

Assessment of structural adequacy of RDSO's standard composite girder bridge and recommendations for retrofitting of superstructure of bridge

Detailed numerical simulations along with the field investigations were carried out on the super-structure of composite bridge (BR159) to evaluate the structural adequacy of the super-structure under 25T of loading. During the field investigations, instrumentation on various parts of the super-structure, i.e., rail, concrete slab, two I-girders, bearings is carried out in order to evaluate the response under static and dynamic test cases conducted using the test train formation provided by ECR. Instrumentation on the I-girders is carried out to measure the displacement along the length of the girder at critical locations and strain measurements are carried out at three different locations across the depth of the girder, along the slab with and near the concrete-steel interface. Non-destructive testing (NDT) on the concrete slab is also conducted using ultrasonic pulse velocity (UPV) and rebound hammer to assess the overall quality of concrete. As the field study could not be conducted using the intended 25T loading, the same is assessed using the validated numerical model. The numerical validation is thoroughly carried out using the results obtained from field investigation. Numerical simulation is carried out for response evaluation (both static and dynamic) of the super-structure under 25T loading. It is found that the composite superstructure is performing well under all the load cases considered in the present study. The interface behaviour (steel-concrete interface near mid- and quarter- span) shows the required integrity for complete force transfer.



Figure Bridge super structure and test train formation



Figure Sensors in steel-concrete composite and Instrumentation

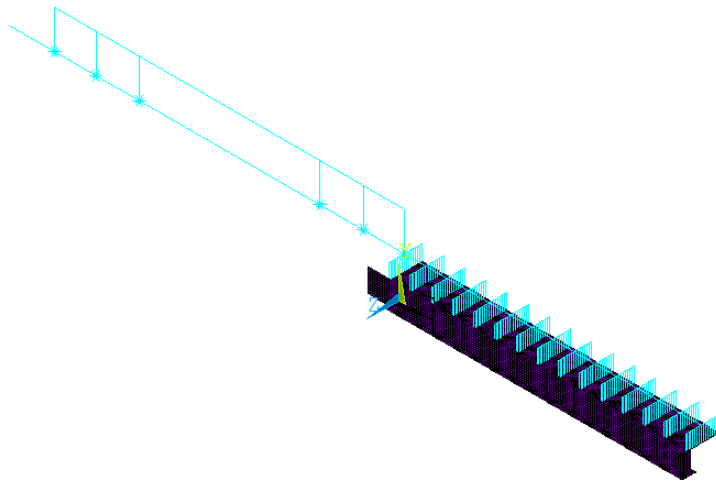


Figure Test train formation and fully coupled numerical simulations (wheel-rail-bridge interactions) for obtaining the dynamic response of the bridge under different speeds