

Title:

Studies on the retrofitting of distressed PSC box girders using external post-tensioning for bridges (OLP 22841).

Duration:

April 2024 to March 2026

Objectives:

- Development of an Improved technology for retrofitting of distressed PSC box girders by external post-tensioning.
- Development of an Analytical model on the retrofitting of box girders by external post-tensioning.

Progress Highlights:

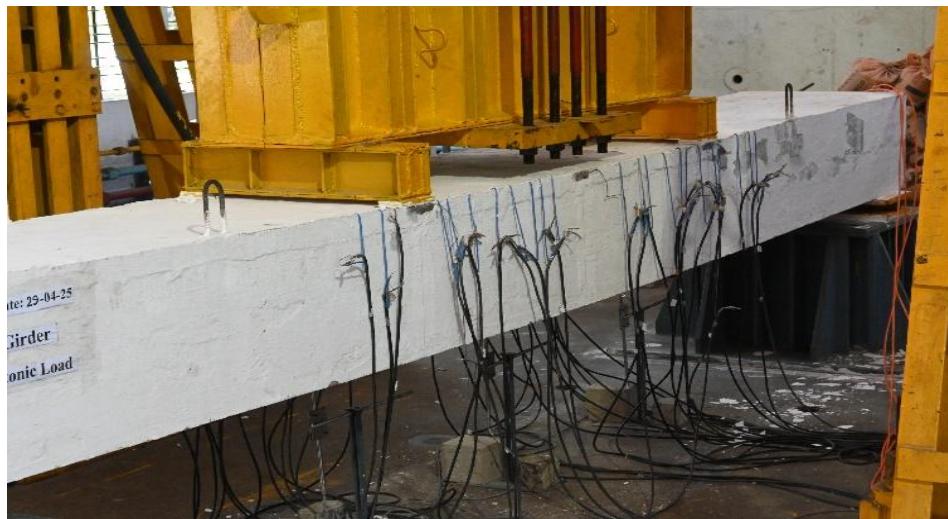
- The PSC Box girder specimen CBG3-SM of 6 m length (5.6 m span) was load tested by static monotonic load. The behaviour was predicted by stages from decompression, yielding of tensile steel, stress-increase in tendons, and ultimate state. As the stress-increase in tendons is the influencing parameter, the prestressing force need to be monitored in tendons of post-tensioned members. Therefore, it is inferred that the load cells need to be installed in the prestressed concrete bridges to be constructed in future. This would result in noticing the loss of prestress, and will facilitate for planning regarding repair measures for bridges in the country.
- Development of a process for installation of Vibrating Wire Load cell in real life PSC bridges for monitoring of prestress.
- A PSC I-Girder bridge in the Chennai Peripheral Ring road, project section -1 has been identified for carrying out a pilot study on monitoring of prestress.



Specimen CBG3-SM after completion of post-tensioning. Monitoring of prestress using Vibrating Wire Load cells is shown.



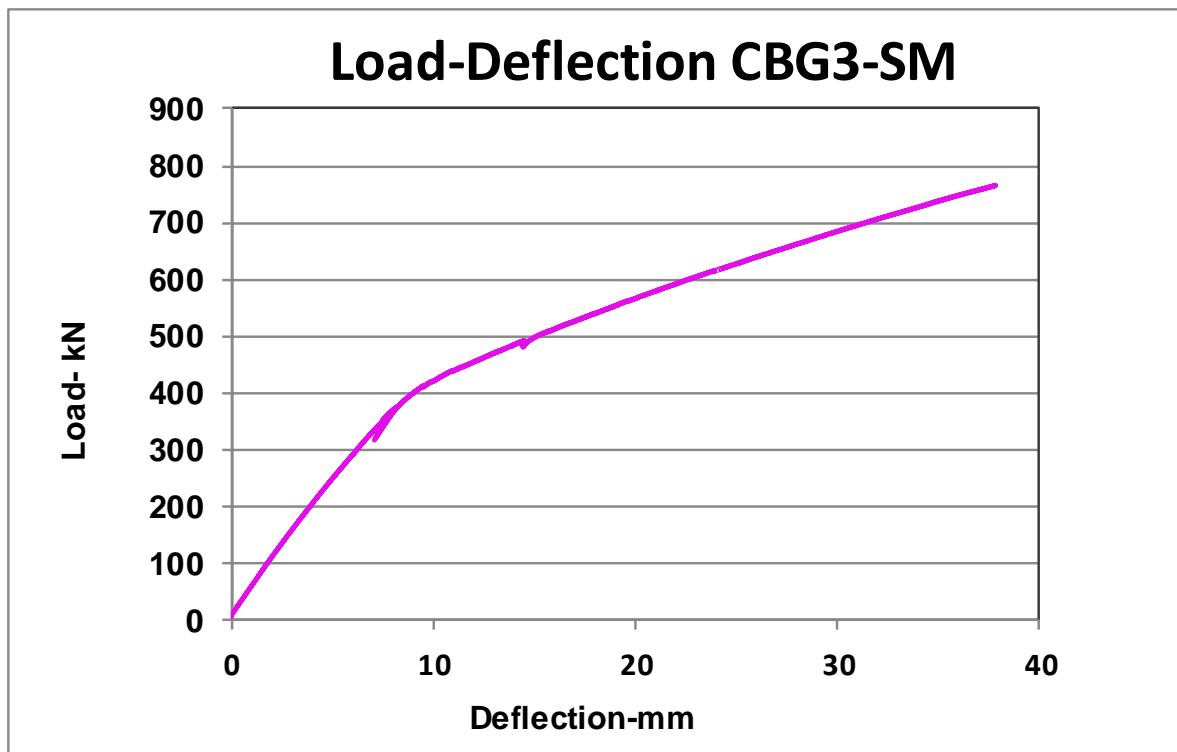
Testing of the PSC box girder specimen CBG3-SM



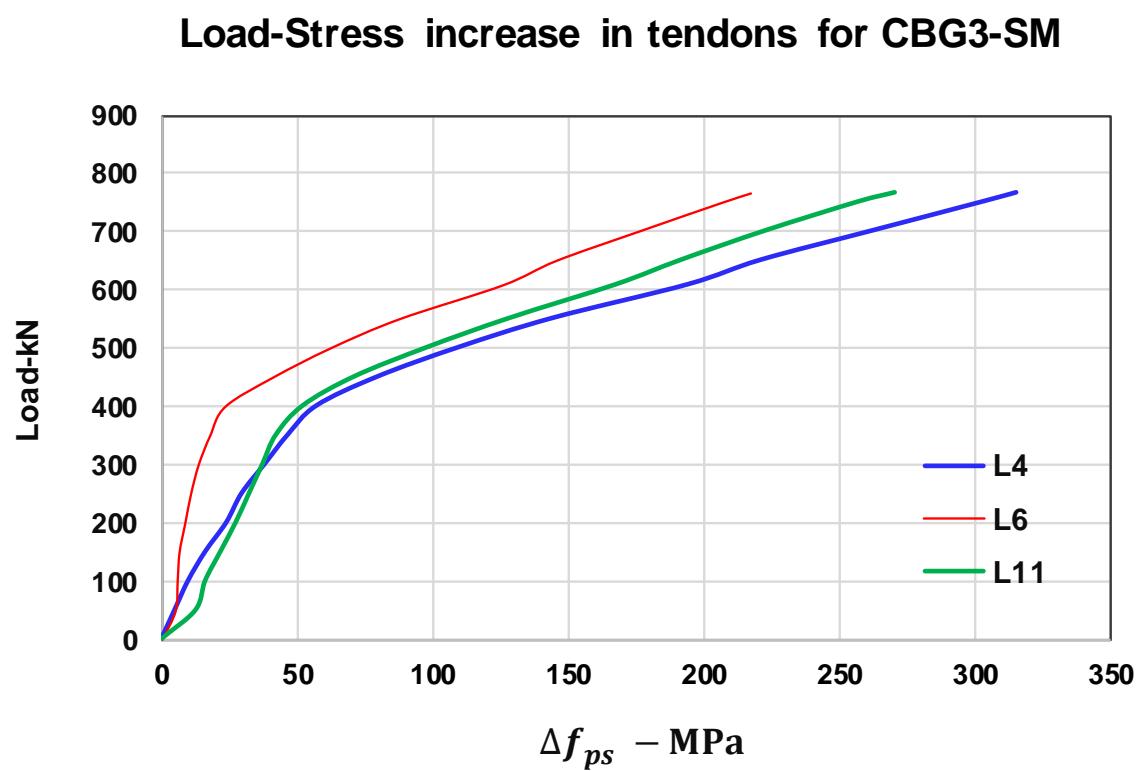
Deflected shape of the specimen under loading



Failure of the specimen by concrete crushing at top compressive fiber



Load-Deflection behavior of the PSC box girder for specimen CBG3-SM



Load-stress increase in tendons- Δf_{ps} relation for specimen CBG3-SM

Future Programme:

- Analytical studies on the retrofitting of box girders by external post-tensioning.
- A pilot study on monitoring of prestress at the identified PSC bridge girder by installation of Vibrating Wire Load cell.

Team:

Dr R Manisekar

Date: 08-01-2026