Trail Feasibility Study

Willis Road & Lincoln Consolidated School Campus
Augusta Charter Township, Washtenaw County, Michigan
August 2020

Study prepared by:

Carlisle Wortman

ACKNOWLEDGMENTS

This study was made possible by a grant from the
Washtenaw County Parks & Recreation Commission's
Connecting Communities Program,
and by the citizens of Washtenaw County.

Special thanks goes to the Washtenaw County Road Commission and the
Washtenaw County Water Resources Commission for their invaluable advice and knowledge.

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Introduction

The Augusta Township Trail Feasibility Study began with a discussion regarding a potential park on Willis Road, and three primary questions: What would the park look like, how would residents reach the park, and how will the park be funded? Rough park concepts were presented to the Washtenaw County Parks & Recreation Commission (WCPRC) and with a goal of learning about potential funding sources. We learned that while WCPRC does not have the resources to fund local park development, it does support non-motorized trail design and development. The Connecting Communities grant, made possible through a millage first passed in 2016 and renewed in the summer of 2020, focuses on providing safe connections for residents to recreational and other amenities. Augusta Township was awarded a grant from this program to fund this study.

As the study progressed, the role of the Lincoln Consolidated School Campus became magnified in importance. The school campus connects two of the most densely populated centers in Augusta Township, and serves as a cultural and recreational centerpiece to the township. Families travel to and from the campus on a near-daily basis throughout most of the year. In one way or another, the schools touch the lives of nearly everyone within the Township borders, and a large number of families outside of the Township as well.

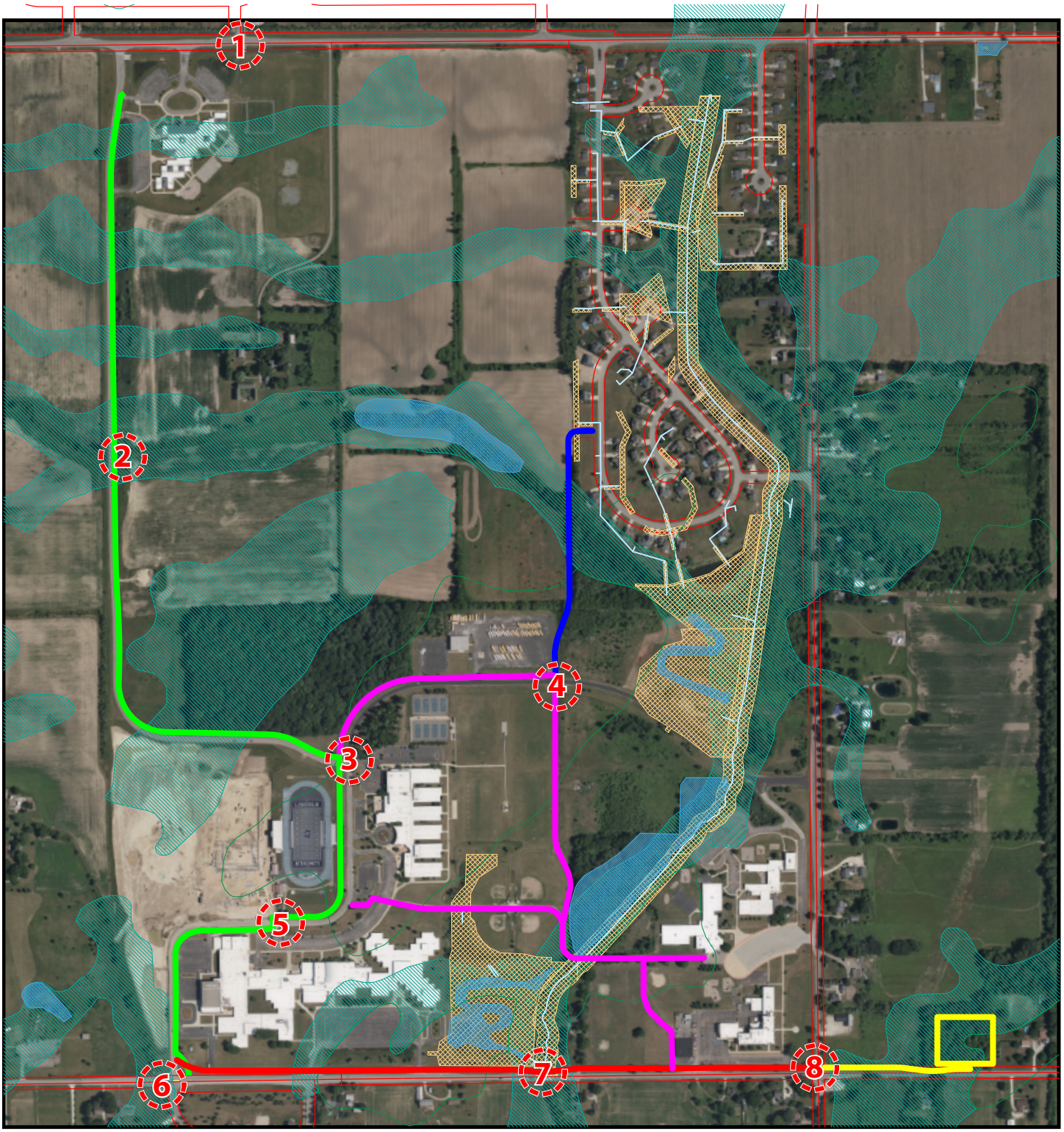
Ultimately, it became clear that while park development is and should remain a priority for the Township, in order for the park to truly succeed, enhanced connections to the schools and nearby neighborhood will be necessary. The end result is a greatly expanded study, incorporating connection points to neighborhoods, school facilities, and trail systems outside of Augusta Township itself.

This document recognizes that a wide variety of factors will influence future trail development. Routes can and likely will change due to factors that cannot be seen by a study of this scope. Financial realities will necessitate construction in phases; new housing or other forms of development will significantly impact both the layout and potential funding sources for different alignments. Even during the course of this study, we saw environmental changes that necessitate a re-evaluation of potential routes. Flexibility will be key going forward.

This study does not in any way obligate the township or school district to design, construct, or fund sidewalks or trails. Instead, it is intended to act as a guidepost for future trail development, offering suggestions for preferred routes and listing potential funding sources. The proposed network will require significant interaction and cooperation between the school district and township, and ongoing input from a number of regional governmental agencies including but not limited to the Washtenaw County Road Commission, the Washtenaw County Water Resources Commission, EGLE, and others.

By adopting this study, the Augusta Township Board is showing a commitment towards providing safe transportation and recreation alternatives to community residents, a willingness to work hand in hand with the Lincoln Consolidated School District, and a desire to provide a higher quality of living for all Augusta Township residents.

FIGURE 1. Final Preferred Alignments



Washtenaw County Drain Easement
Wetlands as identified on NWI and MIRIS maps
Soil areas which include wetland soils
Road Centerline
Road Right-of-Way
Priority 1
Priority 2
Priority 3
Priority 4
Priority 5

Final Preferred Alignments

AUGUSTA TOWNSHIP
Washtenaw County, Michigan

N

0 300 600 900 1,200 Feet

July 2020

GIS Data: Washtenaw County GIS
Aerial Imagery: Google, 2020

Carlisle/Wortman Associates, Inc.
Community Planners & Landscape Architects

1. Executive Summary

The purpose of the study is to identify potential trail routes which will:

a) Connect to a proposed park on Willis Road east of Whittaker Road;
b) Connect with nearby population centers; and
c) Provide safe routes to school facilities.

The study evaluates anticipated costs, available land and/or easement possibilities, and other factors to provide a feasibility score for individual segments.

A feasibility analysis is inherently subjective in nature. This study assigns numeric values to a range of criteria to help overcome any subjective biases and make the evaluation process as objective as possible. Given enough funding and political will, any project can be considered feasible; ultimately, the needs and desires of area residents will determine the true feasibility of the project.

Walking, running, and bicycling have seen significant growth in recent years. In study after study, these three activities are consistently listed as top recreation pursuits by both Michigan residents and in communities across the United States. From a participant perspective, these sports require minimal to no investment in equipment, can provide social outlets for participants, or can be completed individually with no planning required.

Special Amenities - Key

1) Enhanced crosswalk / Rectangular Rapid Flashing Beacon (RRFB)
2) Stream crossing; may require pedestrian bridge
3) Crosswalk
4) Crosswalk
5) Crosswalk
6) Enhanced crosswalk / RRFB
7) Pedestrian bridge required
8) Signaled intersection / future upgrade

Note: Proposed alignments may be developed simultaneously or in a different order, depending on preferences and circumstances. Factors such as easement acquisition and grants will play a role in the ability to develop the trails. Individual alignments may be further broken into segments and developed in phases, especially for the lower priority segments.

The state of Michigan and regional authorities including the Southeast Michigan Council of Governments (SEMCOG) and Washtenaw County have taken notice of these desires. Since 2000, over 10,000 miles of new trails have been developed in Michigan, with many more miles of trails in the works. One of these alignments, Washtenaw County's Border-to-Border Trail (B2B), will ultimately stretch over 40 miles, running from Ypsilanti Township in the southeast to Lyndon Township in the northwest. The B2B is part of the over 2,000 mile-long Iron Belle Trail, which runs from Belle Isle in Detroit to Iron Mountain in the far western Upper Peninsula. Trail projects like these have made Michigan a premier cycling and hiking destination, attracting visitors, new residents, and businesses looking to capitalize on the excitement created by this new infrastructure.

Augusta Township experienced population growth in excess of 40% between 2000 and 2010. Per SEMCOG forecasts, over 75% growth is expected by 2045. As new residents move in to the community, there will be strong demand for non-motorized infrastructure; according to a 2002 Surface Transportation Policy Project study, over half of Americans polled would rather walk than drive to destinations, and regularly walk for exercise and enjoyment. The survey found that distance to stores, restaurants, and schools, and the lack of safe routes to these locations, were the main reasons why most Americans opt to drive rather than walk.

Augusta's location on the southeastern edge of Washtenaw County make it well positioned to take advantage of the building enthusiasm towards trail development. The Township's three northern neighbors, Ypsilanti Township and Pittsfield Township in Washtenaw County and Van Buren Township in Wayne County, have plans to expand their existing trail networks. Providing connections to these trail networks would give Augusta residents easy access to the aforementioned B2B and Iron Belle trails, and contiguous non-motorized routes to regional attractions such as the Metroparks in Huron Township, Lake Erie, and major cities including Ann Arbor and Detroit.

FIGURE 2. Washtenaw County Context

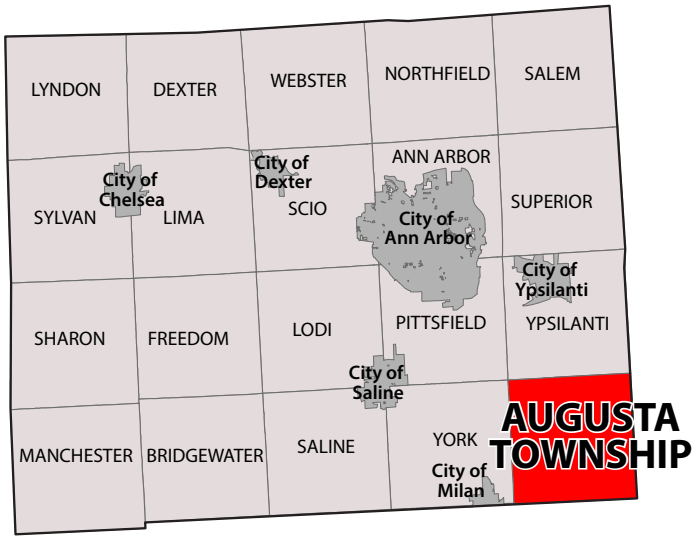
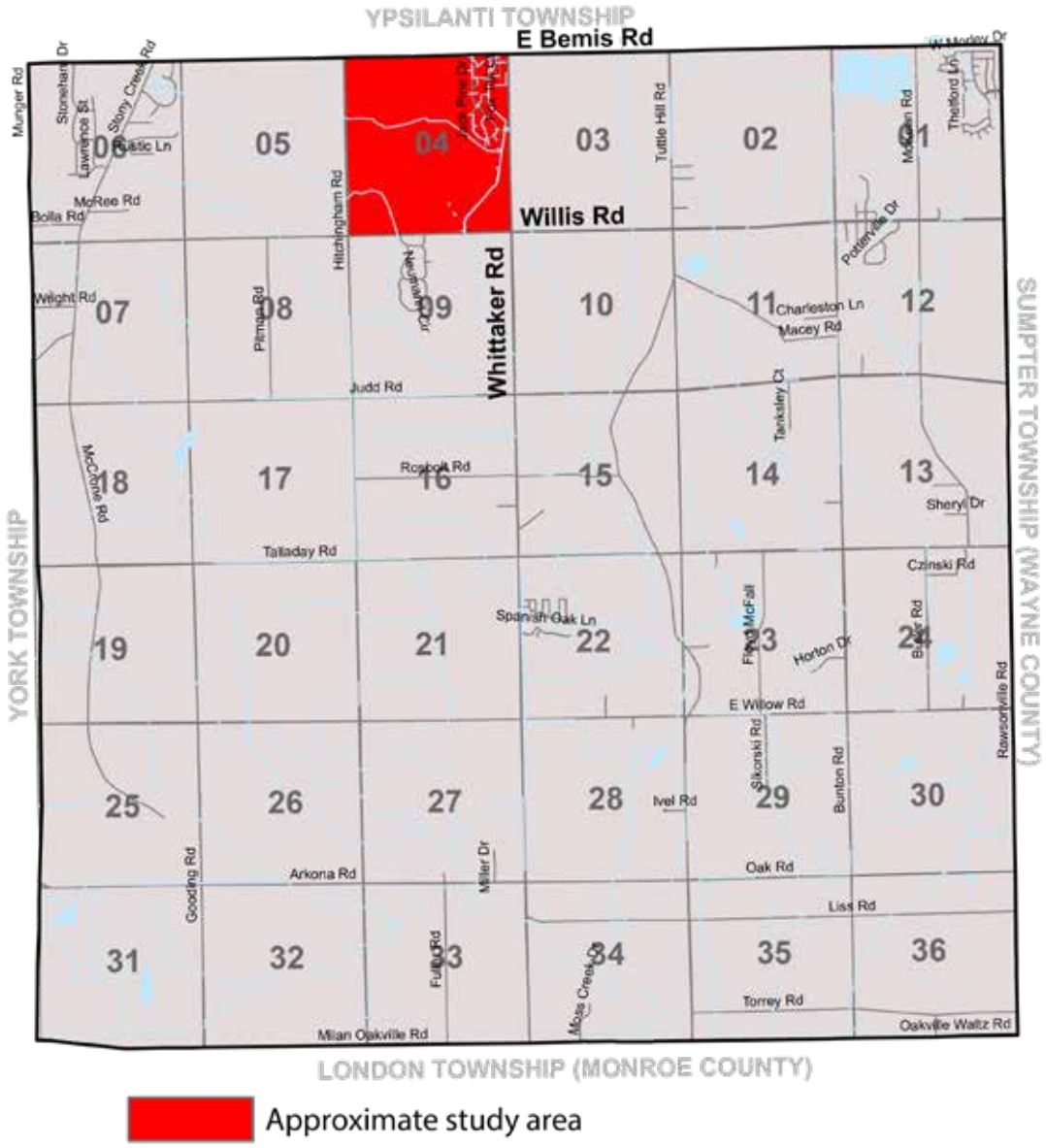


FIGURE 3. Augusta Township Context



This study focuses on section 4 in the north-central portion of the Township. This location was chosen for several reasons. First, two planned unit developments, one in the northeastern corner of the section and one immediately south in section 9, hold approximately 11% of the Township's residents. Second, a parcel just east of Whittaker on Willis Road is being considered for development as the Township's first park. Finally, and perhaps most critically, Section 4 is also the location of the Lincoln Consolidated School campus. The campus houses administrative offices, Lincoln High School and Middle School, and four elementary schools. Approximately 3,770 students study on the campus throughout the school year.

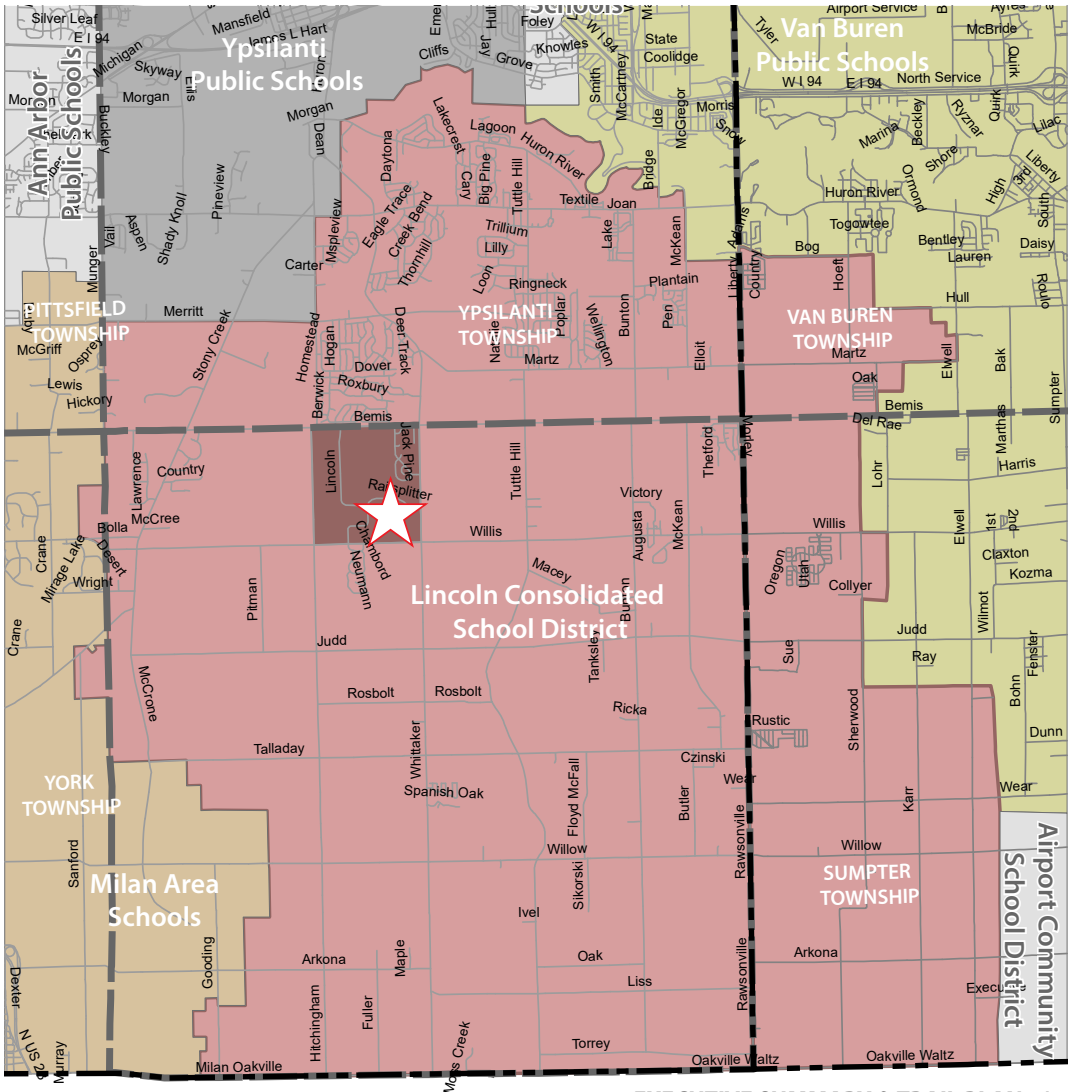
The School District serves students from Augusta, Ypsilanti, and York Townships in Washtenaw County, and Sumpter and Van Buren Townships in Wayne County. While a significant portion of the school population lives within walking distance of the schools, a lack of safe routes means that a most students either take the bus or are driven to school by their parents and caregivers.

The results of the study suggest that developing routes through the school campus is both technically and, for the most part, economically feasible. The Paint Creek crossing is a major obstacle, however, requiring construction of a pedestrian bridge. This bridge must meet Washtenaw County Drain Commission requirements and will involve significant capital outlay.

The park connector path has several major constraints that will likely drive up construction costs. First, the John Bird Drain makes up the northern and western edges of the park parcel; any trail alignment would need to cross the drain, and therefore a pedestrian bridge would be required. Second, the parcel west of the park is almost certainly all wetland. While there are alternatives for how to run a trail through wetland areas, from filling portions of the wetland to building boardwalks, all alternatives are expensive and any disturbance to the wetland will require EGLE permits.

A capital outlay plan which describes alternative development approaches is included in the appendices.

FIGURE 4. Lincoln Consolidated School District



2. Segment Feasibility

Drains and drain easements present the biggest challenges for completion of a trail network in Augusta Township. The soil characteristics and hydrology of southeast Michigan is heavily influenced by the after-effects of glacial action in the Pleistocene era. As the glaciers retreated roughly 12,000 years ago, they scoured the earth, leaving lowlands, water, and poorly-drained soils which ultimately formed upwards of 11 million acres of marshes and wetlands throughout Michigan, or nearly one-third of the state's land mass.

While wetlands offer an enormous amount of benefits, acting as a giant sponge which helps control stormwater flow and providing habitat for a huge variety of plant and animal species, they do present a development problem. As European settlers moved into the area, a series of drains were constructed to allow farming and building construction. In some parts of southeast Michigan, more than 75 percent of the existing wetlands have altered through drainage or filling.

These drains fall under the jurisdiction of the Washtenaw County Water Resources Commissioner (WCWRC). As a general rule, the WCWRC prohibits construction of permanent structures within the drain easement. Any structures which cross a drain must have at least two feet of clearance above the high water mark in a 500-year storm event. Drain easements are present in three locations of the study area:

1. On the eastern end of Railsplitter Drive;
2. Near the midpoint of the campus on Willis Road; and
3. On the western edge of the proposed park property.

Despite the presence of the drains, the area still has a significant number of wetlands or areas with hydric soils. These remaining wetlands are protected by local and federal regulations. On a state level, wetlands protection is administered by the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

EGLE regulates wetlands greater than 5 acres in size; all of the wetlands in the study area fall in this category. While it is certainly possible to receive wetland fill permits, the permitting process can be costly and time consuming. Where wetlands are a potential issue, the Township should hire a certified professional to complete a thorough wetland delineation. GIS-level wetland delineations are usually very high level and inaccurate at a fine scale; a ground-level delineation could identify routes which avoid wetland soils, thereby avoiding the need for permits or other costly trail adjustments.

Assuming the school district remains open to trail development on their property, additional easements would only be required in two locations:

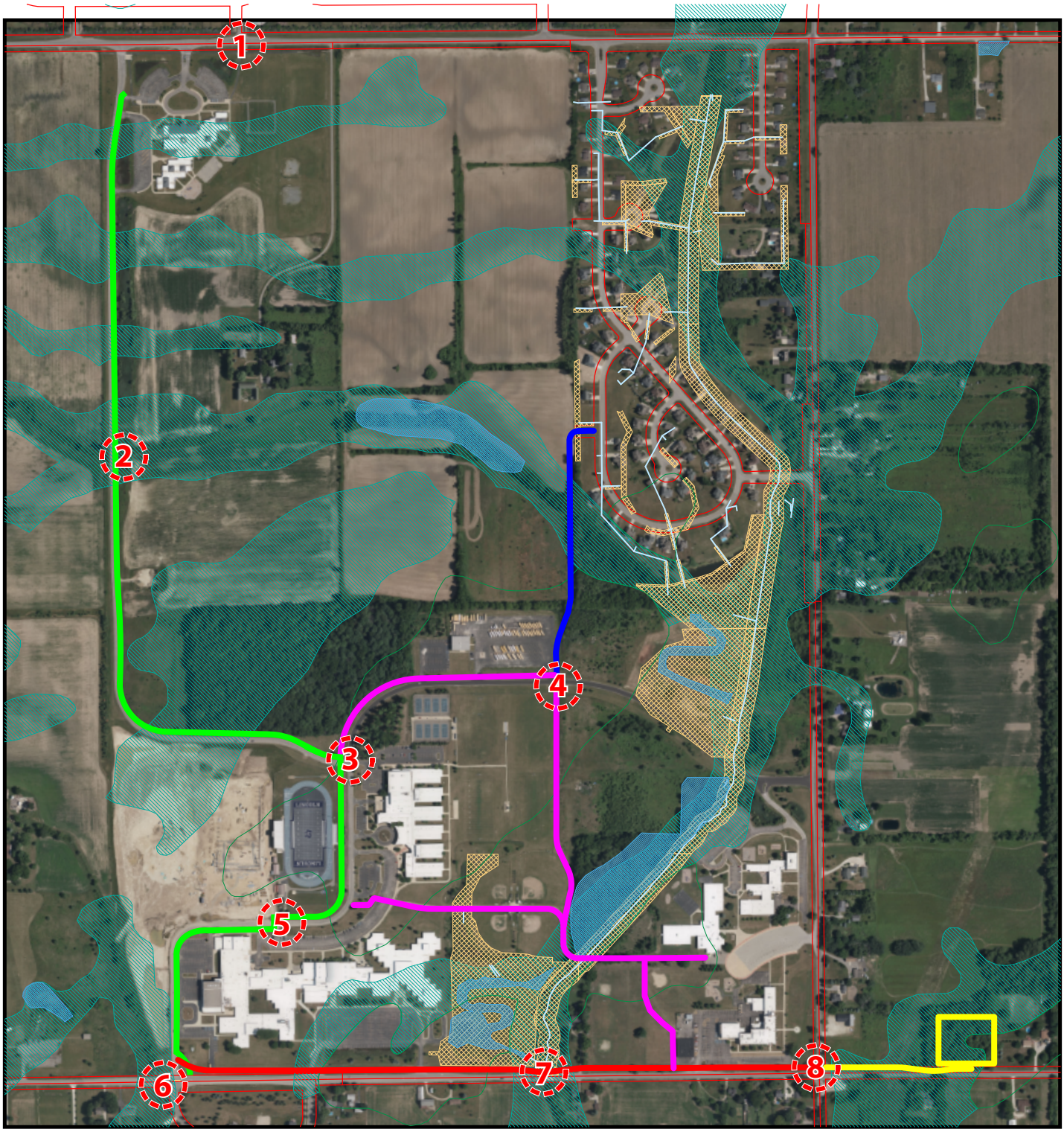
1. East of Paint Creek along Willis Road, and
2. West of the park parcel to the Whittaker / Willis Road intersection.

It will be critical that Township officials work closely with these property owners to develop a trail configuration which meets the needs of the community while protecting the individual property owner rights.

Proposed Special Amenities - Key

1) Enhanced crosswalk / Rectangular Rapid Flashing Beacon (RRFB)
2) Stream crossing; may require pedestrian bridge
3) Crosswalk
4) Crosswalk
5) Crosswalk
6) Enhanced crosswalk / RRFB/Pedestrian Island
7) Pedestrian bridge required
8) Signaled intersection

FIGURE 5. Final Preferred Alignments



Washtenaw County Drain Easement
Wetlands as identified on NWI and MIRIS maps
Soil areas which include wetland soils
Road Centerline
Road Right-of-Way
Priority 1
Priority 2
Priority 3
Priority 4
Priority 5

Final Preferred Alignments

AUGUSTA TOWNSHIP
Washtenaw County, Michigan

N

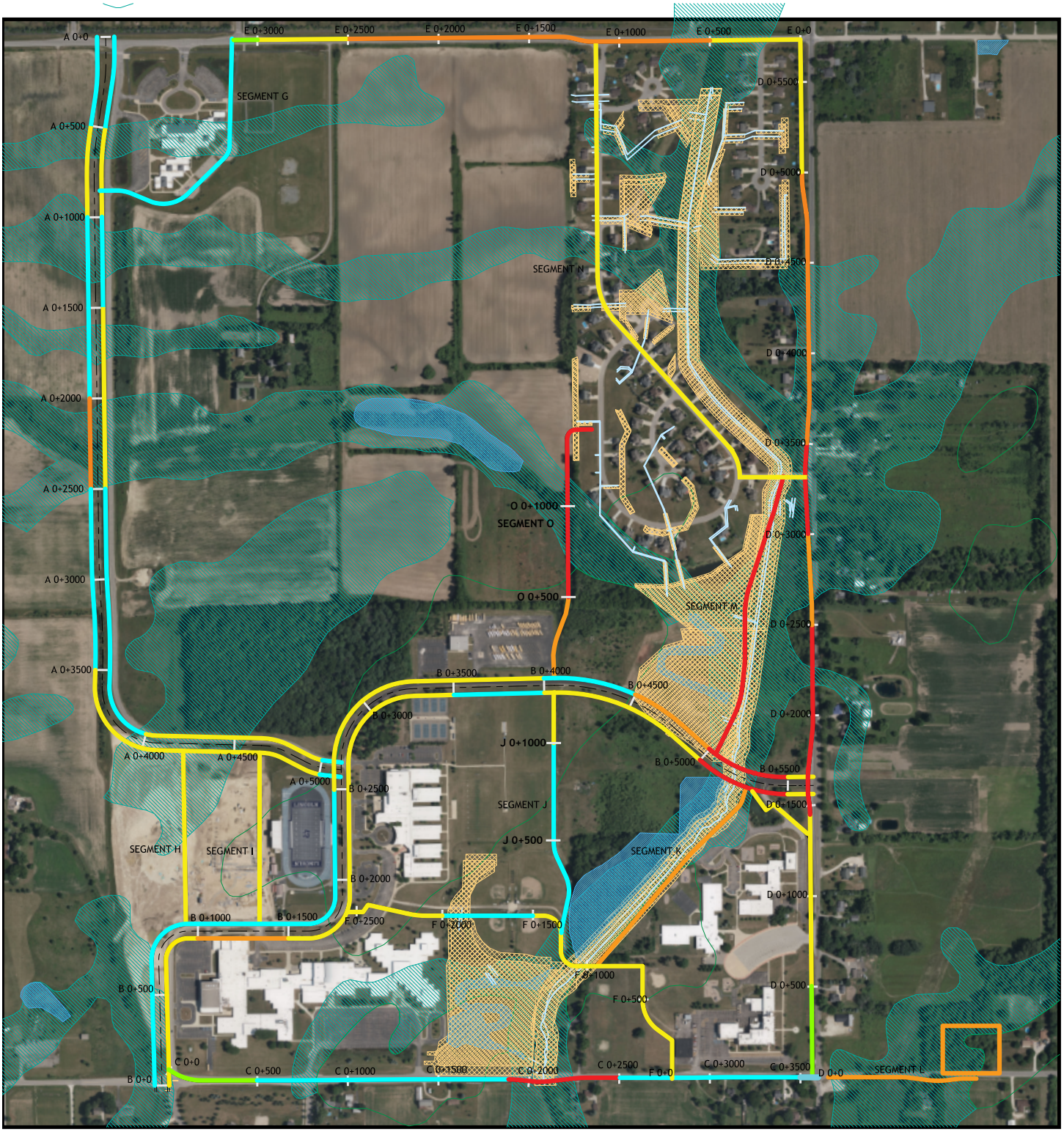
0 300 600 900 1,200 Feet

July 2020

GIS Data: Washtenaw County GIS
Aerial Imagery: Google, 2020

Carlisle/Wortman Associates, Inc.
Community Planners & Landscape Architects

FIGURE 6. Potential Trail Alignments



Excellent (score 13 or higher)
Good (score 7 to 12)
Possible (score 0 to 6)
Questionable (score -12 to -1)
Poor / Difficult (score -13 or lower)
Washtenaw County Drain Easement
Wetlands as identified on NWI and MIRIS maps
Soil areas which include wetland soils
Road Centerline
X 0+1000 Station ID

Potential Trail Alignments

AUGUSTA TOWNSHIP
Washtenaw County, Michigan

N

0 300 600 900 1,200 Feet

April 2020

GIS Data: Washtenaw County GIS
Aerial Imagery: Google, 2020

Carlisle/Wortman Associates, Inc.
Community Planners & Landscape Architects

As part of the feasibility study, a variety of potential alignments were studied (see Figure 6). Initial routes were selected based on the ability to connect population centers to the schools and proposed park. These "high level" alignments were broken into 500-foot segments and each segment was assigned a score based on a variety of positive and negative factors. Factors such as slopes, traffic levels and speeds, soil characteristics, and the need for easements were assigned a numeric score. A copy of the Feasibility Matrix is provided in the appendices. By evaluating each segment using the same criteria, we are able to objectively determine the best possible routes that meet the overall goals of connectivity and safety.

The following pages provide detailed descriptions of each proposed trail segment. The narrative highlights potential benefits of each route, as well as likely constraints to development. A feasibility value is also provided for each segment. Individual ratings are determined as follows:

- Excellent: Few constraints and no major obstacles. A trail with an excellent rating would have comparatively low costs for development.
- Good: Few constraints and no more than one major obstacle.
- Moderate: Multiple constraints with one or two major obstacles.
- Low: Multiple constraints and multiple major obstacles. Costs for this scenario would be high.
- Infeasible: Multiple constraints, multiple major obstacles, and likely opposition from residents. This scenario was only present during the preliminary route evaluations. Any routes considered infeasible are not included in the final recommended alignment map.

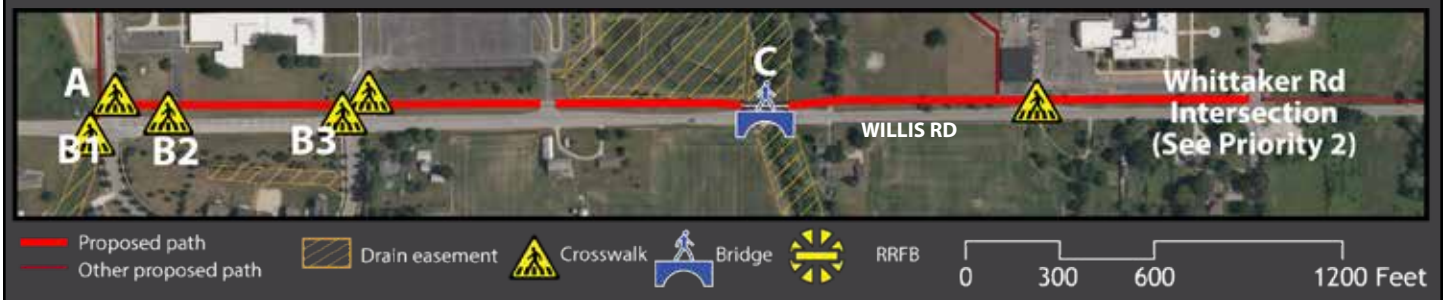
While the alignments are given a "priority" rating, it should be noted that the proposed routes do not have to be constructed in any specific order. A variety of factors can influence the completion order, and will need to be taken into account as the Township moves forward with trail development. For example, the Township and School District may find it easier to complete the "Priority 3" route before the "Priority 1" route due to lower initial costs and lack of permitting requirements.

Finally, priority levels consider both the scores obtained during the feasibility analysis and the relative long-term value of a particular route to residents. In some cases, an alignment was determined to be important enough to warrant inclusion despite a relatively low feasibility score. In these instances, the best alternative was chosen which would provide the desired outcome in the most cost-effective manner possible.

Priority 1: North Side Of Willis Road From Whittaker Road West To Railsplitter Drive. 3,580 Feet/0.69 Miles

- **Benefits:** A highly visible route along a high-speed section of road, with existing pedestrian traffic in place. The path would facilitate pedestrian and bike transportation between Bishop and Model Elementary Schools, the Lincoln Senior Citizen Program, and Lincoln High School, and would connect to one of the largest subdivisions in Augusta Township. Most of the route is flat, and adequate space exists to avoid utilities.
- **Major Constraints:** The West Branch of Paint Creek is encumbered by Washtenaw County Drain Commission easements. Any crossing would require a minimum 130-foot span with footings outside of the easement zone and positioned to a height at least two feet above the high water mark in a 500-year storm event. Per EGLE, approximately 330 feet of the alignment is indicated as containing hydric soils, so wetland permitting may be required. 95% of the alignment is on Lincoln Consolidated School District property; however, any bridge or pathway would require an easement on the one private property along the route.
- **Feasibility:** Moderate to Good. The bridge crossing presents a significant financial hurdle. If the costs for the bridge are offset through grant acquisitions and donations, the feasibility status improves to "Excellent".
- **Proposed Treatment:** 8 to 10-foot wide asphalt shared-use path (see page 47 for a typical configuration)

FIGURE 7. Priority 1 Trail Alignment



OTHER FEATURES

A. Crosswalk across Railsplitter Drive: Painted crosswalks are recommended for Railsplitter Drive and across all parking lot entrance and exits.

B. Crosswalk to Chambord: A crossing demarcated with a Rectangular Rapid Flashing Beacon (RRFB) and/or a pedestrian refuge island is recommended to connect the subdivision south of Willis to the trail network. The subdivision has an established sidewalk network in place. Three alternatives (B1, B2, and B3) are detailed on the following page.

C. Pedestrian Bridge: A pedestrian bridge will be required to cross the drain easement. Costs for prefabricated bridges vary depending on requested features. This will be the most expensive feature in the entire trail network.

OTHER CONSIDERATIONS

School Zone: The Lincoln Consolidated School District can request a reinstatement of the school zone along Willis between Railsplitter Drive and Whittaker Road. Reinstating the zone would result in lower posted speeds during school rush hours, greatly increasing safety for school children.

ESTIMATED COSTS

- Asphalt trail - $173,000 - $345,000
- Pedestrian bridge - $200 to $500,000
- Pedestrian Island - $30,000
- RRFB - $30,000
- Crosswalk - $4,000 - $6,000
- **TOTAL: $437,000 to $911,000**

FIGURE 8. Potential Crosswalk Configurations - Willis at Railsplitter/Chambord

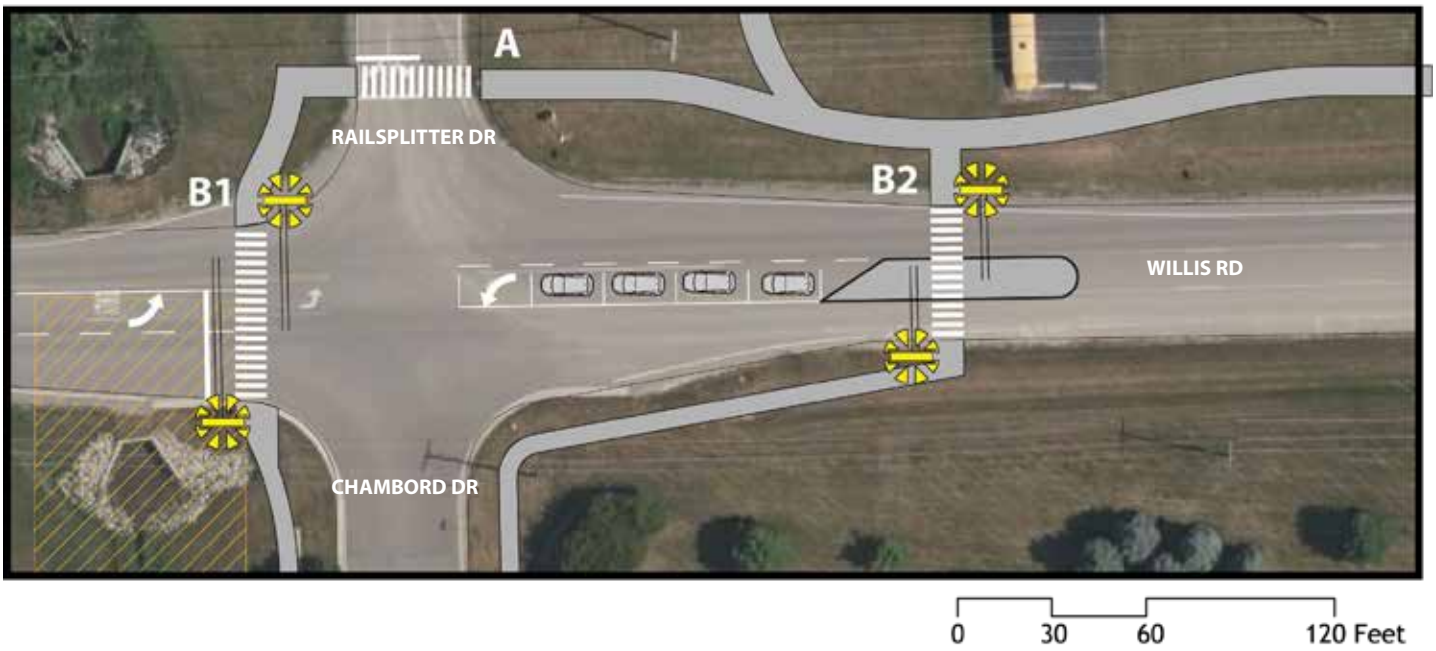


FIGURE 9. Potential Crosswalk Configuration - Willis/ Bordeaux

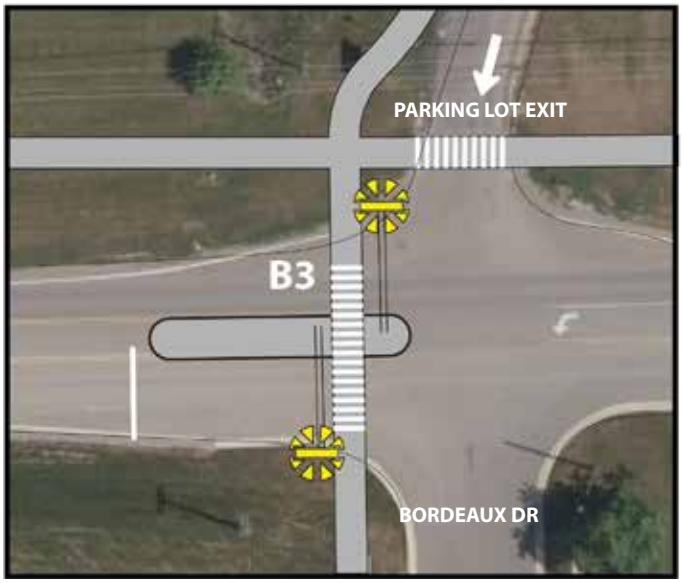


FIGURE 10. Paint Creek Bridge Crossing

Crosswalk options B1, B2, and B3 each offer opportunities and challenges. In all three cases, RRFBs are proposed to enhance safety.

B1 provides the advantage of a direct connection between Chambord Drive and the southwestern terminus of both the Priority 1 and 3 alignments. Its placement would clearly mark the beginning of a pedestrian-friendly school zone to oncoming motorists. It would connect with existing sidewalks on Chambord; the sidewalks would only need to be extended approximately 35 feet. Disadvantages of this configuration include potential topography issues with the adjacent drain, and the need to cross the left turn lane leading to Railsplitter Drive.

B2 proposes a pedestrian island roughly 100 feet from the intersection, providing a safety refuge for cyclists and pedestrians at a highly visible crossing point. It is pulled back from the intersection to allow up to four cars to turn onto Chambord. This configuration would require a more significant extension of the eastern Chambord sidewalks (approximately 520 feet). The shift west also makes the crosswalk somewhat less of a visual cue for drivers.

B3 is located immediately west of the high school parking lot exit. Because the drive is one way, there are no concerns about a left turn lane from Willis. Existing sidewalks on Bordeaux would need to be extended roughly 35 feet. The main drawback of this configuration is its position in the center of the alignment, offering fewer visual cues to drivers than B1 or B2.

Priority 2: North side of Willis Road from Whittaker Road east to proposed Township park. 730 feet/0.14 miles

- **Benefits:** The path would connect the school campus to a proposed Township park.
- **Major Constraints:** The entire route crosses EGLE-designated hydric soils; wetland permitting may be required. The alignment will likely require either infill or boardwalk, increasing costs significantly. A drain easement will require a minimum 68-foot bridge. The majority of the route is on private property, so an easement or outright purchase will be required.
- **Feasibility:** Low to Moderate. The high cost of treatments required to make this alignment a reality reduce its score. Soil bore evaluations and detailed wetland delineations may show alternative routes which do not require permitting or boardwalks, however, and would increase the status to "Moderate".
- **Proposed Treatment:** Will vary depending on results of soil survey. Generally, 8 to 10-foot wide asphalt shared-use path from Whittaker to park border, with boardwalk or fill/retaining wall as needed. Prefab pedestrian bridge over drain. 6-foot wide crushed limestone path around perimeter of park.

FIGURE 11. Priority 2 Trail Alignment

OTHER FEATURES

A. Crosswalks at Whittaker & Willis: Painted crosswalks are recommended as a preliminary safety precaution. See "Other Considerations" for additional information.

B. Wetland Crossing: Wetlands are indicated on ESRI maps and were confirmed by on in-person observations. Boardwalks or infill will be required.

C. Pedestrian Bridge: A pedestrian bridge will be required to cross the John Bird drain.

D. Proposed Park: A passive-use park has been proposed on this Township-owned parcel. The park would feature a small parking lot and walking trails. Other items in consideration include a Veterans Memorial and picnic areas.

E. Rustic Trails: The location of walking trails through the park will require fine level adjustment and take into account items such as trees, steep slopes, and other features. Crushed limestone surfacing is recommended to ensure the trail is ADA compliant.

ESTIMATED COST

- Asphalt trail - $35,000 - $70,000
- Pedestrian bridge - $50 to $100,000
- Boardwalk/infill - varies, up to $70K
- Limestone trail - varies, up to $5,000
- **TOTAL: $160,000 to $245,000**

FIGURE 12. Potential Park Configuration

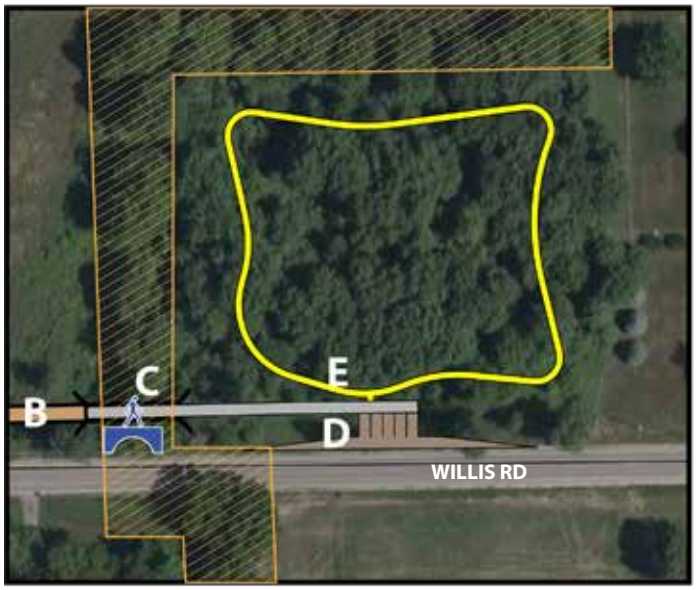


FIGURE 13. Whittaker/Willis Intersection Reconfiguration

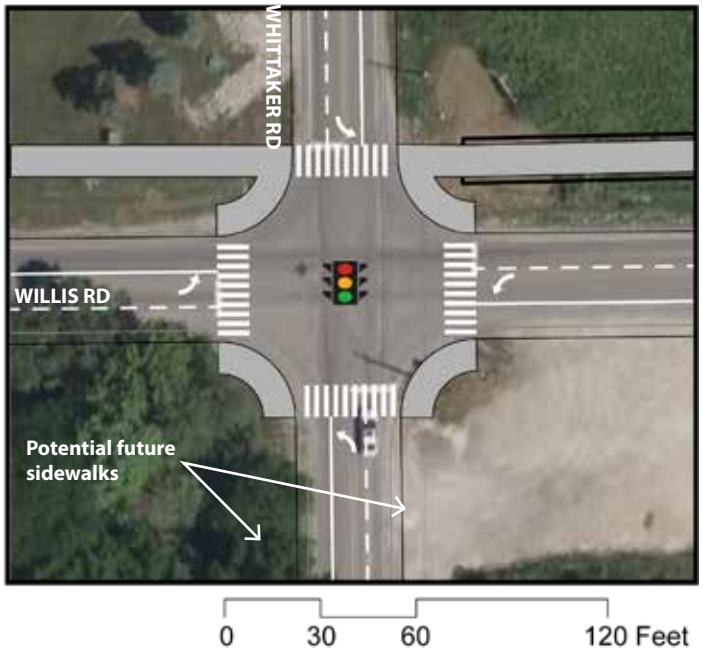
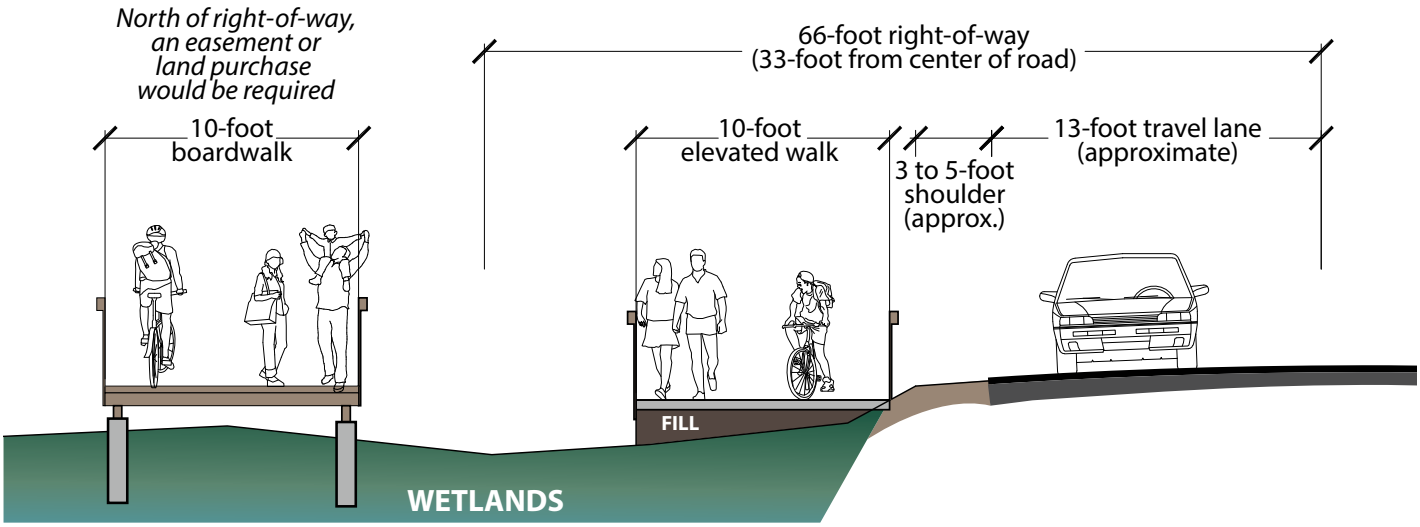


FIGURE 14. Boardwalk & Walkway Configuration Options



OTHER CONSIDERATIONS

- **Easement along Willis Road:** Obtaining an easement for the parcel east of the intersection of Willis and Whittaker could provide the Township with room for creative treatment of the path. Pulling the pathway away from the road would provide a more pleasant atmosphere for users. However, a retaining wall/infill configuration can be significantly less expensive than boardwalk construction.
- **Pedestrian Bridge:** A pedestrian bridge will be required to cross the drain easement. It may be possible to bring the trail into the right-of-way and utilize existing road infrastructure to eliminate the need for a bridge.
- **Whittaker/Willis Intersection:** Per the WCRC, while crosswalks at the intersection are possible, pedestrian-controlled signals would require a center turn lane and would therefore necessitate a complete reconfiguration of the intersection. By combining pedestrian improvements with other planned transportation improvements, the Township and WCRC could see significant cost savings. The Township should continue to monitor regional planning documents for planned projects along Willis and/or Whittaker, and advocate for an intersection redesign with WCRC, SEMCOG, and other regional authorities as opportunities arise.

Priority 3: West and north side of Railsplitter Drive from Willis Road to Lincoln Trail, and north and east side of Lincoln Trail from Railsplitter Dr. to Childs Elementary. 7,370 feet/1.4 miles

FIGURE 15. Priority 3 Trail Alignment

- **Benefits:** Connects the schools on the southern portion of the campus with Childs Elementary. The route would allow students located outside of the Township to reach the schools via non-motorized methods. It also provides a connection for Augusta residents to existing trails in Ypsilanti Township to the north, which in turn connects to the Border-to-Border and Iron Belle Trails and trail systems beyond.
- **Major Constraints:** None. Possible issues at the Hewen's Drain crossing, but there appears to be adequate room on the east side of the road to accommodate a trail and a lack drain easements means that a simpler structure can be installed.

  The slopes near the retention pond west of Childs Elementary are steep, but adequate room exists to accommodate a trail in relatively flat conditions.

  The trail alignment will be greatly impacted by construction of a new sports facility on campus (E). Alignment changes resulting from the new building(s) should take advantage of planned sidewalks to reduce overall system costs.
- **Feasibility:** Excellent. The route is generally flat and has ample room to avoid utility infrastructure or other minor impediments. While this is the longest of the proposed alignments, it will likely have one of the lowest overall costs.
- **Proposed Treatment:** An 8 to 10-foot wide asphalt shared-use path. Near school facilities, concrete may be a better option due to durability and continuity of appearance.

OTHER FEATURES

A. Connection to existing trails at Childs Elementary: Painted crosswalks are recommended for driveway crossings.

B. Crosswalk to Marlow Dr: The existing crosswalk would be enhanced with a Rectangular Rapid Flashing Beacon (RRFB).

C. Drain Crossing: There appears to be adequate room to allow the trail to use existing infrastructure across Hewen's Drain. Enhanced railings may be required.

D. Crosswalk at Lincoln Trail and Railsplitter Intersection

ESTIMATED COST

- Asphalt trail - $350,000 - $700,000
- RRFB - $30,000
- Crosswalks - $5,000
- **TOTAL: $385,000 - $735,000**

FIGURE 16. Childs Elementary Connection

FIGURE 17. Enhanced Crosswalk

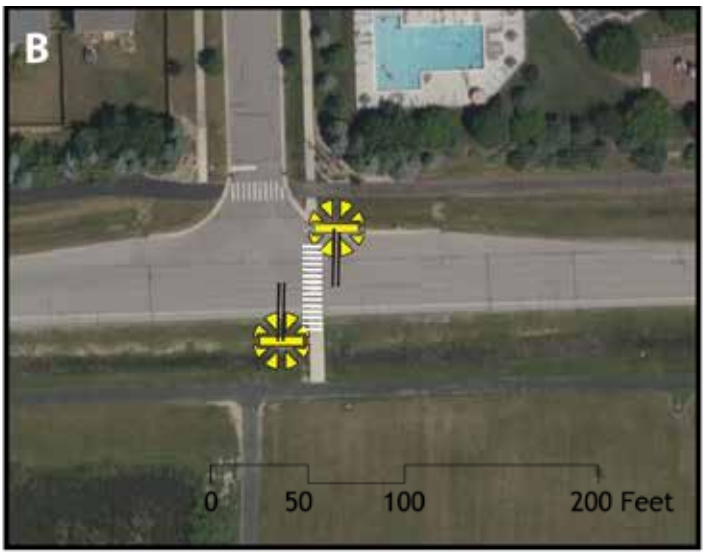


FIGURE 18. Drain Crossing

FIGURE 19. Crosswalk at Railsplitter & Lincoln Trail

OTHER CONSIDERATIONS

- **Pathway through forest:** Creating a route that travels through the school-owned woods in the center of campus could provide a pleasant, shaded route for users. There is some question regarding environmental impact; County and EGLE data and on-site observation indicate wetlands crossing much of the western half of the woodland. Costs for building a trail in such a setting would also be much higher due to clearing work and the likely need for boardwalks or other forms of elevated pathways.
- **Shared use markings along Lincoln Trail:** The addition of wayfinding signs, "Share the Road" markers, and "sharrows" on the pavement would provide a low cost alternative to off-road pathways. Low speeds and relatively light traffic make this stretch of road a good candidate for this form of treatment, and would attract confident cyclists. This alternative would not, however, be appealing to less confident bikers, nor does it provide a route for pedestrians.

Priority 4: Lincoln Pines subdivision to Railsplitter Drive.
1,500 feet/0.28 miles

FIGURE 20. Priority 4 Trail Alignment

- **Benefits:** Connects one of the Township's denser neighborhoods to the school campus.
- **Major Constraints:** Requires an easement to cross private property between the subdivision and school grounds. The alignment also requires crossing Hewen's drain; there are no drain easements in this area, however, so any bridges will not need to be as robust as in other locations on campus. Wetlands are likely present on either side of the drain.
- **Feasibility:** Good. The route is able to take advantage of a road easement located between 8362 and 8398 Jack Pine Drive; a second easement opposite Spruce Court would serve a similar purpose.
- **Proposed Treatment:** An 8 to 10-foot wide asphalt shared-use path. Near school facilities, concrete may be a better option due to durability and continuity of appearance.
- **Proposed Treatment:** A rustic surface would be appropriate for this length of path. Compacted limestone would provide an ADA compliant surface at a relatively low up front cost.

OTHER FEATURES

A. Connection to Jack Pine Drive

B. Required Easement: The property is classified for medium density residential land use, meaning it could be developed as a subdivision in the future. If this development occurs, the Township should require the developer to construct and maintain a multi-use path to the school grounds.

C. Drain Crossing: Because there are no drain easements in this location, the span of any bridge crossing the drain can be relatively modest. Pulling the route west helps to avoid wooded areas and lowers construction costs. A boardwalk may be required for portions of the path in this area.

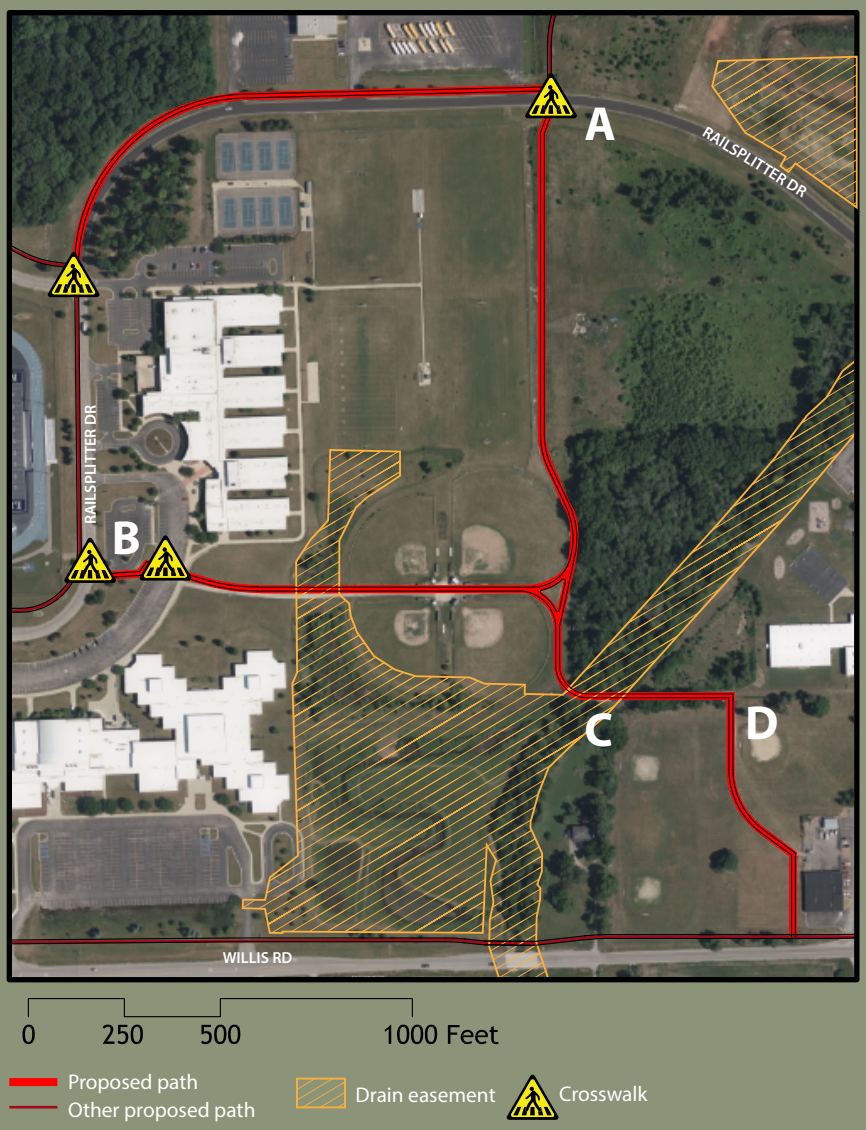
D. Crosswalk at Railsplitter Drive: A painted crosswalk is recommended with connections to existing maintenance drives south of Railsplitter and east of the soccer fields.

ESTIMATED COST

- Mown trail - no cost (annual maintenance only)
- Limestone trail - $3,000 to $5,000K
- Pedestrian bridge - $20,000 - $30,000
- **TOTAL: $23,000 to $35,000**

Priority 5: School campus internal alignments.
5,750 feet/1.1 miles

FIGURE 21. Priority 5 Trail Alignment



OTHER FEATURES

A. **Railsplitter Drive crosswalk**
B. **Railsplitter Drive & parking lot crosswalks**
C. **Drain Crossing:** Because the proposed alignment is utilizing existing road infrastructure in this location, bridge construction is not required.
D. **Alternative alignments:** The path as shown is intended to provide a direct route to the elementary schools without crossing into the playground area, while utilizing existing maintenance drives to save costs. Alternative alignments are shown beginning on page 24.

- **Benefits:** Provides connections between other priority routes by utilizing existing road and walkway infrastructure.
- **Major Constraints:** None. The routes south of Railsplitter Drive all utilize existing infrastructure and therefore drain easement and wetland concerns are negated. The alignment following Railsplitter west is generally flat with adequate room to avoid any utilities or other obstacles.
- **Feasibility:** Excellent. Any improvements made to accommodate these routes would serve the dual role of improving access to the baseball and soccer fields.
- **Proposed Treatment:** Varies. For the path leading from the baseball diamonds west to the football field, concrete walkways would best match the existing conditions. The width of this section should be a minimum 10-feet, with wider promenade-style areas near the sports fields.

  The trail east of the soccer fields between Railsplitter Drive and Willis Road utilizes existing maintenance drives. For this section, the drive would be upgraded to asphalt with sharrows and "share the road" signage.

  North and west of Railsplitter Drive would be an eight to ten-foot asphalt path.

FIGURE 22. Detail: Railsplitter Drive and maintenance drive/sports field alignments

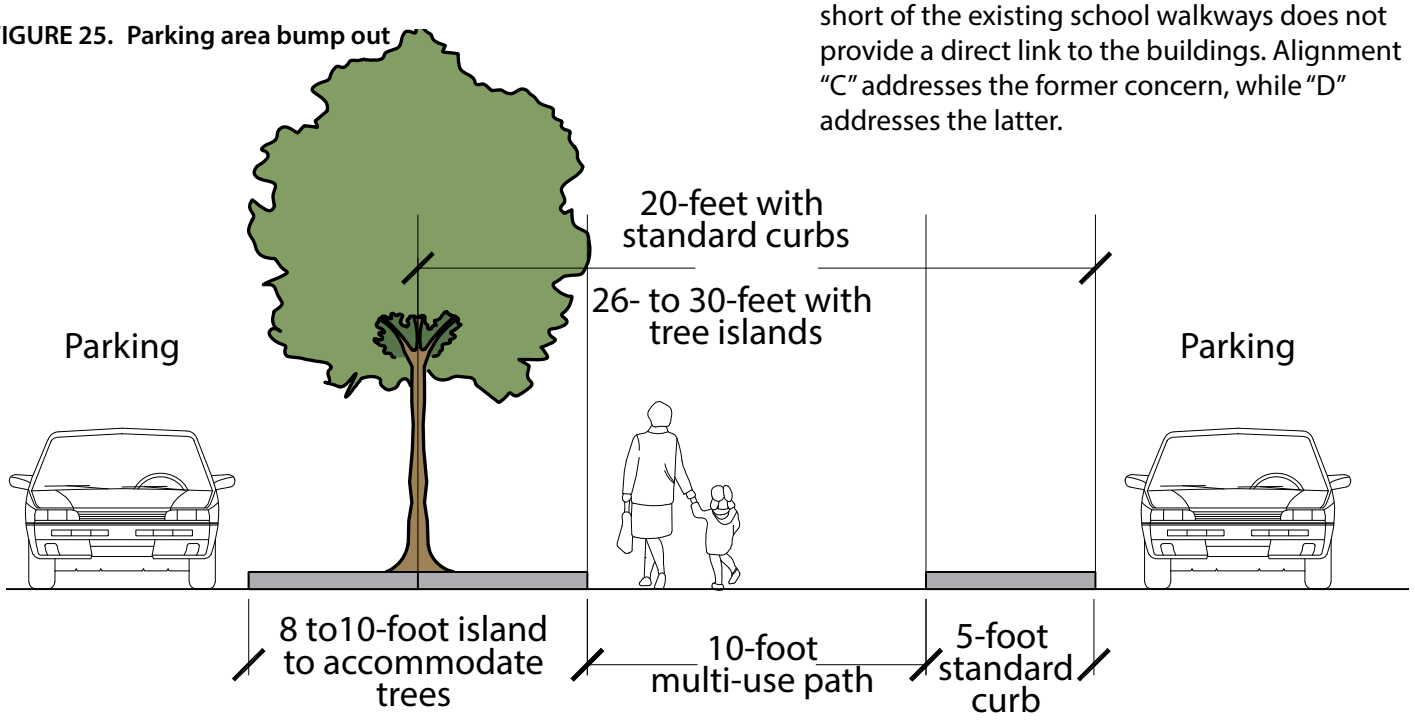
FIGURE 23. Detail: Central sports field alignment

FIGURE 24. Detail: Bishop, Brick, & Model Elementary School alignments

OTHER CONSIDERATIONS

- **Pedestrian Bump Outs (B2):** Adding bump-outs in the parking lot shortens the exposed distance for users and increases overall safety. The islands as shown would eliminate four parking spots (~20-feet width total). The bump-outs could be made larger to allow tree installation.
- **Alternate Routes near Bishop, Brick, and Model Elementary Schools:** Aligning the trails to take advantage of existing road infrastructure can provide cost savings. There may, however, be concerns about bringing the pathways too close to the schools. Conversely, stopping the path short of the existing school walkways does not provide a direct link to the buildings. Alignment "C" addresses the former concern, while "D" addresses the latter.

FIGURE 25. Parking area bump out



3. Existing Conditions

Traffic

Assessing the suitability of the road network for safe pedestrian or bicycle use involves the consideration of many factors. Traffic volumes, car speeds, presence of on-street parking, traffic mix such as presence of trucks, sight distances, and number of intersections and entrances all play a role in the perceived safety of a given route.

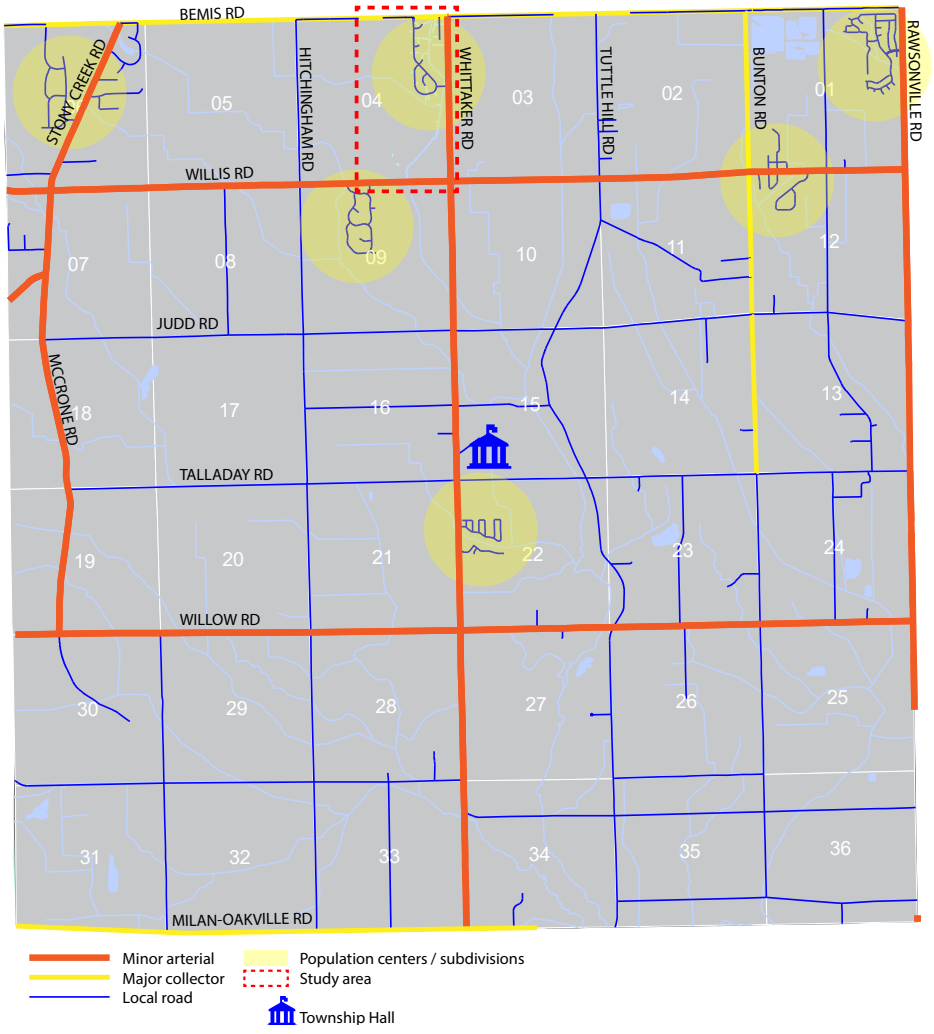
Michigan roadways are classified by the Michigan Department of Transportation (MDOT) according to a hierarchical functional system which determines whether a road is eligible for federal aid. This road classification also corresponds to roadway traffic volumes. Federal aid roads include all principal arterials, minor arterials, and urban collectors. In the study area, Augusta Township's road network includes three classes of roads as described below.

Arterial roads run relatively long distance and service travel movements to important traffic generators. Arterial roads are typically categorized as "Principal" or "Minor" arterial roads, with principal arterials servicing longer distances and connecting to more important traffic generators than minor arterials. There are no major arterial roads in Augusta Township. In the study area, Whittaker and Willis Roads would be considered minor arterial roads.

Major collector roads funnel traffic from residential areas to arterial roads, with some providing direct access to residences. Bemis Road would be a major collector road.

Local roads are neighborhood streets that provide access to residences and include all of the subdivision streets in section 4. For purposes of this study, the private roads servicing the school campus are considered local roads.

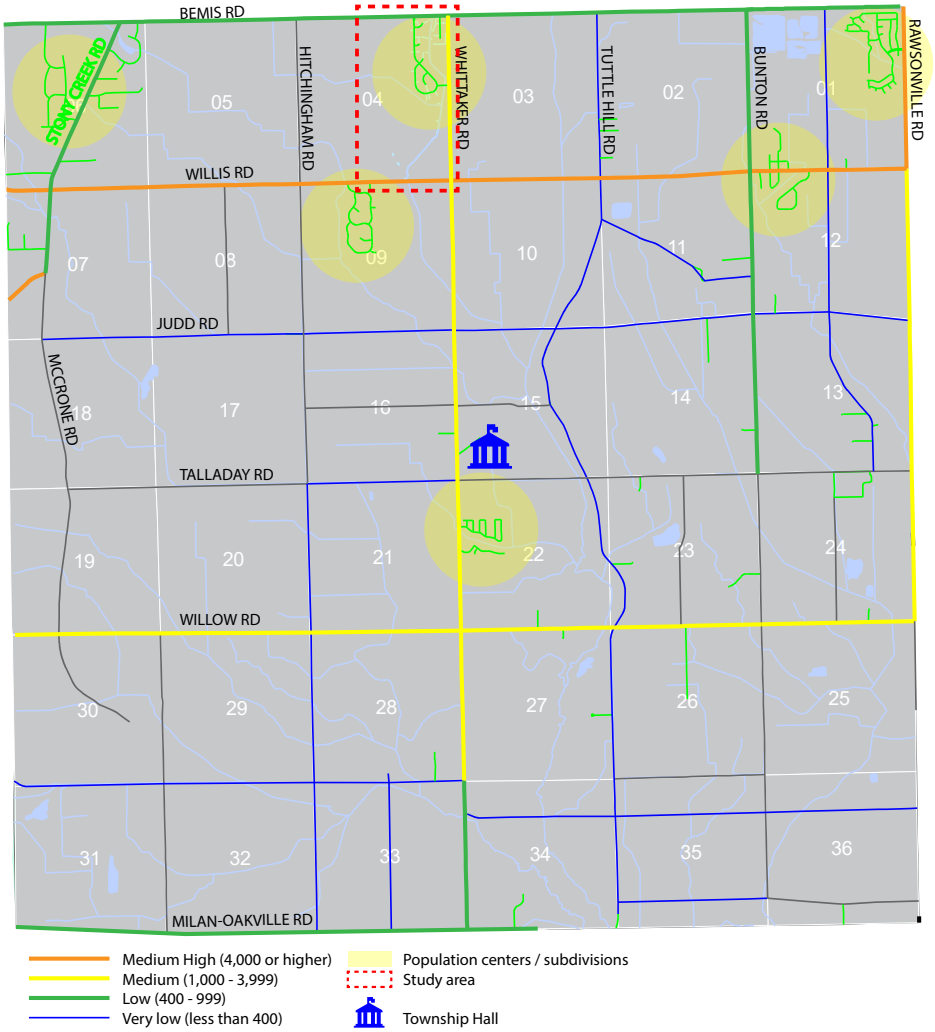
FIGURE 26. Road Classifications



Annual Average Daily Traffic counts (AADT) measures the total volume of vehicle traffic of a highway or road for a year divided by 365 days. According to the Michigan Department of Transportation (MDOT) and SEMCOG, Augusta Township experiences low overall traffic levels, while the study area specifically sees low to moderate traffic levels. Traffic volume is measured by looking at the Average Annual Daily Trips (AADT). Whittaker Road experiences the highest traffic levels, with 6,694 daily trips, with Willis Road close behind at 5,195 trips. Bemis Road was significantly lower, with only 733 daily trips recorded. Trip counts are not available for the local roads or internal school roads.

The schools themselves have an enormous impact on traffic volumes. The heaviest volume would be expected during the morning and afternoon rush periods as parents drop off and pick up their children from classes. Sports and other special events at the schools also have an impact; the high school's football stadium seats over 5,000, making football games one of the largest single traffic events in the Township. The school's auditorium regularly hosts plays and other events as well, and a new multi-use sports facility is expected to draw large crowds. These school programs, while intense during the time of the event, are sporadic in nature and are less of a concern for trail planning than regular school day traffic.

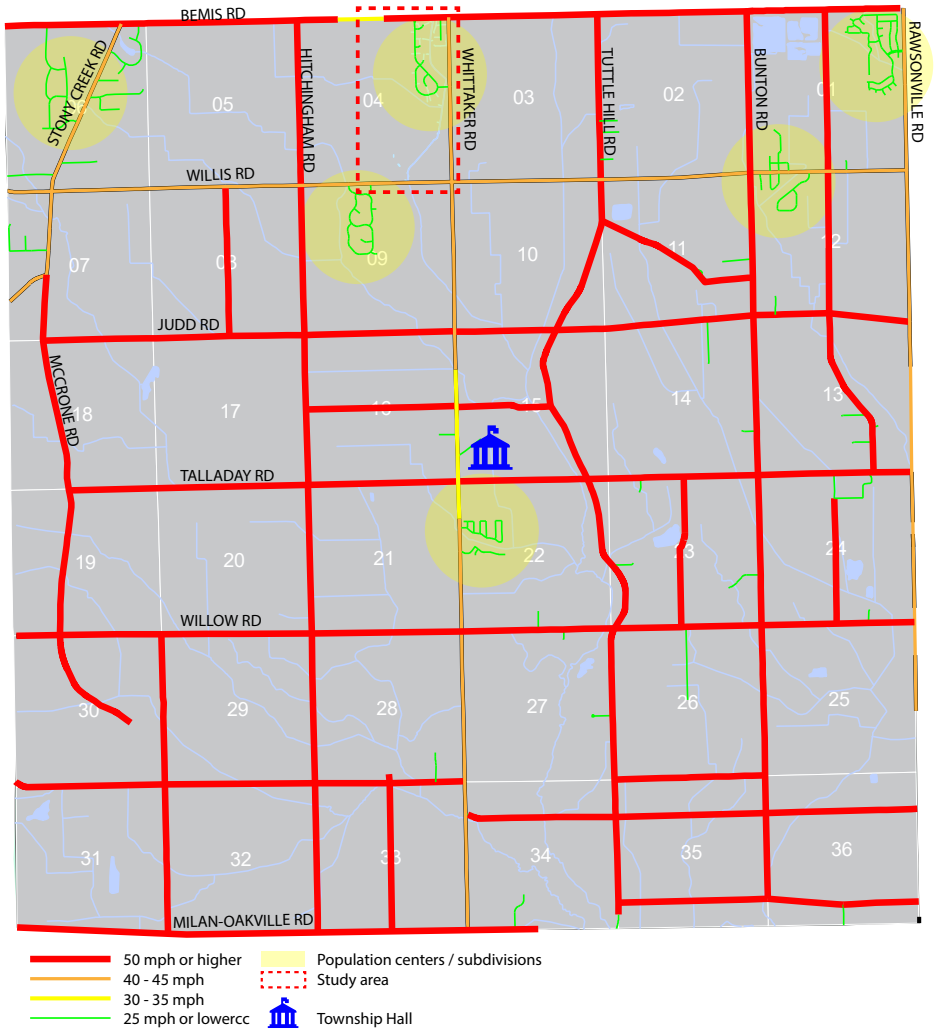
FIGURE 27. Annual Average Daily Traffic (AADT)



Posted speed limits play a major role in overall safety. Whittaker and Willis have posted speed limits of 45 mph. Most of the Township's roads have no posted speed limit; MCL 257.628 of the Michigan Vehicle Code sets the statewide maximum speed limit on all unposted highways at 55 mph. A posted speed limit of 35 mph applies for the school zone which runs for 2,000 feet starting 500 feet west of Lincoln Trail. This speed limit is in effect from 8:00 – 8:30 a.m. and 3:25 – 3:55 p.m. on school days only.

Local roads, including the internal school roads, have posted 25 mph speed limits. The configuration of Lincoln Trail, however, encourages higher speeds, however. The road includes a 3,600 foot (0.7 mile) straightaway with no stop signs or other visual cues to slow traffic. Cars were routinely seen exceeding the speed limit during a site visit for this study.

FIGURE 28. Posted Speed Limits

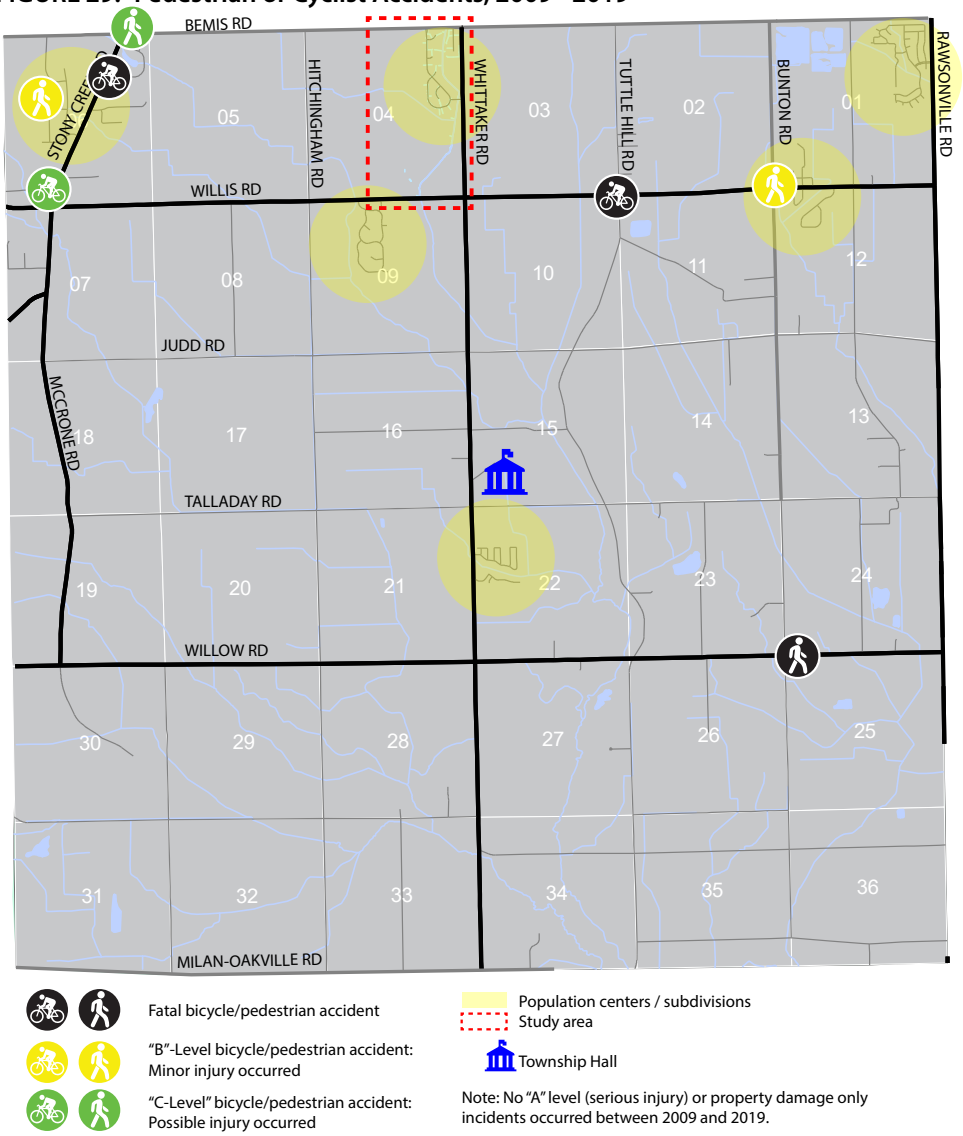


The roads in the study area are predominately traveled by personal vehicles. Commercial traffic is infrequent, with traffic heaviest along Willis Road. The School District's bus depot, located on the north side of Railsplitter Drive opposite from the soccer fields, is another source of large vehicle traffic, but activity is basically limited to morning and afternoon rush hour periods.

Sight distances, entrances, and driveways are of comparatively low concern. The topography of the area is essentially flat and for the most part roads are straight and free of visual barriers. Within the campus, driveway and other entrances are infrequent, limited to school parking lots and the aforementioned bus depot entrance along Railsplitter Drive. Outside of the school campus, these factors play a larger role, especially along Whittaker where high road speeds and private driveways significantly impact pedestrian and bicyclist safety. The large number of private driveways played a large role in eliminating Whittaker Road from consideration for pathway development.

While the number of incidents have not been high, bicycle/pedestrian versus vehicle accidents are a concern. According to SEMCOG, there have been seven vehicular accidents in the Township involving pedestrians (four incidents) and bicyclists (three incidents) since 2009; three of the seven accidents resulted in fatalities. None of the incidents occurred within the study area, although one fatality was recorded at the intersection of Tuttle Hill and Willis Roads, approximately 0.8 miles east. As the Township provides facilities for bicycles and pedestrians, the number of incidents may continue to increase due to the presence of additional cyclists and pedestrians in new locations. The severity of these accidents will be lessened, however, with the introduction of properly designed facilities.

FIGURE 29. Pedestrian or Cyclist Accidents, 2009 - 2019



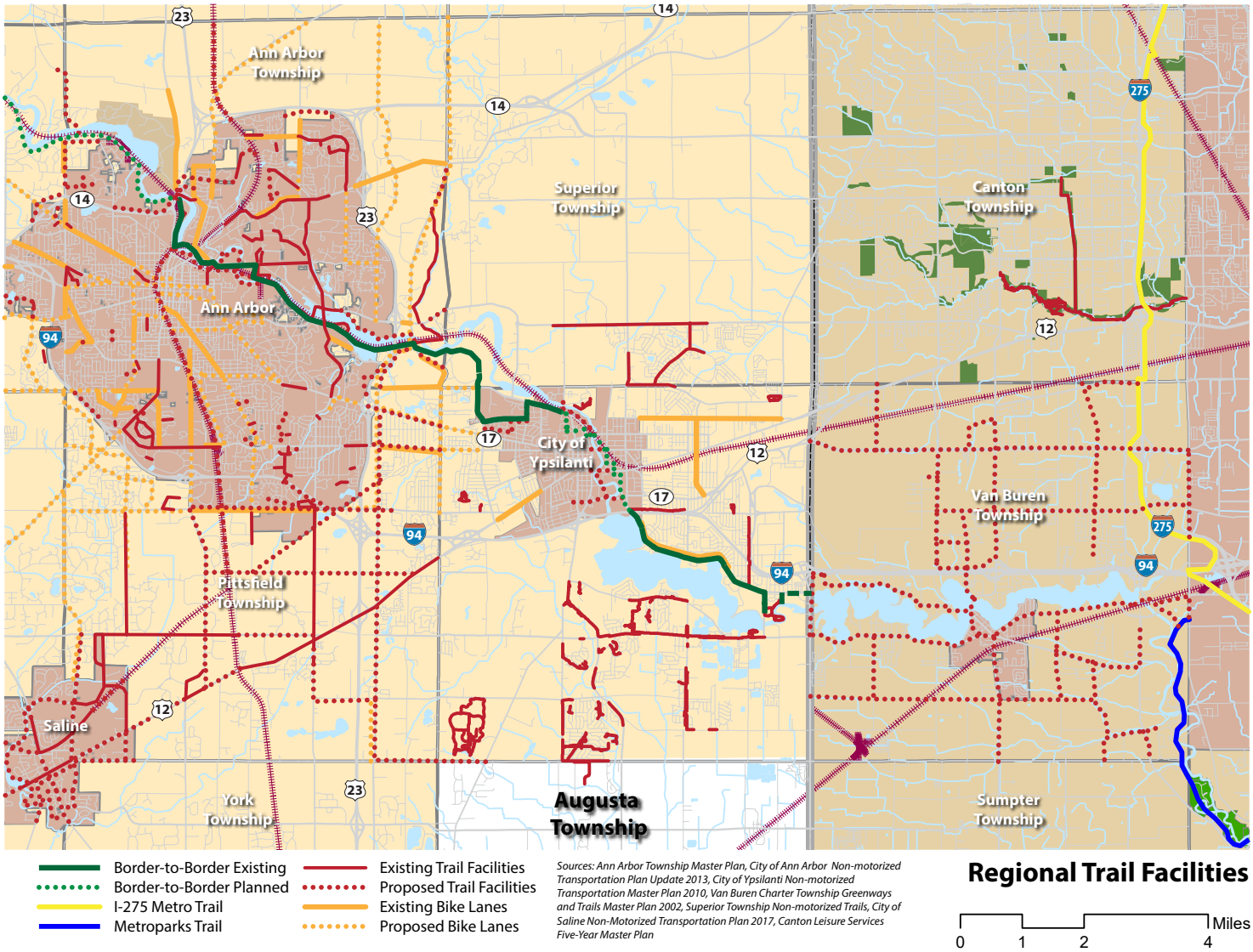
REGIONAL SETTING

Regionally, Augusta Township is well positioned to build off of non-motorized facilities being developed in other communities. A connection with Ypsilanti Township to the north is key; Ypsilanti Township's trails will connect with new projects being developed in Van Buren and Pittsfield Townships as well. Ultimately, Augusta Township cyclists would have new routes heading west towards Ann Arbor or east towards three of the Huron-Clinton MetroParks (Lower Huron, Willow, and Oakwoods), and Lake Erie and the city of Detroit as well. Further west, the B2B will connect to Ingham and Jackson Counties, meeting up with the Lakelands Trail in Stockbridge and continuing on as part of the Great Lakes-to-Lakes Trail from South Haven to Port Huron. Additional major routes, such as the I-275 Metro Trail, would provide links to networks including the Hines Park Bikeway, a 19.5-mile long route which travels from Northville to Dearborn.

To the northwest, Pittsfield Township has constructed roughly ten miles of ten-foot wide pathways since 2009. The Platt Textile Greenway was completed in 2019 and several other projects have been proposed, including phase two of the Platt Road Greenway which runs south of Michigan Avenue.

Other proposed trail facilities west of the Township could eventually connect residents to the City of Saline through Pittsfield Township via US-12. Should this route be completed, a future link to the Village of Manchester and the proposed Watkins Lake State Park / Manchester to Brooklyn trail could come into play. The Watkins Lake trail would ultimately act as an Iron Belle Trail bypass, providing unprecedented trail access for riders from Jackson, Wayne and Washtenaw Counties.

FIGURE 30. Regional Non-Motorized Facilities



Source: Ypsilanti Township Non-Motorized Plan

4. Policies, Laws & Planning

State law allows bicycles to ride on sidewalks and all public roads except where restricted or on limited-access highways. Therefore, bicyclists are found in travel lanes on streets, road shoulders, bike lanes, sidewalks, and shared-use paths or trails across the state. The paragraphs below describe the state laws that govern the non-motorized network in Augusta Township

MICHIGAN BARRIER FREE PUBLIC ACT AND THE AMERICAN WITH DISABILITIES ACT

Augusta Township is required to meet the requirements of the Michigan Barrier Free Public Act of 1966 and MDOT standards for construction of sidewalks and ramps. These laws conform with regulations established by the Americans with Disabilities Act (ADA) of 1990.

The United States Access Board published revised Architectural Barriers Act (ABA) Standards 2015. These guidelines cover pedestrian access to sidewalks and streets, including crosswalks, curb ramps, street furnishings, pedestrian signals, parking, and other components of public right-of-way. The ABA requires that buildings and facilities that are designed, constructed, or altered with Federal funds, or leased by a Federal agency, comply with Federal standards for physical accessibility. The standards are limited to new and altered buildings and in newly leased facilities.

The Department of Justice published revised, enforceable accessibility standards called the 2010 ADA Standards for Accessible Design. Compliance with the 2010 Standards was required for new construction and alterations as of March 2012, and is also the compliance date for using the 2010 Standards for program accessibility and barrier removal. Assessing the suitability of the road network for bicycle use and bike lane striping is one of the first steps in selecting non-motorized transportation improvements. When evaluating roadway corridors for bicycle use, roadway width, number of travel lanes, presence of on-street parking, traffic volumes, car speeds, presence of large trucks, and pedestrian activity are among the many factors that should be considered.

Hardwood Creek Trail, Washington, MN

COMPLETE STREETS

In 2010, the State of Michigan legislature signed into law the Complete Streets amendments to the State Trunkline Highway System Act (Act 51 of 1951) and the Planning Enabling Act (Act 33 of 2008). The law provides an approach to transportation planning and design that considers all street users – pedestrians as well as motorists and bicyclists of all ages and abilities – during the various planning and design stages of a transportation project. It also requires that the Michigan Department of Transportation (MDOT) and local municipalities consider the community's goals and desires for road projects within their boundaries. The goals, objectives and projects articulated in this plan should be considered as part of any MDOT project in Augusta Township.

The law requires Complete Streets policies to be sensitive to the local context, and consider the functional classification of roadways, cost, and the mobility needs of all legal users. Examples of complete streets facilities include curb ramps, well-marked crosswalks, longer crossing times, and bike lanes that are free of obstacles. The Complete Streets legislation also identified non-motorized facilities contributing to complete streets as eligible for funding as well as allowing agencies to enter into agreements to provide maintenance for facilities constructed to implement a Complete Streets policy.

In response to Complete Streets legislation at the state level, many municipalities have adopted Complete Street resolutions or ordinances. Augusta Township has not, as of yet, adopted such a resolution or ordinance.

FIGURE 31. Complete Streets Conceptual Cross Section

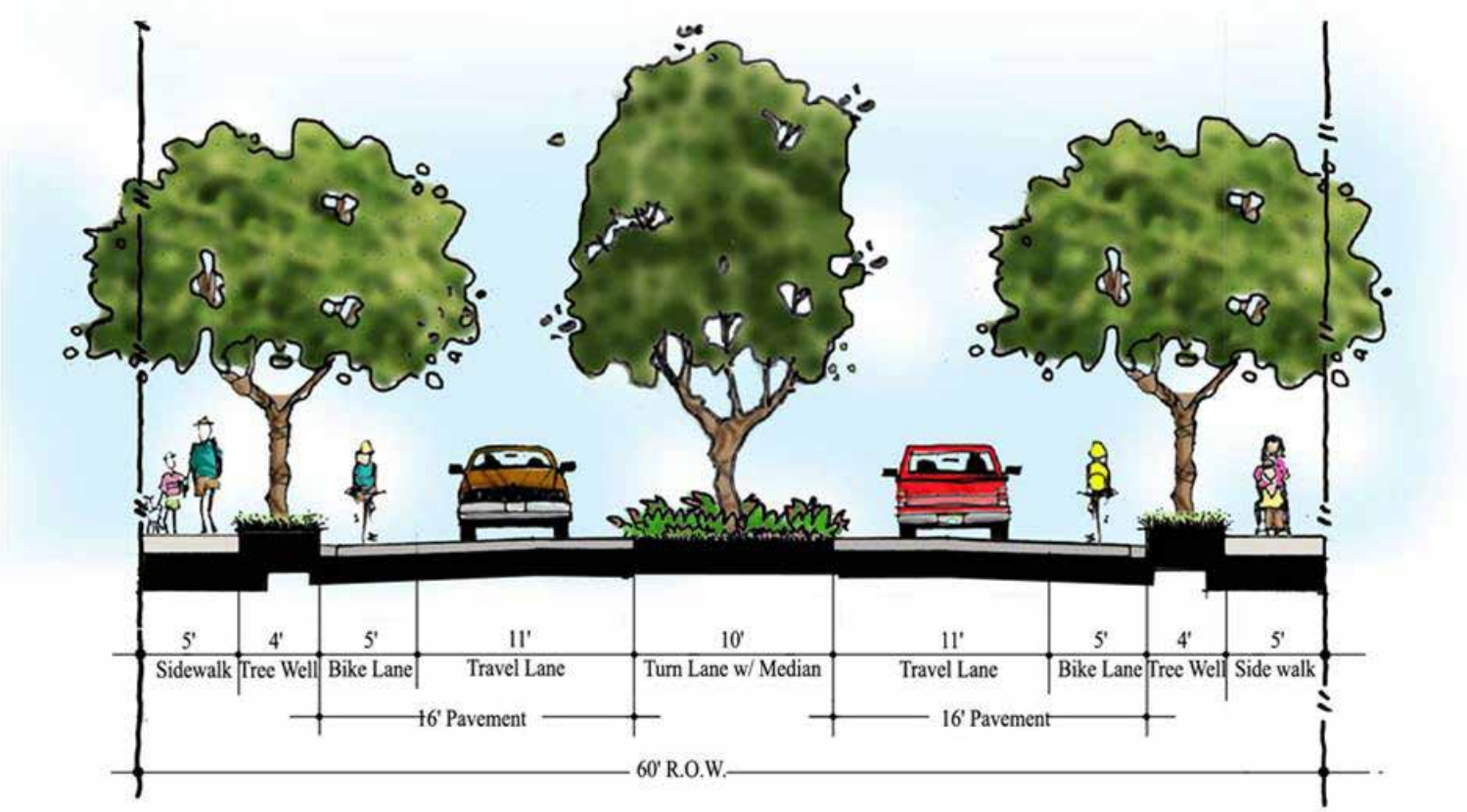
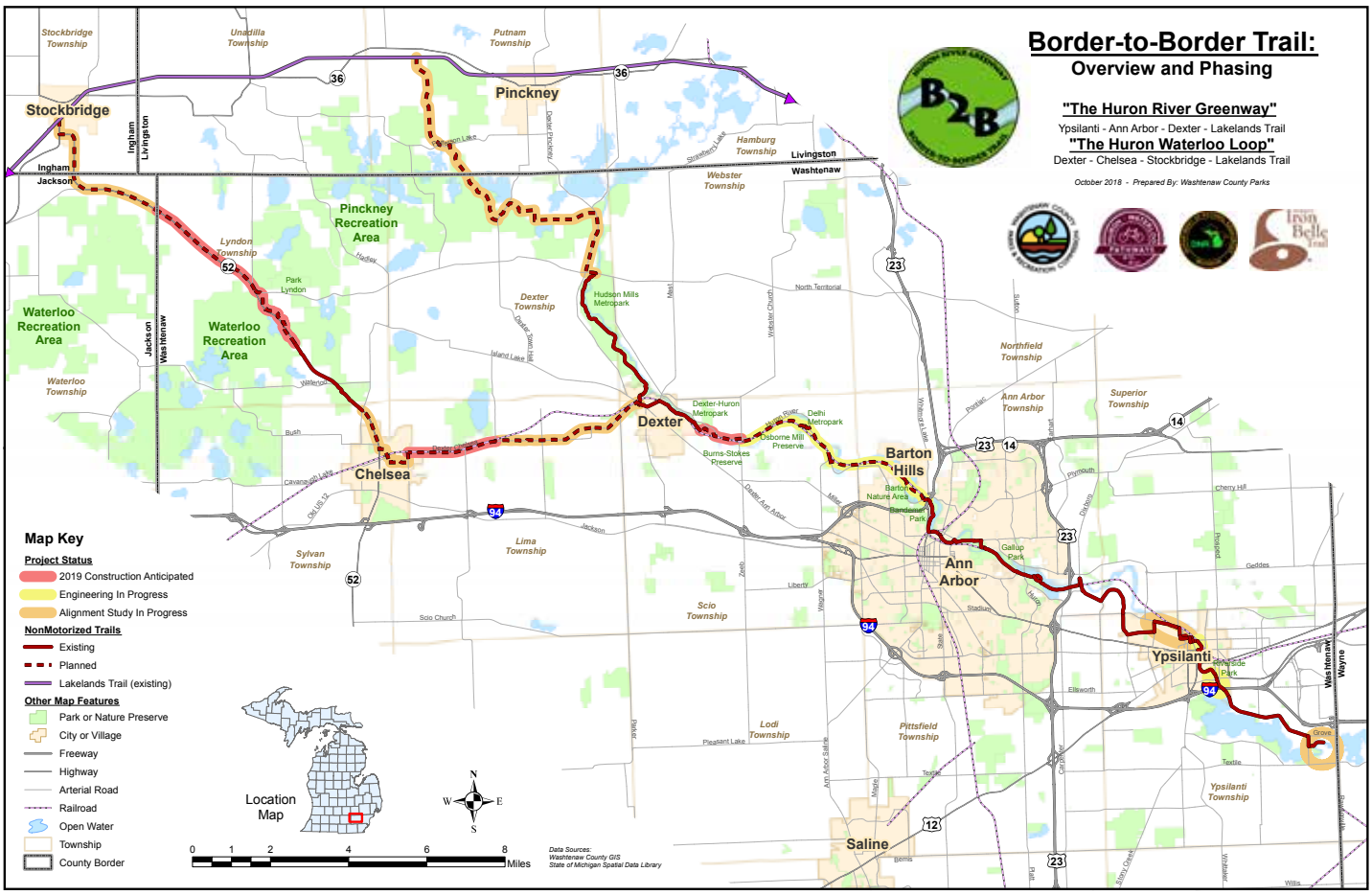


FIGURE 32. Border-to-Border (B2B) Trail



WASHTENAW COUNTY

Washtenaw County Parks & Recreation

The Washtenaw County Parks and Recreation Commission (WCPARC) has made tremendous strides in developing non-motorized transportation facilities in Washtenaw County, with several projects completed in recent years in nearby townships and other communities. Their main efforts have focused on the development of the Border-to-Border Trail along the Huron River, running from the southeast corner of the county to the northwest, and connecting Ann Arbor, Ypsilanti, and other communities along the way. Additional county-led projects form connections to neighboring Livingston and Jackson Counties.

The Border-to-Border Trail (B2B) represents the prime example of non-motorized transportation in the county. When completed, the B2B will run 70 miles through 13 Washtenaw Communities. The B2B begins in Ypsilanti Township and runs northwest through Ypsilanti, Ann Arbor, and Dexter. Long range plans envision connections to the Mike Levine Lakelands State Trail in Ingham and Livingston County, and new routes in Van Buren Township in Wayne County. As a part of the Iron Belle Trail system, the B2B provides a jumping point to thousands of miles of non-motorized pathways within the state and beyond. The WCPARC is actively working with state and local officials to address gaps and other connectivity issues in the B2B.

Other projects in the preliminary stages of evaluation by WCPARC and other local officials include potential routes from Jackson County. If these routes come to fruition, they would pass through Watkins Lake State Park and County Preserve, the Village of Manchester, and the cities of Saline and Milan before reaching Ypsilanti Township along US-12.

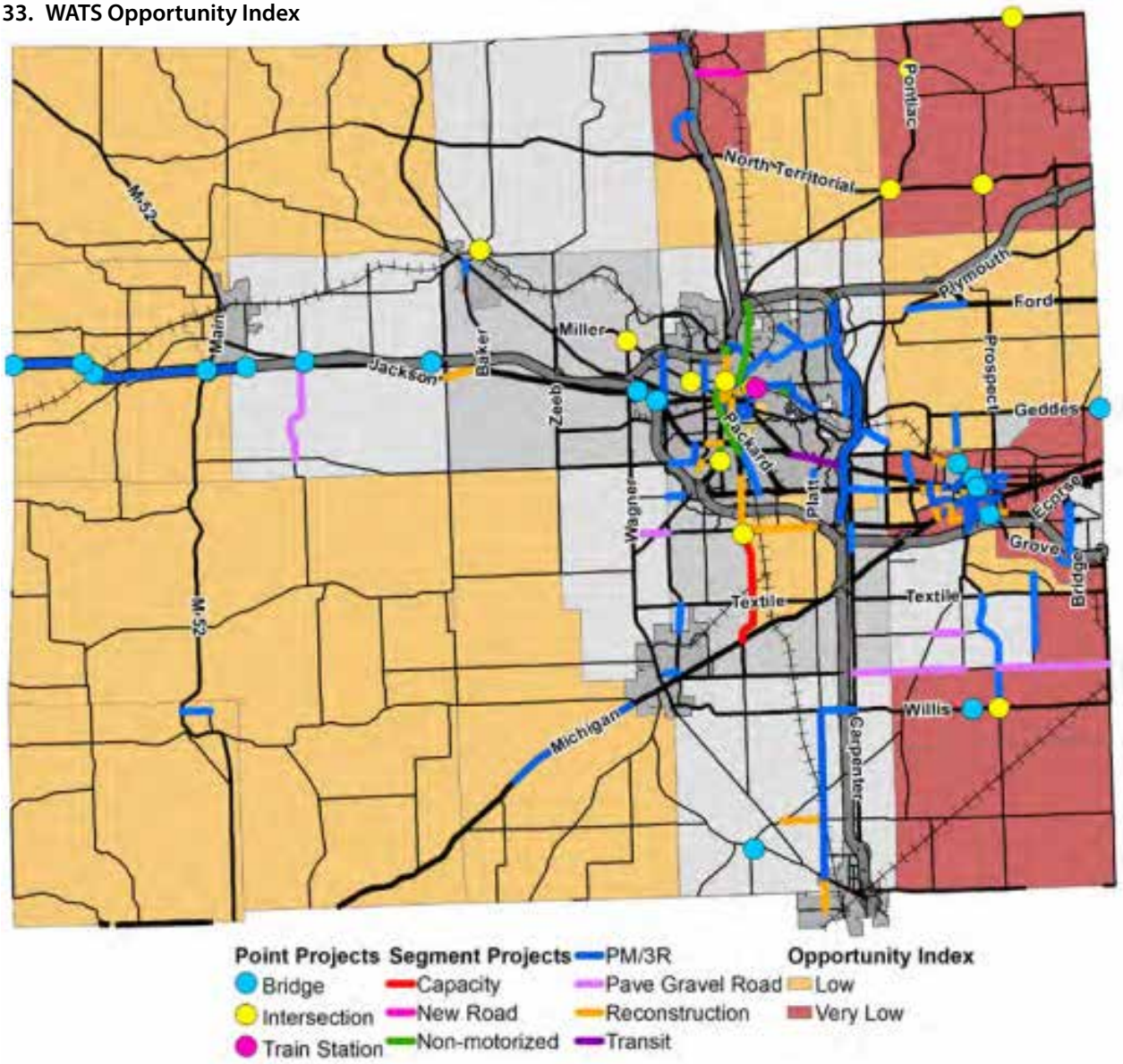
Washtenaw Area Transportation Study

The Washtenaw Area Transportation Study (WATS) is a multi-jurisdictional agency responsible for transportation planning in Washtenaw County. WATS has prepared two documents directly applicable to non-motorized planning in Augusta Township. The 2018 Non-motorized Transportation Plan looks specifically at non-motorized transportation infrastructure while the 2045 Long Range Plan considers overall regional transportation development. The latter plan, adopted by the WATS Policy Committee on March 20, 2019, was developed by a coalition of local municipalities. The new plan is a major overhaul of the original 2006 study, and includes an inventory of existing walking and bicycling facilities and identifies non-motorized transportation deficiencies across the County.

The plan identifies seven major goals, all of which directly relate to non-motorized transportation issues in Augusta Township:

- **Equity:** WATS continues to seek ways to invest in environmental justice, low opportunity, and very low opportunity areas in an effort to disrupt the effects of historic injustice. All of Augusta Township falls under the "very low" categories of the Opportunity Index, a metric which considers indicators such as health, education, job access, economic vitality, and neighborhood safety and stability to identify local areas of inequity;
- **Safety:** Track the number and rate of roadside crashes, reduce the five year average for pedestrian and cyclist injuries, and adopt a "Vision Zero" philosophy with an aim to eliminate all transportation related fatalities by designing systems that protect users;

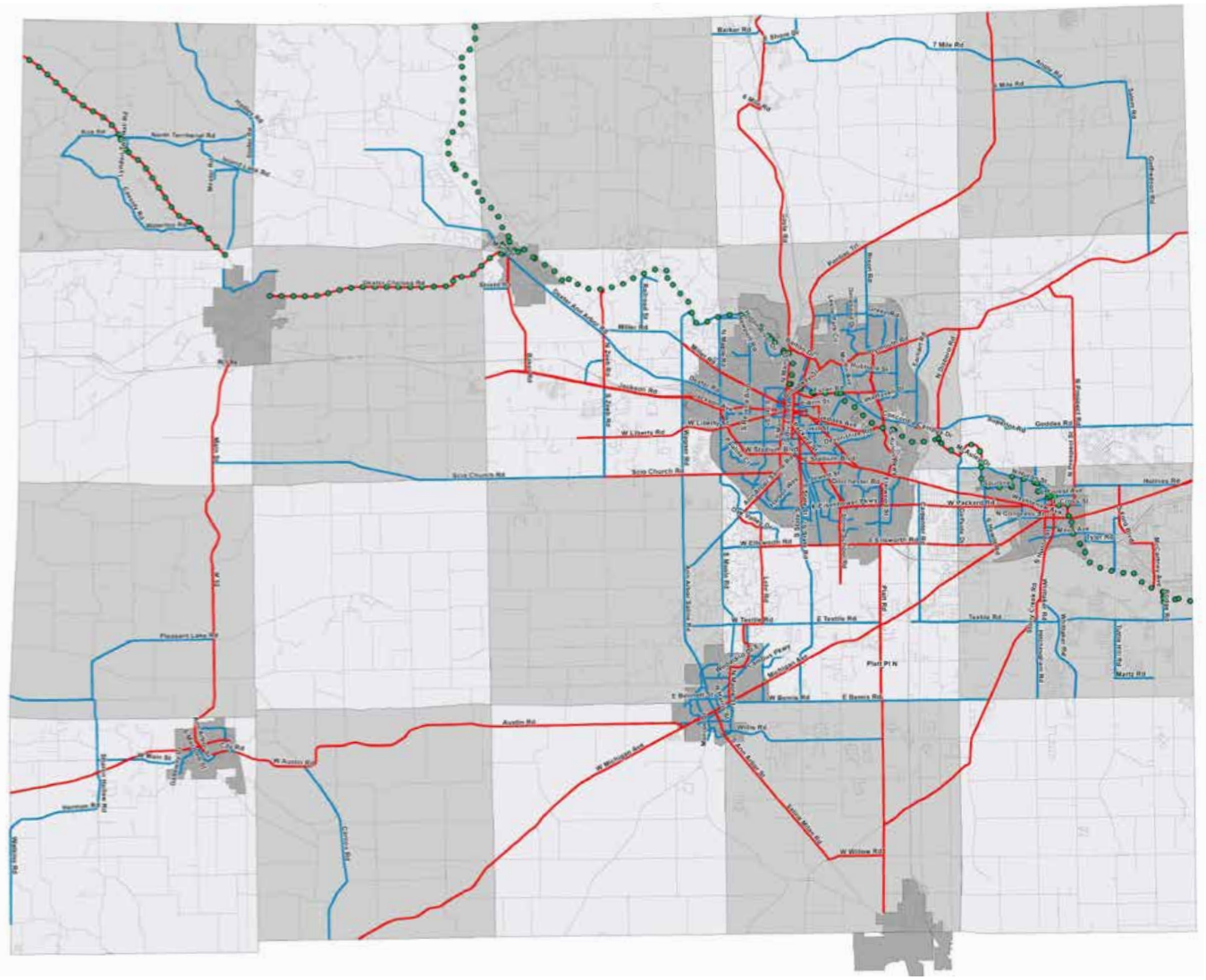
FIGURE 33. WATS Opportunity Index



- **Environment:** Reduce the total number of Vehicle Miles Traveled (VMT) in an effort to reduce greenhouse gas emissions, and has pledged to invest 10% of Surface Transportation Block Grant funds into non-motorized options;
- **Linking Transportation and Land Use:** Increase the percentage of work trips accessible within 30 minutes, noting that biking and walking trips have the highest share of trips within this range;
- **Access & Mobility:** Measure the overall coverage of local bike and pedestrian networks, encourage "Complete Street" development, and increases the availability of non-motorized facilities.
- **Invest Strategically:** Strategic investment in active transportation projects, including transit and non-motorized facilities, provides a higher overall value by increasing transit options to residents and allowing consolidation of financial resources.
- **Engage:** Actively engage in discussions with the public to ensure that all voices are heard, regardless of physical or cognitive ability.

WATS also highlights the importance of the B2B and connected trails. WATS has funded portions of the trail through Surface Transportation Program (STP) funds and showed support for the project by signing letters of support for federal Transportation Alternatives Program (TAP) funds.

FIGURE 34. Primary Regional (red) and Locally Identified (blue) Non-Motorized Transportation Routes

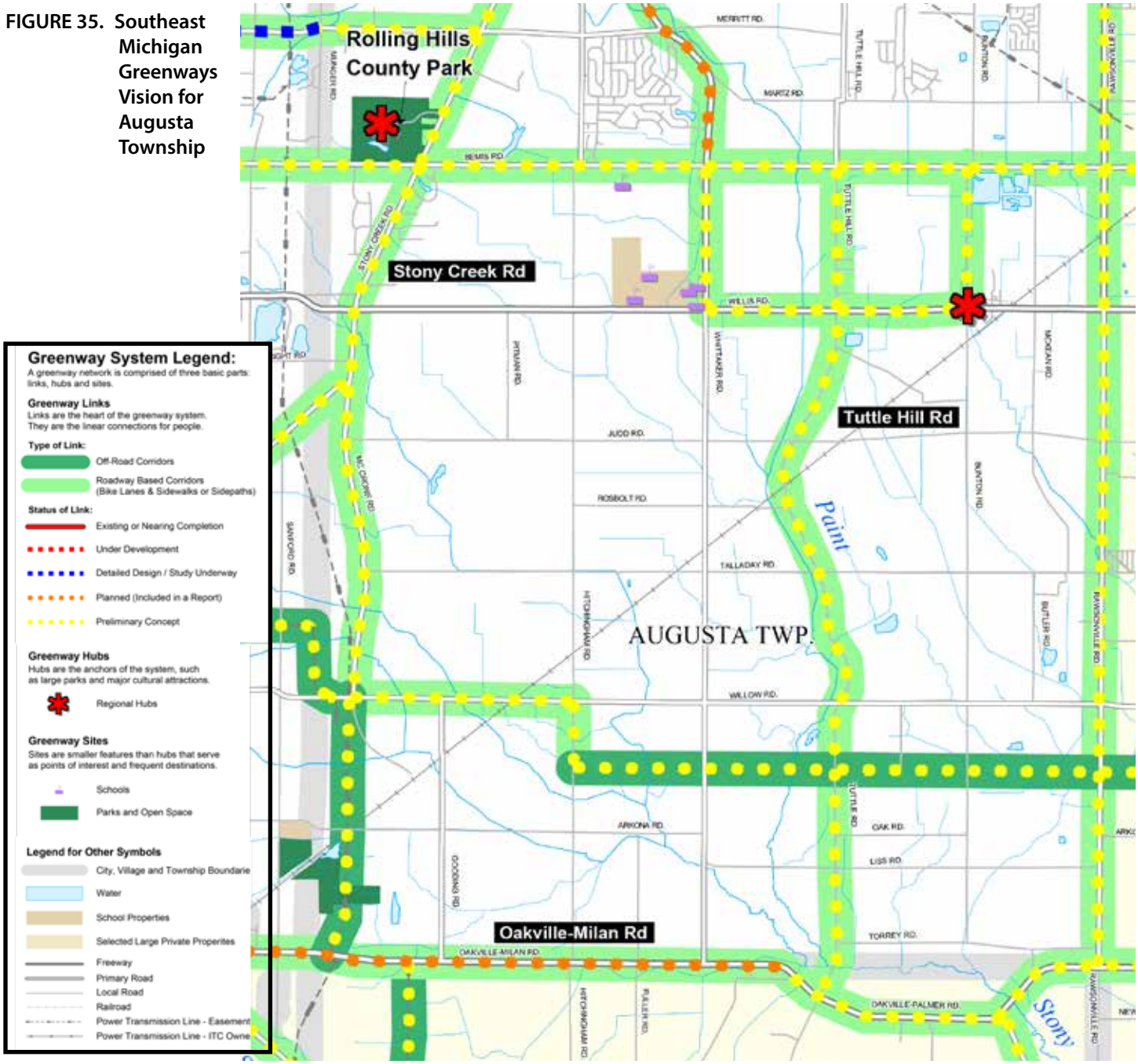


Southeast Michigan (Washtenaw County) Regional Trails and Greenways Vision

The seven-county region of southeast Michigan developed an updated Southeast Michigan Greenways Vision, which reflects the desired non-motorized connections in the region. This initiative was facilitated by the Community Foundation for Southeast Michigan. Counties worked together with local municipalities and community interest groups to develop a long-term vision for a connected system of greenways and non-motorized facilities. The vision for trails and greenways in Washtenaw County resulted from input gathered at several workshops. While grant funding was completed in 2006, the foundation continues to share their greenway experience with interested communities.

The RTGV proposes connections between Augusta and Ypsilanti Townships, providing important links to the Lincoln Consolidated Schools campus. While the proposed route differs from the recommendations of this plan, it underscores the importance of the connection and demonstrates the need for trail development in the area.

FIGURE 35. Southeast Michigan Greenways Vision for Augusta Township



STATE OF MICHIGAN

State of Michigan - Iron Belle Trail

First announced in 2012, the Iron Belle Trail (IBT) system is the longest designated state trail in the United States. The trail, which is approximately 68% complete as of 2019, will provide a 1,273 mile hiking and 791 mile biking route winding from Belle Isle in Detroit to Ironwood in the far northwest corner of the Upper Peninsula. The trail takes advantage of existing multi-use trail systems, and fills gaps between communities where needed. The IBT has become an important driver for other trail development throughout the state, with new spur projects appearing on a regular basis. The hiking portion of the IBT passes just north of Augusta in Ypsilanti Township as part of the Border-to-Border trail.

While the IBT remains well outside of the Township's borders, its presence is still a strong encouragement for connections to the townships immediately to the north. The relatively short routes proposed for Augusta Township take on a much larger role when viewed in context with developments in the surrounding area.

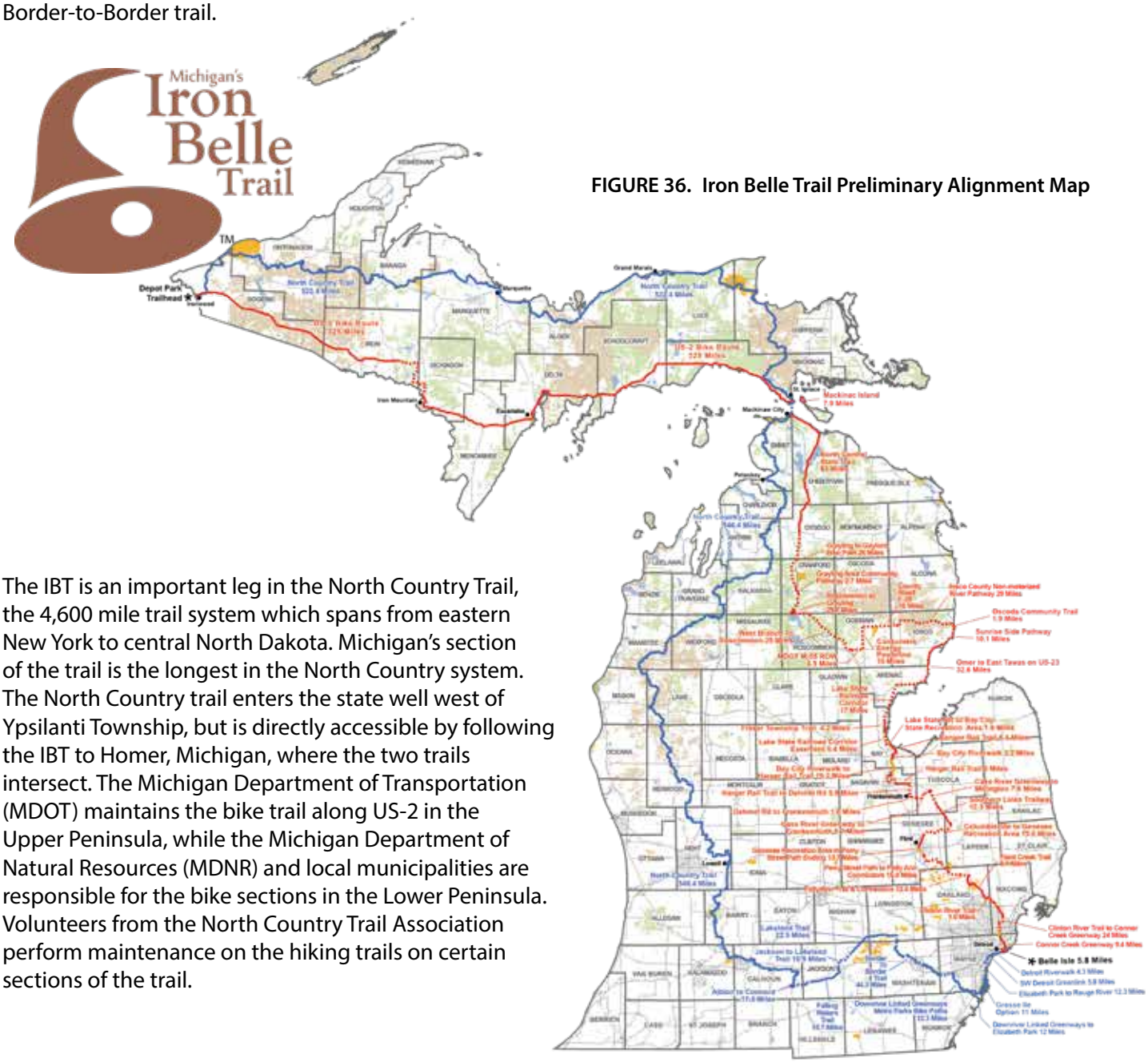


FIGURE 36. Iron Belle Trail Preliminary Alignment Map

The IBT is an important leg in the North Country Trail, the 4,600 mile trail system which spans from eastern New York to central North Dakota. Michigan's section of the trail is the longest in the North Country system. The North Country trail enters the state well west of Ypsilanti Township, but is directly accessible by following the IBT to Homer, Michigan, where the two trails intersect. The Michigan Department of Transportation (MDOT) maintains the bike trail along US-2 in the Upper Peninsula, while the Michigan Department of Natural Resources (MDNR) and local municipalities are responsible for the bike sections in the Lower Peninsula. Volunteers from the North Country Trail Association perform maintenance on the hiking trails on certain sections of the trail.

2040 State Long-Range Transportation Plan

The Michigan Department of Transportation (MDOT) 2040 State Long-Range Transportation Plan indicates that paved shoulders four feet or greater in rural areas and bicycle lanes in urban areas are considered suitable bicycle facilities. More than 44 miles of marked bike lanes and 3,160 miles of paved shoulders have been developed as of 2015. Rail-to-trail facilities also continue to grow as the result of partnerships between governmental agencies, nonprofit groups, and other interested parties. The state saw a nearly 4% increase in rail trails between 2010 and 2015, with 2,386 miles now open to the public.

Community and Economic Benefits of Bicycling in Michigan

MDOT's Community and Economic Benefits of Bicycling in Michigan found that cycling provides an estimated $668 million per year in economic benefits to Michigan's economy. Case studies in Ann Arbor and four other cities were used to quantify the effects on employment, retail revenue, tourism, overall health benefits, and increased productivity.

2010 Complete Streets Legislation (Public Act 135) and MDOT's 2012 Complete Streets Policy are designed to enable coordination between agencies and ensure network connectivity. Since their inception, more than 100 communities have adopted complete street policies, including the cities of Ypsilanti and Ann Arbor. This legislation also required the creation of a Complete Streets Advisory Council. The council provides education and advice to local communities regarding development of complete street policies.

State Trails Implementation Plan

The MDNR's State Trails Implementation Plan of 2014 provides guidance on a variety of motorized and non-motorized trail systems in the state. Priorities for the plan include:

- Developing funding sources and mechanisms for trail maintenance, acquisition, and development;
- Ensuring sustainability by maintaining trails according to established guidelines;
- Expanding trails to ensure broader public access to trail systems;
- Linking trails, trail users, and adjoining communities to enhance local prosperity, and;
- Develop and enhance trail partnerships and collaborations.

SOUTHEAST MICHIGAN COUNCIL OF GOVERNMENTS (SEMCOG)

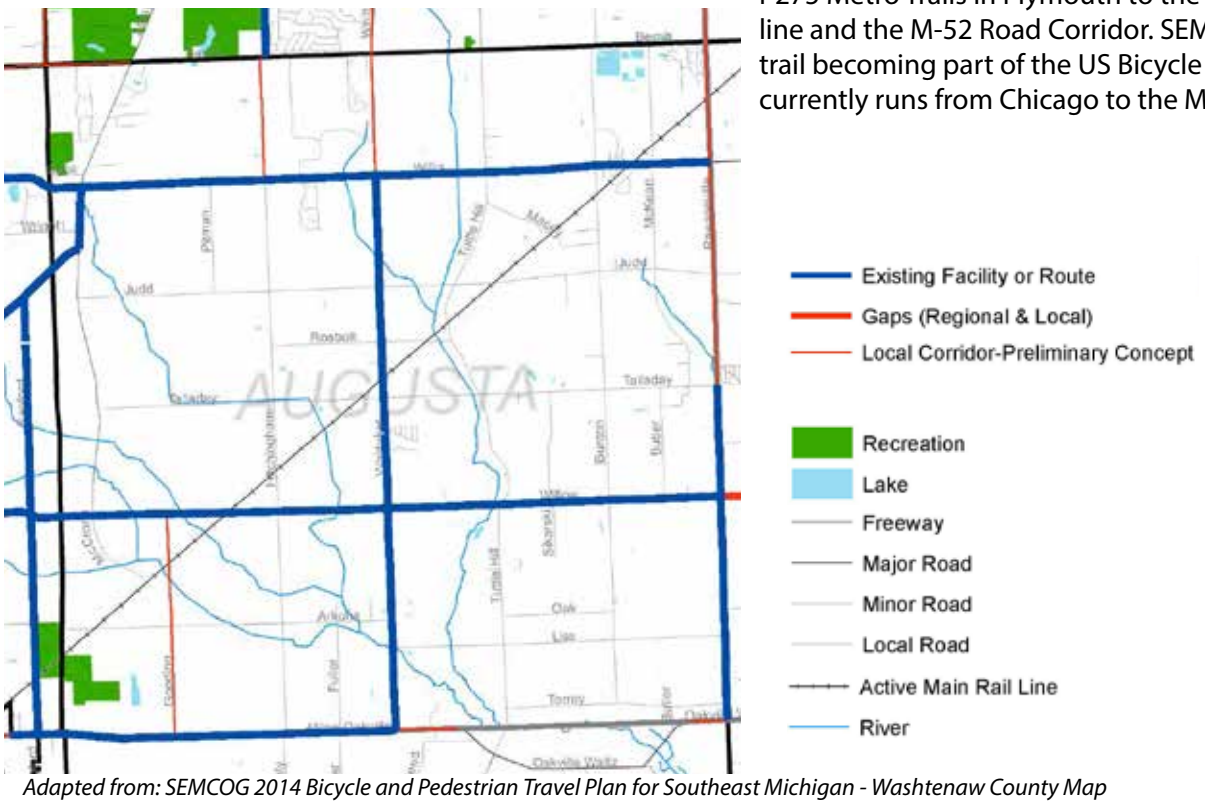
2014 Bicycle and Pedestrian Travel Plan for Southeast Michigan / SEMCOG 2045

In 2014 SEMCOG and MDOT jointly adopted the Bicycle and Pedestrian Travel Plan for Southeast Michigan. This plan focuses on integrating individual trail systems into one cohesive network. The plan provides valuable statistics regarding bike commute trips and pedestrian trends; it notes, for example, that bicycle trips as a form of commuting increased by over 200% between 1994 and 2005.

Washtenaw County has the second largest trail network in the seven-county SEMCOG region, behind Oakland County. The main discrepancy between the two counties is in built and planned safety paths; Oakland has over five times as many shared use paths as Washtenaw.

The plan offers a variety of strategies for regional implementation and emphasizes the importance of timing; using an excerpt from Oakland County's Complete Streets General Guidelines, it demonstrates the importance of incorporating bicycle and pedestrian projects as part of greater streetscape planning and design. As the project progresses, opportunities for input decrease while cost of implementation increases dramatically. This is important for the Township to consider as various WATS projects are implemented over the coming years.

FIGURE 37. Detail - SEMCOG Regional Transportation Plan



Adapted from: SEMCOG 2014 Bicycle and Pedestrian Travel Plan for Southeast Michigan - Washtenaw County Map

In 2018, SEMCOG released two reports, an implementation report and the 2045 Regional Transportation Plan for Southeast Michigan. The reports detail progress made on the region's bicycle and pedestrian network, and references the addition of 109 miles of shared-lane markings, 105 miles of local bike routes, 57 miles of shared-use paths, 47 miles of conventional bike lanes, and 24 miles of protected bike lanes. The implementation report responds to planning efforts first completed in 2006 and later updated in 2014, and incorporates a number of different initiatives, including the Washtenaw County Regional Trails and Greenways Vision.

The 2014 plan identifies a number of potential routes, trail gaps, and other non-motorized opportunities on a county by county basis. Willis, Willow, Milan Oakville, Stony Creek, Whittaker, and the southern portion of Rawsonville are all identified as "Existing Facility or Routes". The northern portions of Whittaker, Rawsonville, and Hitchingham are identified as trail gaps. Two important routes passing near Augusta Township are highlighted. Identified as route one in Figure 21, the B2B plan calls for improved facilities along Grove Road, new connections on Rawsonville Road, and added wayfinding signage along the trail. A second route follows the US 12 / Michigan Avenue corridor, linking the Hines Drive and I-275 Metro Trails in Plymouth to the Lenawee County line and the M-52 Road Corridor. SEMCOG envisions this trail becoming part of the US Bicycle Route 36, which currently runs from Chicago to the Michigan state line.

OTHER PLANS

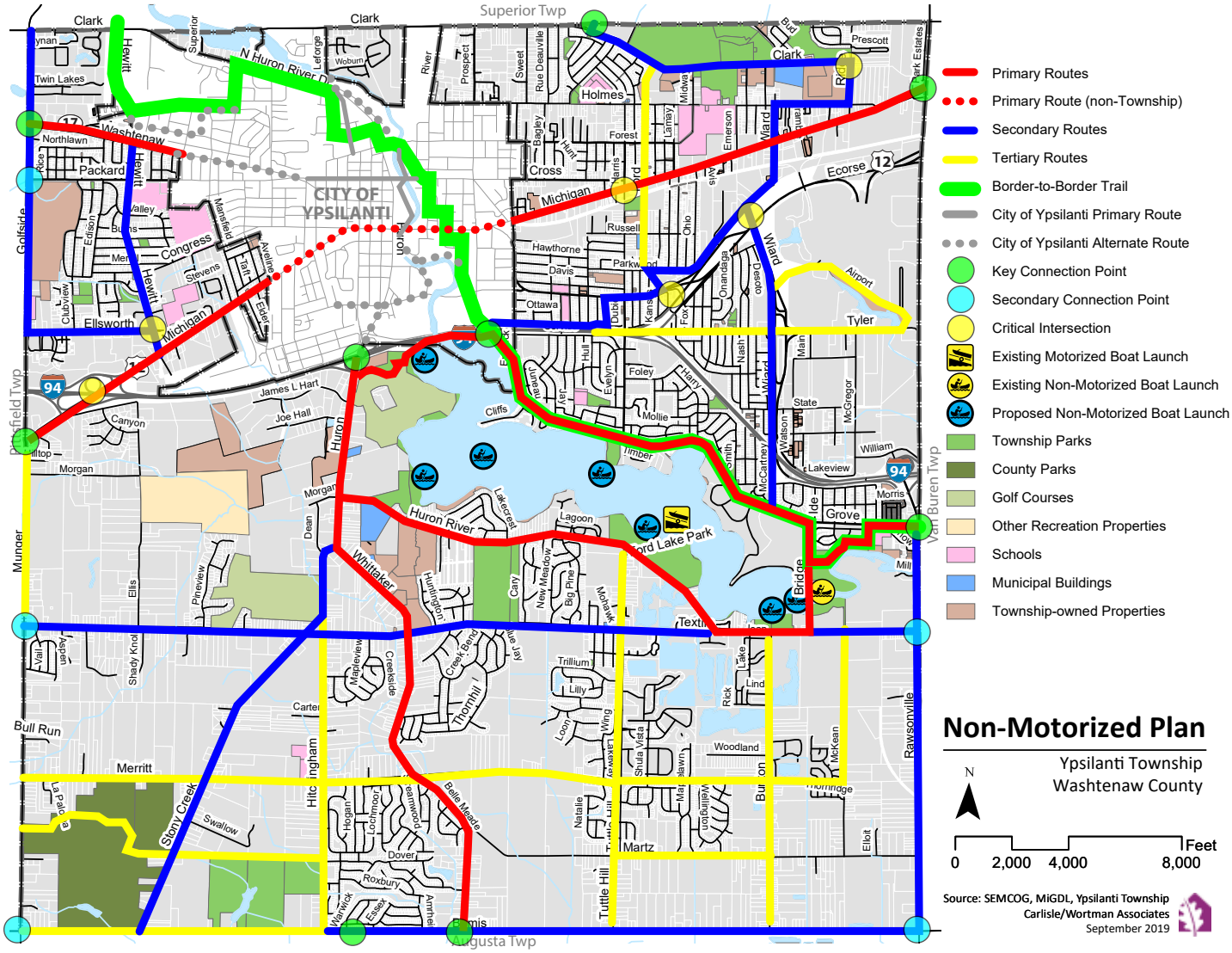
Ypsilanti Township Non-Motorized Plan and 2019-2023 Parks & Recreation Plan

Ypsilanti Township provides a variety of recreation opportunities for Augusta Township residents, including Rolling Hills County Park and Hewens Creek Park, both located on the north side of Bemis Road. The two plans call for significant expansions of the community's pathway system, including connections to Augusta Township. Key connection points are highlighted at the Bemis/Whittaker Road intersection and at the crosswalk at Marlow Drive. Secondary points are shown at Rawsonville and Munger.

Van Buren Township Parks and Recreation Master Plan

Van Buren Township's most recent recreation plan references the 2002 Greenways and Trails Master Plan which establishes the creation of a linked non-motorized pathway system throughout the Township. The plan recommends three treatment levels for the pathway system: Class I would be 10 to 12-foot wide multi-use pathways, Class II are bicycle lanes, and Class III bike routes. Potential routes with connections to Ypsilanti Township would extend the Border-to-Border/Iron Belle Trail alignment, with further connections to the Metroparks. The Five-Year Capital Improvement Plan recommends construction of pathways in Riggs Heritage Park with connections to Lower Huron MetroPark, but does not provide funding for other proposed routes.

FIGURE 38. Ypsilanti Township Non-Motorized Plan



HEALTH AND ACTIVE COMMUNITY PROGRAMS

Several significant programs promoting pedestrian and bicycle friendly communities in Michigan, Washtenaw County, and locally have come together to create incentives and facilitate non-motorized transportation planning and development.

Promoting Active Communities

The Promoting Active Communities (PAC) program is an online assessment and award system funded in whole or in part by the USDA's Supplemental Nutrition Assistance Program Education through the Michigan Department of Health and Human Services and the Michigan Fitness Foundation. It was developed in collaboration with the Community Economic Development Association of Michigan, Michigan Association of Planning, Michigan Department of Education, Michigan Department of Health and Human Services, Michigan Department of Transportation, Michigan Land Use Institute, Michigan Municipal League, Michigan State University Extension, mParks, and the Safe Routes to School National Partnership. The program is part of a state initiative on physical activity to help Michigan communities make changes to their policies, promotion strategies, and the physical design of their communities to make it easier for community residents to be physically active.

The PAC assessment is a self-assessment tool that enables communities to examine their policies, programs, and built environments. The assessment, which requires teamwork between community leaders and citizens, generates ideas for community improvements. Participants complete six modules covering core community readiness, parks and recreation, schools, neighborhoods, commercial districts, and transportation infrastructure. Upon completion, every community is eligible to earn one of five award levels from the Governor's Council and Michigan Department of Community Health, based on their assessment score.

Washtenaw Bicycling and Walking Coalition

The Washtenaw Bicycling and Walking Coalition (WBWC) is a group dedicated to increasing the quality and quantity of bicycling and walking opportunities in Washtenaw County through advocacy and education. The group is comprised of local organizations, agencies, retail stores, as well as individual cyclists and walkers.

Michigan Fitness Foundation – Safe Routes to Schools

The Michigan Fitness Foundation (MFF) Safe Routes to School program provides expertise and assistance in the form of grants to develop solutions which encourage students to walk and bike to school. The Minor Grant program focuses on programming opportunities. Applicants can apply for up to $5,000 per school or $25,000 per districts that serve at least one grade in the K-8 range. Non-profits with an approved working partnership with the school are also eligible.

Major grants are used to identify and correct barriers walking or biking. Barriers can be physical or behavioral, and could include projects such as crosswalk updates, multi-use pathways, sidewalk installation, signage, and traffic calming measures. Eligible communities may apply for up to $200,000 in infrastructure funding and an additional $8,000 in programming funding for each school that serves at least one grade K–8.

Bicycle Friendly Communities Campaign

The League of American Bicyclists sponsors the Bicycle Friendly Communities offers award which recognizes communities that provide safe and plentiful bikeways, access to safe and convenient bike parking, and encourage "share the road" programs for non-cyclists. The five-level award system (bronze, silver, gold, platinum, and diamond) reflects the level of investment in non-motorized transportation infrastructure and programming. As of fall of 2018, 464 communities across the United States had been recognized. Michigan communities recognized by the program include Ann Arbor, Battle Creek, Houghton, and Marquette (silver level), and East Lansing, Flint, Grand Rapids, Kalamazoo, Lansing, Midland, Portage, and Ypsilanti (bronze level). Sault Ste. Marie received an Honorable Mention award in 2018.

Program to Educate All Cyclists

The Program to Educate All Cyclists (PEAC) is a non-profit organization based in Ypsilanti that was developed to teach children with disabilities to become cyclists. PEAC runs summer programs for children with disabilities throughout southeast Michigan. Programs include Family Rides in the Willow Metropark, the Active Transportation Program which teaches young adults how to more independently walk, bike, and use transit, Summer Cycling, 2x2 Visual Impairment Cycling, and private lessons. PEAC also holds special events throughout the year such as Celebration of Cycling, Hand Cycle Racing, and their annual "Pints for PEAC". There may be opportunities to collaborate with the program and host events or programs on the Lincoln School Campus.

Building Healthy Communities Program

Washtenaw County Public Health Department's (WCPHD) "Building Healthy Communities initiative" aims to make policy and environmental changes to communities in ways that make it easier for residents to be physically active, obtain healthful foods, and not smoke. Funded by the Michigan Department of Health and Human Services, the program's goal is to reduce cardiovascular disease, obesity, and other chronic conditions. WCPHD works with partners and residents to implement local projects where they are most needed and can be most effective.

Past projects have helped launch non-motorized planning initiatives and development and construction of walking and biking trails. WCPHD has assisted nearby communities with designing and distributing walking maps, promoting events such as community walks, and installing bike parking and pedestrian-oriented benches.

5. Implementation

This section of the plan details the manner in which the network of non-motorized facilities may be implemented. It provides a snapshot of the different conditions seen around the Township, potential treatments for each condition, as well as an overview of funding opportunities. Approximate costs for each type of treatment is included.

Types of Riders

The needs and preferences of bicyclists vary depending on a bicyclists' skill level and the type of trip the individual wishes to take. Properly designed bicycle routes provide comfortable and direct alternatives for existing bicyclists and to encourage other residents and visitors to ride for transportation and for recreation. Addressing the concerns of casual riders as well as more experienced riders will encourage more people to include bicycling in their daily lives.

Studies have shown that bicycle users and pedestrians share destinations and trip purposes common to other road users and, as a result, use all types of streets. Different types of users, however, generally prefer different types of streets. The American Association of State Highway Transportation Officials (AASHTO, 2012) recognizes different types of riders which are described in FIGURE 39 below. Casual and less confident riders often prefer quiet neighborhood streets or recreational pathways. On the other hand, serious commuting and experienced riders can generally be found on major roads. Some organizations have begun to refer to four types of cyclists ranging from "Strong and Fearless", "No Way No How"; they note that most riders fall under the "Interested but Concerned" category. This category corresponds well with AASHTO's "Type B" rider.

National studies have shown that on-road bicycle facilities for experienced riders and casual adult riders are generally safer than a sidewalk because they provide greater driver visibility. This is especially true at intersections and driveways, where conflicts with vehicles are most likely to occur.

While the proposed routes in this study are aimed at the community as a whole, the fact that almost all of the alignments are positioned on school grounds suggests that the heaviest ridership levels will be comprised of "Type B" users. The ready availability of space and relative lack of major barriers allows for development of off-road multi-use pathways, which in turn will encourage use by these casual riders.

FIGURE 39. Types of Riders (AASHTO)

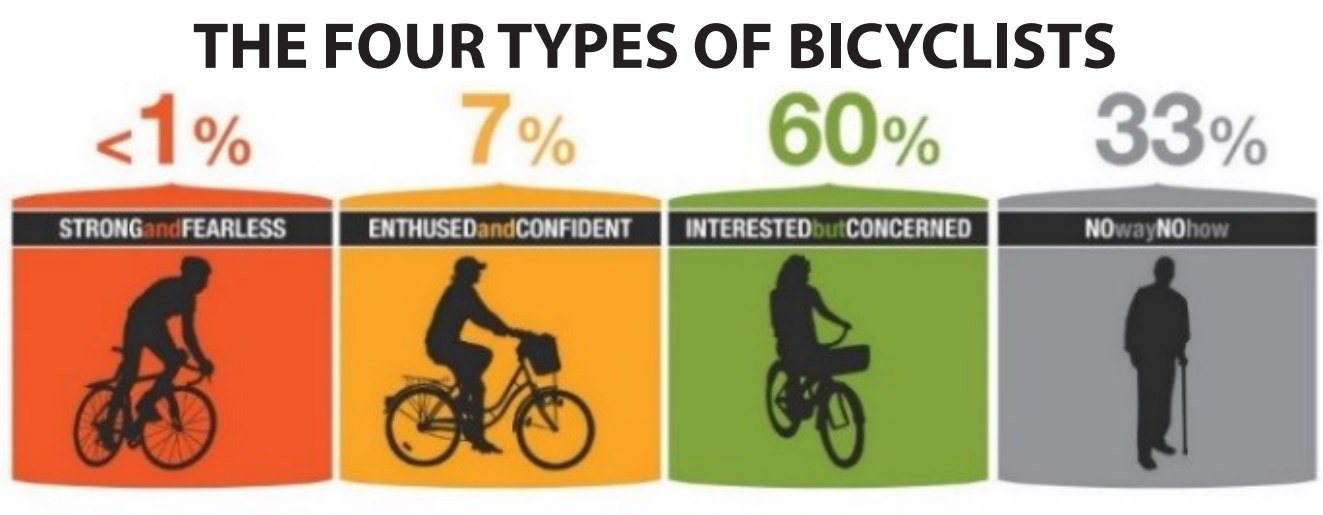
TYPE A RIDERS:

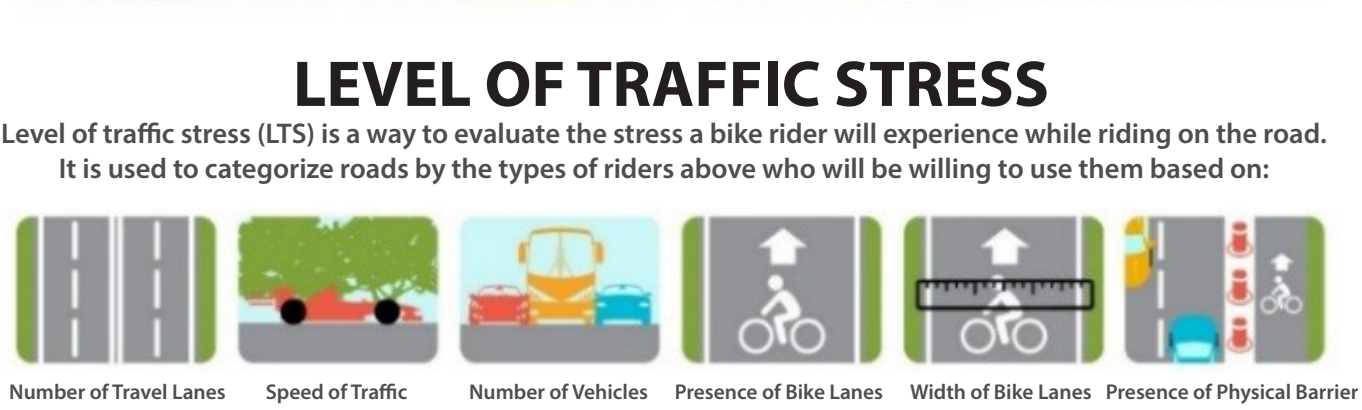
Experienced and confident riders generally use their bicycles as they would a car. They ride for convenience and speed and want direct access to destinations with a minimum of detour or delay. They are typically comfortable riding alongside a car; however, they need sufficient operating space on the traveled way or shoulder to eliminate the need for either them or a passing car to shift position. While comfortable on most streets, some prefer on-street bike lanes, paved shoulders, or shared use paths when available. Experienced riders avoid riding on sidewalks, which have speed and sight line limitations.

TYPE B RIDERS:

Casual or less confident riders may also use their bicycles for transportation purposes, for example, to get to the store or to visit friends, but prefer to avoid roads with fast and busy car traffic unless there is ample roadway width to allow easy overtaking by faster cars. Thus, casual riders are more comfortable riding on neighborhood streets and shared-use paths and prefer designated facilities such as bike lanes on busier streets. If no on-street facilities are available, they may opt to ride on sidewalks. School-aged children generally fall under the "Type B" category.

FIGURE 40. Four Types of Bicyclists





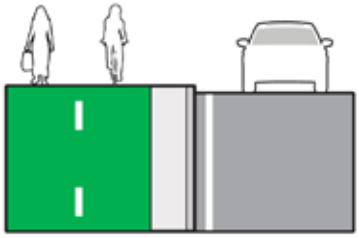
Facility Structure & Design Alternatives

A variety of non-motorized facilities and accommodations are available to help form the proposed network. The following pages provides an overview of many of the design components that must be factored in to non-motorized facility development. A fully comprehensive description of all design considerations goes beyond the scope of this document; Each type or combination of facilities will need to be selected based on further evaluation of the selected roadway or area.

It is important to remember that all Augusta Township roads fall either under the jurisdiction of the Washtenaw County Road Commission (WCRC) or the Lincoln Consolidated School District. Traffic islands, bike lands, and other road configuration adjustments will require approval by and cooperation with the WCRC.

FIGURE 41. Types of Non-Motorized Treatments

Shared Use Path SUP



A shared use path is a two-way facility that is physically separated from motor vehicle traffic and used by bicyclists, pedestrians, and other non-motorized users. Shared use paths are often located in an independent alignment, such as a greenbelt or abandoned railroad right-of-way, and are used for recreation, leisure, and commuting.

Protected Bike Lane PBL

Protected Bike Lanes (also known as separated bike lanes or cycletracks) are an exclusive bikeway facility that combines the user experience of a shared use path with the on-street infrastructure of a conventional bike lane. They are physically separated from motor vehicle traffic and distinct from the sidewalk.

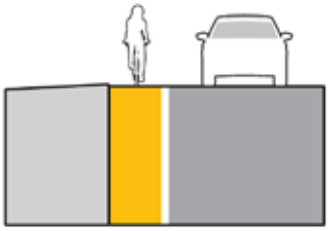
Buffered Bike Lane BBL

Buffered bike lanes are created by painting a flush buffer zone between a bike lane and the adjacent travel lane. While buffers are typically used between bike lanes and motor vehicle travel lanes to increase bicyclists' comfort, they can also be provided between bike lanes and parking lanes to discourage bicyclists from riding too close to parked vehicles.

Bike Lane BL

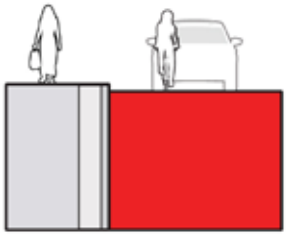
Bike lanes provide an exclusive space for bicyclists in the roadway through the use of lines and symbols. Bike lanes are for one-way travel and are normally provided in both directions on two-way streets and on one side of a one-way street. When roadway width is limited and the road is sloped, a bike lane may be provided in only the uphill direction. This is referred to as a ***climbing lane.***

Shoulder Bikeway SB



Shoulder bikeways are typically reserved for rural road cross-sections. Paved shoulders provide a range of benefits: they reduce motor vehicle crashes; reduce long-term roadway maintenance; ease short-term maintenance, such as debris clearing; and provide space for bicyclists and pedestrians.

Shared Roadway SR



Shared roadways are bikeways where bicyclists and motor vehicles are expected to share the same travel lane. They are denoted by pavement marking (sharrows) and /or signage. They are typically used in locations with low traffic speeds and volumes or as a temporary solution on constrained higher-traffic streets.

Image Source: City and County of Honolulu, Hawaii

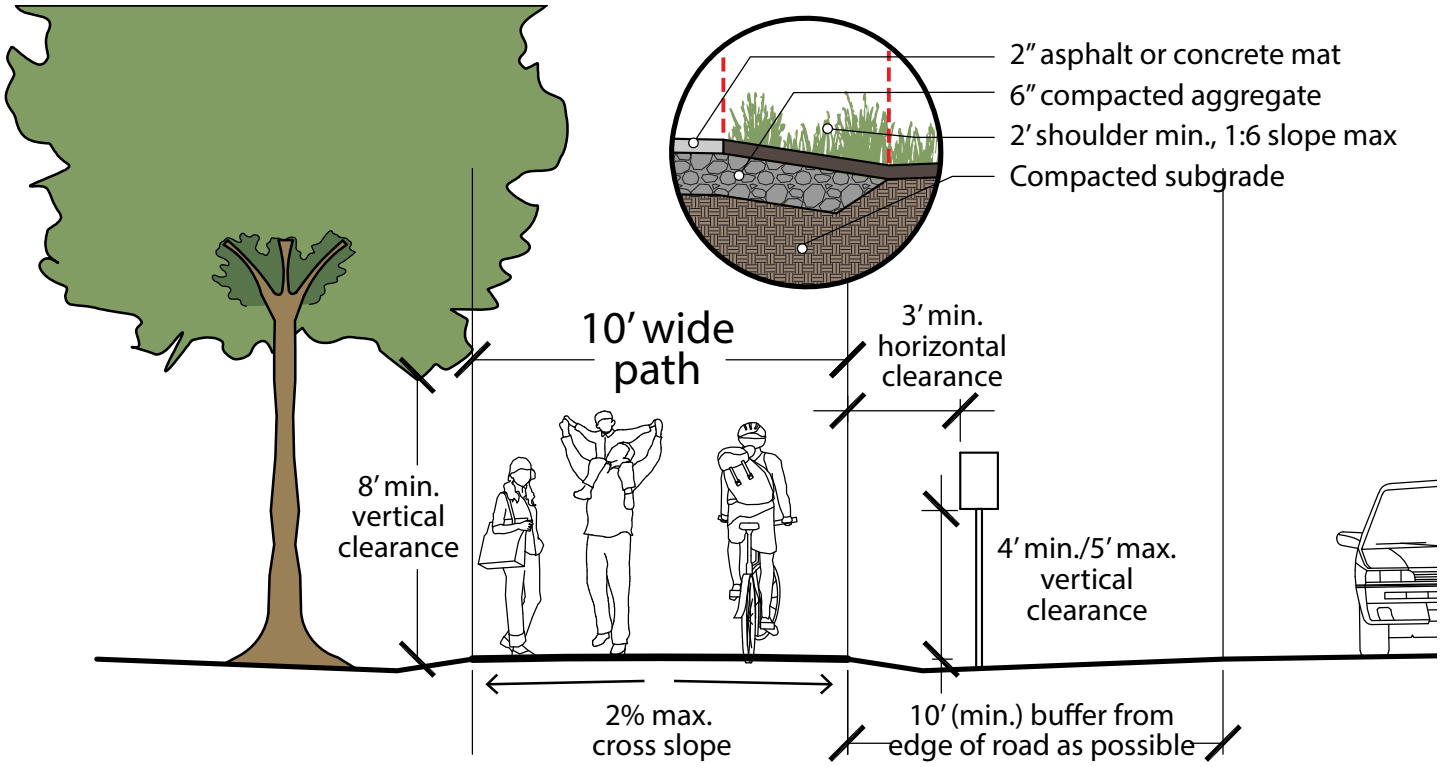
The primary references for establishing the standards for non-motorized facility development are:

- Guide for the development of Bicycle Facilities (AASHTO, 1999, 2012);
- Michigan Manual on Uniform Traffic Control Devices (MMUTCD) (MDOT, 2013); and
- Selecting Roadway Design Treatments to Accommodate Bicycles (FHWA, 1994).

Based on the review of current standards for non-motorized facility development, there are six primary types of facilities which could be utilized in the Augusta Township path system:

- Shared-use pathways for pedestrian and bicycle use.
- Sidewalks for pedestrian use,
- Crosswalks for pedestrian use,
- Refuge islands and bump outs for pedestrian use,
- Shared roadways for bicycle use, and
- Bicycle lanes for bicycle use

FIGURE 42. Typical Multi-Use Pathway Configuration



SHARED-USE OFF-ROAD PATHWAYS

For the average citizen, a shared-use pathway is the standard vision for non-motorized transportation. Shared-use off-road pathways, also known as multi-use paths, safety paths, or side paths, are physically separated from motor vehicular traffic by an open space. The path may be within the road right-of-way or within a park or easement. Paths are normally two-way facilities.

AASHTO (2012) recommends a pavement width of 10 feet, but 8 feet may be considered where path usage is low, where space is limited or where pathways are located on both sides of roadways. Similarly, 12 feet may be considered a better suited width where path usage is expected to be high, such as in an urban situation. A minimum of a 2-foot clear zone needs to be maintained along both sides of a pathway, with an 8 foot vertical clearance.

Shared-use paths are commonly seen as asphalt trails, although crushed limestone or concrete are occasionally used depending on the setting. A further discussion of surface types is provided on page 57.

Because of easement requirements and the complexity of construction, shared-use paths are typically one of the most expensive non-motorized options. Costs range widely depending on circumstances, and can range from as low as $250,000 per mile to as high as $1.0 million per mile. Special facilities such as boardwalks, bridges, or retaining walls can drive costs beyond those levels. For purposes of this plan, proposed shared-use paths are valued at $500,000 per mile, with boardwalks and bridges valued out as separate line items.

SIDEWALKS & WALKWAYS

Sidewalks and walkways are for pedestrians and are located within road rights-of-way. They usually consist of concrete pavement and are separated from the roadway by a landscaped area. Sidewalks are found throughout the Lincoln Campus, with most ranging in size from eight to ten feet wide, and typically located close to school buildings. Any new sidewalk construction must comply with current ADA standards. Four-foot wide walks are the minimum, but would require five-foot passing spaces to be compliant. Six-foot wide walks meet universal design requirements, and are required by some grant programs including those administered by the Michigan Department of Natural Resources (MDNR). Walks must also be connected to road crossings via ADA-compliant ramps.

South of the school campus, sidewalks are available on Chambord and Bordeaux Drives. Connections across Willis will help to improve safety and make any new improvements on the school campus more accessible.

Tactile paving, also known as braille strips, alerts visually impaired users of approaching intersections, grade changes, or other hazards, and is required at crosswalk intersections. Different types of tactile paving indicates different hazards; for Augusta Township, blister strips would be the most common form, indicating road crossings. While buff-colored paving may be acceptable in some circumstances, high contrast colors is preferred for most instances.

FIGURE 43. Multi-Use Pathway with lane markings

FIGURE 44. ADA compliant sidewalk

CROSSWALKS

Crosswalks offer a higher degree of safety by separating pedestrians from vehicular traffic and providing strong visual cues to drivers about potential pedestrian/ vehicle conflicts. The placement and style of crosswalk is dependent upon on a number of factors, with the levels and frequency of vehicular and pedestrian traffic being the primary drivers.

There are two primary forms of crosswalks or intersections. Controlled intersections are found on high speed and high volume roads with regular pedestrian traffic. These intersections are signaled with stop lights or stop signs, which allow non-motorized users to cross in designated areas with relative safety.

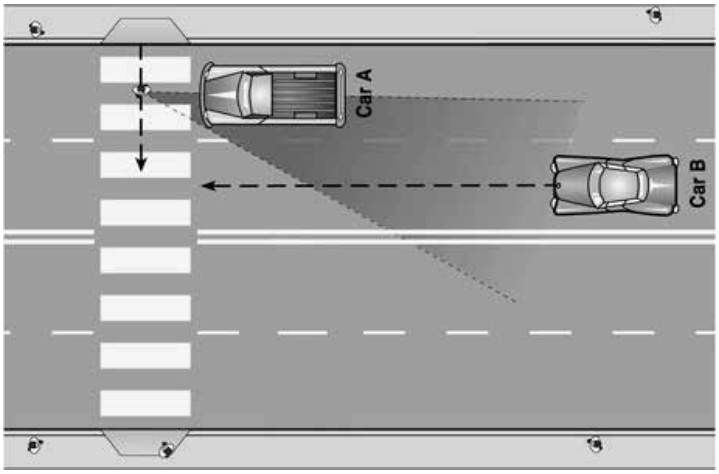
Where pedestrian activity is more sporadic and/or vehicular levels are lower, uncontrolled intersections may be appropriate. A mid-block crosswalk would be an example of an uncontrolled intersection. Depending upon the road characteristics and level of pedestrian activity, treatments such as medians, refuge islands, signage, or other alert utilities such as rapid flashing beacons may be desirable or necessary to increase pedestrian visibility and safety.

Visibility is the most crucial component of any crosswalk design. High visibility crosswalks can be marked with paint or by an epoxy material with reflective glass beads. "Ladder designs" (aka zebra stripes) offer higher visibility than traditional parallel line crosswalks and are considered a better alternative for high speed or heavy volume roads.

Sight distance is critical for both drivers and pedestrians, especially for uncontrolled intersections. Approaching vehicles should have an unobstructed view of the intersection with sufficient distance available to allow the driver to anticipate and avoid potential collisions. The required distance is a function of speed; the higher the traffic speeds, the greater the required visibility. Figure 35 provides recommended sight distances for uncontrolled intersections.

Crosswalk visibility can be enhanced through proper signage, safety signals, street marking, and lighting. While a number of high-tech lighting alternatives such as in-pavement flashers have been developed in recent years, a combination of properly placed traditional overhead lighting and pavement marking can be as effective as higher cost solutions.

FIGURE 45. Advanced Stop / Yield Lines



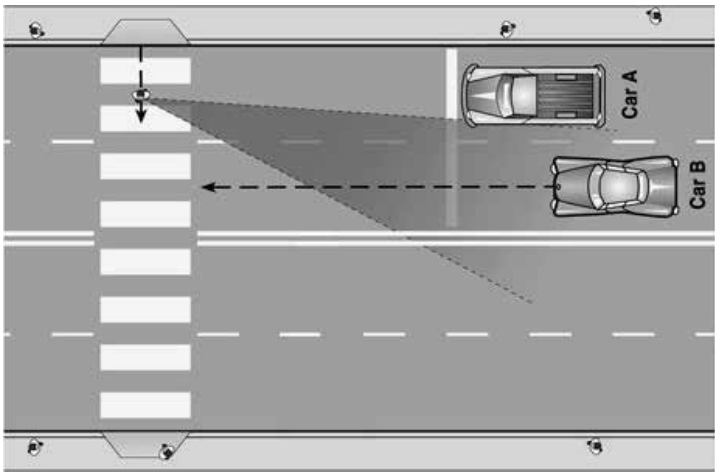
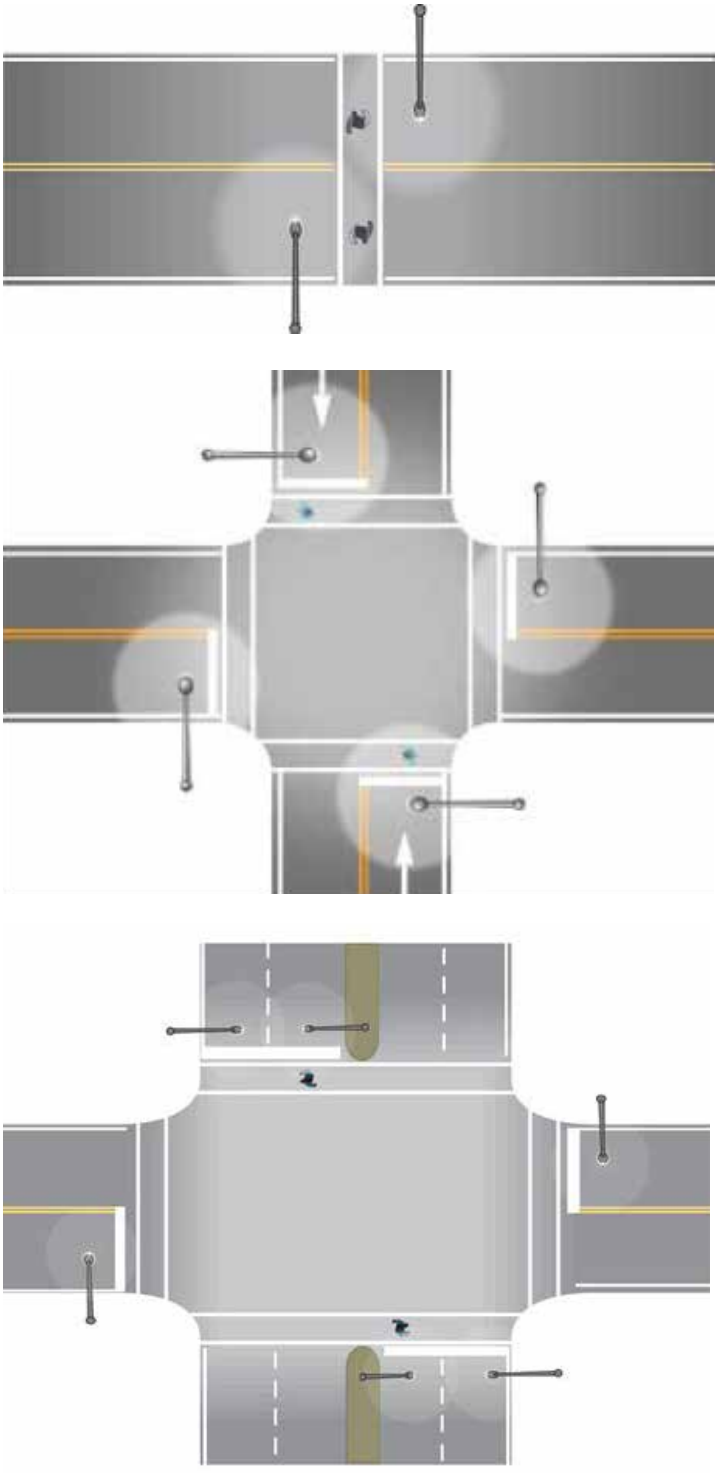


FIGURE 46. Recommended Sight Distances for Uncontrolled Intersections

Vehicle Speed (MPH)	Stopping Sight Distance (feet)
15	70
20	90
25	115
30	140
35	165
40	195
45	220
50	245
55	285

Source: AASHTO Green Book

FIGURE 47. Examples of Overhead Light Placement



According to the Virginia Tech Transportation Institute, 20 lx (a unit of illuminance) is required for motorists to detect a pedestrian in a crosswalk. To achieve this level of lighting, light fixtures should be placed 10 feet from the crosswalk, in between the approaching vehicle and the crosswalk.

Advance stop or yield lines provide additional protection for pedestrians by requiring drivers to stop further back from the crosswalk. On multi-lane roads, pedestrians using a crosswalk may be screened from view by stopped cars. The added distance afforded by yield lines provides an enhanced sight line for both the pedestrian and the driver, reducing the threat of collision.

Rectangular rapid flashing beacons (RRFB) are user-activated warning lights that supplement traditional signs at uncontrolled intersections or at mid-block crossings. The highly visible amber lights have been effectively utilized around southeast Michigan by a number of communities.

Studies provided to the FHWA found that RRFBs increased yield rates from 18 percent to 81 percent. Four beacon systems increased yield rates further to 88 percent. The Manual on Uniform Traffic Control Devices issued a new interim approval to RRFBs in March of 2018.

Per the FHWA, purchase and installation costs for the systems run approximately $10,000 to $15,000. Because of the high posted speed limits on Willis and Bemis Roads, RRFBs are recommended for the mid-block crossings connecting to subdivisions south and north of campus.

FIGURE 48. RRFB at Mid-Block Crossing

REFUGE ISLANDS AND BUMP OUTS

On roads with three or more traffic lanes, or where high speeds and traffic volumes make crossings dangerous and/or uncomfortable for users, the Township should consider the addition of refuge islands.

Refuge islands can come in a variety of configurations but are typically curbed or marked with bollards. Islands should be at least six-feet wide with a preferred width of 8 to 10 feet. The ideal length for a refuge is 40 feet.

The island should include a cut-through equal to the width of the crosswalk. A nose which extends past the crosswalk is required to protect users waiting on the median; the nose also slows turning drivers.

Islands may include vegetation to enhance visual appeal. This option requires additional maintenance, however, and must be carefully designed to ensure visibility is not impaired.

Bump-outs or ***curb extensions*** reduce the travel distance for pedestrians and create visual cues which slow drivers. They can be applied to a variety of situations, from busy urban street corners to midblock crossings in more rural settings. Bump-outs offer added space for lighting, signage, and other site amenities such as bus shelters and benches.

Illustrations of how bump-outs or refuge islands could be used to improve the connection between the school campus and subdivisions is provided below.

FIGURE 49. Refuge Island

FIGURE 50. Bump-Outs

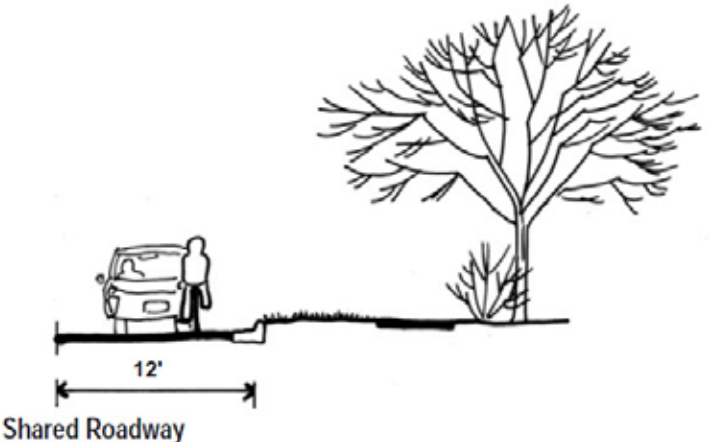
SHARED ROADWAYS

Shared roadways include roads upon which a bicycle may be legally used and marked as a bike route. According to the Federal Highway Administration (1994), shared roadways are appropriate on local roads having low daily volumes or speeds of less than 30 mph. They serve all types of riders. Outside of the school campus, most Township streets have posted speed limits of 35 mph or higher, making them unsuitable for shared roadway bicycling. Within the school campus, however, shared roadways could be a feasible, low cost alternative.

Shared roadways are appropriate in locations where it is not feasible to add pavement at the edge of a roadway to create a bike lane and at roadway intersections. A sharrow may also be used to mark the shared roadway. Sharrows are chevrons pointing in the direction of vehicle traffic to indicate where a bicyclist may ride. They provide a visual cue that bicycles are expected and indicate the location to ride on the roadway. They are typically used on roadways where there is not enough space for bicycle lanes or which connect gaps between other bicycle facilities.

The effectiveness of sharrows as compared to dedicated bike lanes remains a question. According to a 2016 Transportation Research Board study, streets marked with sharrows had higher incidences of injuries than comparable streets with bike lanes. The study also noted that bike ridership was significantly higher along routes with dedicated bike lanes. (Ferenchak 2016)

FIGURE 51. Shared Roadways & Sharrows



BICYCLE LANES

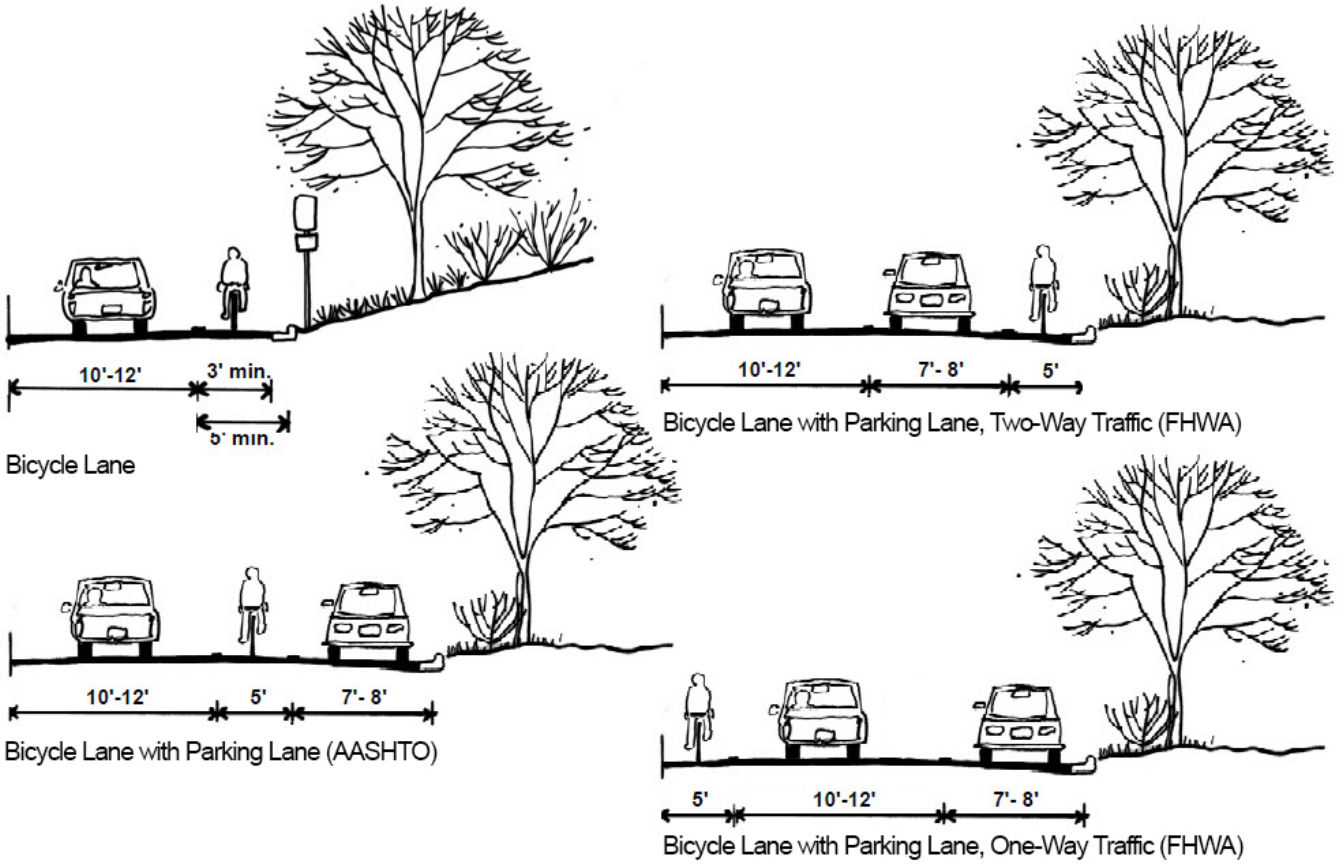
Bicycle lanes include designated lanes on roadways that incorporate striping, signage, and pavement markings for the preferential or exclusive use of bicyclists. They are typically delineated by pavement markings and should be one-way, a minimum of five feet wide to the face of the curb. A minimum of three feet ridable surface should be provided where the joint between the gutter pan and pavement surface is smooth. If the joint is not smooth, four feet ridable surface should be provided. Similarly, bicycle lanes should be a minimum of four feet wide on streets without curbs.

While bike lanes are not recommended for the area evaluated in this study, the Township may want to consider their use on future projects. Typically, implementing bike lanes involves reducing travel lane widths to 10 or 11 feet and striping a broken line indicating the area where motorists should be prepared to see bicyclists. Travel lanes along Willis Road east and west of the study area are already at 11 feet with 6 foot shoulders, and Whittaker is similarly narrow with almost no shoulder. Most Township roads would also need to be widened anywhere from six to eight feet to accommodate bike lanes on both sides of the road. The resulting three- to five-foot marked lane would increase the safety of bicyclists.

According to the Federal Highway Administration (FHWA 2015), bicycle lanes are appropriate on roadways having daily volumes that exceed 10,000 or car speeds that exceed 30 mph. While they definitely serve experienced and confident (Type A) riders, bicycle lanes will attract and serve less experienced (Type B) riders as well. See page 44 for a further discussion of rider types.

Bike lanes can be configured in a variety of ways, from simple lane stripes to highly complex raised cycle tracks. The advocacy organization People for Bikes describes fifteen different types of bike lanes. In practice, however, there are three basic types of bike lanes for consideration: on-road bike lanes, buffered bike lanes, and protected bike lanes.

FIGURE 52. Bike Lanes



On-road bike lanes bike lanes are relatively inexpensive, but offer the least amount of protection. Commonly seen around Michigan, traditional bike lanes require no special considerations for maintenance other than standard road repair and touch-up of paint as necessary.

Buffered bike lanes offer additional protection by providing space between traffic and the cyclist. This added space equates to significantly higher construction costs.

Protected bike lanes offer the highest level of protection by separating cyclists and vehicles by bollards, curbs, or other physical barriers. Expensive to install, this option is best suited for urban settings. In rural or suburban settings, shared-use off-road pathways would offer the same or higher levels of protection for approximately the same cost.

An important consideration in the design of bicycle lanes is the location of bicycle lanes at intersections. Guidance for pavement markings and signs at intersections is contained in the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). For more information, see:

https://mdotjboss.state.mi.us/TSSD/getCategoryDocuments.tm?categoryPrjNumbers=1403862&category=Pedestrian/Bicyclist

A bike lane should be painted with standard pavement symbols to inform bicyclists and motorist of the presence of the bike lane. The standard pavement symbols are a bicycle symbol and a directional arrow (white and reflectorized) (MMUTCD, 2011). They are placed at the beginning and ending points of bike lanes as well as at regular intervals of about 750 feet. Bike lane signs should be placed at about the same location of the pavement markings.

FIGURE 53. On-Road Bike Lanes

FIGURE 54. Buffered Bike Lanes

FIGURE 55. Protected Bike Lanes

FIGURE 56. Bike Lane Pavement Symbol

Other Considerations

Other design issues should be considered with the implementation of non-motorized facilities throughout the study area. The use of uniform signage and the elimination of road hazards.

SIGNAGE

There are three primary types of signs utilized along designated routes. They include:

- Route signs that help identify connecting non-motorized routes,
- Warning signs which advise non-motorized users and motorists of facilities and crossings, and
- Regulatory signs which inform bicyclists of specific traffic laws and regulations such as "Stop" and "Bike Lane Ends."

Directional signs and ***wayfinding maps*** should be placed along pathways and bike routes. Providing these features can improve non-motorized travel, safety, and help ensure efficient connections to destinations.

FIGURE 57. Wayfinding Signage on the B2B Trail

FIGURE 58. Sample of Regulatory & Warning Signs

SITE AMENITIES

Benches, shelters, water fountains, and trees play important roles in non-motorized networks. Benches and shelters make trail facilities more accessible to non-traditional users such as seniors and individuals with disabilities by providing resting points along the route. Trees and shelters provide refuge from the hot sun in summertime and cold winds in winter, and can be placed to serve both the students as well as other community trail users.

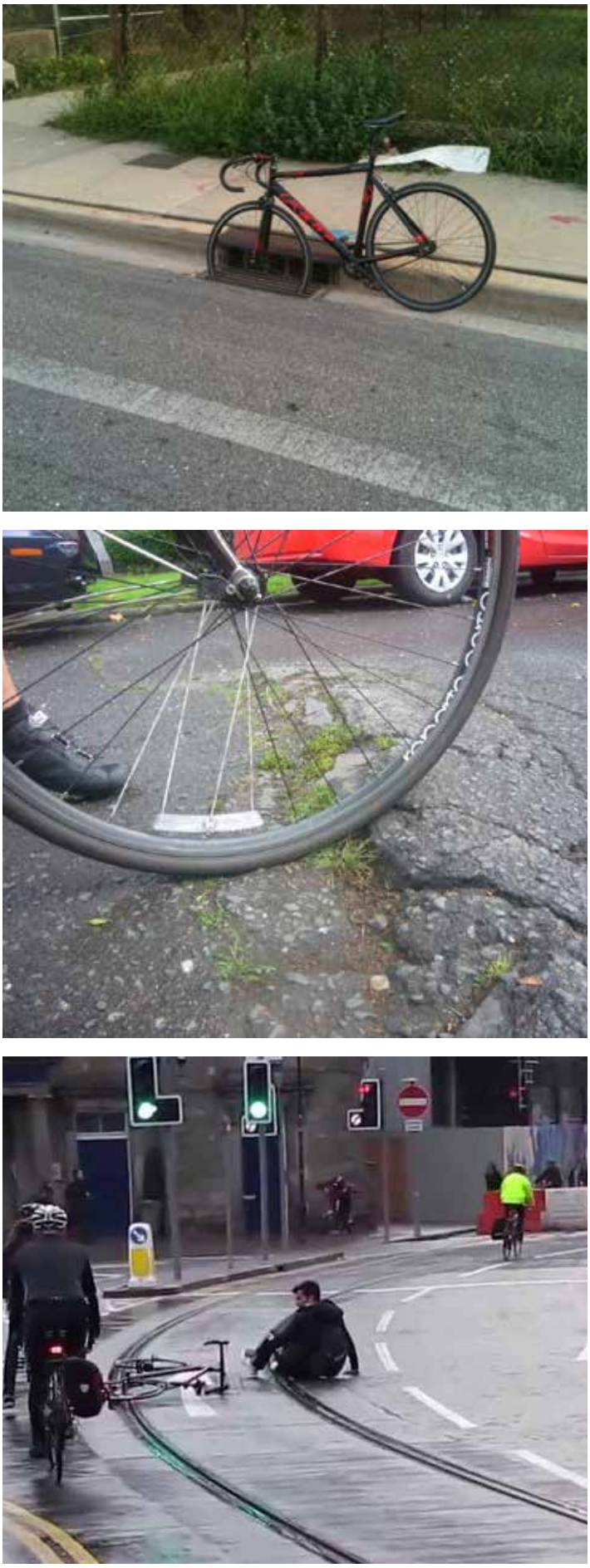
Placement of site amenities should consider user visibility and traffic flow. Shelters, trees, and other vegetation should be placed in a fashion that ensures users remain clearly visible to motorists. Benches and water fountains should not protrude into the pedestrian/cyclist traffic areas; accessible pillar-style drinking fountains provide adequate clearance to accommodate wheelchair users while still allowing visually impaired users to detect the fountain with a cane. Bike racks and bike shelters should also be considered to encourage regular trail use.

ROAD HAZARDS

Because most roads have been designed without bicycle travel in mind, there are often many ways they should be improved to safely accommodate bicycle travel. Some of the common hazards to safe bicycle travel include wheel eating drainage grates and poor pavement conditions. If shared-road pathways are considered by the Township, these hazards should be mitigated, especially if routes are expanded beyond the scope of this study.

Drainage grate inlets and utility covers can be problematic to bicyclists and pedestrians, and should be kept out of bicyclists' expected path. Newly constructed or repaired inlets are required to have a bicycle-safe grate. Curb inlets should be used wherever possible to completely eliminate exposure of bicyclists to grate inlets. A temporary correction recommended by AASHTO involves welding steel cross straps perpendicular to the parallel bars to provide safe openings.

FIGURE 59. Road Hazard Examples



PAVEMENT TYPES

Pavement surface irregularities are also dangerous to bicyclists. Pavement surfaces should be free of irregularities such as gaps in longitudinal paving joints, potholes, and bumps. The presence of debris along curbs due to the failure of routinely sweeping pavement edges reduces the operating space for bicycles and can also create dangerous situations. On older pavements it may be necessary to fill joints, adjust utility covers or, in extreme cases, overlay the pavement to make it suitable for bicycling.

In general, consistency of pavement is more important than the type of pavement. The plan recommends use of asphalt or concrete pathways, but there are other options that may be considered. Each type of pavement has its pluses and minus, but the common thread is that regular, ongoing maintenance is key to ensuring the long-term viability of a pathway or trail.

Asphalt has long been the standard surface type for urban and suburban settings due to its durability, ease of installation, and relatively low cost per linear foot. In recent years, asphalt prices have risen dramatically, to the point where per unit costs for asphalt is close to or higher than concrete. Asphalt must be patched yearly to control cracking, and complete replacement may be required as early as twelve years after installation.

Like asphalt, ***concrete*** is frequently used, most often for sidewalks and similar walkways. It is rarely seen used on multi-use trails due to increased cost of installation. Concrete's durability is much higher than asphalt, however, and yearly maintenance costs are lower on average. In recent years, the cost of asphalt has increased to the point where it is roughly at the same price level as concrete. If costs for the two surfaces remain similar, concrete would be a more cost-effective solution.

Low initial cost and low environmental impact makes ***crushed limestone*** a good choice for more natural settings, but less desirable in formal, high traffic conditions. If properly graded and compacted, crushed limestone paths are considered ADA compliant due to their firm and slip-free surfaces. Regular maintenance is critical, however; limestone will be overgrown by aggressive weeds in a relatively short period of time, and can be prone to washout unless the site is adequately prepared. Maintenance costs drive the long-term costs up to levels near that of asphalt or concrete. Note that gravel is not the same thing as crushed limestone; gravel paths are made of larger sized aggregate which is not passable by wheelchairs, and is not ADA compliant.

A fourth category of pavement that is not recommended by this plan but which may warrant further investigation is ***permeable pavement***. Permeable pavement comes in three basic categories; permeable asphalt or concrete, pavers, or permeable rubber surfacing. All three categories have higher initial costs and require significantly higher levels of maintenance than standard asphalt or concrete paths.

Companies are now offering ***pour-in-place mixes*** comprised of recycled rubber and an adhesive mixture, similar to playground surfacing, which has the same permeability factor as crushed limestone. Per foot costs are comparable to concrete and asphalt. The durability of the product is uncertain, however, and the costs for maintaining such surfaces are unknown. This type of surface may be worth exploring for relatively short, highly visible projects, where the efficacy of the product can be monitored and evaluated.

FIGURE 60. Asphalt Pathway

FIGURE 61. Concrete Pathway

FIGURE 62. Crushed Limestone Pathway

Funding Sources

The following programs are potential funding opportunities for developing pedestrian and non-motorized transportation facilities. The type of projects allowed depends on the program; for example, MDOT requires a minimum 10-foot wide pathway and will not fund aggregate pavements, while MDNR will allow for narrower paths and aggregate trails in appropriate situations. Categories range from planning, design, and construction of pedestrian or bicycle facilities to design of public spaces, educational programs, research, and methods for reducing air pollution.

MAP-21 (Moving Ahead for Progress in the 21st Century Act) is the most recent federal transportation funding law. It consolidates transportation funding programs that were available under the previous funding law including the Transportation Enhancement program, the Safe Routes to School program, and the Recreation Trails program into a program called ***Transportation Alternatives Program (TAP***). This singular program is the largest federal source for trail funding.

Transportation Alternative activities are projects that "expand travel choices and enhance the transportation experience by integrating modes and improving the cultural, historic, and environmental aspects of our transportation infrastructure." Activities which may apply to Augusta Township include:

Construction of on-road and off-road facilities for pedestrians, bicyclists, and other non-motorized forms of transportation, including sidewalks (in conjunction with other non-motorized improvement projects), bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting and other safety-related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act; and

Construction of infrastructure-related projects and systems that will provide safe routes for non-drivers, including children, older adults, and individuals with disabilities to access daily needs.

Transportation Enhancement and Safe Routes to School (K – 8th grade) funds are distributed through a partnership between SEMCOG and MDOT. Each project is jointly evaluated by SEMCOG and MDOT staff to determine eligibility, consistency with TAP program requirements, and how well the project meets SEMCOG's Creating Success goals.

Augusta Township is not eligible to directly apply for TAP or Safe Route to School funding, but may collaborate with an eligible agency such as the WCRC or Lincoln Consolidated Schools. Applications must be submitted through the Michigan Department of Transportation's online grant system (MGS). A minimum 20 percent local match is required for proposed projects and applications are accepted online; competitive bids typically include a higher local match. Note that MDOT may allow planning and design expenditures to count towards the required match. Additional information is available at:

http://www.semcog.org/TAPCall.aspx

Revenues from the ***Michigan Transportation Fund (MTF)*** are generated from state gas and value taxes. The funding is divided among MDOT, road commissions, cities, and villages. Each Act 51 agency is required by law to spend at a minimum an average of one percent of their Act 51 dollars on non-motorized improvements for 10 years subsequent to Act 51 award. This amount can be used to provide portion of a match for federal funds.

This funding is provided to areas that are not in compliance with air quality standards or are in a maintenance area for air quality non-attainment issues. Congestion Mitigation/Air Quality (CMAQ) projects are awarded competitively and jointly between MDOT and the Southeast Michigan Council of Governments (SEMCOG). Applicants must demonstrate that they reduce emissions in order to be considered eligible for funding as determined by the Federal Highway Administration. Southeast Michigan is a designated non-attainment area. Additional information is available at:

http://www.michigan.gov/mdot/0,4616,7-151-9621_11041_60661---,00.html

State grants are available to local units of government for acquisition and development of land and facilities for outdoor recreation such as shared-use paths. 2019 priorities were trails, wildlife/ecological corridors, and projects located within urban areas. State grants require that a five year recreation plan be on file with the MDNR, although some programs will accept a formally adopted Capital Improvement Plan for certain projects.

The ***Michigan Natural Resources Trust Fund (MNRTF)*** provides funding for the purchase and development of land for natural resource based preservation and recreation. Goals of the program are to:

- Protect natural resources and provide for their access, public use and enjoyment,
- Provide public access to Michigan's waters, particularly the Great Lakes and facilitate their recreation use,
- Meet regional, county, and community needs for outdoor recreation opportunities,
- Improve the opportunities for outdoor recreation in urban areas, and
- Stimulate Michigan's economy through recreation related to tourism and community revitalization.

Grant proposals must include a local match of at least 25 percent of the total project cost. Development project grants have a minimum of $15,000 and a maximum of $300,000. There is no minimum or maximum for acquisition projects. Applications are due April 1. Program information is available at:

http://www.michigan.gov/dnr/0,4570,7-153-58225_58301---,00.html

The ***Land and Water Conservation Fund (LWCF)*** is a federal appropriation to the National Park Service, who distributes funds to the Michigan Department of Natural Resources for development of outdoor recreation facilities. The focus of the program has recently been on trailway systems and other community recreation needs such as playgrounds, picnic areas, athletic fields, and walking paths. The match percentage must be 50 percent of the total project cost. Applications are due April 1. Additional information is available at:

http://www.michigan.gov/dnr/0,4570,7-153-58225_58672---,00.html

Advocacy Advance is the partnership of the Alliance for Biking & Walking and the League of American Bicyclists. They work to boost local and state bicycle and pedestrian advocacy efforts. This grant is intended to help advocacy organizations take advantage of unexpected opportunities to win, increase, or preserve funding for biking and walking. These grants are available to non-profit groups; however, partnerships with local governments are encouraged. Eligible activities include campaigns centered around transportation bonds or ballot initiatives, campaigns to attain and spend public funding, campaigns to preserving existing allocations of public funding at risk of being cut, and development of specialized tools and materials to reach targeted audiences who may influence the decision for increased funding on biking and walking. For additional information, see:

https://www.advocacyadvance.org/

Connecting Communities is a grant program operated by the WCPARC that provides supplemental funding for the development of non-motorized trails or similar projects. A Connecting Communities grant was used to help fund this study. County residents renewed the millage program in 2020; 20% will be allocated to WCPARC for the development of non-motorized trails, including the Border-to-Border Trail. The Parks and Recreation Commission voted to use 1/3 of its allocation to reinstate the Connecting Communities initiative.

The program is open to all municipalities and public entities in Washtenaw County. Projects should support the Parks and Recreation Commission's primary goal of providing valuable, non-motorized connections between communities and activity centers thus offering a healthy alternative for recreation, transportation, fitness, and energy conservation. Additional information can be found at:

https://www.washtenaw.org/953/Connecting-Communities-Grants

Augusta Township should investigate additional sources of funding. Seeking donations, attracting sponsors, holding fund-raising events, and seeking out other revenue sources are methods that should be pursued aggressively to raise funding for walk- and bike-way development.

6. Appendices

Trail Feasibility Matrix - Sheet 1a of 3

					Traffic				GIS			Field ID									
Route	Segment	Length (feet) - approximate measure	Description	Treatment	Road crossings (# instances)	Drive crossing (# instances)	Other interactions (Y/N) - describe in notes	Traffic speed	GIS identified wetland (Y/N)	Drain easement	GIS poor soil (Y/N)	Heavy vegetation (Y/N)	Landmark trees (Y/N)	Field ID'd wetland (Y/N)	Steep slopes (Y/N)	Other obstruction (Y/N)	Bridge required (# instances)	Boardwalk required (# of linear feet)	Easement required (other than school) Y/N	Intangible (most negative 5, least negative 1)	**SUBTOTAL**
A	0+0	500	East/north side	Off-road safety path	0	1	N	25	N	N	Y	N	N	N	N	N	0	0	N	2	-4
A	0+500	500	East/north side	Off-road safety path	0	2	N	25	Y	N	Y	N	N	N	N	Y	0	0	N	4	-9
A	0+1000	500	East/north side	Off-road safety path	0	0	N	25	Y	N	Y	N	N	N	N	N	0	0	N	2	-4
A	0+1500	500	East/north side	Off-road safety path	0	0	N	25	N	N	Y	N	N	N	N	Y	0	0	N	3	-5
A	0+2000	500	East/north side	Off-road safety path	0	0	N	25	N	N	Y	N	N	N	N	Y	0	0	N	2	-4
A	0+2500	500	East/north side	Off-road safety path	0	1	N	25	N	N	N	N	N	N	N	N	0	0	N	2	-3
A	0+3000	500	East/north side	Off-road safety path	0	0	N	25	N	N	N	N	N	N	N	Y	0	0	N	2	-3
A	0+3500	500	East/north side	Off-road safety path	0	0	N	25	N	N	Y	N	N	N	N	Y	0	0	N	1	-3
A	0+4000	500	East/north side	Off-road safety path	0	0	N	25	N	N	Y	Y	N	N	N	N	0	0	N	3	-5
A	0+4500	500	East/north side	Off-road safety path	0	0	N	25	N	N	Y	N	N	N	N	N	0	0	N	2	-3
A	0+5000	100	East/north side	Off-road safety path	0	0	N	25	N	N	N	N	N	N	Y	Y	0	0	N	3	-6
A	0+0	500	West/south side	Off-road safety path	0	0	N	25	N	N	N	N	N	N	N	N	0	0	N	1	-1
A	0+500	500	West/south side	Off-road safety path	0	0	N	25	N	N	Y	N	N	N	N	Y	0	0	N	3	-5
A	0+1000	500	West/south side	Off-road safety path	0	0	N	25	N	N	Y	N	N	N	N	N	0	0	N	2	-3
A	0+1500	500	West/south side	Off-road safety path	0	0	N	25	N	N	Y	N	N	N	N	N	0	0	N	2	-3
A	0+2000	500	West/south side	Off-road safety path	0	0	N	25	N	N	Y	N	N	N	Y	Y	1	0	N	5	-13
A	0+2500	500	West/south side	Off-road safety path	0	0	N	25	N	N	N	N	N	N	N	N	0	0	N	2	-2
A	0+3000	500	West/south side	Off-road safety path	0	0	N	25	N	N	N	N	N	N	N	N	0	0	N	2	-2
A	0+3500	500	West/south side	Off-road safety path	0	0	N	25	N	N	Y	N	N	N	N	Y	0	0	N	3	-5
A	0+4000	500	West/south side	Off-road safety path	0	0	Y	25	N	N	Y	N	N	N	N	Y	0	0	N	4	-7
A	0+4500	500	West/south side	Off-road safety path	0	0	Y	25	N	N	N	N	N	N	N	Y	0	0	N	4	-6
A	0+5000	100	West/south side	Off-road safety path	0	0	Y	25	N	N	N	N	N	N	N	N	0	0	N	3	-4
B	0+0	500	East/south side	Off-road safety path	0	2	Y	25	N	N	N	N	N	N	N	Y	0	0	N	4	-8
B	0+500	500	East/south side	Off-road safety path	0	1	Y	25	N	N	N	N	N	N	N	N	0	0	N	4	-6
B	0+1000	500	East/south side	Off-road safety path	0	2	Y	25	N	N	N	N	N	N	Y	N	0	0	N	4	-9
B	0+1500	500	East/south side	Off-road safety path	0	0	Y	25	N	N	N	N	N	N	Y	N	0	0	N	4	-7

Trail Feasibility Matrix - Sheet 1b of 3

	Identified positive traits								
Notes	Available ROW (min. 21') Y/N	Connection to amenity (school, sport field, etc.) Y/N	Connection to existing non-motorized amenity (Y/N)	Important crossing point (e.g. crosswalk) Y/N	Separated by >20-feet from traffic (Y/N)	Intangible (most positive 5, least positive 1)	SUBTOTAL	Notes	GRAND TOTAL
Connects to existing walk adjacent to parking entrance	Y	Y	Y	N	Y	3	15	Proximity to school a positive trait for students walking to school. Can be routed to minimize drive crossings and take advantage of existing walks.	11
Electrical box. School entrance. Steep slope between drives, would require retaining wall.	Y	Y	Y	N	N	3	12	Proximity to school a positive trait for students walking to school. Can be routed to minimize drive crossings and take advantage of existing walks.	3
Likely wetlands along eastern line. Stake 25' from EOR	Y	N	N	N	Y	4	11	No obstructions; can be pulled off road significantly which would allow new landscaping	7
Electrical box. Wetlands along eastern edge (18' from EOR)	Y	N	N	N	Y	4	11	No obstructions; can be pulled off road significantly which would allow new landscaping	6
Electrical box. Guard rail 12' from EOR	N	N	N	N	N	4	4	Possible bottleneck at drain crossing; appears to be adequate room to accommodate trail	0
Farm access drive. Property stake may show boundary 14.5' from edge of road.	Y	N	N	N	Y	3	10	No obstructions; can be pulled off road significantly which would allow new landscaping	7
Electrical box. Wet prairie to northeast	Y	N	N	N	Y	3	10	No obstructions; can be pulled off road significantly which would allow new landscaping	7
Electrical box; no major obstacles	Y	N	N	N	Y	3	10	No obstructions; can be pulled off road significantly which would allow new landscaping	7
Moderate slope. Swale takes up much of space.	Y	N	N	N	Y	2	9	Heavily wooded; could be considered scenic, but would require significant clearing.	4
Moderate slope. Swale takes up much of space.	Y	N	N	N	Y	2	9	Heavily wooded; could be considered scenic, but would require significant clearing.	6
Fence/gate and boulder line. Wide open space, but significant slope @ gate. Past that point, relatively open with low swale 15' from EOC. 40' to woods.	Y	N	N	Y	Y	3	14	Possible crossing point to Middle School. Difficult at points, but open and easy to work with in others.	8
No barriers. Flat, large amounts of space	Y	N	N	N	Y	3	10	No obstructions; can be pulled off road significantly which would allow new landscaping	9
Fence/gate @ 400'. Slope moderate. 20'+ to apparent lot line	Y	N	N	N	Y	3	10	No obstructions; can be pulled off road significantly which would allow new landscaping	5
No barriers. Moderate slope. 20'+ to apparent lot line	Y	N	N	N	Y	3	10	No obstructions; can be pulled off road significantly which would allow new landscaping	7
Sewer drains on street (possible issue). No other barriers. Moderate slope, 20'+ to lot line.	Y	N	N	N	Y	3	10	No obstructions; can be pulled off road significantly which would allow new landscaping	7
Guard rail ~1' from curb, ~8' on other side of rail to culvert edge. Wetlands and steep slopes. Not a feasible option.	N	N	N	N	N	2	2	Possible bottleneck at drain crossing	-11
Sewer drains on street (possible issue). No other barriers. Moderate slope, slightly narrower (18').	Y	N	N	N	Y	3	10	No obstructions; can be pulled off road significantly which would allow new landscaping	8
Pole but otherwise no barriers. Flat, 17' to apparent lot line.	Y	N	N	N	Y	3	10	No obstructions; can be pulled off road significantly which would allow new landscaping	8
Widens on curve but then narrows down to ~11' along fence line. Swale runs along fence.	Y	N	N	N	Y	3	10	No obstructions; can be pulled off road significantly which would allow new landscaping	5
Proximity to sports fields, possible spectator or participant conflicts. 11' to fence. Swale at fence.	Y	Y	N	N	Y	3	12	Connection to playing fields a positive.	5
Proximity to sports fields, possible spectator or participant conflicts. Widens, but swale continues 12' from edge of road. Fence/gate at 468'. Moderate slope.	Y	Y	N	N	Y	3	12	Connection to playing fields a positive.	6
Proximity to sports fields, possible spectator or participant conflicts. 11' to fence. Swale at fence.	Y	Y	N	Y	N	3	13	Possible crossing point to Middle School; connection to football field a positive.	9
Proximity to school, arts center. Likely heavy foot and vehicular traffic. Little available room.	Y	Y	N	Y	N	2	12	Space limited near parking lots and drives. Possible crossing point to Chambord Drive.	4
Proximity to school, arts center. Likely heavy foot and vehicular traffic. Little available room.	Y	Y	N	N	N	2	8	Space limited near parking lots and drives.	2
Proximity to school, arts center. Likely heavy foot and vehicular traffic. Little available room. Challenging terrain.	Y	Y	N	N	N	2	8	Space limited near parking lots and drives.	-1
Proximity to school, arts center. Likely heavy foot and vehicular traffic. Little available room. Challenging terrain.	Y	Y	N	N	Y	3	12	Close proximity to school with adequate space to accommodate landscaping and trail	5

Trail Feasibility Matrix - Sheet 2a of 3

B	0+2000	500	East/south side	Off-road safety path	0	3	Y	25	N	N	N	N	N	N	N	N	0	0	N	4	-8
B	0+2500	500	East/south side	Off-road safety path	0	1	Y	25	N	N	N	N	N	N	N	N	0	0	N	4	-6
B	0+3000	500	East/south side	Off-road safety path	0	0	Y	25	N	N	N	N	N	N	N	Y	0	0	N	2	-4
B	0+3500	500	East/south side	Off-road safety path	0	0	N	25	N	N	N	N	N	N	N	Y	0	0	N	3	-4
B	0+4000	500	East/south side	Off-road safety path	0	0	N	25	N	N	N	N	N	Y	N	N	0	0	N	3	-7
B	0+4500	500	East/south side	Off-road safety path	0	0	N	25	N	N	N	N	N	Y	N	N	0	0	N	3	-7
B	0+5000	500	East/south side	Off-road safety path	0	1	N	25	Y	Y	Y	N	N	Y	N	N	1	0	N	5	-26
B	0+5500	141	East/south side	Off-road safety path	0	0	N	25	N	N	N	N	N	N	Y	N	1	0	N	3	-9
B	0+0	500	West/north side	Off-road safety path	0	0	N	25	N	N	Y	N	N	N	N	Y	0	0	N	4	-6
B	0+500	500	West/north side	Off-road safety path	0	0	N	25	N	N	N	N	N	N	N	Y	0	0	N	4	-5
B	0+1000	500	West/north side	Off-road safety path	0	1	Y	25	N	N	N	N	N	N	N	N	0	0	N	2	-4
B	0+1500	500	West/north side	Off-road safety path	0	0	Y	25	N	N	N	N	N	N	N	N	0	0	N	2	-3
B	0+2000	500	West/north side	Off-road safety path	0	0	Y	25	N	N	N	N	N	N	N	N	0	0	N	2	-3
B	0+2500	500	West/north side	Off-road safety path	1	0	Y	25	N	N	N	Y	Y	N	N	N	0	0	N	2	-9
B	0+3000	500	West/north side	Off-road safety path	0	1	Y	25	N	N	N	Y	Y	N	N	N	0	0	N	2	-6
B	0+3500	500	West/north side	Off-road safety path	0	1	Y	25	N	N	N	N	N	N	N	N	0	0	N	3	-5
B	0+4000	500	West/north side	Off-road safety path	0	1	N	25	N	N	N	N	N	Y	N	N	0	0	N	3	-8
B	0+4500	500	West/north side	Off-road safety path	0	0	N	25	N	Y	N	N	N	Y	N	N	0	0	N	3	-17
B	0+5000	500	West/north side	Off-road safety path	0	0	N	25	N	Y	Y	N	N	N	Y	N	0	1	N	5	-19
B	0+5500	141	West/north side	Off-road safety path	0	0	N	25	N	N	N	N	N	N	N	N	0	0	N	3	-3
C	0+0	500		Off-road safety path	0	0	N	45	N	N	N	N	N	N	N	N	0	0	N	1	-5
C	0+500	500		Off-road safety path	0	1	N	45	N	N	Y	N	N	N	N	N	0	0	N	1	-7
C	0+1000	500		Off-road safety path	0	1	N	45	N	N	N	N	N	N	N	Y	0	0	N	3	-9
C	0+1500	500		Off-road safety path	0	0	N	45	N	N	Y	N	N	N	N	Y	0	0	N	4	-10
C	0+2000	500		Off-road safety path	0	0	N	45	N	Y	Y	N	N	Y	Y	Y	1	0	Y	4	-32
C	0+2500	500		Off-road safety path	0	1	N	45	N	N	N	N	N	N	N	Y	0	0	N	3	-9
C	0+3000	500		Off-road safety path	0	0	N	45	N	N	N	N	N	N	N	Y	0	0	N	3	-8
C	0+3500	98		Off-road safety path	0	0	N	45	N	N	N	N	N	N	N	Y	0	0	N	3	-8
D	0+0	500		Off-road safety path	0	0	N	45	N	N	N	N	N	N	N	Y	0	0	N	2	-7
D	0+500	500		Off-road safety path	0	1	N	45	N	N	N	N	N	N	N	Y	0	0	N	3	-9
D	0+1000	500		Off-road safety path	0	0	N	45	N	N	N	N	N	N	N	Y	0	0	N	3	-8
D	0+1500	500		Off-road safety path	1	0	N	45	N	N	N	Y	Y	Y	Y	Y	0	100	N	5	-23
D	0+2000	500		Off-road safety path	0	0	N	45	N	N	Y	Y	Y	Y	Y	Y	0	100	N	5	-20
D	0+2500	500		Off-road safety path	0	0	N	45	N	N	Y	Y	Y	Y	Y	Y	0	100	N	5	-20
D	0+3000	500		Off-road safety path	1	0	N	45	N	N	Y	Y	Y	Y	Y	Y	0	100	N	5	-24
D	0+3500	500		Off-road safety path	0	1	N	45	N	N	Y	N	N	N	N	Y	0	0	Y	5	-14
D	0+4000	500		Off-road safety path	0	3	N	45	N	N	Y	N	N	N	N	Y	0	0	Y	5	-16
D	0+4500	500		Off-road safety path	0	2	N	45	N	N	Y	N	N	N	N	Y	0	0	Y	4	-14

Trail Feasibility Matrix - Sheet 2b of 3

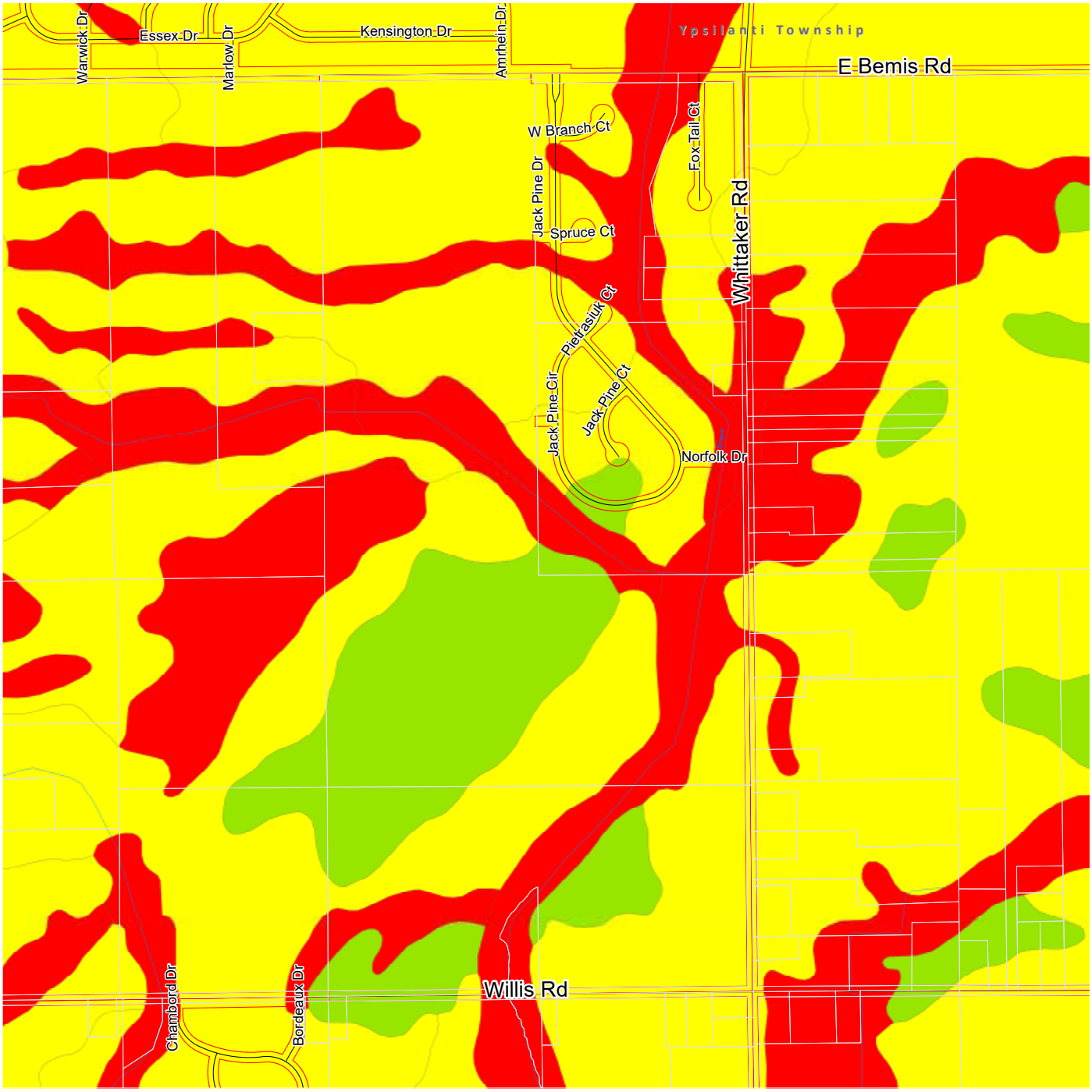
Proximity to school, arts center. Likely heavy foot and vehicular traffic. Little available room. Challenging terrain.	Y	Y	N	N	N	2	8	Space limited near parking lots and drives.	0
Proximity to school, arts center. Likely heavy foot and vehicular traffic. Little available room. Challenging terrain.	Y	Y	N	N	Y	3	12	Close proximity to school with adequate space to accommodate landscaping and trail	6
Proximity to tennis courts, but little interference expected from games. Steep slopes, swale.	Y	Y	N	N	N	2	8	Close proximity to sports facilities with adequate space to accommodate landscaping and trail. Somewhat tight near tennis courts	4
Fairly steep slopes, swale.	Y	Y	N	N	Y	3	12	Close proximity to fields with adequate space to accommodate landscaping and trail.	8
Fairly steep slopes, swale. Wetland to south.	Y	Y	N	N	Y	3	12	No obstructions; can be pulled off road significantly which would allow new landscaping	5
Fairly steep slopes, swale. Wetland to south.	Y	Y	N	N	Y	3	12	No obstructions; can be pulled off road significantly which would allow new landscaping	5
Steep slopes at bridge and no shoulder on bridge. Would require separate pedestrian bridge. Drive crossing.	Y	Y	N	N	Y	1	10	Creek crossing and wetlands presents possible bottleneck.	-16
Steep slopes, relatively little room to operate.	Y	Y	N	N	Y	3	12		3
Retention pond being installed west of drive. Access would depend on final configuration of pond.	Y	N	N	Y	Y	3	14	Possible crossing point to Chambord Drive	8
Retention pond being installed west of drive. Access would depend on final configuration of pond.	Y	Y	N	N	Y	3	12	Connection to playing fields a positive.	7
Proximity to sports fields, possible spectator or participant conflicts.	Y	Y	N	N	Y	3	12	Connection to playing fields a positive.	8
Proximity to sports fields, possible spectator or participant conflicts.	Y	Y	N	N	Y	3	12	Connection to playing fields a positive.	9
Proximity to sports fields, possible spectator or participant conflicts.	Y	Y	N	N	Y	3	12	Connection to playing fields a positive.	9
Road intersection and proximity to sports fields.	Y	N	N	Y	Y	2	13	Potential to pull trail into woods.	4
Bus depot/maintenance building (periodic heavy traffic)	Y	N	N	N	Y	2	9	Potential to pull trail into woods; limited space at bus depot / maintenance area	3
Bus depot/maintenance building (periodic heavy traffic)	Y	N	N	N	Y	3	10	Adequate space to allow landscaping and trail	5
	Y	N	N	N	Y	3	10	Adequate space to allow landscaping and trail	2
	Y	N	N	N	Y	3	10	Adequate space to allow landscaping and trail	-7
Soils questionable.	Y	N	N	N	N	2	6	Creek crossing presents possible bottleneck.	-13
	Y	N	N	N	Y	2	9		6
Flat with room for trail development. Swales, slopes closer to edge of road.	Y	Y	N	Y	Y	5	18	Opportunity to separate pedestrians/cyclists from busy, high speed road. Possible crossing point to Chambord Drive	13
Flat with room for trail development. Swales, slopes closer to edge of road.	Y	Y	N	Y	Y	5	18	Opportunity to separate pedestrians/cyclists from busy, high speed road.	11
More difficult terrain east of entry drive. Numerous obstacles, but generally enough room to be able to avoid them. Will need to work around buried gas and cable lines.	Y	Y	N	Y	Y	5	18	Opportunity to separate pedestrians/cyclists from busy, high speed road.	9
Difficult terrain with numerous obstacles. Drain easement limits ability to adjust alignment.	Y	Y	N	Y	Y	5	18	Opportunity to separate pedestrians/cyclists from busy, high speed road.	8
118' drain easement (59' either side of drain) necessitates bridge. 45' from edge of road. Swale and steep slopes.	Y	Y	N	Y	N	5	15	Bridge crossing presents possible bottleneck	-17
Swale, trees, and fence pose obstacles.	Y	Y	N	Y	Y	5	18	Opportunity to separate pedestrians/cyclists from busy, high speed road.	9
Numerous trees and other obstacles, especially difficult near entry drive.	Y	Y	N	Y	Y	5	18	Opportunity to separate pedestrians/cyclists from busy, high speed road.	10
Swale, trees, utility poles all pose challenges. Per WCRC, if crossing is proposed for Whittaker, would require complete intersection redesign.	Y	Y	N	Y	Y	5	18	Opportunity to separate pedestrians/cyclists from busy, high speed road. Possible crossing point at Whittaker.	10
Swale, utility pole, trees, but adequate room to adjust alignment	Y	Y	N	Y	Y	5	18	Opportunity to separate pedestrians/cyclists from busy, high speed road.	11
Swale, utility pole, trees, but adequate room to adjust alignment. Very tight at entry drive.	Y	Y	N	N	N	4	10	Somewhat limited space near parking	1
Swale, fire hydrant; steeper slope and wet area near entry drive	Y	Y	N	N	N	4	10	Somewhat limited space near parking	2
Wetlands, steep slope, heavy brush	Y	N	N	N	N	1	5		-18
Wetlands, steep slope, heavy brush	Y	N	N	N	N	1	5		-15
Wetlands, steep slope, heavy brush	Y	N	N	N	Y	3	10	Extended ROW allows trail to be pulled away from road	-10
Wetlands, steep slope, heavy brush	Y	N	N	N	Y	2	9	Extended ROW allows trail to be pulled away from road	-15
Tight ROW - very close to residences	Y	N	N	N	N	1	5		-9
Tight ROW - very close to residences	Y	N	N	N	N	1	5		-11
Tight ROW - very close to residences	Y	N	N	N	N	2	6	Extended ROW at north end of segment allows trail to be pulled away from road.	-8

Trail Feasibility Matrix - Sheet 3a of 3

D	0+5000	500		Off-road safety path	0	0	N	45	N	N	N	N	N	N	N	Y	0	0	N	2	-7
D	0+5500	225		Off-road safety path	0	0	N	45	N	N	N	N	N	N	N	Y	0	0	N	2	-7
E	0+0	500		Off-road safety path	0	1	N	45	N	N	N	N	N	N	Y	Y	0	0	Y	4	-14
E	0+500	500		Off-road safety path	0	0	N	45	N	N	N	N	N	N	Y	Y	0	0	Y	4	-13
E	0+1000	500		Off-road safety path	0	1	N	45	N	N	N	N	N	N	Y	Y	0	0	Y	4	-14
E	0+1500	500		Off-road safety path	0	0	N	45	N	N	N	N	N	N	Y	Y	0	0	Y	4	-13
E	0+2000	500		Off-road safety path	0	0	N	45	N	N	N	N	N	N	Y	Y	0	0	Y	4	-13
E	0+2500	500		Off-road safety path	0	0	N	45	N	N	N	N	N	N	Y	Y	0	0	Y	4	-13
E	0+3000	130		Off-road safety path	0	0	N	45	N	N	N	N	N	N	Y	Y	0	0	Y	4	-13
F	0+0	500		Off-road safety path	0	0	Y	0	N	N	N	N	N	N	N	Y	0	0	N	5	-7
F	0+500	500		Off-road safety path	0	0	Y	0	N	N	Y	N	N	N	N	Y	0	0	N	3	-6
F	0+1000	500		Off-road safety path	0	0	Y	0	Y	N	Y	N	N	N	N	Y	0	0	N	2	-6
F	0+1500	500		Off-road safety path	0	0	Y	0	N	N	N	N	N	N	N	Y	0	0	N	2	-4
F	0+2000	500		Off-road safety path	0	1	Y	25	N	N	N	N	N	N	N	Y	0	0	N	4	-7
F	0+2500	52		Off-road safety path	0	0	N	25	N	N	N	N	N	N	Y	Y	0	0	N	4	-7
G		1470	behind Childs Elementary	Off-road safety path	0	0	Y	45	N	N	Y	N	N	N	N	Y	0	0	N	3	-10
H		955	between ball diamonds west of football field	Off-road safety path	0	0	Y	0	N	N	Y	N	N	N	N	Y	0	0	N	4	-7
I		945	between ball diamond & football field	Off-road safety path	0	0	Y	0	N	N	N	N	N	N	N	Y	0	0	N	4	-6
J	0+0	500	east of ball diamond, west of drain	Off-road safety path	0	0	Y	0	Y	N	Y	N	N	N	N	N	0	0	N	2	-5
J	0+500	500	east of soccer fields	Off-road safety path	0	0	Y	0	N	N	N	N	N	N	N	N	0	0	N	2	-3
J	0+1000	335	east of soccer fields to station B 0+4000	Off-road safety path	0	0	Y	0	N	N	N	N	N	N	N	N	0	0	N	2	-3
K		1285	northwest of Bishop Elem.	Off-road safety path	0	0	Y	0	Y	N	Y	N	N	Y	N	Y	0	0	N	4	-12
L		2000*	east of Whittaker (including proposed Township park)	Off-road safety path & internal park path. *Total length will depend on park segment (estimated road length 820')	0	0	N	45	N	N	Y	Y	Y	Y	Y	Y	1	200	Y	2	-24
M		1600	west of Paint Creek btwn Norfolk and Railsplitter	Off-road safety path	0	0	Y	0	N	Y	Y	Y	N	Y	Y	N	1	200	Y	5	-32
N		3050	along Jack Pine/Norfolk	On-road bike route	1	0	Y	25	N	N	N	N	N	N	N	N	0	0	N	2	-7

Trail Feasibility Matrix - Sheet 3b of 3

Wide ROW; several obstacles, but adequate room to avoid	Y	N	N	N	N	3	7	Extended ROW allows trail to be pulled away from road	0
Wide ROW; several obstacles, but adequate room to avoid	Y	N	N	N	N	3	7	Extended ROW allows trail to be pulled away from road	0
Deep swale with steep slopes.	Y	N	Y	Y	Y	4	18	Extended ROW allows trail to be pulled away from road. Proximity to dense housing. Possible crossing point at Bemis with connection to existing non-motorized facilities.	4
Deep swale with steep slopes.	Y	N	N	N	Y	4	11	Extended ROW allows trail to be pulled away from road. Proximity to dense housing.	-2
Deep swale with steep slopes.	Y	N	N	N	N	3	7	Proximity to dense housing.	-7
Swales entire length. Would require easement from farmer. Gas line west of entrance.	Y	N	N	N	N	3	7		-6
Swales entire length. Would require easement from farmer. Gas line west of entrance.	Y	N	N	N	N	3	7		-6
Swales entire length. Would require easement from farmer. Gas line west of entrance.	Y	Y	Y	N	Y	4	16	Connection to school grounds	3
Swales entire length. Would require easement from farmer. Gas line west of entrance.	Y	Y	Y	Y	Y	5	21	Connecting point to Marlow Drive and existing non-motorized facilities	8
Fence blocks access. Proximity to school, playing fields problematic.	Y	Y	N	N	Y	1	10		3
Proximity to sports fields	Y	Y	N	N	Y	3	12	Ability to use existing maintenance path	6
Proximity to sports fields	Y	Y	N	N	Y	3	12		6
Proximity to sports fields	Y	Y	N	N	Y	3	12		8
Would require crossing over parking lot	Y	Y	N	N	Y	2	11		4
Challenging slopes, obstacles with little room for making adjustments	Y	Y	N	N	Y	2	11		4
Proximity to Childs Elementary; fairly wet area	Y	Y	Y	Y	Y	4	20	Proximity to school can be both positive and negative. Could pull path further east for additional separation from school if so desired. Well placed for Marlow Dr crossing over Bemis	10
Area being redeveloped with sports dome, new fields.	Y	Y	N	N	N	3	9	Connection to sports fields a positive, but could be problematic during games.	2
Area being redeveloped with sports dome, new fields.	Y	Y	N	N	N	3	9	Connection to sports fields a positive, but could be problematic during games.	3
Poor soils/wetlands only in small section near ball fields. Would require at least a portion of "F" to be completed to be a candidate. Interaction with sports fields could be positive or negative.	Y	Y	N	N	Y	2	11	Connects to sports fields but offers little else in terms of connectivity on its own.	6
Poor soils/wetlands only in small section near ball fields. Would require at least a portion of "F" to be completed to be a candidate. Interaction with sports fields could be positive or negative.	Y	Y	N	N	Y	2	11	Connects to sports fields but offers little else in terms of connectivity on its own.	8
Poor soils/wetlands only in small section near ball fields. Would require at least a portion of "F" to be completed to be a candidate. Interaction with sports fields could be positive or negative.	Y	Y	N	N	Y	2	11	Connects to sports fields but offers little else in terms of connectivity on its own.	8
Proximity to Bishop Elementary playground could be problematic. Poor soils for most of alignment. Steep slopes near Railsplitter drive.	Y	Y	N	N	Y	1	10	Ability to use existing maintenance path. Proximity to elementary school could be a positive or negative.	-2
Soil quality highly questionable. Easement most likely required from Whittaker to park parcel. Drain crossing required? Path alignment within park undetermined.	Y	Y	N	Y	N	2	12	Will be an important segment if the Township park is developed. Until that time, trail development offers little benefit.	-12
Soil highly questionable. Likely wetlands throughout property. Bridge likely required at intersection of Paint Creek and drain. Easements necessary. Close proximity to residences.	Y	N	N	N	Y	1	8	Possible beneficial connection to subdivision, but would likely require major infrastructure (boardwalk) and easements.	-24
Bike route proposed with directional signs and possible sharrows painted on road. No significant infrastructure required, but could face homeowner resistance.	Y	Y	N	Y	N	2	12	Low cost solution, but only if completed in conjunction with improvements along Bemis and Whittaker Roads.	5



Not Limited Development Potential

Somewhat Limted Development Potential

Very Limited Development Potential

Soil Suitability for Trail Development (MI)

AUGUSTA TOWNSHIP
Washtenaw County, Michigan

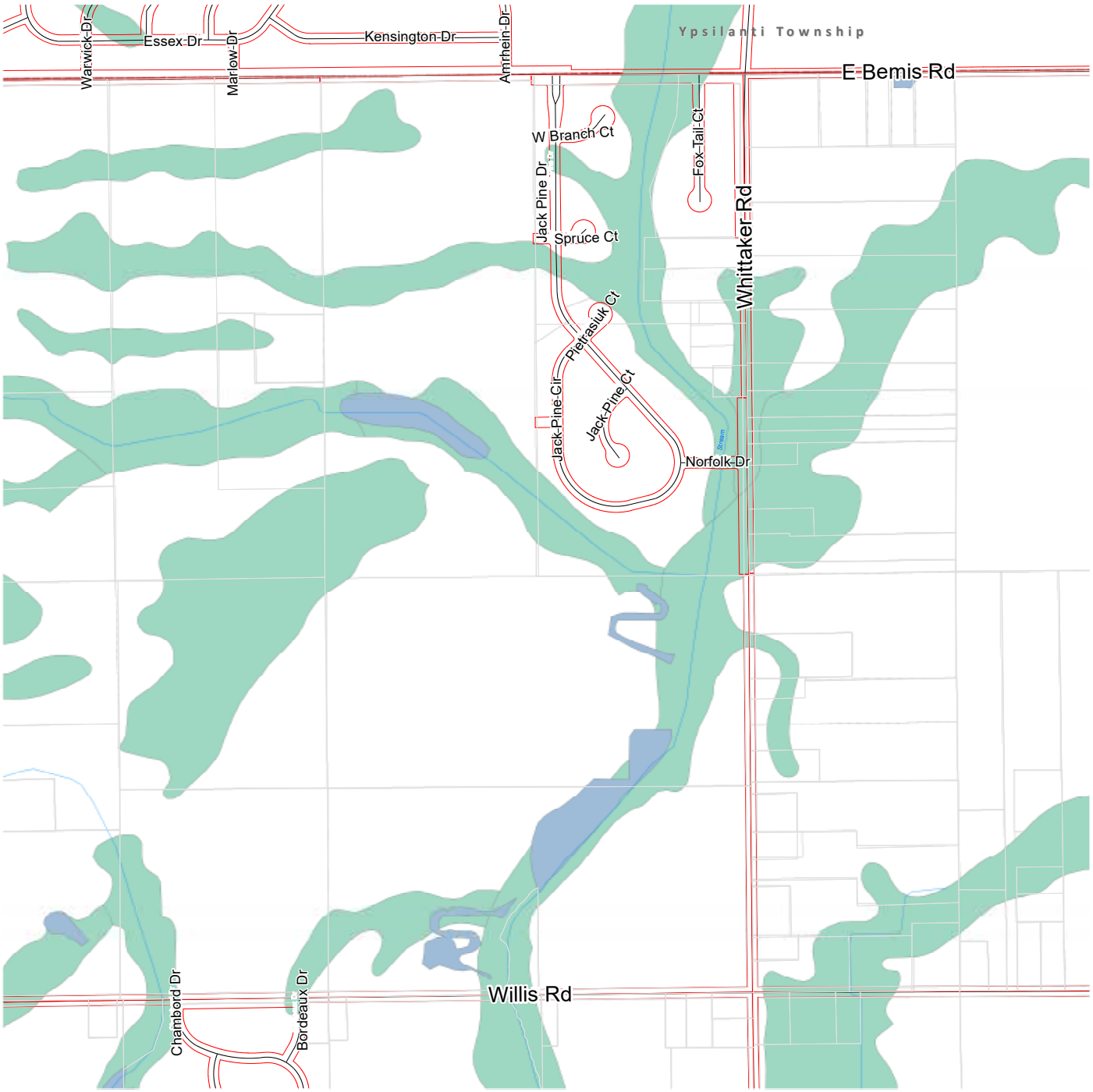
N

0 300 600 900 1,200 Feet

1-31-2020

GIS Data: Washtenaw County GIS
USDA Soils Survey

Carlisle/Wortman Associates, Inc
Community Planners & Landscape Architects



Wetlands as identified on NWI and MIRIS maps

Soil areas which include wetland soils

Potential and Identified Wetlands

AUGUSTA TOWNSHIP
Washtenaw County, Michigan

N

0 300 600 900 1,200 Feet

GIS Data: Washtenaw County GIS
Michigan Department of Environment, Great Lakes, & Energy (EGLE)

1-31-2020

Carlisle/Wortman Associates, Inc.
Community Planners & Landscape Architects

Short-term Implementation Alternatives

Trail development is rarely linear in nature. Communities construct pathways in phases as dictated by resident demand and the availability of funding. In a community such as Augusta, where no trails have been developed at all, it may be easiest to select short segments and/or use temporary low-cost options to demonstrate the functionality of an alignment and encourage further, long-term development.

The table below provides different approaches for the various segments outlined in this plan. There is no specific order of implementation; Township officials and community stakeholders would need to decide which amenities best meet the needs of residents. As demand for trails grow, these short-term fixes could be replaced with more permanent solutions.

Segment name	Feature	Alternative/Short-term solution	Notes
All trails	Crosswalks, pedestrian islands	Painted crosswalks	Pedestrian/refuge islands are the preferred approach for high volume, high speed roads (e.g. Willis). They provide visual cues to drivers and offer a physical barrier from oncoming traffic. Where islands are not feasibile or for initial trail developments, a standard painted crosswalk will aso provide a visual alert to oncoming drivers and offer at least some protection for trail users.
All trails	RRFP	Signs	Rectangular rapid flashing beacons are a secondary form of alert, greatly increasing pedestrian visibility. Standard crosswalk signs meet regulatory requirements and help to slow down traffic.
All trails	Asphalt or concrete pathway	Crushed limestone trail	Up-front costs for crushed limestone trails are significantly cheaper on a per-foot basis (~$2.00 LF) than either asphalt or limestone. Limestone trails are also considered ADA compliant, make them superior to simple gravel walkways. For demonstration purposes, a limestone trail may be a way to evaluate the efficacy of a desired route. Long term, limestone trails require yearly maintenance (patching, raking) which increases costs to the same level of asphalt across the expected lifespan of the facility. Limestone also may not be eligible for grant funding at a state or federal level. Finally, limestone will not work for crossing wetland spans.
Priority 1	Pedestrian bridge	Existing bridge	The existing bridge over Paint Creek has approximately 6-foot shoulders, meaning that pedestrians would have adequate room to cross the bridge without interacting with vehicular traffic. 6 feet is not wide enough, however, to comfortably accommodate two-way pedestrian and cyclist traffic, however, especially next to vehicle traffic. As a short-term solution, the existing bridge may be considered, but only with coordination with and approval of the Washtenaw County Road Commission.
Priority 2	Limestone internal park pathway	Mowed path walkway	For early internal park pathway development, a simple mown or graded path may be adequate for preliminary purposes. ADA regulations require that a minimum of 20% of a facility be available to disabled users, so this could not be a long-term solution. Grants typically require that all facilities be designed for accessibility. Similarly, the parking area may be a simple gravel lot, but handicapped parking spots should be asphalt or concrete.

Segment name	Feature	Alternative/Short-term solution	Notes
Priority 2	(Potential) boardwalk from Whittaker to park	Mowed path	The parcel east of Whittaker Road contains at least some wetland or wet prairie areas, but it is possible that a route could be found that remains relatively dry. If an easement can be obtained for this parcel, it is possible that a mowed path could suffice to bring visitors from the school campus to the park. The path would likely not be usable in spring months due to standing water, but could be functional during the summer months. It would necessarily need to be pulled close to the road edge at the drain crossing. This treatment would not be ADA compliant, may not be functional at all depending on the conditions of the wetlands, and should only be used as a way to raise awareness of the park.
Priority 3	Asphalt or concrete pathway	Shared use signs and road markings	Because of the slow (25 mph) posted speed limits, Lincoln Trail is an excellent candidate for use as a shared road. Adding signage at the beginning and ending of the route and marking the road with sharrows would indicate the special nature of the road, and encourage drivers to remain at or under the posted speed limit. This alternative does not address pedestrian traffic, but it is assumed that pedestrians would be able to walk on the road shoulder or on adjacent grass.
Priority 4	Limestone pathway	Mowed path	Much like with the Priority 2 path, this path may be a simple mowed path during preliminary demonstration phases. A mowed path would not provide a crossing over the drain, however.
Priority 5	Various surfaces	Signage	The Priority 5 alignments were deliberately chosen to take advantage of existing infrastructure. Any improvements would benefit both trail users and maintenance activities. The short term solution would not involve any surface improvements (the existing surfaces would be left as-is), and instead would include simple wayfinding signs. Over time, surfaces would be improved to concrete or asphalt and wayfinding signage upgraded to a more attractive and informational style.