Seismic Upgrade of John Wayne Airport Terminals A & B

This configuration was extensively modeled using refined Finite Elements analyses indicating superior performance in comparison to the existing configuration. In addition to some locations it was necessary to use RBG configuration away from the face of the strengthened connections to ensure the occurrence of the plastic hinges at the beams.

Due to the construction's complexity and limited access to the connections, IDS advised the Airport to initiate a pilot construction project to verify the constructability of the upgrades and to develop a realistic schedule and cost estimate of the full-scale project. The plans of the pilot project were approved by the County of Orange. It included a 20 sequence construction operation to upgrade two identical connections at two different locations. Two shortlisted qualified contractors performed the pilot's construction project. Lessons learned from the construction of the pilot project were implemented in the final design, including changing some of the welding sequences.

Consequently, the two contractors participated in a guaranteed maximum bid. The selection criteria were based on the contractor's rated performance during the pilot test, the bid cost, the contractor's approach to limit disturbance to the airport operation, among other factors. Swinerton Builders provided the best value and were chosen to complete the renovation project.

The construction of the seismic upgrade completed on December 2017 with an approximate cost of $35 M, meeting Budget and Schedule. There was no noticeable interruption of the airport's operation during construction.

Final Construction Document

Developed Details and Construction Sequence of Seismic Retrofit

2D construction sequence was proposed for the developed concept.

Existing Conditions

There are a few locations with limited accessibility to the Connections.

A flange welding required to weld, according to the approved construction plan which needs to be carefully removed from the flange to get access to the beam-Ceiling connection.

Validation of Nonlinear Connection Model Based on UC Berkeley's Research

Seismic Upgrade of John Wayne Airport

Project: Structural Engineer: IDS Group, Inc. - Irvine, California
Geotechnical Engineer: Amec Foster Wheeler - Los Angeles, CA
Testing & Inspection: Ninyo & Moore, Irvine, CA

Owner: Resident Engineer: Contractors: Construction Management:
County of Orange (CA) IDS Group, Inc. Swinerton Builders Butler

SEAOEC 2018 Excellence in Structural Engineering Awards
Award Category: Retrofit/Alterations

RESEARCH INVESTIGATION AT UC BERKELEY (Whiteaker et al. - 2008)

Modeling of Strengthened joints used typical post-Northridge "crisprail" moment connections idealized endplates. It is important to note that when emphasis is not placed high stress concentration away from the strengthened connections, IDS details were used. Krupka showed that this stress field is more adequate solution.