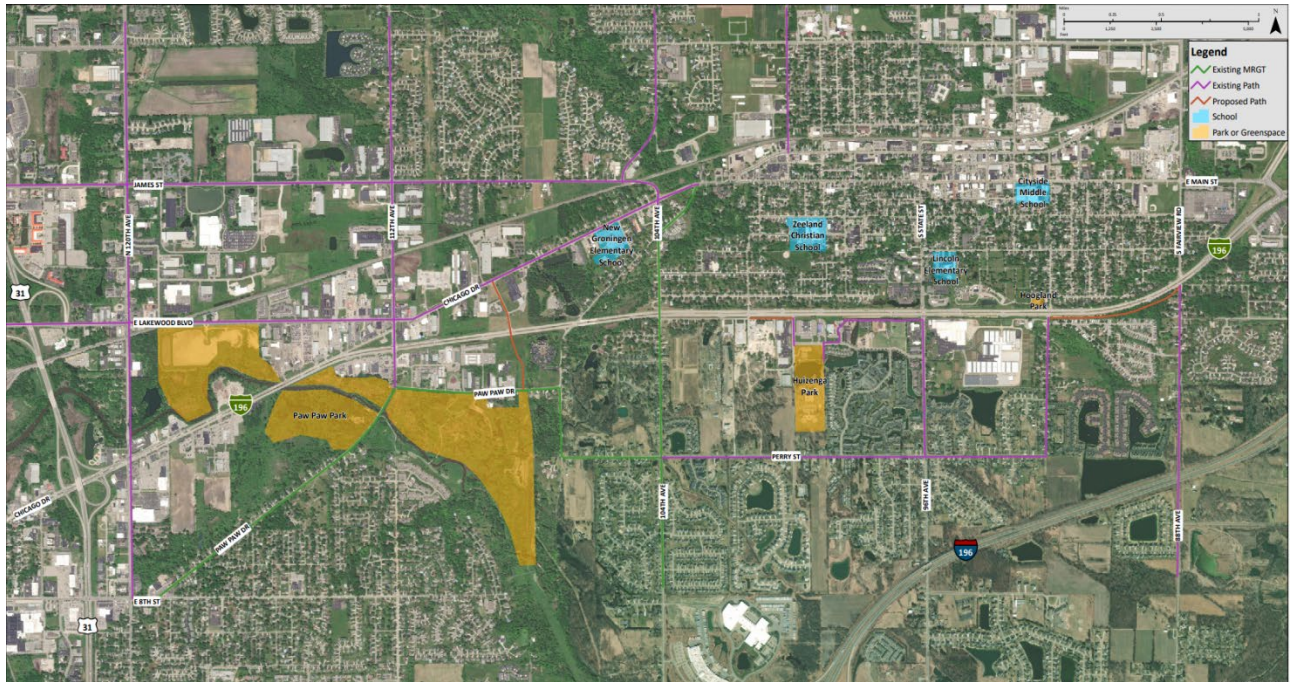


I-196 BL Non-Motorized Crossing Study

Macatawa Area Coordinating Council



I-196 BL Corridor – Waverly Rd./120th Ave. to Fairview Rd./88th Ave.
City of Zeeland, Zeeland Charter Township, City of Holland, and Holland Charter Township

Prepared for the Macatawa Area Coordinating Council
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September 2023

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Executive Summary

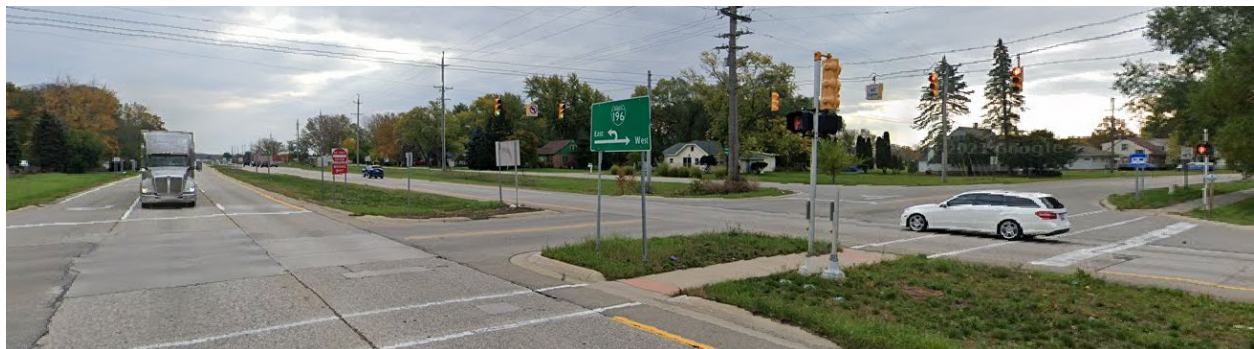
This study was commissioned by the Macatawa Area Coordinating Council (MACC), the Metropolitan Planning Organization that is responsible for carrying out the transportation planning processes throughout the Holland, Michigan region. The study's goal is to understand the existing non-motorized crossing facilities on I-196 BL from Waverly Road/120th Avenue to Fairview Road/88th Avenue and to recommend future enhancements, both for at-grade crossings and potential overhead or underpass crossings.

Key Findings and Recommendations

- I-196 BL is a barrier to north-south bicycle and pedestrian movement in the Zeeland community.
- Due to communication with Michigan Department of Transportation (MDOT) during this study, proposed improvements on I-196 BL include non-motorized crossing enhancements.
- A future pedestrian bridge is feasible east of Maple Street/92nd Avenue and at Van Hill Drive, along with associated new trail connections.
- There is strong community recognition that I-196 BL is a barrier for safe and comfortable crossings and strong support for non-motorized improvements.

These finding and recommendations are based on review of past planning efforts, data analysis, and robust community outreach. They can be used by stakeholders to communicate the need for improvements and as a basis for funding and for design and future improvements.

Figure 1 Example of a Crossing in the Study Area, I-196 BL and 104th Ave. (Google, 2021)



1.0 Introduction

The increasing demand for safe and efficient non-motorized transportation has led to a growing concern about non-motorized crossing facilities in the MACC area. Pedestrians and bicyclists are often left without adequate means of crossing busy roadways, causing safety hazards and limiting mobility for those who rely on non-motorized transportation. This report outlines a study conducted on the non-motorized crossing facilities on I-196 BL from Waverly Road/120th Avenue to Fairview Road/88th Avenue, aiming to identify potential improvements that could enhance safety and accessibility for pedestrians and bicyclists. The stretch of road highlighted in this study serves as a major motorized vehicle artery for local residents and businesses, making it challenging for non-motorized crossings. The report focuses on identifying the problem of inadequate non-motorized crossing and providing a comprehensive analysis of potential solutions to improve the situation.

I-196 BL is a business loop route owned and maintained by MDOT and is also named Chicago Drive in the western portion of the study area. The full extent of the business loop includes a portion US Route 31 to the south and west of the study area. The route traverses the southern portion of the City of Zeeland until it intersects I-196 via an interchange about one mile east of the study area. It is adjacent to multiple jurisdictions including the City of Zeeland, Zeeland Charter Township, City of Holland, and Holland Charter Township.

The roadway bisects the Zeeland community on its north and south sides limiting safe and comfortable crossing points. Single and multi-family residential land uses mostly surround the study area and there are several bicycle and pedestrian trip generators nearby. These include four schools on the north side (Lincoln Elementary School, New Groningen Elementary School, Cityside Middle School, and Zeeland Christina School). The roadway also has three nearby greenspaces including Huizenga Park and Hoogland Park, and a large natural area on both sides of the roadway called Paw Paw Park. In addition, there are institutional and employment centers for commercial and light industrial enterprises along the study area.

The region currently has a robust non-motorized trail network, the Macatawa River Greenway Trail which currently crosses I-196 BL at 104th Avenue. The trail is a popular recreational trail and runs approximately 20 miles along the Macatawa River and its adjacent wetlands, through forests and meadows, connecting the cities of Zeeland, Holland and Grand Haven. It is managed by the Ottawa County Parks and Recreation Department, which works to maintain and improve the trail and its facilities for the enjoyment of visitors and locals alike. The trail is an important local resource and a good example of how greenways can enhance quality of life and connectivity in the local communities. I-196 BL is a barrier to this trail system due to the difficulty for users to cross it.

2.0 Past Plan and Engineering Review

To understand the current engineering efforts on I-196 BL and background of planning efforts for the study area, the current design project for the roadway and three previous non-motorized plans were researched. Below are summaries of the roadway project and previous plans with documentation of their analysis specifically related to this study.

I-196 BL Reconstruction and Rehabilitation

The I-196 BL improvement from US 31 to Fairview Road, JN 210058, is planned to start construction in 2024. Engineering started in 2021, the project was let in September 2023, and construction is planned to start in 2024 for the 4.5-mile project. The bounds for the reconstruction portion of the project are US 31 to Paw Paw Drive and the bounds for rehabilitation are Paw Paw Drive to Fairview Road/88th Avenue. Improvements include resurfacing, patch repairs, guardrail upgrades, drainage, signing, pavement markings, and signal improvements. Most relevant to this study and due to coordination described in later sections, the design includes ADA sidewalk ramps, widened sidewalks in the medians, new signage and pavement markings at intersections.

MACC Non-Motorized Plan

In 2014, the MACC developed a non-motorized plan outlining the background, vision, and current needs for the region. This plan identified the existing bicycle and pedestrian network and proposed regional connectors that would help increase connectivity across the region.

The purpose of this plan was to develop a connected network of bicycle and pedestrian facilities providing opportunities for safe and efficient travel through the MACC area. The goals of the plan were:

1. Provide residents with increased non-motorized travel opportunities.
2. Increase safety for residents who walk and/or bike.
3. Connect existing and planned facilities by identifying gaps in the regional non-motorized network and recommend improvements.
4. Assist in promoting pedestrian and bicycle “friendly” character of the region.

The plan identifies “pedestrian detractors,” or physical obstacles or conditions that impact non-motorized access, and points to all crossings of I-196 BL within the study area as such. In addition, participants in a walkability audit ended with several recommendations including that crossings on I-196 BL be improved.

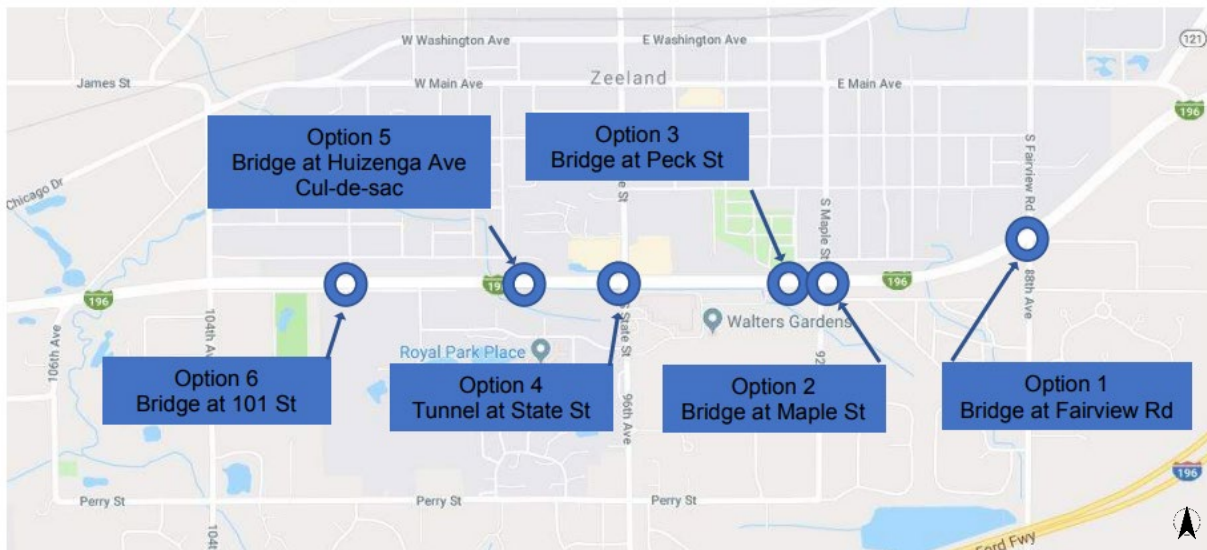
Zeeland Non-Motorized Plan

Completed in 2019, the goal of the Zeeland Non-Motorized Transportation Plan was to promote non-motorized transportation by offering guidance to develop infrastructure to meet the needs of pedestrians and cyclists. The plan created an inventory of existing pedestrian and bicycle facilities in the city and an assessment of the existing conditions for these and related facilities. See **Figure 6** on **Page 12** for plan material that was used for analysis in this study.

It ultimately proposed and mapped new pedestrian facilities through a prioritizations process, proposes additional bicycles facilities that emphasis low stress routes, and provided specific options for I-196 BL crossings. The plan was made to be referenced during the planning and design of future capital improvement projects.

The plan identified 196 BL as a hazardous obstruction to the non-motorized pathways. It specifically points to the crossing at Fairview/88th as high risk due to highway geometry, sight distance, and crossing distance. It also indicated to two other signalized crossings at 104th Avenue and State Street as unsuitable for young children and novice bikers. It analyzed six options for grade-separated crossing locations and said that further study should be conducted to investigate environmental impacts, cost, and constructability. See **Figure 2** for the option locations.

Figure 2 Zeeland Non-Motorized Plan Grade Separated Crossing Options



Grand Region Non-Motorized Plan

In 2017, MDOT created a plan for improving non-motorized travel throughout the agency’s Grand Region, which include Zeeland and the study area. This plan focused on the regional level and is therefore not intended to supersede local planning efforts. MDOT can utilize this plan to work towards complete streets in the region per Michigan Public Act 135 of 2010. The primary goals of the plan were to:

- Document the existing and proposed non-motorized transportation network
- Identify opportunities to enhance nonmotorized transportation
- Help prioritize nonmotorized investment
- Continue to foster cooperative planning across municipal/county boundaries
- Synchronization of Plans – understand what exists and what is planned to better coordinate efforts

The plan outlines 11 priority projects in Ottawa County including two that deal directly with the study area. Under the recommendation to complete the Macatawa River Greenway, it included improving facilities along I-196 BL because it is an important connection to the Greenway. It goes further by recognizing that it is a regional priority for a non-motorized overpass or underpass near I-196 BL and State/96th Avenue.

3.0 Non-Motorized Crossing Best Practices

Since these crossings can be dangerous for pedestrians, cyclists, and other non-motorized vehicles, it is essential to establish best practices for non-motorized crossings to ensure the safety of all road users. Some applicable best practices for crossings are outlines below:

- **Provide adequate signage and markings:** Clear and visible signs and markings should be placed to indicate the presence of the crossing and to alert motorists to slow down and give way to

pedestrians and cyclists. Use of high visibility markings on the ground like zebra crossings can enhance the visibility of the crossing. Advance warning signage should be considered in addition when crossings are unsignalized or mid-block.

- **Ensure adequate lighting:** Adequate lighting at the crossing should be provided to increase visibility and safety during low light conditions. This includes proper street lighting, and/or the installation of pedestrian-level lighting specifically for the crossing.
- **Establish appropriate crossing points:** Crossing points should be placed in areas where pedestrians and cyclists are likely to cross. This includes placing crossings at intersections and other high pedestrian traffic areas. The crossings should also be aligned with existing pedestrian and bicycle paths and sidewalks.
- **Provide traffic calming measures:** Short trees, shrubs, and other vegetation can produce what is called “side friction” and cause motorists to slow down.
- **Provide adequate space:** Adequate space should be provided at the crossing to accommodate the anticipated volume of pedestrians and cyclists. This includes providing sufficient sidewalk or cycle path width, as well as ample waiting areas at the crossing and in the medians.
- **Provide clear sightlines:** Clear sightlines should be provided to both motorists and non-motorized users. This includes trimming back foliage that may obscure the view of the crossing, and avoiding placement of obstructions signage or traffic signal posts that may hinder the line of sight.
- **Implement traffic control devices:** Traffic control devices like traffic signals or flashing signage can be used to manage the flow of traffic and help ensure the safety of pedestrians and cyclists.

By following these best practices, non-motorized crossings on busy roads can be made safer for all road users, reducing the risk of accidents, and promote active transportation.

Grade separated pedestrian crossings, also known as pedestrian overpasses or underpasses, are another way to reduce pedestrian conflict and are designed to provide safe passage for pedestrians and cyclists across busy roads or highways, without having to interact with vehicular traffic. Some of the benefits of grade separated pedestrian crossings are:

- **Increased Safety:** Grade separated pedestrian crossings offer a much higher degree of safety than traditional crosswalks, as they eliminate the risk of pedestrian-vehicle collisions.
- **Improved Accessibility:** Pedestrians and cyclists can cross the road at any time, without waiting for a signal or disrupting vehicular traffic.
- **Reduced Traffic Congestion:** Pedestrian overpasses or underpasses can help reduce traffic congestion by separating pedestrian and vehicular traffic, thereby allowing for a smoother flow of vehicles.
- **Better Traffic Flow:** Grade separated pedestrian crossings can improve traffic flow, as they eliminate the need for drivers to stop or slow down for pedestrians.
- **Enhanced Walkability:** Pedestrian overpasses or underpasses can enhance the walkability of urban areas, as they provide a safe and convenient way for pedestrians and cyclists to cross busy roads.
- **Improved Public Health:** Pedestrian overpasses or underpasses can encourage more people to walk or cycle, promoting a healthier and more active lifestyle.

Overall, grade separated pedestrian crossings can improve safety, accessibility, traffic flow, and public health, making them a potentially valuable addition to transportation infrastructure. For grade separated crossings to be successful, they should be convenient for users and not require people to walk or bicycle a much longer distance than where they currently cross or wish to cross. This same principle applies to having to climb a long distance or requiring users to descend into a dark tunnel.

Coordination with MDOT will be crucial for the success of any crossing within the area. MACC staff have been engaged with MDOT officials and project managers since implementing a strategy for safer non-motorized crossings across the I-196 BL corridor.

4.0 Data Analysis

The study was conducted over a period of nine months and involved a variety of data analysis methods. Site visits were conducted to gather information about the existing conditions at the intersections along the I-196 BL corridor. The visits included observation of traffic flow patterns, pedestrian and bicycle traffic volumes, and existing infrastructure such as sidewalks and crosswalks at each intersection.

In addition, MDOT traffic count data was collected. According to 2022 traffic counts, 21,080 annual average daily traffic (AADT) was recorded in I-196 BL between the Waverly/120th and 112th crossings. The highest counts along the corridor were recorded between 104th and State/96th with 25,597 AADT. The eastern edge of the study area, closest to the I-196 interchange at Fairview/88th recorded 23,881 AADT.

Other data collection and analysis in the areas of safety, pedestrian and cyclist volumes, previously completed level of traffic stress analysis are considered in this study.

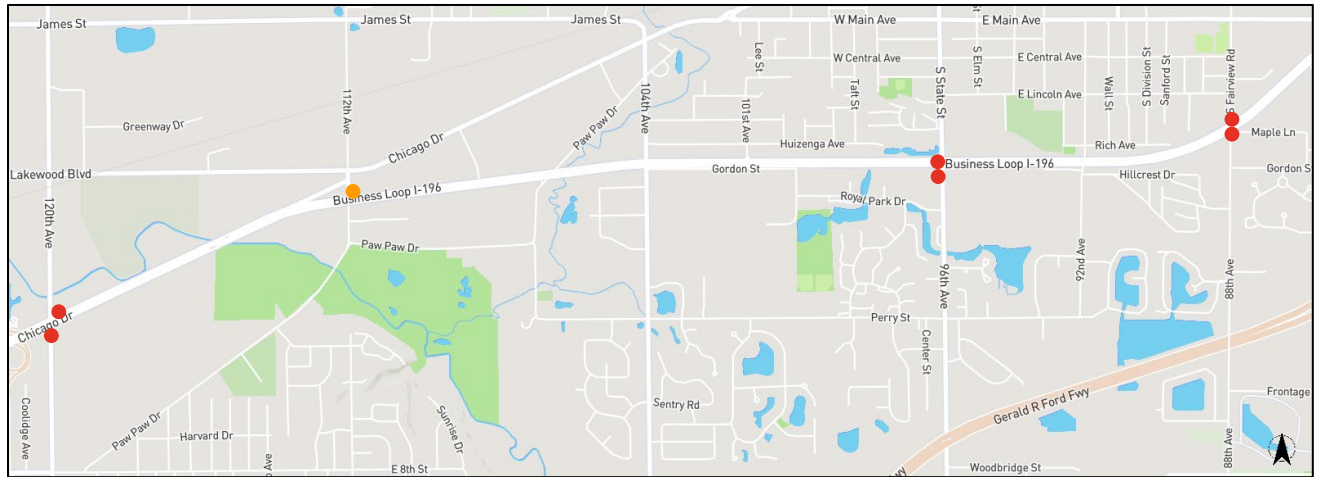
Safety

The project team analyzed crash data through the Michigan Traffic Crash Facts website which provides users with annual official Michigan crash data from publicly available police reports.¹ Crashes that involved a cyclist or pedestrian along the study area corridor from the last 10 years of available data were analyzed (2013-2022). Crashes within a buffer of 250ft around intersections of I-196 BL were considered as influenced by the crossing.

As show in **Figure 3**, a total of seven crashes were reported within the time period, six involving a cyclist and one involving a pedestrian. Crash locations were at Waverly/120th (2), 112th, State/96th (2), and Fairview/88th (2, including one fatal crash). According to the police reports two of the crashes involved minors who were bicycling, and two other crashes happened during dark lighting conditions.

¹ <https://www.michigantrafficcrashfacts.org/>

Figure 3 Pedestrian and Bicycle Crashes 2013-2022



- Pedestrian Involved Crash
- Cyclist Involved Crash

Volumes

Bicycle and pedestrian volumes are not collected by MDOT or another entity within the study area, so data was collected through Strava Metro, an analytics tool that presents data generated by users of the Strava fitness tracking application. The applications records biking, running, and walking activity. Users of the service are not representative of the total population, but studies have found that Strava data has a strong association with active transportation rates of the general population.^{2,3}

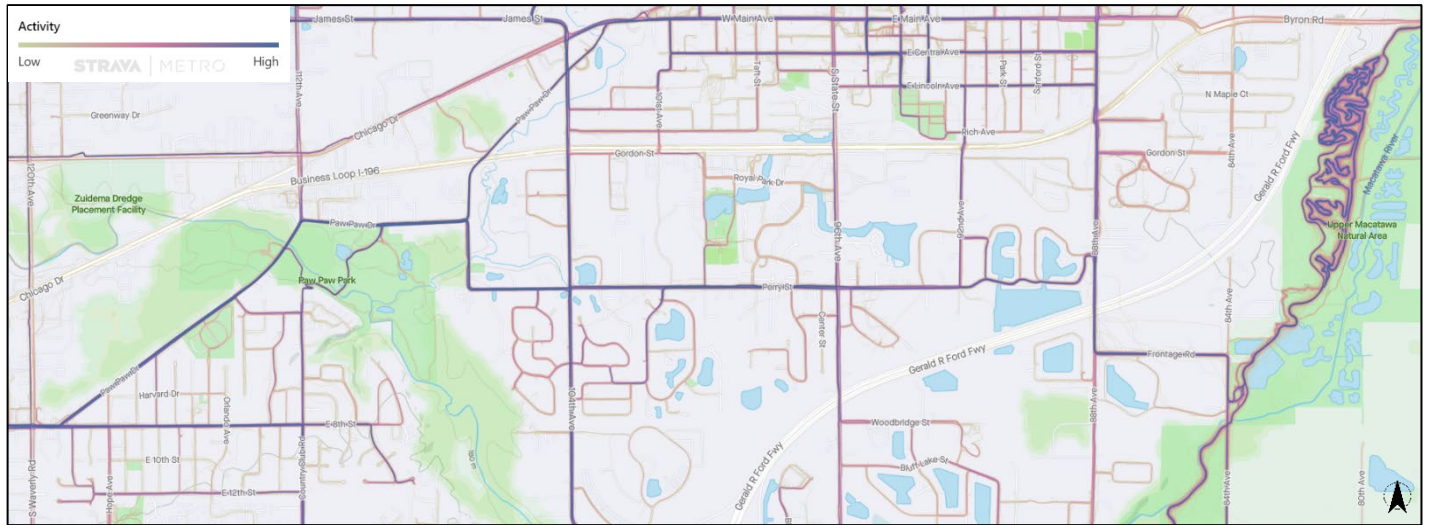
Figure 4 provides a heat map of the Strava bicycle trips recording in the study area in 2022. The Macatawa River Greenway show high relative volumes near the study area including at the 104th crossing. Other crossings that show relatively high volumes include Paw Paw Drive and Fairview/88th. Other crossings with fewer relative volumes, but still show demand to cross I-196 BL include Waverly/120th, 112th, 101st, State/96th, and Maple/92nd.

The heat map provides visibility to notable connections being made by bicycle. It shows that crossings are likely used to connect to other east-west routes such as Main Avenue or Central Avenue north of I-196 BL and Perry St. or Paw Paw Drive to the south. Also, the 88th Avenue bike sidepath shows relatively heavy volumes that connect to the Upper Macatawa Natural Area bike trails.

² Whitfield GP, Ussery EN, Riordan B, Wendel AM. Association Between User-Generated Commuting Data and Population-Representative Active Commuting Surveillance Data — Four Cities, 2014–2015. *MMWR Morb Mortal Wkly Rep* 2016;65:959–962. DOI: <http://dx.doi.org/10.15585/mmwr.mm6536a4external> icon.

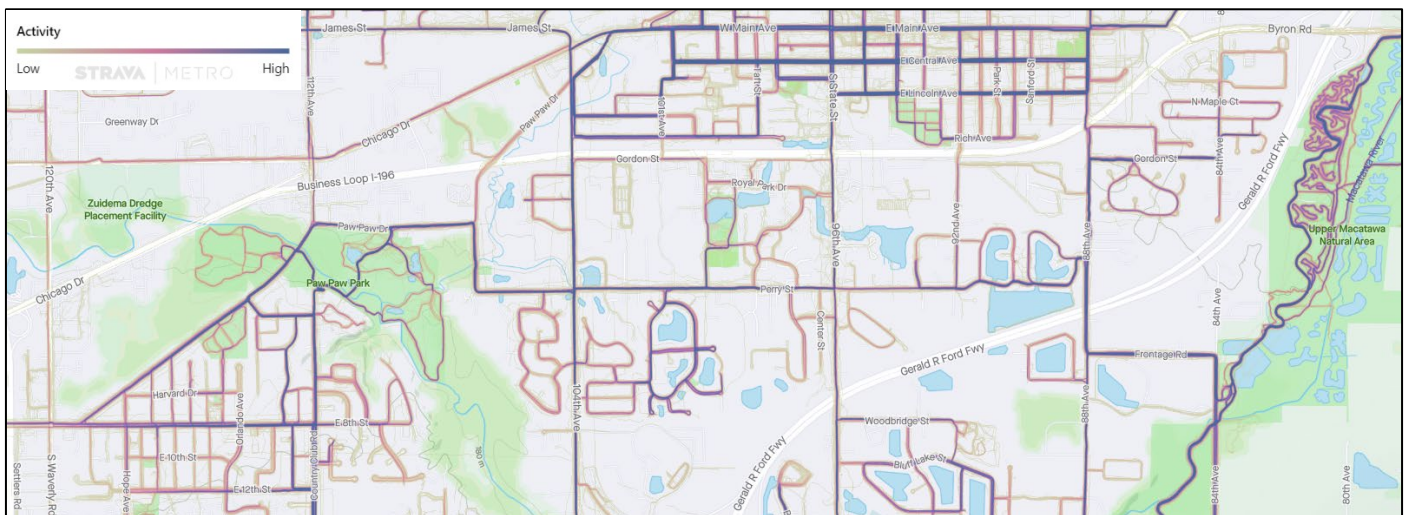
³ Kyuhyun Lee & Ipek Nese Sener (2021) Strava Metro data for bicycle monitoring: a literature review, *Transport Reviews*, 41:1, 27-47, DOI: [10.1080/01441647.2020.1798558](https://doi.org/10.1080/01441647.2020.1798558)

Figure 5 Strava Bicycle Trip Volumes Heatmap, 2022



With similar results as the bicycle volumes heat map, **Figure 5** displays the walking/running volumes around the study area. Crossings with relative high volumes includes 104th, State/96th, and Fairview/88th. Other crossings that show demand for pedestrian crossings include 120th, 112th, Paw Paw, and Maple/92nd.

Figure 4 Strava Pedestrian Trip Volumes Heatmap, 2022



Level of Traffic Stress

Level of Traffic Stress (LTS) is a methodology that quantifies the amount of discomfort that people feel when they bicycle close to traffic. It was developed in 2012 by the Mineta Transportation Institute and San Jose State University. LTS assigns a numeric stress level to streets and trails based on attributes such as traffic speed, traffic volume, number of lanes, frequency of parking turnover, ease of intersection crossings and others.

The LTS scale ranges from 1 to 4, with 1 being the least stressful and 4 being the most stressful. LTS 1 is suitable for children, while a LTS 2 is based on Dutch bikeway design criteria, which represent the traffic stress that most adults will tolerate. LTS levels of 3 and 4 represent greater levels of stress.

LTS is a useful tool for planning and designing bicycle infrastructure. It can help to identify streets and trails that are stressful for cyclists, and it can also be used to help prioritize improvements to make cycling more comfortable and safer for a greater number of users.

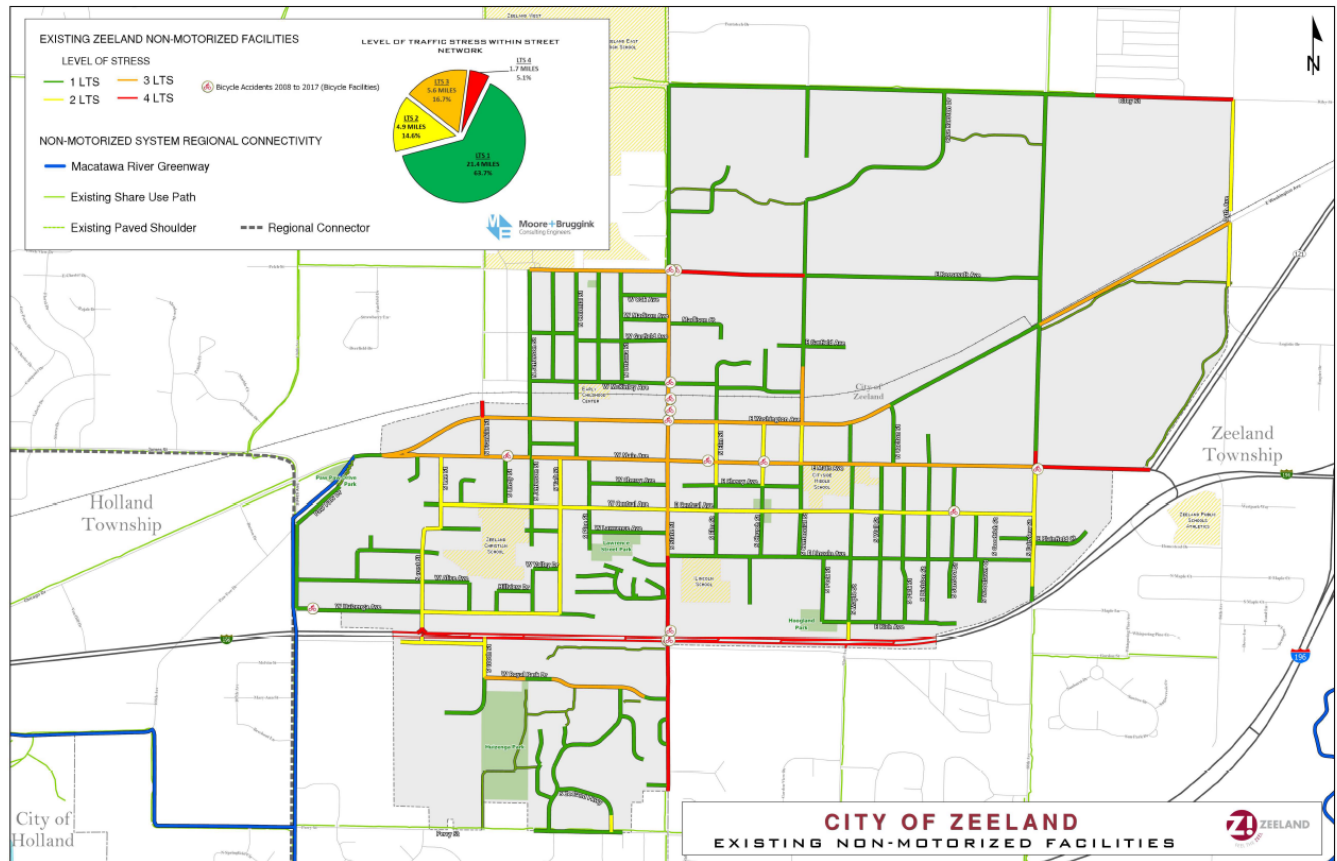
Factors that are used to calculate BLTS are:

- **Traffic speed:** The higher the traffic speed, the more stressful it is for cyclists.
- **Traffic volume:** The greater the traffic volume, the more stressful it is for cyclists.
- **Number of lanes:** More lanes means more traffic and complexity, which means more stress for cyclists.
- **Frequency of parking turnover:** Frequent parking turnover means more cars entering and exiting the street, which can be more stressful for cyclists.
- **Ease of intersection crossings:** Intersections can be a major source of stress for cyclists, so it's important to make sure that they are easy to cross.

The City of Zeeland completed a LTS analysis of its road in its 2019 non-motorized plan. The analysis found the following conditions at LTS 4 conditions for the I-196 BL and in all four directions of the intersection of State/96th. LTS 2 conditions were found on the north side of the 101st, 100th, and Maple/92nd intersections and LTS 1 conditions were found north of the Fairview/88th intersection.

Note that the only full crossing analyzed was State/96th. The full extent of I-196 BL is LTS 4 including all the intersections. It is notable that where the crossing street is comfortable for all non-motorized users, there is an abrupt change in stress-level at the crossings. For example, the LTS 1 rating north of the Fairview/88th intersection suggests that it is a non-stressful place to walk or bike, but this ends at the intersection of I-196 BL. The other intersections within the study area were not analyzed. See **Figure 6** below for the full analysis completed in the plan.

Figure 6 City of Zeeland LTS Analysis (Zeeland Non-Motorized Plan)



5.0 Stakeholder and Community Outreach

Within the study timeline, the MDOT design project for I-196 BL was also being completed for the project corridor of this study. Through agency coordination made possible by this study, MACC staff and other stakeholders were able to communicate to MDOT about safety concerns for the non-motorized crossings which led to MDOT including enhanced crossings. The enhanced safety designs for these existing crossings are included in the current design of the MDOT project.

This study also included community outreach in the form of a public open house held on March 7, 2023 at the Howard Miller Public Library in Zeeland. There were 55 community member attendees. The purpose of the open house was to discuss both projects with the public. A presentation was given by MACC staff and the public provided their comments on paper forms. A large roll plot of the study area was shown to the public as well and they were able to provide markups and comments on the map itself in order to identify the most desirable location for a grade separated crossing (See **Figure 7**). MDOT was also in attendance to discuss their current design project along the corridor and to help answer any questions the public may have had.

Figure 7 Example of Community Feedback at the March 7, 2023 Open House



Based on the data collected, there was an overwhelming positive response to a pedestrian bridge. As previously mentioned, the large roll-plot provided the attendees of the open house a place to provide a ranking of the desired location for a pedestrian bridge. The two locations that ranked the highest were at 88th/Fairview and 92nd/Maple. These ranked the highest since there are a lot of residents, particularly school aged children, that currently use these intersections to cross even though there are no existing facilities at 92nd and the existing facilities at 88th are substandard, cross at a skew, and are located at an unsignalized intersection.

The community expressed that a pedestrian bridge would have a positive impact on the community by improving safety for pedestrians and bicyclists, reducing congestion, and improving traffic flow, and providing a new and attractive amenity for residents and visitors alike. The bridge is also seen as promoting connectivity between different parts of the community, promoting more sustainable modes of transportation and encouraging active lifestyles. See **Figures 8 and 9** for photos of the event.

Figure 8 Presentation at the March 7, 2023 Open House



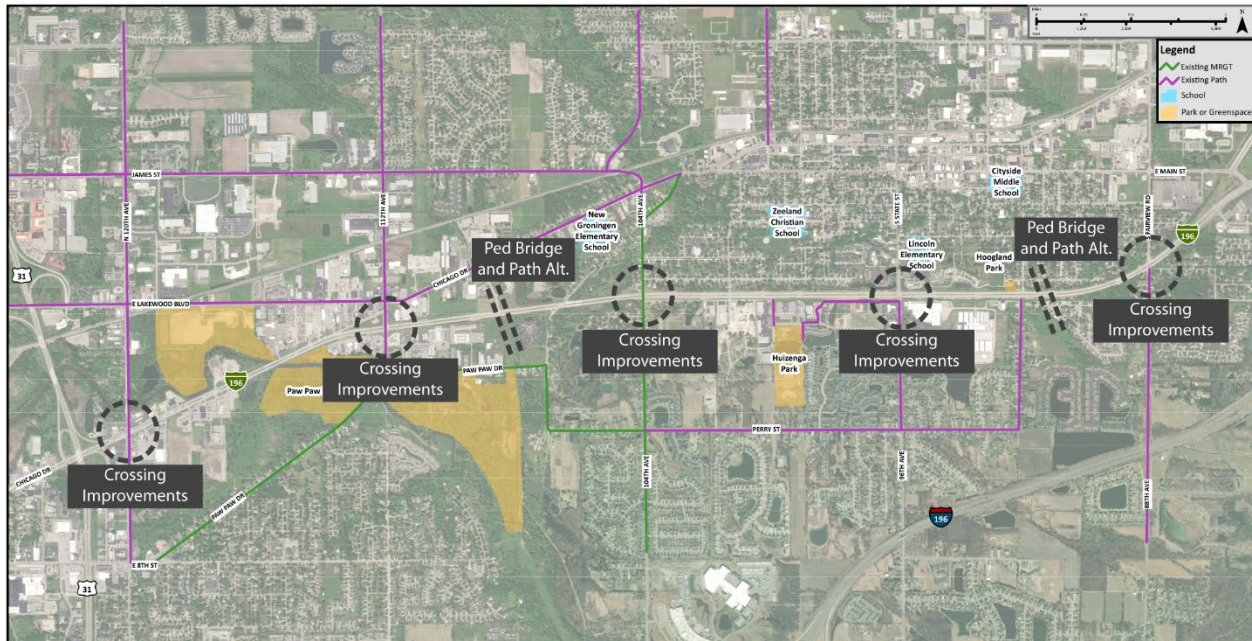
Figure 9 Community Discussions and Comment Submissions at the March 7, 2023 Open House



6.0 Recommendations

This study provides recommendations for pedestrian bridge and trail alternatives and five at-grade crossing improvements. Planning-level concept exhibits and descriptions are provided below with the full-page version of the exhibits presented in **Appendix A**. To refine these concepts, several meetings were held with MACC staff to discuss findings and potential options throughout the corridor. Exhibits were provided to MACC staff to discuss, receive feedback on, and also brought to MDOT and other stakeholders in the area for their input. A map with the extent of the study area with locations of the crossing recommendations is below in **Figure 10**.

Figure 10 Study Crossing Recommendation Locations



The project team has estimated costs of the improvements with detailed breakouts found in **Appendix B**. A summary table is below in **Table 1**. Please note that costs of project elements that are included in the I-196 BL design as of July 2023 are not included in the project cost estimate. Outside of the pedestrian bridge and trail alternatives, only lighting improvements are included in the at-grade crossing estimates as they are not part of the current roadway design improvements.

Table 1 Crossing Recommendation Cost Estimates

Location	Project Cost	Comments
Maple Bridge Alternative and Trails	\$ 11,639,100	10' wide pedestrian bridge across I-196 BL (east of Maple Street), and 10' wide longitudinal trails between State/96 th and Fairview/88 th .
Van Hill Bridge Alternative	\$ 7,321,260	10' wide pedestrian bridge across I-196 BL (east of Van Hill Drive) and 10' wide trails connecting to Chicago Drive and Paw Paw Drive.
88th St	\$ 40,080	Median sidewalk widening and enhanced pavement markings have been incorporated into the I-196 BL road design (JN 210058) as of July 2023. Project costs represent lighting improvements only.
96th St	\$ 13,360	
104th St	\$ 26,720	
112th St	\$ 40,080	
120th St	\$ -	

Pedestrian Bridge and Trail Alternatives

The most impactful and most aligned with community input is the recommendation for a pedestrian bridge and key trail connections along I-196 BL. There are currently no grade-separated crossings for the roadway and the only dedicated bridge over a roadway dedicated to pedestrians and bicycles in the region crosses I-196 at Adams Street as part of the Macatawa River Greenway.

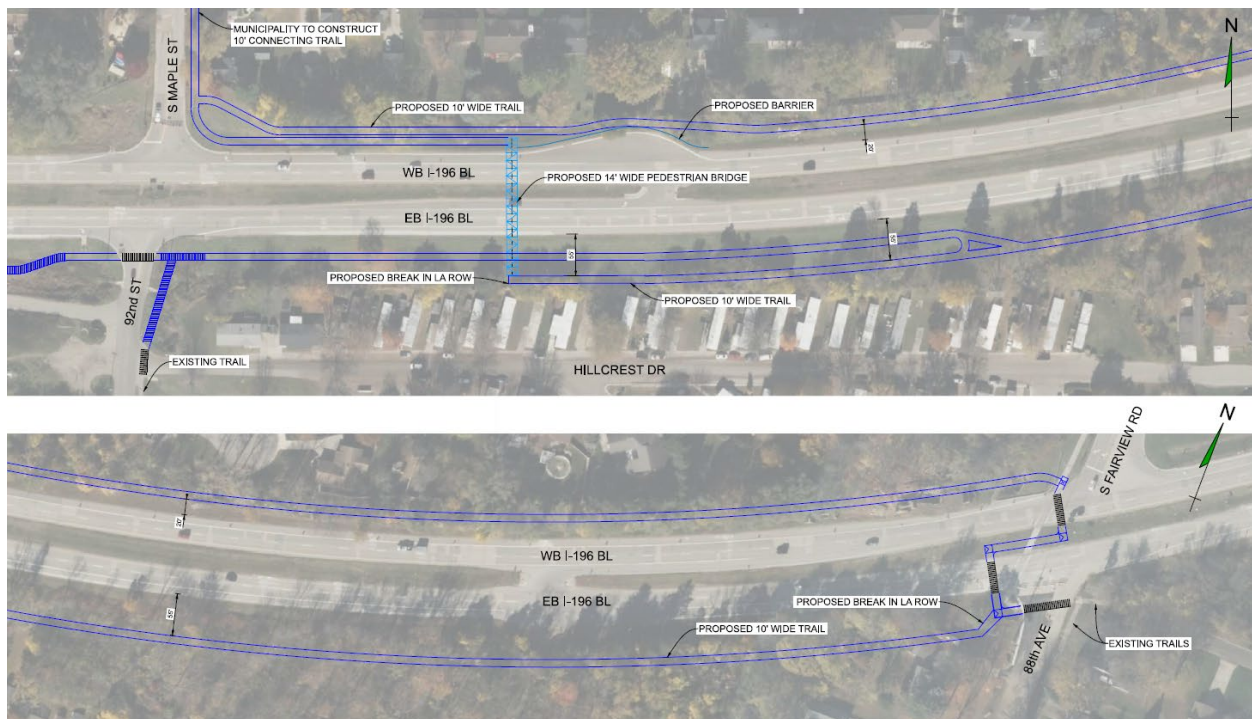
Two alternatives are presented in this study: the Maple Street location and the Van Hill Drive location. At a high-level engineering review, both have been found feasible and have a cost estimate between \$7.3-11.6M. Both add substantial amount of new trail length and provide key connections to existing sidepaths or trails. Each are detail in turn below.

Placing the bridge at other locations was examined including at an intersection within the study area. Adjacent streets, driveways and overhead wires near I-196 BL prevented a simple and cost-effective bridge design at other intersections. Another possible location is from the Rich Avenue cul-de-sac north of I-196 BL, but this location required more substantive property acquisition and possibly a more complex design. A pedestrian underpass was removed from consideration based on the engineering and cost challenges considering the high water table in the area. At either location, any soft scaping or plantings would be the responsibility of local jurisdictions.

Maple Bridge and Trails

The location of the bridge is between Maple/92nd and Fairview/88th Avenues. The longitudinal trails connect to sidewalk and sidepath networks on both sides of the roadway with new trails between Maple/92nd and Fairview/88th and on the south side between State/96th and Maple/92nd. All slopes, pathway widths, and surfaces would be in accordance with ADA regulations. See **Figures 11.1 and 11.2** for a concept drawing of the recommendation.

Figure 11.1 and 11.2 Maple Bridge and Longitudinal Trails Concept





The concept includes a new 10' path that connects to the sidewalk network on the east side of Maple Street to Rich Avenue. Once along the I-196 BL ROW, the path to the bridge would rise with an approximately 5% slope to reach a 17' 0" minimum vertical clearance and be supported by retaining wall on a portion of the sloped section. Additionally, a second path will stay at-grade along the roadway connecting Maple Street to Fairview Road on the north side of I-196 BL.

Likely a prefabricated bridge such as the one pictured in **Figure 12**, would provide the most cost-effective bridge type. If a pier is needed in the center median of the roadway, coordination with MDOT on the appropriate safety measures would be needed. On the south side of the roadway, the pathway would descend to grade level where a 10' trail would connect to three existing paths:

- The 88th Avenue sidepath which connects to the Adams Street sidepath and Upper Macatawa Natural Area
- The 92nd Avenue sidepath which connects to Perry Street
- The longitudinal trail east of 96th Avenue that connects to Huizenga Park

Because of a small stream on the south side of I-196 BL and a small wetland area on the east side of Maple/92nd, much of the trail would consist of a boardwalk. This allows the trail to have greater separation from vehicle traffic and not disturb the existing natural conditions. See **Figure 13** for an example of a trail with boardwalk portions adjacent to the roadway. All three crossings of this new longitudinal trail will receive enhancements.

This concept has the benefits of both creating 1.5 miles of longitudinal trail and above-grade crossing—both of which were strongly expressed as a need from the community.

Figure 12 Example of a Pedestrian Bridge near Adams Street over I-196 in Holland Township



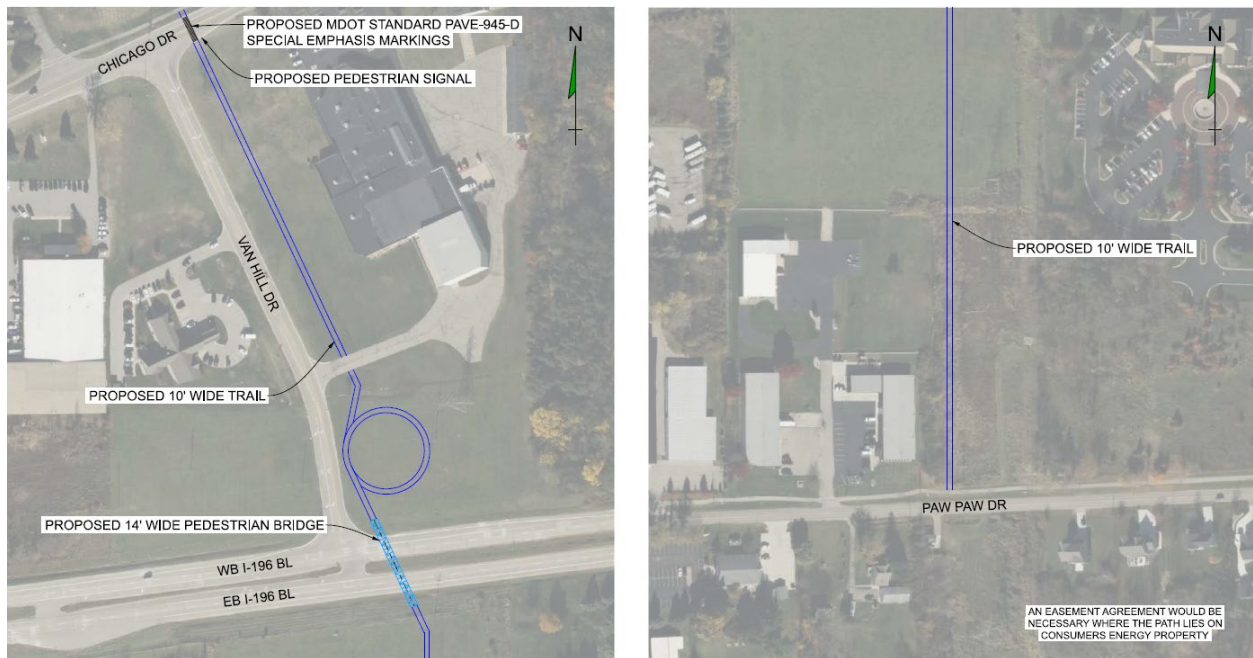
Figure 13 Example of a trail boardwalk adjacent to a road in Glencoe, IL



Van Hill Bridge and Trail

The location of this bridge concept is on the east side of Van Hill Drive. The road intersects with I-196 BL only on the north side between 112th Avenue and 104th Avenue. There are currently no sidewalks or bicycle facilities on the road. All proposed slopes, pathway widths, and surfaces would be in accordance with ADA regulations. Like the Maple Bridge concept, an approximately 5% slope and 17' 0" minimum vertical clearance were assumed. See **Figure 14** for a concept drawing of the recommendation.

Figure 14 Van Hill Bridge and Trail Concept



The concept incorporates a prefabricated bridge across I-196 BL with a circling, sloped approach to the north and a simple sloped incline to the south. Both approaches are estimated to fit within Consumers Energy property and avoid conflicts with overhead wires. The remainder of the 10' trail to the north of the bridge would be within the ROW of Van Hill Drive, cross a private driveway, and terminate at Chicago Drive where a new pedestrian crossing is included. This would provide a connection to the sidepath on the north side of Chicago Drive.

To the south of the crossing, the approach uses a retaining wall for a portion of the sloped segment and the 10' trail continues south within the utility corridor property until it meets the Paw Paw Drive sidepath which is part of the Macatawa River Greenway. The connection point is also about 900' from the Paw Paw Park entrance. An easement agreement with Consumers Energy would be necessary for this concept.

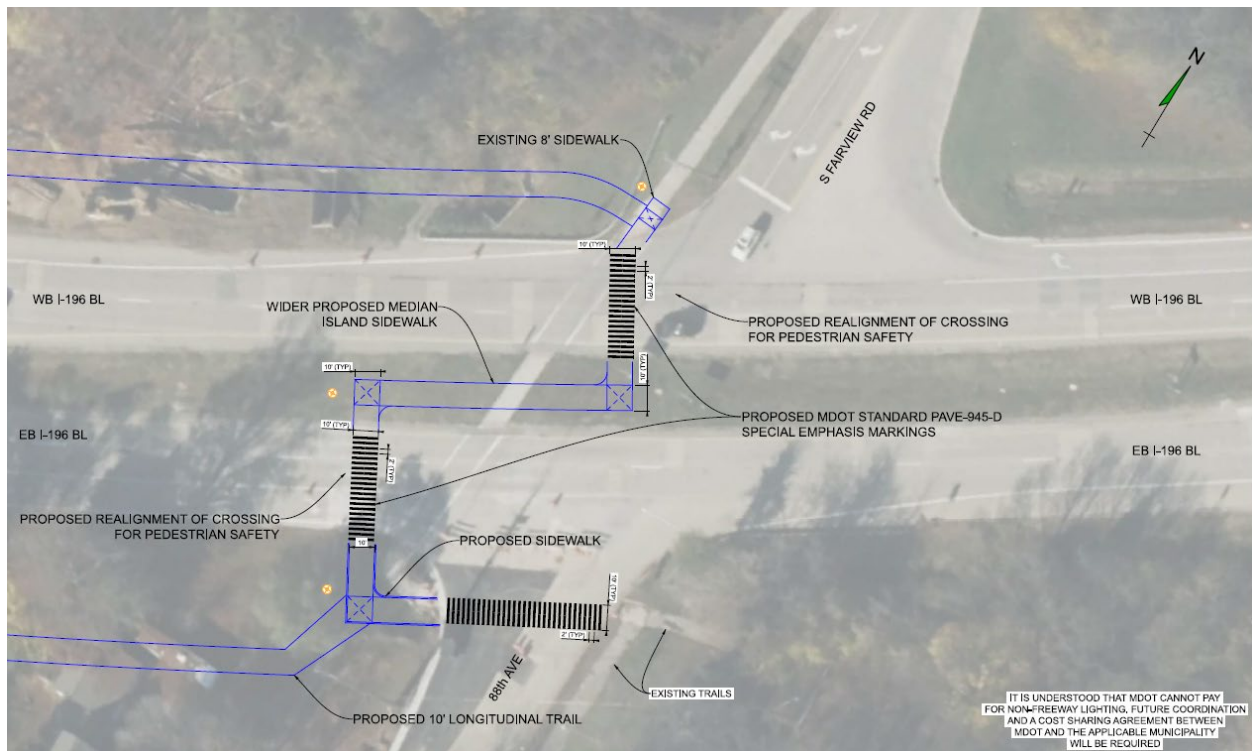
Fairview/88th

The current Fairview/88th crossing is uncontrolled with a standard crosswalk, ADA ramps, and a median refuge island. This location generated more concerns from the public about crossing safety at I-196 BL than any other location. High vehicles speeds and reduced visibility because of the roadway's curve at this location were the primary concerns. The location also provides the closest access to the Macatawa River Greenway portion near the Upper Macatawa Natural Area, a popular recreational location for cycling and hiking. There is currently a sidepath on the east side of 88th Avenue south of the intersection.

The recommendations to improve this crossing include the following elements (show below in **Figure 15**):

- New crossing locations on the north and south legs of the roadway that minimize crossing distances
- New 10' special emphasis pavement markings in the roadway crosswalk and across 88th Avenue (MDOT Pavement Marking Standard PAVE-945-D)
- A pedestrian refuge area in the median of the roadway with sidewalk widened to 10' and connecting the two crossing locations
- A new sidewalk connection from the crossing to the 88th Avenue crossing with potential to also connect to the future longitudinal trail
- Intersection lighting and advanced crossing signage

Figure 15 Fairview/88th Crossing Concept



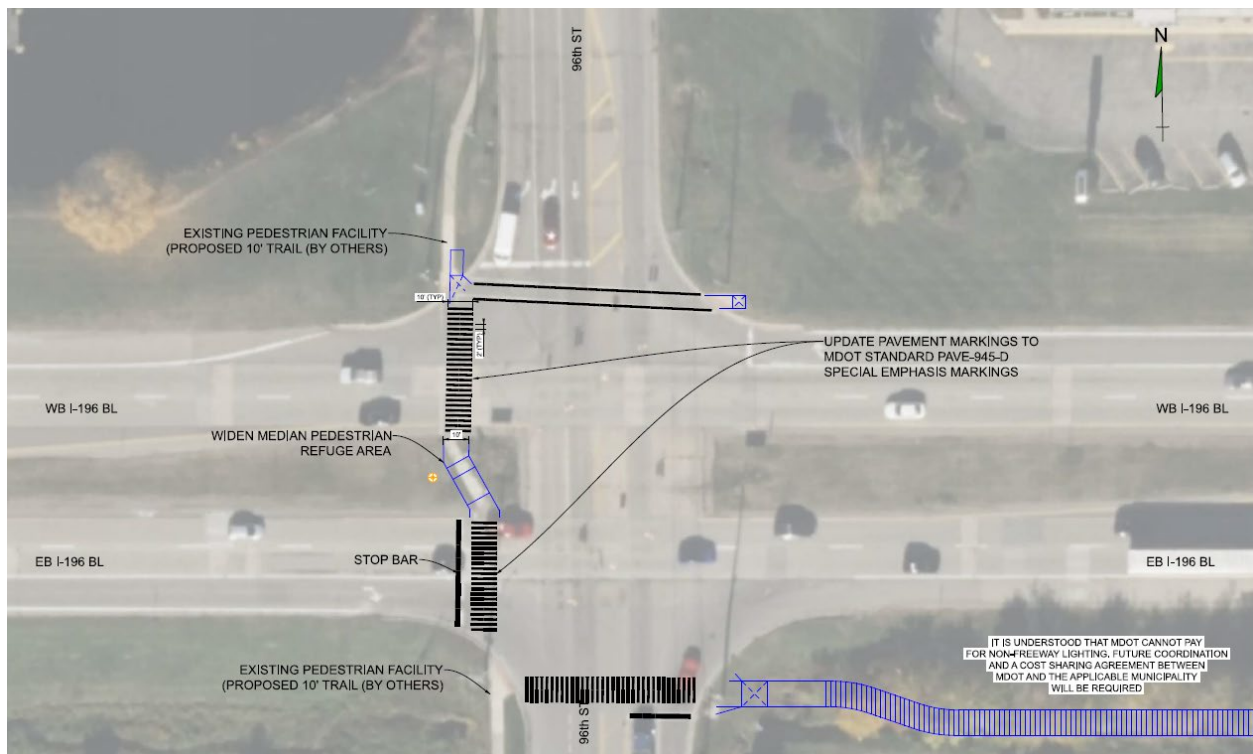
State/96th

The State/96th crossing is a signal-controlled intersection with a crosswalk only on the west side. There are standard crossing pavement marking and a median refuge area. Each leg of the crossing has its own pedestrian signals. Vehicle left turns are restricted from NB 96th street removing a conflict with pedestrians on the north side of the roadway. ADA ramps are present on both sides of the crossing. Nearby land uses include commercial, light industrial, multifamily and single family residential, and a public school.

Recommendations for this intersection include the following elements (shown below in **Figure 16**):

- New 10' special emphasis pavement markings in the roadway crosswalk (MDOT Pavement Marking Standard PAVE-945-D)
- A pedestrian refuge area in the median of the roadway with sidewalk widened to 10'
- Intersection lighting

Figure 16 State/96th Crossing Concept



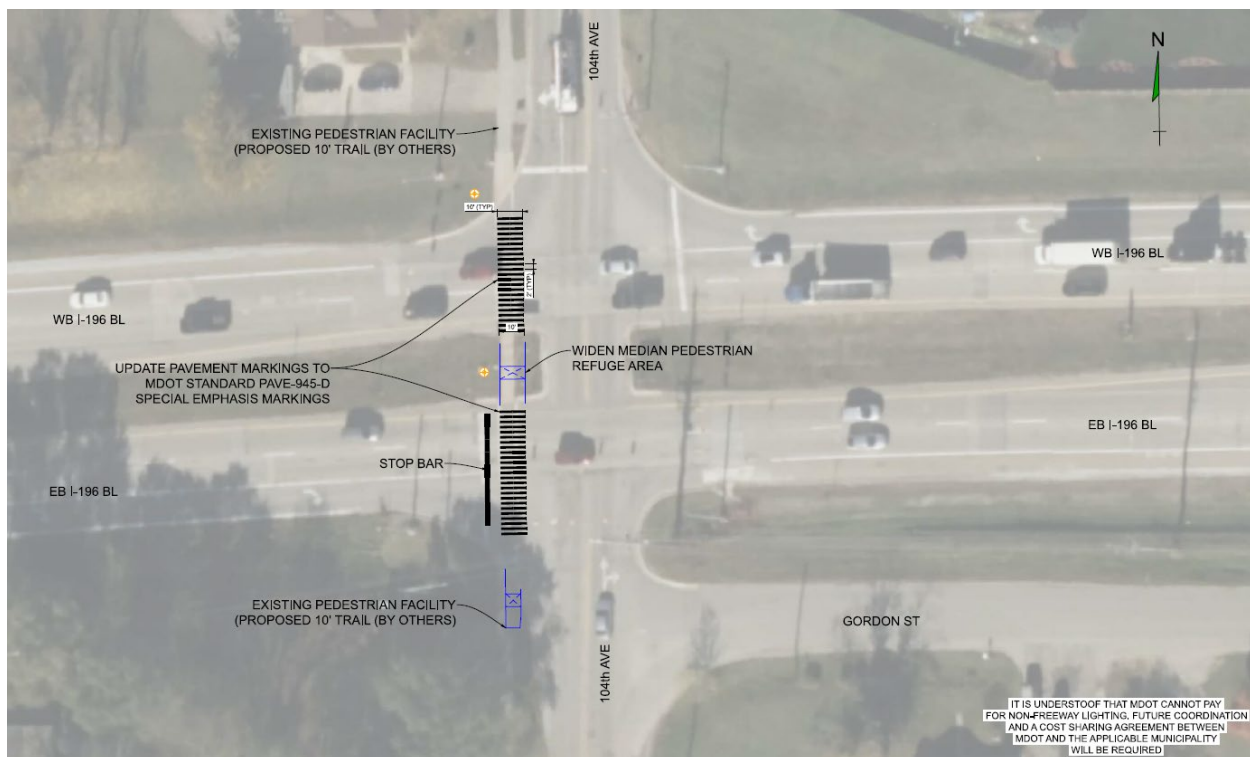
104th

The 104th crossing is a signal-controlled intersection with a crosswalk only on the west side. The crossing connects the sidepath along 104th Avenue which is part of the Macatawa River Greenway. There are standard crossing pavement marking and a median refuge area. Similar to the State/96th crossing, each leg of the crossing has its own pedestrian signals and vehicle left turns are restricted from 96th Street removing a conflict with pedestrians on the north side of the roadway. ADA ramps are present on both sides of the crossing. Nearby land uses include greenspace and single-family residential.

Recommendations for this intersection include the following elements (shown below in **Figure 17**):

- New 10' special emphasis pavement markings in the roadway crosswalk (MDOT Pavement Marking Standard PAVE-945-D)
- A pedestrian refuge area in the median of the roadway with sidewalk widened to 10'
- Intersection lighting

Figure 17 104th Crossing Concept



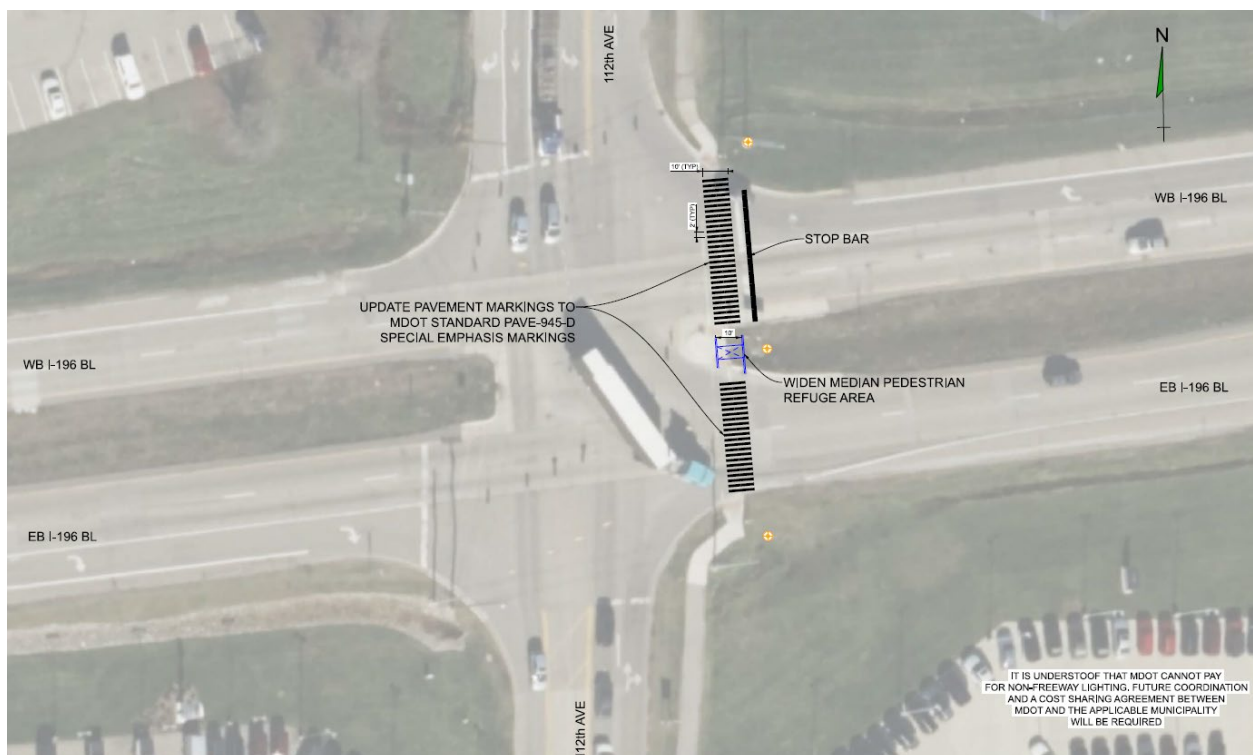
112th

The 112th crossing is a signal-controlled intersection with a crosswalk only on the east side. There are standard crossing pavement markings and a median refuge area. Similar to the above crossings, each leg of the crossing has its own pedestrian signals and ADA ramps are present on both sides of the crossing. Nearby land uses include commercial and light industrial.

Recommendations for this intersection include the following elements (shown below in **Figure 18**):

- New 10' special emphasis pavement markings in the roadway crosswalk (MDOT Pavement Marking Standard PAVE-945-D)
- A pedestrian refuge area in the median of the roadway with sidewalk widened to 10'
- Intersection lighting

Figure 18 112th Crossing Concept



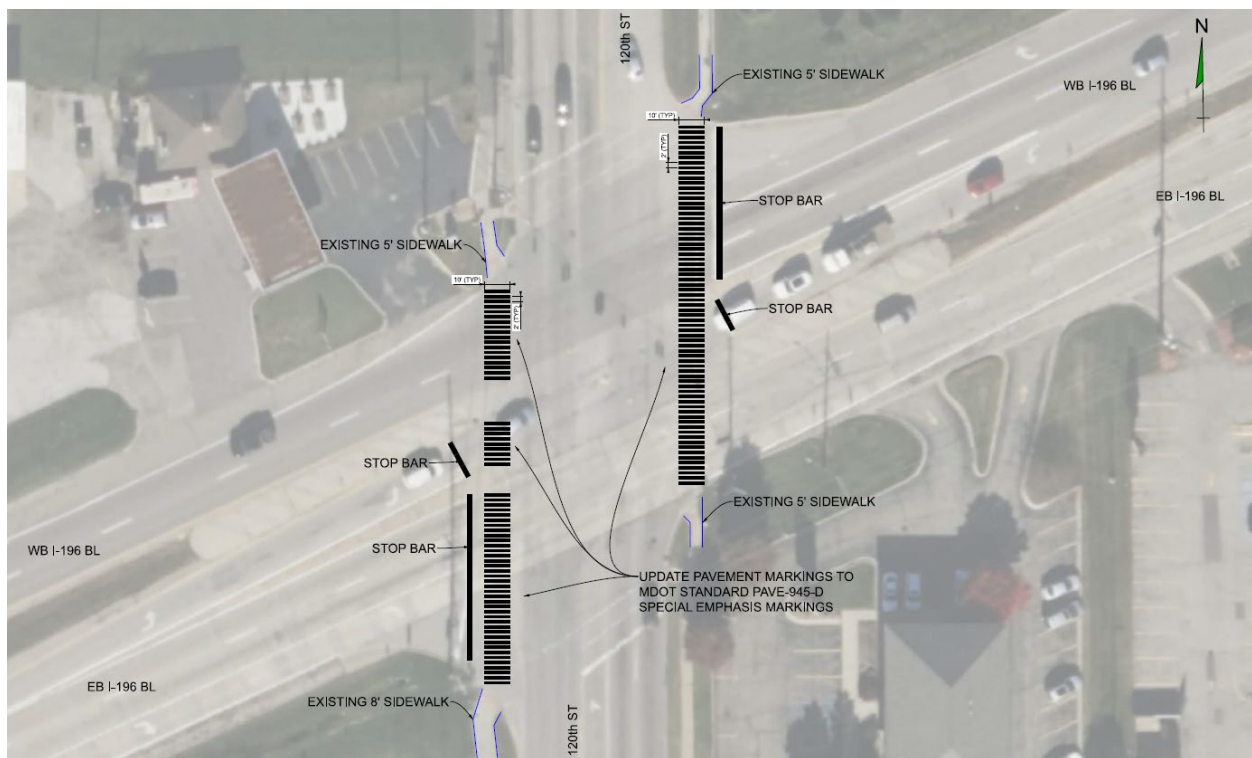
Waverly/120th

The Waverly/120th crossing is a signal-controlled intersection with a crosswalk on both sides. There are standard crossing pavement marking and no median refuge areas. Similar to the other signal-controlled crossings, each leg of the crossing has its own pedestrian signals and ADA ramps are present on both sides of the crossing. Nearby land uses include commercial and greenspace.

Recommendations for this intersection include the following elements (shown below in **Figure 19**):

- New 10' special emphasis pavement markings in the roadway crosswalk (MDOT Pavement Marking Standard PAVE-945-D)
- Intersection lighting

Figure 19 Waverly/120th Crossing Concept



Additional Recommendations for Further Study

Considering the current MDOT roadway design project, many of these recommendations have been incorporated into the larger improvement project for the I-196 BL roadway within the study area (not including the recommended pedestrian bridge and trail alternatives). Future improvements may be incorporated in follow-up studies or as part of separate studies that include larger portions of the City or Township of Zeeland. These additional recommendations for further study include:

- Adding countdown pedestrian timers at all signalized crossings in the study area
- Add a new crossing on the east side of Maple/92nd to connect to the sidepath on the south side of I-196 BL which includes:

- ADA ramps
- Special emphasis pavement markings
- High-Intensity Activated Crosswalk (HAWK) signal
- Add HAWK signals to the north and south directions of I-196 BL at Fairview/88th
- Include traffic calming measures on 88th street at the intersection of I-196 BL (narrow roadway and lanes, remove double turn lane, lessen turning radii)

7.0 Funding Strategy

Obtaining funding for future improvement, especially those outside of the upcoming improvements to I-196 BL, is a critical step toward implementation and options should be considered. The following sources have potential to provide partial or full funding for future projects.

Michigan Act 51 of 1951

Created by Public Act 51 of 1951, this is where all state fuel taxes and license plate fees are deposited. This revenue is shared among transportation agencies for construction, maintenance, and operation of Michigan's transportation systems. The state transportation law (MCLA 247.660k) requires a minimum of 1% of state transportation funds be spent for non-motorized transportation.

Michigan Safe Routes to School Program

The Michigan SRTS program is managed by the Michigan Department of Transportation with support provided by the Michigan Fitness Foundation, and seeks to: enable and encourage students to walk and bicycle to school, make bicycling and walking to school a safer and more appealing transportation choice, and facilitate the planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of elementary and middle schools. Lincoln Elementary school is ¼ mi north from I-196 BL, just east of State Street, and improvements to its crossings could help students walk or bike to it and other schools nearby.

Reconnecting Communities and Neighborhoods Grant Program

This federal program was established by both the 2012 Bipartisan Infrastructure Law and the 2022 Inflation Reduction Act. It aims to prioritize disadvantaged communities, improve access to daily needs, and reconnect communities by removing, retrofitting, or mitigating highways or other transportation facilities that create barriers to community connectivity. It includes nearly \$2 billion in discretionary grant funding each year divided into project categories: capital construction, community planning, and regional partnership challenge. The local match is at least 20%, including with other federal sources.

Safe Streets and Roads for All (SS4A)

The Bipartisan Infrastructure Law established this new discretionary grant program with \$5 billion in appropriated funds over 5 years, 2022-2026. The SS4A program funds regional, local, and Tribal initiatives through grants to prevent roadway deaths and serious injuries. The program includes Implementation Grants which provide Federal funds to implement projects and strategies identified in an Action Plan to address a roadway safety problem. Projects and strategies can be infrastructure, behavioral, and/or operational activities. The standard local match is 20%.

Congestion Mitigation and Air Quality (CMAQ)

The primary goal of this federal program is to reduce traffic congestion and enhance air quality. These funds can be used for either the construction of bicycle transportation facilities and pedestrian

walkways, bike lanes on existing streets, or non-construction projects such as bike share equipment. Funds are available to counties designated as non-attainment areas for air quality, based on federal standards. The standard local match is also 20%.

A comprehensive list of Pedestrian Bicycle funding opportunities is hosted on Michigan state website.⁴

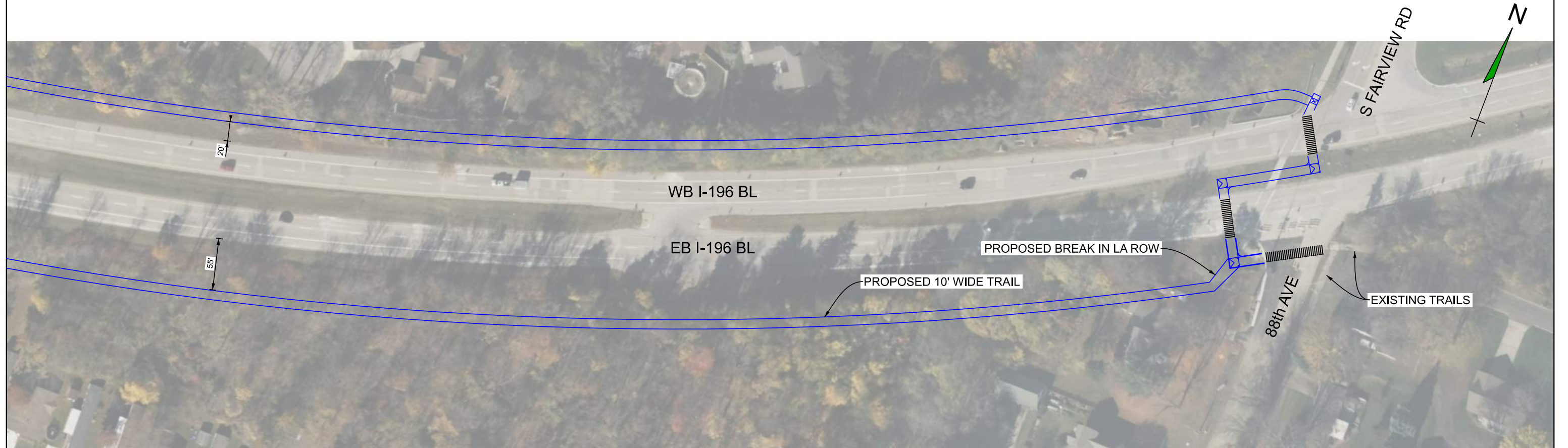
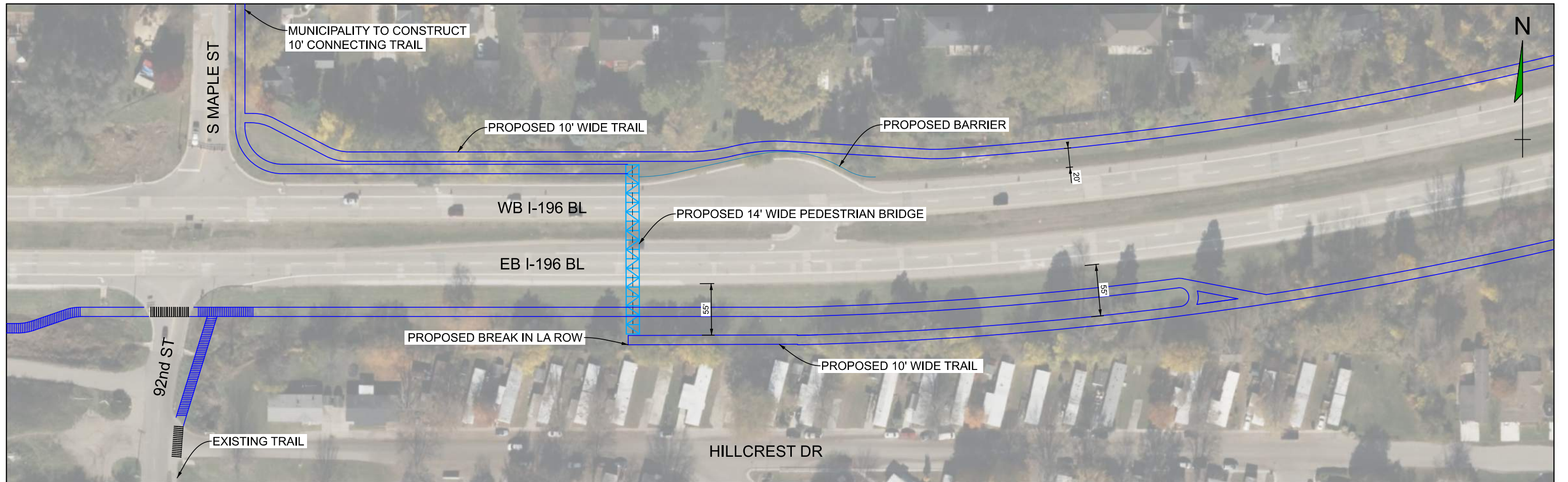
8.0 Conclusion

In conclusion, there is growing concern for non-motorized crossing facilities and the need for safe and efficient means of transportation at I-196 BL within the study area. This study identifies the problem of inadequate non-motorized crossings and provides an analysis of potential solutions with guidance from industry best practices and design elements included in the MDOT reconstruct and rehabilitation project. Future improvements that address community desires such as an above-grade crossing and increased connectivity to existing pedestrian and bicycle facilities are also included.

The MACC's vision for safer, more comfortable non-motorized travel across I-196 BL is attainable and already in process with the I-196 BL roadway project as prompted by this study. Additional improvements recommended in this study will go further in providing pedestrians and cyclists a safer and more connected non-motorized network in the Zeeland community.

⁴ https://www.michigan.gov/msp/-/media/Project/Websites/msp/ohsp/1_Fall_2022_Teen/Pedestrian-and-Bicycle-Funding-Opportunities-2022.pdf?rev=bcd2ba6f73d24d1b90a0836c5b2bdd53&hash=70359BC11576D7EE7A2A85C46C34B741

Appendix A - Exhibits



FINAL ROW PLAN REVISIONS		SUBMITTAL DATE:	
NO.	DATE	AUTH	DESCRIPTION



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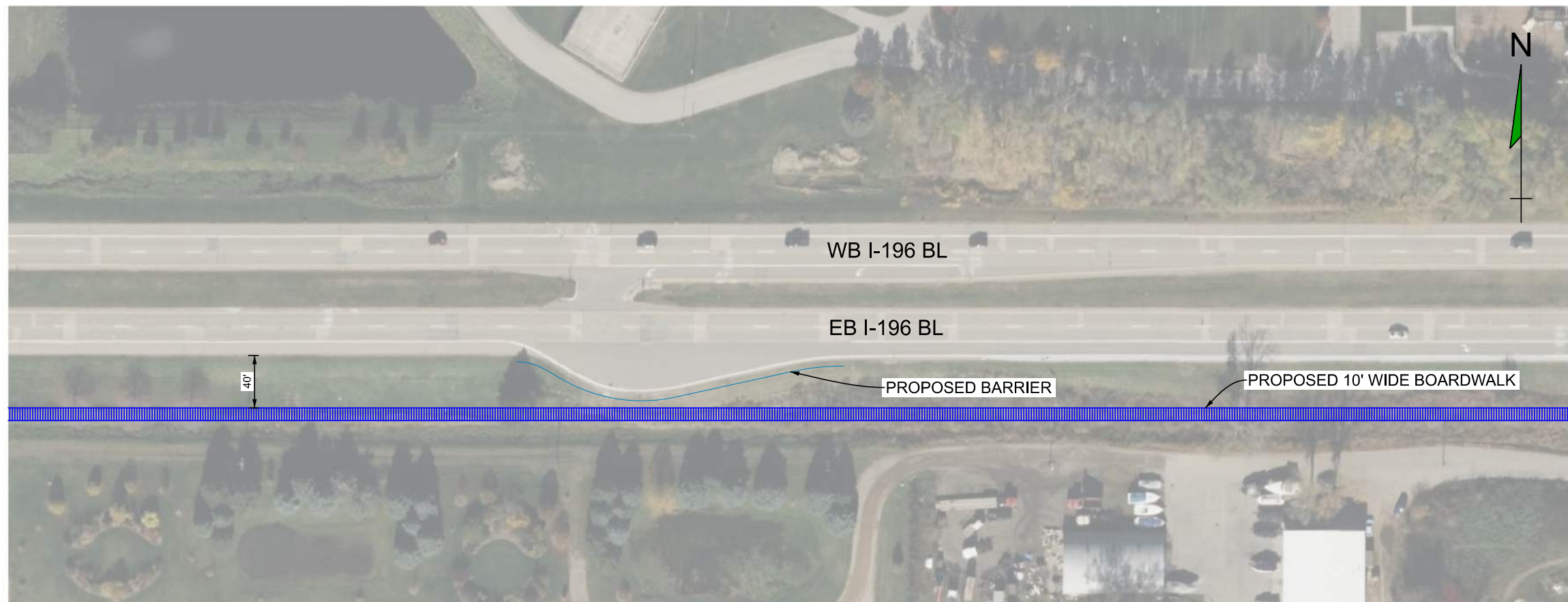
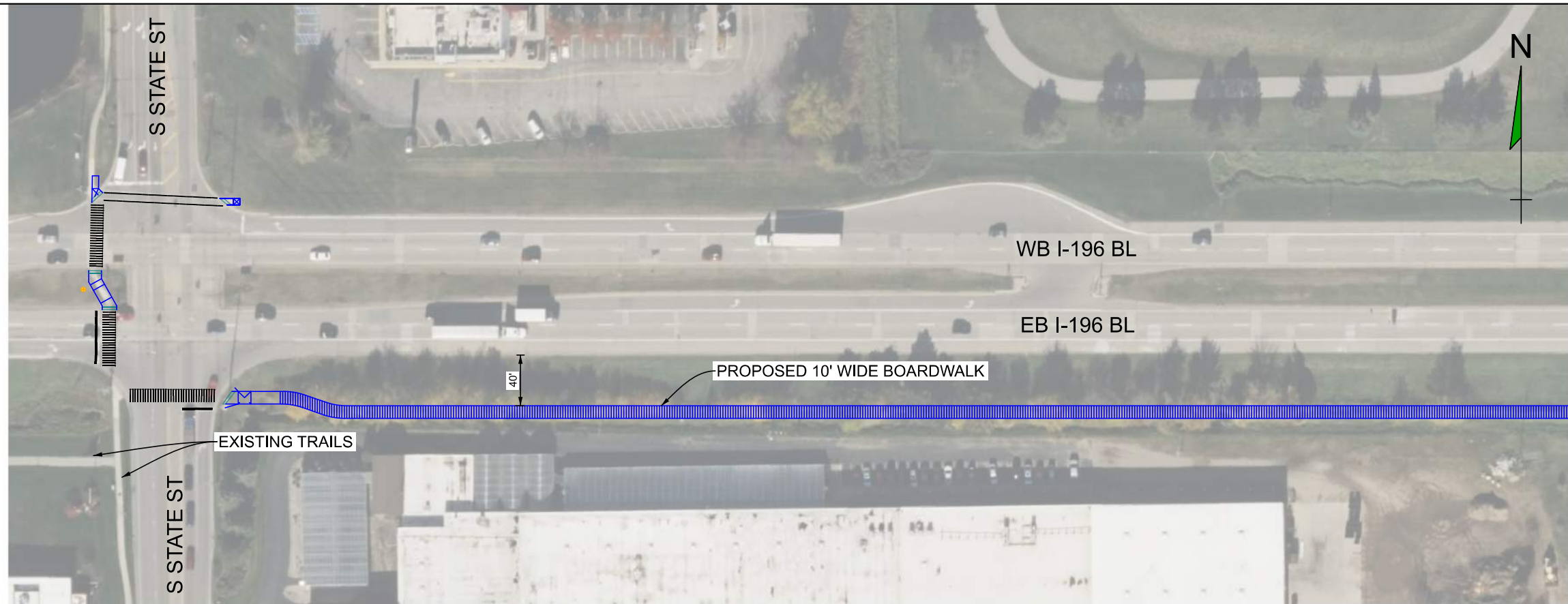
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DATE: 08/03/23
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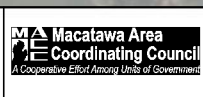
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JN: 278608

MACC EXHIBIT
PROPOSED PEDESTRIAN BRIDGE - MAPLE ST

DRAWING SHEET
SECT



FINAL ROW PLAN REVISIONS			SUBMITTAL DATE:				
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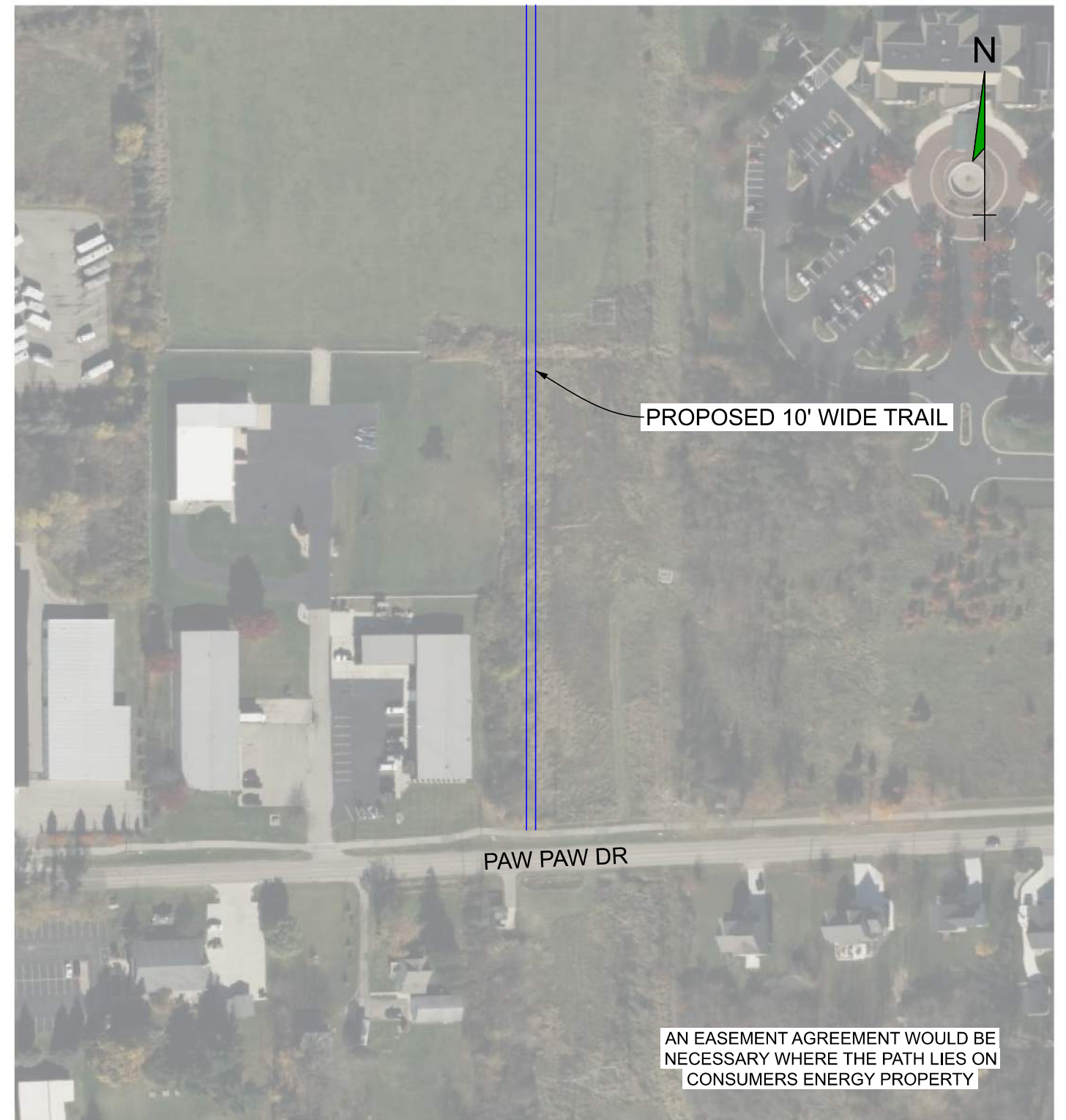
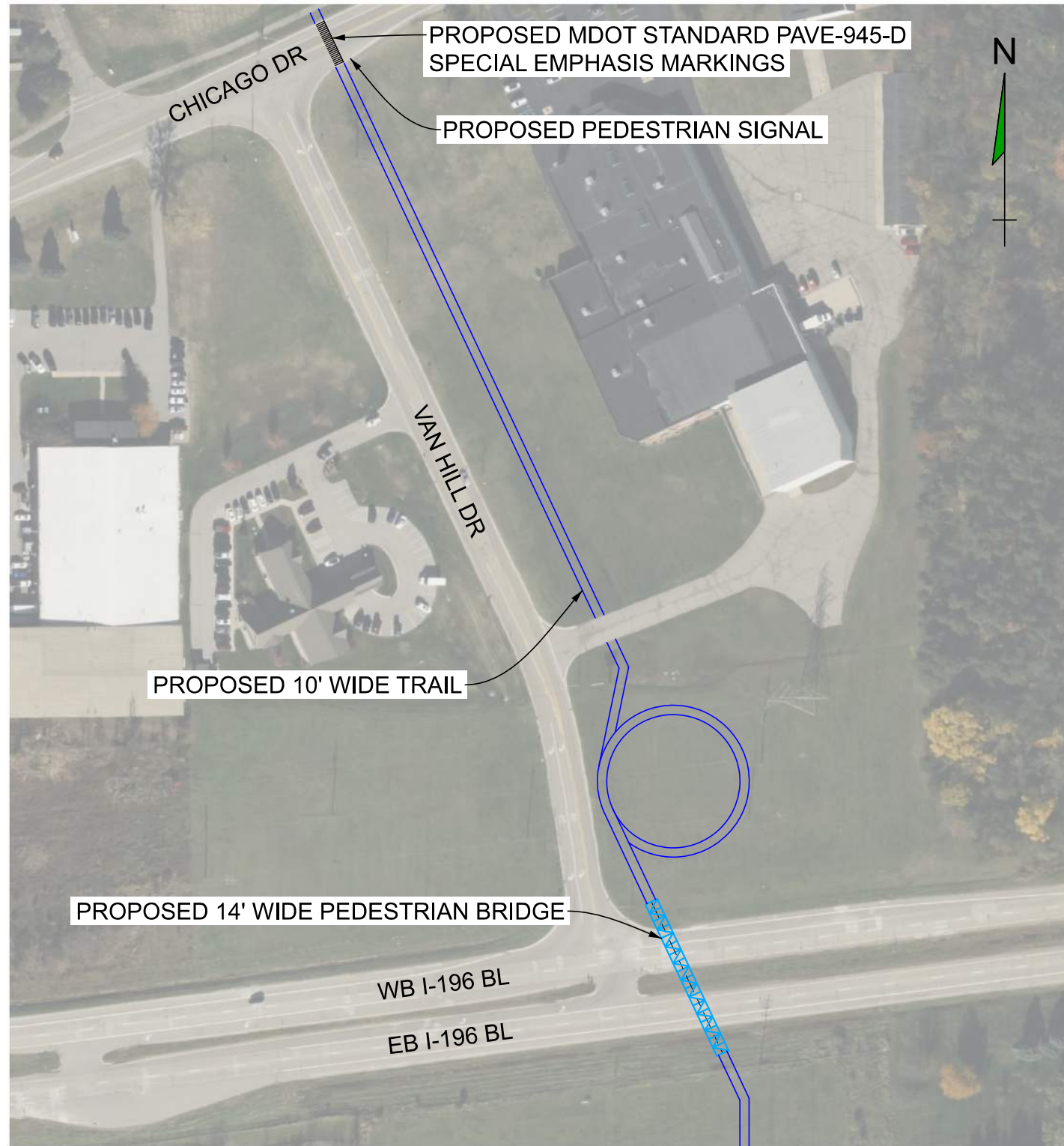
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DATE: 09/18/23
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CS:
JN: 278608

MACC EXHIBIT
PROPOSED PEDESTRIAN BOARDWALK

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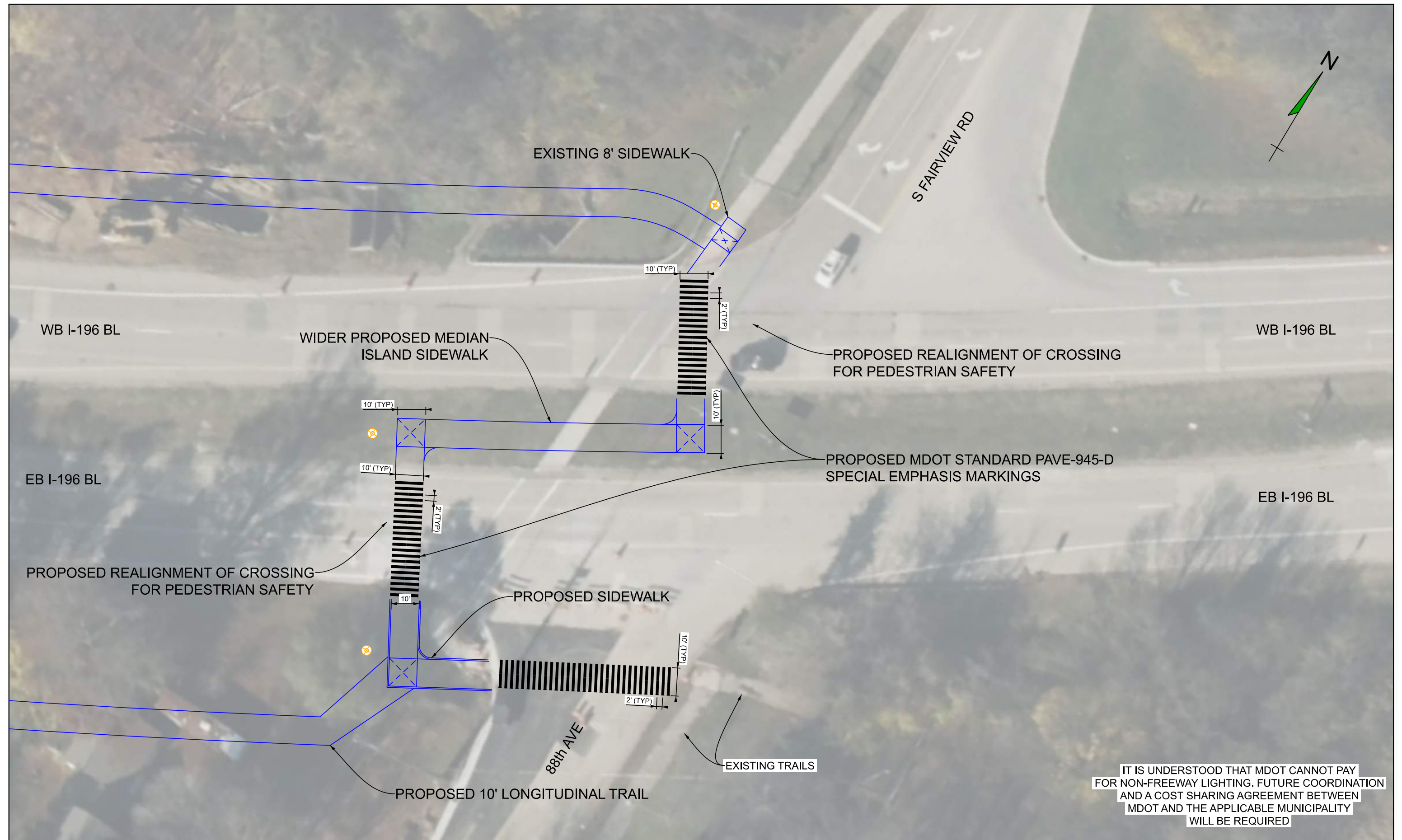
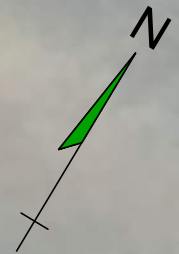
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DATE: 08/03/23
DESIGN UNIT:
TSC:

CS:
JN: 278608

MACC EXHIBIT
PROPOSED PEDESTRIAN BRIDGE - VAN HILL DR

DRAWING SHEET
SECT



IT IS UNDERSTOOD THAT MDOT CANNOT PAY FOR NON-FREEWAY LIGHTING. FUTURE COORDINATION AND A COST SHARING AGREEMENT BETWEEN MDOT AND THE APPLICABLE MUNICIPALITY WILL BE REQUIRED

FINAL ROW PLAN REVISIONS						SUBMITTAL DATE:					
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FILE: MACC_Exhibits.dgn

DATE: 08/03/23
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JN: 278608

MACC EXHIBIT
88TH INTERSECTION

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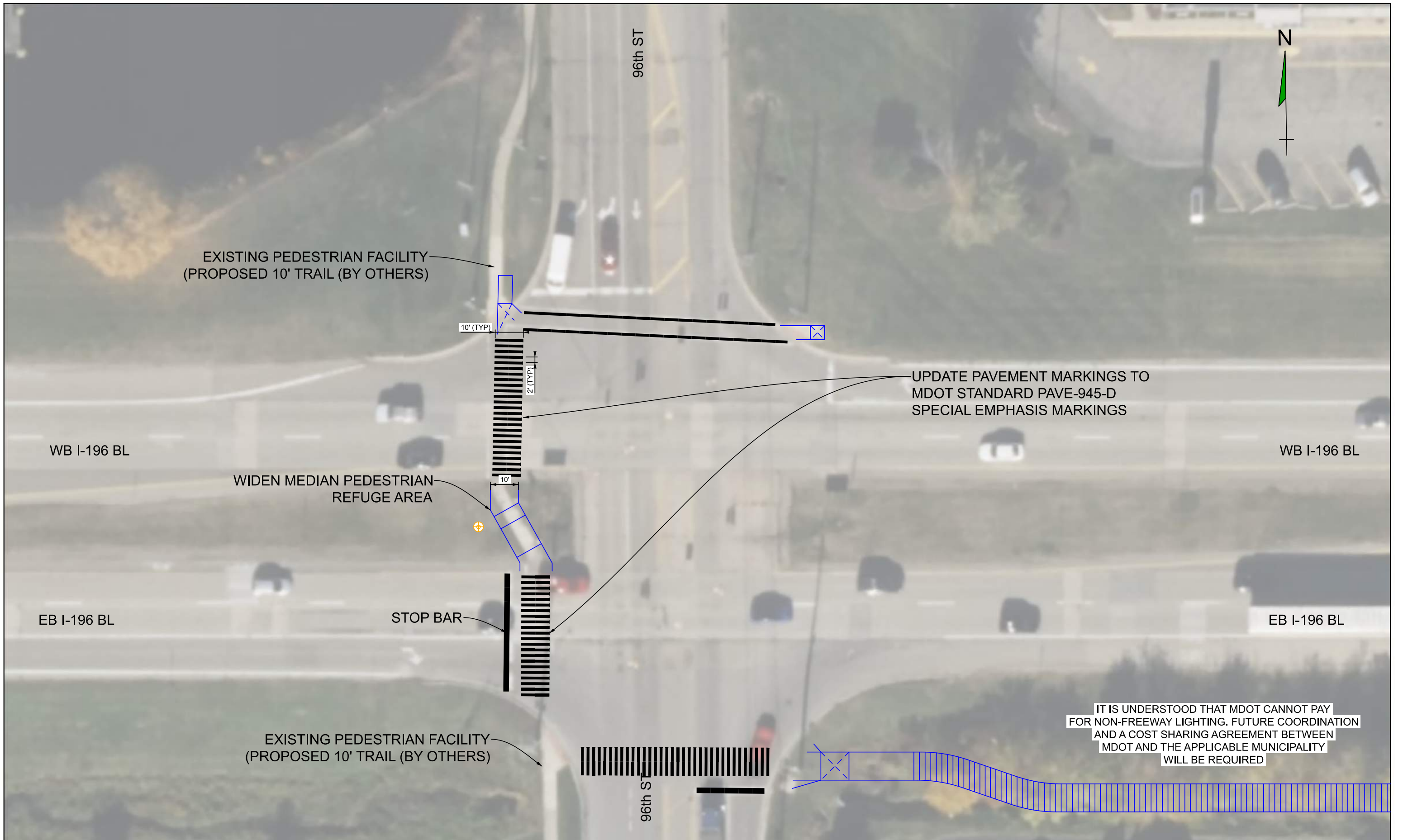
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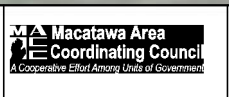
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MACC EXHIBIT
92ND INTERSECTION

DRAWING SHEET
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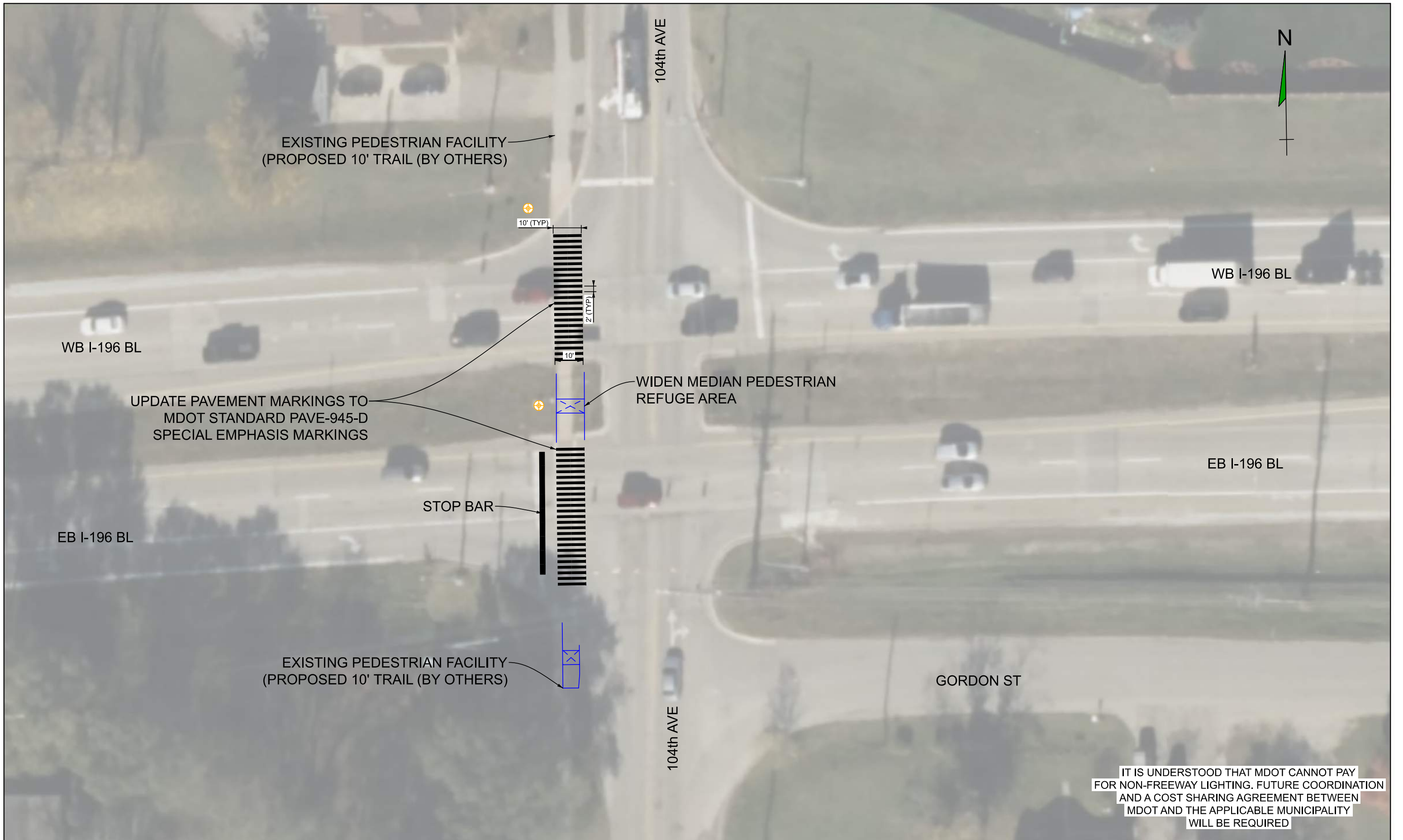
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MACC EXHIBIT
96TH INTERSECTION

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SECT



IT IS UNDERSTOOD THAT MDOT CANNOT PAY FOR NON-FREEWAY LIGHTING. FUTURE COORDINATION AND A COST SHARING AGREEMENT BETWEEN MDOT AND THE APPLICABLE MUNICIPALITY WILL BE REQUIRED

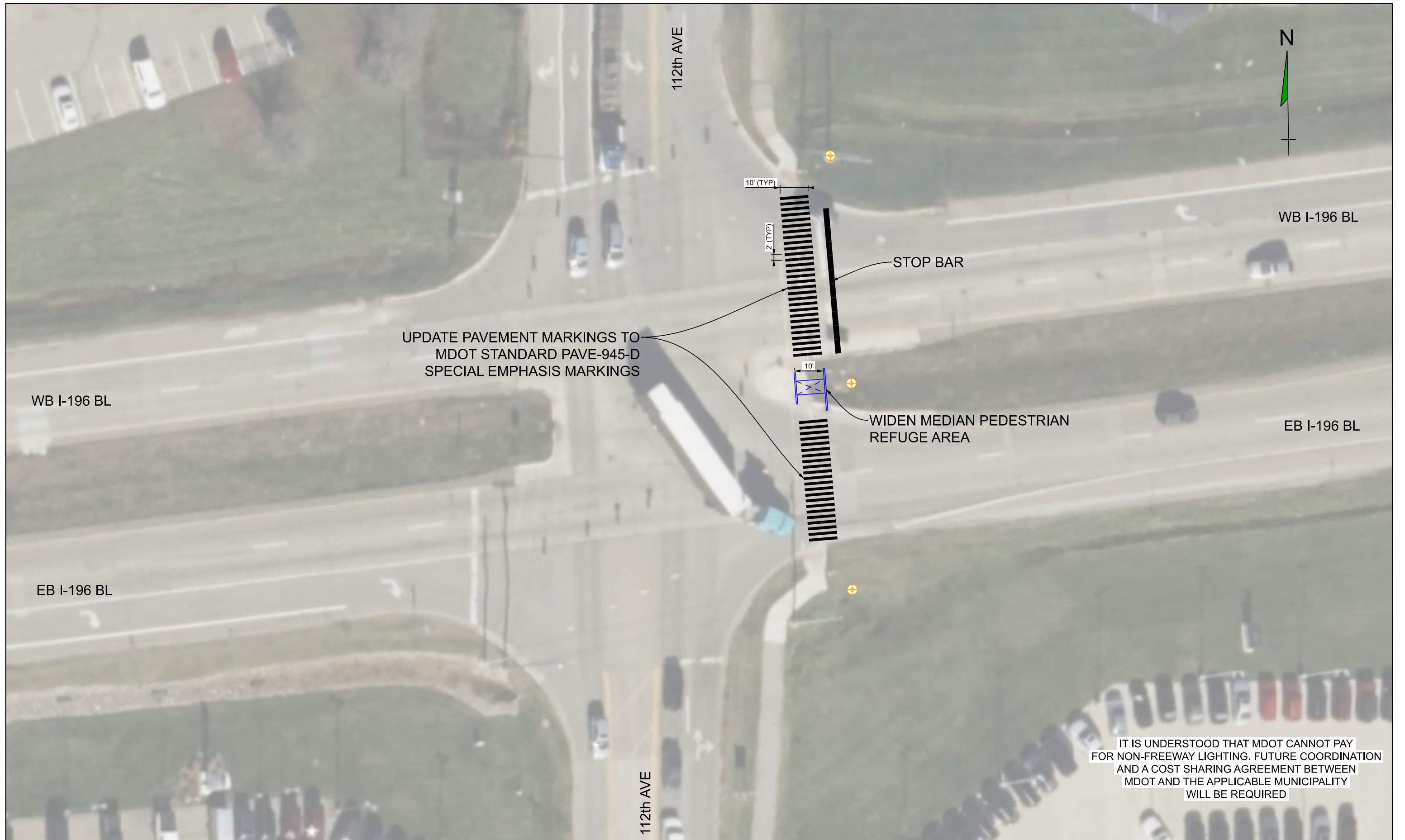
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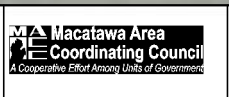
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MACC EXHIBIT	DRAWING	SHEET
104TH INTERSECTION		SECT



IT IS UNDERSTOOD THAT MDOT CANNOT PAY FOR NON-FREEWAY LIGHTING. FUTURE COORDINATION AND A COST SHARING AGREEMENT BETWEEN MDOT AND THE APPLICABLE MUNICIPALITY WILL BE REQUIRED

FINAL ROW PLAN REVISIONS		SUBMITTAL DATE:	
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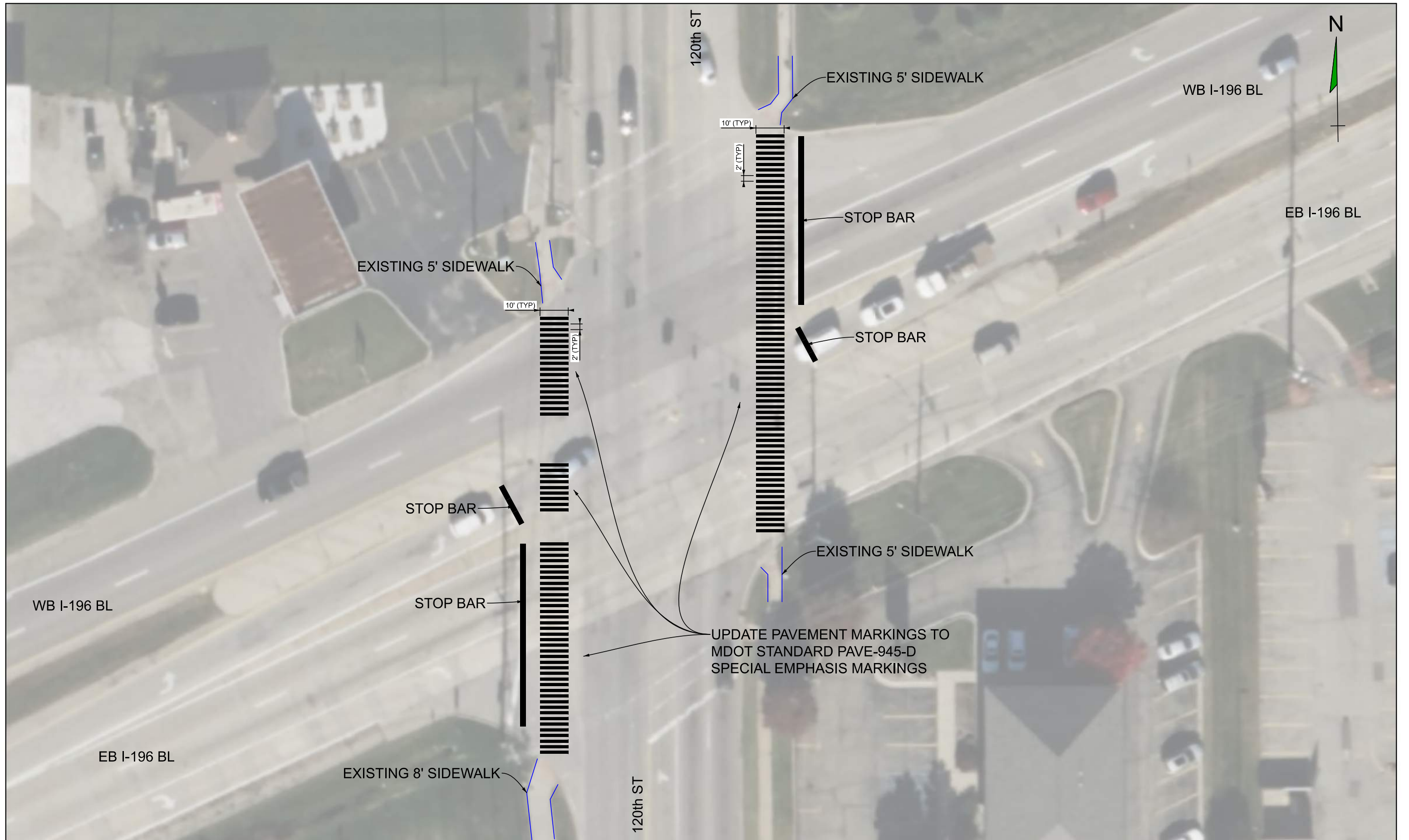
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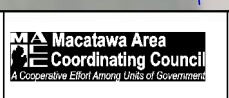
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MACC EXHIBIT
112TH INTERSECTION

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FINAL ROW PLAN REVISIONS		SUBMITTAL DATE:	
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FILE: MACC_Exhibits.dgn

DATE: 08/03/23
DESIGN UNIT:
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JN: 278608

MACC EXHIBIT
120TH INTERSECTION

DRAWING SHEET
SECT

Appendix B – Cost Estimates



Project: MACC Non-Motorized Crossing Study
Street Name: Maple St Pedestrian Bridge Enhancements

Project Cost Estimate: Maple St Pedestrian Bridge Enhancements

<u>Item Section</u>	<u>Total:</u>
Street Construction	
Earthwork	\$42,959
Bases	\$122,247
HMA Pavements & Surface Treatments	\$159,600
Structures	\$4,814,763
Incidental Construction	\$596,833
SUB-TOTAL:	\$5,736,410
Traffic and Amenities	
Signing & Pavement Markings	\$1,140
Lighting	\$27,480
SW Ramps	\$6,664
SUB-TOTAL:	\$35,290
Miscellaneous	
Maintenance of Traffic	\$699,488
Erosion Control (1%)	\$57,364
SUB-TOTAL:	\$756,860
CONSTRUCTION TOTAL	\$6,528,560
Other Costs	
Contingencies (30% of Construction Total)	\$1,958,568
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$254,614
Mobilization (10% of Construction Total, Contingencies and Staking)	\$874,174
CONSTRUCTION GRAND TOTAL	\$9,615,916
Other Project Costs	
Preliminary Engineering (10% of Construction Total)	\$961,592
Construction Engineering (10% of Construction Total)	\$961,592
Right of Way	\$100,000
SUB-TOTAL:	\$2,023,183
PROJECT COST	\$11,639,100

Estimated unit prices were taken from MDOT's average item price reports (2023)



Project: MACC Non-Motorized Crossing Study
Street Name: Van Hill Dr Pedestrian Bridge Enhancements

Project Cost Estimate: Van Hill Dr Pedestrian Bridge Enhancements

<u>Item Section</u>	<u>Total:</u>
Street Construction	
Earthwork	\$6,358
Bases	\$56,838
HMA Pavements & Surface Treatments	\$51,450
Structures	\$3,463,547
Incidental Construction	\$59,371
SUB-TOTAL:	\$3,637,570
Traffic and Amenities	
Signing & Pavement Markings	\$600
Signals	\$10,298
Lighting	\$6,870
SW Ramps	\$6,664
SUB-TOTAL:	\$24,440
Miscellaneous	
Maintenance of Traffic	\$443,806
Erosion Control (1%)	\$36,376
SUB-TOTAL:	\$480,190
CONSTRUCTION TOTAL	\$4,142,200
Other Costs	
Contingencies (30% of Construction Total)	\$1,242,660
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$161,546
Mobilization (10% of Construction Total, Contingencies and Staking)	\$554,641
CONSTRUCTION GRAND TOTAL	\$6,101,046
Other Project Costs	
Preliminary Engineering (10% of Construction Total)	\$610,105
Construction Engineering (10% of Construction Total)	\$610,105
SUB-TOTAL:	\$1,220,209
PROJECT COST	\$7,321,260

Estimated unit prices were taken from MDOT's average item price reports (2023)



Project: MACC Non-Motorized Crossing Study
Street Name: 88th St Enhancements

Project Cost Estimate: 88th St Enhancements

<u>Item Section</u>		<u>Total:</u>
Traffic and Amenities		
Lighting		\$20,610
SUB-TOTAL:		\$20,610
Miscellaneous		
Maintenance of Traffic		\$2,061
SUB-TOTAL:		\$2,061
CONSTRUCTION TOTAL		\$22,671
Other Costs		
Contingencies (30% of Construction Total)	\$6,801	
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$884	
Mobilization (10% of Construction Total, Contingencies and Staking)	\$3,036	
CONSTRUCTION GRAND TOTAL	\$33,392	
Other Project Costs		
Preliminary Engineering (10% of Construction Total)	\$3,339	
Construction Engineering (10% of Construction Total)	\$3,339	
SUB-TOTAL:	\$6,678	
PROJECT COST		\$40,080

Estimated unit prices were taken from MDOT's average item price reports (2023)



Project: MACC Non-Motorized Crossing Study
Street Name: 96th St Enhancements

Project Cost Estimate: 96th St Enhancements

<u>Item Section</u>		<u>Total:</u>
Traffic and Amenities		
Lighting		\$6,870
SUB-TOTAL:		\$6,870
Miscellaneous		
Maintenance of Traffic		\$687
SUB-TOTAL:		\$687
CONSTRUCTION TOTAL		\$7,557
Other Costs		
Contingencies (30% of Construction Total)	\$2,267	
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$295	
Mobilization (10% of Construction Total, Contingencies and Staking)	\$1,012	
CONSTRUCTION GRAND TOTAL	\$11,131	
Other Project Costs		
Preliminary Engineering (10% of Construction Total)	\$1,113	
Construction Engineering (10% of Construction Total)	\$1,113	
SUB-TOTAL:	\$2,226	
PROJECT COST		\$13,360

Estimated unit prices were taken from MDOT's average item price reports (2023)



Project: MACC Non-Motorized Crossing Study
Street Name: 104th St Enhancements

Project Cost Estimate: 104th St Enhancements

<u>Item Section</u>		<u>Total:</u>
Traffic and Amenities		
Lighting		\$13,740
SUB-TOTAL:		\$13,740
Miscellaneous		
Maintenance of Traffic		\$1,374
SUB-TOTAL:		\$1,374
CONSTRUCTION TOTAL		\$15,114
Other Costs		
Contingencies (30% of Construction Total)	\$4,534	
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$589	
Mobilization (10% of Construction Total, Contingencies and Staking)	\$2,024	
CONSTRUCTION GRAND TOTAL	\$22,261	
Other Project Costs		
Preliminary Engineering (10% of Construction Total)	\$2,226	
Construction Engineering (10% of Construction Total)	\$2,226	
SUB-TOTAL:	\$4,452	
PROJECT COST		\$26,720

Estimated unit prices were taken from MDOT's average item price reports (2023)



Project: MACC Non-Motorized Crossing Study
Street Name: 112th St Enhancements

Project Cost Estimate: 112th St Enhancements

<u>Item Section</u>		<u>Total:</u>
Traffic and Amenities		
Lighting		\$20,610
SUB-TOTAL:		\$20,610
Miscellaneous		
Maintenance of Traffic		\$2,061
SUB-TOTAL:		\$2,061
CONSTRUCTION TOTAL		\$22,671
Other Costs		
Contingencies (30% of Construction Total)	\$6,801	
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$884	
Mobilization (10% of Construction Total, Contingencies and Staking)	\$3,036	
CONSTRUCTION GRAND TOTAL	\$33,392	
Other Project Costs		
Preliminary Engineering (10% of Construction Total)	\$3,339	
Construction Engineering (10% of Construction Total)	\$3,339	
SUB-TOTAL:	\$6,678	
PROJECT COST		\$40,080

Estimated unit prices were taken from MDOT's average item price reports (2023)