Concrete Column Repair

Emergency Bridge Column Repair

The New York State Department of Transportation, District #6 (NYSDOT), operating under an emergency repair contract, effected repairs on Bridge no. 7012680 and 7012690 on Route 17 in Painted Post, New York.

The bridge, built in 1952, was structurally sound but was exhibiting serious spalling on the columns. This bridge supports the Norfolk Southern Railroad over Route 17. The bridge consisted of four columns that were approximately 5 feet in diameter and 12 feet high. They were damaged primarily due to weathering, freeze/thaw cycling, and the use of salt in winter conditions.

The NYSDOT elected to use Aquawrap® for the repair of the columns supporting the bridge. The columns were first patched using cementitious materials. The column's shape was restored and the installation process began.

The first layers consist of Aquawrap® G-05, which is a heavy 22 oz. fabric. This is later covered with the G-03 fabric, a much tighter weave that provides a smooth surface.

Using our water-activated prepreg Aquawrap®, the installation was accomplished in a timely matter, with little waste of time or material. The low temperatures encountered during the installation posed no delay, as might have been the case using an epoxy based system.

Contact us for a copy of the report.

Aquawrap® is the simplest, most cost-effective repair you can find

External damage to concrete column

Filler material used to restore shape

Aquawrap® G-05 Installation

Completed Installation

Metal Structures

Sign-Structure Repair

Several states utilize welded aluminum structures to support freeway and throughway signage. These structures are continuously battered by wind and vibration loads, freeze-thaw cycles, and other environmental conditions. These extra loads have put undue stress on the welds which has caused them to be damaged. In some cases, the welds at the joints of these structures have either partially or fully cracked. The exact failure mechanism has not been isolated, but the need to reinforce them is urgent.

There are dozens of different shapes, angles, and sizes of joint members, so construction of reinforcement clamps wasn't practical. Welding was not preferred, as that was the problem in the first place, and field welding over traffic was difficult at best.

In cooperation with universities and state agencies, Air Logistics has developed and tested a field applied FRP repair system which is currently in use to repair the cracked joint welds. Several joints with cracked welds were cut from dismantled sign structures and repaired with the FRP repair system. these samples were tested a the University of Utah in a series of tension tests and proved to be as strong as sound aluminum welds.

A second series of endurance tests was also conducted. In this series, two test specimens were set up and subjected to long term cyclical loads. The first included a composite reinforcement over a failed weld. The second specimen was a sound weld with no defects.

The final results were compared and it was determined that the composite reinforced welds performed as well as, or better than, a sound weld with no defects under a cyclical load.

A thorough field procedure has been developed and implemented for this repair. Surface preparation is crucial, and the procedure includes specified cleaning chemicals, abrasives, and safety gear. By using a kit concept, all the materials needed to do the job are readily available. Technicians are trained and certified for installations and most jobs can be done in less than one day.

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Typical Sign Structure

Cracked Weld in Sign Structure

Aquawrap® Installation

Three Point Configuration

Externally Corroded Pipeline

Corrosion pitting on buried pipelines can be an expensive problem. Thousands of dollars each year are spent repairing, replacing, and protecting pipelines from the damaging effects corrosion can cause.

The line shown here was a 24" natural gas line that normally operates upwards of 900 psi. During normal inspection procedures, this section of piping was found to have severe corrosion pitting, nearly 80% wall loss in some areas. This condition required an immediate repair.

Aquawrap® was chosen for the repair material.

After sandblasting to a NACE No.2/SSPC-SP10 finish, the pitted areas were filled with a high-compressive strength load-transfer compound. This is used to transfer the load of the piping to the composite material as the damaged area reaches its yield point.

Our BP-1 Primer System was applied over the entire repair surface to provide an interface between the steel and the composite. When tacky, the installation of Aquawrap® began. Using in-house design calculations, the proper amount of layers were installed to bring the pipeline back to the required strength.

When all the layers have been applied, Stricture Banding™ is used to compress and consolidate the installation. This process forces air out of the installation, allowing a solid composite lay-up to be formed. After a 1-hour cure time, the Stricture Banding™ was removed and the line was coated with a standard pipe tape material.

Aquawrap® is the perfect solution for quick repairs on DOT regulated pipelines. Click here for more information.

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Side Note: Past repair procedures for this pipeline owner required the fabrication of a steel enclosure that could be welded or bolted to the line. Measurements are taken during inspection and the repair part is manufactured off site and then transported the job. If measurements are incorrect, for any reason, the part must be modified. This also holds true for fixed width, non-metallic repair systems. Aquawrap® is flexible and can handle small changes in the job parameters. A good example of this situation occurred on this job. The initial inspection found corrosion to be within a 24" area along the pipe. After sandblasting, more corrosion was found. This brought the corrosion length to 28". If a steel repair sleeve had been made to exacting specifications, which is usually the case, it would have been too short. This would have caused a lost work day for the crew. Keep in mind, the crew probably would have been a welder, welders assistant, safety watch, backhoe operator, and a

supervisor. It would have also meant modification of the sleeve. In any case it would have cost the pipeline owner a significant amount of money and a two or three day delay. In contrast, all the Aquawrap® installation crew had to do was have the calculations checked to see if there was enough material to cover that extended area. The requirements were verified and the crew was given the go ahead. The technicians were able to cover the extra four inches while maintaining the layer requirement.

Corrosion pitting was nearly 80% deep

Aquawrap® being applied around pipe

Stricture Banding™ is used to compress and consolidate the composite

Final Result

Splash Zone Repair

Innovative FRP Piling Repair without the use of Coffer Dams

Steel reinforced concrete bridge and pier pilings are subject to splash zone damage in both fresh and salt water areas (Figure 2). The damage to the concrete is usually caused by abrasion or impacts by wave and tidal action, collisions with marine vessels, and normal spalling. In addition, oxygen and water penetration can cause corrosion of the reinforcing steel.

When this happens, the resulting expansion causes the concrete to fracture. The corrosion of steel in these structures is exacerbated in the splash zone due to the combination of salt-water and oxygen present in this area of the piling. The damage to the pilings may be cosmetic or structural. In either case, the repair system must restore the piling and reduce further deterioration.

Splash zone and underwater repair of concrete pilings using composites has traditionally been accomplished by utilizing coffer dams. This repair was successfully completed on two steel reinforced concrete pilings on a bridge over the North River located near Wilmington, North Carolina. Aquawrap® uses a unique water activated urethane resin system coupled with a custom woven fabric that can easily be applied to round or rectangular pilings under water. The pilings were prepared with an underwater epoxy adhesive and then wrapped with this material. The river water activates the resin and cures the system. The particular system used has no VOCs and is approved for drinking water use, making it attractive for use in environmentally sensitive areas.

Contact us for a copy of the report.

Aquawrap® is the simplest, most cost-effective repair you can find.

External cosmetic damage to concrete pile


Filler material used to restore shape


Aquawrap® Installation Complete


Final protective coating applied

Utility Repair

Wooden Utility Pole Repair

Woodpeckers, hunters, run-away cars... many different things cause damage to utility poles. When the damage is structurally dangerous, the pole either has to be replaced at a huge expense, or a practical field repair must be devised. Aquawrap® has become a very viable solution to this problem.

Although many laboratories and customers have test Aquawrap® in almost every conceivable way, the pole manufacturer had to have hard data on the performance when applied to old, weathered, treated wood poles. The tests showed that a severely damaged pole can be rebuilt in the field, using Aquawrap® and when subjected to enough bending load, the pole would always break somewhere out in the "good wood" areas, away from the repair.

Air Logistics has worked with the customer and now produces exclusive, custom-designed material that provide field workers with just the right amount of material to repair the pole as

needed. This material is tinted to match the color of the wooden pole, thus saving labor on expensive paints and coatings.

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Initial Layer of Aquawrap® G-05

Simple Installation

Final Coat of Aquawrap® G-03

Pole Bent to Test Strength

Timber Pile Repair

A transportation department had found some timber piles under a bridge that had suffered compression damage. In some cases, the piles were completely holed through and the pile provided no support at all. Reinforcement was required to keep the pile from completely breaking in two pieces.

A special application of Aquawrap® was chosen to strengthen and reinforce the pile. First, our BP-4 Primer/Coating was applied to fill in small cracks and voids. BP-4 can be applied in dry and wet conditions and cures in about 2 hours. Large voids were left open in preparation for grout injection. Next, Aquawrap® was installed around the pile, covering all damaged areas, above and below the water line. The composite was allowed to set up, about 2 hours, and then the injection process began.

Starting at the bottom, small holes were drilled into the composite every 12". A high compressive strength epoxy grout was then injected into the column to provide a solid structure. Air and water were pushed out of the voids as the epoxy was injected from the bottom up. This continued until the column was full. The injection process was closely monitored for heat buildup from the epoxy reaction. If too much epoxy was injected at once, the exotherm could cause shrinkage and damage to the repair.

The entire project took less than one day. This type of repair allowed the agency to keep the road open and traffic flowing. Replacing the pile would have required road closures and very long detours.

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Damaged Timber Pile

Bridge Supports

First Layer of Epoxy Coating

Aquawrap® Installation

Final Layer of BP-4 Coating