# 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 - 120KL CAPACITY LAMBADITHANDA AT NARNOOR MANDAL

| DOC./DRG. No. | SIZE | REV. |
|---|---|---|
| LE150883-C-WS-RW-DC-1252 | A4 | A |

RELEASED FOR

| ☐ PRELIMINARY | ☐ INFORMATION | ☑ APPROVAL | ☐ CONSTRUCTION |
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Submitted sir,

Sub: RWS&S-TDWSP- Lambadithanda 120KL clear water sump in Narnoor Mandal–Komarambheem Asifabad Segment-Adilabad District-Designs -Approval-Reg.

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Kindly pursue the Designs of the following 120KL Clear Water sump at Lambadithanda(V) , Narnoor (M), submitted by the Executive Engineer TDWSP Asifabad Division , Adilabad district for approval.

1. **120 KL Clear Water Sump.**

The Executive Engineer TDWSP Asifabad Division has submitted Structural Designs & Drawings of 120KL 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 : 120kL
- Net SBC of Soil : 10.0 t/sqm
- Grade of concrete & Steel : M 30 & Fe 415
- Dia of sump Inner to Inner: 7.50m
- Sidewall Height : 3.20 mts
- Sidewall Thickness:150mm
- Top Slab thickness: 150 to 100 mm tapered
- Raft Slab thickness: 250mm

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 120 KL Capacity Sump at

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Data** | | | | | | | |
| Location | | | | | | | |
| Safe bearing Capacity | sbc | Safe | | | 100 Kn/m² | | |
| Capacity | v | | | | 120 KL | | |
| Free Board | fb | | | | 0.25 m | | |
| Dead Storage | ds | | | | 0.20 m | | |
| Dia of sump | d | | | | 7.50 m | | |
| Projection from side wall | ps | | | | 0.15 m | | |
| Depth of the tank | h | | | | 3.2 m | | |
| Depth of tank above GL | dgl | | | | 0.50 m | | |
| Depth of tank below GL | | | | | 2.70 m | | |
| thicknesss of PCC (lean mix cc1:6:10) | | couter wt | | | 0.00 m | | |
| Th. Of Bottom Slab | bsth | provided th is suffficient | | | 0.25 m | | 0.14 m |
| Depth of Water table below GL | wl | safe Against Uplift | | | 2.00 m | | |
| **Top Dome** | | | | | | | |
| Rise of the dome | | | | | 1.20 | | |
| Radius of the dome | | | | | 6.46 | | |
| Thickness of the dome | td | 150 to 100 | 0.1 | | 0.125 m | | |
| Dia of Reinforcement | db | | | | 8 mm | | |
| Reinforcement | | | | | | | |
| Spacing | | | | | 125 mm | c/c | |
| | Provide 8 mm dia Tor @125 mm C/c both radially and in form of circular rings | | | | | | |
| **Top Ring Beam** | | | | | | | |
| Width of ring beam | rb | | 300 mm | | | | |
| Depth of ring beam | dtrb | Provided size is sufficient | 250 mm | | 101 mm | | |
| Dia of hoop bars | dbrb | | 12 mm | | 4 Nos | | |
| Dia of stirrups | | | 8 mm | | 150 mm | | 175 |
| **Side Wall** | | | | | | | |
| Depth of the tank | h | | 3.2 m | | | | |
| Th. Of side wall | sth | | 0.150 m | | 130 mm | | |
| Depth of tank above GL | dgl | | 0.50 m | | | | |
| Moments | | | | | | | |
| | Inner Side | | 4.35 Kn-m | | | | |
| | Outer Side | | 5.623 Kn-m | | | | |
| Hoop force | | | | | | | |
| | Inner Side | | 85.84 Kn | | (Tension) | | |
| | Outer Side | | 107.07 Kn | | (Compression) | | |
| Reinforcement | | | Dia | | Spacing provided | | Required |
| Inner face | Vertical | 385 mm² | 10 mm | | 150 mm | | 150 |
| | Horizontal | 331 mm² | 10 mm | | 150 mm | | 150 |
| Outer face | Vertical | 498 mm² | 10 mm | | 150 mm | | 150 |
| | Horizontal | 331 mm² | 10 mm | | 150 mm | | 150 |
| **Bottom Slab** | | | | | | | |
| Safe bearing capacity | sbc | | | 100 Kn/m² | | | |
| Th. Of Bottom Slab | bsth | Provided size is sufficient | | 0.250 m | | | 0.14 m |
| Dia of Bottom Slab | dbs | | | 8.10 m | | | |
| Size of Haunch | bh | | | 0.20 m | | | |
| effective cover to reinforcement for raft slab | | covraft | | 65 mm | | | |
| Moments | Radial | | | 4.93 Kn-m | | | |
| | Circumferential | | | 6.66 Kn-m | | | |
| | | Ast | Dia | | Spacing provided | | Required |
| Reinforcement | Top mesh | 319 mm² | 10 mm | | 125 mm | | 130 |
| | Bottom mesh | 240 mm² | 10 mm | | 125 mm | | 150 |



| | | | | |
|---|---|---|---|---|
| bmcfps | 0.0051 | 0.00479 | 0.0038 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Max Ring Tension | rtcfs | | 0.643 | 0.65596 | 0.697 | | |
| Max.-ve BM | mbms | (bmcfs*pas*hbgl^2) | | | 5.62 Kn-m | | |
| Max +ve BM | mpbms | (bmcfps*pas*hbgl^2) | | | 1.52 Kn-m | | |
| Max Ring compression | mrts | rtcfs*pas*d/2 | | | 107.07 Kn | | |
| Th. Of Side Wall | | (MAX(mbm,mbms)*10^6*6/(2*1000))^0 | | | 130 mm | | |
| | | | | Th.provided is sufficient | | | |
| Eff Th. Of Side Wall | edswi | | | | 100 mm | | |
| Max Inner face moment | bml | MAX(mpbms,mbm) | | | 4.35 Kn-m | | |
| Max outer face moment | bmo | MAX(mpbm,mbms) | | | 5.62 Kn-m | | |
| Area of Steel | | | | | | | |
| Reinforcement | | | | | | | |
| Min Steel | pt | 0.24%for<15m span 0.35% | 0.24 | | 0.16% | | |
| Area of bending Steel inner side | Astm | MAX(pt*sth*10^4,bmi*10^6/(130*0.87*e | | | 385 mm² | on each side | |
| Area of steel outer facde | Astpbm | MAX(pt*sth*10^4,bmo*10^6/(130*0.87*e | | | 498 mm² | on each side | |
| Area of steel for Hoop | Asth | MAX(pt*sth*10^4,CEILING(mrt@1000/13 | | | 661 mm² | on each side | |
| Vertical Steel spacing | | | | | | | |
| **Inner face** | vsp | | | | | | |
| Spacing | | FLOOR(pi*dbi^2/4*1000/Astm,25) | | | 150 mm | | |
| provide 10 mm dia Tor @ 150 mm C/c | | | | | | | |
| **Outer face** | vspo | FLOOR(pi*dbo^2/4*1000/astpbm,25 | | | 150 mm | | |
| provide 10 mm dia Tor @ 150 mm C/c spacing | | | | | | | |
| **Horizontal Steel** | | | | | | | |
| Spacing | hsp | FLOOR(pi*dbh^2/2*1000/Asth,25) | | | 150 mm | | |
| provide 10 mm dia Tor @ 150 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 | | | 8.10 m | | |
| Size of Haunch | bh | | | | 0.2 m | | |
| Dia of Bar top | dbbs | | | | 10 mm | | |
| bottom | dbbsb | | | | 10 mm | | |
| Load on Bottom Slab | | | | | | | |
| Wt of Top Dome | | 2*pi*rd&hd*wd | | | 225.27 Kn | | |
| Wt of Ring Beam | | pi*(d+rb/1000)*rb*drb*25/10^6 | | | 45.95 Kn | | |
| Wt of Side Wall | | pi*(d+sth)*sth*(h-dtrb)*25 | | | 265.86 Kn | | |
| Wt of Haunch | | pi*(d-bh)*bh^2/2*25 | | | 11.47 Kn | | |
| Total Load | wbs | | | | 548.55 Kn | | |
| | | | | | 5.49 sq m | | 0.15555 |
| Max pr on soil | prb | Wbs/(pi*(d)*1) | | | 23.28 Kn/m² | | |
| Bottom slab is designed as circular slab loaded with UDL and simply supported on edges | | | | | | | |
| | | r | | | 3.825 | | 3.05 |
| Radial moment | mri | 3/16*prb*((dbs/2)^2-((d=sth)/2)^2)-wbs/ | | | -1.14 mrb | | 4.93 kKn-m |
| Circumferential Moment | mti | 1/16*prb*(3*(dbs/2)^2-((d=sth)/2)^2)-wbs/ | | | 4.51 mtb | | 4.93 kKn-m |
| for uplift Net uplift load on bottom slab | | | | | 3.25 kn/m² | | |
| for uplift | | Max Radial moment | | | 6.66 | | 6.66 kKn-m |
| | | Max Circumferential Moment | | | 6.66 | | 6.66 kKn-m |
| Max Radial moment | mr | IF(wl>hbgl,0,CEILING(3*PRB*(DBS/2)2/ | | | 4.93 kKn-m | | 6.66 kKn-m |
| Max Circumferential Moment | mt | IF(wl>hbgl,0,CEILING(PRB*(DBS/2)2/16 | | | 4.93 kKn-m | | 6.66 kKn-m |

Asst. Executive Engineer
TDWSP Asifabad

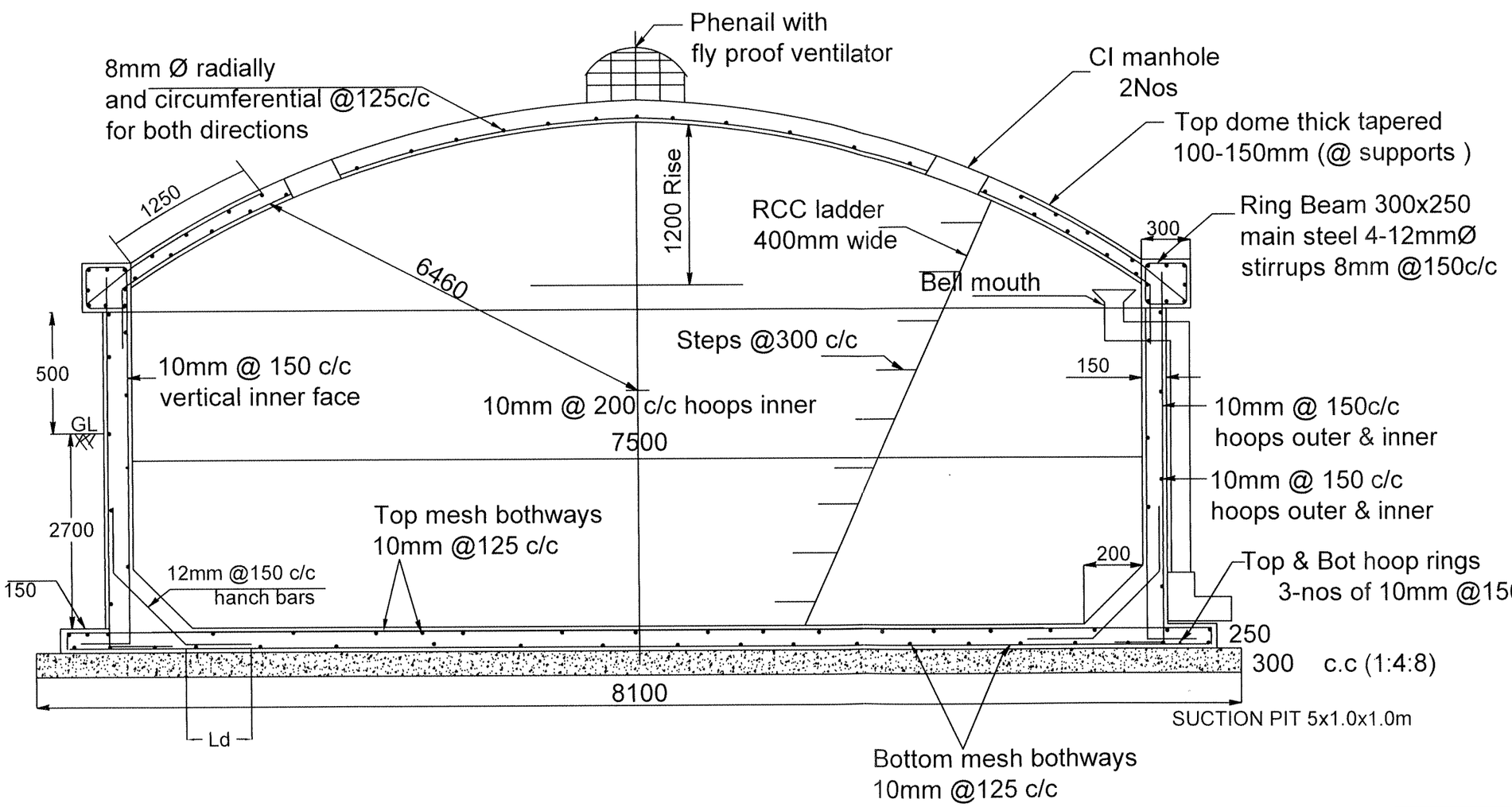
Dy. Executive Engineer
TDWSP Asifabad

Executive Engineer
TDWSP Asifabad

"APPROVED"

SE, TDWSP
NIRMAL

# 120KL SUMP




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

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NIRMAL

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Executive Engineer
TDWSP Asifabad

LARSEN & TOUBRO LIMITED Construction - Chennai

| 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 :
LAMBADITHANDA AT NARNOOR ( M)
SUMP - 120KL

SCALE

PROJECTION

| CHECKED BY | SIGN | DATE |
|---|---|---|
| CIVIL & STRUCTURAL | | |
| MECHANICAL | | |
| ELECTRICAL | | |
| INSTRUMENTATION | | |

DRAWING No. LE150883-C-WS-RW-DC-1252

SIZE A3 | REV. A

RELEASED FOR ☐PRELIMINARY ☐ TENDER ☐INFORMATION ☑APPROVAL ☐CONSTRUCTION