

**SPECIFICATIONS**  
**&**  
**SPECIAL CONDITIONS**  
**FOR**  
**CONSTRUCTION OF**  
**OHSRs**

**WATER SUPPLY & SANITATION**  
**DEPARTMENT PUNJAB**

# RCC OHSR

## Specifications For Over Head Service Reservoir (OHSR)

### Schedule No. 1

Construction of One No RCC, OHSR of \_\_\_\_\_ city with sill level not to be less than \_\_\_\_\_ m and FSL. not to be less than \_\_\_\_\_ m. from ground level in village \_\_\_\_\_ complete with external R.C.C. stair case with landing slabs at each staging, R.C.C. roof, ventilator, Automatic Water level control device, single manhole cover, lightening conductor etc. complete as described in schedule No. 3 duly tested and handed over in proper working order to the Engineer.

### SCHEDULE NO. 2

#### Item No.

#### Description of rate of OHSR

The lump-sum rate quoted for this component shall include the cost for providing and installing inlet, outlet, scour and over flow, Double flanged, CI cast iron pipes as per (IS 7181-1986 or latest) schedule no.3 including cost of CID/ F Expansion joint conforming to (IS-1536-1989 or latest ), Bell mouth. D/F puddle collars as per DWSS standard design on the basis of enclosed drawing. (Drawing 21-C attached), Duck foot bends conforming to ISI-13382 and CI D./ F sluice valves, ISI marked (IS-14846-2000 or latest) one each with inlet, out let and scour pipes along with construction of suitable size Haudis, Cement, TMT Steel and painting of all components shall be included in cost complete in all respects to the entire satisfaction of the Engineer in Charge.

The lump sum price of the OHSR shall also include the cost for jointing material including cost of nuts and bolts (ISI marked) rubber sheet, MS clamp made out of 50mm x 6mm flat in two halves, each set fixed with 5 Nos. Nuts and Bolts with each pipe complete as per Drawing including any material required It should be noted: -

- a) The construction of OHSR shall be based on the designs and drawings provided by the DWSS.
- b) That the bidder shall review the designs and drawings provided with the bid documents and point out deficiencies if any and that the bidder shall be responsible for the structural stability and water tightness of the OHSR.
- c) Before commencement of the work the bidder should take the SBC of foundation soils and satisfy that the design furnished by DWSS conforms to the same SBC.

*Extra payment on account of revision of design based upon the actual SBC, less than prescribed i.e. 8.75 t/m<sup>2</sup> ((to be got tested from the reputed institute such as PEC Chandigarh/ TTTI Sector 26 Chandigarh GNEC Ludhiana etc./reputed consultant ) shall be made as per allotted rates. If the rate for the item has not been quoted, the same shall be paid at CSR plus ceiling premium applicable at the time of tendering.*

### SCHEDULE NO. 3

Specification for the construction of 1 No. reinforced cement concrete overhead service Reservoir of \_\_\_\_\_ litres capacity and works contingent there to at Village \_\_\_\_\_.

#### 1. **Definition:**

In the specification the term "works" means the reinforced cement concrete overhead service Reservoir mentioned in paragraph 2 below which may be let out on contract. The term Engineer / Executive Engineer means the Engineer / Executive Engineer P.W.D. W/S & Sanitation (RWS) Circle/Division \_\_\_\_\_. The term "Engineer" means the Executive Engineer, W/S & Sanitation Branch under whose Executive charge the construction of the Reservoirs will be carried out. "Contractor" means the persons or firm

whose tender for the construction of the Reservoirs is accepted and the term "contract" means the contract covered by the contract agreement to be entered into by the said contractor with the Engineer concerned for carrying out and completion of the said work.

2. **Situation and Short Description of Work:**

1 No. R.C.C. overhead service reservoir of \_\_\_\_\_ liters capacity with FSL \_\_\_\_\_ m and Sill Level not to be less than \_\_\_\_\_ M from ground level is to be constructed at village \_\_\_\_\_.

3. **Consideration for contract and extent of work:**

The contract price payable to the contractor in respect of each reservoir shall be the consideration for all and every description of work done, executed and performed in and about and incident to the work described or mentioned in this schedule and in the drawing or intended so to be, whether the same shall be incidental and necessary to the ultimate completion or only for the temporary purpose of the said work or be required for the carrying out of such precautions as the Engineer may require for the protection of the public workman and work and also existing etc. or as set out in the condition of the contract. The work shall include the construction of the reservoir as mentioned in paragraph 2 above and of testing the integral parts of the reservoir for their structural strength as set out hereinafter, filling the reservoir to the full supply level with water and testing this for the water tightness and also making good all defects to the satisfaction of Engineer. It also includes other incidental items of work, matters and things required to make the work a satisfactory structure in all respects and complying with the contractor's guarantee as incorporated in schedule.

4. **Drawing and structural Designs:**

The DWSS shall supply structural drawings of the OHSR/water tank to the contractor at Bearing Capacity of 8.75 tonne per sq. m. The contractor shall examine the drawings /design and convey his acceptance in writing within 10 days that design/drawings are structurally safe and he is fully satisfy with the design and is willing to execute the construction work as per design. In case the contractor is not satisfied with the departmental design he can upward revise the structural design with the written approval of the engineer. However, no extra amount will be payable for such upward revision of design, except on account of lesser SBC. The contractor is NOT ALLOWED to DOWNWARD REVISE the design supplied by DWSS. The contractor is fully responsible for the structural safety and serviceability of the structure during its life span.

*Extra payment on account of revision of design based upon the actual SBC ((to be got tested from the reputed institute such as PEC Chandigarh/ TTTI Sector 26 Chandigarh GNEC Ludhiana etc/ reputed consultant) shall be made as per allotted rates. If the rates for the item has not been quoted, the same shall be paid at CSR plus ceiling premium applicable at the time of tendering.. The design shall be supplied to contractor by the department and the contractor may accept the design and convey his acceptance or otherwise if does not accept the design he may upgraded the design with the written approval of the Engineer but he shall not be allowed to down grade the design. However no extra payment shall be made, for such upward revision, to the contractor. The contractor shall be fully responsible for structural safety of the tank for its life time.*

**5. Possession of the Site:**

The Engineer shall, as soon as practicable after the acceptance of the tender /structural drawings or the execution of the contract agreement as the case may be given to the contractor the use of the site of the respective works covered by his contract, so as to enable him to commence and continue the execution of the work included in his contract but the non-delivery of the use of such site or sites or any part thereof, shall not affect the contract of this specification and shall not entitle the contractor to any increased allowance.

**6. Contractor to be responsible for accidents or damages:**

The contractor shall be responsible and answerable for all accidents and damages of any kind arising and anything to the detriment of any person or persons whatsoever which may occur during the performance of the contract and which in the opinion of the Engineer are consequent upon or in any way attributable to the execution of the work and he is forthwith to reimburse and compensate at his own costs and charge, the Government, or other injured or aggrieved parties as the case may require for all expenses, losses or injuries which may be there in consequences of any such accident or damage or may have sustained or become liable for and in the event of the contractor failing to meet reimburse or defray any claims costs and charges in respect of such accidents, the Engineer or some other person appointed by the Government may settle all claim and restore any damage done and the cost shall be deducted from any money due to the contractor or shall be recovered from him.

**7. Pumping and De- Watering:**

The contractor shall at his own costs and charges at all time during the period of the contract, provide and maintain in good working order and repair, and shall operate by day and by night an adequate number of pumping sets and equipment with all accessories of suitable capacity and design to the full satisfaction of the Engineer and shall keep the trenches and other excavation clear of rain/flood/ underground water to extent necessary in the opinion of the Engineer for proper construction of the work. For draining water from the work and for the disposal of such water in a manner to be approved by the Engineer shall be deemed to be temporary works incidental to the construction work and as set out in clause 3 herein before. The full costs thereof are included in the lump sum price of the contract and no other payment shall be made to the contract in respect of any work he may carry out and any expenditure he may incur in compliance with the terms and conditions of this close.

**8. Interference with or damage to other works:**

The contractor shall not cause any interference with the work of any other contractor engaged on the construction of the water works near the site of reservoir and shall take all due precaution to prevent his work / people from causing damage to the work of other contractor while in the course of construction and testing the reservoir.

**9. Supervision of Contractor:**

As soon as after the acceptance of the tender, the Engineer may direct, the contractor that he shall depute a competent Engineer of his staff to take charge of the work and get it done under his supervision.

## 10. Water

All water to be used on the work shall be clean fresh water to be obtained from a source to be approved by Engineer. It shall be entirely free from brackish salt, alkaline, acidic, vegetable or mineral impurities shall be stored and carried in clean tanks and vessels. The contractors shall provide at all times an ample supply of water for all purpose to the full satisfaction of the Engineer. If the water supply scheme of the department is commissioned and water supply line adjacent to the site of O.H.S.R. is passing through, a water connection for construction purpose shall be provided to the executing agency. The recovery of the water charges shall be made @ 1 % of the LS contract amount.

## 11. Cement concrete:

### i) Coarse aggregates:-

Aggregates most of which are retained on 4.75 mm screen IS Sieve and contains only as much fine material as is permitted in IS 383 for various sizes and grading is known as coarse aggregates. Coarse aggregates shall be as coarse aggregates, gravel or brick aggregates shall be obtained from approved / authorized sources.

### ii) Fine aggregates / sand:-

Fine aggregates shall consist of natural, crushed stone sand or crushed gravel sand conforming to IS 2686-1977. Silt content in the fine aggregates shall not exceed 8%. The method of testing silt content is described below:

A sample of sand to be tested shall be placed without drying in a 200 ml measuring cylinder. The volume of the sand shall be such that it shall fill the cylinder upto 100 ml mark.

Clean salted water (in the ratio of one tea salt to 1/2 L of water) shall be added upto 150 ml mark. The mixture shaken vigorously, last few shakes being sidewise direction to level to level off sand and the contents allowed to settle for 3 hours.

The height of the silt visible as settled layer above the sand shall be expressed as a percentage of the height of and below. The sand containing silt more than the permissible shall be washed so as to bring the silt contents within allowable limits. The fineness modulus of the sand shall be between 2.6 and 3.5. The screens shall conform to IS 460.

In all reinforced concrete work, the mix of cement concrete shall be as per latest provisions of IS-456/2000, IS-3370 (Part 1 to V) as approved by Engineer, with upto date amendments.

The concrete mix shall be designed as per Handbook On Concrete mixes, SP 23 - 1982 6<sup>th</sup> reprint November 2001 or the latest taking the following factors as described under the "HEAD DESIGN OF M25".

Design mix M25 shall be used for all components of OHSR. The nominal covers shall be as per IS 456-2000

The consumption of cement shall be maintained between 413 (8.25 bags) kg and 425 kg (8.5 bags) per cum of concrete. The workability (compactability factor 0.75 -0.80), K factor ( a statistical value depending upon the accepted proportion of lower results and the number of tests, 1.65) water cement ratio ( maximum 0.5), standard deviation (4.0) and degree of quality control expected in the field ( fair ) of concrete shall also be specified for design of concrete mix. Correct water cement ratio (as prescribed in the design of concrete mix) is to maintain at all the time.

Only weigh batching shall be allowed for platform (with wheel barrows) / spring dial type weighing machine should be used. Following precaution shall be taken while using a weigh batcher:-

- i) Calibration of dial regularly: Engineer or his representative should make sure that the reading shown by machine is real weight of the materials being weighed. This can be done by putting known weight in the bucket say 2 to 3 bags of cement ( 100 to 150 kg ) and see if the machine is showing the actual weight. Necessary repairs may be attended if the reading is not correct. This exercise should be done daily before the work is started.
- ii) Installation of machine in perfect level: Any weigh batcher even the platform scale should be fixed in perfect level. Even the slight tilt may result in incorrect values. The level should also be checked daily.
- iii) No material of any kind shall be brought from any other than the one supplied for designing the concrete mix.

Sampling:-

The frequency of concrete sampling shall be as per the table below:

Quantity of concrete delivered ( Cum )	Number of Samples each consisting of 6 specimens
Less than 5	1
6 to 15	2
16 to 30	3
31 to 50	4
51 and above	4 Plus one additional sample for each additional 50 cum or part thereof

Each sample shall consist of 6 no cubes of size 15x15x15 cm. out of these 6 no. cubes 3 shall be tested on 7<sup>th</sup> day and the remaining 3 shall be tested on 28<sup>th</sup> day.

**1. Method to be used for compression tests of concrete Samples during the progress of works:**

**Sampling the concrete**

(a) Concrete for the test specimens shall be taken at the point of deposit to ensure that the specimens are representative of the concrete in the structure. 6 numbers of samples shall be taken from different points. Each sample shall be large enough to make at least one test specimen consisting of 6 samples. Samples shall be taken from Foundation Ring beam, all the braces, Column section from brace to brace, Ring beam, bottom and top dome and from each lift of container walls and stair case. The samples shall be got tested by the contractor at his cost from any of the Engineering colleges or Govt. approved Laboratory. The location from which samples is taken shall be recorded.

**(b) The test specimen**

The test specimen shall be of 150x150x150 mm cube. The test specimens shall be made from each stage as mentioned above at which tests are required.

The mould shall be of metal inner faces accurately machined in order that the opposite side of specimens is plane and parallel. Each mould shall be provided with a metal base having a smooth machine surface. The interior surface of the mould and the base shall be lightly oiled before concrete is placed in the mould.

Test specimen shall be moulded by placing the fresh concrete in the mould in 50mm layers. At least 35 strokes of 25 mm bar shall be given in each layer.

Where mechanical vibrators are used for compacting the concrete the test specimens will be compacted with mechanical vibrator or by hand. The vibrators be used for members above 115mm x 115mm in size.

Test specimens shall be marked with the date of casting and when sent to the laboratories they shall be accompanied by particulars giving the proportion of the concrete and the position in the work from which the samples were taken.

(c) **The storage of test specimens.**

The test specimens shall be stored at the site at a place free from vibration under damp sacks for 24 hours (plus ½ hours) after which time they shall be removed from the mould marked and shall be moist cured to relate to the actual site conditions and will reach laboratory at least 24 hours before the test where they shall be similar stores in water till test time.

(d) The test shall be made at the laboratory fixed by the Engineer at age of 7 and 28 days. Compression test shall be made between smooth plane steel plates without the packing and the load shall be applied exactly at the rate or approximately 2000 lbs, per sq inch (907.1kg per 6.44 sq.cm.) per minute. One compression plate of the test machines shall be provided with a ball seating in the form of a portion of a sphere, the center of which coincides with the central point of the face of plate. Test specimens shall be placed in the machine in such a manner that the load is applied to the sides of the specimens as these are cast.

**Acceptance criterion :**

- i) 7 days' tests :  
Average of the 3 samples should be accepted as the compressive strength of the concrete provided the variation in individual specimen is not more than  $\pm 15\%$  of the average. The difference between the maximum and the minimum strength shall not more than  $\pm 30\%$  of the average strength. If the difference between the maximum and the minimum strength exceeds, then 28 days' test must  $\pm 30\%$  of the average strength then 28 days' test must be performed.
- ii) 28 days' tests :
  - a) Average of the 3 samples should be accepted as the compressive strength of the concrete provided the strength of any individual cube shall neither be less than 70% nor higher than 130% of the specified strength.
  - b) If the actual average strength of the accepted sample exceeds specified strength by more than 30%, the Engineer shall further investigate the matter, if he so desires.
  - c) If the actual average strength of the accepted sample is less than 70% of the specified strength, shall be rejected.

13 **The cubes shall be tested in the presence of any of the following two officers i.e. EE, SDE, JE , AE.**

14. **Bearing Capacity :-**

The SBC shall be got tested from the reputed institute such as PEC Chandigarh/ TTTI Sector 26, Chandigarh, GNEC Ludhiana etc/ reputed consultant. SBC shall be tested in the presence of Engineer or his representative. He would seek approval of Superintending Engineer for such less SBC before allowing the revision of design.

15. All cement concrete used in R.C.C. work shall be poured by mixing it in a mechanical mixer to be arranged by the contractor at his own cost and charges. All reinforced/ concrete

work shall be compacted with mechanical operated vibrators. The concrete surface as turned out after removal of shuttering shall be allowed to stay & is not to be finished with plaster or with patches of plaster or smeared with cement slurry & snowcem too. Shuttering of cement concrete should be smooth so that finishing is of good standard. Only steel shuttering be provided for the sections having thickness more than 450 mm, for other sections, particularly domes, the wooden shuttering may be provided with inside iron sheet cladding. Verticality of columns and Horizontality of braces must be ensured throughout the construction right from beginning. If square columns are provided then these should be kept perfectly square and corners should be chamfered with. The Engineer may require a reasonable number of tests to be made on the concrete during the progress of the work. Not less than 6 specimens shall be made for each test. The specimen shall be cured under field conditions. If the specimen fails to comply with requirements set out above the Engineer will have the right to order the demolition of such work as he may think to have been carried out in weak concrete at the cost of the contractor and no payment shall be made for the faculty construction. The method of making work cube test shall be according to that given in Appendix A headed he Engineer method to be used for compression test of concrete samples during the progress work. The Engineer shall have the right to order the test materials entering into R.C.C. work to determine their suitability for the purpose. The cost of all such test shall be borne by the contractor. All the faulty materials so found shall be removed from the site of the work by the contractor at his own cost within the specified period as fixed by the Engineer.

16. **Curing :** The contractor shall be responsible for carrying out curing of R.C.C. work with suitable mechanical (electric motor/diesel Engine Operated) device capable of lifting water upto top dome of OHSR for 28 days.

**The work shall only be started after such arrangement is installed at site and got approved from Engineer or SDE concerned.**

17. **Steel and Cement**

- i) **Steel :** All steel used in the reinforcement shall be tested and the test report shall be submitted for examination to the Engineer, for all the batches/ lots. It shall conform to the latest I:S 1786- 1985 ( reaffirmed 2000 ). However, the Engineer may it test any batch any time at the cost of contractor. Only **SAIL, RASHRIYA ISPAT AND TISCO** makes shall be allowed.

The trade mark and the strength identification mark shall be engraved on bars.

Physical properties of steel bars :-

Property	Grade Fe 415
0.2 % proof stress/ yield stress, min. N/mm <sup>2</sup>	415
Elongation, percent min. on gauge length 5.65A, where A is the X-Sectional area of the test piece	14.5
Tensile strength	10% more than actual 0.2% proof stress but not less than 465 N/mm <sup>2</sup>



Allowed tolerance in the nominal mass :-

Nominal size in mm	Tolerance on nominal mass Percent		
Upto and including 10 mm	$\pm 7$	$\pm 8$	$\pm 8$
Over 10mm, upto to and including 16 mm	+ 5	- 6	+6
Over 16 mm	$\pm 3$	- 4	$\pm 4$

18. **Minimum Lap length:**

Lap length including anchorage value for bars in flexure tension shall be  $L_d$  or 30 times the dia. of bar whichever is greater and for direct tension shall be  $2L_d$  or 30 times the dia. of bar whichever is greater. The straight length of the lap shall not be less than 30 times the dia. of bar or 200 mm. the following provision shall also apply:-

- i) Top of section as cast and the minimum cover is less than twice the parameter of the lapped bar, the lap length should be increased by a factor of 1.4.
- ii) Corner of the section and the minimum cover to either face is less than twice the dia. of lapped bar or the clear distance between the adjacent laps is less than 75 mm or 6 times the dia. of the lapped bar whichever is greater, the lap length shall be increased by a factor of 1.4 .
- iii) Where both the (i) and (ii) apply the lap length of by the factor 2.0. The splices in tension members shall be enclosed in spirals made of bars not less than 6 mm dia. with pitch not more than 100 mm.
- iv) The lap length in compression shall be equal to development length in compression, calculated as per below but not less than 24 times the dia of lapped bar:

$$L_d = \frac{(\text{nominal dia. of the bar}) \times (\text{stress in bar at the section considered at design load})}{4 \times (\text{design bond strength})}$$

- v) When the bars of two sizes are to be spliced the lap length shall be calculated on the basis of the dia. of smaller bar.

i) Cement: All cement used in the construction shall be OPC 43 Grade. Every batch of cement shall be tested. The test report shall be submitted for examination to the Engineer. It shall conform to the latest IS 8112- 1989 (re- affirmed 2000 ). However, the Engineer may get it tested from batch at any time at the cost of contractor. **Only JK (Nimbura) , JP (Bulund), Bangur, Birla Chetak, Vikram , ACC, CCI, Ambuja, Laxmi, chetak, DLF, Shree makes shall be allowed.** The cement shall be supplied with under the guarantee of the manufacturer. The guarantee card shall be supplied by the contractor to Executive Engineer along with all supply lots.

**The cement shall not be stored for more than one month.**

**19. Other factors in design**

- (a) For design of any member of over head service reservoir the allowable stress givens in the relevant IS code shall be adopted with latest amendments.
- (b) Age factor will not be considered while designing the structure.

**20 Mode of construction**

The R.C.C. slabs shall be cast monolithic with the supporting beams. The shuttering and form must be sustainable and unyielding, built to correct dimensions and water tight to the entire satisfaction of the Engineer to preserve the concrete from damages or distortion during setting.

The reinforcement shall be provided as per detailed drawings and calculation supplied by the contractor and duly approved by the Engineer. The contractor shall be responsible for the accurate fixing of the reinforcement and shall not pour any concrete until the reinforcement has been inspected in position and approved by Engineer. The contractor shall take full precautions to prevent the displacement of reinforcement during concreting.

**21 Free Board**

A free board of 0.60m from the full supply level upto the top ring beam as shown in the drawing shall be provided in the reservoir.

**22. Test of water tightness of the reservoir**

The structural stability of the reservoir shall be the responsibility of the contractor. The contractor shall construct the reservoir at his own cost & risk. The reservoir shall be tested after the last bit of concreting. The reservoir shall be absolutely water tight. No sweating shall take place after a period of 20 days of the tank being filled upto full supply level & kept full during the above period. The test shall be carried out after the expiry of the above period and in any case after the tank has been kept filled with water upto full supply level for a period of at least 48 hrs. before the test, the maximum fall in water level shall be not more than 6.25 mm after 48 hrs. during winter and 12.50 mm during summer and it shall also cover all evaporation losses. The water shall be made available for testing by the contractor at his own cost.

**23 Treatment for water tightness:**

The contractor shall state intender the measure if any, proposed for securing the water tightness of the structure. The cost of all such measures shall be covered by the lump sum price of the reservoir.

**24. Cast iron specials, puddle collars, vertical pipes and sluice valve etc.:**

The contract price shall include for providing & fixing of Double flanged as per (IS-1538-1993 or latest ) duly ISI. marked from bottom dome to duck foot bend further upto length of 2.75 m. Beyond the flange of double flanged Bend provided for inlet, outlet, overflow and scour pipes duly erected and tightened with MS clamps fixed on RCC pillars. The overflow pipe shall be further extended by providing a D/F Bend at its end and vertical pipe of 2 m Length. A double flanged Bend duly fitted with GI wire mesh of 10mm square shall be provided at its end. The rate shall also include the connection of these pipes and providing and fixing of Bell mouth & double flanged

Puddle collars, Expansion joints, sluice valves complete in all respects as per detail given below including painting of all components:

Capacity of OHSR (Liters)	Height of OHSR Upto FSL above ground level not to be less than	Height of OHSR Up to sill of bottom dome above ground level not to be less than	Size of C.I. D/F Pipes and Specials (in mm)			
			i. Inlet Pipe ii. D/F puddle Collar iii. Expansion Joint iv. Duck foot Bend v. Sluice Valve	i. Outlet Pipe ii. B/M puddle collar iii. Expansion Joint iv. Duck Foot Bend v. Sluice Valve	i. Over flow Pipe ii. D/F puddle collar iii. Expansion Joint iv. Duck foot Bend	i. Scour Pipe ii. B/M puddle Collar iii. Expansion Joint iv. Duck Foot Bend. v. Sluice Valve
1	2	3	4	5	6	7
25000 LTR			100mm	100mm	100mm	80mm
50000 LTR			100mm	100mm	100mm	80mm
75000 LTR			100mm	100mm	100mm	80mm
100000 LTR			150mm	150mm	150mm	100mm
150000 LTR			150mm	150mm	150mm	100mm
200000 LTR			150mm	150mm	150mm	100mm
250000 LTR			200mm	200mm	200mm	150mm
300000 LTR			200mm	200mm	200mm	150mm

- Sluice valves-C.I. double flanged Sluice valves shall be ISI marked as per IS 14846/2000 or latest.
- C.I. bell mouth puddle collars with one side flanged for outlet and scour pipes to be fixed / grouted in the bottom dome/ slab of the OHSR as per departmental drawing annexed at annexure-II.
- C.I. Double Flanged Puddle Collars (as per W/S & Sanitation. Department to be fixed for inlet and overflow pipes to be grouted/ fixed in bottom Dome in order to extend inlet and overflow Double Flanged pipes in the Tank Portion upto full supply level.
- Expansion Joint-Expansion joints for all sizes given above shall confirm to IS-1536/1989 or latest and shall be fixed in the D/F vertical pipes at 0.6 m above from the top most brace.
- C.I. Duck foot bend:- Duck foot bends of all sizes shall confirm to IS-13382/1992 or latest and shall be fixed at bottom of each D/F pipe and 1mt. Below ground level. The duck foot bend should be duly supported with suitable Cement concrete block to be approved by Engineer.
- Joining material: The lump sum rate shall include for jointing material for all the above items (pipes and specials) such as nuts and bolts "W" make 5/8"x3" long as per IS:3138/1966 or latest. Rubber insertion shall confirm to latest ISI specification and white lead/ safaida to be used shall be of special quality as approved by the Engineer.

7. M.S. clamps: The contractor amount shall also include the cost of supplying and fixing M.S. clamps made out of M.S. flat of 50mmx 6mm to be provided at each joint of vertical pipes. The design of clamps shall be as per detail given in drawing no. D-21 B. attached.

**25. Other fitting and accessories :**

The contract price shall also include the supply and installation of following fittings and accessories:-

- i) R.C.C. landing with railing at all bracing levels, as per tentative drawing no. D-21. attached.
- ii) A reinforcement concrete staircase of 0.9 m. Width with non slip treads including railing of 20mm i/d G.I. pipe B- Class in double rows on both sides of stair case supported on angle iron posts (50x50x6mmx0.8mtrs. height) fixed/ grouted in the stair case and should be painted in two coats after applying priming coat with ready mix of special quality paint to be approved by Engineer in Charge as per Drawing D-21A attached
- iii) One R.C.C. roof ventilator as per drawing D-21 attached .
- iv) 1 no. water indicator comprising of enameled indicating gauge of 15cm width of suitable length, fixed on white aluminum frame of angle 40mm. The plumb/ indicator shall be brass/ lead triangular in shape having base 150mm wide & 200mm height with suitable arrangement for its movement on 10 SWG brass wire. The indicator will be connected to the polythene ball inside the tank (not less than 30cm. Dia) through iron rope of 10 SWG & plug arrangement etc.
- v) One MS 560mmx560mm manhole cover and made of 50x50x8mm angle frame fitted with MS sheet hinged cover of 6 mm thickness. It shall be fixed with cement concrete kerb 2" (5cm) all around. The frame and the cover shall be fabricated in such a way so as to prevent the entry of rain water into the OHSR through the manhole cover.
- vi) The lightning conductor of GI 7/10" SWG (10mm) dia. standard wire with lightning rod of 25mm. Dia 0.9 m. Long with earth electrode 25mm dia. 2.75mtrs. long GI pipe from ground level connecting 50mm dia 1.40 m long perforated GI pipe including fixing of clamps as per IS:2309-1969.
- vii) The vertical pipes, clamps, railings and steel ladder etc. shall be painted in two coats after applying priming coat with ready mix of special quality paint to be approved by Engineer
- viii) 0.9 m. wide RCC gallery fixed with bottom Dome with G.I. pipe railing in two rows as per details of railing mentioned in '(ii)' above.
- ix) The vertical wall shall be extended upto a height of 0.9 m above the top of ring beam of top dome.
- x) Steel ladder from balcony landing to top of the Dome shall be of 60 cm wide made from 65 x 65x 6mm angle iron with two bars of 16mm dia for steel steps welded in angle iron along with G.I. railing in two rows on both sides. Railing should be supported by welding angle iron posts on steel ladder on both sides as mentioned in the drawing should be painted in D 21 attached and two coats after applying priming coat with ready mix of special quality paint to be approved by Engineer in Charge

xi). Aluminum ladder inside the tank shall be 60 cm wide made from Aluminum section LS 974 size, 66.68x31.75x4mm, weight 1.27 Kg/m with steps made out of Aluminum section H, SP 3024 size-35X16.70X1.60mm, weight 0.362kg/m to be fixed one side in the top dome and other side in the bottom dome .

**The tenderer shall guarantee that:**

1. The reservoir to be constructed under this contract shall be absolutely water tight and no sweating shall take place after a period of 20 days of the tank being filled upto the full supply level and kept full during the above period.
2. The maximum fall in the water level including evaporation shall not be more than 6.25m after 48 hours during the winter and 12.50mm during the summer.
3. The reservoir shall be structurally stable and sound in all respect for the conditions of loading, wind pressure, earth quack loads etc. set out above.

**List of drawing attached:**

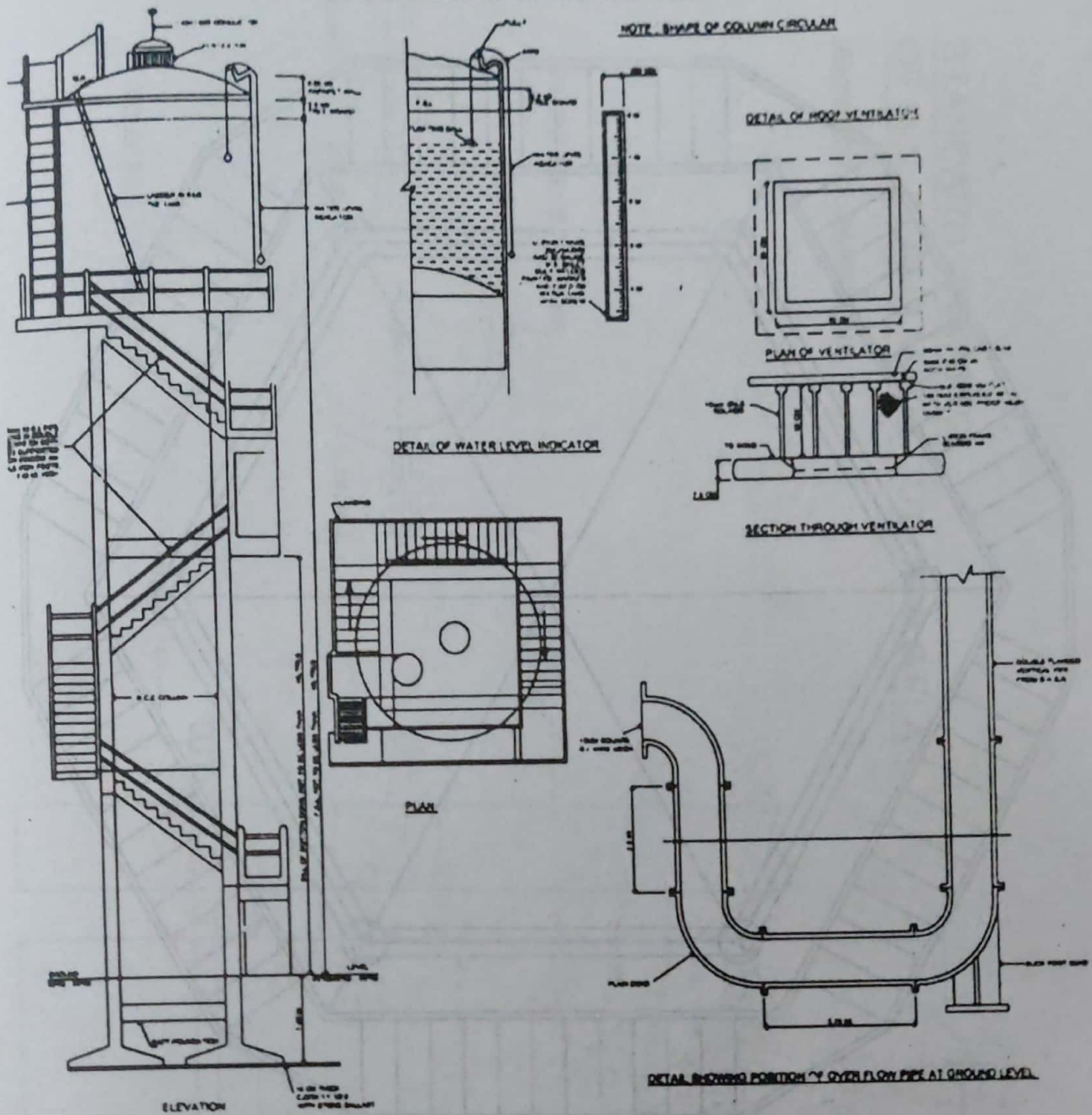
- |                                     |                     |
|-------------------------------------|---------------------|
| a) Schematic Plan & Section of OHSR | D-21 , 21 A to 21 C |
| b) Structural detail drawing        | To be attached.     |
| c) Plinth protection of OHSR        | D-9                 |
| d) L-Section of pumping main        | D-17                |

Sr. No.	Brief Description	Relevant Code reference (with latest amendment)		Remarks
		Indian Standards (IS)	Pb. PWD Book of specification Chapter No.	
1	2	3	4	5
1.	Steel	IS: 1786-1985 (reaffirmed 2000).		sail, Rashtriya Ispat and TISCO
2.	43 grade OPC Cement.	latest IS 8112-1989 (re-affirmed 2000).		Only JK (Nimbura) , JP (Bulund), Bangur, Birla Chetak, Vikram , ACC, CCI, Ambuja, Laxmi, chetak DLF, Shree
3.	Sluice valves for water works purposes (50mm – 300mm size).	780-1994		IVC/ KIRLOSKAR
4.	Non Return Valves			ISI Marked

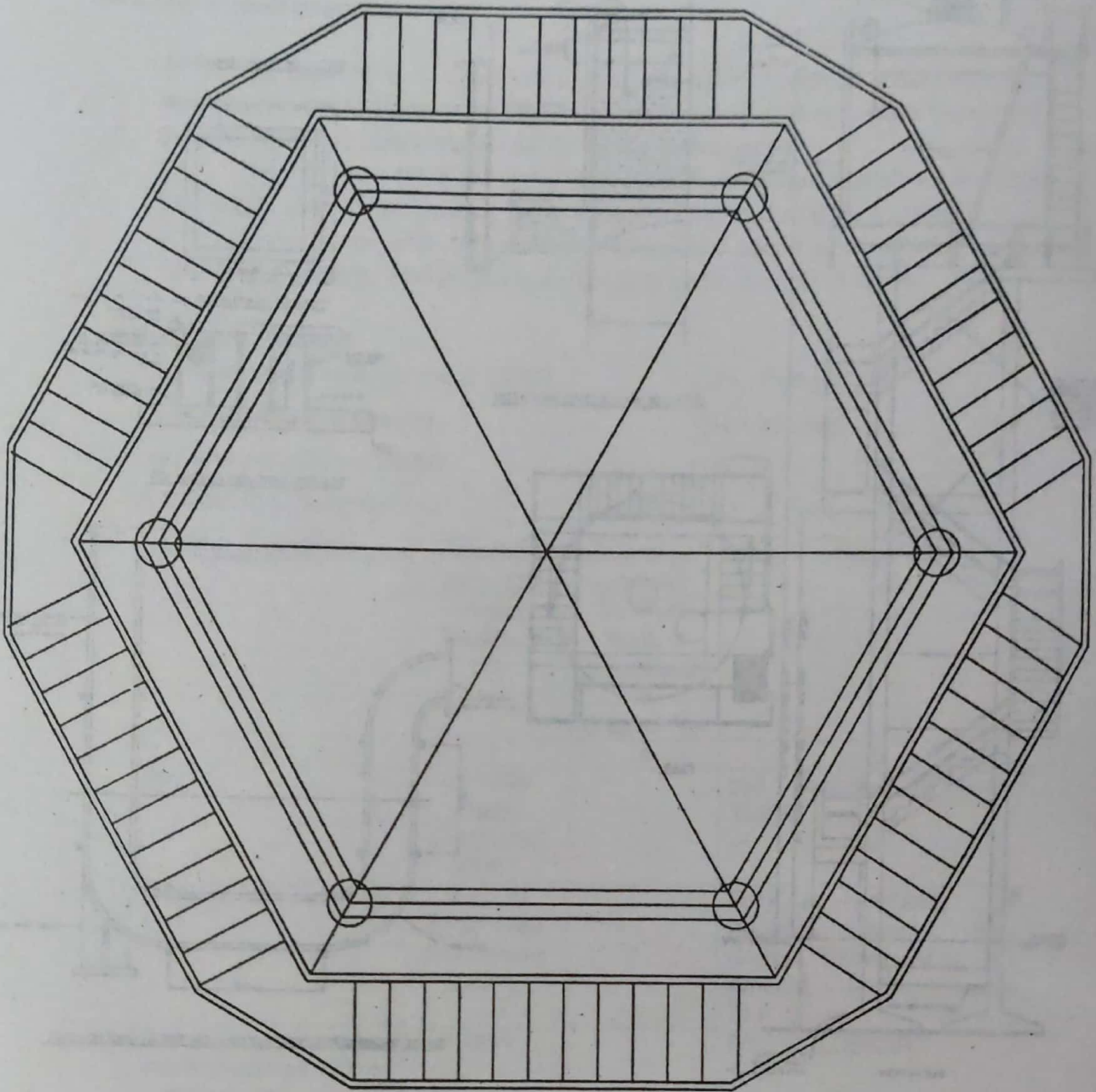
NOTE: The PWD specification book, relevant IS/ISO codes/ any other reference in works relevant to the various material and workmanship etc. shall be read apart from this schedule provided,. However, wherever the provision in this schedule are in variance with any provisions of the above mentioned specification book/ relevant IS/ISO codes/ any other reference, the specification of this schedule shall be followed.

STANDARD DRAWING OF R C C OVER HEAD SERVICE RESERVOIR OF LITRES CAPACITY

WITH SILL LEVEL NOT TO BE LESS THAN METRES +  
 FSL NOT LESS THAN METRES ABOVE GROUND LEVEL



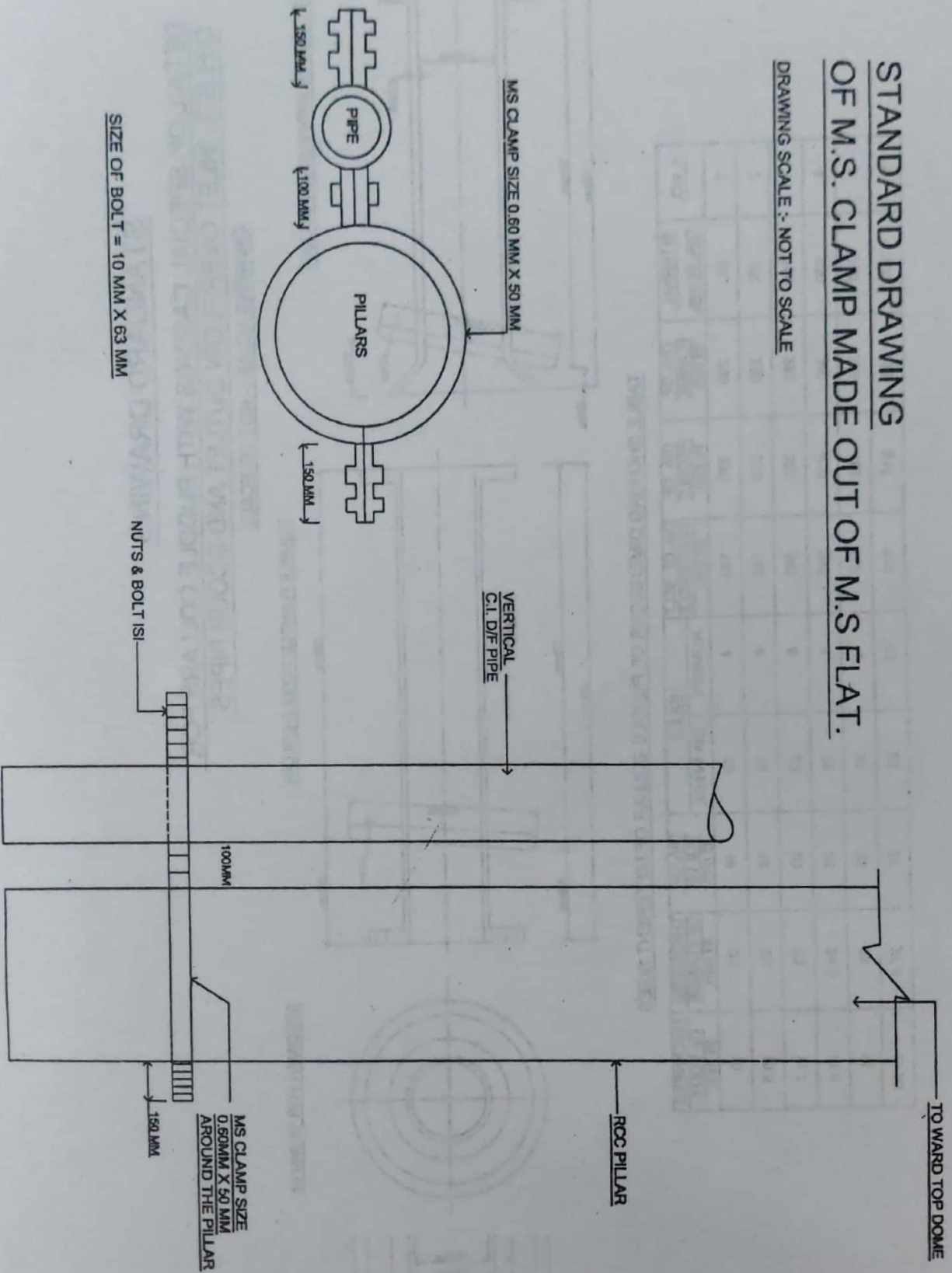
STANDARD DRAWING  
OF PLAN FOR STAIR FLIGHTS



EXTERNAL R.C.C. STAIR CASE 0.90 ML. WIDE  
RAILING IN TO ROWS ON BOTH SIDES

# STANDARD DRAWING OF M.S. CLAMP MADE OUT OF M.S FLAT.

DRAWING SCALE :- NOT TO SCALE



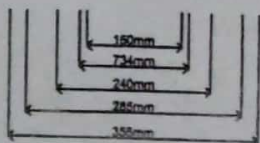
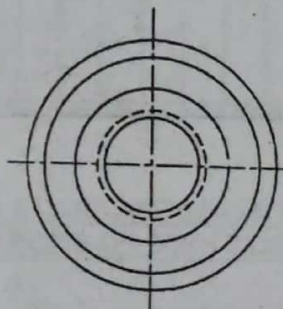
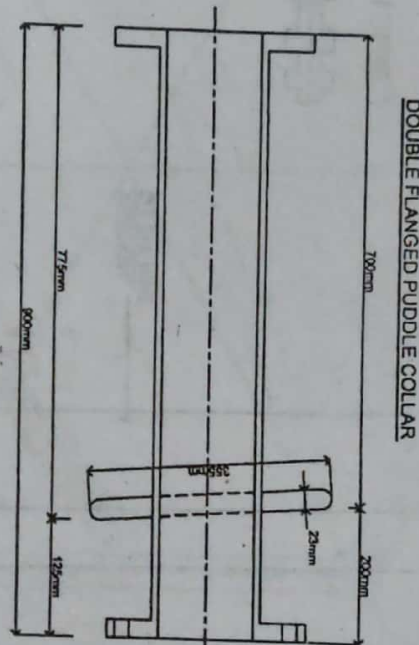
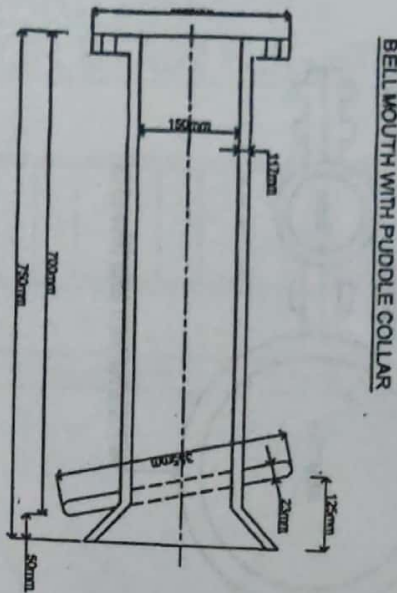
SIZE OF BOLT = 10 MM X 63 MM



**STANDARD DRAWING**

**DETAIL OF SPECIAL CASINGS WITH PUDDLE COLLARS FOR  
O.H.S.R. INLET OVERFLOW OUTLET AND SCOUR PIPES**

DRAWING SCALE :- NOT TO SCALE



SPECIMEN FOR 150MM i/d

TABLE SHOWING DIMENSIONS OF PUDDLE COLLAR OF DIFFERENT SIZES

S. NO.	INTERNAL DIA. IN mm.	DIA. OF FLANGE IN mm.	DIA. OF PUDDLE IN mm.	DIA. OF HOLE CIRCLE IN mm.	NUMBER	HOLES DIA IN MM.	DIA. OF BOLTS IN mm.	THICKNESS OF FLANGE IN mm.	THICKNESS OF BODY IN mm.
1	80	200	270	160	4	19	16	21	10
2	100	220	290	180	8	19	16	22	10.5
3	150	285	355	240	8	23	20	23	11.7
4	200	340	410	295	8	23	20	24.5	12.8
5	250	395	465	350	12	23	20	26	14
6	300	495	515	400	12	23	20	27.5	15.20