

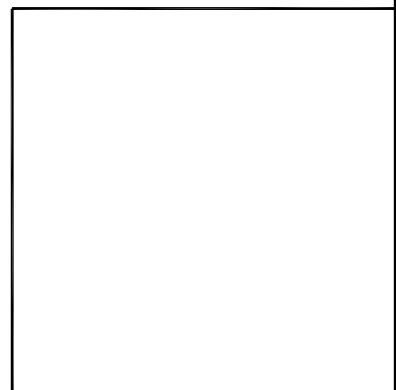
Overhead Transmission Lines (35kV and above) installed with a static wire require every structure to be grounded in accordance with the grounding standards. The top of each ground rod is to be located at a depth below the frost line. Two reasons being that the moisture in the ground is more stable at greater depths and there is less deviation in the system's contact resistance when below the frost line (stable temperature). The minimum depth from top of ground rod to the surface is 3' in New York and 4' in Maine. If the minimum depth cannot be obtained for reasons such as rock interference then the actual depth must be documented on the record document TM2.23.TG-09-001 for wood poles or TM2.23.TG-09-002 for steel poles.

The desirable maximum value to achieve for ground resistance at each structure is 25 ohms. If 25 ohms is not obtained with one ground rod, then up to 3 additional ground rods shall be installed, in-line spacing of at least 10' apart. Refer to standard TM2.23.TG-01-002 for single pole applications and standard TM2.23.TG-01-003 for double pole applications. If the new measured resistance is above 35 ohms, then the structure grounding is to be improved with additional measures:

- For span lengths 500' and less, a counterpoise is to be installed to the next structure. The counterpoise should be installed to the adjacent structure that has the lower resistance. Refer to standard TM2.23.TG-01-004 for single pole applications and standard TM2.23.TG-01-005 for double pole applications. Counterpoising should not be used where it must cross a road, regulated wetland, stream or navigable waterway. The counterpoise shall be installed at least 2' from grade. Record the new structure resistance after the counterpoise has been installed. In cases where the counterpoise cannot be installed, then refer to the standard for radial type grounding system.
- For span lengths 500' and more, a radial type grounding system shall be installed. Refer to standard TM2.23.TG-01-006 for single pole applications and standard TM2.23.TG-01-007 for double pole applications. Ground rods are to be installed every 20' with the wire extending 60' out from the structure. As shown in the standard, each extended wire is to be approximately 45° to the R/W. Record the new structure resistance after the radial ground system has been installed. If the R/W width is too narrow or the wire cannot extend 60' for any reason, then the wire shall extend as far as it can within the R/W with 2 ground rods installed equal distance from the structure.


The overhead ground wire or OPGW shall tie into the substation ground grid at both ends and at each tap location. If the static wire or OPGW does not terminate inside the station, then a counterpoise must be installed from the last structure with a static wire or OPGW and tie into the substation ground grid.

IF SOIL CONDITIONS PREVENTS INSTALLATION OF ANY OF THESE GROUNDING METHODS, CONTACT ELECTRIC SYSTEM ENGINEERING - TRANSMISSION SECTION FOR ASSISTANCE.



Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: N/A

	IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL	TRANSMISSION GROUNDING GROUNDING PROCEDURE				Revision
						01
						DATE
						11/10/2015
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:	<b>TM2.23.TG-01-001</b>
L.A. Best	2/3/2015	Gauvin/Becken/Hart	11/10/2015	Barry R. Hart	11/10/2015	
						Sheet 1

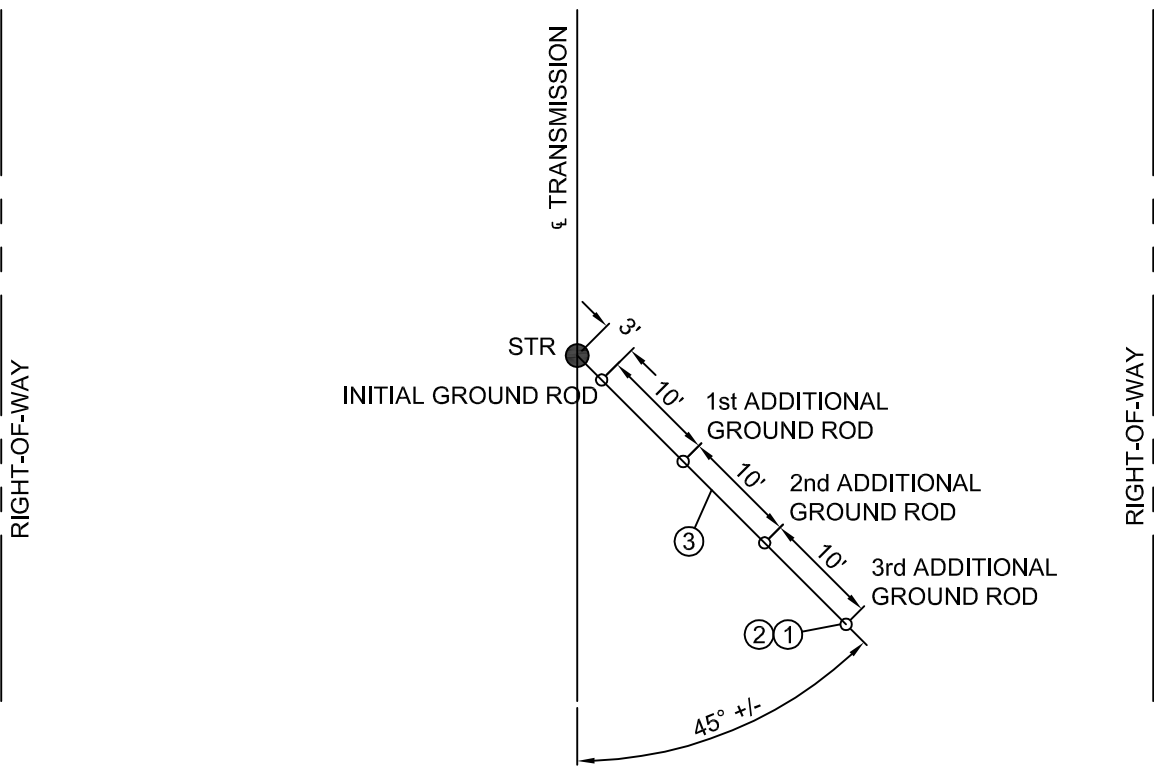
THIS IS A COMPUTER GENERATED DRAWING - DO NOT REVISE MANUALLY

ANSI A 8-1/2" X 11"

**BILL OF MATERIAL**

CU Type: UC\_SHLDO

ITEM NO.	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-01-002
1	3	ST	30925441	CLAMP GRND FOR 5/8 IN ROD
1	3	ST	30923789	ROD GRND CWLD 5/8 X 8 FT NO THREADS
1	31	FT	30924223	WIRE 1C # 2 CWLD SOL BARE



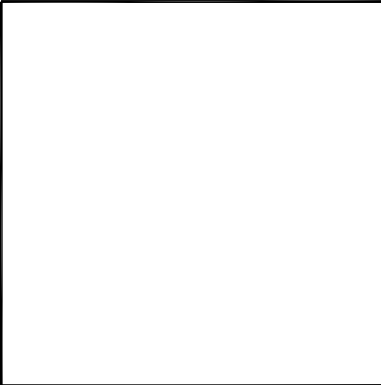
**NOTE A:**

Install 1 ground rod a maximum of 3' away from structure according to standard TM2.23.TG-02-001 for a single steel pole or TM2.23.TG-02-002 for a single wood pole and record ground resistance. If resistance is more than 25 ohms, then install 3 additional ground rods spaced at least 10' apart as shown. Install grounds at approximately 45° to the centerline of the transmission line. Record the new ground resistance of the structure.

**CU Function:**

U\_TL69 for 35kV & 46kV, U\_TG69 for 69kV through 344kV, U\_T345 for 345kV & greater.

For correct CU: substitute 2 for NYSEG, 3 for CMP or 4 for RG&E in place of asterisk (U\*\_).



Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: 1" = 200



IBERDROLA USA  
TRANSMISSION  
CONSTRUCTION  
STANDARDS  
MANUAL

TRANSMISSION GROUNDING  
ADDITIONAL GROUNDING  
SINGLE POLE STRUCTURE

Revision	01
DATE	11/10/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
L.A. Best	2/3/2015	Gauvin/Becken/Hart	11/10/2015	Barry R. Hart	11/10/2015

**TM2.23.TG-01-002**

Sheet 1

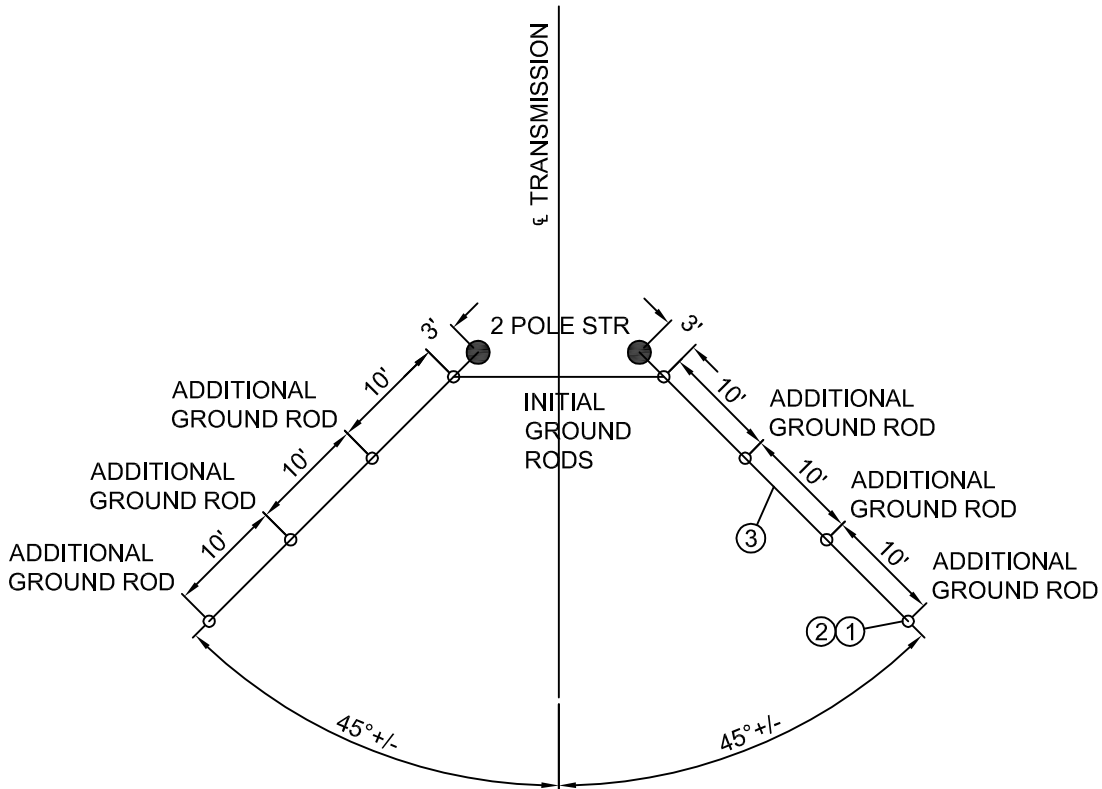
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ANSI A  
8-1/2" X 11"

**BILL OF MATERIAL**

CU Type: UC\_SHLDO

ITEM NO.	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-01-003
1	6	ST	30925441	CLAMP GRND FOR 5/8 IN ROD
1	6	ST	30923789	ROD GRND CWLD 5/8 X 8 FT NO THREADS
1	62	FT	30924223	WIRE 1C # 2 CWLD SOL BARE



**NOTE A:**

Install 1 ground rod a maximum of 3' away from each pole of the structure and tie the 2 structure grounds together according to standard TM2.23.TG-02-004 for a two wood pole and record ground resistance. If resistance is more than 25 ohms, then install 3 additional ground rods at each pole of the structure spaced at least 10' apart as shown. Install grounds at approximately 45° to the centerline of the transmission line. Record the new ground resistance of the structure.

**CU Function:**

U\_TL69 for 35kV & 46kV, U\_TG69 for 69kV through 344kV, U\_T345 for 345kV & greater.

For correct CU: substitute 2 for NYSEG, 3 for CMP or 4 for RG&E in place of asterisk (U\*\_).

Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: 1" = 200



IBERDROLA USA  
TRANSMISSION  
CONSTRUCTION  
STANDARDS  
MANUAL

TRANSMISSION GROUNDING  
ADDITIONAL GROUNDING  
TWO POLE STRUCTURE

Revision

01

DATE

11/10/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
L.A. Best	2/3/2015	Gauvin/Becken/Hart	11/10/2015	Barry R. Hart	11/10/2015

**TM2.23.TG-01-003**

Sheet 1

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ANSI A  
8-1/2" X 11"

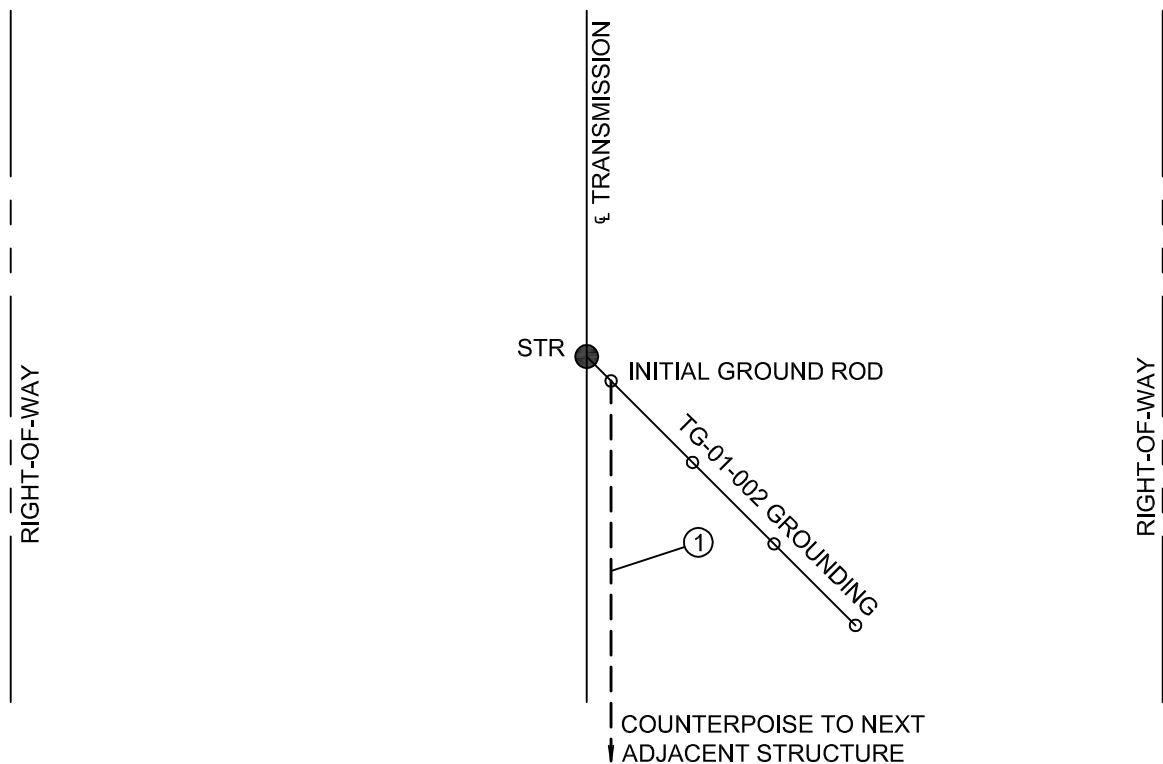
**BILL OF MATERIAL**

CU Type: UC\_SHLDO

ITEM NO.	QTY	UOM	GLOBAL IUSA MID	
1	500 **	FT	30924223	WIRE 1C # 2 CWLD SOL BARE

CU: U\*CT-TG-01-004

\*\* 500' USED AS GENERIC LENGTH IN CU.  
COUNTERPOISE SPAN LENGTH WILL BE  
FIELD DETERMINED FOR ITEM 1 QUANTITY.



**NOTE A:**

If standard TM2.23.TG-01-002 grounding measures over 35 ohms, then install counterpoise for spans less than 500'. Tie to the next adjacent structures ground system. If feasible, choose the structure with the lowest ground resistance. Counterpoise should not cross roadways, regulated wetlands and streams, or waterways. If counterpoising is not feasible, then refer to standard TM2.23.TG-01-006 for radial ground system. Record the new ground resistance of the structure.

**CU Function:**

U\_TL69 for 35kV & 46kV, U\_TG69 for 69kV through 344kV, U\_T345 for 345kV & greater.

For correct CU: substitute 2 for NYSEG, 3 for CMP or 4 for RG&E in place of asterisk (U\*\_).

Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: 1" = 200

	IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL	TRANSMISSION GROUNDING ADDITIONAL GROUNDING - COUNTERPOISE SINGLE POLE STRUCTURE				Revision
						01
						DATE
						11/10/2015
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:	<b>TM2.23.TG-01-004</b>
L.A. Best	2/3/2015	Gauvin/Becken/Hart	11/10/2015	Barry R. Hart	11/10/2015	
						Sheet 1

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ANSI A 8-1/2" X 11"

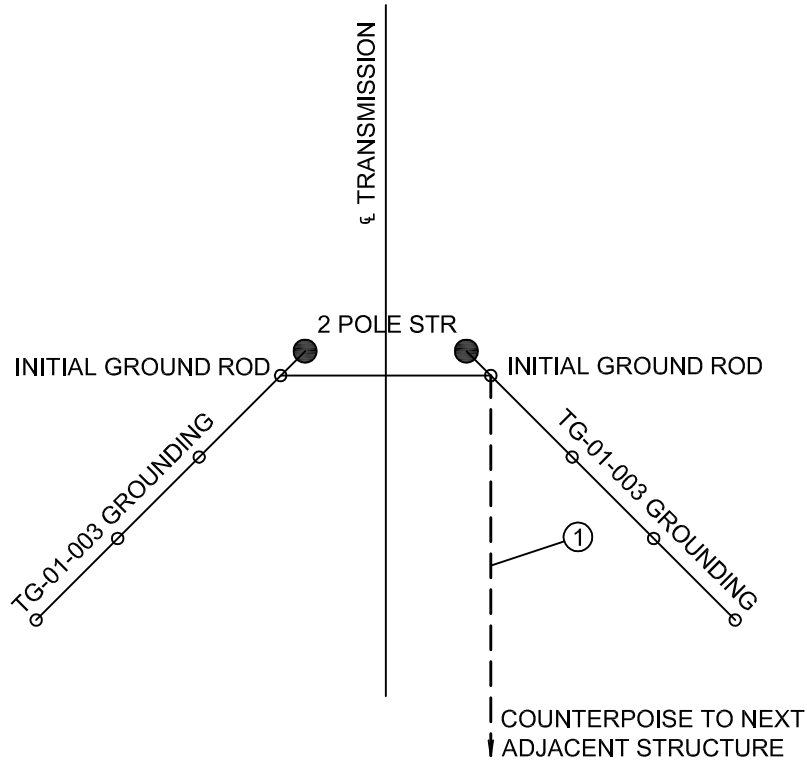
**BILL OF MATERIAL**

CU Type: UC\_SHLDO

ITEM NO.	QTY	UOM	GLOBAL IUSA MID	
1	500 **	FT	30924223	WIRE 1C # 2 CWLD SOL BARE

CU: U\*CT-TG-01-005

\*\* 500' USED AS GENERIC LENGTH IN CU.  
COUNTERPOISE SPAN LENGTH WILL BE  
FIELD DETERMINED FOR ITEM 1 QUANTITY.



**NOTE A:**

If standard TM2.23.TG-01-003 grounding measures over 35 ohms, then install counterpoise for spans less than 500'. Tie to the next adjacent structures ground system. If feasible, choose the structure with the lowest ground resistance. Counterpoise should not cross roadways, regulated wetlands and streams, or waterways. If counterpoising is not feasible, then refer to standard TM2.23.TG-01-006 for radial ground system. Record the new ground resistance of the structure.

**CU Function:**

U\_TL69 for 35kV & 46kV, U\_TG69 for 69kV through 344kV, U\_T345 for 345kV & greater.

For correct CU: substitute 2 for NYSEG, 3 for CMP or 4 for RG&E in place of asterisk (U\*\_).

Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: 1" = 200



IBERDROLA USA  
TRANSMISSION  
CONSTRUCTION  
STANDARDS  
MANUAL

TRANSMISSION GROUNDING  
ADDITIONAL GROUNDING - COUNTERPOISE  
TWO POLE STRUCTURE

Revision	01
DATE	11/10/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
L.A. Best	2/3/2015	Gauvin/Becken/Hart	11/10/2015	Barry R. Hart	11/10/2015

**TM2.23.TG-01-005**

Sheet 1

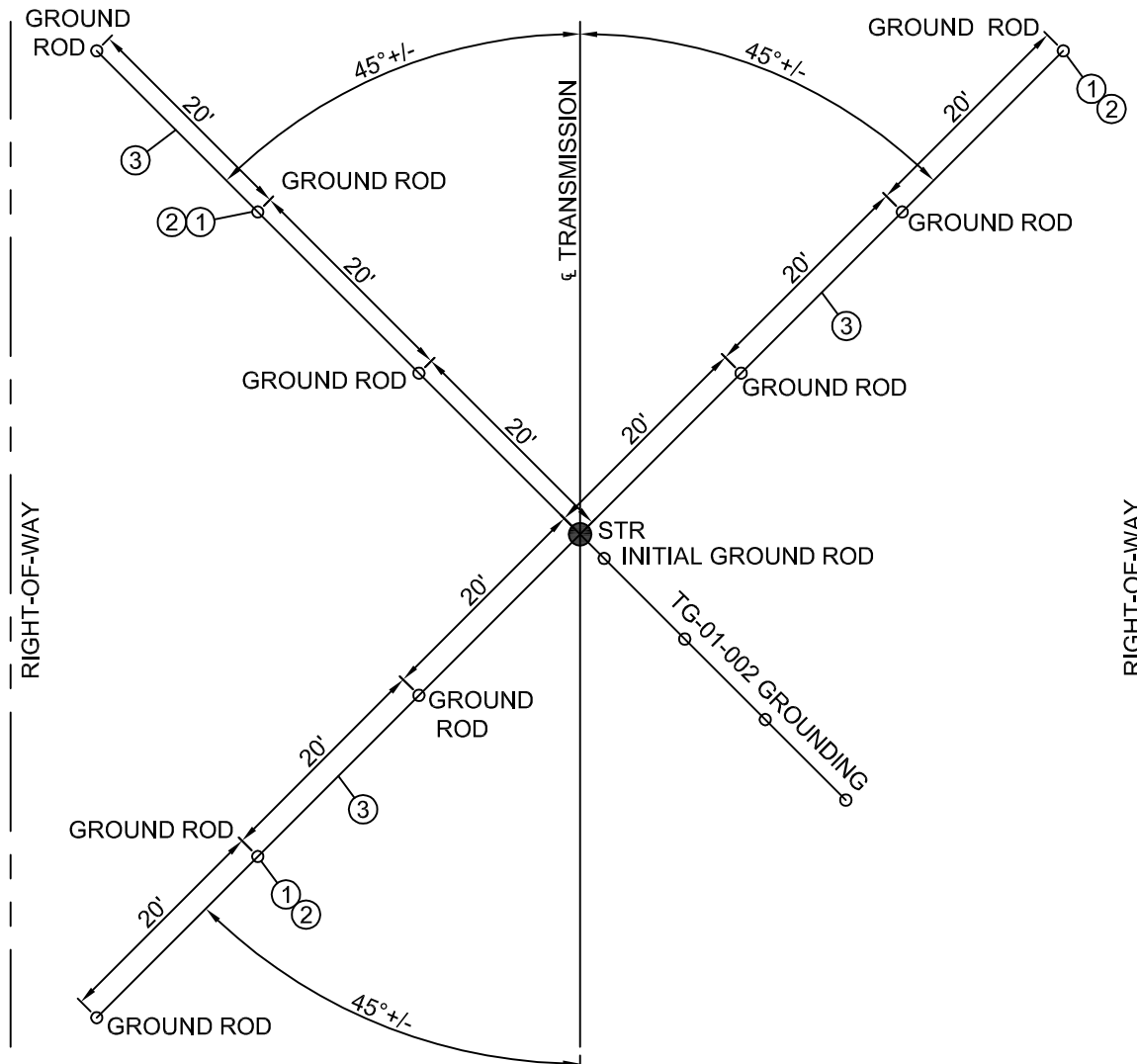
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DRAWING - DO NOT REVISE MANUALLY

ANSI A  
8-1/2" X 11"

**BILL OF MATERIAL**

CU Type: UC\_SHLDO

ITEM NO.	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-01-006
1	9	ST	30925441	CLAMP GRND FOR 5/8 IN ROD
1	9	ST	30923789	ROD GRND CWLD 5/8 X 8 FT NO THREADS
1	183	FT	30924223	WIRE 1C # 2 CWLD SOL BARE



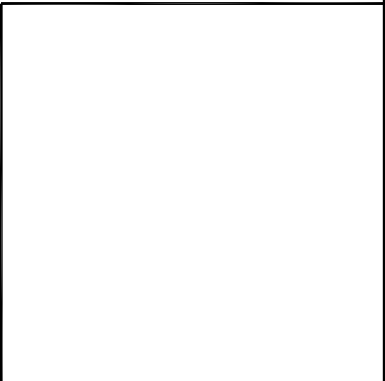
**NOTE A:**

If standard TM2.23.TG-01-002 grounding measures over 35 ohms and counterpoising is not feasible, then install radial ground system for spans less than 500'. This standard maximizes the surface area of the ground system where it is difficult to obtain a low resistance in high soil resistivity locations. Record the new ground resistance of the structure.

**CU Function:**

U\_TL69 for 35kV & 46kV, U\_TG69 for 69kV through 344kV, U\_T345 for 345kV & greater.

For correct CU: substitute 2 for NYSEG, 3 for CMP or 4 for RG&E in place of asterisk (U\*\_).



Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: 1" = 200



IBERDROLA USA  
TRANSMISSION  
CONSTRUCTION  
STANDARDS  
MANUAL

TRANSMISSION GROUNDING  
RADIAL GROUND SYSTEM  
SINGLE POLE STRUCTURE

Revision

01

DATE

11/10/2015

Drwn. By: L.A. Best  
Date Dr.: 2/3/2015

Checked By: Gauvin/Becken/Hart

Date Ck.: 11/10/2015

Approved By: Barry R. Hart

Date App.: 11/10/2015

**TM2.23.TG-01-006**

Sheet 1

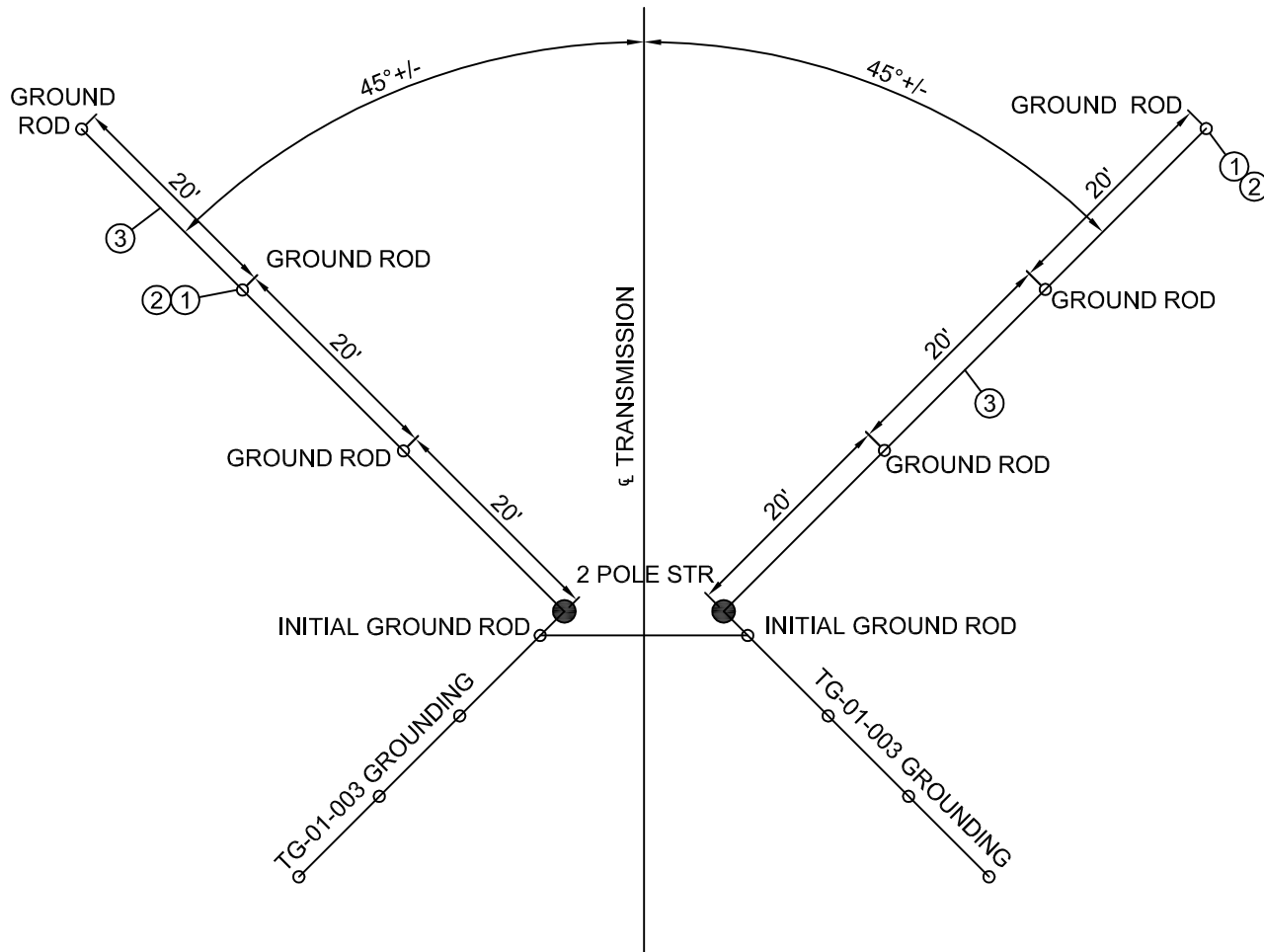
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ANSI A  
8-1/2" X 11"

**BILL OF MATERIAL**

CU Type: UC\_SHLDO

ITEM NO.	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-01-007
1	6	ST	30925441	CLAMP GRND FOR 5/8 IN ROD
1	6	ST	30923789	ROD GROUND CWLD 5/8 X 8 FT NO THREADS
1	122	FT	30924223	WIRE 1C # 2 CWLD SOL BARE



**NOTE A:**

If standard TM2.23.TG-01-003 grounding measures over 35 ohms and counterpoising is not feasible, then install radial ground system for spans greater than 500'. This standard maximizes the surface area of the ground system where it is difficult to obtain a low resistance in high soil resistivity locations. Ensure the initial two pole grounds are tied together. Record the new ground resistance of the structure.

**CU Function:**

U\_TL69 for 35kV & 46kV, U\_TG69 for 69kV through 344kV, U\_T345 for 345kV & greater.

For correct CU: substitute 2 for NYSEG, 3 for CMP or 4 for RG&E in place of asterisk (U\*\_).

Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: 1" = 200



IBERDROLA USA  
TRANSMISSION  
CONSTRUCTION  
STANDARDS  
MANUAL

TRANSMISSION GROUNDING  
RADIAL GROUNDING SYSTEM  
TWO POLE STRUCTURE

Revision	01
DATE	11/10/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
L.A. Best	2/3/2015	Gauvin/Becken/Hart	11/10/2015	Barry R. Hart	11/10/2015

**TM2.23.TG-01-007**

Sheet 1

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ANSI A  
8-1/2" X 11"

CU Type:  
UC\_SHLDO

**BILL OF MATERIAL - standard grounding using #2 CWLD solid wire**

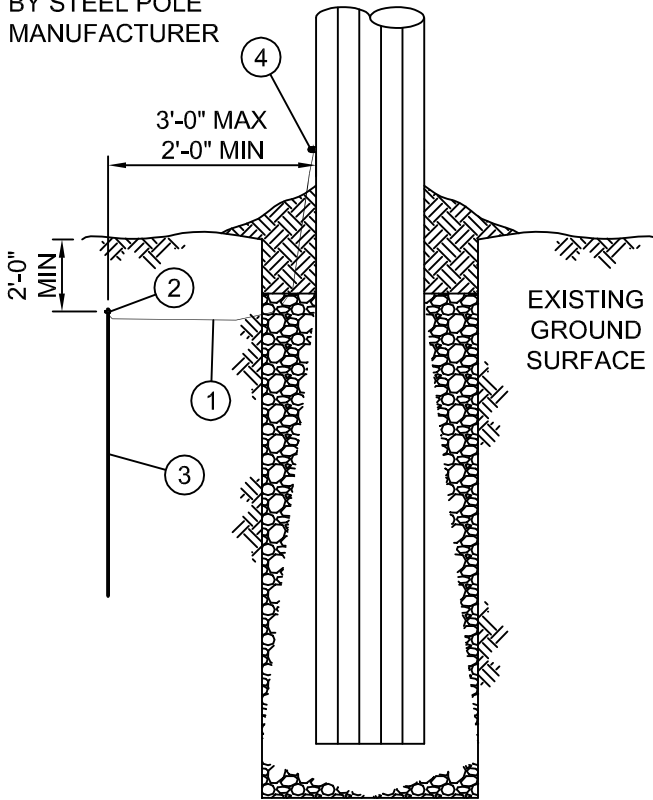
ITEM NO.	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-02-001
1	10	FT	30924223	WIRE 1C # 2 CWLD SOL BARE
2	1	ST	30925441	CLAMP GRND FOR 5/8 IN ROD
3	1	ST	30923789	ROD GRND CWLD 5/8 X 8 FT NO THREADS
4	1	ST	30925256	CONN GRND BRZ CAPTIVE 1/2 DIA 0.162-.419

Special Applications

**BILL OF MATERIAL - grounding using #2 CU solid MHD wire**

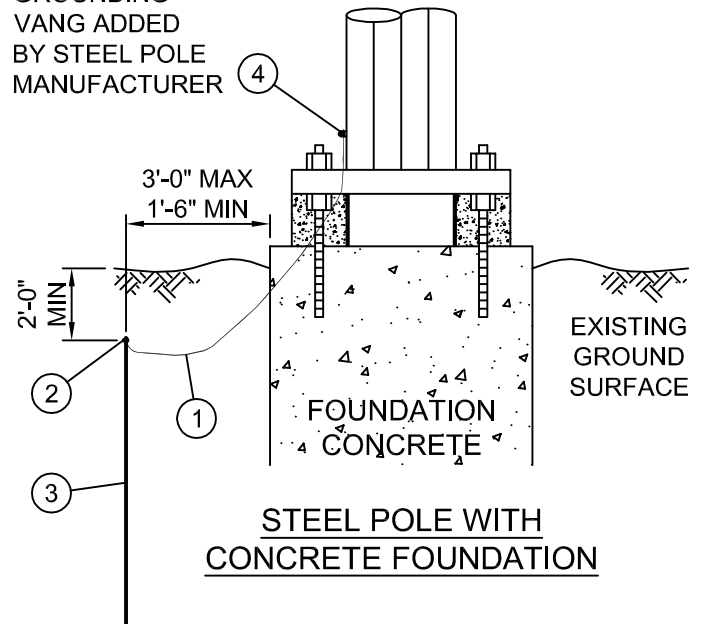
ITEM NO.	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-02-001CU
1	10	FT	30924316	WIRE # 2 CU SOL MHD
2	1	ST	30925441	CLAMP GRND FOR 5/8 IN ROD
3	1	ST	30923789	GROUND ROD CWLD 5/8 X 8 FT NO THREADS
4	1	ST	30925256	CONN GRND BRZ CAPTIVE 1/2 DIA 0.162-.419

GROUNDING VANG ADDED BY STEEL POLE MANUFACTURER



DIRECT EMBED STEEL POLE

GROUNDING VANG ADDED BY STEEL POLE MANUFACTURER



STEEL POLE WITH CONCRETE FOUNDATION

REFER TO IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL TM2.23.TG FOR ADDITIONAL GROUNDING

GROUND RESISTANCE RECORD TM2.23.TG-09-002

CU Function: U\_TL69 for 35kV & 46kV, U\_TG69 for 69kV through 344kV, U\_T345 for 345kV & greater.

For correct CU: substitute 2 for NYSEG, 3 for CMP or 4 for RG&E in place of asterisk (U\*\_\*).

Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: 3/16" = 1'-0"



IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL

TRANSMISSION GROUNDING GROUND ROD AND GROUND WIRE STEEL POLES

Revision	01
DATE	11/9/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
L.A. Best	5/4/2015	Gauvin/Becken/Hart	11/9/2015	Barry R. Hart	11/9/2015

**TM2.23.TG-02-001**

Sheet 1

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ANSI A 8-1/2" X 11"



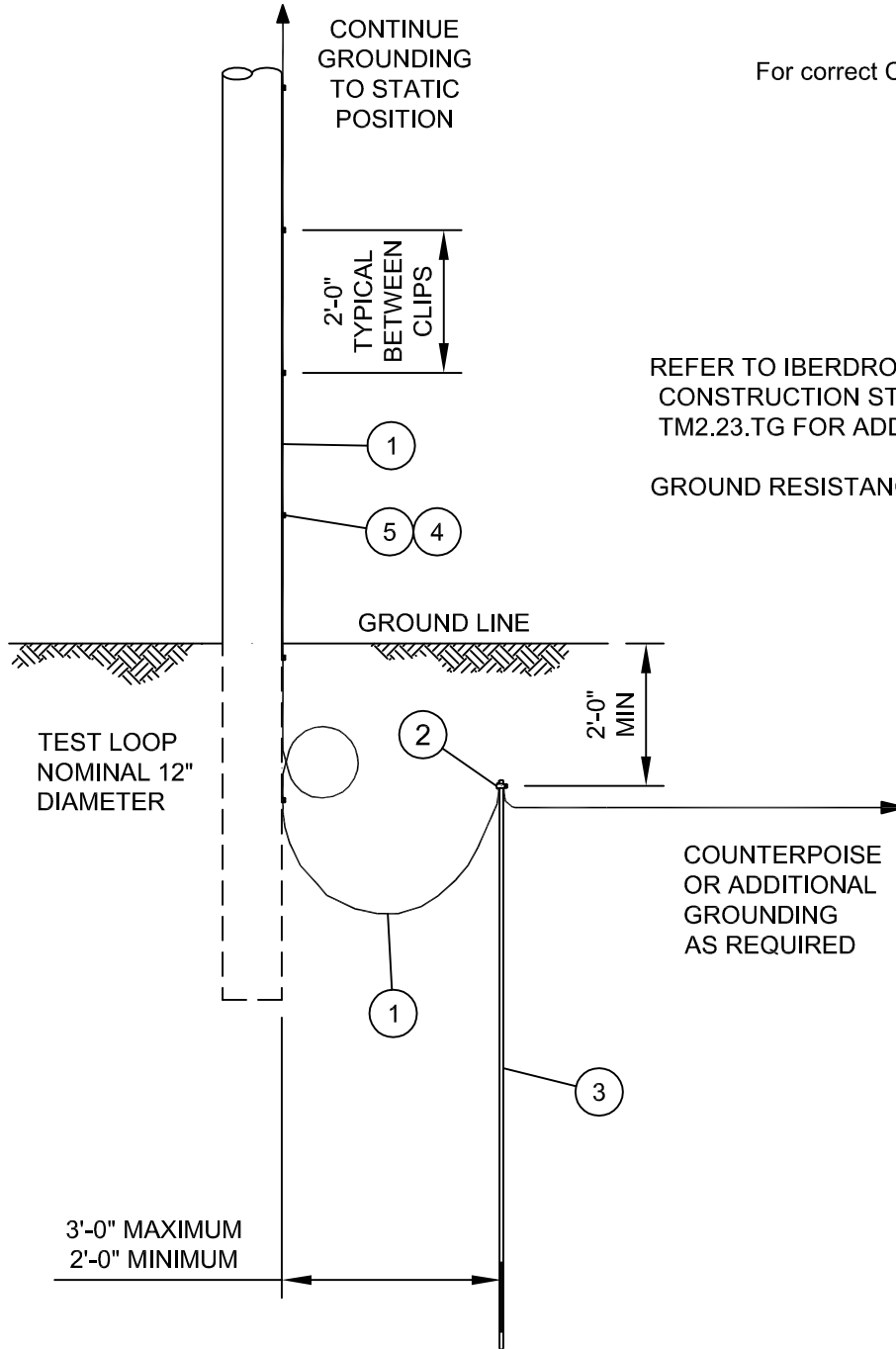
CU Type:  
UC\_SHLDO

**BILL OF MATERIAL**

ITEM NO.	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-02-002
1	100	FT	30924223	WIRE 1C # 2 CWLD SOL BARE
2	1	ST	30925441	CLAMP GRND FOR 5/8 IN ROD
3	1	ST	30923789	ROD GRND CWLD 5/8 X 8 FT NO THREADS
4	45	ST	30923811	CLIP CU GRND WIRE 3/16 H 1/2 X 1-3/8
5	1	LB	30918792	NAIL CWLD 16D 3-1/2 IN LONG

CU Function: U\_TL69 for 35kV & 46kV,  
U\_TG69 for 69kV through 344kV,  
U\_T345 for 345kV & greater.

For correct CU: substitute 2 for NYSEG,  
3 for CMP or 4 for RG&E  
in place of asterisk (U\*\_).



REFER TO IBERDROLA USA TRANSMISSION  
CONSTRUCTION STANDARDS MANUAL  
TM2.23.TG FOR ADDITIONAL GROUNDING

GROUND RESISTANCE RECORD TM2.23.TG-09-001

COUNTERPOISE  
OR ADDITIONAL  
GROUNDING  
AS REQUIRED

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Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: 3/8" = 1'-0"



IBERDROLA USA  
TRANSMISSION  
CONSTRUCTION  
STANDARDS  
MANUAL

TRANSMISSION GROUNDING  
GROUND ROD AND GROUND WIRE DETAIL  
SINGLE ROUND OR LAMINATED WOOD POLE

Revision	01
DATE	11/10/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
L.A. Best	5/4/2015	Gauvin/Becken/Hart	11/10/2015	Barry R. Hart	11/10/2015

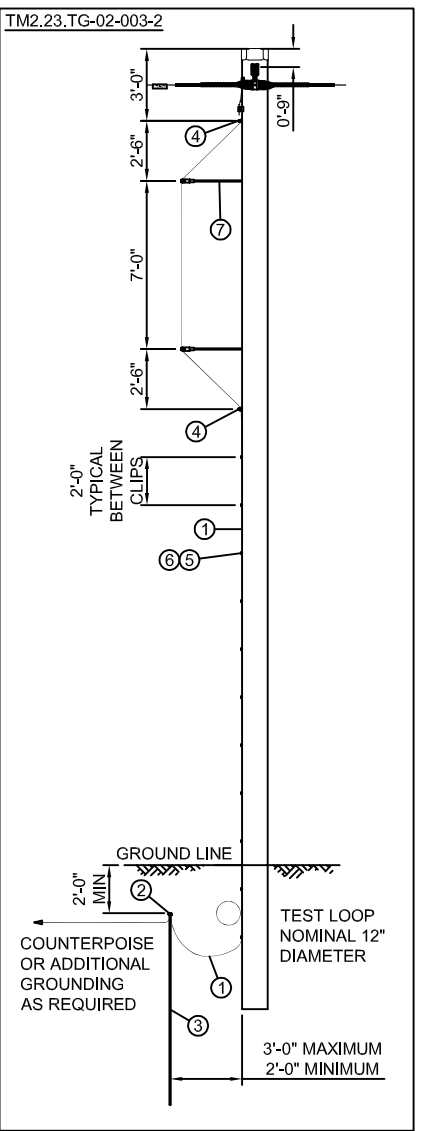
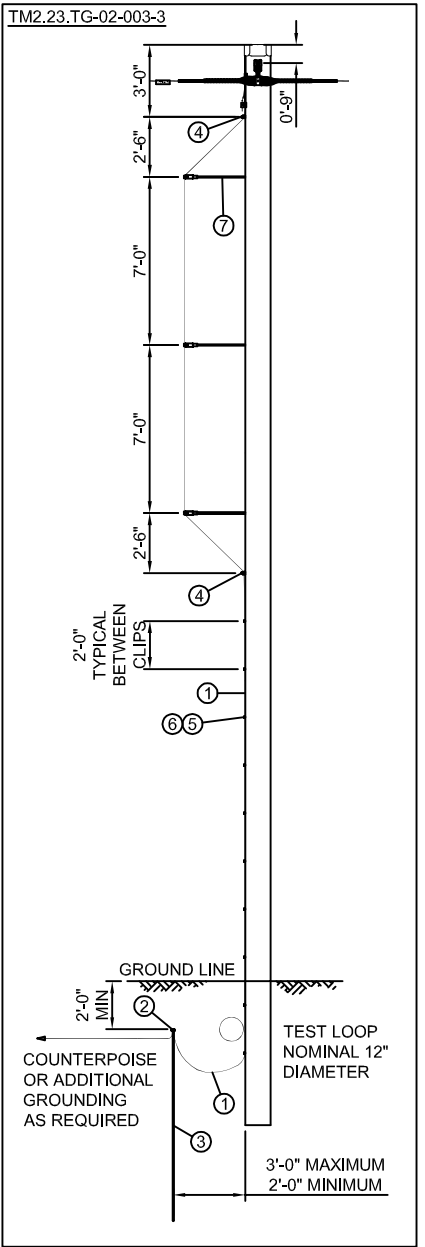
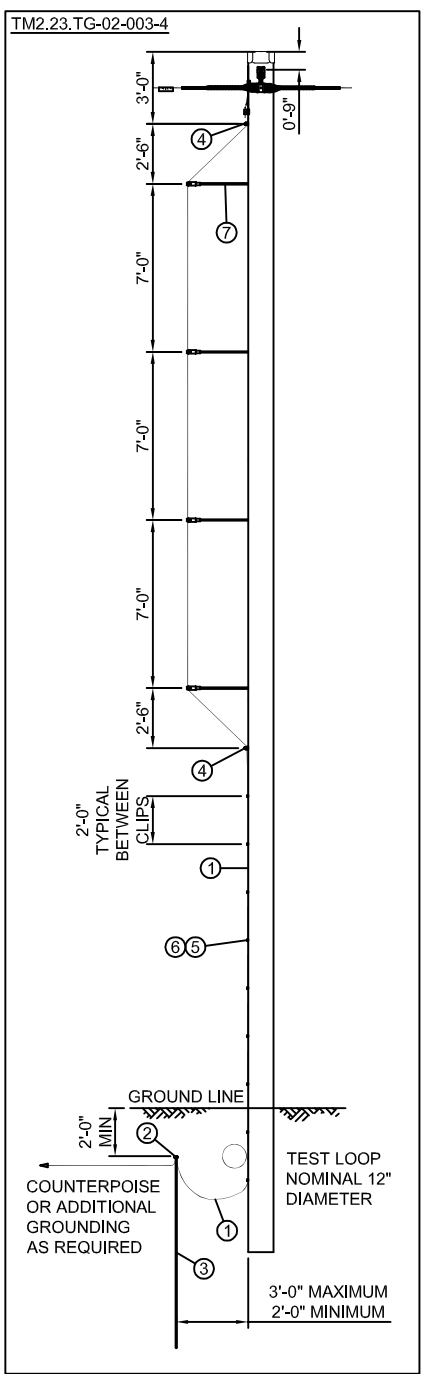
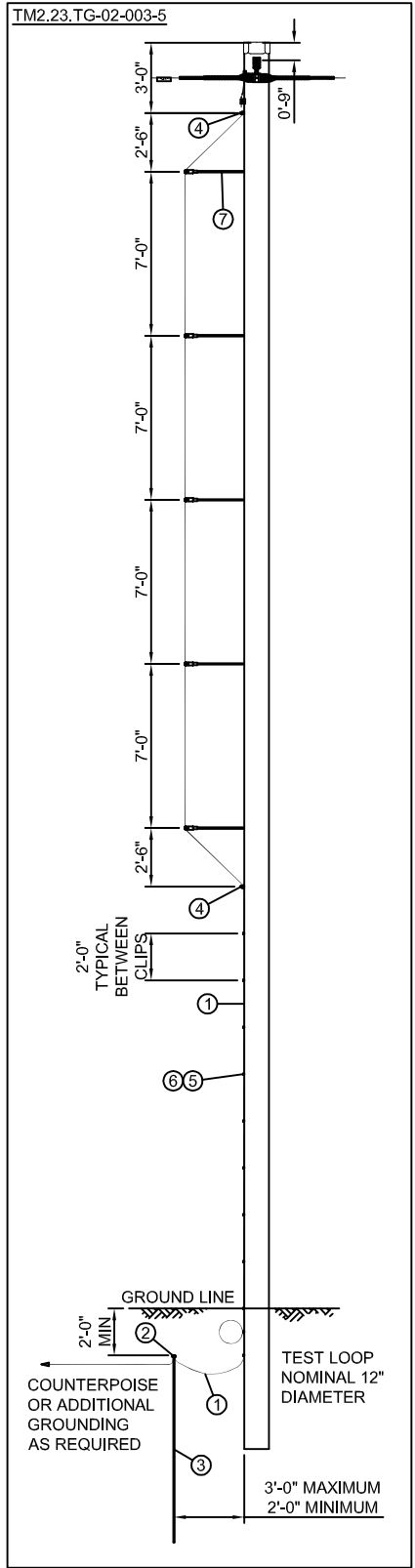
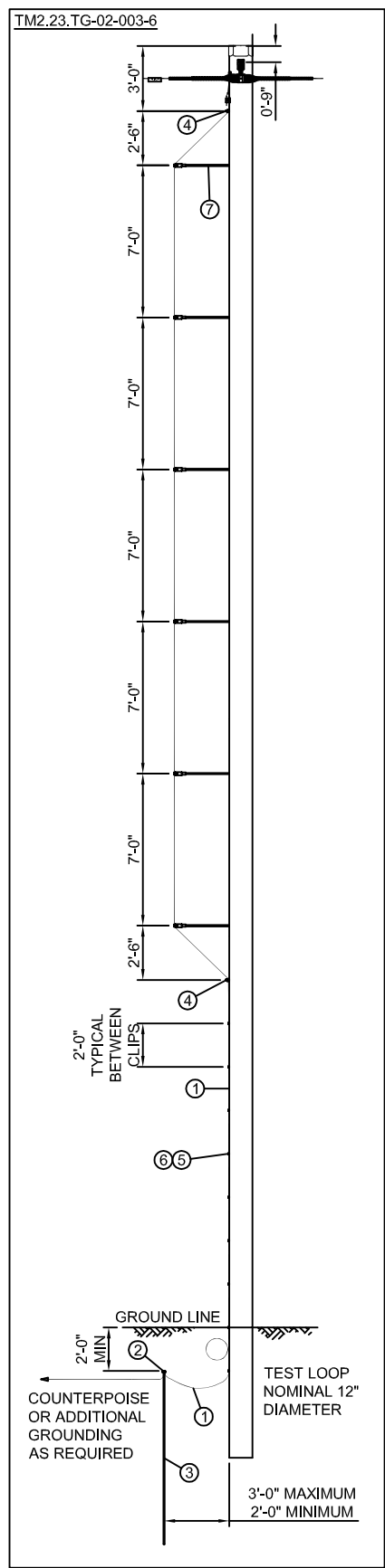
**TM2.23.TG-02-002**

Sheet 1

ANSIA  
8-1/2" X 11"

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ANSI B 11" X 17"



CU Type:  
UC\_SHLDO

mark	-6	-5	-4	-3	-2			
ITEM NO.	QTY.	QTY.	QTY.	QTY.	QTY.	UOM	GLOBAL IUSA MID	CU: U*CT-TG-02-003(mark)
1	100	100	100	100	100	FT	30924223	WIRE 1C # 2 CWLD SOL BARE
2	1	1	1	1	1	ST	30925441	CLAMP GRND FOR 5/8 IN ROD
3	1	1	1	1	1	ST	30923789	ROD GROUND CWLD 5/8 X 8 FT NO THREADS
4	2	2	2	2	2	ST	30919256	BOLT SCR/LAG GRNDNG ASSY 1/2 X 2
5	45	45	45	45	45	ST	30923811	CLIP CU GRND WIRE 3/16 H 1/2 X 1-3/8
6	1	1	1	1	1	LB	30918792	NAIL CWLD 16D 3-1/2 IN LONG
7	6	5	4	3	2	ST	30923814	ROD STAND-OFF FBRGLS 28 IN LNG

**BILL OF MATERIAL**

CU Function: U\_TL69 for 35kV & 46kV,  
U\_TG69 for 69kV through 344kV,  
U\_T345 for 345kV & greater.

For correct CU: substitute 2 for NYSEG,  
3 for CMP or 4 for RG&E  
in place of asterisk (U\*\_).

For use with crossarm or davit  
arm single pole construction.

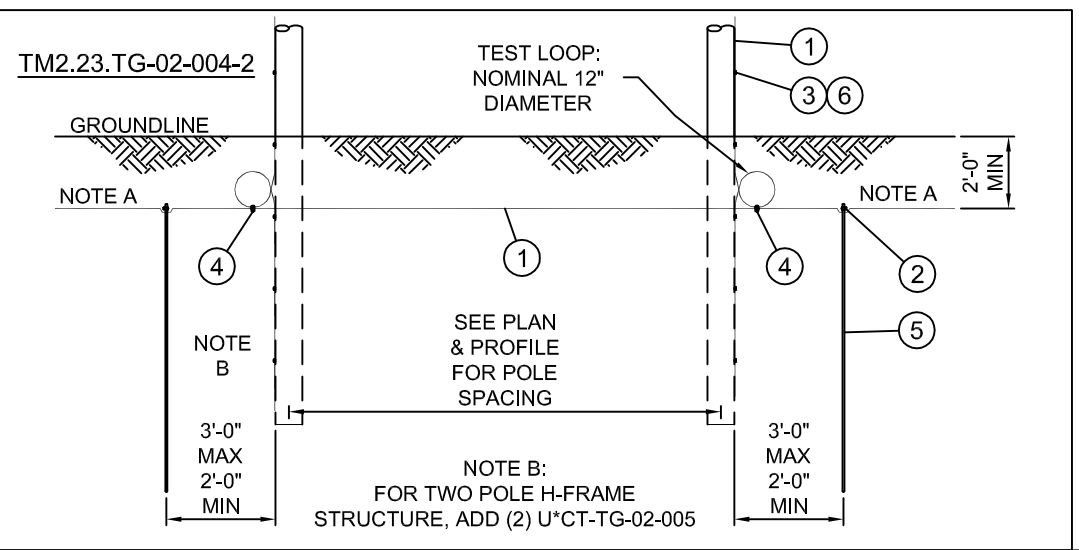
REFER TO IBERDROLA USA TRANSMISSION  
CONSTRUCTION STANDARDS MANUAL  
TM2.23.TG FOR ADDITIONAL GROUNDING

GROUND RESISTANCE RECORD TM2.23.TG-09-001

Contact Engineering Standards - Transmission for the creation of new standards and CUs.						Drawing Scale: 1/8" = 1'-0"	
	IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL		TRANSMISSION GROUNDING GROUND ROD AND GROUND WIRE SINGLE ROUND OR LAMINATED WOOD POLE FIBERGLASS STANDOFF RODS			Revision	
						01	
Drwn. By: L.A. Best		Date Dr.: 5/4/2015		Checked By: Gauvin/Becken/Hart		Date	
				Date Ck.: 11/10/2015		11/10/2015	
				Approved By: Barry R. Hart		Date App.: 11/10/2015	
TM2.23.TG-02-003						Sheet 1	

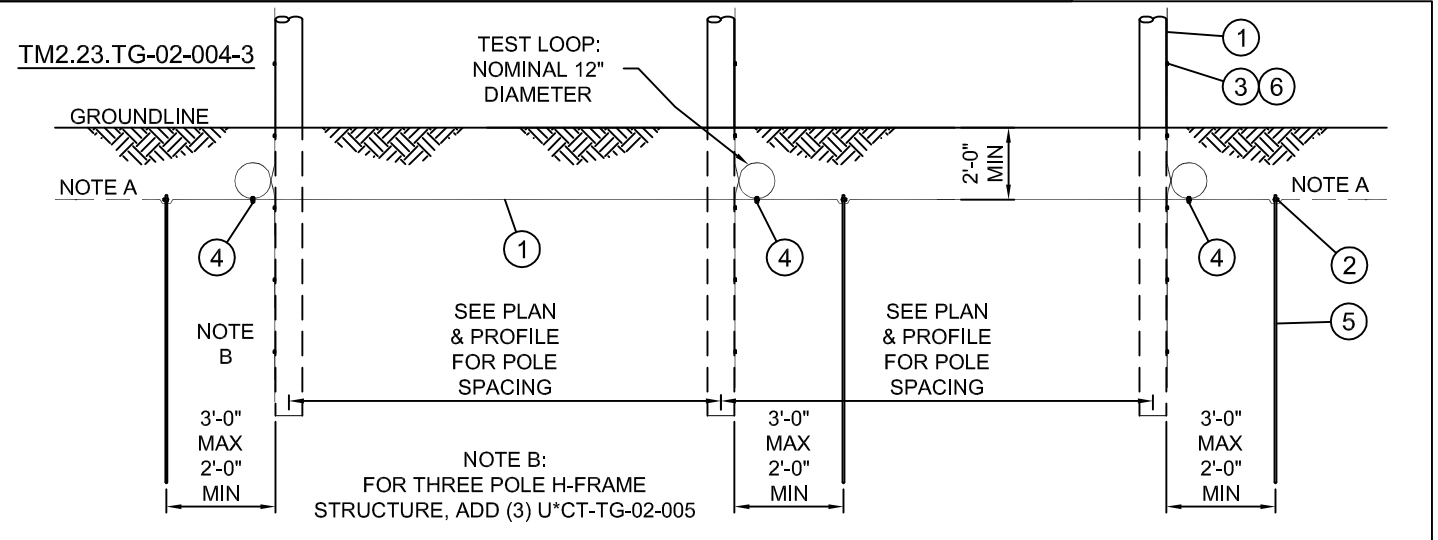
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ANSI B 11" X 17"

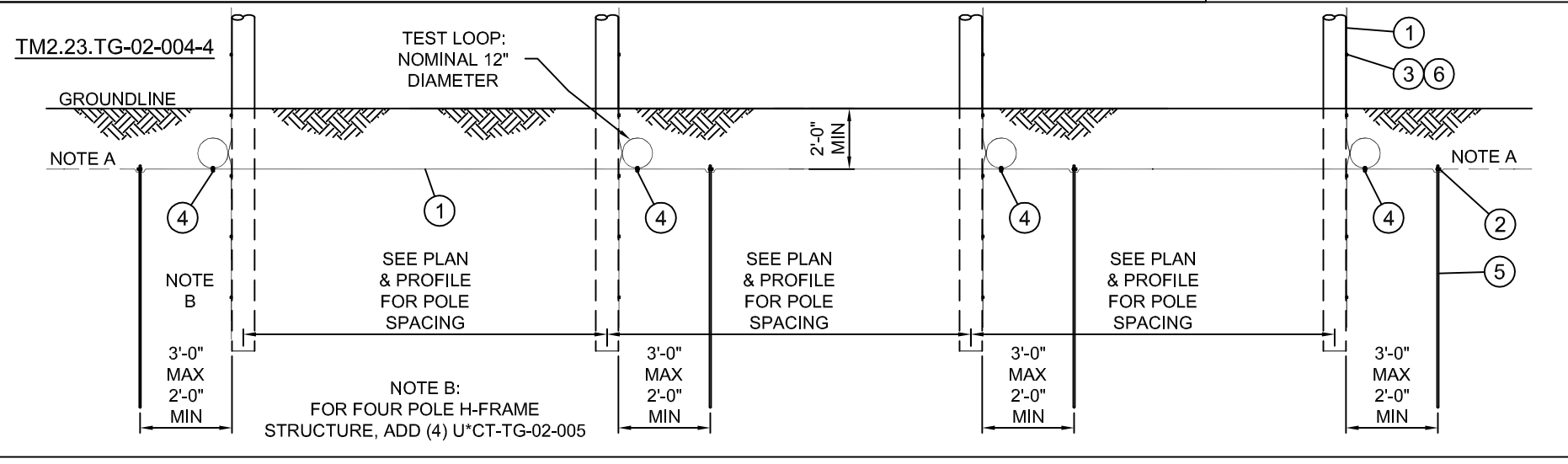


CU Type:  
UC\_SHLDO

BILL OF MATERIAL - grounding for 2 pole structure					
ITEM NO.	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-02-004-2	
1	240	FT	30924223	WIRE 1C # 2 CWLD SOL BARE	
2	2	ST	30925441	CLAMP GRND FOR 5/8 IN ROD	
3	90	ST	30923811	CLIP CU GRND WIRE 3/16 H 1/2 X 1-3/8	
4	2	ST	30925567	CONN 2B TAP 2-2/0STR TO 6SOL-2/0STR	
5	2	ST	30923789	ROD GROUND CWLD 5/8 X 8 FT NO THREADS	
6	2	LB	30918792	NAIL CWLD 16D 3-1/2 IN LONG	



BILL OF MATERIAL - grounding for 3 pole structure					
ITEM NO.	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-02-004-3	
1	365	FT	30924223	WIRE 1C # 2 CWLD SOL BARE	
2	3	ST	30925441	CLAMP GRND FOR 5/8 IN ROD	
3	135	ST	30923811	CLIP CU GRND WIRE 3/16 H 1/2 X 1-3/8	
4	3	ST	30925567	CONN 2B TAP 2-2/0STR TO 6SOL-2/0STR	
5	3	ST	30923789	ROD GROUND CWLD 5/8 X 8 FT NO THREADS	
6	3	LB	30918792	NAIL CWLD 16D 3-1/2 IN LONG	



BILL OF MATERIAL - grounding for 4 pole structure					
ITEM NO.	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-02-004-4	
1	500	FT	30924223	WIRE 1C # 2 CWLD SOL BARE	
2	4	ST	30925441	CLAMP GRND FOR 5/8 IN ROD	
3	225	ST	30923811	CLIP CU GRND WIRE 3/16 H 1/2 X 1-3/8	
4	4	ST	30925567	CONN 2B TAP 2-2/0STR TO 6SOL-2/0STR	
5	4	ST	30923789	ROD GROUND CWLD 5/8 X 8 FT NO THREADS	
6	5	LB	30918792	NAIL CWLD 16D 3-1/2 IN LONG	

CU Function:  
 U\_TL69 for 35kV & 46kV, U\_TG69 for 69kV through 344kV, U\_T345 for 345kV & greater.  
 For correct CU: substitute 2 for NYSEG, 3 for CMP or 4 for RG&E in place of asterisk (U\* ).

NOTE A: REFER TO IBERDROLA IUSA TRANSMISSION CONSTRUCTION STANDARDS MANUAL TM2.23.TG SECTION FOR GROUNDING STANDARDS TM2.23.TG-01-001 THROUGH TM2.23.TG-01-007 FOR ADDITIONAL GROUNDING AND COUNTERPOISE INFORMATION

NOTE B: ADD (1) U\*CT-TG-02-005 (POLE BEARING PLATES) FOR EACH POLE OF A H-FRAME STRUCTURE

Contact Engineering Standards - Transmission for the creation of new standards and CUs.				Drawing Scale: 1/8" = 1'-0"	
	IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL	TRANSMISSION GROUNDING GROUND ROD AND GROUND WIRE DETAIL MULTI-POLE ROUND OR LAMINATED WOOD STRUCTURE			Revision
					01
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
L.A. Best	5/4/2015	Gauvin/Becken/Hart	11/10/2015	Barry R. Hart	11/10/2015
<b>TM2.23.TG-02-004</b>					Sheet 1

CU Type: UC\_SHLDO

**BILL OF MATERIAL**

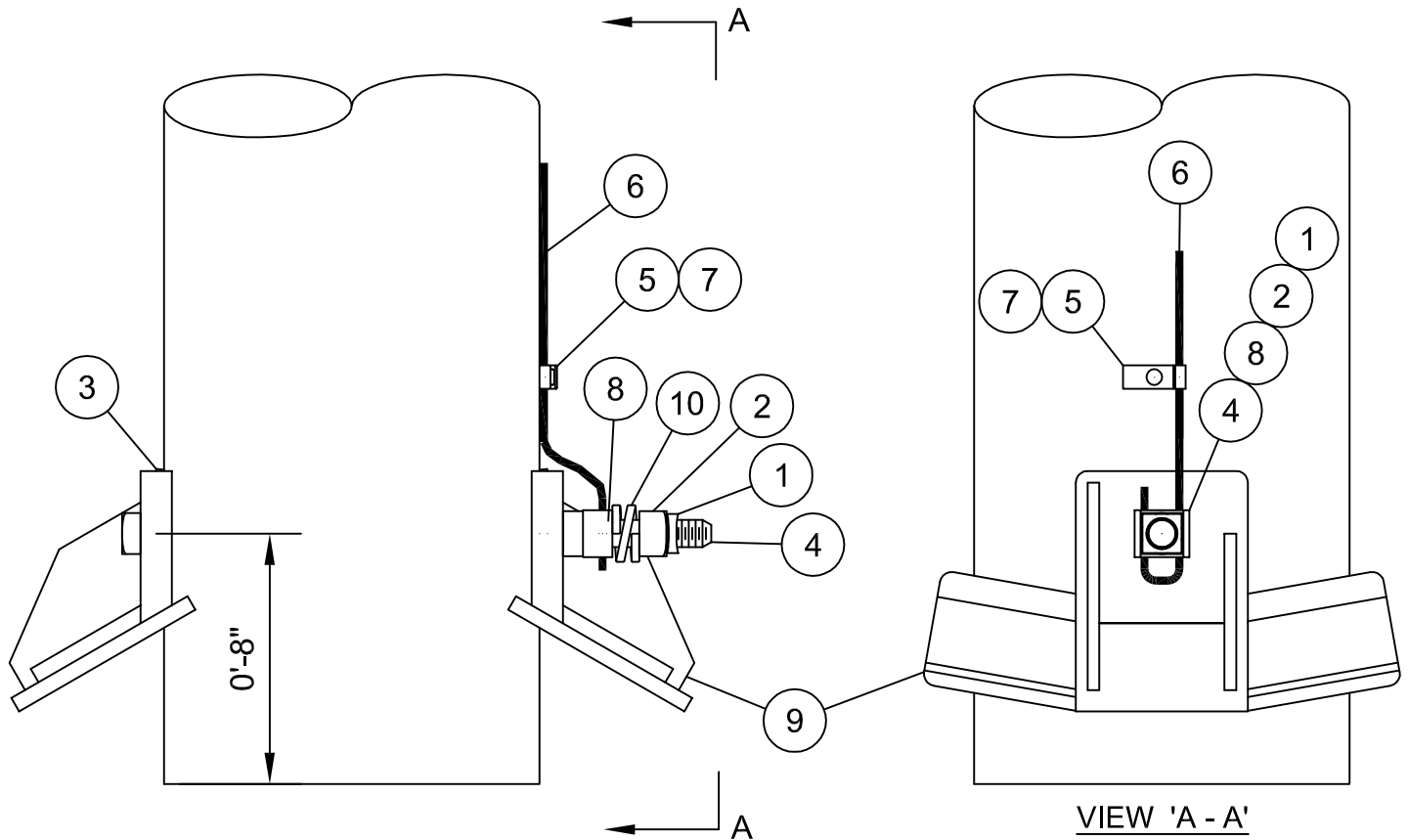
CU Function:

U\_TL69 for 35kV & 46kV,  
 U\_TG69 for 69kV thru 344kV,  
 U\_T345 for 345kV & greater.

For correct CU:

substitute 2 for NYSEG,  
 3 for CMP or 4 for RG&E  
 in place of asterisk (U\*\_).

ITEM NO.	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-02-005
1	1	ST	30919294	NUT LOCK MF SQ FOR 7/8 BOLT
2	1	ST	30919303	NUT SQ FOR 7/8 BOLT
3	2	ST	30923837	GRID GAIN 15/16 HOLE 4-1/8 SQ S-1E
4	1	ST	30919198	BOLT SQHD GALV SQNT 7/8 X 26
5	1	ST	30923811	CLIP CU GRND WIRE 3/16 H 1/2 X 1-3/8
6	2	FT	30924223	WIRE 1C # 2 CWLD SOL BARE
7	0.1	LB	30918792	NAIL CWLD 16D 3-1/2 IN LONG
8	1	ST	30923809	CLAMP GRND WIRE U-CLIP 15/16 IN HOLE
9	2	ST	30923580	PLATE POLE BEARING FOR H-FRAME STRS
10	1	ST	30919328	WSHR LCK 2 TURN SPR GALV 7/8



NOTE: Longer or shorter bolts may be required depending on the actual diameter of the pole used. Substitute material ID (MID) on the work order components page for the length needed if different than the generic length shown in the Bill of Materials. Contact Engineering Standards - Transmission if you need assistance.

Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: 2" = 1'-0"



IBERDROLA USA  
 TRANSMISSION  
 CONSTRUCTION  
 STANDARDS  
 MANUAL

TRANSMISSION GROUNDING  
 POLE BEARING PLATE  
 H-FRAME STRUCTURES  
 ROUND WOOD POLES

Revision	01
DATE	11/10/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
L.A. Best	5/4/2015	Gauvin/Becken/Hart	11/10/2015	Barry R. Hart	11/10/2015

**TM2.23.TG-02-005**

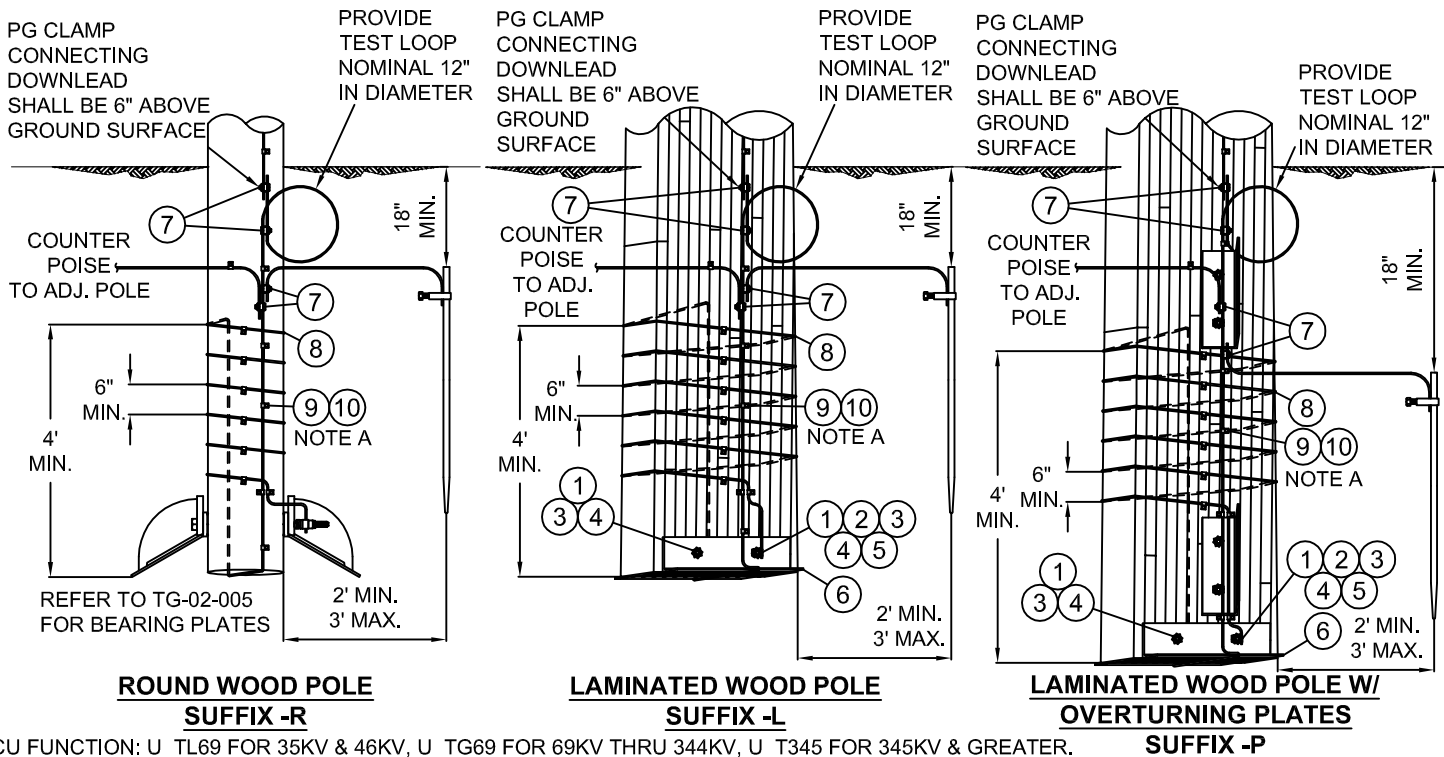
Sheet 1

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ANSIA 8-1/2" X 11"

**BILL OF MATERIAL (CU Type: POLE)**

ITEM NO.	SUFFIX -R	SUFFIX -L	SUFFIX -P	UOM	IUSA MID	CU: U*CT-TG-02-010
1	-	2	6	ST	30919294	NUT LOCK M-F SQ FOR 7/8" BOLT
2	-	1	3	ST	30919303	NUT SQ GALV FOR 7/8" BOLT
3	-	2	6	ST	30919196	BOLT SQHD GALV SQNT 7/8 X 22 (NOTE D)
4	-	2	6	ST	30919328	WSHR LCK 2 TURN SPR GALV 7/8"
5	-	1	3	ST	30923809	CLAMP GRND WIRE U-CLIP 15/16" HOLE
6	-	2	2	ST	NON-STOCK	STEEL ANGLE 6X6X1/4, W 2x 15/16" MTG HOLES
7	4	4	4	ST	30926037	CONN VISE PG 8 SOL TO 2 SOL - 3STR CU/AL
8	50	50	50	FT	30924223	WIRE 1C #2 CWLD SOL BARE
9	1	1	1	LB	30918792	NAIL CWLD 16D 3-1/2" LONG
10	20	20	20	ST	30923811	CLIP CU GRND WIRE 3/16 H 1/2 X 1-3/8



CU FUNCTION: U\_TL69 FOR 35KV & 46KV, U\_TG69 FOR 69KV THRU 344KV, U\_T345 FOR 345KV & GREATER.

FOR CORRECT CU: SUBSTITUTE 2 FOR NYSEG, 3 FOR CMP OR 4 FOR RG&E IN PLACE OF ASTERISK (U\*\_).

NOTE A: WRAP GROUND WIRE (ITEM #8) AROUND POLE MINIMUM OF FIVE (5) TURNS. ATTACH GROUND WIRE CLIP (ITEM #10) AT EACH VERTICAL RUN.

NOTE B: THE CONTRACTOR SHALL NOT WRAP THE GROUND WIRE AROUND THE BUTT OF THE POLE WHEN USING SELECT BACKFILL, STONE BACKFILL, ROCK BACKFILL, FLOWABLE BACKFILL OR CONCRETE BACKFILL UNLESS OTHERWISE REQUIRED BY THE ENGINEER OR CONSTRUCTION MANAGER.

NOTE C: WHEN RIGHT-OF-WAY IS SHARED WITH A PIPELINE USE TG-04-010. THE CATHODIC PROTECTION OF THE PIPELINE WILL OTHERWISE PREMATURELY CORRODE THE COPPERWELD WIRE OF THIS STANDARD.

NOTE D: LARGER OR SMALLER BOLTS MAY BE REQUIRED DEPENDING ON THE DIAMETER OF THE POLE USED. SUBSTITUTE MATERIAL ID (MID) ON THE WORK ORDER COMPONENTS PAGE FOR THE LENGTH NEEDED IF DIFFERENT THAN THE GENERIC LENGTH SHOWN IN THE BILL OF MATERIALS. CONTACT SYSTEM ENGINEERING - TRANSMISSION SECTION IF YOU NEED ASSISTANCE.

NOTE E: USE APPROPRIATE TG-02-003-X FOR THE DOWNGROUND TO BE INSTALLED ON THE POLE.

THIS IS A COMPUTER GENERATED DRAWING - DO NOT REVISE MANUALLY

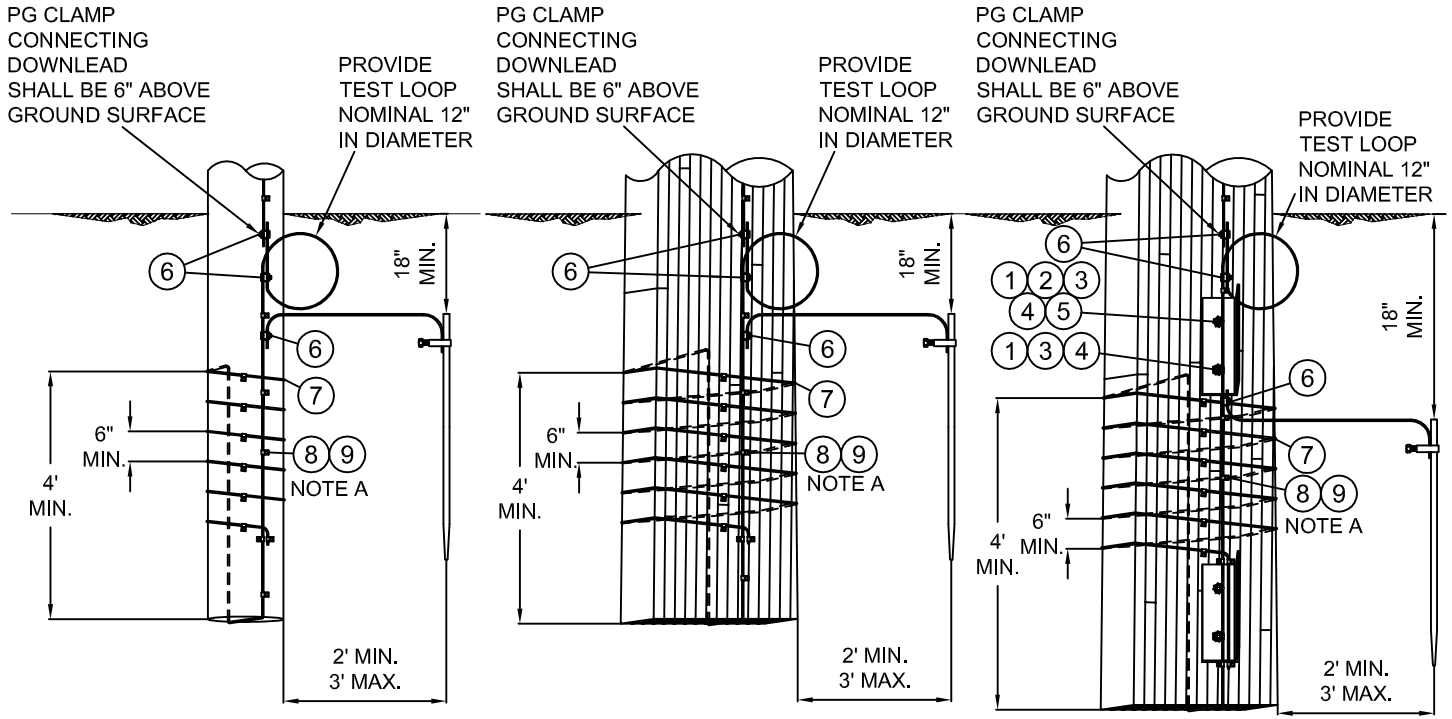
Contact Engineering Standards - Transmission Section for the creation of new standards and CUs.

Drawing Scale: 1" = 30"

	<b>TRANSMISSION CONSTRUCTION STANDARDS MANUAL</b>	<b>POLE BEARING PLATES AND GROUNDING H-FRAME STRUCTURES COPPERWELD GROUNDING 345KV AND SPECIAL APPLICATIONS ONLY</b>	REVISION
			01
			DATE
			11/20/2015
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:
B. Franklin	10/17/2013	Gauvin	12/24/2014
Approved By:	Date App.:	TM2.23.TG-02-010	
Barry R. Hart	12/24/2014	Sheet 1	

**BILL OF MATERIAL (CU Type: POLE)**

ITEM NO.	SUFFIX -R	SUFFIX -L	SUFFIX -P	UOM	IUSA MID	CU: U*CT-TG-02-011
1	-	-	4	ST	30919294	NUT LOCK M-F SQ FOR 7/8" BOLT
2	-	-	2	ST	30919303	NUT SQ GALV FOR 7/8" BOLT
3	-	-	4	ST	30919196	BOLT SQHD GALV SQNT 7/8 X 22 (NOTE D)
4	-	-	4	ST	30919328	WSHR LCK 2 TURN SPR GALV 7/8"
5	-	-	2	ST	30923809	CLAMP GRND WIRE U-CLIP 15/16" HOLE
6	3	3	3	ST	30926037	CONN VISE PG 8 SOL TO 2 SOL - 3STR CU/AL
7	50	50	50	FT	30924223	WIRE 1C #2 CWLD SOL BARE
8	1	1	1	LB	30918792	NAIL CWLD 16D 3-1/2" LONG
9	20	20	20	ST	30923811	CLIP CU GRND WIRE 3/16 H 1/2 X 1-3/8



**ROUND WOOD POLE  
SUFFIX -R**

**LAMINATED WOOD POLE  
SUFFIX -L**

**LAMINATED WOOD POLE W/  
OVERTURNING PLATES  
SUFFIX -P**

CU FUNCTION: U\_TL69 FOR 35KV & 46KV, U\_TG69 FOR 69KV THRU 344KV, U\_T345 FOR 345KV & GREATER.

FOR CORRECT CU: SUBSTITUTE 2 FOR NYSEG, 3 FOR CMP OR 4 FOR RG&E IN PLACE OF ASTERISK (U\*\_).

NOTE A: WRAP GROUND WIRE (ITEM #7) AROUND POLE MINIMUM OF FIVE (5) TURNS. ATTACH GROUND WIRE CLIP (ITEM #9) AT EACH VERTICAL RUN.

NOTE B: THE CONTRACTOR SHALL NOT WRAP THE GROUND WIRE AROUND THE BUTT OF THE POLE WHEN USING SELECT BACKFILL, STONE BACKFILL, ROCK BACKFILL, FLOWABLE BACKFILL OR CONCRETE BACKFILL UNLESS OTHERWISE REQUIRED BY THE ENGINEER OR CONSTRUCTION MANAGER.

NOTE C: WHEN RIGHT-OF-WAY IS SHARED WITH A PIPELINE USE TG-04-011. THE CATHODIC PROTECTION OF THE PIPELINE WILL OTHERWISE PREMATURELY CORRODE THE COPPERWELD WIRE OF THIS STANDARD.

NOTE D: LARGER OR SMALLER BOLTS MAY BE REQUIRED DEPENDING ON THE DIAMETER OF THE POLE USED. SUBSTITUTE MATERIAL ID (MID) ON THE WORK ORDER COMPONENTS PAGE FOR THE LENGTH NEEDED IF DIFFERENT THAN THE GENERIC LENGTH SHOWN IN THE BILL OF MATERIALS. CONTACT SYSTEM ENGINEERING - TRANSMISSION SECTION IF YOU NEED ASSISTANCE.

NOTE E: USE TG-02-002 FOR THE DOWNGROUND TO BE INSTALLED ON THE POLE.

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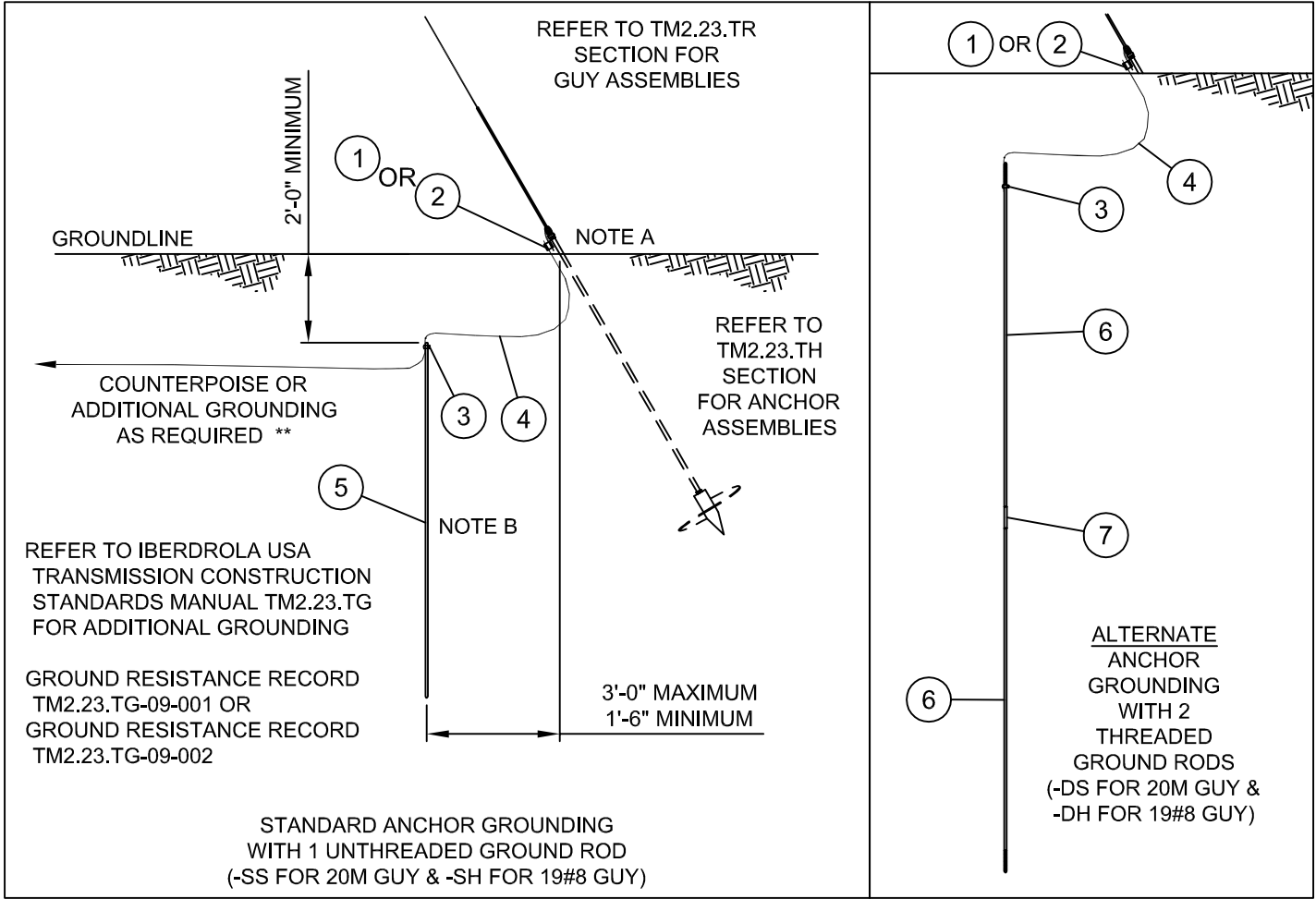
Contact Engineering Standards - Transmission Section for the creation of new standards and CUs.

Drawing Scale: 1" = 30"

	<b>TRANSMISSION CONSTRUCTION STANDARDS MANUAL</b>	<b>POLE BEARING PLATES AND GROUNDING SINGLE POLE STRUCTURES COPPERWELD GROUNDING 345KV AND SPECIAL APPLICATIONS ONLY</b>	REVISION
			01
			DATE
			11/20/2015
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:
B. Franklin	10/17/2013	Gauvin	12/24/2014
Approved By:	Date App.:	TM2.23.TG-02-011	
Barry R. Hart	12/24/2014	Sheet 1	

mark	-DH	-SH	-DS	-SS	BILL OF MATERIAL		CU Type: UC_SHLDO
ITEM NO.	QTY	QTY	QTY	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-03-001-(mark)
1			1	1	ST	30925710	CONN H TAP 2AL 4ACSR TO 2/0-3/0STR
2	1	1			ST	30925708	CONN H TAP 1/0AL TO 250-500CU OR AL
3	1	1	1	1	ST	30925441	CLAMP GRND FOR 5/8 IN ROD
4	25 **	25 **	25 **	25 **	FT	30924223	WIRE 1C # 2 CWLD SOL BARE
5		1		1	ST	30923789	ROD GROUND CWLD 5/8 X 8 FT NO THREADS
6	2		2		ST	30923788	ROD GROUND CWLD 5/8 X 8 FT (1) CPLG
7	1		1		ST	30925442	CPLR SECT THRDD BRNZ FOR 5/8 GRND ROD

\*\* COUNTERPOISE LENGTH WILL BE FIELD DETERMINED, QUANTITY SHOWN IS A PLACE HOLDER IN CU. ALTER QUANTITY ON THE COMPONENTS PAGE OF THE WORK ORDER.



CU Function:

U\_TL69 for 35kV & 46kV, U\_TG69 for 69kV through 344kV, U\_T345 for 345kV & greater.

For correct CU: substitute 2 for NYSEG, 3 for CMP or 4 for RG&E in place of asterisk (U\*\_).

NOTE A: TRAIN COPPERWELD GROUND WIRE ALONG ANCHOR ROD TO A MINIMUM OF 6 INCHES BELOW THE GROUNDLINE.

NOTE B: PLACE GROUND ROD DIRECTLY UNDER GUY STRAND, NOT OFF TO SIDE OF GUY.

Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: 1/4" = 1'-0"



IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL

TRANSMISSION GROUNDING ANCHOR GROUNDING SPECIAL APPLICATION

Revision	01
DATE	11/10/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
L.A. Best	5/4/2015	Gauvin/Becken/Hart	11/10/2015	Barry R. Hart	11/10/2015

TM2.23.TG-03-001

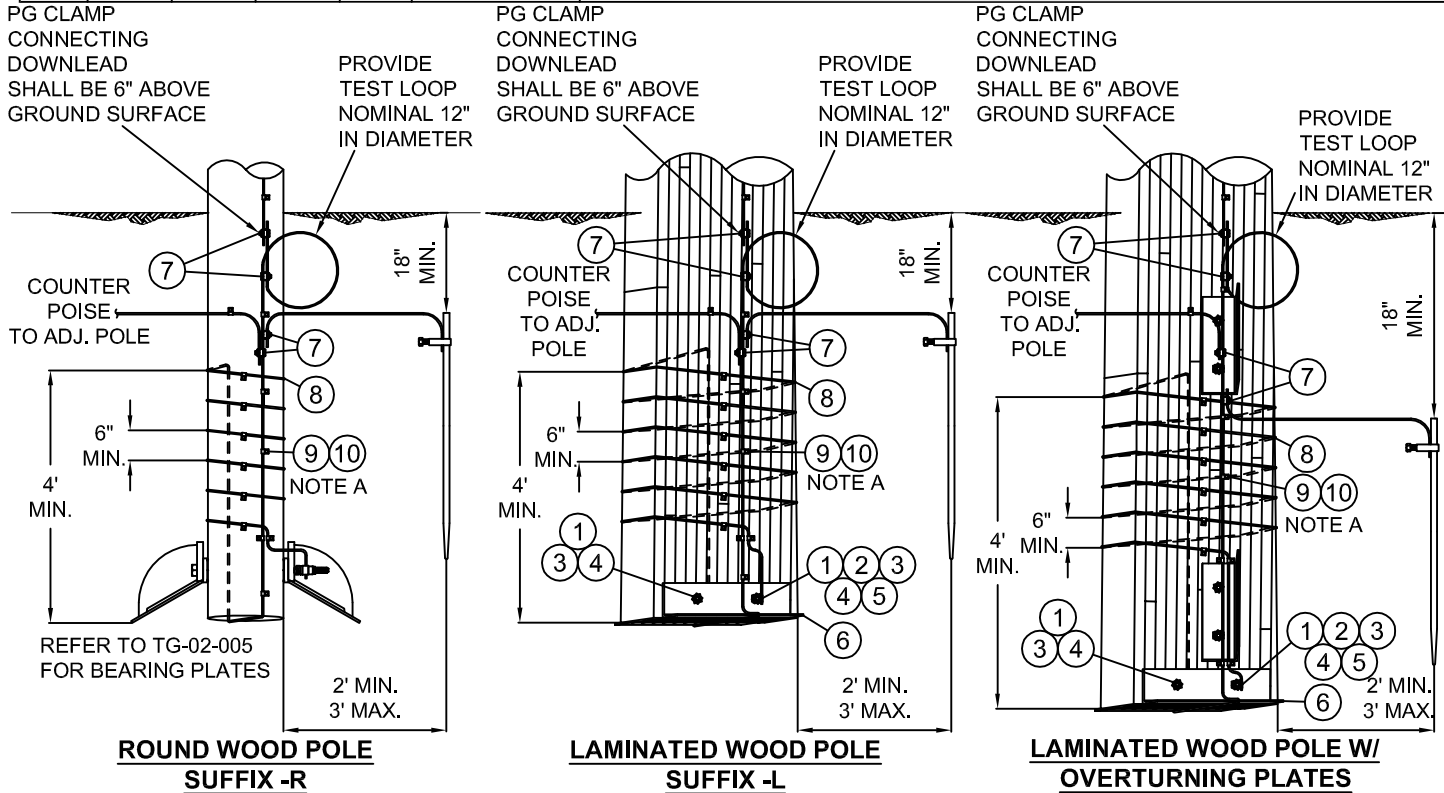
Sheet 1

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ANSIA 8-1/2" X 11"

**BILL OF MATERIAL (CU Type: POLE)**

ITEM NO.	SUFFIX -R	SUFFIX -L	SUFFIX -P	UOM	IUSA MID	CU: U*CT-TG-04-010
1	-	2	6	ST	30919294	NUT LOCK M-F SQ FOR 7/8" BOLT
2	-	1	3	ST	30919303	NUT SQ GALV FOR 7/8" BOLT
3	-	2	6	ST	30919196	BOLT SQHD GALV SQNT 7/8 X 22 (NOTE D)
4	-	2	6	ST	30919328	WSHR LCK 2 TURN SPR GALV 7/8"
5	-	1	3	ST	30923809	CLAMP GRND WIRE U-CLIP 15/16" HOLE
6	-	2	2	ST	NON-STOCK	STEEL ANGLE 6X6X1/4, W 2x 15/16" MTG HOLES
7	4	4	4	ST	30926037	CONN VISE PG 8 SOL TO 2 SOL - 3STR CU/AL
8	50	50	50	FT	30924223	WIRE 1C #2 CWLD SOL BARE
9	1	1	1	LB	30918792	NAIL CWLD 16D 3-1/2" LONG
10	20	20	20	ST	30923811	CLIP CU GRND WIRE 3/16 H 1/2 X 1-3/8



CU FUNCTION: U\_TL69 FOR 35KV & 46KV, U\_TG69 FOR 69KV THRU 344KV, U\_T345 FOR 345KV & GREATER.

FOR CORRECT CU: SUBSTITUTE 2 FOR NYSEG, 3 FOR CMP OR 4 FOR RG&E IN PLACE OF ASTERISK (U\*\_).

NOTE A: WRAP GROUND WIRE (ITEM #8) AROUND POLE MINIMUM OF FIVE (5) TURNS. ATTACH GROUND WIRE CLIP (ITEM #10) AT EACH VERTICAL RUN.

NOTE B: THE CONTRACTOR SHALL NOT WRAP THE GROUND WIRE AROUND THE BUTT OF THE POLE WHEN USING SELECT BACKFILL, STONE BACKFILL, ROCK BACKFILL, FLOWABLE BACKFILL OR CONCRETE BACKFILL UNLESS OTHERWISE REQUIRED BY THE ENGINEER OR CONSTRUCTION MANAGER.

NOTE C: ONLY TO BE USED WHEN RIGHT-OF-WAY IS SHARED WITH A PIPELINE. IN ALL OTHER INSTANCES USE STANDARD TG-02-010.

NOTE D: LARGER OR SMALLER BOLTS MAY BE REQUIRED DEPENDING ON THE DIAMETER OF THE POLE USED. SUBSTITUTE MATERIAL ID (MID) ON THE WORK ORDER COMPONENTS PAGE FOR THE LENGTH NEEDED IF DIFFERENT THAN THE GENERIC LENGTH SHOWN IN THE BILL OF MATERIALS. CONTACT SYSTEM ENGINEERING - TRANSMISSION SECTION IF YOU NEED ASSISTANCE.

NOTE E: USE APPROPRIATE TG-02-003-X FOR THE DOWNGROUND TO BE INSTALLED ON THE POLE.

THIS IS A COMPUTER GENERATED DRAWING - DO NOT REVISE MANUALLY

Contact Engineering Standards - Transmission Section for the creation of new standards and CUs.

Drawing Scale: 1" = 30"



**TRANSMISSION  
CONSTRUCTION  
STANDARDS  
MANUAL**

**POLE BEARING PLATES AND GROUNDING  
H-FRAME STRUCTURES  
#2 COPPER GROUNDING  
FOR RIGHT-OF-WAY WITH COLOCATED PIPELINE**

REVISION
01
DATE
11/20/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
B. Franklin	10/17/2013	Gauvin	12/24/2014	Barry R. Hart	12/24/2014

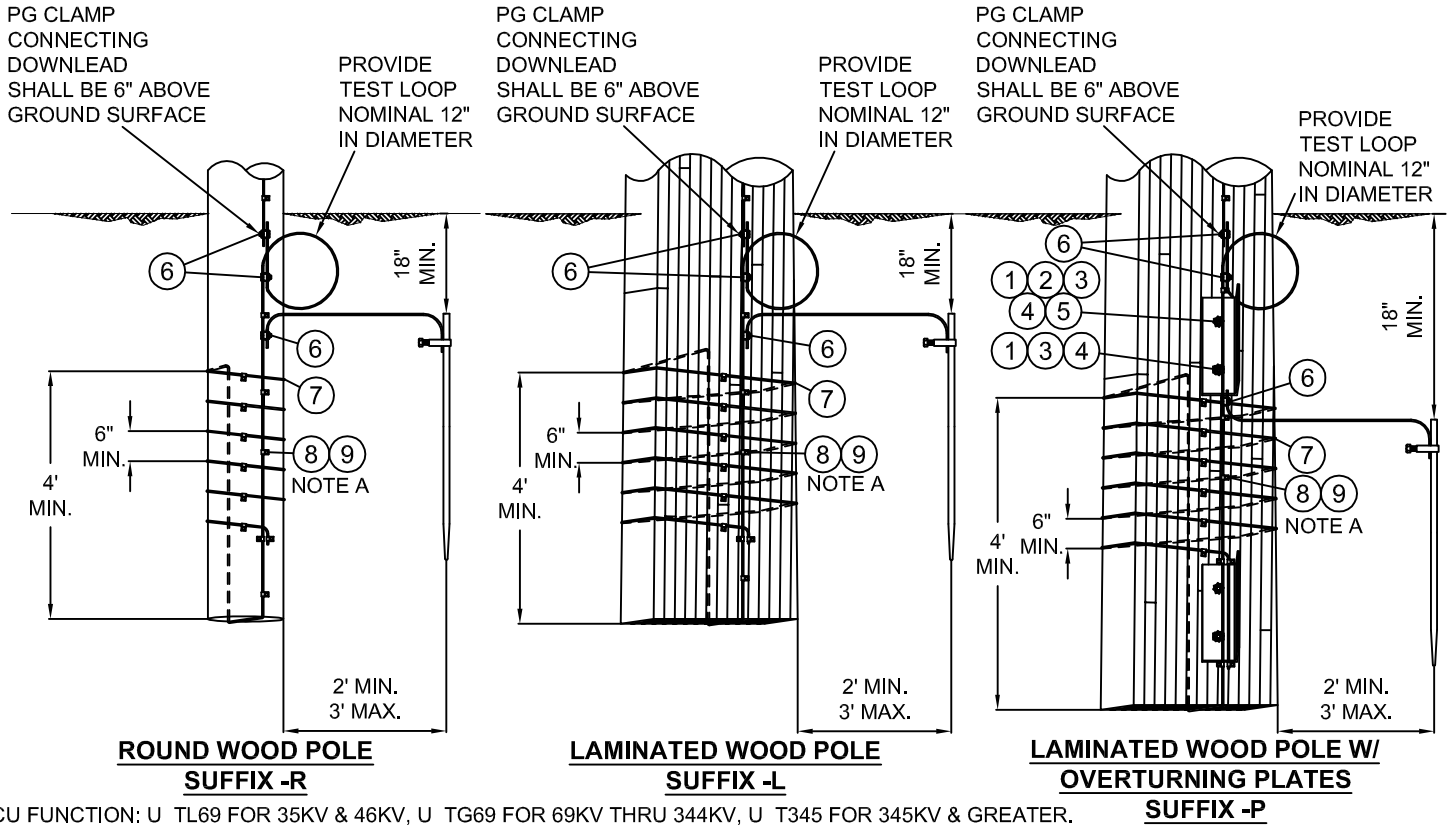
**TM2.23.TG-04-010**

Sheet 1



**BILL OF MATERIAL (CU Type: POLE)**

ITEM NO.	SUFFIX -R	SUFFIX -L	SUFFIX -P	UOM	IUSA MID	CU: U*CT-TG-04-011
1	-	-	4	ST	30919294	NUT LOCK M-F SQ FOR 7/8" BOLT
2	-	-	2	ST	30919303	NUT SQ GALV FOR 7/8" BOLT
3	-	-	4	ST	30919196	BOLT SQHD GALV SQNT 7/8 X 22 (NOTE D)
4	-	-	4	ST	30919328	WSHR LCK 2 TURN SPR GALV 7/8"
5	-	-	2	ST	30923809	CLAMP GRND WIRE U-CLIP 15/16" HOLE
6	3	3	3	ST	30926037	CONN VISE PG 8 SOL TO 2 SOL - 3STR CU/AL
7	50	50	50	FT	30924223	WIRE 1C #2 CWLD SOL BARE
8	1	1	1	LB	30918792	NAIL CWLD 16D 3-1/2" LONG
9	20	20	20	ST	30923811	CLIP CU GRND WIRE 3/16 H 1/2 X 1-3/8



CU FUNCTION: U\_TL69 FOR 35KV & 46KV, U\_TG69 FOR 69KV THRU 344KV, U\_T345 FOR 345KV & GREATER.

FOR CORRECT CU: SUBSTITUTE 2 FOR NYSEG, 3 FOR CMP OR 4 FOR RG&E IN PLACE OF ASTERISK (U\*\_).

NOTE A: WRAP GROUND WIRE (ITEM #7) AROUND POLE MINIMUM OF FIVE (5) TURNS. ATTACH GROUND WIRE CLIP (ITEM #9) AT EACH VERTICAL RUN.

NOTE B: THE CONTRACTOR SHALL NOT WRAP THE GROUND WIRE AROUND THE BUTT OF THE POLE WHEN USING SELECT BACKFILL, STONE BACKFILL, ROCK BACKFILL, FLOWABLE BACKFILL OR CONCRETE BACKFILL UNLESS OTHERWISE REQUIRED BY THE ENGINEER OR CONSTRUCTION MANAGER.

NOTE C: ONLY TO BE USED WHEN RIGHT-OF-WAY IS SHARED WITH A PIPELINE. IN ALL OTHER INSTANCES USE STANDARD TG-02-011.

NOTE D: LARGER OR SMALLER BOLTS MAY BE REQUIRED DEPENDING ON THE DIAMETER OF THE POLE USED. SUBSTITUTE MATERIAL ID (MID) ON THE WORK ORDER COMPONENTS PAGE FOR THE LENGTH NEEDED IF DIFFERENT THAN THE GENERIC LENGTH SHOWN IN THE BILL OF MATERIALS. CONTACT SYSTEM ENGINEERING - TRANSMISSION SECTION IF YOU NEED ASSISTANCE.

NOTE E: USE TG-02-002 FOR THE DOWNGROUND TO BE INSTALLED ON THE POLE.

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Contact Engineering Standards - Transmission Section for the creation of new standards and CUs.

Drawing Scale: 1" = 30"



**TRANSMISSION  
CONSTRUCTION  
STANDARDS  
MANUAL**

**POLE BEARING PLATES AND GROUNDING  
SINGLE POLE STRUCTURES  
#2 COPPER GROUNDING  
FOR RIGHT-OF-WAY WITH COLOCATED PIPELINE**

REVISION
01
DATE
11/20/2015

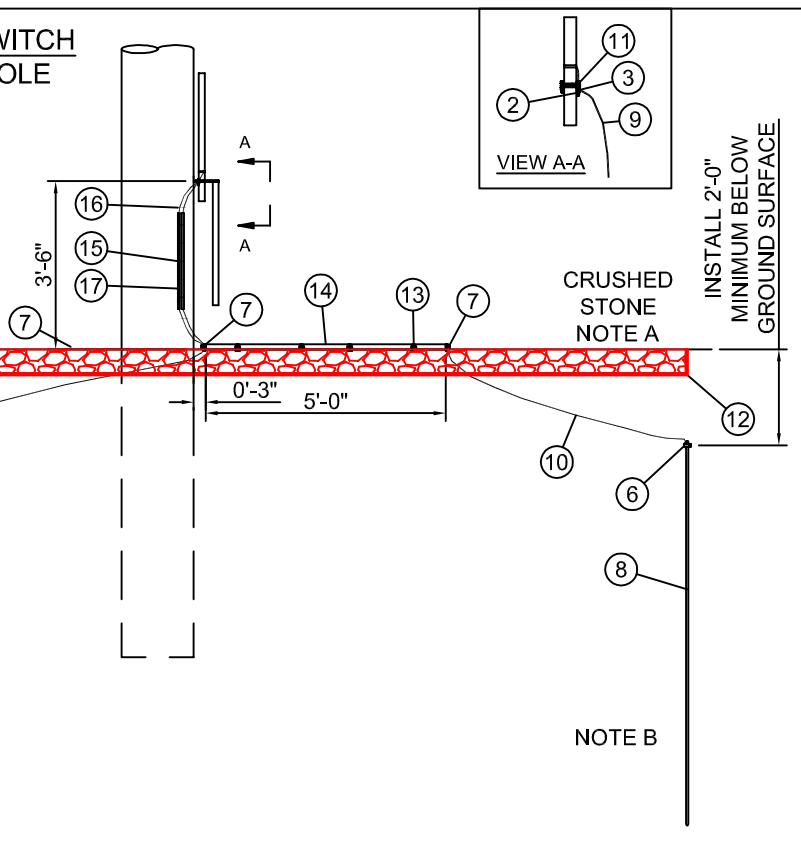
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
B. Franklin	10/17/2013	Gauvin	12/24/2014	Barry R. Hart	12/24/2014

**TM2.23.TG-04-011**

Sheet 1

**TYPICAL ONE-WAY SWITCH  
DETAIL FOR WOOD POLE**

CAUTION:  
LEAVE ENOUGH SLACK  
IN 1/0 GROUND BRAID  
(SUPPLIED BY  
SWITCH VENDOR)  
TO OPERATE  
SWITCH HANDLE



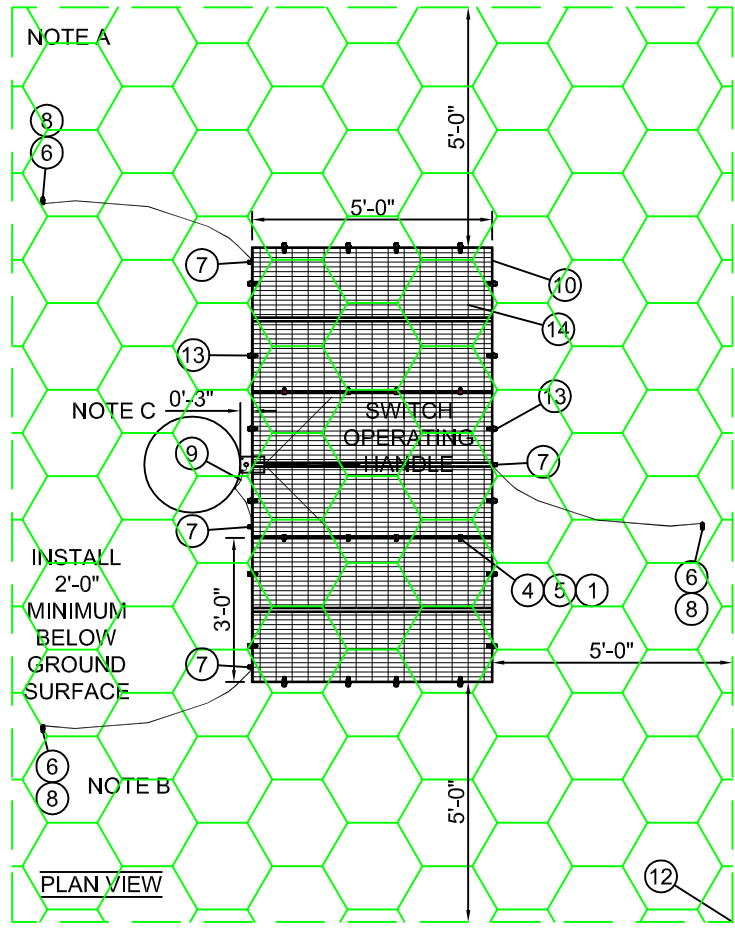
CU Function:  
U\_TL69 for 35kV & 46kV,  
U\_TG69 for 69kV through 344kV,  
U\_T345 for 345kV & greater.

CU Type:  
UC\_SHLDO

For correct CU:  
substitute 2 for NYSEG,  
3 for CMP or 4 for RG&E  
in place of asterisk (U\*\_).

mark	BILL OF MATERIAL		CU: U*CT-TG-05-001-(mark)		
	-W (wood)	-S (steel)	UOM	GLOBAL IUSA MID	
ITEM NO.	QTY	QTY	UOM	GLOBAL IUSA MID	
1	8	8	ST	30919288	NUT LOCK M-F HX FOR 1/2 BOLT
2	1	1	ST	30919293	NUT LOCK M-F SQ FOR 5/8 BOLT
3	1	1	ST	30919302	NUT SQ FOR 5/8 BOLT
4	8	8	ST	30919091	BOLT HXHD GALV 1 HXN 13 TPI 1/2 X 1-1/2
5	8	8	ST	30919395	WSHR LCK DBL COIL SPR FOR 1/2 DIA BOLT
6	3	3	ST	30925441	CLAMP GRND FOR 5/8 IN ROD
7	5	5	ST	30926042	CONN VICE TAP 5 SOL CU - 2 STR CU
8	3	3	ST	30923789	ROD GROUND CWLD 5/8 X 8 FT NO THREADS
9	5	10	FT	30924166	WIRE 1C #2 CU 7 STR SD BR
10	60	60	FT	30924223	WIRE 1C #2 CWLD SOL BARE
11	1	1	ST	30923806	CLAMP GRND WIRE U-CLIP 11/16 IN HOLE
12	0.5	0.5	ST	30918530	FABRIC GEOTEXTILE PERMEABLE 75 IN WIDE
13	20	22	ST	30925256	BOLT GRND BRZ CAPTIVE 1/2 DIA 0.162-.419
14	3	3	ST	30923812	PLATFORM SW GRNDNG STL 3F X 5F
15	2		LB	30918798	STAPLE GRND WIRE 1/4
16	3		ST	30918799	STAPLE MOULDING 5/8 SPREAD 2 IN LNG
17	4		FT	30923541	MOULDING #1 PLASTIC 1/2 IN FOR GRND WIRE

BOUNDARY FOR STONE  
AND GEOTEXTILE FABRIC



NOTE A: INSTALL A 6 INCH LAYER OF #2 CRUSHED STONE OVER A SINGLE LAYER OF GEOTEXTILE FABRIC (TYPAR 3401 OR EQUIVALENT). THE EDGES OF THE GEOTEXTILE SHEET SHALL OVERLAP 6 INCHES WHERE SHEETS MEET AND THE EDGES OF THE GEOTEXTILE FABRIC SHALL BE FOLDED UP AT THE PERIMETER OF THE FABRIC TO PREVENT SOIL FROM INFILTRATING SIDE WARDS INTO THE CRUSHED STONE LAYER. BOTH THE CRUSHED STONE AND GEOTEXTILE LAYERS SHALL EXTEND 5' BEYOND THE OUTSIDE EDGES OF THE STEEL GROUNDING PLATFORMS.

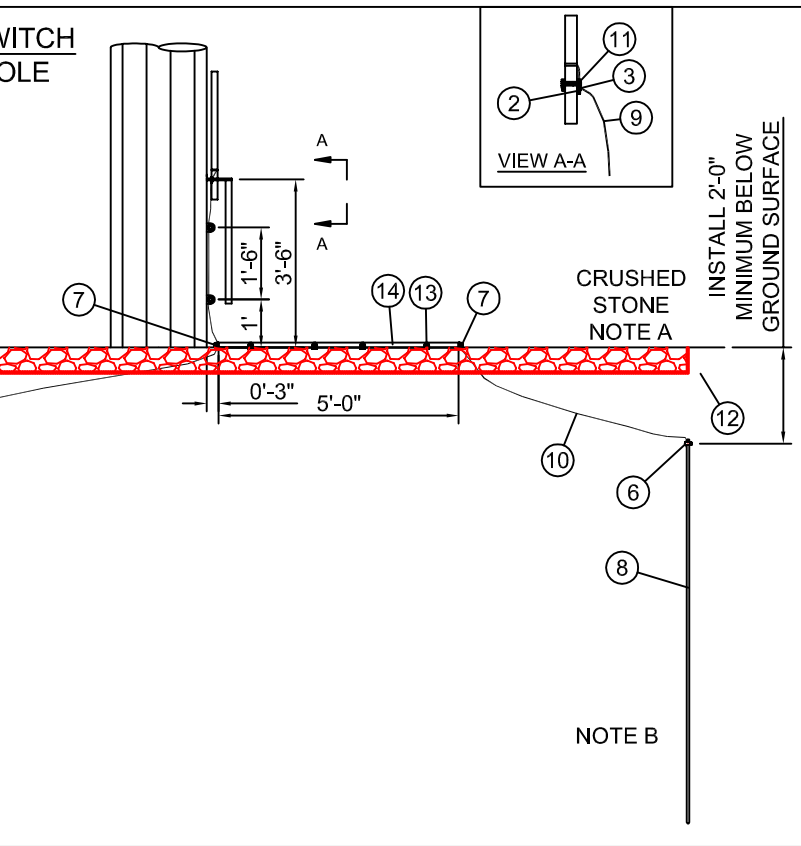
NOTE B: POSITION GROUND RODS A MINIMUM OF 6 FEET FROM THE POLE AND 10 FEET FROM EACH OTHER. AFTER ALL GROUNDING IS CONNECTED, CHECK THE GROUND RESISTANCE WITH A MEGGER NULL BALANCE EARTH TESTER. IF THE METER READS MORE THAN 15 OHMS, INSTALL ADDITIONAL GROUND RODS.

NOTE C: PLATFORMS ADJACENT TO POLE SHALL BE NO MORE THAN 3 INCHES FROM THE FACE OF THE POLE.

NOTE D: DRILL ADDITIONAL 9/16" HOLES AS NEEDED FOR BOLTING PLATFORMS TOGETHER.

**TYPICAL ONE-WAY SWITCH  
DETAIL FOR STEEL POLE**

CAUTION:  
LEAVE ENOUGH SLACK  
IN 1/0 GROUND BRAID  
(SUPPLIED BY  
SWITCH VENDOR)  
TO OPERATE  
SWITCH HANDLE



OTHER STANDARDS DRAWINGS REQUIRED:

- TM2.23.TG-02-001 GROUND ROD AND GROUNDING DETAIL - STEEL POLES
- TM2.23.TG-02-002 GROUND ROD AND GROUNDING DETAIL - SINGLE WOOD POLE
- TM2.23.TD-03-002 FOUNDATION AND BACKFILL H1 & GREATER WOOD OR DIRECT EMBED STEEL POLES
- TM2.23.TD-03-003 FOUNDATION AND BACKFILL MATERIALS

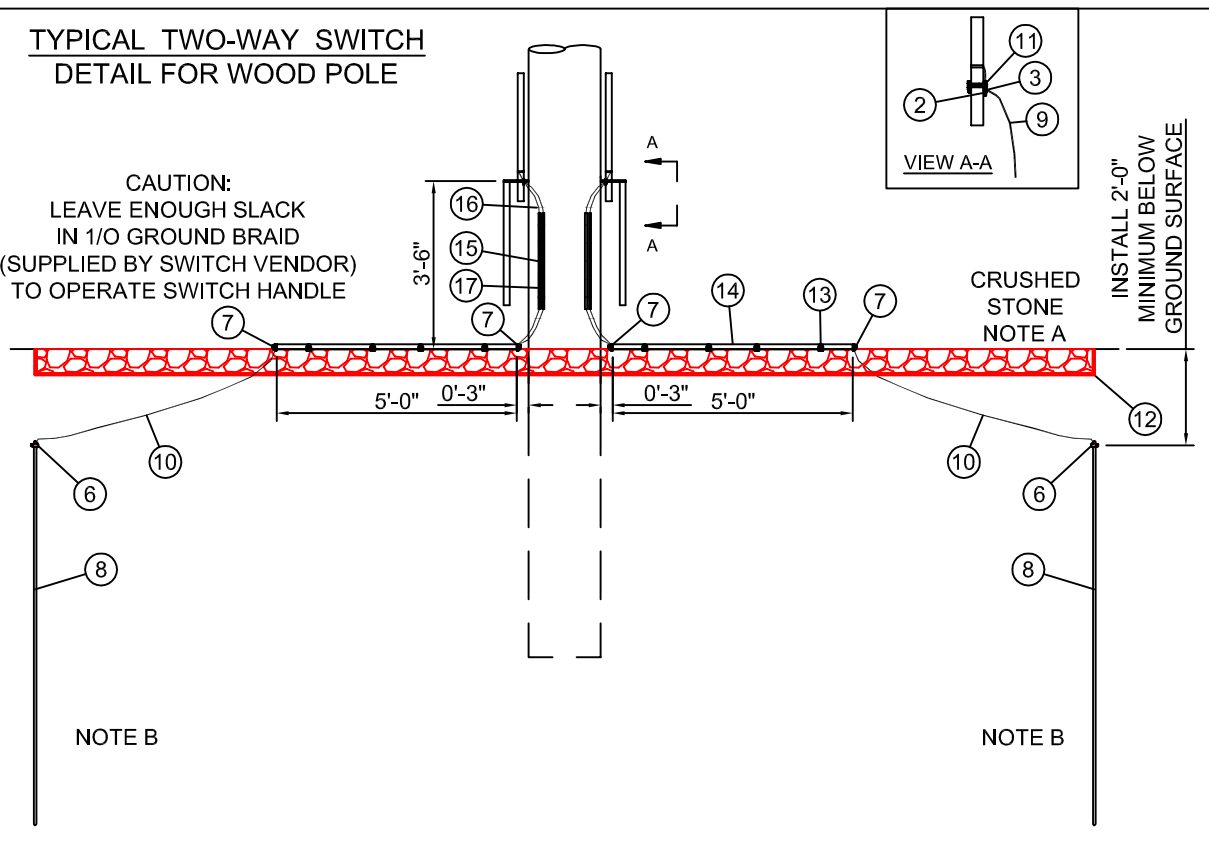
Contact Engineering Standards - Transmission for the creation of new standards and CUs.				Drawing Scale: 1/4" = 1'-0"	
	IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL	TRANSMISSION GROUNDING GROUNDING FOR ONE-WAY SWITCH GROUNDING PLATFORM DETAIL			Revision 01
					Date 11/10/2015
Drwn. By: L.A. Best	Date Dr.: 5/4/2015	Checked By: Gauvin/Becken/Hart	Date Ck.: 11/10/2015	Approved By: Barry R. Hart	Date App.: 11/10/2015
TM2.23.TG-05-001					Sheet 1

THIS IS A COMPUTER GENERATED  
DRAWING - DO NOT REVISE MANUALLY

ANSI B  
11" X 17"

**TYPICAL TWO-WAY SWITCH  
DETAIL FOR WOOD POLE**

CAUTION:  
LEAVE ENOUGH SLACK  
IN 1/0 GROUND BRAID  
(SUPPLIED BY SWITCH VENDOR)  
TO OPERATE SWITCH HANDLE

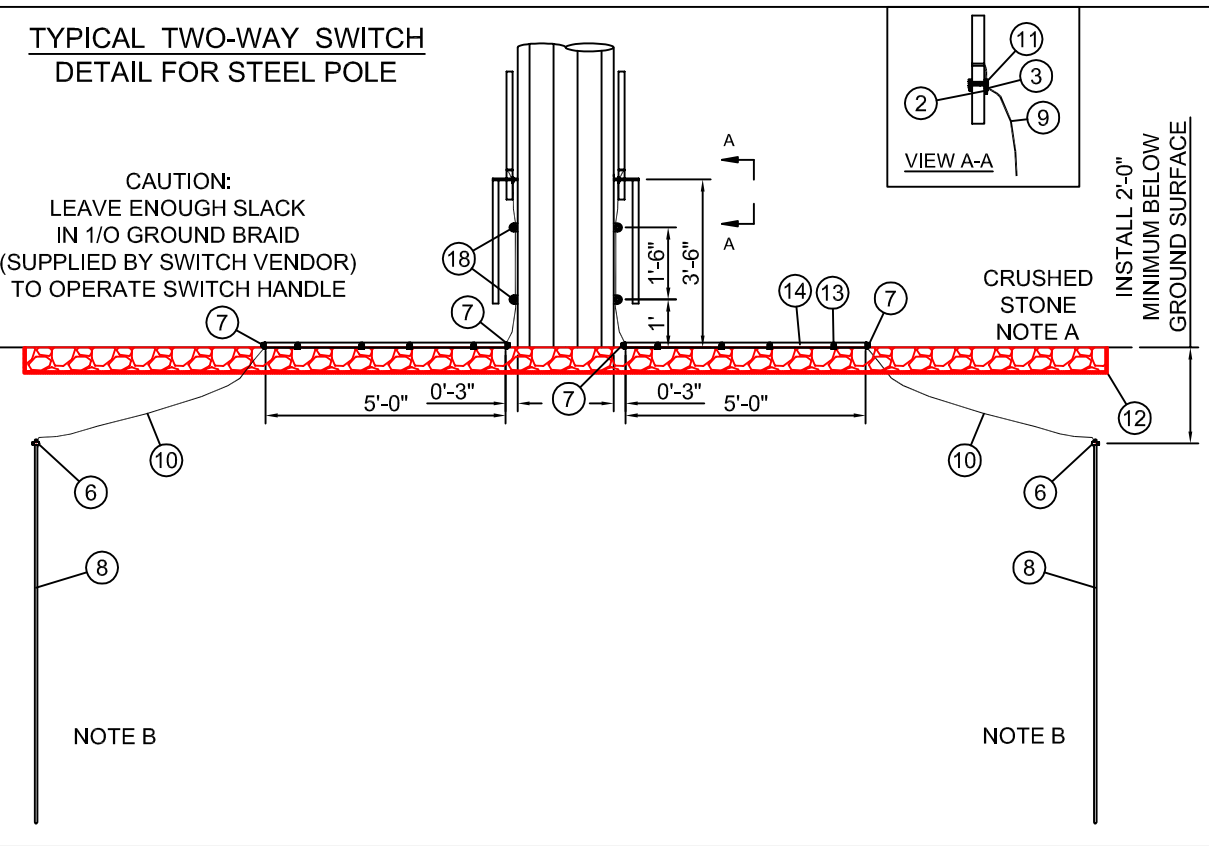


NOTE B

NOTE B

**TYPICAL TWO-WAY SWITCH  
DETAIL FOR STEEL POLE**

CAUTION:  
LEAVE ENOUGH SLACK  
IN 1/0 GROUND BRAID  
(SUPPLIED BY SWITCH VENDOR)  
TO OPERATE SWITCH HANDLE



NOTE B

NOTE B

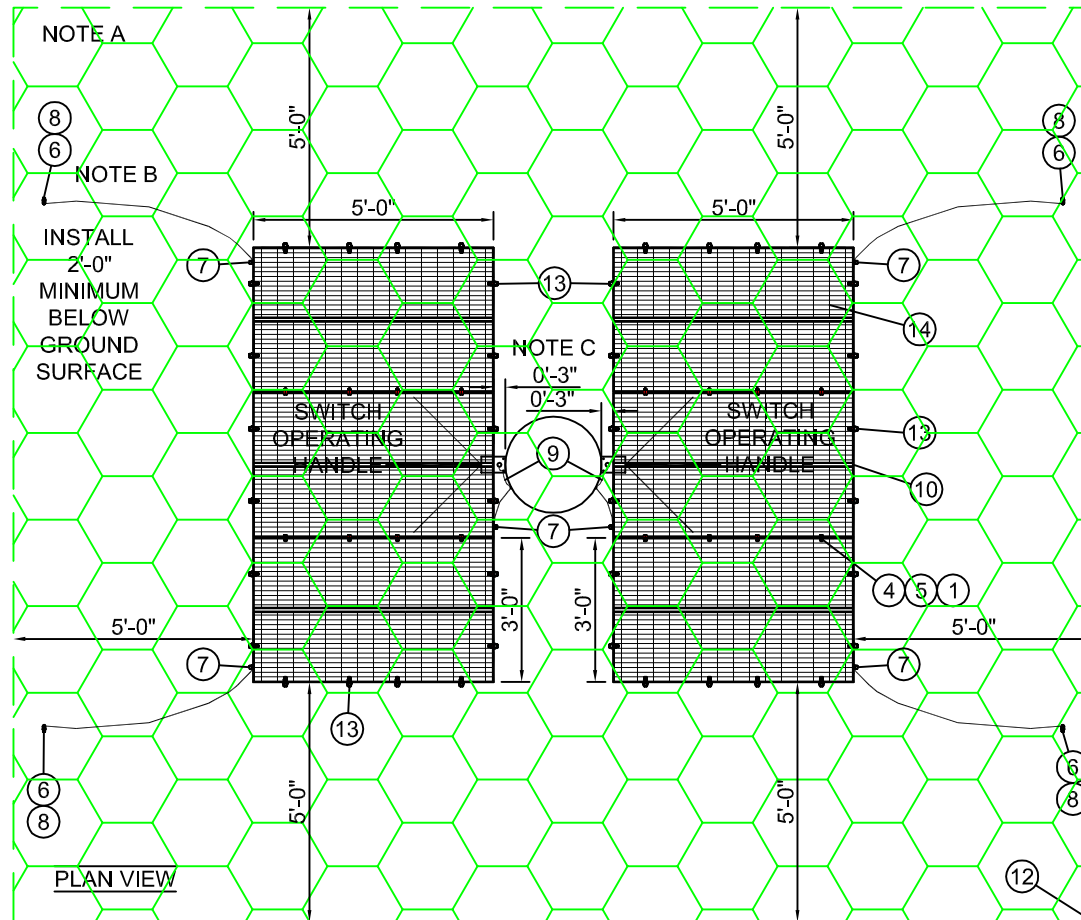
CU Function:  
U\_TL69 for 35kV & 46kV,  
U\_TG69 for 69kV through 344kV,  
U\_T345 for 345kV & greater.

CU Type:  
UC\_SHLDO

For correct CU:  
substitute 2 for NYSEG,  
3 for CMP or 4 for RG&E  
in place of asterisk (U\*\_).

mark	-W (wood)		-S (steel)		BILL OF MATERIAL	
	QTY	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-05-002-(mark)	
1	16	16	ST	30919288	NUT LOCK M-F HX FOR 1/2 BOLT	
2	2	2	ST	30919293	NUT LOCK M-F SQ FOR 5/8 BOLT	
3	2	2	ST	30919302	NUT SQ FOR 5/8 BOLT	
4	16	16	ST	30919091	BOLT HXHD GALV 1 HXN 13 TPI 1/2 X 1-1/2	
5	16	16	ST	30919395	WSHR LCK DBL COIL SPR FOR 1/2 DIA BOLT	
6	4	4	ST	30925441	CLAMP GRND FOR 5/8 IN ROD	
7	6	6	ST	30926042	CONN VICE TAP 5 SOL CU - 2 STR CU	
8	4	4	ST	30923789	ROD GROUND CWLD 5/8 X 8 FT NO THREADS	
9	10	10	FT	30924166	WIRE 1C #2 CU 7 STR SD BR	
10	100	100	FT	30924223	WIRE 1C #2 CWLD SOL BARE	
11	2	2	ST	30923806	CLAMP GRND WIRE U-CLIP 11/16 IN HOLE	
12	0.75	0.75	ST	30918530	FABRIC GEOTEXTILE PERMEABLE 75 IN WIDE	
13	20	24	ST	30925256	BOLT GRND BRZ CAPTIVE 1/2 DIA 0.162-.419	
14	6	6	ST	30923812	PLATFORM SW GRNDNG STL 3F X 5F	
15	4		LB	30918798	STAPLE GRND WIRE 1/4	
16	6		ST	30918799	STAPLE MOULDING 5/8 SPREAD 2 IN LNG	
17	8		FT	30923541	MOULDING #1 PLASTIC 1/2 IN FOR GRND WIRE	

BOUNDARY FOR STONE  
AND GEOTEXTILE FABRIC



NOTE A: INSTALL A 6 INCH LAYER OF #2 CRUSHED STONE OVER A SINGLE LAYER OF GEOTEXTILE FABRIC (TYPAR 3401 OR EQUIVALENT). THE EDGES OF THE GEOTEXTILE SHEET SHALL OVERLAP 6 INCHES WHERE SHEETS MEET AND THE EDGES OF THE GEOTEXTILE FABRIC SHALL BE FOLDED UP AT THE PERIMETER OF THE FABRIC TO PREVENT SOIL FROM INFILTRATING SIDE WARDS INTO THE CRUSHED STONE LAYER. BOTH THE CRUSHED STONE AND GEOTEXTILE LAYERS SHALL EXTEND 5' BEYOND THE OUTSIDE EDGES OF THE STEEL GROUNDING PLATFORMS.

NOTE B: POSITION GROUND RODS A MINIMUM OF 6 FEET FROM THE POLE AND 10 FEET FROM EACH OTHER. AFTER ALL GROUNDING IS CONNECTED, CHECK THE GROUND RESISTANCE WITH A MEGGER NULL BALANCE EARTH TESTER. IF THE METER READS MORE THAN 15 OHMS, INSTALL ADDITIONAL GROUND RODS.

NOTE C: PLATFORMS ADJACENT TO POLE SHALL BE NO MORE THAN 3 INCHES FROM THE FACE OF THE POLE.

NOTE D: DRILL ADDITIONAL 9/16" HOLES AS NEEDED FOR BOLTING PLATFORMS TOGETHER.

**OTHER STANDARDS DRAWINGS REQUIRED:**

- TM2.23.TG-02-001 GROUND ROD AND GROUNDING DETAIL - STEEL POLES
- TM2.23.TG-02-002 GROUND ROD AND GROUNDING DETAIL - SINGLE WOOD POLE
- TM2.23.TD-03-002 FOUNDATION AND BACKFILL H1 & GREATER WOOD OR DIRECT EMBED STEEL POLES
- TM2.23.TD-03-003 FOUNDATION AND BACKFILL MATERIALS

REFER TO GROUNDING STANDARDS TM2.23.TG-01-001 THROUGH TM2.23.TG-01-007  
FOR ADDITIONAL GROUNDING AND COUNTERPOISE INFORMATION

Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: 1/4" = 1'-0"



IBERDROLA USA  
TRANSMISSION  
CONSTRUCTION  
STANDARDS  
MANUAL

TRANSMISSION GROUNDING  
GROUNDING FOR TWO-WAY SWITCH  
GROUNDING PLATFORM DETAIL

Revision  
01  
Date  
11/10/2015

Drwn. By: L.A. Best  
Date Dr.: 5/4/2015

Checked By: Gauvin/Becken/Hart

Date Ck.: 11/10/2015

Approved By: Barry R. Hart

Date App.: 11/10/2015

TM2.23.TG-05-002

Sheet 1

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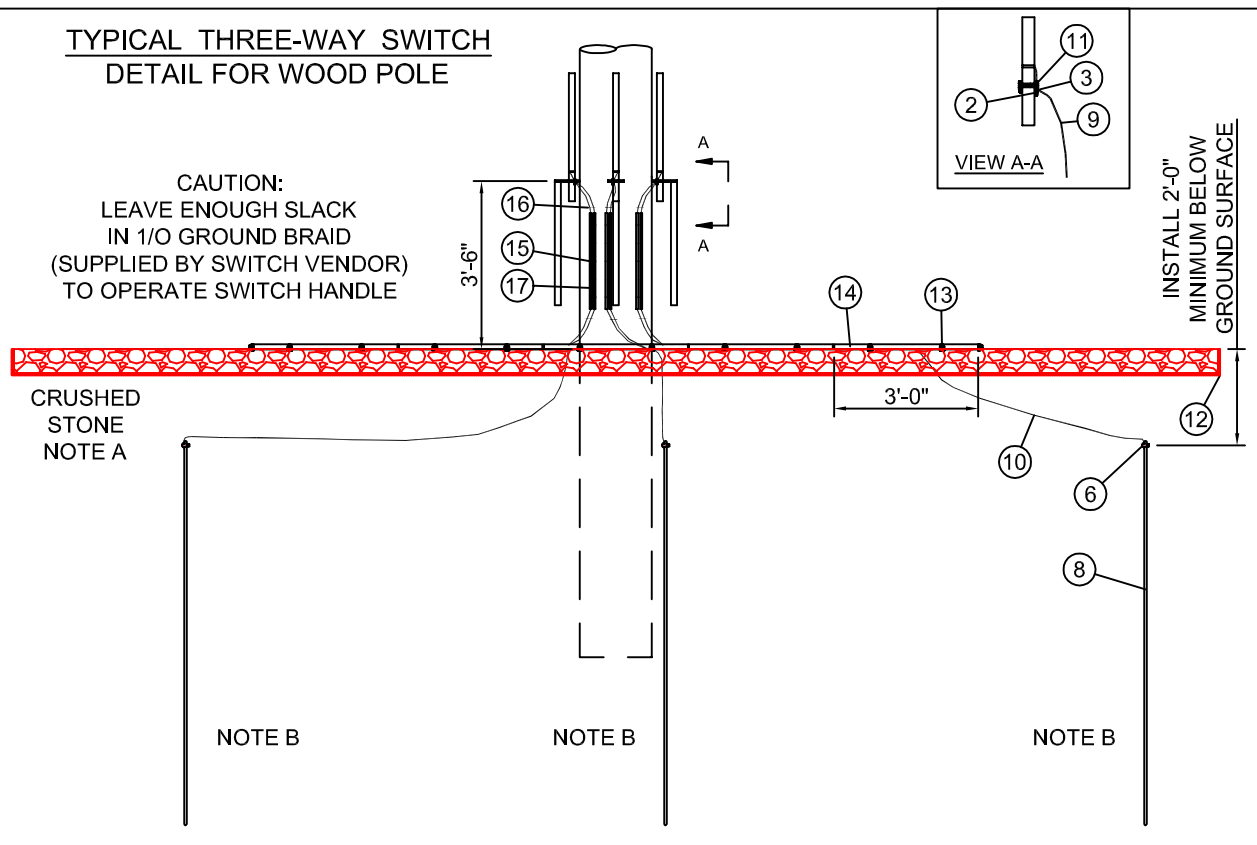
ANSI B  
11" X 17"

THIS IS A COMPUTER GENERATED DRAWING - DO NOT REVISE MANUALLY

ANSI B 11" X 17"

**TYPICAL THREE-WAY SWITCH  
DETAIL FOR WOOD POLE**

CAUTION:  
LEAVE ENOUGH SLACK  
IN 1/0 GROUND BRAID  
(SUPPLIED BY SWITCH VENDOR)  
TO OPERATE SWITCH HANDLE



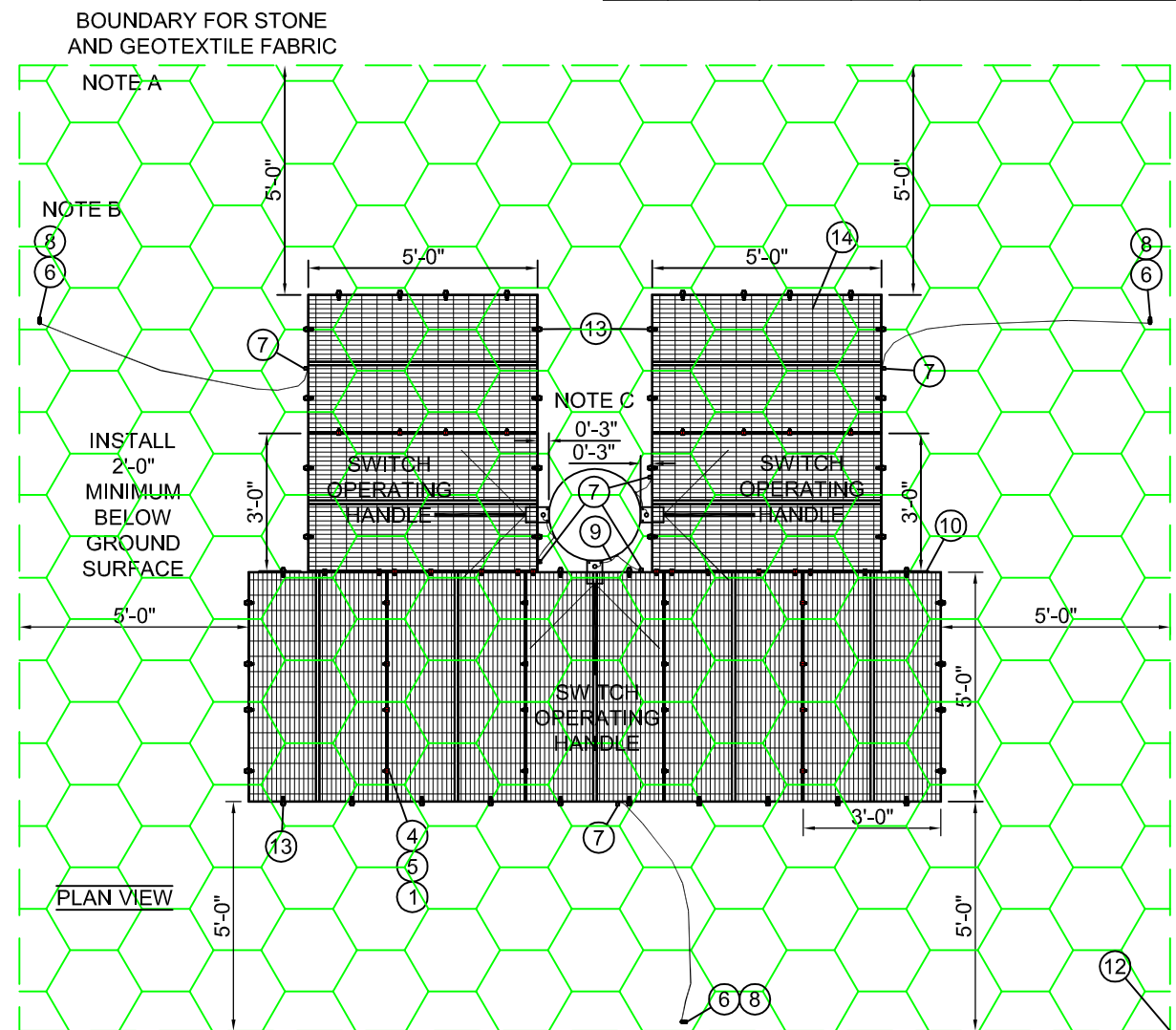
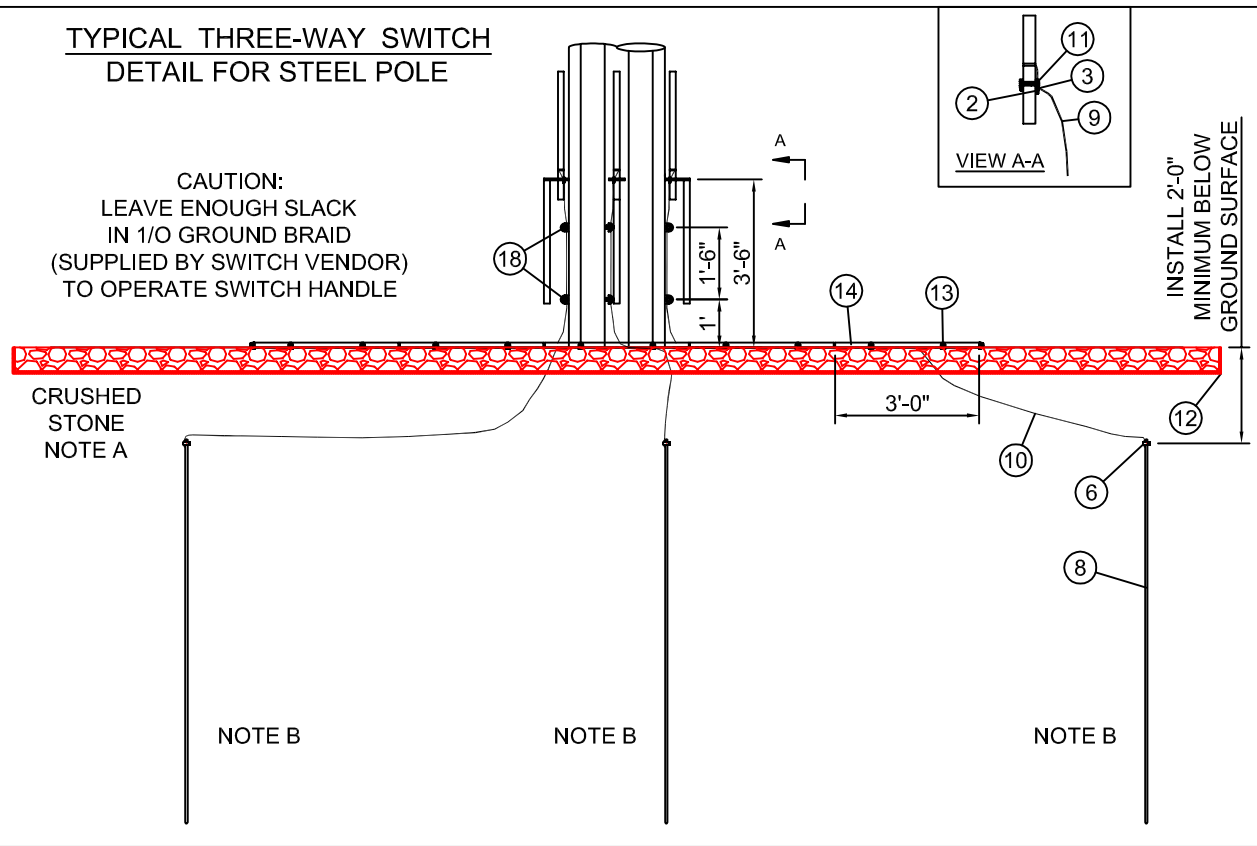
NOTE A: INSTALL A 6 INCH LAYER OF #2 CRUSHED STONE OVER A SINGLE LAYER OF GEOTEXTILE FABRIC (TYPAR 3401 OR EQUIVALENT). THE EDGES OF THE GEOTEXTILE SHEET SHALL OVERLAP 6 INCHES WHERE SHEETS MEET AND THE EDGES OF THE GEOTEXTILE FABRIC SHALL BE FOLDED UP AT THE PERIMETER OF THE FABRIC TO PREVENT SOIL FROM INFILTRATING SIDE WARDS INTO THE CRUSHED STONE LAYER. BOTH THE CRUSHED STONE AND GEOTEXTILE LAYERS SHALL EXTEND 5' BEYOND THE OUTSIDE EDGES OF THE STEEL GROUNDING PLATFORMS.

NOTE B: POSITION GROUND RODS A MINIMUM OF 6 FEET FROM THE POLE AND 10 FEET FROM EACH OTHER. AFTER ALL GROUNDING IS CONNECTED, CHECK THE GROUND RESISTANCE WITH A MEGGER NULL BALANCE EARTH TESTER. IF THE METER READS MORE THAN 15 OHMS, INSTALL ADDITIONAL GROUND RODS.

Mark	-W (wood)	-S (steel)	BILL OF MATERIAL		
ITEM NO.	QTY	QTY	UOM	GLOBAL IUSA MID	CU: U*CT-TG-05-003-(mark)
1	38	38	ST	30919288	NUT LOCK M-F HX FOR 1/2 BOLT
2	3	3	ST	30919293	NUT LOCK M-F SQ FOR 5/8 BOLT
3	3	3	ST	30919302	NUT SQ FOR 5/8 BOLT
4	38	38	ST	30919091	BOLT HXHD GALV 1 HXN 13 TPI 1/2 X 1-1/2
5	38	38	ST	30919395	WSHR LCK DBL COIL SPR FOR 1/2 DIA BOLT
6	3	3	ST	30925441	CLAMP GRND FOR 5/8 IN ROD
7	6	6	ST	30926042	CONN VICE TAP 5 SOL CU - 2 STR CU
8	3	3	ST	30923789	ROD GROUND CWLD 5/8 X 8 FT NO THREADS
9	15	15	FT	30924166	WIRE 1C #2 CU 7 STR SD BR
10	100	100	FT	30924223	WIRE 1C #2 CWLD SOL BARE
11	3	3	ST	30923806	CLAMP GRND WIRE U-CLIP 11/16 IN HOLE
12	1	1	ST	30918530	FABRIC GEOTEXTILE PERMEABLE 75 IN WIDE
13	46	52	ST	30925256	BOLT GRND BRZ CAPTIVE 1/2 DIA 0.162-.419
14	9	9	ST	30923812	PLATFORM SW GRNDNG STL 3F X 5F
15	6		LB	30918798	STAPLE GRND WIRE 1/4
16	9		ST	30918799	STAPLE MOULDING 5/8 SPREAD 2 IN LNG
17	12		FT	30923541	MOULDING #1 PLASTIC 1/2 IN FOR GRND WIRE

**TYPICAL THREE-WAY SWITCH  
DETAIL FOR STEEL POLE**

CAUTION:  
LEAVE ENOUGH SLACK  
IN 1/0 GROUND BRAID  
(SUPPLIED BY SWITCH VENDOR)  
TO OPERATE SWITCH HANDLE



CU Type:  
UC\_SHLDO

CU Function:  
U\_TL69 for 35kV & 46kV,  
U\_TG69 for 69kV through 344kV,  
U\_T345 for 345kV & greater.

For correct CU:  
substitute 2 for NYSEG,  
3 for CMP or 4 for RG&E  
in place of asterisk (U\*\_).

NOTE C: PLATFORMS ADJACENT TO POLE SHALL BE NO MORE THAN 3 INCHES FROM THE FACE OF THE POLE.

NOTE D: DRILL ADDITIONAL 9/16" HOLES AS NEEDED FOR BOLTING PLATFORMS TOGETHER.

OTHER STANDARDS DRAWINGS REQUIRED:  
 TM2.23.TG-02-001 GROUND ROD AND GROUNDING DETAIL - STEEL POLES  
 TM2.23.TG-02-002 GROUND ROD AND GROUNDING DETAIL - SINGLE WOOD POLE  
 TM2.23.TD-03-002 FOUNDATION AND BACKFILL H1 & GREATER WOOD OR DIRECT EMBED STEEL POLES  
 TM2.23.TD-03-003 FOUNDATION AND BACKFILL MATERIALS

REFER TO GROUNDING STANDARDS TM2.23.TG-01-001 THROUGH TM2.23.TG-01-007 FOR ADDITIONAL GROUNDING AND COUNTERPOISE INFORMATION

Contact Engineering Standards - Transmission for the creation of new standards and CUs.				Drawing Scale: 1/4" = 1'-0"	
	IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL		TRANSMISSION GROUNDING GROUNDING FOR THREE-WAY SWITCH GROUNDING PLATFORM DETAIL		Revision 01
	Drwn. By: L.A. Best	Date Dr.: 5/4/2015	Checked By: Gauvin/Becken/Hart	Date Ck.: 11/10/2015	Approved By: Barry R. Hart
<p style="text-align: center;"><b>TM2.23.TG-05-003</b></p>					Sheet 1

CU Function:  
 U\_TL69 for 35kV & 46kV,  
 U\_TG69 for 69kV thru 344kV,  
 U\_T345 for 345kV & greater.

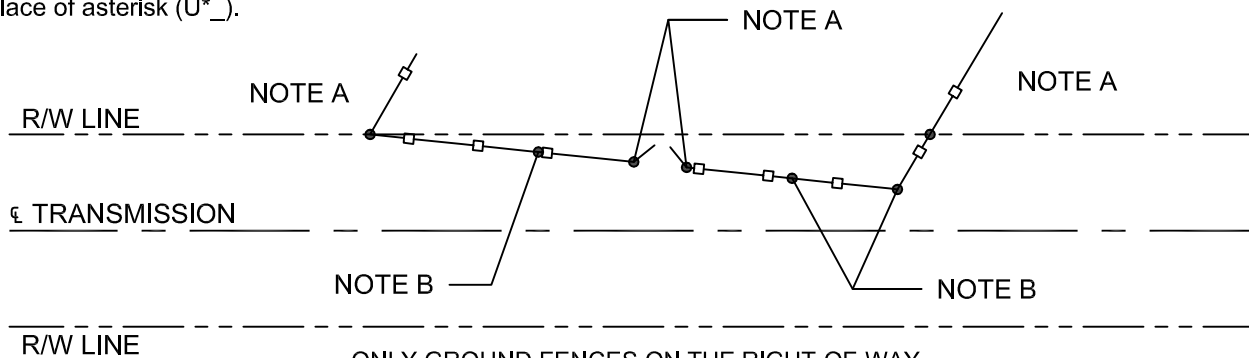
For correct CU:  
 substitute 2 for NYSEG,  
 3 for CMP or 4 for RG&E  
 in place of asterisk (U\*\_).

**BILL OF MATERIAL**

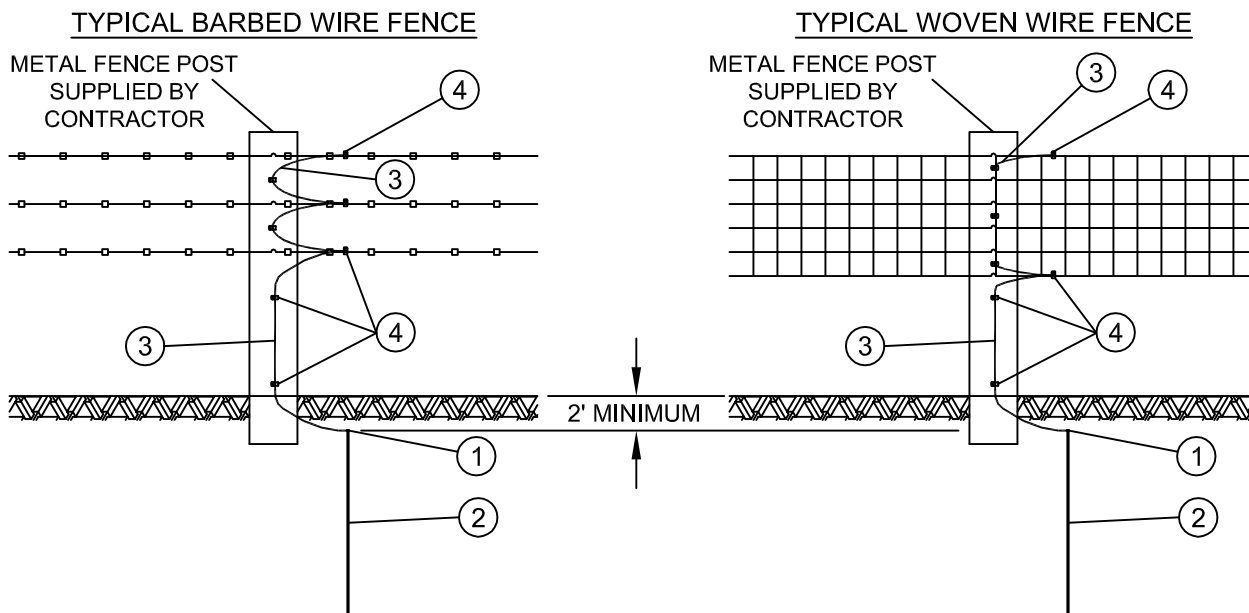
CU Type: UC\_SHLDO

CU: U\*CT-TG-06-001

ITEM NO.	QTY	UOM	GLOBAL IUSA MID	
1	1	ST	30925441	CLAMP GRND FOR 5/8 IN ROD
2	1	ST	30923789	ROD GROUND CWLD 5/8 X 8 FT NO THREADS
3	10	FT	30924223	WIRE 1C # 2 CWLD SOL BARE
4	7	ST	30926045	CONN VICE TAP WO SPCR PLATE



ONLY GROUND FENCES ON THE RIGHT-OF-WAY  
 WHEN SPECIFIED ON PLAN & PROFILE SHEETS



NOTE A: GROUND FENCE WHEN ENTERING AND LEAVING RIGHT-OF-WAY AND BOTH SIDES OF ANY BREAK POINT (SUCH AS A GATE). BOND GATES TO ADJACENT POSTS WITH BRAIDED GROUND STRAP.

NOTE B: GROUND FENCE AT 300' INTERVALS. IF MORE THAN ONE CIRCUIT, GROUND AT 200' INTERVALS.

Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: not to scale



IBERDROLA USA  
 TRANSMISSION  
 CONSTRUCTION  
 STANDARDS  
 MANUAL

TRANSMISSION GROUNDING  
 NON-ELECTRIC FENCES  
 ON TRANSMISSION RIGHT-OF-WAY

Revision	01
DATE	11/10/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
L.A. Best	5/4/2015	Gauvin/Becken/Hart	11/10/2015	Barry R. Hart	11/10/2015

TM2.23.TG-06-001

Sheet 1

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ANSI A  
 8-1/2" X 11"



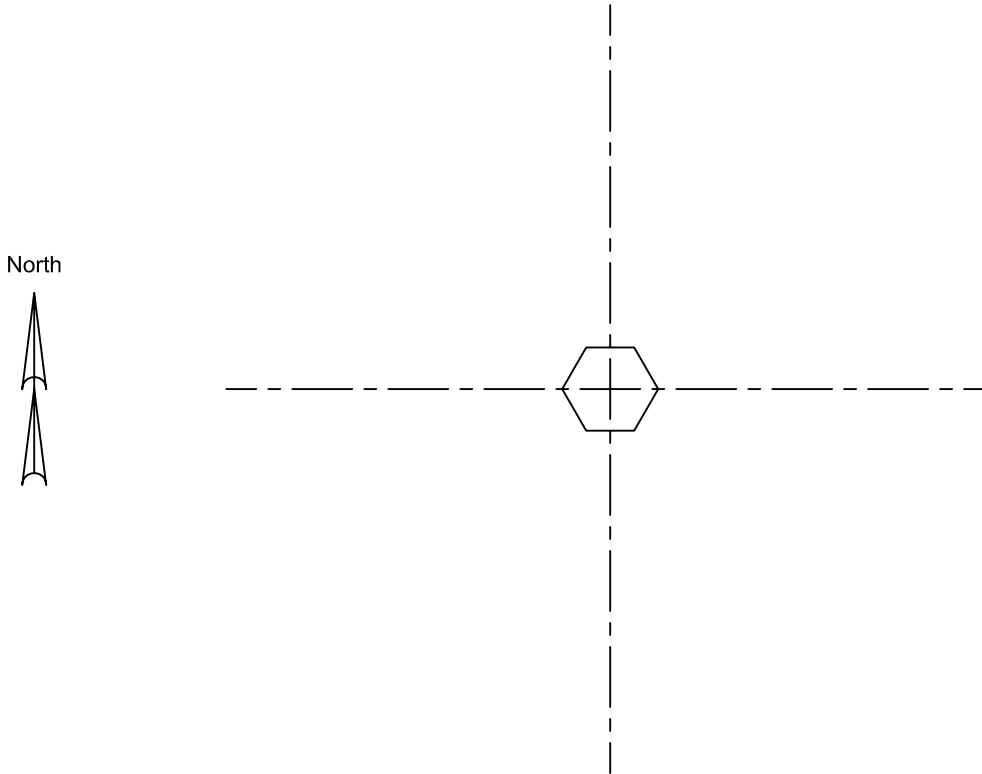
# STRUCTURE GROUND RESISTANCE RECORD - STEEL POLES

Job: \_\_\_\_\_

Grounding Done By: \_\_\_\_\_

Str. No.	Structure Type	Ground System Used (note C)	Depth of Ground Rod (if min. depth is not obtained) (note B)	Type of Soil	Moisture Condition of Soil	Measured Resistance (note A)	Date

Diagram of Structure  
(Show location and number of ground rods and counterpoise, if any)



Note A: Desirable maximum value = 25 Ohms


Note B: TG-01-001      Grounding Procedure

Note C: TG-01-002 thru TG-01-007      Additional Grounding details  
 TG-02-001      Ground Rod & Ground Wire for Steel Poles

RETURN COMPLETED FORM TO:  
 ELECTRIC SYSTEM ENGINEERING DEPARTMENT - TRANSMISSION SECTION

Contact Engineering Standards - Transmission for the creation of new standards and CUs.

Drawing Scale: N/A

	IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL	TRANSMISSION GROUNDING STRUCTURE GROUND RESISTANCE RECORD STEEL POLES	Revision 00				
			DATE 12/13/2012				
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:	TM2.23.TG-09-002	Sheet 1
L.A. Best	11/2/2011	Shepard/Becken/Hart	12/15/2011	Barry R. Hart	12/13/2012		

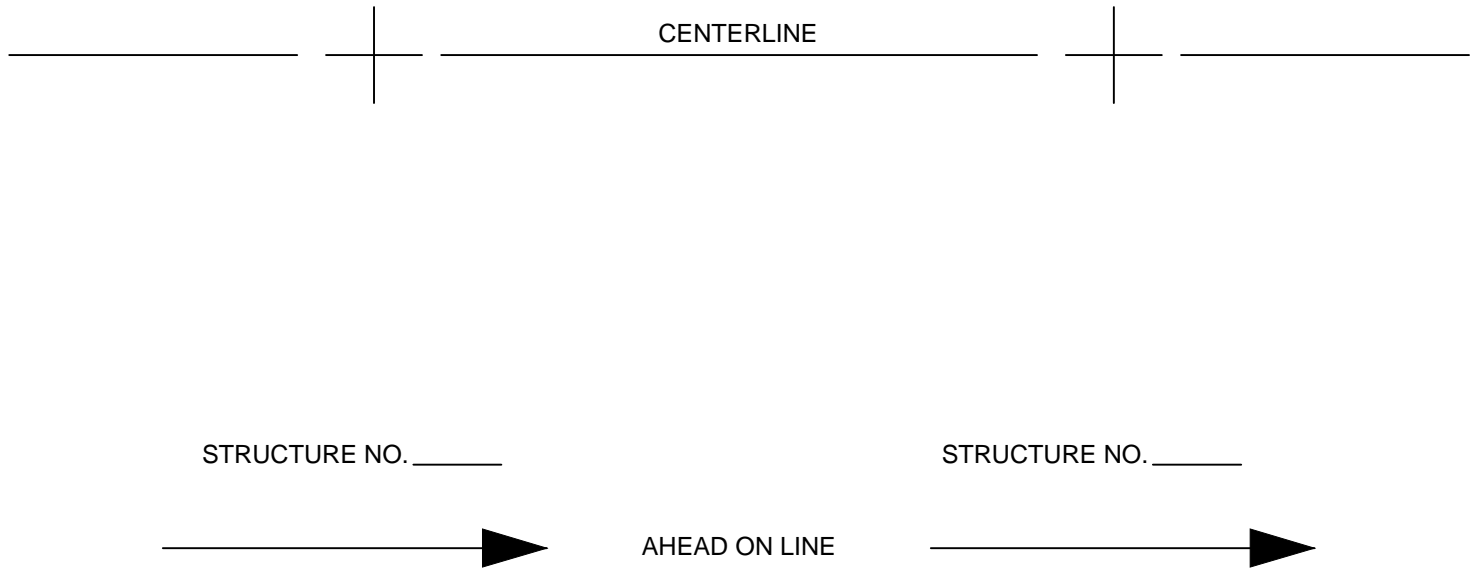
THIS IS A COMPUTER GENERATED DRAWING - DO NOT REVISE MANUALLY

ANSIA 8-1/2" X 11"

## FENCE GROUNDING REPORT

LINE SECTION NAME:		STRUCTURE NO'S:	
CONTRACTOR:		WEEK ENDING:	
APPROX STATION OF FENCE	NUMBER OF GROUNDS INSTALLED	DATE GROUNDING COMPLETED	COMMENTS

### SKETCH PLAN VIEW OF STRUCTURES




(SHOW FENCE AND GROUNDING IN RELATION TO THE TRANSMISSION LINE. SHOW DISTANCES.)

CONTRACTOR SIGNATURE:	DATE:

THIS IS A COMPUTER GENERATED DRAWING - DO NOT REVISE MANUALLY

Contact Engineering Standards - Transmission Section for the creation of new standards and CUs.

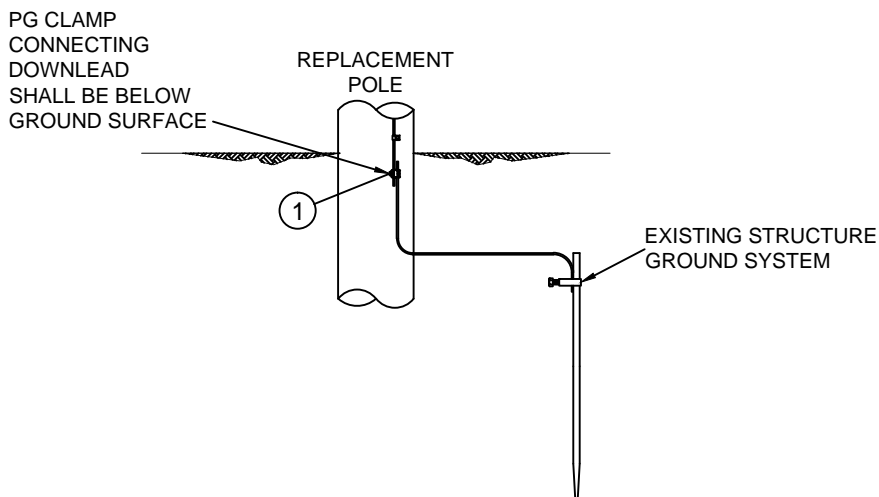
Drawing Scale: N/A

	TRANSMISSION CONSTRUCTION STANDARDS MANUAL	GROUNDING FENCE GROUNDING REPORT FOR TRANSMISSION PROJECTS	REVISION 00				
			DATE 5/21/2015				
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:	<b>TM2.23.TG-09-003</b>	Sheet 1
B. Franklin	5/31/2012	Becken/Hart	12/24/2014	Barry R. Hart	12/24/2014		



**BILL OF MATERIAL (CU Type: POLE)**

ITEM NO.	QTY.	UOM	IUSA MID	<b>CU: C*CT-MG-02-009</b>
1	1	EA	6000113712	WISE, PAR GROOVE GRND CNCTR BRZ, NO. 2 AWG CWLD



CU FUNCTION: TL69 FOR 35KV & 46KV, TG69 FOR 35KV THRU 344KV, T345 FOR 345KV & GREATER.

FOR CORRECT CU: SUBSTITUTE 5 FOR NYSEG, 6 FOR CMP OR 9 FOR RG&E IN PLACE OF ASTERISK (C\*\_).

NOTE A: THIS IS ONLY TO BE USED WHEN REPLACING A POLE AND CONNECTING TO THE EXISTING GROUNDING SYSTEM.

THIS IS A COMPUTER GENERATED DRAWING - DO NOT REVISE MANUALLY

Contact Engineering Standards - Transmission Section for the creation of new standards and CUs.

Drawing Scale: 1" = 30"



**TRANSMISSION  
CONSTRUCTION  
STANDARDS  
MANUAL**

**CONNECTION TO EXISTING GROUNDING  
FOR REPLACEMENT OF POLES AND/OR STRUCTURES  
MAINTENANCE ONLY**

REVISION
00
DATE
5/21/2015

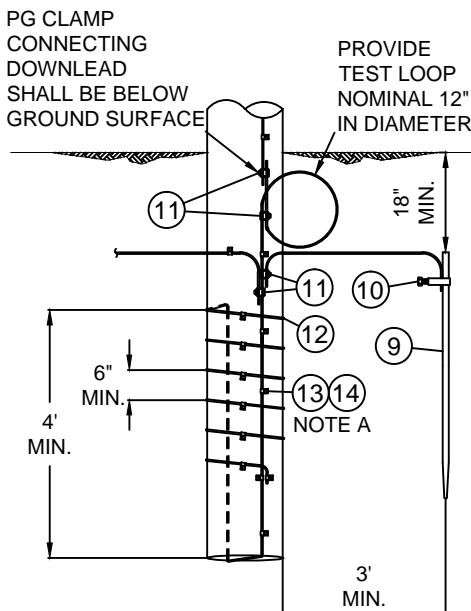
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
B. Franklin	11/16/2012	Shepard/Becken/Hart	12/24/2014	Barry R. Hart	12/24/2014

**TM2.23.MG-02-009**

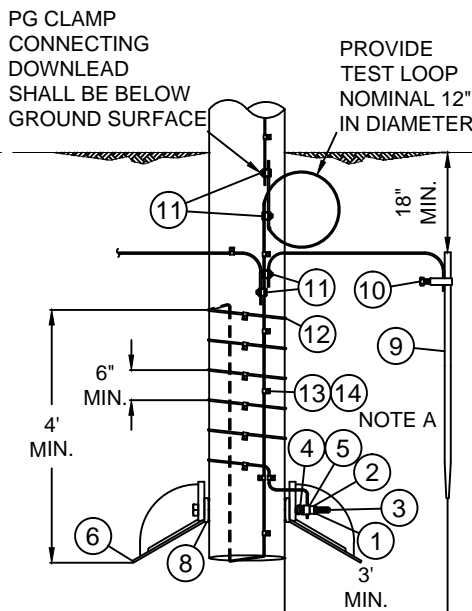
Sheet 1

**BILL OF MATERIAL (CU Type: POLE)**

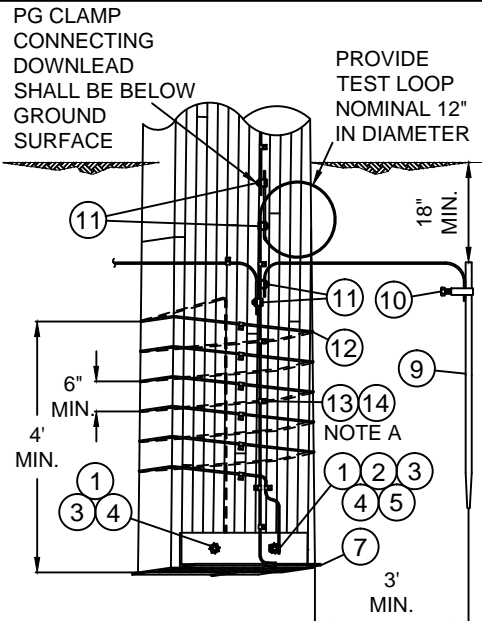
ITEM NO.	SUFFIX -R	SUFFIX -P	SUFFIX -L	UOM	IUSA MID	CU: C*CT-MG-02-020
1	-	1	2	EA	1000910800	NUT LCK MF SQ 7/8 BOLT GALV
2	-	1	1	EA	6000273770	NUT SQ 7/8 BOLT GALV
3	-	1	2	EA	1035475022	BOLT SQ HEAD 7/8 X 22 W/ SQ NUT (NOTE D)
4	-	1	2	EA	6000274612	WASHER HELICAL (7/8")
5	-	1	1	EA	1036200007	CLMP GRND WIRE U-CLIP 15/16 H
6	-	2	-	EA	6000270110	PLATE POLE BEARING
7	-	-	2	EA	NON-STOCK	STEEL ANGLE 6X6X1/4, W 2x 15/16" MTG HOLES
8	-	2	-	EA	6000273255	GAIN GRID, 4 X 6-3/4 IN, BONDING, 1-1/16 IN BONDING HOLES
9	1	1	1	EA	1007260000	GRND ROD 5/8 X 8F CWLD NO THREAD
10	1	1	1	EA	1000909100	CLMP GRND NO. 2 CWELD TO 5/8 IN GROUND ROD
11	4	4	4	EA	6000113712	WISE, PAR GROOVE GRND CNCTR BRZ, NO. 2 AWG CWLD
12	50	50	50	FT	752373	WIRE CWLD #2 SOL BARE DSA 40% LC
13	1	1	1	LB	1023091010	NAIL CWLD 16D 3-1/2" LNG
14	20	20	20	EA	6000251033	CLIP CU GRND WIRE



**ROUND WOOD POLE WITHOUT BEARING PLATES SUFFIX -R**



**ROUND WOOD POLE WITH BEARING PLATES SUFFIX -P**



**LAMINATED WOOD POLE WITH BEARING PLATES SUFFIX -L**

CU FUNCTION: TL69 FOR 35KV & 46KV, TG69 FOR 35KV THRU 344KV, T345 FOR 345KV & GREATER.

FOR CORRECT CU: SUBSTITUTE 5 FOR NYSEG, 6 FOR CMP OR 9 FOR RG&E IN PLACE OF ASTERISK (C\*\_).

NOTE A: WRAP GROUND WIRE (ITEM #12) AROUND POLE MINIMUM OF FIVE (5) TURNS. ATTACH GROUND WIRE CLIP (ITEM #14) AT EACH VERTICAL RUN.

NOTE B: THE CONTRACTOR SHALL NOT WRAP THE GROUND WIRE AROUND THE BUTT OF THE POLE WHEN USING SELECT BACKFILL, STONE BACKFILL, ROCK BACKFILL, FLOWABLE BACKFILL OR CONCRETE BACKFILL UNLESS OTHERWISE REQUIRED BY THE ENGINEER OR CONSTRUCTION MANAGER.

NOTE C: WHEN RIGHT-OF-WAY IS SHARED WITH A PIPELINE USE MG-04-020. THE CATHODIC PROTECTION OF THE PIPELINE WILL OTHERWISE PREMATURELY CORRODE THE COPPERWELD WIRE OF THIS STANDARD.

NOTE D: LARGER OR SMALLER BOLTS MAY BE REQUIRED DEPENDING ON THE DIAMETER OF THE POLE USED. SUBSTITUTE MATERIAL ID (MID) ON THE WORK ORDER COMPONENTS PAGE FOR THE LENGTH NEEDED IF DIFFERENT THAN THE GENERIC LENGTH SHOWN IN THE BILL OF MATERIALS. CONTACT SYSTEM ENGINEERING - TRANSMISSION SECTION IF YOU NEED ASSISTANCE.

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Contact Engineering Standards - Transmission Section for the creation of new standards and CUs.

Drawing Scale: 1" = 30"



**TRANSMISSION  
CONSTRUCTION  
STANDARDS  
MANUAL**

**POLE BEARING PLATES AND GROUNDING  
115KV H-FRAME STRUCTURES - MAINTENANCE ONLY  
COPPERWELD GROUNDING**

REVISION
00
DATE
5/21/2015

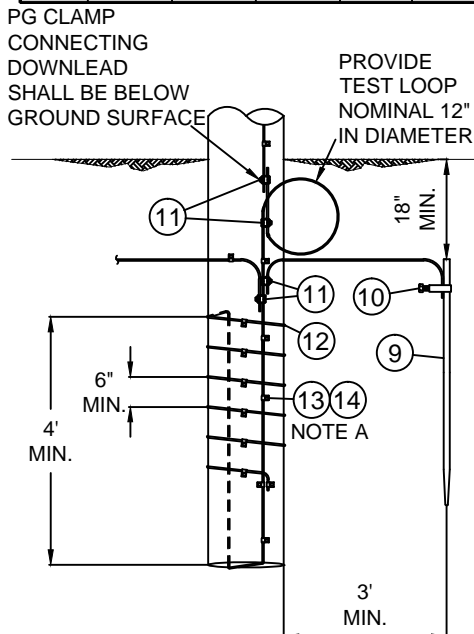
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
B. Franklin	12/16/2012	Shepard/Becken/Hart	12/24/2014	Barry R. Hart	12/24/2014

**TM2.23.MG-02-020**

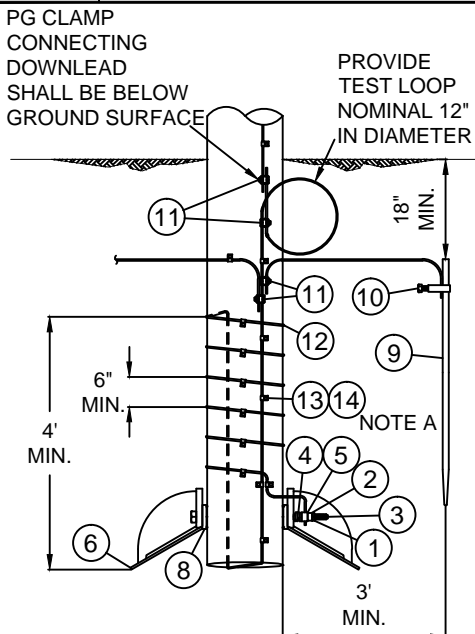
Sheet 1

**BILL OF MATERIAL (CU Type: POLE)**

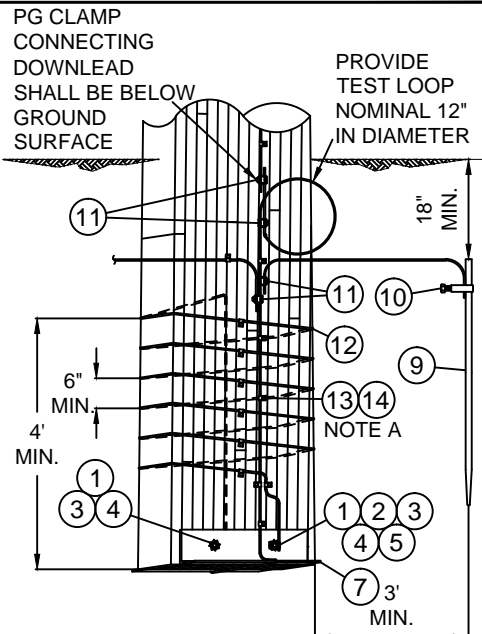
ITEM NO.	SUFFIX -R	SUFFIX -P	SUFFIX -L	UOM	IUSA MID	CU: C*CT-MG-04-020
1	-	1	2	EA	1000910800	NUT LCK MF SQ 7/8 BOLT GALV
2	-	1	1	EA	6000273770	NUT SQ 7/8 BOLT GALV
3	-	1	2	EA	1035475022	BOLT SQ HEAD 7/8 X 22 W/ SQ NUT (NOTE D)
4	-	1	2	EA	6000274612	WASHER HELICAL (7/8")
5	-	1	1	EA	1036200007	CLMP GRND WIRE U-CLIP 15/16 H
6	-	2	-	EA	6000270110	PLATE POLE BEARING
7	-	-	2	EA	NON-STOCK	STEEL ANGLE 6X6X1/4, W 2x 15/16" MTG HOLES
8	-	2	-	EA	6000273255	GAIN GRID, 4 X 6-3/4 IN, BONDING, 1-1/16 IN BONDING HOLES
9	1	1	1	EA	1007260000	GRND ROD 5/8 X 8F, CWLD NO THREAD
10	1	1	1	EA	1000909100	CLMP GRND NO. 2 CWELD TO 5/8 IN GROUND ROD
11	4	4	4	EA	6000113712	WISE, PAR GROOVE GRND CNCTR BRZ, NO. 2 AWG CWLD
12	50	50	50	FT	6000205819	WIRE CU #2 SOL BARE
13	1	1	1	LB	1023091010	NAIL CWLD 16D 3-1/2" LNG
14	20	20	20	EA	6000251033	CLIP CU GRND WIRE



**ROUND WOOD POLE WITHOUT BEARING PLATES SUFFIX -R**



**ROUND WOOD POLE WITH BEARING PLATES SUFFIX -P**



**LAMINATED WOOD POLE WITH BEARING PLATES SUFFIX -L**

CU FUNCTION: TL69 FOR 35KV & 46KV, TG69 FOR 35KV THRU 344KV, T345 FOR 345KV & GREATER.

FOR CORRECT CU: SUBSTITUTE 5 FOR NYSEG, 6 FOR CMP OR 9 FOR RG&E IN PLACE OF ASTERISK (C\*\_).

NOTE A: WRAP GROUND WIRE (ITEM #12) AROUND POLE MINIMUM OF FIVE (5) TURNS. ATTACH GROUND WIRE CLIP (ITEM #14) AT EACH VERTICAL RUN.

NOTE B: THE CONTRACTOR SHALL NOT WRAP THE GROUND WIRE AROUND THE BUTT OF THE POLE WHEN USING SELECT BACKFILL, STONE BACKFILL, ROCK BACKFILL, FLOWABLE BACKFILL OR CONCRETE BACKFILL UNLESS OTHERWISE REQUIRED BY THE ENGINEER OR CONSTRUCTION MANAGER.

NOTE C: ONLY TO BE USED WHEN RIGHT-OF-WAY IS SHARED WITH A PIPELINE. IN ALL OTHER INSTANCES USE STANDARD MG-02-020.

NOTE D: LARGER OR SMALLER BOLTS MAY BE REQUIRED DEPENDING ON THE DIAMETER OF THE POLE USED. SUBSTITUTE MATERIAL ID (MID) ON THE WORK ORDER COMPONENTS PAGE FOR THE LENGTH NEEDED IF DIFFERENT THAN THE GENERIC LENGTH SHOWN IN THE BILL OF MATERIALS. CONTACT SYSTEM ENGINEERING - TRANSMISSION SECTION IF YOU NEED ASSISTANCE.

THIS IS A COMPUTER GENERATED DRAWING - DO NOT REVISE MANUALLY

Contact Engineering Standards - Transmission Section for the creation of new standards and CUs.

Drawing Scale: 1" = 30"



**TRANSMISSION CONSTRUCTION STANDARDS MANUAL**

**POLE BEARING PLATES AND GROUNDING  
115KV H-FRAME STRUCTURES - MAINTENANCE ONLY  
#2 COPPER GROUNDING  
FOR RIGHT-OF-WAY WITH COLOCATED PIPELINE**

REVISION
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DATE
5/21/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
B. Franklin	12/16/2012	Shepard/Becken/Hart	12/24/2014	Barry R. Hart	12/24/2014

**TM2.23.MG-04-020**

Sheet 1