

INSTALLATION OF SANITARY PIPELINE

GENERAL NOTES for KHARAYEB SEWER

- A. The design drawings are made by the Designer to suit the tender documents. It is important for the contractor to re-survey the whole site and to re-consider the whole layout plans and levels to proceed with his cost estimation and implementation on a later stage.
- B. Gravity Sewer Pipes with Diameter less than $\phi 300$ shall be POLYVINYL CHLORIDE (PVC), Contractor Shall Present a Technical Data Sheet from Manufacturer to the approval of UN Habitat's Engineer.
- C. PVC pipes shall have a TRY AXIAL Strength not less than 2.5 Tons/m for $\phi 300$ Pipes and 1.6 Tons/m for $\phi 200$ pipes. PVC pipes should be connected with a proper joint and sealed to prevent any leakage.
- D. Pipes to be connected with rubber joints and/ or sealed with proper sealant, Technical Data Sheet provided by Contractor should show clearly the type of Joints used and to the approval of UN Habitat Engineer.
- E. Soil underneath the sewer pipes to be well graded and compacted to prevent any future settlements. UN Habitat should approve bottom soil before any activity.
- F. The Connection of sewer pipe with Manhole should be well sealed with proper sealing material. No porous or air entrained materials are allowed to be used. UN Habitat engineer has the full right to reject any non-suitable material.
- G. Manholes are allowed to have Hollow Block walls not less than 20cm thick, if Manhole Height is less than 2m. Otherwise, manholes should be concrete casted with 1% minimum reinforcement if height exceeds 2m. In all cases, Contractor can adopt pre-cast concrete manholes to the approval of UN-Habitat engineer.
- H. Manhole covers should be cast Reinforced Concrete, as shown in the drawings, Reinforcement to be 1 layer of [T12@12.5](#) or any equivalent. 2 Metal Hangers should be attached properly to the Slab and coated with non-corrosive material or Epoxy.
- I. If Manhole depth exceeds the 1.7m, Contractor should install stairs inside the Manhole's Shaft to allow access.
- J. Prior to laying and casting the water channel, Contractor shall remove all garbage, debris and the like from the channel to allow a clear inspection for the Engineer. He should dig a water channel as shown in the drawings prior in the opposite side of the sewer.
- K. Backfilling the sewage network should be complete with a well selected backfill material to the approval of the Engineer.
- L. 45 degrees Slopes are to be applied from the top of the trench using a Backhoe loader bucket. Contractor should hand over an acceptable shape to the approval of UN Habitat Engineer.
- M. In Principle, Sewer Pipes are located as shown on the detailed drawings for location of utilities under roads. Final locations shall be modified to suit other existing utilities in the street as directed by UN Habitat engineer. Contractor shall detect all passing utilities and avoid crossings. Contractor shall seek to obtain all available utilities drawings from proper sources. And if somehow utilities were subjected to deterioration, it is the Contractor's responsibilities to fix it.
- N. The drawings provided shall not be scaled. Exact dimensions for locations of Manholes, levels, distances, etc... For the purpose of this contract shall be as indicated on the approved construction drawings and as specified.

- O. The contractor shall provide suitable opening in the inspection chamber to accommodate future house connections.
- P. Details may be modified by UN habitat engineer if site conditions warrant.
- Q. All connections shall be completed and terminated as directed by UN Habitat engineer.
- R. The Following Abbreviations are used:
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| Dia. (mm) | Pipe Diameter in Millimeters |
| GRD. ELEV | Ground elevation in Meters |
| PART. DIST | Partial Distance in Meters |
| CUM. DIST | Cumulative Distance in Meters |
| I.L. | Invert Level in Meters (unless otherwise indicated) |
| PVC | Polyvinyl Chloride Pipe. |
| MDD | Maximum Dry Density as determined by AASHTO standards in Labs. |
- S. Contractor shall provide concrete encasement for sewer pipes passing under water pipes with a clearance of less than 150mm, as specified and approved by UN habitat engineer.
- T. Benching details are shown for guidance purposes. Applicable benching shall be determined to suit each condition as directed by the engineer.
- U. Double flexible joint shall be used whenever pipe is connected to a sub-structure such as manhole wall, concrete encasement, or even another pipe...
- V. Whenever the drawings show a sewer line connecting to an existing manhole fitted with a stub, the contractor shall remove the plug and make the connection to the approval of the engineer.
- W. Prior to any construction, the contractor shall establish a new bench mark system, within the project area for setting out of all works, and obtain UN habitat engineer's approval.
- X. Markings of Pipes and Fittings
1. Each pipe shall be clearly marked at the place of manufacture with the following:
- Name or distinctive mark of the manufacturer.
 - Date of manufacture.
 - Pressure Rating.
 - Nominal Diameter and laying length.
 - Strength Class.

GENERAL NOTES for WATER CHANNEL in KHARAYEB

- Channel should be cleaned with heavy machineries, from all garbage, debris and eroded soil. All these should be transported away from site. Channel should be extended to its proper limits (boundaries).
- Contractor should install all manholes as per the drawings, unless any other study was provided.
- Contractor to start casting the first concrete layer and a Ø6mm Tie to fix the pipe with it while casting the top Concrete layer and to the approval of UN Habitat engineer.
- Contractor to backfill all the implemented sewer system.
- Contractor is supposed to Jett and test all pipes afterwards.

SUBMITTALS

- A. The Contractor shall submit sufficient information to UN-Habitat, in order to verify compliance with the specifications.

B. Quality Assurance QA: Method Statements

1. The contractor shall provide method statements at least for following activities:
 - a. Sewer/ Manhole Installation.
 - b. Sewer Testing.

C. Shop Drawings

The Contractor shall submit shop drawings at least for the following items:

2. Pipeline profile together with details of all joints, manholes etc.

QUALITY CONTROL

A. Prior TO DISPATCH FROM THE FACTORY, THE Contractor shall notify UN Habitat engineer, in sufficient time to allow them to inspect and test the products.

1. All notifications shall be made by written “Inspection Requests”.
 - a. A copy should be scanned and mailed to UN-Habitat engineer; it should arrive before the day of inspection.

B. Final Inspection:

Any product found to be fabricated from unapproved materials or incorrectly fabricated, incorrectly installed, poorly fitted or damaged, shall be rejected and removed from the works.

1. No site repairs will be allowed, unless authorized by UN-Habitat engineer.
2. The Contractor shall bear all costs for replacing unacceptable work.

DELIVERY, STORAGE AND HANDLING

A. Delivery, storage and handling shall be according to the manufacturer’s recommendations, along with the following provisions:

1. Transportations, storage and handling shall at all times be performed in a manner to avoid product damage.
2. Only nylon slings shall be used for lifting products. Steel chains, clamps or cables shall not be allowed lifting purposes.
3. If stored outside, cover products to prevent weather degradation.
4. Any products found to be incorrectly fabricated shall be marked and set aside.
5. Any products damaged during delivery, storage or installation shall be marked by the Contractor and set aside.

EXECUTION

A. Flushing and Jetting

1. The Contractor shall clean, flush using a jetter tank all water channels, existing pipelines or any other locations related to the sewer line.
2. Contractor shall be piling all large stone and heavy rocks on the banks of the water channel (if the case exists).
3. The Contractor should dispose all solid waste/ garbage away into a proper garbage disposal plant and transport them from Site.

B. Excavation

1. Warning tapes should be installed all around the construction site especially near private plots, roads and highways.
2. Excavated trench should be inspected by UN habitat engineer to make sure that all dimensions are respected.

C. Pipe laying and Manhole Installation

1. Due to differential settlements in the region of manholes and adjacent pipe zone, damage to the pipe structure might occur at this zone. To prevent this damage, additional joints on either side of the manhole shall be installed by using short pipe pieces or rocker pipes. A minimum of one flexible pipe shall be installed adjacent to each connection to manholes shall be provided.
2. In some places, soil under the sewer box might not be compact and proper for any pipe installation; Contractor should look for a soil improvement solution or cast concrete chairs each 6m underneath the sewer box.
3. Manholes should be placed correctly in place, proper care shall be taken when Manholes are transported and handled in place if not casted in place.
4. Soil under manholes shall be well compacted to prevent settlements.
5. Proper Topographic machinery shall be used to control proper alignment and gradient of installed pipeline.
6. Sewer installation shall commence from the lowest point of the line.
7. Excavator buckets shall not be used to push pipes together.
8. During sewer installation, manholes should be always closed or shut down by a wood border prior to prevent any debris penetration into the pipes.
9. After testing and finishing all installation, backfilling and covers for manholes shall be installed. (Covers can be installed in previous stages- proper care shall be taken while finishing the job).
10. The Contractor shall provide full detailed shop drawings including all manholes, pipelines and particular details proper for the execution and completion of works.

D. TESTING

Testing of installed pipelines shall be performed as specified below.

A. Air Test

1. Low-Pressure air test shall be performed in accordance with ASTM 828 (If required by UN habitat engineer).

B. Water Test

1. The part of pipeline under test shall be filled with water to give an effective minimum internal water pressure of 1m at highest point and a maximum of 7m at the lowest point.
2. The pressure of 1m head of water shall be maintained for one hour to allow initial absorption of water. After that, the test pressure shall be maintained for 10 minutes and water added shall be measured. If water consumption in 10 minutes does not exceed one liter per hour per linear meter of pipe per meter of nominal internal diameter of pipe and, if there are no visible leakage through joints, the pipeline shall be deemed to have passed.