RHINO™
CARBON FIBER REINFORCEMENT PRODUCTS

CRACK INJECTION & CFRP CASE STUDY

BASEMENT CRACK REPAIR WITH INJECTION AND CFRP

LOCATION
Oakville, Ontario

CLIENT
Pro Waterproofers

PRODUCTS USED

- RCF™ Polyurethane Injection Expanding Foam Kit
- Rhino Carbon Fiber™ Crack Repair Kit (Bidirectional)

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CASE BACKGROUND

The owner of Pro Waterproofers was called out to inspect a water leak in the basement of a residential home in Oakville, Ontario after the homeowner noticed wet drywall in one corner of the basement. The homeowner also noticed a crack that extended above the soil line which was visible from the backyard. The wet drywall and insulation were removed, revealing a foundation crack.

Pro Waterproofers concluded that the **RCF™ Polyurethane Injection Expanding Foam Kit** along with the **Rhino Carbon Fiber™ Crack Repair Kit (Bidirectional)** would be the best option for the repair due to the bidirectional carbon fiber's strength in all directions.

Pro Waterproofers suggested to the homeowner that the crack be filled with expandable polyurethane foam to fill all the concrete capillaries and to waterproof the area, and then the entire crack would be strengthened with carbon fiber reinforced polymer (CFRP) to prevent the crack from expanding. The homeowner was thrilled to learn that CFRP is high-strength, cost-effective, resists corrosion and is easy-to-apply. Pro Waterproofers was hired by the homeowner to be the applicator for this repair.

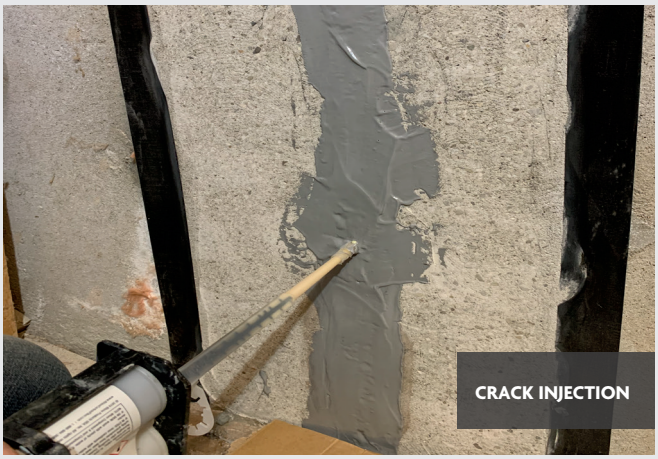
THE SOLUTION

The concrete surface was prepared prior to application. Pro Waterproofers used a rotary hammer and chisel to remove any loose debris in and around the crack, filled small cracks at the bottom of the main crack with quick-setting structural repair mortar, then used a grinder with dust-collection shroud to create a clean and rough surface to ensure a strong epoxy bond (a dust extractor with HEPA filter was used to keep the dust to a minimum).

Injection ports were then applied over the crack approximately 18" apart with **RCF™ High Strength Anchoring Epoxy Paste**. Once the anchoring epoxy paste adhering the ports to the wall cured, the **RCF™ Polyurethane Injection Expanding Foam** was slowly injected into the ports one at a time, starting at the bottom, until the entire cavity was filled. Water in the crack acted as a catalyst for the polyurethane foam as it expanded to 15x its volume, preventing further leakage. Polyurethane foam extruded from the top of the wall as well as from the other side of the crack in the backyard. Once the polyurethane foam cured, the injection ports were cut off with a saw as to not disturb the smooth and cured anchoring epoxy paste around the ports, and the port cavities were filled with more anchoring epoxy paste to create a smooth application surface for CFRP. As a final step, the **Rhino Carbon Fiber™ Crack Repair Kit (Bidirectional)** was applied over the surface of the crack. The 8-foot long, 12-inch wide strap of CFRP covered the entire crack as well as some of the surface area on either side of the crack. Most crack repairs stop at the injection stage but the crack can continue to spread as the main purpose of injection material is waterproofing and not structural strengthening. Strengthening the cracked area with CFRP is an essential step to prevent further movement and crack expansion, and adds an additional layer of protection for waterproofing. The homeowner was very pleased with how neat and professional the repair turned out.

CRACK PREPARATION

CFRP APPLICATION



CRACK INJECTION

COMPLETED REPAIR

1-888-684-3889 **www.rhinocarbonfiber.com** **info@rhinocarbonfiber.com**

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