

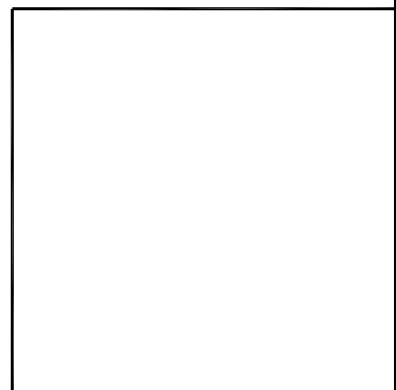
IUSA TRANSMISSION CONSTRUCTION MANUAL STANDARDS POLICY

The IUSA Transmission Standards Manual is composed of structure drawings, construction guides and design guides for use in construction, operation and maintenance of IUSA electric transmission lines. These standards have been developed to comply with all applicable sections of the National Electric Safety Code (NESC) and the codes of other applicable regulatory authorities. These codes have requirements for electrical and structural strength, loadings, clearances and safety.

All new construction shall conform to these standards. Deviation from these standards will be permissible only in those applications where strict adherence to these standards would cause unnecessary reconstruction of existing facilities. The approval of the Electric System Engineering - Transmission Section and Engineering Standards - Transmission is required for any such deviation. All electrical, structural and safety requirements set forth in the NESC and the codes of other regulatory agencies will still apply.

This document is IUSA property and should not be distributed to any individual or non-IUSA company without the express approval of the Electric System Engineering - Transmission Section, Engineering Standards - Transmission and IUSA management.

Any proposed changes to this policy or manual should be routed to the Electric System Engineering - Transmission Section Standards Team for review and approval.



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

Drawing Scale: N/A

	IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL		TRANSMISSION GENERAL INFORMATION IUSA TRANSMISSION CONSTRUCTION MANUAL STANDARDS POLICY				Revision 00
							DATE 12/13/2012
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:	TM2.23.TA-01-001	Sheet 1
L.A. Best	9/30/2011	Shepard/Becken/Hart	11/3/2011	Barry R. Hart	12/13/2012		

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ANSIA
8-1/2" X 11"

REVISIONS, ADDITIONS, OR DELETIONS TO THE IUSA TRANSMISSION CONSTRUCTION STANDARDS MANUAL

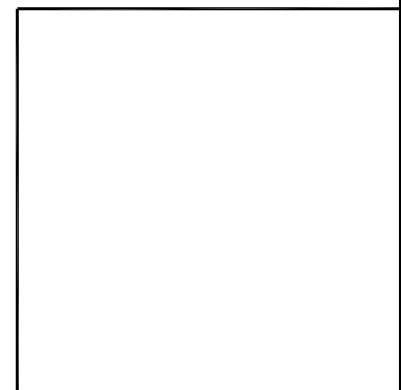
The IUSA Transmission Construction Standards Manual is intended to provide a ready reference for structure drawings, construction guides and design guides for use in construction, operation and maintenance of IUSA electric transmission line system in New York and Maine.

All changes should be submitted to the IUSA Transmission Standards team for review and implementation. The requested additions, revisions or deletions will be carefully reviewed by the team to make sure they do not violate any NESC, regulatory, construction, operations, or safety codes.

The new standard drawing will then be created or the existing standard drawing revised. The new or updated drawings will again be reviewed and approved by the standards team.

The approved drawings will then be placed on the ProjectWise site in the correct TM2.23.00 (Overhead Transmission) or TM2.30.00 (Underground Transmission) folders and a notification will be issued that the addition or revision is complete. The drawings will also be available on the Intranet Enterprise Live Link site.

Any proposed changes to this policy or manual should be routed to the Electric System Engineering - Transmission Section Standards Team for review and approval.



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	IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL		TRANSMISSION GENERAL INFORMATION REVISIONS, ADDITIONS OR DELETIONS TO THE IUSA TRANSMISSION CONSTRUCTION STANDARDS MANUAL			Revision 00
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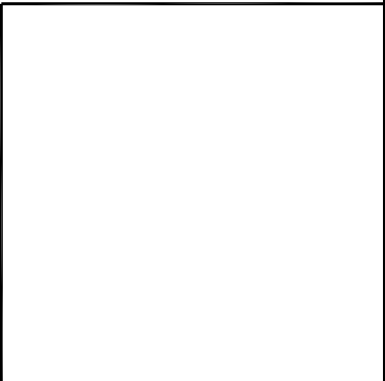
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-A-	STANDARD
Access Roads	
Cut and Fill	TM2.23.TL-02-001
Water Bar	TM2.23.TL-02-002
Sediment Mat	TM2.23.TL-02-003
Account Numbers	TM2.23.TA-03-001
Aerial Patrol Markers	
Aerial Numbering	TM2.23.TK-01-001
Line Crossing Markers	TM2.23.TK-04-001
Aircraft Observation Markers	TM2.23.TK-04-002
Anchor Grounding	TM2.23.TG-01-001
Anchor Installation	
Auger Pile Anchor	TM2.23.TH-01-001
Cross Plate Anchor	TM2.23.TH-01-002
Driven Plate Anchor	TM2.23.TH-01-003
Expanding Bolt Rock Anchor	TM2.23.TH-01-004
Single Helix Screw Anchor	TM2.23.TH-01-005
Double Helix Screw Anchor	TM2.23.TH-01-006
Triple Helix Screw Anchor	TM2.23.TH-01-007
Anchor Rod Length Chart	TM2.23.TH-02-001
Anchor Pull Test Procedure	TM2.23.TH-04-001
Anchor Pull Test Report Data Sheet	TM2.23.TH-04-002
Armor Rods, Preformed	TM2.23.TJ-05-001
Physical Characteristics	TM2.23.TJ-05-002


-B-	
-C-	
Clamps, Bolted Strain	TM2.23.TJ-03-001
Physical Characteristics	TM2.23.TJ-03-002

Clamps, Post Insulator	
Over Preformed Armor Rods	TM2.23.TJ-02-001
Without Preformed Armor Rods	TM2.23.TJ-02-002
Physical Characteristics	TM2.23.TJ-02-003
Clamps, Suspension	
Over Preformed Armor Rods	TM2.23.TJ-01-001
Without Preformed Armor Rods	TM2.23.TJ-01-002
Physical Characteristics	TM2.23.TJ-01-003

Clearances, Electrical	
Buildings and Other Structures	TM2.23.TB-02-004
Ground Clearances	TM2.23.TB-02-001
Phase to Phase	TM2.23.TB-02-003
Phase to Ground	TM2.23.TB-02-003



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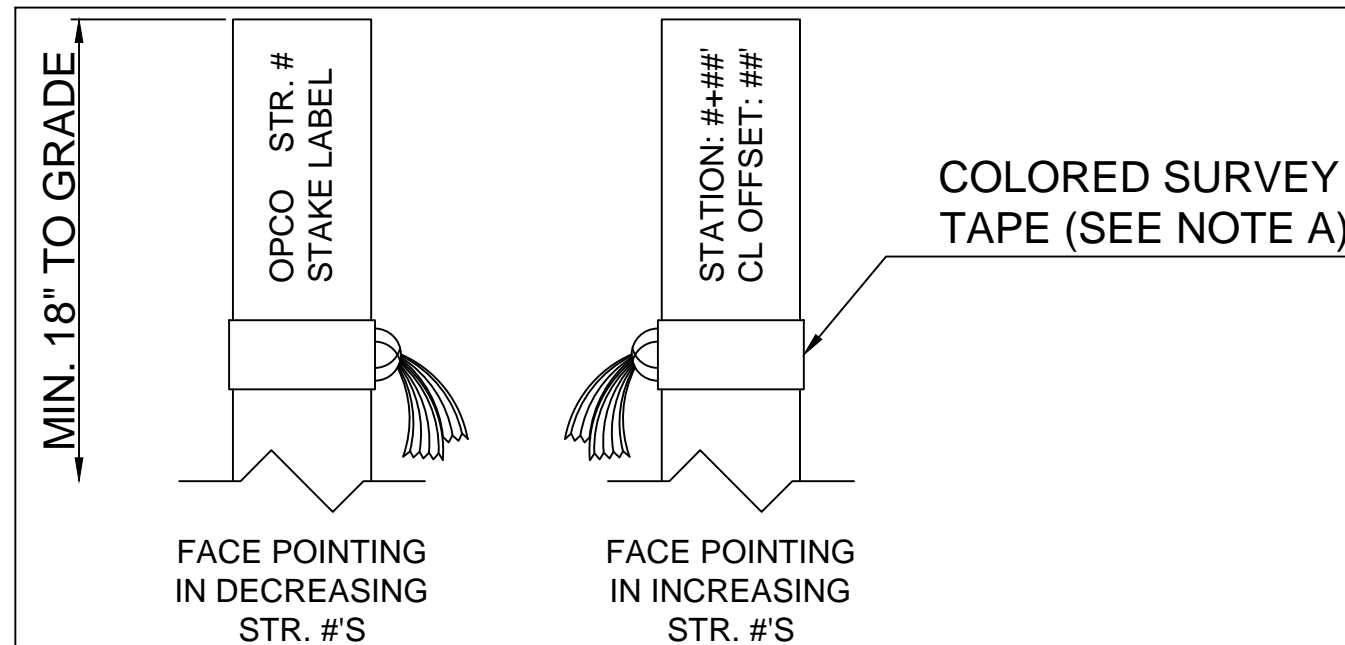
	IBERDROLA USA TRANSMISSION CONSTRUCTION STANDARDS MANUAL		TRANSMISSION GENERAL INFORMATION INDEX				Revision 00
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ALL NEW STRUCTURES AND/OR LINES SHALL INCLUDE A CONSTRUCTION STAKING TABLE IN THE DOCUMENTATION THAT INCLUDES THE COORDINATES FOR THE FOLLOWING STAKES FOR EACH STRUCTURE:

- LEFT REFERENCE STAKE (30' CENTERLINE OFFSET PERPENDICULAR TO THE CENTERLINE, LEFT IS DEFINED WHEN LOOKING IN THE DIRECTION OF INCREASING STRUCTURE NUMBER)
- RIGHT REFERENCE STAKE (30' CENTERLINE OFFSET PERPENDICULAR TO THE CENTERLINE, RIGHT IS DEFINED WHEN LOOKING IN THE DIRECTION OF INCREASING STRUCTURE NUMBER)
- CENTER OF LOCATION FOR ALL POLES
- LOCATION OF ALL GUYS (STAKE TO BE PLACED AT THE LOCATION WHERE THE GUY ANCHOR SHALL INTERSECT THE GROUNDLINE)

THE CONSTRUCTION STAKING TABLE SHALL CONTAIN THE FOLLOWING COLUMNS

- STRUCTURE NUMBER
- STAKE LABEL
- STAKE STATION (FT.)
- CENTERLINE OFFSET (FT., LEFT IS NEGATIVE, RIGHT IS POSITIVE)
- NORTHING AND EASTING (STATE PLANE, US SURVEY FEET, NAD83)
- LATITUDE AND LONGITUDE



STAKE IDENTIFICATION LAYOUT

NOTE A: FOR STRUCTURES THAT THE ENGINEER OR CONSTRUCTION CONTRACTOR DEEMS TO REQUIRE DIGSAFE AND/OR OK-TO-DIG NOTIFICATION THE RIBBON SHALL BE WHITE AND THE TOP OF THE STAKE SHALL BE PAINTED BLAZE ORANGE PRIOR TO LABELLING. FOR STRUCTURES THAT DO NOT REQUIRE DIGSAFE OR OK-TO-DIG NOTIFICATION THE RIBBON SHALL BE BLAZE ORANGE OR PINK.


NOTE B: ALL STAKES, RIBBON, PAINT, WRITING UTENSILS, AND OTHER INCIDENTALS SHALL BE PROVIDED BY THE SURVEY CONTRACTOR.

NOTE C: IF DURING CLEARING, DEMOLITION OF EXISTING FACILITIES, OR THE CONSTRUCTION OF NEW FACILITIES ANY STAKES ARE REMOVED, DESTROYED, KNOCKED OVER, MOVED, VANDALIZED, OR OTHERWISE DISTURBED THE CONSTRUCTION CONTRACTOR SHALL HAVE THE STRUCTURE RE-SURVEYED AND THE STAKE PROPERLY REPLACED AT NO COST TO IUSA.

NOTE D: SURVEYOR SHALL COMPLETE A STAKING REPORT (TA-05-007) ONCE ALL STAKES HAVE BEEN INSTALLED.

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	TRANSMISSION CONSTRUCTION STANDARDS MANUAL	GENERAL INFORMATION STRUCTURE STAKING STAKING IDENTIFICATION	REVISION
			00
			DATE
			5/21/2015
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:
B. Franklin	9/26/2014	Becken/Hart	1/08/2015
Approved By:	Date App.:		
Barry R. Hart	1/08/2014	TM2.23.TA-05-003	
			Sheet 1


STAKING REPORT

LINE NAME:	SURVEYOR:
CONTRACTOR:	WEEK ENDING:

					COORDINATES		
STR. NO.	STR STATION (FT.)	DATE STAKED	SURVEY CREW PARTY CHIEF NAME OR INITIALS	HAS A CONFLICT SKETCH BEEN PREPARED? (YES/NO)	NORTHING (FT.)	EASTING (FT.)	COMMENTS

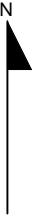
CONTRACTOR SIGNATURE:	DATE:
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Contact Engineering Standards - Transmission Section for the creation of new standards and CUs.	Drawing Scale: N/A

	TRANSMISSION CONSTRUCTION STANDARDS MANUAL	SURVEY STAKING STAKING REPORT FOR TRANSMISSION PROJECTS	REVISION
			00
			DATE
Drwn. By: B. Franklin	Date Dr.: 5/31/2012	Checked By: Becken/Hart	Date Ck.: 1/08/2015
		Approved By: Barry R. Hart	Date App.: 1/08/2015
TM2.23.TA-05-007			Sheet 1

STRUCTURE CONFLICT SKETCH

LINE NAME:	STRUCTURE NO:
DESIGNED STATION:	DESIGNED LINE ANGLE:
STRUCTURE NORTHING:	STRUCTURE EASTING:



SKETCH ALL POLES, FOUNDATIONS AND GUY ANCHORS OF THE STRUCTURE, PLUS ANY PROPERTY LINES, FENCE LINES WATER BODIES, WELLS, GAS LINES, POWER LINES, BOULDERS, ROADS, RAILWAYS OR OTHER FEATURES. DIMENSION BETWEEN POLES, FOUNDATIONS AND GUY WIRES TO RELEVANT FEATURES.

PROVIDE ANY PICTURES OF THE SITE WITH THE SKETCH IF AVAILABLE.


DESCRIBE SOIL TYPE (BY VISUAL INSPECTION ONLY):

DESCRIBE LAND USE (BY VISUAL INSPECTION ONLY):

CONTRACTOR SIGNATURE:	DATE:
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Contact Engineering Standards - Transmission Section for the creation of new standards and CUs. Drawing Scale: N/A

	TRANSMISSION CONSTRUCTION STANDARDS MANUAL	SURVEY STAKING STRUCTURE CONFLICT SKETCH FOR TRANSMISSION PROJECTS	REVISION				
			00				
			DATE				
			5/21/2015				
Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:	TM2.23.TA-05-007	Sheet 2
B. Franklin	5/31/2012	Becken/Hart	1/08/2015	Barry R. Hart	1/08/2015		

WHEN SURVEYING TRANSMISSION LINES AND THE USE OF AERIAL SURVEY IS TO BE EMPLOYED. IUSA TRANSMISSION LINES SHALL BE SURVEYED USING LIGHT DETECTION AND RANGING (LIDAR) EQUIPMENT AND METHODS.

WHEN PERFORMING LIDAR SURVEY OF TRANSMISSION LINES THE LIDAR SURVEYOR SHALL CAPTURE THE ENTIRE RIGHT-OF-WAY. IF THE LINE TO BE SURVEYED IS LOCATED IN THE SAME CORRIDOR AS ANOTHER LINE(S) THE LIDAR SURVEYOR SHALL CAPTURE DATA FOR THE ENTIRE WIDTH OF THE CORRIDOR. THE LIDAR SURVEYOR SHALL PROVIDE LIDAR DATA EXTENDING 25' BEYOND THE EDGES OF THE CORRIDOR. (FOR EXAMPLE: IF THE RIGHT-OF-WAY IS 150' WIDE [75' EACH SIDE OF CENTERLINE], THE LIDAR SURVEYOR SHALL PROVIDE A SWATH OF DATA 200' WIDE [100' EACH SIDE OF CENTERLINE])

WHEN PERFORMING THE LIDAR SURVEY THE LIDAR SURVEYOR SHALL CAPTURE THE ENTIRETY OF THE SUBSTATION AT EACH END OF THE LINE.

AT ANY TIME THAT THE LIDAR SURVEYOR ENCOUNTERS A DISTRIBUTION, COMMUNICATION, OTHER TRANSMISSION LINE THAT CROSSES THE RIGHT-OF-WAY THE LIDAR SURVEYOR SHALL CAPTURE THE LINE THAT CROSSES THE RIGHT-OF-WAY FOR A MINIMUM OF ONE FULL SPAN BEYOND THE EDGE OF THE RIGHT OF WAY. THIS WILL LIKELY RESULT IN THE LIDAR CAPTURE OF A MINIMUM OF THREE SPANS OF THE CROSSING LINE: THE SPAN THAT CROSSES THE RIGHT-OF-WAY AND ONE SPAN ON EACH SIDE OF THE RIGHT-OF-WAY.

WHEN PERFORMING LIDAR SURVEY OF A NEW LINE [I.E. A NEW CORRIDOR] THE LIDAR SURVEYOR SHALL PROVIDE LIDAR DATA FOR THE PRESCRIBED WIDTH OF THE RIGHT-OF-WAY AND 50' ON EACH SIDE OF THE PRESCRIBED RIGHT-OF-WAY. (FOR EXAMPLE: IF THE PRESCRIBED RIGHT-OF-WAY IS 150' WIDE [75' EACH SIDE OF CENTERLINE], THE LIDAR SURVEYOR SHALL PROVIDE DATA FOR A 250' WIDE CORRIDOR [125' EACH SIDE OF CENTERLINE]).

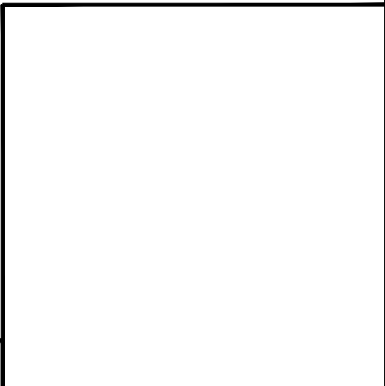
THE LIDAR SURVEYOR SHALL PROVIDE METEOROLOGICAL DATA FOR THE ENTIRE TIME OF THE FLIGHT. THIS DATA SHALL INCLUDE AMBIENT AIR TEMPERATURE, ATMOSPHERIC CONDITIONS [SUNNY, CLEAR, CLOUDY, OVERCAST, ETC.], WIND SPEED, WIND DIRECTION. THIS DATA SHALL BE PROVIDED IN TABULAR FORMAT OR EMBEDDED INTO THE FILE.

ALL LIDAR DATA THAT IS PROVIDED SHALL BE CLASSIFIED PER THE FEATURE CODE TABLE ON STANDARD TA-07-001. THE CLASSIFIED LIDAR DATA SHALL BE PROVIDED AS A PLS-CADD FILE (.XYZ FORMAT).

ALL LIDAR DATA SHALL BE CAPTURED IN STATE PLANE COORDINATE SYSTEM USING THE NAD83 AND NAVD88 DATUMS. LIDAR POINT DATA SHALL BE WITHIN 3" OF ACCURACY.

LIDAR SURVEY SHALL BE CAPTURED AT A MINIMUM POINT DENSITY OF 5 POINTS PER SQUARE FOOT.

LIDAR DATA SHALL BE ACCOMPANIED BY TWO TYPES OF IMAGERY: ORTHO-RECTIFIED PHOTOGRAPHY AND OBLIQUE PHOTOGRAPHY. THE ORTHO-RECTIFIED PHOTOGRAPHY SHALL HAVE A MINIMUM RESOLUTION OF 8 MEGAPIXELS AND BE GEO-REFERENCED AND PROVIDED IN A FORMAT THAT IS IMPORTABLE INTO PLS-CADD. THE ORTHO-RECTIFIED PHOTOGRAPHY SHALL COVER THE ENTIRE AREA THAT LIDAR DATA IS PROVIDED FOR. THE OBLIQUE PHOTOGRAPHY SHALL BE A SINGLE PHOTOGRAPH OF EACH STRUCTURE IN THE LINE BEING SURVEYED (NOT OTHER LINES WITHIN THE CORRIDOR). OBLIQUE PHOTOGRAPHY SHALL CAPTURE THE ENTIRE STRUCTURE IN A PHOTOGRAPH WITH A MINIMUM RESOLUTION OF 10 MEGAPIXELS.



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TRANSMISSION
CONSTRUCTION
STANDARDS
MANUAL

GENERAL INFORMATION
AERIAL SURVEY PARAMETERS
LIGHT DETECTION AND RANGING
LIDAR

REVISION
00
DATE
5/21/2015

Drwn. By:	Date Dr.:	Checked By:	Date Ck.:	Approved By:	Date App.:
B. Franklin	8/22/2014	Becken/Hart	1/08/2015	Barry R. Hart	1/08/2015

TM2.23.TA-06-001

Sheet 1

NUMBER	DESCRIPTION	POINT ON GROUND?	AERIAL OBSTACLE	34KV VERT. CLEARANCE	46KV VERT. CLEARANCE	69KV VERT. CLEARANCE	115KV VERT. CLEARANCE	230KV VERT. CLEARANCE	345KV VERT. CLEARANCE
10	CENTERLINE (PI)	YES	NO	24	24	24	25	29	32
100	INTERPOLATED POINTS	YES	NO	24	24	24	25	29	32
200	GROUND	YES	NO	24	24	24	25	29	32
201	PAVED ROAD	YES	NO	24	24	24	25	29	32
202	UNPAVED ROAD	YES	NO	24	24	24	25	29	32
203	RAILROAD TRACKS	YES	NO	32	32	32	33	37	40
204	PEDESTRIAN ONLY AREA	YES	NO	20	20	20	21	25	28
301	COMMUNICATION CROSSING	NO	YES	10	10	10	11	15	19
302	DISTRIBUTION CROSSING	NO	YES	7	7	7	8	12	16
305	FUTURE DISTRIBUTION CROSSING	NO	YES	7	7	7	8	12	16
310	35KV CROSSING	NO	YES	7	7	7	8	12	16
311	46KV CROSSING	NO	YES	1000	7	7	8	13	17
312	69KV CROSSING	NO	YES	1000	1000	8	9	14	18
313	115KV CROSSING	NO	YES	1000	1000	1000	10	15	20
314	230KV CROSSING	NO	YES	1000	1000	1000	1000	18	22
315	345KV CROSSING	NO	YES	1000	1000	1000	1000	1000	23
400	FENCE	NO	YES	8	8	8	10	12	15
401	BRIDGE (OTHER THAN ROADWAY)	YES	NO	13	14	14	15	17	20
402	SIGN/FLAGPOLE	NO	YES	9	10	10	11	13	16
403	LIGHT/LUMINAIRE	NO	YES	9	10	10	11	13	16
404	ANTENNA	NO	YES	9	10	10	11	13	16
405	BUILDING	NO	YES	14	14	15	16	18	20
406	GRAIN BINS	NO	YES	14	14	15	16	18	20
407	SWIMMING POOLS	YES	NO	26	27	27	28	30	33
420	VEGETATION	NO	YES						
500	STREAMS AND BROOKS	YES	NO	24	24	24	25	29	32
501	WATER NOT FOR SAILING	YES	NO	24	24	24	25	29	32
502	SAILBOAT RIGGING AREA	YES	NO	29	29	29	30	34	37
503	WATER BODY < 20 ACRES	YES	NO	26	26	26	27	31	34
504	WATER BODY 20-200 ACRES	YES	NO	34	34	34	35	39	42
505	WATER BODY 200-2000 ACRES	YES	NO	40	40	40	41	45	48
506	WATER BODY > 2000 ACRES	YES	NO	46	46	46	47	51	54
600	BASE OF POLE	YES	NO						
601	TOP OF POLE	NO	NO						
602	INSULATOR ATTACHMENT	NO	NO						
603	CONDUCTOR ATTACHMENT	NO	NO						
604	END OF CROSSARM	NO	NO						
605	GUY ANCHOR	NO	NO						
606	MAIN LINE STRUCTURE	NO	NO						
607	MAIN LINE INSULATOR	NO	NO						
608	MAIN LINE GUY WIRE	NO	YES	1.5	1.5	1.8	2.4	3.8	5.3
700	S/S STEEL	NO	YES						
701	S/S EQUIPMENT	NO	YES						
800	DISTRIBUTION STRUCTURE	NO	NO	6	7	7	8	10	12
801	DISTRIBUTION INSULATOR	NO	NO	7	7	7	8	12	16
802	DISTRIBUTION GUY WIRE	NO	YES	2	2.25	2.5	3	4.5	6
803	TOP OF DISTRIBUTION POLE	NO	YES	6	7	7	8	10	12
900	OTHER LINE STRUCTURE	NO	NO						
901	OTHER LINE INSULATOR	NO	NO						
902	OTHER LINE STATIC WIRE	NO	YES	7	7	7	8	12	16
903	OTHER LINE GUY WIRE	NO	YES	2	2.25	2.5	3	4.5	6

NOTE A: REFER TO TB-02-001 FOR INFORMATION CONCERNIGN CLEARANCES.

NOTE B: LOCATIONS WHERE CLEARANCE VALUE IS LISTED AS 1000' IS TO INDICATE AREAS WHERE A HIGHER VOLTAGE LINE WOULD BE CROSSING OVER A HIGHER VOLTAGE LINE. THIS IS TO BE AVOIDED WHEREVER POSSIBLE.

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TRANSMISSION
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MANUAL

GENERAL INFORMATION
STANDARD FEATURE CODE DATA

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Sheet 1