

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/  
MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2020**

**STRUCTURAL AND IRRIGATION ENGINEERING DRAWING**

[Maximum Marks: 75]

[Time: 2.15 Hours]

- [Note:-
1. Use of steel tables are permitted.
  2. Missing data if any may be suitably be assumed.
  3. A2 size drawing sheet to be supplied.
  4. Drawing shall be neat and fully dimensioned.
  5. Answer **any one** from **Unit-I**.
  6. Answer **any one** from **Unit-II**
  7. Answer **any one** from **Unit-III or IV**.

**UNIT – I**

I. A beam of 300mm x 450mm is supported on walls of 300mm thick is provided over a 3m clear opening. The reinforcement details are given below:

main reinforcement : 3 Nos 16mm  $\phi$  (1 No.bent up)

Stirrup holder : 2 Nos 12mm  $\phi$

Stirrups : 8mm  $\phi$  @ 200mm c/c

Draw the following views of the beam to suitable scale.

(a) The longitudinal section (15)

(b) The cross section at mid span and at support. (10)

**OR**

II. A simply supported one way slab has a clear span of 2.5m x 5.0m supported on 300mm brick walls. The structural design gives a slab thickness of 120mm with main reinforcement of 10mm dia TMT bars at 200mm c/c and distribution bars of 8mm dia. at 250mm c/c. Draw the section of the slab along the short span and long span showing all the reinforcement details.

(25)

**UNIT – II**

III. Draw the sectional elevation (one flight) and plan of a dog legged staircase with the following details:

Size of room : 5.0 m x 2.5m

Floor height : 3.00 m

Wall thickness : 300 mm

Thickness of waist slab and landing slab : 125 mm

Width of landing : 1000 mm

Tread : 250 mm

Rise : 150 mm

Main reinforcement : 120 mm  $\varnothing$  @ 150 mm c/c, distribution bars 8 mm  $\varnothing$  @ 180 mm c/c

Provide support at ground: 900 mm wide and 150 mm thick concrete. (25)

**OR**

IV. Draw the sectional view across the stem of the retaining wall having the details given below.

Base slab – 3400 mm x 600 mm with bottom at 1200 mm below ground level.

Toe projection : 600 mm

Stem thickness : 480 mm at bottom and 200 mm at top with back face vertical.

Height of retaining wall : 4900 mm above ground level.

Main reinforcement in stem : 20 mm  $\varnothing$  at 100 mm c/c.

Alternate bars are cut off at 3.76 m from the top.

Alternate of the remaining bars are cut off at 2.76 m from the top.

Distribution bars : 12 mm  $\varnothing$  at 250 mm c/c.

Exposed face reinforcement : Main bars 12 mm  $\varnothing$  250 mm c/c.

Distribution bars : 10 mm  $\varnothing$  at 300 mm c/c.

Main reinforcement in heel slab : 200 mm  $\varnothing$  at 160 mm c/c extend straight to the end of the toe slab.

Distribution bars : 10 mm  $\varnothing$  at 300 mm c/c.

Main reinforcement in toe slab : 20 mm  $\varnothing$  at 160 mm c/c.

Distribution bars : 12 mm  $\varnothing$  at 300 mm c/c. (25)

### UNIT- III

V. Two steel beams mutually intersect in such a way that the secondary beam is connected to the centre of the main beam. The details are given below:

Main beam ISMB 500@869 N/m.

Secondary beam ISLB 350 @ 495 N/m.

Cleat (web) angle 2xISA 150x115x10mm

16 mm dia. Rivets provided suitably.

Draw (a) Connection showing main beam in section. (15)

(b) Connection showing secondary beam in section. (10)

**OR**

VI. The details given below refer to a plate girder:

Flange plate : 2 Nos. of 480 mm x 10 mm plates on each flange.

Flange angle : 150 mm x 115 mm x 10 mm.

Web plate: 1600 mm x 8 mm.

Rivets : 18 mm dia. Rivets at 16 cm pitch.

Stiffeners : 100 mm x 75 mm x 10 mm.

Draw the cross section of the plate girder showing the connection of stiffeners to the web plate. (25)

#### UNIT - IV

VII The hydraulic particulars of a surplus escape (core wall type) are as given below:

Top bund level : +102.5

Max. water level : +101.00.

Full tank level : + 100.00

GL and top level of concrete : + 99.00

Bottom level of concrete : + 98.00 (below the body wall)

Bottom width of concrete : 150 cm (below body wall)

Top width of body wall : 75 cm.

Bottom width of body wall : 90 cm.

Top width of bund : 2.00 m.

Length of solid apron : 3.00m, 60 cm thick.

Grouted apron : 60 cm thick.

Side slope upstream : 1:1.5.

Side slope downstream : 1:2.

Cut off wall (between solid apron and grouted apron) 50 cm x 100 cm

Body wall divided 3 vertical offsets each 0.50m.

Draw to a suitable scale the longitudinal half sectional elevation of the surplus escape. (25)

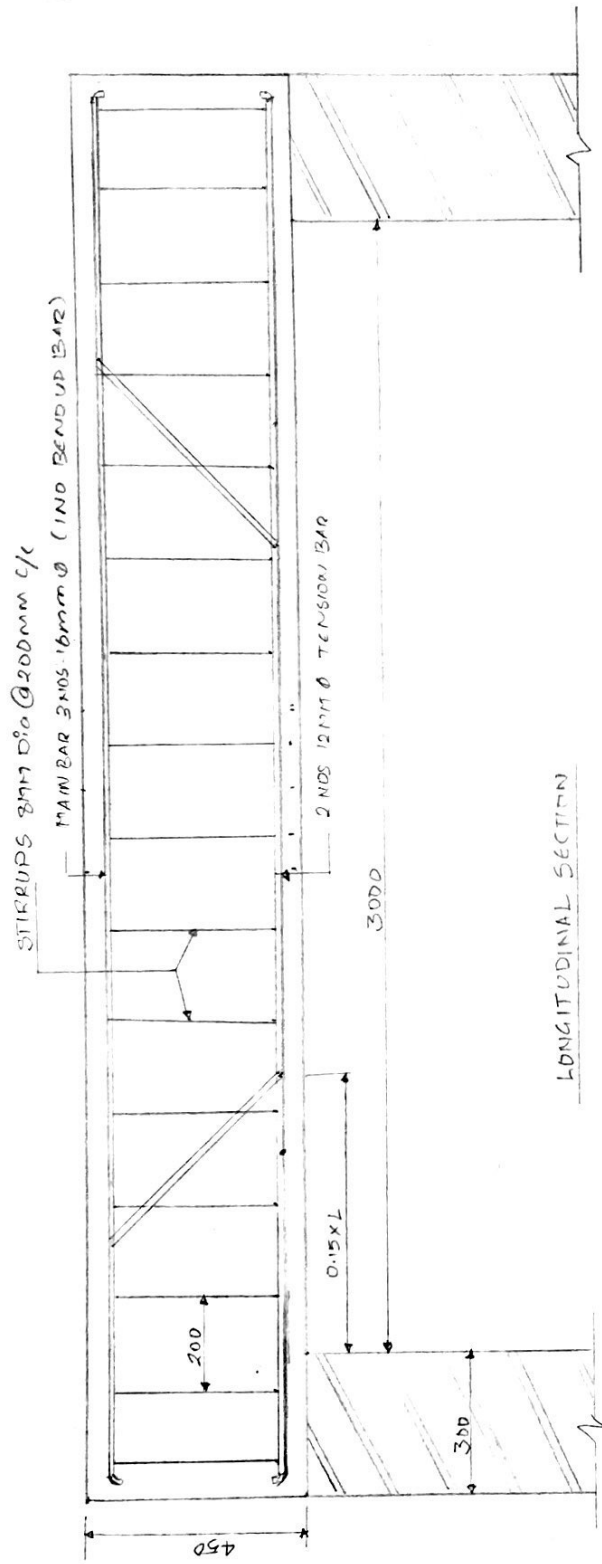
OR

VIII. A septic tank has internal dimensions 5.00m x 2.00 m with liquid depth 1.8 m, brick Masonry wall, 30 cm thick, free board 50 cm. RCC baffle wall of 5 cm thick is provided at 1.2 m from the inlet. Provide necessary concrete flooring in cc 1:3:6 with a slope of 1 in 20 and foundation of thickness 20 cm.

Draw : (a) Sectional plan. (15)

(b) Longitudinal section. (10)

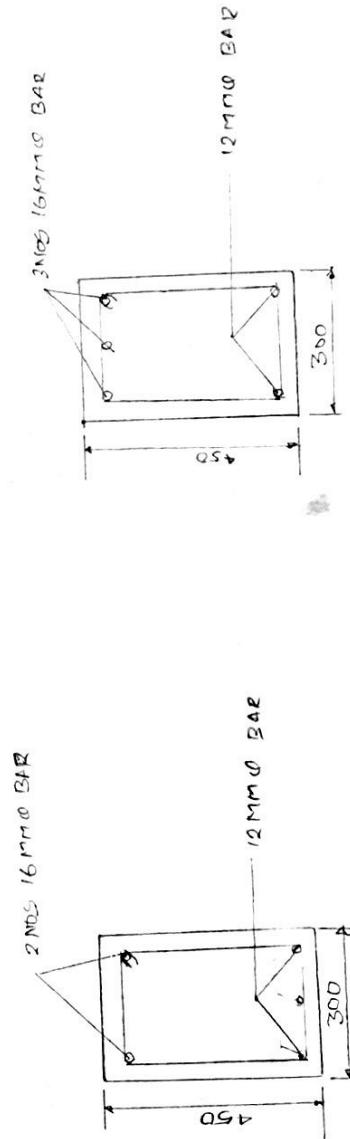
I (a)



I (a)

Correct figure - 6 marks  
 Reinforcement - 3 marks  
 Dimensions - 3 marks  
 Detailing - 3 marks  
 TOTAL - 15 MARKS

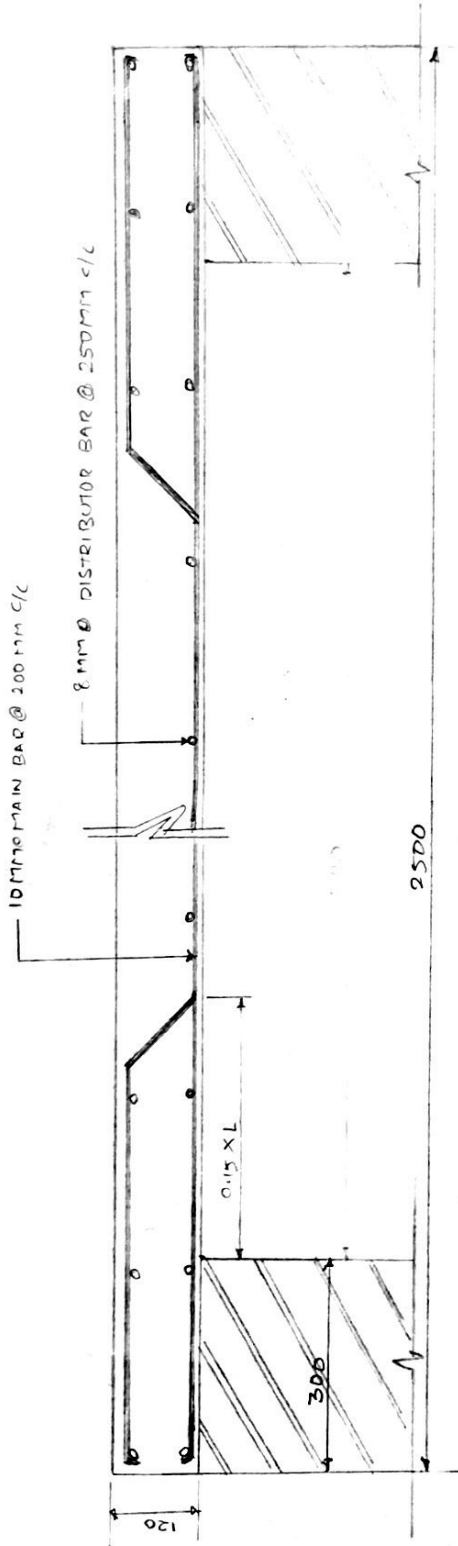
(b)



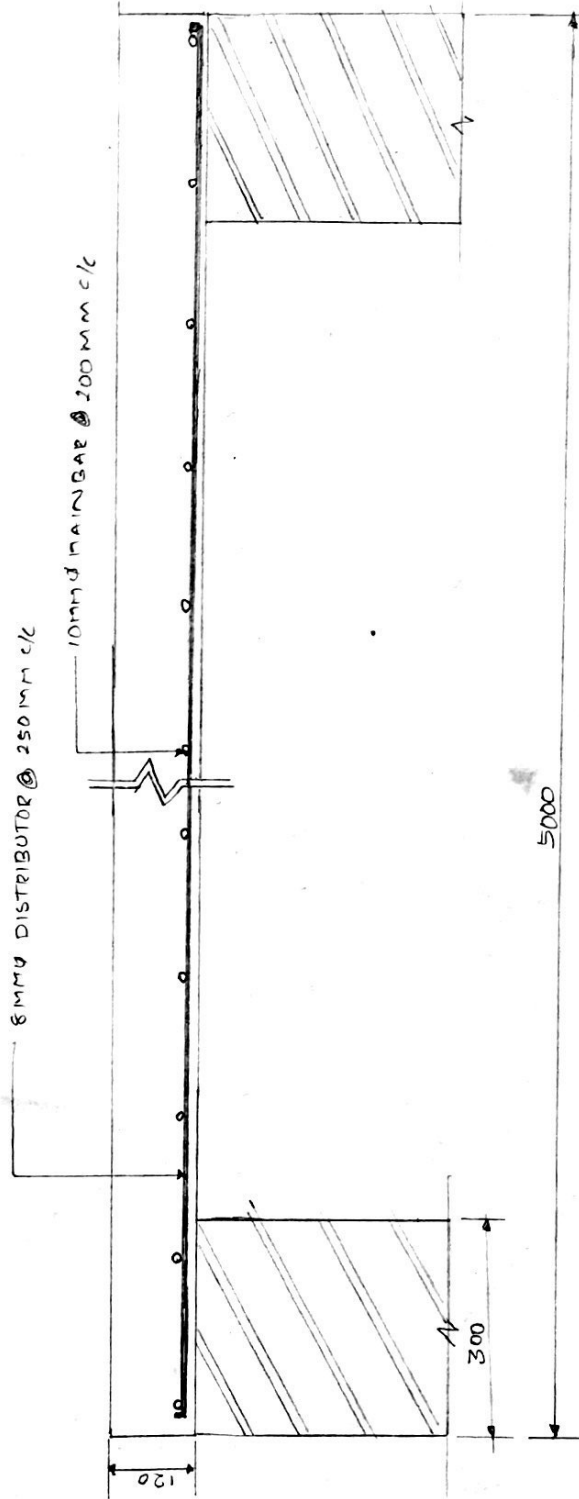
(b)

Correct figure - 2+2 = 4 marks  
 Reinforcement - 1+1 = 2 marks  
 Dimension - 1+1 = 2 marks  
 Detailing - 1+1 = 2 marks  
 TOTAL - 10 MARKS

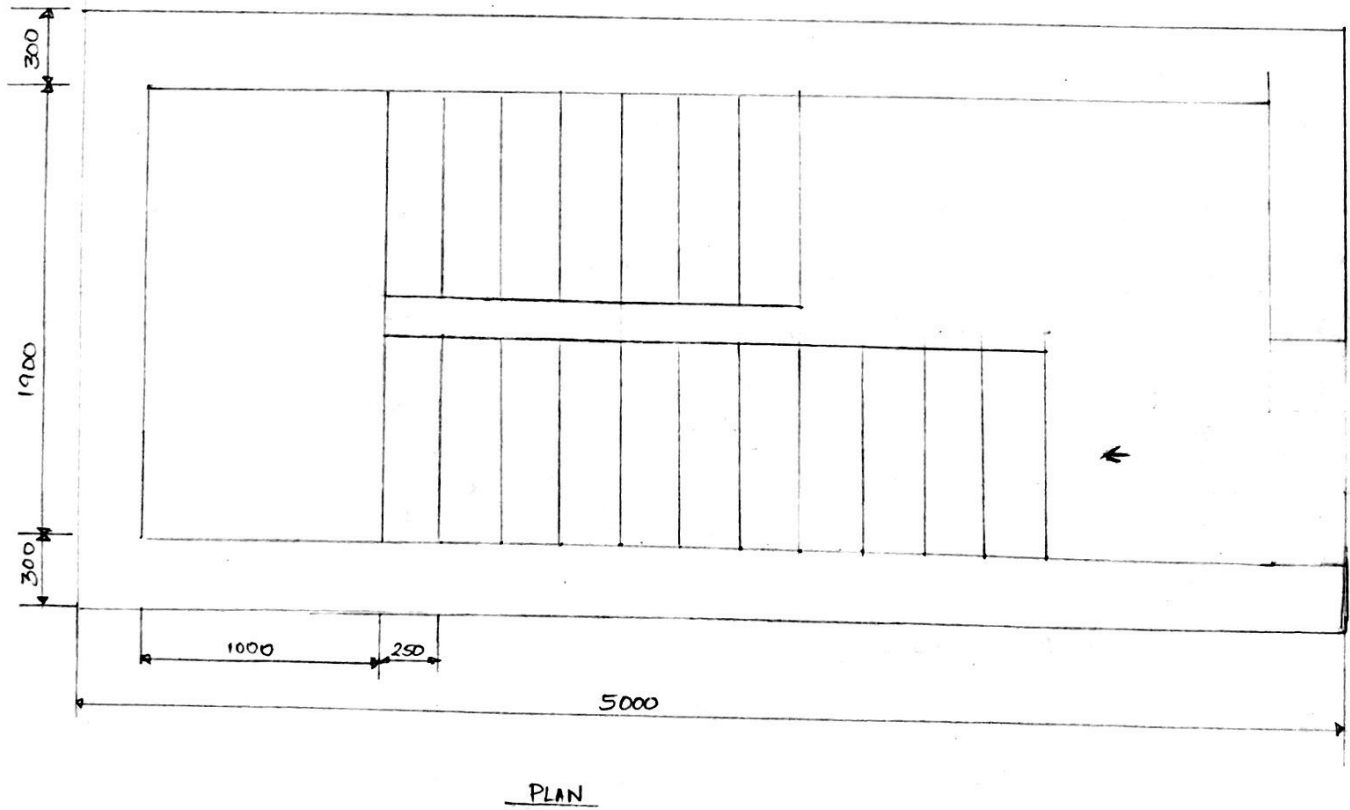
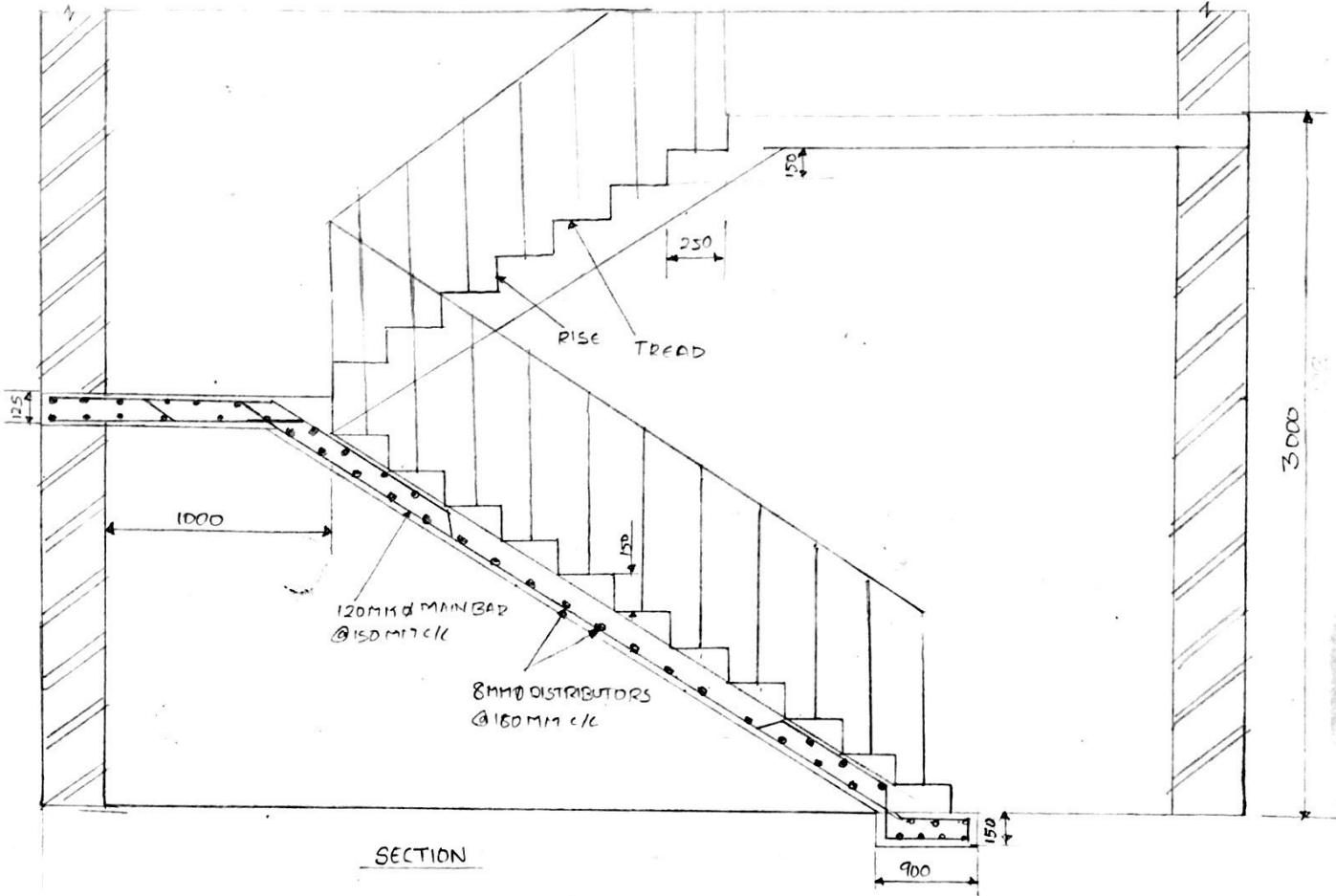
II

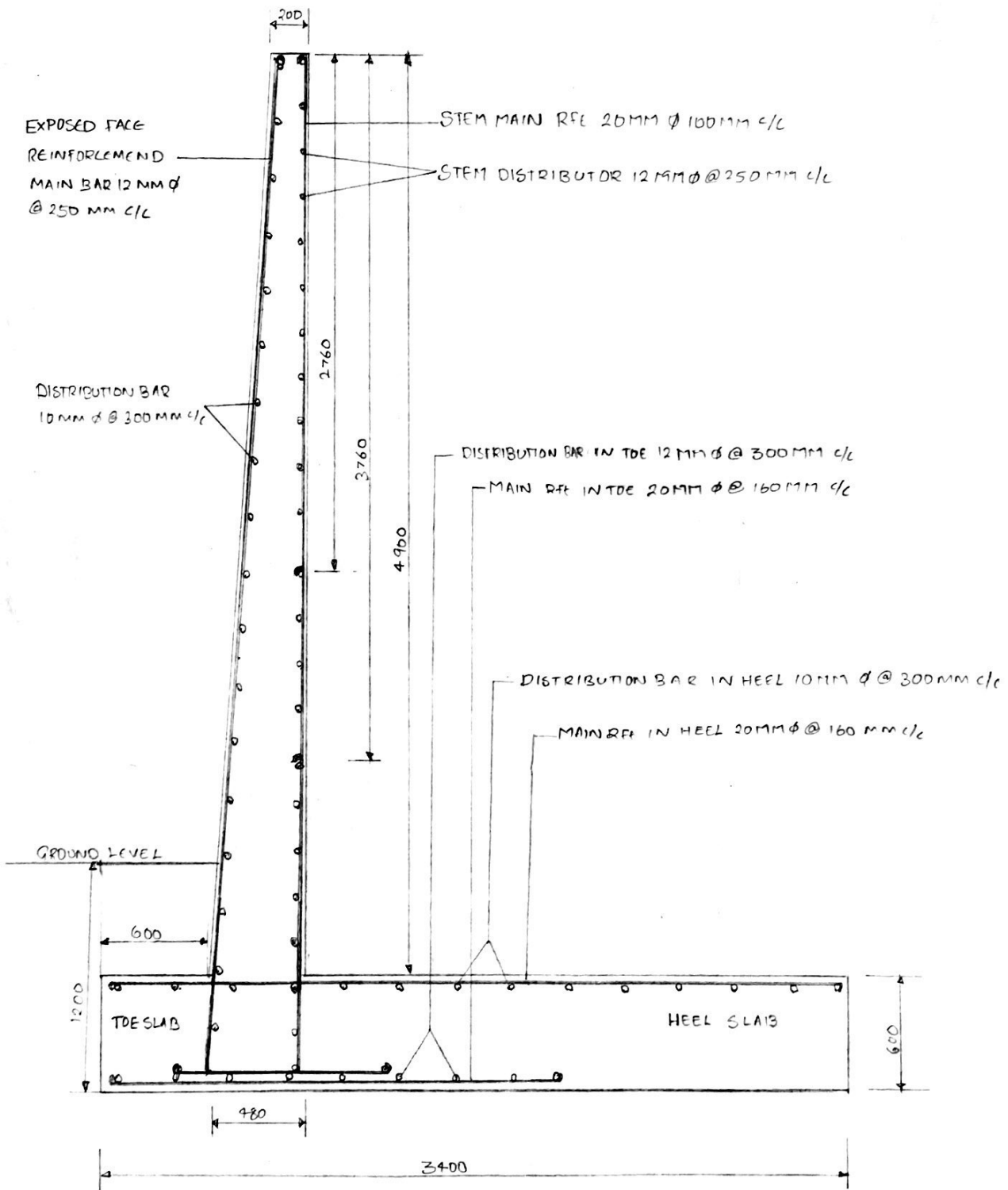


CROSS SECTION OF SLAB ALONG SHORT SPAN

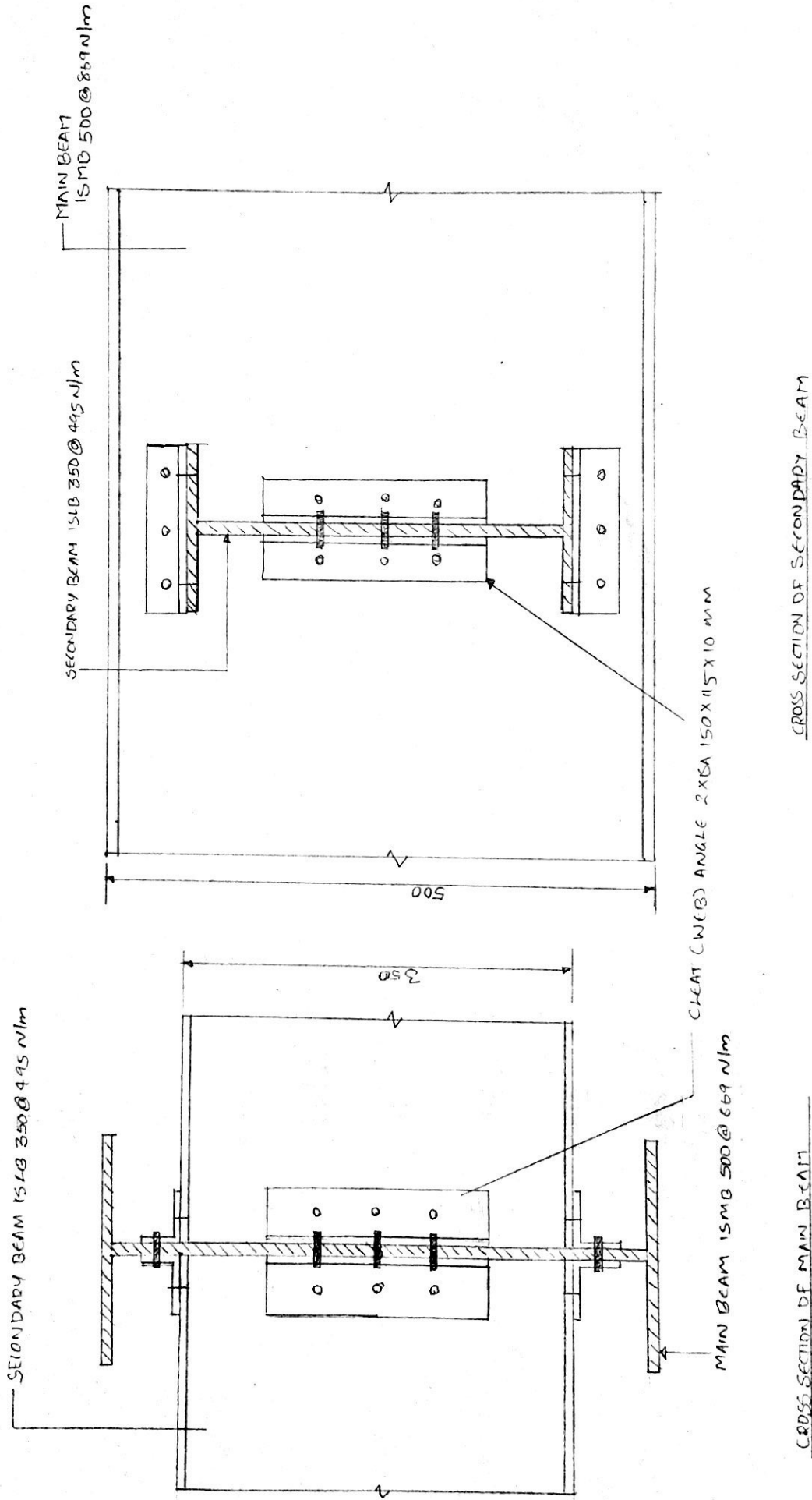


CROSS SECTION OF SLAB ALONG LONG SPAN

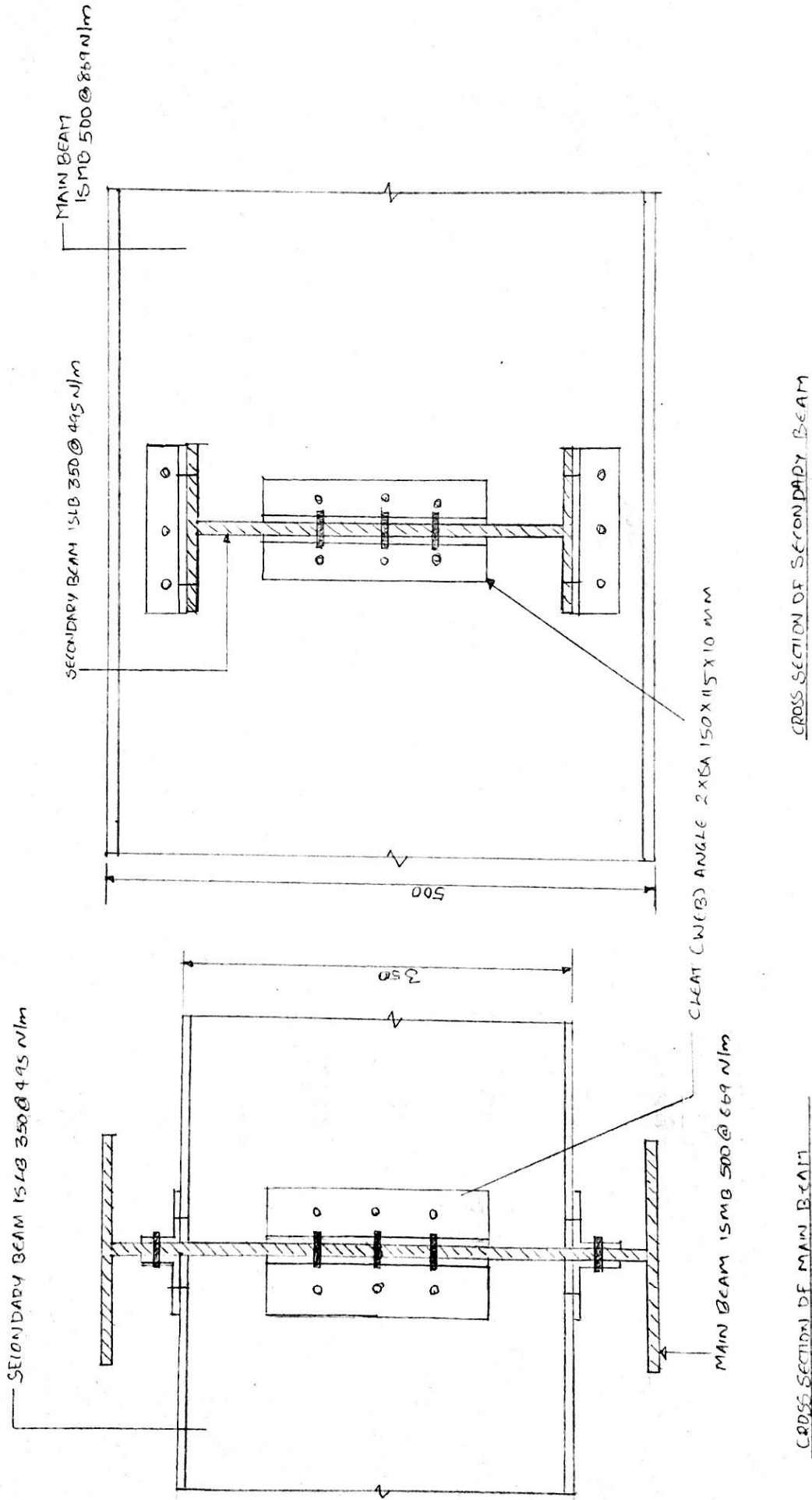


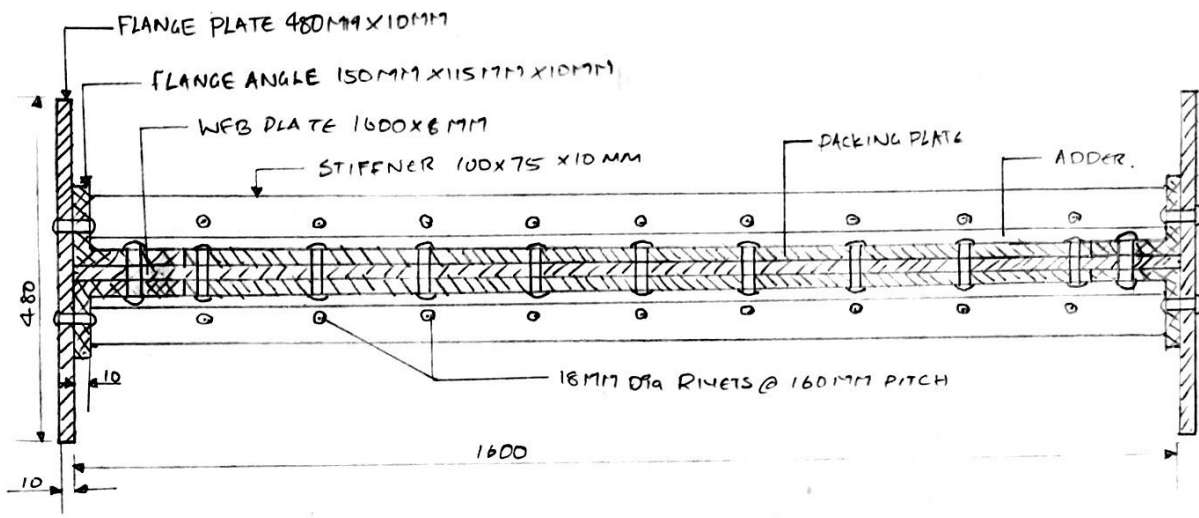


v) a.



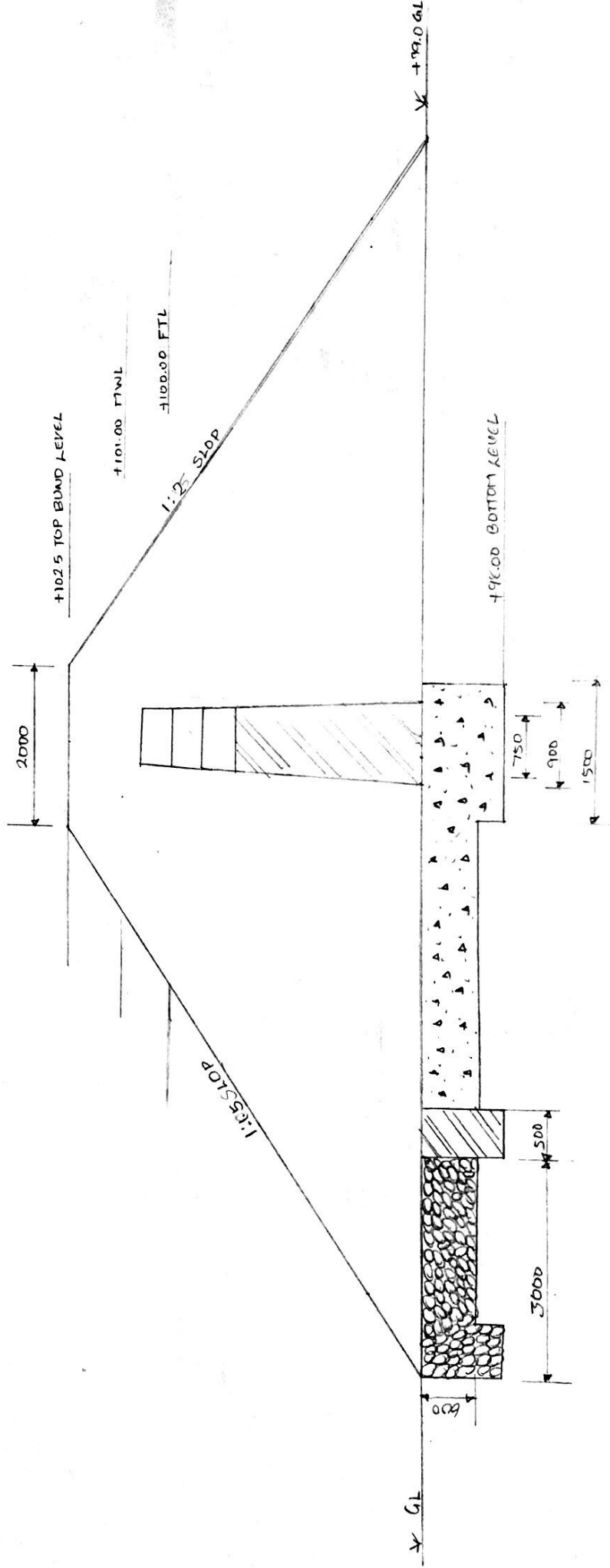
b.



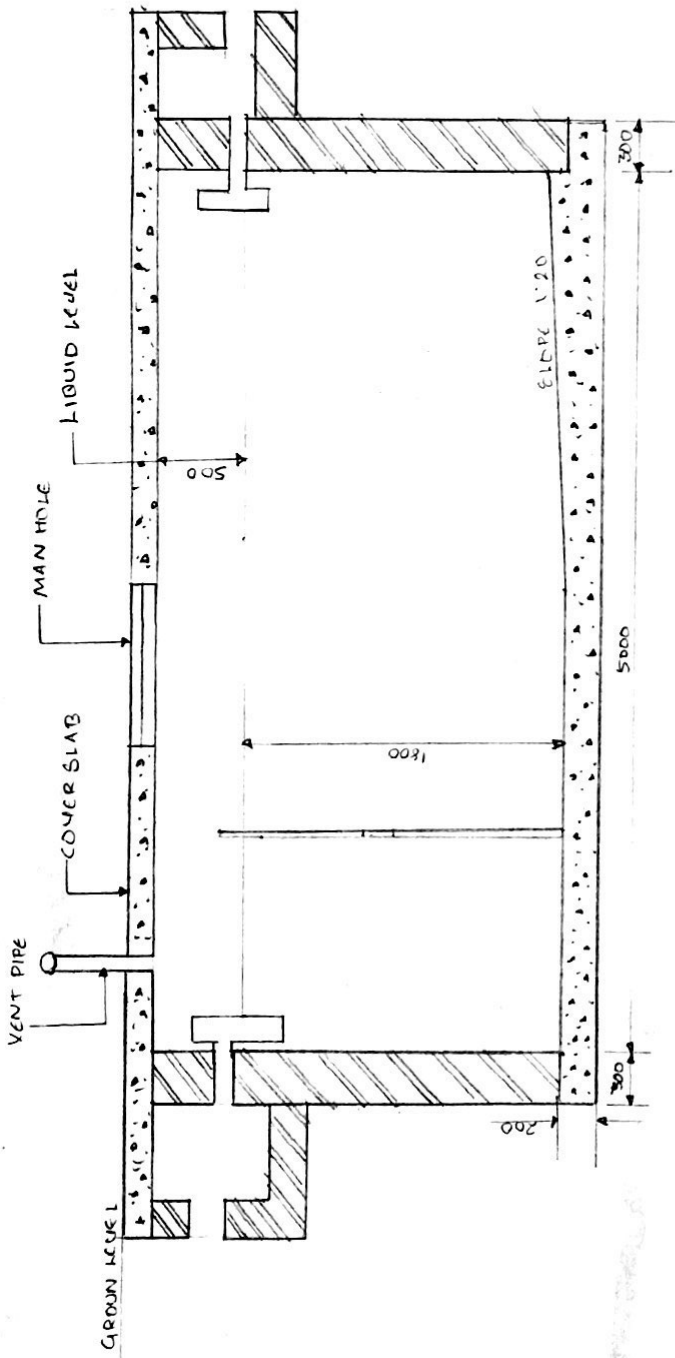


CROSS SECTION

VII

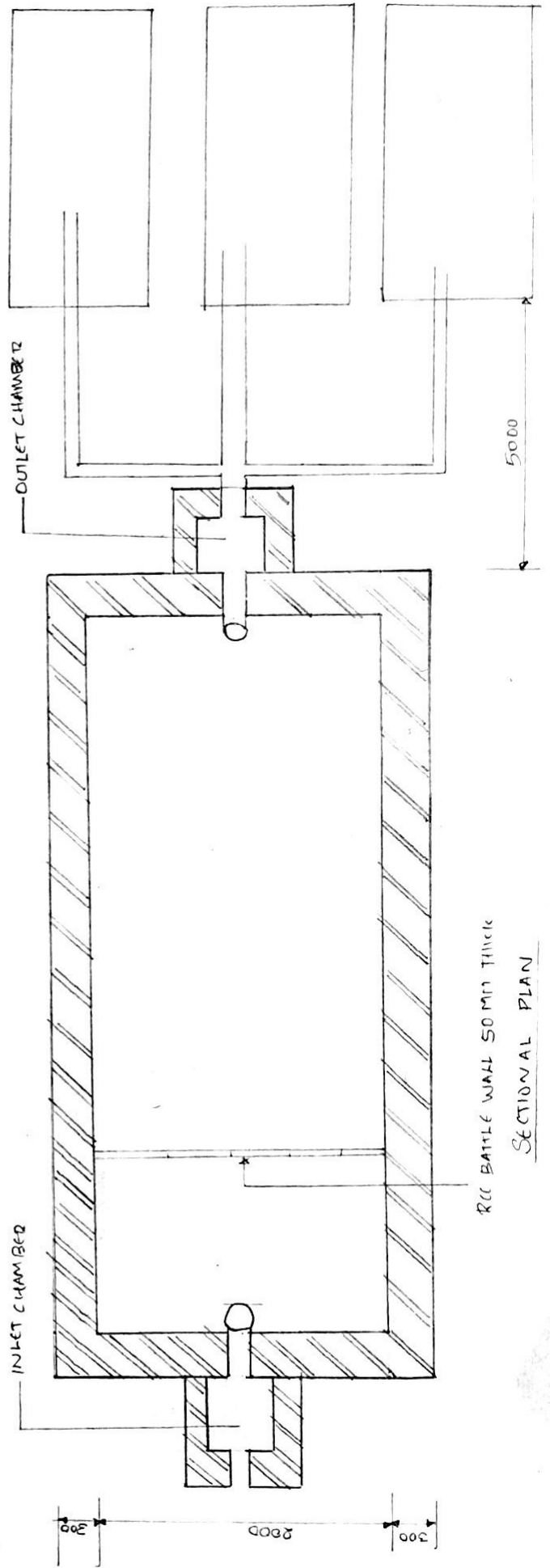


VIII (b)



(a)

LONGITUDINAL SECTION



RCC BATTLE WALL 50 MM THICK

SECTIONAL PLAN