

## Project Info

-  November 2014
-  CC5™ Batched Rolls
-  31m<sup>2</sup>
-  Transverse layers
-  Lewis County, Washington, USA
-  Lewis County maintenance crews
-  CC was used to repair an eroded culvert located in an environmentally sensitive fish habitat



Completed culvert

In November 2014, Concrete Canvas® (CC) GCCM was specified to reline a steel corrugated culvert pipe in Lewis County, Washington, USA. The material was supplied by Concrete Canvas Ltd's sales and distribution partner, Nuna Innovation Inc. who brand the material as Concrete Cloth.

The existing pipe, which measured 5ft high, 7ft wide and 34ft long, had broken down as a result of flow erosion and weathering. Water was flowing through the bottom of the culvert and was compromising the base soils below which, in turn, threatened the integrity of the road above. This culvert rests below a rural country road, heavily used by logging trucks. A road closure, which would be required to replace the culvert, was not an option at this time.

CC was a much more cost effective solution for this problem and was chosen due to its speed of installation, its ability to easily accommodate changes in culvert profile and its minimal environmental impact. CC has a low alkaline reserve, allowing it to be used in live watercourses without any adverse effect to the local ecology. CC has been recognised for these types of application by the UK's Environment Agency. This unique material property was important for this particular project as the material would be installed into an environmentally sensitive fish habitat.

To facilitate installation, a stream bypass was installed to divert water around the work zone. The work zone was then isolated with cofferdams while a fish rescue was performed and the site de-watered. Sediment laden water was pumped downstream to a grassy area where water was filtered prior to rejoining the stream channel.

\*Geosynthetic Cementitious Composite Mat



*Isolating with cofferdams*



*De-watering site*



*CC laid transversely across culvert floor*



*CC post-installation, prior to trimming and sealing of edges*



*Tar used to seal material edges*



*Water catchment for pH testing*



*Site re-visited in January 2015*

The installation was completed over two days; the first day, the crew of five workers installed the CC, before hydrating it and leaving it overnight to set. On the second day, the CC edges were sealed using caulk.

The CC lining covered an area of approximately 10ft wide and 34ft long. A minimum overlap of 4 inches (approximately 100mm) was given between layers. Self-tapping stainless steel screws were used to fix the CC to the culvert, placed approximately every 4 inches (100mm) along the sides of the culvert, and every 18 inches (approximately 450mm) along the culvert floor. The use of the caulk to seal the CC edges prevented any ingress and protected the edges of the material, while offering an additional fixing method to secure the material in place. Tar was also applied over the edges to ensure a water tight seal. At the inlet and outlet of the culvert, CC was wrapped and fixed beneath the culvert pipe and substrate placed to fill existing voids.

Once installation was completed, pH monitoring was carried out as water was introduced to the material for hydration. Any excess water in the work zone was pumped to an upland where it would infiltrate. Once the CC had hardened, the water was pumped through the culvert, tested, and pumped to an upland until pH readings were within 0.5 units of the background readings between 6.5 and 8.5 units. Once complete and pH readings met the required levels, the cofferdams were removed and the stream allowed to flow freely.

The client was pleased with the installation, noting that the CC was delivered on time and well-packaged. Workers were trained on-site and the project ran smoothly. After numerous high-flow events during the months following the completion of the project, the CC was still performing as designed. Overall, Lewis County rates the project a success.