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

TELANGANA WATER GRID

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

CLIENT:	CONSULTANT :
RURAL WATER SUPPLY AND SANITATION DEPARTMENT (WATER GRID), TELUNGANA.	WAPCOS LIMITED

PROJECT :	PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT
SUPPLIER / CONTRACTOR:	L&T Construction, Water, Smart World and Communication

JOB Ref. No. : LE150883

	NAME	SIGN	DATE
DSGN			
CHKD			
APPD			

TITLE :

DESIGN OF SUMP - 150KL CAPACITY
PEDDAPULLARA AT WANKIDI MANDAL

DOC./DRG. No.	SIZE	REV.
LE150883-C-WS-RW-DC-1212	A4	A

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☐ PRELIMINARY	☐ INFORMATION	☑ APPROVAL	☐ CONSTRUCTION

Submitted sir,

Sub: RWS&S-TDWSP- Peddapullara 150KL clear water sump in Wankidi Mandal – Komarambheem Asifabad Segment - Adilabad District -Designs -Approval- Reg.

*****

Kindly pursue the Designs of the following 150KL Clear Water sump at Peddapullara (V) , Wankidi (M), submitted by the Executive Engineer TDWSP Asifabad Division , Adilabad district for approval.

1. **150 KL Clear Water Sump.**

The Executive Engineer TDWSP Asifabad Division has submitted Structural Designs & Drawings of 150KL Clear Water sump based on the field conditions and as per the estimate provisions, the structural designs & drawings for the above structure is verified with RWS&S standard Type Designs and submitted for approval.

The following design parameters were considered:

- Capacity : 150kL
- Net SBC of Soil : 10.0 t/sqm
- Grade of concrete & Steel : M 30 & Fe 415
- Dia of sump Inner to Inner: 9.00 m
- Sidewall Height : 2.85 mts
- Sidewall Thickness: 200 mm
- Top Slab thickness: 150 to 100 mm tapered
- Raft Slab thickness: 200 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)	DEE (Designs)	Superintending Engineer,
TDWSP,Nirmal Circle	TDWSP,Nirmal Circle	TDWSP,Nirmal Circle

Design Of 150 KL Capacity Sump at

Data						
Location						
Safe bearing Capacity	sbc		Safe	100	Kn/m^2	
Capacity	v			150	KL	
Free Board	fb			0.25	m	
Dead Storage	ds			0.20	m	
Dia of sump	d			9.00	m	
Projection from side wall	ps			0.15	m	
Depth of the tank	h			2.85	m	
Depth of tank above GL	dgl			0.50	m	
Depth of tank below GL				2.35	m	
thickness of PCC (lean mix cc1:6:10)		couter wi		0.00	m	
Th. Of Bottom Slab	bsth	Provided th is Sufficient		0.200	m	0.13 m
Depth of Water table below GL	wi	Safe Against Uplift		2.00	m	
Top Dome						
Rise of the dome				1.40		
Radius of the dome				7.93		
Thickness of Dome	td	150 to 100	0.1	0.125	m	
Dia of Reinforcement	db			10	mm	
Reinforcement						
Spacing				125	mm	c/c

Provide 10 mm dia Tor @ 125 mm C/c both radially and in the form of circular rings

Top Ring Beam					
Width of ring beam	rb		300	mm	
Depth of ring Beam	dtrb	Provided size is sufficient	300	mm	140 mm
Dia of hoop bars	dbrb		12	mm	8 Nos
Dia of Stirrups			8	mm	200 mm 225
Side Wall					
Depth of the tank	h		2.85	m	
Th. Of Side wall	sth		0.200	m	144 mm
Depth of tank above GL	dgl		0.50	m	
Moments					
	Inner Side		5.65	Kn-m	
	Outer Side		6.873	Kn-m	
Hoop force					
	Inner Side		76.8	Kn	(Tension)
	Outer Side		89.19	Kn	(Compression)

Reinforcement			Dia	Spacing Provided	Required
Inner face	Vertical	334 mm^2	10 mm	200 mm	200
	Horizontal	296 mm^2	10 mm	200 mm	200
Outer face	Vertical	406 mm^2	10 mm	175 mm	190
	Horizontal	296 mm^2	10 mm	200 mm	200

Bottom slab						
Safe bearing Capacity	sbc			100	Kn/m^2	
Th. Of Bottom Slab	bsth	Provided th is Sufficient		0.200	m	0.13 m
Dia of Bottom Slab	dbs			9.70	m	
Size of Haunch.	bh			0.25	m	
effective cover to reinforcement for raft slab			covraft	67	mm	
Moments Radial				5.54	Kn-m	
Circumferential				5.54	Kn-m	

Reinforcement		Ast	Dia	spacing Provided	Required
	Top mesh	369 mm^2	12 mm	200 mm	200
	Bottom mesh	240 mm^2	10 mm	200 mm	200

Design Calculations

Top Dome				
Chord Dia of the Dome	dcd		9.00 m	
Rise of the Dome	hd		1.40 m	
Radius of the Dome	rd		7.93 m	
Theta	th	$\sin^{-1}$(dcd/(2*rd))	34.56 Degrees	
Sin(theta)			0.57	
Cos(theta)			0.83	
Dead load on dome			3.13 Kn/m^2	
Live Load			1.50 Kn/m^2	
Total Load	wd		4.63 Kn/m^2	
Meridinal Stress	Ts	wd*rd*10^3/((1+cos(th))*td*10^6)	0.17 N/mm^2	Safe
Maximum Hoop Stress	Hs	wd*rd*10^3/(2*td*10^6)	0.15 N/mm^2	Safe
Ast			300 mm^2	
Top Ring Beam				
Maximum Hoop Tension	Ht	Ts*td*cos(th)*dcd/2	79.37 Kn	
Area of steel required	asttrb	Ht/130	610.53 mm^2	
No of bars		asttrb/(pi*dbrb^2/4)	6 Nos	
Provide 8 Nos of 12 mm dia tor and provde 8 mm dia stirrups @ 200 C/c				
Actual Area of Steel Provided	aastrb		905 mm^2	
Area of ring beam required	Arb	(Ht*1000-(m-1)*aastrb*1.5)/1.5	42052.50 mm^2	
Assuming a Square section				
Size of beam		Arb/rb	140.18 mm	
			Provided size is sufficient	
Side Wall				
Depth of the tank	h		2.85 m	
Dia of inner face bars	dbi		10 mm	
Dia of outer face bars	dbo		10 mm	
Dia of bars for hoop	dbh		10 mm	
H^2/Dt			4.52	

CASE I : Inside Water and Outside no Earth

From Table of IS 3370 Coefficients

For H^2/Dt			4	4.52	5	
Max BM	bmcf		0.0268	0.02441	0.0222	
	bmcfp		0.0077	0.00677	0.0059	
Max Ring Tension	rtcf		0.5790	0.59876	0.6170	
Max. -ve BM	mbm	(bmcf*10*h^3)			5.65	Kn-m
Max +ve BM	mpbm	(bmcfp*10*h^3)			1.57	Kn-m
Max. Ring Tension	mrt	(rtcf*10*h*d/2)			76.8	Kn

CASE II OUT SIDE SATURATED EARTH AND INSIDE EMPTY

Unit weight of Soil	γ_s		18	Kn/m^3
Angle of Repose	Phi		30	°
Side wall ht below GL	hbgl	h-dgl	2.35	m
Coeff. Of actie Earth pr	Ka	$\frac{(1-\sin(Phi))}{(1+\sin(Phi))}$	0.34	
	Pa	IF(wl>hbgl,Ka*gs*hbgl,Ka*gs*hbgl+hbg	37.88	Kn/m^2
			3.07	

From IS 3370 Coefficients

For H^2/Dt		3.0	3.1	4.0
	bmcfs	0.0333	0.03285	0.0268

	bmcfps		0.0097	0.00956	0.0077		
Max Ring Tension	rtcfs		0.519	0.5232	0.579		
Max. -ve BM	mbms	(bmcfs*pas*hbgl^2)			6.87	Kn-m	
Max +ve BM	mpbms	(bmcfps*pas*hbgl^2)			2.00	Kn-m	
Max. Ring compression	mrts	rtcfs*pas*d/2			89.19	Kn	
Th. Of Side Wall		(MAX(mbm,mbms)*10^6*6/(2*1000))^0.			144	mm	
					Th. Provided is Sufficient		
Eff Th. Of Side wall	edswi				150	mm	
Max Inner face moment	bmi	MAX(mpbms,mbm)			5.65	Kn-m	
Max outer face moment	bmo	MAX(mpbm,mbms)			6.87	Kn-m	
Area of Steel							
Reinforcement							
Min Steel	pt	0.24% for <15m span 0.35%		0.24	0.12	%	
Area of BendingSteel inner sid	Astm	MAX(pt*sth*10^4,bmi*10^6/(130*0.87*e			334	mm^2	on each side
Area of steel outer face	Astpbm	MAX(pt*sth*10^4,(bmo*10^6/(130*0.87'			406	mm^2	on each side
Area of Steel for Hoop	Asth	MAX(pt*sth*10^4,CEILING(mrt*1000/13			591	mm^2	for two sides
Vertical Steel Spacing							
inner face	vsp						
Spacing		FLOOR(pi*dbi^2/4*1000/Astm,25)			200	mm	
Provide 10 mm dia TOR @ 200 mm C/c							
Outer face	vspo	FLOOR(pi*dbo^2/4*1000/astpbm,25)			190	mm	
Provide 10 mm dia TOR @ 190 mm C/c spacing							
Horizontal Steel							
Spacing	hsp	FLOOR(pi*dbh^2/2*1000/Asth,25)			200	mm	
Provide 10 mm dia TOR @ 200 mm C/c on both faces in staggered fashion							
Design Of Bottom Slab							
Projection from side wall	ps				0.15	m	
Dia of Bottom Slab	dbs	d+2*sth+2*ps			9.70	m	
Size of Haunch	bh				0.25	m	
Dia of Bar top	dbbs				12	mm	
bottom	dbbsb				10	mm	
Load on Bottom Slab							
Wt of Top Dome		2*pi*rd*hd*wd			322.74	Kn	
Wt of Ring Beam		pi*(d+rb/1000)*rb*drb*25/10^6			65.74	Kn	
Wt Of Side wall		pi*(d+sth)*sth*(h-dtrb)*25			368.5	Kn	
Wt of Haunch		pi*(d-bh)*bh^2/2*25			21.48	Kn	
Total Load	wbs				778.46	Kn	
					7.78	sq m	0.22075
Max Pr on Soil	prb	Wbs/(pi*(d)*1)			27.53	Kn/m^2	
Bottom Slab Is designed as circular Slab loaded with UDL and Simply Supported on edges							
				r	4.6		3.85
Radial moment	mri	3/16*prb*((dbs/2)^2-((d+sth)/2)^2)-wbs/			-1.39	mrb	5.54 Kn-m
Circuferential Moment	mti	1/16*prb*(3*(dbs/2)^2-((d+sth)/2)^2)-wb			5.15	mtb	5.54 Kn-m
for uplift Net uplift load on bottom slab					0.5	Kn/m^2	
for uplift		max Radial moment			1.47		1.47 Kn-m
		max Circuferential Moment			1.47		1.47 Kn-m
Max Radial Moment	mr	IF(wl>hbgl,0,CEILING(3*prb*(dbs/2)^2/			5.54	Kn-m	1.47 Kn-m
Max Circumferential moment	mt	IF(wl>hbgl,0,CEILING(prb*(dbs/2)^2/16			5.54	Kn-m	1.47 Kn-m

Base Slab Th for Uncracked Condition

Th	bsthr	IF(mr=0,sth*1000,(max(mr,mt)*6*10^6/(	0.129	m	0.067 m
			Provided th is Sufficient		
Eff Depth	de	bsth*1000-covraft	133	mm	
Area of Steel					
Min Steel	Astmin	0.24% for <15m span 0.35%	0.24	%	
		min for TOP STEEL =	480	mm^2	
		min for TOP STEEL =	240	mm^2	
Area of Steel	Astr	mr*10^6/(130*.87*de)	369	mm^2	
Spacing					
Top Steel	Asttp	pi*(dbbs^2/4)*1000/max(Astmn,astr)	200	mm	
Provide 12 mm dia TOR @ 200 mm c/c in the form of mesh at top					
Bottom Steel	Astb	pi*(dbbsb^2/4)*1000/(Astminb)	200	mm	
Provide 10 mm dia TOR @ 200 mm c/c in the form of mesh at bottom					
Check For SBC					
Load from tank Portion	wbs		778.46	Kn	
Weight of Bottom Slab	wbsi	pi*(dbs^2/4)*bsth*25	369.48	Kn	
Weight of water	ww	pi*(d^2/4)*h*10	1813.04	Kn	
Total	W	wbs+wbsi+ww	2960.98	Kn	
Pr on Soil.	pr s	w/(pi*dbs^/4)	40.07	Kn/m^2	Safe
Check For Uplift					
Depth of Water	dw	h-hgl-wl+bsth	0.55	m	
Wt of Sump upto side walls only	We	wbs-wtdome+wbsi	825	Kn	
Uplift Pr	Pu	pi*dbs^2/4*dw*10	406	Kn	
Resisting load		cc wt+str wt	825	Kn	
Factor of Safety against Uplift	F	We/Pu	2.04		
			Safe Against Uplift		

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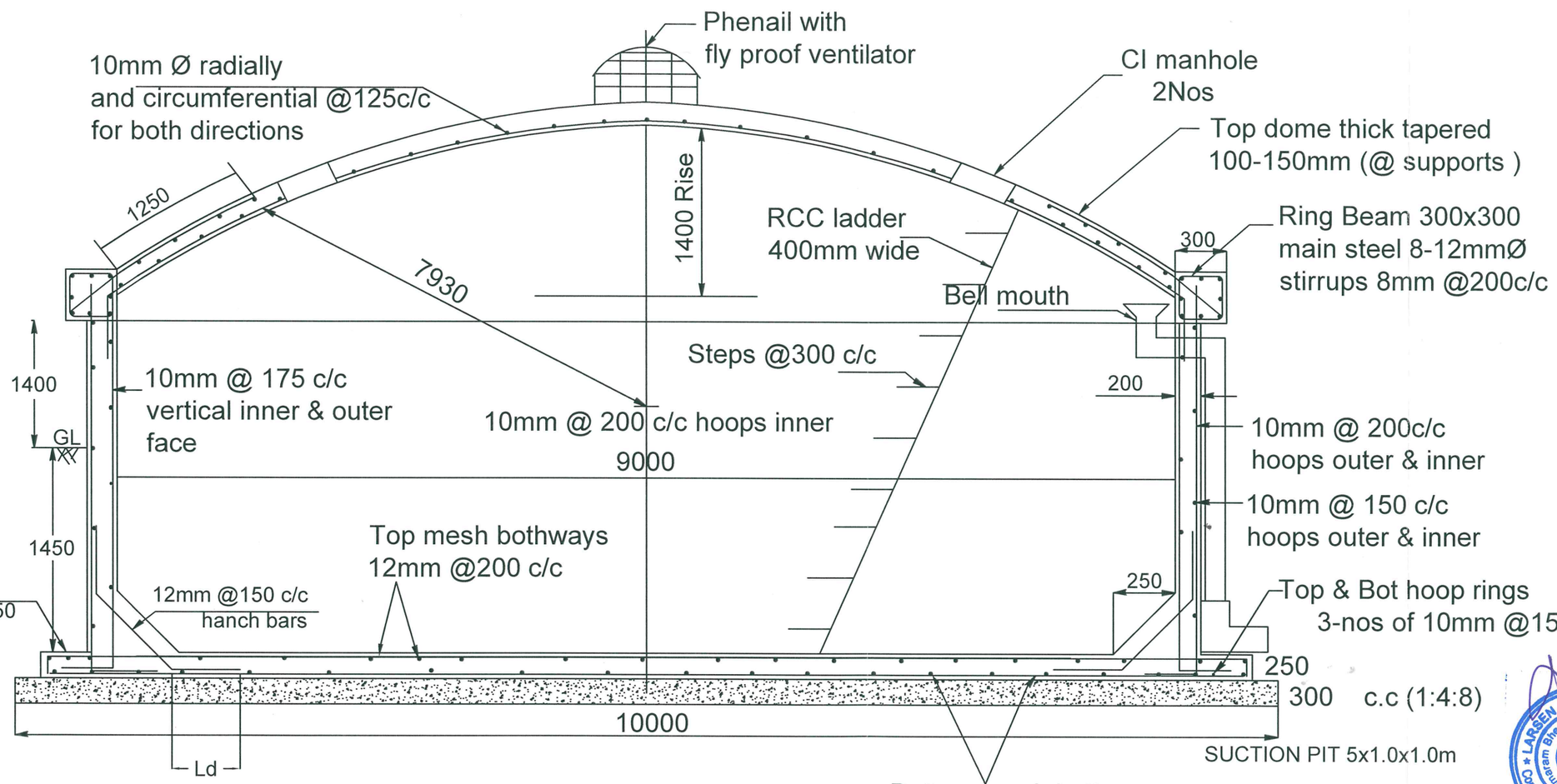
Asst. Executive Engineer
TDWSP Asifabad

Dy. Executive Engineer
TDWSP Asifabad

Executive Engineer
TDWSP Asifabad

APPROVED
SE, NIRMAL

150KL SUMP



All dimenstions are in 'mm'
Concrete mix V.R.C.C M30
Steel Fe-415
Reinforcement details shall be
as per IS-SP34

Asst. Executive Engineer
TDWSP Asifabad

Dy. Executive Engineer
TDWSP Asifabad

Executive Engineer
TDWSP Asifabad

APPROVED
SE, NIRMAL 6/11/16

REV.NO.	DESCRIPTION	DESIGNED	DRAWN	CHECKED	APPROVED
A	FOR INFORMATION				

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 (PRIMARY GRID)

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

JOB No :	LE150883
NAME	SIGN / DATE

TITLE : PEDDAPULLARA AT WANKIDI MANDAL
SUMP - 150KL

SCALE

PROJECTION

CHECKED BY	SIGN	DATE
CIVIL & STRUCTURAL		
MECHANICAL		
ELECTRICAL		
INSTRUMENTATION		

DRAWING No. LE150883-C-WS-RW-DC-1212

SIZE A3 | REV. A

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TELANGANA DRINKING WATER SUPPLY PROJECT

150 KL SUMP AT PEDDAPULLARA(V), WANKIDI(M) AT ASIFABAD

1. INTRODUCTION

M/s. L &T Construction, Water & Effluent Treatment is proposing to construct 150 KL Sump at Loddiguda, Thiriyani (M). The work is taken up under Segment 22 , Komaram Bheem Project , TDWSP, in Adilabad Dt.

The present Report presents the results of (1) Bore hole.

M/S Anji Drilling & Grouting works; Anantapur has carried out the drilling of bore holes, collection of soil and rock samples and conduct of Standard Penetration Tests at different levels in the respective bore holes at the proposed site.

Analysis of borehole data , Laboratory tests and geotechnical investigation report have been made by Prof. D Babu Rao, ME (IIT,R) , Ph.D. (USA), MIGS, Empanelled Consulting Geo technical Engineer &,Director, Geo technologies, Former Professor of Civil Engineering, Osmania University.

2. SCOPE OF WORK

The following is the scope of work of M/s. Anji Drilling and Grouting Works:

- Drilling Borehole at (1) location for 150 KL Sump at Peddapullar at wankidi(M) Adilabad Dt.
- Conducting SPT at regular intervals, where feasible
- Collection of undisturbed / disturbed samples from the Bore holes

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Consulting Geotechnical Engineer

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- Preparation of Technical Report recommending suitable foundations and safe bearing capacity

Following is the scope of work of Prof. D Babu Rao ,

Testing of soil samples in the Laboratory

Preparation of Technical Report

3. SUB SOIL INVESTIGATION

The sub soil investigation was carried out to determine:

Nature of sub stratum and engineering properties of sub strata which may affect the mode of construction of the proposed work.

FIELD INVESTIGATION PROCEDURE:

The following technique is adopted for sub soil investigations.

a) BORINGS:

Rotary Drilling was done using TC / Diamond bits. The size of the casing used was 125 to 75 mm, yielding samples of NX size.

TC bits were employed for the overburden, and Impregnated Diamond Core bits were used for rock formation.

Drilling was performed on 6 – 7 Jan ,2016.

The following relevant data was recorded during Rotary drilling operations.

- Nature of strata
- Details of samples

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- Core Recovery (CR)
- Rock Quality Designation (RQD)

b) STANDARD PENETRATION TEST (SPT):

SPT split spoon sampler of standard dimensions was driven into the soil from the borehole bottom using 63.5 kg hammer with a fall of 75 cm height. The SPT weight was lifted to the specified height and allowed to fall freely on the anvil with the use of cat-head winch with one to one and half turn of the drum. Blow counts for the penetration of every 15 cm were recorded and the 'N' value is reported as the blow counts for 30 cm penetration of the sampler excluding the first 15 cm penetration as seating drive.

When the number of blows exceeded 50 to penetrate the first or second 15 cm length of the sampler, the SPT 'N' is regarded as more than 100 as described in IS 2131 - 1981. The test is terminated in such case and a record of the penetration of the sampler under 50 blows is made. SPT refusal is recorded when there is no penetration of the sampler at any stage and also when a rebound of the sounding system is recorded. These tests were conducted at close intervals of 1.0m so that a continuous SPT 'N' profile is available.

Disturbed soil collected in the SPT sampler was preserved in polythene covers and transported to the laboratory. Additional polythene cover was used to prevent the loss of moisture during the transit period.

c) DEPTH OF BORING: The depth of the Bore hole was as follows:

BH No	R.L.	Drilled depth
1	550.0	6 m

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6.0 SHALLOW FOUNDATIONS

In general, the following pertains to foundations resting in soils.

. A properly designed foundation has to satisfy the following two limit states.

1) Limit state of collapse (i.e. Shear strength)

2) Limit state of serviceability (i.e. Settlement)

SHEAR CRITERIA:

The first criterion is depends on shear strength. The calculations are based on "TERZAGHI" bearing capacity equation as recommended by IS: 6403 (with factor of Safety) which takes care of L/B ratio (shape), foundation depth etc., along with other parameters.

SETTLEMENT CRITERIA:

The intensity of loading that will cause a permissible settlement or specified settlement of the structure is termed as allowable bearing pressure. The settlement in this type of layer will be elastic settlement.

These foundation settlements are evaluated using elastic theory. The pressure distribution below the footing is assumed as 2 V: 1 H for estimating the settlement. Since rock formation is available at shallow depth. The settlement will be within the permissible limit. Hence open foundation is suitable.

ALLOWABLE BEARING CAPACITY:

Allowable Bearing capacity (ABC) is the net intensity of the loading which the foundation will carry without undergoing settlement in excess of the permissible value for the structure under consideration but not exceeding the net safe bearing capacity (SBC).

7.0 DISCUSSION ON FOUNDATION OPTIONS

From sub soil profile and laboratory test data, it can be seen that weathered /hard

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rock exist from 1 to 6 m depth.

Hence shallow foundation is feasible and same is recommended.

8.0 RECOMMENDATIONS

Based on Field Investigations and laboratory testing, the following Recommendations are made for construction of Sump at Peddapullara at Wankidi

a) Open foundations resting at 2 m below GL ,are recommended. The structure is likely to result in saturation and inundation of the sub soil during long – time operation,

b) SBC is recommended as follows :

Location		BH 1
S. No.	Depth (m)	Recommended SBC t/ sq m
1	2.0	15
2	3.0	16
3	4.0	18

c) The actual size of foundations will be based on loads from the superstructure.

For ANJI DRILLING AND GROUTING WORKS

(DR. D. BABU RAO)

M. E(IIT,R), Ph. D. (USA), MIGS

Former Professor of Civil Engineering

Consulting Geotechnical Engineer

MCH Panelist No. 2490/TP/2000-2

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d) LOG OF BORE HOLE:

All the results obtained from the field operations are presented in Log of Bore hole in Fig. 1 .

4. LABORATORY TESTING:

The laboratory tests are conducted in the laboratory of Geotechnolgies, Hyderabad, an ISO- 9000 approved Laboratory.

The following tests were conducted on cores from hard rock from 1.5 m depth.:

- Unconfined compressive strength (as per IS: 9143)

Table 1 gives the rock properties of Cores.

No cores were available in weathered rock. .

5. SUB SOIL PROFILE

Based on Field and Laboratory tests, the following idealized sub soil profile is evolved.

Depth	Strata	N value
0 – 1 m	Top soil	-
1 – 1.5 m	Weathered rock	>100
1.5 – 6.0	Hard rock	Cores

. In Hard rock, no SPT can be conducted. However, in SDR strata, SPT can be conducted with N values tending to be 'refusal'. This is the criterion for distinguishing between Soft rock /Weathered rock and Hard rock.

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TELANGANA DRINKING WATER SUPPLY PROJECT

FIG 1 : Record of Boring, *Bore Hole No : 1*

SUMP AT LODDIGUDA IN ADILABAD DT.

Type of Boring: Core drilling **Dia of Boring: NX**

Date : 6-7 Jan 2016 **GL: 550.00** **Drilled depth = 6 m**

Depth, m	Profile	Soil	Sample Depth m	N value	CR, %	RQD%
0		Top soil	0	>100	Small pieces	
1.0		Weathered	1.5			
2.0		Hard rock			52	36
3.0			3.0		61	46
4.0			4.5		72	60
5.0						
6.0						
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						

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TABLE 1 : RESULTS OF TESTS ON ROCK SAMPLES

SUMP AT Peddapullara IN ADILABAD DT.

BH No.	Depth, m	Specific gravity	Porosity %	Water absorption %	UCS Kg / sq cm
1	1.8	2.71	4.1	3.9	433
	3.4	2.70	3.9	2.8	510
	4.6	2.70	4.5	3.3	450

NOTES : Where core Samples are less than 100 mm long, UCC tests are not conducted.

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APPENDIX

CALCULATION OF SBC

SUMP AT **Peddapullara** IN ADILABAD DT.

TYPICAL CALCULATIONS FOR OPEN FOUNDATIONS RESTING IN

HARD ROCK AT 2 M DEPTH

From Lab tests UCC is taken as 400 kg / sq cm

Keeping the heterogeneous nature of rock,

For RQD < 0.50, Field strength = 0.2 x 400 = 80 kg / sq cm

With a F.S. of 10, SBC = 80/10 =8 kg /sq cm

= 80 t / sq m

Recommended SBC is 15 t / sq m.

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Consulting Geotechnical Eng

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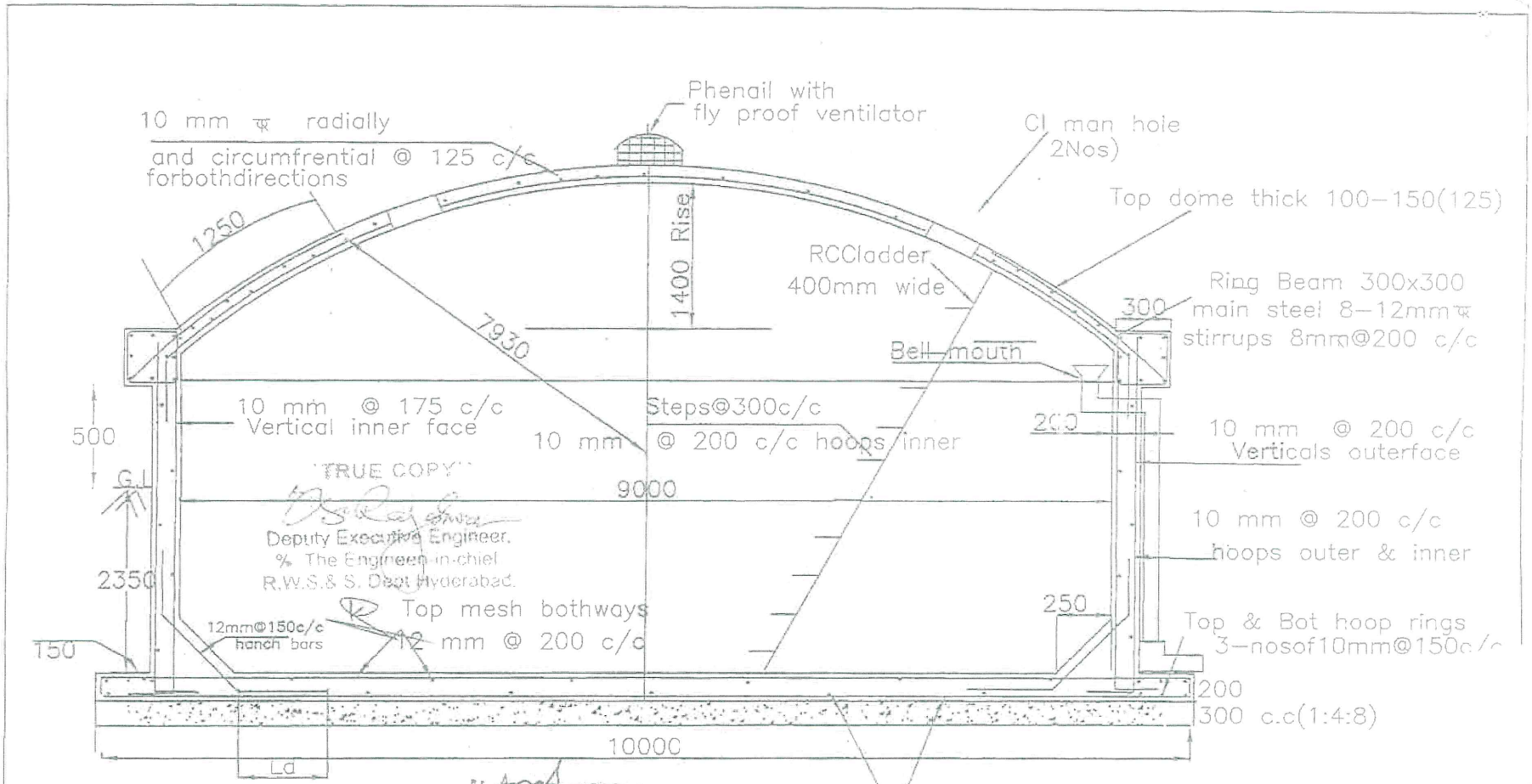
LARSEN & TOUBRO LTD. Kommaram Bheem - Asifabad Segment Construction-TDWSP -ADILABAD

Asst. Executive Engine.
TDWSP Asifabad

Dy. Executive Engineer
TDWSP Asifabad

Executive Engineer
TDWSP Asifabad



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Deputy Executive Engineer,
% The Engineer-in-chief
R.W.S.& S. Dept Hyderabad.

All dimensions are in 'mm'

Concrete mix V.R.C.C M30

Steel Fe–415

Reinforcement Details shall be as per IS – SP34

150 KL SUMP

Designed for uplift GWT @ 2.0 below GL

SCHEME : CPWSS

LOCATION: Kamalapuragudem

SBC 10T/SQM

Deputy Executive Engineer,
RWS & S Project Sub-Division, Warangal.

Executive Engineer
R.W.S. Division, Hanamkonda.

Superintending Engineer
RWS&Sanitation Warangal