RENEWWRAP®

Carbon Fiber Strengthening System

BUILDINGS & PARKING FACILITIES

Case Study

FRP system to strengthen concrete columns, Colorado, U.S.

During construction of a natural gas plant in Colorado, builders faced an unexpected challenge that threatened to derail their construction schedule and the plant opening. After waiting 56 days for the concrete columns supporting one of the plant's control buildings to reach their design compression strength of 4000 psi (27.6 MPa) they had only reached about 2,000 psi (13.8 MPa). The installation of the control equipment in the building was a critical milestone on the plant's construction schedule and finding a solution to the deficient support columns that could be quickly implemented before winter was needed.

CHALLENGE

Once it was concluded the concrete strength was not going to reach 4,000 psi, the engineer re-analyzed the structure using the lower compressive strength and determined the columns were still capable of supporting the design loads, but with a lower margin of safety. However, the engineer remained concerned about the risks of future spalling that might result from freeze-thaw cycling or impacts during plant operations that could compromise the structural integrity of the columns. The project engineer reached out to GeoTree Solutions to determine if one of their FRP strengthening systems could be used to protect the columns and provide some additional strength. The Engineer was already familiar with our PipeWrap™ FRP products for rehabilitating oil and gas pipelines.

SOLUTION

GeoTree proposed a solution consisting of wrapping three layers of its RenewWrap carbon fiber strengthening system around the columns. The RenewWrap system consists of high-strength carbon fiber fabrics that are coated in the field with epoxy resins and bonded to the structure to strengthen the member being repaired.

Alternately, the contractor was considering demolishing and recasting the columns or jacketing with additional concrete. Both options were rejected due to the cost and more importantly the schedule. The FRP application was planned over a two-week period in November. Unfortunately, a winter storm— with snow and winds exceeding 40 mph (64.4 km/h)—descended on the project site.

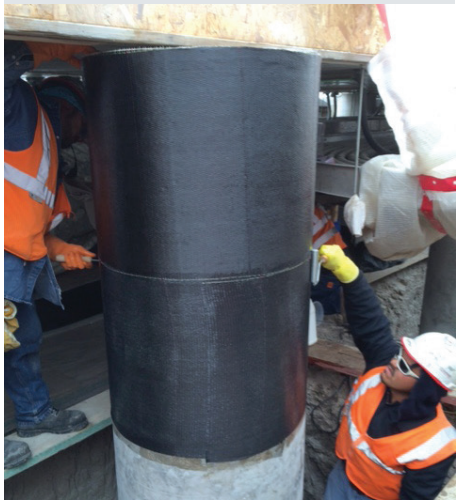
Thankfully, the construction team had anticipated the inclement weather beforehand and built temporary tenting around the exposed columns. The team also pumped in propane heat to elevate temperatures in the work area to 60 °F (15.5 °C) and kept backup heaters on stand-by. This was a critical component of the process, since the failure of any one heater would have compromised the FRP installation. The RenewWrap™ system was installed and coated with an UV-resistant paint within the two-week schedule.

RESULTS

Once applied, the RenewWrap system not only provided additional strength to the columns, but also functioned as a protective waterproofing membrane to the concrete.

PROJECT DETAILS

Application: FRP System to Strengthen Concrete Columns
Client: Natural Gas Plant
Location: Colorado
Product Used: RenewWrap FRP
Installation: November 2014



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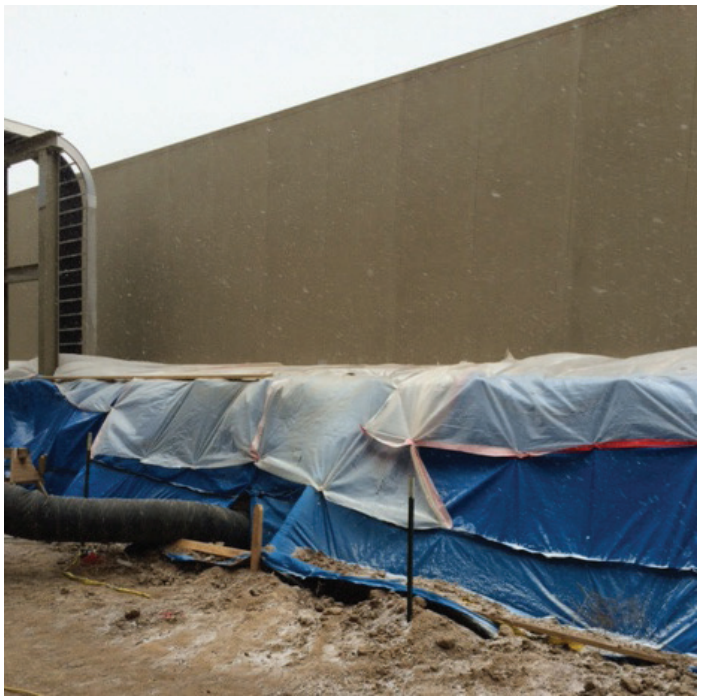
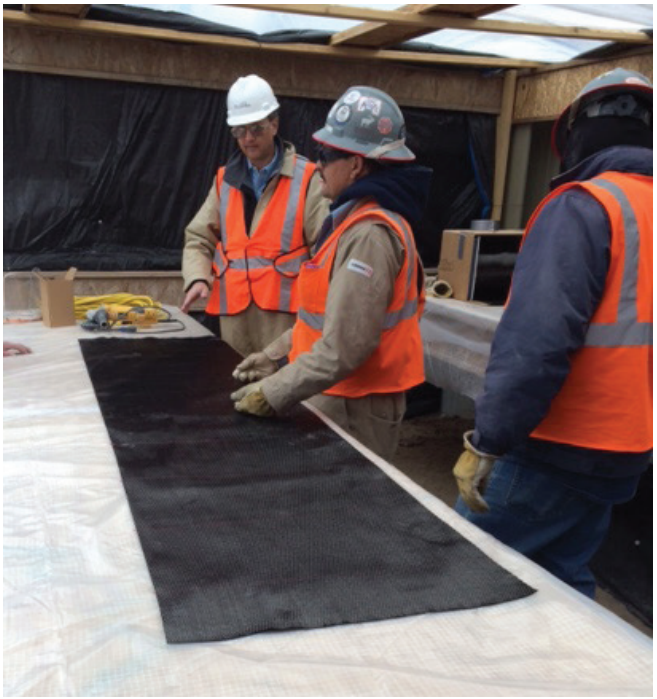
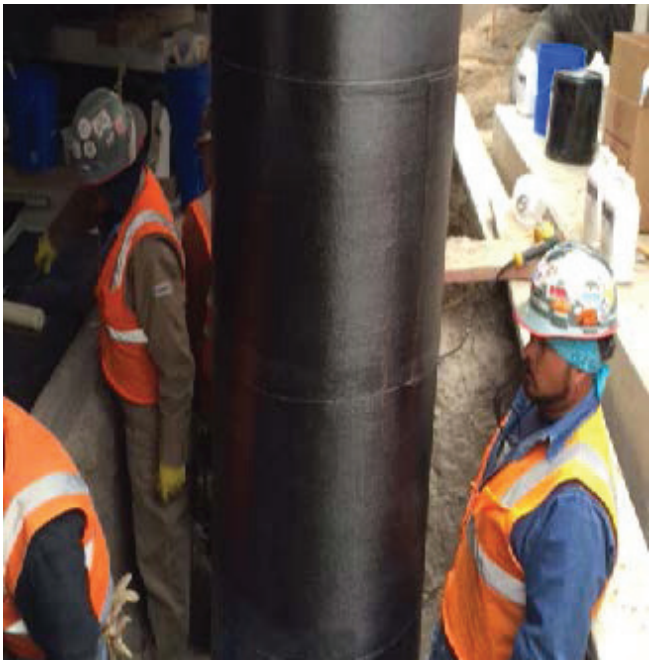


The columns were part of the construction of a new natural gas plant in Colorado



Preparing the fabric to install around the columns

The wrap was covered with a UV-resistant coating



The columns were successfully protected and strengthened with the FRP solution

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Before using any GeoTree product, the user must review the most recent version of the product's technical data sheet, safety data sheet and other applicable documents, available at www.geotreesolutions.com or by calling +1.855.655.6750.

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