



Project Overview

FRP RETROFIT OF REINFORCED CONCRETE COLUMNS IN HIGH RISE CONDOMINIUM TOWER

Name: Plaza in Clayton
Type: Condominium Tower
Location: St. Louis, Missouri
Completed: September 2003

PROBLEM

Soon after the construction of this 26-story residential condominium tower in an exclusive suburb of St. Louis was completed, it was realized that the columns in the lower 15 stories did not have sufficient reinforcing steel. Retrofit of the columns had to be conducted while the units remained occupied, requiring minimal disturbance to the residents.

Sixty reinforced concrete columns (28x28 inches) were designed improperly and lacked sufficient hoop and longitudinal reinforcement. Work had to be carried out in units that were mostly occupied. Many columns were covered in wooden panels that were too expensive to discard.

SOLUTION

QuakeWrap® FRP Retrofit System was selected given its versatility to be installed around tight spaces where mechanical and electrical lines are in place. Moreover, the virtually odorless resins of the system allowed for minimum disturbance to existing residents.

FRP composite carbon fabric was saturated in the garage (using QuakeWrap® Saturating Machine) and it was sent up to the floors using passenger elevators. Columns were wrapped in two layers of fabric. The complete confinement of the columns increased the compressive strength of the concrete, increasing its load sharing participation and a result, the existing longitudinal steel was deemed adequate. The lacking additional hoop reinforcement was accounted for by orienting the carbon fibers in the transverse direction. The FRP retrofit also upgraded the seismic capabilities of the columns by increasing their ductility.

The small thickness of the fabrics allowed the wooden panels to be re-installed around the columns after FRP retrofit was completed.



Technical Highlights

- 26 story residential condominium tower (nearly completed)
- 60 columns in lower 15 floors had insufficient steel
- Columns were wrapped in 2 layers of carbon fabric
- Building remained occupied during retrofit
- Lack of odor in our resins was a major benefit to the residents

Credits

Consultant: SSE, Inc., St. Louis, MO
General Contractor: Tarlton Corporation, St. Louis, MO



“The FRP Retrofit Experts”