SRP Strengthening of PC Double-T Beams

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Objectives:
To investigate and validate, by means of in-situ load testing, the behavior of steel reinforced polymers (SRP) as external reinforcement for the upgrade of concrete structures, intending to maintain and improve on the performance and installation advantages of FRP systems, while significantly reducing their cost.

Background:
In the last decades, fiber reinforced polymer (FRP) composites have been effectively used as external reinforcement for the upgrade of concrete structures. Bonded FRP essentially works as reinforcement to provide additional tensile strength to reinforced and prestressed concrete (RC and PC) members. The proposed innovation intends to maintain and improve on the performance and installation advantages of FRP systems, while significantly reducing their cost. This new material is composed of a unidirectional tape of continuously scrim bonded high-strength steel cords impregnated in polymeric resin/grout, and is defined as steel reinforced polymer/grout (HardwireTM SRP-SRG).

Test Matrix

Load vs Displacement plot

Test set up

Preliminary Conclusions:
- Very good performance of the strengthening system as shown in the increased capacity in both strengthened beams;
- Significant ductility till collapse compared to a more elastic behavior experienced in conventional FRP strengthening members;
- Very good bond between the Hardwire mesh and the concrete as shown by the significant amount of concrete attached to the detached SRP strip.