

INTRODUCTION

The intersection where Harcourt Road meets Williams Street is often viewed as one of the busiest intersections in Angola, Indiana. This can be explained by the presence of State Route 827 travelling through the western and northern legs of the intersection (Harcourt Rd onto Williams St). Many Angola residents use this road to travel to work, go to the numerous stores to shop, or dine at some of Angola's fine restaurants. The importance of these roads is apparent in the overall number of drivers that travel on the roadway. As more of the public travel through this intersection, an upgraded design should be implemented.



PROJECT OBJECTIVES

As Angola's northeast side continues to grow with the upcoming construction of a new subdivision, this project will serve a major role in keeping the city moving into the future. There will be more traffic as residents of these subdivisions drive to their jobs, shopping, and restaurants, and more pedestrian and bicycle traffic as well. The objectives of this project are to improve intersection safety and efficiency for all users, use innovative strategies to increase community value, and to minimize the impact to nearby businesses and homes.



TRANSPORTATION DESIGN

Designing the roundabout layout required several iterations and performance checks. Three layouts were created utilizing the National Cooperative Highway Research Program (NCHRP) Report 672 – Roundabouts Informational Guide for design criteria. These layouts were created to evaluate the feasibility of reducing right-of-way impacts while still being able to accommodate the design vehicle. Performance checks that were evaluated for the layouts include checking truck turning paths using AutoTURN software and evaluating passenger car fastest paths. The geometry of the approach legs were designed per the Indiana Design Manual. In addition to the roundabout, a multi-use path was designed to allow pedestrians and bicyclists to safely and efficiently navigate the intersection and continue north of the intersection.

Three proposed layouts were created during the roundabout design process. The first layout used mid-range values of the NCHRP's geometric criteria. This design would require significant right-of-way acquisition but would be able to accommodate the design vehicle with minor modifications. The second layout used almost minimum allowable geometric values to fit the project within the existing right-of-way (ROW); however, this did not accommodate the design vehicle. The final layout was a revised version of the first and second layouts to meet the NCHRP criteria, minimize right-of-way impacts, and accommodate the design vehicle.

STORMWATER MANAGEMENT

Stormwater will be managed on-site by implementing a curb and gutter system, a vegetative swale, three new pipes, and several low impact development designs, including a rain garden, retention basin, and two infiltration boxes. These features will efficiently manage stormwater runoff generated on-site, as well as stormwater runoff generated upstream of the intersection and flowing through the site. The Rational Method and Runoff Curve Number Method were used to calculate peak runoff and flow rates for the area. The FHWA Hydraulic Toolbox software was utilized for the curb and gutter design and swale design. Standards from the Indiana Design Manual and Michigan's Low Impact Development Manual were used to evaluate the proposed designs.

Three sustainable stormwater management methods were implemented to accommodate additional runoff at the site and promote infiltration. A rain garden will be implemented in the central island of the roundabout. At the northwest quadrant of the intersection, a retention basin will be installed between the Project Help parking lot and Harcourt road. To manage pavement runoff, two infiltration boxes will be implemented along the roadside on Williams street. Michigan's Low Impact Development Manual was utilized as a design standard for all low impact development features of this project.

TRAFFIC ANALYSIS

Traffic analysis was conducted at the intersection in order to better understand the current and future needs of the intersection. Manual and automated traffic counts were conducted to obtain current traffic values, along with determining the peak hour of traffic. Traffic was then projected to determine the amount of traffic traveling through the intersection in the future. Level of services analysis was then conducted to determine the best approach for the intersection, including leaving it as is, adding a traffic signal, or constructing a roundabout. Based upon the results of these LOS analyses it was determined that a roundabout is the best approach for this intersection.

MULTI-USE PATH

The proposed 8-foot multi-use path connects the existing multi-use path to the west of the roundabout to future housing developments to the north of the roundabout. The width of 8 feet was selected according to Section 5.2.1 of the 2012 AASHTO Guide for the Development of Bicycle Facilities, which is also wider than the existing 6-foot path. Following Section 5.2.7 of the 2012 AASHTO Guide for the Development of Bicycle Facilities, the path grade does not exceed 5 percent and generally matches the roadway profile. To create efficient pedestrian routes, the path is aligned along all three legs with three roadway crossings at the project location. Two are existing crossings: one crossing Williams St directly south of Henney St and the other crossing Harcourt Rd directly east of Nolan Meadows Run. The additional crossing is located at the roundabout crossing Harcourt Rd to allow pedestrians to travel north through the intersection. A modification was made to improve the safety of the pedestrian crossing at Nolan Meadows Run by creating a landing off the travel way. The existing crosswalk configuration requires pedestrians to cross Harcourt Rd and Nolan Meadows Run at the same time with no refuge in between. This improvement will aid all users to safely cross both roadways, especially during peak travel times. The path extension and crossing improvements create a safer environment for pedestrians to travel through the area and is a step toward achieving the City of Angola's goal to become more walkable.