# Appendix D

## City of Ann Arbor
## Lower Town Mobility Study
## Road Safety Audit

# FINAL REPORT

July 2020

Prepared for:

By:

# City of Ann Arbor
## Lower Town Mobility Study

# Road Safety Audit

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## APPENDICES

# 1.0 INTRODUCTION

The Lower Town Mobility Study is a study attempting to understand how the effects of population and employment growth are impacting the movement of people through the Lower Town neighborhood, while seeking ways to support the ease of movement and safety of all travelers, including pedestrians, bicyclists, transit users, and those in personal and commercial vehicles. A key piece of this Study is to perform a Road Safety Audit (RSA) to understand the potential safety hazards that exist in the area and how they relate to the mobility issues in Lower Town.

An RSA is a formal safety evaluation of planned or existing roadways by an independent, multidisciplinary audit team. The team looks for potential safety hazards that may affect any type of road user and suggests measures to mitigate those safety issues. RSAs help promote road safety by identifying safety issues during the planning, design, and implementation stages, promoting awareness of safe design practices, integrating multimodal safety concerns, and considering human factors. The RSA team is composed of transportation professionals and individuals with special skills in traffic safety, roadway design, non-motorized facilities, and school safety. The RSA team leader and team members conduct field reviews (both day and night) and prepare the audit report. Procedures in performing an RSA are detailed in the FHWA Road Safety Audit Guidelines.

This RSA was performed as part of the Lower Town Mobility Study and followed the 8-step process as detailed in the FHWA Road Safety Audit Guidelines:

Step 1: Identify Project
Step 2: Select an RSA Team
Step 3: Conduct a Pre-Audit Meeting to Review Project Information and Drawings
Step 4: Conduct Review Analysis and Prepare Report of Findings
Step 5: Conduct Audit Analysis and Prepare Report of Findings
Step 6: Present Audit Findings to Project Owner/Design Team
Step 7: Prepare Formal Response
Step 8: Incorporate Findings into the Project when Appropriate

This RSA will help inform the recommendations made as part of the Study, specifically those centered around safety. The process, methodology for this analysis, and data obtained throughout the study, as well as all significant findings, safety issues, and recommended mitigation strategies will be detailed in this Report.

## *1.1 Project Location*

The Lower Town Neighborhood, and greater project Study Area, is located on the north side of the City of Ann Arbor, north of the Huron River. The "center" of the neighborhood is the intersection of Broadway Street, Maiden Lane, and Moore Street. The majority of the Study Area is located south of Barton Drive, west of Plymouth Road, north of the Huron River, and east of Chandler Road. The RSA also encompassed Pontiac Trail to Dhu Varren Road and Division Street to Catherine Street. See Figure 1 on the next page for the full Study Area location.

The objectives of the study are to:

- Review traffic operations and safety on the corridor
- Identify physical and operational problems that may affect traffic safety
- Suggest mitigating measures

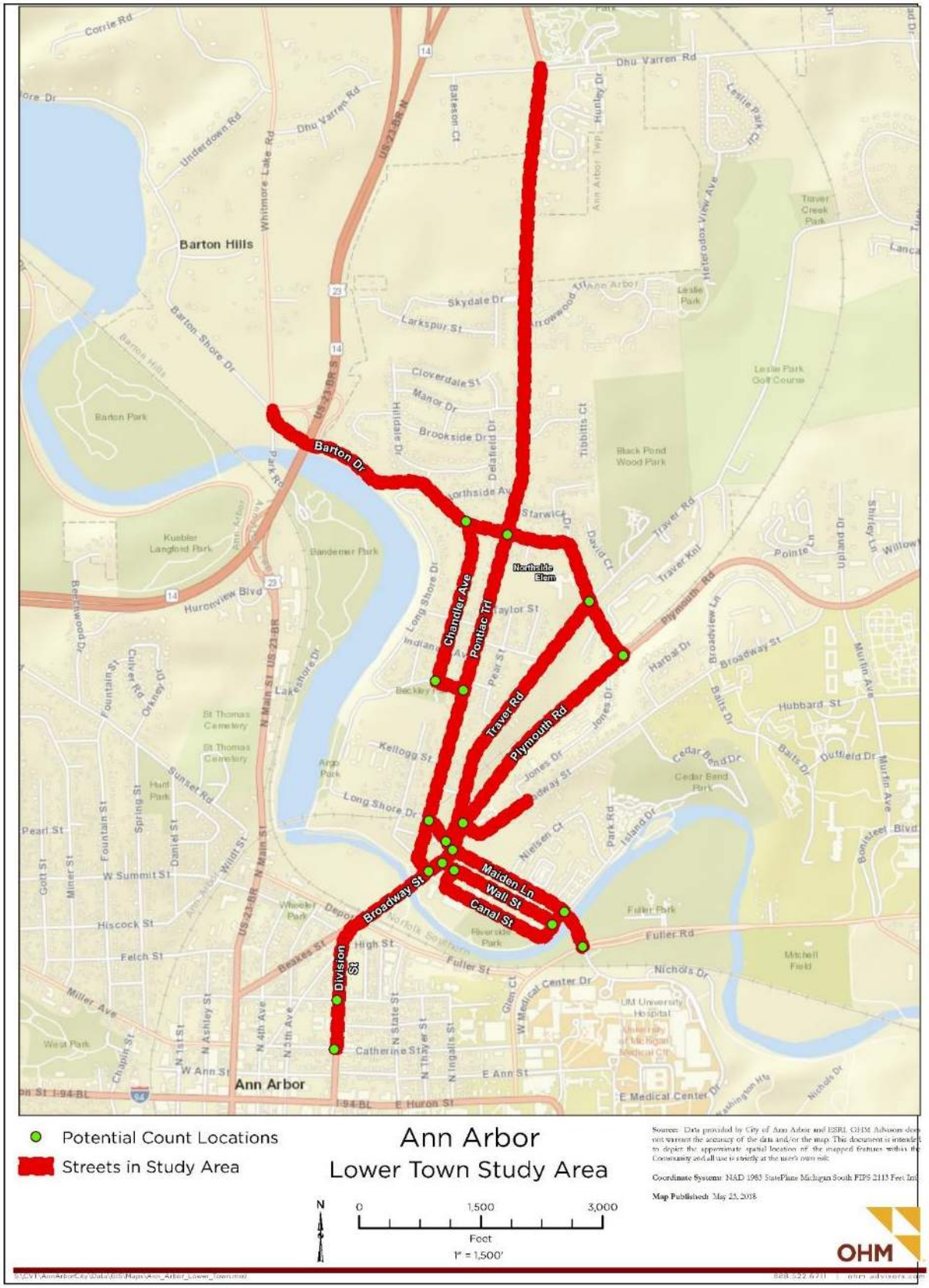


**Figure 1 – Lower Town Mobilty Study Project Location**

# 2.0 ROAD SAFETY AUDIT

## *2.1 Road Safety Audit Team*

An experienced and independent group of transportation professionals from the Lower Town Mobility Study team participated in the Lower Town RSA. The location, RSA team members, and audit days are listed below:

Location: Lower Town neighborhood, Ann Arbor, MI

| | | | |
|---|---|---|---|
| Audit Team Members: | Steve Loveland | Team Leader | OHM Advisors |
| | Stephan Maxe | Assistant | OHM Advisors |
| | Stephen Dearing | Geometrics & Human Factors | OHM Advisors |
| | Andrew Ceifetz | Safety | WSP |
| | Eric Dryer | Non-Motorized | OHM Advisors |
| | Matt Clark | Operations | OHM Advisors |
| | Taryn Juidici | School Facilities | OHM Advisors |

| | |
|---|---|
| Project Owner: | City of Ann Arbor, MI |
| Review Date: | February 4 – February 6, 2020 |
| Audit Stage: | Existing Road Safety Audit |
| Start Up Meeting: | February 4, 2020 at 10:00 AM |
| Preliminary Findings Meeting: | February 13, 2020 at 10:00 AM |
| Stakeholders in Attendance: | City of Ann Arbor Engineering Department<br>Ann Arbor Fire Department<br>Ann Arbor Area Transportation Authority (The Ride)<br>Ann Arbor Public Schools<br>City of Ann Arbor Planning Department |

The RSA team members conducted this audit to the best of their professional abilities within the on-site time available and by referring to provided information. While every attempt has been made to identify significant safety issues, the project owner is reminded that responsibility of the design, construction, and performance of the roadway remains with the agency with jurisdictional authority.

## *2.2 Road Safety Audit Materials*

The RSA was based on the following data and analyses:

Streets Reviewed:

- Division St from Catherine St to Broadway St
- Broadway St from Division St to Plymouth Rd
- Plymouth Rd from Broadway St to Barton Dr
- Barton Dr from Plymouth Rd to M-14
- Pontiac Trail from Dhu Varren Rd to Moore St and Swift St
- One-way pair of Moore St and Swift St
- Maiden Lane, Wall St and Canal St
- Traver Rd and Chandler Rd

Study Area Review: Site visits were conducted between February 4, 2020 and February 6, 2020 to review the intersection geometry, non-motorized facilities, public transit infrastructure, and adjacent land use and to observe traffic operations and safety conflicts.

Traffic Counts: A variety of traffic data were collected in mid-November 2019. There were 26 intersections where 13 hours of turning movement count (TMC) data was collected. Further, there were six nodes identified for the purposes of obtaining origin / destination (O/D) data within the study area. The TMC's included mode and vehicle classification information for the number of pedestrians, bicyclists, personal automobiles, busses, light trucks, etc. The O/D information used Wi-Fi MAC addresses to estimate the number of vehicles traveling between the identified nodes, their general travel times and speeds, and how they varied though the day of data collection.

Crash Data: Five years of crash data was obtained for the key roadways in the study area. The data encompassed the period of January 1, 2014 through December 31, 2018. This data was summarized and analyzed for concentrations and patterns susceptible for corrections with the appropriate countermeasures.

Identification of Improvement: Countermeasures were identified to address the safety issues and collision causes.

Project Data and Documents Available for the RSA:

- Traffic Volumes
- Crash History and UD-10s
- Google Earth
- Field Observation
- Right-of-way (ROW) Information
- Speed Limits

### *2.3 Road Safety Audit Team and Process*

The Lower Town Road Safety Audit started on February 4, 2020 with a pre-Audit meeting attended by the RSA team and the stakeholders listed above. An overview of the RSA was presented that described process, goals and objectives, and the steps that would be completed by the RSA Team during the next two days. Following the presentation, the Team had an open discussion with stakeholders to identify known issues, concerns, constraints, and any planned future projects.

## Local Stakeholder Known Issues and Concerns

Stakeholders attending the RSA kick off meeting were candid in their voicing of issues and concerns surrounding mobility that exist in the neighborhood. The following were noted:

- Upcoming development at 841 Broadway Street and the recent Barton Green development will likely contribute to traffic and mobility issues.
- Ann Arbor STEAM school had to return Safe Routes to School money due to a lack of support for sidewalks in the neighborhood. Specifically, for sidewalks on Traver Road.
- Stakeholders want to make sure that the Fuller Road/Maiden Lane intersection is included in the study
- Barton Drive at M-14 is high crash location
- Evaluation of uncontrollable crossings – both existing and proposed
- University of Michigan Medical Campus is a major employment driver in this area with many employees traveling through Lower Town to get to work.
- There is an official traffic calming request for Northside Avenue at Pontiac Trail
    - A conflict exists between arterial and residential streets

- Controversy regarding the addition of a bike lane and removal of parking on Barton Drive coinciding with water main replacement.
- Only two bridges crossing Huron River exacerbate traffic and isolate northside neighborhoods.
- Consider pedestrian and multi-modal friendly lighting at major intersections.
- AAATA Route 23 -Maiden Lane bus is full in the morning
- On time performance of buses traveling through Lower Town suffers due to vehicle congestion.
- People using the Cascades canoe/kayak/tubing area in the summer can park in the University lots at Wall Street and Broadway Street. Pedestrians crossing here can be a safety issue.
- Moore Street at Pontiac Trail has had requests for attention due to the odd traffic control signals here.
    - There are also two slow freight trains per day that pass through this intersection.
- The far side bus stop at the intersection of Moore Street and Broadway Street has a complaint about not being ADA compliant.
- 1140 Broadway project is installing a new sidewalk at Plymouth Road and Broadway Street.

### Constraints

- Right of way at Barton Drive and Pontiac Trail – it would be difficult to widen the roadway at this intersection
    - Midwest Consulting investigated the possibility of a roundabout at Barton Drive & Pontiac Trail.

### Planned/ Scheduled Projects

- A water main replacement and resurfacing of Barton Drive from the M-14 ramp to Pontiac Trail.

### Future Projects

- None mentioned

Due to the size of the Study Area, the RSA was broken down into manageable sections that the team could observe each day. Four team members participated for each session. The schedule was broken out as shown below:

**Table A: RSA Field Schedule**

| Date | Team | Focus |
|---|---|---|
| 4-Feb | Loveland, Ceifetz, Maxe, Dryer | • Walk Plymouth/Broadway Corridor<br>• PM Peak Drive – All Study Area<br>• Night Reviews |
| 5-Feb | Loveland, Ceifetz, Maxe, Dearing | • Walk Barton Corridor<br>• Walk Pontiac Trail Corridor<br>• Walk all other side streets<br>• AM Peak Drive – All Study Area |
| 6-Feb | Dearing, Judici, Clark, Dryer | • School Observations – AM Bell and PM Bell |

The teams drove each area of the study area at different times of the day, including AM peak, PM peak, and after dark, to observe how traffic operations and safety conditions differ as travel patterns change. Each team also spent time walking specific corridors in the Study Area to observe issues from the perspective of a non-motorized or transit user. While out driving and walking the study area, the team verified issues discussed during the pre-Audit meeting and observed additional concerns, while taking notes and photos to document the findings.

Once the field reviews were completed, the team gathered to discuss and compile a comprehensive list of the findings. This comprehensive list was then put into groupings to arrive at a list of six key safety focus areas according to an analytical hierarchy process guided by the "Prioritize Safety Issues: Risk Matrix" (developed by the FHWA). The team also discussed potential recommendations to address each of the safety concerns. The safety issues were ranked from highest to lowest priority using the risk matrix.

# 3.0 ROADWAY CHARACTERISTICS

Due to the size of the Lower Town study area, a number of roads, intersections, and non-motorized facilities were analyzed during the Road Safety Audit. An assessment of the intersection conditions, roadway conditions, adjacent land uses, traffic control, road user characteristics, and collisions are laid out below for each segment that was analyzed.

## *3.1 Street Characteristics*

Streets in the Study Area range from major arterial roadways to local neighborhood streets. Due to the street layout and limited crossings of the Huron River and railroad tracks, most traffic is required to use a major street to travel to adjacent areas of Ann Arbor. Plymouth Road and Broadway Street are functionally classified as Principle Arterial, while Barton Drive, Pontiac Trail, Wall Street, Maiden Lane and Fuller Road are minor arterials. These form the main spines of the neighborhood, with the local streets feeding into them. Roads in the neighborhood range from 2 lanes to 5 lanes, depending on its utilization.

Sidewalks and bicycle infrastructure can be found throughout the Study Area and connecting to other non-motorized paths around the City. Gaps in the system exist making walking or biking to certain parts of Ann Arbor harder. For example, the area near the Plymouth Road/Maiden Lane/Broadway Street intersection is missing dedicated bicycle facilities connecting to adjacent routes, potentially making travel unsafe and uncomfortable. There are also critical gaps near Northside STEAM school.

## *3.2 Adjacent Land Uses*

The Lower Town Study Area is comprised of various land uses, however much of the land use in the Study Area is residential in nature. The majority of the land use north of the Huron River and west of Plymouth Road is single family and small multi-family residential units. A small commercial strip can be found on Broadway Street from Swift Street to Jones Drive. Between Maiden Lane and the Huron River, parking garages, parking lots, and University of Michigan owned facilities dominate. Scattered throughout the Study Area are parks and open space areas used by area residents.

## *3.3 Traffic Control*

A variety of traffic control devices can be found in the study area, ranging from stop and yield signs, intersection control beacons to fully signalized intersections. At the major intersections, traffic signals are typically found.

## *3.4 Road User Characteristics*

The primary travel mode through the Study Area is private vehicles that are accessing the area for employment, school, or retail. Secondary travel modes include walking, biking, and public transportation. Given the seasonal nature of their use, we were not able to discern if e-scooters or other types of mobility devices were likely to be in use with the advent of warmer weather. A growing number of Ann Arbor residents are choosing to travel around the city via these modes and it will likely continue.

### 3.5 Collision Analysis

There were 479 crashes in the study area over a 5-year period. The crashes on the road segments under study did not involve any fatalities. However, there were 7 involving Type A (incapacitating) injuries, 29 with Type B (non-incapacitating) and 36 Type C (possible) injuries in the five years of the study period. Crash types are summarized in the following table:

**Table B: Study Area Crash Data 2014 Through 2018**

| | Targeted Crash Patterns | | | | | | | 5 Year Total for Study Area (All Crash Types) | 5 Year Total for Ann Arbor |
|---|---|---|---|---|---|---|---|---|---|
| | Sideswipe | Head-on | Head-on Left-turn | Angle | Rear-end | Single Vehicle | Other | | |
| All Crashes | 83 | 9 | 13 | 93 | 189 | 71 | 21 | 479 | 15,577 |
| | 17.3% | 1.9% | 2.7% | 19.4% | 39.5% | 14.8% | 4.4% | | |
| Fatal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 |
| | 0% | 0% | 0% | 0% | 0% | 0% | 0% | | |
| A Injury | 0 | 1 | 0 | 0 | 0 | 5 | 1 | 7 | 151 |
| | 0% | 14.3% | 0% | 0% | 0% | 71.4% | 14.3% | | |

Further details are available in the Crash Analysis Report, found in Appendix B.

## 4.0 POSITIVES

During the field visit, the RSA team looked for positive aspects of safety in the Study Area for all modes of travel and documented examples of each. The following items are great examples of multi-modal safety and can be incorporated into future project designs and expanded further (as applicable):

- **Bicycle Infrastructure**


**Figure 2: On-street Bike Lanes**

In keeping with the policies established by the City Council, great strides have been made in adding non-motorized facilities along key roadways. While sometimes difficult to always meet the appropriate geometric guidelines, the City has nevertheless been able to add bike lanes along considerable portions of the minor arterials in the study area.

**Figure 3: Sharrows for Bike Routes**

Where bike lanes are not practical due to limited pavement width, the city has added sharrows for designated bike routes. Both the lane lines for bike lanes and the associated specialty pavement markings are being well maintained.

**Figure 4: Delineated Bike Lanes Through Turn Lanes**

The city has also kept abreast of the latest guidance from the NACTO on use of color markings to delineate bike lanes where auxiliary turn lanes are provided. This type of marking will require a higher maintenance effort than standard white markings but are well worth the extra effort.

- **Sidewalk Condition**

**Figure 5: Sidewalk Recently Replaced**

Our field review noted that sidewalk conditions were in generally good shape. There was ample evidence of ongoing repairs and some improvements at select locations.

**Figure 6: Sidewalks Were Found to be Well Maintained**

While it may seem like ADA requirements are a moving target, the sidewalk facilities we observed were, with the exception of street ramps, compliant.

- **Leading Pedestrian Interval at Barton Drive & Pontiac Trail**

**Figure 7: Example of Location With Leading Pedestrian Interval**

There is a growing recognition that some of the crashes involving pedestrians involve vehicles turning right on the green indication, rather than turning on red. One countermeasure for this crash typology is the use of leading pedestrian interval, as demonstrated at this intersection.

- **ADA On-Street Parking in front of Northside Grill**


**Figure 8: On-street Handicap Parking**

While provisions for ADA compliant parking is almost universal in off-street facilities, very few communities have shown a commitment to also providing for on-street handicap parking. This is a significant benefit for this community of users.

- **Bus Stops with Bus Pad, Shelter and Pull-Off Bay**

**Figure 9: Bus Stop With Shelter At Pull-off Bay**

Transit users all too often are just afforded utilitarian bus stops with just a transit logo sign to note its location. But providing amenities like a hard surface pad and shelter are key elements to improving transit usage.

The issue of bus pull-off bays can be a contentious one for AAATA. In locations where they make operational sense, they are yet another amenity to improve the riders experience.

- **Lighting**

Most of the major roadways in the study area were well lit. We noted that the lighting was generally high-mounted and probably installed with vehicle users in mind. The illumination provided was suitable for pedestrians when sidewalks were adjacent to the streets.

**Figure 10: Samples of Street Lighting in the Study Area**

- **School Features**


**Figure 11: Restrictions Limiting Access to School Property**

The Northside STEAM school is a relatively small site, with extremely confined areas for vehicles. It was never designed with a parent loading zone, so they have diligently strove to keep parent vehicles off the school grounds, especially during the arrival and dismissal periods. They have been relatively successful at limiting access.

**Figure 12: Families Walking to School**

One key reason for their success is the culture for parents to allow their children to walk to school. Compared to other primary schools in the region, Northside has a far greater proportion of students walking.

Facilitating these walkers are trained crossing guards. We observed that the three guards, stationed at the crossings of Barton, Pontiac Trail and at the intersection of Peach and Taylor, were doing a good job.

**Figure 13: Crossing Guards at School Crossings**

## 5.0 AUDIT FINDINGS AND SUGGESTIONS

The issues identified by the RSA team were first grouped into classes of safety issues and then prioritized using the Prioritize Safety Issues: Risk Matrix provided by FHWA. For each of the classes of safety issues, the team developed potential mitigation measures for review by the City of Ann Arbor. The safety issue classes were prioritized based on observed and perceived crash frequency and the anticipated and observed severity of crashes resulting from each safety issue class. As a result, each safety issue class was given a ranking from A (lowest risk and lowest priority) to F (highest risk and highest priority). The Risk Matrix is displayed in Figure 14 below and shows how each risk category is determined.

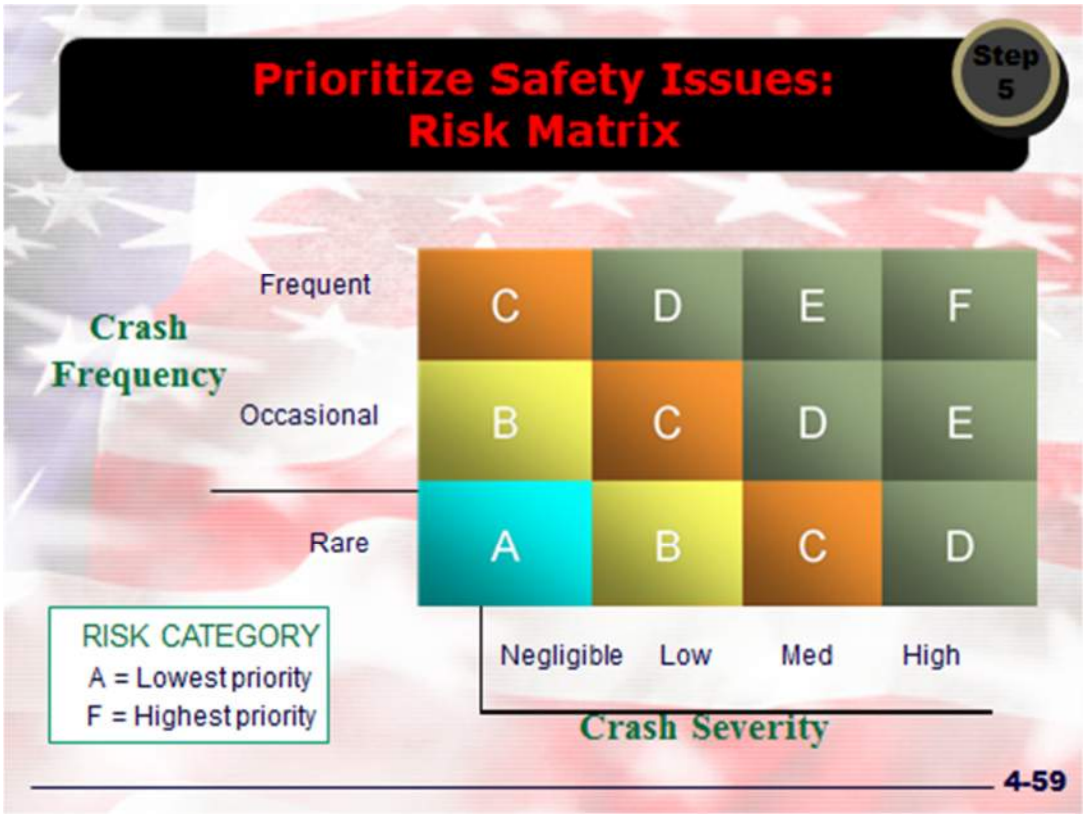


**Figure 14: Prioritize Safety Issues: Risk Matrix**

The safety deficiencies discovered during the Lower Town RSA fell into three risk categories, E, D, and C. Each area with a safety deficency identified in the Study Area is discussed below.

## *5.1 Crash Potential #1 (Risk Category E) – Pedestrian Infrastructure*

### Sidewalks on Traver Road, Broadway Street, and Barton Drive

Observations:

- There is a lack of sidewalk connectivity along Traver Road, Broadway Street, and Barton Drive.
- In many cases desire paths, a.k.a. goat trails, are apparent showing that pedestrians are active in this area but do not have a dedicated place to walk.
- Traver Road is near the AAPS Northside STEAM school and students may use this street when walking to school, but do not have a safe place to do so.

**Figure 15: Pedestrian Walking in Roadway Due to Absence of Sidewalk**

**Figure 16: Isolated Sidewalk Segments Not Continuous with the Rest of the Network**

**Figure 17: Sidewalks End Without Advance Notice to Users**

Suggested Mitigations:

- Traver Road: Construct sidewalk between John A Wood Street and Barton Drive, filling the sidewalk gap on the west side of the road. This could be accomplished by removing on-street parking along the northwest side of Traver and using the resultant space for a sidewalk and greenbelt separation from the travel lanes.

**Figure 18: Traver Rd Sidewalk Gap Between John A Wood and Barton Dr**

- Broadway Street: Fill the sidewalk gap from Maiden Lane to Broadway Street/Plymouth Road intersection on east side of roadway.

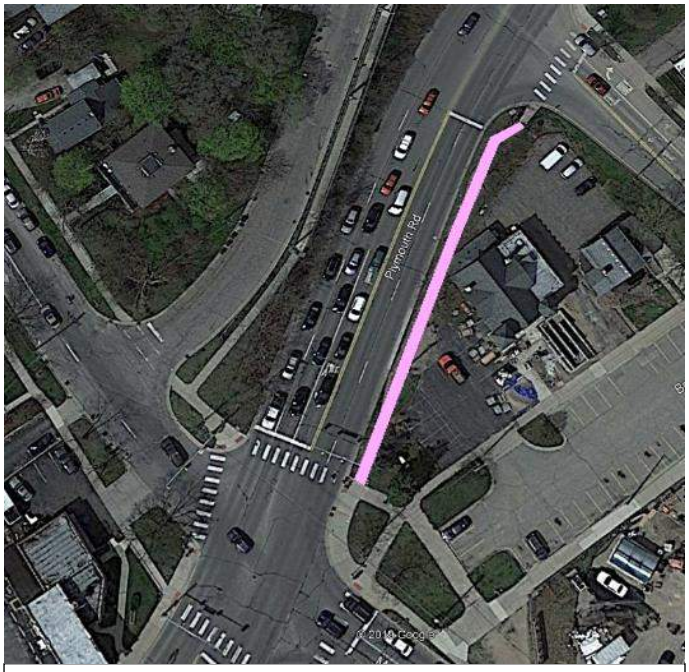


**Figure 19: Broadway St Sidewalk Gap Between Plymouth Rd and Maiden Ln**

- Barton Drive: Fill the sidewalk gaps near Starwick Drive and Chandler Road to connect to the existing sidewalks.
- Barton Drive: Provide a connection from north to south to access the boardwalk at Brede Place


**Figure 20: Barton Dr Sidewalk Gaps West of Starwick Dr and East of Chandler Rd. Proposed Crossing of Barton Dr West of Chandler Rd.**

## Sidewalk Ramps

Observations:

- Many of the ramps in the Lower Town Study Area are not ADA compliant.
- This includes:
  - Ramps lacking tactile strips
  - Incorrect geometry
  - Impediments from railroads
  - No ramps at some crossings

**Figure 21: Crossing Ramp Lacking Detectable Warning**

**Figure 22: Sidewalk Does Not Continue Through Railroad Crossing**

**Figure 23: Sidewalk Crossing Without Accessible Ramp and Detectable Warning**

Suggested Mitigations:

- Upgrade all non-ADA compliant ramps to meet ADA requirements.
- Some items that need to be improved include:
    - Grades
    - Crossing Push-Button Locations with appropriate level landings
    - Adding Truncated Domes
    - Providing Landing Areas
    - Providing Curb Drops

**Figure 24: ADA Compliant Sidewalk Facilities Are Widely Used in the Community**

## Desire Lines

Observations:

The RSA Team noticed locations where "goat trails", or more formally desire lines, were present and represent where pedestrians and bicyclists actually travel.

**Figure 25: Examples of "Goat Trails" Created by Pedestrians Which Show the True Desire Lines of Travel**

Suggested Mitigations:

- Provide sidewalk or pathway connections to accommodate the actual travel patterns of pedestrians

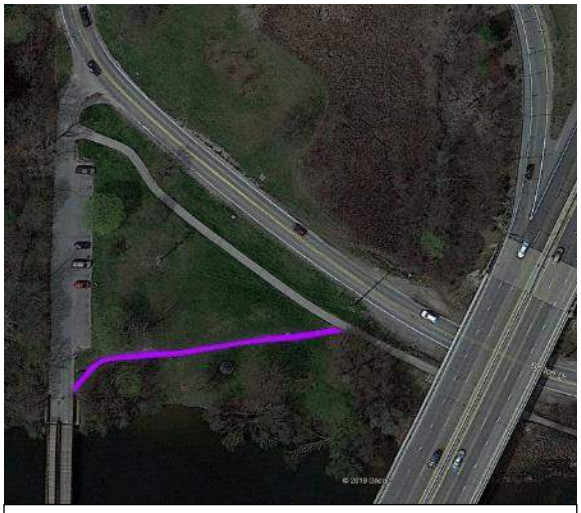

**Figure 26: Desire Line from Barton Dr to Huron Bridge Park**

**Figure 27: Desire Line Along Broadway St from Plymouth Rd to Maiden Ln**

## Fences and Railings

Observations:

- A number of locations contained gaps in fences and railings that exist along sidewalks and could be a hazard for those walking alongside.
- Some appear to be forced by pedestrians looking for a shortcut down a steep slope

**Figure 28: Gap in Fence, Coinciding with Pedestrian Desire Line to go from Barton Dr to Pathways Along Huron River**

**Figure 29: Gap in Fence Along Traver St Near Moore St**

Suggested Mitigations:

- Fill gaps in railings to keep pedestrians from falling
- Replace fencing in areas as needed

## Pathway Sight Distance

Observations:

- A mid-block access point to the Barton Drive boardwalk is hidden along the curve between Brede Place and the M-14 entrance/exit ramp.
- This access point is difficult for pedestrians to find and nearly impossible to see for passing motorists.

**Figure 30: Mid-block Access to Boardwalk Along South Side of Barton Dr**

**Figure 31: Location of Mid-block Access to Boardwalk Along Curve of Barton Dr**

Mitigations:

- Clear brush surrounding the boardwalk entry point so that pedestrians and bicyclists can see and use it more easily.
- Clear brush around the access point to allow motorists to see pedestrians and bicyclists that are waiting to cross Barton Drive
- Provide warning with signage and pavement markings to alert motorists to the potential for pedestrians and bicyclists
- Add lighting at access point

## Bus Stops

Observations:

- Several bus stops do not have of pedestrian landing pads connecting the sidewalk to the curb. These bus pads are essential for the bus stop to be ADA accessible.

**Figure 32: Example of Bus Stop Without a Landing Pad or Connection to Sidewalk/Pathway**

Suggested Mitigations

- Install level bus stop landing pads that connect to the curb.
- Connect bus stop pads to the existing sidewalk to ensure a seamless connection

## Huron River Cascades Access

Observations

- The Cascades are a very popular City Park asset that draws large crowds in the summer. Many using the Cascades park in the lots at Broadway Street and Wall Street and must cross Broadway – along with kayaks or innertubes – to access the Cascades. Large numbers of park-goers cross at the Swift Street intersection, some without waiting for the light to change.


**Figure 33: A Pedestrian Route Used from Overflow Parking East of Broadway St to Headwater of the Cascade Park**

Suggested Mitigations

- Adding a connection from the south side of Broadway Street to the Border to Border Trail/Riverwalk would reduce pedestrians crossing over Broadway. The Riverwalk provides access under the Broadway Street bridge and ties directly into the pathway on the south side of the Cascades.

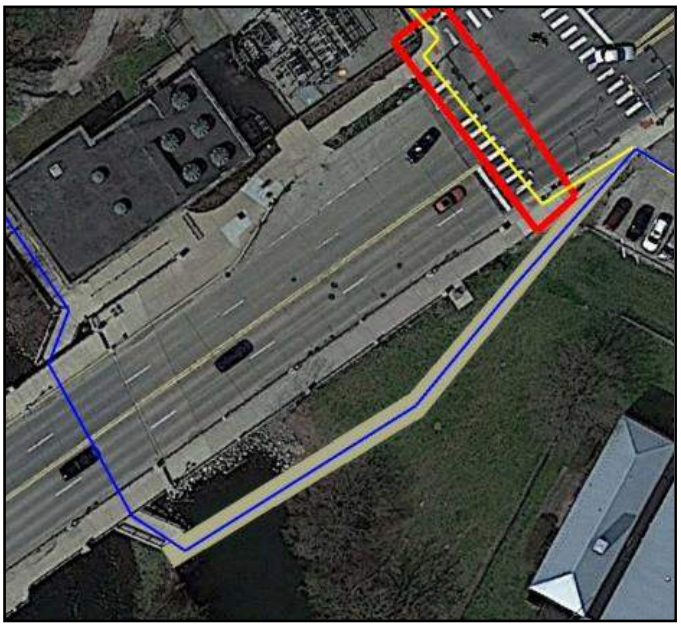

**Figure 34: Alternate Route (Blue) From Overflow Parking to Cascade Headwaters**

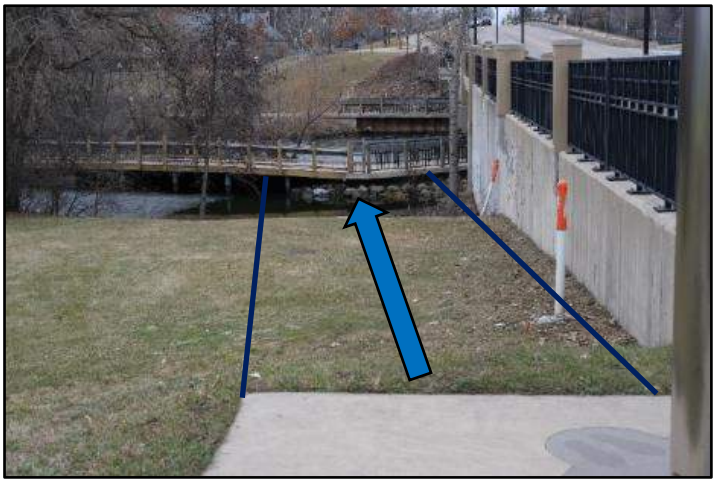

**Figure 35: Alternate Route Avoids At-grade Crossing of Broadway St by Connecting to Existing Boardwalk Along Huron River and Passes Under Broadway St**

## *5.2 Crash Potential #2 (Risk Category D) – Speed Management*

### Division Street Northbound

Observations:

- Vehicles traveling northbound on Division Street toward the Broadway Bridge are coming downhill and traveling faster than the posted 25 mph speed limit.
- This is a highly active bicycle and pedestrian route with a number of midblock crossings, bike facilities, and transit stops in the general vicinity.
- The dedicated on-street bike lane for northbound Division St ends less than 300' from the junction with Beakes St, Broadway St, Carey St, Detroit St and High St.
- Visibility around the curve may be blocked by the retaining wall.

**Figure 36: Retaining wall as sight distance obstruction. Top view as seen by drivers NB on Division; bottom view as seen by pedestrians.**

**Figure 37: Geometric constraints related to NB Division St joining Broadway St. Dedicated On-street bike lane ends just prior to start of steep down-grade and sharp horizontal curve.**

Suggested Mitigations:

- The intersection of Division Street with Carey Street, Detroit Street, Broadway Street, Beakes Street and Summit Street should be reconfigured to improve safety, slow vehicles down, and make pedestrian crossing easier.
- The northern pedestrian crossing at Carey Street should be relocated to enhance visibility (from red box to yellow box in image)
- Add in road gateway treatments R1-6 to crossing areas
- Narrow the lanes to slow vehicles down

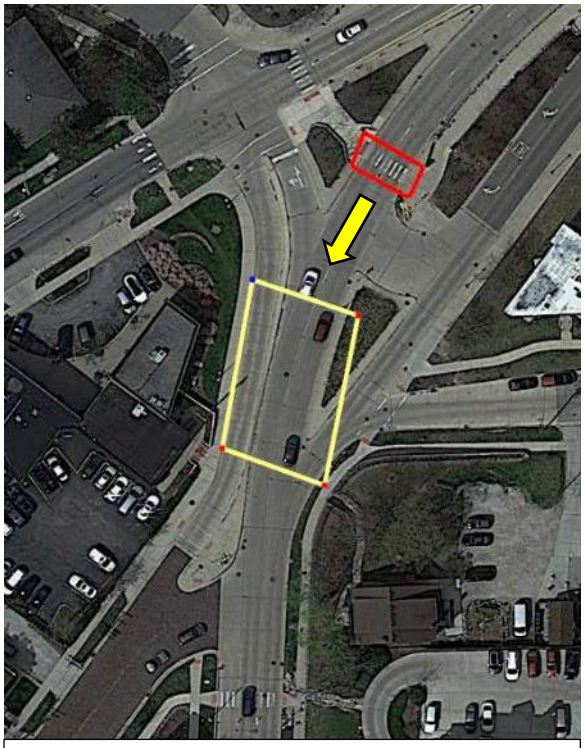

**Figure 38: Relocating the pedestrian crossing would improve sight lines for both drivers and pedestrians with each other.**

**Figure 39: Example of using R1-6 in-road signs on a multi-lane road as a gateway treatment.**

## Broadway Bridge

Observations:

- High vehicle travel speeds coming down both ends of the Broadway Bridge. The speed limit on the Bridge is 30 mph, but vehicles were observed traveling faster than the posted speed limit.

**Figure 40: The continuous down-grade for NB Broadway exacerbates the poor observance of the posted speed limit.**

Suggested Mitigations:

- Install electronic speed warning systems on each end to alert drivers to their speed and the posted speed limit. Similar signs have been installed on Pontiac Trail.


**Figure 41: Example of radar-based speed warning system.**

## Pontiac Trail

Observations:

- Posted speed limits along Pontiac Trail, particularly north of Barton Drive, appear to low, based on roadway design and speeds drivers are traveling.


**Figure 42: A variety of speed limits are posted along the Pontiac Trail / Pontiac St. The different postings are not commiserate with the roadside environment.**

Suggested Mitigations:

- Look for opportunities to use physical design and other measures to improve safety for motorists, pedestrians and cyclists.
- Add additional enforcement of the appropriate speed limit.

## Plymouth Road

Observations:

- Posted speed limits along Plymouth Road from Barton Drive to Broadway Street appear to be low.
- Traffic data shows prevailing speeds of 45+ mph in both directions along Plymouth Road

**Figure 43: The speed limit posting for Plymouth Rd is not commiserate with the roadside environment.**

Suggested Mitigations:

- Look for opportunities to implement traffic calming to bring speeds more in line with posted speed limits.
- Add additional enforcement of the appropriate speed limit.

## *5.3 Crash Potential #3 (Risk Category D) – Traffic Congestion*

**Barton Drive at M-14 NB Entrance Ramp**

Observations:

- During the PM peak hour, traffic seeking to enter NB M-14 freeway face critical lack of adequate gaps, resulting in vehicles queuing back down the ramp and spilling over to westbound Barton Drive.


**Figure 44: Queues on Barton Dr due to traffic seeking to enter EB M-14 generating backups down the ramp.**

Suggested Mitigations:

- Close or relocate interchange from Barton Drive.
- Redesign interchange to current standards to allow for vehicle acceleration lane, rather than a stop sign, when entering NB M-14.

### Barton Drive at Pontiac Trail (AM)

Observations:

- Traffic heading eastbound on Barton Drive and turning south onto Pontiac Trail during the morning peak period backs up.

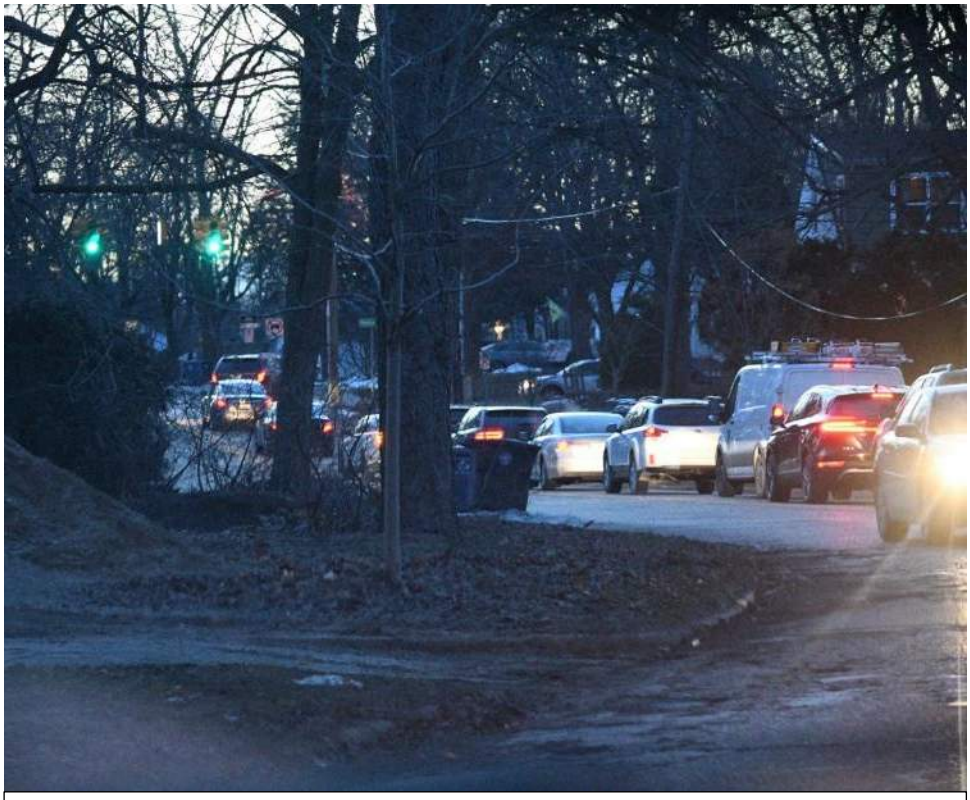

**Figure 45: Traffic queues on Barton Dr from signal at Pontiac Trail.**

Suggested Mitigations:

- Signal timing could be reviewed and adjusted to allow more vehicles to travel through the intersection during each cycle.
- The intersection should be studied to determine if removing on-street parking and adding auxiliary turn lanes are feasible and would benefit traffic.

## Freight Train Related Traffic Backups

Observations:

- Multiple locations within the Study Area experience congestion when freight trains pass through.
- Backups happen at Barton Drive, Traver Road, Pontiac Trail, and Moore Street.


**Figure 46: The Ann Arbor Railroad freight train routinely impact the a.m. commuter period, resulting in significant queues that take protracted time to clear.**

**Figure 47: A train consisting of about 60 freight cars (green line) would block all the rail crossings in Lower Town, leading to extensive backups (red lines).**

Suggested Mitigations:

- Review and potentially add traffic signal pre-emption
- Review vehicle storage needs during train events
- Consider an ITS-based changeable message signs for NB and SB M-14 tied to a RR pre-emption to advise drivers of train's presence and advise them to find alternate routes.

### Broadway Street Bridge Eastbound (PM)

Observations:

- Traffic heading eastbound on Broadway Street backs up from Maiden Lane onto the Broadway Bridge.

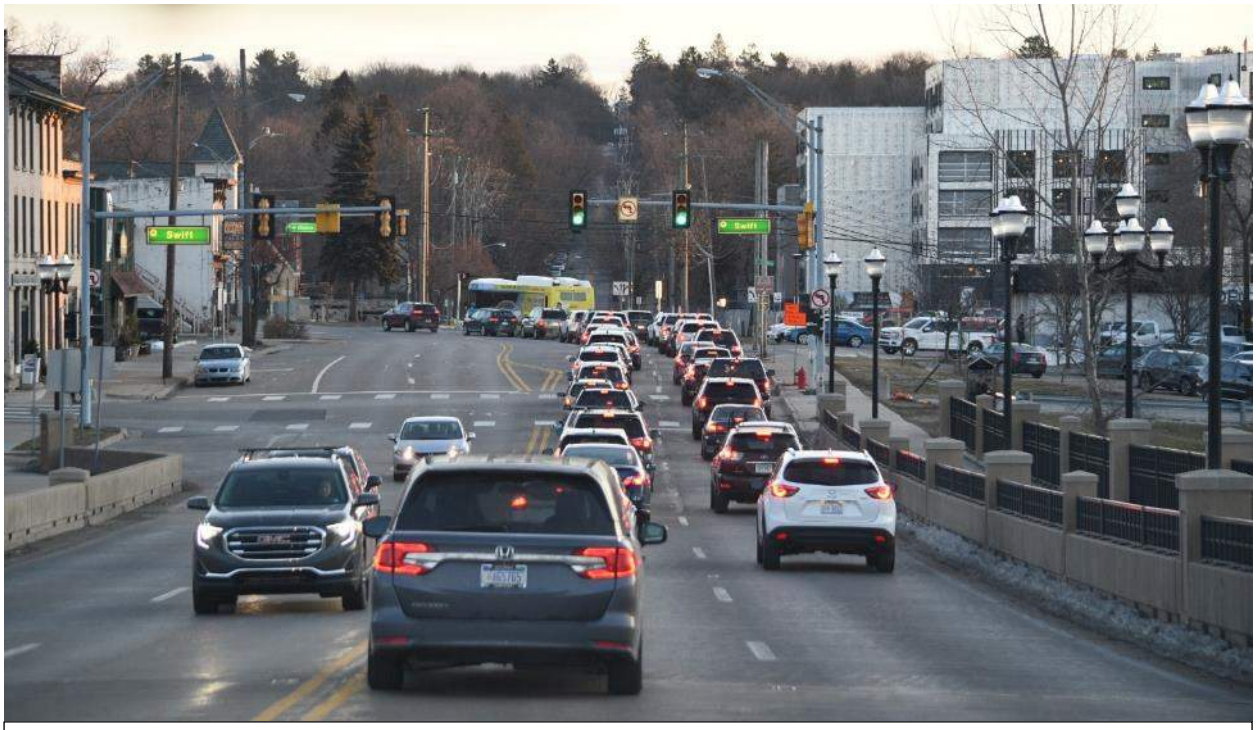


**Figure 48: Traffic backups for NB Broadway from the traffic signal at Maiden Lane / Moore St extend through the signal at Swift St.**

Suggested Mitigations:

- Review and adjust signal timing at the Swift Street and Maiden Lane/Moore Street intersections
- Reconfigure area and/or reroute traffic to reduce stacking

### Catherine Street Westbound (PM)

Observations:

- Traffic on Catherine Street heading westbound toward Main Street backs up at N Division Street

**Figure 49: The offset (about 34') between the east and west legs of Catherine St leads to potential conflicts with pedestrians.**

Suggested Mitigations:

- Review and adjust signal timing on Division Street and Catherine Street as necessary

### Maiden Lane at Fuller Road (All Day)

Observations:

- Throughout the day, heavy traffic and pedestrian volumes exist at the intersection of Maiden Lane and Fuller Road due to patients, visitors, employees, and students accessing the University of Michigan Medical Campus.

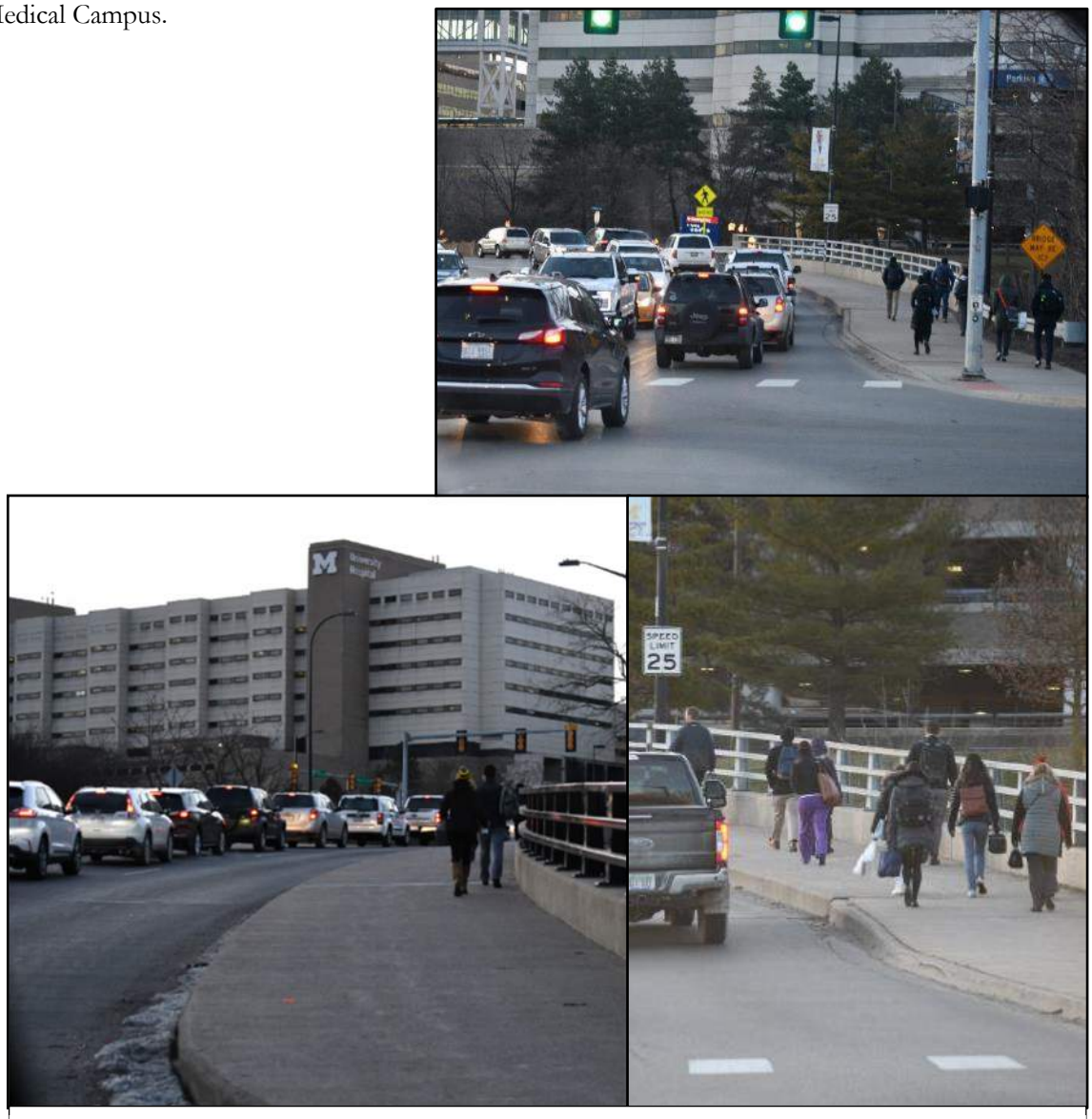


**Figure 50: Pedestrian traffic along Maiden Ln, crossing Fuller Rd and along E. Medical Center Dr is substantial for significant periods of the day.**

Suggested Mitigations:

- Consider additional access point to and from Medical Center Drive, which could reduce the overall intersection delay.

## *5.4 Crash Potential #4 (Risk Category D) - Bicycle Infrastructure*

### Obstacles

Observations:

**Figure 51: Shared use path boardwalk along Barton Drive, between Longshore Drive and M-14, does not meet the design standards for width. Clear width of path between railings is less than 10'. Should be ~14' per AASHTO guidelines.**

**Figure 52: Broadway Street bridge has poor visibility around the curve at Division Street and concrete pillars holding light poles extend too far into the travel way. Concrete fillers should be placed to eliminate the protrusions of the bridge and lighting posts, presenting a smooth barrier face to cyclists.**


**Figure 53: On-street bike lanes lose their utility when blocked by rubbish receptacles or other types of obstructions.**


**Figure 54: On-street bike lanes adjacent to parked vehicles should generally be wider (~6') to reduce likelihood of bicyclists running into opening car doors. Construction work zones must include warnings for cyclists that their exclusive lanes are blocked and there is a need to share the road. At least one instance of a car double-parked resulted in the bike lane being blocked.**

Suggested Mitigation:

- Add bike lanes to Barton Drive from Pontiac Trail to Huron Bridge Park
- Add bike lane to Broadway Street bridge or adjust light pole pillars to be flush with the bridge's sidepath.
- Widen bike lanes adjacent to parking areas by reducing travel lane width and delineating limits to the parking area.
- Increase enforcement and citations of obstacles blocking bike lanes


**Figure 55: Example of a well dimensioned and signed on-street bike lane.**

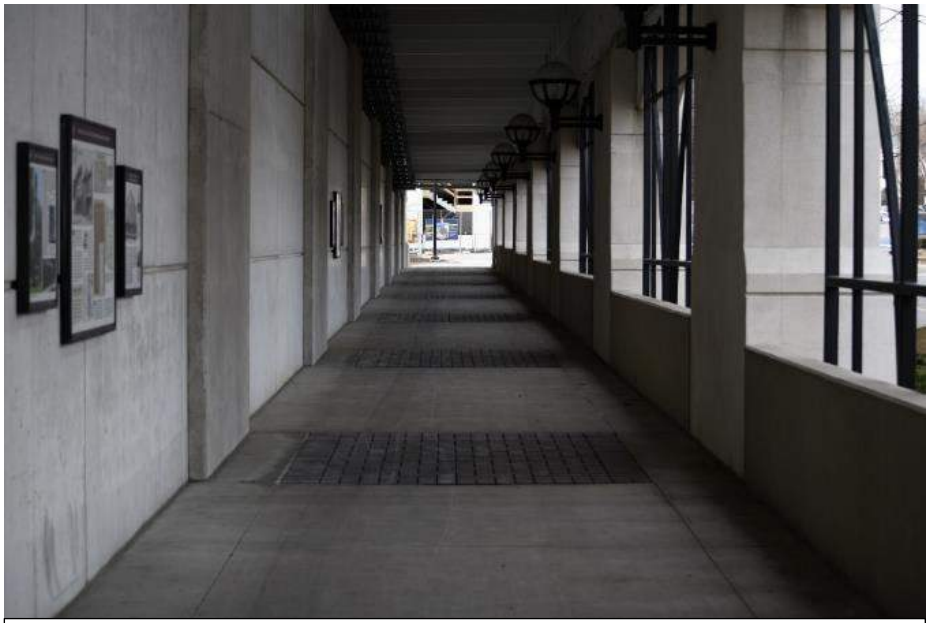

**Figure 56: Example of how filler walls can eliminate (right side) or minimize (left side) protuberances that could snag bicyclists.**

## Bike Infrastructure Transitions

Observations:

**Figure 57: The transition from the Division Street bike lane to the Broadway Street Bridge shared use path is not continuous or marked. The Division Street bike lane ends before Carey Street and there is not an easy entrance for bikes to enter the bridge path.**

**Figure 58: At the intersection of Barton Drive and Pontiac Trail, the bike lanes on Barton Drive west of the intersection do not continue and no guidance is provided for bicyclists.**

Suggested Mitigations:

- Extend bike lanes with a dotted line (similar to what has been installed on S. 7th Street) or use sharrow markings through intersections

**Figure 59: Provide ramps for bicyclists to use to easily transition from the bike lane to pathways and vice versa.**


**Figure 60: Add signs notifying cyclists and drivers to changes in bike infrastructure – Share the Road and Bike Lane Ends signs, where appropriate.**

## Bike Infrastructure – Wayfinding

Observations:

- There is a general lack of wayfinding for bikes throughout the study area.


**Figure 61: The bike route on Chandler Road does not lead to a bicycle facility and only designates Chandler Road as a safe bicycle street. There are few other signs and the signs are lacking arrows pointing where the bike route continues.**

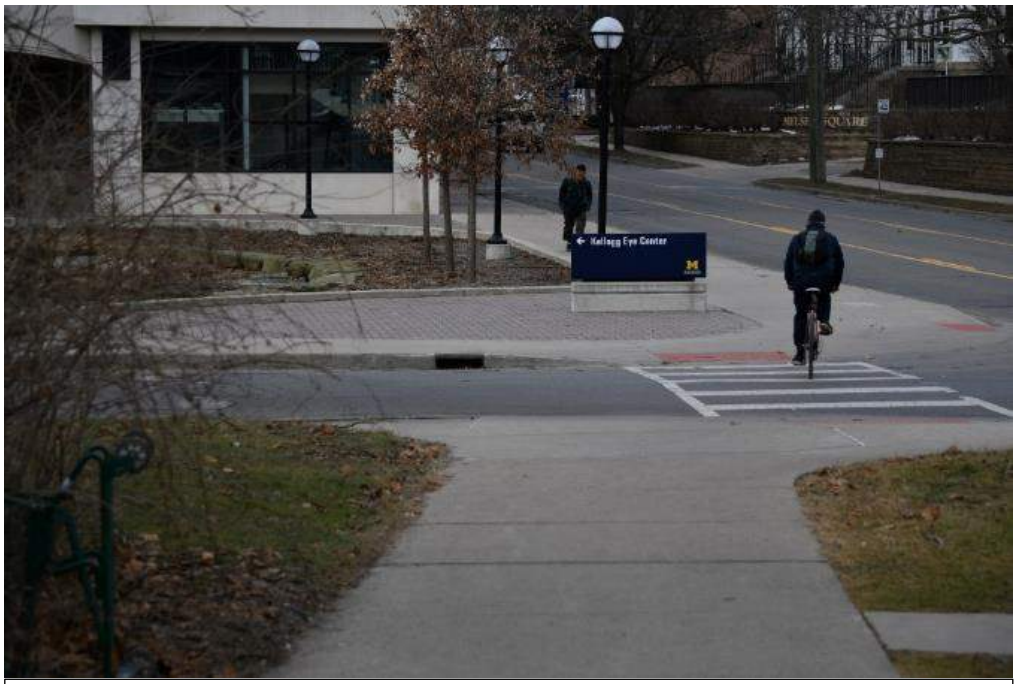


**Figure 62: There are no bike lanes on Maiden Lane, which is a high traffic bicycle route for students and employees looking to access the hospital.**

Suggested Mitigations:

- Provide a bicycle facility on Barton Drive that would connect to the existing bike lanes on Barton Drive at Pontiac Trail and continue west to Huron Bridge Park.


**Figure 63: Provide guidance from Chandler Av to bike route on Hilldale Dr (2016 Ann Arbor and Washtenaw County Bike Map).**


**Figure 64: Provide guidance, including distance and direction, to preferred destinations around the City.**

### *5.5 Crash Potential #5 (Risk Category C) – Pavement Condition*

Observations:

**Figure 65: Poor pavement conditions, including severe edge rutting, exist on several roads within the project study area, including Broadway Street, Barton Drive, and Traver Road.**

Suggested Mitigation:

- Improve drainage on these corridors to ensure that pavement lasts as long as possible.

**Figure 66: Rehabilitate or reconstruct pavement in areas with damaged roadway surfaces.**

### 5.6 Crash Potential #6 (Risk Category C) – Traffic Control Devices

Observations:

- Improper sign use throughout the Study Area is confusing for all roadway users, including:

**Figure 67: Chevron signs at Swift Street and Pontiac Street are improper. Should be a Two-direction Large Arrow (W1-7).**


**Figure 68: Per MMUTCD, Curve with advisory speed sign (W1-2a) is only to supplement a standard alignment sign with an additional advisory speed plaque (W13-1). In any case, sign is wrong because it combines a curve message with an advisory speed associated with a turn. Curve signs are for speeds 35 mph and above.**

- Sign Locations

**Figure 69: No horizontal alignment warning sign for westbound Barton Drive west of Pontiac Trail.**


**Figure 70: Yield sign on Wall Street at Canal Street is placed beyond the crosswalk.**

**Figure 71: R1-6 signs need to be placed in the road on the lane line or in a pedestrian island per the MMUTCD.**


**Figure 72: Turn warning sign with advisory speed on Barton Drive, in front of the Northside STEAM school, is poorly located. Should be located just beyond the school pedestrian crossing to not detract from the crossing itself.**

- Sign Maintenance


**Figure 73: There are older signs throughout the Study Area that lack adequate retro-reflectivity, making them hard to see at night.**

**Figure 74: Some signs, including one at Barton Drive and the M-14 entrance, have been knocked over.**

**Figure 75: Some signs have been vandalized.**

Suggested Mitigations:


**Figure 76: Inventory all signs in the study area and upgrade signs as needed.**

## Pavement Markings

Observations:


**Figure 77: Inconsistent sharrow pavement markings throughout the Study Area in areas where bike lanes end.**

**Figure 78: Old pavement markings have not been fully removed in areas where changes have been made, which sends mixed messages to road users.**

**Figure 79: Multiple crosswalks throughout the Study Area have degraded markings, making it hard to distinguish where the crosswalk is.**

**Figure 80: The crosswalk at Detroit Street and Broadway Street/Beakes Street has a deflection mid-crossing, making it non-ADA compliant.**

Suggested Improvements:

- When placing new pavement marking symbols, completely remove existing markings first to avoid "ghosted" markings.
- Refresh pavement markings near Division Street/Broadway Street/Beakes Street with high durability pavement markings.
- Ensure that all crosswalks are straight across the intersection.


**Figure 81: Example of a well maintained pavement markings.**

## Signals

Observations:

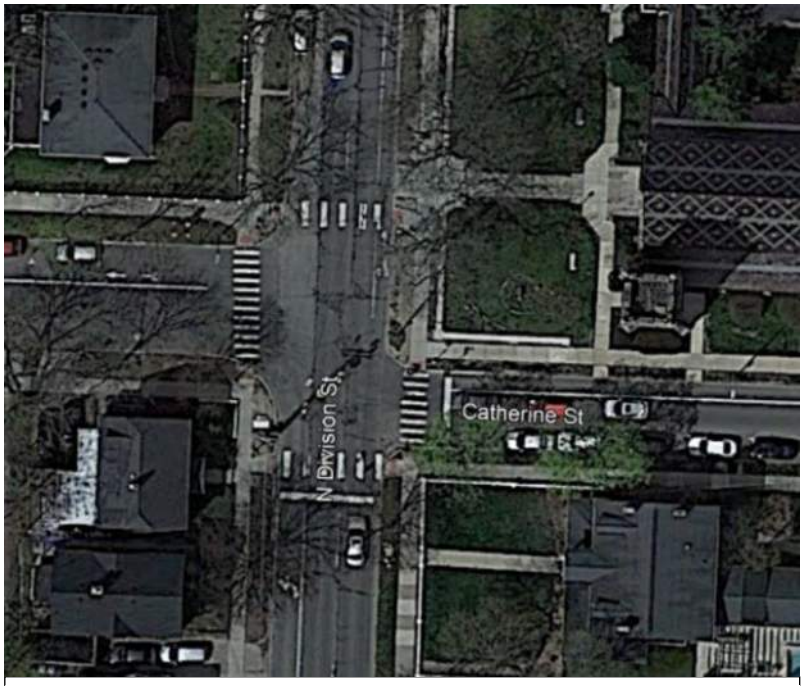


**Figure 82: The offset of Catherine St at Division St is problematic for pedestrians. This is particularly true for WB vehicles turning right from Catherine Street onto Division Street to see pedestrians crossing the northern leg of the intersection.**

**Figure 83: Outdated diagonal span-wire mounted traffic signals should be considered for modernization.**

**Figure 84: Pedestrian signal heads were noted that lack countdown feature.**

Suggested Mitigations:

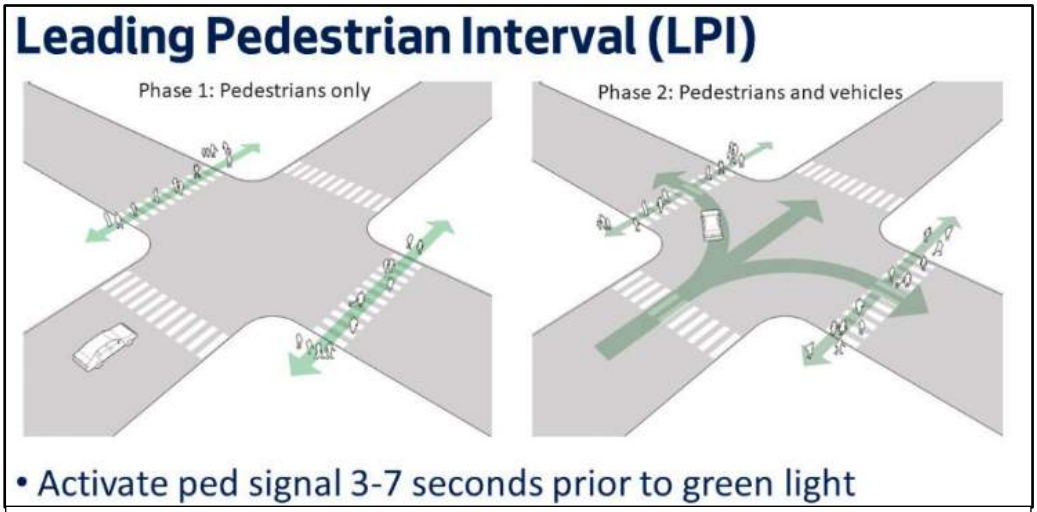


**Figure 85: For problematic intersections, such as Catherine St at Division St, implement leading pedestrian interval timing. This allows pedestrians a head start when crossing and makes them more visible to turning vehicles.**


**Figure 86: Install box span-wire mounted or mast arm mounted signals to improve visibility and safety.**


**Figure 87: Accelerate the replacements of obsolete pedestrian signal heads. [Notes: MMUTCD Section 4E.07 – All pedestrian signal heads used at crosswalks where the pedestrian change interval is more than 7 seconds shall include a pedestrian change interval countdown display in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval. There was an August 2015 compliance date for the replacement of all pedestrian signal heads at such locations to incorporate the countdown feature. This may imperil agencies receiving Act 51 funding.]**

## Roadside Barriers

Observations:

**Figure 88: Guardrail is damaged at Barton Drive and M-14.**

**Figure 89: A light pole is located in front of the attenuator at Fuller Road and Maiden Lane intersection.**

Suggested Mitigations:

- Repair guardrail on Barton Drive
- Relocate any and all fixed objects behind the guardrail or extend guardrail to encompass the fixed objects.

# 6.0 Potential Improvement Projects

## *6.1 Pontiac Trail at Moore Street and Longshore Drive*

This intersection can be highly confusing for motorists and other road users that are traveling through this area. The southern legs of the intersection act as a one-way pair with Moore Street heading northwest into the intersection and Pontiac Trail heading southwest out of the intersection, eventually turning into Swift Street before reaching Broadway Street. Pontiac Trail north of the intersection and Longshore Drive (the west leg) are both two-way streets. The following issues were observed during the RSA:

- Skewed intersection with main route northbound turning through the intersection
- One-way pair for southern legs of intersection to access/come from Plymouth Road/Broadway Street
- Unusual traffic control devices, including flashing yellow and red signals facing Moore Street
- Railroad tracks located just north of the intersection
- Wrong way movements observed by team

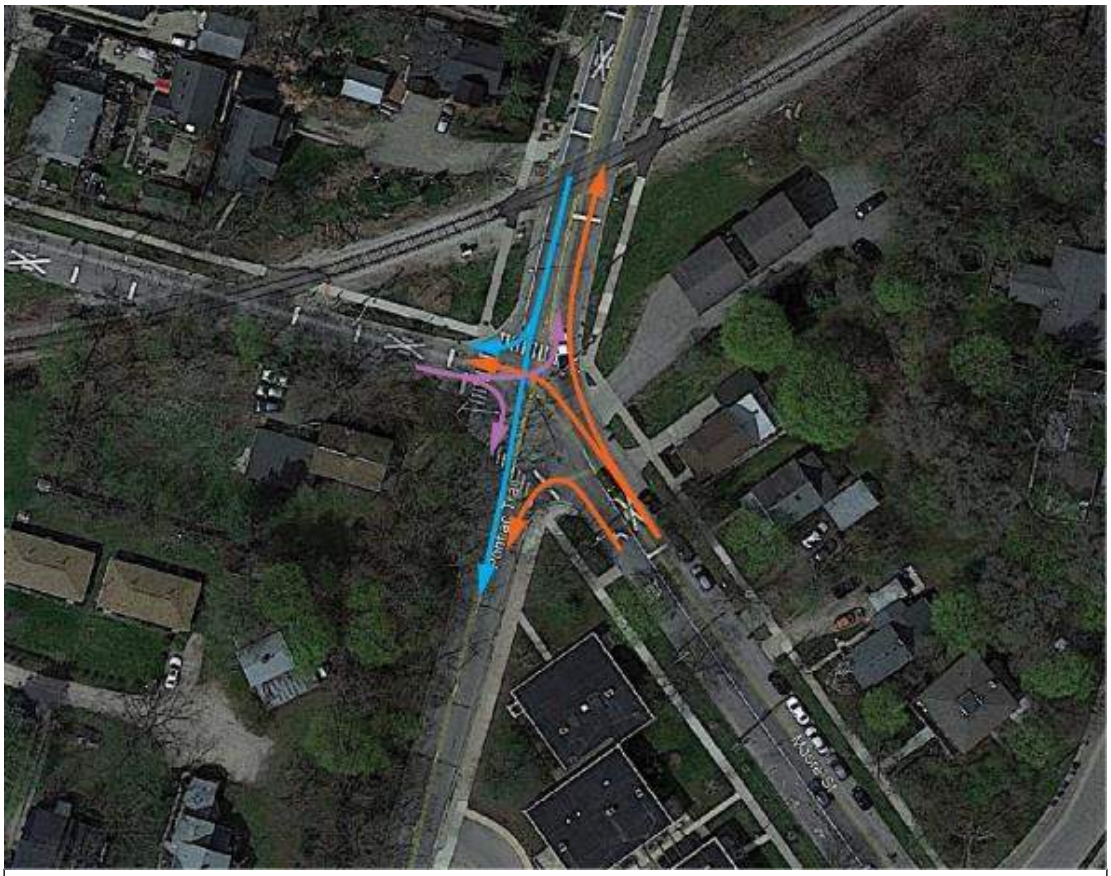


**Figure 90: The south and east legs of intersection are one-way streets. Various allowed movements are depicted.**


**Figure 91: View for WB Moore St approaching Pontiac St at skewed angle. Southbound vehicle heading the wrong direction down Moore St.**

Suggested Mitigations (listed in order of short term to long term improvements):
Note: All options would look to simplify and improve pedestrian and bike access through the intersection.

- Add channelizing pavement markings

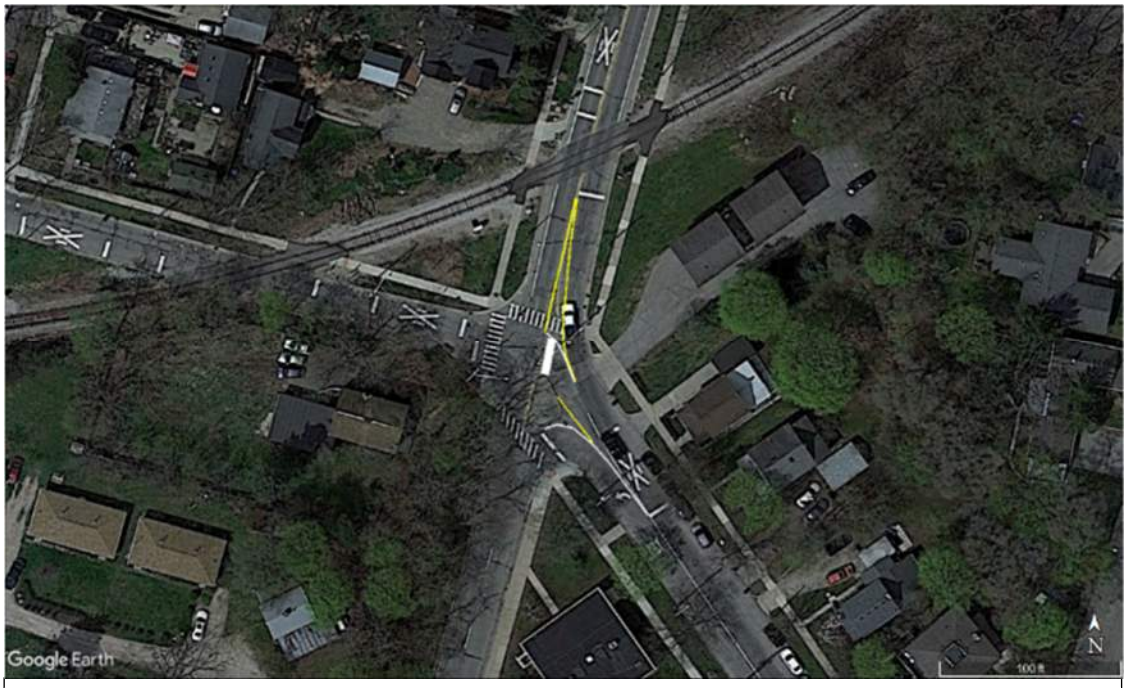


**Figure 92: Short Term - Add pavement markings to better delineate vehicle paths through intersection. Maintain existing signals, but swap flashing yellow light for green arrow.**

- Add and/or enhance traffic islands and remove signals

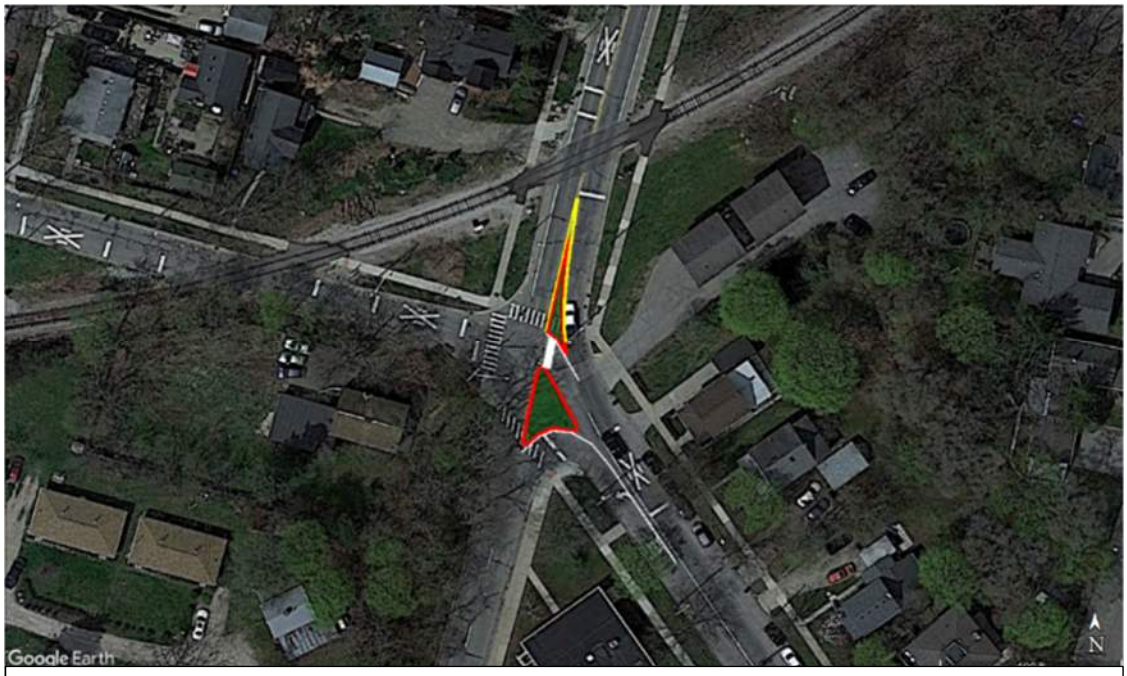


**Figure 93: Mid-Term Option A – Add new islands to intersection. Stop signs would be added for Moore Street to Longshore Drive movement. Traffic signals would be**

- Remove access to Longshore Drive from Moore Street and NB Pontiac Street


**Figure 94: Mid-Term Option B – Add new island to intersection. Treatment would simplify the intersection by allowing only two movements from Moore Street and require Longshore to be right in/out only. Would remove traffic signals.**

- Add roundabout to intersection (roughly 80' in diameter)

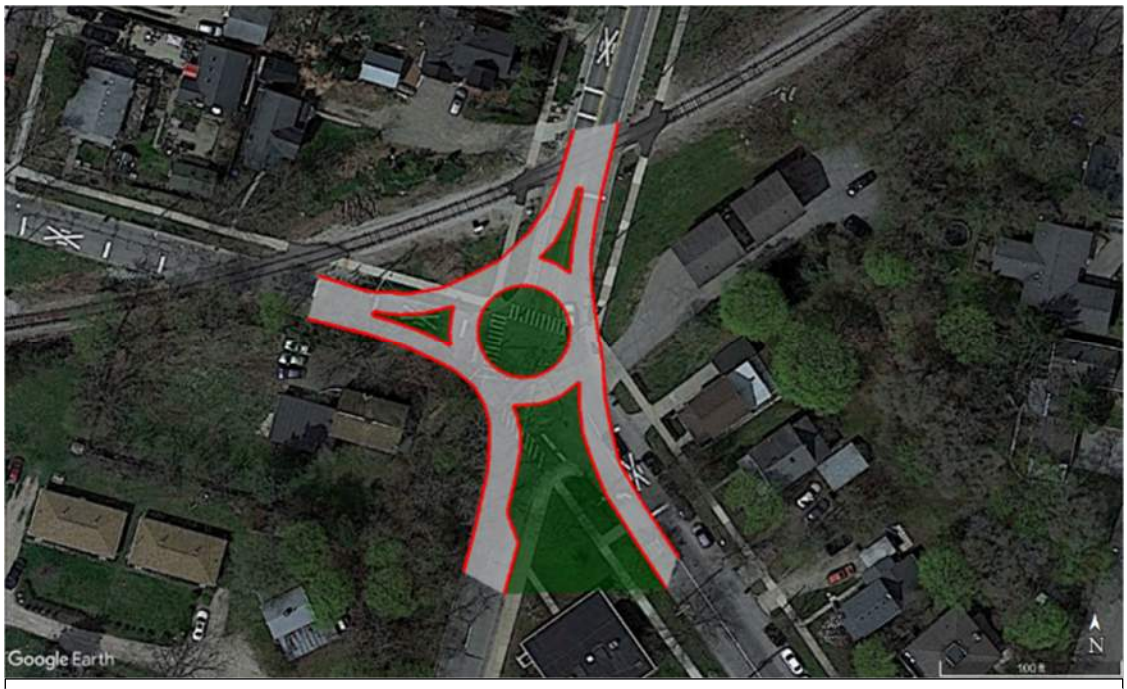


**Figure 95: Long Term – Reconfigure intersection as one-lane roundabout. Maintains access for all existing movements. Would eliminate all signals. Depicted is one with about 90' diameter.**

## *6.2 Maiden Lane/Wall Street/Swift Street/Moore Street/Canal Street*

The following observations were made during the RSA:

- This is the primary connection through Lower Town to the Medical Center
- New parking structures and residential construction in the general vicinity have increased traffic
- Maiden Lane and Wall Street both have a narrow clear zone with obstructions close to the roadway and a sidewalk going under the parking garage
- Maiden Lane has more traffic in less right of way, while Wall Street has a wider cross section and less traffic
- Access to the Maiden Lane/Wall Street area is circuitous via Pontiac Trail, Swift Street, Broadway Street and Fuller Rd

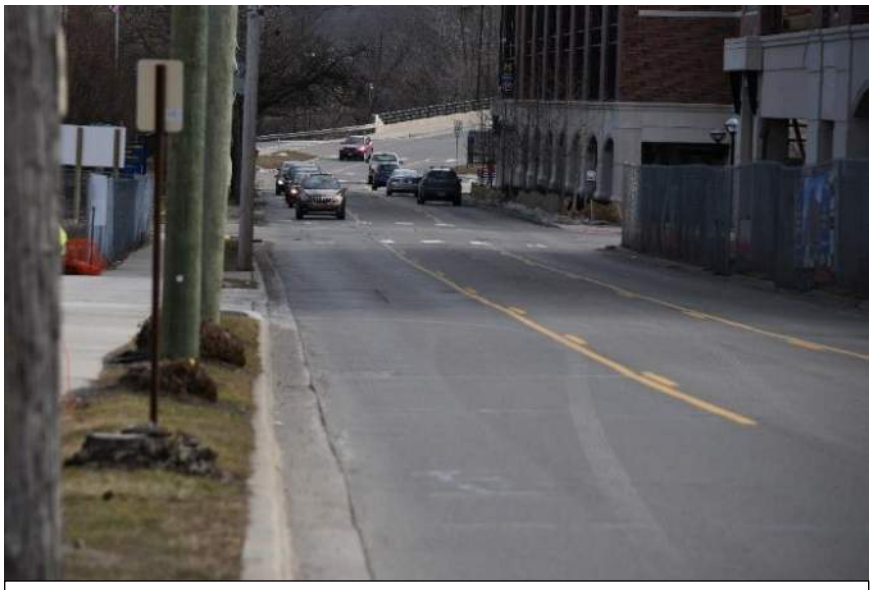

**Figure 96: Maiden Lane – Typical section is 3 vehicle lanes, no parking allowed, no bike lanes, sidewalk both sides, overhead utilities along north side.**

**Figure 97: Wall Street – Typical section is 2 vehicle lanes, parking allowed both sides, bike lanes both sides, sidewalk both sides, utilities underground.**

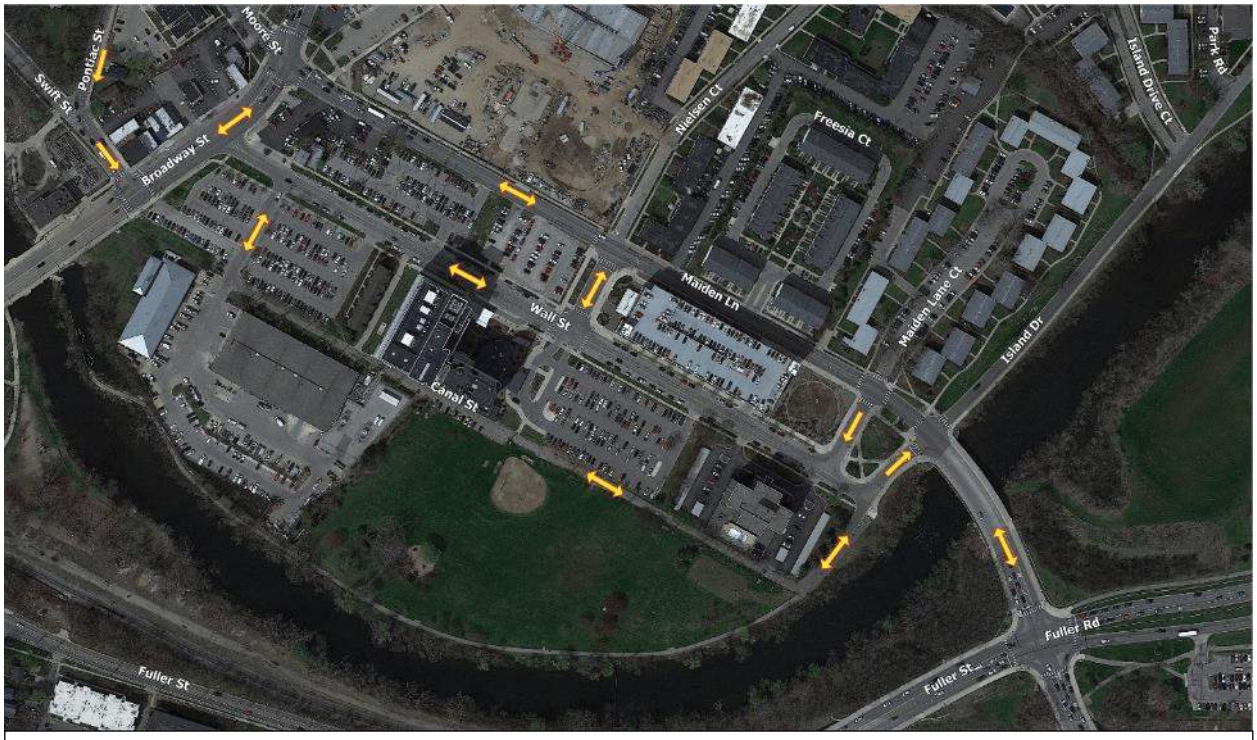


**Figure 98: Overview of the Lower Town business district, showing pattern of one-way and two-way streets.**

Suggested Mitigations:

- Add two-lane roundabout at Maiden Lane, Moore Street, Broadway Street intersection.

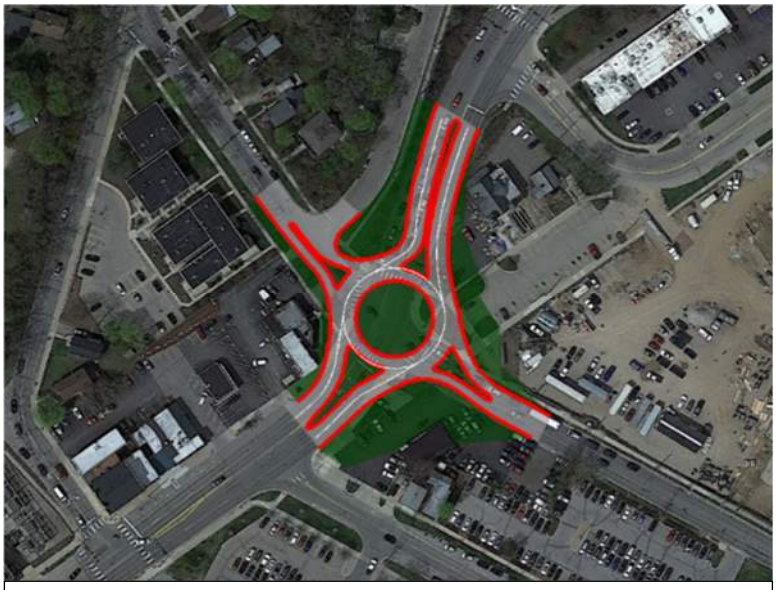

**Figure 99: Convert intersection of Broadway St, Maiden Lane and Moore St to 2-lane roundabout. Moore St could change to 2-way traffic. Depicted is one with about 150' diameter.**

- Convert Maiden Lane and Wall Street into a one-way pair

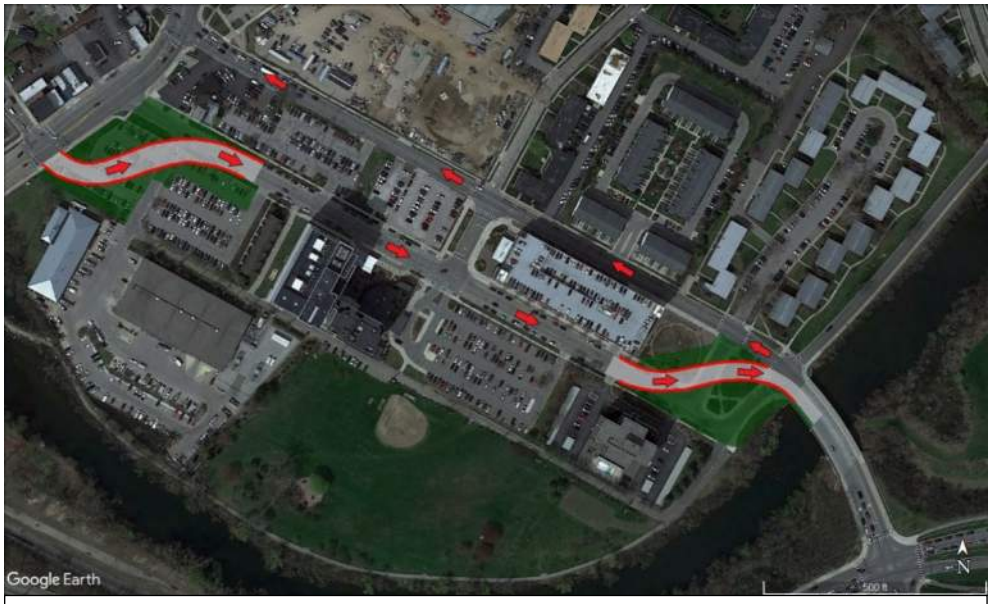


**Figure 100: Convert Maiden Ln and Wall St to one-way pair. Option A: Shift western portion of Wall St to align with Swift St at signalized intersection and eastern portion to join Maiden Ln prior to Huron River bridge. One-way pair has less conflict than two-way operations. Reduces operational stresses at Broadway Street/Moore Street/Maiden Lane intersection. Driving lanes, bike lanes, and Wall Street parking lane would all fit into the cross section for both streets.**

  - Canal Street would become one-way, in southeast direction, or be reclassified to an alley.

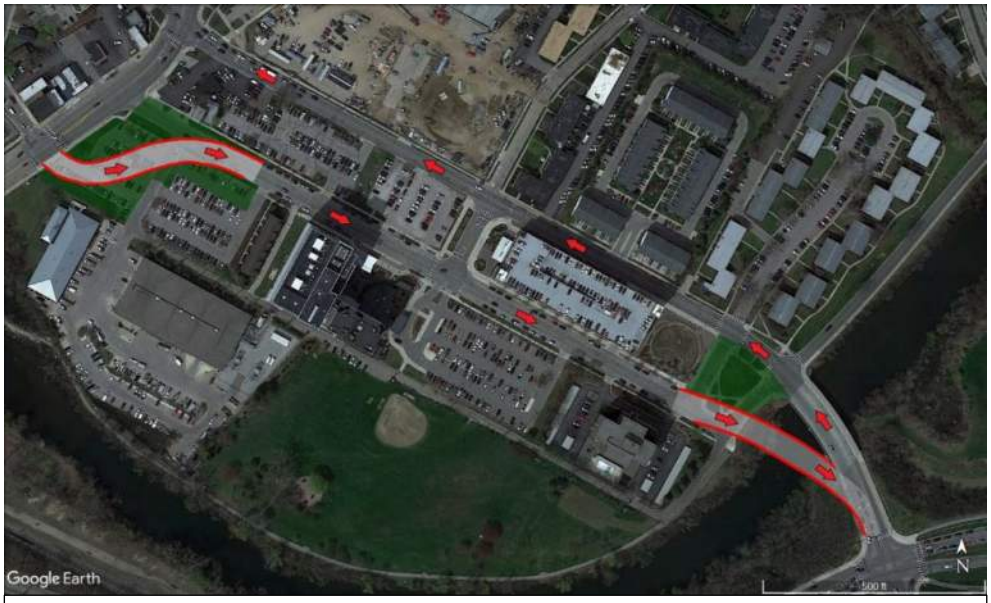


**Figure 100: Convert Maiden Ln and Wall St to one-way pair. Option B: Shift western portion of Wall St to align with Swift St at signalized intersection and eastern portion uses new Huron River bridge to rejoin Maiden Ln at Fuller Rd. Otherwise same benefits as Option A.**

## 6.3 Broadway Street/Division Street/Beakes Street

The area where NB Division Street becomes Broadway Street, and SB Broadway Street becomes Beakes Street, is open enough to encourage high speeds through the area but has limited sight lines to make traversing the area as a pedestrian uncomfortable.

Observations:

- Confusing geometrics at the intersection of Division Street, Broadway Street, Beakes Street, Summit Street, Detroit Street and Carey Street
    - Visibility around existing retaining walls
    - Steep grades

**Figure 101: Vehicle speeds are high as SB Division transitions to Beakes. This leads to concerns for pedestrians crossing the roadways.**


**Figure 102: Vehicle speeds are also high as NB Division turns onto Broadway. This, combined with limited sight distance, raises concerns for pedestrians crossing the roadways.**

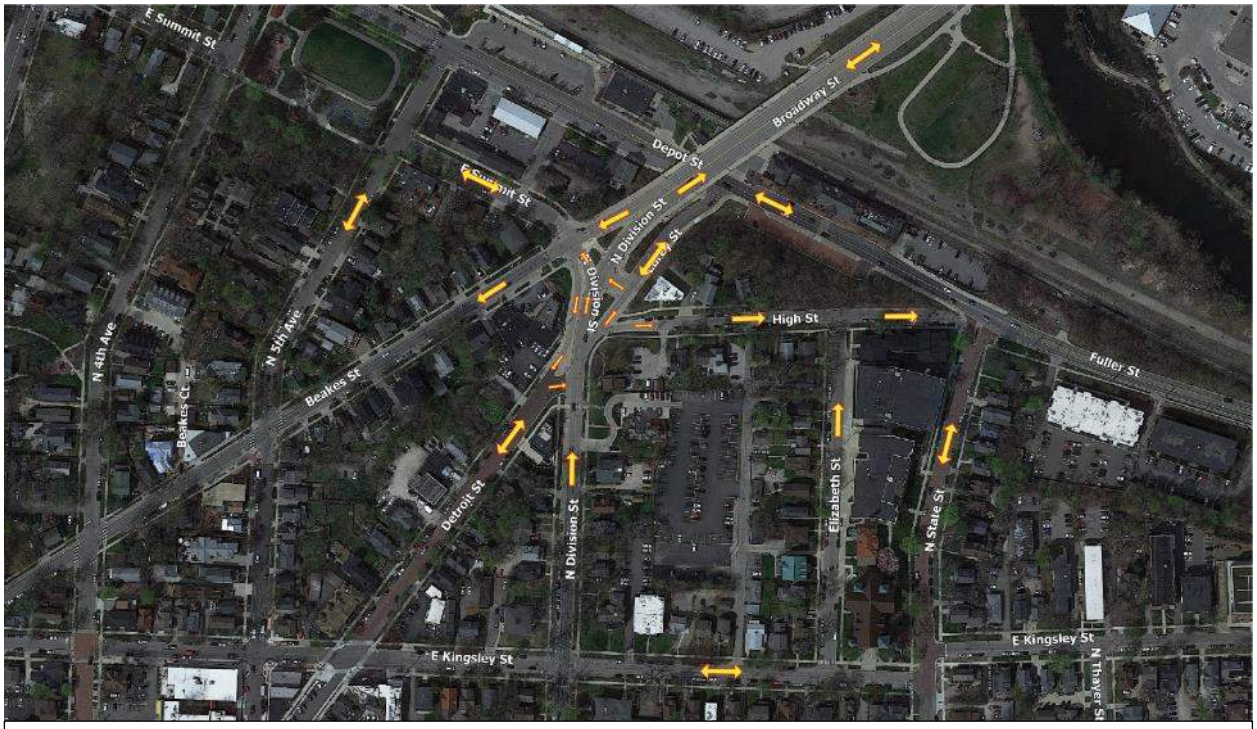


**Figure 103: Overview of the area just north of Kerrytown, showing pattern of one-way and two-way streets.**

Suggested Enhancements:

- Option A: Close Detroit Street south of Beakes Street using a median island extension

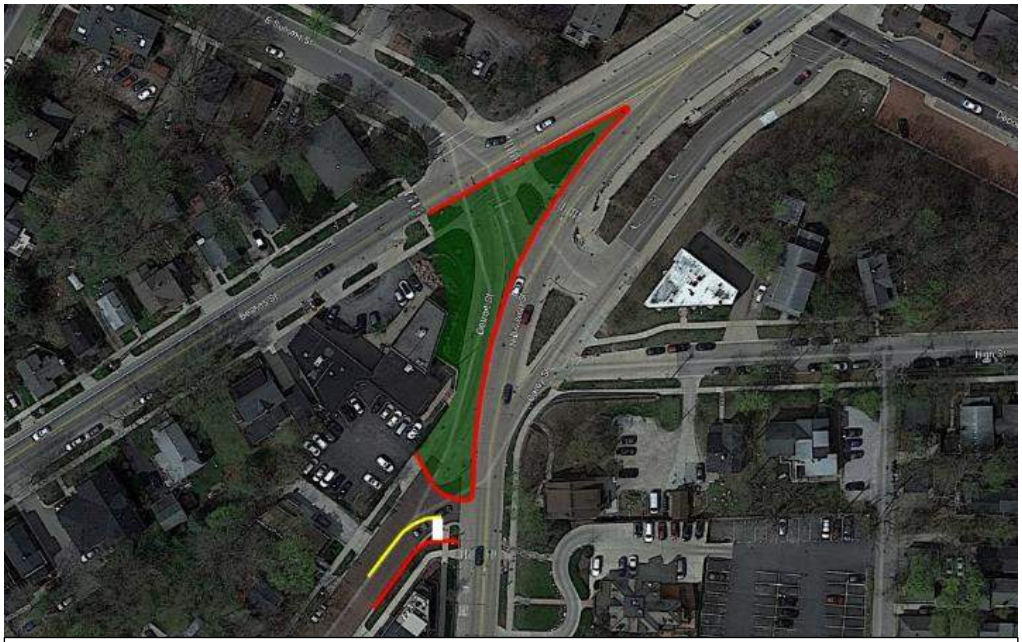

**Figure 104: Option A – Close access between Detroit / Division and Broadway / Summit. This would eliminate conflicts with pedestrians crossing Beakes St and Broadway St. Crosswalk would be moved south along Division to improve visibility around the retaining wall.**

- Option B: Close Detroit Street south of Beakes Street using a median island extension. Eliminate access from Depot Street to Broadway Street by converting Carey Street to one-way northbound.

**Figure 105: Option B – Variation on Option A. Would eliminate conflicts related to pedestrian crossings at Beakes St and Broadway St. Maintains access from Division St down to Depot St and to High St, but Depot St up to Broadway St. will be detoured.**

- Option C: Close northbound entrance to Carey Street from Division Street and southbound access to Detroit Street from Summit Street.

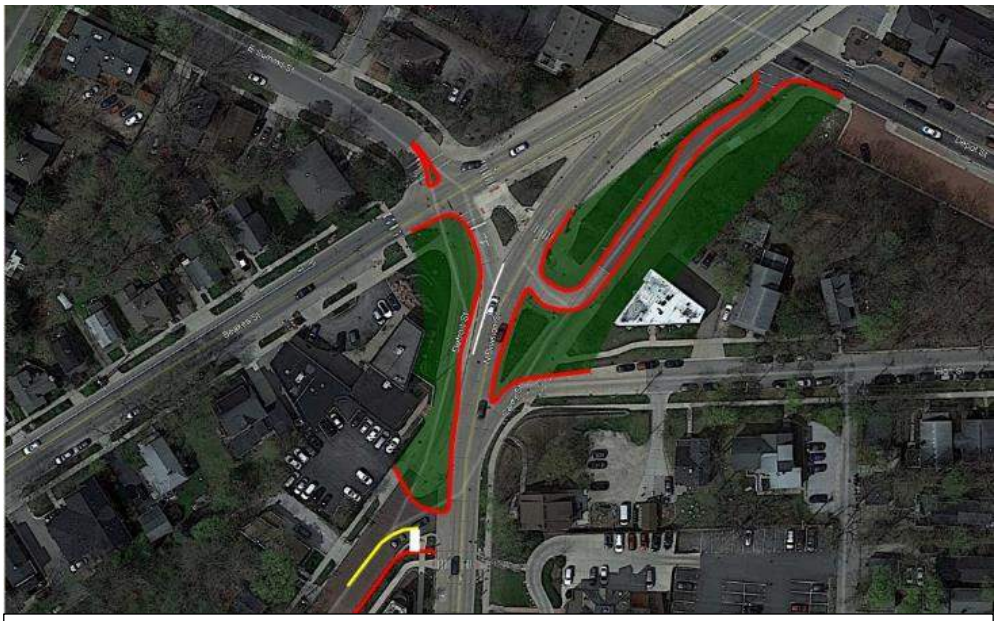

**Figure 106: Option C – Close northbound entrance to Carey St from Division St and southbound access to Detroit St from Broadway St/Summit St. Maintains access from Division to Summit. Left turns and thru movements would be channelized. Would maintain access to the Broadway Street bridge from Depot Street and to High Street from Division.**

### 6.4 Fuller Road at Maiden Lane/Medical Center Drive

This intersection is highly utilized by employees, visitors, and students looking to access the University of Michigan Medical Center. Parking garages and residential development located on Maiden Lane mean that high pedestrian volumes are common throughout the day, along with single occupancy vehicles and transit.

Observations:

**Figure 107: Fuller Rd at Maiden Ln/E Medical Ctr is highly congested with vehicles especially during the peak hours. Left turns from Maiden Lane onto Fuller Road cause backups during peaks.**


**Figure 108: Contributing to the high pedestrian volumes are the shared use pathways and the connection to the Border to Border trail.**

**Figure 109: Intersection features high pedestrian volumes from various groups accessing the hospital campus. Volumes are highest during the hospital shift change.**

Suggested Enhancements:

- Add additional roadway to Medical Center Drive from Fuller Road

**Figure 110: Add new roadway connection between E Medical Ctr Dr and Fuller Rd. Would provide an additional entrance and exit to and from the Hospital. Would move some traffic to the east to help clear up the Maiden Lane intersection. A study would need to be conducted to determine the location and feasibility of adding the new roadway.**

## *6.5 Northside STEAM School*

The Northside STEAM school is located in the Lower Town neighborhood and has undergone a large expansion over the last 5 years, transitioning from a standard neighborhood elementary school to a K-8 magnet, commuter school. The school's PTO applied for and won a Safe Routes to Schools grant to add sidewalks around the campus, but due to neighbor opposition, the sidewalks were never installed.


**Figure 111: Overview of AAPS Northside STEAM School.**

Observations:

- Northside STEAM is located along Barton Drive, a busy route into Ann Arbor, and is typically congested with vehicle traffic from both school parents and commuters. This congestion leads to tardy students, especially when the AA Railroad freight train blocks traffic in the neighborhood.


**Figure 112: Parent vehicles dropping off students are kept off site and are directed to remote lots near the school where they can park and walk with their children to school. A volunteer guard is stationed to help direct parents who are allowed to park in the designated lots.**

**Figure 113: Many families walk to school to make sure their children make it safely and on time.**

**Figure 114: There are three adult crossing guards stationed around the Northside STEAM campus to help identify gaps in traffic, to safely cross students.**

**Figure 115: Since parents are forced to the outside of the campus, there is little space for them to quickly drop off older children that can walk up to the school building by themselves. Parents typically drop off on the side streets in the parking lane.**


**Figure 116: Signing practices around the school are confusing and not to roadway standards. Some signs are handmade, others are typical standard street signs but poorly located, and others are related to towing practices.**

**Figure 117: The neighborhood around the school features many sidewalk gaps, short ones on Barton Dr and especially long gaps on Traver Rd.**

Suggested Improvements:


**Figure 118: On-Site Changes – Build a new driveway off Pontiac Trail to function as a loading zone for parents to easily and safely drop off students at the school. In the parking lot on the west side of the school building, accessible via Taylor Street, the parking spaces could be changed from 45 degrees to 60 degrees to allow room for more spaces. Build an island at the end of this parking lot to better define the circulation aisles and the intersection of Taylor St, Peach St and the school drive.**

**Figure 119: Update all signage around the school to be consistent**

- Explore the option of additional drop off sites around the neighborhood.
- Fill in all sidewalk gaps leading to, or adjacent to, the school.
- Improve traffic congestion along Barton Dr and Pontiac Trail, which are amongst the busiest streets in the neighborhood.

## *6.6 Other Items Considered*

### Work Zones

New developments in the neighborhood had some unsafe conditions related to pedestrian and ADA access around the work site.


**Figure 120: On Broadway, in front of the Format Framing building, a temporary sidewalk was constructed using thick rubber mats. These were not placed close enough together to eliminate gaps and the mat itself was not sturdy enough to be stable for someone in a wheelchair or walker. Caution tape was used to prevent pedestrian from falling off the end of the mat pathway at the drop off.**


**Figure 121: Other construction site issues including missing sidewalks, holes in the concrete, and exposed electrical boxes.**

### Parking

On-street parking in the Study Area is inconsistent and some areas where parking could be improved are as follows:

**Figure 122: Parking is allowed along Barton Drive in the block west of Pontiac Trail. Due to traffic congestion along Barton Drive, it may be more appropriate to restrict on-street parking in this area and provide a right-turn lane for the eastbound approach to Pontiac Trail.**


**Figure 123: In front of the electrical substation on Broadway Street at Swift Street a 30-minute parking sign shares the same places as an AAATA bus stop. If a vehicle is parked in the spot, bus riders will be forced to enter the street in order to board. There is no ramp down from the sidewalk to the street level for a person in a wheelchair to travel down to the street.**

## Lighting

For much of the Study Area, the streets and sidewalks were well lit and provided good visibility for vehicles and pedestrians using the street. Some areas where lighting could be improved are as follows:

- Fuller Road and Maiden Lane intersection
    - Lights set are back from crosswalks and pedestrians waiting to cross are hard to see
- Pontiac Trail
    - Moore Street to Swift Street is dark

**Figure 124: Side path in the depressed section along Plymouth Road does not get much light from streetlights and could use path level lighting.**

**Figure 125: There is a light burned out on Plymouth Road, between Broadway Street and Barton Drive**

## Access Management

Throughout the Study Area, access management could be improved to reduce conflicts and improve traffic conditions. The areas where access management could be improved are as follows:

**Figure 126: The auto repair shop with access to Broadway Street, Maiden Lane and Wall Street has at least six different curb cuts allowing vehicles to pull in and out of traffic in many places. Some of these driveways are blocked by parked cars throughout the day and should be considered for closure.**

**Figure 127: It is our understanding that local ordinance calls for driveway not in use to be closed. If correct, this driveway on Barton Drive is a candidate for removal.**


**Figure 128: There is no direction on how Canal Street should function, and it has largely been unimproved. The street is very narrow and does not easily allow for two vehicles to pass each other side by side. Should be considered for posting as one-way.**

## Future Growth

Though there has been a high amount of recent and current residential growth in the neighborhood, it is likely that more development will come to the Study Area. Because of this, some policy decisions should be made that will direct development to be less vehicle focused. The following recommendations may help combat congestion due to future growth:

- Policy – 1% set-aside
    - Fund future safety improvements not apparent during construction
- Future developments need to consider access, transit
- New Park and Ride at Olson Park (on Dhu Varren)
    - City-owned and parking already in place
    - Not heavily used during working hours

# 7.0 CONCLUSION

This audit has been prepared to assist the responsible road authorities in the identification and actualization of opportunities to improve safety within the study area. The audit is based on observations to improve safety within the Lower Town Study Area through observations made from February 4 to February 6 and information available at the time of the safety review. This RSA has been performed in accordance with the FHWA guidelines and policies. The suggestions it contains are for consideration only and are in no way intended to serve as design or operational recommendations.

This report does not preclude the identification of additional issues pertaining to safety by the responsible road authorities, or the emergence of new issues over time.

It is recommended that the responsible agencies review this report; document their responses to the issues identified in a formal response report; and track their progress towards the implementation of safety improvements prompted by this audit.