

Submitted sir,

Sub: RWS&S-TDWSP- Design of Calrifloculator at WTP Dhanora –Komarambheem Asifabad Segment - Adilabad District-Designs -Approval-Reg.

Kindly pursue the Designs of the following Design of Calrifloculator at WTP Dhanora, submitted by the Executive Engineer TDWSP Asifabad Division, Adilabad district for approval.

1. Calrifloculator at WTP Dhanora.

The Executive Engineer TDWSP Asifabad Division has submitted Structural Designs & Drawings of Calrifloculator at WTP Dhanora based on the field conditions vetted by consultant (third party) as well as WAPCOS 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:

- Net SBC of Soil : 15.0 t/sqm
- Grade of concrete & Steel : M 30 & Fe 415
- Outer wall Diameter of inner to inner: 39mtr
- Inner wall diameter of outer to outer: 17.75mtr
- Inlet Pipe Diameter: 900mm
- Outlet Sludge pipe Diameter:200mm
- Side wall thickness ; bottom 300mm to top 200mm
- Raft thickness; 200mm
- Sludge Chamber : 4mx2m

As per the above parameters the structural design and drawings of the Calrifloculator at WTP Dhanora is verified, 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

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29/02/16	R1	FOR APPROVAL	DVJ	RMM	
16/02/16	R0	FOR APPROVAL	DVJ	RMM	
DATE	REV.NO.	DESCRIPTION	Designed	Checked	Approved

REVISIONS

L&T Construction
Water & Renewable energy

CLIENT:
GOVERNMENT OF TELANGANA, RURAL WATER SUPPLY
AND SANITATION DEPARTMENT

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

SUPPLIER / CONTRACTOR:
L & T Construction, Water & Effluent treatment SBG

JOB No.

TOTAL NO. OF PAGES				TITLE : CLARIFLOCCULATOR - DESIGN CALCULATIONS
	NAME	SIGN	DATE	
DSGN	DVJ	DVJ	16/02/16	
CHKD	RMM	RMM	16/02/16	
APPD				

DOC NO. L E 1 5 0 8 8 3 - P - W S - W T - D C - 2 0 0 6	CODE	REV.
	IS	R1

RELEASED FOR	PRELIMINARY	TENDER	INFORMATION	<div style="text-align: center;"> √ APPROVAL </div>	CONSTRUCTION
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PROJECT:	PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT (30 MLD WTP)	Document LE150883-P-WS-WT-DC-2006		DATE 16.02.16
TITLE	CLARIFLOCCULATOR	DESIGNED DVJ	CHECKED RMM	PAGE
	CONTENTS	PAGE NO		
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	DESIGN OF CYLINDRICAL WALL	2		
	DESIGN OF LAUNDER	10		
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	DESIGN OF BAFFLE WALL	21		
	DESIGN OF CENTRAL SHAFT	36		
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**PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM
ASIFABAD SEGMENT IN ADILABAD DISTRICT (30 MLD WTP)**

1.0 DESIGN DATA

Diameter = 39 m
Water depth = 3.3 m
Free board = 0.3 m
Launder = 0.6 x 0.9 m deep

Levels:

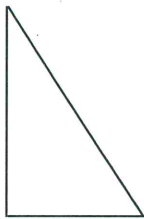
Finish ground level = 280.00
Bottom level of wall at bottom raft = 279.61
FSL = 282.61
Top level of wall = 282.91

Concrete grade = M 30
Clear cover to main steel = 45.0 mm for water retaining structure

Design as per IS 456-2000 & IS 3370-2009 -

Support condition

- Circular ring wall, fixed base, free top and subjected to triangular loading , supported by bottom slab



Analysis of structure is done using STAAD – Program

Maximum pressure at bottom slab = $10 \text{ kN/m}^3 \times 3.3 \text{ m} = 33 \text{ kN/m}^2$

Depth of foundation below bottom slab = 1.5m

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

2.0 DESIGN OF CYLINDRICAL WALL

A> STAAD INPUT

```
STAAD SPACE
START JOB INFORMATION
JOB PART 39 M dia Clarifier : WATER HEIGHT 3.0 +0.3 FB
END JOB INFORMATION
INPUT WIDTH 79
UNIT METER KN
Joint coordiante cyl rev
1 19.5 0 0 144 19.5 0 357.5
repeat 3 0 0.5 0
repeat 6 0 0.5 0
repeat 1 0 0.3 0
element incidences
1 1 2 146 145 to 143 1 1
144 144 1 145 288
repeat all 9 144 144
ELEMENT PROPERTY
1 TO 144 THICKNESS 0.3
145 TO 288 THICKNESS 0.3
289 TO 432 THICKNESS 0.3
433 TO 576 THICKNESS 0.285
577 TO 720 THICKNESS 0.270
721 TO 864 THICKNESS 0.255
865 TO 1008 THICKNESS 0.240
1009 TO 1152 THICKNESS 0.225
1153 TO 1296 THICKNESS 0.210
1297 TO 1440 THICKNESS 0.2
CONSTANTS
E 2.73e+007 MEMB 1 TO 1440
POISSON 0.17 MEMB 1 TO 1440
DENSITY 25 MEMB 1 TO 1440
ALPHA 1.2e-011 MEMB 1 TO 1440
SUPPORTS
1 TO 144 FIXED
433 TO 576 FIXED BUT FY MX MY MZ
LOAD 1 WATER
SELFWEIGHT Y -1
ELEMENT LOAD
*below raft, (3.3*10)+(1.5*22/3)
1 TO 144 TRAP Y 44.01 40.34
145 TO 288 TRAP Y 40.34 36.67
289 TO 432 TRAP Y 36.67 33.00
*above raft
433 TO 576 TRAP Y 33.00 28.00
577 TO 720 TRAP Y 28.00 23.0
721 TO 864 TRAP Y 23.00 18.00
865 TO 1008 TRAP Y 18.00 13.00
1009 TO 1152 TRAP Y 13.00 8.00
1153 TO 1296 TRAP Y 8.00 3.00
1297 TO 1440 TRAP Y 3.00 0.00
LOAD 2 SOIL
SELFWEIGHT Y -1
ELEMENT LOAD
1 TO 144 TRAP Y -13.86 -10.19
145 TO 288 TRAP Y -10.19 -6.53
289 TO 432 TRAP Y -6.53 -2.86
433 TO 576 TRAP Y -2.86 0
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**PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM
ASIFABAD SEGMENT IN ADILABAD DISTRICT (30 MLD WTP)**

PERFORM ANALYSIS

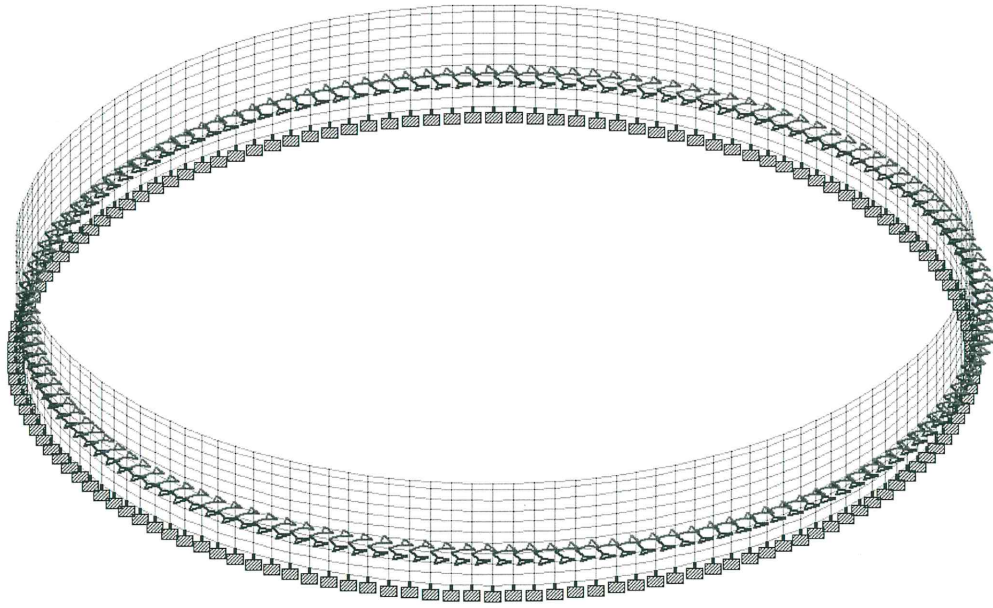
UNIT METER KN

PRINT ELEMENT FORCE LIST 1 145 289 433 577 721 865 1009 1153 1297

FINISH

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

B> STAAD DIAGRAM



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

C> PLATE NUMBERS AND SUPPORT

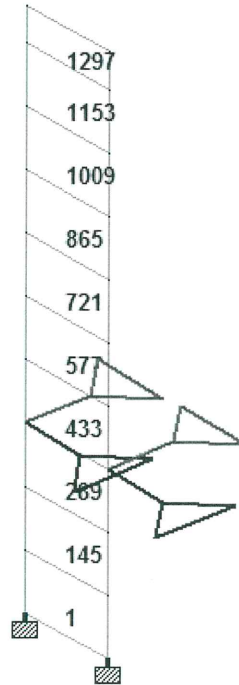
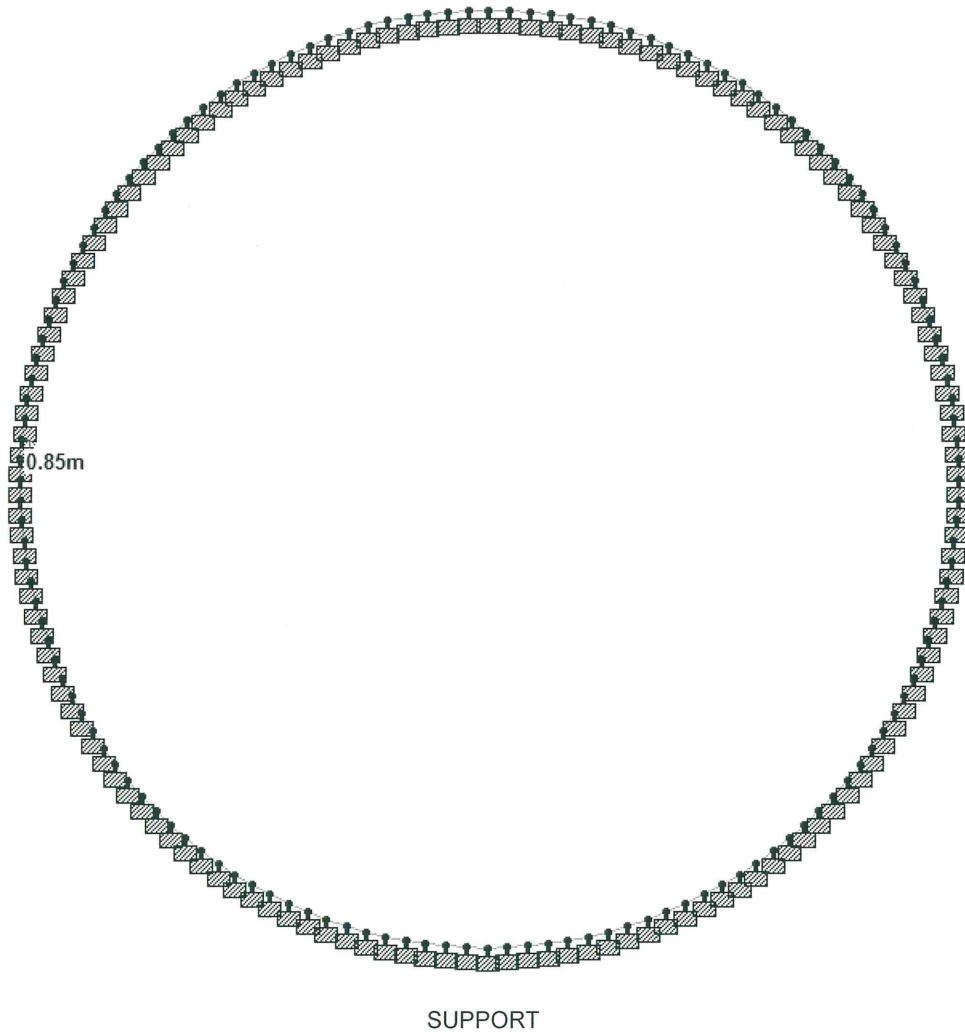


PLATE NUMBERS

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



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

D> EXCEL SHEET FOR WALL DESIGN

Reinforcement Calculation of Cylindrical wall										
Circular wall										
Load case : Water + Seismic										
BASIC DATA										
Diameter - in to in	Diain	39			m					
Maximum wall thickness	wthk	0.3			m					
Clear cover to main steel	Cv	45			mm					
Maximum dia of bar	mdbar	12			mm					
Concrete grade	Fck	30			N/mm2					
Allowable crack width	Acw	0.2			mm					
GENERAL DATA										
As per IS 3370-2009	Dmin	15			m					
steel grade	Fy	415			N/mm2					
Modulus of Elasticity of Concrete	Ec	27386			N/mm2					
Modulus of Elasticity of reinforcement	Es	200000			N/mm2					
Maximum out to out Dia	Maxdia	39.60			m					
Permissible stress in direct tension	fyuc	130			N/mm2					
Permissible stress in tension due to bending	fyucb	130			N/mm2					
Minimum % steel as per IS 3370-2009	ptmin	0.35			%					
per. stress in con. for direct comp	fckc	8.0			N/mm2					
per. stress in con in com. due to bending	fckbc	10.0			N/mm2					
per. stress in con. for direct tension	fckt	1.5			N/mm2					
per. stress in con. In ten due to bending	fcktb	2.0			N/mm2					
Modular ratio	m	9.33								
	k	0.418								
	j	0.861								
As maximum diameter is more than 15 m , minimum steel = 0.35 %										
Paste data from STADD										
Plate	L/C	SQX kN/m2	SQY kN/m2	MX kNm/m	MY kNm/m	MX kNm/m	SX kN/m2	SY kN/m2	SXY kN/m2	
1	1	0	17.5	0.3	1.7	0	-17	-98	0	0
145	1	0	-50.2	-0.1	-0.7	0	-24	-86	0	0
289	1	0	-112.1	-2.2	-12.9	0	-27	-73	0	0
433	1	0	100.0	-2.4	-14.2	0	43	-64	0	0
577	1	0	56.8	-0.6	-3.2	0	201	-55	0	0
721	1	0	22.7	0.3	2.0	0	383	-45	0	0
865	1	0	-1.1	0.6	3.3	0	546	-35	0	0
1009	1	0	-13.8	0.4	2.5	0	675	-25	0	0
1153	1	0	-14.6	0.2	0.9	0	772	-13	0	0
1297	1	0	-5.8	0.0	0.1	0	838	-4	0	0
OUTPUT										
Calculation for hoop steel										

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

Sr.no	Plate no	Sx - Str. Stress	Thk	Axial Force	Steel reqd Design	Steel reqd Minimum	Dia. mm	spc mm	Astp mm2
1	1	-17	300	-5.2	0	1050	10	140	1122
2	145	-24	300	-7.3	0	1050	10	140	1122
3	289	-27	300	-8.0	0	1050	10	140	1122
4	433	43	285	12.4	95	997.5	10	140	1122
5	577	201	270	54.3	417	945	10	140	1122
6	721	383	255	97.5	750	892.5	12	170	1331
7	865	546	240	131.1	1009	840	12	170	1331
8	1009	675	225	151.8	1168	787.5	12	125	1810
9	1153	772	210	162.1	1247	735	12	125	1810
10	1297	838	200	167.6	1289	700	12	125	1810

Check for hoop steel and stress

	steel			Concrete stress		
	Steel reqd mm2	Steel Prov mm2	check	perm. stress N/mm2	Actual stress N/mm2	check
1	1050	1122	O.K	1.5	Comp	O.K
2	1050	1122	O.K	1.5	Comp	O.K
3	1050	1122	O.K	1.5	Comp	O.K
4	998	1122	O.K	1.5	0.04	O.K
5	945	1122	O.K	1.5	0.19	O.K
6	893	1331	O.K	1.5	0.37	O.K
7	1009	1331	O.K	1.5	0.52	O.K
8	1168	1810	O.K	1.5	0.63	O.K
9	1247	1810	O.K	1.5	0.72	O.K
10	1289	1810	O.K	1.5	0.78	O.K

Calculation Vertical steel

Sr.no	Plate no	My Stress	Thk	Effective Depth	Steel reqd	Steel			
						Water face		Other face	
		Kn-m	mm	mm	mm2	Design mm2	Min mm2	Design mm2	Min mm2
1	1	1.7	300	249	62	0	525	62	525
2	145	0.7	300	249	-25	25	525	0	525
3	289	12.9	300	249	-462	462	525	0	525
4	433	14.2	285	234	-541	541	499	0	499
5	577	3.2	270	219	-132	132	473	0	473
6	721	2.0	255	204	87	0	446	87	446
7	865	3.3	240	189	158	0	420	158	420
8	1009	2.5	225	174	128	0	394	128	394
9	1153	0.9	210	159	52	0	368	52	368
10	1297	0.1	200	149	6	0	350	6	350

Check for Vertical steel

Sr.no	Plate no	Steel provd.				Steel required mm2	Steel Provided mm2	check
		Water side						
		Dia	mm	Dia	mm			
1	1	10	150	8	300	525	691	O.K
2	145	10	150	8	300	525	691	O.K

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

3	289	10	150	8	300	525	691	O.K
4	433	10	150	8	300	541	691	O.K
5	577	10	150	8	300	473	691	O.K
6	721	10	150			446	524	O.K
7	865	10	150			420	524	O.K
8	1009	10	150			394	524	O.K
9	1153	10	150			368	524	O.K
10	1297	10	150			350	524	O.K

Check for Vertical steel

Sr.no	Plate no	Steel provd.				Steel required mm2	Steel Provided mm2	check
		Outer side						
		Dia	mm	Dia	mm			
1	1	10	150	8	300	525	691	O.K
2	145	10	150	8	300	525	691	O.K
3	289	10	150	8	300	525	691	O.K
4	433	10	150	8	300	499	691	O.K
5	577	10	150	8	300	473	691	O.K
6	721	10	150			446	524	O.K
7	865	10	150			420	524	O.K
8	1009	10	150			394	524	O.K
9	1153	10	150			368	524	O.K
10	1297	10	150			350	524	O.K

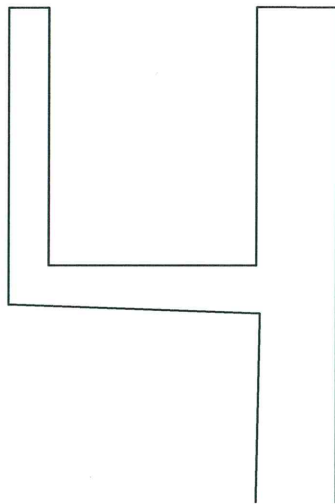
**PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM
ASIFABAD SEGMENT IN ADILABAD DISTRICT (30 MLD WTP)**

3.0 DESIGN OF LAUNDER

A> INPUT

Launder size: 600 wide x 550 water depth + 350 free board

Provide wall thickness of 150 mm
Bottom slab thickness = 150 mm



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

B> DESIGN AND OUTPUT

JOB : L16_02					
LAUNDER - CANTILEVER CHANNEL -WITHOUT SLAB					
DATA					
Concrete grade	Fck	30	N/mm2		
Steel	Fy	415	N/mm2		
Clear cover	Cv	45	mm		
Density of concrete	Dc	25	Kn/m3		
Modulus of Elasticity of Concrete	Ec	27386	N/mm2		
Modulus of Elasticity of reinforcement	Es	200000	N/mm2		
Permissible stress in direct tension	fyuc	130	N/mm2		
Permissible stress in tension due to bending	fyucb	130	N/mm2		
per. stress in con. for direct comp	fckc	8	N/mm2		
per. stress in con in com.due to bending	fckbc	10	N/mm2		
per. stress in con. for direct tension	fckt	1.5	N/mm2		
per. stress in con. In ten due to bending	fcktb	2	N/mm2		
Modular ratio	m	9.33			
	k	0.418			
	j	0.861			
GEOMETRY					
Width of launder	Lw	0.60	m		
Water Depth	Wd	0.55	m		
Free board	Fb	0.35	m		
Thickness of vertical wall	thw	0.150	m		
Thickness of bottom slab	thb	0.150	m		
FB check	fbcheck	y			
Presast slab	pslab	n			
thickness	thps		m		
Livel oad	LL		KN/m2		
CALCULATION					
VERTICAL WALL WALL					
Calculation of loading					
Total height of vertical wall	Twh	0.9	m		
Total height of water	Twa	0.90	m		
Self wt (Dead load) - vertical wall	Dlw	3.38	KN/m2		
Water pressure	Wwl	9.00	KN/m2		
Presast slab wt - total	pst		KN/m2		
Design					
Effective depth	Dew	100.00	mm		
Total water load = 0.5 x H X Pre	twl	4.05	KN		
Maximum moment - cantilever wall	Mw	1.22	KN-m		
Area of steel	astwr	109	mm2		
Area of steel - provided		dia	spc	dia	spc
		mm	mm	mm	mm
		10	200		
	astwp	393	mm2		
Check for steel		o.k			

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

BOTTOM SLAB					
Effective depth of bootm slab	Deb	99			
LOAD					
1> Point load of vertical wall	Pw	3.38	kN		
2> Precast slab - point load	Ps		kN		
3> UDL due to self wt	Us	3.75	kN/m ²		
4> UDL due to water load	Uw	9.00	kN/m ²		
MOMENT					
Moment at the face of wall					
1> Point load of vertical wall	MPw	2.28	kN-m		
2> Precast slab - point load	MPs		kN-m		
3> UDL due to self wt	MUs	1.05	kN-m		
4> UDL due to water load	MUw	1.62	kN-m		
5> Moment due to cantilever wall pre.	MPs	1.22	kN-m		
Total moment	TMB	6.17	kN-m		
Area of steel	astbr	557	mm ²		
Area of steel - provided		dia	spc	dia	spc
		mm	mm	mm	mm
		10	125		
		628	mm ²		
Check for steel		o.k			

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

4.0 DESIGN OF BOTTOM SLAB

Bottom slab directly rest on ground and subjected to axial tension, and transferred to soil by friction

Support reactions are as under

WTP - ASIFABAD										
39 m DIA CLARIFIER										
SUPPORT REACTION-										
Diameter		D			39					
Node	L/C	Force- X kN	Force- Y kN	Force- Z kN	Moment- X kNm	Moment- Y kNm	Moment- Z kNm	resultant reaction	resultant moment	
433	1	-66.8	0.0	0.0	0.0	0.0	0.0	66.8	0.0	
434	1	-66.7	0.0	2.9	0.0	0.0	0.0	66.8	0.0	
435	1	-66.5	0.0	5.8	0.0	0.0	0.0	66.8	0.0	
436	1	-66.2	0.0	8.7	0.0	0.0	0.0	66.8	0.0	
437	1	-65.8	0.0	11.6	0.0	0.0	0.0	66.8	0.0	
438	1	-65.2	0.0	14.5	0.0	0.0	0.0	66.8	0.0	
439	1	-64.5	0.0	17.3	0.0	0.0	0.0	66.8	0.0	
440	1	-63.7	0.0	20.1	0.0	0.0	0.0	66.8	0.0	
441	1	-62.8	0.0	22.8	0.0	0.0	0.0	66.8	0.0	
442	1	-61.7	0.0	25.6	0.0	0.0	0.0	66.8	0.0	
443	1	-60.5	0.0	28.2	0.0	0.0	0.0	66.8	0.0	
444	1	-59.2	0.0	30.8	0.0	0.0	0.0	66.8	0.0	
445	1	-57.8	0.0	33.4	0.0	0.0	0.0	66.8	0.0	
446	1	-56.3	0.0	35.9	0.0	0.0	0.0	66.8	0.0	
447	1	-54.7	0.0	38.3	0.0	0.0	0.0	66.8	0.0	
448	1	-53.0	0.0	40.7	0.0	0.0	0.0	66.8	0.0	
449	1	-51.2	0.0	42.9	0.0	0.0	0.0	66.8	0.0	
450	1	-49.2	0.0	45.1	0.0	0.0	0.0	66.8	0.0	
451	1	-47.2	0.0	47.2	0.0	0.0	0.0	66.8	0.0	
452	1	-45.1	0.0	49.2	0.0	0.0	0.0	66.8	0.0	
453	1	-42.9	0.0	51.2	0.0	0.0	0.0	66.8	0.0	
454	1	-40.7	0.0	53.0	0.0	0.0	0.0	66.8	0.0	
455	1	-38.3	0.0	54.7	0.0	0.0	0.0	66.8	0.0	
456	1	-35.9	0.0	56.3	0.0	0.0	0.0	66.8	0.0	
457	1	-33.4	0.0	57.8	0.0	0.0	0.0	66.8	0.0	
458	1	-30.8	0.0	59.2	0.0	0.0	0.0	66.8	0.0	
459	1	-28.2	0.0	60.5	0.0	0.0	0.0	66.8	0.0	
460	1	-25.6	0.0	61.7	0.0	0.0	0.0	66.8	0.0	
461	1	-22.8	0.0	62.8	0.0	0.0	0.0	66.8	0.0	
462	1	-20.1	0.0	63.7	0.0	0.0	0.0	66.8	0.0	
463	1	-17.3	0.0	64.5	0.0	0.0	0.0	66.8	0.0	
464	1	-14.5	0.0	65.2	0.0	0.0	0.0	66.8	0.0	
465	1	-11.6	0.0	65.8	0.0	0.0	0.0	66.8	0.0	
466	1	-8.7	0.0	66.2	0.0	0.0	0.0	66.8	0.0	
467	1	-5.8	0.0	66.5	0.0	0.0	0.0	66.8	0.0	
468	1	-2.9	0.0	66.7	0.0	0.0	0.0	66.8	0.0	
469	1	0.0	0.0	66.8	0.0	0.0	0.0	66.8	0.0	
470	1	2.9	0.0	66.7	0.0	0.0	0.0	66.8	0.0	
471	1	5.8	0.0	66.5	0.0	0.0	0.0	66.8	0.0	
472	1	8.7	0.0	66.2	0.0	0.0	0.0	66.8	0.0	

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

473	1	11.6	0.0	65.8	0.0	0.0	0.0	66.8	0.0	
474	1	14.5	0.0	65.2	0.0	0.0	0.0	66.8	0.0	
475	1	17.3	0.0	64.5	0.0	0.0	0.0	66.8	0.0	
476	1	20.1	0.0	63.7	0.0	0.0	0.0	66.8	0.0	
477	1	22.8	0.0	62.8	0.0	0.0	0.0	66.8	0.0	
478	1	25.6	0.0	61.7	0.0	0.0	0.0	66.8	0.0	
479	1	28.2	0.0	60.5	0.0	0.0	0.0	66.8	0.0	
480	1	30.8	0.0	59.2	0.0	0.0	0.0	66.8	0.0	
481	1	33.4	0.0	57.8	0.0	0.0	0.0	66.8	0.0	
482	1	35.9	0.0	56.3	0.0	0.0	0.0	66.8	0.0	
483	1	38.3	0.0	54.7	0.0	0.0	0.0	66.8	0.0	
484	1	40.7	0.0	53.0	0.0	0.0	0.0	66.8	0.0	
485	1	42.9	0.0	51.2	0.0	0.0	0.0	66.8	0.0	
486	1	45.1	0.0	49.2	0.0	0.0	0.0	66.8	0.0	
487	1	47.2	0.0	47.2	0.0	0.0	0.0	66.8	0.0	
488	1	49.2	0.0	45.1	0.0	0.0	0.0	66.8	0.0	
489	1	51.2	0.0	42.9	0.0	0.0	0.0	66.8	0.0	
490	1	53.0	0.0	40.7	0.0	0.0	0.0	66.8	0.0	
491	1	54.7	0.0	38.3	0.0	0.0	0.0	66.8	0.0	
492	1	56.3	0.0	35.9	0.0	0.0	0.0	66.8	0.0	
493	1	57.8	0.0	33.4	0.0	0.0	0.0	66.8	0.0	
494	1	59.2	0.0	30.8	0.0	0.0	0.0	66.8	0.0	
495	1	60.5	0.0	28.2	0.0	0.0	0.0	66.8	0.0	
496	1	61.7	0.0	25.6	0.0	0.0	0.0	66.8	0.0	
497	1	62.8	0.0	22.8	0.0	0.0	0.0	66.8	0.0	
498	1	63.7	0.0	20.1	0.0	0.0	0.0	66.8	0.0	
499	1	64.5	0.0	17.3	0.0	0.0	0.0	66.8	0.0	
500	1	65.2	0.0	14.5	0.0	0.0	0.0	66.8	0.0	
501	1	65.8	0.0	11.6	0.0	0.0	0.0	66.8	0.0	
502	1	66.2	0.0	8.7	0.0	0.0	0.0	66.8	0.0	
503	1	66.5	0.0	5.8	0.0	0.0	0.0	66.8	0.0	
504	1	66.7	0.0	2.9	0.0	0.0	0.0	66.8	0.0	
								0.0	9617	0
Perimeter = $\pi \times D$		122.52	m	Vertical reaction =		0.0	Kn			
Total reaction =		9617	Kn	Total moment =		0.0				
Reaction /m =		78.49	Kn/m	moment /m =		0				

Maximum axial tension = 78.49 kN

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

WTP - ASIFABAD					
39 m DIA CLARIFIER					
SUPPORT REACTION					
Material Data					
Concrete grade		fck	30	N/mm ²	
Steel		Fy	415	N/mm ²	
Permissible stress in steel		pst	130	N/mm ²	
Geometry data					
Diameter		D	39	m	
Slab Thickness		thk	200	mm	
Load					
Reaction /m		Ra	78.49	Kn/m	
Calculation					
Total steel required at wall - slab junction				604	mm ² /m
Area of steel required at top		Ast	604	mm ² /m	
Area of steel required at bottom at wall - slab junction			0	mm ² /m	
Check for slab thickness					
Minimum % steel		Pt	0.35	%	
Steel required		Astmin	3.5	cm ² /m	
Calculation of curtailment of radial bar - at top					
	Dia	Bars req	bars provided	Actual spacing	
1	39	471	620	198	O.k
2	31.2	377	496	198	O.k
3	23.4	283	372	198	O.k
4	15.6	188	248	198	O.k
5	7.8	94	124	198	O.k

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

5.0 DESIGN OF RCC WALL FOOTING

Support reactions at foundation level

WTP - ASIFABAD										
39 m DIA CLARIFIER										
SUPPORT REACTION-										
Diameter		D 39								
Node	L/C	Force- X kN	Force- Y kN	Force- Z kN	Moment- X kNm	Moment- Y kNm	Moment- Z kNm	resultant reaction	resultant moment	
1	1	-13.6	26.6	0.0	0.0	0.0	-0.4	13.6	0.4	
2	1	-13.6	26.6	0.6	0.0	0.0	-0.4	13.6	0.4	
3	1	-13.6	26.6	1.2	0.0	0.0	-0.4	13.6	0.4	
4	1	-13.5	26.6	1.8	-0.1	0.0	-0.4	13.6	0.4	
5	1	-13.4	26.6	2.4	-0.1	0.0	-0.4	13.6	0.4	
6	1	-13.3	26.6	2.9	-0.1	0.0	-0.4	13.6	0.4	
7	1	-13.2	26.6	3.5	-0.1	0.0	-0.4	13.6	0.4	
8	1	-13.0	26.6	4.1	-0.1	0.0	-0.4	13.6	0.4	
9	1	-12.8	26.6	4.7	-0.1	0.0	-0.4	13.6	0.4	
10	1	-12.6	26.6	5.2	-0.2	0.0	-0.4	13.6	0.4	
11	1	-12.3	26.6	5.8	-0.2	0.0	-0.4	13.6	0.4	
12	1	-12.1	26.6	6.3	-0.2	0.0	-0.4	13.6	0.4	
13	1	-11.8	26.6	6.8	-0.2	0.0	-0.4	13.6	0.4	
14	1	-11.5	26.6	7.3	-0.2	0.0	-0.4	13.6	0.4	
15	1	-11.2	26.6	7.8	-0.2	0.0	-0.4	13.6	0.4	
16	1	-10.8	26.6	8.3	-0.3	0.0	-0.3	13.6	0.4	
17	1	-10.4	26.6	8.8	-0.3	0.0	-0.3	13.6	0.4	
18	1	-10.0	26.6	9.2	-0.3	0.0	-0.3	13.6	0.4	
19	1	-9.6	26.6	9.6	-0.3	0.0	-0.3	13.6	0.4	
20	1	-9.2	26.6	10.0	-0.3	0.0	-0.3	13.6	0.4	
21	1	-8.8	26.6	10.4	-0.3	0.0	-0.3	13.6	0.4	
22	1	-8.3	26.6	10.8	-0.3	0.0	-0.3	13.6	0.4	
23	1	-7.8	26.6	11.2	-0.4	0.0	-0.2	13.6	0.4	
24	1	-7.3	26.6	11.5	-0.4	0.0	-0.2	13.6	0.4	
25	1	-6.8	26.6	11.8	-0.4	0.0	-0.2	13.6	0.4	
26	1	-6.3	26.6	12.1	-0.4	0.0	-0.2	13.6	0.4	
27	1	-5.8	26.6	12.3	-0.4	0.0	-0.2	13.6	0.4	
28	1	-5.2	26.6	12.6	-0.4	0.0	-0.2	13.6	0.4	
29	1	-4.7	26.6	12.8	-0.4	0.0	-0.1	13.6	0.4	
30	1	-4.1	26.6	13.0	-0.4	0.0	-0.1	13.6	0.4	
31	1	-3.5	26.6	13.2	-0.4	0.0	-0.1	13.6	0.4	
32	1	-2.9	26.6	13.3	-0.4	0.0	-0.1	13.6	0.4	
33	1	-2.4	26.6	13.4	-0.4	0.0	-0.1	13.6	0.4	
34	1	-1.8	26.6	13.5	-0.4	0.0	-0.1	13.6	0.4	
35	1	-1.2	26.6	13.6	-0.4	0.0	0.0	13.6	0.4	
36	1	-0.6	26.6	13.6	-0.4	0.0	0.0	13.6	0.4	
37	1	0.0	26.6	13.6	-0.4	0.0	0.0	13.6	0.4	
38	1	0.6	26.6	13.6	-0.4	0.0	0.0	13.6	0.4	
39	1	1.2	26.6	13.6	-0.4	0.0	0.0	13.6	0.4	
40	1	1.8	26.6	13.5	-0.4	0.0	0.1	13.6	0.4	
41	1	2.4	26.6	13.4	-0.4	0.0	0.1	13.6	0.4	
42	1	2.9	26.6	13.3	-0.4	0.0	0.1	13.6	0.4	

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

43	1	3.5	26.6	13.2	-0.4	0.0	0.1	13.6	0.4
44	1	4.1	26.6	13.0	-0.4	0.0	0.1	13.6	0.4
45	1	4.7	26.6	12.8	-0.4	0.0	0.1	13.6	0.4
46	1	5.2	26.6	12.6	-0.4	0.0	0.2	13.6	0.4
47	1	5.8	26.6	12.3	-0.4	0.0	0.2	13.6	0.4
48	1	6.3	26.6	12.1	-0.4	0.0	0.2	13.6	0.4
49	1	6.8	26.6	11.8	-0.4	0.0	0.2	13.6	0.4
50	1	7.3	26.6	11.5	-0.4	0.0	0.2	13.6	0.4
51	1	7.8	26.6	11.2	-0.4	0.0	0.2	13.6	0.4
52	1	8.3	26.6	10.8	-0.3	0.0	0.3	13.6	0.4
53	1	8.8	26.6	10.4	-0.3	0.0	0.3	13.6	0.4
54	1	9.2	26.6	10.0	-0.3	0.0	0.3	13.6	0.4
55	1	9.6	26.6	9.6	-0.3	0.0	0.3	13.6	0.4
56	1	10.0	26.6	9.2	-0.3	0.0	0.3	13.6	0.4
57	1	10.4	26.6	8.8	-0.3	0.0	0.3	13.6	0.4
58	1	10.8	26.6	8.3	-0.3	0.0	0.3	13.6	0.4
59	1	11.2	26.6	7.8	-0.2	0.0	0.4	13.6	0.4
60	1	11.5	26.6	7.3	-0.2	0.0	0.4	13.6	0.4
61	1	11.8	26.6	6.8	-0.2	0.0	0.4	13.6	0.4
62	1	12.1	26.6	6.3	-0.2	0.0	0.4	13.6	0.4
63	1	12.3	26.6	5.8	-0.2	0.0	0.4	13.6	0.4
64	1	12.6	26.6	5.2	-0.2	0.0	0.4	13.6	0.4
65	1	12.8	26.6	4.7	-0.1	0.0	0.4	13.6	0.4
66	1	13.0	26.6	4.1	-0.1	0.0	0.4	13.6	0.4
67	1	13.2	26.6	3.5	-0.1	0.0	0.4	13.6	0.4
68	1	13.3	26.6	2.9	-0.1	0.0	0.4	13.6	0.4
69	1	13.4	26.6	2.4	-0.1	0.0	0.4	13.6	0.4
70	1	13.5	26.6	1.8	-0.1	0.0	0.4	13.6	0.4
71	1	13.6	26.6	1.2	0.0	0.0	0.4	13.6	0.4
72	1	13.6	26.6	0.6	0.0	0.0	0.4	13.6	0.4

	3836					1961				62
Perimeter = $\pi \times D$	122.52	m	Vertical reaction =	31.3	Kn/m					
Total reaction =	1961	Kn	Total moment =	62.4						
Reaction /m =	16.01	Kn/m	moment /m =	0.5093						

Maximum moment = 0.5093 kN-m

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

PROJECT : WTP AT ASIFABAD		JOB : L16-02	
UNIT : CLARIFIER			
RCC WALL FOOTING			
DATA : General			
Steel	Fy	415	N/mm2
Clear cover	Cv	50	mm
Density of concrete	Wd	25	kN/m3
Grade of concrete	Fck	30	N/mm2
Maximum Diameter of bar	Db	12	mm
DATA : Soil			
Net sbc soil	SBC	150	kN/m2
Density of soil	Wds	22	kN/m3
DATA : Geometry			
Width of RCC wall	Wr	300	mm
Project of RCC wall on each side	Prj	600	mm
Footing depth at edge	Fe	300	mm
Footing depth at face of the wall	Ffw	300	mm
DATA : Loading			
Total Load top - Live load if any	TI	20.00	kN/m
Self wt of RCC wall	Sw	0.0	kn/m
Self wt includes () (from Staad reaction / Manual backup)			
Water load if any	OI	28.00	kN/m
Other load if any ()		0.00	kN/m
Moment if any	M	1.00	kN/m
Minimum % steel	Ptmin	0.12	%
Output			
SBC			
Permissible SBC		150.00	kN/m2
Actual SBC		35.57	kN/m2
Check for SBC			OK
Reinforcement - Main			
Reinforcement required		108	mm2/m
Reinforcement provided	dia	spc	
	12	150	
Reinforcement provided		754	mm2/m
Check for Reinforcement provided			OK
Reinforcement - distribution			
Reinforcement required		360	mm2/m
Reinforcement provided	dia	spc	
	10	200	

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

Reinforcement provided		393	mm ² /m	
Check for Reinforcement provided		OK		
Shear				
Permissible shear stress		0.40	N/mm ²	
Actual Shear stress		0.08	N/mm ²	
		OK		
CALCULATION				
Check for Sizing				
Total load on footing	Tlf	48.00	kN/m	
Total width of footing in m	Pw	1.50	m	
Total width of footing in mm		1500	mm	
Selt wt of footing /m	Swf	11.25	kN/m	
Additonal wt of footing	Swfa	1.35	kN/m	
Total Load on foundation	Total	49.35	kN/m	
Check for SBC				
Act.ual pre.- due to vertical load - P/A	Apv	32.90	kN/m ²	
Modulus of section Zxx	zxx	0.38	m ³	
M/Z	Apm	2.67	kN/m ²	
Maximum Pressure = P/A + M/Z	Ap	35.57	kN/m ²	
Check < SBC		O.K		
Minimum Pressure = P/A - M/Z	Apmin	30.23	kN/m ²	
Check < 0 , No loss of Contact		O K		
Footing design				
Effective depth of footing at wall face	De	244	mm	
cantilever	Ca	600	mm	
pressure at the face of wall	pref	33	kN/m ²	
Pre. Difference (max and Wall face)	pdif	2	kN/m ²	
Due to Rectangle block pressure		6.02	kN-m	
Due to Triangular block presure		0.26	kN-m	
Total Moment	Ma	6.27	kN-m	
Factored Moment at the face of wall	MF	9.41	kN-m	
Reinforcement				
Area of steel required	ast	108	mm ²	
Dia meter	dia	12.00	mm	
Spacing	spc	150.00	mm	
provided ast	past	754	mm ²	ok
Minimum Steel				
Avarage Thickness		300		
Area of steel required	astmin	360	mm ²	
Dia meter	dia	10		

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

Spacing provided	ast	spc past	200 393	ok
Shear check				
Shear at a distance effective depth d				
Soil pressure at effective Depth de			34	
Shear Due to rectancgle block			12.21	kN
Shear due to triangular block			0.38	kN
Total Shear				
Total Factor shear		V	12.59	kN
		Vu	18.89	kN
effective depth ds at critical section				
Differece of Thickness(Face-edge)			0.0	mm
Variation			0.0	
Depth at critical section for shear			300.0	mm
effective depth ds at critical section		ds	244.0	mm
Actual Shear stress		Tv	0.077	N/mm2
Percentage steel		pt	0.31	%
Pt for calculation of shear		pt	0.31	
		beta	11.27	
		Tc	0.40	N/mm2

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

6.0 DESIGN OF BAFFLE WALL

Central baffle wall 150 mm thick – RCC wall
Diameter of wall = 17.6 m in-to-in
Height of wall = 3.3 m wall

Wt = 3.3 x 0.15 x 25 = 12.375 Kn/m Say 12.5 Kn/m
The wall is supported on ring beam which is supported by 12column equally placed.
Let beam size = 230 x 350 and
Column size = 230 x 230
Analysis of beam is done on STAAD. Attached output shows the final moment due to loading on beam

STAAD INPUT

```
STAAD SPACE
START JOB INFORMATION
JOB NAME WTP AT Asifabad
JOB PART bottom ring beam : 17.6 in to in
ENGINEER DATE 10-Feb-16
JOB CLIENT Rural water supply and sanitation department
JOB NO L16-02
JOB REV R0
END JOB INFORMATION
INPUT WIDTH 79
* c/c distance = 17.6 + 0.2 = 17.80
* radius = 8.9 m
*****
*          STAAD.Pro Generated Comment          *
*****
*JOINT COORDIANTE CYL REV
*JOINT COORDIANTE CYL REV
*1 8.9 0 0 72 8.9 0 355
*FINISH
*****
UNIT METER KN
JOINT COORDINATES
1 8.9 0 0; 2 8.86613 0 -0.775686; 3 8.76479 0 -1.54547; 4 8.59674 0 -
2.30349;
5 8.36326 0 -3.04398; 6 8.06614 0 -3.7613; 7 7.70762 0 -4.45;
8 7.29045 0 -5.10483; 9 6.81779 0 -5.72081; 10 6.29325 0 -6.29325;
11 5.72081 0 -6.8178; 12 5.10483 0 -7.29045; 13 4.45 0 -7.70763;
14 3.7613 0 -8.06614; 15 3.04398 0 -8.36327; 16 2.30348 0 -8.59674;
17 1.54546 0 -8.76479; 18 0.77568 0 -8.86613; 19 -5.69384e-006 0 -8.9;
20 -0.775693 0 -8.86613; 21 -1.54548 0 -8.76479; 22 -2.3035 0 -8.59674;
23 -3.04399 0 -8.36326; 24 -3.76131 0 -8.06614; 25 -4.45001 0 -7.70762;
26 -5.10484 0 -7.29045; 27 -5.72082 0 -6.81779; 28 -6.29326 0 -6.29324;
29 -6.8178 0 -5.7208; 30 -7.29046 0 -5.10482; 31 -7.70763 0 -4.44999;
32 -8.06614 0 -3.76129; 33 -8.36327 0 -3.04397; 34 -8.59674 0 -2.30348;
35 -8.76479 0 -1.54546; 36 -8.86613 0 -0.775675; 37 -8.9 0 1.13877e-005;
38 -8.86613 0 0.775699; 39 -8.76479 0 1.54548; 40 -8.59674 0 2.3035;
41 -8.36326 0 3.04399; 42 -8.06613 0 3.76131; 43 -7.70762 0 4.45001;
44 -7.29044 0 5.10484; 45 -6.81779 0 5.72082; 46 -6.29324 0 6.29326;
47 -5.7208 0 6.8178; 48 -5.10482 0 7.29046; 49 -4.44998 0 7.70763;
50 -3.76129 0 8.06615; 51 -3.04396 0 8.36327; 52 -2.30347 0 8.59674;
53 -1.54545 0 8.76479; 54 -0.775669 0 8.86613; 55 1.70815e-005 0 8.9;
56 0.775703 0 8.86613; 57 1.54549 0 8.76479; 58 2.30351 0 8.59673;
59 3.044 0 8.36326; 60 3.76132 0 8.06613; 61 4.45002 0 7.70762;
62 5.10485 0 7.29044; 63 5.72082 0 6.81778; 64 6.29326 0 6.29324;
```

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

65 6.81781 0 5.72079; 66 7.29046 0 5.10481; 67 7.70764 0 4.44998;
68 8.06615 0 3.76128; 69 8.36327 0 3.04396; 70 8.59675 0 2.30347;
71 8.76479 0 1.54545; 72 8.86613 0 0.775663; 73 8.9 -1.675 0;
74 7.70762 -1.675 -4.45; 75 4.45 -1.675 -7.70763; 76 -5.69384e-006 -1.675
-8.9;
77 -4.45001 -1.675 -7.70762; 78 -7.70763 -1.675 -4.44999;
79 -8.9 -1.675 1.13877e-005; 80 -7.70762 -1.675 4.45001;
81 -4.44998 -1.675 7.70763; 82 1.70815e-005 -1.675 8.9;
83 4.45002 -1.675 7.70762; 84 7.70764 -1.675 4.44998;

MEMBER INCIDENCES

1 1 2; 2 2 3; 3 3 4; 4 4 5; 5 5 6; 6 6 7; 7 7 8; 8 8 9; 9 9 10; 10 10 11;
11 11 12; 12 12 13; 13 13 14; 14 14 15; 15 15 16; 16 16 17; 17 17 18; 18
18 19;
19 19 20; 20 20 21; 21 21 22; 22 22 23; 23 23 24; 24 24 25; 25 25 26; 26
26 27;
27 27 28; 28 28 29; 29 29 30; 30 30 31; 31 31 32; 32 32 33; 33 33 34; 34
34 35;
35 35 36; 36 36 37; 37 37 38; 38 38 39; 39 39 40; 40 40 41; 41 41 42; 42
42 43;
43 43 44; 44 44 45; 45 45 46; 46 46 47; 47 47 48; 48 48 49; 49 49 50; 50
50 51;
51 51 52; 52 52 53; 53 53 54; 54 54 55; 55 55 56; 56 56 57; 57 57 58; 58
58 59;
59 59 60; 60 60 61; 61 61 62; 62 62 63; 63 63 64; 64 64 65; 65 65 66; 66
66 67;
67 67 68; 68 68 69; 69 69 70; 70 70 71; 71 71 72; 72 72 1; 73 73 1; 74 74
7;
75 75 13; 76 76 19; 77 77 25; 78 78 31; 79 79 37; 80 80 43; 81 81 49; 82
82 55;
83 83 61; 84 84 67;

DEFINE MATERIAL START

ISOTROPIC CONCRETE

E 2.73e+007

POISSON 0.17

DENSITY 25

ALPHA 1e-005

DAMP 0.05

TYPE CONCRETE

STRENGTH FCU 27579

END DEFINE MATERIAL

MEMBER PROPERTY

1 TO 72 PRIS YD 0.35 ZD 0.23

73 TO 84 PRIS YD 0.23 ZD 0.23

CONSTANTS

MATERIAL CONCRETE ALL

SUPPORTS

73 TO 84 FIXED

LOAD 1 LOADTYPE Dead TITLE Wall

SELFWEIGHT Y -1

MEMBER LOAD

1 TO 72 UNI GY -12.5

LOAD COMB 101 FACTORED

1 1.5

LOAD COMB 201 WORKING

1 1.0

PERFORM ANALYSIS

LOAD LIST 101

START CONCRETE DESIGN

CODE INDIAN

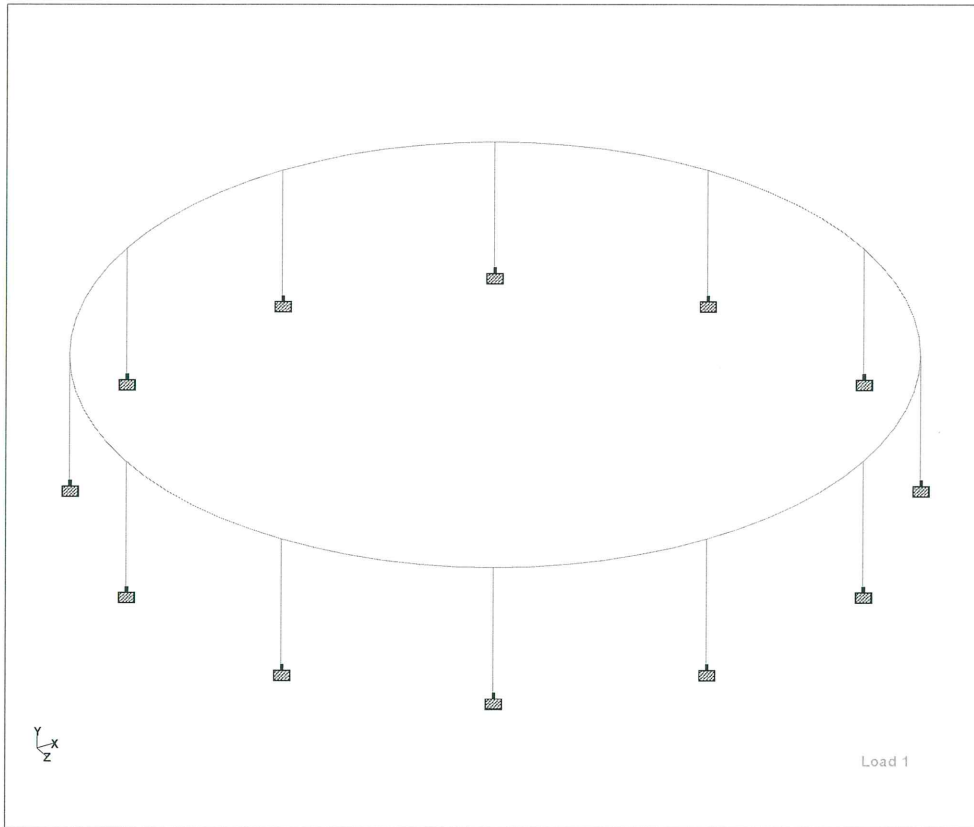
UNIT MMS NEWTON

CLEAR 50 ALL

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

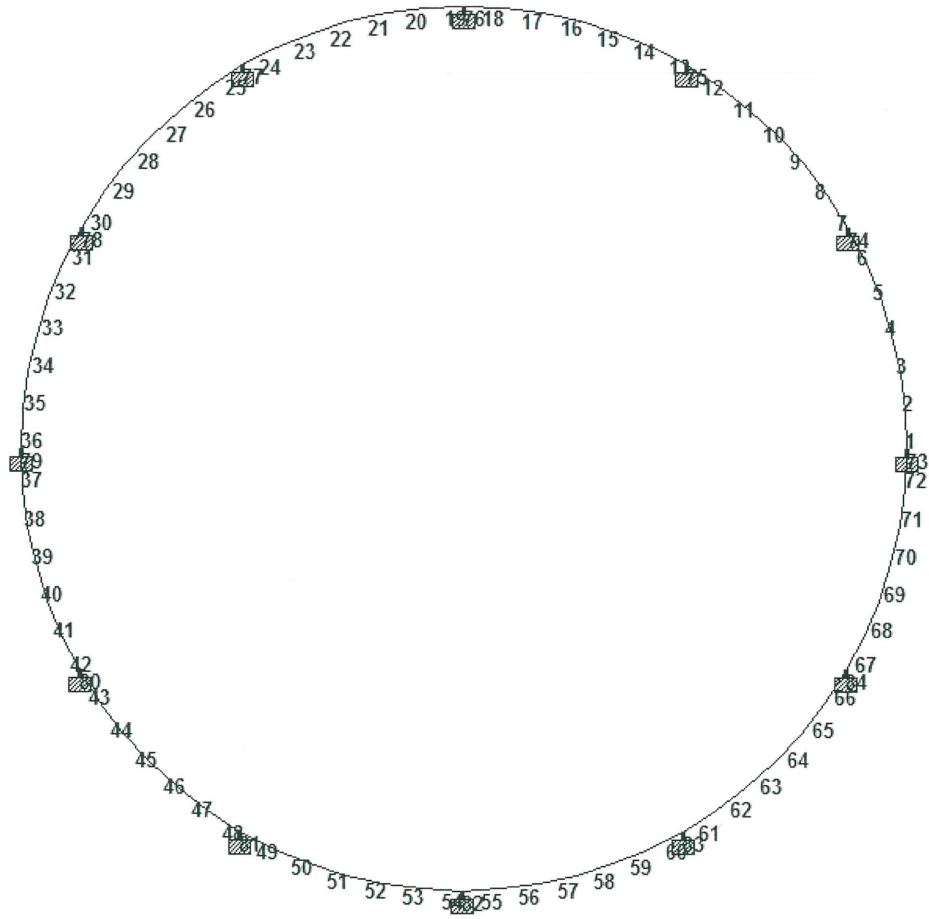
FC 30 ALL
FYMAIN 415 ALL
FYSEC 415 ALL
MAXMAIN 25 ALL
MAXSEC 8 ALL
MINMAIN 12 ALL
TORSION 0 MEMB 1 TO 72
DESIGN BEAM 13 TO 24
DESIGN COLUMN 73 TO 84
END CONCRETE DESIGN
UNIT METER KN
LOAD LIST 101
FINISH

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



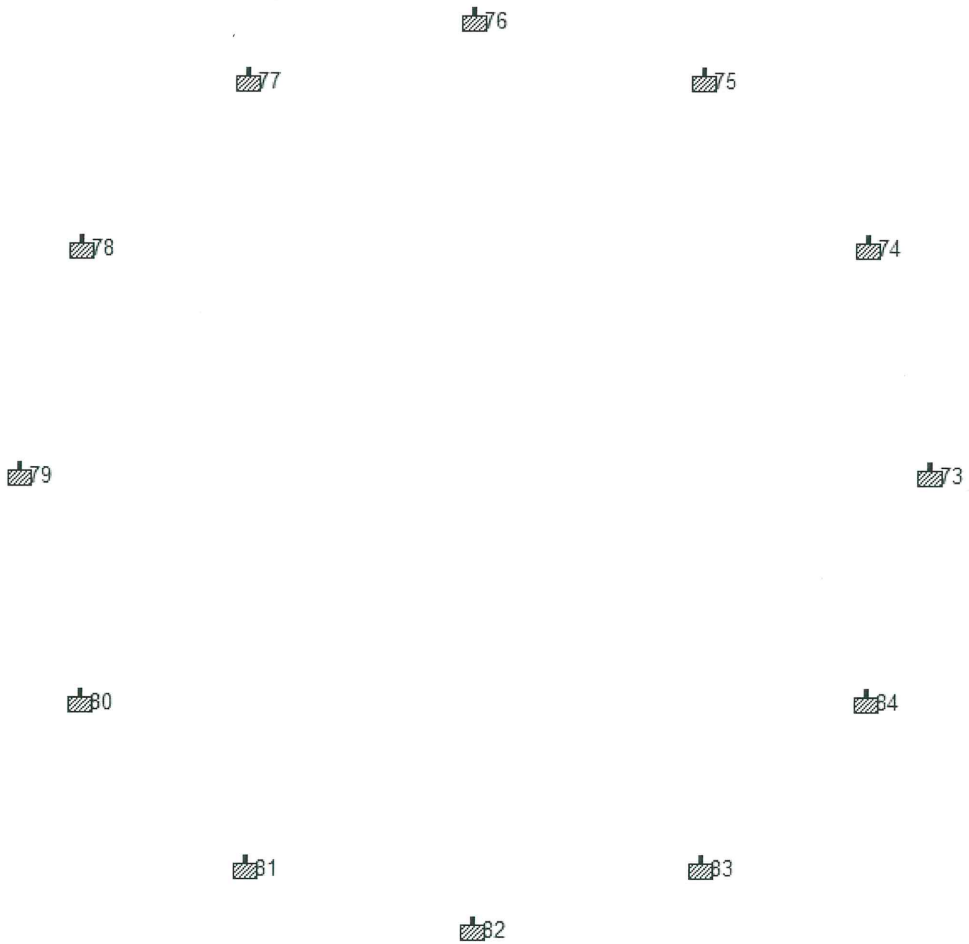
3D MODEL

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



MEMBER NOS

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



SUPPORT NUMBERS

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

BEAM DESIGN OUTPUT

```
=====
B E A M   N O .      13   D E S I G N   R E S U L T S
M30                Fe415 (Main)                Fe415 (Sec.)
LENGTH:   776.4 mm    SIZE:   230.0 mm X 350.0 mm    COVER: 50.0 mm
```

SUMMARY OF REINF. AREA (Sq.mm)

SECTION	0.0 mm	194.1 mm	388.2 mm	582.3 mm	776.4 mm
TOP REINF.	433.99 (Sq. mm)	328.55 (Sq. mm)	236.70 (Sq. mm)	164.88 (Sq. mm)	164.88 (Sq. mm)
BOTTOM REINF.	0.00 (Sq. mm)	0.00 (Sq. mm)	0.00 (Sq. mm)	0.00 (Sq. mm)	0.00 (Sq. mm)

SUMMARY OF PROVIDED REINF. AREA

SECTION	0.0 mm	194.1 mm	388.2 mm	582.3 mm	776.4 mm
TOP REINF.	4-12i 1 layer(s)	3-12i 1 layer(s)	3-12i 1 layer(s)	2-12i 1 layer(s)	2-12i 1 layer(s)
BOTTOM REINF.	2-12i 1 layer(s)	2-12i 1 layer(s)	2-12i 1 layer(s)	2-12i 1 layer(s)	2-12i 1 layer(s)
SHEAR REINF.	2 legged 8i @ 90 mm c/c	2 legged 8i @ 90 mm c/c	2 legged 8i @ 90 mm c/c	2 legged 8i @ 90 mm c/c	2 legged 8i @ 90 mm c/c

```
=====
B E A M   N O .      14   D E S I G N   R E S U L T S
M30                Fe415 (Main)                Fe415 (Sec.)
LENGTH:   776.4 mm    SIZE:   230.0 mm X 350.0 mm    COVER: 50.0 mm
```

SUMMARY OF REINF. AREA (Sq.mm)

SECTION	0.0 mm	194.1 mm	388.2 mm	582.3 mm	776.4 mm
TOP REINF.	138.50 (Sq. mm)	138.50 (Sq. mm)	0.00 (Sq. mm)	0.00 (Sq. mm)	0.00 (Sq. mm)
BOTTOM REINF.	0.00 (Sq. mm)	138.50 (Sq. mm)	138.50 (Sq. mm)	138.50 (Sq. mm)	151.79 (Sq. mm)

SUMMARY OF PROVIDED REINF. AREA

SECTION	0.0 mm	194.1 mm	388.2 mm	582.3 mm	776.4 mm
TOP REINF.	2-12i 1 layer(s)	2-12i 1 layer(s)	2-12i 1 layer(s)	2-12i 1 layer(s)	2-12i 1 layer(s)
BOTTOM REINF.	2-12i 1 layer(s)	2-12i 1 layer(s)	2-12i 1 layer(s)	2-12i 1 layer(s)	2-12i 1 layer(s)
SHEAR REINF.	2 legged 8i @ 90 mm c/c	2 legged 8i @ 90 mm c/c	2 legged 8i @ 90 mm c/c	2 legged 8i @ 90 mm c/c	2 legged 8i @ 90 mm c/c

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

COLUMN DESIGN OUTPUT

=====

C O L U M N N O . 7 3 D E S I G N R E S U L T S
M30 Fe415 (Main) Fe415 (Sec.)
LENGTH: 1675.0 mm CROSS SECTION: 230.0 mm X 230.0 mm COVER: 50.0 mm

** GUIDING LOAD CASE: 101 END JOINT: 73 SHORT COLUMN

REQD. STEEL AREA : 62.62 Sq.mm.
REQD. CONCRETE AREA: 52837.39 Sq.mm.
MAIN REINFORCEMENT : Provide 4 - 12 dia. (0.86%, 452.39 Sq.mm.)
(Equally distributed)
TIE REINFORCEMENT : Provide 8 mm dia. rectangular ties @ 190 mm c/c

SECTION CAPACITY BASED ON REINFORCEMENT REQUIRED (KNS-MET)

Puz : 732.80 Muz1 : 11.86 Muy1 : 11.86

INTERACTION RATIO: 0.35 (as per Cl. 39.6, IS456:2000)

SECTION CAPACITY BASED ON REINFORCEMENT PROVIDED (KNS-MET)

WORST LOAD CASE: 101
END JOINT: 73 Puz : 848.85 Muz : 20.49 Muy : 20.49
IR: 0.20

SUPPORT REACTIONS

Node	L/C	Horizontal		Vertical	Moment		
		Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
73	201 WORKING	-0.432	69.822	0	0	0	0.19
74	201 WORKING	-0.374	69.823	0.216	0.095	0	0.165
75	201 WORKING	-0.216	69.822	0.374	0.165	0	0.095
76	201 WORKING	0	69.822	0.432	0.19	0	0
77	201 WORKING	0.216	69.822	0.374	0.165	0	-0.095
78	201 WORKING	0.374	69.822	0.216	0.095	0	-0.165
79	201 WORKING	0.432	69.822	0	0	0	-0.19
80	201 WORKING	0.374	69.822	-0.216	-0.095	0	-0.165
81	201 WORKING	0.216	69.823	-0.374	-0.165	0	-0.095
82	201 WORKING	0	69.822	-0.432	-0.19	0	0
83	201 WORKING	-0.216	69.822	-0.374	-0.165	0	0.095
84	201 WORKING	-0.374	69.822	-0.216	-0.095	0	0.165

Considering Maximum P = 70 kN

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

FOOTING DESIGN			
PROJECT : WTP AT ASIFABAD		JOB : L16_02	
UNIT :BAFFLE WALL			
FOOTING NO		FF	
Concrete grade	Fck	30	N/mm2
Steel	Fy	415	N/mm2
Clear cover	Cv	50	mm
Maximum Bar Dia	Db	10	
FOOTING GEOMETRY			
Column length - X dir	Cx	0.23	m
Column Width - Z Direction	Cz	0.23	m
Pedestal projection	Ppj	0.05	m
Footing length - X dir	Fx	1	m
Footing Width - Z Direction	Fz	1	m
Edge thickness	Ed	0.15	m
Total thicness	Td	0.35	m
Loading			
Load Combination	LC	101	
Vertical load - Working load	P	70.0	Kn
S.B.C	sbc	150.0	kn/m2
% increase in SBC	ptsbc	0.0	%
OUTPUT			
Area required // el to X axis (i.e @ Z axis) =		332	mm2
Area provided	dia 10 spc 150	= 524	mm2
Area required // el to Z axis (i.e @ X axis) =		332	mm2
Area provided	dia 10 spc 150	= 524	mm2
Check for Shear			
Actual Shear Stress @ Z direction	=	0.04	N/mm2
permissble Shear Stress @ Z direction	=	0.47	N/mm2
Actual Shear Stress @ X direction	=	0.04	N/mm2
permissble Shear Stress @ X direction	=	0.47	N/mm2
Punching Shear : Actual	=	0.11	N/mm2
permissble	=	1.37	N/mm2
Calculation			
Calculation footing property			
area of footing	Af	1.00	m2
Modulus of Section - Zxx i.e @ X	Zxx	0.17	m3
Modulus of Section - Zzz i.e @ Z	Zzz	0.17	m3
Self wt of footing			
Footing top dimenstion - X dir	cxp	0.33	m
Footing top dimenstion - Z dir	czp	0.33	m

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

Flat portion		3.75	kN
Tapered portion		2.40	kN
Total wt	Pfself	6.1	kN
Total P	P	76.1	kN
Calculation Pressure check			
Pressure due to vertical load	Pv	76.15	kN/m ²
Allowable SBC	Asbc	150.00	kN/m ²
Total pre at corner 1	Pcor1	76.1	kN/m ²
Total pre at corner 2	Pcor2	76.1	kN/m ²
Total pre at corner 3	Pcor3	76.1	kN/m ²
Total pre at corner 4	Pcor4	76.1	kN/m ²
Check for SBC			kN/m ²
P/a+ Mx/z	Chka	o.k	mm
P/a- Mx/z	Chkb	o.k	mm
P/a+ Mx/z	Chkc	o.k	mm
P/a- Mx/z	chkd	o.k	mm
Design			
Reinforcement Calculation			
Effective depth	De	285.00	mm
	dee	0.29	m
Width	Bx	280.00	mm
	Bz	280.00	mm
Moment at Face of footing in X direction			
Distance of footing from face of column	Disxa	0.335	m
Pressure variation/m	Pvaryx	0.0	kN/m ² /m
Pressure at face of column	Prefcx	76.1	
Moment at the face of column ' due to UDL	Mudlx	4.27	kN-m
	Mtrax	0.00	kN-m
Total moment	Tmx	4	kN-m
Total Factored moment	Ftmx	6	kN-m
Ast	Astx	63	mm ²
Area of footing			
Flat portion		0.15	m ²
Tapered portion		0.13	m ²
Total C/S Area		0.28	m ²
Min area of steel (0.12 %) (Total rf in footing)		332	mm ²
Min area of steel (0.12 %) / m		332	mm ²
Governing reinforcement		332	mm ²
Reinforcement provided	dia	10	
	spc	150	
Reinforcement provided		524	mm ²
Moment at Face of footing in Z direction			
Distance of footing from face of column	Disza	0.335	
Pressure variation/m	Pvaryz	0.0	kn/m ² /m

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

Pressure at face of column	Prefcz	76.1	
Moment at the face of column ' due to UDL	Mudlz	4.27	Kn-m
	Mtraz	0.00	Kn-m
Total moment	Tmz	4.27	Kn-m
Total Factored moment	Ftmz	6.41	Kn-m
Ast	Astz	63	mm2
Area of footing			
Flat portion		0.15	m2
Tapered portion		0.13	m2
Total Area		0.28	m2
Min steel (0.12 %) (Total steel in footing)		332	mm2
Min area of steel (0.12 %) / m		332	mm2
Governing reinforcement		332	mm2
Reinforcement provided	dia	10	
	spc	150	
Reinforcement provided		524	mm2

Shear Calculation

One way Shear

Shear about Z direction :

Shear to be check at distance Deff from the face of the column			
Distance of shear section from face of footing	disvx	0.050	m
Pressure at that distance	Prefcvx	76	kN/m
Shear at a distance	Vxs	3.8	kn
Top width of footing at a distance	Wvb	0.90	m
Effective depth at a distance			
Depth of tapered portion	tapered	0.20	m
Depth at distance	TDvx	0.030	m
Total depth at Section	Devx	0.180	m
Aera to resist the shear			
arae of flat portion	Ax1	0.09	m2
area of taperd portion	Ax2	0.03	m2
	Arvx	0.12	m2
Angle tanbx		30.84	theta
	tanbx	0.597	
Moment at a distance	due to rect. Portion	0.10	kn-m
	due to tri.. Portion	0.00	kn-m
	momvx	0.10	kn-m
Shear reduction	vxsrd	0.3	kn
Net shear	Vnetxs	3.5	kn
Facored Shear at a distance	FVxs	5.2	kn
actual Shear Stress		0.04	N/mm2
Shear Capacity			
Actual Reinforcement provided /m		524	mm2
Total area of reinforcement		524	mm2
Area of concrete to resist shear		0.12	m2

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

% Pt		0.44	%
% pt for Shear check		0.44	
= $0.8 \cdot F_{ck} / (6.89 \cdot pt)$	Beta	7.87	
= $0.85 \cdot (0.8 \cdot F_{ck})^{0.5} \cdot ((1 + 5 \cdot \beta)^{0.5} - 1) / (6 \cdot \beta)$	Vucx	0.47	N/mm ²
One way Shear			
Shear about X direction :			
Shear to be check at distance Deff from the face of the column			
Distance of shear section from face of footing	disvz	0.050	m
Pressure at that distance	Prefcvz	76.1	kN/m
Shear at a distance	Vzs	3.81	kn
Top width of footing at a distance	Wvd	0.90	m
Effective depth at a distance			
Depth of tapered portion	tapered	0.20	m
Depth at at distance	TDvz	0.030	m
	Devz	0.180	m
Aera to resist the shear			
arae of flat portion		0.09	m ²
area of taperd portion		0.03	m ²
	Arvz	0.12	m ²
Angle tanbx		30.84	theta
	tanbz	0.60	
Moment at a distance		0.10	kn-m
		0.00	kn-m
	momvz	0.10	kn-m
Shear reduction	vzsrd	0.32	kn
Net shear	Vnetzs	3.49	kn
Facored Shear at a distance	FVzs	5.24	kn
Shear Stress		0.04	N/m ²
Shear Capacity			
Actual Reinforcment provided /m		524	mm ²
Total area of reinforcment		524	
Area of concrete to resist shear		0.12	m ²
% Pt		0.44	%
% pt for Shear check		0.44	
= $0.8 \cdot F_{ck} / (6.89 \cdot pt)$	Beta	7.87	
= $0.85 \cdot (0.8 \cdot F_{ck})^{0.5} \cdot ((1 + 5 \cdot \beta)^{0.5} - 1) / (6 \cdot \beta)$	Vucx	0.47	N/mm ²
Two way Shear			
Two way Shear at a distace de/2			
effective twoway shear			
legth of shear plane	Spx	0.62	m
width of shear plane	Spz	0.62	m
Area of twoway shear	A3	areatws	0.62 m
Shear in X - direction		vtwayx	47 kN

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

Shear in Z - direction	vtwayz	47	kN
Maximum shear	vtwaym	47	kN
Factored shear		71	kN
area to resist shear			
Peridery		2.46	m ²
Depth // el to Fz		0.265	m
Depth // el to Fx		0.265	m
Area to resist //el to Fz		0.326	m ²
Area to resist //el to Fx		0.326	m ²
Total area		0.652	m ²
Actual shear Stress due to punching		0.11	m ²
Permissible stress for M30	tcperm	1.37	m ²
Check	Ok		

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

7.0 DESIGN OF CENTRAL SHAFT

A> WALL DESIGN

Basic Data:

Inside diameter: 1.00 m
Wall thickness: 0.20 m

Material:

Concrete grade = M 30
Reinforcement = Fe 415

Forces

Total wt of clarifier unit with drive mechanism = 120 kN

Considered 288kN for design

Load / area = $288 \text{ kN} / (\pi * 1.4 * 1.4 / 4) = 187 \text{ kN/m}^2$, considered = 190 kN/m^2

Water pressure:

Top of shaft = 282.91
Bottom of shaft = 276.01

Total height = $282.91 - 276.01 = 6.9 \text{ m}$
Water pressure = $6.9 \text{ m} \times 10 \text{ kN/m}^3$ (density of water) = 69.0 kN/m^2

Analysis is done in STAAD Pro : Input & Output is attached for reference

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

STAAD INPUT

```
STAAD SPACE
START JOB INFORMATION
JOB NAME WTP AT ASIFABAD
JOB PART 39 dia Clarifier : Central shaft
ENGINEER DATE 15-Feb-16
JOB NO L16-02
JOB REV r0 39 CLARIFIER :
END JOB INFORMATION
INPUT WIDTH 79
* CENTRAL SHAFT = INSIDE DIA 1.00 M . C/C 1.0+0.2 = 1.20
*****
* STAAD.Pro Generated Comment *
*****
*JOINT COORDIANTE CYL REV
*JOINT COORDIANTE CYL REV
*1 0.600 0 0 16 0.600 0 337.50
*REPEAT 1 0 0.69 0
*REPEAT 9 0 0.69 0
*177 0 6.9 0
*ELEMENT INCIDENCES
*****
UNIT METER KN
JOINT COORDINATES
1 0.6 0 0; 2 0.554328 0 -0.22961; 3 0.424264 0 -0.424264;
4 0.22961 0 -0.554328; 5 -3.83855e-007 0 -0.6; 6 -0.229611 0 -0.554328;
7 -0.424264 0 -0.424264; 8 -0.554328 0 -0.229609; 9 -0.6 0 7.67709e-007;
10 -0.554327 0 0.229611; 11 -0.424263 0 0.424265; 12 -0.229609 0
0.554328;
13 1.15156e-006 0 0.6; 14 0.229611 0 0.554327; 15 0.424265 0 0.424263;
16 0.554328 0 0.229609; 17 0.6 0.69 0; 18 0.554328 0.69 -0.22961;
19 0.424264 0.69 -0.424264; 20 0.22961 0.69 -0.554328;
21 -3.83855e-007 0.69 -0.6; 22 -0.229611 0.69 -0.554328;
23 -0.424264 0.69 -0.424264; 24 -0.554328 0.69 -0.229609;
25 -0.6 0.69 7.67709e-007; 26 -0.554327 0.69 0.229611;
27 -0.424263 0.69 0.424265; 28 -0.229609 0.69 0.554328;
29 1.15156e-006 0.69 0.6; 30 0.229611 0.69 0.554327; 31 0.424265 0.69
0.424263;
32 0.554328 0.69 0.229609; 33 0.6 1.38 0; 34 0.554328 1.38 -0.22961;
35 0.424264 1.38 -0.424264; 36 0.22961 1.38 -0.554328;
37 -3.83855e-007 1.38 -0.6; 38 -0.229611 1.38 -0.554328;
39 -0.424264 1.38 -0.424264; 40 -0.554328 1.38 -0.229609;
41 -0.6 1.38 7.67709e-007; 42 -0.554327 1.38 0.229611;
43 -0.424263 1.38 0.424265; 44 -0.229609 1.38 0.554328;
45 1.15156e-006 1.38 0.6; 46 0.229611 1.38 0.554327; 47 0.424265 1.38
0.424263;
48 0.554328 1.38 0.229609; 49 0.6 2.07 0; 50 0.554328 2.07 -0.22961;
51 0.424264 2.07 -0.424264; 52 0.22961 2.07 -0.554328;
53 -3.83855e-007 2.07 -0.6; 54 -0.229611 2.07 -0.554328;
55 -0.424264 2.07 -0.424264; 56 -0.554328 2.07 -0.229609;
57 -0.6 2.07 7.67709e-007; 58 -0.554327 2.07 0.229611;
59 -0.424263 2.07 0.424265; 60 -0.229609 2.07 0.554328;
61 1.15156e-006 2.07 0.6; 62 0.229611 2.07 0.554327; 63 0.424265 2.07
0.424263;
64 0.554328 2.07 0.229609; 65 0.6 2.76 0; 66 0.554328 2.76 -0.22961;
67 0.424264 2.76 -0.424264; 68 0.22961 2.76 -0.554328;
69 -3.83855e-007 2.76 -0.6; 70 -0.229611 2.76 -0.554328;
71 -0.424264 2.76 -0.424264; 72 -0.554328 2.76 -0.229609;
73 -0.6 2.76 7.67709e-007; 74 -0.554327 2.76 0.229611;
75 -0.424263 2.76 0.424265; 76 -0.229609 2.76 0.554328;
```

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

77 1.15156e-006 2.76 0.6; 78 0.229611 2.76 0.554327; 79 0.424265 2.76
0.424263;
80 0.554328 2.76 0.229609; 81 0.6 3.45 0; 82 0.554328 3.45 -0.22961;
83 0.424264 3.45 -0.424264; 84 0.22961 3.45 -0.554328;
85 -3.83855e-007 3.45 -0.6; 86 -0.229611 3.45 -0.554328;
87 -0.424264 3.45 -0.424264; 88 -0.554328 3.45 -0.229609;
89 -0.6 3.45 7.67709e-007; 90 -0.554327 3.45 0.229611;
91 -0.424263 3.45 0.424265; 92 -0.229609 3.45 0.554328;
93 1.15156e-006 3.45 0.6; 94 0.229611 3.45 0.554327; 95 0.424265 3.45
0.424263;
96 0.554328 3.45 0.229609; 97 0.6 4.14 0; 98 0.554328 4.14 -0.22961;
99 0.424264 4.14 -0.424264; 100 0.22961 4.14 -0.554328;
101 -3.83855e-007 4.14 -0.6; 102 -0.229611 4.14 -0.554328;
103 -0.424264 4.14 -0.424264; 104 -0.554328 4.14 -0.229609;
105 -0.6 4.14 7.67709e-007; 106 -0.554327 4.14 0.229611;
107 -0.424263 4.14 0.424265; 108 -0.229609 4.14 0.554328;
109 1.15156e-006 4.14 0.6; 110 0.229611 4.14 0.554327;
111 0.424265 4.14 0.424263; 112 0.554328 4.14 0.229609; 113 0.6 4.83 0;
114 0.554328 4.83 -0.22961; 115 0.424264 4.83 -0.424264;
116 0.22961 4.83 -0.554328; 117 -3.83855e-007 4.83 -0.6;
118 -0.229611 4.83 -0.554328; 119 -0.424264 4.83 -0.424264;
120 -0.554328 4.83 -0.229609; 121 -0.6 4.83 7.67709e-007;
122 -0.554327 4.83 0.229611; 123 -0.424263 4.83 0.424265;
124 -0.229609 4.83 0.554328; 125 1.15156e-006 4.83 0.6;
126 0.229611 4.83 0.554327; 127 0.424265 4.83 0.424263;
128 0.554328 4.83 0.229609; 129 0.6 5.52 0; 130 0.554328 5.52 -0.22961;
131 0.424264 5.52 -0.424264; 132 0.22961 5.52 -0.554328;
133 -3.83855e-007 5.52 -0.6; 134 -0.229611 5.52 -0.554328;
135 -0.424264 5.52 -0.424264; 136 -0.554328 5.52 -0.229609;
137 -0.6 5.52 7.67709e-007; 138 -0.554327 5.52 0.229611;
139 -0.424263 5.52 0.424265; 140 -0.229609 5.52 0.554328;
141 1.15156e-006 5.52 0.6; 142 0.229611 5.52 0.554327;
143 0.424265 5.52 0.424263; 144 0.554328 5.52 0.229609; 145 0.6 6.21 0;
146 0.554328 6.21 -0.22961; 147 0.424264 6.21 -0.424264;
148 0.22961 6.21 -0.554328; 149 -3.83855e-007 6.21 -0.6;
150 -0.229611 6.21 -0.554328; 151 -0.424264 6.21 -0.424264;
152 -0.554328 6.21 -0.229609; 153 -0.6 6.21 7.67709e-007;
154 -0.554327 6.21 0.229611; 155 -0.424263 6.21 0.424265;
156 -0.229609 6.21 0.554328; 157 1.15156e-006 6.21 0.6;
158 0.229611 6.21 0.554327; 159 0.424265 6.21 0.424263;
160 0.554328 6.21 0.229609; 161 0.6 6.9 0; 162 0.554328 6.9 -0.22961;
163 0.424264 6.9 -0.424264; 164 0.22961 6.9 -0.554328;
165 -3.83855e-007 6.9 -0.6; 166 -0.229611 6.9 -0.554328;
167 -0.424264 6.9 -0.424264; 168 -0.554328 6.9 -0.229609;
169 -0.6 6.9 7.67709e-007; 170 -0.554327 6.9 0.229611;
171 -0.424263 6.9 0.424265; 172 -0.229609 6.9 0.554328;
173 1.15156e-006 6.9 0.6; 174 0.229611 6.9 0.554327; 175 0.424265 6.9
0.424263;

176 0.554328 6.9 0.229609; 177 0 6.9 0;

* HEIGHT = 282.91-276.01 = 6.9

* STAAD.Pro Generated Comment *

*1 1 2 18 17 TO 15 1 1

*REPEAT ALL 9 16 16

ELEMENT INCIDENCES SHELL

1 1 2 18 17; 2 2 3 19 18; 3 3 4 20 19; 4 4 5 21 20; 5 5 6 22 21; 6 6 7 23
22;

7 7 8 24 23; 8 8 9 25 24; 9 9 10 26 25; 10 10 11 27 26; 11 11 12 28 27;

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

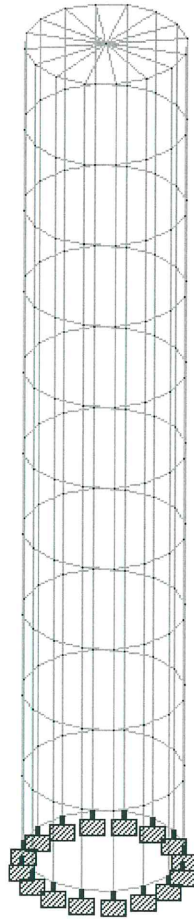
12 12 13 29 28; 13 13 14 30 29; 14 14 15 31 30; 15 15 16 32 31; 16 16 1
17 32;
17 17 18 34 33; 18 18 19 35 34; 19 19 20 36 35; 20 20 21 37 36; 21 21 22
38 37;
22 22 23 39 38; 23 23 24 40 39; 24 24 25 41 40; 25 25 26 42 41; 26 26 27
43 42;
27 27 28 44 43; 28 28 29 45 44; 29 29 30 46 45; 30 30 31 47 46; 31 31 32
48 47;
32 32 17 33 48; 33 33 34 50 49; 34 34 35 51 50; 35 35 36 52 51; 36 36 37
53 52;
37 37 38 54 53; 38 38 39 55 54; 39 39 40 56 55; 40 40 41 57 56; 41 41 42
58 57;
42 42 43 59 58; 43 43 44 60 59; 44 44 45 61 60; 45 45 46 62 61; 46 46 47
63 62;
47 47 48 64 63; 48 48 33 49 64; 49 49 50 66 65; 50 50 51 67 66; 51 51 52
68 67;
52 52 53 69 68; 53 53 54 70 69; 54 54 55 71 70; 55 55 56 72 71; 56 56 57
73 72;
57 57 58 74 73; 58 58 59 75 74; 59 59 60 76 75; 60 60 61 77 76; 61 61 62
78 77;
62 62 63 79 78; 63 63 64 80 79; 64 64 49 65 80; 65 65 66 82 81; 66 66 67
83 82;
67 67 68 84 83; 68 68 69 85 84; 69 69 70 86 85; 70 70 71 87 86; 71 71 72
88 87;
72 72 73 89 88; 73 73 74 90 89; 74 74 75 91 90; 75 75 76 92 91; 76 76 77
93 92;
77 77 78 94 93; 78 78 79 95 94; 79 79 80 96 95; 80 80 65 81 96; 81 81 82
98 97;
82 82 83 99 98; 83 83 84 100 99; 84 84 85 101 100; 85 85 86 102 101;
86 86 87 103 102; 87 87 88 104 103; 88 88 89 105 104; 89 89 90 106 105;
90 90 91 107 106; 91 91 92 108 107; 92 92 93 109 108; 93 93 94 110 109;
94 94 95 111 110; 95 95 96 112 111; 96 96 81 97 112; 97 97 98 114 113;
98 98 99 115 114; 99 99 100 116 115; 100 100 101 117 116; 101 101 102 118
117;
102 102 103 119 118; 103 103 104 120 119; 104 104 105 121 120;
105 105 106 122 121; 106 106 107 123 122; 107 107 108 124 123;
108 108 109 125 124; 109 109 110 126 125; 110 110 111 127 126;
111 111 112 128 127; 112 112 97 113 128; 113 113 114 130 129;
114 114 115 131 130; 115 115 116 132 131; 116 116 117 133 132;
117 117 118 134 133; 118 118 119 135 134; 119 119 120 136 135;
120 120 121 137 136; 121 121 122 138 137; 122 122 123 139 138;
123 123 124 140 139; 124 124 125 141 140; 125 125 126 142 141;
126 126 127 143 142; 127 127 128 144 143; 128 128 113 129 144;
129 129 130 146 145; 130 130 131 147 146; 131 131 132 148 147;
132 132 133 149 148; 133 133 134 150 149; 134 134 135 151 150;
135 135 136 152 151; 136 136 137 153 152; 137 137 138 154 153;
138 138 139 155 154; 139 139 140 156 155; 140 140 141 157 156;
141 141 142 158 157; 142 142 143 159 158; 143 143 144 160 159;
144 144 129 145 160; 145 145 146 162 161; 146 146 147 163 162;
147 147 148 164 163; 148 148 149 165 164; 149 149 150 166 165;
150 150 151 167 166; 151 151 152 168 167; 152 152 153 169 168;
153 153 154 170 169; 154 154 155 171 170; 155 155 156 172 171;
156 156 157 173 172; 157 157 158 174 173; 158 158 159 175 174;
159 159 160 176 175; 160 160 145 161 176;
161 177 161 162; 162 177 162 163; 163 177 163 164; 164 177 164 165;
165 177 165 166; 166 177 166 167; 167 177 167 168; 168 177 168 169;
169 177 169 170; 170 177 170 171; 171 177 171 172; 172 177 172 173;
173 177 173 174; 174 177 174 175; 175 177 175 176; 176 177 176 161;
ELEMENT PROPERTY
1 TO 160 THICKNESS 0.2
161 TO 176 THICKNESS 0.3

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

```
DEFINE MATERIAL START
ISOTROPIC MATERIAL1
E 2.73e+007
POISSON 0.17
DENSITY 25
ALPHA 1.2e-011
END DEFINE MATERIAL
CONSTANTS
MATERIAL MATERIAL1 ALL
SUPPORTS
1 TO 16 FIXED
LOAD 1 BRIDGE LOAD
SELFWEIGHT Y -1
* Maximim bridge load on central shaft = 120 kN
* consider 240 kN for design
* Add 20 %
* Total = 288 kN
* AREA OF SLAB = PI/4 * 1.4^2 = 1.54 m2
*LOAD ON SLAB = 360/1.54 = 187 kN/m2
ELEMENT LOAD
161 TO 176 PR -190
* heighth = 6.90m
LOAD 2 WATER
ELEMENT LOAD
1 TO 16 TRAP Y 69.0 62.1
17 TO 32 TRAP Y 62.1 55.2
33 TO 48 TRAP Y 55.2 48.3
49 TO 64 TRAP Y 48.3 41.4
65 TO 80 TRAP Y 41.4 34.5
81 TO 96 TRAP Y 34.5 27.6
97 TO 112 TRAP Y 27.6 20.7
113 TO 126 TRAP Y 20.7 13.8
127 TO 144 TRAP Y 13.8 6.90
145 TO 160 TRAP Y 6.90 00.0
LOAD COMB 3 TOTAL
2 1.0 1 1.0
PERFORM ANALYSIS
FINISH
```

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

STAAD DIAGRAM – 3D model



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

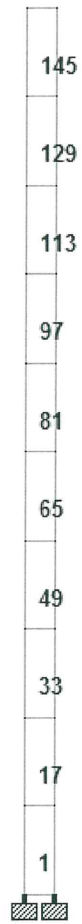


PLATE NOS

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

SHAFT DESIGN

Reinforcement Calculation of Cylindrical wall										
Central Shaft										
Load case : Water										
BASIC DATA										
Diameter - in to in	Diain	1	m							
Maximum wall thickness	wthk	0.2	m							
Clear cover to main steel	Cv	50	mm							
Maximum dia of bar	mdbar	12	mm							
Concrete grade	Fck	30	N/mm2							
Allowable crack width	Acw	0.2	mm							
GENERAL DATA										
As per IS 3370-2009	Dmin	15	m							
steel grade	Fy	415	N/mm2							
Modulus of Elasticity of Concrete	Ec	27386	N/mm2							
Modulus of Elasticity of reinforcement	Es	200000	N/mm2							
Maximum out to out Dia	Maxdia	1.40	m							
Permissible stress in direct tension	fyuc	130	N/mm2							
Permissible stress in tension due to bending	fyucb	130	N/mm2							
Minimum % steel as per IS 3370-2009	ptmin	0.24	%							
per. stress in con. for direct comp	fckc	8.0	N/mm2							
per. stress in con in com. due to bending	fckbc	10.0	N/mm2							
per. stress in con. for direct tension	fckt	1.5	N/mm2							
per. stress in con. In ten due to bending	fcktb	2.0	N/mm2							
Modular ratio	m	9.33								
	k	0.418								
	j	0.861								
As maximum diameter is less than 15 m , minimum steel = 0.24 %										
Paste data from STADD										
Plate	L/C	SQX kN/m2	SQY kN/m2	MX kNm/m	MY kNm/m	MXY kNm/m	SX kN/m2	SY kN/m2	SXY kN/m2	
1	3	0	37.4	0.0	0.0	-0.003	52	-416		2
17	3	0	-8.7	0.0	0.1	-0.004	188	-404		3
33	3	0	-1.0	0.0	0.0	-0.005	150	-392		3
49	3	0	-2.5	0.0	0.0	-0.008	132	-380		3
65	3	0	-2.2	0.0	0.0	-0.013	112	-369		3
81	3	0	-2.1	0.0	0.0	-0.023	92	-357		3
97	3	1	-2.8	0.0	0.0	-0.035	69	-346		4
113	3	2	-1.1	0.0	0.0	-0.033	48	-333		2
129	3	1	-7.1	0.0	-0.2	-0.036	22	-317		0
145	3	1	23.6	0.1	0.7	-0.059	50	-299		0
OUTPUT										
Calculation for hoop steel										

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

Sr.no	Plate no	Sx - Str. Stress	Thk	Axial Force	Steel reqd Design	Steel reqd Minimum	Dia. mm	spc mm	Astp mm2
1	1	52	200	10.3	79	480	10	200	785
2	17	188	200	37.5	289	480	10	200	785
3	33	150	200	30.0	231	480	10	200	785
4	49	132	200	26.5	204	480	10	200	785
5	65	112	200	22.3	172	480	10	200	785
6	81	92	200	18.3	141	480	10	200	785
7	97	69	200	13.8	106	480	10	200	785
8	113	48	200	9.7	74	480	10	200	785
9	129	22	200	4.4	34	480	10	200	785
10	145	50	200	10.0	77	480	10	200	785

Check for hoop steel and stress

	steel			Concrete stress		
	Steel reqd mm2	Steel Prov mm2	check	perm. stress N/mm2	Actual stress N/mm2	check
	1	480	785	O.K	1.5	0.05
2	480	785	O.K	1.5	0.18	O.K
3	480	785	O.K	1.5	0.15	O.K
4	480	785	O.K	1.5	0.13	O.K
5	480	785	O.K	1.5	0.11	O.K
6	480	785	O.K	1.5	0.09	O.K
7	480	785	O.K	1.5	0.07	O.K
8	480	785	O.K	1.5	0.05	O.K
9	480	785	O.K	1.5	0.02	O.K
10	480	785	O.K	1.5	0.05	O.K

Calculation Vertical steel

Sr.no	Plate no	My Stress	Thk	Effective Depth	Steel reqd	Steel			
						Water face		Other face	
						Design	Min	Design	Min
		Kn-m	mm	mm	mm2	mm2	mm2	mm2	mm2
1	1	0.0	200	144	-1	1	240	0	240
2	17	0.1	200	144	9	0	240	9	240
3	33	0.0	200	144	0	0	240	0	240
4	49	0.0	200	144	2	0	240	2	240
5	65	0.0	200	144	1	0	240	1	240
6	81	0.0	200	144	1	0	240	1	240
7	97	0.0	200	144	0	0	240	0	240
8	113	0.0	200	144	1	0	240	1	240
9	129	0.2	200	144	-10	10	240	0	240
10	145	0.7	200	144	41	0	240	41	240

Check for Vertical steel

Sr.no	Plate no	Steel provd.				Steel required mm2	Steel Provided mm2	check
		Water side						
		Dia	mm	Dia	mm			

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

1	1	12	200	240	565	O.K		
2	17	12	200	240	565	O.K		
3	33	12	200	240	565	O.K		
4	49	12	200	240	565	O.K		
5	65	12	200	240	565	O.K		
6	81	12	200	240	565	O.K		
7	97	12	200	240	565	O.K		
8	113	12	200	240	565	O.K		
9	129	12	200	240	565	O.K		
10	145	12	200	240	565	O.K		
Check for Vertical steel								
Sr.no	Plate no	Steel provd.				Steel required mm2	Steel Provided mm2	check
		Outer side						
		Dia	mm	Dia	mm			
1	1	12	200	240	565	O.K		
2	17	12	200	240	565	O.K		
3	33	12	200	240	565	O.K		
4	49	12	200	240	565	O.K		
5	65	12	200	240	565	O.K		
6	81	12	200	240	565	O.K		
7	97	12	200	240	565	O.K		
8	113	12	200	240	565	O.K		
9	129	12	200	240	565	O.K		
10	145	12	200	240	565	O.K		

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

FOOTING DESIGN

CENTRAL SHAFT - FOUNDATION				
DATA : General				
Steel	Fy	415	N/mm ²	
Clear cover	Cv	50	mm	
Maximum Diameter of bar	MaxDia	12	mm	
Density of concrete	Wd	25	Kn/m ³	
Density of soil	Sd	16.9	Kn/m ³	
Grade of concrete	Fck	30	N/mm ²	
Permissible stress in steel	Fyub	130	N/mm ²	
DATA : Soil				
SBC of soil	SBC	150	kn/m ²	
Depth of foundation	Df	3.6	m	
Gross SBC	GSBC	210.8	kn/m ²	
DATA :Geometry				
Dia of central shaft - inside	Dcshti	1000	mm	
Thickness of wall	wthk	200	mm	
Height of Shaft	Shfl	6.90	m	
Out to out Dia of central shaft	Dcshto	1200	mm	
Out to out Dia of foundation	Diaf	2200	mm	
Project of RCC wall on each side	Prj	400	mm	
Footing depth at edge	Fe	300	mm	
Footing depth at face of the shaft	Ffw	300	mm	
DATA :Loading				
Total Load of bridge	TI	190	kN	
Self wt of central shaft	Sw	59.6	kN	
Other loading if any	OI	0.00	kN	
CALCULATION				
Total load on footing	Tlf	250.0	kn	
Self weight of footing	Tfs	28.5		
Total Load on foundation	Total	278.5	kn/m	
Total Area of footing	Farea	3.80	m ²	
Check for SBC				
Actual pressure on soil	Ap	73.27	kn/m ²	< 210.84
Check for SBC		O.K		
Footing design				
Effective depth of footing at wall face	De	244	mm	
cantilever	Ca	0.40	m	
Moment at the face of wall	MF	5.86	knm	
Area of steel required	ast	205	mm ²	
Dia meter	dia	10	mm	
Spacing	spc	200	mm	
provided ast	past	393	mm ²	ok
Shear check				
Shear at a distance effective depth d (factor)	sdde	11.43	kn	

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

effective depth d_s at critical section	d_s	244.0	mm
Actual Shear stress	T_v	0.047	N/mm ²
Percentage steel	p_t	0.16	%
Permissible shear stress	T_c	0.203	N/mm ²
Check for Shear		O.k	

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

8.0 DESIGN OF SLUDGE VALVE PIT

BASIC DATA

Bottom level of wall at bottom raft = 277.21

Concrete grade = M 30

Design as per IS 456-2000 & IS 3370-2009 -

Wall is designed as box – support condition top free, bottom fixed support and soil load subject to triangular loading

Loading

Soil load

Soil depth = 280.0 – 277.21 = 2.79m

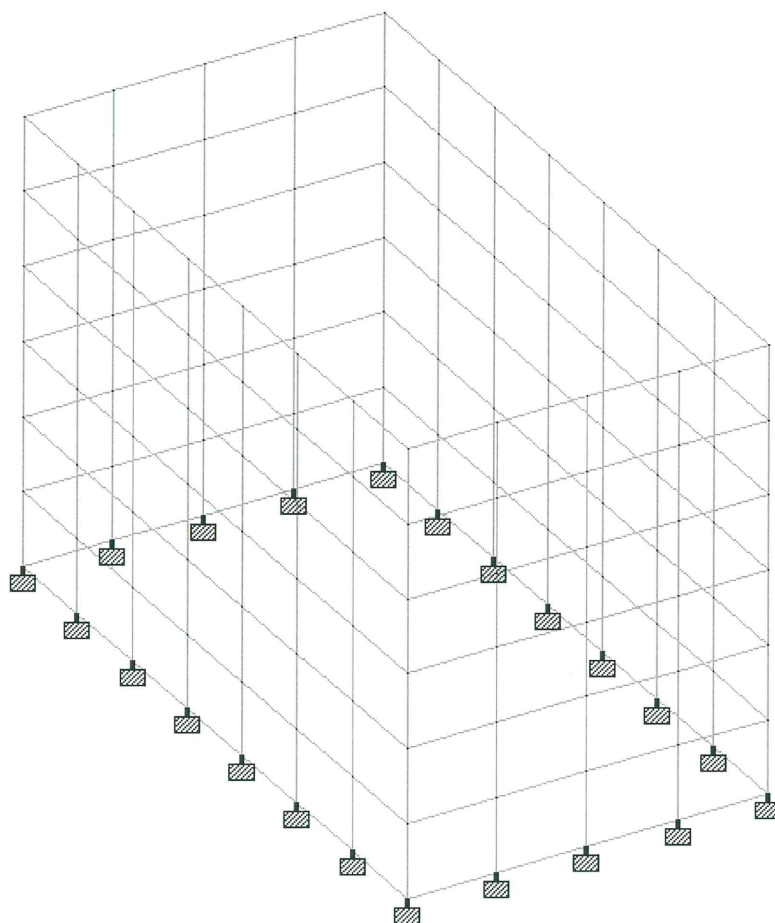
Maximum soil pressure at bottom = $3 * 22 * 0.333 = 22 \text{ kN/m}^2$

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

STAAD INPUT

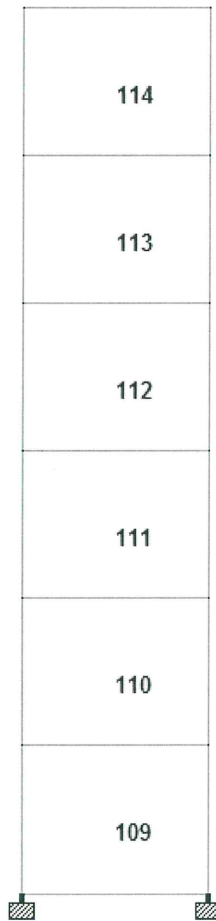
```
STAAD SPACE
START JOB INFORMATION
JOB NAME WTP at Asifsbad
JOB NO L16_02
JOB PART CLARIFIER-SLUDGE CHAMBER_4x2x3.09
ENGINEER DATE 15-Feb-2016
END JOB INFORMATION
INPUT WIDTH 79
UNIT METER KN
JOINT COORDINATES
1 0 0 0
2 0 0.5 0 7 0 3 0
REPEAT ALL 4 0.6 0 0
REPEAT 7 0 0 0.633
REPEAT 4 -0.6 0 0
REPEAT 6 0 0 -0.633
ELEMENT INCIDENCES SHELL
1 1 2 9 8 TO 6 1 1
REPEAT 20 6 7
127 148 149 2 1 TO 132 1 1
ELEMENT PROPERTY
1 TO 132 by 6 THICKNESS 0.2
2 TO 132 by 6 THICKNESS 0.2
3 TO 132 by 6 THICKNESS 0.2
4 TO 132 by 6 THICKNESS 0.2
5 TO 132 by 6 THICKNESS 0.2
6 TO 132 by 6 THICKNESS 0.2
DEFINE MATERIAL START
ISOTROPIC MATERIAL1
E 2.73e+007
POISSON 0.17
DENSITY 25
ALPHA 1.2e-011
END DEFINE MATERIAL
CONSTANTS
MATERIAL MATERIAL1 ALL
SUPPORTS
1 to 154 by 7 fixed
LOAD 1 SOIL
ELEMENT LOAD
6 TO 132 by 6 TRAP X -3.67 0
5 TO 132 by 6 TRAP X -7.33 -3.67
4 TO 132 by 6 TRAP X -11 -7.33
3 TO 132 by 6 TRAP X -14.67 -11
2 TO 132 by 6 TRAP X -18.33 -14.67
1 TO 132 by 6 TRAP X -22 -18.33
JOINT LOAD
56 140 FY -45
PERFORM ANALYSIS
FINISH
```

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



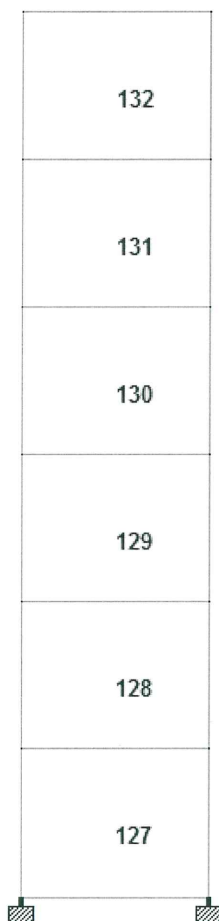
3-D MODEL

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



CENTRAL PLATE NUMBERS

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



CORNER PLATE NUMBERS

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

WALL DESIGN

PROJECT NO : L16-02												
Element : CLARIFIER												
Wall : SLUDGE VALVE PIT												
DATA												
Concrete grade	fck	30	N/mm2									
Steel Grade	fy	415	N/mm2									
Plate thickness	thk	200	mm									
Plate width	b	1000	mm									
Clear Cover	cv	45	mm									
Max.diameter of bar	db	12	mm	Area of steel in each face	=	240	mm2					
Minimum % steel	ptmin	0.24	%									
Minimum Area of steel	Amin	480	mm2									
Modulus of Elasticity of Concrete	Ec	27386	N/mm2									
Modulus of Elasticity of reinforcement	Es	200000	N/mm2									
Permissible stress in direct tension	fyuc	130	N/mm2									
Permissible stress in tension due to ber	fyucb	130	N/mm2									
per. stress in con. for direct comp	fckc	8	N/mm2									
per. stress in con in com.due to bending	fckbc	10	N/mm2									
per. stress in con. for direct tension	fckt	1.5	N/mm2									
per. stress in con. In ten due to bending	fcktb	2	N/mm2									
Modular ratio	m	9.33										
	k	0.418										
	j	0.861										
Sr . No	Plate No	b mm	D mm	Effecti ve depth mm	Plate Momen t (unfact ored)	Plate Moment (unfactor ed) kN-m	Ast required mm2	Ast provided				RF
								dia	spc	dia	spc	
Vertical - steel - Corner												
1	127	1000	200	143	1.277	1.3	80	10	190			413
2	128	1000	200	143	-0.023	0.0	1	10	190			413
3	129	1000	200	143	-0.324	0.3	20	10	190			413
4	130	1000	200	143	-0.426	0.4	27	10	190			413
5	131	1000	200	143	-0.455	0.5	28	10	190			413
6	132	1000	200	143	1.493	1.5	93	10	190			413
7		1000	200	143					1			
Vertical - steel - Middle												
1	109	1000	200	143	6.5	6.5	408	10	190			413
2	110	1000	200	143	-0.5	0.5	29	10	190			413
3	111	1000	200	143	-3.1	3.1	193	10	190			413
4	112	1000	200	143	-3.1	3.1	196	10	190			413
5	113	1000	200	143	-1.9	1.9	118	10	190			413
6	114	1000	200	143	-0.4	0.4	23	10	190			413
7		1000	200	143					1			

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

Horizontal steel - Corner											
1	127	1000	200	143	0.6	0.6	40	10	200		393
2	128	1000	200	143	1.4	1.4	88	10	200		393
3	129	1000	200	143	2.2	2.2	137	10	200		393
4	130	1000	200	143	2.4	2.4	147	10	200		393
5	131	1000	200	143	2.3	2.3	142	10	200		393
6	132	1000	200	143	1.2	1.2	74	10	200		393
7		1000	200	143					1		
Horizontal steel - middle											
1	109	1000	200	143	0.9	0.9	54	10	200		393
2	110	1000	200	143	-1.1	1.1	68	10	200		393
3	111	1000	200	143	-2.5	2.5	155	10	200		393
4	112	1000	200	143	-3.3	3.3	204	10	200		393
5	113	1000	200	143	-3.6	3.6	226	10	200		393
6	114	1000	200	143	-3.9	3.9	242	10	200		393
7		1000	200	143					1		

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

FOOTING DESIGN

WALL FOOTING DESIGN				
PROJECT : WTP AT ASIFABAD			JOB : L16-02	
UNIT : Clarifloculator				
WALL TYPE 1		W1		
BASIC DATA				
Density of water	denwt	10	kN/m3	
Density of soil	denso	22	kN/m3	
Density of concrete	decon	25	kN/m3	
Angle of Repose	Phi	30	degree	
Safe bearing capacity of soil	Sbc	150.0	kN/m2	
Concrete grade	Fck	30	N/mm2	
Steel grade	Fy	500	N/mm2	
Depth below GI	Dbg	2.50	m	
Water depth	wtd	3.00	m	
free board	fb	0.00	m	
Clear cover	Cv	50	mm	
Maximum size of bar dia	Db	12	mm	
Water depth with free board	Wd	3.00	m	
minimum % steel	pt	0.24	%	
Moment				
Due to Water	Mtw	0.0	kN-m	(From Analysis Result)
Due to soil if any	Mts	10.50	kN-m	
Wt from top dome/slab/column/wall	Slabwt	22.50	kN-m	
Wall geometry (Figure 1)				
Straight portion	lb	3.000	m	
Tapered portion	lc	0.000	m	
	tb	0.200	m	
	td	0.200	m	
Footing geometry				
Toe projection	ht	0.450	m	
Heel portion for soil stability	hh3	1.000	m	
Thickness at toe (free end)	tta	0.200	m	
Thickness at toe (fwall face)	ttb	0.200	m	
Thickness at heel (wall end)	tha	0.200	m	
Total Height of Wall	Tlw	3.000	m	
Total length of wall footing for soil load	wfs	1.650	m	

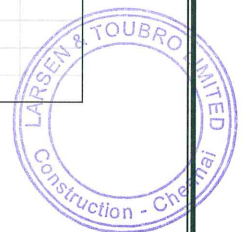
**PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM
ASIFABAD SEGMENT IN ADILABAD DISTRICT (30 MLD WTP)**

CASE 2 : TANK EMPTY CONDITION WITH SOIL OUTSIDE				
Total load & Moment calculation				
Taking moment @ toe				
Component		Wt	Lever A	Moment
		kN	m	kN-m
		W	Dist	W * dist
Wall Straight portion	W1	15.00	1.10	16.50
Wall Tapered portion	W2	0.00	1.20	0.00
Walkway/slab	P	22.50	1.10	24.75
Footing				
Footing : toe	W3	2.25	1.43	3.21
Footing center	W4	1.00	1.10	1.10
Footing : heel	W5	5.00	0.50	2.50
Soil on toe	W6	24.75	1.43	35.27
Total downward load		70.50		83.33
Total restoring moment @ heel				
	TRMs	83.3	kN-m	
Total over turning moment due to soil				
		10.5	kN-m	
F.S.against over turning				
		7.9		
Check for over turning				
		Hense o.k		
Total moment due to vertical load				
	Tmv1	83.3	kN-m	
Total moment due to horizontal load				
	Tmh1	10.5	kN-m	
Total vertical load				
	TPv1	70.5	kn	
Net Moment				
	Tmn1	72.8	kN-m	
M/p				
	E1	1.03	m	
Ecc				
	Ecc1	-0.208	m	
b/6				
	Aec1	0.28	m	
Net moment From ECC				
	Mdg1	-14.663		
Property of footing				
Width of footing				
		1.00	m	
Depth of footing				
		1.65	m	
Footing Area				
	Fare1	1.65	m2	
Modulus of section				
	Fz1	0.45	m3	
Pressure distribution				
Pressure due to direct load =P/A				
	prea1	42.73	kN/m2	
Pressure due to moment =M/Z				
	Preb1	-32.3	kN/m2	
Pressure				
Maximum pressure - P/A + M/Z				
	Pmax1	10.41	kN/m2	
Minimum pressure - P/A + M/Z				
	Pmin1	75.04	kN/m2	
Check for SBC				
Maximum pressure < SBC				
		OK		
Minimum presure > 0				
		OK		
Pressure difference				
		-64.63	kN/m2	
Pressure difference / m				
		-39.17	kN/m2	
Pressure at outer Wall face - A				
	preow1	57.42	kN/m2	
Pressure at inner Wall face B				
	preiw1	49.58	kN/m2	

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

Toe - At Point A			
Moment at face of outer wall			
Due to rectangle diagram	Mreco1	7.60	kn-m
Due to triabgular diagram	Mtrio1	-0.59	kn-m
Total moment due to upward pressure		7.00	kn-m
Total downward moment due to soil		5.57	kn-m
Net moment at A from Toe side	Toem1	-1.43	kn-m
Thickness at toe		200	mm
Effective depth	DefToe1	144	mm
Ast required =		-3.42	mm ²
Check for minimum steel			
top		240	mm ²
bottom		0	mm ²
Design Steel			
Main steel - Top		240	mm ²
Main steel - bottom		0	mm ²
Distribution steel - top		240	mm ²
Distribution steel - bottom		0	mm ²

Design of heel : At point B			
Design at point B			
Due to rectangle diagram (upward)	Mreci1	24.79	kn-m
	Mtrii1	-13.06	kn-m
Total Upward moment	heelm1	11.73	kn-m
Net downward moment at B from heel side		200	mm
Thickness Provided	defheel1	144	mm
Steel required at bottom		291	mm ²
Ast required =			
Check for minimum steel - straight portion			
top		240	mm ²
bottom		0	mm ²
Design Steel			
Main steel - Top		240	mm ²
Main steel - bottom		291	mm ²
Distribution steel - top		240	mm ²
Distribution steel - bottom		0	mm ²



[Signature]
Asst. Executive Eng.
TDWSP Asifabad

[Signature]
Dy. Executive Engineer
TDWSP Asifabad

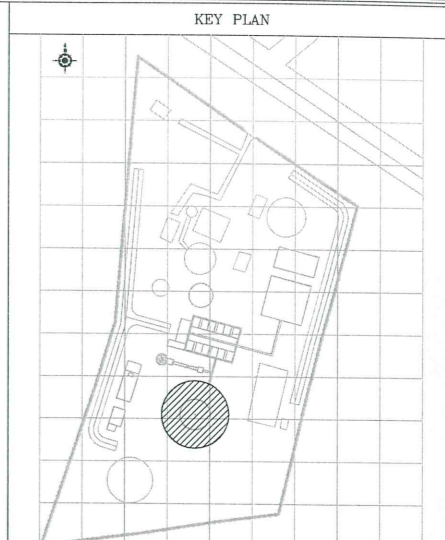
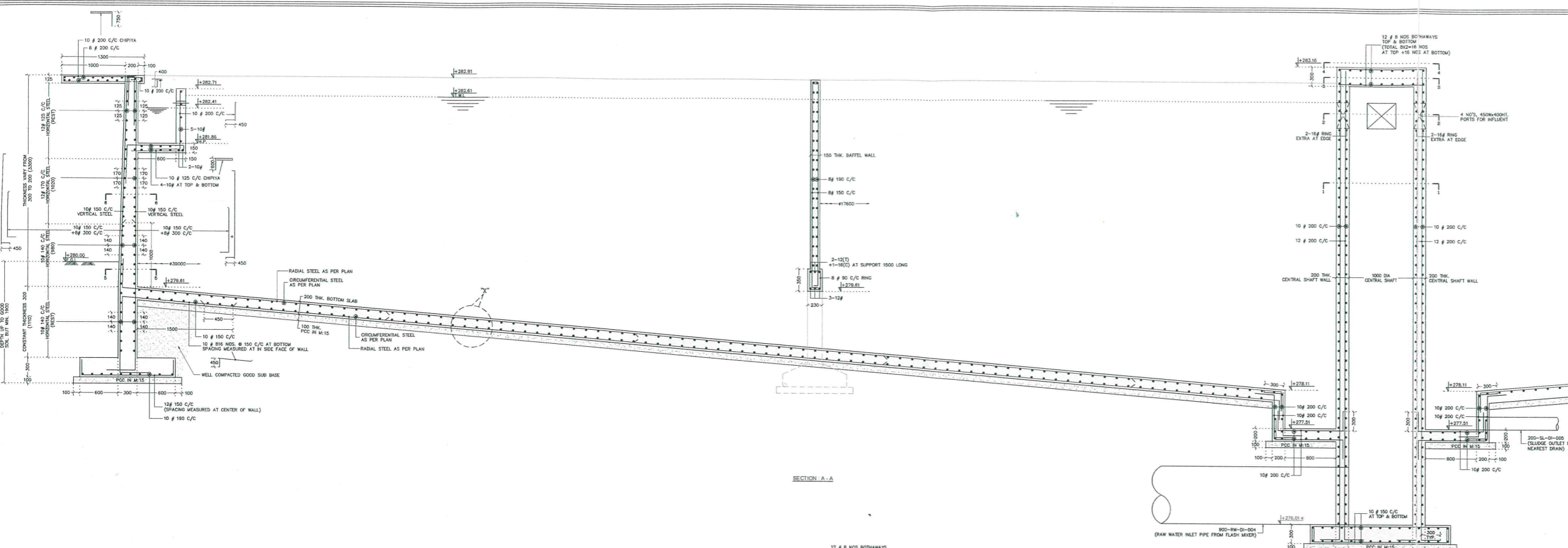
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27/11/16



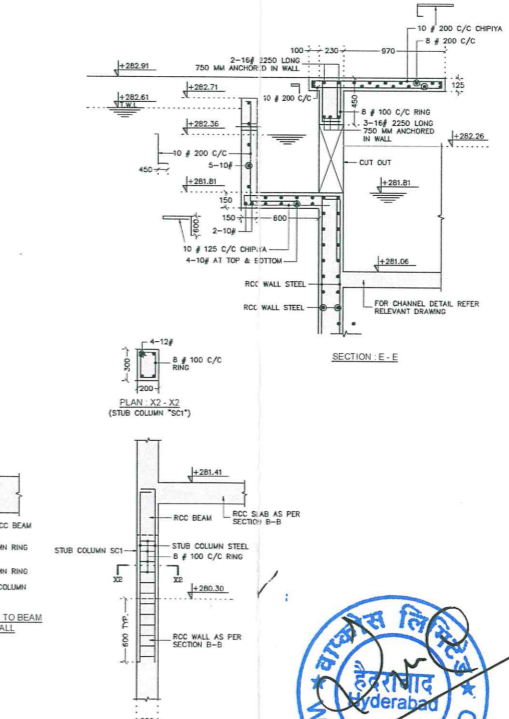
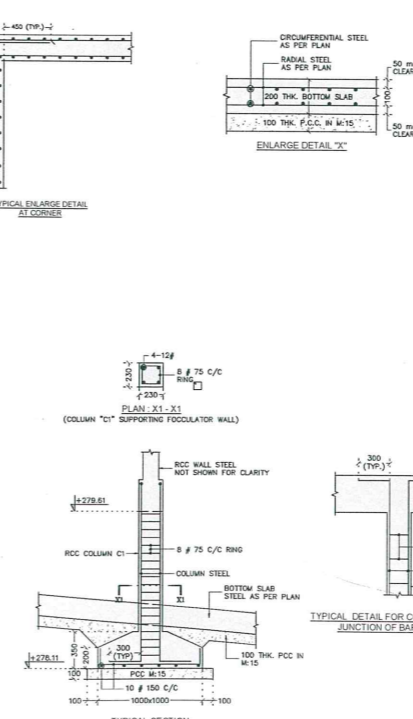
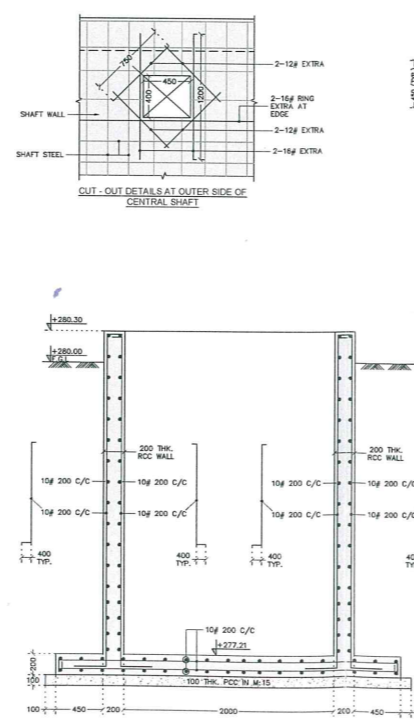
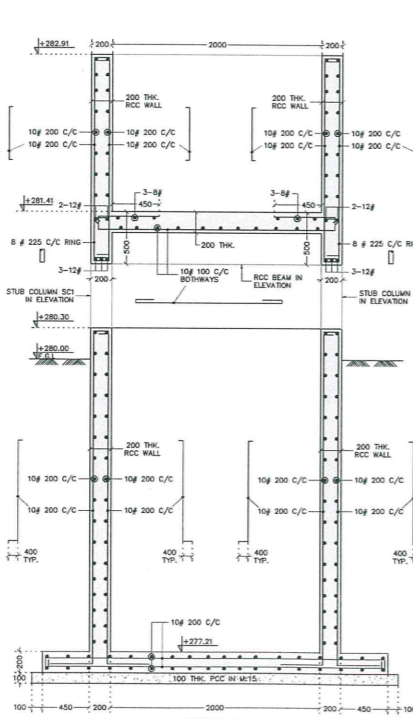
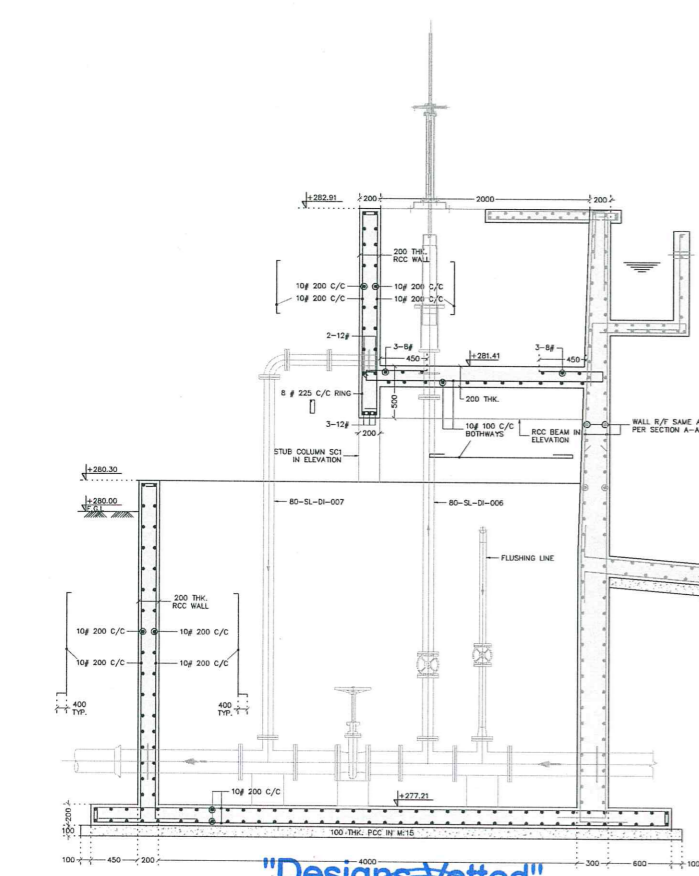
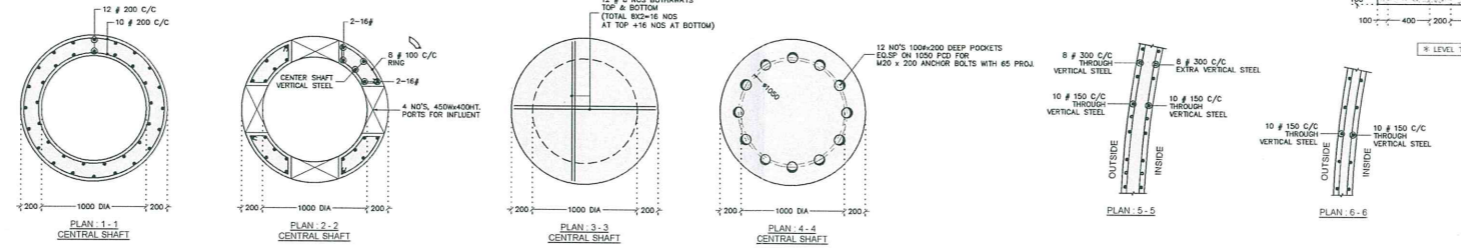


REFERENCE DRAWING

DRAWING TITLE	DRAWING NO
LAYOUT PLAN FOR WATER TREATMENT PLANT	LE150B83-P-WS-WT-PP-2002
HYDRAULIC FLOW DIAGRAM FOR WATER TREATMENT PLANT	LE150B83-P-WS-WT-HF-2003
G.A. DRAWING OF CLARIFLOCCULATOR	LE150B83-P-WS-WT-GA-2007

LEGEND

F.G.L.	FINISHED GROUND LEVEL	H.P.	HIGH POINT
T.O.W.	TOP OF WALL	L.P.	LOW POINT
T.W.L.	TOP WATER LEVEL	RW	RAW WATER
B.O.S.	BOTTOM OF SLAB	DI	DUCTILE IRON
T.O.S.	TOP OF SLAB	SL	SLUDGE
C1,C2,C3.....	RCC COLUMN	GI	GALVANISAID IRON



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 DRAWING 1 OF 3 & 2 OF 3.
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 <6> LEVEL OF ALL PIPES SHALL BE CONFIRMED WITH G.A. DRAWING.

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 SE, NIRMAL
 27/11/16



REV. No	DESCRIPTION	DATE	DESIGNED	DRAWN	CHECKED	APPROVED
B	REVISED AS PER CONSULTANT COMMENTS	01/03/16	HMP	NSP	RMM	-
A	FOR APPROVAL	16/02/16	HMP	NSP	RMM	-

REVISIONS

L&T Construction
 Water, Smart World & Communication.

CLIENT: GOVERNMENT OF TELANGANA
 RURAL WATER SUPPLY AND SANITATION DEPARTMENT
 PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT (30 MLD WTP)

CONSULTANT:
 Water & Effluent Treatment SBG

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

JOB No: LE150B83 TITLE: STRUCTURAL DRG FOR CLARIFLOCCULATOR

NAME	DATE	SCALE
DSH	16-02-16	1:30
NSP	16-02-16	
DRW	16-02-16	
APPD	16-02-16	

DRAWING No. LE150B83-C-WS-WT-R-C-11023 SHEET 3 OF 3
 COMP. DATA: 16-02-01-01-03

RELEASED FOR: PRELIMINARY TENDER INFORMATION APPROVAL CONSTRUCTION

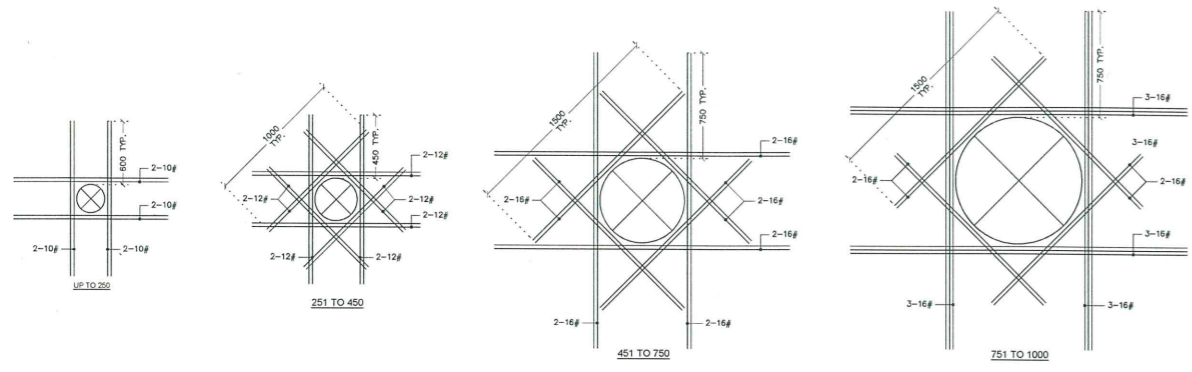
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 "Drawings Vetted"
 M.S. Srinivas Reddy
 HYD-8

Asst. Executive Engineer
 TDWSP Asifabad

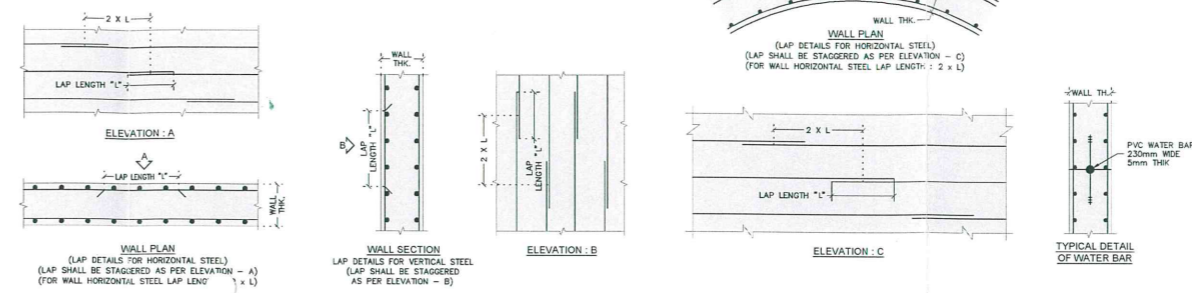
Dy. Executive Engineer
 TDWSP Asifabad

Executive Engineer
 TDWSP Asifabad

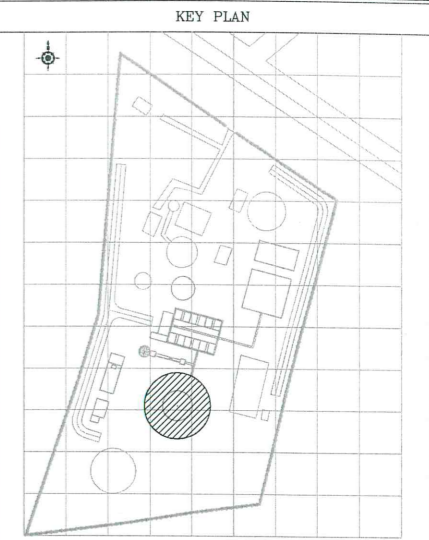




TYPICAL DETAIL FOR EXTRA STEEL BAR AT CUT-OUT



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

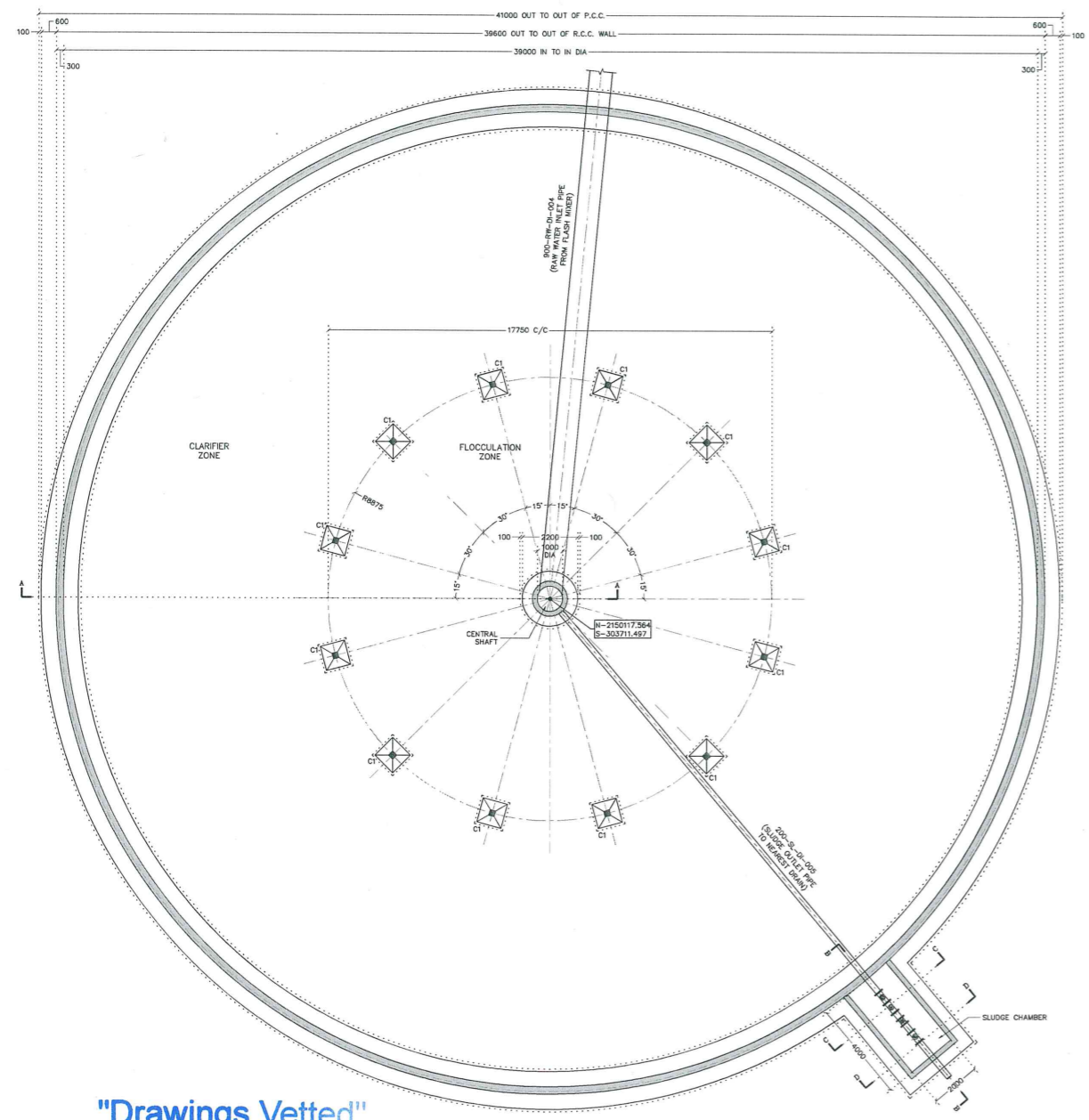


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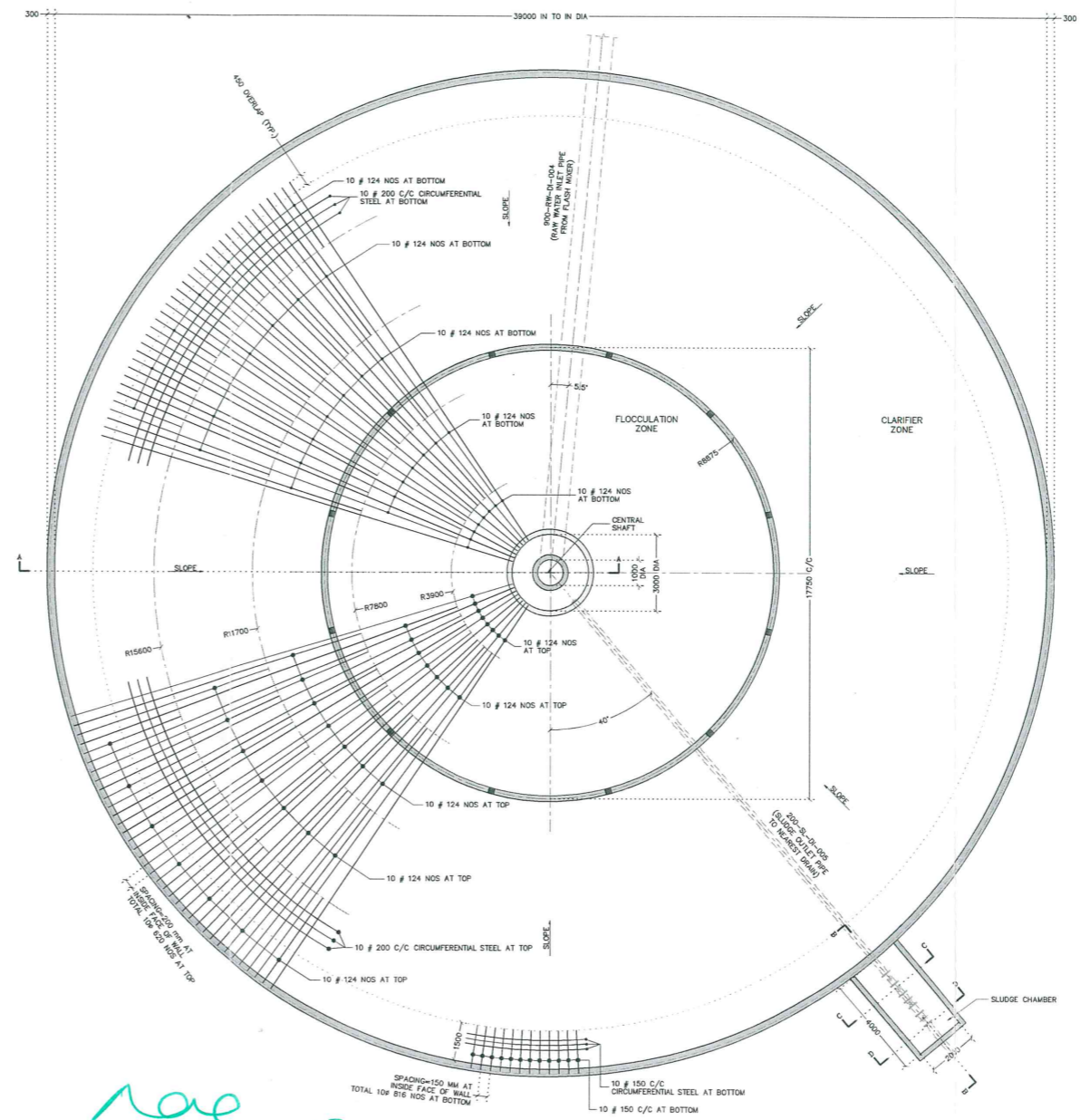
DRAWING TITLE	DRAWING NO
LAYOUT PLAN FOR WATER TREATMENT PLANT	LE150883-P-WS-WT-PP-2002
HYDRAULIC FLOW DIAGRAM FOR WATER TREATMENT PLANT	LE150883-P-WS-WT-HF-2003
G.A. DRAWING OF CLARIFLOCCULATOR	LE150883-P-WS-WT-GA-2007

LEGEND			
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T.O.S.	TOP OF SLAB	SL	SLUDGE
C1,C2,C3.....	RCC COLUMN	GI	GALVANISAID IRON

- NOTES :-**
- MATERIALS, WORKMANSHIP, INSPECTION AND TESTING AS PER IS 456-2000 & IS 3370-2005.
 - ALL DIMENSION ARE IN MM AND LEVELS ARE IN METER
 - ALL CONCRETE MIX M:30 FOR WATER RETAINING STRUCTURES.
 - ALL CONCRETE SHALL BE MACHINE MIXED AND MACHINE VIBRATED
 - # - INDICATE HYSD BAR FE-415 GRADE CONFORMING TO IS 1786- LATEST REVISION
 - CLEAR COVER TO
 - (a) SLAB (ROOF & FLOOR, CANOPIES, CHAJJAS, WAST SLAB IN STAIR ETC.) : 20mm
 - (b) BEAMS, LINTELS : 25mm
 - (c) COLUMNS, PEDESTALS : 40mm
 - (d) FOOTING
 - I. SIDES AND TOP : 50mm
 - II. BOTTOM : 50mm
 - (e) DRY PITS/RETAINING WALLS
 - I. FACE IN CONTACT WITH EARTH : 40mm
 - II. FREE FACE : 30mm
 - (f) WATER/LIQUID RETAINING STRUCTURE
 - I. FACE IN CONTACT WITH LIQUID : 45mm
 - II. AWAY FROM LIQUID BUT IN CONTACT WITH EARTH : 45mm
 - LAP LENGTH SHALL BE 40 TIMES BAR DIA FOR BEAM & SLAB BARS
 - PROVIDE SPACER BAR FOR KEEPING THE SECOND LAYER STEEL OF BEAM IN PROPER POSITION
 - STEEL CHAIRS SHALL BE PROVIDE TO KEPT TOP REINFORCEMENT OF SLAB IN PROPER POSITION
 - ALL BRICK WORK SHALL BE DONE IN 1:4 CEMENT MORTAR
 - ALL DIMENSION SHALL BE CHECKED WITH G.A. DRG ANY AMBIGUITY IF FOUND SHALL BE BROUGHT TO THE NOTICES OF THE CONSULTING ENGINEERS BEFORE EXECUTION OF WORK
 - FOUNDATION SHOULD BE IN-SITU SOIL AND IT SHOULD NOT BE ON FILLING MATERIAL i.e. MADE UP SOIL
 - BACK FILLING SHALL BE DONE IN WELL COMPACTED AND WELL WATER LAYER NOT EXCEEDING 300mm IN DEPTH
 - FOURING SHALL BE DONE AS PER INSTRUCTION OF ENGINEER INCHARGE.
 - WATER STOPPERS SHALL BE PROVIDED AT CONSTRUCTION JOINTS IN WALL AND BOTTOM SLAB.
 - S.B.C. OF SOIL IS T/M2 AS PER SOIL REPORT PREPARED BY DR. D. BABU RAO, CONSULTING GEO TECHNICAL ENGINEER
 - READ THIS DRAWING ALONG WITH SHEET NO. 2 OF 3 & 3 OF 3.



FOUNDATION PLAN



APPROVED
P. 30/14/16
SE, NIRMAL

Executive Engineer
TDWSP Asifabad

Dy. Executive Engineer
TDWSP Asifabad

Asst. Executive Engineer
TDWSP Asifabad

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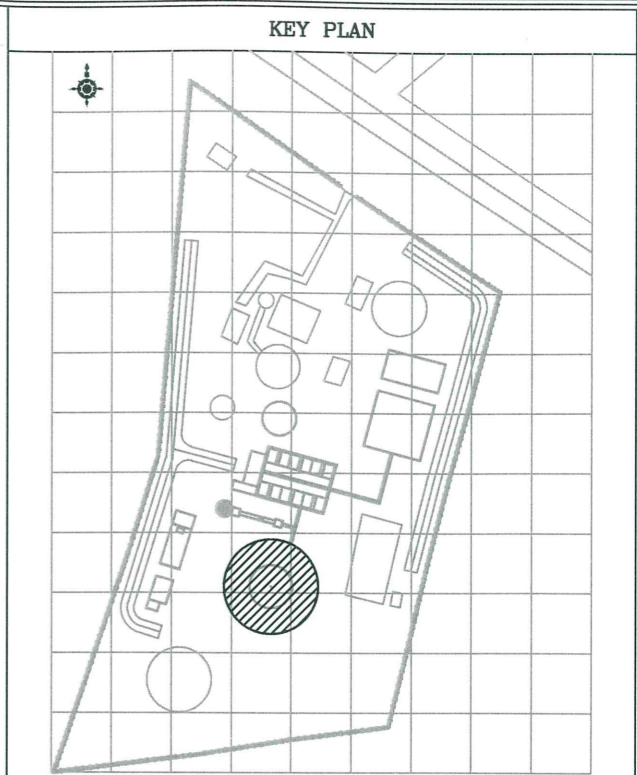
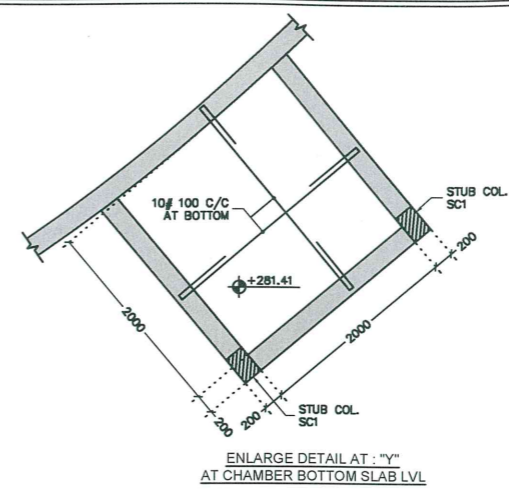
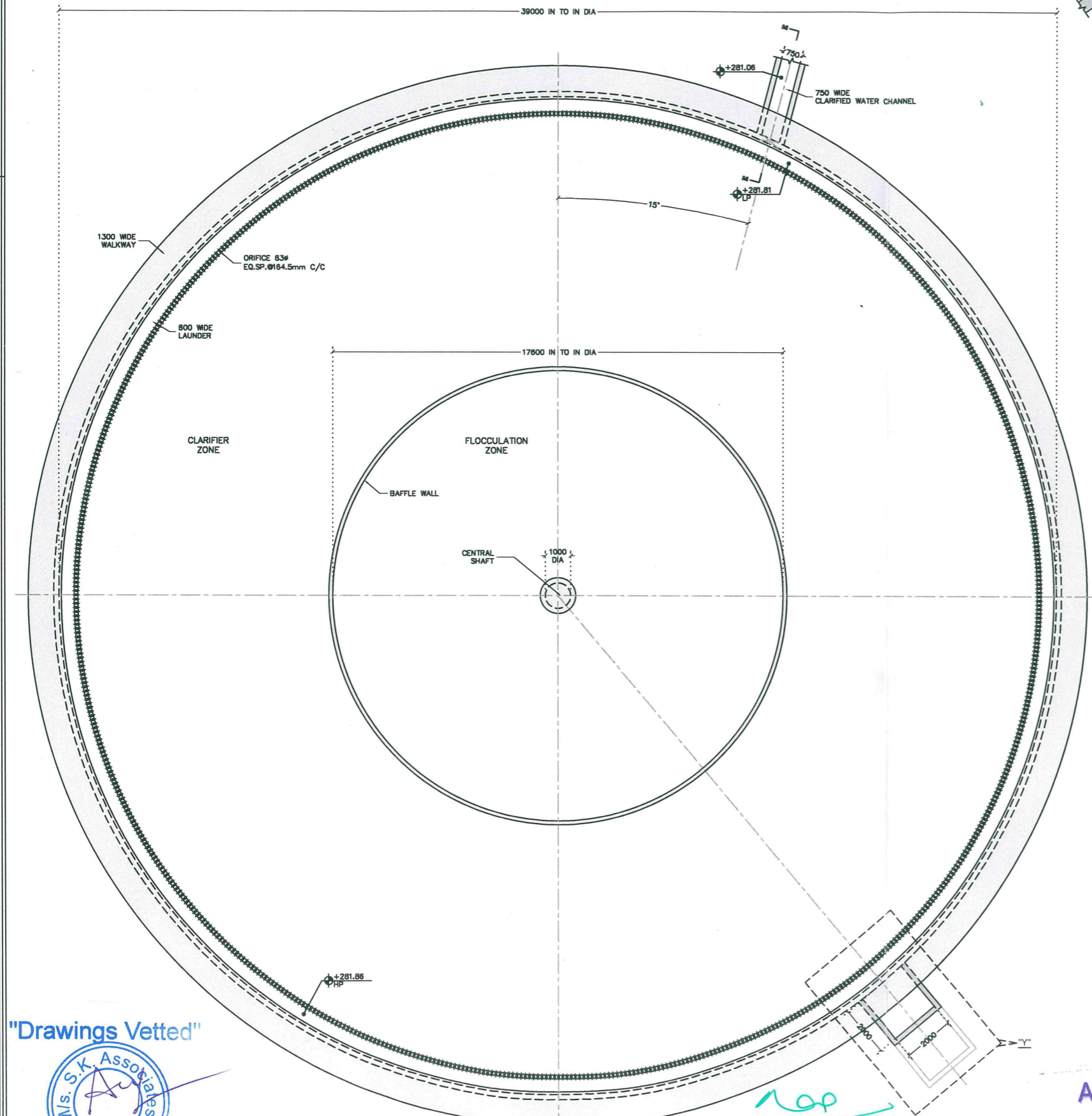
REV. No	DESCRIPTION	DATE	DESIGNED	DRAWN	CHECKED	APPROVED
B	REVISED AS PER CONSULTANT COMMENTS	01/03/16	HMP	NSP	RMM	-
A	FOR APPROVAL	16/02/16	HMP	NSP	RMM	-

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

CLIENT : GOVERNMENT OF TELANGANA
RURAL WATER SUPPLY AND SANITATION DEPARTMENT
PROJECT : PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT (30 MLD WTP)
SUPPLIER / CONTRACTOR : **L&T Construction**
Water & Effluent Treatment SGB

NAME	SIGN	DATE
DSN	HMP	16-02-16
DRWN	NSP	16-02-16
CHKD	RMM	16-02-16
APPD	-	16-02-16

DRAWING No. LE150883-P-WS-WT-R[C]-110231
COMP. DATA : L16-02-02-01-01
RELEASED FOR PRELIMINARY TENDER INFORMATION APPROVAL CONSTRUCTION



REFERENCE DRAWING

DRAWING TITLE	DRAWING NO
LAYOUT PLAN FOR WATER TREATMENT PLANT	LE150883-P-WS-WT-PP-2002
HYDRAULIC FLOW DIAGRAM FOR WATER TREATMENT PLANT	LE150883-P-WS-WT-HF-2003
G.A. DRAWING OF CLARIFLOCCULATOR	LE150883-P-WS-WT-GA-2007

LEGEND

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T.W.L.	TOP WATER LEVEL	RW	RAW WATER
B.O.S.	BOTTOM OF SLAB	DI	DUCTILE IRON
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C1,C2,C3.....	RCC COLUMN	GI	GALVANISAID IRON

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B	REVISED AS PER CONSULTANT COMMENTS	01/03/16	HMP	NSP	RMM	-
A	FOR APPROVAL	16/02/16	HMP	NSP	RMM	-



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Water, Smart World & Communication.

CLIENT: GOVERNMENT OF TELANGANA RURAL WATER SUPPLY AND SANITATION DEPARTMENT CONSULTANT: -
PROJECT: PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT (30 MLD WTP)

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

JOB No. : LE150883	TITLE: STRUCTURAL DRG. FOR CLARIFLOCCULATOR (TOP PLAN)	SCALE: 1:125,50
DSGN HMP 16-02-16	DRWN NSP 16-02-16	CHKD RMM 16-02-16
APPD - 16-02-16		

DRAWING No. **LE150883-C-WS-WT-RC-1023** SHEET 2 OF 3
COMP. DATA : L16-02-02-01-02

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Geetha
Asst. Executive Engineer
TDWSP Asifabad

Chy
Dy. Executive Engineer
TDWSP Asifabad

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