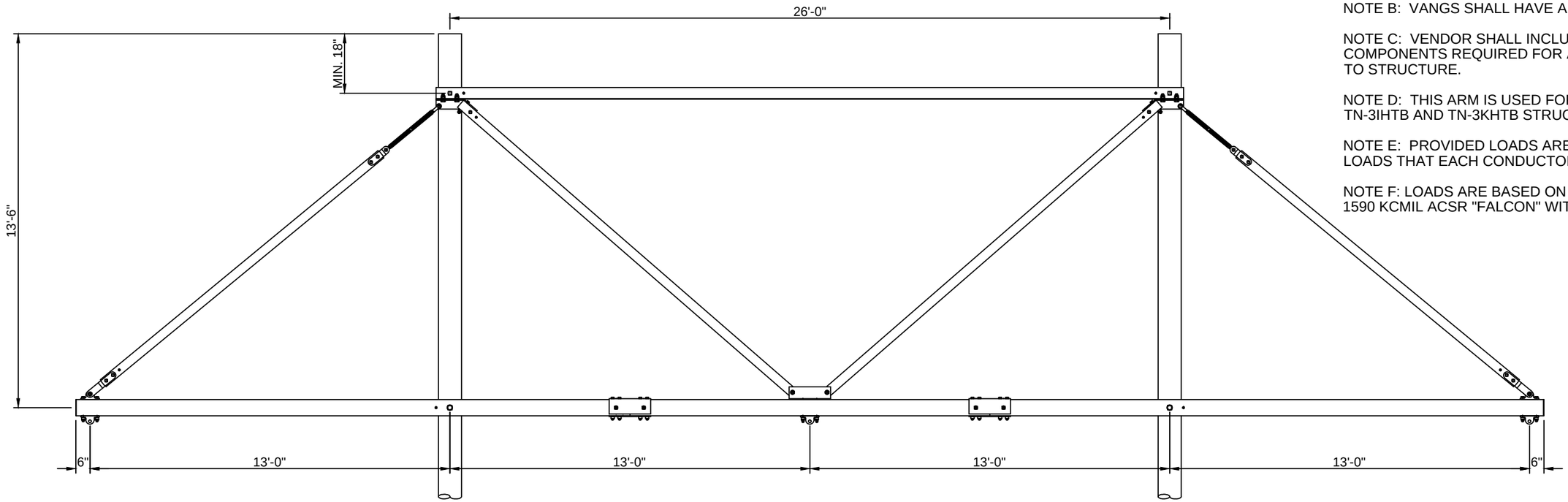


FOR CORRECT CU: SUBSTITUTE 5 FOR NYSEG, 6 FOR CMP OR 9 FOR RG&E IN PLACE OF ASTERISK (C*_).

NOTE A: ASSEMBLED WEIGHT - 3200#.

NOTE B: VANGS SHALL HAVE A MAXIMUM THICKNESS OF 3/4".

NOTE C: VENDOR SHALL INCLUDE ALL HARDWARE AND COMPONENTS REQUIRED FOR ASSEMBLY AND MOUNTING TO STRUCTURE.

NOTE D: THIS ARM IS USED FOR IUSA STANDARD 345KV TN-3IHTB AND TN-3KHTB STRUCTURES.

NOTE E: PROVIDED LOADS ARE THE MINIMUM FACTORED LOADS THAT EACH CONDUCTOR VANG SHALL WITHSTAND.

NOTE F: LOADS ARE BASED ON A 2-CONDUCTOR BUNDLE OF 1590 KCMIL ACSR "FALCON" WITH A SPAN OF 1,200 FT.

	CONDUCTOR VANG LOADS IN POUNDS		
LOADING CONDITION	VERTICAL	TRANSVERSE	LONGITUDINAL
NESC HEAVY (0°F, 4 PSF WIND, 1/2" ICE)	13,000	5,500	2,000
NESC HIGH WIND (60°F, 25.6 PSF WIND)	5,000	8,000	1,000
NESC RULE 250D (15°F, 4 PSF WIND, 1" ICE)	12,500	3,000	1,000
IUSA HEAVY ICE (0°F, 1-1/2" ICE)	19,000	0	2,000

INSTALLATION INSTRUCTIONS FOR WOOD CROSSARM REPLACEMENT:

- LAY OUT ALL COMPONENTS ON FLAT GROUND. PRE-ASSEMBLE ALL COMPONENTS INCLUDING BOLTING CROSS ANGLE TO BRACES. CONNECT TURNBUCKLES AND BRACES.

- INSTALL INSULATORS TO ASSEMBLED STEEL CROSSARM WHILE ASSEMBLY IS LAYING FLAT ON THE GROUND.

- PRIOR TO REMOVING THE EXISTING WOOD CROSSARM ASSEMBLY, ENSURE THAT POLES ARE PLUMB. OUT OF PLUMB POLES WILL NOT ALLOW A LEVEL STEEL ARM INSTALLATION.

- DISCONNECT CONDUCTOR PHASES AND TEMPORARILY SECURE TO THE POLES WITH STRAPPING AT A POINT BELOW THE LOWEST ATTACHMENT POINT OF THE STEEL CROSSARM ASSEMBLY
  DO NOT LOWER CONDUCTOR PHASES TO GROUND LEVEL.

- REMOVE EXISTING WOOD CROSSARM ASSEMBLY IN A PIECEMEAL FASHION USING A CHAIN SAW. DO NOT REMOVE THE UPPER CABLE STRAIN GUY AND MOUNTING BRACKETS.

- MEASURE DOWN FROM TOP OF ONE POLE AND DRILL HOLE FOR CROSS ANGLE 1A AT CENTER OF POLE. LEVEL ACROSS TO OPPOSITE POLE AND DRILL NEW HOLE AT POLE CENTER. A 26'-0" HOLE TO HOLE SPACING MUST BE MAINTAINED.

- USING A CRANE AND RIGGING, HOIST NEW STEEL ARM ASSEMBLY, WITH INSULATORS ATTACHED, AND CONNECT CROSS ANGLE 1A TO EXISTING POLE AT NEW BOLT HOLE LOCATIONS USING SUPPLIED BOLTING HARDWARE.

- REMOVE EXISTING CABLE STRAIN GUY AND MOUNTING BRACKETS FROM TOP OF POLE.

- RELAX RIGGING STRAPS AND ADJUST THE TURNBUCKLE ASSEMBLIES ATTACHED TO BRACES F1 IN ORDER TO CENTER CROSSARM CONNECTION HOLES TO CENTER OF POLES.

- DRILL NEW POLE HOLES USING CROSSARM TUBING SLEEVES AS DRILL BIT GUIDES. CONNECT CROSSARM USING SUPPLIED BOLTING HARDWARE.
  DO NOT ATTEMPT TO USE EXISTING CROSSARM HOLES FOR MOUNTING NEW CROSSARM.

- USE HYDRAULIC TOOLS TO SEAT ALL SPIKE GRIDS INTO POLES.

- CONNECT DOWN GROUNDS TO BONDING CLIPS - 4 LOCATIONS.

- REINSTALL CONDUCTOR PHASES.

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: 1/4" = 1'

IBERDROLA USA

TRANSMISSION CONSTRUCTION STANDARDS MANUAL

TRANSMISSION CROSSARM DETAILS
FOR 345kV APPLICATIONS - H-FRAME TANGENT SUSPENSION
7" X 7" X 53'-0" STEEL CROSSARM ASSEMBLY
MID 1036235452

REVISION 00

DATE 5/21/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:	
B. Franklin	8/27/2013	Becken/Hart	12/24/2014	Barry R. Hart	12/24/2014	TM2.23.TT-3S-A-FC53

Sheet 1

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

NOTE A: ASSEMBLED WEIGHT - 3800#.

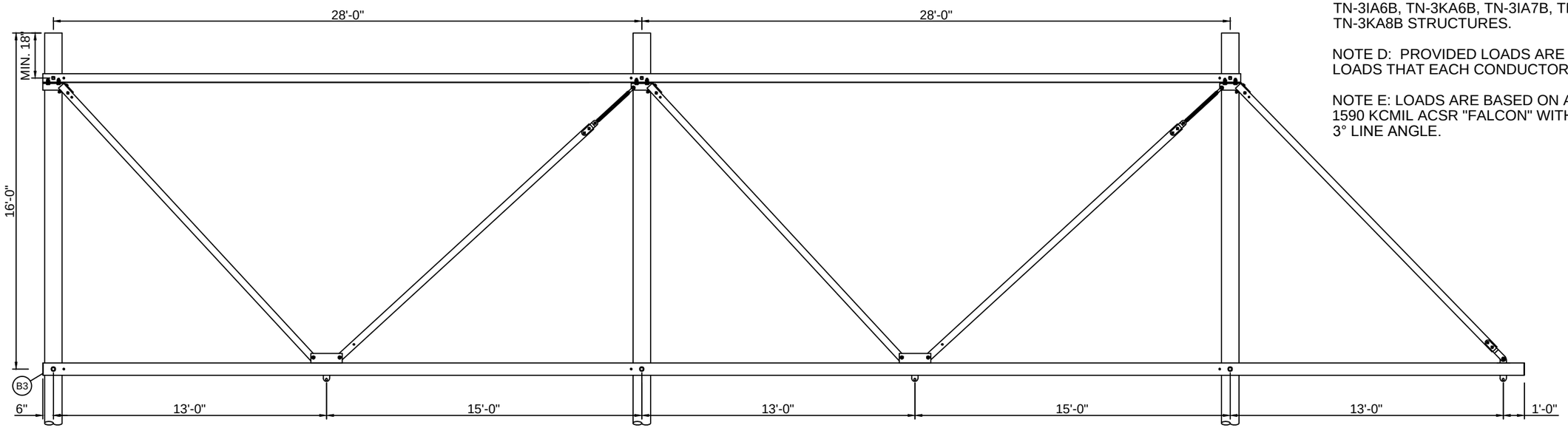
NOTE B: VANGS SHALL HAVE A MAXIMUM THICKNESS OF 3/4".

NOTE C: VENDOR SHALL INCLUDE ALL HARDWARE AND COMPONENTS REQUIRED FOR ASSEMBLY AND MOUNTING TO STRUCTURE.

NOTE D: THIS ARM IS USED FOR IUSA STANDARD 345KV TN-3IA6B, TN-3KA6B, TN-3IA7B, TN-3KA7B, TN-3IA8B, AND TN-3KA8B STRUCTURES.

NOTE D: PROVIDED LOADS ARE THE MINIMUM FACTORED LOADS THAT EACH CONDUCTOR VANG SHALL WITHSTAND.

NOTE E: LOADS ARE BASED ON A 2-CONDUCTOR BUNDLE OF 1590 KCMIL ACSR "FALCON" WITH A SPAN OF 1,200 FT AND A 3° LINE ANGLE.



CONDUCTOR VANG LOADS IN POUNDS			
LOADING CONDITION	VERTICAL	TRANSVERSE	LONGITUDINAL
NESC HEAVY (0°F, 4 PSF WIND, 1/2" ICE)	13,000	7,000	2,000
NESC HIGH WIND (60°F, 25.6 PSF WIND)	5,000	9,500	1,000
NESC RULE 250D (15°F, 4 PSF WIND, 1" ICE)	12,500	4,500	1,000
IUSA HEAVY ICE (0°F, 1-1/2" ICE)	19,000	1,500	2,000

INSTALLATION INSTRUCTIONS FOR WOOD CROSSARM REPLACEMENT:

- LAY OUT ALL COMPONENTS ON FLAT GROUND. PRE-ASSEMBLE ALL COMPONENTS INCLUDING BOLTING CROSS ANGLE TO BRACES. CONNECT TURNBUCKLES AND BRACES.

- INSTALL INSULATORS TO ASSEMBLED STEEL CROSSARM WHILE ASSEMBLY IS LAYING FLAT ON THE GROUND.

- PRIOR TO REMOVING THE EXISTING WOOD CROSSARM ASSEMBLY, ENSURE THAT POLES ARE PLUMB. OUT OF PLUMB POLES WILL NOT ALLOW A LEVEL STEEL ARM INSTALLATION.

- DISCONNECT CONDUCTOR PHASES AND TEMPORARILY SECURE TO THE POLES WITH STRAPPING AT A POINT BELOW THE LOWEST ATTACHMENT POINT OF THE STEEL CROSSARM ASSEMBLY DO NOT LOWER CONDUCTOR PHASES TO GROUND LEVEL.

- REMOVE EXISTING WOOD CROSSARM ASSEMBLY IN A PIECEMEAL FASHION USING A CHAIN SAW. DO NOT REMOVE THE UPPER CABLE STRAIN GUY AND MOUNTING BRACKETS.

- MEASURE DOWN FROM TOP OF ONE POLE AND DRILL HOLE FOR CROSS ANGLE 1A AT CENTER OF POLE. LEVEL ACROSS TO OPPOSITE POLE AND DRILL NEW HOLE AT POLE CENTER. A 28'-0" HOLE TO HOLE SPACING MUST BE MAINTAINED.

- USING A CRANE AND RIGGING, HOIST NEW STEEL ARM ASSEMBLY, WITH INSULATORS ATTACHED, AND CONNECT CROSS ANGLE 1A TO EXISTING POLE AT NEW BOLT HOLE LOCATIONS USING SUPPLIED BOLTING HARDWARE.

- REMOVE EXISTING CABLE STRAIN GUY AND MOUNTING BRACKETS FROM TOP OF POLE.

- RELAX RIGGING STRAPS AND ADJUST THE TURNBUCKLE ASSEMBLIES ATTACHED TO BRACES F1 IN ORDER TO CENTER CROSSARM CONNECTION HOLES TO CENTER OF POLES.

- DRILL NEW POLE HOLES USING CROSSARM TUBING SLEEVES AS DRILL BIT GUIDES. CONNECT CROSSARM USING SUPPLIED BOLTING HARDWARE. DO NOT ATTEMPT TO USE EXISTING CROSSARM HOLES FOR MOUNTING NEW CROSSARM.

- USE HYDRAULIC TOOLS TO SEAT ALL SPIKE GRIDS INTO POLES.

- CONNECT DOWN GROUNDS TO BONDING CLIPS - 6 LOCATIONS.

- REINSTALL CONDUCTOR PHASES.

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

Drawing Scale: 3/16" = 1'

IBERDROLA USA

TRANSMISSION CONSTRUCTION STANDARDS MANUAL

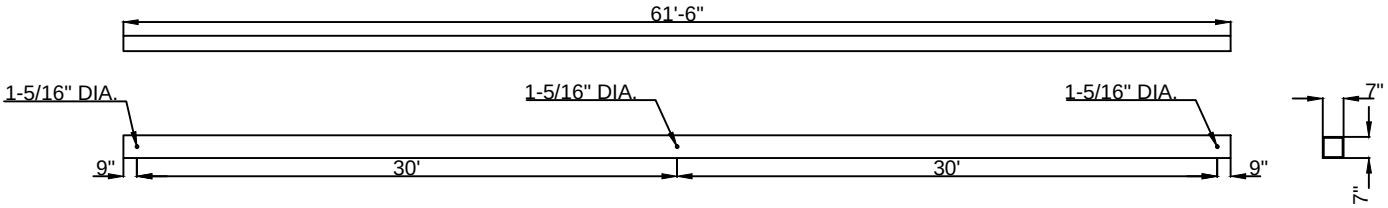
TRANSMISSION CROSSARM DETAILS
FOR 345kV APPLICATIONS - H-FRAME ANGLE SUSPENSION
7" X 7" X 70'-0" STEEL CROSSARM ASSEMBLY
MID 1036235455

REVISION 00

DATE 3/21/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:	
B. Franklin	8/27/2013	Becken/Hart	12/24/2014	Barry R. Hart	12/24/2014	TM2.23.TT-3S-A-FC70

Sheet 1



C*PT-TT-3S-B-FC61

CROSSARM FOR STEEL ARM RUNNING ANGLE 345KV
H-FRAME STRUCTURES TN-3IA9B/TN-3KA9B (ECR-1) AND TN-3IA0B/TN-3KA0B (ECR-2)
WALL THICKNESS: 5/16"
STEEL: A500 GRADE B HOT-DIPPED GALVANIZED
MID: 6000740821

CU FUNCTION: TL69 FOR 35KV & 46KV, TG69 FOR 69KV 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: DRILLING: ALL HOLES - 15/16" DIAMETER UNLESS OTHERWISE NOTED

NOTE B: ARMS SHALL BE SUPPLIED WITH EXPANDED METAL OR METAL MESH END CAPS FROM THE MANUFACTURER.

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" = 10'

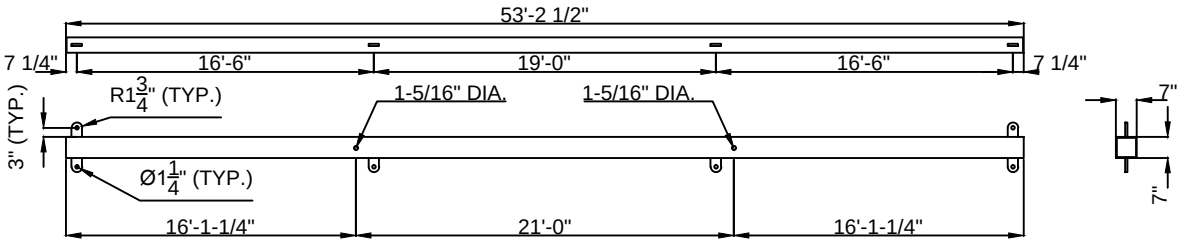
IBERDROLA USA

TRANSMISSION CONSTRUCTION STANDARDS MANUAL

TRANSMISSION STANDARDS - CROSSARMS
345kV SINGLE CIRCUIT - RUNNING ANGLE H-FRAME
7" X 7" X 61'-6" GALVANIZED STEEL CROSSARM DETAILS
MID 6000740821

REVISION 00
DATE 5/21/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:	TM2.23.TT-3S-B-FC61	Sheet 1
B. Franklin	8/30/2013	Becken/Hart	12/24/2014	Barry R. Hart	12/24/2014		



C*PT-TT-3S-G-FC89

CROSSARM FOR STEEL ARM V-STRING TANGENT 345KV H-FRAME STRUCTURES TN-3IHWB AND TN-3KHWB (EAR-3)
WALL THICKNESS: 5/16"
STEEL: A500 GRADE B HOT-DIPPED GALVANIZED
MID: 6000740823

	CONDUCTOR VANG LOADS IN POUNDS		
LOADING CONDITION	VERTICAL	TRANSVERSE	LONGITUDINAL
NESC HEAVY (0°F, 4 PSF WIND, 1/2" ICE)	7,000	3,000	1,000
NESC HIGH WIND (60°F, 25.6 PSF WIND)	3,000	4,000	1,000
NESC RULE 250D (15°F, 4 PSF WIND, 1" ICE)	6,500	2,000	1,000
IUSA HEAVY ICE (0°F, 1-1/2" ICE)	9,000	0	1,000

CU FUNCTION: TL69 FOR 35KV & 46KV, TG69 FOR 69KV 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: DRILLING: ALL HOLES - 15/16" DIAMETER UNLESS OTHERWISE NOTED

NOTE B: ARMS SHALL BE SUPPLIED WITH EXPANDED METAL OR METAL MESH END CAPS FROM THE MANUFACTURER.

NOTE C: VANGS SHALL HAVE A MAXIMUM THICKNESS OF 3/4".

NOTE D: PROVIDED LOADS ARE THE MINIMUM FACTORED LOADS THAT EACH CONDUCTOR VANG SHALL WITHSTAND.

NOTE E: LOADS ARE BASED ON A 2-CONDUCTOR BUNDLE OF 1590 KCMIL ACSR "FALCON" WITH A SPAN OF 1,200 FT.

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" = 10'

IBERDROLA USA

TRANSMISSION CONSTRUCTION STANDARDS MANUAL

TRANSMISSION STANDARDS - CROSSARMS
345kV SINGLE CIRCUIT - TANGENT V-STRING H-FRAME
7" X 7" X 53'-2-1/2" GALVANIZED STEEL CROSSARM DETAILS
MID 6000740823

REVISION 00
DATE 5/21/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:	TM2.23.TT-3S-G-FC89	Sheet 1
B. Franklin	8/30/2013	Becken/Hart	12/24/2014	Barry R. Hart	12/24/2014		