

RELEASED FOR

PRELIMINARY

INFORMATION

APPROVAL

CONSTRUCTION

DOC./DRG. No.

L E 1 5 0 8 8 3 - C - W S - R W - D C - 1 5 2 6

DESIGN OF GLBR - 350KL CAPACITY  
KOWTHALAGUTTA AT KOWTHALA MANDAL

APPD			
CHKD			
DSGN			
NAME	SIGN	DATE	

JOB Ref. No. : LE150883

TITLE :

SUPPLIER /  
CONTRACTOR :

L&T Construction, Water, Smart World and Communication

PROJECT :

PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN  
ADILABAD DISTRICT

CLIENT:

RURAL WATER SUPPLY AND SANITATION DEPARTMENT (WATER

WAPCOS LIMITED

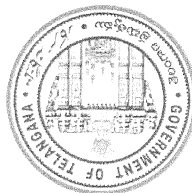
CONSULTANT :



L&T Construction - Water, Smart World & Communication  
CHENNAI

TELANGANA WATER GRID

GOVERNMENT OF TELANGANA  
Rural Water Supply & Sanitation Department  
TELANGANA DRINKING WATER SUPPLY PROJECT



# **DESIGN CALCULATION**

## PROJECT TITLE

PROVIDING DRINKING WATER TO HABITATIONS  
IN KOMARAMBHEEM ASIFABAD SEGMENT  
IN ADILABAD DISTRICT (30 MLD WTP)

## UNIT

350KL CAPACITY GLBR  
AT KOWTHALA GUTTA VILLAGE

## PRINCIPAL CLIENT

RURAL WATER SUPPLY  
AND  
SANITATION DEPARTMENT,  
TELANGANA

## CONTRACTOR

L&T CONSTRUCTION  
WATER & EFFLUENT TREATMENT SBG

## DESIGN OF SUMP

CAPACITY = 3.5 LAC

Width = 11.1 m

Length = 11.1 m

Water depth = 3.20 m

Free board = 0.450 m

Plaster thickness = 0.012 m

Column = 300 dia

Concrete grade = M 30

Clear cover to main steel = 45.0 mm

SBC: 15 T/M<sup>2</sup>

GWT: GROUND WATER TABLE IS NOT OBSERVED

## CAPACITY CHECK:

Capacity of compartment

Width = 11.10 m

Length = 11.10 m

Clear Width

= 11.10 - 2 x plaster thickness

= 11.10 - 2 x 0.012

= 11.076 m

Dead storage = 0.15

Free board = 0.3

Water depth = 2.9 m

Volume = B x L x H

= 11.076 x 11.076 x 2.9 = 355.77 m<sup>3</sup>

Volume of single column

=  $\pi \times d \times d / 4 \times H$

=  $\pi \times 0.30 \times 0.30 / 4 \times 2.9$

= 0.205

Total nos of column = 4 nos

Less for pedestal = 4 x 1 x 1 x 0.1 = 0.4

Less volume of column = 0.205 m<sup>3</sup> x 4 nos = 0.82 m<sup>3</sup>

Total deduction = 0.4 + 0.82 = 1.22

Net volume = 355.77 - 1.22 = 354.55 m<sup>3</sup> > 350 m<sup>3</sup> i.e. 3.5 lacs hence O.K.

## Design of Sump

Design Approach

Element

- External wall
- Flat slab
- Column

EXTERNAL WALL

### External wall

Wall is designed as top hinge, bottom fixed condition Subject to triangular loading

- Water pressure from inside
- Soil pressure from outside

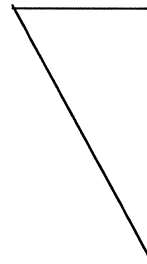
### Loading

#### 1. Water load :

- Water depth = 3.20 m
- Free board = 0.45 m

Total height = 3.650 m

Water pressure is as below



#### 2. Soil load :

- Depth below ground level = 0.4 m
- Density of soil = 1.80 t/m<sup>3</sup>
- Angle of repose = 30 degree

Pressure at bottom =  $\gamma * H * (1 - \sin \theta) / (1 + \sin \theta)$   
=  $18 * 0.4 * (1 - \sin 30) / (1 + \sin 30)$   
= 2.4 kN/m

Analysis is done in STADD, Input data & Output result are given

Provide, 200 to 350 mm tapered thick wall  
Analysis of wall is done using software STAAD.Pro

STAAD MODEL



```

STAD SPACE
START JOB INFORMATION
JOB NAME 4 lac sump
JOB NO P16.02
JOB PART SECTION EXTERNAL WALL
ENGINEER DATE 04-03-16
JOB CLIENT Adilabad RWSS
JOB REV R0
END JOB INFORMATION
INPUT WIDTH 79
UNIT METER KN
JOINT COORDINATES
1 0 0 0; 2 0 0 4 0; 3 0 0 8 0; 4 0 1 2 0; 5 0 1 6 0; 6 0 2 0; 7 0 2 4 0;
8 0 2 8 0; 9 0 3 25 0; 10 0 -0.4 0;
MEMBER INCIDENCES
4 9 8; 5 8 7; 6 7 6; 7 6 5; 8 5 4; 9 4 3; 10 3 2; 11 2 1; 12 1 10;
DEFINE MATERIAL START
ISOTROPIC CONCRETE
E 2.73e+007
POISSON 0.17
DENSITY 25
ALPHA 1e-005
DAMP 0.05
END DEFINE MATERIAL
MEMBER PROPERTY INDIAN
4 PRIS YD 0.2 ZD 1
5 PRIS YD 0.2 ZD 1
6 PRIS YD 0.23 ZD 1
7 PRIS YD 0.25 ZD 1
8 PRIS YD 0.27 ZD 1
9 PRIS YD 0.29 ZD 1
10 PRIS YD 0.31 ZD 1
11 PRIS YD 0.33 ZD 1
12 PRIS YD 0.35 ZD 1
SUPPORTS
10 FIXED
9 PINNED
CONSTANTS
MATERIAL CONCRETE ALL
LOAD 1 WATER
MEMBER LOAD
4 TRAP GX 0 4.5
5 TRAP GX 4.5 8.5
6 TRAP GX 8.5 12.5
7 TRAP GX 12.5 16.5
8 TRAP GX 16.5 20.5
9 TRAP GX 20.5 24.5
10 TRAP GX 24.5 28.5
11 TRAP GX 28.5 32.5
12 TRAP GX 32.5 36.5
SELFWEIGHT Y -1
LOAD 2 SOIL
MEMBER LOAD
12 TRAP GX -0 -2.4
PERFORM ANALYSIS
FINISH

```

**BEAM END FORCE (WATER LOAD)**

Beam	L/C	Node	Axial Force kN	Shear-Y kN	Shear-Z kN	Torsion kNm	Moment-Y kNm	Moment-Z kNm
	4	1	-9.577	-11.023	0	0	0	0
		8	7.327	10.011	0	0	0	-5
	5	1	-7.327	-10.011	0	0	0	5
		7	5.327	7.411	0	0	0	-8
	6	1	-5.327	-7.411	0	0	0	8
		6	3.027	3.211	0	0	0	-11
	7	1	-3.027	-3.211	0	0	0	11
		5	0.527	-2.589	0	0	0	-11
	8	1	-0.527	2.589	0	0	0	11
		4	-2.173	-9.989	0	0	0	-8
	9	1	2.173	9.989	0	0	0	8
		3	-5.073	-18.989	0	0	0	-2
	10	1	5.073	18.989	0	0	0	2
		2	-8.173	-29.589	0	0	0	7
	11	1	8.173	29.589	0	0	0	-7
		1	-11.473	-41.789	0	0	0	21
	12	1	11.473	41.789	0	0	0	-21
		10	-14.973	-55.589	0	0	0	41

Maximum moment at bottom = 41 kNm Say 42 kNm

Calculation for Coefficient of Uncrack condition

RCC wall

notation

Unit

DATA

Parameter	Value	Unit
Bending moment	42	kN-m
Reinforcement	500	N/mm <sup>2</sup>
Concrete grade	30	N/mm <sup>2</sup>
Area of steel provided	1398	mm <sup>2</sup>
Depth provided	350	mm
Width	1000	mm
Clear Cover	50	mm
maximum bar dia	25	mm
Permissible stress in Steel	130	N/mm <sup>2</sup>
Calculation		
Modular ratio	9	
Per. str. in direct Tension	15	kg/cm <sup>2</sup>
Per. str. tension due to bending	20	kg/cm <sup>2</sup>
steel	0.0040	
Effective depth	287.5	mm
Constants		
ka	0.82	
kb	1.05	
kc	2.06	
Depth of neutral axis - N	0.5100	
nd	178.4836	
Check for Mu/bd <sup>2</sup>		
kd	0.0031	
ke	0.0834	
kt	0.0865	
Unc	3.5316	
Depth required	344.9	mm
Calculation of Steel		
De	287.5	mm
Area of steel required	1249	mm <sup>2</sup>
Check	OK	

Steel provided  
dia      spc

10      200  
16      200

equation

For Fck 30      =Def/Dp

For Fck 30      =1+2\*PT\*ka\*(md-1)

For Fck 30      =2+2\*PT\*(md-1)

For Fck 30      =kb/kc

For Fck 30      =n\*Dp

For Fck 30      =Dp-Cv-dbar/2

For Fck 30      =Bm\*1000000/(0.9\*Fyub\*De)

**BEAM END FORCE (SOIL LOAD)**

Beam	L/C	Node	Axial Force kN	Shear-Y kN	Shear-Z kN	Torsion kNm	Moment-Y kNm	Moment-Z kNm
4	2	9	0	0.001	0	0	0	0
		8	0	-0.001	0	0	0	0
5	2	8	0	0.001	0	0	0	0
		7	0	-0.001	0	0	0	0
6	2	7	0	0.001	0	0	0	0
		6	0	-0.001	0	0	0	0
7	2	6	0	0.001	0	0	0	0
		5	0	-0.001	0	0	0	0
8	2	5	0	0.001	0	0	0	0
		4	0	-0.001	0	0	0	0
9	2	4	0	0.001	0	0	0	0
		3	0	-0.001	0	0	0	0
10	2	3	0	0.001	0	0	0	0
		2	0	-0.001	0	0	0	0
11	2	2	0	0.001	0	0	0	0
		1	0	-0.001	0	0	0	0
12	2	1	0	0.001	0	0	0	0
		10	0	0.479	0	0	0	0

Maximum moment at bottom = 0.04 kNm say 2 kNm

R/F at Different Place  
1 > Water load

GSR - TOTAL HEIGHT 3.4 m

Water load

concrete grade	Fck	30	N/mm <sup>2</sup>	fyuc	130	N/mm <sup>2</sup>
Steel grade	Fy	500	N/mm <sup>2</sup>	fyuc	130	N/mm <sup>2</sup>
Height of wall	H	3.20	m	fckb	10.0	N/mm <sup>2</sup>
Free board	Fb	0.45	m	fckt	1.5	N/mm <sup>2</sup>
cover	Cv	45	mm	r ratio	9.333	
Maximum Diameter of bar	Db	12	mm	K	0.418	
Minimum % steel	pt	0.35	%	j	0.861	

Sr.n	Height from top (m)	Moment (kN-m)	Depth provide(m)	effective depth(mm)	Design Steel in mm <sup>2</sup>	Wate r face soil	Wate r face	Minimum steel / Dist steel in mm <sup>2</sup>	Required steel in mm <sup>2</sup>
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1	0.45	-5.00	200	149	300	350	350	350	350
2	0.85	-8.00	200	149	480	350	350	350	480
3	1.25	-11.00	230	179	549	403	403	403	549
4	1.65	-11.00	250	199	494	438	438	438	494
5	2.05	-8.00	270	219	326	473	473	473	473
6	2.45	-2.00	290	239	75	508	508	508	508
7	2.85	7.00	310	259	242	543	543	543	543
8	3.25	21.00	330	279	673	578	578	578	578
9	3.65	-21.00	350	299	1226	613	613	1226	613

REINFORCMENT BAR PROVIDED  
WATER FACE due to WATER LOAD

1	Dist in m	Ast required	Reinforcement	Provide Ast
1	0.45	350	200	393 TRUE
2	0.85	350	200	393 TRUE
3	1.25	403	200 + 16 400	895 TRUE
4	1.25	403	200 + 16 400	895 TRUE

Dist	Thickness	Ast	Ast	Reinforcement	Ast	Provided
1	0.45	200	350	10	200	OK
2	0.85	200	350	10	200	OK
3	1.25	230	403	10	160	OK
4	1.65	250	438	10	160	OK
5	2.05	270	473	10	160	OK
6	2.45	290	508	10	140	OK
7	2.85	310	543	10	140	OK
8	3.25	330	578	10	125	OK
9	3.65	350	613	10	125	OK
REINFORCEMENT BAR PROVIDED						
1	0.45	350	10	200	393	TRUE
2	0.85	480	10	200	644	TRUE
3	1.25	549	10	200	644	TRUE
4	1.65	494	10	200	644	TRUE
5	2.05	473	10	200	644	TRUE
6	2.45	508	10	200	644	TRUE
7	2.85	543	10	200	644	TRUE
8	3.25	578	10	200	644	TRUE
9	3.65	613	10	200	644	TRUE
SOIL FACE due to WATER LOAD						
5	1.65	438	10	200	895	TRUE
6	2.05	473	10	200	895	TRUE
7	2.45	508	10	200	895	TRUE
8	2.85	543	10	200	1398	TRUE
9	3.25	673	10	200	1398	TRUE
9	3.65	1226	10	200	1398	TRUE

WALL FOOTING

WALL FOOTING DESIGN

PROJECT : P16\_02\_Adilabad W.S.S

JOB : P16\_02

UNIT : Rectangular Sump

WALL TYPE 1

W1

BASIC DATA

Density of water	denwt	10	kN/m <sup>3</sup>	fyuc	130	N/mm <sup>2</sup>
Density of soil	denso	18	kN/m <sup>3</sup>	fyuc	130	N/mm <sup>2</sup>
Density of concrete	decon	25	kN/m <sup>3</sup>	fyuc	10.	N/mm <sup>2</sup>
Angle of Repose	Phi	30	degree	fckt	1.5	N/mm <sup>2</sup>
Safe bearing capacity of soil	Sbc	150.0	kN/m <sup>2</sup>	modula	9.3	
Concrete grade	Fck	30	N/mm <sup>2</sup>	r ratio	3	
Steel grade	Fy	500	N/mm <sup>2</sup>		0.8	
Depth below G1	Dbg	0.40	m		6	
Water depth	wtd	3.20	m			
free board	fb	0.45	m			
Wall above Ground		3.25	m			
Clear cover	Cv	50	mm			
Maximum size of bar dia	Db	12	mm			
Water depth with free board	Wd	3.65	m			
minimum % steel	pt	0.35	%			
Moment	Mtw	42.00	kN-m			
Due to Water	Mts	2.00	kN-m			
Due to soil if any	Slabwt	25.00	kN-m	( From Analysis Result)		

Wt from top dome/slab/column/wall						
Wall geometry ( Figure 1 )						
Straight portion	lb	0.000	m			
Tapered portion	lc	3.650	m			
	tb	0.200	m			
	td	0.350	m			
Footing geometry						
Toe projection	ht	0.450	m			
Heel straight projection	hh1	1.500	m			
Heel tapered projection	hh2	0.000	m			
Heel portion for soil stability	hh3	0.500	m			
Thickness at toe (free end)	tta	0.300	m			
Thickness at toe (wall face)	ttb	0.300	m			
Thickness at heel (wall end)	tha	0.300	m			
Thickness at heel (free face)	thb	0.300	m			
Total Height of Wall	Thw	3.650	m			
Total length of wall footing	wf	2.300	m			

CASE 1 : TANK FULL CONDITION WITH NO SOIL OUTSIDE

Total load & Moment calculation  
Taking moment @ toe  
Component

Wt Lever Moment



Pressure difference / m	43.07			
Pressure at outer Wall face - A	preow	83.23		
Pressure at inner Wall face B	preiw	68.16		
Pressure at point C	prei1	3.55		
<b>Design of Toe - At Point A</b>				
Moment at face of outer wall	Mireco	8.43	kN-m	
Due to rectangle diagram	Mitrio	1.31	kN-m	
Total moment due to upward pressure	Toem	9.74	kN-m	
Net moment at A from Toe side		9.74	kN-m	
Thickness at toe		300	mm	
Effective depth	Defoe	244	mm	
Ast required =		357	mm2	
Check for minimum steel		525	mm2	
top		525	mm2	
bottom		350	mm2	
Design Steel				
Main steel - Top		525	mm2	
Main steel - bottom		357	mm2	
Distribution steel - top		525	mm2	
Distribution steel - bottom		350	mm2	
<b>Design of heel : At point B &amp; C</b>				
Due to rectangle diagram (upward)	Mireci	4.0	kN-m	
Due to water (down ward)	Mitrii	24.2	kN-m	
Total Upward moment		28.2	kN-m	
Due to water (down ward)	heelm	41.1	kN-m	
Net downward moment at B from heel side		12.8	kN-m	
Thickness Provided		300	mm	
Ast required =		244	mm	
Check for minimum steel - straight portion		470	mm2	
top		525	mm2	
bottom		350	mm2	
Design Steel				
Main steel - Top		525	mm2	
Main steel - bottom		350	mm2	
Distribution steel - top		525	mm2	
Distribution steel - bottom		350	mm2	
<b>Design at point B</b>				
Due to rectangle diagram (upward)	Mireci	4.0	kN-m	
Due to water (down ward)	Mitrii	24.2	kN-m	
Total Upward moment		28.2	kN-m	
Due to water (down ward)	heelm	41.1	kN-m	
Net downward moment at B from heel side		12.8	kN-m	
Thickness Provided		300	mm	
Ast required =		244	mm	
Check for minimum steel - straight portion		470	mm2	
top		525	mm2	
bottom		350	mm2	
Design Steel				
Main steel - Top		525	mm2	
Main steel - bottom		350	mm2	
Distribution steel - top		525	mm2	
Distribution steel - bottom		350	mm2	
<b>Design at point C</b>				
Due to rectangle diagram (upward)	Mireci	0.00	kN-m	
Due to water (down ward)	Mitrii	0.00	kN-m	
Total Upward moment		0.00	kN-m	
Due to water (down ward)	heelm	0.00	kN-m	
Net downward moment at B from heel side		0.00	kN-m	
Thickness Provided		300	mm	
Ast required =		244	mm	
Check for minimum steel - straight portion		470	mm2	
top		525	mm2	
bottom		350	mm2	
Design Steel				
Main steel - Top		525	mm2	
Main steel - bottom		350	mm2	
Distribution steel - top		525	mm2	
Distribution steel - bottom		350	mm2	

Ast required =  
 Check for minimum steel - tapered portion  
 Average thickness  
 top  
 bottom  
 Design Steel  
 Main steel - Top  
 Main steel - bottom  
 Distribution steel - top  
 Distribution steel - bottom

0 mm2  
 0.30 m  
 525 mm2  
 350 mm2  
 525 mm2  
 350 mm2  
 525 mm2  
 350 mm2

1

SUMMARY

Pressure Check

>1	P/A +	103	<	150	OK
>2	M/Z - P/A -	3.55	>	0	OK

Reinforcement

Toe		Astp		+ dia		spc		Astp	
Top - main	525	12	200	0	0	0	0	565	OK
Bottom main	357	10	220	0	0	0	0	357	OK
Top - Dist	525	12	200	0	0	0	0	565	OK
Bottom - Dist	350	10	220	0	0	0	0	357	OK
<b>Heel Straight portion</b>									
Top - main	525	12	200	0	0	0	0	565	OK
Bottom main	350	10	220	0	0	0	0	357	OK
Top - Dist	525	12	200	0	0	0	0	565	OK
Bottom - Dist	350	10	220	0	0	0	0	357	OK
<b>Heel tapered portion</b>									
Top - main	525	12	200	0	0	0	0	565	OK
Bottom main	350	10	220	0	0	0	0	357	OK
Top - Dist	525	12	200	0	0	0	0	565	OK
Bottom - Dist	350	10	220	0	0	0	0	357	OK

**CASE 2 : TANK EMPTY CONDITION WITH SOIL OUTSIDE**

Total load & Moment calculation		Taking moment @ toe		Component	
Wt	Lever Arm	Moment	W * dist	Wt	Moment
W1	18.25	10.95	10.95	Wall Straight portion	10.95
W2	6.84	5.13	5.13	Wall Tapered portion	5.13
P	25.00	15.00	15.00	Walkway/slab	15.00
W3	3.38	3.63	3.63	Footing : toe	3.63
W4	2.63	1.77	1.77	Footing center	1.77
W5	3.75	0.94	0.94	Footing : heel	0.94
W6	3.24	3.48	3.48	Soil on toe	3.48
<b>63.08</b>		<b>40.90</b>		<b>Total downward load</b>	
TRMS		40.9	KN-m	Total restoring moment @ heel	
F.S. against over turning		2.0	KN-m	Total over turning moment due to soil	
Check for over turning		20.5			
Hense o.k					
Tmv1	40.9	KN-m		Total moment due to vertical load	
Tmh1	2.0	KN-m		Total moment due to horizontal load	
TPV1	63.1	kn		Total vertical load	
Tm1	38.9	KN-m		Net Moment	
E1	0.62	m		M/p	
Ecc1	0.033	m		Ecc	
Aec1	0.22	m		b/6	
Mdg1	2.1011			Net moment From ECC	
Property of footing					
Width of footing	1.00	m		Depth of footing	1.30
Footing Area	1.30	m <sup>2</sup>		Footing Area	1.30
Modulus of section	0.28	m <sup>3</sup>			
Pressure distribution					
Pressure due to direct load =P/A	48.53	KN/m <sup>2</sup>		Pressure due to moment =M/Z	7.5
Pressure	55.99	KN/m <sup>2</sup>		Maximum pressure - P/A + M/Z	41.07
Minimum pressure - P/A + M/Z	41.07	KN/m <sup>2</sup>		Check for SBC	
Maximum pressure < SBC	OK			Minimum pressure > 0	
Pressure difference	14.92	KN/m <sup>2</sup>		Pressure difference	14.92
Pressure at outer Wall face - A	11.48	KN/m <sup>2</sup>		Pressure at inner Wall face B	50.25
Pressure at outer Wall face - A	46.23	KN/m <sup>2</sup>		prew1	46.23
prew1	50.25	KN/m <sup>2</sup>			
Design of Toe - At Point A					
Moment at face of outer wall	4.16	KN-m		Mreco1	4.16
Due to rectangle diagram	0.17	KN-m		Mtri1	0.17
Due to triangular diagram	4.33	KN-m		Toem1	4.33
Total downward moment due to soil	0.73	KN-m			
Net moment at A from Toe side	-3.60	KN-m			
Thickness at toe	300	mm			
Effective depth	244	mm			
Ast required =	####	mm <sup>2</sup>			



## DESIGN OF FLAT SLAB

Top slab

Loading:

Assume top slab = 160 th

(1) Dead load =  $0.160 \times 2.5 = 0.4 \text{ t/m}^2$

(2) Live load =  $0.150 \text{ t/m}^2$

(3) Finishing load =  $0.125 \text{ t/m}^2$

Total load =  $0.675 \text{ t/m}^2$

Analysis of Slab is done on STAAD.Pro with Slab is Plate.

STAAD INPUT DATA

STAAD SPACE  
START JOB INFORMATION  
ENGINEER DATE 01-Mar-16  
END JOB INFORMATION  
INPUT WIDTH 79  
UNIT METER KN  
JOINT COORDINATES

1 0 0 0; 2 3.75 0 0; 3 7.55 0 0; 4 11.3 0 0; 5 0 0 3.75; 6 3.75 0 3.75;  
7 7.55 0 3.75; 8 11.3 0 3.75; 9 0 0 7.55; 10 3.75 0 7.55; 11 7.55 0 7.55;  
12 11.3 0 7.55; 13 0 0 11.3; 14 3.75 0 11.3; 15 7.55 0 11.3; 16 11.3 0 11.3;  
17 0.375 0 0; 18 0.375 0 0.375; 19 0 0 0.375; 20 0.75 0 0; 21 0.75 0 0.375;  
22 1.125 0 0; 23 1.125 0 0.375; 24 1.5 0 0; 25 1.5 0 0.375; 26 1.875 0 0;  
27 1.875 0 0.375; 28 2.25 0 0; 29 2.25 0 0.375; 30 2.625 0 0; 31 2.625 0 0.375;  
32 3 0 0; 33 3 0 0.375; 34 3.375 0 0.375; 35 3.375 0 0.375; 36 3.75 0 0.375;  
37 0.375 0 0.75; 38 0 0 0.75; 39 0.75 0 0.75; 40 1.125 0 0.75; 41 1.5 0 0.75;  
42 1.875 0 0.75; 43 2.25 0 0.75; 44 2.625 0 0.75; 45 3 0 0.75; 46 3.375 0 0.75;

ELEMENT INCIDENCES SHELL

27 1 17 18 19; 29 17 20 21 18; 31 20 22 23 21; 33 22 24 25 23; 35 24 26 27 25;  
37 26 28 29 27; 39 28 30 31 29; 41 30 32 33 31; 43 32 34 35 33; 45 34 2 36 35;  
47 19 18 37 38; 48 18 21 39 37; 49 21 23 40 39; 50 23 25 41 40; 51 25 27 42 41;  
52 27 29 43 42; 53 29 31 44 43; 54 31 33 45 44; 55 33 35 46 45; 57 35 36 47 46;  
59 38 37 48 49; 60 37 39 50 48; 61 39 40 51 50; 62 40 41 52 51; 63 41 42 53 52;  
64 42 43 54 53; 65 43 44 55 54; 66 44 45 56 55; 67 45 46 57 56; 69 46 47 58 57;  
71 49 48 59 60; 72 48 50 61 59; 73 50 51 62 61; 74 51 52 63 62; 75 52 53 64 63;  
76 53 54 65 64; 77 54 55 66 65; 78 55 56 67 66; 79 56 57 68 67; 81 57 58 69 68;  
83 60 59 70 71; 84 59 61 72 70; 85 61 62 73 72; 86 62 63 74 73; 87 63 64 75 74;  
88 64 65 76 75; 89 65 66 77 76; 90 66 67 78 77; 91 67 68 79 78; 93 68 69 80 79;  
95 71 70 81 82; 96 70 72 83 81; 97 72 73 84 83; 98 73 74 85 84; 99 74 75 86 85;

ELEMENT PROPERTY

160 270 287 397 426 541 542 552 642 659 660 760 789 905 915 1023 THICKNESS 0.31  
27 29 31 33 35 37 39 41 43 45 47 TO 55 57 59 TO 67 69 71 TO 79 81 83 TO 91 -  
93 95 TO 103 105 107 TO 115 117 119 TO 127 129 131 TO 139 141 143 145 147 -  
149 151 153 155 157 159 162 164 166 168 170 TO 233 235 TO 244 246 TO 255 257 TO 266 -  
268 272 274 276 278 280 282 284 286 289 291 293 295 297 299 301 303 305 307 -  
308 TO 316 318 TO 327 329 TO 338 340 TO 349 351 TO 360 362 TO 371 373 TO 382 -  
384 TO 393 395 399 401 403 405 407 409 411 413 414 416 TO 424 428 TO 436 -  
438 440 TO 448 450 452 TO 460 462 464 TO 472 474 476 TO 484 486 488 TO 496 -  
498 500 TO 508 510 512 TO 520 522 524 526 528 530 532 534 536 538 540 543 -  
544 TO 550 553 TO 561 563 TO 572 574 TO 583 585 TO 594 596 TO 605 607 TO 616 -  
618 TO 627 629 TO 638 640 644 646 648 650 652 654 656 658 661 TO 668 670 -  
671 TO 679 681 TO 690 692 TO 701 703 TO 712 714 TO 723 725 TO 734 736 TO 745 -  
747 TO 756 758 762 764 766 768 770 772 774 776 777 779 TO 787 791 TO 799 -  
801 803 TO 811 813 815 TO 823 825 827 TO 835 837 839 TO 847 849 851 TO 859 -  
861 THICKNESS 0.16  
863 TO 871 873 875 TO 883 885 887 889 891 893 895 897 899 901 903 904 906 -  
907 TO 913 916 TO 924 926 TO 935 937 TO 946 948 TO 957 959 TO 968 970 TO 979 -  
981 TO 990 992 TO 1001 1003 1005 1007 1009 1011 1013 1015 1017 1019 1021 -  
1022 1024 TO 1031 1033 TO 1042 1044 TO 1053 1055 TO 1064 1066 TO 1075 1077 -  
1078 TO 1086 1088 TO 1097 1099 TO 1108 1110 TO 1119 1121 1123 1125 1127 1129 -  
1131 1133 1135 1137 1139 1140 THICKNESS 0.16  
DEFINE MATERIAL START  
ISOTROPIC CONCRETE  
E 2.7386e+007  
POISSON 0.17  
DENSITY 25

ALPHA 1e-005

DAMP 0.05

TYPE CONCRETE

STRENGTH FCU 27579

END DEFINE MATERIAL

CONSTANTS

MATERIAL CONCRETE ALL

SUPPORTS

1 TO 17 19 20 22 24 26 28 30 32 34 38 49 60 71 82 93 104 115 134 136 138 140 -  
 142 144 146 148 150 242 244 246 248 250 252 254 256 258 260 270 280 290 300 -  
 310 320 330 340 351 362 373 384 395 406 417 428 439 566 576 586 596 606 616 -  
 626 636 646 657 668 679 690 701 712 723 734 745 755 TO 763 854 TO 862 872 -  
 882 892 902 912 922 932 942 952 TO 961 PINNED

LOAD 1 LOADTYPE Dead TITLE DL

SELEWEIGHT Y -1 LIST ALL

ELEMENT LOAD

27 29 31 33 35 37 39 41 43 45 47 TO 55 57 59 TO 67 69 71 TO 79 81 83 TO 91 -  
 93 95 TO 103 105 107 TO 115 117 119 TO 127 129 131 TO 139 141 143 145 147 -  
 149 151 153 155 157 159 160 162 164 166 168 170 172 174 176 178 180 TO 189 -  
 191 TO 200 202 TO 211 213 TO 222 224 TO 233 235 TO 244 246 TO 255 -  
 257 TO 266 268 270 272 274 276 278 280 282 284 286 287 289 291 293 295 297 -  
 299 301 303 305 307 TO 316 318 TO 327 329 TO 338 340 TO 349 351 TO 360 362 -  
 363 TO 371 373 TO 382 384 TO 393 395 397 399 401 403 405 407 409 411 413 414 -  
 416 TO 424 426 428 TO 436 438 440 TO 448 450 452 TO 460 462 464 TO 472 474 -  
 476 TO 484 486 488 TO 496 498 500 TO 508 510 512 TO 520 522 524 526 528 530 -  
 532 534 536 538 540 TO 550 552 TO 561 563 TO 572 574 TO 583 585 TO 594 596 -  
 597 TO 605 607 TO 616 618 TO 627 629 TO 638 640 642 644 646 648 650 652 654 -  
 656 658 TO 668 670 TO 679 681 TO 690 692 TO 701 703 TO 712 714 TO 723 725 -  
 726 TO 734 736 TO 745 747 TO 756 758 760 762 764 766 768 770 772 774 776 777 -  
 779 TO 787 789 791 TO 799 801 803 TO 811 813 815 TO 823 825 827 TO 835 837 -  
 839 PR GY -1.25

840 TO 847 849 851 TO 859 861 863 TO 871 873 875 TO 883 885 887 889 891 893 -  
 895 897 899 901 903 TO 913 915 TO 924 926 TO 935 937 TO 946 948 TO 957 959 -  
 960 TO 968 970 TO 979 981 TO 990 992 TO 1001 1003 1005 1007 1009 1011 1013 -  
 1015 1017 1019 1021 TO 1031 1033 TO 1042 1044 TO 1053 1055 TO 1064 -  
 1066 TO 1075 1077 TO 1086 1088 TO 1097 1099 TO 1108 1110 TO 1119 1121 1123 -  
 1125 1127 1129 1131 1133 1135 1137 1139 1140 PR GY -1.25

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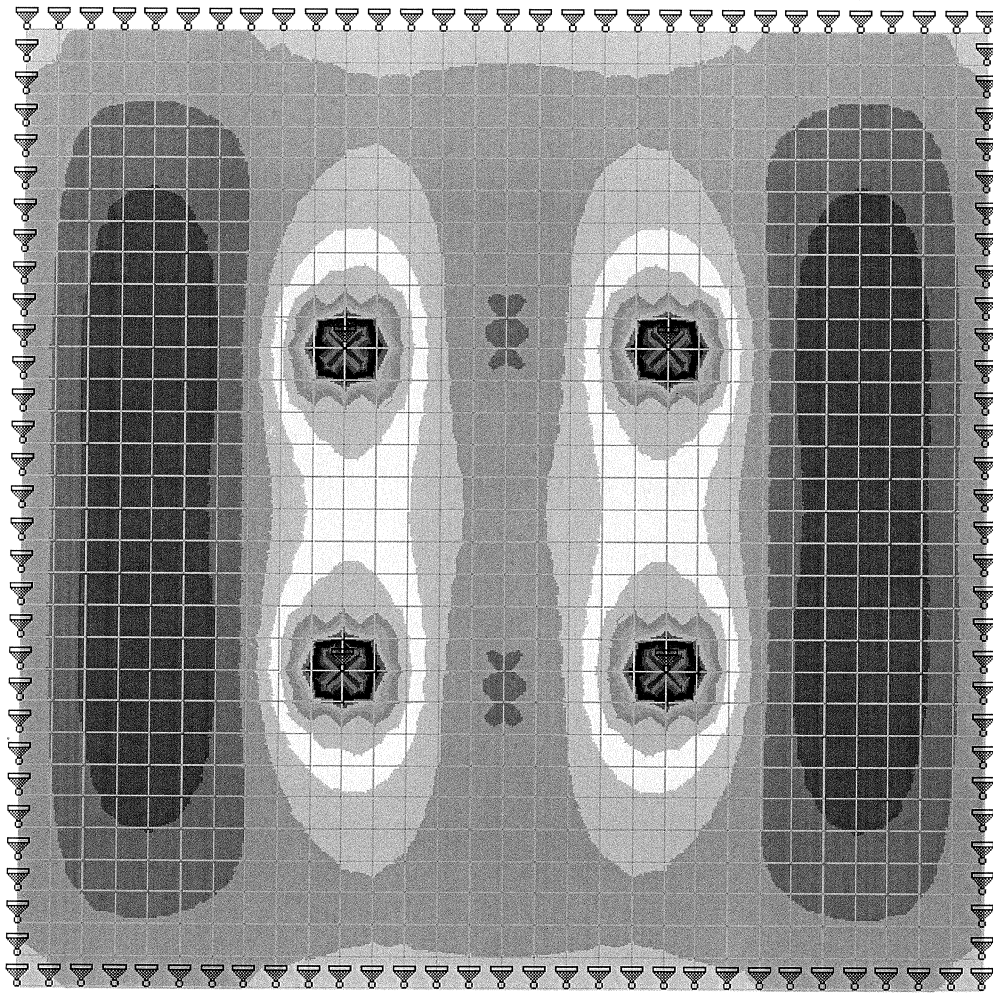
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 93 95 TO 103 105 107 TO 115 117 119 TO 127 129 131 TO 139 141 143 145 147 -  
 149 151 153 155 157 159 160 162 164 166 168 170 172 174 176 178 180 TO 189 -  
 191 TO 200 202 TO 211 213 TO 222 224 TO 233 235 TO 244 246 TO 255 -  
 257 TO 266 268 270 272 274 276 278 280 282 284 286 287 289 291 293 295 297 -  
 299 301 303 305 307 TO 316 318 TO 327 329 TO 338 340 TO 349 351 TO 360 362 -  
 363 TO 371 373 TO 382 384 TO 393 395 397 399 401 403 405 407 409 411 413 414 -  
 416 TO 424 426 428 TO 436 438 440 TO 448 450 452 TO 460 462 464 TO 472 474 -  
 476 TO 484 486 488 TO 496 498 500 TO 508 510 512 TO 520 522 524 526 528 530 -  
 532 534 536 538 540 TO 550 552 TO 561 563 TO 572 574 TO 583 585 TO 594 596 -  
 597 TO 605 607 TO 616 618 TO 627 629 TO 638 640 642 644 646 648 650 652 654 -  
 656 658 TO 668 670 TO 679 681 TO 690 692 TO 701 703 TO 712 714 TO 723 725 -  
 726 TO 734 736 TO 745 747 TO 756 758 760 762 764 766 768 770 772 774 776 777 -  
 779 TO 787 789 791 TO 799 801 803 TO 811 813 815 TO 823 825 827 TO 835 837 -  
 839 PR GY -1.5

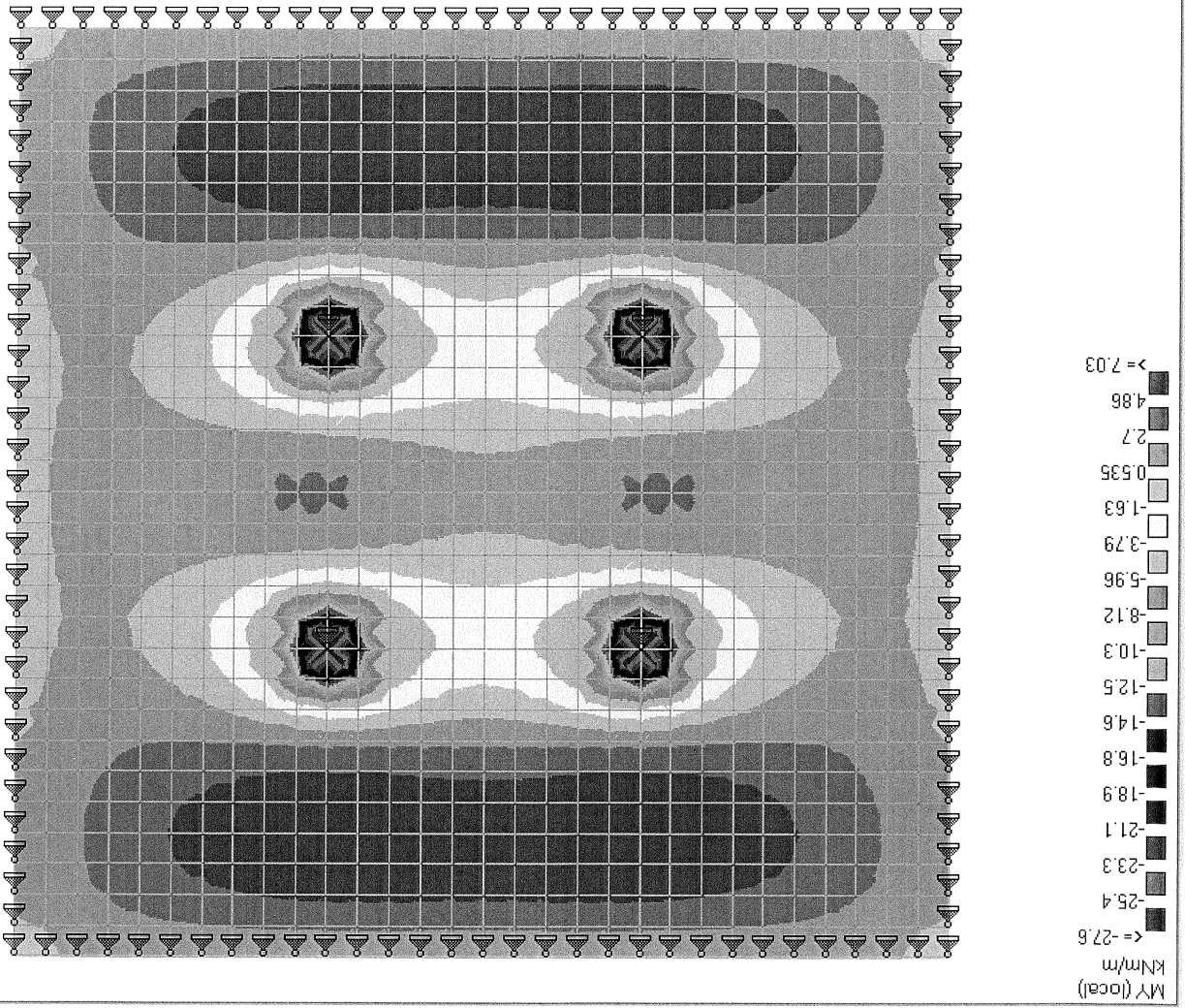
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 895 897 899 901 903 TO 913 915 TO 924 926 TO 935 937 TO 946 948 TO 957 959 -  
 960 TO 968 970 TO 979 981 TO 990 992 TO 1001 1003 1005 1007 1009 1011 1013 -  
 1015 1017 1019 1021 TO 1031 1033 TO 1042 1044 TO 1053 1055 TO 1064 -  
 1066 TO 1075 1077 TO 1086 1088 TO 1097 1099 TO 1108 1110 TO 1119 1121 1123 -  
 1125 1127 1129 1131 1133 1135 1137 1139 1140 PR GY -1.5

LOAD COMB 3 COMBINATION LOAD  
1 1.0 2 1.0  
PERFORM ANALYSIS  
LOAD LIST 3  
FINISH

STRESS DIAGRAM - MX



STRESS DIAGRAM - MY



## Design of bottom Reinforcement

Provide depth of 160 mm

Program for Finding Wall steel subject to moment & Axial tension

Basic Data

Concrete	fck	30	N/mm <sup>2</sup>
Modula	md	9.3	N/mm <sup>2</sup>
r ratio		3	N/mm <sup>2</sup>
Fernissible stress in concrete :			
Direct tension	Pst	15	N/mm <sup>2</sup>
Fernissible stress in concrete : bending	Psb	20	N/mm <sup>2</sup>
Fernissible stress in steel	Pst	130	kg/cm <sup>2</sup>
Cover	Cv	45	mm
Wall thickness		0.2	m

Type A : Horizontal wall : Horizontal steel at corner

Depth provide 160 mm

At Corner	Lo ad	ca se	Mom	kn-m	Ten sion	kn-m	Desi gn	Ten sion	Desi gn	Calculation for	Depth provide	Effe ctive	mo me nt	Ecc	Steel	for	Steel	mo me nt	for	Steel	Total	Minimum
bottom	3		8.0	0.0	8.0	0.0	11.	0	0.1	240	4	151	160	115	727	2	7.6	5.8	5	0.85	6.70	3.62
bottom	3		8.0	0.0	8.0	0.0	11.	0	0.1	240	4	151	160	115	727	2	7.6	5.8	5	0.85	6.70	3.62

Check for Shear:  
Slab is to be checked at a distance  $d/2$  from column head

$$\text{Total depth } D = 160$$

$$\text{Effective depth} = 160 - 45 = 110 \text{ mm}$$

$$\text{Length at critical section for shear} = 1060, \text{ Similar area} = 0.94 \times 0.94$$

$$\text{Total panel load} = 3.8 \times 3.7 \times 0.65 = 9.386 \text{ T}$$

$$\text{Net load at critical section}$$

$$= 9.386 - 0.94 \times 0.94 \times 0.675$$

$$= 8.79 \text{ T}$$

$$\text{Net load at critical section} = 8.79 \text{ T}$$

$$\text{Actual shear stress} = 8.79 \times 10^4 / (940 \times 4 \times 110)$$

$$= 0.212 \text{ N/mm}^2$$

$$\text{Permissible stress} = K_s \times T_c$$

$$T_c = 0.16 \times f_{ck}^{0.5}$$

$$= 0.16 \times 30^{0.5}$$

$$= 0.87$$

$$K_s = (0.5 + \beta) \text{ or } K_s < 1$$

$$\beta = 1$$

$$\text{Hence } K_s = 1.0$$

$$T_c = 0.87 \times 1 = 0.87 \text{ N/mm}^2 > 0.212 \text{ O.K.}$$

**COLUMN REACTION**

Node	L/C	Force-X kN	Force-Y kN	Force-Z kN	Moment-X kNm	Moment-Y kNm	Moment-Z kNm
6	3	0	119.497	0	0	0	0
7	3	0	119.497	0	0	0	0
10	3	0	119.497	0	0	0	0
11	3	0	119.497	0	0	0	0

Maximum load on column = 11.95 T (Refer computer output)  
 Add self wt = 1.0 T

Total = 12.95 t

Capacity of column =  $\sigma_{cc} \cdot A_c + \sigma_{sc} \cdot A_{st}$

=  $8 \cdot 70686 + 275 \cdot 1206$

= 89.7 T > 12.95 T O.K

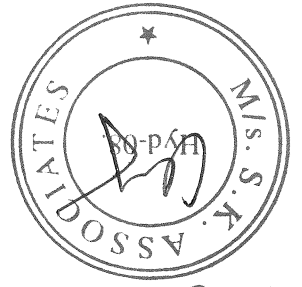
**APPROVED**

**SE, NIRMAL**

*[Signature]*  
 Asst. Executive Engineer  
 TDWSP Asifabad

*[Signature]*  
 Dy. Executive Engineer  
 TDWSP Asifabad

*[Signature]*  
 Executive Engineer  
 TDWSP Asifabad



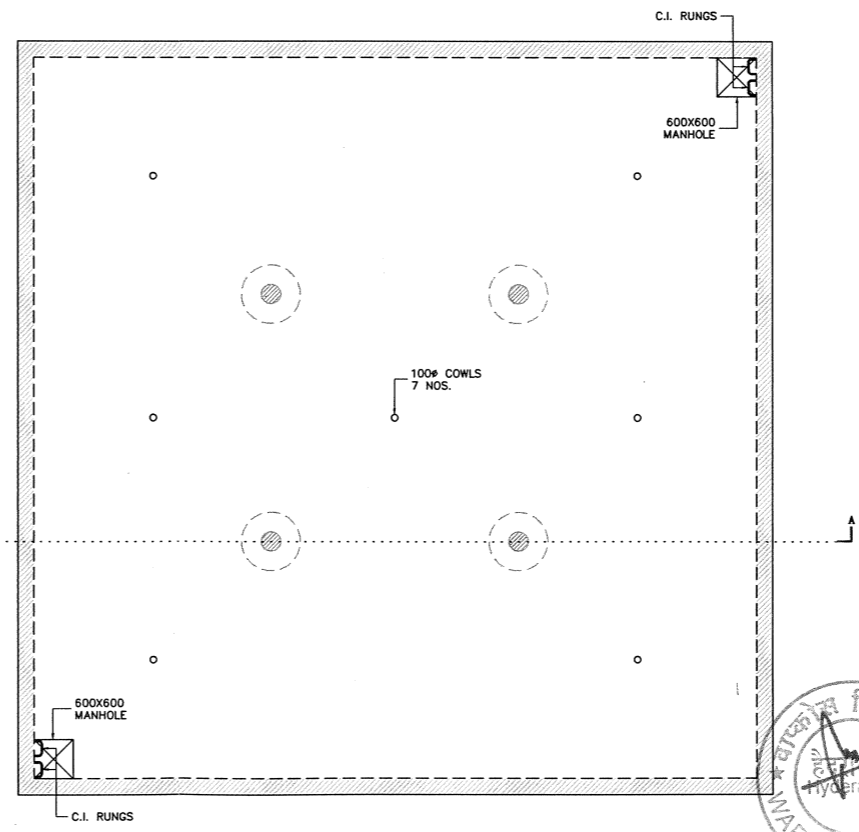
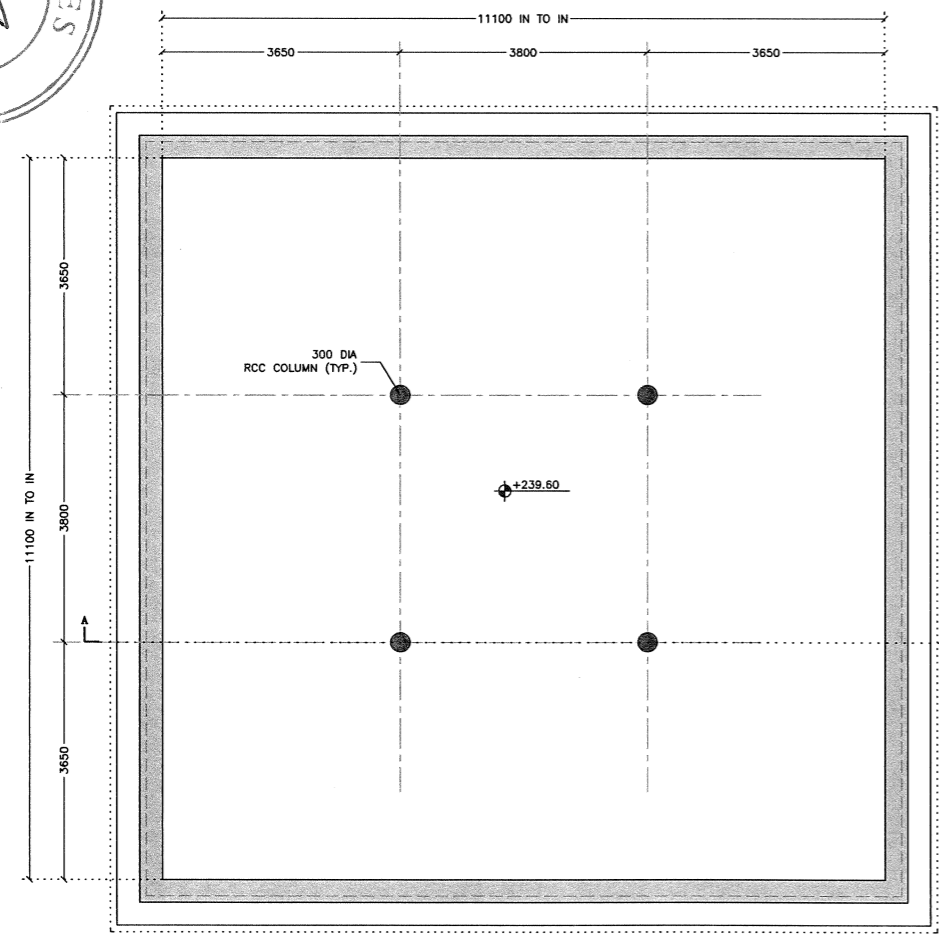
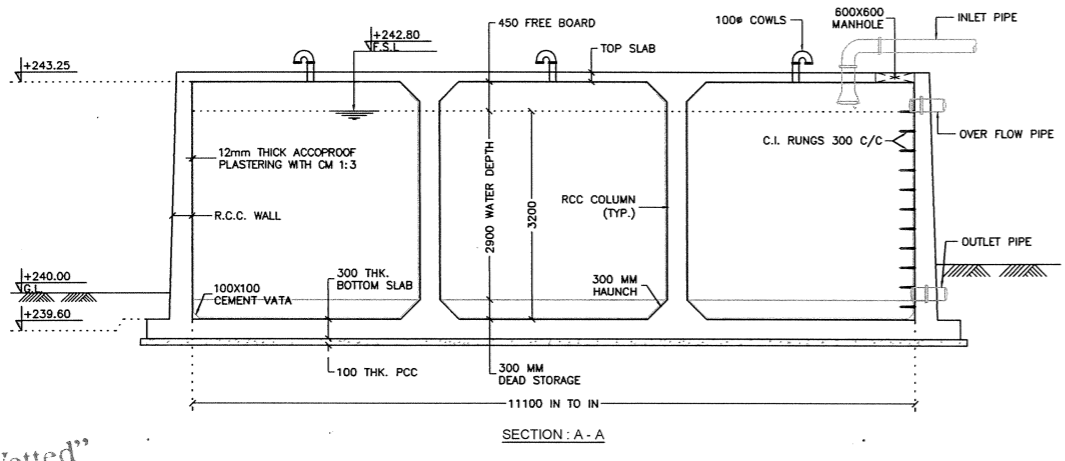
“Designs Vetted”

Superintendent Engineer  
 TDWSP Nirmal



SCHEDULE OF PIPE	
INLET PIPE SIZE	-
OUTLET PIPE SIZE	-
OVER FLOW PIPE SIZE	-

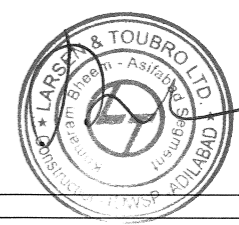
NOTES:  
 <1> ALL DIMENSION ARE IN MM AND LEVELS ARE IN METER.  
 <2> LOCATION & LEVELS OF INLET, OUTLET & OVERFLOW PIPE SHALL BE VARIFIED WITH ENGINEER INCHARGE BEFORE EXECUTION



"Drawings Vetted"

M/S. S.A. ASSOCIATES  
Hydrabad

APPROVED  
SE, NIRMAL



REV. No	DESCRIPTION	DATE	DESIGNED	DRAWN	CHECKED	APPROVED
A	FOR APPROVAL	03/06/16	-	NSP	RMM	-

REVISIONS

**L&T Construction**  
Water, Smart World & Communication.

CLIENT: RURAL WATER SUPPLY AND SANITATION DEPARTMENT, TELANGANA  
 CONSULTANT: L&T Construction  
 PROJECT: PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT

SUPPLIER / CONTRACTOR: L&T Construction  
Water & Effluent Treatment SBG

NAME	SIGN	DATE
DSCR: HMP		03-06-16
DRW: NSP		03-06-16
CHK: RMM		03-06-16
APP: -		03-06-16

TITLE: 350KL CAPACITY GLBR AT KOWTHALA GUTTA VILLAGE (GENERAL ARRANGEMENT DRAWING)

DRAWING No. LE150883-C-WS-RW-GA-1581  
 CO.P. DATA: P16-02-106-01-01 SHEET 1 OF 1

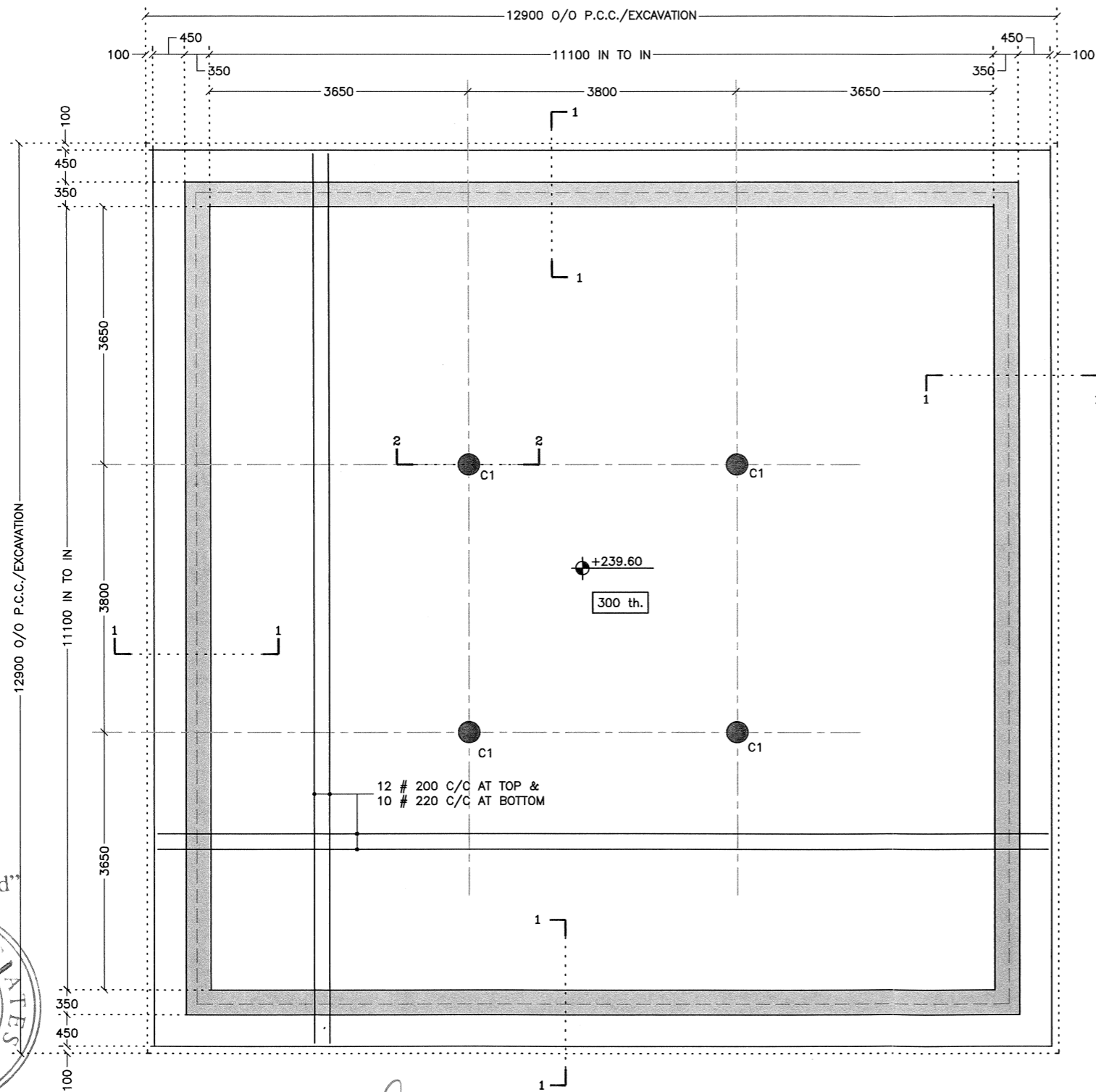
RELEASED FOR:  PRELIMINARY  TENDER  INFORMATION  APPROVAL  CONSTRUCTION

Asst. Executive Engineer  
TDWSP Asifabad

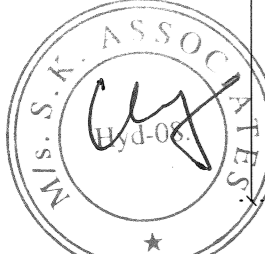
Dy. Executive Engineer  
TDWSP Asifabad

Executive Engineer  
TDWSP Asifabad

Superintendent Engineer  
TDWSP Nirmal



"Drawings Vetted"



**Asst. Executive Engineer**  
TDWSP Asifabad

**Dy. Executive Engineer**  
TDWSP Asifabad

**Executive Engineer**  
TDWSP Asifabad

**Superintendent Engineer**  
TDWSP Nirmal

FOUNDATION PLAN

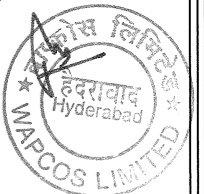
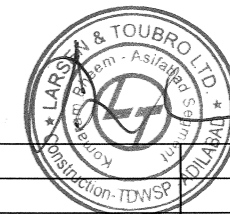
**IMPORTANT NOTES**

- 1 NO GROUND WATER TABLE WAS FOUND UP TO DEPTH OF INVESTIGATION. IF WATER TABLE IS FOUND DURING THE EXECUTION, WORK SHALL BE STOP AND SAME SHALL BE INFORMED TO CONCERNED AUTHORITY AND DESIGNER. PROPER STORM WATER DRAINAGE SYSTEM FOR SURROUNDING AREA SHALL ALSO BE PROVIDED TO AVOID LOCALIZED TEMPORARY WATER TABLE EFFECTS.
- 2 FOUNDATION SHALL REST ON GOOD SOIL. IT SHOULD NOT REST ON BLACK COTTON SOIL OR SOIL HAVING EXPANSIVE PROPERTY.

**NOTES -**

- 1 ALL DIMENSION ARE IN MM AND LEVELS ARE IN METER
- 2 ALL CONCRETE MIX M:30 WITH MAXIMUM FREE WATER CEMENT RATIO OF 0.45 AND MAXIMUM CEMENT CONTENT OF 400kg/m<sup>3</sup> FOR WATER RETAINING STRUCTURE
- 3 ALL CONCRETE SHALL BE MACHINE MIXED AND MACHINE VIBRATED
- 4 # - INDICATE TMT BAR FE-500 GRADE 1 CONFIRMING TO I.S 1786-LATEST REVISION
- 5 CLEAR COVER TO MAIN STEEL 50mm IN BOTTOM SLAB & 45mm TOP SLAB & WALL
- 6 FOUNDATION SHALL REST ON IN-SITU SOIL AND IT SHALL NOT BE ON FILLING MATERIAL i.e. MADE UP SOIL OR HIGHLY COMPRESSIBLE SOIL
- 7 BACK FILLING SHALL BE DONE IN WELL COMPACTED AND WELL WATER LAYER NOT EXCEEDING 150mm IN DEPTH
- 8 SBC CONSIDERED 15.0 t/m<sup>2</sup> IN DESIGN.
- 9 INLET & OVERFLOW PIPE SHALL BE DECIDED AS PER SITE CONDITION
- 10 LOCATION & LEVELS OF INLET,OUTLET & OVERFLOW PIPE SHALL BE VERIFY WITH ENGINEER INCHARGE BEFORE EXECUTION
- 11 SEISMIC ZONE CONSIDERED IN DESIGN IS ZONE II
- 12 READ THIS DRAWING ALONG WITH SHEET NO. 2 OF 3 TO 3 OF 3.
- 13 STEEL CHAIRS SHALL BE PROVIDE TO KEPT TOP REINFORCEMENT OF SLAB IN PROPER POSITION

**APPROVED**  
**SE, NIRMAL**



A	FOR APPROVAL	08/06/16	HMP	PMG	RMM	-
REV. No	DESCRIPTION	DATE	DESIGNED	DRAWN	CHECKED	APPROVED

**REVISIONS**



**L&T Construction**

Water, Smart World & Communication.

CLIENT : RURAL WATER SUPPLY AND SANITATION DEPARTMENT, TELANGANA. CONSULTANT : -

PROJECT : PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT

SUPPLIER / CONTRACTOR : **L&T Construction**  
Water & Effluent Treatment SBG

JOB No. : LE150883	TITLE :	SCALE
NAME	SIGN	DATE
DSGN HMP		08-06-16
DRWN PMG		08-06-16
CHKD RMM		08-06-16
APPD -		08-06-16

350KL CAPACITY GLBR  
AT KOWTHALA GUTTA VILLAGE  
(FOUNDATION PLAN)

SCALE  
1:75

PROJECTION

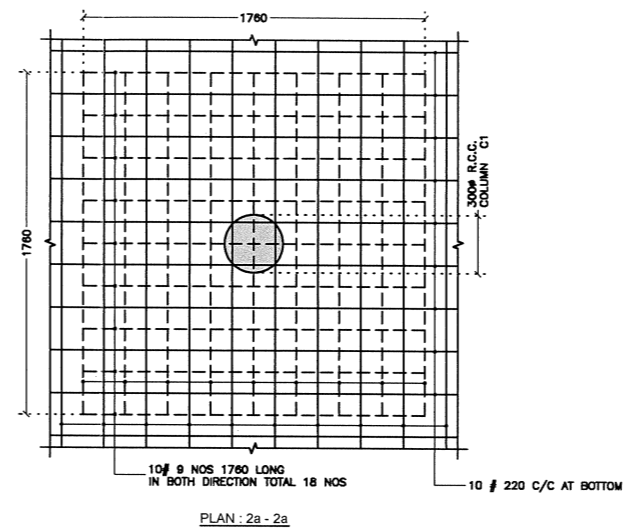
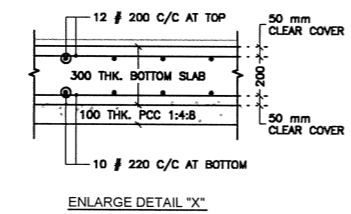
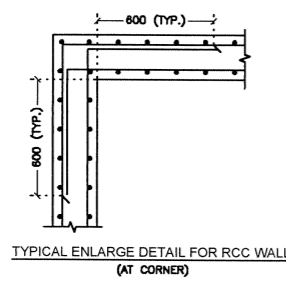
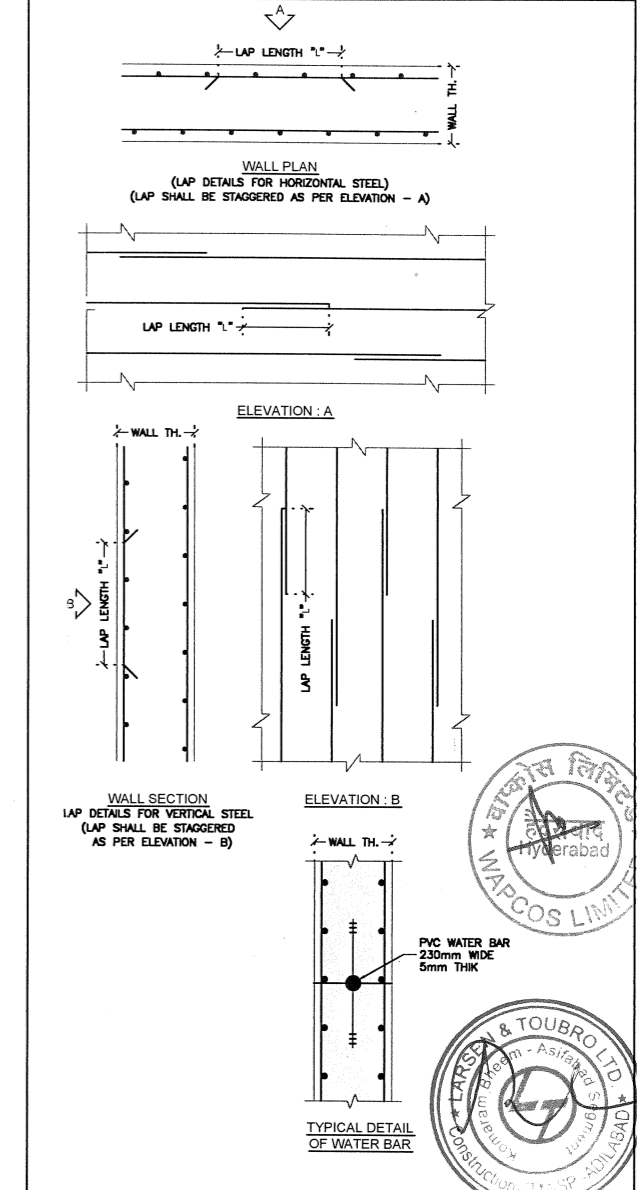


DRAWING No. LE150883-C-WS-RW-RC-1584  
COMP. DATA : P16-02\_106-02-01 SHEET 1 OF 3

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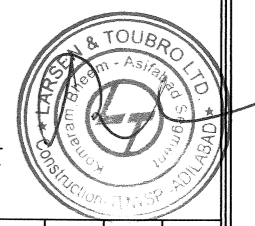
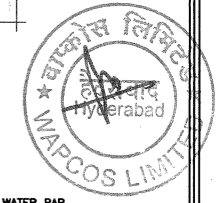
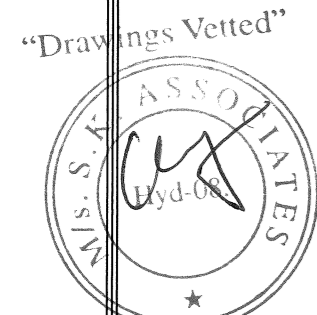
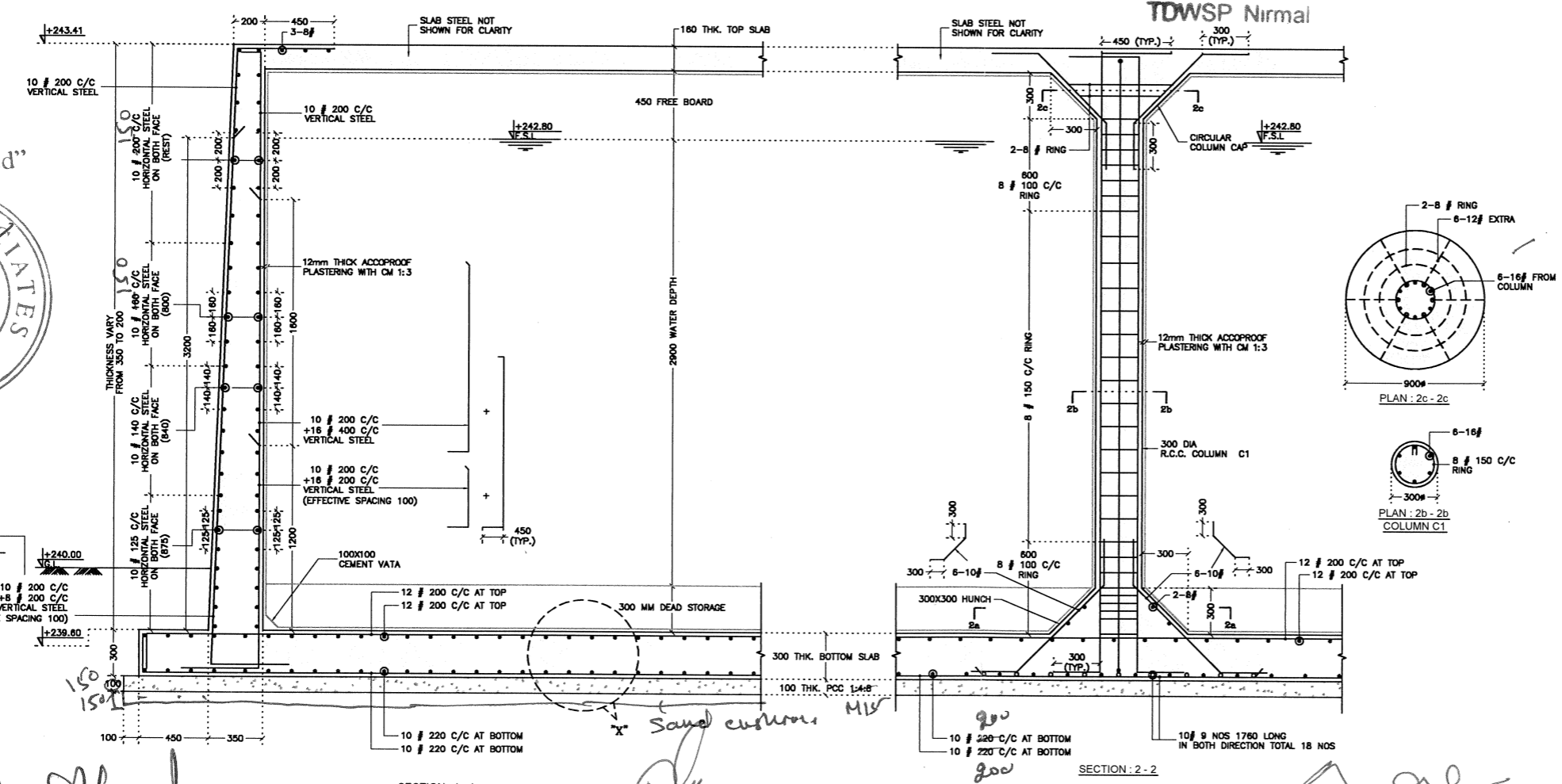
NOTES :  
 <1> ALL DIMENSION ARE IN MM AND LEVELS ARE IN METER.  
 <2> FOR ALL OTHER NOTES REFER SHEET NO 1 OF 3.  
 <3> READ THIS DRAWING ALONG WITH DRG.NO. 1 OF 3 TO 3 OF 3.

LAP LENGTH SCHEDULE	
DIA OF BAR	LAP LENGTH "L" IN mm
8	320
10	400
12	480
16	640
20	800
25	1000



APPROVED  
 SE, NIRMAL

Superintendent Engineer  
 TDWSP Nirmal



REV. No	DESCRIPTION	DATE	DESIGNED	DRAWN	CHECKED	APPROVED
A	FOR APPROVAL	08/06/16	HMP	PMG	RMM	-

REVISIONS

**L&T Construction**  
 Water, Smart World & Communication.

CLIENT : RURAL WATER SUPPLY AND SANITATION DEPARTMENT, TELANGANA. CONSULTANT :  
 PROJECT : PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT  
 SUPPLIER / CONTRACTOR : **L&T Construction**  
 Water & Effluent Treatment SBG

JOB No. : LE150883 TITLE :  
 350KL CAPACITY GLBR AT KOWTHALA GUTTA VILLAGE (SECTION DETAILS)

NAME	SIGN	DATE
DSGN	HMP	08-06-16
DRWN	PMG	08-06-16
CHKD	RMM	08-06-16
APPD	-	08-06-16

SCALE 1:25  
 PROJECTION

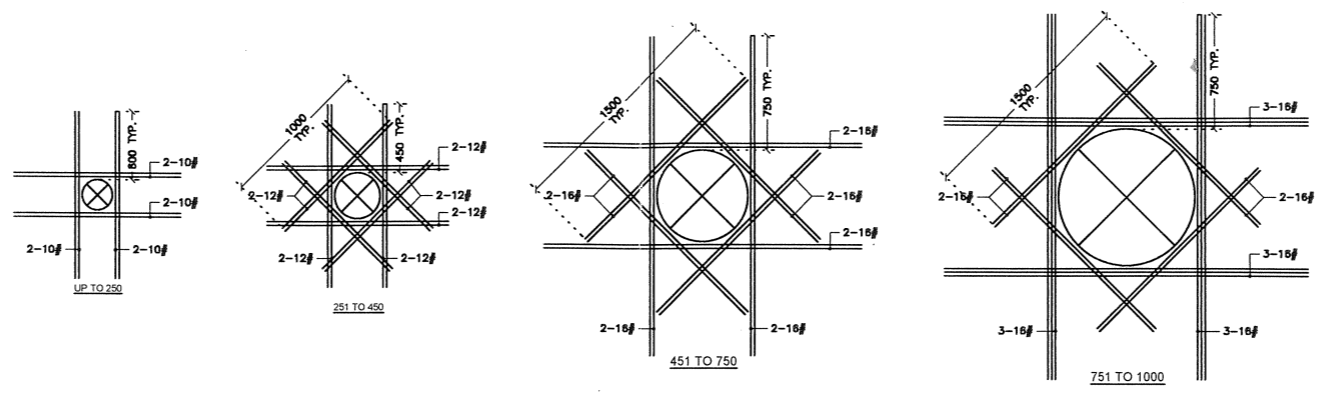
DRAWING No. LE150883-C-W-S-R-W-R-C-1584  
 COMP. DATA : P16-02-108-02-02 SHEET 2 OF 3

RELEASED FOR  PRELIMINARY  TENDER  INFORMATION  APPROVAL  CONSTRUCTION

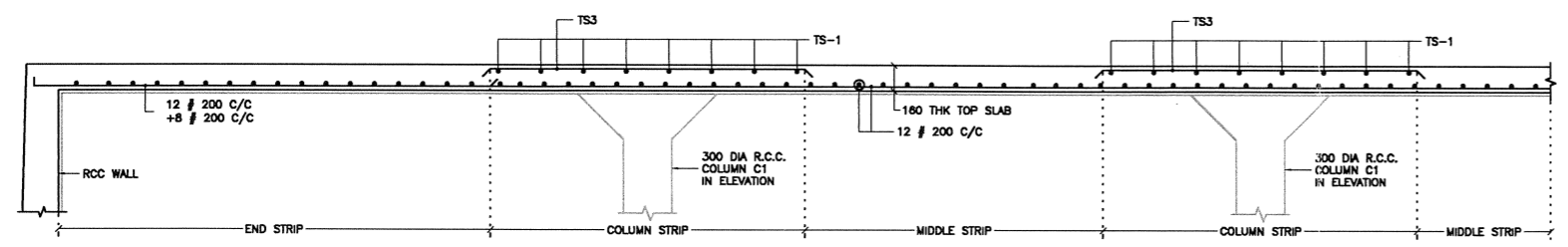
Asst. Executive Engineer  
 TDWSP Asifabad

Dy. Executive Engineer  
 TDWSP Asifabad

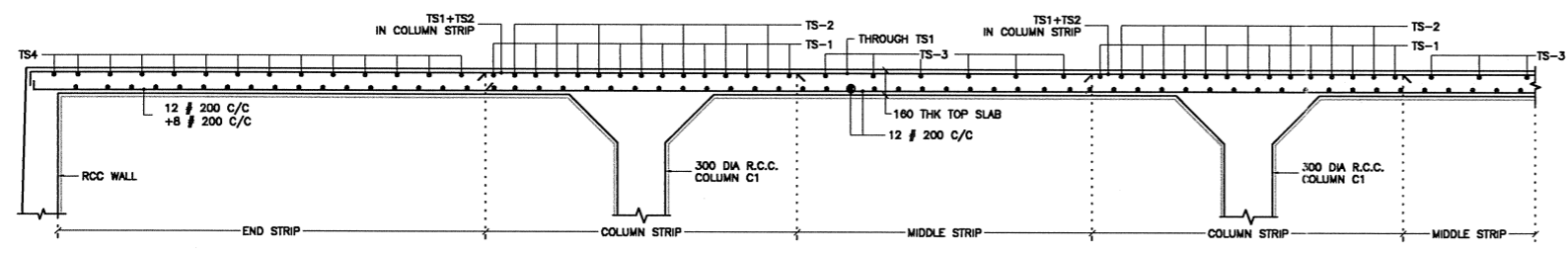
Executive Engineer  
 TDWSP Asifabad



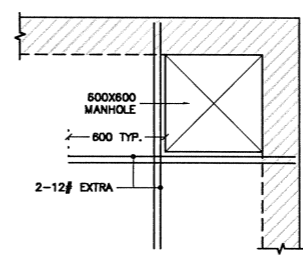
TYPICAL DETAIL FOR EXTRA STEEL BAR AT CUT-OUT



SECTION - Y - Y

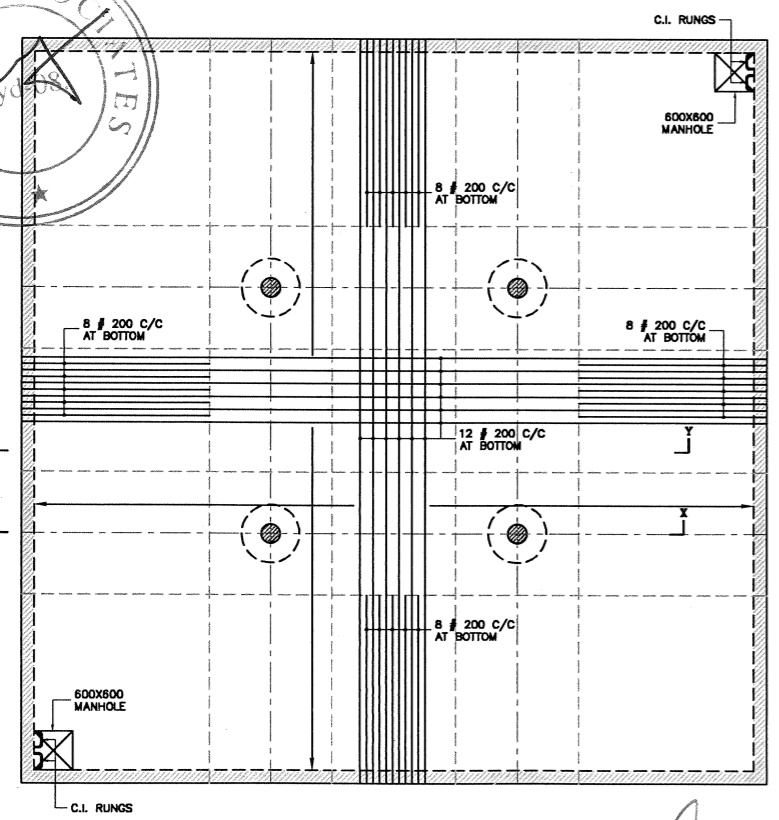


SECTION - X - X  
STEEL CHAIRS SHALL BE PROVIDED TO KEPT TOP REINFORCEMENT OF SLAB IN PROPER POSITION

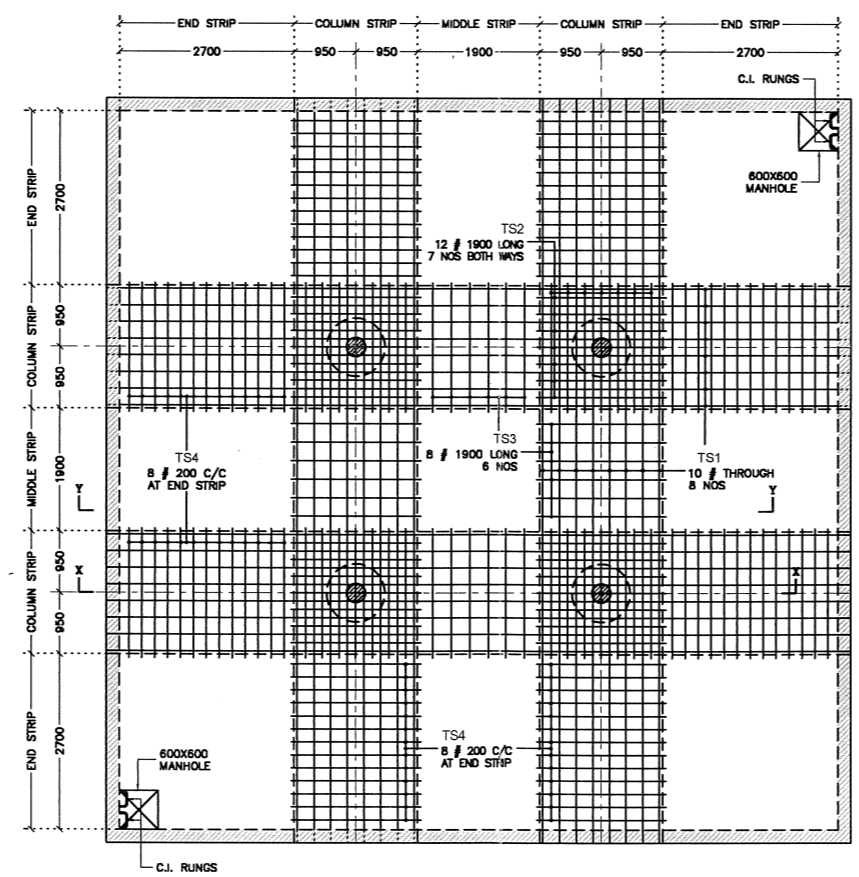


TYPICAL DETAIL FOR MANHOLE

"Drawings Vetted"  
M.S. S.A. ASSOCIATES  
Hyderabad

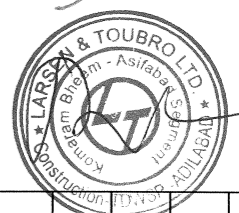
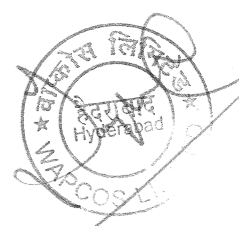


PLAN FOR TOP SLAB BOTTOM REINFORCEMENT  
ALL SLAB ARE 160 THK. (CONCRETE MIX M:30)



PLAN FOR TOP SLAB TOP REINFORCEMENT  
ALL SLAB ARE 160 THK. (CONCRETE MIX M:30)

APPROVED  
SE, NIRMAL



NOTES :  
<1> ALL DIMENSION ARE IN MM AND LEVELS ARE IN METER.  
<2> FOR ALL OTHER NOTES REFER SHEET NO 1 OF 3.  
<3> READ THIS DRAWING ALONG WITH DRG.NO. 1 OF 3 TO 2 OF 3.

SLAB SCHEDULE	
TYPE	DESCRIPTION
TS - 1	10 # THROUGH 8 NOS
TS - 2	12 # 1900 LONG 7 NOS BOTH WAYS (TOTAL 14 NOS)
TS - 3	8 # 1900 LONG 6 NOS
TS - 4	8 # 200 C/C AT END STRIP

FOR APPROVAL	08/06/16	PMG	RMM	
REVISIONS	DATE	DESIGNED	DRAWN	CHECKED

**L&T Construction**  
Water, Smart World & Communication.

CLIENT : RURAL WATER SUPPLY AND SANITATION DEPARTMENT, TELANGANA. CONSULTANT :  
PROJECT : PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT  
SUPPLIER / CONTRACTOR : **L&T Construction**  
Water & Effluent Treatment SBG

JOB No. : LE150883 TITLE : 350KL CAPACITY GLBR AT KOWTHALA GUTTA VILLAGE (STRUCTURAL LAYOUT & DETAILS AT BOTTOM REINFORCEMENT & TOP REINFORCEMENT OF TOP SLAB) SCALE : 1:75,30

DSGN   HMP	08-06-16
DRWN   PMG	08-06-16
CHKD   RMM	08-06-16
APPD   -	08-06-16

DRAWING No. LE150883-C-WS-RW-RC-1584 SIZE A2  
COMF. DATA : P16-02\_108-02-03 SHEET 3 OF 3

RELEASED FOR  PRELIMINARY  TENDER  INFORMATION  APPROVAL  CONSTRUCTION

Asst. Executive Engineer  
TDWSP Asifabad

Dy. Executive Engineer  
TDWSP Asifabad

Executive Engineer  
TDWSP Asifabad

Superintendent Engineer  
TDWSP Nirmal