

# Anna River Culvert Replacement Project

Sedimentation control using polymer enhanced best  
management practices

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The Anna River culvert replacement project was carried out in the fall of 2010. The Anna River is 7.1 miles long and is located in Alger County just southeast of Munising in Michigan's Upper Peninsula. An old metal culvert on Perch Lake Road was beginning to rust away and there was concern it would collapse and bury the Anna River. Perch Lake Road is the only access for homeowners on Perch Lake and logging plots in the area. Liz Coyne a project manager for Alger County Conservation District contacted Steve Iwinski of Applied Polymer Systems, Inc. (APS) to consult on watershed restoration and erosion control project. An anionic water soluble polyacrylamide was used to control the inevitable sediment and turbidity caused by the construction. Permits are required when using polymer chemical treatment within the waters of the State of Michigan (Rule 97). A permit was obtained through the Michigan Department of Environmental Quality before the project was started.

Both APS Floc Logs and Silt Stop Powder were used in this project to ensure that no sedimentation or turbid water was allowed to leach into the river during construction. As a preventative measure, eight (8) APS Floc Logs and particle curtains made of jute matting were installed 20-30 feet downstream of the site. The particle curtains were devised by stretching a rope across the river and attaching jute matting to it. These curtains served as a surface area of attachment for any flocculated sediment that traveled downstream after the reaction with the Floc Logs.

Before the excavation and repair work could be done on the culvert, a diversion channel had to be constructed. This channel allowed the old culvert to be isolated so it could be removed and replaced with the new concrete box culvert. The construction of the channel began by excavating at the side of the culvert down to the river level. At this point, sheet pilings were installed with a pile driver attached to an excavator ensuring correct assembly. Once the diversion channel was complete, limestone rock was used to line the channel.

The limestone rock was treated with polymer powder to prevent white plumes of lime sediment from going downstream. This process was very successful. The water flowing through the diversion channel was so clear that salmon could be seen swimming in the water.

Now that the water was being diverted work could begin on the replacement of the culvert. Once the old culvert was removed the area was excavated, graded, leveled and compacted. An impervious fabric liner was then installed to prevent erosion. The bedding material was stabilized with polymer powder to prevent sediment loss and stream contamination. Additional crushed limestone was put over the bedding material and treated with polymer powder to prevent white plumes of sediment from going downstream.

Once the site was prepped and the bedding materials in place, the sections of the cement box culvert were installed completing the new culvert. The area was then backfilled, graded and compacted in preparation for the new road over the culvert. All areas draining from the road to the stream (i.e. sides of slopes and box culvert) were soft armored using polymer enhanced mulch and matting.

Polymer powder was applied everywhere the soil had been disturbed except on the road surface. The polymer powder was also blended with the seed and fertilizer that was sown over all the bare soil. The application of the polymer with the seed and fertilizer prevents them from washing into the stream. The Floc Logs in the river were removed at the completion of the project. The particle curtains were laid on the forest floor to decompose.

The Anna river culvert replacement project took five (5) days to complete. A snow event occurred on the seventh day following completion of the project. The soft armoring and stabilization held throughout the winter months under the snow cover. During the spring breakup there was no erosion, sediment loss or rills and gullies formed. The Anna River project was a great success with newly established grass and clear water running down river. A highlight to the overall success was that there were no impacts or effects to the salmon run during the course of the construction.



This is the beginning of the removal of the old culvert using an excavator.



Floc Logs were placed downstream from the activity to treat any turbidity that is created from the disturbance. The sheet pilings were used to create the stream diversion separating the construction from the stream flow. An excavator was used to put the sheet pilings in place, slotting them together.





Floc Logs can be seen in the stream preventing turbidity migration.



Jute matting was installed downstream from the Floc Logs and the construction site. This collection field captured the flocculated particles from reaction of the Floc Logs and sediment.





The diversionary channel was treated and stabilized with polymer powder to prevent additional sedimentation from the rock. The rock itself would have caused a white plume in the stream.



Success is evident viewing the clear water flowing through the diversionary channel. The diversion channel has now isolated the old culvert so construction can begin.





Within minutes of opening the diversionary ditch, small salmon were seen swimming in the diversion channel.



With all of the water diverted, the old culvert could now be removed.



New bedding material was installed in preparation for the new concrete box culvert.



The installation of the new box culvert is beginning.



Adult spawning salmon are seen moving upstream through the diversionary channel all the while the box culvert is being installed.



Placement and assembly of the new box culvert is in progress.





Assembly of the new box culvert is continued



Looking through the culvert after all segments are assembled.





After the box culvert was finished, the backfilling, grading and compaction had to be done for the preparation of the new road surface.





Polymer enhanced rock check systems were installed along the ditch lines.



Polymer powder, fertilizer and seed were mixed together to be used to start the stabilization process on the all the bare disturbed soil along the edges of the road, ditches and all the places water will flow to the stream.



Polymer enhanced straw matting and jute was installed everywhere on the site except the road surface.





The mixture of the polymer, seed and the fertilizer was loaded into a spreader.



The polymer mixture was spread on all the soil that was disturbed. The polymer not only stabilized the soil but prevents the seed and fertilizer from washing into the stream.





The road stabilization is complete and vegetation is established. The above photos were taken one year after the completion of the project.