

Urban demolitions in Barcelona

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Summary

The case history of two structures demolished in the city of Barcelona is presented.

To achieve the remodelation of Plaça Lesseps (Barcelona) it's been necessary to demolish and rebuild a post-tensioned concrete slab. A new railway station in an existing tunnel at Hospitalet de Llobregat needed the deconstruction of the existing structure to build up a wider one in order to leave the space for the platforms

Keywords: controlled demolition, urban structures, diamond wire cutting.

1. Plaça Lesseps's remodelation

1.1 Introduction

To achieve the remodelation of Plaça Lesseps (Barcelona) it's been necessary to demolish and rebuild a post-tensioned concrete slab. The demolition of the structure was made by cuts with diamond wires. Calculations were made to provide the new structural scheme was resisted by the existing reinforcement, mainly prestressing steel. Special care was kept in bond stresses at the ends of the members where there was a need to assure transfer forces from steel to concrete. The demolition was carried out successfully with alternative traffic under one of two spans of the existing structure.

1.2 Description of the structure

The structure to be demolished is a cut-and-covered concrete roof as part of a two-span frame structure. The roof is divided in 6 different slabs, all of them made up of post-tensioned, 0.60m depth concrete solid sections. The slabs are continuous over the central supporting wall in most of the length of the subway passage; as approaching to the extremes of the tunnel, the central wall is progressively reduced so that, at the ends, the slabs bridge twice the length in one single span with two stiffening beams upstanding at the edges.

The slabs (1 and 6) have four groups of post-tensioning wires. The first of them has 4 tendons, each consisting of 34 Ø7 strands. These tendons provide basically a state of axial compression as they are straight and near the section's center of gravity. Parallel to these, 12 tendons 48 Ø7 strands each run curved to balance the sagging moments of a simple supported beam. The third group of cables (11 tendons 48 Ø7 strands each) counteract for the hogging moments in the cantilever formed by the extension of the central wall at the ends while the fourth and last group of cables include the rest of the curved tendons which, running transverse to the tunnel axis, balance the local moments at the slab with variable spacing along the tunnel length.