



No.W.506/ESOs

Date: 21-05-2020

ENGINEERING STANDING ORDER No 87

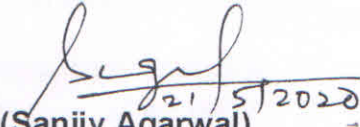
Sub: Bridge Planning and Construction - Policy

Bridges are important structures with long life and therefore have to be planned and designed in a conservative manner. It is very difficult to take up repairs / rehabilitation of any bridge due to distress / damage during the service life which is generally a time consuming process that disrupts traffic for a long time. Hence, planning and design of new bridges should be done with proper care keeping in mind the future inspection and maintenance requirements. In this regard, following directives are issued for adoption during construction of new bridges in this Railway.

1. RCC shall be used for substructure/foundation rather than MCC. Concrete of minimum M30 grade with design mix shall be adopted for RCC with minimum cement content of 400 kg per Cum. of concrete.
2. RCC slabs are prone for spalling of concrete under dynamic loads resulting in exposure and corrosion of bottom reinforcement. Hence, they shall not be used unless in unavoidable circumstances. RCC BOX can be adopted if the site is not susceptible for scour and undermining. Proper protective works like flooring, curtain / drop walls shall be provided for RCC BOX waterway bridges to prevent scour.
3. For drainage, proper cross slope of 1 in 40 to 1 in 45 shall be provided on the top deck of bridges by laying wearing coat of concrete. Drain pipes of 50mm dia. shall be provided at the edge of the deck at a spacing of 1m to lead the water away.
4. A minimum head room of 1.8m shall be planned for all bridges for easy inspection and maintenance. Minimum head room however, shall not be less than 1.2m as stipulated under Para 311(3) of IRBM unless warranted under special circumstances such as heavy regrading of track, difficulties in construction etc. Minimum clear span of 1m shall be provided for all bridges as stipulated in IRBM.
5. Splayed wing walls shall be preferred and adopted for all water way bridges. Square returns can be considered for adoption when the bank height is not more than 3m. Stone pitching shall be extended for at least 1m beyond return walls on upstream and downstream sides of waterway bridges.
6. Side Footpath of minimum 900mm width walkway shall be planned for all Bridges. For standard spans of PSC slabs, this can be in the form of RCC cantilever slab

extending from the ballast retainer or Steel deck over Steel brackets fixed to the ballast retainer. For Steel girders, standard RDSO footpath drawings shall be adopted. Alternatively, Steel framed structure with walkway supported independently on the piers/abutments can also be planned as side footpath.

7. For Major / Important bridges, Inspection platforms (Steel/RCC) shall be provided around the piers and abutments to facilitate inspection of bearings and to carry out related maintenance works. Steel ladders provided to the pier / abutment top from the deck should invariably be with rungs of steel angles and with a hand railing.
8. Minimum Deck width of 5.15m shall be planned for Ballasted decks to facilitate deep screening by BCM. This shall be increased further in cases of curved track. For Ballasted decks with PSC slabs of standard RDSO design up to 12.2m, this can be achieved by increasing the width of the RCC ballast retainers on both sides.
9. For Bridges of spans more than 24.4m, Steel / Composite superstructure shall be adopted with provision for side footpath.
10. For Major Bridges, standard spans to be used as far as possible and skew super structure to be avoided. Planning of number of spans to be done carefully so as to achieve overall economy in construction. As a general principle, cost of foundation and substructure to be equal to cost of super structure.
11. In New line construction, where there is no likelihood of a station yard in future, RCC BOXes can be adopted for use as ROB to reduce the overall height and length of ROB approaches. Provision shall be made for future tracks within Railway boundary. For service road connectivity, one span shall be provided beyond Railway boundary in consultation with the Road authorities.


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