



## Emergency Watershed Protection (EWP) Program Success Story Laurel Avenue Project - Coventry, Rhode Island

### **Project Overview: Laurel Ave (Concordia Manufacturing, LLC and Anthony Mills) Pawtuxet Riverbank Stabilization Project.**

During the March 2010 storm induced floods, high flows damaged infrastructure upstream of the Anthony Mills and Concordia Manufacturing, LLC, which are located on the southern branch of the Pawtuxet River in Coventry, RI. In addition, severe bank erosion occurred along the Pawtuxet River banks and threatened the foundations of the mills. In response, an Emergency Watershed Protection (EWP) Program agreement was reached with the Town of Coventry for removal of existing damaged embankment walls, reconstruction of the riverbed, construction of new embankment walls, reconstruction of the areas located behind the new walls, and tying the new walls into the existing retaining wall below the upstream Laurel Avenue Bridge. Initially, NRCS completed temporary emergency repairs to stabilize the riverbanks and subsequently completed engineering tasks to complete permanent repairs to the riverbanks. In total, the project cost \$3,653,945 of which NRCS contributed \$3,330,771 while non-federal entities contributed \$323,174.

Regarding benefits, the project not only reduced soil erosion but it also generated jobs and tax revenue for Rhode Island. Local businesses were able to resume operations and continue providing employment to more than 40 employees. The net benefit of this project is approximately \$2,300,000. In addition, the construction related impact of the project generated an additional 40 direct jobs with an average annual salary of \$53,500 which, in turn, generated another 33 indirect jobs. It is estimated to result in over \$500,000 in direct and indirect income taxes for Rhode Island.

**Site Description:** This site suffered structural failure of mill buildings and severe erosion adjacent to bridge abutments and buildings. Both the right and left banks of the Pawtuxet River support large multi-level buildings with existing industrial manufacturing operations. Known as Anthony Mills, the building on the left descending bank was constructed in 1873. The building on the right descending bank was constructed in about 1900 and is the home of Concordia Manufacturing, LLC, a manufacturer of engineered textiles and other products important to the United States military.

**Problem:** During an historic flood event in March of 2010, flood flows along the Pawtuxet River eroded the riverbank at Concordia Manufacturing causing the side of the building to fall into the river and the parking lot was destroyed. The riverbank adjacent to the Anthony Mill also experienced significant erosion that threatened to undermine the mill structure. The floods also caused severe erosion which led to the failure of the Laurel Avenue Bridge abutments.

**Solution:** The USDA-NRCS provided financial and technical resources to a local sponsor in order to acquire engineering services necessary to analyze the damage and develop a temporary solution to stabilize the site. We provided the local sponsor with resources necessary for the acquisition of a construction contractor to implement the temporary work. Once the temporary solution was completed, NRCS partnered with the Town of Coventry, engineering firm Fuss and O'Neill, and general contractor Cardi Corporation to develop permanent solutions to the impacted area.

**Works of Improvement:** Upon entering an agreement with the RIEDC-Rhode Island Economic Development Corporation (local sponsor), NRCS took action to temporarily stabilize the riverbank at Concordia Manufacturing as well as the riverbank and foundation of the tower at Anthony Mills. Emergency actions taken at this location involved: **1)** pumping approximately 40 yards of flowable fill concrete grouting into voids beneath the subgrade of the foundation ballast for the tower; **2)** installing approximately 120 tons of rock rip rap ( $D_{50} = 36''$ ) and 150 Linear Feet of precast concrete blocks in order to support the toe of the wall and prevent the collapse of the banks; **3)** installing a cable anchoring system in order to support the riverbank at



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the foundation of the tower. The system consists of installing six 1” steel cables attached to an I-beam and strapped across the riverbank buttress below the tower. The 1” steel cables were then routed through the building’s foundation and anchored into two concrete masses (each approximately 8 C.Y. in volume) on the opposite side of the tower.

**Emergency Repair Cost:**

Total	NRCS Share	Local Sponsor Share
\$368,333	\$285,000	\$83,333

**Benefits:** Local businesses were able to resume operations and continue providing employment to more than 40 employees. The net benefit of this project is approximately \$2,300,000. In addition, the construction related impact of the project generated an additional 40 direct jobs with an average annual salary of \$53,500 which, in turn, generated another 33 indirect jobs. It is estimated to result in over \$500,000 in direct and indirect income taxes for Rhode Island.

**Permanent Repair:** NRCS and the Town of Coventry developed an agreement to work together to complete permanent stabilization of the Pawtuxet River corridor adjacent to the Concordia Manufacturing, LLC and Anthony Mills complex. Additional partners included engineering firm Fuss and O’Neill and general contractor Cardi Corporation. The work would protect the Laurel Avenue Bridge repairs that were in the process of being completed. The work involved permanent stabilization of the riverbank and removal of sand and alluvial deposits while replacing gravel and stone substrate that were washed away from the riverbed.

**Final Cost:** Site assessments and investigations were conducted by NRCS in order to determine the cost of this project. Initially, it was estimated that the permanent repairs would cost approximately \$2.5 million. Due to certain requirements to permanently reinforce the Laurel Avenue Bridge retaining wall with the retaining walls along the adjacent riverbanks and additional riverbank foundation stabilization requirements, the final project cost \$3.65 million.

**Project Completion Date:** December 8, 2015

Total	NRCS Share	Local Sponsor Share
\$3,653,945	\$3,330,771	\$323,174

## Laurel Avenue Photos



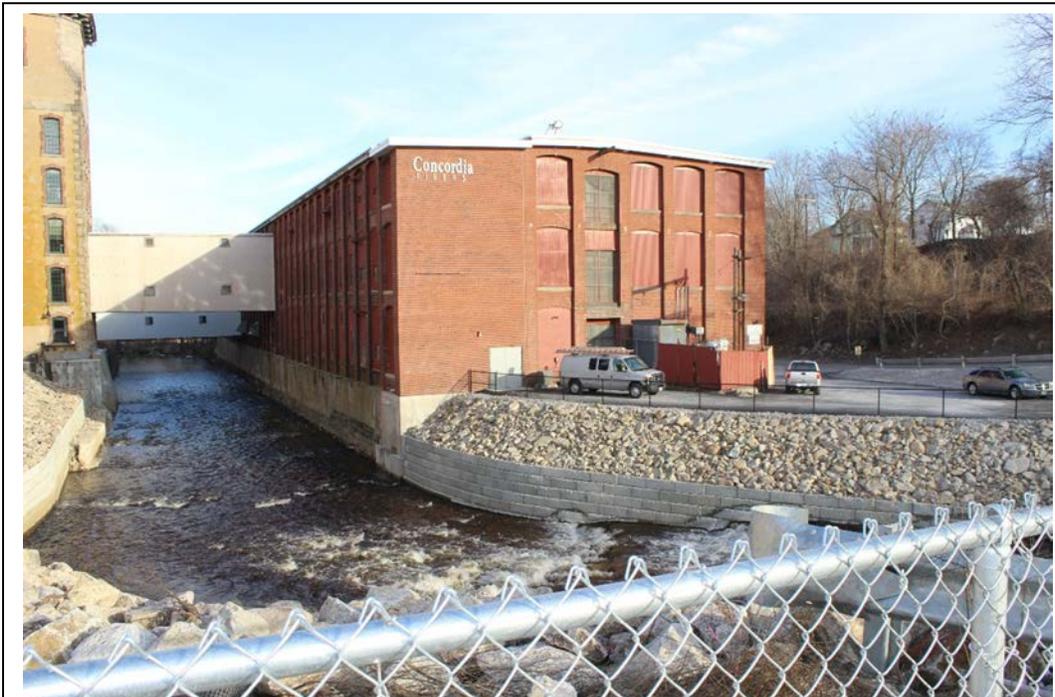
March 2010: Peak flood flows in the Pawtuxet River during the historic storm event. The riverbank is eroded but the building at Concordia Manufacturing is still intact.



Dec. 2015: The riverbanks on both sides of the river are reinforced to prevent soil erosion and prevent further damage to the building structure.



March 2010: Flood flows cause severe erosion of the riverbank. This led to a partial collapse of the Concordia Manufacturing building. As a result, the building was uninhabitable.



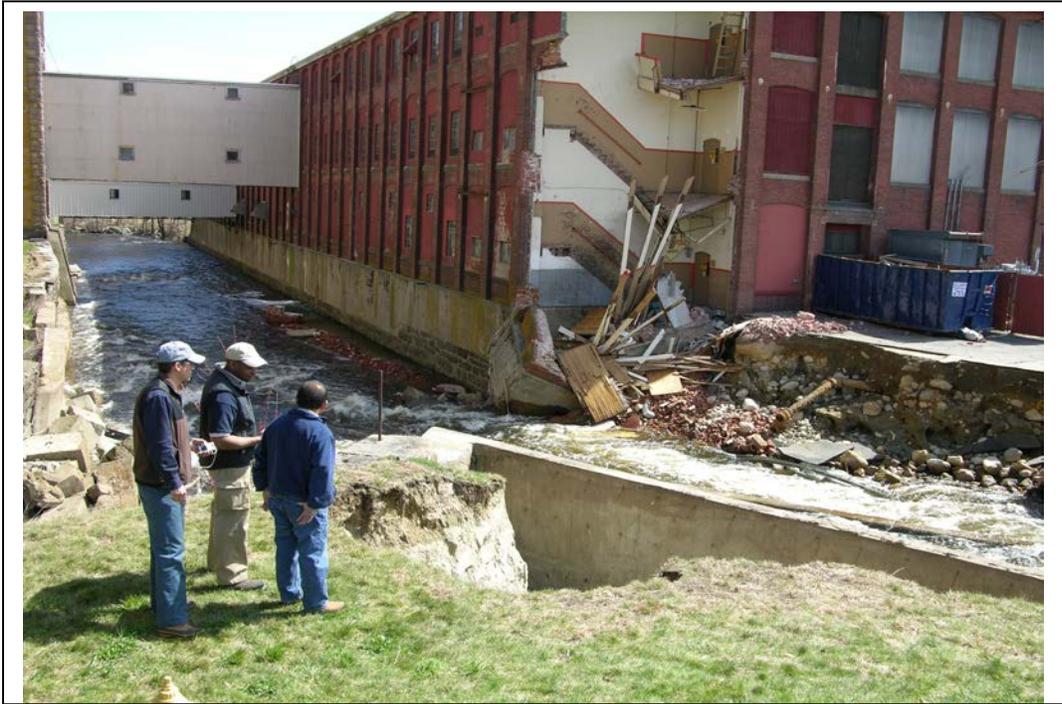
Dec. 2015: The Concordia Manufacturing building is repaired with a new staircase where manufacturing continues to contribute to the Rhode Island economy.



April 2010: Riverbank failure below Laurel Avenue Bridge in Coventry, RI; residents and property downstream need to be protected. The retaining wall collapses into the river.



Dec. 2015: Rows of arched rock weirs were installed to reduce channel velocity and strain on the riverbanks.



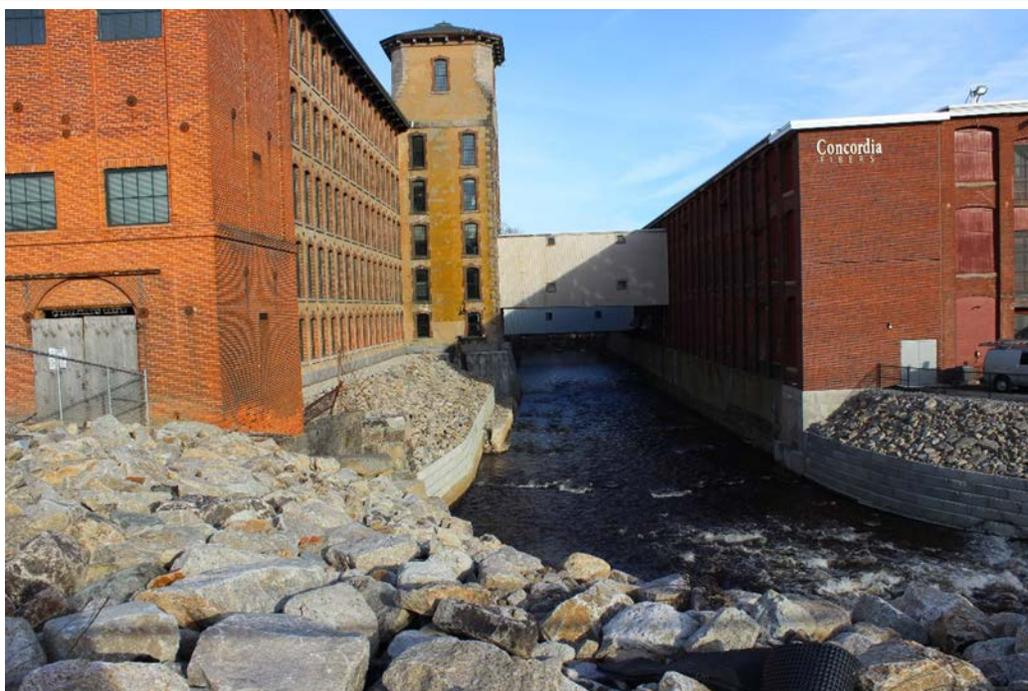
April 2010: Severe erosion has jeopardized the local businesses adjacent to the river, permanent repairs are necessary to ensure employment security and protect critical infrastructure.



Dec. 2015: The riverbanks on both sides of the Pawtuxet River are reinforced with stone retaining walls and rip rap fill to dramatically reduce soil erosion along the river.



June 2010: NRCS emergency repairs included providing rock rip rap and concrete armor along the toe of the severely eroded riverbank.



Dec. 2015: The project's success is based on a collaborative partnership including USDA-NRCS, Town of Coventry, State of Rhode Island, Fuss and O'Neill, and Cardi Corporation.



June 2010: NRCS emergency repairs included installing a steel cable anchoring system to prevent the further collapse of the mill tower. These efforts prevented the potential release of hazardous materials and further impairment of the river.



Dec. 2015: NRCS permanent repairs included installing reinforced concrete collar walls around the mill tower foundation.



April 2015: Fill is placed along the riverbank along with a temporary barrier so that rip rap can be installed to reinforce the location.



Dec. 2015: The gabion basket wall was replaced with a stone retaining wall and rip rap combination to further reinforce the banks of the Pawtuxet River.



Sept. 2014: A temporary platform and bridge are installed so that construction crews may build retaining walls abutting the mills' foundations.



Dec. 2015: Permanent repairs will help support sustained employment and continued manufacturing operations for the Rhode Island economy. They will restore health and safety within the watershed. As well, these repairs will preserve the economic viability of the mill complex.



Sept. 2014: State Conservationist R. Phou Vongkhamdy discusses the status of the project to U.S. Congressman Langevin, U.S. Senator Reed, and U.S. Senator Whitehouse.



The project's success is based on a collaborative partnership including USDA-NRCS, Town of Coventry, State of Rhode Island, Fuss and O'Neill, and Cardi Corporation.



Jan. 2016: The ribbon cutting celebration was held on Jan. 15, 2016 and included several partners along with U.S. Senator Whitehouse, U.S. Congressman Langevin, and U.S. Senator Reed.



Jan. 2016: NRCS staff celebrates at the ribbon cutting event with U.S. Senator Jack Reed. Pictures from left to right are Nat. Watershed Ops. Pgm. Mgr. Kevin Farmer, U.S. Senator Jack Reed, State Conservationist R. Phou Vongkhamdy, and Public Affairs Specialist Walter Marshall.



The project's success is based on a collaborative partnership including USDA-NRCS, Town of Coventry, State of Rhode Island, Fuss and O'Neill, and Cardi Corporation.



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