Reliability Project Case Study

Reinforced Concrete Fire Deterioration

After any fire event, the concrete should always be evaluated thoroughly by trained experts

A Link to the Ancients

The use of concrete as a building compound was first recorded over 2000 years ago by the Romans. Concrete was used to build numerous structures and helped improve the safety and load capacity of those structures, as well as the overall standard of living resulting from their construction. This material evolved over time and become the most important building material in modern construction.

Most buildings and structures constructed today use concrete in many aspects of the structure. Engineers have constantly improved the strength, durability and uses of concrete to provide the most efficient product with the lowest cost. Over the years, Engineers started using concrete as a fire protection material for steel that could be potentially exposed to a fire. The thicker the concrete used, the more protected the steel became.

Post Fire Evaluation

As part of Brindley Engineering's (BE) ongoing Structural Reliability Program at a major US refinery, we were recently awarded a project to evaluate deteriorated steel platforms and reinforced concrete columns that were exposed to fires in the past. The 20-inch square concrete columns and steel platforms were heavily deteriorated from the fire. To assess the depth that the concrete was affected, our experienced inspectors worked with the construction contractor to provide oversight during demolition. Our engineers were able to identify the presence of sound concrete, while simultaneously controlling how the demolition was done, ensuring that the column wasn't over-loaded. We discovered that the deterioration of the concrete reached up to 5" in depth. The reinforced steel inside was preserved in good condition with only small surface corrosion. As a team, we then created a repair plan that required the removal of only the deteriorated material on two columns. Each half face would have a maximum 10'-0" monolithic, vertical pour. Replacing the 5" of concrete restored capacity and increased the structural stability in the event of a fire by approximately two hours.

BE the Result

As mentioned, this structure was exposed to multiple fires over the past years. Deep concrete deterioration that was present in the structure could have potentially led to a catastrophic failure because visually the concrete appeared to be in acceptable condition, but the reality was that it was highly deteriorated and of reduced capacity. After any fire event, the concrete should always be evaluated thoroughly by trained experts because any concrete element exposed to a fire will lose strength and durability that may not be readily apparent to untrained personnel.

Contact Us

Brindley Engineering
901 Warrenville Road
Suite 300
Lisle, IL 60532

630-796-2020

info@BrindleyEngineering.com

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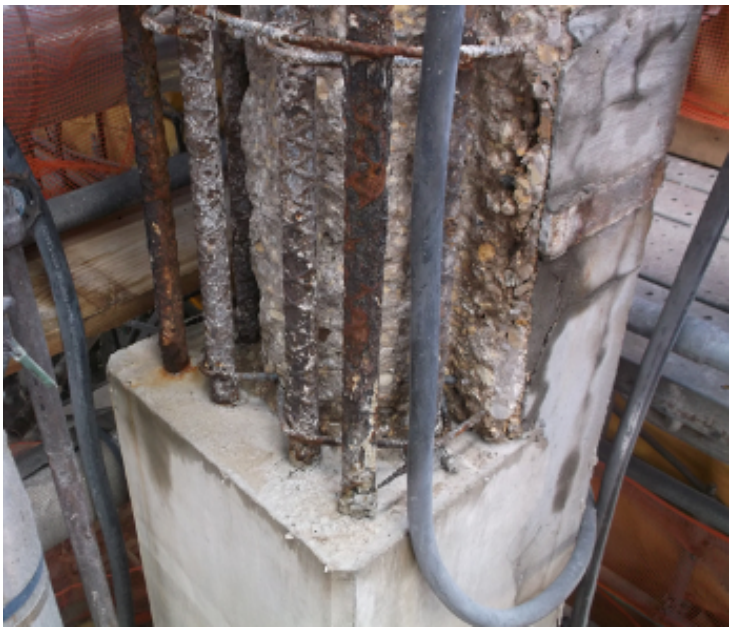
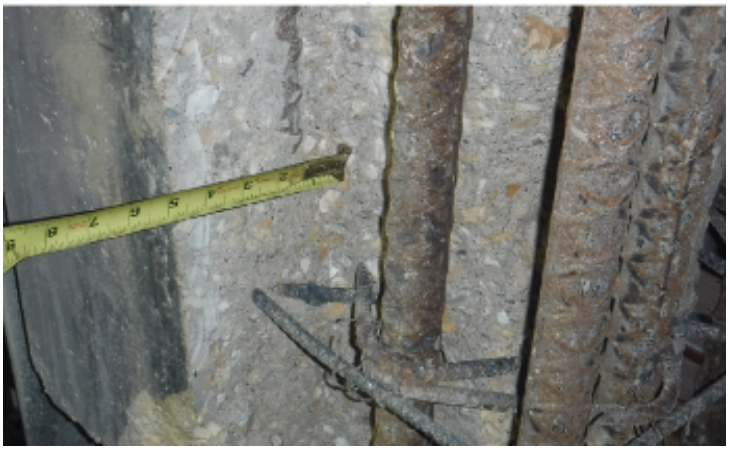
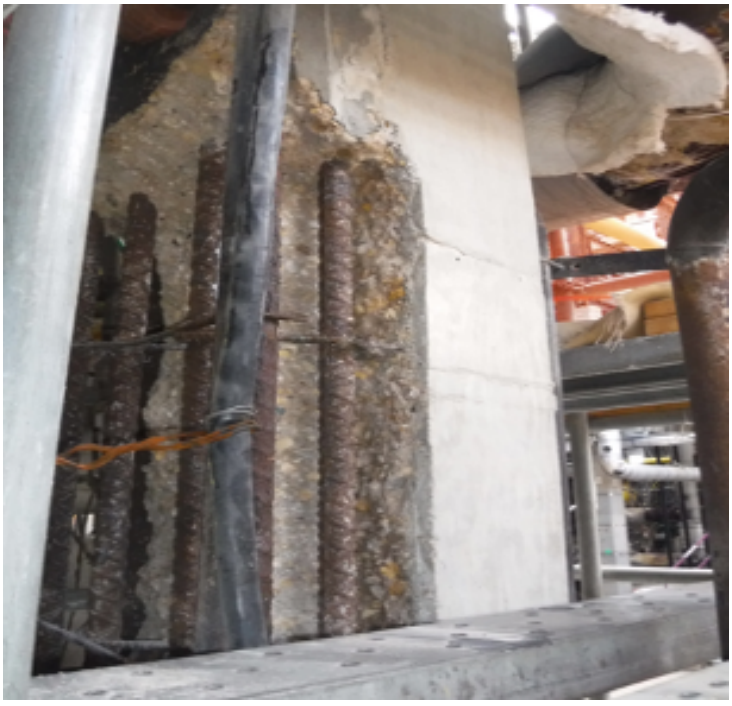


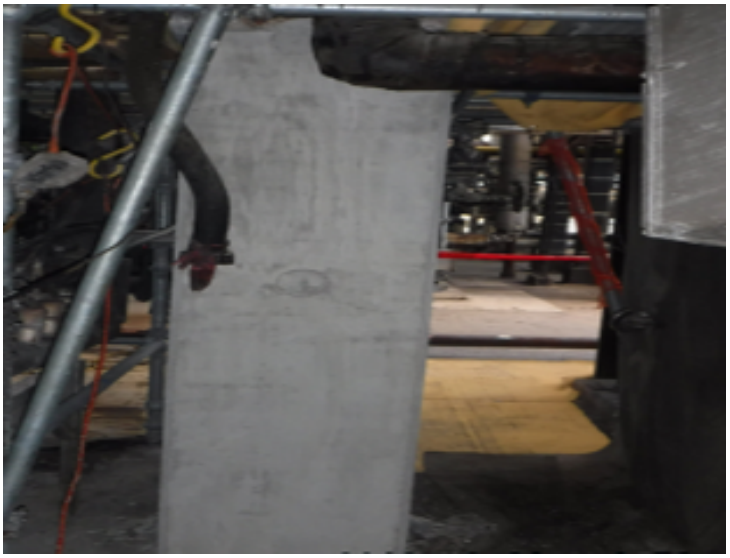
Reinforce Concrete Deterioration



Reinforce Concrete Deterioration 5”



Partially concrete repair in progress



Full concrete repair completed

901 Warrenville Road, Suite 300 Lisle, IL 60532 • 630-796-2020 • info@BrindleyEngineering.com