

# **Final Report**

**Instructor: Melanie Kueber-Watkins**

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**Superior Consulting**



**US-41 MDOT Highway Reconstruction**

**Marquette, MI**

## **Team Members:**

Austin Hintz

Ben Rybicki

Connor Weber

Tia Williams

## Superior Consulting



To: Michigan Department of Transportation  
From: Superior Consulting  
Date: 4/24/20  
Re: MDOT US-41 Marquette Team Memo

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### Our Mission Statement:

To provide responsive, safe, and trusted solutions to our clients with the highest-quality, most dependable, cost-effective engineering, design and construction management services.

The goal for our team on this project was to provide a proposed design for a storm sewer system and culvert crossings, within the scope of this project on US-41, that is both dependable and cost-effective, while minimizing potential environmental impacts. After analyzing and modeling the existing systems in place, we were able to determine what changes needed to be made. From there, we were able to model and test these proposed changes to the current system. Some of these changes included resizing of piping and drainage structures or complete removal. These designs will be implemented with a number of LID measures to minimize potential environmental impacts. Also, we provided an estimate of the overall costs of the project, that is also broken down into each specific section. Lastly, we provided a tentative schedule for construction of this project from start to finish.

We would like to thank the CEE department at Michigan Tech along with Trevor Sholten and MDOT for the collaboration of this project, and allowing access to the project for our team and to provide insight for developing the reconstruction of US-41 in Marquette MI.

This report, titled “Final Report ”, represents the efforts of undergraduate students in the Civil and Environmental Engineering Department of Michigan Technological University. While the students worked under the supervision and guidance of associated faculty members, the contents of this report *should not* be considered professional engineering.

## 1.0 Executive Summary

Superior Consulting has been tasked with supportive design of stormwater management and environmental mitigation controls related to partial reconstruction of US-41 in Marquette Michigan. Existing conditions were assessed in order to determine the state of existing infrastructure, potential drainage issues, and additional site specific design considerations. Design work includes sizing of sanitary sewer within the limits of full-reconstruction, design of ditching and retention ponds, removal and replacement of existing culvert crossings, and implementation of low-impact design measures (LID) within stormwater outfall. Additional design considerations include state mandated permitting, wetland location, and impact on aquatic organisms. Notable design improvements from existing conditions include increased storm sewer drainage, implementation of retention basins, and integrated LID measures including a central infiltration trench. The culvert crossings of Whetstone Brook near Altamont Street and the Heritage Trail overpass were also enlarged to accommodate a 50 year storm with reduced risk of overtopping or upstream flooding.

Superior consulting has estimated that the redevelopment of stormwater management and environmental mitigation controls associated with the US-41 redesign project in Marquette will require 39 days at an expense of \$1,039,270.96. This estimate includes the removal and replacement of storm sewer between Front and Grove Street, implementation of an LID filter trench within the highway median, and replacement of existing culvert crossings. Design considerations include required permitting, regional design standards, and potential environmental impact based on site characteristics. The bulk of cost is attributed to replacement of culverts at the three crossings outlined. Two of which will be re-sized based on MDOT design standards, with the largest being a 5x11 concrete box culvert near Altamont Street. Storm sewer will also be resized to allow for better drainage, and is the second largest portion of the estimated costs. Superior Consulting believes that the proposed design outlined in this document will ensure the safety and longevity of US-41 in Marquette, while posing the least environmental impact possible.