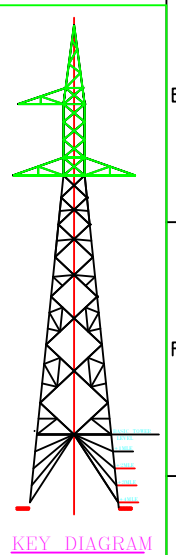
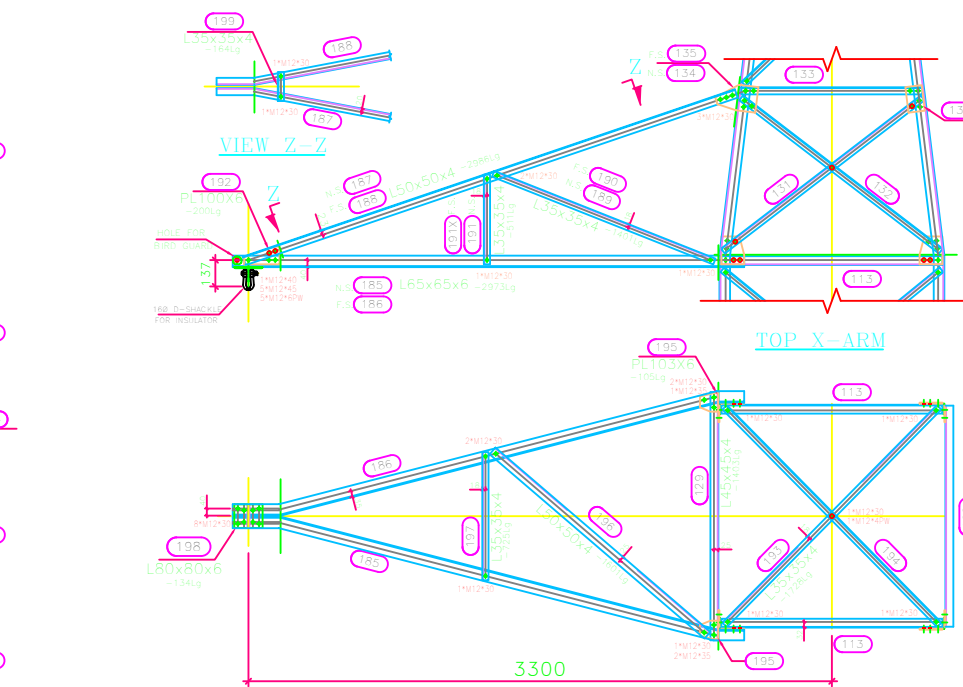
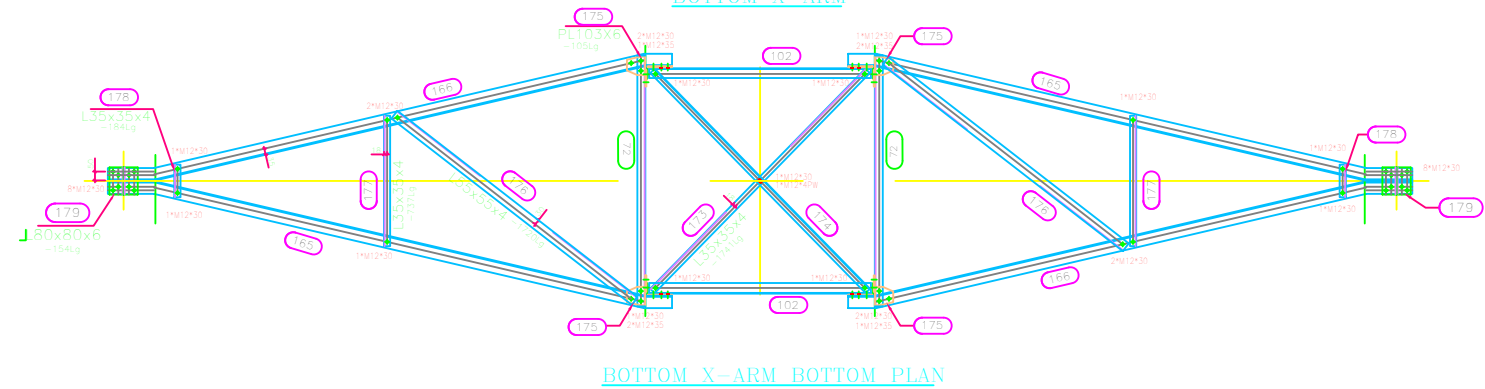
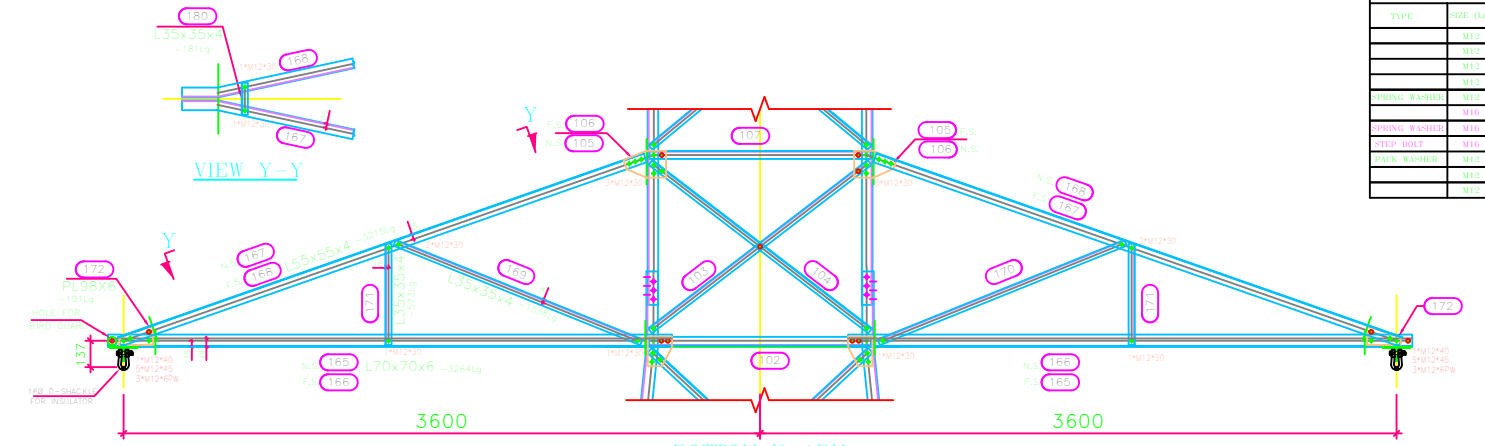
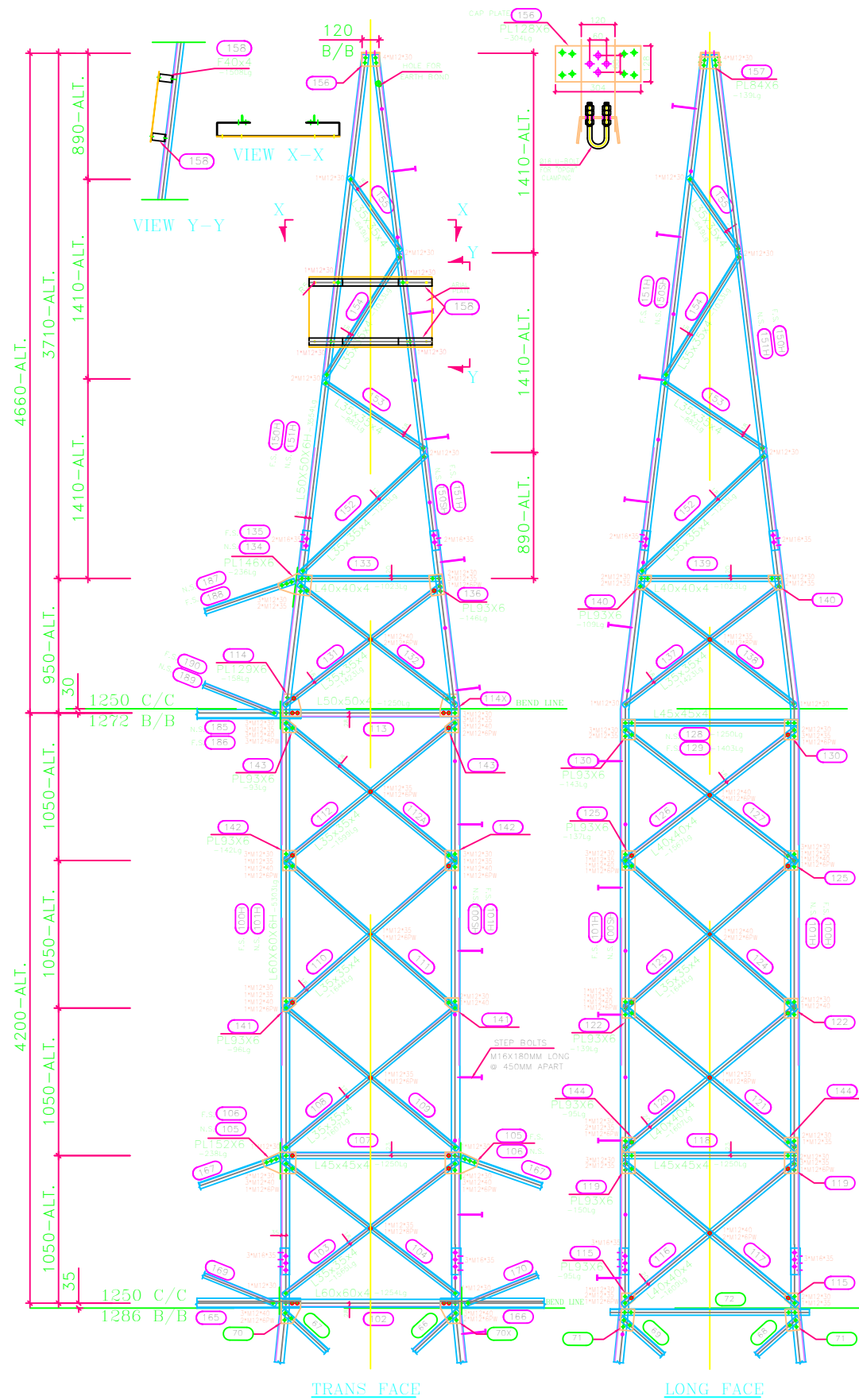


PEAK SLOPE	
TAN B	0.122915766
2TAN B	0.245831533
FACE	1.007525824
DEVELOP	1.014995848








BOLTS / NUTS / STATEMENT		
CAGE, PEAK & X-ATOM		
TYPE	SIZE (Length in mm)	TOTAL QTY.
	M12 X 50 MM	250
	M12 X 55 MM	400
	M12 X 60 MM	55
	M12 X 75 MM	12
SPRINGS WASHER	M12 X 2.5 THK	300
	M12 X 3.5 THK	40
SPRINGS WASHER	M12 X 3.5 THK	30
STIFF BOLT	M12 X 100 LG	10
PACK WASHER	M12 X 4 THK	2
	M12 X 6 THK	60
	M12 X 8 THK	6



NOTES:—

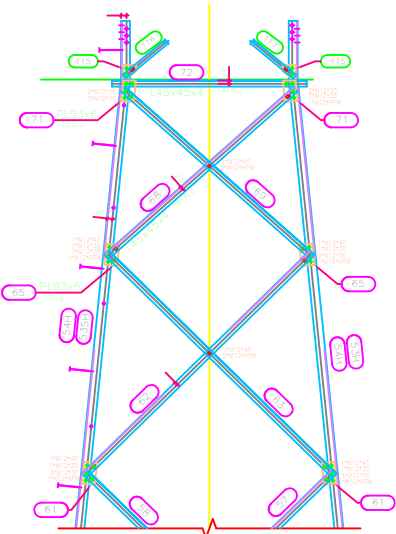
1. ALL DIMENSIONS ARE IN MM.
2. MATERIALS :
 - "H" INDICATES HIGH TENSILE STEEL – IS2062:2008 E350 ($f_y=350N/sqmm$),
 - MILD STEEL – IS2062:2008 E250 ($f_y=250N/sqmm$).
 - BOLTS & NUTS – 120 & 160 – GRADE 5.6 / S (ISO:898) OR EQUIVALENT.
 - ROLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.
 - STEP BOLT SET: ONE BOLT+TWO NUT+TWO SPRING WASHER.
3. ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
4. THE PRECEDING LETTER WILL BE "SA1".
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.

MARK NOS.
CAGE:-100H TO 144
PEAK:-150H TO 158
BOTTOM X-ARM:-165 TO 180
TOP X-ARM:-185 TO 199

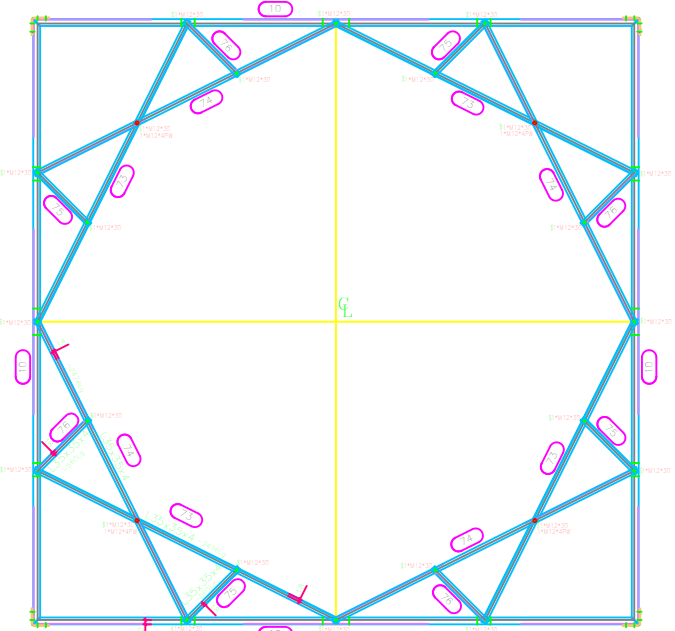
CLIENT :		 KETRACO KENYA ELECTRICITY TRANSMISSION CO. LTD., KENYA	
CONSULTANT :		 ELECTRO CONSULTANT.	
CONTRACTOR :		 TATA PROJECTS LIMITED, NEW DELHI, INDIA	
Contract :		XVIII: KPLC1/6E/2/A17	
PROJECT : Kindaruma-Mwingi-Garissa 132 KV S/C Transmission Lines (LOT A17)			
DESIGN	Monali	02.11.2012	TITLE STRUCTURAL DRAWING FOR SUSPENSION TOWER TYPE "SA1" (0°-2°) CAGE, PEAK & X-ARM DRG. NO. KETRACO/A17/SA1/SD/003 REV. NO.  1   SHEET 2 OF 2
JBWL	AMIT .A.	14.01.2013	
CHKD	AMIT .A.	14.01.2013	
APPD.	MMK	14.01.2013	
			

1	11.03.13	REVISED AS PER CLIENTS COMMENTS REGARDING ACCESSORIES	WS	WS	
REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

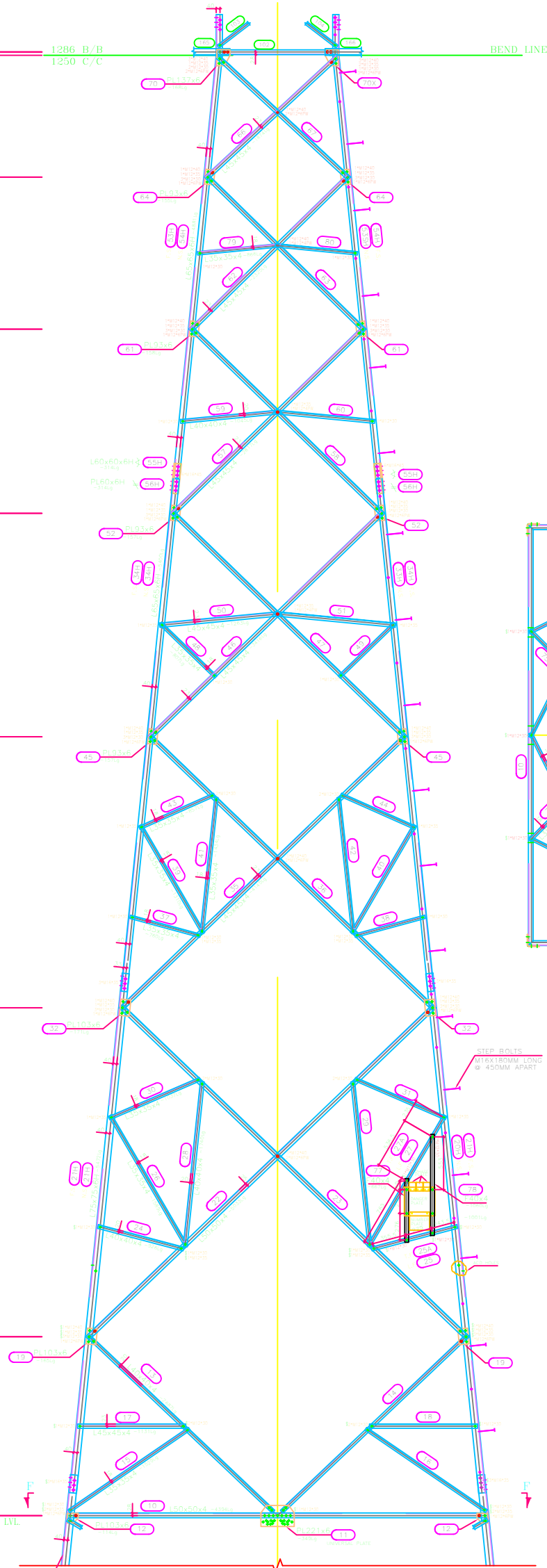
TOWER SLOPE			
TAN B	0.102195038		
2TAN B	0.204390117		
FACE	1.005200852		
DEVELOP	1.010389855		



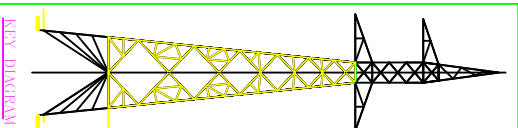
LONG. FACE



VIEW 'F-F'



TRANS./LONG. FACE



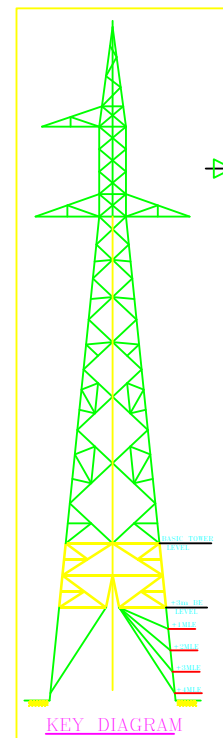
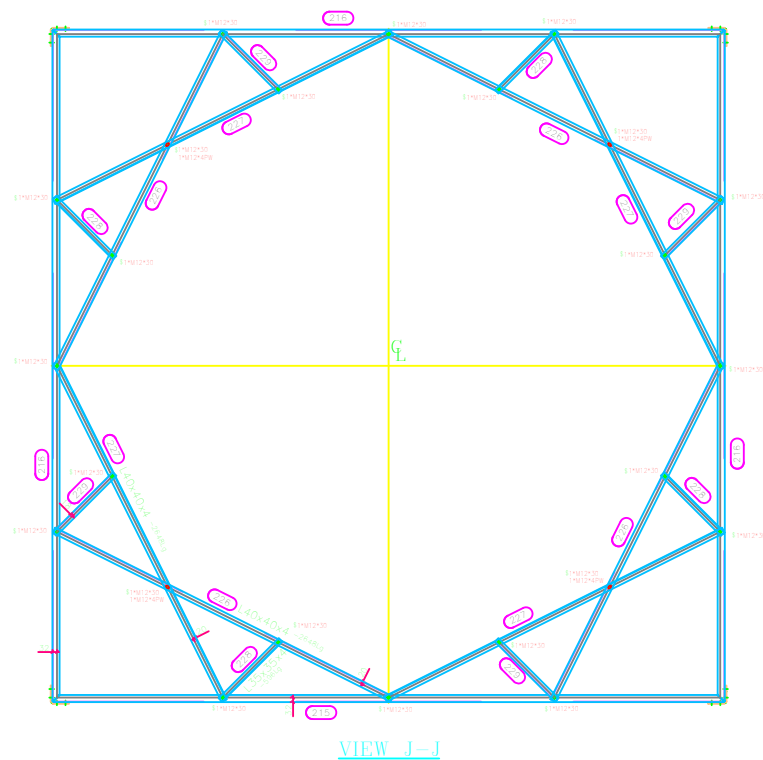
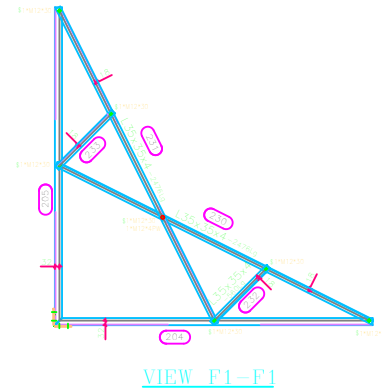
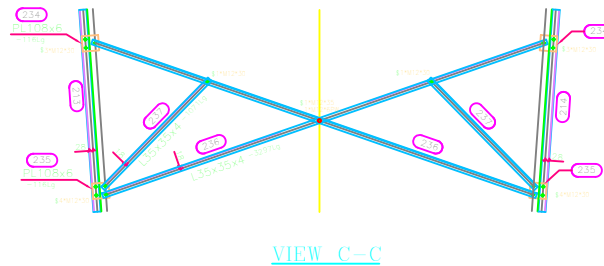
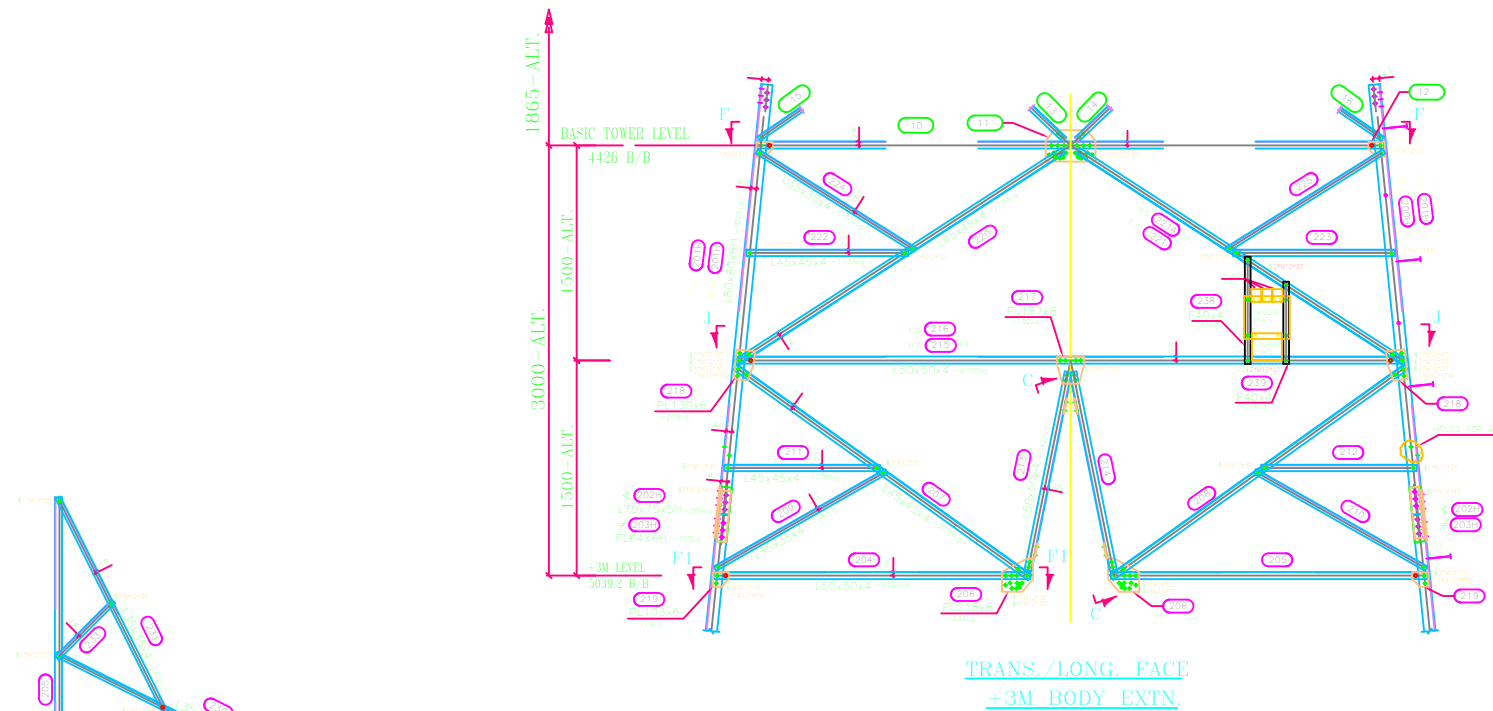
KEY DIAGRAM

1. ALL DIMENSIONS ARE IN MM.
2. MATERIALS :
 - 1. H¹ INDICATES HIGH TENSILE STEEL - S206/2206 E350 (Y=350N/mm²)
 - WILD STEEL - S206/2206 E250 (Y=250N/mm²)
 - BOLTS & NUTS - 120 & 160 - GRADE 5.6/7 (50/898) OR EQUIVALENT.
 - ROUT SET: ONE ROLT+ONE NUT+ONE SPRING WASHER.
 - STEP ROLT SET: ONE ROLT+TWO NUT+TWO SPRING WASHER.
 - 3. ALL STEEL MEMBERS SHALL BE HOT DP GALVANIZED.
 - 4. THE PROCEEDING LETTER WILL BE "SAI".
 - 5. INDICATES HOLES OF 125mm DIA FOR 12mm DIA BOLTS.
 - 6. INDICATES HOLES OF 175mm DIA FOR 16mm DIA STEP BOLTS.
 - 7. INDICATES HOLES OF 175mm DIA FOR 16mm DIA STEP BOLTS.
 - 8. 1 INDICATES ANTI-THEFT BOLTS.

BOLTS - NUTS SUMMARY			
TYPE	SIZE	LENGTH IN MM	TOTAL QTY
BOLTS			
M12 X 30	30	30	120
M16 X 40	40	40	120
M16 X 50	50	50	120
M16 X 60	60	60	120
M16 X 70	70	70	120
M16 X 80	80	80	120
M16 X 90	90	90	120
M16 X 100	100	100	120
M16 X 110	110	110	120
M16 X 120	120	120	120
M16 X 130	130	130	120
M16 X 140	140	140	120
M16 X 150	150	150	120
M16 X 160	160	160	120
M16 X 170	170	170	120
M16 X 180	180	180	120
M16 X 190	190	190	120
M16 X 200	200	200	120
M16 X 210	210	210	120
M16 X 220	220	220	120
M16 X 230	230	230	120
M16 X 240	240	240	120
M16 X 250	250	250	120
M16 X 260	260	260	120
M16 X 270	270	270	120
M16 X 280	280	280	120
M16 X 290	290	290	120
M16 X 300	300	300	120
M16 X 310	310	310	120
M16 X 320	320	320	120
M16 X 330	330	330	120
M16 X 340	340	340	120
M16 X 350	350	350	120
M16 X 360	360	360	120
M16 X 370	370	370	120
M16 X 380	380	380	120
M16 X 390	390	390	120
M16 X 400	400	400	120
M16 X 410	410	410	120
M16 X 420	420	420	120
M16 X 430	430	430	120
M16 X 440	440	440	120
M16 X 450	450	450	120
M16 X 460	460	460	120
M16 X 470	470	470	120
M16 X 480	480	480	120
M16 X 490	490	490	120
M16 X 500	500	500	120
M16 X 510	510	510	120
M16 X 520	520	520	120
M16 X 530	530	530	120
M16 X 540	540	540	120
M16 X 550	550	550	120
M16 X 560	560	560	120
M16 X 570	570	570	120
M16 X 580	580	580	120
M16 X 590	590	590	120
M16 X 600	600	600	120
M16 X 610	610	610	120
M16 X 620	620	620	120
M16 X 630	630	630	120
M16 X 640	640	640	120
M16 X 650	650	650	120
M16 X 660	660	660	120
M16 X 670	670	670	120
M16 X 680	680	680	120
M16 X 690	690	690	120
M16 X 700	700	700	120
M16 X 710	710	710	120
M16 X 720	720	720	120
M16 X 730	730	730	120
M16 X 740	740	740	120
M16 X 750	750	750	120
M16 X 760	760	760	120
M16 X 770	770	770	120
M16 X 780	780	780	120
M16 X 790	790	790	120
M16 X 800	800	800	120
M16 X 810	810	810	120
M16 X 820	820	820	120
M16 X 830	830	830	120
M16 X 840	840	840	120
M16 X 850	850	850	120
M16 X 860	860	860	120
M16 X 870	870	870	120
M16 X 880	880	880	120
M16 X 890	890	890	120
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M16 X 910	910	910	120
M16 X 920	920	920	120
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M16 X 1090	1090	1090	120
M16 X 1100	1100	1100	120
M16 X 1110	1110	1110	120
M16 X 1120	1120	1120	120
M16 X 1130	1130	1130	120
M16 X 1140	1140	1140	120
M16 X 1150	1150	1150	120
M16 X 1160	1160	1160	120
M16 X 1170	1170	1170	120
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M16 X 1190	1190	1190	120
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M16 X 1220	1220	1220	120
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M16 X 1370	1370	1370	120
M16 X 1380	1380	1380	120
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M16 X 1620	1620	1620	120
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M16 X 1640	1640	1640	120
M16 X 1650	1650	1650	120
M16 X 1660	1660	1660	120
M16 X 1670	1670	1670	120
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M16 X 2930	2930	2930	120
M16 X 2940	2940	2940	120
M16 X 2950	2950	2950	120
M16 X 2960	2960	29	

TOWER SLOPE	
TAN B	0.102195058
2TAN B	0.204390117
FACE	1.005208352
DEVELOP	1.010389855





M01475 - NUTS - STATEMENT			
+3M BODY EXTN			
TYPE	SIZE: (length in mm)	TOTAL QTY	AVAIL THQTY
		HEXAGONAL	
	M12 X 30 MM	40	260
	M12 X 35 MM	8	22
	M12 X 40 MM		8
SPRING WASHER	M12 X 2.5 THK	338	
PACK WASHER	M12 X 4 THK	8	
PACK WASHER	M12 X 6 THK	20	
	M16 X 43 MM		48
SPRING WASHER	M16 X 2.5 THK	48	
STEP BOLT	M16 X 180 MM	5	



NOTES:—

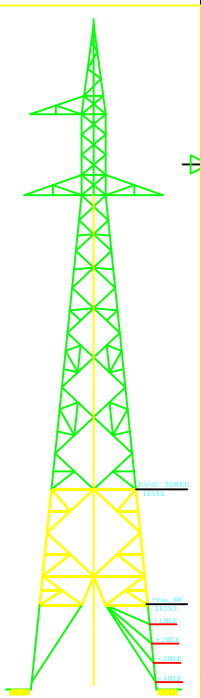
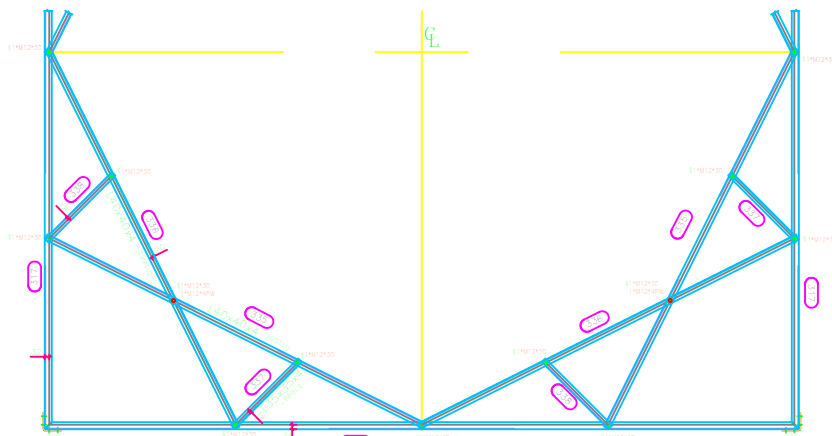
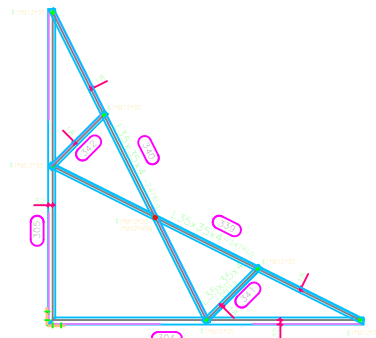
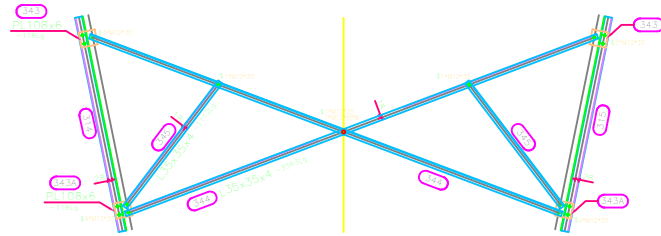
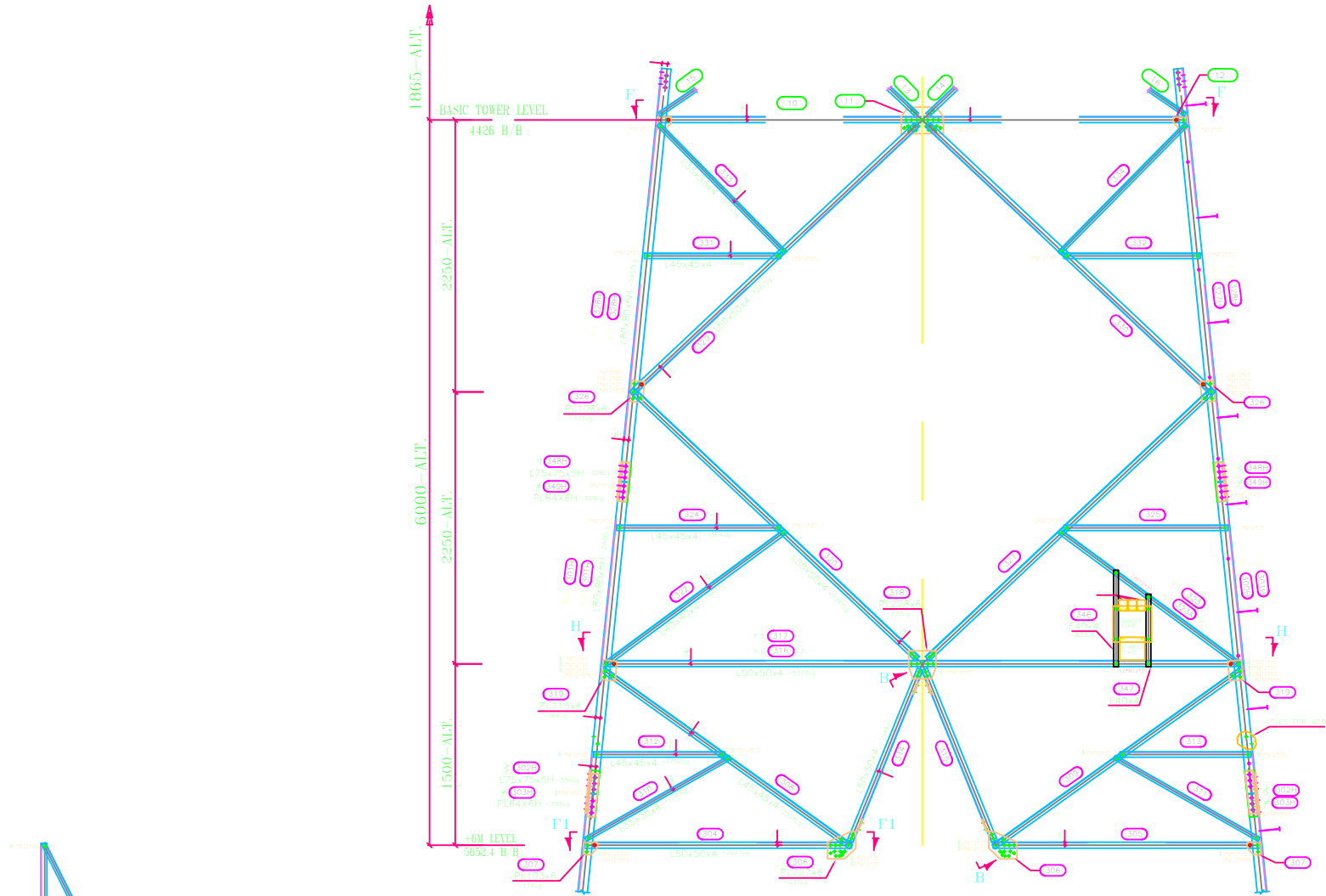
1. ALL DIMENSIONS ARE IN MM.
2. MATERIALS :
- 'H' INDICATES HIGH TENSILE STEEL – IS2062:2006 E350 ($f_y=350N/sqmm$)
- MILD STEEL – IS2062:2006 E250 ($f_y=250N/sqmm$)
- BOLTS & NUTS – 12Ø & 16Ø – GRADE 5.6/5 (ISO:898) OR EQUIVALENT.
- BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.
- STEP BOLT SET: ONE BOLT+TWO NUT+TWO SPRING WASHER.
3. ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
4. THE PROCEEDING LETTER WILL BE "SA1".
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/SA1/SD/O3 SHEET 1/2.

1	11.03.13	REVISED AS PER CLIENTS COMMENTS REGARDING ACCESSORIES	WS	WS	
REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

MARK NO. :- 200H TO 239		KEY DIAGRAM					
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	Monoli	82.11.2012	SCALE=1:25 				
DRN.	WS	14.01.2013					
CAD.	WS	14.01.2013					
APPD.	MKM	14.01.2013					
			TITLE STRUCTURAL DRAWING FOR SUSPENSION TOWER TYPE "SA1" (0°-2°) +3M BODY EXTENSION				
			DRG. NO. KETRACO/A17/SA1/SD/04				
			REV. NO. <table border="1" data-bbox="2537 2013 2718 2039"> <tr> <td>1</td> <td></td> <td></td> <td></td> </tr> </table>	1			
1							
			SHEET 1 OF 1				

TOWER SLOPE	
TAN B	0.102195058
2TAN B	0.204390117
FACE	1.005208352
DEVELOP	1.010389855





BOLTS / NUTS STATEMENT -6M BODY EXTN.			
TYPE	SIZE (Length in mm)	TOTAL QTY.	
		HEXAGONAL	ST. THICK
	M12 X 30 MM	96	508
	M12 X 40 MM	16	52
	M12 X 40 MM	8	8
SPRING WASHER	M12 X 2.5 THK	432	
PACK WASHER	M12 X 4 THK	8	
PACK WASHER	M12 X 6 THK	20	
	M16 X 40 MM	48	48
SPRING WASHER	M16 X 3.5 THK	96	
STEP BOLT	M16 X 180 MM	14	



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 "SA1".
- ♦ 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/SA1/SD/03 SHEET 1/2.

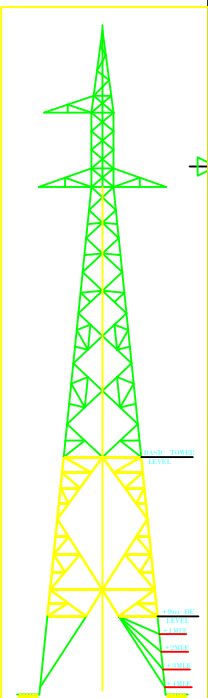
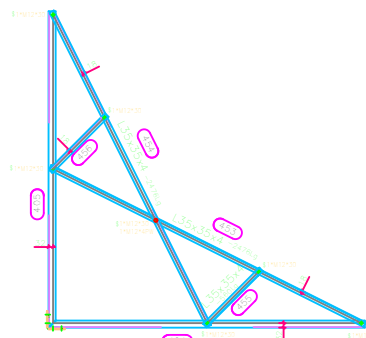
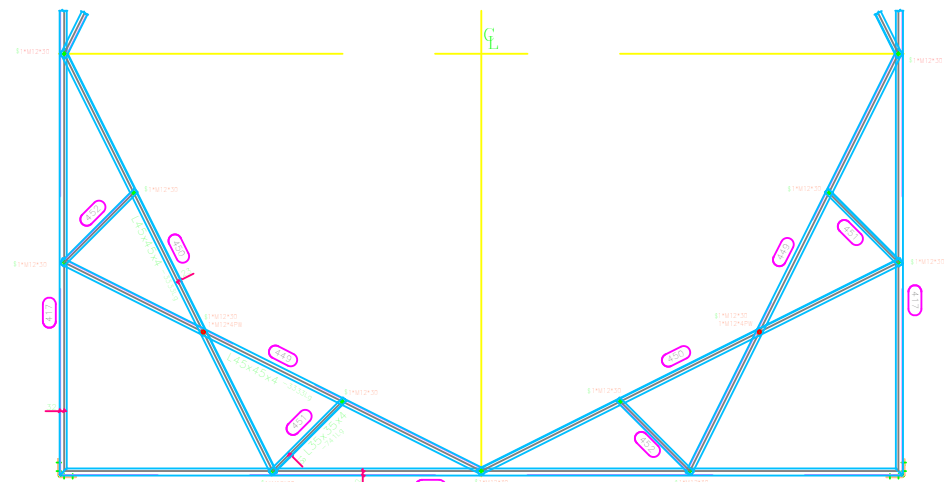
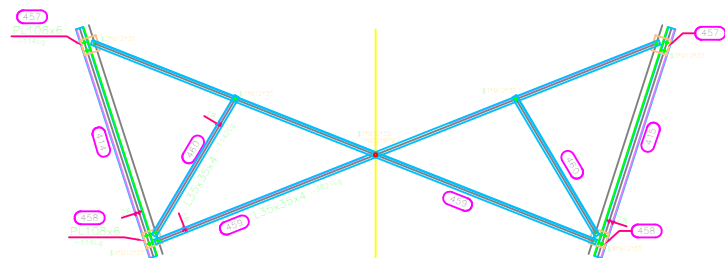
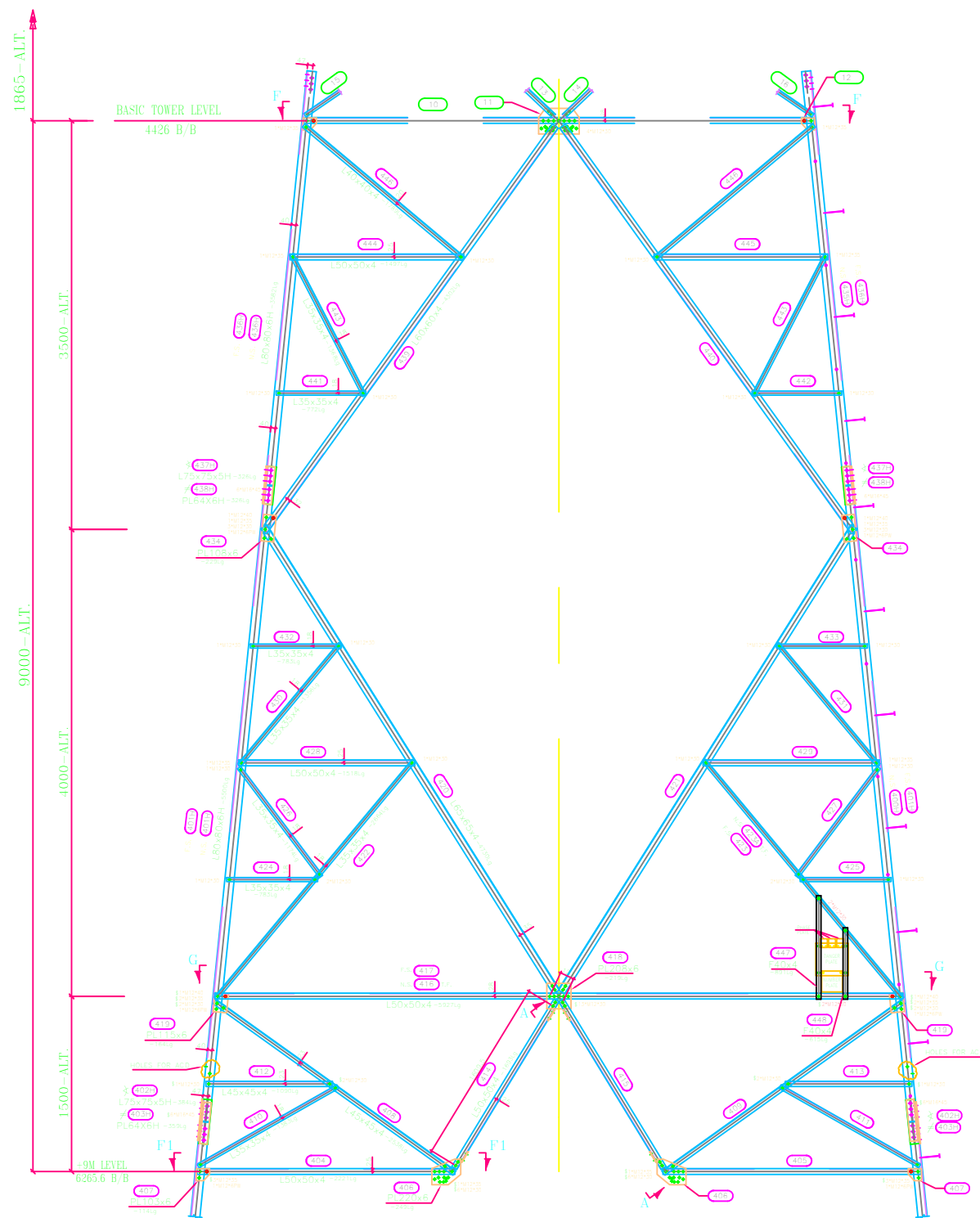
MARK NOS. :- 300H TO 349

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	02.11.2012
DRN	WS	14.01.2013
CHKD	WS	14.01.2013
APPRD	MKM	14.01.2013
SCALE:-1:25		
TITLE	STRUCTURAL DRAWING FOR SUSPENSION TOWER TYPE "SA1" (0°-2°) +6M BODY EXTENSION	
DRG. NO.	KETRACO/A17/SA1/SD/05	
REV. NO.	1	SHEET 1 OF 1

REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
1	11.03.13	REVISED AS PER CLIENTS COMMENTS REGARDING ACCESSORIES	WS	WS	

TOWER SLOPE	
TAN B	0.102195058
2TAN B	0.204390117
FACE	1.005208352
DEVELOP	1.010389855




BOLTS / NUTS / STUDS			
3/8" BODY EXTN.			
TYPE	SIZE (Length in mm)	TOTAL QTY	
		HEXAGONAL	UNTY THEFT
	M12 X 30 MM	122	258
	M12 X 35 MM	32	52
	M12 X 40 MM	8	8
SPRING WASHER	M12 X 2.5 THK	480	
PACK WASHER	M12 X 4 THK	8	
PACK WASHER	M16 X 6 THK	28	
	M16 X 45 MM	48	10
SPRING WASHER	M16 X 2.5 THK	96	
STEP BOLT	M16 X 180 MM	20	



KEY DIAGRAM


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 – 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 "SA1".
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/SA1/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	Monali	02.11.2012	SCALE-1:25	TITLE STRUCTURAL DRAWING FOR GUERINONIA TOWER TYPE "GAL" (00-00)
DRN.	WS	14.01.2013		
CHD.	WS	14.01.2013		

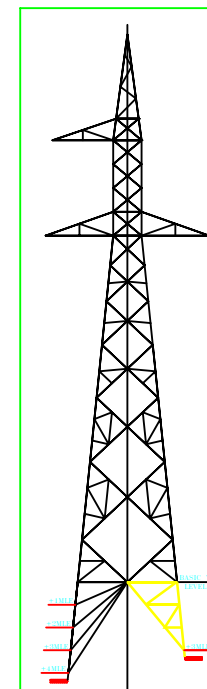
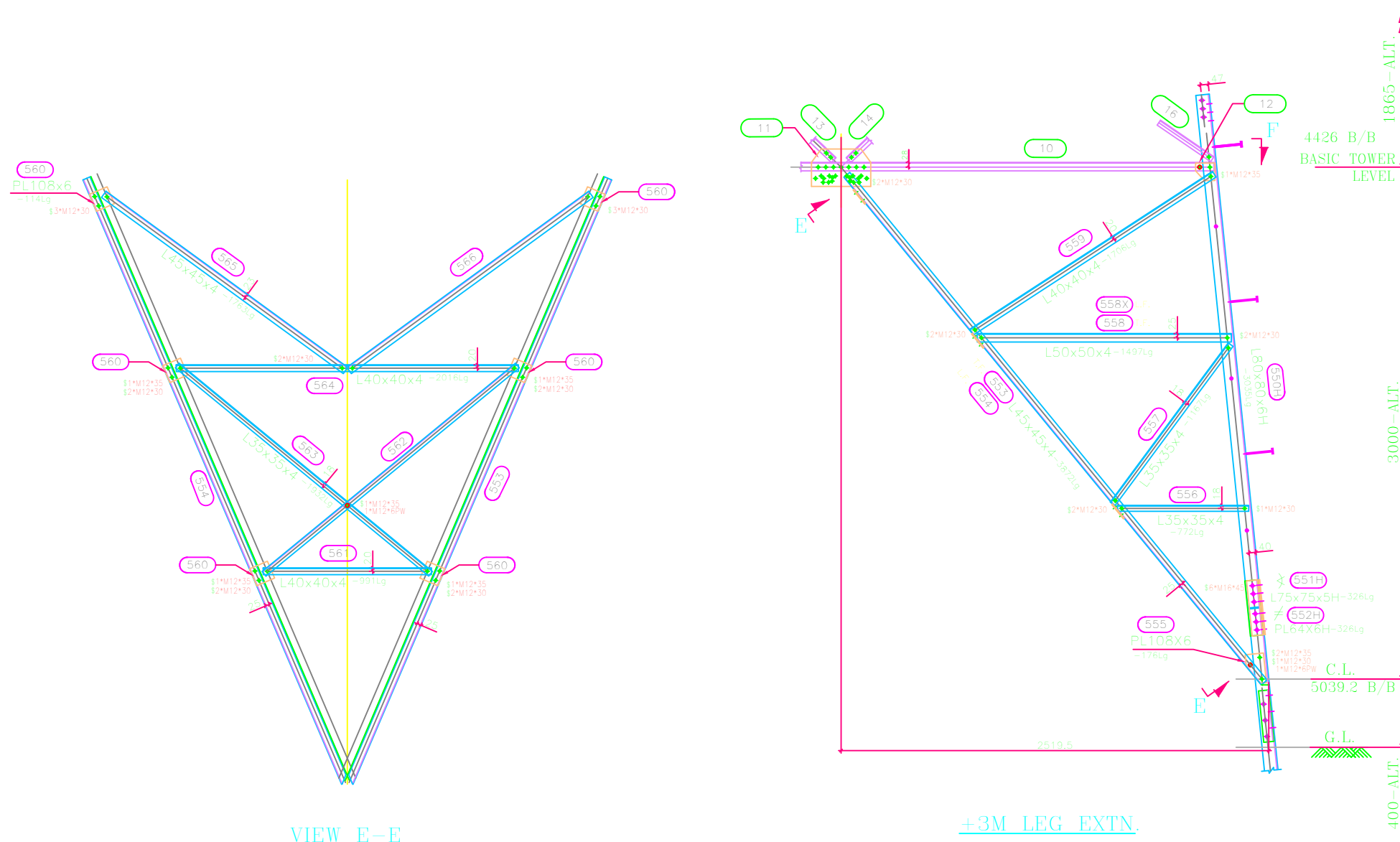
APPD.	MKM	14.01.2013		SUSPENSION TOWER TYPE SA1 (0-2)
				+9M BODY EXTENSION

		DRG. NO. KETRACO/A17/SA1/SD/06	
REV. NO.	0		SHEET 1 OF 1

REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

TOWER SLOPE	
TAN B	0.102195058
2TAN B	0.204390117
FACE	1.005208352
DEVELOP	1.010389855

BOLTS / NUTS STATEMENT			
+3M LEG EXTN			
TYPE	SIZE (Length in mm)	TOTAL QTY.	
	M12 X 30 MM	---	36
	M12 X 35 MM	---	11
SPRING WASHER	M12 X 2.5 THK	47	
PACK WASHER	M12 X 6 THK	3	
	M16 X 45 MM	---	12
SPRING WASHER	M16 X 4.5 THK	43	
STEP BOLT	M16 X 160 MM	6	







KEY DIAGRAM

NOTES:—

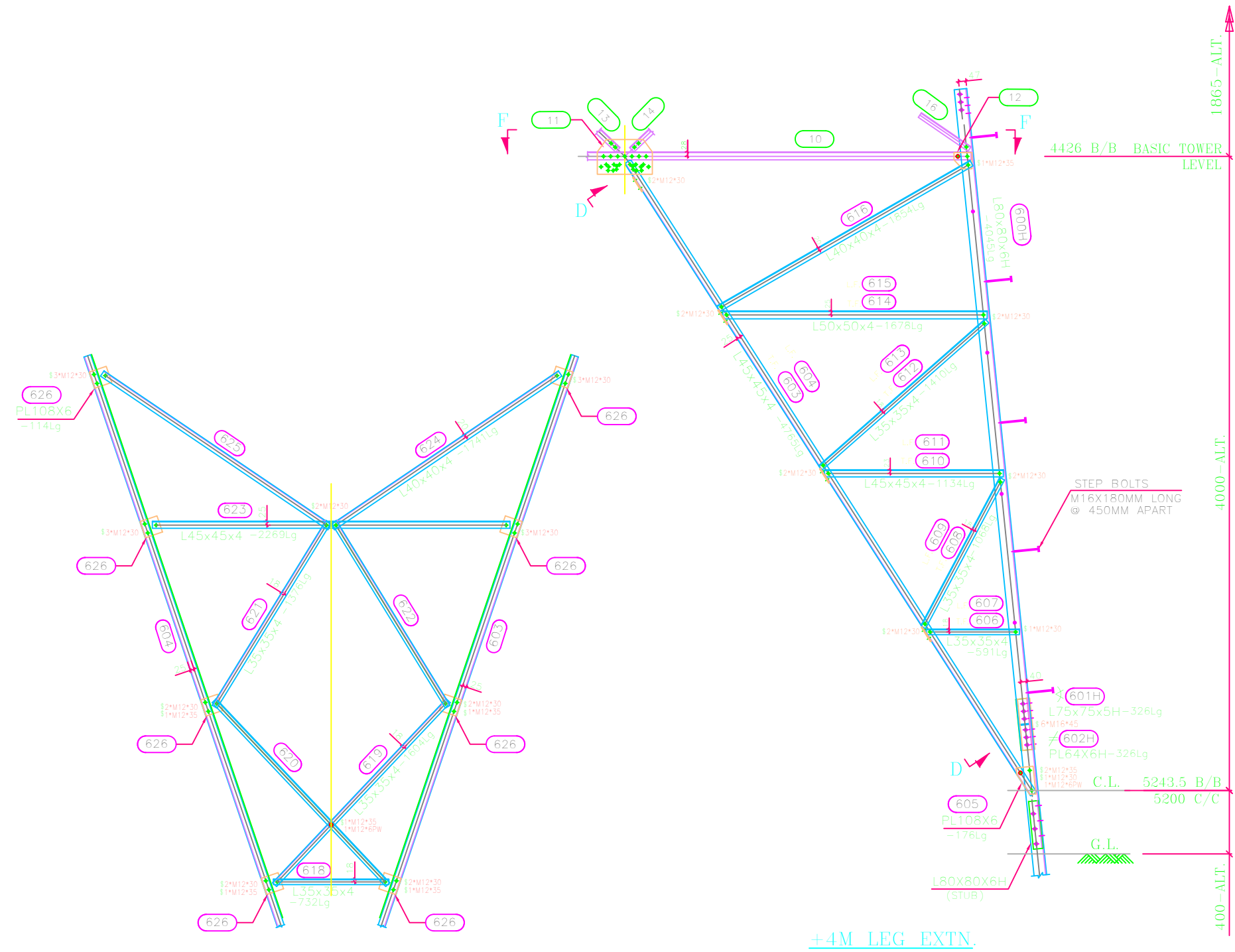
1. ALL DIMENSIONS ARE IN MM.
2. MATERIALS :
'H' INDICATES HIGH TENSILE STEEL – IS2062:2006 E350 (fy=350N/sqmm)
MILD STEEL – IS2062:2006 E250 (fy=250N/sqmm)
BOLTS & NUTS – 12Ø & 16Ø – GRADE 5.6/5 (ISO:898) OR EQUIVALENT.
BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.
STEP BOLT SET: ONE BOLT+TWO NUT+TWO SPRING WASHER.
3. ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
4. THE PRECEEDING LETTER WILL BE "SA1".
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/SA1/SD/03 SHEET 1/2.

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	Manali	02.11.2012	SCALE=1:15 
DRN.	WS	14.01.2013	
CRD.	WS	14.01.2013	
APPD.	MKM	14.01.2013	
			TITLE STRUCTURAL DRAWING FOR SUSPENSION TOWER TYPE "SA1" (0°-2°) +3M LEG EXTENSION
			DRG. NO. KETRACO/A17/SA1/SD/09
			REV NO. 0
			SHEET 1 OF 1

TOWER SLOPE	
TAN B	0.102195058
2TAN B	0.204390117
FACE	1.005208352
DEVELOP	1.010389855

BOLTS / NUTS STATEMENT			
+ 4M LEG EXTN			
TYPE	SIZE (Length in mm)	TOTAL QTY.	
		HEXAGONAL	ASH THFT
	M12 X 30 MM	50	
	M12 X 35 MM	11	
SPRING WASHER	M12 X 2.5 THK	61	
PACK WASHER	M12 X 6 THK	03	
	M12 X 35 MM	12	
SPRING WASHER	M16 X 3.5 THK	12	
STEP BOLT	M16 X 180 MM	09	







VIEW D-D

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 5,6/5 (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 "SA1".
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/SA1/SD/03 SHEET 1/2.

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: KPLCL/6E/2/A17			
PROJECT : Kindar uma-Mwingi-Garissa 132 KV S/C Transmision Lines (LOT A17)			
DESIGN	Mogali	22.11.2012	SCALE=1:15 
DRN.	WS	24.01.2013	
CHD.	WS	24.01.2013	
APPD.	MKM	24.01.2013	
			TITLE STRUCTURAL DRAWING FOR SUSPENSION TOWER TYPE "SA1" (0°-2°) +4M LEG EXTENSION
			DRG. NO. KETRACO/A17/SA1/SD/O10 Rev. No. 0
			SHEET 1 OF 1

