



Technical Note No: 2

Sub: - Andhra Pradesh Rural Roads Projects (APRRP)- Panchayat Raj Engineering Department (PRED)- PMC Services: Roads- Construction of pipe culverts-Providing bedding and minimum cushion over pipes- Execution Methodology- Reg.

Ref: - 1) Clarification sought by the DEE PIU Talluru of Prakasam Dist.

Dear Sir,

1. Background:

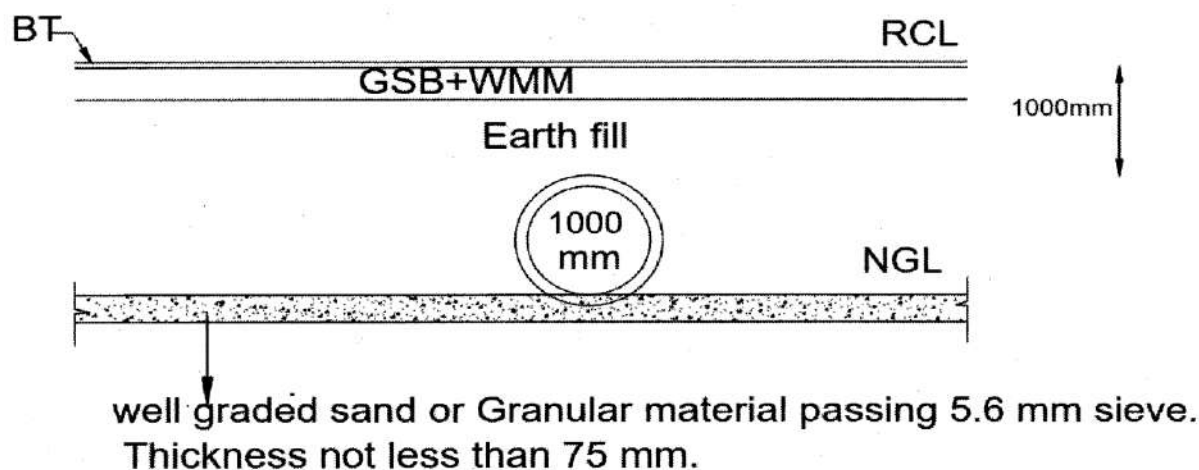
During inspection of works by PMC it was observed that the required cushion over the pipes and bedding is not maintained properly during execution of pipe culverts. This may result into early damage to the pipes when the over loaded vehicles ply on the roads before the design life.

2. Recommendations:

a) Required cushion over the pipes is as follows as per IRC: SP:20 and MoRD 2014.

Case: 1: Height of Embankment is equal or greater than 2.00 mts

Minimum Cushion: 1.00 mt Cushion over pipe including road crust has to be maintained as per Plate No 7.01 of SP:20 (Item 3 of Notes) when the sufficient embankment height is available at site, the pipe culvert may be executed without any modification as per drawing. To maintain the required cushion excluding crust shall be filled with back fill soil. The fill material shall be granular and care has to be taken to compact top 300 mm above the pipe shall be done with compacters, vibrators for effective consolidation. The c/s details of pipe culvert are shown as follows.

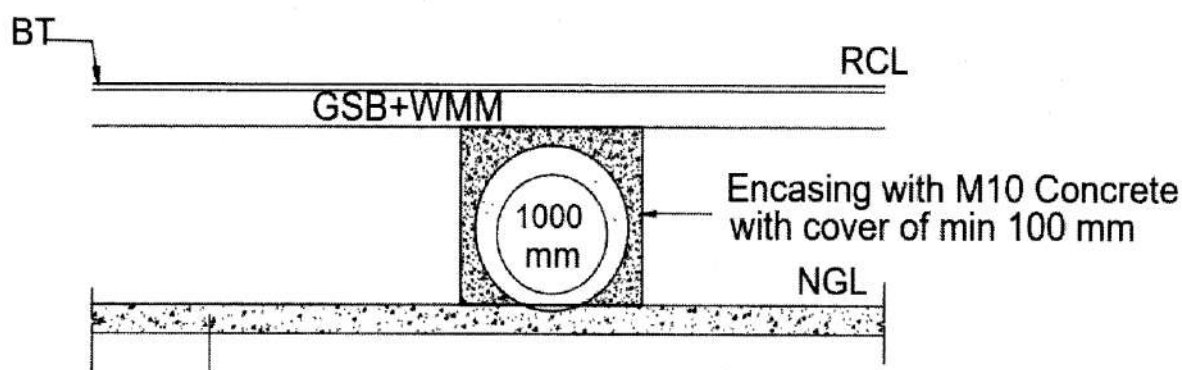


Case I: Minimum cushion 1.00 mt including road crust



Case: 2: Embankment height is less than 2.00 mts

When it is not possible to maintain minimum specified cushion over the pipe, i.e. 1.00 mt the pipe shall be encased in M10 concrete with cover of minimum 100 mm (Clause 1101.8 of MoRD). To maintain the geometric standards of the road properly, over the encasement the balance height will be filled with either by concrete or by GSB and WMM as per crust design. Most of Rural Roads fall under this category only. The C/S details of Pipe culvert with encasement is as shown below.

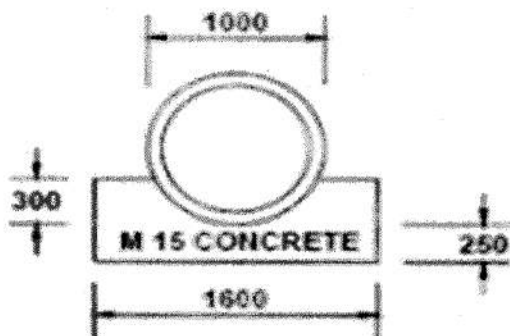


well graded sand or Granular material passing 5.6 mm sieve.

Case II: Encasing of pipe culvert where it is not possible to maintain 1.00mt cushion .

- b) **Bedding:** The bedding shall provide a firm foundation of uniform density throughout the length of the culvert. Two types of bedding specified in the MoRD depending upon the height of fill (Clause 1101.5 of MoRD 2014)
- i) **Type A (Concrete Cradle) bedding:** Type A bedding shall be provided where height of fill above pipe is more than 4 metres.

Min Mix of concrete: M15

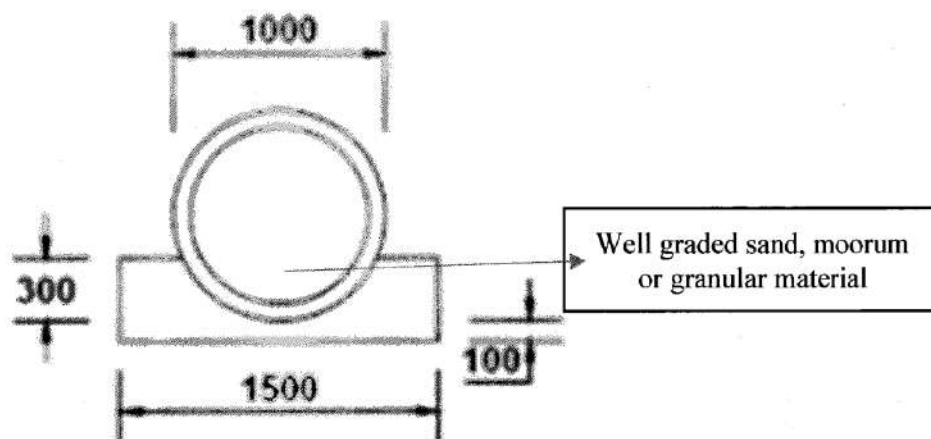




- ii) **Type B (First Class) Bedding:** Type B bedding shall be adopted where height of fill above the pipe is between 0.6 m and 4 m. Normally our rural roads fall under this category only.

Material: Well graded Sand, moorum or approved granular material passing 5.6 mm sieve.

Thickness: Compacted thickness of bedding layer shall not be less than 75 mm



In case of expansive soils, the BC soils a layer of sand/moorum or non-expansive material shall be provided under the bedding. Minimum thickness shall be 450 mm.

- c) **Laying of pipe:** As per clause 1101.6 of MoRD 2014

When two or more pipes are to be laid adjacent of each other they shall be separated by a distance equal to at least half the diameter of the pipe subject to a minimum of 450 mm. The longitudinal slope of the pipe: 1 in 1000 The invert of the pipe shall be minimum 150 mm below the average bed level.

- d) **CD works in Black Cotton Soils:** As per Article 22 of IRC: SP:13-2014.

The expansive soils have very poor bearing capacity. It can be improved by providing layer of metal/boulders with sand having thickness of 450 to 600 mm. It will improve the bearing capacity of the strata to a considerable extent and safeguard the foundation from the adverse effects of the expansive soil also.



The cross section of Hume Pipe Culvert in BC soils is as shown below.

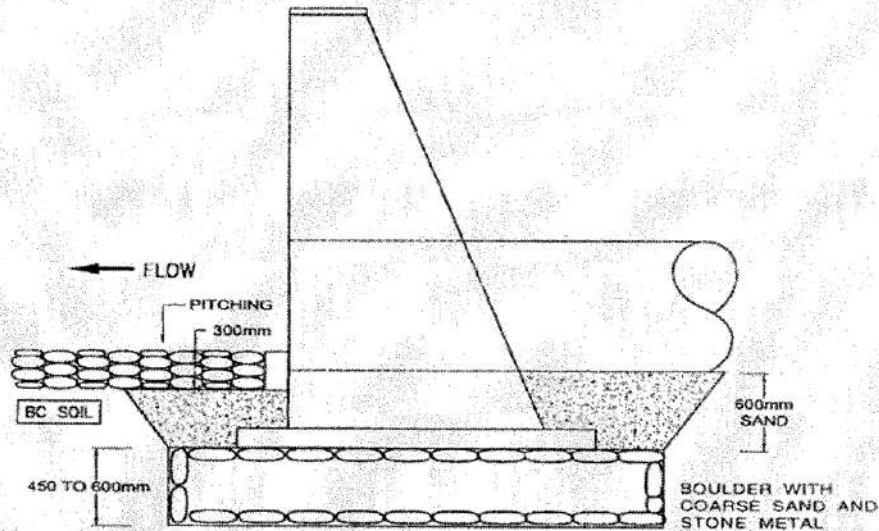


Fig. 22.1 Hume Pipe Culvert in BC Soil

Date: 24.07.2020

KPR 24/7
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- References:** 1) IRC: SP:20- Rural Roads Manual.
2) MoRD Specification for Rural Roads (First Revision)-2014.
3) IRC: SP:13-2014: Guidelines for the design of Small Bridges and Culverts.