

Submitted sir,

Sub: RWS&S-TDWSP- Maniguda1600KL clear water sump in Asifabad Mandal – Komarambheem Asifabad Segment - Adilabad District -Designs -Approval- Reg.

Kindly peruse the Designs of the following 1600KL Clear Water sump at Kesalaguda(V), Asifabad(M), submitted by the Executive Engineer TDWSP Asifabad Division , Adilabad district for approval.

1. 1600 KL Clear Water Sump.

The Executive Engineer TDWSP Asifabad Division has submitted Structural Designs & Drawings of 1600KL Clear Water sump based on the field conditions and as per the estimate provisions, the structural designs & drawings for the above structure is verified and submitted for approval.

The following design parameters were considered:

- Capacity : 1600KL
- Net SBC of Soil : 15.0 t/sqm
- Grade of concrete & Steel : M 30 & Fe 500
- Size of Sump: 24 x 24 m
- Sidewall Height : ~~3.5 mts~~ 3.55 mts
- Sidewall Thickness: 350 to 200 mm
- Top Slab thickness: 200 mm
- Raft Slab thickness: 450 mm

As per the above parameters the structural design and drawings of the clear water sump is verified, as per similar Type designs available and approved by the RWS&S Department considering the SBC and type of soil, duly following IS codes, IS: 456-2000, SP: 16, 34, IS: 3370 and IS 1893-2002 (seismic codes).The sizes and steel proposed in the designs and drawings of all components are safe and sufficient.

The additional points noted after checking the designs are:

- Detailed Estimate of the Structure with these specifications has to be prepared and compared with the provision made in sanctioned estimate. Such that deviation if any is within authorized limits. If any deviations noticed, the Estimate should be submitted for obtaining approval from the Competent Authority.

Subject to approval a draft memo addressed to the EE, TDWSP Asifabad Division , for communicating approved Structure is put up for kind perusal and approval.



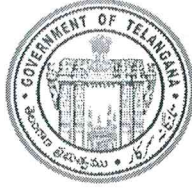
AEE (Designs)
TDWSP, Nirmal Circle



DEE (Designs)
TDWSP, Nirmal Circle



Superintending Engineer,
TDWSP, Nirmal Circle



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

TELANGANA WATER GRID



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

CLIENT: RURAL WATER SUPPLY AND SANITATION DEPARTMENT (WATER GRID), TELUNGANA.	CONSULTANT: WAPCOS LIMITED
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PROJECT :	PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT
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SUPPLIER / CONTRACTOR:	L&T Construction, Water, Smart World and Communication
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JOB Ref. No. : LE150883	TITLE : DESIGN OF GLBR - 1600KL CAPACITY MANIGUDAGUTTA AT ASIFABAD MANDAL																
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L	E	1	5	0	8	8	3	-	C	-	W	S	-	R	W	-	D	C	-	1	5	1	2			

RELEASED FOR	<input type="checkbox"/> PRELIMINARY	<input type="checkbox"/> INFORMATION	<input checked="" type="checkbox"/> APPROVAL	<input type="checkbox"/> CONSTRUCTION
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DESIGN CALCULATION

PROJECT TITLE

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

UNIT

1600 KL SUMP AT MANIKGUDAGUTTA VILLAGE

PRINCIPAL CLIENT

**RURAL WATER SUPPLY
AND
SANITATION DEPARTMENT,
TELANGANA**

CONTRACTOR

**L&T CONSTRUCTION
WATER & EFFLUENT TREATMENT SBG**

DESIGN OF SUMP

CAPACITY = 16 LAC

Width = 24.00 m
Length = 24.00 m
Water depth = 2.80 m

Free board = 0.45 m
Plaster thickness = 0.012 m

Column = 300 dia
Concrete grade = M 30
Clear cover to main steel = 45.0 mm

SBC: 15 T/M²

GWT: GROUND WATER TABLE IS NOT OBSERVED

CAPACITY CHECK:

Capacity of compartment

Width = 24.00 m
Length = 24.00 m

Clear Width = 24.00 - 2 x plaster thickness
= 24.00 - 2 x 0.012
= 23.976 m

Dead storage = 0.30

Free board = 0.45

Water depth = 2.80 m

Volume = B x L x H
= 23.976 x 23.976 x 2.80 = 1609.57 m³

Volume of single column = $\pi \times d \times d / 4 \times H$
= $\pi \times 0.30 \times 0.30 / 4 \times 2.8$
= 0.198

Total nos of column = 36 nos

Less volume of column = 0.198 m³ x 36 nos = 7.128 m³

Net volume = 1609.57 - 7.128 = 1602.44 m³ > 1600 m³ i.e. 16 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

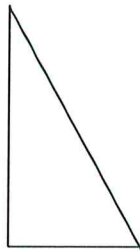
- Water pressure from inside
- Soil pressure from outside

Loading

1. Water load :
 - a. Water depth = 3.1 m
 - b. Free board = 0.45 m

Total height = 3.55 m

Water pressure is as below



2. Soil load :

- a. Depth below ground level = 0.85 m, Considered = 0.85 m
- b. Density of soil = 1.80 t/m³
- c. Angle of repose = 30 degree

$$\begin{aligned}\text{Pressure at bottom} &= Y * H * (1 - \sin \theta) / (1 + \sin \theta) \\ &= 18 * 0.85 * (1 - \sin 30) / (1 + \sin 30) \\ &= 5.1 \text{ kN/m}\end{aligned}$$

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

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STAAD SPACE
START JOB INFORMATION
JOB NAME 19 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 0.425 0; 3 0 0.85 0; 4 0 1.3 0; 5 0 1.75 0; 6 0 2.2 0;
7 0 2.65 0; 8 0 3.1 0; 9 0 3.55 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;
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 0.200 ZD 1
5 PRIS YD 0.238 ZD 1
6 PRIS YD 0.257 ZD 1
7 PRIS YD 0.276 ZD 1
8 PRIS YD 0.295 ZD 1
9 PRIS YD 0.31 ZD 1
10 PRIS YD 0.33 ZD 1
11 PRIS YD 0.35 ZD 1
SUPPORTS
1 FIXED
9 PINNED
CONSTANTS
MATERIAL CONCRETE ALL
LOAD 1 WATER
MEMBER LOAD
4 TRAP GX 0 4.5
5 TRAP GX 4.5 9
6 TRAP GX 9.0 13.5
7 TRAP GX 13.5 18
8 TRAP GX 18.0 22.5
9 TRAP GX 22.5 27.00
10 TRAP GX 27.0 31.25
11 TRAP GX 31.25 35.5
SELFWEIGHT Y -1
LOAD 2 SOIL
MEMBER LOAD
10 TRAP GX -0 -2.55
11 TRAP GX -2.55 -5.1
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	-10.098	-10.981	0	0	0	0
		8	7.848	9.969	0	0	0	-4.79
5	1	8	-7.848	-9.969	0	0	0	4.79
		7	5.171	6.931	0	0	0	-8.668
6	1	7	-5.171	-6.931	0	0	0	8.668
		6	2.28	1.869	0	0	0	-10.724
7	1	6	-2.28	-1.869	0	0	0	10.724
		5	-0.825	-5.219	0	0	0	-10.047
8	1	5	0.825	5.219	0	0	0	10.047
		4	-4.144	-14.331	0	0	0	-5.724
9	1	4	4.144	14.331	0	0	0	5.724
		3	-7.632	-25.469	0	0	0	3.155
10	1	3	7.632	25.469	0	0	0	-3.155
		2	-11.138	-37.847	0	0	0	16.546
11	1	2	11.138	37.847	0	0	0	-16.546
		1	-14.857	-52.031	0	0	0	35.581

Maximum moment at bottom = 35.6 kNm Say 36 KNm ✓

Calculation for Coefficient of Uncrack condition				
RCC wall				
	notation		Unit	
DATA				Steel provided
				dia spc
Bending moment	Bm	36	kN-m	
Reinforcement	Fy	500	N/mm ²	
Concrete grade	fck	30	N/mm ²	12 200
Area of steel provided	Ast	1571	mm ²	16 200
Depth provided	Dp	350		
Width	B	1000		
Clear Cover	Cv	50	mm	
maximum bar dia	dbar	25		
Permissible stress in Steel	Fyub	130	N/mm ²	
Calculation				equation
Modular ratio	md	9		For Fck 30
Per.str.in direct Tension	Pst	15	kg/cm ²	For Fck 30
Per.str.tension due to bending	Pstb	20	kg/cm ²	For Fck 30
steel	PT	0.0045		=Ast/Dp/B
Effective depth	Def	287.5	mm	
Constants	ka	0.82		=Def/Dp
	kb	1.06		=1+2*PT*ka*(md-1)
	kc	2.07		=2+2*PT*(md-1)
Depth of neutral axis - N	n	0.5111		=kb/kc
Depth of neutral axis	nd	178.8992		=n*Dp
Check for Mu/bd ²	kd	0.0035		=(ka-n) ² *(md-1)*PT
	ke	0.0835		=1/3-n*(1-n)
	kf	0.0869		=kd+ke
m/bd ²	Unc	3.5558		=Pstb/(1-n)*kf
Depth required	Dr	318.2	mm	=(Bm*100/Unc) ^{0.5} *10
Calculation of Steel	Ast			
Effective Depth	De	287.5	mm	=Dp-Cv-dbar/2
Area of steel required		1070	mm ²	=Bm*1000000/(0.9*Fyub*De)
Check		OK		

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	0.022	0	0	0	0
		8	0	-0.022	0	0	0	0.01
5	2	8	0	0.022	0	0	0	-0.01
		7	0	-0.022	0	0	0	0.02
6	2	7	0	0.022	0	0	0	-0.02
		6	0	-0.022	0	0	0	0.03
7	2	6	0	0.022	0	0	0	-0.03
		5	0	-0.022	0	0	0	0.04
8	2	5	0	0.022	0	0	0	-0.04
		4	0	-0.022	0	0	0	0.05
9	2	4	0	0.022	0	0	0	-0.05
		3	0	-0.022	0	0	0	0.06
10	2	3	0	0.022	0	0	0	-0.06
		2	0	0.52	0	0	0	-0.007
11	2	2	0	-0.52	0	0	0	0.007
		1	0	2.145	0	0	0	-0.535

Maximum moment at bottom = 0.535 kNm say 1 kNm

R/F at Different Place

1> Water load

GSR - TOTAL HEIGHT 3.55 m						
Water load						
concrete grade	Fck	30	N/mm2	fyu c	130	N/mm 2
Steel grade	Fy	500	N/mm2	fyu cb	130	N/mm 2
Height of wall	H	3.55	m	fck bc	10.0	N/mm 2
Free board	Fb	0.3	m	fck t	1.5	N/mm 2
cover	Cv	45	mm	modula r ratio	m	9.3333
Maximum Diameter of bar	Db	12	mm	K	0.4179	
Minimum % steel	pt	0.35	%	j	0.8607	

Sr. no	Height from top m	Moment (kN-m) mm	Depth provide (mm) mm	effective depth(m) mm	Design Steel in mm2		Minimum steel / Dist steel in mm2		Required steel in mm2	
					Water face	soil face	Water face	soil face	Water face	soil face
1	0.45	-4.79	200	149	287		350	350	350	350
2	0.90	-8.67	238	187	414		417	417	417	417
3	1.35	-10.72	257	206	465		450	450	450	465
4	1.80	-10.05	276	225	399		483	483	483	483
5	2.25	-5.72	295	244	210		516	516	516	516
6	2.70	3.16	310	259	109		543	543	543	543
7	3.13	16.55	330	279	530		578	578	578	578
8	3.55	35.58	350	299	1064		613	613	1064	613

REINFORCMENT BAR PROVIDED

WATER FACE due to WATER LOAD

Dist in m	Ast required	Reinforcement				Ast Provided	
1	350	12	200			=	565 TRUE
2	417	12	200			=	565 TRUE
3	450	12	200			=	565 TRUE
4	483	12	200			=	565 TRUE
5	516	12	200	+	16 400	=	1068 TRUE
6	516	12	200			=	1068 TRUE

7	2.70	543	12	200 + 16	400	=	1068	TRUE
8	3.13	578	12	200 + 16	200	=	1571	TRUE
	3.55	1064	12	200 + 16	200	=	1571	TRUE

SOIL FACE due to WATER LOAD

	Dist in m	Ast required		Reinforcement			Ast Provided	
1	0.45	350	12	200	=		565	TRUE
2	0.90	417	12	200	=		565	TRUE
3	1.35	465	12	200	=		565	TRUE
4	1.80	483	12	200	=		565	TRUE
5	2.25	516	12	200	=		565	TRUE
6	2.70	543	12	200 + 10	200	=	958	TRUE
7	3.13	578	12	200 + 10	200	=	958	TRUE
8	3.55	613	12	200 + 10	200	=	958	TRUE

REINFORCMENT BAR PROVIDED

DISTRIBUTION STEEL

	Dist in m	Thickne ss	Ast require d		Reinforcement			Ast Provided	
1	0.45	200	350		10 150	=		524	OK
2	0.90	238	417		10 150	=		524	OK
3	1.35	257	450		10 150	=		524	OK
4	1.80	276	483		10 150	=		524	OK
5	2.25	295	516		10 100	=		785	OK
6	2.70	310	543		10 100	=		785	OK
7	3.13	330	578		10 100	=		785	OK
8	3.55	350	613		10 100	=		785	OK

2> Soil load

GSR - TOTAL HEIGHT 3.55 m											
Water load											
concrete grade	Fck	30	N/mm2	fy _c	130	N/mm2					
Steel grade	Fy	500	N/mm2	fy _{cb}	130	N/mm2					
Height of wall	H	3.55	m	fck _{bc}	10.0	N/mm2					
Free board	Fb	0.3	m	fck _t	1.5	N/mm2					
cover	Cv	45	mm	modu lar ratio	m	9.3333					
Maximum Diameter of bar	Db	12	mm	K	0.4179						
Minimum % steel	pt	0.35	%	j	0.8607						
Sr. no	Height from top m	Moment (kN-m) mm	Depth provide (mm) mm	effective depth(m) mm	Design Steel in mm2		Minimum steel / Dist steel in mm2		Required steel in mm2		
					Water face	soil face	Water face	soil face	Water face	soil face	
1	0.45	0.01	200	149	1		350	350	350	350	
2	0.90	-0.01	238	187	1		417	417	417	417	
3	1.35	0.03	257	206	1		450	450	450	450	
4	1.80	-0.03	276	225	2		483	483	483	483	
5	2.25	0.05	295	244	2		516	516	516	516	
6	2.70	-0.05	310	259	2		543	543	543	543	
7	3.13	0.06	330	279		0	578	578	578	578	
8	3.55	-0.54	350	299		16	613	613	613	613	
REINFORCEMENT BAR PROVIDED											
WATER FACE due to SOIL LOAD											
1	Dist in m	Ast required	Reinforcement				Ast Provid ed				
1	0.45	350	12	200			=	565	TRUE		
2	0.90	417	12	200			=	565	TRUE		
3	1.35	450	12	200			=	565	TRUE		
4	1.80	483	12	200			=	565	TRUE		
5	2.25	516	12	200	+	16 400	=	1068	TRUE		
6	2.70	543	12	200	+	16 400	=	1068	TRUE		

7	3.13	578	12	200	+	16	200	=	1571	TRUE	
8	3.55	613	12	200	+	16	200	=	1571	TRUE	
SOIL FACE due to SOIL LOAD											
	Dist in m	Ast required		Reinforcement					Ast Provided		
1	0.45	350	12	200				=	565	TRUE	
2	0.90	417	12	200				=	565	TRUE	
3	1.35	450	12	200				=	565	TRUE	
4	1.80	483	12	200				=	565	TRUE	
5	2.25	516	12	200				=	565	TRUE	
6	2.70	543	12	200	+	10	200	=	958	TRUE	
7	3.13	578	12	200	+	10	200	=	958	TRUE	
8	3.55	613	12	200	+	10	200	=	958	TRUE	
REINFORCEMENT BAR PROVIDED											
DISTRIBUTION STEEL											
	Dist in m	Thicknes s	Ast require d	Reinforcement					Ast Provid ed		
1	0.45	200	350	10	150			=	524	OK	
2	0.90	238	417	10	150			=	524	OK	
3	1.35	257	450	10	150			=	524	OK	
4	1.80	276	483	10	150			=	524	OK	
5	2.25	295	516	10	100			=	785	OK	
6	2.70	310	543	10	100			=	785	OK	
7	3.13	330	578	10	100			=	785	OK	
8	3.55	350	613	10	100			=	785	OK	

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/m3	fyuc	130 N/mm ²
Density of soil	denso	18	kN/m3	fyuc _b	130 N/mm ²
Density of concrete	decon	25	kN/m3	fckb _c	10.0 N/mm ²
Angle of Repose	Phi	30	degree	fckt	1.5 N/mm ²
Safe bearing capacity of soil	Sbc	150.0	kN/m2	modular ratio	9.33
Concrete grade	Fck	30	N/mm2	K	3
Steel grade	Fy	500	N/mm2	j	0.41
Depth below GI	Dbg	0.85	m		8
Water depth free board	wtd	3.10	m		0.86
Wall above Ground	fb	0.45	m		1
Clear cover	Cv	50	mm		
Maximum size of bar dia	Db	12	mm		
Water depth with free board	Wd	3.55	m		
minimum % steel	pt	0.35	%		
Moment					
Due to Water	Mtw	36.00	kN-m	(From Analysis Result)	
Due to soil if any	Mts	2.00	kN-m		
Wt from top dome/slab/column/wall	Slabwt	47.00	kN-m		
Wall geometry (Figure 1)					
Straight portion	lb	0.000	m		
Tapered portion	lc	3.550	m		
	tb	0.200	m		
	td	0.350	m		
Footing geometry					
Toe projection	ht	0.600	m		
Heel straight projection	hh1	1.000	m		
Heel tapered projection	hh2	0.000	m		
Heel portion for soil stability	hh3	0.500	m		
Thickness at toe (free end)	tta	0.450	m		
Thickness at toe (fwall face)	ttb	0.450	m		
Thickness at heel (wall end)	tha	0.450	m		
Thickness at heel (freel face)	thb	0.450	m		
Total Height of Wall	Tlw	3.550	m		
Total length of wall footing	wf	1.950	m		
CASE 1 : TANK FULL CONDITION WITH NO SOIL OUTSIDE					
Total load & Moment calculation					
Taking moment @ toe					
Component	Wt	Lever	Mome		

		kN	Arm m	nt kN-m W * dist
		W	Dist	
Wall Straight portion	W 1	17.75	0.85	15.09
Wall Tapered portion	W 2	6.66	0.70	4.66
Walkway/slab	P	47.00	0.85	39.95
Footing	W			
Footing : toe	W 3	6.75	0.30	2.03
Footing center	W 4	3.94	0.78	3.05
Footing : heel (straight)	W 5	11.25	1.45	16.31
Footing : heel (tapered)	W 6	0.00	1.95	0.00
Water	W 7	35.50	1.45	51.48

Total downward load		128.8	4	132.56
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Total restoring moment @ toe	TRM	132.6	kN-m
Total over turning moment		36.0	kN-m
F.S.against over turning		3.7	

Check for over turning Hense o.k

Total moment due to vertical load	Tmv	132.6	kN-m
Total moment due to horizontal load	Tmh	36.0	kN-m
Total vertical load	TPv	128.8	kn
Net Moment	Tmn	96.6	kN-m
M/p	E	0.75	m
Ecc	Ecc	0.226	m
b/6	Aec	0.33	m
		29.06	
Net moment From ECC	Mdg	2	

Property of footing

Width of footing		1.00	m
Depth of footing		1.95	m
Footing Area	Fare	1.95	m ²
Modulus of section	Fz	0.63	m ³

Pressure distribution			
Pressure due to direct load =P/A	prea	66.07	kN/m
		2	
Pressure due to moment =M/Z	Preb	45.86	kN/m
		2	
Pressure			
Maximum pressure - P/A + M/Z	Pma	111.9	kN/m
	x	3	2
Minimum pressure - P/A + M/Z	Pmin	20.22	kN/m

2

Check for SBC

Maximum pressure < SBC

OK

Minimum pressure > 0

OK

,91.71

Pressure difference

4

47.03

Pressure difference / m

3

Pressure at outer Wall face - A

preow 83.71

kN/m

2

Pressure at inner Wall
face B

preiw 67.25

kN/m

2

Pressure at point C

preiw1 20.22

kN/m

2

Design of Toe - At Point A

Moment at face of outer wall

Due to rectangle diagram

Mreco 15.07 kN-m

Mtrio 3.39 kN-m

Total moment due to upward pressure

18.45 kN-m

Net moment at A from Toe side

Toem 18.45 kN-m

Thickness at toe

450 mm

Effective depth

Def toe 394 mm

Ast required =

419 mm²

Check for minimum steel

top

787.5 mm²

bottom

350 mm²

Design Steel

Main steel - Top

788 mm²

Main steel - bottom

419 mm²

Distribution steel - top

788 mm²

Distribution steel - bottom

350 mm²**Design of heel : At point B & C****Design at point B**

Due to rectangle diagram (upward)

Mreci 10.1 kN-m

Mtrii 7.8 kN-m

Total Upward moment

17.9 kN-m

Due to water (down ward)

17.8 kN-m

Net downward moment at B from heel side

heelm 0.2 kN-m

Thickness Provided

450 mm

defhe

el 394 mm

Ast required =

4 mm²

Check for minimum steel - straight portion

top

787.5 mm²

bottom

350 mm²

Design Steel

Main steel - Top

788 mm²

Main steel - bottom

350 mm²

Distribution steel - top

788 mm²

Distribution steel -bottom

350 mm²

Design at point C

Due to rectangle diagram (upward)	Mreci	0.00	kN-m
	Mtrii	0.00	kN-m
Total Upward moment		0.00	kN-m
Due to water (down ward)		0.00	kN-m
Net downward moment at B from heel side	heelm	0.00	kN-m
Thickness Provided		450	mm
	defhe		
	el	394	mm
Ast required =		0	mm2
Check for minimum steel - tapered portion			
Average thickness	thav	0.45	m
top		787.5	mm2
bottom		350	mm2
Design Steel			
Main steel - Top		788	mm2
Main steel - bottom		350	mm2
Distribution steel - top		788	mm2
Distribution steel -bottom		350	mm2

CASE 2 : TANK EMPTY CONDITION WITH SOIL OUTSIDE

Total load & Moment calculation

Taking moment @ toe

Component		Wt kN W	Lever Arm m Dist	Moment kN-m W * dist
Wall Straight portion	W1	17.75	0.60	10.65
Wall Tapered portion	W2	6.66	0.75	4.99
Walkway/slab	P	47.00	0.60	28.20
Footing				
Footing : toe	W3	6.75	1.15	7.76
Footing center	W4	3.94	0.68	2.66
Footing : heel	W5	5.63	0.25	1.41
Soil on toe	W6	9.18	1.15	10.56

Total downward load		96.90		66.23
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Total restoring moment @ heel	TRMs	66.2		kN-m
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Total over turning moment due to soil		2.0		kN-m
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F.S.against over turning		33.1		
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Check for over turning	Hense o.k			
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Total moment due to vertical load	Tmv1	66.2		kN-m
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Total moment due to horizontal load	Tmh1	2.0		kN-m
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Total vertical load	TPv1	96.9		kn
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Net Moment	Tmn1	64.2		kN-m
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M/p	E1	0.66		m
-----	----	------	--	---

Ecc	Ecc1	0.062		m
-----	------	-------	--	---

b/6	Aec1	0.24		m
-----	------	------	--	---

Net moment From ECC	Mdg1	6.02584		
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Property of footing

Width of footing		1.00		m
------------------	--	------	--	---

Depth of footing		1.45		m
------------------	--	------	--	---

Footing Area	Fare1	1.45		m2
--------------	-------	------	--	----

Modulus of section	Fz1	0.35		m3
--------------------	-----	------	--	----

Pressure distribution

Pressure due to direct load =P/A	prea1	66.83		kN/m2
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Pressure due to moment =M/Z	Preb1	17.2		kN/m2
-----------------------------	-------	------	--	-------

Pressure			
Maximum pressure - P/A + M/Z	Pmax1	84.02	kN/m2
Minimum pressure - P/A + M/Z	Pmin1	49.63	kN/m2
Check for SBC			
Maximum pressure < SBC		OK	
Minimum pressure > 0		OK	
Pressure difference		34.39	kN/m2
Pressure difference / m		23.72	kN/m2
Pressure at outer Wall face - A	preow1	63.86	kN/m2
Pressure at inner Wall face B	preiw1	72.16	kN/m2

Design of Toe - At Point A

Moment at face of outer wall			
Due to rectangle diagram	Mreco1	8.93	kn-m
Due to triangular diagram	Mtrio1	0.85	kn-m
Total moment due to upward pressure		9.79	kn-m
Total downward moment due to soil		2.75	kn-m
Net moment at A from Toe side	Toem1	-7.03	kn-m
Thickness at toe		450	mm
Effective depth	DefToe1	394	mm
Ast required =		-159.54	mm2
Check for minimum steel			
top		788	mm2
bottom		350	mm2
Design Steel			
Main steel - Top		788	mm2
Main steel - bottom		350	mm2
Distribution steel - top		788	mm2
Distribution steel - bottom		350	mm2

Design of heel : At point B

Design at point B

Due to rectangle diagram (upward)	Mreci1	9.02	kn-m
	Mtrii1	0.99	kn-m
Total Upward moment	heelm1	10.01	kn-m
Net downward moment at B from heel side		450	mm
Thickness Provided	defheel1	394	mm
Steel required at bottom		227	mm2
Ast required =			
Check for minimum steel - straight portion			
top		787.5	mm2
bottom		350	mm2
Design Steel			
Main steel - Top		788	mm2
Main steel - bottom		350	mm2
Distribution steel - top		788	mm2
Distribution steel -bottom		350	mm2

DESIGN OF FLAT SLAB

Top slab

Loading:

Assume top slab = 200 th

- (1) Dead load = $0.200 \times 2.5 = 0.5 \text{ t/m}^2$
- (2) Live load = 0.150 t/m^2
- (3) Finishing load = 0.125 t/m^2

Total load = 0.775 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 3.35 0 0; 3 6.85 0 0; 4 10.35 0 0; 5 13.85 0 0; 6 17.35 0 0; 7 20.85 0 0; 8 24.2 0 0; 9 0 0 3.35; 10 3.35 0 3.35; 11 6.85 0 3.35; 12 10.35 0 3.35; 13 13.85 0 3.35; 14 17.35 0 3.35; 15 20.85 0 3.35; 16 24.2 0 3.35; 17 0 0 6.85; 18 3.35 0 6.85; 19 6.85 0 6.85; 20 10.35 0 6.85; 21 13.85 0 6.85; 22 17.35 0 6.85; 23 20.85 0 6.85; 24 24.2 0 6.85; 25 0 0 10.35; 26 3.35 0 10.35; 27 6.85 0 10.35; 28 10.35 0 10.35; 29 13.85 0 10.35; 30 17.35 0 10.35; 31 20.85 0 10.35; 32 24.2 0 10.35; 33 0 0 13.85; 34 3.35 0 13.85; 35 6.85 0 13.85; 36 10.35 0 13.85; 37 13.85 0 13.85; 38 17.35 0 13.85; 39 20.85 0 13.85; 40 24.2 0 13.85; 41 0 0 17.35; 42 3.35 0 17.35; 43 6.85 0 17.35; 44 10.35 0 17.35; 45 13.85 0 17.35; 46 17.35 0 17.35; 47 20.85 0 17.35; 48 24.2 0 17.35; 49 0 0 20.85; 50 3.35 0 20.85; 51 6.85 0 20.85; 52 10.35 0 20.85; 53 13.85 0 20.85; 54 17.35 0 20.85; 55 20.85 0 20.85; 57 0 0 24.2; 58 3.35 0 24.2; 59 6.85 0 24.2; 60 10.35 0 24.2; 61 13.85 0 24.2; 62 17.35 0 24.2; 63 20.85 0 24.2; 64 24.2 0 24.2; 65 0.335 0 0; 66 0.335 0 0.335; 67 0 0 0.335; 68 0.67 0 0; 69 0.67 0 0.335; 70 1.005 0 0; 71 1.005 0 0.335; 72 1.34 0 0; 73 1.34 0 0.335; 74 1.675 0 0; 75 1.675 0 0.335; 76 2.01 0 0; 77 2.01 0 0.335; 78 2.345 0 0; 79

MEMBER INCIDENCES

55 48 64; 98 47 3629; 4382 3629 3630; 4384 3630 3631; 4386 3631 3632;
4388 3632 3633; 4390 3633 3634; 4392 3634 3635; 4394 3635 3636; 4396 3636 3637;
4398 3637 48; 6062 5038 64; 6069 3634 4246; 6070 4336 4948; 6071 4246 4256;
6072 4256 4266; 6073 4266 4276; 6074 4276 4286; 6075 4286 4296; 6076 4296 4306;
6077 4306 4316; 6078 4316 4326; 6079 4326 4336; 6080 4948 4958; 6081 4958 4968;
6082 4968 4978; 6083 4978 4988; 6084 4988 4998; 6085 4998 5008; 6086 5008 5018;
6087 5018 5028; 6088 5028 5038;

ELEMENT INCIDENCES SHELL

165 1 65 66 67; 167 65 68 69 66; 169 68 70 71 69; 171 70 72 73 71; 173 72 74 75 73; 175 74 76 77 75; 177 76 78 79 77; 179 78 80 81 79; 181 80 82 83 81; 183 82 84 83; 185 67 66 85 86; 186 66 69 87 85; 187 69 71 88 87; 188 71 73 89 88; 189 73 75 90 89; 190 75 77 91 90; 191 77 79 92 91; 192 79 81 93 92; 193 81 83 94 93; 195 83 84 95 94; 197 86 85 96 97; 198 85 87 98 96; 199 87 88 99 98; 200 88 89 100 99; 201 89 90 101 100; 202 90 91 102 101; 203 91 92 103 102; 204 92 93 104 103; 205 93 94 105 104; 207 94 95 106 105; 209 97 96 107 108; 210 96 98 109 107; 211 98 99 110 109; 212 99 100 111 110; 213 100 101 112 111; 214 101 102 113 112; 215 102 103 114 113; 216 103 104 115 114; 217 104 105 116 115; 219 105 106 117 116; 221 108 107 118 119; 222 107 109 120 118; 223 109 110 121 120; 224 110 111 122 121; 225 111 112 123 122; 226 112 113 124 123; 227 113 114 125 124;

ELEMENT PROPERTY

298 408 425 535 552 662 679 789 806 916 933 1043 1072 1187 1188 1198 1288 -
1305 1306 1316 1406 1423 1424 1434 1524 1541 1542 1552 1642 1659 1660 1670 -
1760 1777 1778 1878 1907 2022 2023 2033 2123 2140 2141 2151 2241 2258 2259 -
2269 2359 2376 2377 2387 2477 2494 2495 2505 2595 2612 2613 2713 2742 2857 -
2858 2868 2958 2975 2976 2986 3076 3093 3094 3104 3194 3211 3212 3222 3312 -
3329 3330 3340 3430 3447 3448 3548 3577 3692 3693 3703 3793 3810 3811 3821 -
3911 3928 3929 3939 4029 4046 4047 4057 4147 4164 4165 4175 4265 4282 4283 -
4383 4412 4527 4528 4538 4628 4645 4646 4656 4746 4763 4764 4774 4864 4881 -
4882 4892 4982 4999 5000 5010 5100 5117 5118 5218 5247 5363 5373 5481 5491 -
5599 5609 5717 5727 5835 5845 5953 THICKNESS 0.35
165 167 169 171 173 175 177 179 181 183 185 TO 193 195 197 TO 205 207 209 -
210 TO 217 219 221 TO 229 231 233 TO 241 243 245 TO 253 255 257 TO 265 267 -
269 TO 277 279 281 283 285 287 289 291 293 295 297 300 302 304 306 308 310 -
312 314 316 318 TO 327 329 TO 338 340 TO 349 351 TO 360 362 TO 371 -
373 TO 382 384 TO 393 395 TO 404 406 410 412 414 416 418 420 422 424 427 -
429 431 433 435 437 439 441 443 445 TO 454 456 TO 465 467 TO 476 478 TO 487 -

489 TO 498 500 TO 509 511 TO 520 522 TO 531 533 537 539 541 543 545 547 549 -
551 554 556 558 560 562 564 566 568 570 572 TO 581 583 TO 592 594 TO 603 -
605 TO 614 616 TO 625 627 TO 636 638 TO 647 649 TO 658 660 664 666 668 670 -
672 674 676 678 681 683 685 687 689 691 693 695 697 699 TO 708 710 TO 719 -
721 TO 730 732 TO 741 743 TO 752 754 TO 763 765 TO 774 776 TO 785 787 791 -
793 795 797 799 801 803 805 808 810 812 814 816 818 820 822 824 826 TO 835 -
837 TO 846 848 TO 857 859 TO 868 870 TO 879 881 TO 890 892 TO 901 -
903 TO 912 914 918 920 922 924 926 928 930 932 935 937 939 941 943 945 947 -
949 951 953 TO 962 964 TO 973 975 TO 984 986 THICKNESS 0.2
1886 1888 1890 1892 1894 1895 1897 TO 1905 1909 TO 1917 1919 1921 TO 1929 -
1931 1933 TO 1941 1943 1945 TO 1953 1955 1957 TO 1965 1967 1969 TO 1977 1979 -
1981 TO 1989 1991 1993 TO 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019 -
2021 2024 TO 2031 2034 TO 2042 2044 TO 2053 2055 TO 2064 2066 TO 2075 2077 -
2078 TO 2086 2088 TO 2097 2099 TO 2108 2110 TO 2119 2121 2125 2127 2129 2131 -
2133 2135 2137 2139 2142 TO 2149 2152 TO 2160 2162 TO 2171 2173 TO 2182 2184 -
2185 TO 2193 2195 TO 2204 2206 TO 2215 2217 TO 2226 2228 TO 2237 2239 2243 -
2245 2247 2249 2251 2253 2255 2257 2260 TO 2267 2270 TO 2278 2280 TO 2289 -
2291 TO 2300 2302 TO 2311 2313 TO 2322 2324 TO 2333 2335 TO 2344 -
2346 TO 2355 2357 2361 2363 2365 2367 2369 2371 2373 2375 2378 TO 2385 2388 -
THICKNESS 0.2
2769 TO 2776 2778 2780 TO 2788 2790 2792 TO 2800 2802 2804 TO 2812 2814 2816 -
2817 TO 2824 2826 2828 TO 2836 2838 2840 2842 2844 2846 2848 2850 2852 2854 -
2856 2859 TO 2866 2869 TO 2877 2879 TO 2888 2890 TO 2899 2901 TO 2910 2912 -
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3020 TO 3028 3030 TO 3039 3041 TO 3050 3052 TO 3061 3063 TO 3072 3074 3078 -
3080 3082 3084 3086 3088 3090 3092 3095 TO 3102 3105 TO 3113 3115 TO 3124 -
3126 TO 3135 3137 TO 3146 3148 TO 3157 3159 TO 3168 3170 TO 3179 -
THICKNESS 0.2
3661 3663 TO 3671 3673 3675 3677 3679 3681 3683 3685 3687 3689 3691 -
3694 TO 3701 3704 TO 3712 3714 TO 3723 3725 TO 3734 3736 TO 3745 -
3747 TO 3756 3758 TO 3767 3769 TO 3778 3780 TO 3789 3791 3795 3797 3799 3801 -
3803 3805 3807 3809 3812 TO 3819 3822 TO 3830 3832 TO 3841 3843 TO 3852 3854 -
3855 TO 3863 3865 TO 3874 3876 TO 3885 3887 TO 3896 3898 TO 3907 3909 3913 -
3915 3917 3919 3921 3923 3925 3927 3930 TO 3937 3940 TO 3948 3950 TO 3959 -
3961 TO 3970 3972 TO 3981 3983 TO 3992 3994 TO 4003 4005 TO 4014 -
4016 TO 4025 4027 4031 4033 4035 4037 4039 4041 4043 4045 4048 TO 4055 4058 -
4059 TO 4066 4068 TO 4077 4079 TO 4088 4090 TO 4099 4101 TO 4110 4112 TO 4121 -
4123 TO 4132 4134 TO 4143 4145 4149 4151 4153 4155 4157 4159 4161 4163 4166 -
4167 TO 4173 4176 TO 4184 4186 TO 4195 4197 TO 4206 4208 TO 4217 4219 TO 4228 -
4230 TO 4239 4241 TO 4250 4252 TO 4261 4263 4267 4269 4271 4273 4275 4277 -
4279 4281 4284 TO 4291 4293 TO 4302 4304 TO 4313 4315 TO 4324 4326 TO 4335 -
4337 TO 4346 4348 TO 4357 4359 TO 4368 4370 TO 4379 4381 4385 4387 4389 4391 -
4393 4395 4397 4399 4400 4402 TO 4410 4414 TO 4422 4424 4426 TO 4434 4436 -
4438 TO 4446 4448 4450 TO 4458 4460 4462 TO 4470 4472 4474 TO 4482 4484 4486 -
4487 TO 4494 4496 4498 TO 4506 4508 4510 4512 4514 4516 4518 4520 4522 4524 -
4526 4529 TO 4536 4539 THICKNESS 0.2
5451 TO 5459 5461 5463 5465 5467 5469 5471 5473 5475 5477 5479 5480 -
5482 TO 5489 5492 TO 5500 5502 TO 5511 5513 TO 5522 5524 TO 5533 -
5535 TO 5544 5546 TO 5555 5557 TO 5566 5568 TO 5577 5579 5581 5583 5585 5587 -
5589 5591 5593 5595 5597 5598 5600 TO 5607 5610 TO 5618 5620 TO 5629 5631 -
5632 TO 5640 5642 TO 5651 5653 TO 5662 5664 TO 5673 5675 TO 5684 5686 TO 5695 -
5697 5699 5701 5703 5705 5707 5709 5711 5713 5715 5716 5718 TO 5725 5728 -
5729 TO 5736 5738 TO 5747 5749 TO 5758 5760 TO 5769 5771 TO 5780 5782 TO 5791 -
5793 TO 5802 5804 TO 5813 5815 5817 5819 5821 5823 5825 5827 5829 5831 5833 -
5834 5836 TO 5843 5846 TO 5854 5856 TO 5865 5867 TO 5876 5878 TO 5887 5889 -
5890 TO 5898 5900 TO 5909 5911 TO 5920 5922 TO 5931 5933 5935 5937 5939 5941 -
5943 5945 5947 5949 5951 5952 5954 TO 5958 5964 TO 5969 5975 TO 5980 5986 -
5987 TO 5991 5997 TO 6002 6008 TO 6013 6019 TO 6024 6030 TO 6035 6041 TO 6046 -
6053 6055 6057 6059 6061 6063 THICKNESS 0.2

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

MEMBER PROPERTY INDIAN

98 4382 4384 4386 4388 4390 4392 4394 4396 4398 6069 TO 6087 -

6088 PRIS YD 0.45 ZD 0.23

55 6062 PRIS YD 0.1 ZD 0.1

CONSTANTS

MATERIAL CONCRETE ALL

SUPPORTS

1 TO 55 57 TO 65 67 68 70 72 74 76 78 80 82 86 97 108 119 130 141 152 163 -

182 184 186 188 190 192 194 196 198 290 292 294 296 298 300 302 304 306 398 -

400 402 404 406 408 410 412 414 506 508 510 512 514 516 518 520 522 614 616 -

618 620 622 624 626 628 630 722 724 726 728 730 732 734 736 738 740 750 760 -

770 780 790 800 810 820 831 842 853 864 875 886 897 908 919 1442 1452 1462 -

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2144 2154 2164 2174 2184 2194 2204 2214 2224 2235 2246 2257 2268 2279 2290 -

2301 2312 2323 2846 2856 2866 2876 2886 2896 2906 2916 2926 2937 2948 2959 -

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4407 4418 4429 4439 TO 4447 4538 TO 4546 4637 TO 4645 4736 TO 4744 -

4835 TO 4843 4934 TO 4942 5033 TO 5038 PINNED

LOAD 1 LOADTYPE Dead TITLE DL

SELFWEIGHT Y -1

ELEMENT LOAD

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210 TO 217 219 221 TO 229 231 233 TO 241 243 245 TO 253 255 257 TO 265 267 -

269 TO 277 279 281 283 285 287 289 291 293 295 297 298 300 302 304 306 308 -

310 312 314 316 318 TO 327 329 TO 338 340 TO 349 351 TO 360 362 TO 371 373 -

374 TO 382 384 TO 393 395 TO 404 406 408 410 412 414 416 418 420 422 424 425 -

427 429 431 433 435 437 439 441 443 445 TO 454 456 TO 465 467 TO 476 478 -

479 TO 487 489 TO 498 500 TO 509 511 TO 520 522 TO 531 533 535 537 539 541 -

543 545 547 549 551 552 554 556 558 560 562 564 566 568 570 572 TO 581 583 -

584 TO 592 594 TO 603 605 TO 614 616 TO 625 627 TO 636 638 TO 647 649 TO 658 -

660 662 664 666 668 670 672 674 676 678 679 681 683 685 687 689 691 693 695 -

697 699 TO 708 710 TO 719 721 TO 730 732 TO 741 743 TO 752 754 TO 763 765 -

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871 TO 879 881 TO 890 892 TO 901 903 TO 912 914 916 918 920 922 924 926 928 -

930 932 933 935 937 939 941 943 945 947 949 PR GY -1.25

951 953 TO 962 964 TO 973 975 TO 984 986 TO 995 997 TO 1006 1008 TO 1017 1019 -

1020 TO 1028 1030 TO 1039 1041 1043 1045 1047 1049 1051 1053 1055 1057 1059 -

1060 1062 TO 1070 1072 1074 TO 1082 1084 1086 TO 1094 1096 1098 TO 1106 1108 -

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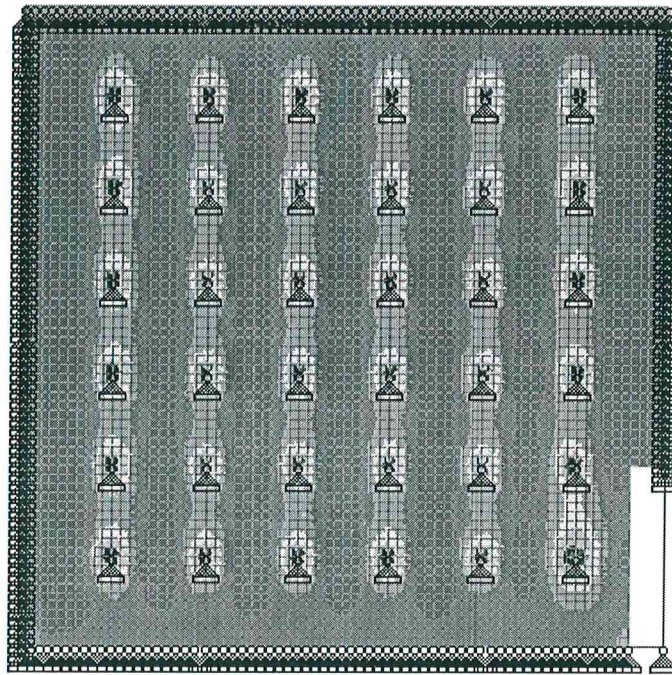
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 1747 TO 1756 1758 1760 1762 1764 1766 1768 1770 1772 1774 1776 TO 1786 1788 -
 1789 TO 1797 1799 TO 1808 1810 TO 1819 1821 TO 1830 1832 TO 1841 -
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 2729 2730 2732 TO 2740 2742 2744 TO 2752 2754 2756 TO 2764 2766 2768 TO 2776 -
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 3256 TO 3264 3266 TO 3275 3277 TO 3286 3288 TO 3297 3299 TO 3308 3310 3312 -
 3314 3316 3318 3320 3322 3324 3326 3328 TO 3338 3340 TO 3349 3351 TO 3360 -
 3362 TO 3371 3373 TO 3382 3384 TO 3393 3395 TO 3404 3406 TO 3415 -
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 3524 TO 3533 3535 TO 3544 3546 3548 3550 3552 3554 3556 3558 3560 3562 3564 -
 3565 3567 TO 3575 3577 3579 TO 3587 3589 3591 TO 3599 3601 3603 TO 3611 3613 -
 3615 PR GY -1.25
 3616 TO 3623 3625 3627 TO 3635 3637 3639 TO 3647 3649 3651 TO 3659 3661 3663 -
 3664 TO 3671 3673 3675 3677 3679 3681 3683 3685 3687 3689 3691 TO 3701 3703 -
 3704 TO 3712 3714 TO 3723 3725 TO 3734 3736 TO 3745 3747 TO 3756 3758 TO 3767 -
 3769 TO 3778 3780 TO 3789 3791 3793 3795 3797 3799 3801 3803 3805 3807 3809 -
 3810 TO 3819 3821 TO 3830 3832 TO 3841 3843 TO 3852 3854 TO 3863 3865 TO 3874 -
 3876 TO 3885 3887 TO 3896 3898 TO 3907 3909 3911 3913 3915 3917 3919 3921 -
 3923 3925 3927 TO 3937 3939 TO 3948 3950 TO 3959 3961 TO 3970 3972 TO 3981 -
 3983 TO 3992 3994 TO 4003 4005 TO 4014 4016 TO 4025 4027 4029 4031 4033 4035 -
 PR GY -1.25
 4500 TO 4506 4508 4510 4512 4514 4516 4518 4520 4522 4524 4526 TO 4536 4538 -
 4539 TO 4547 4549 TO 4558 4560 TO 4569 4571 TO 4580 4582 TO 4591 4593 TO 4602 -
 4604 TO 4613 4615 TO 4624 4626 4628 4630 4632 4634 4636 4638 4640 4642 4644 -
 4645 TO 4654 4656 TO 4665 4667 TO 4676 4678 TO 4687 4689 TO 4698 4700 TO 4709 -
 4711 TO 4720 4722 TO 4731 4733 TO 4742 4744 4746 4748 4750 4752 4754 4756 -
 4758 4760 4762 TO 4772 4774 TO 4783 4785 TO 4794 4796 TO 4805 4807 TO 4816 -
 4818 TO 4827 4829 TO 4838 4840 TO 4849 4851 TO 4860 4862 4864 4866 4868 4870 -
 4872 4874 4876 4878 4880 TO 4890 4892 TO 4901 4903 TO 4912 4914 TO 4923 4925 -
 4926 TO 4934 4936 TO 4945 4947 TO 4956 4958 TO 4967 4969 TO 4978 4980 4982 -
 PR GY -1.25
 5396 TO 5404 5406 TO 5415 5417 TO 5426 5428 TO 5437 5439 TO 5448 5450 TO 5459 -
 5461 5463 5465 5467 5469 5471 5473 5475 5477 5479 TO 5489 5491 TO 5500 5502 -
 5503 TO 5511 5513 TO 5522 5524 TO 5533 5535 TO 5544 5546 TO 5555 5557 TO 5566 -
 5568 TO 5577 5579 5581 5583 5585 5587 5589 5591 5593 5595 5597 TO 5607 5609 -
 5610 TO 5618 5620 TO 5629 5631 TO 5640 5642 TO 5651 5653 TO 5662 5664 TO 5673 -
 5675 TO 5684 5686 TO 5695 5697 5699 5701 5703 5705 5707 5709 5711 5713 5715 -
 5716 TO 5725 5727 TO 5736 5738 TO 5747 5749 TO 5758 5760 TO 5769 5771 TO 5780 -
 PR GY -1.25
 LOAD 2 LOADTYPE Live REDUCIBLE TITLE LL
 ELEMENT LOAD
 165 167 169 171 173 175 177 179 181 183 185 TO 193 195 197 TO 205 207 209 -
 210 TO 217 219 221 TO 229 231 233 TO 241 243 245 TO 253 255 257 TO 265 267 -
 269 TO 277 279 281 283 285 287 289 291 293 295 297 298 300 302 304 306 308 -
 310 312 314 316 318 TO 327 329 TO 338 340 TO 349 351 TO 360 362 TO 371 373 -
 374 TO 382 384 TO 393 395 TO 404 406 408 410 412 414 416 418 420 422 424 425 -
 427 429 431 433 435 437 439 441 443 445 TO 454 456 TO 465 467 TO 476 478 -
 479 TO 487 489 TO 498 500 TO 509 511 TO 520 522 TO 531 533 535 537 539 541 -
 543 545 547 549 551 552 554 556 558 560 562 564 566 568 570 572 TO 581 583 -

584 TO 592 594 TO 603 605 TO 614 616 TO 625 627 TO 636 638 TO 647 649 TO 658 -
660 662 664 666 668 670 672 674 676 678 679 681 683 685 687 689 691 693 695 -
697 699 TO 708 710 TO 719 721 TO 730 732 TO 741 743 TO 752 754 TO 763 765 -
766 TO 774 776 TO 785 787 789 791 793 795 797 799 801 803 805 806 808 810 -
812 814 816 818 820 822 824 826 TO 835 837 TO 846 848 TO 857 859 TO 868 870 -
871 TO 879 881 TO 890 892 TO 901 903 TO 912 914 916 918 920 922 924 926 928 -
930 932 933 935 937 939 941 943 945 947 949 PR GY -1.5
951 953 TO 962 964 TO 973 975 TO 984 986 TO 995 997 TO 1006 1008 TO 1017 1019 -
1020 TO 1028 1030 TO 1039 1041 1043 1045 1047 1049 1051 1053 1055 1057 1059 -
1060 1062 TO 1070 1072 1074 TO 1082 1084 1086 TO 1094 1096 1098 TO 1106 1108 -
1110 TO 1118 1120 1122 TO 1130 1132 1134 TO 1142 1144 1146 TO 1154 1156 1158 -
1159 TO 1166 1168 1170 1172 1174 1176 1178 1180 1182 1184 1186 TO 1196 1198 -
1199 TO 1207 1209 TO 1218 1220 TO 1229 1231 TO 1240 1242 TO 1251 1253 TO 1262 -
1264 TO 1273 1275 TO 1284 1286 1288 1290 1292 1294 1296 1298 1300 1302 1304 -
1305 TO 1314 1316 TO 1325 1327 TO 1336 1338 TO 1347 1349 TO 1358 1360 TO 1369 -
1371 TO 1380 1382 TO 1391 1393 TO 1402 1404 1406 1408 1410 1412 1414 1416 -
1418 1420 1422 TO 1432 1434 TO 1443 1445 TO 1454 1456 TO 1465 1467 TO 1476 -
PR GY -1.5
2729 2730 2732 TO 2740 2742 2744 TO 2752 2754 2756 TO 2764 2766 2768 TO 2776 -
2778 2780 TO 2788 2790 2792 TO 2800 2802 2804 TO 2812 2814 2816 TO 2824 2826 -
2828 TO 2836 2838 2840 2842 2844 2846 2848 2850 2852 2854 2856 TO 2866 2868 -
2869 TO 2877 2879 TO 2888 2890 TO 2899 2901 TO 2910 2912 TO 2921 2923 TO 2932 -
2934 TO 2943 2945 TO 2954 2956 2958 2960 2962 2964 2966 2968 2970 2972 2974 -
2975 TO 2984 2986 TO 2995 2997 TO 3006 3008 TO 3017 3019 TO 3028 3030 TO 3039 -
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3088 3090 3092 TO 3102 3104 TO 3113 3115 TO 3124 3126 TO 3135 3137 TO 3146 -
3148 TO 3157 3159 TO 3168 3170 TO 3179 3181 TO 3190 3192 3194 3196 3198 3200 -
PR GY -1.5
3616 TO 3623 3625 3627 TO 3635 3637 3639 TO 3647 3649 3651 TO 3659 3661 3663 -
3664 TO 3671 3673 3675 3677 3679 3681 3683 3685 3687 3689 3691 TO 3701 3703 -
3704 TO 3712 3714 TO 3723 3725 TO 3734 3736 TO 3745 3747 TO 3756 3758 TO 3767 -
3769 TO 3778 3780 TO 3789 3791 3793 3795 3797 3799 3801 3803 3805 3807 3809 -
3810 TO 3819 3821 TO 3830 3832 TO 3841 3843 TO 3852 3854 TO 3863 3865 TO 3874 -
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4872 4874 4876 4878 4880 TO 4890 4892 TO 4901 4903 TO 4912 4914 TO 4923 4925 -
PR GY -1.5
LOAD 3 LOADTYPE Dead TITLE WALL
MEMBER LOAD
6069 TO 6088 UNI GY -11.5
LOAD COMB 4 COMBINATION LOAD
1 1.0 2 1.0
LOAD COMB 5 COMBINATION LOAD
1 1.0 2 1.0 3 1.0
PERFORM ANALYSIS
LOAD LIST 4 5
FINISH

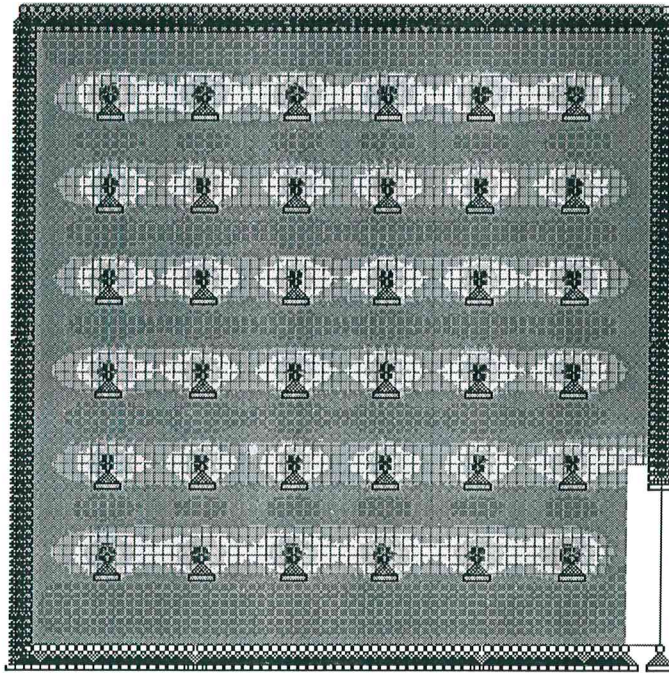
MX (local)
kNm/m

█	<= -32.2
█	-29.8
█	-27.4
█	-24.9
█	-22.5
█	-20.1
█	-17.7
█	-15.3
█	-12.8
█	-10.4
█	-8
█	-5.58
█	-3.16
█	-0.742
█	1.68
█	4.1
█	>= 6.51



STRESS DIAGRAM – MX

MY (local)
 kNm/m
 <= -26.4
 -24.4
 -22.3
 -20.3
 -18.2
 -16.1
 -14.1
 -12
 -9.96
 -7.9
 -5.84
 -3.78
 -1.71
 0.346
 2.41
 4.47
 >= 6.53



STRESS DIAGRAM – MY

Design of bottom Reinforcement

Provide depth of 200 mm

Program for Finding Wall steel subject to moment & Axial tension

Basic Data

Concrete mix	fc	30	N/mm2
Modular ratio	m	9.	
Permissible stress in concrete : Direct tension	Ps	33	N/mm2
Permissible stress in concrete : bending	tb	20	N/mm2
Permissible stress in steel	Ps	13	
Cover	tt	00	kg/cm2
Wall thickness	Cv	45	mm
	wt	0.	
	h	2	m

Type A : Horizontal wall : Horizontal steel at corner

Depth provide 200 mm

At Corner	Load case	Moment /comp kn-m	Tension /comp kn/m2	Design moment kn-m	Design tension kn	Calculation for constant	Depth required mm	Depth provided mm	Effective depth mm	Ecc due to moment mm	Ecc moment mm	Steel for moment cm2	Steel for tension cm2	Total steel cm2	Minimum steel cm2
bottom	3	9.0	0.0	9.0	11.0	0. 27 0. 1 0 4	160	200	155	818	7 6 3 8.4	4.79	0.85	5.6 3	4.34
bottom	3	9.0	0.0	9.0	11.0	0. 27 0. 1 0 4	160	200	155	818	7 6 3 8.4	4.79	0.85	5.6 3	4.34

Check for Shear:

Slab is to be checked at a distance $d/2$ from column head

Total depth $D = 200$

Effective depth $= 200 - 45 - 5 = 150$ mm

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

Total panel load $= 3.5 \times 3.5 \times 0.775 = 9.50$ T

Net load at critical section

$$= 9.50 - 0.94 \times 0.94 \times 0.775$$

$$= 8.82 \text{ T}$$

Net load at critical section $= 8.82$ T

Actual shear stress $= 8.82 \times 10^4 / (940 \times 4 \times 150)$

$$= 0.156 \text{ N/mm}^2$$

Permissible stress $= K_s \times T_c$

$$T_c = 0.16 * f_{ck}^{0.5}$$

$$= 0.16 * 30^{0.5}$$

$$= 0.87$$

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

Beta $= 1$

Hence $K_s = 1.0$

$T_c = 0.87 * 1 = 0.87 \text{ N/mm}^2 \gg 0.156 \text{ O.K.}$

COLUMN REACTION

Node	L/C	Force-X kN	Force-Y kN	Force-Z kN	Moment- X kNm	Moment- Y kNm	Moment- Z kNm
10	4	0	116.398	0	0	0	0
11	4	0	105.292	0	0	0	0
12	4	0	107.597	0	0	0	0
13	4	0	107.598	0	0	0	0
14	4	0	105.299	0	0	0	0
15	4	0	116.411	0	0	0	0
18	4	0	105.292	0	0	0	0
19	4	0	91.693	0	0	0	0
20	4	0	94.754	0	0	0	0
21	4	0	94.754	0	0	0	0
22	4	0	91.671	0	0	0	0
23	4	0	105.23	0	0	0	0
26	4	0	107.597	0	0	0	0
27	4	0	94.754	0	0	0	0
28	4	0	97.816	0	0	0	0
29	4	0	97.788	0	0	0	0
30	4	0	94.811	0	0	0	0
31	4	0	107.91	0	0	0	0
34	4	0	107.594	0	0	0	0
35	4	0	94.763	0	0	0	0
36	4	0	97.789	0	0	0	0
37	4	0	97.828	0	0	0	0
38	4	0	95.041	0	0	0	0
39	4	0	105.948	0	0	0	0
42	4	0	105.284	0	0	0	0
43	4	0	91.728	0	0	0	0
44	4	0	94.62	0	0	0	0
45	4	0	95.245	0	0	0	0
46	4	0	90.132	0	0	0	0
47	4	0	109.506	0	0	0	0
50	4	0	116.388	0	0	0	0
51	4	0	105.336	0	0	0	0
52	4	0	107.403	0	0	0	0
53	4	0	108.485	0	0	0	0
54	4	0	101.234	0	0	0	0
55	4	0	122.501	0	0	0	0

Maximum load on column = 12.3 T (Refer staad output)
 Add self wt = 1.0 T

Total = 13.3 t

$$\begin{aligned} \text{Capacity of column} &= \sigma_{cc} * A_c + \sigma_{sc} * A_{st} \\ &= 8 * 70686 + 275 * 1884 \\ &= 108.4 \text{ T} \gg 13.3 \text{ T O.K} \end{aligned}$$

Stair case Design

STAIR DESIGN							
Project : Adilabad RWSS				Proj. No P16_02			
Unit : 1600KL SUMP							
DATA							
Concrete grade	Fck	30	N/mm2				
Steel	Fy	500	N/mm2	fyucb	275	N/mm2	
Clear cover	Cv	25	mm	fckbc	10.0	N/mm2	
Stair effective span	L	5.60	m	fckt	1.5	N/mm2	
Width	B	1000	mm	modular ratio	m	9.333	
Depth of Waist slab	D	200	mm		K	0.253	
Riser	R	194	mm		j	0.916	
Tread	T	250	mm				
Density of concrete	Wd	25	kN/m3				
Moment coefficient	Me	0.125					
Maximum Dia of Bar	Db	10	mm				
Minimum % Steel	ptmin	0.12	%				
Basic Span to depth ratio	rat	26					
Loading							
Live load	LI	3.00	kN/m2				
Finishing load	FI	1.50	kN/m2				
Calculation							
Calculation of loading							
Self wt (Dead load)	DI	6.33	kN/m2				
Weight of step	WS	3.08	kN/m2				
Total Load	TI	13.91	kN/m2				
Effective depth	De	170	mm				
Design							
Moment	M	54.54	kN-m				
Required area of steel	Ast(req)	806	mm ²				
Provide area of steel	Ast(pro)	1131	mm ²	12 [#]	100	150	O.K
Distribution steel	Ast(min)	240	mm ²				
Provide Distribution steel	DAst(pro)	335	mm ²	8	150		O.K
Shear Check							
Maximum shear	V	39.0	kN				
Factored Shear	Vu	58.4	kN				

Actual Shear stress	Tv	0.344	N/mm2	
% Ast	pt	0.67	%	
beta	beta	5.24		
Value of K for Solid slab				
Overall Depth		200.00	mm	
	K	1.20		
permissible shear for pt	Tc	0.691	N/mm2	OK
CHECK FOR DEFLECTION				
basic span /deph ratio	bsd	26		
fs	fs	207	N/mm2	
% steel provided	ptt	0.67	%	
Moification factor	mf	1.29		
permissible span/ depth ratio	psd	33.44		
actual span /depth ratio	sdr	28.00		OK

DESIGN OF BEAM

$Ast = Mu / (j \times d \times Tst)$

Where Mu = 40 KN.M from Staad

$J = 1-k/3$

$K = 1/(1+(Tst/Tcbc))$

$= 1/(1+(275/10))$

$= 0.035$

Required Ast = 368 mm2

“Designs Vetted”



APPROVED
130/4/16
SE, NIRMAL

Du

[Signature]
Asst. Executive Engineer
TDWSP Asifabad

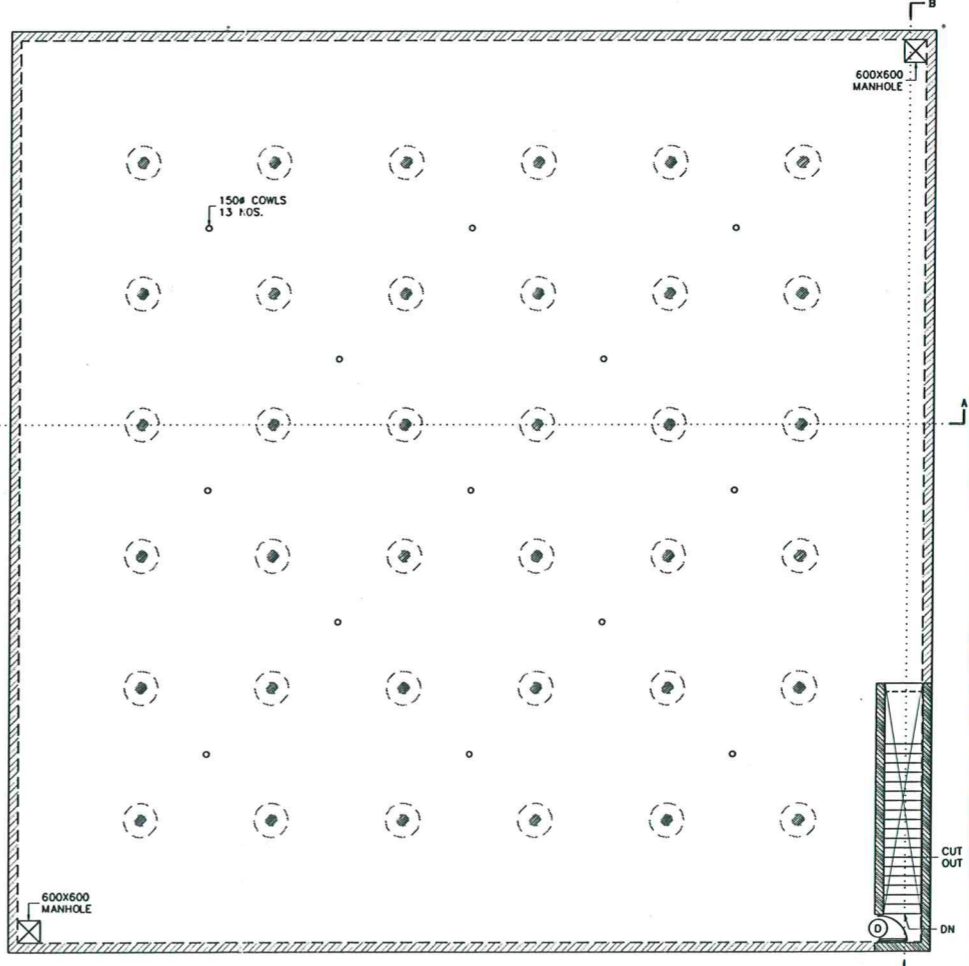
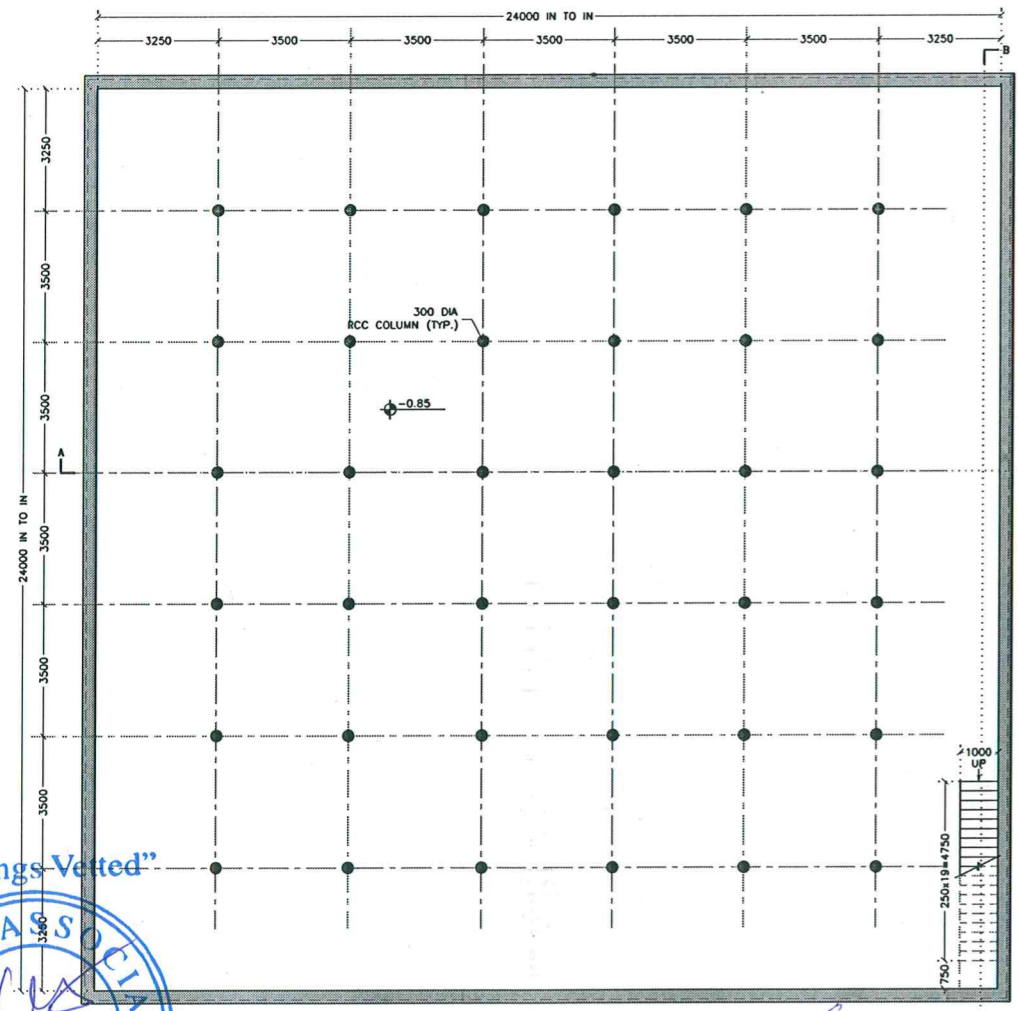
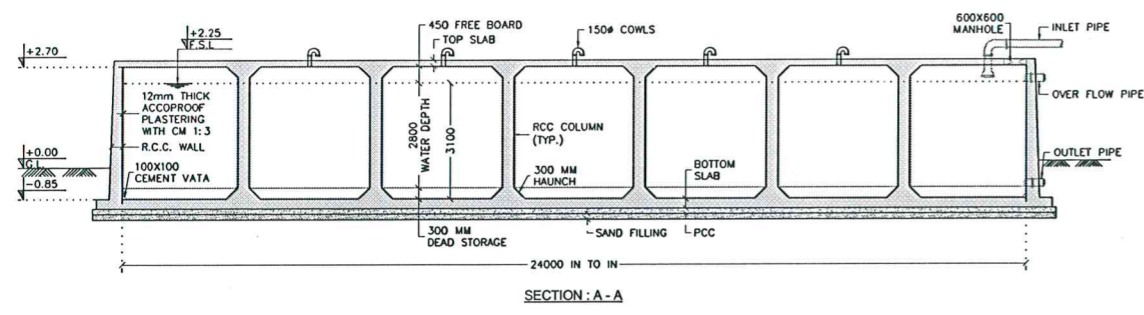
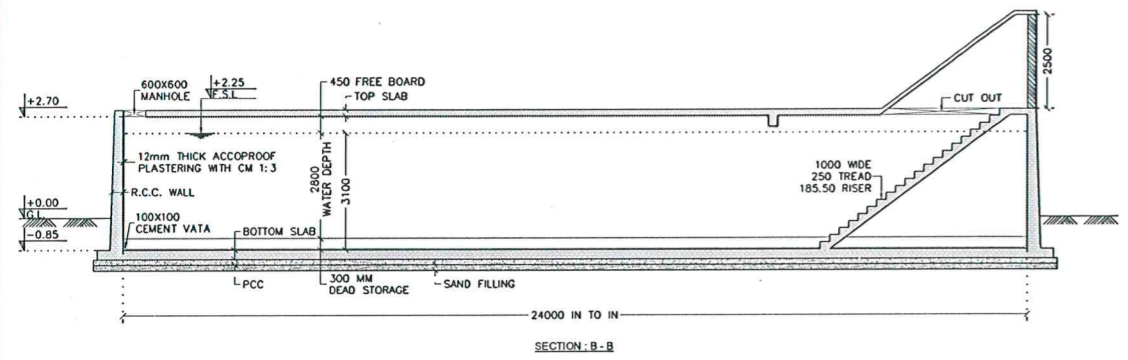
[Signature]
Dy. Executive Engineer
TDWSP Asifabad

[Signature]
Executive Engineer
TDWSP Asifabad

SCHEDULE OF OPENING			
SYMBOL	SIZE	LINTEL	REMARK
D	750 X 2500	2500	DOOR

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



APPROVED
 13/04/16
 SE, NIRMAL



REV. No	DESCRIPTION	DATE	DESIGNED	DRAWN	CHECKED	APPROVED
A	FOR APPROVAL	18/04/16	HMP	PNP	RMM	-

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

NAME	SIGN	DATE
DSGN	HMP	18-04-16
DRWN	PNP	18-04-16
CHKD	RMM	18-04-16
APPD	-	18-04-16

JOB No.: LE150883 TITLE: 1600KL CAPACITY GLBR AT MANIKGUDAGUTTA VILLAGE (GENERAL ARRANGEMENT DRAWING) SCALE: 1:125
 DRAWING No. LE150883-C-WS-RW-GA-1511 SIZE: A2
 COMP. DATA: P16-02-97-01-01 SHEET 1 OF 1 REV. A

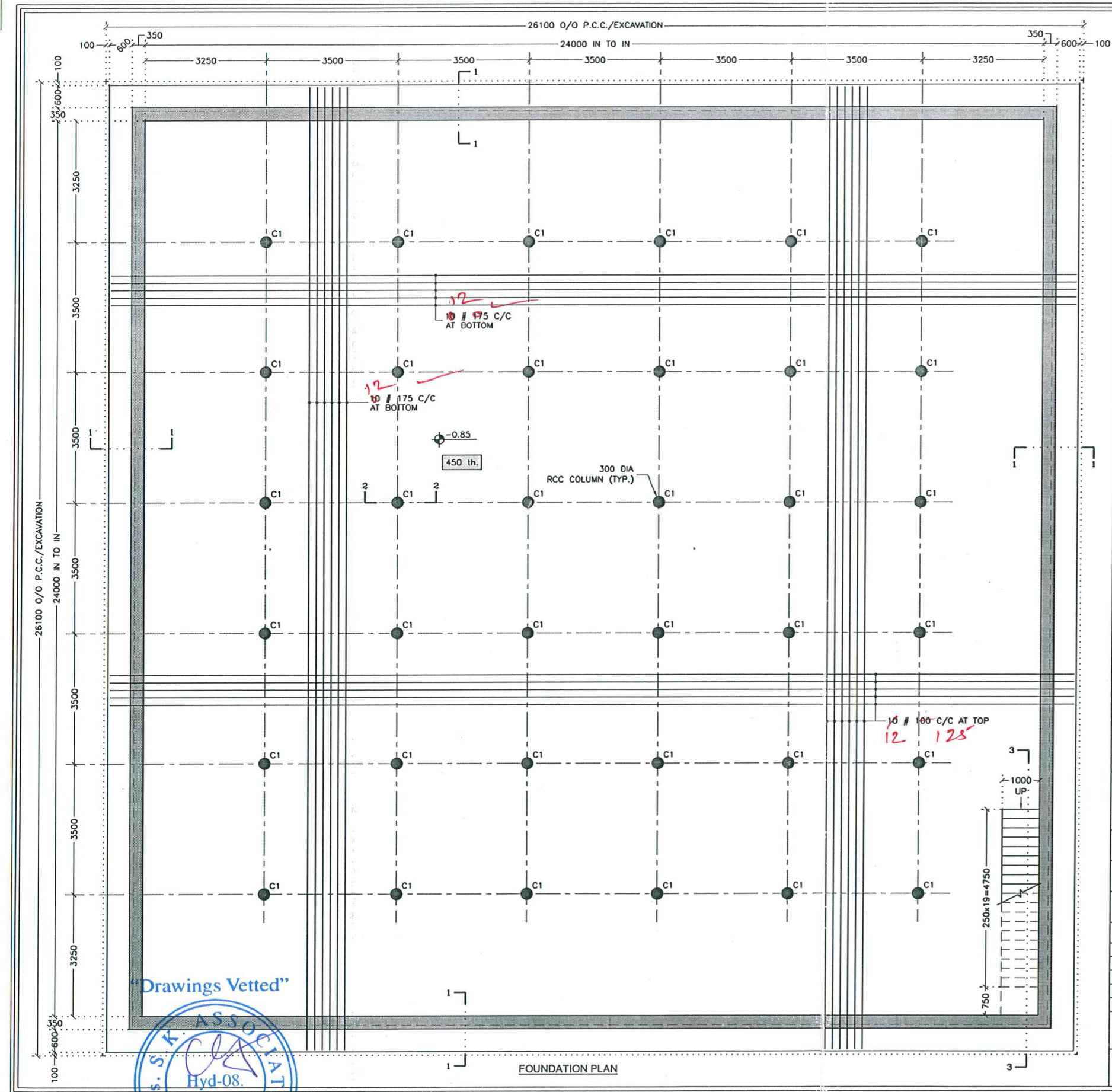
RELEASED FOR: PRELIMINARY TENDER INFORMATION APPROVAL CONSTRUCTION



Asst. Executive Engineer
 TDWSP Asifabad

Dy. Executive Engineer
 TDWSP Asifabad

Executive Engineer
 TDWSP Asifabad



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/m³ 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/m² 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 4 TO 4 OF 4.
- 13 STEEL CHAIRS SHALL BE PROVIDE TO KEPT TOP REINFORCEMENT OF SLAB IN PROPER POSITION

APPROVED
SE, NIRMAL
 Du

A	FOR APPROVAL	25/04/16	HMP	PNP	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 1:100															
<table border="1"> <tr><th>NAME</th><th>SIGN</th><th>DATE</th></tr> <tr><td>DSGN</td><td>HMP</td><td>25/04/16</td></tr> <tr><td>DRWN</td><td>PNP</td><td>25/04/16</td></tr> <tr><td>CHKD</td><td>RMM</td><td>25/04/16</td></tr> <tr><td>APPD</td><td>-</td><td>25/04/16</td></tr> </table>	NAME	SIGN	DATE	DSGN	HMP	25/04/16	DRWN	PNP	25/04/16	CHKD	RMM	25/04/16	APPD	-	25/04/16	1600KL CAPACITY GLBR AT MANIKGUDAGUTTA VILLAGE (FOUNDATION PLAN)	PROJECTION
NAME	SIGN	DATE															
DSGN	HMP	25/04/16															
DRWN	PNP	25/04/16															
CHKD	RMM	25/04/16															
APPD	-	25/04/16															

DRAWING No. LE150833-C-WS-RW-RC-1514 SIZE A3 REV. A
 COMP. DATA : P16-02_97-02-01 SHEET 1 OF 4

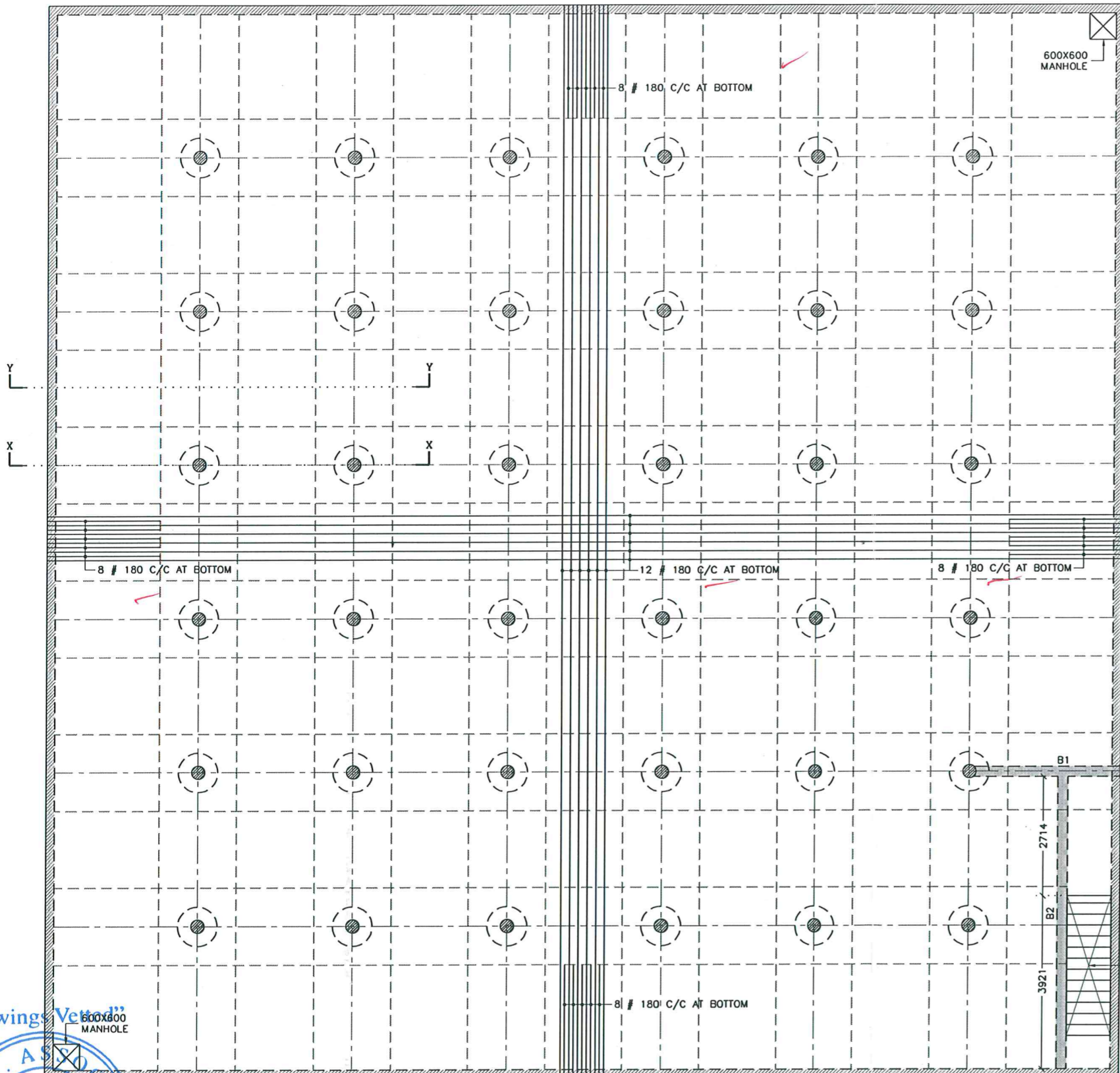
RELEASED FOR PRELIMINARY TENDER INFORMATION APPROVAL CONSTRUCTION

"Drawings Vetted"

Yathred
 Asst. Executive Engineer
 TDWSP Asifabad

Dr
 Dy. Executive Engineer
 TDWSP Asifabad

nae
 Executive Engineer
 TDWSP Asifabad



PLAN FOR TOP SLAB BOTTOM REINFORCEMENT
ALL SLAB ARE 200 THK. (CONCRETE MIX M:30)

NOTES :
 <1> ALL DIMENSION ARE IN MM AND LEVELS ARE IN METER.
 <2> FOR ALL OTHER NOTES REFER SHEET NO 1 OF 4.
 <3> READ THIS DRAWING ALONG WITH DRG.NO. 1 OF 4 TO 4 OF 4.



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 SE, NIRMAL

REV. No	DESCRIPTION	DATE	DESIGNED	DRAWN	CHECKED	APPROVED
A	FOR APPROVAL	25/04/16	HMP	PNP	RMM	-

REVISIONS

L&T Construction
 Water, Smart World & Communication.

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

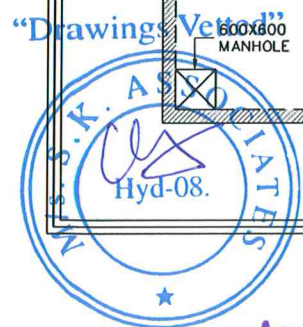
PROJECT : PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT

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

JOB No. : LE150883	TITLE : 1600KL CAPACITY GLBR AT MANIKGUDAGUTTA VILLAGE (STRUCTURAL LAYOUT AT BOTTOM REINFORCEMENT OF TOP SLAB)	SCALE : 1:100															
<table border="1"> <thead> <tr> <th>NAME</th> <th>SIGN</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>DSGN</td> <td>HMP</td> <td>25-04-16</td> </tr> <tr> <td>DRWN</td> <td>PNP</td> <td>25-04-16</td> </tr> <tr> <td>CHKD</td> <td>RMM</td> <td>25-04-16</td> </tr> <tr> <td>APPD</td> <td>-</td> <td>25-04-16</td> </tr> </tbody> </table>	NAME	SIGN	DATE	DSGN	HMP	25-04-16	DRWN	PNP	25-04-16	CHKD	RMM	25-04-16	APPD	-	25-04-16	PROJECTION	
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APPD	-	25-04-16															

DRAWING No. LE150883-3-C-WS-RW-RC-1514
 COMP. DATA : P16-02_97-02-03 SHEET 3 OF 4

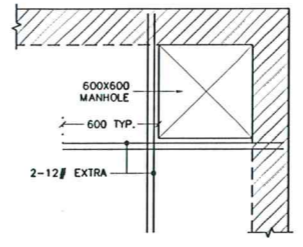
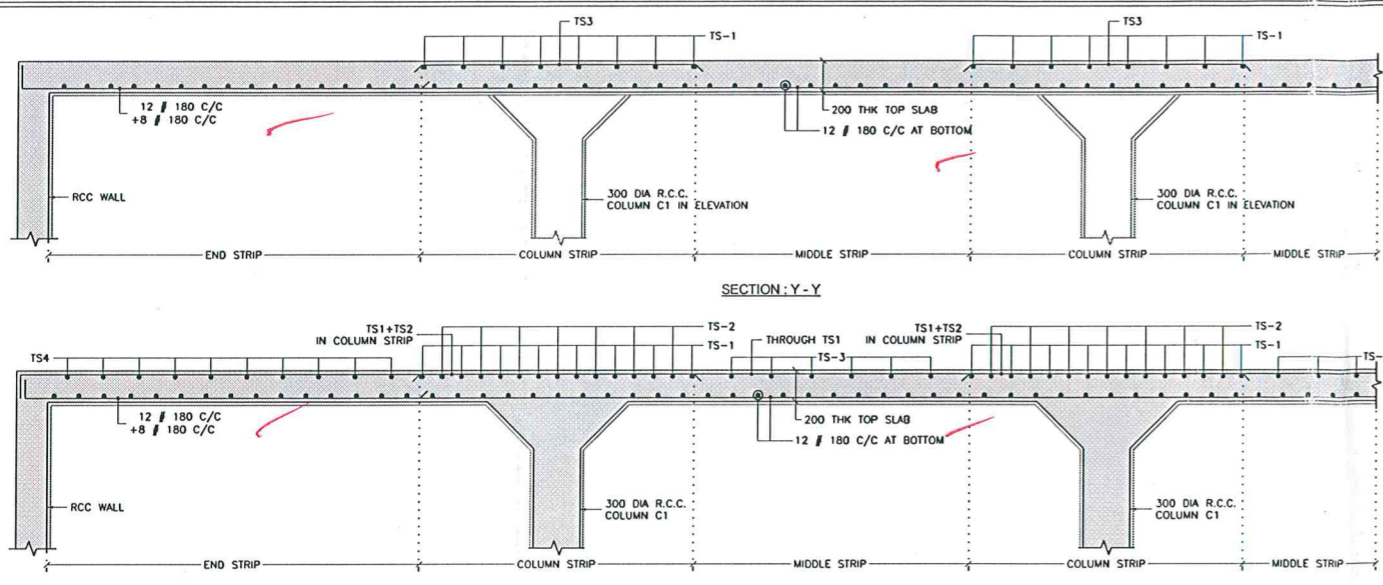
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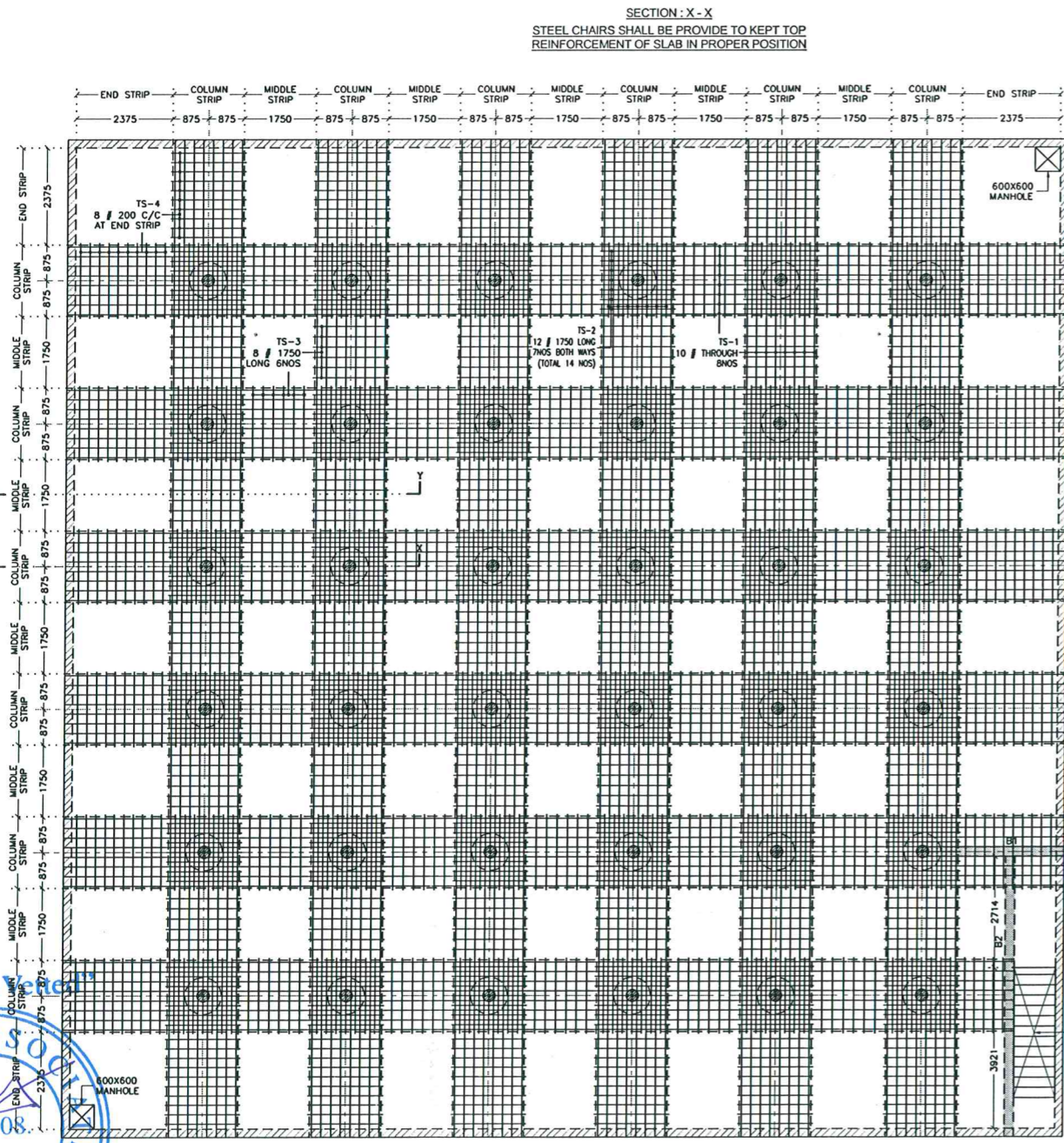
Asst. Executive Engineer
 TDWSP Asifabad

Dy. Executive Engineer
 TDWSP Asifabad

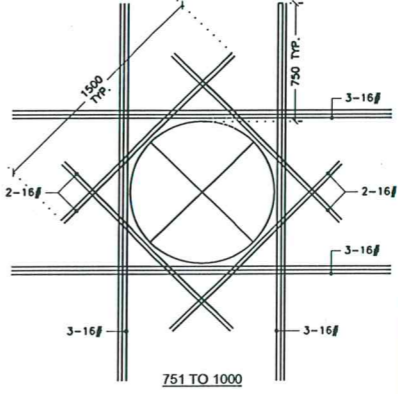
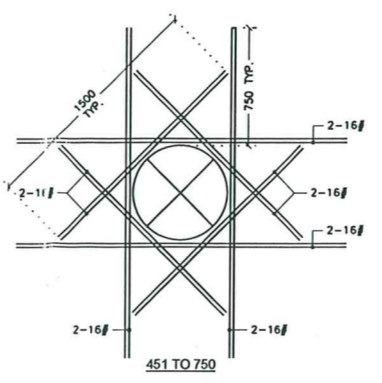
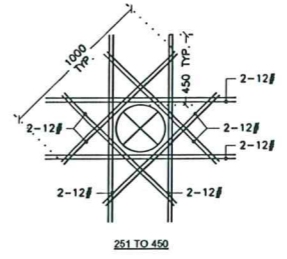
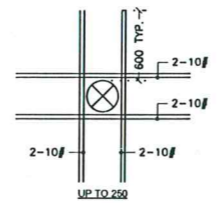
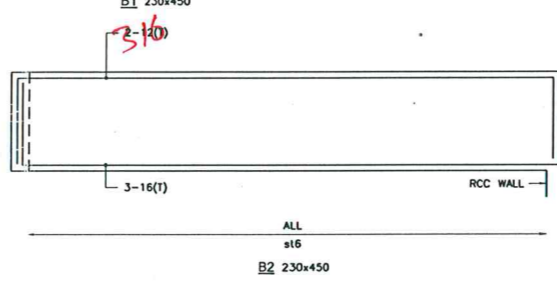
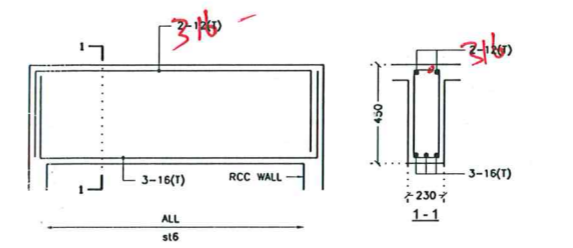
Executive Engineer
 TDWSP Asifabad



TYPICAL DETAIL FOR MANHOLE



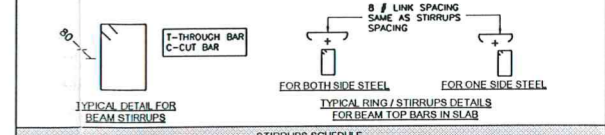
TYPICAL PLAN FOR TOP SLAB TOP REINFORCEMENT
ALL SLAB ARE 200 THK (CONCRETE MIX M:30) FOR BOTTOM R/F REFER SHEET NO. 3 OF 4



TYPICAL DETAIL FOR EXTRA STEEL BAR AT CUT-OUT

NOTES:
 <1> ALL DIMENSION ARE IN MM AND LEVELS ARE IN METER.
 <2> FOR ALL OTHER NOTES REFER SHEET NO 1 OF 4.
 <3> READ THIS DRAWING ALONG WITH DRG.NO. 1 OF 4 TO 3 OF 4.

SLAB SCHEDULE	
TYPE	DESCRIPTION
TS-1	10 # THROUGH 8 NOS
TS-2	12 # 1750 LONG 7 NOS BOTH WAYS
TS-3	8 # 1750 LONG 6 NOS
TS-4	8 # 200 C/C AT END STRIP



STIRRUPS SCHEDULE (2 LEGGED STIRRUPS UNLESS OTHERWISE SPECIFIED)					
TYPE	DESCRIPTION	TYPE	DESCRIPTION	TYPE	DESCRIPTION
st1	8 # 225 C/C	st2	8 # 200 C/C	st3	8 # 175 C/C
st4	8 # 150 C/C	st5	8 # 125 C/C	st6	8 # 100 C/C
st7	10 # 150 C/C	st8	10 # 125 C/C	st9	10 # 100 C/C
st10	12 # 125 C/C	st11	12 # 100 C/C	st12	12 # 75 C/C



APPROVED
 20/11/16
 SE, NIRMAL



REV. No	DESCRIPTION	DATE	DESIGNED	DRAWN	CHECKED	APPROVED
A	FOR APPROVAL	25/04/16	HMP	PNP	RMM	-

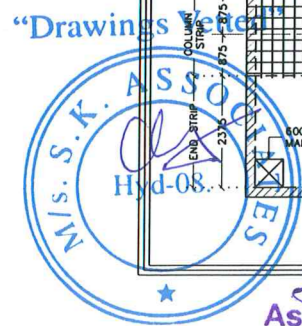
L&T Construction
 Water, Smart World & Communication.

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

JOB No.: L1150883	TITLE: 1600KL CAPACITY GLBR AT MANIKGUDAGUTTA VILLAGE (STRUCTURAL LAYOUT & DETAILS AT TOP REINFORCEMENT OF TOP SLAB)	SCALE: 1:100,60,30
DRSN: HMP 25-04-16	DRWN: PNP 25-04-16	PROJECTION: 1st Angle
CHKD: RMM 25-04-16	APPD: - 25-04-16	SIZE: A2

DRAWING No. L1150883-C-WS-RW-RC-1514
 COMP. DATA: P16-02-97-02-04 SHEET 4 OF 4

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Asst. Executive Engineer
 TDWSP Asifabad

Dy. Executive Engineer
 TDWSP Asifabad

Executive Engineer
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