

PROJECT PROFILE

CORE FILL EFFECT ON HOLLOW CORE PLANK BEARING CAPACITY



PROJECT BACKGROUND

Strescon Limited, is a precast concrete product manufacturer in Eastern Canada. One of their products, Hollow core planks (HCP), is extensively used as floor and roof members. A common HCP is 8" deep and 4' long in cross section with 6 hollow cores. The main purpose of HCP is to have high flexural resistance to carry floor loads while being lightweight. However, in total precast concrete and masonry constructions, the floor slabs have to be able to carry and transfer their share of axial load from all of the above floors to the load-bearing walls below. The load bearing capacity of the HCP is of concern due to their reduced cross-sectional area. This experimental study was conducted to assess the bearing capacity of unfilled and core-filled planks, and to determine whether additional core filling is required or not.

METHODS

The experiments look into the bearing capacity of HCP based on the condition of core filling at the ends of the slabs where walls usually sit. The core filling would run for 12" inside the hollow core. Smaller sections of specimens cut from full width, as well as full width slabs, were tested in the lab. The variables considered in the testing program were the presence of core-fill, and the way core filling was done (partial or fully core-filled). In each test, two similar HCP cuts were abutted end-to-end and loaded under an 8" wide W-section beam.

RESULTS

Tests on unfilled HCP sample cuts with two web and one hollow core showed an average strength of 600 kN. Contrastingly, fully grouted specimens, filled 12" long each side in the facility, demonstrated more than twice the capacity, with an average of 1400 kN. Lastly, partially grouted specimens, only the gap

between the two slabs was filled and any grout that fell in the voids, reached an average capacity of 540 kN showing a reduction in strength.

In another set of tests, sample cuts had one web and two half hollow cores on the sides. The specimens were tested in form of unfilled and partially grouted in the lab. Both unfilled and partially grouted specimens reached an average of 350 kN strength.

The bearing capacity of unfilled full width (6 hollow cores) specimens were tested which showed bearing capacity of 2500-3200 kN.



RECOMMENDATIONS

The fully core-filled specimens resulted in more than twice of the strength (1400 kN) of unfilled specimens (600 kN), while partially grouting specimens at their ends did not show any increase in strength (540 kN). The full-size unfilled slab strength (3000 kN) was about 5 times the sample cuts (600 kN). This can suggest an estimated strength of roughly 7000 kN for full-size core-filled slabs, which needs to be verified through testing. The analysis of the force-displacement and strain-stress results are still ongoing. In depth analysis of the results is required to come up with a model that can predict the full-size slab strength with or without corefilling based on sample cut strengths.