

SECTION - 5

TECHNICAL SPECIFICATION

TECHNICAL SPECIFICATIONS

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CHAPTER-I

WORK & SITE CONDITION

WORK AND SITE CONDITION

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WORK AND SITE CONDITION

1.00 INTRODUCTION: -

GENERAL FEATURES OF THE PROJECT

- I. **Providing and Fixing 315 mm Dia. HDPE Pipeline for filling Village Tank Survey No. 364 and 460 of village Balisana Ta & Dist-Patan @ Existing Scour Valve Ch. 7500 mt From Patan(Matpur)-Dindrol Pipeline.**

2.00 LOCATION:-

The proposed site of M.I. Scheme is situated as below: -

The proposed project site is situated near village Balisana Ta.Patan Dist.Patan. The nearest railway station at Patan.

3.00 COMMUNICATION: -

The nearest city & town is Patan is the city of Patan district. Nearest villages are connected through VRB & SH with district and Taluka place.

4.00 Deleted

4.1 Proposed work consists of following: -

- II. **Providing and Fixing 315 mm Dia. HDPE Pipeline for filling Village Tank Survey No. 364 and 460 of village Balisana Ta & Dist-Patan @ Existing Scour Valve Ch. 7500 mt From Patan(Matpur)-Dindrol Pipeline.**
- III. This work includes Steel, Excavation, Earth Work and cement concrete work in as per grade, Steel for various component of etc.

II. PRINCIPAL DETAILS OF WORK:

Works to be performed for the various items included in Bill of Quantities.

The above information is only a general outline and does not in any way limit, the performance of all work and supply of plant, machinery, all labour and materials necessary for completing the works as shown in the approved working drawing and mentioned in the specification.

No extra payment or claim on account of any additions or alteration in working drawing shall be admissible.

5.00 LABOUR:

Availability is good except showing and harvesting period. However, there may be shortage of skilled labour like masons, carpenters' operators, mechanics etc. However, the contractors shall have to make his own inquiry in this regard and quote his rates.

6.00 HOUSING:

Area being highly rural, there is no local housing arrangement available and contractor will have to make his own arrangements for his staff and labour etc. in the area as may be available on rental basis as per tender condition.

7.00 WATER SUPPLY:

The contractor shall have to make his own arrangements of water supply for this work. Fresh use of available water for work will be allowed free of cost to the contractor from the river length flowing in the construction areas and area transferred to Narmada Water Resources, W.S. & K. Department. Contractor shall have to make his own arrangement for Pumping, purification; storage tanks, pipe line etc. for the said purpose at his own cost.

8.00 DRAINAGE:

Suitable and adequate arrangement shall have to be made by the contractor for drainage of water around his colony and work spots. The contractor shall also have to install and maintain at his own cost suitable drainage system to dispose of sewage & solid waste from his colony. The labour colony layout shall be got approved from the Engineer-in-charge.

9.0 CAMP REGULATIONS:

The contractor shall be responsible for maintaining law and order in his camp and on his work, and shall employ such officers, watchman or other persons as required, unauthorized or undesirable persons shall be excluded from the camp and the work. If

in the opinion (which shall not be questioned) of the Engineer-in-charge any employee or agent of the contractor misbehaves and/or causes obstructions in the proper execution or otherwise makes himself undesirable, the contractor shall on receipt of the instruction to do so remove him from the premises.

10.00 MEDICAL AID:

There is no dispensary on Project Site. However, there is a Government Hospital at Taluka Head Quarter. The Services of this Hospital will be available to contractor's staff and labour on payment of requisite charges as may be required to be paid by the agency at his risk & cost.

11.00 POWER SUPPLY:

Power supply shall be arranged by the contractor at their own cost. No power supply is guaranteed by the department.

12.00 ROADS:

The contractor shall construct and maintain the inspection roads and quarries roads for all purposes required during construction at his own cost. There will however be no charge for any reasonable use of any road constructed by Government at site of work. At present site is only approachable during fair weather.

13.00 POST, TELEGRAPHS & TELEPHONE:

Post office is available at Taluka head quarter. Contractor shall make their own arrangements for telephone if required.

14.00 BANK FACILITY:

Branches of Nationalized Bank and other Schedule Banks are available at Taluka head quarter.

15.00 SUPPLY OF PETROL & DIESEL:

Petrol & Diesel will be available from Taluka Head Quarter.

16.00 MATERIALS: - (Quarry details are shown for guidance purpose only)

(a) WATER:

Water is scarily available in Dam vicinity area in summer season. Hence, contractor shall have to make his own arrangement and inquiry regarding this at his own cost.

(b) SAND:

Good quality natural sand will be used. However, sand of required quantity may not be available in reasonable lead. The contractor should arrange to obtain the sand of approved quality from any lead. No extra claim shall be admissible for extra lead.

(c) COARSE AGGREGATE (CRUSHED METAL):

The black stone crushed metal for concrete work should be procured by contractor from approved quarries. However coarse aggregate of required size & quantity may not be available in reasonable lead, the contractor should arrange to obtain the coarse aggregate of required size & of approved quality from any lead. No extra claim shall be admissible for extra lead.

Signature of Contractor

Executive Engineer

CHAPTER-II

SPECIAL CONDITIONS

SPECIAL CONDITIONS

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6	Assistance in Procurement of Properties, Permits, Import License, Exchange Facilities etc.
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SPECIAL CONDITIONS

1.0) ACCURACY OF LINES, LEVELS AND GRADES:

The various works shall be done true to the line, levels, and grade. The periodical checking of these works by the government staff shall not absolve the contractor of his responsibility regarding the accuracy of lines, levels, and grades. In case of any deviation or discrepancy in line, level or grade at the meeting faces, the contractor shall have to make good the discrepancy at his own cost and without any extra compensation for the additional work involved. Whenever such discrepancy is found to arise at the junction of works of different contractors, the responsibility to set right such discrepancy lies with contractors concerned. The engineer in charge shall further have been unquestioned right if need to be rectify the discrepancies and recover the cost from the contractor or contractors according to proportion as he may consider reasonable.

2.0) TESTING OF MATERIALS AND WORKS:

2.1 All materials before being incorporated in the work shall be inspected visual & by common field tests according to GERI guidelines for Quality Control & Quality Assistance Vol.1,2002 and if necessary, tested before being approved by the Engineer- in-charge.

For HDPE Pipe, the bidder shall have to arrange testing of pipes at Manufacture Company where Bidder supply of pipe before brought on site, and carried out testing in CIPET as per guideline. Any work on which such materials are used without prior inspection (and when necessary prior testing) and without approval or written permission of the Engineer- in -charge is liable to be considered as unauthorized, defective and not acceptable. Any additional test required to be carried out at any stage of the work as per instruction of Engineer - in -charge etc./ C.E (Q.C) / E.E (Q.C.) / D.E.E.(Q.C.) shall be carried out at department's cost, however sample test results are failed then retesting charges shall be borne by the contractor, but if sample test results are found ok, the Cost of testing charges of material shall be borne by the department.

- 2.2 The contractor shall, however, supply all material required for tests and also make good at his cost with materials, mixes, core holes and similar for other materials as may be directed by and to the satisfaction of the engineer in charge. An authorized representative of the contractor shall have to remain present at the time when the sample or cores etc. are taken & shall be authenticated the facts, if so required. When the contractor's agent fails to remain present at aforesaid time, the sample or cores etc., taken by the engineer in charge or his representative shall be considered to be authentic. The contractor will, however, be informed about the details of such sample and cores etc. that have been taken.
- 2.3 The materials, mixes and cores etc. shall be tested at field laboratory / GERI / CIPET/ other government approved (NABL) laboratory and the results given by them shall be considered correct and authentic. The contractor shall be given access to all operational tests that may be carried out as aforesaid, so that, he may satisfy himself regarding the procedure and methods adopted. It shall than be contractor's responsibility to carry out the finished item of work to the standard based on the laboratory design and test.
- 2.4 The method of sampling and testing and procedures and standard shall be as laid by respective IS code of practice and GERI manual / as mentioned in the tender.
- 2.5 The materials, mixes, cores etc. shall be tested frequency at the department's t field laboratory set up at the site of work or nearby regional or district level GERI laboratory or Engineering or NABL/Polytechnic colleges in Gujarat or government approved (R&B, IRRIGATION Deptts. etc.) private laboratories where facility of testing is available as per BIS rules & regulation or Government approved private institutes and the results given there by shall be considered correct and authentic.
- 10% in Government approved laboratories and 10% in GERI laboratories. However minimum one test of all type of tests shall have to be carried out in GERI laboratories

only. The choice of testing laboratory where test to be carried out shall on sole discretion of Engineer in charge. If there are any dispute regarding test results, GERI / NSIC / Govt. Engineering College, test results shall be final and binding to all. If test results of sample does not complies relevant BIS code further investigation shall be carried out as per BIS: 456-2000 or relevant BIS code of practice prior to rejection of work. The contractor shall be given access to all operations of tests that may be carried out as aforesaid so that he may satisfy himself regarding the procedure and methods adopted. It shall then be contractor's responsibility to carry out the finished items the standards based on the laboratory design and tests.

- Site laboratories tests will be carried out by qualified Engineer of the contractor whom I Card is given by the Executive Engineer and in the presence of Section Office / Dy. Executive Engineer in charge of the work.
- 80% of site tests will not be carried out at one time but will be related to the progress of work and consumption of materials. Prescribed Registers for recording details and results of tests will be maintained on site of work. The tests which are not done in GERI laboratories e.g. electrometric bearing etc. will be carried out in the laboratory consented by the Executive Engineer.

2.6 Frequently periodical tests to be carried out on materials, mixes, cores and placed concrete, mortar etc. shall be specified by the Engineer-in-charge from time to time and the contractor shall allow all facilities and co-operation toward collection of samples, transportation up to any laboratories, all labour for collecting samples, casting, testing of cubes shall be supplied by contractor without any extra payment.

2.7 Contractor shall have to establish the field laboratory at site as per the instruction of engineer in charge. The necessary equipment shall be kept duly calibrated in the field laboratory for the required Field test for concrete, FA, CA and Field soil testing for earth

work. Contractor shall have to construct pucca underground curing water tank of minimum size 2.0 x 2.0 x 0.60 mt (or size as directed as per size of the project) at nearby site of work for curing of cubes as per Engineer's instructions. No extra payment shall be made for this to the contractor.

2.8 It shall be the responsibility of the contractor to provide clean water to fill the curing tank & maintain full water level in curing tank periodically and also maintenance of leak proof curing tank throughout the work without any extra payment for this.

2.9 Contractor shall have to provide sufficient 15 cm cube mould and skilled labours for laboratory and field tests of works and materials for activity such as:

(i) Cleaning, fitting and unfitting of moulds, oiling etc.

(ii) Carting of moulds and placement in to curing tank.

(iii) Transporting the cubes from site of work to field laboratory for testing.

(iv) Helping in cube testing on compressive machine etc. All facilities for carrying out field test on various materials, mixes and cores shall be provided by contractor. No extra payment for the above work shall be made to the contractor.

2.10 The method of sampling and testing procedures and standard shall be as laid down by the Engineer-in-charge for respective items.

~~3.0 MATERIALS MENTIONED IN SCHEDULE "A":~~

~~3.1 It shall be noted that, owing to difficulty in obtaining certain materials in the open market, the government has undertaken to supply materials specified in the SCHEDULE 'A' of the tender form at the rate stated therein, the contractor shall not have right to claim compensation for delay, if any. The contractor is there for required to keep in touch with the day-to-day position of supply of materials and to adjust the progress of the work, so that their labour may not remain idle. No monitory claim what so ever shall be~~

entertained by the government on account of delay in the supply of materials. ~~**Useable hard rock available from dismantling existing pitching at site of work will be issued at rates mentioned in schedule A.**~~——

~~**4.0 RECOVERY OF HARD ROCK AVAILABLE FROM EXCAVATION:**~~

~~(1) As per Govt. of Gujarat N.W.R.W.S. and Kalpasar Dept. Order No. MI Cell /102010 /17 / (2) K-1, Dt.21/01/2014, for the hard rock, which is excavated from the work will be allotted to the agency. The **amount will be recovered at the rate Rs. 211 per Cum excluding GST (As per R&B SOR 2023-24).** In addition, necessary royalty for these materials has to be paid by the agency as per prevailing rules and regulation to the Industries & Mines Dept. according to classification of materials. The quantity will be calculated as per instruction of Engineer-In-Charge. This fact should be kept in mind while quoting the tender rates of these items.~~

~~**Recovery of hard rock shall not be made for excavation in hard rock by boring rigs or any other such special equipment utilized for excavation of diaphragm walls.**~~——

~~**(2) OTHER MATERIALS:**~~

Other materials required for the work shall be procured by the contractor. The specifications mentioned in the chapter of MATERIAL SECTION shall be applicable

~~**5.0 LOAN OF GOVERNMENT FOR TOOLS & PLANTS AND MACHINARIES:**~~

~~The machinery and tools & plants as and where available with the department shall be supplied on hire as per rules and regulations and as per the provisions contained in Government PWD GR No- MCN / 167 / 97, Part-iv / h, dated 01-10-1980 and as amended from time to time. It must be also noted that the machineries or equipment's justified for the use in the work and available with the department will be given on hire. No claim for delay in procurements of such machineries or equipment shall be entertained. At present no machineries or tools and plants are available with the~~

departments.

**6.0 — ~~ASSISTANCE IN PROCUREMENT OF PROPERTIES, PERMITS, IMPORT LICENCE,
EXCHANGE FACILITIES ETC.~~**

~~Generally, it shall not be realized in the normal course by the department for providing assistance in purchase of Tools & Plants and Machineries required for the execution of work, contracted for. However, the engineer in charge, on request by the contractor shall assist in the procurement of necessary import license, exchange facilities etc. for importing necessary plants & machineries, which is not locally available and engineer in charge deemed it in the interest of work ant its progress. The government shall not however, be responsible for non-availability of any of the above facilities or delay. The contractor's application for import license etc. will be scrutinized by the engineer in charge regarding the responsibility of the government etc. and recommendations will be made as deem fit. The decision of engineer in charge in this regard shall be final and no claim either in cost or delay in time will be admissible.~~

7.0 SECURITY MEASURES:

In view of the strategic importance of all the project and installations, security restriction may be imposed by the engineer in charge as per directions of the security authorities and the contractor shall abide by, to implement all such instructions scrupulously. In case a system of identity cards with photos is introduced, then the contractor shall have to provide the same to his personal at his cost. The identity cards shall be dully sign by engineer in charge. The contractor shall also keep informed regarding all visitors and obtain permits for their visitors. No unauthorized visitors will be allowed on site of work.

8.0 APPLICABILITY OF SPECIFICATIONS:

Considering the common general item required in executive of irrigation project, general subject wise specifications has been drawn and provide separately with the tender. This

provision suitably provides requirements of execution of each component of work in general, consistent with the present practice of the scope of work & more of execution and standards to be observed etc. for the work. To avoid descriptive matter, suitable reference for the relevant IS (BIS) code or otherwise is also specified. The whole idea is to guide the tenderer regarding the execution of work, so as to base his rates accordingly. The general subject wise specifications are further supplemented in separate chapter to cover the item wise specification of work as per the Bill of Quantities of the tender. These item wise specifications shall cover the applicable provision of the general specification, considering the item description as per Bill of Quantities. Over and above this, the specific requirement of each item such as applicable lead and lift, proportion of concrete & mortar mix, description about the execution of the item in detail and other applicable aspects will be covered in detail/item wise specification. Intending tenderers are there for requested to read the tender papers on above lines and quote their rates.

9.0 CHANGE IN DESIGN AND DRAWINGS:

The drawings attached with tender documents are at present available data. However, during execution of work any change in design and drawing that may be warranted on account of strata met with or the materials that may be available or any reasons shall not vitiate the contract and no extra payment shall be made to the contractor. The variation in quantities under the relevant items on account of above changes shall be paid only as per the Clause 38 (Page No. 50) of Section 3 Conditions of Contract of SBD.

10.0 DEWATERING AND DIVERSION AS AND WHERE NEEDED:

If, there is no separately provision for dewatering, diversion of water and construction of temporary diversion road during construction in the fair weather as well as in the monsoon, the rates of respective item of works quoted by the contractor shall be consider inclusive of dewatering and diversion as and where needed with maintaining it during construction. In such condition no extra payment shall be made for dewatering & diversion of water, road diversion etc. Also, no payment shall be made for any part of earth work of materials washed away or damaged during monsoon or other period and

it shall have to be made good by the contractor at his own cost. It is the responsibility of the contractor to make good, or repair any government property, materials to be utilized for the work or completed part of present work damaged during the construction period. If there is a separate item for care and diversion in the tender, then general technical specification for "care and diversion " shall be applicable.

11.0 APPLICABLE PUBLICATIONS:

All methods or procedure for execution of different items of work shall confirm to the INDIAN STANDARD (IS) now renamed as BUERO OF INDIAN STANDARD (BIS) Specifications. The latest addition shall be followed. Some of the important IS publications are listed below. The provisions of these IS specifications shall be applicable.

IS OR BIS CODE NO	VERSION	SUBJECT OF CODE
EXCAVATION AND EARTH WORK		
2720 Part-I	Latest	Method of test for soil-particle size and shape
2720 Part-III	Latest	Determination of water contents, dry density relation using light compaction.
2720 Part-IV	Latest	Grain size analysis
2720 Part-5	Latest	Determination of liquid and plastic limit
1498	Latest	Classification and identification of soil for general engineering purposes
2720-Part-III / sec-1&-2	Latest	Determination of Sp. Gravity
9429	Latest	Drainage system for earth and Rock fill dams
3764	Latest	Safety code for excavation work
CONCRETE WORK		
269	Latest	Specification for OPC cement
12269	Latest	Specification for 53 grade OPC cement
1489 Part-1 & 2	Latest	Specification for 53 grade PPC

432	Latest	cement Specification for MS & medium tensile steel bars
1786	Latest	Specification for HYSD bars
280	Latest	Specification for Binding wires
2336 Part I to VIII	Latest	Method of various tests for aggregate
383	Latest	Coarse and fine aggregate from natural sources for concrete
10262	Latest	Concrete mix designs
456	Latest	Plain & Reinforced concrete
457	Latest	Plain & Reinforced concrete for Dams & other massive structures
3873	Latest	Laying in situ cement concrete lining For canal
9556	Latest	Construction of diaphragm walls.
14334	Latest	Cost. Of diaphragms for under-seepage control.

MASONRY WORK

2116	Latest	Sand for masonry mortar
1121	Latest	Testing for stone-Comp. Strength
1126	Latest	Testing for stone-Soundness
1124	Latest	Testing for stone-Water absorption
1526	Latest	Sand for plastering work.

IS OR BIS CODE NO OTHERS:

IS OR BIS CODE NO	VERSION	SUBJECT OF CODE
15068	Latest	PVC Water stop.
4985	Latest	PVC Pipes
2266	Latest	Wire Rope
11855	Latest	Rubber seal

IS OR BIS CODE NO

VERSION

SUBJECT OF CODE

458	Latest	Specification for pre-cast concrete pipes (With and without reinforcement)
3597	Latest	Methods of test for concrete pipes.
5382	Latest	Specification for rubber sealing rings for gas

516	Latest	mains, water mains and sewers
783	Latest	Method of test for strength of concrete
		Code of practice for laying of concrete pipes

12.0 INSPECTION OF WORK BY THIRD PARTY:

All the conditions and scope of work of Third-Party inspection shall apply and shall be binding to the contractor if there is a provision for the same.

13.0 WORKING DRAWING & FINAL DRAWING: -

Initially working drawing shall be prepared & made by contractor at his own cost under instruction of Engineer. Final “as built” drawing shall be prepared in Auto CAD computerized drawing with C.D. for which amount of **Rs. 50,000.00 (Rs. Fifty Thousand only) shall be withheld till finalized the work.**

Signature of Contractor

Executive Engineer

CHAPTER-III

STANDARD GENERAL TECHNICAL SPECIFICATIONS

CHAPTER-III

STANDARD GENERAL TECHNICAL SPECIFICATIONS:

- 1.1 All the items occurring in the work and as found necessary during actual execution shall be carried out in workman like manner as per specifications below and as per written orders of the Engineer-in-charge.
- 1.2 A work order book as prescribed by the Engineer-in-charge shall be maintained on the site of work and the contractor shall carryout field compliance properly.
- 1.3 The contractor shall engage authorized representative who shall be responsible and competent for managing the work. He shall take orders from the Engineer-in-charge and shall be responsible for carrying out the same.
- 1.4 Quantities specified in the tender may vary at the time of actual execution and the contractor shall have not to claim for compensation on account such variation.
- 1.5 No trees shall be cut without permission of Engineer-in-charge.
- 1.6 Diversion for roads, if necessary, shall be provided and maintained during the currency of the contract without any extra cost to the Department.
- 1.7 The work shall be executed strictly in accordance with plans & specifications. Only the best materials and sound construction shall be executed in a through workman like manner.
- 1.8 The drawing prepared and trial pits taken are for general guidance and indication and changes either minor or major are likely to take place. No claim for extra payment shall be made by the contractor for such changes.
- 1.9 The quantities in the Bill of Quantities are only estimate quantities and during execution they may increase or decrease. Any claim put forward for this variation in quantity shall

not be entertained.

- 1.10 The rejected materials shall be removed from the site within 24 hours. If they are not removed within this period, the same will be removed at the contractor's risk and cost by the Department.
- 1.11 The work is an important work, and this fact shall be constantly borne in mind by the contractors and his workers. Works not specified above shall be carried out according to P.W.D. Handbook or according to instructions of the Executive Engineer.
- 1.12 The work requires constant attention for line, levels, and workmanship and hence the contractor shall have to keep the experienced technical staff on the work. The contractor has to supply the necessary materials and labour for the line and levels work at his own cost.
- 1.13 The contractor unless otherwise specified and providing in the contract shall pay all duties, tolls, quarry fees, royalties and taxes on all materials and articles they may use. The rate quoted by the contractor shall be considered inclusive of all such duties, fees, royalties, taxes etc.
- 1.14 In the specification "as directed / approved" shall be taken to mean "as directed / approved" by the Engineer - in - Charge.
- 1.15 Wherever a reference to any India Standard appears in the specifications, it shall be taken to mean as reference to the latest edition of the same in force on date of agreement.
- 1.16 In "Mode of Measurement " in the specifications, wherever a dispute arises in the absence of specification of a particular point or aspect, the provision on these particular points or aspect in the relevant Indian Standard shall be referred to.
- 1.17 All measurement and computations, unless otherwise specified, shall be carried out nearest to the following limits: -

(1)	Length, Width and Depth (Height)	0.01	Meter.
(2)	Areas	0.01	Sq. Mt.
(3)	Cubic Contents (Except Wood)	0.01	Cumt.
(4)	Cubic Contents (Woodwork)	0.001	Cumt.

In recording dimensions of work in measurement book the sequence of length, width and height (depth) or thickness shall be followed.

- 1.18 The distance which constitutes lead shall be determined along the shortest practical route and not necessarily the route actually taken. The decision of the Engineer - in - Charge in this regard shall be taken as final.
- 1.19 Where no lead is specified, it shall mean "all leads ".
- 1.20 Lift shall be measured as per current practice for relevant item under direction or decision by Engineer-in-charge.
- 1.21 Definite particulars covered in the items of work, though not mentioned or included in it, specifications shall be deemed to be included therein.
- 1.22 Reference to specifications of materials as made in the detailed specification of the items of work is in the form of a designation containing the number of the specification of the material and prefix "M" i.e. "M-1 "etc.
- 1.23 Approval to the samples of various materials given by the Engineer-in-charge shall not absolve the contractor from the responsibility of replacing defective material brought on site or materials used in the work found defective at a later date. The contractor shall have no claim to any payment or compensation whatsoever on account of any such materials being rejected by the Engineer - in - Charge.
- 1.24 The contract rate of the item of work shall be for the work completed in all respects.
- 1.25 No collections of materials shall be made before it is got approved from the Engineer -

in - charge.

1.26 Collection of approved materials shall be done at site of work in a systematic manner.

Materials shall be stored in such a manner as to prevent damage, deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work.

1.27 Materials if and when rejected by the Engineer-in-charge, shall be immediately removed from the site of work.

1.28 No materials shall be stored prior to, during and after execution of a structure in such a way as to cause or lead to damage or overloading of various components of the structure.

1.29 All works shall be carried out in a workman like manner as per the best technique for the particular item.

1.30 All tools, templates, machinery and equipment for correct execution of the work as well as for check line, levels, alignment of the works during execution shall be kept in sufficient number and in good working condition on the site of work.

1.31 The contractors shall be responsible for observing the rules and regulations imposed under the “Mine and Minerals Act “and such other laws and rules prescribed by Govt. from time to time.

1.32 All necessary safety measures and precaution (including these laid down in the various relevant Indian Standards) shall be taken to ensure the safety of men, materials and machinery on the works and also of the work itself.

1.33 Approval to any of the executed item for the work does not in any way relieved the contractor of his responsibility for the correctness, soundness, strength of the structure as per the drawings and the specifications.

1.34 **Setting Out Works**

In the vicinity of **Village Kalyana** the bench marks fixed by the Survey of India and

temporary bench marks established by the NWRWS&KD, which will serve as control points for these works. The Contractor shall establish sufficient number or reference benchmarks for facilitating setting out of works and taking levels for purpose of measurements.

Before starting any work, the Contractor shall erect reference benchmarks, reference lines and check profiles at convenient locations approved by the Engineer-in-Charge.

The benchmark shall be 20 cm. x 20 cm. x 60 cm. with 40 cm. embedded in the firm ground and 20 cm projecting above ground. The word "BM" showing value of RL shall be conspicuously carved and painted on the benchmark. The reference line shall comprise the base line properly dog belled on the ground with the numbered concrete/masonry pillars suitably spaced.

The check profiles shall be located 30 m apart or closer as directed by the Engineer-in-Charge so as to ensure execution of all slopes, steps and elevations to the profile or profiles indicated in the approved drawings. All-important levels and all control points with respect to benchmarks and reference lines shall be fixed and co-related by the Engineer-in-Charge.

All equipment's (Total Station or DGPS or Auto Level etc. with all equipment) materials and labour for setting out works including construction of bench marks, reference lines, check profiles and surveys, as may be required at the various stages of construction, shall be supplied by the Contractor at his own cost. The cost of such work shall be deemed to have been included in the rates of the items in the Schedule-B.

All equipment's shall be of standard and approved make and precision, and shall be made available well in advance of starting of the work. All equipment's shall be maintained, repaired and got tested and certified as and when required for its accuracy from the standard test houses or from the manufacturers and to the satisfaction of the Engineer-in-Charge. Cost of all above shall be deemed to have been included in the rates of the

items included in the Schedule-B.

1.35 Preparation of Site

1.35.1 Clearing the site

- a) The Contractor shall clear the entire working land width required for setting out of the work incl. removing all tree stumps, roots, bushes, brushwood, rubbish of all kinds, loose stones, and all other objectionable materials cutting of trees etc. The Contractor shall dispose of all such materials as directed by the Engineer-in-Charge.
- b) No separate payment will be made for complying the requirements of this paragraph for borrow area and all cost shall be deemed to have been included in rates quoted in Schedule-B.

1.36 Recording of Cross Sections

- a) After clearing the site and prior to the beginning of excavation work, earthwork and any other works, Initial cross sections levels of existing ground shall be taken by contractor with Total Station or DGPS or Auto Level at every 30m intervals or closer depending on the nature of ground, normal to axis of works up to sufficient distance outside the limits of the work. Levels on this cross section shall be taken at 5m or closer intervals for structure works, they shall be taken at 3 m or closer intervals as directed by Engineer-in-Charge and submit initial level sheet with cross-section and longitudinal section for ready reference and this levels have been entered with ink in the field books by the Engineer-in-Charge or his representative not below rank of Assistant Engineer in presence of the Contractor or his authorized agent if he so desires and these shall be binding on the Contractor. The contractor or his authorized agent shall sign the field book in token of acceptance of levels. These cross sections shall form the basis of all future measurements and payments. The original cross sections duly signed by the Contractor and the Engineer-in-Charge shall be preserved in safe custody by the

Engineer-in-Charge. Each dimension shall be measured to the nearest 0.01 m. Any dimension greater than 25 m shall be measured with a precision of 0.1 m. Areas shall be computed to 0.01 m² and volume shall be computed to 0.01 m³.

- b) No separate payment shall be made to the Contractor for the labour, equipment (Total Station or DGPS or Auto Level etc.) and materials required for taking the cross sections.

1.37 Planning

Prior to the commencement of the work, all relevant data shall be collected by the Contractor and drawing prepared by him showing the locations of the excavation stripping and filling. On these drawing both the excavation and filling should be shown in separate reaches and the quantity of material to be excavated and filled shall be stated clearly in these reaches. This information would be useful to ensure economic hauls throughout the work. Where the material to be excavated consists of different types and if the various types have to be used separately in the fill or dumped to spoil tip, the quantities of each class of material in each area should be shown on drawings. From the nature of material to be excavated and the method of its disposal the type of excavation, the length of haul and the amount of compaction necessary, it should be possible to select the most suitable type of plant for a particular job. The Contractor shall present his planning of the work along with required details to the Engineer-in-Charge at least 15 days before starting the work. The contractor shall be allowed to excavate as per the sequence of excavation as directed by the Engineer-In-Charge.

Signature of Contractor

Executive Engineer

CHAPTER-IV

MATERIAL SECTION

SPECIFICATION OF PRINCIPAL MATERIALS

CHAPTER-IV

:: SPECIFICATION OF MATERIALS ::

The following specifications are only for the principal materials of construction which are included in the details specifications of items and indicated the requirements of qualities of materials. They are given as guide and neither includes all the materials of construction nor exhibits all their desirable qualities. This should be supplemented by detailed specifications as per relevant IS Code unless otherwise not mentioned. The rate of all items is inclusive of all materials inclusive of all lifts and leads for the material unless otherwise specified in detailed specifications.

M.1 WATER

The water to be used shall be potable water, clean & free from objectionable quantities of silt, organic matters alkali, salts and other injurious materials and shall be as per I, S. 456:2000. Water sample shall be tested in Government or Government approved laboratories, once before starting of work and then starting of new working season.

Permissible limit for some of the important parameters are as under.

	TEST	PERMISSIBLE LIMIT AS PER IS-456-2000
1	Organic solids	200 mg. per liters (max.)
2	Inorganic solids	3000 mg. per liters (max.)
3	Sulplates (as So ₂)	400 mg. per liters (max)
4	Chlorides (as Cl)	2000 mg./lit. for PCC. And 500 mg.lit.for RCC
5	Ph Value	Not less than 6

M-2 CEMENT

Cement shall be ORDINARY PORTLAND CEMENT (OPC) of grade 53 confirming to IS-12269:2015. The cement shall be used OPC 53 grade but any of the above and the type selected should be appropriate for the intended use.

The contractor shall have to make his own arrangement to procure the cement bearing I.S.I. mark directly from the major cement manufacturing plants having installed capacity of one LACS tonnes per annum or its authorized dealers only. The contractor

shall arrange to cart, load and unload the same to the site of work at his own cost. The cement brought to site shall be tested in Government or government approved laboratory as per provision in IS-12269.

The cement bags shall be neatly stacked in a orderly manner so as to afford easy access and count in a damp proof condition. If the consumption of cement exceeds 25.00 MT., then the cement shall be stored in tin shed godown or in a pucca godown, one feet above the ground, so as cement can be prevented from atmospheric effect. Deteriorated cement shall not be allowed to use.

The testing of the cement shall be done for each lot / consignment received on site. The frequency of the test shall be as under.

Quantity of Consignment	No. of Test Specimen
50 M.T.	1
100 M.T.	2
200 M.T.	3
300 M.T.	4
500 M.T.	5
800 M.T.	6
1300 M.T.	7
For each larger consignment	8

All physical tests required as per IS - 4031 (Part 1 to 6) – 1988 shall be carried out as per frequency mentioned in the table above. While the chemical test shall be carried out as per IS-4032-7986 one for ten physical test samples.

Each consignment shall be stacked separately and shall be used on the basis of first cum first used. The cement shall be used after testing only. Cement older than 90 days shall not be allowed to use.

The cement lot failed in testing shall be removed immediately from the site. A day-to-day account of cement received & used on the work together with the particulars of the work and quantity of the work and quantity of the work in which it was used, shall be maintained separately by the representative of the department, and shall be signed at the end of the day's work, both by the department's representative and the contractor.

M.3 SAND (FINE AGGREGATE)

All fine aggregate shall be natural river sand and shall confirm to IS-383 -2016.

Sand shall be of natural river sand having F.M. from 2.1 to 3.2 for all concrete works. It shall be clean, well graded, hard, durable and strong and free from injurious amount of dust, clay, silt, kankar nodules, soft or flaky particles, shale, alkali, salts, organic matter, loam, mica or other deleterious materials. Grading of the fine aggregate (sand) shall be as per Table – A given below. (IS-383-page No. 11 table-4)

TABLE – A (Table –IV of IS: 383- 1970)

IS Sieve designation	PERCENTAGE PASSING FOR			
	Grading Zone-I	Grading Zone-II	Grading Zone-III	Grading Zone-IV
10 mm	100	100	100	100
4.75 mm	90-100	90-100	90-100	90-100
2.36 mm	60-95	75-100	85-100	95-100
1.18 mm	30-70	55-90	75-100	90-100
600 micron	15-34	35-59	60-79	80-100
300 micron	5-20	8-30	12-40	15-50
150 micron	0-10	0-10	0-10	0-15

Sand of grading zone-iv shall not be used for concrete work.

Limits of various deleterious materials in fine aggregate shall be as per mention below. Sand for masonry mortar and plastering work shall only be used after screening through proper number screen and shall confirm to IS-2116 for masonry mortar and to IS-1526 for plaster work.

STORAGE:

The fine aggregate should be stacked carefully on a clean and hard surface so that it should not be get mixed up with deleterious foreign materials, Segregation of heavier particles by sliding down may be not stacking in high conical heaps.

TEST:

The particulars of tests and frequency shall be as mention below.

TABLE - B

Sr. No.	Particulars of Test	Frequency of Test	Remarks
1	Gradation for Fineness Modulus	One test per 150 Cum of concrete/masonry work	IS-383-1970 & IS-2386-1963
2	Sp. gravity and water absorption	Once for new quarry/change in source	IS-383-1970 & IS-2386-1963
3	Silt Content	One test per 150 Cum of concrete/masonry work	IS-383-1970 & IS-2386-1963
4	Impact Value	Once for new quarry/change in source	IS-383-1970 & IS-2386-1963

M.4 COARSE AGGREGATE

The coarse aggregate for the use of making concrete and other purpose shall be of black stone crushed metal. It shall be clean, hard, durable & free from alkalis and other deleterious substance. The coarse aggregate shall be well grade and generally be cubical in shape. The gradation shall give a dense & water tight concrete of specified strength and consistency. The actual gradation shall be as indicated by the laboratory study.

GRADING:

The grading of the coarse aggregate shall be as per Table – A given below (IS-383:1970 Page No. 9 table - 2).

TABLE - A

IS Sieve designation	% Passing for graded aggregate of nominal size.			
	40 mm.	20 mm.	16 mm.	12.5 mm.
80 mm.	100	-	-	-
63 mm.	-	-	-	-
40 mm.	95 to 100	100	-	-
20 mm.	30 to 70	95 to 100	100	100
16 mm.	-	-	90 to 100	-
12.5 mm.	-	---	-	90 to 100
10 mm.	10 to 35	25 to 55	30 to 70	40 to 85
4.75 mm.	0 to 5	0 to 10	0 to 10	0 to 10

2.36 mm.	-	-	-	-
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SIZE OF AGGREGATE:

The size of coarse aggregate for mass concrete shall be as Table – B given below (IS-383-Page No.-10 table – 3).

TABLE – B

CLASS	SIZE	IS Sieve Designation	% Passing
Very large	150 to 80 mm.	150 mm.	90 to 100
		80 mm.	0 to 10
Large	80 to 40 mm.	80 mm.	90 to 100
		40 mm.	0 to 10
Medium	40 to 20 mm	40 mm	90 to 100
		20 mm.	0 to 10
Small	20 to 4.75 mm	20 mm.	90 to 100
		4.75 mm.	0 to 10
		2.36 mm.	0 to 2

The nominal maximum size of coarse aggregate shall not be greater than one fourth of the minimum thickness of the member for PCC work, In case of RCC members maximum size of coarse aggregate shall be such so as concrete can

easily place in the members without honey combing. It can be determined as follow.

(i) One fourth of the minimum thickness of the members. (ii) The minimum clear distance between main bars minus 5 mm. (iii) The minimum cover to the reinforcement minus 5 mm. whichever is smaller. The minimum and maximum size of the aggregate shall be between 4.75 mm. to 80 mm.

DELETERIOUS MATERIALS:

Deleterious material as described and its acceptance criteria for coarse aggregate shall be as per IS-383-1970.

TESTING:

The material subjected to tests for gradation, flakiness and elongation, abrasion value, soundness crushing/ impact value, and deleterious materials etc. as per IS-383.

Following is the acceptance limit.

- i) Flakiness and elongation : 30 % maximum.
- ii) Abrasion value. : 40 % maximum.
- iii) Soundness. : 12 % loss with Na₂SO₄ and 18 % loss with MgSO₄
- iv) Crushing value. : 45 % for concrete and 30 % for wearing surface.
- v) % of deleterious material. : 5 %
- vi) Sp. Gravity. : 2.5 Minimum.
- vii) Water absorption : 1.5 % maximum.

FREQUENCY OF TESTING:

The particulars of tests and its frequency shall be as mention below.

Sr. No.	PARTICULARS OF TEST	FREQUENCY	REMARKS.
1	Gradation	One test per 150 cum. Of concrete work.	IS-383-1970 & IS-2386-1963
2	Sp. Gravity and Water absorption	Once for new quarry/ change in source.	IS-383-1970 & IS-2386-1963
3	Flakiness and elongation.	Once for new quarry/ change in source.	IS-383-1970 & IS-2386-1963
4	Impact value.	Once for new quarry/ change in source.	IS-383-1970 & IS-2386-1963

STORAGE:

The aggregate of different size shall be stacked or batched or stored separately and handle in such a manner as to prevent intermixing of different size of aggregates. No foreign materials shall be allowed to be mixed up with the aggregates.

M.5. THERMO MECHANICALLY TREATED (TMT) H.Y.S.D. STEEL:

The thermo mechanically treated, popularly known as TMT H.Y.S.D. steel shall conform to IS-1786. The steel shall be procured by the contractor and grade of steel shall

be Fe415/Fe500 as per item description. The contractor shall make suitable arrangement for storage of the steel at site. In any circumstances steel produced by re-rolling mills shall not be allowed to use. The steel shall be free from loose mill scale, rust oil, grease, or any other harmful matter. The contractor shall have to procure steel bars directly from manufacturers having BIS certification or its authorized dealer. The contractor shall have to produce original voucher / bill (Retail invoice or Tax Invoice). For the same along with physical and chemical test report whenever asked by engineer in charge for the same.

- The mechanical properties of the steel shall be as mention below.

TABLE – A (IS-1786-2008)

STRENGTH GRADE & DESIGNATION	MECHANICAL PROPERTIES			BEND TEST		REBEND TEST	
	YIELD STRESS(Y S)	TENSILE STRENGTH (TS)	ELONG ATION % ON GAUGE LENGTH (EL)	Up to & incl. 20mm dia.	Over 20mm. dia	Upto & incl. 10mm dia	Over 10mm. dia.
	N/mm2	N/mm2		☞	☞	☞	☞
1	2	3	4	5	6	7	8
Fe415	415	10 % more than the actual Ys but not less than 485 N/mm2	14.5	Mandrel Dia=3 mm	Mandrel Dia=4 mm	Mandrel Dia=5 mm	Mandrel Dia=7 mm
Fe500	500	8 % more than the actual Ys but not less than 545 N/mm2	12	Mandrel Dia=4 mm	Mandrel Dia=5 mm	Mandrel Dia=7 mm	Mandrel Dia=8 mm

NOTE: The sample shall be considered to have passed in the bend test if there is no transverse crack in the bent portion. The sample shall be considered to have passed in the re-bend test if there is no fracture in the bent portion.

- The chemical composition of the steel shall be as mention below.

TABLE-B (IS-1786-2008)				
CONSTITUENT	PERCENTAGE MAXIMUM			PERMISSIBLE VARIATION
	Fe 415	Fe 500	Fe550	% max

Carbon	0.3	0.3	0.3	0.02
Sulphur	0.06	0.055	0.055	0.005
Phosphorus	0.06	0.055	0.05	0.005
Sulphur & phosphorus	0.11	0.105	0.1	0.01

TESTING:

Testing of steel shall be done for each of bars at the frequency mention in table-C below or less of steel in government or government approved laboratory to known the physical properties of steel bars, like nominal mass, 0.2 percentage proof stress/yield stress, Elongation percentage, Tensile strength, Bend and Re-bend test. And chemical test shall be done one for every ten physical test sample.

TABLE-C (Table-5, Page-17 of IS-1786)			
FREQUENCY FOR NOMINAL MASS, TENSILE BEND AND REBEND TESTS			
NOMINAL SIZE IN mm	QUANTITY		
	FOR CASTS/BEATS BELOW 100 TONNES	FOR CASTS/BEATS OVER 100 TONNES	
Under 10 mm	One sample from each 25 tonnes or part thereof	One sample from each 40 tonnes or part thereof	
10mm to 16 mm inclusive	One sample from each 35 tonnes or part thereof	One sample from each 45 tonnes or part thereof	
Over 16mm	One sample from each 45 tonnes or part thereof	One sample from each 50 tonnes or part thereof	

MEASUREMENT:

For the purpose of payment, the bar shall be measured correct up to 10mm in length Unit weight of bars shall be computed as per weight given in IS-1786-2008.

Specification for Indian steel or at the rate specified below:

TABLE-D (Table-1, Page-11 of IS-1786)			
BAR DIA.	UNIT WEIGHT	BAR DIA.	UNIT WEIGHT
In mm	Kg / Rmt.	In mm	Kg / Rmt.
6	0.222	22	2.98
8	0.395	25	3.85
10	0.617	28	4.83

12	0.888	32	6.31
16	1.58	36	7.99
18	2.00	40	9.85
20	2.47	50	15.42

M.6 BINDING WIRE:

The binding wire for tying reinforcement shall be of soft & annealed mild steel confirming to IS-280. The diameter of wire shall be of 1.63mm or 1.22mm (16 or 18 gauge). the use of black wire shall be permitted for binding reinforcement bars. It shall be free from rust, oil paint, grease, loose mill scales or any other undesirable coating which may prevent adhesion of cement mortar.

Signature of Contractor

Executive Engineer

CHAPTER - V

ITEM WISE DETAILED TECHNICAL SPECIFICATION

CHAPTER - V
ITEM WISE DETAILED TECHNICAL SPECIFICATION

Item No.1:-

Excavation in all Sorts of Soil (including wet and slushy condition of soil) with yellow, sandy, gravelly soil including soft murrum & H.M. including sorting & stacking and depositing the excavated stuff in uniform layers as and where directed upto lead of 30 m and lift as shown below including dewatering, clearing the site etc. complete. - (a) 0 to 3 mt. depth

1.1 Scope of Work

The work to be done under this specification shall consist of clearing the site, excavation in different type of strata as mentioned in item of works and disposal of excavated material within lead and lift mention in the item of works. The scope of work also incl. of furnishing all tools, plants and labour and materials required to carry out excavation and maintaining the slope of excavated trenches by way of artificial manner (strutting) also, if required so.

This shall include soil, silt, sand, gravel, soft murrum, stiff clay, kanker, and other soft materials, which can be easily excavated by means of pick and shovel. Loose stone less than 0.03 mtr. Which does not require breaking up shall be treated as soil.

The item shall include excavation in wet, dry or slushy condition and removal of excavated materials and their stacking and disposal in a manner as per instruction of Engineer-in-charge and refilling the foundation trenches as directed.

1.2 General requirement

The contractor shall provide all materials and labour and necessary for execution and completion of the work as per the drawings and specification and the intent there of.

The contractor shall provide necessary protective measures for labour materials and equipment to ensure safely against risk and accident. The contractor shall be liable to

pay compensations for injury to life and damage to property if any caused to any operation connected with the item.

The contractor shall hand over the site of work in neat and tidy condition and shall remove all waste arising from construction.

1.3 Clearing the site

The contractor shall clear the entire area required for the structure and shall remove all the tress, stumps, roots, bush wood, rubbish of all kind, loose stones and all other objectionable materials. The contractor shall dispose of useless materials. The contractor shall dispose of useless materials by burning or as directed by the Engineer-in-charge and the remaining useful materials shall be stacked properly within the lead specified in the item. The Government shall remain owner of all the above useful materials so obtained.

1.4 Setting out

The contractor shall provide necessary materials and labours and make all necessary arrangements to get line out from the Engineer-in-charge or his authorized representatives. It shall be responsibility of the contractor to install substantial reference points, bench marks etc. at his own cost and maintain them during the construction period.

1.5 Excavation

The Contractor shall perform all excavation in accordance with line, levels, width and depth as per instruction of Engineer-In-Charge. If the Executive Engineer or competent authority decides to take the foundation lower than the foundation level shown on the plan the same will have to be done by the contractor at the same rate quoted by him for the item. If the last depth slab does not change and unless there is a change in strata for which rates as per corresponding item shall be last depth slab of the item for which rate

is not quoted in tender, the rate for such item shall be paid as per S.O.R. of Division, for the year in which tender was accepted. The percentage above or below of the accepted tender shall also be applicable to these rates.

The contractor shall have to present a clean, even and dry surface for the foundation for the satisfaction of the Engineer - in - charge.

1.6 Excess Excavation

The excavation beyond the lines and levels specified on plan shall not be measured and paid for unless it is ordered by the Engineer in charge in writing. If excess excavation is required to be filled it shall be filled by the contractor with concrete or masonry of the same type as used for foundation at his cost and risk.

1.7 Disposal of excavated materials

The excavated materials shall be dumped sufficiently away from the edges of excavation so as not to endanger stability of the slopes of excavation. The excavated stuff suitable for filling behind abutments, returns, approach roads or canal banks shall be conveyed and deposited directly as directed, as per lead and lift specified without any extra payment on this account. If the contractor falls to do so and the useful materials is wanted by him, recovery shall be done at the rate of collection of that type of materials.

1.8 Sorting of excavated materials

The excavated materials shall be properly sorted out.

1.9 Stacking of excavated materials

The useful materials not to be used in the work shall be stacked at places as directed by the Engineer in charge according to the nature of materials. The excavated materials not required for the back filling or for the use will be stacked in other approved locations or as directed by the engineer within the lead and lift specified in the item. All materials obtained from excavation will the property of Government.

1.10 Shoring and strutting

In reaches where vertical excavation is not possible the Executive Engineer may allow at his discretion excavation in suitable slopes for the strata actually uncontested extra excavation on this account shall not be paid for within pay line slopes for different strata as under:

(H : V)

1.	Soil	1 : 1
2.	Soft Murrum	$\frac{1}{2}$: 1
3.	Hard murrum	$\frac{1}{2}$: 1
4.	Soft rock	$\frac{1}{4}$: 1
5.	Hard rock	$\frac{1}{4}$: 1

Generally, for depth up to 1.5mt vertical excavation shall be done.

1.11 Slips

Adequate steps shall be taken to prevent slips. However if slips occur, the slopes should be flattened or support of other measures as required shall be taken for stabilizing the slopes. The sides shall struttred and shorted carefully and adequately where they are liable to fall. The contractor shall clear the foundation trenches of slipped materials at his own cost. The Government shall not be responsible for any accident occurring due to slips or any other cause whatsoever. The contractor shall be held responsible and liable to pay all claims under workmen's Compensation Act.

1.12 Preparation of foundation

The bottom of the foundation shall be dressed perfectly in level as directed and all loose and soft materials shall be removed before laying of foundation concrete. Before any

concrete or masonry is laid, the foundation is in strata other than rock. In case of rock. It shall be totally cleared & wetted before laying the foundation concrete, the contractor shall get the foundation approved from the Executive Engineer or competent authority.

1.13 Silting of foundation pits due to floods

If the foundation trenches get silted up due to intervening floods or other reasons, the contractor shall restore the foundations to the required dimension at his cost.

1.14 Mode of Measurement and Payment

The measurement shall be on the basis of the required section of trench of excavation.

The trench shall be measured by length, width and depth by measuring tape. The measurements of trench shall be taken at each interval depending upon the ground profile change or directed by engineer-in-charge. The quantity of item shall be computed from length, width and depth of trench.

The payment shall be made on cubic meter basis.

ItemNo. 2: -

Manufacture, Supply & Delivery of Electric Resistance Welded (Up to 400 mm) / Submerged Arc Welded (Above 400 mm) M.S. Pipe having beveled ends plate or coil confirming to IS-3589-2001 or its latest revision / amendment for following thickness outside diameter at GWSSB store or site anywhere in Gujarat state including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. all complete. - Pipe Dia in O.D. in mm and Thickness in mm - 323.9 mm O.D. and 5.6 mm Thickness

2.1 General

M.S. pipes and specials shall be manufactured out of new steel plates conforming to I.S. 3589-2001 shall be free from cracks, surface flaws, laminations, excessive pitting or any other defects. The pipes shall be truly cylindrical and straight in axis. The ends shall be accurately cut and prepared for field welding. The external circumference of the pipe pieces. Which are to be fixed adjacent to flange adapter with fixed outer diameter, to obtain this accuracy the pipe shall be rolled several times, it necessary, as pipe pieces should be truly cylindrical. The external longitudinal welding of this pipe shall be ground smooth flush with surface to the satisfaction of the purchaser; no extra cost shall be charged by the Bidder for this grinding work.

Minor repair by welding or otherwise shall be permitted at the discretions of the purchaser, but such repairs shall be done only after obtaining him previous permission of the purchaser. Any pipe or part thereof, which develops injurious defects during shop welding or other operations shall be rejected.

2.2 Black Paint

The contractor has to carry out Black paint to outside surface of the M.S. pipes the surface should be free from oil and grease, rust, loose, scale, dirt to be removed this might affect the adhesive, corrosion.

2.3 Transporting of Pipes

All pipes and specials fabricated in the factory/ work shop and temporality stacked in the yard shall be transported to the site of laying after clearing them internally etc. The loading in the factory shall be carried out by means of either a crane, gantry or shear legs, so as not to cause any damage to the finished material. Similarly, while unloading and stacking, great care shall be taken to ensure that the materials is not damaged or dented.

2.4 Procedure for receiving steel, Pipes.

2.4.1 General

To ensure that the work of erecting pipes is not held up at any stage and place, the Bidder shall maintain an adequate stock of standard specials, flange rings, Plug, plates, manhole, covers etc. and short length of smaller diameter Pipelines etc. at site in his field stores, in consultation with the purchaser. Wherever possible, the Bidder shall arrange on full month's requirement of pipe specials etc. stacked along the alignment.

2.4.2 Stacking of Pipes and inspection

The bidder shall keep in each section a responsible representative to take delivery of the pipes, specials and appurtenances etc. transported from the fabricating stockyard or received from any other work site to the site of laying and stack along the route on timber skids, Padding shall be provided between pipes and timber skids to avoid damage to the suitable gaps in the pipes stacked shall be left at intervals to permit access from one side to the other. The pipes, specials appurtenances are received on site shall be jointly inspected and defects recorded if any, such as protrusions, grooves, dents, notches damages to the internal etc.

2.4.3 Handling of Pipes

It is essential to avoid damage to the pipes at all stages during handling. The pipe shall be handled in such a manner as not to distort their circularity of cause and damage to their surface treatment. Pipes shall not be thrown down from the trucks nor shall they be dragged or rolled along hard surfaces. Sling of canvas or equally non-abrasive materials of suitable width of special attachment shaped to fit the pipe ends shall be used to lift and lower pipes to prevent damage to the Outer side.

Great care shall be taken in handling the pipe right from the first operation of manufacture until they are laid and jointed. The Bidder will provide temporary props and described earlier in order to prevent any staging of the pipes while they are stacked in their yard and while transporting to the site of delivery i.e laying. The props shall be retained until the pipes are laid and welded. If at any time these props are found to be dislodged or disturbed the Bidder shall immediately reinstate them in such a way that the true shape of the pipe shall or specials in maintained to the satisfaction of the purchaser. No. defective or damaged pipe or special shall be allowed to be used in the work without rectification to the satisfaction of the purchase. Any damage to the M.S Pipe shall be repaired by the bidder at his own cost of the satisfaction of the purchaser.

2.5 Mode of Measurement and Payments.

Payment will be as per Rmt. basis.

Item No. 3: -

Lowering, Laying, Jointing & Welding in position to correct line & level M.S. Pipe with outer gunniting & inside lining / Epoxy painting on pedestal or chairs upon prepared formation or prepared bedding in trenches the rates include conveyance from store to site of work loading, unloading, joint plastering, hydrotesting etc. complete. - 4 mm to 7 mm Thick - Pipe Dia in mm: 323.9 mm

3.1 Electrodes

The contractor shall use preferably approved IS made Electrodes as approved by Engineer-in-charge depending upon the thickness of the plate and type of joint. They shall use standard current and Arc. Voltage required for the machine in use as per manufacturer's directions. Electrode shall be stored unopened on original containers. Electrodes when used shall be free of rust, oil grease and all other matter which could be harmful for the good quality of welding.

3.2 Welding Process

All welds shall be made down hand by manual or automatic shielded arc welding process. Welding shall be done so that there shall be through fusion and complete. Penetration sealing runs in the inside shall be done manually. The joints for seams and circular welding shall be square but as per standard practice shall be accepted.

3.3 End Preparation

Ends to be welded will be preferably made by machining. However preparation of ends may be made by flame cutting provided all grooves and irregularities are ground off and all the oxidation's is removed.

3.4 Clearing

The ends to the welded shall be properly cleaned. All paint oil, grease, rust and oxide as well as earth, sand or any other material sticking which could be harmful to the welding should be removed. Ends shall be totally dry while welding. No dirt or debris will be permitted in the pipeline. Prior to alignment the inside of each joint shall be adequately by approved means to the satisfaction of the Engineer-in-charge.

3.5 Alignment and Spacing

Pipe to be welded shall be aligned and fitted with external line up clamp and spaced in a suitable manner. so as to hold ends, during welding at a distance to ensure full penetration. Root opening shall not be more than as specified, internal offset shall not exceed 1.5 mm. The pipe piece to be butt welded shall be coupled by means of pipe couplers or by yokes of bridge "C" clamps. Owner's inspector may check and approve the joint fit-up and alignment prior to the commencement of welding.

3.6 Lowering

- 1) After the application and inspection of coating, the entire welded pipe shall be normally lowered into the finished trench next day after completion of the coating where ever required.
- 2) The trenches shall be sufficient width to enable lowering of pipe without difficulty. The trench bottom shall not be uneven.
- 3) Water present in the trench at the time of lowering shall be balled out by the contractor without any extra cost.
- 4) The pipes shall be brushed before lowering and laying or remove any soil or dirt etc. that may have accumulated.

3.7 Contractor's Scope

Every care shall be taken in carting of pipe to site. During transportation any damage shall be occurring to pipes for fittings the replacement of the pipes given by the contractor at his own cost.

Cutting of pipes required for fabricated specials or for competing the gaps should be cut in such a way that the wastage shall be minimum.

3.8 Scope of Work

Cost of additional excavation required for jointing clearing the site of all scrubs, buses and tress and dewatering whenever necessary.

Cost of materials like steel, cement, aggregate, bolts nuts, buts, washers, while lead, grease, rubber packing etc. necessary for pipe lowering laying and jointing.

Labour for laying pipes in trenches to correct alignment at required depth with tools including cutting of pipes and specials if require for laying the pipes, including connecting pipes to specials and appurtenances.

Cost of scaffolding tools and plants ropes etc.

Protection of exciting works from damage and cost of requires to the existing structure.

Poles, sewer, pipe line, telephone/ electricity cables and electrical line etc.

Labour for cutting pipes by gas cutting or any other method and laying and fixing the same. Labour for fabricating necessary specials such as bends, tees, reducers, enlarges, branch, flange etc. Using M.S. Plates including drilling holes in flanges as may be required.

Carting surplus pipes, pieces, scrap etc. to stores at plant site, head work or sub head work sites.

Supply of any other materials or labour not mentioned above but required to complete the work.

3.9 Mode of Measurement and Payment

The measurement shall be recorded in running meter of pipe length laid along centre line or axis of pipe line including tees, enlarges, reducers and bends correct up to 0.0 M length. No payment shall be made for overlaps etc.

The payment shall be paid after completion of whole item as mentioned in price bid on Running Meter basis.

Item No. 4:-

Providing and supplying in Standard length ISI mark high density Polyethylene H.D.P.E pipes suitable for potable water as per IS specification No. 4984/1995 including all local and central taxes, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to the dept. stores etc. comp.

- Test Pressure : 6.0 Kg/cm² - Pipe Dia in O.D. in mm : 315 mm dia O.D.

4.1 Scope of Item:

The item shall be covering manufacturing, supplying, and delivery of HDPE pipes having pressure rating PN-6 & material grade PE -100 bearing IS 4984/1995 and its latest version or amendments. The HDPE pipes shall be supply in standard length.

4.2 Standard:

The HDPE pipes is to be procured, supplied under the scope of this item and which shall be meet the requirement of pressure rating of PN 6 and material grade PE-100 in accordance and confirming to IS:4984/1995 or its latest version or amendments with IS certification mark.

4.3 Temperature Variation:

All the pipes to be supplied and delivered shall be subject to weather condition like sun, dust, rain, wind as available in the state of Gujarat. They shall also be subject to carry and convey drinking water under available temperature condition of Gujarat State.

4.4 Technical Specification

a) Manufacture of pipes.

The General requirement relating to the manufacture of HDPE pipes shall be confirming to IS 4984 - 2016 and its latest revision /amendments.

- a. The dimension, material composition, tests etc shall be as per IS 4984 – 2016 and its latest revision/ amendments.

- b. HDPE pipes shall be marked with ISI certification mark.
- c. The pipe dimensions and tolerances shall be as per latest revisions and amendments of IS 4984 -2016.
- d. The colour of pipes shall be black as per IS 4984 -2016 and its latest revision/amendments.
- e. For the identification purposes each pipe shall contain minimum three equispaced longitudinal strips of width 3 mm (min) in blue colour. These strips shall be co-extruded during pipe manufacturing itself and shall not be more than 0.2 mm in depth. The material of the strips shall be of the same types of resin as used in based compound for the pipe.
- f. 100 % virgin material shall allow no rework is to be used for the production of pipes.

b) Test

The following tests as per IS 4984-2016 and its latest revision/amendments will be carried out by the agency in the presence of representative of Engineer-In-Charge / Third party Inspection (T.P.I). (Laboratory tests as well as field tests).

- a. Dimensions (Inside and outside diameter, Wall thickness and Length of pipe)
- b. Visual appearance
- c. Hydraulic Characteristics
- d. Reversion test
- e. Over all migration test
- f. Density

- g. Melt flow rate (MFR)
- h. Carbon Black content and dispersion test.
- i. Acceptance test.
- j. Internal Creep Rupture Test

c) Sampling.

The scale of sampling for tests for Hydraulic characteristics, Reversion, Overall Migration, Density, MFR and Carbon Black Content, Dispersion shall be as per IS 4984 – 2016, as mentioned below:

Sr. No.	Nos. of Pipes	Sample Size
1	Up to 150	3
2	151 to 1200	5
3	1201 to 35000	8

The scale of sampling for visual and dimensional requirement shall be as per Table No: of IS 4984 – 2016 or as directed by Engineer-In-Charge.

The sampling shall be made on random basis, from a lot manufactured. The samples required for testing shall be taken as directed by Engineer-In-Charge or his representative.

The Agency should provide the test certificates from the manufacturer for the internal creep rupture tests conducted, as given here under along with the supply of pipes. These tests are to be performed in the presence of Engineer-In-Charge or his representative in the in-house laboratory of the pipe manufacturer. At the discretion of NWRWS&K, if required the representative will be deputed for checking raw material and production process. Internal creep rupture test shall be in accordance with procedure given in Annex - B of IS 4984-2016 or latest revision/ amendments. The pipes under test shall show no signs of localized swelling, leakage or weeping and shall not burst during the

prescribed test period. The temperature for Duration of test and induced stress for the test shall confirm to IS 4984.

During execution if required the sampling of pipes shall be made from the procured, tested and delivered lot of pipes at site randomly. The same shall be tested for the tests mentioned in para as above.

The Contractor shall have to arrange testing of pipes at Manufacturer Company where Contractor supply of Pipe Before brought on site, and Testing in CIPET for the satisfactorily report from the CIPET.

d) Type Test

The type test shall be carried out as per IS 4984 - 2016 and its latest revision/ amendments. The type tests are intended to prove the suitability and performance of anew composition, a new technique or a new size of a pipe. Such tests, therefore, need be applied only when a change is made in Polymer composition or method of manufacture, or when a new size of pipe is to be introduced. Engineer-In-Charge or his representative may call for the fresh samples for the type tests if required.

4.5 Marking:

The method of marking to all the pipes to be used under the scope of contract shall ensure that all the information as mentioned in clause 10 of IS:4984/1995 and/or its latest amendments. The marking will remain legible even after transportation, storage in open space etc. In general the legible and indelible marking upon the pipes shall indicate the following:

- a) Manufacturer's name or trade mark.
- b) Grade of material.
- c) Class of pipes and pressure rating.
- d) Nominal diameter.

- e) Lot number / Batch number of manufacturer.
- f) ISI certification Mark.
- g) Purchasers mark as "N.W.R.W.S. & Kalpasar Department".
- h) Any other important detail.

4.6 Packing and handling:

When the pipes are transported at railway risk, special packing as per IRCA rules are absolutely necessary for which the extra cost if any sale be borne by in total by bidders only.

The bidder shall have proper handling instrument / equipment and shall follow suitable method of handling of pipes as may be approved by Engineer while unloading, and stacking material.

4.7 Material and workman ship:

1. General requirement of material and workmanship shall mean any material or articles either raw material or additives or finished are required to be used in the manufacturing process of pipes.
2. The material used for manufacturing of pipes should not constitute any toxic hazards should not support microbiological growth and should not give rise to unpleasant test or odor, cloudiness or discoloration of water. The Contractor shall have to produce Pipe manufacturer's certificate, that the material meets the PE 100 requirements as per IS 4984/1995 and its latest revision / amendments.

All other quality parameters like density, MFR, carbon black content, anti-oxidant and reworked material of raw material use for manufacturing of pipes shall be strictly as per IS:4984/1995 or its latest revision or amendment.

The original invoice of raw material requires to manufacture ordered length of HDPE pipes and batch wise test certificate of raw material will be verified by Engineer-In-Charge or his representative.

The carbon black master batch if used shall be certified by the master batch seller as fit for the purpose of standard for which the HDPE pipe is under order.

3. The HDPE pipe shall be manufactured from the certified raw material of PE-100 grade and suppliers have to submit the certificate from raw material manufacturer.
4. The HDPE Pipe shall be procured from the approved vendor list of GUJARAT WATER SUPPLY AND SEWERAGE BOARD (GWSSB)/GWIL and GWRDC.

4.8 Mode of Measurement and Payment:

- **Measurement shall be paid in Running meter basis.**
- **For supply of pipe on site 60% payment can be made, further 20% of amount can be released for the quantity of pipe laying subject to producing satisfactory CIPET test results. Remaining 20% shall be released after successful finalizing of Hydro Test of pipeline.**

Item No. 5:-

Lowering, laying, jointing of HDPE pipes including HDPE Pipe specials of following class and diameter (By butt fusion welding method) including cost of conveyance from stores to site of works including cost of labour, material giving satisfactory hydraulic testing including crop compensation for the crops for the pipe laying work etc complete. - Test Pressure : 6.0 Kg/cm² - Pipe Dia in O.D. in mm : 315 mm dia O.D.

5.1 Scope of Item:

The item shall be covering Lowering, laying, jointing of HDPE pipes including HDPE Pipe specials by butt fusion welding method including cost of conveyance from stores to site of works including cost of labour, material giving satisfactory hydraulic testing including crop compensation for the crops for the pipe laying work etc complete.

The contractor shall have to arrange demonstration of the installation and testing of pipe by manufacturer including fixing all specials and valves properly at least up to 10 % of total quantity to be supplied by them at any place of the site of work under the bid.

5.2 Welding

HDPE pipes are joined by BUTT Fusion welding method with the help of electric heat (Mirror) and hydraulically operated welding jack.

5.3 Precautions

Since critical parameters for sound welding joint are temperature and pressure, welding methods should insure proper temperature and pressure by using proper equipment's.

The welding area has to be protected from adverse weather condition like rain water, moisture, rough wind, dust and low ambient temperature (less than 50 C. Primary inspection of pipes should be done for ensuring defect free pipe before starting welding.

5.4 Welding Procedure

Two ends of pipes to be welded are to be cut perpendicular to the pipe axis and then cleaned and planed by using proper planning tool. The pipes are fixed in welding jack

and aligned properly in axial direction. The pipes then are pressed against a hot plate (called heating mirror or simply mirror) till a bead of molten material is formed. The mirror is electrically heated by in-built electric resistance heating coil. The heating should be uniform all around mirror plate on both sides. The mirror should be provided with a temperature control device so that during welding the surface temperature is automatically maintained within the required limit i.e. $200 \pm 10^\circ\text{C}$. Proper Teflon cloth covering should be provided on mirror surface to avoid sticking of melted HDPE material on plate surface.

After attaining the welding temperature of 200°C . on mirror surface the pipe ends are simultaneously brought in contact with the heating surfaces of mirror. This is done by using hydraulically operated welding jack. Initial contact pressure is applied which is maintained till the uniform ring of molten bead is achieved. Then the contact pressure is reduced until proper fusion takes place.

After proper fusion, the welding mirror is removed carefully without damaging the head.

The time of removal of the mirror should be as short as possible. After removal of mirror, pipe ends are brought immediately to contact with each other under initial welding pressure which is gradually increased to final welding pressure. This pressure depends on the total welding surface of pipe.

The final welding pressure is maintained to be applied till the joint is cooled down to ambient temperature naturally. Artificial cooling such as wrapping with wet cloth, spraying of water etc. are not allowed.

5.5 Inspection of Joints

The visual inspection of each joint should be done to ensure correct bead formation.

Weld joint should be checked for axial alignment of welded pipes.

5.6 Laying of Pipes

The required length of HDPE pipes are made alongside the trench. The pipe is lowered into the trench carefully avoiding damage to pipe and joints.

5.7 Trench

Since the welding of pipe is done outside of trench, the width of trench should be kept as minimum as possible, Normally pipe O.D. plus 300 mm width should be sufficient for laying. The depth of trench will be as per the requirement of client depending on level survey (L.S) Here in our case the earth cover of average 1.2 mtr. on top of pipe is to be provided. Hence the depth of trench will be pipe O.D. plus 1.2 mtr.

The trench should be made as straight as possible. Wherever necessary, the trench can be made with smooth curve but not below allowed bending radius of HDPE pipe, which is 25 times of O.D.

The bottom of trench should be properly dressed and made free from any sharp objects.

5.8 Laying & Backfilling

Laying of pipe lengths to be done carefully from one end without giving any impact on pipe. After laying of pipe, trench should backfilled with the layers of good earth of dug soil as available. extra soil will be embedded on trench which will be compacted.

5.9 Field Testing of HDPE Pipeline

5.9.1 Inspection and test after erection

In addition to the progressive supervision and inspection, the contractor shall offer for inspection to Engineer-In-Charge or his representative, to complete, erected or its parts on which tests are to be carried out. After such inspection by Engineer-In-Charge or his representative, the contractor shall have to carry out the testing for leakage / seepage from pipe line in the presence of Engineer-In-Charge or his representative.

5.9.2 Testing

5.9.2.1 The contractor shall have to make all the arrangement of water for testing, labours, supervisory staff etc. for the period of testing. The necessary arrangement for plugging of opening shall be made by the contractor at his cost. After testing contractor shall have to remove the plugging at his cost, but care should be taken that no damage will occur to the work executed. If any damage will occur to any parts of work executed the same shall be required to be repaired by the contractor at his cost to the satisfaction of Engineer-in-charge.

5.9.2.2 The water shall be filled in the pipeline and pressure shall be created by the working pumps at the Pumping Station and this observed pressure shall be maintained in the pipeline for 30 minutes without any drop in pressure.

During the testing, entire length of pipeline shall be observed for the including joints and structures for checking of leakage and if any leakage is found the same shall be rectified by the contractor at his own cost. The test is repeated again till there is no any leakage observed in entire length and joint of pipe line.

5.10 Connection of HDPE to MS Pipe

This connection will be made by using metal flange. We shall provide flange at the end of HDPE pipe by using HDPE stub end. Matching flange connection from M.S. pipe will be made by M.S. pipe agency to which flange of HDPE pipeline will be connected by bolting and proper rubber gasket packing.

5.11 Air Valve Fixing

Suitable size of air valve will be installed on HDPE pipe with the help of metallic saddle. Metallic flange for air valve will be provided on upper part of saddle for fixing air valve.

5.12 Scope of Work

Cost of additional excavation required for jointing clearing the site of all scrubs, bushes, and trees and dewatering where necessary.

Labour for laying pipes in trenches to correct alignment at required depth with tools, including cutting of pipes and specials if required for laying of pipes including connecting pipes to specials and appurtenances. Cost of the scaffolding, tools and plants, ropes etc.

Protection of existing works from damage and cost of repair to the damages carried out to the existing structure, sewer line telephone/electricity cables, electric cables, electric lines, gas pipe line, irrigation pipe line etc.

The pipe laying across the state highways, national highways etc. will have to be done either through open cut method or through push through method depending upon the requirement to be prescribed by the sanctioning authority. However, mostly it would be push through method.

Labor for making joints including jointing material for joints, tools as well as tests. Testing of pipes for leakage under water pressure and flushing the pipes after testing and construction work shall have to be arranged by the contractor at his own cost.

5.13 Crop Compensation

- The work of laying of pipeline is to be executed on the land acquired under “Right of work” permission.
- The contractor will have to pay crop compensation for the standing crops, standing trees, fruit/non fruits bearing trees etc. to be damaged due to laying of pipeline used to the standing crops in the fields of the farmer-account holders coming in the path of the pipeline laying, as per the survey number and location.
- The contractor will have to obtain a **No Objection Certificate** (Proforma as provided by the Department) from the farmer account holder regarding payment of adequate crop compensation to the farmer account holder as per the damage caused on the spot.
- The payment of standing crops, compensation of wells, bores, buildings, properties, any of such requirements for work for the right of use permission to

farmer / other affected persons / owners, NOC and other miscellaneous charges shall be borne by the contractor for the entire period of the contract.

- The contractor shall have to take enough precaution to see that no adjacent/ surrounding land is damaged / obstructed / encroached by them during the execution. Any such dispute / litigation if arise shall be the responsibility of the contractor. However, bidder/contractor shall note that ROU notification shall be issued by the Department and land cost for getting ROU for laying pipeline (excluding above) shall be paid by the department as per Government rules and regulations. **Further ROU Proposal for the said Work shall be prepared by the Contractor and to be submitted to the Department.**
- The R.C.C. chamber on pipeline shall be constructed without acquiring land. Contractor shall have to pay the compensation to farmer by mutual understanding.
- On satisfactory completion of the work, required NOC to be obtained by the contractor from the concerned department. The contractor is responsible for obtaining all necessary permissions / clearance / NOC / sanctions etc. Required coordination for sanction from the concerned authority and NOC from the concerned authority / field owner for satisfactory completion shall be provided by the contractor.

5.14 Mode of Measurement and Payment: -

THE PAYMENT SHALL BE MADE ON RUNNIG METER BASIS (RMT)

- The HDPE pipe shall be measured along their center line of axis of pipeline including tees, enlarges, reducers & bends correct up to 0.01 mt. length. No payment shall be made for overlaps etc. in linear meter. The rate shall be for a unit

of one running meter. The rate shall include the cost of pipes including loading, unloading transporting, laying in position, jointing, distance indicator etc. complete.

- On completion of lowering laying work, 80% of the amount of this item shall be paid and 20% retained for crop Compensation and successful completion of Hydro test. Contractor has to give undertaking (On stamp of Rs. 300 as approved Performa by engineer-in-charge) and satisfactory proof (Receipt from farmer) for crop compensation that they paid crop compensation to beneficiary foresaid work.

Item No.6: -

Refilling the pipeline trenches incl. ramming, watering, consolidating disposal of surplus stuff as directed within a radius of 3 km.

- 6.1 The scope of work under this item includes Refilling with excavated stuff including loading, unloading, stacking laying in uniform layers including ramming, consolidating, watering for the different component of the Structure/ Trench etc. or as directed.
- 6.2 The item provides for the selected materials from excavated stuff, loading the same in his own transport vehicles employed by him. Carting and unloading the materials as directed, proper watering on site of work shall be done.
- 6.3 The work shall be carried out in workmen like manner at the places shown by the Engineer-in-charge up to all lead & lift. The area under measurement shall be as directed by Engineer-in-charge.
- 6.4 The contractor shall take all precautions for safe working for which no extra charge shall be permitted.
- 6.5 The work done at the place other than that directed by the Engineer-in-charge shall not be paid.

All tools required to carry out the item shall be brought by the contract at his own cost.
- 6.6 No stones, cobbles or rock fragments having maximum dimension of more than specified shall be placed.
- 6.7 **Mode of Measurement and Payment: -**

The Payment shall be made on Cubic Meter basis.

ItemNo.7:-

Raising of air valve incl. providing and fixing of 80 mm dia Medium duty G.I. Pipe 3.50 mt long, incl Providing and fixing Double acting cutting (DS2) with built in S.V. incl. providing and welding of M.S. flange incl. C.C. block of 1:2:4 as per Drawing etc Complete. - Air valves double acting (DS2) - Diameter : 80 mm

MATERIALS

7.1 GENERAL

The Double acting air valve shall confirm to the IS as and when published and shall be approved make and quality. The standard applies to air valves used for water mains.

The details given below briefly cover the requirement for materials, dimensions and tests for air valves.

7.2 CLASSIFICATION

All valves shall be of Double acting air valve.

7.3 MATERIALS

Cast iron: Cast iron for bodies pressure covers, splash cover glands, caps, joints supporting shall be of best iron of selected grade IS specification for grey iron casting.

Gun metal: Gun metal shall be of mixture of 88% copper, 10% tin, 2% zinc having excellent hard wearing qualities ball guides of small orifice units and out let bushes of large orifice valves shall be of gun metal.

Forged Bronze: Wipplies, spindles shall be machined from polished, extruded or forged high tensile brass or aluminium bronze. The product shall pass much greater strength than ordinary cast product.

Mild steel: Bolts, nuts, flanges etc. shall be of mild steel unless otherwise specified and shall confirm to IS-226-1975 specification for structural steel

Materials for Balls: The balls shall be of rubber covered and vulcanite covered. The rubber shall be a smooth and hard surface. It shall be as per IS specification for rubber and insertion jointing.

Flange jointing materials: The jointing materials used between the flanges of component parts of the valve shall be compressed fibre board or rubber of thickness between 1.5mm to 3mm. The rubber shall be as per IS specification for rubber and insertion jointing. The fibre board shall be impregnated with chemically natural mineral oil and shall have a smooth and hard surface.

7.4 CHARACTERISTICS

Small orifice valve shall have rubber covered balls and nipples of forged bronze or special alloy screwed in to brass plugs.

Large orifice valves shall have vulcanite covered balls closing on rubber packing/sealing backed with leather and gun metal outlet bushed. They shall be screwed or flanged. The flanges shall be faces and drilled to IS.

Air valves shall be sound in all respect and uniformly forged so as to have uniform Bore. They shall be free from any defects such as unwanted projection. Holes, or roughness and shall have inner and outer surface perfectly smooth.

7.5 COATING

Immediately after coating and before machining. All cast iron parts shall be through cleaned and before raising commences shall be coated by dipping in a bath containing a composition having a tar base.

The coating shall be such that it shall not impose any test of small to water. The coating shall be smooth glossy and sufficiently hard. It shall not chip when scratched lightly with the point of one knife.

7.6 INSPECTION AND TESTING

Each valve shall be subjected to the Field Testing of HDPE Pipeline and shall not show any sign of leakage under tests i.e. the balls shall function properly.

7.7 MANUFACTURE'S GUARANTEE

The contractor shall guarantee that if any defects chargeable to faulty workmanship, design of materials are found in the valves within a period of one year after installation, free of charge at site of work.

The following information shall be cast on each valve body.

- (A) Manufacturer's Name or Trade Mark.
- (B) Size of valve
- (C) ISI Mark.

7.8 LABOUR

The contractor shall have to provide G.I. pipe of medium duty of approved make and as per standard of ISI mark. The same shall be got approved prior to fixing in position. The pipes shall be of 3.50 mt. length and it shall be threading on both ends without claiming extra cost.

The contractor shall have to bring M.S. flange / G.I. Coupling of suitable dia. The flanges / Coupling shall be free from any defects and cracks and rust. The flange / Coupling shall have threads inside. Both the faces of flanges shall be even and smooth. The flanges / Coupling shall be got approved by the Engineer in charge before use. The contractor shall have to supply a welded with pipe in such a way that no leakage occur after fixing. The welding shall be made even and smooth and around the pipe. The flanges / Coupling shall be welded with one end of 25mm dia pipe and the other end of pipe shall be fitted with PVC Service saddle in Line by the contractor.

The contractor shall have to provide rubber packing of good packing and approved quality and 3mm thick. It shall be soft and durable and shall not break if bend. It shall be free from impurities and other organic matters.

The contractor shall have to bring necessary nuts and bolts of suitable size. The nuts and bolts shall be free from corrosion and dust. The threads and bolts and nuts shall be clean and appropriate.

The above pipe duly welded with flanges / Coupling shall be fixed on Rising main by fixing with PVC Service saddle.

The item also includes necessary excavation, fixing and raising of air valve etc. complete.

The item also includes supplying of all materials like air valve, flanges, coupling nuts, bolts, rubber packing, loading, unloading, carting, cutting and threading pipes fixing of air valve and pipes etc. complete. Care shall be taken so that no parts of air valves shall be damaged during lowering and fixing with pipes.

7.9 CONCRETE FOOTING AND COLUMN

The proportion of concrete shall be one part of cement Two parts of coarse sand and Four parts of stone aggregate having 6mm to 20mm nominal size. The cement shall be ISI port land cement and stored in such a way to avoid dampness. The coarse river sand shall be hard, clean and free from any films. The coarse aggregates shall be of 6mm to 20mm nominal hard stones and durable.

The aggregate shall not contain flat, thin or elongated pieces, water used for mixing shall be clean potable water.

Concrete shall be mixed in mechanical mixer at the site of work. When hand mixing is permitted, it shall be carried out on a smooth water tight platform. The mixing shall be done in such a way that uniform colour and consistency of concrete is obtained. The concrete is prepared shall than be placed in to its position and consolidated. The method

of placing shall be so that there is no segregation. The concrete shall be protected from direct impact sunlight and shall be cured for at least 7 days by covering wet gunny bags. The Size of footing of column below G.L. 0.75 mt. x 0.75 mt. x 1.00 mt. and size of column around the vertical pipe 0.230 mt. x 0.230 mt. x 3.50 mt. or Circular Column May Be Constructed ht. above G.L.

7.10 Mode of Measurement and Payment: -

The measurement shall be made on number basis and payment on No. basis.

Item No. 8: -

Providing and laying foundation concrete of proportion as under by using cement, sand and machine crushed coarse aggregate laid in situ including necessary temping, smooth finishing, watering and curing as directed with all leads and lifts etc. complete. (a) PCC- 1:3:6

8.1 Materials.

Water shall conform to M-4, sand shall conform to M-2, Cement shall conform to M-1, Metal shall conform to M-3, of General Technical Specification.

8.2 Workmanship.

General.

Before starting concrete the bed of foundation trenches shall be cleared off all loose materials, leveled watered and rammed as directed.

Proportion of Mix (for 1:3:6) concrete.

The proportion of cement, sand and Metal shall be one part of cement, 3 part of sand, 6 part of Metal of size 25 to 40mm and shall be measured by volume.

Mixing.

The concrete shall be mixed in a mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by the Executive Engineer or his authorized Engineer-in-charge. When hand mixing is permitted by the Executive Engineer. In case of breakdown of machineries and in the interest of the work. It shall be taken to ensure that mixing is continued until the mix is uniform in color and consistency. However in such case 10 % more cement than otherwise required shall have to be used without any extra cost. The mixing in mechanical mixer Shall be done

for a period 1 to 2 minutes. The quantity of water shall be sufficient in produce a dense concrete of required workability for the purpose.

8.3 Transporting & placing the concrete.

The concrete shall be handled from the place of mixing to the final position without any segregation compacted and finished within 30 minutes of mixing with water i.e. before the setting commences.

The concrete shall be laid in layers of 15cms to 20cms.

8.4 Compacting.

The concrete shall be crammed with heavy iron rammers and rapidly to get the required compaction and to allow all the interstices to be filled with mortar.

8.5 Curing.

After the final set the concrete shall be kept continuously wet, if required by pounding for a period of not less than 7 days from the date of placement. However, masonry work shall be allowed after 72 hours.

8.6 Mode of Measurement and Payment.

The concrete shall be measured for its length, breadth and depth,

The rate includes cost of all materials labour, tools and plant required for mixing, placing in position compacting finishing as directed curing and all other incidental expenses for producing center of specified strength. The rate including the cost of form work.

8.7 Mode of Measurement:-

Payment shall be made on cubic meter basis.

Item No. 9: -

Providing and Laying CC 1:2:4 grade using cement, sand and crushed metal including providing and erecting necessary form work, centering, vibrating, smooth finishing, watering and curing as directed with all leads and lifts etc. complete. (a) substructure

9.1 MATERIALS

1.1) WATER:

Specification M-1 of specification of material section shall apply.

1.2) CEMENT:

Specification M-2 of specification of material section shall apply.

1.3) FINE AGGREGATE (SAND):

Specification M-3 of specification of material section shall apply.

1.4) COARSE AGGREGATE:

Specification M-4 of specification of material section shall apply.

9.2 GENERAL

The concrete mix is not required to be designed by preliminary tests. The proportion of the concrete mix shall be 1:2:4 (1 cement : 2 coarse sand : 4 stone aggregate) graded stone aggregate 20 mm nominal size) by volume concrete work shall have exposed concrete surface or as specified in the item.

The ingredients required for ordinary concrete containing 1 bag of cement of 50 kg by weight (0.0342 cu. Meter) for deferent properties of mix shall be as per Table-9, IS 456:2000.

Grade of Concrete	Total quantity or dry aggregate by mass per 50 kg of cement to be taken as the sum of individual masses of fine and coarse aggregates kg	Proportion of fine aggregate to coarse	Qty. of water per 50 kg of
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	maximum	aggregates (by mass)	cement maximum
M-5	800	Generally 1:2 but subject to an upper limit of 1:1½ and a lower limit of 1:2½	60
M-7.5	625		45
M-10	480		34
M-15	330		32
M-20	250		30

The water cement ratio shall not be more than specified in the above table. The cement content of the mix specified on the table shall be increased if the quantity of water in mix has to be increased to overcome the difficulties of placement and compaction so that the water cement ratio specified in the table is not exceeded.

Workability of the concrete shall be controlled by maintaining a water cement ratio that is found to give a concrete mix which is just sufficient wet to be placed and compacted without difficulty with the means available.

The maximum size of coarse aggregates shall be as large as possible within the limits specified but in no case greater than one fourth of the minimum thickness of the member provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and to fill the corners of the form.

For reinforced work coarse aggregates having a nominal size of 20mm are generally considered satisfactory.

For heavily reinforced concrete members as in the case of ribs of main beams, the nominal maximum size of coarse aggregate should usually be restricted to 5 mm less than the minimum clear distance between the main bars or 5 mm less than the minimum cover to the reinforcement whichever is smaller.

Where the reinforcement is widely spaced as in solid slabs limitations of size of the aggregate may not be so important and the nominal maximum size may sometimes be as great as or greater than the minimum cover.

Admixture may be used in concrete only with approval of Engineer-in-charge based upon the evidence that with the passing of time neither the compressive strength of concrete is reduced nor are other requisite qualities of concrete and steel impaired by the use of such admixture.

9.3 Proportioning:

Proportioning shall be done by volume, except which shall be measured in items of bags of 50 kg weight the volume of one such bag being taken as 0.0342 cu, meter. Boxes of suitable size shall be used for measuring sand aggregate. The size of boxes (internal) shall be 35 x 25 cms and 40 cms deep while measuring the aggregate and sand the boxes shall be filled without shaking ramming or hammering. The proportioning of sand shall be on the basis of its dry volume and in case of dense sand, allowances for bulk age shall be made.

9.4 Mixing:

For all work, concrete shall be mixed in a mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction. Measured quantity of aggregate sand and cement required for each batch shall be poured into the drum of the mechanical mixer while it is continuously running. After half a minute of dry mixing measured quantity of water required for each batch of concrete mix shall be added gradually and mixing continued for another one and half minute. Mixing shall be continued till materials are uniformly distributed and uniform colour of the entire mass is obtained and each individual particle of the coarse aggregates shows complete coating of mortar containing its proportionate amount of cement. In no case shall the mixing be done for less than 2 minutes after all ingredients have been put into the mixer.

When hand mixing is permitted by the Engineer-in-charge for small jobs or for certain other reasons, it shall be done on the smooth water tight platform large enough to allow efficient fuming over the ingredients of concrete before and after adding water, mixing

platform, shall be so arranged that no foreign materials gets mixed with concrete nor does the mixing water flow out. Cement is required number of bags shall be spread in a layer of uniform thickness on the mixing platform. Dry coarse and fine aggregate and cement shall that be mixed thoroughly by turning over to get a mixture of uniform colour. Specified quantity water shall then be added gradually through a rose can and the mass fumed over till a mix of required consistency is obtained. In hand mixing quantity of cement shall be increased by 10 % above that specified.

Mixture which have been out of use for more than 30 minutes shall be thoroughly cleaned before putting in a new batch, Unless otherwise agreed to by the Engineer-in-charge the first batch of concrete from the mixture shall contain only two third of normal quantity of coarse aggregate. Mixing plant shall be thoroughly cleaned before changing from one type of cement to another.

9.5 Consistency:

The degree of consistency which shall depend upon the nature of the work and methods of vibration of concrete shall be determined by regular slump tests in accordance with I.S 1199-1939. The slump of 10 mm to 25 mm shall be adopted with vibrators are used and 80 mm when vibrators are not used.

9.6 Inspection:

Contractor shall give the Engineer-in-charge due notice before placing any concrete in the form to permit him to inspect and accept the false work and forms as to their strength, alignment and general fitness but such inspection shall not relieve the contractor from his responsibility for the safety of men, machinery, materials and for result obtained immediately before concreting all forms shall be thoroughly cleaned.

Centering design and its erection shall be got approved from the Engineer-in-charge. One carpenter with helper shall invariably be kept present throughout the period of concreting. Movement of labour and other persons shall be totally prohibited for

reinforcement laid in position. For access to different parts suitable mobile platforms shall be provided so that steel reinforcement in position is not disturbed. For ensuring proper cover mortar blocks of suitable size shall be cast and tied to the reinforcement. Timber, kapchi or metal pieces shall not be used for this purpose.

9.7 Transporting and laying

The method of transporting and placing concrete shall be as approved by Engineer in charge of the work. Concrete shall be so transported and placed that no contamination segregation or loss of its constituent material takes place. All form work shall be cleaned and made free from standing water dust, snow or ice immediately before placing of concrete. No concrete shall be placed in any part of the structure until the approval of the Engineer-in-charge has been obtained.

Concreting shall proceed continuously over the area between construction joints. Fresh concrete proper contraction joint is formed. Concrete shall be compacted in its final position within 30 minutes of its discharge from the mixer. Except where otherwise agreed to by the Engineer-in-charge concrete shall be deposited in horizontal layers to a compacted depth of not more than 0.45 meter when internal vibrators are used and not exceeding 0.30 meter in all other cases.

Unless otherwise to by the Engineer-in-charge, concrete shall be dropped in place from a height exceeding 2 meters. when trucking or chutes are used they shall be kept close and used in such a way as to avoid segregation, when concreting has to be resumed on a surface which has hardened is shall be roughened, swept clean thoroughly wetted and covered with a 13 mm thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself. This 13 mm layer of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully

hardened all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to avoid dislodgement of any particles of coarse aggregate the surface shall then be thoroughly wetted all free from water removed and then coated with neat cement grout. The first layer of concrete to be placed in this surface shall not exceed 150 mm in thickness and shall be well rammed against old work, particular attention being given to corners and close spots.

All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrators unless otherwise permitted by the Engineer-in-charge for exceptional cases, such as concreting under water, where vibrators cannot be used. Sufficiently vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of break-downs. Concrete shall be judged to be compacted when the mortar fills the spaces between the coarse aggregate and begins to cream up to form an even surface. Compaction shall be completed before the initial setting time i.e. within 30 minutes of addition of water to dry mixture. During compaction, it shall be observed that needle vibrators are not applied on reinforcement which likely to destroy the bond between concrete and reinforcement.

9.8 Curing:

Immediately after compaction, concrete shall be protected from weather, including rain running water, shocks, vibration traffic, rapid temperature changes frost and drying out processes. It shall be covered with wet sacking or other similar absorbent materials approved soon after the initial set and shall be kept continuously wet for a period of not less than 14 days from the date of placement. Masonry work over foundation concrete may be started after 48 hours of its laying but curing of concrete of concrete shall be continued for a minimum period of 14 days.

9.9 Sampling and testing of concrete:

Samples from fresh concrete shall be taken as per I.S. 1199-1959 and cubes shall be made, cured and tested as 7 days and 28 days as per requirements in accordance with

I.S. 526-1959. A random sampling procedure shall be adopted to ensure that each concrete batch shall have a reasonable chance of being tested i.e. the sampling should be speared over the entire period of concreting and cover all mixing units. The minimum frequency of sampling of concrete of each grade shall be in accordance with following.

Quantity of concrete in the work	Nos. of samples	Quantity of concrete in the work	Nos. of samples
1-5 cmt	1	16-30cmt	3
6-15 cmt	2	31-50 cmt	4
51 and above cmt	4 + one additional for each additional 50 cu meter of part thereof.		

Note: At least one sample shall be taken from each shift. Six test specimens shall be made from each sample, three for testing at 7 days and the remaining three at 28 days the samples of concrete shall be taken on each day of concreting as per frequency. The number of specimens may be suitable increase as deemed necessary by the Engineer-in-charge when procedure of tests given above reveals a poor quality of concrete and in other special cases.

The average of the group of cube test for each day shall not be less than the specified cubes strength of 200 kg/cm² at 28 days 20 % of the cubes cast for each day may have value less than the specified strength provided the lowest value is not less than 85 % of the specified strength. If the concrete made in accordance with the proportions given for a particular grade does not yield the specified strength, such concrete shall be classified as belonging to the proportions give for a particular grade shall not however be placed a higher grade on the ground that the test strength are higher than the minimum specified.

9.10 Stripping:

The Engineer-in-charge shall be informed in advance by the contractor of his intention to start the form work. While fixing the time of removal of form work due consideration shall be given to local conditions character of the structure, the weather and other conditions that influences the setting of concrete and of the materials used in the mixture. In normal circumstances (generally where temperature are above 20.c) and where ordinarily concrete used forms may be struck after expire on period specified.

All form work shall be removed without causing any shock or vibration as would damage the concrete. Before the soffit and struts are removed, the concrete surface shall be gradually exposed, where necessary on order to ascertain that concrete has sufficiently hardened, centering shall be gradually and uniformed lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually where internal metal tiles are permitted, they or their removable parts shall be extracted without causing any damage to the concrete and remaining holes filled with mortar. No permanently embedded metal part shall have less than 25 mm cover to the finished concrete surface. Where it is intended to reuse the form work, it shall be cleaned and made good to the satisfaction of the Engineer-in-charge. After removal of form work and shuttering, the Executive Engineer shall inspect the work and satisfy by random checks that concrete produced is of good quality.

Immediately after the removal of forms, all exposed bolts etc. passing through the cement concrete member and used for shuttering or any other purpose shall be cut inside the cement concrete and the resulting holes be filled by cement mortar, all fins caused by form joints, all cavities produced by the removal of form tiles and all other holes and depressions, honeycomb sports, broken edges or corners and other defects, shall be thoroughly cleaned saturated with water and carefully pointed and rendered true with mortar of cement and fine carefully pointed as rendered true with mortar of cement and fine aggregate mixed in proportions used in the grads of concrete that is being furnished and of as dry consistency as is possible to use. Considerable pressure shall be applied in filling the pointing to ensure through filling in all voids. Surface which are pointed shall

be kept moist for a period of 24 hours if rock pockets / honey comb in the opinion of the Engineer-in-charge are of a such an extent or character as to effect the strength of the structure materially or to endanger the life of the steel reinforcement; he may declare the concrete defective and require the removal and replacement if the portions of structure affected.

9.11 Mode of Measurement:

The consolidated cubical contents of concrete work as specified in item shall be measured. No deduction shall be made for.

- (a) Ends of dis-similar materials such as joints, beams, posts girders, flatters, purling trusses, corbels and steps etc. up to 500 sq. cms in section

The rate includes cost of all materials labour, tools and plant required for mixing, placing in position vibrating and compacting finishing as directed curing and all other incident expenses for producing concrete of specified strength. The rate including the cost of from work.

Payment shall be made on cubic meter basis.

Item No. 10: -

Steel/Reinforcement bars

Supplying, Cutting, Bending, Binding and placing in the position steel as per plan and design and as per ISS 2502 including cost of steel and binding wire for reservoirs/structures only including lift upto 6 meter height or depth below G.L

For all Diameter

Do- Deformed (TMT) bars confirming to relevant IS Fe-500 grade for all Diameter

10.1 MATERIALS:

- 1) TMT BARS: Specification M-5 of section of materials shall apply.
- 2) BINDING WIRES: Specifications of M-6 of section of materials shall apply.

10.2 SCOPE OF WORK:

Scope of work shall include supplying all materials and labour for cutting, bending, binding, reinforcement, dowels, anchor, etc. Required quantity of steel shall be procured by the contractor at his own cost.

10.3 REINFORCEMENT WORK:

Steel reinforcement bars shall be placed in position where concreting is to be done, after cutting & bending as shown in the drawing or as directed. Steel bars shall be cleaned of objectionable foreign substances like rust, scale, dirt, grease, oil, etc. before placing in position by means of bolts in concrete blocks, metallic chairs, rangers, spacers or other suitable devices at sufficient close intervals as directed so they will neither sag between support nor be displaced during the placing of concrete nor by any operations of work. Special care shall be exercised to prevent any disturbance of the reinforcement; after being placed in position and it shall be maintained in clean condition until it is completely embedded in concrete to prevent further damage to the concrete or unsightly rust stain on exposed concrete surface. Reinforcement shall not be straightened or bent in manner that will injure or weaken the material. Bars with kinks or bend not shown in

the drawings shall not be used. Bars shall be bent to the shapes and dimensions shown in the drawings or as directed, using a bar bender, operated by hand or power. The radius for bends along the edge of bar shall not be less than 4 times the diameter of the bar. Heating of bars to facilitate bending will not be permitted, except for large diameter of bars. The reinforcement available from rejected concrete shall not be used. Reinforcement may be fixed in position by means of anchor rods, supporting and hanger, rods as approved by the engineer. In difficult locations, tack welding of bars at isolated spots may be permitted to keep these bars in position.

10.4 COVERS:

Concrete cover to the reinforcement shown in drawing or as directed shall be maintained by providing cement mortar (1:2) blocks of same w/c ratio as the concrete to be used in the particular work. Sufficient concrete cover shall be provided to protect reinforcement from erosion and shall be as shown in the drawing or as directed. But it shall not be less than 5cms and more than 10cms, depends upon type of structures and exposure condition.

Cover of concrete shall be as per the detailed drawings. Unless shown otherwise on the drawings, the minimum thickness of concrete cover to any reinforcement material measured from the outside surface of concrete to the bar center line shall be as per IS: 456 – 2000 tabulated below.

Table: Nominal cover to meet durability requirement as per

IS: 456 – 2000 (Clause 26.4.2)

Exposer	Nominal concrete cover in mm not less than
Mild	20 mm
Moderate	30 mm
Severe	45 mm
Very severe	50 mm
Extreme	75 mm

Note: For main reinforcement up to 10 mm dia for mild exposure condition nominal

cover may be reduced by 5 mm Actual cover should not deviate by more than 10 mm on plus side and zero on minus side.

For longitudinal bars in column, nominal cover shall not be less than 40 mm or dia of bars whichever is more. For column of dimension of 200 mm & under, where rein bar does not exceed 12 mm in dia, nominal cover of 25 mm be used. For footing main cover shall be 50 mm.

10.5 BINDING:

Wire for tying reinforcement shall confirm to specifications of materials. All reinforcement bars shall be tied securely by binding wires, so as to transfer the stresses easily. All main bars and distribution bars shall be tied with each crossing, so that spacing of bars remains accurate and cannot displaced during concreting operation.

10.6 SPLICING / DEVELOPMENT LENGTH.:

Bar splices as indicated in the drawing or as specified by the engineer shall only be allowed. The lapped ends shall be placed to ensure full bond on each bar. The development length shall be calculated as per clause no-26.2.1 page no-42 & clause no-26.2.5.1 page no-45 of IS-456-2000.for tension bars/main steel. And for distribution bars/temp. reinforcement bars/skin reinforcement bars, it shall be 30 times the diameter of bars. Laps splices shall not be used for bars larger than 36 mm, for larger diameters, bars may be welded in cases where welding is not practicable, lapping of bars larger than 36 mm may be permitted, in which case additional spirals should be provided around the lapped bars. The bars to be spliced shall be lap or butt welded by electric welding in the manner specified without loss of strength. Suitable means shall be provided for holding the bars accurately in position during the welding process Welded joints shall be provided in terms of length of bar equal to 40 times the diameter of the bars. The welded joints shall be staggered as directed. Three percent of the welded joints shall

be tested for the tensile strength. Splicing shall not be done in the region of maximum bending moment & splicing of adjacent bars shall be avoided as far as possible. Also splices shall be suitable staggered.

10.7 INSPECTION BEFORE CONCRETE:

No concreting shall be started unless the reinforcement as laid finally checked and recorded by engineer in charge or by his representative.

10.8 ANCHOR BARS:

Anchor bars and rods are required in connection with installation of gates, etc. shall be supplied by the contractor or by department, as per tender provision, shall be placed in the concrete as shown in the drawing or as directed. No extra payment shall be made for placing of anchor rods.

10.9 DOWEL BARS:

Dowel bars as required for anchoring concrete face to the masonry shall be placed on masonry as shown in the drawing or as directed and included under reinforcement work.

10.10 TESTING:

Testing of steel shall be done for each size of bars as per provision mentioned in specification of materials in government or government approved laboratory.

MODE OF MEASUREMENT AND PAYMENT:

- The payment for steel used shall be on the basis of actual lengths of bars used and placed as shown in the bar bending schedules, including hooks, Bend laps etc.
- The length of the bars shall be measured to the nearest 100mm Viz 2001 mm to 2049 mm will be measure as 2000 mm and 2050 mm and above 2099 will be measured as 2100mm.
- The rate quoted in the tender will include the cost of supplying, cutting bending,

binding cleaning and strengthening the coil and cords, fixing and maintaining in position the Reinforcement.

- After all the steel bars have been placed in position they shall be got approved and measured from the Engineer-in-Charge before starting the concrete work.
- The payment for this item shall be on the basis of computed weight of T.M.T. steel bars after measuring the length including specified lengths and hooks. The weight of the steel bars shall be calculated according to the standard weight mentioned in the I.S.I. handbook corrected up to 10 Kg.
- No payment shall be made for extra members or length's net included in the design and which in the opinion of the Engineer-In-Charge are not essential for the purpose of the item of the work even though provided by the contractor as supports and for other reasons and allowed to be embedded in the concrete by the Engineer-In-Charge.
- The weight of annealed steel wire used for tying the reinforcement bars shall not be taken into account for payment purpose.
- **The item shall be measured and paid in Metric Tonne basis of completed work.**

Item No. 11:

Providing and Supplying ISI mark CI D/F sluice valves as per IS:14846 (Latest Edition) of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete. - PN 1.6 With Hand wheel / Cap Operated (PD type Short body) - Diameter : 300 mm Dia.

11.1 General

This Specification describes design, construction, inspection and testing features of Sluice Valves.

11.2 Code And Standards:-

The design and manufacture of the valves shall comply with all applicable codes, standards Regulations and safety codes. Nothing in this specification shall relieve the Contractor of his responsibility. Valves shall be conforming to IS 14846.

11.3 Design Requirement:-

Valves shall be provided with back seating arrangement.

Renewable body and wedge rings shall be provided.

Drain plugs of gunmetal shall be provided for all valves. .

Valves shall be with non-rising spindle type.

Face to face dimension shall be as per IS;14846 (air Valves for pipeline)

Direction of Flow shall coincide with the flow direction indicated by "arrow" cast on the valve body.

11.4 Constructional Features:

1.0	Standard	IS:14846-2000
2.0	Stem	Non rising spindle only.

3.0	Ends	Flanged, flat faced flanges having off center bolt holes
4.0	Bonnet	Bolted
5.0	Disc.	Solid Wedge
6.0	Operation	Manual
7.0	Seat	Body - Renewable Disc - Renewable
8.0	Other requirements	Valves Shall close in clockwise rotation of the hand wheel.
9.0	Body & bonnet	C.I. IS 210 GR 260
10.0	Disc	C.I. IS 210 GR 260
11.0	Stem	S.S. AISI 410
12.0	Body Seat	Bronze IS 318 Gr. LTB2
13.0	Disc Seat	Bronze IS 318 Gr. LTB2
14.0	Stem Nut	Bronze IS 318 Gr. LTB2
15.0	Stuffing box	C.I. IS 210 GR 260
16.0	Gland	C.I. IS 210 GR 260
17.0	Packing	Graphited Asbestos
18.0	Bolts, studs & nuts	Carbon Steel IS 1367 Class 4.6/ 4

11.5 Cleaning And Painting:-

Prior of factory inspection, all manufacturing waste such as metal chips, debris and other foreign materials shall be removed from the interior of the valve. All mill scale rust, oil, grease, chalk and all other material shall be removed from the interior and exterior surface.

Valves shall first be given two coats and zinc base primer after completely cleaning the surface and then is shall coated with three coats of coal tar epoxy paint. The resulting coating shall be uniform and smooth and adhere perfectly to the surface.

The inside coating shall not contain any constituent soluble in water or any ingredient which could impart any taste or odour to the water.

11.6 Tests and Inspection:-

Valves shall be offered for visual inspection and dimensional check.

Valves shall be tested as per IS:14846 (Sluice valves for pipeline)

11.7 Mode of Measurement:-

Measurement shall be paid in Numbers Basis.

Item No. 12: -

Lowering, laying & jointing in position following C.I./ D/F Reflux valve, Butterfly valves, Sluice valve and Air valves including cost of all labour, jointing material, including nut bolts & giving satisfactory hydraulic testing etc. Complete. - Sluice valve - Dia. in mm : 300 mm Dia.

12.1 CLEARING:-

The ends to the welded shall be properly cleaned. All paint oil, grease, rust and oxide as well as earth, sand or any other material sticking which could be harmful to the welding should be removed. Ends shall be totally dry while welding. No dirt or debris will be permitted in the pipeline. Prior to alignment the inside of each joint shall be adequately by approved means to the satisfaction of the Engineer-in-charge.

12.2 ALIGNMENT AND SPACING:-

Valve shall be aligned and fitted with external line up clamp and spaced in a suitable manner. Owner's inspector may check and approve the joint fit-up and alignment prior to the commencement of fitting.

12.3 LOWERING:-

The trenches shall be sufficient width to enable lowering of valve without difficulty. The trench bottom shall not be uneven.

Water present in the trench at the time of lowering shall be balled out by the contractor without any extra cost.

The valve shall be brushed before lowering and laying or remove any soil or dirt etc. that may have accumulated.

12.4 CONTRACTOR'S SCOPE

Every care shall be taken in carting of valve to site. During transportation any damage shall be occurring to valve for fittings the replacement of the valve given by the contractor at his own cost.

12.5 THE SCOPE FOR THE ITEM COVERS.

Cost of additional excavation required for jointing clearing the site of all scrubs, bushes and trees and dewatering whenever necessary.

Cost of materials like steel, cement, aggregate, bolts nuts, washers, while lead, grease, rubber packing etc. necessary for valve lowering , laying and jointing.

Labour for laying valve in trenches to correct alignment at required depth with tools including cutting of pipes and specials if require for laying the valves, including connecting pipes to specials and appurtenances.

Cost of scaffolding tools and plants ropes etc.

Protection of existing works from damage and cost of repairs to the existing structure.

Poles, sewer, pipe line, telephone/ electricity cables and electrical line etc.

Carting surplus pipes, pieces, scrap etc. to stores at plant site, head work or sub head work sites.

Supply of any other materials or labour not mentioned above but required to complete the work.

12.6 Mode of Measurement:-

Measurement shall be paid in Numbers Basis.

Item No. 13:-

Providing and Supplying In Standard Length ISI mark rigid unplasticized PVC Pipes Suitable For Potable Water With Ring fit Joint Including Cost of rings, as per IS Specification no 4985/1988 Including all Local and Central taxes, Transportation, Freight Charges, Octroi, Inspection Charges, Loading, Unloading, Conveyance to the Departmental Stores and Including Cost Of Jointing material etc. Complete. - Test Pressure : 6.0 Kg/cm² - Pipe Dia in mm : 160 mm Dia.

Providing. 6.00 kg/sq.cm working pressure polythene pipe of 160mm outer side diameter should be keep as and where required and subjected by contractor.

- (1) The P.V.C. pipe of 160mm outer dia. should be standard quality & I.S.I. mark.
- (2) The pipe shall provide proper length as required for fixing at required place.
- (3) The pipe shall be hard and durable. It shall be kept in earth and concrete works. The function of pipe is as a hollow duct for passing electrical cable etc.
- (4) The pipe shall be full length; piece should do not allowed for the work.

The Payment of pipe shall be made in running meter basis.

Signature of Contractor

**Deputy Executive Engineer
Drainage Sub Division
Visnagar**

**Executive Engineer
Drainage Division
Gandhinagar**

SECTION - 7

BILL OF QUANTITIES

DRAINAGE DIVISION – GANDHINAGAR					
Drainage Sub Division, Visnagar					
Providing and Fixing 315 mm Dia. HDPE Pipeline for filling Village Tank Survey No. 364 and 460 of village Balisana Ta & Dist-Patan @ Existing Scour Valve Ch. 7500 mt From Patan(Matpur)-Dindrol Pipeline.					
Annexure-2 Bill of Quantities					
Percentage Rate Tender (Up to INR 50 Cr.)					
Item No	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate In figures	Amount
1	Excavation in all Sorts of Soil (including wet and slushy condition of soil) with yellow, sandy, gravelly soil including soft murrum & H.M. including sorting & stacking and depositing the excavated stuff in uniform layers as and where directed upto lead of 30 m and lift as shown below including dewatering, clearing the site etc. complete.(a) 0 to 3 Mt. Depth	3015.00	cum	79.00	238185.00
2	Manufacture, Supply & Delivery of Electric Resistance Welded (Up to 400 mm) / Submerged Arc Welded (Above 400 mm) M.S. Pipe having beveled ends plate or coil confirming to IS-3589-2001 or its latest revision / ammendment for following thickness outside diameter at GWSSB store or site anywhere in Gujarat state including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. all complete. - Pipe Dia in O.D. in mm and Thickness in mm - 323.9 mm O.D. and 5.6 mm Thickness	15.00	Rmt	3106.00	46590.00
3	Lowering, Laying, Jointing & Welding in position to correct line & level M.S. Pipe with outer on pedestal or chairs upon prepared formation or prepared bedding in trenches the rates include conveyance from store to site of work loading, unloading, joint plastering, hydrotesting etc complete. - 4 mm to 7 mm Thick - Pipe Dia in mm : 323.9 mm	15.00	Rmt	297.00	4455.00

4	Providing and supplying in Standard length ISI mark high density Polyethylene H.D.P.E pipes suitable for potable water as per IS specification No. 4984/1995 including all local and central taxes, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to the dept. stores etc. comp. - Test Pressure : 6.0 Kg/cm ² - Pipe Dia in O.D. in mm : 315 mm dia O.D.	1895.00	Rmt	2008.00	3805160.00
5	Lowering, laying, jointing of HDPE pipes including HDPE Pipe specials of following class and diameter (By butt fusion welding method) including cost of conveyance from stores to site of works including cost of labour, material giving satisfactory hydraulic testing including crop compensation for the crops for the pipe laying work etc complete. - Test Pressure : 6.0 Kg/cm ² - Pipe Dia in O.D. in mm : 315 mm dia O.D.	1895.00	Rmt	387.00	733365.00
6	Refilling the pipeline trenches incl. ramming, watering, consolidating disposal of surplus stuff as directed within a radius of 3 km.	2803.00	cum	22.00	61666.00
7	Raising of air valve incl. providing and fixing of 80 mm dia Medium duty G.I. Pipe 3.00 mt long, incl Providing and fixing Double acting cutting (DS2) with buile in S.V. incl.providing and welding of M.S. flange incl. C.C. block of 1:2:4 as per Drawing etc Complete. - Air valves doulbe acting (DS2) - Diameter : 80 mm	5.00	Nos.	8644.00	43220.00
8	Providing and Laying foundation concrete of proportion as under by using cement, sand and machine crushed course aggregate laid in situ including necessary temping, smooth finishing,watering and curing as directed with all leads and lifts etc complete. (a) PCC 1:3:6	4.00	Cum	3424.30	13697.20
9	Providing and Laying CC 1:2:4 grade using cement,sand and crushed metal including providing and erecting necessary form work, centering, vibrating, smooth finishing, watering and curing as directed with all leads and lifts etc complete. (a) substructure	32.40	Cum	4873.40	157898.16

10	Steel/Reinforcement bars Supplying, Cutting, Bending, Binding and placing in the position steel as per plan and design and as per IS 2502 including cost of steel and binding wire for reservoirs/structures only including lift upto 6 meter height or depth below G.L For all Diameter Do- Deformed (TMT) bars confirming to relevant IS Fe-500 grade for all Diameter	1.67	M.T.	77504.00	129431.68
11	Providing and Supplying ISI mark CI D/F sluice valves as per IS:14846 (Latest Edition) of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc complete. - PN 1.6 With Hand wheel/Cap Operated (PD type Short body) - Diameter : 300 mm Dia.	3.00	Nos.	20946.00	62838.00
12	Lowering, laying & jointing in position following C.I./ D/F Reflux valve, Butterfly valves, Sluice valve and Air valves including cost of all labour, jointing material, including nut bolts & giving satisfactory hydraulic testing etc. Complete. - Sluice valve - Dia. in mm : 300 mm Dia.	3.00	Nos.	1141.00	3423.00
13	Providing and Supplying In Standard Length ISI mark rigid unplasticised PVC Pipes Suitable For Potable Water With Ring fit Joint Including Cost of rings, as per IS Specification no 4985/1988 Including all Local and Central taxes, Transportion, Freight Charges, Octroi, Inspection Charges, Loading, Unloading, Conveyance to the Departmental Stores and Including Cost Of Jointing material etc. Complete. - Test Pressure : 6.0 Kg/cm ² - Pipe Dia in mm : 160 mm Dia.	150.00	Rmt	420.00	63000.00
	Total				5362929.04

I/We am/are willing to carry out the work at..... % above/below percent (Should be written in figures and words) of the estimated rate mentioned above. Amount of my /our tender works out as under.

Estimated amount put to tender	Rs.	Estimated amount put to tender	Rs.
Deduct..... % below	Rs.	Add..... % Above	Rs.

Net	Rs.	Net	Rs.
In words ::		In words ::	
* (Please strike out whichever is not applicable)			
NOTE 1:	All work shall be carried out as per Public Works Department Handbook and other specifications of division or as directed.		
NOTE 2:	All the columns in schedule should be filled in ink and the total of the entries in the last column should be struck by the contractor under his signature. Site, moisture, weather etc.		
NOTE 3:	Rates quoted include clearance of site (Prior to commencement of work and at tis close) in all respects and hold good for work under all conditions.		
NOTE 4:	To be on additional sheets, if found necessary.		

Signature of Contractor

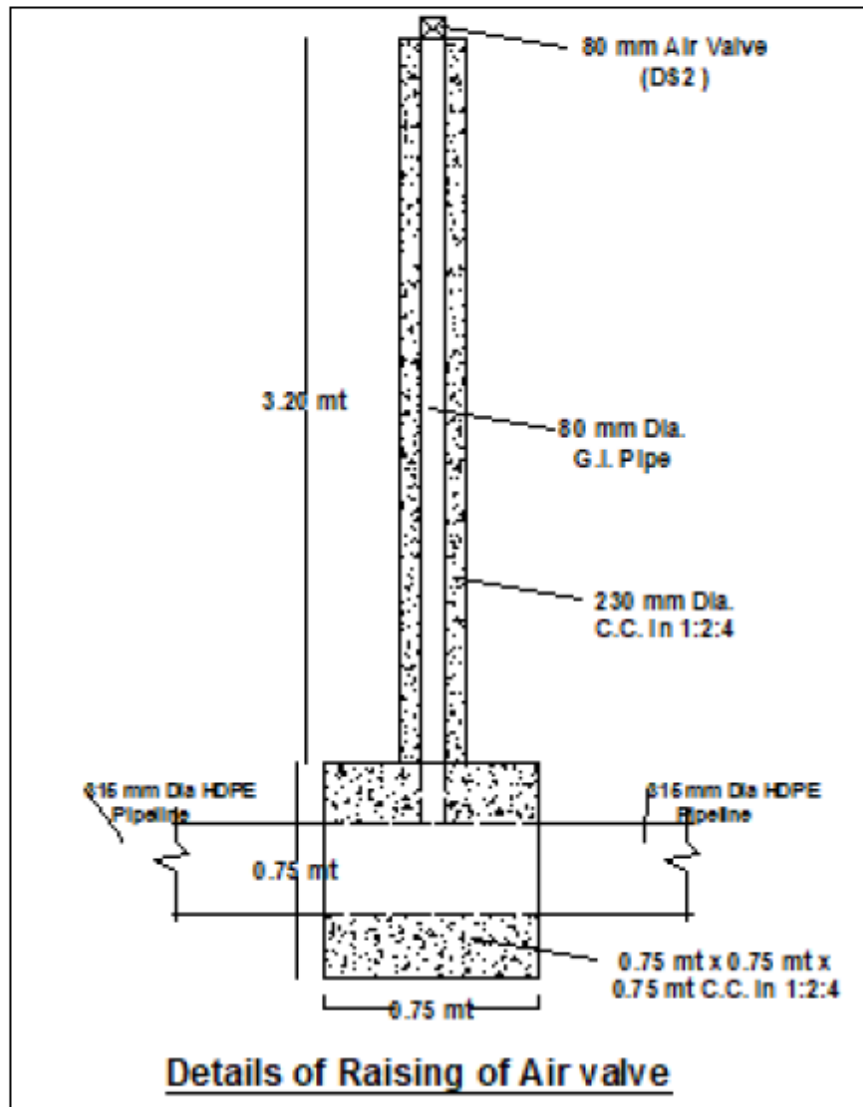
**Deputy Executive Engineer
Drainage Sub Division
Visnagar**


**Executive Engineer
Drainage Division
Gandhinagar**

SECTION - 9

DRAWINGS

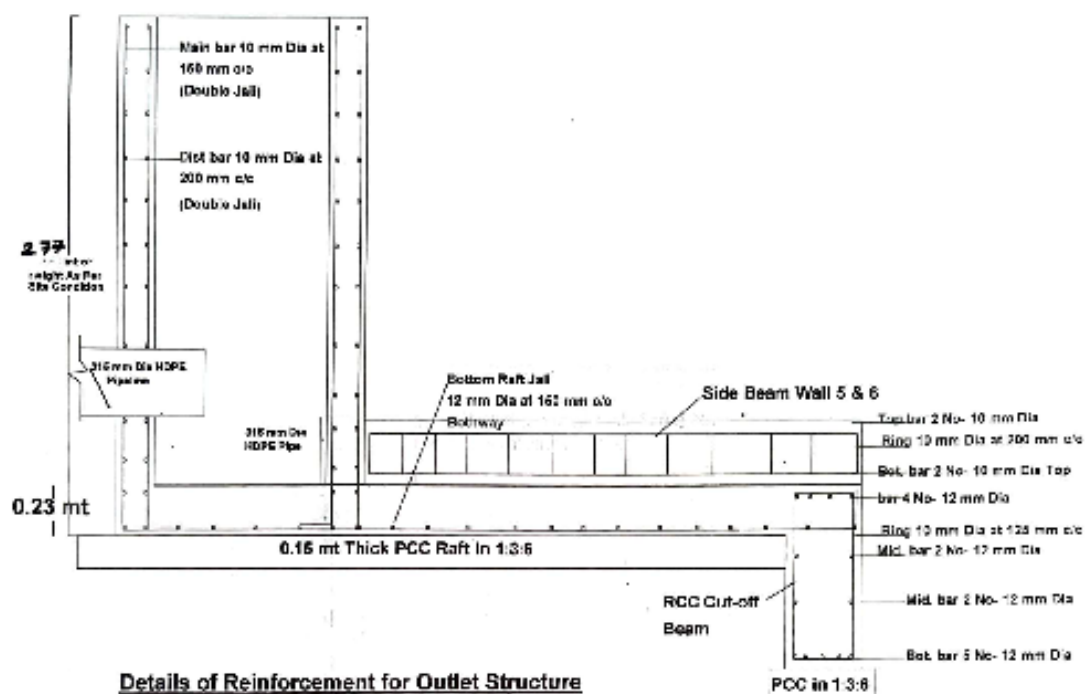
Name Of Work : Providing and Fixing 315 mm Dia. HDPE Pipeline for filling Village Tank Survey No. 364 and 460 of village Balisana Ta & Dist-Patan @ Existing Scour Valve Ch. 7500 mt From Patan(Matpur)-Dindrol Pipeline.




Deputy Executive Engineer
Drainage Sub Division
Visnagar

Executive Engineer
Drainage Division
Gandhinagar

Name of work: Providing and Fixing 315 mm Dia. HDPE Pipeline for filling Village Tank Survey No. 364 and 460 of village Ballama Ta & Dist-Patan @ Existing Sewer Valve Ch. 7500 mt From Patan(Matpur)-Dindrol Pipeline.

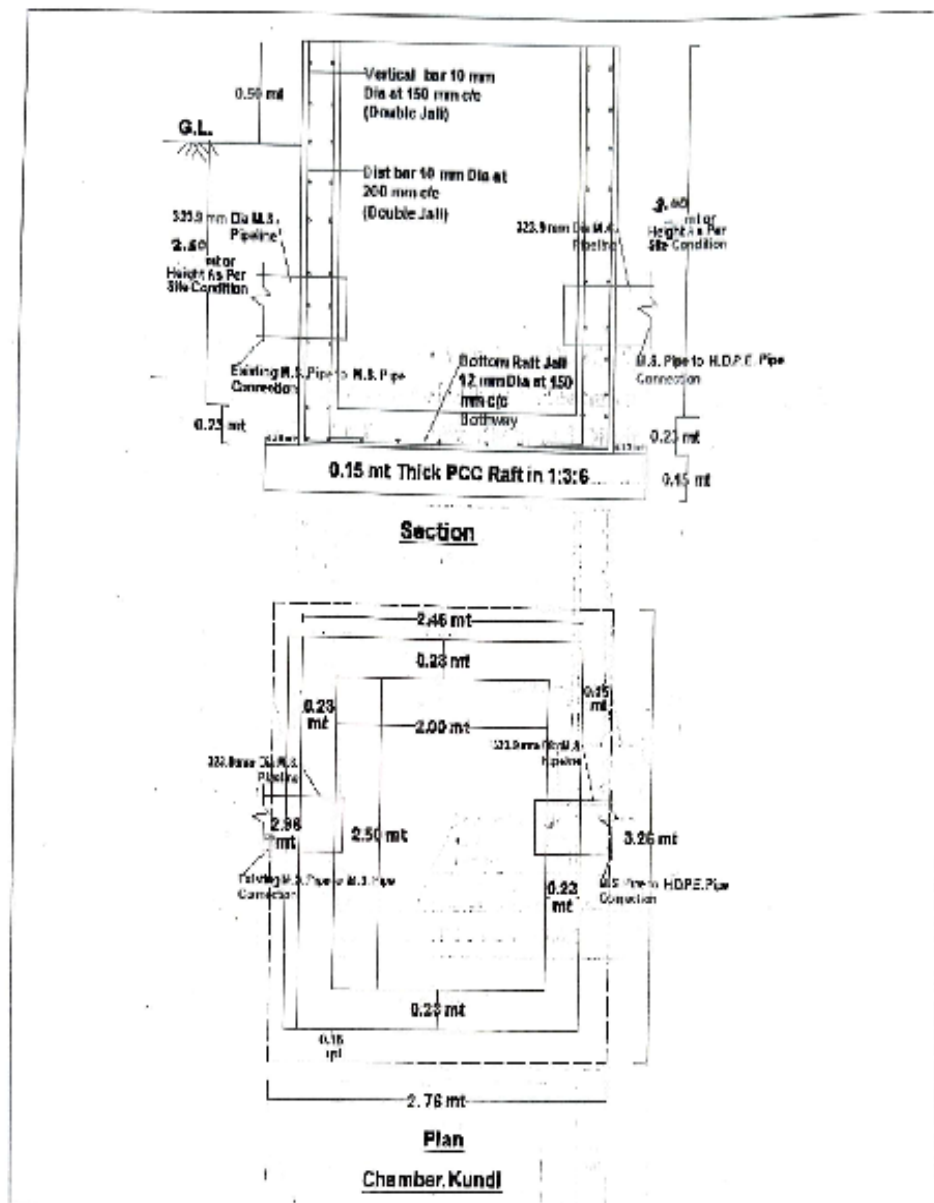


Details of Reinforcement for Outlet Structure

Deputy Executive Engineer
Drainage Sub Division
Vijnagar

Executive Engineer
Drainage Division
Gandhinagar

Name Of Work : Providing and Fixing 315 mm Dia. HDPE Pipeline for filling Village Tank
Survey No. 364 and 460 of village Balisana Ta & Dist-Patan @ Existing Scour
Valve Ch. 7500 mt From Patan(Matpur)-Dindrol Pipeline.



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Visnagar

Executive Engineer
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