


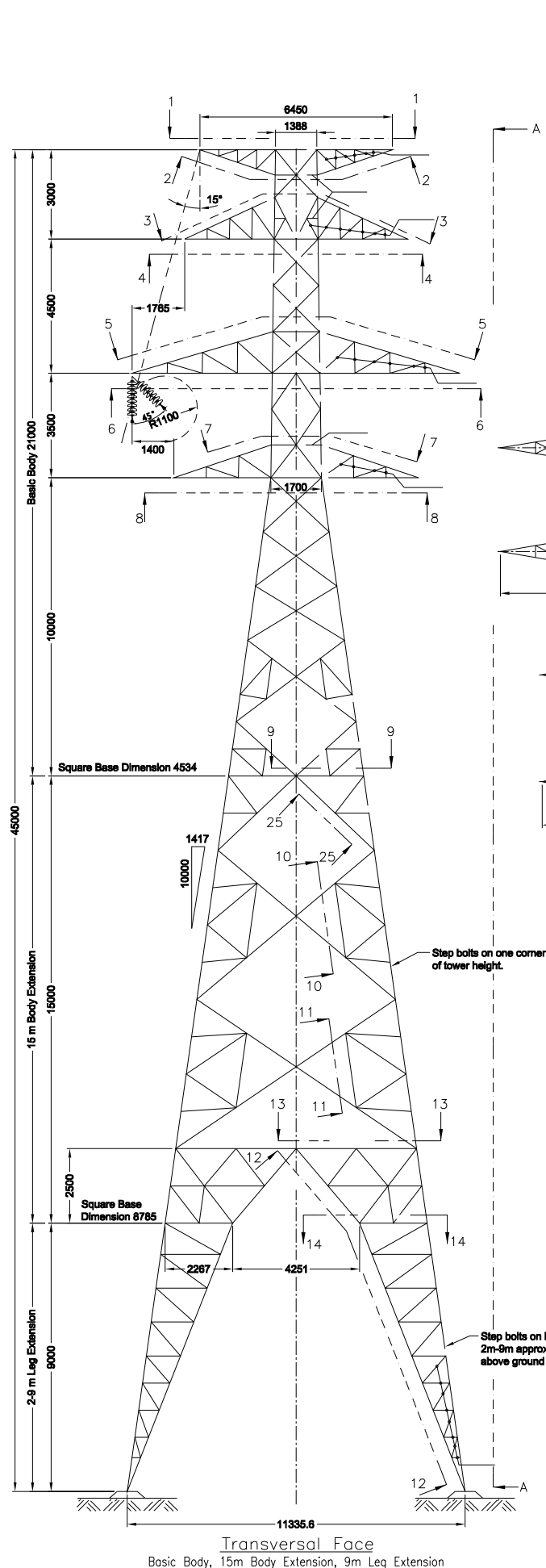


# Samin Mahvelat 132 kV Overhead Power Transmission Line

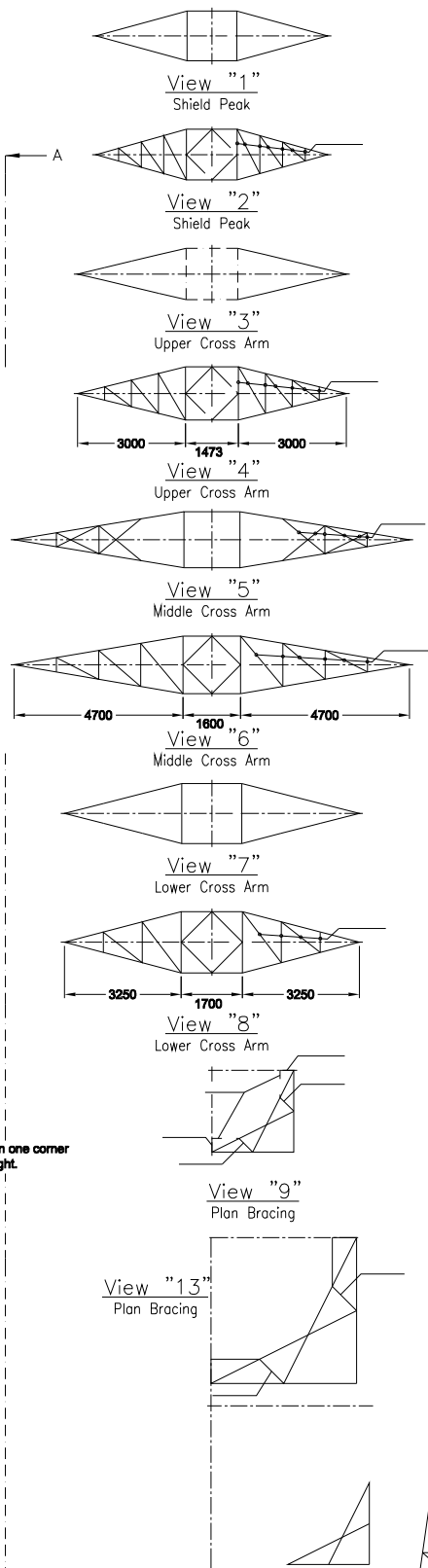
## Lattice Steel Tower Drawings

Z	1404/08	FIRST ISSUE
REV	DATE	DESCRIPTION
DRAWN	M.H.ASKARI	SCALE: NTS      SIZE: A3      SHEET: 00
DESIGNED	M.H.ASKARI	SUBJECT:
CHECKED	H.NAZERI	<p align="center">Samin Mahvelat 132 kV Overhead Power Transmission Line <b>Lattice Steel Tower Drawings</b></p>
APPROVED	H.REZAEI	
CONTRACT NO:		
PROJECT NO:		DRAWING NO:2BP2-B-3MG-DWG-LIN-431001-CV-007
CONSULTANT: 		CONTRACTOR:  گروه طراحی و مهندسی پردیس کوردخاتان پارس
		CLIENT : <b>SAMIN ENERGY PAYDAR</b> 

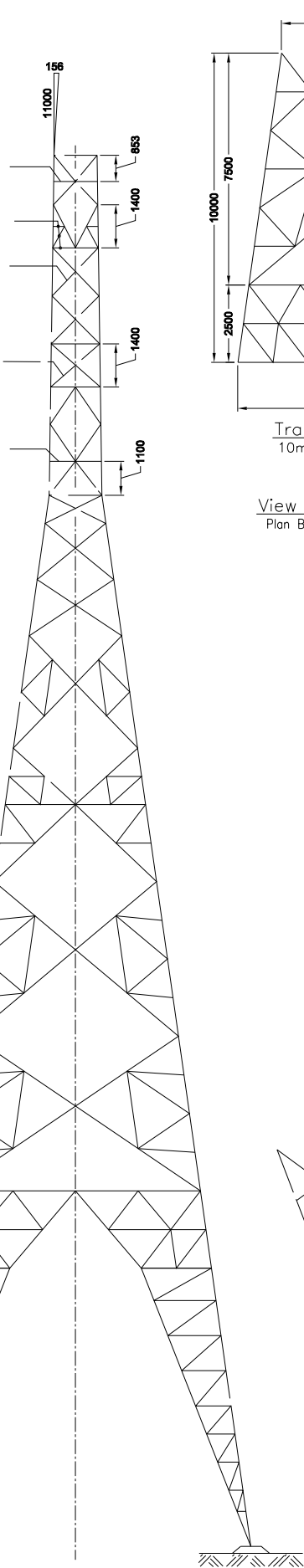




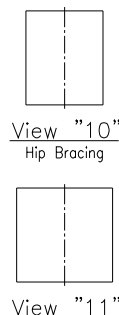
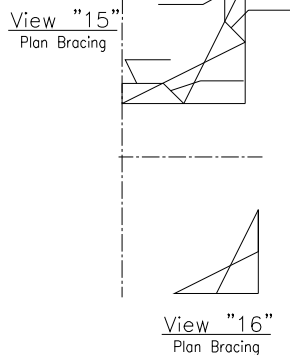
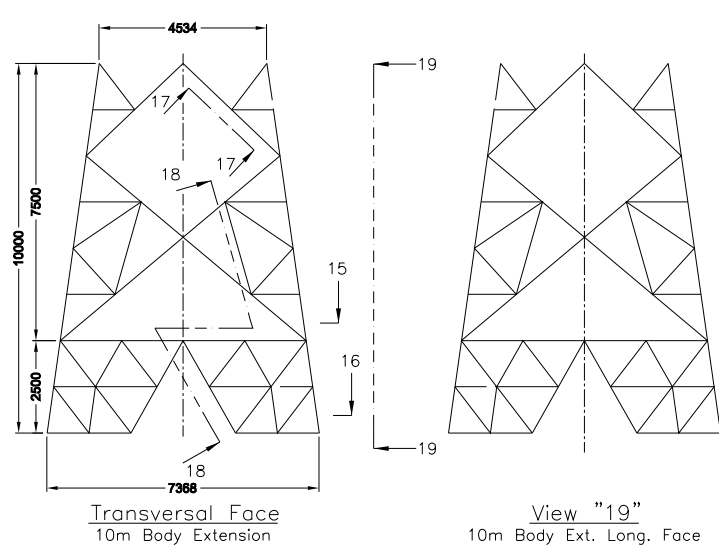
Transversal Face  
Basic Body, 15m Body Extension, 9m Leg Extension



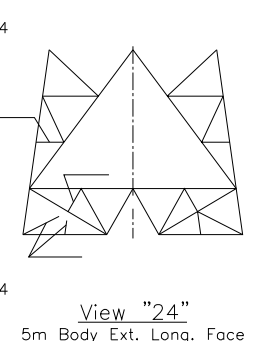
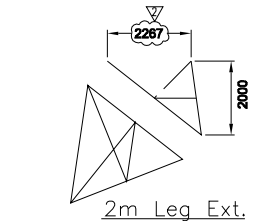
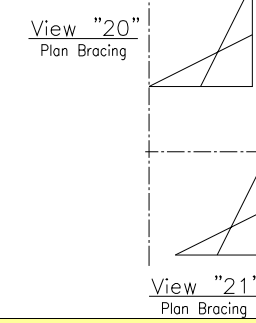
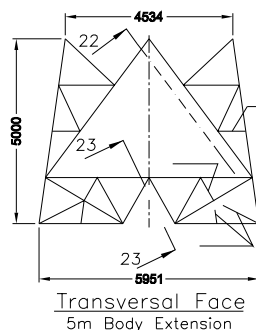
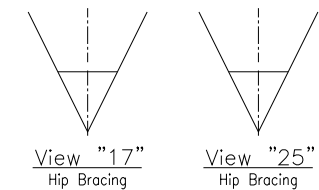
View "14"  
Plan Bracing



View "A"  
Basic Body, 15m Body Extension, 9m Leg Extension



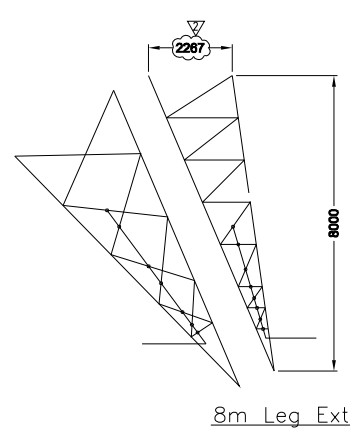
View "12"  
Hip Bracing



7m Leg Ext.

5m Leg Ext.



3m Leg Ext.



6m Leg Ext.

4m Leg Ext.

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The production, copying, tracing, utilization for any purpose other than agreed and disclosure to a third party are strictly subjected to prior written agreement by GAM ARAK.

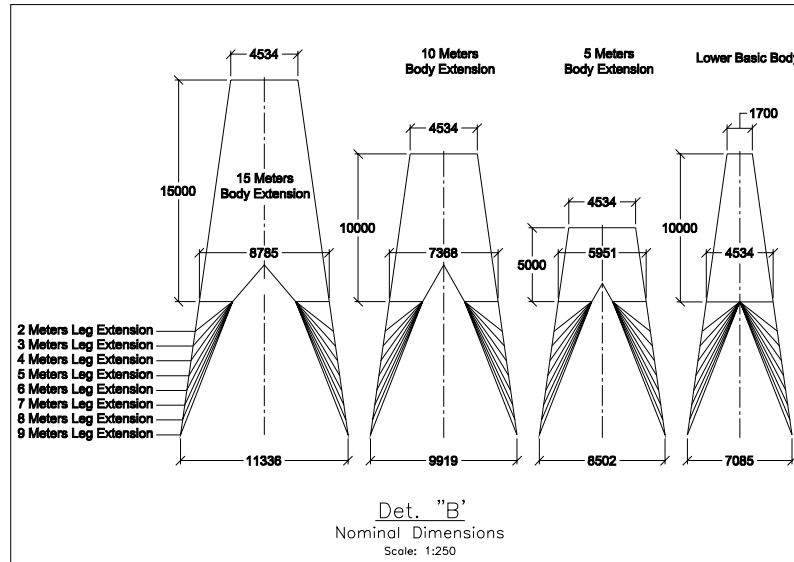
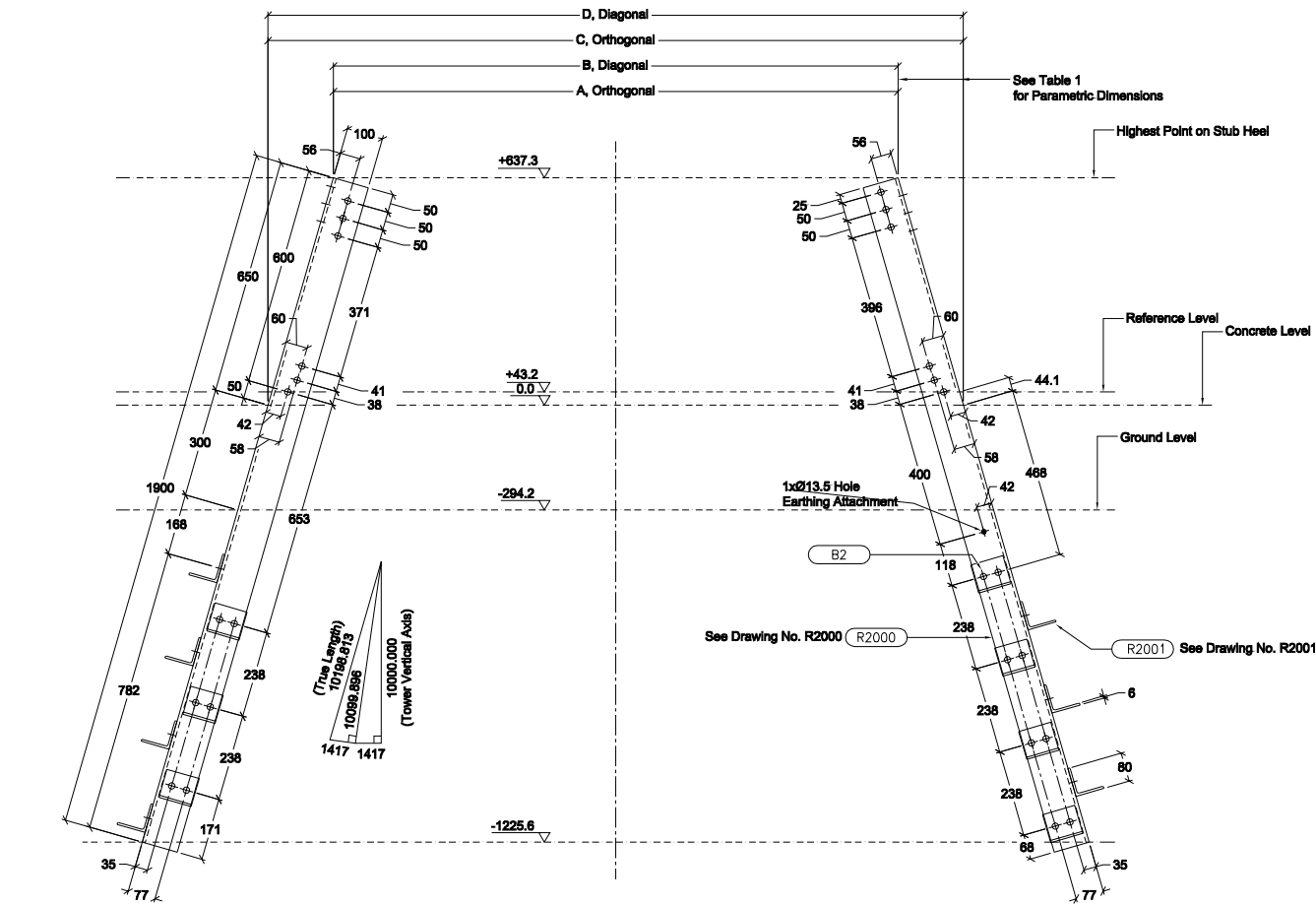
2	Corrected after our review, Modified dimension 2275 to 2267.				-	A.G.	M.M.	84/05/02				
1	Corrected after our review, tower slope, panel arrangement and material for several members modified.				-	A.G.	M.M.	84/03/07				
0	Issued for Approval				-	D.K.	M.M.	84/01/27				
Rev.		Description				Modify	Checked	Approved	Date			
Customer:					Project:							
Customer:					132 kV Double Circuit Transmission Line							
Design:		D.K.H.	Date:	84/01/27	Contract No.:		97-19					
Drawn:		S.G.	Date:	84/01/27	Format:		A1					
Checked:		A.G.	Date:	84/01/27	Sheet:		1/1					
Approved:		M.M.	Date:	84/01/27	Scale:		1:100					
This drawing has been prepared by CAD Drawing System of GAM ARAK IND. P.O.Box: 14145/138, Tehran, Iran. Tel: +98 21 895 8524, Fax: +98 21 896 4865, web: www.gamarak.com							Model:			"GMS" Suspension Tower		
							Title:		Outline Drawing and Electrical Clearances			
Drawing No.:					12 GMS		D 01 2					
					Circuit		Type				Code	

Certification, Comments

NOTES

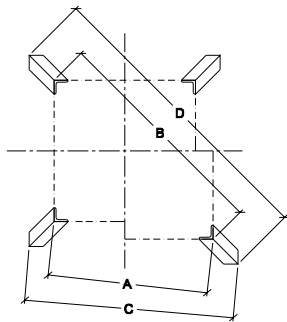
- All dimensions are in millimeter and true length along vertical axis.
- Electrical Clearances, tower design loads and load combinations should be in accordance with specifications outlined in consultant Document.
- Structural steel design should be in accordance with ANSI/ASCE 10-97.
- Tower steel properties should be in accordance with EN 10025.
- Conductor is ACSR 477 MCM (Hawk), One conductors per phase and Hawk shield wire.
- Wind span is 300 m in 3' line angle.
- A suffix "H" after size designation denotes high strength material.





Leg Mounted under		Basic Body				5 m Body Extension				10 m Body Extension				15 m Body Extension			
Reference Leg	Mating Leg	A Transversal (mm)	B Diagonal (mm)	C Transversal (mm)	D Diagonal (mm)	A Transversal (mm)	B Diagonal (mm)	C Transversal (mm)	D Diagonal (mm)	A Transversal (mm)	B Diagonal (mm)	C Transversal (mm)	D Diagonal (mm)	A Transversal (mm)	B Diagonal (mm)	C Transversal (mm)	D Diagonal (mm)
Leg 2	Leg 2	4,891.8	8,918.1	5,072.5	7,173.5	6,308.8	8,922.0	6,489.5	8,177.5	7,725.8	10,926.0	7,906.5	11,181.4	9,142.8	12,829.9	9,323.5	13,185.4
	Leg 3	5,133.9	7,188.4	5,311.1	7,441.4	6,529.1	8,177.1	6,707.6	9,431.0	7,932.1	11,171.2	8,111.3	11,425.7	9,339.3	13,168.3	9,518.9	13,423.1
	Leg 4	5,555.5	7,587.2	5,724.1	7,833.9	6,894.8	9,534.9	7,067.7	9,784.8	8,260.0	11,502.0	8,436.3	11,753.6	9,640.2	13,479.9	9,816.9	13,732.6
	Leg 5	6,119.7	8,095.7	6,277.2	8,333.4	7,384.2	9,964.6	7,549.3	10,228.5	8,695.9	11,911.2	8,665.4	12,158.5	10,036.2	13,659.7	10,208.6	14,109.2
	Leg 6	6,791.0	8,694.4	6,937.0	8,922.0	7,974.7	10,514.2	8,130.9	10,750.9	9,224.4	12,391.0	9,387.1	12,633.0	10,516.6	14,302.2	10,683.6	14,547.7
	Leg 7	7,540.9	9,366.3	7,676.0	9,563.3	8,645.5	11,112.4	8,782.8	11,341.1	9,630.6	12,933.5	9,986.0	13,169.5	11,070.3	14,801.9	11,231.3	15,042.6
	Leg 8	8,348.3	10,096.6	8,473.5	10,303.2	9,379.5	11,768.8	9,518.1	11,989.2	10,501.0	13,331.3	10,649.0	13,760.7	11,686.9	15,353.2	11,841.7	15,588.7
	Leg 9	9,197.9	10,873.7	9,314.5	11,070.4	10,162.9	12,474.0	10,293.4	12,686.3	11,224.2	14,177.4	11,365.1	14,400.1	12,357.1	15,950.7	12,505.6	16,180.8
	Leg 3	5,175.2	7,318.9	5,355.9	7,574.3	6,592.2	8,322.8	6,772.9	9,578.3	8,009.2	11,328.8	8,189.9	11,582.2	9,428.2	13,330.7	9,606.9	13,586.1
Leg 3	Leg 4	5,412.0	7,585.5	5,589.6	7,838.8	6,809.3	9,576.6	6,987.9	9,829.7	8,213.3	11,570.5	8,392.6	11,825.0	9,621.1	13,568.0	9,800.7	13,822.8
	Leg 5	5,820.4	7,974.6	5,990.1	8,222.1	7,166.2	9,927.2	7,339.7	10,177.5	8,535.1	11,896.9	8,710.7	12,148.8	9,917.5	13,876.4	10,094.4	14,129.2
	Leg 6	6,367.5	8,469.2	6,526.9	8,708.6	7,643.5	10,367.5	7,869.7	10,612.3	9,662.1	12,299.4	9,132.3	12,547.3	10,306.8	14,251.2	10,479.5	14,501.0
	Leg 7	7,020.8	9,052.2	7,169.3	9,282.0	8,220.3	10,885.9	8,378.1	11,123.9	9,480.0	12,770.9	9,643.7	13,013.8	10,778.8	14,887.5	10,946.4	14,933.4
	Leg 8	7,753.7	9,707.6	7,891.7	9,927.4	8,877.1	11,471.8	9,026.2	11,702.2	10,074.8	13,304.1	10,231.5	13,541.1	11,323.2	15,179.8	11,485.1	15,421.2
	Leg 9	8,545.7	10,421.7	8,674.0	10,631.6	9,597.5	12,115.3	9,737.8	12,337.8	10,733.7	13,891.7	10,883.3	14,122.5	11,930.1	15,722.9	12,086.1	15,959.3
	Leg 4	5,458.6	7,719.7	5,639.3	7,975.1	6,875.8	9,723.6	7,056.3	9,979.1	8,292.6	11,727.6	8,473.3	11,983.0	9,709.6	13,731.5	9,890.3	13,986.9
	Leg 5	5,690.7	7,983.0	5,868.5	8,236.4	7,089.6	9,974.3	7,268.5	10,228.4	8,494.6	11,969.8	8,674.0	12,224.4	9,903.0	13,967.7	10,082.7	14,222.5
	Leg 6	6,087.0	8,363.1	6,257.6	8,611.4	7,438.6	10,320.1	7,612.5	10,570.8	8,810.7	12,292.1	8,986.6	12,544.2	10,195.2	14,273.1	10,372.3	14,526.1
Leg 4	Leg 7	6,618.1	8,845.2	6,779.2	9,085.9	7,904.5	10,751.8	8,071.6	10,997.3	9,229.3	12,686.5	9,400.1	12,936.8	10,578.0	14,843.3	10,751.2	14,883.4
	Leg 8	7,254.5	9,413.4	7,405.2	9,645.2	8,468.2	11,259.7	8,627.4	11,498.8	9,737.1	13,152.2	9,907.7	13,395.7	11,042.0	15,073.5	11,210.3	15,319.9
	Leg 9	7,970.9	10,053.2	8,111.5	10,275.6	9,111.6	11,833.8	9,262.5	12,065.8	10,321.0	13,676.3	10,478.9	13,914.4	11,577.5	15,568.8	11,740.3	15,800.9
	Leg 5	5,742.0	8,120.5	5,922.7	8,375.9	7,159.0	10,124.4	7,339.7	10,379.8	8,576.0	12,128.3	8,756.7	12,383.8	9,993.0	14,132.3	10,173.7	14,387.7
	Leg 6	5,969.8	8,380.7	6,147.9	8,634.4	7,370.3	10,373.1	7,549.2	10,627.4	8,776.0	12,369.2	8,955.5	12,623.8	10,184.9	14,367.5	10,364.7	14,622.4
	Leg 7	6,355.0	8,752.8	6,526.5	9,001.7	7,711.7	10,713.5	7,886.1	10,964.6	9,086.8	12,687.0	9,263.0	12,940.1	10,473.1	14,670.0	10,650.4	14,923.1
	Leg 8	6,871.3	9,223.2	7,033.8	9,466.1	8,167.0	11,137.2	8,335.0	11,383.4	9,497.4	13,076.3	9,668.8	13,327.0	10,849.8	15,026.8	11,023.4	15,286.2
	Leg 9	7,491.5	9,777.7	7,644.2	10,011.3	8,718.4	11,635.2	8,678.8	11,875.4	9,995.6	13,524.5	11,308.3	13,778.7	11,560.3	15,460.3	11,475.1	15,707.2
	Leg 6	6,025.4	8,521.3	6,206.1	8,776.7	7,442.4	10,525.2	7,623.1	10,780.6	8,859.4	12,529.1	9,040.1	12,784.6	10,276.4	14,533.1	10,457.1	14,788.5
Leg 6	Leg 7	6,249.3	8,778.8	6,427.6	9,032.6	7,651.1	10,772.1	7,830.2	11,026.5	9,057.6	12,768.7	9,237.1	13,023.4	10,467.0	14,767.4	10,646.8	15,022.2
	Leg 8	6,624.3	9,143.5	6,796.6	9,392.9	7,985.5	11,107.5	8,160.4	11,358.9	9,363.3	13,063.7	9,539.8	13,336.2	10,751.3	15,067.2	10,928.8	15,320.4
	Leg 9	7,126.7	9,603.1	7,290.6	9,846.0	8,430.8	11,523.7	8,599.6	11,770.5	9,766.4	13,468.7	9,938.3	13,717.8	11,122.2	15,428.7	11,296.1	15,679.4
	Leg 7	6,308.8	8,922.0	6,489.5	9,177.5	7,725.8	10,926.0	7,906.5	11,181.4	9,142.8	12,929.9	9,323.5	13,185.4	10,599.8	14,933.9	10,740.5	15,189.3
	Leg 8	6,529.1	9,177.1	6,707.6	9,431.0	7,932.1	11,171.2	8,111.3	11,425.7	9,339.3	13,168.3	9,518.9	13,423.1	10,749.1	15,167.3	10,928.9	15,422.1
	Leg 9	6,894.6	9,534.9	7,067.7	9,784.8	8,260.0	11,502.0	8,436.3	11,753.6	9,640.2	13,479.9	9,816.9	13,732.6	11,029.8	15,464.5	11,207.4	15,717.9
	Leg 8	6,592.2	9,322.8	6,772.9	9,578.3	8,009.2	11,328.8	8,189.9	11,582.2	9,428.2	13,330.7	9,606.9	13,586.1	10,843.2	15,334.7	11,023.9	15,580.1
	Leg 9	6,809.3	9,575.6	6,967.9	9,829.7	8,213.3	11,570.5	8,392.6	11,825.0	9,621.1	13,568.0	9,800.7	13,822.8	11,031.3	15,567.2	11,211.1	15,822.1
	Leg 9	6,875.6	9,723.6	7,056.3	9,979.1	8,292.6	11,727.6	8,473.3	11,983.0	9,709.6	13,731.5	9,980.3	13,986.9	11,126.6	15,735.4	11,307.3	15,990.9

Table 1  
Parametric Dimensions



Parameters  
Schematic Plan  
Scale: None

Diagonal slope (mm/m)  
Back to back of min. leg extension (mm)  
Stub elevation (mm)  
Concrete level elevation (mm)

200.394062  
4891.837635  
1802.961973  
837.329096

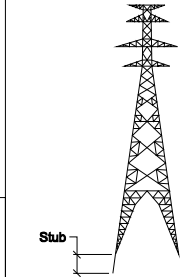
Slope Data  
Precise Tower Slope Parameters

#### Bill of Materials

Mark	Description	Specification	Qty	Material <sup>(1)</sup>	Requirements	Protection	Remark
R2000	Stub	L 100x100x8-1900	4	EN 10025-S235JR	EN 10056-1	ASTM 123	Note 2
R2001	Cleat	L 80x80x6-92	28	EN 10025-S235JR	EN 10056-1	ASTM 123	Note 2
B2	Hex. Bolt	M16x40	56	Property class 5.8	DIN 7990	ASTM 123	-
	Hex. Nut	M16	56	Property class 5	EN 24034	ASTM 123	-
	Spring Washer	A16	56	DIN 17221-Spring SL	DIN 128	ASTM 123	-

Notes: 1) Use of an equal and approved material is allowed only after written permission of the consultant engineer.  
2) An inspection document covering specific test as described in 3.1 of EN 10204 shall be made out.

#### Certification, Comments



#### Adjoining Blocks

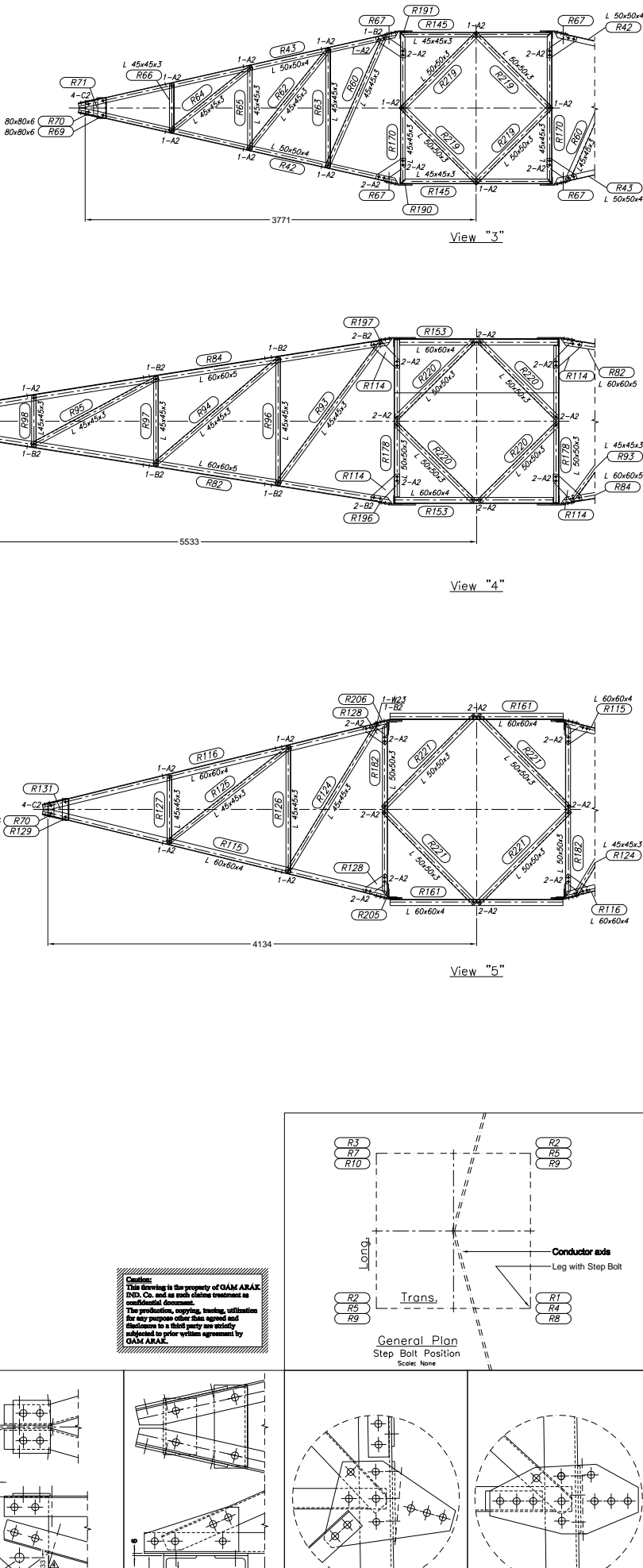
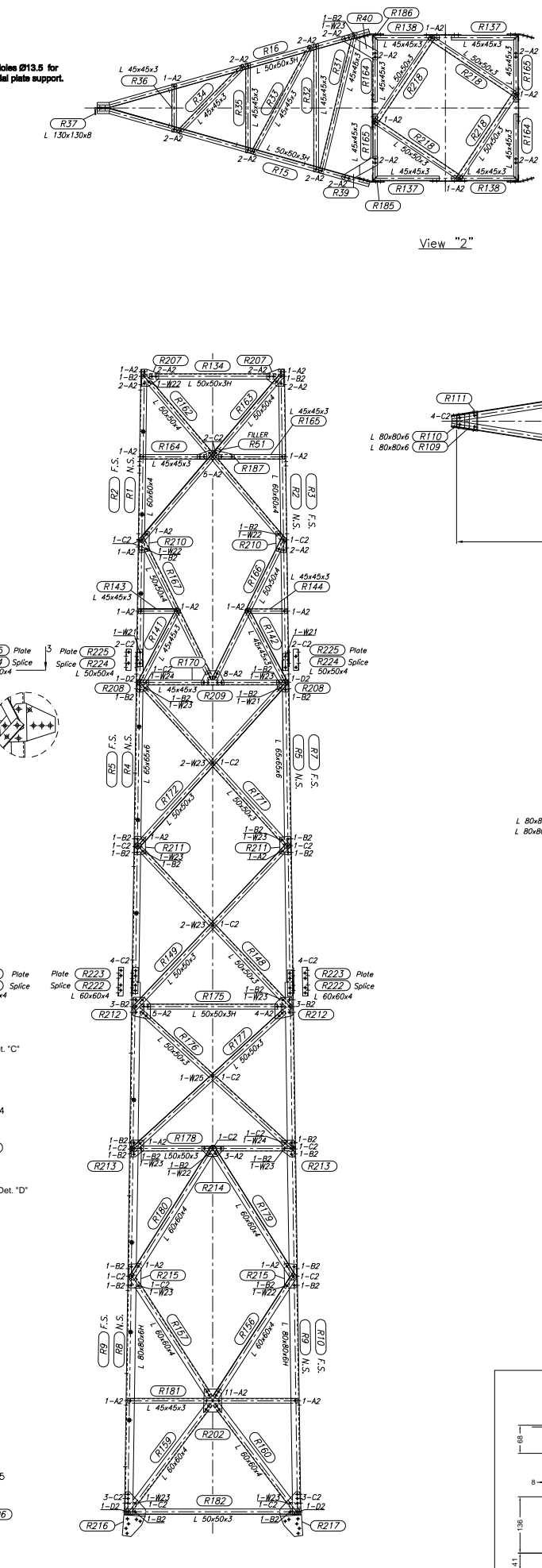
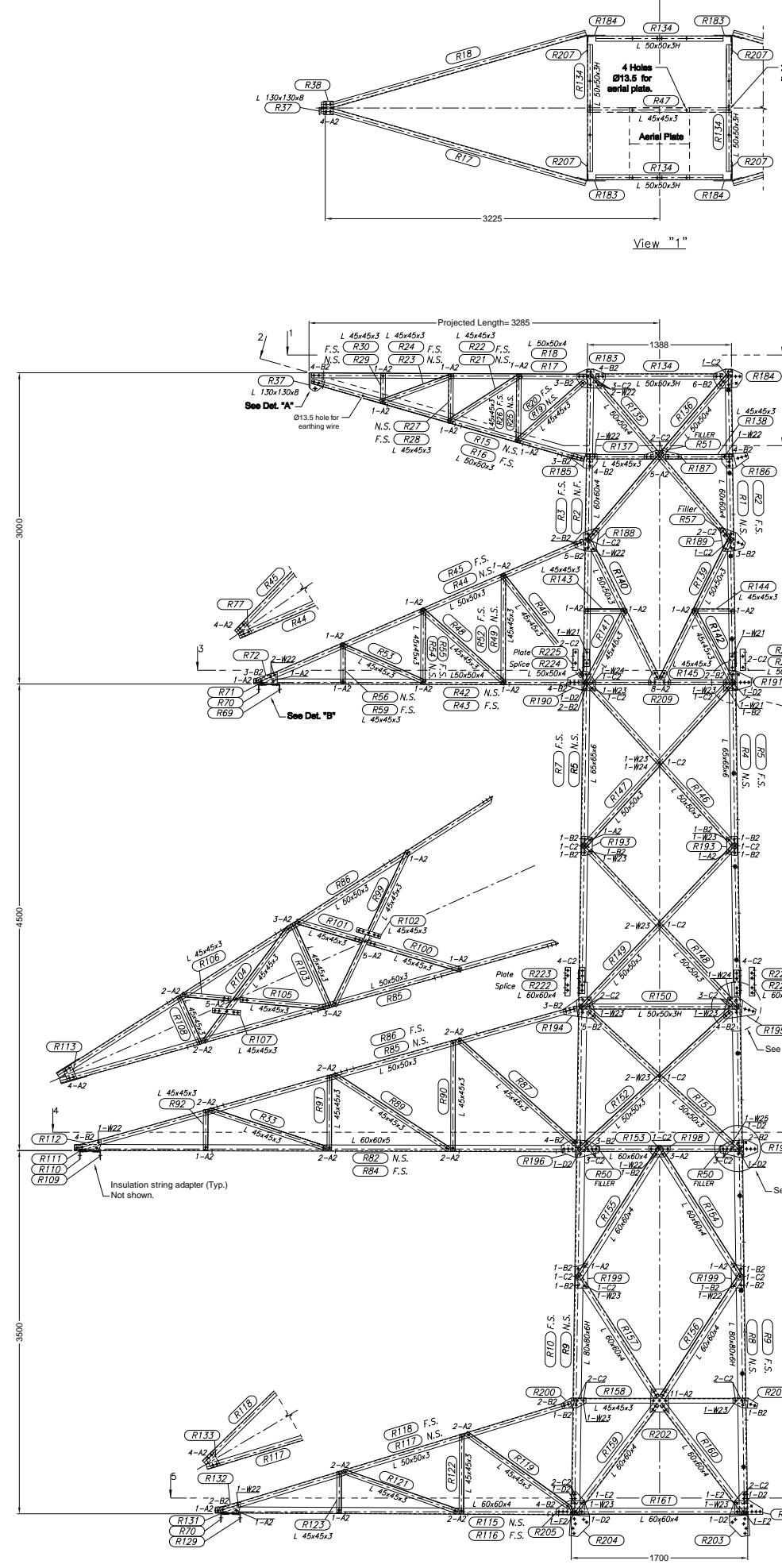
No.	Title	Document No.
1	Leg Extensions	12-GMS-S-XX- (Latest Edition)
2	-	-
3	-	-
4	-	-

#### Legend

FL	Filler Plate	1- All dimensions are in millimeter.
N.S.	Near Side	2- All unspecified hole diameters are Ø17.5 mm, unless otherwise specified.
F.S.	For Side	3- Each bolt shall be tightened to a truly closed-fit condition by application of max. 100 Nm torque. A curved spring lock washer shall be used on each bolt as nut locking device.
○	Bolted connection, Hole Ø17.5	4- All dimensions shown are true lengths, unless otherwise specified.
⊙	Accessory mount, Hole Ø13.5	
⊕	Bolted connection, Hole Ø21.5	

1	Corrected after our review, Tower slope, stub material and length modified.	-	A.G.	M.M.	84/03/08
0	Issued for Approval	-	D.K.	M.M.	84/02/04
Rev.	Description	Model	Checked	Approved	Date
Customer:	132 kV Double Circuit Transmission Line				
Designed: D.K.H.	Date: 84/02/4	Control No:	Model: "GMS" Suspension Tower		
Drawn: S.G.	Date: 84/02/4	Person: A1	System:		
Checked: A.G.	Date: 84/02/4	Sheet: 1/1	Title: Arrangement & Setting for Stub		
Approved: M.M.	Date: 84/02/4	Scale: 1:10	Drawing No: 12 GMS F 01 1		
This drawing has been prepared by CAD Drawing System of GAM ARAK IND. P.O.Box: 14145/130, Tehran, Iran. Tel: +98 21 895 8524, Fax: +98 21 896 4865, web: www.gamarak.com					
Sheet	Type	Code	Serial	Rev.	





Material Specifications				
No.	Item	Specific Requirements	Technical Delivery Conditions	Corrosion Protection
1	Angle Profile	EN 10056-1: 1998	EN 10025: 1990-3 S355J2S355JR	Galvanized to ASTM 123
2	Gusset Plate	EN 10048: 1996	EN 10025: 1990-3 S355J2S355JR	Galvanized to ASTM 123
3	Filter Plate	EN 10048: 1996	EN 10025: 1990-3 S355J2S355JR	Galvanized to ASTM 123
4	Bolt	DN 7950: 1999	Property class 5.8	Galvanized to ASTM 153
5	Nut	DN 7950: 1999	Property class 5.8, Grade C	Galvanized to ASTM 153
6	Pin Washer	DN 7950: 1999	Property class 4.6	Galvanized to ASTM 153
7	Step Bolt	DN 7950: 1999	Property class 4.6	Galvanized to ASTM 153
8	Spring Washer	DN 128	Spring Steel	Galvanized to ASTM 153

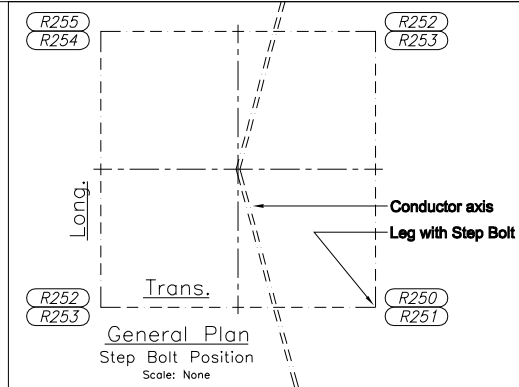
  

Bill of Materials				
Mark	Description	Specification	Qty	Material
R1	Leg	L 60x60x4-2800	1	EN 10056-1: 1998
R2	Plate	PL 60x10x242	4	EN 10056-1: 1998
R3	Plate	PL 60x10x150	4	EN 10056-1: 1998
R4	Plate	PL 60x10x124	4	EN 10056-1: 1998
R5	Plate	PL 60x10x119	4	EN 10056-1: 1998
R6	Plate	PL 60x10x114	4	EN 10056-1: 1998
R7	Plate	PL 60x10x109	4	EN 10056-1: 1998
R8	Plate	PL 60x10x104	4	EN 10056-1: 1998
R9	Plate	PL 60x10x99	4	EN 10056-1: 1998
R10	Plate	PL 60x10x94	4	EN 10056-1: 1998
R11	Plate	PL 60x10x89	4	EN 10056-1: 1998
R12	Plate	PL 60x10x84	4	EN 10056-1: 1998
R13	Plate	PL 60x10x79	4	EN 10056-1: 1998
R14	Plate	PL 60x10x74	4	EN 10056-1: 1998
R15	Plate	PL 60x10x69	4	EN 10056-1: 1998
R16	Plate	PL 60x10x64	4	EN 10056-1: 1998
R17	Plate	PL 60x10x59	4	EN 10056-1: 1998
R18	Plate	PL 60x10x54	4	EN 10056-1: 1998
R19	Plate	PL 60x10x49	4	EN 10056-1: 1998
R20	Plate	PL 60x10x44	4	EN 10056-1: 1998
R21	Plate	PL 60x10x39	4	EN 10056-1: 1998
R22	Plate	PL 60x10x34	4	EN 10056-1: 1998
R23	Plate	PL 60x10x29	4	EN 10056-1: 1998
R24	Plate	PL 60x10x24	4	EN 10056-1: 1998
R25	Plate	PL 60x10x19	4	EN 10056-1: 1998
R26	Plate	PL 60x10x14	4	EN 10056-1: 1998
R27	Plate	PL 60x10x9	4	EN 10056-1: 1998
R28	Plate	PL 60x10x4	4	EN 10056-1: 1998
R29	Plate	PL 60x10x-1	4	EN 10056-1: 1998
R30	Plate	PL 60x10x-6	4	EN 10056-1: 1998
R31	Plate	PL 60x10x-11	4	EN 10056-1: 1998
R32	Plate	PL 60x10x-16	4	EN 10056-1: 1998
R33	Plate	PL 60x10x-21	4	EN 10056-1: 1998
R34	Plate	PL 60x10x-26	4	EN 10056-1: 1998
R35	Plate	PL 60x10x-31	4	EN 10056-1: 1998
R36	Plate	PL 60x10x-36	4	EN 10056-1: 1998
R37	Plate	PL 60x10x-41	4	EN 10056-1: 1998
R38	Plate	PL 60x10x-46	4	EN 10056-1: 1998
R39	Plate	PL 60x10x-51	4	EN 10056-1: 1998
R40	Plate	PL 60x10x-56	4	EN 10056-1: 1998
R41	Plate	PL 60x10x-61	4	EN 10056-1: 1998
R42	Plate	PL 60x10x-66	4	EN 10056-1: 1998
R43	Plate	PL 60x10x-71	4	EN 10056-1: 1998
R44	Plate	PL 60x10x-76	4	EN 10056-1: 1998
R45	Plate	PL 60x10x-81	4	EN 10056-1: 1998
R46	Plate	PL 60x10x-86	4	EN 10056-1: 1998
R47	Plate	PL 60x10x-91	4	EN 10056-1: 1998
R48	Plate	PL 60x10x-96	4	EN 10056-1: 1998
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R50	Plate	PL 60x10x-106	4	EN 10056-1: 1998
R51	Plate	PL 60x10x-111	4	EN 10056-1: 1998
R52	Plate	PL 60x10x-116	4	EN 10056-1: 1998
R53	Plate	PL 60x10x-121	4	EN 10056-1: 1998
R54	Plate	PL 60x10x-126	4	EN 10056-1: 1998
R55	Plate	PL 60x10x-131	4	EN 10056-1: 1998
R56	Plate	PL 60x10x-136	4	EN 10056-1: 1998
R57	Plate	PL 60x10x-141	4	EN 10056-1: 1998
R58	Plate	PL 60x10x-146	4	EN 10056-1: 1998
R59	Plate	PL 60x10x-151	4	EN 10056-1: 1998
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R80	Plate	PL 60x10x-256	4	EN 10056-1: 1998
R81	Plate	PL 60x10x-261	4	EN 10056-1: 1998
R82	Plate	PL 60x10x-266	4	EN 10056-1: 1998
R83	Plate	PL 60x10x-271	4	EN 10056-1: 1998
R84	Plate	PL 60x10x-276	4	EN 10056-1: 1998
R85	Plate	PL 60x10x-281	4	EN 10056-1: 1998
R86	Plate	PL 60x10x-286	4	EN 10056-1: 1998
R87	Plate	PL 60x10x-291	4	EN 10056-1: 1998
R88	Plate	PL 60x10x-296	4	EN 10056-1: 1998
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R92	Plate	PL 60x10x-316	4	EN 10056-1: 1998
R93	Plate	PL 60x10x-321	4	EN 10056-1: 1998
R94	Plate	PL 60x10x-326	4	EN 10056-1: 1998
R95	Plate	PL 60x10x-331	4	EN 10056-1: 1998
R96	Plate	PL 60x10x-336	4	EN 10056-1: 1998
R97	Plate	PL 60x10x-341	4	EN 10056-1: 1998
R98	Plate	PL 60x10x-346	4	EN 10056-1: 1998
R99	Plate	PL 60x10x-351	4	EN 10056-1: 1998
R100	Plate	PL 60x10x-356	4	EN 10056-1: 1998
R101	Plate	PL 60x10x-361	4	EN 10056-1: 1998
R102	Plate	PL 60x10x-366	4	EN 10056-1: 1998
R103	Plate	PL 60x10x-371	4	EN 10056-1: 1998
R104	Plate	PL 60x10x-376	4	EN 10056-1: 1998
R105	Plate	PL 60x10x-381	4	EN 10056-1: 1998
R106	Plate	PL 60x10x-386	4	EN 10056-1: 1998
R107	Plate	PL 60x10x-391	4	EN 10056-1: 1998
R108	Plate	PL 60x10x-396	4	EN 10056-1: 1998
R109	Plate	PL 60x10x-401	4	EN 10056-1: 1998
R110	Plate	PL 60x10x-406	4	EN 10056-1: 1998
R111	Plate	PL 60x10x-411	4	EN 10056-1: 1998
R112	Plate	PL 60x10x-416	4	EN 10056-1: 1998
R113	Plate	PL 60x10x-421	4	EN 10056-1: 1998
R114	Plate	PL 60x10x-426	4	EN 10056-1: 1998
R115	Plate	PL 60x10x-431	4	EN 10056-1: 1998
R116	Plate	PL 60x10x-436	4	EN 10056-1: 1998
R117	Plate	PL 60x10x-441	4	EN 10056-1: 1998
R118	Plate	PL 60x10x-446	4	EN 10056-1: 1998
R119	Plate	PL 60x10x-451	4	EN 10056-1: 1998
R120	Plate	PL 60x10x-456	4	EN 10056-1: 1998
R121	Plate	PL 60x10x-461	4	EN 10056-1: 1998
R122	Plate	PL 60x10x-466	4	EN 10056-1: 1998
R123	Plate	PL 60x10x-471	4	EN 10056-1: 1998
R124	Plate	PL 60x10x-476	4	EN 10056-1: 1998
R125	Plate	PL 60x10x-481	4	EN 10056-1: 1998
R126	Plate	PL 60x10x-486	4	EN 10056-1: 1998
R127	Plate	PL 60x10x-491	4	EN 10056-1: 1998
R128	Plate	PL 60x10x-496	4	EN 10056-1: 1998
R129	Plate	PL 60x10x-501	4	EN 10056-1: 1998
R130	Plate	PL 60x10x-506	4	EN 10056-1: 1998
R131	Plate	PL 60x10x-511	4	EN 10056-1: 1998
R132	Plate	PL 60x10x-516	4	EN 10056-1: 1998
R133	Plate	PL 60x10x-521	4	EN 10056-1: 1998
R134	Plate	PL 60x10x-526	4	EN 10056-1: 1998
R135	Plate	PL 60x10x-531	4	EN 10056-1: 1998
R136	Plate	PL 60x10x-536	4	EN 10056-1: 1998
R137	Plate	PL 60x10x-541	4	EN 10056-1: 1998
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R140	Plate	PL 60x10x-556	4	EN 10056-1: 1998
R141	Plate	PL 60x10x-561	4	EN 10056-1: 1998
R142	Plate	PL 60x10x-566	4	EN 10056-1: 1998
R143	Plate	PL 60x10x-571	4	EN 10056-1: 1998
R144	Plate	PL 60x10x-576	4	EN 10056-1: 1998
R145	Plate	PL 60x10x-581	4	EN 10056-1: 1998
R146	Plate	PL 60x10x-586	4	EN 10056-1: 1998
R147	Plate	PL 60x10x-591	4	EN 1

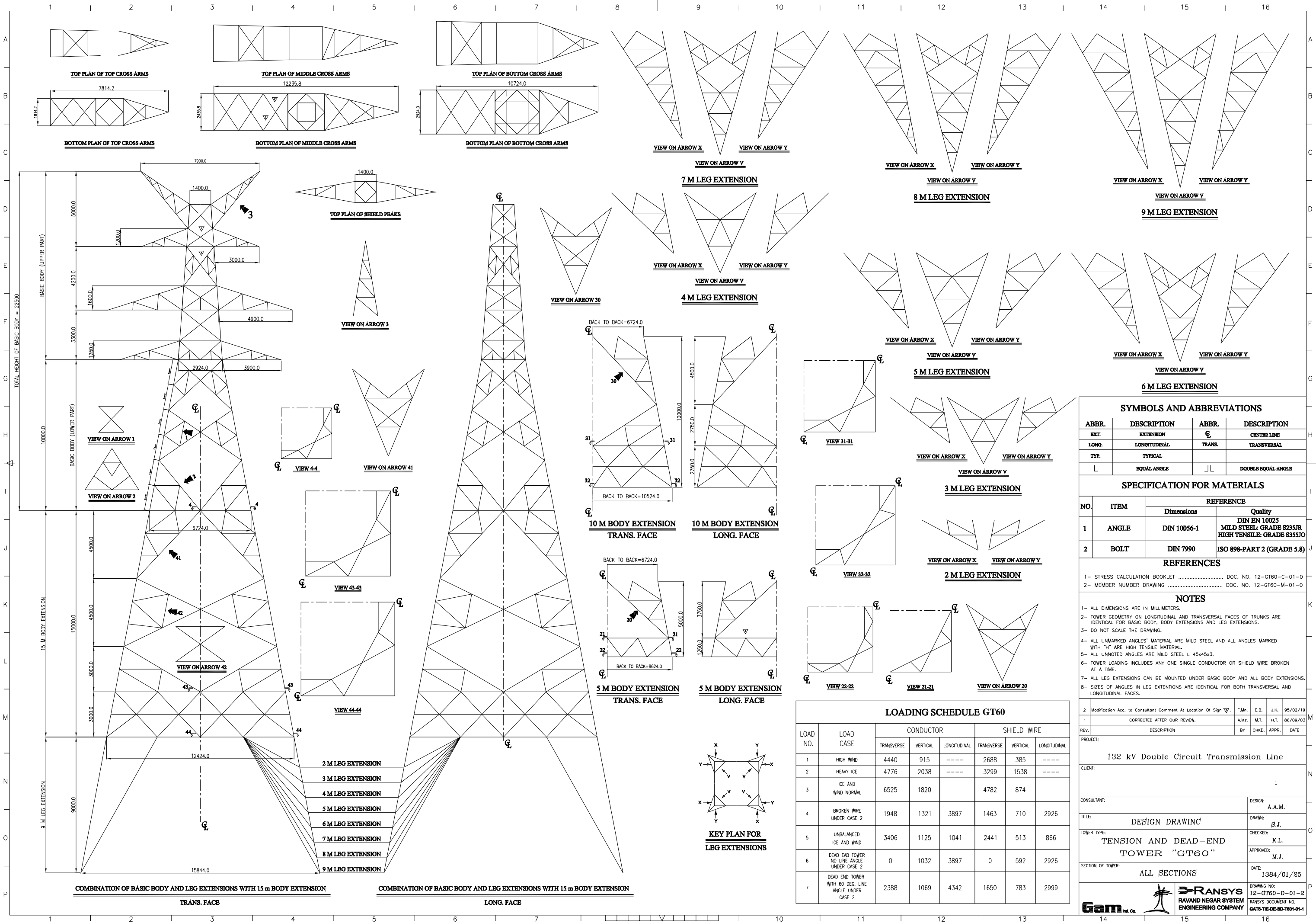
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The production, copying, tracing, utilization for any purpose other than agreed and disclosure to a third party are strictly subjected to prior written agreement by GAM ARAK.

Material Specifications				
No.	Item	Specific Requirements	Technical Delivery Conditions	Corrosion Protection
1	Angle Profile	EN 10056-1: 1998	EN 10025: 1990- S355J0, S235JR	Galvanized to ASTM 123
2	Gusset Plate	EN 10048: 1996	EN 10025: 1990- S355J0, S235JR	Galvanized to ASTM 123
3	Filter Plate	EN 10048: 1996	EN 10025: 1990- S235JR	Galvanized to ASTM 123
4	Bolt		Property class 5.8	
5	Nut	DIN 790: 1999	Property class 5, Grade C	Galvanized to ASTM 153
6	Plain Washer		EN 10025: 1990- S235JR2	
7	Step Bolt	-	Property class 4.6	Galvanized to ASTM 153
8	Spring Washer	DIN 128	Spring Steel	Galvanized to ASTM 153

Note: 1) Application of an equal and approved material is allowed only after the written permission of consultant engineer.  
2) An inspection document covering specific tests as described in 3.1 of EN 10204 shall be made out.








SYMBOLS AND ABBREVIATIONS			
ABBR.	DESCRIPTION	ABBR.	DESCRIPTION
EXT.	EXTENSION	CL	CENTER LINE
LONG.	LONGITUDINAL	TRANS.	TRANSVERSAL
TYP.	TYPICAL		
L	EQUAL ANGLE	JL	DOUBLE EQUAL ANGLE

SPECIFICATION FOR MATERIALS			
NO.	ITEM	REFERENCE	
		Dimensions	Quality
1	ANGLE	DIN 10056-1	DIN EN 10025 MILD STEEL: GRADE S235JR HIGH TENSILE: GRADE S355JO
2	BOLT	DIN 7990	ISO 898-PART 2 (GRADE 5.8)

REFERENCES			
1-	STRESS CALCULATION BOOKLET	DOC. NO. 12-GT60-C-01-0	
2-	MEMBER NUMBER DRAWING	DOC. NO. 12-GT60-M-01-0	

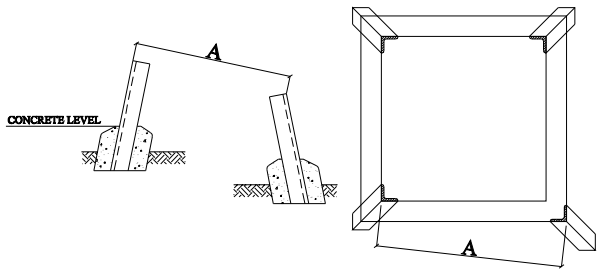
NOTES			
1-	ALL DIMENSIONS ARE IN MILLIMETERS.		
2-	TOWER GEOMETRY ON LONGITUDINAL AND TRANSVERSAL FACES OF TRUNKS ARE IDENTICAL FOR BASIC BODY, BODY EXTENSIONS AND LEG EXTENSIONS.		
3-	DO NOT SCALE THE DRAWING.		
4-	ALL UNMARKED ANGLES' MATERIAL ARE MILD STEEL AND ALL ANGLES MARKED WITH "4" ARE HIGH TENSILE MATERIAL.		
5-	ALL UNNOTED ANGLES ARE MILD STEEL L 45x45x3.		
6-	TOWER LOADING INCLUDES ANY ONE SINGLE CONDUCTOR OR SHIELD WIRE BROKEN AT A TIME.		
7-	ALL LEG EXTENSIONS CAN BE MOUNTED UNDER BASIC BODY AND ALL BODY EXTENSIONS.		
8-	SIZES OF ANGLES IN LEG EXTENSIONS ARE IDENTICAL FOR BOTH TRANSVERSAL AND LONGITUDINAL FACES.		

LOADING SCHEDULE GT60							
LOAD NO.	LOAD CASE	CONDUCTOR			SHIELD WIRE		
		TRANSVERSE	VERTICAL	LONGITUDINAL	TRANSVERSE	VERTICAL	LONGITUDINAL
1	HIGH WIND	4440	915	----	2688	385	----
2	HEAVY ICE	4776	2038	----	3299	1538	----
3	ICE AND WIND NORMAL	6525	1820	----	4782	874	----
4	BROKEN WIRE UNDER CASE 2	1948	1321	3897	1463	710	2926
5	UNBALANCED ICE AND WIND	3406	1125	1041	2441	513	866
6	DEAD END TOWER NO LINE ANGLE UNDER CASE 2	0	1032	3897	0	592	2926
7	DEAD END TOWER WITH 60 DEG. LINE ANGLE UNDER CASE 2	2388	1069	4342	1650	783	2999

2	Modification Acc. to Consultant Comment At Location Of Sign	F.Mn.	E.B.	J.K.	95/02/19
1	CORRECTED AFTER OUR REVIEW.	A.Mz.	M.T.	H.T.	86/09/03
REV.	DESCRIPTION	BY	CHKD.	APPR.	DATE
PROJECT:					
132 kV Double Circuit Transmission Line					
CLIENT:					
CONSULTANT:					
TITLE:			DESIGN: A.A.M.		
DESIGN DRAWING			DRAWN: S.J.		
TOWER TYPE:			CHECKED: K.L.		
TENSION AND DEAD-END TOWER "GT60"			APPROVED: M.J.		
SECTION OF TOWER:			DATE: 1384/01/25		
ALL SECTIONS			DRAWING NO: 12-GT60-D-01-2		
			RANSYS RAVAND NEGAR SYSTEM ENGINEERING COMPANY		
			RANSYS DOCUMENT NO. GAT6-TIE-DE-80-T01-01-1		

TABLES OF BACK TO BACK DISTANCES FOR PLAN ON STUB

(VALUES OF "A")



BASIC BODY	2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
2 Meter	724.4	750.7	788.6	838.7	897.7	964.7	1037.0	1114.2
3 Meter	750.7	782.1	825.3	874.2	931.0	996.5	1067.9	1146.2
4 Meter	788.6	825.4	862.0	909.1	961.2	1019.4	1084.9	1157.0
5 Meter	838.7	874.2	909.1	944.8	989.4	1034.0	1078.6	1123.2
6 Meter	897.7	931.0	961.2	991.4	1021.6	1051.8	1082.0	1112.2
7 Meter	964.7	996.5	1019.4	1042.6	1065.8	1089.0	1112.2	1135.4
8 Meter	1037.0	1067.9	1084.9	1101.4	1118.0	1134.6	1151.2	1167.8
9 Meter	1114.2	1146.2	1167.8	1184.4	1201.6	1218.8	1236.0	1253.2

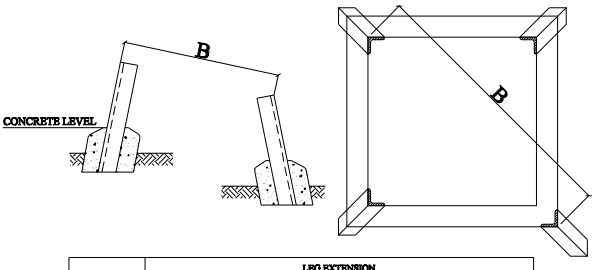
BASIC BODY WITH 5 M BODY EXT.	2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
2 Meter	914.1	936.7	973.6	1018.0	1070.5	1130.2	1198.5	1266.6
3 Meter	936.7	952.1	976.6	1010.8	1054.3	1105.8	1164.7	1228.7
4 Meter	973.6	976.6	990.1	1014.2	1048.0	1090.5	1141.2	1198.5
5 Meter	1018.0	1010.8	1014.2	1028.1	1052.7	1095.4	1147.2	1206.1
6 Meter	1070.5	1054.3	1048.0	1052.7	1066.4	1099.0	1137.5	1186.1
7 Meter	1130.2	1105.8	1090.5	1089.0	1099.0	1127.2	1160.1	1201.6
8 Meter	1198.5	1164.7	1141.2	1127.2	1127.2	1127.2	1142.1	1165.9
9 Meter	1266.6	1228.7	1198.5	1168.1	1139.1	1101.4	1065.9	1031.4

BASIC BODY WITH 10 M BODY EXT.	2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
2 Meter	1104.1	1127.4	1160.1	1206.2	1248.0	1302.7	1362.6	1427.6
3 Meter	1127.4	1142.1	1165.9	1197.7	1231.1	1264.3	1307.3	1356.4
4 Meter	1160.1	1165.9	1180.1	1204.5	1230.3	1262.7	1304.7	1352.5
5 Meter	1206.2	1204.5	1204.5	1218.1	1241.2	1272.5	1312.9	1359.7
6 Meter	1248.0	1231.1	1230.3	1230.3	1241.2	1264.3	1307.3	1352.5
7 Meter	1302.7	1264.3	1241.2	1230.3	1230.3	1241.2	1264.3	1307.3
8 Meter	1362.6	1307.3	1264.3	1230.3	1230.3	1230.3	1241.2	1264.3
9 Meter	1427.6	1356.4	1307.3	1264.3	1230.3	1230.3	1230.3	1241.2

BASIC BODY WITH 15 M BODY EXT.	2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
2 Meter	1294.1	1317.0	1347.0	1382.1	1423.5	1470.4	1524.7	1586.1
3 Meter	1317.0	1332.1	1354.6	1385.8	1423.0	1465.8	1515.7	1568.1
4 Meter	1347.0	1354.6	1370.1	1392.6	1422.7	1464.9	1510.1	1557.0
5 Meter	1382.1	1385.8	1392.6	1406.1	1430.6	1465.8	1510.1	1557.0
6 Meter	1423.5	1423.0	1422.7	1430.6	1441.4	1465.8	1510.1	1557.0
7 Meter	1470.4	1465.8	1441.4	1430.6	1430.6	1441.4	1465.8	1510.1
8 Meter	1524.7	1510.1	1510.1	1510.1	1510.1	1510.1	1510.1	1510.1
9 Meter	1586.1	1568.1	1557.0	1557.0	1557.0	1557.0	1557.0	1557.0

TABLES OF DIAGONAL BACK TO BACK DISTANCES FOR PLAN ON STUB

(VALUES OF "B")



BASIC BODY	2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
2 Meter	1024.0	1057.0	1092.2	1144.0	1201.8	1267.3	1339.5	1399.7
3 Meter	1057.0	1078.2	1109.2	1149.0	1196.5	1250.9	1311.2	1376.7
4 Meter	1092.2	1109.2	1131.5	1167.4	1220.6	1284.4	1350.1	1399.7
5 Meter	1144.0	1149.0	1167.4	1185.0	1212.2	1250.9	1300.7	1350.1
6 Meter	1201.8	1196.5	1200.6	1212.2	1220.6	1238.2	1281.5	1300.7
7 Meter	1267.3	1250.9	1247.4	1250.9	1268.6	1292.8	1324.4	1351.2
8 Meter	1339.5	1311.2	1302.1	1300.7	1308.1	1324.4	1345.2	1377.0
9 Meter	1399.7	1376.7	1361.0	1353.5	1353.2	1361.2	1377.0	1400.2

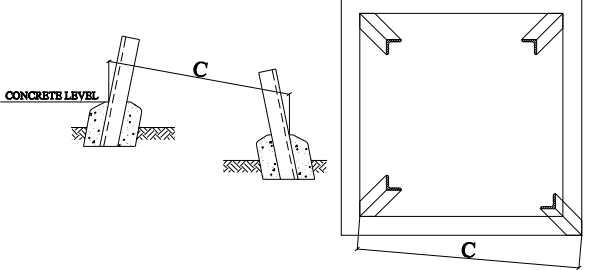
BASIC BODY WITH 5 M BODY EXT.	2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
2 Meter	1292.8	1324.4	1361.2	1405.8	1456.2	1512.9	1572.9	1637.8
3 Meter	1324.4	1346.5	1377.0	1414.7	1458.2	1508.2	1563.0	1622.4
4 Meter	1361.2	1377.0	1400.6	1436.3	1476.9	1519.5	1569.0	1614.0
5 Meter	1405.8	1414.7	1436.3	1454.0	1482.5	1520.2	1561.9	1601.9
6 Meter	1456.2	1458.2	1462.6	1464.5	1477.4	1507.4	1542.4	1581.4
7 Meter	1512.9	1508.2	1510.8	1520.5	1537.7	1561.4	1591.0	1627.6
8 Meter	1572.9	1563.0	1559.0	1563.6	1574.2	1591.0	1622.4	1651.4
9 Meter	1637.8	1622.4	1614.0	1619.0	1616.4	1627.6	1645.1	1668.6

BASIC BODY WITH 10 M BODY EXT.	2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
2 Meter	1561.4	1591.0	1627.6	1669.2	1716.2	1768.1	1824.2	1884.1
3 Meter	1591.0	1616.2	1645.1	1680.0	1721.6	1768.5	1819.2	1875.0
4 Meter	1627.6	1645.1	1668.6	1697.8	1734.2	1775.1	1820.9	1873.5
5 Meter	1669.2	1680.0	1697.8	1721.0	1754.5	1791.7	1831.2	1873.5
6 Meter	1716.2	1721.6	1734.2	1754.5	1776.4	1800.8	1831.2	1861.3
7 Meter	1768.1	1768.5	1775.1	1787.7	1806.0	1831.2	1857.4	1884.1
8 Meter	1824.2	1819.2	1820.9	1828.1	1841.0	1857.4	1883.9	1914.1
9 Meter	1884.1	1875.0	1873.5	1873.5	1884.1	1895.1	1914.1	1937.6

BASIC BODY WITH 15 M BODY EXT.	2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
2 Meter	1830.8	1850.7	1894.5	1934.0	1978.2	2027.6	2082.3	2132.2
3 Meter	1850.7	1869.7	1913.4	1947.6	1987.1	2031.4	2082.3	2132.2
4 Meter	1894.5	1913.4	1934.0	1967.8	2004.2	2044.5	2082.3	2132.2
5 Meter	1934.0	1947.6	1967.8	1991.0	2027.6	2067.9	2106.1	2144.4
6 Meter	1978.2	1987.1	2004.2	2027.6	2051.4	2074.4	2106.1	2132.2
7 Meter	2027.6	2031.4	2044.5	2051.4	2067.9	2082.3	2106.1	2132.2
8 Meter	2082.3	2082.3	2082.3	2082.3	2082.3	2082.3	2082.3	2082.3
9 Meter	2132.2	2132.2	2132.2	2132.2	2132.2	2132.2	2132.2	2132.2

TABLES OF BACK TO BACK DISTANCES AT CONCRETE LEVEL

(VALUES OF "C")



BASIC BODY	2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
2 Meter	750.6	776.2	814.1	863.5	921.4	989.1	1058.2	1135.0
3 Meter	776.2	801.6	839.5	882.0	930.1	988.6	1058.2	1135.0
4 Meter	814.1	839.5	876.6	921.4	970.1	1019.4	1069.1	1118.8
5 Meter	863.5	882.0	921.4	966.6	1015.4	1065.1	1114.8	1164.5
6 Meter	921.4	930.1	970.1	1015.4	1065.1	1114.8	1164.5	1214.2
7 Meter	989.1	988.6	1019.4	1065.1	1114.8	1164.5	1214.2	1263.9
8 Meter	1058.2	1058.2	1069.1	1114.8	1164.5	1214.2	1263.9	1313.6
9 Meter	1135.0	1135.0	1164.5	1214.2	1263.9	1313.6	1363.3	1413.0

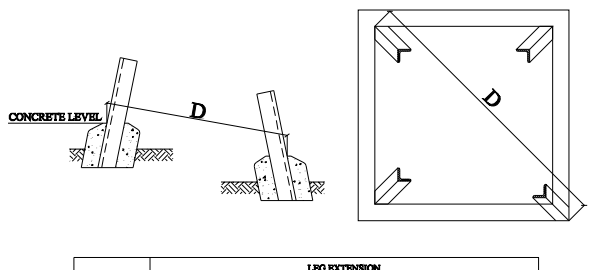
BASIC BODY WITH 5 M BODY EXT.	2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
2 Meter	940.6	964.9	995.1	1032.5	1076.0	1125.7	1176.4	1228.1
3 Meter	964.9	978.6	1002.7	1036.7	1076.0	1125.7	1176.4	1228.1
4 Meter	995.1	1002.7	1016.6	1040.5	1074.3	1114.1	1153.8	1193.5
5 Meter	1032.5	1036.7	1040.5	1054.5	1088.3	1128.0	1167.7	1207.4
6 Meter	1076.0	1076.0	1076.0	1088.3	1128.0	1167.7	1207.4	1247.1
7 Meter	1125.7	1125.7	1125.7	1141.1	1180.8	1220.5	1260.2	1300.0
8 Meter	1176.4	1176.4	1176.4	1193.5	1233.2	1272.9	1312.6	1352.3
9 Meter	1228.1	1228.1	1228.1	1247.1	1286.8	1326.5	1366.2	1405.9

BASIC BODY WITH 10 M BODY EXT.	2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
2 Meter	1130.6	1154.6	1186.1	1226.1	1273.0	1327.3	1383.3	1440.6
3 Meter	1154.6	1168.6	1191.1	1226.1	1273.0	1327.3	1383.3	1440.6
4 Meter	1186.1	1191.1	1206.6	1226.1	1250.6	1289.3	1338.0	1386.7
5 Meter	1226.1	1226.1	1226.1	1240.6	1274.4	1313.1	1351.8	1390.5
6 Meter	1273.0	1273.0	1273.0	1286.1	1329.9	1368.6	1407.3	1446.0
7 Meter	1327.3	1327.3	1327.3	1340.6	1384.4	1423.1	1461.8	1500.5
8 Meter	1383.3	1383.3	1383.3	1407.3	1446.0	1484.7	1523.4	1562.1
9 Meter	1440.6	1440.6	1440.6	1464.6	1503.3	1542.0	1580.7	1619.4

BASIC BODY WITH 15 M BODY EXT.	2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
2 Meter	1320.6	1344.2	1373.7	1410.0	1454.0	1504.7	1559.5	1618.0
3 Meter	1344.2	1358.6	1381.1	1411.2	1448.2	1491.2	1540.8	1594.8
4 Meter	1373.7	1381.1	1396.6	1410.0	1448.2	1485.2	1527.8	1576.0
5 Meter	1410.0	1411.2	1426.1	1448.2	1485.2	1527.8	1569.4	1614.4
6 Meter	1454.0	1448.2	1448.2	1454.0	1485.2	1527.8	1569.4	1614.4
7 Meter	1504.7	1491.2	1485.2	1485.2	1491.2	1504.7	1527.8	1569.4
8 Meter	1559.5	1540.8	1527.8	1527.8	1527.8	1527.8	1527.8	1527.8
9 Meter	1618.0	1594.8	1576.0	1562.1	1548.0	1533.9	1519.8	1505.7

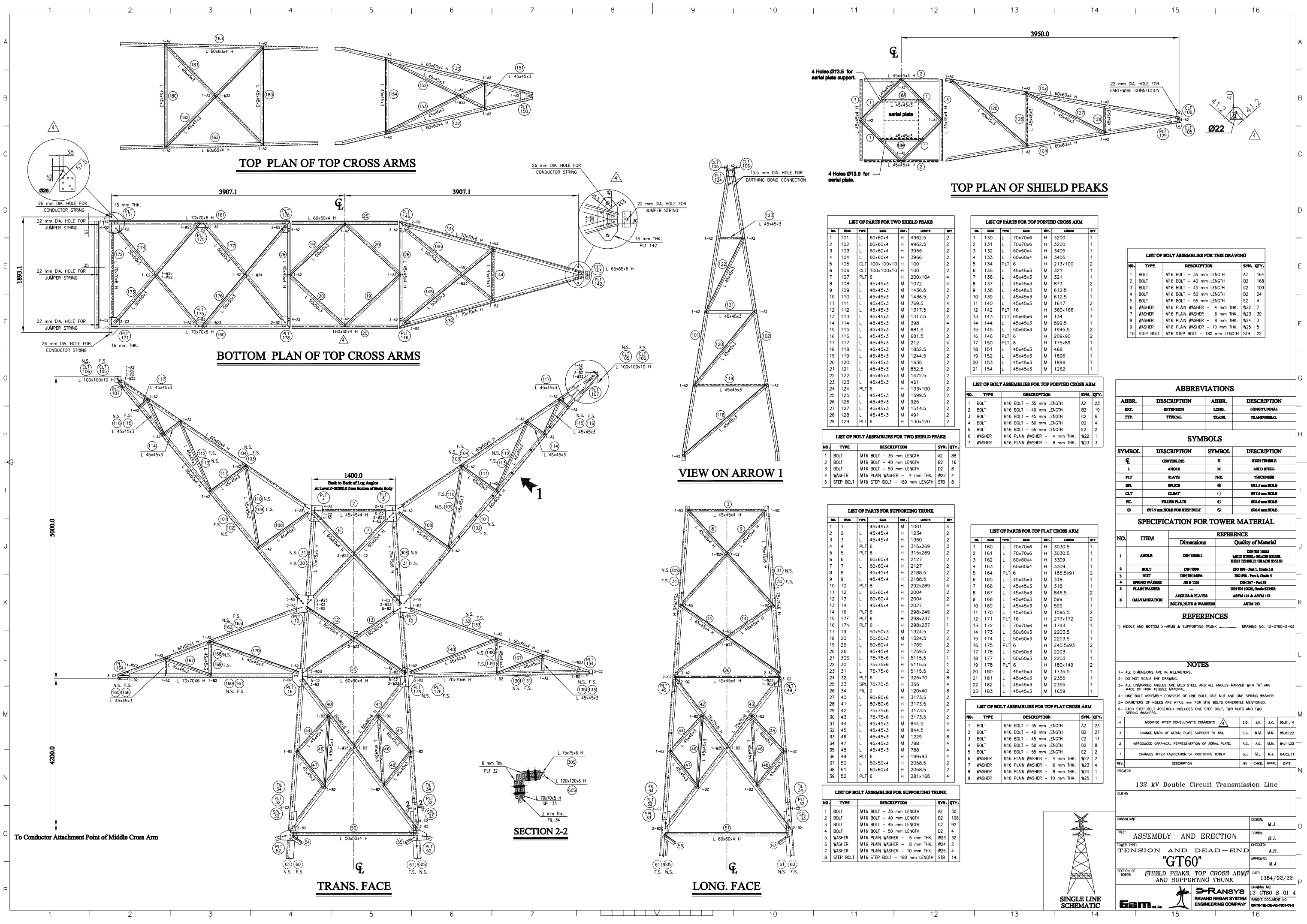
TABLES OF DIAGONAL BACK TO BACK DISTANCES AT CONCRETE LEVEL

(VALUES OF "D")



BASIC BODY		LEBO EXTENSION							
		2 Meter	3 Meter	4 Meter	5 Meter	6 Meter	7 Meter	8 Meter	9 Meter
LEBO EXTENSION	2 Meter	1061.4	1092.0	1129.8	1180.8	1234.7	1291.2	1351.5	14322.5
	3 Meter	1092.0	1115.9	1146.3	1189.2	1238.6	1294.4	1356.8	14340.0
	4 Meter	1129.8	1151.9	1169.7	1211.1	1259.5	1316.5	1380.0	14540.0
	5 Meter	1180.8	1189.2	1209.7	1227.6	1253.3	1291.8	1337.6	1388.0
	6 Meter	1234.7	1237.8	1258.2	1280.3	1304.1	1331.1	1361.0	1393.9
	7 Meter	1291.2	1286.4	1295.0	1291.9	1307.1	1330.1	1356.0	1382.7
	8 Meter	1351.5	1345.6	1357.6	1337.9	1345.1	1360.7	1383.9	1413.0
	9 Meter	14322.5	1410.4	1390.0	1388.9	1389.7	1392.7	1414.3	1416.3





TOP PLAN OF TOP CROSS ARMS

BOTTOM PLAN OF TOP CROSS ARMS

TOP PLAN OF SHIELD PEAKS

VIEW ON ARROW 1

SECTION 2-2

TRANS. FACE

LONG. FACE

LIST OF PARTS FOR TWO SHIELD PEAKS

NO.	MARK	TYPE	SIZE	MAT.	LENGTH	QTY.
1	101	L	60x60x4	H	4962.5	2
2	102	L	60x60x4	H	4962.5	2
3	103	L	60x60x4	H	3966	2
4	104	L	60x60x4	H	3966	2
5	105	CLT	100x100x10	H	100	2
6	106	CLT	100x100x10	H	100	2
7	107	PLT	6	H	200x104	4
8	108	L	45x45x3	M	1072	4
9	109	L	45x45x3	M	1436.5	2
10	110	L	45x45x3	M	1436.5	2
11	111	L	45x45x3	M	769.5	4
12	112	L	45x45x3	M	1317.5	2
13	113	L	45x45x3	M	1317.5	2
14	114	L	45x45x3	M	398	4
15	115	L	45x45x3	M	681.5	2
16	116	L	45x45x3	M	681.5	2
17	117	L	45x45x3	M	212	4
18	118	L	45x45x3	M	1852.5	2
19	119	L	45x45x3	M	1244.5	2
20	120	L	45x45x3	M	1635	2
21	121	L	45x45x3	M	852.5	2
22	122	L	45x45x3	M	1422.5	2
23	123	L	45x45x3	M	461	2
24	124	PLT	6	H	133x100	2
25	125	L	45x45x3	M	1699.5	2
26	126	L	45x45x3	M	925	2
27	127	L	45x45x3	M	1514.5	2
28	128	L	45x45x3	M	491	2
29	129	PLT	6	H	130x120	2

LIST OF PARTS FOR TOP POINTED CROSS ARM

NO.	MARK	TYPE	SIZE	MAT.	LENGTH	QTY.
1	130	L	70x70x6	H	3200	1
2	131	L	70x70x6	H	3200	1
3	132	L	60x60x4	H	3405	1
4	133	L	60x60x4	H	3405	1
5	134	PLT	6	H	213x100	2
6	135	L	45x45x3	M	321	1
7	136	L	45x45x3	M	321	1
8	137	L	45x45x3	M	873	2
9	138	L	45x45x3	M	612.5	1
10	139	L	45x45x3	M	612.5	1
11	140	L	45x45x3	M	1617	2
12	142	PLT	16	H	360x166	1
13	143	CLT	65x65x6	H	134	1
14	144	L	45x45x3	M	899.5	1
15	145	L	50x50x3	M	1945.5	2
16	146	PLT	6	H	209x90	2
17	150	PLT	6	H	175x89	1
18	151	L	45x45x3	M	468	1
19	152	L	45x45x3	M	1896	1
20	153	L	45x45x3	M	1896	1
21	154	L	45x45x3	M	1262	1

LIST OF BOLT ASSEMBLIES FOR THIS DRAWING

NO.	TYPE	DESCRIPTION	SYM.	QTY.
1	BOLT	M16 BOLT - 35 mm LENGTH	A2	164
2	BOLT	M16 BOLT - 40 mm LENGTH	B2	168
3	BOLT	M16 BOLT - 45 mm LENGTH	C2	109
4	BOLT	M16 BOLT - 50 mm LENGTH	D2	24
5	BOLT	M16 BOLT - 55 mm LENGTH	E2	4
6	WASHER	M16 PLAIN WASHER - 4 mm THK.	W22	7
7	WASHER	M16 PLAIN WASHER - 6 mm THK.	W23	39
8	WASHER	M16 PLAIN WASHER - 8 mm THK.	W24	3
9	WASHER	M16 PLAIN WASHER - 10 mm THK.	W25	5
10	STEP BOLT	M16 STEP BOLT - 180 mm LENGTH	STB	22

LIST OF BOLT ASSEMBLIES FOR TWO SHIELD PEAKS

NO.	TYPE	DESCRIPTION	SYM.	QTY.
1	BOLT	M16 BOLT - 35 mm LENGTH	A2	88
2	BOLT	M16 BOLT - 40 mm LENGTH	B2	16
3	BOLT	M16 BOLT - 50 mm LENGTH	D2	8
4	WASHER	M16 PLAIN WASHER - 4 mm THK.	W22	4
5	STEP BOLT	M16 STEP BOLT - 180 mm LENGTH	STB	8

LIST OF BOLT ASSEMBLIES FOR TOP POINTED CROSS ARM

NO.	TYPE	DESCRIPTION	SYM.	QTY.
1	BOLT	M16 BOLT - 35 mm LENGTH	A2	23
2	BOLT	M16 BOLT - 40 mm LENGTH	B2	19
3	BOLT	M16 BOLT - 45 mm LENGTH	C2	6
4	BOLT	M16 BOLT - 50 mm LENGTH	D2	4
5	BOLT	M16 BOLT - 55 mm LENGTH	E2	2
6	WASHER	M16 PLAIN WASHER - 4 mm THK.	W22	1
7	WASHER	M16 PLAIN WASHER - 6 mm THK.	W23	3

ABBREVIATIONS

ABBR.	DESCRIPTION	ABBR.	DESCRIPTION
EXT.	EXTENSION	LONG.	LONGITUDINAL
TYP.	TYPICAL	TRANS.	TRANSVERSE

SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
⊕	CENTRELINE	H	HIGH TENSILE
∠	ANGLE	M	MILD STEEL
PLT	PLATE	THK.	THICKNESS
SPC	SPRINGS	Ø	Ø13.5 mm HOLES
CLT	CLIMAT	○	Ø17.5 mm HOLES
PLT	PLATE PLATE	○	Ø22.0 mm HOLES
⊙	Ø17.5 mm HOLE FOR STEP BOLT	⊙	Ø26.0 mm HOLES

SPECIFICATION FOR TOWER MATERIAL

NO.	ITEM	REFERENCE	
		Dimensions	Quality of Material
1	ANGLE	IS 1006-1	IS 1006-1 MILD STEEL, GRADE B330 HIGH TENSILE, GRADE B330
2	BOLT	IS 1900	IS 1900 - Part 1, Grade 5.8
3	NUT	IS 1900	IS 1900 - Part 2, Grade 5
4	SPRING WASHER	IS 1381	IS 1381 - Part 26
5	PLAIN WASHER	---	IS 1381, Grade B330
6	GALVANIZATION	ANCHOR & PLATE	ASTM 123 & ASTM 153
		BOLTS, NUTS & WASHERS	ASTM 153

REFERENCES

1) MIDDLE AND BOTTOM X-ARMS & SUPPORTING TRUNK ..... DRAWING NO. 12-GT60-S-02

NOTES

- 1- ALL DIMENSIONS ARE IN MILLIMETERS.
- 2- DO NOT SCALE THE DRAWING.
- 3- ALL UNMARKED ANGLES ARE MILD STEEL AND ALL ANGLES MARKED WITH "H" ARE MADE OF HIGH TENSILE MATERIAL.
- 4- ONE BOLT ASSEMBLY CONSISTS OF ONE BOLT, ONE NUT AND ONE SPRING WASHER.
- 5- DIAMETERS OF HOLES ARE Ø17.5 mm FOR M16 BOLTS OTHERWISE MENTIONED.
- 6- EACH STEP BOLT ASSEMBLY INCLUDES ONE STEP BOLT, TWO NUTS AND TWO SPRING WASHERS.

132 kV Double Circuit Transmission Line

CLIENT: \_\_\_\_\_

CONSULTANT: \_\_\_\_\_

DESIGN: M.J.

TITLE: ASSEMBLY AND ERECTION

DRAWING: S.J.

TOWER TYPE: TENSION AND DEAD-END

CHECKED: A.H.

APPROVED: M.J.

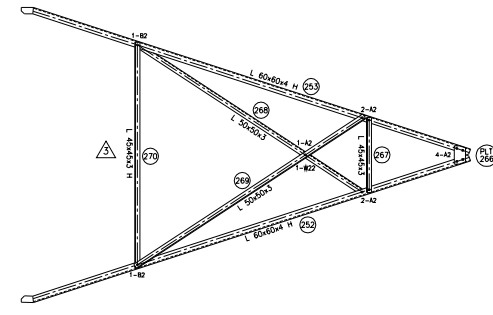
SECTION OF TOWER: SHIELD PEAKS, TOP CROSS ARMS AND SUPPORTING TRUNK

DATE: 1384/02/22

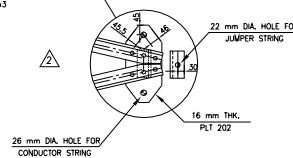
DRAWING NO: 12-GT60-S-01-4

REVISION DOCUMENT NO. 0478-TE-04-01-01-01-01

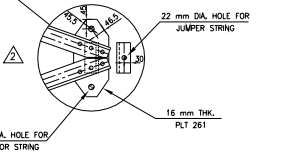
GAM RAVAND NEGAR SYSTEM ENGINEERING COMPANY



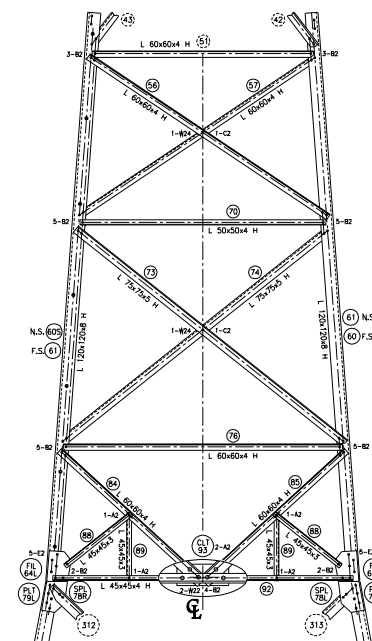
TOP PLAN OF BOTTOM CROSS ARMS



**LIST OF PARTS FOR BOTTOM POINTED CROSS ARM**



**LIST OF BOLT ASSEMBLIES FOR BOTTOM POINTED CROSS A**

















**LONG. FACE**

#### LIST OF PARTS FOR SUPPORTING TRUNK

No.	SL	TYPE	SL	SP.	TIME	C
1	54	L	60x60A	W	2618.5	2
2	55	L	60x60A	W	2618.5	2
3	56	L	60x60A	W	2618.5	2
4	57	L	60x60A	W	2686.5	2
5	58	L	45x45A3	W	801.5	2
6	60	L	120x120A	W	3500.5	1
7	60	L	120x120A	W	3500.5	1
8	61	L	120x120A8	W	3500.5	2
9	62	PLT	8	W	3534.156	1
10	62A	PLT	8	W	3534.156	1
11	63N	PLT	8	W	2824.156	1
12	63F	PLT	8	W	2824.156	1
13	64	F	2	W	2606.82	1
14	64L	F	2	W	2606.82	1
15	65	L	45x54A	W	730.5	2
16	65	L	45x54A	W	730.5	2
17	67	L	50x50A3	W	1224.5	2
18	68	L	50x50A3	W	1332.5	2
19	69	L	70x70A	W	3300.5	2
20	70	L	50x50A	W	2300	2
21	71	L	80x80A	W	3200.5	2
22	72	L	80x80A	W	3200.5	2
23	73	L	70x70A	W	3300.5	2
24	74	L	75x75A	W	3200.5	2
25	75	L	60x60A	W	2598.5	2
26	75	L	60x60A	W	2598.5	2
27	77R	PLT	10	W	5599.210	2
28	77L	PLT	10	W	5599.210	2
29	78L	SPL	100x100A	W	567.5	2
30	78L	SPL	100x100A	W	567.5	2
31	79L	PLT	8	W	5676.220	2
32	79R	PLT	8	W	5676.220	2
33	80A	PLT	12	W	5676.119	2
34	80A	PLT	6	W	1634.128	2
35	81	PLT	12	W	3386.107	2
36	82	PLT	12	W	3386.107	2
37	81F	PLT	12	W	3414.107	1
38	82	L	60x60A5	W	716.2	2
39	83	L	60x60A	W	1797.5	2
40	84	L	60x60A	W	1797.5	2
41	85	L	60x60A	W	1797.5	2
42	86	L	45x45A3	W	612	2
43	87	L	45x45A3	W	784.5	2
44	88	L	45x45A3	W	633	2
45	89	L	45x45A3	W	798.5	2
46	90	L	45x45A3	W	798.5	2
47	91	PLT	6	W	1934.104	2
48	92	L	45x54A	W	279.5	2
49	93	L	50x100A	W	279.5	2
50	94	L	50x50A	W	2005.5	2
51	95	L	50x50A	W	2005.5	2
52	96	L	50x50A	W	2005.5	2
53	97	L	45x54A	W	1456	2
54	98	L	45x45A3	W	727	2
55	99	L	45x45A3	W	788.5	2
56	100	L	45x45A3	W	788.5	2

LIST OF BOLT ASSEMBLIES FOR THIS DRAWING				
NO.	TYPE	DESCRIPTION	SYN.	QTY.
1	BOLT	M16 BOLT - 35 mm LENGTH	A2	105
2	BOLT	M16 BOLT - 40 mm LENGTH	B2	255
3	BOLT	M16 BOLT - 45 mm LENGTH	C2	93
4	BOLT	M16 BOLT - 50 mm LENGTH	D2	24
5	BOLT	M16 BOLT - 55 mm LENGTH	E2	42
6	BOLT	M16 BOLT - 65 mm LENGTH	G2	8
7	BOLT	M16 BOLT - 70 mm LENGTH	H2	12
8	WASHER	M16 PLAIN WASHER - 4 mm THK.	W22	11
9	WASHER	M16 PLAIN WASHER - 6 mm THK.	W23	11
10	WASHER	M16 PLAIN WASHER - 8 mm THK.	W24	29
11	WASHER	M16 PLAIN WASHER - 10 mm THK.	W25	11
12	STEP BOLT	M16 STEP BOLT - 180 mm LENGTH	S12	12

ABBREVIATIONS			
ABBR.	DESCRIPTION	ABBR.	DESCRIPTION
EXT.	EXTENSION	LONG.	LONGITUDINAL
TYP.	TYPICAL	TRANS.	TRANSVERSAL

SYMBOLS			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	CENTRALLINE		HIGH TENSILE
	ANGLE		MILD STEEL
	PLATE		TRUCK/SS
	SPRUE		Ø13.5 mm HOLE
	CLAY		Ø17.5 mm HOLE
	FILLER PLATE		Ø20.9 mm HOLE
	Ø17.5 mm HOLE FOR STEP BOLT		Ø26.6 mm HOLE

SPECIFICATION FOR TOWER MATERIAL			
NO.	ITEM	REFERENCE	
		Dimensions	Quality of Material
1	ANGLE	DIN 10356-1	DIN EN 10025 MILD STEEL: GRADES S235JR HOT ROLLED: GRADES S235JR
2	BOLT	DIN 7900	ISO 898 - Part 1, Grade 5.8
3	NUT	DIN EN 14944	ISO 898 - Part 1, Grade 5.8
4	SPEED WASHER	JB 8 1231	ISO 898 - Part 3
5	PLAIN WASHER		DIN EN 10375, GRADE S235JR
6	GALVANIZATION	ANGLES & PLATES	ASTM 133 & ASTM 153
		BOLTS, NUTS & WASHERS	ASTM 153



## REFERENCES

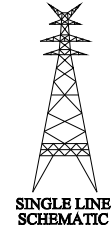
1) SHIELD PEAKS, TOP X-ARMS AND SUPPORTING TRUNK .. DRAWING NO. 12-GT60-  
2) BASIC BODY (LOWER PART) ..... DRAWING NO. 12-GT60-

## NOTES

- 1- ALL DIMENSIONS ARE IN MILLIMETERS.
- 2- DO NOT SCALE THE DRAWING.
- 3- ALL UNLAMPARED KANGES ARE MILD STEEL AND ALL ANGLES MARKED WITH "H" ARE MADE OF HIGH TENSILE MATERIAL.
- 4- ONE BOLT ASSEMBLY CONSISTS OF ONE BOLT, ONE NUT AND ONE SPRING WASHER.
- 5- DIAMETERS OF HOLES ARE  $\phi 17.5$  mm FOR M16 BOLTS OTHERWISE MENTIONED.
- 6- EACH STEP BOLT ASSEMBLY INCLUDES ONE STEP BOLT, TWO NUTS AND TWO SPRING WASHERS.

3	MODIFIED AFTER CONSULTANT'S COMMENTS	3	F.M.H.	E.B.	J.K.	J.K.
2	MODIFIED AFTER CONSULTANT'S COMMENTS	2	E.B.	J.K.	J.K.	J.K.
1) CHANGES AFTER FABRICATION OF PROTOTYPE TOWER 2) PLATES "OGA" AND "OGA" ADDED BEFORE PROTOTYPE TESTING			S.S.H.	M.J.	M.J.	E.B.
REV.	DESCRIPTION	BY	CHGD.	APPR.		
PROJECT:						
132 kV Double Circuit Transmission Line						
CLIENT:						

CONSULTANT:		DESIGN: <i>M.J.</i>
TITLE: ASSEMBLY AND ERECTION		DRAWING: <i>S.J.</i>
TOWER TYPE: TENSION AND DEAD-END		A.H.
"GT60"		CHECKED:
SECTION OF TOWER: MIDDLE & BOTTOM CROSS ARMS AND SUPPORTING TRUNK		APPROVED: <i>M.J.</i>
		DATE: 13/04/2002
 		DRAWING NO. 12-CIT60-S RANSYS DOCUMENT DATE: 12-04-2002



### SINGLE LINE SCHEMATIC

