

CARBON FIBER CONCRETE DOCK CRACK REINFORCEMENT

COAL HARBOUR, BRITISH COLUMBIA



The Royal Vancouver Yacht Club, located in Coal Harbour, British Columbia, stands as one of the world's premier yacht clubs. Year after year, its thousands of members enjoy the world-class facilities and exclusive access to some of the finest boating opportunities in the Pacific Northwest.

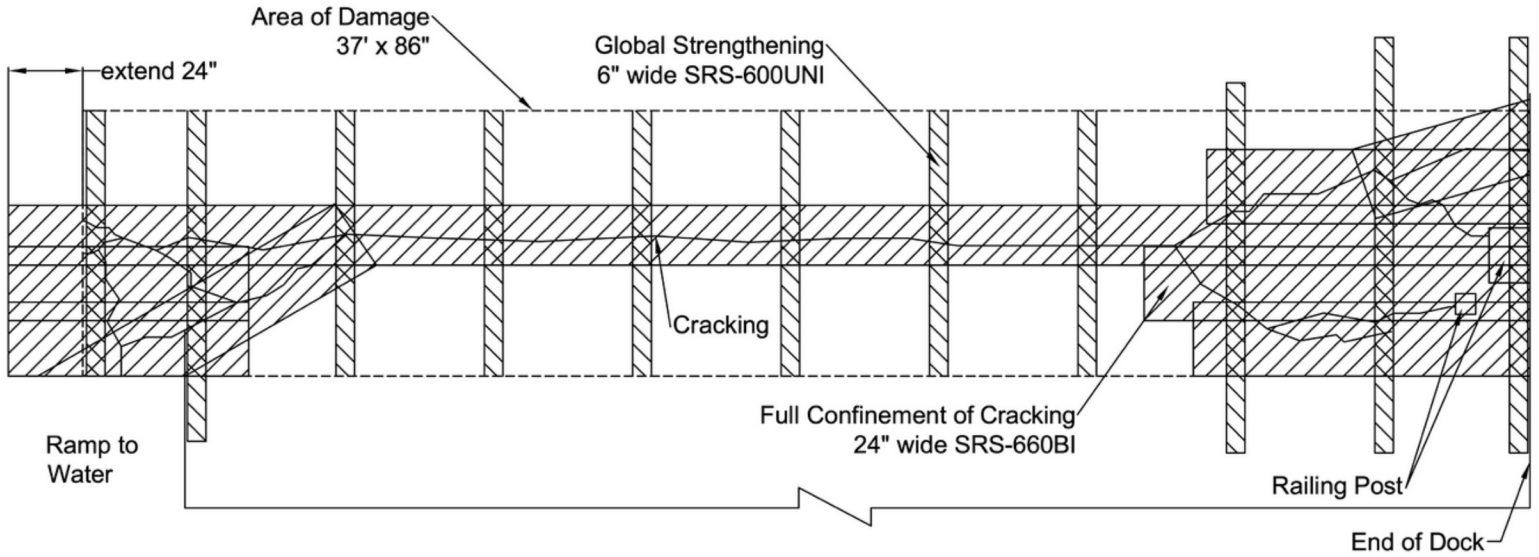


However, the oceanfront environment in the Burrard Inlet can present unique challenges for property owners. From December to February, winter storms can usher in strong winds, which can elevate water levels in this region by 20 to 40 - 50 inches (50 - 100 cm) above the normal levels.

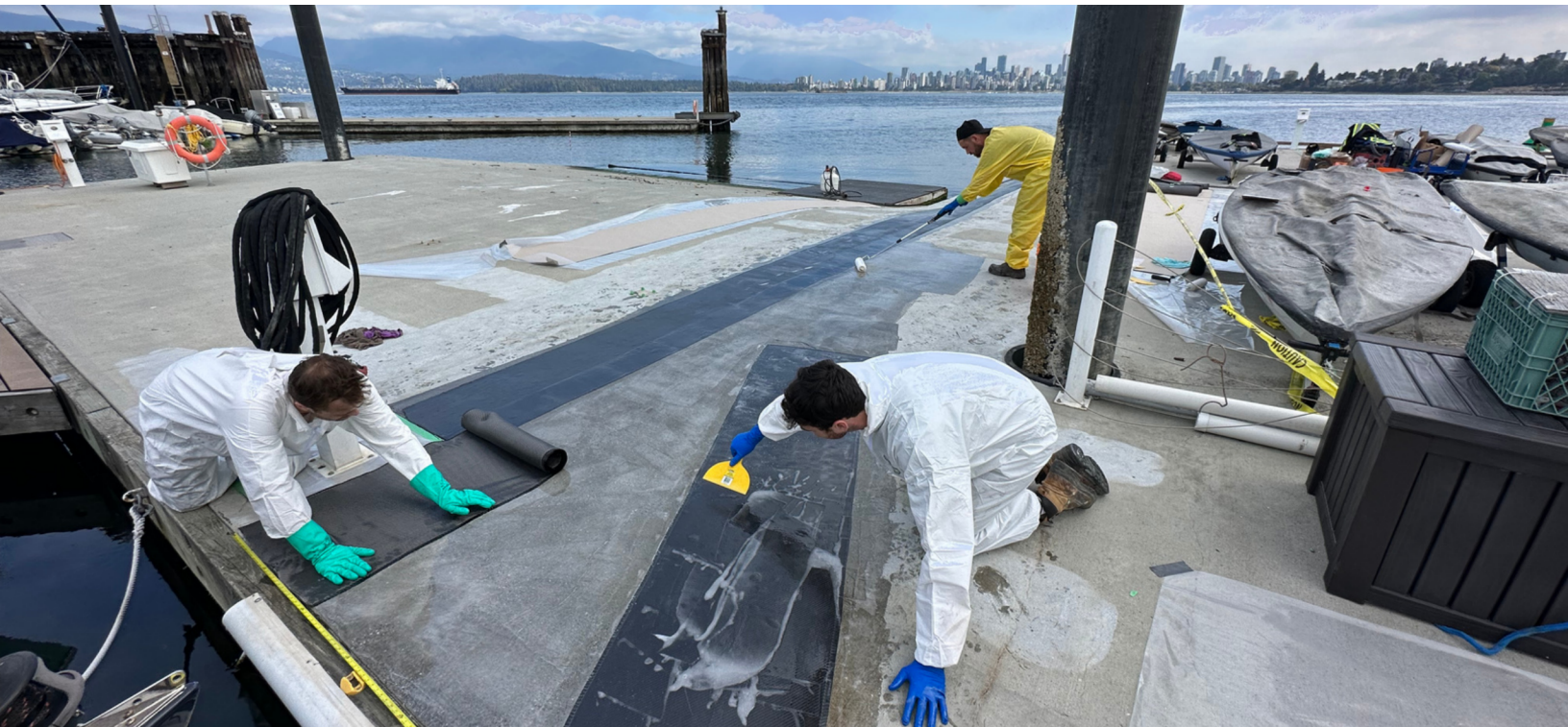
These occurrences, known as storm surges, can lead to complications when they coincide with king tides, which are exceptionally high seasonal tides occurring three or four times a year during the winter season. Consequently, the significant floating concrete docks along the waterfront face substantial stresses, necessitating high-strength solutions capable of withstanding these forces.



The floating concrete boat ramp on one of the docks at the Yacht Club was experiencing extensive cracking. Zervan Engineering, out of North Vancouver was contracted to inspect the damage and look for possible repair options. Zervan reached out to Structural Reinforcement Solutions for a non-corrosive engineered composite repair solution that utilized SRS' Carbon Fiber Strengthening Systems.



SRS provided a CFRP solution to provide reinforcement and waterproofing of the cracked areas as well as globally strengthen this area against future damage. To accomplish this, 24" SRS-660 Bidirectional Carbon Fiber was specified to confine the cracking, along with 6" SRS-600 Unidirectional straps placed perpendicular to the cracks to provide global strengthening across the area. These straps offer more than 2 x the strength of #4 rebar and are applied to the surface of the concrete. This non-invasive approach minimizes disruption to the concrete, resulting in a non-invasive repair with significantly reduced downtime to the area.



A specialized structural epoxy resin, designed to saturate the fabric and bond it to the concrete, was applied to the surface prior to the wet layup process. The SRS-24" bidirectional fabric was cut to exact lengths and rolled out over the concrete surface and embedded into the epoxy resin to form a composite strengthening system for crack repair and confinement.

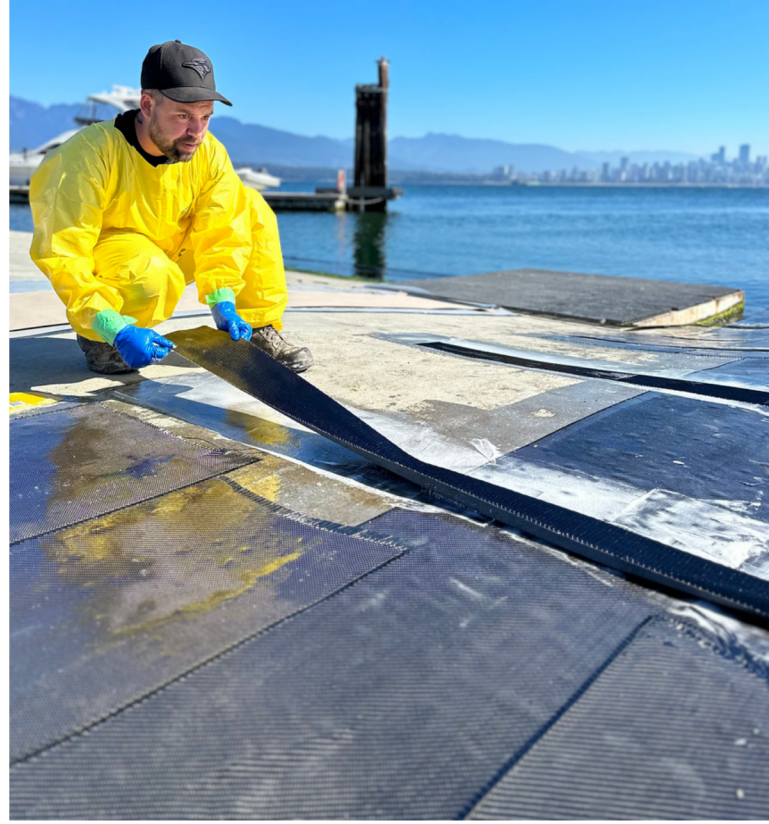
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SYSTEMS**

SRS collaborated with Retro Specialty Contractors based in Vancouver, BC. Their extensive experience installing CFRP on major infrastructure rehabilitation projects throughout the region, including the Burrard Bridge, BC Place, and the Vancouver Airport Authority, led to Retro to be awarded the waterfront dock strengthening project.



On day two of the installation 6" SRS-600UNI straps were applied to over the bidirectional to complete the global strengthening of the area and feathered into the previously installed CFRP to conceal the edges of the fabric.



The layout of the carbon fiber was mapped out onto the concrete surface, which was prepared to achieve an optimum surface profile for carbon fiber embedment. This critical step ensures that any surface contaminants are removed, further opening the pores of the concrete to maximize the adhesion of the carbon fiber to the surface. Additionally, this light scarification of the concrete allows the ultra-thin CFRP (Carbon Fiber Reinforced Polymer) to lie flush with the surface.

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CARBON FIBER STRENGTHENING SYSTEMS

The complete installation permanently strengthened the concrete dock against future storms while significantly increasing its service life. A final coat of sand was broadcast over a layer of wet epoxy to protect the installation from UV exposure and form an abrasion resistant non-slip finish.



SRS takes pride in its pivotal role in backing essential infrastructure projects along North America's shorelines. The success of the Royal Vancouver Yacht Club project exemplifies our proficiency in pioneering structural repairs, addressing the requirements of waterfront infrastructure restoration, and ensuring their long-term functionality.

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