

Seismic Design and Performance of the FedEx Airbus A380 Hangar Facility

FedEx Airbus A380 Hangar Facility
Memphis, Tennessee

Abstract:

The FedEx Airbus A380 Hangar Facility in Memphis, Tennessee is comprised of five steel buildings. The five buildings are an airplane hangar to service the new Airbus A380, storage warehouse, shop infill building, 2-story office building, and a ground support maintenance building (GSE). The paper and presentation will focus on the A380 Hangar structure, which has 400 ft span roof trusses, a building height of 150 feet, a building depth of 330 feet, numerous suspended overhead crane hoists and telescopic platforms, special concentrically braced frames, and concrete drilled pier and grade beam foundation special moment frames.

The seismicity and soil conditions for the City of Memphis, Tennessee require these structures to be designed and detailed to accommodate all requirements for Seismic Design Category D in accordance with the International Building Code, 2003 Edition. Figure 1 provides an architectural plan of the FedEx A380 Hangar Facility. Figure 2 provides an illustration of the Sap 2000 3-D model of the A380 Hangar.

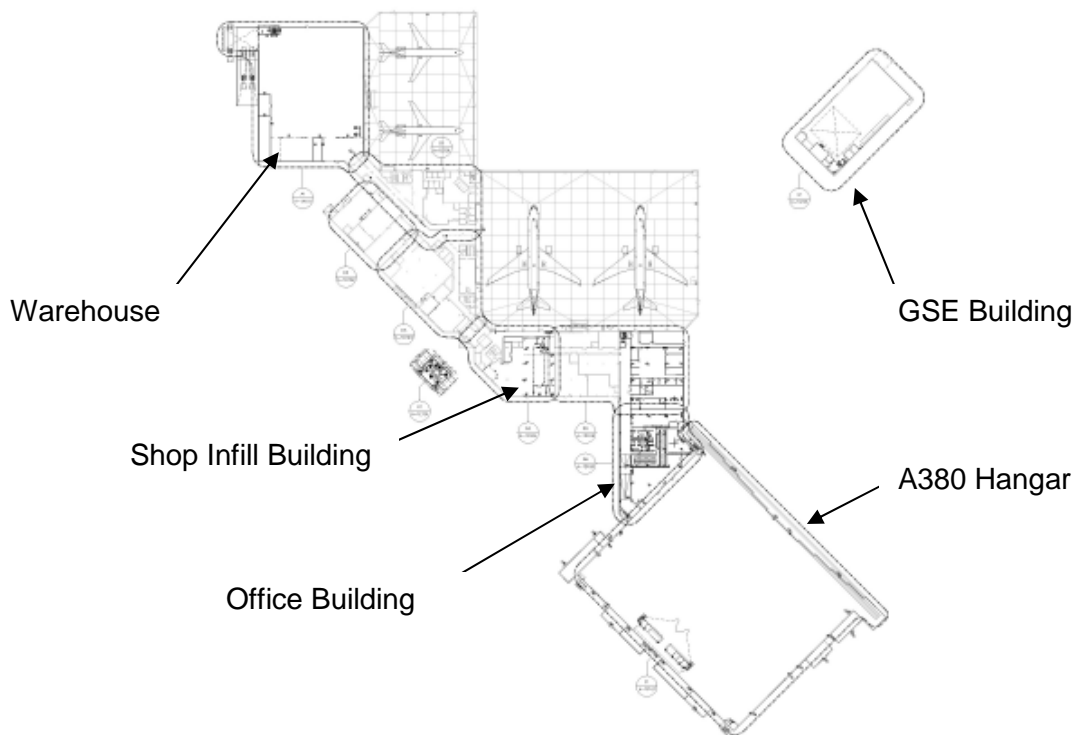


Figure 1 – Architectural Plan of the A380 Hangar Facility

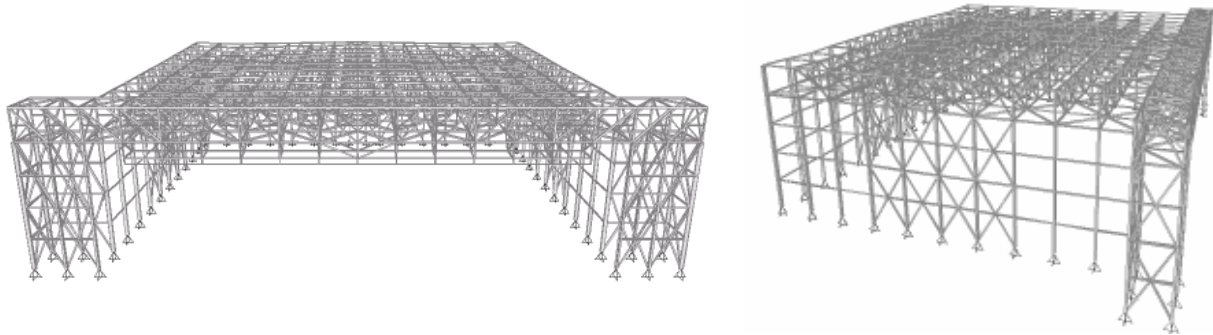


Figure 2 – A380 Hangar 3-D Model (SAP 2000)

Analysis and design challenges included equivalent lateral force and response spectra analyses for seismic forces, special concentrically braced frames, concrete special moment frame foundations, large roof truss suspended moving loads, and wind loads corresponding to a partially-enclosed structure. ANSI/AISC 341-02, “Seismic Provisions for Structural Steel Buildings,” steel detailing requirements for special concentrically braced frames, ordinary concentrically braced frames, special moment frames, and ordinary moment frames were utilized. ACI 318-02 - Chapter 21, “Special Provisions for Seismic Design,” detailing requirements for concrete special moment frames was utilized.

Adoption of the IBC 2003 over the SBC for this project caused some culture shocks with respect to seismic connection costs in the Memphis, Tennessee area. This project also exposed some unanticipated issues with using tall multi-story special concentrically braced frames without intermediate floors to brace the beams. With the many different seismic load and moving load cases for member and connection design, using correct load cases and load paths and maintaining steel economy also became challenging.

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