

Title : Evaluating the structural adequacy of substructure of bridge No 262 between Renukut-Jogidiht under ECR for 25T axle load (October 2019-December 2019)

Sponsoring Agency: East Central Railway, Sonebadra, Uttar Pradesh

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Scope/Objectives:

- Instrumentation of piers of typical span of the bridge for tilt, strain and deformation response measurement under the provided test train load formation
- Non-destructive evaluation of substructure (piers) for assessing the concrete strength and durability parameters
- Evaluating the structural adequacy of the substructure for 25T axle loading and formulation of strengthening/retrofit measures (if any)
- Analysis and interpretation of results and preparation of report

Objectives Achieved/ Progress made:

Extensive field investigations and numerical simulation studies were carried out on the super- and sub- structure of underslung type steel truss bridge under East Central Railway to evaluate the performance of the substructure under 25T standard railway loading. During field investigations, instrumentation on members of the super-structure and substructure including the instrumentation on rail is carried out in order to evaluate the response under static and dynamic test cases using the test train formation [Fig.1 (a)-(c)]. Longitudinal force exerted at the track level is evaluated based on the strain responses measured from the sensors fixed on the rails. Numerical simulation is carried out for the super-structure and sub-structure consisting of pier with bearing support system [Fig.1 (d)]. The numerical model is validated with experimentally obtained structural responses and the validated model is further used for evaluating the performance and adequacy of the pier for 25T railway loading. Non-destructive testing on the pier structures constructed using mass concrete is conducted to assess the condition, strength and durability of the concrete [Fig.1 (e)-(f)].

The result of studies showed that the sub-structure pier is capable of carrying the 25T loading of the railways. Further, as the concrete quality varies drastically across the pier section, it is recommended to carryout strengthening measures on the pier so that it carries safely any additional loading due to increase in axle loading conditions than the present load scenarios.



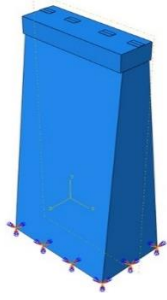
(a)



(b)



(c)



(d)



(e)



(f)



(g)

Fig. 1: Experimental, numerical and NDT investigations of the bridge