

Kalamazoo Downtown Streets Phase 2 Technical Memorandum

Prepared for:
City of Kalamazoo



Prepared by:



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Appendix A Conceptual Level Layouts and Cross Sections

Appendix B Traffic Analysis

Appendix C Safety Analysis

Appendix D Cost Estimates

Appendix E Amenities

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Section 1

Overview

The City of Kalamazoo is repurposing the right-of-way (ROW) for a combination of one-way street conversions to two-way, right-sizing of roadway and/or incorporation of street side amenities (on-street parking, bike lanes, cycle tracks, curb side dining, etc.) to establish a downtown look-and-feel to match the City's goals for all users. To accomplish this goal, CDM Smith has developed the conceptual level layouts for the downtown streets of Kalamazoo. These layouts show the improvements needed to the various corridors including pavement widening, turn lane lengths, intersections, available parking, bike and pedestrian facilities, major utilities, amenities, and estimated right-of-way. The conceptual level layouts, along with the graphic cross sections and supplemental descriptions, provide the City of Kalamazoo supporting materials for their use on advancing the master plan, public meetings, grant applications, and future design scopes. Refer to Appendix A for conceptual level layouts and cross sections.

This technical memorandum describes several technical aspects of the project as detailed in the project scope and as listed below:

- Conceptual Maintenance of Traffic
- Construction Phasing
- Projected traffic (travel demand model)
- Level of Service along the corridors
- Estimated Impacts
 - Utilities
 - Parking
 - Right-of-Way
- Location and Type of Amenities
- Cost Estimates
- Safety analysis at selected intersections

1.1 Existing Conditions

Existing physical, social, environmental, and cultural resources were evaluated when reviewing the existing project corridors. Physical resources included the existing roadways, sidewalks, lighting, and other amenities within the project Right of Way (ROW). Social resources included the characteristics of the people and land uses within the project corridors. This includes the demographic makeup, any economic or socially disadvantage. Environmental resources included

the area's plans and animals, water features, parks, and other natural resources. Cultural resources are related to the historic locations in the project corridors. This includes historic properties, historic districts, and prehistoric sites. Existing conditions for the specific streets of this report are described in further detail under their respective sections.

1.2 Proposed Conditions

The proposed conditions described in this document have taken into account the existing physical, social, environmental, and cultural resources in order to create the optimized corridor for all users. The proposed conditions are intended to provide improvements to transportation within the corridors (for vehicular, bicycle, and pedestrian). Improvements to level-of-service, travel times, safety, and emissions are all considered, while factoring in future growth for the various corridors. Proposed conditions for the specific streets of this report are described in further detail under their respective sections.

1.3 Traffic and Safety

Traffic Modeling

Traffic volumes developed from the forecasting model for buildout AM and PM peak hours were input into Synchro, version 10.3, for analysis to produce intersection level-of-service (LOS) results. The analysis produced the 2040 buildout results for the AM and PM peak hours with the typical sections and intersection configurations proposed. Key intersections of the study area were selected for analysis, mainly along Kalamazoo Avenue and Michigan Avenue, to note the changes between the existing and proposed typical sections, as well as a few intersections that will likely require future signalization. Initial analysis results identified locations where turn lanes are recommended at congested intersections along Kalamazoo Avenue and Michigan Avenue to reduce queues, and these locations were confirmed with the concept designs.

Overall projected LOS indicate some over-capacity conditions on Kalamazoo Avenue at Rose Street and Burdick Street due to anticipated development shown in the forecasting model. Additionally, forecasted conditions on Michigan Avenue at Stadium Drive/Michigan Avenue/Main Street show poor LOS during the PM peak hour due to high volumes of traffic traveling from Stadium Drive to Michigan Avenue. All other intersections function with acceptable LOS. The analysis results are included in **Appendix B**.

Turn Lane Lengths

Another synchro output was storage length for the turning lanes. The following intersections/locations were included in the analysis:

- Michigan & Douglas
- South & Burdick
- Rose & Lovell
- Westnedge & Vine
- Burdick & Lovell
- Lovell & Portage
- John & Lovell
- John & South
- Lovell and Kalamazoo
- King Hwy & Kalamazoo
- Kalamazoo & Michigan
- Kalamazoo & Gull/M-43

- Bixby/Shaffer & M-43
- Michigan & Lovell
- Howard & Crosstown
- Westnedge & Lovell
- Westnedge & South
- I-94 BL & Michigan
- I-94 BL & Oliver
- Rambling Road & I-94 BL/Stadium
- Kalamazoo & Mills
- Park & Lovell
- Park & Vine
- Park & South
- Oakland/Michigan & Lovell
- Howard & railroad
- Michigan & railroad
- Oliver & railroad
- Westnedge & Kalamazoo
- Park & Kalamazoo
- Michigan & Westnedge
- Park & Michigan
- Park & North
- Westnedge & North
- Park & Paterson
- Westnedge & Paterson
- Rose & Michigan
- Burdick & Michigan
- Edwards & Michigan
- Pitcher & Michigan
- Burdick & Kalamazoo
- Rose & Kalamazoo
- Edwards & Kalamazoo
- Pitcher & Kalamazoo
- Stadium & Michigan
- Douglas & Kalamazoo
- Rose & South
- South & Portage
- Portage & Michigan
- South & Edwards
- Michigan & Kalamazoo
- Michigan/Stadium & Academy
- Crosstown & Park
- Park & Balch
- Westnedge & Crosstown
- Westnedge & Howard
- Crosstown & Howard
- Park & Howard

Storage lengths for the specific streets of this report are described in further detail under their respective sections. **Appendix B** details the Synchro analysis outputs for all intersections included within the project limits.

Travel Times and Measures of Effectiveness

Travel times were developed for the corridors along Kalamazoo Avenue, Michigan Avenue, Lovell Street, and South Street using SimTraffic, Synchro’s accompanying microsimulation software, to show comparative travel times of projected traffic to the existing network. Emissions data are reported as additional measure of effectiveness of the comparison. Buildout improvements include signalization and optimization, exclusive turn lanes and storage length in coordination with the proposed conceptual design.

Travel times are expected to increase along these corridors due to anticipated delays at intersections with high anticipated turning movements. Significant left turns are expected in both

directions along Michigan Avenue and Kalamazoo Avenue, especially during the PM peak hour, and where exclusive left turn lanes and phasing are not provided, delays can be expected. The full table of travel times and emission comparisons can be found in **Appendix B**.

Safety Analysis

Michigan's Department of Transportation Highway Safety Manual (HSM) workbook was used to predict crashes for both the no-build and preferred recommendations utilizing the Empirical-Bayes method. The five locations that were analyzed are as follows:

- Michigan Avenue & Kalamazoo Avenue
- Stadium Drive/Michigan Avenue & South Street
- Stadium Drive/Michigan Avenue & Academy Street
- Michigan Avenue & Main Street
- The modified roundabout at Stadium Drive, Oakland Drive, Michigan Avenue, and Lovell Street

The full output of the HSM analysis can be found in **Appendix C**. Further detail of the specific locations can be found in their respective sections.

1.4 Parking

Parking is a main staple for the City of Kalamazoo. Parking is intended to be minimally impacted by the two-way conversion but will be affected with the planned conversion. As part of the previous Planning and Environmental Linkage's (PEL) Study with the Michigan Department of Transportation (MDOT), existing parking was analyzed and gathered for the applicable downtown streets of Kalamazoo.

1.5 Bike and Pedestrian Facilities

Providing bike and pedestrian facilities are important for the City of Kalamazoo for multimodal access and connections to existing trails and paths. There are multiple routes available for bicyclists to use, such as the Kalamazoo River Valley Trail, Western Michigan University/Kalamazoo College Connector, Spring Valley Park Connector, and Kal-Haven Trail. In addition to adding more shared use path and on-street bike lane opportunities, connections will allow direct access for bicyclists to the downtown, commercial areas of Kalamazoo. Specific opportunities are future explored in each section per street.

1.6 Utilities

There are several utility owners within the downtown streets of Kalamazoo. Major utilities to consider designing around based on relative cost to relocate would be water main, sanitary, gas, and fiber optic. The utility owners gathered from MISSDIG include but are not limited to:

- 123 Net
- AT&T

- Consumers Energy
- Charter Communications
- Climax Telephone (CTS Communications)
- Comcast
- Everstream
- KEPS Technologies Inc. (ACD-NET)
- Kalamazoo City Department of Public Services
- Level 3 NOW Century Link
- Midwest Communications
- TurnKey Network Solutions (US Signals Corp)
- Windstream Communications
- Western Michigan University
- ZAYO Bandwidth Midwest LLC

Anticipated conflicts are determined on a street-by-street basis based on what was received from the various utility companies and compared to the proposed roadway improvements.

Consumers Energy has an interest in relocating their overhead utilities underground within the project limits. The applicability of relocation depends on the location of the underground utilities and whether the existing pavement is being removed. Moving the location of the utility line could possibly mitigate future concerns.

1.7 Right-of-Way (ROW)

ROW considerations are considered within the conversion to two-way traffic. Specific right-of-way elements are described in detail under each street's section.

1.8 Conceptual Maintenance of Traffic

The conceptual Maintenance of Traffic (MOT) schematics described throughout this report are for considerations and awareness moving forward through the life of the master plan of the City of Kalamazoo. The MOT for each roadway section is described assuming the needed drainage replacements and lane configurations. Full drainage replacement requires a more extensive MOT than is conceptually described in this report. There may be more details and decisions needed as the individual streets are phased.

As part of the previous phase of the Downtown Streets Study, the Study Team worked with the City of Kalamazoo to identify potential phasing for the one-way to two-way conversions to occur. The team tested the preferred phasing in the travel demand model with 2040 traffic

volumes to ensure that the transportation network still performed at an acceptable level of service.

Construction phasing of the downtown street conversion from two-way to one way includes traffic demand modeling, constructability, and other economic factors. There are multiple phasing opportunities for the downtown street conversions, which are further discussed under each street's section. Impacts are expected to occur in each roadway section. All impacts can be mitigated but have special considerations to consider. These impacts are described in the following sections.

The proposed construction phasing utilizes both detours and part-width construction between the various project segments. This proposed construction phasing is as follows:

- Phase 1 – Kalamazoo Avenue from Westnedge Avenue to Harrison Street
- Phase 2 – Michigan Avenue from Main Street to Kalamazoo Avenue
- Phase 3 – Kalamazoo Avenue/Douglas Avenue from Westnedge Avenue to Main Street
– South Street from Michigan Avenue to Portage Street
- Phase 4 – Lovell Street from Eldred Street to Portage Street
- Phase 5 – West Main Street from Douglas Avenue to Michigan Avenue
- Phase 6 – Stadium Drive/Michigan Avenue modified roundabout from Lovell Street to Michigan Avenue
- Phase 7 – Removal of Michikal Street from Michigan Avenue to Kalamazoo Avenue (Michikal Street can be closed during any phase and be utilized for MOT during other stages)

Appendix B includes inputs and results from the travel demand model, including the number of lanes on all downtown streets in each phase and the resulting average daily traffic and level of service throughout the network. The results show that the network performs at an acceptable level of service throughout all phases of implementation.

1.9 Estimates

The cost estimates performed by CDM Smith were done using MDOT's 2020 pay items along with their weighted Average Unit Prices from 2019-2021. The unit prices were chosen while taking into consideration the MDOT region in which Kalamazoo is located and inflation, among other factors, while also understanding that this phase on the project is highly conceptual which should reflect conservative unit price values.

CDM Smith provided detailed cost estimates that broke items down into sections. The sections include but are not limited to:

- Earthwork, Bases, HMA Pavements & Surface Treatments, Portland Cement Concrete Pavement, Structures, Incidental Construction

- Signing & Pavement Markings, Signals, Maintenance of Traffic, Erosion Control, Drainage (Full), Drainage (Needed)
- Contingencies, Contractor Staking and Errors, Mobilization
- Preliminary Engineering, Construction Engineering, Right-of-Way, Railroad Modifications, Utility Owner Relocations

All streets except for Michikal include both an “All Drainage Replacement” as well as a “Needed Drainage Replacement”. According to the public GIS web map on the City of Kalamazoo website, much of the storm sewer within the project limits was installed between the years 1885 and 1911. The two alternatives for drainage costs were created to account for the option to remove and replace all the storm drainage structures and pipes within the individual streets project limits, as well as the option for only needed replacements due to the proposed two-way conversion construction. The total project cost for each street, though, includes the cost for just the “all drainage replacement”.

Due to a lack of existing survey, CDM Smith was limited to providing planning level cost estimates. CDM Smith worked with public GIS data along with high quality aerials provided by the City of Kalamazoo to produce the most accurate cost estimates capable.

Listed below are some important assumptions made in the cost estimates that were standard across all streets:

- An additional 30% contingency was added to the total cost to provide some buffer in consideration of the high-level conceptual phase that this project is currently at.
- When performing milling and resurfacing, CDM Smith accounted for two inches of milled surface to be paved back.
- Where widening was proposed, a four-inch base course and three-inch top course of HMA was assumed, along with one foot of subbase and six inches of aggregate base.
- A railroad signal upgrade cost of \$175,000 is used at all applicable locations.
- The “needed drainage replacement” option assumed that each structure would receive a new cover
- The design of the at grade crossing will be designed and installed by railroad forces and the cost of the design and installation reimbursed by the project
- The highest amenity cost tier was including in the applicable cost estimates

See **Appendix D** for the cost estimate summaries for each street.

1.10 Amenities

While existing conditions tend to only focus on the demands of the vehicle, the Downtown Kalamazoo streetscape plans offer multi-modal accommodations and activate the city’s largest public realm. It was important to identify the specific contexts and uses of each street individually

to come up with appropriate layouts of elements behind the curb. Priorities included wider sidewalks, safer crossings, bike accommodations, transit amenities, and aesthetics. These concepts also evaluate the possibility of green infrastructure opportunities.

The team had previously identified the preferred alternatives for each street:

- W Kalamazoo Avenue
- W Michigan Avenue
- Lovell Street
- South Street
- Stadium Drive

Transit

A goal for many of the segments is to concentrate the stops at intersection, specifically leading up to the intersection. This will allow users to be picked up and dropped off near existing crosswalks. Amenities such as benches, trash receptacles, lighting, and bike racks ensure an improved overall rider experience.

Bike lanes

- There are several design options depicted for the streetscape alternatives.
- Raised bike lane: this option concentrates the bike lanes on the sidewalk level. This could be a combined two lane, two directional system on one side of the road, or one directional lane on either side. Typically, these bike lanes are delineated by contrasting colors or materials, or with physical barriers from the adjacent pedestrian way. This scenario is depicted on Kalamazoo Avenue and Stadium Drive.
- Buffered bike lane: on-street, single directional bike lanes are used in the Michigan Avenue and Lovell Street alternatives. These segments of bike lanes are buffered from vehicles through striping.
- Shared street: on low-volume and low-speed residential roads, shared streets may be the best option for cyclists. The travel lanes are shared between vehicles and bikes and are indicated with signage and “sharrow” symbols on the road.

The overall objective of the bike lanes is to solidify a multi-modal network within downtown.

Costs

Because many options can be included in the streetscape elements, it was important to simplify the costs into three tiers of cost opinion (see **Appendix E**).

Line items for each tier are provided, anticipating each streetscape concept to be individually customized to fit needs per street. Each tier is assumed to include all items in the list provided in **Appendix E**, knowing these cost opinions will be refined upon City review and public feedback.

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Section 2

Michigan Avenue

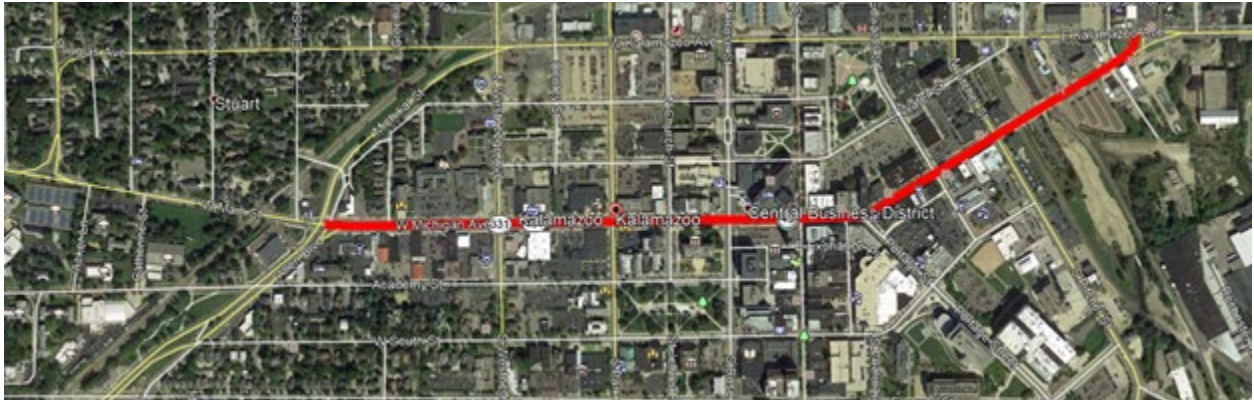


Figure 2-1: Limit of West Michigan Avenue from West. Main Street to Kalamazoo Avenue

2.1 Existing Conditions

The one-way east bound section of Michigan Avenue from Michikal Street/Main Street to Kalamazoo Avenue is roughly one mile in length through urban downtown Kalamazoo. The existing cross section features are:

- Five lanes from Michikal Street/Main Street to Park Street
- Four-lane section from Park Street to Rose Street
- Three-lane section from Rose Street to Kalamazoo Avenue
- Curb-to-curb width along the length of Michigan Avenue varies from 54 feet to 76 feet
- Parking is located along the length and on both sides of Michigan Avenue wherever side street turn pockets are absent
- Lighting, drainage, curb, sidewalk, and signing are present along the length of the roadway section
- Twelve crossing intersections
- Nine traffic signals
- Two controlled at-grade railroad crossings for the EB direction
- Existing storm sewer pipes were installed in 1885
- Pedestrian crosswalks at intersections

2.2 Proposed Conditions

The current one-way Michigan Avenue section will be converted to a two-way section. The overall roadway width will be narrowed to have a final lane configuration for Michigan Avenue from Main Street to Kalamazoo Avenue that includes one lane in each direction with on-street parking on both sides of the roadway, a shared left turn lane, and dedicated left turns at intersections. At the time of this report, the final location of a downtown bike route was undecided. There has been discussion with the City about placing the bike lanes on both sides of Michigan Avenue from Main Street to Portage Street. The proposed bike lanes could be located outside the proposed parking, on the sidewalk level or between the travel lanes and the proposed parking. Cross sections have been provided for each of these alternatives as well as a drawing showing the bike lanes located outside the parking lanes. Work along Michigan Avenue would include:

- Mill and resurface of the proposed pavement width
- Left turn lanes at intersections as needed
- New planting/amenity zone and sidewalks are to be outside of the proposed curb limits and may include street trees, plantings, outdoor cafes, bus stops, lighting, parking meters, pedestrian amenities, etc.
- Modifying the storm sewer system to fit the new cross section or full replacement of the existing system
- Existing lighting will need to be relocated along the length of the section due to the narrowing roadway limits
- Intersection at Michigan Avenue/Main Street /Michikal Street will be realigned to accommodate left turn movements onto the two-way converted Main Street and to reduce the existing intersection skew
- Intersection at Michigan Avenue/Kalamazoo Avenue will be realigned along Michigan Avenue to omit the existing skew and provide a tee intersection with a right turn only out onto the converted two-way Kalamazoo Avenue
- Signals will need to be relocated, improved, or redesigned to accommodate two-way traffic and any new pedestrian crossing movements
- Depending on the location of the bike lanes, pedestrian crossing distance may be minimalized at each intersection with the use of bumpouts and refuge islands at mid-block crossings where applicable.

Existing railroad gates will need to be modified or redesigned and constructed to accommodate the new lane configuration by the railroad owner for both EB and WB movements

Existing cantilever signing will be removed and replaced by non-cantilever signing due to new lane designation of the proposed cross section.



Figure 2-2: Proposed Cross Section for Michigan Avenue with Bike Lanes inside the Parking Lane



Figure 2-3: Proposed Cross Section for Michigan Avenue with Bike Lanes outside the Parking Lane



Figure 2-4: Proposed Cross Section for Michigan Avenue with Bike Lanes at the Sidewalk Level

2.3 Traffic and Safety

Turn Lane Lengths

Table 2-1 displays the storage length outputs from the Synchro analysis described in Section 1.3.

Table 2-1 Michigan Avenue - Storage Length of Turning Lanes

Intersecting Road	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
Douglas	100			150			100	
Kalamazoo			215	215	100			
I-94 BL (Stadium)					300			300
Lovell					250			
Westnedge	100	125	50	100	75			
Park (M-331 & US-131 BR)	200	100	100	50	75		75	75
Rose	50		50		50		50	
Burdick			50					
Edwards	75		100		50		50	
Pitcher	75		100		100			
Stadium	150	150	100	150				
Dummy	50	100	50					
Portage		150	150			100		
Kalamazoo			125		450	200		

Note: Eastbound Left (EBL), Eastbound Right (EBR), Westbound Left (WBL), Westbound Right (WBR), Northbound Left (NBL), Northbound Right (NBR), Southbound Left (SBL), Southbound Right (SBR)

Safety Analysis

The intersection of Michigan Avenue and Kalamazoo Avenue had sixty-five crashes in the past five years. Rear-end and same direction sideswipe crash types had the highest distributions at this location. The analysis predicts around a 23 percent reduction in crashes after the intersection is modified as suggested in this report.

2.4 Parking

Parking lanes are proposed in both directions of Michigan Avenue. The lanes shall be seven feet wide, positioned variously depending on where potential bike lanes are located. If the bike lanes are located outside the proposed parking, this would reduce the number of parking spaces due to allowing the proper sight distance near the drives and intersections. The bike alternatives are explored in Section 2.5.

2.5 Bike/Pedestrian Facilities

Bike lane and pedestrian connections are important aspects to Michigan Avenue's cross section. There are three alternatives involving bike lanes, where the location of the buffered bike lanes varies on-street or off-street. All bike lane options are proposed between Allen Boulevard / Main Street and Rose Street.

For one option, the bike lanes can be at the pavement level, between the curb and parking lanes. This scenario offers separation from the travel lanes; however, cyclists could be interrupted by

passenger car doors. Barriers can be added within the buffer zone to help prevent the potential conflicts, such as bollards.

Another option can be placing the bike lanes between the travel lane and parking lane. Similar interactions are present in this scenario, potential interruptions from driver side car doors and vehicles in the active travel lane.

A third option positions the bike lanes at the sidewalk level. Between the curb and the sidewalk or planting strip, the cyclists have more physical separation from the roadway vehicles. However, at the sidewalk level, there is more interaction with pedestrians.

For pedestrians, the existing sidewalk shall remain available.

2.6 Utilities

Based on the proposed scope of work for Michigan Avenue, there is a significant utility impact anticipated. The reduction of the roadway width and the associated pavement removals may affect underground utilities in the area. Additionally, street lighting adjustments are anticipated to better provide lighting to the roadway, including proposed parking and bike lanes.

Utilities within the Michigan Avenue corridor:

- Consumers Energy
- Charter Communications
- Climax Telephone (CTS Communications)
- Kalamazoo City Department of Public Services
- Level 3 NOW Century Link
- Midwest Communications
- Windstream Communications
- ZAYO Bandwidth Midwest LLC

Underground fiber optic runs along the north side of Michigan Avenue. This could be impacted due to the pavement removals associated with the proposed roadway reduction, as well as any storm sewer improvements along the north side of Michigan Avenue.

Overhead fiber optic crosses Michigan Avenue along the west side of Westnedge Avenue, Edwards Street, Pitcher Street, and Rochester Avenue, as well as runs along the south side of Michigan Avenue at Rochester Avenue. Relocation of utility poles may be necessary due to proposed pavement removals.

Underground cable runs along the north and south side of Michigan Avenue from Main Street to Westnedge Avenue and from Pitcher Street to Kalamazoo Avenue with some crossings. It crosses

Michigan Avenue along the east and west side of Rose Street as well as east of Pitcher Street and Walbridge Street. These locations could be impacted due to the proposed pavement removals.

Overhead Cable crosses Michigan Avenue west of Westnedge Avenue, Edwards Street, Pitcher Street, and Walbridge Street. Relocation of utility poles may be necessary due to proposed pavement removals.

Storm sewer is located along the south side of Michigan Avenue from Main Street to Westnedge Avenue and from Edwards Street to Pitcher Street. Storm sewer is located along the north side of Michigan Avenue from Westnedge Avenue to Edwards Street and from Pitcher Street to Kalamazoo Avenue. There are storm sewer crossings to catch basins on Michigan Avenue as well as at Westnedge Avenue, Park Street, Rose Street, Kalamazoo Mall, Farmers Avenue, Edwards Street, Pitcher Street, and Porter Street. The anticipated impacts will depend on the selected drainage replacement option (need replacement vs full replacement). At a minimum, all catch basins will need to be relocated due to the reduction in roadway width on Michigan Avenue.

Sanitary sewer is located along the south side of Michigan Avenue from Main Street to Westnedge Avenue and from Portage Street to Pitcher Street. Sanitary sewer is located along the north side of Michigan Avenue from Westnedge Avenue to Portage Street and from Pitcher Street to Kalamazoo Avenue. There are crossing at all intersection on Michigan Avenue. It is anticipated that there are sanitary services connected to the sewer main along Michigan Avenue that may be impacted by the proposed work.

Water main is located along the north and south side of Michigan Avenue from Main Street to Pitcher Street and along the south side from Pitcher Street to Kalamazoo Avenue. It is anticipated that there are water services connected to the sewer main along Michigan Avenue that may be impacted by the proposed work.

2.7 Right-of-Way

The existing ROW on Michigan Avenue is 96 feet wide. There are ROW impacts anticipated at the SW corner of the Michigan Avenue and Main Street intersection. This property is owned by MDOT, according to the Kalamazoo GIS records.

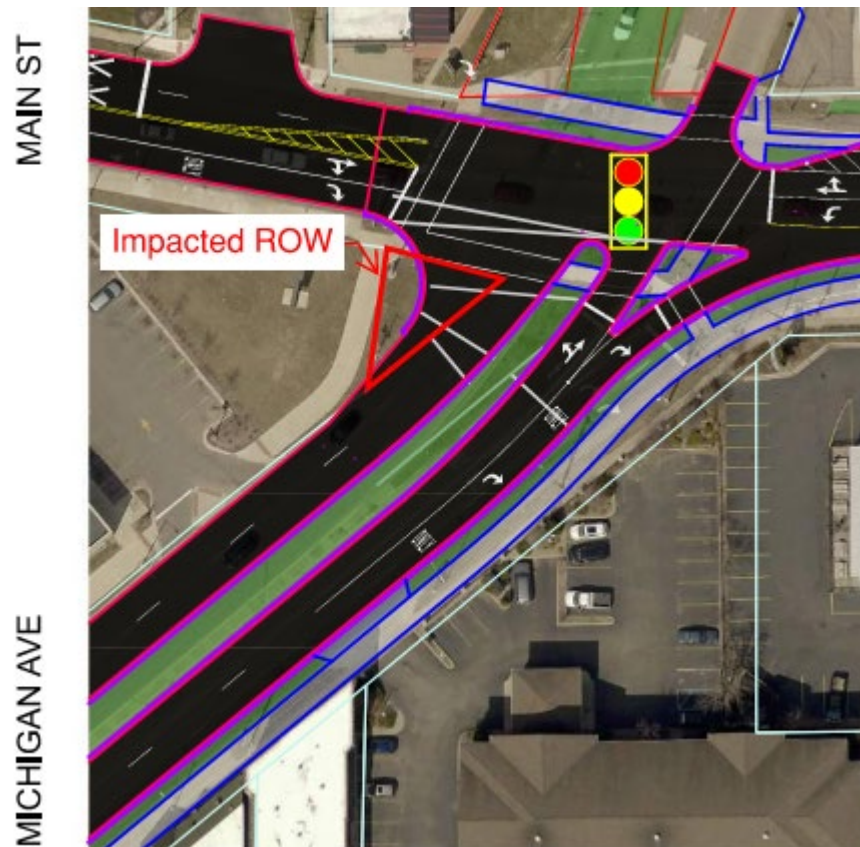


Figure 2-5: Impacted Right-of- Way at Michigan/Main Intersection

2.8 Conceptual Maintenance of Traffic (MOT)

The intersection of Michigan Avenue and Kalamazoo Avenue is intended to be standard T-intersections and have special MOT considerations. Additional coordination with the railroad company will be necessary due to a rail crossing within the project corridor. The recommended staging is as follows:

Stage 1

Close parking on both sides of Michigan Avenue. Maintain two EB lanes on the south half of Michigan Avenue. Proceed with pavement removal and construction of sidewalks and driveways on the north side of Michigan Avenue.

Stage 2

Shift traffic to north side of Michigan Avenue, maintaining one EB lane of traffic on the north side of Michigan Avenue. Proceed with pavement removal and construction of sidewalks and driveways on the south side of Michigan Avenue.

Stage 3

Mill and resurface the south two lanes and parking/bike lanes on Michigan Avenue.

Stage 4

Shift traffic to the south side of the road. Mill and resurface the north lane and parking/bike lanes on Michigan Avenue.

2.9 Cost Estimate

CDM Smith has provided three cost estimates for each of the three alternatives currently being considered on Michigan Avenue. See section 2.2 for the proposed conditions for each of the three alternatives. The total project cost for the alternatives is the following:

- Alt 1 (Bike lanes outside): \$21,213,770
- Alt 2 (Bike Lanes inside): \$21,406,380
- Alt 3 (Sidewalk level bike lanes): \$21,117,480

The estimates for Michigan Avenue include the majority of the work at the Michigan/Michikal/Main intersection which serves as the limits on the western end. The cost estimate also includes the work at the intersection of Michigan Avenue and Kalamazoo Avenue as well as the work on Kalamazoo Avenue from Walbridge Street to Harrison Street.

Eight total signal upgrades are accounted for on Michigan Avenue. These upgrades include the intersections of Michigan Avenue with Main Street, Westnedge Avenue, Park Street, Rose Street, Kalamazoo Mall, Portage Street, Edwards Street, and Pitcher Street. The total cost estimate for these signals on each of the alternatives is \$1,754,481.

The cost estimate for the full drainage replacement is \$2,051,111 within the limits of the Michigan Avenue proposed construction for all three options. The needed drainage replacement cost estimate is \$358,980 for each of the alternatives. Therefore, it would approximately cost an extra \$1,692,131 to upgrade the storm sewer network in this area beyond what is needed for construction. CDM Smith recommends the full drainage replacement option here as much of the existing network was installed in 1885 according to the City of Kalamazoo Public GIS Map.

Section 3

Kalamazoo Avenue



Figure 3-1: West Kalamazoo project limits from Westnedge Avenue to 300 feet East of Harrison Street.

3.1 Existing Conditions

The section of West Kalamazoo/Michigan from Westnedge Avenue to 300 feet east of Harrison Street is approximately 0.85 miles long. The existing cross section and features are:

- Three lanes in the west bound direction from Westnedge Avenue to Michigan Avenue / Kalamazoo Avenue / Harrison Street
- The existing cross sections vary along the length of the corridor due to parking, turn lanes, and bike/pedestrian facilities
- Curb-to-curb lengths vary throughout the length of the corridor ranging from 68 feet to 41 feet
- Shared use path on the north side between N Edwards Street and Potter Street which limits the curb-to-curb width to 44 feet
- Three lanes with a 41-foot curb-to-curb roadway width at the nose of the island between Michigan Avenue and Walbridge Street
- Existing storm sewer pipes were installed in 1885 based on the City of Kalamazoo GIS.

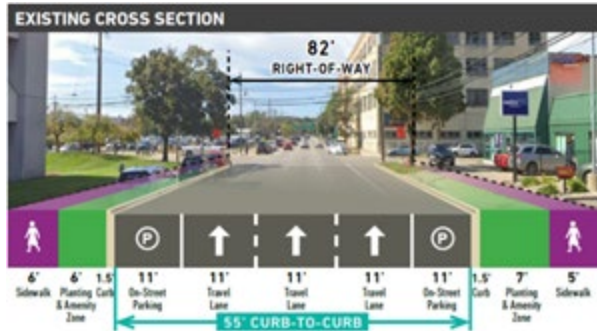


Figure 3-2: Existing Cross Section of Kalamazoo Avenue

3.2 Proposed Conditions

The one-way section of roadway will be converted to two-way with two lanes in each direction. The majority of the length will have a center turn lane, with the possible exception of the section between N Edwards Street and Potter Street where an existing shared use path creates a 44-foot existing curb-to-curb and only 58 feet from the face of the shared use path curb to the face of the building. This will restrict the ability for the center turn lane/left turn lane along this length unless it is decided to modify the existing bike path. There are three (3) proposed alternatives for the proposed Kalamazoo Avenue corridor from Westnedge Avenue to Harrison Street. At the time no decision has been made as to which of the three cross sections will be the preferred cross section and the final decision is pending further public involvement and decisions as to the final location of a planned bike route through the downtown. The final preferred configuration and may be one or a combination of the following three options.

Alternative #1

The final lane configuration for Kalamazoo Avenue Alternative #1 from Westnedge Avenue to Harrison Street includes two lanes each way with a center left turn lane and a bicycle track behind the north curb (no on street parking).



Figure 3-3: Proposed Cross Section of Alternative #1 for Kalamazoo Ave

Alternative #2

The final lane configuration for Kalamazoo Avenue Alternative #2 from Westnedge Avenue to Harrison Street includes retaining existing curbs where possible and providing two lanes each way with a center left turn lane (no on street parking).

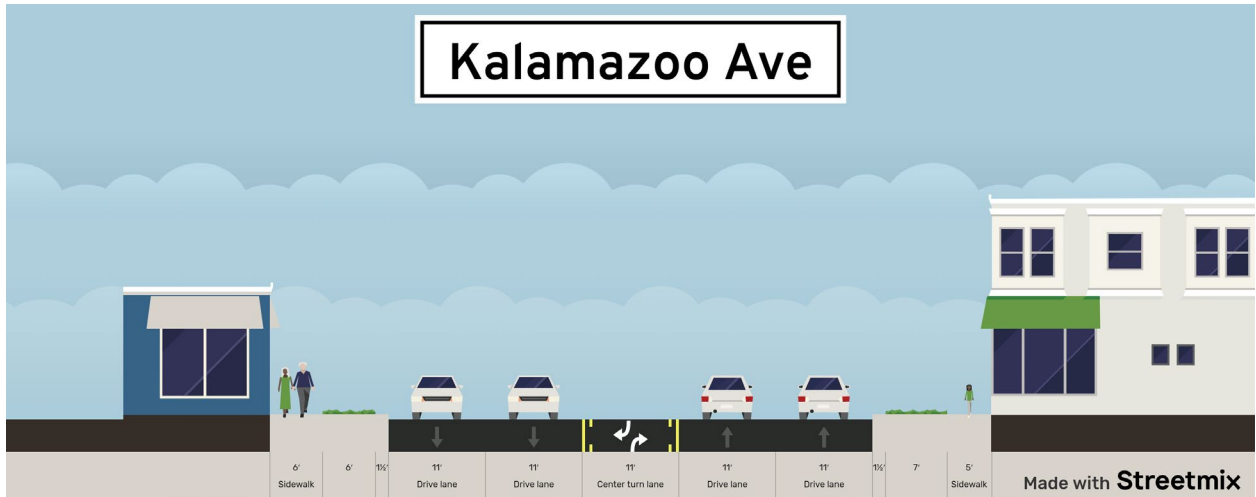


Figure 3-4: Proposed Cross Section of Alternative #2 for Kalamazoo Ave

Alternative #3

The final lane configuration for Kalamazoo Avenue from Westnedge Avenue to Harrison Street includes widening Kalamazoo Avenue and providing two lanes of traffic in each direction with a center left turn lane and parking on the south side.

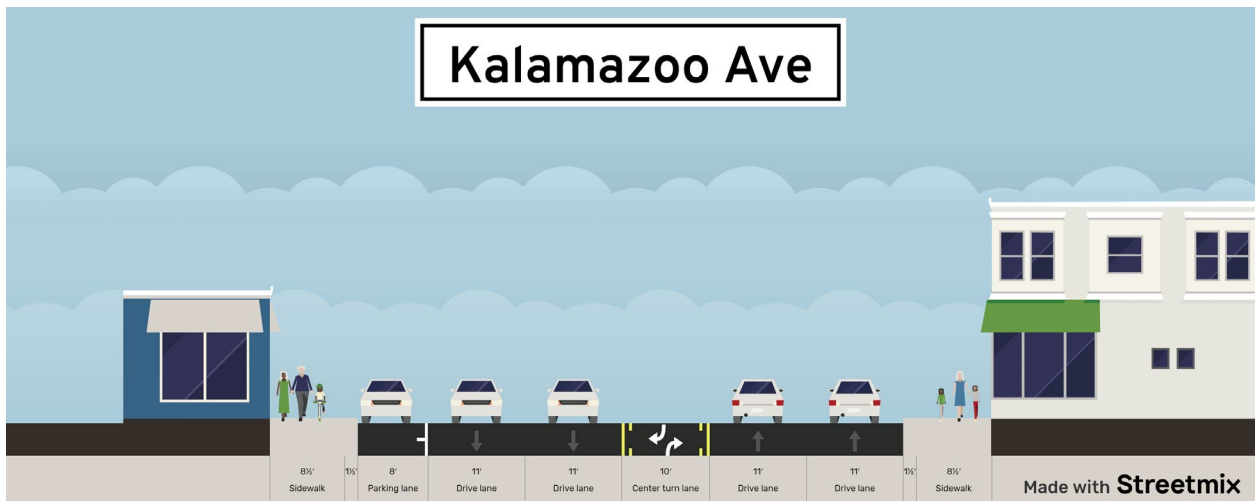


Figure 3-5: Proposed Cross Section of Alternative #3 for Kalamazoo Ave

This work will include:

- Widening, depending on the cross section alternative selected, and the turn lane and radius needed at the intersections
- Existing pavement will be milled and resurfaced
- Accommodations for Metro transit to provide bus stops in the final design
- Railroad gates and lights will be provided at the at-grade crossing for the eastbound traffic. Traffic signals will have preemption timing to ensure that a vehicle will have sufficient time to clear the tracks prior to the arrival of the train.
- Left and right turn lanes will be provided on both the main line and crossroads along the corridor where needed
- ADA ramps, pedestrian crossings, bump outs, parking, turning radii will be included/modified at the intersections where applicable
- Modifying the storm sewer system to fit the new cross section or full replacement of the existing system
- Signals will need to be relocated, improved, or redesigned to accommodate two-way traffic
- Signals will be interconnected along the roadway using the City's fiber
- Sign and striping for two-way traffic
- Amenities improvements

3.3 Traffic and Safety

Turn Lane Lengths

Table 3-1 displays the storage length outputs from the Synchro analysis described in Section 1.3.

Table 3-1 Kalamazoo Avenue - Storage length of turning lanes

Intersecting Road	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
Kings Hwy			300			350		
Michigan			215	215				
Gull/M-43	300			250		175	300	
Mills							200	
Westnedge	100	100			100	100	100	100
Park	150		100				75	75
Burdick	100		100		100	100	100	100
Rose	100		100		100			
Edwards	100		100		166			
Pitcher	100		100				150	
Douglas			100			100	75	
Michigan			125		450	200		

Note: Eastbound Left (EBL), Eastbound Right (EBR), Westbound Left (WBL), Westbound Right (WBR), Northbound Left (NBL), Northbound Right (NBR), Southbound Left (SBL), Southbound Right (SBR)

3.4 Parking

Under the Alternative 3, an eight-foot parking lane could be provided on the north side of the road.

3.5 Bike/Pedestrian Facilities

Under Alternative 1, a cycle track is proposed on the south side of the road. Sidewalks would also be available in that alternative. While bicycle facilities are not proposed in Alternative 2 and 3, minimum sidewalk widths are proposed within the second alternative and eight-foot sidewalks are proposed in the third alternative.

3.6 Utilities

Based on the proposed scope of work for Kalamazoo Avenue, there is a significant utility impact anticipated. With the roadway widening and the intersection reconstruction/realignment, it is expected to affect both overhead and underground utilities in the area.

Utilities within the Kalamazoo Avenue corridor include:

- Consumers Energy
- Charter Communications
- Climax Telephone (CTS Communications)
- Kalamazoo City Dept. of Public Services
- Level 3 NOW Century Link
- Midwest Communications
- ZAYO Bandwidth Midwest LLC

Underground fiber optic runs along the south side of Kalamazoo Avenue and along the north side from Rose Street to Edwards Street. This could be impacted due to the pavement removals associated with the proposed roadway widening, as well as any storm sewer improvements.

Overhead fiber optic runs along the north side of Kalamazoo Avenue from Westnedge Avenue to Cooley Street, Church Street to Rose Street, and Pitcher Street to Water Street. There are crossings located along the west side of Westnedge Avenue, and along the east sides of Church Street, Burdick Street, and Pitcher Street. Relocation of utility poles may be necessary if the selected alternative requires pavement widening.

Underground cable runs along the north side of Kalamazoo Avenue from Church Street to Edwards Street and along the south side from Edwards Street to Pitcher Street. There are crossings located along both sides of Rose Street, east of Burdick Street and Porter Street, and the west side of Edwards Street.

Overhead cable runs along the north side of Kalamazoo Avenue from Westnedge Avenue to Burdick Street and along the south side from Edwards Street to Walbridge Street. There are crossings located along the west side of Westnedge Avenue, Walbridge Street, and Harrison Street as well as along the east side of Church Street and Pitcher Street. Relocation of utility poles may be necessary if the selected alternative requires pavement widening.

Storm sewer is located along the south side of Kalamazoo Avenue from Westnedge Avenue to Church Street and from Burdick Street to Porter Street, and along the north side of Kalamazoo Avenue from Church Street to Burdick Street and from Porter Street to Harrison Street. There are storm sewer crossings to catch basins on Kalamazoo Avenue as well as at all intersections. The anticipated impacts will depend on the selected drainage replacement option (need replacement vs. full replacement) and which alternative of proposed roadway work is selected.

Sanitary sewer is located along the center of Kalamazoo Avenue from Westnedge Avenue to Pitcher Street, and along the north side of Kalamazoo Avenue from Pitcher Avenue to Harrison Street. There are crossings at all intersections on Kalamazoo Avenue. There are sanitary service lines connected to the sewer main along Kalamazoo Avenue that may be impacted by the proposed work.

Water main is located along the north and south side of Kalamazoo Avenue. There are water service lines connected to the sewer main along Kalamazoo Avenue that may be impacted by the proposed work.

3.7 Right-of-Way

The existing ROW on Kalamazoo Avenue is 82 feet wide. There are no ROW impacts anticipated for Kalamazoo Avenue.

3.8 Conceptual Maintenance of Traffic (MOT)

To maintain traffic there are several considerations to consider. Additional coordination with the railroad company will be necessary due to a rail crossing within the project corridor. The recommended staging for the three alternatives is as follows:

Stage 1

Close parking along both sides of Kalamazoo Avenue. Close the southernmost travel lane while maintaining two west bound movements. Widen the southern curb line to the proposed location, construct sidewalk and ramps as required. Pave the widened roadway section. The top 3 inches of pavement will be milled off in a later stage.

Stage 2

Close the north travel lane while maintaining traffic on the southern two westbound travel lanes. Shift traffic onto the southern side while maintaining two west bound movements. Widen the northern curb line to the proposed location, construct sidewalk and ramps as required. Pave the widened roadway section. The top 3 inches of pavement will be milled off in a later stage.

Stage 3

Mill and resurface the north half of Kalamazoo Avenue by maintaining traffic on the south side of Kalamazoo Avenue.

Stage 4

Mill and resurface the south half of Kalamazoo Avenue by shifting traffic to the north side of Kalamazoo Avenue.

3.9 Cost Estimate

CDM Smith has provided a cost estimate for each of the three alternatives currently being considered on Kalamazoo Avenue. See **Section 3.2** for the proposed conditions for each of the three alternatives. The total project cost for the alternatives is the following:

- Alt 1 (Cycle Track): \$11,328,390
- Alt 2 (Retain Existing Curbs): \$10,115,400
- Alt 3 (On-Street Parking): \$12,157,160

The estimates for Kalamazoo Avenue include the work up to the intersection of Kalamazoo Avenue and Westnedge Avenue at the west end, and on the east end up to the intersection of Kalamazoo Avenue and Walbridge Street.

Seven total signal upgrades are accounted for on Kalamazoo Avenue. These upgrades include the intersections of Kalamazoo Avenue with Westnedge Avenue, Park Street, Rose Street, Burdick Street, Edwards Street, Pitcher Street, and Harrison Street. The total cost estimate for these signals on each of the alternatives is \$1,535,171.

The cost estimate for the full drainage replacement is \$1,242,105 within the limits of the Kalamazoo Avenue proposed construction for options one and three, and 1,265,285 for option two. The needed drainage replacement cost estimate is \$176,330 for options one and three. Due to option two consisting of retained curb lines, the needed drainage replacement cost estimate is less than option one and three at \$66,025. CDM Smith recommends the full drainage replacement option here as much of the existing network was installed in 1885 according to the City of Kalamazoo Public GIS Map.

Section 4

Stadium Drive/Oakland Drive/Michigan Avenue



Figure 4-1: Stadium Drive/Michigan Avenue from 250 feet south of Lovell Street to W. Main St

4.1 Existing Conditions

The section of Stadium Drive/Michigan Avenue from 250 feet South of Lovell Street to W. Main Street is roughly 1,850 feet in length and consists of two directional traffic along the length. This includes the area referred to as the “Spaghetti bowl” due to the interweaving of Stadium Drive/Michigan Avenue, Oakland Drive, Michigan Avenue, Lovell Street and South Street. Stadium Drive/Michigan Avenue provides access to Western Michigan University from downtown Kalamazoo. The existing cross section features in the project area are:

- Stadium Drive/Michigan Avenue from just south of Lovell Street to W. Main Street consists of varying roadway cross sections with divided medians, skewed intersections, and directional turning lanes at intersections
- Existing curb runs along this stretch of Stadium Drive/Michigan Avenue.
- Five crossing streets
- Four traffic signals
- Two-track railroad that runs parallel to Stadium Drive/Michigan Avenue on the western side, roughly 100 feet, offset from the nearest travel lane
- Street lighting and signing is present along the length of Stadium Drive/Michigan Avenue
- Existing drainage features include catch basins and trunkline storm sewers

- An existing structure with columns exists north of Lovell Street between Stadium Drive/Michigan Avenue and Oakland Drive that will not be disturbed as part of the project

4.2 Proposed Conditions

The proposed lane configuration for Stadium Drive/Michigan Avenue from Lovell Street to Michigan Avenue includes a modified roundabout for the Stadium Drive/Michigan Ave/Lovell Street/Oakland Drive intersection. This modified roundabout will have a metering light on the north bound Stadium Drive/Michigan Avenue leg south of Eddies Lane. North of the roundabout will have two lanes in each direction with a grassy center median. The South Street intersection will result in South Street being a right-in right-out. A mid-block pedestrian crossing with a HAWK signal will be located between South Street and Academy Street. The median grassy median will extend through the Academy Street intersection, making Academy Street a right-in right-out on both sides of Stadium Drive/Michigan Avenue. An option exists for a break in the median to allow for west bound traffic along Academy Street to make a left turn to southbound Stadium. Additional work along Stadium would include:

- Mill and resurface of the existing pavement to remain
- The existing intersections are being replaced with a modified roundabout in order to encompass the multiple intersections within the same vicinity
- The proposed modified roundabout will have two lanes of traffic and connect to Stadium Drive, Oakland Drive, Bellevue Place, Lovell Street, and Michigan Avenue.
- New planting/amenity zone and sidewalks are to be outside of the proposed curb limits and may include street trees, plantings, lighting, pedestrian amenities, etc.
- Modifying the storm sewer system to fit the new cross section or full replacement of the existing system
- Existing lighting will need to be relocated along the length of the section due to the modification of the roadway limits



Figure 4-2: Proposed Cross Section for Stadium Drive/Michigan Avenue

4.3 Traffic and Safety

Travel Times and Emissions

Travel times were developed for the intersecting streets of the roundabout, Stadium Drive, Lovell Street, Oakland Drive, and Michigan Avenue using SimTraffic, Synchro's accompanying microsimulation software, to show comparative travel times of projected traffic to the existing network. Emissions data are reported as additional measures of effectiveness of the comparison. The following tables display the intersection delay, intersection approach delay, average and maximum queues, level-of-service (LOS) for each, as well as emissions.

Table 4-1 Intersection Delay and LOS

Intersections	2040 No Build		2040 Build (Roundabout)	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Lovell Street & Oakland Dr	144.0	F	NA	NA
Lovell Street & Michigan Avenue	10.2	B	NA	NA
South Street & Oakland Drive & Michigan Ave	12.3	B	NA	NA
Overall	34.7	C	9.9	A

Table 4-2 Intersection Approach Delay and LOS

Intersections	2040 No Build		2040 Build (Roundabout)	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Lovell Street & Oakland Drive Northbound	96.7	F	13.3	B
Lovell Street & Oakland Drive Westbound	275.2	F	16.8	C
Lovell Street & Michigan Avenue Northbound	4.2	A	12.1	B
South Street & Oakland Drive & Michigan Avenue Southbound	3.5	A	0.2	A

Table 4-3 Average and Maximum Queues

Intersections	2040 No Build		2040 Build (Roundabout)	
	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Lovell Street & Oakland Drive Northbound	262	644	32	295
Lovell Street & Oakland Drive Westbound	590	627	37	356

Intersections	2040 No Build		2040 Build (Roundabout)	
	Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)
Lovell Street & Michigan Avenue Northbound	12	176	18	406
South Street & Oakland Drive & Michigan Avenue Southbound	16	190	0	0

Table 4-4 Emissions

Intersections	2040 No Build		2040 Build (Roundabout) Delta	
	CO	NOx	CO	NOx
Lovell Street & Oakland Dr	3,950	769	NA	NA
Lovell Street & Michigan Ave	1,279	249	NA	NA
South Street & Oakland Drive & Michigan Ave	1,698	330	NA	NA
Overall	6,927	1,348	2,849	554

Note: Nitrogen Oxides (NOx), Carbon Monoxide (CO), Not Available (NA)

Turn Lane Lengths

Table 4-5 displays the storage length outputs from the Synchro analysis described in Section 1.3.

Table 4-5 Stadium/Oakland/Michigan - Storage length of turning lanes

Intersecting Road	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
Michigan	150	150	100		150			
Oliver			150		555	116		91
Rambling	500		175	175	190			

Note: Eastbound Left (EBL), Eastbound Right (EBR), Westbound Left (WBL), Westbound Right (WBR), Northbound Left (NBL), Northbound Right (NBR), Southbound Left (SBL), Southbound Right (SBR)

Safety Analysis

At the intersection of Stadium Drive, Michigan Avenue, Oakland Drive, and Lovell Street, there were 89 crashes reported in the last five years. Of those crashes, rear-ends and angle crashes were the highest reported within the intersections. The HSM analysis predicts around a 66 percent reduction in crashes after implementing the modified roundabout.

The intersection of Stadium Drive and Academy Street had 48 crashes reported in the last five years. Same direction sideswipe, rear-ends, and angle crashes were the most frequent crash types. The HSM analysis predicts about a 90% reduction in crashes for constructing a right-in right-out intersection.

4.4 Parking

There is no on-street parking recommended for Stadium Drive.

4.5 Bike/Pedestrian Facilities

A shared use path is proposed for Stadium Drive/Michigan Avenue near the peanut shaped roundabout to the Main Street and Michigan Avenue intersection. Connecting to the potential facilities on Michigan Avenue, found in **Section 2.5**, adds paths for those accessing southwest of downtown Kalamazoo. On the other side of Stadium Drive/Michigan Avenue, most of the existing sidewalk shall remain with improvements made at intersections such as Academy Street and Lovell Street. Near the roundabout, sidewalk connections are present to existing facilities at South Street, Lovell Street, Oakland Drive, and Stadium Drive/Michigan Avenue.

4.6 Utilities

Based on the proposed scope of work for Stadium Drive/Michigan Avenue, there is a significant utility impact anticipated. The reconstruction and reconfiguration of multiple intersection into a modified roundabout will affect the existing overhead utilities, as well as underground utilities in the area.

The utilities within the Stadium Drive/Michigan Avenue corridor include:

- Charter Communications
- Kalamazoo City Dept. of Public Services
- Level 3 NOW Century Link
- TurnKey Network Solutions (US Signals Corp)
- Windstream Communications
- Western Michigan University

Underground fiber optic runs along the west side of Stadium Drive/Michigan Avenue and crosses along the south side of Lovell Street. This is expected to be significantly impacted due the pavement removals and new pavement associated with the proposed modified roundabout.

Underground cable runs along the east side of Stadium Drive/Michigan Avenue and crosses along the south side of Lovell Street. This is expected to be significantly impacted due the pavement removals and new pavement associated with the proposed modified roundabout.

Overhead cable runs along the east side of Stadium Drive/Michigan Avenue and crosses along the south side of Lovell Street. This is expected to be significantly impacted due the pavement removals and new pavement associated with the proposed modified roundabout.

Storm sewer is located along Stadium Drive/Oakland Drive/Michigan Avenue. This is anticipated to be completely reconstructed due to the proposed modified roundabout.

Sanitary sewer is located along Stadium Drive/Oakland Drive/Michigan Avenue. This, along with sanitary services, are anticipated to be completely reconstructed due to the proposed modified roundabout.

Water main is located along Stadium Drive/Oakland Drive/Michigan Avenue. This, along with water services, are anticipated to be completely reconstructed due to the proposed modified roundabout.

4.7 Right-of-Way

The existing ROW on Stadium Drive/Michigan Avenue varies 96 feet to 220 feet. There are three (3) locations that are anticipated to have ROW impacts on Stadium Drive/Michigan Avenue with the proposed modified roundabout.

Figure 4-3 shows the ROW impacts anticipated at the south half of the Stadium Drive/Michigan Avenue, Oakland Drive, and Lovell intersection. This property is owned by the WMU Board of Trustees, according to the Kalamazoo GIS records.

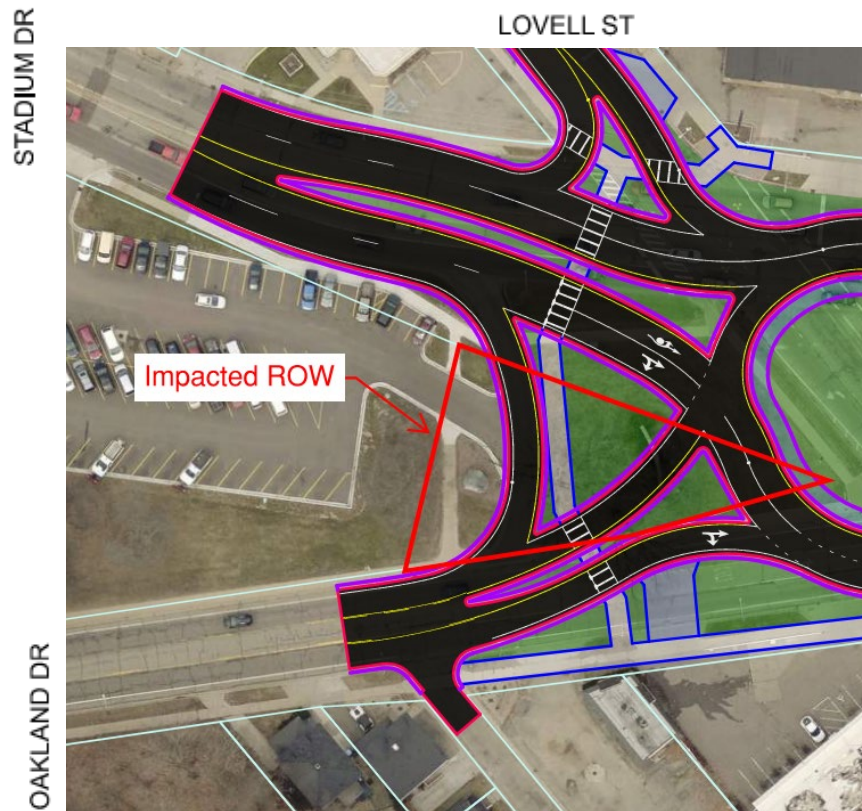


Figure 4-3: Impacted ROW at Oakland Drive/Stadium Drive/Lovell Street Intersection

Figure 4-4 shows the ROW impacts anticipated at the NE corner of the Stadium Drive/Michigan Avenue, Oakland Drive, and Lovell intersection. This property is owned by H & L Capital, LLC, according to the Kalamazoo GIS records.

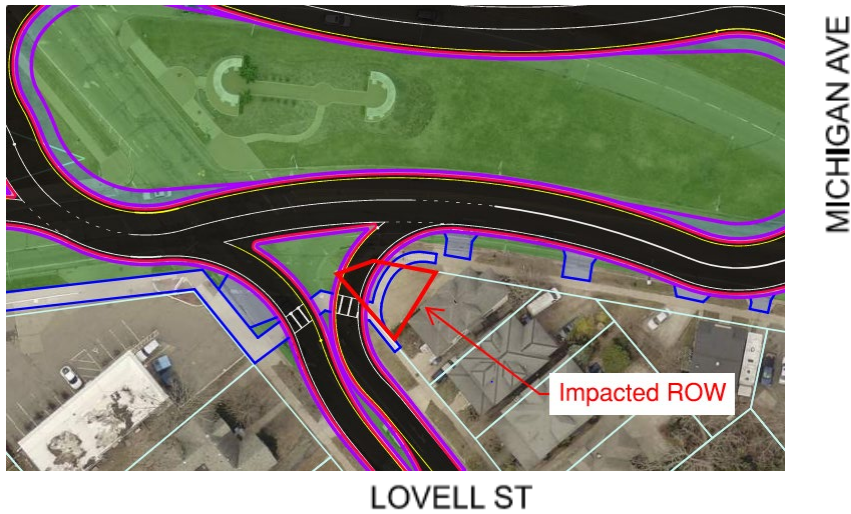


Figure 4-4: ROW impacts at Stadium Drive/Michigan Ave/Oakland Drive/ Lovell Intersection

Figure 4-5 shows the ROW impacts anticipated along the west side of Stadium Dr, across from the South Street intersection. This property is owned by the City of Kalamazoo Parks and Rec, according to the Kalamazoo GIS records.

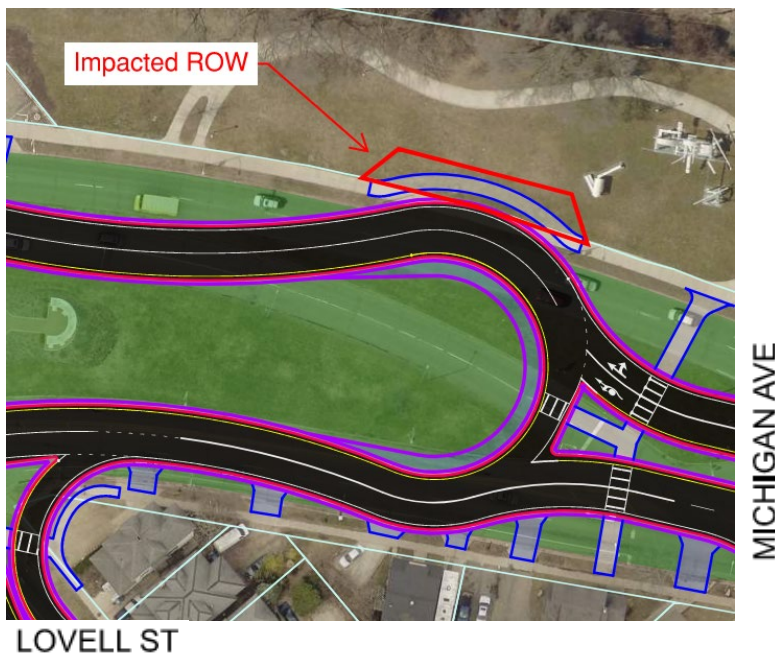


Figure 4-5: ROW impacts at Stadium Drive/Michigan Ave

4.8 Conceptual Maintenance of Traffic (MOT)

To maintain traffic there are several considerations to consider. Additional coordination with the railroad company will be necessary due to a rail crossing within the project corridor. Due to the traffic impact during the construction of the roundabout, it is recommended that the construction contract contain incentives for meeting or penalties for not meeting an accelerated construction schedule. The recommended staging is as follows:

Stage 1

Close Oakland Drive from Bellevue Place to South Street. Detour NB Oakland Drive traffic at Howard Street to take Stadium Drive/Michigan Avenue. SB traffic to be maintained on Stadium Drive/Michigan Avenue. Construct southern and eastern portions of the roundabout. WB Lovell Street traffic to be detoured north to South Street.

Stage 2

Close Stadium Drive/Michigan Avenue from Lovell Street to Academy Street. Detour SB Stadium Drive movements to Howard Street via Westnedge Avenue. NB Stadium Drive/Michigan Avenue and Oakland Drive traffic to have through access on completed portion of roundabout. EB Lovell Street traffic will be detoured south to Michigan Avenue.

Stage 3

Detour NB Stadium Drive/Michigan Avenue traffic EB on Lovell to Westnedge Avenue. SB Stadium Drive/Michigan Avenue traffic will have through access along completed roundabout.

4.9 Cost Estimate

The total project cost estimate for Stadium Drive/Michigan Avenue is \$6,154,390

The estimate for Stadium Drive/Michigan Avenue consists of all work to be performed associated with the modified roundabout. This would include work within the limits of the following:

- Lovell east of modified roundabout to end of median island
- Lovell west of modified roundabout to railroad
- Stadium Drive/Michigan Avenue north of modified roundabout to Michigan Avenue/Main Street

Three total signal removals are accounted for on Stadium Drive/Michigan Avenue. These removals are located at the intersections of Stadium Drive/Michigan Avenue with Lovell Street and South Street as well as the intersection of Lovell Street and Oakland Street. The metering light for the modified roundabout as well as the HAWK signal between South Street and Academy Street are accounted for in the signal costs. The total cost estimate for these signal modifications is \$216,921.

Due to the proposed Stadium Drive/Michigan Avenue work being mostly complete reconstruct, the “all” versus “needed” drainage replacement costs do not differ as much as some of the other streets. Within the footprint of the modified roundabout, likely none of the existing drainage will

be able to be salvaged, which results in the “needed” replacement cost in that area to be the same as the “all” replacement cost. The cost estimate for the full drainage replacement is \$612,753 within the limits of the Stadium Drive/Michigan Avenue proposed construction. The needed drainage replacement cost estimate is \$452,135. Therefore, it would approximately cost an extra \$160,618 to upgrade the storm sewer network in this area beyond what is needed for construction. CDM Smith recommends the full drainage replacement option here as much of the existing network was installed in 1911 according to the City of Kalamazoo Public GIS Map.

Section 5

Lovell Street



Figure 5-1: Lovell Street from Eldred Street to Pitcher Street

5.1 Existing Conditions

The one-way Lovell section from Eldred Street to Portage Street is roughly 1.2 miles in length. Lovell Street serves the downtown area of Kalamazoo as well as a residential area. Existing travel lanes, parking, and planting zone widths vary along the length with having wider lanes within the residential area and larger parking widths within the downtown area of Lovell Street. Westnedge Avenue is the separating roadway between the residential area (west of Westnedge Ave) and downtown area (east of Westnedge Ave). The existing cross section consists of:

- Two west bound lanes with parking on both sides of the roadway along the length
- 39 foot and 42-foot curb-to-curb width along the length of the roadway sections
- Fifteen crossing streets
- Eight traffic signals
- Existing trunkline sewer along Lovell Street was installed in 1885
- Typical street lighting exists east of Westnedge Avenue through the downtown area
- Residential lighting exists west of Westnedge Avenue within the residential area
- Metro transit bus stops are located along the length of Lovell Street
- Two track railroad crossings on the west end of the roadway section and it currently controlled for the west bound one-way movement
- Multiple intersections with pedestrian crosswalks
- Midblock pedestrian crossing between Park Street and Rose Street.



Figure 5-2: Commercial Lovell Street

Figure 5-3: Residential Lovell Street

5.2 Proposed Conditions

Lovell Street will be converted from the existing one-way to a two-way movement. Existing curb lines will be maintained. The proposed lane configuration for Lovell Street consists of two sections. The first section includes one lane in each direction with on-street parking. The second section of Lovell Street includes one lane in each direction, Four-foot buffers on each side of Lovell, and dedicated directional bike lanes alongside the curb. At the time of this report the exact limits of the bike lanes and the parking has not been finalized. For the purpose of this report, we assumed that the parking would be in the residential area between Eldred Street and Westnedge Avenue. And the bike lane section would be in the downtown section between Westnedge Avenue and Portage Street.

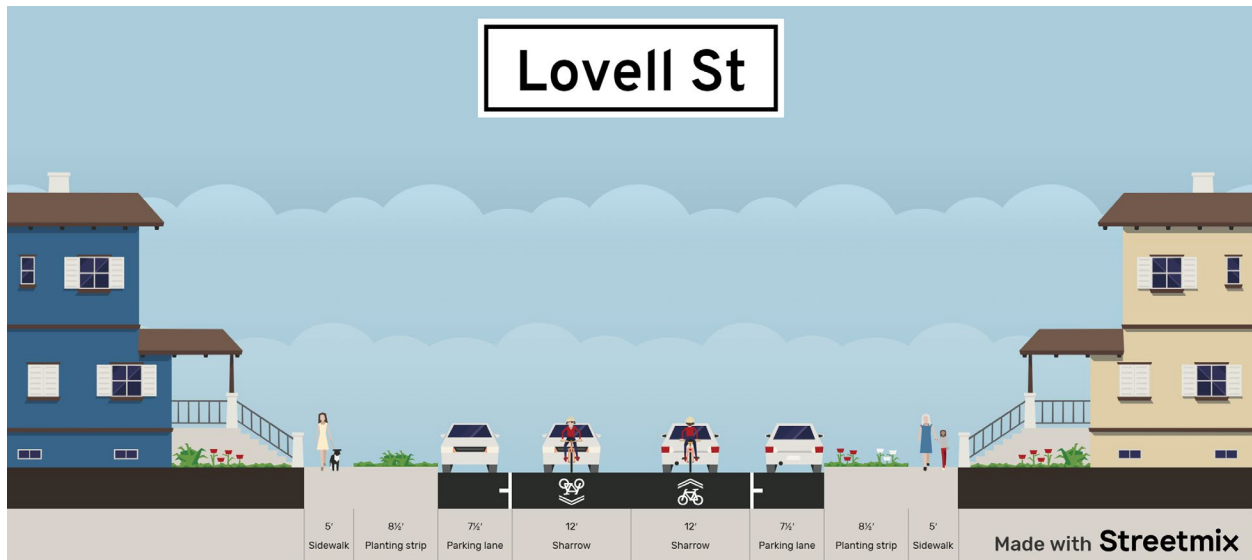


Figure 5-4: Lovell Street between Westnedge Avenue and Davis Street



Figure 5-5: Lovell Street between Westnedge Avenue and Pitcher Street

Parking:

- Assumed from Eldred Street to Westnedge Avenue
- Two 12-foot shared use lanes with sharrows along the length of the section
Narrowing of the existing lanes will calm traffic and continue to accommodate Metro Transit
- Parking widened to 7.5 feet wide on both sides

Bike lanes:

- Assumed from Westnedge Avenue to Portage Street
- One 11-foot travel lane in each direction with no dedicated turn lanes
- Six-foot bike lanes on both sides of the roadway section with a four-foot buffer between the bike and travel lane

This work will include:

- Mill and resurface of the proposed pavement width
- Left turn lanes at intersections as needed and where the existing width is adequate
- Left leg of the Lovell Street/Stadium Drive/Michigan Avenue intersection will be redesigned and reconstructed to provide a sufficient pavement structure where the existing curbed bump out is located
- Signals will be relocated, improved, or redesigned to accommodate two-way traffic and any new pedestrian crossing movements

- Existing railroad gates west of Stadium Drive/Michigan Avenue will be modified or redesigned and constructed by the railroad owner to accommodate the new lane configuration for both EB and WB movements
- Modifying the storm sewer system to fit the new cross section or full replacement of the existing system
- Existing lighting will remain as is with no modification to the existing cross section outside of the curbed limits.

5.3 Traffic and Safety

Turn Lane Lengths

Table 5-1 displays the storage length outputs from the Synchro analysis described in Section 1.3.

Table 5-1 Lovell Street - Storage length of turning lanes

Intersecting Road	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
Kings Hwy			300			350		
Gull/M-43	300			250		175	300	
Rose	75		75		100			
Burdick	75		75					
Portage			50					
John	75							
Westnedge		100	100		75		75	
Park	200		75		100	75	75	
Oakland/Michigan					250			

Note: Eastbound Left (EBL), Eastbound Right (EBR), Westbound Left (WBL), Westbound Right (WBR), Northbound Left (NBL), Northbound Right (NBR), Southbound Left (SBL), Southbound Right (SBR)

5.4 Parking

Parking is proposed on the south side of Lovell Street, between Eldred Street and Stadium Drive/Michigan Avenue. To the east of Stadium Drive/Michigan Avenue and Oakland Drive, Lovell Street has on-street parking available for both directions of traffic until Westnedge Avenue. To the east of Westnedge, the parking options convert to bike lanes, which is discussed in **Section 5.5**.

5.5 Bike/Pedestrian Facilities

On-street bike lanes are proposed on Lovell Street from Westnedge Avenue to Portage Street in both directions of travel. Buffered bike lanes are recommended between the travel lane and curb.

5.6 Utilities

Based on the proposed scope of work, minimal impacts to utilities are anticipated. The roadway resurfacing should not have any impact on underground utilities in the area. There is potential for the intersection improvements to impact nearby utilities.

The utilities within the Lovell Street corridor include:

- Consumers Energy
- Charter Communications
- Climax Telephone (CTS Communications)
- Everstream
- KEPS Technologies Inc. (ACD-NET)
- Kalamazoo City Department of Public Services
- Level 3 NOW Century Link
- Midwest Communications
- TurnKey Network Solutions (US Signals Corp)
- ZAYO Bandwidth Midwest LLC

Underground fiber optic runs along the south side of Lovell Street. This is expected to be minimally impacted due to the proposed work remaining within the existing pavement footprint, with the exception being for intersection radii and ADA ramp improvements.

Overhead fiber optic crosses Lovell Street along the west side of Westnedge Avenue. Intersection radii and ADA ramp improvement may require utility poles to be relocated.

Underground cable runs along the south side of Lovell Street with crossings along the west side of Westnedge Avenue and intermittently throughout the project. Minor conflicts may occur at locations of intersection radii and ADA ramp improvements.

Overhead cable runs along the south side of Lovell Street from Oakland Drive to Pearl Street and at the intersection of Westnedge Avenue. Minor conflicts may occur at locations of intersection radii and ADA ramp improvements.

Underground phone is located along the north side of Lovell Street from Park Street to Kalamazoo Mall. Minor conflicts may occur at locations of intersection radii and ADA ramp improvements.

Storm sewer runs along the north side of Lovell Street. Minimal impacts are anticipated to the sewer and connecting structures due to the proposed retaining the existing roadway footprint.

Sanitary sewer runs down the center of Lovell Street. Minimal impacts are anticipated to the sewer and connecting structures due to the proposed retaining the existing roadway footprint

Water main along the south side of Lovell Street. Minimal impacts are anticipated to the sewer and connecting structures due to the proposed retaining the existing roadway footprint.

5.7 Right-of-Way

The existing ROW on Lovell Street is 66 feet wide. There are no ROW impacts anticipated for Lovell St.

5.8 Conceptual Maintenance of Traffic (MOT)

Maintaining traffic through crossing streets will need either a detour, flagging, or part with construction. The MOT scheme for crossing streets will depend on existing traffic volumes. Minor streets could be flagged or detoured to an adjacent street.

Stage 1

Close existing parking along both sides of Lovell Street. Shift traffic to the southern side of the road. Mill and resurface the northern side of the road.

Stage 2

Shift traffic to the northern side of the road. Mill and resurface the southern side of the road.

5.9 Cost Estimate

The total project cost estimate for Lovell Street is \$12,920,670.

The Lovell Street cost estimate consists of the work performed beginning at Eldred Street at the west end, and then ending at the intersection with Portage Street. The estimate does not include the work performed on Lovell between the railroad and approximately 150 feet east of Oakland Drive. This gapped portion of Lovell Street will be included in the work performed with the modified roundabout associated with the Stadium Drive/Michigan Avenue estimate.

Seven total signal upgrades are accounted for on Lovell Street. These upgrades include the intersections of Lovell Street with Westnedge Avenue, Park Street, Rose Street, Kalamazoo Mall, John Street, and Portage Street. The total cost estimate for these signals on each of the alternatives is \$1,535,171.

The cost estimate for the full drainage replacement is \$1,930,723 within the limits of the Lovell Street proposed construction. The needed drainage replacement cost estimate is \$102,470. Therefore, it would approximately cost an extra \$1,828,253 to upgrade the storm sewer network in this area beyond what is needed for construction. CDM Smith recommends the full drainage replacement option here as much of the existing network was installed in 1904 according to the City of Kalamazoo Public GIS Map.

Section 6

South Street



Figure 6-1: South Street from Oakland Drive/Michigan Avenue to Pitcher Street

6.1 Existing Conditions

The one-way W. South Street section extends from Oakland Drive to Portage Street and is roughly 0.85 miles in length and serves the downtown area of Kalamazoo as well as a residential area. The existing cross section consists of:

- Two east bound lanes to Farmers Alley
- Three east bound lanes extend to Portage Street Parking exists along the roadway
- Pavement width varies along the corridor ranging from 30 feet to 52 feet curb-to-curb
- Nine crossing streets
- Six traffic signals
- Existing trunkline sewer along South Street was installed in 1885
- Street lighting exists though out the limits of the roadway
- Metro transit bus stops are located along the length of South Street

6.2 Proposed Conditions

The final lane configuration for South Street consists of one lane in each direction. On street parking will be along the south side of South Street from Michigan Avenue to Westnedge Avenue. On street parking will along both sides of South Street from Westnedge Avenue to Portage Street. Existing Curb lines will be maintained except to provide bump outs at intersections and for Metro Transit Bus stops. This work will include:

- Restriping to accommodate two-way traffic

- Pavement will be milled and resurfaced
- Left turn lanes at intersections included as needed
- Signals will be relocated, improved, or redesigned to accommodate two-way traffic and any new pedestrian crossing movements
- Improvements to the intersection of South and Oakland will be temporary until the Stadium Drive/Michigan Avenue project is constructed. Improvement will include a right turn only for west bound traffic along south street at the South and Oakland intersection and traffic signal improvements
- Metro Transit bus stop locations
- The exiting storm sewer will be modified at the bumpouts for a low-cost option, or a new storm sewer system will be provided to replace the existing system
- Existing lighting will remain as is, with no modification to the existing cross section outside of the curbed limits

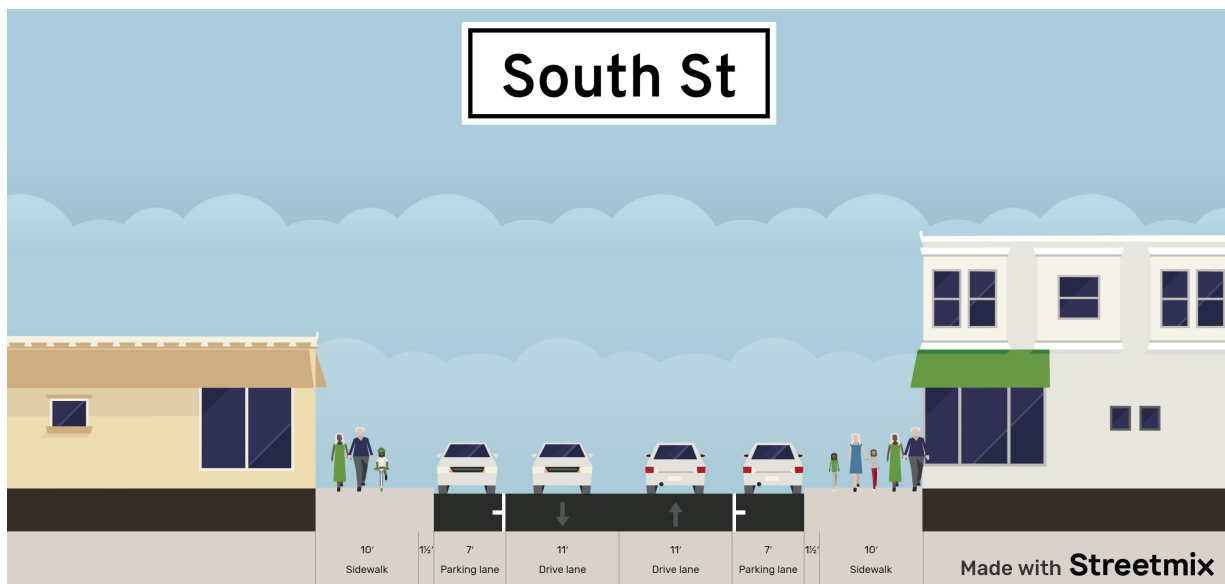


Figure 6-2: Proposed Cross Section for South Street from Westnedge Avenue to Portage Street

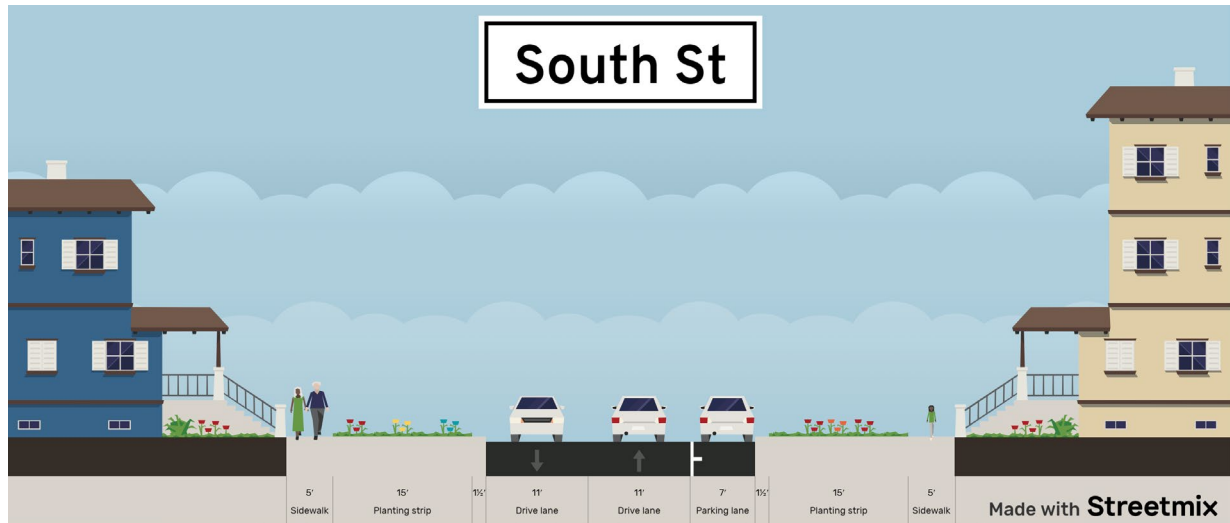


Figure 6-3: Proposed Cross Section for South Street from Michigan Avenue to Westnedge Avenue

6.3 Traffic and Safety

Turn Lane Lengths

Table 6-1 displays the storage length outputs from the Synchro analysis described in Section 1.3.

Table 6-1 South Street - Storage length of turning lanes

Intersecting Road	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
John		100						
Westnedge	75		75		75		75	
Park	78		75		75		75	
Rose	75		75		100		100	
Portage	100							

Note: Eastbound Left (EBL), Eastbound Right (EBR), Westbound Left (WBL), Westbound Right (WBR), Northbound Left (NBL), Northbound Right (NBR), Southbound Left (SBL), Southbound Right (SBR)

Safety Analysis

The intersection of Stadium Drive/Michigan Avenue and South Street had 30 crashes in the past five years. Of those crashes, same direction sideswipe and rear-end crash types occurred most often. The HSM analysis predicted around an 86 percent reduction in crashes after modifying the intersection as described in this section.

6.4 Parking

South Street has on-street parking spaces available on the south side of the road from Michigan Avenue to Westnedge Avenue. East of Westnedge Avenue, the parking options expand to both sides of the road, which ends at Portage Street.

6.5 Bike/Pedestrian Facilities

There are no bicycle facilities proposed for South Street.

6.6 Utilities

Based on the proposed scope of work, minimal impacts to utilities are anticipated. The roadway resurfacing should not have any impact on underground utilities in the area. There is potential for the intersection improvements to impact nearby utilities.

The utilities within the South Street corridor include:

- Consumers Energy
- Charter Communications
- Climax Telephone (CTS Communications)
- Kalamazoo City Dept. of Public Services
- Level 3 NOW Century Link
- TurnKey Network Solutions (US Signals Corp)
- Windstream Communications
- ZAYO Bandwidth Midwest LLC

Underground fiber optic runs along the entire north side of South Street and along the south side from Rose Street to Kalamazoo Mall and from John Street to Portage Street. This is expected to be minimally impacted due to the proposed work remaining within the existing pavement footprint, with the exception being for intersection radii and ADA ramp improvements.

Overhead fiber optic crosses South Street along the west side of Westnedge Avenue. Intersection radii and ADA ramp improvement may require utility poles to be relocated.

Underground cable runs along the north side of South Street with crossings along the west side of Westnedge Avenue and intermittently throughout the project. Minor conflicts may occur at locations of intersection radii and ADA ramp improvements.

Overhead cable crosses along the west side of Westnedge Avenue. Minor conflicts may occur at locations of intersection radii and ADA ramp improvements.

Storm sewer runs along the south side for South Street from Oak Street to Westnedge Avenue and from Farmers Alley to John Street. Storm sewer runs along the north side of South Street from Westnedge Avenue to Farmers Alley and from John Street to Portage Street. Minimal impacts are anticipated to the sewer and connecting structures due to the proposed retaining the existing roadway footprint.

Sanitary sewer runs down the center of South Street. Minimal impacts are anticipated to the sewer and connecting structures due to the proposed retaining the existing roadway footprint.

Water main runs along the north and south side of South Street. Minimal impacts are anticipated to the sewer and connecting structures due to the proposed retaining the existing roadway footprint.

6.7 Right-of-Way

The existing ROW on South Street varies from 59 feet to 72 feet wide. There are no ROW impacts anticipated for South Street.

6.8 Conceptual Maintenance of Traffic (MOT)

Maintaining traffic through crossing streets will need either a detour, flagging, or part with construction. The MOT scheme for crossing streets will depend on existing traffic volumes. Minor streets could be flagged or detoured to an adjacent street.

Stage 1

Close existing parking along both sides of South Street. Shift traffic to the southern side of the road. Mill and resurface the northern side of the road.

Stage 2

Shift traffic to the northern side of the road. Mill and resurface the southern side of the road.

6.9 Cost Estimate

The total project cost estimate for South Street is \$7,817,590

The estimate for South Street consists of all work to be performed beginning at Stadium Drive/Michigan Avenue at the west end and continuing east to and including the intersection of South Street and Portage Street.

Five total signal upgrades are accounted for on South Street. These upgrades include the intersections of South Street with Westnedge Avenue, Park Street, Rose Street, Kalamazoo Mall, and Portage Street. The total cost estimate for these signals is \$1,096,551.

The cost estimate for the full drainage replacement is \$1,130,160 within the limits of the South Street proposed construction. The needed drainage replacement cost estimate is \$99,730. Therefore, it would approximately cost an extra \$1,030,430 to upgrade the storm sewer network in this area beyond what is needed for construction. CDM Smith recommends the full drainage replacement option here as much of the existing network was installed in 1903 according to the City of Kalamazoo Public GIS Map.

Eighteen total bump outs are proposed on South Street. The cost per bump out used in the estimate is about \$6,837 which accounts for the removal of existing pavement and curb and gutter along with the construction of the new curb and gutter, aggregate, and ramp. The number of bump outs may increase depending on the needs to accommodate METRO bussing.

Section 7

Main Street



Figure 7-1: Main Street from Thompson Street to Michigan Avenue

7.1 Existing Conditions

The Main Street section from Thompson Street to Michigan Avenue is roughly 0.4 miles in length and consists of two-way traffic from Thompson Street to Douglas Avenue and one-way east bound traffic from Douglas Avenue to Michigan Avenue. Main Street travels through a school zone and historic district of Kalamazoo. The cross-section features consist of:

- Two 11-foot lanes in each direction from Thompson Street to Douglas Ave
- Douglas Avenue free flows traffic onto Main Street with two lanes going west bound and one lane going east bound
- Main Street has a short length of one-way traffic with two 11-foot lanes before Douglas Avenue adds an additional east bound lane to begin a three-lane one-way section with two 14-foot outside lanes and one 11-foot center lane up to Woodward Ave
- From Woodward Avenue to Michigan Avenue the outside lane widths narrow to 11 feet and include a dedicated right turn lane for traffic heading south on Michigan Ave
- Outside of the curbed roadway limits, there are planting zones and sidewalks along the length of the section
- Street lighting and signing are present on both sides of the road
- Pedestrian crossings occur at multiple intersections with advanced markings
- Existing trunkline sewer dates to 1885 installation and outlets into Arcadia creek just west of the Michigan Avenue intersection

- Existing two track railroad crossing west of the Michigan Avenue intersection and is currently controlled for east bound traffic and allows for pedestrian crossing along the sidewalk
- Current utility/power poles are offset roughly two feet from the back of the existing curb

7.2 Proposed Conditions

The final lane configuration for the two-way conversion of Main Street consists of two lanes in each direction. The existing curb is intended to be maintained and significant intersection modifications at Douglas Avenue will be implemented. This work will include:

- Douglas Avenue intersection will be redesigned in its own conversion to two-way traffic
- Michigan Avenue intersection will also be redesigned with its own two-way conversion
- Mill and resurface of the proposed pavement width
- Full depth construction within the pavement widening area
- Left turn lanes at Douglas intersection
- Modifying the storm sewer system to fit the new cross section or full replacement of the existing system
- Pedestrian crossing distance will be minimalized at the Douglas intersection with the use of refuge islands
- Existing railroad gates will need to be modified or redesigned and constructed to accommodate the new lane configuration by the Railroad owner for both EB and WB movements

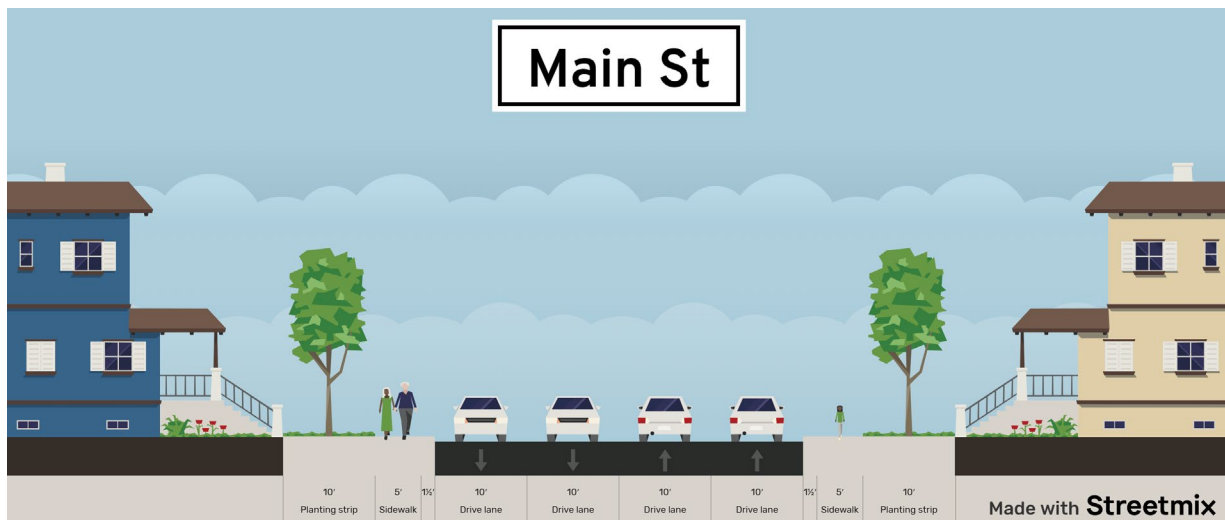


Figure 7-2: Proposed Cross Section of Main Street

7.3 Traffic and Safety

Safety Analysis

The intersection of Michigan Avenue and Main Street had 153 crashes in the past five years. Angle and rear-end crash types were highest among other types listed. The HSM analysis predicted a reduction of around sixty-three percent after the proposed modifications described in this section.

7.4 Parking

There are no on-street parking spaces proposed for Main Street.

7.5 Bike/Pedestrian Facilities

There are no bicycle facilities proposed for Main Street. Sidewalk connections are available to existing facilities along Main Street and Douglas Avenue.

7.6 Utilities

Based on the proposed scope of work for Main Street, there is a significant utility impact anticipated. With the roadway widening and the intersection reconstruction/realignment, it is expected to affect both overhead and underground utilities in the area.

The utilities within the Main Street corridor include:

- Consumers Energy
- Charter Communications
- Kalamazoo City Dept. of Public Services
- Midwest Communications
- TurnKey Network Solutions (US Signals Corp)
- Windstream Communications

Underground fiber optic runs along the north side of Main Street. Conflicts are anticipated at the intersection of Douglas Avenue due to the proposed realignment.

Overhead fiber optic runs along the north side of Main Street. Conflicts are anticipated at the intersection of Douglas Avenue which may require utility poles to be relocated due to the proposed intersection realignment.

Underground cable runs along the south side of Main Street. Conflicts are anticipated at the intersection of Douglas Avenue due to the proposed realignment.

Overhead Cable runs along the north side of Main Street. Conflicts are anticipated at the intersection of Douglas Avenue which may require utility poles to be relocated due to the proposed intersection realignment.

Storm sewer runs along the north side of Main Street with crossing to catch basins and side streets. Conflicts are anticipated at the intersection of Douglas Avenue due to the proposed realignment.

Sanitary sewer runs through the center of Main Street with crossing to catch basins and side streets. Conflicts are anticipated at the intersection of Douglas Avenue due to the proposed realignment.

Water main runs along the north and south side of Main Street with crossing to catch basins and side streets. Conflicts are anticipated at the intersection of Douglas Avenue due to the proposed realignment.

7.7 Right-of-Way

The existing ROW on Main Street is 73 feet wide. There are no ROW impacts anticipated for Main Street.

7.8 Conceptual Maintenance of Traffic (MOT)

To maintain traffic there are several considerations to consider. Intersections along Main Street will need to be evaluated and use a combination of flaggers, detours, and part width construction to maintain the traffic on the intersecting street. Additional coordination with the railroad company will be necessary due to a rail crossing withing the project corridor. The recommended staging is as follows:

Stage 1

Close north EB lanes, maintaining one lane open for EB traffic. Widen the north side of Main Street.

Stage 2

Close south EB lanes, shifting one lane of traffic for EB traffic. Widen the south side of Main Street.

Stage 3

Maintain SB lane closures with the north EB lane open to traffic. Mill and resurface the two southern lanes.

Stage 4

Close north EB lanes, shifting EB traffic to the southern lanes. Mill and resurface the two northern lanes.

7.9 Cost Estimate

The total project cost estimate for Main Street is \$3,260,670

The Main Street cost estimate consists of the work to be performed beginning at the Thompson Street and Main Street intersection on the west end up to but not including the Michigan Avenue/Michikal Street/Main Street intersection at the east limits.

One new signal is accounted for in the estimate on this street. This signal is being implemented at the proposed T-intersection of Main Street and Douglas Avenue. The total cost estimate for the signal is \$256,734.

The drainage cost items on Main Street take into consideration the proposed widening near the intersection with Douglas Avenue and its effects on existing structures. The cost estimate for the full drainage replacement is \$977,864 within the limits of the Main Street proposed construction. The needed drainage replacement cost estimate is \$55,790. Therefore, it would approximately cost an extra \$922,074 to upgrade the storm sewer network in this area beyond what is needed for construction. CDM Smith recommends the full drainage replacement option here as much of the existing network was installed in 1885 according to the City of Kalamazoo Public GIS Map.

Section 8

Douglas Avenue



Figure 8-1: Douglas Avenue from Michigan Avenue to Westnedge Avenue

8.1 Existing Conditions

The section of West Kalamazoo Avenue/Douglas Avenue is approximately 1,600 feet long. The existing cross section features are:

- Three lanes in the west/south bound directions from Westnedge Ave to the Michigan Avenue/Douglas Avenue intersection
- 36 feet curb-to-curb width along the length of the roadway
- At grade railroad crossing just west of Westnedge Avenue
- Sidewalk runs along both sides of the roadway with a missing section between Westnedge Avenue and the railroad
- Roadway lighting is provided along both sides of the roadway section
- Existing drainage sewers that were installed in 1885



Figure 8-2: Existing Cross Section of Douglas Avenue

The three-legged intersection at Kalamazoo Avenue/Douglas Avenue provides a continuous right turn lane to north bound Douglas Avenue and two continuous left turn lanes on to south bound Douglas Avenue for West Kalamazoo. Southbound Douglas Avenue opens to two lanes through the intersection where the center lane merges with the center lane from westbound Kalamazoo Avenue at a stop condition at the south side of the intersection. The existing T intersection at Main and Douglas has two continuous flow lanes from southbound Douglas to westbound main street and one continuous lane from southbound Douglas to eastbound Main St.

8.2 Proposed Conditions

The final lane configuration for Kalamazoo Avenue from Westnedge to Douglas Avenue along with Douglas Avenue from Kalamazoo Avenue to main street includes one lane in each direction with a center left turn lane and no on street parking. The 36 feet curb-to-curb width will not move outside the influence of the intersection redesign at the Kalamazoo Avenue/Douglas Avenue and Douglas Avenue/Main Street. This work will include:

- Existing pavement will be milled and resurfaced
- Metro operates a bus line along the roadway bus stop locations will be included in the plan
- Railroad and gates and lights will be provided at the at grade crossing for the east bound traffic by the Railroad
- Left and right turn lanes will be included at the Kalamazoo Avenue/Douglas Avenue and Douglas Avenue/Main Street intersections
- The other intersections will not need any upgrades
- New sidewalk will be provided between Westnedge Avenue and the Railroad
- Modifying the storm sewer system to fit the new cross section at the modified intersections or full replacement of the existing system
- Signals will need to be installed at the two new intersections with pedestrian crossings and push buttons. The signals will be coordinated with adjacent signals.
- Lighting at redesigned intersections will be relocated/replaced
- Sign and striping will be developed for 2-way traffic

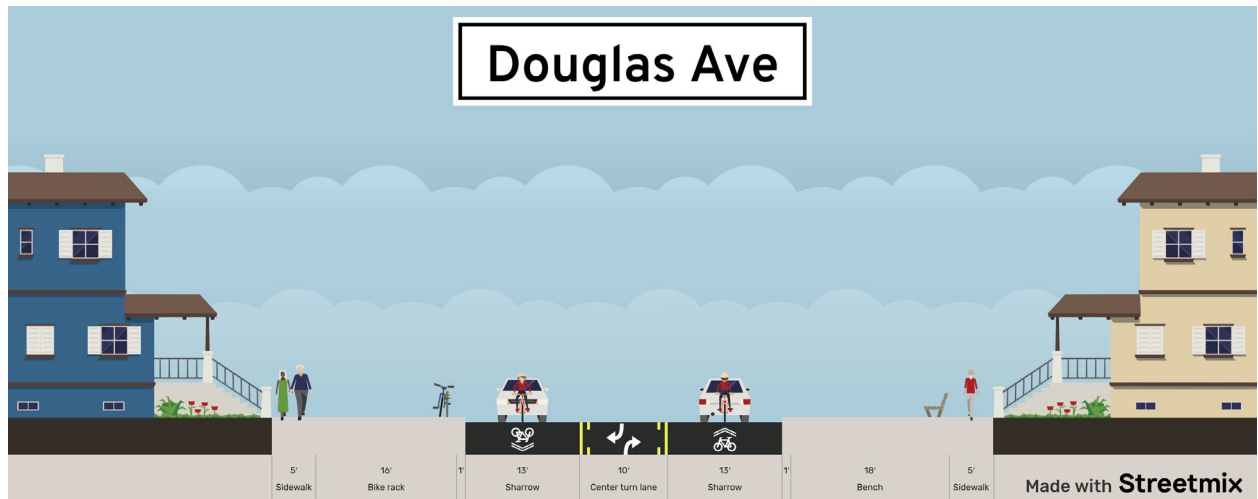


Figure 8-3: Proposed Cross Section of Douglas Avenue

8.3 Traffic and Safety

Turn Lane Lengths

Table 8-1 displays the storage length outputs from the Synchro analysis described in Section 1.3.

Table 8-1 Douglas Avenue - Storage length of turning lanes

Intersecting Road	EBL	EBR	WBL	WBR	NBL	NBR	SBL	SBR
Michigan	100			150			100	
Kalamazoo			100			100	75	

Note: Eastbound Left (EBL), Eastbound Right (EBR), Westbound Left (WBL), Westbound Right (WBR), Northbound Left (NBL), Northbound Right (NBR), Southbound Left (SBL), Southbound Right (SBR)

8.4 Parking

There are no on-street parking spaces proposed for Douglas Avenue.

8.5 Bike/Pedestrian Facilities

There are no bicycle facilities proposed for Douglas Avenue. Sidewalk connections are available between Westnedge Avenue and the railroad.

8.6 Utilities

Based on the proposed scope of work for Douglas Avenue, there is a significant utility impact anticipated. With the roadway the intersection reconstruction/realignment, it is expected to affect both overhead and underground utilities in the area.

The utilities within the Douglas Street corridor include:

- Charter Communications
- Climax Telephone (CTS Communications)

- Kalamazoo City Dept. of Public Services
- Midwest Communications
- Windstream Communications

Underground fiber optic runs along the east and south side of Kalamazoo Avenue/Douglas Avenue. Conflicts are anticipated at the intersections of Douglas Avenue/Kalamazoo Avenue and Douglas/Main Street due to the proposed realignment.

Overhead Cable runs along the east and south side of Kalamazoo Avenue/Douglas Avenue. Conflicts are anticipated at the intersection of Douglas Avenue which may require utility poles to be relocated due to the proposed intersection realignment.

Storm sewer runs along the south side of Kalamazoo Avenue/Douglas Avenue with crossing to catch basins and side streets. Conflicts are anticipated at the intersections of Douglas Avenue/Kalamazoo Avenue and Douglas Avenue/Main Street due to the proposed realignment.

Sanitary sewer runs through the center of Kalamazoo Avenue/Douglas Avenue with crossing to catch basins and side streets. Conflicts are anticipated at the intersections of Douglas Avenue/Kalamazoo Avenue and Douglas/Main Street due to the proposed realignment.

Water main runs along the east and west side of Kalamazoo Avenue and the north side of Douglas Avenue with crossing to catch basins and side streets. Conflicts are anticipated at the intersections of Douglas Avenue/Kalamazoo Avenue and Douglas Avenue/Main Street due to the proposed realignment.

8.7 Right-of-Way

The existing ROW on Douglas Avenue is 82 feet wide. There are no ROW impacts anticipated for Douglas Avenue.

8.8 Conceptual Maintenance of Traffic (MOT)

The intersections of Kalamazoo/Douglas and Kalamazoo Avenue are intended to be standard T-intersections and have special MOT considerations. Additional coordination with the railroad company will be necessary due to a rail crossing within the project corridor. The recommended staging is as follows:

Stage 1

Detour traffic from the Douglas Avenue/Main Street intersection. Detour options include north on Douglas Avenue or south on Michikal Street or Westnedge Avenue (if the Main Street and Michigan Avenue two-way conversion is complete). Modifying the right turn slip lane onto WB Main Street is an option as well. Complete the proposed intersection work (realign intersection and addition of traffic signals).

Stage 2

Detour traffic from the Kalamazoo Avenue/Douglas Avenue intersection. Detour options include south on Michikal Street or Westnedge Avenue (if the Main Street and Michigan Avenue two-way

conversion is complete). Complete the proposed intersection work (realign intersection and addition of traffic signals).

Stage 3

Complete full width mill and resurfacing under Stage 2 detour.

8.9 Cost Estimate

The total project cost estimate for Douglas Avenue is \$5,446,890.

The Douglas Avenue cost estimate consists of the work to be performed starting at but not including the intersection of Douglas Avenue and Main Street at the south end limits. The limits go north from said intersection to the intersection of Douglas Avenue and Kalamazoo Avenue. The portion of Kalamazoo Avenue that runs east from the intersection with Douglas to the intersection with Westnedge Avenue is also included in this estimate.

One new signal is accounted for in the estimate on this street. This signal is being implemented at the proposed T-intersection of Douglas Avenue and Kalamazoo Avenue. The total cost estimate for the signal is \$256,734.

The widening on Douglas Avenue approaching the intersection with Main Street as well as the reconstruction of the Douglas Avenue/Kalamazoo Avenue intersection affects the location of some of the drainage structures. The cost estimate for the full drainage replacement is \$755,185 within the limits of the Douglas Avenue proposed construction. The needed drainage replacement cost estimate is \$43,910. Therefore, it would approximately cost an extra \$711,275 to upgrade the storm sewer network in this area beyond what is needed for construction. CDM Smith recommends the full drainage replacement option here as much of the existing network was installed in 1885 according to the City of Kalamazoo Public GIS Map.

Section 9

Michikal Street Closure



Figure 9-1: Michikal Street between Kalamazoo Avenue and Michigan Avenue

9.1 Existing Conditions

Michikal Street is an existing one-way roadway that provides a connection between the W Kalamazoo Avenue/N. Westnedge Avenue intersection and the W Main Street and W Michigan Avenue intersection. Michikal Street is approximately 1,500 feet in length. Elm Crossover is the only intersection between Michikal's two ends. Michikal consist of:

- Three south bound lanes, paralleling the existing railroad tracks to the west
- Shared use path to the east
- Existing drainage networks along Michikal

9.2 Proposed Conditions

Michikal Street is intended to be closed and repurposed, connecting Eleanor Street through the existing Amtrack Railroad, and removing the existing Elm Crossover with the Amtrack Railroad. This work will include:

- Removal of Michikal's existing pavement
- Curb closures at the terminals of Michikal Street.
- Existing signal modification due to road closure
- Elm cross over will be removed
- Drainage pipes/structures modified due to road removal

9.3 Traffic and Safety

There are no turning movements from Michikal Street after closing the road permanently.

9.4 Parking

There are no parking spaces proposed for Michikal Street.

9.5 Bike/Pedestrian Facilities

A multiuse path is conceptualized to replace the vehicular roadway along Michikal Street.

9.6 Utilities

Based on the proposed scope of work for Michikal Street, there is a moderate utility impact anticipated. With the roadway removal, it is expected to have a limited effect on both overhead and underground utilities in the area. Removal of street lighting and other utilities that will no longer be necessary would require utility work in the area.

The utilities within the Michikal Street corridor include:

- Charter Communications
- Kalamazoo City Dept. of Public Services

Underground fiber optic runs along the north and west side of Michikal Street. Due to the complete pavement removal proposed for the street, significant utility impacts are anticipated.

Underground cable crosses Michikal Street north of the Main Street/Michigan Avenue intersection. Due to the complete pavement removal proposed for the street, significant utility impacts are anticipated.

Overhead cable crosses at various points along Michikal Street. Due to the complete pavement removal with no replacement, minimal impacts are anticipated.

Storm sewer crosses a several locations but there are no trunklines along Michikal Street. These are expected to be moderately impacted due to the pavement removal schedule for this area.

Sanitary sewer runs along the west side for Michikal Street and crosses at two locations. Minimal impacts are anticipated.

Water main runs along the east of Michikal Street and is not anticipated to be impacted by the removals in the area.

9.7 Right-of-Way

The existing ROW on Michikal Street Varies. There are no ROW impacts anticipated for Michikal Street.

9.8 Conceptual Maintenance of Traffic (MOT)

MOT for Michikal Street will be minimal as the closure itself will act as the final stage of MOT. Special consideration will be needed based on other street phasing as well as permanent signing so that traffic will be aware of navigating downtown Kalamazoo without the use of Michikal Street. Michikal Street may be used as a detour route for other downtown street conversions to two-way traffic.

9.9 Cost Estimate

The total project cost estimate for Michikal Street is \$482,240.

The Michikal Street cost estimate consists of the work to be performed for the removal of Michikal Street between Michigan Avenue and Kalamazoo Avenue. The removal of the connection of Allen Boulevard to Elm Street is also included in this estimate. This estimate does not include items for what this new area may become after it is removed. Therefore, no seeding/mulching, amenities, and such items are accounted for in this estimate.

The drainage items for Michikal are not broken out in the estimate into two options as all the other streets are. This is because it would make the most logical sense to completely remove the drainage within the limits of the Michikal removal that serves the existing Michikal roadway. There is some proposed pipe accounted for to route drainage that is to be left as existing to other existing pipes. Overall, the “needed drainage replacement” estimate for Michikal Street is \$36,334.

Appendix A

Conceptual Level Layouts and Cross Sections

MICHIKAL ST

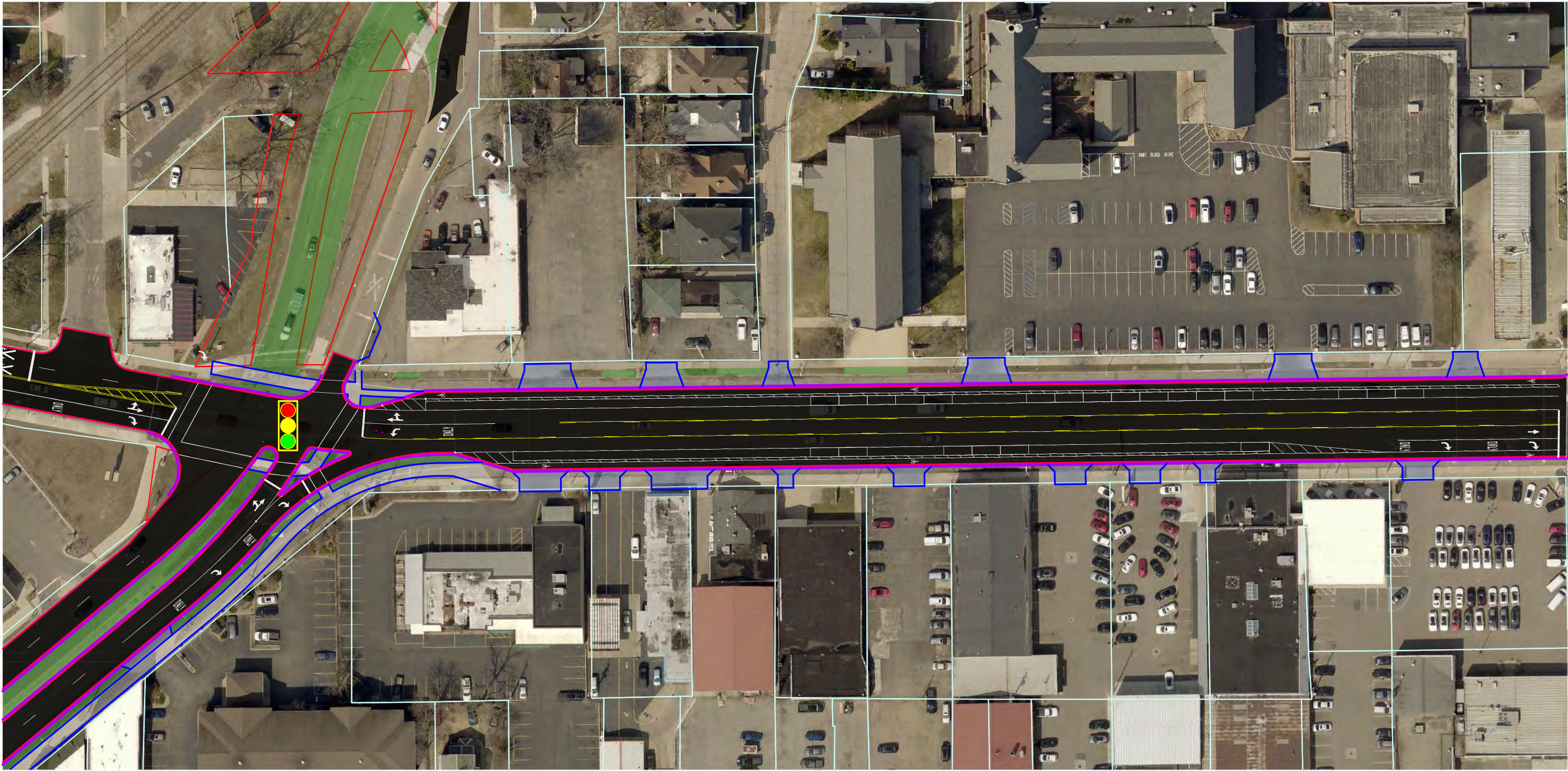
ALLEN BLVD



MAIN ST

MICHIGAN AVE

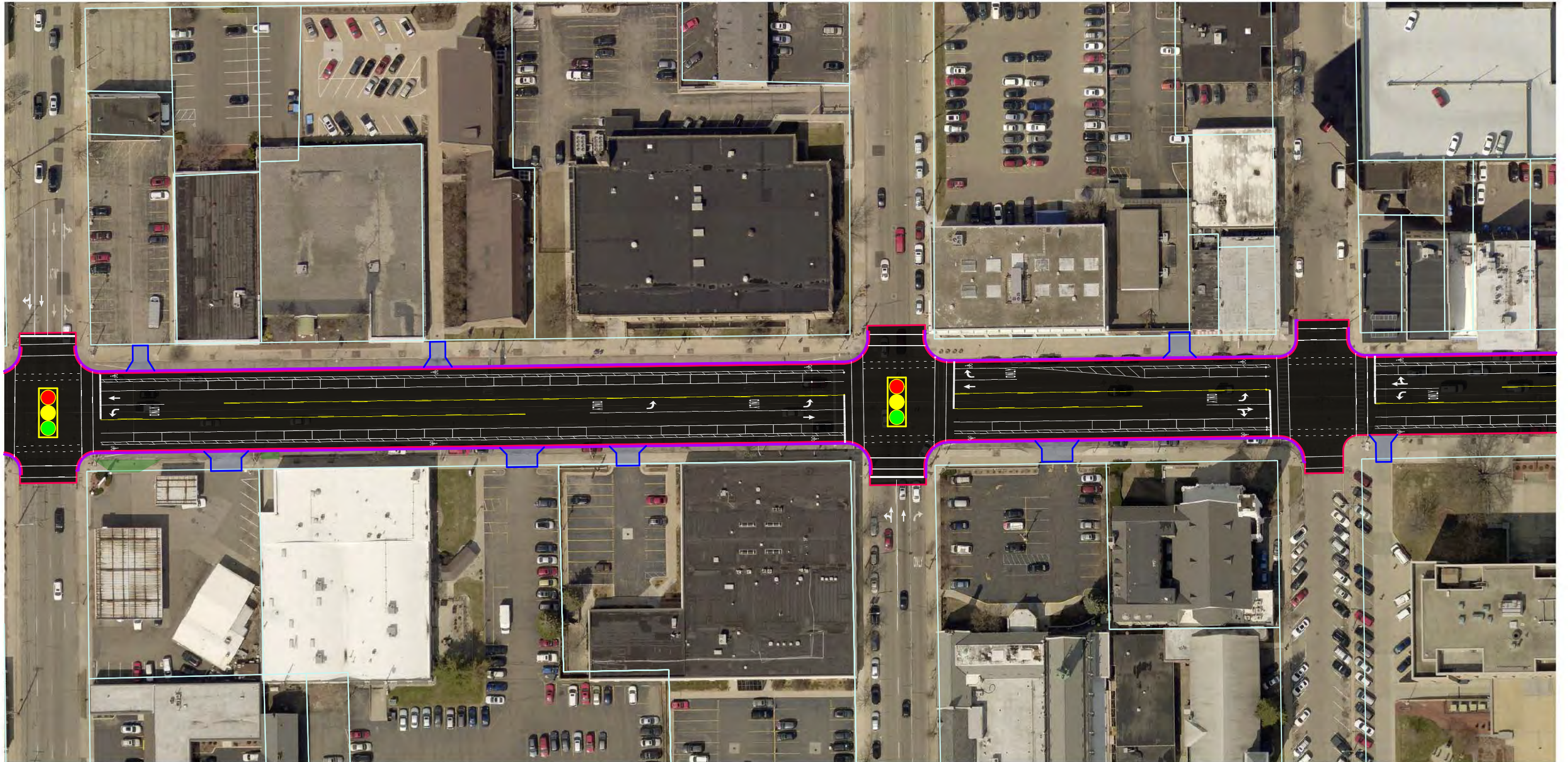
MICHIGAN AVE



WESTNEDGE AVE

PARK ST

CHURCH ST



MICHIGAN AVE

MICHIGAN AVE

WESTNEDGE AVE

PARK ST

CHURCH ST

ROSE ST



MICHIGAN AVE

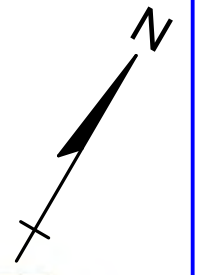
MICHIGAN AVE



ROSE ST

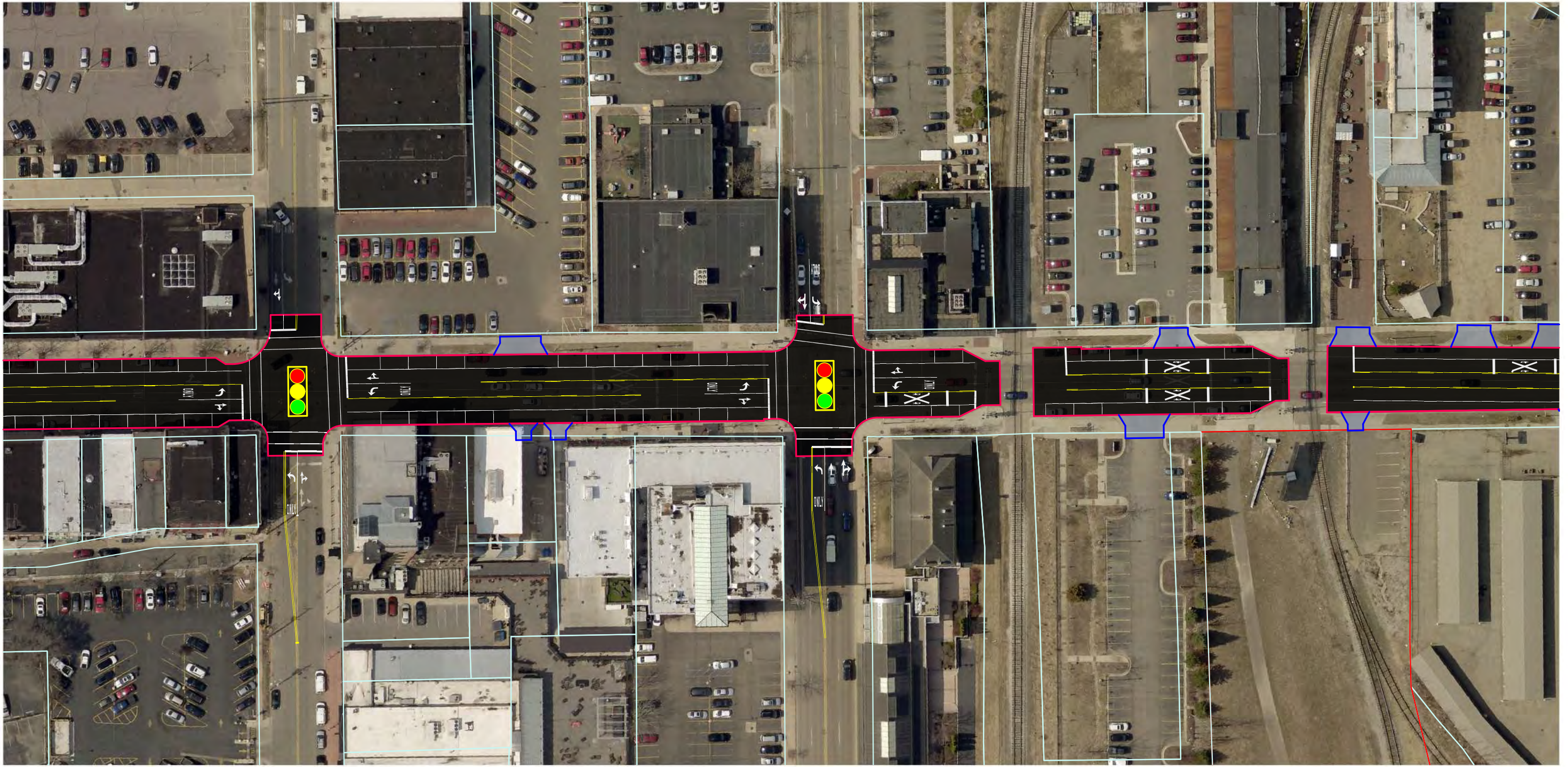
KALAMAZOO MALL

PORTAGE ST



EDWARDS ST

PITCHER ST



MICHIGAN AVE

MICHIGAN AVE

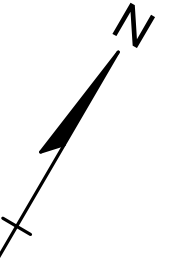
EDWARDS ST

PITCHER ST

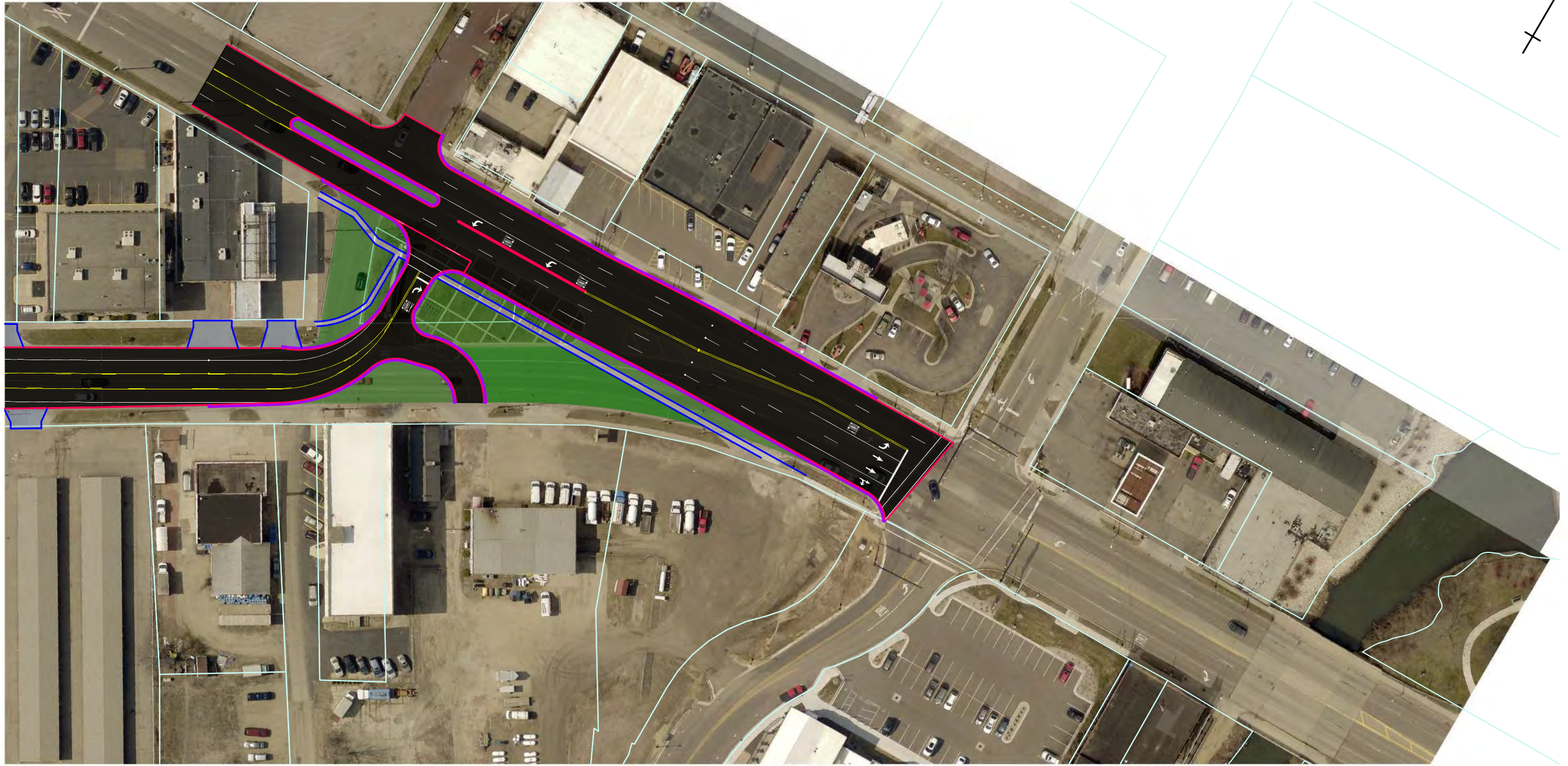
KALAMAZOO AVE

WALBRIDGE ST

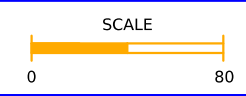
HARRISON ST



MICHIGAN AVE



MICHIGAN AVE

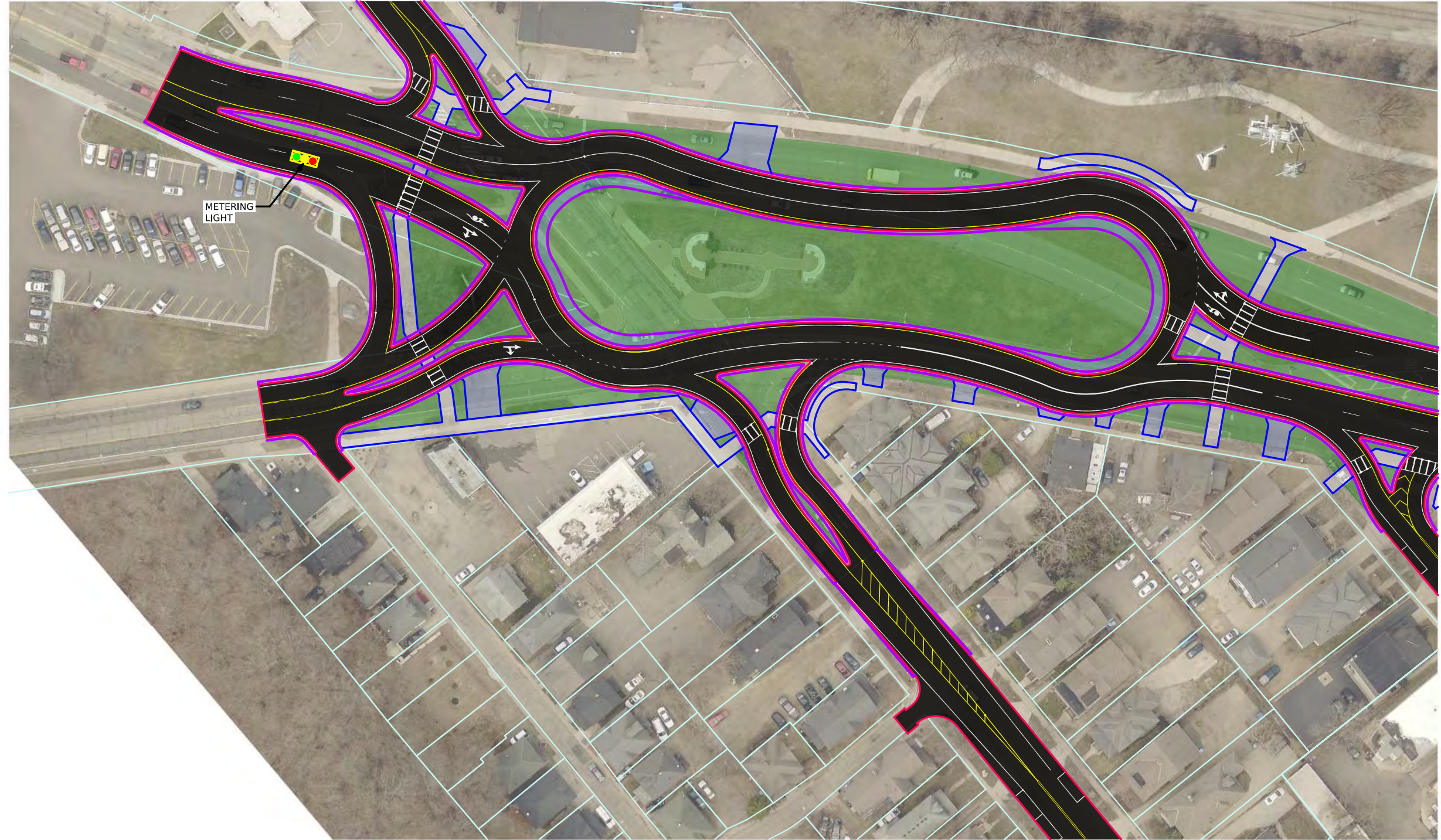


MICHIGAN		DRAWING	SHEET
			5

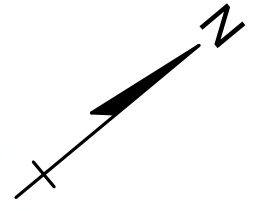
STADIUM DR

OAKLAND DR

LOVELL ST



METERING LIGHT



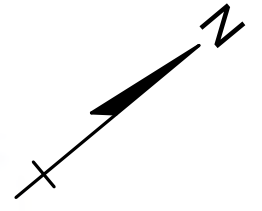
SOUTH ST OAKLAND DR MICHIGAN AVE

BELLEVUE PL

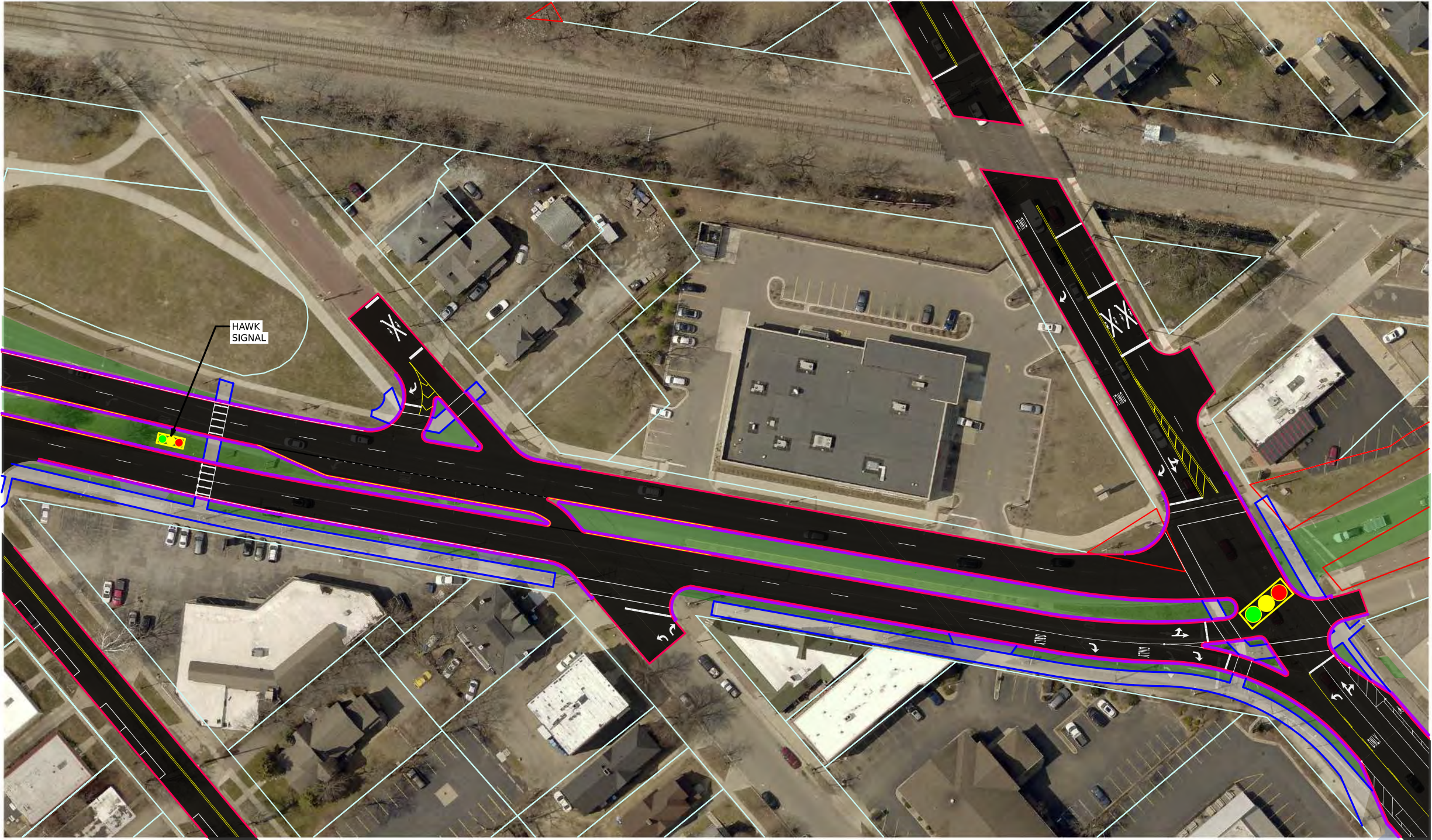
LOVELL ST

ACADEMY ST

MAIN ST



MICHIGAN AVE

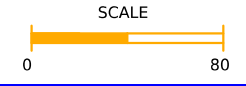


ALLEN BLVD MICHICAL ST

SOUTH ST

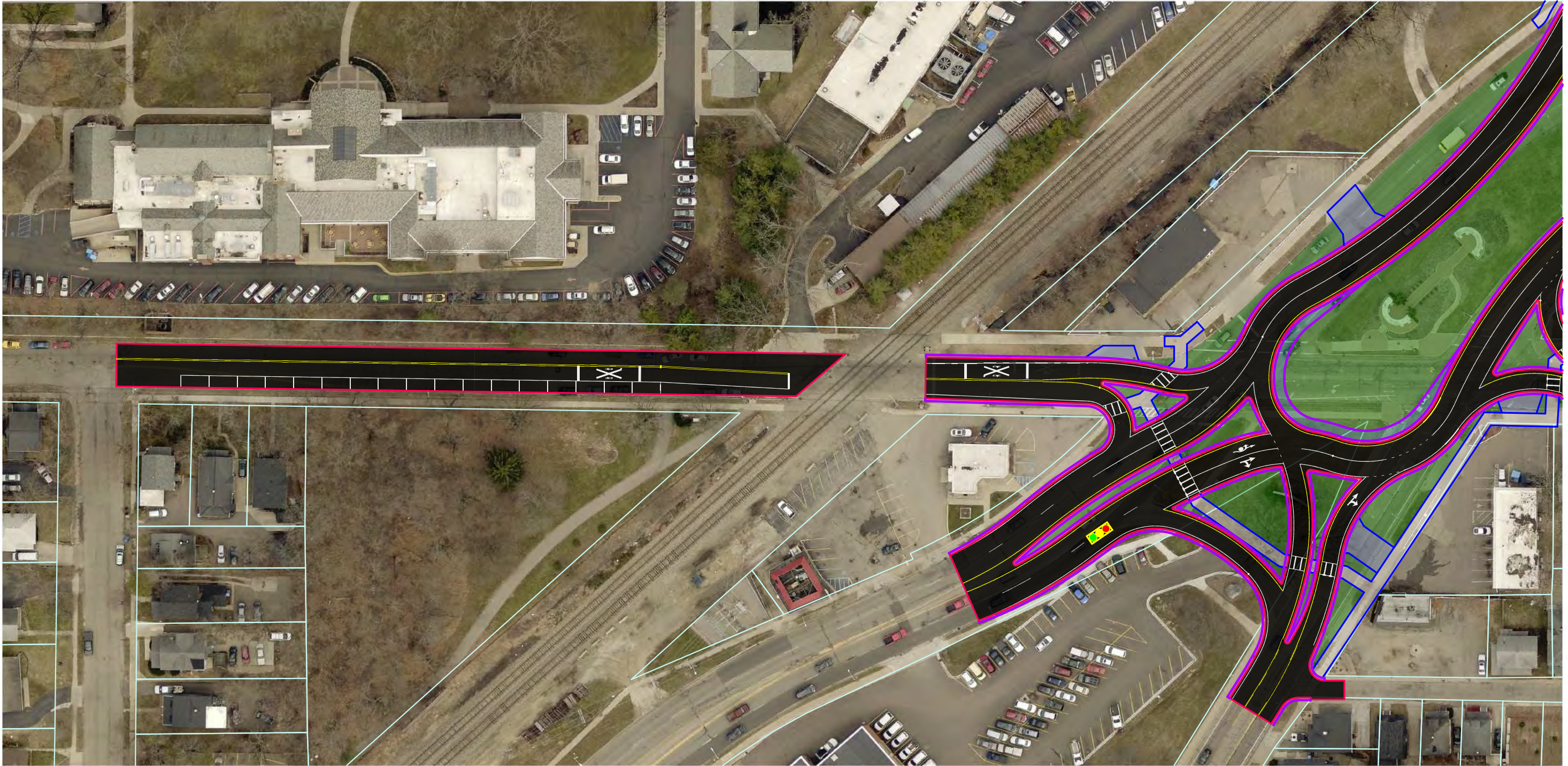
ACADEMY ST

MICHIGAN AVE



STADIUM		DRAWING	SHEET
			7

LOVELL ST



MICHIGAN AVE

LOVELL ST

BELLEVUE PL

ELDRED ST

STADIUM DR

OAKLAND DR



LOVELL ST

LOVELL ST

BELLEVUE PL

DAVIS ST

LOCUST ST

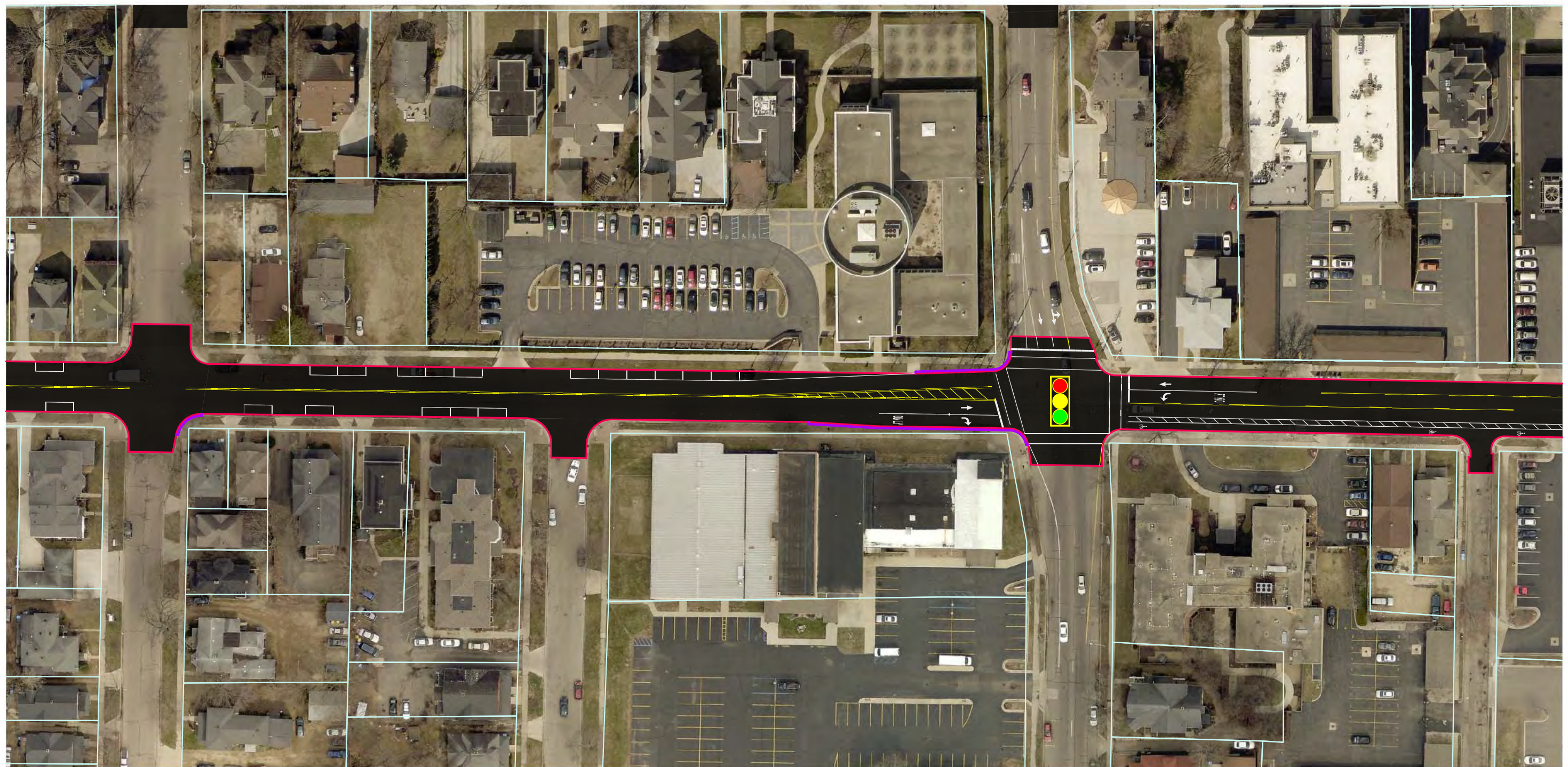


OAK ST

WESTNEDGE AVE

LOVELL

LOVELL

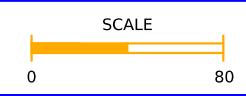


OAK ST

PEARL ST

WESTNEDGE AVE

POTTER ST



LOVELL		DRAWING	SHEET
			10
		SECT	

PARK ST

ST JOHN'S PL

ROSE ST



LOVELL ST

LOVELL ST

PARK ST

ROSE ST

KALAMAZOO MALL

JOHN ST

N



LOVELL ST

LOVELL ST

BURDICK ST

JOHN ST

JASPER ST

PORTAGE ST

TOWN ST

PORTAGE CREEK



LOVELL ST

PITCHER ST

PORTAGE ST

TOWN ST

PORTAGE CREEK

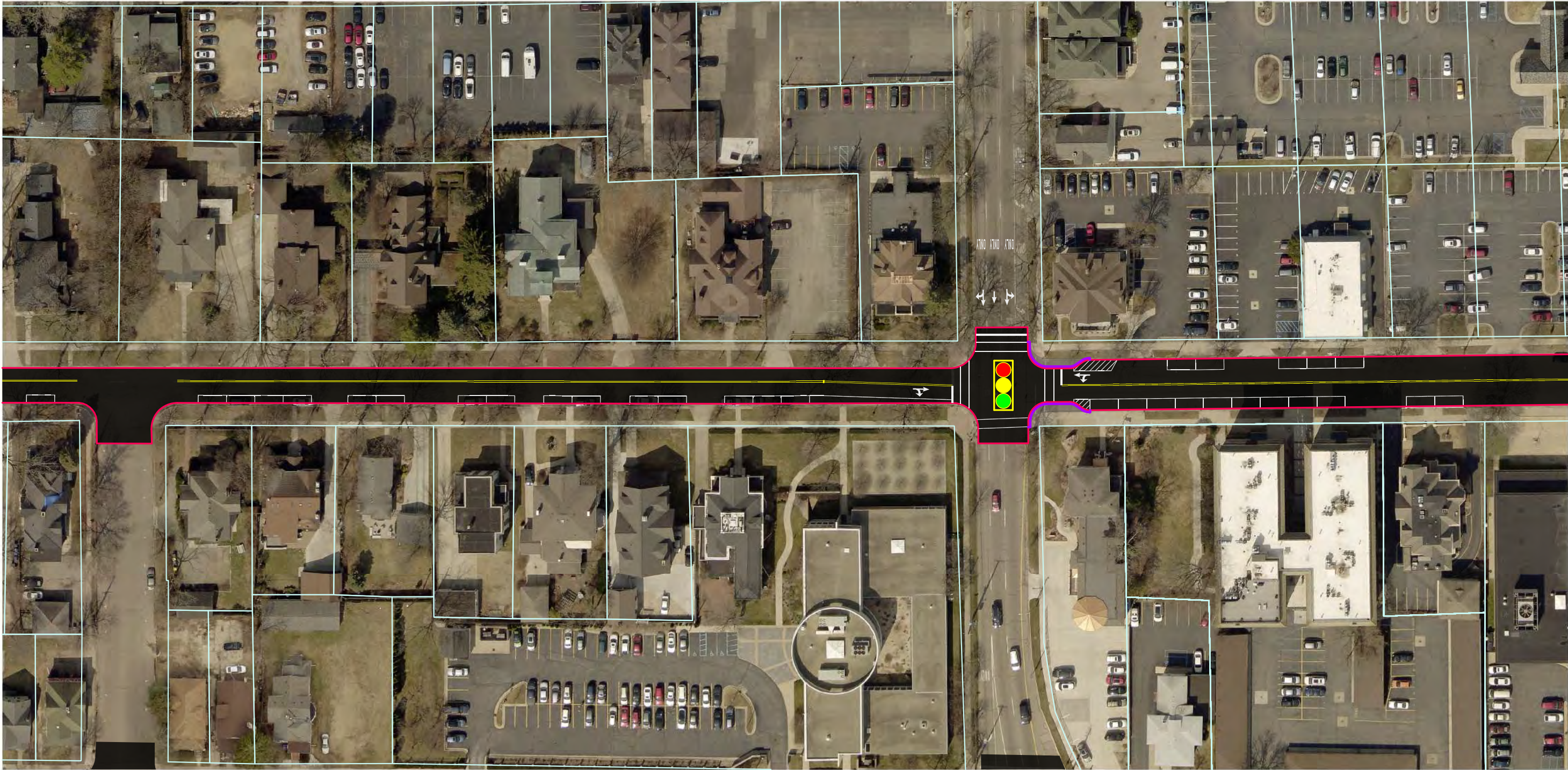
MICHIGAN AVE



MICHIGAN AVE

SOUTH ST

WESTNEDGE



SOUTH ST

SOUTH ST

OAK ST

WESTNEDGE

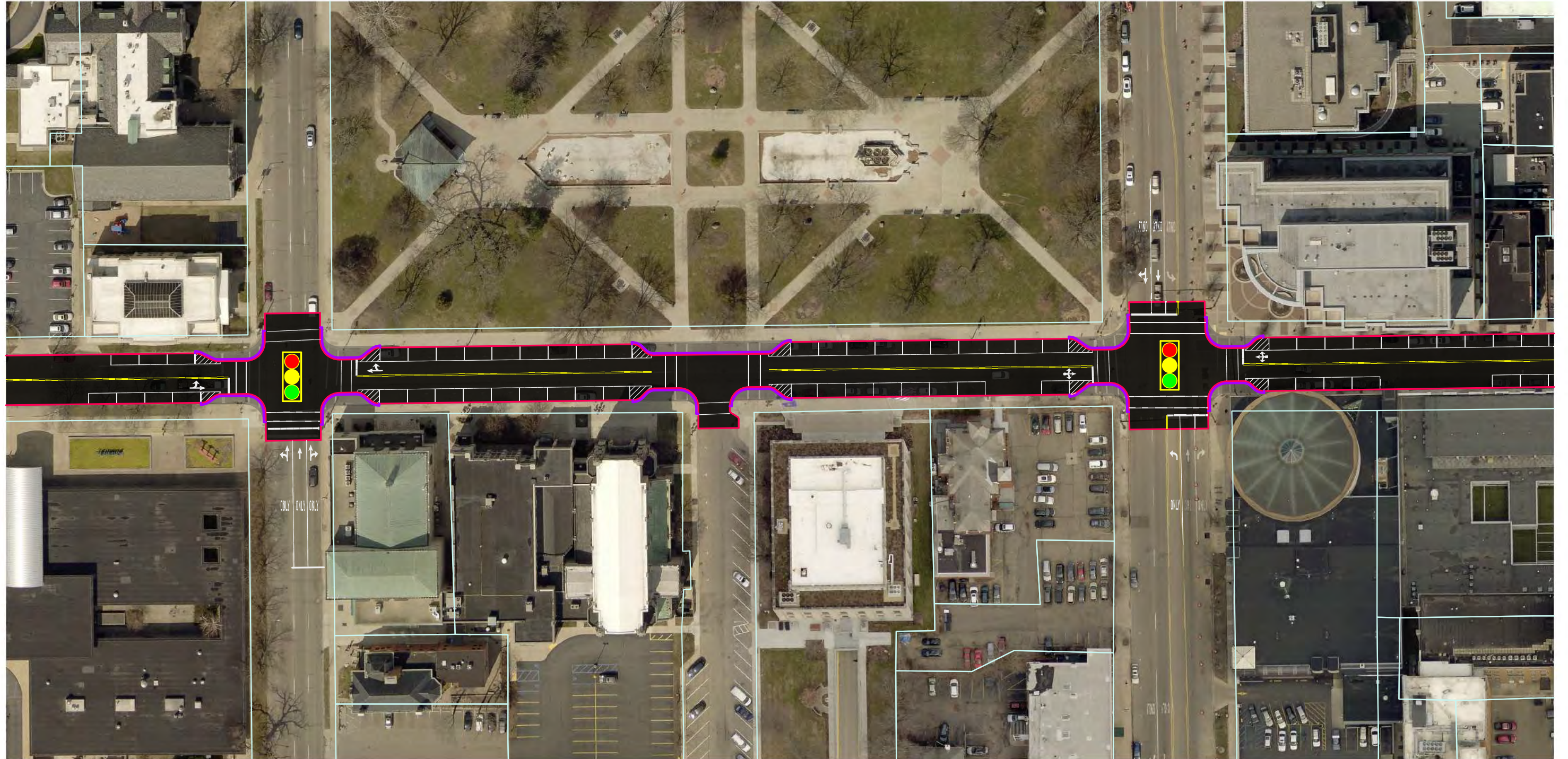
PARK ST

ROSE ST



SOUTH ST

SOUTH ST



PARK ST

ST JOHN'S PL

ROSE ST

KALAMAZOO MALL

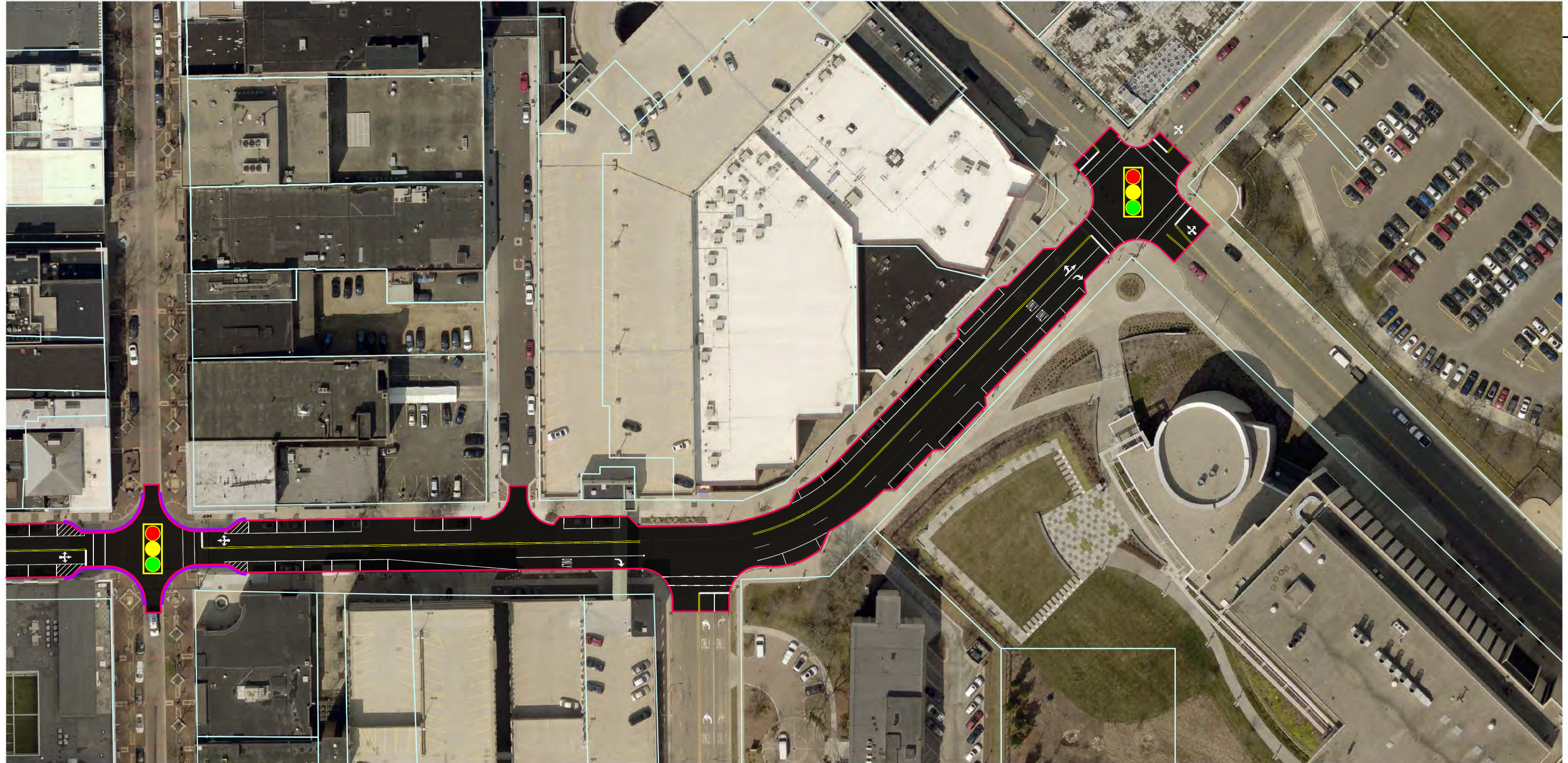
FARMERS ALLEY

PORTAGE ST

SOUTH ST



SOUTH ST



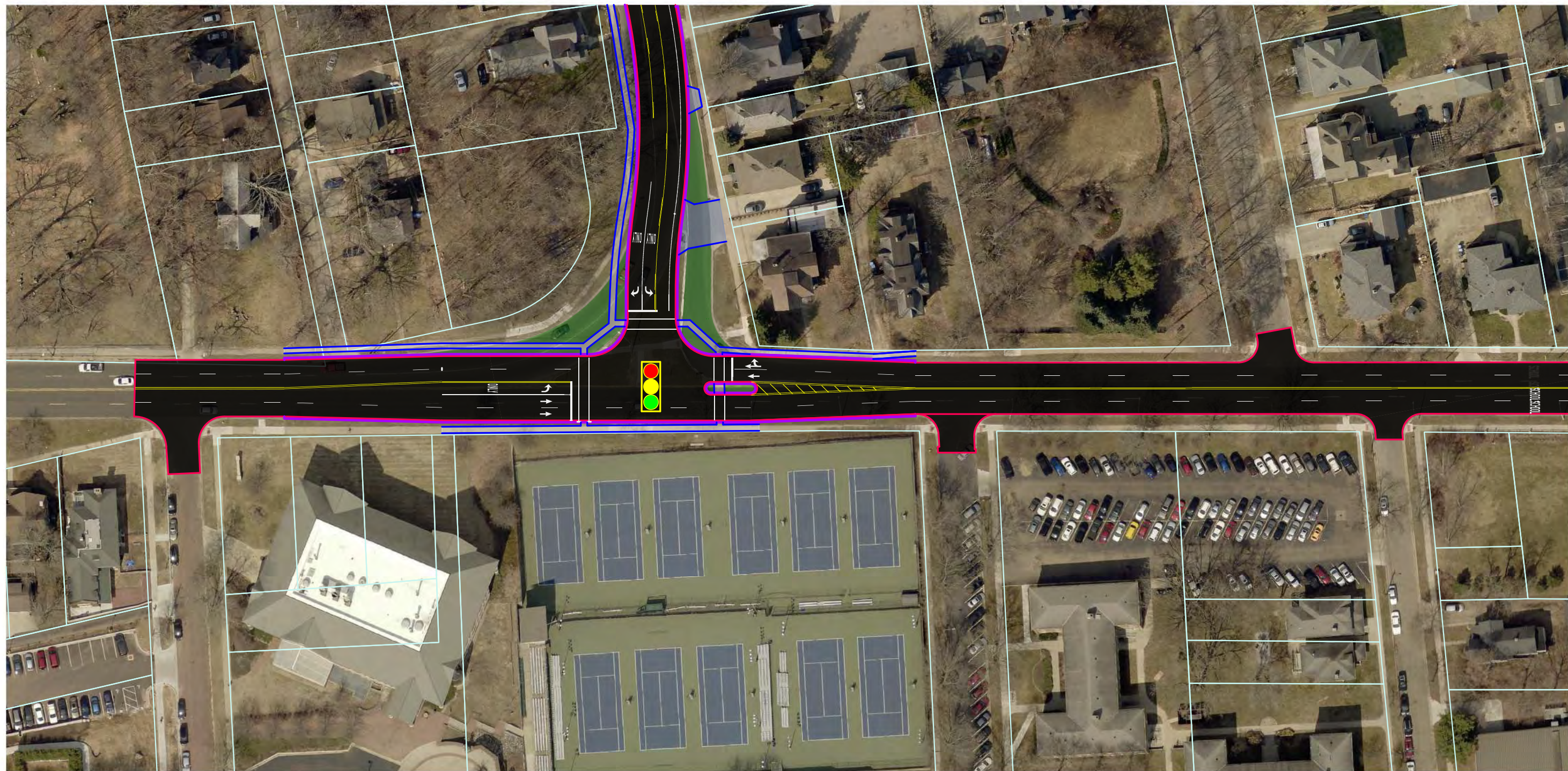
PORTAGE ST

KALAMAZOO MALL

JOHN ST

DOUGLAS AVE

STUART AVE



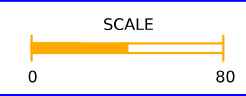
MAIN ST

MAIN ST

THOMPSON ST

ACKER LN

CATHERINE ST



MAIN OPTION 1		DRAWING	SHEET
SHEET 1			18
		SECT	

WOODWARD AVE

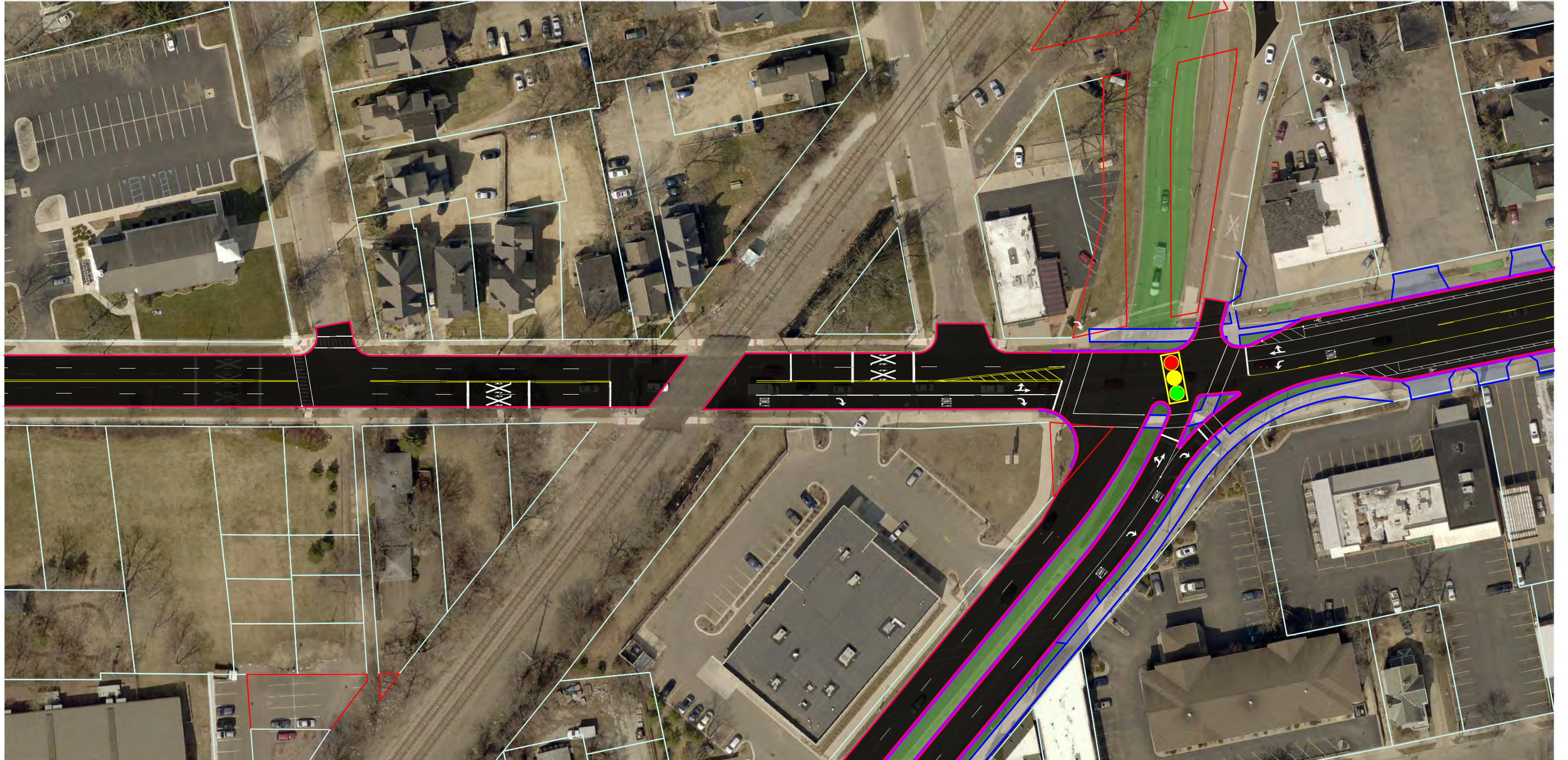
ELM ST

MICHIKAL ST ALLEN BLVD



MAIN ST

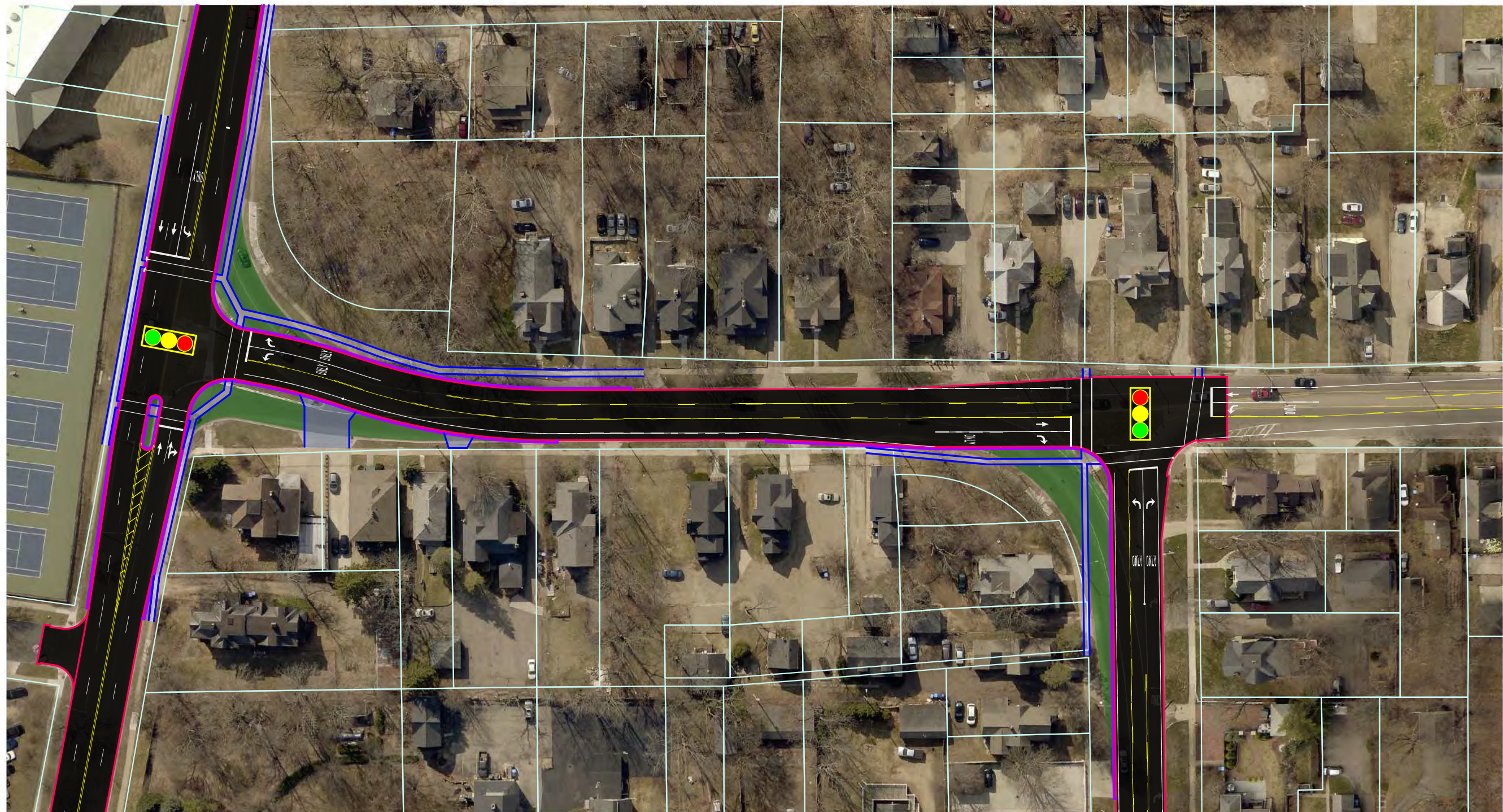
MICHIGAN AVE



MICHIGAN AVE



MAIN ST



MAIN ST

KALAMAZOO AVE

DOUGLAS AVE

STUART AVE

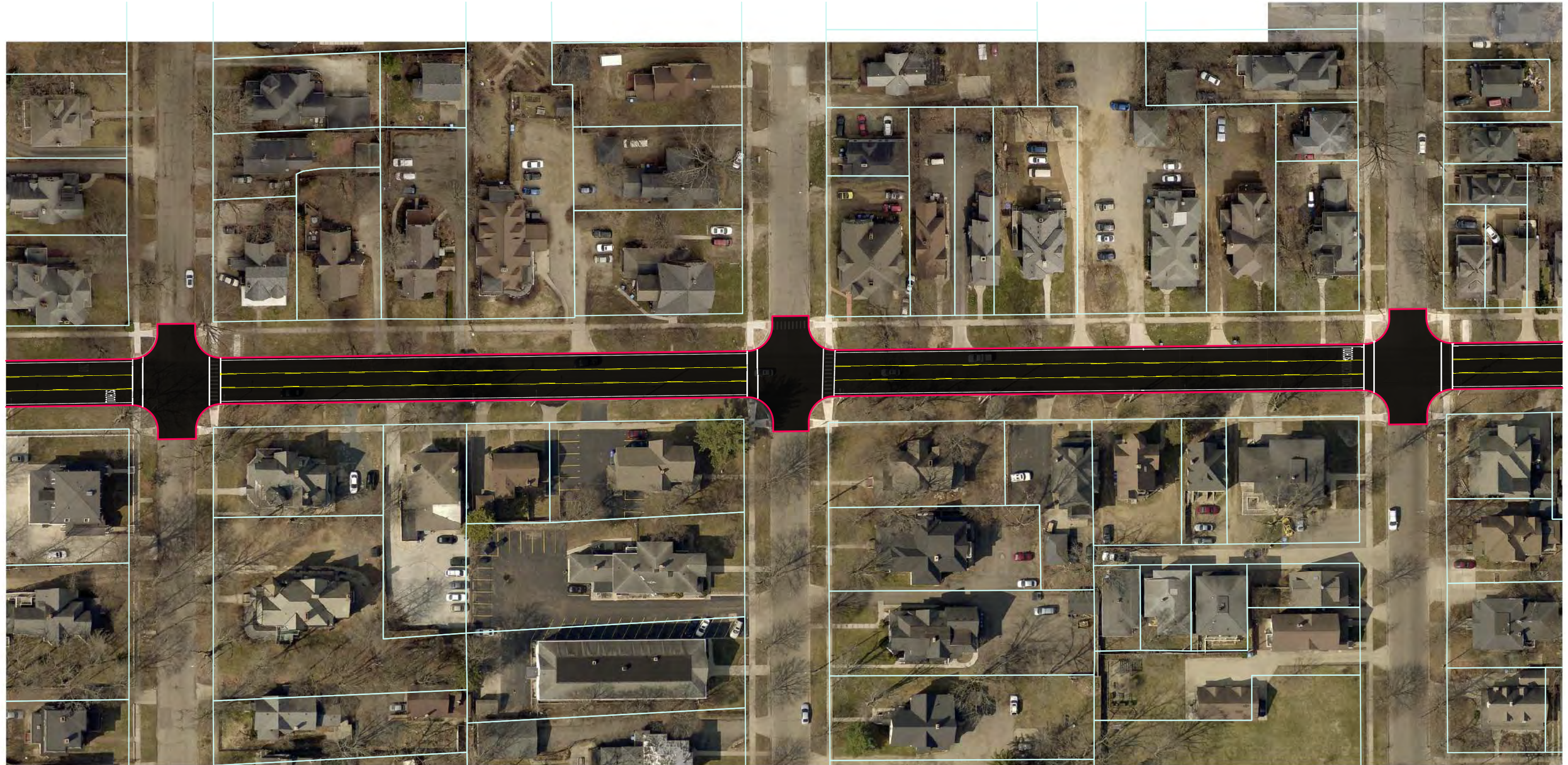
WOODWARD AVE

ELM ST



KALAMAZOO AVE

KALAMAZOO AVE



STUART AVE

WOODWARD AVE

ELM ST

GREENWICH PL

WESTNEDGE AVE

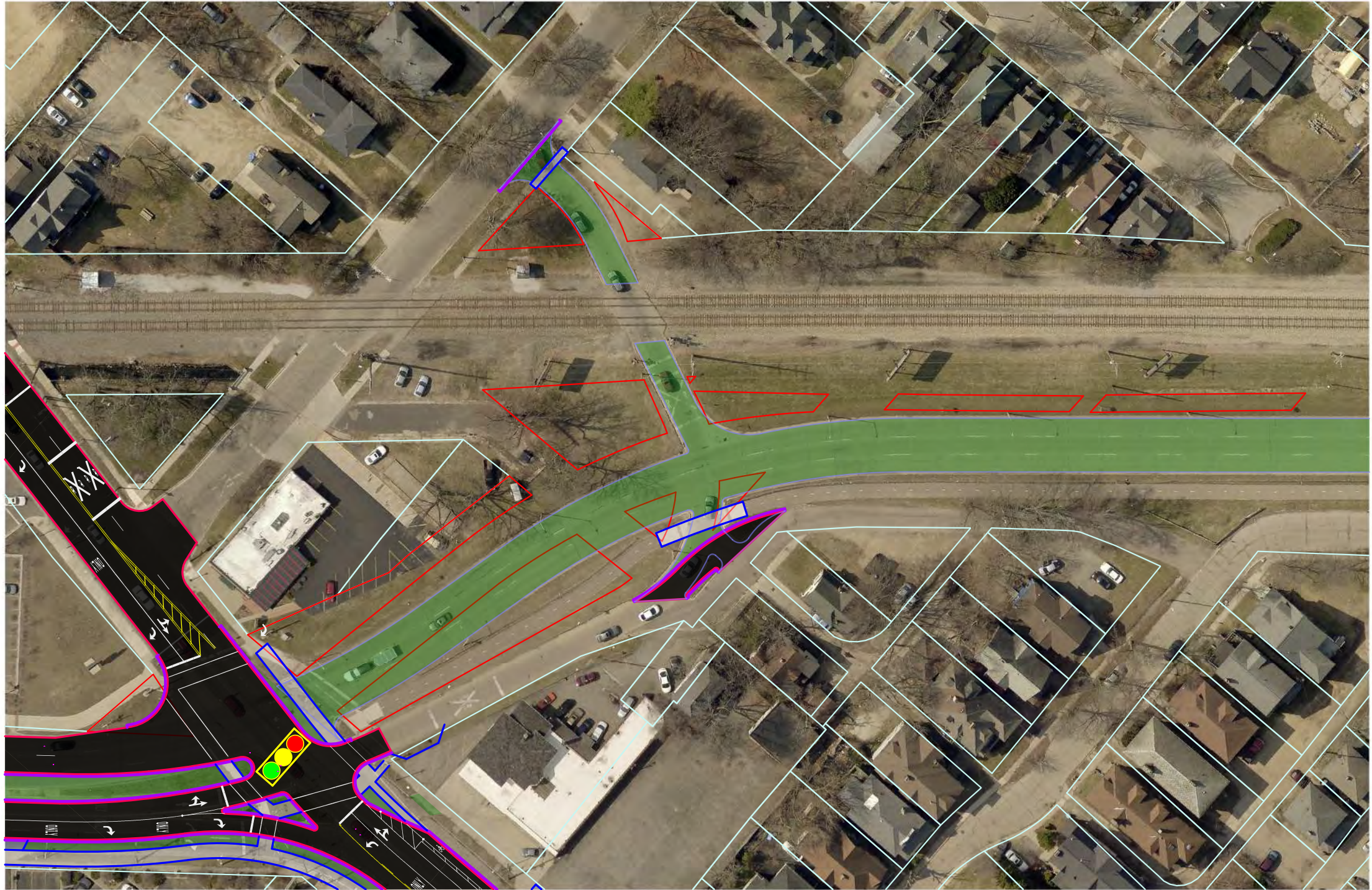


KALAMAZOO AVE

KALAMAZOO AVE

MICHIKAL ST

WESTNEDGE AVE

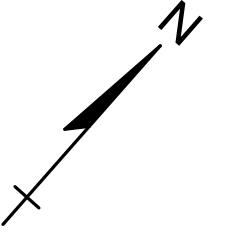


MAIN ST

MICHIGAN AVE

MICHIKAL ST

MICHIGAN AVE



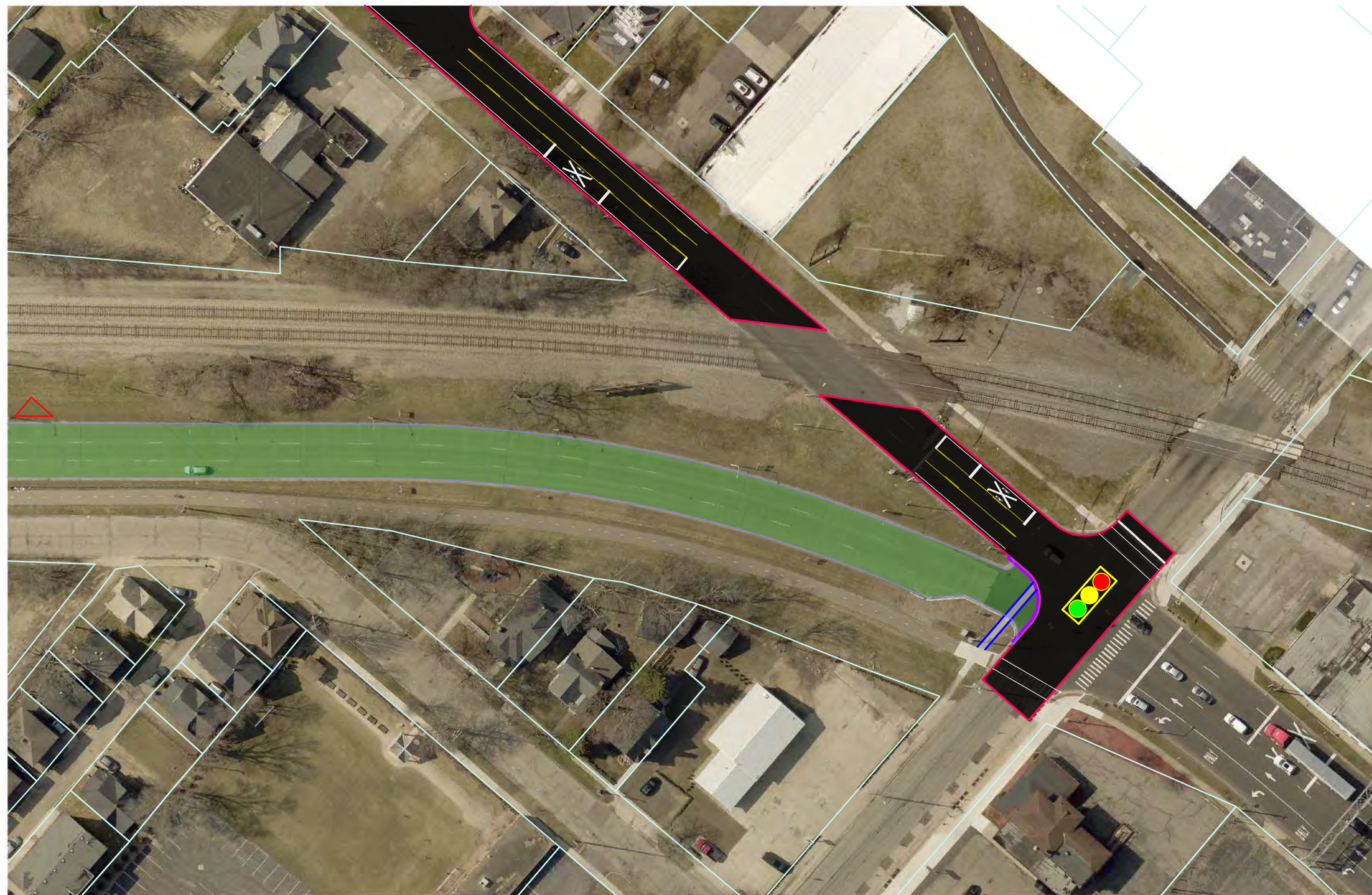
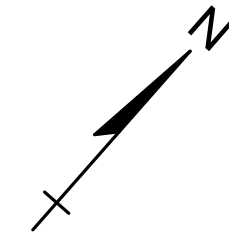
KALAMAZOO AVE

MICHIKAL ST

WESTNEDGE AVE

KALAMAZOO AVE

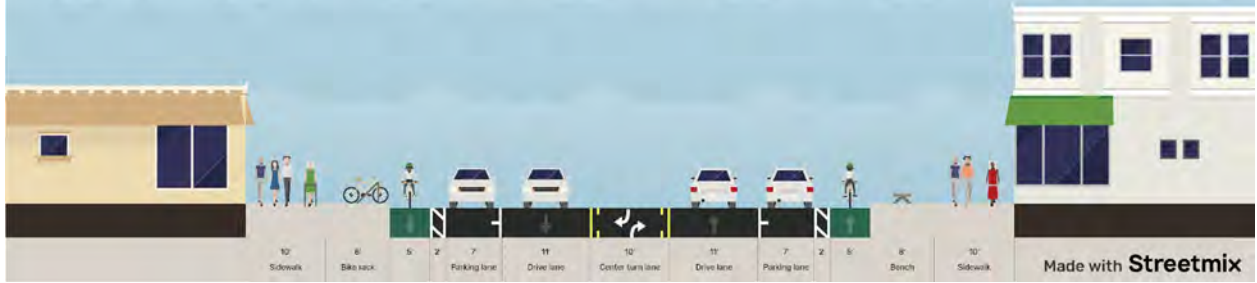
WESTNEDGE AVE



Michigan Ave



Michigan Ave



Michigan Ave



Kalamazoo Ave



Kalamazoo Ave



Kalamazoo Ave



Stadium Dr



Made with **Streetmix**

Lovell St



Made with **Streetmix**

Lovell St



Made with **Streetmix**

South St



South St



Main St



Douglas Ave



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Appendix B

Traffic Analysis

2040 Level-of-Service Comparison

Intersection	Traffic Control	Peak Period	2040 NO BUILD TRAFFIC			2040 BUILDOUT TRAFFIC WITH IMPROVEMENTS		
			V/C	DELAY	LOS	V/C	DELAY	LOS
Kalamazoo Ave at Westnedge Ave	SIGNAL	AM	0.59	7.8	A	0.85	25.8	C
		PM	0.69	14.7	B	0.90	27.3	C
Kalamazoo Ave at Park St	SIGNAL	AM	0.63	24.7	C	0.80	14.0	B
		PM	0.93	37.2	D	1.29	69.7	E
Kalamazoo Ave at Rose St	SIGNAL	AM	0.61	22.6	C	0.65	6.6	A
		PM	0.81	30.6	C	1.28	42.9	D
Kalamazoo Ave at Burdick St	SIGNAL	AM	1.09	83.7	F	1.10	55.3	E
		PM	1.64	136.2	F	>5.00	>100.0	F
Kalamazoo Ave at Edwards St	SIGNAL	AM	0.50	20.0	B	0.60	4.4	A
		PM	0.60	21.6	C	0.77	9.4	A
Kalamazoo Ave at Pitcher St	SIGNAL	AM	0.48	14.9	B	0.63	18.5	B
		PM	0.58	18.2	B	0.65	18.8	B
Kalamazoo Ave at Michigan Ave	STOP NB/WB	AM	-	-	-	1.14 / 0.20	114.2 / 13.4	F / B
		PM	-	-	-	3.20 / 0.35	>100.0 / 22.8	F / C
Michigan Ave at Stadium Dr/Main St	SIGNAL	AM	1.14	35.6	D	3.22	480.7	F
		PM	1.41	42.9	D	1.68	179.5	F
Michigan Ave at Westnedge Ave	SIGNAL	AM	0.84	26.7	C	0.80	27.9	C
		PM	0.65	23.8	C	0.71	20.6	C
Michigan Ave at Park St	SIGNAL	AM	0.81	26.0	C	0.93	22.3	C
		PM	0.81	24.7	C	1.12	70.0	E
Michigan Ave at Rose St	SIGNAL	AM	0.83	27.7	C	0.70	10.3	B
		PM	0.80	25.3	C	0.72	16.8	B
Michigan Ave at Burdick St	SIGNAL	AM	0.42	1.2	A	0.40	46.1	D
		PM	0.46	2.4	A	0.45	56.1	E
Michigan Ave at Portage St	STOP NB	AM	0.00	0.0	-			
		PM	0.03	21.7	C			
	SIGNAL	AM				0.77	10.1	B
		PM				0.75	8.7	A
Michigan Ave at Edwards St	SIGNAL	AM	1.18	97.4	F	0.76	2.8	A
		PM	0.66	22.9	C	0.91	17.1	B
Michigan Ave at Pitcher St	SIGNAL	AM	0.55	14	B	0.75	18.0	B
		PM	0.71	19.1	B	0.88	19.4	B
Michigan Ave and Harrison St	STOP SB/EBL	AM	0.54 / 0.10	20.8 / 11.3	C / B			
		PM	0.00 / 0.57	0.0 / 19.8	- / C			
	SIGNAL	AM				0.87	30.6	C
		PM				0.90	34.2	C
Main St at Douglas Ave	STOP	AM	0.91	57.7	F			
		PM	0.66	24.8	C			
	SIGNAL	AM				0.82	18.8	B
		PM				0.89	23.5	C
South St at Westnedge St	SIGNAL	AM	0.46	14.0	B	0.60	21.7	C
		PM	0.31	14.2	B	0.72	22.5	C
South St at Park St	SIGNAL	AM	0.58	19.6	B	0.48	26.4	C
		PM	0.71	23.3	C	0.55	34.0	C
SoutLovell St at Westnedge St	SIGNAL	AM	0.86	26.6	C	0.76	34.5	C
		PM	0.97	30.5	C	0.96	54.1	D
Lovell St at Park St	SIGNAL	AM	0.52	17.1	B	0.58	19.0	B
		PM	0.62	15.7	B	1.03	47.1	D

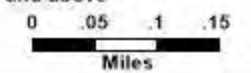
Travel Time and Emissions Comparison

Corridor	Limits	Travel Time	No Build AM	No Build PM	Buildout AM	Buildout PM
EB Michigan (US-131BL/I-94BL/M-43)	From Stadium Dr to Kalamazoo Ave	Total Delay (s/veh)	64.3	43.6	416.5	431.2
		Total Travel Time (s)	179.6	158.1	575.7	1,675.5
		Total Distance (mi)	0.9	0.9	0.9	0.9
		Arterial Speed (mph)	20.0	23.0	17.9	7.7
		Hydrocarbon Emissions (g)	1,100	1,000	500	700
		CO Emissions (g)	25,600	26,200	12,000	15,000
		NOx Emissions (g)	3,600	3,100	1,400	1,700
WB Michigan (US131BR/I-94BL/M-43)	From Kalamazoo Ave to Stadium Dr	Total Delay (s/veh)	-	-	94.5	209.3
		Total Travel Time (s)	-	-	185.0	470.2
		Total Distance (mi)	-	-	0.9	0.9
		Arterial Speed (mph)	-	-	18.9	14.9
		Hydrocarbon Emissions (g)	-	-	200	300
		CO Emissions (g)	-	-	7,100	8,300
		NOx Emissions (g)	-	-	900	800
EB Kalamazoo (I-94BL/M-43)	From Westnedge Ave to Michigan Ave	Total Delay (s/veh)	-	-	44.7	71.0
		Total Travel Time (s)	-	-	97.0	120.2
		Total Distance (mi)	-	-	0.7	0.7
		Arterial Speed (mph)	-	-	19.0	15.0
		Hydrocarbon Emissions (g)	-	-	200	500
		CO Emissions (g)	-	-	8,300	16,000
		NOx Emissions (g)	-	-	900	1,500
WB Kalamazoo (I-94BL/M-43)	From Michigan Ave to Westnedge Ave	Total Delay (s/veh)	46.9	139.9	346.9	419.9
		Total Travel Time (s)	122.5	222.2	2,871.9	2,503.5
		Total Distance (mi)	0.7	0.7	0.7	0.7
		Arterial Speed (mph)	25.0	16.0	8.3	5.3
		Hydrocarbon Emissions (g)	700	800	800	600
		CO Emissions (g)	18,700	20,900	18,300	16,900
		NOx Emissions (g)	19,500	2,600	1,400	1,400
EB Lovell St	From Stadium Dr to Pitcher St	Total Delay (s/veh)	-	-	44.1	91.2
		Total Travel Time (s)	-	-	152.8	279.1
		Total Distance (mi)	-	-	1.3	1.3
		Arterial Speed (mph)	-	-	19.0	20.0
		Hydrocarbon Emissions (g)	-	-	50	100
		CO Emissions (g)	-	-	1,400	3,600
		NOx Emissions (g)	-	-	200	500
WB Lovell St	From Pitcher St to Stadium Dr	Total Delay (s/veh)	117.6	95.0	162.3	385.6
		Total Travel Time (s)	262.0	257.7	266.3	1,103.2
		Total Distance (mi)	1.3	1.3	1.3	1.3
		Arterial Speed (mph)	16.0	16.0	13.0	8.0
		Hydrocarbon Emissions (g)	100.0	200.0	100	300
		CO Emissions (g)	2,400.0	5,600.0	2,500	6,900
		NOx Emissions (g)	300.0	700.0	300	500
EB South St	From Stadium Dr to Burdick St	Total Delay (s/veh)	50.3	57.8	72.5	121.6
		Total Travel Time (s)	153.5	159.4	180.9	223.6
		Total Distance (mi)	0.8	0.8	0.8	0.8
		Arterial Speed (mph)	19.8	17.5	16.0	13.0
		Hydrocarbon Emissions (g)	100.0	100.0	100	100
		CO Emissions (g)	1,900.0	1,800.0	2,000	1,600
		NOx Emissions (g)	200.0	200.0	300	200
WB South St	From Burdick Ave to Stadium Dr	Total Delay (s/veh)	-	-	63.5	68.6
		Total Travel Time (s)	-	-	134.2	133.1
		Total Distance (mi)	-	-	0.8	0.8
		Arterial Speed (mph)	-	-	15.0	15.0
		Hydrocarbon Emissions (g)	-	-	50	50
		CO Emissions (g)	-	-	1,300	1,200
		NOx Emissions (g)	-	-	100	100



No-Build Number of Lanes

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7 and above

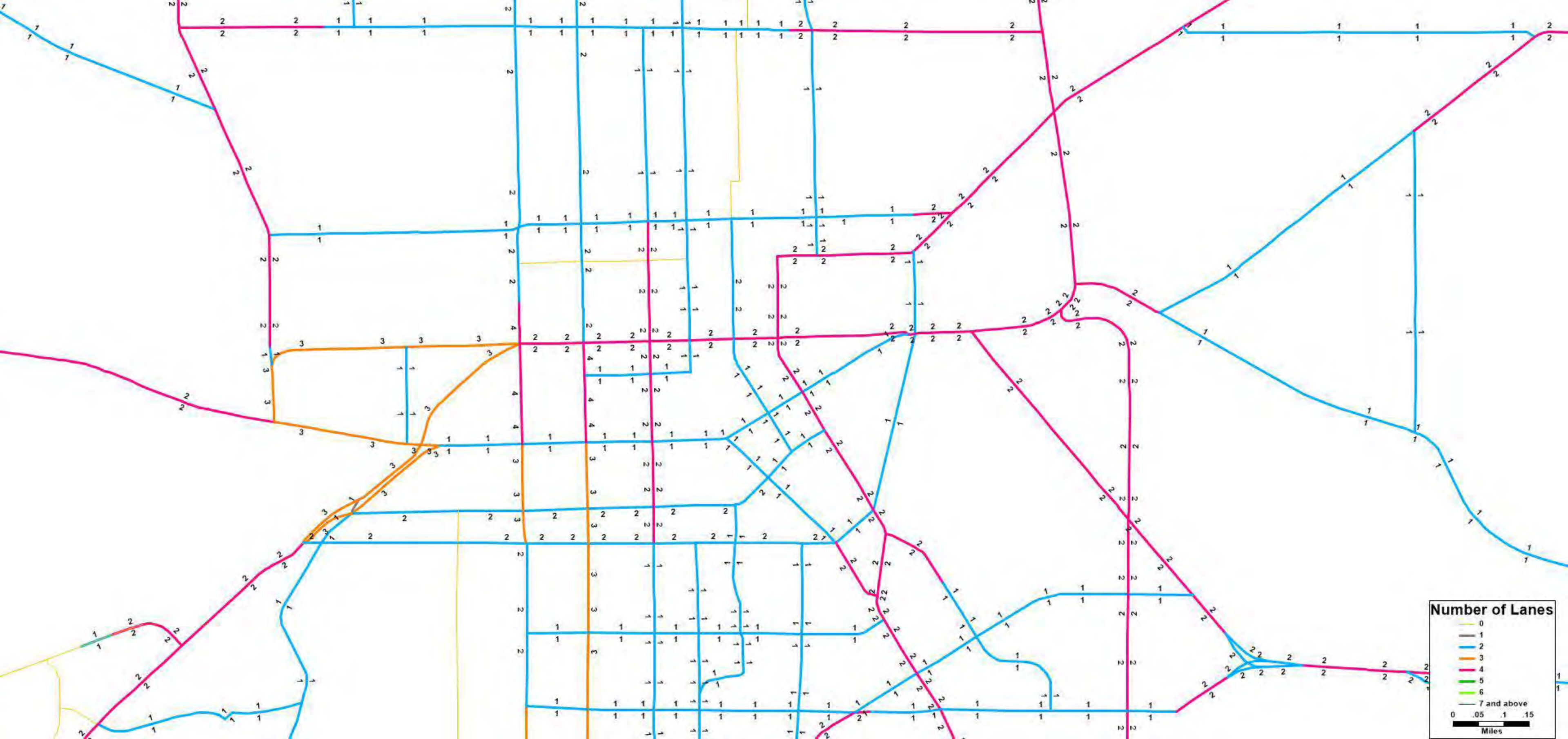




Number of Lanes

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7 and above

0 .05 .1 .15
Miles



Number of Lanes

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7 and above

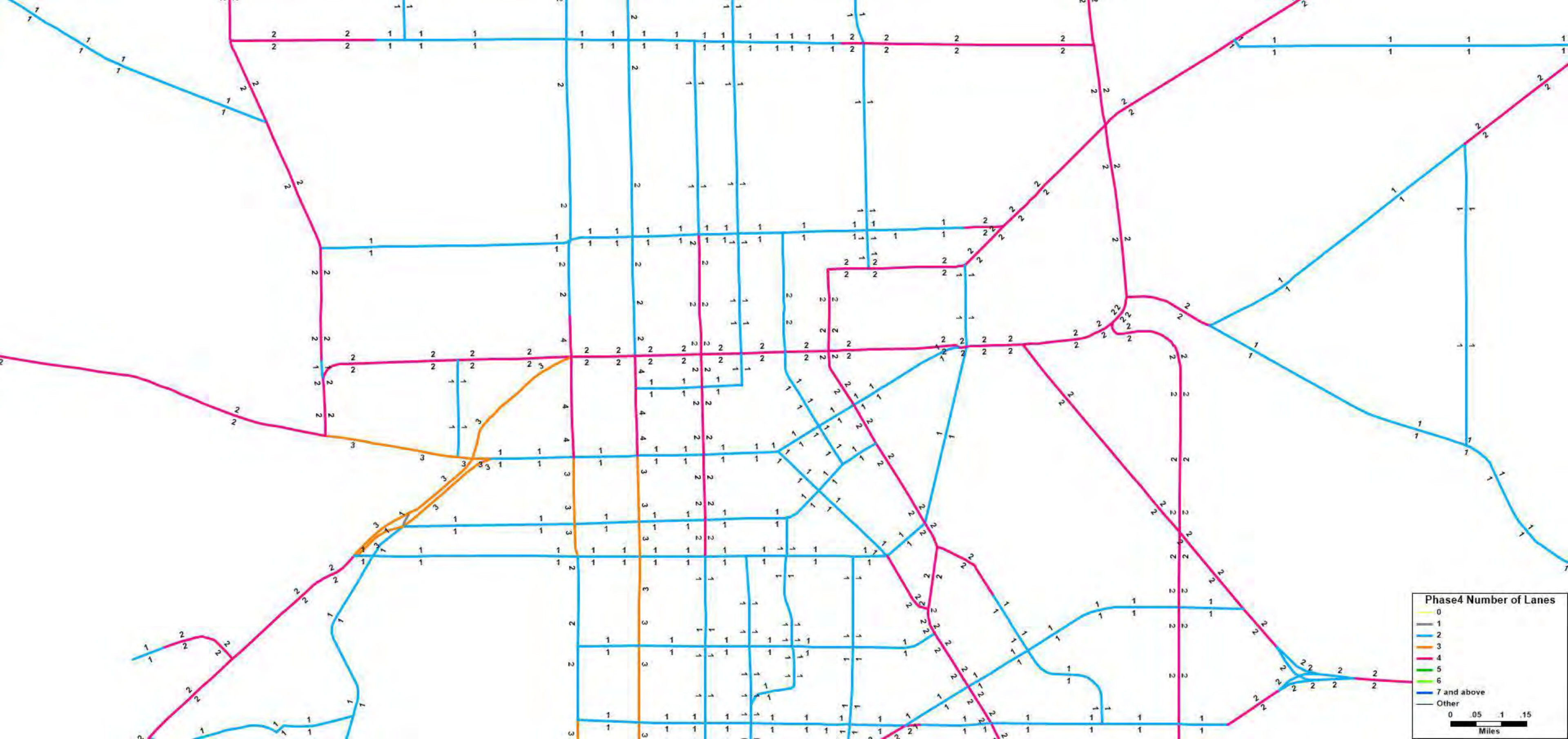
0 .05 .1 .15
Miles



Phase3 Number Of Lanes

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7 and above
- Other

0 .05 .1 .15
Miles



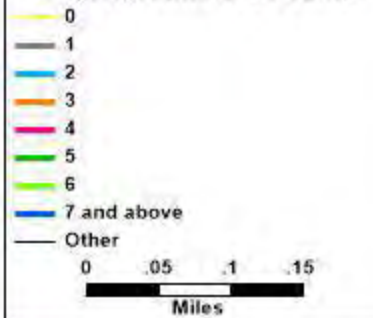
Phase4 Number of Lanes

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7 and above
- Other

0 .05 .1 .15
Miles



Phase5 Number Of Lanes





Y2010 - Phase 1 ADT Map
Average Daily Traffic

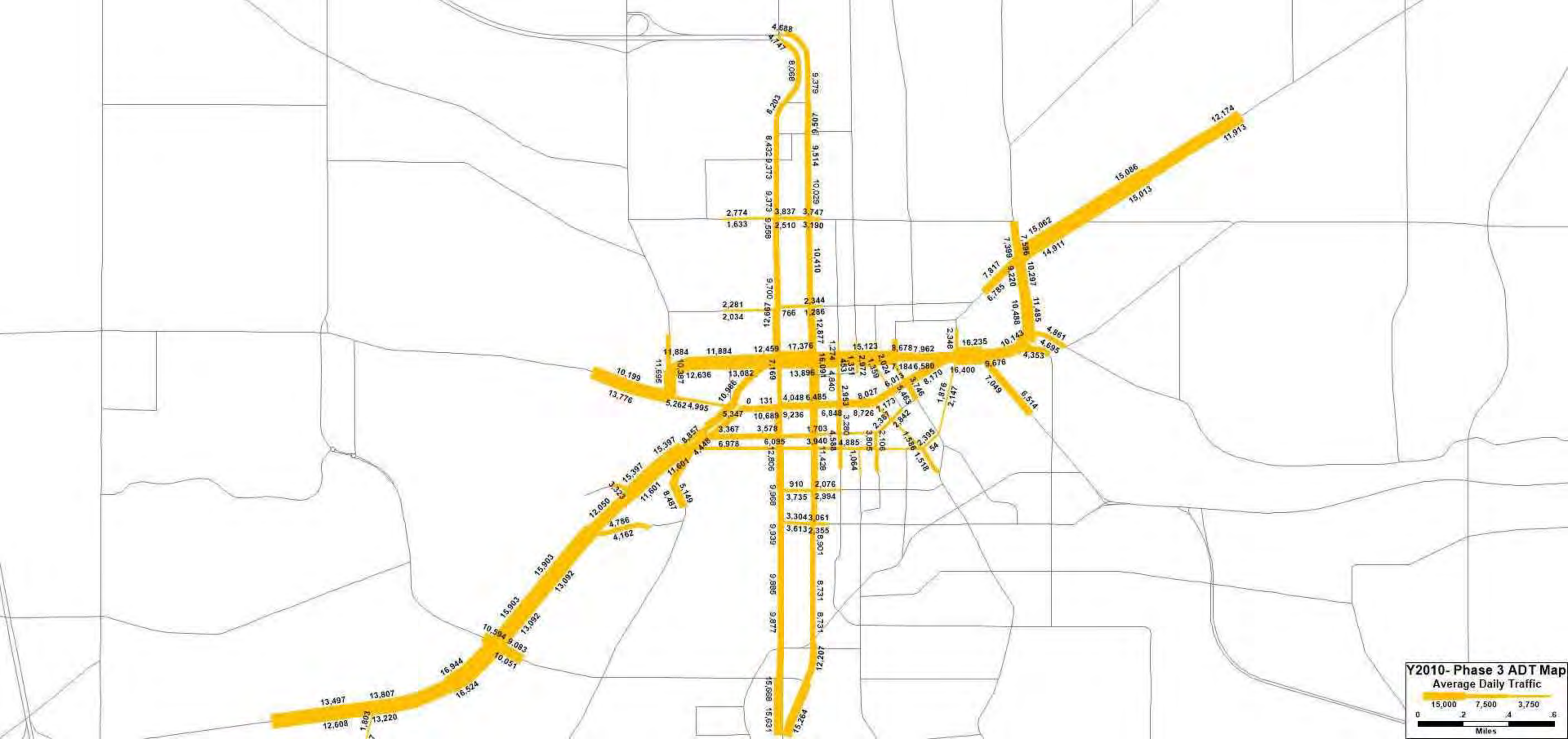
20,000	10,000	5,000	
0	.2	.4	.6

Miles



Y2010 - Phase 2 ADT Map
Average Daily Traffic





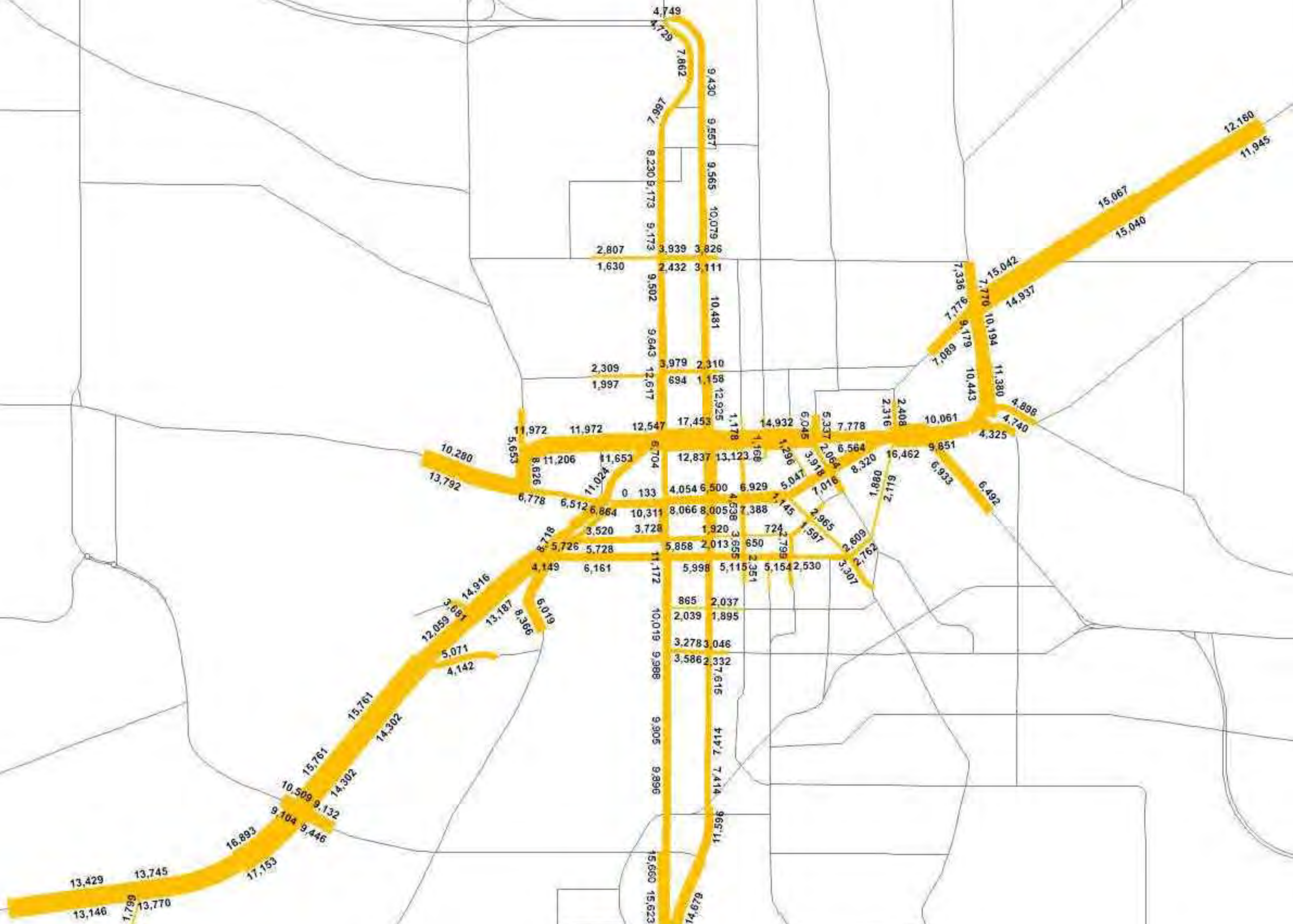
Y2010- Phase 3 ADT Map
Average Daily Traffic



Y2010 - Phase 4 ADT Map
Average Daily Traffic

20000	10000	5000
-------	-------	------

0 2 4 6
Miles



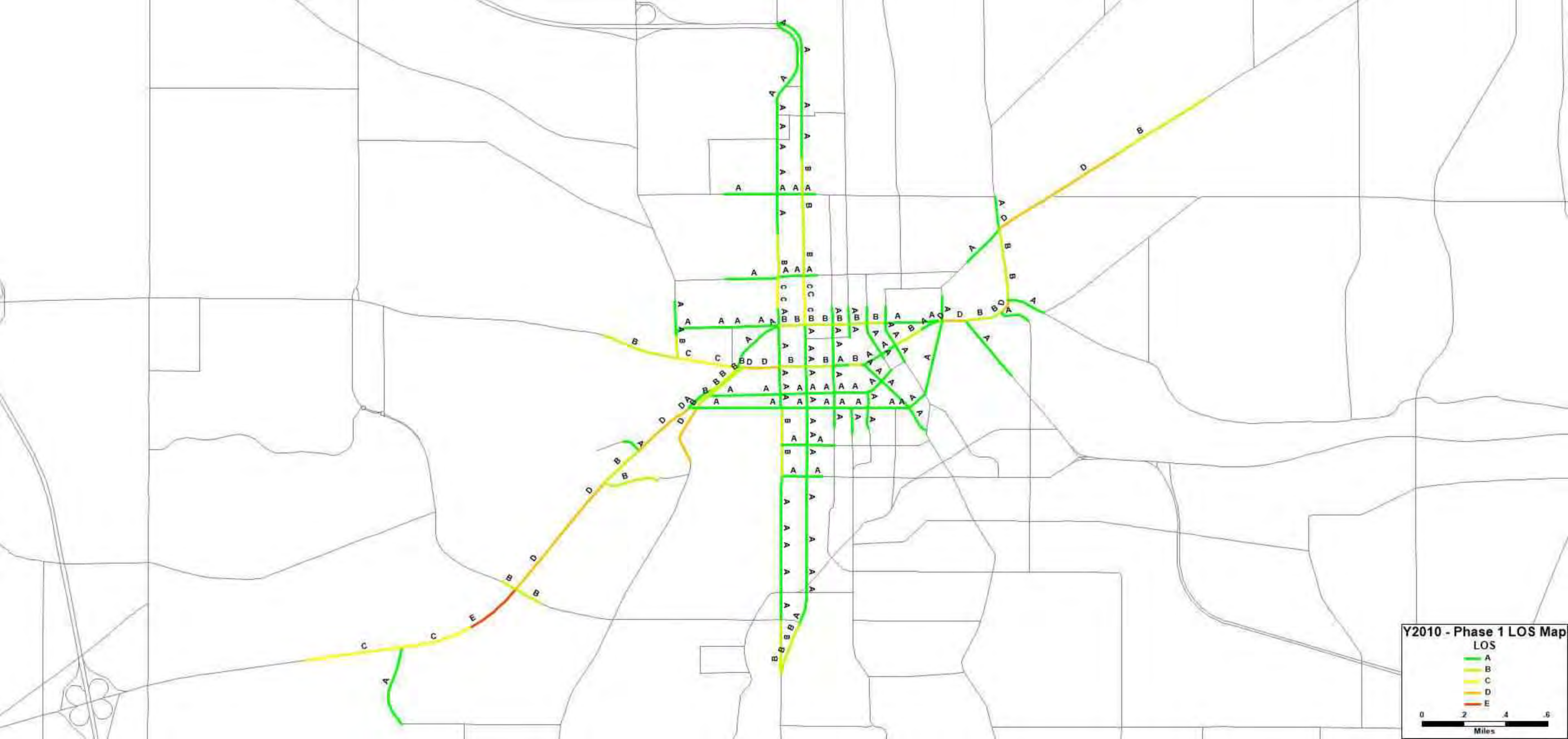


Y2010 - Phase 5 ADT Map
Ph5_Y2010.DyFlow

20000 10000 5000

0 .2 .4 .6

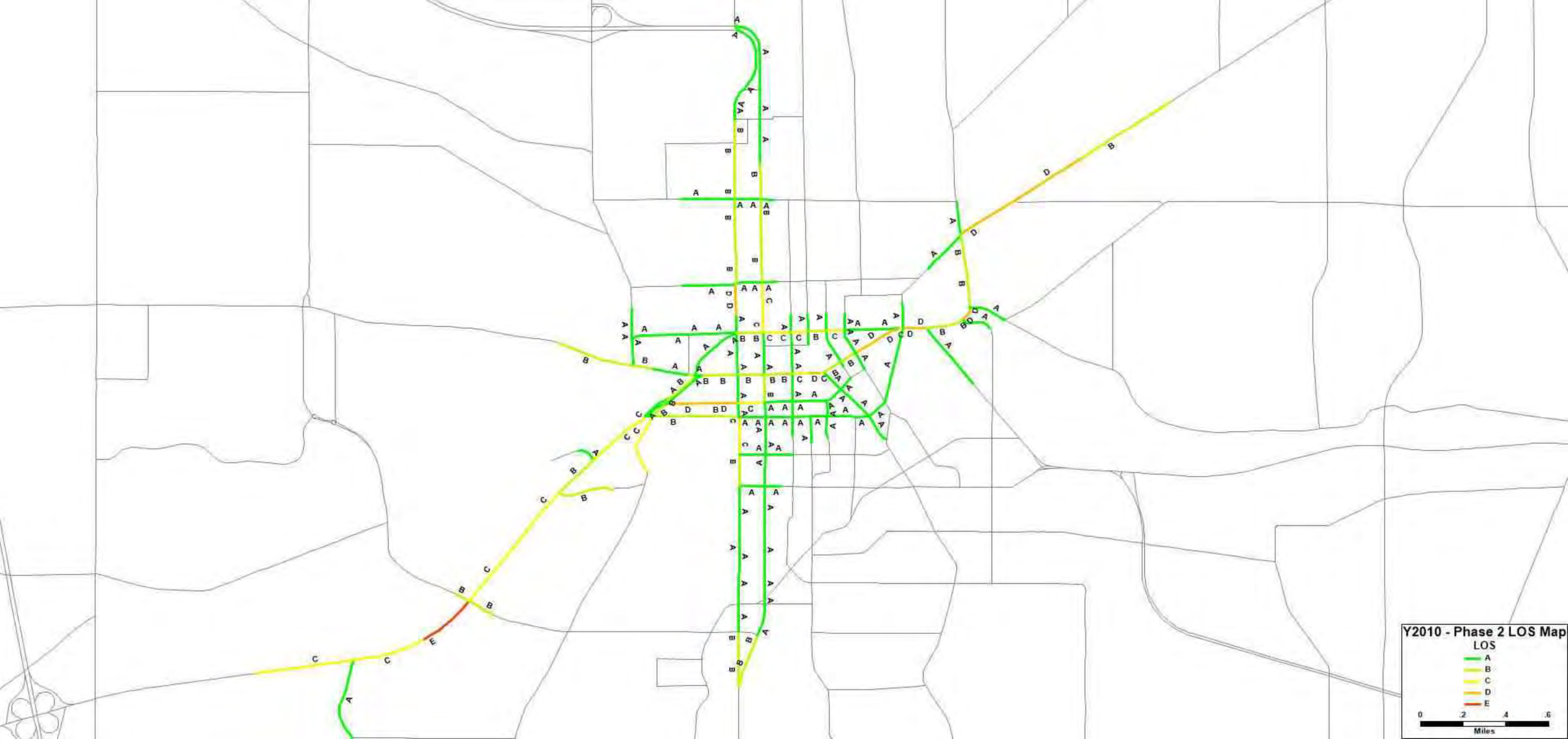
Miles



Y2010 - Phase 1 LOS Map
LOS

- A
- B
- C
- D
- E

0 2 4 6
Miles

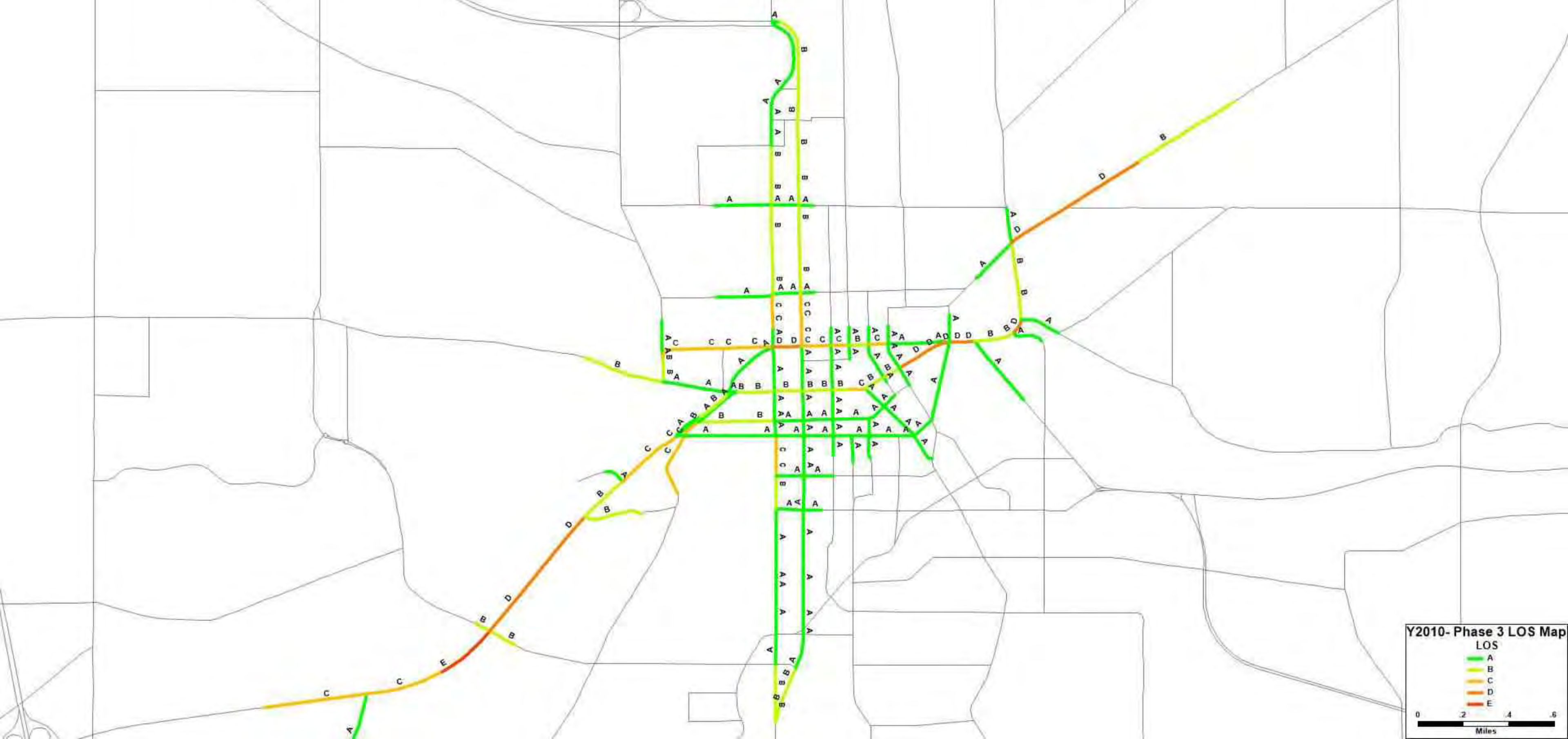


Y2010 - Phase 2 LOS Map

LOS

- A
- B
- C
- D
- E

0 0.2 0.4 0.6
Miles

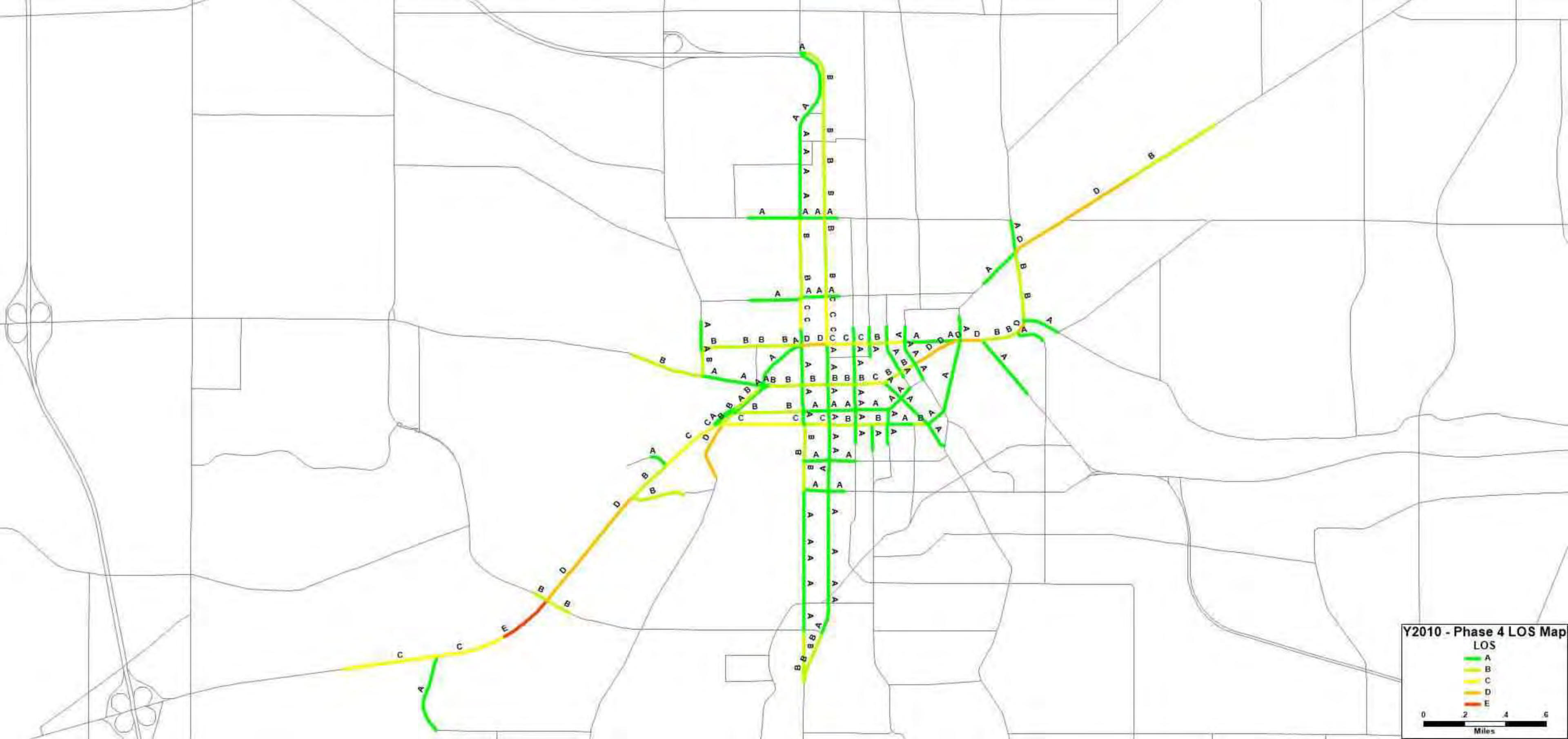


Y2010- Phase 3 LOS Map

LOS

- A
- B
- C
- D
- E



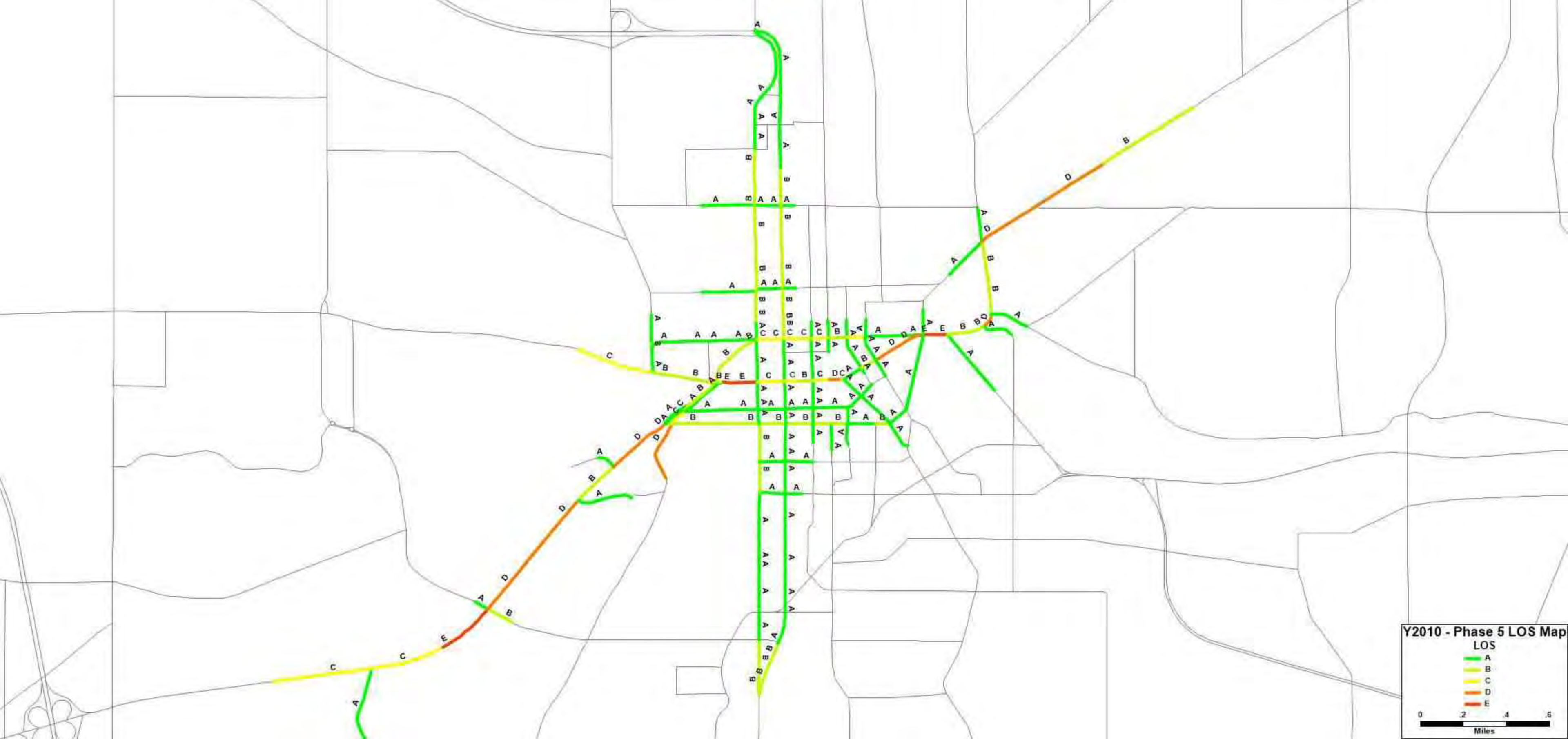


Y2010 - Phase 4 LOS Map

LOS

- A
- B
- C
- D
- E





Y2010 - Phase 5 LOS Map
LOS
A
B
C
D
E
0 .2 .4 .6
Miles



Y2045 - Phase 1 ADT Map
Average Daily Traffic





Y2045 - Phase 2 ADT Map
 Average Daily Traffic

20,000	10,000	5,000	
0	.2	.4	.6

Miles



Y2045 - Phase 4 ADT Map
Average Daily Traffic

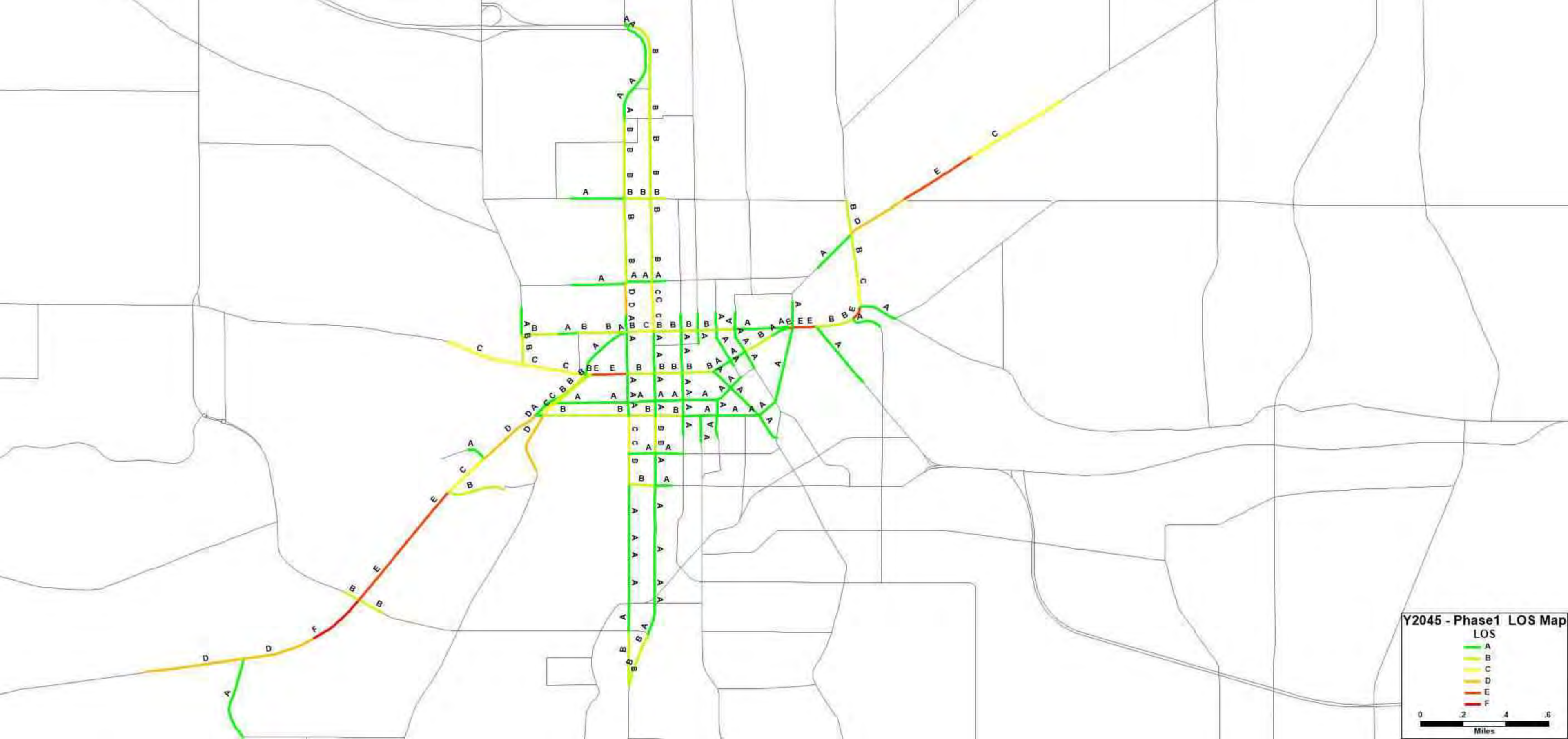
20000	10000	5000	
0	2	4	6

Miles



Y2045- Phase 5 ADT Map
Average Daily Traffic



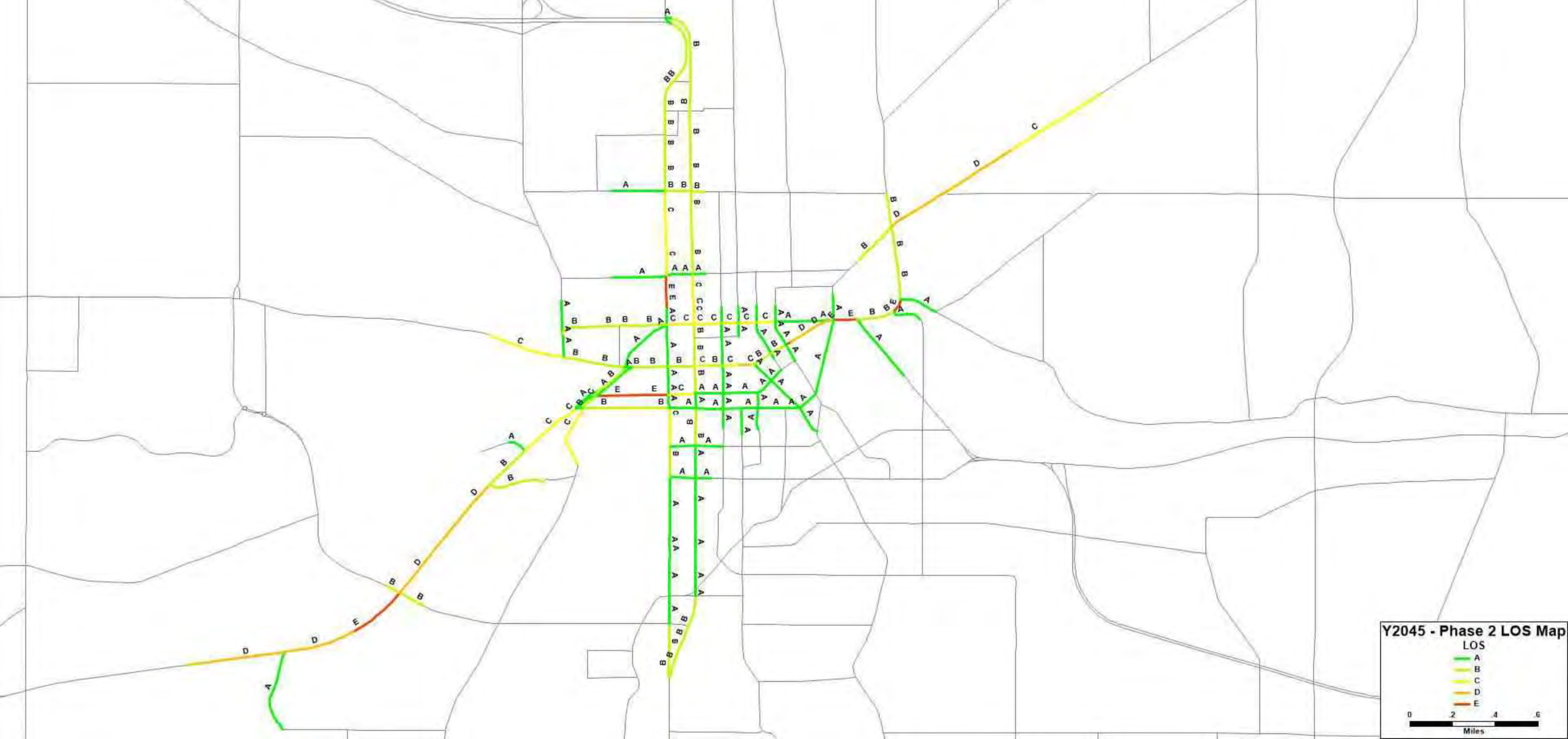


Y2045 - Phase1 LOS Map

LOS

- A
- B
- C
- D
- E
- F





Y2045 - Phase 2 LOS Map

LOS

- A
- B
- C
- D
- E





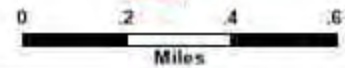
Y2045- Phase 3 LOS Map
LOS
A
B
C
D
E
0 2 4 6
Miles

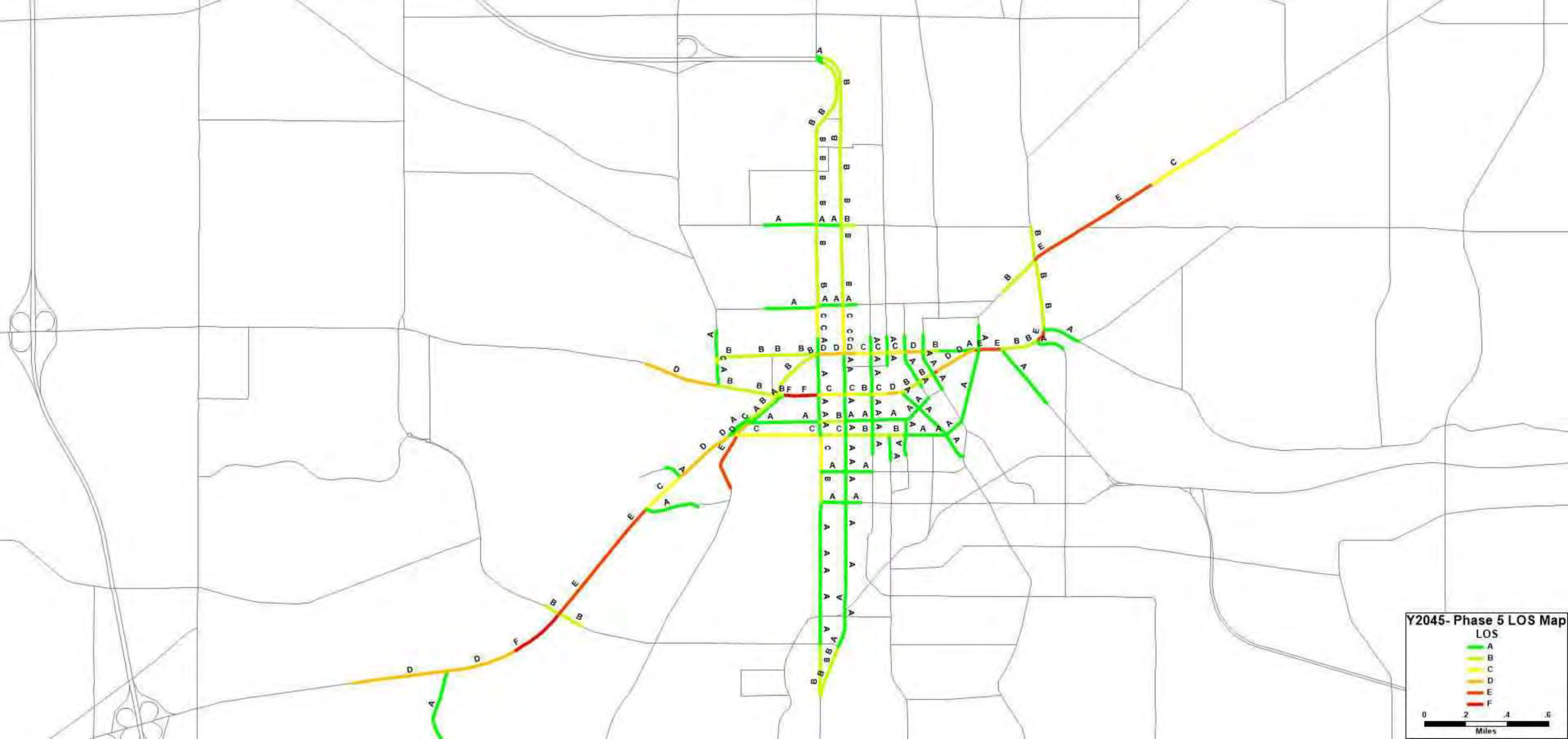


Y2045 - Phase 4 LOS Map

LOS

- A
- B
- C
- D
- E
- F





Y2045- Phase 5 LOS Map

LOS

- A
- B
- C
- D
- E
- F



Lanes and Geometrics
 2: Michigan (US-131BR/I-94BL/M-43) & Douglas



















Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	100			150	100	0
Storage Lanes	1			0	1	1
Taper Length (ft)	100				50	
Right Turn on Red				No		No
Link Speed (mph)		30	30		30	
Link Distance (ft)		704	1478		745	
Travel Time (s)		16.0	33.6		16.9	

Intersection Summary

Area Type: Other




















Lanes and Geometrics
7: South & Burdick

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			25	
Link Distance (ft)		394			412			410			690	
Travel Time (s)		10.7			11.2			9.3			18.8	

Intersection Summary

Area Type: Other

Lanes and Geometrics
15: Rose & Lovell



















												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	75		0	75		0	100		0	0		0
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		690			412			470			399	
Travel Time (s)		18.8			11.2			10.7			9.1	

Intersection Summary

Area Type: Other

Lanes and Geometrics
 16: Westnedge (M-331) & Vine

















Kalamazoo PEL Study
 Buildout PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	75		0	100		0	75		0
Storage Lanes	0		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		522			571			2929			922	
Travel Time (s)		14.2			15.6			66.6			21.0	

Intersection Summary

Area Type: CBD


















Lanes and Geometrics
23: Burdick & Lovell

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	75		0	75		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		412			404			259			410	
Travel Time (s)		11.2			11.0			5.9			9.3	

Intersection Summary

Area Type: Other

















Lanes and Geometrics
33: Lovell & Portage

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1030			539			600			967	
Travel Time (s)		28.1			14.7			13.6			22.0	

Intersection Summary

Area Type: Other

Lanes and Geometrics
34: John & Lovell

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	75		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		404			1030			393			407	
Travel Time (s)		11.0			28.1			8.9			9.3	

Intersection Summary

Area Type: Other

Lanes and Geometrics
 35: Westnedge (M-331) & Dummy



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			100
Storage Lanes	0	1	0			0
Taper Length (ft)	25		25			
Link Speed (mph)	25			30	30	
Link Distance (ft)	288			271	349	
Travel Time (s)	7.9			6.2	7.9	
Intersection Summary						
Area Type:	CBD					



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			100
Storage Lanes	0	1	0			0
Taper Length (ft)	25		25			
Link Speed (mph)	25			30	30	
Link Distance (ft)	300			439	612	
Travel Time (s)	8.2			10.0	13.9	

Intersection Summary

Area Type:	CBD
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Lane Group	EBL	EBR	NBL	NBR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%		0%	
Storage Length (ft)	0	100	0	0	0	0
Storage Lanes	1	1	1	1	1	0
Taper Length (ft)	25		25		25	
Link Speed (mph)	25		30		30	
Link Distance (ft)	412		407		425	
Travel Time (s)	11.2		9.3		9.7	

Intersection Summary

Area Type:	Other
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Lanes and Geometrics
 39: Lovell & Kalamazoo (I-94BL/M-43)

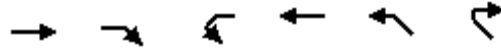


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	75		0	75		0	150		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	100			75			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25				25
Link Distance (ft)		457			580			1967				1044
Travel Time (s)		8.9			11.3			53.6				28.5

Intersection Summary

Area Type: Other

Lanes and Geometrics
 75: Kings Hwy (I-94 BL) & Kalamazoo (I-94BL/M-43)



Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑↑	↑	↑	↑↑	↑↑	↑
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%		0%	
Storage Length (ft)		0	300		0	350
Storage Lanes		1	1		2	1
Taper Length (ft)			25		25	
Right Turn on Red		Yes			Yes	
Link Speed (mph)	35		35		40	
Link Distance (ft)	580		921		3096	
Travel Time (s)	11.3		17.9		52.8	

Intersection Summary

Area Type: Other

Lanes and Geometrics
 76: Kalamazoo (I-94BL/M-43) & Michigan Ave





























Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%		0%	
Storage Length (ft)	215	215	0		0	
Storage Lanes	1	0	1		1	
Taper Length (ft)	25				25	
Right Turn on Red	Yes		Yes			
Link Speed (mph)	30		35		35	
Link Distance (ft)	915		366		785	
Travel Time (s)	20.8		7.1		15.3	

Intersection Summary

Area Type: Other

Lanes and Geometrics
 77: Kalamazoo (I-94BL/M-43) & Gull Rd (Ped Push Button)/M-43

Kalamazoo PEL Study
 Buildout PM Peak























												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	300		0	0		250	0		175	300		0
Storage Lanes	1		0	1		2	0		1	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			40			35			35	
Link Distance (ft)		781			2530			1029			804	
Travel Time (s)		17.8			43.1			20.0			15.7	

Intersection Summary

Area Type: Other

Lanes and Geometrics
79: Bixby Rd/Shaffer Rd & M-43

Kalamazoo PEL Study
Buildout PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	300		0	300		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		998			991			982			670	
Travel Time (s)		17.0			16.9			26.8			18.3	

Intersection Summary

Area Type: Other

Lanes and Geometrics
86: Dummy Drive F & M-43



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↓			↑↓							
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		40			40			25				25
Link Distance (ft)		2530			998			442				592
Travel Time (s)		43.1			17.0			12.1				16.1
Intersection Summary												
Area Type:	Other											



















Lanes and Geometrics
 87: Kalamazoo (I-94BL/M-43) & Dummy Drive G

Kalamazoo PEL Study
 Buildout PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								↑↑			↑↑	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		25			25			35				35
Link Distance (ft)		374			438			785				1029
Travel Time (s)		10.2			11.9			15.3				20.0
Intersection Summary												
Area Type:	Other											

Lanes and Geometrics
1001: Michigan & Lovell

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			35			30	
Link Distance (ft)		416			350			326			574	
Travel Time (s)		9.5			8.0			6.4			13.0	
Intersection Summary												
Area Type:	Other											





























Lane Group	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR
Lane Configurations	↖ ↗			↑	↖ ↗		↑			
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			0%		0%	
Storage Length (ft)	0	0	100		0	0		0	0	0
Storage Lanes	2	0	0		2	0		0	0	0
Taper Length (ft)	25		100			25		25		
Right Turn on Red	Yes				Yes	Yes		Yes		
Link Speed (mph)	30			35			30		35	
Link Distance (ft)	278			527			206		395	
Travel Time (s)	6.3			10.3			4.7		7.7	

Intersection Summary

Area Type: Other

Lanes and Geometrics
 1004: Howard St & Crosstown Pkwy

Kalamazoo PEL Study
 Buildout PM Peak




















												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	375		300	475		250	300		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		3314			3488			2517			148	
Travel Time (s)		75.3			79.3			57.2			3.4	

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 1007: Westnedge (M-331) & Lovell

Kalamazoo PEL Study
 Buildout PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											 	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	100		0	75		0	75		0
Storage Lanes	0		1	1		0	0		0	0		1
Taper Length (ft)	75			50			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1986			673			797			363	
Travel Time (s)		54.2			18.4			18.1			8.3	

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 1009: Westnedge (M-331) & South

Kalamazoo PEL Study
 Buildout PM Peak


















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↻			↻						↻↻↻	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	75		0	75		0	75		0	75		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	75			75			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1637			668			363			271	
Travel Time (s)		44.6			18.2			8.3			6.2	

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 1010: I-94 BL (Stadium) & Michigan - Push Buttons

						
Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		 	 		  	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	300			300	0	0
Storage Lanes	1			1	2	0
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		40	40		25	
Link Distance (ft)		1200	1175		100	
Travel Time (s)		20.5	20.0		2.7	

Intersection Summary

Area Type: Other

Lanes and Geometrics
 1012: I-94 BL (Stadium) & Oliver - Push Buttons

Kalamazoo PEL Study
 Buildout PM Peak


























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	13	12	12	12	12	12	10	12	14	12	12	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	150		0	555		116	0		91
Storage Lanes	1		0	1		0	1		1	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40				40
Link Distance (ft)		137			812			3488				1200
Travel Time (s)		3.7			22.1			59.5				20.5

Intersection Summary

Area Type: Other

Lanes and Geometrics
 1013: Rambling PB Xing S. Leg/Rambling & I-94 BL (Stadium)

Kalamazoo PEL Study
 Buildout PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	11	12	12	10	12	10	11	12	12	12	16	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	500		0	175		175	190		0	0		0
Storage Lanes	1		0	1		0	1		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		2757			3314			578			278	
Travel Time (s)		47.0			56.5			15.8			7.6	

Intersection Summary

Area Type: Other

Lanes and Geometrics
 1102: Kalamazoo (I-94BL/M-43) & Mills St






















Lane Group	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	200	
Storage Lanes	0	2		0	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		35			35
Link Distance (ft)	683		921			366
Travel Time (s)	15.5		17.9			7.1

Intersection Summary

Area Type: Other

Lanes and Geometrics
1107: Park (M-331) & Lovell

Kalamazoo PEL Study
Buildout PM Peak




















												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								  				
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	75		100	75		0	75		0
Storage Lanes	1		0	0		0	1		0	0		0
Taper Length (ft)	75			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30				30
Link Distance (ft)		673			690			805				380
Travel Time (s)		18.4			18.8			18.3				8.6

Intersection Summary

Area Type: CBD

Lanes and Geometrics
1108: Park (M-331) & Vine

Kalamazoo PEL Study
Buildout PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								  				
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	100		0	100		0	100		0
Storage Lanes	1		0	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30				30
Link Distance (ft)		571			400			2695				901
Travel Time (s)		15.6			10.9			61.3				20.5

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 1109: Park (M-331) & South

Kalamazoo PEL Study
 Buildout PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕↕↕				
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	78		0	75		0	75		0	75		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		668			724			380			337	
Travel Time (s)		18.2			19.7			8.6			7.7	

Intersection Summary

Area Type: CBD



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	250			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	35	
Link Distance (ft)	350			1227	527	
Travel Time (s)	8.0			27.9	10.3	

Intersection Summary

Area Type: CBD

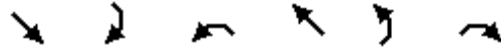
Lanes and Geometrics
 1904: Howard St/Howard-Push Buttons & RR

	↑	↗	↘	↓	↙	↖
Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑↑			↑↑↑		
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	230		0	0
Storage Lanes		0	1		0	0
Taper Length (ft)			25		25	
Right Turn on Red		Yes				Yes
Link Speed (mph)	35			35	30	
Link Distance (ft)	148			805	110	
Travel Time (s)	2.9			15.7	2.5	

Intersection Summary

Area Type: Other

Lanes and Geometrics
 1910: RR & Michigan - Push Buttons



Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	↑↑			↑		
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		0	0		0	0
Taper Length (ft)			25		25	
Right Turn on Red		Yes				Yes
Link Speed (mph)	25			25	25	
Link Distance (ft)	465			100	133	
Travel Time (s)	12.7			2.7	3.6	

Intersection Summary

Area Type: Other



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑		
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		0	0		0	0
Taper Length (ft)			25		25	
Right Turn on Red		Yes			Yes	
Link Speed (mph)	25			25	25	
Link Distance (ft)	293			137	138	
Travel Time (s)	8.0			3.7	3.8	

Intersection Summary

Area Type: Other

Lanes and Geometrics
 2001: Westnedge (US-131BR) & Kalamazoo (I-94BL/M-43)

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 Buildout PM Peak























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↶		↷	↶			↶			↶↷↶	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		100	0		0	100		100	100		100
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	100			25			25			100		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		2582			639			612			598	
Travel Time (s)		50.3			12.4			13.9			13.6	

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 2002: Park (US-131BR) & Kalamazoo (I-94BL/M-43)

Kalamazoo PEL Study
 Buildout PM Peak




















												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 		 	 				
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%				0%
Storage Length (ft)	150		0	100		0	0		0	75		75
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (ft)	25			25			75			75		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30				30
Link Distance (ft)		639			346			675				865
Travel Time (s)		12.4			6.7			15.3				19.7

Intersection Summary

Area Type: CBD

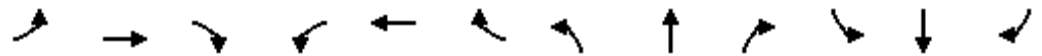
Lanes and Geometrics
 2003: Michigan (US-131BR/I-94BL/M-43) & Westnedge (M-331/US-131BR)

Kalamazoo PEL Study
 Buildout PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		125	50		100	75		0	0		0
Storage Lanes	0		1	1		0	0		0	1		0
Taper Length (ft)	100			50			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1095			650			349			439	
Travel Time (s)		24.9			14.8			7.9			10.0	

Intersection Summary

Area Type: CBD





















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		100	100		50	75		0	75		75
Storage Lanes	1		0	0		1	1		0	0		0
Taper Length (ft)	50			100			100			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30				30
Link Distance (ft)		650			371			276				390
Travel Time (s)		14.8			8.4			6.3				8.9

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 2005: Park (US-131BR) & North

Kalamazoo PEL Study
 Buildout PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	75		0	75		0	75		0	75		0
Storage Lanes	1		0	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		623			400			360			1109	
Travel Time (s)		17.0			10.9			8.2			25.2	

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 2006: Westnedge (US-131BR) & North

Kalamazoo PEL Study
 Buildout PM Peak





















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	75		0	75		0	75		0	75		0
Storage Lanes	0		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		409			623			585			2118	
Travel Time (s)		11.2			17.0			13.3			48.1	

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 2007: Park (US-131BR) & Paterson

Kalamazoo PEL Study
 Buildout PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	75		0	75		0	75		0	75		0
Storage Lanes	1		0	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30				35
Link Distance (ft)		649			400			944				580
Travel Time (s)		17.7			10.9			21.5				11.3

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 2009: Westnedge (US-131BR) & Paterson

Kalamazoo PEL Study
 Buildout PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	75		0	75		0	75		0	75		0
Storage Lanes	0		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		400			649			2118			1988	
Travel Time (s)		10.9			17.7			48.1			45.2	

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 3002: Rose & Michigan (US-131BR/I-94BL/M-43)

Kalamazoo PEL Study
 Buildout PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	50		0	50		0	50		0	50		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		377			385			345			668	
Travel Time (s)		8.6			8.8			9.4			18.2	

Intersection Summary

Area Type: CBD



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%		0%	
Storage Length (ft)		0	50		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			50		25	
Right Turn on Red		No			Yes	
Link Speed (mph)	30		30		25	
Link Distance (ft)	385		351		690	
Travel Time (s)	8.8		8.0		18.8	

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 3005: Edwards & Michigan (US-131BR/I-94BL/M-43)

Kalamazoo PEL Study
 Buildout PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	75		0	100		0	50		0	50		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			100			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		506			408			423			656	
Travel Time (s)		11.5			9.3			11.5			17.9	

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 3006: Pitcher & Michigan (US-131BR/I-94BL/M-43)

Kalamazoo PEL Study
 Buildout PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	75		0	100		0	100		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30				25
Link Distance (ft)		408			801			468				400
Travel Time (s)		9.3			18.2			10.6				10.9

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 3012: Burdick & Kalamazoo (I-94BL/M-43)

Kalamazoo PEL Study
 Buildout PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕			↕	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	100		0	100		100	100		100
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			100			100		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		405			457			300			483	
Travel Time (s)		7.9			8.9			8.2			13.2	

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 3013: Rose & Kalamazoo (I-94BL/M-43)

Kalamazoo PEL Study
 Buildout PM Peak



















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕			↕↕	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	100		0	100		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		312			405			372			499	
Travel Time (s)		6.1			7.9			10.1			13.6	

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 3014: Edwards & Kalamazoo (I-94BL/M-43)

Kalamazoo PEL Study
 Buildout PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%				0%
Storage Length (ft)	100		0	100		0	166		0	0		0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25				25
Link Distance (ft)		457			512			287				432
Travel Time (s)		8.9			10.0			7.8				11.8

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 3015: Pitcher & Kalamazoo (I-94BL/M-43)

Kalamazoo PEL Study
 Buildout PM Peak





















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕		↗	↘			↕↕	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	100		0	0		0	150		0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			No			Yes			No
Link Speed (mph)		35			35			30				25
Link Distance (ft)		512			919			232				408
Travel Time (s)		10.0			17.9			5.3				11.1

Intersection Summary

Area Type: CBD

Lanes and Geometrics
 4002: Stadium & Michigan (US-131BR/I-94BL/M-43)

Kalamazoo PEL Study
 Buildout PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		150	100		150	0		0	0		0
Storage Lanes	0		0	1		0	0		1	0		0
Taper Length (ft)	25			50			100			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			35			30	
Link Distance (ft)		1478			1095			392			281	
Travel Time (s)		33.6			24.9			7.6			6.4	

Intersection Summary
 Area Type: CBD



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		0	1		0	0
Taper Length (ft)			25		25	
Link Speed (mph)	30			30	30	
Link Distance (ft)	415			212	206	
Travel Time (s)	9.4			4.8	4.7	

Intersection Summary	
Area Type:	Other



Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations				↑↑		↑↑
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	0	0		2	0	
Taper Length (ft)	25				25	
Link Speed (mph)	30		30			30
Link Distance (ft)	278		574			415
Travel Time (s)	6.3		13.0			9.4

Intersection Summary

Area Type:	Other
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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	100			100
Storage Lanes	0	1	0			0
Taper Length (ft)	25		50			
Link Speed (mph)	25			30	30	
Link Distance (ft)	431			922	797	
Travel Time (s)	11.8			21.0	18.1	

Intersection Summary


















Area Type:	CBD
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Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕	↖		
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	0	1		1	0	
Taper Length (ft)	25				25	
Link Speed (mph)	25		30			30
Link Distance (ft)	396		901			805
Travel Time (s)	10.8		20.5			18.3

Intersection Summary

Area Type:	CBD
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	150		0	0		0	0		0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		539			1967			360			960	
Travel Time (s)		14.7			53.6			8.2			21.8	

Intersection Summary

Area Type: Other



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		100	0	
Storage Lanes	0	1		0	0	
Taper Length (ft)	25				25	
Link Speed (mph)	25		30			30
Link Distance (ft)	214		337			276
Travel Time (s)	5.8		7.7			6.3
Intersection Summary						
Area Type:	CBD					



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		100	0	
Storage Lanes	0	1		0	0	
Taper Length (ft)	25				25	
Link Speed (mph)	25		30			30
Link Distance (ft)	271		390			675
Travel Time (s)	7.4		8.9			15.3
Intersection Summary						
Area Type:	CBD					



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	75			100
Storage Lanes	0	1	0			0
Taper Length (ft)	25		25			
Link Speed (mph)	25			30	30	
Link Distance (ft)	279			598	585	
Travel Time (s)	7.6			13.6	13.3	
Intersection Summary						
Area Type:	CBD					



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		100	0	
Storage Lanes	0	1		0	0	
Taper Length (ft)	25				25	
Link Speed (mph)	25		30			30
Link Distance (ft)	320		865			360
Travel Time (s)	8.7		19.7			8.2
Intersection Summary						
Area Type:	CBD					



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		100	0	
Storage Lanes	0	1		0	0	
Taper Length (ft)	25				25	
Link Speed (mph)	25		30			30
Link Distance (ft)	408		1109			944
Travel Time (s)	11.1		25.2			21.5
Intersection Summary						
Area Type:	CBD					



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%		0%	
Storage Length (ft)	100	0		100	75	
Storage Lanes	1	1		1	1	
Taper Length (ft)	50				50	
Right Turn on Red	Yes		Yes			
Link Speed (mph)	35		30		30	
Link Distance (ft)	2582		745		618	
Travel Time (s)	50.3		16.9		14.0	

Intersection Summary

Area Type: Other























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%				0%
Storage Length (ft)	50		100	50		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	50			50			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			25				30
Link Distance (ft)		371			377			273				186
Travel Time (s)		8.4			8.6			7.4				4.2

Intersection Summary

Area Type: CBD



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↗		↗
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			100	0	0
Storage Lanes	0			1	0	1
Taper Length (ft)	25				25	
Link Speed (mph)		35	35		25	
Link Distance (ft)		346	312		316	
Travel Time (s)		6.7	6.1		8.6	
Intersection Summary						
Area Type:	CBD					



















												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%				0%
Storage Length (ft)	75		0	75		0	100		0	100		0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (ft)	75			75			75			75		
Right Turn on Red			Yes			No			Yes			Yes
Link Speed (mph)		25			25			30				25
Link Distance (ft)		724			394			399				320
Travel Time (s)		19.7			10.7			9.1				8.7

Intersection Summary

Area Type: Other

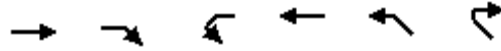
Lanes and Geometrics
9072: South & Portage

Kalamazoo PEL Study
Buildout PM Peak

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	50			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			30			30			30	
Link Distance (ft)		573			967			425			386	
Travel Time (s)		15.6			22.0			9.7			8.8	

Intersection Summary

Area Type: Other



Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%		0%	
Storage Length (ft)		150	150		0	100
Storage Lanes		0	0		1	1
Taper Length (ft)			25		25	
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	25	
Link Distance (ft)	351			506	573	
Travel Time (s)	8.0			11.5	15.6	

Intersection Summary

Area Type: CBD



Lane Group	WBL	WBR	SBL	SBR	NEL	NER
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%		0%	
Storage Length (ft)	0	0	0	0	0	0
Storage Lanes	1	0	1	0	0	1
Taper Length (ft)	25		25		25	
Link Speed (mph)	30		25		30	
Link Distance (ft)	386		423		386	
Travel Time (s)	8.8		11.5		8.8	
Intersection Summary						
Area Type:	Other					



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	30	
Link Distance (ft)	386			960	468	
Travel Time (s)	8.8			21.8	10.6	

Intersection Summary

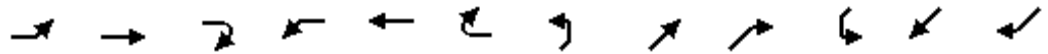
Area Type: Other



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑		↗
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	125		450	200
Storage Lanes		0	1		0	0
Taper Length (ft)			150		25	
Link Speed (mph)	35			35	30	
Link Distance (ft)	919			457	187	
Travel Time (s)	17.9			8.9	4.3	
Intersection Summary						
Area Type:	CBD					

Lanes and Geometrics
 9082: Michigan/Stadium & Academy (Dummy)

Kalamazoo PEL Study
 Buildout PM Peak



















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		30			25			35			35	
Link Distance (ft)		431			1065			124			392	
Travel Time (s)		9.8			29.0			2.4			7.6	

Intersection Summary

Area Type:	Other
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Lanes and Geometrics
9901:

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		618			638			1416			1794	
Travel Time (s)		14.0			14.5			32.2			40.8	
Intersection Summary												
Area Type:	Other											

Lanes and Geometrics
 9902: Westnedge (US-131BR)

Kalamazoo PEL Study
 Buildout PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		399			618			1988			448	
Travel Time (s)		9.1			14.0			45.2			10.2	

Intersection Summary



















Area Type:	Other
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Lane Group	EBL	EBR	NEL	NET	SWT	SWR
Lane Configurations				↑↑		↑↑↑
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	0	0	0			3
Taper Length (ft)	25		25			
Link Speed (mph)	30			35	35	
Link Distance (ft)	212			395	124	
Travel Time (s)	4.8			7.7	2.4	
Intersection Summary						
Area Type:	Other					

Lanes and Geometrics
 9904: Crosstown Pkwy & Park (M-331)

Kalamazoo PEL Study
 Buildout PM Peak

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		150
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		218			2695			352			761	
Travel Time (s)		5.0			61.3			8.0			17.3	

Intersection Summary

Area Type: Other

Lanes and Geometrics
 9905: Park (M-331) & Balch St

Kalamazoo PEL Study
 Buildout PM Peak






















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	1		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30				30
Link Distance (ft)		264			670			802				218
Travel Time (s)		6.0			15.2			18.2				5.0

Intersection Summary

Area Type: Other

Lanes and Geometrics
 9906: Westnedge (M-331) & Crosstown Pkwy

Kalamazoo PEL Study
 Buildout PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											  	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	150		0	0		0	0		150
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		513			379			688			2929	
Travel Time (s)		11.7			8.6			15.6			66.6	

Intersection Summary

Area Type: Other

Lanes and Geometrics
 9907: Westnedge (M-331) & Howard St

Kalamazoo PEL Study
 Buildout PM Peak




























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↗		↖						↖	↗
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		683			477			1083			688	
Travel Time (s)		15.5			10.8			24.6			15.6	

Intersection Summary

Area Type: Other

















Lanes and Geometrics
 9908: Crosstown Pkwy & Howard St

Kalamazoo PEL Study
 Buildout PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	250		0	75		0	150		250	200		200
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		860			683			1008			532	
Travel Time (s)		19.5			15.5			22.9			12.1	

Intersection Summary

Area Type: Other

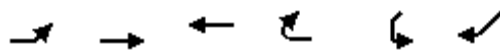
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					 							
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1584			886			122			697	
Travel Time (s)		36.0			20.1			2.8			15.8	
Intersection Summary												
Area Type:	Other											



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↑	↗		↕↕↕				
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%				0%
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		30			30			30				30
Link Distance (ft)		477			350			522				802
Travel Time (s)		10.8			8.0			11.9				18.2

Intersection Summary

Area Type:	Other
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Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	1			0	0	1
Taper Length (ft)	25				25	
Link Speed (mph)		30	30		30	
Link Distance (ft)		379	264		352	
Travel Time (s)		8.6	6.0		8.0	

Intersection Summary

Area Type:	Other
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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↓	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			0	1	0
Taper Length (ft)	25				25	
Link Speed (mph)		30	30		30	
Link Distance (ft)		1628	772		122	
Travel Time (s)		37.0	17.5		2.8	
Intersection Summary						
Area Type:	Other					

Intersection Delay (sec/veh) and LOS

Intersections	2040 No Build		2040 Build (Roundabout)	
	Delay	LOS	Delay	LOS
Lovell St & Oakland Dr	144.0	F	NA	NA
Lovell St & Michigan Ave	10.2	B	NA	NA
South St & Oakland Dr & Michigan Ave	12.3	B	NA	NA
Overall	34.7	C	9.9	A

Intersection Approach Delay (sec/veh) and LOS

Intersection Approach	2040 No Build		2040 Build (Roundabout)	
	Delay	LOS	Delay	LOS
Lovell St & Oakland Dr Northbound	96.7	F	13.3	B
Lovell St & Oakland Dr Westbound	275.2	F	16.8	C
Lovell St & Michigan Ave Northbound	4.2	A	12.1	B
South St & Oakland Dr & Michigan Ave Southbound	3.5	A	0.2	A

Average and Maximum Queues (feet)

Intersections	2040 No Build		2040 Build (Roundabout)	
	Avg Queue	Max Queue	Avg Queue	Max Queue
Lovell St & Oakland Dr Northbound	262	644	32	295
Lovell St & Oakland Dr Westbound	590	627	37	356
Lovell St & Michigan Ave Northbound	12	176	18	406
South St & Oakland Dr & Michigan Ave Southbound	16	190	0	0

Emissions (grams)

Intersections	2040 No Build		2040 Build (Roundabout)		Delta	
	CO	NOx	CO	NOx	CO	NOx
Lovell St & Oakland Dr	3,950	769	NA	NA		
Lovell St & Michigan Ave	1,279	249	NA	NA		
South St & Oakland Dr & Michigan Ave	1,698	330	NA	NA		
Overall	6,927	1,348	2,849	554	59%	59%

nitrogen oxides (NOx) and carbon monoxide (CO)

NA: Not Applicable

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Appendix C

Safety Analysis

Kalamazoo Downtown Streets Phase 2

Date: November 5, 2021
 Agency: CDM Smith
 Analyst: Michelle St. Onge + Ganapathi Badireddi
 Description: 0

Control Section(s): 0
 PR Number(s): 0
 Job Number(s): 261991

Empirical Bayes Analysis (Site-Specific)								
Predicted average crash frequency (crashes/year)						Observed Crashes (crashes/year)		
	N _{predicted} (TOTAL)	N _{predicted} (FI)	N _{predicted} (PDO)	N _{predicted} (ped)	N _{predicted} (bike)	N _{observed} (TOTAL)	N _{observed} (segment)	N _{observed} (intersection)
Rural 2-Lane	--	--	--	--	--	--	--	--
Rural Multilane	--	--	--	--	--	--	--	--
Urban/Suburban	26.123	4.466	21.657	0.380	0.449	158	--	158
Total	26.123	4.466	21.657	0.380	0.449	158	--	158

Expected Crashes (crashes/year)								
	N _{expected} (TOTAL)	N _{expected} (FI)	N _{expected} (PDO)	N _{expected} (vehicle)	N _{expected} (ped)	N _{expected} (bike)	N _{expected} (segment)	N _{expected} (intersection)
Rural 2-Lane	--	--	--	--	--	--	--	--
Rural Multilane	--	--	--	--	--	--	--	--
Urban/Suburban	27.0	5.3	21.7	26.1	0.4	0.4	--	27.0
Total	27.0	5.3	21.7	26.1	0.4	0.4	--	27.0

Highest Expected Average Crashes (crashes/year)							Expected
Rank							
1.	(INT) Michigan Ave_Ex @ Main St_Ex		Kalamazoo, MI		Control = 4SG	Major AADT: 16,100 / Minor AADT: 15,300	21.20
2.	(INT) Michigan Ave @ Main St		Kalamazoo, MI		Control = 3SG	Major AADT: 17,400 / Minor AADT: 16,400	15.41
3.	(INT) Oakland +Michigan_Ex @ Lovell_Ex		Kalamazoo, MI		Control = 3SG	Major AADT: 21,800 / Minor AADT: 5,000	12.53
4.	(INT) Kalamazoo Ave_Ex @ Michigan Ave_Ex		Kalamazoo, MI		Control = 4ST	Major AADT: 33,500 / Minor AADT: 5,900	9.12
5.	(INT) Kalamazoo Ave @ Michigan Ave		Kalamazoo, MI		Control = 3ST	Major AADT: 34,000 / Minor AADT: 9,300	9.00
6.	(INT) Oakland +Michigan @ Lovell		Kalamazoo, MI		Control = 4ST	Major AADT: 23,400 / Minor AADT: 7,900	7.35
7.	(INT) Stadium Drive_Ex @ W South St_Ex		Kalamazoo, MI		Control = 3SG	Major AADT: 29,650 / Minor AADT: 2,300	4.94
8.	(INT) Stadium Drive_Ex @ Academy Dr_Ex		Kalamazoo, MI		Control = 4ST	Major AADT: 25,800 / Minor AADT: 1,250	4.40
9.	(INT) Stadium Drive @ W South St		Kalamazoo, MI		Control = 3ST	Major AADT: 25,300 / Minor AADT: 3,200	2.98
10.	(INT) Stadium Drive @ Academy Dr		Kalamazoo, MI		Control = 3ST	Major AADT: 8,300 / Minor AADT: 625	1.23

Highest Excess Expected Crashes (crashes/year)							Excess
Rank							
1.	(INT) Michigan Ave @ Main St		Kalamazoo, MI		Control = 3SG	Major AADT: 17,400 / Minor AADT: 16,400	15.19
2.	(INT) Oakland +Michigan @ Lovell		Kalamazoo, MI		Control = 4ST	Major AADT: 23,400 / Minor AADT: 7,900	10.45
3.	(INT) Michigan Ave_Ex @ Main St_Ex		Kalamazoo, MI		Control = 4SG	Major AADT: 16,100 / Minor AADT: 15,300	9.40
4.	(INT) Stadium Drive_Ex @ Academy Dr_Ex		Kalamazoo, MI		Control = 4ST	Major AADT: 25,800 / Minor AADT: 1,250	7.20
5.	(INT) Oakland +Michigan_Ex @ Lovell_Ex		Kalamazoo, MI		Control = 3SG	Major AADT: 21,800 / Minor AADT: 5,000	5.27
6.	(INT) Stadium Drive @ Academy Dr		Kalamazoo, MI		Control = 3ST	Major AADT: 8,300 / Minor AADT: 625	4.77
7.	(INT) Stadium Drive @ Academy Dr		Kalamazoo, MI		Control = 3ST	Major AADT: 8,300 / Minor AADT: 625	4.38
8.	(INT) Kalamazoo Ave @ Michigan Ave		Kalamazoo, MI		Control = 3ST	Major AADT: 34,000 / Minor AADT: 9,300	4.00
9.	(INT) Kalamazoo Ave_Ex @ Michigan Ave_Ex		Kalamazoo, MI		Control = 4ST	Major AADT: 33,500 / Minor AADT: 5,900	3.88
10.	(INT) Stadium Drive @ W South St		Kalamazoo, MI		Control = 3ST	Major AADT: 25,300 / Minor AADT: 3,200	3.02

Rank	Highest Predicted Total Crashes (crashes/year)				Predicted
1.	(INT) Michigan Ave_Ex @ Main St_Ex	Kalamazoo, MI	Control = 4SG	Major AADT: 16,100 / Minor AADT: 15,300	8.02
2.	(INT) Stadium Drive_Ex @ W South St_Ex	Kalamazoo, MI	Control = 3SG	Major AADT: 29,650 / Minor AADT: 2,300	3.65
3.	(INT) Oakland +Michigan_Ex @ Lovell_Ex	Kalamazoo, MI	Control = 3SG	Major AADT: 21,800 / Minor AADT: 5,000	3.58
4.	(INT) Kalamazoo Ave_Ex @ Michigan Ave_Ex	Kalamazoo, MI	Control = 4ST	Major AADT: 33,500 / Minor AADT: 5,900	3.14
5.	(INT) Michigan Ave @ Main St	Kalamazoo, MI	Control = 3SG	Major AADT: 17,400 / Minor AADT: 16,400	2.94
6.	(INT) Kalamazoo Ave @ Michigan Ave	Kalamazoo, MI	Control = 3ST	Major AADT: 34,000 / Minor AADT: 9,300	2.43
7.	(INT) Stadium Drive_Ex @ Academy Dr_Ex	Kalamazoo, MI	Control = 4ST	Major AADT: 25,800 / Minor AADT: 1,250	1.21
8.	(INT) Oakland +Michigan @ Lovell	Kalamazoo, MI	Control = 4ST	Major AADT: 23,400 / Minor AADT: 7,900	1.21
9.	(INT) Stadium Drive @ W South St	Kalamazoo, MI	Control = 3ST	Major AADT: 25,300 / Minor AADT: 3,200	0.52
10.	(INT) Stadium Drive @ Academy Dr	Kalamazoo, MI	Control = 3ST	Major AADT: 8,300 / Minor AADT: 625	0.12

Rank	Highest Predicted Fatal & Injury Crashes (crashes/year)				Predicted
1.	(INT) Michigan Ave_Ex @ Main St_Ex	Kalamazoo, MI	Control = 4SG	Major AADT: 16,100 / Minor AADT: 15,300	1.48
2.	(INT) Stadium Drive_Ex @ W South St_Ex	Kalamazoo, MI	Control = 3SG	Major AADT: 29,650 / Minor AADT: 2,300	0.63
3.	(INT) Oakland +Michigan_Ex @ Lovell_Ex	Kalamazoo, MI	Control = 3SG	Major AADT: 21,800 / Minor AADT: 5,000	0.61
4.	(INT) Kalamazoo Ave_Ex @ Michigan Ave_Ex	Kalamazoo, MI	Control = 4ST	Major AADT: 33,500 / Minor AADT: 5,900	0.61
5.	(INT) Kalamazoo Ave @ Michigan Ave	Kalamazoo, MI	Control = 3ST	Major AADT: 34,000 / Minor AADT: 9,300	0.60
6.	(INT) Michigan Ave @ Main St	Kalamazoo, MI	Control = 3SG	Major AADT: 17,400 / Minor AADT: 16,400	0.57
7.	(INT) Stadium Drive_Ex @ Academy Dr_Ex	Kalamazoo, MI	Control = 4ST	Major AADT: 25,800 / Minor AADT: 1,250	0.32
8.	(INT) Oakland +Michigan @ Lovell	Kalamazoo, MI	Control = 4ST	Major AADT: 23,400 / Minor AADT: 7,900	0.26
9.	(INT) Stadium Drive @ W South St	Kalamazoo, MI	Control = 3ST	Major AADT: 25,300 / Minor AADT: 3,200	0.06
10.	(INT) Stadium Drive @ Academy Dr	Kalamazoo, MI	Control = 3ST	Major AADT: 8,300 / Minor AADT: 625	0.01

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Appendix D

Cost Estimates

Item	Douglas	Kalamazoo Alt 1	Kalamazoo Alt 2	Kalamazoo Alt 3	Lovell	Main	Michigan Alt 1	Michigan Alt 2	Michigan Alt 3	Michikal	South	Stadium
Earthwork	\$ 69,637	\$ 243,707	\$ 8,212	\$ 194,312	\$ 4,007	\$ 16,220	\$ 273,030	\$ 273,030	\$ 273,030	\$ 177,648	\$ -	\$ 371,800
Bases	\$ 38,326	\$ 100,512	\$ 109	\$ 110,403	\$ 2,125	\$ 9,298	\$ 293,271	\$ 293,271	\$ 293,271	\$ 3,269	\$ -	\$ 23,902
Drainage Features	\$ 28,200	\$ 12,600	\$ 12,600	\$ 12,600	\$ 108,000	\$ 50,400	\$ 79,200	\$ 79,200	\$ 79,200	\$ -	\$ 60,000	\$ 16,800
HMA Pavements & Surface Treatments	\$ 200,359	\$ 285,512	\$ 255,849	\$ 339,026	\$ 332,455	\$ 119,097	\$ 713,337	\$ 713,337	\$ 713,337	\$ 5,483	\$ 217,393	\$ 494,730
PCC Pavements	\$ -	\$ 169,422	\$ 591	\$ 35,107	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Structures	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Incidental Construction	\$ 53,384	\$ 308,250	\$ 7,575	\$ 359,875	\$ 9,275	\$ 50,406	\$ 366,360	\$ 366,360	\$ 366,360	\$ 10,168	\$ -	\$ 460,810
SUB-TOTAL	\$ 389,910	\$ 1,120,010	\$ 284,940	\$ 1,051,330	\$ 455,870	\$ 245,430	\$ 1,725,200	\$ 1,725,200	\$ 1,725,200	\$ 196,570	\$ 277,400	\$ 1,368,050
Signing & Pvmnt Mrkgs	\$ 40,729	\$ 55,405	\$ 55,585	\$ 64,566	\$ 119,984	\$ 22,126	\$ 189,836	\$ 288,900	\$ 140,305	\$ 5,000	\$ 73,328	\$ 32,217
Signals	\$ 256,734	\$ 1,535,171	\$ 1,535,171	\$ 1,535,171	\$ 1,535,171	\$ 256,734	\$ 1,754,481	\$ 1,754,481	\$ 1,754,481	\$ -	\$ 1,096,551	\$ 216,921
Lighting	\$ 31,911	\$ 351,021	\$ -	\$ 351,021		\$ 42,548	\$ 659,494	\$ 659,494	\$ 659,494	\$ 8,160		\$ 319,110
SW Ramps	\$ 55,283	\$ 152,139	\$ 6,143	\$ 92,139	\$ 122,852	\$ 39,927	\$ 104,424	\$ 104,424	\$ 104,424		\$ 190,626	\$ 107,495
Bump Outs											\$ 123,057	
Amenities	\$ 1,177,900	\$ 1,179,600	\$ 1,872,789	\$ 1,726,074	\$ 2,345,454		\$ 4,404,210	\$ 4,404,210	\$ 4,404,210		\$ 1,239,720	\$ 469,515
Maintenance of Traffic (10%)	\$ 271,155	\$ 564,665	\$ 502,276	\$ 607,292	\$ 655,564	\$ 158,708	\$ 1,090,601	\$ 1,100,507	\$ 1,085,648	\$ 24,803	\$ 289,389	\$ 313,974
Erosion Control (1%)	\$ 3,899	\$ 11,200	\$ 2,849	\$ 10,513	\$ 45,587	\$ 2,454	\$ 17,252	\$ 17,252	\$ 17,252	\$ 1,966	\$ 2,774	\$ 13,681
Drainage (Full)	\$ 755,185	\$ 1,242,105	\$ 1,265,285	\$ 1,242,105	\$ 1,930,723	\$ 977,864	\$ 2,051,111	\$ 2,051,111	\$ 2,051,111		\$ 1,130,160	\$ 612,753
Drainage (Needed)	\$ 43,910	\$ 176,330	\$ 66,025	\$ 176,330	\$ 102,470	\$ 55,790	\$ 358,980	\$ 358,980	\$ 358,980	\$ 36,334	\$ 99,730	\$ 452,135
CONSTRUCTION SUB-TOTAL	\$ 2,982,710	\$ 6,211,320	\$ 5,525,040	\$ 6,680,220	\$ 7,211,210	\$ 1,745,800	\$ 11,996,610	\$ 12,105,580	\$ 11,942,130	\$ 272,840	\$ 4,423,010	\$ 3,453,720
Contingencies (20% of Construction Total)	\$ 894,813	\$ 1,863,396	\$ 1,657,512	\$ 2,004,066	\$ 2,163,363	\$ 523,740	\$ 3,598,983	\$ 3,631,674	\$ 3,582,639	\$ 81,852	\$ 1,326,903	\$ 1,036,116
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$ 116,326	\$ 242,241	\$ 215,477	\$ 260,529	\$ 281,237	\$ 68,086	\$ 467,868	\$ 472,118	\$ 465,743	\$ 10,641	\$ 172,497	\$ 134,695
Mobilization (10% of Construction Total, Contingencies and Staking)	\$ 399,385	\$ 831,696	\$ 739,803	\$ 894,481	\$ 965,581	\$ 233,763	\$ 1,606,346	\$ 1,620,937	\$ 1,599,051	\$ 36,533	\$ 592,241	\$ 462,453
CONSTRUCTION TOTAL	\$ 4,393,234	\$ 9,148,653	\$ 8,137,831	\$ 9,839,296	\$ 10,621,391	\$ 2,571,389	\$ 17,669,807	\$ 17,830,309	\$ 17,589,563	\$ 401,866	\$ 6,514,651	\$ 5,086,984
Preliminary Engineering (10% of Construction Total)	\$ 439,323	\$ 914,865	\$ 813,783	\$ 983,930	\$ 1,062,139	\$ 257,139	\$ 1,766,981	\$ 1,783,031	\$ 1,758,956	\$ 40,187	\$ 651,465	\$ 508,698
Construction Engineering (10% of Construction Total)	\$ 439,323	\$ 914,865	\$ 813,783	\$ 983,930	\$ 1,062,139	\$ 257,139	\$ 1,766,981	\$ 1,783,031	\$ 1,758,956	\$ 40,187	\$ 651,465	\$ 508,698
Right of Way (# Acres)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 10,000	\$ 10,000	\$ 10,000	\$ -	\$ -	\$ 50,000
Rail Road Modifications	\$ 175,000	\$ 350,000	\$ 350,000	\$ 350,000	\$ 175,000	\$ 175,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Utility Owner Relocations	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
PROJECT COST	\$ 5,446,890	\$ 11,328,390	\$ 10,115,400	\$ 12,157,160	\$ 12,920,670	\$ 3,260,670	\$ 21,213,770	\$ 21,406,380	\$ 21,117,480	\$ 482,240	\$ 7,817,590	\$ 6,154,390



Project: Kalamazoo Downtown Streets Ph 2
Street Name: Michigan Ave Alternative #1
Estimate by: MM Date: 11/2/2021
Checked by: DAT Date: 11/10/2021
Revised by: MM Date: 11/10/2021

Project Cost Estimate: Michigan Ave Alternative #1

<u>Item Section</u>	<u>Total:</u>
Earthwork	\$273,030
Bases	\$293,271
Drainage Features	\$79,200
HMA Pavements & Surface Treatments	\$713,337
Portland Cement Concrete Pavement	\$0
Structures	\$0
Incidental Construction	\$366,360
SUB-TOTAL:	\$1,725,200
<u>Miscellaneous</u>	
Signing & Pavement Markings	\$189,836
Signals	\$1,754,481
Lighting	\$659,494
SW Ramps	\$104,424
Amenities	\$4,404,210
Maintenance of Traffic (10%)	\$1,090,601
Erosion Control (1%)	\$17,252
Drainage (Full Replacement)	\$2,051,111
*Drainage (Needed Replacements)	\$358,980
CONSTRUCTION SUB-TOTAL:	\$11,996,610
Contingencies (30% of Construction Total)	\$3,598,983
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$467,868
Mobilization (10% of Construction Total, Contingencies and Staking)	\$1,606,346
CONSTRUCTION TOTAL:	\$17,669,807
Preliminary Engineering (10% of Construction Total)	\$1,766,981
Construction Engineering (10% of Construction Total)	\$1,766,981
Right of Way (# Acres)	\$10,000
Rail Road Modifications	\$0
Utility Owner Relocations	\$0
PROJECT COST	\$21,213,770

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

*Notes:

Total cost includes full replacement of drainage system

Needed drainage replacements include cost for drainage modifications based on two-way conversion



Project: Kalamazoo Downtown Streets Ph 2
Street Name: Michigan Ave Alternative #2
Estimate by: MM Date: 11/2/2021
Checked by: DAT Date: 11/10/2021
Revised by: MM Date: 11/10/2021

Project Cost Estimate: Michigan Ave Alternative #2

<u>Item Section</u>	<u>Total:</u>
Earthwork	\$273,030
Bases	\$293,271
Drainage Features	\$79,200
HMA Pavements & Surface Treatments	\$713,337
Portland Cement Concrete Pavement	\$0
Structures	\$0
Incidental Construction	\$366,360
SUB-TOTAL:	\$1,725,200
<u>Miscellaneous</u>	
Signing & Pavement Markings	\$288,900
Signals	\$1,754,481
Lighting	\$659,494
Sidewalk Ramps	\$104,424
Amenities	\$4,404,210
Maintenance of Traffic (10%)	\$1,100,507
Erosion Control (1%)	\$17,252
Drainage (Full Replacement)	\$2,051,111
*Drainage (Needed Replacements)	\$358,980
CONSTRUCTION SUB-TOTAL:	\$12,105,580
Contingencies (30% of Construction Total)	\$3,631,674
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$472,118
Mobilization (10% of Construction Total, Contingencies and Staking)	\$1,620,937
CONSTRUCTION TOTAL:	\$17,830,309
Preliminary Engineering (10% of Construction Total)	\$1,783,031
Construction Engineering (10% of Construction Total)	\$1,783,031
Right of Way (# Acres)	\$10,000
Rail Road Modifications	\$0
Utility Owner Relocations	\$0
PROJECT COST	\$21,406,380

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

*Notes:

Total cost includes full replacement of drainage system

Needed drainage replacements include cost for drainage modifications based on two-way conversion



Project: Kalamazoo Downtown Streets Ph 2
Street Name: Michigan Ave Alternative #3
Estimate by: MM Date: 11/2/2021
Checked by: DAT Date: 11/10/2021
Revised by: MM Date: 11/10/2021

Project Cost Estimate: Michigan Ave Alternative #3

<u>Item Section</u>	<u>Total:</u>
Earthwork	\$273,030
Bases	\$293,271
Drainage Features	\$79,200
HMA Pavements & Surface Treatments	\$713,337
Portland Cement Concrete Pavement	\$0
Structures	\$0
Incidental Construction	\$366,360
SUB-TOTAL:	\$1,725,200
<u>Miscellaneous</u>	
Signing & Pavement Markings	\$140,305
Signals	\$1,754,481
Lighting	\$659,494
Sidewalk Ramps	\$104,424
Amenities	\$4,404,210
Maintenance of Traffic (10%)	\$1,085,648
Erosion Control (1%)	\$17,252
Drainage (Full Replacement)	\$2,051,111
*Drainage (Needed Replacements)	\$358,980
CONSTRUCTION SUB-TOTAL:	\$11,942,130
Contingencies (30% of Construction Total)	\$3,582,639
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$465,743
Mobilization (10% of Construction Total, Contingencies and Staking)	\$1,599,051
CONSTRUCTION TOTAL:	\$17,589,563
Preliminary Engineering (10% of Construction Total)	\$1,758,956
Construction Engineering (10% of Construction Total)	\$1,758,956
Right of Way (# Acres)	\$10,000
Rail Road Modifications	\$0
Utility Owner Relocations	\$0
PROJECT COST	\$21,117,480

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

*Notes:

Total cost includes full replacement of drainage system

Needed drainage replacements include cost for drainage modifications based on two-way conversion



Project: Kalamazoo Downtown Streets Ph 2
Street Name: Kalamazoo Ave Alternative #1
Estimate by: MS Date: 9/10/2021
Checked by: JBH Date: 9/16/2021
Revised by: JBH Date: 9/21/2021

Project Cost Estimate: Kalamazoo Ave Alternative #1

<u>Item Section</u>	<u>Total:</u>
Earthwork	\$243,707
Bases	\$100,512
Drainage Features	\$12,600
HMA Pavements & Surface Treatments	\$285,512
Portland Cement Concrete Pavement	\$169,422
Structures	\$0
Incidental Construction	\$308,250
SUB-TOTAL:	\$1,120,010
<u>Miscellaneous</u>	
Signing & Pavement Markings	\$55,405
Signals	\$1,535,171
Lighting	\$351,021
SW Ramp	\$152,139
Amenities	\$1,179,600
Maintenance of Traffic (10%)	\$564,665
Erosion Control (1%)	\$11,200
Drainage (Full Replacement)	\$1,242,105
*Drainage (Needed Replacements)	\$176,330
CONSTRUCTION SUB-TOTAL:	\$6,211,320
Contingencies (30% of Construction Total)	\$1,863,396
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$242,241
Mobilization (10% of Construction Total, Contingencies and Staking)	\$831,696
CONSTRUCTION TOTAL:	\$9,148,653
Preliminary Engineering (10% of Construction Total)	\$914,865
Construction Engineering (10% of Construction Total)	\$914,865
Right of Way (# Acres)	\$0
Rail Road Modifications	\$350,000
Utility Owner Relocations	\$0
PROJECT COST	\$11,328,390

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

*Notes:

Total cost includes full replacement of drainage system

Needed drainage replacements include cost for drainage modifications based on two-way conversion



Project: Kalamazoo Downtown Streets Ph 2
Street Name: Kalamazoo Ave Alternative #2
Estimate by: DAT Date: 9/10/2021
Checked by: JBH Date: 9/16/2021
Revised by: JBH Date: 9/21/2021

Project Cost Estimate: Kalamazoo Ave Alternative #2

<u>Item Section</u>	<u>Total:</u>
Earthwork	\$8,212
Bases	\$109
Drainage Features	\$12,600
HMA Pavements & Surface Treatments	\$255,849
Portland Cement Concrete Pavement	\$591
Structures	\$0
Incidental Construction	\$7,575
SUB-TOTAL:	\$284,940
<u>Miscellaneous</u>	
Signing & Pavement Markings	\$55,585
Signals	\$1,535,171
Lighting	\$0
SW Ramp	\$6,143
Amenities	\$1,872,789
Maintenance of Traffic (10%)	\$502,276
Erosion Control (1%)	\$2,849
Drainage (Full Replacement)	\$1,265,285
*Drainage (Needed Replacements)	\$66,025
CONSTRUCTION SUB-TOTAL:	\$5,525,040
Contingencies (30% of Construction Total)	\$1,657,512
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$215,477
Mobilization (10% of Construction Total, Contingencies and Staking)	\$739,803
CONSTRUCTION TOTAL:	\$8,137,831
Preliminary Engineering (10% of Construction Total)	\$813,783
Construction Engineering (10% of Construction Total)	\$813,783
Right of Way (# Acres)	\$0
Rail Road Modifications	\$350,000
Utility Owner Relocations	\$0
PROJECT COST	\$10,115,400

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

*Notes:

Total cost includes full replacement of drainage system

Needed drainage replacements include cost for drainage modifications based on two-way conversion



Project: Kalamazoo Downtown Streets Ph 2
Street Name: Kalamazoo Ave Alternative #3
Estimate by: DAT Date: 9/10/2021
Checked by: JBH Date: 9/16/2021
Revised by: JBH Date: 9/21/2021

Project Cost Estimate: Kalamazoo Ave Alternative #3

<u>Item Section</u>	<u>Total:</u>
Earthwork	\$194,312
Bases	\$110,403
Drainage Features	\$12,600
HMA Pavements & Surface Treatments	\$339,026
Portland Cement Concrete Pavement	\$35,107
Structures	\$0
Incidental Construction	\$359,875
SUB-TOTAL:	\$1,051,330
<u>Miscellaneous</u>	
Signing & Pavement Markings	\$64,566
Signals	\$1,535,171
Lighting	\$351,021
SW Ramp	\$92,139
Amenities	\$1,726,074
Maintenance of Traffic (10%)	\$607,292
Erosion Control (1%)	\$10,513
Drainage (Full Replacement)	\$1,242,105
*Drainage (Needed Replacements)	\$176,330
CONSTRUCTION SUB-TOTAL:	\$6,680,220
Contingencies (30% of Construction Total)	\$2,004,066
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$260,529
Mobilization (10% of Construction Total, Contingencies and Staking)	\$894,481
CONSTRUCTION TOTAL:	\$9,839,296
Preliminary Engineering (10% of Construction Total)	\$983,930
Construction Engineering (10% of Construction Total)	\$983,930
Right of Way (# Acres)	\$0
Rail Road Modifications	\$350,000
Utility Owner Relocations	\$0
PROJECT COST	\$12,157,160

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

*Notes:

Total cost includes full replacement of drainage system

Needed drainage replacements include cost for drainage modifications based on two-way conversion



Project: Kalamazoo Downtown Streets Ph 2
Street Name: Stadium Dr
Estimate by: MM Date: 11/2/2021
Checked by: DAT Date: 11/10/2021
Revised by: MM Date: 11/10/2021

Project Cost Estimate: Stadium Dr

<u>Item Section</u>	<u>Total:</u>
Earthwork	\$371,800
Bases	\$23,902
Drainage Features	\$16,800
HMA Pavements & Surface Treatments	\$494,730
Portland Cement Concrete Pavement	\$0
Structures	\$0
Incidental Construction	\$460,810
SUB-TOTAL:	\$1,368,050
<u>Miscellaneous</u>	
Signing & Pavement Markings	\$32,217
Signals	\$216,921
Lighting	\$319,110
Sidewalk Ramps	\$107,495
Amenities	\$469,515
Maintenance of Traffic (10%)	\$313,974
Erosion Control (1%)	\$13,681
Drainage (Full Replacement)	\$612,753
*Drainage (Needed Replacements)	\$452,135
CONSTRUCTION SUB-TOTAL:	\$3,453,720
Contingencies (30% of Construction Total)	\$1,036,116
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$134,695
Mobilization (10% of Construction Total, Contingencies and Staking)	\$462,453
CONSTRUCTION TOTAL:	\$5,086,984
Preliminary Engineering (10% of Construction Total)	\$508,698
Construction Engineering (10% of Construction Total)	\$508,698
Right of Way (# Acres)	\$50,000
Rail Road Modifications	\$0
Utility Owner Relocations	\$0
PROJECT COST	\$6,154,390

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

*Notes:

Total cost includes full replacement of drainage system

Needed drainage replacements include cost for drainage modifications based on two-way conversion



Project: Kalamazoo Downtown Streets Ph 2
Street Name: Lovell
Estimate by: DAT Date: 9/17/2021
Checked by: MM Date: 11/10/2021
Revised by: DAT Date: 11/10/2021

Project Cost Estimate: Lovell

<u>Item Section</u>	<u>Total:</u>
Earthwork	\$4,007
Bases	\$2,125
Drainage Features	\$108,000
HMA Pavements & Surface Treatments	\$332,455
Portland Cement Concrete Pavement	\$0
Structures	\$0
Incidental Construction	\$9,275
SUB-TOTAL:	\$455,870
<u>Miscellaneous</u>	
Signing & Pavement Markings	\$119,984
Signals	\$1,535,171
Sidewalk Ramps	\$122,852
Amenities	\$2,345,454
Maintenance of Traffic (10%)	\$655,564
Erosion Control (1%)	\$45,587
Drainage (Full Replacement)	\$1,930,723
*Drainage (Needed Replacements)	\$102,470
CONSTRUCTION SUB-TOTAL:	\$7,211,210
Contingencies (30% of Construction Total)	\$2,163,363
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$281,237
Mobilization (10% of Construction Total, Contingencies and Staking)	\$965,581
CONSTRUCTION TOTAL:	\$10,621,391
Preliminary Engineering (10% of Construction Total)	\$1,062,139
Construction Engineering (10% of Construction Total)	\$1,062,139
Right of Way (# Acres)	\$0
Rail Road Modifications	\$175,000
Utility Owner Relocations	\$0
PROJECT COST	\$12,920,670

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

Notes:

Total cost includes full replacement of drainage system

Needed drainage replacements include cost for drainage modifications based on two-way conversion



Project: Kalamazoo Downtown Streets Ph 2
Street Name: South St
Estimate by: DAT Date: 9/20/2021
Checked by: MM Date: 11/10/2021
Revised by: DAT Date: 11/10/2021

Project Cost Estimate: South St

<u>Item Section</u>	<u>Total:</u>
Earthwork	\$0
Bases	\$0
Drainage Features	\$60,000
HMA Pavements & Surface Treatments	\$217,393
Portland Cement Concrete Pavement	\$0
Structures	\$0
Incidental Construction	\$0
SUB-TOTAL:	\$277,400
<u>Miscellaneous</u>	
Signing & Pavement Markings	\$73,328
Signals	\$1,096,551
Sidewalk Ramps	\$190,626
Bump Outs	\$123,057
Amenities	\$1,239,720
Maintenance of Traffic (10%)	\$289,389
Erosion Control (1%)	\$2,774
Drainage (Full Replacement)	\$1,130,160
*Drainage (Needed Replacements)	\$99,730
CONSTRUCTION SUB-TOTAL:	\$4,423,010
Contingencies (30% of Construction Total)	\$1,326,903
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$172,497
Mobilization (10% of Construction Total, Contingencies and Staking)	\$592,241
CONSTRUCTION TOTAL:	\$6,514,651
Preliminary Engineering (10% of Construction Total)	\$651,465
Construction Engineering (10% of Construction Total)	\$651,465
Right of Way (# Acres)	\$0
Rail Road Modifications	\$0
Utility Owner Relocations	\$0
PROJECT COST	\$7,817,590

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

*Notes:

Total cost includes full replacement of drainage system

Needed drainage replacements include cost for drainage modifications based on two-way conversion



Project: Kalamazoo Downtown Streets Ph 2
Street Name: Main St
Estimate by: DAT Date: 9/20/2021
Checked by: MM Date: 11/10/2021
Revised by: DAT Date: 11/10/2021

Project Cost Estimate: Main St

<u>Item Section</u>	<u>Total:</u>
Earthwork	\$16,220
Bases	\$9,298
Drainage Features	\$50,400
HMA Pavements & Surface Treatments	\$119,097
Portland Cement Concrete Pavement	\$0
Structures	\$0
Incidental Construction	\$50,406
SUB-TOTAL:	\$245,430
<u>Miscellaneous</u>	
Signing & Pavement Markings	\$22,126
Signals	\$256,734
Lighting	\$42,548
SW Ramps	\$39,927
Maintenance of Traffic (10%)	\$158,708
Erosion Control (1%)	\$2,454
Drainage (Full Replacement)	\$977,864
*Drainage (Needed Replacements)	\$55,790
CONSTRUCTION SUB-TOTAL:	\$1,745,800
Contingencies (30% of Construction Total)	\$523,740
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$68,086
Mobilization (10% of Construction Total, Contingencies and Staking)	\$233,763
CONSTRUCTION TOTAL:	\$2,571,389
Preliminary Engineering (10% of Construction Total)	\$257,139
Construction Engineering (10% of Construction Total)	\$257,139
Right of Way (# Acres)	\$0
Rail Road Modifications	\$175,000
Utility Owner Relocations	\$0
PROJECT COST	\$3,260,670

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

*Notes:

Total cost includes full replacement of drainage system

Needed drainage replacements include cost for drainage modifications based on two-way conversion



Project: Kalamazoo Downtown Streets Ph 2
Street Name: Douglas/Kalamazoo Ave
Estimate by: DAT Date: 9/29/2021
Checked by: MM Date: 11/10/2021
Revised by: DAT Date: 11/10/2021

Project Cost Estimate: Douglas/Kalamazoo Ave

<u>Item Section</u>	<u>Total:</u>
Earthwork	\$69,637
Bases	\$38,326
Drainage Features	\$28,200
HMA Pavements & Surface Treatments	\$200,359
Portland Cement Concrete Pavement	\$0
Structures	\$0
Incidental Construction	\$53,384
SUB-TOTAL:	\$389,910
<u>Miscellaneous</u>	
Signing & Pavement Markings	\$40,729
Signals	\$256,734
Lighting	\$31,911
Sidewalk Ramps	\$55,283
Amenities	\$1,177,900
Maintenance of Traffic (10%)	\$271,155
Erosion Control (1%)	\$3,899
Drainage (Full Replacement)	\$755,185
*Drainage (Needed Replacements)	\$43,910
CONSTRUCTION SUB-TOTAL:	\$2,982,710
Contingencies (30% of Construction Total)	\$894,813
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$116,326
Mobilization (10% of Construction Total, Contingencies and Staking)	\$399,385
CONSTRUCTION TOTAL:	\$4,393,234
Preliminary Engineering (10% of Construction Total)	\$439,323
Construction Engineering (10% of Construction Total)	\$439,323
Right of Way (# Acres)	\$0
Rail Road Modifications	\$175,000
Utility Owner Relocations	\$0
PROJECT COST	\$5,446,890

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

*Notes:

Total cost includes full replacement of drainage system

Needed drainage replacements include cost for drainage modifications based on two-way conversion



Project: Kalamazoo Downtown Streets Ph 2
Street Name: Michikal St
Estimate by: DAT Date: 9/24/2021
Checked by: MM Date: 11/10/2021
Revised by: DAT Date: 11/10/2021

Project Cost Estimate: Michikal St

<u>Item Section</u>	<u>Total:</u>
Earthwork	\$177,648
Bases	\$3,269
Drainage Features	\$0
HMA Pavements & Surface Treatments	\$5,483
Portland Cement Concrete Pavement	\$0
Structures	\$0
Incidental Construction	\$10,168
SUB-TOTAL:	\$196,570
<u>Miscellaneous</u>	
Signing & Pavement Markings	\$5,000
Signals	\$0
Lighting	\$8,160
Maintenance of Traffic (10%)	\$24,803
Erosion Control (1%)	\$1,966
Drainage (Full Replacement)	
*Drainage (Needed Replacements)	\$36,334
CONSTRUCTION SUB-TOTAL:	\$272,840
Contingencies (30% of Construction Total)	\$81,852
Contractor Staking and Errors (3% of Construction Total and Contingencies)	\$10,641
Mobilization (10% of Construction Total, Contingencies and Staking)	\$36,533
CONSTRUCTION TOTAL:	\$401,866
Preliminary Engineering (10% of Construction Total)	\$40,187
Construction Engineering (10% of Construction Total)	\$40,187
Right of Way (# Acres)	\$0
Rail Road Modifications	\$0
Utility Owner Relocations	\$0
PROJECT COST	\$482,240

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

*Notes:

Needed drainage replacements include cost for drainage modifications based on two-way conversion

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Appendix E

Amenities

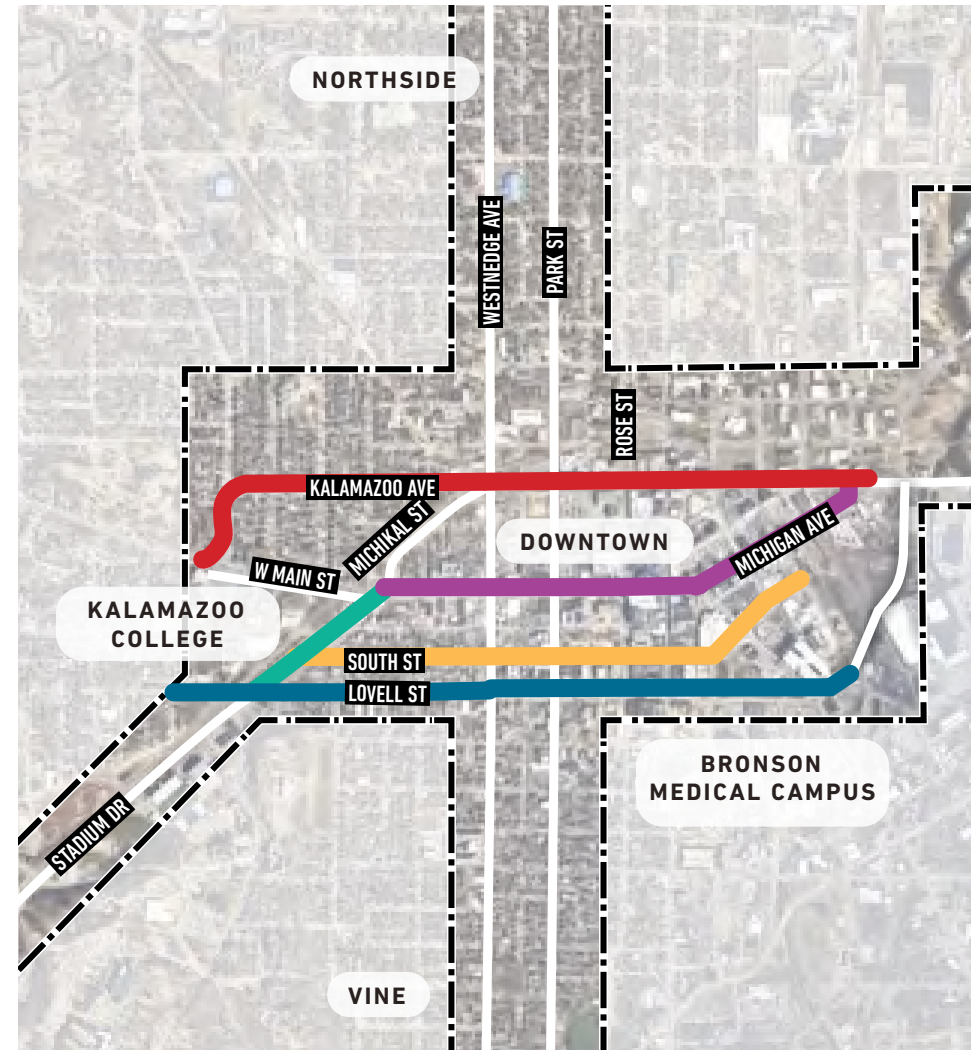
DOWNTOWN KALAMAZOO STREETS

STREETSCAPE

Purpose

Downtown Kalamazoo is ready for a functional, connective street fabric optimized for both businesses and residents, pedestrians and motorists. In order to create active spaces that are conducive for all users, one-way streets are primed to switch traffic flow to two ways.

In addition to the conversion, the future streets will provide wider sidewalks, street trees, street furniture, transit amenities, bicycle parking, pedestrian-scaled lighting, on-street parking, and bump-outs, where applicable. These design elements together create a comfortable pedestrian environment, a unified aesthetic, and opportunities for activity in these valuable public spaces.



Proposed streetscape improvements

- Kalamazoo Avenue
- Michigan Avenue
- Stadium Drive
- Lovell Street
- South Street

Streetscape goals

- Convert vehicular traffic flow from **one-way to two-way**, where applicable.
- Enhance **multi-modal safety** and experience through wider sidewalks and/or bike lane.
- Increase **tree canopy** and/or green space.
- Upgrade or replace **lighting** and include pedestrian level lighting.
- Provide site furnishings, including bike parking.
- **Increase safety for pedestrians overall**, particularly at intersections, crossings, driveways.
- Concentrate amenitized **transit stops** near intersections.



W. KALAMAZOO AVE (DOWNTOWN) STREETSCAPE

Existing conditions

Kalamazoo Avenue currently is a one-way, main thoroughfare to downtown. It is an 82 foot Right-of-Way with three one-way travel lanes and parking lanes on both sides. Sidewalks are in various levels of repair and styles. There are numerous driveways and trees sparingly planted. Kalamazoo Avenue is not only one of the main gateways into downtown, but also home to the major transit center, various businesses, and future development.

Streetscape goals

- Convert vehicular traffic flow from **one-way to two-way**.
- Enhance **multi-modal safety** and experience through wider sidewalks and/or bike lane.
- Increase **tree canopy** and/or green space, where possible.
- Upgrade or replace **lighting** and include pedestrian level lighting.
- **Increase safety for pedestrians** at crossings, driveways.
- Concentrate **transit stops** near intersections.



Potential Streetscape Improvements:



Street trees



Street furniture



Raised cycle lane



Tree planters



Enhanced landscape



Multi modal amenities



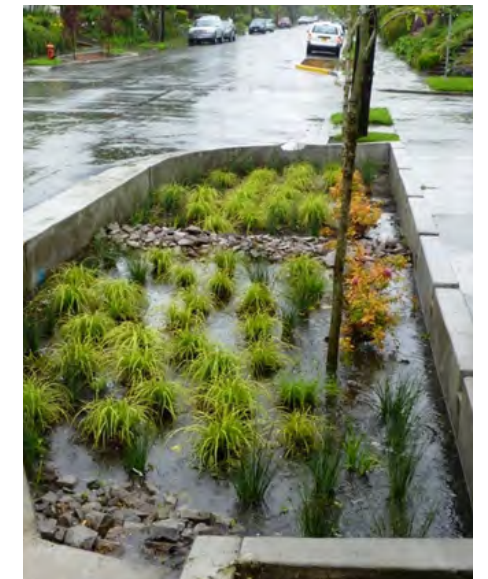
Lighting



Bike repair stations



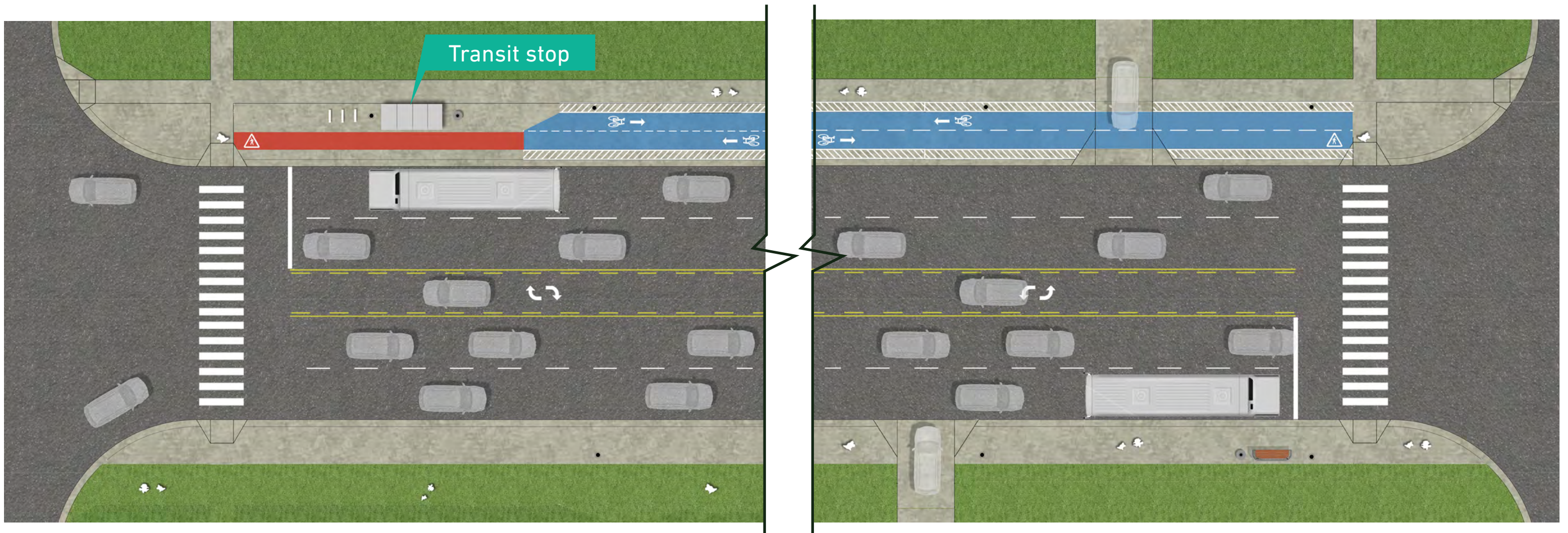
Transit stop shelters



Green infrastructure

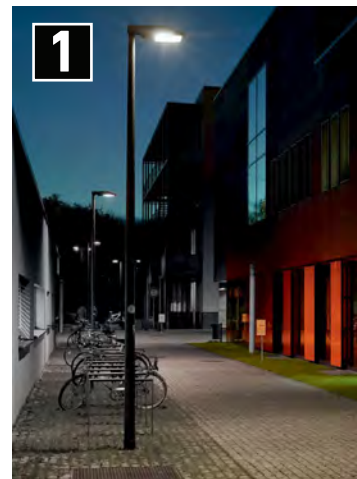
LOWER COST

HIGHER COST



PROS

- Separated bike lane, from vehicles and pedestrians
- Updates street lighting
- Transit stop amenities

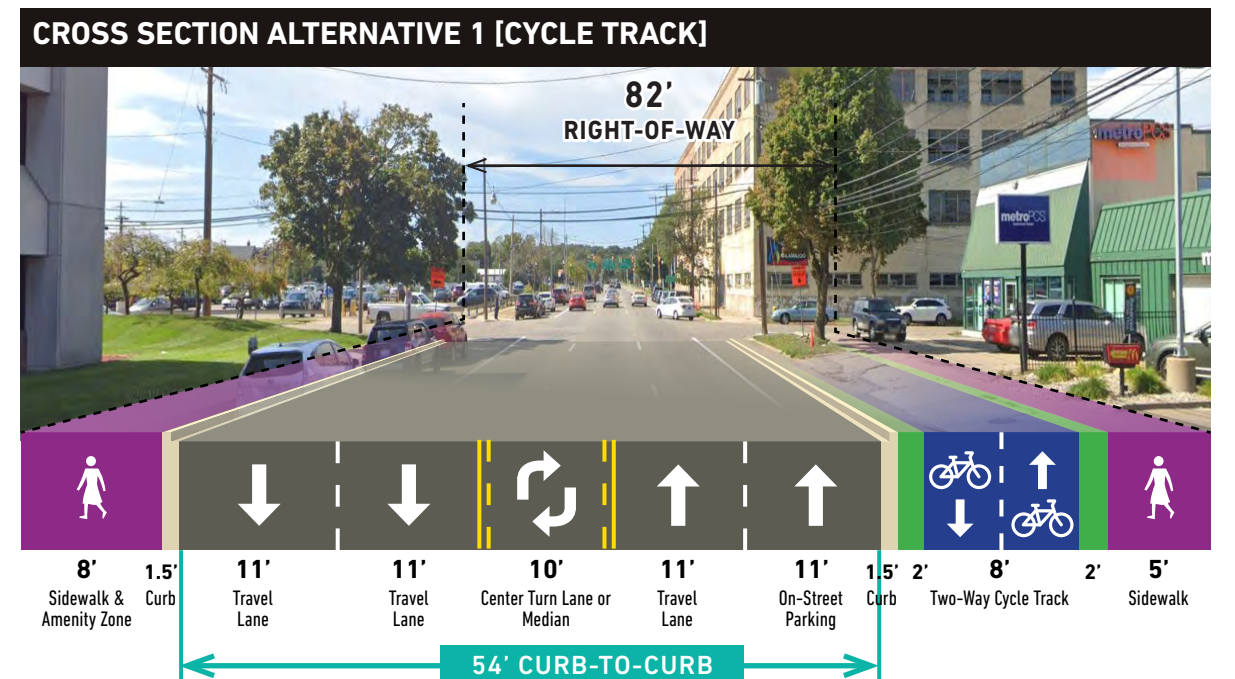


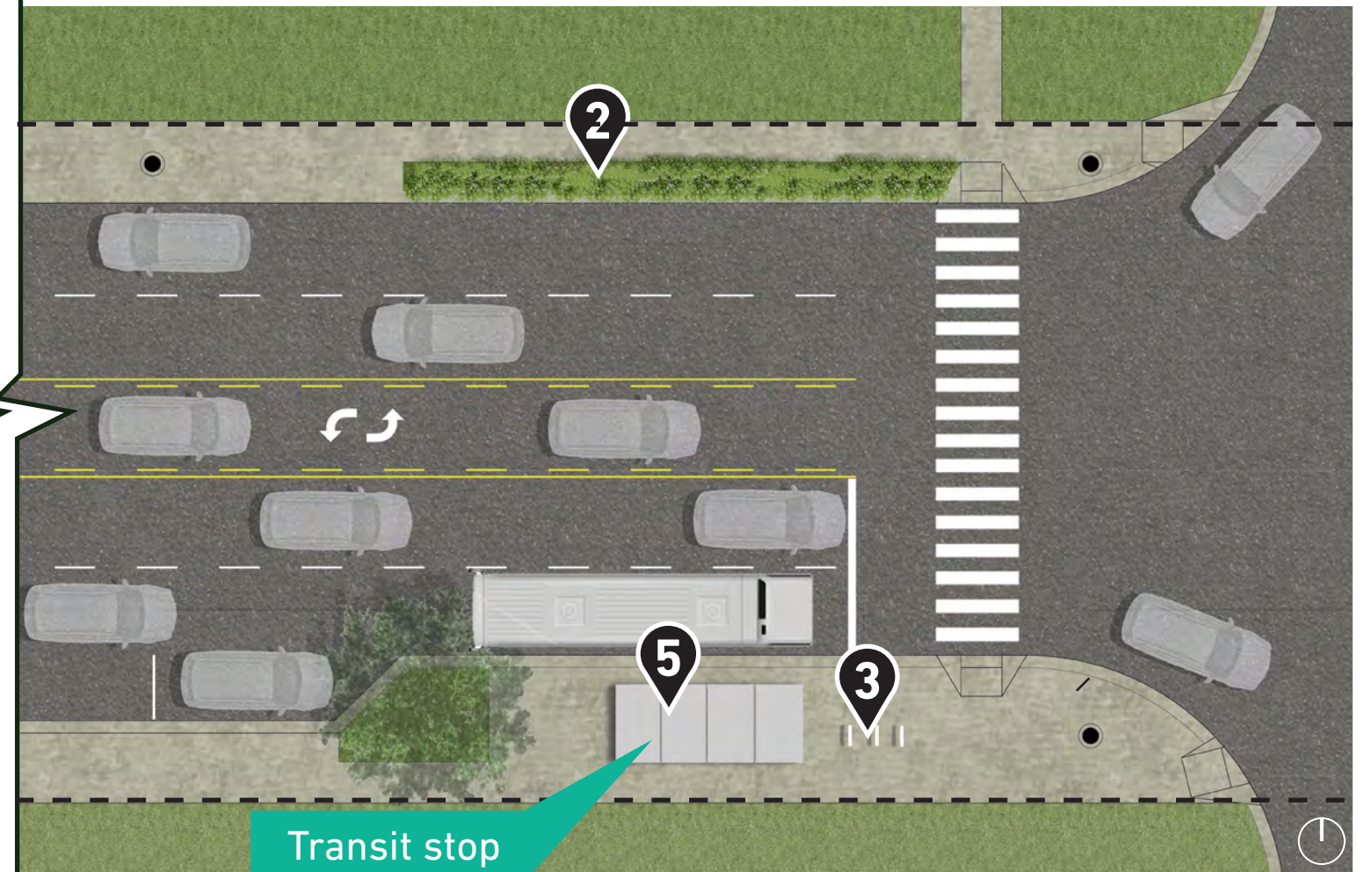
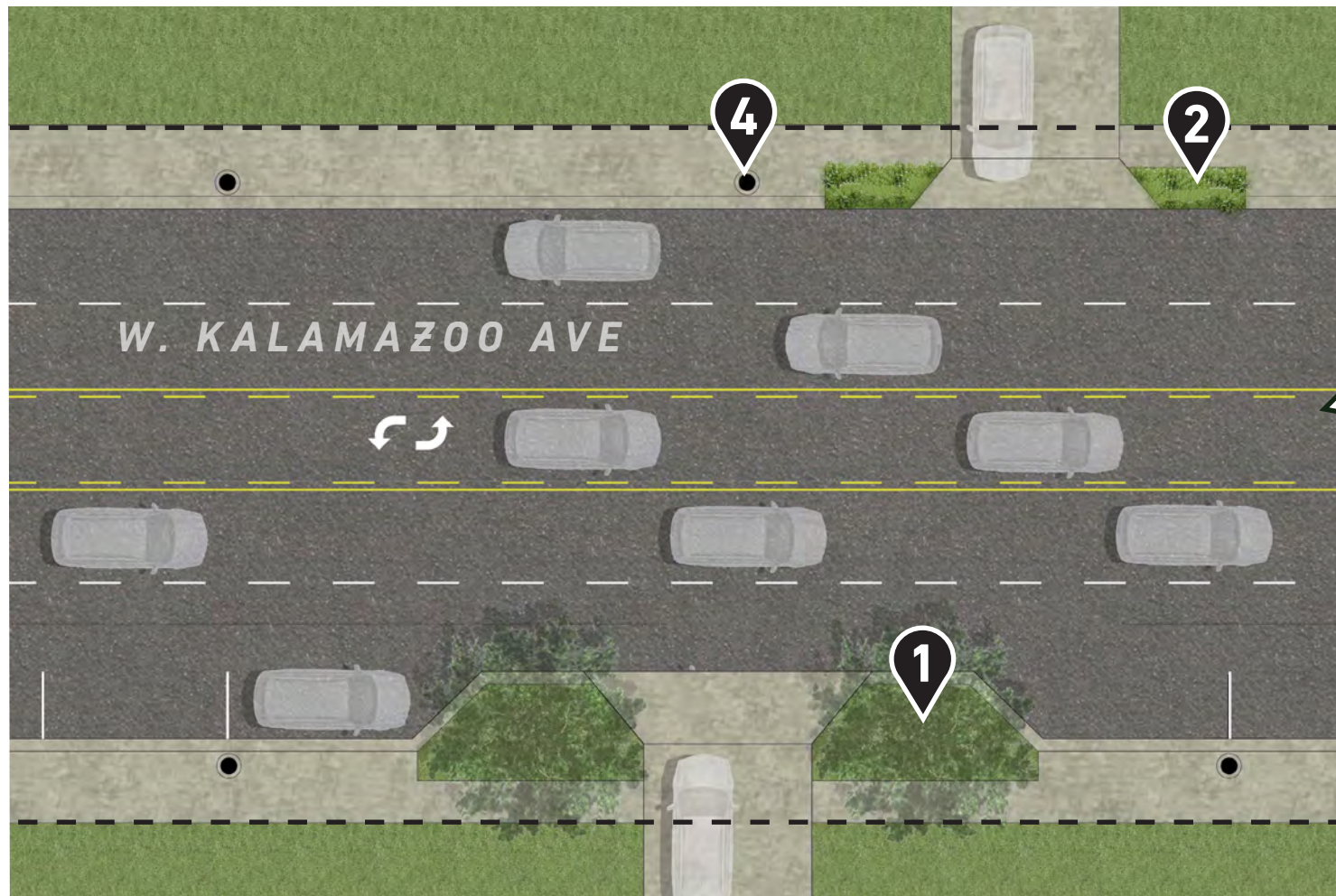
CONS

- No on-street parking
- Conflicts between driveways and bike lanes, pedestrians
- Lacks width for street trees, planter areas



W. KALAMAZOO AVE (DOWNTOWN) ALT 1 STREETSCAPE





Transit stop

PROS

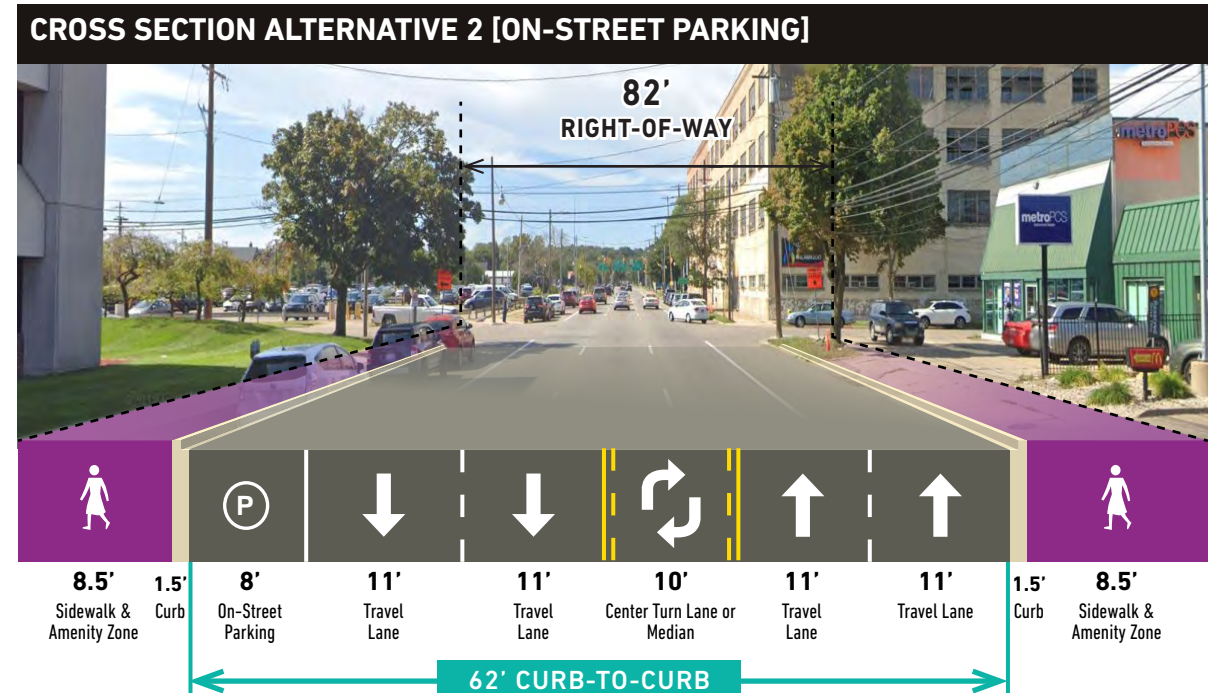
- On-street parking
- Reduces crossing distances
- Increased visibility at private driveways
- Updates street lighting
- Transit/multimodal amenities, concentrated at intersections

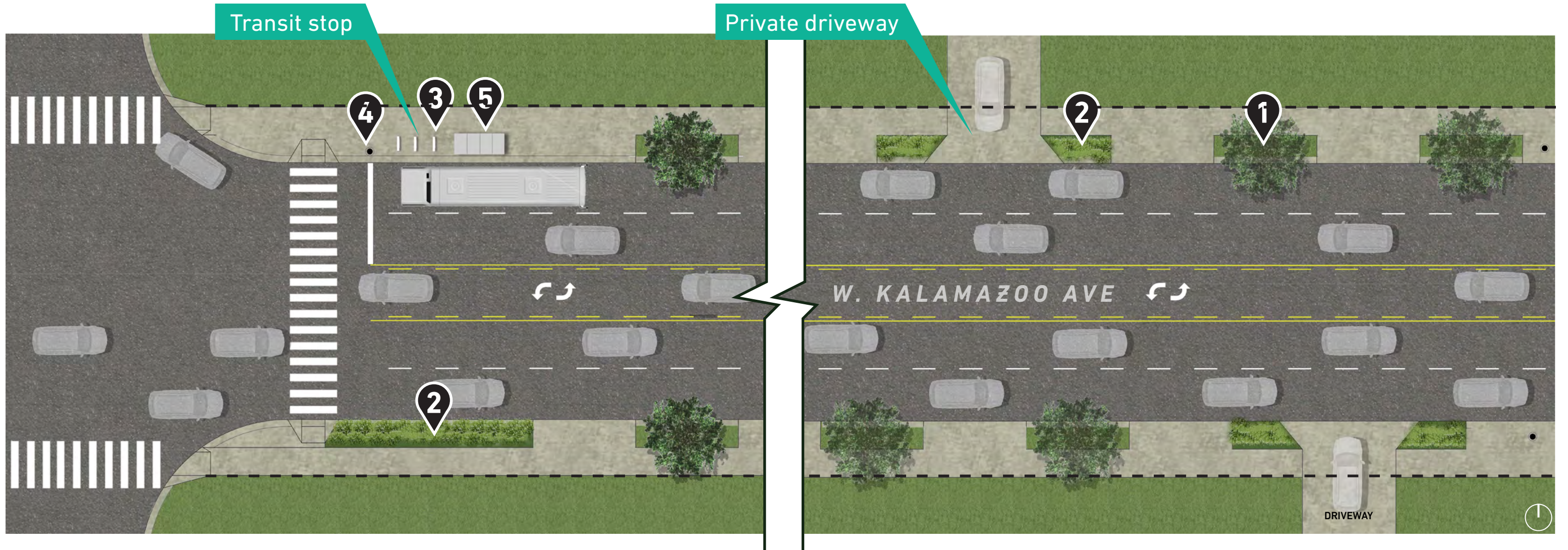


CONS

- Little separation between pedestrians and roadway on north side
- Street trees only planted within bump outs

W. KALAMAZOO AVE (DOWNTOWN) ALT 2 STREETSCAPE





PROS

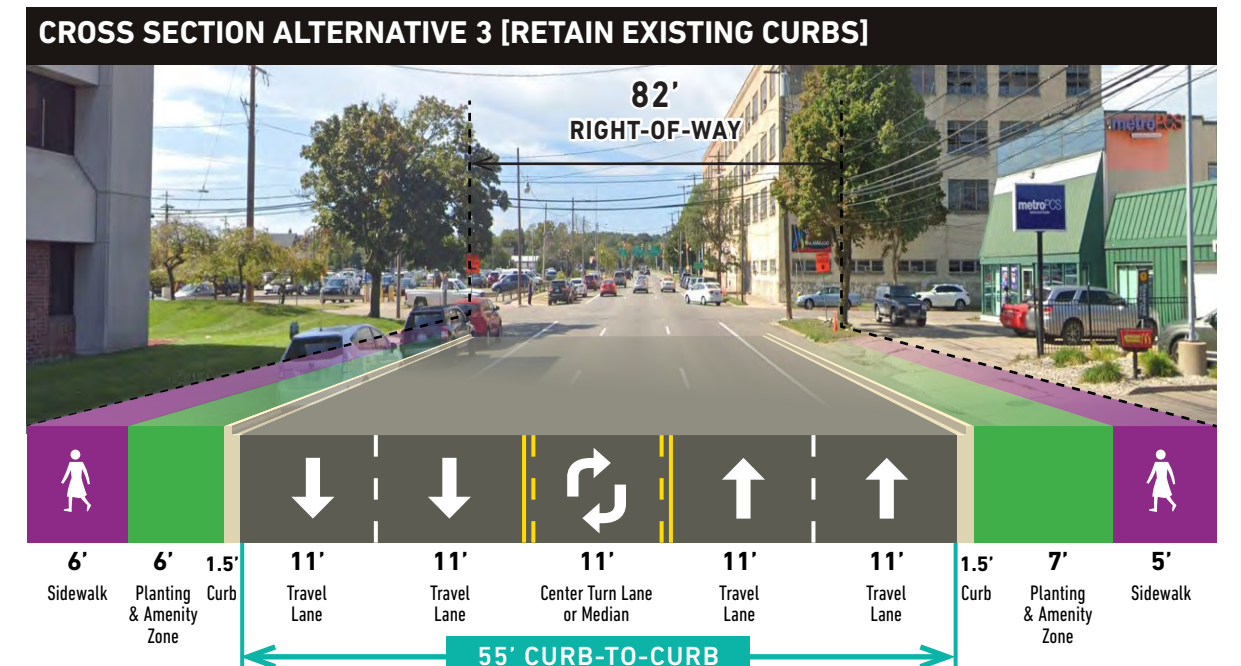
- Maximizes green space, minimizes impervious surfaces
- Updates street lighting
- Provides street trees
- Transit / multi-modal amenities, concentrated at intersections
- Center turn lane configuration
- Retains existing curbs

CONS

- No on-street parking
- Crossings and driveways less distinguished than alternatives with bump outs



W. KALAMAZOO AVE (DOWNTOWN) ALT 3 STREETScape



1
STREET TREES*
60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



SWAMP WHITE OAK
QUERCUS BICOLOR



HYBRID ELM
ULMUS 'FRONTIER'

OPINION OF PROBABLE COSTS - TIER 1
(STREETSCAPE ONLY)

2
PLANTING



SEEDED TURF

3
BIKE FACILITIES



VICTOR STANLEY
BIKE RACK



CONCRETE
RAISED BIKE LANE

ALTERNATIVE 1 ONLY

4
STREET LIGHTING
120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

5
TRANSIT AMENITIES



VICTOR STANLEY
BENCH & TRASH BIN



	Downtown Alt 1: Cycle Track		Downtown Alt 2: Retain Existing Curbs		Downtown Alt 3: On-Street Parking	
	UNITS		UNITS			
Streetscape:						
Concrete Sidewalks (per SF)	88,000	\$ 616,000.00	72,000	\$ 504,000.00	34,000	\$ 238,000.00
Soil- Amended (per CY) 6"	1,630	\$ 73,333.35	43	\$ 1,935.00	1840	\$ 82,800.00
Seed (per SF)	12,000	\$ 12,000.00	98,400	\$ 98,400.00	0	\$ 0
Demolition of existing walks & drives(per SF)	44,000	\$ 132,000.00	0	\$ -	44,000	\$ 132,000.00
Demolition of existing trees	43	\$ 17,200.00	43	\$ 17,200.00	43	\$ 17,200.00
Street Trees (per unit)	0	0	0	0	133	\$ -
Bike lane paint (per SF)	0	0	0	0	n/a	n/a
Sub Total		\$ 850,533.35		\$ 621,535.00		\$ 470,000.00
6 ft metal bench (generic)		\$3,000		\$0		\$3,000
Melville Bench (Landscape Forms)		n/a		n/a		n/a
Poe Litter Bin (Landscape Forms)		n/a		n/a		n/a
Metal Litter Bin (generic)		\$3,200		\$0		\$3,200
Connect 2.0 Bus Shelter (Landscape Forms)		n/a		n/a		n/a
Bike Fixit Station (Dero)		n/a		n/a		n/a
Precast Concrete Curb (per LF)		n/a		n/a		n/a
Stormwater detention -1 year storm (per CF)		n/a		n/a		n/a
Perennials (per unit)		n/a		n/a		n/a
Bike Racks (per unit, generic)		\$2,000		\$0		\$2,000
Lighting (per unit)	0	-	0	-	0	\$ -
Contingency at conceptual phase (30%)		30%		30%		30%
Total		\$ 1,116,353.36		\$ 807,995.50		\$478,200

W. KALAMAZOO AVE (DOWNTOWN)
STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 1

*NO TREES OR OTHER PLANTINGS PROPOSED FOR ALTERNATIVE 1

1 STREET TREES* 60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



SWAMP WHITE OAK
QUERCUS BICOLOR



HYBRID ELM
ULMUS 'FRONTIER'

2 PLANTING



RHUS AROMATICA
FRAGRANT SUMAC



RIBES ALPINUM 'GREEN MOUND'
GREEN MOUND ALPINE CURRANT



LIRIOPE MUSCARI
LILY TURF



JUNIPERUS HORIZONTALIS
CREEPING JUNIPER

3 BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK



ASPHALT
RAISED BIKE LANE

ALTERNATIVE 1 ONLY

4 STREET LIGHTING 120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

5 TRANSIT AMENITIES



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

	COST	Downtown Alt 1: Cycle Track		Downtown Alt 2: Retain Existing Curbs		Downtown Alt 3: On-Street Parking	
		UNITS		UNITS		UNITS	
Streetscape:							
Concrete Sidewalks (per SF)	\$7	88,000	\$ 616,000.00	72,000	\$ 504,000.00	34,000	\$ 238,000.00
Soil- Amended (per CY 6")	\$45	0	\$ -	2,829	\$ 127,305.00	2990	\$ 134,550.00
Seed (per SF)	\$1	12,000	\$ 12,000.00	98,400	\$ 98,400.00	98400	\$98,400
Demolition of existing walks & drives(per SF)	\$3	44,000	\$ 132,000.00	44,000	\$ 132,000.00	44,000	\$ 132,000.00
Demolition of existing trees	\$400	43	\$ 17,200.00	43	\$ 17,200.00	43	\$ 17,200.00
Street Trees (per unit)	\$500	0	\$ -	0	\$ -	133	\$ 66,666.67
Bike lane paint (per SF)	\$3	0	\$ -	0	\$ -	n/a	n/a
Sub Total			\$ 777,200.00		\$ 878,905.00		\$ 686,816.67
6 ft metal bench (generic)	\$750		\$3,000		\$0		\$3,000
Melville Bench (Landscape Forms)	\$2,700		n/a		n/a		n/a
Poe Litter Bin (Landscape Forms)	\$2,000		n/a		n/a		n/a
Metal Litter Bin (generic)	\$800		\$3,200		\$0		\$3,200
Connect 2.0 Bus Shelter (Landscape Forms)	\$25,000		n/a		n/a		n/a
Bike Fixit Station (Dero)	\$1,400		n/a		n/a		n/a
Precast Concrete Curb (per LF)	\$65		n/a		n/a		n/a
Stormwater detention -1 year storm (per CF)	\$10		n/a		n/a		n/a
Perennials (per unit)	\$15		n/a		n/a		n/a
Bike Racks (per unit, generic)	\$500		\$2,000		\$0		\$2,000
Lighting (per unit)	\$6,000	34	\$ 204,000.00	34	\$ 204,000.00	34	\$ 204,000.00
Contingency at conceptual phase (30%)			30%		30%		30%
Total			\$ 1,286,220.00		\$ 1,407,776.50		\$899,017

W. KALAMAZOO AVE (DOWNTOWN) STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 2

*NO TREES OR OTHER PLANTINGS PROPOSED FOR ALTERNATIVE 1

1 STREET TREES* 60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



SWAMP WHITE OAK
QUERCUS BICOLOR



HYBRID ELM
ULMUS 'FRONTIER'

2 PLANTING*



ANEMONE CANADENSIS
CANADA ANEMONE



POTENTILLA FRUTICOSA
SHRUBBY CINQUEFOIL



ASTER NOVAE-ANGLIAE
NEW ENGLAND ASTER



SCHIZACHYRIUM SCOPARIUM
LITTLE BLUESTEM



ECHINACEA PURPUREA
PURPLE CONEFLOWER



CORNUS SERICEA
RED OSIER DOGWOOD

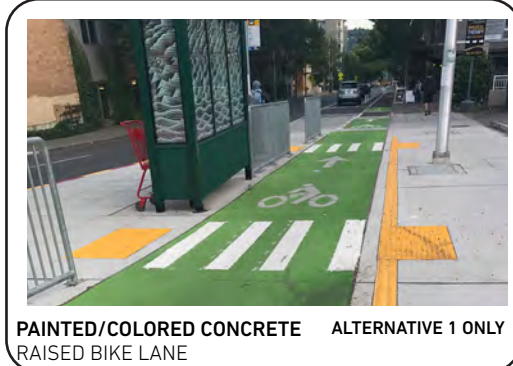
3 BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK



DERO
BIKE FIXIT STATION



PAINTED/COLORED CONCRETE
RAISED BIKE LANE

ALTERNATIVE 1 ONLY

4 STREET LIGHTING 120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

5 TRANSIT AMENITIES



LANDSCAPE FORMS
CONNECT 2.0



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

	COST	Downtown Alt 1: Cycle Track		Downtown Alt 2: Retain Existing Curbs		Downtown Alt 3: On-Street Parking	
		UNITS		UNITS		UNITS	
Streetscape:							
Concrete Sidewalks (per SF)	\$7	100,000	\$ 700,000.00	72,000	\$ 504,000.00	34,000	\$ 700,000.00
Soil- Amended (per CY 6")	\$45	0	\$ -	2990	\$ 134,550.00	2990	\$ 134,550.00
Seed (per SF)	\$1	0	\$ -	160,889	\$ 160,889.00	963	\$ 962.96
Demolition of existing walks & drives(per SF)	\$3	44,000	\$ 132,000.00	44,000	\$ 132,000.00	44,000	\$ 132,000.00
Demolition of existing trees	\$400	43	\$ 17,200.00	43	\$ 17,200.00	43	\$ 17,200.00
Street Trees (per unit)	\$500	0	\$ -	133	\$ 66,500.00	133	\$ 66,666.67
Bike lane paint (per SF)	\$3	32000	\$ 96,000.00	0	\$ -	n/a	n/a
Sub Total			\$ 849,200.00		\$ 1,015,139.00		\$ 1,051,379.63
6 ft metal bench (generic)	\$750		n/a		n/a		n/a
Melville Bench (Landscape Forms)	\$2,700		\$10,800		\$10,800		\$10,800
Poe Litter Bin (Landscape Forms)	\$2,000		\$8,000		\$8,000		\$8,000
Metal Litter Bin (generic)	\$800		n/a		n/a		n/a
Connect 2.0 Bus Shelter (Landscape Forms)	\$25,000		\$100,000		\$0		\$100,000
Bike Fixit Station (Dero)	\$1,400		\$5,600		\$5,600		\$5,600
Precast Concrete Curb (per LF)	\$65		n/a	9650	\$627,250	13263	\$862,116.67
Stormwater detention -1 year storm (per CF)	\$10		n/a		n/a		n/a
Perennials (per unit)	\$15		n/a		n/a		n/a
Bike Racks (per unit, generic)	\$500	34	\$ 204,000.00	34	\$ 204,000.00	34	\$ 204,000.00
Lighting (per unit)	\$6,000		\$2,000		\$2,000		\$2,000
Contingency at conceptual phase (30%)			30%		30%		30%
Total			\$ 1,533,480.00		\$ 2,434,625.70		\$ 2,243,896.29

W. KALAMAZOO AVE (DOWNTOWN) STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 3

*NO TREES OR OTHER PLANTINGS PROPOSED FOR ALTERNATIVE 1

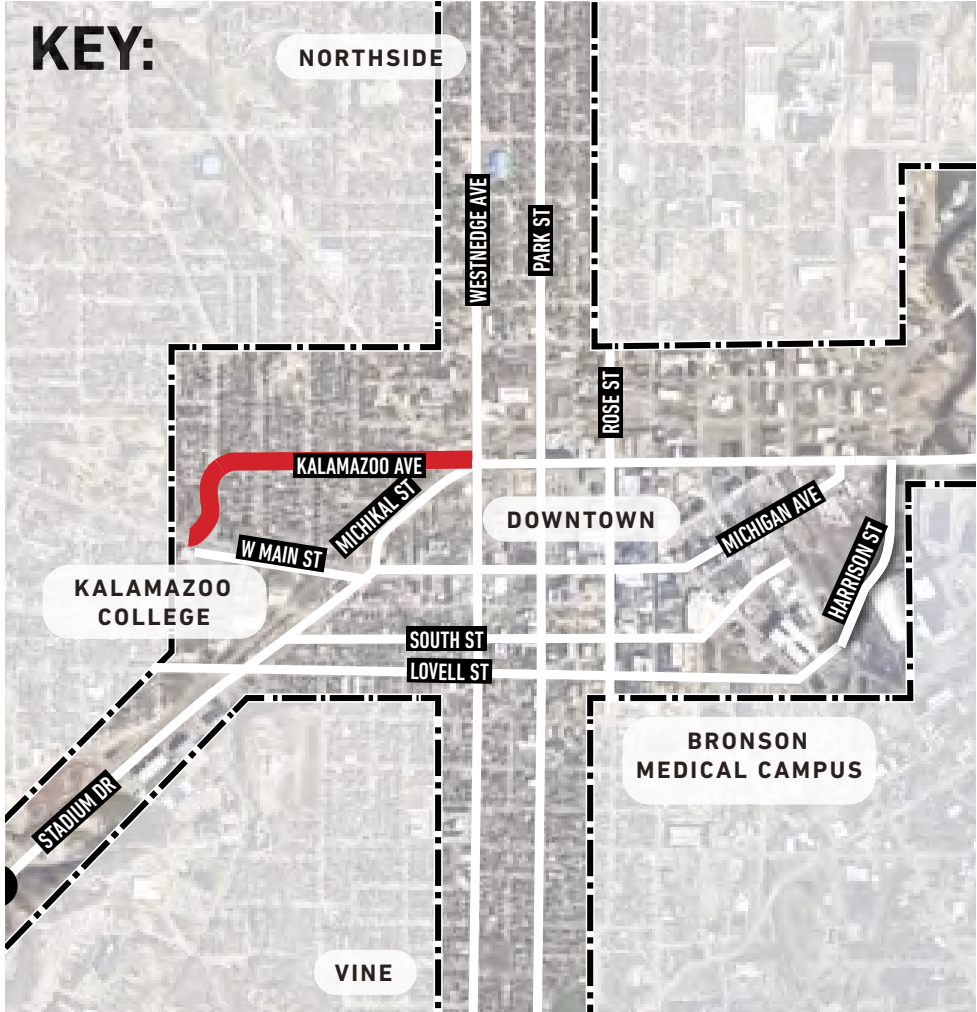
W. KALAMAZOO AVE / DOUGLAS AVE (RESIDENTIAL) STREETSCAPE

Existing conditions

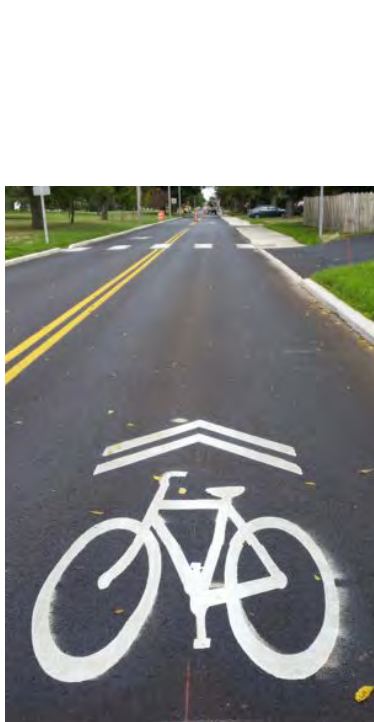
Kalamazoo Avenue currently is a one-way, main thoroughfare in the adjacent neighborhoods. It is an 82 foot Right-of-Way with three one-way travel lanes. Concrete sidewalks are in various levels of repair. Because of the residential setting, there are a high number of private driveways. There are currently no designated bike routes to connect the area to the overall bike network or the Kalamazoo River Valley Trail.

Streetscape goals

- Convert vehicular traffic flow from **one-way to two-way**.
- Designate street as a **shared street** for cyclists.
- **Decrease vehicular speeds**.
- Increase **tree canopy**, where possible, while preserving historic trees.
- Upgrade or replace **lighting** and include some pedestrian level lighting.
- **Increase safety for pedestrians** at crossings, driveways.
- Concentrate **transit stops** near intersections.



Potential Streetscape Improvements:



Sharrow markings



Street trees



Street furniture



Multi modal amenities



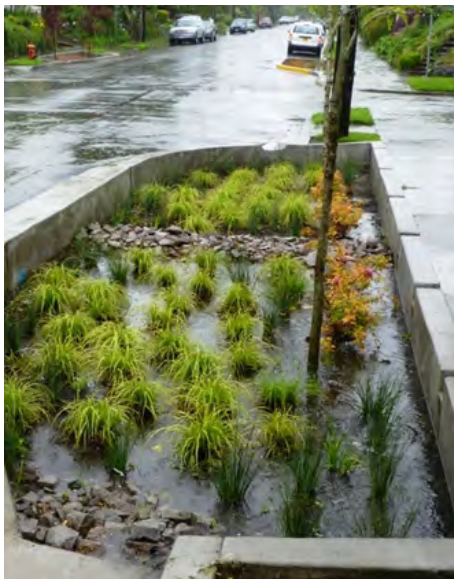
Lighting



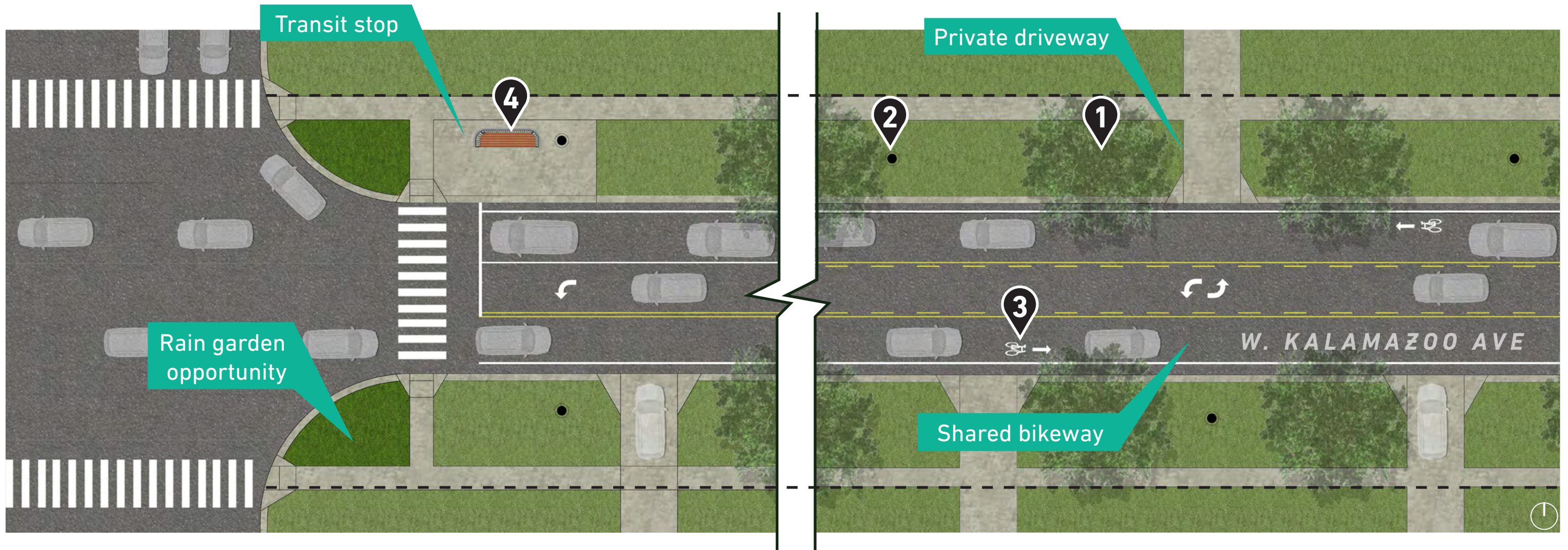
Transit shelter



Enhanced landscape



Green infrastructure

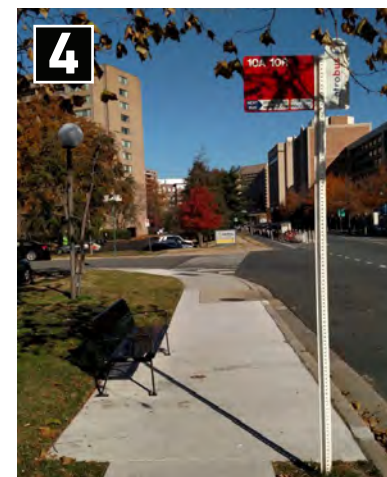
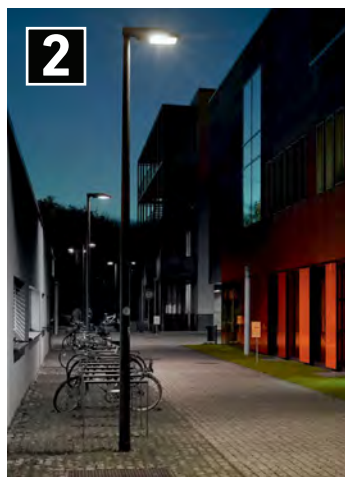


PROS

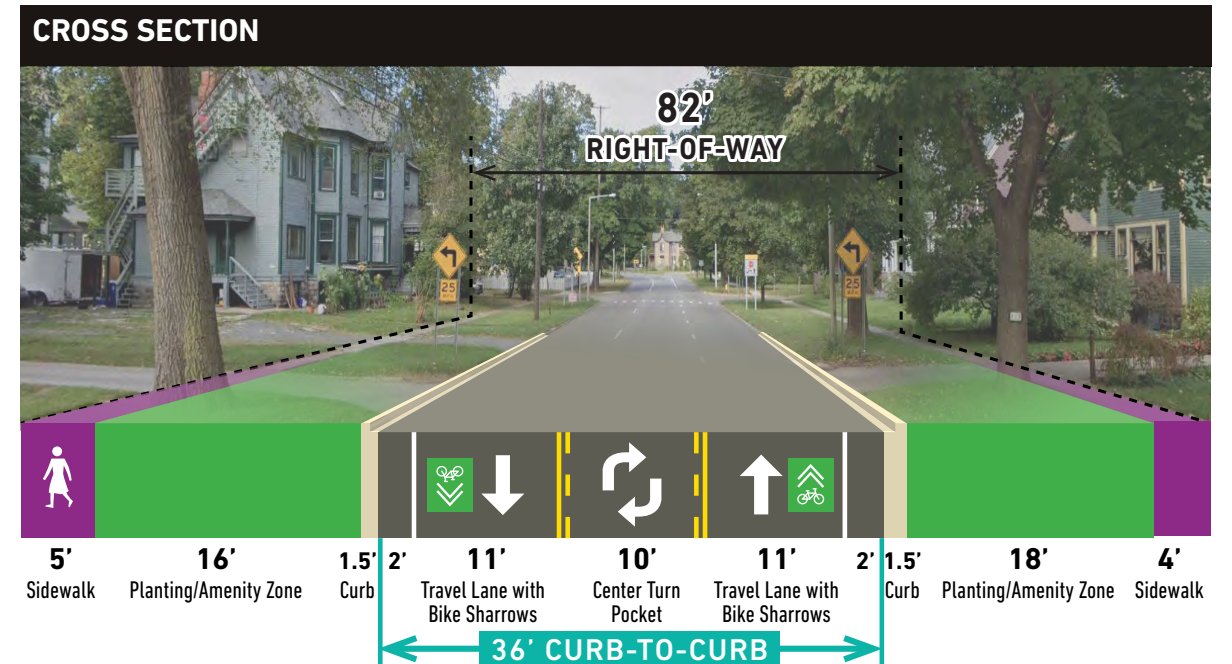
- Maximizes green space, minimizes impervious surfaces
- Center turn lane configuration
- Updates street lighting
- Street trees
- Potential for stormwater infiltration areas

CONS

- No on-street parking
- No separation between bike way and vehicles
- Crossings and driveways less distinguished than bump outs



W. KALAMAZOO AVE / DOUGLAS AVE (RESIDENTIAL) STREETSCAPE



1

STREET TREES
60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



SWAMP WHITE OAK
QUERCUS BICOLOR



HYBRID ELM
ULMUS 'FRONTIER'

2

PLANTING



SEEDED TURF

3

BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK

4

STREET LIGHTING
120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

5

TRANSIT AMENITIES



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

		Residential	
		UNITS	
Streetscape:			
Concrete Sidewalks (per SF)	\$7	18,000	\$ 126,000.00
Soil- Amended (per CY 6")	\$45	0	\$ -
Seed (per SF)	\$1	12,000	\$ 12,000.00
Demolition of existing walks & drives(per SF)	\$3	44,000	\$ 132,000.00
Demolition of existing trees	\$400	10	\$ 4,000.00
Street Trees (per unit)	\$500	17	\$ 8,500.00
Bike lane paint (per SF)	\$3	0	\$ 0
Sub Total			\$ 282,500.00
6 ft metal bench (generic)	\$750		\$3,000
Melville Bench (Landscape Forms)	\$2,700		n/a
Poe Litter Bin (Landscape Forms)	\$2,000		n/a
Metal Litter Bin (generic)	\$800		\$3,200
Connect 2.0 Bus Shelter (Landscape Forms)	\$25,000		n/a
Bike Fixit Station (Dero)	\$1,400		n/a
Precast Concrete Curb (per LF)	\$65		n/a
Stormwater detention -1 year storm (per CF)	\$10		n/a
Perennials (per unit)	\$15		n/a
Bike Racks (per unit, generic)	\$500		\$2,000
Lighting (per unit)	\$6,000	0	-
Contingency at conceptual phase (30%)			30%
Total			\$ 377,910.00

W. KALAMAZOO AVE / DOUGLAS AVE (RESIDENTIAL)
STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 1

1

STREET TREES
60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



2

PLANTING



RHUS AROMATICA
FRAGRANT SUMAC



RIBES ALPINUM 'GREEN MOUND'
GREEN MOUND ALPINE CURRANT



LIRIOPE MUSCARI
LILY TURF



JUNIPERUS HORIZONTALIS
CREEPING JUNIPER

3

BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK

4

STREET LIGHTING
120 ft O.C.



5

TRANSIT AMENITIES



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

		Residential	
		UNITS	
Streetscape:			
Concrete Sidewalks (per SF)	\$7	20,000	\$ 140,000.00
Soil- Amended (per CY 6")	\$45	0	\$ -
Seed (per SF)	\$1	12,000	\$ 12,000.00
Demolition of existing walks & drives(per SF)	\$3	44,000	\$ 132,000.00
Demolition of existing trees	\$400	20	\$ 8,000.00
Street Trees (per unit)	\$500	27	\$ 13,500.00
Bike lane paint (per SF)	\$3	0	\$ -
Sub Total			\$ 305,500.00
6 ft metal bench (generic)	\$750		\$3,000
Melville Bench (Landscape Forms)	\$2,700		n/a
Poe Litter Bin (Landscape Forms)	\$2,000		n/a
Metal Litter Bin (generic)	\$800		\$3,200
Connect 2.0 Bus Shelter (Landscape Forms)	\$25,000		n/a
Bike Fixit Station (Dero)	\$1,400		n/a
Precast Concrete Curb (per LF)	\$65		n/a
Stormwater detention -1 year storm (per CF)	\$10	18630	\$186,300
Perennials (per unit)	\$15	10500	\$157,500
Bike Racks (per unit, generic)	\$500		\$2,000
Lighting (per unit)	\$6,000	25	\$ 150,000.00
Contingency at conceptual phase (30%)			30%
Total			\$ 1,049,750.00

W. KALAMAZOO AVE / DOUGLAS AVE (RESIDENTIAL)
STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 2

1 STREET TREES 60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



SWAMP WHITE OAK
QUERCUS BICOLOR



HYBRID ELM
ULMUS 'FRONTIER'

2 PLANTING*



ANEMONE CANADENSIS
CANADA ANEMONE



POTENTILLA FRUTICOSA
SHRUBBY CINQUEFOIL



ASTER NOVAE-ANGLIAE
NEW ENGLAND ASTER



SCHIZACHYRIUM SCOPARIUM
LITTLE BLUESTEM



ECHINACEA PURPUREA
PURPLE CONEFLOWER



CORNUS SERICEA
RED OSIER DOGWOOD

3 BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK



DERO
BIKE FIXIT STATION

4 STREET LIGHTING 120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

5 TRANSIT AMENITIES



LANDSCAPE FORMS
CONNECT 2.0



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

		Residential	
		UNITS	
Streetscape:			
Concrete Sidewalks (per SF)	\$7	24,000	\$ 168,000.00
Soil- Amended (per CY 6")	\$45	0	\$ -
Seed (per SF)	\$1	0	\$ -
Demolition of existing walks & drives(per SF)	\$3	18,000	\$ 54,000.00
Demolition of existing trees	\$400	30	\$ 12,000.00
Street Trees (per unit)	\$500	37	\$ 18,500.00
Bike lane paint (per SF)	\$3	450	\$ 1,350.00
Sub Total			\$ 253,850.00
6 ft metal bench (generic)	\$750		n/a
Melville Bench (Landscape Forms)	\$2,700		\$10,800
Poe Litter Bin (Landscape Forms)	\$2,000		\$8,000
Metal Litter Bin (generic)	\$800		n/a
Connect 2.0 Bus Shelter (Landscape Forms)	\$25,000		n/a
Bike Fixit Station (Dero)	\$1,400		\$5,600
Precast Concrete Curb (per LF)	\$65		n/a
Stormwater detention -1 year storm (per CF)	\$10	18630	\$186,300
Perennials (per unit)	\$15	10500	\$157,500
Bike Racks (per unit, generic)	\$500		\$2,000
Lighting (per unit)	\$6,000	50	\$ 300,000.00
Contingency at conceptual phase (30%)			30%
Total			\$ 1,531,270.00

W. KALAMAZOO AVE / DOUGLAS AVE (RESIDENTIAL) STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 3

LOVELL STREET STREETSCAPE

Existing conditions

Lovell Street is a 66 foot Right-of-Way, one-way road. It is identified as a Main Street in the 2018 Imagine Kalamazoo Plan, and a strong pedestrian connection for near-Downtown residents. There are a high number of driveways for businesses and mixed-use access. Tree plantings increase in the west, but are sparse in the east. Sporadic area lights provide nighttime visibility for vehicles. Lovell Street is primed to be the parallel cyclist route in comparison to South Street, which will accommodate transit.

Streetscape goals

- Convert vehicular traffic flow from **one-way to two-way**.
- Enhance **multi-modal safety** and experience through wider sidewalks and/or bike lane.
- Increase **tree canopy** and/or green space, where possible.
- Upgrade or replace **lighting** and include pedestrian-level lighting.
- **Increase safety for pedestrians** at crossings, driveways.
- Concentrate **transit stops** near intersections.



Potential Streetscape Improvements:



Street trees



Street furniture



Multi modal amenities



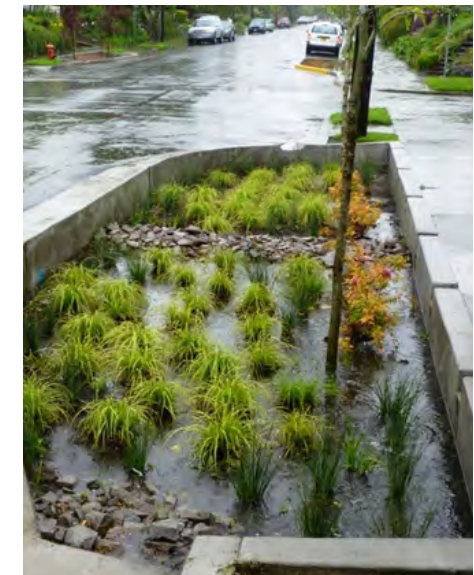
Bike lane markings



Lighting



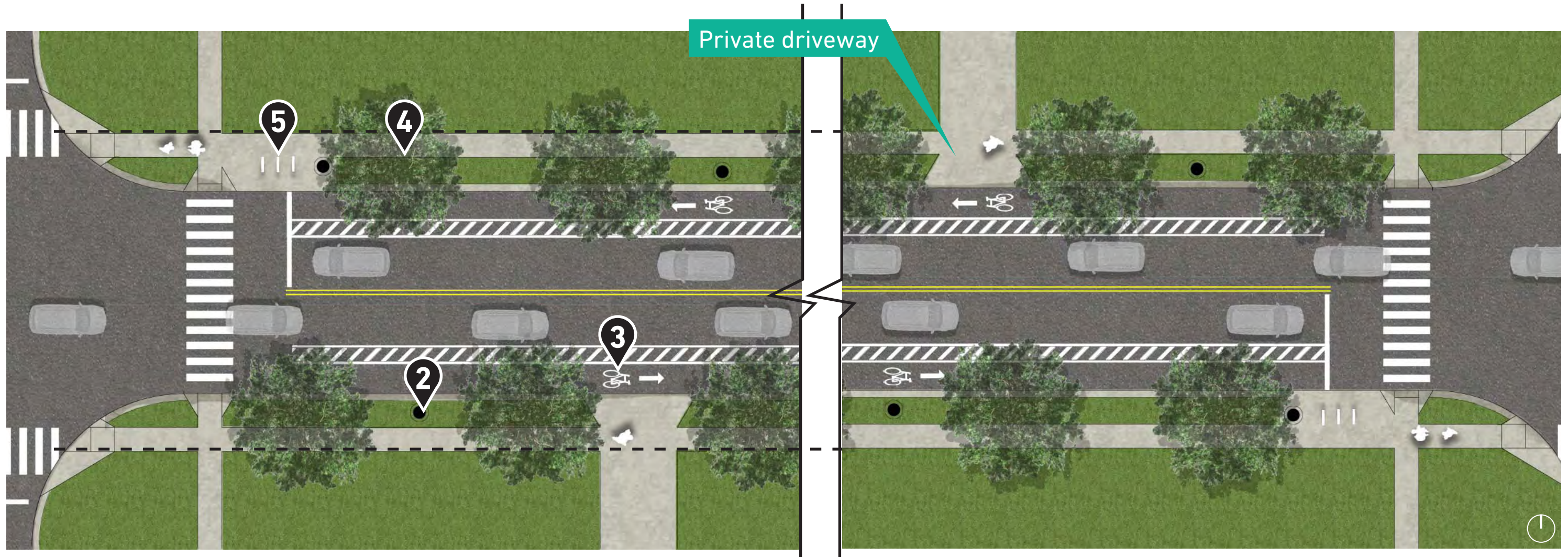
Enhanced landscape



Green infrastructure

LOWER COST

HIGHER COST



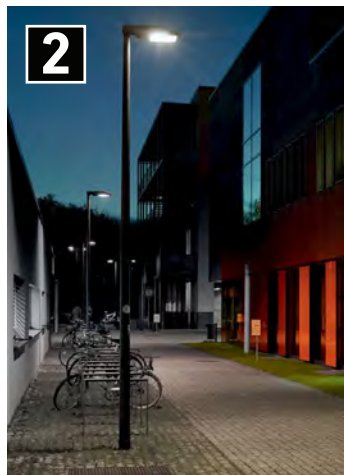
PROS

- Bike lanes separated by buffers
- Updates street lighting
- Maximizes street tree canopy
- Transit/multi-modal amenities concentrated at intersections

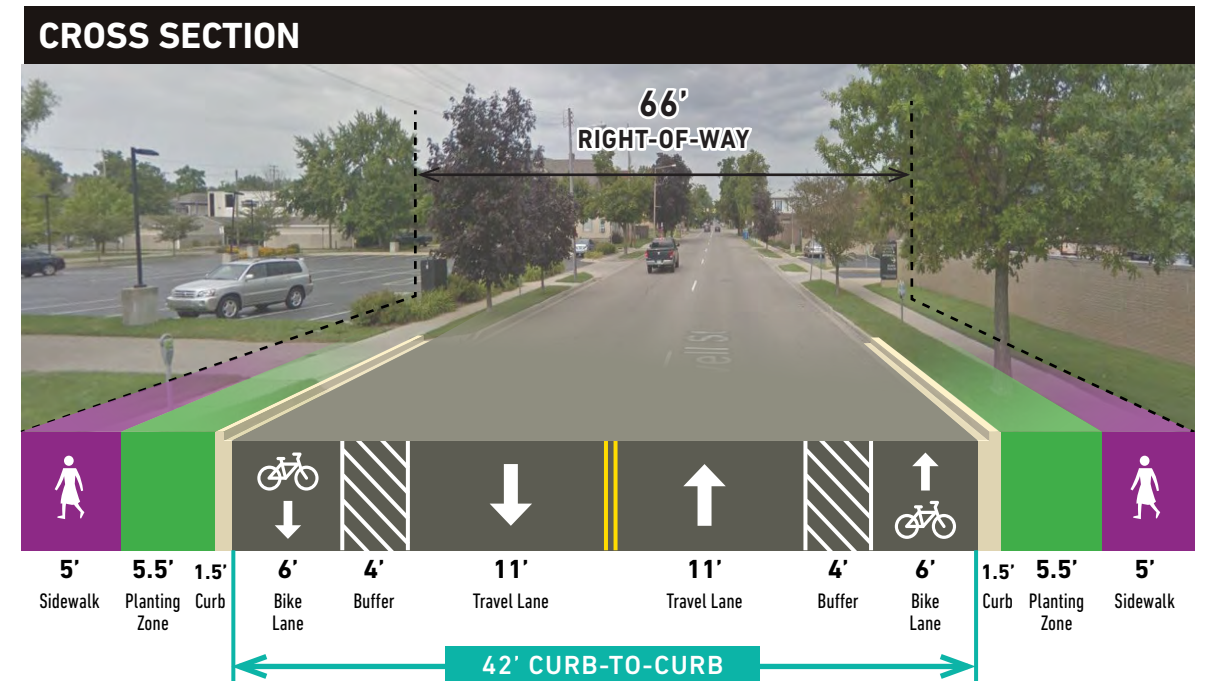


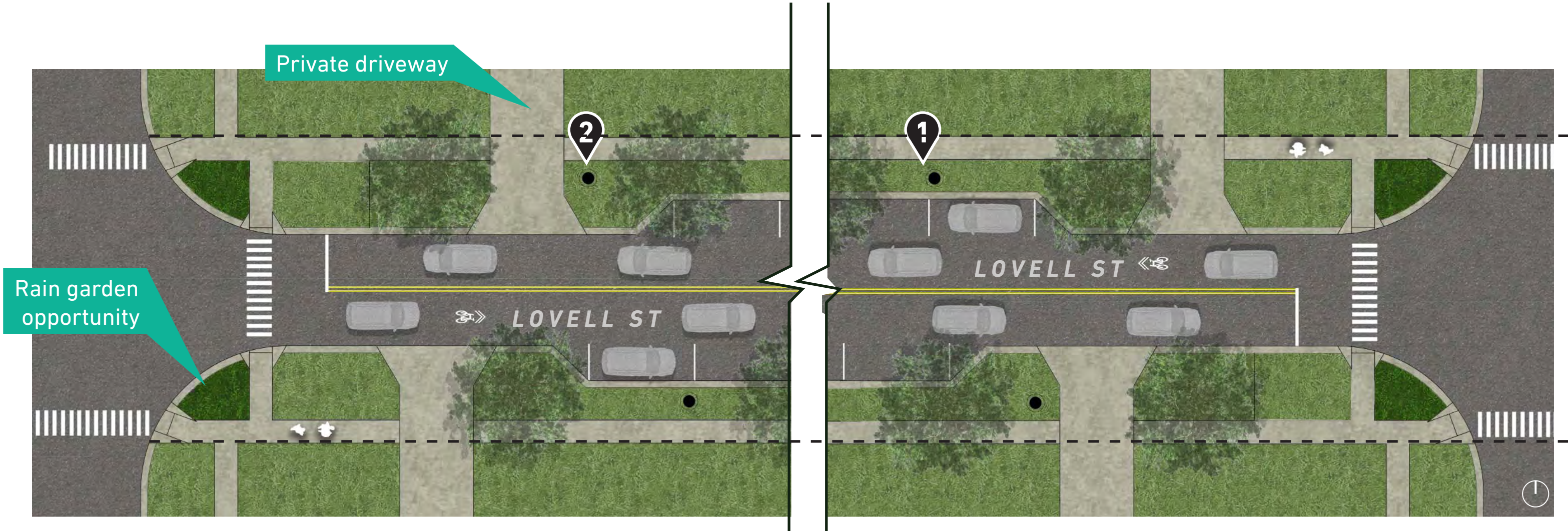
CONS

- No on-street parking
- Conflict points between driveways and bike lanes, pedestrians



LOVELL STREET (DOWNTOWN) STREETSCAPE





PROS

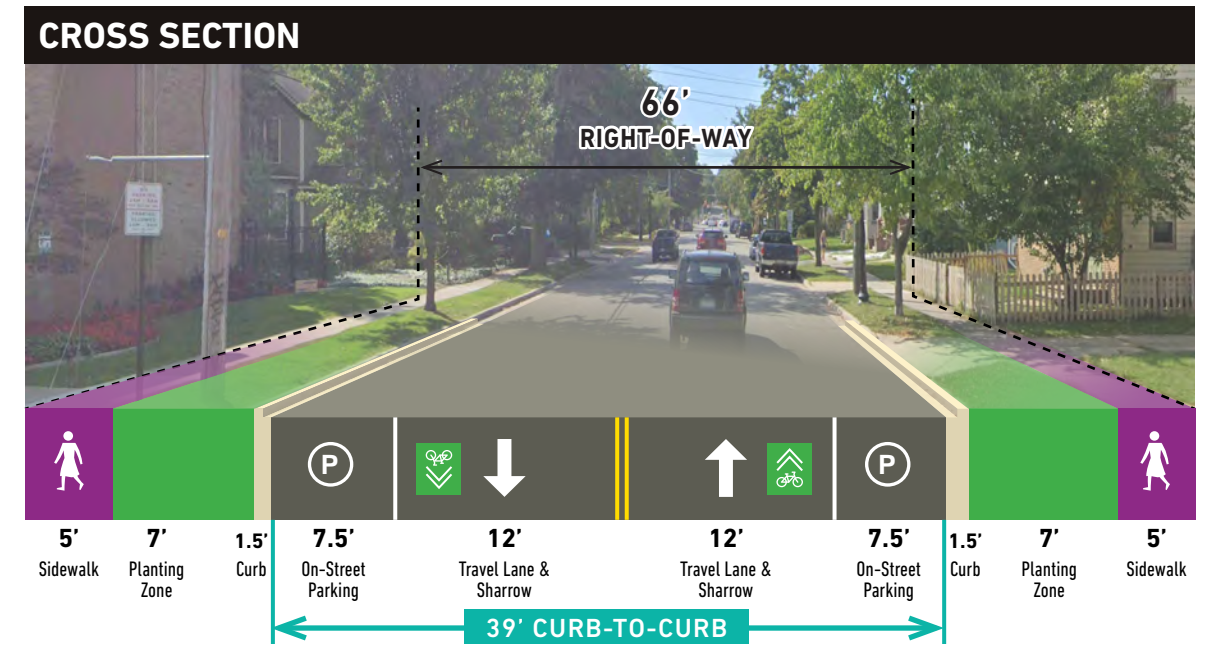
- Maximizes green space, minimizes impervious surfaces
- Reduces crossing distances
- Updates street lighting
- Provides most street trees
- Transit stop amenities, concentrated at intersections

CONS

- No on-street parking
- No separation of cyclists and vehicles



LOVELL STREET (RESIDENTIAL) STREETSCAPE



1 STREET TREES

60 ft O.C.

SMALL TO MEDIUM TREES UNDER UTILITIES



AMERICAN HORNBEAM
CARPINUS CAROLINIANA



TRIDENT MAPLE
ACER BUERGERIANUM

2 STREET LIGHTING

120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

3 BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK

4 TRANSIT AMENITIES



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

	COST	UNITS	Residential
Streetscape:			
Concrete Sidewalks (per SF)	\$7	0	\$ -
Soil- Amended (per CY) 6"	\$45	0	\$ -
Seed (per SF)	\$1	0	\$ -
Demolition of existing walks & drives(per SF)	\$3	0	\$ -
Demolition of existing trees	\$400	0	\$ -
Street Trees (per unit)	\$500	20	\$ 10,000.00
Bike lane paint (per SF)	\$3	n/a	n/a
Sub Total			\$ 10,000.00
6 ft metal bench (generic)	\$750		\$1,500
Melville Bench (Landscape Forms)	\$2,700		n/a
Poe Litter Bin (Landscape Forms)	\$2,000		n/a
Metal Litter Bin (generic)	\$800		\$1,600
Connect 2.0 Bus Shelter (Landscape Forms)	\$25,000		n/a
Bike Fixit Station (Dero)	\$1,400		n/a
Precast Concrete Curb (per LF)	\$65		n/a
Stormwater detention -1 year storm (per CF)	\$10		n/a
Perennials (per unit)	\$15		n/a
Bike Racks (per unit, generic)	\$500		\$1,000
Lighting (per unit)	\$6,000		-
Contingency at conceptual phase (30%)			30%
Total			\$ 18,330.00

LOVELL STREET STREETScape

OPINION OF PROBABLE COSTS - TIER 1

1

STREET TREES
60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



2

PLANTING



RHUS AROMATICA
FRAGRANT SUMAC



RIBES ALPINUM 'GREEN MOUND'
GREEN MOUND ALPINE CURRANT



LIRIOPE MUSCARI
LILY TURF



JUNIPERUS HORIZONTALIS
CREEPING JUNIPER

3

BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK

4

STREET LIGHTING
120 ft O.C.



5

TRANSIT AMENITIES



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

	COST	UNITS	Residential
Streetscape:			
Concrete Sidewalks (per SF)	\$7	0	\$ -
Soil- Amended (per CY) 6"	\$45	0	\$ -
Seed (per SF)	\$1	0	\$ -
Demolition of existing walks & drives(per SF)	\$3	48,000	\$ 144,000.00
Demolition of existing trees	\$400	41	\$ 16,400.00
Street Trees (per unit)	\$500	59	\$ 29,500.00
Bike lane paint (per SF)	\$3	n/a	n/a
Sub Total			\$ 189,900.00
6 ft metal bench (generic)	\$750		\$1,500
Melville Bench (Landscape Forms)	\$2,700		n/a
Poe Litter Bin (Landscape Forms)	\$2,000		n/a
Metal Litter Bin (generic)	\$800		\$1,600
Connect 2.0 Bus Shelter (Landscape Forms)	\$25,000		n/a
Bike Fixit Station (Dero)	\$1,400		n/a
Precast Concrete Curb (per LF)	\$65		n/a
Stormwater detention -1 year storm (per CF)	\$10	32,292	\$322,920
Perennials (per unit)	\$15	2622	\$39,330
Bike Racks (per unit, generic)	\$500		\$1,000
Lighting (per unit)	\$6,000		n/a
Contingency at conceptual phase (30%)			30%
Total			\$ 723,125.00

**LOVELL STREET
STREETSCAPE**

OPINION OF PROBABLE COSTS - TIER 2

1 STREET TREES 60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



SWAMP WHITE OAK
QUERCUS BICOLOR



HYBRID ELM
ULMUS 'FRONTIER'

2 PLANTING*



ANEMONE CANADENSIS
CANADA ANEMONE



POTENTILLA FRUTICOSA
SHRUBBY CINQUEFOIL



ASTER NOVAE-ANGLIAE
NEW ENGLAND ASTER



SCHIZACHYRIUM SCOPARIUM
LITTLE BLUESTEM



ECHINACEA PURPUREA
PURPLE CONEFLOWER



CORNUS SERICEA
RED OSIER DOGWOOD

3 BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK



DERO
BIKE FIXIT STATION

4 STREET LIGHTING 120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

	COST	Residential	
		UNITS	
Streetscape:			
Concrete Sidewalks (per SF)	\$7	36,000	\$ 252,000.00
Soil- Amended (per CY) 6"	\$45	2622	\$ 117,990.00
Seed (per SF)	\$1	6,954	\$ 6,954.00
Demolition of existing walks & drives(per SF)	\$3	30,000	\$ 90,000.00
Demolition of existing trees	\$400	86	\$ 34,400.00
Street Trees (per unit)	\$500	100	\$ 50,000.00
Bike lane paint (per SF)	\$3	n/a	n/a
Sub Total			\$ 551,344.00
6 ft metal bench (generic)	\$750		n/a
Melville Bench (Landscape Forms)	\$2,700		\$5,400
Poe Litter Bin (Landscape Forms)	\$2,000		\$4,000
Metal Litter Bin (generic)	\$800		n/a
Connect 2.0 Bus Shelter (Landscape Forms)	\$25,000		\$50,000
Bike Fixit Station (Dero)	\$1,400		\$2,800
Precast Concrete Curb (per LF)	\$65		n/a
Stormwater detention -1 year storm (per CF)	\$10	139,158	\$1,391,580
Perennials (per unit)	\$15	2622	\$39,330
Bike Racks (per unit, generic)	\$500		\$1,000
Lighting (per unit)	\$6,000	50	\$ 300,000.00
Contingency at conceptual phase (30%)			30%
Total			\$ 3,049,090.20

LOVELL STREET STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 3

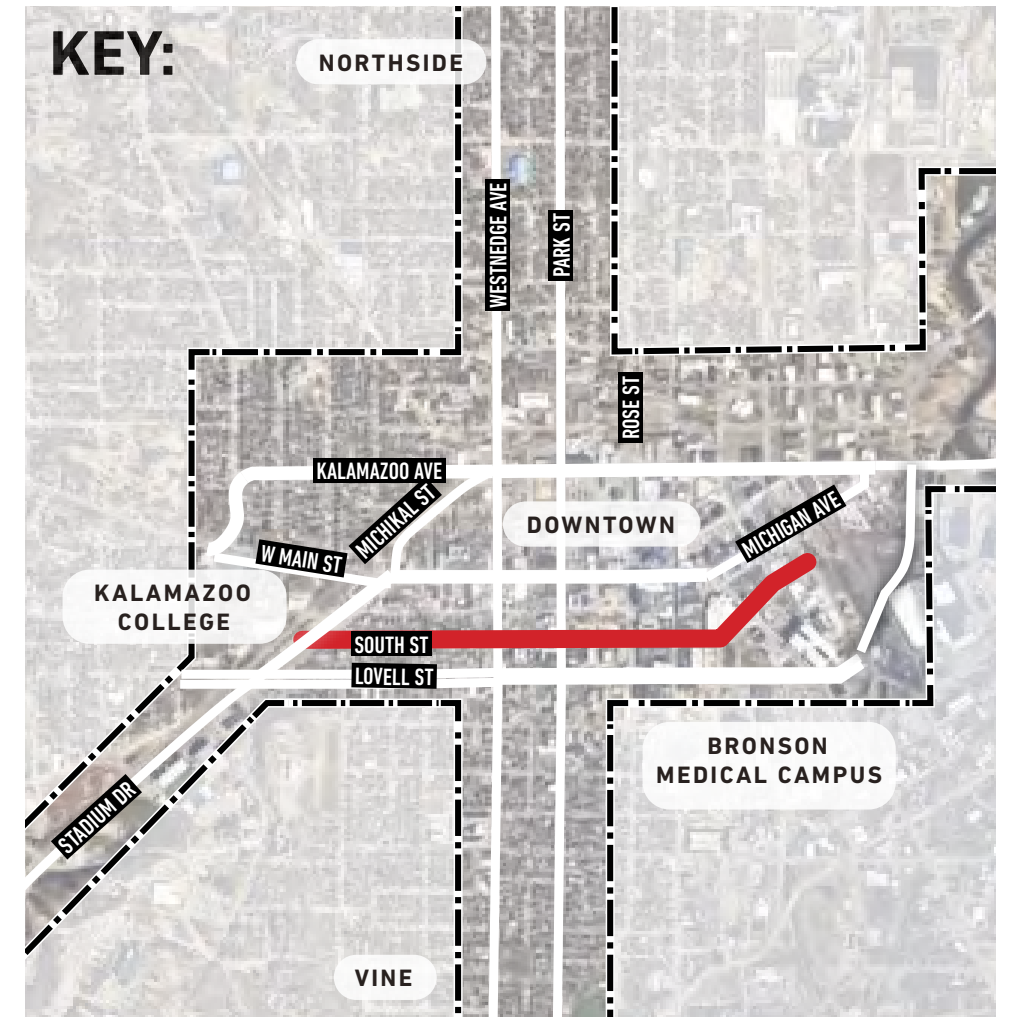
SOUTH STREET STREETSCAPE

Existing conditions

South Street is a varying, one-way road. It is identified as a transit connector, and a strong pedestrian connection for near-Downtown residents. There are a high number of driveways for businesses and residential homes. Tree plantings increase in the west, but fade out in the east. Sporadic area lights provide nighttime visibility for vehicles. South Street is primed to be the parallel transit route in comparison to Lovell Street, which will accommodate cyclists.

Streetscape goals

- Convert vehicular traffic flow from **one-way to two-way**.
- Enhance **multi-modal safety** and experience through wider sidewalks and/or bike lane.
- Increase **tree canopy** and/or green space, where possible.
- Upgrade or replace **lighting** and include pedestrian-level lighting.
- **Increase safety for pedestrians** at crossings, driveways.
- Concentrate **transit stops** near intersections.



Potential Streetscape Improvements:



Street trees



Street furniture



Multi modal amenities



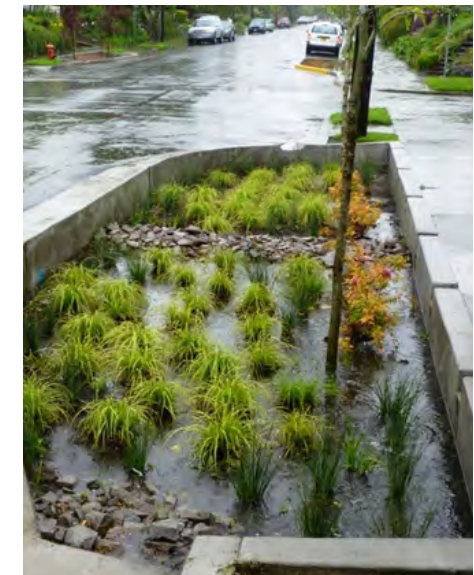
Lighting



Transit shelters



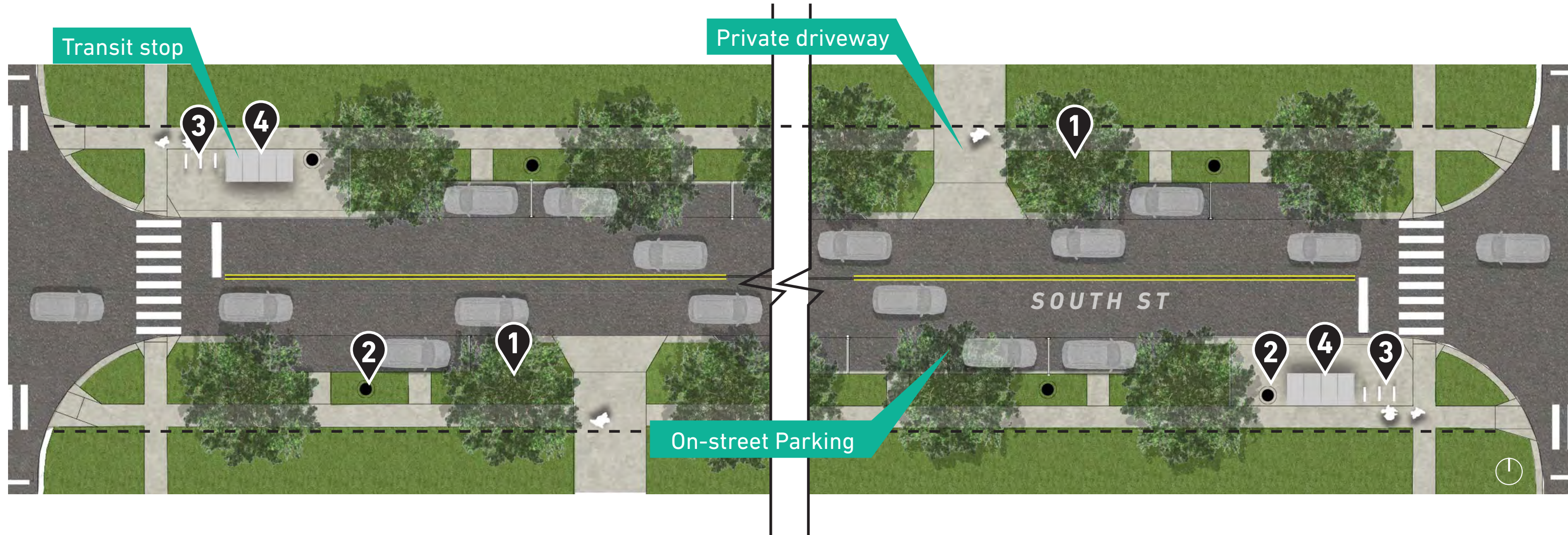
Enhanced landscape



Green infrastructure

LOWER COST

HIGHER COST



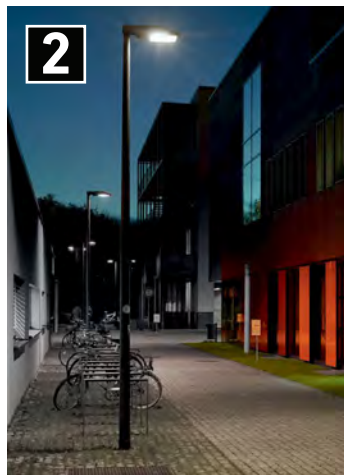
PROS

- Updates street lighting
- Maximizes street tree canopy
- Transit/multi-modal amenities concentrated at intersections
- Retains on-street parking

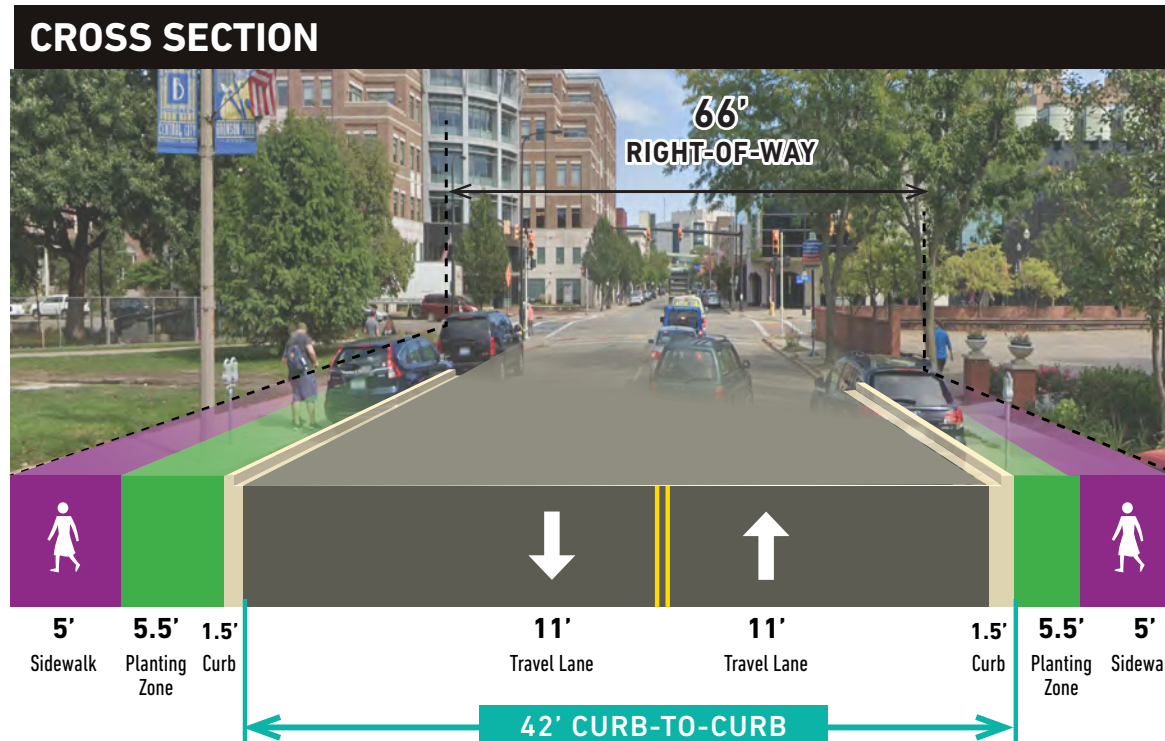


CONS

- Conflict points between driveways and pedestrians
- No bike accommodations (Lovell Street as bike connection)



SOUTH STREET (DOWNTOWN) STREETSCAPE



1 STREET TREES

60 ft O.C.

SMALL TO MEDIUM TREES UNDER UTILITIES



AMERICAN HORNBEAM
CARPINUS CAROLINIANA



TRIDENT MAPLE
ACER BUERGERIANUM

2 STREET LIGHTING

120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

3 BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK

4 TRANSIT AMENITIES



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

	Downtown	
	UNITS	
Streetscape:		
Concrete Sidewalks (per SF)	34,030	\$ 238,210.00
Soil- Amended (per CY) 6"	1139	\$ 51,255.00
Seed (per SF)	n/a	n/a
Demolition of existing walks & drives(per SF)	34,030	\$ 102,090.00
Demolition of existing trees	n/a	n/a
Street Trees (per unit)	112	\$ 56,000.00
Bike lane paint (per SF)	n/a	n/a
Sub Total		\$ 447,555.00
6 ft metal bench (generic)	4	\$3,000
Melville Bench (Landscape Forms)	n/a	n/a
Poe Litter Bin (Landscape Forms)	n/a	n/a
Metal Litter Bin (generic)	n/a	n/a
Connect 2.0 Bus Shelter (Landscape Forms)	n/a	n/a
Bike Fixit Station (Dero)	n/a	n/a
Precast Concrete Curb (per LF)	n/a	n/a
Stormwater detention -1 year storm (per CF)	n/a	n/a
Perennials (per unit)	15375	\$230,625
Bike Racks (per unit, generic)	4	\$2,000
Lighting (per unit)	28	\$ 168,000.00
Contingency at conceptual phase (30%)		30%
Total		\$ 1,106,534.00

SOUTH STREET (DOWNTOWN) STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 1

1 STREET TREES 60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



SWAMP WHITE OAK
QUERCUS BICOLOR



HYBRID ELM
ULMUS 'FRONTIER'

2 PLANTING*



ANEMONE CANADENSIS
CANADA ANEMONE



POTENTILLA FRUTICOSA
SHRUBBY CINQUEFOIL



ASTER NOVAE-ANGLIAE
NEW ENGLAND ASTER



SCHIZACHYRIUM SCOPARIUM
LITTLE BLUESTEM



ECHINACEA PURPUREA
PURPLE CONEFLOWER



CORNUS SERICEA
RED OSIER DOGWOOD

3 BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK

4 STREET LIGHTING 120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

5 TRANSIT AMENITIES



LANDSCAPE FORMS
CONNECT 2.0

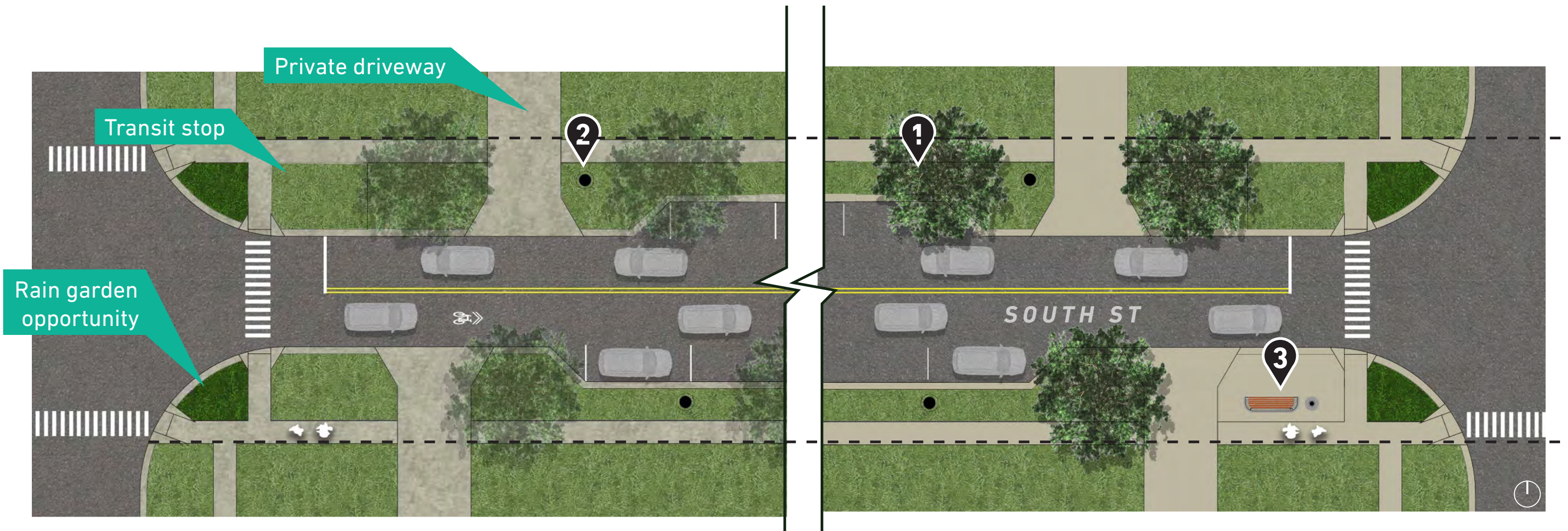


LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

	Downtown	
	UNITS	
Streetscape:		
Concrete Sidewalks (per SF)	34,030	\$ 238,210.00
Soil- Amended (per CY) 6"	1,139	\$ 51,255.00
Seed (per SF)	n/a	n/a
Demolition of existing walks & drives(per SF)	34,030	\$ 102,090.00
Demolition of existing trees	n/a	n/a
Street Trees (per unit)	112	\$ 56,000.00
Bike lane paint (per SF)	n/a	n/a
Sub Total		\$ 447,555.00
6 ft metal bench (generic)	n/a	n/a
Melville Bench (Landscape Forms)	4	\$ 10,800.00
Poe Litter Bin (Landscape Forms)	n/a	n/a
Metal Litter Bin (generic)	n/a	n/a
Connect 2.0 Bus Shelter (Landscape Forms)	4	\$ 100,000.00
Bike Fixit Station (Dero)	n/a	n/a
Precast Concrete Curb (per LF)	n/a	n/a
Stormwater detention -1 year storm (per CF)	n/a	n/a
Perennials (per unit)	15375	\$ 230,625.00
Bike Racks (per unit, generic)	4	\$ 2,000.00
Lighting (per unit)	28	\$168,000
Contingency at conceptual phase (30%)		30%
Total		\$ 1,246,674.00

SOUTH STREET (DOWNTOWN) STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 2

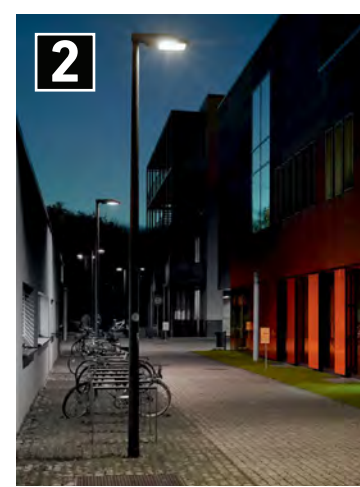


PROS

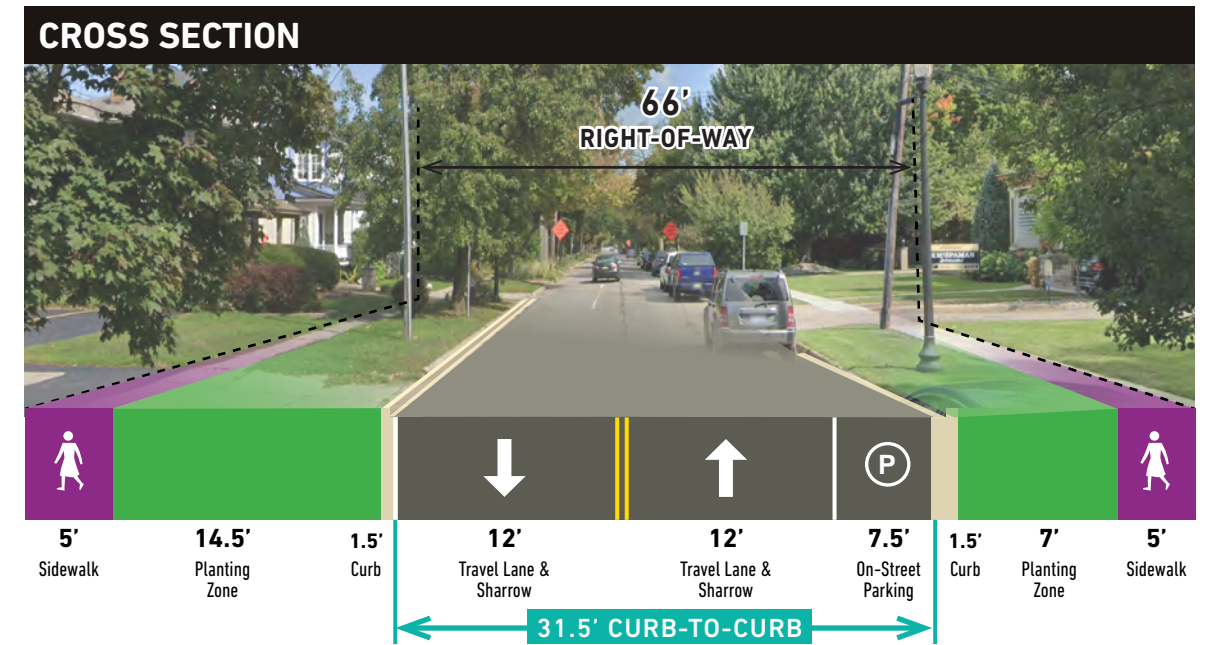
- Maximizes green space, minimizes impervious surfaces
- Reduces crossing distances
- Updates street lighting
- Provides most street trees
- Transit stop amenities, concentrated at intersections

CONS

- Conflict points between driveways and pedestrians
- No bike accommodations (Lovell Street as bike connection)



SOUTH STREET (RESIDENTIAL) STREETScape



1 STREET TREES

60 ft O.C.

SMALL TO MEDIUM TREES UNDER UTILITIES



AMERICAN HORNBEAM
CARPINUS CAROLINIANA



TRIDENT MAPLE
ACER BUERGERIANUM

2 STREET LIGHTING

120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

3 BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK

4 TRANSIT AMENITIES



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

	Residential	
Streetscape:	UNITS	
Concrete Sidewalks (per SF)	8775	\$ 61,425.00
Soil- Amended (per CY) 6"	92	\$ 4,140.00
Seed (per SF)	n/a	n/a
Demolition of existing walks & drives(per SF)	8,775	\$ 26,325.00
Demolition of existing trees	n/a	n/a
Street Trees (per unit)	60	\$ 30,000.00
Bike lane paint (per SF)	n/a	n/a
Sub Total		\$ 121,890.00
6 ft metal bench (generic)	\$2	\$1,500
Melville Bench (Landscape Forms)	n/a	n/a
Poe Litter Bin (Landscape Forms)	n/a	n/a
Metal Litter Bin (generic)	n/a	n/a
Connect 2.0 Bus Shelter (Landscape Forms)	n/a	n/a
Bike Fixit Station (Dero)	n/a	n/a
Precast Concrete Curb (per LF)	n/a	n/a
Stormwater detention -1 year storm (per CF)	n/a	n/a
Perennials (per unit)	1230	\$18,450
Bike Racks (per unit, generic)	2	\$1,000
Lighting (per unit)	14	\$ 84,000.00
Contingency at conceptual phase (30%)		30%
Total		\$ 294,892.00

SOUTH STREET (RESIDENTIAL) STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 1

1 STREET TREES 60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



SWAMP WHITE OAK
QUERCUS BICOLOR



HYBRID ELM
ULMUS 'FRONTIER'

2 PLANTING*



ANEMONE CANADENSIS
CANADA ANEMONE



POTENTILLA FRUTICOSA
SHRUBBY CINQUEFOIL



ASTER NOVAE-ANGLIAE
NEW ENGLAND ASTER



SCHIZACHYRIUM SCOPARIUM
LITTLE BLUESTEM



ECHINACEA PURPUREA
PURPLE CONEFLOWER



CORNUS SERICEA
RED OSIER DOGWOOD

3 BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK



DERO
BIKE FIXIT STATION

4 STREET LIGHTING 120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

5 TRANSIT AMENITIES



LANDSCAPE FORMS
CONNECT 2.0



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

	Residential	
	UNITS	
Streetscape:		
Concrete Sidewalks (per SF)	8775	\$ 61,425.00
Soil- Amended (per CY) 6"	92	\$ 4,140.00
Seed (per SF)	n/a	n/a
Demolition of existing walks & drives(per SF)	8,775	\$ 26,325.00
Demolition of existing trees	n/a	n/a
Street Trees (per unit)	60	\$ 30,000.00
Bike lane paint (per SF)	n/a	n/a
Sub Total		\$ 121,890.00
6 ft metal bench (generic)	n/a	n/a
Melville Bench (Landscape Forms)	2	\$5,400
Poe Litter Bin (Landscape Forms)	n/a	n/a
Metal Litter Bin (generic)	n/a	n/a
Connect 2.0 Bus Shelter (Landscape Forms)	2	\$50,000
Bike Fixit Station (Dero)	n/a	n/a
Precast Concrete Curb (per LF)	n/a	n/a
Stormwater detention -1 year storm (per CF)	n/a	n/a
Perennials (per unit)	1230	\$18,450
Bike Racks (per unit, generic)	2	\$1,000
Lighting (per unit)	14	\$84,000
Contingency at conceptual phase (30%)		30%
Total		\$ 364,962.00

SOUTH STREET (RESIDENTIAL) STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 2

MICHIGAN AVENUE STREETSCAPE

Existing conditions

Michigan Avenue currently is a one-way thoroughfare through downtown. It has a large, 98 foot Right-of-Way with four one-way travel lanes and on-street parking. Sidewalks are in various levels of repair and styles. There are a large number of access driveways and sparse number of trees. Lighting is either achieved through large area lights or city standard pedestrian light poles.

Streetscape goals

- Convert vehicular traffic flow from **one-way to two-way**.
- Enhance **multi-modal safety** and experience through wider sidewalks and/or bike lane.
- Increase **tree canopy** and/or green space, where possible.
- Upgrade or replace **lighting** and include pedestrian level lighting.
- **Increase safety for pedestrians** at crossings, driveways.
- Concentrate **transit stops** near intersections.



Potential Streetscape Improvements:



Street trees



Street furniture



Raised cycle lane



Tree planters



Enhanced landscape



Multi modal amenities



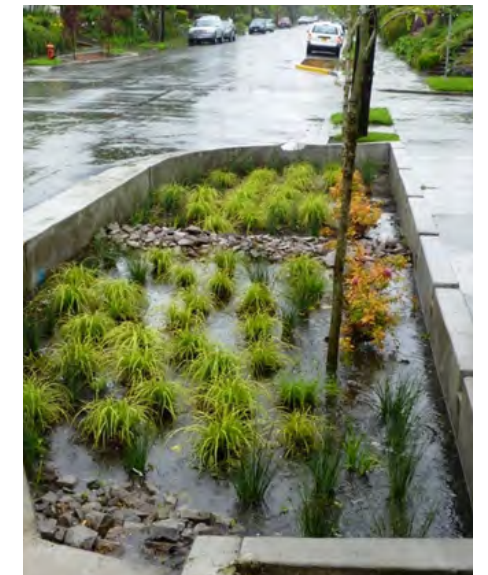
Lighting



Bike repair stations



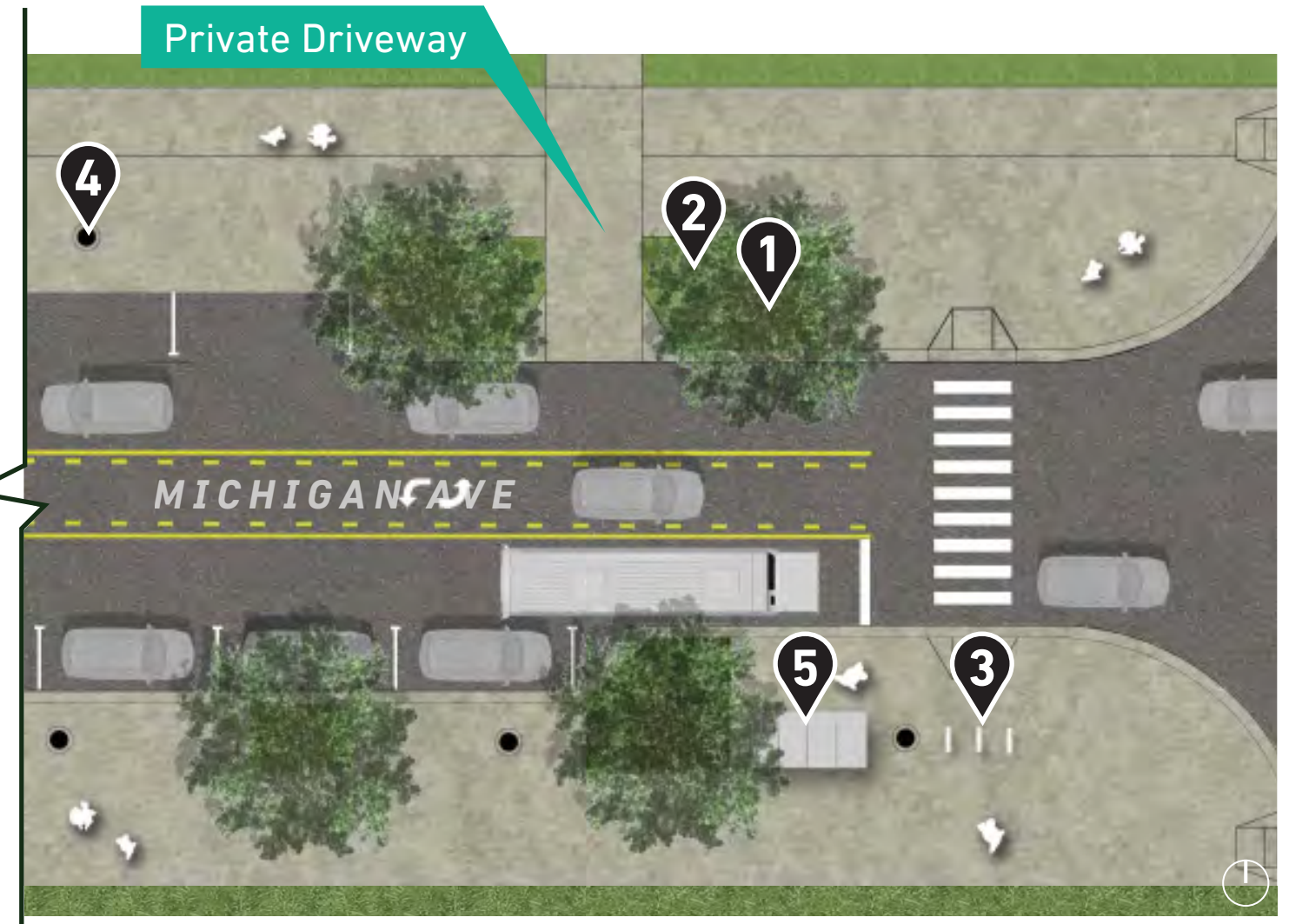
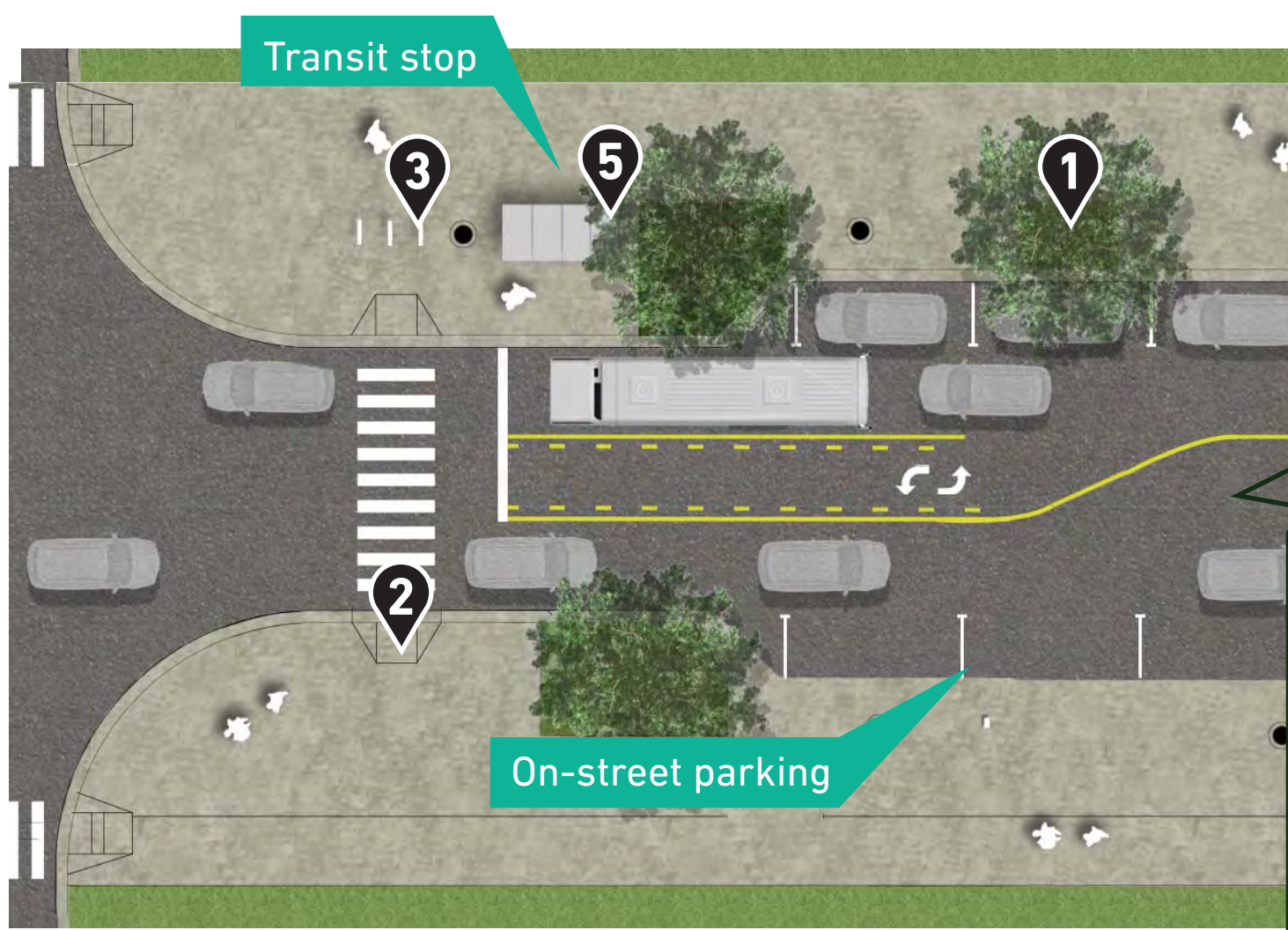
Transit stop shelters



Green infrastructure

LOWER COST

HIGHER COST



PROS

- Widened sidewalks
- Center turn lane configuration
- On-street parking
- Updates street lighting
- Maximizes street trees
- Opportunities for rain gardens in bump outs, intersections
- Transit, multi-modal amenities, concentrated at intersections

CONS

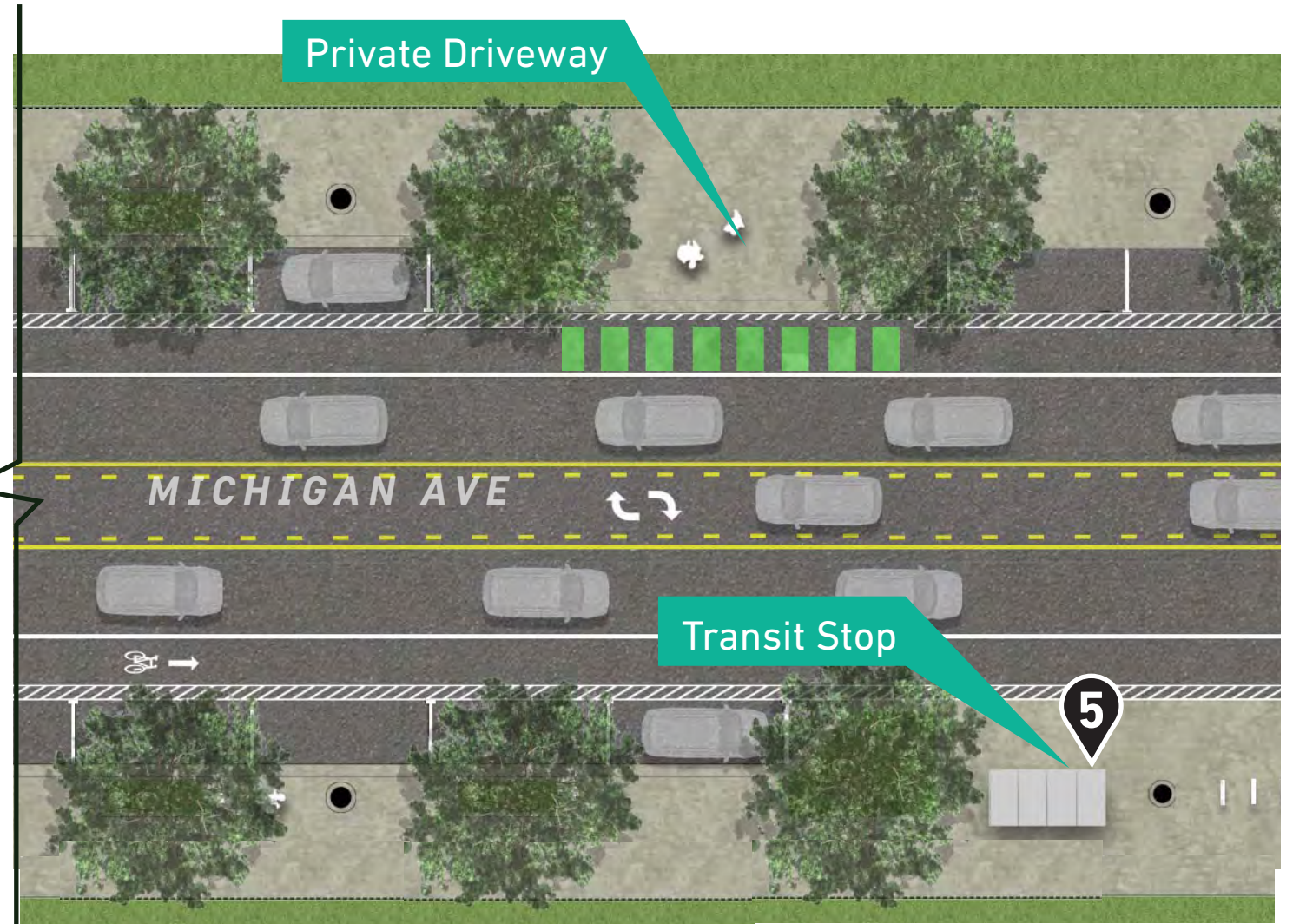
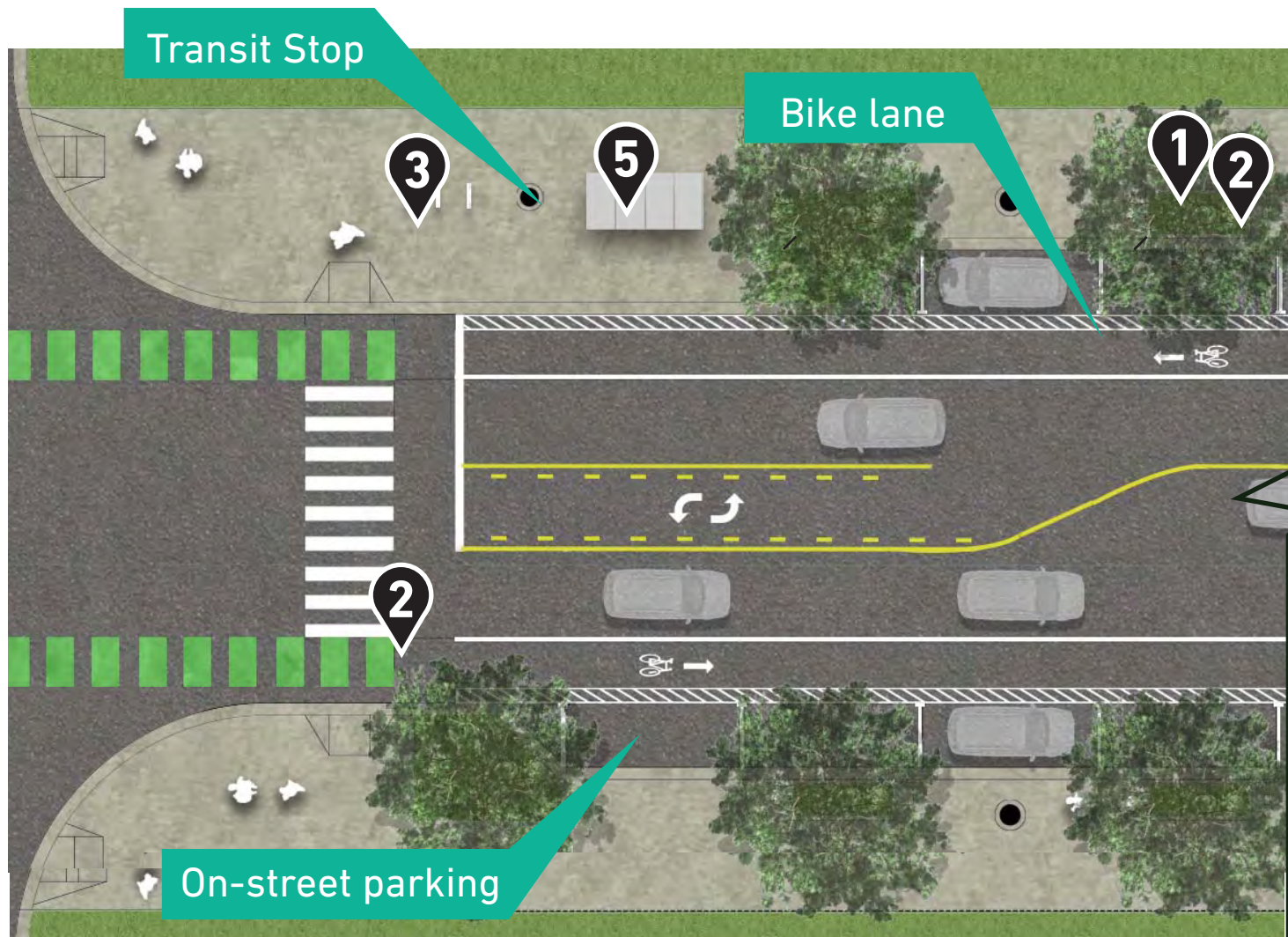
- High impervious surface area
- Cost



MICHIGAN AVE ALT 1 STREETSCAPE

CROSS SECTION ALTERNATIVE 1 [ONE EASTBOUND THROUGH LANE]





PROS

- Widened sidewalks
- Left/right turn lane configuration
- On-street parking
- Updates street lighting
- Maximizes street trees
- Opportunities for rain gardens in bump outs, intersections



CONS

- High impervious surface area
- Cost

MICHIGAN AVE ALT 2 STREETSCAPE

CROSS SECTION ALTERNATIVE 2 [TWO EASTBOUND THROUGH LANES]



1

STREET TREES
60 ft O.C.



SWAMP WHITE OAK
QUERCUS BICOLOR



HONEY LOCUST
GLEDITSIA TRIACANTHOS



HYBRID ELM
ULMUS 'FRONTIER'

2

PLANTING



SEEDED TURF

3

BIKE FACILITIES



VICTOR STANLEY
BIKE RACK

4

STREET LIGHTING
120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

	COST	Alt 1: One Eastbound Through Lane		Alt 2: Two Eastbound Through Lanes	
		UNITS		UNITS	
Streetscape:					
Concrete Sidewalks (per SF)	\$7	54,000	\$ 378,000.00	54,000	\$ 378,000.00
Soil- Amended (per CY) 6"	\$45	3,036	\$ 136,620.00	3,036	\$ 136,620.00
Seed (per SF)	\$1	100,000	\$ 100,000.00	100,000	\$ 100,000.00
Demolition of existing walks & drives(per SF)	\$3	48,000	\$ 144,000.00	48,000	\$ 144,000.00
Demolition of existing trees	\$400	82	\$ 32,800.00	82	\$ 32,800.00
Street Trees (per unit)	\$500	167	\$ 83,500.00	167	\$ 83,500.00
Bike lane paint (per SF)	\$3	n/a	n/a	n/a	n/a
Sub Total			\$ 874,920.00		\$ 874,920.00
6 ft metal bench (generic)	\$750		\$3,000		\$3,000
Melville Bench (Landscape Forms)	\$2,700		n/a		n/a
Poe Litter Bin (Landscape Forms)	\$2,000		n/a		n/a
Metal Litter Bin (generic)	\$800		\$3,200		\$3,200
Connect 2.0 Bus Shelter (Landscape Forms)	\$25,000		n/a		n/a
Bike Fixit Station (Dero)	\$1,400		n/a		n/a
Precast Concrete Curb (per LF)	\$65		n/a		n/a
Stormwater detention -1 year storm (per CF)	\$10		n/a		n/a
Perennials (per unit)	\$15	3340	\$50,100	3340	\$50,100
Bike Racks (per unit, generic)	\$500		\$2,000		\$2,000
Lighting (per unit)	\$6,000	0	-	0	-
Contingency at conceptual phase (30%)			30%		30%
Total			\$ 1,213,186.00		\$ 1,213,186.00

**MICHIGAN AVE
STREETSCAPE**

OPINION OF PROBABLE COSTS - TIER 1

1

STREET TREES

60 ft O.C.



SWAMP WHITE OAK
QUERCUS BICOLOR



HONEY LOCUST
GLEDITSIA TRIACANTHOS



HYBRID ELM
ULMUS 'FRONTIER'

2

PLANTING



RHUS AROMATICA
FRAGRANT SUMAC



RIBES ALPINUM 'GREEN MOUND'
GREEN MOUND ALPINE CURRANT



LIRIOPE MUSCARI
LILY TURF



JUNIPERUS HORIZONTALIS
CREEPING JUNIPER

3

BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK

4

STREET LIGHTING

120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

5

TRANSIT AMENITIES



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

	COST	Alt 1: One Eastbound Through Lane		Alt 2: Two Eastbound Through Lanes	
		UNITS		UNITS	
Streetscape:					
Concrete Sidewalks (per SF)	\$7	60,000	\$ 420,000.00	60,000	\$ 420,000.00
Soil- Amended (per CY) 6"	\$45	3,036	\$ 136,620.00	3,036	\$ 136,620.00
Seed (per SF)	\$1	0	\$ -	0	\$ -
Demolition of existing walks & drives(per SF)	\$3	48,000	\$ 144,000.00	48,000	\$ 144,000.00
Demolition of existing trees	\$400	82	\$ 32,800.00	82	\$ 32,800.00
Street Trees (per unit)	\$500	167	\$ 83,500.00	167	\$ 83,500.00
Bike lane paint (per SF)	\$3	n/a	n/a	n/a	n/a
Sub Total			\$ 816,920.00		\$ 816,920.00
6 ft metal bench (generic)	\$750		\$3,000		\$3,000
Melville Bench (Landscape Forms)	\$2,700		n/a		n/a
Poe Litter Bin (Landscape Forms)	\$2,000		n/a		n/a
Metal Litter Bin (generic)	\$800		\$3,200		\$3,200
Connect 2.0 Bus Shelter (Landscape Forms)	\$25,000		n/a		n/a
Bike Fixit Station (Dero)	\$1,400		n/a		n/a
Precast Concrete Curb (per LF)	\$65		n/a		n/a
Stormwater detention -1 year storm (per CF)	\$10	77,004	\$770,040	77,004	\$770,040
Perennials (per unit)	\$15	25516	\$382,740	25516	\$382,740
Bike Racks (per unit, generic)	\$500		\$2,000		\$2,000
Lighting (per unit)	\$6,000	42	\$ 252,000.00	42	\$ 252,000.00
Contingency at conceptual phase (30%)			30%		30%
Total			\$ 2,898,870.00		\$ 2,898,870.00

MICHIGAN AVE STREETScape

OPINION OF PROBABLE COSTS - TIER 2

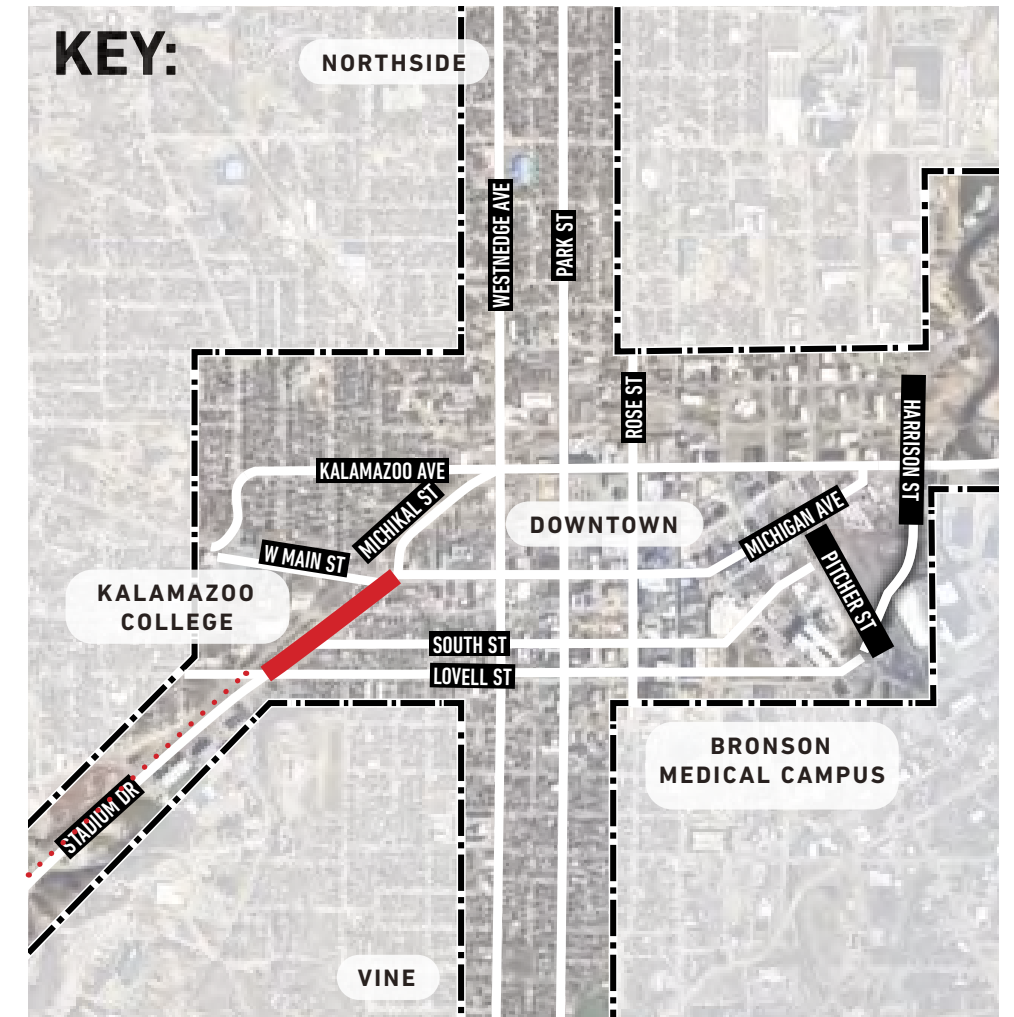
STADIUM DRIVE STREETSCAPE

Existing conditions

Stadium Drive is a vehicular-focused road streamlining traffic in and out of downtown. It has a large, 238 foot Right-of-Way with two travel lanes in each direction, as well as a center turn lane and shoulders. Where there are sidewalks, they are in various levels of repair and widths. There is no existing standard of landscape or tree plantings. Lighting is achieved through large area lights.

Streetscape goals

- Convert vehicular traffic flow from **one-way to two-way**.
- Enhance **multi-modal safety** and experience through wider sidewalks and/or bike lane.
- Increase **tree canopy** and/or green space, where possible.
- Upgrade or replace **lighting** and include pedestrian level lighting.
- **Increase safety for pedestrians** at crossings, driveways.
- Concentrate **transit stops** near intersections.



Potential Streetscape Improvements:



Street trees



Street furniture



Raised cycle lane



Tree planters



Enhanced landscape



Multi modal amenities



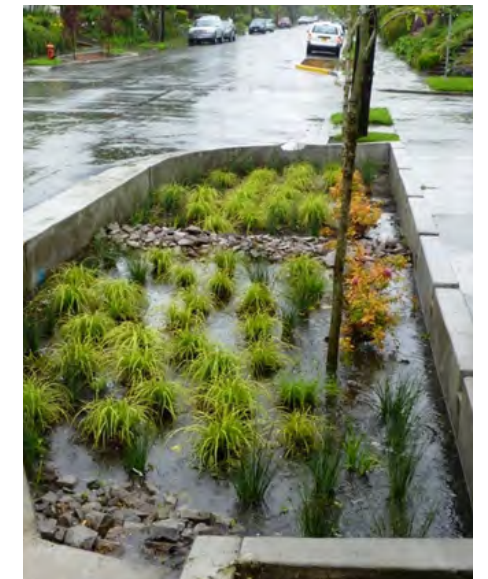
Lighting



Bike repair stations



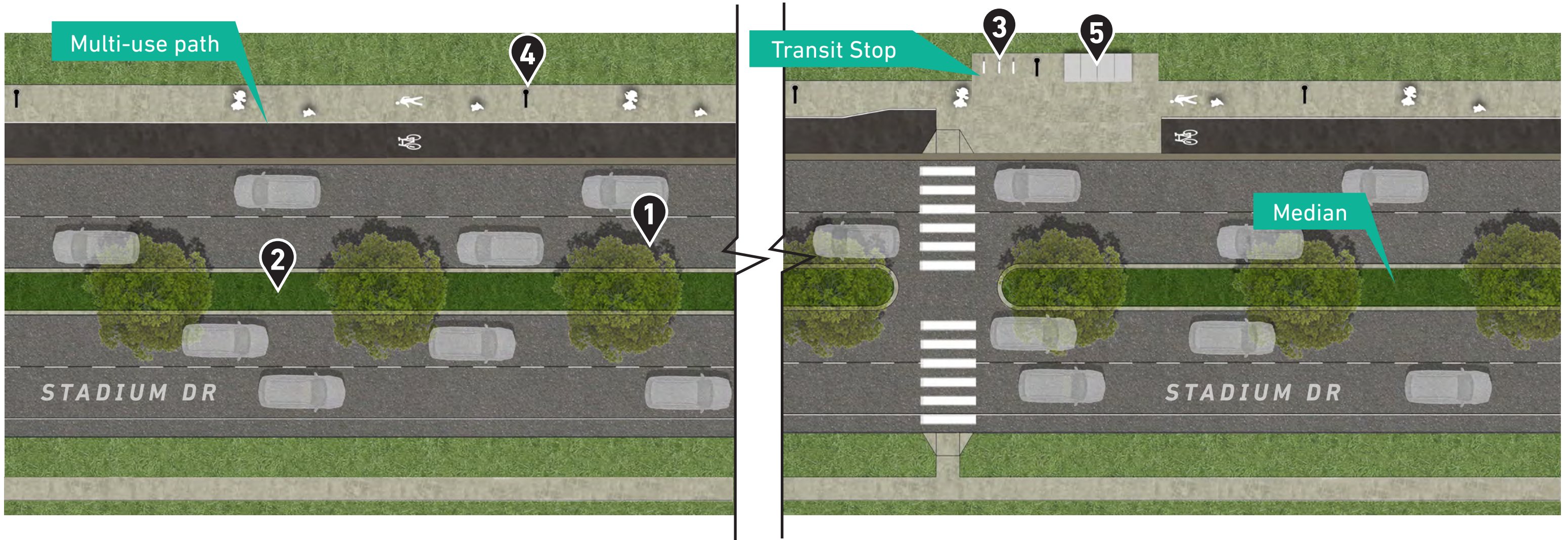
Transit stop shelters



Green infrastructure

LOWER COST

HIGHER COST



PROS

- Median creates gateway boulevard aesthetic
- Updates street lighting for pedestrians and vehicles
- Maximizes street trees
- Wide multi-use path

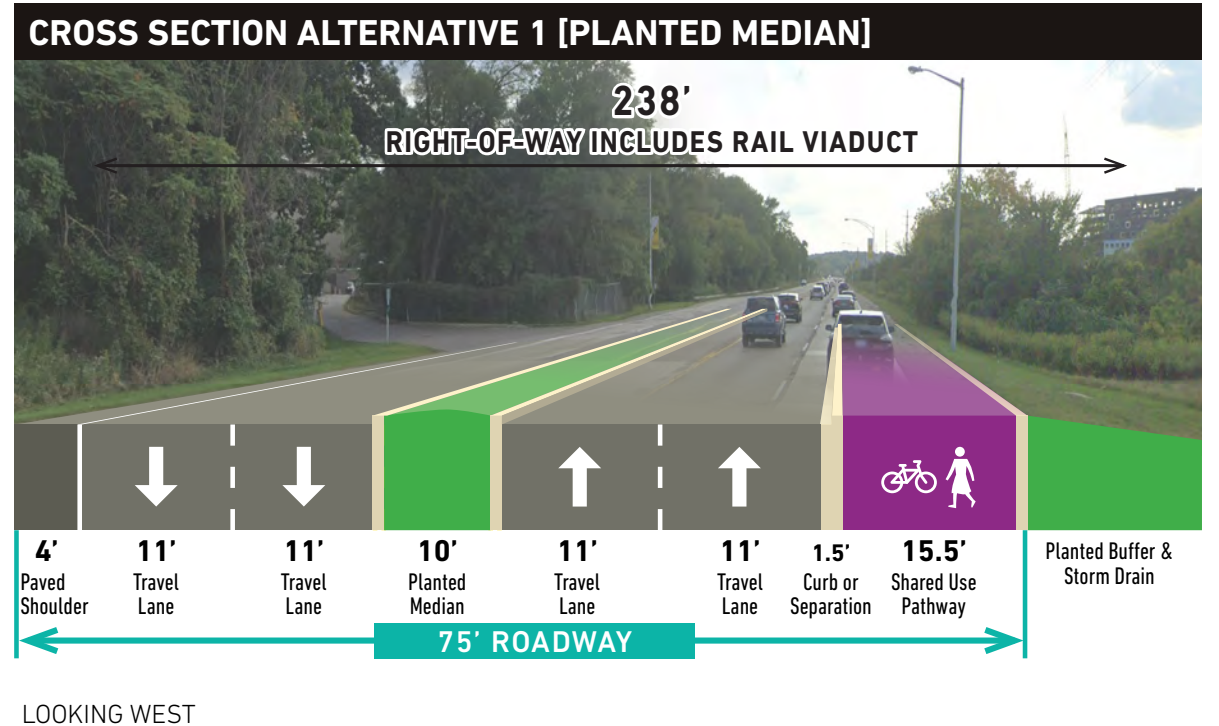


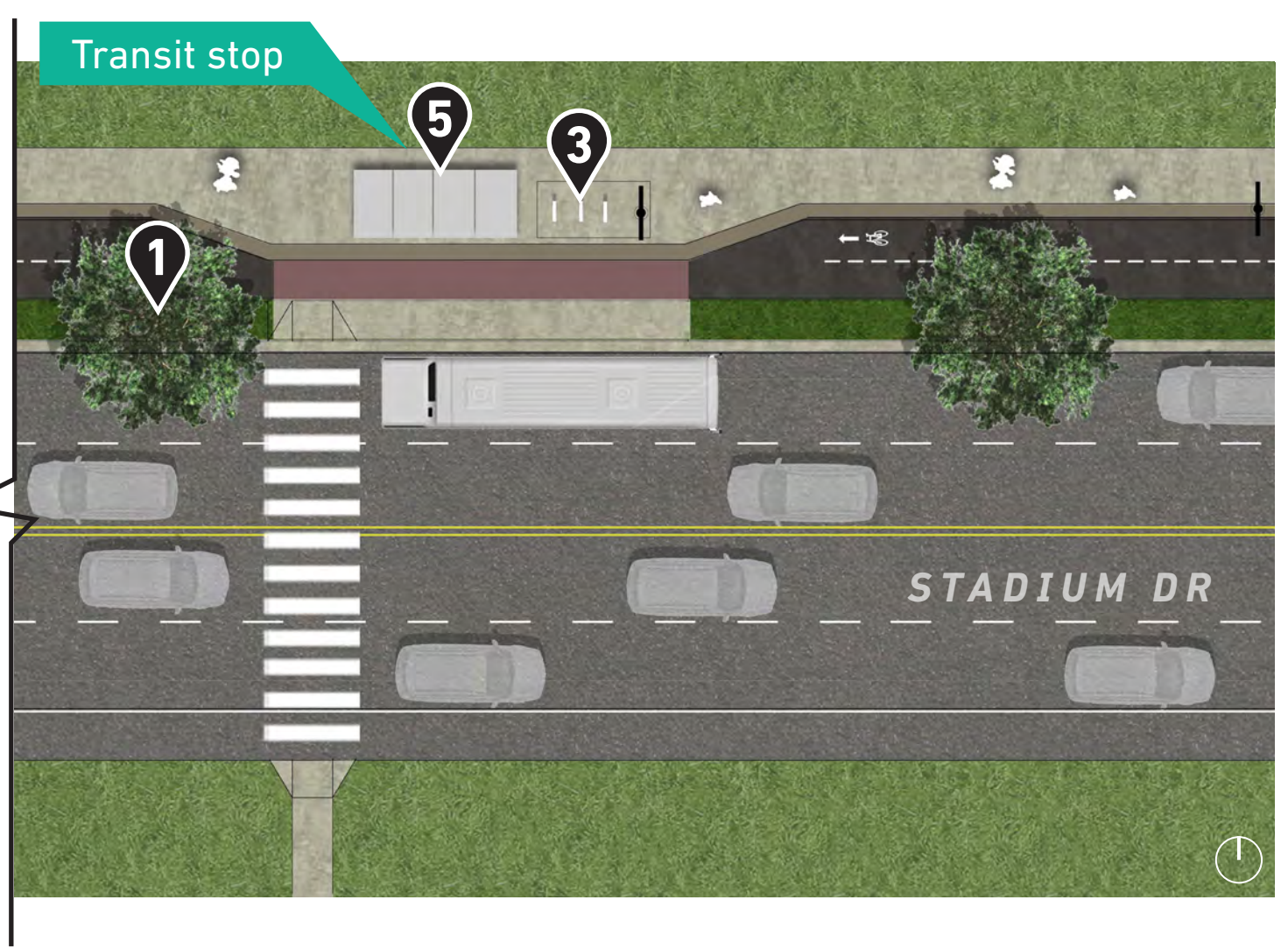
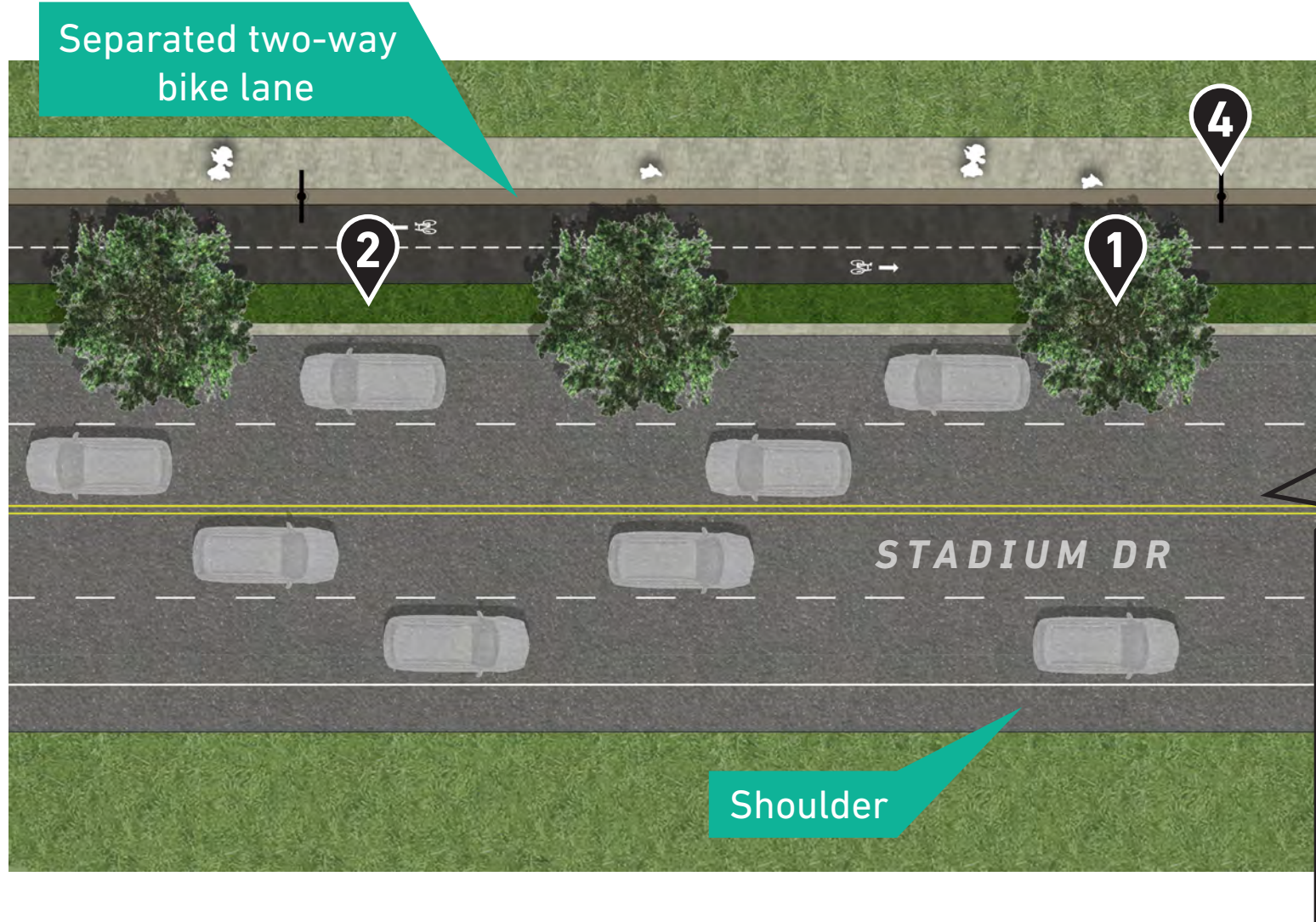
CONS

- No center turn lane
- No buffer between bike lane and road
- No separation between pedestrian walk and bike lane



STADIUM DRIVE ALT 1 STREETSCAPE





PROS

- Separation of bike lanes and pedestrian
- Updates street lighting for pedestrians and vehicles
- Maximizes street trees
- Transit/Multimodal amenities

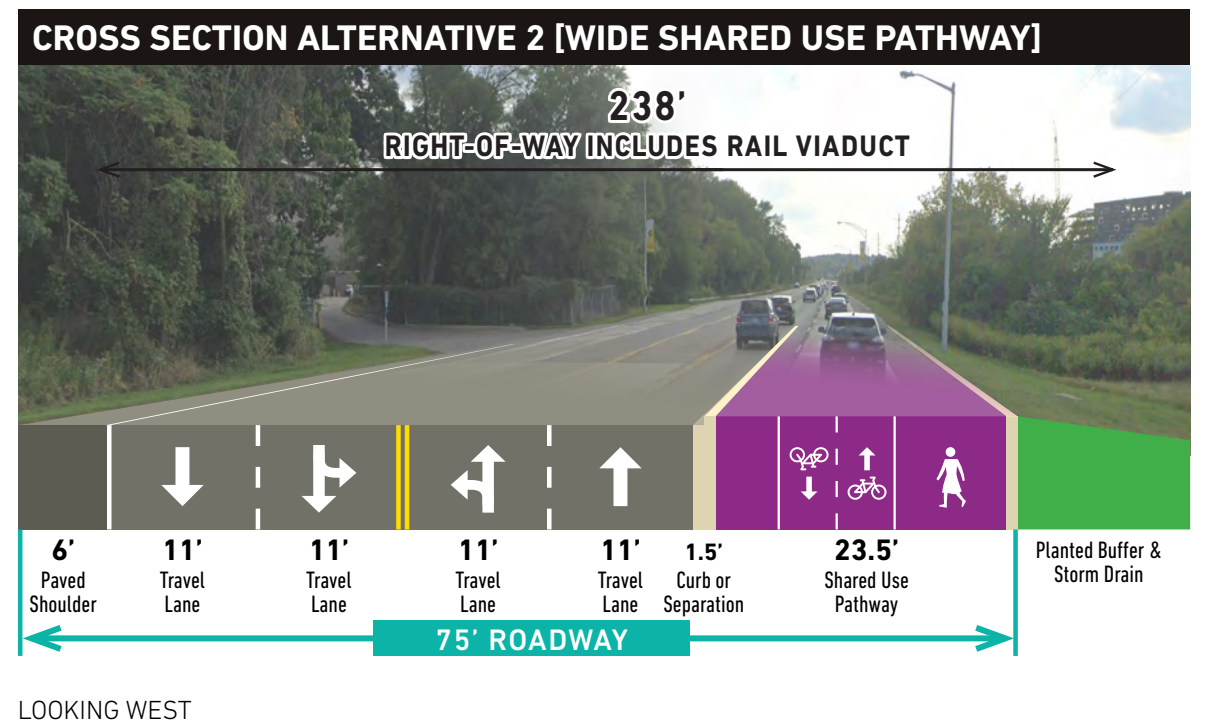


CONS

- Four-lane cross section
- Street trees only on north side



**STADIUM DRIVE ALT 2
STREETSCAPE**



1 STREET TREES 60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



SWAMP WHITE OAK
QUERCUS BICOLOR



HYBRID ELM
ULMUS 'FRONTIER'

2 PLANTING



SEEDED TURF

3 BIKE FACILITIES



VICTOR STANLEY
BIKE RACK



CONCRETE
RAISED BIKE LANE

4 STREET LIGHTING 120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

5 TRANSIT AMENITIES



VICTOR STANLEY
BENCH & TRASH BIN



		Alt 1: Planted Median		Alt 2: Wide Shared Use Pathway	
		UNITS		UNITS	
Streetscape:					
Concrete Sidewalks (per SF)	\$7	8,330	\$ 58,310.00	10,730	\$ 75,110.00
Concrete Bike Path (per SF)	\$7	n/a	n/a	n/a	n/a
Colored Concrete Bike Path (per SF)	\$8	n/a	n/a	n/a	n/a
Asphalt Pvmt - Bike Path, 3" Thick, single course (SY)	\$45	1,778	\$ 80,010.00	1,778	\$ 80,010.00
Paver Strip (SF)	\$15	n/a	n/a	3,200	\$ 48,000.00
Soil- Amended (per CY) 6"	\$45	238	\$ 10,710.00	149	\$ 6,705.00
Seed (per SF)	\$1	12,800	\$ 12,800.00	8,000	\$ 8,000.00
Demolition of existing walks & drives(per SF)	\$3	8,300	\$ 24,900.00	8,300	\$ 24,900.00
Demolition of existing trees	\$400	10	\$ 4,000.00	10	\$ 4,000.00
Street Trees (per unit)	\$500	27	\$ 13,500.00	27	\$ 13,500.00
Bike lane paint (per SF)	\$3	n/a	n/a	1600	\$ 4,800.00
Sub Total			\$ 204,230.00		\$ 265,025.00
6 ft metal bench (generic)	\$750	\$2	\$1,500	\$2	\$1,500
Melville Bench (Landscape Forms)	\$2,700	n/a		n/a	
Poe Litter Bin (Landscape Forms)	\$2,000	n/a		n/a	
Metal Litter Bin (generic)	\$800	2	\$1,600	2	\$1,600
Connect 2.0 Bus Shelter (Landscape Forms)	\$25,000	n/a		n/a	
Bike Fixit Station (Dero)	\$1,400	n/a		n/a	
Precast Concrete Curb (per LF)	\$65	n/a	n/a	n/a	n/a
Stormwater detention -1 year storm (per CF)	\$10	n/a	n/a	n/a	n/a
Perennials (per unit)	\$15	n/a	n/a	n/a	n/a
Bike Racks (per unit, generic)	\$500	2	\$1,000	2	\$1,000
Lighting (per unit)	\$6,000	13	\$12,000	13	\$ 78,000.00
Contingency at conceptual phase (30%)			30%		30%
Total			\$ 286,429.00		\$ 451,262.50

STADIUM DRIVE STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 1

Stadium Drive Multi-Use Path Continuation (Lovell To Howard)	COST	Bike Path Extension	
		UNITS	
Streetscape:			
Asphalt Pvmt - Bike Path, 3" Thick, single course (SY)	\$45	7,008	\$ 315,360.00
Concrete Bike Path (per SF)	\$7	n/a	n/a
Colored Concrete Bike Path (per SF)	\$8	n/a	n/a
Street Trees (per unit)	\$500	105	\$ 52,500.00
Lighting (per unit)	\$6,000	52	\$312,000
Contingency at conceptual phase (30%)			30%
Total			\$ 883,818.00

1 STREET TREES 60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



SWAMP WHITE OAK
QUERCUS BICOLOR



HYBRID ELM
ULMUS 'FRONTIER'

2 PLANTING



RHUS AROMATICA
FRAGRANT SUMAC



RIBES ALPINUM 'GREEN MOUND'
GREEN MOUND ALPINE CURRANT



LIRIOPE MUSCARI
LILY TURF



JUNIPERUS HORIZONTALIS
CREEPING JUNIPER

3 BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK



ASPHALT
RAISED BIKE LANE

4 STREET LIGHTING 120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

5 TRANSIT AMENITIES



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

	Alt 1: Planted Median		Alt 2: Wide Shared Use Pathway	
	UNITS		UNITS	
Streetscape:				
Concrete Sidewalks (per SF)	8,330	\$ 58,310.00	10,730	\$ 75,110.00
Concrete Bike Path (per SF)	16,000	\$ 112,000.00	16,000	\$ 112,000.00
Colored Concrete Bike Path (per SF)	n/a	n/a	n/a	n/a
Asphalt Pvmnt - Bike Path, 3" Thick, single course (SY)	n/a	n/a	n/a	n/a
Paver Strip (SF)	n/a	n/a	3,200	\$ 48,000.00
Soil- Amended (per CY) 6"	238	\$ 10,710.00	149	\$ 6,705.00
Seed (per SF)	12,800	\$ 12,800.00	8,000	\$ 8,000.00
Demolition of existing walks & drives(per SF)	8,300	\$ 24,900.00	8,300	\$ 24,900.00
Demolition of existing trees	10	\$ 4,000.00	10	\$ 4,000.00
Street Trees (per unit)	27	\$ 13,500.00	27	\$ 13,500.00
Bike lane paint (per SF)	n/a	n/a	1600	\$ 4,800.00
Sub Total		\$ 236,220.00		\$ 292,215.00
6 ft metal bench (generic)	\$2	\$1,500	2	\$1,500
Melville Bench (Landscape Forms)		\$0	n/a	
Poe Litter Bin (Landscape Forms)		\$0	n/a	
Metal Litter Bin (generic)	2	\$1,600	2	\$1,600
Connect 2.0 Bus Shelter (Landscape Forms)		\$0	n/a	
Bike Fixit Station (Dero)		\$0	n/a	
Precast Concrete Curb (per LF)			n/a	
Stormwater detention -1 year storm (per CF)			n/a	
Perennials (per unit)			n/a	
Bike Racks (per unit, generic)	2	\$1,000	2	\$1,000
Lighting (per unit)	13	\$12,000	13	\$78,000
Contingency at conceptual phase (30%)		30%		30%
Total		\$ 328,016.00		\$ 486,609.50

STADIUM DRIVE STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 2

Stadium Drive Multi-Use Path Continuation (Lovell To Howard)	COST	Bike Path Extension	
		UNITS	
Streetscape:			
Asphalt Pvmnt - Bike Path, 3" Thick, single course (SY)	\$45	n/a	n/a
Concrete Bike Path (per SF)	\$7	63,070	\$ 441,490.00
Colored Concrete Bike Path (per SF)	\$8	n/a	n/a
Street Trees (per unit)	\$500	105	\$ 52,500.00
Lighting (per unit)	\$6,000	52	\$312,000
Contingency at conceptual phase (30%)			30%
Total			\$ 1,047,787.00

1 STREET TREES 60 ft O.C.



HONEY LOCUST
GLEDITSIA TRIACANTHOS



SWAMP WHITE OAK
QUERCUS BICOLOR



HYBRID ELM
ULMUS 'FRONTIER'

2 PLANTING*



ANEMONE CANADENSIS
CANADA ANEMONE



POTENTILLA FRUTICOSA
SHRUBBY CINQUEFOIL



ASTER NOVAE-ANGLIAE
NEW ENGLAND ASTER



SCHIZACHYRIUM SCOPARIUM
LITTLE BLUESTEM



ECHINACEA PURPUREA
PURPLE CONEFLOWER



CORNUS SERICEA
RED OSIER DOGWOOD

3 BIKE FACILITIES



LANDSCAPE FORMS
BIKE RACK



DERO
BIKE FIXIT STATION



PAINTED/COLORED CONCRETE
RAISED BIKE LANE

4 STREET LIGHTING 120 ft O.C.



BEGA
AREA/ROADWAY LUMINAIRE

5 TRANSIT AMENITIES



LANDSCAPE FORMS
CONNECT 2.0



LANDSCAPE FORMS
MELVILLE BENCH & POE TRASH BIN

Streetscape:	
Concrete Sidewalks (per SF)	\$7
Concrete Bike Path (per SF)	\$7
Colored Concrete Bike Path (per SF)	\$8
Asphalt Pvmnt - Bike Path, 3" Thick, single course (SY)	\$45
Paver Strip (SF)	\$15
Soil- Amended (per CY) 6"	\$45
Seed (per SF)	\$1
Demolition of existing walks & drives(per SF)	\$3
Demolition of existing trees	\$400
Street Trees (per unit)	\$500
Bike lane paint (per SF)	\$3
Sub Total	

Alt 1: Planted Median		Alt 2: Wide Shared Use Pathway	
UNITS		UNITS	
8,330	\$ 58,310.00	10,730	\$ 75,110.00
n/a	n/a	n/a	n/a
16,000	\$ 128,000.00	16,000	\$ 128,000.00
n/a	n/a	n/a	n/a
n/a	n/a	3,200	\$ 48,000.00
238	\$ 10,710.00	149	\$ 6,705.00
12,800	\$ 12,800.00	8,000	\$ 8,000.00
8,300	\$ 24,900.00	8,300	\$ 24,900.00
10	\$ 4,000.00	10	\$ 4,000.00
27	\$ 13,500.00	27	\$ 13,500.00
n/a	n/a	1600	\$ 4,800.00
	\$ 252,220.00		\$ 308,215.00

6 ft metal bench (generic)	\$750
Melville Bench (Landscape Forms)	\$2,700
Poe Litter Bin (Landscape Forms)	\$2,000
Metal Litter Bin (generic)	\$800
Connect 2.0 Bus Shelter (Landscape Forms)	\$25,000
Bike Fixit Station (Dero)	\$1,400
Precast Concrete Curb (per LF)	\$65
Stormwater detention -1 year storm (per CF)	\$10
Perennials (per unit)	\$15
Bike Racks (per unit, generic)	\$500
Lighting (per unit)	\$6,000
Contingency at conceptual phase (30%)	
Total	\$ 537,576.00

n/a	\$0		\$0
2	\$5,400	2	\$5,400
2	\$4,000	2	\$4,000
n/a	\$0		\$0
2	\$50,000	2	\$50,000
2	\$2,800	2	\$2,800
	n/a		n/a
	n/a		n/a
1340	\$20,100	1340	\$20,100
2	\$1,000	2	\$1,000
13	\$78,000	13	\$78,000
	30%		30%
	\$ 610,369.50		\$ 610,369.50

STADIUM DRIVE STREETSCAPE

OPINION OF PROBABLE COSTS - TIER 3

Stadium Drive Multi-Use Path Continuation (Lovell To Howard)	COST	Bike Path Extension	
		UNITS	
Streetscape:			
Asphalt Pvmnt - Bike Path, 3" Thick, single course (SY)	\$45	n/a	n/a
Concrete Bike Path (per SF)	\$7	n/a	n/a
Colored Concrete Bike Path (per SF)	\$8	63,070	\$ 504,560.0
Street Trees (per unit)	\$500	105	\$ 52,500.0
Lighting (per unit)	\$6,000	52	\$312,00
Contingency at conceptual phase (30%)			30
Total			\$ 1,129,778.0

MICHIKAL PARK CONCEPT DESIGN

- Closes Michikal Street between W Kalamazoo Ave and W Michigan Ave.
- Concept includes multiuse path, landscape, seating areas, parking, trailheads to Kalamazoo River Valley Trail, and more.
- Cost varies as concept is refined.



Connection to Kalamazoo River Valley Trail

Connection to future Kalamazoo Ave bike route

Trailhead

W KALAMAZOO AVE

Proposed Eleanor St connection

ELEANOR ST

Closed Elm St connector

ALLEN BLVD

ELEANOR ST

N WESTRIDGE AVE

WATER ST

Trailhead

W MAIN ST

Intersection to be redesigned

W MICHIGAN AVE