

Project No. and Title of the Project: SSP 412, Technical Audit of the Structural Design and Analysis for the Construction of the Twin Tunnel Beneath the Railway Line between RJPB–GZH

Client : Delhi Metro Rail Corporation (DMRC) Limited, Patna, Bihar

CSIR-SERC was approached by DMRC, Patna, for technical audit of the structural design and analysis for the construction of the twin tunnel pertaining to metro railway crossing beneath the railway line at RJPB-GZH, based on the recommendation of Eastern Central Railway (ECR). An initial site investigation was undertaken to assess prevailing ground conditions and to review DMRC's proposed instrumentation and monitoring scheme. Subsequently, numerical simulation studies were undertaken to evaluate ground surface settlements due to twin tunnel construction, with a detailed finite element model developed using ANSYS Mechanical to assess displacement responses during staged excavation, which indicated a maximum ground surface

settlement of approximately 9 mm following completion of twin tunneling.



Figure 1: Site visit and field inspection conducted at the RJPB–GZH railway corridor for assessment and review of the proposed tunneling alignment and monitoring scheme.

Benefits to Client: A revised instrumentation and monitoring scheme was suggested incorporating high-precision instrumentation, defined data acquisition frequencies, thorough calibration protocols, and operational guidelines. Through the staged construction simulations, the structural integrity and operational continuity of the overlying railway infrastructure were maintained. Preliminary ground investigation insights were leveraged to deliver actionable revisions, ensuring reliable, uninterrupted monitoring throughout tunneling operations.