



RHINO
CARBON FIBER
REINFORCEMENT PRODUCTS

CFRP CASE STUDY

RESIDENTIAL BOWED BLOCK (CMU) WALL REPAIR



LOCATION

Hastings, New York

CLIENT

EcoSpect, Inc.

PRODUCTS USED

- Rhino Carbon Fiber™ Bowed Wall Repair Kit (Unidirectional, Vertical): 400 GSM in 7-Foot Height and 6-Inch Width
- Rhino Carbon Fiber™ CFRP (Bidirectional): 560 GSM in 12-Inch Width
- RCF™ Saturant-Adhesive Epoxy

CASE BACKGROUND

A contractor from EcoSpect out of Syracuse, New York was called out to look at a bowing concrete masonry unit (CMU) wall discovered in the basement during a home inspection being performed for a real estate transaction.

EcoSpect determined that CFRP would be the best solution to strengthen the wall to prevent further inward movement while minimizing the cost, labor and intrusiveness of the repair. When a wall bows more than 2", the repair becomes more cumbersome and costly, so the issue was addressed before the situation became worse.

By using CFRP, EcoSpect was able to provide the homeowners a more cost effective solution than would be possible with traditional methods. Excavating and pushing the wall in would be more expensive and there would be access restrictions to consider. If the homeowners wanted to go through with the expense of pushing the wall back, CFRP would still be applied to strengthen the wall to prevent it from bowing again. Beams and tieback systems were also considered since they provide resistance against deflection but they do not strengthen the entire height of the wall. Without

adding strength from top to bottom, as is achieved with the **Rhino Carbon Fiber™ Bowed Wall Repair Kit**, failures are still possible. EcoSpect contacted **Rhino Carbon Fiber™** and reviewed their line of bowed wall repair kits and determined that the **400 GSM Rhino Carbon Fiber™ Bowed Wall Repair Kit (Unidirectional, Vertical)** in 7-foot height would be the best solution to reinforce the wall due to the 400 GSM's superior strength in one direction. Three additional walls would also be reinforced as a preventative measure. **The Rhino Carbon Fiber™ Bowed Wall Repair Kit** bonds CFRP to the sill plate (top) and foundation (bottom) to prevent shear damage and utilize the complete tensile strength of CFRP. This gave EcoSpect confidence in their decision.

THE SOLUTION

Proper surface preparation is one of the most important steps when installing CFRP. EcoSpect prepared the walls by grinding them to ensure the straps were engaged to their full capacity in order to resist any further inward movement of the wall, and to ensure a strong epoxy bond. Next, they repaired the damaged mortar joints. To complete and ensure the repair was water-resistant, the cracked mortar needed to be knocked out and the joints were tuck-pointed. If the joints were not repaired properly, the walls were at risk of receding during the summer months when the moisture content of the soil is lower. Allowing any movement of the wall will further deteriorate the mortar joints which could create a wrinkle in the carbon fiber, decreasing the effectiveness of the repair.

Nine **Rhino Carbon Fiber™ Bowed Wall Repair Kits** were applied across the four surface-prepped walls for a total of 26 straps. In addition, a single strap of 560 GSM, 12-inch wide **Rhino Carbon Fiber™ CFRP (Bidirectional)** was applied along the upper course of block over the mortar joint that had started to open up where the movement manifested. The additional bidirectional strap provided strength in all directions. It was applied to increase the bond strength on the ends of the straps eliminating the possibility of a premature bond failure.

The homeowners were thrilled they wouldn't lose any square footage (due to CFRP's thin profile) as is the case with traditional bowed wall repair methods such as steel beam reinforcement. The CFRP could easily be painted over which meant there would be no visible trace of damage. EcoSpect was able to successfully reinforce the walls quickly and efficiently resulting in a successful real estate transaction for the homeowners.



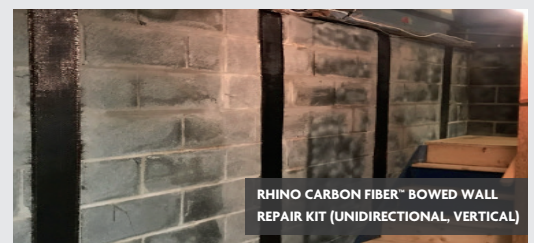
BLOCK (CMU) WALL PRIOR TO PREP



PREPARED BLOCK (CMU) WALL



RHINO CARBON FIBER™ CFRP (BIDIRECTIONAL)



RHINO CARBON FIBER™ BOWED WALL REPAIR KIT (UNIDIRECTIONAL, VERTICAL)

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