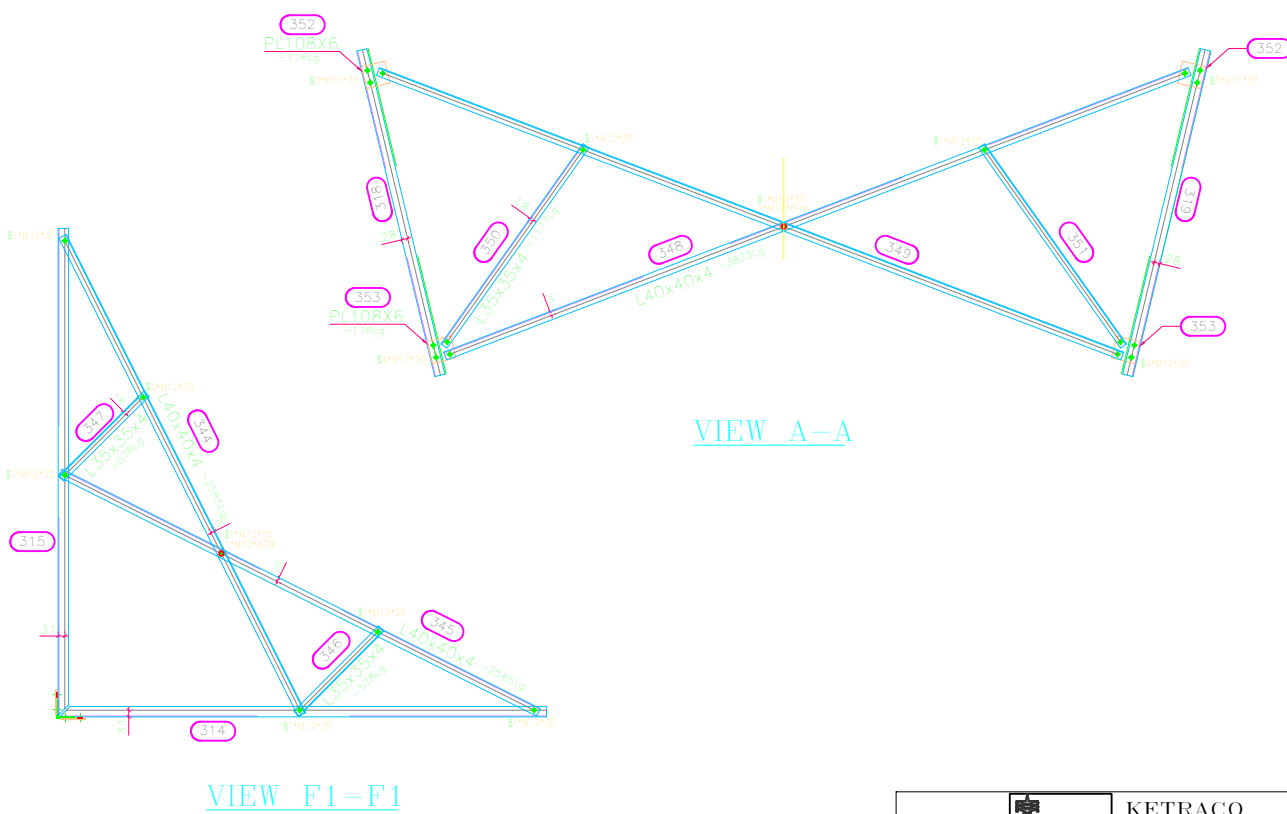
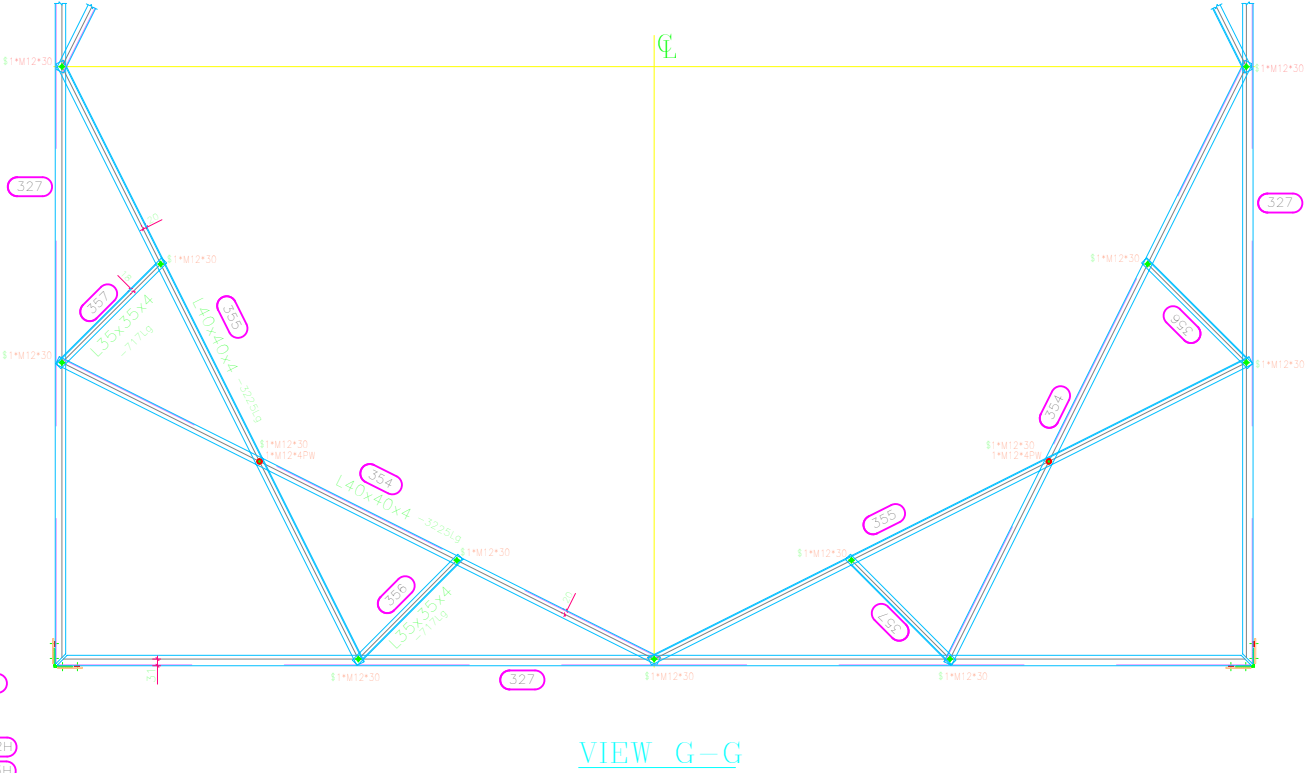
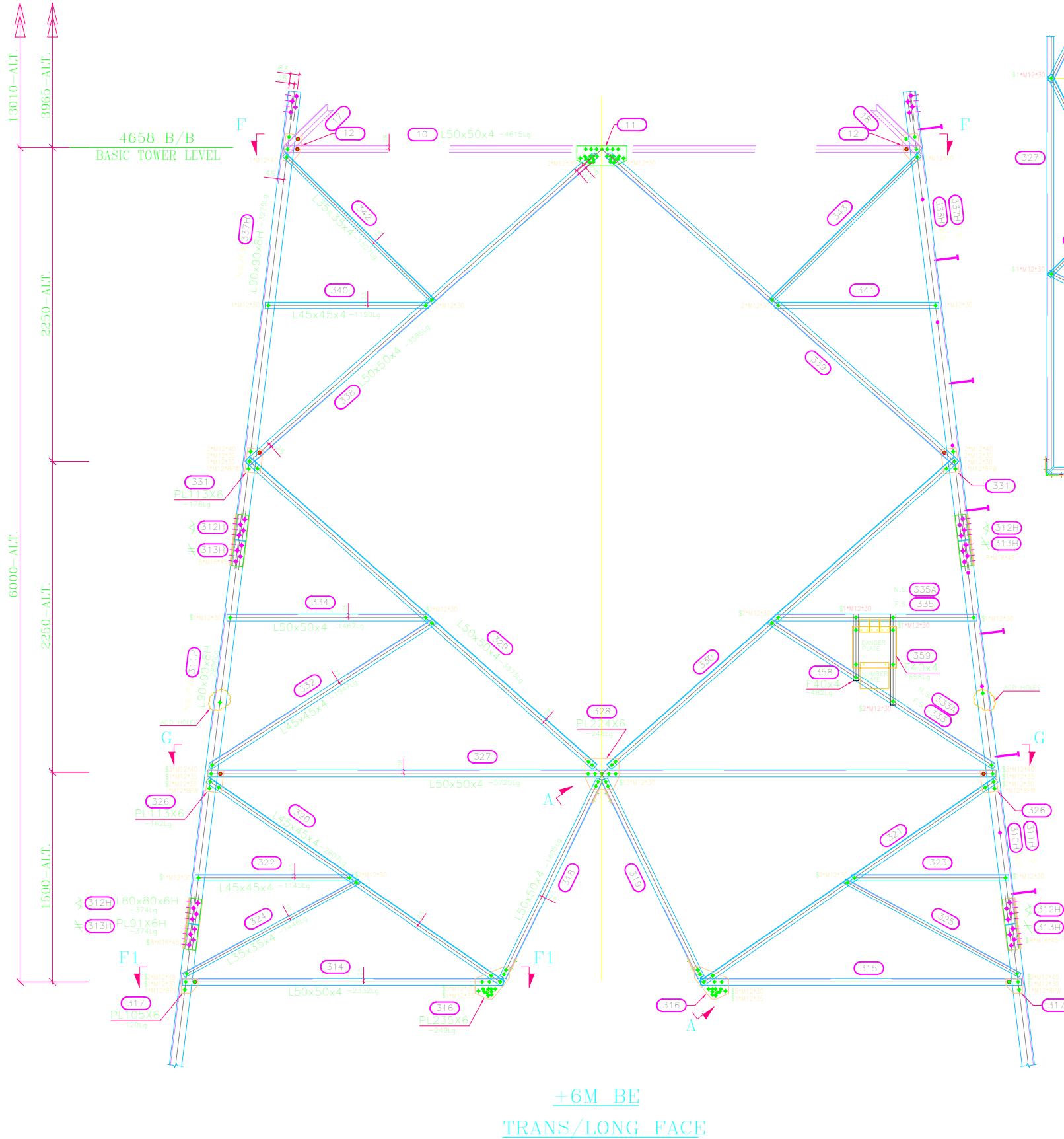





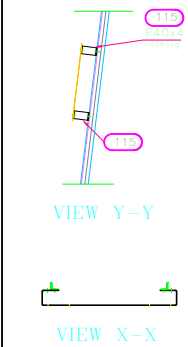
SLOPE
0.123405007
0.246810014
1.007585627
1.015114571

TYPE
SPRING WASHER
PACK WASHER
PACK WASHER
PACK WASHER
SPRING WASHER
STEP BOLT

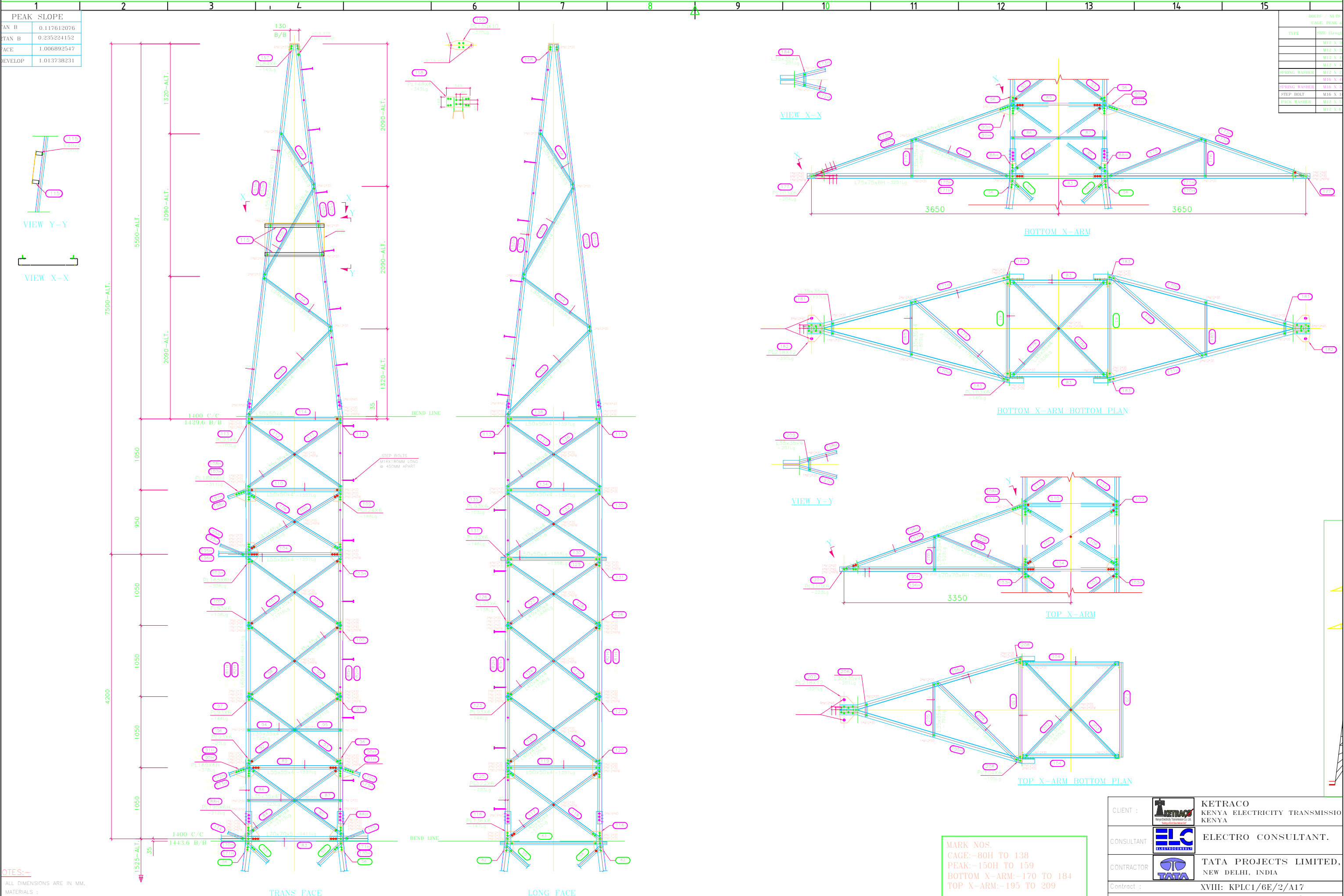


CLIENT :		KETRACO KENYA ELECTRICITY KENYA
CONSULTANT :		ELECTRO CON
CONTRACTOR :		TATA PROJECT NEW DELHI, INDIA

PEAK SLOPE	
TAN B	0.117612076
TAN B	0.235224152
FACE	1.006892547
DEVELOP	1.013738231

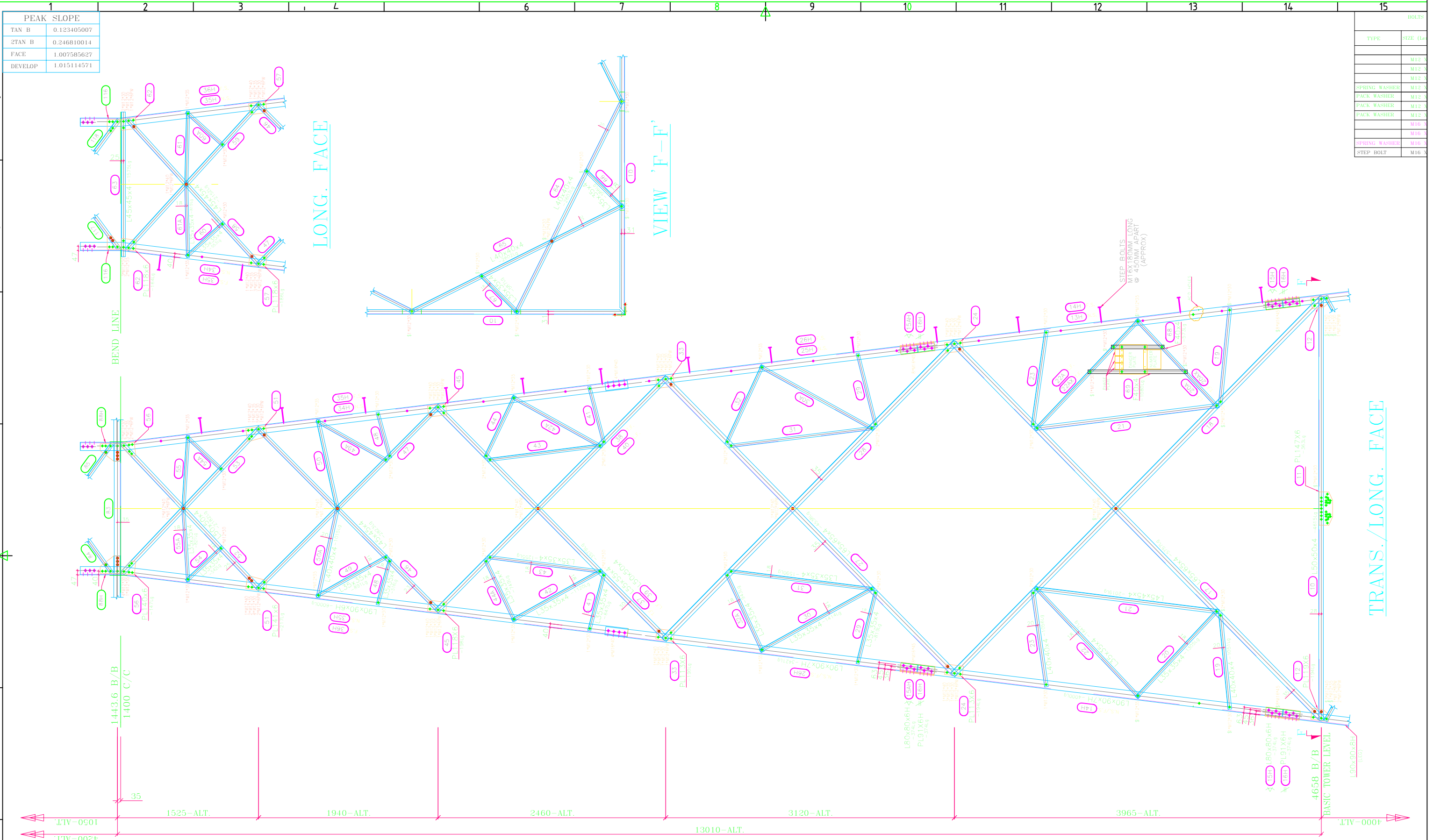


NOTES:-  
ALL DIMENSIONS ARE IN MM.  
MATERIALS :



BOLTS / NUTS	
CAGE-PEAK	
TYPE	SIZE (Length)
	M15 X 4
	M15 X 4
	M15 X 4
	M15 X 4
SPRING WASHER	M15 X 4
SPRING WASHER	M16 X 4
STEP BOLT	M16 X 4
PACK WASHER	M15 X 4
	M15 X 4

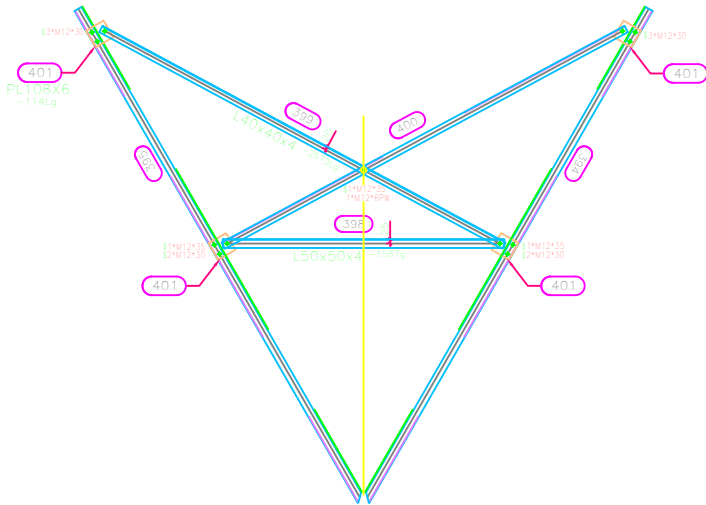
CLIENT :	KETRACO KENYA ELECTRICITY TRANSMISSION KENYA
CONSULTANT	ELECTRO CONSULTANT.
CONTRACTOR	TATA PROJECTS LIMITED, NEW DELHI, INDIA
Contract :	XVIII: KPLC1/6E/2/A17



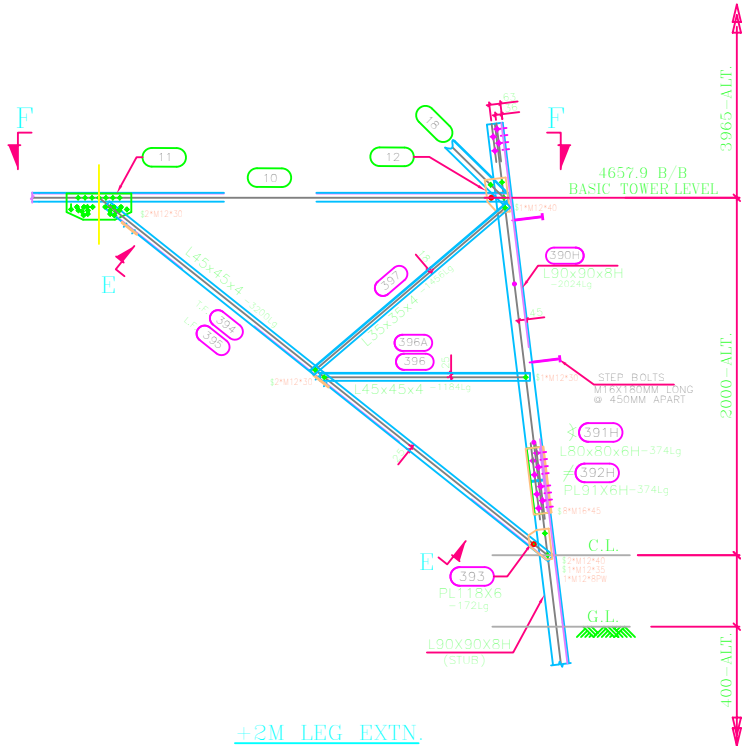


PEAK SLOPE	
TAN B	0.123405007
2TAN B	0.246810014
FACE	1.007585627
DEVELOP	1.015114571

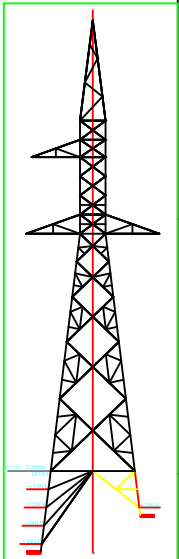
BOLTS / NUTS STATEMENT +2M BODY EXTEN.			
TYPE	SIZE (Length in mm)	HEXAGONAL	NUT THICK
	M12 X 30 MM	20	20
	M12 X 35 MM	5	5
	M12 X 40 MM	6	6
SPRING WASHER	M12 X 2.5 THK	31	
PACK WASHER	M12 X 0 THK	1	
PACK WASHER	M12 X 0 THK	2	
	M16 X 45 MM	16	16
SPRING WASHER	M16 X 1.5 THK	16	
STEP BOLT	M16 X 160 MM	4	



VIEW E-E






+2M 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 - 120 & 160 - 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 SB1".
  - ♦ 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/SB1/SD/003 SHEET 1/2.

MARK NOS. 390H TO 401

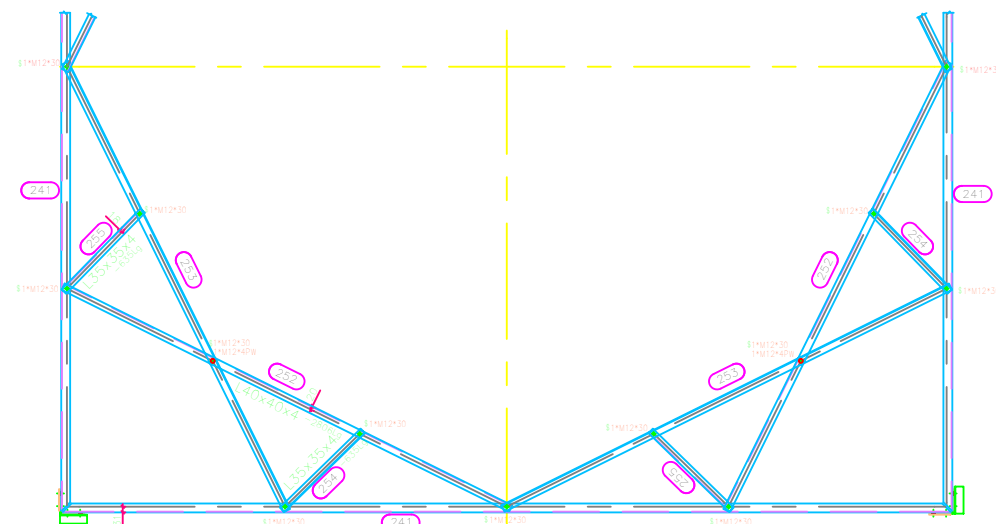
REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

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 :	Mondal	03.02.2013
DRN :	MJ	06.04.2013
CHD :	WS	06.04.2013
APPR :	MKM	06.04.2013
SCALE:-1:20		TITLE
		STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB1" (0°-15°) +2M LEG EXTENSION
		DRG. NO. KETRACO/A17/SB1/SD/07
		REV. NO. 0

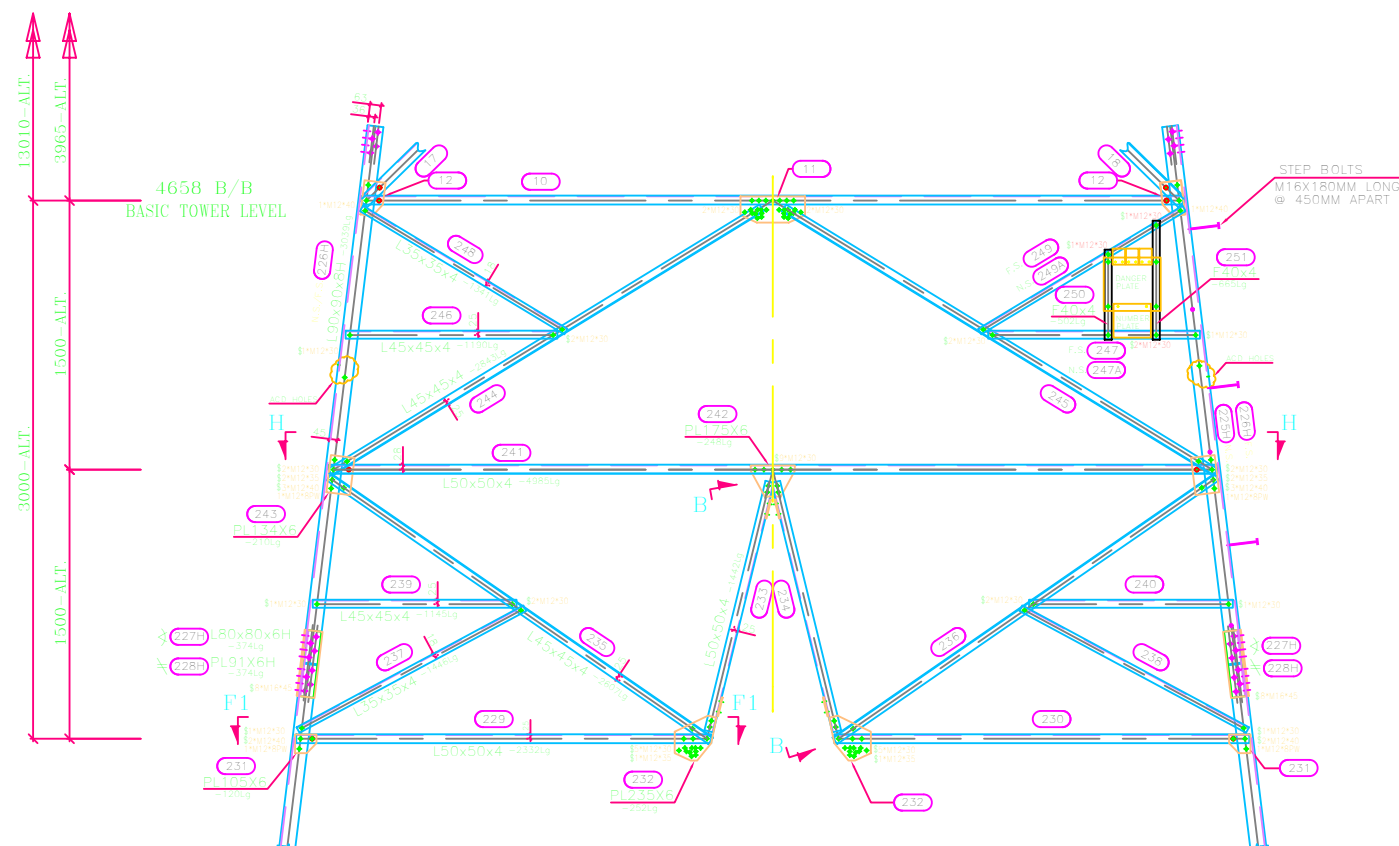
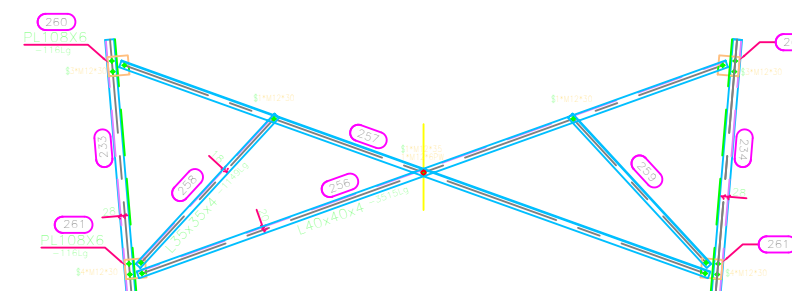


PEAK SLOPE	
TAN B	0.123405007
2TAN B	0.246810014
FACE	1.007585627
DEVELOP	1.015114571

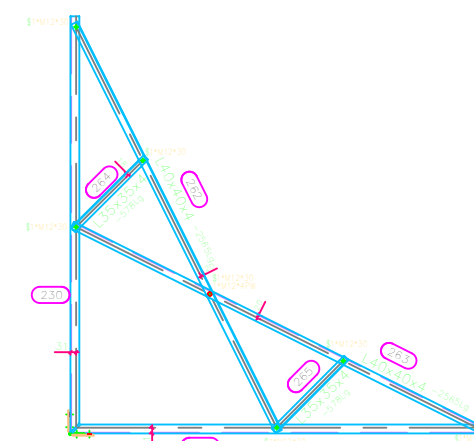
BOLTS / NUTS / STATEMENT -3M BODY PARTS			
TYPE	SIZE (Length in mm)	DIAGONAL	AND THRD
	M12 X 10 MM	16	240
	M12 X 15 MM		28
	M12 X 40 MM	0	40
SPRING WASHER	M12 X 2.5 THK	100	
PACK WASHER	M12 X 4 THK	0	
PACK WASHER	M12 X 6 THK	4	
PACK WASHER	M12 X 8 THK	16	
	M16 X 15 MM		63
SPRING WASHER	M16 X 3.5 THK	64	
STEP BOLT	M16 X 180 MM	6	



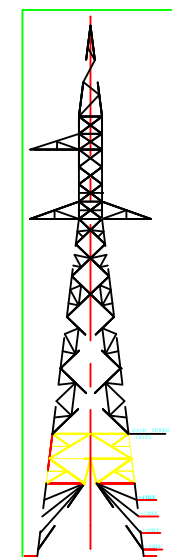
VIEW H-H



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







VIEW F1-F1



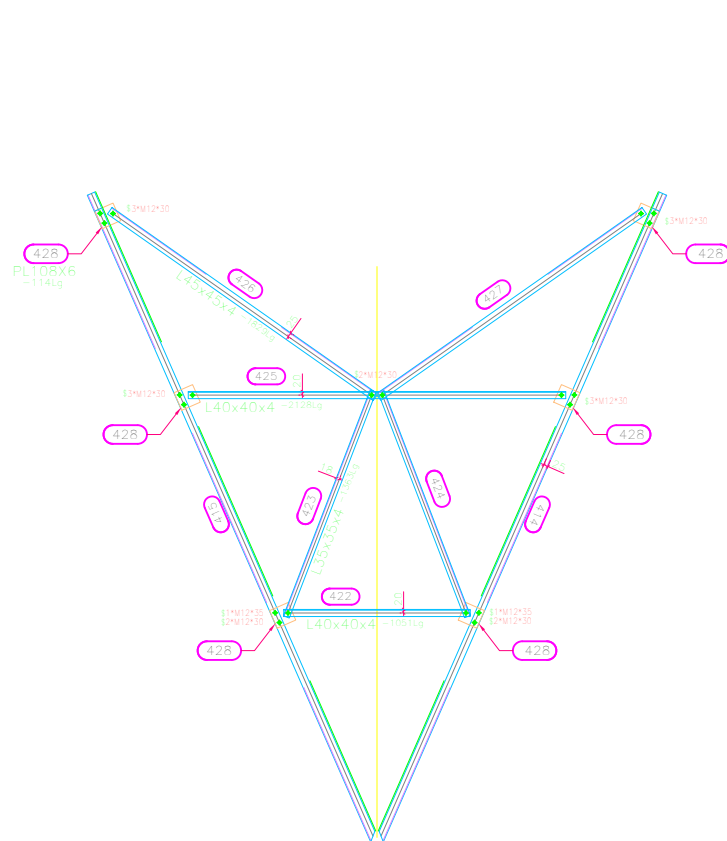
- NOTES:-**
1. ALL DIMENSIONS ARE IN MM.
  2. MATERIALS :  
 "H" INDICATES HIGH TENSILE STEEL – IS2062:2006 E350 ( $f_y=350\text{N/sqmm}$ )  
 MILD STEEL – IS2062:2006 E250 ( $f_y=250\text{N/sqmm}$ )  
 BOLTS & NUTS – 120 & 160 – GRADE 5.6/5 (ISO-898) OR EQUIVALENT.  
 BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.  
 STEP BOLT SET: ONE BOLT+TWO NUT+TWO SPRING WASHER.
  3. ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
  4. THE PROCEEDING LETTER WILL BE "F43 SR1".
  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 ANTITHEFT BOLTS.

REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

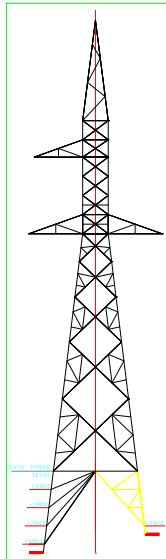
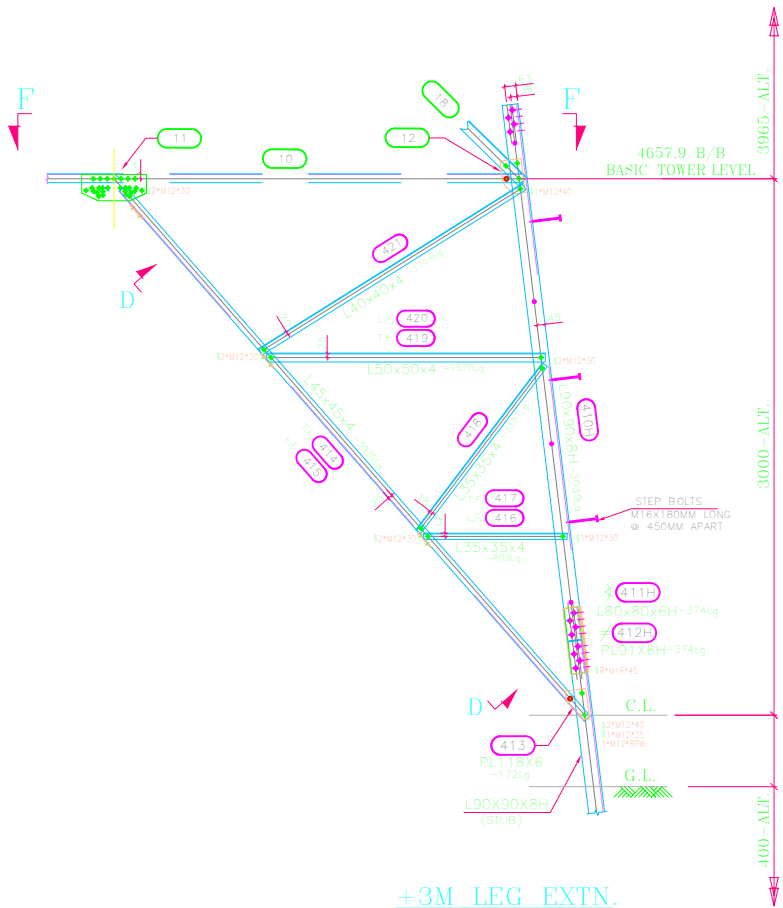
CLIENT :		KETRACO KENYA ELECTRICITY TRANSMISSION CO. LTD., KENYA
CONSULTANT :		ELECTRO CONSULTANT.
CONTRACTOR :		TATA PROJECTS LIMITED, NEW DELHI, INDIA
Contract :	XVIII: KPLC1/6E/2/A17	
PROJECT :	Kindaruma-Mwingi-Garissa 132 KV S/C Transmission Lines (LOT A17)	
DESIGN :	Momali	09.02.2013
DRN :	MJ	06.04.2013
CHKD :	WS	06.04.2013
APPD :	MKM	06.04.2013
 TITLE STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB1" (0°-15°) +3M BODY EXTENSION		
BRG. NO. KETRACO/A17/SB1/SD/04 REV 0		

PEAK SLOPE	
TAN B	0.123405007
2TAN B	0.246810014
FACE	1.007585627
DEVELOP	1.015114571





BOLTS - NUTS - STATEMENT BASIC BODY			
TYPE	SIZE (Length in mm)	TOTAL QTY.	
		HEXAGONAL	ANTI THEFT
	M12 X 30 MM	---	36
	M12 X 35 MM	---	4
	M12 X 40 MM	---	6
SPRING WASHER	M12 X 2.5 THK	46	
PACK WASHER	M12 X 4 THK	2	
	M16 X 45 MM	---	16
SPRING WASHER	M16 X 3.5 THK	16	
STEP BOLT	M16 X 180 MM	7	



VIEW D-D

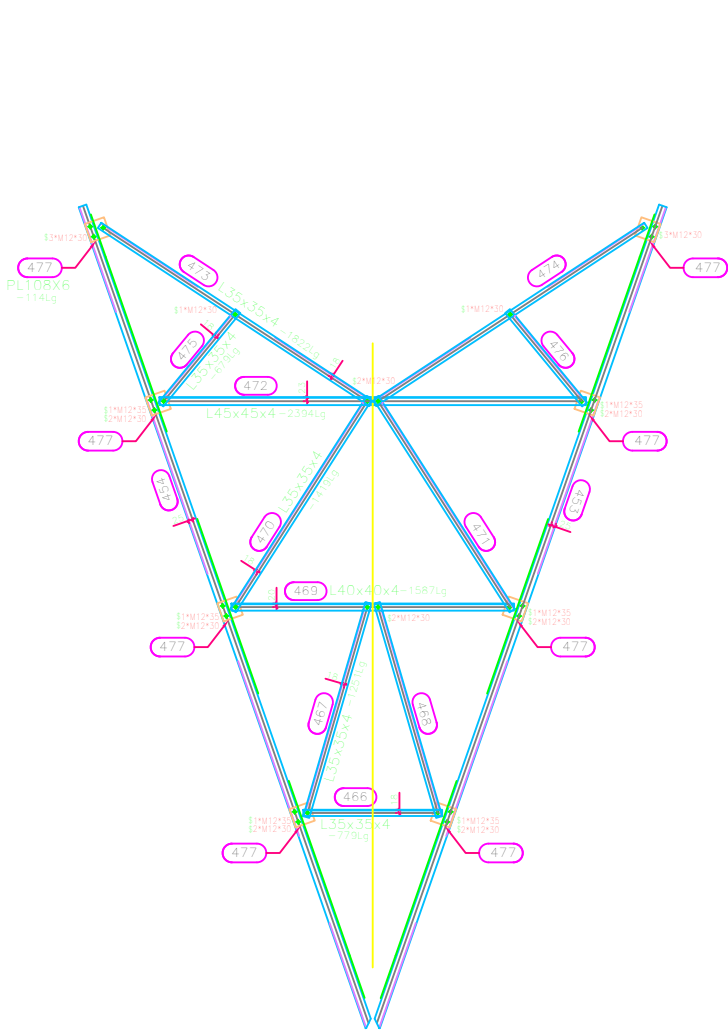


REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

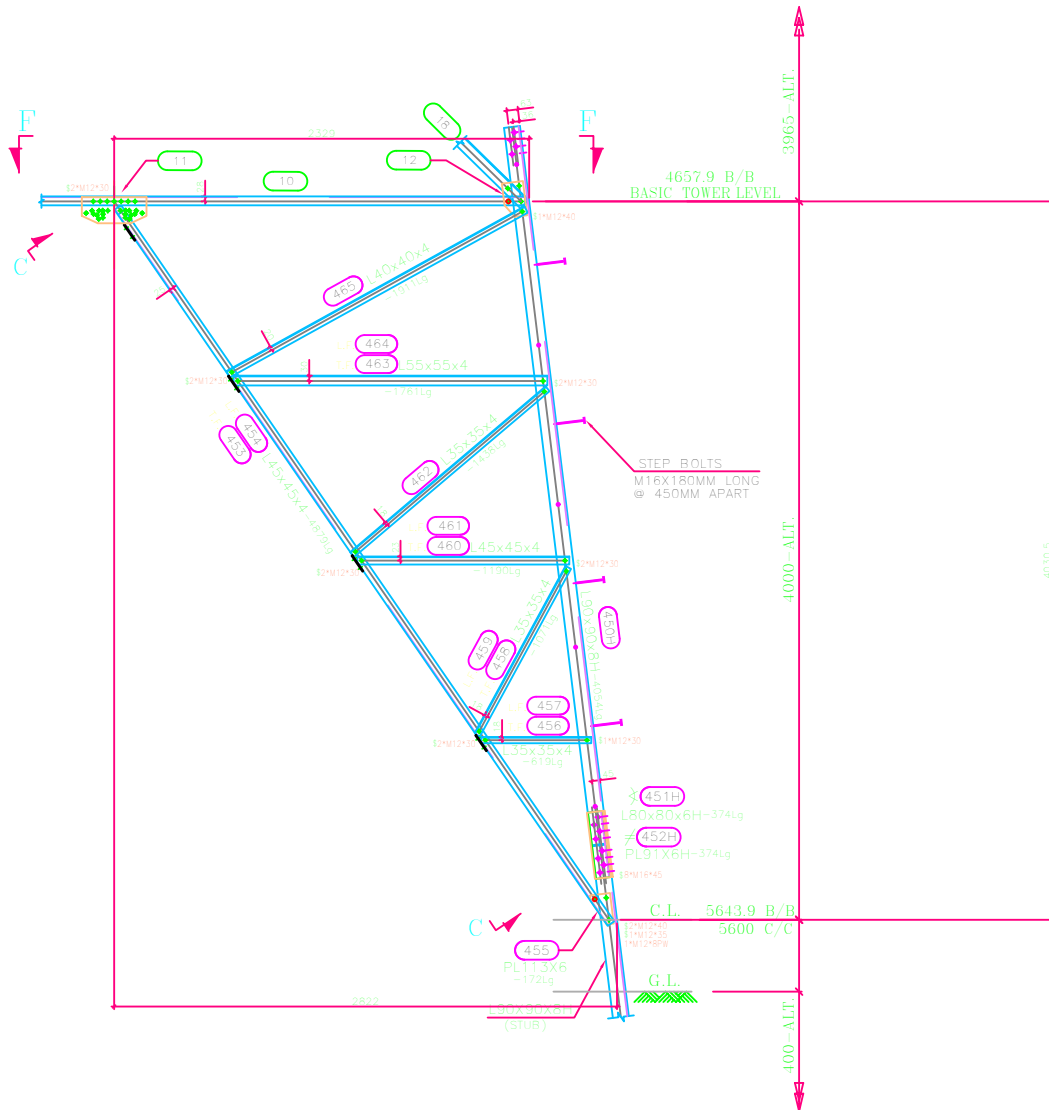
CLIENT :		 <b>KETRACO</b> KENYA ELECTRICITY TRANSMISSION CO. LTD., KENYA	
CONSULTANT :		 <b>ELECTRO CONSULTANT.</b>	
CONTRACTOR :		 <b>TATA PROJECTS LIMITED,</b> NEW DELHI, INDIA	
Contract :		XVIII: KPLC1/6E/2/A17	
PROJECT : Kindaruma-Mwingi-Garissa 132 KV S/C Transmission Lines (LOT A17)			
Design	Monali	09.02.2013	SCALE - 1:20  
DRN.	MJ	06.04.2013	
CHD.	WS	06.04.2013	
APPD.	MKM	06.04.2013	
			TITLE STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB1" (0°-15°) +3M LEG EXTENSION
			DRG. NO. <b>KETRACO/A17/SB1/SD/08</b>
			REV NO. 0

TOWER SLOPE	
TAN B	0.123405007
2TAN B	0.246810014
FACE	1.007585627
DEVELOP	1.015114571

BOLTS & NUTS STATEMENT +4M LEG EXTN.		
TYPE	SIZE (Length in mm)	TOTAL QTY.
		HEXAGONAL NUT THEFT
	M12 X 30 MM	50
	M12 X 35 MM	8
	M12 X 40 MM	6
SPRING WASHER	M12 X 2.5 THK	64
BACK WASHER	M12 X 0 THK	62
	M16 X 15 MM	16
SPRING WASHER	M16 X 3.5 THK	16
STEP BOLT	M16 X 180 MM	08

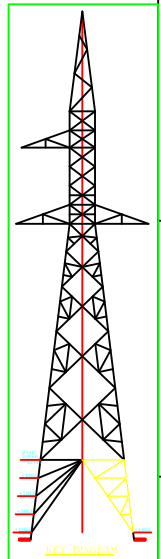


VIEW 'C-C'






+4M LEG EXTN.

MARK NOS. - 450H TO 477



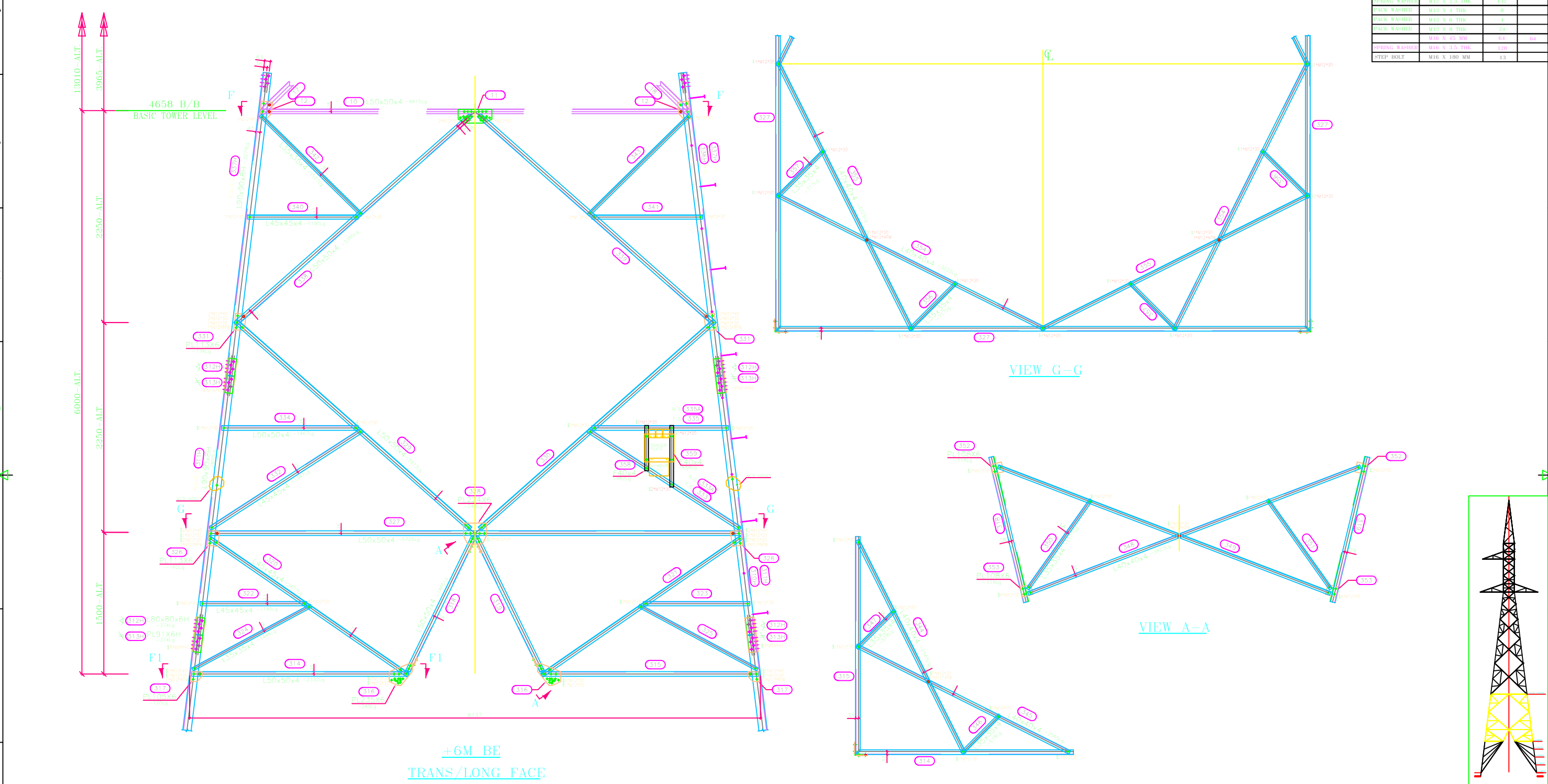
- NOTES:-
- ALL DIMENSIONS ARE IN MM.
  - MATERIALS :
    - 'H' INDICATES HIGH TENSILE STEEL - IS2062:2006 E350 (fy=350N/sqmm)
    - MILD STEEL - IS2062:2006 E250 (fy=250N/sqmm)
    - BOLTS & NUTS - 120 & 160 - GRADE 5.6/5 (ISO:898) OR EQUIVALENT.
    - BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.
    - STEP BOLT SET: ONE BOLT+TWO NUT+TWO SPRING WASHER.
  - ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
  - THE PROCEEDING LETTER WILL BE "T43 SB1".
  - 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 ANTITHEFT BOLTS.
  - FOR VIEW F-F REFER DRAWING NO. KETRACO/A17/SB1/SD/003 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 :	Kindaruma-Mwingi-Garissa 132 KV S/C Transmission Lines (LOT A17)	
DESIGN :	Monali	09.02.2013
BRN :	MJ	06.04.2013
CHK :	WS	06.04.2013
APPD :	MKM	06.04.2013
SCALE :	1:20	
TITLE :	STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB1" (0°-15°) +4M LEG EXTENSION	
DRG. NO. :	KETRACO/A17/SB1/SD/09	
REV :	0	



PEAK SLOPE	
TAN B	0.123405007
2TAN B	0.246810014
FACE	1.007585627
DEVELOP	1.015114571




BOLTS & NUTS STATEMENT +6M BODY EXTENSION			
TYPE	SIZE (Length in mm)	HEXAGONAL	TOTAL QTY.
	M12 X 30 MM	48	96
	M12 X 35 MM	16	16
	M12 X 40 MM	24	48
	M12 X 2.5 THK	432	
SPRING WASHER	M12 X 4 THK	8	
BACK WASHER	M12 X 6 THK	4	
BACK WASHER	M12 X 8 THK	24	
SPRING WASHER	M16 X 15 MM	64	64
SPRING WASHER	M16 X 12.5 THK	128	
STEP BOLT	M16 X 180 MM	13	



- 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: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 SR1".
  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.

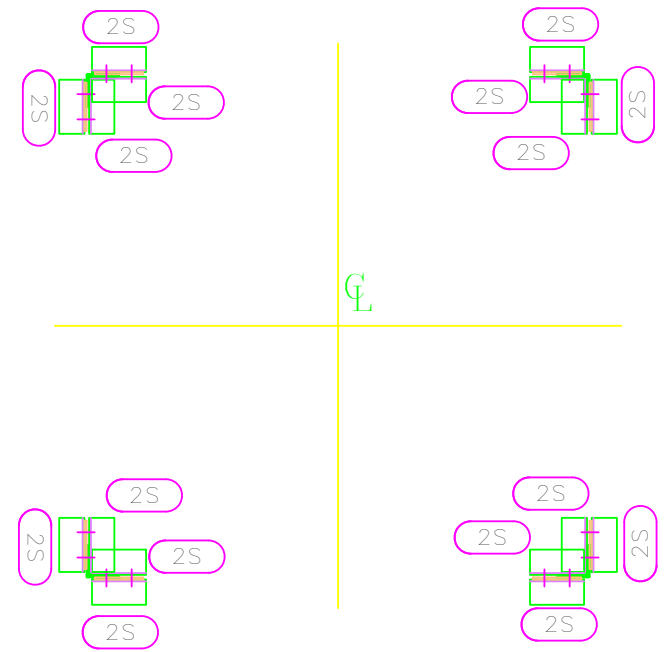
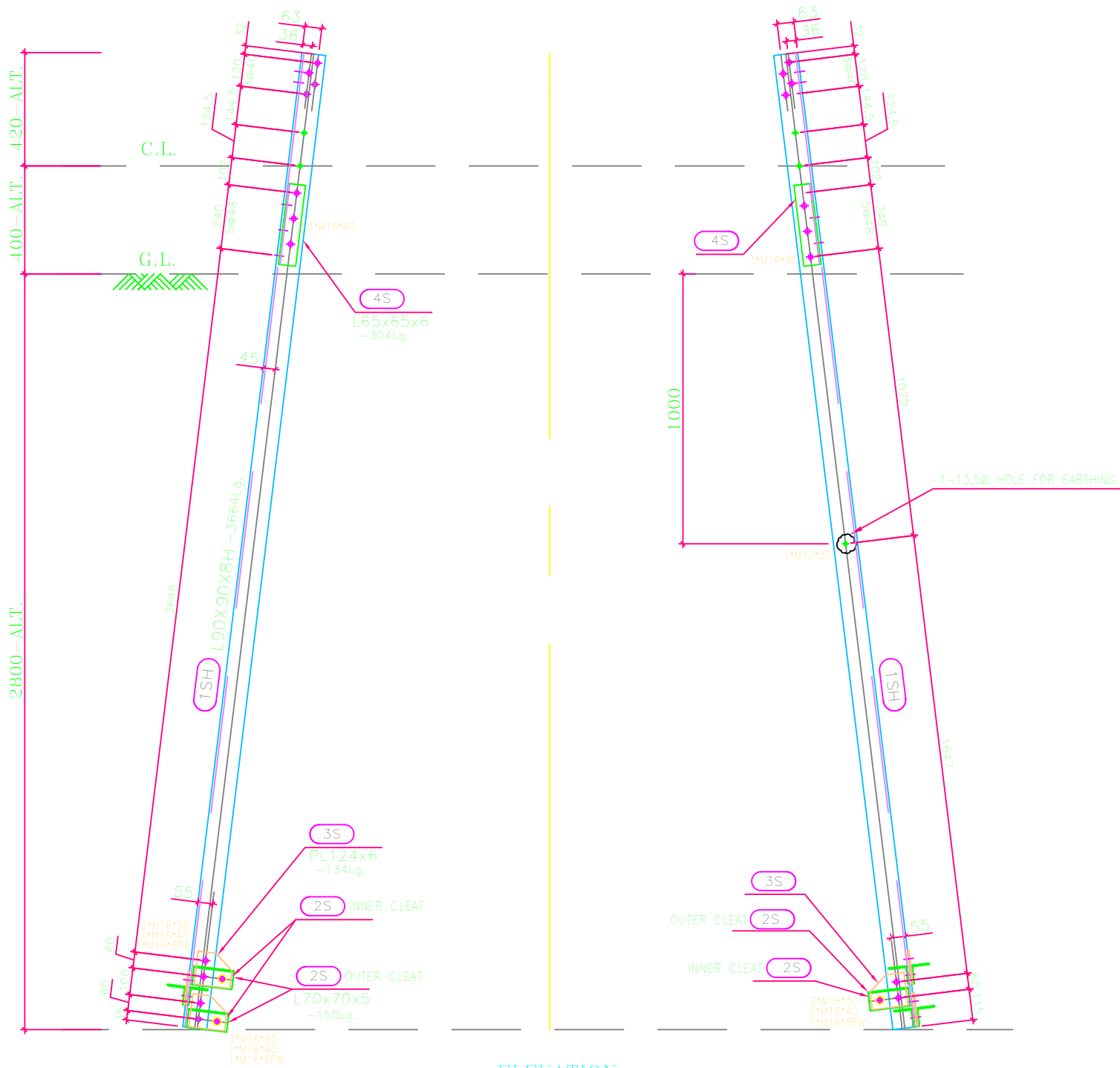
MARK NOS. 310H TO 359

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 :	Mandir	03.02.2013
DRN :	MJ	06.04.2013
CHD :	WS	06.04.2013
APPD :	MKM	06.04.2013
SCALE :	1:20	
TITLE :	STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB1" (0°-15°) +6M BODY EXTENSION	
DRG. NO. :	KETRACO/A17/SB1/SD/05	
REV. NO. :	0	





PEAK SLOPE	
TAN B	0.123405007
2TAN B	0.246810014
FACE	1.007585627
DEVELOP	1.015114571

BOLTS / NUTS STATEMENT STUB		
TYPE	SIZE (Length in mm)	TOTAL QTY.
	M12 X 35 MM	4
SPRING WASHER	M12 X 2.5 THK	4
	M16 X 40 MM	36
	M16 X 50 MM	24
SPRING WASHER	M16 X 3.5 THK	60
PACK WASHER	M16 X 8 THK	12

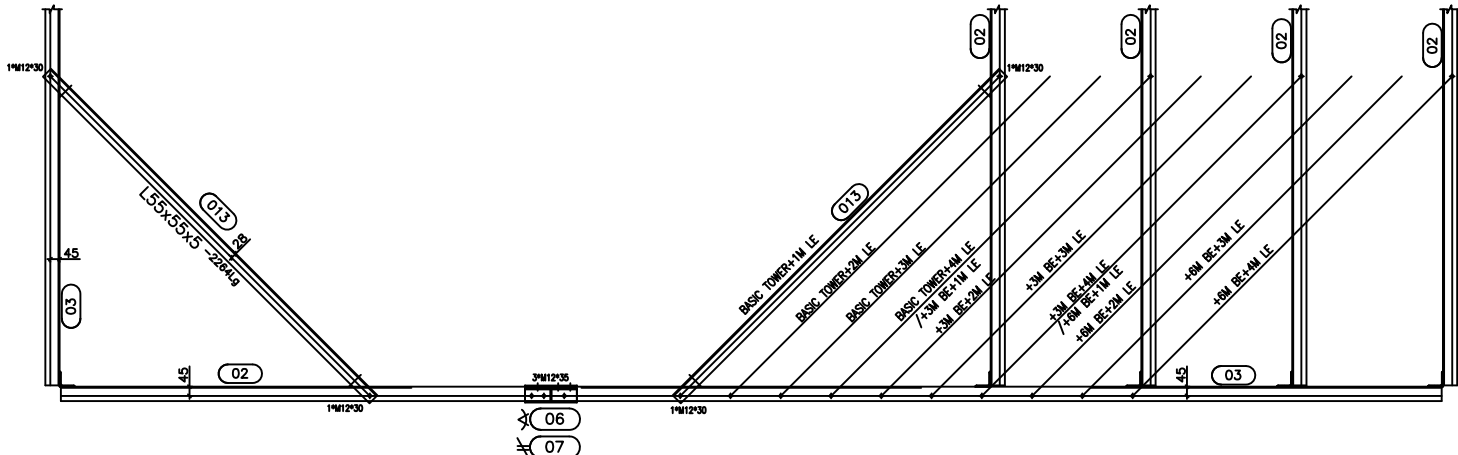


- NOTES:-
1. ALL DIMENSIONS ARE IN MM.
  2. MATERIALS :  
"H" INDICATES HIGH TENSILE STEEL - IS2062:2006 E350 (fy=350N/sqmm)  
MILD STEEL - IS2062:2006 E250 (fy=250N/sqmm)  
BOLTS & NUTS - 12Ø & 16Ø - GRADE 5.6/5 (ISO:898) OR EQUIVALENT.  
BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.  
STEP BOLT SET: ONE BOLT+TWO NUT+TWO SPRING WASHER.  
3. ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.  
4. THE PRECEEDING LETTER WILL BE "T43 SB1".  
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 ANTITHEFT BOLTS.

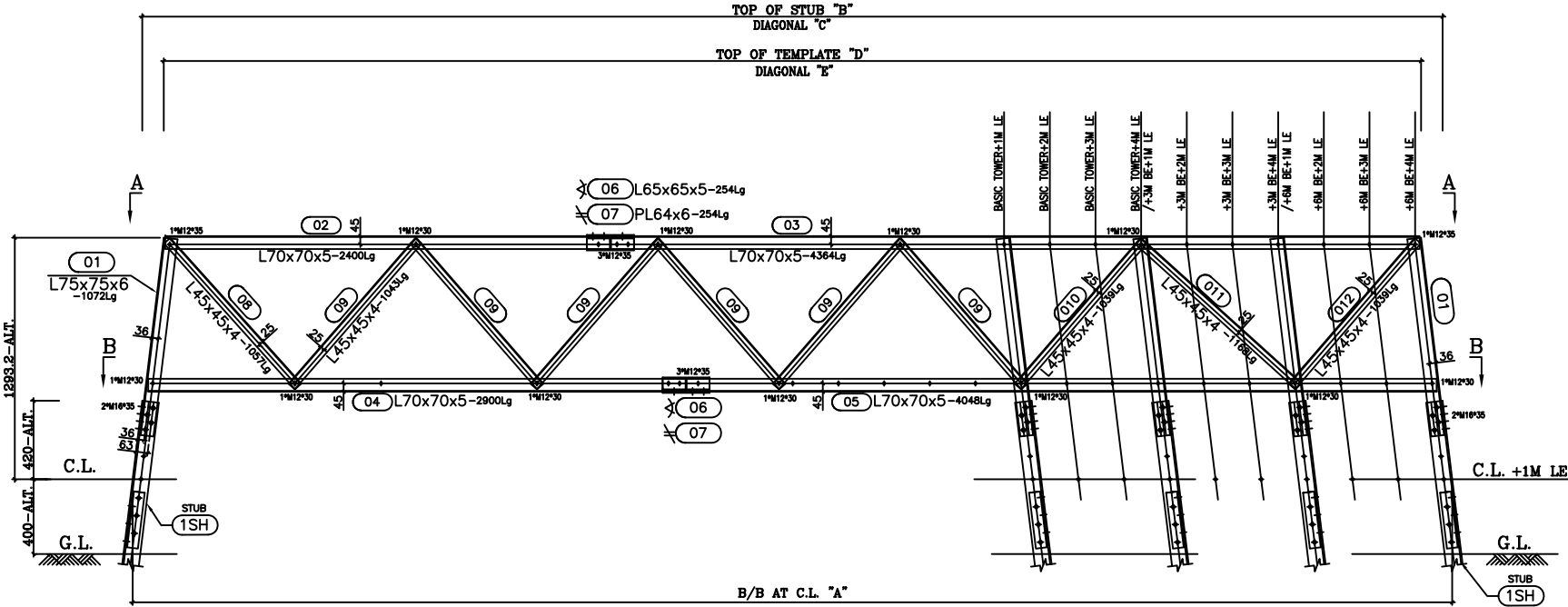
REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

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 : Kindar uma-Mwingi-Garissa 132 KV S/C Transmission Lines (LOT A17)		
DESIGN	Mondri	09.02.2013
DRN	WS	06.04.2013
CAL	WS	06.04.2013
APPD	MKM	06.04.2013
SCALE-NTS		
TITLE		STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB1" (0°-15°) STUB
DRG. NO., KETRACO/A17/SB1/SD/01		REV 0

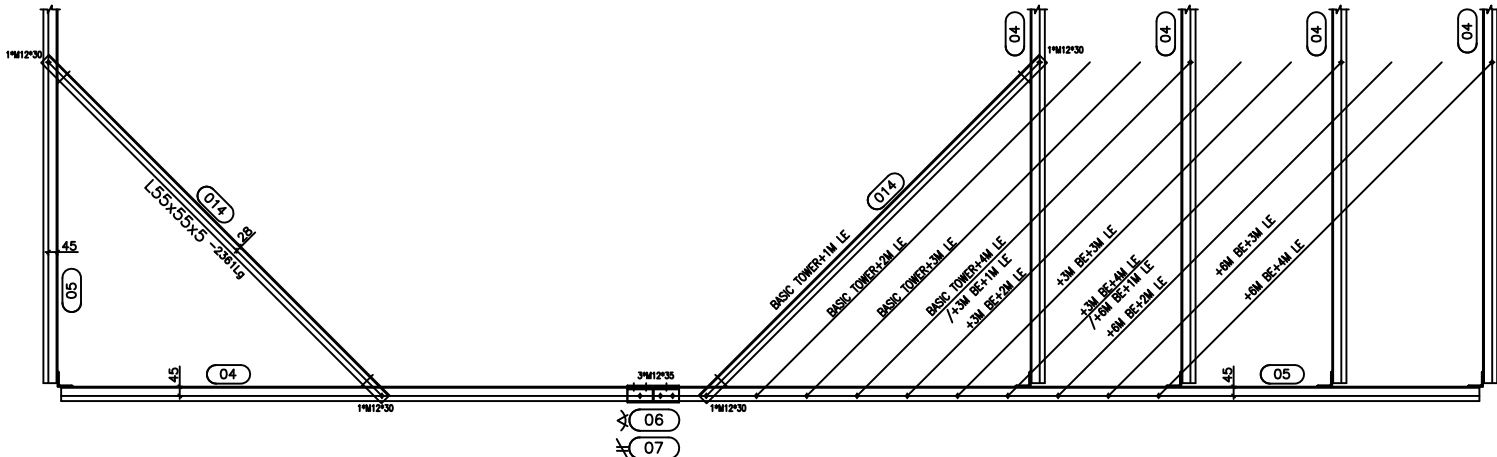
PEAK SLOPE	
TAN B	0.123405007
STAN B	0.248810014
FACE	1.007585627
DEVELOP	1.015114571



VIEW 'A-A'



STUB SETTING TEMPLATE  
(FOR EQUAL LEG EXTNS)



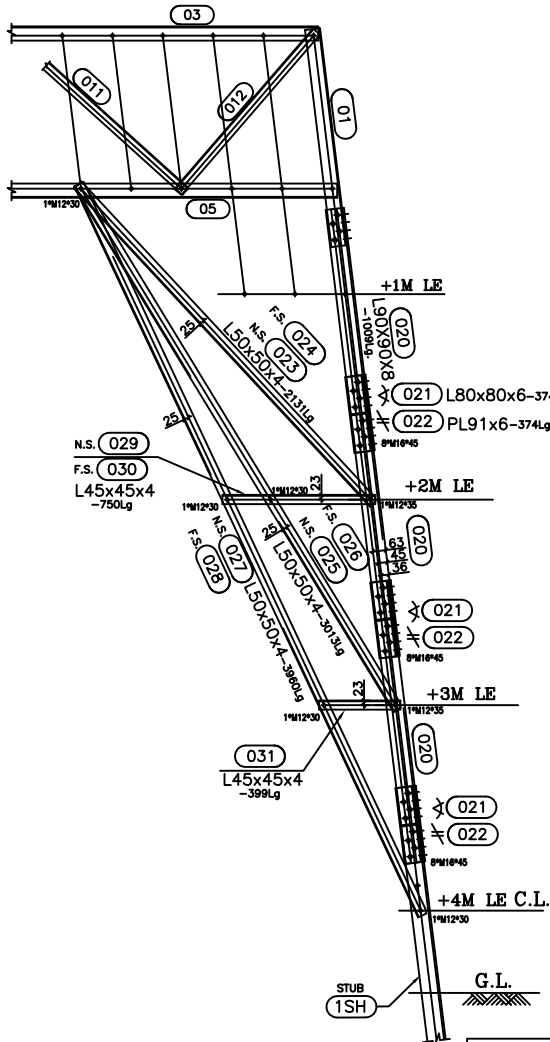
VIEW 'B-B'

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 - 12# & 16# - 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 RED OXIDE PAINTED.
- THE PROCEEDING LETTER WILL BE "T43 SB1".
- ◆ 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.




STUB SETTING DIMENSIONS					
	A	B	C	D	E
BASIC TOWER +1M LE	4904.4	4800.9	6789.5	4567.5	6459.4
BASIC TOWER +2M LE	5150.9	5047.4	7138.1	4814.0	6808.0
BASIC TOWER +3M LE	5397.4	5293.9	7486.7	5060.5	7156.6
BASIC TOWER +4MLE / +3M BE +1M LE	5643.9	5540.4	7835.3	5307.0	7505.2
+3M BE +2M LE	5890.4	5786.9	8183.9	5553.5	7853.8
+3M BE +3M LE	6136.9	6033.4	8532.5	5800.0	8202.4
+3M BE +4M LE / +6M BE +1M LE	6383.4	6279.9	8881.1	6046.5	8551.0
+6M BE +2M LE	6629.9	6526.4	9229.7	6293.0	8899.6
+6M BE +3M LE	6876.4	6772.9	9578.3	6539.5	9248.2
+6M BE +4M LE	7122.9	7019.4	9926.9	6786.0	9596.9

BOLTS / NUTS STATEMENT (STUB SETTING TEMPLATE)		
TYPE	SIZE (Length in mm)	TOTAL QTY.
	M12 X 30 MM	80
	M12 X 35 MM	56
	M16 X 35 MM	16
(+LEG EXTENDER)		
	M12 X 30 MM	10
	M12 X 35 MM	4
	M16 X 45 MM	48



LEG EXTENDER  
(FOR ±3M LE LEVEL DIFF.  
OF UNEQUAL LEG EXTNS)

MARK NOS.  
SST :- 01 TO 014  
LEG EXTENDER :- 020 TO 031

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
DRN.	WS	06.04.2013
CHD.	WS	06.04.2013
APPD.	MKM	06.04.2013
SCALE:- 1:20	TITLE STRUCTURAL DRAWING FOR TENSION TOWER TYPE "SB1" (0°-15°) STUB SETTING TEMPLATE	
DRG. NO.	KETRACO/A17/SB1/SD/02	
REV NO.	2	SHEET 1 OF 1

REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
2.	13/07/2013	REVISED AS PER CLIENTS COMMENTS	WS	WS	MKM
1.	31/05/2013	EQUAL LEG EXTN COMBINATION ADDED IN SST	AMIT A.	AMIT A.	MKM