SPECIFICATION OF LAYING OF R.C.C. AND STONEWARE SEWERS

1.0 SPECIFICATION FOR THE WORK

1.1 The specification written below will form a part of the Tender Document.

1.2 The work in general shall be carried out according to the specification laid down here under and all other related specification shown elsewhere in this tender document and relevant I.S.S.

2.0 GENERAL METHODS OF WORK

2.1 The works of sewerage shall commence from the peripheral end to lifting station point unless otherwise directed by the Engineer-in-Charge. The work shall be carried out in such a manner and phase/section wise so as to cause least possible inconvenience to the people in the locality and the general public/on-going work.

The contractor shall provide and ensure adequate facilities for the movement and diversion of the pedestrians and other traffic using the road to be disturbed by the work during the execution of the work as per direction of the Engineer-in-Charge. Unless the work in a section has sufficiently advanced, the contractor shall not be allowed to take up works in a new section. Once the laying/construction of conduits in a section is completed and approved by the Engineer-in-Charge, the trench should be filled up immediately and the temporarily restoration of the disturbed road shall be carried out expeditiously.

2.2 When the work in a section is taken up, the contractor shall erect temporary barricades not less than 1.2m high on either side of the trench along the trench line. The barricades shall be made of stout salbullahs or Eucalyptusbullahs or not less than 125mm dia at the narrowest section driven into the g round at spacing not more than 3m and the runners shall be of timber planks in three rows of size not less than 150mm. The Engineer-in-Charge shall have the authority to direct the contractor to provide barricades made of G.C.I. sheet depending upon the site condition and cost for erection of G.C.I. sheet shall be paid separately. Night lanterns shall be provided along the barricades at a space of 6m apart. The cost for erection of barricades and provision of night lanterns is deemed to be included in the overall rate of works and shall not be paid separately.

2.3 Engineer-in-Charges shall have the power to direct the contractor to take up any section of works in preference to another and to limit the extent of any excavation to be made at one time and the contractor shall comply with the same and expedite the completion of any such particular section/component of work as per direction of the Engineer-in-Charge.

2.4 Any excavation made below the level or grade as indicated on the plans should be refilled to specified level or grade at the contractor's expense with sand or cement concrete (1:4:8) with 20 mm down jhama khoa aggregate as may be directed by the Engineer-in-Charge and to his satisfaction. With progress of excavation, if any pipe, conduit, electric cable, telephone cable or other underground structure already laid, is encountered, digging by general equipment shall be discontinued and the excavation shall be done with the help of hand tools by special equipment for such excavation, for which, no extra payment will be made. In all such cases the contractor shall intimate the Engineer-in-Charge explaining the facts without any delay and seek instructions from the Engineer-in-Charge.

2.5 Removal of surplus spoils :

The contractor, shall make arrangement for removal of surplus spoils from as the excavation proceeds, and shall ensure daily removal so that no undue excess quantity of spoil is stacked at the work site. Surplus spoils needs to be removed within the projects area as per direction of the Engineer-in-Charge.

2.6 Sand filling :

All street level sewer trenches shall be filled up by silver sand. If the excavated materials are considered unsatisfactory for filling in trenches for other sewers, sand filling should be done as per direction and upto the full satisfaction of the Engineer-in-Charge. The sand should be local variety and free from clay/ clayey materials. Filling with sand should be done in layer of 150 mm, each layer being thoroughly saturated with water and compacted with rammer. All such costs compaction shall be borne by the contractor.

3.0 PROTECTION OF UNDERGROUND UTILITY LINES ALREADY LAID

3.1 The contractor, at his own cost, shall properly provide for sling, support and effectively protect all such services e.g. water mains, service pipes, gully pits, construction pipes, house drains, electric, telephone, and telegraph cables, including their adjuncts and appurtenances falling within or outside the trench as likely to be exposed, disturbed or damaged during execution of the work or in consequence thereof, in such a manner and with such materials as are required or specified by the concerned public utility agencies and as per instruction for the Engineer-in-Charge and hold them in proper position without any damage being caused to them during execution of the work or in consequence thereof and shall bear the expense of pipes, gully pit construction pipes, house drains, electric, telephone and telegraph cables or any other underground structure services falling within or outside the trench which may be found to have been disturbed or damaged due to his (contractor) faulty, defective and careless workmanship etc. The decision of the Engineer-in-Charge in this respect shall be binding and final and all cost in rebuilding of repairing of such damaged services or structure as aforesaid shall be deducted from the contractor's bills.

The fore going will not absolve the contractor of his responsibility in the matter. The contractor should include in his cost of works to be done in proper aligning, supporting and adequately protecting of all underground services, structure and utilities. If the Engineer-in-Charge thinks it necessary to put permanent supports under water mains, cables etc. or any other utility services, he will order the contractor to do so and the work will be paid separately.

3.2 Materials obtained from dismantling of any structures or parts thereof or picked up road materials or kerb or channel stone etc. taken out shall remain the property of the NIT. The contractor shall sort out and stack all serviceable materials near the site of works as per instruction of the Engineer-in-Charge. He shall also dispose of all unserviceable materials etc. as per instruction of the Engineer-in-Charge or his representative. The contractor shall remain the custodian of dismantled serviceable materials and handover to the Estate Maintenance or his representative. No additional payment or compensation will be admissible.

4.0 CONSTRUCTION OF BLOCKAGES WITHIN THE CONDUITS

4.1 The contractor shall not construct any masonry wall/ barricade inside the conduit for segregating the works previously done and/ or prevention of ingress of water either from the completed portion of the conduits or from adjacent areas. Such temporary blocks if necessary shall be provided by adopting other suitable methods as may be directed by the Engineer-in-Charge, which shall have to be removed/ dismantled early after completion of the relevant section of the work. No extra payment will be made in this regard.

5.0 DEWATERING

5.1 The contractor shall provide, install and operate all the necessary pumping machinery, piping appliances and equipments and supply fuel, lubricants etc. to keep trench reasonably free from water during execution. He should have sufficient equipments and machinery in good working condition to meet all situations and shall make available at all times competent mechanics / operation. Water should be disposed off in such a manner as will not cause any injury to public or private property, nor be a nuisance or menace to the public or any other public utilities. The contractor shall make all arrangements for dewatering to keep the trench reasonably free from water from all sources i.e. either due to seepage or percolation from sides or bottom of the trench or rain water or due to leakage/ breakage in the existing drains/ sewer, water main/ pipes or connections there to whether outside or inside of the trench. The trench will also have to be kept reasonably free from water during execution of all stage of work, e.g. excavation soling, foundation concrete, pipe laying and jointing, testing, brick work, plastering etc. No other consideration shall be made for any extra payment for dewatering at any stage of work.

5.2 When it will be necessary to pump out waste water from the existing sewers/ drains where the newly laid sewer is intended to be connected, or the waste water is required to pump out from the closed area, e.g. sump, lagoon or section or channel etc. The payment of such dewatering to make the area reasonably free from water will be made on the basis of HP-HR of the pump under relevant items of pumping. No payment for dewatering shall be allowed in the gully pit line unless specifically instructed by the Engineer-in-Charge in writing.

6.0 SHORING WORKS

6.1 General :

Shoring works shall be of timber and steel. Timber shoring shall be of well-seasoned hard wood of requisite strength, good quality, free from knots and cracks and preferably treated with preservatives. The shoring work shall include providing bracing and struts and it should be strong enough to support the sides of excavation and to prevent any movement of soil. The planks should be sufficiently long and fixed continuously as directed by the Engineer-in-Charge. The contractor will have to submit detailed drawing and design to the Engineer-in-Charge for this approval, as per his full satisfaction sufficiently prior to taking up the work of execution. In case of partial of total collapse of shoring and shuttering, contractor will be fully responsible to make good to original condition at his own cost. Shoring materials provided by the contractor shall be removed from the site immediately on completion of work. If the Engineer-in-Charge is of the opinion that at any place, sufficient or proper shoring has not been provided, he may order for additional shoring and further strengthening at the contractor's expense. The contractor shall bring to sites sufficient quality of shoring materials well ahead of starting the execution depending on the volume of the works involved and the speed to be attained to complete the work within the stipulated time. As far as practicable, shoring shall be driven of execution and finally to a depth sufficiently below the bottom of the trench not less than 250 mm in any case. The height of the shoring planks shall not be less than 350 mm above the existing G.L. to facilitate proper withdrawal of planks and as well as barricading of the trench etc. Shoring shall not be left in place and carefully be taken out as not to endanger the construction or any other adjacent structure. The shoring shall be lifted gradually as filling in trenches with proper compaction proceeds by filling materials with necessary watering. At the time of final withdrawal of shoring after complete filling, the voids caused by the withdrawal of the shoring shall be filled up with dry sand properly tamped with rod and watering.

The timber may be reused so long it retains its shape and adequate structural strength.

6.2 Retaining Shoring :

Whenever so directed by the Engineer-in-Charge, the contractor shall leave in place the shoring to be embedded in the filled up trench with runners, cross struts etc. The projected portion of the shoring shall be cut at 30 cm below the established street level or the existing surface of the street as directed by the Engineer-in-Charge. All shoring not be left in place shall also carefully be taken out as not to endanger the construction or any other adjacent structure. The shoring shall be lifted gradually as filling in trenches with proper compaction proceeds by filling materials with necessary watering. At the time of final withdrawal of shoring after complete filling the voids caused by the withdrawal of the shoring shall be filled up with dry sand properly tamped with rod and watering.

7.0 MATERIALS: R.C.C. NP3 & NP2 PIPES & FITTINGS, STONE WARE PIPES & FITTINGS MANHOLE COVER WITH MATCHING FRAME AND CAST IRON STEPS.

7.1 Procurement of materials

All materials shall be procured from the approved vendor list supplied by the Department. The contractor shall communicate to the Department, well in advance, the name & address of the vendor from whom he is going to purchase, indicating the quantity to be purchased, the name of approved third party inspector so that the Engineer-in-Charge or his authorized representative may present during the test before supply them to the site. Contractor will bear the cost of all materials and labour and third party inspection charges, if any, Engineer-in-Charge reserves the full right to reject the materials from site even if the materials are dispatched after testing.

7.2 All materials in general shall conform to the relevant IS codes (latest), All R.C.C. NP3 & NP2 pipes and their fittings. Stone ware pipes and their fittings and Manhole covers shall contain embossed marking of the following:

(a) Relevant ISI mark with IS code number
(b) Manufacturer's name or trade mark
(c) Date of manufacture
(d) Nominal diameter
(e) Class of the pipe/manhole cover

7.3 In addition to the above all such materials as stated above shall contain embossed making of the NIT Department as

NIT - RKI

7.4 **Stone Ware Pipe :**

All stoneware pipes and their fittings shall confirm to IS : 651-1992

7.5 **R.C.C. NP3 pipe :**

All R.C.C. NP3 pipes and their fitting shall confirm to IS: 458-1971. It is desired to have an inside clear cover of 20 mm without deteriorating of quality and strength as specified by the code. Minimum barrel thickness shall be provided with 75 mm or as specified by the code, whichever is higher, for any diameter of pipe.

7.6 **C.I. Step :**

Cast Iron Steps for manholes shall be in accordance with IS: 5455-1969 in design dimension and weight.

8.0 LAYING OF R.C.C. PIPE

8.1 **General :**

The work shall include supplying, handling laying and jointing of pipes on prescribed bedding to be used for construction of sewer. Drawings of all types of bedding will be supplied by the Engineer-in-Charge & will be strictly followed.

8.2 **Laying of R.C.C. Pipe :**

The trench shall be so dug that the pipe can be laid to the required alignment and at required depth. The width-of-the trenches shall be in accordance with IS: 783-1985 or as approved by the Engineer-in-Charge. Bed concrete for R.C.C. pipe shall be as per department drawing and provision of IS: 783-1985.

8.3 While unloading from trucks, pipes and fittings shall not be dropped loose on the ground or hard roads. Care should be taken to unload them on timber skids with the steadying rope so as not to allow the pipes to bump hard against one another. In order to avoid damage to the pipe and especially to ends, it shall not be rolled or damaged along the concrete or similar pavements with hard surfaces. All pipe sections and connection shall be inspected carefully before being laid. Damaged or defective pipes or connections shall not be used.

All lumps, blisters and excess coating materials shall be removed gently from the pipe surface and end of each pipe shall be wiped, cleaned and dried before the pipe is laid. Before lowering into the trench shall be provided with a bituminous coating inside and properly dried.

Each pipe unit shall be handled and placed in position **inside** the trench properly and gently. Under no circumstances shall any pipe unit be dumped or rolled into the trench or be allowed to drop against the pipe already in the trench. Pipe shall be lowered into the trenches carefully. Mechanical appliances may be used.

8.4 **Jointing of R.C.C. Pipe :**

After the pipes and fittings are laid into the trench, the jointing is to be done after thorough cleaning of the joint surface. Rigid collar joint shall be in accordance with IS: 783-1985 or as per direction of the Engineer-in-Charge. The caulking space is to be filled up with span yarn gasket and cement mortar (1:2) as per his direction. The end grooves of the pipes should be filled up with necessary bitumastic compound as per direction of the Engineer-in-Charge.

Every joint shall be kept wet for about ten days for maturing. Each section or length of R.C.C. pipe sewer shall be completed perfectly straight and true in level and gradient and trench shall not be filled until the length has been inspected and passed by the Engineer-in-Charge. If it is found before expiration of the period of maintenance that any length of sewer has become out of alignment, leaky or damaged, the contractor shall at his own expense rectify the defect as per direction of the Engineer-in-Charge.

8.5 **Hydraulic testing of R.C.C. (NP3 & NP2) pipe sewer lines :**

When testing a pipeline hydraulically, the line shall be filled completely with the water and kept filled for a week. The pressure shall then be increased gradually to full test pressure and maintained at this pressure for one hour. In testing pipelines a seepage allowance of 2.5 liters per kilometer per hour per centimeter dia of the pipe shall be permissible. Test pressure will be in general considered as 2.5 m static head above invert of the upstream section.

9.0 SALTGLAZED STONE WARE PIPE, LAYING AND JOINTING

9.1 **General** :

The work shall include supplying, handling, laying and jointing of pipes on prescribed bedding to be used for construction of sewers. Drawings of all types of bedding will be supplied by the Engineer-in-Charge & will be strictly followed.

9.2 **Laying of S.W. Pipe :**

The trench shall be so dug that the pipe can be laid to the required alignment and at required depth. The width of the trenches shall be in accordance with IS: 4127-1967 or as approved by the Engineer-in-Charge. Bed concrete for S.W. pipes shall be in accordance with IS: 4127-1967 or as per departmental drawing.

While unloading from trucks, pipes and fittings shall not be dropped loose on the ground or hard roads. Care should be taken to unload them on timber skids with the steadying rope so as not to allow the pipes to bump hard against one another. In order to avoid damage to the pipe and especially to ends, it shall not be rolled or damaged along the concrete or similar pavements with hard surfaces. All pipe sections and connections shall be inspected carefully before being laid. Broken or defective pipes or connections shall not be used.

All lumps, blisters and excess coating materials shall be removed gently from the socket and spigot ends of each shall be wiped clean and dry before the pipe is laid. Every precaution shall be taken to prevent foreign materials from entering the pipes when it is being placed in the line. Normally the socket end should face the upstream. After placing a length of pipe in the trench on concrete bedding the spigot end shall be centered in the socket and the pipe forced home and aligned. Pipe and fitting which do not allow sufficient and uniform space for joints shall be removed and replaced with pipe and fittings of proper dimensions to ensure such uniform space. Precautions shall be taken to prevent dirt from entering the joint space. At times, when pipe laying is not in progress, the open ends of pipe shall be closed by temporary wooden plugs or canvas. Each pipe unit of fitting shall be so laid as to form a close joint with the adjoining pipe and bring the inverts continuously to the required grade with the help of site rails and bonding rod.

The cutting of pipe or inserting, fitting or closure pieces shall be done in neat and workman like manner without damage to the pipe so as to leave a smooth and at right angle to the exit of the pipe.

The pipes when laid should not be subjected to superimpose load beyond their safe crushing strength.

The connection to an existing sewer shall be done through manholes.

9.3 **Jointing of S. W. Pipe :**

After the pipe units aligned and laid in the trench, jointing is to be done after thorough cleaning of joint surface.

Jointing of S. W. Pipe shall be done in accordance with IS: 4127-1967.

In each joint, spun yarn soaked in neat cement slurry or tarred gasket shall be passed round the joint and inserted in it by means of a caulking tool. More skins of yarn or gasket shall be added if necessary and shall be well caulked.

The gasket after being thoroughly caulked shall not occupy more than one fourth the depth of socket and the rope should fully encircle the spigot with a slight over lap. The remaining of the annular space is to be hand packed with cement mortar (1:1) and then thoroughly caulked with a caulked tool. The joint shall then be finished off neatly and leveled smoothly at an angle of 45° with the outside of the pipe. The cement mortar joint shall be cured at least for seven days before testing.

Each length of pipe sewer shall be completed from manhole unless otherwise ordered, perfectly straight and true in level and gradient and the trench shall not be filled in until the length has been inspected, tested and passed by the Engineer-in-Charge or his representative. If it is found before the expiration of the period of maintenance that any length of sewer between certain manholes has become out of alignment or grade, leaky or damaged, the contractor shall at their own expense readjust the work as per instruction of the Engineer-in-Charge.

9.4 **Hydraulic testing of stone ware pipe sewer lines :**

Hydraulic testing of stone ware pipe sewer lines is to be done is accordance with IS: 4127-1967. All new sanitary sewers upto 460 mm dia except in case where sewerage facilities have been extended, shall be subject to a test pressure of at least 2.5m head of water at the highest point of the section under test. The tolerance of two liter per centimeter of diameter per kilometer may be allowed during a period of ten minutes. The method of testing should be adopted as per direction of the Engineer-in-Charge. Any leakage that will be visible and the defective part of the work should be cut out and made good. A slight amount of sweating which is uniform may be allowed but excessive sweating from a particular pipe or joints shall be watched for and taken as indicating a defect to be made good. Any joints found leaking or sweating shall be rectified as per direction of the Engineer-in-Charge. Filling of the trench shall not be commenced until the length of the pipes has been tasted and passed.

CORRIGENDUM SHEET TO SPECIFICATIONS

2.2. MS pipe may be included.

2.4. Any excavation made below the level or grade as indicated on the plans should be refilled and compacted to specified level or grade.

3.1. Pipes may be water mains, services pipes.

7.1 "Department" to be replaced by "NIT."

LIST OF APPROVED MANUFACTURERS / BRANDS FOR CIVIL WORKS

Sl. No.	Materials	Manufacturers
1	Grey Cement (43 or 53 Grade) White Cement Putty	Konark (OCL) Birla White Birla White Putty
2	Steel (TMT)	TATA, SAIL
3	Clay Bricks	Reputed brand approved by project Engineer and Architect.
4	Pressed Steel frames for Doors.	As approved by Architect/Consultant & Engineer-in-Charge.
5	Flush Door Shutters	Green Ply/Century/Archid Ply/Duro/Bhutan Board/ Hindustan Board/equivalent.
6	Particle Boards/Block Boards (Ward robe shutters and kitchen cabinets on with laminates)	Century Ply woods Archidply / Kitply / Duro, Bhutan Board, Novapan, Equivalent.
7	Glass (Plain/Pin Headed)	Modi Float not less than Grade as per IS 1868
8	Aluminium Hardware/fittings	Argent/Classic (ISI marked anodised coating not less than grade AC as per IS 1868).
9	Brass Mortice Lock & Latches	Godrej or equivalent.
10	Latches with Internal locks	Godrej or equivalent.
11	Floor Type Hydraulic door closer (Floor spring)	Everite / Hyper.
12	Aluminium door, window and ventilator sections.	Jindal / Indal / Hindalco.
13	Water proofing materials / compound	CICO – I / Sikaflex / Sikalatex / Dr. FIXIT / Plastocrete Plus / F Airmate.
14	Ceramic Glazed Tiles	Kajaria / NITCO / equivalent
15	Ceramic Tiles (Non-Skid)	Kajaria / NITCO / equivalent
16	Cement Concrete (Chequred) Tiles	NITCO / Bharat / URO.
17	Synthetic Enamel Paint	Burger / Asian or equivalent
18	Oil Bound Distemper	Burger / Asian or equivalent
19	Plastic Paint	Burger / Asian
20	Glass Mosaic Tiles	Italia or equivalent
21	Vitrified Tiles	NITCO / Kajaria / or equivalent
22	Interlocking Grass Pavers	NITCO
23	Any other item	On Approval of Architect / Consultant or Engineer-in-Charge

Note: In case of non-availability of any other item listed above architect/Consultant will approve the make / brand to be used in the work.

LIST OF APPROVED MANUFACTURERS/BRANDS FOR PLUMBING WORKS

Sl. No.	Materials	Manufacturers
1	VITREOUS CHINA SANITARY WARES	PARRYWARE / CERA / HIND WARE
2	C P FITTINGS / MIXTURES	MARC / PLUMBER
3	URINAL / WC FLUSHING SYSTEM	MARC / PLUMBER
4	FIRE CLAY SINK	SANFIRE / JOHNSON PEDDER / PARRYWARE / HIND WARE
5	STAINLESS STEEL SINK	NIRALI / PARRY / FRANKE / SALEM
6	BALL VALVES / NRV / STRAINER / PRV	CIM / LEADER / AUDCO / ZOLOTO
7	GI PIPES – IS : 1239	JINDAL (HISSAR) / PRAKASH – SURYA (TATA (MEDIUM) / BANSAL OR EQUIVALENT
8	GI FITTINGS – IS : 1239	UNCO / R BRAND / UNIK / ZOLOTO / TATA /BANSAL OR EQUIVALENT
9	CI PIPES (CLASS LA / A/ B) – IS, 1536	ELECTROSTEEL / KESHORAM / HINDUSTAN / NECO
10	DI PIPES – IS - 8329	ELECTROSTEEL / JINDAL OR EQUIVALENT
11	CI PIPES (CENTRIFUGAL CAST) – IS - 3989	NECO OR EQUIVALENT
12	SW PIPES / GULLY TRAPS – IS - 651	BURN / PERFECT OR ISI MARKED OR EQUIVALENT
13	PWC PLASTIC SEAT COVERS	PARRYWARE / CERA / HINDUSTAN / COMMANDER
14	OVER HEAD TANKS	SINTEX OR EQUIVALENT
15	SS FLOOR GRATING / CLAMPS	CHILLY OR EQUIVALENT
16	SS LIQUID SOAP DISPENSOR / HAND DRIER	IMPULSE / TOSHI / UTEC OR EQUIVALENT
17	SI UICE / BUTTERFLY / NON RETURN VALVES	KIRLOSKER / LEADER / CIM / ZOLOTO) / VENUS/IVC
18	RCC PIPES – IS - 458	INDIAN HUME PIPE / JAIN SPUN / DAYA SPUN OR EQUIVALENT
19	SUBMERSIBLE PUMP FOR WATER SUPPLY	KSB / / GRUNDFOSS / CROMPTON GREAVES
20	MONOBLOCK PUMP FOR WATER SUPPLY	KIRLOSKER / CROMPTON / MATHER + PLATT
21	UPVC PIPES (S/W/R)	PRINCE / SUPREME / FINOLEX
22	GUNMETAL VALVES (FULLWAY. CHECK & GLOBE)	LEADER / ZOLOTO (WITH ISI MARK) / SANT
23	MIRRORS	FLOAT GLASS (MODIGUARD/AGI/EQUIVALENT
24	CI MANHOLE COVER	NECO/SILC OR EQUIVALENT
25	CHEMICAL DOSER	ASIA LMI / PROMINENT / ION EXCHANGE
26	PVC FITTINGS	PRAYAG OR EQUIVALENT

27	PRESSURE GAUGE	H GURU
28	LEVEL INDICATOR	RM OR EQUIVALENT APPROVED MAKE
29	AIR RELIEF VALVES	RB / ZOLOTO
30	WATER METER	DASMESH / CAPSSTAIN
31	PVC ENCAPSULATED FOOTREST	KKM OR EQUIVALENT APPROVED MAKE
32	CI BUTTERFLY VALVE	KEYSTONE / KIRLOSKAR / CASTLE
33	RCC PIPES	INDIA HUME PIPES / JAIN SPUN / OR ISI MARKED
34	ANY OTHER ITEMS	ON APPROVAL OF ARCHITECT / CONSULTANT OR ENGINEER-IN-CHARGE

Note: 1. The choice of the final makes shall be made by the owner / consultant.

2. The samples or Cat. No. of all type of sanitary fixtures, CP, fitting & pumps should be approved before execution.