

TOWER VARIANTS

Variant 1: LAK-6m, BB±0m LE (3m LEG)

Variant 2: LAK-3m, BB±0m LE (6m LEG)

Variant 3: LAK±0m, BB±0m LE (9m LEG)

Variant 4: LAK+3m, BB+BE9m ±0m LE (3m LEG)

Variant 5: LAK+6m, BB+BE9m ±0m LE (6m LEG)

Variant 6: LAK-6, BB + 2x +3m LE (6m LEG) +2x -2m LR (1m LEG)





Variant 7: LAK-3, BB +2x +3m LE (9m LEG) +2x -2m LR (4m LEG)

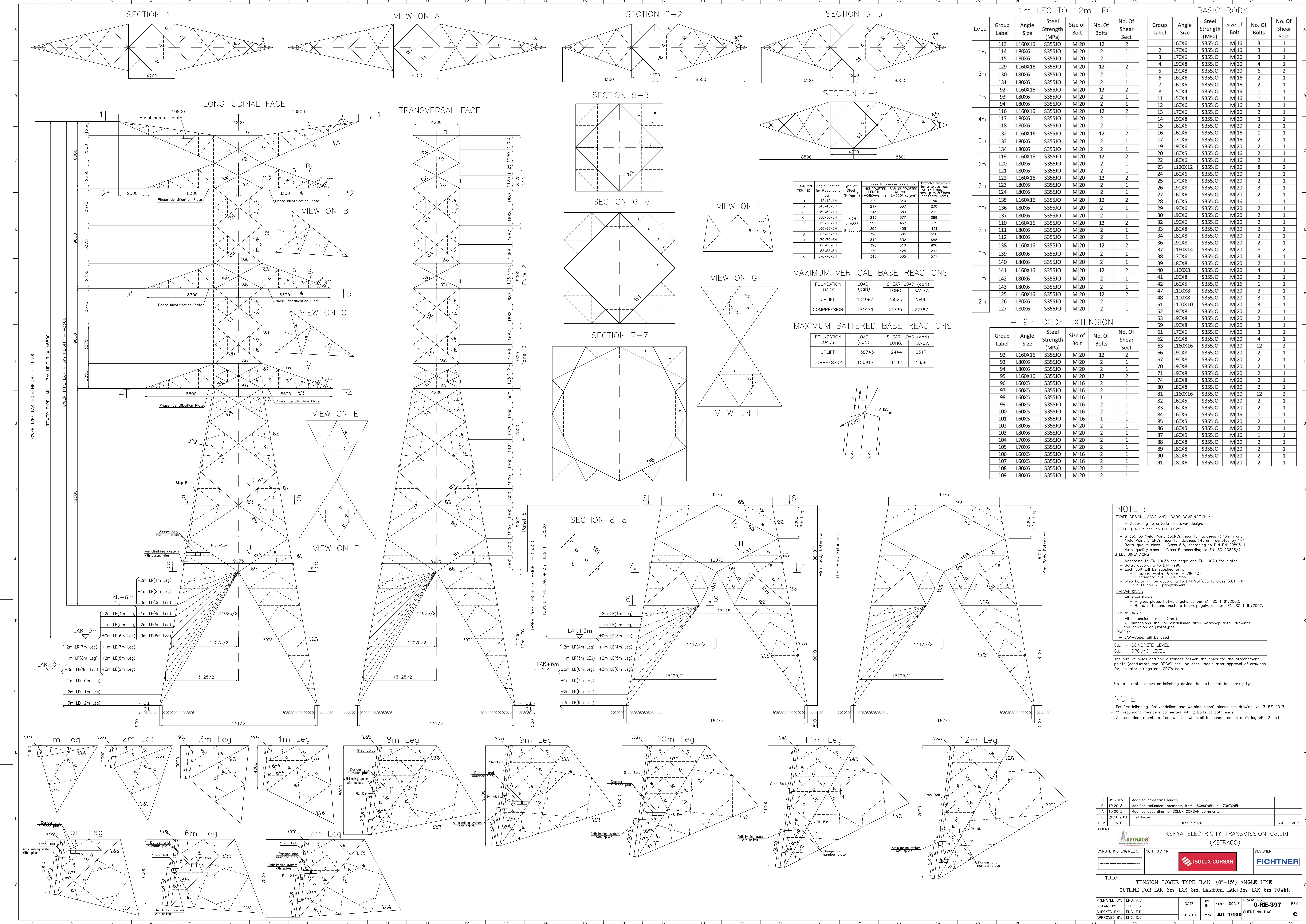
Variant 8: LAK±0, BB +2x +3m LE (12m LEG) +2x -2m LR (7m LEG)

Variant 9: LAK+3, BB+BE9m +2x +3m LE (6m LEG) +2x -2m LR (1m LEG)

Variant 10: LAK+6, BB+BE9m +2x +3m LE (9m LEG) +2x -2m LR (4m LEG)

Variant 11: LAK+6, BB+BE9m +2x +6m LE (12m LEG) +2x +1m LE (7m LEG)

B	05.2015	Modified tower geometry			
A	10.2013	Modified tower geometry			
O	10.2011	First Issue			
REV.	DATE	DESCRIPTION		CHE	APR.
CLIENT:		KENYA ELECTRICITY TRANSMISSION Co.Ltd (KETRACO)			
					
CONSULTING ENGINEER:		CONTRACTOR:		DESIGNER:	
					
Title: TENSION TOWER TYPE "LAK" BEAMS AND NODES					
PREPARED BY:	ENG. A.C.		DATE:	DIM. IN:	SCALE:
DRAWN BY:	ENG. N.M.			mm	SIZE:
CHECKED BY:	ENG. E.D		10.2011	mm	A1
APPROVED BY:	ENG. G.G.				
DRAWN No.: 1-RE-1752			REV. B		
CLIENT No. DWG:					

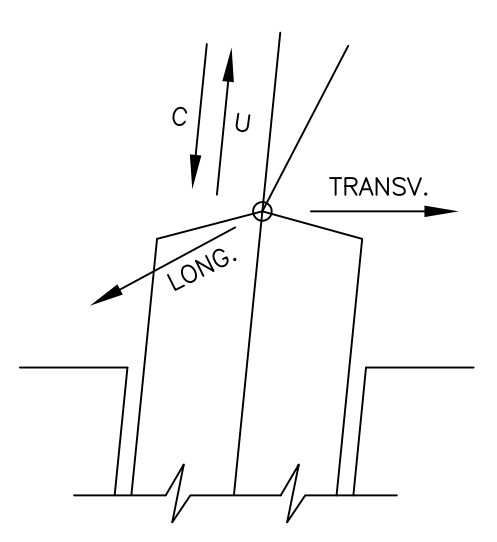


1m LEG TO 12m LEG										BASIC BODY					
Legs	Group Label	Angle Size	Steel Strength (MPa)	Size of Bolt	No. Of Bolts	No. Of Shear Sect	Group Label	Angle Size	Steel Strength (MPa)	Size of Bolt	No. Of Bolts	No. Of Shear Sect			
1m	113	L160X16	S355JO	M20	12	2	1	L60X6	S355JO	M16	3	1			
	114	L80X6	S355JO	M20	2	1	2	L70X6	S355JO	M16	3	1			
	115	L80X6	S355JO	M20	2	1	3	L70X6	S355JO	M20	3	1			
	129	L160X16	S355JO	M20	12	2	4	L90X8	S355JO	M20	4	1			
2m	130	L80X6	S355JO	M20	2	1	5	L90X8	S355JO	M20	6	2			
	131	L80X6	S355JO	M20	2	1	6	L60X6	S355JO	M16	2	1			
	92	L160X16	S355JO	M20	12	2	7	L60X5	S355JO	M16	2	1			
	93	L80X6	S355JO	M20	2	1	8	L50X4	S355JO	M16	1	1			
3m	94	L80X6	S355JO	M20	2	1	11	L50X4	S355JO	M16	1	1			
	116	L160X16	S355JO	M20	12	2	12	L60X6	S355JO	M16	2	1			
	117	L80X6	S355JO	M20	2	1	13	L70X6	S355JO	M20	2	1			
	118	L80X6	S355JO	M20	2	1	14	L90X8	S355JO	M20	3	1			
4m	132	L160X16	S355JO	M20	12	2	15	L60X6	S355JO	M20	2	1			
	133	L80X6	S355JO	M20	2	1	16	L60X5	S355JO	M16	1	1			
	134	L80X6	S355JO	M20	2	1	17	L70X5	S355JO	M16	2	1			
	119	L160X16	S355JO	M20	12	2	19	L90X6	S355JO	M20	2	1			
5m	120	L80X6	S355JO	M20	2	1	20	L60X5	S355JO	M16	2	1			
	121	L80X6	S355JO	M20	2	1	22	L80X6	S355JO	M20	2	1			
	122	L160X16	S355JO	M20	12	2	23	L120X12	S355JO	M20	8	2			
	123	L80X6	S355JO	M20	2	1	24	L60X6	S355JO	M20	3	1			
6m	124	L80X6	S355JO	M20	2	1	25	L70X6	S355JO	M20	2	1			
	135	L160X16	S355JO	M20	12	2	26	L90X8	S355JO	M20	3	1			
	136	L80X6	S355JO	M20	2	1	27	L60X6	S355JO	M20	2	1			
	137	L80X6	S355JO	M20	2	1	28	L60X5	S355JO	M16	1	1			
7m	110	L160X16	S355JO	M20	12	2	29	L90X6	S355JO	M20	2	1			
	111	L80X6	S355JO	M20	2	1	30	L90X6	S355JO	M20	2	1			
	112	L80X6	S355JO	M20	2	1	32	L90X6	S355JO	M20	2	1			
	138	L160X16	S355JO	M20	12	2	33	L80X8	S355JO	M20	2	1			
8m	139	L80X6	S355JO	M20	2	1	34	L80X8	S355JO	M20	2	1			
	140	L80X6	S355JO	M20	2	1	36	L90X8	S355JO	M20	2	1			
	141	L160X16	S355JO	M20	12	2	37	L160X14	S355JO	M20	8	2			
	142	L80X6	S355JO	M20	2	1	38	L70X6	S355JO	M20	3	1			
9m	143	L80X6	S355JO	M20	2	1	39	L80X8	S355JO	M20	2	1			
	125	L160X16	S355JO	M20	12	2	40	L100X8	S355JO	M20	4	1			
	126	L80X6	S355JO	M20	2	1	41	L90X8	S355JO	M20	3	1			
	127	L80X6	S355JO	M20	2	1	42	L60X5	S355JO	M16	1	1			
10m							47	L100X8	S355JO	M20	3	1			
							48	L100X8	S355JO	M20	3	1			
							51	L100X10	S355JO	M20	3	1			
							52	L90X8	S355JO	M20	2	1			
11m							53	L90X8	S355JO	M20	2	1			
							59	L90X8	S355JO	M20	3	1			
							61	L70X6	S355JO	M20	3	1			
							62	L90X8	S355JO	M20	4	1			
12m							63	L160X16	S355JO	M20	12	2			
							66	L90X8	S355JO	M20	2	1			
							67	L90X8	S355JO	M20	2	1			
							70	L90X8	S355JO	M20	2	1			

REDUNDANT ITEM NO.	Angle Section for Redundant bar	Type of Steel (N/mm ²)	Limitation to slenderness ratio (UNSUPPORTED LENGTH L=200x/cm) AT JOINT (L=200x/cm)	Horizontal projection for a vertical load of 100 kgf bolts up to 30mm horizontal (cm)
a	L45x45x4H	220	340	186
b	L45x45x5H	217	337	230
c	L50x50x4H	245	380	232
d	L50x50x5H	245	377	289
e	L60x60x4H	295	457	339
f	L60x60x5H	292	455	421
g	L65x65x5H	320	505	516
h	L70x70x6H	342	532	688
i	L80x80x6H	393	610	908
j	L55x55x5H	270	425	242
k	L70x70x5H	345	535	577

MAXIMUM VERTICAL BASE REACTIONS			
FOUNDATION LOADS	LOAD (daN)	SHEAR LOAD (daN)	
		LONG.	TRANSV.
UPLIFT	134097	25025	25444
COMPRESSION	151939	27730	27767

MAXIMUM BATTERED BASE REACTIONS			
FOUNDATION LOADS	LOAD (daN)	SHEAR LOAD (daN)	
		LONG.	TRANSV.
UPLIFT	138743	2444	2517
COMPRESSION	156917	1592	1639



+ 9m BODY EXTENSION									
Group Label	Angle Size	Steel Strength (MPa)	Size of Bolt	No. Of Bolts	No. Of Shear Sect				
92	L160X16	S355JO	M20	12	2				
93	L80X6	S355JO	M20	2	1				
94	L80X6	S355JO	M20	2	1				
95	L160X16	S355JO	M20	12	2				
96	L60X5	S355JO	M16	2	1				
97	L60X5	S355JO	M16	2	1				
98	L60X5	S355JO	M16	1	1				
99	L60X5	S355JO	M16	2	1				
100	L60X5	S355JO	M16	2	1				
101	L60X5	S355JO	M16	1	1				
102	L80X6	S355JO	M20	2	1				
103	L80X6	S355JO	M20	2	1				
104	L70X6	S355JO	M20	2	1				
105	L70X6	S355JO	M20	2	1				
106	L60X5	S355JO	M16	2	1				
107	L60X5	S355JO	M16	2	1				
108	L80X6	S355JO	M20	2	1				
109	L80X6	S355JO	M20	2	1				

NOTE :

TOWER DESIGN LOADS AND LOADS COMBINATION :

- According to criteria for tower design.

STEEL QUALITY acc. to EN 10025:

- S 355 JO Yield Point 355N/mm² for thickness <16mm and Yield Point 355N/mm² for thickness >16mm, denoted by "J"
- Bolts - quality class - Class 5.6, according to DIN EN 20898-1
- Nuts - quality class - Class 5, according to EN ISO 20898/2

STEEL DIMENSIONS:

- According to EN 10056 for angle and EN 10029 for plates.
- Bolts, according to DIN 7990
- Each bolt will be supplied with:
 - 1 Spring washer Grouper - DIN 127
 - 1 Standard nut - DIN 550
- Step bolts will be according to DIN 931 (quality class 6.8) with 2 nuts and 2 Springwashers.

GALVANISING:

- All steel items:
 - Angles, plates hot-dip galv. as per EN ISO 1461:2002.
 - Bolts, nuts, and washers hot-dip galv. as per EN ISO 1461:2002.

DIMENSIONS:

- All dimensions are in (mm)
- All dimensions shall be established after workshop detail drawings and erection of prototypes.

PRELIM:

- LAK - Code, will be used

C.L. - CONCRETE LEVEL
G.L. - GROUND LEVEL

The size of holes and the distances between the holes for the attachment points (conductors and OPGW) shall be checked again after approval of drawings for insulator strings and OPGW sets.

Up to 1 meter above anticlimbing device the bolts shall be sharing type.

NOTE :

- For "Anticlimbing, Antivandalism and Warning signs" please see drawing No. 3-RE-1013.
- Redundant members connected with 2 bolts at both ends
- All redundant members from waist down shall be connected on main leg with 2 bolts.

C 05.2015 Modified crossarms length

B 10.2013 Modified redundant members from L60x60x6H in L70x70x5H

A 10.2013 Modified according to ISOLUX CORSAN comments

O 26.10.2011 First issue

REV. DATE DESCRIPTION CKE APR.

CLIENT: KETRACO KENYA ELECTRICITY TRANSMISSION Co.Ltd (KETRACO)

CONSULTING ENGINEER: CONTRACTOR: ISOLUX CORSAN DESIGNER: FICHTNER

Title: TENSION TOWER TYPE "LAK" (0°-15°) ANGLE LINE OUTLINE FOR LAK-6m, LAK-9m, LAK±0m, LAK+3m, LAK+6m TOWER

PREPARED BY: ENG. A.C. DATE: DRAWN BY: TH. E.S. DATE: 10.2011

CHECKED BY: ENG. E.D. DATE: 10.2011

APPROVED BY: ENG. G.G. DATE: 10.2011

DRAWN NO: 0-RE-397

SCALE: A0 1/100

CLIENT NO. DWG: C

