

# Village Stormwater Mitigation Abstract

2021 NCEES Awards Submission

This project takes place in a small Midwest village known for its scenic views and Swedish heritage. The community lies at the base of a 400-foot-tall bluff adjacent to the Mississippi River. Village businesses and homes are located close to one another and near the main drainageway that runs through the Village. With runoff intensity and frequency increasing, the community is concerned about heavy rainfall events that may increase flooding and erosion. In response to this concern, the Village desires a stormwater mitigation system to reduce upland runoff and safely convey the flows through the main drainageway in the Village.

In the 1950s, a concrete channel, indicated by the blue line in Figure 1, was built through the Village to control the flow of stormwater with the intention of protecting the Village and the railroad tracks that pass over the drainageway. Since then, the channel has developed areas of disrepair and sediment deposits that result in vegetation impeding the flow of water through the channel. To successfully mitigate flooding risk, the channel will need to be refurbished and/or upstream detention or retention methods will need to be implemented to lower the peak flood rates.

In collaboration with four P.E.s, an architect, Village officials, and community stakeholders (landowners, business owners, farmers), a team of four undergraduate engineering students worked to develop designs for stormwater mitigation, channel repairs, and outdoor public space.

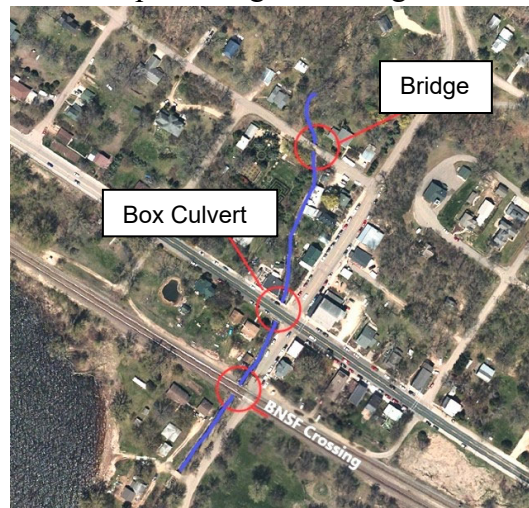


Figure 1: Aerial view of the project site.

The students began by developing three design alternatives and preparing a concept design for each. Having achieved an understanding of the engineering, environmental, and public constraints, they prepared an evaluation matrix in which weighted decision criteria were applied to each concept design. Based on input from their collaborators and a panel of experts from the engineering community (including two P.E.s), the team recommended the Central Pond Location design, which incorporates a large retention pond and green space for a community park and walking path.

The design required the use of multiple engineering disciplines (geotechnical, structural, hydraulic, construction, and hydrologic) and an understanding of applicable codes. Since the design was to be constructed on land not currently owned by the Village, the team also researched funding sources for the acquisition of easements to construct the new pond and connect it to the concrete channel, and surround the pond with public green space.