1.50	1.00	0.65	0.65	0.90	2.0
RULE 250C GRADE B (1)(4)(7)	NESC Extreme Wind	Initial	1.00	1.00	1.00	1.00	0.75	0.75	0.90	1.6
RULE 250D GRADE B (1)(7)	NESC Concurrent Ice & Wind	Initial	1.10	1.10	1.10	1.00	0.75	0.75	0.90	1.6
RULE 250B GRADE C (2)(7)	NESC Medium	Initial	1.75	1.30	1.90	1.00	0.85	0.85	0.90	2.0
RULE 250C GRADE C (2)(4)(5)(7)	NESC Extreme Wind	Initial	1.00	1.00	1.00	1.00	0.75	0.75	0.90	1.6
RULE 250D GRADE C (2)(7)	NESC Concurrent Ice & Wind	Initial	1.00	1.00	1.00	1.00	0.75	0.75	0.90	1.6
RULE 250B GRADE C CROSSING (3)(7)	NESC Medium	Initial	2.20	1.30	1.90	1.00	0.85	0.85	0.90	2.0
RULE 250C GRADE C CROSSING (3)(4)(6)(7)	NESC Extreme Wind	Initial	1.00	1.00	1.00	1.00	0.75	0.75	0.90	1.6
RULE 250D GRADE C CROSSING (3)(6)(7)	NESC Concurrent Ice & Wind	Initial	1.00	1.00	1.00	1.00	0.75	0.75	0.90	1.6
Uplift (7)	Cold Uplift	Initial	1.00	1.00	1.00	1.00	1.00	N/A	0.90	2.0
RULE 277 250 B (7)	NESC Medium	Initial	1.00	1.00	1.00	N/A	N/A	N/A	N/A	1.00
RULE 277 250C (7)	NESC Extreme Wind	Initial	1.00	1.00	1.00	N/A	N/A	N/A	N/A	1.00
RULE 277 250D (7)	NESC Concurrent Ice & Wind	Initial	1.00	1.00	1.00	N/A	N/A	N/A	N/A	1.00
Deflection (5)(7)	Deflection	Initial	1.00	1.00	1.00	1.00	N/A	N/A	N/A	N/A

1. Grade B load case to be applied to all Transmission structures with distribution underbuild and to distribution poles as required by the NESC.
2. Grade C load cases to be applied to all distribution poles.
3. Grade C Crossing load cases to be applied to distribution poles where a line crosses another supply or communication line.
4. NESC 2023 'Wire Wind Height Adjust Model.'
5. Deflection for laminated wood switch poles shall be limited to 1% or less of the structure length from the top phase to switch handles.
6. Load case only applied to a structure if it or its supported facilities exceeds 60 ft above ground or water level.
7. Insulators derated in insulator properties.

7. Conductors

Calico – Grassy Mountain begins at Hope substation and terminates at the new Calico mine substation. Due to the anticipated loads provided by Paramount Nevada Gold, 336.4 AAC was selected as the 34.5kV circuit conductor. Paramount Nevada also requested that the poles carry an ADSS cable for internet and phone lines. The selected ADSS cable was conservatively sized since a specific cable was not identified by either Idaho Power or Paramount Nevada.

Table 3. Transmission Conductors

	69 kV Conductor	-	-
Wire Name	1 AWG 7 Strand Copper	-	-
Code Name	N/A	-	-
Weight	0.2584 lbs/ft	-	-
Diameter	0.3279 in.	-	-
Rated Tensile Strength (RTS)	3,800 lbs	-	-

Table 4. Distribution Conductors

	34.5 kV Conductor	12.5 kV Conductor	12.5 kV	Neutral	ADSS
Wire Name	336.4 kcmil 19/0 AAC	336.4 kcmil 19/0 AAC	4 AWG Solid Copper	336.4 kcmil 19/0	ADED1611-12-ES-096
Code Name	"Tulip"	"Tulip"	N/A	"Tulip"	N/A
Weight	0.316 lbs/ft	0.316 lbs/ft	0.126 lbs/ft	0.316 lbs/ft	0.117 lbs/ft
Diameter	0.666 in.	0.666 in.	0.2043 in.	0.666 in.	0.627 in.
Rated Tensile	6,150 lbs	6,150 lbs	1,970 lbs	6,150 lbs	4,048 lbs

8. Guys and Anchors

Table 5. Guying

	Guy	Diameter (in)	Unit Weight (lbs/ft)	Rated Tensile Strength (RTS) (lbs)
Transmission	3/8" E.H.S. 7 Strand Steel	0.360	0.273	15,400
	1/2" E.H.S. 7 Strand Steel	0.495	0.517	26,900
Distribution	3/8" E.H.S. 7 Strand Steel	0.360	0.273	15,400
	1/2" E.H.S. 7 Strand Steel	0.495	0.517	26,900

Table 6. Anchoring

	Helix Combination	Type	Soil Anchor Holding Strength [1] (lbs)	Soil Class at Rated Strength
Transmission	PISA 10" Helix	Round Shaft, 1" diameter	15,000 lbs	Class 5
	PISA 14" Helix	Round Shaft, 1" diameter	25,500 lbs	Class 5
Distribution [2]	PISA 10" Helix	Round Shaft, 1" diameter	15,000 lbs	Class 5
	PISA 14" Helix	Round Shaft, 1" diameter	25,500 lbs	Class 5

1. Soil class and holding strength based on Hubbell Power System's Chance, Encyclopedia of Anchoring.
2. Distribution shall use the same Anchors as Transmission.

9. Tension Criteria

Table 7. 69 kV Transmission Conductor

15° F, Initial, No Ice, No Wind	35%
15° F, Final, No Ice, No Wind	25%
NESC Medium	60%
NESC Extreme Wind	80%
NESC Concurrent Ice & Wind Loading	80%

#1 AWG 7 Copper

- #1 AWG 7 Copper shall be limited to 2280# tension at NESC Medium District Loading

Table 8. 34.5 & 12.5 kV Distribution Conductor

15° F, Initial, No Ice, No Wind	35%
15° F, Final, No Ice, No Wind	25%
NESC Medium	60%
NESC Extreme Wind	80%
NESC Concurrent Ice & Wind Loading	80%

#4 AWG 7 Copper

- #1 AWG 7 Copper shall be limited to 1725# tension at NESC Medium District Loading

4/0 ACSR "Quail"

- 4/0 "Quail" ACSR shall be limited to 1850# tension at NESC Medium District Loading

336 AAC "Tulip"

- 336 "Tulip" ACC shall be limited to 2,233# tension at NESC Medium District Loading

Table 9. Creep-Stretch

Weather Case for Final After Creep	60
Weather Case for Final After Load	NESC Medium & NESC Concurrent Ice & Wind

10. Air-Gap Criteria

Table 10. 69 kV Phase to Structure

	Wood Poles
No Wind (SWING 1), Final Tension	25”
Medium Wind (SWING 2), Initial Ten.	18”
High Wind (SWING 3), Final Ten.	5”
Medium Wind (SWING 4), Final Ten.	18”

Table 11. 69 kV Phase to Guy(1)

	Wood Poles
No Wind (SWING 1), Final Tension	25”
Medium Wind (SWING 3), Final Ten.	22”
High Wind (SWING 4), Final Tension	5”

1. These clearances may be reduced by not more than 25% to a guy insulator, provided that full clearance is maintained to its metallic end fittings, guy wires, and uninsulated portion of the guy.

Table 12. Distribution Phase to Structure

	34.5 kV Wood Poles	12.5 kV Wood Poles
No Wind (SWING 1), Final Tension	19”	9.5”
Medium Wind (SWING 2), Initial Ten.	11”	8”
Medium Wind (SWING 3), Final Ten.	11”	8”
High Wind (SWING 4), Final Ten.	3”	3”

Table 13. Distribution Phase to Guy(1)

	34.5 kV Wood Poles	12.5 kV Wood Poles
No Wind (SWING 1), Final Tension	19”	11”
Medium Wind (SWING 3), Final Ten.	13”	9.5”
High Wind (SWING 4), Final Ten.	3”	3”

1. These clearances may be reduced by not more than 25% to a guy insulator, provided that full clearance is maintained to its metallic end fittings, guy wires, and uninsulated portion of the guy.

11. Insulators and Conductor Attachment Hardware

Transmission and Distribution Insulators

Table 14. Distribution Insulators

Insulators	Manufacturer	MFR Part #	60 Hz Dry	60 Hz Wet	Impulse +	Impulse -	Section Length
34.5kV Tangent (1)	Required Performance		110	85	180	205	-
	Lapp	320275R70	100	50	150	170	-
12.47kV Tangent (1)	Required Performance		65	35	105	130	-
	Lapp	6183R70	55	30	90	110	-
34.5kV Deadend (1)	Required Performance		-	-	-	-	-
	Hubbell	401025-0215	155	135	270	280	18.75

1. Distribution insulators are supplied by IPCO and all data is internal to their system. Properties are assumed to be sufficient and IPCO has assumed that.

Table 15. Transmission Insulators

Insulators	Manufacturer	MFR Part #	60 Hz Dry	60 Hz Wet	Impulse +	Impulse -	Section Length
69kV Tangent (1)	Required Performance		200	180	360	440	-
	NGK-Locke	L1-SN151-46	255	215	360	400	27
	Ohio Brass	402069-0209	210	170	350	425	28
138kV Tangent (1)	Required Performance		500	445	740	835	-
	Ohio Brass	522009-1226	495	435	765	875	58
	Sediver	NBKV-510HX-1540	530	450	800	860	61
	Ohio Brass (2)	522009-1002	495	435	765	875	58
	NGK (2)	L2-SN321-13	515	450	765	840	60
69kV Deadend (1)	Required Performance		380	330	610	780	-
	Ohio Brass	511005-1201	310	295	505	490	41
	NGK-Locke	NBKG30XH028S0	340	300	510	545	40

1. Distribution insulators are supplied by IPCO and all data is internal to their system. Properties are assumed to be sufficient and IPCO has assumed that.
2. Horizontal post insulator.

Transmission and Distribution Hardware

- Conductor attachment hardware:
  - Deadend Applications
    - Shackle type
  - Jumper Post Applications
    - Vise-top insulators
  - Tangent Post Applications
    - Pin Type
  - All Suspension Clamps shall be Cushion Grip
  - All Hardware to be ANSI class 52-2.
    Tangent applications supporting may require ANSI class 55-4 or 55-6.

12. Survey Data

Survey coordinates shall be in State Plane Coordinate System, Oregon South (3602), NAD83 (2011), Vertical Datum NAVD 1988, International Feet.

13. Shield Angle

A shield wire will not be utilized for this design.

14. Vertical Clearances

The vertical design clearances shall be based on the conductor's final sag at the maximum design operating temperature or at the NESC District loaded condition, whichever produces the greater sag.

- Maximum Operating Temperatures
  - Transmission AL & CU conductors = 185°F
  - Distribution Primary conductors = 212°F
  - Distribution Neutral conductors = 145°F

Table 16. Vertical Clearances

	Minimum Design Clearances			
	69 kV	**34.5 kV**	**12.5 kV**	**Neutral**
Ground Clearance	22.6 ft.	22 ft.	22 ft.	18 ft.
Over state highways[1]	22.6 ft.	22 ft.	22 ft.	18 ft.
Over railroad tracks[2]	36.1 ft.	35.5 ft.	35.5 ft.	31.5 ft.
From a lighting support, traffic signal Support, or supporting structure of a Second Line	7.5 ft.	7.5 ft.	5.5 ft.	5.5 ft.
Buildings Accessible to Pedestrians	16.2 ft.	15.7 ft.	15.7 ft.	13.5 ft.
Signs, Chimneys, Billboards, Radio & TV Antennas, tanks & other Installations not accessible to personnel	10.6 ft.	10.0 ft.	10.0 ft.	3.0 ft.
Grain Bin Probe Ports	20.7 ft.	20.2 ft.	20.2 ft.	20.2 ft.
Airport Glide Path	Contact FAA	Contact FAA	Contact FAA	Contact FAA

1. Additional clearance may be required by DOT.
2. Additional clearance may be required by railroad track owner/operator.

15. Line Crossings

Transmission line crossing clearances where the conductors of one line cross over the conductors of another and where the upper and lower conductors have ground fault relaying shall be based on the following two weather cases, whichever produces the minimum clearance:

- Upper Conductor at maximum design operating temperature, Final Sag
- Lower Conductors at 40°F, Initial Sag

And

- Upper Conductor at 32°F, Final Sag, 0.25” Ice, No Wind
- Lower Conductors at 0°F, Final Sag, No Ice, No Wind

Table 17. Line Crossings

	Minimum Design Clearances – Conductor to Conductor					
	Guys & Neutrals	**Comm.**	**Multiplex**	**Open Wire 0-750V**	**750V to 34.5kV**	**69kV**
Guys, neutrals	2.0 ft	2.0 ft	2.5 ft.	3.0 ft.	4.0 ft.	4.6 ft.
Communication	2.0 ft	2.0 ft	2.5 ft.	4.0 ft.	6.0 ft.	6.2 ft.
Multiplex	2.5 ft	2.5 ft	2.5 ft.	3.0 ft.	4.0 ft.	4.6 ft.
Open-wire (0-750V)	3.0 ft.	4.0 ft.	4.0 ft.	3.0 ft.	4.0 ft.	4.6 ft.
750V to 34.5kV	4.0 ft.	6.0 ft.	4.0 ft.	4.0 ft.	4.0 ft.	4.6 ft.

1. Greater values should be used where the survey method used to develop the ground profile and crossing information is subject to greater unknowns.
2. Higher voltage should always be on top.

16. Horizontal Clearance

Horizontal clearances shall be based on the following two weather cases:

- Conductors at Rest (No Wind Displacement)
  - 60° F Final Sag
  - Maximum Design Operating Temperature, Final Sag
  - 32°F, Final Sag, No Ice
- 60°F Final Sag, 6 psf Wind

Table 18. Horizontal Clearances

	Minimum Design Clearances			
		69 kV	**34.5 & 12.5kV**	**Neutral**
From a lighting support, traffic signal support, or supporting structure of another line	At Rest	6.5 ft.	6.0 ft.	3.0 ft.
	Displaced By Wind	6.7 ft.	5.5 ft.	N/A
From buildings, walls, projections	At Rest	13 ft.	13 ft.	4.5 ft.
	Displaced By Wind	10.6 ft.	10 ft.	N/A
Signs, Chimneys, Billboards, Radio & TV Antennas, tanks & other installations not classified as buildings	At Rest	13.0 ft.	13.0 ft.	3.0 ft.
	Displaced By Wind	10.6 ft.	10 ft.	N/A
From grain bins loaded with permanently attached conveyor	At Rest	17.7 ft.	17.2 ft.	15.0 ft.
	Displaced By Wind	7.2 ft.	6.7 ft.	4.5 ft.
From grain bins loaded with Portable conveyor (At Rest)	At Rest	height “V” of Highest filling or probing port (24+V) + 1.5V		
From grain bin on non loading side		15 ft.	15 ft.	15 ft.

17. Phase to Phase Separation of Different Circuits

Mid Span phase to phase separation shall be based on the following two weather cases, whichever produces the minimum clearance:

- Upper Conductor at maximum design operating temperature, Final Sag
- Lower Conductors at 40°F, Final Sag

And

- Upper Conductor at 32°F, Final Sag, 0.25" Ice
- Lower Conductors at 32°F, Final Sag, No Ice

Table 19. Phase to Phase Separation

Minimum Design Clearance		
	69kV	**34.5kV**
34.5 kV Lines	4.3 ft.	3.8 ft.
25 kV Lines and below	4.2 ft.	3.7 ft.

1. These vertical separations in span are one foot (H>1.0ft). When conductors or wires are directly over one another or have less than 1 foot horizontal offset, it is recommended that an additional 2 feet of clearance be added to the values given in the table above.
2. 69kV to 34.5kV clearance shall also meet NESC clearance plus 0.25 ft. with Upper Conductor at maximum design operating temperature, final sag, and lower conductor at 0°F, initial sag.
3. Designer is reminded to check clearances for the upper conductor at maximum operating temperature (Final Sag) and the lower conductor at the same ambient condition as the upper conductor without electrical loading and without ice loading.

18. Galloping

Span lengths from 0 to 599 ft shall be assumed for the A.E. Davison Single Loop Method. Span lengths greater than 600 ft shall be assumed for the L.W. Toye Double Loop Method. The galloping swing criteria used to determine galloping is ½" Ice, 2 psf Wind, Final Sag. The galloping sag criteria use to determine galloping is ½" Ice, No Wind, Final Sag.
Galloping Ellipses shall be less than those shown below:

Table 20. Galloping Clearances

Clearance	Percent Overlap
OHGW to Phase	0%
Phase to Phase	0%
Phase to Distribution	0%
Distribution to Distribution	10%

19. Weight Spans

All tangents shall have no uplift at the following cases unless approved otherwise:

- 0°F, Initial and Final
- Extreme Wind, Initial and Final
- 60°F, Initial and Final

20. Conductor Vibration

Vibration analysis of phase conductors and OHGW/OPGW will be performed using industry standard software such as ALCOA VIBREC or an acceptable equivalent. When required, dampers shall be properly installed as indicated.

21. Grounding & Bonding

All poles will be grounded using #6 AWG stranded or solid copper wire per Idaho Power Company Standards.

22. Plan and Profile Display

Plan and profile shall show all conductors at the following weather cases:

- All conductors shall be shown at maximum operating temperature, Final Sag
  - Transmission AL & CU conductors = 185°F
  - Distribution Primary conductors = 212°F
  - Distribution Neutral conductors = 145°F
- Communication cables shall be shown at 120°F, Final Sag

23. Right of Way Limits

All R.O.W. must be verified by the client

24. Transmission Phasing

Transmission Phasing shall be provided by Idaho Power Company

25. Foundation Design

Poles will be direct embedded.

26. Avian Protection and Mitigation

The design of the Calico-Grassy Mountain 34.5kV line includes mitigation measures for two impact categories:

- Avian electrocutions of raptors and migratory birds
- Oregon Sage-Grouse

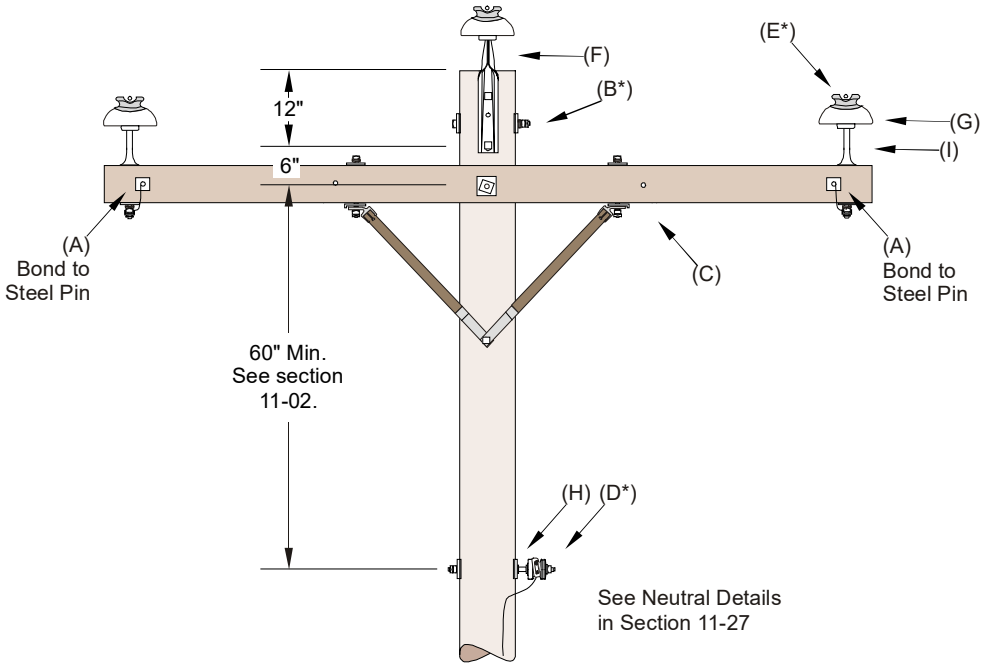
To mitigate the risk of Avian Electrocutions on the power lines due to perching, hunting, or nesting of raptors or other migratory bird species the structure framing and materials were designed in accordance with the Idaho Power Company's Wildlife Protection Standards and the Avian Power Line Interaction Committee (APLIC) suggested practices for avian protection on power lines. The Idaho Power avian wildlife protection standards and avian mitigation measures can be found in Appendix B – Idaho Power Avian Protection Standards.

Power lines present a potential risk to sage-grouse populations by providing perch sites for predators such as raptors and ravens. To minimize the impact that the new power line will have on the sage-grouse populations in the project area Triangular Avian Perch and Nest Diverters will be installed on the structures located within 3.3 km of the sage-grouse habitats. The Idaho Power Company standards triangular perch diverters can be found in Overhead Distribution Manual 11-32-01.

The use of Perch and Nest Diverters was selected based on the minimization measures recommended by the Oregon Department of Fish and Wildlife's (ODFW) Oregon Sage-Grouse Mitigation Program. The recommended minimizations measures can be found in Section 3.4.1 and Table C-2 of the ODFW Habitat Quantification Tool Scientific Rationale. Table C-2 can be found in Appendix C of this report.

Appendix A. Idaho Power Structure Framing Standards

3-Ø Tangent–10' Crossarm 2-Up–Wood



For details, see the next page.

For 10' FG Crossarm–see page 11-20-18 and 11-20-19.

3-Ø Tangent–10' Crossarm 2-Up–Wood Details

For 12.5-kV Construction

	CU Codes	Description	Qty
(A)	DASB6*	Anti-split Bolt 6"	2
(B)	DASB…*	Anti-split Bolt	1
(C)	DAS10	Crossarm 10'	1
(D)	DFSP…*	Formed Spool Tie	1
(E)	DFTF…*	Formed Top Tie	3
(F)	DPTP	Pole Top Pin	1
(G)	DI12F	Insulator 12.5-kV Pin Type F-Neck	3
(H)	DNB	Neutral Bracket	1
(I)	DSP	Steel Pin Long	2

For 34.5-kV Construction

	CU Codes	Description	Qty
(A)	DASB6*	Anti-split Bolt 6"	2
(B)	DASB…*	Anti-split Bolt	1
(C)	DAS10	Crossarm 10'	1
(D)	DFSP…*	Formed Spool Tie	1
(E)	DFTJ…*	Formed Top Tie	3
(F)	DPTP	Pole Top Pin	1
(G)	DI35J	Insulator 34.5-kV Pin Type J-Neck	3
(H)	DNB	Neutral Bracket	1
(I)	DSP	Steel Pin Long	2

***Notes**

*(B) **Anti-split Bolt–**DASB…, Are included in crossarm and pole CU codes.

*(D) **Formed Spool Tie–**DFSP..., Wedge is included according to wire size ordered.

DFSP4 Formed Spool Tie F/Sec Rack & NB No. 4

DFSP20 Formed Spool Tie F/Sec Rack & NB No. 2/0

*(E) **Formed Top Tie–**DFT…

DFTF4 Formed Top Tie F/F-Neck Insulator No. 4

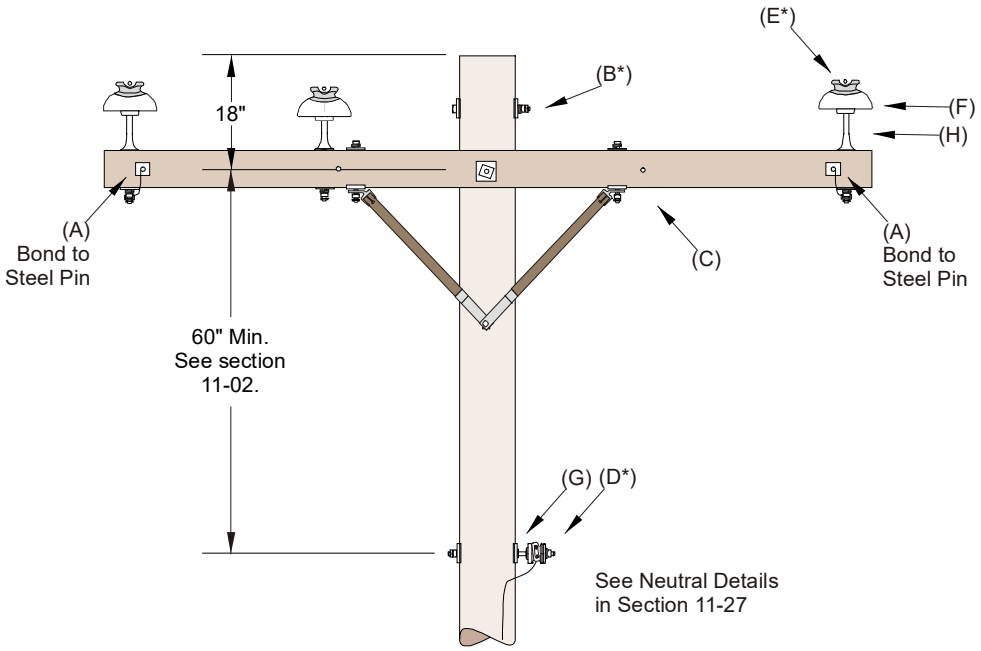
DFTF20 Formed Top Tie F/F-Neck Insulator No. 2/0

DFTJ4 Formed Top Tie F/J-Neck Insulator No. 4

DFTJ20 Formed Top Tie F/J-Neck Insulator No. 2/0

Pole, conductor, and grounding assembly are not listed. Refer to Sections 05, 10, and 20.

3-Ø Tangent–10' Crossarm 3-Up



For details, see the next page.

3-Ø Tangent–10' Crossarm 3-Up Details

For 12.5-kV Construction

	CU Codes	Description	Qty
(A)	DASB6*	Anti-split Bolt 6"	2
(B)	DASB…*	Anti-split Bolt	1
(C)	DAS10	Crossarm 10'	1
(D)	DFSP…*	Formed Spool Tie	1
(E)	DFTF…*	Formed Top Tie	3
(F)	DI12F	Insulator 12.5-kV Pin Type F-Neck	3
(G)	DNB	Neutral Bracket	1
(H	DSP	Steel Pin Long	3

For 34.5-kV Construction

	CU Codes	Description	Qty
(A)	DASB6*	Anti-split Bolt 6"	2
(B)	DASB…*	Anti-split Bolt	1
(C)	DAS10	Crossarm 10'	1
(D)	DFSP…*	Formed Spool Tie	1
(E)	DFTJ…*	Formed Top Tie	3
(F)	DI35J	Insulator 34.5-kV Pin Type J-Neck	3
(G)	DNB	Neutral Bracket	1
(H)	DSP	Steel Pin Long	3

***Notes**

*(B) **Anti-split Bolt–**DASB…, Are included in crossarm and pole CU codes.

*(D) **Formed Spool Tie–**DFSP..., Wedge is included according to wire size ordered.

DFSP4 Formed Spool Tie F/Sec Rack & NB No. 4

DFSP20 Formed Spool Tie F/Sec Rack & NB No. 2/0

*(E) **Formed Top Tie–**DFT…

DFTF4 Formed Top Tie F/F-Neck Insulator No. 4

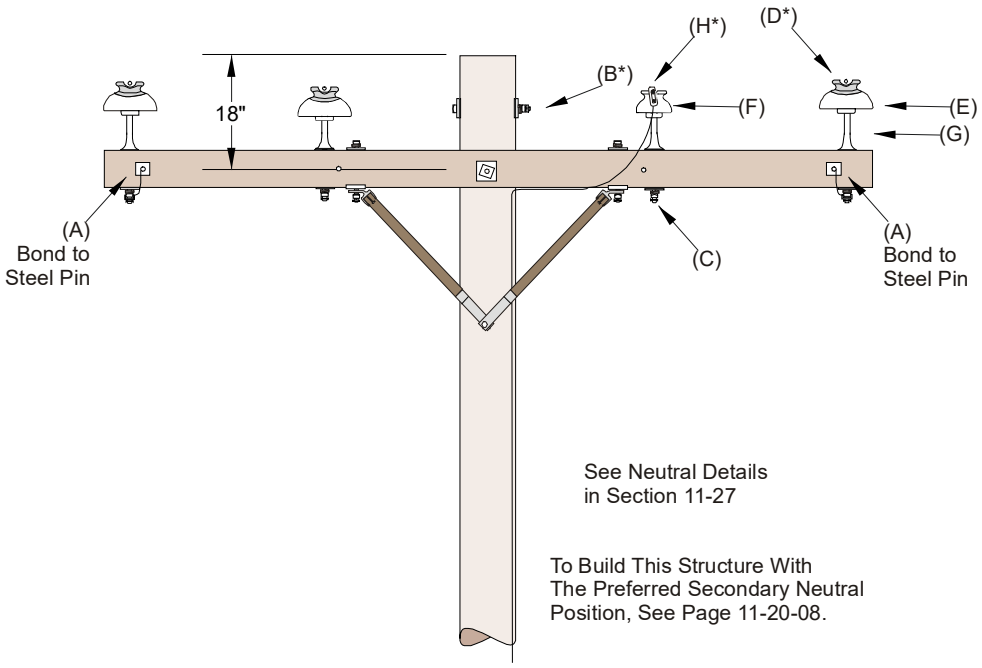
DFTF20 Formed Top Tie F/F-Neck Insulator No. 2/0

DFTJ4 Formed Top Tie F/J-Neck Insulator No. 4

DFTJ20 Formed Top Tie F/J-Neck Insulator No. 2/0

Pole, conductor, and grounding assembly are not listed. Refer to Sections 05, 10, and 20.

3-Ø Tangent–10' Crossarm 4-Up



For details, see the next page.

3-Ø Tangent–10' Crossarm 4-Up Details

For 12.5-kV Construction

	CU Codes	Description	Qty
(A)	DASB6*	Anti-split Bolt 6"	2
(B)	DASB…*	Anti-split Bolt	1
(C)	DAS10	Crossarm 10'	1
(D)	DFTF…*	Formed Top Tie	4
(E)	DI12F	Insulator 12.5-kV Pin Type F-Neck	3
(F)	DI4C	Insulator 4-kV Pin Type C-Neck	1
(G)	DSP	Steel Pin Long	4
(H)	DWC…*	Wedge Connector	1

For 34.5-kV Construction

	CU Codes	Description	Qty
(A)	DASB6*	Anti-split Bolt 6"	2
(B)	DASB…*	Anti-split Bolt	1
(C)	DAS10	Crossarm 10'	1
(D)	DFTJ…*	Formed Top Tie	4
(E)	DI35J	Insulator 34.5-kV Pin Type J-Neck	3
(F)	DI4C	Insulator 4-kV Pin Type C-Neck	1
(G)	DSP	Steel Pin Long	4
(H)	DWC…*	Wedge Connector	1

***Notes**

*(B) **Anti-split Bolt–**DASB…, Are included in crossarm and pole CU codes.

*(D) **Formed Top Tie–**DFT…

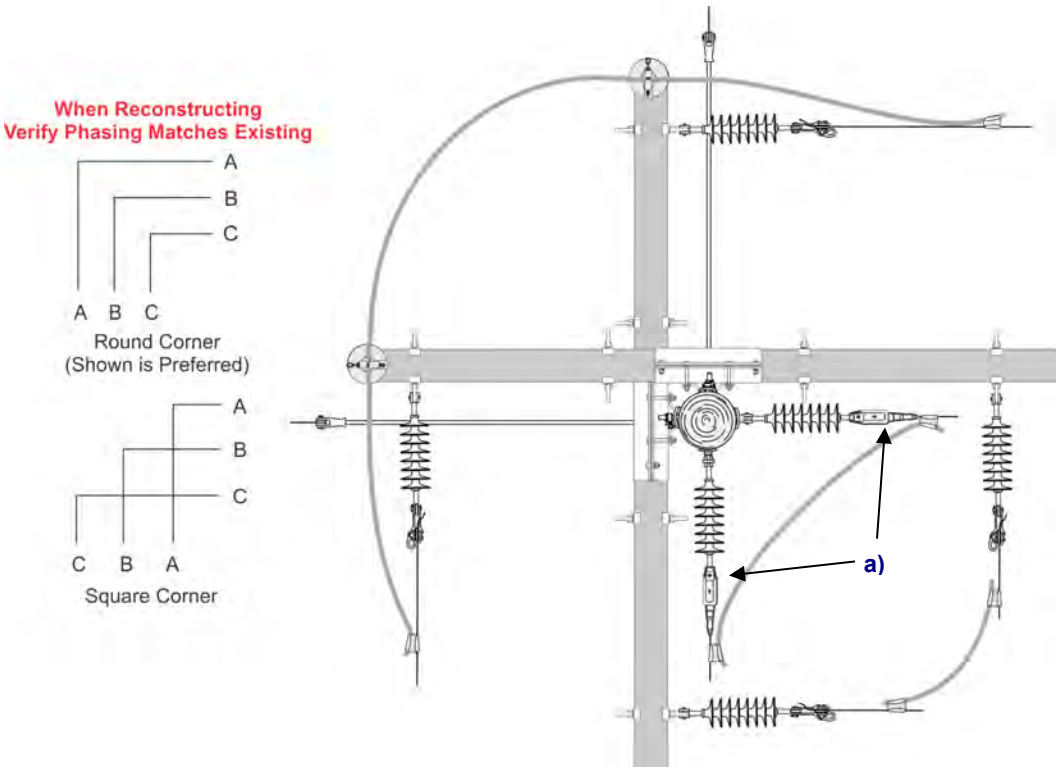
DFTF4	Formed Top Tie F/F-Neck Insulator No. 4	DFTJ4	Formed Top Tie F/J-Neck Insulator No. 4
DFTF20	Formed Top Tie F/F-Neck Insulator No. 2/0	DFTJ20	Formed Top Tie F/J-Neck Insulator No. 2/0

*(H) **Wedge Connector–**DWC…, Order by wire sizes.

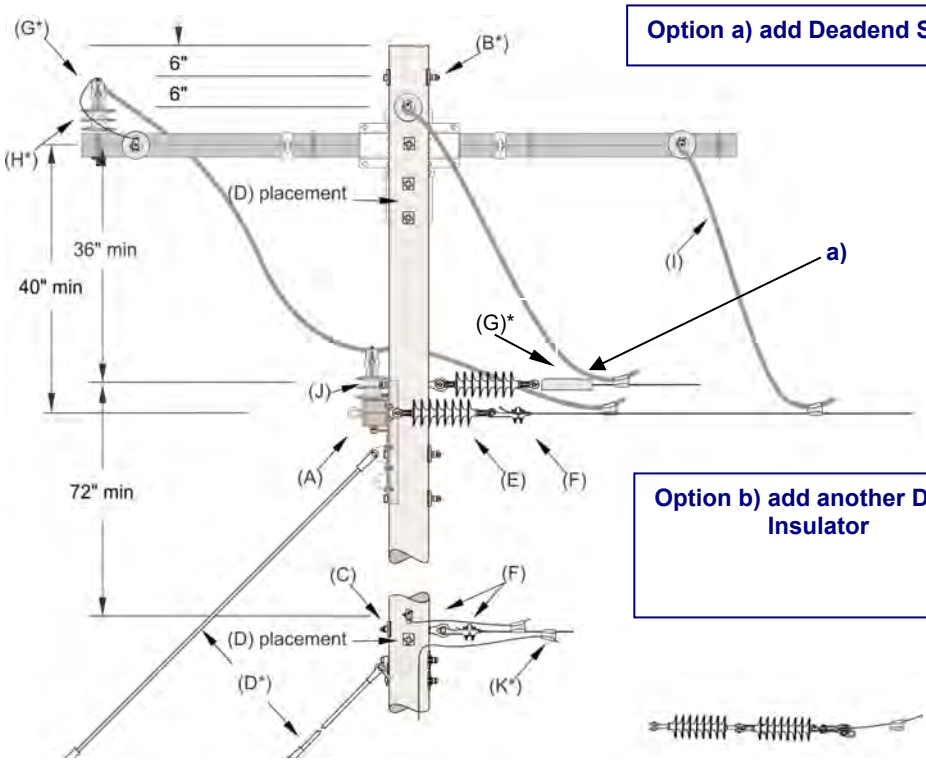
Pole, conductor, and grounding assembly are not listed. Refer to Sections 05, 10, and 20.

3-Ø Deadend–Corner for 336 or 795

Note–Keep jumper close to the shoe, whenever possible, to shorten the jumper



Option a) add Deadend Shoe Cover



Option b) add another Deadend Insulator

For table and details, see the next page. For eagle zone, refer to OH 11-33-03.

3-Ø Deadend - Corner for 336 or 795 Details

For 12.5-kV Construction

	CU Codes	Description	Qty
(A)	DFDE10	Crossarm Fiberglass 10'	2
(B)	DASB…*	Anti-split Bolt	1
(C)	DDENEB	Deadend Neutral on 12" Eyebolt	2
(D)	DDG…*	Down Guy EHS	4
(E)	DDLEN35	35-KV Lt Wt Strain Ins W/Eyenut	6
(F)	DD…*	Deadend Bolted Primary In-Line	8
(G)	DAPD1…*	Deadend Shoe Cover	2
(H)	DI35V *	Insulator 34.5-kV Pin Vise Top	2
(I)	DJMPR	Jumper-Covered	4
(J)	DSP	Steel Pin Long	2
(K)	DWC…*	Wedge Connector	1

For 34.5-kV Construction

	CU Codes	Description	Qty
(A)	DFDE10	Crossarm Fiberglass 10'	2
(B)	DASB…*	Anti-split Bolt	1
(C)	DDENEB	Deadend Neutral on 12" Eyebolt	2
(D)	DDG…*	Down Guy EHS	4
(E)	DDLEN35	35-KV Lt Wt Strain Ins W/Eyenut	6
(F)	DD…*	Deadend Bolted Primary In-Line	8
(G)	DAPD1…*	Deadend Shoe Cover	2
(H)	DI35V *	Insulator 34.5-kV Pin Vise Top	2
(I)	DJMPR	Jumper-Covered	4
(J)	DSP	Steel Pin Long	2
(K)	DWC…*	Wedge Connector	1

***Notes**

*(B) **Anti-split Bolt–**DASB…, Are included in crossarm and pole CU codes.

*(D) **Down Guy–**DDG…, W/Guy Guard, Guy Strain Insulator, & Pole Eye Plate. Order by wire size.
Neutral guy is not needed for #4 ACSR. For other guying options see Section 11-09.

*(E) If option B on 11-34-05 is chosen, add quantity of 2 from 6 for total of 8. Do not order G.

*(F) **Deadend and Tension–**DD…, Primary and neutral
DD336 for 336 AAC
DD795 for 795
DDR20 for 2/0 ACSR

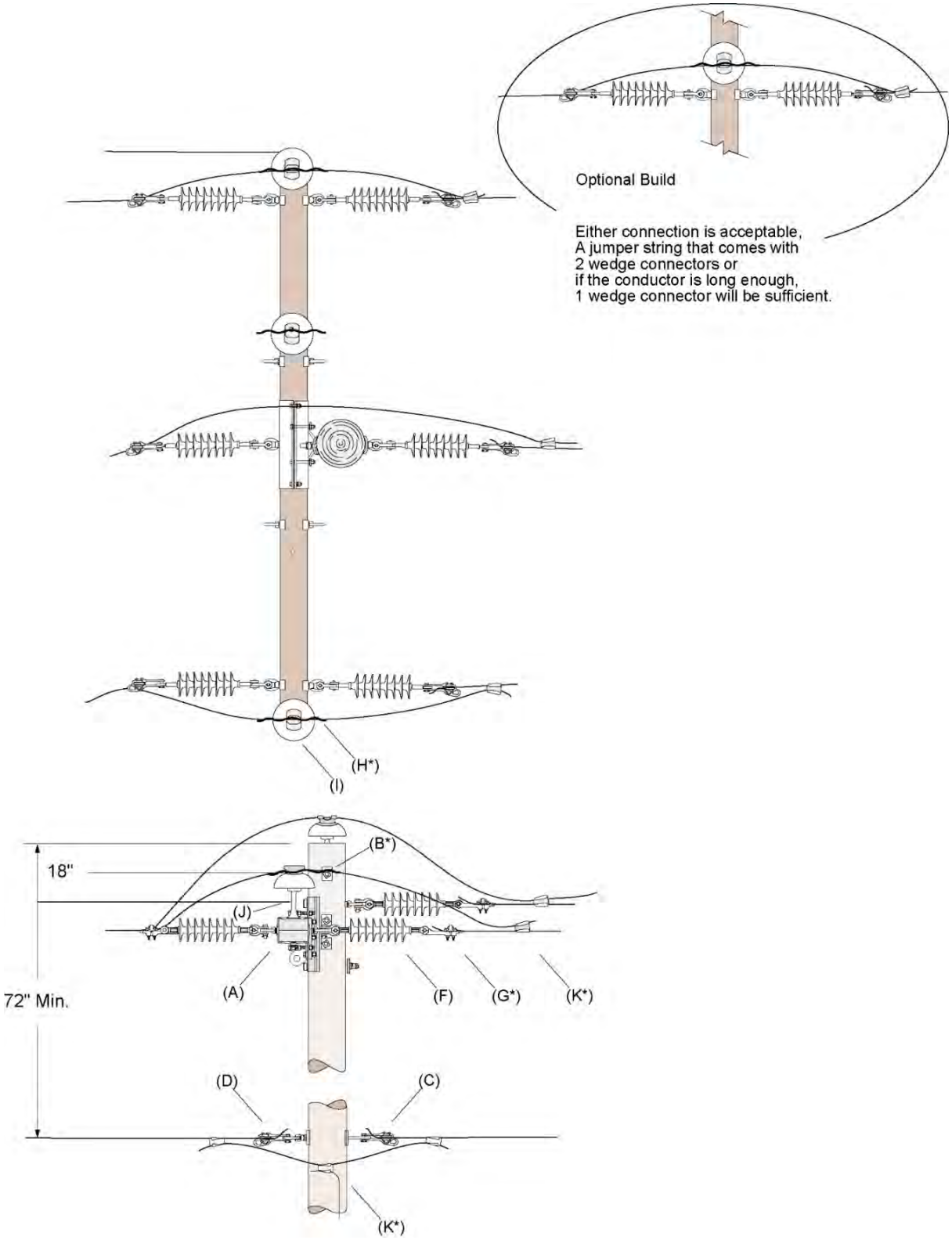
*(G) **Deadend Shoe Cover**–DAPD1…, Mid phase only.
DAPD1C1 up to 2/0
DAPD1C795 larger conductor up to 795. If option A on 11-34-05 is chosen, quantity of E stays at 6.

*(H) **Vise Type Insulator**–DI…, Vise-top style (DI35V).

*(K) **Wedge Connector–**DWC…, Order by wire size.

Pole, conductor, anchor, and grounding assembly are not listed. Refer to Sections 05, 06, 10, and 20.

Double Deadend 3-Up



Note–Keep jumper close to the shoe, whenever possible, to shorten the jumper.

Double Deadend 3-Up Details

For 12.5-kV Construction

	CU Codes	Description	Qty
(A)	DFDE10	Crossarm Fiberglass 10'	1
(B)	DASB…*	Anti-split Bolt	1
(C)	DDENEB	Deadend Neutral on 12" Eyebolt	1
(D)	DDENEN	Deadend Neutral on 5/8" Eye Nut	1
(E)	DPT…*	Pole Top Pin-1	1
(F)	DDLS35	DE one 35-KV Lt Wt Strain Ins W/Shkl	6
(G)	DDR *	Deadend Bolted Primary In-Line	6
(H)	DFTF…*	Formed Top Tie	3
(I)	DI12F*	Insulator 12.5-kV Pin Type F-Neck	3
(J)	DSP	Steel Pin Long	2
(K)	DWC…*	Wedge Connector	4

For 34.5-kV Construction

	CU Codes	Description	Qty
(A)	DFDE10	Crossarm Fiberglass 10'	1
(B)	DASB…*	Anti-split Bolt	1
(C)	DDENEB	Deadend Neutral on 12" Eyebolt	1
(D)	DDENEN	Deadend Neutral on 5/8" Eye Nut	1
(E)	DPT…*	Pole Top Pin-1	1
(F)	DDLS35	DE one 35-KV Lt Wt Strain Ins W/Shkl	6
(G)	DDR *	Deadend Bolted Primary In-Line	6
(H)	DFTJ…*	Formed Top Tie	3
(I)	DI35J	Insulator 34.5-kV Pin Type J-Neck	3
(J)	DSP	Steel Pin Long	2
(K)	DWC…*	Wedge Connector	4

***Notes**

*(B) **Anti-split Bolt**–DASB…, Are included in crossarm and pole CU codes.

*(G) **Deadend and Tension**–DDR…, Primary. Order by wire size.

*(H) **Formed Top Tie**–DFT…, Order by wire size.

*(I) **Insulator 12.5-kV Pin Type F-Neck**–Option to use DI35V on DDE construction.

*(K) **Wedge Connector**–DWC…, Order by wire sizes.

Pole, conductor, anchor, and grounding assembly are not listed. Refer to Sections 05, 06, 10, and 20.

3-Ø Multi Circuit - Crossarm under Crossarm (Wood)

Illustrated with both circuits as 34.5 kV.

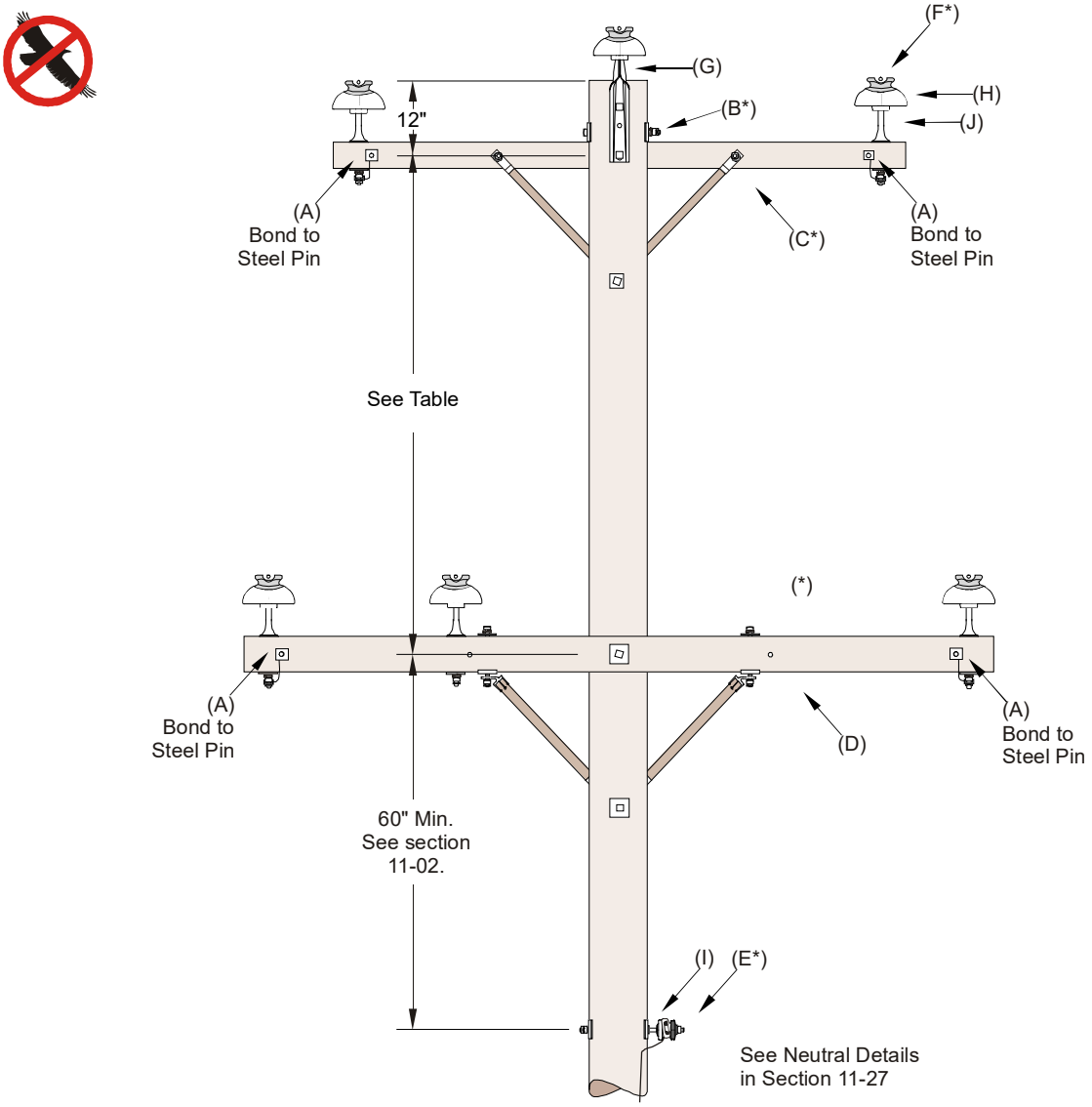
The table shows the recommended separation for double circuit distribution conductors based on the following assumptions:

- Span is based on the shortest ruling span either circuit (300' for 336 & 795, 350' for #4 & 2.0). Longer spans may require greater separation.
- Both circuits are assumed to be 34.5 kV. For both circuits at 12.5 kV you may subtract 6".
- Top circuit @ 212°
- Bottom circuit @ 40° final sag

For additional information contact Methods & Materials

Lower Circuit	Upper Circuit			
	#4	2/0	336	795
#4	6'-6"*	6'-6"*	8'-6"	8'-6"
2/0	6'-6"*	6'-6"*	9'-0"	9'-0"
336	6'-6"*	6'-6"*	7'-0"	7'-0"
795	6'-6"*	6'-6"*	7'-0"	7'-0"

* Separation of 6'-6" (6' for 12.5) minimum is recommended to provide bucket access.



For details, see the next page.

3-Ø Multi Circuit - Crossarm under Crossarm Details

For 34.5 kV Construction

	CU Codes	Description	Qty
(A)	DASB6*	Anti-split Bolt 6"	4
(B)	DASB…*	Anti-split Bolt	1
(C)	DASW8*/DAS10	Crossarm 8'/10'	1
(D)	DAS10	Crossarm 10'	1
(E)	DFSP…*	Formed Spool Tie	1
(F)	DFT…*	Formed Top Tie	6
(G)	DPTP	Pole Top Pin	1
(H)	DI35J	Insulator 34.5 kV Pin Type J-Neck	6
(I)	DNB	Neutral Bracket	1
(J)	DSP	Steel Pin Long	5
(*)	Optional		See Note Below

**** Notes***

*(B) ***Anti-split Bolt*** - DASB…, Are included in crossarm and pole CU codes.

*(C) ***Crossarm***, DAS…, For 336 and 795 AL replace DASW8 with DAS10. In Red Risk Zone areas, use fiber glass crossarms, DAFT8/DAFT10

*(D) ***Crossarm 10' –*** In Red Risk Zone areas, use fiber glass crossarms.'

*(E) ***Formed Spool Tie -*** DFSP..., Order by wire size. Wedge is included according to wire size ordered.

*(F) ***Formed Top Tie -*** DFT…Order by wire size.

*(*) ***Alternate Neutral Position -*** See section 11-26.

Pole, conductor, and grounding assembly are not listed. Refer to Sections 05, 10, & 20.

Application. The ***"TR–HL"*** structure is the preferred method to build a 138 kV ***TR***iangular configuration with polymer "***H***i-***L***ite" insulators. It is used for tangent construction where no angles are involved and where a shield wire is not required.

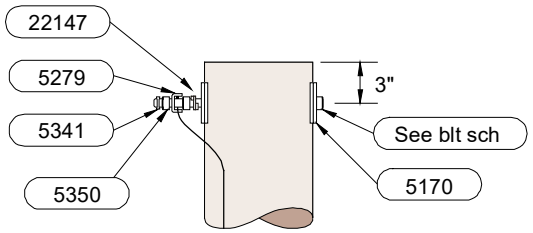
Notes:

1. **Design Reference.** Use the elevation of the bottom bolt of the lowest insulator mount as a conductor reference point for calculating vertical clearances.
2. **Framing Reference.** Maintain a minimum of 12' to the crossarm mounting bolt of any distribution underbuild. This dimension is valid for spans of 300' or less. For longer spans, consult with engineering.
3. **Construction Practice**. If there is a possibility of energizing a broken or sagging down guy then guy strain insulators are required. Anchor type may also require the use of guy strain insulators. See Section 04.

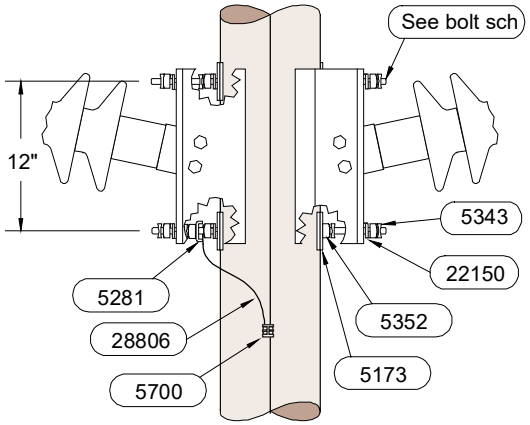
For hardware details and PassPort Codes see sections:

02-002	Grounding	08-300	Suspension Clamps
08-200	Insulator Conductor Clamps	11-010	Armor Rod
08-205	Clamp Top Adapter		

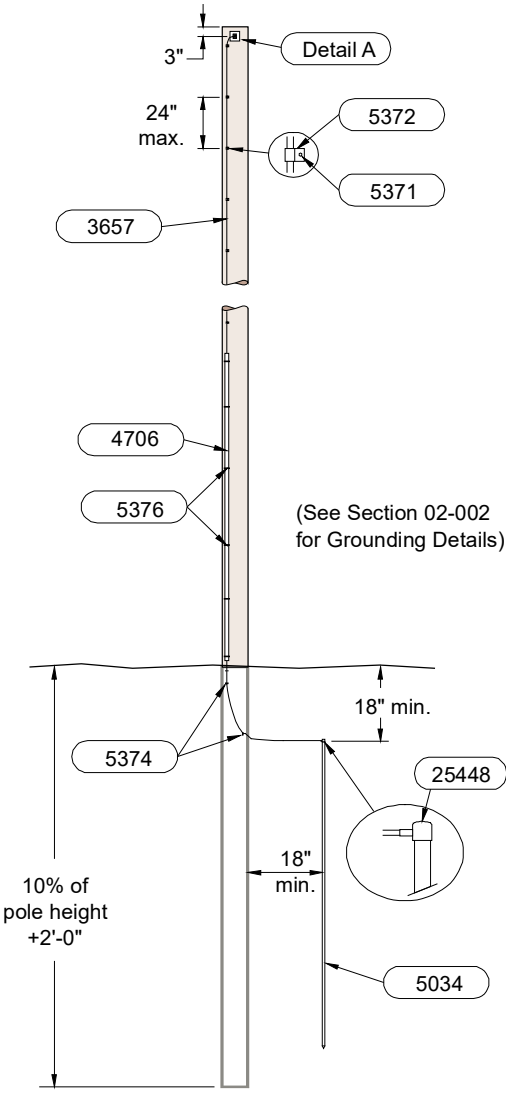
Details. (See section 00-010 for an explanation of special drawing conventions used in the illustrations within this document.



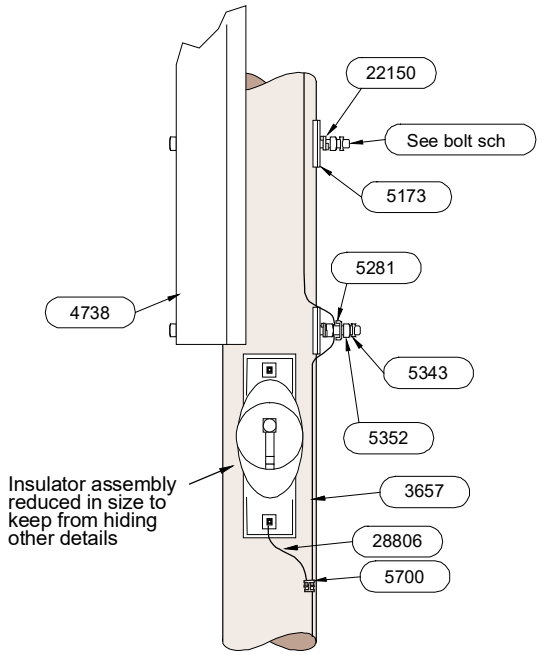
Detail A
Anti-Split Bolt Assembly
(TASB)



Detail B
Post Insulator Mount
(TI138HHPD)



Detail C
Pole Grounding



Detail D
Post Insulator Mount
(TI138VP)

Bolt Schedule

Cat. ID	Description Purpose	Qty Per Pole Class H2	H1	1	2	3
5078	BLT GALV DA 7/8X24					
	Post Mnt.	-	-	2	2	2
5079	BLT GALV DA 7/8X26					
	Post Mnt.	2	2	-	-	-
5108	BLT GALV MCH 5/8X12					
	Anti-split	-	-	1	1	1
5109	BLT GALV MCH 5/8X14					
	Anti-split	1	1	-	-	-
5138	BLT GALV MCH 7/8X16					
	Top Mnt.	-	-	2	2	2
5139	BLT GALV MCH 7/8X18					
	Top Mnt.	2	2	-	-	-

Bill of Materials

See the Work Order and PassPort for current Bill of Materials information.

Cat. ID	Qty	Description
Note 1	3	CLP INS ALUM (size)
Note 2	2	CLP SUSP AL (size)
Note 3	3	ARMOR ROD AL (size)
28806	3 ft	CND CU SLD SD BR 6
3657	80 ft	CND CW SLD 6
4706	1	MLDG GRD PSTC 1X8'
4738	1	INS VERT CLP 138PLMR
4744	2	INS HRZ 138 PLMR WD
4805	1	ADPTR CLT V138KV INS
4816	2	CLV Y BALL 52-3
5034	1	ROD GRD CW 5/8 X 8'
See Bolt Sch		BLT GALV DA 7/8X*(long)*
See Bolt Sch		BLT GALV MCH 5/8X*(long)*
See Bolt Sch		BLT GALV MCH 7/8X*(long)*
5170	2	WSHR CRVD 3X3 X11/16
5173	6	WSHR CRVD 4X4X15/16
5279	1	CLIP BONDING 5/8"
5281	2	CLIP BONDING 7/8"
5341	1	NUT MF 5/8"
5342	2	NUT MF 3/4"
5343	10	NUT MF 7/8"
5350	1	NUT GALV PLAIN 5/8
5351	1	NUT GALV PLAIN 3/4
5352	6	NUT GALV PLAIN 7/8
5371	1 lb	NAIL GALV 10D
5372	40	CLIP GRD WIRE ZINC EL STL
5374	1 lb	STAPLE FENCE 1 1/2
5376	6	STAPLE MLD SQ BARBED
5700	3	CONN, C-TAP, #6 to #6
22147	1	WSHR DBL COIL 11/16 HOLE
22149	2	WSHR DBL COIL 13/16 HOLE
22150	8	WSHR DBL COIL 15/16 HOLE
25448	1	CONN. CU, GRD, DRV-ON,5/8

1 Refer to page 08-200-01 for line post insulator conductor clamps and clamp top adapters.
2 Refer to page 08-200-02 for suspension clamps.
3 Refer to page 11-010-01 for armor rods.

PassPort Codes

CU Codes	Qty
TASB	1
TI138HHPD	1
TI138VP	1

Application: The ***T*** is a 46-kV, 69-kV ***T***angent structure utilizing vertical polymer insulators on an 11' crossarm with saddles to support the insulators. The center insulator is mounted on a pole top bracket that shares the through bolt of the crossarm. This is the preferred 69-kV structure in eagle and hawk zones.

Avian: Eagle Safe - 60"

Compatible Units:

CU Code	Qty	Notes	Description
TASB	1		ANTI-SPLIT BOLT 5/8 X 12
TASM11	1		ARM SINGLE 6X8X11 FOR METAL PINS W/72" BR
TPTB	1		POLE TOP BKRT FOR VERT CLAMPTOP 46 &69KVI
TI69VP	3		INSULATOR 69KV VERTICAL POST POLYMER
TXASAD	2		CROSSARM SADDLE W/INS STUD FOR 11' X-ARM
TGWMOLD	1	*If no distribution*	*GROUND WIRE MOLDING, PLASTIC, W/ STAPLES*
POLE	*1*		
TRUNIONCLAMP	*3*	*3 Phases*	*SEE 08-200*
ARMORROD	*3*	*3 Phases*	*SEE 11-010*
DAMPERS	?	*As required*	*SEE 10-050*

Parts listed below dotted line are generic and/or variable. Analysis required.

See Bolt Schedule and order proper bolts as required by pole class

Bonding and Grounding: Halo ground 1' below arm brace hardware. Bond metallic parts that are less than 6" apart. The arm brace bolts should not be bonded. For additional grounding practices. See page 02-002-01.

Template Drawing: T-WD-69.pdf

PLS CADD Pole File: t-wd-69.pol

Revision History:

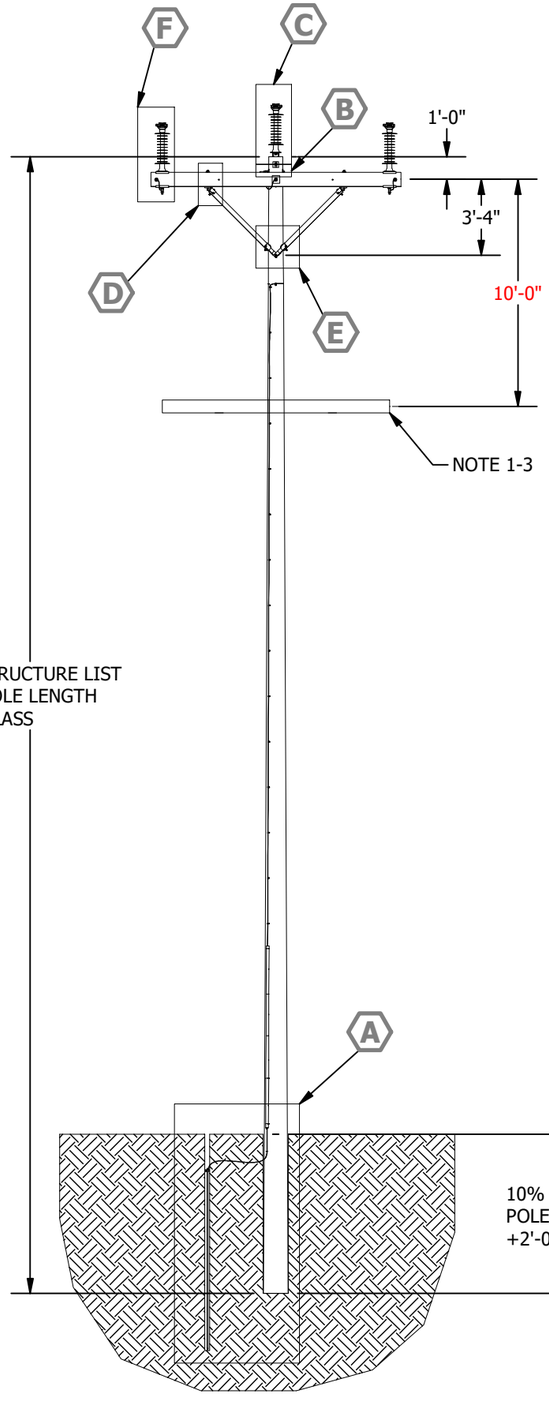
7-8-2020 – Updated drawing and issued with Info Sheet

7-28-2020 – Replaced 4877 - 14” Insulator mounting stud with 59029 -12”. Detail F

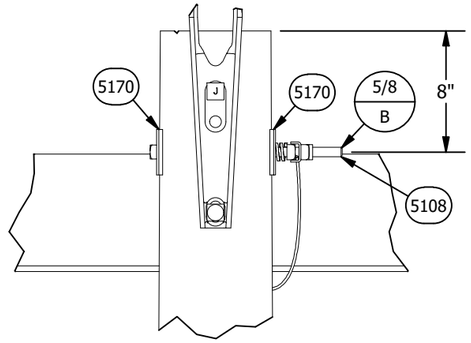
4-27-2023 – Updated Compatible Units chart to include descriptions – WEF

11-7-2024 Added the reference to additional grounding practices to the “Bonding and Grounding” text. Added transmission manual references to Trunion Clamp, Armor rod, and Dampers.- WEF

01-350-03

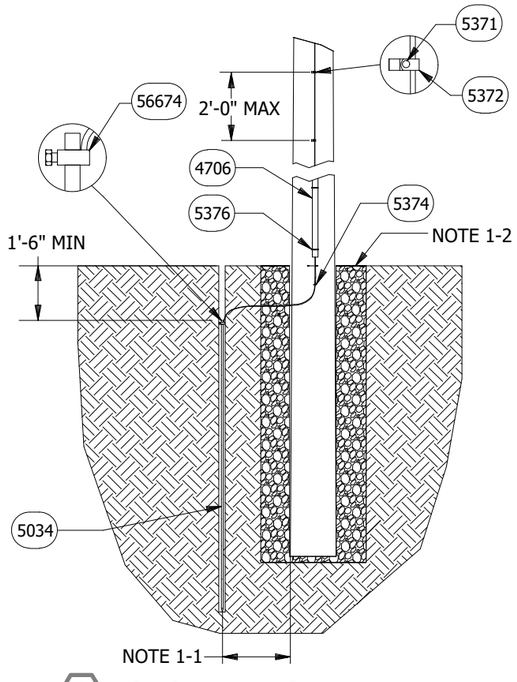


ELEVATION VIEW



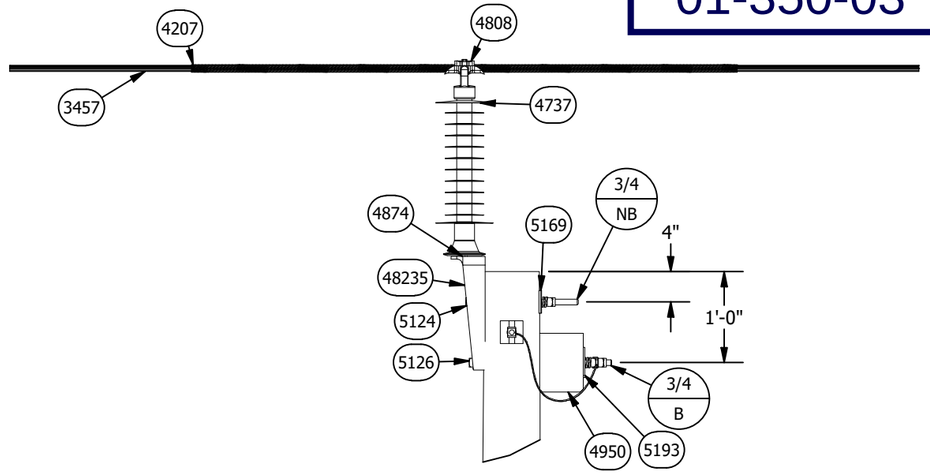
B ANTI-SPLIT BOLT DETAIL

TASB



A GROUNDING DETAIL

TGWMOLD



C UPPER CROSSARM AND INSULATOR BRACKET

TASM11
TI69VP
TPTB

SYMBOL KEY

- (X) **DETAIL REFERENCE**
- #/# / XX **BOLT DIAMETER CONFIGURATION** (SEE SCHEDULE)
- XXXXXX **COMPATIBLE UNIT**
- #### **CATALOG ID**

STR# X

NOTES

1-1. INSTALL GROUND ROD OUTSIDE EXCAVATION IN UNDISTURBED AREA. MINIMUM DISTANCE 1'-6"
1-2. COMPACT BACKFILL IN ACCORDANCE WITH SPECIFICATIONS.
1-3. SEE DISTRIBUTION WORK ORDER FOR DISTRIBUTION DETAILS.

NUT AND WASHER SCHEDULES

	NON-BONDED (NB)	BONDED (B)
5/8	22147 5350 5341	22147 5350 5279 5350 5341
3/4	22149 5351 5342	22149 5351 5280 5351 5342
7/8	22150 5352 5343	22150 5352 5281 5352 5343

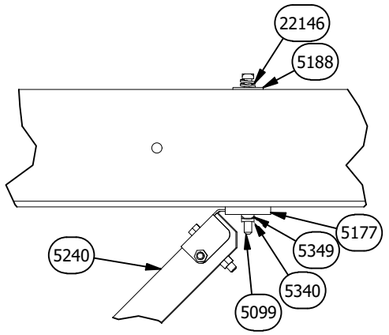
REF.(S): WO#X

LINE-SECT
69kV LINE #X
T
ELEVATION AND NOTES

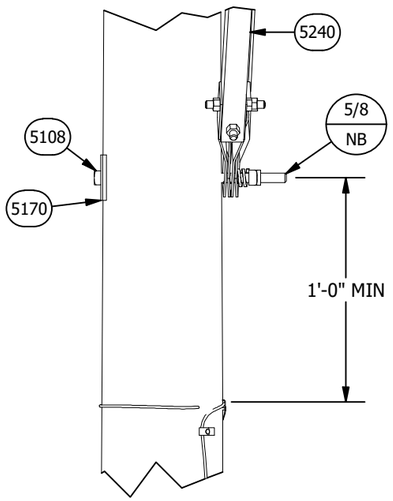
VAULT# XX

SCALE: NONE
DATE: 1/21/2020
DS.
DR. MJC2654
SHT. 1
X
06

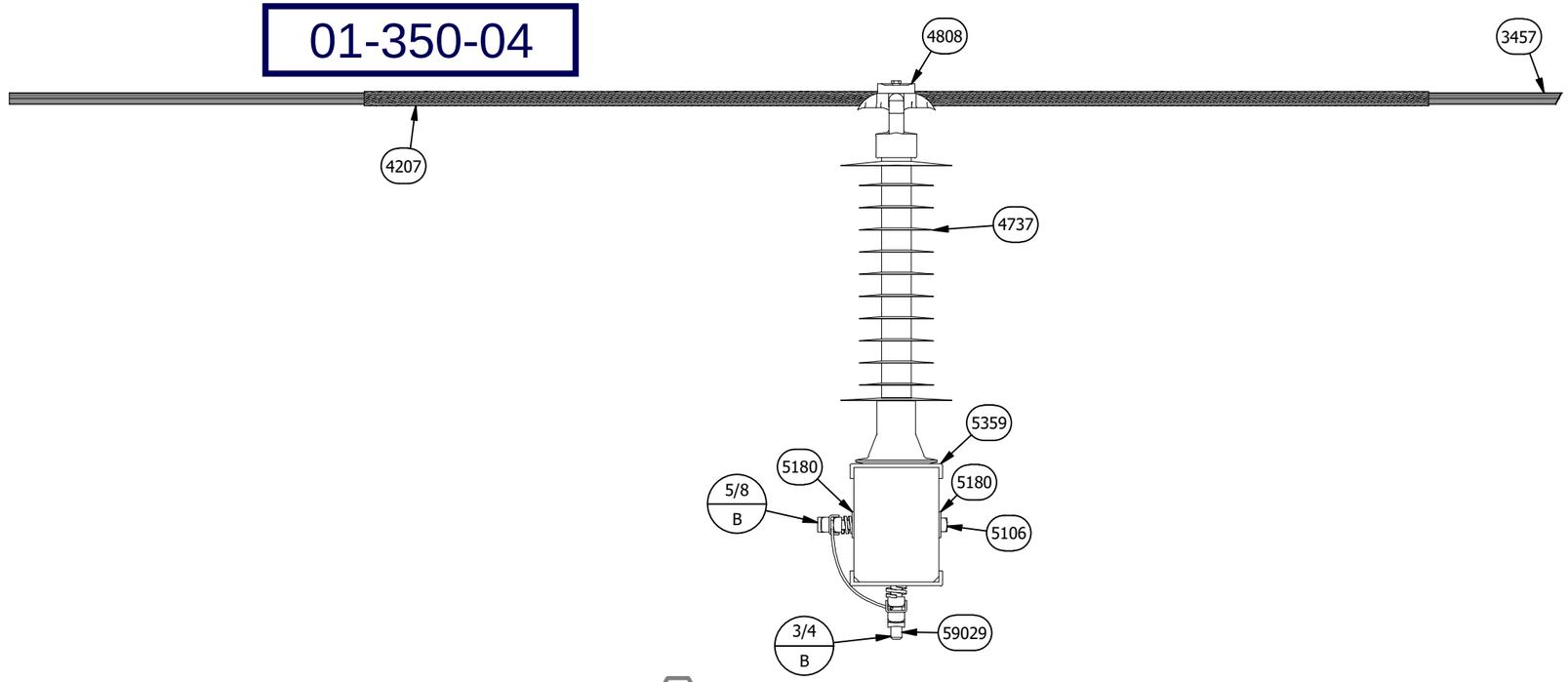
01-350-04



D UPPER BRACE ATTACHMENT



E LOWER BRACE ATTACHMENT



F INSULATOR AND SADDLE

TXASAD

TCP100

TR397

TRD397

STR# X

NOTES	NUT AND WASHER SCHEDULES										REF.(S): WO#X
		NB NON-BONDED				B BONDED					LINE-SECT 69kV LINE #X T DETAILS
	5/8	22147	5350	5341		22147	5350	5279	5350	5341	
	3/4	22149	5351	5342		22149	5351	5280	5351	5342	
	7/8	22150	5352	5343		22150	5352	5281	5352	5343	

SCALE: NONE | DATE: 1/21/2020

DS. | DR. MJC2654 | SHT. 2 | X | 06

VAULT# XX

01-350-05

BOLT SCHEDULE (NOTE 3-2)

CAT ID	DESCRIPTION PURPOSE	QTY PER POLE CLASS H2	H1	1	2	3
5108*	BOLT GALV MCH 5/8 X 12 ANTI SPLIT	–	–	1	1	1
5109	BOLT GALV MCH 5/8 X 14 ANTI-SPLIT	1	1	–	–	–
5126*	BOLT GALV MCH 3/4 X 18 CROSSARM	–	–	–	–	1
5127	BOLT GALV MCH 3/4 X 20 CROSSARM	–	–	1	1	–
5128	BOLT GALV MCH 3/4 X 22 CROSSARM	1	1	–	–	–
5124*	BOLT GALV MCH 3/4 X 14 POLETOP BRACKET	–	1	1	1	1
5125	BOLT GALV MCH 3/4 X 16 POLETOP BRACKET	1	–	–	–	–
5108*	BOLT GALV MCH 5/8 X 12 BOTTOM BRACE	–	–	–	1	1
5109	BOLT GALV MCH 5/8 X 14 BOTTOM BRACE	1	1	1	–	–

*BOLT PROVIDED WITH COMPATIBLE UNIT

PARTS LIST (NOTE 3-1)

PART NUMBER	QTY	DESCRIPTION
3457	3	Conductor, IBIS, ACSR 397.5, 26/7 (Part # for Ref; see Design Pkg. for qty)
3657	1	Conductor, Bare Copper #6 (Part # for Ref; see Design Pkg for qty)
4207	3	Armor Rod, Aluminum, For 397 ACSR Ibis
4706	1	Molding Plastic Ground Wire 1"x8'
4737	3	Insulator, Line Post, Polymer Vert, Clamp Top, 69Kv
4808	3	Clamp, Insulator, 1.0" - 1.5"
4874	1	Stud, Insulator, F/Line Post Ins, 3/4" x 1-3/4"
4921	1	Pole, (see structure list for pole length and class)
4950	1	Crossarm, Wood, HD 11' x 5-3/4" x 7 3/4"
5034	1	Rod, Ground, 5/8" x 8' Cu Bonded
5099	2	Bolt, Machine, 1/2" x 10" W/Sq.Nut
5106	2	Bolt, machine, 5/8" x 8"
5108	2	Bolt, Machine, 5/8"x12" w/ sq. nut
5124	1	Bolt, Machine, 3/4"x14" w/sq. head & nut
5126	1	Bolt, Machine, 3/4" x 18" W.Sq. head and nut
5169	1	Washer, Curved, 3"x3"x1/4", 13/16" Hole
5170	3	Washer, Curved, 3"x3"x1/4", 11/16" Hole
5177	2	Washer, Tap, Flanged, 3" x 3" x 3/16", 1/2" hole
5180	4	Washer, Round, 11/16" Hole
5188	2	Washer, Square, 2" x2", 9/16 hole
5193	1	Washer, Square, 4" x4" x 3/16" thick, 13/16 Hole
5240	2	Crossarm Brace, Wood, 72" Span, 36" Drop
5279	3	Clip, Galv. Bonding, for 5/8"sq nut
5280	3	Clip, Galv. Bonding, for 3/4"sq nut
5340	2	MF Locknut Galv. 1/2"
5341	4	MF Locknut Galv. 5/8"
5342	4	MF Locknut Galv. 3/4"
5349	2	Nut, Galv, 1/2"
5350	7	Nut, Galv. 5/8"
5351	7	Nut, Galv. 3/4"
5359	4	Crossarm Saddle for line post insulator, 7-3/4" x 5-3/4"
5371	20	Nail, Galv. Common, 10D (taken from 1 lb.)
5372	20	Clip, Ground Wire, Zinc Plate
5374	2	Staple, Steel, 1-1/2" F/Ground Wire (taken from 1 lb)
5376	5	Staple, Moulding, Square, Barbed
22146	2	Washer, Double Coil Spring Lock 9/16"
22147	4	Washer, Double Coil Spring Lock 11/16"
22149	4	Washer, Double Coil Spring Lock 13/16"
48235	1	Bracket, Pole Top, for 46kv-69kv LP insulator, 3/4" bolt
56674	1	Connector, CU, Ground, Acorn Clamp F5/8"Rod & #6Solid & #2 Stranded
59029	2	Stud, Insulator, For Line Post Ins, 3/4" x 12"

STR#X

NOTES:

3-1. NUT AND BOLT QUANTITIES MAY INCLUDE THOSE SUPPLIED AS PART OF A CATALOG ID.
3-2. BOLTS SHOWN IN THE PARTS LIST ARE FOR A GENERIC POLE SIZE. INSTALL THE PROPER BOLT LENGTH, BASED ON POLE CLASS AS SHOWN IN THE BOLT SCHEDULE.

REF. (S): WO# X

LINE-SECT
69kV LINE #X
T
PARTS LIST

VAULT# XX

SCALE: NONE | DATE: 1/21/2020

DS.
DR. MJC2654

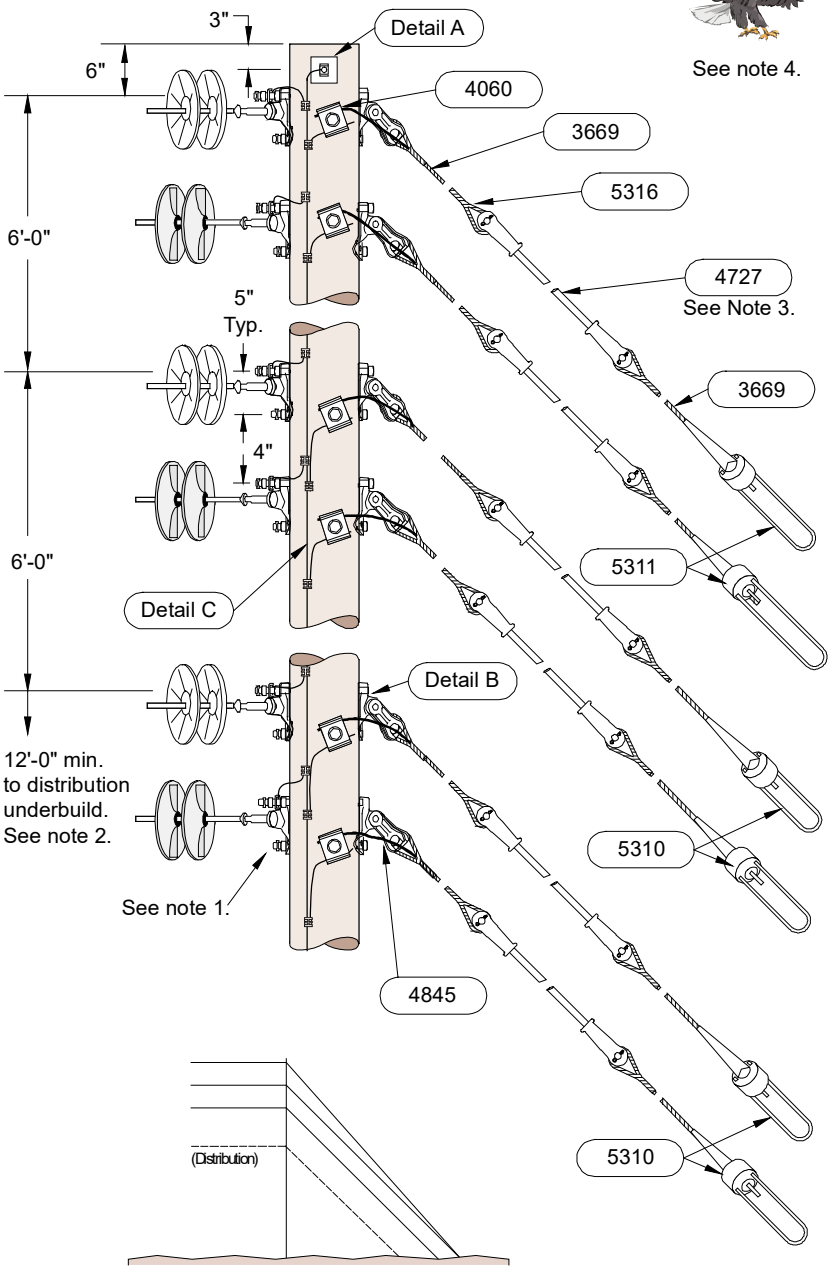
SHT. 3 | X | 06

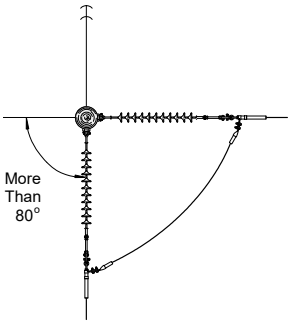
Application. The ***D2*** structure is used to ***D***eadend line tension in ***2*** directions. It is a 138-kV, vertical configuration structure built with polymer or ball and socket disc insulators. It is used when there is a change in line tension or a change in conductor size. This structure is intended for line angles greater than 80°. For line angles between 30°– 80°, see structure ***D2-HP*** on page 01-081-01. A similar structure, the ***D2S***, includes provisions for a shield wire. See page 01-075-01.

Notes:

1. **Design Reference.** Use the elevation of the bottom bolt of the lowest insulator mount as a conductor reference point for calculating vertical clearances.
2. **Framing Reference.** Maintain a minimum of 12' to the crossarm mounting bolt of any distribution underbuild. This dimension is valid for spans of 300' or less. For longer spans, consult with engineering.
3. **Construction Practice**. If there is a possibility of energizing a broken or sagging down guy then guy strain insulators are required. Anchor type may also require the use of guy strain insulators. See Section 04.
4. **Avian.** Eagle safe construction requires 138-kV steel construction insulators or larger. See 06-10-04.

See note 4.





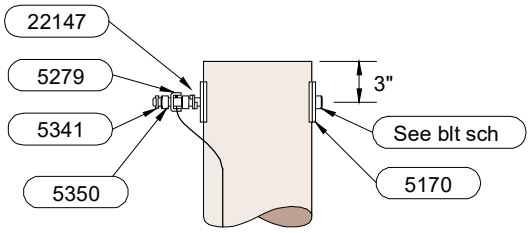
2 Direction Guy

Guy Anchoring

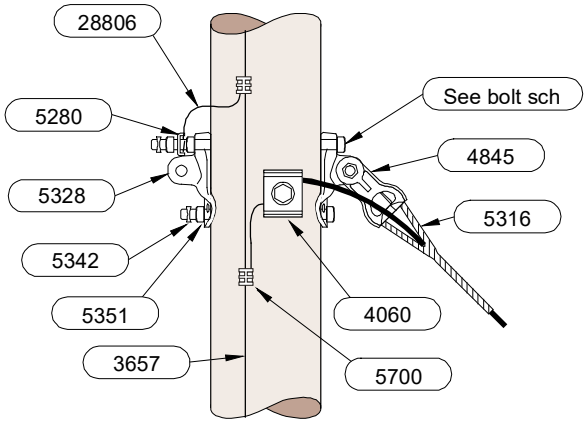
For hardware details and PassPort Codes see sections:

02-002	Grounding	04-600	Insulating Guys
04-100	Anchoring	08-150	Conductor Deadends
04-510	Down Guy Assembly	08-170	Shield Wire Deadends

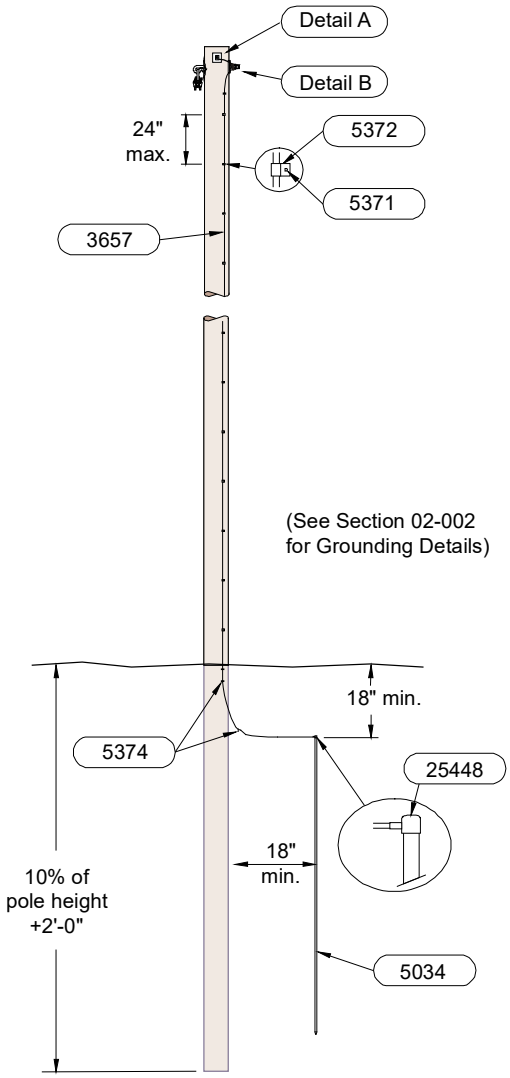
Details. (See section 00-010 for an explanation of special drawing conventions used in the illustrations within this document.)



Detail A
Anti-Split Bolt Assembly
(TASB)



Detail B
Pole Eye Assembly
(TPEA) (TI138W)



Detail C
Pole Grounding

Bill of Materials

See the Work Order and PassPort for current Bill of Materials information.

Cat. ID	Qty	Description
28806	18 ft	CND CU SLD SD BR 6
3657	80 ft	CND CW SLD 6
3669	150 lb	WIRE GALV GUY 3/8EHS
4060	6	CN PG 1 BLT 6-2/0
4706*	1	MLDG GRD PSTC 1X8 FT
4727	6	INS GUY STR 30000 78
4845	6	CLV THMB BNK
5034	1	ROD GRD CW 5/8 X 8 FT
See Bolt Sch		BLT GALV MCH 5/8X(long)
See Bolt Sch		BLT GALV MCH 3/4X(long)
5170	2	WSHR CRVD 3X3 X11/16
5279	1	CLIP BONDING 5/8 IN
5280	6	CLIP BONDING 3/4 IN
5310	4	GRIP GUY AUT 3/8
5311	2	GRIP GUY AUT 3/8 LNG
5316	18	GRIP GUY FMD 3/8 EHS
5328	12	EYE POLE PLT HD
5341	1	NUT MF 5/8 IN
5342	12	NUT MF 3/4 IN
5350	1	NUT GALV PLAIN 5/8
5351	6	NUT GALV PLAIN 3/4
5371	1 lb	NAIL GALV 10D
5372	40	CLIP GRD WIRE
5374	1 lb	STAPLE FENCE 1 1/2
5376*	6	STAPLE MLD SQ BARBED
5700	12	CONN, C-TAP, #6 to #6
22147	1	WSHR DBL COIL 11/16 HOLE
25448	1	CONN, CU, GRD, DRV-ON,5/8

* To be used when there is no distribution underbuild.

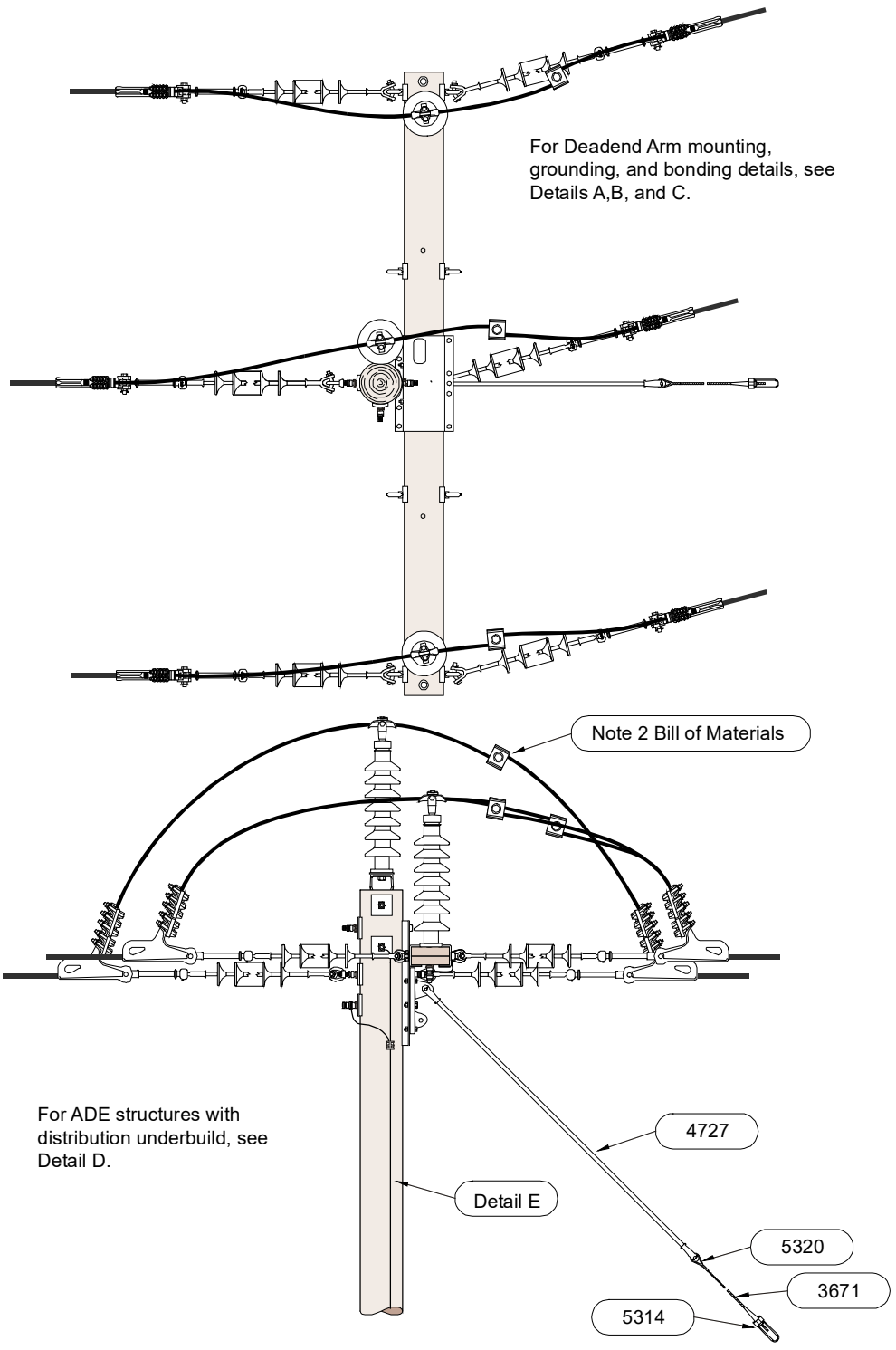
Bolt Schedule

Cat. ID	Description / Purpose	Qty Per Pole Class H2	H1	1	2	3
5108	BLT GALV MCH 5/8X12					
	Anti-split	-	-	1	1	1
5109	BLT GALV MCH 5/8X14					
	Anti-split	1	1	-	-	-
5123	BLT GALV MCH 3/4X12					
	Pole Eye	-	-	-	-	2
5124	BLT GALV MCH 3/4X14					
	Pole Eye	4	4	8	12	10
5125	BLT GALV MCH 3/4X16					
	Pole Eye	4	8	4	-	-
5126	BLT GALV MCH 3/4X18					
	Pole Eye	4	-	-	-	-

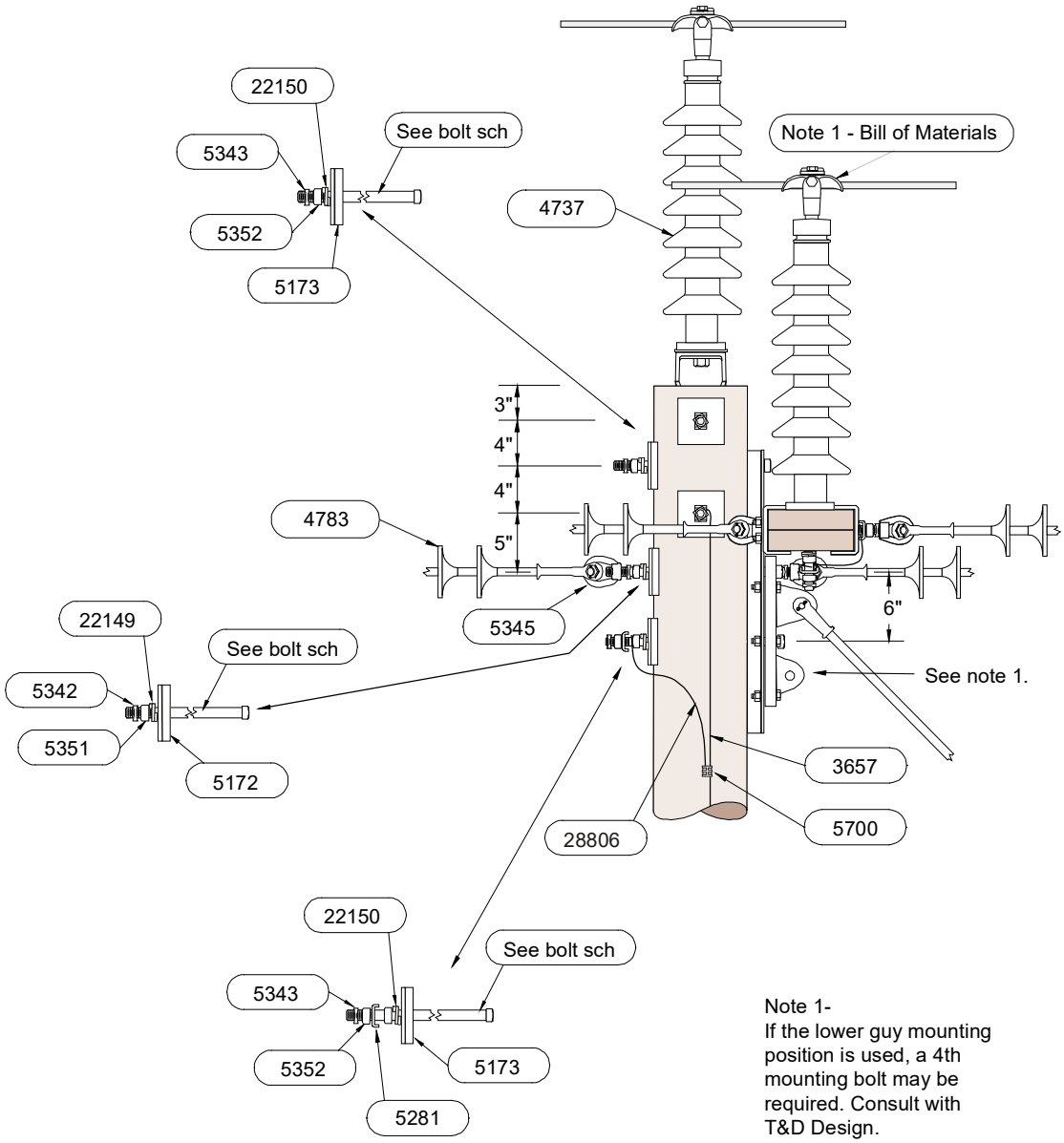
PassPort Codes

CU Codes	Qty
TASB	1
TI138W	6
TPEA	6

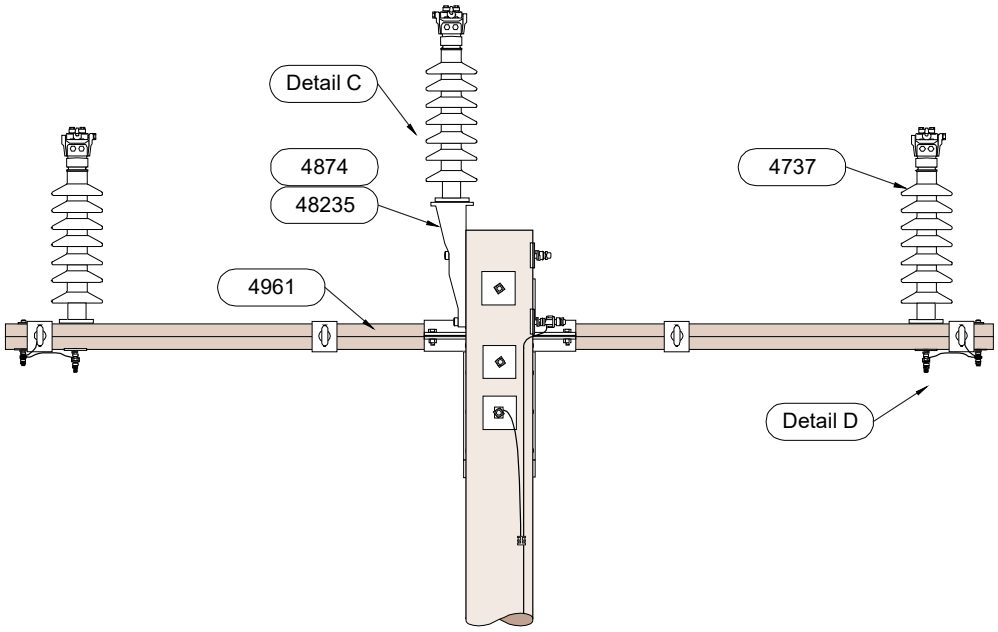
Application. The ***ADE*** structure is used on 46-kV and 69-kV lines. It is constructed with an ***A***luma-Form ***d***ead***e***nd arm.



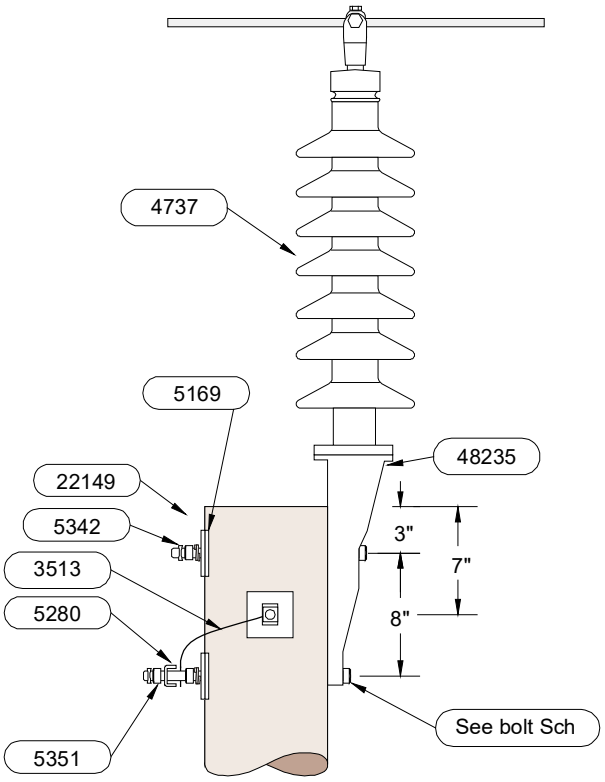
Details. (See section 00-010 for an explanation of special drawing conventions used in the illustrations within this document.)



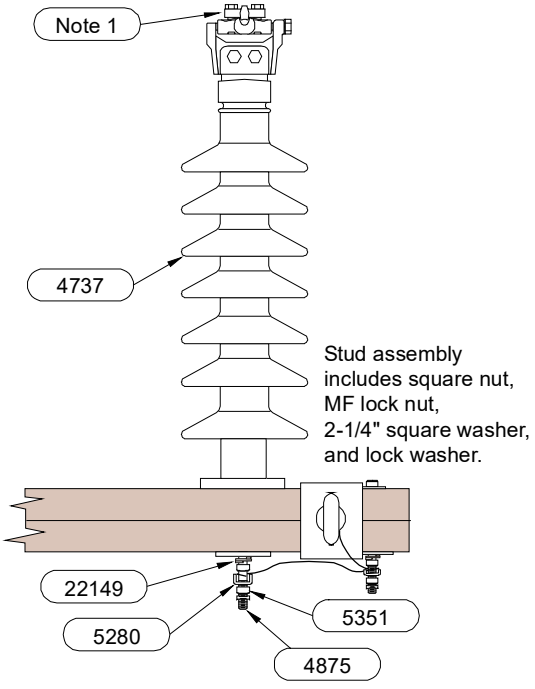
Detail A
Deadend Arm Mounting
(TI69W)



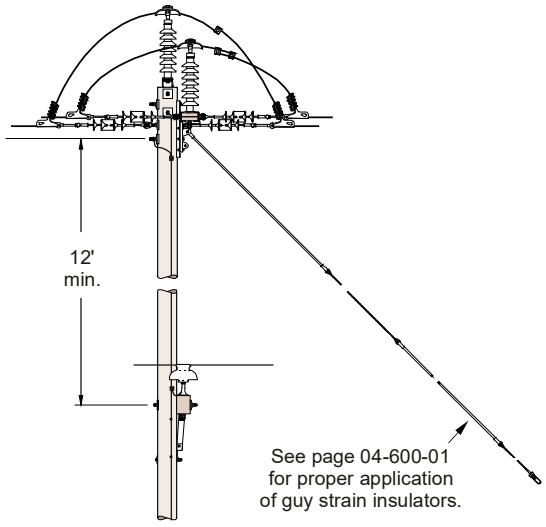
Detail B. Crossarm Hardware Bonding (TALDE10H)



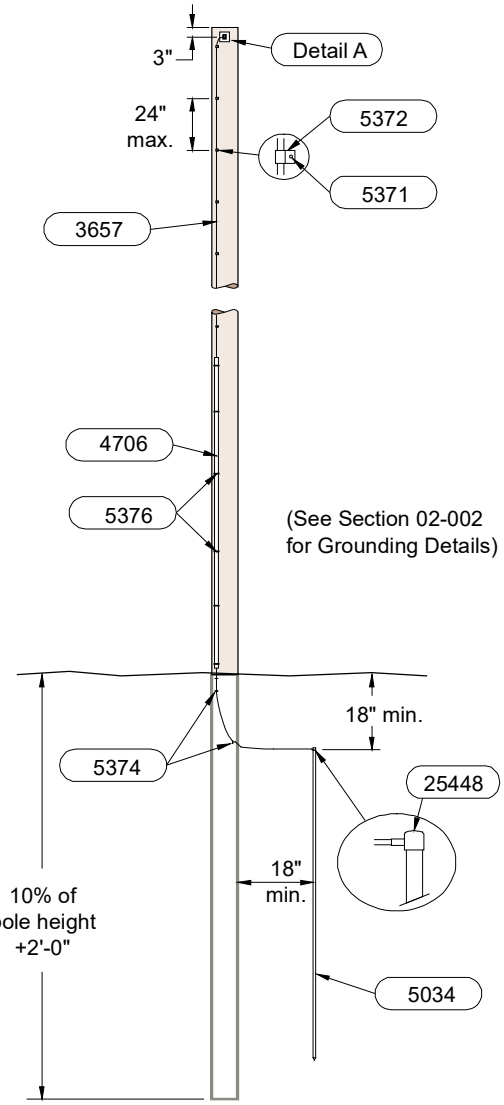
Detail C. Pole Top Bracket Mount (TI69VP) (TPTB)



Detail D. Bonding Detail (TSS7.5) (TI69VP)



Detail E
Distribution Underbuild



Detail F
Pole Grounding

Bill of Materials

See the Work Order and PassPort for current Bill of Materials information.

Cat. ID	Qty	Description
28806	8 ft	CND CU SLD SD BR 6
3657	80 ft	CND CW SLD 6
3671	45 lb	WIRE GALV GUY 1/2EHS
Note 2	2	CN PG (qty) BLT (size)
4706*	1	MLDG GRD PSTC 1X8 FT
4727	1	INS GUY STR 300000 78
4737	3	INS VERT CLT 69 PLMR
4783	6	INS SUSP 69KV WD 10K
Note 1	3	CLP INS ALUM (size)
4874	1	STUD INS 3/4 X 7 1/2
4875	2	STUD INS 3/4x7 1/2
4961	1	XARM 10 FT HVY DE
5034	1	ROD GRD CW 5/8 X 8 FT
See Bolt Sch		BLT GALV DA 3/4X(long)
See Bolt Sch		BLT GALV MCH 5/8X(long)
See Bolt Sch		BLT GALV MCH 7/8X(long)
5169	2	WSHR CRVD 3X3X1/4, 13/16
5170	2	WSHR CRVD 3X3X1/4, 11/16
5172	1	WSHR CRVD 4X4X1/4, 13/16
5173	2	WSHR CRVD 4X4X1/4, 15/16
48235	1	BRKT POLETOP 69KV INS
5279	1	CLIP BONDING 5/8 IN
5280	5	CLIP BONDING 3/4 IN
5281	1	CLIP BONDING 7/8 IN
5314	1	GRIP GUY AUT 1/2 LNG
5320	1	GRIP GUY FMD 1/2 EHS
5341	1	NUT MF 5/8 IN
5342	6	NUT MF 3/4 IN
5343	2	NUT MF 7/8 IN
5345	2	NUT EYE GALV 3/4 IN
5350	1	NUT GALV PLAIN 5/8
5351	9	NUT GALV PLAIN 3/4
5352	2	NUT GALV PLAIN 7/8
5371	1 lb	NAIL GALV 10D
5372	40	CLIP GRD WIRE
5374	1 lb	STAPLE FENCE 1 1/2
5376*	6	STAPLE MLD SQ BARBED
5700	1	CONN, C-TAP, #6 to #6
22147	1	WSHR DBL COIL 11/16 HOLE
22149	6	WSHR DBL COIL 13/16 HOLE
22150	2	WSHR DBL COIL 15/16 HOLE
25448	1	CONN, CU, GRD, DRV-ON,5/8

* To be used when there is no distribution underbuild.
1 Refer to page 08-200-01 for line post insulator conductor clamps.
2 Refer to page 08-200-06 for parallel groove connectors.

Bolt Schedule

Cat. ID	Description / Purpose	Qty Per Pole Class H2	H1	1	2	3
5065	BLT GALV DA 3/4X20					
	Crossarm	-	-	-	-	1
5066	BLT GALV DA 3/4X22					
	Crossarm	-	-	1	1	-
5067	BLT GALV DA 3/4X24					
	Crossarm	1	1	-	-	-
5124	BLT GALV MCH 3/4X14					
	Top Mnt.	-	-	2	2	2
5125	BLT GALV MCH 3/4X16					
	Top Mnt.	2	2	-	-	-
5138	BLT GALV MCH 7/8X16					
	Crossarm	-	-	-	-	2
5139	BLT GALV MCH 7/8X18					
	Crossarm	-	-	2	2	-
5140	BLT GALV MCH 7/8X20					
	Crossarm	2	2	-	-	-

PassPort Codes

CU Codes	Qty
TALDE10H	1
TI69VP	3
TI69W	6
TPTB	1
TSS7.5	2

Appendix B. Idaho Power Avian Protection Standards

Cat ID Code	Description	CU
48622	Tool F/Inst 3-Pc Cvr Shtgn Op None	

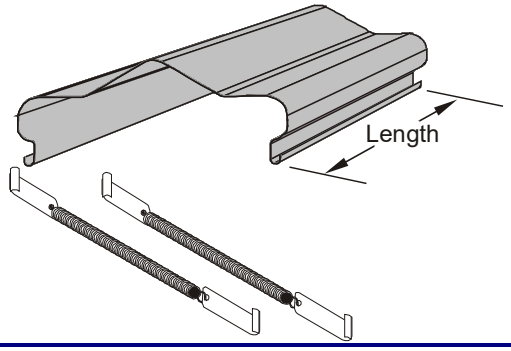
Pole Top Switch Protection

Steel framed pole top switches make protecting birds and small animals a unique issue. The base covers and the disc diverters have been proven to protect the animals.

See page 11-32-02 for the disc diverter.

Wildlife Base Covers are made of plastic in three lengths; short, med or long. It spans the steel frame between the insulators and is held on with two spring clips.

The clip may be covered with gray vinyl tape if it falls in the path of a curious small animal.



Cat ID	Description	CU Code
40593	Base Cvr, Short 15-1/2"	DAPPTSAC16
40607	Base Cvr, Med 20"	DAPPTSAC20
49139	Base Cvr, Long 26"	DAPPTSAC26
41041	Spring Clip Assembly	None

Two (2) spring clip assemblies are included with each cover's CU code.

Installation of 3-piece Covers

Step 1: Cut the ends off the two outside pieces to fit the conductor size being covered.

Conductor Size	Required Cut on Outside Pieces
#4	No Cuts Required
2/0	Cut off 1st Step of Cover
336	Cut off 1st Step of Cover
795	Cut off 1st & 2nd Step of Cover

Step 2: Snap the center piece (sized for the insulator, see page 11-30-07 for appropriate cover size) over the two outside pieces.

Step 3: Using a shotgun/hotstick place and push/"snap" the *assembled* (3 piece) cover over the insulator and then the conductor.

Installation of 3-piece Covers with a Shotgun Installation Tool

Steps 1 and 2: Follow steps shown on the previous page.

Step 3: Fit the Installation tool into the eye hole in the top of the center piece. The tool must be over a recessed area to accommodate larger conductors.

Step 4: Drawing the tool up tight against the part for stability, center the cover over the insulator and pull down over the conductor.

Step 5: Move the tool down to the end of the cover arm and pull down, snapping the cover into place.

Step 6: Repeat on the other side securing the cover with an auditable “snap” on both sides of the insulator and arm ends.

Power Fuse Cutout Covers

These cover the top of the power fuse cutout holder and are securely held in place by a locking pin, which prevents the cover from blowing off during strong winds. Use protective tubing to cover the bare wire exiting the top of the cutout or use covered wire.

Cat ID	Description	CU Code
59754	Power Fuse Cutout Cover For small wirel	DAPPF
53966	Lock-pin Replacement	none
61123	Power Fuse Cutout Cover For large wire using terminal pad 2- piece	DAPPFKIT

NOTES:

- The power fuse cutout cover is not manufacturer specific. It fits all the power fuse cutout holders that are approved in Standards.
- This Cat ID-59754 is embedded on the CU Codes of Power Fuse Holders DSMD15P, and DSMD35P for new power fuse installation. Swap Cat ID 59754 with Cat ID 61123 if using 2-hole terminal, either Cat ID 3741 for AL or Cat ID 3712 for CU jumpers.

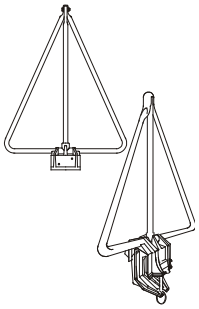
Wildlife Protection Materials, Diverters

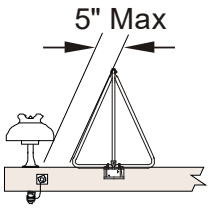
Bird Diverters

Diverters are installed between phases to discourage birds from landing in an unsafe location on a structure. Ideally, when a diverter is installed, leave a safe alternative perch site on the same structure. If a safe area is left open the bird will hopefully choose that spot to perch. Note that diverters are not always successful. The preferred method to protect birds is to use insulator and conductor covers.

Triangles should only be used on existing construction when insulator and conductor covers cannot be installed. The triangle style has two configurations; one is hotstick installed and one can be installed without a hotstick and requires the work area to be de-energized. This diverter is installed with lag screws that come with the unit. The hotstick type can be installed while the work area is energized using a shotgun tool to turn the eyebolt, securing it to the crossarm. Each type needs to be ordered by the crossarm size it is to be used on.

Note the 5 inch distance maximum. If exceeded, it will allow birds to perch.





Cat ID	Description	CU Code
37407	Diverter f/ 7'-8" Xarm/NHS	DAPBD8
37819	Diverter f/ 7'-8" Xarm	DAPBDH8
37864	Diverter f/ 10' M Xarm	DAPBDH10M
36692	Diverter f/ 10' HD Xarm	DAPBDH10H
37293	Diverter f/ GX-14' Xarm	DAPBDH9
39764	Diverter f/ 6"sq Xarm/NHS	DAPBD6IN

Bird Spike Diverters are positioned to deter birds from landing on certain locations on crossarms. Note that these spikes may not deter the larger birds and smaller birds may nest in them. Bird Spike Diverters should only be used in combination with covers with the intent to keep birds from perching, which may cause contamination. Some birds use the spike to build their nests.

Spikes are 5 inches tall and are attached by 10 nails or #8 wood screws per 2 foot section.

Cat ID	Description	CU Code
25633	Bird Spikes 5"x2'	DAPBDSPIKE

This CU code does not include the screws or nails.

Fake Horned Owls may be attached to a crossarm or affixed to an area if you believe it could deter other birds from landing or nesting in a certain spot. These owls are made of plastic and have a head that rotates in the breeze.

NOTE–Some assembly may be required.

Owl with Mount Assembly Attached

Cat ID	Description	CU Code
49580	Diverter, Fake Owl	None
None	Mount Assembly w/owl	DAPBRDOWL

Mount assembly is required prior to installation. **Click Here** for mount attachment instructions.

Appendix C. ODFW Habitat Quantification Tool Scientific Rationale Table C-2

Table C- 2. Indirect impact mechanisms and associated minimization measures

Source of impact	Mechanism of impact	Distance (km)	Explanation	Potential minimization measures[1]	References
Noise	Noise (NS)	5.0	Increased noise levels interfere with sage-grouse breeding behavior, and may increase stress on individuals throughout the year. A distance of 5 km should allow noise to drop to less than 10 decibels above ambient for relatively loud impacts (oil and gas wells), and to below ambient for relatively quiet impacts (infrastructure construction).	Closure during breeding season (March 1 - June 30) Seasonal closures beyond breeding season	(Patricelli et al. 2013, Manier et al. 2014)
Structures	Avoidance (AV)	0.8	Sage-grouse behaviorally avoid vertical features, including both tall structures such as transmission lines or communications towers and low structures or features such as rural buildings or juniper trees.	*No potential minimization*	(Manier et al. 2014, Howe et al. 2014, Severson et al. 2016)
	Avian perch subsidies (AP)	3.3	Vertical features such as powerlines provide perch sites for raptors and ravens, which can measurably increase predator foraging behavior in proximity to such features.	Installation of perch deterrents	(Slater and Smith 2010, Manier et al. 2014)
	Corvid[2] nest subsidies (CN)	3.3	Ravens use structures such as buildings and transmission line poles for nesting sites, which may lead to locally increased density of raven populations.	Unoccupied corvid nest destruction Installation of corvid nest diverters	(Dwyer and Leiker 2012, Manier et al. 2014, Dwyer et al. 2015)
Provision of food and water	Corvid food and water subsidies (CF)	3.3	Human development may provide subsidies in the form of food and water to ravens and crows, which increases raven population density and thus predation on sage-grouse.	Water abatement programs Trash abatement programs Carcass collection	(Manier et al. 2014, Howe et al. 2014)
	West Nile Virus subsidies (WN)	2.0	Human development that creates standing water during mosquito breeding seasons can increase the risk of transmission of West Nile virus.	Draining of water sources during summer months	(Hamer et al. 2014, Ferraguti et al. 2016)

[1] *Minimization measures and impact reduction are explained in Section 3.4.1.*
[2] *Corvids include crows and ravens.*