HDC WICKERSHEIMER ENGINEERING

Structural Division - HDC Engineering, LLC

PROJECT PROFILE

Caterpillar, Inc.
Structural Modifications
Building "B", Shipping Floor

Joliet, Illinois

Client: Caterpillar, Inc., Joliet, IL
Architect: Architectural Expressions, Forsyth, IL
Contractor: Modern Builders Industrial Concrete Company, Chicago, IL

Range of Services

- Structural planning and design
- Foundation design; construction administration

Project Overview

The Problem: To upgrade the crane capacity from 20 to 40 tons, without disrupting a three-shift work schedule inside the building. The crane bay runs 360 feet along the 720 foot length of the building.

The Solution: The building's lateral load resistance system was an unbraced framework in the short direction. Thus, the additional lateral crane force plus wind produced excessive column sway. Upgrading all the column sections and the crane-rail girders would have involved considerable upgrade work within the building. This would have required a major shutdown of the area, involving three work shifts and re-location of mechanical systems mounted to the interior columns. It was estimated to result in $2 million of lost revenue for Caterpillar to do the upgrade from the inside of the building based on a design proposed by another engineering firm.

Several solutions were studied. The selected scheme involved changing the crane bay area to a braced frame. Exterior three-dimensional trussing was used to reduce the building's lateral sway. The allowable capacities of the columns were dramatically increased due to the change from an unbraced to a braced frame system. This allowed all three work shifts to function without interruption. This creative solution was also an aesthetic one.

The foundation system utilized pre-stressed rock anchors at the individual pier locations. See page 2 for the details of the construction process.

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Construction Process

Rock exists all the way up to near grade at the Joliet site, necessitating rock anchors to resist the overturning at each pier.

The rock anchors are visible in image 1 with screw thread endings to attach to the threaded ends of the reinforcement within the cage of re-bar for the pier itself, shown in image 2.

The three dimensional truss joints were fabricated and connected at the shop (see image 3) into assembled components that were then shipped to the site, as shown in image 4.

Image 5 illustrates one such component attached to the building, while image 6 shows the penetration of the component through the exterior siding and attaching to the building column.

Image 7 illustrates a typical connection of the component to the foundation pier.

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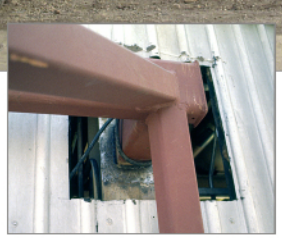

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