

## Introduction

Steuben County wanted the intersection of CR 100 N and 200 W redesigned as a roundabout. In the past few years, this intersection has had increased traffic wait times and increased truck traffic through this area. Steuben County has shown interest in future bike lane plans to connect the lake communities in the surrounding area. A roundabout here will create a safer and more efficient intersection for vehicles and foot traffic.

The design of the roundabout included a preliminary survey, geometric design, pavement design, soil evaluation, environmental study and stormwater management.



## Preliminary Data Collection

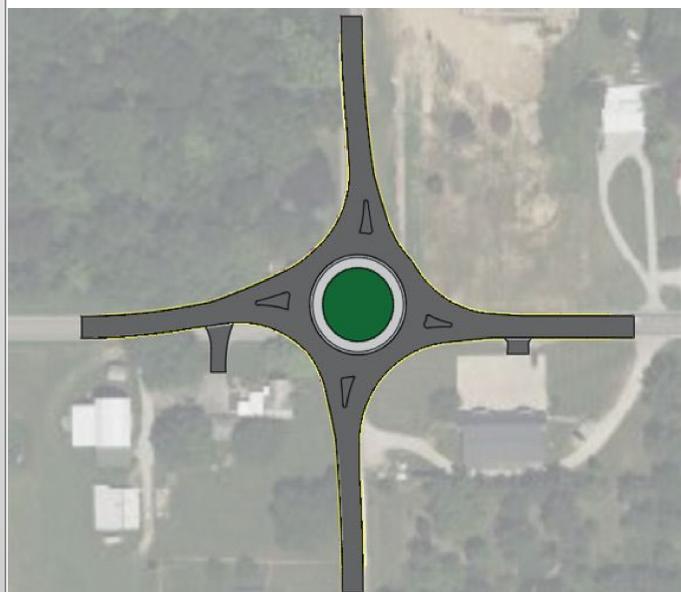
We used a TOPCON GPS rover to survey the existing roadway and drainage ditches and to locate existing power lines and boxes.

We conducted turn counts at two different times of the day to get more data of the flow of traffic in each direction and movements of the current intersection.

We also did a preliminary investigation on the existing waterways that the drainage flows to in order to identify the impaired waterways around our site.

## Roundabout Design

The geometric design of the roundabout was designed using the 2013 INDOT Design Manual and FHWA code. To design the roundabout, we used AutoCAD Civil 3D extension Vehicle Tracking to implement all the codes into the design as well as to check the entry speeds and vehicle paths for the largest vehicle to pass through (WB-50). Due to the existing site and properties we located the roundabout 35' North and 5' East to be able to avoid interference with the existing residential and commercial properties on the South. The design consists of a 74' diameter and 10' truck apron center circle with grass pavers inside. The roundabout consists of a 21' circulatory roadway width and an 18' entry width. The deflection angles changed in each of the directions to slow the entry speed in all the directions to meet INDOT code.



The proposed roundabout was graded at a 2% slope direct stormwater outward to the integrated curb turn outs and swales along the sides. The vehicle tracking also implements sight distance tracking to check the angles of visibility to ensure safe entering and exit points throughout the roundabout.

## Pavement Design

JNC Engineering used standard INDOT Code and Mechanistic-Empirical Pavement Design software (MEPD) to conduct our analysis. A 20-year period was used for the analysis period. MEPD uses Equivalent Axle Loads calculated from the INDOT Traffic Site which are used with an annual growth rate factor to determine pavement thickness. The resulting pavement sections can be seen below.

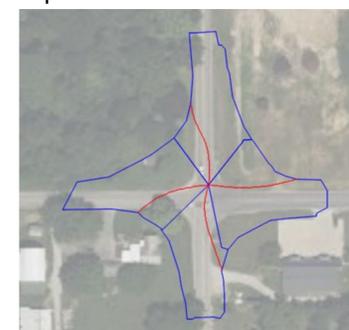
Material Type	Thickness (in)	Material Type	Thickness (in)
HMA Surface	1.5	HMA Surface	1.5
HMA Intermediate	2.5	HMA Intermediate	2.5
HMA Base	4.0	HMA Base	3.0
Aggregate Base INDOT No. 53 Stone	6.0	Chemical Treated Subgrade	14.0
Chemical Treated Subgrade	14.0	A-6 Subgrade	12.0

INDOT Minimum Composite

INDOT Minimum Full-Depth

## Storm Water Management

Stormwater runoff for the intersection was calculated by JNC Engineering using the Rational Method from the 2013 INDOT Design Manual. Peak flow rates were established for each of the four delineated drainage areas as well as the longest flow path for each area. The roundabout will also feature two LID features. The center island will consist of grass pavers for visual purposes and stormwater storage. The splitter islands will be made of pervious concrete to allow for rainwater infiltration.



## Maintenance of Traffic

A Maintenance of traffic plan was developed by JNC Engineering to smoothly route the traffic around the intersection during construction. The plan follows the standards in the INDOT Design Manual in Chapter 503. The plan will require the full closure of the intersection. Traffic will be rerouted on I69, US-20, Buck Lake Rd., and Wohlert St. down to Mechanic St.



- 1) 3A Barricade and Road Closure Sign
- 2) Road Construction Ahead Sign
- 3) 3-B Barricade and Road Closed to Thru Traffic
- 4) Detour Guide Signs

## Cost Estimate

JNC Engineering's cost estimate comes from 5 main categories that are listed in the table below. The total Cost of the project also includes a 10% contingency fee upon completion of the project before the end date.

Cost Estimate	
Paving	\$231,195.45
Demolition	\$38,189.84
Engineering	\$63,450.00
Mobilization	\$146,140.45
Concrete	\$92,687.00
<b>Total</b>	<b>\$579,123.04</b>