Calico – Grassy Mountain 34.5kV Line

Vale, OR

Paramount Nevada Gold

April 30, 2021

Superseded

DOCUMENT REVISION PAGE

Project Name: Calico – Grassy Mountain 34.5kV Distribution Line
Project Number: 10140278

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Date: April 5, 2019
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Project Engineer: Cody Jura

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	3-5	Added Section 7 “Avian Protection & Mitigation” Added Appendices A, B, & C	

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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. Weather Cases Considered

Weather Case	Ice in	Ice Density lbs/ft³	Wind mph (mph)	Temperature °F
NESC 250B Medium	0.25	57	4 (39.2)	15°
NESC 250C – Extreme Wind	None	-	18.8 (85)	60°
NESC 250D – Concurrent Ice & Wind	0.25	57	4.1 (40)	15°
Uplift	None	-	0 (0)	0°

3. Loading Criteria

Grade B Construction					
Load Case	**Weather Case**	**Condition**	**Overload Capacity Factors (OCF)**		
			Wind	**Wire Tension**	**Vertical**
RULE 250B	NESC Medium	Initial	2.50	1.65	1.50
RULE 250C	NESC Extreme Wind	Initial	1.00	1.00	1.00
RULE 250D	NESC Concurrent Ice & Wind	Initial	1.00	1.00	1.00

Grade C Construction					
Load Case	**Weather Case**	**Condition**	**Overload Capacity Factors (OCF)**		
			Wind	**Wire Tension**	**Vertical**
RULE 250B	NESC Medium	Initial	1.75	1.30	1.90
RULE 250C	NESC Extreme Wind	Initial	0.87	1.00	1.00
RULE 250D	NESC Concurrent Ice & Wind	Initial	1.00	1.00	1.00

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. Conductor Type

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.

	34.5 kV Conductor	**Neutral Conductor**	**ADSS Conductor**
Wire Name	336.4 AAC 19 Strand	2/0 AWG ACSR 6/1 Strand	ADED1611-12-ES-096
Code Name	"Tulip"	"Quail"	-
Weight	0.315 lbs/ft.	0.183 lbs/ft.	0.117 lbs/ft
Diameter	0.665 in.	0.447 in.	0.627 in.
Rated Tensile Strength (RTS)	6,150 lbs	5,310 lbs	4,048 lbs
Allowable Ampacity	513 amps	276 amps	N/A
Bundle	1	1	1

6. Structure Framing

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 – 137 will include a new 34.5kV circuit and the continuation of the existing 12.5kV circuit and utilize Grade B 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

7. 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.

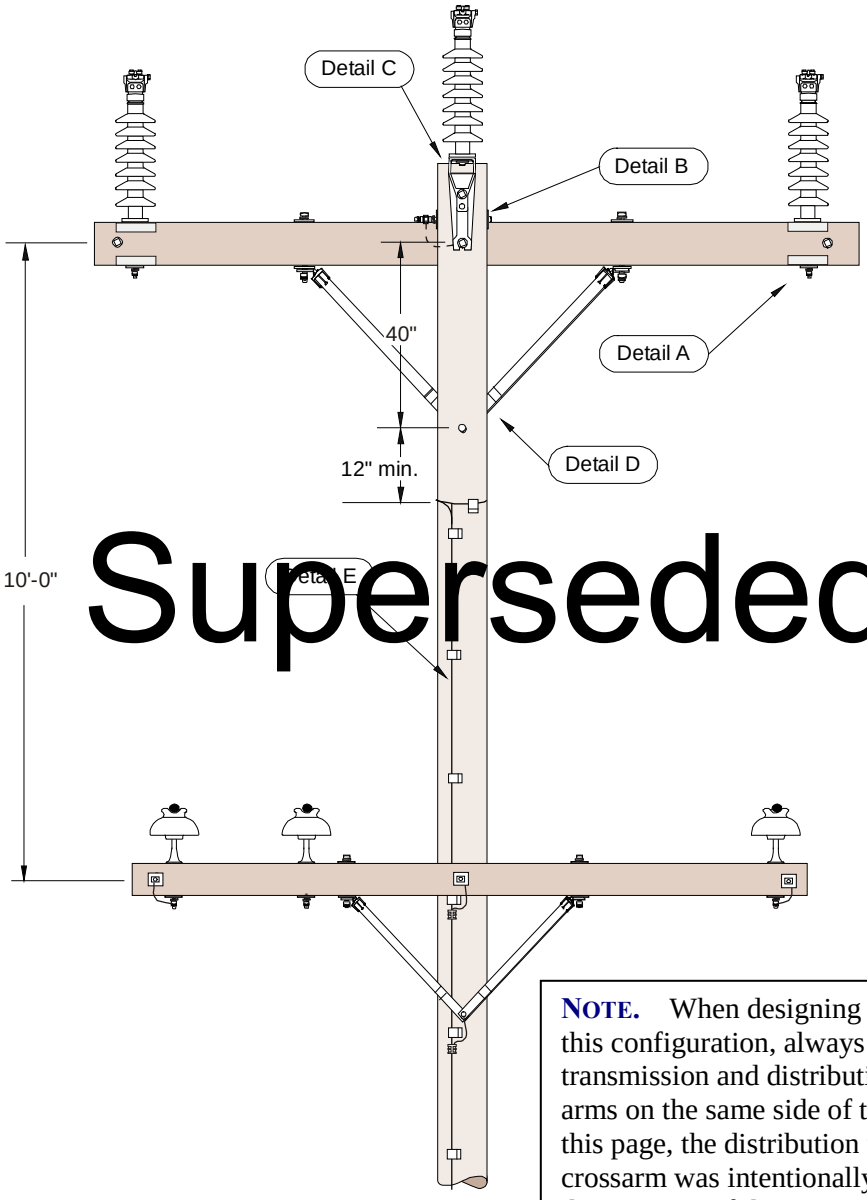
Power lines present a potential risk to sage-grouse populations by providing perch sites for predators such as raptors and ravens. To minimize the impact that the new power line will have on the sage-grouse populations in the project area Triangular Avian Perch and Nest Diverters will be installed on 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

Superseded

Application. This ***T***angent structure is used for 46-kV and 69-kV. This structure is assembled using vertical polymer post 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.

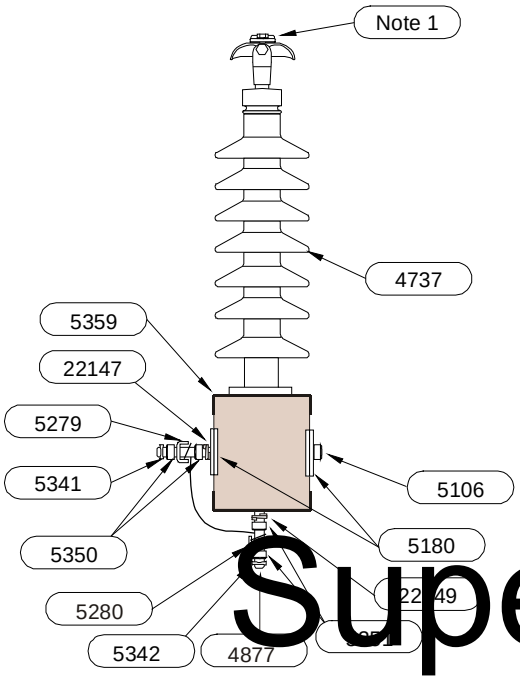


NOTE. When designing and building this configuration, always face the transmission and distribution underbuilt arms on the same side of the pole. On this page, the distribution underbuilt crossarm was intentionally shown on the opposite of the transmission arm to illustrate the clarity of bonding

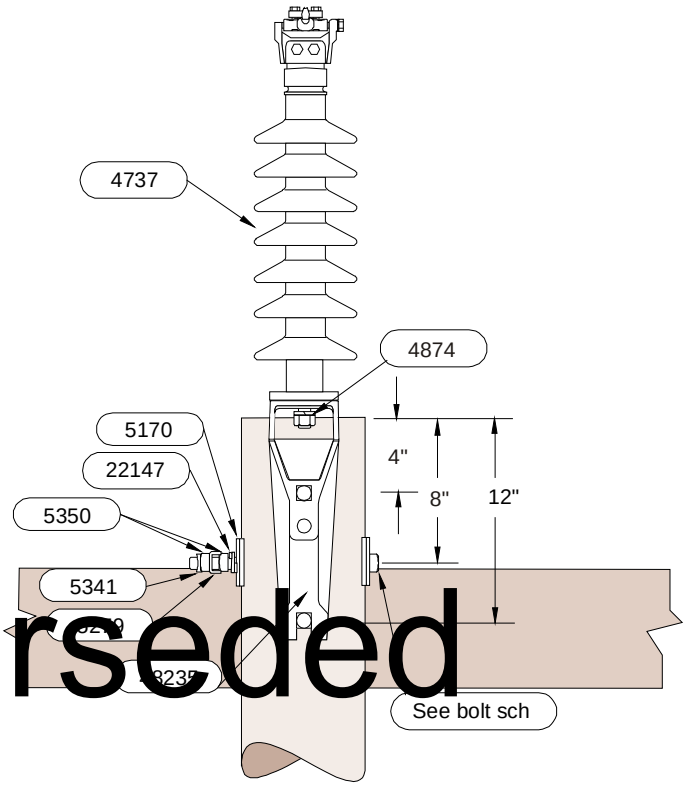
For hardware details and PassPort Codes see sections:

02-002	Grounding	11-010	Armor Rod
08-200	Clamp		

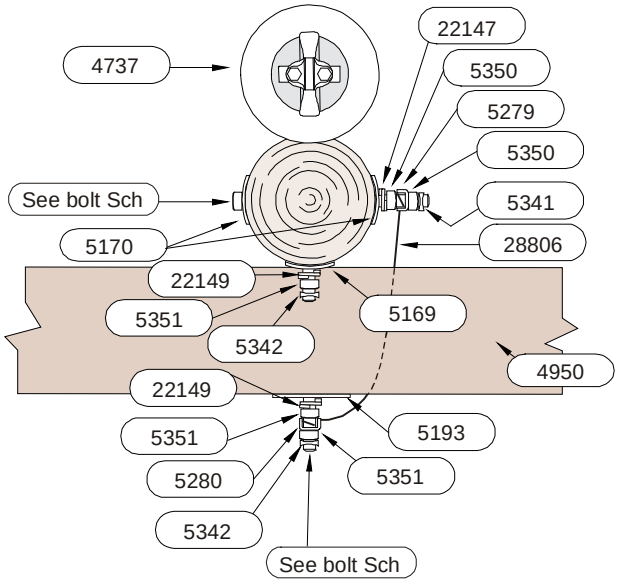
Details. (See section 00-010 for an explanation of special drawing conventions used in the illustrations within this document.)



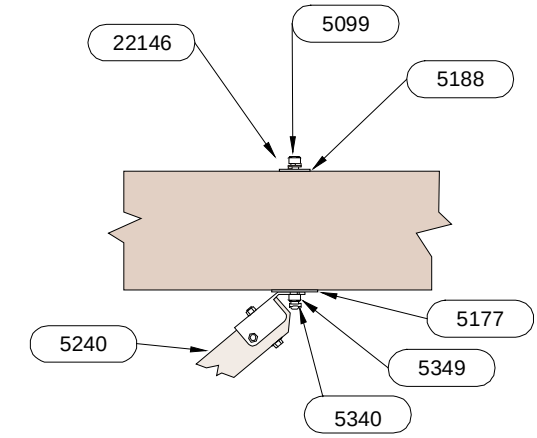
Detail A
Insulator & Saddle (TXASAD, T169VP)

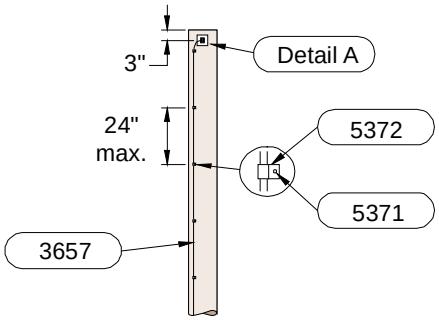


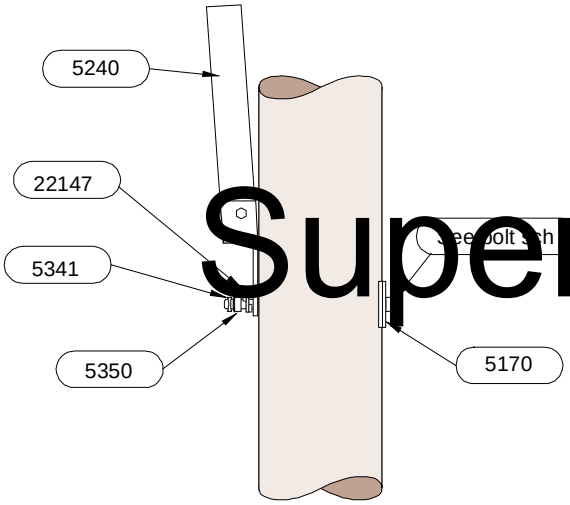
Detail B
Insulator & Pole Top Bracket
(TPTB) (TI69VP) (TASB)



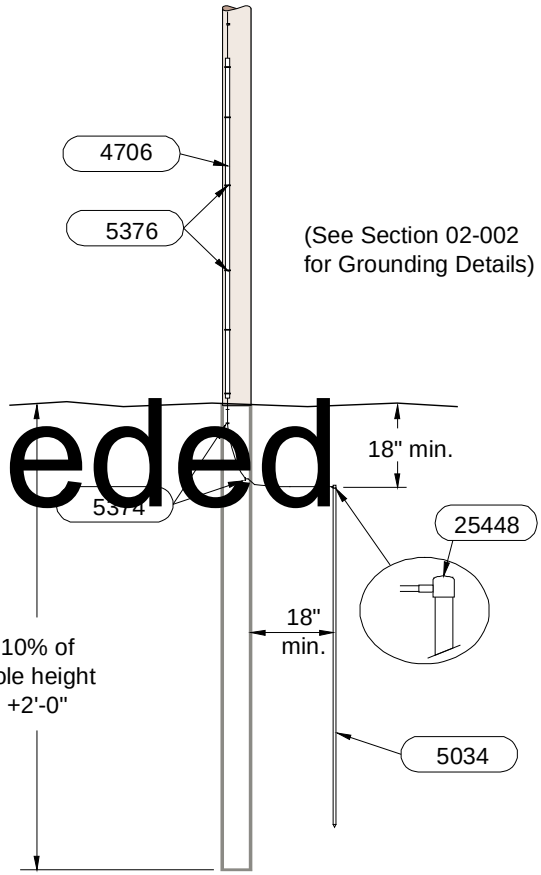
Detail C Crossarm Mounting & Bonding (TASM11)







Detail D
Brace Attachment



Detail E
Pole Grounding

Bill of Materials

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

Cat. ID	Qty	Description
3657	55 ft	CND CU CW SLD 6
4706*	1	MLDG PSTC GRD WIRE
4737	3	INS LNPST POLY 69 KV CL
4874	1	STUD, INSUL, 3/4x1-3/4"
4877	2	STUD, INSUL, 3/4x14"
Note 1	3	CLP INS ALUM (size)
4950	1	XARM, WOOD, 11 FT HD
5034	1	ROD GRD 5/8 X 8 FT
5099	2	BLT GALV MCH 1/2X10"
5106	2	BLT GALV MCH 5/8X8"
5169	1	WSHR CRVD 3X3X1/4, 13/16"
5170	3	WSHR CRVD 3X3X1/4, 11/16"
5177	2	WSHR FLGD 3X3, F/1/2" BLT
5180	4	WSHR RND 11/16" HOLE
5188	2	WSHR SQ 2X2, 9/16" HOLE
5193	1	WSHR SQ 4X4, 13/16" HOLE
48235	1	BRKT, POLE TOP, 69kV
5240	1 pr	BRC XARM WOOD 72"
5279	3	CLIP BONDING 5/8"
5280	3	CLIP BONDING 3/4"
5340	2	NUT MF 1/2"
5341	4	NUT MF 5/8"
5342	4	NUT MF 3/4"
5349	2	NUT GALV PLAIN 1/2"
5350	6	NUT GALV PLAIN 5/8"
5351	7	NUT GALV PLAIN 3/4"
5359	4	SADDLE CROSSARM
5371	1 lb	NAIL CW 20D
5372	25	CLIP GRD WIRE
5374	1 lb	STAPLE FENCE 1-1/2"
5376*	6	STAPLE SQ BARBED
22146	2	WSHR DBL COIL 9/16" HOLE
22147	4	WSHR DBL COIL 11/16" HOLE
22149	4	WSHR DBL COIL 13/16" HOLE
25448	1	CONN, CU, GRD, DRV-ON,5/8
28806	4 ft.	CND CU BR SLD 6 SD

* To be used when there is no distribution underbuild.

1 Refer to page 08-200-01 for line post insulator conductor clamps.

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	-	-	-
5126	BLT GALV MCH 3/4X18					
	Crossarm	-	-	-	-	1
5127	BLT GALV MCH 3/4X20					
	Crossarm	-	-	1	1	-
5128	BLT GALV MCH 3/4X22					
	Crossarm	1	1	-	-	-
5124	BLT GALV MCH 3/4X14					
	PT Bracket	-	-	1	1	1
5125	BLT GALV MCH 3/4X16					
	PT Bracket	1	1	-	-	-
5109	BLT GALV MCH 5/8X14					
	Bottom Brace	-	-	-	-	1
5110	BLT GALV MCH 5/8X16					
	Bottom Brace	-	-	1	1	-
5111	BLT GALV MCH 5/8X18					
	Bottom Brace	1	1	-	-	-

PassPort Codes

CU Codes	Qty
TA[illegible]	1
TASM1	1
TI69VP	3
TPTB	1
TXASAD	2

Bonding and Grounding. The pole ground is to be terminated in a halo at a minimum of 12" below the attachment point of the crossarm brace. Any outside insulator steel pins on the crossarm are to be bonded to the crossarm anti-split bolts and the center insulator steel pin is to be bonded to the crossarm through-bolt and the pole anti-split bolt. These changes have been made to help eliminate the problem of nuisance tripping and the extreme difficulty that follows in attempting to locate the source of the problem. The pole ground is terminated in a halo to eliminate radio noise and near the top of the pole to provide a convenient ground point for maintenance personnel. For additional details concerning appropriate grounding practices, see page 02-002-01.

3-Ø Multi Circuit - Crossarm under Crossarm Illustrated with both circuits as 34.5-kV.

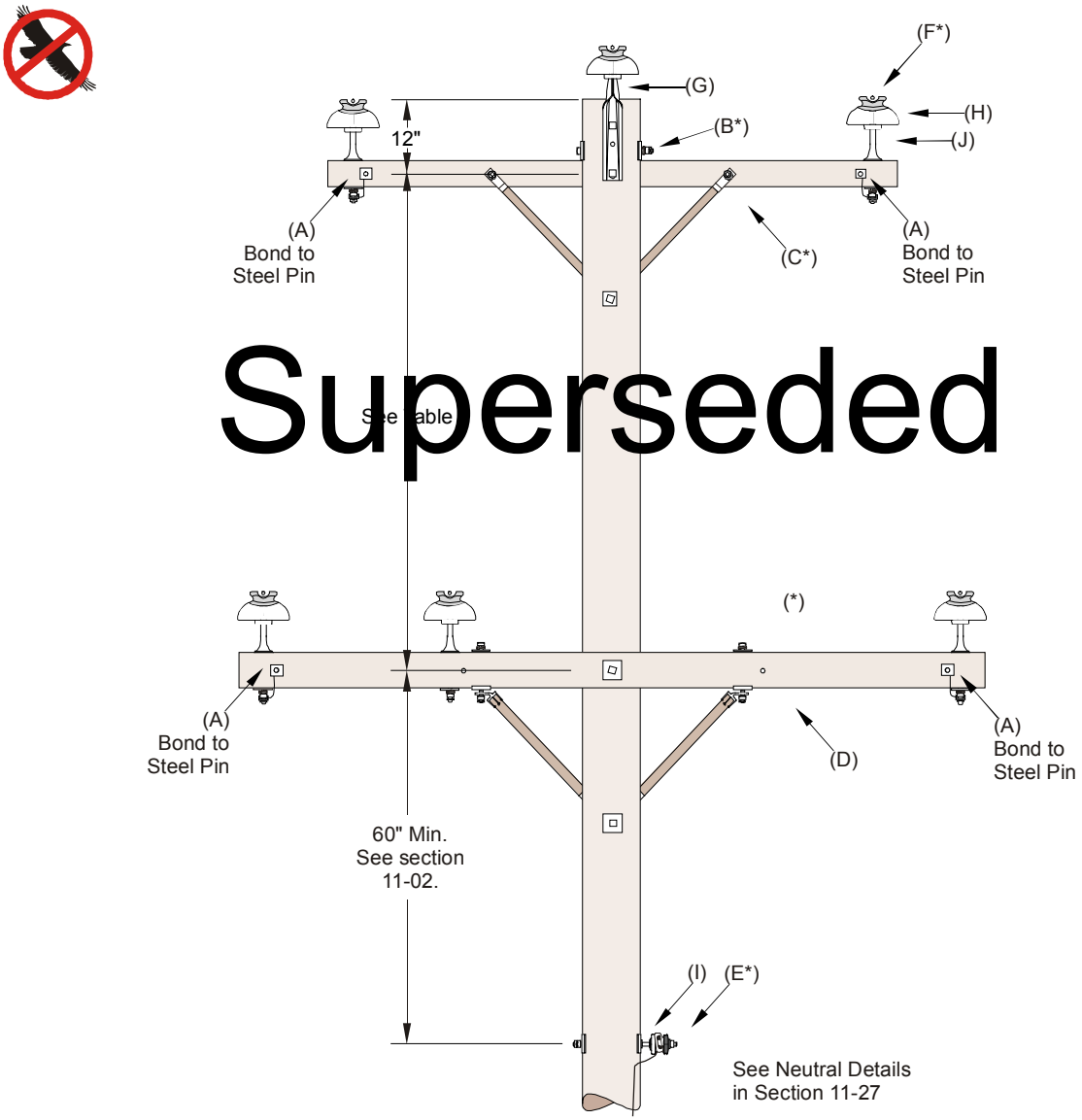
The table shows the recommended separation for double circuit distribution conductors based on the following assumptions:

- 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*	Crossarm 8'	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.

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

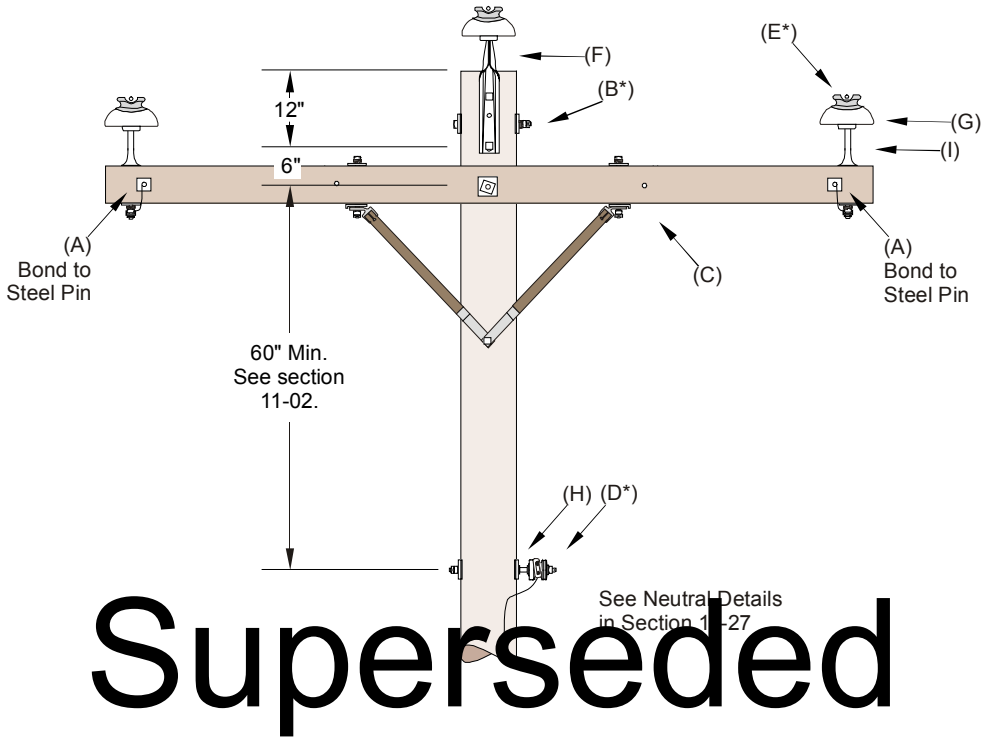
*(F) ***Formed Top Tie -*** DFT…Order by wire size.

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

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

Superseded

3-Ø Tangent –10' Crossarm 2-Up



For details, see the next page.

3-Ø Tangent – 10' Crossarm 2-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)	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

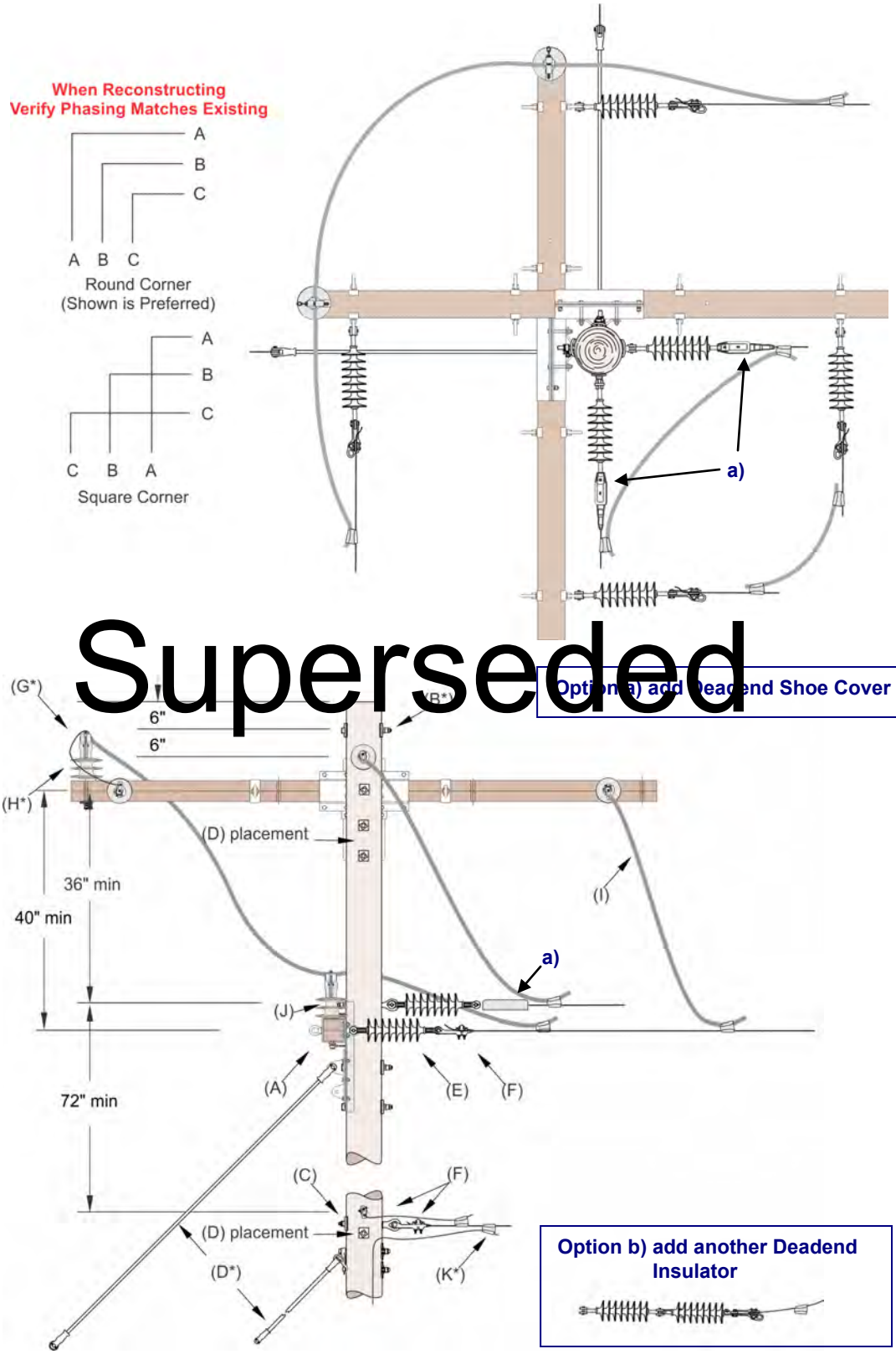
DFTJ4 Formed Top Tie F/J-Neck Insulator No. 4

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

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

Superseded

3-Ø Deadend - Corner for 336 or 795



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)	DADE10H	Crossarm Apitong 10' Heavy	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)	DADE10H	Crossarm Apitong 10' Heavy	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…*	Formed Top Tie	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 Sections 11-09 and 11-25.

*(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 & 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).

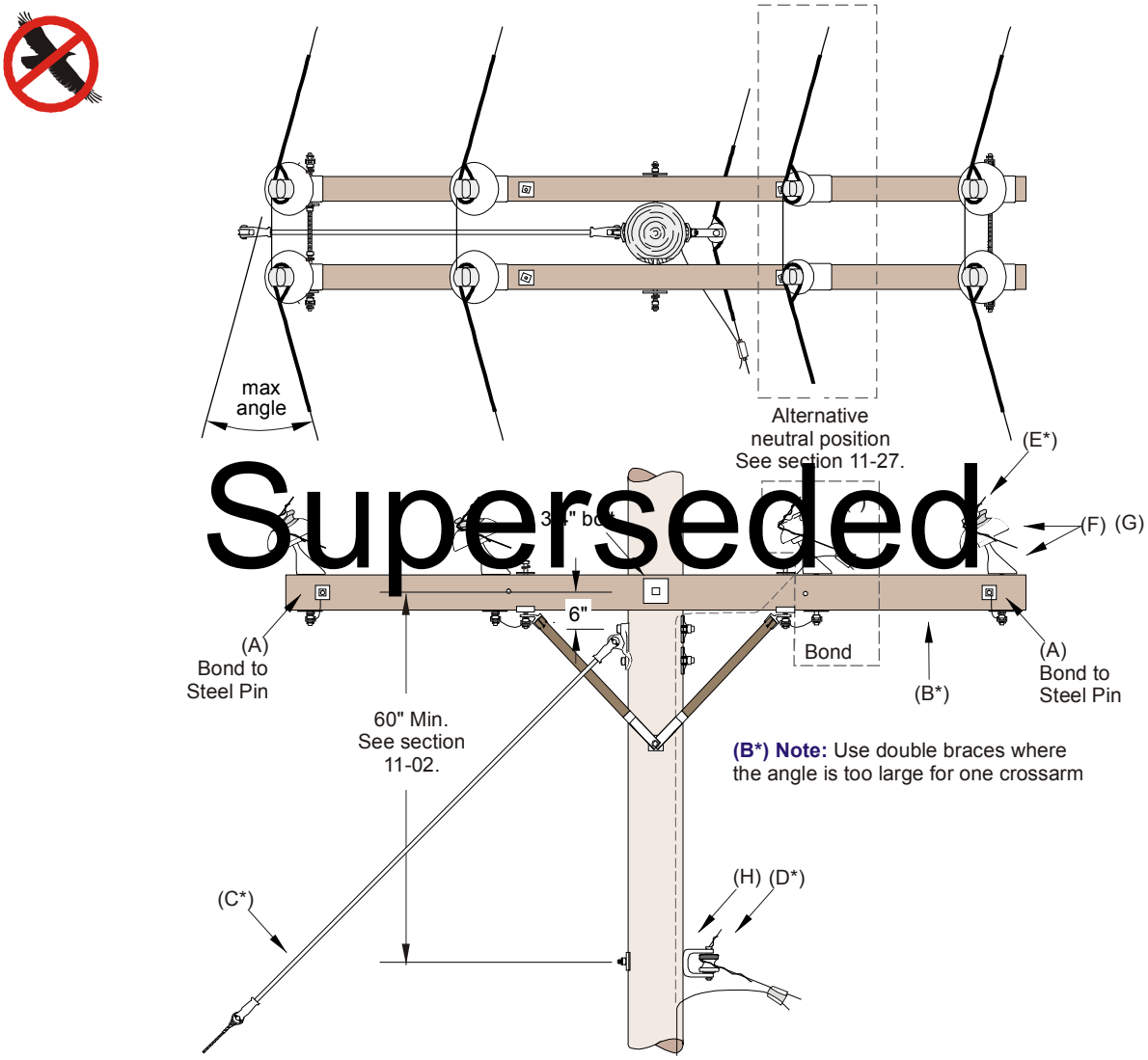
*(K) ***Wedge Connector -*** DWC…, Order by wire size.

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

3-Ø Angle - Double Crossarm 3-Up

Conductor	Angle (3 up)	(4 up)
#4 ACSR	0° - 26.2°	0° - 18.3°
2/0 ACSR	0° - 13.4°	0° - 9.2°
336AL	0° - 10.9°	0° - 7.4°
795AL	0° - 5.5°	0° - 3.6°

* Use top ties for 795 AL and for angles less than 10°



For details, see the next page.

3-Ø Angle - Double Crossarm 3-Up Details

For 12.5 or 34.5-kV Construction

	CU Codes	Description	Qty
(A)	DASB6*	Anti-split Bolt 6"	4
(B)	DAAD10*	Dbl Crossarm 10'	1
(C)	DDG…*	Down Guy EHS	1
(D)	DFSP…*	Formed Spool Tie	1
(E)	DFD…*	Formed Dbl Side Tie	3
(F)	DI35J	Insulator 34.5-kV Pin Type J-Neck	6
(G)	DSAP35	Steel Pin Angle 35-kV	6
(H)	DSR1	Sec. Rack, 1 Spool W/Spool	1
(*)	Optional	See Note Below	

**** Notes***

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

*(B) ***Crossarm*** - DAAD10, or one (1) DAD10 and an additional 42" brace, DWB42. Order as indicated in the table by angle required.

*(C) ***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 Sections 11-09 and 11-25.

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

*(E) ***Formed Double Side Tie -*** DFDST…, Order by wire size. For 795 use DFDTJ795 ***Formed Double Top Tie***.

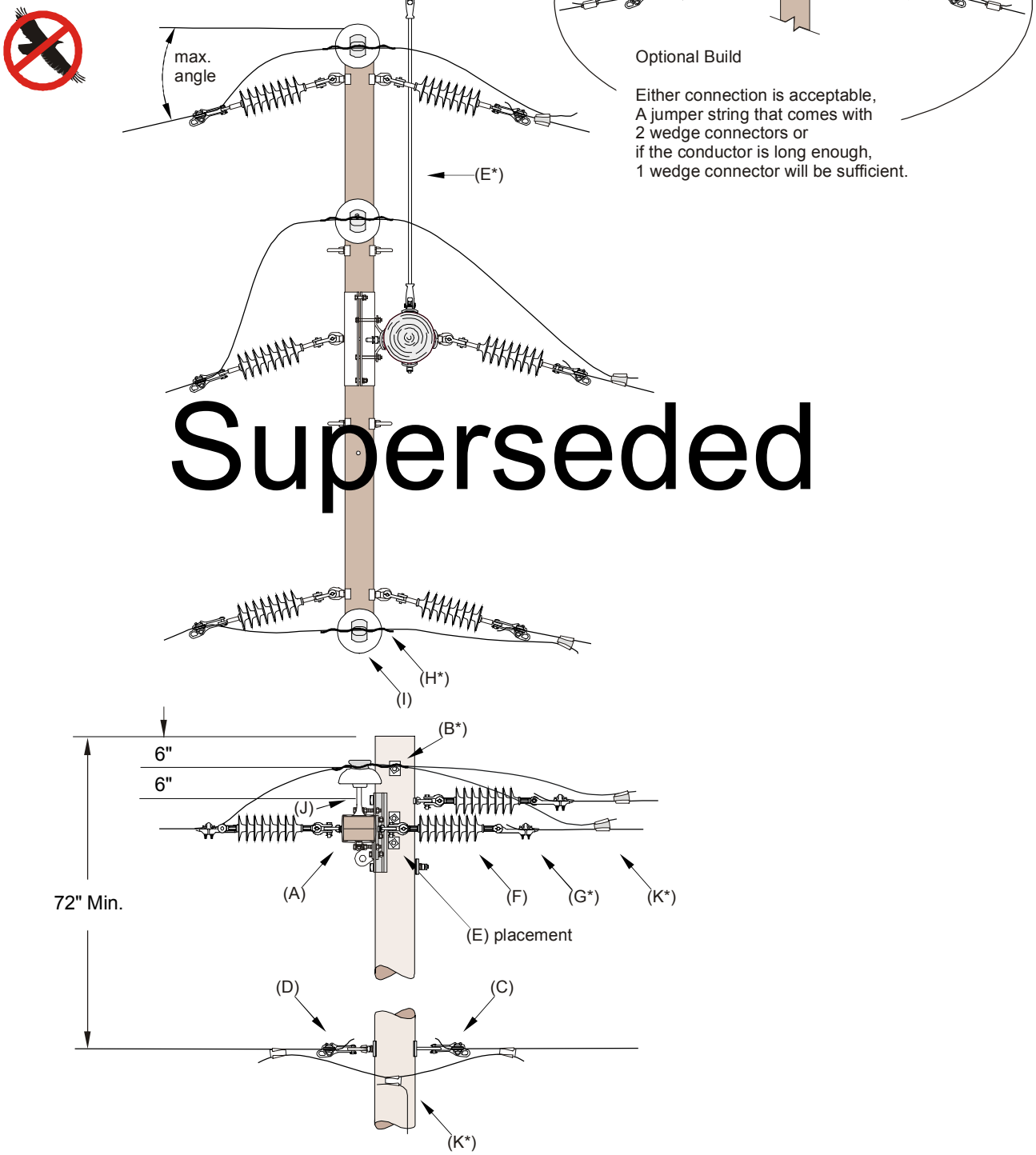
*(*) ***Alternate Neutral Position -*** See section 11-26.

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

Superseded

3-Ø Angle – Double Deadend 3-Up

Conductor	Max Angle 8' Arm	Max Angle 10' Arm
#4 ACSR	30.0°	30.0°
2/0 ACSR	25.2°	30.0°
336AL	-	30.0°
795AL	-	17.1°



For details, see the next page.

3-Ø Angle – Double Deadend 3-Up Details

For 12.5-kV Construction

	CU Codes	Description	Qty
(A)	DADE10M	Crossarm Apitong 10' Medium	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)	DDG…*	Down Guy EHS	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	3
(K)	DWC…*	Wedge Connector	4

For 34.5-kV Construction

	CU Codes	Description	Qty
(A)	DADE10M	Crossarm Apitong 10' Medium	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)	DDG…*	Down Guy EHS	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	3
(K)	DWC…*	Wedge Connector	4

**** Notes***

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

*(E) ***Down Guy -*** DDG, W/Guy Guard, Guy Strain Insulator, & Pole Eye Plate. Order by wire size. For other guying options see Sections 11-09 and 11-25.

*(G) ***Deadend & Tension -*** DDR…,Primary. Order by wire size.

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

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

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

Superseded

Appendix B. – Idaho Power Avian Protection Standards

Superseded

Wildlife Protection

Idaho Power's Bird Management Program

Birds commonly use power poles for perching, hunting, and nesting which increases their risk of electrocution. Several laws protect raptors and other migratory bird species. It is Idaho Power's policy that new or rebuilt lines be built to avian protection guidelines or safe construction standards.

A GPS was used to develop a map delineating 3 zones within our service territory that would govern which design guidelines were appropriate for new construction and the rebuilding of lines:

1) no raptor restrictions,
2) a 40" guideline where hawks and owls would be found but we do not expect eagles to be found, and
3) a 60" guideline where eagles would be found. Note that all federal and state (BLM, FS) land is to be built by zone 3, eagle safe standards.

Maps are located in your regional operations center or on the Spillway. If you see an error, contact Environmental Affairs so that the map can be updated.

NOTE. For information regarding procedures for Avian Mortality, Raptor Nesting on Power Poles and Bird Collisions see *Distribution Manual* section 13.01.

An example of the Bird Mortality Report (PSD 007) form is located in *Distribution Manual* section 13.01-02 on page 04. This report can be completed on the Spillway or a hard copy may be obtained from the Environmental Affairs Department

Protection Criteria

The two (2) basic principles of avian protection are *isolation* (separation) and *insulation* (coverings). See section 11-31 and 11-32 for *insulation* materials and section 11-33 and -34 for specific *isolation* construction details.

Types of Protection

There are several types of protection measures that are available to protect wildlife on existing structures.

- Covers (See section 11-31) *Preferred*
- Bird Diverters (See section 11-32)
- Perches (See section 11-32)
- Nesting Platforms (See section 11-32)
- Structural Modification (See section 11-33 and 34) *Preferred*

Avian Symbols

This symbol on any construction illustration means that the structure, if built as shown, is **not avian protected**. (zone 1), no restriction)

This symbol on any construction illustration means that the structure, if built as shown, **is avian protected** for hawks and owls (zone 2), 40").

This symbol on any construction illustration means that the structure, if built as shown, **is avian protected** for any kind of bird, including eagles (zone 3), 60").

See sections 11-31 through 11-34 for examples of how to modify various structures to make them "avian protected".

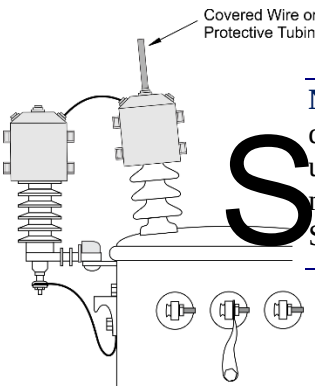
Wildlife Protection Materials, Covers

Covers

These bird guard covers are made out of non-conductive, UV stable, fire-retardant and flame resistant plastic. They may be used on all voltages.

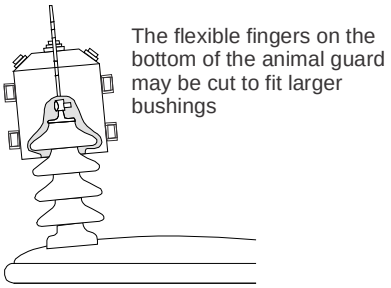
Small Animal/Bird Guards

Animal Bushing Guards. The high voltage bushing on all overhead distribution transformers shall have an animal guard installed to reduce the incidence of outages caused by birds and small animals.



NOTE. Manufacturer does not recommend use on primary metering bushings. See page 05-35-01.

CAUTION. Only place the animal guard over the top skirt of the bushing. Otherwise, the creepage distance provided by the skirts is lost.



Placement of Animal Guards

NOTE. Cover all transformer primary bushings – single and two bushing transformers.

Cat. ID	Description	CU Code
54130	Grd, Med, F/Xfmr Bushing	DAP
49353	Grd, Lrg, F/Rclr/Seclr,Reg&Pothead	None

DAP Includes arrester bolt cover, bushing guard and 2' protective tubing.

See *Material Manual* page 05-051-01.

Gray Vinyl Tape. In your opinion, if a small animal/bird guard does not lock securely enough you have the option to make a couple wraps with this gray tape around the center of the guard.

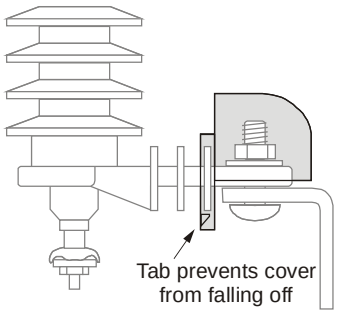
Cat. ID	Description	CU Code
48515	Tape, Gray, Vinyl 3/4"	none
49307	Tape, Gray, Vinyl 2"	none

See *Material Manual* page 15-251-02.

Regulator Arrester Cover is installed on a series arrester.

Cat. ID	Description	CU Code
45342	Cover F/Regulator Series Arrester	none

Arrester Bracket Cover. The arrester bracket covers the bolt where an animal or bird might stand. They are easy to install; just slip them over a creepage skirt on polymer arresters to effectively cover the mounting bolt. This cover has an insulation value of 21-kV.



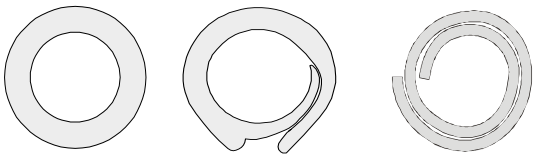
Cat. ID	Description	CU Code
44487	Arrester Bkt Grd	DAPAB

See *Material Manual* page 05-052-01.

Protective Tubing. All primary jumpers from the top of the transformer bushing to the bottom of the switch and from the switch to the phase will be covered with protective tubing.

On 1-Ø structures the jumper between the transformer bushing and the switch will be covered with protective tubing.

Caution. Tubing is not to be considered personnel safe insulation.



Gray Tubing | Split Tubing | Insulation Tubing

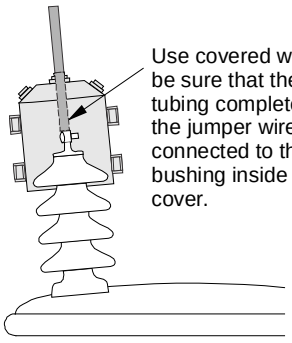
Cat. ID	Description w/Inside Dia	CU Code
43694	Tubing, Wildlife Gray, 1/2"	DAPGT12
4682	Tubing, Split, Gray, 5/8"	DAPGTS58
24748	Tubing, Split, Gray, 3/8"	DAPGTS38
47639	Tubing, Split, Gray, 3/4"	DAPGTS34
47769	Insul Tubing, Gray, 3/4"	DAPGTI34
44970	Insul Tubing, Gray, 1"	DAPGTI1
39894	Insul Tubing, Gray, 1-1/4"	DAPGTI125

The gray wildlife tubing is included in blue CU codes. If ordered individually these are issued by the foot.

A stick-application tool is available for installing insulation tubing on pre-existing jumpers. See *Tools* page 111-12-04 for installation details.

Size Tubing with Jumper Conductor

Jumper	Conductor Dia	Tubing Cat. ID
#4 CU	0.2043"	24748 or 43694
#2 CU	0.2920"	24748 or 43694
2/0 CU	0.414"	43694, 47639 or 47769
4/0 CU	0.522"	4682, 47639 or 47769
250 CU	0.574"	4682, 47639 or 47769
336 AL	0.666	44970, 47639 or 47769
500 CU	0.811"	44970 or 39894

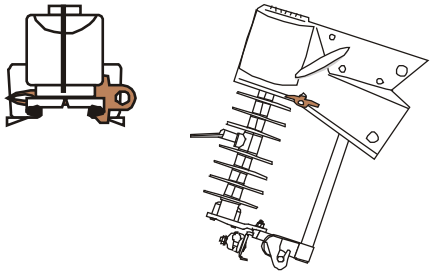


Use covered wire or be sure that the protective tubing completely covers the jumper wire that is connected to the transformer bushing inside the bushing cover.

For more information about tubing see *Materials Manual* page 05-053-01 and 02.

Switch Covers

Non-loadbreak Cutout Covers cover the top of the cutout and are securely held in place by a locking pin. This pin 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.



NOTE. The universal cover is not manufacturer specific. It fits all non-loadbreak cutout switches including the linkbreak style.

Cat. ID	Description	CU Code
58348	Universal Cover fits all	DAPNLBC
53962	Hook-pin Replacement	none

Superseded

The Solid Blade 600 Amp Cutout Cover comes with 2 pieces. One part covers the top of a non-loadbreak solid blade cutout and the other part covers the NEMA pad. Use protective tubing to cover the bare wires exiting the top of the cutout for existing construction or use covered wire for new construction. Two parts are hot "stickable."

Solid Blade 600A Cover

Cat. ID	Description	CU Code
55721	Cover, SLD BLD 600A	DAPNLBSLD6

For more information on NLB covers see *Materials Manual* page 05-054-01.

Loadbreak Switch Covers consists of 2 pieces and attach to the top of the cutout by snapping together. Protective tubing should be used on the wire coming out of the top of the cutout.

Cat. ID	Description	CU Code
47445	Cvr, Loadbreak Switch	DAPLBC

For more information see *Materials Manual* page 05-054-02.

Insulator and Conductor Covers

Insulator and Conductor Covers are 3-piece phase and insulator bird guards that cover the insulator and conductor to keep birds from making phase to phase or phase to ground contact. Different types of insulators require different covers. The ends of each cover may be cut to accommodate various wire sizes.

These covers are made out of non-conductive, UV stable, fire-retardant and flame resistant plastic. They may be used on all voltages.

Cat. ID	Description	CU Code
51464	3 PC LP F/Vert Tie Top Ins	DAPVIC3CFJK
52971	3 PC F/Vert Clamp Top Ins	DAPVIC3CT
56889	3 PC F/Hrz Poly Clamp Top Ins	NONE
14700	3 PC F/Hrz Por. Clamp Top Ins	DAPHIC

The following table matches the appropriate cover with insulator.

3-piece Cover to Insulator Table

Cat. ID	Description	CU Code
Cat. ID 51464 (3 Piece Low Profile)		
4732	Por. Vert Tie Top 25kV	DIP12
4733	Por. Vert Tie Top 35kV	DIP35
4762	Por. Pin Type 4kV	DI4C
4763	Por. Pin Type 11kV	DI12F
4797	Por. Pin Type 35kV	DI35J
4799	Plastic Pin Type 15kV	None
4800	Plastic Pin Type 35kV	None
Cat. ID 52971 (3 Piece)		
4731	Por. Vert Clamp Top 25kV	DIPT12
4735	Por. Vert Clamp Top 35kV	DIPT35
Cat. ID 14700 (3 Piece)		
4734	Por. Hrz Clamp Top 35kV	DIPH35
4739	Por. Hrz Clamp Top 25kV	DIPH12
Cat. ID 56889 (3 Piece)		
4743	Poly Hrz Clamp Top 69kV	

For more information see the *Materials Manual* page 05-056-01.

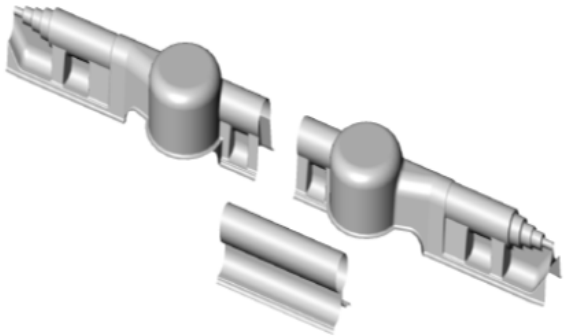
Installation steps begin on page 11-31-05.

Double Crossarm Cover. The 3-piece double crossarm bird guard adjustable covers go over the two double phase insulators and the phase conductor. Saw cut middle adjustable part to cover the two insulators. Call M&M for extension arms.

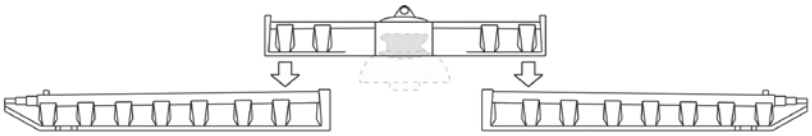
Cat. ID	Description	CU Code
Bird Guards for Dbl arm Vrt. Type Insulators		
55179	3 PC DXARM F/CPJ Neck Ins	DAPDXV3J

For more information, see the *Materials Manual* page 05-056-03.

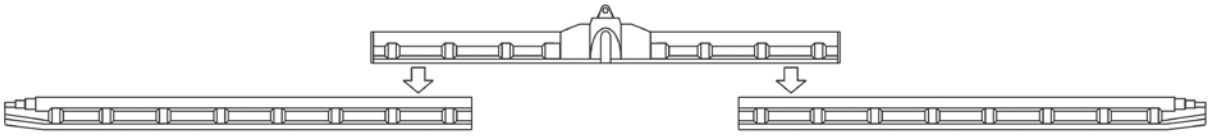
Double Crossarm Side Tie Cover. The 3-piece double crossarm side tie bird guard adjustable covers go over the two double phase insulators where conductors are on side tie configuration. Saw cut middle adjustable part to cover the two insulators. Order extension arms for both sides.



Cat. ID	Description	CU Code
56653	3 PC DBL PINS SIDE TIES, ADJ, F/CJF NECK INS	DAPDPST3CFJ



3 Piece Low Profile Cover for C, F, J, & K Tie Top Insulators (CID 51464) Assembled Length = 80"



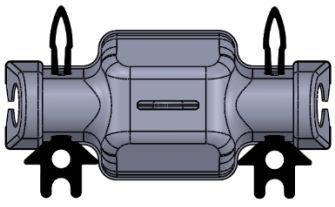
3 Piece Cover for Horizontal Insulators (CID14700 for Porcelain and CID 56889 for Poly) Assembled Length = 120"
3 Piece Cover for Vertical Clamp Top Insulators (CID52971) Assembled Length = 120"

Short Line/Insulator Cover. The 1-piece short line/insulator bird guard cover goes over an insulator and a short piece of conductor. The overall length of this cover is 32".

Cat. ID	Description	CU Code
57296	1 Pc SL Vert F/CFJ-Neck Ins	DAPVIC1CFJ

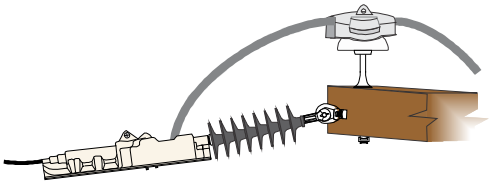
Low-Profile Insulator Cover is a plastic cover that pops over the top of the insulator only, allowing the bottom of the porcelain pin-type insulator to remain open to the air.

Useful for existing tie top insulators on double dead end 3-Ø corners and taps.



Cat. ID	Description	CU Code
57116	Cvr, LP F/J NECK Ins	DAPLPCFJ

For more information on the 1-piece covers see *Materials Manual* page 05-055-01.



DE (Shoe) Cover with a Low-Profile Cover

Deadend Clamp (Shoe) Cover. This cover goes over the clamp (shoe) reaching from the last skirt of a polymer insulator to the conductor. The sizes and style varies according to the age and style of the clamp.

Cat. ID	Description	Size	CU Code
48621	1 Pc F/Poly DE Ins	Up to 2/0	DAPDIC1
50467	1 Pc F/Poly DE Ins	795	DAPDIC795

For more information see the *Materials Manual* page 05-057-01.

Shotgun Installation Tool for 3-piece Covers may be used while installing Avian covers when the line is hot. Instructions begin on the next page.

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

For more information, see the *Tools Manual* page 111-14-07.

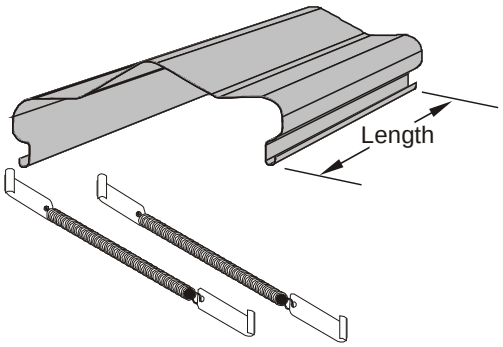
Pole Top Switch Protection

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 2 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

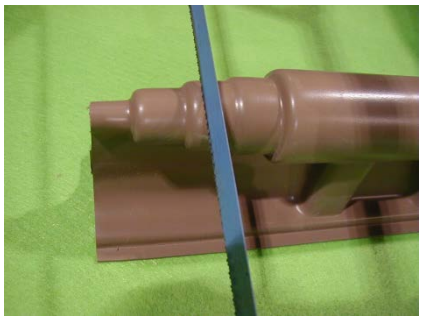
Two (2) spring clip assemblies are included with each cover's CU code.

For more information, see the *Materials Manual* page 05-058-01.

Installation of 3 piece Covers

Step 1: Cut the ends off the 2 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 2 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

shown on the previous page.

Follow Step 1 and 2 previously shown.

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.

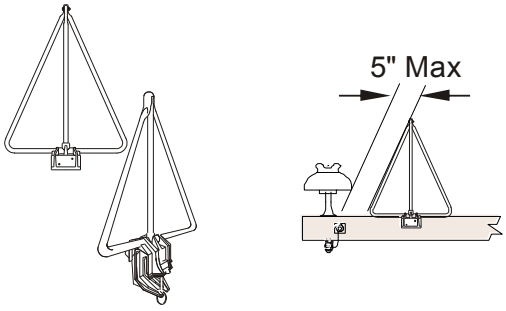
Wildlife Protection Materials, Diverters

Bird Diverters

Diverters are installed between phases to discourage birds from landing on an unsafe location on a structure. Ideally, when a diverter is installed, leave a safe alternative perch site on the same structure if possible. If a safe area is left open the bird hopefully will 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 2 configurations; one is hotstick installed and one can be installed without a hotstick which requires the work area to be de-energized. This diverter is installed on 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" distance maximum. If exceeded, it will allow birds to perch and do no good.



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

For more information on the triangle or spikes, see *Materials Manual* page 05-061-01.

Bird Spike Diverters are positioned to deter birds from landing on certain locations on our crossarms. Note that these spikes may not deter the larger birds and smaller birds may nest in them. This 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.

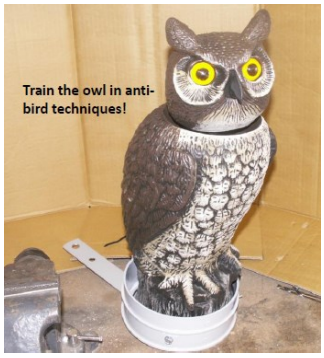
Spikes 5" tall and are attached by 10 nails or #8 wood screws per 2' section.

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

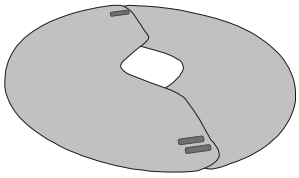
Cat. ID	Description	CU Code
49580	Diverter, Fake Owl	None
None	Mount Assembly w/owl	DAPBRDOWL

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

For more information see *Materials Manual* page 05-061-02.

Small Animal /Bird Diverter Discs snap together between the second and third skirt of a vertical or angled insulator to deter animals or birds from getting into hot areas. This 13-1/2" plastic disc is made for pole top switches but may be used where it may divert and protect as needed.

Stations uses a larger version of this disk.



Cat. ID	Description	CU Code
47583	Wildlife Disc Diverter	DAPPTSDISC

For more information see *Materials Manual* page 05-062-01.

Bird Flight Diverters

Bird flight diverters are attached directly to the conductor to help prevent bird collisions with Idaho Power's power lines.

Bird Flight Diverter (BFD). The BFD is installed directly on the conductor and held in place by means of the Heliformed rod gripping section (small end). Order based upon the conductor size.

Studies have determined the most effective spacing for the bird flight diverters to be 15' apart on the topmost outside conductors.

Consult the Environmental Department for recommended placement (location) and use.

Cat. ID	Conductor	Cond. Range	CU Code
36395	#4 ACSR	0.250-0.349	DAPFD4
40463	2/0 ACSR	0.350-0.449	DAPFD20
46498	336 Al	0.600-0.770	DAPFD336
36413	795 Al	0.970-1.050	DAPFD795

For more information see *Materials Manual* section 05-063-01.

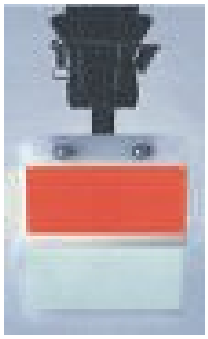
Bird Flight Diverter, Target Type is attached directly to the conductor up to 2-1/2" in diameter by means of a clamping jaw. This device can be installed with a hotstick. The total length is 11-1/2".

Consult the Environmental Department for recommended placement (location) and use.

Cat. ID	Description	CU Code
41701	Diverter, Target	DAPFDOT

Bird Flight Diverter, FireFly is attached directly to the conductor up to 2-1/2" in diameter by means of a clamping jaw. This device can be installed with a hotstick. The FireFly has a florescent 3-in-1 color flapper that glows in the dark.

Consult the Environmental Department for recommended placement (location) and use.



Cat. ID	Description	CU Code
46619	Diverter, FireFly	DAPFDFF

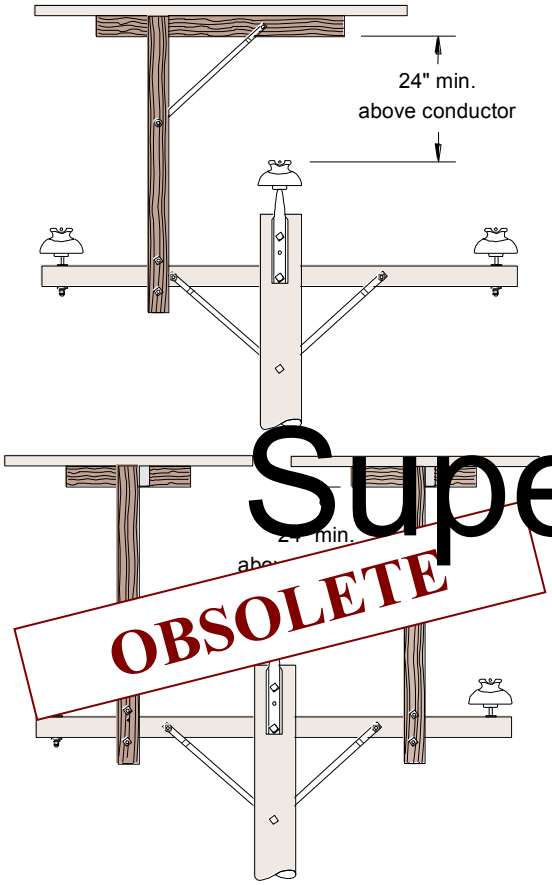
For more information on the target or FireFly, see *Materials Manual* page 05-063-02.

Perches

Perches are used in combination with diverters to elevate birds above energized wires.

Perches are made by the IPCo M&E Shop in a "Straight" configuration.

Consult the Environment Department for recommended placement (location) and use.



Cat. ID	Description	CU Code
4976	Perch, "T" OBSOLETE	DAPTP
4977	Perch, "Straight"	DAPST

For more information see *Materials Manual* section 05-064.

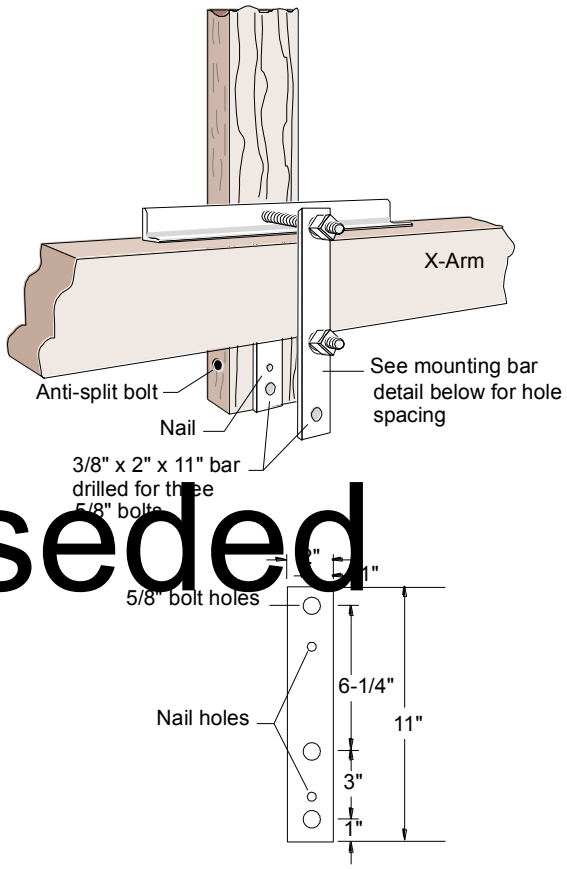
Perch Construction Details

Light-duty crossarm:

- Use 5/8" x 8" Machine bolts in upper set of mounting holes

Heavy-duty crossarm:

- Use 5/8" x 8" machine bolts in lower set of mounting holes



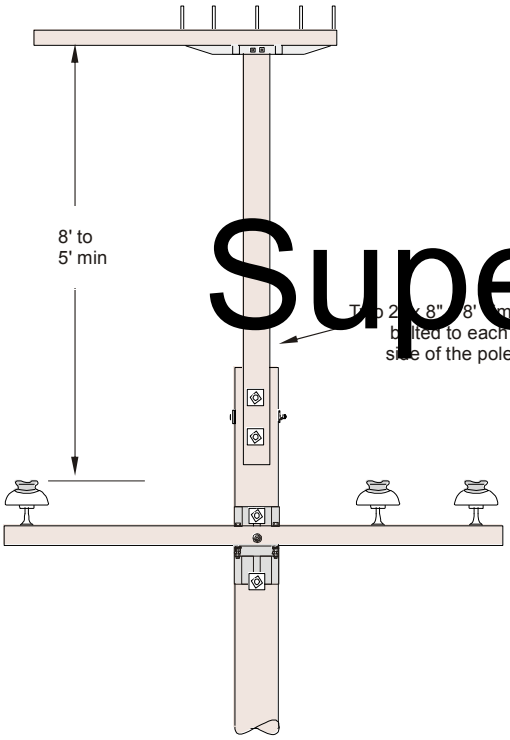
Nesting Platforms

Nesting Platforms are used to elevate the nests of large birds above energized wires or can be placed on a nearby non-energized pole.

Platforms are installed on specific poles where nesting birds affect the reliability of the system.

After installing a next platform it should be checked periodically to make sure the nesting materials are not drooping down into our lines which may cause an outage.

Consult the Environment Department for recommended placement (location) and use.

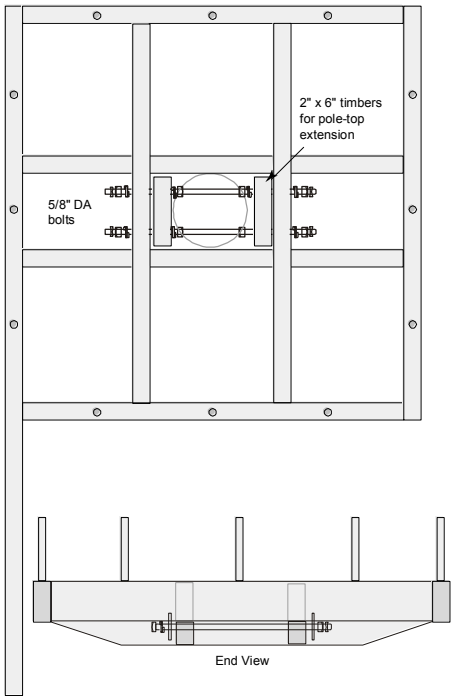


Side View

Cat. ID	Description	CU Code
4980	Nesting Platform	DAPNB

The platforms are made in the IPCo M&E shop. For more information see *Materials Manual* section 05-065.

Top View



End View

Anti-Nesting Deflector

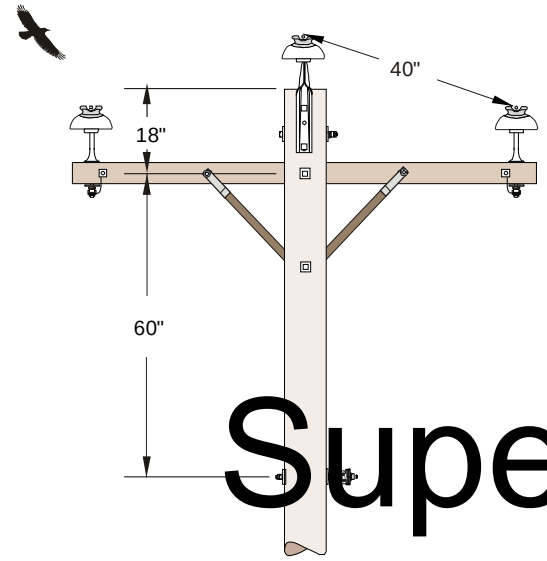
Anti-Nesting Deflectors are used and installed around pole where birds have the potential to build nests around the equipment and devices i.e. transformer bank and primary metering packages. This will deflect nesting material to ground and birds will not be able to build its nest. Attach it around pole using nails.

Cat. ID	Description	CU Code
56465	Nesting Deflector	DAPND

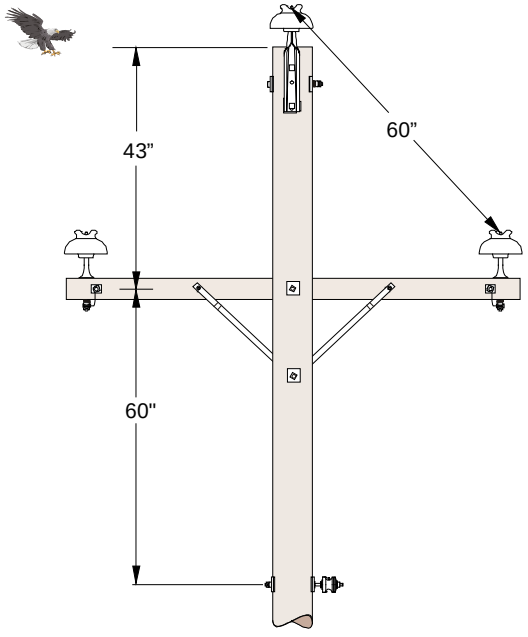
Wildlife Protection, Structure Modification

Structure Modification involves increasing the phase-to-phase or phase-to-ground spacing to make a given structure safe for birds. Refer to section 11-34 for more detail.

A 7'-8" crossarm with increased vertical spacing can be used if there is adequate clearance to ground or other circuits.

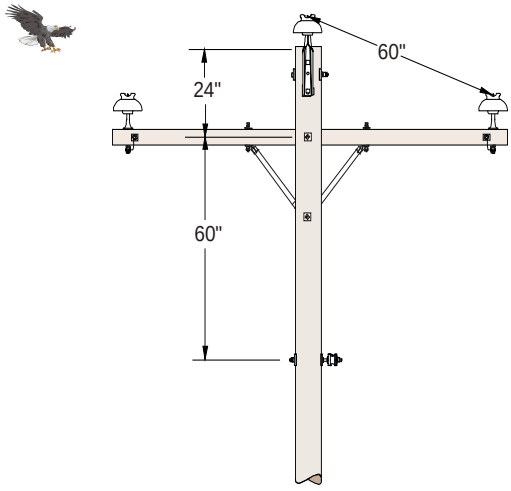


For Zone 2) Avian Protection, 40"
(Normal 3-Ø Tangent Framing) See section 11-20.



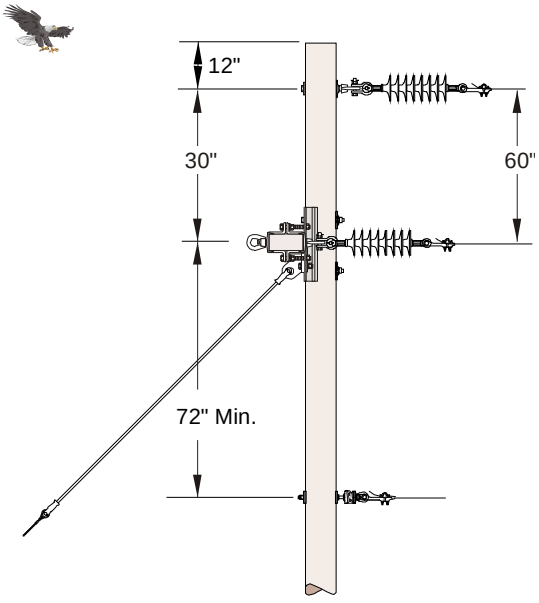
For Zone 3) Avian Protection, 60"

A 10' crossarm can also be used if clearances allow the arm to be lowered 24" from the top of the pole (preferred).



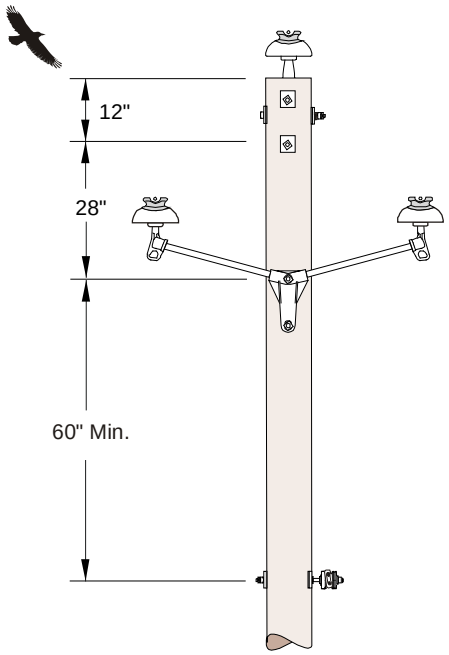
For Zone 3) Avian Protection, 60"

A 10' angle-deadend crossarm can be used if clearances allow the arm to be lowered 42" from the top of the pole.



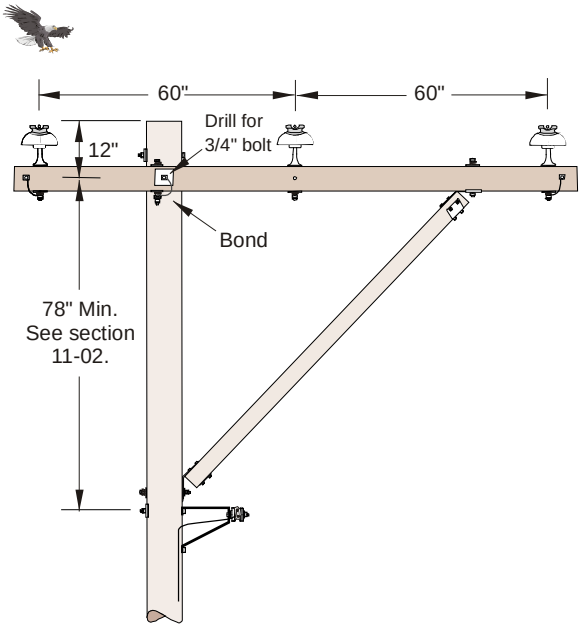
For Zone 3) Avian Protection, 60"

A 48" Fiberglass "V" arm, lowered 10" to obtain diagonal separation. Refer to page 11-20-12.



For Zone 2) Avian Protection, 40"

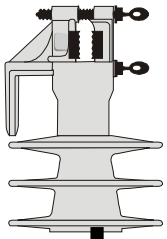
An 11' crossarm drilled to mount insulators 60" apart will obtain proper separation.



Modification Materials

Vise-top Insulators are made of HDPE material and are the preferred avian safe construction option to train covered jumpers. The top allows the avian protective tubing to be placed on the conductor and run through the top of the insulator so an insulator cover is not needed. A formed tie is not required

if a vise-top insulator is used. To tighten, use shotgun stick onto the black ring of the insulator and tighten (rotate) until it shears. Once it shears, that indicates bolt is tight and installed in proper torque. To loosen, use your socket wrench into the hex head of bolt. Rotate back to loosen.



To view jumper training as mentioned on *Retrofit* 11-34-05 see pages 19-02-01 and 19-02-06.

Cat. ID	Description	CU Code
4916	Ins,Vise-Top,12.5or24.5-kV	DI35V

For more information see *Materials Manual* page 02-006-01 and *Overhead Manual* page 09-02-01.

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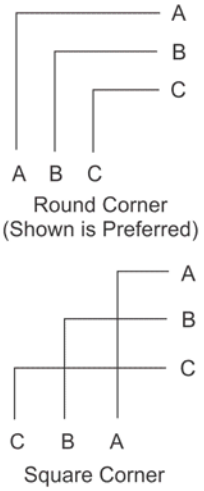
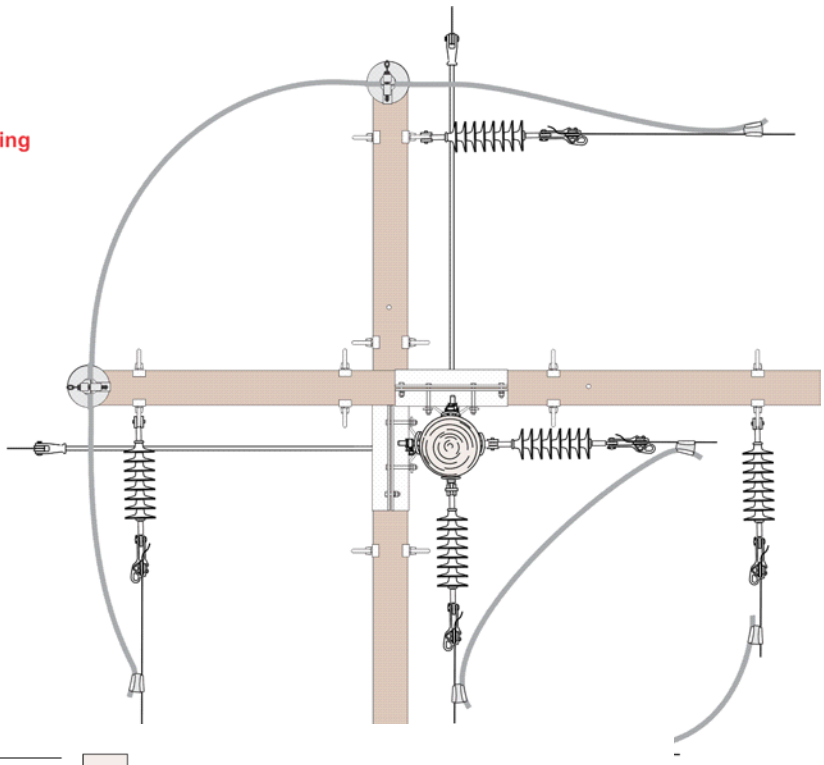
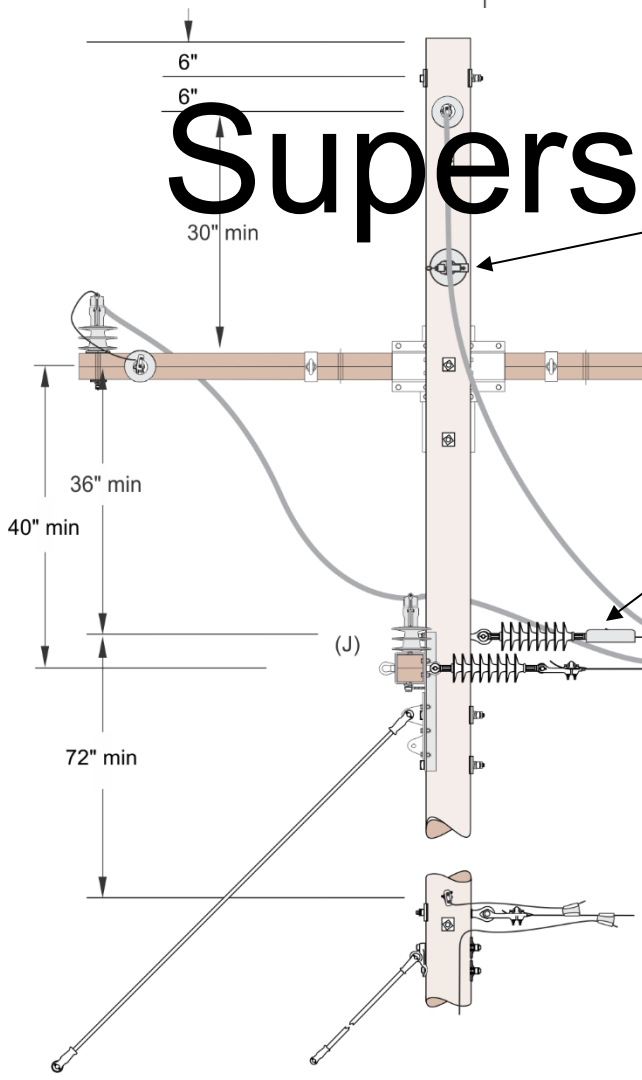
The pole top extension is no longer a construction option on 60" Zone 3 eagle safe area.

3-Ø Deadend - Corner

When Reconstructing
Verify Phasing Matches Existing







Note:
Use Vise Top Insulator to hold jumper if it is too long (optional).

Option a) add Deadend Shoe Cover

Option b) add another Deadend Insulator

Option c) 18" Guy Link (CID 4725)

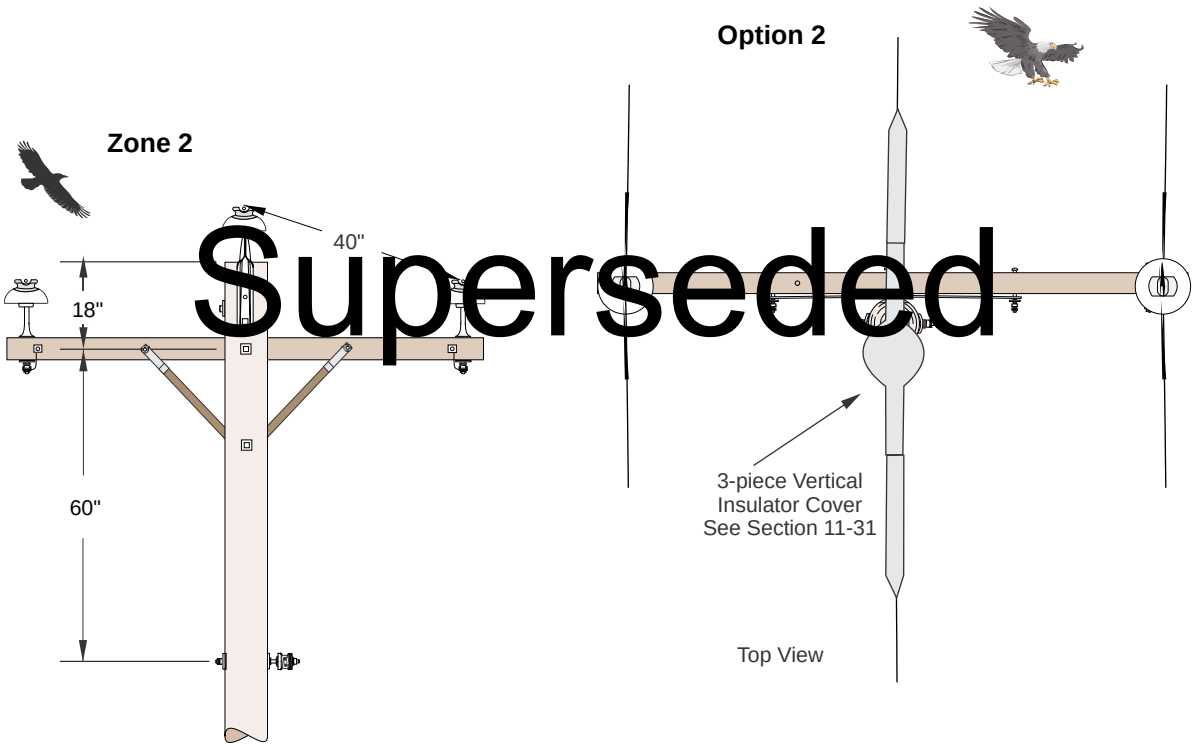
Wildlife Protection, Structure Modification or Retrofit Details

Tangent Configuration – Crossarm 3-Up

The illustrations on this page show 7'-8" crossarm configurations as shown on page 11-33-01.

Note that no changes are necessary for the normal construction is already zone 2 safe. Changes are required however, to make this structure zone 3 or eagle protected.

Option 2. Add a 3-piece insulator and conductor cover. See Section 11-31.



Option 1. Lower arm as shown on page 11-33-01 if feasible.

Avian Materials

Description	CU Code
Option 1	
Lower arm	
Option 2	
3-piece Cover	DAPVIC3CF or J

3-Ø Transformer Framing (Crossarm)

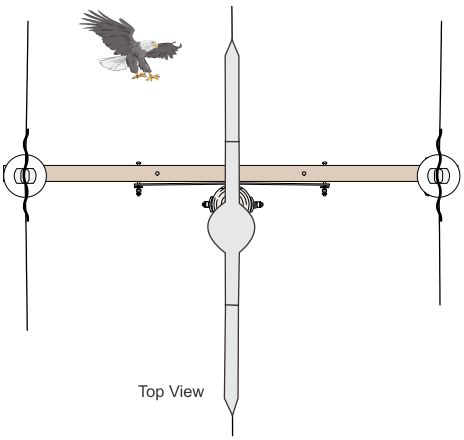
Refer to page 19-03-03.

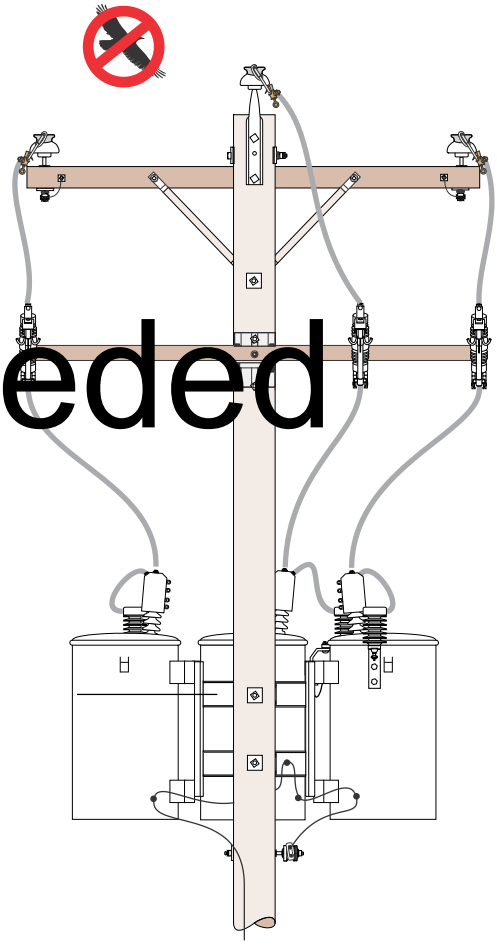
Note that there are 3 steps to make this structure avian zone 2 and zone 3 protected.

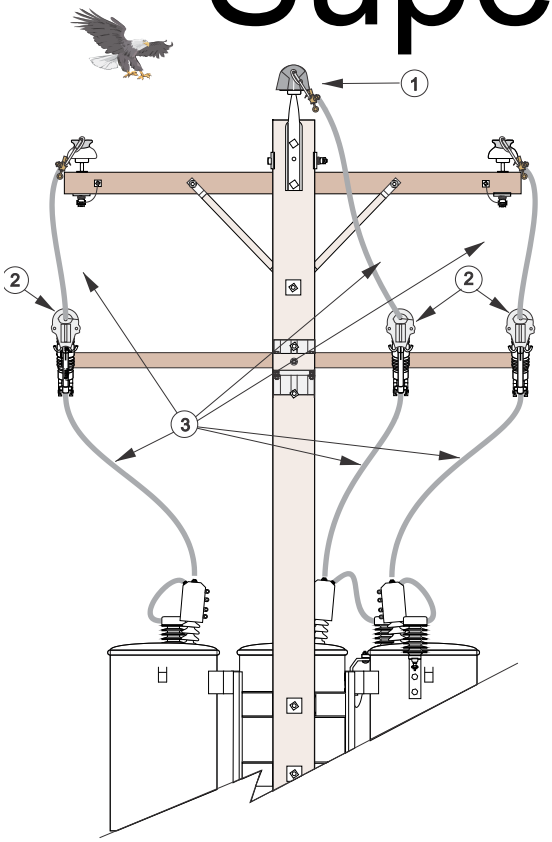
Step 1. Add a 3-piece insulator and conductor cover. See Section 11-31. It may be necessary to move the wedge connection out beyond the cover.

Step 2. Cover all switches. See Section 11-31.

Step 3. Verify all jumpers are covered with avian protective tubing or replace with covered wire. See section 11-31.







Avian Materials

Description	CU Code
3-piece Cover	DAPVIC3CF or J
Switch Cover	DAPNLBC
Tubing - Comes with Jumper or Covered Wire	DAPGT or DJMPRW4C
Bushing Cover	DAP
Arrester Brkt Cover	DAPAB

100 Amp, 34.5 kV, 3–Ø Riser

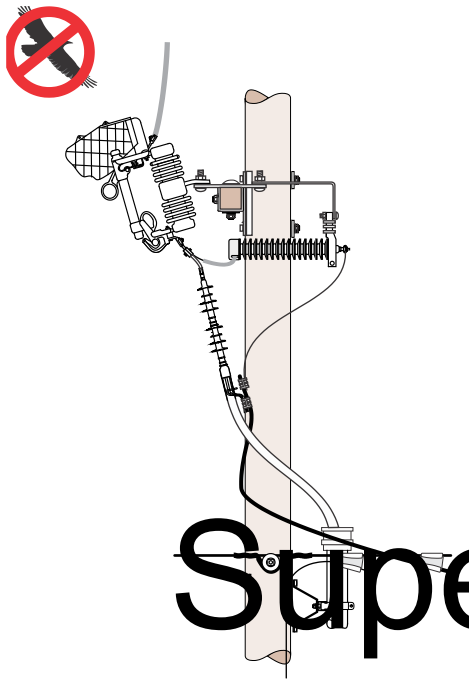
This page refers to *Underground Manual* Pole Riser section 63-07.

To make this structure zone 2 or zone 3 safe the same two steps are required:

Step 1. Cover all switches. See Section 11-31.

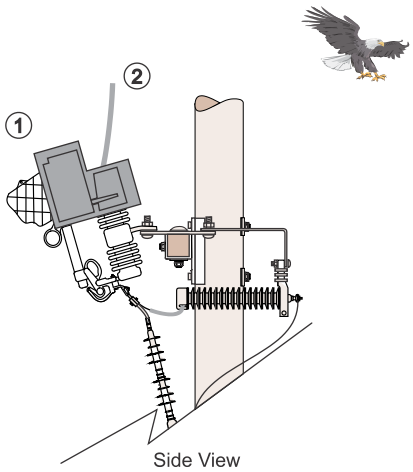
and

Step 2. Verify all jumpers are covered with avian protective tubing or replace with covered wire. See section 11-31.

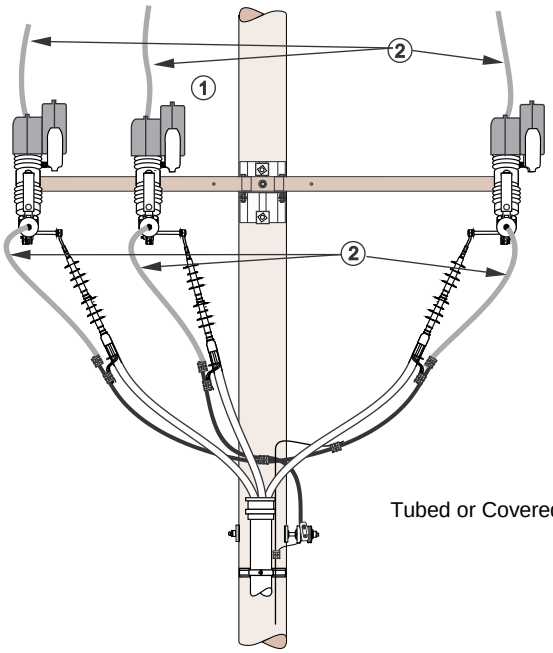


Avian Materials

Description	CU Code
Switch Cover	DAPNLBC
Tubing - Comes with Jumper or Covered Wire	DAPGT or DJMPRW4C
Arrester Brkt Blt Cover (Optional)	DAPAB



Side View



Tubed or Covered Wire

3-Ø Junction (Crossarm)

This illustration refers to the structure on page 11-24-04. To make it zone 2 safe the following 3 steps are required.

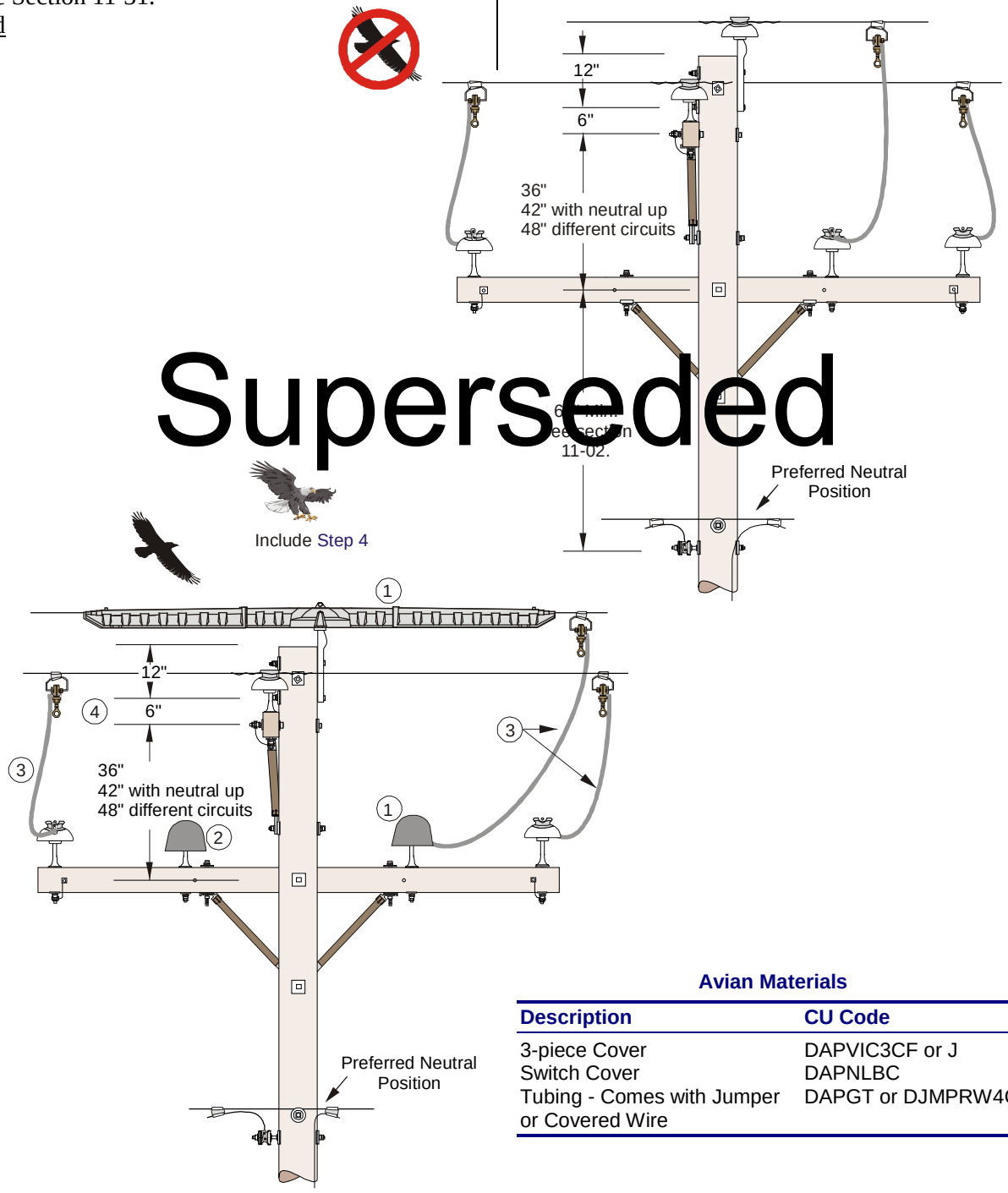
Step 1. Cover the top and bottom center phases with 3 piece covers. See Section 11-31. It may be necessary to move the wedge connections out beyond the covers.

Step 2. Cover the neutral if in the up position. See Section 11-31.
and

Step 3. Verify all jumpers are covered with avian protective tubing. See section 11-31.

To make it zone 3, or “eagle safe”, step # 4 is also required.

Step 4. Lower the top crossarm distance from the top of the pole to 24" from the normal 18".



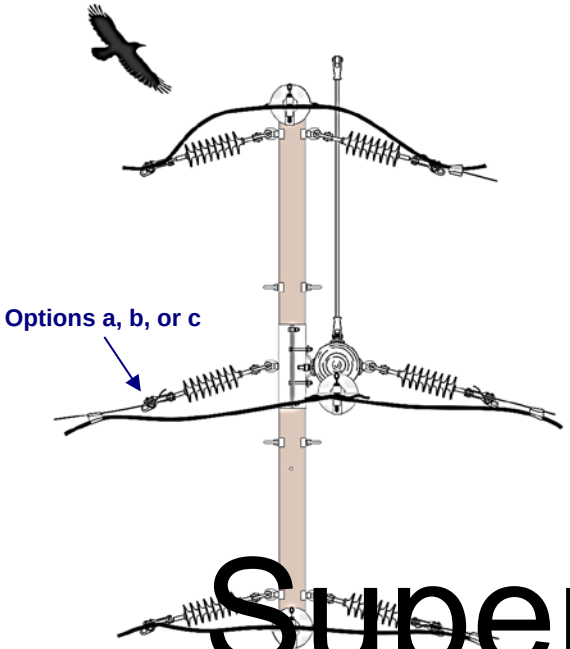
Avian Materials

Description	CU Code
3-piece Cover	DAPVIC3CF or J
Switch Cover	DAPNLBC
Tubing - Comes with Jumper or Covered Wire	DAPGT or DJMPRW4C

Angle Configuration Double Deadend 3-Up

These illustrations refer to the structure on page 11-22-28 which are modified based on avian zone.

1) Zone 2 - arm drops 18" from top of pole



To make this structure zone 2 or zone 3 safe the same steps are required.

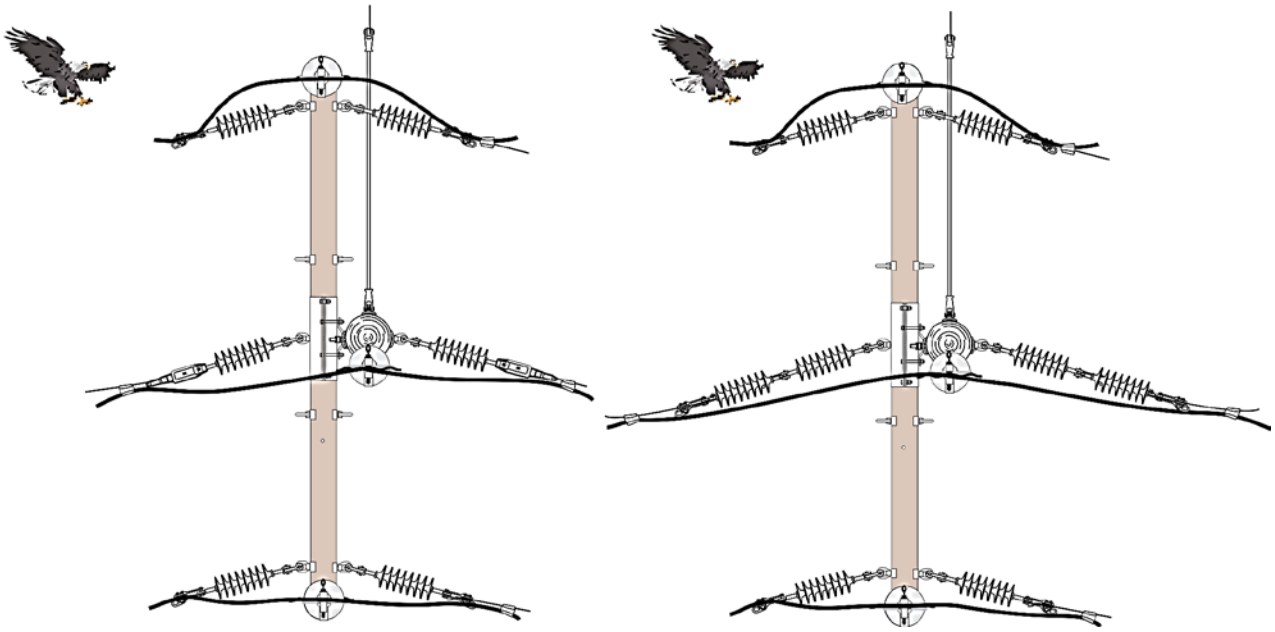
Retrofit as follows:

1. Replace with vise top insulator.
2. Use tubed wire or covered wire as shown.
3. On center phase, use either a) or b) or c).

Avian Materials

Description	CU Code
Tubing - Comes with Jumper or Covered Wire	DAPGT or DJMPRW4C
Vise Top Insulator	DI35V
DE Shoe Cover	DAPD1C1 or 795
DE Polymer Insulator	DDL35

2) Zone 3 - arm drops 24" from top of pole



a) Deadend Shoe Cover **b) Add Another Deadend Insulator**

c) 18" Link + DE Insulator. Please see 11-33-03.

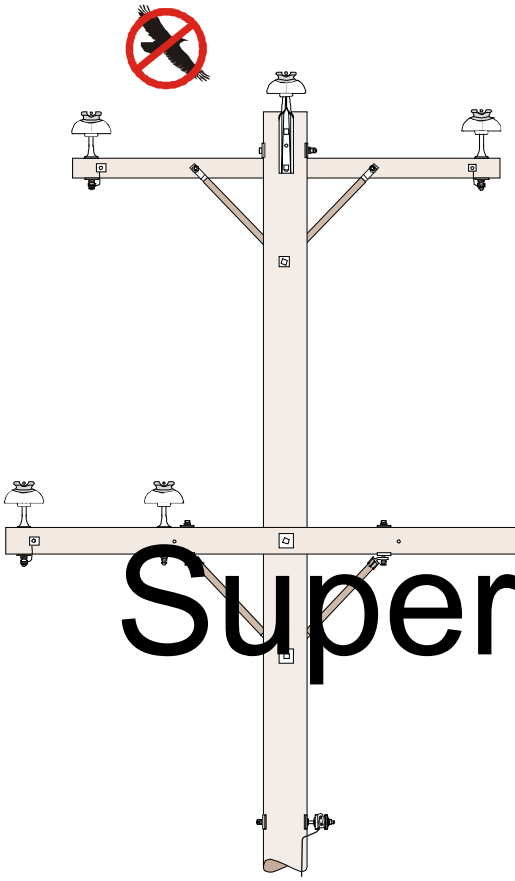
3-Ø Multi Circuit - Crossarm under Crossarm Construction

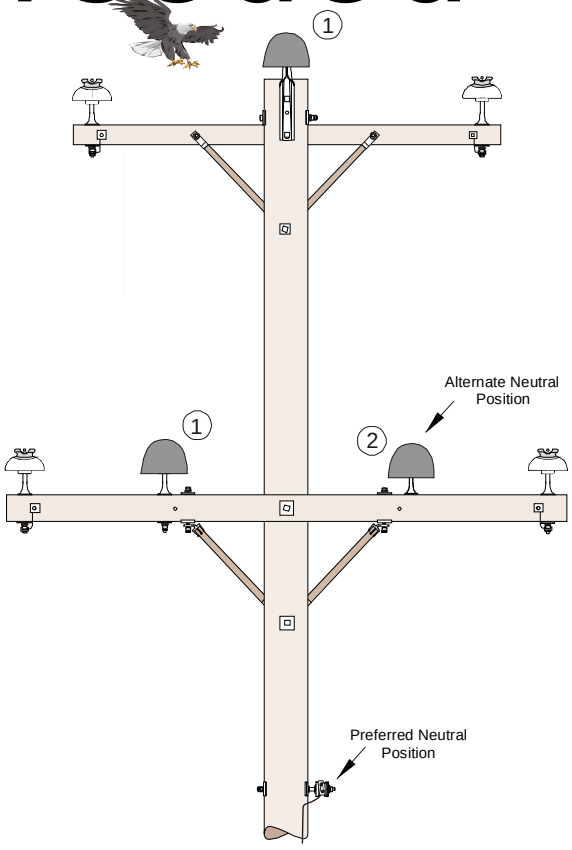
This illustration refers to page 11-25-02.

To make this structure zone 2 or zone 3 safe the same steps are required.

Step 1. Cover the top and bottom center phases with 3 piece covers. See Section 11-31.

Step 2. Cover the neutral if in the up position. See Section 11-31.





Avian Materials

Description	CU Code
3-piece Cover	DAPVIC3CF or J

Guidelines for Retrofitting Structures as Avian Protected

Structures should be retrofitted by the same criteria as a new or rebuild structure. Isolation (separation) or insulation (covering), see sections 11-33 and 11-34.

Arresters

- Move arrester as close to the protected equipment as possible
- Cover caps and bracket bolt
- Cover jumpers (top & Bottom)

Cutout/Switches

- Cover all switches
- Cover jumpers or replace using covered wire

Jumper Wires

- Cover all or use covered wire, equipment to primary
- Any coiled jumpers should be replaced and covered

Grounds/Guys

- Lowered or covered (guarded)
- Guy wire should have guy strain insulator installed

Pole Top Switches

- Change out old switch with newer avian protected
- Add covering to base and insulator skirts

Equipment Mounting Arms/Brackets

- Replace any metal with fiberglass or wood

Double Deadend Pole

- Move center jumper to pole top pin insulator when possible (preferred)
- Use covered wire (preferred) or tube wire

Junction Pole

- Move center jumper to pole top pin insulator when possible
- Replace jumpers either covered (preferred) or covered wire

Anti-Perching and Nesting Devices

- Triangles – only on underbuilt configuration. Using conductor cover is the preferred method

Depending on the Diameter of the Pole for Underbuild Only

- 11' medium crossarm may be used *Contact M&M for approval and ordering*

Streamline Configurations

- Use vine clip insulator to train center phase jumpers.

Primary Metering Terminal Cover/Tape

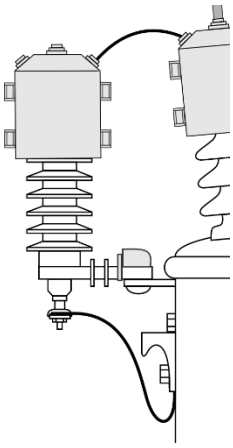
- Use gray compound (AirSeal) to cover PT/CT terminals and wrap with gray tape. CT/PT manufacturer does not recommend using any bushing guards.
- Use TL lugs instead of bolts at the terminals for better connection

Transformer Retrofit Options

Move arrester close to the transformer.

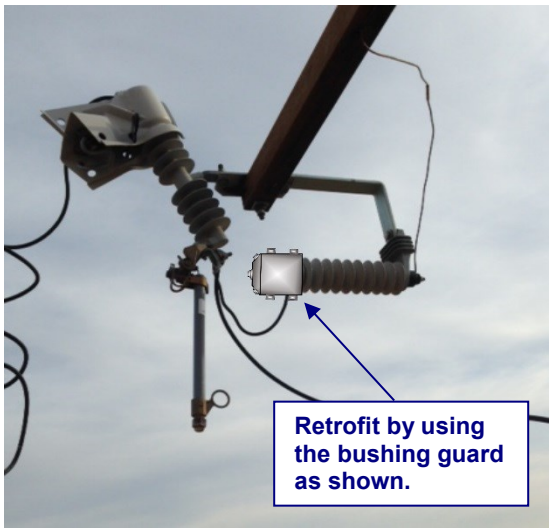
Option 1: Existing transformer with threaded holes (BOSS) on the tank.

Order DLA CU Code –OH Page 13-11-01 and retrofit just like new transformer- see below:



Option 2: Existing transformer with no threaded holes (BOSS) on the tank. Order DCMBK (NEMA) and DLA CU Codes then retrofit just like in picture below:

Option 3: Existing riser arrester configuration. Order bushing guard – CID 54130 and cover [illegible] with the [illegible] cap.



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

Superseded

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 substrate 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.*