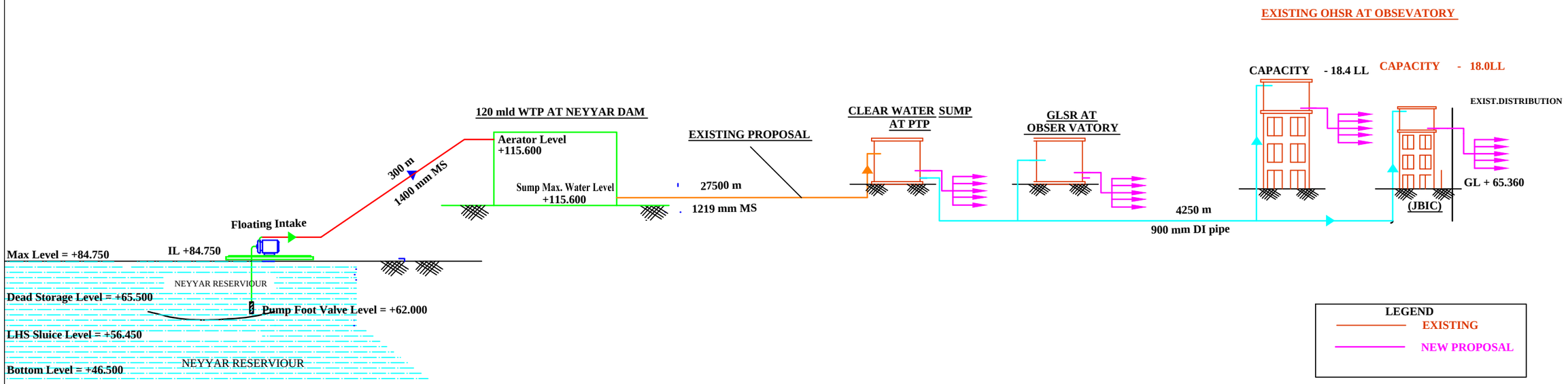
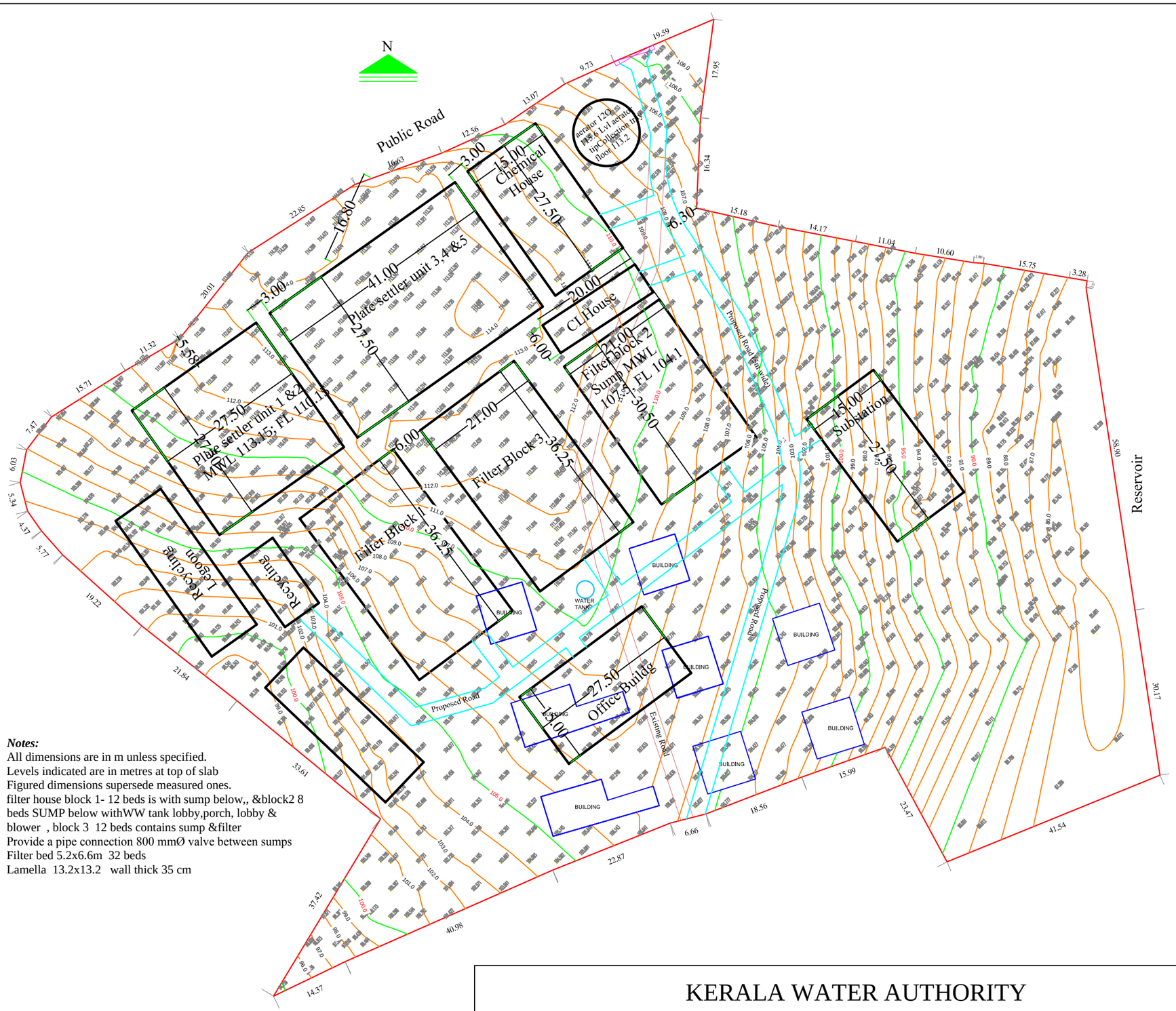
Construction of 120 mld Water Treatment Plant at Neyyar Dam





Notes:

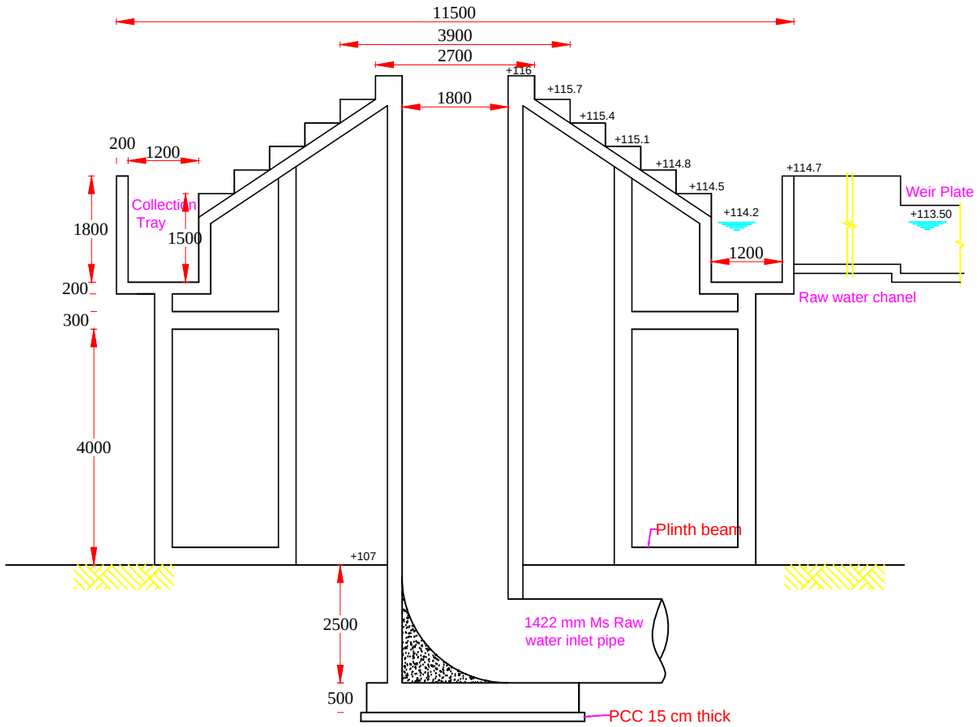
All dimensions are in m unless specified.
Levels indicated are in metres at top of slab
Figured dimensions supersede measured ones.
filter house block 1- 12 beds is with sump below,, &block2 8 beds SUMP below withWW tank lobby,porch, lobby & blower , block 3 12 beds contains sump &filter
Provide a pipe connection 800 mmØ valve between sumps
Filter bed 5.2x6.6m 32 beds
Lamella 13.2x13.2 wall thick 35 cm

KERALA WATER AUTHORITY

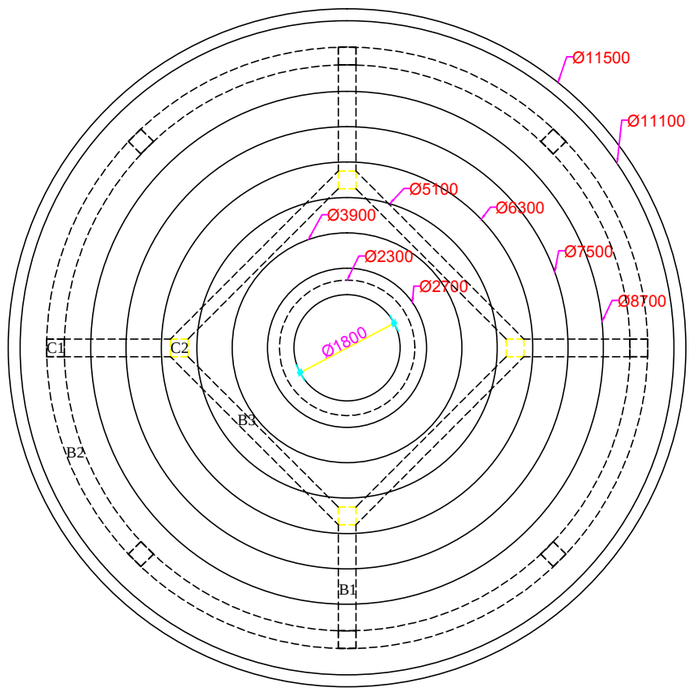
Layout Plan

State Plan- Providing additional 100 MLD water to Thiruvananthapuram WSS and 20 MLD to adjoining Panchayaths from Neyyar Dam-Design &Construction of 120MLD Water Treatment Plant at Neyyar dam

Drawing issued by Design Consultancy wing of KWA WASCON



Aerator (Cascade Aerator)



Plan of Aerator Shaft and Trays

Notes:

1.All dimensions are in **mm** unless specified.
2.Levels indicated are in metres at top of slab /surface
3.Figured dimensions supersede measured ones.
4.Use M30 concrete and steel of fy ≥415 N/mm2.
5. Use tor steel of fy ≥415 N/mm2.
6.PCC mix M 15 with 40-20mm broken stone below footings
7.Clear cover to main reinforcements shall be as follows :

Footings	50 mm
Columns	40 mm.
water face of side wall	45 mm.
face away from water of side wall	30 mm.
Floor slab	30 mm
Beams	30 mm.
Slab	30 mm.

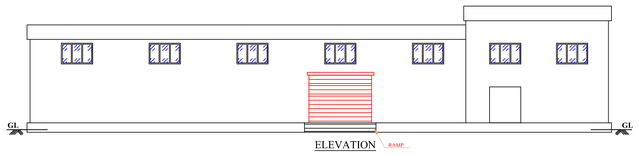
KERALA WATER AUTHORITY

State Plan- Providing additional 100 MLD water to Thiruvananthapuram WSS and 20 MLD to adjoining Panchayaths from Neyyar Dam-Design &Construction of 120MLD Water Treatment Plant at Neyyar dam

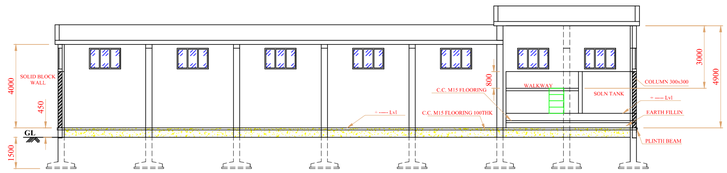
Details of AERATOR

Assistant Engineer	Assi.Exe. Engineer	Executive Engineer	Superintending Engineer	Chief Engineer

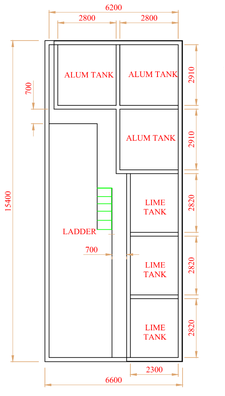
Drawing issued by Design Consultancy wing of KWA, WASCON



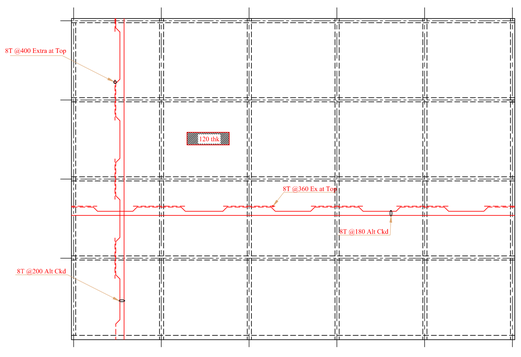
ELEVATION
SCALE 1:100



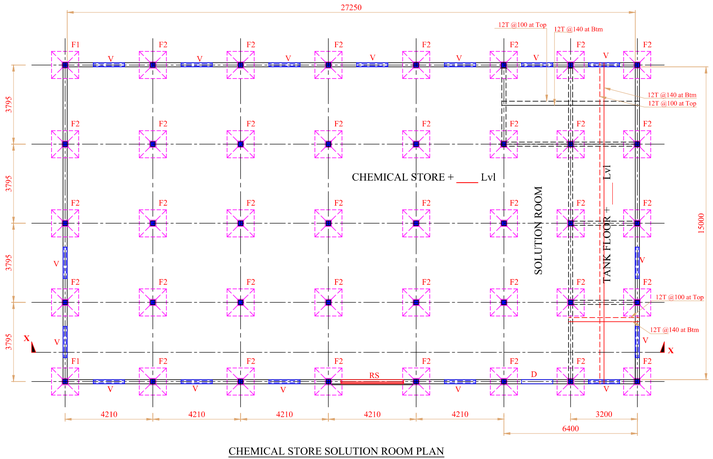
SECTION - XX
SCALE 1:100



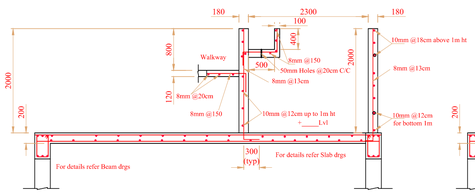
SOLUTION ROOM



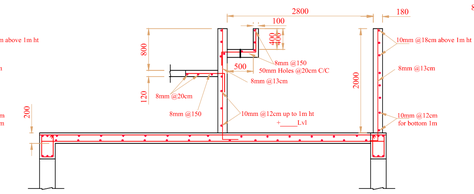
DETAILS OF ROOF SLAB
SCALE 1:100



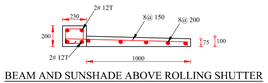
CHEMICAL STORE SOLUTION ROOM PLAN
SCALE 1:100



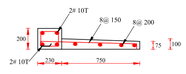
SECTION OF LIME TANK
SCALE 1:40



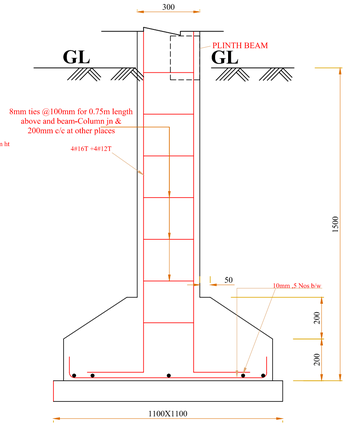
SECTION OF ALUM TANK
SCALE 1:40



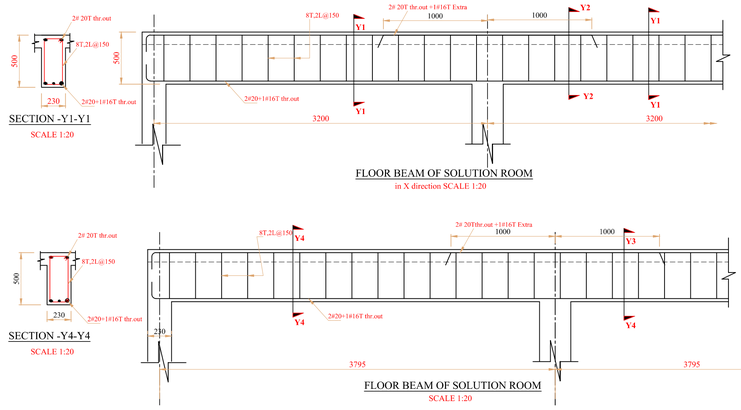
BEAM AND SUNSHADE ABOVE ROLLING SHUTTER



LINTEL SUNSHADE ABOVE WINDOWS



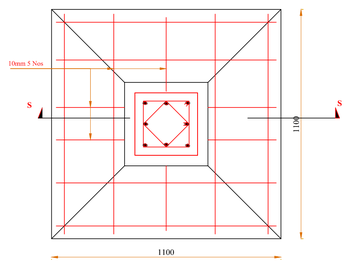
SECTION OF FOOTING F1
SCALE 1:10



SECTION -Y1-Y1
SCALE 1:20

FLOOR BEAM OF SOLUTION ROOM
in X direction SCALE 1:20

SECTION -Y2-Y2
SCALE 1:20

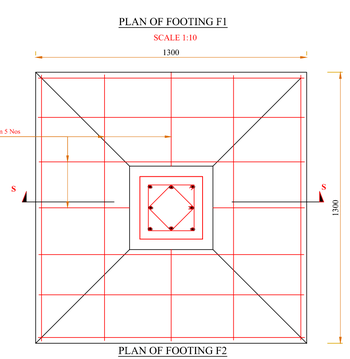


PLAN OF FOOTING F1
SCALE 1:10

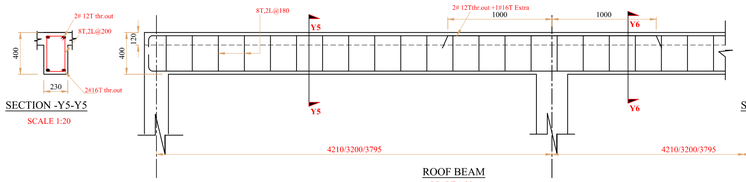
SECTION -Y4-Y4
SCALE 1:20

FLOOR BEAM OF SOLUTION ROOM
SCALE 1:20

SECTION -Y3-Y3
SCALE 1:20



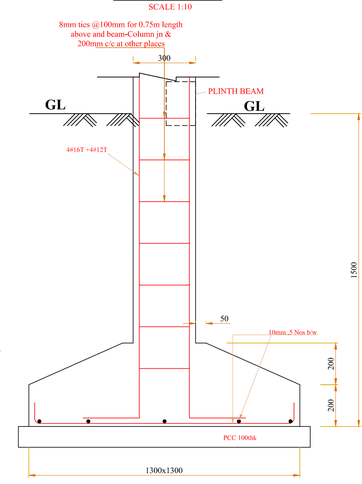
PLAN OF FOOTING F2
SCALE 1:10



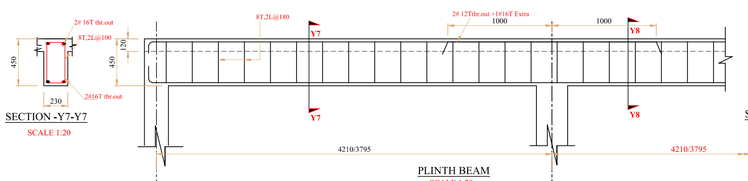
SECTION -Y5-Y5
SCALE 1:20

ROOF BEAM
SCALE 1:20

SECTION -Y6-Y6
SCALE 1:20



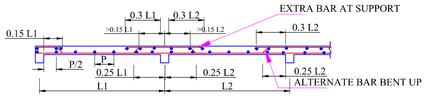
SECTION OF FOOTING F2
SCALE 1:10



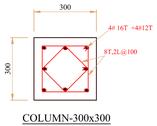
SECTION -Y7-Y7
SCALE 1:20

PLINTH BEAM
SCALE 1:20

SECTION -Y8-Y8
SCALE 1:20



TYPICAL BAR BENDING DETAILS IN SLAB



COLUMN-300x300
SCALE 1:10

Notes:

1.All dimensions are in **mm** unless specified.
2.Levels indicated are in metres at top of slab /surface
3.Figured dimensions supersede measured ones.
4.Use M30 concrete and steel of fy ≥415 N/mm2.
5. Use tor steel of fy ≥415 N/mm2.
6.PCC mix M 15 with 40-20mm broken stone below footings
7.Clear cover to main reinforcements shall be as follows :

Footings	50 mm
Columns	40mm.
water face of side wall	45mm.
face away from water of side wall	30mm.
Floor slab	30 mm
Beams	30mm.
Slab	30mm.

8. Scour pipe shall be provided
9.The bar bending details of the stirrups are as follows

Typical Beam sec

Rolling Shutter RS:4000 X 3000
Window W: 1500 X 1500
Ventilator V: 1500 X 750
Legend:
------- indicate Top Layer reinforcement for slab.
_____ indicates Bottom Layer reinforcement for slab.

KERALA WATER AUTHORITY

WORK: Design & Construction of 120 MLD Water Treatment Plant at Neyyar

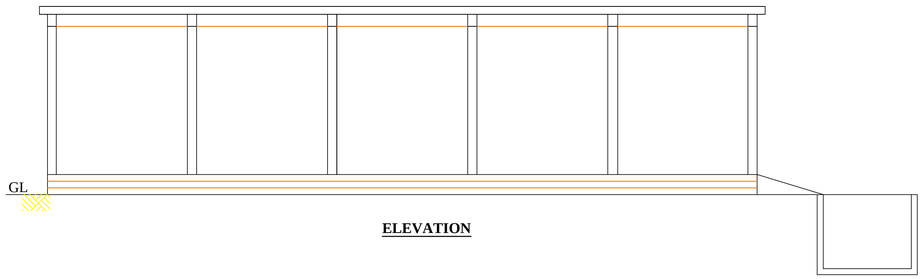
COMPONENT: **CHEMICAL STORE & SOLUTION ROOM**

DRG NO: 001/NYR-120 MLD/CML&SL -XXXX/2021 | SHEET. NO: 1/1 | REV. NO: R0

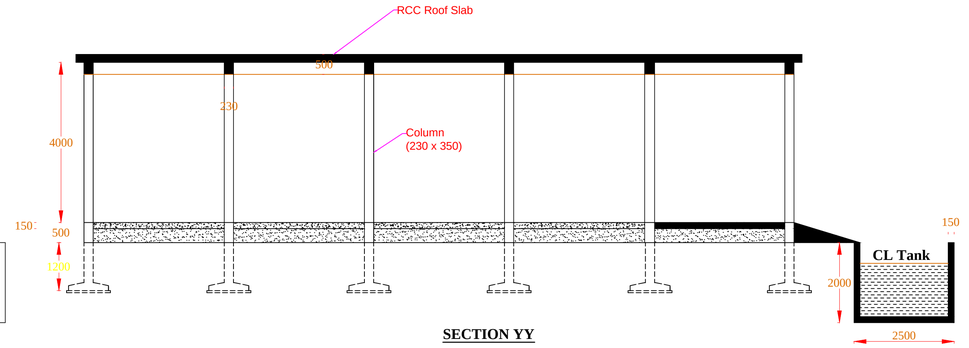
Assistant Engineer	AssiExe. Engineer	Executive Engineer	Superintending Engineer	Chief Engineer

SCALE:

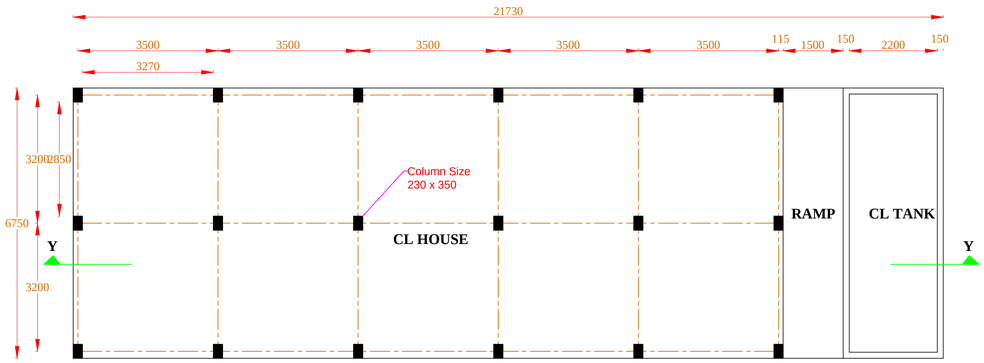
Drawing issued by Design Consultancy wing of KWA, WASCON



ELEVATION



SECTION YY



CHLORINE HOUSE PLAN
Scale 1:100

Notes:

1.All dimensions are in **mm** unless specified.
2.Levels indicated are in metres at top of slab /surface
3.Figured dimensions supersede measured ones.
4.Use M30 concrete and steel of fy ≥415 N/mm2.
5. Use tor steel of fy ≥415 N/mm2.
6.PCC mix M 15 with 40-20mm broken stone below footings
7.Clear cover to main reinforcements shall be as follows :

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face away from water of side wall	30mm.
Floor slab	30 mm
Beams	30mm.
Slab	30mm.

8. Scour pipe shall be provided
9.The bar bending details of the stirrups are as follows

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KERALA WATER AUTHORITY

WORK: State Plan- Providing additional 100 MLD water to Thiruvananthapuram WSS and 20 MLD to adjoining Panchayaths from Neyyar Dam-Design &Construction of 120MLD Water Treatment Plant at Neyyar dam

COMPONENT: **CHLORINE HOUSE**

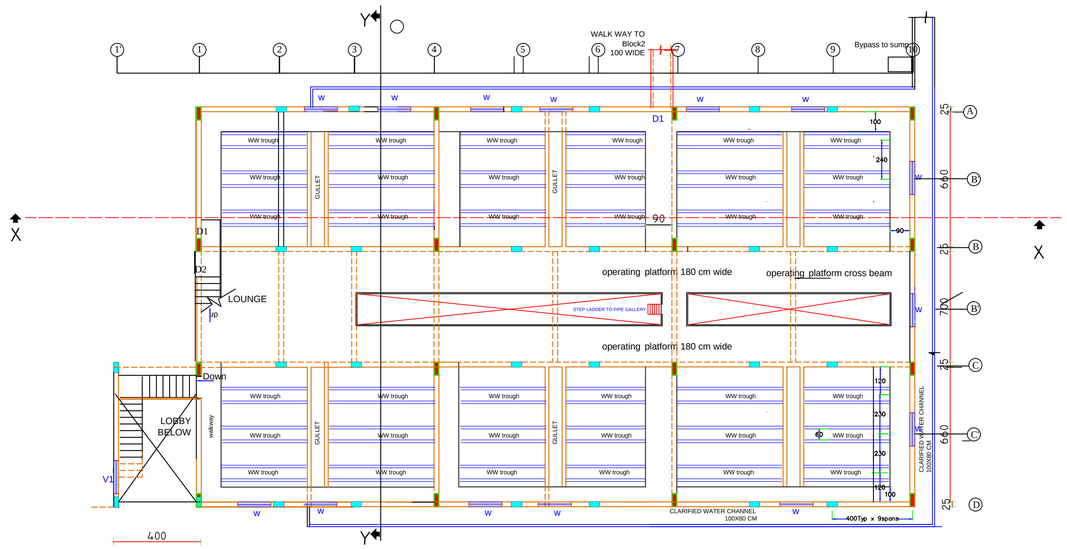
DRG NO: 001/NYR-120 MLD/SS - XXXX/2021

SHEET. NO: 1/1
REV. NO: R0

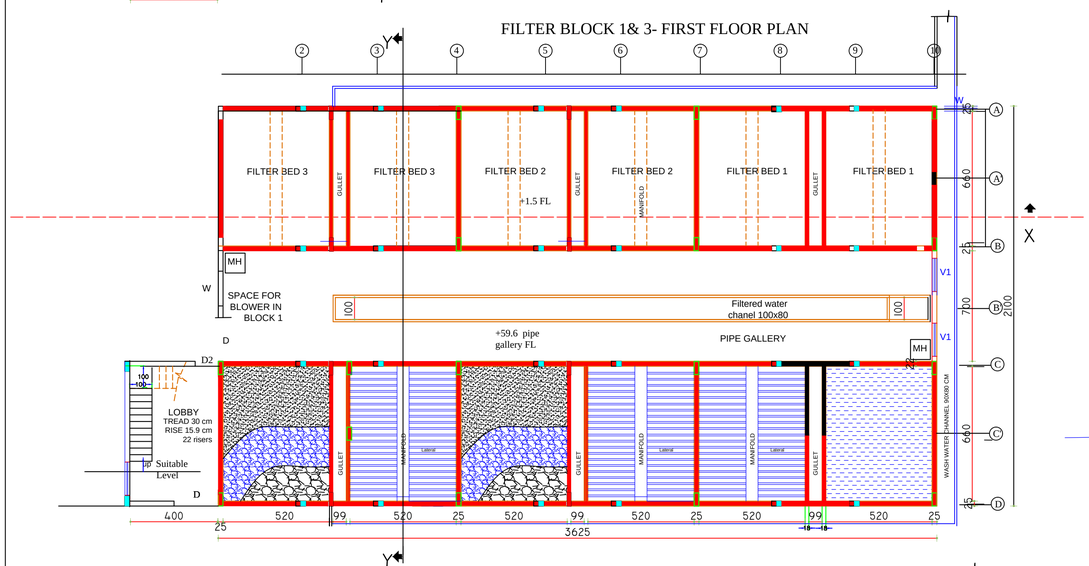
Assistant Engineer	Assi.Exe. Engineer	Executive Engineer	Superintending Engineer	Chief Engineer

SCALE:

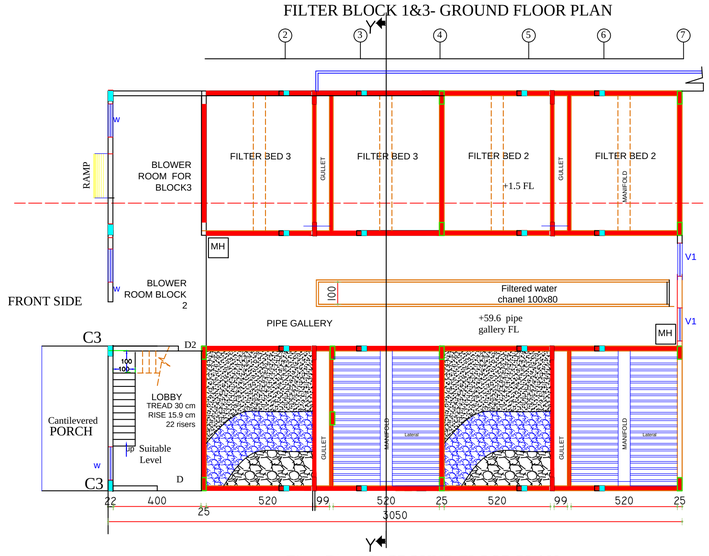
Drawing issued by Design Consultancy wing of KWA, WASCON



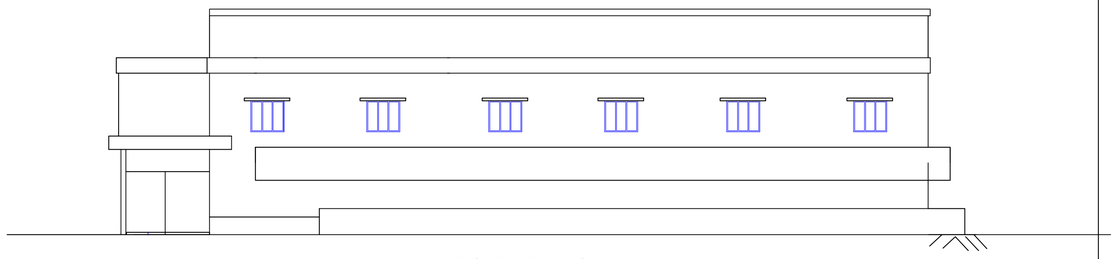
FILTER BLOCK 1& 3- FIRST FLOOR PLAN



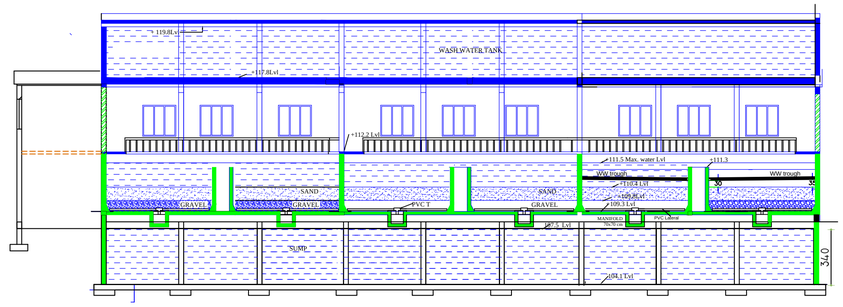
FILTER BLOCK 1&3- GROUND FLOOR PLAN



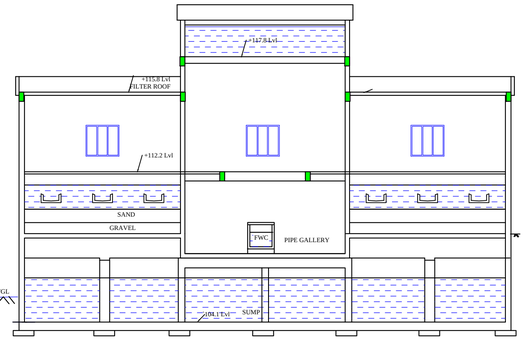
Filter Block 2- GROUND FLOOR PLAN



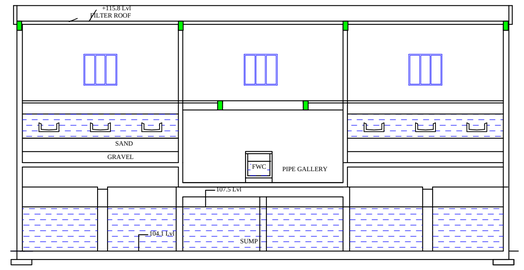
FRONT ELEVATION



SECTION ON XX



SECTION ON YY FOR FILTER BLOCK 1&3



SECTION ON YY FOR FILTER BLOCK2

Specifications for filter media:

Thickness of sand bed	600mm
Thickness of gravel bed (2mm to 25mm size)	500 mm
Thickness of 2mm av. size gravel	8 cm (top most layer)
Thickness of 5mm av. size gravel	12 cm
Thickness of 10mm av. size gravel	10 cm
Thickness of 20mm av. size gravel	10 cm
Thickness of 25mm av. size gravel	10 cm (bottom most layer)

Filter Bed 6.6x5.2m 32 beds; Sump total Cap 69.22 LL , LD 3.4m; WW Tank 450m3 each on block 1 &3 36.25x7x 2m
Blower 3+3 (asssume all wall thickness 0.3 m)

W2	window 75x200 cm
W1	window 100x140 cm
W	window 150x140 cm
V	ventilator 100x60 cm
V1	ventilator 150x60 cm
D	front door 200x210 cm
D 1	door 120x210 cm
D 2	door 100x210 cm
D3	Toilet door 80x210cm syntex
RS	Rolling shutter 240x250 cm
RSG	Rolling shutter grill 200x220 cm
J	Jally works 120x190

Details of underdrainage system:

Dia of lateral	90mm(PVC)
Dia of perforation	12mm
Spacing of lateral	24 cm
No of perforation/ lateral	17
Spacing of orifice	13 cm
Total no of laterals per bed	56

Notes:
All dimensions are in cm unless specified.
Levels indicated are in metres at top of slab
Figured dimensions supersede measured ones.
Sunshades over openings are 70cm wide
filter house block 1 is with sump,WW tank, porch, lobby & blower &block2 contains sump &filter only
Provide a pipe connection 800 mmØ valve between sumps

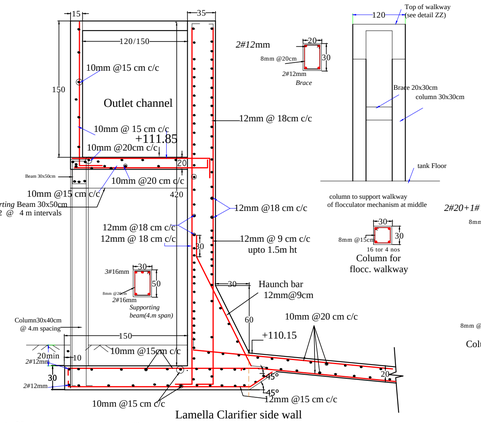
KERALA WATER AUTHORITY

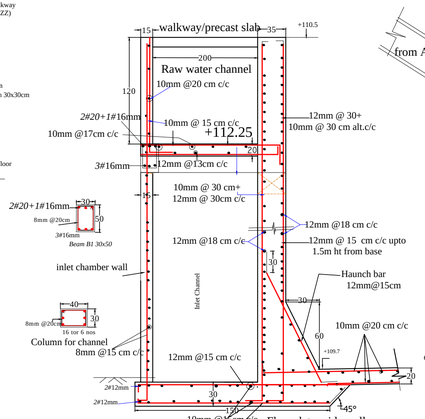
State Plan- Providing additional 100 MLD water to Thiruvananthapuram WSS and 20 MLD to adjoining Panchayaths from Neyyar Dam-Design &Construction of 120MLD Water Treatment Plant at Neyyar dam

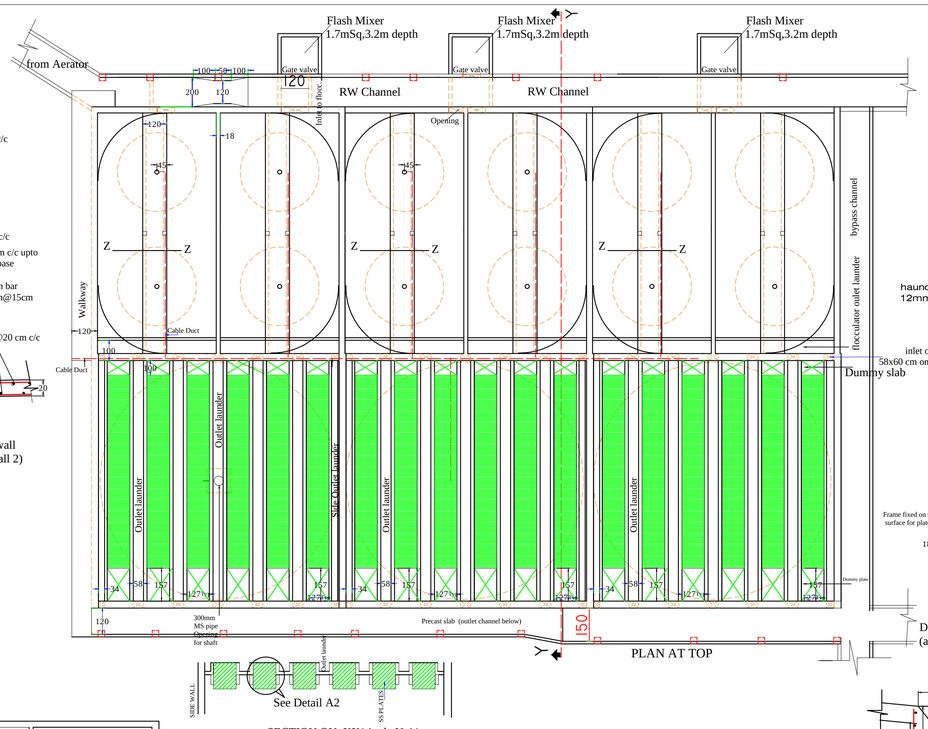
General arrangement of sump cum filter house

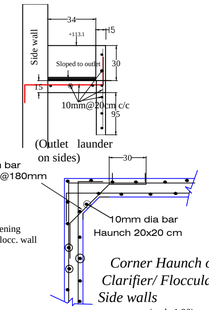
Scale 1:100 in A0
Drawing no: Neyyar/GA sheet 1/1

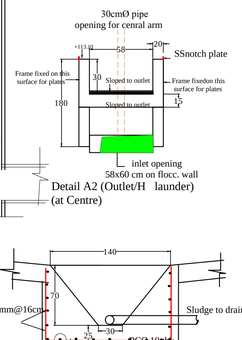
Drawing issued by Design Consultancy wing of KWA, WASCON

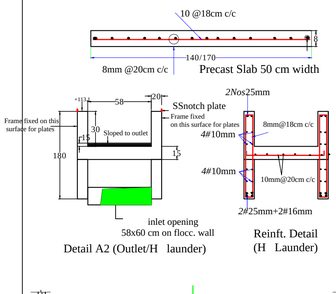


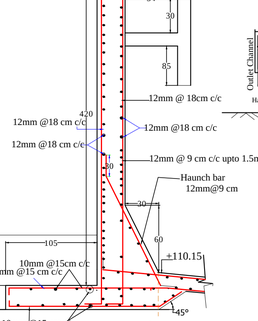


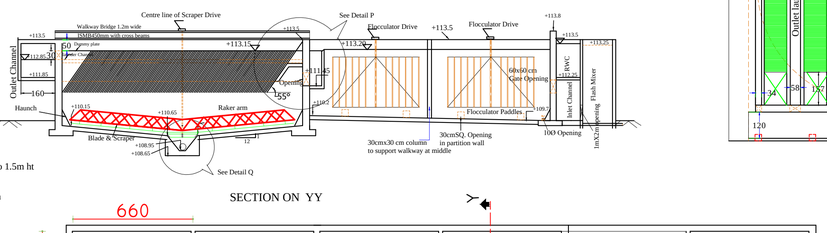


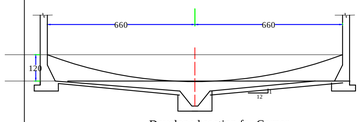


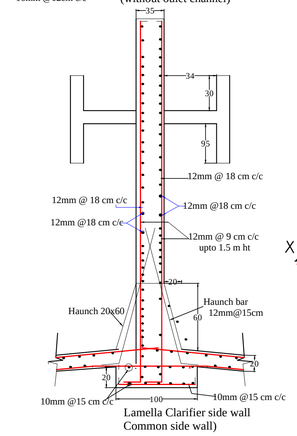


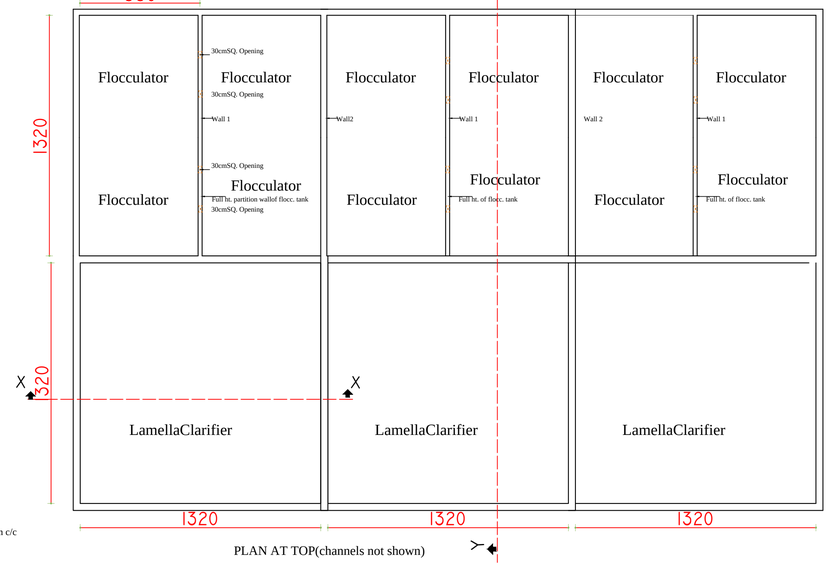


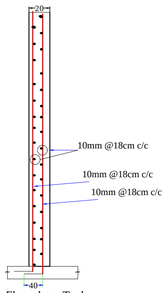


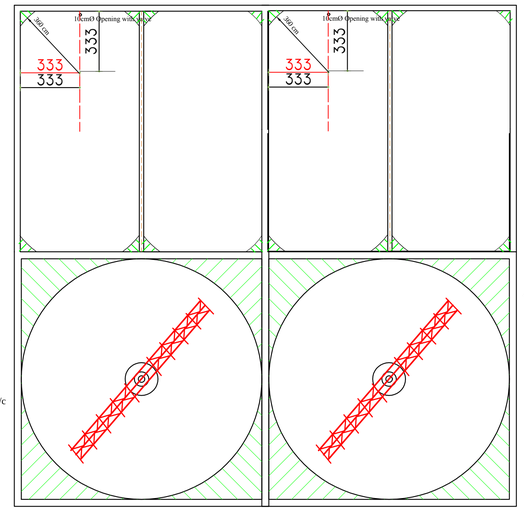


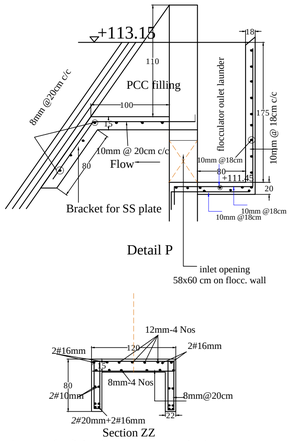












Notes:

1.All dimensions are in **cm** unless otherwise specified.
2.Levels indicated are in metres at top of surface
3.Figured dimensions supersede measured ones.
4.Use M30 concrete and steel of fy $\geq$415 N/mm2.
5.Clear cover to main reinforcements shall be as follows :

water face of side wall,slab,beam	45mm.
face away from water of side wall	30mm.
Beams and floor slab	30mm.
Columns	40mm.
Footings	60 mm

6.PCC mix M 15 with 20mm broken stone 100mm thick. for portion of base slab touching ground.
7. Aerator&Flash mixer details will be given seperately
8. Provide PVC cable duct for flocculator & scrapper motors
9. An SBC not less than 200 KN/m2 shall be ensured at site

Specification for plates

10. plate 0.7mm thick SS 304 grade stainless steel
11. Length of plate 2750mm(eff length 2.1m) width 1219mm
12. spacing of plates100mm approx.(no of plates 620/unit

Legend for reft bars

10T@200 indicates 10mm TMT/ tor steel 200mm c/c
2Nos 20T indicates 2 nos of 20mm TMT/Torsteel
B/W indicates Both ways reinforceemnt
B/F indicates Reinforcement in both faces
(T) indicates Top Layer reinforcement
(B) Indicates Bottom Layer reinforcement

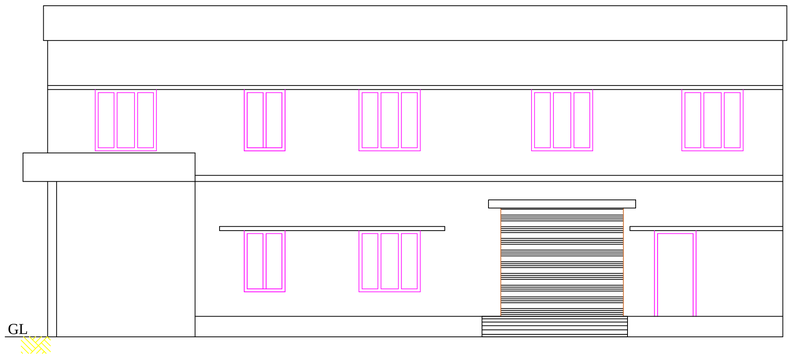
KERALA WATER AUTHORITY

Providing Additional 100 MLD water to Thiruvanathapuram City and 20 MLD water to adjoning Panchayaths from Neyyar Dam.

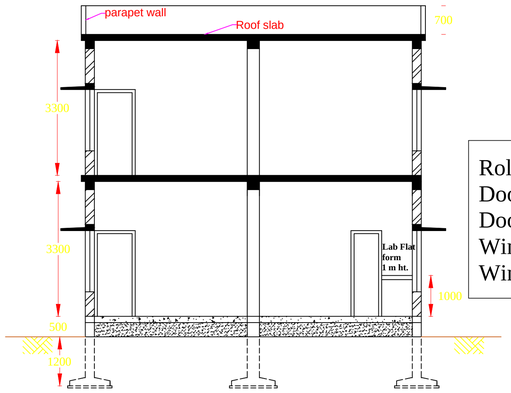
Details of Flocculator & Lamella Clarifier

Scale 1:125 (Plan & Section) ; Details 1:25
Drawing no: sheet 1/1

Drawing issued by Design Consultancy wing of KWA, WASCON

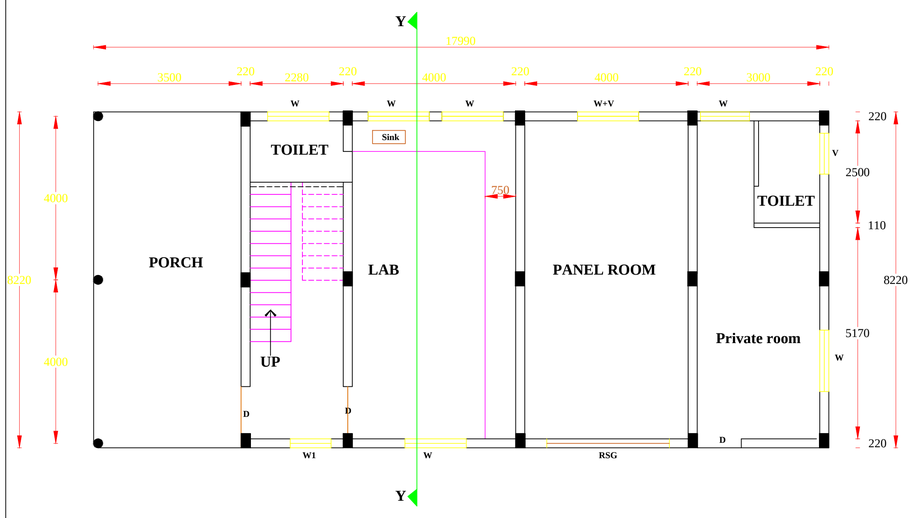


ELEVATION

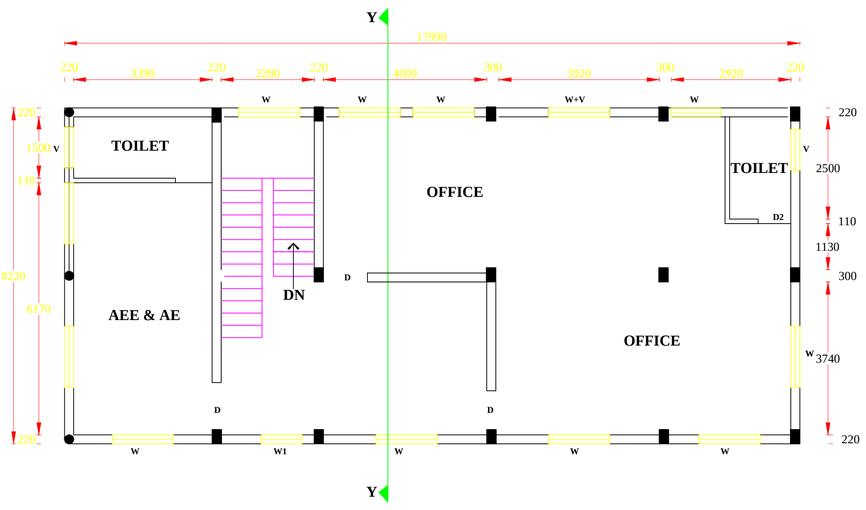


SECTION YY

Rolling Shutter	RSG : 2700 x 3000
Door	D : 1000 x 2100
Door	D1: 800 x 2100
Window	W: 1500 x 1500
Window	W1: 1000 x 1500



OFFICE BUILDING GROUND FLOOR PLAN
Scale 1:100



FIRST FLOOR PLAN
Scale 1:100

Notes:

1.All dimensions are in **mm** unless specified.
2.Levels indicated are in metres at top of slab /surface
3.Figured dimensions supersede measured ones.
4.Use M30 concrete and steel of fy ≥415 N/mm2.
5. Use tor steel of fy ≥415 N/mm2.
6.PCC mix M 15 with 40-20mm broken stone below footings
7.Clear cover to main reinforcements shall be as follows :

Footings	50 mm
Columns	40mm.
water face of side wall	45mm.
face away from water of side wall	30mm.
Floor slab	30 mm
Beams	30mm.
Slab	30mm.

8. Scour pipe shall be provided
9.The bar bending details of the stirrups are as follows

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KERALA WATER AUTHORITY

WORK: State Plan- Providing additional 100 MLD water to Thiruvananthapuram WSS and 20 MLD to adjoining Panchayaths from Neyyar Dam-Design &Construction of 120MLD Water Treatment Plant at Neyyar dam

COMPONENT: **OFFICE BUILDING**

DRG NO: 001/NYR-120 MLD/SS - XXXX/2021

SHEET. NO: 1/1
REV. NO: R0

Assistant Engineer	Assi.Exe. Engineer	Executive Engineer	Superintending Engineer	Chief Engineer

SCALE:

Drawing issued by Design Consultancy wing of KWA, WASCON

120 mld first awarded tender

Design of Flocculator for Lamella Type Clarifier

Provide 3 unit
Detention time = 30 minutes
Capacity = 127 mld.
Volume Reqd= 882 m3
Depth provided =3m
Size of flocculator 17.2m Square

Design of Lamella Type Clarifier

Provide 3 unit
Detention time = 30 minutes
SOR = 144 m3/m2/d
Plan area= 124800/144/3= 294m2
Volume Reqd=127*1000/24/60x30/3=882 m3
Depth provided =3m
Plan area for DT= 294m2
Plate settler = 17.2mx17.2m

Design of Plates for Lamella Type Clarifier

Surface loading rate on plates considered = 28.8
Plate angle = 55 deg
Proj. plate area red = Q/28.8= 124800/28.8/3= 1445 m2
Plate length= 2m; width =1.2m
Proj length= 2x cos55= 1.15m
Length available for fixing= 12.65m
But Provide plates in 6 rows
Plate spacing = 0.07 cm
Total No of plates =6x12.65/0.07=1084
Provide cross launder at ends
Weir length =12*17.2+2*17.2=240.8m
Weir loading rate = 124800/(240.8x3)=172.7

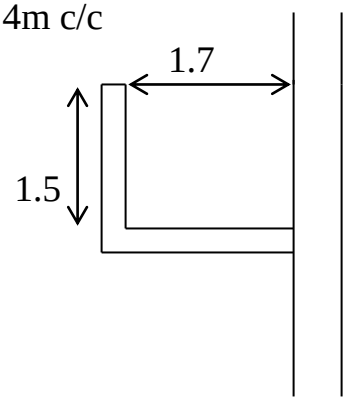
Therefore OK

Raw water Channel*(Resting on ground)*

Provide 1.7m and 1.3 m water depth with 0.3 mFB
Provide 15 cm thickness for side wall & 18cm for base slab
Also provide min. steel 3.6 cm2; 10 mm @ vertical on side wall
With 8 mm @ 14 cm hori.
For base slab provide 8 mm @ 20 cm b/w b/f

Clarified water/Outlet Channel/Filter Inlet Channel (supported on wall)

Max.Cantilever projection = 1.7m supported on beams @ 4m c/c



Assume water depth = 1.3m

Free board = 0.2m

Design for full depth of water

Wt. of water = 1.7x1.5x1000 = 2550 Kg/m

Self Wt. of side wall = 0.15x1.5x2500 = 563 Kg/m

Self Wt. of base slab = 0.2x1.85x2500 = 925Kg/m; Total 4038 Kg/m

Provide cant.beams at 4m centres from side wall of Clarifier/filter

Max. Bending moment =4050x4x4/12 = 5400Kgm

Provide 22x45cm beam

Area of steel A_{st} = M/tjd = 5400/(13x0.86x40) = 12 cm^2

Provide 4# 20 @ 8 mm stir@ 200mm

For base slab

Provide 10 tor @ 20 cm c/c at bottom & top

Distribution steel = 0.24 x 18 = 4.32 cm^2

Provide 8 tor @ 22cm c/c.(2x2.27 cm2) distribn. on base slab

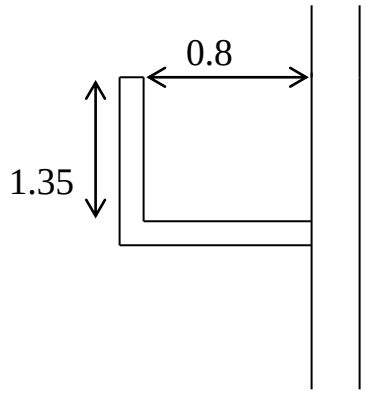
For side wall provide 15 cm thickness and 8 tor @ 20 cm spacing single layer

---

Inlet to Platesettler-Launder channel supported on side wall

Cantilever projection = 0.8m

Assume water depth = 1.3m



Design for uplift =1.55x1000=1550 kg/m

Self Wt. of base slab = 0. 2x0.95 x2500 = 475 Kg/m;

Net = 1550-475=1075 kg/m

Max. Bending moment =1075x0.95^2/2= 485Kgm

20 x t^2 / 6 = 485
Solving, t = 14.5cm

Provide 15cm thickness for base slab

Area of steel A_{st} = M/tjd = 485/(13x0.86x10) = 4.34 cm^2

Provide 10 tor @ 15 cm c/c

Distribution steel = 0.24 x 20= 4.8 cm^2

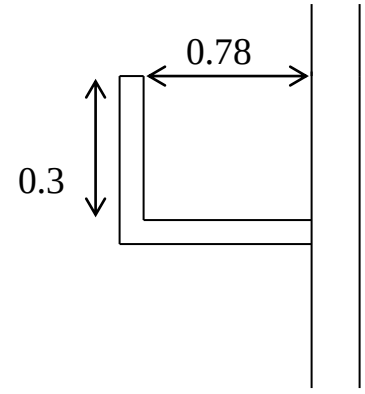
Provide 8 tor @ 20cm c/c 2 layer distribn. on base slab

For side wall provide 15 cm thickness and 8 tor @ 14 cm spacing

Launder channels on ends- supported on side wall

Cantilever projection = 0.78m

Assume water depth = 0.3m



Design for uplift =0.3x1000=300 kg/m

Provide 15cm thickness for base slab & side wall

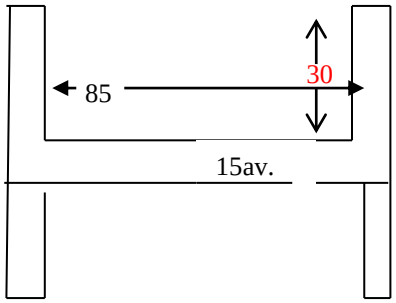
Provide 10 tor @ 20 cm c/c

Distribution steel = 0.24 x 15= 3.6 cm^2

Provide 10 tor @ 20cm c/c for distribn. on base slab

For side wall provide 15 cm thickness and 10 tor @ 20 cm spacing
---- to be corrected from this line

INNER TROUGHS- H Channel



Span= 17.2-0.6x2=16m
Design for channel full of water and outside empty
Trough size 0.85mX0.3m depth; 20 cm thickness for
for side wall and 20 cm av. thickness for bottom slab

Provide 6 central channels & 2 side channels
Max.flow through each channel =1.444/(7x60x3unit)=0.00115m3/s
Depth of water = $[0.00115/(1.376x0.85)]^{2/3}$ = 0.01m but Provide 30 cm depth
Consider only channel full of case
Wt. of water = 0.85X0.3X1000 = 255kg/m
Self of base = 0.85X0.15X2500 = 319
Self of side wall = 2X0.2X0.5X2500 = 500 kg/m
Self of side board considered 2x0.15x0.7x2500=525
Total 1600Kg/m

Max BM (as simply supported) = 1600X $16^2/10$ =40960kgm

$$\bar{Y} = \frac{85X18X9+2x15X48X24}{85x18+2x15x48} = \frac{48330}{2970} = 16.3 \text{ cm}$$

Provide 18 cm for base slab

$$I_{NA} = \frac{85X16^3}{3} + \frac{2X15X48^3}{3} - 2970x16.3^2 = 432874 \text{ cm}^4$$

Bending stress $= \frac{4096000 \text{ X } (18-16.3)}{432874} = 16 <$ 100 kg/cm^2 (Permissible stress)

Area of reinforcement

$$Ast = \frac{4096000}{1300x0.861x145} = 25.3cm^2$$

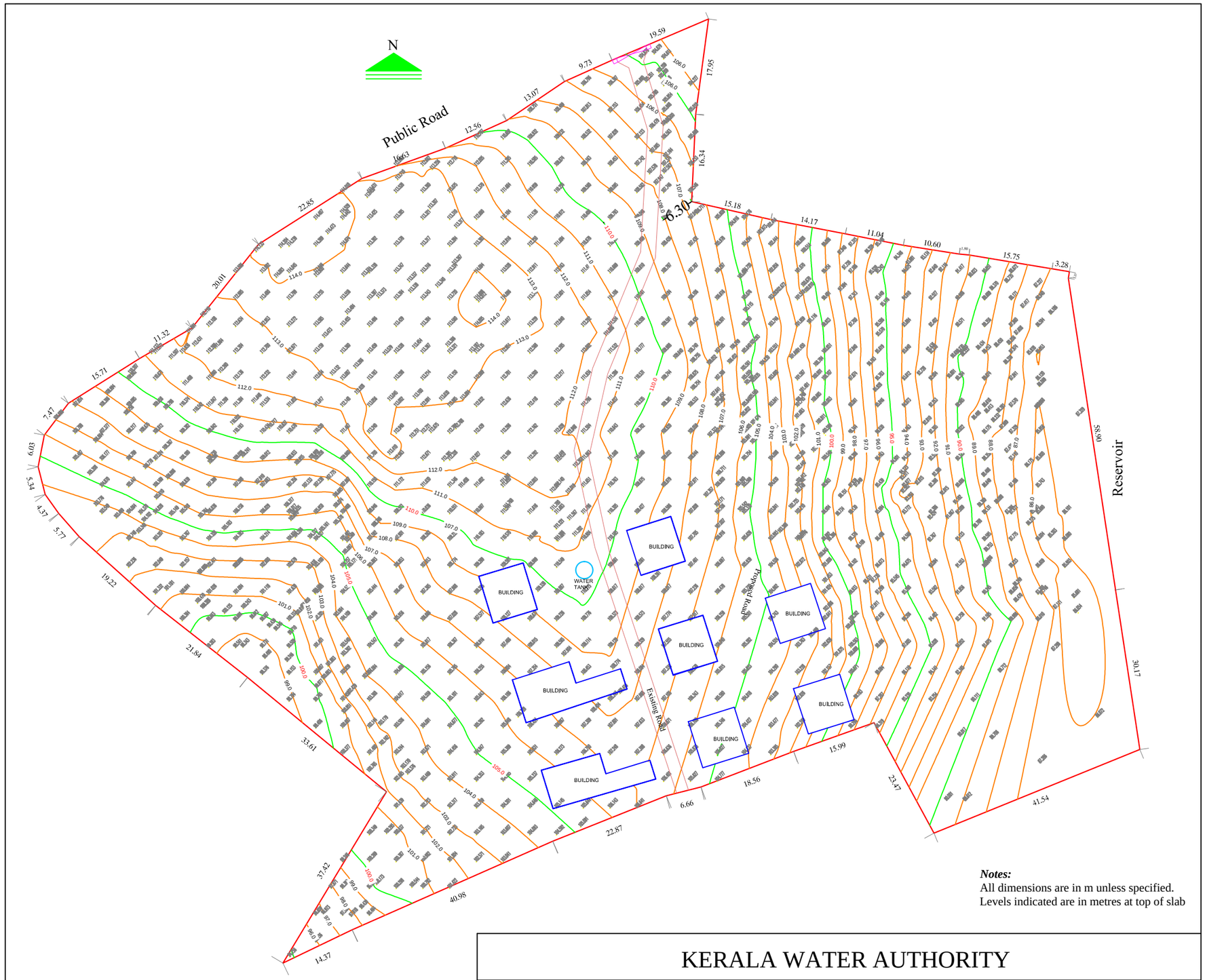
Provide 25ϕ 5+2#8 Nos.at bottom (total)
Provide 12ϕ 4 Nos. At top (total) and 8mm @ 200 on side wall

Shear

V =1600X16/2 =12800Kg

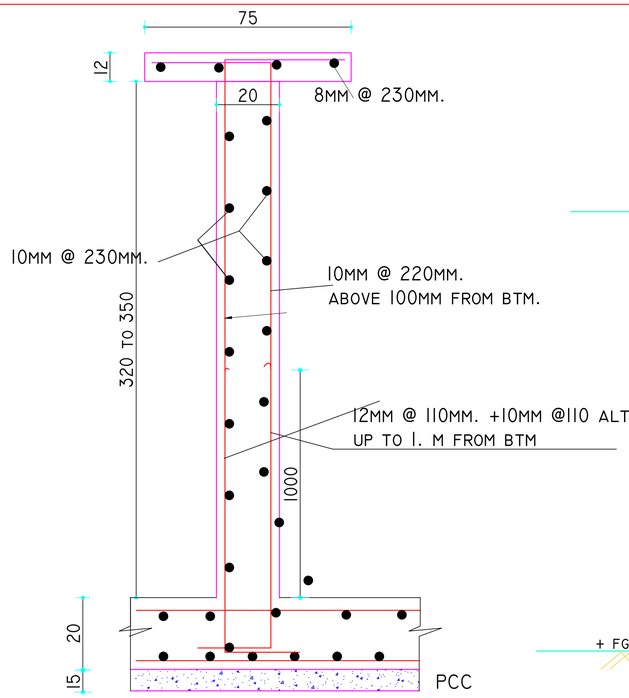
$$\tau v = \frac{12800}{2X15X145} = 2.9Kg/cm^2$$

Provide 8ϕ stirrups @ 200 c/c;

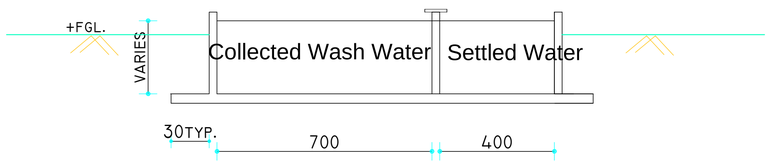


Notes:
All dimensions are in m unless specified.
Levels indicated are in metres at top of slab

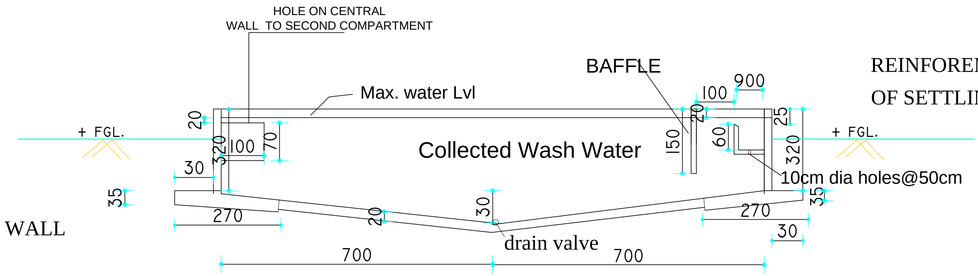
KERALA WATER AUTHORITY
Location of the project site with contour at 1m interval
State Plan- Providing additional 100 MLD water to Thiruvananthapuram WSS and 20 MLD to adjoining Panchayaths from Neyyar Dam-Design &Construction of 120MLD Water Treatment Plant at Neyyar dam



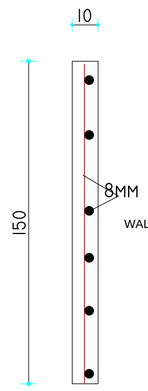
REINFOREMENT DETAILS OF COMPARTMENT WALL
OF SETTLING TANK Scale 1:10



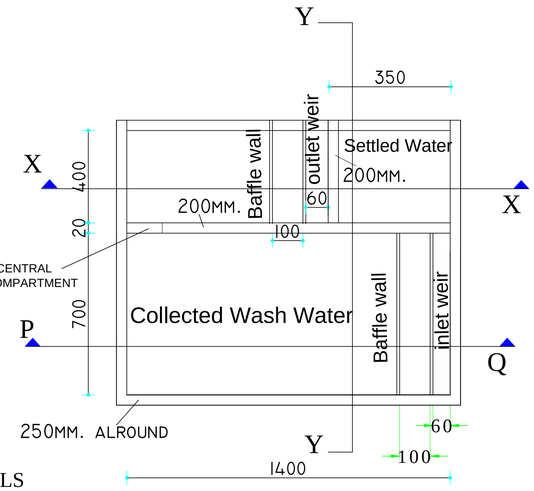
SECTIONAL VIEW AT YY OF SETTLING TANK
Scale 1:100



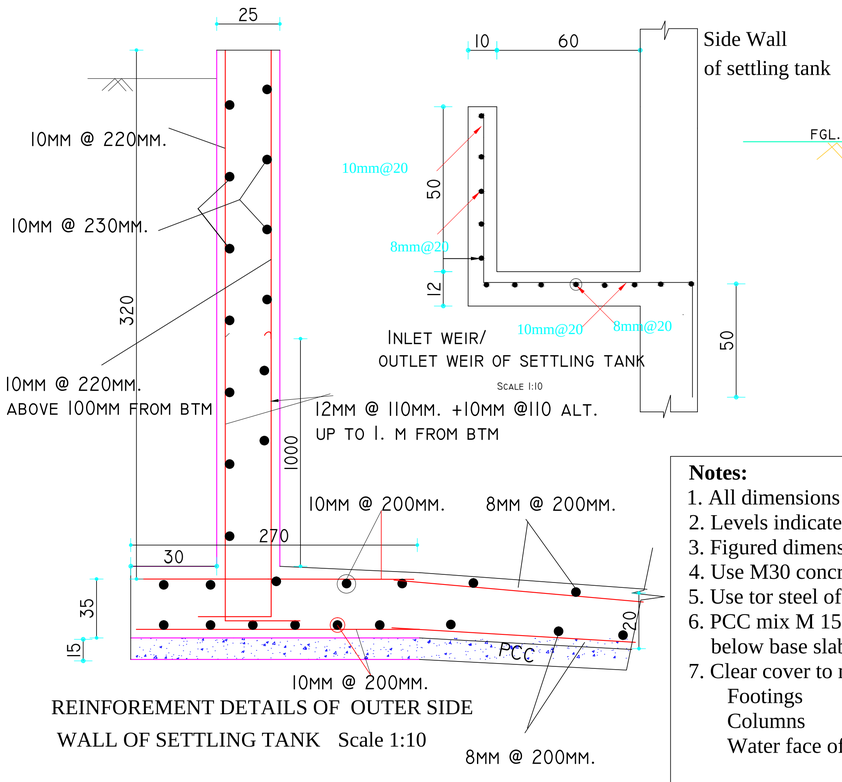
LONGL. SECTIONAL VIEW AT PQ OF SETTLING TANK
Scale 1:100



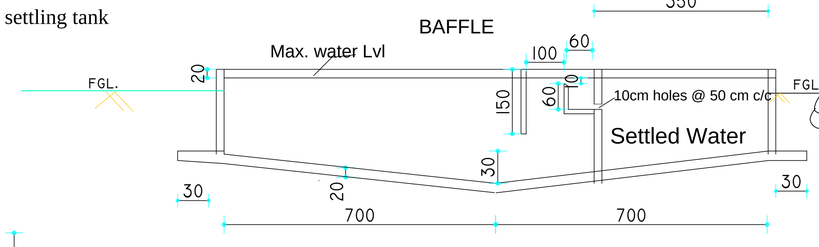
REINFOREMENT DETAILS IN BAFFLE WALLS
OF SETTLING TANK Scale 1:10



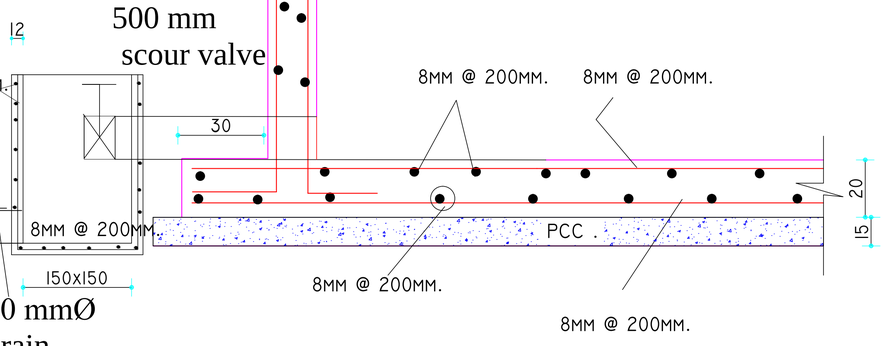
PLAN OF SETTLING TANK
Scale 1:150



REINFOREMENT DETAILS OF OUTER SIDE
WALL OF SETTLING TANK Scale 1:10



CROSS SECTIONAL VIEW AT XX OF SETTLING TANK
Scale 1:100



REINF. DETAILS OF BASE SLAB (AT YY)
Scale 1:150

Notes:

1. All dimensions are in cm unless specified.
2. Levels indicated are in metres at top of slab
3. Figured dimensions supersede measured ones.
4. Use M30 concrete
5. Use tor steel of $fy \geq 415$ N/mm2
6. PCC mix M 15 with 40-20 mm broken stone below base slab
7. Clear cover to main reinforcement shall be as follows:

Footings	50mm
Columns	40mm
Water face of side wall	40mm

Clear cover:

Face away from water of side wall	30m
Floor slab of tank	30mm
Beams	30mm
Slab under side	25mm
Slab top	25 cm

8. The scour shall be kept open till completion of settling tank if surrounding water table rises during construction

LEGEND

2-#12 indicate 2nos 12mm dia tor steelbar
#8@200 indicate 2 legged 8mm tor steel stirrups at 200mm spacing

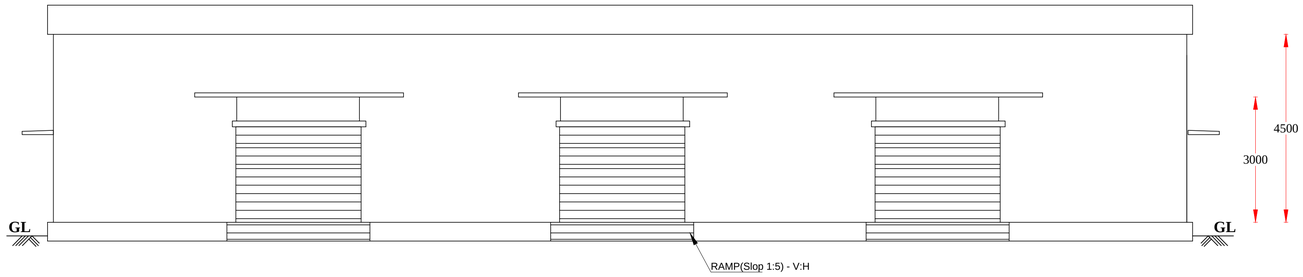
KERALA WATER AUTHORITY

State Paln- Providing addln 100 MLD Water to TVPM & 20 MLD to adj Panchayaths-Construction of 12MLD Water Treatment Plant at Neyyardam

DETAILS OF WASH WATER SETTLING TANK

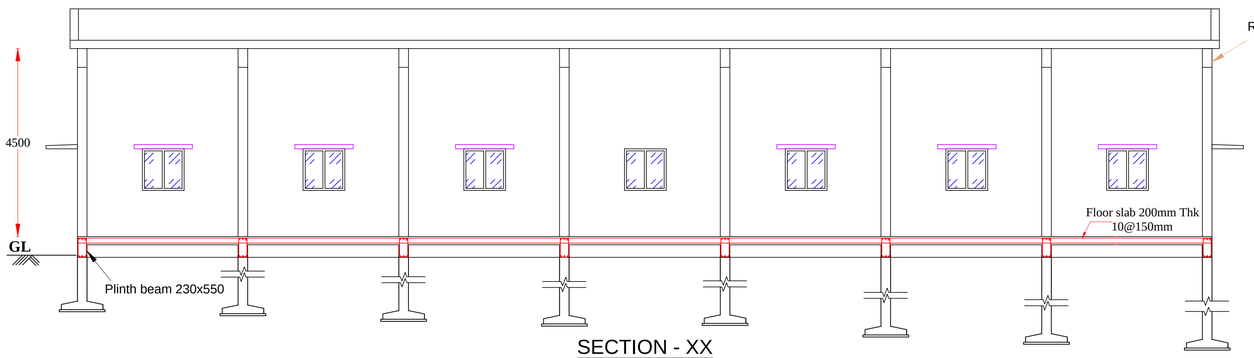
Drawing no: Neyyari/MISC Sheet No. 1/1 Scale : *as shown AppdR1*

Drawing issued by Design Consultancy wing of KWA, WASCON



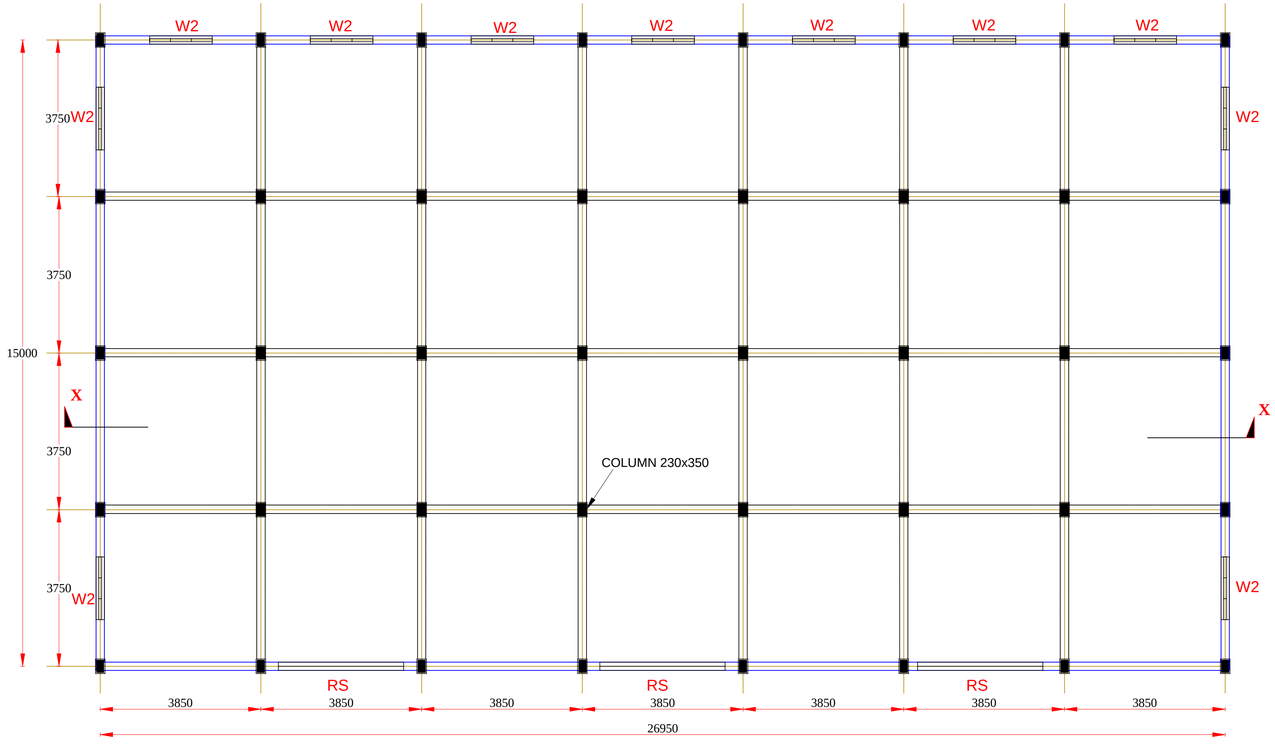
ELEVATION

SCALE 1:100



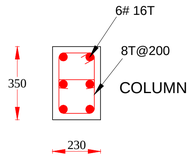
SECTION - XX

SCALE 1:100



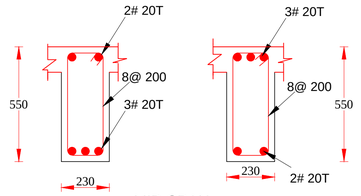
SUBSTATION ROOM PLAN

SCALE 1:100



COLUMN -C1

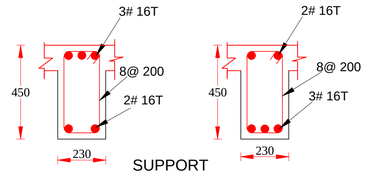
SCALE 1:20



MID SPAN

Plinth beam

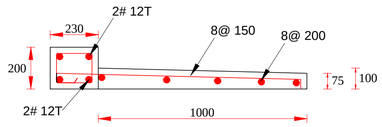
SCALE 1:20



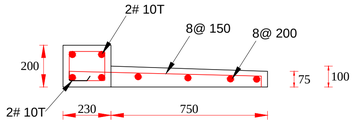
SUPPORT

Roof beam

SCALE 1:20



Lintel above rolling shutter



Lintel above window

Rolling Shutter RS:3000 X 3000

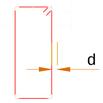
Window W2: 1000 X 1500

Notes:

1.All dimensions are in **cm** unless specified.
2.Levels indicated are in metres at top of slab /surface
3.Figured dimensions supersede measured ones.
4.Use M30 concrete and steel of fy ≥415 N/mm2.
5. Use tor steel of fy ≥415 N/mm2.
6.PCC mix M 15 with 40-20mm broken stone below footings
7.Clear cover to main reinforcements shall be as follows :

Footings	50 mm
Columns	40mm.
water face of side wall	45mm.
face away from water of side wall	30mm.
Floor slab	30 mm
Beams	30mm.
Slab	30mm.

8. Scour pipe shall be provided
9.The bar bending details of the stirrups are as follows



Legend:

-------- indicate Top Layer reinforcement for slab.
_____ indicates Bottom Layer reinforcement for slab.

KERALA WATER AUTHORITY

WORK: Design & Construction of 120 MLD Water Treatment Plant at Neyyar

COMPONENT: **SUBSTATION ROOM**

DRG NO: 001/NYR-120 MLD/SS -XXXX/2021

SHEET. NO: 1/1

REV. NO: R0

Assistant Engineer	Assi.Exe. Engineer	Executive Engineer	Superintending Engineer	Chief Engineer

SCALE:

Drawing issued by Design Consultancy wing of KWA, WASCON

CONSTRUCTION OF FLOATING PUING STATION AT NEYYAR DAM

TENTATIVE DRAWING
FOR ESTIMATE PURPOSE