Submitted sir,

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

*****

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

1. **Chlorine Tonner Room at WTP Dhanora.**

The Executive Engineer TDWSP Asifabad Division has submitted Structural Designs & Drawings of Chlorine Tonner Room at WTP Dhanora 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 Designs 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
- No of Columns: 12 nos
- Size of Column C1,C2&C3: 300 x 450mm
- Size of Footing: 1500 x 1650mm
- Top Slab thickness: 125mm

As per the above parameters the structural design and drawings of the Chlorine Tonner Room 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)	DEE (Designs)	Superintending Engineer,
TDWSP,Nirmal Circle	TDWSP,Nirmal Circle	TDWSP,Nirmal Circle

22/04/16	R0	FOR APPROVAL	VBM	RMM	
DATE	**REV.NO.**	**DESCRIPTION**	**Designed**	**Checked**	**Approved**

REVISIONS

L&T Construction
Water & Renewable energy

CLIENT:
GOVERENMENT 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			
	NAME	**SIGN**	**DATE**
DSGN	VBM	VBM	22/04/16
CHKD	RMM	RMM	22/04/16
APPD			

TITLE :

CHLORINE TONNER ROOM - DESIGN CALCULATIONS

DOC NO.	CODE	REV.
LE150883-C-WS-WT-DC-1062	IS	R0

RELEASED FOR	PRELIMINARY	TENDER	INFORMATION	√ APPROVAL	CONSTRUCTION

PROJECT:	**PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT (30 MLD WTP)**	Document LE150883-C-WS-WT-DC-1062		DATE 22.04.16
TITLE	CHLORINE TONNER ROOM	DESIGNED VBM	CHECKED RMM	PAGE

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

1.0 DESIGN DATA

LOADING for Building

- **Plinth Level**

1) Wall = 230 mm thick,
   Wall load = 0.23*2.1*20 = 9.66, considered 9.66 kN/m
2) Base slab =200 mm thick.
   Wall Load = 0.23*4.6*20 = 21.2 kN/m^2

- **Beam 284.5 Level**

1) Wall load = 0.925*0.23*20 = 4.3 kN/m
2) Slab load = (0.125*25)+2.0 (F.F.)+1.5(L.L.) = 6.625 kN/m^2
3) Parapet load = 4.6 kN/m

- **Terrace, 286.0 level**

1) Slab load = (0.125*25)+2 (F.F.)+1.5(L.L.) = 6.625 kN/m2
2) Parapet load = 4.6 KN/m

2.0 Computer model of the Chlorine room building

The building has been modeled in STAAD Pro. Beams and columns have modeled using beam elements. Support condition for column foundation and wall foundation has been considered as fixed. Complete structural model and floor layouts at various levels are attached herewith.

Loads:

(a) Dead and live loads: at various floor levels dead and live loads has been considered as per defined above.

(b) Earthquake loads: To calculate earthquake loads, 'Define 1893 load' command of staad has been used. Parameters used for this command are as given below.

Zone factor -0.1 (For zone II)
Importance factor -1.5
Response reduction factor – 5 for SMRF
Depth of foundation – 2 m
SS (rock or soil factor) :2 (for medium soil)
ST (Optional value for type of structure):1(for RC Building)

Load combinations:

Following load combinations have been considered for design of various components of building.

```
LOAD COMB 101 1.5 DL + 1.5 LL
1 1.5 2 1.5
LOAD COMB 201 1.5 DL + 1.5 EQX
1 1.5 11 1.5
LOAD COMB 202 1.5 DL - 1.5 EQX
1 1.5 12 1.5
LOAD COMB 203 1.5 DL + 1.5 EQZ
1 1.5 13 1.5
LOAD COMB 204 1.5 DL - 1.5 EQZ
1 1.5 14 1.5
LOAD COMB 205 1.2 DL + 1.2 LL + 1.2 EQX
1 1.2 2 1.2 11 1.2
LOAD COMB 206 1.2 DL + 1.2 LL - 1.2 EQX
1 1.2 2 1.2 12 1.2
LOAD COMB 207 1.2 DL + 1.2 LL + 1.2 EQZ
1 1.2 2 1.2 13 1.2
LOAD COMB 208 1.2 DL + 1.2 LL - 1.2 EQZ
1 1.2 2 1.2 14 1.2
LOAD COMB 209 0.9 DL + 1.5 EQX
1 0.9 11 1.5
LOAD COMB 210 0.9 DL - 1.5 EQX
1 0.9 12 1.5
LOAD COMB 211 0.9 DL + 1.5 EQZ
1 0.9 13 1.5
LOAD COMB 212 0.9 DL - 1.5 EQZ
1 0.9 14 1.5
LOAD COMB 401 1 DL + 1 LL
1 1.0 2 1.0
LOAD COMB 501 1 DL + 1 EQX
1 1.0 11 1.0
LOAD COMB 502 1 DL - 1 EQX
1 1.0 12 1.0
LOAD COMB 503 1 DL + 1 EQZ
1 1.0 13 1.0
LOAD COMB 504 1 DL - 1 EQZ
1 1.0 14 1.0
LOAD COMB 505 1 DL + 1 LL + 1 EQX
1 1.0 2 1.0 11 1.0
LOAD COMB 506 1 DL + 1 LL - 1 EQX
```

```
1 1.0 2 1.0 12 1.0
LOAD COMB 507 1 DL + 1 LL + 1 EQZ
1 1.0 2 1.0 13 1.0
LOAD COMB 508 1 DL + 1 LL - 1 EQZ
1 1.0 2 1.0 14 1.0
LOAD COMB 509 0.9 DL + 1 EQX
1 0.9 11 1.0
LOAD COMB 510 0.9 DL - 1 EQX
1 0.9 12 1.0
LOAD COMB 511 0.9 DL + 1 EQZ
1 0.9 13 1.0
LOAD COMB 512 0.9 DL - 1 EQZ
1 0.9 14 1.0
```

A> STADD INPUT DATA

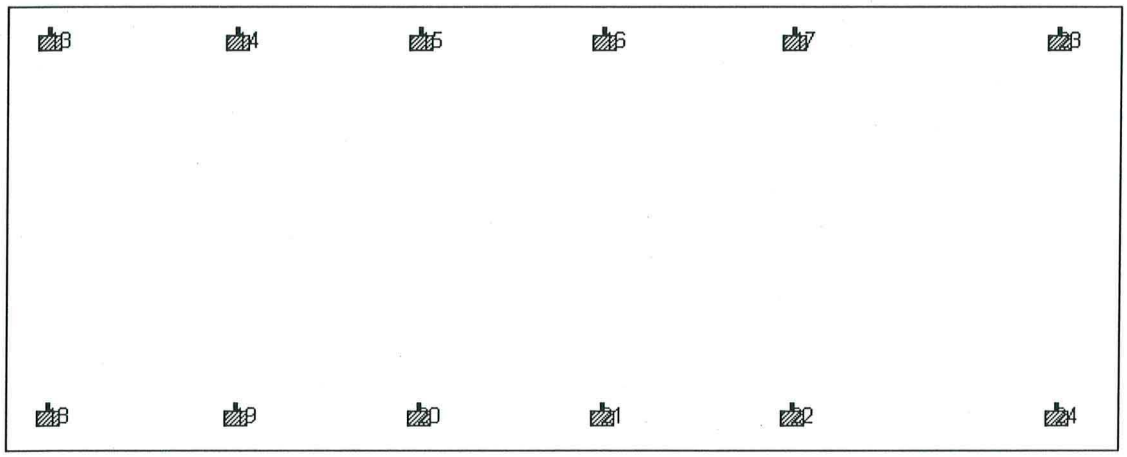
```
STAAD SPACE
START JOB INFORMATION
ENGINEER DATE 25-mar-16
END JOB INFORMATION
INPUT WIDTH 79
UNIT METER KN
JOINT COORDINATES
1 0 0 0; 2 4.115 0 0; 3 8.115 0 0; 4 12.115 0 0; 5 16.23 0 0; 6 0 0 8.23;
7 4.115 0 8.23; 8 8.115 0 8.23; 9 12.115 0 8.23; 10 16.23 0 8.23; 11
21.96 0 0;12 21.96 0 8.23; 13 0 -2 0; 14 4.115 -2 0; 15 8.115 -2 0; 16
12.115 -2 0;17 16.23 -2 0; 18 0 -2 8.23; 19 4.115 -2 8.23; 20 8.115 -2
8.23;21 12.115 -2 8.23; 22 16.23 -2 8.23; 23 21.96 -2 0; 24 21.96 -2
8.23;25 0 4.5 0; 26 4.115 4.5 0; 27 8.115 4.5 0; 28 12.115 4.5 0; 29
16.23 4.5 0;30 0 4.5 8.23; 31 4.115 4.5 8.23; 32 8.115 4.5 8.23; 33
12.115 4.5 8.23;34 16.23 4.5 8.23; 35 21.96 4.5 0; 36 21.96 4.5 8.23; 37
0 4.5 0.35;38 4.115 4.5 0.35; 39 8.115 4.5 0.35; 40 12.115 4.5 0.35; 41 0
4.5 7.88;42 4.115 4.5 7.88; 43 8.115 4.5 7.88; 44 12.115 4.5 7.88; 45
16.23 6 0;46 16.23 6 8.23; 47 0 6 0; 48 4.115 6 0; 49 8.115 6 0; 50
12.115 6 0;51 0 6 8.23; 52 4.115 6 8.23; 53 8.115 6 8.23; 54 12.115 6
8.23;55 19.095 4.5 0; 56 19.095 4.5 8.23; 57 16.23 6 4.115; 58 0 6 4.115;
59 4.115 6 4.115; 61 12.115 6 4.115; 1001 19.095 4.5 4.115; 2001 8.115 6
4.115;
MEMBER INCIDENCES
101 1 2; 102 2 3; 103 3 4; 104 4 5; 105 5 11; 106 6 7; 107 7 8; 108 8 9;
109 9 10; 110 10 12; 111 1 6; 112 2 7; 113 3 8; 114 4 9; 115 5 10; 116 11
12;201 29 55; 202 55 35; 203 34 56; 204 56 36; 205 25 37; 206 41 30; 207
26 38;208 42 31; 209 27 39; 210 43 32; 211 28 40; 212 44 33; 213 29 34;
214 55 1001;215 1001 56; 216 35 36; 301 47 48; 302 48 49; 303 49 50; 304
50 45; 305 58 59;306 59 2001; 307 2001 61; 308 61 57; 309 51 52; 310 52
53; 311 53 54;312 54 46; 313 47 58; 314 58 51; 315 48 59; 316 59 52; 317
49 2001;318 2001 53; 319 50 61; 320 61 54; 321 45 57; 322 57 46; 401 13
1; 402 1 25;403 25 47; 404 14 2; 405 2 26; 406 26 48; 407 15 3; 408 3 27;
409 27 49;410 16 4; 411 4 28; 412 28 50; 413 17 5; 414 5 29; 415 29 45;
416 23 11;417 11 35; 418 18 6; 419 6 30; 420 30 51; 421 19 7; 422 7 31;
423 31 52;424 20 8; 425 8 32; 426 32 53; 427 21 9; 428 9 33; 429 33 54;
430 22 10;431 10 34; 432 34 46; 433 24 12; 434 12 36;
START GROUP DEFINITION
FLOOR
_125TH_SLAB284.5 201 TO 204 213 TO 216
_125TH_SLAB286.0 301 TO 322
END GROUP DEFINITION
DEFINE MATERIAL START
ISOTROPIC M25
E 2.5e+007
POISSON 0.17
DENSITY 25
ALPHA 1e-005
DAMP 0.05
ISOTROPIC M30
E 2.73e+007
POISSON 0.17
DENSITY 25
ALPHA 1e-005
DAMP 0.05
TYPE CONCRETE
STRENGTH FCU 27579
```

```
ISOTROPIC CONCRETE
E 2.17185e+007
POISSON 0.17
DENSITY 23.5616
ALPHA 1e-005
DAMP 0.05
TYPE CONCRETE
STRENGTH FCU 27579
END DEFINE MATERIAL
MEMBER PROPERTY INDIAN
101 TO 114 PRIS YD 0.45 ZD 0.23
MEMBER PROPERTY INDIAN
201 TO 204 PRIS YD 0.725 ZD 0.3
301 TO 312 PRIS YD 0.425 ZD 0.23
205 TO 212 PRIS YD 0.45 ZD 0.3
401 TO 434 PRIS YD 0.45 ZD 0.3
MEMBER PROPERTY INDIAN
213 TO 216 313 TO 322 PRIS YD 0.725 ZD 0.3
MEMBER PROPERTY INDIAN
115 116 PRIS YD 0.45 ZD 0.3
CONSTANTS
BETA 90 MEMB 401 TO 434
MATERIAL M30 ALL
SUPPORTS
13 TO 24 FIXED
MEMBER RELEASE
101 TO 116 201 TO 204 213 TO 216 301 TO 322 START MX
101 TO 116 201 TO 204 213 TO 216 301 TO 322 END MX
SLAVE FX FZ MASTER 1001 JOINT 29 34 TO 36
SLAVE FX FZ MASTER 2001 JOINT 45 TO 54
DEFINE 1893 LOAD
ZONE 0.1 RF 5 I 1.5 SS 2 ST 1 DT 2
SELFWEIGHT 1
FLOOR WEIGHT
**************DL*****************************
_125TH_SLAB284.5 FLOAD 5.125
_125TH_SLAB286.0 FLOAD 5.125
**************LL*****************************
_125TH_SLAB284.5 FLOAD 0.75
_125TH_SLAB286.0 FLOAD 0.75
*****************************************
MEMBER WEIGHT
*20X0.23X2.1 =9.66
101 TO 104 106 TO 109 111 UNI 9.66
*20X0.23X4.6 = 21.16
105 110 115 116 UNI 21.16
*20X0.23X1 = 4.6
201 TO 204 216 UNI 4.6
*20X0.23X0.925 = 4.3
213 UNI 4.3
*20X0.23X1 = 4.6
301 TO 304 309 TO 314 321 322 UNI 4.6
*****************************************
LOAD 11 EQLOAD X DIRECTION
1893 LOAD X 1
PERFORM ANALYSIS
CHANGE
LOAD 12 EQLOAD - X DIRECTION
1893 LOAD X -1
PERFORM ANALYSIS
CHANGE
```

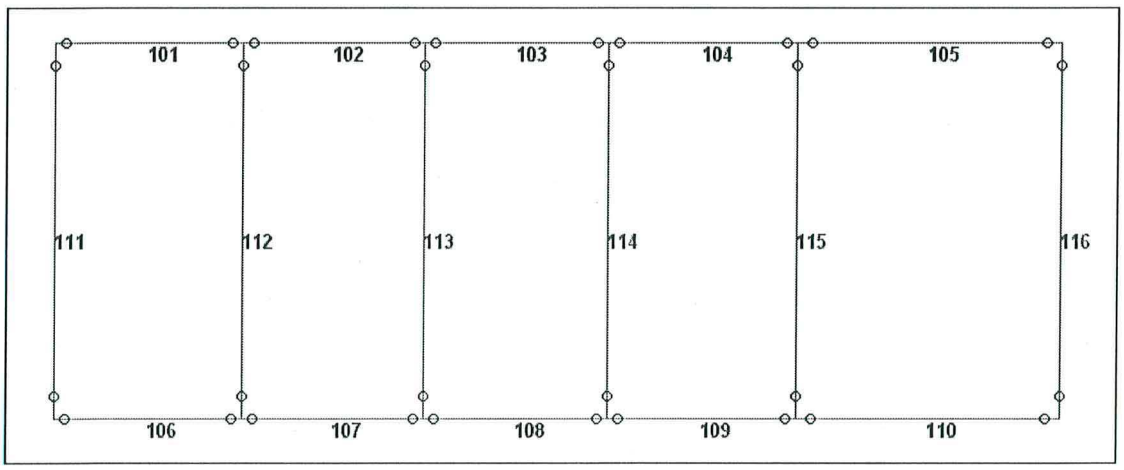
```
LOAD 13 EQLOAD Z DIRECTION
1893 LOAD Z 1
PERFORM ANALYSIS
CHANGE
LOAD 14 EQLOAD - Z DIRECTION
1893 LOAD Z -1
PERFORM ANALYSIS
CHANGE
*****************************************
LOAD 1 LOADTYPE Dead  TITLE DL
SELFWEIGHT Y -1
FLOOR LOAD
_125TH_SLAB284.5 FLOAD -5.125 GY
_125TH_SLAB286.0 FLOAD -5.125 GY
*****************************************
LOAD 2 LOADTYPE Live  TITLE LL
FLOOR LOAD
_125TH_SLAB284.5 FLOAD -1.5 GY
_125TH_SLAB286.0 FLOAD -1.5 GY
*****************************************
LOAD 3 LOADTYPE Dead  TITLE WALL
MEMBER LOAD
*20X0.23X2.1 =9.66
101 TO 104 106 TO 109 111 UNI GY -9.66
*20X0.23X4.6 = 21.16
105 110 115 116 UNI GY -21.16
*20X0.23X1 = 4.6
201 TO 204 216 UNI GY -4.6
*20X0.23X0.925 = 4.3
213 UNI GY -4.3
*20X0.23X1 = 4.6
301 TO 304 309 TO 314 321 322 UNI GY -4.6
*********************************************
LOAD 4 LOADTYPE Dead  TITLE OTHER
JOINT LOAD
*EOT CRANE
37 TO 44 FY -40
LOAD COMB 101 1.5DL+1.5LL
1 1.5 2 1.5 3 1.5 4 1.5
LOAD COMB 201 1.5DL+1.5EQX
1 1.5 3 1.5 4 1.5 11 1.5
LOAD COMB 202 1.5DL-1.5EQX
1 1.5 3 1.5 4 1.5 12 1.5
LOAD COMB 203 1.5DL+1.5EQZ
1 1.5 3 1.5 4 1.5 13 1.5
LOAD COMB 204 1.5DL-1.5EQZ
1 1.5 3 1.5 4 1.5 14 1.5
LOAD COMB 205 1.2DL+1.2LL+1.2EQX
1 1.2 2 1.2 3 1.2 4 1.2 11 1.2
LOAD COMB 206 1.2DL+1.2LL-1.2EQX
1 1.2 2 1.2 3 1.2 4 1.2 12 1.2
LOAD COMB 207 1.2DL+1.2LL+1.2EQZ
1 1.2 2 1.2 3 1.2 4 1.2 13 1.2
LOAD COMB 208 1.2DL+1.2LL-1.2EQZ
1 1.2 2 1.2 3 1.2 4 1.2 14 1.2
LOAD COMB 209 0.9DL+1.5EQX
1 0.9 3 0.9 4 0.9 11 1.5
LOAD COMB 210 0.9DL-1.5EQX
1 0.9 3 0.9 4 0.9 12 1.5
LOAD COMB 211 0.9DL+1.5EQZ
1 0.9 3 0.9 4 0.9 13 1.5
```

```
LOAD COMB 212 0.9DL-1.5EQZ
1 0.9 3 0.9 4 0.9 14 1.5
LOAD COMB 401 DL+LL
1 1.0 2 1.0 3 1.0 4 1.0
LOAD COMB 501 DL+EQX
1 1.0 3 1.0 4 1.0 11 1.0
LOAD COMB 502 DL-EQX
1 1.0 3 1.0 4 1.0 12 1.0
LOAD COMB 503 DL+EQZ
1 1.0 3 1.0 4 1.0 13 1.0
LOAD COMB 504 DL-EQZ
1 1.0 3 1.0 4 1.0 14 1.0
LOAD COMB 505 DL+LL+EQX
1 1.0 2 1.0 3 1.0 4 1.0 11 1.0
LOAD COMB 506 DL+LL-EQX
1 1.0 2 1.0 3 1.0 4 1.0 12 1.0
LOAD COMB 507 DL+LL+EQZ
1 1.0 2 1.0 3 1.0 4 1.0 13 1.0
LOAD COMB 508 DL+LL-EQZ
1 1.0 2 1.0 3 1.0 4 1.0 14 1.0
LOAD COMB 509 0.9DL+EQX
1 0.9 3 0.9 4 0.9 11 1.0
LOAD COMB 510 0.9DL-EQX
1 0.9 3 0.9 4 0.9 12 1.0
LOAD COMB 511 0.9DL+EQZ
1 0.9 3 0.9 4 0.9 13 1.0
LOAD COMB 512 0.9DL-EQZ
1 0.9 3 0.9 4 0.9 14 1.0
*****************************************
PERFORM ANALYSIS
LOAD LIST 101 201 TO 212
START CONCRETE DESIGN
CODE INDIAN
UNIT MMS NEWTON
FC 30 ALL
CLEAR 40 MEMB 401 TO 434
CLEAR 25 MEMB 101 TO 116 201 TO 216 301 TO 322
FYMAIN 415 ALL
FYSEC 415 ALL
MAXMAIN 32 ALL
MAXSEC 10 ALL
MINMAIN 12 ALL
MINSEC 8 ALL
ENSH 1 ALL
DESIGN BEAM 101 TO 116 201 TO 216 301 TO 322
DESIGN COLUMN 401 TO 434
END CONCRETE DESIGN
UNIT METER KN
LOAD LIST 101 201 TO 212
FINISH
```

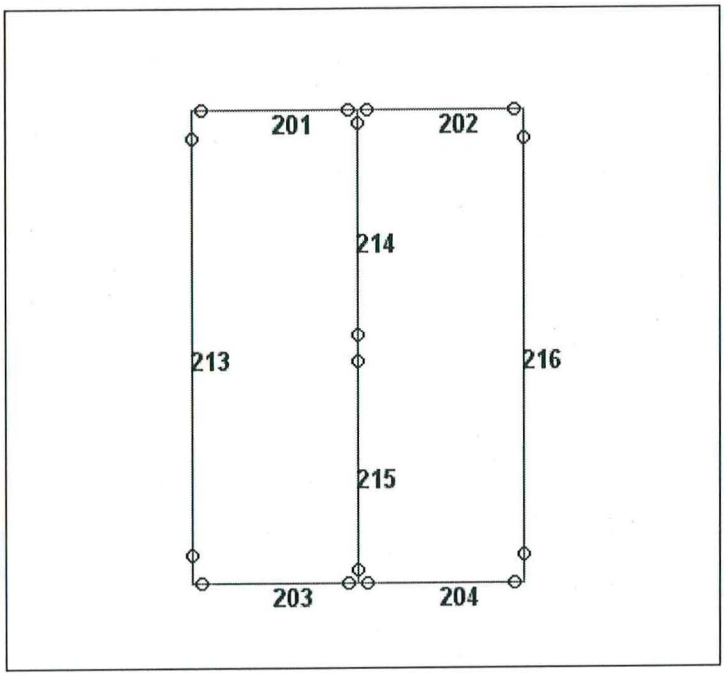
B> STAAD DIAGRAM



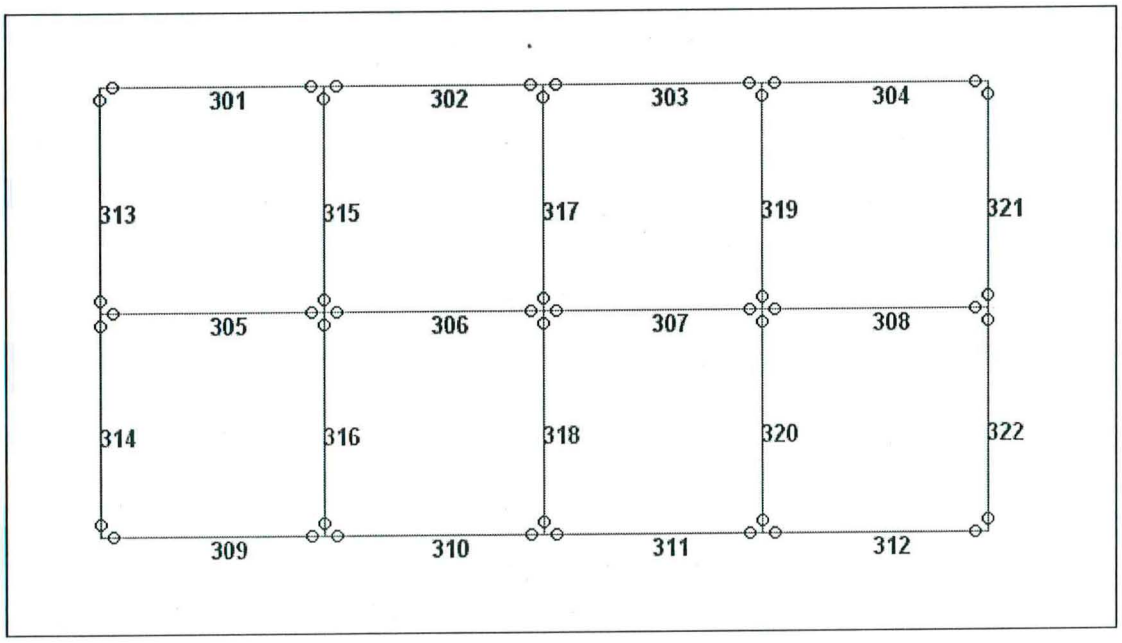
COLUMN NO



BEAM LAYOUT AT PLINTH LEVEL.



BEAM LAYOUT AT 284.5 LEVEL.



BEAM LAYOUT AT 286.00 LEVEL.

C> Typical calculation of Footing: -

Safe bearing capacity of soil = 200 Kn/m^2

Increase in S.B.C for the combination of Earthquake forces = 25 %
S.B.C for Eq forces = 250 Kn/m^2

Footing area & loads are also design for following combination

LOAD COMB 401 1 DL + 1 LL
1 1.0 2 1.0
LOAD COMB 501 1 DL + 1 EQX
1 1.0 11 1.0
LOAD COMB 502 1 DL - 1 EQX
1 1.0 12 1.0
LOAD COMB 503 1 DL + 1 EQZ
1 1.0 13 1.0
LOAD COMB 504 1 DL - 1 EQZ
1 1.0 14 1.0
LOAD COMB 505 1 DL + 1 LL + 1 EQX
1 1.0 2 1.0 11 1.0
LOAD COMB 506 1 DL + 1 LL - 1 EQX
1 1.0 2 1.0 12 1.0
LOAD COMB 507 1 DL + 1 LL + 1 EQZ
1 1.0 2 1.0 13 1.0
LOAD COMB 508 1 DL + 1 LL - 1 EQZ
1 1.0 2 1.0 14 1.0
LOAD COMB 509 0.9 DL + 1 EQX
1 0.9 11 1.0
LOAD COMB 510 0.9 DL - 1 EQX
1 0.9 12 1.0
LOAD COMB 511 0.9 DL + 1 EQZ
1 0.9 13 1.0
LOAD COMB 512 0.9 DL - 1 EQZ
1 0.9 14 1.0

For Footing Design refer ANNEXURE-1

D> Column Design: -

Analysis of building is done as 3d – Analysis using Staad-pro.

Columns are designed for the following combination

LOAD COMB 101 1.5 DL + 1.5 LL
1 1.5 2 1.5
LOAD COMB 201 1.5 DL + 1.5 EQX
1 1.5 11 1.5
LOAD COMB 202 1.5 DL - 1.5 EQX
1 1.5 12 1.5
LOAD COMB 203 1.5 DL + 1.5 EQZ
1 1.5 13 1.5
LOAD COMB 204 1.5 DL - 1.5 EQZ
1 1.5 14 1.5
LOAD COMB 205 1.2 DL + 1.2 LL + 1.2 EQX
1 1.2 2 1.2 11 1.2
LOAD COMB 206 1.2 DL + 1.2 LL - 1.2 EQX
1 1.2 2 1.2 12 1.2
LOAD COMB 207 1.2 DL + 1.2 LL + 1.2 EQZ
1 1.2 2 1.2 13 1.2
LOAD COMB 208 1.2 DL + 1.2 LL - 1.2 EQZ
1 1.2 2 1.2 14 1.2
LOAD COMB 209 0.9 DL + 1.5 EQX
1 0.9 11 1.5
LOAD COMB 210 0.9 DL - 1.5 EQX
1 0.9 12 1.5
LOAD COMB 211 0.9 DL + 1.5 EQZ
1 0.9 13 1.5
LOAD COMB 212 0.9 DL - 1.5 EQZ
1 0.9 14 1.5

Columns are designed in Staad-pro & Sample output as well as steel required for provided size is also given at all level.

		stadd	check data	RF Reqd	select level	level	select col	type	column size b	D	column Dia	bar No		Dia	No	Rf provided
1	C1	401	401	278	1	plinth	1	C1	300	450	4	20	+	6	16	2463
1	C1	402	402	1191	2	gf	1	C1	300	450	4	20	+	6	16	2463
2	C1	403	403	1733	3	ff	1	C1	300	450	4	20	+	6	16	2463
3	C1	404	404	272	1	plinth	1	C1	300	450	4	20	+	6	16	2463
4	C1	405	405	1273	2	gf	1	C1	300	450	4	20	+	6	16	2463
6	C1	406	406	1810	3	ff	1	C1	300	450	4	20	+	6	16	2463
7	C1	407	407	261	1	plinth	1	C1	300	450	4	20	+	6	16	2463
8	C1	408	408	1199	2	gf	1	C1	300	450	4	20	+	6	16	2463
9	C1	409	409	1684	3	ff	1	C1	300	450	4	20	+	6	16	2463
10	C1	410	410	265	1	plinth	1	C1	300	450	4	20	+	6	16	2463
11	C1	411	411	1228	2	gf	1	C1	300	450	4	20	+	6	16	2463
12	C1	412	412	1712	3	ff	1	C1	300	450	4	20	+	6	16	2463
13	C2	413	413	1595	1	plinth	2	C2	300	450	10	20				3142
14	C2	414	414	2852	2	gf	2	C2	300	450	10	20				3142
15	C2	415	415	2760	3	ff	2	C2	300	450	10	20				3142
16	C3	416	416	2464	1	plinth	3	C3	300	450	6	20	+	4	25	3848
17	C3	417	417	3471	2	gf	3	C3	300	450	6	20	+	4	25	3848
18	C1	418	418	278	1	plinth	1	C1	300	450	4	20	+	6	16	2463
19	C1	419	419	1191	2	gf	1	C1	300	450	4	20	+	6	16	2463
20	C1	420	420	1733	3	ff	1	C1	300	450	4	20	+	6	16	2463
21	C1	421	421	272	1	plinth	1	C1	300	450	4	20	+	6	16	2463
22	C1	422	422	1273	2	gf	1	C1	300	450	4	20	+	6	16	2463
23	C1	423	423	1810	3	ff	1	C1	300	450	4	20	+	6	16	2463
24	C1	424	424	261	1	plinth	1	C1	300	450	4	20	+	6	16	2463
25	C1	425	425	1199	2	gf	1	C1	300	450	4	20	+	6	16	2463
26	C1	426	426	1684	3	ff	1	C1	300	450	4	20	+	6	16	2463
27	C1	427	427	265	1	plinth	1	C1	300	450	4	20	+	6	16	2463
28	C1	428	428	1228	2	gf	1	C1	300	450	4	20	+	6	16	2463
29	C1	429	429	1712	3	ff	1	C1	300	450	4	20	+	6	16	2463
30	C2	430	430	1595	1	plinth	2	C2	300	450	10	20				3142
31	C2	431	431	2852	2	gf	2	C2	300	450	10	20				3142
32	C2	432	432	2760	3	ff	2	C2	300	450	10	20				3142
33	C3	433	433	2464	1	plinth	3	C3	300	450	6	20	+	4	25	3848
34	C3	434	434	3471	2	gf	3	C3	300	450	6	20	+	4	25	3848

E> Beam Design: -

Analysis of building is done as 3d – Analysis using Staad-pro.

Beams are designed for the following combination

LOAD COMB 101 1.5 DL + 1.5 LL
1 1.5 2 1.5
LOAD COMB 201 1.5 DL + 1.5 EQX
1 1.5 11 1.5
LOAD COMB 202 1.5 DL - 1.5 EQX
1 1.5 12 1.5
LOAD COMB 203 1.5 DL + 1.5 EQZ
1 1.5 13 1.5
LOAD COMB 204 1.5 DL - 1.5 EQZ
1 1.5 14 1.5
LOAD COMB 205 1.2 DL + 1.2 LL + 1.2 EQX
1 1.2 2 1.2 11 1.2
LOAD COMB 206 1.2 DL + 1.2 LL - 1.2 EQX
1 1.2 2 1.2 12 1.2
LOAD COMB 207 1.2 DL + 1.2 LL + 1.2 EQZ
1 1.2 2 1.2 13 1.2
LOAD COMB 208 1.2 DL + 1.2 LL - 1.2 EQZ
1 1.2 2 1.2 14 1.2
LOAD COMB 209 0.9 DL + 1.5 EQX
1 0.9 11 1.5
LOAD COMB 210 0.9 DL - 1.5 EQX
1 0.9 12 1.5
LOAD COMB 211 0.9 DL + 1.5 EQZ
1 0.9 13 1.5
LOAD COMB 212 0.9 DL - 1.5 EQZ
1 0.9 14 1.5

Beams are designed in Staad-pro & Sample output as well as steel required for provided size is also given at all level.

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

Beam No	Beam No	l * b * d in mm	Reinforcement in mm2 Top/Bottom					Stirrups Dia * spacing * leggs				
PB1a	101	4115										
		230	360	197	0	197	391	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	197	197	197	197	197	2	2	2	2	2
b	102	4000										
		230	348	197	0	197	342	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	197	197	197	197	197	2	2	2	2	2
b	103	4000										
		230	353	197	0	197	326	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	197	197	197	197	197	2	2	2	2	2
c	104	4115										
		230	334	197	0	197	533	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	197	197	197	197	197	2	2	2	2	2
d	105	5730										
		230	988	197	0	197	864	8 - 280	8 - 300	8 - 300	8 - 300	8 - 300
		450	0	224	447	340	0	2	2	2	2	2
PB1a	106	4115										
		230	360	197	0	197	391	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	197	197	197	197	197	2	2	2	2	2
b	107	4000										
		230	348	197	0	197	342	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	197	197	197	197	197	2	2	2	2	2
b	108	4000										
		230	353	197	0	197	326	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	197	197	197	197	197	2	2	2	2	2
c	109	4115										
		230	334	197	0	197	533	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	197	197	197	197	197	2	2	2	2	2
d	110	5730										
		230	988	197	0	197	864	8 - 280	8 - 300	8 - 300	8 - 300	8 - 300
		450	0	224	447	340	0	2	2	2	2	2
PB2	111	8230										
		230	1035	197	0	197	1035	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	0	222	396	222	0	2	2	2	2	2
PB3	112	8230										
		230	363	197	0	197	363	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	197	197	197	197	197	2	2	2	2	2
PB3	113	8230										
		230	346	197	0	197	346	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	197	197	197	197	197	2	2	2	2	2
PB3	114	8230										
		230	330	197	0	197	330	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	197	197	197	197	197	2	2	2	2	2
PB4	115	8230										
		300	1866	0	0	0	1866	8 - 230	8 - 300	8 - 300	8 - 300	8 - 230
		450	83	418	895	418	83	2	2	2	2	2
PB5	116	8230										
		300	1835	0	0	0	1835	8 - 230	8 - 300	8 - 300	8 - 300	8 - 230
		450	52	384	881	384	52	2	2	2	2	2
B1	201	2865										
		300	515	426	0	0	0	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		725	425	425	576	750	985	2	2	2	2	2
	202	2865										
		300	0	0	0	426	426	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		725	985	764	528	425	425	2	2	2	2	2
B1	203	2865										
		300	515	426	0	0	0	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		725	425	425	576	750	985	2	2	2	2	2
	204	2865										
		300	0	0	0	426	426	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		725	985	764	528	425	425	2	2	2	2	2
BK1	205	350										
		300	257	257	257	257	0	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300

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

		450	0	0	0	0	0	2	2	2	2	2
BK1	**206**	350										
		300	0	257	257	257	257	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	0	0	0	0	0	2	2	2	2	2
BK1	**207**	350										
		300	257	257	257	257	0	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	0	0	0	0	0	2	2	2	2	2
BK1	**208**	350										
		300	0	257	257	257	257	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	0	0	0	0	0	2	2	2	2	2
BK1	**209**	350										
		300	257	257	257	257	0	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	0	0	0	0	0	2	2	2	2	2
BK1	**210**	350										
		300	0	257	257	257	257	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	0	0	0	0	0	2	2	2	2	2
BK1	**211**	350										
		300	257	257	257	257	0	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	0	0	0	0	0	2	2	2	2	2
BK1	**212**	350										
		300	0	257	257	257	257	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		450	0	0	0	0	0	2	2	2	2	2
B2	**213**	8230										
		300	756	426	0	426	756	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		725	0	426	426	426	0	2	2	2	2	2
B3	**214**	4115										
		300	0	0	0	0	0	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		725	0	522	960	1243	1341	2	2	2	2	2
	215	4115										
		300	0	0	0	0	0	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		725	1341	1243	960	522	0	2	2	2	2	2
B4	**216**	8230										
		300	511	0	0	0	511	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		725	0	426	644	426	0	2	2	2	2	2
B101a	**301**	4115										
		230	282	186	0	186	400	8 - 290	8 - 290	8 - 290	8 - 290	8 - 290
		425	186	222	187	186	186	2	2	2	2	2
b	**302**	4000										
		230	343	186	0	186	316	8 - 290	8 - 290	8 - 290	8 - 290	8 - 290
		425	0	186	186	186	186	2	2	2	2	2
b	**303**	4000										
		230	315	186	0	186	356	8 - 290	8 - 290	8 - 290	8 - 290	8 - 290
		425	186	186	186	186	0	2	2	2	2	2
c	**304**	4115										
		230	367	186	0	186	304	8 - 290	8 - 290	8 - 290	8 - 290	8 - 290
		425	0	186	186	186	186	2	2	2	2	2
B102a	**305**	4115										
		230	0	0	0	0	270	8 - 290	8 - 290	8 - 290	8 - 290	8 - 290
		425	0	267	352	185	0	2	2	2	2	2
b	**306**	4000										
		230	270	0	0	0	306	8 - 290	8 - 290	8 - 290	8 - 290	8 - 290
		425	0	186	186	186	0	2	2	2	2	2
b	**307**	4000										
		230	306	0	0	0	235	8 - 290	8 - 290	8 - 290	8 - 290	8 - 290
		425	0	186	186	186	0	2	2	2	2	2
c	**308**	4115										
		230	235	0	0	0	0	8 - 290	8 - 290	8 - 290	8 - 290	8 - 290
		425	0	185	370	276	0	2	2	2	2	2
B101a	**309**	4115										
		230	282	186	0	186	400	8 - 290	8 - 290	8 - 290	8 - 290	8 - 290
		425	186	222	187	186	186	2	2	2	2	2
b	**310**	4000										
		230	343	186	0	186	316	8 - 290	8 - 290	8 - 290	8 - 290	8 - 290
		425	0	186	186	186	186	2	2	2	2	2
b	**311**	4000										

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

		230	315	186	0	186	356	8 - 290	8 - 290	8 - 290	8 - 290	8 - 290
		425	186	186	186	186	0	2	2	2	2	2
c	**312**	4115										
		230	367	186	0	186	304	8 - 290	8 - 290	8 - 290	8 - 290	8 - 290
		425	0	186	186	186	186	2	2	2	2	2
B103	**313**	4115										
		300	493	426	0	0	0	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		725	422	422	601	814	955	2	2	2	2	2
	314	4115										
		300	0	0	0	426	493	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		725	955	814	601	422	422	2	2	2	2	2
B104	**315**	4115										
		300	547	426	0	0	0	8 - 270	8 - 300	8 - 300	8 - 300	8 - 300
		725	0	425	854	1294	1614	2	2	2	2	2
	316	4115										
		300	0	0	0	426	547	8 - 300	8 - 300	8 - 300	8 - 300	8 - 270
		725	1614	1294	854	425	0	2	2	2	2	2
B104	**317**	4115										
		300	520	426	0	0	0	8 - 290	8 - 300	8 - 300	8 - 300	8 - 300
		725	0	424	837	1250	1537	2	2	2	2	2
	318	4115										
		300	0	0	0	426	520	8 - 300	8 - 300	8 - 300	8 - 300	8 - 290
		725	1537	1250	837	424	0	2	2	2	2	2
B104	**319**	4115										
		300	510	0	0	0	0	8 - 280	8 - 300	8 - 300	8 - 300	8 - 300
		725	0	426	850	1292	1604	2	2	2	2	2
	320	4115										
		300	0	0	0	0	510	8 - 300	8 - 300	8 - 300	8 - 300	8 - 280
		725	1604	1292	850	426	0	2	2	2	2	2
B105	**321**	4115										
		300	582	426	0	0	0	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		725	0	426	426	549	685	2	2	2	2	2
	322	4115										
		300	0	0	0	426	582	8 - 300	8 - 300	8 - 300	8 - 300	8 - 300
		725	685	549	426	426	0	2	2	2	2	2

F> Slab Design :-

One Way Continuous Slab

One way continuous slab			
Project : 30MLD WTP at Asifabad			Project No : L16_2
Unit : Chlorine Tonner Room			Level : 284.50
DATA			
Long span	Ly	**8.23**	m
Short span - Effective span	Lx	**2.865**	m
Concrete grade	Fck	**30**	N/mm2
Steel	Fy	**415**	N/mm2
Slab thikness	Thk	**125**	mm
clear cover	Cv	**20**	mm
Maximum Diameter of bar	Db	**10**	mm
Minimum % steel	ptmin	**0.12**	%
Width	B	**1000**	mm
Live load	Ll	**1.5**	kN/m2
Finishing load	Fl	**2**	kN/m2
Other load	Ol	**0**	kN/m2

Calculation			
Dead load .	DL	3.13	kN/m2
Total load	Tl	6.63	kN/m2
Effective depth	Deff	100	mm

Moment coefficient for one way continuous slab

Moment coefficient (as per IS 456 table 12)

	positive moment in near middle of end span	nagativemoment in next to the end support	positive moment in middle of interior span	nagative moment in interior supports
Dead Load	1/12	1/10	1/16	1/12
Live load	1/10	1/9	1/12	1/9
	Mxm	Mxs	Mym	Mys
Moment - Unfactored	4.74	5.57	3.66	4.87
Moment- factored	7.11	8.36	5.48	7.31
Area of steel required	203	240	155	209
bar	**8**	**8**	**8**	**8**
spc	**200**	**400**	**400**	**200**
Provided steel		+	+	
bar	**0**	**8**	**8**	
spc	**0**	**400**	**400**	
Area of steel provided	251	251	251	251
Distribution Steel	0.12	%		
Required distribution steel steel	150	dia	spc	ast
Provided steel bar	10			
Provided steel spc	200			
Provided distribution steel steel	393			

Shear Check

Maximum shear is at first span	Outer side	Inner side
Dead Load	0.6	0.55
Live load	0.6	0.6

Maximum shear	V	11.02	kN	
Factored shear	Vu	16.53	kN	
Actual shear stress	Tv	0.17	N/mm2	
Area of steel provided at support	Astsh	251	mm2	
	Pt	0.25	%	
	beta	13.86		
Value of K for Solid slab				
Overall Depth	D	125.00	mm	
	K	1.30		
Parmiisble shear Stress	Tc	0.50	N/mm2	O.k

Check for Deflection				
Maximum defflecti is at first span				
basic span /deph ratio	bsd	26		
Area of steel required		203	mm2	
Area of steel provided		251	mm2	
Steel stress of service load - Fs	fs	194	N/mm2	
% steel provided	ptt	0.25	%	
Moification factor	mf	2.11		
permissible span/ depth ratio	psd	55		
actual span /depth ratio	sdr	29		
Deflecttion Check		O.K		

Two Way Slab

TWO WAY SLAB DESIGN										
PROJECT : 30MLD WTP at Asifabad									JOB : L16-02	
UNIT : Chlorine Tonner room										
LEVEL : 286.00 LVL										
GENERAL DATA										
Concrete grade		Fck	30	N/mm2						
Steel		Fy	415	N/mm2						
Clear cover		Cv	20	mm						
Density of concrete		Wd	25	Kn/m3						
Width		B	1000	mm						
Max.Dia. of Bar		Db	10	mm						
Slab Data										
Slab No			S1	S2	S3	S4	S5	S6	S7	S8
shorter span	Lx	m	4.115	4						
longer span	Ly	m	4.115	4.115						
Slab type	St		4	2						
Depth	D	mm	125	125						
Loading										
Live load	Ll	kN/m2	1.5	1.5						
Finishing load	Fl	kN/m2	2	2						
Sunk load	Sl	kN/m2								
Other Load	Ol	kN/m2								
CALCULATION										
Calculation of loading										
Self wt (Dead load)	Dl	Kn/m2	3.125	3.125						
Total Load	Tl	Kn/m2	6.625	6.625						
Effective depth	De	mm	100	100						
Calcultation of Two slab coefficient										
Ratio Ly/lx		Rat	1.00	1.03						
Short span										
Negative mom. At continuous edge		Axs	0.047	0.039						
Positive momenet at mid span		Axm	0.035	0.029						
Long span										
Negative mom. At continuous edge		Ays	0.047	0.037						
Positive momenet at mid span		Aym	0.035	0.028						
Moment - Factored										
Short span										
Neg. mom. At contin. edge		kN-m	7.91	6.16						
Positive momenet at mid span		kN-m	5.89	4.63						
Long span										
Neg. mom. At cont.edge		kN-m	7.91	5.88						
Positive momenet at mid span		kN-m	5.89	4.45						
Reinforcement Required										
Short span										
Neg. mom. At contin. edge		mm2	226	175						
Positive momenet at mid span		mm2	167	131						
Long span										
Neg. mom. At cont.edge		mm2	226	167						
Positive momenet at mid span		mm2	167	126						
Reinforcement provided										
Short span										

Neg. mom. At contin. edge		mm2	251	251
Positive momenet at mid span		mm2	251	251
Long span				
Neg. mom. At cont.edge		mm2	251	251
Positive momenet at mid span		mm2	251	251
Check for Shear				
Shear at support	Vus	Kn	13.63	13.25
Actual Shear stress	Vuact	N/mm2	0.14	0.13
Factored shear stress	VuF	N/mm2	0.20	0.20
Ast provide	Astsh	mm2	251	251
% Ast	pt	%	0.25	0.25
beta			13.86	13.86
K value corrosponds to slab thickness			1.30	1.30
permissible shear for pt			0.37	0.37
permissible shear Ktc			0.48	0.48
Check for Deflection				
basic span /deph ratio	bsd		26	26
fs	fs		160	125.27
% steel provided	pt		0.25	0.25
Moification factor	mf		2.7491	3.964
permissible span/ depth ratio	psd		71.476	103.06
actual span /depth ratio	sdr		41.15	40
Deflecttion Check			OK	OK

REINFORCEMENT DATA																
		-ve At cont edge short span				+ve momenet At mid short span				-ve At cont edge long span				+ve momenet At mid long span			
S1	ASTR	226				167				226				167			
	bar	8	400	8	400	8	200			8	400	8	400	8	200		
	ASTP	251				251				251				251			
S2	ASTR	175				131				167				126			
	bar	8	400	8	400	8	200			8	400	8	400	8	200		
	ASTP	251				251				251				251			

3.0 Neutralization tank

A>DESIGN DATA

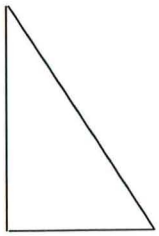
Size of bed = 1.5 x 2.5 m
Water depth = 1.5 m
Free board = 0.45 m

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

- wall, fixed base, subjected to triangular loading



Analysis of structure is done using STAAD – Program

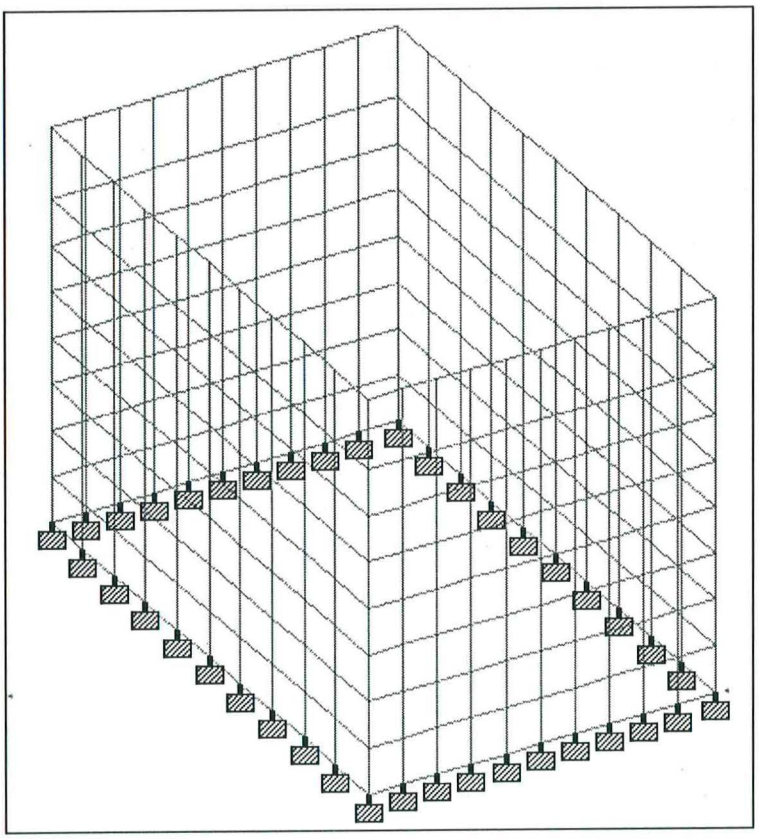
Maximum pressure at bottom = 10 kN/m^3 x 1.95 m = 19.5 kN/m^2

B> STAAD INPUT

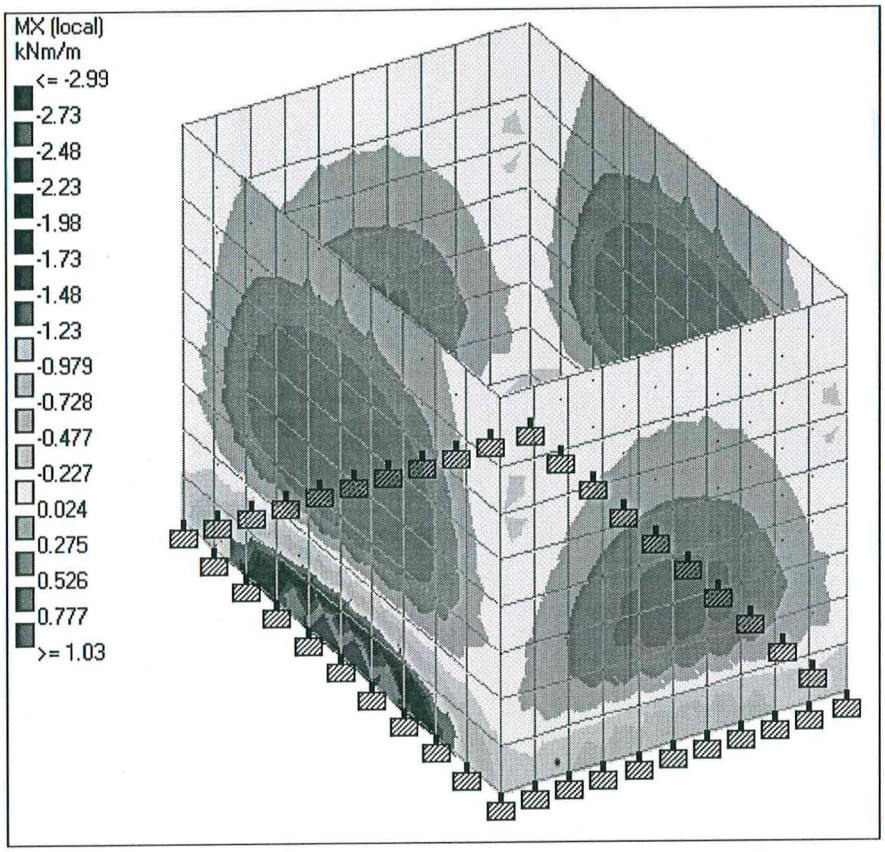
```
STAAD SPACE
START JOB INFORMATION
JOB PART NEUTRALIZATION TANK 2.5 X 1.5 X 1.95
ENGINEER DATE 21-APR-16
END JOB INFORMATION
INPUT WIDTH 79
UNIT METER KN
JOINT COORDINATES
1 0 0 0; 2 1.7 0 0; 3 0 0 2.7; 4 1.7 0 2.7; 5 0 1.6 0; 6 1.7 1.6 0;7 0
1.6 2.7; 8 1.7 1.6 2.7; 13 0 0.228571 0; 14 0.1675 0.228571 0;15 0.1675 0
0; 16 0 0.457143 0; 17 0.1675 0.457143 0; 18 0 0.685714 0;19 0.1675
0.685714 0; 20 0 0.914286 0; 21 0.1675 0.914286 0; 22 0 1.14286 0;23
0.1675 1.14286 0; 24 0 1.37143 0; 25 0.1675 1.37143 0; 26 0.1675 1.6 0;
27 0.335 0.228571 0; 28 0.335 0 0; 29 0.335 0.457143 0; 30 0.335 0.685714
0;31 0.335 0.914286 0; 32 0.335 1.14286 0; 33 0.335 1.37143 0; 34 0.335
1.6 0;35 0.5025 0.228571 0; 36 0.5025 0 0; 37 0.5025 0.457143 0;38 0.5025
0.685714 0; 39 0.5025 0.914286 0; 40 0.5025 1.14286 0;41 0.5025 1.37143
0; 42 0.5025 1.6 0; 43 0.67 0.228571 0; 44 0.67 0 0;45 0.67 0.457143 0;
46 0.67 0.685714 0; 47 0.67 0.914286 0; 48 0.67 1.14286 0;49 0.67 1.37143
0; 50 0.67 1.6 0; 51 0.8375 0.228571 0; 52 0.8375 0 0;53 0.8375 0.457143
0; 54 0.8375 0.685714 0; 55 0.8375 0.914286 0;56 0.8375 1.14286 0; 57
0.8375 1.37143 0; 58 0.8375 1.6 0; 59 1.005 0.228571 0;60 1.005 0 0; 61
1.005 0.457143 0; 62 1.005 0.685714 0; 63 1.005 0.914286 0;64 1.005
1.14286 0; 65 1.005 1.37143 0; 66 1.005 1.6 0; 67 1.1725 0.228571 0;
68 1.1725 0 0; 69 1.1725 0.457143 0; 70 1.1725 0.685714 0;71 1.1725
0.914286 0; 72 1.1725 1.14286 0; 73 1.1725 1.37143 0;74 1.1725 1.6 0; 75
ELEMENT INCIDENCES SHELL
501 1 13 14 15; 502 13 16 17 14; 503 16 18 19 17; 504 18 20 21 19;
505 20 22 23 21; 506 22 24 25 23; 507 24 5 26 25; 508 5 97 98 26;
511 15 14 27 28; 512 14 17 29 27; 513 17 19 30 29; 514 19 21 31 30;
515 21 23 32 31; 516 23 25 33 32; 517 25 26 34 33; 518 26 98 102 34;
521 28 27 35 36; 522 27 29 37 35; 523 29 30 38 37; 524 30 31 39 38;
525 31 32 40 39; 526 32 33 41 40; 527 33 34 42 41; 528 34 102 105 42;
531 36 35 43 44; 532 35 37 45 43; 533 37 38 46 45; 534 38 39 47 46;
535 39 40 48 47; 536 40 41 49 48; 537 41 42 50 49; 538 42 105 108 50;
541 44 43 51 52; 542 43 45 53 51; 543 45 46 54 53; 544 46 47 55 54;
545 47 48 56 55; 546 48 49 57 56; 547 49 50 58 57; 548 50 108 111 58;
551 52 51 59 60; 552 51 53 61 59; 553 53 54 62 61; 554 54 55 63 62;
555 55 56 64 63; 556 56 57 65 64; 557 57 58 66 65; 558 58 111 114 66;
561 60 59 67 68; 562 59 61 69 67; 563 61 62 70 69; 564 62 63 71 70;
565 63 64 72 71; 566 64 65 73 72; 567 65 66 74 73; 568 66 114 117 74;
571 68 67 75 76; 572 67 69 77 75; 573 69 70 78 77; 574 70 71 79 78;
575 71 72 80 79; 576 72 73 81 80; 577 73 74 82 81; 578 74 117 120 82;
581 76 75 83 84; 582 75 77 85 83; 583 77 78 86 85; 584 78 79 87 86;
585 79 80 88 87; 586 80 81 89 88; 587 81 82 90 89; 588 82 120 123 90;
591 84 83 91 2; 592 83 85 92 91; 593 85 86 93 92; 594 86 87 94 93;
595 87 88 95 94; 596 88 89 96 95; 597 89 90 6 96; 598 90 123 126 6;
601 2 91 128 129; 602 96 6 135 134; 603 6 126 206 135; 605 129 128 136
137;
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
```

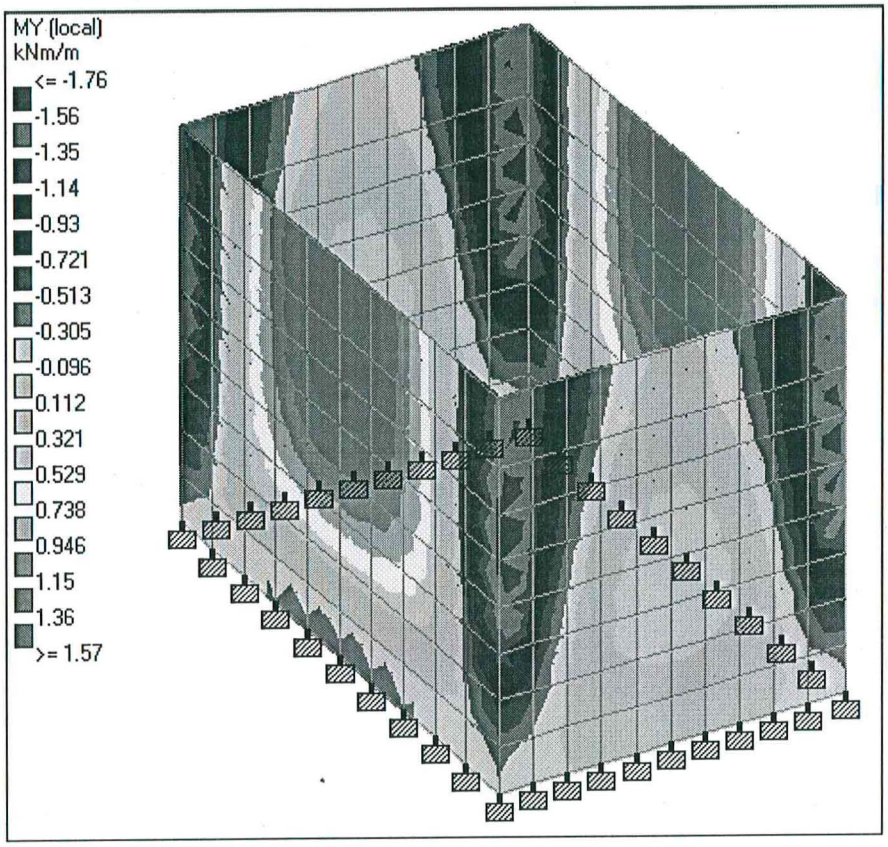
```
1 TO 4 15 28 36 44 52 60 68 76 84 129 137 145 153 161 169 177 185 193 236
-244 252 260 268 276 284 292 300 343 351 359 367 375 383 391 399 407
FIXED
ELEMENT PROPERTY
501 TO 508 511 TO 518 521 TO 528 531 TO 538 541 TO 548 551 TO 558 561 TO
568 -571 TO 578 581 TO 588 591 TO 598 601 TO 603 605 TO 612 615 TO 622 -
625 TO 632 635 TO 642 645 TO 652 655 TO 662 665 TO 672 675 TO 682 -
685 TO 692 695 TO 699 701 TO 705 707 TO 709 711 TO 718 721 TO 728 -
731 TO 738 741 TO 748 751 TO 758 761 TO 768 771 TO 778 781 TO 788 -
791 TO 793 795 TO 799 801 TO 805 807 TO 809 811 TO 818 821 TO 828 -
831 TO 838 841 TO 848 851 TO 858 861 TO 868 871 TO 878 881 TO 888 -
891 TO 898 THICKNESS 0.2
LOAD 1 WATER
SELFWEIGHT Y -1
ELEMENT LOAD
501 511 521 531 541 551 561 571 581 591 601 605 615 625 635 645 655 665
675 -685 707 711 721 731 741 751 761 771 781 791 807 811 821 831 841 851
861 871 -881 891 TRAP X 19.5 17.2
502 512 522 532 542 552 562 572 582 592 606 616 626 636 646 656 666 676
686 -695 701 712 722 732 742 752 762 772 782 795 801 812 822 832 842 852
862 872 -882 892 TRAP X 17.2 14.9
503 513 523 533 543 553 563 573 583 593 607 617 627 637 647 657 667 677
687 -696 702 713 723 733 743 753 763 773 783 796 802 813 823 833 843 853
863 873 -883 893 TRAP X 14.9 12.6
504 514 524 534 544 554 564 574 584 594 608 618 628 638 648 658 668 678
688 -697 703 714 724 734 744 754 764 774 784 797 803 814 824 834 844 854
864 874 -884 894 TRAP X 12.6 10.3
505 515 525 535 545 555 565 575 585 595 609 619 629 639 649 659 669 679
689 -698 704 715 725 735 745 755 765 775 785 798 804 815 825 835 845 855
865 875 -885 895 TRAP X 10.3 8
506 516 526 536 546 556 566 576 586 596 610 620 630 640 650 660 670 680
690 -699 705 716 726 736 746 756 766 776 786 799 805 816 826 836 846 856
866 876 -886 896 TRAP X 8 5.7
507 517 527 537 547 557 567 577 587 597 602 611 621 631 641 651 661 671
681 -691 708 717 727 737 747 757 767 777 787 792 808 817 827 837 847 857
867 877 -887 897 TRAP X 5.7 3.5
508 518 528 538 548 558 568 578 588 598 603 612 622 632 642 652 662 672
682 -692 709 718 728 738 748 758 768 778 788 793 809 818 828 838 848 858
868 878 -888 898 TRAP X 3.5 0
PERFORM ANALYSIS
FINISH
```

C> STAAD DIAGRAM



D> MOMENT


MX (local)
kNm/m
<= -2.99
-2.73
-2.48
-2.23
-1.98
-1.73
-1.48
-1.23
-0.979
-0.728
-0.477
-0.227
0.024
0.275
0.526
0.777
>= 1.03


MY (local)
kNm/m
<= -1.76
-1.56
-1.35
-1.14
-0.93
-0.721
-0.513
-0.305
-0.096
0.112
0.321
0.529
0.738
0.946
1.15
1.36
>= 1.57

Sample calculation is furnished for crack width calculation for max. moment

Calculation for Coefficient of Uncrack condition					
Central RCC wall					
Inside Face					
	notation		Unit		
DATA					Steel provided
Bending moment	Bm	5	kn-m		dia spc
Concrete grade	fck	30	N/mm2		10 200
Area of steel provised	Ast	393	mm2		0 1
Depth provided	Dp	200			0 1
Width	B	1000			
Clear Cover	Cv	50	mm		
maximum bar dia	dbar	16			
Calculation					equation
Modular ratio	md	9.33			For concrete grade M25
Per.str.in direct Tension	Pst	15	kg/cm2		For concrete grade M25
Per.str.tension due to bending	Pstb	20	kg/cm2		For concrete grade M25
steel	PT	0.0020			=Ast/Dp/B
Effective depth	Def	142	mm		
Constants	ka	0.71			=Def/Dp
	kb	1.02			=1+2*PT*ka*(md-1)
	kc	2.03			=2+2*PT*(md-1)
Depth of neutral axis - N	n	0.5034			=kb/kc
Depth of neutral axis	nd	100.6759			=n*Dp
Check for Mu/bd2					
	kd	0.0007			=(ka-n)^2*(md-1)*PT
	ke	0.0833			=1/3-n*(1-n)
	kf	0.0840			=kd+ke
m/bd2	Unc	3.3846			=Pstb/(1-n)*kf
Depth reuired	Dr	121.5	mm		=(Bm*100/Unc)^0.5*10
Ast required		270	mm2		

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

E> WALL FOUNDATION

WALL FOOTING DESIGN							
PROJECT : 30MLD WTP AT ASIFABAD				JOB : L16_02			
UNIT : NEUTRALIZATION TANK							
WALL TYPE 1				W1			
BASIC DATA							
Density of water	denwt	**10**	kN/m3		fyuc	130	N/mm2
Density of soil	denso	**18**	kN/m3		fyucb	130	N/mm2
Density of concrete	decon	**25**	kN/m3		fckbc	10.0	N/mm2
Angle of Repose	Phi	**30**	degree		fckt	1.5	N/mm2
Safe bearing capacity of soil	Sbc	**150.0**	kN/m2	modular ratio	m	9.33	
Concrete grade	Fck	**30**	N/mm2		K	0.433	
Steel grade	Fy	**415**	N/mm2		j	0.861	
Depth below GI	Dbg	**1.00**	m				
Water depth	wtd	**1.50**	m				
free board	fb	**0.45**	m				
Wall above Ground		**0.95**	m				
Clear cover	Cv	**50**	mm				
Maximum size of bar dia	Db	**12**	mm				
Water depth with free board	Wd	**1.95**	m				
minimum % steel	pt	**0.24**	%				
Moment							
Due to Water	Mtw	**5.00**	kN-m	(From Analysis Result)			
Due to soil if any	Mts	**0.00**	kN-m				
Wt from top dome/slab/column/wall	Slabwt	**1.00**	kN-m				
Wall geometry (Figure 1)							
Straight portion	lb	**1.950**	m				
Tapered portion	lc	**0.000**	m				
	tb	**0.200**	m				
	td	**0.200**	m				
Footing geometry							
Toe projection	ht	**0.300**	m				
Heel straight projection	hh1	**0.750**	m				
Heel tapered projection	hh2	**0.000**	m				
Heel portion for soil stability	hh3	**0.450**	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				
Thickness at heel (freel face)	thb	**0.200**	m				
Total Height of Wall	Tlw	1.950	m				

Total length of wall footing		wf	1.250	m

CASE 1 : TANK FULL CONDITION WITH NO SOIL OUTSIDE

Total load & Moment calculation
Taking moment @ toe

Component		Wt kN W	Lever Arm m Dist	Moment kN-m W * dist
Wall Straight portion	W1	9.75	0.40	3.90
Wall Tapered portion	W2	0.00	0.30	0.00
Walkway/slab	P	1.00	0.40	0.40
Footing				
Footing : toe	W3	1.50	0.15	0.23
Footing center	W4	1.00	0.40	0.40
Footing : heel (straight)	W5	3.75	0.88	3.28
Footing : heel (tapered)	W6	0.00	1.25	0.00
Water	W7	14.63	0.88	12.80
Total downward load		31.63		21.00

Total restoring moment @ toe	TRM	21.0	kN-m
Total over turning moment		5.0	kN-m
F.S.against over turning		4.2	
Check for over turning	Hense o.k		
Total moment due to vertical load	Tmv	21.0	kN-m
Total moment due to horizontal load	Tmh	5.0	kN-m
Total vertical load	TPv	31.6	kn
Net Moment	Tmn	16.0	kN-m
M/p	E	0.51	m
Ecc	Ecc	0.119	m
b/6	Aec	0.21	m
Net moment From ECC	Mdg	3.762	5

Property of footing

Width of footing		1.00	m
Depth of footing		1.25	m
Footing Area	Fare	1.25	m2
Modulus of section	Fz	0.26	m3

Pressure distribution				
Pressure due to direct load =P/A	pre a	25.30	kN/m2	
Pressure due to moment =M/Z	Pre b	14.45	kN/m2	
Pressure				
Maximum pressure - P/A + M/Z	Pm ax	39.75	kN/m2	
Minimum pressure - P/A + M/Z	Pmi n	10.85	kN/m2	
Check for SBC				
Maximum pressure < SBC		OK		
Minimum presure > 0		OK		
Pressure difference		28.896		
Pressure difference / m		23.117		
Pressure at outer Wall face - A	preo w	32.81		kN/ m2
Pressure at inner Wall face B	preiw	28.19		kN/ m2
Pressure at point C	preiw 1	10.85		kN/ m2

Design of Toe - At Point A

Moment at face of outer wall			
Due to rectangle diagram	Mreco	1.48	kN-m
	Mtrio	0.21	kN-m
Total moment due to upward pressure		1.68	kN-m
Net moment at A from Toe side	Toem	1.68	kN-m
Thickness at toe		200	mm
Effective depth	Defto e	144	mm
Ast required =		105	mm2
Check for minimum steel			
top		240	mm2
bottom		0	mm2
Design Steel			
Main steel - Top		240	mm2
Main steel - bottom		105	mm2
Distribution steel - top		240	mm2
Distribution steel - bottom		0	mm2

Design of heel : At point B & C

Design at point B			
Due to rectangle diagram (upward)	Mreci	3.1	kN-m
	Mtrii	1.6	kN-m
Total Upward moment		4.7	kN-m
Due to water (down ward)		5.5	kN-m
Net downward moment at B from heel side	heel m	0.8	kN-m

Thickness Provided		200	mm
	defhe el	144	mm
Ast required =		50	mm2
Check for minimum steel - straight portion			
top		240	mm2
bottom		0	mm2
Design Steel			
Main steel - Top		240	mm2
Main steel - bottom		0	mm2
Distribution steel - top		240	mm2
Distribution steel -bottom		0	mm2
Design at point C			
Due to rectangle diagram (upward)	Mreci	0.00	kN-m
	Mtrii	0.00	kN-m
Total Upward moment		0.00	kN-m
Due to water (down ward)		0.00	kN-m
	heel		
Net downward moment at B from heel side	m	0.00	kN-m
Thickness Provided		200	mm
	defhe el	144	mm
Ast required =		0	mm2
Check for minimum steel - tapered portion			
Avrage thickness	thav	0.20	m
top		240	mm2
bottom		0	mm2
Design Steel			
Main steel - Top		240	mm2
Main steel - bottom		0	mm2
Distribution steel - top		240	mm2
Distribution steel -bottom		0	mm2

SUMMARY

Pressure Check

1>	P/A + M/Z	39.75	<	150	OK
2>	P/A - M/Z	10.85	>	0	OK

Reinforcement

	AstR						Astp	
Toe		dia	spc	+	dia	spc		
Top - main	240	10	200		0	0	393	OK
Bottom main	105	10	200		0	0	393	OK
Top - Dist	240	10	200		0	0	393	OK
Bottom - Dist	0	10	200		0	0	393	OK
Heel Straight portion								
Top - main	240	10	200		0	0	393	OK
Bottom main	0	10	200		0	0	393	OK
Top - Dist	240	10	200		0	0	393	OK
Bottom - Dist	0	10	200		0	0	393	OK
Heel tapered portion								
Top - main	240	10	200		0	0	393	OK
Bottom main	0	10	200		0	0	393	OK
Top - Dist	240	10	200		0	0	393	OK
Bottom - Dist	0	10	200		0	0	393	OK

ANNEXURE-1

Isolated Footing Design (IS 456-2000)

Design For Isolated Sloped Footing 13

Design For Isolated Sloped Footing 14

Design For Isolated Sloped Footing 15

Design For Isolated Sloped Footing 16

Design For Isolated Sloped Footing 18

Design For Isolated Sloped Footing 19

Design For Isolated Sloped Footing 20

Design For Isolated Sloped Footing 21

Footing No.	Group ID	Foundation Geometry			
-	-	Length	Width	Thickness	Slope End Thickness
13	1	1.500m	1.650m	0.450m	0.150m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
13	Ø10 @ 135 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 135 mm c/c	N/A	N/A

Footing No.	Group ID	Foundation Geometry			
-	-	Length	Width	Thickness	Slope End Thickness
14	2	1.500m	1.650m	0.450m	0.150m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
14	Ø10 @ 135 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 135 mm c/c	N/A	N/A

Footing No.	Group ID	Foundation Geometry			
-	-	Length	Width	Thickness	Slope End Thickness
15	3	1.500m	1.650m	0.450m	0.150m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
15	Ø10 @ 135 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 135 mm c/c	N/A	N/A

Footing No.	Group ID	Foundation Geometry			
-	-	Length	Width	Thickness	Slope End Thickness
16	4	1.500m	1.650m	0.450m	0.150m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
16	Ø10 @ 135 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 135 mm c/c	N/A	N/A

Footing No.	Group ID	Foundation Geometry			
-	-	Length	Width	Thickness	Slope End Thickness
18	5	1.500m	1.650m	0.450m	0.150m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
18	Ø10 @ 135 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 135 mm c/c	N/A	N/A

Footing No.	Group ID	Foundation Geometry			
-	-	Length	Width	Thickness	Slope End Thickness
19	6	1.500m	1.650m	0.450m	0.150m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
19	Ø10 @ 135 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 135 mm c/c	N/A	N/A

Footing No.	Group ID	Foundation Geometry			
-	-	Length	Width	Thickness	Slope End Thickness
20	7	1.500m	1.650m	0.450m	0.150m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
20	Ø10 @ 135 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 135 mm c/c	N/A	N/A

Footing No.	Group ID	Foundation Geometry			
-	-	Length	Width	Thickness	Slope End Thickness
21	8	1.500m	1.650m	0.450m	0.150m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
21	Ø10 @ 135 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 135 mm c/c	N/A	N/A

Isolated Footing Design (IS 456-2000)

Design For Isolated Sloped Footing 17

Design For Isolated Sloped Footing 22

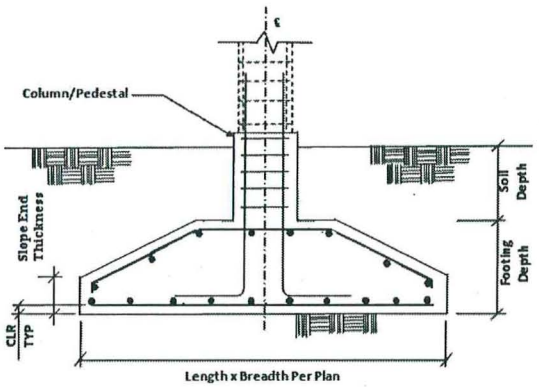
Footing No.	Group ID	Foundation Geometry			
-	-	Length	Width	Thickness	Slope End Thickness
17	1	2.000m	2.150m	0.450m	0.150m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
17	Ø10 @ 110 mm c/c	Ø10 @ 145 mm c/c	Ø10 @ 145 mm c/c	Ø10 @ 145 mm c/c	N/A	N/A

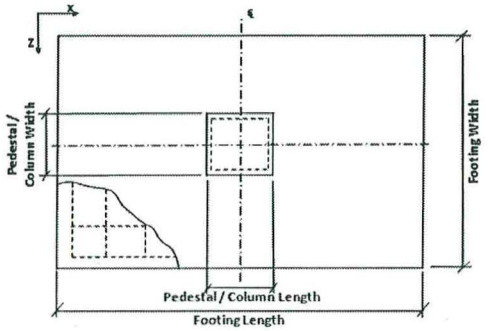
Footing No.	Group ID	Foundation Geometry			
-	-	Length	Width	Thickness	Slope End Thickness
22	2	2.000m	2.150m	0.450m	0.150m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
22	Ø10 @ 110 mm c/c	Ø10 @ 145 mm c/c	Ø10 @ 145 mm c/c	Ø10 @ 145 mm c/c	N/A	N/A

Isolated Footing 17



ELEVATION



PLAN

Input Values

Footing Geomtery

Design Type : Set Dimension
Footing Thickness (Ft) : 450.000mm
Slope End Thickness (St) :
Footing Length - X (Fl) : 2000.000mm
Footing Width - Z (Fw) : 2150.000mm
Eccentricity along X (Oxd) : 0.000mm
Eccentricity along Z (Ozd) : 0.000mm

Column Dimensions

Column Shape : Rectangular

Isolated Footing Design (IS 456-2000)

Design For Isolated Sloped Footing 23

Design For Isolated Sloped Footing 24

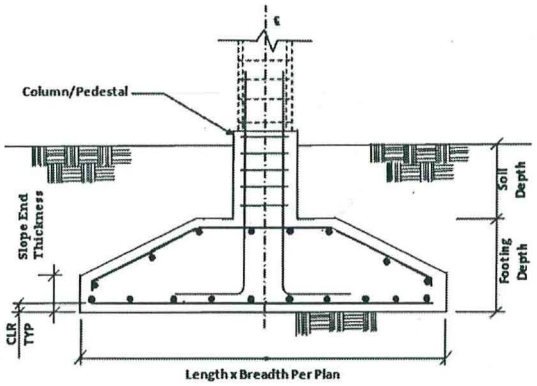
Footing No.	Group ID	Foundation Geometry			
-	-	Length	Width	Thickness	Slope End Thickness
23	1	1.800m	1.950m	0.450m	0.150m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
23	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	N/A	N/A

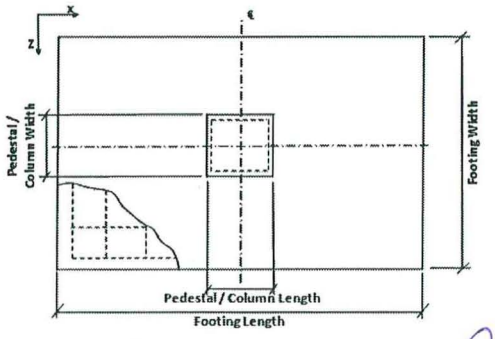
Footing No.	Group ID	Foundation Geometry			
-	-	Length	Width	Thickness	Slope End Thickness
24	2	1.800m	1.950m	0.450m	0.150m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
24	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	Ø10 @ 140 mm c/c	N/A	N/A

Isolated Footing 23



ELEVATION



PLAN

APPROVED
15/30/4/16
SE, NIRMAL

Asst. Executive Engineer
TDWSP Asifabad

Dy. Executive Engineer
TDWSP Asifabad

Executive Engineer
TDWSP Asifabad

Input Values

Footing Geomtery

Design Type : Set Dimension
Footing Thickness (Ft) : 450.000mm
Slope End Thickness (St) :
Footing Length - X (Fl) : 1800.000mm
Footing Width - Z (Fw) : 1950.000mm
Eccentricity along X (Oxd) : 0.000mm
Eccentricity along Z (Ozd) : 0.000mm

Column Dimensions

Column Shape : Rectangular

"Designs Vetted"
M/s. S.K. ASSOCIATES
Hyd-08.

WAPCOS LIMITED Hyderabad

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

COLUMN SCHEDULE

COLUMN NO		C1	C2	C3
COL. SIZE	UP TO +286.725 LVL	300x450	300x450	
COL. STEEL		4–20ϕ+6–16ϕ	10–20ϕ	
CONC. MIX		M 30	M 30	
COL. SIZE	UP TO +285.225 LVL	300x450	300x450	300x450
COL. STEEL		4–20ϕ+6–16ϕ	10–20ϕ	4–25ϕ+6–20ϕ
CONC. MIX		M 30	M 30	M 30
COL. SIZE	UP TO PLINTH	300x450	300x450	300x450
COL. STEEL		4–20ϕ+6–16ϕ	10–20ϕ	4–25ϕ+6–20ϕ
CONC. MIX		M 30	M 30	M 30

FOOTING SCHEDULE

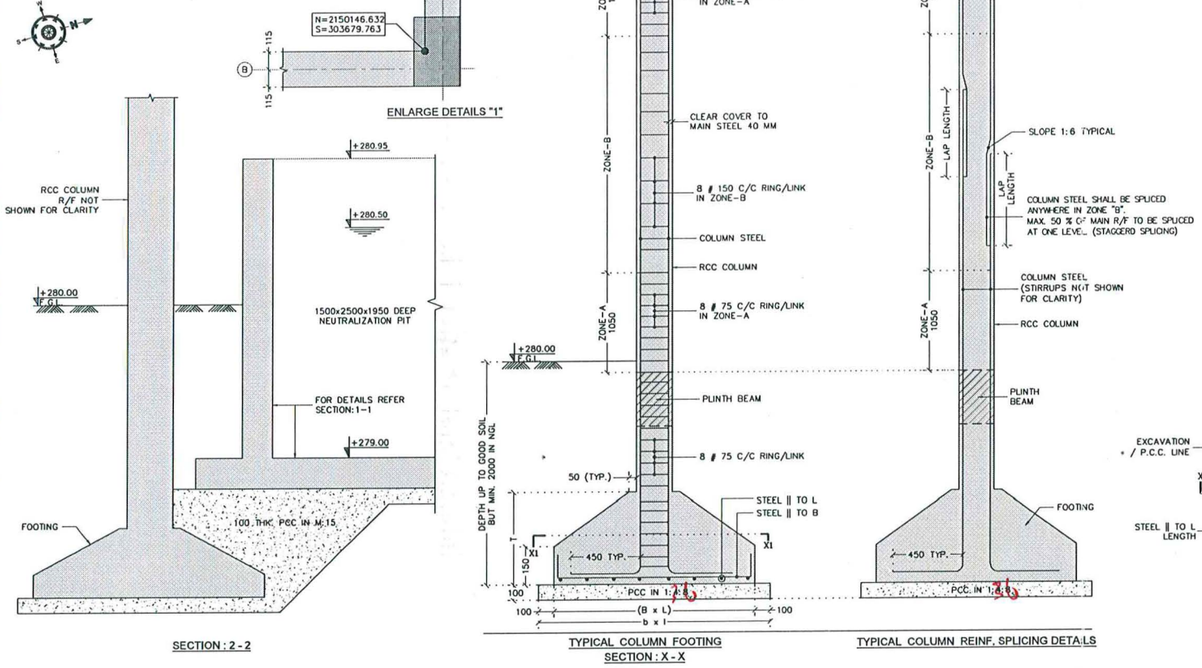
FOOTING NO		F1	F2	F3
PCC (bxl)	FOOTING	1700x1850	2200x2350	2000x2150
FOOTING(BxL)		1500x1650	2000x2150	1800x1950
TOTAL THK. (T)		450	450	450
STEEL // B		10 ϕ 125 c/c	10 ϕ 125 c/c	10 ϕ 125 c/c
STEEL // L		10 ϕ 125 c/c	10 ϕ 125 c/c	10 ϕ 125 c/c
CONC. MIX		M 30	M 30	M 30

HOOK DETAILS FOR COLUMN RING

COLUMN C1 & C3 FOR 10 BARS

COLUMN C2 FOR 10 BARS

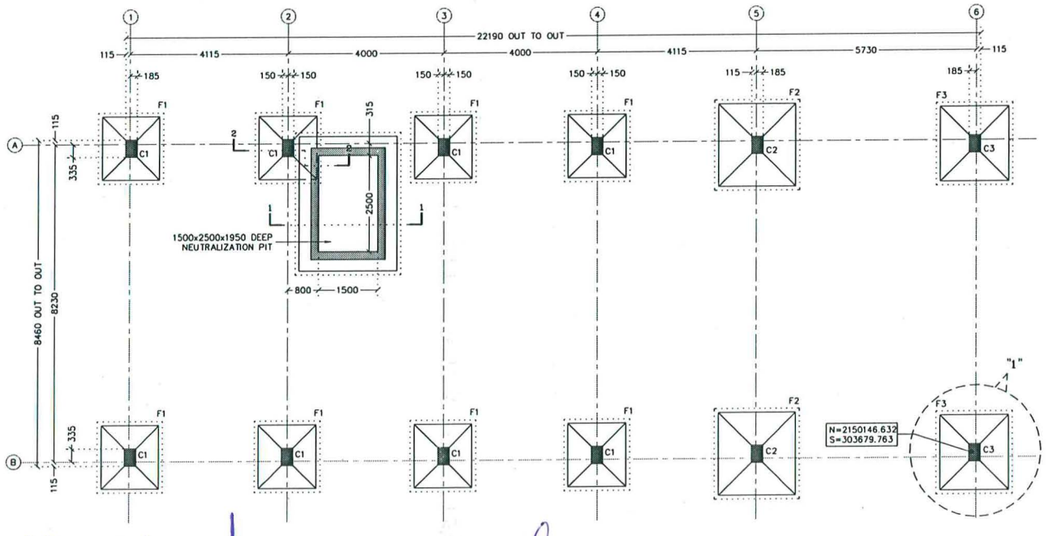
● HIGHER DIA BARS
○ LOWER DIA BARS



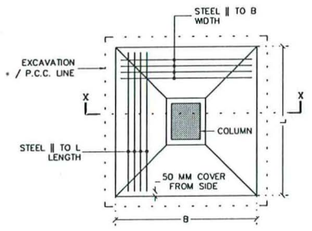
SECTION : 2 - 2

TYPICAL COLUMN FOOTING SECTION : X - X

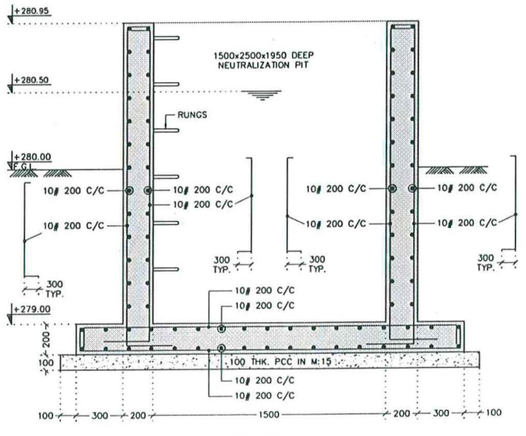
TYPICAL COLUMN REINF. SPLICING DETAILS



FOUNDATION PLAN



TYPICAL COLUMN FOOTING DETAIL PLAN : X1 - X1



SECTION : 1 - 1

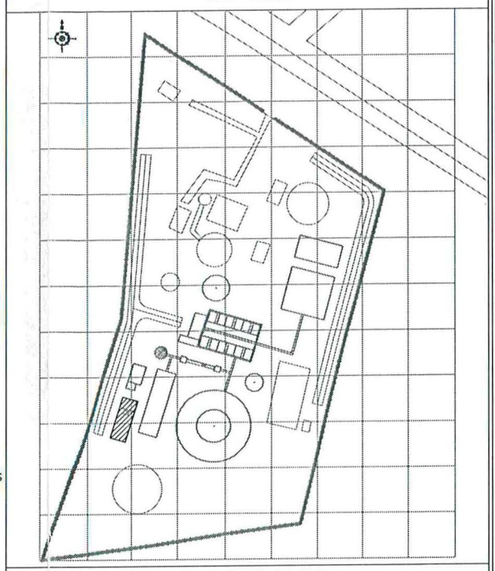
NOTES :-

1 MATERIALS, WORKMANSHIP, INSPECTION AND TESTING AS PER IS 456–2000 & IS 3370–2009.
2 ALL DIMENSION ARE IN MM AND LEVELS ARE IN METER
3 ALL CONCRETE MIX M:30
4 ALL CONCRETE SHALL BE MACHINE MIXED AND MACHINE VIBRATED
5 ϕ – INDICATE HYSD BAR FE–415 GRADE COMFORMING TO I.S 1786–LATEST REVISION
6 CLEAR COVER TO
- (a) SLAB (ROOF & FLOOR, CANOPIES, CHAJJAS, WAIST 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

7 LAP LENGTH SHALL BE 40 TIMES BAR DIA FOR BEAM & SLAB BARS
8 PROVIDE SPACER BAR FOR KEEPING THE SECOND LAYER STEEL OF BEAM IN PROPER POSITION
9 STEEL CHAIRS SHALL BE PROVIDE TO KEPT TOP REINFORCEMENT OF SLAB IN PROPER POSITION
10 ALL BRICK WORK SHALL BE DONE IN 1:4 CEMENT MORTAR
11 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
12 FOUNDATION SHOULD BE IN–SITU SOIL AND IT SHOULD NOT BE ON FILLING MATERIAL i.e. MADE UP SOIL
13 BACK FILLING SHALL BE DONE IN WELL COMPACTED AND WELL WATER LAYER NOT EXCEEDING 300mm IN DEPTH
14 POURING SHALL BE DONE AS PER INSTRUCTION OF ENGINEER INCHARGE.
15 WATER STOPPERS SHALL BE PROVIDED AT CONSTRUCTION JOINTS IN WALL AND BOTTOM SLAB.
16 S.B.C. OF SOIL 20 T/M2 AS PER SOIL REPORT PREPARED BY DR. D. BABU RAO, CONSULTING GEO TECHNICAL ENGINEER
17 READ THIS DRAWING ALONG WITH SHEET NO: 2 OF 4 TO 4 OF 4.

"Drawings Vetted"
M/s. S.K. ASSOCIATES
Hyd-08.

KEY PLAN



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 CHLORINE TONNER ROOM	LE150883–P–WS–WT–GA–2011

LEGEND

F.G.L.	FINISHED GROUND LEVEL	H.P	HIGH POINT
T.C.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	GALVANAISAD IRON

APPROVED
30/4/16
SE, NIRMAL

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

WAPCOS LIMITED Hyderabad

REV. No	DESCRIPTION	DATE	DESIGNED	DRAWN	CHECKED	APPROVED
A	FOR APPROVAL	22/04/16	VBM	PMD	RMM	–

REVISIONS

L&T Construction
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

	NAME	SIGN	DATE
DSGN	VBM		22–04–16
DRWN	PMD		22–04–16
CHKD	RMM		22–04–16
APPD	--		22–04–16

TITLE : STRUCTURAL DRG. FOR CHLORINE TONNER ROOM (FOUNDATION PLAN)

SCALE 1:100,25
PROJECTION

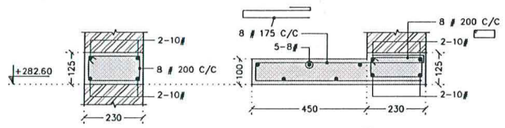
DRAWING No. LE150883–C–WS–WT–RC–1064 | SIZE A2 | REV. A
COMP. DATA : L16–02_06–01–01 | SHEET 1 OF 4

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

Asst. Executive Engineer
TDWSP Asifabad

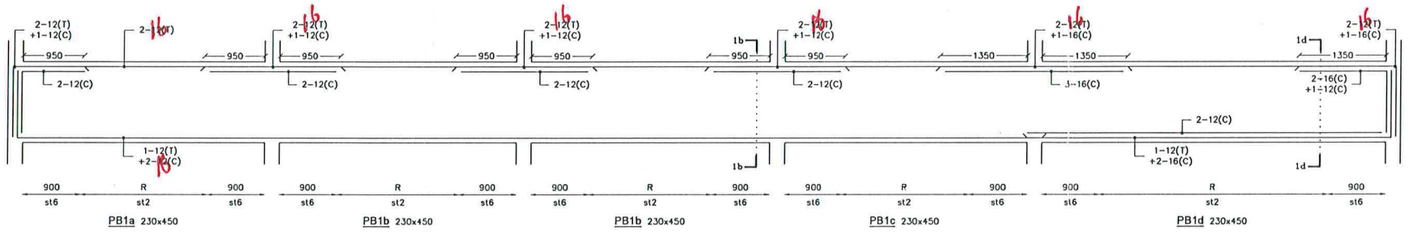
Dy. Executive Engineer
TDWSP Asifabad

Executive Engineer
TDWSP Asifabad

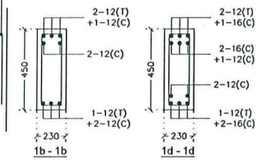


FOR 230 THK. WALL
THROUGH LINTEL DETAILS

L1

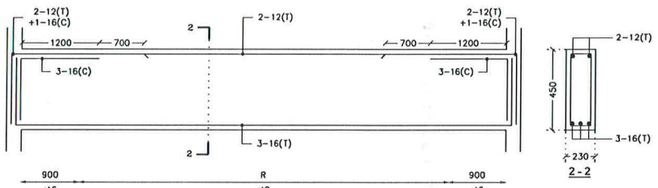


PB1a 230x450 PB1b 230x450 PB1b 230x450 PB1c 230x450 PB1d 230x450



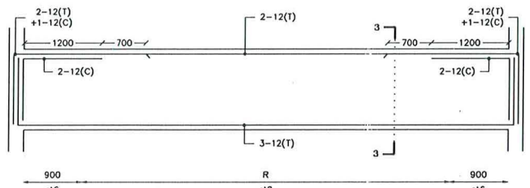
1b - 1b

1d - 1d

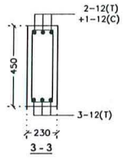


PB2 230x450

2 - 2



PB3 230x450



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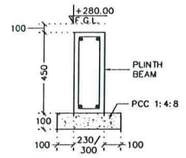
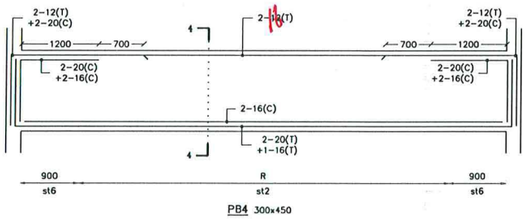
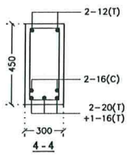


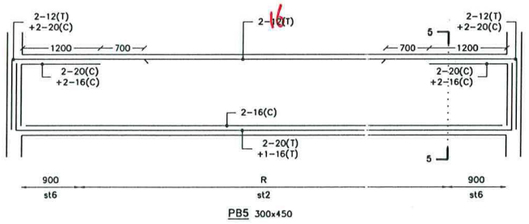
TYPICAL SECTION FOR PLINTH BEAM



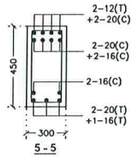
PB4 300x450



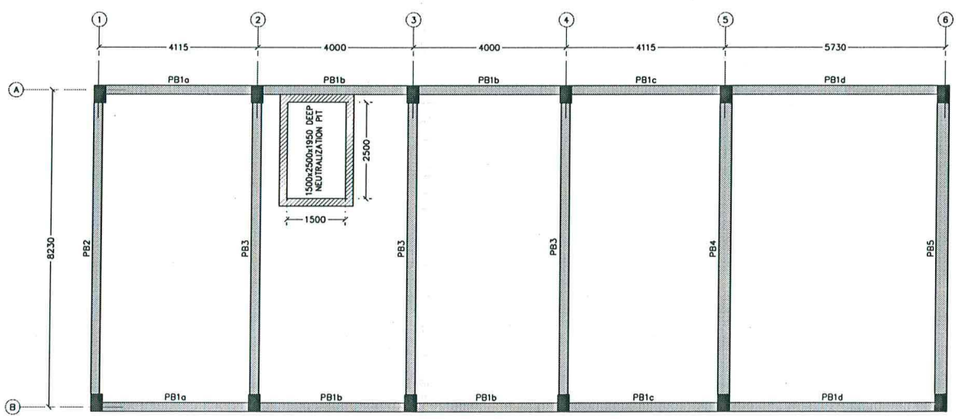
4 - 4



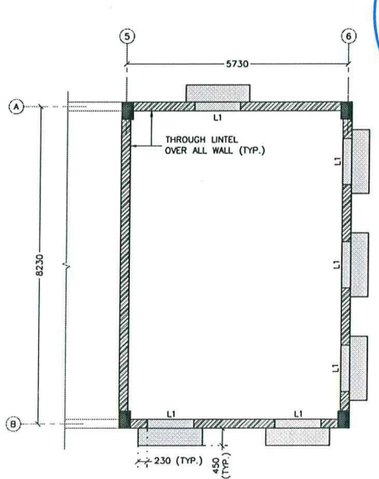
PB5 300x450



5 - 5



STRUCTURAL LAYOUT AT PLINTH LEVEL



STRUCTURAL LAYOUT AT LINTEL LEVEL

"Drawings Vetted"
M/S. S.K. ASSOCIATES
Hyd-08.

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

वाप्कोस लिमिटेड हैदराबाद Hyderabad WAPCOS LIMITED

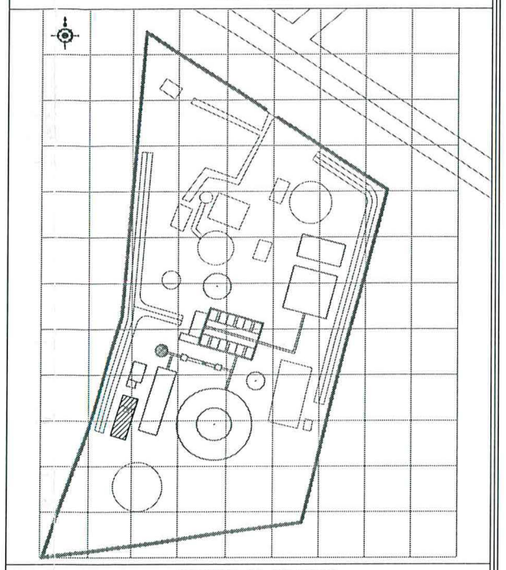
APPROVED
Dt 30/4/16
SE, NIRMAL

Asst. Executive Engineer
TDWSP Asifabad

Dy. Executive Engineer
TDWSP Asifabad

Executive Engineer
TDWSP Asifabad

KEY PLAN



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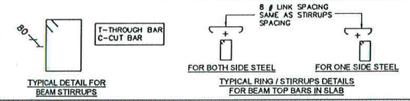
G. A. DRAWING OF CHLORINE TONNER ROOM	LE150883-P-WS-WT-GA-2011

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	GALVANAISAD IRON



TYPICAL DETAIL FOR BEAM STIRRUPS

TYPICAL RING / STIRRUPS DETAILS FOR BEAM TOP BARS IN SLAB

STIRRUPS SCHEDULE
(2 Legged STIRRUPS UNLESS OTHERWISE SPECIFIED)

TYPE	DESCRIPTION	TYPE	DESCRIPTION	TYPE	DESCRIPTION
st1	8 ϕ 225 C/C	st2	8 ϕ 200 C/C	st3	8 ϕ 175 C/C
st4	8 ϕ 150 C/C	st5	8 ϕ 125 C/C	st6	8 ϕ 100 C/C
st7	10 ϕ 150 C/C	st8	10 ϕ 125 C/C	st9	10 ϕ 100 C/C
st10	12 ϕ 125 C/C	st11	12 ϕ 100 C/C	st12	12 ϕ 75 C/C

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

REV. No	DESCRIPTION	DATE	DESIGNED	DRAWN	CHECKED	APPROVED
A	FOR APPROVAL	22/04/16	VBM	PMD	RMM	–

REVISIONS

L&T Construction
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

	NAME	SIGN	DATE
DSGN	VBM		22-04-16
DRWN	PMD		22-04-16
CHKD	RMM		22-04-16
APPD	–		22-04-16

TITLE : STRUCTURAL DRG. FOR CHLORINE TONNER ROOM (STRUCTURAL LAYOUT & DETAILS AT PLINTH LEVEL)

SCALE 1:100,60,15

PROJECTION

DRAWING No. LE150883-C-WS-WT-RC-1064

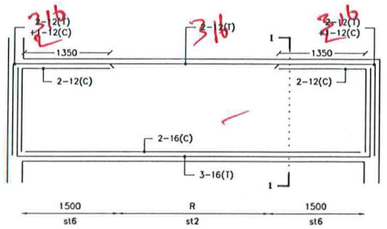
COMP. DATA : L16-02_06-01-02

SHEET 2 OF 4

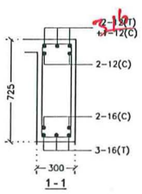
SIZE A2

REV. A

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



B1 300x725



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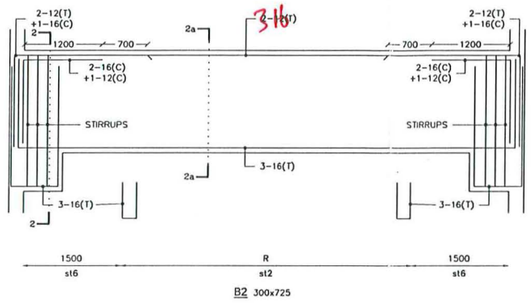
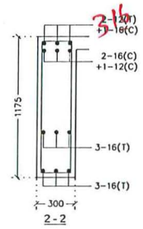


B2 300x725



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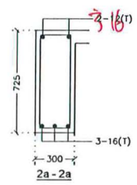
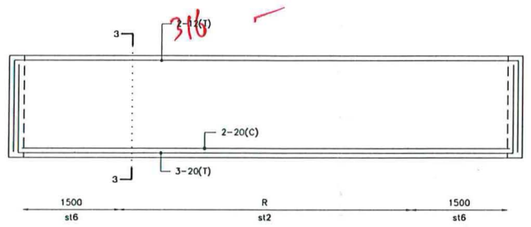
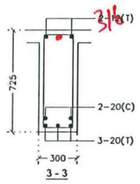


2a - 2a



B3 300x725



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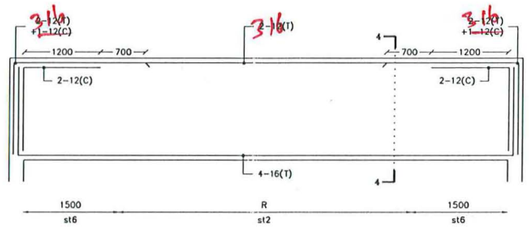
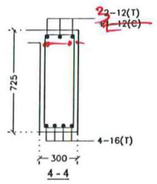
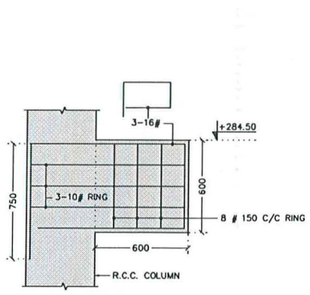


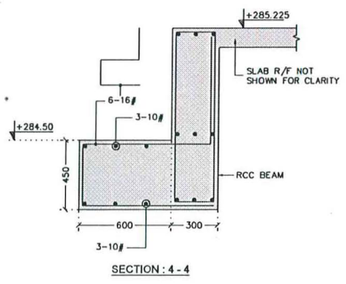
B4 300x725



4 - 4



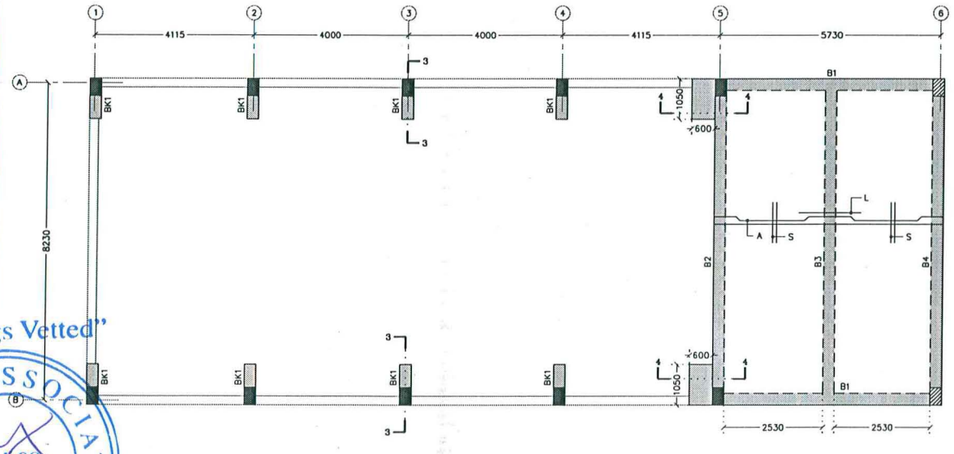
SECTION : 3 - 3
(BK1 : 300X600)



SECTION : 4 - 4

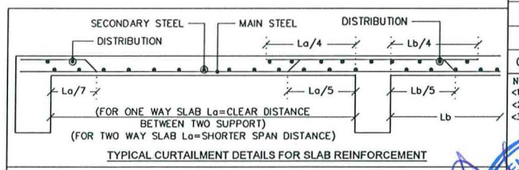
RAINFORCEMENT DETAIL

* BRACKET TOP SHALL BE VERIFIED WITH GANTRY SUPPLIER BEFORE EXECUTION

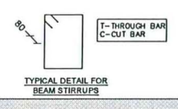


STRUCTURAL LAYOUT AT GANTRY +284.50 LEVEL & +285.225 TERRACE LEVEL

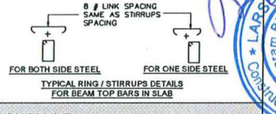
ALL SLAB ARE 125 THK. UNLESS OTHERWISE SPECIFIED.



TYPICAL CURTAILMENT DETAILS FOR SLAB REINFORCEMENT



TYPICAL DETAIL FOR BEAM STIRRUPS



TYPICAL RING / STIRRUPS DETAILS FOR BEAM TOP BARS IN SLAB

SLAB SCHEDULE

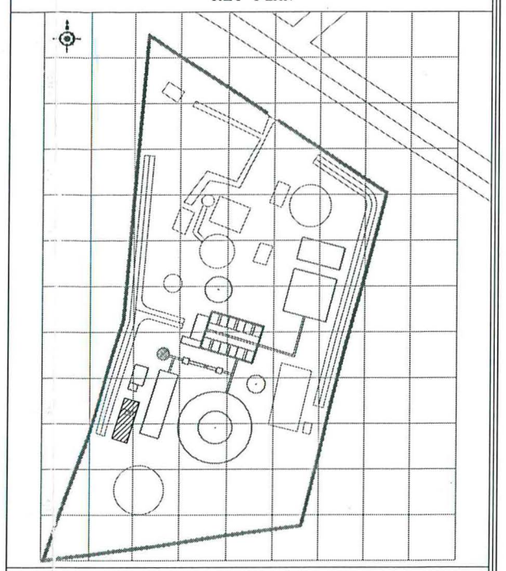
THIS IS TYPICAL SLAB SCHEDULE SOME CATEGORY OF THE BAR MAY NOT BE USED IN THIS DRAWING.

TYPE	DESCRIPTION	TYPE	DESCRIPTION	TYPE	DESCRIPTION
ALTERNATE BENT UP BAR					
A	8 # 200 C/C	B	8 # 175 C/C	C	8 # 150 C/C
D	8 # 125 C/C	E	8 # 100 C/C	F	10 # 125 C/C
G	10 # 100 C/C	J	12 # 125 C/C	K	12 # 100 C/C
EXTRA AT TOP BET'N TWO BENT UP BAR					
L	1-8 #	M	1-10 #	N	1-12 #
STRAIGHT AT BOTTOM					
P	8 # 200 C/C	Q	10 # 200 C/C	R	12 # 200 C/C
DISTRIBUTION BAR					
S	8 # 200 C/C	T	8 # 175 C/C	U	8 # 150 C/C
EXTRA AT TOP					
ET1	8 # 200 C/C	ET2	10 # 200 C/C	ET3	12 # 200 C/C
CHIPIYA AT TOP					
CH1	10 # 150 C/C	CH2	10 # 100 C/C	CH3	12 # 200 C/C

STIRRUPS SCHEDULE
(2 Legged STIRRUPS UNLESS OTHERWISE SPECIFIED)

TYPE	DESCRIPTION	TYPE	DESCRIPTION	TYPE	DESCRIPTION
st1	8 # 225 C/C	st2	8 # 200 C/C	st3	8 # 175 C/C
st4	8 # 150 C/C	st5	8 # 125 C/C	st6	8 # 100 C/C
st7	10 # 150 C/C	st8	10 # 125 C/C	st9	10 # 100 C/C
st10	12 # 125 C/C	st11	12 # 100 C/C	st12	12 # 75 C/C

KEY PLAN



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 CHLORINE TONNER ROOM	LE150883-P-WS-WT-GA-2011

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	GALVANAISAD IRON

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

APPROVED
12/04/16
SE, NIRMAL

REV. No	DESCRIPTION	DATE	DESIGNED	DRAWN	CHECKED	APPROVED
A	FOR APPROVAL	25/04/16	VBM	PMD	RMM	–

REVISIONS

L&T Construction
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 CHLORINE TONNER ROOM (STRUCTURAL LAYOUT & DETAILS AT GANTRY +284.50 LEVEL & +285.225 TERRACE LEVEL)
SCALE 1:100,60,25
PROJECTION

	NAME	SIGN	DATE
DSGN	VBM		25-04-16
DRWN	PMD		25-04-16
CHKD	RMM		25-04-16
APPD	-		25-04-16

DRAWING No. LE150883-C-WS-WT-RC-1064
COMP. DATA : L16-02_06-01-03
SHEET 3 OF 4
SIZE A2 REV. A

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

"Drawings Vetted"
M/s. S.K. ASSOCIATES
Hyd-08.

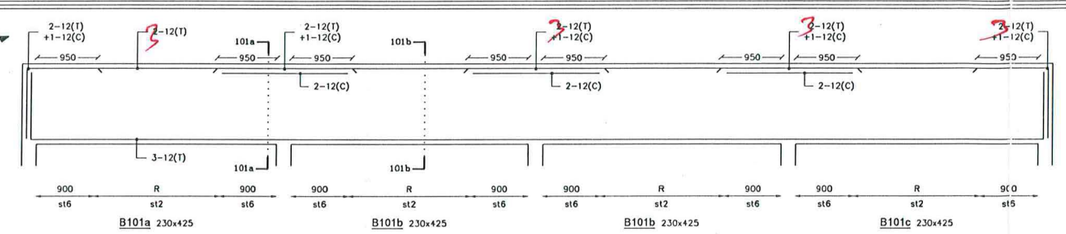
Asst. Executive Engineer
TDWSP Asifabad

Dy. Executive Engineer
TDWSP Asifabad

Executive Engineer
TDWSP Asifabad

L&T Construction - Komaram Bheem - Asifabad Segment - TDWSP - ADILABAD

वाप्कोस लिमिटेड हैदराबाद Hyderabad WAPCOS LIMITED



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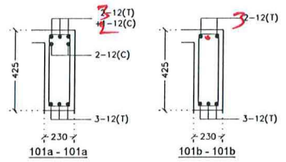
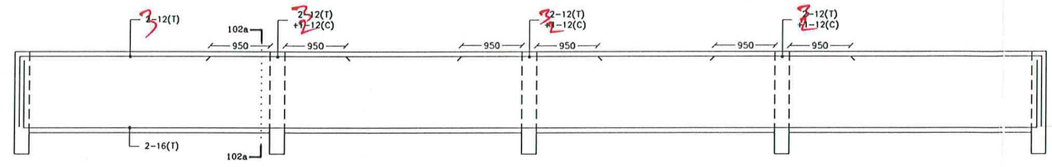


101a - 101a 101b - 101b



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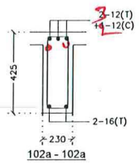
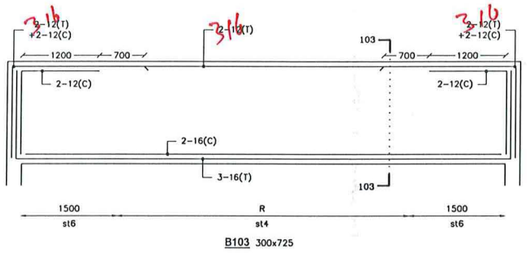


102a - 102a



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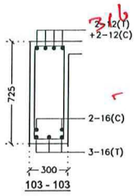

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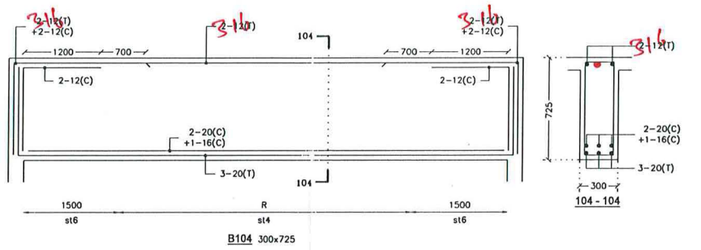

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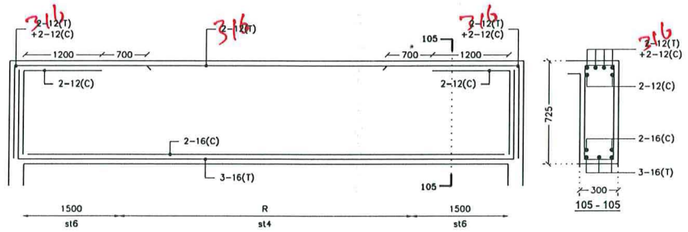

B105 300x725

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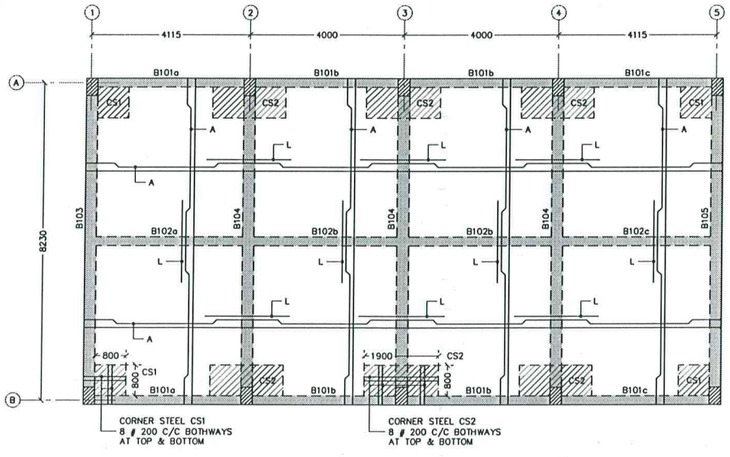
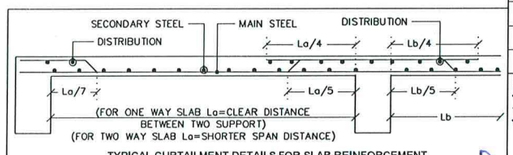
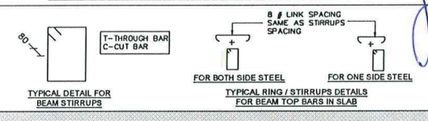


STRUCTURAL LAYOUT AT +286.725 TERRACE LEVEL
ALL SLAB ARE 125 THK. UNLESS OTHERWISE SPECIFIED.



TYPICAL CURTAILMENT DETAILS FOR SLAB REINFORCEMENT



TYPICAL DETAIL FOR BEAM STIRRUPS

TYPICAL RING / STIRRUPS DETAILS FOR BEAM TOP BARS IN SLAB

SLAB SCHEDULE

THIS IS TYPICAL SLAB SCHEDULE SOME CATEGORY OF THE BAR MAY NOT BE USED IN THIS DRAWING.

TYPE	DESCRIPTION	TYPE	DESCRIPTION	TYPE	DESCRIPTION
	ALTERNATE BENT UP BAR				
A	8 # 200 C/C	B	8 # 175 C/C	C	8 # 150 C/C
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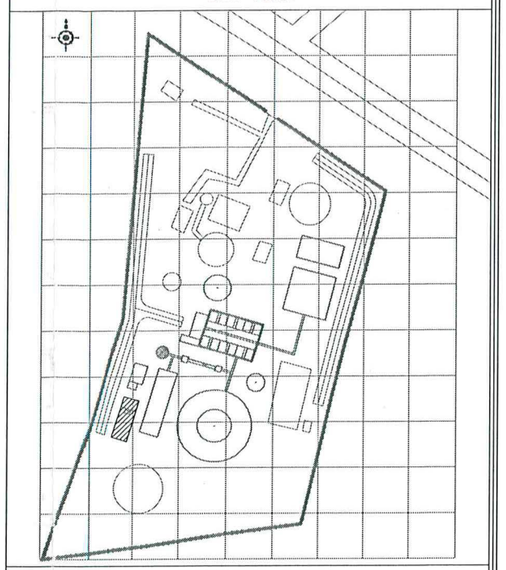
G	10 # 100 C/C	J	12 # 125 C/C	K	12 # 100 C/C
	EXTRA AT TOP BET'N TWO BENT UP BAR				
L	1-8 #	M	1-10 #	N	1-12 #
	STRAIGHT AT BOTTOM				
P	8 # 200 C/C	Q	10 # 200 C/C	R	12 # 200 C/C
	DISTRIBUTION BAR				
S	8 # 200 C/C	T	8 # 175 C/C	U	8 # 150 C/C
	EXTRA AT TOP				
ET1	8 # 200 C/C	ET2	10 # 200 C/C	ET3	12 # 200 C/C
	CHIPIYA AT TOP				
CH1	10 # 150 C/C	CH2	10 # 100 C/C	CH3	12 # 200 C/C

STIRRUPS SCHEDULE
(2 Legged STIRRUPS UNLESS OTHERWISE SPECIFIED)

TYPE	DESCRIPTION	TYPE	DESCRIPTION	TYPE	DESCRIPTION
st1	8 # 225 C/C	st2	8 # 200 C/C	st3	8 # 175 C/C
st4	8 # 150 C/C	st5	8 # 125 C/C	st6	8 # 100 C/C
st7	10 # 150 C/C	st8	10 # 125 C/C	st9	10 # 100 C/C
st10	12 # 125 C/C	st11	12 # 100 C/C	st12	12 # 75 C/C

KEY PLAN



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G. A. DRAWING OF CHLORINE TONNER ROOM	LE150883-P-WS-WT-GA-2011

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	GALVANAISAD IRON

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

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

APPROVED 30/4/16
SE, NIRMAL

WAPCOS LIMITED हैदराबाद Hyderabad

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

REVISIONS

L&T Construction
Water, Smart World & Communication.

CLIENT : GOVERNMENT OF TELANGANA, RURAL WATER SUPPLY AND SANITATION DEPARTMENT
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PROJECT : PROVIDING DRINKING WATER TO HABITATIONS IN KOMARAMBHEEM ASIFABAD SEGMENT IN ADILABAD DISTRICT (30 MLD WTP)
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	NAME	SIGN	DATE
DSGN	VBM		25-04-16
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CHKD	RMM		25-04-16
APPD	-		25-04-16

DRAWING No. LE150883-C-WS-WT-RC-1064
COMP. DATA : L16-02_06-01-04
SHEET 4 OF 4
SIZE A2 REV. A

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

"Drawings Vetted"
M/s. S.K. ASSOCIATES Hyd-08.

Asst. Executive Engineer TDWSP Asifabad
Dy. Executive Engineer TDWSP Asifabad
Executive Engineer TDWSP Asifabad