

SECTION-5
TECHNICAL SPECIFICATION

GENERAL SPECIFICATIONS

1. In the specifications “as directed” / “approved” shall be taken to mean “as directed / approved by the Engineer in charge.
2. **Wherever a reference to any Indian Standard appears in the Specifications, it shall be taken to mean as a reference to the latest edition of the same in force on the date of agreement.**
3. In “Mode of Measurement” in the specifications wherever a dispute arises in the absence of specific mention of a particular point of aspect, the provisions on these particular points or aspects in the relevant Indian standards shall be referred to
4. All measurements and computations, unless otherwise specified, shall be carried out nearest to the following limits :
 - i) Length, width and depth (height) 0.01 Meter
 - ii) Areas 0.01 Sq. Meter.
 - iii) Cubic contents. 0.01 Cu. Meter.In recording dimensions of work, the sequence of length, width and height (depth) or thickness shall be followed.
5. The distance which constitutes lead shall be determined along the shortest practical route and note necessarily the route actually taken. The decision of the Engineer-in-charge in this regard shall be taken as final.
6. Where no lead is specific, it shall mean “all leads”
7. Lift shall be measured from plinth level.
8. Up to “floor two levels” means actual height of floor (Maxi. 4 M) up to 3 Mt. Above plinth level.
9. Definite particulars covered in the items of work, though not mentioned or elucidated in it specifications shall be deemed to be included therein.
10. Reference to specifications of materials as made in the detailed specification of the items of works is in the form of a designation containing them tuber of the specification of the material and prefix ‘M’ e.g. M-5
11. 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 what so ever on account of any such materials being rejected by the Engineer in charge.
12. The contract rate of the item of work shall be for the work completed in all aspects.
13. No collection of materials shall be made before it is not approved from the Engineer in charge.

14. 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.
15. Materials, if and when rejected by the Engineer-in-charge, shall be immediately removed from the site of work.
 - i. No materials shall be stored prior to, during and after execution of a structure in such a way as to cause or over loading of the various components of the structure.
 - ii. All works shall be carried out in a workman like manner as per the best techniques for the particular item.
 - iii. All tools, templates, machinery and equipment for correct execution of the work as well as for checking lines, levels, alignment of the works during execution shall kept in sufficient numbers and in good working condition on the site of the work.
 - iv. The mode, procedure and manner of execution shall be such that it does not cause damage or over loading of the various components of the structure during execution or after completion of the structure.
 - v. Special modes of construction not adopted in general Engineering practice if proposed to be adopted by the Contractor, shall be considered only if the contractor provides satisfactory evidence that such special mode of construction is safe, found and helps in speedy construction and completion of work to the required strength and quality. Acceptance of the same by the Engineer in charge shall not, however absolve the contractor of the responsibility of any adverse effects and consequences of adopting the same in the course of execution of completion of the work.
 - vi. All installations pertaining to water supply and fixtures there of as well as drainage lines and sanitary fittings shall be deemed to be completed only after giving satisfactory tests by the contractor.
 - vii. The contractor shall be responsible for observing the rules and regulations imposed under the “Minor Minerals Act” and such other laws and rules prescribed by Government from time to time.
 - viii. All necessary safety measures and precautions (including those laid down in the various relevant Indian Standards) shall be taken to ensure to ensure the safety of men, materials and machinery on the works as also of the work itself.
 - ix. Approval to any of the executed items for the work does not in any relieve the contractor his responsibility for the correctness, soundness and strength of the structure as per the drawings and specifications.

SPECIFICATIONS OF MATERIALS

M-1: Water

Water shall not be salty brackish and shall be clean, reasonably clear and free objectionable quantities of silt and traces of oil and injurious alkalis, salts, organic matter and other deleterious material which will either weaken the mortar of concrete or cause efflorescence or attack the steel in RCC container for transport, storage and handling of water shall be clean. Water shall conform to the standard specified in I.S. 456-1978.

If required by the Engineer-in-charge it shall be tested by comparison with distilled water comparison shall be made by means of standard cement tests for soundness, time of setting and mortar strength as specified in I.S. 269-1976. Any indication of unsoundness, change in time of setting by 30 minutes or more or decrease of more than 10 percent in strength of mortar prepared with water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.

Water for curing mortar, concrete or masonry should not be too acidic or too alkaline.

It shall be free of elements which significantly affect the hydration reaction or otherwise interfere with the hardening of mortar or concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces.

Hard and bitter water shall not be used for curing.

Potable water will generally found suitable for curing mortar or concrete.

M-2: Cement

Cement shall be ordinary Portland slag cement as per I.S. 12269-1976 or Portland slag cement as per I.S. 455-1976.

M-3: Sand

Sand shall be natural sand, clean, well graded, hard strong, durable and gritty, particles free from injurious amounts of dust, clay canker nodules, soft or flaky particles shale, alkali salts organic matter, loam, mica or other deleterious substances and shall be got approved from the Engineer-in-charge. The sand shall not contain more contain more than 8 percent of silt as determined by field test. If necessary, the sand shall be washed to make it clean.

Coarse Sand:

The fineness modules of coarse sand shall not be less than 2.5 and shall not exceed 3.0 The Sieve analysis of coarse shall be as under:

I.S. Designation	Sieve passing sieve.	Percentage by weight Designation	I.S. Sieve percentage by weight passing sieve.
4.75 mm	100	600 Micron	30 – 100
2.36 mm	90 - 100	300 Micron	5 – 70
1.18 mm	70 – 100	150 Micron	0 - 50

Fine Sand:

The finance modulus shall not exceed. 1.0 The sieve analysis of fine sand shall be as under.

I.S. Designation	Sieve passing sieve.	Percentage by weight Designation	I.S. Sieve percentage by weight passing sieve.
4.75 mm	100	600 Micron	40-85
2.36 mm	100	300 Micron	5-50
1.18 mm	75-100	150 Micron	0-10

M-4: Cement Mortar

Water: Water shall conform to Specification M-1,

Cement: Cement shall conform to Specifications M-3,

Sand: Sand shall conform to M-6.

Proportion of Mix:

In hand mixed mortar, cement and sand in the specified proportions shall be thoroughly mixed dry on clean impervious platform by turning over at least 3 times or more till a homogeneous mixture of uniform colour is obtained. Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar or mortar shall flow out while mixing the water shall be gradually added and thoroughly mixed to form a stiff plastic mass of uniform colour so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio shall be adopted as directed.

The mortar so prepared shall be used within 30 minutes of adding water. Only such quantity of mortar shall be prepared as can be used within 30 minutes.

M - 5: Stone Coarse Aggregate for Nominal mix Concrete

Coarse aggregate shall be of machine crushed stone of black trap or equivalent and be hard, strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion of mortar.

The aggregate shall generally be cubical in shape. Unless special stones of particular quarries are mentioned aggregates shall be machine crushed from the best black trap or equivalent hard stone as approved aggregate shall have no deleterious fraction with cement. The size of the coarse aggregate for plain cement and ordinary reinforced cement concrete shall generally be as per the table given below.

However: In case of reinforced cement concrete the maximum limit may be restricted to 6 mm less than the minimum lateral clear distance between bars or 6 mm less than the cover whichever is smaller.

TABLE:

I.S. Sieve Designation	Percentage passing for single sized aggregates of Nominal Size.			I.S. Sieve Designation	Percentage passing for single sized aggregates of Nominal Size.		
	40 mm	20 mm	16 mm		40 mm	20 mm	16 mm
80 mm	-	-	-	12.50 mm	-	-	-
63 mm	100	-	-	10 mm	0.50	0.20	0.30
40 mm	85-100	100	-	4.75 mm	-	0.50	0.50
20 mm	0-20	85-100	100	2.35 mm	-	-	-
16 mm	85-100	-	-				

Note: This percentage may be varied somewhat by the Engineer-in-charge when considered necessary for obtaining better density and strength of concrete.

The grading test shall be taken in the beginning and at the change of source of materials. The necessary tests, indicated in I.S. 383-1970 and 456-2000 shall have to be carried out to ensure the acceptability. The aggregates shall be stored separately and handled in such a manner as to prevent the intermixing of different aggregates. If the aggregates are covered with dust, they shall be washed with water to make them clean.

M-6: Black Trap or Equivalent Hard Stone Coarse

Aggregate for Concrete: Coarse aggregate shall be of machine crushed stone of black trap or equivalent hard stone and be hard, strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion of mortar.

The aggregates shall generally be cubical in shape. Unless special stones of particular quarries are mentioned, aggregates shall be machine crushed from the best, black trap or equivalent hard stones as approved; Aggregate shall have no deleterious reaction with cement.

The necessary tests indicated in I.S. 383-1970 and I.S. 456-2000 shall have to be carried out to ensure the acceptability of the material.

If aggregate is covered with dust it shall be washed with water to make it clean.

M-7: Brick Bats Aggregate

Brick bat aggregate shall be broken from well burnt or slightly over burnt and dense bricks. It shall be homogeneous in texture, roughly cubical in shape, clean and free from dirt of any other foreign material. The brick bats shall be of 40 mm. 50 mm. size unless otherwise specified in the item. The under burnt off over burnt brick bats shall not be allowed.

The brick bats shall be measure by volume suitable boxes or as directed.

M-8: Bricks

The bricks shall be hand or machine molded and made from suitable soils and kiln burnt. They shall be free from cracks and flaws and nodules of free lime, they shall have smooth rectangular faces with sharp corners and shall be of uniform color.

The bricks shall be molded with a frog of 100 mm. x 40mm. and 10mm. to 20mm. deep on one of its flat sides. The bricks shall not break when thrown on the ground from a height of 600 mm.

The size of modular bricks shall be 190 mm. x 90 mm. x 90 mm.

The size of the conventional cricks shall be as under:

(9" x 4.3/8" x 2,3/4") 225 x 110 x 75 mm.

Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work.

Length + 1/8" (3.0 mm) Width + 1/16" (1.50 mm) Height + 1/16" (1.50 mm)

The crushing strength of the bricks shall not be less than 35 Kg/Sq. Cm. **The average water absorption shall not be more the 26 percent by weight (for south Gujarat Region).** Necessary tests for crushing strength and water absorption etc, shall be carried out as per I.S. 3495 (Part-1 to 4) – 1992.

M-9: Stone

The stone shall be of the specified variety such as Granite/Trap Stone/ Quartzite or any other type of good hard stones. The stones shall be only from the approved quarry and shall be hard, sound, durable and free from defects like cavities, cracks, sand holes, flaws, injurious veins, patches of loose or soft materials etc., and weathered portions and other structural defects or Imperfections tending to affect their soundness and strength. The stone with round surface shall not be used. The percentage of water absorption shall not be more than 5% of dry weigh. When tested in accordance with I.S. 1124-1974. The minimum crushing strength of stone shall be 200 Kg/Sq. Cm. unless otherwise, specified.

The samples of the stone to be used shall be got approved before the work is started.

The Khanki facing stone shall be dressed by chisel as specified in the item for khaki facing in required shape and size. The face of the stone shall be so dressed that the bushing on the exposed face shall not project by more than 40 mm. from the general wall surface and on face to be plastered it shall not project by more than 19 mm. nor shall it have depressions more than 10 mm. from the average wall surface.

M-10: Mild Steel Bars:

Mild steel bars reinforcement for R.C.C. work shall conform to I.S. 432 (Part-II) 1982 and shall be of tested quality. It shall also comply with relevant part of I.S. 456-2000.

All the reinforcement shall be clean and free from dirt, paint, grease, mill scale or loose or thick rust at the time of placing.

For the purpose of payment, the bar shall be measured correct up to 10 mm. length and weight payable worked out at the rate specified below:

<u>No</u>	<u>Dia</u>	<u>Weight</u>	<u>No</u>	<u>Dia</u>	<u>Weight</u>
1.	6 mm.	0.22 Kg/Rmt.	8.	20 mm.	2.47 Kg/Rmt.
2.	8 mm.	0.39 Kg/Rmt.	9.	22 mm.	2.98 Kg/Rmt.
3.	10 mm.	0.62 Kg/Rmt.	10.	25 mm.	3.85 Kg/Rmt.
4.	12 mm.	0.89 Kg/Rmt.	11.	28 mm.	4.83 Kg/Rmt.
5.	14 mm.	1.21 Kg/Rmt.	12.	32 mm.	6.31 Kg/Rmt.
6.	16 mm.	1.58 Kg/Rmt.	13.	36 mm.	7.99 Kg/Rmt.
7.	18 mm.	2.00 Kg/Rmt.	14.	40 mm.	9.86 Kg/Rmt.

M-11: High Yield Strength Steel Deformed Bars

High yield strength steel deformed bars shall be either cold twisted other rolled and shall conform to I.S. 1786-2000 and I.S. 1139-1966 respectively.

Other provisions and requirements shall conform to specification no. M-18 for Mild Steel Bars.

M-12: High Tensile Steel Wires

The high tensile wires for use in pre-stressed concrete work shall conform to I.S. 2090-1962.

The tensile strength of the high tensile steel bars shall be as specified in the item. In absence of the given strength the minimum strength shall be taken as per Para 6-1 of the I.S. 1785-1983. Testing shall be done as per I.S. requirements.

The high tensile steel shall be free from loose mill scale, rust, oil, grease, or any their harmful matter. Cleaning of steel bars may be carried out by immersion in solvent solution, wire brushing or passing through a pressure box containing Carborundum.

The high tensile wire shall be obtained from manufactures in coils having diameter not less than 350 times the diameter of wire itself so that wire springs back straight on being uncoiled.

M-13: Mild Steel Binding Wire

The mild steel wire shall be of 1.63 mm. or 1.22 mm. (16 to 18 gauge) diameter and shall conform to I.S. 280 – 2006.

The use of black wire will be permitted for binding reinforcement bars. It shall be free from rust. Oil paint, grease, loose mill scale or any other undesirable coating which may prevent adhesion of cement mortar.

M-14: Shuttering

The shuttering shall be either of wooden planking of 30 mm. minimum thickness with or without steel lining or of steel plates stiffened by steel angles. The shuttering shall be supported on battens and beams and props of vertical bellies properly cross braced together so as to make the centering rigid. In places of bullies props, brick pillar of adequate section built in mud mortar may be used.

The form work shall be sufficiently strong and shall have camber, so that it assumes correct shape after deposition of the concrete and shall be able to resist forces caused by vibration of live load of men working over it and other incidental loads associated with it. The shuttering shall have smooth and even surface and its joints shall permit leakage of cement grout.

If at any stage of work during or after placing concrete in the structure, the form work sags or bulges out beyond the required shape of the structure, the concrete shall be removed and work redone with fresh

concrete and adequately rigid form work. The complete form work shall be got inspected by and got approved from the Engineer-in-charge, before the reinforcement bars are placed in position.

The props shall consist of bulbies having 100 mm. minimum diameters measured at mid length and 80 mm. at thin end shall be placed as per design requirement. These shall rest squarely on wooden sole plates 40 mm. thick and minimum bearing area of 0 – 10 sq. m. laid on sufficiently hard base.

Double wedges shall further be provided between the sole plate and the wooden props so as to facilitate tightening and easing of shuttering without jerking the concrete.

The timber used in shuttering shall not be so dry as to absorb water from concrete and swell or bulge nor so green or wet as to shrink after erection. The timber shall be properly sawn and planed on the sides and the surface coming in contact with concrete. Wooden form work with metal sheet lining or steel plates stiffened by steel angles shall be permitted.

As far as practicable, clamps shall be used to hold the forms together and use of nails and spikes avoided.

The surface of timber shuttering that would come in contact with concrete shall be well wetted and coated with soap solution before the concreting is done. Alternatively coat of raw linseed oil or oil of approved manufacture may be applied in place of soap solution. In case of steel shuttering either soap solution or raw linseed oil shall be applied after thoroughly cleaning the surface. Under no circumstances black or burnt oil shall be permitted.

The shuttering for beams and slabs shall have camber of 4 mm. per meter (1 in 250) or as directed by the Engineer-in-charge so as to offset the subsequent deflection. For cantilevers, the camber at free end shall be 1/50 of the projected length or as directed by the Engineer-in-charge.

M-15: Paints

Oil paints

1. Oil paints shall be of the specified color and as approved. The ready mixed paints shall only be used. However, if ready mixed paint of specified shade or tint is not available white ready mixed paint with approved Steiner will be allowed. In such a case, the contractor shall ensure that the shade of the paint so allowed shall be uniform.
2. All the paints shall meet with the following general requirements:
 - i. Paint shall not show excessive setting in a freshly opened full can and shall easily be re-dispersed with a paddle to a smooth homogeneous state. The paint shall show no curdling, leveraging, caking or color separation and shall be free from lumps and skins.
 - ii. The paint as received shall brush easily, possess good levelling properties and show no running or sagging tendencies.
 - iii. The paint shall not skin within 48 hours in a three quarters filled closed container.

- iv. The paint shall dry to a smooth uniform finish free from roughness, grit unevenness and other imperfections.
3. Ready mixed paint shall be used exactly as received from the manufacturers and generally according to their instructions and without any admixtures whatsoever.

Enamel paints

1. The enamel paint shall satisfy in general requirements in specification of oil paints, Enamel paint shall conform to I.S 2933-1975.

M-16 Rough Kota Stone

1. The Kotah stones shall be hard even, sound, and regular in shape and generally uniform in color. The colour of the stone shall generally be green Brown colored shall not be allowed for use They shall be without any soft veins, cranks of flaws.
2. The size of the stones to be used for flooring shall be of size 600 mm x 600 mm and/or size 600 mm. x 450 mm as directed However smaller sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be as specified
3. The edges of minus 30 mm on accounts of chisel dressing of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be + 3 mm
4. The edges of stones shall be truly chiseled and table rubbed with coarse sand before paving. All angles and edges of the stones of shall be true, square and free from chipping and surface shall De true and plain
5. When machine cut edges are specified, the exposed and the edges at joints shall be machine cut The thickness of the exposed machine cut edges shall be uniform.

M-17: Marble Slab

Marble slab shall be white or of other and of best quality as approved by the Engineer-in-charge.

Slabs shall be hard, close, uniform and homogeneous in texture. They shall have even crystalline grain and free from defects and cracks. The surface shall be machine polished to an even and perfect plane surface and edges machine cut true and square. The rear face shall be rough to provide key for the mortar.

Marble slabs with natural veins, if selected shall have to be laid as per the pattern given by the Engineer-in-charge. Size of the slab shall be minimum 460 mm. x 450 mm. and preferably 600 mm. x 600 mm. However, smaller sizes will be allowed to be used to the extent of maintaining required pattern.

The slab shall not be thinner than the specified thickness at its thinnest part. A few specimen of finished slab to be used shall be deposited by the Contractor in the office for reference.

Except as above the marble slabs shall conform to I.S. 1130-1969.

M-18: Galvanized from pipes and fittings

Galvanized iron pipes shall be of the medium type and or required diameter and shall comply with I.S. 1239-1979. The specified diameter of the pipes shall refer to the inside diameter of the bore. Clamps, screw and all galvanized iron fittings shall be of the standard ' R ' or equivalent make

M-19: A. Foot Rests

A pair of whit glazed earthen ware rectangular foot to minimum size 250 mm. x 130 mm. x 20 mm shall be provided with the water closet.

M-20 Nahni Trap

1. Nahni trap shall be of cast iron and shall be sound and free from porosity or other defects which affect serviceability The thickness of the base metal shall not be less than 6.5 mm The surface shall be smooth and free from craze, chips and other flaws or any other kind of defects which affect serviceability The size of nahni trap shall be specified and shall be of self-cleaning design.
2. The Nahni trap shall be of-quality approved by the Engineer-in-charge and shall generally conform to the relevant Indian Standards.
3. The Nahni trap provides shall be with deep seal, minimum 50 mm. except at places where trap with deep seal cannot be accommodated. The cover shall be cast iron perforated cover shall be provided on the trap of appropriate size.

M-21 Corydon Ball valve

Mall valve of screwed type including polythene float and necessary level etc shall be of the size as mentioned in the description of item and shall conform to I.S 1703-1977.

M-22 Barbed Wire

1. The barbed wire shall be of galvanised steel and it shall generally conform to I.S. 278-1978. The barbed wire shall be of types-I whose nominal diameter for line wire shall be 2.5 mm. and point wire 2.24 mm. The nominal distance between two barbs shall be 75 mm unless otherwise specified in the item. The barbed wire shall be formed by twisting together two line wires. One containing the barbs. The size of the line and point wires and barb spacing shall be as specified above. The permissible deviation from the nominal diameter of the line wire and point wire shall not exceed + 0.08 mm
2. The barbs shall carry four points and shall be formed by twisting two point wires, each two turns tightly round one-line wire making altogether four complete turns. The barbs shall have a length of not less than 13 mm and not more than 18 mm. The point shall be sharp and cut at an angle not greater than 35 degree of the axis of the wire forming the barbs.
3. The line and point wires shall be circular in section, free from scale and other defects and shall be uniformly galvanized. The line wire shall be in continuous length and shall not contain any welds other than those in the rod before it is drawn. The distance between two successive splices shall not be less than 15 meters.
4. The lengths per 100 Kg. of barbed wire I.S. type I shall be as under:
5. Nominal 1000-meter Minimum 934-meter Maximum 1066 Meter.

DETAILED TECHNICAL SPECIFICATION

1. EXCAVATION WORK

Excavation of pipeline trenches/foundation trenches in the strata shown below including depositing the excavated stuff as and where directed up to lead of 50 Mts. and 6.0 Mt lift of excavation below average G.L. including refilling, cleaning the site with thin jungle cutting but excluding dewatering if any.

- A. All sorts of soil - up to 1.50 Mt.
- B. Hard Murrum - up to 1.50 Mt.
- C. Soft Rock – up to 1.50 Mt. to 5.00 Mt
- D. Hard Rock - up to 1.50 Mt. to 8.00 Mt

General

Any soil which generally yields to the application of pickaxes and shovels, phawaras rakes or any such ordinary excavating implement or organic soil, grovel silt, sand turf loam, clay, peat etc., fall under this category.

1) Clearing the site

The site on which the structure is to be built shall be cleared with thin jungle cutting but excluding dewatering, all obstructions like loose stone, materials and rubbish of all kind, bush wood and trees shall be removal as directed. The materials so obtained shall be property of the Government and shall be conveyed and stacked as directed within 50 mt. lead. The roots of the trees coming in the sides shall be cut and coated with a hot asphalt.

The rate of site clearance is deemed to be included in the rate of earth work for which no extra will be paid.

2) Setting out

After clearing the site the center lines will be given, by the Engineer - in- charge. The contractor shall assume full responsibility for alignment, elevation and dimension of each and all parts of the work. Contractor shall supply labor, materials, etc., required for setting out the reference marks and bench marks and shall maintain them as long as required and directed.

3) Excavation

The excavation in foundation shall be carried out in true line and level and shall have the width and depth as shown in the drawings or as directed, the contractor shall do the necessary shoring and shutting or providing necessary slopes to a safe angle, at his own cost. The payment for such precautionary measures shall be paid separately if not specified. The bottom of the excavated area shall be levelled both longitudinally and transversal as directed by removing and watering as required. No earth filling will be allowed for bringing it to level. If by mistake or any other reason excavation is made deeper or wider than that shown on the plan or directed. The extra depth or width shall be made up with concrete of same proportion as specified for the foundation concrete at the cost of the contractor.

4) Workmanship

Excavation shall be done by blasting to the dimensions shown in the drawings or as directed. The blasting shall be carried out only with written permission of the Engineer-in-charge. All the laws, regulations etc. pertaining to the precautions, acquisition, transport, storage, handling and use of explosive shall be rigidly followed.

The Magazine for the storage of the explosive shall be built to the design and specifications of explosive authority and located at the approved site. No unauthorized persons shall be admitted in to the magazine and when not in use it, shall be kept securely locked. No matches or inflammable materials shall be allowed in Magazine. The Magazine shall have an effective lightning conductor. The rules of explosive 1940 revised from time to time shall be followed strictly for obtaining, handling, undertaking blasting work.

The contractor shall be responsible for damage to property, workmen public due to any accident due to use of explosives and operations.

5) Precautions

- i. The blasting operation shall remain in charge of competent and experienced supervisor and workmen who are thoroughly acquainted with the detail of handling explosive and blasting operations. The blasting shall be carried out during fixed hours of the day, preferably during the mid-day lunch hours or at the close of the work as ordered in writing by the Engineer-in-charge. The hours of blasting shall be notified in advance to the people in the vicinity. All the charges shall be prepared by the man in charge only.
- ii. Red danger flags shall be displayed prominently in all directions during the blasting operations.

- iii. People except those who actually light the fuse shall be prohibited from entering into this area. The flags shall be stationed at 200 m from the firing site in all directions and all persons including workmen shall be excluded from the flagged area at least 10 minutes before the firing warning whistle being sounded for this purpose.
- iv. During excavation in rock by blasting, the lowest 15 cm. of strata shall be blasted with light charge so as not to shatter or weaken the underlying rock on which the foundation will be actually laid. If excavation in rock is done to large widths and length than those shown on the drawings or as directed, no payment shall be made for such over break. If excavation is done to depths greater than shown on the drawings or directed, excess depth shall be made up with foundation grade concrete as directed at the contractor's cost.
- v. The charged hole shall be drilled to the required depth and in suitable places when blasting is done with powder, the fuse cut to the required length shall be inserted in the holes and the powder dropped in. The powder shall be gently tamped with copper rod with rounded ends. The explosive powder shall then be covered with trapping materials which shall be tamped lightly but firmly. When blasting is done with dynamite and other high explosive, dynamite cartridges shall be prepared by inserting the square cut ends of fuse into the detonator, and finished with dippers at the open ends. The detonator should be gently pushed into the primer leaving one third of the copper exposed outside. The primer should be housed to in the explosive. Bore holes shall be of such size that the cartridges can be easily passed down. The holes shall be cleared of all debris and explosive inserted. The space for about 20 cm above the charge shall then be gently filled with dry clay pressed home and rest of the tamping is firmed with any convenient materials gently packed with a wooden cover.
- vi. At a time not more than 20 such charge, shall be prepared and fired. The man in charge shall blow a whistle in a recognized manner for cautioning the people. All the people shall then be required to move to safe distance. The charges shall be lighted by the man in charge only. The man in charge shall count the nos. of explosion He shall satisfy himself that all the charges have been exploded before allowing the workmen to go to the work site.
- vii. The contractor shall be fully responsible to strictly follow the prevailing rules and procedures regarding blasting procedures.

6) Misfire

- i. In case of a misfire the following procedure shall be observed.
- ii. Sufficient time shall be allowed to account for the delayed blast. The man in charge shall inspect all the charges and determine the missed charge.

- iii. If it is the blasting powder charge it shall be completely flooded with water. A new hole shall be drilled at about 45 cm. from the old and fired. This should blast the old charge. Should it not blast the old charge, the procedure shall be repeated till the old charge is blasted.
- iv. In case of charge of gelatins, dynamite etc, the man in charge shall gently remove the tamping and the primer with detonator a fresh detonator and primer shall then be used to blast the charge. Alternatively, the hole may be cleared of one foot of tamping and the direction then ascertained by placing a stick in the hole. Another hole may then be drilled 15 cm. away and parallel to it. This hole shall then be charged, fired when the misfired hole should have exploded at the same time. The man in charge shall report to the office all cases of misfire and cause of the same and what steps were taken in connection therewith.
- v. If a misfire has been found to be due to defective detonator or dynamite, the whole quantity in the box from which defective article was taken must be sent to authority as directed for inspection to ascertain whether all the remaining materials in the box are also defective or not.

7) Accidents:

The contractor shall be solely responsible for any accident during the entire procedure of handling explosive and blasting and shall pay necessary compensation to persons affected or damage to lands or property etc. due to the blasting, without extra claims on the department.

8) Account:

A careful and day to day account of explosives shall be maintained by the contractor in an approved manner and shall be open to inspection of the Engineer-in-charge at all times. Surprise visits may also be paid by the Engineer-in-charge to the storage and in case of any unaccountable shortage of unsatisfactory accounting; the contractor shall be liable to be penalized by forfeiture of part or whole of his Security Deposit or by cancellation of tender in which case he shall not be entitled for any compensation.

9) Disposal of Excavated Materials:

The excavated stuff of the selected type shall be used in refilling the trenches and plinth or levelling the ground in layers including ramming and watering etc.

The balance of the excavated quantity shall be removed by the contractor from the site of work to a place as directed with lead up to 50 m and specified lift.

In Case of Hard Rock Strata

As per Govt: Circular No. Narmada Water Resources, Water Supply & Kalpsar Department Order No. MIS/2010/17/(2)/MI Cell (K-1) Dt.05.10.2019 Cost of measured excavated Hard Rock shall be recovered from Running & Final Bill as per Rates laid down basic rate of SOR put to Tender for the Year.

2. P.C.C WORK

Providing and laying hand mixed and un-vibrated plain cement concrete as under of different proportion for foundation laid in situ including temping smooth finishing, curing and lead up to 50 mt. moreover, lift 1.50 mt. etc. completed.

P.C.C. 1: 2: 4 of cement sand and kapchi (25 mm & under)

Materials

Water shall conform to M-1, Cement shall conform to M-2, Sand shall conform to M-3, and Stones aggregate Size as above shall conform to M-5.

Workmanship

General

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

Proportion of Mix

For P.C.C. 1: 2: 4 of cement sand and kapchi (25 mm & under)

The proportion of cement, sand and coarse aggregate shall be 1- part of cement, 2- parts of sand and 4- parts of stone aggregates and shall be measured by volume. Minimum cement content should be 300 Kg/ Cum.

For P.C.C. 1: 3: 6 of cement sand and kapchi (20 mm to 40 mm)

The proportion of cement, sand and coarse aggregate shall be 1- part of cement, 3- parts of sand and 6- parts of stone aggregates and shall be measured by volume. Minimum cement content should be 280 Kg/ Cum.

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 Engineer-in-charge. When hand mixing is permitted by the Engineer-in-charge in case of breakdown of machineries and in the interest of the work, it shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in color and consistency.

However, in such case 10 % more cement than other wise required shall have to be used. Without any extra cost. The mixing in Mechanical Mixture shall be done for a period 1 to 2 minutes. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the purpose.

Transporting & placing the concrete:

The concrete shall be handled from the place of mixing to the final position in not more than 15 minutes by the method as directed and shall be placed into its final position, compacted and finished within 30 minutes of mixing with water i.e. before the setting commences.

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

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

Curing:

After the final set, the concrete shall be kept continuously wet if required by ponding for a period of not less than 7 days from the date of placement.

3. M.S.BAR

Providing and fixing in position T.M.T. Bar reinforcement or tor steel bars reinforcement as per detail drawing and design including cutting bending and binding in position with binding wires as directed with all leads and lifts etc. complete.

T.M.T. ISI Marked Bar Reinforcement (Fe 415)

Materials

Mild Steel bars shall conform to M-10; Mild steel binding wires shall conform, to M-13.

Workmanship

The work shall consist of furnishing and placing reinforcement to the shape and dimensions shown as on the drawings or as directed.

Steel shall be clean and free from rust and loose mill scale at the time of fixing in position and subsequent concreting.

Reinforcing steel shall conform accurately to the dimensions given in the bar bending schedules shown on relevant drawings. Bars shall be bent cold to specified shape and dimensions or as directed, using a proper bar bender, operated by hand or power to attain proper radius of bends. Bars shall not be bent or straightened in a manner that will injure the material. Bars bent during transport or handling shall be straightened before being used on the work. They shall not be heated to facilitate bending. Unless otherwise specified, a 'U' type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bend shall not be less than twice the diameter of the round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times the diameter of the round bar. In case of bars which are not round and in case of deformed bars, the diameter shall be taken as the diameter of circle having an equivalent effective area. The hooks shall be suitably encased to prevent any splitting of the concrete.

All the reinforcement bars shall be accurately placed in exact position shown on the drawings, and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm. in size, and by using stay blocks or metal chair spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals, Bars shall not be allowed to sag between supports nor displaced during concreting or any other operations of the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports shall not extend to the surface of concrete, except where shown on drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed. Pieces of broken stone or brick and wooden blocks shall not be used. Layers of bars shall be separated by spacer bars, pre-cuts mortar blocks or other approved devices. Reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcements in concrete already placed. To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawings. All the bars protruding from concrete and to which other bars are to be sliced and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout.

Bars crossing each other where required shall be secured by binding wire (annealed) of size not less than 1 mm in such a manner that they do not slip over each other at the time of fixing and concreting.

As far as possible, bars of full length shall be used, in case this is not possible. Over lapping of bars shall be done as directed. When practicable, over lapping bars shall not touch each other, but be kept apart by 25 mm or 1.25 times the maximum size of coarse aggregate whichever is greater by concrete between them. Where not feasible, overlapping bars shall be bound with annealed wires not less than 1 mm. thick twisted tight. The overlaps shall be staggered for different bars and located at points, along the span where neither shear nor bending moment is maximum.

Whenever indicated on the drawings or desired by the Engineer-in-charge, bars shall be joined by couplings which shall have a cross-section sufficient to transmit the full stresses of bars. The ends of the bars that are joined by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross-section of the bar. Threads shall be standard threads. Steel for couplings shall conform to Relevant.

When permitted or specified on the drawings, joints of reinforcement bars shall be butt-welded so as to transmit their full stresses. Welded joints shall preferably be located at points when steel will not be subject to more than 75 percent of the maximum permissible stresses and welds so staggered that at any one section not more than 20 percent of the rods are welded. Only electric arc welding using a process which excludes air from the molten metal and conforms to any or all other special provisions for the work shall be accepted. Suitable means shall be provided for holding bars securely in position during welding. It shall be ensured that no voids are left in welding and when welding is done in two or three stages, previous surface shall be cleaned

properly. Ends of the bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before welding. Only competent welders shall be employed on the work. The M.S. electrodes used for welding shall conform to I.S. 814-2004. Welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number and frequency of test shall be as directed.

4. R.C.C WORK

Providing and laying in position RCC as under proportion using cement sand and crushed aggregate (25 mm and under) for plinth course, lintels, slabs, beams, columns, chajja, lofts, barrels, etc. including cost of frame work providing and shuttering temping smooth finishing, curing as directed with all leads and lifts etc. complete.

10. R.C.C. (1:2:4)

General

The concrete mix is not required to be designed by preliminary testes. The proportion of the concrete mix shall be 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 25 mm. nominal size) by volume concrete work shall have exposed concrete surface or as specified in the item.

The designation ordinary M-100, M-150., M-200, M-250 specified as per I.S. correspond approximately to 1:3:6, 1:2:4, 1:1.1/2:3 and 1:1:2 nominal mix of ordinary concrete by volume respectively.

The ingredients required for ordinary concrete containing one beg of cement of 50 kg. by weight (0.0342 Cu. Mt.) for different proportions of mix shall be as under.

Grade of concrete	Total quantity of dry aggregate by volume per 50 kg. of cement to be taken as the sum of individual volume of fine and coarse aggregates, maximum	Proportion of fine aggregate to coarse aggregate	Quantity of water per 50 kg. Of cement maximum.
1	2	3	4
M-100(1:3:6)	300 Liters	Generally 1:2 for Fine aggregate to coarse	34 Liters
M-150(1:2:4)	220 Liters	aggregate by volume 160	32 Liters
M-200(1:1.1/2:3)	160 Liters	but subject to an upper limit of 1:1.1/2 and lower limit 1:3	30 Liters
M-250(1:1:3)	100 Liters		27 Liters

The water cement ratios shall not be more than those specified in the above table. The cement content of the mix specified in the table shall be increased if the quantity of water in mix has to be increased to overcome the difficulties of placements 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 bound to give a concrete mix which is just sufficient wet to be placed and compacted without difficulty with the mean available.

The maximum size of coarse aggregate 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 concrete work, coarse aggregates having a nominal size of 20 mm. 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 passage 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 admixtures.

Workmanship

Proportioning: Proportioning shall be done by volume, except which shall be measured in terms 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 cm x 25 cm and 40 cm 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 damp sand, allowances for bulkage shall be made. Minimum cement content should be 300 Kg/ Cum.

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 about 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 a half minute. Mixing shall be continued till materials are uniformly distributed and uniform color of the entire mass is obtained and each individual particle of the coarse aggregate 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 turning over the ingredients of concrete before and after adding water. Mixing platform shall be so arranged that no foreign material gets mixed with concrete nor does the mixing water flow out. Cement in required number of bags shall be placed in uniform layer on top of the measured quantity of fine and coarse aggregates which shall also be spread in a layer of uniform thickness on the mixing platform. Dry coarse and fine aggregate and cement shall then be mixed thoroughly be turning over to get a mixture to uniform color. Specified quantity water shall then be added gradually through a rose can and the mass turned over till a mix of required consistency is obtained. In hand mixing quantity of cement shall be increased by 10 percent above that specified.

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

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 when vibrators are used and 80 mm. when vibrators are not used.

Inspection:

Contractor shall give the Engineer-in-charge due notice before placing any concrete in the forms 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 of his responsibility for the safety of men, machinery, materials and for results 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 labor 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.

Transporting and laying:

The method of transporting and placing concrete shall be as approved. 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 shall not be placed against concrete which has been in position more than 30 minutes unless a 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 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 agreed to by the Engineer-in-charge, concrete shall not be dropped in to place from 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, it 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 water removed and then coated with neat cement grout. The first layer of concrete to be placed on 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 concretes shall be compacted to produce a dense homogeneous mass with the assistance of vibrator unless otherwise permitted by the Engineer-in-charge for exceptional cases, such as concreting under water, when vibrators cannot be used. Sufficient vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of breakdowns. Concrete shall be judged to be compacted when the mortar fills the space between the coarse aggregate and begins to cream up to form an even surface. Compaction shall be completed before the initial setting starts 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 is likely to destroy the bond between concrete and reinforcement.

Curing:

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

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 at 7 days or 28 days as per requirements in accordance with I. S. 516-1959. 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 spread 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 works	Nos. of samples
1-5 cu.m.	1	16-30 cu.m.	3
6 - 15 cu.m.	2	31-50 cu.m.	4
51 and above	4 \pm one additional for each additional 50 cum. or 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 the concreting as per above frequency. The number of specimens may be suitably increased 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 strength of the group of cubes cast for each day shall not be less than the specified cube strength of 150 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 accordance with the proportions given for a particular grade does not yield the specified strength, such concrete shall be classified as belonging to the appropriate lower grade. Concrete made in accordance with the Proportions given for a particular grade shall not, however, be placed in a higher grade on the ground that the test strength is higher than the minimum specified testing of concrete.

Stripping:

The Engineer-in-charge shall be informed in advance by the contractor of his intention to strike 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 influence the setting of concrete and of the materials used in the mix, in normal circumstances (generally where temperatures are above 20.C) and where ordinary concrete is used forms may be struck after expire of periods specified as below for respective item of form work.

- | | | |
|--|-----|----------------|
| 1. Side of walls, columns and vertical face of beams | ... | 24 to 28 hours |
| 2. Beam soffits (props. Left under) | ... | 7 days |

3. Removal of props. Slabs

- | | | | |
|-----|-----------------------------|-----|---------|
| i. | Slabs spanning up to 4.50 m | ... | 7 days |
| ii. | Slabs spanning over 4.50 m | ... | 14 days |

4. Removal of props. Slabs and arches

- | | | | |
|-----|-----------------------------|-----|---------|
| i. | Slabs spanning up to 6.00 m | ... | 14 days |
| ii. | Slabs spanning over 6.00 m | ... | 28 days |

All form work shall be removed without causing any shock or vibration as would damage the concrete. Before the soft and struts are removed, the concrete surface shall be exposed, where necessary in order to ascertain that concrete has sufficiently hardened. Centering shall be gradually and uniformly 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 re-use 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 member to a depth of at least 25mm. below the surface of the 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 spots, broken edges or comers and other defects, shall be thoroughly cleaned, saturated with water and carefully pointed an rendered true with mortar of cement and fine aggregate mixed in proportions used in the grade of concrete that is being finished and of as dry consistency as is possible to use. Considerable pressure shall be applied in filling and 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/honeycombs in the opinion of the Engineer-in-charge are of 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 of the portions of structure affected.

5. PVC PIPES

Providing, Laying & jointing in standard length ISI Mark rigid un-plasticized PVC pipes suitable for irrigating water with self-fit joint incl. Necessary fittings like Tee, Bend, Coupler, Reducer, End cap etc. with joining material (Cement Solvent) of following class and diameter as per IS specification No.4985 / 2000 etc. comp. (4 KG / CM², 6 KG / CM², 8 KG / CM², 10 KG / CM²)

P.V.C. pipe: - diameter of 110 mm, 140 mm, 160 mm, 180 mm, 200 mm, 250 mm, 280 mm, 315 mm, 355mm, 400mm etc.

Materials

The required quantity of U. P. V. C. pipe of required size with PVC specials shall be supplied by the contractor as per relevant I. S. I. Negative tolerance in length and size for U.PVC pipe are not permissible. (I.S. 4985/2000).

The jointing materials such as solvent cement of approved make shall be supplied by the contractor and also cleaning agents such as methyl no chlorides or similar solvent emery cloth cotton waste etc. also shall be brought by the contractor.

The Manufacturer of the U-PVC pipes shall have minimum following requirements.

The manufacturer shall have own testing laboratory.

The manufacturer shall have a combined production capacity of U-PVC and HDPE pipes not less than 25000 M.T. per annum. But the manufacturer registered under small scale industries under The Government of Gujarat shall have a combined production capacity of U-PVC and HDPE pipe not less than 10000 M.T. per annum shall be allowed.

The manufacturer shall have capacity of manufacturing minimum up to 2.50 kg/Cm² pressure pipe and capacity of manufacturing up to 400 mm Dia. Pipes with IS Certification.

The manufacturer shall have own R & D department.

The U-PVC pipes shall be used only of single manufacturer.

The U-PVC fittings of same manufacturer shall be used. If same manufacturer are not manufacturing fittings other branded fittings shall be used with prior approval of Engineer in charge.

All U-PVC pipes shall be supplied duly inspected and tested by CIPET (Central Institute of Plastic Engineering and Technology) or GIRDA (Gujarat Industrial Research and Development Agency). No loose sample for testing shall be allowed.

Authentic copy of document for required criteria shall have to be provided by the Agency to the department. The department or third party agency approved by the department shall be offered for verification of documents, if required. All the expenditure for above inspection shall have to be borne by the Agency.

Scope of contract:

The contract includes supplying and delivering of Un plasticized with PVC pipes confirming to relevant Indian

standards along with solvent cement solution.

Standards:

- a) The UPVC Pipes and UPVC Couplers to be manufactured supplied and delivered and used under the scope of contract shall be manufactured in accordance and confirming to I.S. :4985-2000 or its latest revision or amendments. The Pipes only shall be with ISI certification mark.
- b) U-PVC Couplers shall be confirming to IS:4985-2000
- c) Solvent Cement Solution shall be of a good quality.
- d) Laying & jointing shall be done as per IS 7634 (Part-3): 1975 or its revision.

Marking: -

The methods of marking all the pipes to be delivered at site of work shall ensure that all the information will remain legible even after transportation. Storage in open space etc. in general the legible and indelible marking upon the goods shall indicate the followings.

- i. I S I certification mark on each pipes.
- ii. Manufacturers brand name and / or trade mark.
- iii. The outside diameter and pressure of pipes.
- iv. Any other important matter that the manufacturer of purchaser deems fit to be inscribed.

Technical specification for UPVC Pipes

Supply of Material: -

The general requirement relating to supply to material and manufacture of UPVC pipes and shall be confirming to the relevant Indian standard specification no. 4985-2000 or its latest revision the pipe shall be with ISI mark.

U-PVC Pipes and couplers shall be confirming to and manufactured as per IS:4985-2000 or with its latest revision or amendments.

The dimensions material compositions test etc. shall be as per IS:4985-2000 or with its latest revision or amendments. Each pipe shall be marked with ISI certification mark.

Testing of Materials

The pipe shall be offered for inspection agency at the manufacture's site/factory. The pipe shall be approved by CIPET (Central Institute of plastics Engineering and Technology) or the third party agency approved by the Executive Engineer. The Executive Engineer shall appoint his representative for testing of material in his presence. All the expenditure for testing material & procurement of testing certificate is to be borne by contractor. No extra cost of any material, tools and labor's requirement for testing will be given to the contractor.

The material shall be tested as per IS of respective material.

Laying:

Before lowering of P.V.C. pipe in excavated trenches, the trenches shall be inspected and it shall be in proper line level. If any materials such as kapchi pointed roads, roots of tree etc. shall be removed. As far as possible the trenches shall be excavated in true line. Pipe line should be straight level and not excavated on borrow pit near road.

The pipes after cleaning shall be jointed outside the trenches by spigot and socket jointing method and then shall be carefully lowered and freely in proper manner in the trenches. The jointing of P.V.C. pipe line shall be in following manner.

- a) Clean carefully male and female at end of pipes. (spigot and socket)
- b) If the grease, oil etc. is found on the end of pipes shall be removed by well clean cloth.
- c) The solvent cement solution shall be applied after the ends are made rough by emery cloth.
- d) The uniform coat of solvent cement solution shall be smoothly applied with brush other than nylon or synthetic on the outer surface of spigot and inner side of socket.
- e) The spigot ends shall then be immediately inserted in the socket ends by turning the pipe round. So that the solvent cement can be uniformly spreader.
- f) The jointing work of pipe as described in Para (e) above shall be completed within the period of one minute. Pipe to be laid, shall be stored under cool atmosphere.
- g) the pipe joint shall be exposed generally to atmosphere at 30o C. for five minutes. depending up on temp. For more strength of joints, it shall be not disturbed for 24 hours. At the end of jointing work, the open pipe shall be protected by plugging. The jointing work of P.V.C. pipe shall not be carried out in a cloudy atmosphere and in rainy season, because it affects the strength of solvent cement and it is possible to have leakage from the same.

Inspection of material:

Inspection of the pipe item shall be carried out by Executive Engineer or his representative agency appointed by Engineer-In-Charge. All the expenditure for inspection charges if any in any case of inspection agency appointed by the DEPARTMET shall be paid by agency and certificate, if necessary, shall be produced by the Agency from manufacturing company.

Hydraulic Test

The pipe line shall be laid in continuity and shall be in small sections for purpose of testing and as directed by the Engineer-in-charge. The contractor shall make his own arrangement for filling the lines with water for testing purpose. The necessary accessories for plugging the ends of the pipes for taking pressure test will be provided by the contractor. The pipe line shall be tested to the pressure of one and half time of the working pressure in the particular sections. Leakage joints if any shall be made good and tests reapplied until no

further leakages are noticed. The lines shall be tested in section as specified and shall be subjected to maximum steady pressure. When the required pressures on the gauge the testing pump shall be cut of and the pressure shall be maintained without any drop to the satisfaction of the Engineer-in-charge.

In absence of satisfactory hydraulic test given by the contractor, 10% payment will be withheld from the bill.

6. R.C.C. PIPES

Providing and Fixing in position R.C.C. pipe of NP2 class as per IS:458-1988 of following diameter with collar including caulking joints in cement mortar (1:1) proportion using jute string soaked in cement slurry and finishing joints and laying pipe to the designed grade and levels including making connections with masonry chambers tasting of pipe line as per design condition, curing as directed with all lead and lifts etc. complete.

150 mm, 225 mm, 230mm, 300 mm, 600 mm NP2 Class pipe

The contractor shall procure certificate from the pipe manufacture regarding the steel provided in the pipes and collars confirming to IS:458-1988 or its revised edition and this certificate is to be submitted to the sub-division office when the pipes are brought on the site and before starting laying of the pipe line in the trenches. The steel provided in the pipe may be tested by Engineer-in-charge before manufacturing of pipe at pipe factory.

The NP2 class R.C.C. pipe with collar shall be provided as per I.S.S. 458-1988. These pipes when tested to their maximum design hydraulic static pressure head, shall not show any sign of leakage of breakage or deterioration of any sort.

The pipes shall be tested for dimension workmanship and finish and for hydrostatic test in accordance with I.S. 458-1988. 25 pipes shall be tasted for a lot size 50 and more for dimensional requirements finish and deviation from straight as required vide clauses 7 and 8 of I.S. 458-1988. for hydrostatic pressure, pressure required tests are as per general technical specification of pipes decided by the Engineer-in-charge are to be carried out by competent authority and these tests shall be considered sufficient for accessing quality of pipes. The required pipe shall withstand hydrostatic pressure as per I.S.S. 458-1988. Without any leakage of joints. The full expenditure for testing shall be borne by the contractor. The tests shall be carried out in presence of the Engineer-in-charge or his authorized agent at the factory or Government approved organization like GERI Laboratories etc. The date of manufacturing shall be already written on the pipe itself before immersion in the water. If test results are not found as per I.S. 458-1988 during the inspection such pipes will be liable to summary rejection by the inspection officer. The reinforcement in the pipes shall confirm to the I.S. Specification No. I.S. 458-1988 class NP2 in all respect. Since it will not be possible by the Corporation to inspect the reinforcement for each and every pipe brought on site, it will be the whole responsibility of the contractor to ascertain this from the pipe manufacturers. The contract shall be considered full responsible in this respect, all pipes having reinforcement below the specified limit shown I.S.

for NP2 class will be rejected. In general pipes shall be manufactured and tested as per I.S. 458-1988.

Lowering & jointing of R.C.C. Pipes

The R.C.C. pipes shall be lowered properly in the well graded excavated trenches after cleaning the pipes properly. The pipes shall be joined by R.C.C. collar with C.M. in 1:1 proportion by using jute string soaked in cement slurry. The pipe line shall be laid as per instructions of Engineer-in-charge in proper grade.

Curing and Refilling

- 1) Curing of joints shall be done by wet gunny bag and protect the joints from direct sun rays. The joints shall be cured for 14 days.
- 2) After 14-day curing period is over, the trenches shall be filled in two stage. In first stage, the trenches shall be filled up to the top of pipe. This filling shall fully saturated with water to ensure compact earth filling below and around the pipe. In second stage rest of the trenches shall be filled up to the original ground level and the filling shall be watered and no extra payment shall be made for the same.

7. M.S. PIPE

Providing and joining ISI marked M.S. pipe of require length with M.S. flange of following Dia by necessary cutting and welding work and laying the same in excavated trench of rising main, suction / delivery of pump motor, after laying, the flanged pipes joint with necessary nut bolt of required size by using rubber packing of required thickness, after fitting M.S. pipe. Paints the M.S. pipe with anticorrosive paints etc. comp. (As per IS 3589 – 2001, 4270 – 2001, 1239 – 2004)

M.S. Pipe of 100 mm diameter (5.4mm thick), 125 mm. diameter (5.4mm thick), 150mm diameter (5.4mm thick), 200 mm diameter (6.30 mm thick), 250 mm (7.1 mm thick), 300 mm diameter (7.1 mm thick), 350 mm diameter (8.00 mm thick), 400 mm diameter (8.00 mm thick)

Scope of Work

The item cover for providing, laying & joining M.S. pipe of above diameter for rising main, suction & delivery of pump motor by providing & supplying flanges of required diameter including nut bolts, rubber packing & red oxide to paints the M.S. pipe etc. should be mfg. as per I.S 1239-2004, 3589- 2001, & 4270-2001. should be of superior quality. The whole material for the above item to be got approved by the competent authority before the work commence welding of flange at the ends of M.S. pipes of specified length and also welding two pipes at end by providing extra supports. Laying the pipes in excavated trenches after painting with anti-corrosive paint & bolting two flanged pipes by using rubber packing sheet as per required grade & position and as per the instruction of Engineer-in-charge.

The item covers erecting in position the M.S. pipe including cost of supplying pipes, flanges, nut bolts, rubber packing, red oxide including cutting, bending, welding, bolting & painting etc. complete.

Welding of Pipe

During erection pipes are to be welded with welding rods, confirming to I.S. 814-1974 with its latest addition & I.S.I. make welding rod should be Ferro speed M.S. electrodes 4 to 5 mm. diameter, 450 mm. length.

Material

1. M.S. Pipe:

Supply of M. S. Pipe having minimum wall thickness confirming to I. S. 1239 – 2004, 3589-2001, 4270-2001 (or latest revision).

wall thickness: confirming to I.S. with tolerance as per IS

Details of M.S. Pipe (Diameter/Thickness/Relevant I.S. Code)						
Sr. No.	Diameter of Pipe	Outer Diameter	Thickness in mm	Relevant I.S. Code	Fe as per I.S.	Remarks
1	100	115.00	5.40	1239-2004 or Latest version Heavy	330	For Suction-Delivery pipe
2	125	140.80	5.40		330	
3	150	168.30	5.40		410/450	
4	200	219.10	6.30	3589-2001 or Latest version	410/450	For Rising main Pipe
5	250	273.00	7.10		410/450	
6	300	323.90	7.10		410/450	
7	350	355.60	8.00		410/450	
8	400	406.40	8.80		410/450	
9	450	457.00	10.00		410/450	

Length of Pipe: Random length of 4 to 7 meter.

Strength of Steel: FE 410 – FE 450.

Hydraulic Test Pressure: As per IS: 1239 – 2004, 3589-2001, 4270-2001 (or latest revision).

The pipe shall be offered for inspection agency at the manufacture's site. The third party inspection agency is to be approved by the Executive Engineer in charge The contractor has to take prior approval for the same.

Weight of Pipes: As specified in the IS: and subject to tolerance as per IS.

Beveling of Ends: Both the ends should be bevel faced with chamfer of 300 + 50 - 00 perpendiculars to the axis of the pipes as per Para 9.3 of IS 1239 -2004, 3589-2001, 4270-2001 (or latest revision)

Coating: Pipe should be coated with black bitumen paints to external surface as mentioned in IS 1239 – 2004, 3589: 2001, 4270-2001 (or latest revision)

2. Flanges:

The required Nos. of flanges shall have to be supplied by the contractor. The qty. of flanges is depending upon the actual working condition and as per requirement of specified length of M.S. pipe as desired by Engineer-in-charge. (IS standard).

The mfg. & supplying of M.S. Flanges suitable as per size of pipe, its duly machined as per attached drawing & dimension, manufactured from mild steel confirming to IS 226 materials. The sample of M.S. Flanges of each size is required to be got approved before the work commence.

3. Bolts & Nuts with Washers:

The required material will be supplied by the contractor. The M.S. bolt nut of 3" x 3/4" size of standard material as per I S 1363 Part I & II

4. Rubber Seat:

The required material will be supplied by the contractor & it should be having 1/8" thickness of standard materials.

5. Red oxide:

The required material will supplied by the contractor & it should be standard make & superior quality.

Fabrication & Transportation

All work of fabrication i.e. joining the pipe ends with welding plates and with flange at specified length of pipe shall be performed and completed in a thorough workman like manner, equal to the best modern practice in fabrication of metal work of the type covered. The work shall be carefully performed to the entire satisfaction of the Engineer-in-charge. The contractor shall ensure that the workmanship by him is free from injuring and defect and shall replace free of cost. and defect in workmanship, fabrication, transportation, handling and strong until final acceptance by the Engineer-in-charge.

Welding

All welding shall be done by electric arc method using a process which will exclude the atmosphere from the molten metal except where otherwise specifically permitted. The welding rods shall be of the heavily coated type designed for all position welding, and the size, type of use, less shall be made in accordance with the Indian standards, only qualified welding operator shall be employed to perform welding, surface to be welded shall be cleaned of rust, paint and other foreign matters where weld metal lees is deposited in two or more layers, each shall be crushed with brush or otherwise the subsequent laying deposited.

All welding precautions shall be taken to minimize stress due to heat by using the proper sequences in welding by pressing the welds, while hot, or by other satisfactory methods. All the arrangement for welding is to be done by the contractor at his own cost.

Cleaning and Painting

The contractor shall furnish, prepare and supply all materials for cleaning, painting and coating of metal work

as per direction of Engineer-in-charge. The cost of furnishing, preparing and supplying red oxide which is required for the work including labor, tools and equipment shall be included in the rate tendered for the complete item.

Erection (Laying)

The reference lines, center lines, grades and levels having relation of civil structures shall have to be established on site. The contractor so as to facilitate section in proper manner. Erection in the field shall be done by boil bolting two flanged pipe ends by using the nuts and bolts with washers on both the sides and by using rubber sheet packing in between the flanges. The contractor shall perform this work with greater accuracy to ensure leak proof joints.

All parts shall be accurately assembled and erected in lines and levels as directed by the Engineer-in-charge.

Inspection & Tests

All the work performed shall be subjected to inspection. rest of completed work shall have to be given by the contractor as required by the Engineer-in-charge. While testing the corrected and completed work, any defect in workmanship is found, the same should be rectified by the contractor at his own risk and cost. The contractor shall replace, free of cost, any defective workmanship discovered during testing. No extra cost will be given for the purpose. All the joints and connections shall be water tight. The Engineer-in-charge may demand test checking of weld joints.

The primary requirement to accept the work is the water tightness of each and every joint. All the necessary arrangements for the testing as per the design requirements shall have to be made by the contractor by his own cost. No extra cost of any material, tools and laborers required for the testing will be given to the contractor. No. extra claim for satisfactorily completion of the work as per the design requirement will be entertained.

Temperature Variations

All the pipes and couplers to be manufactured, supplied and delivered shall be subjected to weather condition like sun, dust, rain, wind as available in State of Gujarat. They shall also be subjected to carry and convey drinking water under variable temperature conditions ranging from 40°C to 45°C.

8. PROVIDING AND FIXING VALVES.

Providing and fixing ISI mark following class and dia. of different type of valves necessary fittings of standard design and specification including testing with all lead and lifts etc. complete.

Sluice valve as per I.S.: 14846 - 2000(100 mm diameter/ 125 mm diameter/ 150 mm diameter/ 200 mm diameter/ 250 mm diameter/ 300 mm diameter/ 350 mm diameter)

General

The contractor shall be covering manufacturing, supplying and delivery of sluice valve conforming to IS 14846 - 2000 or its latest revision (Specification for sluice valve (50 to 1200 mm. sizes) with ISI certification.

Standards

The C.I. sluice valves to be manufactured, supplied and delivered under the scope of this contract shall be manufactured in accordance with and conforming to Indian Standard Specifications as given below: with ISI certification mark on each sluice valves.

Temperature Variation

All sluice valves manufactured, supplied and delivered shall be subjected to drinking water under variable temperature condition ranging from 4° to 45° C.

Marking

The legible and in deniable marking upon each valve shall indicate the following:

- (1) ISI certification mark on each sluice valve only.
- (2) Manufacture's brand name and/or trade mark.
- (3) Size of valve and nominal pressure of valve.
- (4) Serial number of cast.
- (5) Serial number in punch.
- (6) Where a valve has been tested for only open and test, it should be marked 'o' distinctly and permanently.
- (7) Any other important matter that the manufacturer deems fit to be inscribed embossed.

Test Certificate

The contractor shall always provide manufacture's test certificate in accordance with every batch/lot as valves so manufactured and supplied.

The contractor shall also produce, in addition to manufacture's test certificate the inspection certificate issued by the authorized person / agency.

Nominal Pressure

Sluice valves shall be designed by nominal pressure (PN) defined as the

- a. maximum permissible gauge working pressure in MPa as "PN-1.6" (MPa=10 kgf/m² approx.)

- b. The nominal size shall refer to the nominal bore at any point, shall not be less than the nominal size required.

Material

The materials for the different component parts of the sluice valve shall confirm to requirements given in Table.

Sr. No.	Component	Preferred Material	Ref. to I.S. No.	Grade of designation	Alternative Material	Ref to I.S. No.	Grade or Designation
i)	Body, bonnet, dome, stool cover, wedge stuffing box, gland thrust plate, and cap.	Grey cast iron	210	FG 200	Spheroid or Nodular iron Cast steel	1865 1030	260-300/12 or 500/2
ii)	Hand wheel	Grey cast iron	210	FG 200	Mild steel Cast steel Nodular iron	2062 1030 1865	F 410 WA 230 - 450W 400/12
iii)	Steam	Stainless steel	6603	12Cr 3 04Cr 18Ni 0 04Cr 17 Ni 12 MO 2	High Tensile Brass Stainless steel	320 or 6912 6603	HT 2 FHTB 2 20Cr13
iv)	Wedge nut, shoe, channel	Leaded tin bronze	318	LTB - 2	High Tensile Brass Phosphor bronze	320 6912 28	HTB 2 FHTB-2
v)	Body seat ring, wedge facing ring and bushes	Leaded tin bronze	318	LTB - 2	Alloy steel Stainless steel	3444 6603	Gr.1 Gr.4 Gr.10 04Cr18Ni10
vi)	Bolts	Carbon steel	1363 (Part I)	Class 4.6	Stainless steel	6603	
vii)	Nuts	Carbon steel	1363 (Part 3)	Class 4.0	Stainless steel	6603	
viii)	Gasket	Compressed fiber Board	638	Type B	Neoprene Rubber		
ix)	Gland packing	Jute & hemp	5414		Rubber	638	Type B

Materials for components parts of sluice valve.

- (1) Specification for grey iron casting (third revision)
- (2) Specification for high tensile brass rods and sections (revised)
- (3) Specification for leaded tin bronze in hot sand casting (revised)
- (4) Specification for technical supply 'condition threaded fasteners (first revision).
- (5) Specification for compressed asbestos fiber jointing (first revision).
- (6) Specification for gasket packing, jute and hemp.

Manufacture

Sluice valve bodies for 50 mm to 1200 mm size valves shall be provided with double flanged ends connection or as per Instruction of Engineer in Charge.

Flanges

The flanges and their dimensions of drilling shall be in accordance with part IV and VI of I.S.1538 (Part I to XXII) 1976 (Specification for cast iron fittings for pressure pipes for water gas and sewage) or its latest revision.

Lowering, Laying and Jointing of Valves

Reflux valves, Butterfly valves, Sluice valves and Air valves

Lowering laying and jointing in position following C.I./D/F Reflux valves, Butterfly valves, sluice valves and Air valves including cost of all labor, jointing material, including nut bolts and giving satisfactory hydraulic testing etc. complete (Rate for all class of valves)

A, C: Sluice Valve, Butterfly Valves, Scour Valve, Reflux Valve

Cast iron double-flanged sluice valve with two tail pieces suitable to pipe shall be supplied and carted by the Contractor as per latest IS. The rate shall include loading, unloading and stacking at site.

The sluice valve/butterfly valves and tailpieces shall be examined before laying for cracks and other flaws. They shall be undamaged in all respect.

The sluice valves shall be operated before laying.

All grits and foreign materials shall be removed from the inside of the valves before placing.

All the four faces shall be thoroughly cleaned and coated with a thin layer of mineral grease.

The tightening of gland shall be checked with a pair of inside-calipers. Clearance between the top of stuffing box and the underside of the gland shall be uniform all the sides.

Jointing Material:

The Contractor shall provide all necessary jointing materials such as nuts bolts, rubber packing, white zinc, jute, lead, wool etc.

All tools and plant required for installation of sluice valve shall be provided by the Contractor.

All jointing materials shall be got approved from the engineer-in-charge before use.

B: Air valve of double acting - 40 mm dia. / 50 mm./80 mm./100mm.

Providing:

Double acting air valve combined with screw down is isolating valve.

All the valves are provided with all of suitable size at the maximum working pressure double acting air valve should be combination of both the small and large orifice valve in single unit with a common connection to the mains for automatically discharging air during pipe filling and ventilating the pipe during emptying.

The bodies pressure cover and splash covers should be finest Grey cast iron carefully machined and jointed for small orifice valve walls should be of rubber. Scrawled inlet nipple off gun mental, large orifice valves have balls of vulcanite closing of rubber sitting. The operating screws should be solid forged bronze with gun mental nuts and cast-iron caps. The double air valves is to combine with screw down isolating valve. The size of the valves is indicated with inlet diameter other details of the balls, flange bolts. No. of bolts and working pressure should be as per I.S. 14845 – 2000 Standard specification of the Double Acting Air valve should be approved by the Engineer-in-charge before supplying the materials.

Fixing:

Item included all labor charges for fixing Air valve by drilling necessary hole in R.C.C / PVC pipe and making joints watertight and excavation and refilling if required for fixing same on R.C.C. / P.V.C./M.S. pipe.

C: Reflux Valve - 100mm.diameter, 125mm.diameter, 150 mm diameter 200 mm Dia., 250 mm Dia., 300 mm Dia.

Best Indian Make cast iron Flanged Reflux valve suitable to prevent back of water to the pump from rising main. Valve should be suitable for handling raw usual water having high turbidity Reflux valve should be as per IS: 5312 part-1 (latest Edition) and made of close grained C.I.

1	Test Pressure	(1) Body 1.5 MPa (2) Seat 1 MPa (3) Working 1 MPa
2	Cover	It should be made of close grained T.I. with provision of air release plugs IS-210 FG 200
3	Flanged	Should be drilled as per I.S. 1538
4	Materials for body seal	Leaded tin base, CI IS 210 GP FG 200

Fixing:

Item included lab our charge for fitting of reflux valve with flanged delivery side M.S. pipe of pump motor to control and backward flow of water towards the pump motor side by using necessary rubber packing. Nut, Bolt, Washer etc. as per I.S.

9. Construction of PUMP HOUSE/PANEL ROOM (Size: 3.00 m x 5.00 m In-to in) as per approved Drawing

1. Scope of Work:

The item included the cost for work of Excavation in all sorts of soil/murum/hard rock for foundation sub structure/super structure, P. C. C., B. B. Masonry, R. C. C., Cement Plaster, Door, Window, Flooring and white or color wash, road sign board, cupboard, I.P.S, sink, light fitting, including sanitary and plumbing work, fencing as per standard design etc. The work shall be carried out as per detail drawing and as per instruction of engineer in charge.

The work shall be carried out as per drawing and instruction given by Engineer In charge. The Pump house inside size shall be as per drawing.

- The item includes cost of Excavation in all sorts of Soil/Murum/Hard rock to the required depth including necessary sorting/Scaffolding dewatering if required any complete as directed by Engineer-In-Charge.
- The item includes the cost of PCC in 1:3:6 at all locations as shown in Drawing.
- The Sub Structure shall be constructed in B.B. Masonry IInd Class in cement mortar of Proportion 1:6 for foundation plinth and super structure including striking out joints 20 mm deep with curing finishing joints and providing scaffolding as directed with all lead and lift etc. complete and as directed by Engineer-In-Charge.
- Backfilling for Foundation including filling in plinth with sand under floors including consolidation, watering, ramming and dressing etc. complete.
- Providing and laying in position RCC in proportion 1:2:4 for Plinth Beam, Sill, Lintel, and Slab including necessary scaffolding, Shuttering completed.
- Providing and fixing in position reinforcement Fe415/Fe 500 D mild steel or tor steel bars as per detail drawing and design including cutting bending and binding in position with binding wires as directed with all leads and lifts etc. complete.
- Providing & Fixing Steel Doors with angle 40X40X6 mm & 25 x25x4 mm frame with shutter of 16 Gauge plate as per approved drawing and design with one coat of red-oxide/dichromate and two coats of approved oil paint with etc. complete.
- Providing & fixing steel window with angle 40 x 40 x 6mm & 25 x 25 x 4 mm frame with

shutter of 16-gauge plate as per approved drawing and design with one coat of red-oxide/dichromate and two coats of approved oil paint with etc. complete.

- Providing plaster of cement and sand in 1:3 proportion including preparing surface providing scaffolding, finishing curing as directed etc. complete in 15 mm thickness. Also include over above item for finishing with a floating coat of neat cement slurry.
- Providing and laying I.P.S. flooring of plain cement concrete 40 mm thick in proportion (1:2:4) using crushed aggregate (20mm and under) laid in situ over 120 mm thick B.B.C.C (1:5:10) including temping, smooth finishing, curing, lining as directed with all leads and all lifts etc. complete.
- Providing white or color wash in three coats including scaffolding, cleaning surface etc. complete.
- Supplying & Fixing Road Sign Board of MS plate & Angle Iron including painting lettering etc. complete including fixing in CC (1:4:8) with necessary excavation Etc. complete as per Design (Non-Reflective Type)
- Providing & fixing 45 cm x 30 cm x 2.5 cm thick year plate of marble stone set in CM 1:1 including finishing and engraving letter etc. complete.

a) Fitting:

The door shall be well fitted with following fixtures and fastening as under:

1. Hold fast 6 Nos. 150 mm x 40 mm. x 5 mm.
 2. Stopper 1 Nos. 20 cm.
 3. AL drop 1 Nos. 30 cm.
 4. Tadi 1 Nos. 30 cm.
 5. Hinges 6 Nos. for double shutter & 3 Nos. for single shutters. 10 cm.
 6. Handle 2 Nos. 15 cm.
- Providing cement and sand vata (10 cm X 10 cm) size quarter around in cement mortar 1:1 prop. Including net cement finishing watering etc. complete.
 - Providing and fixing RCC precast Jali in 40 mm thick for ventilator or of approved quality and design including fixing in position curing finishing as directed etc. complete.
 - Providing and fitting Room wiring confirming IS694 for PVC insulated Copper Wire 2.50 Sq. mm
 - All light fitting shall be LED of required watt of approved make.
 - Providing & erecting approved make ceiling fan with double ball bearing ISI mark with condenser AC 230 V 550c/s 1200mm sweep complete canopy and 30 cm down rod erected

on existing hook or clamp with 24/.23 core flexible wire with earthing (make shall be approved by Engineer in Charge.

- Supplying and erecting Solar Street Light fitting made from MS body power coated/ Painted with corrosion resistant paint with gasket & transparent cover with following LED non retro lamp with choke holder & accessories fitting shall be mounted on 75/80mm B class GI pipe pole up to 5.5 mt load complete erected CC foundation duly painted with two coats of red oxide and corrosive resistant paint complete connected and commissioned in approved manner.

For, all materials necessary test/ MTC shall be carried out as per General Technical Specification.

10. DEWATERING

Dewatering by pumping set of required capacity, temporary platform, carting pumping at site and fixing the same position including all accessories and fuel and labor etc. comp. (5.00 H.P. Engine.)

1. Where water is met in excavation due to stream flow, seepage, springs, races or other reasons, the contractor shall take adequate measures such as baking pumping, to keep foundation trenches dry when so required and to protect the green concrete / masonry against damage by erosion or sudden rising of water level. The methods to be adopted in this regarded and other details there of shall to the choice of the contractors but subject to approved of the Engineer-in-charge. Approval of the Engineer-in-charge shall, however not relieve the contractor of the responsibility for the adequacy of dewatering and production arrangement and for the quality and safety of the works.
2. Pumping form, the interior of any foundation enclosure shall be done in such manner as to preclude the possibility of movement of water through any fresh concrete. No. pumping shall be permitted during the placing of concrete or for any period of at least 24 hours thereafter, unless it is done a suitable sump separated from the concrete work by a water tight wall or other similar means.

11. M.S. BEND

Supplying & Fixing Portion submerged arc M.S. Short bend outside coated with best quality bituminous paint having be welled ends pates coil confirming to Is 3589/2001 or its latest version/amendments for following Dia.

M.S. Bend (Short/Long) of 125 mm Dia 150 mm. dia., 200 mm. dia. 250 mm dia.300 mm Dia

Scope of Work:

3. The item cover for laying & joining M.S. Bend of above diameter for rising main, suction & delivery of pump motor by providing & supplying flanges of require diameter nut bolts, rubber packing & red oxide to paints the M. S. Bend etc. should be mfg. as I.S. & superior quality. The whole material for the above item to be got approved by the competent authority before the work commence welding of flange at the ends of M.S. Bends of specified length and also welding two pipes at end by providing

extra supports. Laying the Bends in excavated trenches after painting with anti-corrosive paint & bolting two flanged pipes by using rubber packing sheet on grade & position as per the instruction of Engineer-in-charge.

4. The item covers erection in position the M.S. Bend including cost of supplying flanges, nut bolts, rubber packing red oxide including cutting, bending, welding, bolting & painting etc., complete.

a) Welding of Pipe:

5. During erection Bends are to be welded with welding rods, confirming to I.S. 814-1947 with its latest addition & I.S.I. make welding rod should be Ferro speed M.S. electrodes 4.00 mm. diameter 450 mm. length.

b) Material

- M.S. Bend: - The required M.S. Bend will be supplied by the contractor.
- Flanges: - The required Nos. of flanges will be supplied by the contractor. The qty. of flanges is depend upon the work of nature & the flange at the ends of M.S. Bends of specified length desired by Engineer-in-charge.
 - The mfg. & supplying of M.S. Flanges suitable as per size of Bend, its duly machined as per attached drawing & dimensions, manufactured from mild steel confirming to IS 226 materials. The sample of M.S. Flanges of each size is required to be got approved before the work commence.
- Bolts & Nuts with Washers: - The required material will be supplied by the contractor. The M.S. bolt nut of 3" x 3/4" size of standard materials.
- Rubber Seat: - The required material will be supplied by the contractors & it should be having 1/8" thickness of standard material.
- Red oxide: - The required material will be supplied by the contractor & it should be standard make & superior quality.

c) Fabrication and Transportation

6. All work of fabrication i.e. joining the Bend ends with welding plates and with flange at specified length of Bend shall be performed and completed in a thorough workman like manner. Equal to the best modern practice in fabrication of metal work of the type covered. The work shall be carefully performed to the entire satisfaction of the Engineer-in-charge. The contractor shall ensure that the workmanship by his is free from injuring and defect and shall replace free of cost. And defect in workmanship, fabrication, transportation, handling and strong until final acceptance by the Engineer-in-charge.

d) Welding

7. All welding shall be done by electric arc method using a process which will exclude the atmosphere from the molten metal except where otherwise specifically permitted. The welding rods shall be of the heavily coated type designed for all position welding, and the size, type of useless shall be made in

accordance with the Indian standards, only qualified welding operator shall be employed to perform welding, surface to be welded shall be cleaned of rust, paint and other foreign matters where weld metal is deposited in two or more layers, each shall be crushed with brush or otherwise cleaned before the subsequent layer is deposited.

8. All welding precautions shall be taken to minimize stress due to heat by using the proper sequences in welding by pressing the welds, while hot, or by other satisfactory methods. All the arrangement for welding is to be done by the contractor at his own cost.

e) Cleaning and Painting

9. The contractor shall furnish, prepare and supply all materials for cleaning, painting and coating of metal work as per direction Engineer-in-charge. The cost for furnishing, preparing and supplying black bitumen painting which are required for the work including labor, tools and equipment shall be included in the rate tendered for the complete item.

f) Erection (Laying)

10. The reference lines, center lines, grades and levels having relation of civil structures shall have to be established on site. The contractor so as to facilitate section in proper manner.
11. Erection in the field shall be done by bolt bolting two flanged pipe ends by using the nuts and bolts with washers on both the sides and by using rubber sheet packing in between the flanges. The contractor shall perform these work with greater accuracy to ensure leak proof joints.
12. All parts shall be accurately assembled and erected in lines and levels as directed by the Engineer-in-charge.

g) Inspection & Tests:

13. All the work performed shall be subjected to inspection. Rest of completed work shall have to be given by the contractor as required by the Engineer-in-charge. While testing the corrected and completed work, any defect in workmanship is found, the same should be rectified by the contractor at his own risk and cost. The contractor shall replace, free of cost, any defective workmanship discovered during testing. No. extra cost will be given for the purpose. All the joints and connections shall be water tight.
14. The Engineer-in-charge may demand test checking of weld joints.
15. The primary requirement to accept the work is the water tightness of each and every joint. All the necessary arrangements for the testing as per the design requirements shall have to be made by the contractor by his own cost. No extra cost of any material, tools and laborers required for the testing will be given to the contractor. No extra claim for satisfactory completion of the work as per the design requirement will be entertained.

Item No. 12. Pump Set with Motor

Providing and Fitting of Pump set coupled with motor with all required accessories like strainer, NRV, Panel Starter & Main switch with Cable of suitable Size of Approved make etc. comp. 15 HP, 32 LPS, 31 Meter Head

This specification covers the Design, manufacture, testing performance guarantee and supply of zero suction polder Type submersible pumps. The, construction of pump shall be of pump below, motor above, and suction Intel at bottom, so that water can be pumped from the lowest level. The mixed flow type impellers shall be made of chrome steel materials, capable to handle raw water having turbidity up to 20,000 P.P.M. and maximum particle size of 8 mm. the motor shall be totally enclosed submersible water/oil filled, squirrel cage, induction type, water cooled and protected against contamination from surrounding water by effective sealing using high quality mechanical seal. The motor should be designed for 415+10% and (-)15% volts. Three phase 50 cycles.

2.0 The zero suction, polder Type submersible pumps should be of sturdy construction. The duty point of pump should be located at the optimum efficiency point of the pump rating and there should not be steep fall in efficiency in the range of + 10% and (-)25% Head variation.

The pumps as specified here in shall generally comply with the requirement of all applicable coders, regulations and safety codes in the locality where the pumps sets shall be installed. The pumps shall generally comply flowing standards.

- A. 1.5 8034-1976 Submersible pumps set for clear, cold fresh water.
- B. 1.5 9283-1979 Motor for submersible pump sets.
- C. ASYM-E-165 Standard Methods for Liquid penetrate inspection.
- D. Hydraulic institute standards (U.S.A.)

3.0 SPECIFIC REQUIREMENT:

3.1 The Contractor shall make his own assessment of the friction losses (Based on C-100) under all conditions of operation and suitable head shall be selected. Date given in the data sheets is indicative.

3.2 Details of pumps and motors such as discharge, efficiency Head, H.P., R.P.M. etc. shall be worked out and filled up by the contractor in the enclosed data sheets at 48.5 Hz frequency.

3.3 Pumps shall have a continuous rising head characteristic from the operating point towards shut-off without any zone of instability, pumps with dropping curves shall not be acceptable. The contractor shall submit system resistance curve for the pumping station.

3.4 Pumps of each category shall be identical in all respects and shall be suitable for paralleled operation and pumps shall be selected for paralleled operation. The contractor shall also furnish torque speed curves of the pumps.

3.5 The minimum percentage of margin over the input power required at pump design point should be provided as mentioned here under. Motor H.P. shall be suitable to cover complete operating range.

MARGIN TO DECIDE DRIVE RATING	
B KW required at the operating point	Multiplying factor to decide drive rating.
Up to 1.5	1.5
Above 1.5 & up to 3.7	1.4
Above 3.7 & up to 7.5	1.3
Above 7.5 & up to 15	1.2
Above 15 & up to 75	1.15
Above 75	1.1

The power rating of motor thus selected should be higher than mean power consumption of any point of the Ch. Curve.

3.6 Material of construction of pumps shall be as per data sheets enclosed.

3.7 Pumps sets along with its drive shall run smooth without undue noise and vibration.

3.8 Noise level shall be limited to 76 dB and vibration to 50 microns after installation.

3.9 Before placing the order for pumps approval to be obtained from Engineer in charge.

- 3.10 The motor drive shall be totally enclosed sq. cage induction submersible motor confirming to relevant I.S.S.
- 3.11 The shut of head shall be as per data sheet given if the pump offered having shut of head less than shall be out rightly rejected.

4.0 GENERAL REQUIREMENT:

- 4.1 The calculation for system resistance is to be furnished along with offer. The H.Q. characteristic of pump to be super imposed on system resistance curve and to be enclosed with bid. The pump model shall be the one from the existing regular production range of the manufacture.
- 4.2 At least 50 Units of the pump model shall be operation at different job sites.
- 4.3 The pump sets are to be accommodated in the prescribed size of seepage well only. There will not by any change in the size pre scribed size of pump house. The layout of the pump sets shall shut to that shown in the respective pump house. The layout of the pump sets shall shut to the shown in the respective pump house drawing.
- 4.4 **CONSTUCTION FEATURES:**

Construction features shall be generally as specified hereunder.

4.4 1 SUCTION HOUSING AND DISCHAGE OUTLET:

The suction housing and is charge outlets should be of the grain C I. confirming to IS.210- 1978 FG-200 and free from blow hole slag inclusion and other determined defects. Housing and casing should be hydraulically tested up to 1.5 ties shut-off pressure.

4.4 2 IMPELLERS: -

Impeller/ impellers should be of mixed flow design, ensuring required performance free of cavitation's. It shall bed dynamically balanced impeller shall be made of chrome steel / Bronze confirming to I.S. 318 materials capable to handle raw water having turbidity up to 20,000PPM and maximum practical size of 8mm with fine sand & mud.

SHAFT SLEEVE:

The single piece shaft shall be designed for 0.05 mm maximum deflection at stuffing box face under worst condition of shut-off head renewable shaft sleeves shall be provided. It shall have surface finishing of 0.75 Microns. The material of shaft & sleeve shall be of SS AISI 431.

MECHANICAL SEAL:

The effective sealing shall be provided by high quality mechanical seal of appropriate design to prevent sandy and muddy water entrance into the motor suitably designed axial thrust bearing should be provided.

The sliding materials of rotating and stationary parts of mechanical seal shall be suitably designed to suits the application either made of metal carbides i.e. silicon carbide/ Tangiest carbide as per the manufacturers own design.

- 4.2 **MOTOR:** -The totally enclose squired cage induction submersible type water cooled/ oil cooled motor shall generally confirm to I.S 9283 of 1979.
- 5.0 **TEST TO BE CONDUCTED AS PER RELEVANT IS SPECIFICATIONS INSPECTION AND TESTING AT MANYUFACTURER'S WORKS.**
- INSPECTION AND TESTING AT MANUFACTURE" S WORKS SHALL BE CARRIED OUT AS SPECIFIED BELOW.**

All instruments and equipment required for such test shall be provided by the vendor and instrument shall be calibrate and certified by an approval independent testing authority. The testing data of the instruments not more than one month period to the inspection. All the tests shall be carried out as per the relevant IS code. Brief description of the tests to be carried out is as follows.

5.1 HYDROSTATIC TEST:

5.1.1 All the pressure containing parts shall be tested with water at 1.1/2 times the maximum discharge pressure on the head characteristic curve or twice the rated pressure whichever is higher. TEST CERTIFICATE TO BE PRODUCED.

5.1.2 Unless otherwise stated in data sheet the hydrostatic test shall be conducted for a minimum duration of 30minutes.

5.2 MACHANICAL BALANCING:

5.2.1 STATIC BALANCING:

Major rotating components of the pumps like impeller, shaft etc. shall be individually statically balanced.

5.2.2 DYNAMIC BALANCING:

In addition to static balancing impeller and pump rotating assembly shall be dynamically balanced at rotating speed of rotation. TEST CERTIFICATE TO BE PRODUCED

5.3 PERFORMANCE TESTING:

To be witnessed by third party inspecting agency/Department or each pump be tested for its full operating range in accordance with the IS standard, site conditions shall be stipulated as near as possible. They shall be carried out with minimum discharge. Each pump shall be tested at its rated speed with its entire working range. Test shall preferably be conducted with actual drive capacity meter. During pump testing reading to the extent possible shall be taken to correspond to the net effective range specification in the data sheet and ever its full working range from its closed valve condition to full valve open condition. Head flow and overall efficiency characteristic curves shall be drawn. The curve produced shall determine the capability of pump set to meet the guaranteed performance at site.

5.4 Pump motor shall be offered for inspection by third party inspection agency/Department at the manufacture's site. The third party Agency is to be approved by the Engineer-in-charge the contractor has to take prior approval for the same. components of pump shall not be painted before inspection.

5.5 MATERIAL TEST CERTIFICATE:

Material test certificate for the various pumps components shall be furnished for purchaser's approval. Test certificate to be provided.

The payment will be made on satisfactory completion as above with testing. If testing after Installations not done. 10% of the cost will be withheld as a deposit at the time of final bill and released after satisfactory testing. Inspection of this item will be carried out by Executive engineer or respective agency appointed by Engineer in Charge. All the expenditure for Inspection Changes shall be produced by the Contractor. Also produce the relevant certificate form manufacture company with mention that the prudent to as per I.S. confirm.

The Item also includes with necessary platform required. For fixing as directed by the Engineer in charge.

Before placing the order for pump Approval to be obtained from Engineer in charge.

Measurement shall be on the Unit basis includes pump and motor starter, Main switch, Capacitor, Cable etc. complete.

GURANTEE OF PERFOMANCE:

The pump and motor shall be guaranteed against defect in materials workmanship under normal use and service for a period at least 12 month or as given by the company. The contractor shall have to give necessary documents for that the time of final payment with all necessary detail required for under guarantee service

SPECIFICATION OF OIL IMMERSED STAR-DELTA STARTER:

Manually / Automatic operated Oil immersed type i.e. as per IS:13947 (Part 4 Sec.1) 1993 (or Latest Revision) the interrupting medium should be Oil MEI (Mysore Electrical Industries, Bangalore) / JMP (Jyoti) / Kilburn / Crompton/ UEI/Advance/ Asian make Star-Delta starter fitted with three Magnetic type overload release with oil dash pot time lags of thermal type over load relay, stop push button and Plain entries for PVC Copper Cable of Submersible Motor operating on Three Phase, 50 Cycle (+/-) 3% 415 Volt + 10% - 15% Volt. Supply and preferably having following features or as per their own standard design and confirming to IS 13947 (Part-4/Sec. I) 1993 (Or latest revision) ISI marked product will be preferred. The Starter shall be will mounting cum pedestal type. The enclosure of Starter and metering panel should be vermin proof and as per IP 50. The Starter should be suitable for squirrel cage motor of submersible pump set.

The Starters as per their own (Manufacturers) standard design and confirming to IS:13947 (Part-4/Sec I) 1993 (or Latest Revision) IEC PUB 949-4-1 (1990) are also acceptable but if any major deviation found other than features specified below (Point No.1 to 10) should be pointed out clearly in offer with respect to their own design.

Fixed contact carrier assembly, moving contact and rubbing contact, assembly mounted on Non – Hygroscopic Bakelite insulated shaft to give free access to contact assemblies and moisture proof to eliminate insulation failure.

All fixed and moving contact made of high-grade electrolyte hard drawn cold rolled solid copper with the hardness to give long contact life. Contacts shall be suitable for Category AC-3 duty.

Fixed and moving contact of round oval design to achieve roller type self-wiping action to remove surface oxides and sulfides during making and breaking.

Rubbing contacts matched by high pressure alloy steel springs to achieve high pressure positive contact during long period of operation and during change over from start to run position.

Interface barrier of high-grade hygroscopic Bakelite materials to localize arc by shielding.

Independent acting magnetic/ thermal overload relays with direct acting type in each phase designed on Electromagnetic/ Electro Thermal principle and filled with four position Oil dash pot time lags easily and fully adjustable manually to suit any typical operating voltage and starting time condition requirement to enable the motor to reach near synchronous speed during starting period and before changeover. Relay having guaranteed non-edging property and rapid inverse tripping time characteristics in over load to trip the starter. Relay should be as per IS: 13947 (Part-4/Sec.1)1993 (or latest addition).

Starter handle (in case of manually operated) with positive sequencing, device making it impossible to go into running position without moving the handle into start position.

Under Voltage release should be such that the inter locking catch to ensure guaranteed release and tripping during very low voltage condition (Below 50% normal Voltage).

All current carrying terminals studs/ strips of hard drawn high electrically conductive brass materials with nuts, bolts and washers to carry required current without any damage. The main body of the starter should be moisture proof and dust proof design of C.I. Grade FG-260 or suitable thick CRCA metal sheet, starter enclosures should have IP 50 classification category protection. The body of Starter/Panel box must be fully enamel paint for de-rusting and weather resistance.

Fixed contact shaft shall be bolted with the side plate in order to facilitate maintenance work. Starter should have easily replaceable finger contacts, and moving contacts, which are of self-aligning type with renewable tips. The starter should be provided with ear thing terminal duly identified by sign.

METERING PANEL:

Over and above the starter as specified above, it shall be provided with the panel box mounted on it comprising with single phasing prevent or water level guard, volt meter, Ammeter, 3 Phase Indicating lamps, duly fixed in the CRCA Steel Box of minimum 1.5 mm thick and this Panel Box shall be fixed on the starter with making required connection with starter. The metering panel and

starter both should be fitted on suitable size of angle iron structure. The details of accessories to be included in metering box shall be as under. The detailed specification of which are attached herewith. For protection of dust, the rubber lining should be provided on the door of metering panel box. After application of Zinc Chrome Primer, the panel box shall be stove enameled with two coats of final paint.

Single Phasing Preventer with over voltage and under voltage cut out device with bypass toggle switch-1 No.

Water Level Guard with bypass toggle switch-1 No. The 1 sq.mm. PVC Insulated copper wire of one coil (91.44 Mtr.) and brass Electrode to be provided with it.

Voltmeter with Selector Switch-1 No.

Ammeter -1 No.

Earth leakage relay – 1 No.

Control fuses (Rewireable type) – 3 Nos.

LED Indicating lamps – 8 Nos.

SPECIFICATION OF SHUNT CAPACITOR.

The shunt capacitors shall be confirming to IS NO: 13340:1993 (with latest revision) and with ISI mark. The capacitors shall remain permanently connected with the cable of squirrel eager 3 phase induction type Submersible Motor having rated speed of 2900 RPM. Operating on A.C. 3 Phase 415 + 10% and – 15% volts with frequency 50 C/S. The frequency variation should be as per IS: 13340:1993 with latest revision if any. The ambient temperature at the site of location of capacitor shall be 45° C.

The capacitor shall be of indoor type. The container shall be either metallic or nonmetallic type. The power loss of capacitor offered should be clearly indicated without which the offer shall be rejected. The capacitors shall be mixed dielectric capacitor or polypropylene or MPP type and shall having self-discharging device. The capacitor shall be or oil impregnated type by vacuum method for increase in life of capacitor. The capacitor should have explosion proof arrangement and preferably with its failure indicating feature. Capacitors are for power installations as per Indian Elect Rules 1956.

The capacitor shall be provided with 3 phase Insulated copper wires of ISI marked and 1 meter in length for each phase (3x1=3 meters total) duly connected in unexposed manner in the flexible pipes.

The inspection of the capacitor will be carried out at the works as per IS: 13340:1993 with latest revision if any. It shall be obligatory on party of the tenderer to get the capacitors tested and approved by Concerned authority.

TECHNICAL DATA SHEET FOR POLDER PUMP SET

NO.	PARTICULAR	DESCRIPTION		
1.0	PUMPING STATION	Intake well		Offered by Contractor
1.1	Pump Make	MBH Pumps, Ahmedabad, Jasco Pumps, Rajpur(Ahmedabad), Lubin Submersible Ltd., Ahmedabad, Pullen Pump Ind. Pvt. Ltd., Dholka, Unnati Industrial Corporation, Ahmedabad.		
1.2	Size of Well	4.5 mtr. Dia x 8 mtr. Deep		
1.3	Design Capacity	LPS	HP	
1.4	Total head	mt.		
1.5	Number of Pumps	2		
1.6	Normally working pumps	2		
1.7	Speed	1450/2900 rpm		
1.8	No. of Stage	Single		
1.9	Shut off head	115%		
2.1	Impeller	S.S.CF 8 M /Bronze,IS318,LTB-2		
2.2	Pump Body	CI IS210,FG 200		
2.3	Shaft	S.S.AISI-410,431 (M)		
2.4	Shaft Sleeve	S.S.AISI-410,431(M)		
2.5	Casing wear ring (if provided)	S.S.CF8M/ Bronze IS 318		
2.6	Strainer	SS 304		
2.7	Thrust Bearing Housing	C.I.,I.S.-210 FG-260		
2.8	Thirst Plate	GM with fiber plate		
2.9	Bearing Bush	Bronze IS 318, Gr.LTB2		
2.10	Sand Guard	Nit rile Rubber		
2.11	Motor	Submersible, squirrel cage conforming to IS 9283		
4.17	Supply system	415 Volts 50 HZ,A.C. 3 phase		
4.18	Voltage and frequency variation	+ - 10% voltage variation + - 5% Frequency variation + - 10% combined voltage & frequency variation		
4.19	Method of Starting	S-D		
4.20	Motor winding	Wet type		
5	CABLE			
5.1	Standard	IS 9283		
5.2	Cable type and quantity	1 No. 3Cx25sq.mm.copper flat cable, 15 mtr. Length of cable is required for each pump feeder		
5.3	Type of Sealing	Mechanical seal		
5.4	Delivery column pipe size	150 mm.	150 mm	
5.5	Suction bell mouth and strainer	Required		
5.6	Paint	Epoxy paint		
5.7	Type of test required	Performance test Hydraulic test		

5.8	Drawing and Curves	Required	
5.9	Overall efficiency	60 %	

(B) - OIL IMMERSED/STAR-DELTA STARTER (15.00 H.P.)

1. Manually / Automatic operated Oil immersed type i.e. as per IS:13947 (Part 4 Sec.1) 1993 (or Latest Revision) the interrupting medium should be Oil MEI (Mysore Electrical Industries, Bangalore) / JMP (Jyoti) / Kilburn / Crompton/ UEI/Advance/ Asian make Star-Delta starter fitted with three Magnetic type overload release with oil dash pot time lags of thermal type over load relay, stop push button and Plain entries for PVC Copper Cable of Submersible Motor operating on Three Phase, 50 Cycle (+/-) 3% 415 Volt + 10% - 15% Volt. Supply and preferably having following features or as per their own standard design and confirming to IS 13947 (Part-4/Sec. I) 1993 (Or latest revision) ISI marked product will be preferred. The Starter shall be will mounting cum pedestal type. The enclosure of Starter and metering panel should be vermin proof and as per IP 50. The Starter should be suitable for squirrel cage motor of submersible pump set.
2. The Starters as per their own (Manufacturers) standard design and confirming to IS:13947 (Part-4/Sec I) 1993 (or Latest Revision) IEC PUB 949-4-1 (1990) are also acceptable but if any major deviation found other than features specified below (Point No.1 to 10) should be pointed out clearly in offer with respect to their own design.
3. Fixed contact carrier assembly, moving contact and rubbing contact, assembly mounted on Non – Hygroscopic Bakelite insulated shaft to give free access to contact assemblies and moisture proof to eliminate insulation failure.
4. All fixed and moving contact made of high-grade electrolyte hard drawn cold rolled solid copper with the hardness to give long contact life. Contacts shall be suitable for Category AC-3 duty.
5. Fixed and moving contact of round oval design to achieve roller type self-wipes action to remove surface oxides and sulphonyls during making and breaking.
6. Rubbing contacts matched by high pressure alloy steel springs to achieve high pressure positive contact during long period of operation and during change over from start to run position.
7. Interface barrier of high-grade hygroscopic Bakelite materials to localize are by shielding.
8. Independent acting magnetic/ thermal overload relays with direct acting type in each phase designed on Electromagnetic/ Electro Thermal principle and filled with four position Oil dash pot time lags easily and fully adjustable manually to suit any typical operating voltage and starting time condition requirement to enable the motor to reach near synchronous speed during starting period and before changeover. Relay having guaranteed non-edging property and rapid inverse tripping time characteristics in over load to trip the starter. Relay should be as per IS: 13947 (Part-4/Sec.1)1993 (or latest addition).

9. Starter handle (in case of manually operated) with positive sequencing, device making it impossible to go into running position without moving the handle into start position.
10. Under Voltage release should be such that the inter locking catch to ensure guaranteed release and tripping during very low voltage condition (Below 50% normal Voltage).
11. All current carrying terminals studs/ strips of hard drawn high electrically conductive brass materials with nuts, bolts and washers to carry required current without any damage. The main body of the starter should be moisture proof and dust proof design of C.I. Grade FG-260 or suitable thick CRCA metal sheet, starter enclosures should have IP 50 classification category protection. The body of Starter/Panel box must be fully enamel paint for de-rusting and weather resistance.
12. Fixed contact shaft shall be bolted with the side plate in order to facilitate maintenance work. Starter should have easily replaceable finger contacts, and moving contacts, which are of self-aligning type with renewable tips. The starter should be provided with ear thing terminal duly identified by sign.

- **METERING PANEL:**

13. Over and above the starter as specified above, it shall be provided with the panel box mounted on it comprising with single phasing prevent or water level guard, volt meter, Ammeter, 3 Phase Indicating lamps, duly fixed in the CRCA Steel Box of minimum 1.5 mm thick and this Panel Box shall be fixed on the starter with making required connection with starter. The metering panel and starter both should be fitted on suitable size of angle iron structure. The details of accessories to be included in metering box shall be as under. The detailed specification of which are attached herewith. For protection of dust, the rubber lining should be provided on the door of metering panel box. After application of Zinc Chrome Primer, the panel box shall be stove enameled with two coats of final paint.
14. Single Phasing Preventer with over voltage and under voltage cut out device with bypass toggle switch-1 No.
15. Water Level Guard with bypass toggle switch-1 No. The 1 sq.mm. PVC Insulated copper wire of one coil (91.44 m) and brass Electrode to be provided with it.

Voltmeter with Selector Switch-1 No.

Ammeter -1 No.

Earth leakage relay – 1 No.

Control fuses (Re-wire able type) – 3 Nos.

LED Indicating lamps – 8 Nos.

© - MAIN SWITCH

31.(Rewirable TP type 63 Amp.)

Providing of rewire able TP type M.C.T.P. Main Switches of re-wire able fuses suitable for 415 V acceptable makes as per category-II & III approved by Electrical Division, Govt. of Gujarat, R&B Department.

- | | |
|------------------------|-------------------------|
| (a) Capacity – 16 Amp. | (d) Capacity – 100 Amp. |
| (b) Capacity – 32 Amp. | (e) Capacity – 200 Amp. |
| (c) Capacity – 63 Amp. | |

1. All Main switches (Other than those of iron clad pattern) carrying current of 10 Amp. and above shall be fitted for back connection land shall be suitably protected.
2. All switches and circuit breakers shall be constructed in accordance with the I.S. 4237-1967. General requirement for switch gear and control gear for voltage not exceeding 1000 Volts and other relevant I.S. provided also that spring shall be either of phosphor bronze or if steel shall be copper or Nickel plated and that handle shall be so fastened that they do not tend to unscrew or become loose.
3. All main switches shall be either of metal clad enclosed pattern or of any insulated enclosed pattern which shall be fixed at close proximity to the point of entry of supply.
4. Switch boards shall not be erected above gas, stoves or sinks or within 2.5 m. of any washing unit in the washing rooms of laundries or in the bath rooms, lavatories, toilets or kitchens.
5. Switch boards, if unavoidably fixed in places likely to be exposed to weather, to drip or to abnormal moist temperature the outlet casing shall be weather proof and shall be provided with glands or bushing of adopted to receive screwed conduit according to the manner in which cables are run. PVC and double flanged bushes shall be fitted in the holes of the switches for entry and exit of wires.
6. A switch board not be installed so that its bottom is within 1.25 m. above the floor unless the front of the switch board is completely enclosed by a door or the switch board is located in a position to which only authorized persons have access.
7. Switch boards shall be recessed in the wall if so specified in the schedule of work or in the special specification. The front shall be fitted with hinged panel of other suitable material such as Bakelite in wood frame with locking arrangement. The outer surface of door being flush with the walls. Ample room shall be provided at the back for connections and at the front between the switchgear mountings and the door.
8. Equipment which are on the front of a switch board shall be so arranged that inadvertently personal contact with live parts is unlikely during the manipulation of switchgear, changing of fuses or like operations.
9. No holes other than the holes by means of which the panel is fixed shall be drilled closer than 1.3 cm from any edge of the panel.

10. The various live parts, unless they are effectively screened by substantial barriers of non-hydroscopic, no-inflammable insulating material, shall be so spaced that space shall not be maintained between such parts and earth.
11. The arrangement of gear shall be such that they shall be readily accessible and their connections to all instruments and apparatus shall also be traceable.
12. In every case in which switches and fuses are fitted on the same pole, these fuses shall be so arranged that the fuses are not alive when their respective switches are in the off position.
13. No fuses other than fuses in instrument circuit shall be fixed on the back of or behind a switch board panel or frame.
14. All the metal switchgears and switch boards shall be painted, prior to erection with one coat of antirust primer, after erection they shall be painted with two coats of approved enamel or aluminum paint as required on all sides wherever accessible.
15. All switch boards connected to medium voltage and above shall be provided with "Danger Notice Plate" conforming to relevant Indian Standards.

(D) COPPER CABLE

2.50 Sq.mm and 10.00 Sq.mm

1. Motor will be provided with three core that flat PVC insulated and PVC sheathed water proof flexible 3 core flat copper cable conforming to IS: 694 of 1990.
2. The cross sectional area of conductor should be sufficient so as not to cause voltage drop of more than 3% of rated voltage. The size of conductor shall be adequate and suitable for continuous use under water and air. Along with pump set, 5 mtrs. Lead cable has to be supplied. The length of extra cable shall be equal to head of pump set in meter plus 3 meters more. The minimum cross section of cable required is as per enclosed table of cable.
3. The cable used with submersible motor shall be of Finolex, Good Cab, Janson, Emcee, Sabar, Reliance (up to 4 sq.mm.)
4. The cable guard cable clips should be provided along with the pump to prevent damage to cable when handling pump or lowering of the same.
5. It should be got tested through T.P.I. with test certificate.

(E) - SPECIFICATION OF SHUNT CAPACITOR (4,8,12 KVAR each)

The shunt capacitors shall be confirming to IS NO: 13340:1993 (with latest revision) and with ISI mark. The capacitors shall remain permanently connected with the cable of squirrel edge 3 phase induction type Submersible Motor having rated speed of 2900 RPM. Operating on A.C. 3 Phase 415 + 10% and –

15% volts with frequency 50 C/S. The frequency variation should be as per IS: 13340:1993 with latest revision if any. The ambient temperature at the site of location of capacitor shall be 45 degree C.

16. The capacitor shall be of indoor type. The container shall be either metallic or nonmetallic type. The power loss of capacitor offered should be clearly indicated without which the offer shall be rejected. The capacitors shall be mixed dielectric capacitor or polypropylene or MPP type and shall having self-discharging device. The capacitor shall be or oil impregnated type by vacuum method for increase in life of capacitor. The capacitor should have explosion proof arrangement and preferably with its failure indicating feature. Capacitors are for power installations as per Indian Elect Rules 1956.
17. The capacitor shall be provided with 3 phase Insulated copper wires of ISI marked and 1 meter in length for each phase (3x1=3 meters total) duly connected in unexposed manner in the flexible pipes.
18. The inspection of the capacitor will be carried out at the works as per IS: 13340:1993 with latest revision if any. It shall be obligatory on party of the tenderer to get the capacitors tested and approved by concerned Authority.

(F) - M.S. CLAMP

(B) 750 mm diameter x 75 mm width x 10 mm thickness

Providing of Hot forged M.S. Clamps size (a) 450 mm diameter x 65 mm width x 10 mm thickness (b) 750 mm diameter x 75 mm width x 10 mm thickness (c) 750 mm diameter x 75 mm width x 16 mm. Thickness(d) 900 mm diameter x 100 mm width x 16 mm thickness manufactured from M.S. flat confirming to IS: 226 & fitted with $\frac{3}{4}$ " diameter 3" long high tensile strength bolt, Nuts & Washers. (2 sets on each side) Overall length for clamps should be 24" suitable for column pipes.

(G) - ELCB (Earth Leakage Circuit Breakers)

Approved make / ELCB / RCCBS confirming to IS:12640 and having sensitively of 30 MA and short circuit withstand capacity of 6 K.A. and suitable for operation on 3 phase and neutral 415 V. having characteristic of quick action & tripping with all advance feature & do not in-corporate any electronic component for following max. rating erected as directed.

25 AMP FP ,40 Amp. FP ,63 AMP FP ,100 Amp. FP (63 Amp sensitivity)

The basic must be of incombustible, non-conducting and moisture proof material.

Circuit breaker as must be so arranged and placed that no combustible material is endangered by their action unless placed in an engine room or in a compartment especially arranges for the purpose, they must their line parts covered. The covers must be of incombustible material and must be either non conducting or of rigid metal and clear o all internal mechanism.

(H) – EARTHING FOR PANEL BOARD

(B Type and C Type)

1- *Installation of Ear thing Plates:* (A) With 30 x30x0.35 cm C.I. earth Plate (B) With 45 x45x0.35 cm C.I. earth Plate (C) With 60 x60x0.315 cm Copper earth Plate.

19. All installation of ear thing shall conform to Indian Electricity Rules. IS. 3043 and its latest addition and I.E.E. The copper earth plates should be tinned before installation. The earth plate of copper 60 cm x 60 cm x 3.515 mm thick size as mentioned in the schedule be in separate pits at least 150 CMS to 300 CMS. away from the building at a depth necessary to reach moist earth surface but with a minimum depth of 2.5mt. from the finished ground level up to the top vertical dodge of earth electrode. The earth plate shall be thoroughly cleaned to remove all dirt from the surface and be tinned properly for electrical contact with the main ground. Each earth pit should be provided with 38 mm dia. G.I. Pipe 2.5 Mt. Long or more depending up to the depth of pit, put over the vertical edge of earth plate (with top end of pipe provided with a closed to coupler). Alternative layers of salt and coke shall be provided surrounding the plate. The pits shall be filled when the plates are in position and with the approval of Engineer in charge.
20. To facilitate watering the pit, a concrete compartment should be made with funnel with mesh and cover plate as per rules provided in ISI regulation. The masonry endorers shall be 25 cm x25 cm x 25 cm (deep) with C.I. lid of 23 cm x 30 cm size. After installation, the earthing resistance of each earth plate should be measured by resistance measure in the presence of Engineer in charge, three days after the completion of earthing work, and the value should confirm to regulations.

13. DIFFERENT TYPES OF KUNDIES of various sizes

Providing & Constructing Air vent/Outlet Kundi, Air vent Kundi, & SV Chamber and Main Delivery Chamber (MDC) As Per Drawing & Design as Directed. (A). Air vent cum Outlet (B) Air vent Kundi (C) Sluice valve Chamber 150 mm Dia.(D) Sluice valve Chamber 200 mm Dia (E)Sluice valve Chamber 250 mm Dia (F)Sluice valve Chamber 300 mm Dia (G) Main Delivery Chamber (MDC)

The item included the cost for work of Excavation in all sorts of soil/murum/hard rock for foundation sub structure/super structure, P. C. C., B. B. Masonry, Sluice valve, 50 mm GI pipe of required length, 50 mm CI Air Valve Double Acting, Tee and PVC pipe of required of any length as per standard design etc. The work shall be carried out as per detail drawing and as per instruction of engineer in charge.

The work shall be carried out as per drawing and instruction given by Engineer In charge. The Kundi of various size shall be as per drawing.

- The item includes cost of Excavation in all sorts of Soil/Murum/Hard rock to the required depth including necessary sorting/Scaffolding dewatering if required any complete as

directed by Engineer-In-Charge.

- The item includes the cost of PCC in 1:3:6 at all locations as shown in Drawing.
- The Sub Structure shall be constructed in B.B. Masonry IInd Class in cement mortar of Proportion 1:6 for foundation plinth and super structure including striking out joints 20 mm deep with curing finishing joints and providing scaffolding as directed with all lead and lift etc. complete and as directed by Engineer-In-Charge.
- Backfilling for Foundation including filling in plinth with sand under floors including consolidation, watering, ramming and dressing etc. complete.
- Providing and laying in position RCC in proportion 1:2:4 for Plinth Beam, Sill, Lintel, and Slab including necessary scaffolding, Shuttering completed.
- Providing and fixing in position reinforcement Fe415/Fe 500 D mild steel or tor steel bars as per detail drawing and design including cutting bending and binding in position with binding wires as directed with all leads and lifts etc. complete.
- Providing plaster of cement and sand in 1:3 proportion including preparing surface providing scaffolding, finishing curing as directed etc. complete in 15 mm thickness. Also include over above item for finishing with a floating coat of neat cement slurry.
- Providing white or color wash in three coats including scaffolding, cleaning surface etc. complete.
- Providing cement and sand vata (10 cm X 10 cm) size quarter around in cement mortar 1:1 prop. Including net cement finishing watering etc. complete.
- Providing and fixing RCC precast Jali in 40 mm thick for cove of Kundi of required size or of approved quality and design including fixing in position curing finishing as directed etc. complete.

For, all materials necessary test/ MTC shall be carried out as per General Technical Specification.

14. CHAIN PULLEY BLOCK

Providing Chain Pulley Block with Triple gear arrangement lifting hook, load chain, hand chain & locking device with necessary mounting girder/structure, spur gear travelling trolley and all accessories (2.00 Tone Capacity) etc. Complete.

Tested Load, Tones	4.5
Pulling effort on Hand Chain, Kg.	41
Hand chain required to be passed	
For lifting load through one m (M. Approx.)	114
Standard clear lift range, in mt.	6
Load Chain size, mm	11

1. Specification for- 2 or 3 Tones Hand Operated Balanced Spear Gear Chain Pulley Block requirement as below: (Morris make)
2. Frame: Fabricated steel frame shaped to occupy minimum headroom ensures permanent alignment of spindles and gears enclosed and protect the load chain wheel and brake unit. Detachable steel cast totally enclosed the gears.
3. Hooks:
Hooks are of forged steel and in shape, materials and strength comply, with IS-8610 for chain hoists on single fall of chain, top hook swivels in a cross head which farms part of hoists on two or more falls of chain the top hook swivels in a cast steel yoke whereas bottom hook rotates on thrust bearing and is supported by bottom block frame.
4. Safety Latch:
Every bottom hook is equipped with a safety latch a safety latch for top hook is an optional attachment.
5. Load chain Wheel:
Made from heavy duty malleable cast iron (IS-2108) has pockets accurately cast to receive calibrated load chain.
6. Load Chain:
Higher tensile steel grade 40. As per IS: 3109. All chains are electrically resistance welded and heat treated to give ductility toughness and wear resistance, accurately calibrated, Pitched and polished to ensure free movement, each link is tested to twice the safe working load and can withstand shock loads.
7. Gears:
All gears are accurately machine cut from alloy steel and case hardened to ensure long life.
8. Load Brake:
The precision self-actuating screw and disc type mechanical brake engages instantly and provides uniform performance with rotted loads or less than the rated capacity. When lowering a load is under perfect control at all times. That is exceptionally valuable where accurate movement is demanded for spotting loads.
9. Ratchet wheel are hardened and surfaces ground to maintain parallelism, with adequate thickness to engage properly with pawl.
10. Hand Chain Wheel:
Made form gray cast iron grade FG 260 to IS 210 having bore with square threads and pockets accurately, cast to receive calibrated hand chain, Hand chain guards provided to prevent the chain from snagging and fouling. Hand chain guards are bolted to framed which enables easy removal and refitting of chains.

11. Lubrication: Totally enclosed gear case is packed with sufficient grease during assembly, The driving pinion is provided with grease nipple for lubricating bearing surface, between load wheel bare and driving pinion to ensure smooth and trouble-free operation.

12. Test:

Chain pulley block conform to the testing requirements of IS 3832 and are tested for 50% overload at works in support of which test certificates are required.

15. DIVERSION

Diversion of water course/ providing coffer dam and bound of Island as may be necessary for foundation and maintaining the same for the period as may be necessary etc. complete.

Diversion of water flow by way of excavation of trench and bounding of island of soil (in gunny bags) band for foundation of well including dismantling coffer dam as per instruction of Engineer – in-charge etc. complete.

16. Steel Platforms

Providing fabricating 4 to 5.5 Mt. diameter steel plate form on R.C.C. jack well with walk way and railing around jack well including fabrication, erecting work etc. complete. 5500 mm Dia.

Finished rolled materials shall free from the cracks, flaws, injuries seem, slaps, blisters, ragged and imperfect edges and other defects, it shall have a smooth, uniform finish, and shall be straight, it shall be also be free from loose mill scale rust pits or other defects effects affection its strength and durability.

The acceptance of any materials on inspection at the mill, i.e. rolling mills, foundry or fabricating plant where materials for the work is manufactured, shall not be a bar to its subsequent rejection, if found/defective, Mild steel for bolts and nuts shall confirm to I.S. specification. All work shall be in accordance with the drawings, Care shall be taken that all parts of an assembly for accurately together. All the structural steel members and parts shall have straight edges and bug surfaces. If necessary, they shall be straightened or flattened by pressure unless they are required to be of curvilinear forms. They shall also be free from twist. Pressure applied for straightening or flattening shall be such as would not injure the materials. Adjustment surface or edges shall be in close contact or at uniform distance throughout. All the structural steel parts, where required, shall be sheared, chopped, sawn or flaw not on ground accurately to the required dimensions and shape. All edges of splice and gusset plates 5 mm thick and over shall be machined and those less than 5 mm thick may be sheared and ground.

The diameter of rivets shown on drawing shall be the size before heating. Each rivet shall be of sufficient Length of form a head of the standard dimensions as given in I. S. Hand book on steel section Part-1. It shall be free from the burnt on the underside of the head. All loose or burnt rivets and rivets with cracked or badly formed defective heads or with heads which are unduly eccentric. With the shanks shall be removed and replaced.

In removing rivets, the head shall be sheared off and the rivet punches but, so as not to injure the adjacent metal and if necessary, they shall be drilled out, Recapping and caulking shall not be permitted.

All welding shall be done as per IS 7307 and welder shall be approved as per IS 7310 with the prior approval of the Engineer-in-charge and the workmanship shall confirm to the specifications of I.S. 814-1947 with its latest addition of ISI Mark welding rod should be Ferro speed M.S. electrodes 4/5 mm.

The platform shall be fabricated to the exact shape and dimensions shown on the detailed drawings. The steel sections shall be bent cold to the required shape by making V-cuts in the horizontal portion at not less than eight place for single will at uniform intervals along length.

The V-cuts shall then be welded together electrically steel cutting edges shall be transported on site and shall be conveyed to the exact location by any means and shall be placed in true position as directed by Engineer-in-charge. After fabrication work of platform, all steel materials used should be painted with anticorrosive paint in two coats.

17. M.S Channel Section

Providing & fixing M.S. channel section (medium weight) including applying two coats of oil paint over one coat of anti-corrosive paints with fixing over RCC wall of intake well etc. comp.

MATERIALS :- The structural steel section as specified or required shall be cut, square and correct length as per requirement . The steel section shall be confirming to IS 808-1977. for dimension.

The steel section shall be finished rolled materials, shall be new, unused free from cracks, flaws, injuries, seems, slaps, basters, ragged and imperfect edges and other defects. It shall have a smooth, uniform finish and shall be straight. It shall also be free from loose mill scale rust pits or other defects affecting its strength and durability.

The dimensional and weight tolerances for rolled shapes shall be in accordance with ARE : 1859 for indigenous steel and equivalent applicable codes for imported steel.

PAINTING OF STEEL WORK :

MATERIALS : Red Oxide – Zinc chrome primer shall confirming to IS- 2074.

Synthetic enamel paint shall confirming to IS-2932

All the materials shall be of the best quality from an approved manufacturer. Contractor shall obtain prior approval of the Engineer in charge for the brand of manufacture and the color/shade. All the materials shall be brought to the site in sealed containers.

WORKMANSHIP :- Painting work shall be carried out only on thoroughly dry surfaces. Painting shall be applied either by brushing or by spraying. The workmanship shall generally conforming to the requirement of IS 1477 (Part-2). The channel section shall be fixed in accurate level, line in R.C.C. wall of Intake structure as per instruction of Engineer in charge.

TESTING :- If mill test reports are not available for any steel materials the same shall be tested by the contractor to the Engineer in charge's satisfaction to demonstrate conformity with the relevant specification. No materials shall be painted or dispatched to site without inspection and approval by the Engineer in charge unless such inspection is waived in writing by the Engineer in charge.

The contractor shall provide all the testing and inspection services and facilities for shop work except where otherwise specified.

18. MS bars welded mesh Jali

Providing and fixing 10 mm dia. M.S. bars welded mesh (Jali) for cover over outlet pipe one coat anticorrosive, oil painting three coats as directed etc. complete.

The required size of jali shall be provided of 10 mm dia. M.S. bars and fixed as per the drawing & instruction of Engineer-in-charge. Jali is to be properly fixed by keeping the sighted platform for jali with B. B. masonry and plaster, three coats of oil painting including one coat of anti-corrosive shall be applied of approved quality.

19. U Steps

Providing & fixing 'U' steps fabricated out of 16 mm dia. M.S. bar as per drawing & design including applying two coats of oil paint over one coat of anti-corrosive paints etc. comp.

MATERIALS: - 16 mm. Dia mild steel bars shall conform to M-10.

WORKMANSHIP :- The work shall consist of furnishing and placing bar to the shape and dimension shown as on the drawings or as directed.

The relevant specification for steel cutting & bending as per item No.3 shall be followed. The M.S. bar of 16 mm. Dia shall be bent in 'U' shape with 0.40 x 0.20 x 0.40 mt. size with necessary cover on both the sides. The 'U' shape of bar shall be fixed in the masonry wall of intake wall or distribution tank at 0.45 mt. spacing from bottom to top in zig-zag manner between each step. The ends shall be completely embedded in the wall so that it can take the load.

The 'U' step bar shall be fixed with special care and exercised to prevent any displacement in the position of each step.

The 'U' step bar shall be provided with applying two coats of synthetic enamel oil paint over one coat of red oxide primer or anti corrosive paint of the best quality from an approved manufacturer.

Itemwise Technical Specifications

Pump House (5.00 X 3.00)

Item No:-1

Excavation of pipeline trenches/foundation trenches in the strata shown below including depositing the excavated stuff as and where directed upto lead of 50 Mts. and 6.0 Mt lift of excavation below average G.L. including refilling, cleaning the site with thin jungle cutting but excluding dewatering if any.

The relevant specification of Excavation work as shown in Detailed Technical Specifications shall be followed

Mode of measurement & payment

The measurement of excavation in trenches /foundation shall be made according to the sections of trenches shown on the drawing or as per Instructions given by the Engineer - in - charge. No payment shall be made for surplus excavation made in excess of above requirements or due to stopping and sloping back as found necessary on account of conditions of soil strata and requirements of safety.

The rate shall be for a unit of one cubic meter.

For such items, payment shall be made for respective strata and lift – as per the approved rate.

Item No:- 2

Providing and laying hand mixed and unvibrated plain cement concrete as under of different proportion for foundation lain in situ including temping smooth finishing, curing, and lead upto 50 Mt. Moreover, lift 1.5 Mt. Etc. complete.

The relevant specification of PCC work as shown in Detailed Technical Specifications shall be followed

Mode of measurement & payment

The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plan or as directed.

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

The rate shall be for a unit of one cubic meter.

Item No :- 3

Providing B.B.Masonry IInd class using British size conventional bricks in cement mortar of prop. (1:6) for foundation plinth and super structure including striking out joints 20mm deep with curing finishing joints and providing scaffolding as directed with all leads and all lifts etc. completed.

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The rate shall be for a unit of one cubic meter.

Item No:- 4

Filling in plinth with sand under floors including consolidating, watering, ramming and dressing etc. complete.

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The rate shall be for a unit of one cubic meter.

Item No :- 5

Providing and laying in position RCC as under proportion using cement sand and crushed aggregate (20 mm and under) for plinth course, lintels, slabs, beams, columns, chajja, lofts, barrels, etc. including cost of frame work providing and shuttering temping smooth finishing, curing as directed with all leads and lifts etc. complete.

R.C.C 1 : 2 : 4

The relevant specification of RCC Work as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plan or as directed.

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

The rate shall be for a unit of one cubic meter.

Item No:- 6

Providing and fixing in position mild steel reinforcement or tor steel bars reinforcement as per detail drawing and design including cutting bending and binding in position with binding wires as directed with all leads and lifts etc. complete.

TMT IS MARKED BAR FE 415

The relevant specification of M.S.Bar as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

Reinforcement shall be measured in length including overlaps, separately for different diameters as actually used in the work. Where welding or coupling is resorted to, in place of lap joints, such joints shall be measured for payment as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in tones on the same basis of as per M-10. Length shall include hooks at the ends. Wastage and annealed steel wire for binding shall not be measured and the cost of these items shall be deemed to be included in the rate for reinforcement.

The rate for reinforcement includes cost of steel & binding wires, it's carting to work site, cutting, bending, placing, binding and fixing in position as shown on the drawings and as directed. It shall also include all devices for keeping reinforcement in approved position, cost of joining as per approved method and all wastage and spacer bars.

The rate shall be for a unit of One Kg.

Item No:- 7

Providing & fixing Steel Doors with angel 40 x 40 x 6 mm & 25 x 25 x 4 mm frame with shutter of 16 gauge plate as per approved drawing and design with two coats of approved oil paint with etc. Comp. 0.0 to 1.50 Mt.

(A) Fondation and Plinth)

P.C.C. (1 :3:6)

Up to plinth (Conventional)

for super structure (Conventional)

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on Sqmt. Basis.

Item No. 8

Providing & fixing Steel Window with angel 40 x 40 x 6 mm & 25 x 25 x 4 mm frame with shutter of 16 gauge plate as per approved drawing and design with two coats of approved oil paint etc. Comp. The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on Sqmt. Basis.

Item No. 9

**Providing plaster of cement and sand in 1:3 proportion including preparing surface providing scaffolding,finishing curing as directed etc. complete. (15 mm thick)
15 mm thick**

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on Sqmt. Basis.

Item No. 10

Extra over item for finishing with a floating coat of neat cement slurry.

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on Sqmt. Basis.

Item No. 11

Providing and laying I.P.S. flooring of plain cement concrete 40 mm thick in proportion (1:2:4) using crushed aggregate (20mm and under) laid in situ over 120 mm thick B.B.C.C. (1:5:10) including temping, smooth finishing, curing, lining as directed with all leads and all lifts etc. complete.

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on Sqmt. Basis.

Item No. 12

Providing white or colour wash in three coats including scaffolding, cleaning surface etc. complete.

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on Sqmt. Basis.

Item No. 13

Supplying & Fixing Road Sign Board of M S Plate & Angel Iron Incl Painting Lettering Etc Comp Incl Fixing in C C (1: 4 : 8) With necessary Excavation Etc Comp As per I R C Type Design (Non Reflective Type)

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on Sqmt. Basis.

Item No. 14

Providing & fixing 45cm x 30 cm x 2.5 cm thick year plate of marble stone set in CM. 1:1 including finishing and engraving letter etc. Comp.

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on No. Basis.

Item No. 15

Providing cement and sand vata (10 cm x 10 cm) size quarter around in cement mortar 1:1 prop. Including net cement finishing watering etc. complete.

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on RMT Basis.

Item No. 16

Providing and fixing R.C.C. precast jali 40 mm thick for ventilator or of approved quality and design including fixing in position curing finishing as directed etc. complete.

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on Sqmt. Basis.

Item No. 17

Providing and fitting Room Wiring confirming Is694 for PVC insulated Copper Wire 2.50 Sq.mm With Standard Accessories like PVC pipe Switches plug saddle etc. comp.

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on Point basis of required capacity.

Item No. 18

**Approved make CFL Retrofit 13/15/18 watt erected if required
As Per GWRDC SOR 2023-24 (Ch.12 P/77)**

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on No. basis of required capacity.

Item No. 19

Providing & erecting Approved make Celing fan with double ball bearing ISI mark with condenser A.C 230V.550 c/S.1200 mm sweep complete canopy and 30 cm down rod erected on existing hook or clamp with 24/.2 3 core flexibale wire with earthing (make shall be approved by engineer in charge)

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on No. basis of required capacity.

Item No. 20

Supplying and erecting mens certificate SOLAR STREET LIGHT fitting made from MS body power coated/ painted with corresion resistant paint with gasket & transparent cover with following cfl non retro lamp with choke holder & accessories fitting Sall be mounted on 75/80 mm B class GI pipe pole up to 5.5 mt load complete erected CC foundation duly painted with two coats of red oxide and corrosive resistant paint coml connected & commissioned in approved manner.

The relevant specification of Construction of PUMP HOUSE/PANEL ROOM as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on No. basis of required capacity.

RISING MAIN

Item No:-1

Excavation of pipeline trenches/foundation trenches in the strata shown below including depositing the excavated stuff as and where directed upto lead of 50 Mts. and 6.0 Mt lift of excavation below average G.L. including refilling, cleaning the site with thin jungle cutting but excluding dewatering if any.

All sort of soil 0.0 to 1.50 Mt.

The relevant specification of Excavation Work as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The measurement of excavation in trenches /foundation shall be made according to the sections of trenches shown on the drawing or as per Instructions given by the Engineer - in - charge. No payment shall be made for surplus excavation made in excess of above requirements or due to stopping and sloping back as found necessary on account of conditions of soil strata and requirements of safety.

The rate shall be for a unit of one cubic meter.

Item No:- 2

Providing and jointing ISI marked M.S.pipe of required length with M.S.Flange of following dia by necessary cutting & welding works & laying the same in excavated trench of rising main, suction / delivery of pump motor after laying the flanged pipes joint with necessary nut bolt of required size by using rubber packing of required thickness after fitting M.S.Pipe. Paint the M.S. pipe with anticorrosive paint etc comp. (As per I.S. 3589/2001, 4270/2001, 1239/2004)

150 mm (5.40mm th.)

The relevant specification of M.S.Pipe as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The measurement of work shall be payable on running meter basis of completion of work in all respect.

Item No:- 3

Providing Laying & joining in standard length ISI Mark rigid unplasticised PVC pipes suitable for irrigation water with self fit joint incl. joining necessary fitting like Tee, Bend, Coupler, reducer, Endcap joining (CementSolvent) of following class and dia as per IS specification No.4985 / 1988 etc. comp.(6kg)

250 mm dia (6 kg/cm²)

The relevant specification of PVC Pipe as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The measurement of pipe line works carried out as per specification shall be payable on running meter basis

of Laid pipeline & while balance 10% of value of this item shall be payable after satisfactory testing at site without leakage.

Item No:- 4

Providing and Fixing following class & dia of different type of valves as per IS with necessary fittings of standard design and specification incl. testing with all leads and lifts etc.complete.

Item No:- 4.1 Air Valve (Double Acting)

50 mm dia

The relevant specification of Providing and Fixing Valves as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The whole item shall be carried out as per instruction of Engineer-in-charge, the measurement shall be taken and paid on the number basis.

Item No:- 4.2 Sluice Valve

150 mm dia

The relevant specification of Providing and Fixing Valves as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The whole item shall be carried out as per instruction of Engineer-in-charge, the measurement shall be taken and paid on the number basis.

Item No:- 4.3 Reflux Valve

150 mm dia

The relevant specification of Providing and Fixing Valves as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The whole item shall be carried out as per instruction of Engineer-in-charge, the measurement shall be taken and paid on the number basis.

Item No: 5

Providing & constructing air vent kundi etc completed.

Item No:- 5.1

Excavation of pipeline trenches/foundation trenches in the strata shown below including depositing the excavated stuff as and where directed upto lead of 50 Mts. and 6.0 Mt lift of excavation below average G.L. including refilling, cleaning the site with thin jungle cutting but excluding dewatering if any.

0.0 to 1.50 Mt.

The relevant specification of Excavation Work as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The measurement of excavation in trenches /foundation shall be made according to the sections of trenches shown on the drawing or as per Instructions given by the Engineer - in - charge. No payment shall be made for surplus excavation made in excess of above requirements or due to stopping and sloping back as found necessary on account of conditions of soil strata and requirements of safety.

The rate shall be for a unit of one cubic meter.

Item No:- 5.2

Providing and laying hand mixed and unvibrated plain cement concrete as under of different proportion for foundation lain in situ including temping smooth finishing, curring, and lead upto 50 Mt. Moreover, lift 1.5 Mt. etc. complete.

(A) P.C.C. (1 :3 :6)

(B) P.C.C. (1 :2 :4)

The relevant specification of PCC Work as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plan or as directed.

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

The rate shall be for a unit of one cubic meter.

Item No. 5.3

Providing laying & jointing PVC Pipe & Tee (Moulded) etc complete.

FTA 110 mm

This item shall be carried out as per instruction of Engineer-in-charge with required technical specification.

Mode of measurement & payment

The payment of item shall be made on No. basis of required capacity.

Item No: 5.4

Providing and Fixing G.I.Pipe etc. complete.

80 mm Ø

This item shall be carried out as per instruction of Engineer-in-charge with required technical specification.

Mode of measurement & payment

The payment of item shall be made on Rmt. basis of required capacity.

Item NO: 5.5

Providing and Fixing following class & dia of different type of valves as per IS with necessary fittings of slandered design and specification incl. testing with all leads and lifts etc. complete.

80 mm dia

The relevant specification of Providing and Fixing Valves as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on No. basis of required capacity.

Item No: 6

Supplying & fixing short bend out side coated with best quality bituminus paint having beweolled and plates or coil confirming to ISI 3589/ 2001 or its latest revision/amendment for following thickness etc completed.

Short Bend 150 mm dia.

The relevant specification of M.S.Bends as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The measurement of works shall be payable on No basis of completion of work in all respect.

JACK WELL

Item No:- 1

Excavation of pipeline trenches/foundation trenches in the strata shown below including depositing the excavated stuff as and where directed upto lead of 50 Mts. and 6.0 Mt lift of excavation below average G.L. including refilling, cleaning the site with thin jungle cutting but excluding dewatering if any.

- (A) Soft Soil**
 Up to 1.5
- (B) Hard Murrum**
 Up to 1.5
- (C) Soft Rock**
 1.5 to 3.00
 3.00 to 5.00
- (D) Hard Rock**
 3.00 to 5.00
 5.00 to 6.00
 6.00 to 7.00
 7.00 to 8.00

The relevant specification of Excavation work as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The measurement of excavation in trenches /foundation shall be made according to the sections of trenches shown on the drawing or as per Instructions given by the Engineer - in - charge. No payment shall be made for surplus excavation made in excess of above requirements or due to stopping and sloping back as found necessary on account of conditions of soil strata and requirements of safety.

The rate shall be for a unit of one cubic meter.

For such items, payment shall be made for respective strata and lift – as per the approved rate.

Item No:- 2

Providing and laying hand mixed and unvibrated plain cement concrete as under of different proportion for foundation lain in situ including temping smooth finishing,curring, and lead upto 50 Mt. Moreover, lift 1.5 Mt. Etc.complete.

P.C.C.1:2:4

The relevant specification of PCC work as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plan or as directed.

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

The rate shall be for a unit of one cubic meter.

Item No:- 3

Providing and laying in position RCC as under proportion using cement sand and crushed aggregate (25 mm and under) for plinth course, lintels, slabs, beams, columns, chajja, lofts, barrels, etc. including cost of frame work providing and shuttering temping smooth finishing, curing as directed with all leads and lifts etc.complete.

R.C.C.1:2:4

The relevant specification of RCC work as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plan or as directed.

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

The rate shall be for a unit of one cubic meter.

Item No: 4

Providing and fixing in position mild steel reinforcement or tor steel bars reinforcement as per detail drawing and design including cutting bending and binding in position with binding wires as directed with all leads and lifts etc.complete.

TMT IS MARKED BAR FE 415

The relevant specification of M.S.Bar as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

Reinforcement shall be measured in length including overlaps, separately for different diameters as actually used in the work. Where welding or coupling is resorted to, in place of lap joints, such joints shall be measured for payment as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in tones on the same basis of as per M-10. Length shall include hooks at the ends. Wastage and annealed steel wire for binding shall not be measured and the cost of these items shall be deemed to be included in the rate for reinforcement.

The rate for reinforcement includes cost of steel & binding wires, it's carting to work site, cutting, bending,

placing, binding and fixing in position as shown on the drawings and as directed. It shall also include all devices for keeping reinforcement in approved position, cost of joining as per approved method and all wastage and spacer bars.

The rate shall be for a unit of One Kg.

Item No :- 5

Providing and fixing in position R.C.C. pipe of NP2 class as per IS 458 1971 of following dia. with collar including caulking joints in cm.(1:1) using jute string soaked in cement slurry and finishing joints and laying pipe to the designed grade and levels including making connections with masonry chambers testing of pipe line as per design condition curing as directed with all leads and lifts etc.complete.

600 mm dia

The relevant specification of R.C.C. Pipe as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The measurement of pipe line works carried out as per specification shall be payable on running meter basis of Laid pipeline.

Item No: 6

Dewatering by pumping set of require capacity including temporary platform carting pumping at site and fixing the same position incl all accessories and fuel and labour etc. comp. (5.00 H.P.Engine).

The relevant specification of Dewatering as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment shall be made on engine H.P. - hrs. of running for dewatering.

Item No:- 7

Providing and fixing 10mm diameter M.S.bars welded mesh Jali of cover over outlet pipe on coat of anticorrosive oil painting three coats etc.complete.

10mm Dia M.S.Bars Welded mesh jail

The relevant specification of MS bars welded mess Jali as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The measurement shall be paid for one complete item on Sq. meter. basis.

Item No: 8

**Providing & Fixing " u " steps fabricated out of 16 mm dia M S Bar As per Drawing & design including applying Two coats of Oil paint over one coat of anticorrosive paint etc.Comp.
16mm dia ' U " Steps.**

The relevant specification of U Steps as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on No.. Basis.

Item No: 9

Providing and fabricating steel platforms on 4.50 Mt. R.C.C. jack well with walk way and railing around jack well including fabrication, erection work etc. complete..

The relevant specification of Steel Platform as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The measurement shall be paid on basis in Smt. The weight of steel components will be calculated as per I. S. specifications.

Item No. 10

Diversion of water course/ Providing Cofferdam & Bound of Island as may be Necessary for foundation & Maintaining the same for the period as may be necessary etc.complete.

(A) Diversion By Channel

The relevant specification of Diversion as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

Measurement shall be paid Lump sum as Job Item.

Item No. 11

Providing Chain Pully Block with Tripplr gear arrangement lifting hook ,load chain, hand chain & locking device with necessary mounting girders/structure,spur gear travelling trolley and all accessories (2.00 Tonne Capacity) etc Complete.

The relevant specification of Chain Pully Block as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on No. basis of required capacity.

Item No.12.1

Providing and fabricating pump lowering arrangement on steel platform with pulley including fabrication, erection work etc. complete..

M.S. PIPE 100 mm dia

The relevant specification of M.S.Pipe as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on Rmt. basis of required capacity.

Item No.12.2

Providing and fabricating pump lowering arrangement on steel platform with pulley including fabrication, erection work etc. complete..

M.S. Angle 40x40x6 mm

The relevant specification of M.S. Channel Section as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The measurement of this item shall be taken on Metric Tones basis.

Installation of Pump and Motor

Item No:-1

Providing and Fitting of Pumpset coupled with motor joining with all required Accessories like strainer,NRV Pannel Starter & Main switch with Cable of suitable Size of Approved make etc comp

Polder Type Pump sets (H.P/Lps./Head.)

Pump set with Motor

H.P	Lps.	Head
15.00	32.00	31.00

The relevant specification of Pump Set with Motor as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on No. basis of required capacity.

Item No:-1(A)

Starter / Panel (11 to 15 H.P.)

The relevant specification of Pump Set with Motor as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on No. basis of required capacity.

Item No:-1(B)

Main Switch Rewireable T P type 63 amp

The relevant specification of Pump Set with Motor as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on No. basis of required capacity.

Item No:-1.(C)

PVC insu.Copper Cable 10.00 Sq.mm

PVC insu.Copper Cable 2.500 Sq.mm

The relevant specification of Pump Set with Motor as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on Rmt. Basis of require size and capacity.

Item No:-1(D)

Capacitor 4.00 KVAR each.

The relevant specification of Pump Set with Motor as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on KVAR basis of required capacity.

Item No:-1(E)

M.S.Clamp 750x75x10mm

The relevant specification of Pump Set with Motor as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on PAIR basis of required capacity.

Item No:-1(F)

E L .C.B(Cat.III) 25 Amp.to 100Amp.

The relevant specification of Pump Set with Motor as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on No. basis of required capacity.

Item No:-1(G)

Earthing for Pannel Board

The relevant specification of Pump Set with Motor as shown in Detailed Technical Specifications shall be followed.

Mode of measurement & payment

The payment of item shall be made on No. basis of required capacity.