

# PEDESTRIAN CROSSING STUDY IL ROUTE 148 WITH CRAB ORCHARD GREENWAY

JUNE 2022

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## EXECUTIVE SUMMARY

This report summarizes a planning study conducted for the Southern Illinois Metropolitan Planning Organization (SIMPO). The study considered the feasibility of an underpass or an overpass of IL 148 for the Crab Orchard Greenway Multi-Use Trail (COG) within the boundary of the Crab Orchard National Wildlife Refuge (CONWR).

IL 148, a 2-lane, rural highway runs through the CONWR property and must be traversed by the COG. Since this is a high-speed setting, only grade separated structures were considered for the crossing. This study analyzed the existing conditions, studied vehicular traffic volumes and crash patterns, and met with stakeholders in order to develop potential options for an ADA-compliant pedestrian crossing. Ultimately, one preferred

tunnel location and one preferred bridge location with two bridge types (truss and beam) were presented. Both tie into the Old Visitor's Center parking lot, which is expected to remain in place as a trailhead, and the Amphitheater parking lot. The study analyzed each option on the basis of cost, utility impacts, adverse travel, and stakeholder input. Note the exact location of the crossing is to be determined during Phase I Engineering.



## INTRODUCTION

The purpose of this study is to consider options for a grade separated trail crossing across IL 148 in the heart of the Crab Orchard National Wildlife Refuge (CONWR) property, within the 0.8 mile length from the intersection with Old Route 13 to the intersection with Pigeon Creek Road. See *Attachment 01 for Study Location Map*.

The trail crossing will be part of the 15-20 mile long Crab Orchard Greenway (COG), which is planned to connect the cities of Marion and Carbondale, with much of the length of the trail on the federally owned CONWR property. The COG is a proposed multi-use trail, generally running east-west, south of IL Route 13. Various trail routes are being considered within CONWR, and the parking lot of the old Visitor's Center (building to be demolished) is envisioned to be utilized as a trailhead/parking area for the COG trail.

*Crossing the street can be a complex task for pedestrians. They must estimate vehicle speeds, adjust their own walking speeds, determine adequacy of gaps, predict vehicle paths, and time their crossings appropriately. Similarly, drivers must see pedestrians, estimate vehicle and pedestrian speeds, determine the need for action, and react.*

**-from FHWA**

IDOT began expanding IL Route 13 from 4 lanes to 6 lanes between Marion and Carbondale in 2010. Due to the relatively new Illinois Highway Code's Complete Streets Policy that requires full consideration to bicycle and pedestrian facilities where warranted, IDOT has constructed a 10' wide shared use path adjacent to the various IL Route 13 segments as they were constructed. This led to Southern Illinois envisioning numerous miles of trail between both the COG Trail from Marion to Carbondale, and the Saluki Trail from Carbondale to Murphysboro, also planned along the IL Route 13 corridor.

Multiple segments of the COG trail are now funded, making its realization closer. Not only will this provide destination transportation options between two major communities in Southern Illinois, it will also provide recreational options as well. The trail will provide access to the nearly 70 square miles of CONWR lands, which is a rich asset to Williamson and Jackson Counties in

Southern Illinois. The trail will allow the opportunity to view wildlife and enjoy the peaceful setting while traveling through CONWR, and bring visitors and tourists to the area. See *Attachment 02 for COG Trail Map*.

## EXISTING CONDITIONS

IL 148 is a tangent roadway, running north/south the length of the study. The area is generally flat, and the right-of-way open. There are wooded grounds near the north study area along the frontage road (Esda Rd) and also surrounding Pond #17 and its dam just to the southeast of the old Visitor's Center. On the west side of IL 148 are old warehouses that house active businesses. There is a slight rise/hill in the center of the study area, which does provide some added elevation to make a tunnel option more feasible at this location.



*Typical view of IL 148 in Study Area*

At the intersection with Old Route 13, there is a dedicated left turn lane on the north, east and south legs. There is also a dedicated right turn lane on the east leg. This is a signalized intersection which has experienced enough crashes, that a roundabout has been funded with HSIP funds to replace the signalized intersection. This is expected to be constructed in 2023-2024.

To the south of this intersection, the roadway is 2-lane, 2-way with 12' lanes and 5' paved shoulders.

The right-of-way is generally 120' wide, with many utilities present including:

- Gas (E)
- Telephone (E&W)
- Sanitary Sewer (W) – with connection to lift station at NE corner of old Visitor's Center
- Water (W) – with service connection north of Pigeon Creek Rd.
- Overhead Electric (W)
- Communication lines:
  - FO line west side SW to NE
  - General Dynamic private FO line
  - Govt/CONWR FO line in ROW

Approximately 0.8 miles south of Old Route 13 is the intersection with Pigeon Creek Road. Here IL 148 widens to accommodate a left turn lane and a right turn deceleration lane for both northbound and southbound traffic. Additionally, there are painted islands in all four quadrants. Pigeon Creek Road has a stop condition.

The old Visitor's Center has been abandoned is being relocated a half mile to the southwest of this location, off of Pigeon Creek Road. There is also an existing amphitheater along Pigeon Creek Road, 0.3 miles to the west. The old Visitor's Center on IL 148 will be demolished in the future, with the parking lot remaining for the CONWR trailhead parking area. CONWR is considering a future comfort station (restroom/drinking fountain) facility here at that time. "Visitor's Center Pond" (Pond # 17) is located just east of this existing parking area, with the high-water level approximately 5' below the edge of pavement elevation of IL Route 148.

Existing trails are on each side of IL Route 148 in this location, with Woodland Nature Trail starting directly from the old Visitor’s Center parking lot, with a loop along Pond 17, and Harmony trail, starting 0.3 miles to the west at the amphitheater parking area.

See *Attachment 03* for Photographs of Existing Conditions.

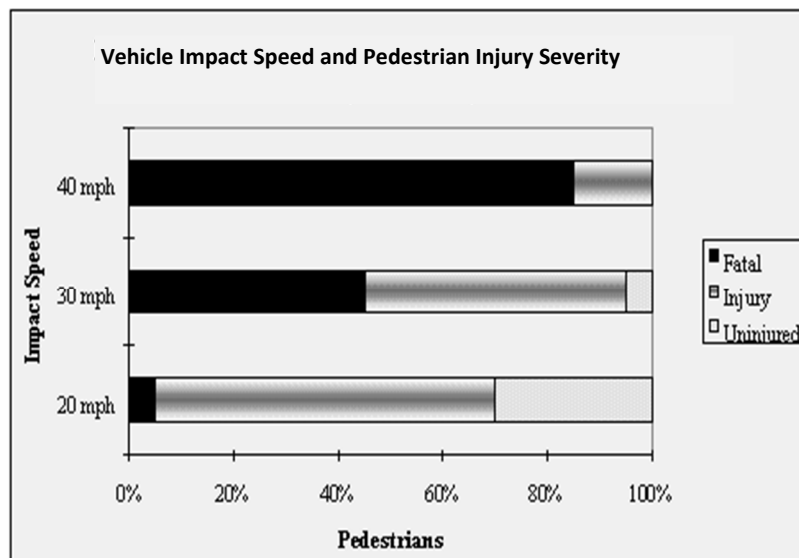
**COLLECTED DATA**

The following factors were measured, observed or otherwise collected along the project study area and will be discussed in detail: Traffic Counts, Vehicular Speed, and Crashes (Vehicular and Pedestrian/Bike).

Vehicular Speed

The posted speed limit along IL Route 148 is 45 mph in the study area. The posted speed increases to 55 mph about 500’ south of Pigeon Creek Road. The vehicular speed data, as collected from IDOT’s Traffic Count Database System (TCDS), indicates the average travel speed is about 60 mph, well above the posted speed of 45 mph, See *Attachment 04* for the speed data.

Speed is the dominant variable for pedestrian survivability of a crash. The faster a vehicle is going, the less likely the driver is to be able to stop in time to avoid a crash. When hit by a vehicle traveling at 40 miles per hour, a pedestrian has an 85% chance of being killed; at 30 miles per hour, the likelihood decreases to 45%; and at 20 miles per hour the pedestrian fatality rate is only 5% (see inset).

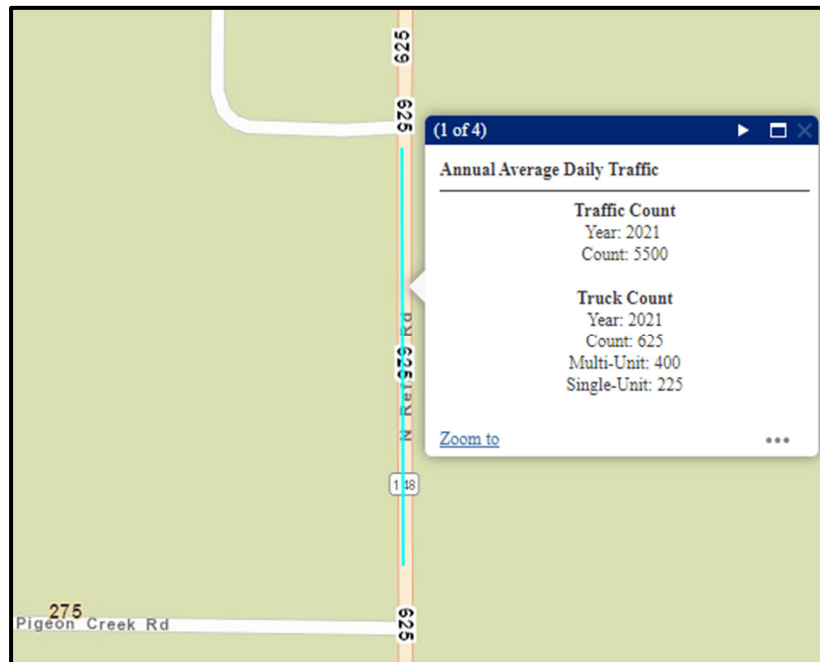


*U.K. DOT, 1987 and Traffic Advisory Unit, 1993*

Traffic Counts

This section of IL Route 148 is classified as a Minor Arterial. It sees an average of 5,500 vehicles per day (2021) through the project study area, with 11% of the vehicles being trucks. This number is projected to be 6700 vehicles per day in 20 years (assuming a 1% growth rate).

Pedestrian counts were not performed, since there is no active trail crossing at this time.



Map illustrating IDOT's average daily traffic within the project area.

### Crashes

Crash data provided by SIMPO indicates 22 crashes in the study area between 2014 and 2021.

- 86% of the crashes occurred at intersections, with most of the crashes (16) at the intersection of Old Route 13 and IL 148 and three (3) additional crashes at the intersection of Pigeon Creek Rd and IL 148.
- 4 crashes occurred in darkness, and one additional occurred at dawn. The remainder (77%) occurred in daylight conditions.
- 5 crashes occurred in wet conditions, with one additional in snow/slush condition. The remainder (73%) occurred in dry conditions.
- There was only one crash involving pedestrians. This occurred at the intersection of Pigeon Creek and IL 148. It occurred on a summer Saturday at 2am in darkness. The cause of the accident was the pedestrian improperly walking down the middle of the highway.
- The two C-injury crashes were at night. One was the pedestrian crash noted above, and the other was at the intersection with Old Route 13. There were 6 B-injury crashes. There was 1 A-injury crash. The remainder (59%) were property damage only.
- Ten crashes were Turning or Angle type. 7 were rear-ends. 3 were fixed object or other object, and one was head-on. One was pedestrian.

As mentioned earlier, intersection of Old Route 13 and IL 148 is being planned for reconstruction with a roundabout. That will address most of the crashes in the study area. For the remainder of the six crashes, three were in the vicinity of Pigeon Creek Road and the other three were at random locations along the study area.

All three of the crashes at the intersection with Pigeon Creek Road occurred in wet surface conditions (2 in darkness), and the head on collision south of this intersection occurred in snow/slush daylight conditions. The remaining two collisions were in daylight, dry conditions (one rear end, one “other object”).

The crashes in the study area away from either of the intersections are a relatively random assortment of crash types, with no predominate patterns.

See *Attachment 05* for Crash Data including a spot map and graphical data for crashes within the study area.

## **STAKEHOLDER INVOLVEMENT**

A Study Oversight Team (SOT) was created at the beginning of the study to guide the decisions for the project. The SOT included SIMPO, IDOT and CONWR. Below is a summary of guidance from these Stakeholders.

CONWR – As adjacent property owner, and future trail owner, CONWR’s input was key. Through a series of meetings, the following were their criteria:

- Connect to the continuous trail system to minimize adverse travel
- Keep options open for future connections to any trails constructed

IDOT District 9 –IL Route 148 Owner, with operational and maintenance jurisdiction. IDOT requested the solutions remain out of the clear zone of the roadway if possible. IDOT of course will require any tunnel or bridge solution to meet current design guidelines as well as ADA standards. IDOT does not have any plans to add lanes or make major improvements to this section of roadway.

## **DESIGN STANDARDS**

A 2017 study *Establishing Procedures and Guidelines for Pedestrian Treatments at Uncontrolled Locations* (Research Report No. FHWA-ICT-17-016) published by the Illinois Center for Transportation, written by Southern Illinois University Edwardsville and Auburn University researchers, studied pedestrian crossing at uncontrolled locations. Nationwide, there has been a trend for increased pedestrian deaths during the past 10-15 years. This study was meant to look specifically at Illinois situational locations and develop procedures and guidelines to be used by IDOT and Illinois Local Agencies for determining the best practices for pedestrian at-grade crossings with roadways. The study indicates an at-grade crossing is not recommended for any pedestrian crossings with roadway speeds at or above 45 mph. See *Attachment 06* for the Recommended Minimum Treatment Design Chart.



### Pedestrian Tunnels

Tunnel design must follow AASHTO LRFD Bridge Design Specifications. Some notable criteria include:

- Minimum vertical clearance for tunnel = 8' with preferred of 10'
- Minimum width = 10'
- Walk surfaces meet ADA, with maximum continuous running slope of 5%. Grades as steep as 8.3% can be used if a 5' long landing is provided between each 30' long ramp.
- Lighting preferred since closed tunnel length would be minimum of 90'
- Underground Utilities will be "cut off" by construction of the tunnel. Therefore, utilities would be rerouted either deeper or outside of the influence area of the ramp excavation
- If precast box culvert segments are used to construct tunnel, joints would be waterproofed and an HMA wearing surface on top of the bottom slab of the tunnel surface is recommended.



*Typical Box Culvert Pedestrian Tunnel*

### Pedestrian Bridges

Bridge design must follow AASHTO LRFD Guide Specifications for Design of Pedestrian Bridges. Some notable criteria include:

- Minimum Vertical Clearance over roadways is 17'-3"
- Minimum width = 6' for walkway only; 10' for shared bicycle/walkway
- Design for 90 psf (unfactored) pedestrian live load and H-5 or H-10 vehicles depending on width of bridge.
- Substructures within the clear zone of roadways must be designed to resist a 600-kip vehicular collision force
- Railings on bridges over roadways designed to prevent object being thrown to roadway below. Generally, 9' tall with top portion curved inward and extending approximately 2' from the inside face of the post (IDOT Railing Standard R-33).
- Walk surfaces meet ADA, with maximum continuous running slope of 5%. Grades as steep as 8.3% can be used if a 5' long landing is provided between each 30' long ramp.



*Typical Truss Pedestrian Bridge*

## **OPTIONS STUDIED**

With these parameters, over 10 locations were considered, including both bridge and tunnel options. See *Attachment 07* for Map of all crossing locations considered.



One thing to consider for both options is the “adverse travel” distance. Many pedestrians will not voluntarily accept the added inconvenience of the additional travel length to their trip. Studies have shown that adverse travel can be an impediment to the actual usage of grade separated crossings if approach ramps are not properly placed in their surroundings to minimize the adverse travel. For our project, the distance traveled from the Amphitheater parking lot to the Old Visitor’s Center parking lot is about 1800’. This distance will be compared to the actual total distance traveled along the approach ramps for various options. The difference of these two distances is the adverse travel distance.

### Tunnel Options

The tunnel (underpass) option provides for complete separation of pedestrians and vehicles. Once constructed, the tunnel will not impact the traffic flow on IL 148 in any way. Drainage will be one of the biggest considerations. Ideally a tunnel would be able to freely drain the base of the tunnel and not require a pump station to keep the underground portions dry. The very flat conditions of the CONWR do not facilitate deep drainage, except near the slight rise/hill south of the warehouses. The top slab of the tunnel will be placed 1-2’ below the PGL of the roadway. This layout will require the culvert to be designed for fill less than 2’ and will require rigid pavement over the top of the culvert per IDOT All Bridge Designers (ABD) Memo 21.1.

Ideally, the tunnel would be long enough to extend beyond the “clear zone” of the highway, to eliminate the need for guardrail. The clear zone for IL 148 is 26’, requiring the tunnel itself to be 88’ long. The tunnel would be comprised of precast concrete box culvert sections, with an internal opening of 12’ wide x 10’ tall. The tunnel would have adequate lighting installed to provide safe passage in darkness. Cast-in-place concrete wingwalls would flank each side, and give an opportunity for decorative finishes and/or logos. See inset photo for architecturally finished trail tunnel wingwalls.



*Pedestrian Tunnel on MetroBikeLink*

The trail approaches will have to drop 13’ total vertically, requiring at least 260’ of approach ramp cut into the ground, to meet ADA requirements. These ramps have been laid out to blend into the existing parking lot and trail system. The ramps are planned to be 10’ wide paved surfaces, with 2’ earthen shoulders and 1:3 side slopes.

IDOT provided two recent soil borings that were taken on either side of the roadway approximately 400’ north of the tunnel location. The borings indicated existing medium stiff to very stiff, silty clay and clay soil to 17’ depth, then very dense sandy clay loam and sandy loam to the bedrock elevation around 435 at the boring. While no water was encountered in either IDOT soil boring, the geotechnical subconsultant had previous knowledge of existing CONWR monitoring wells 650’ north of the tunnel location that have had ground water readings generally varied between 441 and 445 since 2006. The monitoring wells are near the peak of the hill and the tunnel is about halfway down the hill. The geotechnical consultant recommends that a vibrating wire piezometer be installed with a data recorder to collect longer term ground water elevations at the tunnel location and to observe changes over seasons and precipitation events.

To intercept potential ground water before it reaches the tunnel, a special underdrain system will be required and porous granular embankment (PGE) should be placed in the tunnel overdig to facilitate channeling the water to the drainage system. The tunnel placement will allow for gravity draining of this groundwater, as well as the trail and tunnel surface via a shallow swale along the trail alignment. It will be intercepted at the roadway ditch around Sta 91+00 and/or Sta 108+00.

Note an additional boring should be taken during Phase I design to verify both bedrock elevation and groundwater elevation closer to the actual tunnel location. If rock excavation is required to install the tunnel, the construction costs will increase, possibly significantly, and it will be more difficult and costly to construct the tunnel in stages. See *Attachment 08* for Geotechnical Memo and Soil Boring information.

The tunnel and the trail excavation will “cut through” the existing underground utilities noted previously. If the utilities are located in the right-of-way, they must make the adjustments themselves. These include the gas line on the east and telephone, sanitary sewer, water, and communication lines on the west. A few of the private communication lines may be in easements; if so, their adjustment costs may have to be borne by the project.

Also worth noting since the tunnel option will require significant earth excavations, while CONWR does have locations of contaminated soils, there are no expected hazardous soils and/or special non-hazardous soils to occur in the study area south of EMA Road.

### Bridge Options

The bridge (overpass) option will also provide for complete separation of pedestrians and vehicles. Since the bridge is in close proximity to the intersection with Pigeon Creek Road, the bridge will have to be of sufficient length to provide adequate sight distance for the stop-controlled side road. The bridge option(s) will be of sufficient length to avoid the need for piers, however, MSE walls and abutments will be within IDOT ROW for options that include these items. Preliminary sight distance calculations indicate sight distance will be unchanged from the existing conditions.

The bridge is proposed to be 10' wide, matching the trail width. The bridge must include IDOT standard chain link railing with a curved top, which hinders pedestrians from throwing trash or other items to the roadway below. We would suggest a concrete deck for the bridge surface. Wooden plank decks give a nice woodsy feel, and look great at first, but eventually the planks will split and require ongoing replacement/maintenance to remain ADA compliant.

Another choice for the bridge will be steel beam construction vs. steel truss construction. Both have their advantages. The truss option is fabricated and assembled by a steel truss manufacturer who specializes in that type of construction. Completely built truss segments, including railing and decking, are brought out to the construction site, ready to be connected together and erected, and on-site steel work is limited to a day or two at most (of course shop assembly time is much longer, but happens out of the worksite). For the beam option, individual steel beam segments are sent to the construction site, to be erected by ironworkers piece by piece with bolts.

Historically, truss bridges have been overall less expensive than beam bridges. However, at this time current pricing shows the truss and beam prices are similar. Steel beam bridges allow for additional architectural finishes and customization such as formliner and signage for a

welcoming presence. Steel beams also allow for a larger portion of the design and construction to be done by local firms and contractors. See inset photo for an architecturally finished trail bridge. Both a steel beam and truss superstructure are capable of spanning to substructure units placed beyond IDOT's 130' right-of-way if necessary. If a longer single span superstructure is desired without piers near the right-of-way line, only a truss superstructure is feasible.



*Steel Beam Bridge along MetroBikeLink, with formliner finish and concrete staining.*

A fully ADA accessible ramp system will need to be provided on both ends of the bridge, with a maximum running slope of 5%. For a bridge this is about 400' of ramp, or a little more than the length of a typical city block. It is assumed the ramps would be constructed fully from earthen embankments, as there is plenty of open space to provide for this type of construction.

One benefit of a bridge option vs. tunnel option, is underground utilities should not need to be adjusted, unless there is a valve or underground access structure within the footprint of the new embankments. During SOT meetings, CONWR has mentioned that a new comfort station will be installed near the existing welcome center (that is to be demolished). The existing water service and sewer lift station will need to be adjusted in order to continue use after construction of the embankment. The overhead power lines (west of the roadway) will need to be raised in order to provide adequate clearance for the bridge to pass over the roadway.

The geotechnical subconsultant also considered the underlying ground conditions for this type of structure. Bedrock is expected to slope with the topography and remain 10' to 25' below ground surface. During design, additional borings at the actual bridge location would be able to pinpoint this depth, allowing the foundation type to be based on exact information. The abutments for the bridge option will be assumed to be on pile supported foundations to bedrock. See [Attachment 08](#) for Geotechnical Memo and Soil Boring information.

## **PREFERRED OPTIONS**

During SOT meetings, CONWR revealed that it was no longer planning to pursue a trail west of IL 148 on Esda Road. As such, IL 148 would be the west terminus of trails at this time. Upon further discussion, it was felt that the proposed roundabout at the intersection of IL 148 and Old Route 13 would slow IL 148 traffic sufficiently to allow for safe crossing of pedestrians and bicyclist at the new roundabout intersection.

Additionally, since the old Visitor's Center parking lot was slated to remain in place and function as a future trailhead parking area, it made sense to concentrate any crossings closer to the intersection of Pigeon Creek Road and IL 148.

The study team narrowed the options to one tunnel and two bridge options in this intersection area. In consultation with CONWR, the options were further reduced to the best tunnel and best bridge options for more complete layout and cost estimating.

Each of option is summarized below. For each of these options, the pros, cons, and various impacts have been determined, as well as development of a horizontal and vertical alignment layout and a cost estimate.

Final Tunnel Option

The final tunnel option is located 700’ north of the intersection. It takes advantage of the natural hill towards the north, and provides for gravity draining of the tunnel surface. See *Attachment 09 and 10* for aerial plan and profile sheet and cost estimate for this option.

| Pro   | Con  |
|---|--|
| Less Expensive - <b>\$2.65 million</b> (estimated total project cost) | Lighting will require energy source and ongoing operation cost.  |
| Visually blends into natural landscape                                | Can't see tunnel opening from parking lot, which may discourage its use  |
| <1% Grade, meets ADA  | Top slab of tunnel may degrade due to roadway salts. Membrane will be placed to minimize this effect.  |
| Only 13' grade separation required                                    | Even though tunnel will span roadway clearzone, guardrail may be required by IDOT to prevent errant vehicles going off culvert drop off  |
|   | 900' of Adverse travel   |
|   | Requires extensive utility relocations   |
|   | Groundwater elevation is not confirmed near the tunnel, and may be higher than the tunnel bottom, so underdrains and PGE will be required to intercept groundwater. Tunnel may remain moist from time to time. |
|   | Bedrock elevation is not confirmed near the tunnel. Cost could change dramatically once bedrock confirmed.   |

Assumptions for the cost estimate include precast concrete box culvert, cast in place wingwalls with stone form liner, additional boring and piezometer during design, waterproofing materials, porous granular embankment (PGE) backfill with underdrain system, 3 light fixtures inside tunnel, anti-graffiti coating on tunnel and wingwall surfaces, and railing along headwall & wingwalls. Assumes ~2’ of rock excavation.

Final Bridge Option

The bridge option is located 125’ north of the intersection. It utilizes the old Visitor’s Center site for a loop around earth embankment. See *Attachment 11 and 12* for aerial plan and profile sheet and cost estimate.

| <b>Pro</b>  | <b>Con</b>   |
|---|--|
| No ongoing energy costs   | More Expensive - <b>\$3.2 million</b> (estimated total project cost) |
| Bridge Structure can feature trail signage/CONWR branding opportunity                       | 600’ of adverse travel   |
| 4.8% Maximum Grade, meets ADA   | MSE Walls could be hit by an errant vehicle (beam bridge option)     |
| Can visualize crossing from parking lot, which may encourage its use                        | Guardrail required on west side of IL 148 (beam bridge option)       |
| Opportunity for nature viewing platform on top of bridge or on earthen approach embankments | 20’ of grade separation required                                     |
| Minimal utility relocations (only overhead power)   |  |

Assumptions for the cost estimate include concrete deck, IDOT standard pedestrian railing, painted steel rolled beams, stone form liner on abutments, piles to bedrock, and anti-graffiti coating on exposed concrete surfaces.

All options will be required to deal with the “4f lands” issue during Phase I Engineering. However, this should result in a de minimus finding which should be a relatively minor process requiring some additional coordination.



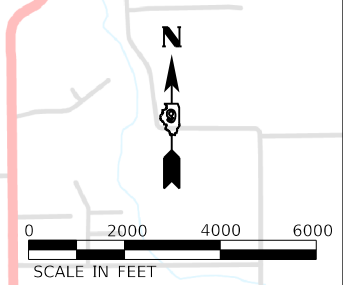
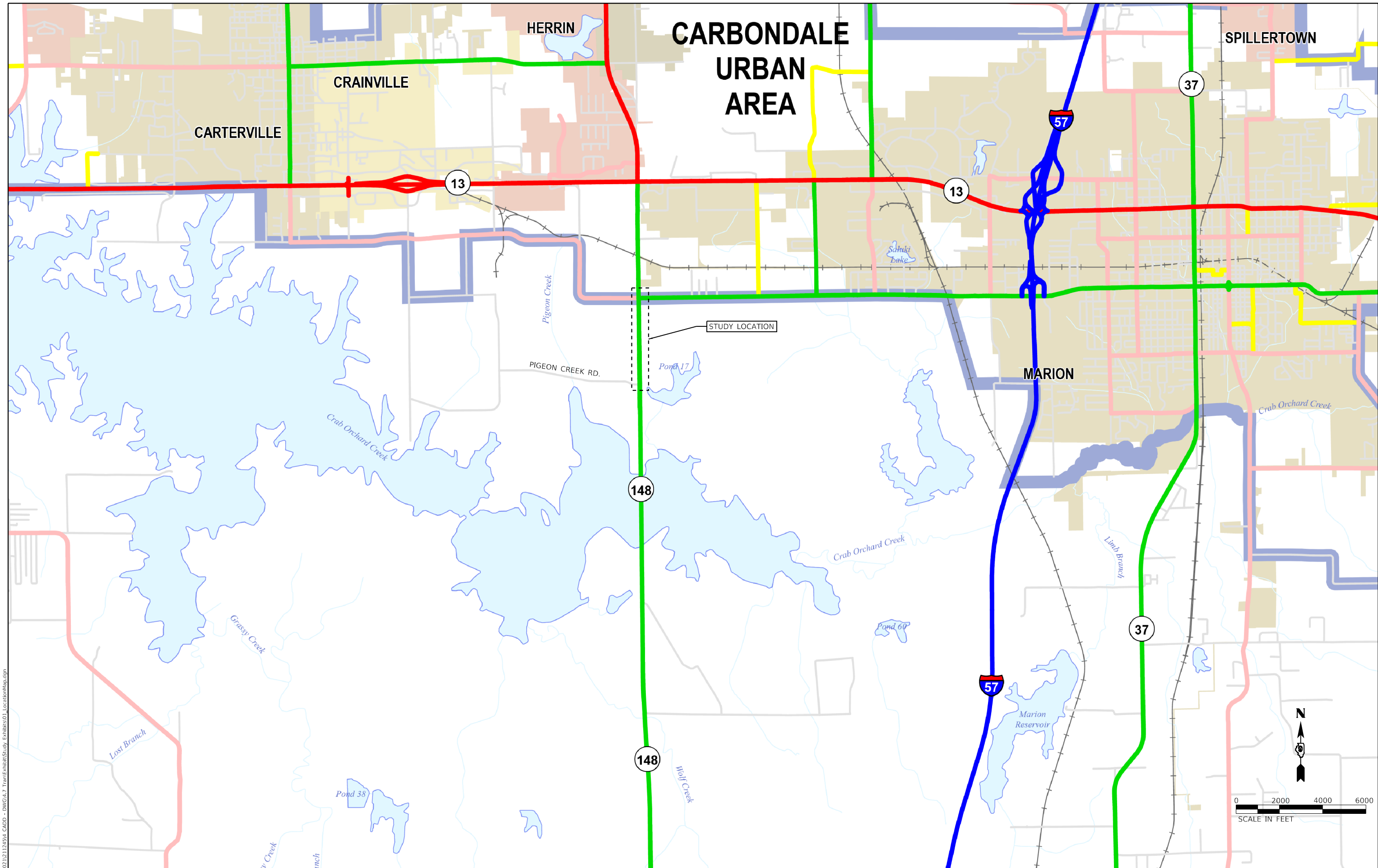
## **POSSIBLE FUNDING SOURCES**

Whichever crossing option is selected, grants will likely be sought out to help with the cost of engineering and construction. Any potential project would likely be sponsored by a joint team comprised of IDOT, CONWR, and/or others. Various state and federal agencies have ongoing grant cycles, the following may be eligible:

- Federal Safety (90%). HSIP Applications in early spring. Statewide competitive grant that is data driven, will require analysis for application.
- Federal STP (80%). Applications in September. Competitive grant within the SIMPO boundary for the preservation and improvement of the transportation system, including bicycle and pedestrian infrastructure.
- Federal ITEP (80%). Applications every year or two, no certain schedule. Promotes and develops alternative transportation options. Statewide competitive grant focuses on improving the cultural, historic, aesthetic and environmental aspects of transportation infrastructure.
- State IDNR (50%). Applications every year or two, usually in the Spring. Statewide competitive grant for recreational and destination trail systems.
- With its location on Federal land, this project would likely qualify for other Federal grants, which are available from time to time from various federal agencies such as FLAP, etc.



# CARBONDALE URBAN AREA



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LICENSE NO: 184-001220

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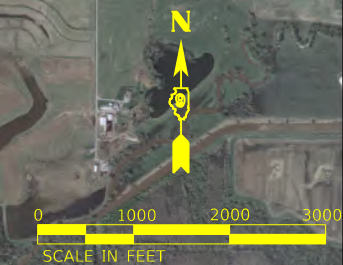
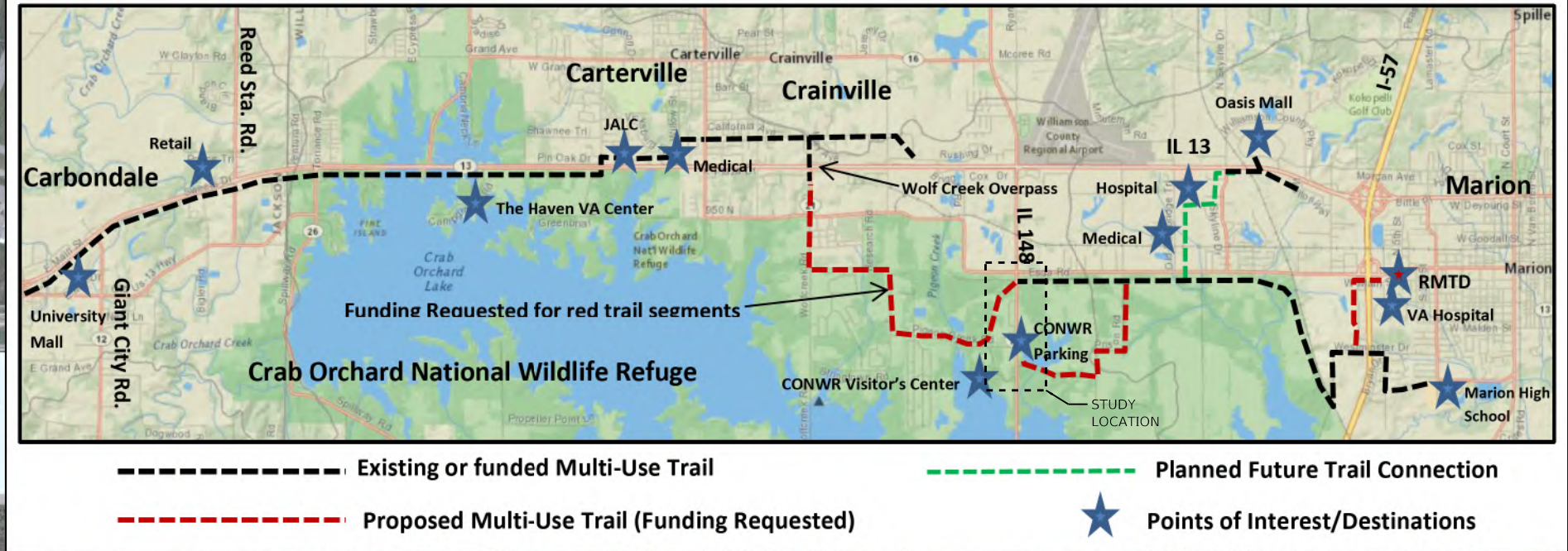
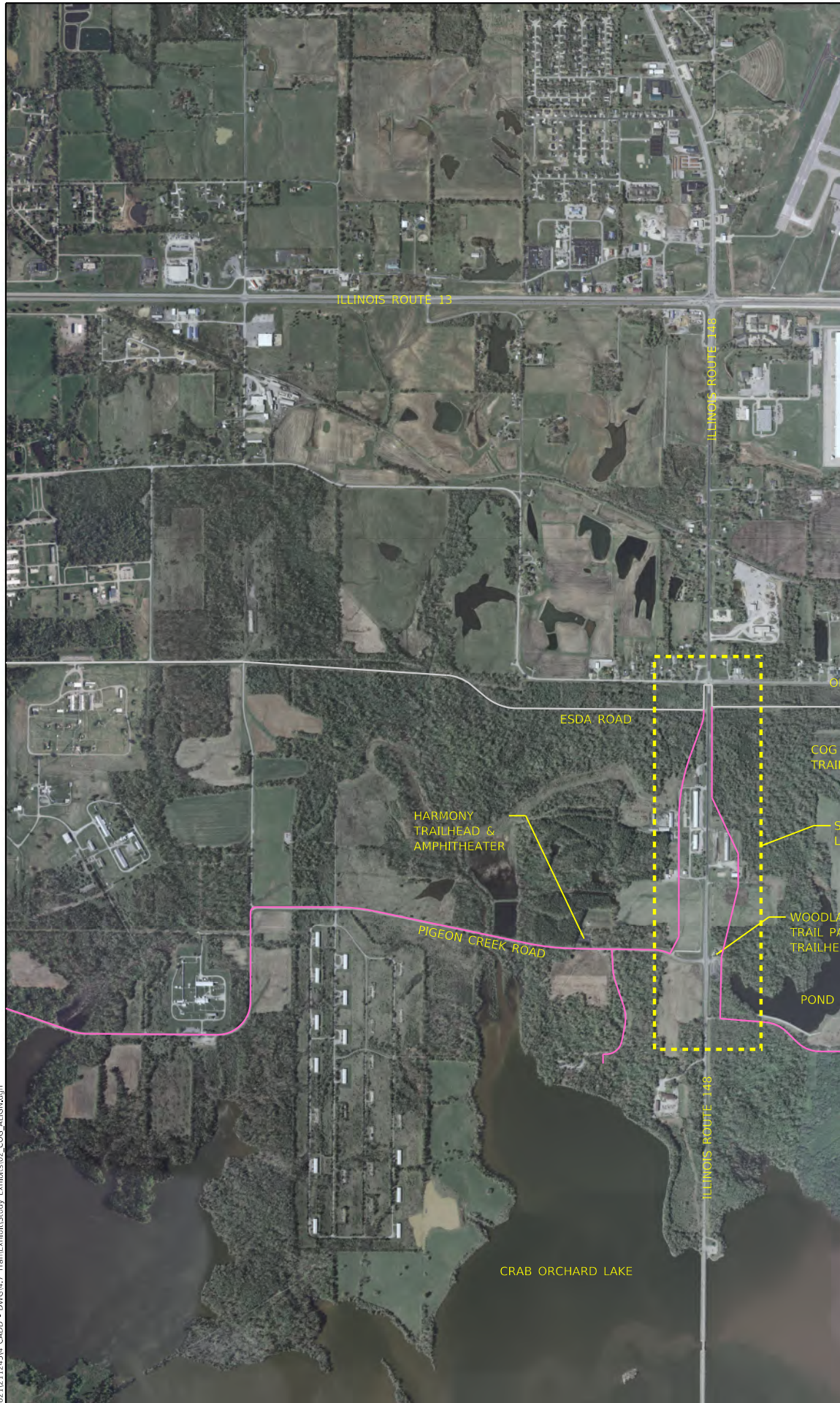
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| <b>ATTACHMENT 01<br/>STUDY LOCATION MAP</b> |       |    |        |              |
| SCALE:                                      | SHEET | OF | SHEETS | STA. TO STA. |

|                           |         |        |              |           |
|---------------------------|---------|--------|--------------|-----------|
| F.A. RTE.                 | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|                           |         |        |              |           |
| CONTRACT NO.              |         |        |              |           |
| ILLINOIS FED. AID PROJECT |         |        |              |           |





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GEOSPATIAL SERVICES

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| DESIGNED | - |
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| REVISED | - |
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| <b>ATTACHMENT 02</b>               |       |    |        |              |
| <b>COG EXISTING/PLANNED TRAILS</b> |       |    |        |              |
| SCALE:                             | SHEET | OF | SHEETS | STA. TO STA. |

|              |         |        |              |           |
|--------------|---------|--------|--------------|-----------|
| F.A. RTE.    | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|              |         |        |              |           |
| CONTRACT NO. |         |        |              |           |
|              |         |        |              |           |





IL 148 – Looking North  
At Northern limits of  
Study Area  
Intersection of Old  
Route 13 and IL 148

IL 148 – Looking North  
Looking towards  
intersection of Old  
Route 13 and IL 148





IL 148 - Looking South  
Just south of Esda  
(Frontage) Road

IL 148 - Looking South  
Near warehouses





IL 148 - Looking South  
Approaching crest of hill

IL 148 - Looking South  
Approaching turns  
lanes at Pigeon Creek  
Road







Intersection of IL 148 and  
Pigeon Creek Road

Looking South

IL 148 – Looking South

South of intersection  
with Pigeon Creek  
Road







IL 148 - Looking North

Approaching Pigeon  
Creek Road/the Old  
Visitor's Center  
parking lot entrance

Parking Lot at Old  
Visitors Center  
Looking Southwest





Pigeon Creek Road  
Looking West



Pigeon Creek Road  
Amphitheater parking lot  
Looking Northeast

**SOUTHERN ILLINOIS MPO  
PEDESTRIAN CROSSING STUDY AT  
IL ROUTE 148, CRAB ORCHARD GREENWAY**

**Time/Speed Report**

| Date                                     | <  | 10 | 15 | 20 | 25 | 30                    | 35 | 40 | 45  | 50   | 55   | 60                        | 65  | 70  | 75  | >  | Total |
|--|----|----|----|----|----|-----------------------|----|----|-----|------|------|---------------------------|-----|-----|-----|----|-------|
| And                                      | to | to | to | to | to | to                    | to | to | to  | to   | to   | to                        | to  | to  | to  | to | to    |
| Time Range                               | 9  | 14 | 19 | 24 | 29 | 34                    | 39 | 44 | 49  | 54   | 59   | 64                        | 69  | 74  | 79  | 84 | 89    |
| <b>Device ID: 406719</b>                 |    |    |    |    |    |                       |    |    |     |      |      |                           |     |     |     |    |       |
| <b>Operator: KAL</b>                     |    |    |    |    |    |                       |    |    |     |      |      |                           |     |     |     |    |       |
| <b>Begin: 05/26/2021 03:00 PM</b>        |    |    |    |    |    |                       |    |    |     |      |      |                           |     |     |     |    |       |
| <b>End: 05/27/2021 03:00 PM</b>          |    |    |    |    |    |                       |    |    |     |      |      |                           |     |     |     |    |       |
| <b>Hours: 24.00</b>                      |    |    |    |    |    |                       |    |    |     |      |      |                           |     |     |     |    |       |
| <b>Period (min): 60</b>                  |    |    |    |    |    |                       |    |    |     |      |      |                           |     |     |     |    |       |
| <b>Location: 0171</b>                    |    |    |    |    |    | <b>Lane: Combined</b> |    |    |     |      |      | <b>Raw Count: 5,929</b>   |     |     |     |    |       |
| <b>Street: OLD ROUTE 13 to GRASSY RD</b> |    |    |    |    |    | <b>City: Marion</b>   |    |    |     |      |      | <b>AAADT Count: 5,929</b> |     |     |     |    |       |
| <b>County: 1000171</b>                   |    |    |    |    |    | <b>State: IL</b>      |    |    |     |      |      | <b>AAADT Factor: 1</b>    |     |     |     |    |       |
|  |    |    |    |    |    |                       |    |    |     |      |      | <b>Speed Limit: 55</b>    |     |     |     |    |       |
| <b>Wed, 05/26/2021</b>                   |    |    |    |    |    |                       |    |    |     |      |      |                           |     |     |     |    |       |
| [03:00 PM-04:00 PM]                      | 1  | 1  | 0  | 0  | 1  | 0                     | 3  | 10 | 18  | 85   | 132  | 83                        | 60  | 37  | 25  |    | 456   |
| [04:00 PM-05:00 PM]                      | 0  | 0  | 0  | 0  | 0  | 2                     | 1  | 3  | 31  | 122  | 136  | 117                       | 56  | 31  | 36  |    | 535   |
| [05:00 PM-06:00 PM]                      | 0  | 0  | 0  | 1  | 0  | 1                     | 1  | 3  | 22  | 72   | 118  | 94                        | 47  | 16  | 20  |    | 395   |
| [06:00 PM-07:00 PM]                      | 0  | 0  | 0  | 0  | 0  | 0                     | 0  | 4  | 14  | 40   | 79   | 67                        | 29  | 18  | 21  |    | 272   |
| [07:00 PM-08:00 PM]                      | 0  | 0  | 0  | 0  | 0  | 0                     | 1  | 3  | 15  | 32   | 65   | 50                        | 18  | 11  | 14  |    | 209   |
| [08:00 PM-09:00 PM]                      | 0  | 1  | 0  | 0  | 0  | 0                     | 3  | 12 | 29  | 47   | 32   | 19                        | 12  | 8   | 7   |    | 170   |
| [09:00 PM-10:00 PM]                      | 0  | 0  | 0  | 0  | 0  | 0                     | 0  | 6  | 14  | 32   | 27   | 17                        | 10  | 5   | 1   |    | 112   |
| [10:00 PM-11:00 PM]                      | 0  | 0  | 0  | 0  | 0  | 0                     | 1  | 3  | 12  | 20   | 20   | 22                        | 4   | 4   | 6   |    | 92    |
| [11:00 PM-12:00 AM]                      | 0  | 0  | 0  | 0  | 1  | 0                     | 2  | 5  | 4   | 15   | 7    | 16                        | 6   | 3   | 4   |    | 63    |
|  | 1  | 2  | 0  | 1  | 2  | 3                     | 12 | 49 | 159 | 465  | 616  | 485                       | 242 | 133 | 134 |    | 2304  |
| <b>Thu, 05/27/2021</b>                   |    |    |    |    |    |                       |    |    |     |      |      |                           |     |     |     |    |       |
| [12:00 AM-01:00 AM]                      | 0  | 0  | 0  | 0  | 0  | 0                     | 0  | 0  | 2   | 3    | 12   | 4                         | 3   | 5   | 2   |    | 31    |
| [01:00 AM-02:00 AM]                      | 0  | 0  | 0  | 0  | 0  | 0                     | 0  | 1  | 3   | 7    | 9    | 3                         | 3   | 3   | 6   |    | 35    |
| [02:00 AM-03:00 AM]                      | 0  | 0  | 0  | 0  | 0  | 0                     | 0  | 0  | 2   | 1    | 4    | 3                         | 0   | 0   | 2   |    | 12    |
| [03:00 AM-04:00 AM]                      | 0  | 0  | 0  | 0  | 0  | 0                     | 0  | 0  | 2   | 4    | 4    | 6                         | 3   | 1   | 3   |    | 23    |
| [04:00 AM-05:00 AM]                      | 0  | 0  | 0  | 1  | 0  | 0                     | 0  | 1  | 7   | 18   | 29   | 16                        | 12  | 9   | 2   |    | 95    |
| [05:00 AM-06:00 AM]                      | 0  | 0  | 0  | 0  | 0  | 0                     | 0  | 2  | 9   | 28   | 34   | 43                        | 18  | 6   | 8   |    | 148   |
| [06:00 AM-07:00 AM]                      | 0  | 0  | 0  | 0  | 1  | 0                     | 0  | 1  | 13  | 31   | 73   | 66                        | 36  | 28  | 29  |    | 278   |
| [07:00 AM-08:00 AM]                      | 0  | 0  | 0  | 0  | 0  | 0                     | 1  | 3  | 30  | 62   | 102  | 109                       | 56  | 49  | 22  |    | 434   |
| [08:00 AM-09:00 AM]                      | 0  | 0  | 1  | 0  | 0  | 2                     | 2  | 0  | 26  | 95   | 97   | 83                        | 39  | 19  | 17  |    | 381   |
| [09:00 AM-10:00 AM]                      | 0  | 0  | 1  | 0  | 0  | 0                     | 0  | 1  | 17  | 55   | 74   | 83                        | 37  | 33  | 20  |    | 321   |
| [10:00 AM-11:00 AM]                      | 0  | 2  | 0  | 0  | 0  | 1                     | 0  | 2  | 24  | 63   | 89   | 95                        | 28  | 20  | 9   |    | 333   |
| [11:00 AM-12:00 PM]                      | 0  | 0  | 0  | 1  | 1  | 0                     | 0  | 6  | 23  | 66   | 84   | 62                        | 51  | 19  | 16  |    | 329   |
| [12:00 PM-01:00 PM]                      | 0  | 1  | 0  | 0  | 0  | 1                     | 0  | 3  | 19  | 81   | 86   | 75                        | 25  | 30  | 26  |    | 347   |
| [01:00 PM-02:00 PM]                      | 0  | 1  | 0  | 0  | 1  | 0                     | 2  | 5  | 32  | 71   | 108  | 75                        | 33  | 24  | 15  |    | 367   |
| [02:00 PM-03:00 PM]                      | 0  | 0  | 0  | 0  | 0  | 0                     | 1  | 5  | 33  | 90   | 87   | 78                        | 36  | 23  | 25  |    | 378   |
|  | 0  | 4  | 2  | 2  | 3  | 4                     | 6  | 30 | 242 | 675  | 892  | 801                       | 380 | 269 | 202 |    | 3512  |
| <b>Summary</b>                           |    |    |    |    |    |                       |    |    |     |      |      |                           |     |     |     |    |       |
| 05/26/2021 03:00 PM                      |    |    |    |    |    |                       |    |    |     |      |      |                           |     |     |     |    |       |
| 05/27/2021 03:00 PM                      | 1  | 6  | 2  | 3  | 5  | 7                     | 18 | 79 | 401 | 1140 | 1508 | 1286                      | 622 | 402 | 336 |    | 5816  |

### Average Speed by Class Report

|  |   |  |
|--|---|--|
| <b>Device ID:</b> 406719<br><b>Operator:</b> KAL<br><b>Begin:</b> 05/26/2021 03:00 PM<br><b>End:</b> 05/27/2021 03:00 PM<br><b>Hours:</b> 24.00<br><b>Period (min):</b> 60 | <b>Location:</b> 0171<br><b>Lane:</b> Combined<br><b>Street:</b> OLD ROUTE 13 to GRASSY RD<br><b>City:</b> Marion<br><b>County:</b> 1000171<br><b>State:</b> IL | <b>Raw Count:</b> 5,929<br><b>AADT Count:</b> 5,929<br><b>AADT Factor:</b> 1<br><b>Speed Limit:</b> 55 |
| <b>Date</b> < 24 40 100<br><b>And</b> to to to to<br><b>Time Range</b> 23 39 99 >  | <b>Average Speed</b>  |  |

|                     |       |       |       |       |
|---------------------|-------|-------|-------|-------|
| Wed,05/26/2021      |       |       |       |       |
| [03:00 PM-04:00 PM] | 59.62 | 65.33 | 60.77 | 59.83 |
| [04:00 PM-05:00 PM] | 59.44 | 65.59 | 59.59 | 59.75 |
| [05:00 PM-06:00 PM] | 59.57 | 64.00 | 56.71 | 59.59 |
| [06:00 PM-07:00 PM] | 60.49 | 63.57 | 63.40 | 60.68 |
| [07:00 PM-08:00 PM] | 59.89 | 54.00 | 59.00 | 59.73 |
| [08:00 PM-09:00 PM] | 55.33 | 57.38 | 55.56 | 55.43 |
| [09:00 PM-10:00 PM] | 56.44 | 52.67 | 62.67 | 56.49 |
| [10:00 PM-11:00 PM] | 57.52 | 69.33 | 56.67 | 57.84 |
| [11:00 PM-12:00 AM] | 58.33 | 52.00 | 52.00 | 57.43 |
| Wed,05/26/2021      | 59.77 | 60.09 | 58.07 | 59.53 |
| Thu,05/27/2021      |       |       |       |       |
| [12:00 AM-01:00 AM] | 61.79 | 58.00 | 58.00 | 61.48 |
| [01:00 AM-02:00 AM] | 62.50 |       | 54.00 | 60.80 |
| [02:00 AM-03:00 AM] | 59.67 |       |       | 59.67 |
| [03:00 AM-04:00 AM] | 63.00 |       | 56.67 | 61.26 |
| [04:00 AM-05:00 AM] | 59.30 | 65.00 | 55.75 | 59.16 |
| [05:00 AM-06:00 AM] | 60.08 | 63.75 | 58.50 | 59.96 |
| [06:00 AM-07:00 AM] | 62.49 | 60.69 | 59.17 | 62.14 |
| [07:00 AM-08:00 AM] | 61.50 | 58.33 | 57.86 | 61.07 |
| [08:00 AM-09:00 AM] | 59.10 | 57.63 | 57.16 | 58.87 |
| [09:00 AM-10:00 AM] | 61.44 | 60.48 | 58.41 | 61.02 |
| [10:00 AM-11:00 AM] | 59.23 | 58.94 | 57.64 | 59.04 |
| [11:00 AM-12:00 PM] | 59.57 | 57.29 | 60.59 | 59.54 |
| [12:00 PM-01:00 PM] | 59.92 | 59.21 | 59.70 | 59.86 |
| [01:00 PM-02:00 PM] | 58.96 | 62.28 | 55.91 | 58.77 |
| [02:00 PM-03:00 PM] | 59.41 | 56.50 | 59.82 | 59.24 |
| Thu,05/27/2021      | 59.77 | 60.09 | 58.07 | 59.53 |

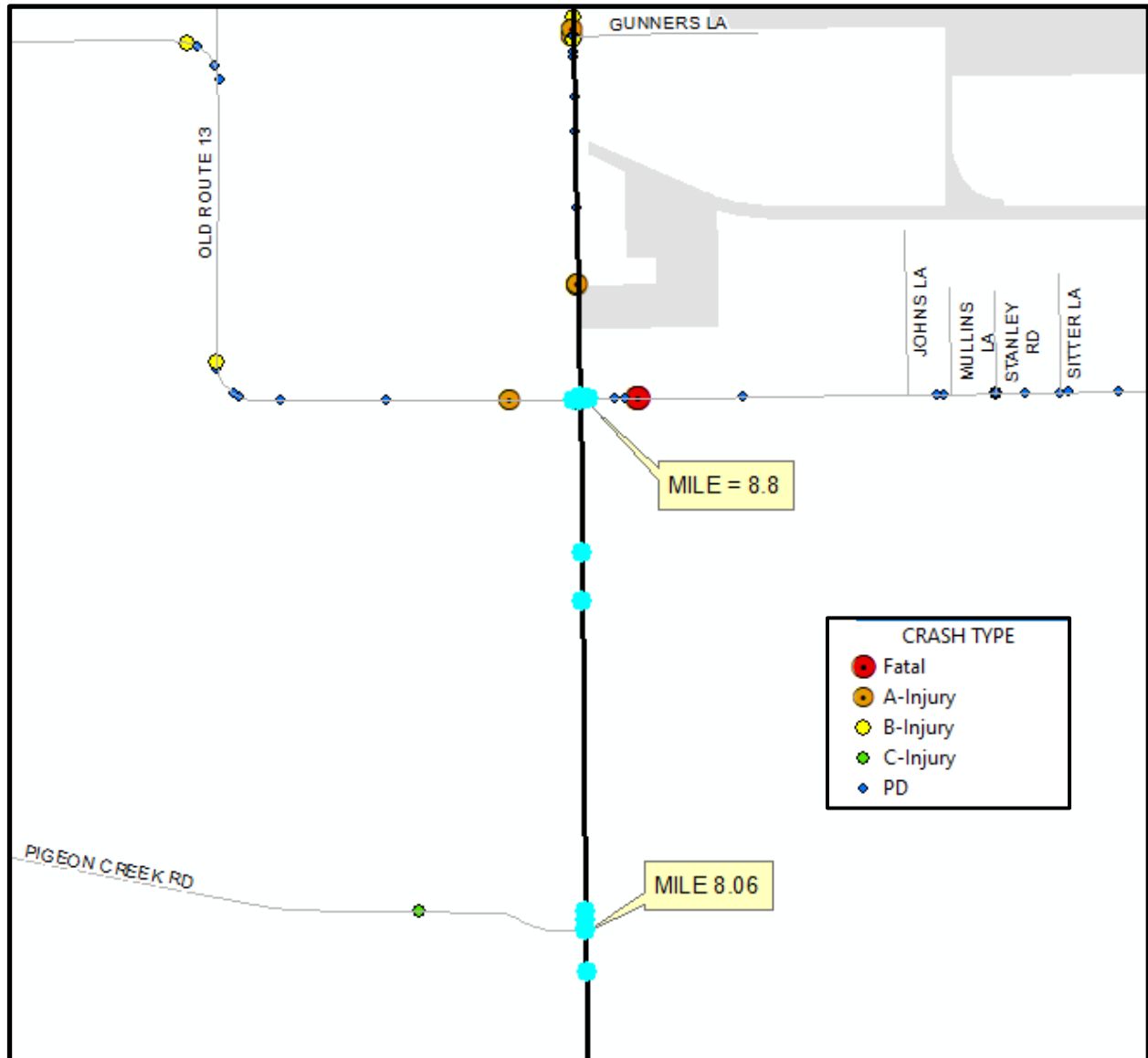
|                     |       |       |       |       |
|---------------------|-------|-------|-------|-------|
| 05/26/2021 03:00 PM | 59.77 | 60.09 | 58.07 | 59.53 |
| 05/27/2021 03:00 PM | 63.00 | 69.33 | 63.40 | 62.14 |

**SOUTHERN ILLINOIS MPO  
PEDESTRIAN CROSSING STUDY AT  
IL ROUTE 148, CRAB ORCHARD GREENWAY**

**Date/Time/Volume/Average Speed/Temperature Report**

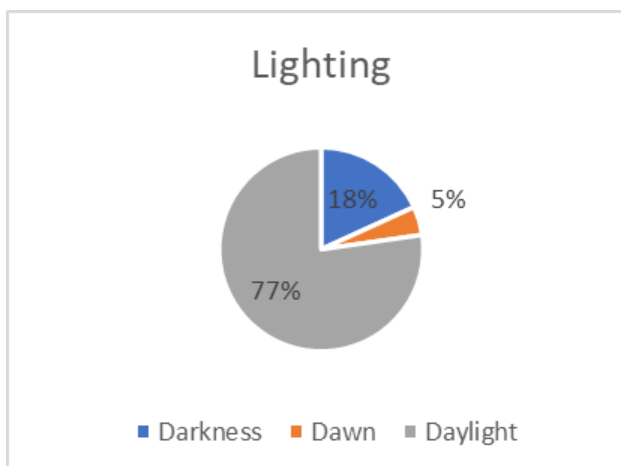
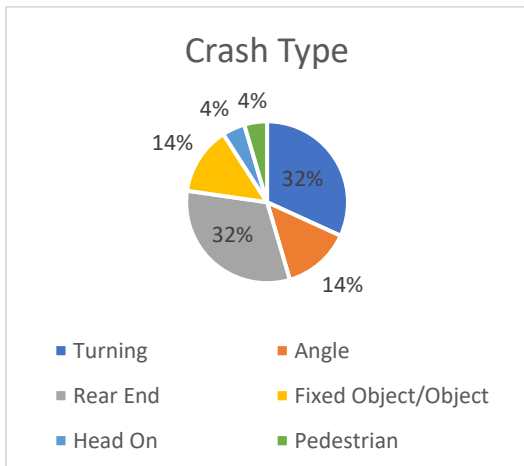
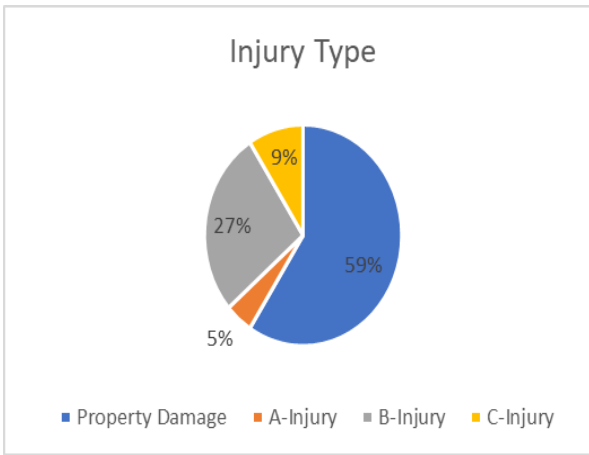
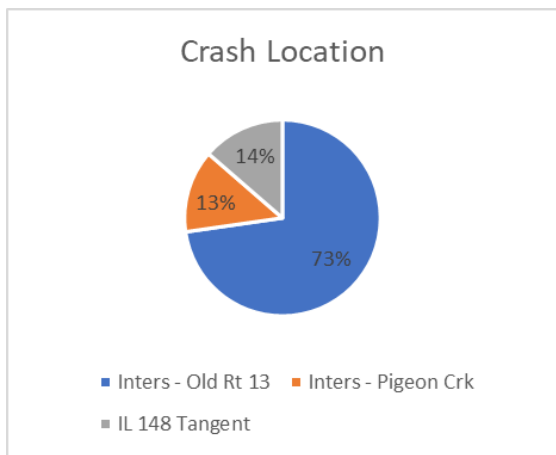
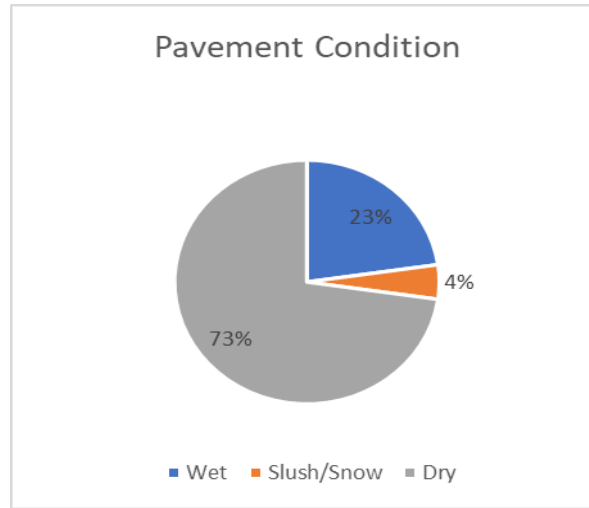
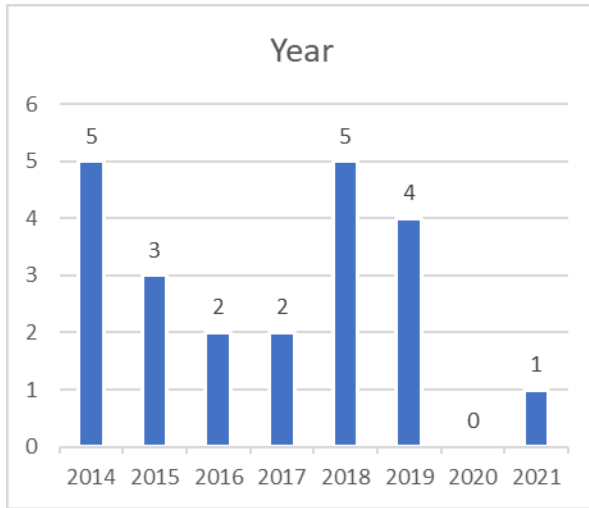
| Device ID: 406719<br>Operator: KAL<br>Begin: 05/26/2021 03:00 PM<br>End: 05/27/2021 03:00 PM<br>Hours: 24.00<br>Period (min): 60 | Location: 0171<br>Lane: Combined<br>Street: OLD ROUTE 13 to GRASSY RD<br>City: Marion<br>County: 1000171<br>State: IL | Raw Count: 5,929<br>AADT Count: 5,929<br>AADT Factor: 1<br>Speed Limit: 55 |                        |                               |
|--|---|--|------------------------|-------------------------------|
| Date<br>And<br>Time Range  | Period<br>Volume  | Average<br>Speed   | Roadway<br>Temperature | Roadway<br>Surface<br>Wet/Dry |
| Wed,05/26/2021   |   |  |                        |                               |
| [03:00 PM-04:00 PM]  | 468   | 60 MPH   | 104 F                  | ---                           |
| [04:00 PM-05:00 PM]  | 544   | 60 MPH   | 100 F                  | ---                           |
| [05:00 PM-06:00 PM]  | 405   | 60 MPH   | 100 F                  | ---                           |
| [06:00 PM-07:00 PM]  | 280   | 61 MPH   | 93 F                   | ---                           |
| [07:00 PM-08:00 PM]  | 213   | 60 MPH   | 88 F                   | ---                           |
| [08:00 PM-09:00 PM]  | 171   | 55 MPH   | 81 F                   | ---                           |
| [09:00 PM-10:00 PM]  | 113   | 56 MPH   | 77 F                   | ---                           |
| [10:00 PM-11:00 PM]  | 94  | 58 MPH   | 77 F                   | ---                           |
| [11:00 PM-12:00 AM]  | 64  | 57 MPH   | 73 F                   | ---                           |
| Wed,05/26/2021   | 2352  | 59 MPH   | 88 F                   |                               |
| Thu,05/27/2021   |   |  |                        |                               |
| [12:00 AM-01:00 AM]  | 31  | 61 MPH   | 73 F                   | ---                           |
| [01:00 AM-02:00 AM]  | 36  | 61 MPH   | 72 F                   | ---                           |
| [02:00 AM-03:00 AM]  | 12  | 60 MPH   | 70 F                   | ---                           |
| [03:00 AM-04:00 AM]  | 23  | 61 MPH   | 70 F                   | ---                           |
| [04:00 AM-05:00 AM]  | 97  | 59 MPH   | 70 F                   | ---                           |
| [05:00 AM-06:00 AM]  | 151   | 60 MPH   | 68 F                   | ---                           |
| [06:00 AM-07:00 AM]  | 287   | 62 MPH   | 72 F                   | ---                           |
| [07:00 AM-08:00 AM]  | 442   | 61 MPH   | 75 F                   | ---                           |
| [08:00 AM-09:00 AM]  | 383   | 59 MPH   | 81 F                   | ---                           |
| [09:00 AM-10:00 AM]  | 327   | 61 MPH   | 88 F                   | ---                           |
| [10:00 AM-11:00 AM]  | 338   | 59 MPH   | 102 F                  | ---                           |
| [11:00 AM-12:00 PM]  | 333   | 60 MPH   | 113 F                  | ---                           |
| [12:00 PM-01:00 PM]  | 354   | 60 MPH   | 117 F                  | ---                           |
| [01:00 PM-02:00 PM]  | 375   | 59 MPH   | 120 F                  | ---                           |
| [02:00 PM-03:00 PM]  | 388   | 59 MPH   | 120 F                  | ---                           |
| Thu,05/27/2021   | 3577  | 60 MPH   | 87 F                   |                               |
| 05/26/2021 03:00 PM  |   |  |                        |                               |
| 05/27/2021 03:00 PM  | 5929  | 60 MPH   | 88 F                   |                               |

**SPOT MAP**

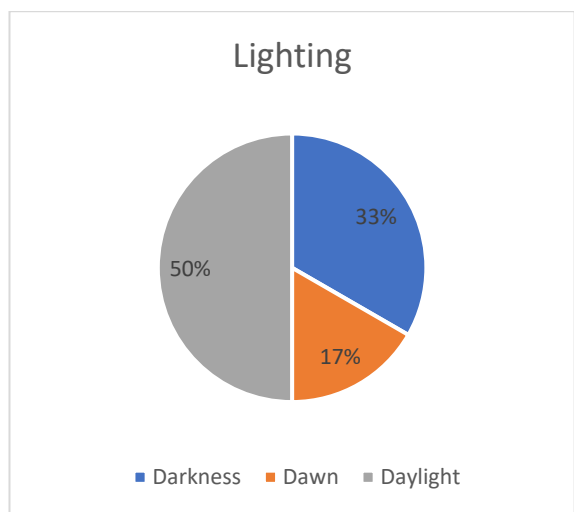
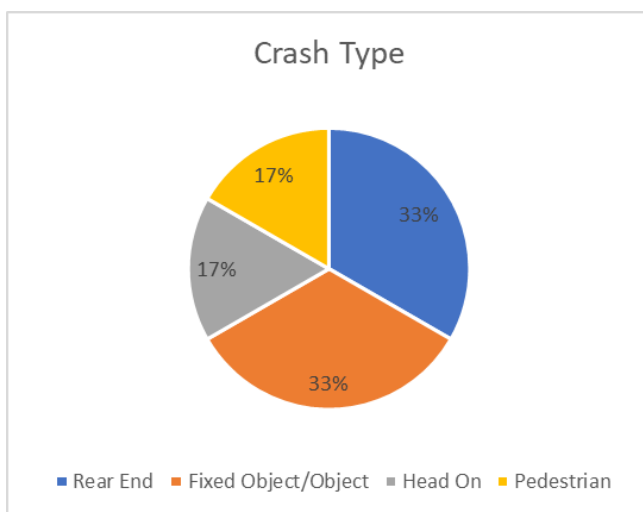
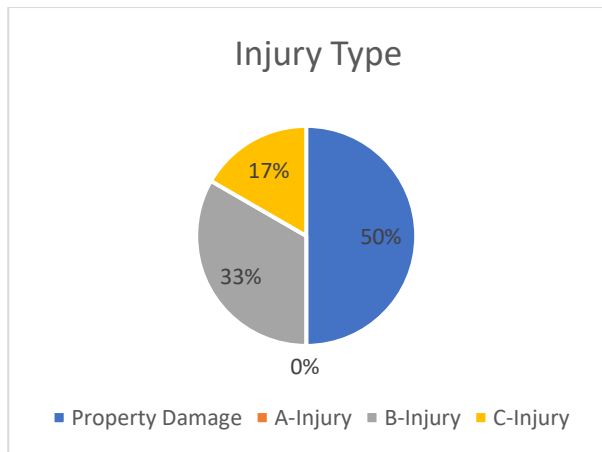
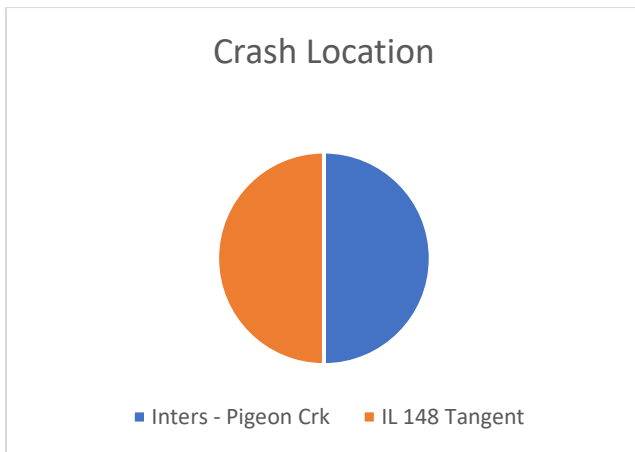
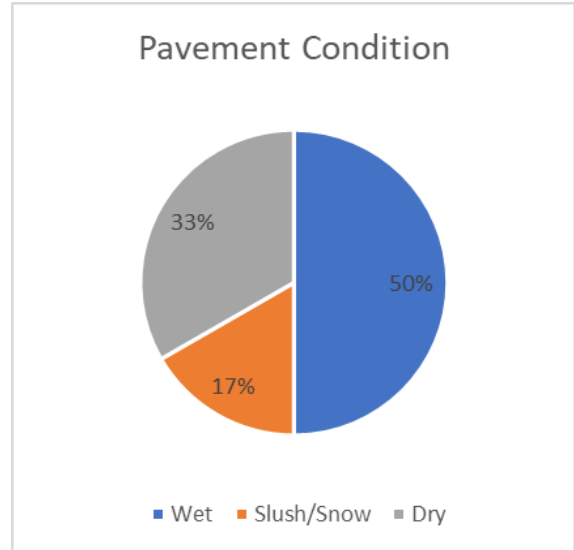
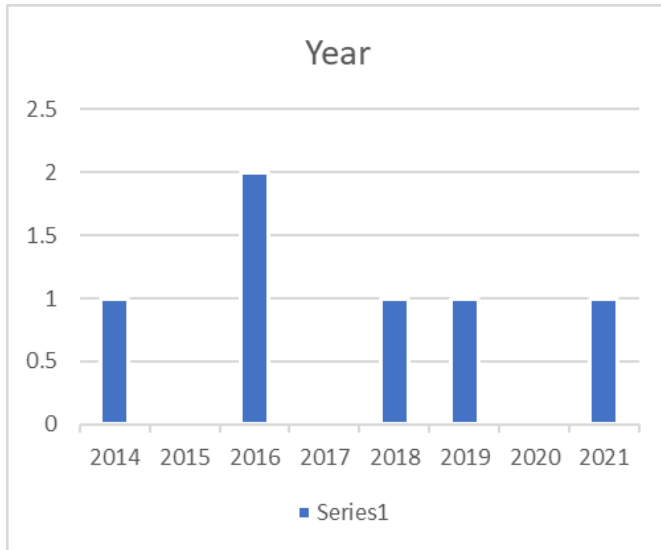




**CRASH DATA – ENTIRE STUDY AREA**



**CRASH DATA – NOT INCLUDING OLD IL 13 INTERSECTION**



**CIVIL ENGINEERING STUDIES**

Illinois Center for Transportation Series No. 17-021

UIIU-ENG-2017-2021

ISSN: 0197-9191

# **ESTABLISHING PROCEDURES AND GUIDELINES FOR PEDESTRIAN TREATMENTS AT UNCONTROLLED LOCATIONS**

Prepared By

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Southern Illinois University Edwardsville

Auburn University

Research Report No. FHWA-ICT-17-016

A report of the findings of

**ICT PROJECT R27-167**

**Establishing Procedures and Guidelines for Pedestrian  
Treatments at Uncontrolled Locations**

**ILLINOIS CENTER FOR  
TRANSPORTATION**

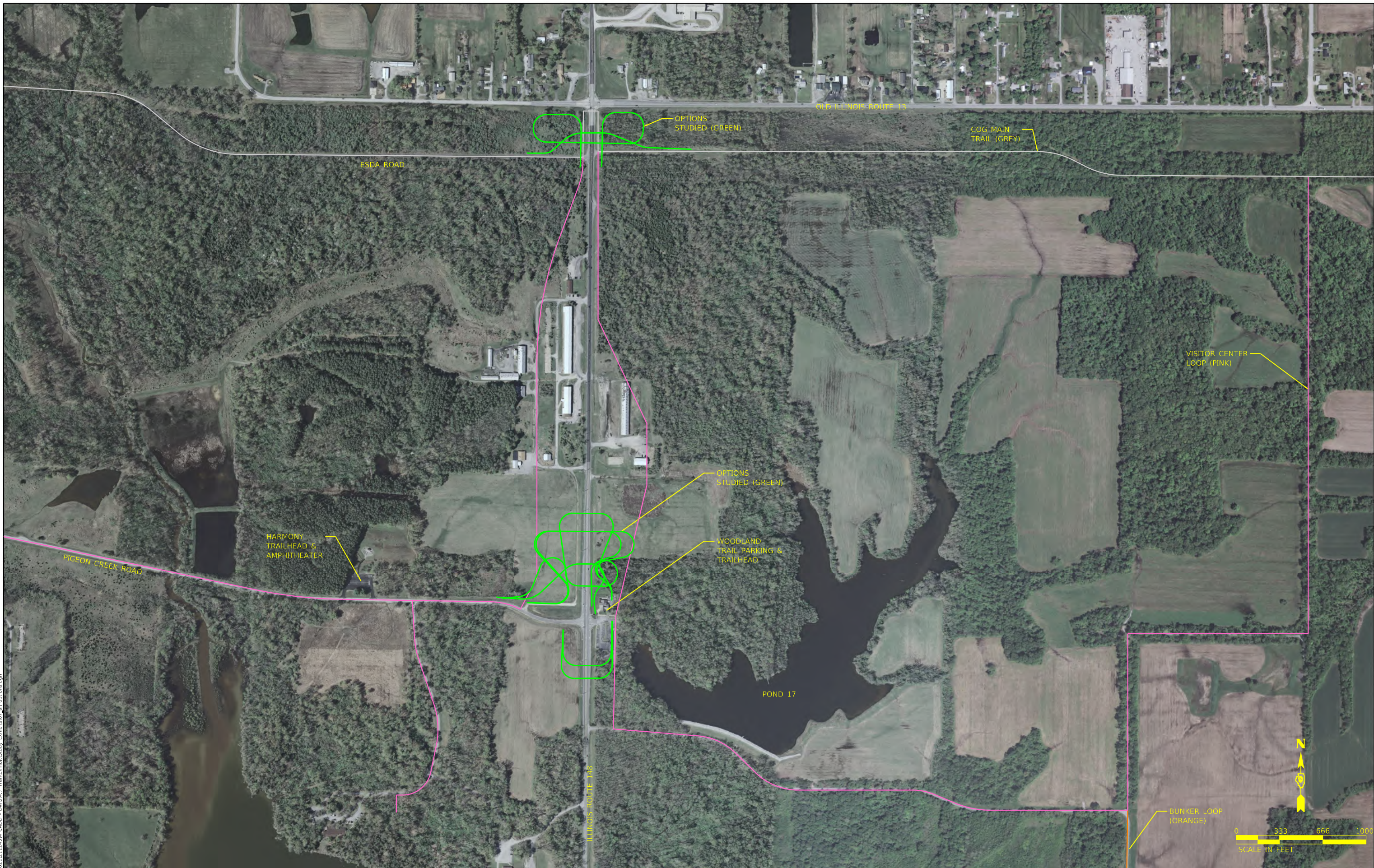


**Table A3. Summary of Recommended Minimum Treatments at Uncontrolled Pedestrian Crossings**

| *Lane Configuration                           | ADT ≤ 9,000  |                               |                               |  | 9,000 < ADT < 15,000        |                              |                               |   | 15,000 < ADT ≤ 25,000         |                               |                               |   | 25,000 < ADT ≤ 35,000         |                     |                     |   | ADT > 35,000  |
|---|--|-------------------------------|-------------------------------|--|-----------------------------|------------------------------|-------------------------------|---|-------------------------------|-------------------------------|-------------------------------|---|-------------------------------|---------------------|---------------------|---|---|
|   | posted speed, mph  |                               |                               |  |                             |                              |                               |   |                               |                               |                               |   |                               |                     |                     |   |   |
|   | vi 30  | 35                            | 40                            | 45   | vi 30                       | 35                           | 40                            | 45  | vi 30                         | 35                            | 40                            | 45  | vi 30                         | 35                  | 40                  | 45  | ≤ 30 to 45  |
| 2 lanes or 3 lanes <u>with</u> raised median  | BT   | In-street sign                | RRFB (or FB) + ASLS           | <b>uncontrolled pedestrian crossing is not recommended</b> | BT                          | FB                           | RRFB (or FB) + ASLS           | Uncontrolled pedestrian crossing is not recommended | In-street sign                | FB                            | RRFB (or FB) + ASLS           | Uncontrolled pedestrian crossing is not recommended | In-street sign                | RRFB (or FB) + ASLS | RRFB (or FB) + ASLS | Uncontrolled pedestrian crossing is not recommended | Uncontrolled pedestrian crossing is not recommended |
| 3 lanes <u>without</u> raised median          | BT   | In-street sign                | RRFB (or FB) + ASLS           |  | BT                          | RRFB (or FB) + ASLS          | RRFB (or FB) + ASLS           |   | FB                            | RRFB (or FB) + ASLS           | RRFB + ASLS                   |   | RRFB (or FB) + ASLS           | RRFB (or FB) + ASLS | **PHB+ CSOR         |   |   |
| 4 lanes <u>with</u> raised median             | In-street sign   | ASLS                          | 4RRFB (or overhead FB) + ASLS |  | ASLS                        | ASLS (consider 4RRFB)        | 4RRFB (or overhead FB) + ASLS |   | 4RRFB (or overhead FB) + ASLS | 4RRFB (or overhead FB) + ASLS | **4 RRFB (consider PHB)+ ASLS |   | 4 RRFB (or overhead FB)+ ASLS | ** PHB + CSOR       | **PHB+ CSOR         |   |   |
| 6 lanes <u>with</u> raised median             | ASLS   | 4RRFB (or overhead FB) + ASLS | 4RRFB (or overhead FB) + ASLS |  | ASLS                        | 4RRFB (or overhead FB)+ ASLS | PHB+ ASLS                     |   | 4RRFB (or overhead FB)+ ASLS  | 4RRFB (or overhead FB) + ASLS | **PHB+ ASLS                   |   | PHB+ CSOR                     | ** PHB + CSOR       | **PHB+ CSOR         |   |   |
| 4, 5, or 6 lanes <u>without</u> raised median | <b>Consider pedestrian refuge island or road diet, if feasible.</b> If raised median, or road diet is feasible then follow the recommendations for the above lane configurations, otherwise follow the recommendation below for 4-lane without raised median to decide pedestrian crossing treatments, providing uncontrolled crossings of more than four lanes without a raised median is not recommended |                               |                               |  |                             |                              |                               |   |                               |                               |                               |   |                               |                     |                     |   |   |
| 4 lanes, raised median not feasible           | ASLS   | ASLS                          | PHB+ CSOR                     | ASLS   | RRFB (or overhead FB)+ ASLS | PHB +CSOR                    | RRFB (or overhead FB)+ ASLS   | PHB +CSOR   | ** PHB+ CSOR                  | PHB +CSOR                     | ** PHB +CSOR                  | **PHB +CSOR   |                               |                     |                     |   |   |

BT= Basic Treatment (W11-2 with W16-7P)  
 In-street sign= In-street stop for pedestrian sign (R1-6a);  
 Overhead sign= Overhead crossing sign (R1-9a) may be used based on engineering judgment  
 ASLS= Advanced stop line and sign (R1-5b and R1-5c)  
 FB= Pedestrian activated flashing beacon (pole mounted)  
 RRFB= Non-median installation of RRFB; 4 RRFB= Median installation of RRFB  
 PHB=Pedestrian Hybrid Beacon; CSOR=Crosswalk Stop on Red line and sign

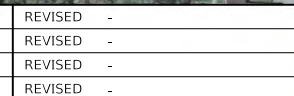




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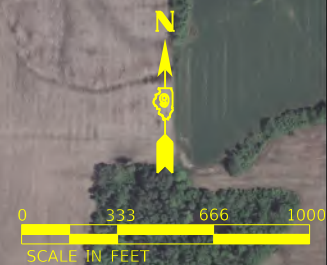


|                               |            |           |
|-------------------------------|------------|-----------|
| USER NAME = jstein            | DESIGNED - | REVISED - |
| PLOT SCALE = 666,6600 ' / in. | DRAWN -    | REVISED - |
| PLOT DATE = 4/21/2022         | CHECKED -  | REVISED - |
|                               | DATE -     | REVISED - |



|  |       |    |        |              |
|--|-------|----|--------|--------------|
| <b>ATTACHMENT 07<br/>CONSIDERED ALTERNATIVES</b> |       |    |        |              |
| SCALE:   | SHEET | OF | SHEETS | STA. TO STA. |

|                           |         |        |              |           |
|---------------------------|---------|--------|--------------|-----------|
| F.A. RTE.                 | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|                           |         |        |              |           |
| CONTRACT NO.              |         |        |              |           |
| ILLINOIS FED. AID PROJECT |         |        |              |           |







May 27, 2022

Ms. Sheila Kimlinger  
TWM, Inc.  
4940 Old Collinsville Rd.  
Swansea, Illinois 62226

RE: PRELIMINARY GEOTECHNICAL REPORT  
IL 148 PEDESTRIAN CROSSING  
MARION, ILLINOIS

Dear Ms. Kimlinger:

## 1 INTRODUCTION

This letter report summarizes the results of a preliminary geotechnical study for a new pedestrian crossing of IL 148 near Marion, Illinois. The purpose of this study was to provide preliminary geotechnical design and construction considerations related to the project. The scope of services included a site visit, review of publicly available subsurface information, the results of borings completed by the Illinois Department of Transportation, and a review of information in Shannon & Wilson's archives from other nearby projects. These services were provided in general accordance with our contract dated April 20, 2022.

## 2 PROJECT SITE AND DESCRIPTION

The project area with the referenced exploration locations is shown on Figure 1. Two options for the pedestrian crossing of IL 148 are being considered in the area. The first is an underpass with an invert elevation of about 437 feet that would be located about halfway between Ema Rd. to the north and Pigeon Creek Rd. to the south. The second option is a pedestrian bridge that would be located about 150 feet north of Pigeon Creek Rd.

## 3 PREVIOUS EXPLORATIONS

Shannon & Wilson was provided boring logs for two borings performed by the Illinois Department of Transportation (IDOT). We understand that these two borings were completed specifically for this project. The borings were completed in November 2021 and the approximate locations are noted on the attached Figure 1. Boring 1-S was terminated at 20.1 feet below the ground surface, and Boring 2-S terminated at 29.6 feet below the ground surface. Sampling included split-spoon sampling at 2.5-foot centers at each boring. The results of moisture content testing and Atterberg limits testing are provided on the boring logs. The measured unconfined compressive strength is



reported on the boring logs. No free water was encountered during drilling at these two locations. During a visit to the site on May 10, 2022, we observed that the boring on the west side of the road (1-S) was backfilled/closed at a depth of about 2 feet below the ground surface. About 2-inches of water was standing in the partially backfilled bore hole. It is not known if the water was groundwater or surface water that had not yet drained into the subgrade. The boring logs are attached for reference.

Shannon & Wilson has previously been involved with the Crab Orchard Wildlife Refuge Superfund Site investigation. As a part of that work, we have installed and/or monitored groundwater at the locations indicated on Figure 1. The groundwater elevation was measured several times between their installation in 2006/2009 and 2021. The groundwater measurements vary depending on the well location and the variation in climatic conditions, but generally varied between about elevation 441 and elevation 445.

Lastly, we reviewed the county soil survey maps for the area. The soil is expected to be either the Ava Silt Loam or the Bluford Silt Loam in the vicinity of the crossing of IL 148. The Rend Silt Loam is expected for the western portion of the trail alignment. These soil units classify as lean clay according to the unified soil classification system. The depth to water table of the Ava Silt Loam is 18 to 36 inches. The depth to water table of the Bluford Silt Loam is 6 to 24 inches and is 24 to 42 inches for the Rend Silt Loam.

## 4 SUBSURFACE CONDITIONS

The borings completed by IDOT indicate medium stiff to very stiff, silty clay and clay, using the U.S. Department of Agriculture classification system, to a depth of about 17 feet below the ground surface. Moisture contents varied from 19 to 28 percent, N-values varied from 4 to 11 blows per foot, and measurements of unconfined compressive strength varied from 0.9 to 3.1 tons per square foot. Below 17 feet (Elevation 434 to 435 feet), the material was classified as very dense, sandy clay loam and sandy loam. It is our interpretation that the material below about 17 feet is likely weak sandstone that the augers were able to penetrate. Moisture contents varied from 10 to 13 percent and N-values ranged from 99 blows per foot to 100 blows for 1.5 inches of penetration.

## 5 FEASIBILITY

### 5.1 Tunnel/Underpass

Construction of an underpass/tunnel for the pedestrian crossing has two main challenges. The first is that the expected ground water elevation is above the invert of the tunnel. Directing surface water away from the tunnel would be necessary. In addition, an underdrain system would need to

be designed and installed. It appears that the drain system may be able to daylight to the ground surface east or west of the tunnel. The rate of inflow into the underdrain system is expected to be small based on the fine-grained nature of the soil. The second challenge is that the anticipated tunnel invert elevation is 437 feet while the top of rock at the IDOT Borings was about Elevation 435 feet. There is uncertainty about what the elevation of the bedrock may be at the tunnel location since it is located about 400 feet south of where the borings were drilled. We recommend that additional borings be drilled at the planned tunnel location to confirm the depth to rock since bedrock excavation could increase the construction cost and schedule for this option significantly. In addition, since this area is slightly elevated from the surrounding ground, it is possible that the elevation of the groundwater surface is also higher here than at the monitoring wells previously discussed. Therefore, we recommend that a vibrating wire piezometer be installed with a data recorder to collect longer term ground water elevations at the tunnel location and observe how the groundwater elevation changes with changes in the season or precipitation.

## 5.2 Bridge

Construction of a new bridge is also feasible. Based on the preliminary plans provided, up to about 20 feet of fill is anticipated. If the same profile of 15 to 17 feet of medium stiff to stiff, cohesive soil is present at the embankment fill area, then a couple to several inches of compression settlement of the underlying natural soil may be expected. Based on our experience in similar lean clay soil, we anticipate it will take between 3 months and a year for all the settlement to occur. Better estimates of the settlement magnitude and rate can be determined with additional subsurface and laboratory exploration and testing.

The preliminary allowable bearing pressure that may be used for the design of a retaining wall associated with the embankment for the natural soil is expected to range from 2,000 to 3,000 pounds per square foot (psf) based on the unconfined compressive strength test results. Driven piles to bedrock may be an alternate method of supporting the bridge abutments, but the depth to bedrock will need to be verified since the elevation of the bedrock disclosed by the IDOT borings is at about the ground surface elevation at Pigeon Creek Road. We anticipate that the bedrock surface slopes or has a sloping erosional surface that is similar to the surface topography. i.e. the depth to bedrock should remain between about 10 to 25 feet below the ground surface across the project area.

## 6 Permanent Slopes

No slope stability analysis has been performed but based on the strength and plasticity of the natural soils expected in the vicinity of the planned bridge, we recommend at the planning stage to

Ms. Sheila Kimlinger  
TWM, Inc.  
May 27, 2022  
Page 4 of 4



assume permanent slopes can be constructed between 1 vertical (V) to 3 horizontal (H) and 1V to 4H.

## 7 LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based on the site conditions as reflected in the subsurface information provided by others and further assume that the borings are representative of the subsurface conditions throughout the site, i.e. the subsurface conditions everywhere are not significantly different from those disclosed by the borings. Additional borings, lab testing, and geotechnical analysis should be completed as the design progresses.

## 8 Closing

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or we may be of further service, please contact us.

Sincerely,

SHANNON & WILSON  
Illinois Professional Design Firm  
License No. 184-001377



Expires 11/30/2023

Patrick M. Kinsella, P.E.  
Associate

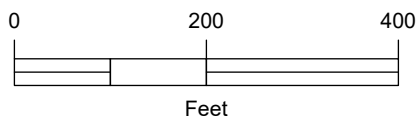
PMK:TJA/tad

Enc. Figure 1  
IDOT Borings Logs







Maxar, Microsoft, Esri Community Maps Contributors, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census



LEGEND

-  Monitoring Well
-  IDOT Boring

IL 148 Pedestrian Crossing Study  
 Marion, Illinois

**REFERENCED INVESTIGATION  
 LOCATIONS**

May 2022

108192-001

 **SHANNON & WILSON, INC.**  
 GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

**Figure 1**

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**Illinois Department of Transportation**  
Division of Highways  
District 9

# SOIL BORING LOG

ROUTE C.O. Greenway Trail DESCRIPTION Crab Orchard Greenway Trail at IL 148 (West side) LOGGED BY L. Estel

SECTION \_\_\_\_\_ LOCATION 0.2 mi N of Pigeon Creek Rd, SEC. 19, TWP. 9S, RNG. 2E, PM

COUNTY Williamson DRILLING METHOD Hollow Stem Auger (8" O.D., 3.25" I.D.) HAMMER TYPE to SPT 140 lbs (HE = 86.5%)

| STRUCT. NO.<br>Station                                   | D<br>E<br>P<br>T<br>H<br>(ft) | B<br>L<br>O<br>W<br>S<br>(tsf) | U<br>C<br>S<br>Qu<br>(tsf) | M<br>O<br>I<br>S<br>T<br>(%) | Surface Water Elev. _____ ft<br>Stream Bed Elev. _____ ft<br>Groundwater Elev.:<br>▽ First Encounter _____ ft<br>▽ Upon Completion _____ ft<br>▽ After _____ Hrs. _____ ft | D<br>E<br>P<br>T<br>H<br>(ft) | B<br>L<br>O<br>W<br>S<br>(tsf) | U<br>C<br>S<br>Qu<br>(tsf) | M<br>O<br>I<br>S<br>T<br>(%) |
|--|-------------------------------|--------------------------------|----------------------------|------------------------------|--|-------------------------------|--------------------------------|----------------------------|------------------------------|
| Stiff Brown and Grey, Moist SILTY CLAY                   |                               | 2                              |                            |                              | Brownish Red, Moist SANDY LOAM   |                               |                                |                            | 11                           |
|  |                               | 5                              | 1.1                        | 28                           |  |                               |                                |                            |                              |
|  |                               | 5                              | B                          |                              |  |                               |                                |                            |                              |
| 447.10   |                               |                                |                            |                              |  |                               |                                |                            |                              |
| Medium Stiff Brownish Grey, Moist SILTY CLAY             | -5                            | 2                              |                            |                              | Bottom of hole @ 20.1 ft   | -25                           |                                |                            |                              |
|  |                               | 2                              | 0.9                        | 21                           | No free water encountered  |                               |                                |                            |                              |
|  |                               | 3                              | B                          |                              | To convert "N" values to "N60", multiply by 1.44; Hammer efficiency = 86.5%  |                               |                                |                            |                              |
| 444.60   |                               |                                |                            |                              | Ground surface elevation referenced to existing IL 148 plans, shot on centerline at Sta 79+00  |                               |                                |                            |                              |
| Stiff Brown, Moist SILTY CLAY                            |                               |                                | 1.4                        | 22                           | See latitude and longitude coordinates in left margin for location information   |                               |                                |                            |                              |
|  |                               |                                | B                          |                              |  |                               |                                |                            |                              |
| 442.10   |                               |                                |                            |                              |  |                               |                                |                            |                              |
| Stiff Brown with specks of Black, Moist CLAY             | -10                           | 1                              |                            |                              |  | -30                           |                                |                            |                              |
|  |                               | 3                              | 1.9                        | 20                           |  |                               |                                |                            |                              |
|  |                               | 4                              | B                          |                              |  |                               |                                |                            |                              |
| 439.60   |                               |                                |                            |                              |  |                               |                                |                            |                              |
| V. Stiff Brown and Grey with specks of Black, Moist CLAY |                               | 2                              |                            |                              |  |                               |                                |                            |                              |
|  |                               | 4                              | 2.2                        | 20                           |  |                               |                                |                            |                              |
|  |                               | 5                              | B                          |                              |  |                               |                                |                            |                              |
| 437.10   |                               |                                |                            |                              |  |                               |                                |                            |                              |
| Stiff Brown with specks of Black, Moist CLAY             | -15                           | 3                              |                            |                              |  | -35                           |                                |                            |                              |
|  |                               | 3                              | 1.6                        | 21                           |  |                               |                                |                            |                              |
|  |                               | 3                              | B                          |                              |  |                               |                                |                            |                              |
| 434.60   |                               |                                |                            |                              |  |                               |                                |                            |                              |
| V. Dense Brown and Brownish Red, Moist SANDY LOAM        |                               | 16                             |                            |                              |  |                               |                                |                            |                              |
| 57% f. SAND, 35% SILT, 7% CLAY, PI 3, LL 23              |                               | 36                             |                            | 11                           |  |                               |                                |                            |                              |
|  |                               | 63                             |                            |                              |  |                               |                                |                            |                              |
| 432.10   |                               |                                |                            |                              |  |                               |                                |                            |                              |
| V. Dense Brown, Tan and                                  | -20                           | 100/7.5"                       |                            |                              |  | -40                           |                                |                            |                              |

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer, E-Estimated) Abbreviations W.O.H - Sampler Advanced By Weight of Hammer, W.O.P - Advanced by Weight of Pipe, B.S. - Before Seating The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) BBS, from 137 (Rev. 8-99)

File Name S:\MATERIALS GEOTECHNICAL UNIT\GIT\PROJECTS\PROJECTS\CRAB ORCHARD GREENWAY TRAIL 2021\CO GREENWAY TRAIL UNDER IL 148 2021.GPJ Data Template D6\TEMP\LT.GDT Date Printed 3/24/22 Latitude 37.43 20.05 Longitude -89.01 18.52 Datum NAD83 Job Number





**Illinois Department of Transportation**  
Division of Highways  
District 9

# SOIL BORING LOG

Date 11/30/21

ROUTE C.O. Greenway Trail DESCRIPTION Crab Orchard Greenway Trail at IL 148 (East side) LOGGED BY L. Estel

SECTION \_\_\_\_\_ LOCATION 0.2 mi N of Pigeon Creek Rd, SEC. 20, TWP. 9S, RNG. 2E, PM

COUNTY Williamson DRILLING METHOD Hollow Stem Auger (8" O.D., 3.25" I.D.) HAMMER TYPE to SPT 140 lbs (HE = 86.5%)

| STRUCT. NO.   | D<br>E<br>P<br>T<br>H | B<br>L<br>O<br>W<br>S | U<br>C<br>S | M<br>O<br>I<br>S<br>T | Surface Water Elev. _____ ft<br>Stream Bed Elev. _____ ft   | D<br>E<br>P<br>T<br>H | B<br>L<br>O<br>W<br>S | U<br>C<br>S | M<br>O<br>I<br>S<br>T |    |
|---|-----------------------|-----------------------|-------------|-----------------------|---|-----------------------|-----------------------|-------------|-----------------------|----|
| Station _____   | (ft)                  |                       | Qu          | (%)                   | Groundwater Elev.:  | (ft)                  |                       | Qu          | (%)                   |    |
| BORING NO. <u>2-S</u>   |                       |                       |             |                       | ▽ First Encounter _____ ft  |                       |                       |             |                       |    |
| Station <u>79+00</u>  |                       |                       |             |                       | ▽ Upon Completion _____ ft  |                       |                       |             |                       |    |
| Offset <u>40.0ft RT</u>   |                       |                       |             |                       | ▽ After _____ Hrs. _____ ft   |                       |                       |             |                       |    |
| Ground Surface Elev. <u>451.8</u> ft  |                       |                       |             |                       |   |                       |                       |             |                       |    |
| Stiff Brown and mottled Grey, Moist SILTY CLAY<br><br>(Brown)                                       |                       |                       |             |                       | V. Dense Brown and Tan, Dry to Moist SANDY CLAY LOAM<br>57% f. SAND, 35% SILT, 7% CLAY, PI 3, LL 23 (continued) |                       | 32                    |             | 13                    |    |
|   |                       | 1                     |             |                       |   |                       | 78                    |             |                       |    |
|   |                       | 2                     | 1.2         | 27                    |   |                       | 100/6"                |             | 11                    |    |
|   |                       | 3                     | B           |                       |   |                       |                       |             |                       |    |
|   | 447.30                |                       |             |                       |   |                       |                       |             |                       |    |
|   |                       | -5                    | 2           |                       |   |                       | -25                   | 100/9"      |                       | 11 |
|   |                       | 3                     | 1.2         | 20                    |   |                       |                       |             |                       |    |
|   |                       | 4                     | B           |                       |   |                       |                       |             |                       |    |
|   |                       | 1                     |             |                       |   |                       |                       | 100/8"      |                       | 11 |
|   |                       | 2                     | 1.0         | 23                    |   |                       |                       |             |                       |    |
|   | 2                     | B                     |             |                       |   |                       |                       |             |                       |    |
| 442.30  |                       |                       |             |                       |   | 422.30                |                       |             |                       |    |
| V. Stiff Brown and Brownish Red, Moist CLAY   | -10                   | 1                     |             |                       | Hard Brown, Dry SANDSTONE   | -30                   | 100                   |             |                       |    |
|   |                       | 3                     | 2.0         | 25                    |   |                       | 1-1/2"                |             |                       |    |
|   |                       | 3                     | B           |                       |   |                       |                       |             |                       |    |
| 439.80  |                       |                       |             |                       | Bottom of hole @ 29.6 ft  |                       |                       |             |                       |    |
|   |                       | 2                     |             |                       | No free water encountered   |                       |                       |             |                       |    |
|   |                       | 6                     | 2.4         | 21                    | To convert "N" values to "N60", multiply by 1.44; Hammer efficiency = 86.5%                                     |                       |                       |             |                       |    |
|   |                       | 5                     | B           |                       | Ground surface elevation referenced to existing IL 148 plans, shot on centerline at Sta 79+00                   |                       |                       |             |                       |    |
|   |                       | 2                     |             |                       |   |                       |                       |             |                       |    |
|   | -15                   | 4                     | 3.1         | 19                    | See latitude and longitude coordinates in left margin for location information                                  | -35                   |                       |             |                       |    |
|   |                       | 5                     | S           |                       |   |                       |                       |             |                       |    |
| 434.80  |                       |                       |             |                       |   |                       |                       |             |                       |    |
| V. Dense Brown and Tan, Dry to Moist SANDY CLAY LOAM<br>57% f. SAND, 35% SILT, 7% CLAY, PI 3, LL 23 |                       | 46                    |             |                       |   |                       |                       |             |                       |    |
|   |                       | 54                    |             | 10                    |   |                       |                       |             |                       |    |
|   |                       |                       |             |                       |   |                       |                       |             |                       |    |
|   |                       | 27                    |             |                       |   |                       |                       |             |                       |    |
|   | -20                   |                       |             |                       |   | -40                   |                       |             |                       |    |

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer, E-Estimated) Abbreviations W.O.H - Sampler Advanced By Weight of Hammer, W.O.P - Advanced By Weight of Pipe, B.S. - Before Seating The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) BBS, from 137 (Rev. 8-99)



|      |                   |    |      |
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| PLAN | SURVEYED          | BY | DATE |
|      | PLOTTED           |    |      |
|      | ALIGNMENT CHECKED |    |      |
|      | NOTE BOOK NO.     |    |      |
|      | CADD FILE NAME    |    |      |

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|---------|-----------------------------|----|------|
| PROFILE | SURVEYED                    | BY | DATE |
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|         | GRADES CHECKED              |    |      |
|         | STRUCTURE NOTATIONS CHECKED |    |      |
|         | NOTE BOOK NO.               |    |      |
|         | CADD FILE NAME              |    |      |



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**TWM**  
 ENGINEERING  
 GEOSPATIAL SERVICES

**TWM, INC.**  
 www.twm-inc.com  
 IL DESIGN FIRM  
 LICENSE NO:  
 184-001220

|                              |            |           |
|------------------------------|------------|-----------|
| USER NAME = jstein           | DESIGNED - | REVISED - |
| PLOT SCALE = 200,0000' / in. | DRAWN -    | REVISED - |
| PLOT DATE = 6/29/2022        | CHECKED -  | REVISED - |
|                              | DATE -     | REVISED - |

|       |        |
|-------|--------|
| 85+00 | 426.00 |
|       | 431.47 |
|       | 426.00 |
|       | 431.65 |
|       | 427.68 |
|       | 431.84 |
|       | 429.06 |
|       | 432.02 |
|       | 430.14 |
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|       | 430.25 |
|       | 432.39 |
|       | 430.90 |
|       | 432.57 |
|       | 431.22 |
|       | 432.76 |
|       | 431.02 |
|       | 432.94 |
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|       | 433.13 |
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|       | 433.31 |
|       | 428.55 |
|       | 433.50 |
|       | 428.03 |
|       | 433.68 |
|       | 428.09 |
|       | 433.87 |
|       | 428.86 |
|       | 434.05 |
|       | 429.97 |
|       | 434.23 |
|       | 431.00 |
|       | 434.42 |
|       | 431.23 |
|       | 434.60 |
|       | 432.31 |
|       | 434.79 |
|       | 433.44 |
|       | 434.97 |
|       | 435.02 |
|       | 435.16 |
|       | 435.62 |
|       | 435.34 |
|       | 436.16 |
|       | 435.53 |
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|       | 435.71 |
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|       | 435.89 |
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|       | 436.08 |
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|       | 442.40 |
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|       | 436.63 |
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|       | 447.06 |
|       | 436.99 |
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|       | 449.07 |
|       | 447.56 |
|       | 436.99 |
|       | 449.11 |
|       | 436.82 |
|       | 448.17 |
|       | 436.65 |
|       | 447.58 |
|       | 436.47 |
|       | 446.24 |
|       | 436.29 |
|       | 444.75 |
|       | 436.12 |
|       | 443.77 |
|       | 435.94 |
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|       | 435.59 |
|       | 442.00 |
|       | 435.41 |
|       | 442.00 |
|       | 435.23 |
|       | 439.98 |
|       | 435.06 |
|       | 439.60 |
|       | 434.88 |
|       | 434.70 |
|       | 434.35 |
|       | 435.07 |
|       | 434.53 |
|       | 434.99 |
|       | 434.35 |

**SIMPO**  
 SOUTHERN ILLINOIS

**CRAB ORCHARD**  
 National Wildlife Refuge

**Illinois Department of Transportation**

**ATTACHMENT 09**  
**PLAN AND PROFILE - CULVERT OPTION**

SCALE: SHEET OF SHEETS STA. TO STA.

|                           |         |        |              |           |
|---------------------------|---------|--------|--------------|-----------|
| F.A. RTE.                 | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|                           |         |        |              |           |
| CONTRACT NO.              |         |        |              |           |
| ILLINOIS FED. AID PROJECT |         |        |              |           |





OPINION OF PROBABLE CONSTRUCTION COST

Project: **ATTACHMENT 10 - TUNNEL OPTION**  
Project No.: 211245

Client: SIMPO  
Date of Estimate: 6/28/2022  
Project Length: 2750 FT.

| Line Item No.   | Item Description   | Quantity | Unit  | Unit Cost     | Total Item Cost        |
|---|--|----------|-------|---------------|------------------------|
| <b>Construction Costs</b>   |  |          |       |               |                        |
| 1   | Earth Excavation   | 25000    | CY    | \$ 20.00      | \$ 500,000.00          |
| 2   | Aggregate Base Course, Type B, 6"                                    | 1069     | TON   | \$ 25.00      | \$ 26,736.11           |
| 3   | Hot-Mix Asphalt Surface Course, Mix "C", 2"                          | 342      | TON   | \$ 130.00     | \$ 44,488.89           |
| 4   | Seeding/Mulching/Fertilizers   | 4        | ACRE  | \$ 7,500.00   | \$ 30,000.00           |
| 5   | Signage and Pavement Markings  | 1        | L SUM | \$ 10,000.00  | \$ 10,000.00           |
| 6   | Drainage Pipe Culverts (Sizes Vary)                                  | 200      | FT    | \$ 75.00      | \$ 15,000.00           |
| 7   | Erosion Control (Temporary and Permanent)                            | 1        | L SUM | \$ 20,000.00  | \$ 20,000.00           |
| 8   | Miscellaneous Removals   | 1        | L SUM | \$ 15,000.00  | \$ 15,000.00           |
| 9   | Tree Removal   | 1        | ACRE  | \$ 20,000.00  | \$ 20,000.00           |
| 10  | Pavement Patching  | 135      | SY    | \$ 150.00     | \$ 20,250.00           |
| 11  | Traffic Control and Protection                                       | 1        | L SUM | \$ 50,000.00  | \$ 50,000.00           |
| 12  | Rock Excavation (est. 2' below bottom of tunnel)                     | 3960     | CF    | \$ 125.00     | \$ 495,000.00          |
| 13  | Soil Boring & Ground Water Monitoring                                | 1        | L SUM | \$ 8,000.00   | \$ 8,000.00            |
| 14  | Lighting System for Tunnel   | 1        | L SUM | \$ 40,000.00  | \$ 40,000.00           |
| 15  | Pre-Cast Box Culvert, 12' X 10'                                      | 1        | L SUM | \$ 408,000.00 | \$ 408,000.00          |
| 16  | (includes waterproofing, geodrain system, formliner & anti-graffiti) |          |       |               | \$ -                   |
| 17  |  |          |       |               | \$ -                   |
| 18  |  |          |       |               | \$ -                   |
| 19  |  |          |       |               | \$ -                   |
| 20  |  |          |       |               | \$ -                   |
| 21  |  |          |       |               | \$ -                   |
| 22  |  |          |       |               | \$ -                   |
| 23  |  |          |       |               | \$ -                   |
| 24  |  |          |       |               | \$ -                   |
| 25  |  |          |       |               | \$ -                   |
| 26  |  |          |       |               | \$ -                   |
| 27  |  |          |       |               | \$ -                   |
| Construction Cost Sub-Total   |  |          |       |               | <b>\$ 1,702,475.00</b> |
| <b>Contingency</b>  |  |          |       |               |                        |
| Contingency @ 10%   |  |          |       |               | <b>\$ 170,248.00</b>   |
| <b>Mark-ups</b>   |  |          |       |               |                        |
| M-1   | Mobilization 6% of Sub-Total   |          |       |               | \$ 112,363.00          |
| M-2   | Inflation (5%)   |          |       |               | \$ 99,254.00           |
| Mark-ups Sub-Total  |  |          |       |               | <b>\$ 211,617.00</b>   |
| <b>Engineering &amp; Legal / Administrative Costs</b>   |  |          |       |               |                        |
| E-1   | Phase I Engineering  | @        | 10%   | =             | \$ 187,272.30          |
| E-2   | Phase II Engineering   | @        | 10%   | =             | \$ 187,272.30          |
| E-3   | Phase III Engineering  | @        | 10%   | =             | \$ 187,272.30          |
| Engineering & Legal / Administrative Costs Sub-Total  |  |          |       |               | <b>\$ 561,816.90</b>   |
| <b>INION OF PROBABLE TOTAL CONSTRUCTION COST / ENGINEERING &amp; LEGAL / ADMINISTRATIVE COSTS</b> |  |          |       |               | <b>\$ 2,646,156.90</b> |

The quantities and prices shown are an engineering opinion of probable construction cost to assist the client in identifying the magnitude of construction cost. Costs are not based on contractor's bids, and actual construction cost may vary. Costs are estimated on present day costs and do not reflect future inflation or seasonal adjustments.

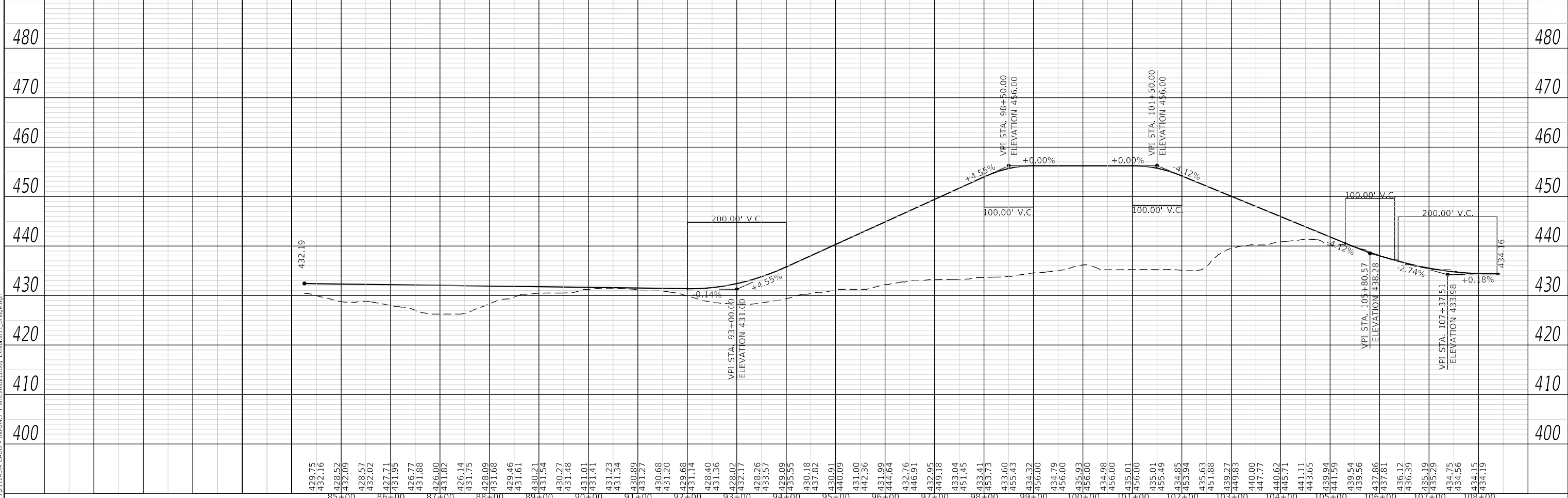
100% Employee Owned  
EXCEPTIONAL SERVICE | NOTHING LESS

ILLINOIS: Swansea • Edwardsville • Waterloo  
MISSOURI: St. Louis • St. Charles



|      |           |    |      |
|------|-----------|----|------|
| PLAN | SURVEYED  | BY | DATE |
|      | PLOTTED   |    |      |
|      | ALIGNED   |    |      |
|      | CHECKED   |    |      |
|      | FILE NAME |    |      |
|      | NO.       |    |      |

|         |           |    |      |
|---------|-----------|----|------|
| PROFILE | SURVEYED  | BY | DATE |
|         | PLOTTED   |    |      |
|         | GRADES    |    |      |
|         | CHECKED   |    |      |
|         | STRUCTURE |    |      |
|         | NOTATIONS |    |      |
|         | NO.       |    |      |



MODEL: Default  
FILE NAME: P:\2021\12\12\45\4 CAD - DWG\4.7 Tran\Exhibit\Study Exhibit\11\_Bridge.dgn

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ENGINEERING  
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LICENSE NO:  
184-001220

|            |                   |
|------------|-------------------|
| USER NAME  | = jstein          |
| DESIGNED   | -                 |
| DRAWN      | -                 |
| CHECKED    | -                 |
| DATE       | -                 |
| PLOT SCALE | = 200.0000" / in. |
| PLOT DATE  | = 4/21/2022       |

|        |   |
|--------|---|
| REVISD | - |
| REVISD | - |
| REVISD | - |
| REVISD | - |



**ATTACHMENT 11**  
**PLAN AND PROFILE - BRIDGE OPTION**

SCALE:      SHEET      OF      SHEETS      STA.      TO      STA.

|                           |         |        |              |           |
|---------------------------|---------|--------|--------------|-----------|
| F.A. RTE.                 | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|                           |         |        |              |           |
| CONTRACT NO.              |         |        |              |           |
| ILLINOIS FED. AID PROJECT |         |        |              |           |





**OPINION OF PROBABLE CONSTRUCTION COST**

Project: **ATTACHMENT 12 - BRIDGE OPTION (TRUSS)**  
 Project No.: 211245

Client: SIMPO  
 Date of Estimate: 5/9/2022  
 Project Length: 2275 FT.

| Line Item No.   | Item Description                            | Quantity | Unit  | Unit Cost     | Total Item Cost        |
|---|---|----------|-------|---------------|------------------------|
| <b>Construction Costs</b>   |   |          |       |               |                        |
| 1   | Earth Embankment                            | 40000    | CY    | \$ 25.00      | \$ 1,000,000.00        |
| 2   | Aggregate Base Course, Type B, 6"           | 885      | TON   | \$ 20.00      | \$ 17,694.44           |
| 3   | Hot-Mix Asphalt Surface Course, Mix "C", 2" | 283      | TON   | \$ 135.00     | \$ 38,220.00           |
| 4   | Seeding/Mulching/Fertilizers                | 4        | ACRE  | \$ 7,500.00   | \$ 30,000.00           |
| 5   | Signage and Pavement Markings               | 1        | L SUM | \$ 10,000.00  | \$ 10,000.00           |
| 6   | Pipe Culverts (Sizes Vary)                  | 200      | FT    | \$ 75.00      | \$ 15,000.00           |
| 7   | Erosion Control (Temporary and Permanent)   | 1        | L SUM | \$ 20,000.00  | \$ 20,000.00           |
| 8   | Miscellaneous Removals                      | 1        | L SUM | \$ 10,000.00  | \$ 10,000.00           |
| 9   | Tree Removal                                | 1        | ACRE  | \$ 20,000.00  | \$ 20,000.00           |
| 10  | Pedestrian Bridge                           | 1        | LSUM  | \$ 850,000.00 | \$ 850,000.00          |
| 11  | Traffic Control and Protection              | 1        | L SUM | \$ 50,000.00  | \$ 50,000.00           |
| 12  |   |          |       |               | \$ -                   |
| 13  |   |          |       |               | \$ -                   |
| 14  |   |          |       |               | \$ -                   |
| 15  |   |          |       |               | \$ -                   |
| 16  |   |          |       |               | \$ -                   |
| 17  |   |          |       |               | \$ -                   |
| 18  |   |          |       |               | \$ -                   |
| 19  |   |          |       |               | \$ -                   |
| 20  |   |          |       |               | \$ -                   |
| 21  |   |          |       |               | \$ -                   |
| 22  |   |          |       |               | \$ -                   |
| 23  |   |          |       |               | \$ -                   |
| 24  |   |          |       |               | \$ -                   |
| 25  |   |          |       |               | \$ -                   |
| 26  |   |          |       |               | \$ -                   |
| 27  |   |          |       |               | \$ -                   |
| <b>Construction Cost Sub-Total</b>  |   |          |       |               | <b>\$ 2,060,914.44</b> |
| <b>Contingency</b>  |   |          |       |               |                        |
| <b>Contingency @ 10%</b>  |   |          |       |               | <b>\$ 206,091.00</b>   |
| <b>Mark-ups</b>   |   |          |       |               |                        |
| M-1   | Mobilization 6% of Sub-Total                |          |       |               | \$ 136,020.00          |
| M-2   | Inflation (5%)                              |          |       |               | \$ 120,151.00          |
| <b>Mark-ups Sub-Total</b>   |   |          |       |               | <b>\$ 256,171.00</b>   |
| <b>Engineering &amp; Legal / Administrative Costs</b>   |   |          |       |               |                        |
| E-1   | Phase I Engineering                         | @        | 10%   | =             | \$ 226,700.54          |
| E-2   | Phase II Engineering                        | @        | 10%   | =             | \$ 226,700.54          |
| E-3   | Phase III Engineering                       | @        | 10%   | =             | \$ 226,700.54          |
| <b>Engineering &amp; Legal / Administrative Costs Sub-Total</b>                                     |   |          |       |               | <b>\$ 680,101.63</b>   |
| <b>OPINION OF PROBABLE TOTAL CONSTRUCTION COST / ENGINEERING &amp; LEGAL / ADMINISTRATIVE COSTS</b> |   |          |       |               | <b>\$ 3,203,278.08</b> |

The quantities and prices shown are an engineering opinion of probable construction cost to assist the client in identifying the magnitude of construction cost. Costs are not based on contractor's bids, and actual construction cost may vary. Costs are estimated on present day costs and do not reflect future inflation or seasonal adjustments.



OPINION OF PROBABLE CONSTRUCTION COST

Project: **ATTACHMENT 12 - BRIDGE OPTION (BEAM)**  
 Project No.: 211245

Client: SIMPO  
 Date of Estimate: 5/9/2022  
 Project Length: 2275 FT.

| Line Item No.   | Item Description                            | Quantity | Unit  | Unit Cost     | Total Item Cost        |
|---|---|----------|-------|---------------|------------------------|
| <b>Construction Costs</b>   |   |          |       |               |                        |
| 1   | Earth Embankment                            | 40000    | CY    | \$ 25.00      | \$ 1,000,000.00        |
| 2   | Aggregate Base Course, Type B, 6"           | 885      | TON   | \$ 20.00      | \$ 17,694.44           |
| 3   | Hot-Mix Asphalt Surface Course, Mix "C", 2" | 283      | TON   | \$ 135.00     | \$ 38,220.00           |
| 4   | Seeding/Mulching/Fertilizers                | 4        | ACRE  | \$ 7,500.00   | \$ 30,000.00           |
| 5   | Signage and Pavement Markings               | 1        | L SUM | \$ 10,000.00  | \$ 10,000.00           |
| 6   | Pipe Culverts (Sizes Vary)                  | 200      | FT    | \$ 75.00      | \$ 15,000.00           |
| 7   | Erosion Control (Temporary and Permanent)   | 1        | L SUM | \$ 20,000.00  | \$ 20,000.00           |
| 8   | Miscellaneous Removals                      | 1        | L SUM | \$ 10,000.00  | \$ 10,000.00           |
| 9   | Tree Removal                                | 1        | ACRE  | \$ 20,000.00  | \$ 20,000.00           |
| 10  | Pedestrian Bridge                           | 1        | LSUM  | \$ 800,000.00 | \$ 800,000.00          |
| 11  | Traffic Control and Protection              | 1        | L SUM | \$ 50,000.00  | \$ 50,000.00           |
| 12  |   |          |       |               | \$ -                   |
| 13  |   |          |       |               | \$ -                   |
| 14  |   |          |       |               | \$ -                   |
| 15  |   |          |       |               | \$ -                   |
| 16  |   |          |       |               | \$ -                   |
| 17  |   |          |       |               | \$ -                   |
| 18  |   |          |       |               | \$ -                   |
| 19  |   |          |       |               | \$ -                   |
| 20  |   |          |       |               | \$ -                   |
| 21  |   |          |       |               | \$ -                   |
| 22  |   |          |       |               | \$ -                   |
| 23  |   |          |       |               | \$ -                   |
| 24  |   |          |       |               | \$ -                   |
| 25  |   |          |       |               | \$ -                   |
| 26  |   |          |       |               | \$ -                   |
| 27  |   |          |       |               | \$ -                   |
| <b>Construction Cost Sub-Total</b>  |   |          |       |               | <b>\$ 2,010,914.44</b> |
| <b>Contingency</b>  |   |          |       |               |                        |
| <b>Contingency @ 10%</b>  |   |          |       |               | <b>\$ 201,091.00</b>   |
| <b>Mark-ups</b>   |   |          |       |               |                        |
| M-1   | Mobilization 6% of Sub-Total                |          |       |               | \$ 132,720.00          |
| M-2   | Inflation (5%)                              |          |       |               | \$ 117,236.00          |
| <b>Mark-ups Sub-Total</b>   |   |          |       |               | <b>\$ 249,956.00</b>   |
| <b>Engineering &amp; Legal / Administrative Costs</b>   |   |          |       |               |                        |
| E-1   | Phase I Engineering                         | @        | 10%   | =             | \$ 221,200.54          |
| E-2   | Phase II Engineering                        | @        | 10%   | =             | \$ 221,200.54          |
| E-3   | Phase III Engineering                       | @        | 10%   | =             | \$ 221,200.54          |
| <b>Engineering &amp; Legal / Administrative Costs Sub-Total</b>                                     |   |          |       |               | <b>\$ 663,601.63</b>   |
| <b>OPINION OF PROBABLE TOTAL CONSTRUCTION COST / ENGINEERING &amp; LEGAL / ADMINISTRATIVE COSTS</b> |   |          |       |               | <b>\$ 3,125,563.08</b> |

The quantities and prices shown are an engineering opinion of probable construction cost to assist the client in identifying the magnitude of construction cost. Costs are not based on contractor's bids, and actual construction cost may vary. Costs are estimated on present day costs and do not reflect future inflation or seasonal adjustments.