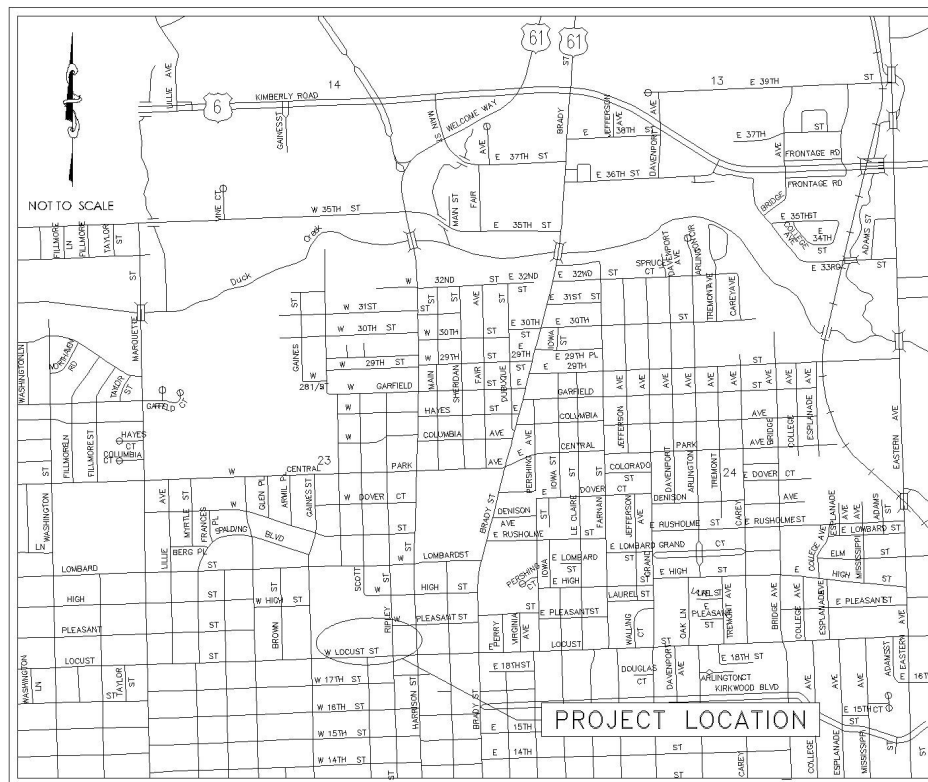


Duck Creek Watershed Storm Water Drainage and Conveyance Improvements Davenport, Iowa

Project Final Report Project Number: 9031-016



LOCATION MAP

**Project Name: Duck Creek Watershed Storm Water Drainage and Conveyance
Improvements**

Project Sponsor: City of Davenport, Iowa

Length of Project: May 15, 2010 to July 1, 2013

Total WIRB Funds awarded for this project: \$400,000

Project Number: 9031-016

Project Objectives

- Administer the St. Ambrose University Storm Water Drainage and Conveyance Improvements Project to ensure all objectives and activities planned are implemented.
- Install practices to decrease frequency and magnitude of flooding on St. Ambrose University campus and downstream properties by detaining storm water and promoting infiltration.
- Capture and treat 3.5 acre-feet of storm water runoff, improving the water quality within Duck Creek.
- Increase public awareness and knowledge of water quality and quantity issues to watershed residents and the local community

Program Accountability

Duck Creek, located in the City of Davenport, Iowa, is plagued by issues such as high bacteria loads, poor water quality, stream bank erosions and localized flooding issues. The Duck Creek Watershed is characterized by relatively flat grades and high impervious areas. The City of Davenport has taken a micro-watershed approach to identify the significant contributors to water quality and flooding issues which affect Duck Creek, its tributaries and the surrounding landscape. Concurrently with the construction of the St. Ambrose Project, the City worked with a consultant on a Citywide Creek Analysis Study and the City will be completing a storm water master plan in the future. This work will identify how to manage the City's drainage ways for future improvements.

St. Ambrose University campus lies within a tributary watershed of Duck Creek. The campus is located in a fully developed commercial and residential area. The commercial areas have large impervious areas and the residential area is comprised of dense properties with a typical lot size of 7,500 s.f. in area. The storm water drainage from these areas south of Locust Street drain northerly to and ultimately through the campus area. Any storm water that wasn't absorbed or detained on the campus site exit at the intersection of Lombard and Gaines Streets and ultimately travels on to Duck Creek via overland, swale, ditch and storm sewer flow.

Prior to the project improvements, storm events greater than a 2-year storm caused significant flooding both in Locust Street at Scott Street but also within the Cosgrove Hall parking area. Cosgrove Hall also flooded during larger rain events due to a lack of overland drainage route through the campus.

- Administer the St. Ambrose University Storm Water Drainage and Conveyance Improvements Project to ensure all objectives and activities planned are implemented.

There are several goals for this project, including: Improved water quality of Duck Creek, lessen flooding of Duck Creek and stream bank erosion and lessen localized flooding issues of the St. Ambrose University Campus and the adjacent neighborhoods. The Project was administered by the City of Davenport, with partnering from St. Ambrose University. The City provided coordination and oversight during the design phase, and provided construction staking, quality control/quality assurance and contract administration during the construction phase. The project was constructed by Hawkeye Paving Corporation of Bettendorf, Iowa.

- Install practices to decrease frequency and magnitude of flooding on St. Ambrose University campus and downstream properties by detaining storm water and promoting infiltration.

Additional pipe and intake capacity were installed in Locust Street in front of the campus and routed to the new underground detention/infiltration system. The parking areas for Cosgrove Hall were also routed to the underground system. This work helps prevent localized flooding that previously occurred during frequent rain events both in the street and parking area.

This project constructed an underground detention/infiltration system comprised of manifolds and an array of 48" diameter perforated corrugated metal pipe. This system, which provides and underground storage volume for the 10-year event storm, is located beneath the Cosgrove Hall parking lot just north of Locust Street. The pipes are perforated to allow storm water to leave the detention system and infiltrate into the ground, thereby decreasing the amount of storm water that leaves the St. Ambrose campus. The system provided is a Contech corrugated metal pipe detention system. Based on the product supplier, the detention system pipe is expected to provide a minimum of a 75 year service life.

In addition to the underground storm water storage area, a storm water pipe was installed to convey storm water from events larger than the 10-year event around Cosgrove Hall into an overland route. This helps to safely pass up to 100-year events without allowing damage to campus structures. After the storm water reaches the overland route, it is given an additional chance to infiltrate in bioswales within the courtyard area of the campus.

- Capture and treat 3.5 acre-feet of storm water runoff, improving the water quality within Duck Creek.

The WIRB Grant Agreement required that 3.5 acre-feet of storage be provided in this project. The storm water detention provided provides slightly more than this requirement. By catching the equivalent of a 10-year storm event as well as infiltrating additional storm water through the permeable pavement, the project is helping to reduce the peak flows reaching Duck Creek and removing pollutants from the storm water in this watershed. The underground system contains

perforations to allow for the infiltration of storm water versus conveyance of the water via the storm sewer system.

- Increase public awareness and knowledge of water quality and quantity issues to watershed residents and the local community

In staying committed to public awareness and education, a number of news stories and public meetings have been held since the completion of the project. To date, the Partners of Scott County Watersheds held a public meeting in June of 2011 which invited news crews from the local television stations. After a sizeable rain event in July 2011, a local television station ran a story on the success of the new system and the lack of flooding and storm water damage which would have occurred prior to the improvements. In November of 2011, WIRB held a public meeting at the St. Ambrose campus. During this meeting a demonstration of the pervious pavement was held utilizing a water truck. Finally, a number of newspaper articles have been published in the Quad City Times and other local newspapers detailing the project, its capabilities and success.

This public awareness and knowledge program will continue as both the City of Davenport and St. Ambrose University showcase the project in its ability to protect the watershed and surrounding infrastructure and how this technology applies to the environment and overall sustainability. St. Ambrose University will continue an educational outreach program both on campus as well as with local elementary, intermediate and high schools to incorporate water quality and flood mitigation issues into their curriculum.

Environmental Accountability

The infiltration/detention system constructed has been designed to capture and treat the storm water runoff from the nearly 58 acre watershed draining to the St. Ambrose campus. With the design storage volume of 3.5 acre-feet the underground system can store the 10-year storm event. With the perforations in the pipe system, the storm water is allowed to recharge into the ground and the system then provides pollution reduction. Based on data published in the Iowa Storm Water Management Manual, the following are the pollution removal rates for infiltration basins:

<u>Pollutant</u>	<u>Removal Rate (%)</u>
Sediment	90%
Total Phosphorous	60-70%
Total Nitrogen	55-60%
Metals	85-90%
Bacteria	90%

Included in the project was permeable concrete pavement in the new Cosgrove Hall parking lot. These areas were constructed to intercept storm water prior to reaching intakes which connect to the underground infiltration/detention system. Intercepting this flow allows additional chance for infiltrating and treating the storm water to remove pollutants and reduce flows reaching Duck Creek. Based on data published in the Iowa Storm Water Management Manual, the following are the pollution removal rates for permeable concrete pavement:

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<u>Pollutant</u>	<u>Removal Rate (%)</u>
Suspended Solids	30-65%
Total Phosphorous	30-65%
Total Nitrogen	50-80%
Metals	85-90%
Bacteria	30-65%
Hydrocarbons	50-80%

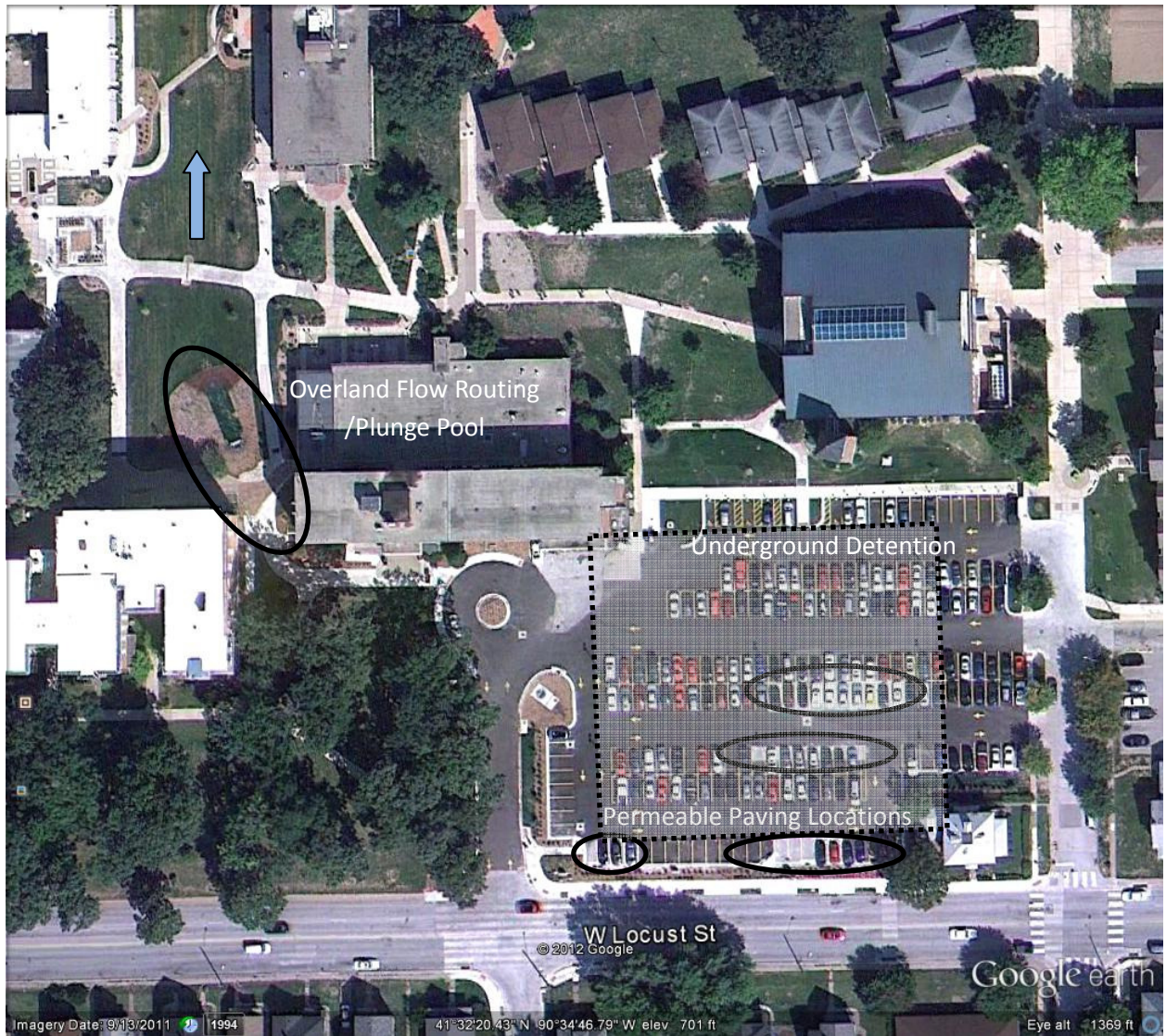
In addition to the infiltration/detention system, the project included a plunge pool/energy dissipation pond at the outlet of the large event bypass piping between Ambrose Hall and Cosgrove Hall. This feature slows the storm water coming from the street and parking areas and allows sediment to settle, thereby reducing solids in the storm water ultimately reaching Duck Creek.

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Appendix A – Site Exhibits/Construction Photos



Preconstruction Site Conditions



Post Construction Site Conditions



Underground infiltration/detention system under construction.



Underground infiltration/detention system under construction.



Permeable pavement areas in Cosgrove Parking Lot.



Site grading work in plunge pool/overland flow route area.