

Dryden & LaRue, Inc.

CONSULTING ENGINEERS

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July 24, 2001

Dora L. Gropp, P.E.
Manager, Transmission & Special Project
CHUGACH ELECTRIC ASSOCIATION, INC.
5601 Minnesota Drive
Anchorage, Alaska 99519-6300

Project: **35 kV Standards for Overhead Construction**
Reference: **Final Overhead Standards**

Delivered with this letter is the final 34.5 kV overhead standards drawing set. All applicable drawings, with the exception of the anchor units, are certified and stamped. Also included is a CD containing electronic copies of all the drawings, the AutoCAD 2000 plot configuration file, and a table of contents.

Again, we appreciate the opportunity to help CEA with their standards. I will review our budget and discuss a proposal for adding underground units to the standards later this week. Please review the documents let us know if you have any questions.

DRYDEN & LaRUE, INC.

Paul M. Williams

PMW:mdw/c/clients/cea/cea35kv/transmittal 7-24-01

RECEIVED

JUL 23 2001

TRANSMISSION &
SPECIAL PROJECT

Drawing Guide

TE-1 Guide to Sub Assemblies

Pole Top Assemblies

TP-3, 3A, 4, 4A Tangent Line Post
TPD-3, 4 Double Circuit Tangent Line Post
TS-3, 3A, 4 Medium and Large Vertical Angles
TS-5, 5A Vertical Double Deadend
TP-7A, 7B Crossarm Construction Deadend (Single)
TP-8A, 8B Crossarm Construction Double Deadend

Guys

TG-11A, 11D, 21A, 21D Factory Formed with Thimble Clevis
STE-13, 14, 15 Factory Formed with Guy Rollers
TG-17C, 17D Light Duty Pole Eye Plates
TG-25C, 25D Medium Duty Guying Tees
TG-28, 28A Medium Duty Guying Tees (With Offset Brackets)
TG-92 Guy Link Assemblies
TG-95 Guy Strain Insulator

Guying Guides

TMG-2 Single Pole Guying Guide

Anchors

SF-1S, 2S, 3S, 4S Power Screw Anchor
SF4C Concrete Anchor (Single Rod)
SF4M, PL Steel Cross Plate Anchor
SF5-4, 5 Rock Anchor
SF7C Concrete Anchor (Double Rod)

Connections

TCD-8, 10 Crossarms (8-10')
TPF-4 Transmission Pole Structures

Foundations

SM-31A, 31B, 31C Pole Stability, Bearing, and Uplift Foundations
SM-32A, 32B, 32C Pole Bearing Plate Assemblies
STM32-1, 2 Pole Stability Foundations
TFP-30 Caisson Pipe Pile

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Miscellaneous

TM-1B, 1C, 1D
TM-3
STM-9A, 9B
TM-30A, 30B
TM3-15
TM3-15A
TM3-15B
SM2-15
SM52-3
TMS-1, 2, 2A
TMS-3A, 3B

Insulator String with Suspension Clamp
Line Post Wire Connections
Pole Ground Assembly
Stockbridge Vibration Dampers
Sectionalizing Air Break Switch (Deadend on Switch)
Sectionalizing Air Break Switch (Vertical)
Sectionalizing Air Break Switch
Platform Type M for Sectionalizing Airbreak Switch
Pole Numbering Guide
Conductor Marker
Bird Flight Diverters

Clearing

TM-11
TM-12, 12(1), 13
TM-14, 14(1), 13
TM-15, 15(1), 13

Guide for Measuring R-O-W Clearing Units
R-O-W Clearing Guide
Feathered/Undulating Clearing
Feathered/Clear-Cut Clearing

SUBASSEMBLY STRUCTURE													
	TCD 8 OR 10	TM-1C	TM-1D	TM-3	TG-17D	TG-25C	TG-25D	TG-28	TG-28A				
TP-3, 3A, 4, 4A TPD-3, 4	●			●									
TP-3		●						●	●				
TP-3A		●						●	●				
TP-4		●			●	●							
TP-5			●		●	●							
TS-5A			●	●	●	●							
TPD-7A, 7B			●		●								
TPS-8A, 8B			●		●								

PROJECT: _____

DESIGNER/PROJECT ENGINEER: _____ W.O. #: _____

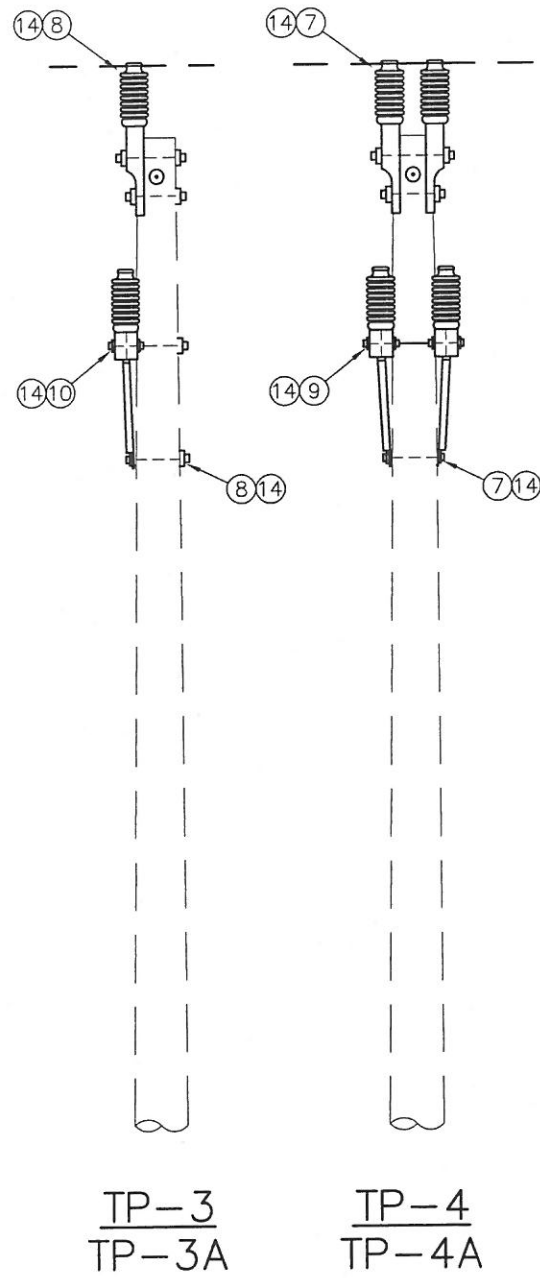
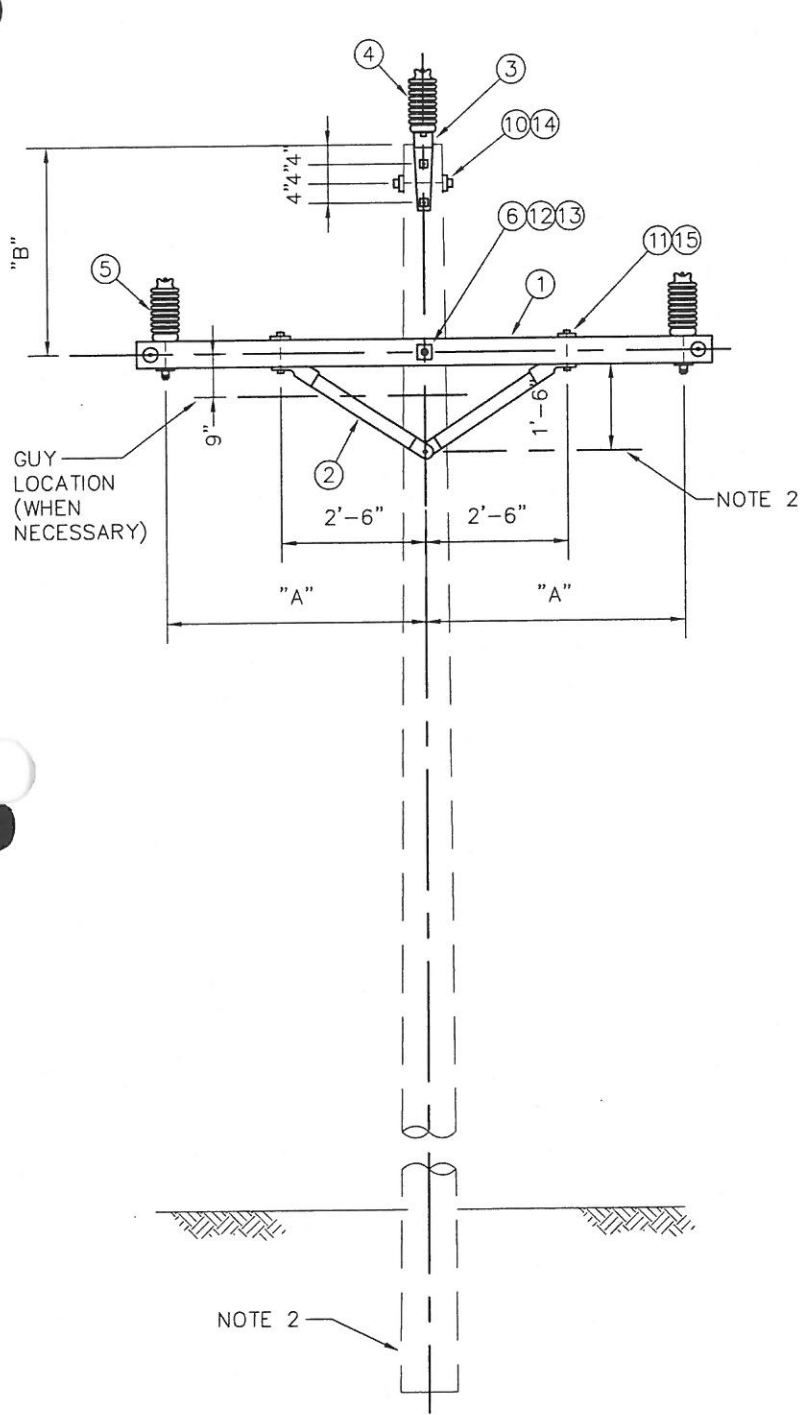
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE

APPROVED (DIRECTOR)	DATE
<i>William J. Bernier</i>	8/2/01
CERTIFIED BY	DATE



DRAWING NAME:	REVISION	DATE	SHEET OF
34.5 kV TRANSMISSION LINE STRUCTURE GUIDE TO SUBASSEMBLIES TE-1			1 1

TE1.DWG



DWG. REF.	TP-		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	3, 3A	4, 4A					
1	1	2	X-Arm, 4 1/8"x5 1/8" (See table below)		TCD-		
2	1pr	2pr	Brace, X-Arm, 60" / 18"	cu			
3	1	2	Bracket, Pole Top	eb			
4	1	2	Insulator, Post Type, w/ short mtg. hardware	ea			
5	2	4	Insulator, Post Type, w/ long mtg. hardware	ea			
6	1	1	3/4" Bolt, Machine, by req'd length	c			
7	-	3	5/8" Bolt, Machine, by req'd length	c			
8	3	-	5/8" Bolt, Machine, w/ Washer & Nut	c			
9	-	2	5/8" Bolt, Double Arming, w/ 4 Washers & Nuts	n			
10	3	1	5/8" Bolt, Washer Head, w/ Washer & Nut	c			
11	2	4	1/2" Bolt, Washer Head, by req'd length	c			
12	2	2	Washer, Flat, 2 1/4" SQ. x 3/16", 13/16" hole	d			
13	1	1	3/4" Locknut, MF Type	ek			
14	6	12	5/8" Locknut, MF Type	ek			
15	2	4	1/2" Locknut, MF Type	ek			

- NOTES:
- Field drilled holes shall be thoroughly treated.
 - The following materials are to be specified separately on plan and profile drawings and staking sheets: POLE, GUYING, ANCHORS, GROUNDING AND FOUNDATION UNITS.
 - Maximum loads based on RUS HEAVY LOADING. Overload capacity factor 4.0 applied with vertical load. Maximum transverse load is 750 lbs. on a post insulator (RUS).
 - Refer to TM-3 for wire connections.



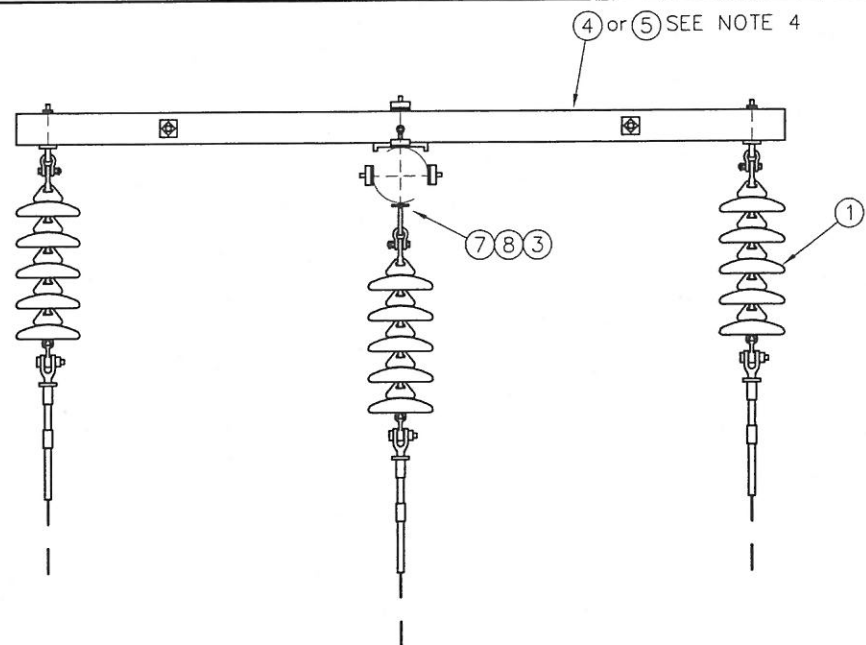
X - ARMS			
STRUCTURE	DIM "A"	DIM "B"	DET
TP-3,4	3'-6"	3'-7"	TCD-8
TP-3A,4A	4'-6"	2'-3"	TCD-10

MAX. LOAD		
STRUCTURE	TRANSVERSE	VERTICAL
TP-3	750 LBS	2750 LBS
TP-4	1500 LBS	5500 LBS
TP-3A	750 LBS	1350 LBS
TP-4A	1500 LBS	2700 LBS
LIMITED	INSULATOR	X-ARM.

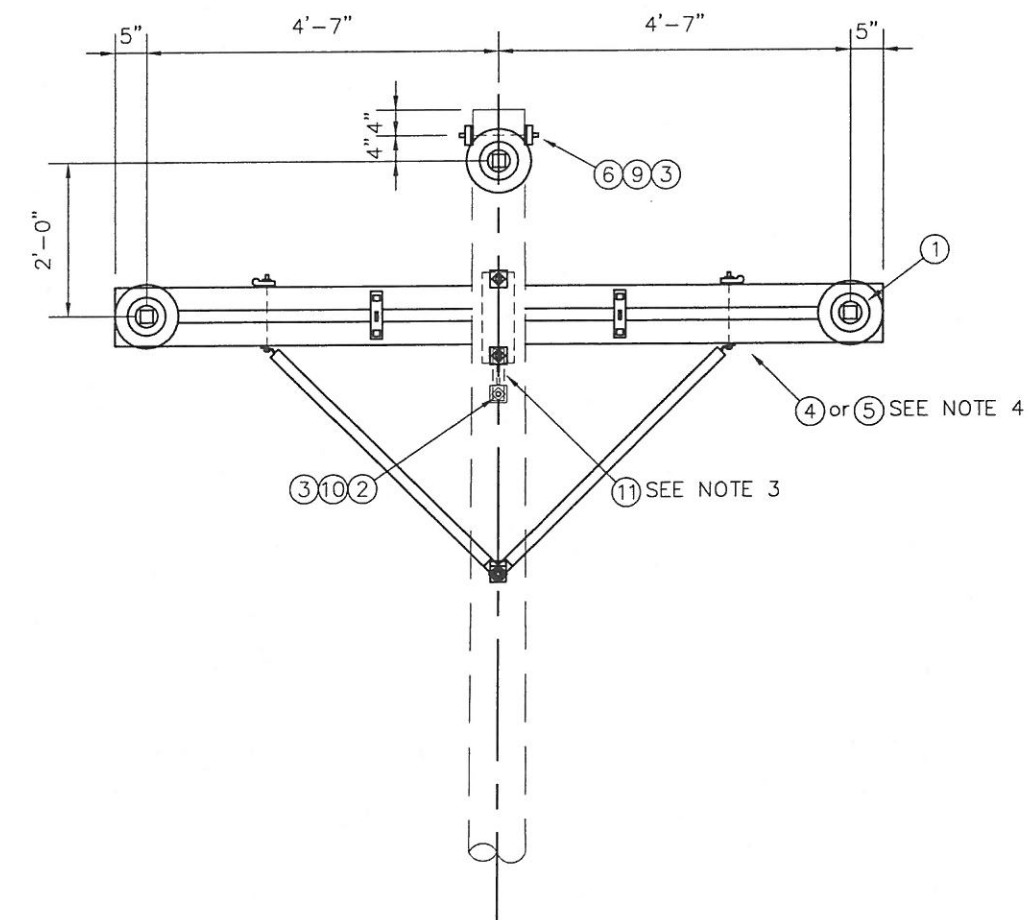
DESIGNER/PROJECT ENGINEER: _____	W.O. #: _____	APPROVED (DIRECTOR) <i>William F. Bernier</i>	DATE 8/3/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	CERTIFIED BY	DATE



DRAWING NAME:		34.5 kV TRANSMISSION LINE STRUCTURE TANGENT LINE POST TP-3, 3A, 4, 4A
REVISION	DATE	
		TP3.DWG
		SHEET 1 OF 1



PLAN VIEW



LIST OF MATERIALS

DWG. REF.	TP		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	7A	7B					
1	3	3	Insulator Assembly, Dead End		TM-1D		
2	2	2	Bolt, Machine, 7/8" x req'd length	c			
3	as req'd	as req'd	Locknuts	ek			
4	1		Crossarm Assembly, X-brace & Mtg. Hardware	aj			Hughes 2892-D
5		1	Crossarm Assembly, X-brace & Mtg. Hardware	aj			Hughes B2218-B
6	1	1	Bolt, Machine, 5/8" x req'd length	c			
7	1	1	Bolt, Eye, 3/4" x req'd length	o			
8	1	1	Washer, Curved, 4" SQ. x 3/8", 13/16" Hole	d			
9	1	1	Washer, Curved, 2 1/4" SQ. x 3/16", 11/16" Hole	d			
10	as req'd	as req'd	Washer, Curved, 2 1/4" SQ. x 3/16", 15/16" Hole	d			
11	1	1	Guy Attachment, Medium Duty		TG-25C		

NOTE:

1. Maximum loads based on RUS HEAVY LOADING. There is an overload capacity factor of 2.0 included with wire tension.
2. For guying arrangements, see drawing TMG-2.
3. Utilize bottom bolt of X-arm assembly for top bolt of guy plate. Shim bottom of guy plate with washers as necessary.
4. TP7A uses a 3 5/8" x 8 1/2" x 10'-0" crossarm.
TP7B uses a 3 5/8" x 9 1/2" x 10'-0" crossarm.

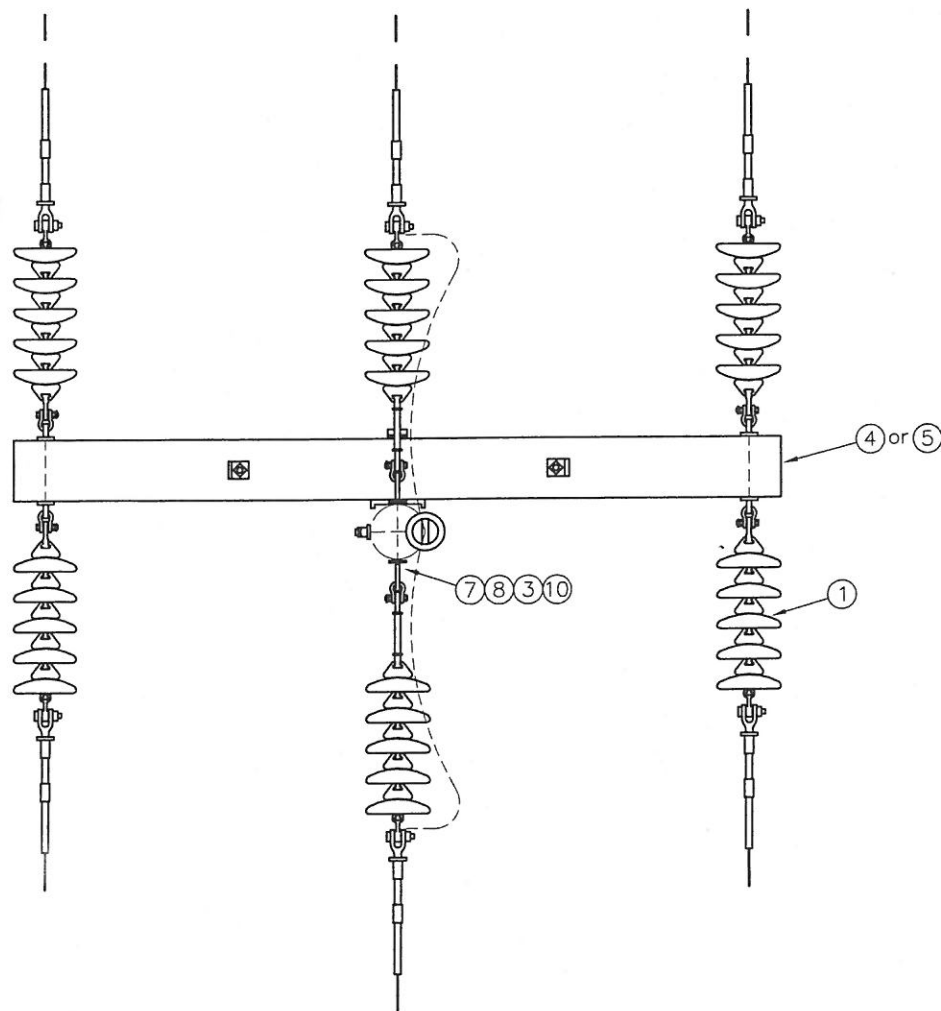
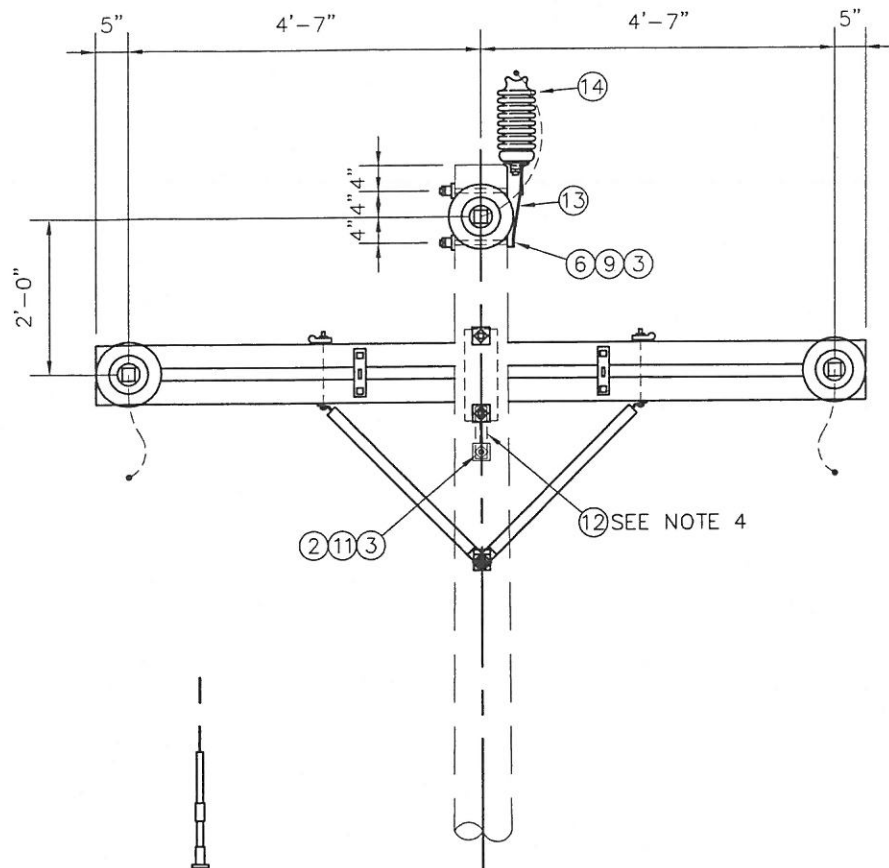


MAX. LOAD	
STRUCTURE	WIRE TENSION
STP7A	5800 lbs.
STP7B	7300 lbs.
LIMITED	CROSSARM

PROJECT:	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER:	<i>William J. Bernius</i>	8/2/01
W.O. #:	CERTIFIED BY	8/3/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	DATE

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV TRANSMISSION LINE STRUCTURE CROSSARM CONSTRUCTION DEADEND (SINGLE) TP-7A, 7B
REVISION	DATE	
		TP7.DWG SHEET 1 OF 1



PLAN VIEW

LIST OF MATERIALS

DWG. REF.	TP		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	8A QTY	8B QTY					
1	6	6	Insulator Assembly, Dead End		TM-1D		
2	1	1	Bolt, Machine, 7/8" x req'd length	c			
3	as req'd	as req'd	Locknuts	ek			
4	1		Crossarm Assembly, w/ Guying Attachments	qi			Hughes 2892-D
5		1	Crossarm Assembly, w/ Guying Attachments	qi			Hughes B2218-B
6	2	2	Bolt, Machine, 5/8" x req'd length	c			
7	1	1	Bolt, Eye, 3/4" x req'd length	o			
8	1	1	Washer, Curved, 4" SQ. x 3/8" x 13/16" Hole	d			
9	2	2	Washer, Curved, 2 1/4" SQ. x 3/16", 11/16" Hole	d			
10	1	1	Eye Nut, 3/4", 30,000 lb.				
11	as req'd	as req'd	Washer, Curved, 2 1/2" SQ. x 3/16", 15/16" Hole	d			
12	1	1	Guy Attachment, Medium Duty		TG-25D		
13	1	1	Bracket, Pole Top	eb			
14	1	1	Insulator, Post Type, w/ Short Mounting Hardware	ea			

* Extension links are not required for deadends on outside phases of crossarms. Use eye-ball adapter.

NOTE:

1. Maximum loads based on RUS HEAVY LOADING. There is an overload capacity factor of 2.0 included with wire tension listed.
2. Refer to TM-3 for wire connections.
3. For guying arrangements, see drawing TMG-2.
4. Utilize bottom bolt of X-arm assembly for top bolt of guy plate. Shim bottom of guy plate with washers as necessary.

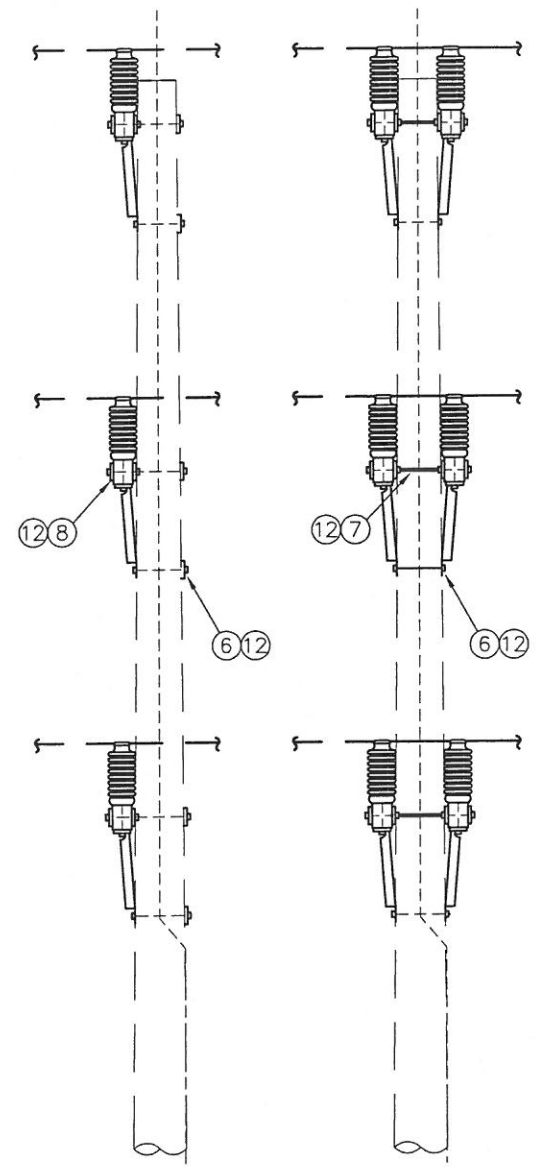
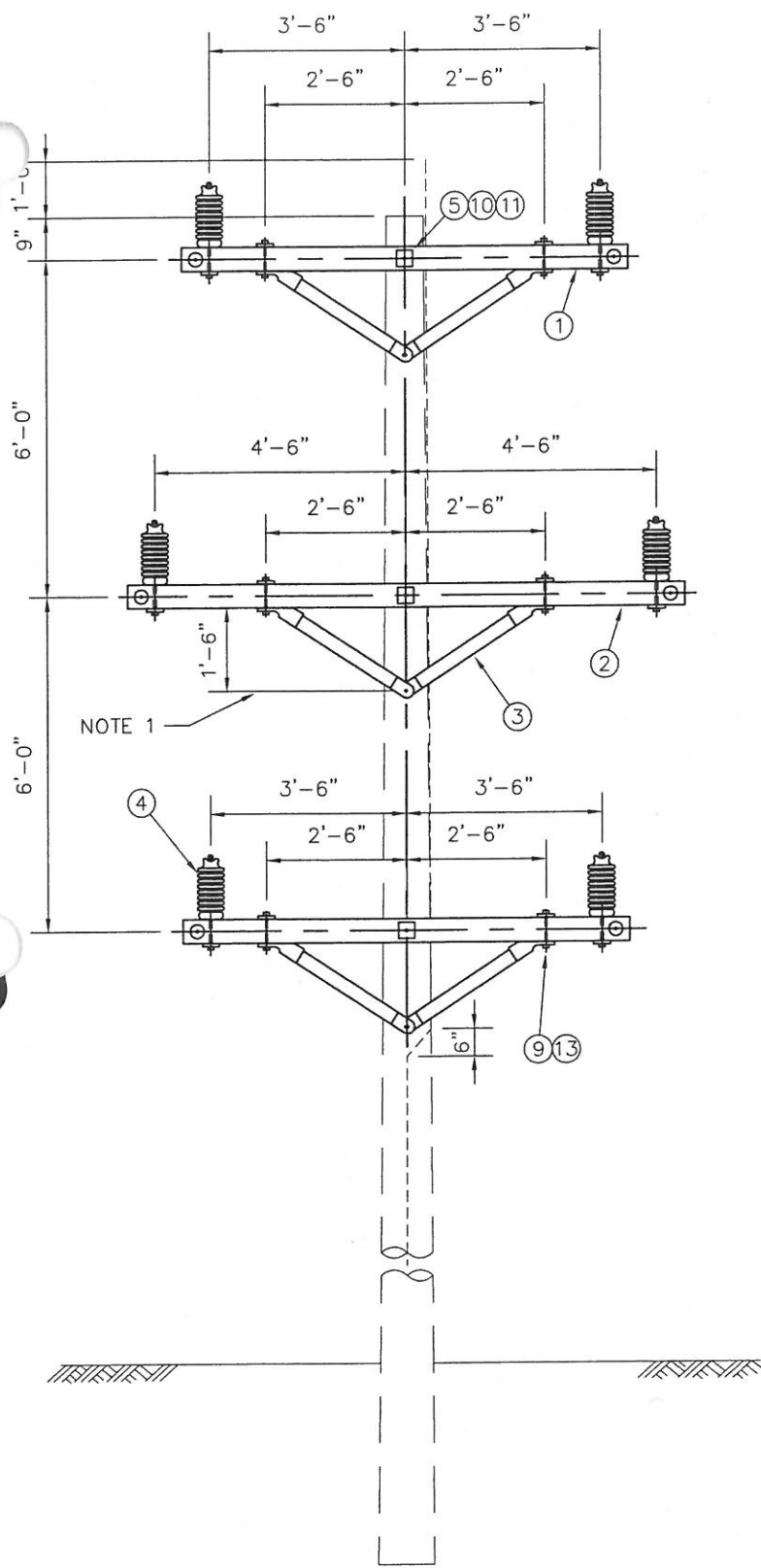


MAX. LOAD	
STRUCTURE	WIRE TENSION
STP8A	5800 lbs.
STP8B	7300 lbs.
LIMITED	CROSSARM

DESIGNER/PROJECT ENGINEER:	W.O. #:	APPROVED (DIRECTOR) <i>William Bernier</i>	DATE 8/13/01
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CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:	34.5 kV TRANSMISSION LINE STRUCTURE CROSSARM CONSTRUCTION DOUBLE DEADEND TP8A, 8B
REVISION	DATE



TPD-3 TPD-4

LIST OF MATERIALS

DWG. REF.	TPD-		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	3	4					
1	2	4	X-Arm, 4 1/8"x5 1/8" x 8'-0"		TCD-8		
2	1	2	X-Arm, 4 1/8"x5 1/8" x 10'-0"		TCD-10		
3	3pr	6pr	Brace, X-Arm, 60" / 18"	cu			
4	6	12	Insulator, Post Type, w/ long mtg. hardware	ea			
5	3	3	3/4" Bolt, Machine, by req'd length	c			
6	3	3	5/8" Bolt, Machine, by req'd length	c			
7	-	6	5/8" Bolt, Double Arming, w/ 4 Washers & Nuts	n			
8	6	-	5/8" Bolt, Washer Head, w/ Washer & Nut	c			
9	6	12	1/2" Bolt, Washer Head, by req'd length	c			
10	9	6	Washer, Flat, 2 1/4" SQ. x 3/16", 13/16" hole	d			
11	3	3	3/4" Locknut, MF Type	ek			
12	15	27	5/8" Locknut, MF Type	ek			
13	6	12	1/2" Locknut, MF Type	ek			

NOTES:

- Field drilled holes shall be thoroughly treated.
- The following materials are to be specified separately on plan and profile drawings and staking sheets: POLE, GUYING, ANCHORS, GROUNDING, AND FOUNDATION UNITS.
- Maximum loads based on RUS HEAVY LOADING. There is an overload capacity factor of 4.0 included with vertical load. Maximum transverse load is 750 lbs. on a post insulator (RUS).
- Refer to TM-3 for wire connections.



MAX. LOAD		
STRUCTURE	TRANSVERSE	VERTICAL
TPD-3	750 LBS	1350 LBS
TPD-4	1500 LBS	2700 LBS
LIMITED	INSULATOR	MID X-ARM.

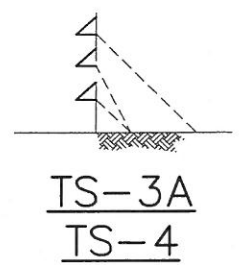
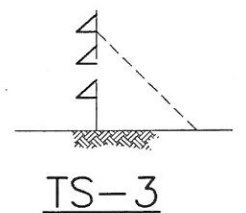
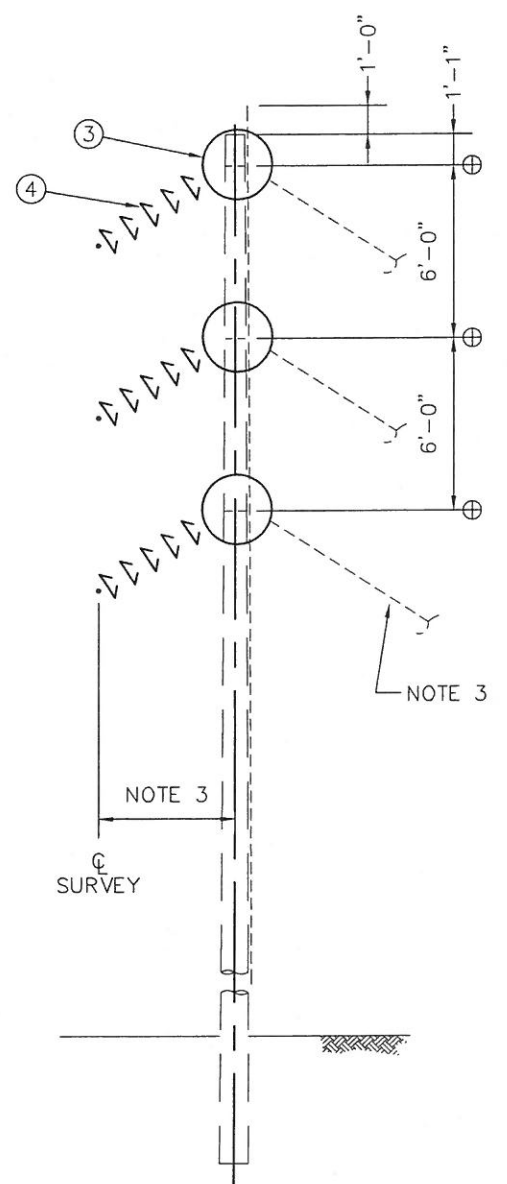
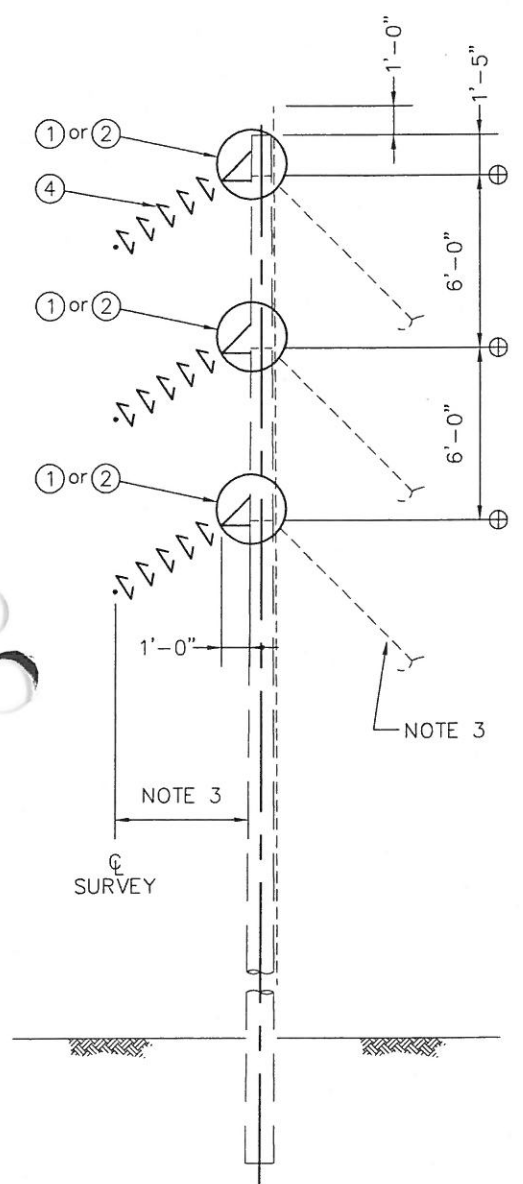
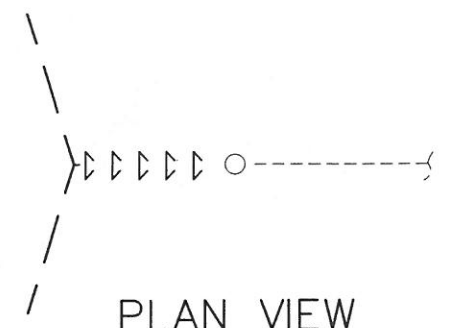
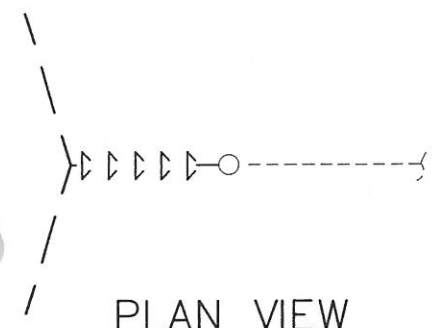
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DESIGNER/PROJECT ENGINEER:	<i>William J. Bernier</i>	8/2/01
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DESIGN/CONSTRUCTION/ASBUILT REVISION		
BY/DATE		

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV TRANSMISSION LINE STRUCTURE DOUBLE CIRCUIT TANGENT LINE POST TPD-3, 4
REVISION	DATE	
		TPD3.DWG
		SHEET 1 OF 1

LIST OF MATERIALS

DWG. REF.	TS-			DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	3	3A	4					
1	2			Bracket Assembly, Medium Duty		TG-28		
2	1	3		Bracket Assembly & Guy Attach., Medium Duty		TG-28A		
3			3	Guy Attachment, Medium Duty		TG-___D		
4	3	3	3	Insulator Assembly, Angle		TM-___C		



NOTES:

- Maximum line angle for TS-4 is 50 degrees (RUS). Minimum angle determined by conductor; Tension, type, and clearance.
- Drawing TE-1 gives guidance to subassembly alternatives.
- For guying arrangements and offset table, see drawing TMG-2.
- The following materials are to be specified on plan and profile drawings and staking sheets: POLES, GUYING, ANCHORS, GROUNDING, AND FOUNDATION UNITS.



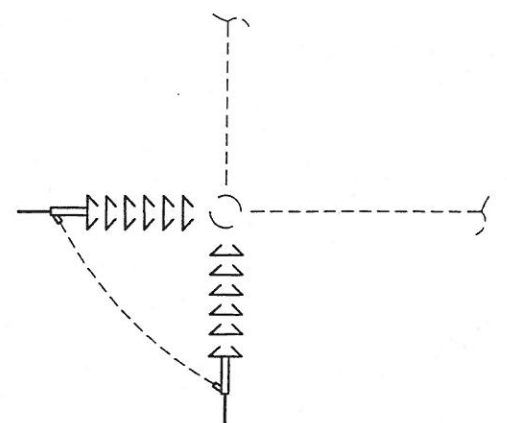
PROJECT: _____	APPROVED (DIRECTOR) <i>William J. Bernier</i>	DATE 8/2/01
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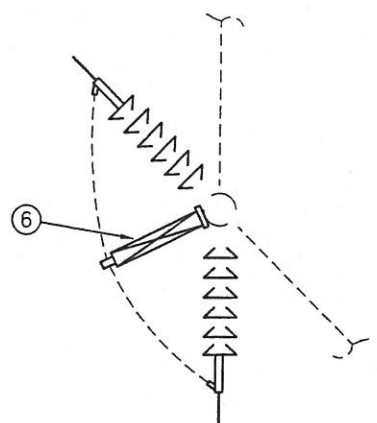
DRAWING NAME:		34.5 kV TRANSMISSION LINE STRUCTURE MEDIUM AND LARGE VERTICAL ANGLES TS-3, 3A, 4
REVISION	DATE	
		TS3.DWG
		SHEET 1 OF 1

LIST OF MATERIALS

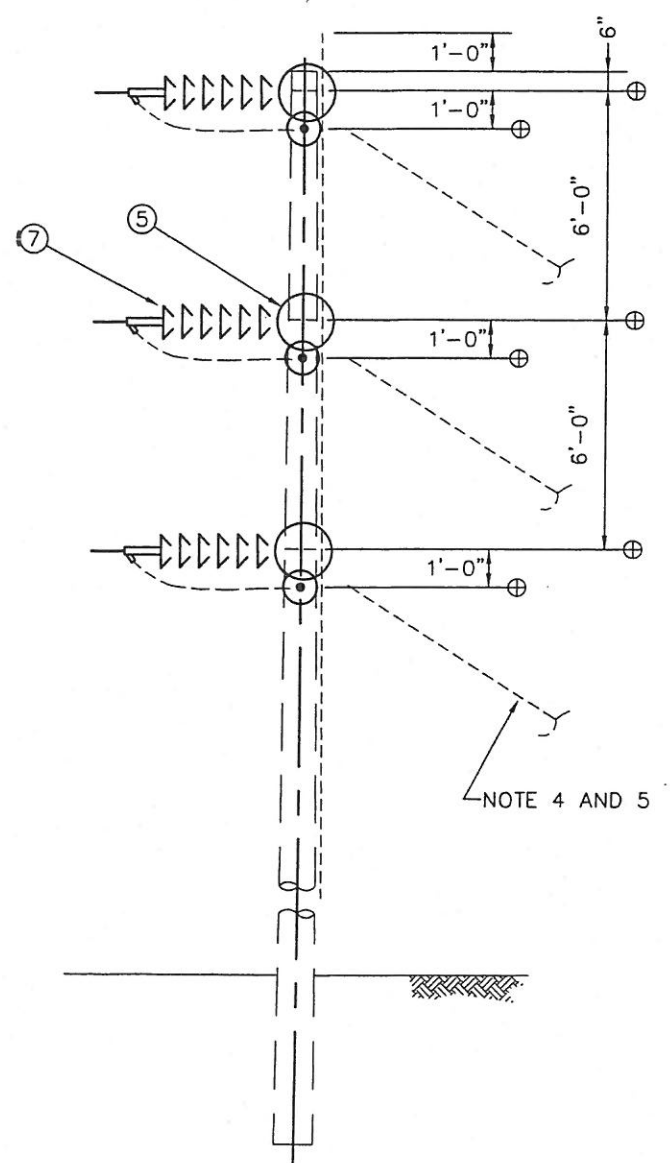
DWG. REF.	TS-		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	5A	5					
1	6		3/4" Bolt, Machine, by req'd length	c			
2	6		Washer, Curved, 4" SQ. x 1/4", 13/16" Hole	d			
3	3		Washer, Spring, 13/16" Hole	aw			
4	6		3/4" Locknut, MF Type	ek			
5	6	6	Guy Attachment, _____ Duty		TG-___D		
6	3		Insulator, Horizontal Post w/ Mounting Bracket				
7	6	6	Insulator Assembly, Deadend		TM-___		



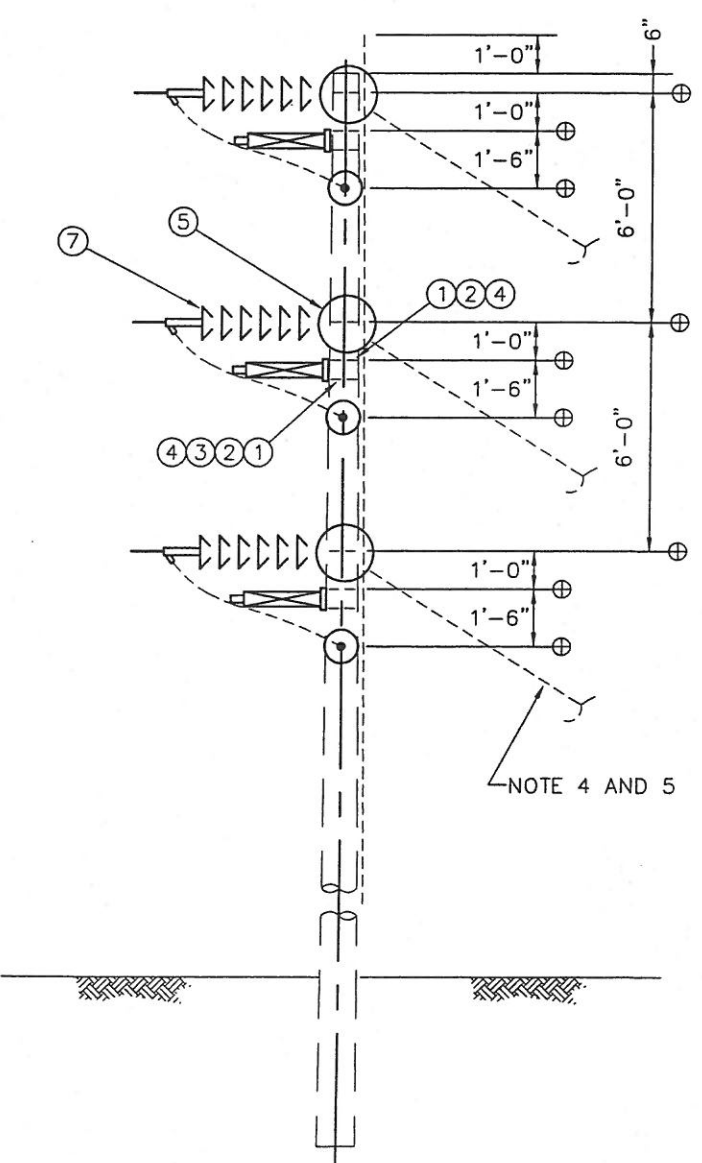
PLAN VIEW



PLAN VIEW



TS-5



TS-5A

NOTES:

1. Metal shims should be used to adjust post insulators when brackets are located on uneven pole surfaces.
2. The minimum line angle for TS-5A is 50 degrees. The minimum line angle for TS-5 is 90 degrees.
3. Drawing TE-1 gives guidance to subassembly alternatives.
4. For guying arrangements, see drawing TMG-2.
5. The following materials are to be specified separately on plan and profile drawings and staking sheets: POLES, GUYING, ANCHORS, GROUNDING AND FOUNDATION UNITS.
6. Refer to TM-3 for line post wire connections.



PROJECT ENGINEER: _____	W.O. # _____	APPROVED (DIRECTOR)	DATE
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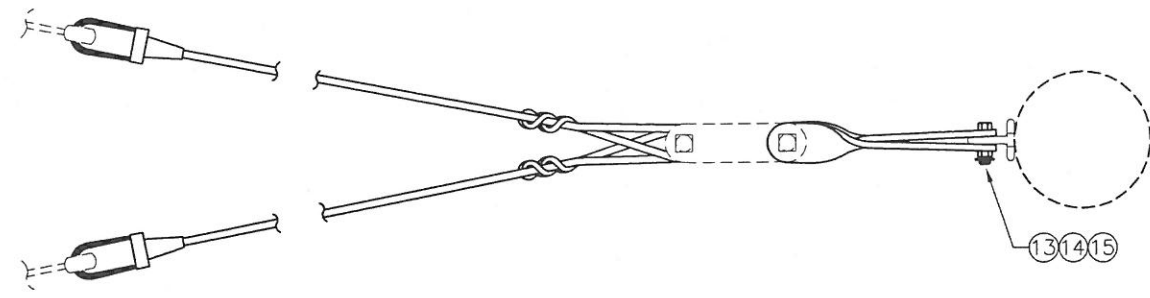
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Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV TRANSMISSION LINE STRUCTURE VERTICAL DOUBLE DEADEND TS-5, 5A	
REVISION	DATE	SHEET 1	OF 1

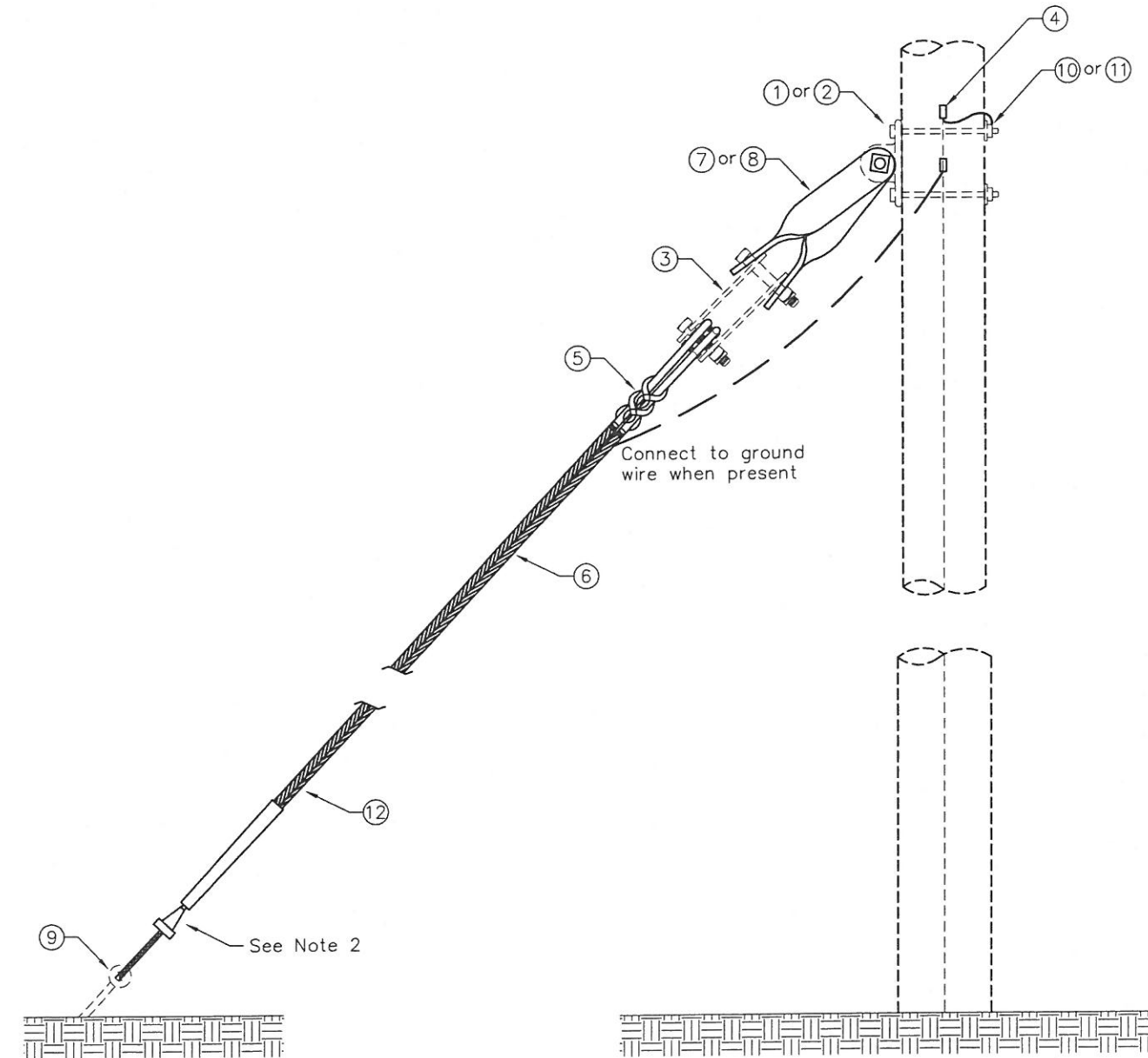
TS5.DWG

LIST OF MATERIALS

DWG. REF.	SE-			DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	13	14	15					
1	1			Guy Attachment Assembly, Light Duty		TG-17		
2		1	1	Guy Attachment Assembly, Medium Duty		TG-25		
3	1	1	1	Link Assembly, Type 1B		TG-92		
4	as req'd	as req'd	as req'd	Connector, Compression	p			
5	4	4	4	Deadend, Preformed, Guy	c			
6	10M	12.5M	16M	Guy Strand, Alumoweld (Rating), Length As Req'd	at			
7	2			Twisted Link, 30,000 lb.				Hughes AS1263
8		2	2	Twisted Link, 50,000 lb.				Hughes AS2019-10
9	2	2	2	Clamp, Anchor Rod, Bonding	ck			
10	1			Clamp, Groundwire, 3/4", with Nut	dp			
11		1	1	Clamp, Groundwire, 7/8", with Nut	dp			
12	2	2	2	Guy Marker, 96" (Orange & Yellow or Solid Orange)	at			
13	1	1	1	Bolt, Mach., 7/8" x Req'd Length, w/ Cotter Hole				
14	1	1	1	Nut, 7/8"				
15	1	1	1	Cotter Key, 1/8" x 1 1/2"				



PLAN



NOTES:

1. Formed type grips may be used only with suitable attachment recommended by grip manufacturer.
2. Chugach accepted automatics may be substituted at the anchor rod attachment.
3. Where separate anchors are installed the minimum separation shall be 10' or as specified in the guying guide.



PROJECT: _____	APPROVED (DIRECTOR) <i>Myak Ma</i>	DATE 8/2/01
DESIGNER/PROJECT ENGINEER: _____ W.O. #: _____	CERTIFIED BY <i>William J. Bernier</i>	DATE 8/3/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	

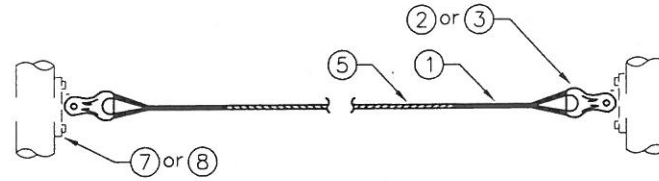
CHUGACH
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Chugach Electric Association, Inc.

DRAWING NAME: 34.5 kV GUYING ASSEMBLIES FACTORY FORMED WITH GUY ROLLERS STE-13, 14, 15		REVISION	DATE

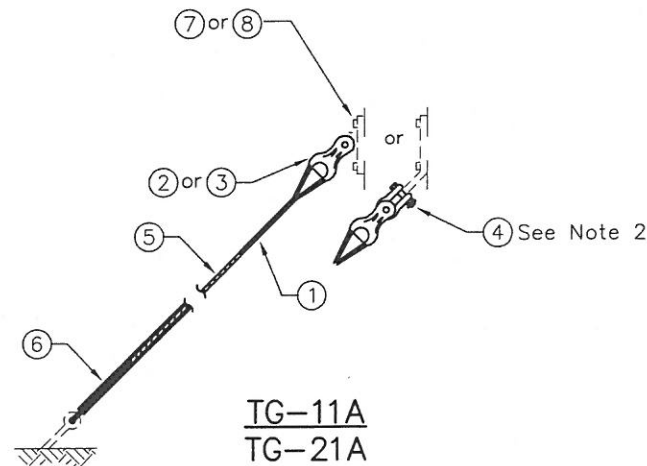
LIST OF MATERIALS

DWG. REF.	TG-11, 21				DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	TG-11A	TG-21A	TG-11D	TG-21D					
1	2	2	2	2	Deadend, Factory Formed	u			
2	1		2		Thimble Clevis, 20,000 lb. 5/8" Pin	cl			
3				2	Thimble Clevis, 40,000 lb. 3/4" Pin	cl			
4	*	*			Anchor Shackle 30,000 lb.	bo			
5	ft	ft	ft	ft	Guy Wire	y			
6	1	1			Guy Marker, B' Yellow or Orange	at			
7	1		2		Guy Attachment Assembly, Light Duty		TG-17		
8		1		2	Guy Attachment Assembly, Medium Duty		TG-25		

* SEE NOTE 2



TG-11D
TG-21D



TG-11A
TG-21A

NOTES:

- Guying assemblies are to be coordinated with the guy attachments. For example, if medium duty guy attachments are specified on the structure drawings, then medium duty guying assemblies are to be used.
- Anchor shackles may be required to orient the guy assembly to the guy attachment. If guy slopes are other than 1/1 add an anchor shackle when connecting the thimble clevis to a bent plate.
- The capacity of a guy assembly is limited by either the strength of the guy strand or of the hardware. The strength limitation for TG-11D is 15,000 lbs.; for TG-21D, 25,000 lbs. The strength limitation for TG-11A is 20,000 lbs.; for TG-21A is 35,400 lbs.



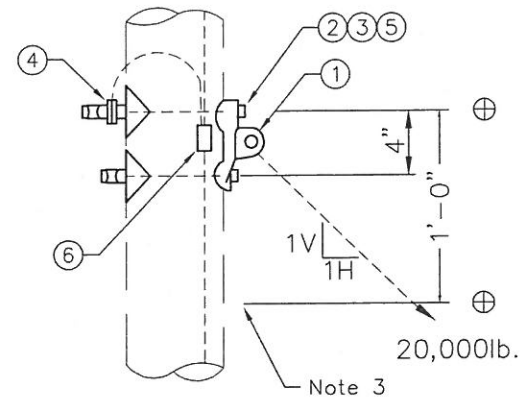
PROJECT: _____	APPROVED (DIRECTOR) <i>William Bernier</i>	DATE 8/26/01
DESIGNER/PROJECT ENGINEER: _____ W.O. #: _____	CERTIFIED BY <i>William Bernier</i>	DATE 8/26/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

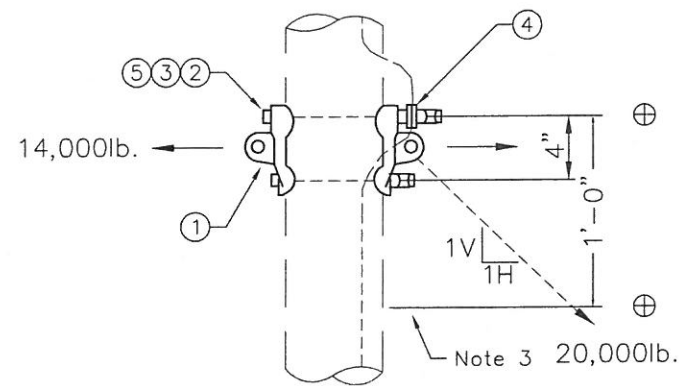
34.5 kV
GUYING ASSEMBLIES
FACTORY FORMED WITH THIMBLE CLEVIS
TG-11A, 11D, 21A, 21D

LIST OF MATERIALS

DWG. REF.	TG-17		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	C	D					
1	1	2	Pole Eye Plate, Light Duty, Grid Gain	fv			
2	2	2	Bolt, Machine, 3/4" x Req'd Length	c			
3	2		Washer, Curved, 4" SQ x 1/4", 13/16" Hole	d			
4	as req'd	as req'd	Clamp, Groundwire + 1 nut, 3/4"	dp			
5	2	2	Locknut, 3/4"	ek			
6	as req'd	as req'd	Connector, Compression	p			



TG-17C



TG-17D

Notes:

- The indicated loads are design maximum.
- For guy slopes more than 1V to 1H the maximum vertical capacity should not exceed 15,000 lbs.
- The lower work points (⊕) are for locations where two guy attachments are required.
- When there is no pole groundwire or the groundwire is stood off from the pole, items 4 & 6 are not required.
- Dimensions of the guying attachments shall accommodate light duty guying assemblies.
- Item 6, compression connector, may not be necessary depending on the location of the pole ground shown on the structure drawings.



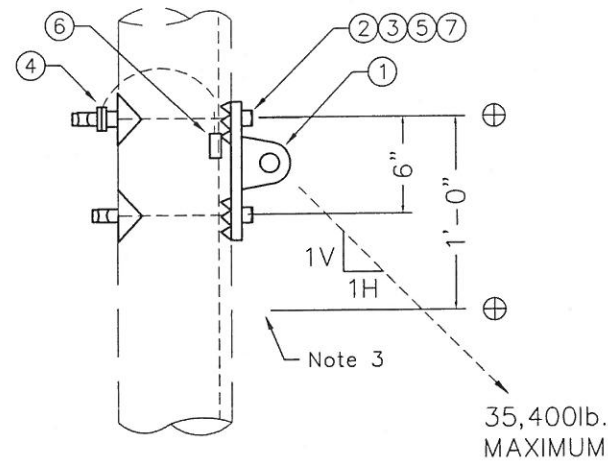
PROJECT: _____	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER: _____ W.O. # _____	<i>William J. Bernier</i>	8/20/11
DESIGN/CONSTRUCTION/ASBUILT REVISION	CERTIFIED BY	DATE

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POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

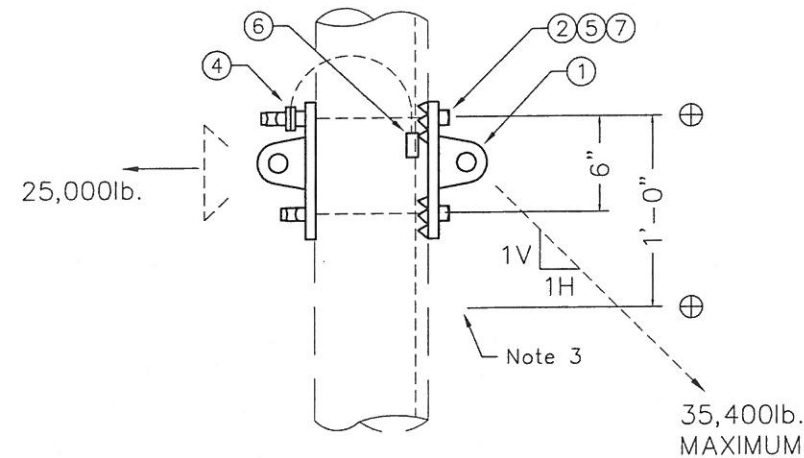
DRAWING NAME:		34.5 kV GUYING ASSEMBLIES LIGHT DUTY POLE EYE PLATES TG-17C, 17D
REVISION	DATE	
		TG-17.DWG
		SHEET 1 OF 1

LIST OF MATERIALS

DWG. REF.	TG-25		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	C	D					
1	1	2	Tee, Deadend, Medium Duty	fv			
2	2	2	Bolt, Machine, 7/8" x Req'd Length	c			
3	2		Washer, Curved, 4" SQ x 1/4", 15/16" Hole	d			
4	as req'd	as req'd	Clamp, Groundwire + 1 nut, 7/8"	dp			
5	2	2	Locknut, 7/8"	ek			
6	as req'd	as req'd	Connector, Compression	p			
7	2	2	Grid Goin, 4"x4", 15/16" Hole	bi			



TG-25C



TG-25D

Notes:

- The indicated loads are design maximum.
- The lower work points (⊕) are for locations where two guy attachments are required.
- When there is no pole groundwire or the groundwire is stood off from the pole, items 4 & 6 are not required.
- Dimensions of the guying attachments shall accommodate medium duty guying assemblies.
- Item 6, compression connector, may not be necessary depending on the location of the pole ground shown on the structure drawings.



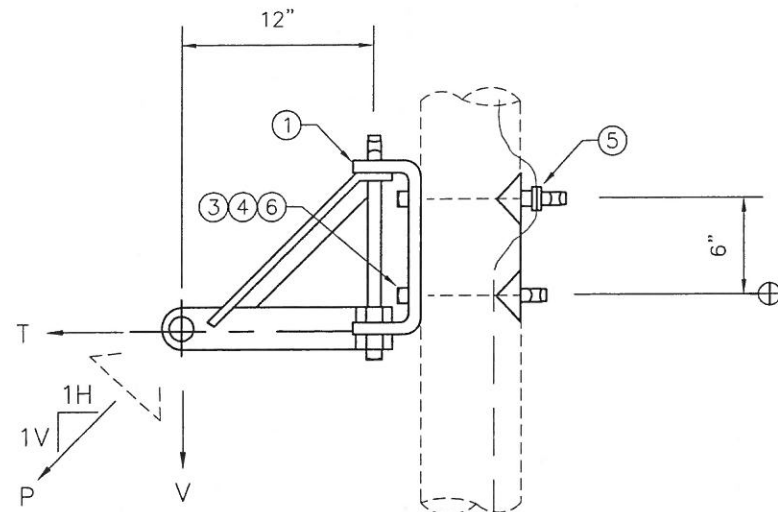
PROJECT: _____	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER: _____ W.O. #: _____	<i>William J. Bernier</i>	8/2/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	CERTIFIED BY	DATE

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

34.5 kV
GUYING ASSEMBLIES
MEDIUM DUTY POLE EYE PLATES
TG-25C, 25D

LIST OF MATERIALS

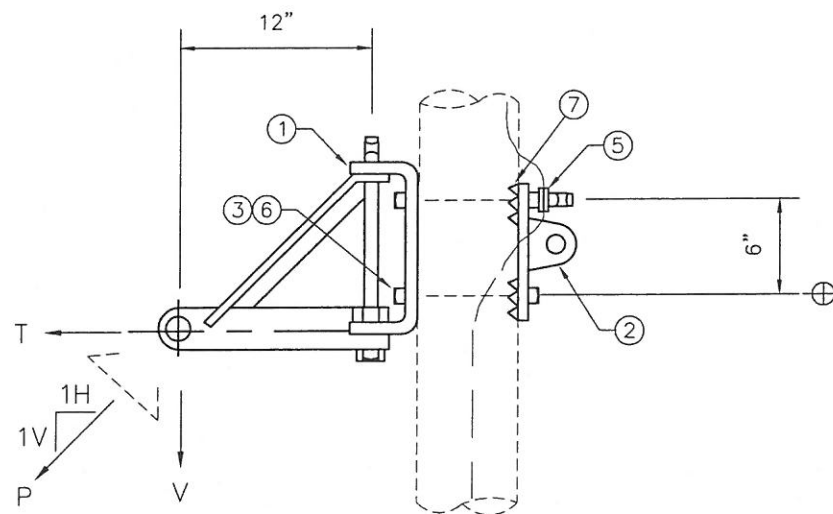
DWG. REF.	TG-28		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	TG-28	TG-28A					
1	1	1	Bracket, Swinging Angle, Assembly	fu			
2		1	Tee, Deadend, Medium Duty, Grid Gain	fv			
3	2	2	Bolt, Machine, 7/8" x Req'd Length	c			
4	2		Washer, Curved, 4" SQ x 1/4", 15/16" Hole	d			
5	as req'd	as req'd	Clamp, Groundwire + 1 nut, 7/8"	dp			
6	2	2	Locknut, 7/8"	ek			
7	2	2	Grid Gain, 4"x4", 15/16" Hole	bi			



TG-28

Notes:

- The 1-1/4" diameter hole shall be reamed on both sides to be suitable for self-locking ball hook.
- Strength limitations on bracket and guy attachment are:
 - A. Maximum vertical load V = 2,500 lbs.
 - B. Maximum transverse load T = 14,000 lbs.
 - C. Maximum oblique load P = 10,000 lbs.



TG-28A



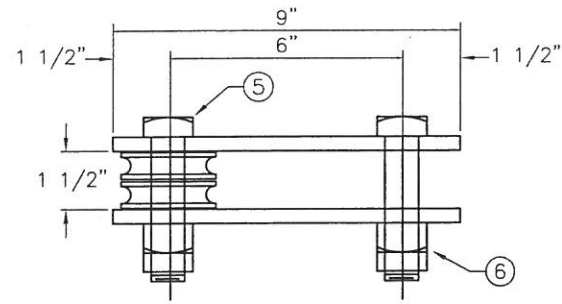
PROJECT:	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER:	<i>William J. Bernier</i>	8/2/01
W.O. #:	CERTIFIED BY	8/3/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	DATE

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POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

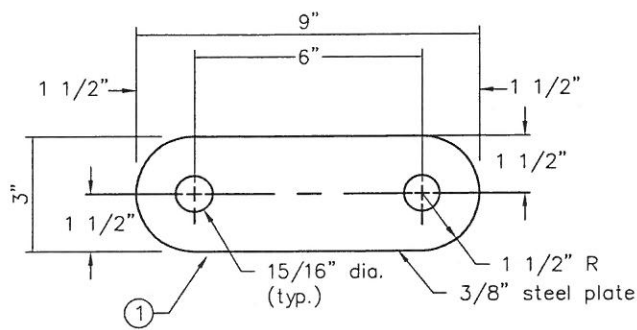
DRAWING NAME:		34.5 kV GUYING ASSEMBLIES MEDIUM DUTY GUYING TEES TG-28, 28A
REVISION	DATE	TG-28.DWG
		SHEET 1 OF 1

LIST OF MATERIALS

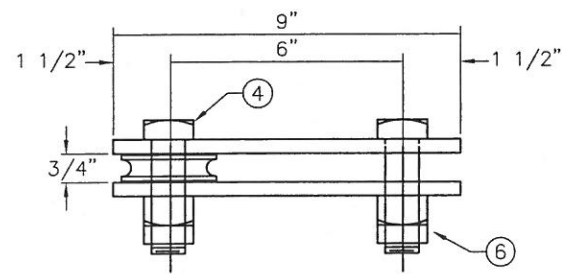
DWG. REF.	TG-92			DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	TYPE 1A	TYPE 1B	TYPE 2					
1	1	1		Type 1 Link				
2			2	Type 2 Link				
3	1	2	2	Guy Roller				
4	2		3	Bolt, Machine, 7/8" x 3"	r			
5		2		Bolt, Machine, 7/8" x 4"	r			
6	2	2	3	Locknut, 7/8"	ek			



DOUBLE ROLLER LINK ASSEMBLY
TYPE 1B



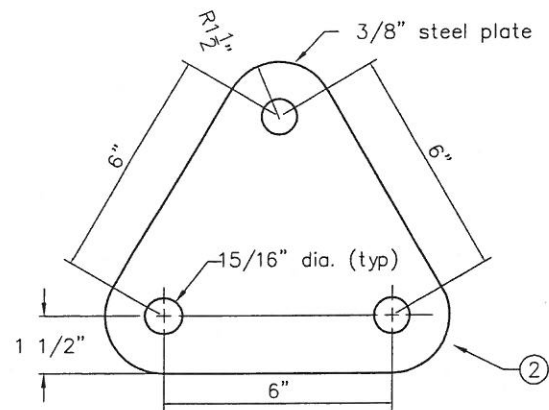
TYPE 1 LINK



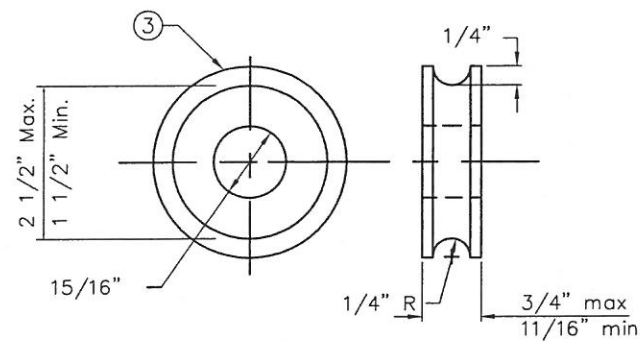
LINK ASSEMBLY
TYPE 1A & 2

NOTES:

- Type 2, Guy Link Assembly, is to be used when attaching two down guy assemblies to one guy attachment for spread guying such as head or back guying of the OHGW on tangent structures where the OHGW is located directly above the conductor.
- Substitute one Type 2 Guy Link Assembly, TG-92, for two thimble clevises or for two Type 1 link assemblies.
- Leave roller free to turn during adjustment of guys. Tighten nuts and locknuts after completion of adjustments.
- Links are to be fabricated from ASTM-36 steel plate and hot dip galvanized per ASTM A-153 and A-123 requirements.
- Type 1, Guy Link Assembly, is for normal guying. Do Not use for Spread Guying.
- Ultimate strength of link is 36,000 lbs.



TYPE 2 LINK



GUY ROLLER



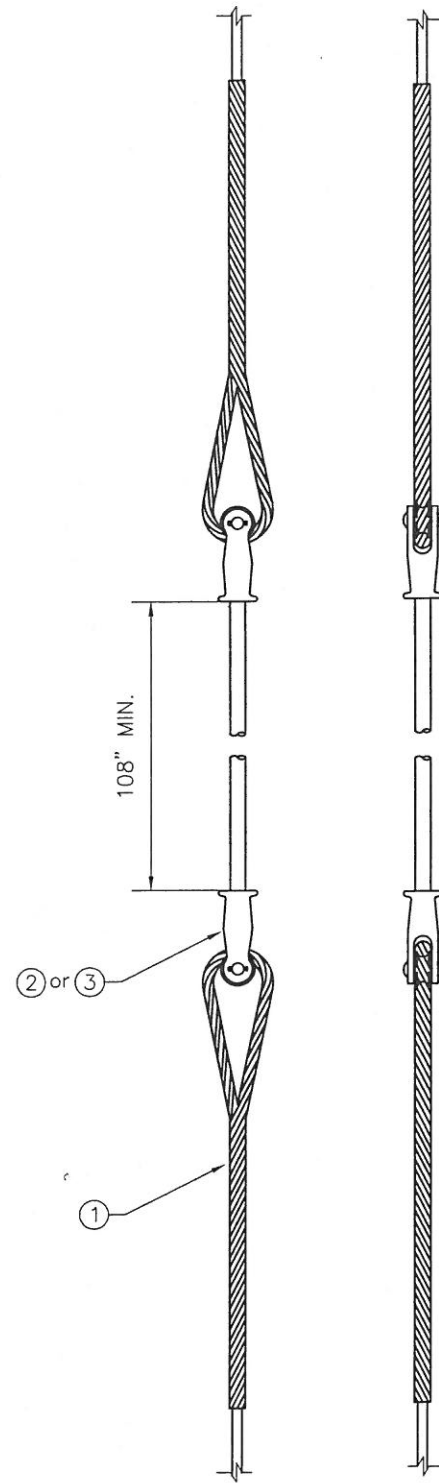
PROJECT:	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER:	<i>William Bernier</i>	8/2/01
W.O. #:	CERTIFIED BY	8/3/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	DATE

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:	34.5 kV GUYING ASSEMBLIES GUY LINK ASSEMBLIES TG-92	TG-92.DWG
REVISION	DATE	SHEET 1 OF 1

LIST OF MATERIALS

DWG. REF.	QTY	DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
1	2	Deadend, Factory formed	U			
2	1	Strain Insulator, w/ Thimble eye End Fittings				Hughes CF694TT-120
3	1	Strain Insulator, w/ Clevis & Guy Roller End Fittings				Hughes CF694-120R2



NOTES:
1. 21,000 lb. minimum breaking strength.



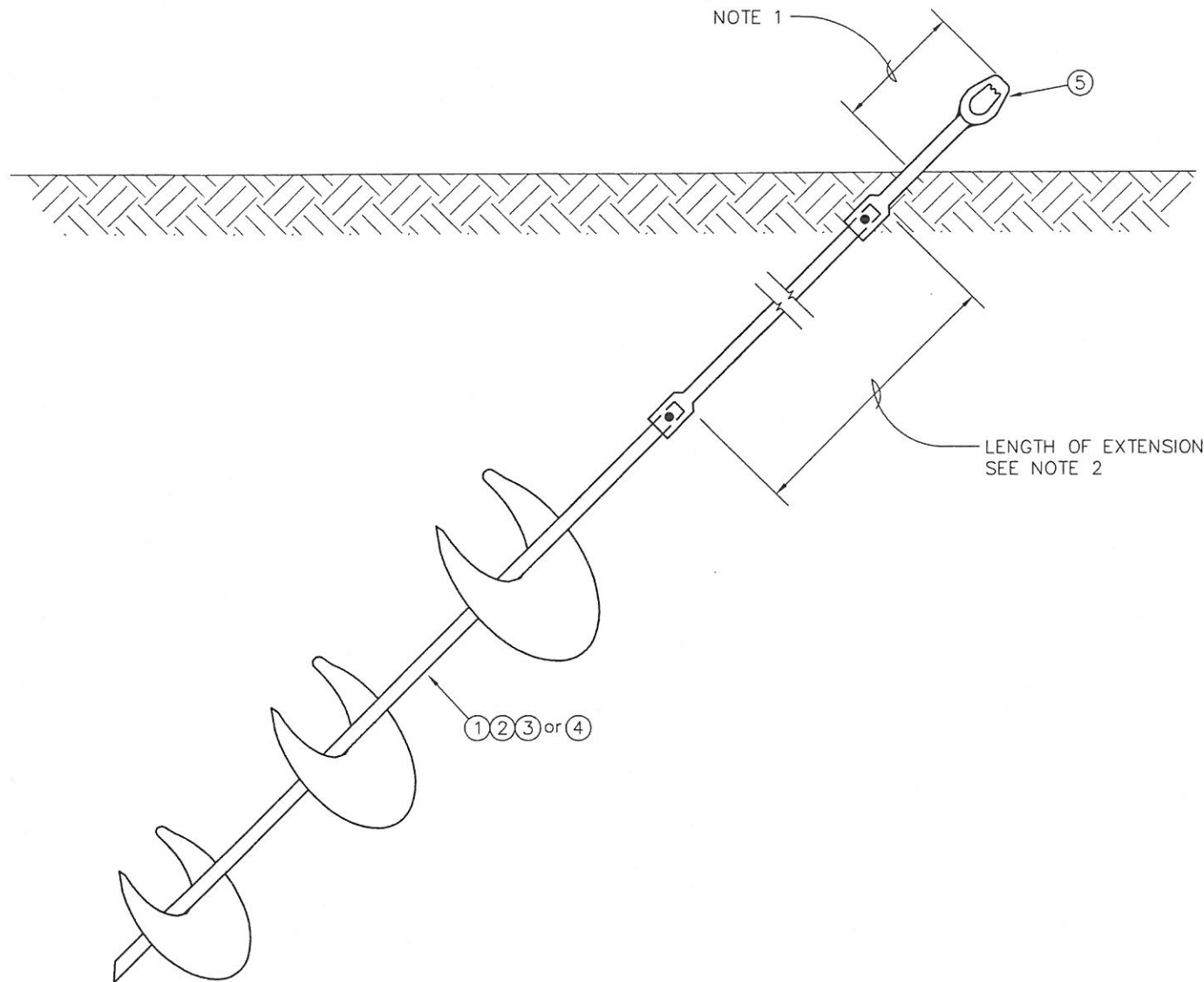
PROJECT:	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER:	<i>William J. Remier</i>	8/26/01
W.O. #:	CERTIFIED BY	DATE
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:	34.5 kV GUYING ASSEMBLIES GUY STRAIN INSULATOR TG-95
REVISION	DATE

LIST OF MATERIALS

DWG. REF.	SF-				DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	1S QTY	2S QTY	3S QTY	4S QTY					
1	1				Anchor, Single Helix, 10"	z			
2		1			Anchor, Double Helix, 8"/10"	z			
3			1		Anchor, Triple Helix, 8"/10"/12"	z			
4				1	Anchor, Quad Helix, 10"/12"/14"/14"	z			
5	1	1	1	1	Adaptor, Twin Eye	z			
6	as req'd	as req'd	as req'd	as req'd	Anchor Extension, 3 1/2', (SF-3.5)	z			
7	as req'd	as req'd	as req'd	as req'd	Anchor Extension, 7', (SF--7)	z			
8	as req'd	as req'd	as req'd	as req'd	Anchor Extension, 10', (SF-10)	z			



NOTES:

1. RECOMMENDED PROJECTION AFTER PRELOADING IS 6 INCHES. PROJECTION MAY BE INCREASED TO AVOID OVERTORQUING OF THE SHAFT. FINAL PROJECTION SHALL BE APPROVED BY THE CHUGACH SITE REPRESENTATIVE.
2. ANCHOR ROD EXTENSION SHAFT IS NOT A PART OF THE ANCHOR ASSEMBLY UNIT. THE EXTENSION SHAFT IS INCLUDED IN UNIT SF- * EXT WHERE THE * REPRESENTS THE LENGTH OF THE EXTENSION SHAFT. FOR EXAMPLE, AN INSTALLATION REQUIRING TWO 10 FT. EXTENSION SHAFTS WOULD BE INDICATED BY 2(SF-10 EXT).

UNIT	ANCHOR TYPE	SOIL CLASS	ULTIMATE CAPACITY
SF-1S	SINGLE - 10"	6	12,000 LBS.
SF-2S	DOUBLE - 8" & 10" HELIX DIA.	6	20,000 LBS.
SF-3S	TRIPLE - 8", 10" & 12" HELIX DIA.	6	26,000 LBS.
SF-4S	QUAD - 10", 12", 14" & 14" HELIX DIA.	6	33,000 LBS.

OBJECT: _____

DESIGNER/PROJECT ENGINEER: _____ W.O. #: _____

DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	APPROVED (DIRECTOR)	DATE
		<i>W. J. Bernier</i>	8/26/01

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

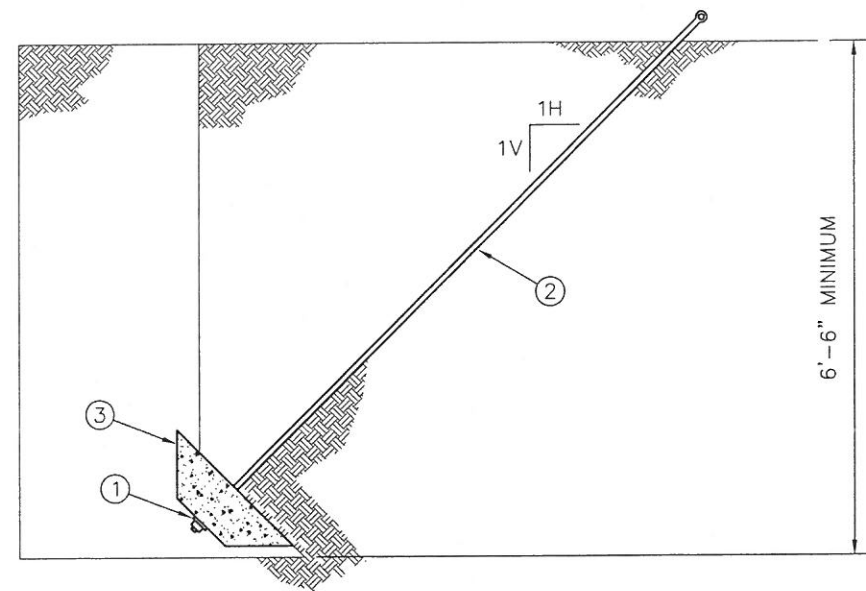
DRAWING NAME: 34.5 kV POWER SCREW ANCHOR AND ANCHOR ROD EXTENSION SF-1S, 2S, 3S, 4S

REVISION	DATE

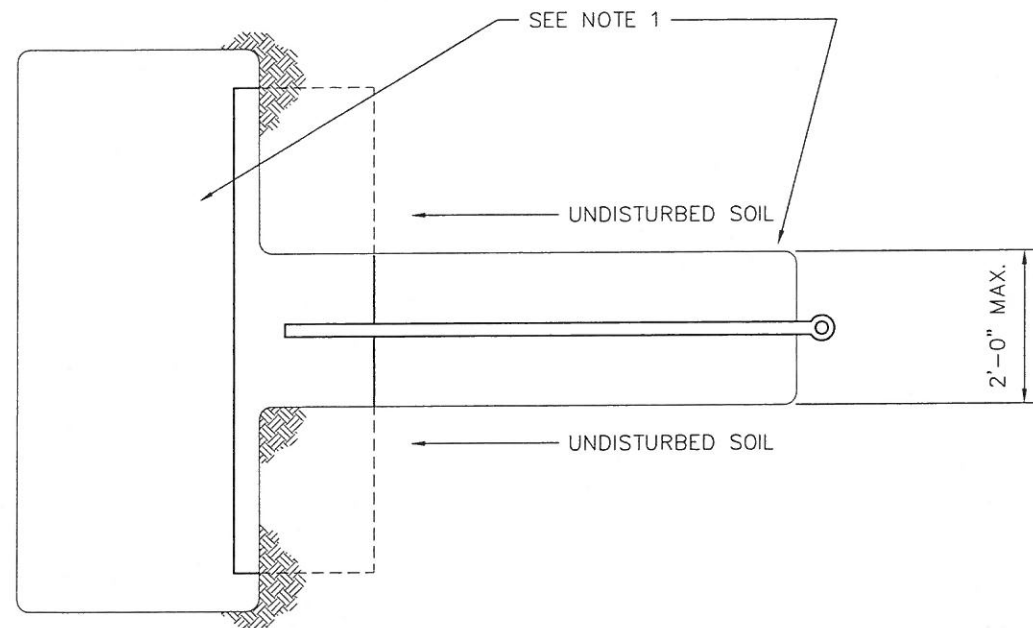
SHEET 1 OF 1

LIST OF MATERIALS

DWG. REF.	QTY	DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
1	1	Washer, 4" SQ. x 1/2", w/ 1 1/8" Hole	d			
2	1	Rod, Anchor, Twin Eye, 1" x 10'-0"	x			
3	1	Anchor, Concrete, 4'-0"	z			



SECTION



PLAN

NOTES:

- EXCAVATE AND BACKFILL WITH TYPE II GRAVEL (MUNICIPALITY OF ANCHORAGE SPEC.) AND MACHINE COMPACT TO 90% OF THE MAXIMUM PROCTOR DENSITY IN 12" LIFTS.

ANCHOR CAPACITY	
SOIL CLASS	ULTIMATE CAPACITY
6	24,000 LBS.
7	16,000 LBS.

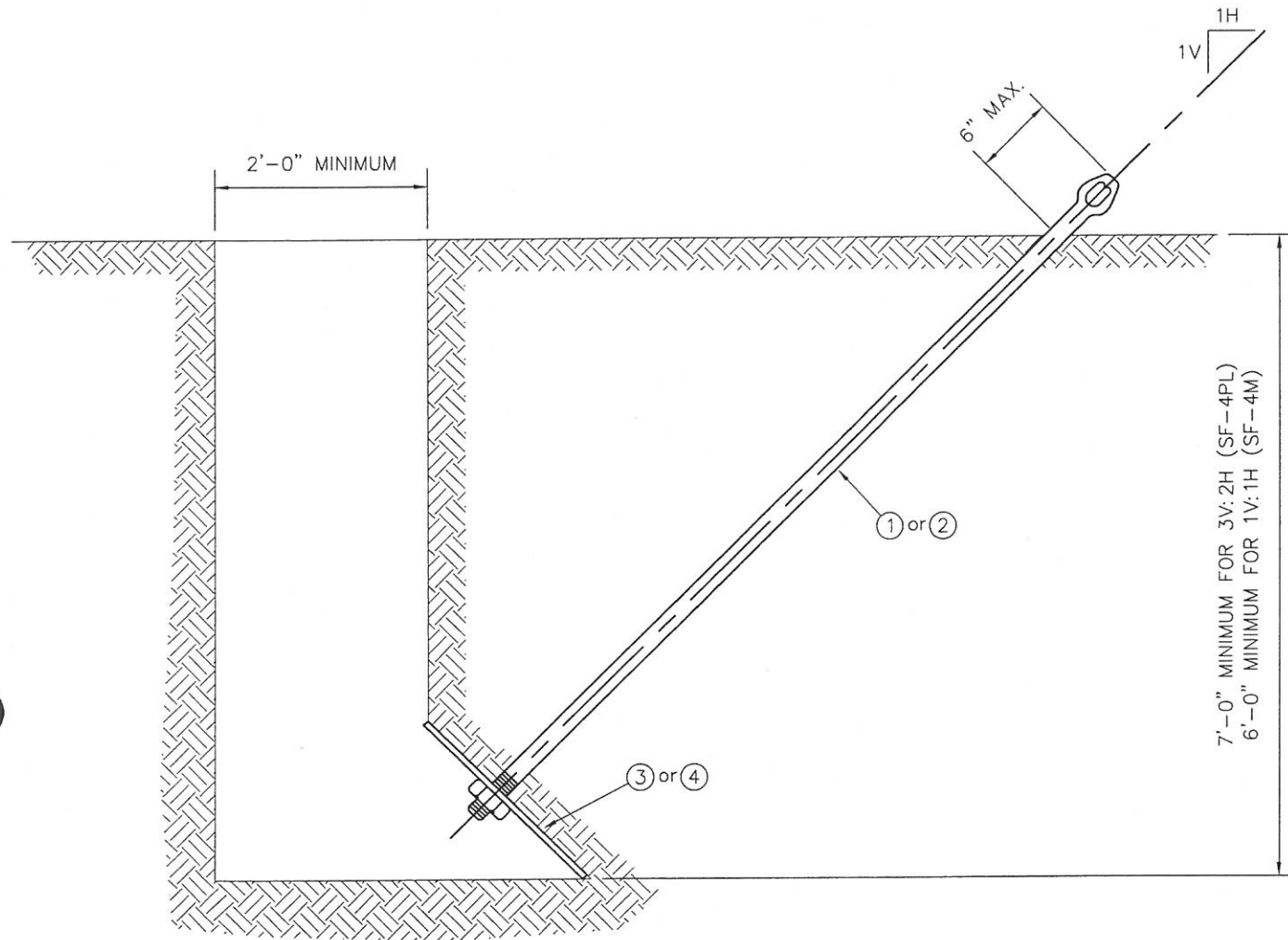
PROJECT: _____	APPROVED (DIRECTOR) <i>William Bernier</i>	DATE 8/2/01
DESIGNER/PROJECT ENGINEER: _____ W.O. #: _____	CERTIFIED BY <i>William Bernier</i>	DATE 8/2/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	DATE

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME: 34.5 kV CONCRETE ANCHOR ASSEMBLY SINGLE ROD SF4C	
REVISION	DATE

LIST OF MATERIALS

DWG. REF.	SF4		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	M	PL					
1	1		Rod, Anchor, Twineye, 3/4" x 8'-0"	x			
2		1	Rod, Anchor, Twineye, 1" x 10'-0"	x			
3		1	Anchor, Plate, 400 sq. in.	z			
4	1		Anchor, Driven	z			
5	as req'd	as req'd	Anchor Extension, 3 1/2', (SF-3.5)	z			
6	as req'd	as req'd	Anchor Extension, 7', (SF-7)	z			



NOTES:

1. SOIL CLASS NOTED AT DEPTH OF ANCHOR INSTALLATION.
2. EXCAVATE AND BACKFILL WITH TYPE II GRAVEL (MUNICIPALITY OF ANCHORAGE SPEC.) AND MACHINE COMPACT TO 90% OF THE MAXIMUM PROCTOR DENSITY IN 12" LIFTS.
3. MULTIPLE ANCHOR INSTALLATIONS REQUIRE A MINIMUM OF 10' HORIZONTAL SEPARATION.
4. DRIVEN ANCHORS (SF4M) INSTALLATION PRELOAD SHALL MEET OR EXCEED 8,000 LBS. (AS INDICATED ON THE LOAD LOCKING DEVICE).

ANCHOR UNIT	SOIL CLASS	ULTIMATE CAPACITY
SF4M	6	16,000 LBS.
SF4PL	6	24,000 LBS.

PROJECT: _____		APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER: _____ W.O. # _____		<i>William Bernier</i>	8/1/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	CERTIFIED BY	DATE

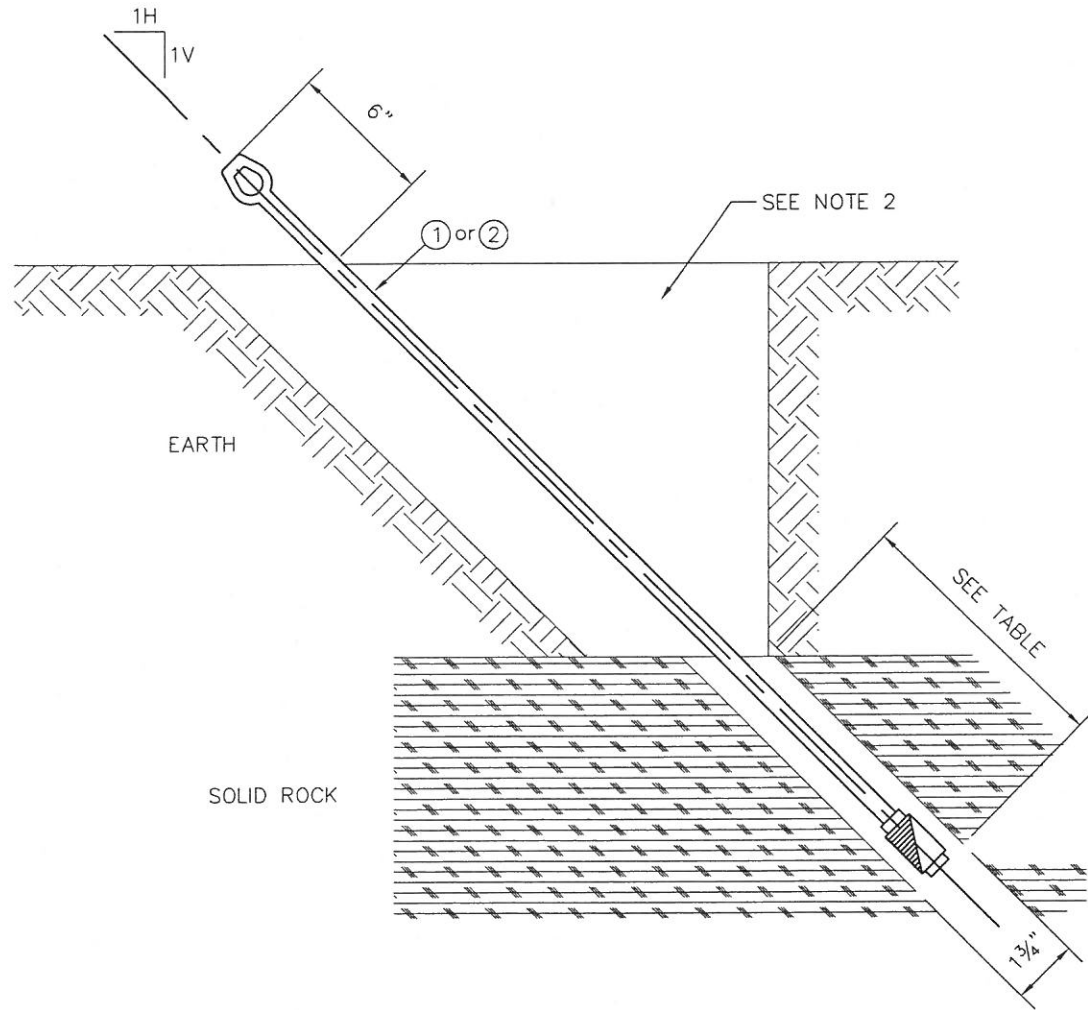
CHUGACH
 POWERING ALASKA'S FUTURE
 Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV ANCHOR STEEL CROSS PLATE SF4M, PL
REVISION	DATE	
		SHEET 1 OF 1

SF4_DWG

LIST OF MATERIALS

DWG. REF.	SF5-		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	4	5					
1	1		Anchor, Rock, 3/4" Rod x req'd length	z			
2		1	Anchor, Rock, 1" Rod x req'd length	z			



NOTES:

1. ONLY ONE GUY SHALL BE ATTACHED TO A ROCK ANCHOR. WHERE MORE THAN ONE GUY IS REQUIRED, SPACE ANCHORS 2 FT. APART AND WHERE PRATICAL THEY SHALL BE IN DIRECT LINE WITH POLE.
2. EXCAVATE AND BACKFILL WITH TYPE II GRAVEL (MUNICIPALITY OF ANCHORAGE SPEC.) AND MACHINE COMPACT TO 90% OF THE MAXIMUM PROCTOR DENSITY IN 12" LIFTS.

ANCHOR UNIT	MINIMUM EMBEDMENT	ULTIMATE CAPACITY
SF5-4	30"	20,000 LBS.
SF5-5	48"	36,000 LBS.

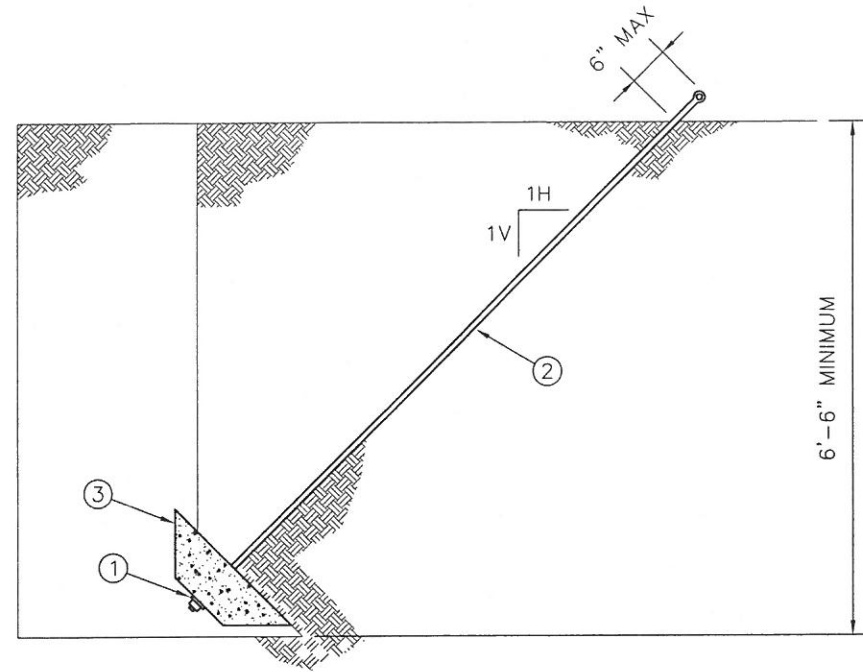
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DESIGNER/PROJECT ENGINEER: _____	<i>William J. Bernier</i>	8/2/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	CERTIFIED BY	8/3/01
BY/DATE		DATE

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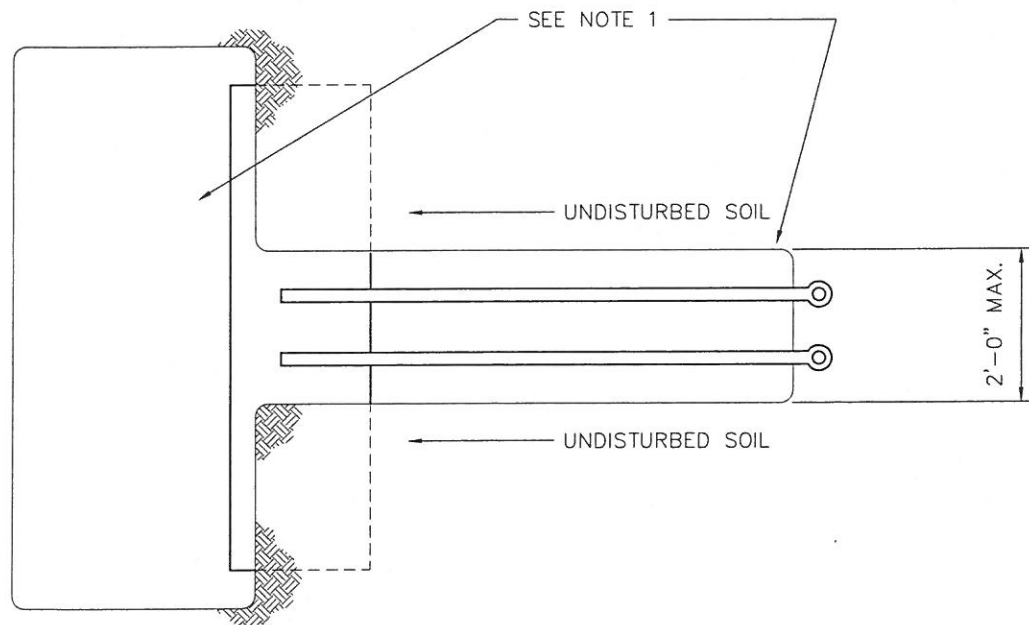
DRAWING NAME:	34.5 kV ROCK ANCHOR ASSEMBLY
	SF5-4, 5
REVISION	DATE

LIST OF MATERIALS

DWG. REF.	QTY	DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
1	2	Washer, 4" SQ. x 1/2", w/ 1 1/8" Hole	d			
2	2	Rod, Anchor, Twin Eye, 3/4" x 10'-0"	x			
3	1	Anchor, Concrete, 7'-0"	z			



SECTION



PLAN

NOTES:

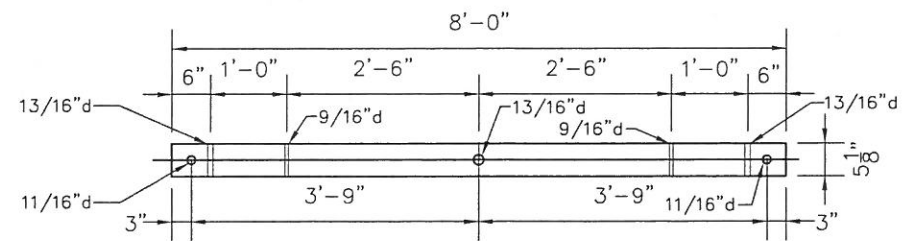
- EXCAVATE AND BACKFILL WITH TYPE II GRAVEL (MUNICIPALITY OF ANCHORAGE SPEC.) AND MACHINE COMPACT TO 90% OF THE MAXIMUM PROCTOR DENSITY IN 12" LIFTS.

ANCHOR CAPACITY	
SOIL CLASS	ULTIMATE CAPACITY
6	40,000 LBS.
7	26,800 LBS.

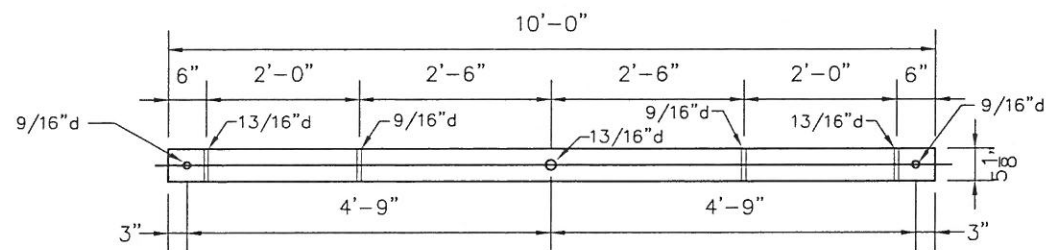
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DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	CERTIFIED BY	DATE	

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV CONCRETE ANCHOR ASSEMBLY DOUBLE ROD SF7C	
REVISION	DATE	SHEET 1	OF 1

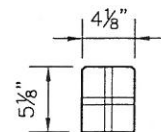


TCD-8



TCD-10

ENLARGED END VIEW



Tolerance:
 Length $\pm 1/4"$
 Cross section $\pm 1/8"$

NOTES:

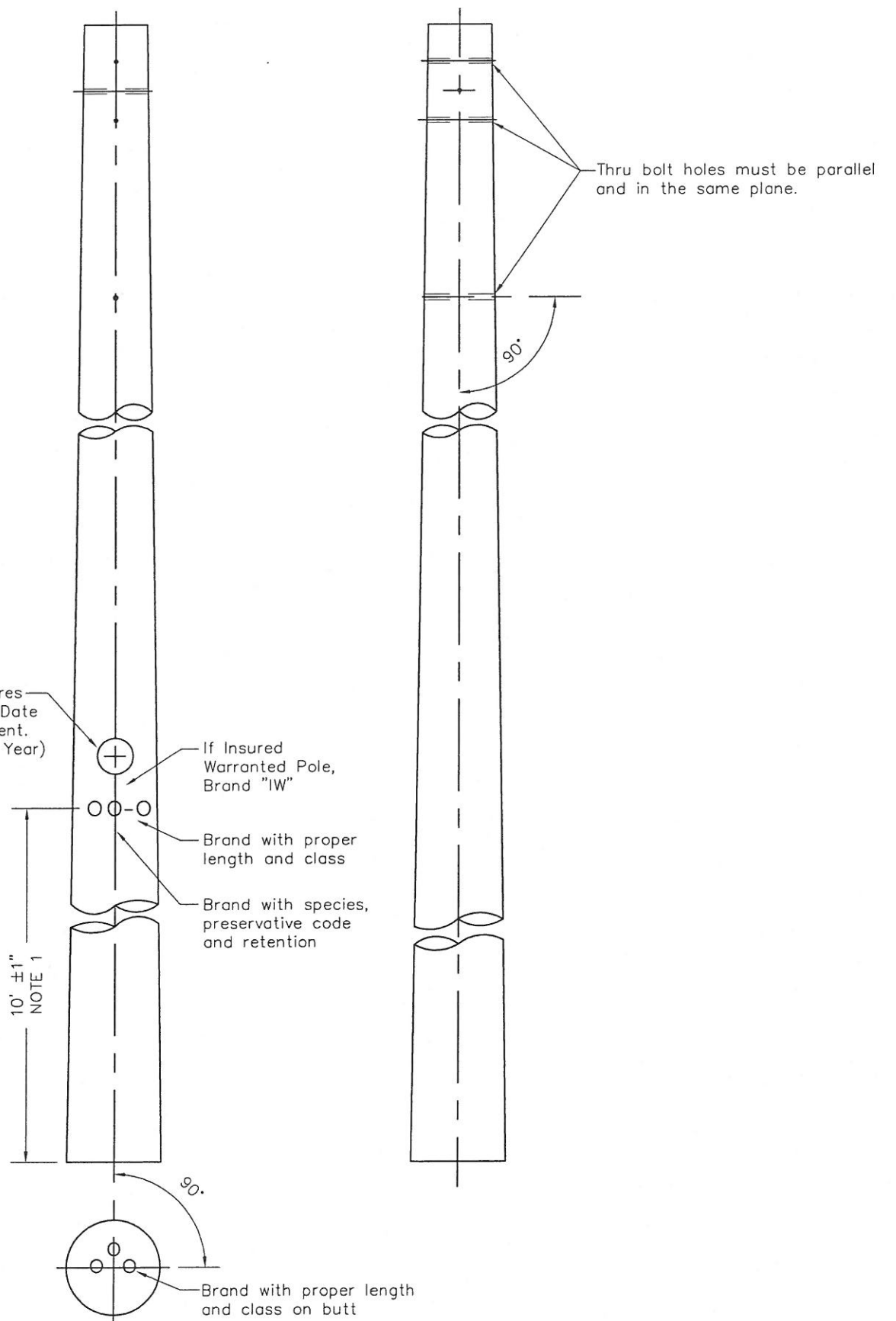
1. Drill all holes on centerlines.
2. "d" denotes hole diameter.
3. Holes shall be drilled before treating.



SUBJECT: _____		APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER: _____ W.O. #: _____		<i>William J. Bertram</i>	8/24/11
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	CERTIFIED BY	DATE

CHUGACH
 POWERING ALASKA'S FUTURE
 Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV TRANSMISSION CROSSARMS EIGHT FOOT TO TEN FOOT TCD-8, 10	
REVISION	DATE	TCD10.DWG	SHEET 1 OF 1



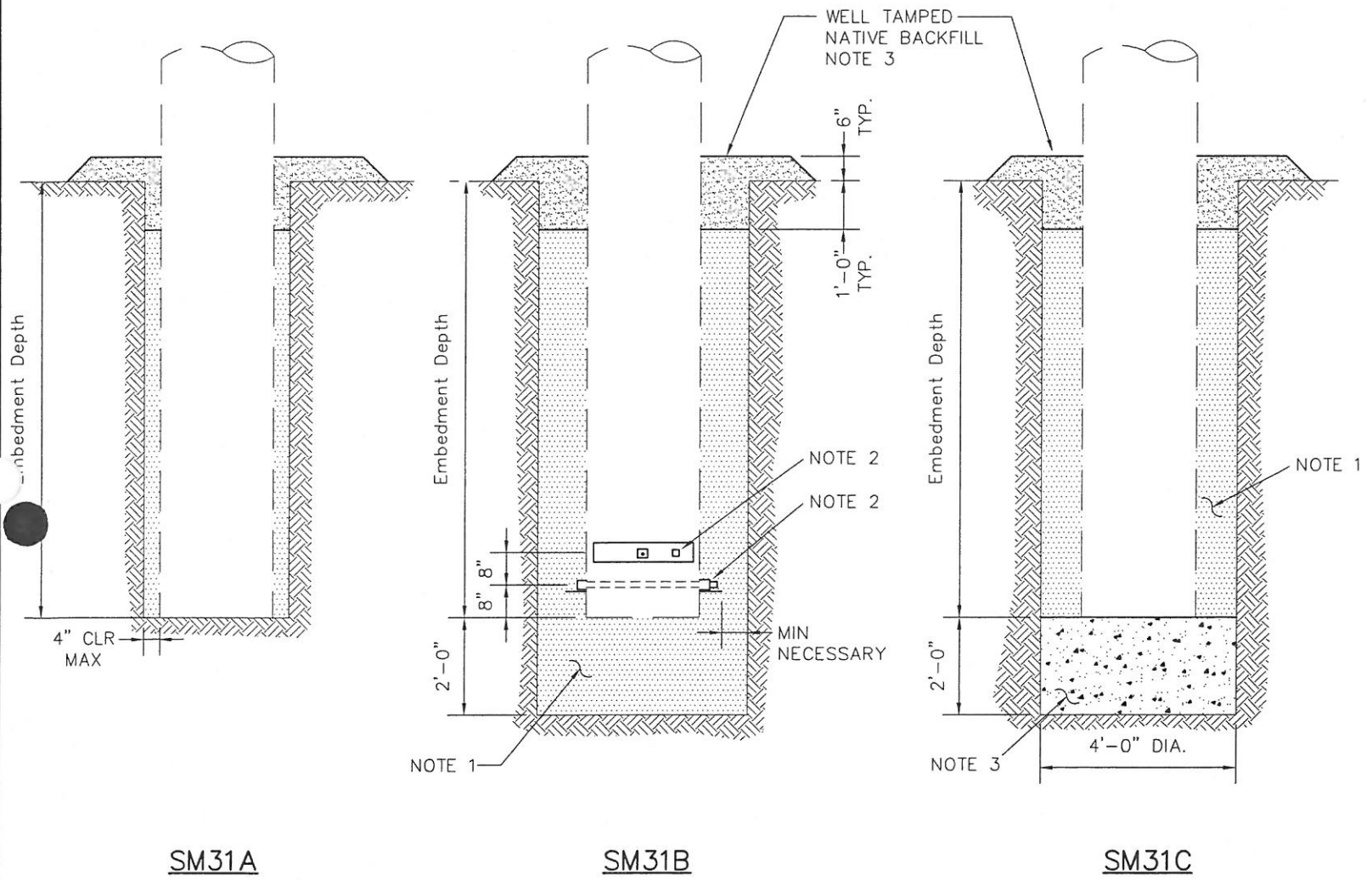
NOTES:

1. Bottom of the brand or center of metal disk shall be 10' ±1" from the butt for poles under 55 feet in length and 14' ±1" for poles 55 feet and longer.
2. All poles treated full length must be bored and roofed before treatment.
3. Refer to the construction specification to determine if the roofs are to be flat or at an angle of 15°.

PROJECT: _____		APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER: _____ W.O. #: _____		<i>Mil Man</i>	8/2/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	CERTIFIED BY	DATE
		<i>William Bernier</i>	8/3/01

CHUGACH
 POWERING ALASKA'S FUTURE
 Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV TRANSMISSION POLES STRUCTURES TPF-4
REVISION	DATE	TPF4.DWG
		SHEET 1 OF 1



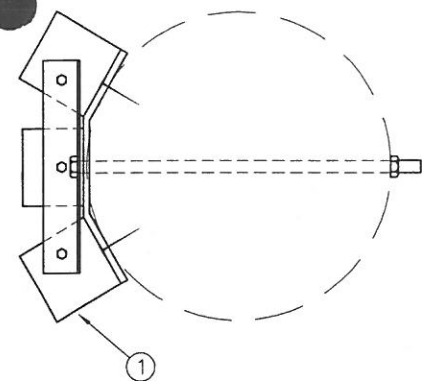
- NOTES:**
1. Backfill with Type II gravel (Municipality of Anchorage Spec.) Backfill shall be pneumatically placed and tamped in 12-inch lifts.
 2. See SM32 for pole bearing plate assemblies (to be specified separately).
 3. Well tamped native backfill shall be placed around the pole as shown. No organic or frozen material shall be used for backfill.



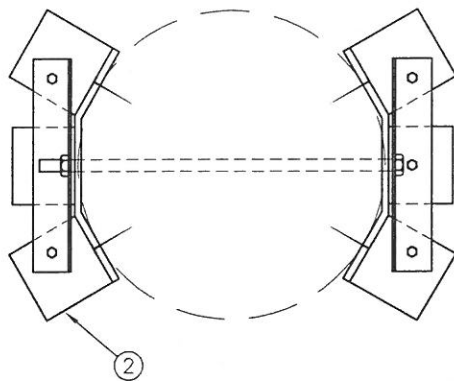
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DESIGNER/PROJECT ENGINEER:	<i>William J. Bernier</i>	8/20/01
W.O. #:	CERTIFIED BY	8/30/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	DATE

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POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

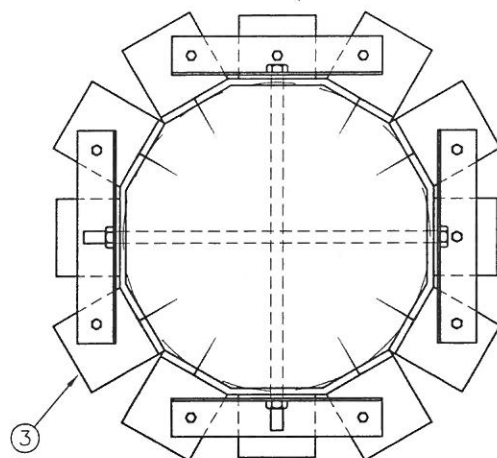
DRAWING NAME:		34.5 kV FOUNDATION UNITS POLE STABILITY, BEARING & UPLIFT FOUNDATIONS SM31A, 31B, 31C
REVISION	DATE	SM31_.DWG
		SHEET 1 OF 1



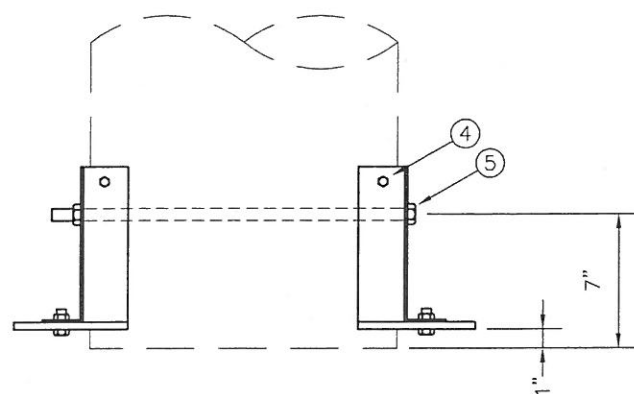
SM32A
ONE SECTION ANCHOR



SM32B
TWO SECTION ANCHOR



SM32C
FOUR SECTION ANCHOR



ELEVATION

LIST OF MATERIALS

DWG. REF.	SM32			DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	A	B	C					
1	1			Anchor Assembly, Pole				Hughes A-1895-1
2		1		Anchor Assembly, Pole				Hughes A-1895-2
3			1	Anchor Assembly, Pole				Hughes A-1895-3
4	as req'd	as req'd	as req'd	Loq Screw, 5/8" x 4 1/2"				Hughes A-1895-3
5	1	1	2	Bolt, Machine, 7/8" x req'd length, w/ nut	c			Hughes A-1895-3

NOTES:

1. Treat field drilled holes with copper naphthante.
2. This unit requires the SM31B foundation which is specified separately.



UNIT	TOTAL BEARING AREA
SM32A	106 sq. in.
SM32B	212 sq. in.
SM32C	424 sq. in.

OBJECT: _____		APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER: _____ W.O. # _____		<i>William Bernier</i>	8/2/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	CERTIFIED BY	DATE

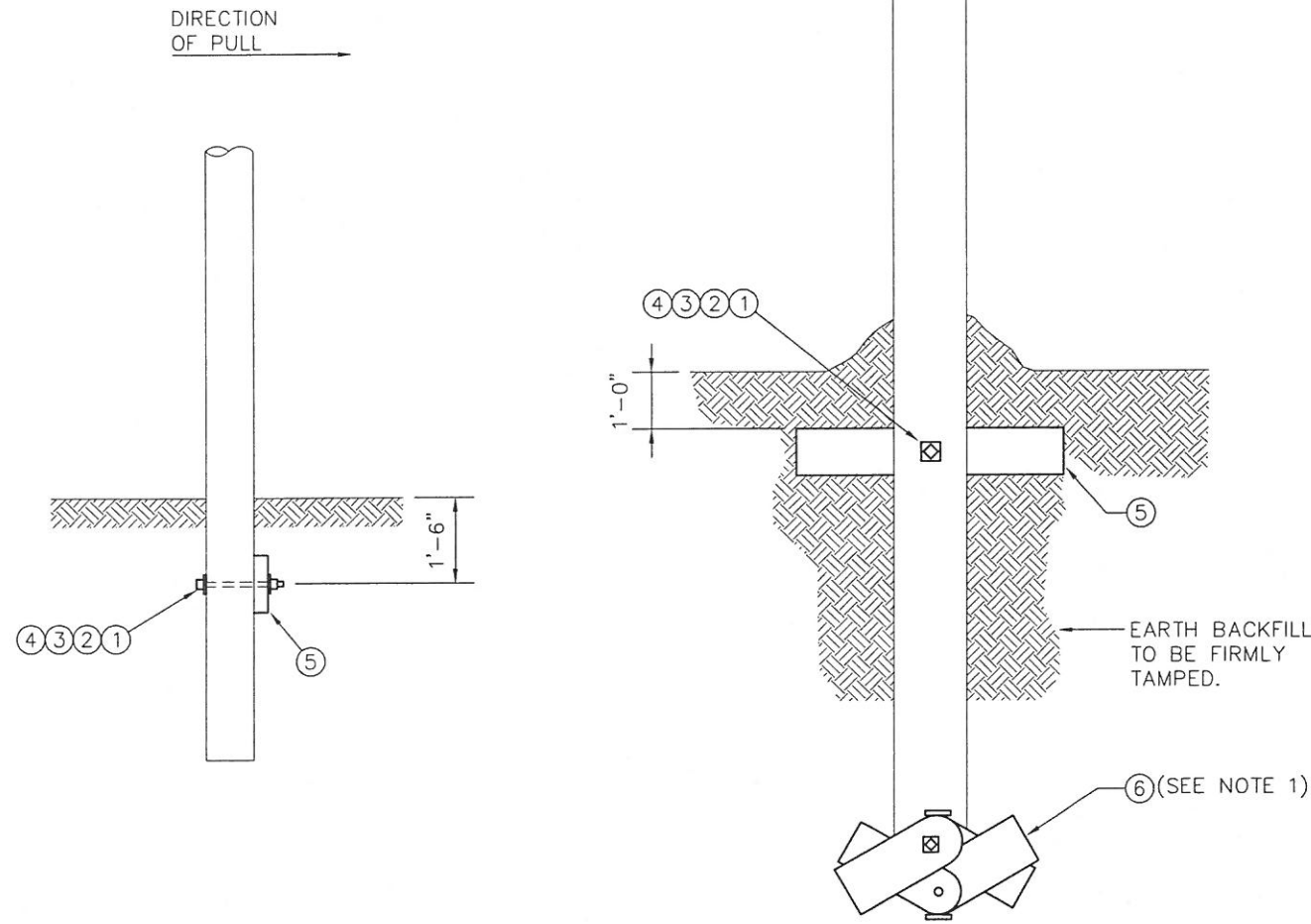
CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV FOUNDATION UNITS POLE BEARING PLATE ASSEMBLIES SM32A, B, C
REVISION	DATE	SM32-_.DWG
		SHEET 1 OF 1

LIST OF MATERIALS

DWG. REF.	SM-32		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	SM-32-1	SM-32-2					
1	2	1	Bolt, Machine, 3/4" x Req'd Length	c			
2	2	1	Washer, Curved 4" SQ, 13/16" Hole	d			
3	1	1	Washer, Flat 4" SQ, 13/16" Hole	d			
4	2	1	Locknut, 3/4"	ek			
5	1	1	Crib Board, Creosoted				
6	1		Expanding Pole Key Anchor				Joslyn #J4817(E)

LOOKING IN DIRECTION OF PULL



STM32-1

STM32-2

NOTES:

1. Diameter of hole for pole should be just large enough to accept the pole and unexpanded key so that when the key is expanding it is into solid undisturbed soil.
2. Rake poles so that after strain is applied the pole will be plumb.



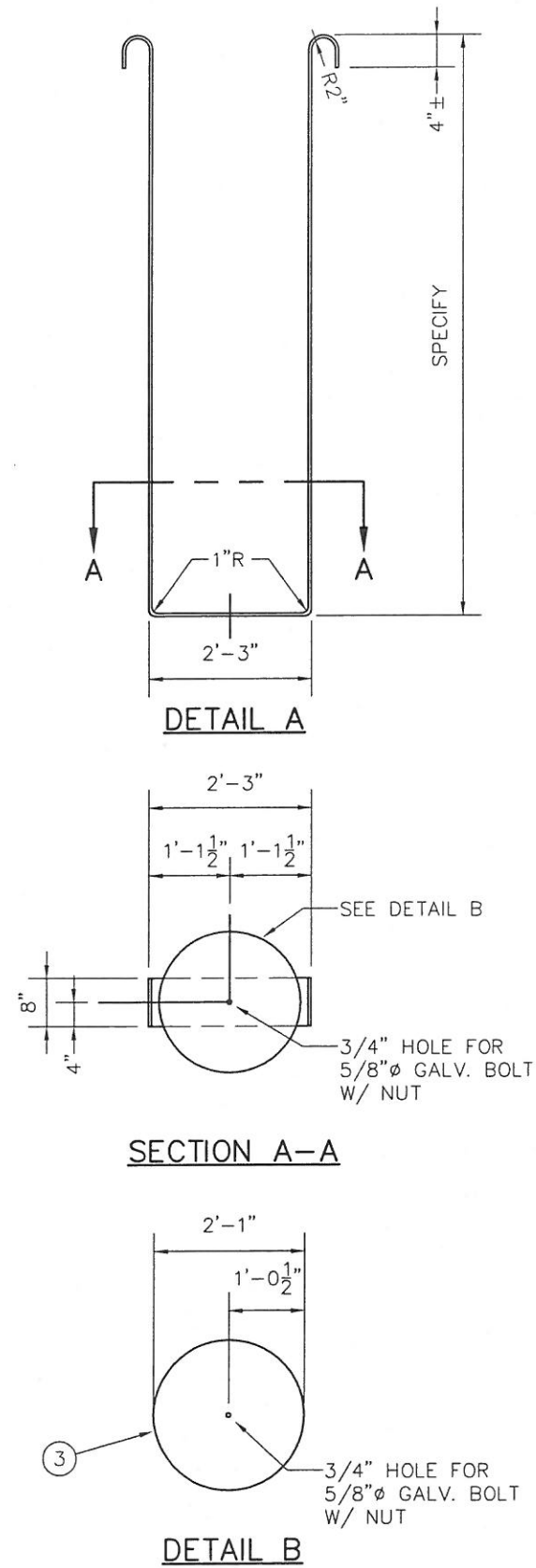
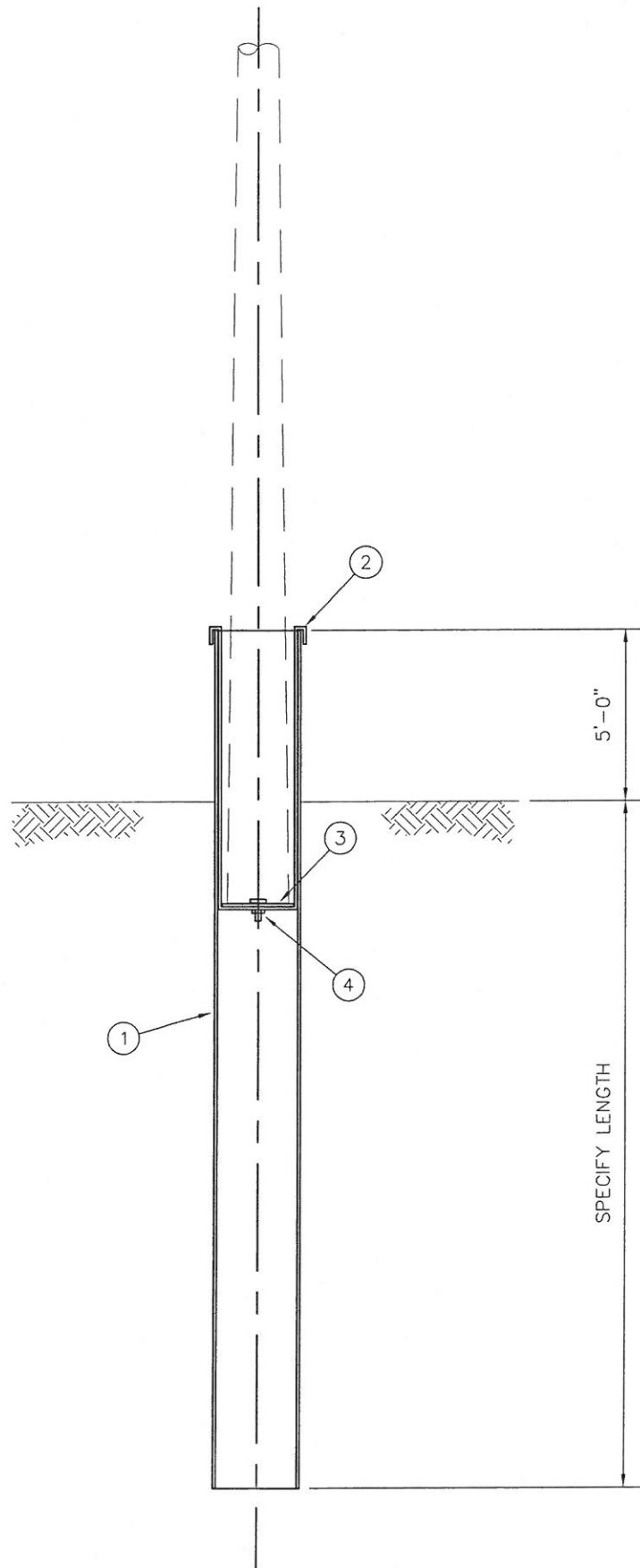
PROJECT: _____	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER: _____ W.O. # _____	<i>William J. Beamer</i>	8/2/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	CERTIFIED BY	DATE

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:	34.5 kV FOUNDATION UNITS POLE STABILITY FOUNDATIONS STM32-1, 2
REVISION	DATE
	STY 32-__DWG
	SHEET 1 OF 1

LIST OF MATERIALS

DWG. REF.	QTY	DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
1	1	30" Dia. x _____ L, ASTM A252 Grade 2 Min. Pipe Pile, Fy=36 KSI				
2	1	Plate, 8" x _____ x 1/2", A36 Steel - Hanger				
3	1	Plate, 1/2" x 2'-1" Dia., A36 Steel				
4	1	Bolt, 5/8" x 2 1/2" Long w/ Nut, Galv., A325 Bolt/Nut				



NOTES:

1. MINIMUM EMBEDMENT DEPTH OF POLE IN PILE IS 10% POLE HEIGHT.
2. EXCAVATE AND BACKFILL WILL BE PART OF THE POLE SETTING UNIT.
3. VOIDS UNDER THE HANGER, AND TO THE TOP OF THE PILE AROUND THE POLE, TO BE BACKFILLED WITH CLASSIFIED MATERIAL AND MACHINE COMPACTED TO 90% OF THE MAXIMUM PROCTOR DENSITY IN 12" LIFTS AS PART OF THE POLE SETTING UNIT.



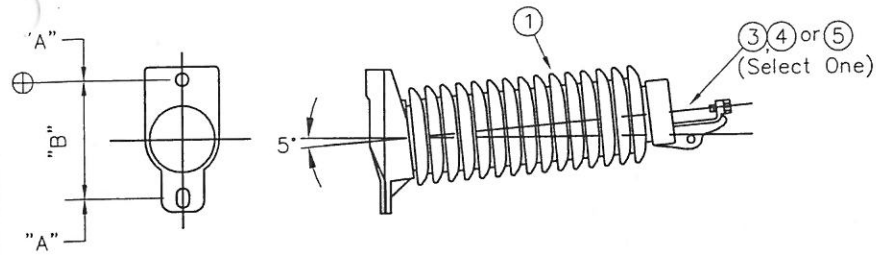
PROJECT: _____	APPROVED (DIRECTOR) <i>hmc</i> DATE: 8/2/01
DESIGNER/PROJECT ENGINEER: _____ W.O. #: _____	CERTIFIED BY <i>William J. Bennett</i> DATE: 8/3/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME: 34.5 kV FOUNDATION UNITS CAISON PIPE PILE TFP-30	REVISION	DATE	TFP-30.DWG SHEET 1 OF 1
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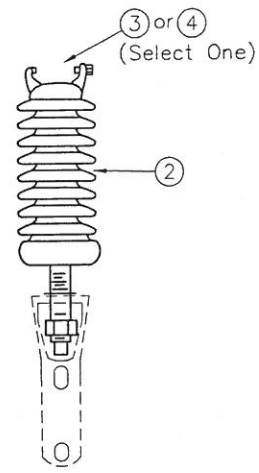
LIST OF MATERIALS

DWG. REF.	QTY	DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
1		Insulator, Horizontal Post, with Base	ea			
2		Insulator, Vertical Post, with mounting hardware				
3		Clamp, Cushioned Support				
4		Clamp, Post (to 15')				
5		Clamp, Angle				
6		Armor Rod	el			



HORIZONTAL POST INSULATOR

- TM-3A (DETAIL A)
- TM-3B (DETAIL B)
- TM-3C (DETAIL C)

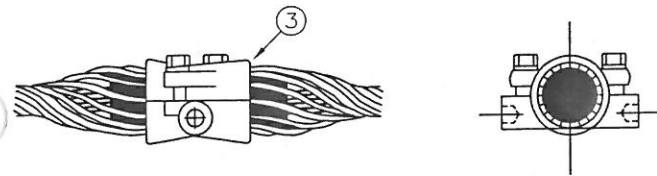


VERTICAL POST INSULATOR

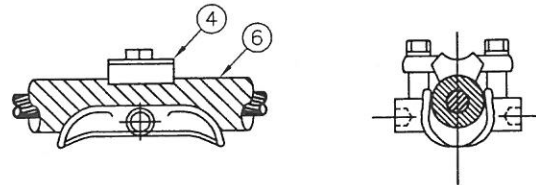
- TM-3E (DETAIL A)
- TM-3F (DETAIL B)

NOTES:

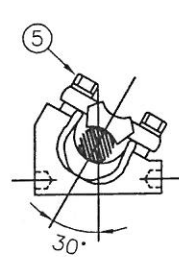
1. The appropriate conductor clamp shall be used for the line angles shown on the plan-profile drawings. For line angles from:
 - A. 0 degrees to 30 degrees TM-3A
 - B. 0 degrees to 15 degrees TM-3B, 3E, 3F
 - C. 15 degrees to 30 degrees TM-3C



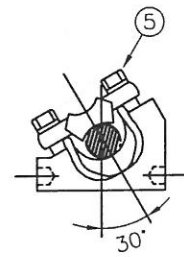
CUSHIONED SUPPORT CLAMP
DETAIL A



POST CLAMP
DETAIL B



LEFT TURN



RIGHT TURN

ANGLE CLAMP
DETAIL C

DIMENSIONS

A	
B	

DESIGNER/PROJECT ENGINEER: _____	W.O. #: _____	APPROVED (DIRECTOR) <i>William J. Bernier</i>	DATE 8/2/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	CERTIFIED BY	DATE 8/30/01

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME: 34.5 kV
INSULATOR ASSEMBLIES
LINE POST WIRE CONNECTIONS
TM-3

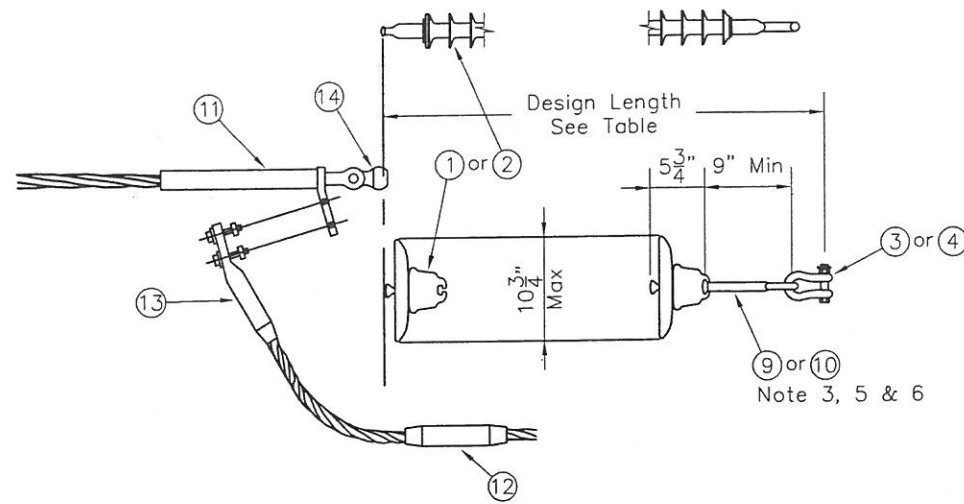
REVISION _____ DATE _____

TM3.DWG

SHEET 1 OF 1

LIST OF MATERIALS

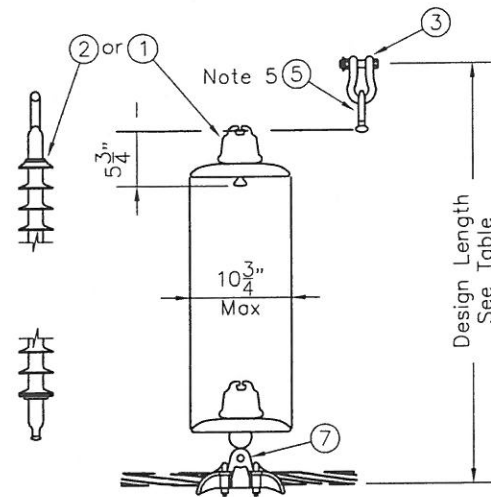
DWG. REF.	QTY	DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
1		Insulator, Suspension, 5 3/4" x 10 3/4" Max	k			
2		Insulator, Suspension, 35kV Polymer, Ball & Eye Connections				
3		Anchor Shackle, 30,000 lb.	bo			
4		Anchor Shackle, 50,000 lb.	bo			
5		Oval Eye, Ball, 30,000 lb.				
6		Oval Eye, Ball, 50,000 lb.				
7		Clamp, Suspension, Socket Eye to 30°	el			
8		Clamp, Suspension, Socket Eye to 60°	el			
9		Link, Extension, Oval Eye, Ball, 30,000 lb.				
10		Link, Extension, Oval Eye, Ball, 50,000 lb.				
11		Clamp, Compression, Deadend	cp			
12		Jumper Connector, Compression	p			
13		Jumper Terminal, Compression 15'				
14		Socket Adapter (Socket Eye or Clevis)	fh			



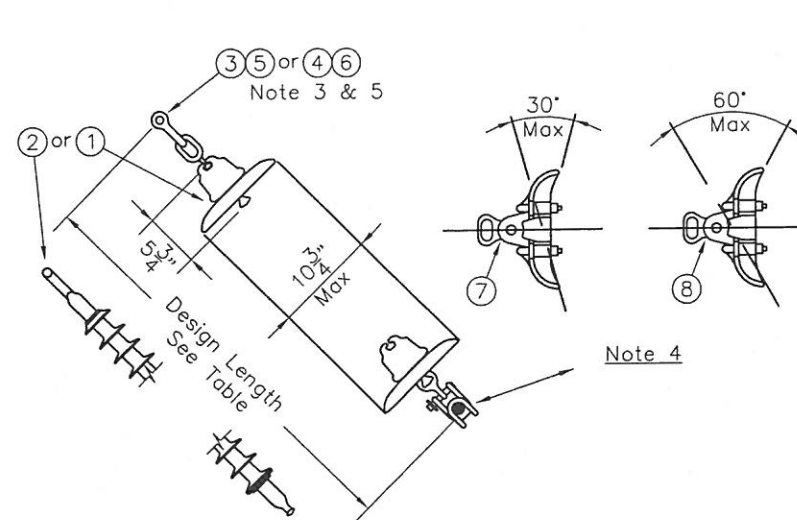
DEADEND ASSEMBLY
TM-1D

Notes:

- Table 1 shall be completed for each project.
- Suitable suspension clamps must be selected for the conductor being used. The following are to be considered: type of conductor, diameter of conductor (considering armor rods and/or liners), etc.
- The capacity of the hardware must be equal to or greater than the M&E strength of the insulator units shown in the table at the right. Use items 4, 6 or 10 for 36,000 lb. insulators.
- Appropriate clamps shall be installed for line angles shown on the plan and profile:
 - For angles from 0 degrees to 30 degrees use dwg. ref. 7.
 - For angles from 30 degrees to 60 degrees use dwg. ref. 8.
- Oval-eye ball adapter and oval-eye ball extension link are not required for polymer insulators.
- The extension link is not required for deadends located on the outside of crossarms. Use an oval eye-ball adapter.



TANGENT ASSEMBLY
TM-1B



ANGLE ASSEMBLY
TM-1C

TABLE 1			
34.5 kV	ASSEMBLY		
	TM-1B TANGENT	TM-1C ANGLE	TM-1D DEADEND
Quantity of Units			
ANSI C29.2, Class			
M & E Strength (lb.)			
Assembly Weight (lb.)			
Design Length (in.)			
Color of Units			

DESIGNER/PROJECT ENGINEER: _____	W.O. #: _____	APPROVED (DIRECTOR) <i>William Bernier</i>	DATE 8/26
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	CERTIFIED BY	DATE

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:
34.5 kV
INSULATOR ASSEMBLIES
INSULATOR STRING WITH SUSPENSION CLAMP
TM-1B, 1C, 1D

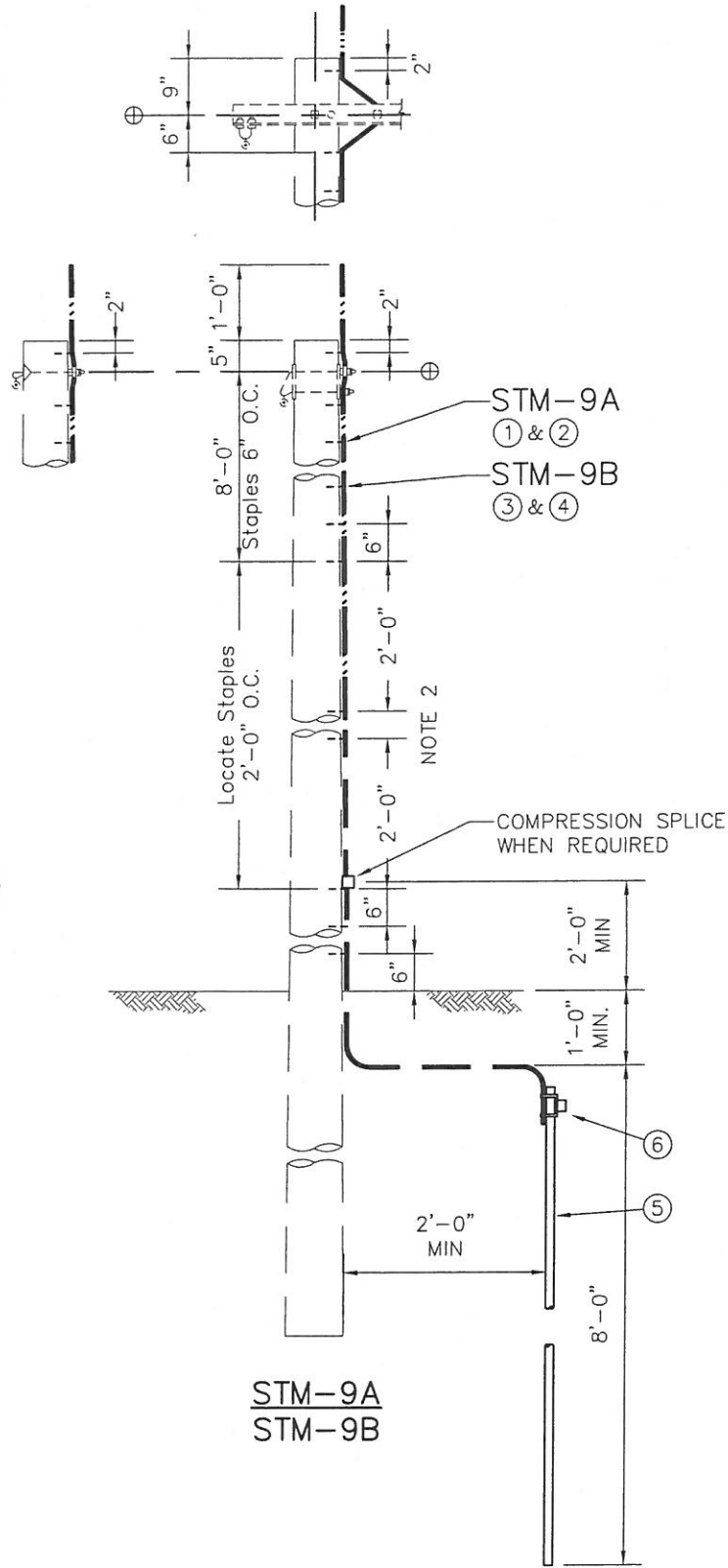
REVISION _____ DATE _____

TM1.DWG

SHEET 1 OF 1

LIST OF MATERIALS

DWG. REF.	STM-9		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	A	B					
1	ft.		5/16" Wire, Soft Annealed Iron	cl			
2	lb.		2" x 1/2" Staples, Galvanized Steel	cl			
3		ft.	#6 or #4 Wire AWG, Copper or Copperclad	cl			
4		lb.	1 1/2" x 3/8" Staples, Copperclad	cl			
5	1	1	Rod, Ground, Steel, 5/8" Dia. Minimum	ai			
6	1	1	Clamp, Ground Rod	aj			



NOTES:

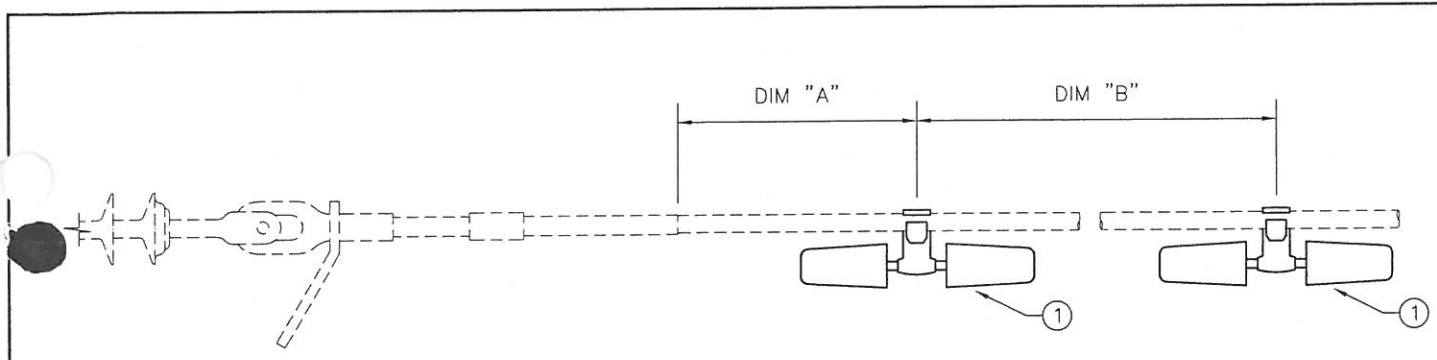
1. On structures with X-Arms, the downlead shall be located and stapled so that it does not come in contact with the X-Arm or the through bolts.
2. Staple the downlead to the pole leaving one foot of wire projecting above the poles. Staples on the downlead shall be 2 feet apart, except for a distance of 8 feet above the ground and 8 feet from the top of the pole where they shall be 6 inches apart.



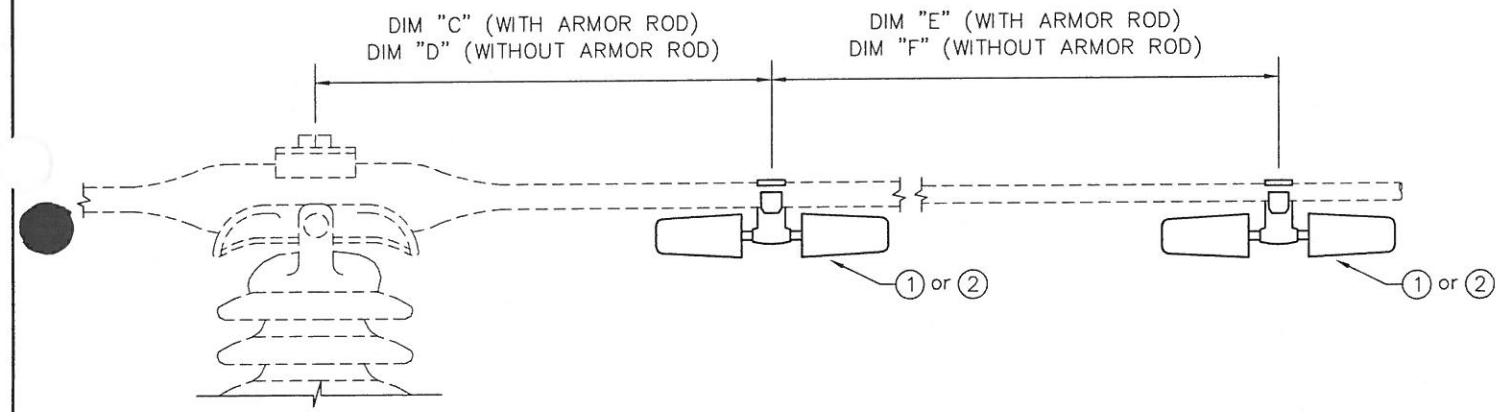
PROJECT:	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER:	<i>William J. Benjamin</i>	8/2/0
DESIGN/CONSTRUCTION/ASBUILT REVISION	CERTIFIED BY	8/3/01
BY/DATE		DATE

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:	34.5 kV GROUNDING ASSEMBLIES POLE GROUND STM-9A, 9B
REVISION	DATE
STM9.DWG	
SHEET 1 OF 1	



VIBRATION DAMPERS – DEAD END
STM-30A-1, -2, -3 (SEE NOTE 2)



VIBRATION DAMPERS
STM-30B-1, -2, -3 (SEE NOTE 2)

LIST OF MATERIALS

DWG. REF.	STM-30		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	A	B					
1	as req'd		Vibration Damper, Sized to fit Bare Conductor				
2	as req'd	as req'd	Vibration Damper, Sized to fit Over Armor Rod				

- NOTES:
- DAMPER LOCATION AND SPACING PER MANUFACTURERS RECOMMENDATIONS.
 - THE SUFFIX ON THE DAMPER UNIT INDICATES THE QUANTITY OF DAMPERS INSTALLED. FOR EXAMPLE, A STM-30A-2 INDICATES TWO DAMPERS INSTALLED AT A DEADEND STRUCTURE.

DAMPER SPACING	
DIMENSION	SPACING
"A"	
"B"	
"C"	
"D"	
"E"	
"F"	

PROJECT: _____		APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER: _____ W.O. # _____		<i>William J. Bernier</i>	8/20/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	CERTIFIED BY	DATE

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV TRANSMISSION LINE STOCKBRIDGE VIBRATION DAMPERS TM-30A, 30B
REVISION	DATE	
		TM-30-__DWG SHEET 1 OF 1

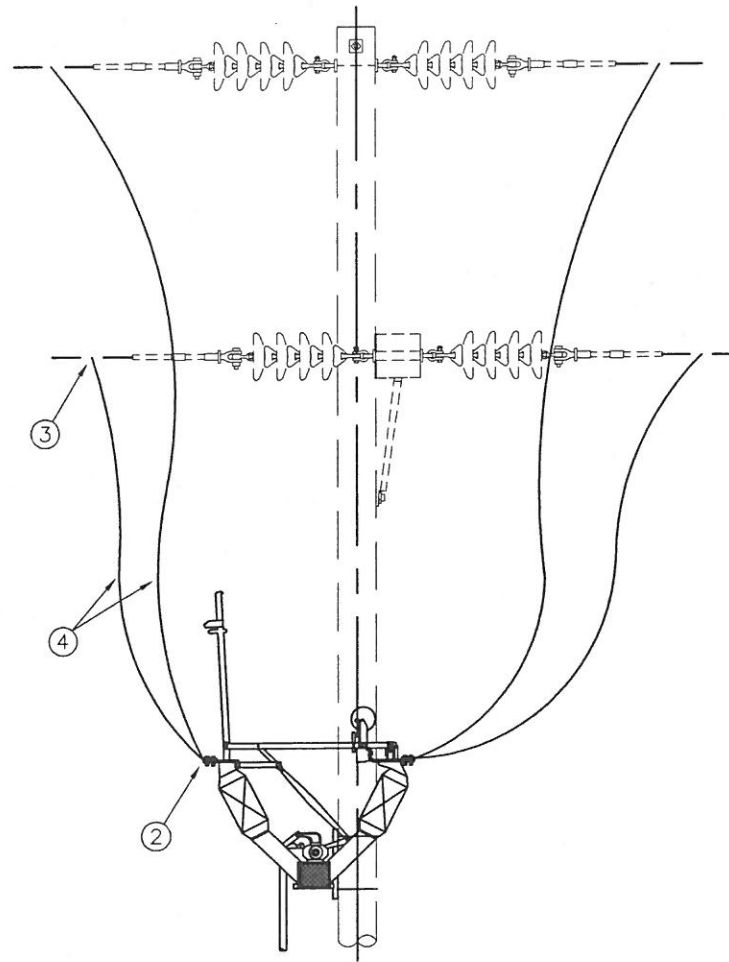
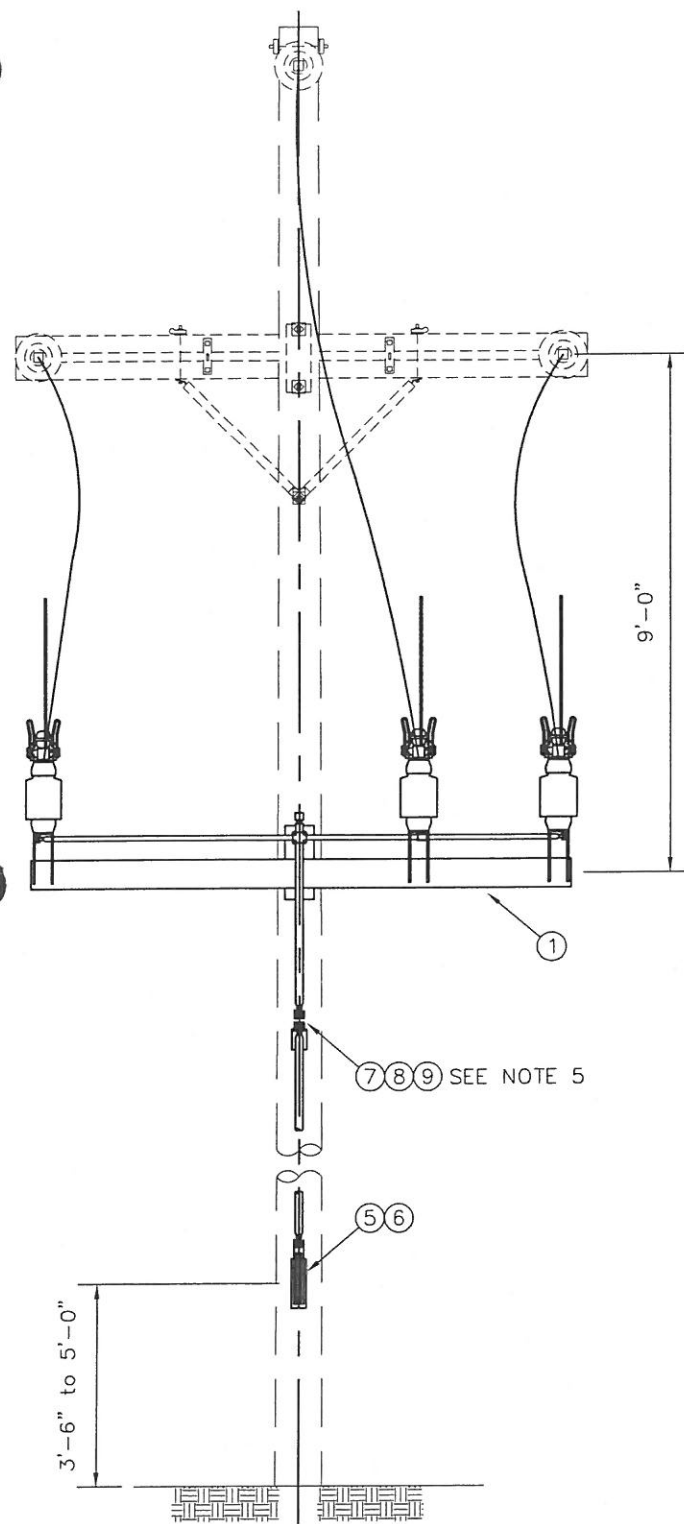
LIST OF MATERIALS

DWG. REF.	QTY	DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
1	1	Switch, Airbreak with Operating Mechanism, Insulating Spacers, Support Arm and Mounting Hardware	cq			
2	6	Connector, NEMA 4-Hole Paddle	p			
3	6	Connector	p			
4	as req'd	Jumpers, BaAlStr, Sized to Match Line Conductor	av			
5	as req'd	Numbers and Letters				
6	1	Padlock, Medium Shank				
7	5 *	Machine Bolt, 5/8", w/ Washer and Nut	c			
8	5 *	Locknut, 5/8", MF Type	ek			
9	5 *	Washer, Curved, 2 1/4" SQ x 3/16", 11/16"ø Hole	d			

* SEE NOTE 5

NOTES:

1. FOR GROUND ASSEMBLY SEE SM2-15.
2. PRIMARY JUMPERS TO MATCH THE LARGEST SOURCE CONDUCTOR.
3. INSTALL SWITCH NUMBERS IN ACCORDANCE WITH SM52-3.
4. INSTALL SWITCH PER MANUFACTURERS REQUIREMENTS.
5. THE NUMBER OF ROD GUIDES WILL DEPEND ON HEIGHT OF SWITCH ABOVE GROUND. SEE MANUFACTURERS INSTRUCTIONS FOR DETAILS.
6. STANDARD SWITCH IS SUPPLIED WITH (2) ROD GUIDES AND (3) SECTIONS OF PIPE. WITH THESE MATERIALS THE BOTTOM OF SWITCH HAS A MAXIMUM ABOVE GROUND HEIGHT OF 36'-5". EACH ADDITIONAL GUIDE USED ADDS A MAXIMUM 10'-4" TO THIS HEIGHT.



PROJECT: _____	APPROVED (DIRECTOR) <i>William J. Bernier</i>	DATE 8/2/01
DESIGNER/PROJECT ENGINEER: _____ W.O. #: _____	CERTIFIED BY <i>William J. Bernier</i>	DATE 8/30/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	

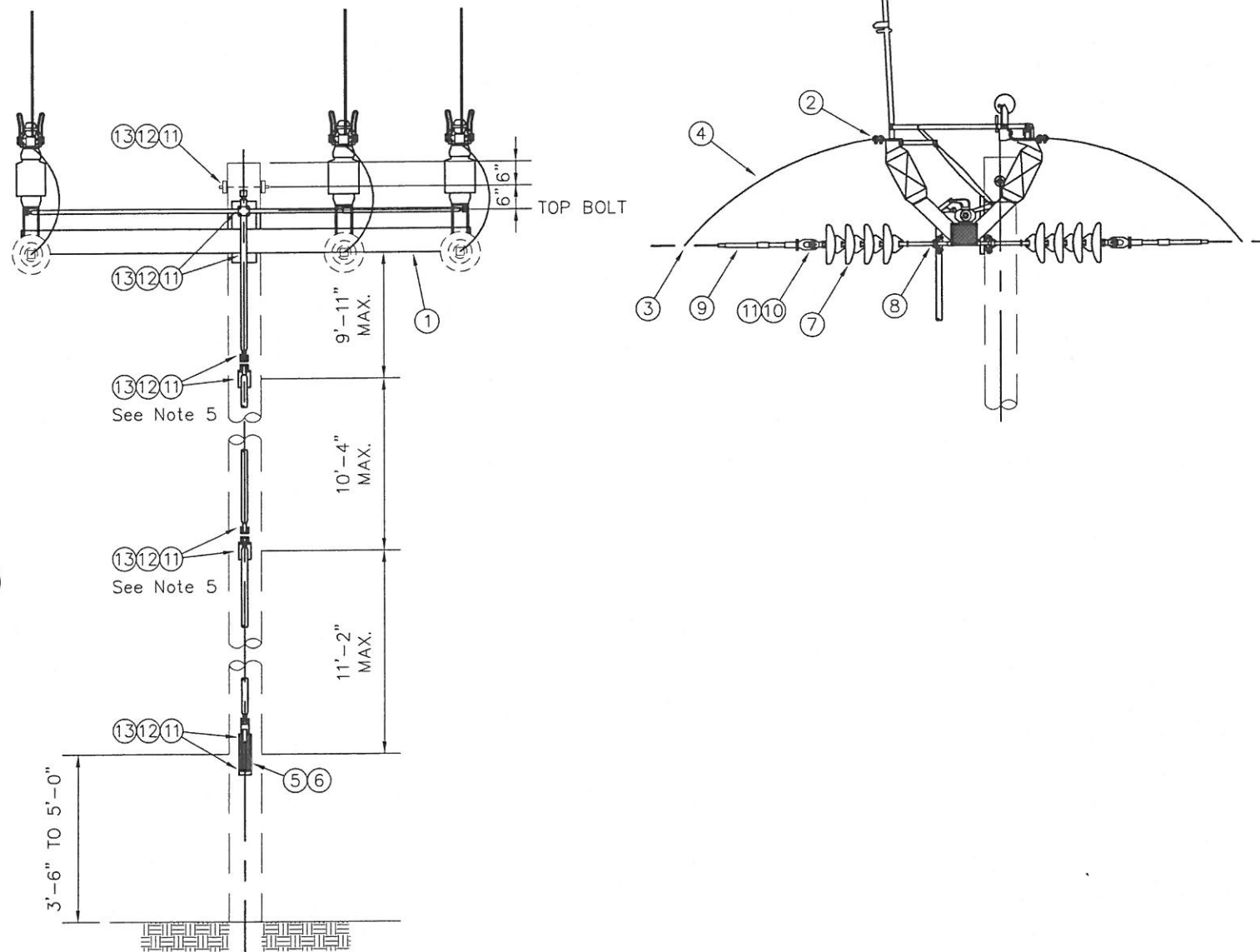
CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:	34.5 kV TRANSMISSION LINE STRUCTURE SECTIONALIZING AIR BREAK SWITCH TM3-15
REVISION	DATE

LIST OF MATERIALS

DWG. REF.	QTY	DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
1	1	Switch, Airbreak with Operating Mechanism, Insulating Spacers, Support Arm and Mounting Hardware	ca			
2	6	Connector, NEMA 4-Hole Paddle	p			
3	6	Connector	p			
4	as req'd	Jumpers, BaAlStr, Sized to Match Line Conductor	av			
5	as req'd	Numbers and Letters				
6	1	Padlock, Medium Shank				
7	24	Insulator, Suspension, 10" Ball & Socket, 30,000 lbs.	k			
8	6	Y-Clevis Ball, Hot Line, 35,000 lb				
9	6	Deadend, Compression	cp			
10	6	Socket Adapter, Clevis				
11	5 *	Machine Bolt, 5/8", w/ Washer and Nut	c			
12	5 *	Locknut, 5/8", MF Type	ek			
13	5 *	Washer, Curved, 2 1/4" SQ x 3/16", 11/16" ø Hole	d			

* See Note 5



NOTES:

1. FOR GROUND ASSEMBLY SEE SM2-15.
2. PRIMARY JUMPERS TO MATCH THE LARGEST SOURCE CONDUCTOR.
3. INSTALL SWITCH NUMBERS IN ACCORDANCE WITH SM52-3.
4. INSTALL SWITCH PER MANUFACTURERS REQUIREMENTS.
5. THE NUMBER OF ROD GUIDES WILL DEPEND ON HEIGHT OF SWITCH ABOVE GROUND. SEE MANUFACTURERS INSTRUCTIONS FOR DETAILS.
6. STANDARD SWITCH IS SUPPLIED WITH (2) ROD GUIDES AND (3) SECTIONS OF PIPE. WITH THESE MATERIALS THE BOTTOM OF SWITCH HAS A MAXIMUM ABOVE GROUND HEIGHT OF 36'-5". EACH ADDITIONAL GUIDE USED ADDS A MAXIMUM 10'-4" TO THIS HEIGHT.



PROJECT:	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER:	<i>William J. Bennison</i>	8/2/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	CERTIFIED BY	DATE

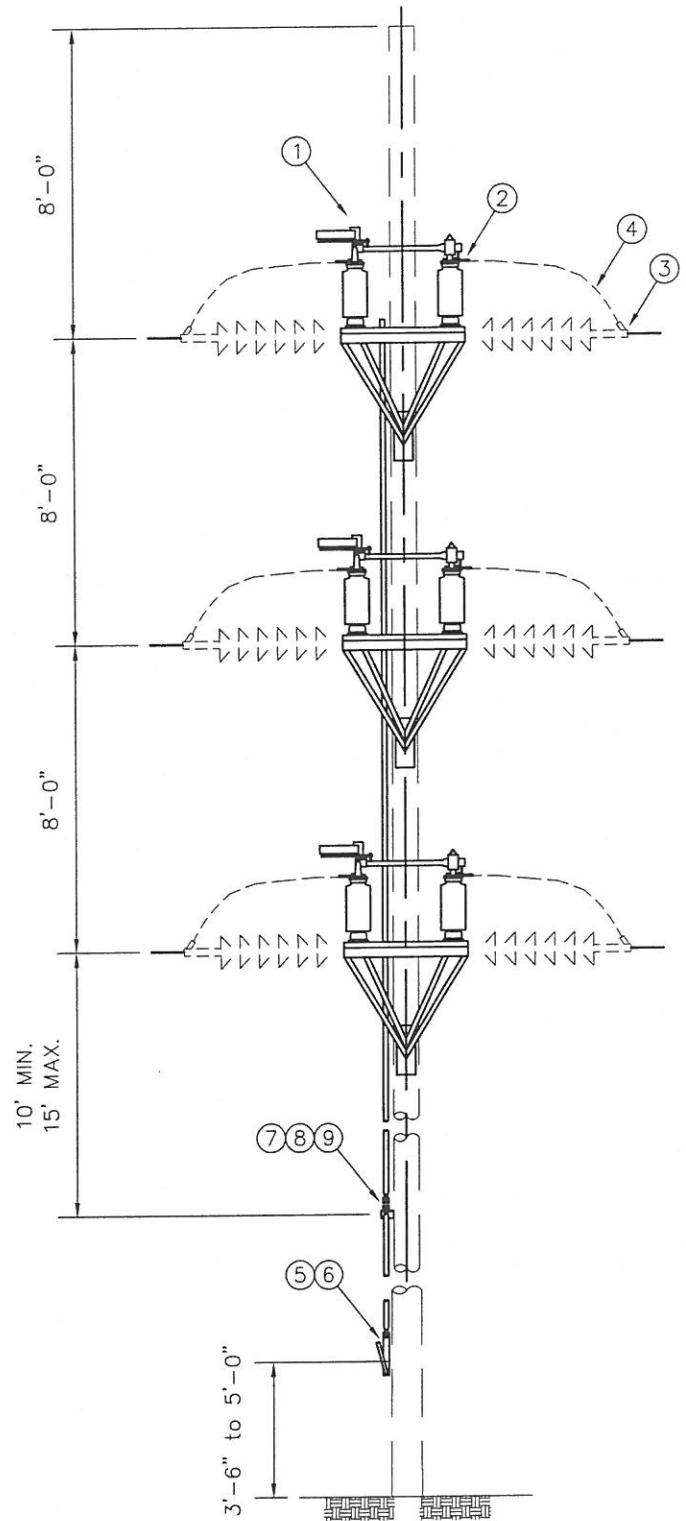
CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV TRANSMISSION LINE STRUCTURE SECTIONALIZING AIR BREAK SWITCH TM3-15A
REVISION	DATE	
		TM3-15A.DWG SHEET 1 OF 1

LIST OF MATERIALS

DWG. REF.	QTY	DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
1	1	Switch, Airbreak with Operating Mechanism, Insulating Spacers, Support Arm and Mounting Hardware	ca			
2	6	Connector, NEMA 4-Hole Paddle	p			
3	6	Connector	p			
4	as req'd	Jumpers, BaAlStr, Sized to Match Line Conductor	av			
5	as req'd	Numbers and Letters				
6	1	Padlock, Medium Shank				
7	5 *	Machine Bolt, 5/8", w/ Washer and Nut	c			
8	5 *	Locknut, 5/8", MF Type	ek			
9	5 *	Washer, Curved, 2 1/4" SQ x 3/16", 11/16"ø Hole	d			

* SEE NOTE 5



NOTES:

1. FOR GROUND ASSEMBLY SEE SM2-15.
2. PRIMARY JUMPERS TO MATCH THE LARGEST SOURCE CONDUCTOR.
3. INSTALL SWITCH NUMBERS IN ACCORDANCE WITH SM52-3.
4. INSTALL SWITCH PER MANUFACTURERS REQUIREMENTS.
5. THE NUMBER OF ROD GUIDES WILL DEPEND ON HEIGHT OF SWITCH ABOVE GROUND. SEE MANUFACTURERS INSTRUCTIONS FOR DETAILS.
6. STANDARD SWITCH IS SUPPLIED WITH (2) ROD GUIDES AND (3) SECTIONS OF PIPE. WITH THESE MATERIALS THE BOTTOM OF SWITCH HAS A MAXIMUM ABOVE GROUND HEIGHT OF 36'-5". EACH ADDITIONAL GUIDE USED ADDS A MAXIMUM 10'-4" TO THIS HEIGHT.



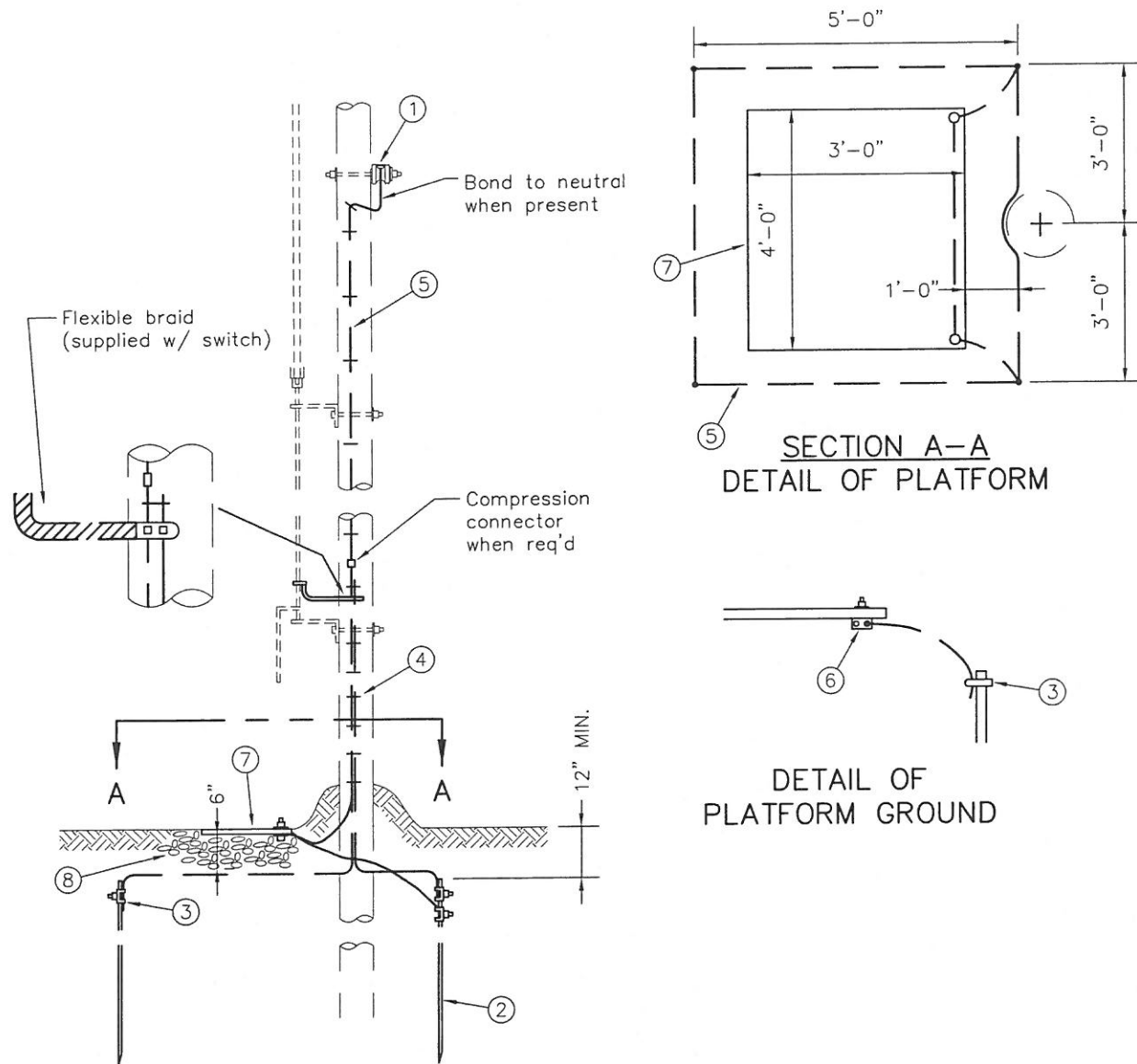
OBJECT:	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER:	<i>William J. Bernier</i>	8/2/10
DESIGN/CONSTRUCTION/ASBUILT REVISION	CERTIFIED BY	DATE

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:	34.5 kV TRANSMISSION LINE STRUCTURE SECTIONALIZING AIR BREAK SWITCH (VERTICAL) TM3-15B
REVISION	DATE

LIST OF MATERIALS

DWG. REF.	QTY	DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
1	as req'd	Connector, Compression, as req'd	p			
2	4	Rod, Ground, 5/8" x 8'-0"	oi			
3	6	Clamp, Ground Rod	oi			
4	as req'd	Staples	ol			
5	as req'd	Ground Wire, #2AWG BaCuStr	av			
6	2	Connector, Grounding, with Lockwasher	dp			
7	1	Grounding Plate, Galv. Steel, 4'-0" x 3'-0"				Enterprise GM-100
8	1/2	Gravel, Crushed, 5/8" Asphalt (Cu. Yd.)				



OBJECT:	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER:	<i>William J. Bernier</i>	8/26
DESIGN/CONSTRUCTION/ASBUILT REVISION	CERTIFIED BY	8/31/0
BY/DATE		DATE

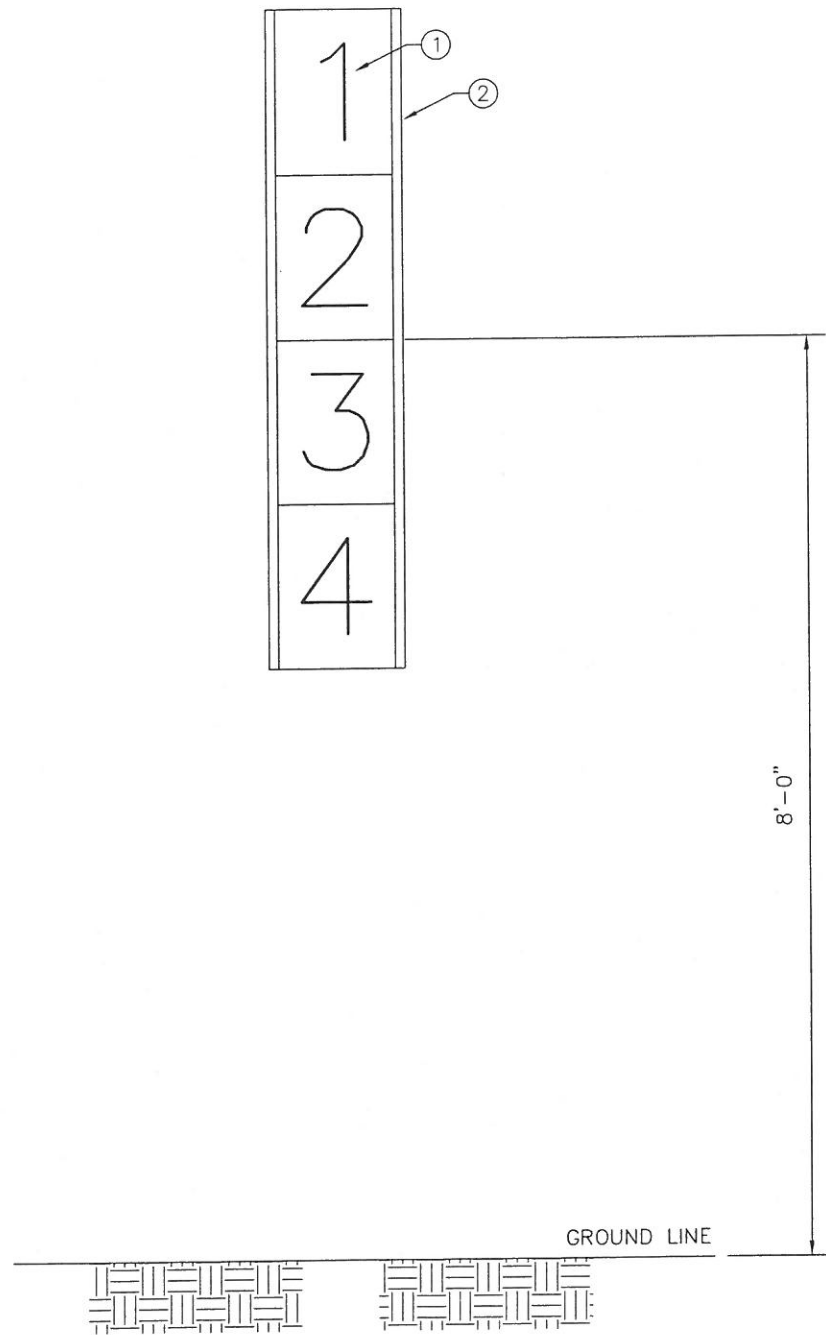
CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV GROUNDING ASSEMBLY PLATFORM TYPE FOR SECTIONALIZING AIR BREAK SWITCH SM2-15
REVISION	DATE	
		SHEET 1 OF 1

SM2-15.DWG

LIST OF MATERIALS

DWG. REF.	QTY	DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
1	as req'd	Pole Decal/Number, 2" High				
2	1	Pole Number Base Plate				



NOTES:

1. The reflectorized numbers and letters shall be attached to LEXAN plastic baseplate and fastened to the pole with aluminum, barbed 1" nails.
2. On poles having limited climbing space due to special equipment, the pole numbers should be located as to leave the climbing space quadrant unobstructed.
3. Pole location numbers to be staggered 30' from direct facing the roadway. When line crosses the roadway or railroad the numbers should face the same.
4. Switch numbers shall be placed adjacent to the switch operating rod and prefixed with the letters 'LS'.

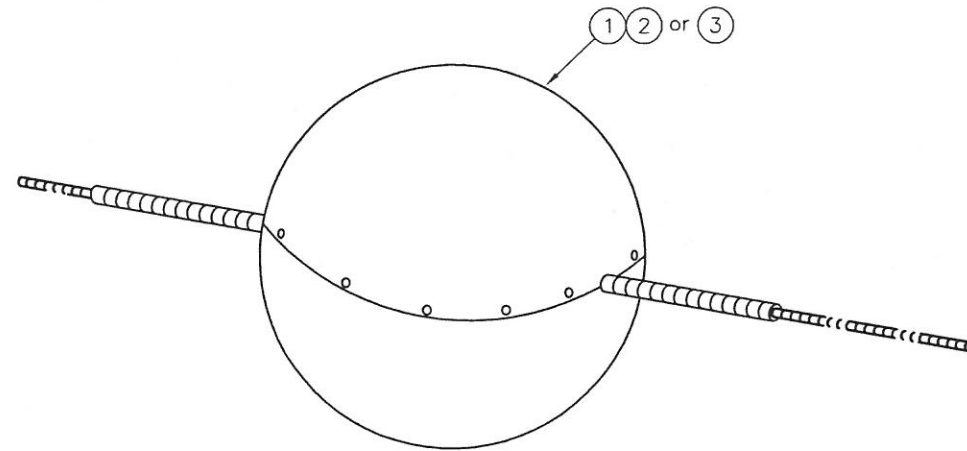
PROJECT:	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER:	<i>William J. Bernier</i>	8/2/01
W.O. #:	CERTIFIED BY	DATE
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	

CHUGACH
 POWERING ALASKA'S FUTURE
 Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV TRANSMISSION LINE POLE NUMBERING GUIDE SM52-3
REVISION	DATE	
		SM52-3.DWG
		SHEET 1 OF 1

LIST OF MATERIALS

DWG. REF.	STMS-				DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	1	2	2A						
	QTY	QTY	QTY	QTY					
1	1				Sphere, 20" Dia., Wire Size _____				
2		1			Sphere, 36" Dia., Wire Size _____				
3			1		Lighted Sphere, 36" Dia., Wire Size _____				



NOTES:

1. LOCATION & COLOR SPECIFIED ON STRUCTURE SHEETS AND PROJECT DRAWINGS.
2. SIZE OF CONDUCTOR REQUIRED FOR SPECIFIC PRODUCT NUMBERS.
3. SIZE AND NUMBER OF WARNING BALLS MUST BE FAA APPROVED. REF CURRENT FAA ADVISORY CIRCULAR AC 70/7460 1K.



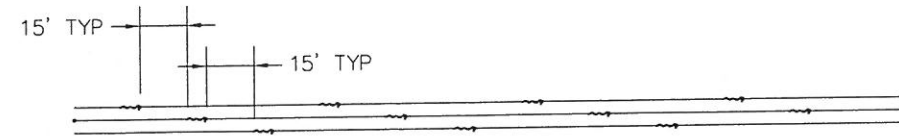
PROJECT: _____	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER: _____ W.O. #: _____	<i>William J. Bernier</i>	8/2/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	CERTIFIED BY	DATE

CHUGACH
 POWERING ALASKA'S FUTURE
 Chugach Electric Association, Inc.

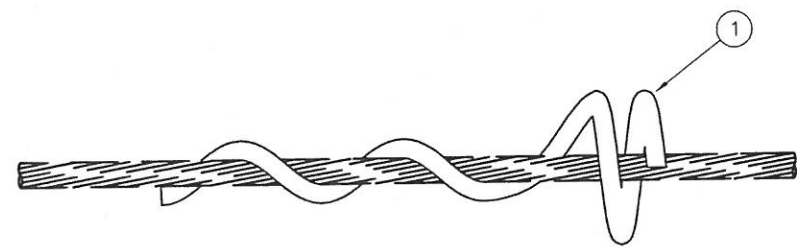
DRAWING NAME:	34.5 kV TRANSMISSION LINE CONDUCTOR MARKER TMS-1, 2, 2A	TMS_.DWG
REVISION	DATE	SHEET 1 OF 1

LIST OF MATERIALS

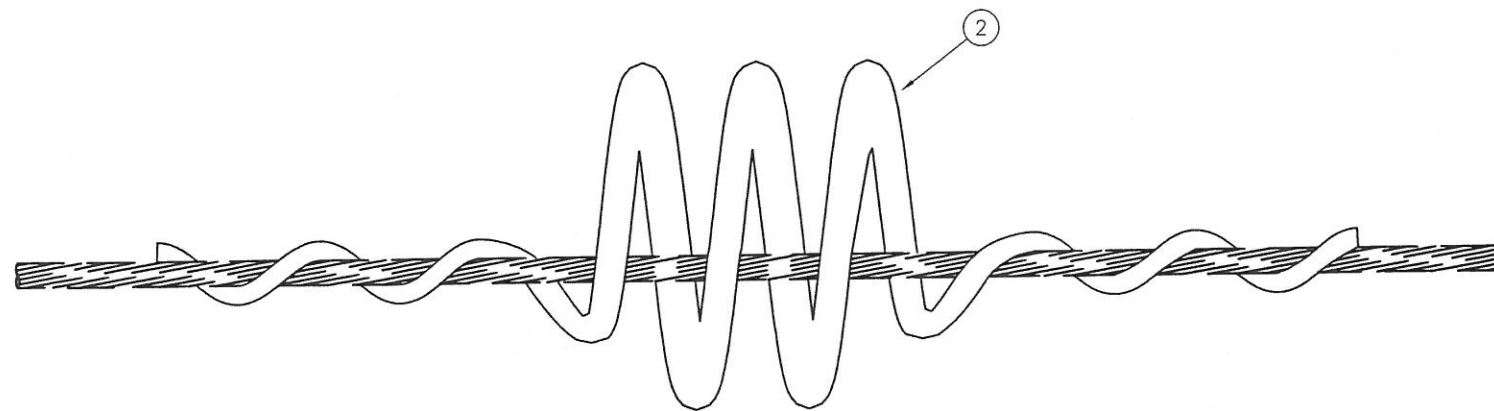
DWG. REF.	TMS-		DESCRIPTION	ITEM	DETAIL	CEA PART No.	CATALOG No.
	3A	3B					
1	as req'd		Bird Flight Diverter				
2		as req'd	Swan Flight Diverter				



PLAN



TMS-3A



TMS-3B

NOTES:

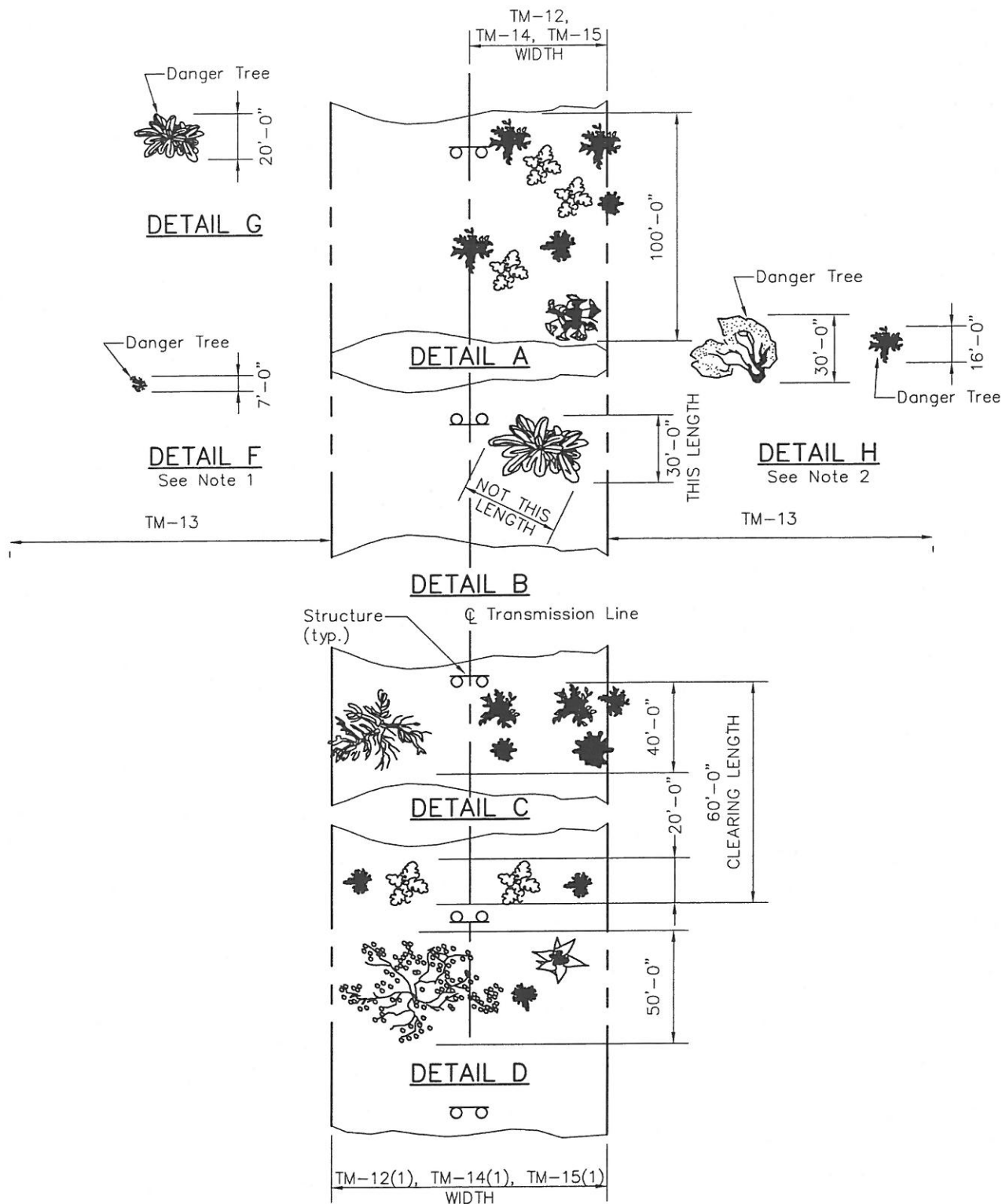
1. Spacing between Bird Flight Diverter's and Swan Flight Diverter's is 15'.
2. Size of conductor required for specific product numbers



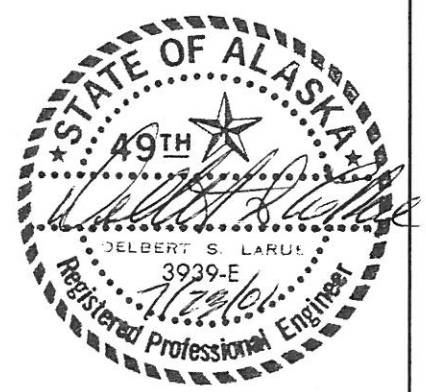
PROJECT:	DESIGNER/PROJECT ENGINEER:	W.O. #:	APPROVED (DIRECTOR):	DATE:
			<i>William J. Bernier</i>	8/2/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	CERTIFIED BY	DATE	

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV TRANSMISSION LINE BIRD FLIGHT DIVERTERS TMS-3A, 3B
REVISION	DATE	
		TMS3.DWG
		SHEET 1 OF 1



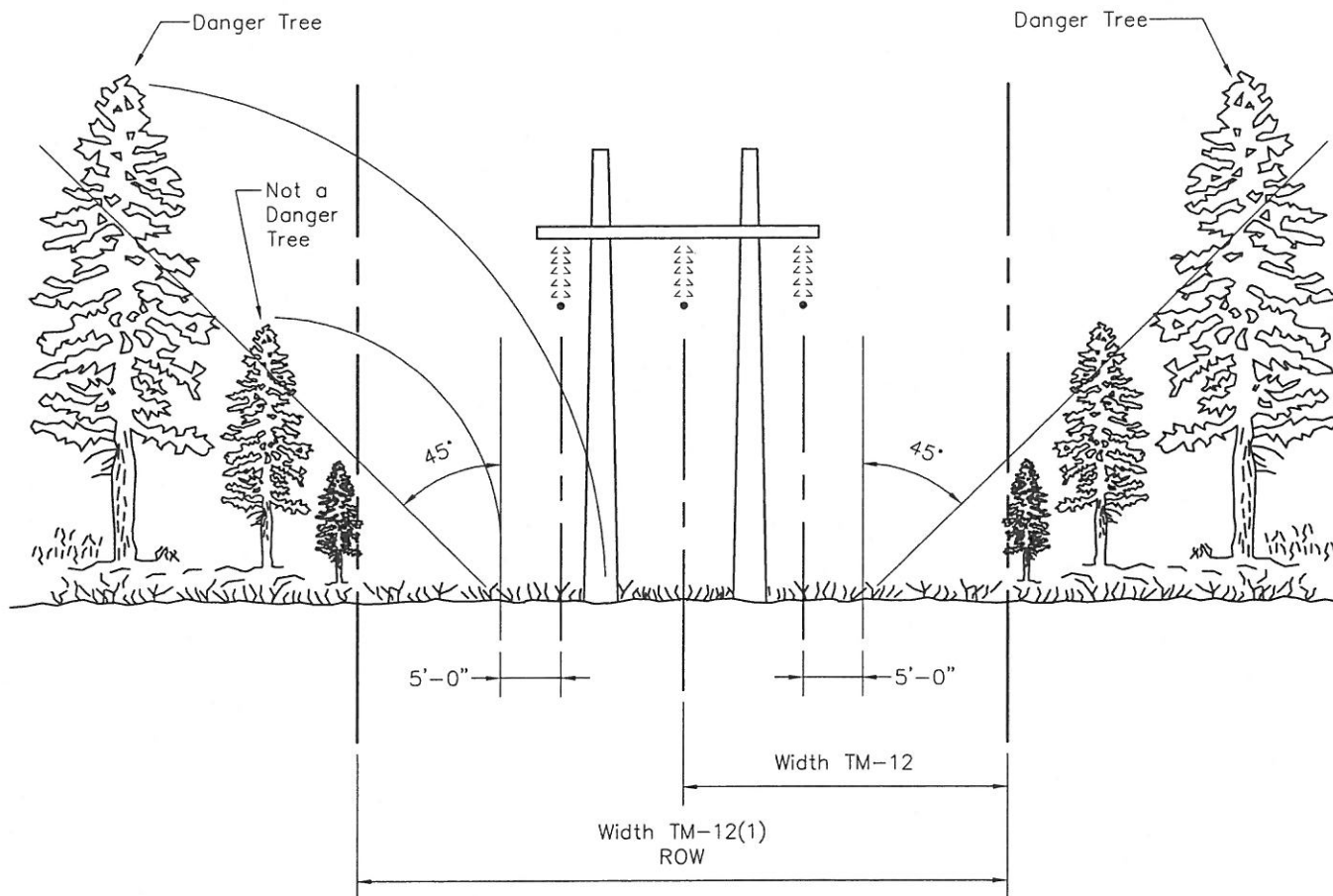
- NOTES:**
1. Dead tree dimension of 7'-0" is multiplied by 2 in computing unit.
 2. Each danger tree is considered separately. Unit length for detail "H" is 46'-0" (30' + 16'). Danger trees are TM-13 units.
 3. Dimensions shown are examples.
 4. TM-12: Right-Of-Way clearing guide, see drawing TM-12.
 TM-13: Danger Tree unit, see drawing TM-12, TM-14 or TM-15.
 TM-14: Feathered/Undulated Clearing, see drawing TM-14.
 TM-15: Feathered/Clear-cut clearing, see drawing TM-15.



PROJECT:	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER:	<i>William Bernin</i>	8/20
W.O. #:	CERTIFIED BY	8/30/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	DATE

CHUGACH
 POWERING ALASKA'S FUTURE
 Chugach Electric Association, Inc.

DRAWING NAME:		34.5 kV TRANSMISSION ROW CLEARING GUIDE FOR MEASURING RIGHT-OF-WAY CLEARING UNITS TM-11
REVISION	DATE	



NOTES:

1. Engineer will designate all danger trees which shall be removed or topped at option of contractor. In approximately level terrain, trees which would reach within 5 feet of a point underneath the outside conductor in falling are examples of danger trees.
2. As directed by the engineer, portions of the right-of-way (ROW) must be cut so that stumps will not prevent the passage of tractor and trucks along the ROW.
3. The unit for clearing one-half of the ROW is "WIDTH TM-12."
4. The unit for clearing the full ROW is "WIDTH TM-12(1)."
5. The unit for clearing danger trees is "TM-13."



PROJECT:	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER:	<i>William J. Bermin</i>	8/2/11
W.O. #:	CERTIFIED BY	DATE
DESIGN/CONSTRUCTION/ASBUILT REVISION		
BY/DATE		

CHUGACH
POWERING ALASKA'S FUTURE

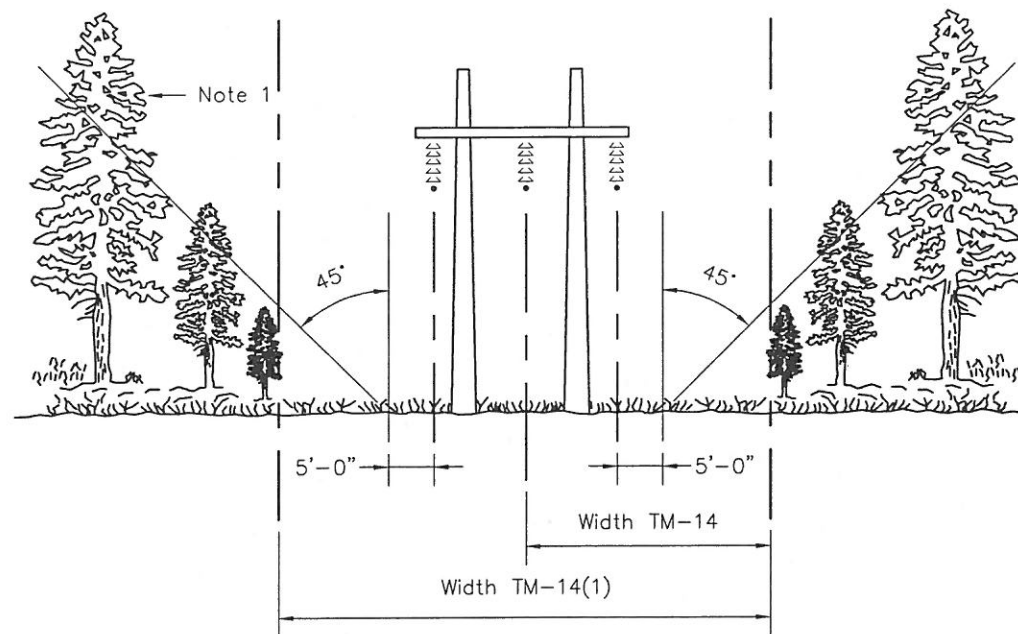
Chugach Electric Association, Inc.

DRAWING NAME:
34.5 kV
TRANSMISSION ROW CLEARING
RIGHT-OF-WAY CLEARING GUIDE
TM-12, 12(1), 13

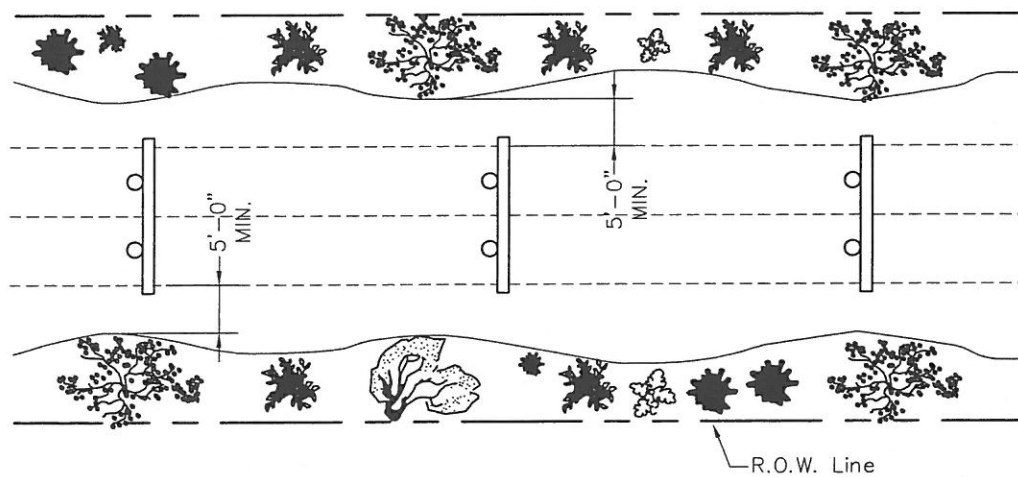
REVISION DATE

TM12.DWG

SHEET 1
OF 1



FEATHERED CLEARING



PLAN VIEW

NOTES:

1. Engineer shall designate all danger trees which are to be removed or topped. The unit for clearing danger trees is "TM-13."
2. The unit for clearing right-of-way of specified width is "TM-14" or "TM-14(1)."



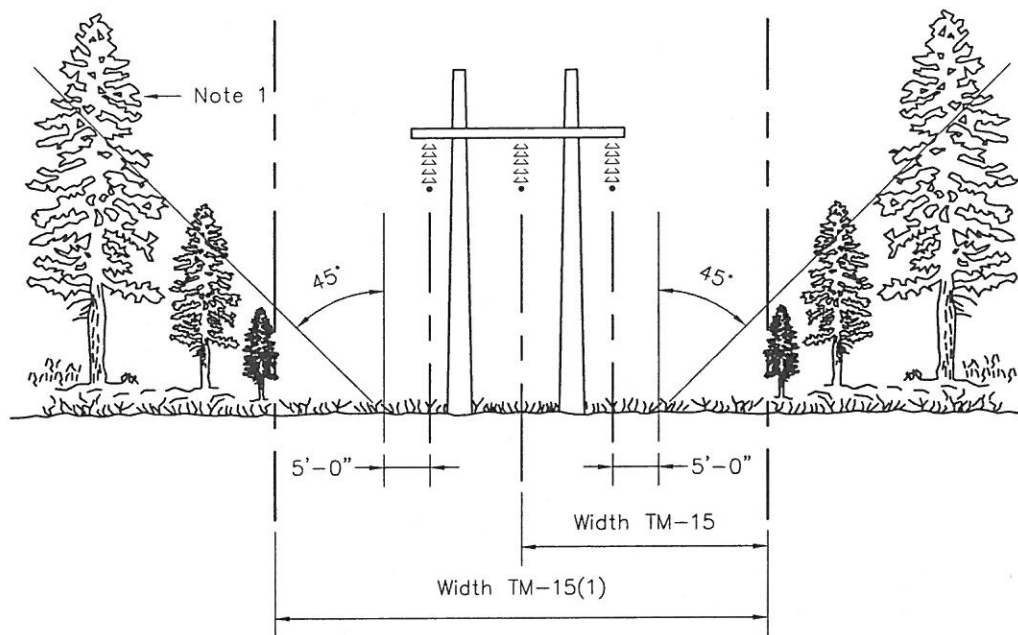
PROJECT:	DESIGNER/PROJECT ENGINEER:	W.O. #:	APPROVED (DIRECTOR)	DATE
			<i>William J. Bernier</i>	8/26
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	CERTIFIED BY		DATE

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

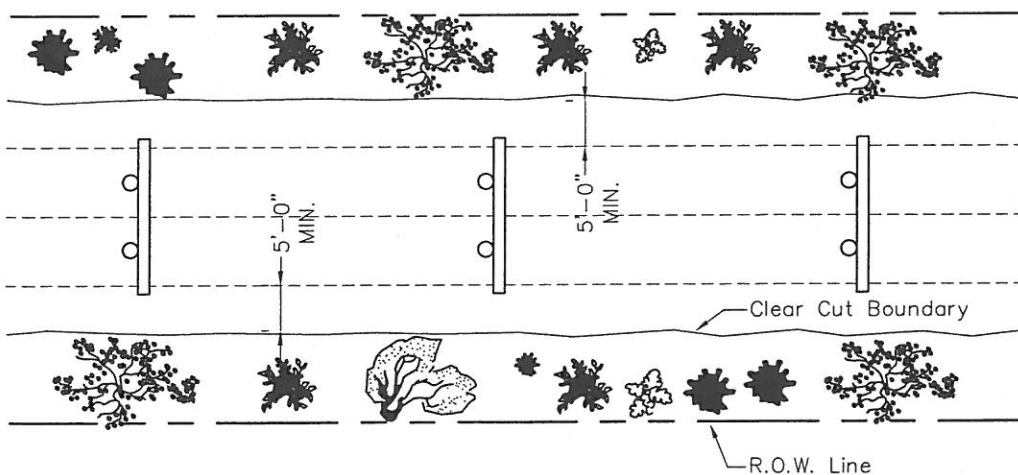
DRAWING NAME:	34.5 kV TRANSMISSION ROW CLEARING FEATHERED/UNDULATED CLEARING TM-14, 14(1), 13
REVISION	DATE

TM14.DWG

SHEET 1 OF 1



FEATHERED CLEARING



PLAN VIEW

NOTES:

1. Engineer shall designate all danger trees which are to be removed or topped. The unit for clearing danger trees is "TM-13."
2. The unit for clearing right-of-way of specified width is "TM-15" or "TM-15(1)."



PROJECT:	APPROVED (DIRECTOR)	DATE
DESIGNER/PROJECT ENGINEER:	<i>William Bernier</i>	8/2/01
W.O. #:	CERTIFIED BY	8/13/01
DESIGN/CONSTRUCTION/ASBUILT REVISION	BY/DATE	DATE

CHUGACH
POWERING ALASKA'S FUTURE
Chugach Electric Association, Inc.

DRAWING NAME:	34.5 kV TRANSMISSION ROW CLEARING FEATHERED/CLEAR-CUT CLEARING TM-15, 15(1), 13
REVISION	DATE