Item No.-1

EXCAVATION AND REFILLING:

Excavation for sewer line trenches, manholes and house connection chambers etc. with shoring strutting bailing our water form trencher wherever necessary including excavation in khal kuvas or soak pits encountered in the work and making the good after the work and all safety measures and provisions such as site rails fencing lighting watching and stacking excavated stuff up to a lead of 90 m and dispose of surplus earth upto a lead of 90 m with spreading is included in the rates of excavation, cleaning the site etc, as stipulated in the e-Tender specifications complete for lifts and soil strata as specified below :-

(i) In all sorts of soil & soft murrum including macadam road, khal kuvas and soak pits.
(ii) In hard murrum boulders.
(iii) In soft rock, masonry structures like in C.M., L.M. or lime concrete.
(iv) In hard rock, in C.C. 1:2:4 or R.C.C. with controlled blasting and or chiseling

1.1. EXCAVATION FOR TRENCHES (MANHOLES, VENT-SHAFT, HOUSE CONNECTIONS CHAMBERS AND CONNECTING SEWERS) IN ALL SORTS OF SOIL AND SOFT MURRUM INCLUDING MACADAM ROAD (WBM), KHAL KUVAS AND SOAK PITS INCLUDING DEWATERING.

1.1.1. The item shall include dry or wet excavation and removal of excavated material and its stacking and disposal in a manner hereinafter specified. The water met with if any, shall be bailed or pumped out by the contractor as necessary.

1.1.2. The contractor shall provide all materials and perform all labour necessary for the excavation and completion of the work in accordance with the drawings and specifications and the intent thereof.

1.1.3. The Contractor shall provide necessary protection to labour materials, equipment etc. to ensure safety against risk and accident. The B.I.S. standard in this regard shall be followed (IS 3764 – 1966)

1.1.4. The Contractor shall be liable to pay compensation for injury to life, and damage to property, if any, caused due to any operation connected with this item.

1.1.5. The Contractor shall hand over the site of work in neat and tidy condition after completion of work and shall remove all rubbish arising out of construction work.

1.1.6. The contractor shall carry out the work of trial hole of the sizes and depths and at places as directed by the Engineer-in-charge to accurately locate and determine the portions of services like water mains and drains, electric cables, telephone cables .etc, and shall fill them back as required and as ordered. The work shall be paid as per the item of excavation.

1.1.7 Widths of excavation for different diameter of pipes

The width of trenches for different diameters of pipes are to be given I.D. of pipe + 0.90m and it shall be paid as per actual excavation done but limited to ID of pipe +0.90m in case of more width done by the contractor. Contractor shall have to keep in mind that the working space at the bottom for easy laying and jointing of pipes. In case of safety in excavation, in soil more than 3.0 m depth, an excavation chart shown as DRN/PHASE-II PART-II/DRG No. 12 in the e-Tender document shall be used but it shall be measured and paid as per the maximum limits of width of excavation shown in drawing.

1.1.8. Depth of Excavation of Trenches:

The depths of excavation for the trenches shall be calculated from the surface to the bottom of the foundation, No payment shall be made for any excavation, beyond the width and depth, as specified above.

1.1.9. A Grip to be cut for pipe collar :

Where a collar is be provided or where socket of the pipe comes a grip shall be cut in the bottom of the trench or bedding as necessary below the bed of the pipes so that the pipe may have a fair bearing on its shaft and not rest upon its collars. Such grip shall be maintained clear until the joint has been passed by the Engineer – in - charge

1.1.10 Trenches in Rocky Ground:

The trenches in stony or rock ground shall be excavated all along to the full depth such that the bottom of the excavation shall not be higher at any point than the bottom of the concrete bedding layer below the sewer pipe.

1.1.11 Measurement of length of Excavation:

The length of excavation for trenches shall be measured in the horizontal plane between manholes.

The excavation shall be taken up at such places and in such lengths as shall be approved by the Engineer-in-charge. The excavation shall proceed in such portions at one time as the Engineer-in-charge may direct. No permanent works shall be started unless the Engineer-in-charge approves the excavations. The length of trench excavated ahead of the laying and the length of trench which may remain open at any time shall at all times be subject to the approval of the Engineer-in-charge. It shall be at no time, longer than can properly be protected from caving. In case of tapering in excavation, average width in measurement shall be taken in to account.

The materials from the excavation shall be deposited on either side of the trench leaving a clear berm on each side at least 40cm wide or at such further distances from the edges of the trench, as may be necessary. To prevent the weight of materials from causing the side of

the trench to slip or fall, or at such distance and in such a manner as to avoid covering fire-hydrants, sluice valves, gas siphons, manhole covers and the like and so as to avoid abutting any wall or structure or causing inconvenience to the public or other persons, or otherwise as the Engineer-in-charge may direct.

In case, where the Engineer-in-charge decides that the width of the road or lane, where he work of excavations to be carried out is so narrow as to warrant stacking of excavated materials away from the site of the work the contractor shall have to remove the same if so directed within the lead of 250M. The excavated stuff shall be brought back for refilling the trenches when required. The surplus material shall be removed as directed. No claims for stacking the excavated stuff away from the site of work or bringing it back for refilling trenches shall be entertained.

1.1.12. Bottom of Trenches and foundation to be saturated with water

The bottom of all trenches and the foundations of all structure shall be saturated with water and well rammed wherever the Engineer may consider it necessary to do so.

1.1.13. Excess Excavation due to nature of sub-soil for additional foundation

If in any place, the Engineer-in-charge considers on account of the nature of sub soil additional foundations of concrete, rubble or other wise necessary or if at any place, for any purpose whatsoever he required the excavation to be carried out deeper than shown on the plans or described in the specifications, the same shall be carried out as may be ordered by the Engineer-in-charge and such additional works shall be measured and paid for to the contractors according to the rates. Excavation and necessary dewatering and shoring strutting for chambers, Main holes, Vent shafts etc, is also included in this item and no extra shall be paid for excavation for chambers manholes, Vent shafts etc.

1.1.14. Unauthorized excess excavation:

Where excavations are made in excess of the width and depth indicated on the drawings, either by error or by accident the hollows so formed shall be filled in with lime concrete or rubble masonry or otherwise as directed by the Engineer-in-charge to his full satisfaction at the expense of the contractor.

1.1.15. Fencing / Lighting and Watching:

The contractor shall make all proper provisions for protecting the work by fences and by watching and lighting at night, or otherwise as may be directed by the Engineer-in-charge. The posts of the fencing shall be of timber or of other approved material securely fixed in the ground not more that 3M apart. The timber posts shall not be less than 75mm in dia, and shall not be less than 1.2 M above the surface of the ground.

There shall be two rails one near the top of the posts and the other about 150mm above the ground and shall be 50 mm to 70mm dia and

sufficiently long to run from post to post to which they shall be securely fixed as per direction of the Engineer-in-charge. The method of projecting rails beyond the posts and typing them together where they meet will not be allowed on any account al along the edges of the excavated trenches a bank of earth about 1.20m high shall be formed where required by the Engineer-in-charge for additional protection Adequate number of red lights wherever required shall be provided at night. Also a watchman shall be engaged to see that the lights are properly maintained during night.

In the event of contractor not fully complying with the provisions of this clause, the Engineer may with or without notice to the contractor put up a fence, improve the lighting and adopt such other measures as he may deem necessary for the safety and all costs of such works including penalty as may be decided by the Engineer-in-charge shall be paid by the contractor the contractor shall also provide and display special Boards painted with fluorescent paints indicating the progress of the work along a particular road.

1.1.16 Maintenance of Water Pipes, Gas Pipes, Telephone lines, Electric lines and Drains Khalkuvas, Sewers during Excavation:

The contractor shall at the rates entered in the bill of quantities and rates, carry out all excavation as the Engineer-in-charge may require in order to locate the positions of water pipes, Gas Pipes, Telephone lines, Electric lines, drains, khalkuvas, sewers, or any other structures in connection with them and shall properly maintain and protect these services by means of shoring strutting planking over padding or otherwise as the Engineer-in-charge may direct during works resulting from the same shall be made good and effectively remedied by the contractor at his cost if the contractor fails to comply with the requirements, the Engineer-in-charge will got it repaired from any other agency at the expense of the contractor. If however, the Engineer-in-charge considers it impracticable for the contractor to maintain any such water pipes, drains, Khalkuvas, sewers or other works and that exigencies of the work necessitate the breaking down removal, or diversion of any such water pipes, drains, khalkuvas, sewers, or other work, them he may direct the contractor to break down or remove any of the above mentioned services and ask the contractor to provide such chutes pumps or other equipment of raising and temporary passage of the water or sewerage. The cost of pumping out or otherwise removing any water or sewerage which may escape from any such broken water pipes, drains, khalkuvas, sewers shall be borne by the contractor.

1.1.17. Shoring:

1.1.17.1 Wherever shoring is found necessary by the Engineer-in-charge the contractor shall provide the same in the best possible manner with the materials as required and as directed by the Engineer-in-charge to his complete satisfaction. The contractor shall employ such kind or kinds of shoring as the Engineer may consider the exigencies of

the work to require and it is to be distinctly understood that the word 'shoring' is to comprise all classes of such work and all appliances and appurtenances, including polling Corporations, sheet piling and runners (whether the joints be butt., groove and tongue, feather edge and grove, birds mouth and double splay, rebate or otherwise), together with walkways, strut, props point blank shores, raking shores, blocks, wedges, Iron dogs, bolts, screws, nails and everything that may be required for due execution of the work.

1.1.17.2 Contractors responsibility for secure shoring and / or all damages:

The contractor shall be responsible for providing secured shoring and for taking every other precaution which may be necessary or proper for protecting any building or any other structure from getting damaged by the excavation of any trench or otherwise by the execution of the works in the vicinity of such building of structure.
If the Engineer-in-charge shall require the adoption of any special or extra measures, or precautions, the contractor shall forthwith adopt and supply the same. However, this revision shall not in nay degree relieve the contractor from his responsibility or from liability under the conditions of the contract in respect of any claim made against the Corporation for loss or damage which might be caused to any such building or structures by the execution of any works or otherwise.

After the work is completed near building, the contractor shall remove the shoring safety without slipping of soil of trenches if any and make good any cutting out or other damage that might have been done.

1.1.17.3 Liability of Timbering:

No work approved by the Engineer-in-charge or his representative about timbering shall absolve the contractor from his responsibility and he will be responsible for making good damage caused as about result of the failure of timbering to give proper support to the sides of the excavation.
The timbering to the sides of excavation for structures shall be carried out in such a way that there is no obstruction caused to the fixing of form work for the walls. The supporting struts and walling shall be removed by the contractor in stage to facilitate progress of concreting pipe laying etc.
If the Engineer-in-charge finds that the standard of timbering is not according to requirements or that the sides of the excavations have not been secured in a manner to render such excavations safe for working may be one hour after notifying the contractor of his representative in writing about this shall employ his own men to mend the timbering and the cost of such workmen and materials employed including penalty shall be paid by the contractor.

1.1.17.4 Removing shoring:

No part of the shoring shall nay time be removed by the contractor without obtaining permission of the Engineer-in-charge While out shoring planks, the hollows if any, formed shall simultaneously be filled in with soft earth well rammed with rammers after watering.

1.1.17.5 Shoring left in Trenches:

The Engineer-in-charge may order in writing portions of shoring to be left in the trenches at such places where it is found absolutely necessary to do so, so at to avoid any damage to buildings, cables, water mains, sewers, etc. in close proximity of the excavation.
The contractor shall not claim, anything, whatsoever for the shoring which might have been left in the trenches.

1.1.17.6 Steel trench sheeting:

Where the subsoil conditions meet with are of a soft and unstable in trench excavation the normal methods of timbering will not prove sufficient to avoid subsidence of the adjoining road surface and other services. In such circumstances, the contractor will be required to use steel trench sheeting or sheet steel pining adequately supported by timber struts, welling etc. without any extra cost. The contractor shall supply, and subsequently remove trench sheeting or piling where no longer required.

1.1.18. Constructing Temporary bunds & sumps:

For the purpose of keeping the excavations dry the work shall, if necessary he divided into sections or separate portions, to be determined by the Engineer-in-charge and temporary bunds shall be put up by the Contractor. Sump shall be excavated by the Contractor at such distances apart and of such depths, as the Engineer-in-charge may direct to allow the pumps to work. When and as the work progresses, other sumps shall be excavated by the Contractor from time to time. The sumps not in use shall be filled in by the Contractor to the satisfaction of the Engineer-in-charge. The contractor shall not claim anything extra for temporary bunds and sumps or their removal and refilling, nor shall such work be taken into measurements in any way.

1.1.19. Rate for Excavation:

The rates for excavation shall be included and cover without extra charge all the stipulations continued in every portion of these specifications, with regard to setting out, provision for the passage or traffic and for access to premises, arrangements for the continuance of drainage, khalkuvas or such points water supply or lighting (If interrupted by the works) arrangements, for the efficient protection of the life and property, fencing, lighting, watching,

shaping the trenches, maintenance of water pipes, gas pipes, telephone lines, electric lines drains, khalkuvas and other work met with in or about the excavation driving them dismantling them, rebuilding them as necessary, subsequent re-excavation, on account of rain, holiday or special occasion, filling necessary dewatering etc. complete.

1.1.20 The excavation shall be carried out in the strata met with as specified in the proper manner and with lifts mentioned therein.

1.2. EXCAVATION FOR TRENCHES, MANHOLES, VENT SHAFTS, HOUSE CONNECTIONS CHAMBERS AND CONNECTING SEWERS IN HARD MURRUM, BOULDERS INCLUDING DEWATERING.

1.2.1 All the items of excavation for trenches and manholes vent shaft, house connections, chambers and connecting sewers as described under 1.1 above shall also apply here.

1.2.2 This shall included all kinds of disintegrated rock or shale or indurate clay tending to the formation of conglomerate interspersed with boulders up to having at least dimension of 300mm in any direction which do not need blasting and could be removed by a pick and bar and shovel with some difficulty.

1.3 EXCAVATION FOR TRENCHES MANHOLES, VENT SHAFTS, HOUSE CONNECTIONS CHAMBERS AND CONNECTING SEWERS, IN LARGE BOULDERS AND SOFT ROCK WITHOUT BLASTING INCLUDING DEWATERING.

1.3.1 All the items of excavation for trenches and foundation as described under 1.1 above shall also apply here.

1.3.2 Excavation shall be in soft rock as lime stone, sand stone, laterite hard conglomerate or other soft of disintegrated rock, which may be quarried on spilt with crow bars, boulders which do not require blasting having diameter in any direction not more than 300mm and any rock which in dry state may be hard, requiring blasting but which when wet becomes soft and manageable by means other than blasting and excavation shall be decided by the Engineer-in-charge and his decision shall be final and binding on the contractor.

1.4 EXCAVATION FOR TRENCHES, MANHOLES, VENT SHAFTS, HOUSE CONNECTIONS CHAMBERS AND CONNECTING SEWERS, IN HARD ROCK INCLUDING DEWATERING AND CONTROLLED BLASTING IF REQUIRED AND OF CHIESELING.

1.4.1 All the items of excavation for trenches and foundations under 1.1 above as applicable shall also apply here.

1.4.2 Excavation shall be in any rock or boulders having diameter in any one direction of more than 300mm for which the use of mechanical

plant or controlled blasting is required. The classifications of excavation shall be decided by the Engineer-in-charge and his decision shall be final and binding on the contractor.

1.4.3 Controlled blasting shall be carried out only with the written permission of the Engineer-in-charge All statutory laws, regulations rules etc. Pertaining to the acquisition, transport, obtaining permission of respective departments, handling and use of explosives shall be strictly followed,

1.4.4 when controlled blasting is permitted by the Engineer-in-charge in writing the same shall be carried out by any method of blasting consistent with the safety and job requirements.

1.4.5 The magazine for the storage of explosives shall be built to the design and specifications of the explosive department concerned and located at the approved site. No unauthorized person shall be admitted into the Magazine which when not in use shall be kept securely locked. No matches or inflammable material shall be allowed in the magazine. The Magazine shall have an effective lighting conductor, the following shall be in the lobby of magazine.

(a) A copy of relevant rules regarding safe storage both in English and Gujarati
(b) A statement of update stock in the magazine.
(c) A Certificate showing the last date of testing of the lighting conductor.
(d) A notice that smoking is strictly prohibited.

1.4.6 In addition to these, the contractor shall also observe the following instructions and any further additional instructions may be given by the Engineer-in-charge & shall be responsible for damage to property and any accident which may occur to workman or the public on account of any operations connected with the storage, handling and use of explosives and blasting.

1.4.7 All the materials, tool and requirement used for blasting operations shall be of approved type and approved by the Engineer-in-charge. The fuse to be used in wet locations shall be sufficiently water resistant as to be unaffected when immersed in water for 30 minutes. The rate of burning of the fuse shall be uniform and known to determine its length.

1.4.8 The blasting operation shall remain in charge of competent, experienced supervisory staff and workmen who are thoroughly acquainted with the details of handing explosives and blasting operations.

1.4.9 The blasting shall be carried out during the time fixed and approved by the Engineer-in-charge. The hour of blasting shall be made known to the people in the vicinity.

1.4.10 Red danger signals shall be displayed in all directions during the blasting operation. People except those who actually light the fire shall be prohibited from entering the area.
The flags shall be planted at safe distance from the blasting area in all directions and all persons including workmen shall be excluded from the flagged area at least 10 minutes before the firing, a warning whistle being sounded for the purpose.

1.4.11 The charge holes shall be drilled in suitable places to depths approved by the Engineer-in-charge blasting should be as light as possible consistent with required breakage of materials.

1.4.12 when blasting is done with powder, the fuse cut to the required length shall be inserted into the hole 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 tamping materials which shall be tamped light but firmly.

1.4.13 As the blasting will be only controlled one with light charges, dynamite etc. shall not be used.

1.4.14 At a time not more than the number of charges approved by the Engineer-in-charge will be prepared and fired. The charges shall be fired after observing the instructions given above and the explosions counted. The man in charge shall satisfy himself that all the charges have been exploded before allowing the workmen to go back to work site.

1.4.15 In case of misfire the following procedure shall be observed.

(a) Sufficient time shall be allowed to account for the delayed blast. The man in charge shall inspect all the charges and determine the missed charges.

(b) In the case of blasting powder missed charge, it shall be completely flooded with water. A new hole shall be drilled about 45 cm. from the old hole and fired. This should be repeated till the old charge is blasted.

1.4.16 The main in charge shall at once report to the contractor's office and the Engineer-in-charge of all cases of misfire the cause of the same and the steps taken in connection there with.

1.4.17 A careful and day to day account of the explosives shall be maintained by the contractor in an approved manner in a register which shall be open for inspection by the Engineer-in-charge at all times.

1.4.18 The rate shall include all stipulations mentioned under 1.1 over and above these stipulations, the rate shall also include excavation by chiselling or controlled blasting as required for the work.

1.4.19 The necessary permission of the concerned district authority shall be obtained by the contractor prior to the blasting operation and all safety and necessary arrangements shall be made as per his directions before the blasting operation is actually started. The rate shall be paid per Cu. M. and will be inclusive of necessary shoring, strutting, scaffolding, bailing out water, dewatering barricading etc. complete.

1.5 REFILLING THE PIPE TRENCHES BY THE EXCAVATED STUFF IN 15CM TO 60 CM THICK LAYER, CONSOLIDATING UP TO POSSIBLE EXTENT AND DISPOSAL OF SURPLUS STUFF AS DIRECTED WITHIN THE PRESCRIBED LIMITS OF CORPORATION OR AS DIRECTED BY THE ENGINEER-IN-CHARGE.

1.5.1 After the sewer pipes have been laid and jointed and the manholes and vent shafts are constructed and as soon as the joints have been inspected and passed by the Engineer-in-charge and after all concrete work thoroughly set the trenches shall be fulfilled with the materials taken there from. In refilling the trenches the utmost care shall be exercised so as not to disturb, break or damage the jointed pipes. Over and around every pipes the finest selected material shall be put. No lumps of rock earth or other material shall be put around the pipe or be thrown into the trenches until the same has been broken to specified size and pipes covered by the fine material above referred to. The selected fine material shall be carefully placed next to the permanent work and well packed and well rammed in layers of 150mm for a depth of at least 300mm over the top of the pipe. The remaining of the excavation shall be filled in with the best and most suitable portions of the excavated material in layers of not more than 600 mm deep or as decided by the engineer in charge. Surplus soil shall be piled on top of the filling to the extent possible for expected subsidence. All road materials to from a compact neat surface. The contractor shall maintain all refilling and surfaces until completion of entire work. The contractor shall be responsible for claims arising from accidents due to subsidence or inadequate maintenance or improper refilling work. Where excavated material is not considered suitable for refilling by the Engineer-in-charge, the Contractor will be required to cart selected surplus excavated materials in place of unsuitable materials. The contractor may also be instructed to supply suitable granular or other hard filling material for use in refilling such imported filling material shall be paid for at the rates given in the Bill of quantities or as per S.O.R. of Rajkot Municipal Corporation.

When trench is excavated under or near any existing work likely to be affected by subsidence of the material in the trench, or where any permanent work will be constructed later of the trench. The contractor shall fill in the trench with M 100 concrete or take such other precaution means to prevent damage by subsidence as. The Engineer-in-charge may direct, Whether such work is shown in the drawing or not, whether it is billed in the quantities or not. Any

extra work necessitated will be paid for according to the provisions of the conditions of Contract. Unless in the opinion of the Engineer-in-charge, it is necessitated by the contractor negligence, bad workmanship faulty materials or lack of reasonable foresight.

1.5.2 Subsidence in filling:

Should any subsidence take place in the filling up of the road on or about any part of the work whatsoever up to the completion of contract works the contractor shall make good the same at his own cost. In case of failure of the contractor to attend to the work, the Engineer-in-charge without notice to the Contractors shall make good the same in any way and with any material that the (Engineer-in-charge) may consider proper atthe cost of the contractor. The Engineer-in-charge may, if he anticipates the occurrence of any subsidence employ watchman to give him timely notice of the necessity of making good the subsidence, and the cost of such watchman shall be charged to the contractor.

2 PROVIDING AND LAYING CEMENT CONCRETE FOR BEDDING FOR PIPES INCLUDING CURING, FORM WORK ETC., AS PER TYPE DESIGN SPECIFIED. BEDDING AS PER TYPE DESIGN. (If applied as Extra Item) (Deleted Here)

2.1. ENCASING / BEDDING:

Bedding of cement concrete 1:3:6 as detailed in the drawing shall be provided below the pipes. In cases near Nallas and where ground water is encountered, encasing of pipes as shown in the detailed drawing shall be provided in C.C.-1:3:6. The concrete work shall be carried out as detailed in the item of cement concrete in this specification and shall also include form work as is found necessary. The concrete shall be laid as required as per the outside diameter of the pipes so as to provide a uniform and firm bedding to the pipe.

The measurements shall be in cubic meters after deducting the pipe portion resting in the bedding. The cement concrete bedding shall be constructed as per the detailed drawing removing surplus excavated material as stipulated here and all necessary matters and things connected with or rendered necessary or otherwise involved by the excavation. It also includes shoring and strutting and dewatering as necessary.

PROVIDING SAND / GRANULAR BEDDING INCLUDING RAMMING, WATERING, CONSOLIDATING ETC. COMPLETE. (If applied as Extra Item) (Deleted Here)

The sand shall be river sand and shall be of round shape particle. crushed stone will no be allowed as bedding. The same to be used for bedding shall be got approved from Engineer-in-charge before using the same for providing bedding on trench bed.

The providing of sand for bedding shall be done in required thick area as per drawing (DRG No.14) or as instructed by Engineer-in- charge. It shall not contain dust, clay or other such harmful materials. If directed the sand shall be washed with water and screened before being used. The sand containing big clods shall be broken into small pieces. The tree's roots, meets, bit stones and other objectionable

materials liable to decay shall not be used in the work. Sand brought from approved source shall only be used.

Item No.-2

Providing, supplying, Lowering, laying, jointing and fixing RCC pipes with ISI marked in standard length with socket and spigot with rubber rings of following class and diameter in proper position, grade and alignment as directed by Engineer-in-charge including all taxes, insurance, transportation, freight charges, including GST and all the taxes, inspection charges, loading, unloading, conveyance to site of work.

TECHNICAL REQUIREMENT & PROCEDURE ADOPTED FOR LOWERING LAYING AND JOINTING OF RCC & SWG PIPES

2.1 Sight Rails and Boning Staves:

2.1.1 In laying the pipe sewers and constructing drains, centre for each manhole must be marked by a peg. Or Otherwise as may be determined by the Engineer-in-charge. The contractor shall then dig holes and set up two posts (about 100mm X 1800mm) at each manhole at nearly equal distance from the centre of the manhole. The distance shall be such that they shall be well clear of all intended excavation. They shall be so arranged that a sight-rail when fixed level against the posts will cross the centre of the manhole. The posts shall also be so set up that the longitudinal direction of the rail may be as clear as possible to the direction of any of the lines pipes or drains converging to the manhole. If walls of buildings afford suitable means of fixing the sight-rail the post may be dispensed with. The sight-rail, must not in any case be more than 30 M apart. If intermediate rails between two manholes be found necessary, the same shall be put up.

2.1.2 Construction of boning staves:

Boning staves shall be prepared by the Contractor about 75mm X 50 mm of various lengths, each length being of a certain number of meter and with a fixed tee-head and fixed intermediate cross piece, each about 300 mm long. The top-edge of the cross piece must be fixed at a distance below the top-edge of this tee-head, equal to the outside diameter of the pipe or the thickness of the concrete bed to be laid. The boning staff must be marked on both sides to indicate its full length. According to the requirements of each case, a suitable length of boning staff will be fixed and the reduced level of the bed of the pip or bottom of concrete of drain at each sight-rail place added to the selected length of boning staff, and marked by a horizontal line in both posts, or on walls or fences to which the sight-rail is to be fixed.

2.1.3 Sight Rails:

The sight rails (about 25 mm wide and 40 mm thick) are to be screwed with the top-edge against the level marks. The centre line of the pipe sewer or the drain will be marked on the rail and this mark will denote also the meeting point of the centre of any converging

drains or pipe sewers. Line drawn from the top-edge on rail to the top-edge of the next will be vertically parallel with the bed of the sewer or drain at any intermediate point. This could be easily determined by letting down the selected boning staff until the tee-head comes in the line of sight from rail to rail.

The posts and rail are to be perfectly square and planned smooth on all sided and edges. The rails are to be painted write on both sides, and the teak-hands and cross pieces of the boning staves are to be painted black. If the pipes or domains converging to a manhole come at different level there must be a rail fixed for every different level. When rail comes within 1.6 M of the surface of the ground a higher sight-rail shall be fixed for use with the rail over the next point. Posts and rails shall in no case be removed until the trench is excavated. The drains are constructed, the pipes are laid and permission given to proceed with the filling in.

2.2 LOWERING LAYING AND JOINTING OF PIPES:

2.2.1 Contractor to obtain permission before laying pipe, concrete or Construction of masonry When any portion of the excavation shall have been carried out to the necessary depth, the contractor shall obtain permission in the Engineer-in-charge before commencing the work of laying of pipes or concrete or the construction of masonry. No sewer pipe shall be allowed to be laid over and parallel to the water supply pipeline. Sewer line shall be laid below the water supply pipeline irrespective of the size of the pipeline.

2.2.2 Handing of pipes:

At every point of loading or unloading, pipes or fittings shall be handled by approved lifting tackle. Unloading by rolling down planks or any other form of inclined ramp shall not be allowed unless the written approval of the Engineer-in-charge is obtained regarding the same. Pipes shall be carefully stacked on site with timber packing under and between the pipes without causing nuisance or obstructions to traffic of walkway.

2.2.3 Laying:

The pipes shall be laid up the gradient beginning at the lowest end. No pipe shall be laid until the trench has been excavated to its required depth for a distance of 20 M in front of the pipe to be laid (This distance may vary as directed by the Engineer-in-charge). All the pipes shall be laid perfectly true, both in line and in gradient. The pipes in a trench shall be all laid and fitted previous to the jointing being commenced properly fitted temporary wooden stoppers shall be provided and constantly added to close the ends of all in-completed pipelines. The stoppers are to be removed only when pipes are laid and jointed.

2.2.4 Jointing of stoneware glazed with Socket and Spigot Joints:

The laying and jointing of pipes shall conform to IS : 4127 (1967) The pipes shall have socket and spigot joints. The trench shall be checked for proper level, gradient and alignment before lowering the pipes. The laying of the pipes shall properly up-grade of slopes. The socket end shall always be facing the up-stream end of the trench.

All joints shall be filled up with hemp yarn dipped in sufficient quantity of cement slurry, cement mortar 1:1 shall be forced into joint by using cocking tools etc as directed by Engineer-In-Charge until the whole space around the spigot between it and the spigot is full so as to form a neat fillet round the pipe.
The cement mortar joints shall be cured at least for seven days.

2.2.5 Jointing of RCC pipe with Socket and Spigot Joints:

The RCC pipe with the rubber ring accurately positioned on the spigot shall be pushed well home into the socket of the previously laid pipe by means of uniformly applied pressure with the aid of a jack or similar appliance. The RCC pipes shall be of spigot and socket type and rubber rings as specified in IS-458-2003, shall be used, and the manufacturer's instructions shall be deemed to form a part of these specifications. The rubber rings shall be lubricated before making the joint and the lubricant shall be soft soap water or an approved lubricant supplied by the manufacturer.

Socket & Spigot NP3 & NP4 pipe with rubber ring roll on joint for diameter up to 900 mm should be provided as per table 14 of IS 458: 2003. Socket & spigot NP3 & NP4 pipe with rubber ring confined joint for diameter 1000mm to 2600 mm should be provided as per Table - 17 of IS 458:2003.

2.2.6 All works to be Water Tight:

The drains, manholes and all joints of pipes shall be made thoroughly sound and water tight and any joint which may be observed to be leaky at any time during the progress of the works or during the contractor's subsequent period of maintenance shall be immediately made good by the contractor at his own cost. The contractor at his own cost shall have to carry out satisfactory flow test as directed by the Engineer-In-Charge. In case of any dispute in this regard, the decision of Engineer-In-Charge shall be final and binding to the contractor.

2.2.7 Inspection of joints:

After the joints of any pipes in under ground work have thoroughly set the Engineer-in-charge (or any person whom he may appoint) may inspect the joints and if he has any doubt as to their soundness he may request the contractor to open out and clean the cement. Contractor shall not be required to open more than one joint in 20 M of pipe. However, if the defect is found, the Engineer-in-charge may direct him to open as many joints as he may deem necessary.

2.2.8 Cleansing of the pipes:

As soon as a stretch of pipeline whether of stoneware or cast iron or RCC pipes has been completed between two manhole, the contractor shall run through the pipes both backwards and forwards a double disc / solid / closed cylinder 75mm less in dia, than the internal dia of the pipes wherever required and suggested by the Engineer-In-

Charge. The open end should be closed as may be directed by the Engineer-in-charge to prevent, entry of mud or silt etc. If as a result of the removal of any obstruction in the pipe line the Engineer-in-charge considers that damages may have been caused to the pipeline, he shall be competent to order the length to be tested at the expense of the contractor. Should such retest prove unsatisfactory the Contractor shall at his own expense amend the work and carry out such further tests as may be required by the Engineer-in-charge. It shall also be ascertained by the Contractor that each stretch from manhole to manhole is absolutely clean and without any obstruction by means of visual examination of the interior of the pipeline suitable illuminated by projecting sunlight or artificial light.

2.2.9. Cracks in Pipes:

In the event of pipes being cracked after being properly laid either due to improper loads having been encountered or the material of refilling having been improperly selected or because of any other cause, the Contractor in every case shall be held responsible and will be called upon to replace such cracked pipes at his own cost during the expiration of period of maintenance.

Any pipe or length of pipes found to be defective shall be immediately removed and replaced at the Contractor's expense and leaking joints shall be remade. The inspections and tests shall them be repeated as often as necessary until the whole line under inspection or tests is accepted by the Engineer-in-charge.

2.2.10 All works to be clear, clean and perfect:

The contractor shall after completion or whenever required by the Engineer-in-charge, prove all pipes and fittings to be clear and perfect, for this purpose he shall at his own expense and in the presence of the Engineer-in-charge or his appointee, provide suitable instruments and appliances and pass them through the pipes and if required shall pass water and show that it passes freely through every portion of the work. Brick mortar and rubbish shall not be allowed to fall into the manholes of sewer lines while fixing or if fallen shall be removed by the Contractor at his own expense.

2.2.11 Pipe entering and leaving manholes :

Whenever a pipe enters or leaves manhole, the ends of all pipes shall be properly built-in and neatly finished with cement mortar. The pipe projections are to be cut so that the ends are flush with plastered surface of the manhole, nothing extra shall be paid for this. The rate of pipe laying include this work also.

2.2.12 Fittings:

The terms fittings as used in this specification is intended to apply to any and every article used in combination with straight pipe itself. In the areas subject to subsidence, the pipe sewer should be laid on suitable supports or concrete cradle supported on piles.

2.2.13 Measurement of pipe lines:

(a) All pipelines shall be measured according to the work actually done and no allowance shall be made for sockets and any wastage in cutting to the exact length required. A bend, junction, or any other piece of fitting which may have necessarily been out for the exigencies of the work will be taken into account as if whole, provided that the cutting has been done properly and that portion used in the work is sound. This clause shall not apply to a straight pipe under any circumstances. In measuring the lengths of pipes laid, deductions shall be made for the lengths of channels between the inside faces of the walls of manholes.

(b) Payment for providing, supplying, lowering, laying, jointing and testing of

R.C.C. and SWG pipes shall only be made after laying & Backfilling for the same as under:

(i) 90% payment of this item shall be paid after lowering, laying and jointing pipes as per specifications.

(ii) Remaining 10% payment shall be paid after satisfactory flow test.

(c) For providing, lowering. laying. jointing and testing work, payment shall be made only for completed section between manhole to manhole.

No payment shall be made for incomplete sections.

Item No. 3

PROVIDING AND SPREDING MURRUM BEDDING OF AS PER DRAWING,BELOW THE PIPELINE OVER THE PREPARED SUB GRADE IN THE PIPELINE TRENCHES, INCLUSIVE OF RAMMING AND CONSOLIDATION ETC. COMP.

3.1) Murrum to be used from selected excavated stuff.

3.2) Murrum brought from outside.

Specification:

The Selected excavated stuff or murrum or sand shall be got proved from the Engineer-in-charge before using the same for providing bedding on trenches bed. Big clods shall be broken into small pieces and tress roots, weeds and big stone and other objectionable material decay shall not be used in the work.

The bedding shall be placed uniformly with minimum thickness (As per Drawing) along the routes of excavated pipe trench as directed by the Engineer-in-charge. The bedding shall be properly rammed watered and consolidated. The mode of measurement.

The quantity of the work shall be paid on Cum. Of the completed bedding after proper consolidation & watering.

Item No.-4

APPURTENANCES :

(Manholes,drop manholes and scraper Manholes & house connection chamber) providing and constructing sewer manholes as per the type design in brick masonry in CM 1:3 including C.C. 1:3:6 in foundation and M-150 in benching, inside plastering C.M. 1:3 and outside plastering in C.M. 1:3, coping in R.C.C. M-250 on all manholes, providing and fixing manhole frame & covers (but excluding supply of manhole frame & covers) complete, as per the stipulation in the type design complete.

(a) Manhole type 'A1', 'A', 'B', 'C', 'D1', 'D2','D3', 'S1', 'S2',.

(b) Brick masonry chambers for house connections. HC-1 and HC-2.

The type of Manhole to be constructed shall be decided by the Engineer- in-charge depending upon the technical requirement, actual site condition, likely future expansion, economy etc. and the contractor shall have to carry out the work according to the instructions of the Engineer-in-charge.

4.1 THE MANHOLE AND DEPTH OF MANHOLES:-

The manholes on the sewers shall be constructed in the form and of the dimensions shown in the Drawing. The depth of the manholes shall be measured from the top of cover to the invert level of the manhole.
The manholes shall be constructed at places shown on the drawings or whatever directed by the Engineer. Type designs for these manholes are shown on the drawings but the actual type and dimensions shall in each case be determined by the Engineer as the circumstances may require. (Refer drawing No. 3 to 11.- DRN - PHASE-II PART-II)

4.2 CONSTRUCTION OF BRICK MASONRY MANHOLES:

The brick masonry shall be constructed as per the type design shown in the drawing enclosed. The various types of manholes to be adopted as per the requirement have been indicated in the L-section and sewer layout drawing in general. The manhole will be fitted with R.C.C. pre-cast medium or heavy duty manhole frame and cover as the case may be. The brick masonry manhole shall be plastered from inside and outside as shown in the drawing and as shown CM proportion and thickness. .

4.3 FLOORS AND 0.80 ID CHANNEL PIPES:

The floor shall consist of cement concrete. Concrete of R.C. 0.80 ID channel pipes of the required size and curves shall be laid and bedded in cement on the concrete base to the same lines and fail as sewers unless otherwise directed. Both sides of the channel pipes shall be trenched up in concrete and rendered in cement mortar 20 mm thick and formed to a slope of not less than 1 in 12 to the channel.

4.4 STEPS:

Where the depth of the invert exceeds 0.90 M below the surface of the ground, HDPE reinforced steps of approved pattern shall be provided as per type design shown in manhole drawings.

4.5 RATE OF MANHOLES:

The rate for construction of manhole to be quoted in the bill of quantities shall include complete masonry, structure, concrete cap, plastering with cement from inside and outside, bottom concrete or channels including providing and fixing of HDPE reinforced steps and fixing of R.C.C. Manhole frame & covers (but excluding supply of manhole frames and covers) complete as per type design drawing and cutting the pipes flush with the inside plaster of the wall. The manholes will be paid per numbers up to the minimum depth shown in the type design and for depth beyond the specified minimum depth for a particular type of manhole; extra will be paid per running meter depth. The rates include dewatering during all stages of construction.

4.5.1 The brick masonry chambers for house connection will be paid per number excluding excavation but including masonry, bottom concrete, plastering, benching channel fixing of RCC frame and covers (but excluding supply of manhole frames and covers). (Refer. R.M.C. DRG No.- & - for H.C.1, H.C.2)

Item No.-6 Excavation of Paver Road (Breaking Road) (DELETED)

BREAKING OF ASPHALT SURFACE:-

In this works, breaking of Asphalt surface is to be done as directed by Engineer-in-charge. For any damage to Gutter or Manhole due to breaking of asphalt surface, contractor is responsible for repairs. No extra payment will be paid for such work.

Payment will be made per square meter of work done. EXCAVATION OF ASPHALT PAVEMENT

Under this item contractor shall demolish existing asphalt or WBM pavement met with during laying of RCC or SWG pipes. Only area of pavement intercepted in pipe laying shall be demolished. If excess area is demolished same shall be reinstated by the contractor. Work done to the extent of requirement for laying of drain and as per specifications shall measured in sq.m. and paid at the tender rate.

Item No.-7

Foundation filling with CC work in proportion of 1:2:4 using 1.5 cm to 2.0 cm aggregate including Ramming, Curing etc.

This Item shall be measured in Cu.m. and paid at the tender rate.

Item No.-11

REMOVING SURPLUS MATERIALS:

After refilling all surplus excavated stuff shall have to be carted by the contractor within RMC limit including loading, transporting, unloading, spreading etc complete as directed by the Engineer-In- Charge. Measurement: Removal of surplus material shall be measured in Cu.m. of surplus material removed and rate will be paid per Cu.M. It is to be noted that the disposal of and spreading the excavated stuff up to a lead of 90 m is included in the rates of excavation. If surplus earth is needed to be dispose of beyond 90 m lead, than as per instruction of Engineer in charge the surplus earth is to be dispose of as directed.

C GENERAL MATERIAL SPECIFICATION

1.0 CONCRETE:-

1.1 Cement Concrete (plain or reinforced) :

All cement concrete to be used in the work shall conform to the requirements of I.S. 456.

1.2 Materials:

1.2.1 Cement:-

All cement for use on the works except otherwise stated shall be the standard ordinary Portland cement manufactured in India and shall confirm to the IS:269, IS : 8112, IS:12269 or latest versions. It shall be of the make and quality approved by the Engineer.

(For this work, approved makes are Ambuja, Sidhi, L&T, Sanghi, Lotus, Hathi or equivalent. Mini cement plant cement shall not be allowed).

The cement shall be stored in weather proof godown or cement store specially constructed for the purpose in such a manner as to prevent deterioration due to moisture of instruction of foreign matters.

The weather proof godown shall have a soil impervious floor raised 300mm above the general ground level so that the cement stored thereon shall not come in direct contract with sub soil moisture. The passage and the general construction shall be such that it offers full protection from weather effects. Large stocks of cement shall not be kept at the works but only sufficient quantities should be kept to maintain continuity of the work.

1.2.2 Storage of Cement:

No cement that has been stored for more than 90 days shall ordinarily be allowed to be used in the works Cement stored for longer period than 90 days shall be used only after approved by the Engineer-in-charge who shall ascertain its quality before giving such permission.

The Contractors shall offer every facility to the Engineer for inspection of cement. The cement go down shall be so arranged by the contractor that each consignment could be stacked separately and in such a manner so as to allow counting of bags in each row with ease.

The cement, used in any type of concrete shall always be measured by weight and one cubic meter shall be taken as weighing 1440kgs. (Table 30 of A.C.C. hand-book)

1.2.3 Aggregates:

All the aggregates shall confirm to the latest IS : 383 The aggregates shall consist of naturally occurring sand and gravel or stones crushed or uncrushed or a combination thereof. They are classified broadly under two categories viz.(i) sand of fine aggregates and (ii) coarse aggregates, depending, upon their sizes. The fine aggregates, those which pass through Is sieve No. 480 and the coarse aggregate are those which are retained on the IS sieve No. 480.

1.2.4 Storage of aggregate:

The fine and coarse aggregate shall be stored separately and in such a manner that segregation of the various sized particles shall not occur, the stock piles shall be formed on platform of weak concrete timber of similar approved hard standing and aggregate shall be kept clean and free from foreign substances. Storage piles of aggregate shall be arranged with proper drainage and protection from rainfall in order to prevent excessive changes in moisture content taking place during concreting.

The aggregate both fine and coarse shall be hard, strong, durable, clean, free from veins and adherent coatings. The use of flaky and elongated pieces of aggregates shall be prohibited.

The aggregates shall not contain deleterious materials such as iron pyrite, coal mica, shale or similar laminate material, clay, alkali, soft fragment sea shells, organic impurities etc in such quantity as to effect the strength of durability of concrete or the reinforcement embedded in such reinforced concrete.

1.2.5 The maximum quantities of deleterious materials that may be permitted shall conform to the following limits by weights.

Deleterious Substances	Fine P.C. by weight		Coarse aggregate P.C. by weight	
	Uncrushed	Crushed	Uncrushed	Crushed
1) Coal and lignite	1.00	1.00	1.00	1.00
2) Clay lumps	1.00	1.00	1.00	1.00
3) Soft fragments	---	---	---	---
4) Materials passing through 75 micro sieve	3.00	3.00	3.00	3.00
5) shale	1.00	---	---	---

The total of various deleterious materials in any sample shall in on case exceed 5per cent. If the aggregate supplied is unclean, it shall be washed. If it is not properly graded, it shall be screened by hand or by mechanical means and the various sizes proportioned to get the required grading.

Storing of aggregates on dusty, muddy and grassy sports shall be avoided. They shall be stored on the works in such a manner as to prevention of foreign matter and protected from exposure to dust. They shall be placed in stock piles in individual units of suitable sizes and in suitable layers to prevent segregation. They shall no be allowed to run down slopes.

1.2.6 Sand or fine aggregates:

All fine aggregates shall consist of clean, hard strong durable uncoated siliceous gritty materials consisting of well graded particles obtained from rock, fragments If shall be free from clay lumps, injurious amounts of

dusts, mica shells, soft or flaky particles shale, alkali, organic matter, lead or other deleterious substances.

The sand shall be taken from source approved by the Engineer. The sand or fine aggregates shall confirm to the latest IS No.383
If the Engineer considers it necessary, it shall be washed and or screened before use, all the expense of the contractors.

The sand shall have a fineness modules of not less than 2.5 and not more than 3.0 and the grading shall confirm as far as possible to the following analysis :

I. S. Sieve No.	Percent passing	
	Natural sand or Crushed gravel.	Crushed Stone.
180	95 - 100	90 - 100
240	70 - 95	60 - 90
120	45 - 85	40 - 80
60	25 - 60	20 - 50
30	5 - 30	5 - 30
15	0 - 10	0 - 15

The specific gravity of sand shall not be less than 1.6. In on case shall fine aggregate be accepted containing more than 2 per cent by dry weight, not more than 2 ½ % by dray volume, not more than 5 percent by wet volume of clay, loam or silt, any sample of fine aggregate shows more than 5 per cent of clay, loam or silt, in one hour's settlement after shaking in an excess of water the lot represented by the sample shall be rejected.

1. The following two field tests are recommended for ascertaining the percentage of clay lumps and impervious organic material and the contractor shall carry out the same if the Engineer-in-charge deems necessary.

(1) Test for determining silt in sand :
Fill a calibrated tumbler with same to half its volume and add water there to until the fill a calibrated tumbler is three quarter full shake up the mixture vigorously and allow it to settle for about an hour. The volume of silt visible on top of the sand shall be measured. If the volume of the its standing over the sand exceeds 5 per cent of the total volume of sand same shall be rejected.

(2) Colorimetric test for organic impurities :
The sample of sand shall be mixed with equal volume of 3p.c. solution (about one ounce in a quarter of water) of caustic soda / sodium hydroxide taken in a plain glass an the mixture shall be allowed to stand for 24 hours. The liquid standing above the sand shall not be darker than

lights straw (pale yellow) colour. If the color is marked yellow of brown, then test would indicate presence of organic materials in excessive amount.

In case suitable sand is not available in adequate quantities within a reasonable and economical limit, the contractors may be allowed the use of crushed or pulverized stone of gravel either along or mixed with natural sand in parts. The stone or gravel shall be clean, sharp and free from dust etc. and shall conform to the latest I.S. 383. In this case, approval of Engineer-In-Charge shall be obtained.
The percentage of crushed stone to be mixed with sand shall be such as to obtain the fineness modulus of the blended sand within the limits specified above, and or approved by the Engineer after Laboratory tests.

1.2.7 Coarse Aggregates:

All coarse aggregate used in concrete works shall consists of crushed rock gravel or other approved inert materials.
Broken or crushed rock from sound blue basalt or black trap zeolite shall be used in concrete as coarse aggregate. The particles of aggregate shall be clean hard, tough, durable free from deleterious substance and shall contain no soft flat or elongated pieces. The coarse aggregate shall have specific gravity not less than 2.6 and the water absorption measured after being immersed for 24 hours in water shall not be more than 6 per cent by weight. The maximum percentage of deleterious materials in the coarse aggregate shall not exceed 5 per cent by weight in the aggregate when tested in conformity with IS No. 363

The nominal size of the coarse aggregate for reinforced concrete work shall be 10 to 20 mm. Larger coarse aggregate up to 40mm size may be used if approved by the Engineer in plain concrete work. The maximum size of coarse aggregate shall be large as possible within the limits specified but in no case shall be greater than one quarter of the minimum thickness of the member, provided that the concrete can be placed in the form work without difficulty so as to surrounded to reinforcement thoroughly and to fill the corners of the form-work. The minimum size of coarse aggregate shall be as mentioned earlier such as to retain most of the material (90 per cent, 95 per cent maximum) on IS sieve No. 480.
Aggregating shall be screened and, if necessary blended to give the required grading when tested in the Laboratory at Contractor's cost by means of standard mesh sieves, the grading shall fall within the following limits:

Sieve size.	Percentage retain by weight	
	Plain C.C.	R.C.C.
40 mm	----------	----------
25 mm	10 to 15	----------
20 mm	35 to 40	15 - 0
10 mm	37 to 80	100 - 80
No.480	98 to 100	100 - 95

The percentage given above are for guidance and the Engineer-in-charge reserves the right to modify the same to any other lower of higher value if considered necessary by him, according to the requirements of the work.

In the event of undesirable segregation occurring in coarse aggregating in two or more suitable fractions as directed.

The grading so specified shall be such as to give a dance, water tight concrete of specified proportion and strength and required consistency. The Engineer shall have the right and authority to carry out routine control tests and analyses of the broken rock at any stage of the work processing and / or concerting operations and the contractors shall give necessary facilities in respect of such testing. The sampling and testing shall be carried out, as per standard IS practice entirely at the cost of the contractors.

1.2.8 Water:

The water used for the preparation of concrete, for washing sand etc. and for curing shall be clean and free from objectionable quantities of silt, organic materials, acid, alkali, salts, oil and other deleterious impurities and it shall be obtained from the source approved by the engineer. Potable water shall be obtained from the source approved by the Engineer. Potable water shall generally be found fit for preparation of concrete. The quantity of water to be added for making concrete shall be properly measured and controlled.

1.3 Water Cement Ratio:

Suitable water cement ratio for the different mixes and use shall be determined in consultation with the Engineer and shall generally not be exceeding 0.5 (i.e. 50 percent by weight) The exact value being fixed after taking into account all relevant factors such as strength required, weather condition, water absorbed by material, workability and slump required consistent with the work requirements, methods of compaction etc.

1.4 Concrete:

All cement concrete whether used in R.C.C. work or plain concrete work shall be designated in grades by the strength at the age of 28 days) M 100, M 150, M 200 & M 250 where M refers to the mix and the number 100, 150,200 and 250 represent the specified 28 days works cube compressive strength of the mix under reference, expressed in Kg/sq cm. The proportions of cement, aggregate water for ordinary cement concrete shall be as designated below and shall generally consist of quantities as given in the table below per bag of cement.

TABLE No.1:– Concrete mix proportion for ordinary concrete.

Grades of Concrete	Total quantity of dry aggregates (Fine and coarse) by volume per 50kg. (Max.in liters).	Quantity of water per 50 kg. Of cement (Max. in liters)
M-100	300	34
M-150	220	32
M-200	160	30
M-250	100	27

The proportion of fine aggregate to coarse for the various mixes listed above shall generally be 1:2 by volume but variation from 1:1 ½ to 1:3 depending upon the grading of the aggregates may be permitted by the Engineer. The quantity of fine and coarse aggregates, however, shall not in any case exceed the quantity given in the above table No.1.

The cement concrete shall be tested for compressive strength at the age of 28 days on 15 cm. Cubes in accordance with the latest IS : 516 and the strengths developed for all type of concrete shall not be less than those given in Table-2.

TABLE –No.2:- Strength requirement of concrete.

Grades of Concrete	Minimum Compressive strength of cubes at 28 days in kg / cm2	
	Preliminary Test	Works Test
M-100	135	100
M-150	200	150
M-200	260	200
M-250	320	250

For quick results the contractors shall carry out compression tests on 15 cm cubes cast in accordance with relevant IS 516 at 7 days in addition to the normal 28 days compressive strength. The 7 day strength of the various concrete mixes shall not be less than the values given in the Table NO.3 below. However the 28 days compressive strength alone shall be the criterion for acceptance or rejection of the concrete unless the Engineer is satisfied of the relation between the 7 days compressive strength and the 28 days compressive strength, established by carrying out a number of tests, in which case, he may relax the test frequency of 28 days compressive strength specified hereinafter.

TABLE –No.3:- Optional test requirement of Concrete

Grades of Concrete	Minimum Compressive strength on 15cm. Cube at 7 days in Kg / cm2
M-100	70
M-150	100
M-200	135
M-250	170

All test strength specified above are exclusively for 15 cm size cubes and they shall be adequately modified to suit the requirement of 15cm dia and 30 cm long cylinder moulds wherever used in the case of cylinder the strength values obtained should be multiplied by 1.25 to obtain the equivalent cube strength.

1.5 Control and Testing of concrete.

The following tests shall be carried out at site whenever required by the Engineer in accordance with IS 516

1. Works tests – 7 days and 28 days compressive strength
2. Consistency test.
3. Moisture contents in aggregates.
4. Unit Weight of concrete.

(1) Works test:

During concreting operations samples of concrete as placed in the work shall be taken every day and set of six cubes or cylinder shall be made there from for being tested for their compressive strength. The consistency (slump) test shall also made and the slump recorded.

All concrete cubes or cylinders shall be tested for compressive strength as specified under IS 456 and 516 at the approved material testing Laboratory generally as per specification under the latest IS 456 and IS 516. The above, specification cover concrete mixes of grade M-100 and above. Ordinarily it is not necessary to test the compressive strength of mix of grade M 100 as it is generally used for non structural purposes. However, where this mix (M 100) is used extensively on works (i.e. more than 75 cu.m. of concrete is to be placed one time in any work) it shall be tested in the same manner as other grades of concrete used for structural purposes. The minimum strength of various grades of concrete both at the age of 7 days and 28 days are given in Table 2 and 3.

In the case of concrete of mix M 150 and above, the above, the Engineer-in-charge may not insist on the testing of concrete if the quantity of concrete to be laid on any particular day is less than 10 cum. if however the quantity exceeds 10 cum, test specimen must invariably, be taken and sent to the Laboratory for testing.

Specimen shall be made for every sample and three of them tested for 7 days strength as mentioned earlier the 28 day strength of concrete shall alone form the criterion for acceptance on rejection of the concrete. With this point in view, the concrete sample shall be tested both for 7 days strength as well as 28 days strength at the start of the work and this shall be continued until the Engineer is satisfied that proper relation between the 7 days compressive strength is established, in which case he may decide to relax frequency of testing the concrete cubes for the 28 days compressive strength.

If the average strength of the specimen tested at the time of 28 days is not less than the strength specified in Table – 2, the test shall be considered satisfactory subject to the condition that only one out of 3 consecutive tests may give a value less than specified strength but not less then 90 per cent of the specified strength. If the tests are unsatisfactory, the contractors shall take immediate steps to carry out remedial measures as may be directed by the Engineer in respect of such works, entirely at the risk and cost of the contractor. Failure of a sample in test may entail partial or whole demolition of such work, heavy penalties, black listing of the contractors concerned and or such other similar steps. The results of the tests conducted at the approved material testing Laboratory shall be taken as final and binding on the contactors. In case of any dispute, the decision of the municipal commissioner shall be binding to the contractors.

A record showing the location of test specimen and daily progress of the work done shall be maintained by the Engineer-in-charge and shall be countersigned by the contractors or their representative. In case record maintained by the Engineer-in-charge is not signed by the contractor or their representative the record kept by the Engineer shall be considered as correct and binding on the contractor. In the case of any disputes, the decision of the Rajkot Municipal Corporation shall binding to the contractor. The contractor shall deliver the specimen for testing at the approved Laboratory at the own cost in their moulds. The contractors shall pay usual testing fees for the tests carried out in the Laboratory. These fees may very as sanctioned by the competent authority.

(2) Consistency slump test:

The workability of concrete shall be cheeked at frequent intervals. The slump test shall be carried out in accordance with the standard methods given under I.S. specifications mentioned above. The slump shall be as small as practicable consistent with the efficient working and compacting of concrete. The slump shall not exceed 64 mm but the Engineer may under exceptional conditions, permit higher slump up to a limit of 150 mm.

The standard consistency test shall be applied very time at each mixer when test cubes are taken for the works of compressive strength test.

(3) Moisture Contents in the aggregates:

The moisture contents in the aggregates shall be determined in the field in accordance with the latest I.S. 2286 (Part – III) methods of test for aggregate for concrete.

(4) Unit weight of concrete.

It shall be determined by placing representative samples of concrete in a unit measures capacity and vibrating at extremely by shall vibratory or hand compacting to represent actual placing by conditions. The top of the concrete shall then be made truly flush with the top of the mould and the weight of concrete per cum. determined after curing and draying. The weight of dry concrete shall be between 2400-2625 kg / cum.

A complete record regarding various tests carried out at site and in the Laboratory shall be kept by the Engineer. The contractors shall provide at their own cost facilities for labour, material, and transport etc, required for the proper execution of the above tests. Any concrete, which does not comply with the above requirements, shall be liable for rejection by the Engineer.

1.6 Transporting Concrete:

The concrete shall be transported in clean metal buckets burrows, dumpers or trucks and the written approval of the Engineer must be obtained before any method involving the use of concrete pumps, placers, pipeline, chutes, or spouts may be used.

1.7 Placing Concrete:

(a) Unless otherwise approved, concrete shall be placed in a single operation to the full tackiness of slabs, beams and similar members and shall be placed in horizontal layers not exceeding 600mm deep or 230 mm when manually compacted in walls columns and similar members.

(b) The contractor shall so organize has work that once concerting of a particular section of the work has started the operation shall be continued and each operation shall be completed prior to a stoppage for meal, etc. the contractor's attention is drawn to the requirements regarding the formation of construction joints.

(c) Where concrete is to be placed directly against the surface of excavations all soft material and debris shall be removed from the contact surfaces which shall be made dry, clean and firm. If the contact surfaces have become softened due to delay in placing the concrete or any other cause, they shall again be excavated to firm material and trimmed as directed immediately before the concrete is placed. The contractor in such event shall receive no payment for

the additional excavation and trimming or for any additional concrete required to replace the material so removed.

(d) Concrete shall be well compacted between and round the steel reinforcement by approved means so as to ensure compact concrete with smooth surfaces, without air holes, flaws or voids. Great care shall be taken to prevent the displacement of the steel and form work before during or after concreting. Whenever possible all reinforcing members shall be fixed in position before the concreting has been started and securely wired together to prevent movement. Reinforcing members which must be inserted during the concreting shall be placed with the greatest care to ensure their perfect location in the finished work.

(e) Care shall be taken to prevent men engaged in placing concrete from introducing clay or other foreign matter into the concrete of form work by means of their body in any other way.

1.8 Compacting:

Concrete shall be properly compacted by use of vibrators or by rodding and spreading as directed by the Engineer. Tamping as above shall be continued until all the entrained air is removed and the concrete has been compacted and completely fills the form. The sides of the form work shall be gently tapped by spades during concreting.

1.9 Curing of Concrete:

All concrete work shall be protected from directed rays of the sun. The exposed surface shall be kept wet for a minimum period of 10 days or for such longer periods as may be directed by the Engineer-In-Charge, Concrete laid shall not be disturbed and shall be suitably protected from any injury until completely set, particular care shall be taken at all corners and edges of the member. All horizontal concrete shall be constantly wet by ponding or in any clear manner approved by the Engineer till the time of next pouring regardless of time. Concrete surface shall be cured either by sprinkling or by spraying water or by adopting any other method to keep the area moist. Flat or fine vertical surfaces may be covered with dump gunny bags and watered frequently water used for cut for shall be clean and free from any excessive silt, coloring matter or other impurities which may stain the finished work. In order to ensure adequate quantities of water for curing, the contractors shall make necessary arrangements such as providing sufficient lengths of temporary pipe lines of suitable size, storage of water in tanks and / or sufficient nos. of bhisties.

1.10 Concreting through water:

Concrete shall not be deposited under water without the prior consent in writing of the Engineer-In-Charge. In the event of permission being given the amount of cement in every batch shall be increased by twenty five per cent entirely at the expense of the contractor and he shall take every reasonable precaution to ensure that cement or fine aggregate is not washed out of any concrete so deposited by any flow of water.

1.11 Finish of Concrete:

On removal of the shuttering and after the approval of the Engineer-In-Charge, honeycombed surfaces shall be made good immediately by the method approved by the Engineer. Superficial water and air holes shall be filled in. Unless instructed to the contractor the faces of exposed concrete placed against shuttering shall be rubbed down with a carborandum stone immediately upon removal of the shuttering to remove fins or other irregularities. The face or concrete for which shuttering is not provided other than a slab, shall be smoothed with a wooden float to give finish equal to that of the rubbed down face where shuttering is provided. No cement wash master or paint may be applied to any concrete surface without the express instruction or permission of the Engineer.

1.12 Sulphate resisting and rapid hardening cement concrete:

Where sulphate resisting or rapid hardening Portland cement is specified or ordered by the Engineer in writing, extra cost will be paid over the price for a Portland cement concrete of similar grade.

1.13 Permission for starting the concrete work:

The surface where concrete or rock or form etc. on which concrete is to be placed, shall be got inspected and approved by the Engineer who shall then issue the permission for starting the work. Any concrete work done without such a permission shall be cut out and removed at the cost of contractors.

No concreting shall be started unless the surface of the foundation is first inspected and approved by the Engineer as stated above. If concreting is to be done on concrete previously laid, the surface of the old concrete shall be cleaned with wire brushed and all laitance removed to expose the original surface of metal and sand particles, etc. it shall then be covered with a 7 mm thick layer of cement mortar (1:2) before laying the fresh concrete.

1.14 Defective concrete:

The defective concrete shall be cut out and the work reconstructed with fresh concrete required quality in the presence of the Engineer. The concrete thus cut out shall not be reused under any circumstances. Should any concrete become permanently damaged due to creaking or broken or damage from whatever cause or should any concrete be found defective in quality due to honey combing or bad workmanship, it shall be removed forthwith and replaced by concrete of required quality at the cost of the contractors of the satisfaction of the Engineer.

2.0 FORM WORK:

2.1 Material:

All form work for concrete works shall be made either of planned and matched timber or MS plates. The timber for the form work shall be hard word dry and well seasoned. It shall not be so dry as to absorb water from concrete not shall it be so green as to shrink after erection. When steel plates are used for forms, the plates shall free from wrinkles, bents, lumps or other imperfections. The timber Corporations or steel plates shall have sufficient thickness to withstand the construction loads and the pressure exerted by the wet concrete as well as vibration during placing of concrete.

Normally the thickness shall not be less than 38mm for timber and 18 gauges for M.S. plates. However, in case where the depth of concrete to be pored in the form work is small the thickness of timber planks may be reduced in consultation with the Engineer.

2.2 Removal of form work:

In no circumstances shall forms to be strict off until the concrete reaches adequate strength as required or without obtaining permission of the Engineer. All form works shall be removed without such shock or vibration as would damage the concrete. Before the soffit and the struts are removed, the concrete surface shall be exposed where necessary in order to as certain has hardened sufficiently.

2.3 Surface treatment and finish:

When the form work is struck all the faces of concrete shall be smooth and sound, free from voids and air holes. Any roughness or irregularity on the exposed surfaces shall be immediately filled up while the concrete is still green with cement wash and or 1:1 ½ cement mortar properly trowel led and finished. Such patching of the concrete face shall be carried out with the permission of the Engineer. If the concrete is found honeycombed the honey combed portion and whatever surrounding the Engineer shall be dismantled and fresh concrete of proper quality shall be reinstated at Contractor's cost.

3.0 REINFORCEMENT:

The total reinforcement to be used on the work shall confirm to the specification of the latest IS: 1139, IS: 1786, IS: 226, IS: 432 as the case may be in respect of physical properties, chemical requirements tolerance limits etc.

All steel reinforcement and wire, nails etc, required for the works shall be supplied by the contractors who shall make their own arrangements for the procurement of reinforcement bars from the open market.

Item No-8 Brick Masonry work in Cement: Mortar 1:6

8.0 BRICK MASONRY WORKS:

8.1 Materials:

(1) Bricks: brick to be sound, well burnt, free from cracks, to ring when struck and not to crack or break when soaked in water or thrown on the ground on their flat face from a height of 60 cm, or when soaked in water in a saturated condition, regular in shape and uniform in size. They shall be of the best description obtainable in market and of the best quality and colour. They shall not absorb water more than 20 percent dry weight, when immersed in water for 24 hours. They shall have a crushing strength of not less than 35 kg / sq,cm.

(2) Sand: sand shall conform to the specifications detailed already for sand.

8.2 Cement Mortar:

All cement mortar to be used on this work shall be in proportion as specified and directed by the Engineer. The ingredients shall be in proportion as specified and directed by the Engineer. The ingredients shall be measured dry, by means of properly made gauge boxes on a covered platform and shall be thoroughly mixed dry before adding water to get the required consistency. Only such quantity of mortar shall be prepared at a time as can be used up immediately. Mortar after it has begun to set shall not be allowed to be racked up again, but shall be rejected and the contractor shall remove the same from the work site immediately.

8.3 Workmanship:

The work of brick shall be carried out in a workman like manner and in a prefect plumb, line and level as required. Brick shall be thoroughly cleaned well watered or soaked in water for at least 12 hours before being used on the work. No broken bricks shall be preserved throughout the work both laterally and transversely. All bed joints shall be horizontal in vertical walls, radial in arches and at right angle for the slopes in battered wells. In walling, the courses shall be kept perfectly horizontal and rise in plumb. The vertical joints shall break joints with the courses below and above. Use of bats shall be avoided as far as possible. The joints shall be close and regular and shall not exceed 12mm in thickness. The bond shall be English bond unless otherwise permitted by the Engineer. The contractors shall provide at their own expense all moulds, templates, centers, scaffolding etc. as may be required for the proper execution of the work and nothing extra will be paid for the same including dewatering where necessary.

The mortar used should be stiff. The brick work shall be kept wet while the work is in progress for at least seven days after completion, to the entire satisfaction of the Engineer. On Sundays and holidays when the work is not in progress, the masonry shall be watered continuously by engaging Bhisties. Watering shall be done carefully so as not to wash out the mortar of the joints. The Engineer shall be at liberty to engage Labours at contractor's cost to water/curing. If contractors fail to do so, the work shall be pulled down and rebuilt at the risk and cost of the contractors.

The whole of the masonry work shall be carried up at one uniform level through out but where breaks are unavoidable, the joint shall be made in good long steps raked so as to prevent cracks arising due to separation of old and new work. All junctions of walls shall be formed at the time the walls are being built and cross wells shall be carefully bonded into the main walls.

When the work is to be added to existing structure, the old work must be prepared to receive new work by roughening and grouting with a layer of rich mortar and both must be carefully bonded together.
During rains, the works to be carefully covered without extra charge so as to avoid fresh mortar being washed away.

Item No.-9
Cement Plaster Work 1.2 cm average thick using Cement: Mortar in proportion of 1:3 rough cast (without Niru Finishing)

and

Item No.-10
20 mm thick Sand Face Cement Plaster Work in which 1 plaster in proportion of 1:3 and 2nd plaster in the proportion of 1:2 using Cement: Mortar with sponge finishing etc. complete (Note: Before carrying out Plaster work on RCC, required tipping work should be carried out as instructed.

9.1 Cement plaster:

Cement plaster shall be provided to brick masonry or rubble masonry wherever directed by the Engineer.

(a) Materials:
(1) Cement: cement shall conform to the specifications detailed earlier.
(2) Sand: sand shall conform to the specifications detailed earlier.

(b) Cement Mortar: All cement mortar to be used on this work shall be in proportion as specified in the drawings and as directed. The ingredients shall be measured dry, by volume of properly made gauge boxes, on a covered platform and shall be thoroughly mixed dry before adding water to get the required consistency. Only such quantity of mortar shall be prepared at a time as can be used up immediately. Mortar after it has begun to set shall not be allowed to racked up again, but shall be removed from the work immediately. Cement mortar shall be used within30 minutes after it leaves the mixing Corporation or mill.

(c) Workmanship:- All bricks shall be thoroughly wetted, joints and raked and well washed.

9.2 Pointing:

The whole of the exposed faces of the brick work, out stone work and stone paving when described as to be pointed are to have the joint raked out to a depth of 13 mm and pointed with cement and sand (unless otherwise described) in the proportion of one of cement to one of fine send flush with the face of the work and out straight, parallel and of uniform width.

The exposed faces of the rubble-work are to be similarly pointed (when described as to be pointed) but the joints shall be raked out to a depth of

20mm and shall be racked out to a depth of 20mm and shall be irregular in direction. The above description of pointing shall apply generally so all classes except only as the pointing materials which may in certain cases or otherwise described in this specification.

4.6 Protection of work from sun:

All cement work pointing, plastering and concreting shall be protected from the sun and the surface kept moisture until in the opinion of the Engineer-in-charge it is thoroughly set.

5. DEFINITION OF INCOMPLETE WORK:-

A line or trench of sewer pipeline (including the excavation thereof and all other accessories thereto) will be considered incomplete unless entirely laid, jointed and fully tested, encased wherever required the trench filled and consolidated and the manhole at each and completely finished with floors, channels, cover and all other detail. A manhole will be considered complete unless it is completely finished as above and at least one of the lines of pipe sewer to which it belongs or is attached is complete as described above.

The contractor shall have no claim for incomplete work and no incomplete work will be measured up for payment to the contractors.

5.1 Rates quoted in Bill of Quantities to cover everything necessary for complete Execution of work:

The rates quoted will be held to cover everything necessary of the due and complete execution of the work according to the drawings and the several conditions and the stipulations of the contract, including specification, or the evident intent and meaning of all or either of them or according to customary usage and for the periodical and final inspection and test and proof of the work in every respect and for measuring, numbering or weighing the same including setting out and laying or fixing in position and the provision of all materials, power, tool rammers, beaters, labour, tackle platforms with impervious lapped joints for scaffolding ranging rods, straight edges, centering and boxes, wedges, moulds, templates, post straight rails, boning-staves, measuring rods, page boards, shores, barriers, fencing, lighting, pumping apparatus, temporary arrangements of passage of traffic, access to premises and continuance of drainage, water supply and lighting (if interrupted by the work) lard temporary sheds and buildings nahanis roofed in or otherwise haulage, painting, varnishing, polishing, establishments for efficient

supervision and watching arrangements for the efficient protection of life and property and all requisite plant, implements and appliances every kind, except only such matter and things as it may be distinctly stated here in are to be supplied by the contractors. A rate for anyone description of work is to be held to include such items of other classes of and for these on separate specific charge will be admitted. The contractors shall keep every portion of the work clear of accumulation from time to time and shall leave every portion of the work clean, clear, perfect and at the conclusion of whole, providing at their own cost all such material implement appliances and labour as the Engineer may require to prove if it is to be so.

Supplying, Cutting, Bending, Binding and Hooking and binding with wire for RCC work Tor steel MS round bar including all cost(Deleted)

3.4.4 REINFORCEMENT

All reinforcement shall be clean, free from pitting, oil, grease, paint, loose mill sealers, rust, dirt, dust, or any other substance that will destroy or reduce bond.

3.4.4.1 MILD STEEL BARS :

Mild steel bars reinforcement for R.C.C. work shall conform to I.S. 432 (Part-II) 1966 and shall be tested quality. It shall comply with relevant part of I.S.456-1978.

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

For the purpose of payment the bar shall be measured correct upto 10 mm length and weight payable shall be worked out as per the weight specified below:

1. 6 mm 0.22 Kg./Rmt.
2. 8 mm 0.39 Kg./Rmt.
3. 10 mm 0.62 Kg./Rmt.
4. 12 mm 0.89 Kg./Rmt.
5. 16 mm 1.58 Kg./Rmt.
6. 20 mm 2.47 Kg./Rmt.
7. 25 mm 3.85 Kg./Rmt.
8. 28 mm 4.83 Kg./Rmt.
9. 32 mm 6.31 Kg./Rmt.
10. 40 mm 9.86 Kg./Rmt.

3.4.4.2 TMT FE-415or FE-500 STEEL BARS FOR REINFORCEMENT :

All reinforcement steel shall be of TMT bars confirming to IS: 1786 of Make TATA, VIZAG, SAIL, ELECTROTHERM, GALLANT, NEELKANTH or equivalent make approved by Engineer-in- charge and welded wire fabric to IS: 1566 for water retaining structure.

Reinforcement bars shall conform to IS-432, IS-226 or IS-1786 and welded wire fabrics to IS : 1566. Only TMT bars for reinforcement in RCC work shall be used which shall be clean, free from pitting, oil, grease, paint, loose mill scale, rust, dirty dust or any other such substance that will destroy or reduce bond.

If permitted by the Engineer-in-charge reinforcement shall be done in accordance with

IS-2751 or IS-9417 as applicable.

Other provision and requirements shall conform to specification No. 3.4.4.1 for mild steel

bars.

3.4.4.3 MILD STEEL BINDING WIRE :

The mild steel wire shall be of 1.63 mm or 1.22 mm (16 or 18 gauge) diameter and shall conform to I.S. 280-1972.

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.

6. CONTRACTOR TO OBSERVE ALL CONDITIONS:

The contractors are particularly directed to observe from the Articles of Agreement and the specifications, what is to be included in their rates for the several portions of the work and also under what conditions payments are to be made.

Signature of contractor

City Engineer (Drainage (Project)
Rajkot Muniicpal Corporation

D. ADDITIONAL CONDITIONS

D. ADDITIONAL CONDITIONS

1. The contractor shall have to provide his own level instrument for this work.

2. Lowering, laying and jointing works of all the pipelines shall have to be carried out by using Sight Rails and Boning Staves.

3. Work is required to be carried out in such area where the services like Oil pipeline, irrigation water supply pipeline, telephone/electric cable are existing or may be exists. Under the circumstances, prior to starting the work agency shall have to excavate the trenches manually for up to 1 mt. depth. During the course of execution, all the services shall have to be maintained by the agency and any damage to any services or property, the agency shall have to get it repair at their cost.

4. For excavation of trench, use of JCB machine will not be permitted directly on the top surface of the road. After excavation up to minimum 1.00 mt. depth from road surface or existing ground level, same shall have to be carried out manually or by using Breaker and after locating underground services like; water supply pipeline, water connection lines, pipe gutters, telephone cables, electric cables etc., and thereafter upon taking the prior approval of the Engineer-In-Charge, the excavation can be carried out by using JCB machine.

5. Rajkot Municipal Corporation shall recommend to the competent authority to give Controlled Blasting License to the contractor for carrying out excavation in hard rock. In case of blasting license not permissible from the competent authority in some places then excavation is to be done by using wedges and hammers, chiseling, breakers, pneumatic tools, etc. Also in case where blasting license is permitted but even then if there is no possibility of carrying out the blasting for whatsoever reason, the excavation is to be done by using Wedges and hammers, chiseling, breakers, pneumatic tools etc. No extra payment shall be made for excavation to be carried out in any of the above mentioned both the situations.

6. Excavation in soft rock and hard rock shall have to be carried out only by Chiseling, Breaker (pneumatic tools) etc., as far as possible. If excavation is not possible in terms of above and if excavation is required to be carried out with the help of blasting then the same shall have to be carried out only after taking prior approval and necessary license for blasting from the competent authority.

7. In case of excavation not possible manually or by chiseling in certain place(s) as well as if blasting is also not possible due to various reasons i.e. to avoid damage to nearby water pipeline, pipe gutter, telephone cables / Duct, Raw houses / week buildings / narrow street etc., then the excavation by blasting will not be permitted. Under these circumstances, excavation shall have to be carried out only by Breaker (pneumatic tools) as per the instructions of the Engineer-In-Charge. No extra payment will be made for such type of excavation done by using Breaker. The rate for excavation shall be paid as per the rate of related item mentioned in Schedule-B.

8. The safety of the trenches is the prime important factor. Along the trenches on both the side, a hump of excavated stuff of minimum height 3 to 5 ft shall have to be provided till the work is got completed. However, where there is

no defined road, in such area, the fencing/ lighting etc., requires to be provided as per clause 1.1.15. Sign Board shall have to be provided at required locations, so that there will not be any fatal accident.

9. Regarding the width of excavation, as (a) it is difficult to carry out the vertical trench excavation, (b) possibility of sliding the soil, and (c) uneven excavation trench width in case of blasting. In this connection, for every 1.5 mt lift if there is less width upto 5 cm at the bottom then the top width of excavated trench, it shall be considered as per the specified trench width or actual trench width carried out at the ground level by the contractor whichever is less. If excavation is carried out more than the specified width then the payment will be made only for the specified width of excavation.

   in all normal conditions, the width shall be kept as mentioned in the Tender Drawing (Normal Condition). Under specific circumstances, additional width, if required, as per the opinion of the engineer-in-charge in the interest of work, the contractor shall be permitted with prior approval from engineer-in- charge to carry out such excavation work by keeping the width as mentioned in the Tender Drawing (Specific Condition). For mode of measurement for excavation, the width of excavation will be considered as given at the time of line out by engineer-in-charge or actual width done whichever is less.

10. The pipes shall be with ISI mark whereas that of manhole frame and cover shall be confirming to relevant IS. The pipes and manhole frames & covers shall be inspected by Third Party Inspection Agency, the cost of which is to be borne by contractor. The Third Party Inspection Agency will be from any Government undertaking agency like RITES, EIL, CEIL, MACON, WAPCOS, SGS etc approved by Gujarat Water Supply & Sewerage Board.

11. After entering into an agreement, the agency shall have to finalize the agency for supply of the material like pipes, manhole / house connection chamber frame and covers etc., and the name of manufacturer / supplier should immediately be informed to Rajkot Municipal Corporation so that Rajkot Municipal Corporation can also expedite the manufacturer / supplier for the material. If necessary, Rajkot Municipal Corporation will visit and inspect the factory. During the inspection, if Rajkot Municipal Corporation is not satisfied then the contractor shall have to procure the material from other manufacturer(s).

12. While the work in progress, there is possibility of change in drainage line routes according to the site conditions. Under these circumstances, the contractor shall have to carry out the work accordingly, for which, no extra payment shall be made in such situations. Over and above, the decision of Engineer-in-charge for change in drainage line routes shall be final and binding to the contractor.

13. The quantity of various items mentioned in the schedule-B is liable to increase or decrease up to any extent. Under the circumstances,

the contractor shall have to carry out the work accordingly without any rate escalation. Rajkot Municipal Corporation will not entertain any dispute in this regard.

14. In excavation, the decision regarding classification of strata shall rest with the Engineer-In-Charge and his decision in this regards shall be final and binding to the Contractor.

15. The rates are inclusive of dewatering, if required.

16. In case of any ambiguity found in specifications / drawings etc, the decision of engineer-in-charge shall be final and binding to the contractor.

17. The contractor shall have to avail P F Code as per the prevailing Circular of Government for the employees on work. The process for preparation of bill will be taken up only after submission of the Challan for the amount of P.F. deposited every month for the employees on work, which will binding to the contractor. The required documents shall have to be submitted every month by the contractor to the competent authority.

18. The contractor shall have to get registered under ESI (Employer's State Insurance) Act and obtain ESI Registration number if the number of workers are 10 Nos. or more. Also, the agency shall have to give all the benefits to the workers as available under the ESI Act. The agency should follow all the rules and regulations of ESI Act as per prevailing norms.

19. R.C.C. Pipes & Stoneware pipes shall be ISI marked only as mentioned in tender document.

20. Regarding Testing & Testing charges of the materials it is clarified that R.C.C. pipes, Stone ware pipes and Manhole frame & Cover are to be tested as per IS requirement as mentioned in the tender documents by third party inspection agency. The charges for the third party inspection agency shall have to be born by the contractor.

21. The prices shall have to quoted firm and fix including all the taxes and duties without any statutory variation.

22. This pipeline shall have to be laid by crossing two oil pipelines of IOCL. Agency shall have to work most carefully and take utmost precautions in crossing work of these oil pipelines. In case of any accident, the agency will be fully responsible for the same. The sanction from Concern authority of IOCL department for the purpose of crossing will have to be obtained by the Tenderer. Agency shall have to do whole liaisoning work at his own level, however, RMC will recommend for the same wherever necessary. The charges occurred for obtaining such permission will have to be initially borne by the tenderer. However, RMC will reimburse only such relevant charges paid to such department(s), upon submission of necessary document i.e. Receipt etc. in original.

Signature of Contractor

City Engineer
Drainage Project
Rajkot Municipal Corporation

PART-III
SEHEDULE - "B"
BILL OF QUANTITIES

Sehedule - "B"
Bill Of Quantities

RAJKOT MUNICIPAL CORPORATION					
Drainage Branch (Project)					
Abstract Sheet					
Name of work:	Providing, Lowering, Laying, Jointing and Testing Work for 600 mm dia. RCC NP-3 Pipeline from Gavaridad STP to nearby Vonkala for Supply of Treated Sewage Water in Anandpar (Baghi) dam for Irrigation.				
Item No.	Qty.	Items	Rate	per	Amount
1		Excavation for sewer line trenches, manholes incl. all safety provisions using side rails etc. including refilling the trenches & stacking the excavated stuff up to a lead of 90mt as directed.			
1 .1		up to 1.50 mt depth			
1.1.1	310.00	-----do-----in all sort of Soil,SM & HM @	100.05	M^3	31,015.50
1.1.2	385.00	-----do-----in SR & HR @	369.15	M^3	1,42,122.75
1 .2		1.50mt to3.00 mt depth			
1.2.1	45.00	-----do-----1.50 to 3.0mt depth in soil SM & HM @	110.40	M^3	4,968.00
1.2.2	510.00	-----do-----in SR & HR @	393.30	M^3	2,00,583.00
1 .3		3.00 mt to 4.50 depth			
1.3.1	80.00	-----do----- 3.0mt to 4.50mt depth in SR & HR @	431.25	M^3	34,500.00
2		Providing, Supplying, lowering, laying, and jointing ISI marked R.C.C. NP-3 class Pipe in OPC Cement of following dia with socket and spigot with rubber ring joints including all taxes, insurances, transpor-tation, freight charges, including all the taxes and duties, inspection charges, loading, unloading, conve-yance, stacking etc complete (Is : 458-2003)			
2.1	320.00	-- do-- For 600mmØ RCC NP3 class pipe line	2418.00	Rmt.	7,73,760.00
3		Providing Bedding incl. ramming, watering, consoli-dating, grading etc. Comp.			
3.1	100.00	From selected excavated earth.	63.00	M^3	6,300.00

Item No.	Qty.	Items	Rate	per	Amount
4		Providing and constructing Sewer manholes, scraper manholes and unit house connection chamber, as per the type design P.C.C. in C.C. 1:3:6 ,brick masonry in C. M. 1:4 ,inside and outside 20mm thick plastering in C. M. 1:3 necessary coping in C.C 1:1:2 ,benching in C.C. 1:2:4 fixing C. I. steps and fixing manhole frame and covers (But excluding supply of manhole frame and covers) over manholes and house connection chambers and fixing Manhole covers (but excluding supplying of manhole covers) over scraper manhole etc. complete, providing and fixing safety chain wherever necessary as per the stipulations in the type design complete (excl. excavation).			
4.1	5.00	-----do---- Manhole type "B"	12589.00	No.	62,945.00
4.2	5.50	-----do---- Manhole For extra depth	9934.00	Rmt.	54,637.00
5	5.00	Pro.& Supply of Pre-cast RCC F/c - 20 T Circular	2306.00	Pair	11,530.00
6		SLUICE GATE: Supply, installation and testing of Manually gear operated C.I. Sluice Gate conforming IS : 13349 - 1992, Class-1/AWWA C 501 , rising spindle of required length, single faced, wall thimble mounted, hand wheel, flange back frame suitable for seating as well as unseating water head of following size:			
6.1	1.00	Size : 600 mm X 600 mm	279770.00	Nos.	2,79,770.00
7	5.00	Foundation filling with CC work in proportion of 1:2:4 using 1.5 cm to 2.0 cm aggregate including Ramming, Curing etc.	3913.20	Cu. mt	19,566.00
8	1.00	Brick Masonry work in Cement: Mortar 1:6	4196.00	Cu. mt	4,196.00
9	10.00	Cement Plaster 12 mm thick using Cement: Mortar in proportion 1:3 with Niru Finishing curing, etc. complete	182.00	Sq. mt	1,820.00

Item No.	Qty.	Items	Rate	per	Amount
10	1.00	Making of Hole in wall (up to 0.60 Mtr. wide wall) with finishing repairing etc.	75.00	Nos.	75.00
11	495.00	Removal of Excavated Stuff within RMC limit as directed by Engineer in-Charge (in outer Part Of City)	122.00	Cu. mt	60,390.00
				Toal	16,88,178.25
				Say	16,89,000.00

I/We agree to carry out the above said work at _____% (In Figure) _____ (In Words) Above / Equal / Below on the tendered rates shown in Scheduled-B.

Note: Contractor shall have to quote their rates in online price bid only. Rates received in any other format will not be acceptable.

Signature of Contractor

City Engineer (Drainage Project)
Rajkot Municipal Corporation

BID FORM(WITH PRICE)

e-Tender No.: RMC/DRN PROJECT/2019/TSW DISPOSAL PIPELINE

Bidders are required to fill up all blank spaces in this Bid Form

The Commissioner
Rajkot Municipal Corporation
Dr. Ambedkar Bhavan
Dhebar Road
Rajkot

Dear Sir,

	SUB :**BID DOCUMENT FOR Providing, Lowering, Laying, Jointing and Testing Work for 600 mm dia. RCC NP-3 Pipeline from Gavaridad STP to nearby Vonkala for Supply of Treated Sewage Water in Anandpar (Baghi) dam for Irrigation.** **e-Tender No.: RMC/AMRUT/18/DRN PROJECT/DISPOSAL**

Having visited the site and examined the Bid Documents, Drawings, Conditions of Contract, Specifications, Schedules, Annexures, Preamble to Price Schedules, Price Schedules etc. including Addenda/Amendments to the above, for the execution of the above Contract, we the undersigned offer to carry out providing underground sewerage system under Rajkot Underground Sewerage Project Phase-II Part-II as given in Conditions of Contract and in conformity with the Drawings, Conditions of Contract, Specifications, Preamble to Price Schedules, Price Schedules, Annexures, Bidding Documents, including Addenda Nos._____(insert numbers) for _____%age (in figure) _____(in words) below / above than the rates given in Price Schedule.

2. I / We agree that

(a) if we fail to provide required facilities to the Employer's representative or any other person/agency by the employer to perform on his behalf for carrying out the inspection and testing of materials and workmanship

or

(b) if we incorporate into the Works, materials before they are tested and approved by the Engineer's representative

or

(c) if we fail to deliver raw water of required quantity according to the conditions/stipulations of the Contract, the Engineer will be at liberty to take any action including termination of Contract and impose at his absolute discretion any penalties, and/or reject the work.

3. We undertake, if our Bid is accepted, to complete and deliver the Works in accordance with the Contract within 3 (Three) calendar months, from the date of Work Order issued to us by you.

4. We agree to abide by this Bid for a period of 180 days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiry of that period.

5. In the event of our Bid being accepted, we agree to enter into a formal Contract Agreement with you incorporating the conditions of Contract thereto annexed but until such agreement is prepared this Bid together with your written acceptance thereof shall constitute a binding Contract between us.

6. We agree, if our Bid is accepted, to furnish Performance Bond/Security in the forms and of value specified in the Conditions of Contract of a sum equivalent to 5% of the Contract price for due performance of the Contract.

7. We have independently considered the amounts of liquidated damages shown in Appendix to Bid and agree that they represent a fair estimate of the damages likely to be suffered by you in the event of the Work not being completed by us in time.

8. We understand that you are not bound to accept the lowest or any Bid you may receive.

Date this _____day of _____2019.

_____

(Signature)

_____

(Name of the person)

_____

_____

Company Seal
(In the capacity of)

(Name of firm)

Duly authorized to sign Bid for and on behalf of
(Fill in block capitals)

_____
_____
_____

Witness

Signature _____

Name _____

Address _____

PREMABLE TO PRICE SCHEDULE

Note on Schedule:

1. The bidder shall note that timely completion of this important work is of essence in meeting the overall schedule of completion of work under this sewerage project.

2. The bidder shall have to identify various risks involved in this work and shall accordingly frame the methodology for constricting the same.

3. The rates and prices shall be submitted in the formats given in the online Price Schedules. Rates and prices received in any other formats will be rejected and the Bids will be disqualified.

4. It will be entirely at the discretion of the Owner to accept or reject the bidder's proposal, without giving any reasons whatsoever.

5. In Price Schedule, bidder shall quote his percentage above/below for items listed in the schedule. Prices quoted in Schedule only will be considered for price evaluation & shall form a part of the Contract Agreement.

6. Only Price Schedule will be considered for financial evaluation of the bid with the successful bidder.

7. The bidder shall be deemed to have allowed in his price for provision, maintenance and final removal of all temporary works of whatsoever nature required for construction including temporary bunds, diverting water, pumping, dewatering etc. for the proper execution of works. The rates shall also be deemed to include any works and setting out that may be required to be carried out for laying out of all the works involved.

8. Where there is a discrepancy between the unit rates and the amount entered, in the price schedule the latter shall govern.

9. The Price Schedules are to be read in conjunction with the Conditions of Contract, the Specifications and other sections of these bid documents and these documents are to be taken as mutually explanatory of one another.

10. Prices quoted by the bidder shall be firm for the entire period of Contract without any escalation.

11. The bidder shall interpret the data furnished and carry out any additional survey work, or investigation work required at his own cost.

12. The prices quoted shall also include the cost of materials utilized for testing.

13. The bidder should acquaint himself with the site conditions including the access to Worksite. The successful bidder shall have to make suitable access to worksites at his own cost. These accesses will be used by the other Contractors working for RMC.

14. From each Running Account Bill, labour cess, Income Tax, Value Added Tax (VAT), Professional Tax, and other taxes prevailing from time to time will be deducted as per norms.

16. The contractor shall have to avail P F Code as per the prevailing Circular of Government for the employees on work. The process for preparation of bill will be taken up only after submission of the Challan for the amount of P.F. deposited every month for the employees on work, which will binding to the contractor. The required documents shall have to be submitted every month by the contractor to the competent authority.

17. The quoted rates should be inclusive of all taxes and duties.

18. The prices shall have to be quoted firm & fix including all the taxes & duties without any statutory variation. RMC will not consider any statutory variation as well as the price rise in the market and if any, those shall be on account of contractor

19. The work contract tax shall be borne by the agency.

20. The contractor shall have to borne all charges for testing and inspection purpose

21. For hydraulic test of pipe, water, power, labor etc. required for the necessary test shall be arranged by the contractor at his own cost.

22. The rates of excavation are inclusive of shoring, strutting, dewatering, refilling etc. complete and hence no any extra payment shall be made for the same.

23. During construction activity, proper care must be taken for labour safety and all the provisions of the labour laws must be followed by the contractor.

24. Testing of the materials like Bricks, Sand, Aggregate, Reinforcement, structural steel, etc. should have to be tested periodically as suggested by the Engineer-in- charge at government approved material testing laboratory and testing charges for the same has to be born by the contractor.

25. This office Circular bearing No.RMC/C/329 dated 22-12-2012 and Order No. RMC /C/132 dated 10-06-2013 are uploaded separately as a part of tender document. The Contractors quoting their rates shall have to read, implement, and submit the same duly signed along with the documents to be submitted during physical submission.

26. In reference to the above Circular and Order cited in Para above, the Contractors who have quoted their rates for this work will be called in person for verification of original documents. The date and time for verification of original documents will be as prescribed in the tender document.

27. The manufacturer shall have a laid down **Quality Assurance Plan** for the manufacture of the products offered which shall be submitted along with the tenders and successful tendered shall have to get its approval from RMC. All the materials, pipe, specials, valves etc. shall have to be inspected through Inspecting TPI/PMC Agency whichever suggested by RMC and the charges for the TPI/PMC Shall have to be borne by the RMC.

28. No extra item or extra width will be paid due to excavating method or type of machinery.

29. For any type of license regarding labour etc. has to be achieved by agency

30. The routes and levels shown in the maps are indicative and not final. There are possibilities of change in routes and levels at the time of execution of work and due to which the diameter of pipeline and depth of drainage line may increase or decrease. Under the circumstances, the contractor shall have to carry out the work accordingly at the approved rates without any extra cost. Rajkot Municipal Corporation will not entertain any dispute in this regard.

31. The contractor shall have to carry out the sub-soil strata investigation at his own cost.

32. Payment shall be only be done in case of complete section.

Complete section - It is the length of laid Pipe part of the Work where sand bedding has been done and the same be backfilled as per tender norms be completed and the surface has been finished by proper compaction as per tender norms and / or as per instruction of engineer in-charge.

33. No extra item or extra width will be paid due to excavating method or type of machinery.

34. The tenders are advised to visit the project area and get acquainted with the local condition as in the said area there are numbers of underground utility services like Oil pipeline, irrigation water supply pipe line, telephone/electric cable etc. which requires to be maintained during the progress of work. The safety of the work is prime important factor and all the tenderer should be very much vigilant for the same. Thus, there may be some locations where clear ROW or ROU may not be available due to certain reasons like TP Road open Issues, Permissions etc. If work of that much location is affected due to such reasons time limit may be extended considering that non-working period but in no case Price Escalation will be given for that extended period.

Thus, it is to be clear that to work within utility services is a part of this work. If utilities are affected, it shall be the responsibility of tenderer to make same as it was as before. The expenditure and arrangement shall be bear by Tenderer.

35. Temporary drainage work like temporary diversion of gutter line, khal kuvas or bailing work of sub soil water, diversion of storm water way etc., is to be carried out by contractor without any extra claim. Cost towards shifting, repairing, replaced of utilities to be born by Tenderer.

36. In case of Extra Item, No on % age i.e. +ve % age Rate will be given but If there is Down % age i.e. -ve % age Rate that will be applied to that rate of that Extra Item.

37. Before procurement of Material the Quality Assurance Plan (QAP) shall be approved by RMC. QAP for approval shall be submitted in 3 Original copy duly signed and stamped by Manufacturer, Third Party Inspection Agency/ PMC and Tenderer. The draft QAP has been attached herewith.

38. The 'Vendor Form' provided in the tender document shall also have to be filled by the contractor and submitted along with all other required documents during the physical submission.

39. Any Financial document i.e. FDR, Demand Draft, Bank Guarantee etc., must be accompanied with the details like; Name and Address of Issuing Branch, Name and Address of Verifying Branch, Name & Designation of Contact Person, Contact Number, e-mail address, Fax Number etc.

40. This pipeline shall have to be laid by crossing two oil pipelines of IOCL. Agency shall have to work most carefully and take utmost precautions in crossing work of these oil pipelines. In case of any accident, the agency will be fully responsible for the same. The sanction from Concern authority of IOCL department for the purpose of crossing will have to be obtained by the Tenderer. Agency shall have to do whole liaisoning work at his own level, however, RMC will recommend for the same wherever necessary. The charges occurred for obtaining such permission will have to be initially borne by the tenderer. However, RMC will reimburse only such relevant charges paid to such department(s), upon submission of necessary document i.e. Receipt etc. in original.

Signature of contractor

City Engineer
Drainage Project
Rajkot Municipal Corporation.