

Poka-Bache Trail Extension

Student Names: Quinten Prieur, Nouh Alshakhl, Matthew Ketner
 Reiners Department of Civil and Environmental Engineering
 Advisor: Dr. Timothy Tyler

INTRODUCTION

The Poka-Bache regional trail system connects several cities, towns, and counties within Northeast Indiana. The trail provides a safe, maintained, and highly accessible path from Pokagon State Park in Steuben County to Ouabache State Park in Wells County. The City of Angola, the Steuben County Highway Department, and Steuben County Trails would like to extend the northern leg of the trail in Steuben County to the Steuben-DeKalb County line.

The northern leg runs from Pokagon State Park, down SR 127, and ends at Commons Park in Angola. The new southern leg will run from the current terminus at Commons Park, down Old US 27, and end at CR 800 South (DeKalb County Line). The trail will also connect to Trine University and include a trailhead at the campus. In addition, Steuben County Trails wants to add several exercise stations along the southern leg.

Adding the southern leg to the Poka-Bache regional trail will not only provide the community members access to DeKalb County from Angola but continue the trail system's growth. Exercise stations on the trail and trailheads will increase community wellness by giving trail users another option to be active. At Trine University, the trailhead will provide campus members, students, and trail users a safe designated route connecting the university and inner Angola.

Trail Alignment

The trail alignment (Figure 1) was developed by following Chapter 51.7 of the Indiana Design Manual (IDM) which gives guidance for the placement of shared-use paths. Avoiding utilities, poor soil, wetlands, and staying within right-of-way (ROW) also influenced the location of the new alignment. About 9554 sf of new ROW will have to be purchased for the trailhead at Pleasant Lake and areas where the path was restricted. Proper signage at crossings and ADA requirements were also met referencing the City of Angola Ordinance, IDM, and the Federal Highway Administration (FHWA).

Within the City of Angola, the Poka-Bache Trail will connect the proposed trailhead at Trine University and the current terminus at Commons Park to Wayne St. by Prospect St.

The existing sidewalk will be replaced with 8 ft wide sidewalk and existing curb ramps will be replaced.

South of the Felicity and Wayne St intersection, the trail will transition into 10 ft wide asphalt pavement and run south along the east side of Old US 27. The trail will cross a three-way intersection formed by W 150 S, S Kankamp Rd, and Old US 27. To cross this intersection safely, the trail will turn into W 150 S and cross over S Kankamp Rd. After crossing the three-way intersection, the trail will continue to run south along the Old US 27 and transition to the west side after W 300 S to avoid wetlands. The route will transition to the east side once again after W 400 S.

The trail will cross Pigeon creek where a pedestrian bridge will need to be constructed. The trail will then continue to run along the east side of Old US 27 through the Village of Pleasant Lake.

South of the Village of Pleasant Lake, a proposed trailhead is recommended in the green space next to Steury Builder Inc. The path will then shorten to an 8 ft width south of the trailhead due to the assumption of lower trail usage.

The path will transition to the west side of Old US 27, north of Pleasant Lake Community Church. The path will cross the west/east portion of the Indiana Northeastern Railroad and transition to the east just north of CR 800 S. This transition will allow for the path to connect to the part of the Poka-Bache Trail that will run through Dekalb County.

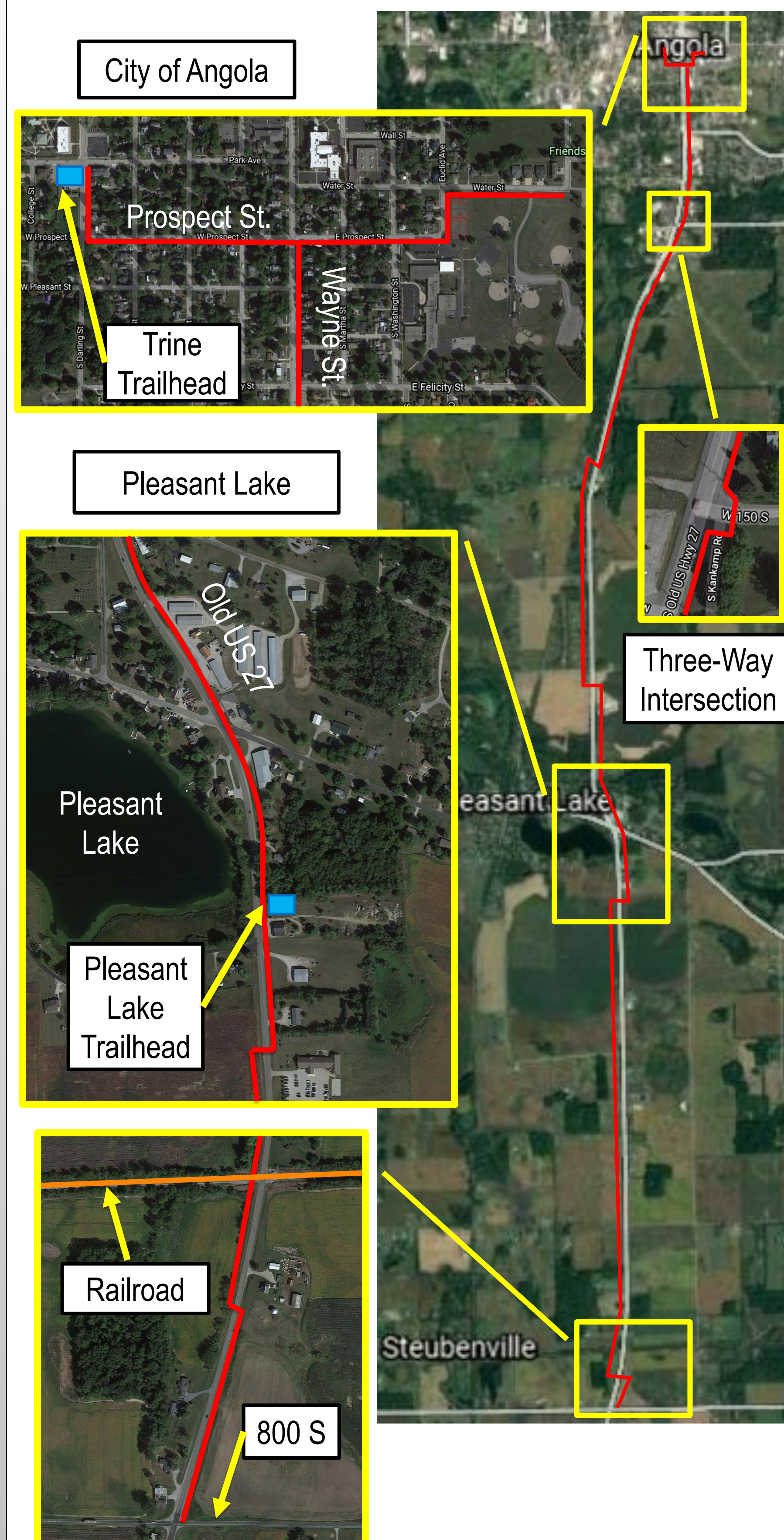


Figure 1: Trail Alignment

Trailheads

Two trailheads will be developed, one at Trine University (Figure 2) at the corner of Darling St and Park Ave. and at Pleasant Lake, north of the Steury Building Company. A topographic survey was done at the proposed lot for Trine to obtain data for the trailhead design. Each trailhead will incorporate bicycle racks and an exercise station which will include outdoor exercise equipment. Each trailhead will incorporate low-impact development (LID) by including pervious concrete pavement (See pavement design) for parking. The Trine trailhead will provide 8 regular parking spaces and 1 handicap space. The Pleasant Lake trailhead will have 7 regular parking spaces and 1 handicap space.

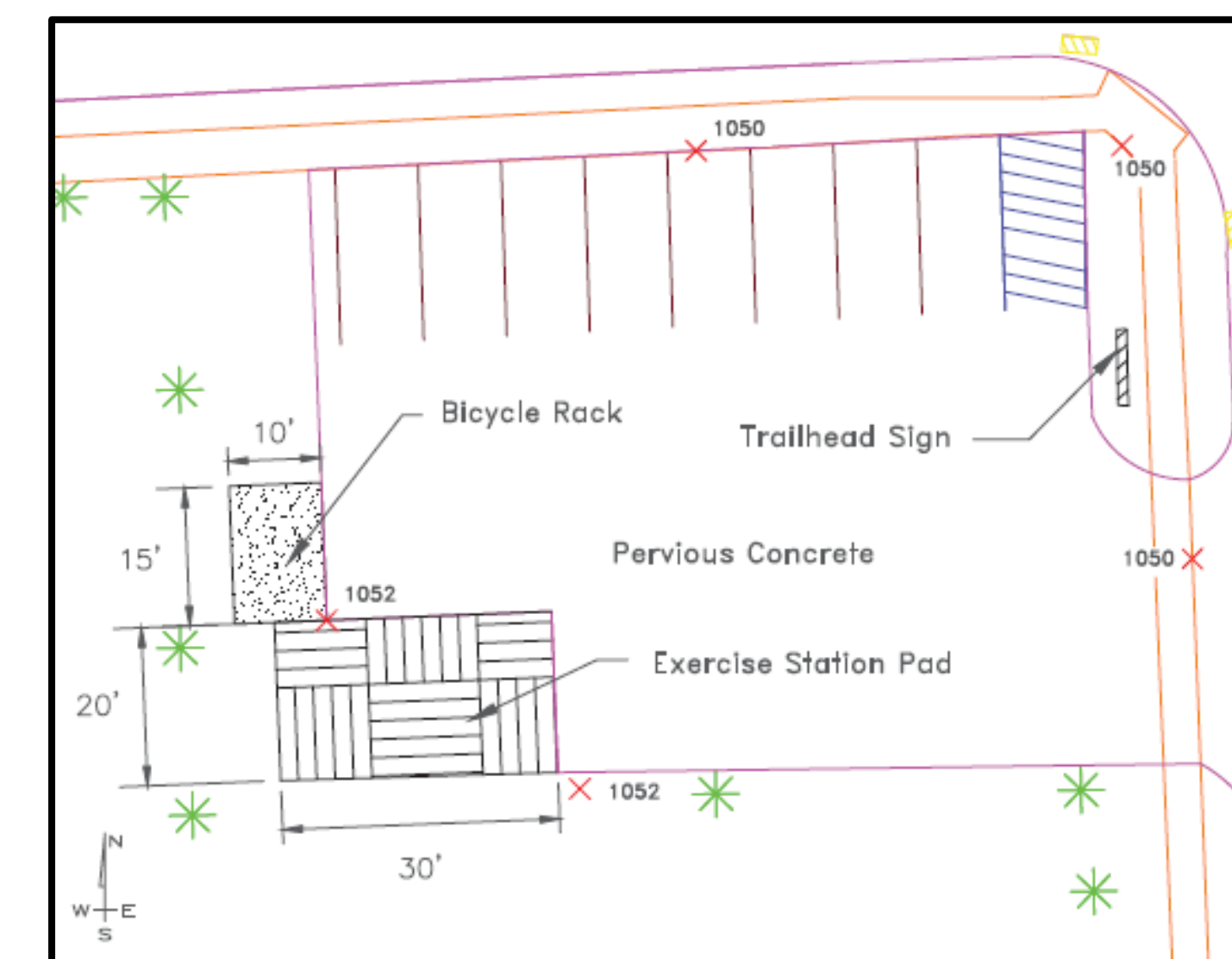
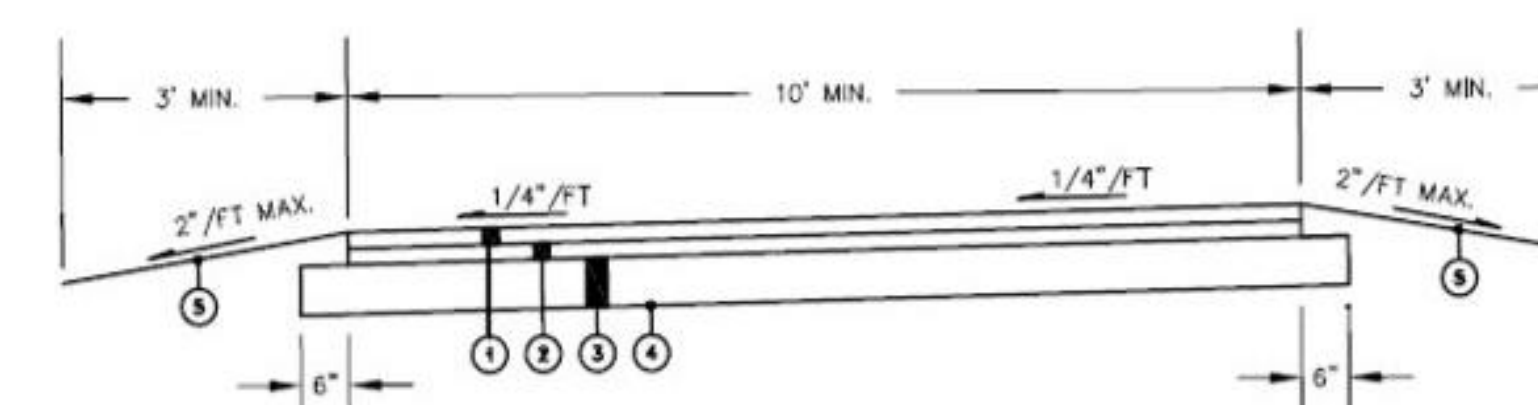


Figure 2: Trine University Trailhead

PAVEMENT DESIGN

The pavement design for this project followed the minimum value as recommended by the IDM. This included 8 ft wide, 4 in thick concrete sidewalks within the city of Angola. Outside of the city of Angola the trail will consist of 10 ft and 8 ft HMA for sidewalks. As shown below in Figure 3, the typical thickness for HMA surface is 1.5 in with an intermediate layer of 2.5 in. The pavement at the trailhead parking lots will be made of 6 in pervious concrete. The advantage of pervious concrete is the drainage of stormwater directly under the material into the soil, rather than to areas adjacent to the pavement.



- ① ITEM 604 - 1 1/2" HMA FOR SIDEWALKS
- ② ITEM 401 - 2 1/2" QC/QA HMA 2, 64, INTERMEDIATE 12.0mm
- ③ ITEM 301 - 6" COMPACTED AGGREGATE NO. 53
- ④ ITEM 207 - SUBGRADE TREATMENT, TYPE III
- ⑤ ITEM 621 - SEED MIXTURE, NATIVE

Figure 3: Typical 10 ft Asphalt Section

STORMWATER MANAGEMENT

Within Angola, PAK engineers did not consider stormwater to be an issue since the city has a stormwater system in place that will be able to handle the minimal runoff from the trail.

Along Old US 27, PAK Engineers conducted a stormwater study for the most critical areas along the route. One location that the team considered was Pigeon Creek. The team followed the Steuben County Ordinance and used the T-55 method to calculate the time of concentration and then used the rational method to calculate the peak flow. The team finally used the Manning equation to calculate the depth of Pigeon Creek. At the most critical time, the trail will raise Pigeon Creek's depth by less than 4.5 inches. As Pigeon Creek has the extra capacity to handle this increase in depth, and more, the team won't create any stormwater management system at this location.

COST ESTIMATE

The costs associated with this project were broken down into multiple categories. The items in the categories were priced using INDOT's 2020 English Unit Price Summaries and online resources. The largest of the pay items was the pavement on the trail. The trail pavement was found by calculating volumes or areas of each layer and multiplying by the unit priced. The pavement price was \$1,370,000. Additionally, the cost for the pervious concrete at the trail was calculated using the same method for a total of \$146,000.

Outside of the pavements some other expensive categories were maintenance of traffic and earthwork. All the categories were added together to calculate a total price of construction. This price factored in extra costs such as contingency, inflation and construction inspection. Therefore, the total for this project was **\$2,739,000**.

CONCLUSION

PAK Engineers was contracted by the Steuben County Highway Department to design an extension to the existing Poka-Bache Trail to the southern portion of Steuben County. Currently, the trail promotes a healthy lifestyle while providing the community of Angola a safe mode of transportation to several city destinations including Pokagon State Park. To increase trail access to more Steuben County members, the trail will extend to the Dekalb County Line by following Old US 27 from the current terminus at Commons Park.

PAK is an avid supporter that physical activity is a key part of a well-balanced life. Designing this trail will allow the Steuben County community to engage in a more active lifestyle, leading to improvements in health and reduced stress levels. Additionally, connecting the Poka-Bache trail to Trine University will give students and university faculty members a safe option to exercise outdoors and route into town.