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Sub: Construction Management System - Circular No. – 19.
Ref: Guidelines for execution of sewerage works.

1. **Priority in Sewer Construction Program –** IPIUs should prioritize the sewer construction programs in each city for each package so that the system can be commissioned as soon as possible, and early benefits can be delivered to the public. It should be noted that provisions of flow in designs of sewerage system should be kept looking to the future requirement. Works should generally start at the downstream end of the systems. Engineers shall develop a program for construction and commissioning according to the priorities. EE IPIU should issue instructions to the sewer contractors as to what lines they will be responsible to take up on a priority basis and ensure the execution in accordance to the given priority. Contractors should not be permitted to take up the construction program in an arbitrary manner. The following order of priorities may be assigned:

   a. **City wise priority:**
      i. Outfall sewer
      ii. Trunk sewers
      iii. Main sewers
      iv. Branch sewers
      v. Lateral sewers
   b. **Package wise priority:**
      i. Priority as mentioned above starting from down stream to upstream.
   c. **Priorities in Lateral sewers:**
      i. Laterals which can be commissioned earlier and those areas covering maximum population from downstream to upstream
      ii. Second priority to the areas in order of their population
      iii. Last priority to less populated areas (ie. Less than 50% habitation)
      iv. No laterals should be laid in the areas where there is no water supply or inadequate water supply
      v. No laterals should be laid in areas where habitation has not developed.

   EE IPIUs should ensure and make all out efforts that no incomplete work of main sewers, Branch sewers, Trunk sewers, & Outfall sewers are left in the sewer works taken up under RUIDP.

2. **Alignment –** Before assigning work L section from each lateral to outfall should be rechecked so that any short coming in flow is checked and rectified before execution. The alignment and bed level of trench should be checked before laying of granular base for pipes. Laying of pipes as per design gradient is the most important factor for successful working of sewerage networks. Therefore the DSC construction engineer and AEn / JEn IPIU should ensure that the pipes have been laid as per the designed gradient in all sections of sewer line. The alignment and gradient of the pipes, once laid in trench should be checked regularly and this fact should be recorded every day in the site instruction book.

ACM DSC and XEn IPIU should also witness at least 30% of them. Any defect in the alignment and gradient should be pointed out and corrected immediately.

3. Quality Assurance and Quality Control –

(a) The thickness of granular bedding (once laid) should be physically checked by DSC support engineer and AEn / JEn IPIU after going down in the trench. Sieve analysis of the bedding material should be carried out in site laboratory for every lot of material received.

(b) The trench filling and further laying of pipes should be taken up only after satisfactory sectional hydraulic testing of the laid pipe line. The test results should be recorded by the DSC support engineer and AEn / JEn IPIU. It should be ensured that such hydraulic testing is witnessed in 100% cases by DSC support engineer and AEn / JEn IPIU, in 30% cases by XEn IPIU & ACM DSC. In no case a section should be back filled without satisfactory hydraulic testing.

(c) In order to maintain high standards of Quality of RCC sewer pipes in waste water contract packages it is directed that EE, IPIU & DSC personnel will select 1 pipe himself out of every lot of RCC pipes (size of lot out of which one pipe is to be selected may vary from 200 to 500 in number, as deemed appropriate) on a random basis for special inspection to check reinforcement (Quality and Quantity) by breaking the selected pipe at site and calculating the diameter and weight of reinforcement and test results should be entered in Measurement Book and signed by testing personnel & contractors repesentative. This test shall be in addition to other tests mentioned in QAQC manual / Third Party Inspection. Proper record of such tests shall be maintained.

(d) The DSC construction engineer and AEn / JEn IPIU should thoroughly check the pipes for any defects before lowering in the trench i.e. surface cracks, visible reinforcement, departure from circularity in the socket ends, broken/fractured mouth edges etc.

(e) It should be ensured that complete construction material for a section has been procured before excavation and the work of manhole, roadside chamber & laying of pipe in that section should be taken up simultaneously.

(f) It should be ensured that open ends of the pipes are suitably plugged to prevent entry of sand/soil and other construction material in the sewers at the end of the day.

(g) Officers of end user line agency should be encouraged to witness various tests during construction and should be formally invited at the time of network testing before finalization of the work and issue of completion certificate. The defects noticed should be jointly recorded and corrective action taken immediately.

4. Safety- Proper safety arrangements like barricading, timbering in trenches, access to trench, proper stacking of construction material, immediate disposal of surplus excavated material should be ensured during construction. The CMS circular no. 17 Guidelines for safety during execution of works should be followed.

5. Manholes & Manhole Cover:

a) **Manholes -** Design of sewerage networks is only indicative in respect of actual location of manhole and street chamber, which needs to be decided at

the site as per site conditions. It is therefore required that before starting the work in a section, the location of manhole and street chamber should be decided by the officer not below the rank of AEn in IPIU and proper record of such decision should be maintained. While deciding location of manhole chamber AEN will ensure that no water pipe line is passing through it.

b) **Manhole Covers -** In case the outer ring of Man Hole cover is of M.S.; it should be non-corroded and of specified thickness. The specifications given in contract for manhole cover and frame of heavy duty steel fiber reinforced concrete conforming to I.S. 12592 (part I & II). The thickness of the M.S. Sheet around the periphery of the cover should be minimum 2 mm and the exposed surface of M.S. sheet should be given suitable treatment with anti corrosive paint or coating.

Looking to susceptibility to corrosion of M.S. ring, cast iron ring should be preferred except otherwise it is mentioned in Contract Agreement.

c) It should be ensured that the manhole cover is flushed with outside frame.

d) RCC cover on the manholes should be finished in all sides to avoid inconvenience or injury to the person going inside manhole.

e) The channel at bottom of manhole should be in curve shape when the flow takes 90 degree bend.

6. Backfilling and compaction in trenches- Restoration of road, in case of trenches excavated for laying of sewer lines is a critical activity in the project. It is our responsibility that these excavated trenches are backfilled and compacted to required standards with in the shortest possible time to avoid public inconvenience. Backfilling in prescribed thickness of layers & compaction to required density is very important. Any sub standard work will result settlement in the trench in near future and will be liable for criticism from all circles. Proper care is therefore required to be taken at every level to ensure refilling of trench and restoration of road to desired standards. There should not be wide gap between the length of excavated trench and the refilling of trench in the works. This should be minimized and ensured that only minimum trench length is kept open with all safety measures. The following procedure should be adopted for backfilling and compaction:

(a) Laboratory test should be conducted for different nature of soils to be backfilled in the trench by Standard Proctor Test and maximum dry density at Optimum Moisture Content should be worked out.

(b) The trench should be refilled in the layers not more than 15 cm and should be compacted by mechanical means in top 1.5 m and rammed manually with rammer below 1.5 m depth (portion in which timbering is there) so as to achieve the desired dry density.

(c) The field density should be checked for every layer by sand replacement method or core cutter method. The sand replacement method is easier and requires less effort in comparison to core cutter method.

(d) The water content ratio shall be gauged quickly by calcium carbide method. It is difficult to use oven drying method in case of determination of field density in trenches located at several places and it takes time too.

(e) It is therefore advised that required number of these equipments should be kept at site by the Contractors so that field density can be checked immediately and work is not held up due to this reason.

(f) It is also desired that in each package where restoration of work is to be done, the backfilling and compaction to required standards should be carried out on one stretch of road in the presence of Executive Engineer IPIU for setting up an example and for enforcing the procedure in the remaining work of refilling of trenches. This effort should be repeated regularly.

7. Separation of sewer lines and its manholes from water supply lines-

More care needs to be taken in maintaining adequate separation of water lines and sewer while laying new water lines/sewers. Pollution in water pipe line from sewers/drains can endanger human health. It is of utmost importance that all measures are taken to prevent it. Stipulated measures for protection against pollution of water supply lines due to sewer lines & its near man holes should be followed in accordance to Water Supply and Treatment Manual (clause 10.11 page 389).

The maximum possibility of pollution in water supply lines is when these lines pass through manholes of sewers. Therefore this condition should be totally avoided and during construction of manhole. It should be ensured that no water pipe line passes through Manhole.

8. Connectivity from house to the sewer line should be encouraged & ensured to all consumers as soon as line is commissioned, so that the consumers are benefited without delay. The CAAP activities shall be started from the very beginning to target the desired house connections.

9. Any construction defect causing road repair, choking in sewer lines etc. should be taken care of by RUIDP through the concerned contractor during defect liability period (one year after completion of work).

This circular should be abided by all the members of PMU, IPIU, IPMC and DSC.

Sd/-
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