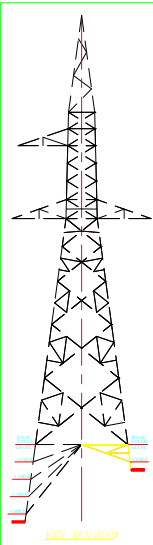
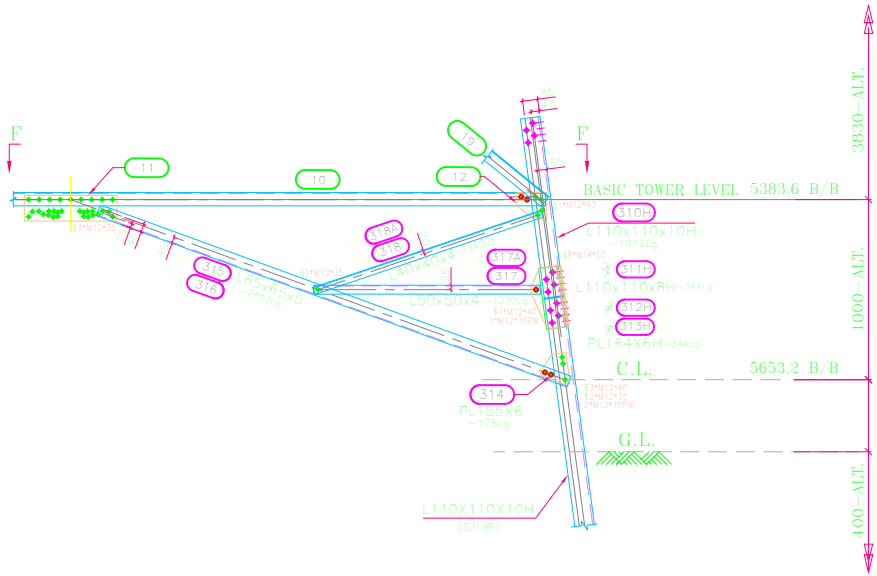


TOWER SLOPE	
TAN B	0.134774668
2TAN B	0.269549336
FACE	1.009041234
DEVELOP	1.018002172





BOLTS / NUTS - STATEMENT +3M LEG EXTN.			
TYPE	SIZE (Length in mm)	TOTAL QTY.	
		HEXAGONAL	ANTI THEFT
	M12 X 35 MM	12	
	M12 X 40 MM	10	
SPRING WASHER	M12 X 2.5 THK	22	
PACK WASHER	M12 X 10 THK	06	
	M16 X 50 MM	16	
SPRING WASHER	M16 X 3.5 THK	16	



- NOTES:-
1. ALL DIMENSIONS ARE IN MM.
 2. MATERIALS :
 - *H* INDICATES HIGH TENSILE STEEL - IS2062:2006 E350. (fy=350N/sqmm)
 - MILD STEEL - IS2062:2006 E250. (fy=250N/sqmm)
 - BOLTS & NUTS - 12Ø & 16Ø - GRADE 5.6/5 (ISO:898) OR EQUIVALENT.
 - BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.
 - STEP BOLT SET: ONE BOLT+TWO NUT+TWO SPRING WASHER.
 3. ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
 4. THE PROCEEDING LETTER WILL BE "T43 'SB2' ".
 5. ♦ INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA BOLTS.
◆ INDICATES HOLES OF 13.5mm DIA FOR 12mm DIA BOLTS.
● INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA STEP BOLTS.
‡ INDICATES ANTI THEFT BOLTS.
 6. FOR VIEW F-F REFER DRAWING NO. KETRACO/A17/SB2/SD/03 SHEET 1/2.

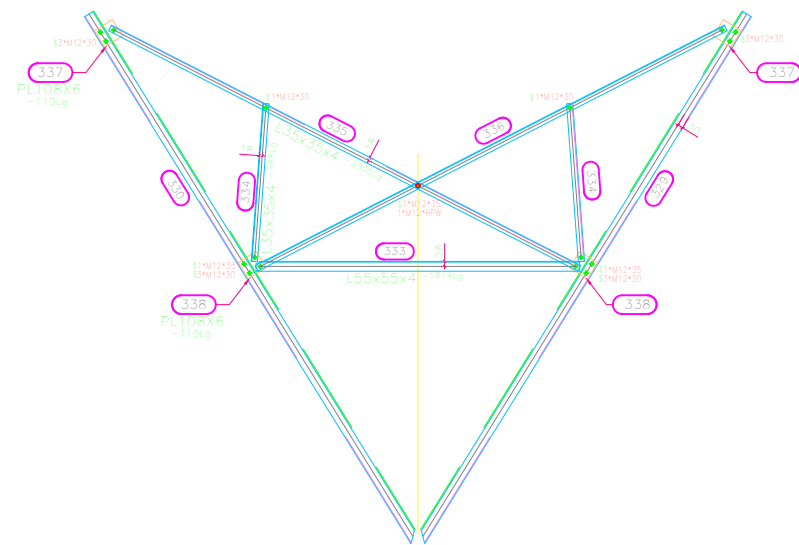
MARK NOS. 310 TO 318

REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

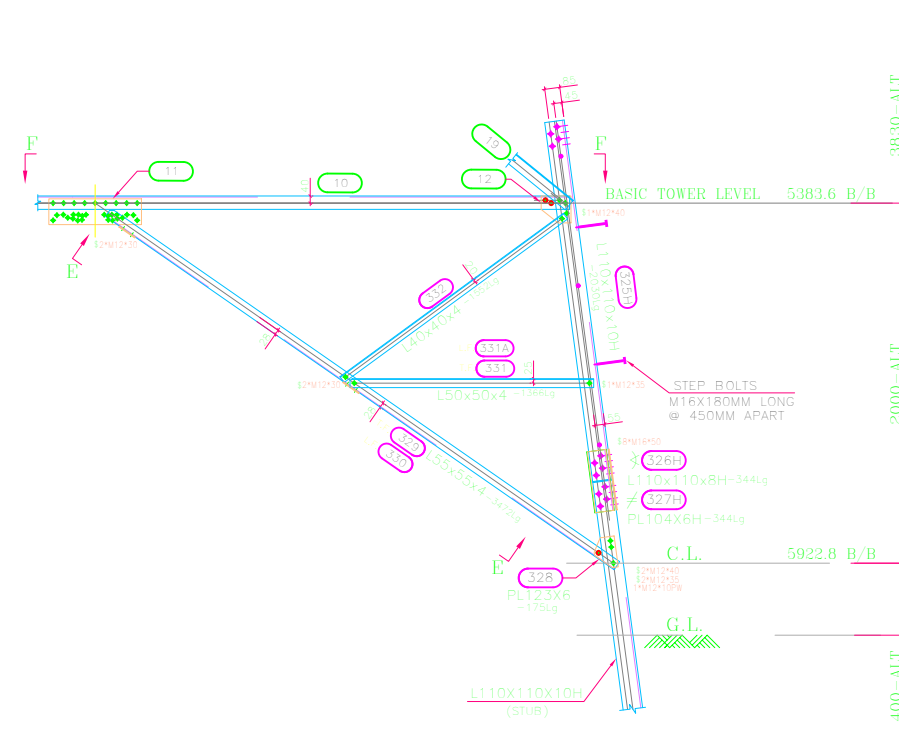
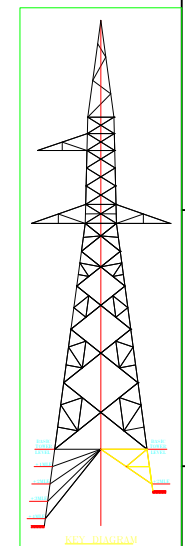
CLIENT :		KETRACO KENYA ELECTRICITY TRANSMISSION CO. LTD., KENYA		
CONSULTANT :		ELECTRO CONSULTANT.		
CONTRACTOR :		TATA PROJECTS LIMITED, NEW DELHI, INDIA		
Contract :	XVIII: KPLC1/6E/2/A17			
PROJECT :	Kindaruma-Mwingi-Garissa 132 KV S/C Transmission Lines (LOT A17)			
DESIGN	Monali	09.02.2013		TITLE STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB2" (0°-45°) +1M LEG EXTENSION
DRN.	SONAM	15.04.2013		
CHK.	WS	15.04.2013		
APPD.	MKM	15.04.2013		
				DWG. NO. KETRACO/A17/SB2/SD/06
REV	0			SHEET 1 OF 1

TOWER SLOPE	
TAN B	0.134774668
2TAN B	0.269549336
FACE	1.009041234
DEVELOP	1.018002172

BOLTS & NUTS - STATEMENT			
+3M LEG. EXTN.			
TYPE	SIZE (Length in mm)	TOTAL QTY	
		HEXAGONAL	ANTI THEFT
	M12 X 30 MM	---	22
	M12 X 35 MM	---	9
	M12 X 40 MM	---	6
SPRING WASHER	M12 X 2.5 THK	37	
PACK WASHER	M12 X 6 THK	01	
PACK WASHER	M12 X 10 THK	02	
	M16 X 50 MM		16
SPRING WASHER	M16 X 2.5 THK	16	
STEP BOLT	M16 X 180 MM	05	







VIEW 'E-E'

+2M LEG EXTN.

NOTES:—

1. ALL DIMENSIONS ARE IN MM.
2. MATERIALS :
- "H" INDICATES HIGH TENSILE STEEL – IS2062:2006 E350 ($f_y=350N/sqmm$)
- MILD STEEL – IS2062:2006 E250 ($f_y=250N/sqmm$)
- BOLTS & NUTS – 120 & 160 – GRADE 5/6S (IS-808) OR EQUIVALENT.
- BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.
- ROST BOLT SET: ONE BOLT+TWO NUT+TWO SPRING WASHER.
3. ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
4. THE PROCEEDING LETTER WILL BE "T43 S82 ".
5. ♦ INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA BOLTS.
- ◆ INDICATES HOLES OF 13.5mm DIA FOR 12mm DIA BOLTS.
- INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA BOLT.
- § INDICATES ANTI THEFT BOLTS.
6. FOR VIEW F-F REFER DRAWING NO. KETRACO/A17/SR2/SD/03 SHEET 1/2.





REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

CLIENT :		 KETRACO KENYA ELECTRICITY TRANSMISSION CO. LTD., KENYA	
CONSULTANT :		 ELC ELECTRICAL CONSULTANTS	
CONTRACTOR :		 TATA TATA PROJECTS LIMITED, NEW DELHI, INDIA	
Contract :		XVIII: KPLC1/6E/2/A17	
PROJECT : Kinder uma-Garissa 132 KV S/C Transmission Lines (LOT A17)			
DESIGN :	Mendi	09.02.2013	SCALE 1:20  TITLE STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB2" (0°-45°) +2M LEG EXTENSION
DRAWN :	SONAM	15.04.2013	
CHECKED :	WS	15.04.2013	
APPROVED :	MMK	15.04.2013	
DRG. NO. KETRACO/A17/SB2/SD/07			REV 0
			SHEET 1 OF 1

VIEW 'D-D'

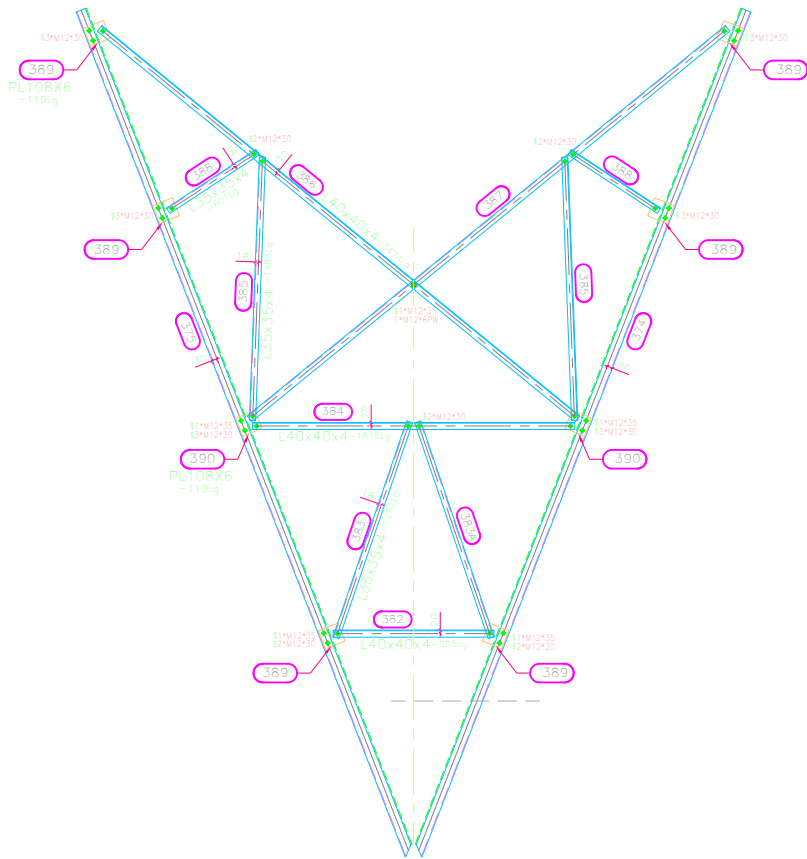
+3M LEG EXTN.

REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

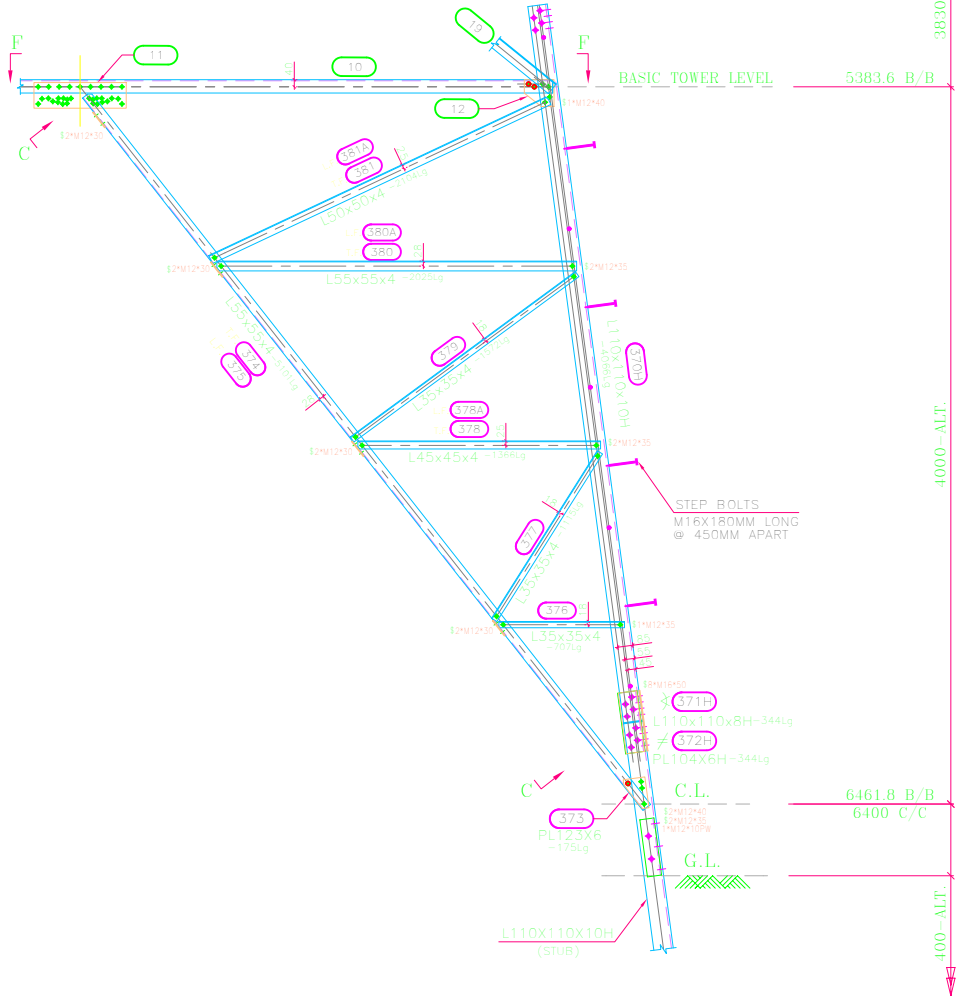
CLIENT :		 KETRACO Kenya Electricity Transmission Co. Ltd. P.O. Box 42589-00100 NAIROBI		KETRACO KENYA ELECTRICITY TRANSMISSION CO. LTD., KENYA		
CONSULTANT :		 ELECTRO CONSULTANTS LTD. P.O. BOX 10000 NAIROBI		ELECTRO CONSULTANT.		
CONTRACTOR :		 TATA PROJECTS LIMITED NEW DELHI, INDIA		TATA PROJECTS LIMITED, NEW DELHI, INDIA		
Contract :		XVIII: KPLC1/6E/2/A17				
PROJECT : Kindar uma-Mwingi-Garissa 132 KV S/C Transmission Lines (LOT A17)						
DESIGN	Monali	09.02.2013	SCALE:-1:20 	TITLE STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB2" (0°-45°) +3M LEG EXTENSION		
DRG.	SONAM	15.04.2013				
CHKD.	WS	15.04.2013				
APPD.	MKM	15.04.2013				
DRG. NO.			KETRACO/A17/SB2/SD/08			
REV	NO.	0				SHEET 1 OF 1

TOWER SLOPE	
TAN B	0.134774668
2TAN B	0.269549336
FACE	1.009041234
DEVELOP	1.018002172

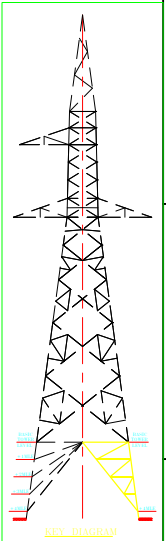
BOLTS / NUTS STATEMENT +4M LEG EXTN			
TYPE	SIZE (Length in mm)	TOTAL QTY.	
		HEXAGONAL	ANTI THEFT
	M12 X 30 MM	44	
	M12 X 35 MM	19	
	M12 X 40 MM	6	
SPRING WASHER	M12 X 2.5 THK	69	
PACK WASHER	M12 X 6 THK	01	
PACK WASHER	M12 X 10 THK	02	
	M16 X 50 MM		16
SPRING WASHER	M16 X 3.5 THK	16	
STEP BOLT	M16 X 180 MM	09	



VIEW 'C-C'






+4M LEG EXTN.



- NOTES:-
- ALL DIMENSIONS ARE IN MM.
 - MATERIALS :
'H' INDICATES HIGH TENSILE STEEL - IS2062:2006 E350 (fy=350N/sqmm)
MILD STEEL - IS2062:2006 E250 (fy=250N/sqmm)
BOLTS & NUTS - 12Ø & 16Ø - GRADE 5.6/5 (ISO:898) OR EQUIVALENT.
BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.
STEP BOLT SET: ONE BOLT+TWO NUT+TWO SPRING WASHER.
 - ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
 - THE PROCEEDING LETTER WILL BE "T43 SB2".
 - ♦ INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA BOLTS.
◆ INDICATES HOLES OF 13.5mm DIA FOR 12mm DIA BOLTS.
● INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA STEP BOLTS.
§ INDICATES ANTI THEFT BOLTS.
 - FOR VIEW F-F REFER DRAWING NO. KETRACO/A17/SB2/SD/03 SHEET 1/2.

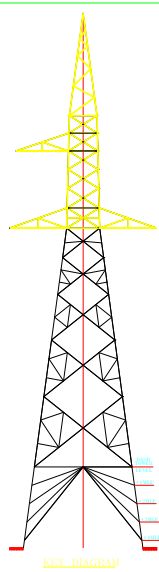
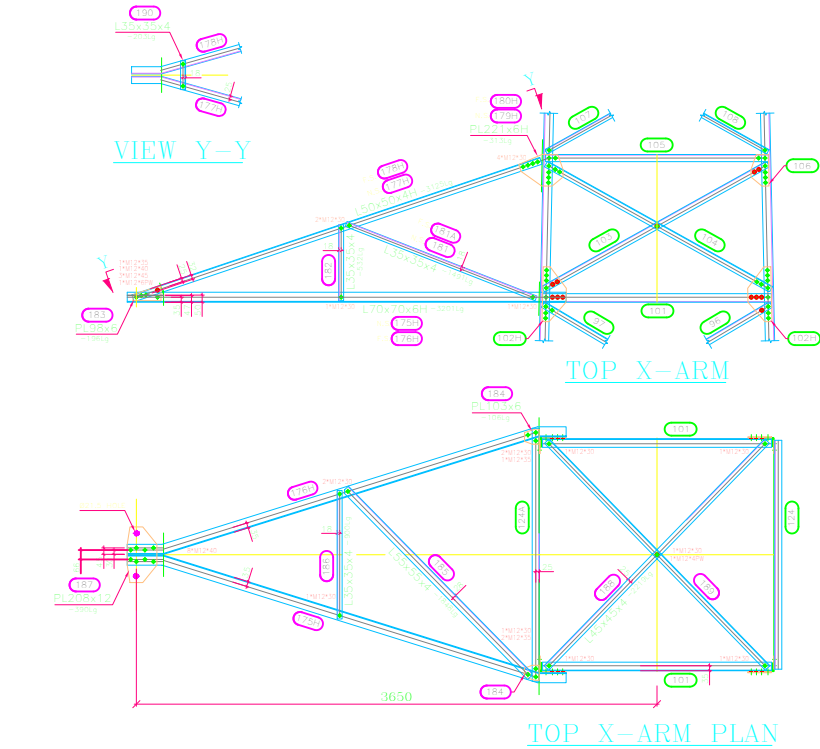
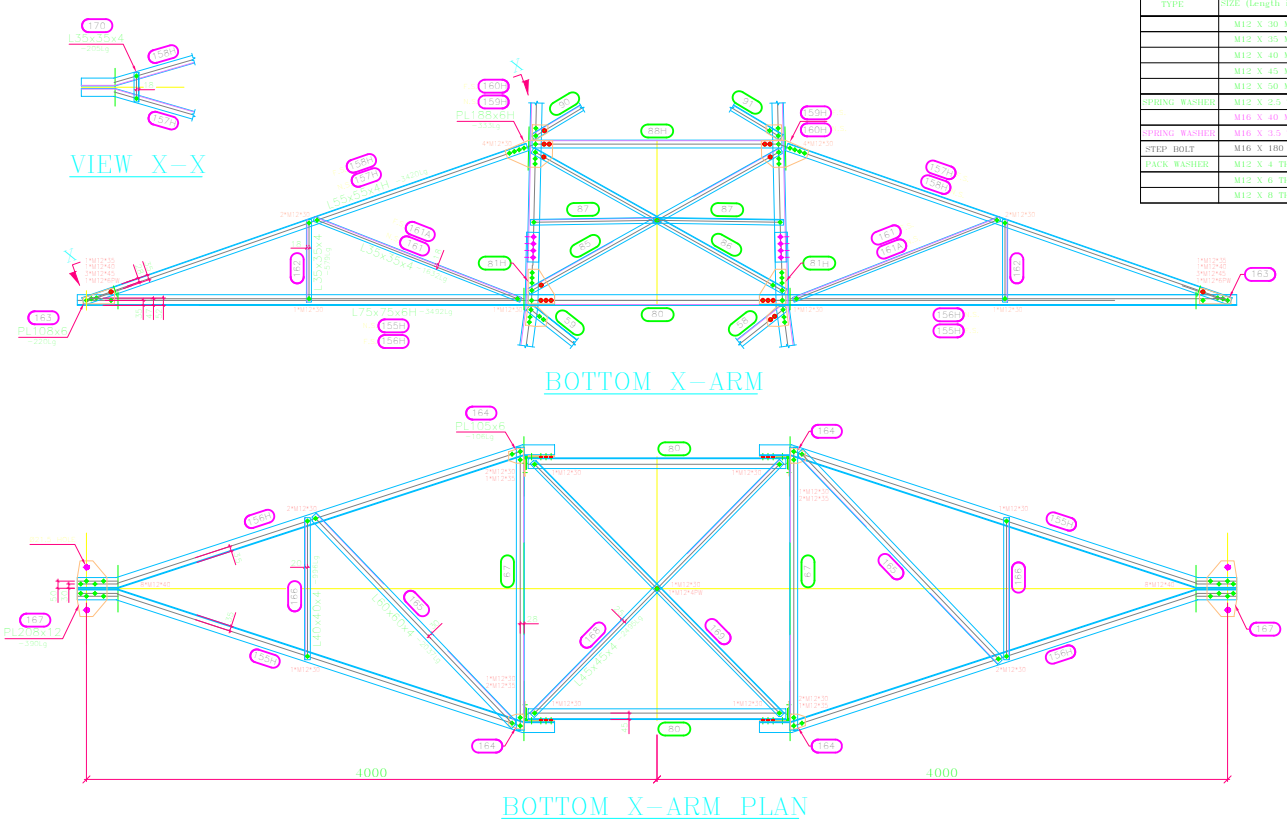
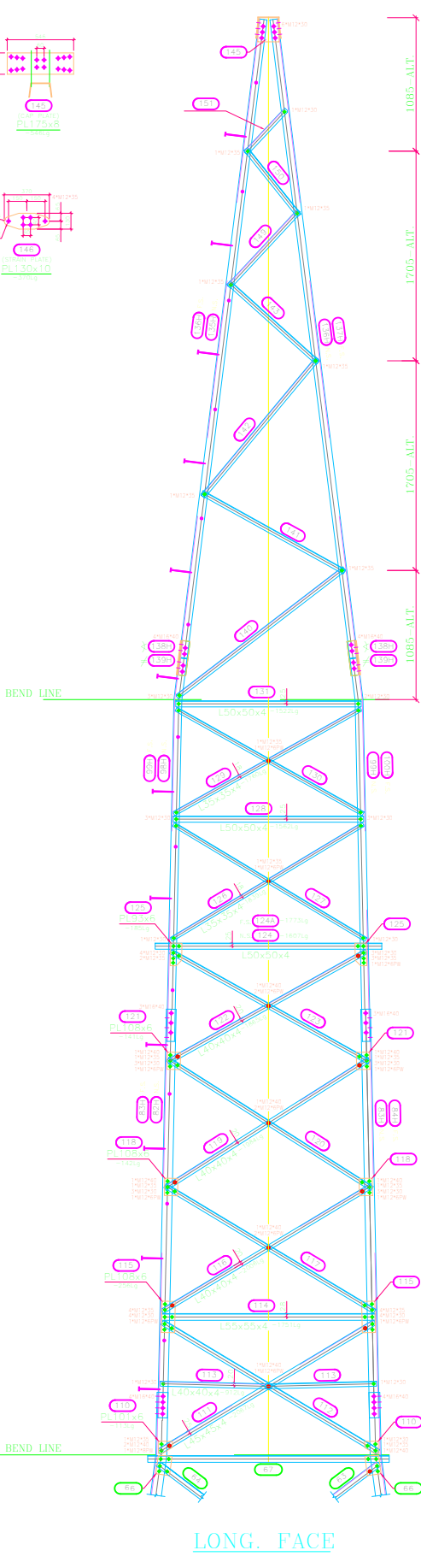
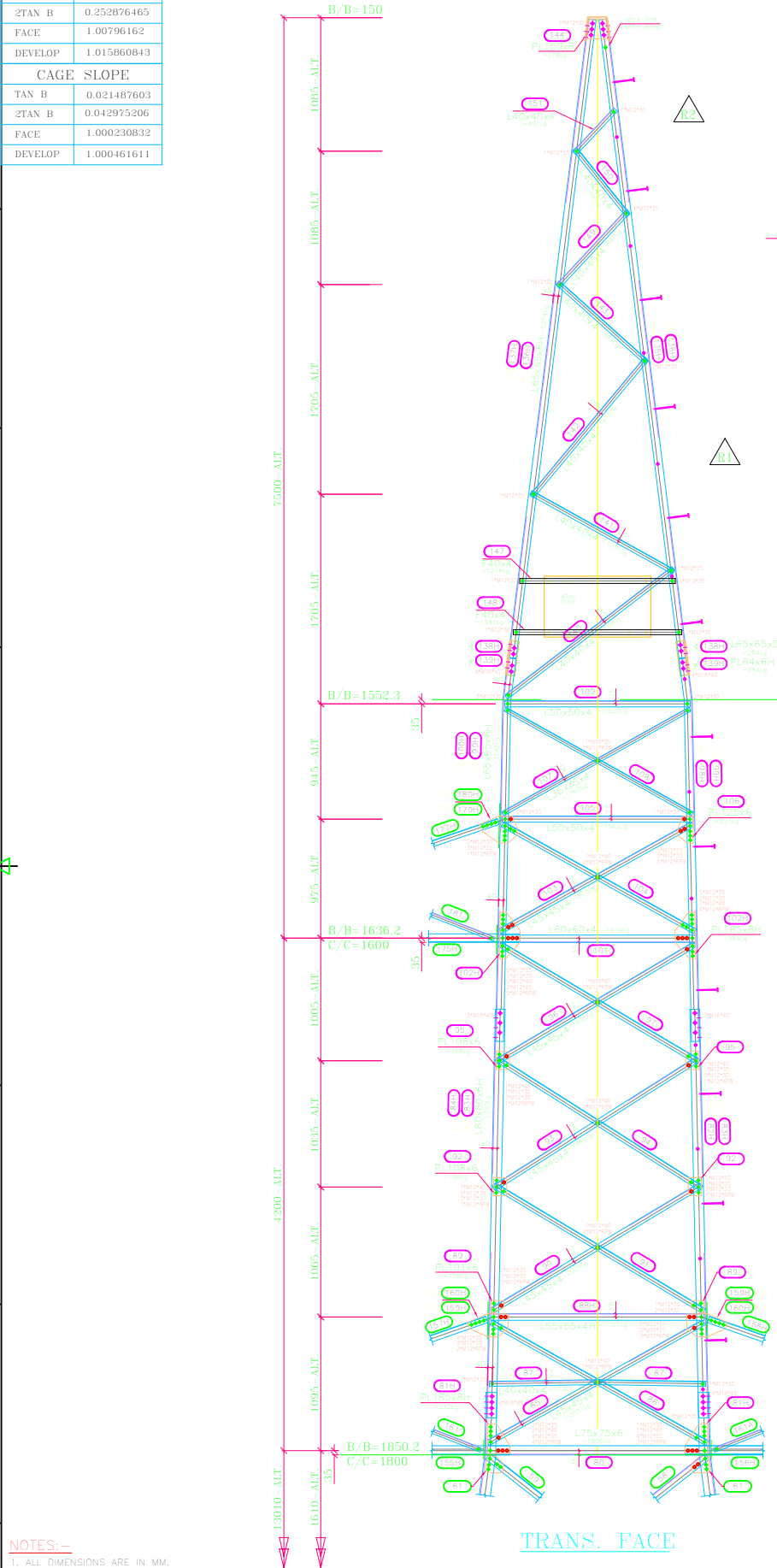
MARK NOS. 370 TO 390

REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

CLIENT :		KETRACO KENYA ELECTRICITY TRANSMISSION CO. LTD., KENYA
CONSULTANT :		ELECTRO CONSULTANT.
CONTRACTOR :		TATA PROJECTS LIMITED, NEW DELHI, INDIA
Contract :	XVIII: KPLC1/6E/2/A17	
PROJECT :	Kindaruma-Mwingi-Garissa 132 KV S/C Transmission Lines (LOT A17)	
DESIGN :	Manali	09.02.2013
DRN :	SONAM	15.04.2013
ENH :	WS	15.04.2013
APPD :	MKM	15.04.2013
SCALE	1:20	
TITLE	STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB2" (0°-45°) +4M LEG EXTENSION	
DRG. NO.	KETRACO/A17/SB2/SD/09	
REV.	0	SHEET 1 OF 1

PEAK SLOPE	
TAN B	0.126438232
2TAN B	0.252876465
FACE	1.00796162
DEVELOP	1.015860843
CAGE SLOPE	
TAN B	0.021487603
2TAN B	0.042975206
FACE	1.000230832
DEVELOP	1.000461611





BOLTS - NUTS STATEMENT CAGE, PEAK & X-ARM		
TYPE	SIZE (length in mm)	TOTAL QTY
	M12 X 30 MM	271
	M12 X 35 MM	109
	M12 X 40 MM	37
	M12 X 45 MM	15
	M12 X 50 MM	16
SPRING WASHER	M12 X 2.5 THK	560
SPRING WASHER	M16 X 30 MM	88
SPRING WASHER	M16 X 3.5 THK	88
STEP BOLT	M16 X 100 Lg	24
FLAT WASHER	M12 X 4 THK	62
	M12 X 6 THK	101
	M12 X 8 THK	16

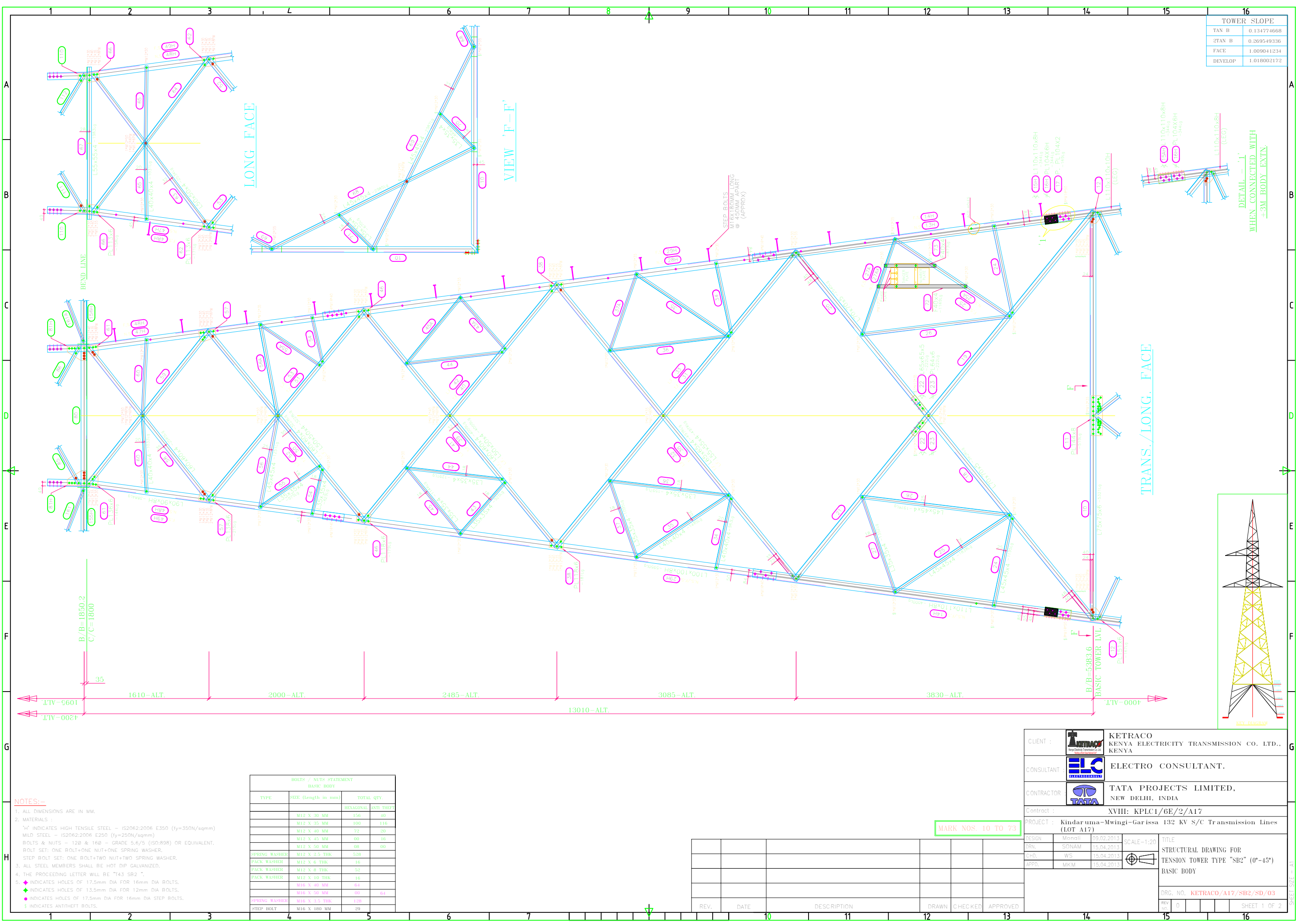


- NOTES:-
- ALL DIMENSIONS ARE IN MM.
 - MATERIALS :
H¹ INDICATES HIGH TENSILE STEEL - IS2062:2006 E350 (fy=350N/sqmm)
MILD STEEL - IS2062:2006 E250 (fy=250N/sqmm)
BOLTS & NUTS - 120 & 160 - GRADE 5.8/5 (ISO:898) OR EQUIVALENT.
BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.
STEP BOLT SET: ONE BOLT+TWO NUT+TWO SPRING WASHER.
 - ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
 - THE PROCEEDING LETTER WILL BE "T43 SB2".
 - ◆ INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA BOLTS.
 - ◆ INDICATES HOLES OF 13.5mm DIA FOR 12mm DIA BOLTS.
 - ◆ INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA STEP BOLTS.
 - ◆ INDICATES ANTI-THEFT BOLTS.

MARK NOS.
CAGE:-80 TO 131
PEAK:-135 TO 151
BOTTOM X-ARM:-155 TO 170
TOP X-ARM:-175 TO 190

REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
2.	13/05/2013	REVISED DURING TESTING	AMIT A.	AMIT A.	MKM
1.	12/05/2013	REVISED DURING TESTING	AMIT A.	AMIT A.	MKM

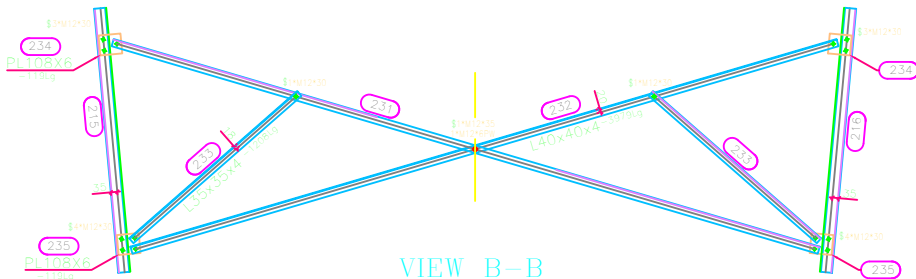
CLIENT :		KETRACO KENYA ELECTRICITY TRANSMISSION CO. LTD., KENYA
CONSULTANT :		ELECTRO CONSULTANT.
CONTRACTOR :		TATA PROJECTS LIMITED, NEW DELHI, INDIA
Contract :	XVIII: KPLC1/6E/2/A17	
PROJECT :	Kindaruma-Mwingi-Garissa 132 KV S/C Transmission Lines (LOT A17)	
DESIGN :	Monali	09.02.2013
BRN :	SONAM	15.04.2013
LDH :	WS	15.04.2013
APPD :	MKM	15.04.2013
SCALE:-1:25		
TITLE	STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB2" (0°-45°) CAGE, PEAK & X-ARMS	
DRG. NO.	KETRACO/A17/SB2/SD/03	
REV	2	SHEET 2 OF 2



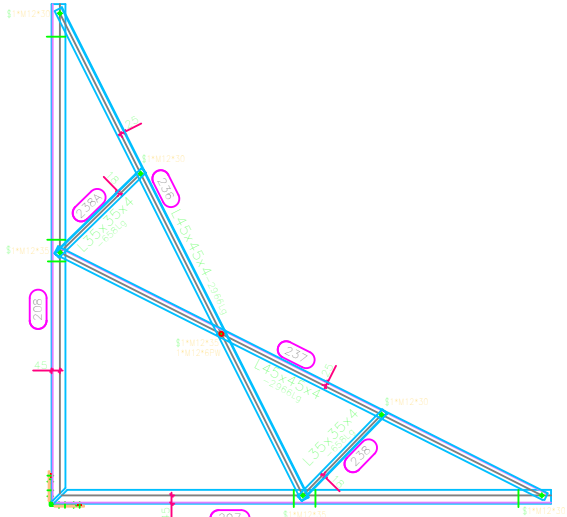
NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. MATERIALS ;
 "H" INDICATES HIGH TENSILE STEEL – IS2062:2006 E350 (fy=350N/sqmm)
 MILD STEEL – IS2062:2006 E250 (fy=250N/sqmm)
 BOLTS & NUTS – 120 & 160 – GRADE 5.6/5 (ISO:838) OR EQUIVALENT.
 BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.
 STEP BOLT SET: ONE BOLT+ TWO NUT+ TWO SPRING WASHER.
3. ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
4. THE PROCEEDING LETTER WILL BE "I43 SR2 ".
5. ♦ INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA BOLTS.
 ♦ INDICATES HOLES OF 13.5mm DIA FOR 12mm DIA BOLTS.
 ♦ INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA STEP BOLTS.
 \$ INDICATES ANTI THEFT BOLTS.
6. FOR VIEW F-F REFER DRAWING NO. KETRACO/A17/SR2/SD/O3 SHEET 1/2

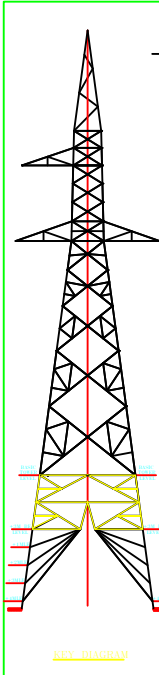
PROJECTS LIMITED, CHENNAI, INDIA					
PLC1/6E/2/A17					
Tamil Nadu 132 KV S/C Transmission Lines					
1:20	TITLE STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB2" (0°-45°) +3M BODY EXTENSION				
	PRG. NO. KETRACO/A17/SB2/SD/04				
REV.	0				SHEET 1 OF 4



VIEW B-B







VIEW F1—F1







TRANS./LONG. FACE
+3M BODY EXTN.

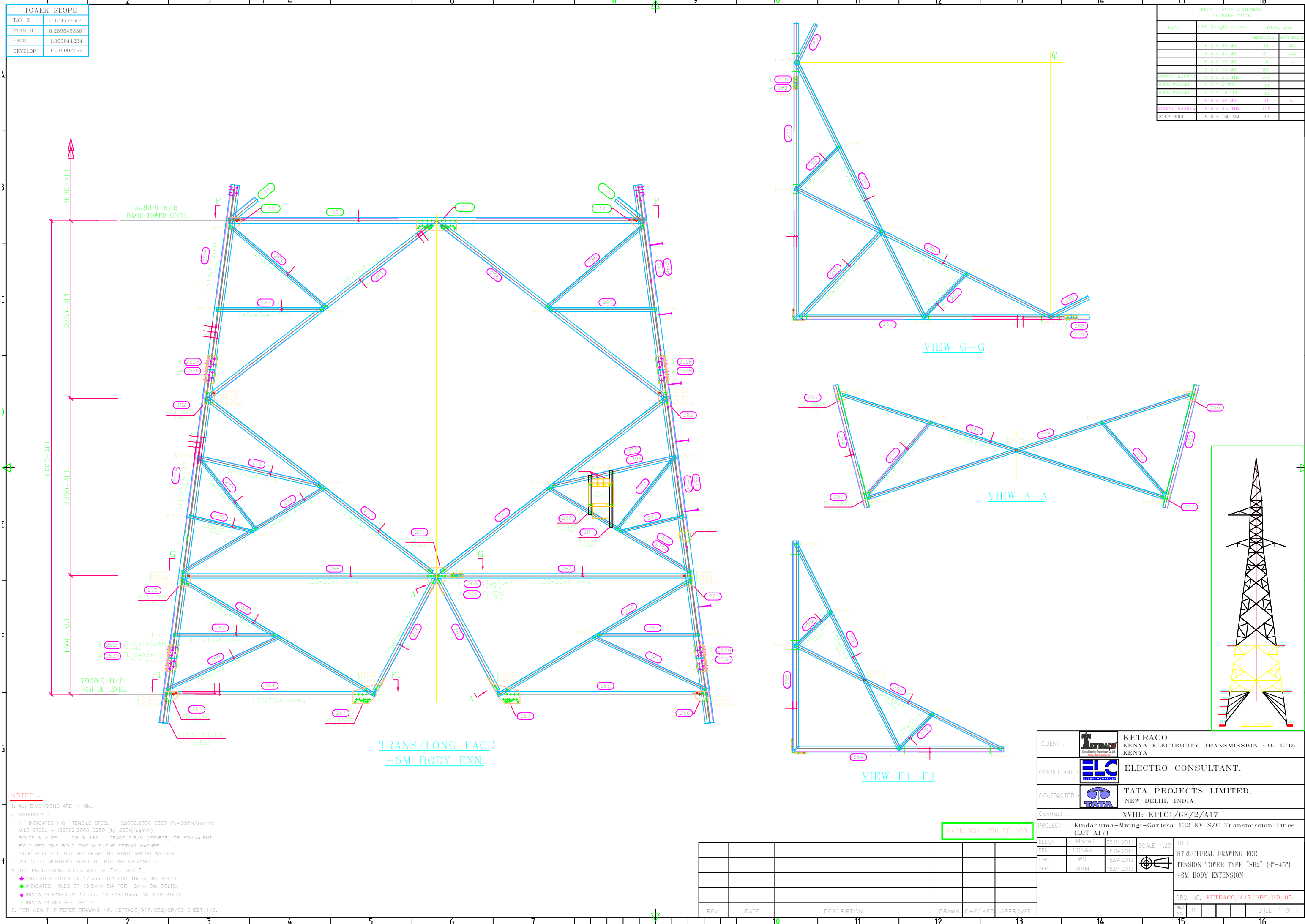
REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

CLIENT :		KETRACO KENYA ELECTRICITY TRANSMISSION CO. LTD., KENYA	
CONSULTANT :		ELECTRO CONSULTANT.	
CONTRACTOR :		TATA PROJECTS LIMITED, NEW DELHI, INDIA	
Contract : XVIII: KPLC1/6E/2/A17			
PROJECT : Kindaruma-Mwingi-Garissa 132 KV S/C Transmission Lines (LOT A17)			
DESIGN	Mwambi	03.02.2012	 SCALE: 1:20 TITLE STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB2" (0°-45°) +3M BODY EXTENSION DRG. NO. KETRACO/A17/SB2/SD/04 REV. NO. 0
CHK.	SONAM	05.04.2012	
APP.	W5	05.04.2012	
APPD.	MKM	05.04.2012	
			SHEET 1 OF

NOTES:—

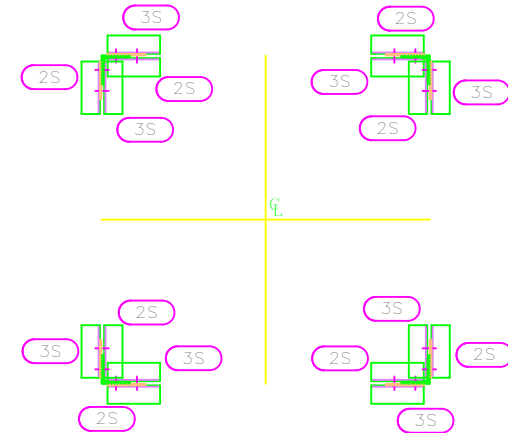
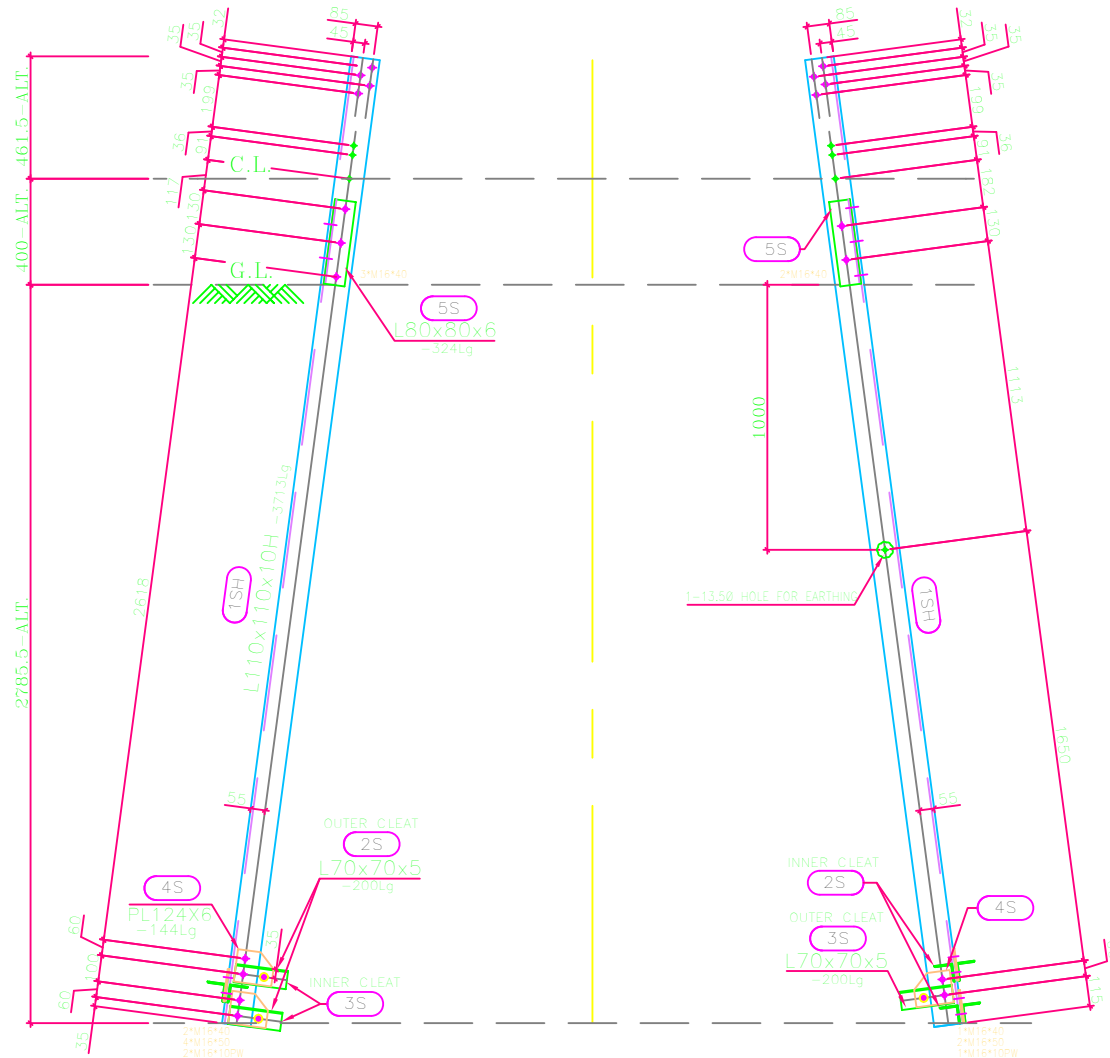
1. ALL DIMENSIONS ARE IN MM.
2. MATERIALS :
3. 'H' INDICATES HIGH TENSILE STEEL – IS2062:2006 E350 (fy=350N/sqmm)
MILD STEEL – IS2062:2006 E250 (fy=250N/sqmm)
4. BOLTS & NUTS – 120 & 160 – GRADE 5.6/5 (ISO:898) OR EQUIVALENT.
BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.
STEP BOLT SET: ONE BOLT+ONE TWO SPRING WASHER.
5. ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
6. THE PROCEEDING LETTER WILL BE "T43 S2 ".
7. ♦ INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA BOLTS.
◆ INDICATES HOLES OF 13.5mm DIA FOR 12mm DIA BOLTS.
◆ INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA STEP BOLTS.
\$ INDICATES ANITTHEFT BOLTS.
8. FOR VIEW F-F REFER DRAWING NO. KETRACO/A17/SB2/SD/03 SHEET 1/2

CLIENT :		 KETRACO KENYA ELECTRICITY TRANSMISSION CO. LTD., KENYA	
CONSULTANT :		 ELECTRO CONSULTANT.	
CONTRACTOR :		 TATA PROJECTS LIMITED, NEW DELHI, INDIA	
Contract : XVIII: KPLC1/6E/2/A17			
PROJECT : Kindar uma-Mwingi-Garissa 132 KV S/C Transmission Lines (LOT A17)			
DESIGN	Mongili	09.02.2013	SCALE : 1:20 
CHK.	SONAM	15.04.2013	
CHK.	WS	15.04.2013	
APPD.	MKM	15.04.2013	
			TITLE STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB2" (0°-45°) +6M BODY EXTENSION
			DRG. NO. KETRACO/A17/SB2/SD/05
			REV 0
			SHEET 1 OF 1



PEAK SLOPE	
TAN H	0.134774668
2TAN H	0.269549336
FACE	1.009041234
DEVELOP	1.018002172

BOLTS / NUTS STATEMENT STUB		
TYPE	SIZE (Length in mm)	TOTAL QTY.
	M16 X 40 MM	32
	M16 X 50 MM	24
SPRING WASHER	M16 X 3.5 THK	56
PACK WASHER	M16 X 10 THK	12






BASE PLAN (TYP.)

MARK NOS. 1SH TO 5S

NOTES:-

- ALL DIMENSIONS ARE IN MM.
- MATERIALS:
 - HT INDICATES HIGH TENSILE STEEL - IS2062:2006 E350 (fy=350N/sqmm)
 - MILD STEEL - IS2062:2006 E250 (fy=250N/sqmm)
 - BOLTS & NUTS - 12Ø & 16Ø - GRADE 5.6/5 (ISO:8.8) OR EQUIVALENT.
 - BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.
 - STEP BOLT SET: ONE BOLT+TWO NUT+TWO SPRING WASHER.
- ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
- THE PRECEDING LETTER WILL BE "T43 SB2".
- ◆ INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA BOLTS.
- ◆ INDICATES HOLES OF 13.5mm DIA FOR 12mm DIA BOLTS.
- ◆ INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA STEP BOLTS.
- ◆ INDICATES ANTI-THEFT BOLTS.

REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

CLIENT :	 KETRACO KENYA ELECTRICITY TRANSMISSION CO. LTD., KENYA
CONSULTANT :	 ELECTRO CONSULTANT.
CONTRACTOR :	 KETRACO NEW DELHI, INDIA
Contract :	XVIII: KPLC1/6E/2/A17
PROJECT :	Kindaruma-Mwingi-Garissa 132 KV S/C Transmission Lines (LOT A17)
DESIGN :	Morali 09.02.2013
CHECK :	SONAM 15.04.2013
DESIGN :	WIS 15.04.2013
DESIGN :	MMH 15.04.2013
TITLE :	STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB2" (0°-45°) STUB
DES. NO. :	KETRACO/A17/SB2/SD/01
REV. NO. :	
SHEET 1 OF 1	

SHEET SIZE - A1