

CITY OF NOVI THOROUGHFARE MASTER PLAN



DRAFT FINAL REPORT

June, 2016

Submitted by:



TABLE OF CONTENTS

Summary.....	S-1
Recommendations	S-1
Roads.....	S-1
Intersections.....	S-5
Non-Motorized.....	S-5
Transit.....	S-7
Regional Transit.....	S-7
Older Adults Services Transportation	S-9
Transit Circulator	S-9
Future Possibilities	S-9
Funding Situation	S-10
State and Federal Programs	S-10
Novi Funding.....	S-11
Implementation.....	S-11
1. Introduction	1
1.1 Thoroughfare Master Plan.....	1
1.2 Schedule.....	2
2. Reports Summaries.....	4

TABLE OF CONTENTS *(continued)*

3. Travel Forecasting	5
3.1 2015 Model	5
3.1.1 Traffic Analysis Zones (TAZs)	5
3.1.2 Traffic Data	5
3.1.3 2015 Base Model Calibration	7
3.2 2040 E+C Model	7
3.3 Existing and Future Traffic Conditions	8
4. Public Engagement	10
5. Multi-modal Alternatives	13
5.1 Roads	13
5.2 Non-Motorized	18
5.3 Transit	21
5.3.1 Regional Transit	21
5.3.2 Older Adults Services Transportation	23
5.3.3 Transit Circulator	23
5.3.4 Future Possibilities	23
6. Funding Situation	24
6.1 State and Federal Programs	24
6.2 Novi Funding	24
7. Recommendations	26
7.1 Roads	26
7.1.1 Potential Impacts of Road Widening	26

TABLE OF CONTENTS *(continued)*

7.2	Intersections	29
7.2.1	Beck Road at 10 Mile Road.....	32
7.2.2	Beck Road at Grand River Avenue.....	33
7.2.3	Beck Road at I-96 Ramps	34
7.2.4	West Park Drive at 12 Mile Road	34
7.2.5	West Park Drive at South Lake Drive	35
7.2.6	Novi Road at 10 Mile Road.....	35
7.2.7	Novi Road at Grand River Avenue.....	35
7.2.8	Novi Road at 12 Mile Road	36
7.2.9	Meadowbrook Road at 13 Mile Road.....	37
7.2.10	Haggerty Road at 8 Mile Road	37
7.2.11	Haggerty Road at 12 Mile Road.....	38
7.2.12	Haggerty Road at 14 Mile Road	38
7.2.13	M5 at 14 Mile Road	39
7.2.14	Other Intersections	39
7.3	Sidewalks and Pathways	39
7.4	Transit.....	39
8.	Observations.....	40

Appendix – Proposed Improvements to Beck Road and 10 Mile Road

LIST OF FIGURES

Figure S-1. 2040 E+C PM Peak Period Traffic Condition.....	S-2
Figure S-2. 2040 E+C PM Peak Period Traffic with Widened Beck and 10 Mile Roads	S-3
Figure S-3. Novi Intersections Proposed to be Improved	S-4
Figure S-4. Proposed Thoroughfare Road Improvement Projects Superimposed on 2015-16 Top Priority Pathway and Sidewalk Segments Map.....	S-6
Figure S-5. RTA Master Plan Proposal.....	S-7
Figure S-6. Current SMART Bus Service near Novi	S-7
Figure S-7. Example Extensions of SMART Routes 330, 740, and 780	S-8
Figure 1. Schedule	3
Figure 2. 2015 Base Model Traffic Analysis Zones (TAZs)	6
Figure 3. 2015 Refined Base Network	6
Figure 4. 2015 PM Peak Period Traffic Conditions	7
Figure 5. 2040 E+C PM Peak Period Traffic Condition.....	9
Figure 6. <i>Community Remarks</i> Application	10
Figure 7a. Touchpad Voting Results	11
Figure 7b. Touchpad Voting Results	12
Figure 8. 2040 E+C PM Peak Period Traffic	13
Figure 9a. Basic Alternatives Test Results, PM Peak Period Over-capacity Vehicle Miles of Travel.....	14
Figure 9b. Basic Alternatives Test Results, PM Peak Period Vehicle Hours of Congested Travel.....	14
Figure 10a. Combination Alternatives Test Results, PM Peak Period Over-capacity Vehicle Miles of Travel.....	15
Figure 10b. Combination Alternatives Test Results, PM Peak Period Vehicle Hours of Congested Travel.....	15
Figure 11. Alternative I with 2040 Traffic.....	16
Figure 12. Novi Intersection Proposed to be Improved	17
Figure 13. Proposed Thoroughfare Road Improvement Projects Superimposed on 2015-16 Top Priority Pathway and Sidewalk Segments Map.....	20
Figure 14. Current SMART Bus Service near Novi	21
Figure 15. Example Extensions of SMART Routes 330, 740, and 780.....	22

LIST OF FIGURES *(continued)*

Figure 16. RTA Master Plan Proposal.....	22
Figure 17. Federal Funding for Michigan	25
Figure 18. Increased Transportation Revenues	25
Figure 19. Highway Program Investment by Category, FY 2016 to 2020.....	25
Figure 20. Novi Intersections Proposed to be Improved	31
Figure 21. Beck Road at 10 Mile Road	32
Figure 22. Beck Road at 10 Mile Road	32
Figure 23. Beck Road at Grand River Avenue Aerial Imagery.....	33
Figure 24. Beck Road at I-96 Interchange	34
Figure 25. W Park Drive at 12 Mile Road.....	34
Figure 26. West Park Drive at South Lake Drive	35
Figure 27. Novi Road at 10 Mile	35
Figure 28. Novi Road at Grand River Avenue	36
Figure 28a. Novi Road at Grand River Avenue	36
Figure 29. Novi Road at 12 Mile Road	36
Figure 30. Meadowbrook Road at 13 Mile Road	37
Figure 31. Haggerty Road at 8 Mile Road	37
Figure 32. Haggerty Road at 12 Mile Road	38
Figure 33. Haggerty Road at 14 Mile Road	38
Figure 34. M5 at 14 Mile Road.....	39

LIST OF TABLES

Table S-1. Table 4A from Annual Non-Motorized Prioritization 2015-16 Update.....	S-5
Table S-2. 2015-16 Top 20 Priority Pathway/Sidewalk Segments Associated with Potential Road Widening Projects	S-6
Table S-3. Potential Costs to Extend SMART Routes 330, 740, and 780 in Novi	S-8
Table S-4. Novi Thoroughfare Master Plan Recommendations	S-11
Table 1. Background Documents	4
Table 2. Utilization of Traffic Data Sources	5
Table 3. 2040 E+C Projects.....	8
Table 4. Novi Trip Growth - 2015 to 2040	8
Table 5. Basic Alternative Improvements Tested to Relieve Congestion.....	14
Table 6. Combination Alternatives Tested to Ease Congestion	15
Table 7. 2015-16 Top 20 Priority Pathway/Sidewalk Segments Associated with Potential Road Widening Projects	18
Table 8. Table 4A from Annual Non-Motorized Prioritization 2015-16 Update.....	19
Table 9. Potential Costs to Extend SMART Routes 330, 740, and 780 in Novi	22
Table 10. Novi Thoroughfare Master Plan Recommendations	27
Table 11. Proposed Beck Road Improvement Cross Section and Cost Summary.....	28
Table 12. Summary of Potential Environmental Impacts of Widening Beck Road and 10 Mile Road	28
Table 13. Level-of-Service Descriptions	31
Table 14. 2040 PM Existing and Proposed LOS, Beck Road at 10 Mile Road	32
Table 15. 2040 PM Existing and Proposed V/C>1, Beck Road at 10 Mile Road	33
Table 16. 2040 PM Existing and Proposed LOS, Beck Road at Grand River Avenue	33
Table 17. 2040 PM Existing and Proposed V/C>1, Beck Road at Grand River Avenue	33

Summary

The leaders and citizens of Novi understand that the purpose of a truly multi-modal thoroughfare master plan is to establish physical and cultural environments that support and encourage safe, comfortable, and convenient travel by a variety of modes.

They understand that a broad constituency must be engaged in the planning process, including elected and agency officials, neighborhood and business leaders, and, most important, the general public. A Thoroughfare Master Plan (TMP) must give form to their vision and provide a consensus on how to move the plan forward to fruition.

Long-range planning is driven by a number of factors: local growth and land use changes; the Michigan Department of Transportation (MDOT) need to maintain its Trunkline system; the Road Commission for Oakland County (RCOC) need to manage county roads; available funding; and, the planning process of the Southeast Michigan Council of Governments (SEMCOG), which integrates these considerations with the needs of its members, including the City of Novi.

This requires the integration of projects among transportation modes to form a plan that complements the Master Plan for Land Use, and is also forward-thinking. To assist in preparing the TMP, Novi has engaged The Corradino Group of Michigan consulting firm (Corradino).

Throughout the project, input was received through the web-based application known as *Community*

Remarks, the results of which are included in a separate Public Involvement Diary. Each public comment received a response. The categories of "Safety and Traffic Calming," "Intersection Improvements," and "Pedestrian Improvements" received more than 75% of the comments. Other comments were divided among "Roadway Improvements" (ten comments), "Bicycle Improvements" (three comments), and "Transit" (two comments). In all, *Community Remarks* receive over 2000 "hits" by people visiting the site.

Over the course of the project, four public meetings were conducted. All but the February, 2016, meeting was preceded by a Novi Planning Commission meeting. Notes of each meeting are included in the *Public Information Diary*.



At the December, 2015, and February, 2016, meetings, those in attendance were asked, using a touch-pad polling system known as *Turning Point*, to provide their opinion on eight topics. In summary, the results, indicate the meeting attendees were older adults and drove fewer than ten minutes

in the off-peak hours to volunteer or work. None biked or walked on a regular basis, for a variety of reasons. Oddly though, when asked about the most important items that would enhance Novi's transportation system, improvements to streets/sidewalks, biking facilities, and traffic signal timing were cited in almost equal amounts (20% to 25%) as the most preferred; roadway widening was preferred by fewer than 10% of the respondents. These independent opinions closely align with the comments received through the *Community Remarks* application.

Recommendations

Roads

A central task to successfully execute this project is predicting traffic in the year 2040. To do so, Corradino developed daily and PM peak period (3-6 pm) travel forecasting models. The 2015 Base Model was developed consistent with modeling of the *2011 Novi and Wixom Transportation Plan* prepared by Corradino. Additional information included SEMCOG model files and the latest traffic data provided by the RCOC, MDOT, and the Traffic Improvement Association of Michigan.

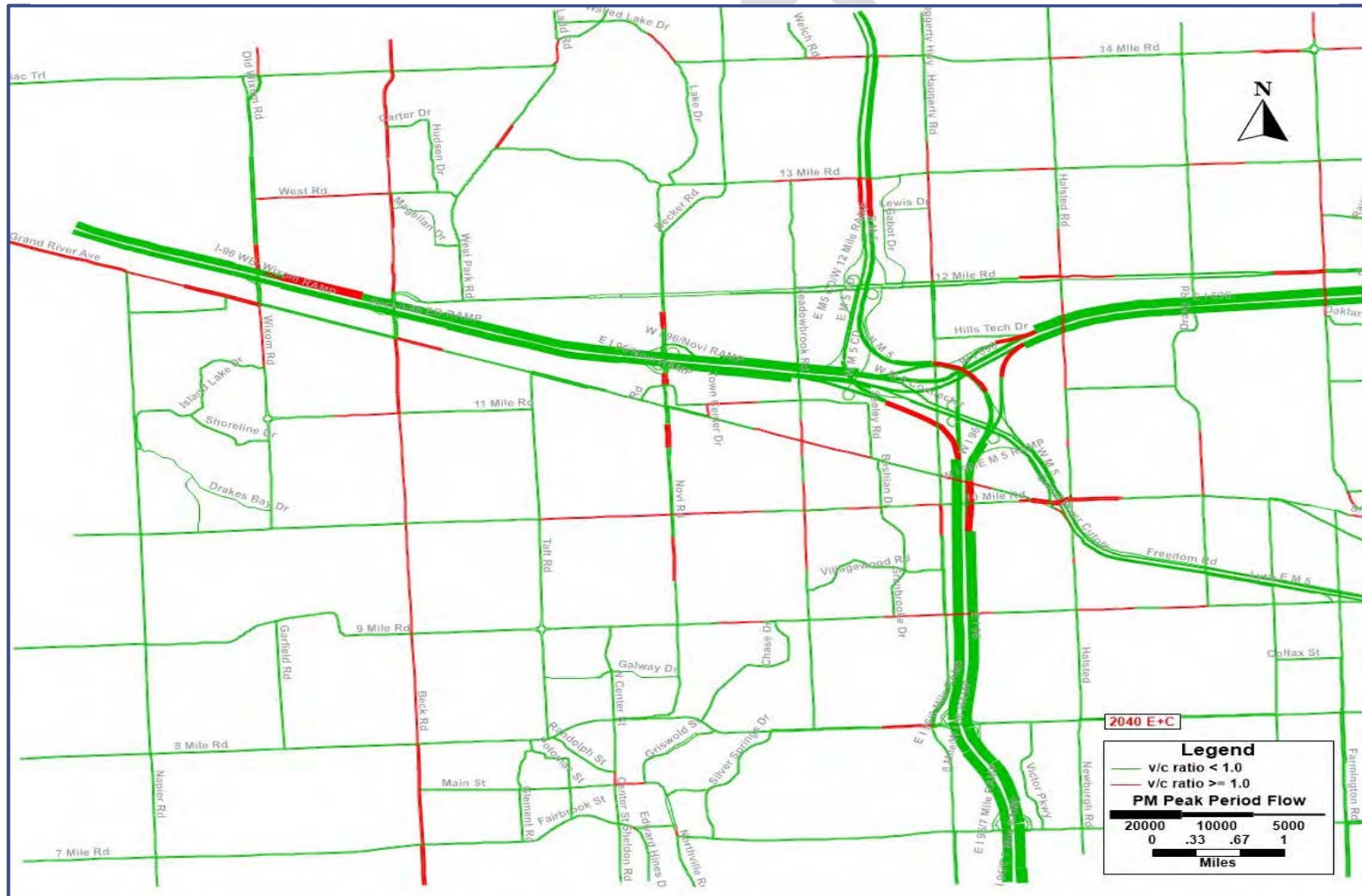
Multi-modal transportation elements were examined in layers, beginning with the most costly-to-implement element – roads. Analysis of future traffic conditions are illustrated in [Figure S-1](#) which shows the 2040 volume/capacity (V/C) ratios in the PM peak period. In this graphic, **RED** indicates the V/C ratio exceeds 1.00, reflecting significant congestion. **GREEN** indicates significant congestion is

not detected by the model. To determine the potential positive impact on congestion, a series of tests was executed. The most cost-effective alternative combines widening Beck Road from 8 Mile Road to

Pontiac Trail and 10 Mile Road from Haggerty to Taft. Funding, impact and policy constraints prevent more road widenings in the near future. It is noted that widening Beck and 10 Mile Roads does

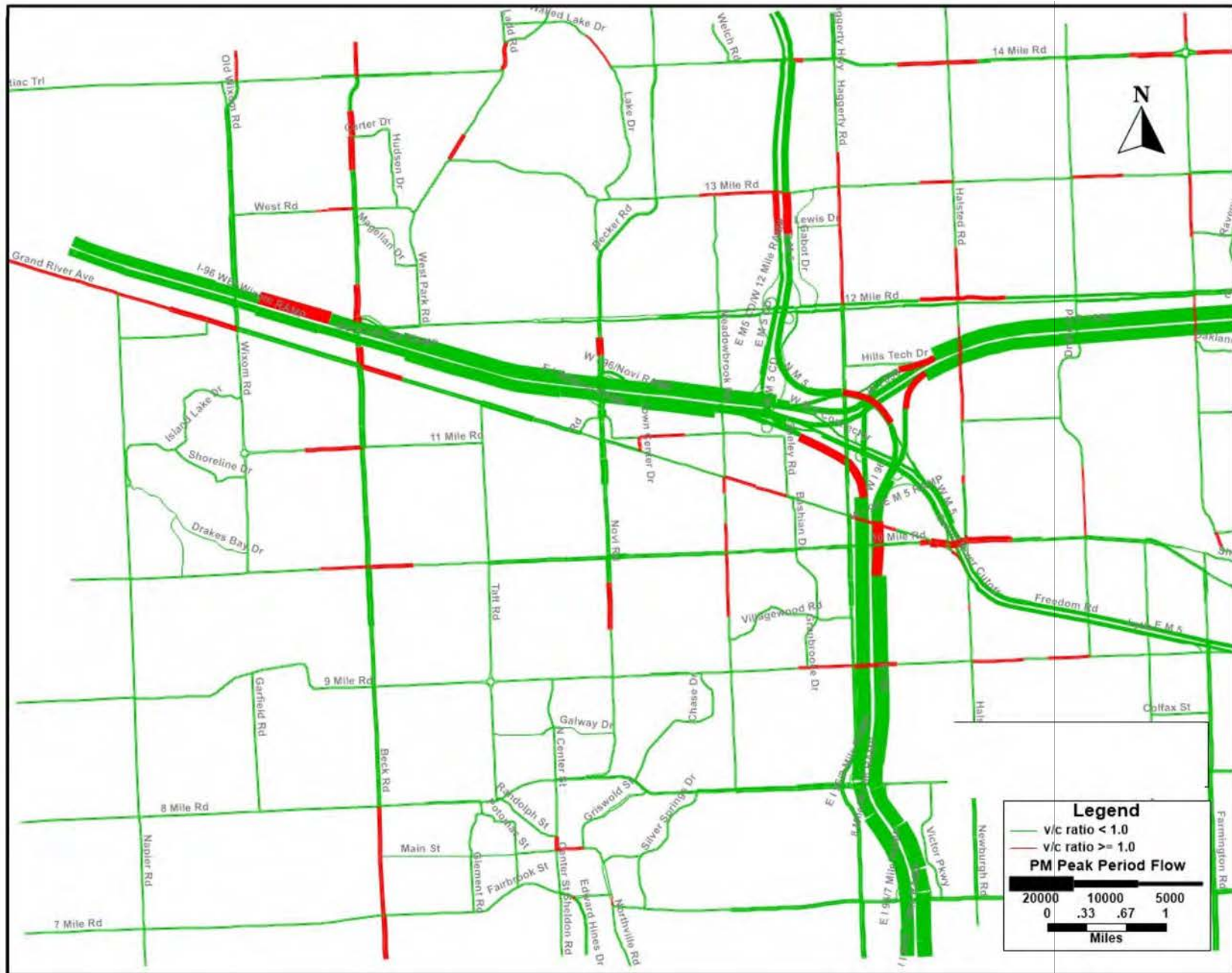
not address all the congestion expected in 2040, as evidenced by the red/congested paths on Figure S-2. Proposed improvements at the intersections circled on Figure S-3 will also address congestion.

Figure S-1. 2040 E+C PM Peak Period Traffic Condition



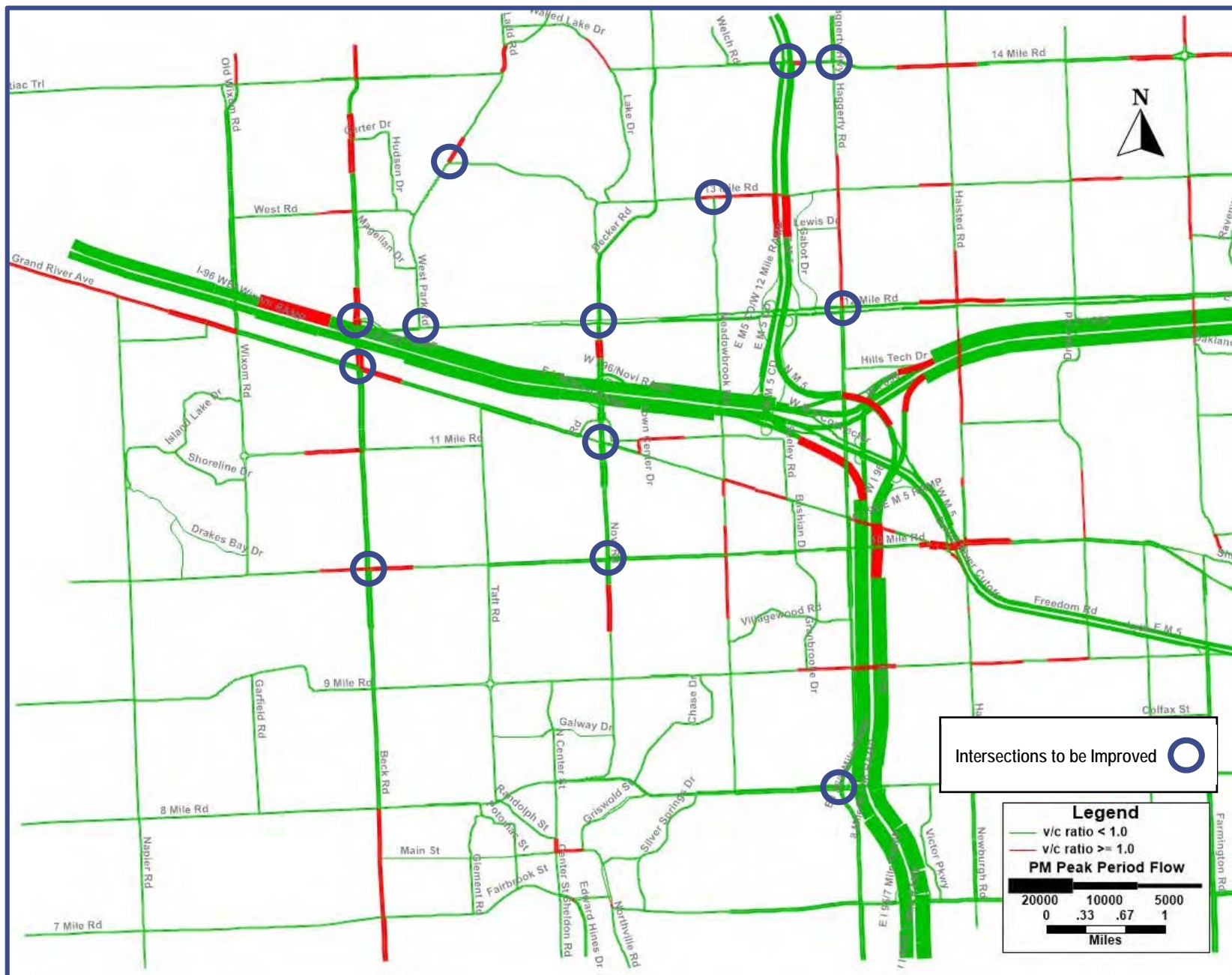
Source: The Corradino Group of Michigan, Inc.

Figure S-2. 2040 E+C PM Peak Period Traffic with Widened Beck and 10 Mile Roads



Source: The Corradino Group of Michigan, Inc.

Figure S-3. Novi Intersections Proposed to be Improved



Source: The Corradino Group of Michigan, Inc.

Table S-1. Table 4A from Annual Non-Motorized Prioritization 2015-16 Update

Intersections

For the Thoroughfare Master Plan, Corradino used an approach that examines crash rates per million vehicles entering an intersection. Additionally, a *Severity Index* was calculated for each intersection.

Corradino determined the candidate intersections for crash countermeasures are:

1. Beck Road at 10 Mile Road;
2. Beck Road at Grand River Avenue
3. Beck Road at I-96 ramps;
4. Novi Road at Grand River Avenue;
5. 8 Mile Road at Haggerty Road;
6. Novi Road at 10 Mile Road;
7. 12 Mile Road at Novi Road;
8. 12 Mile Road at Haggerty Road;
9. 12 Mile at West Park Drive;
10. 14 Mile Road at M5;
11. 14 Mile Road at Haggerty Road;
12. Meadowbrook at 13 Mile Road; and,
13. West Park Drive at South Lake Drive

All but the last two intersections are under MDOT or RCOC control. Intersections #13 and #14 are under the control of the City of Novi.

Details of the proposed improvements at these locations are covered in Section 7.2 of this report.

Non-Motorized

Novi's current top priority pathway/sidewalk projects, as listed in the *Annual Non-Motorized Prioritization 2015-16 Update*, are shown on Table S-1.

Annual Non-Motorized Prioritization: 2015-2016 Update										
Table 4A: 2015-16 Top 20 Priority Pathway and Sidewalk Segments excluding deferred segments City of Novi										
Overall Segment Rank	Segment Item #	Section #	Type	Side of Street	Location	From	To	# of Pieces in Segment	Segment Length (ft.) excluding Developer Planned & Completed Pieces	Notes
1	81B		P	south	Ten Mile	Willowbrook	Haggerty	1	2,750	17-18 & 19/20 CIP
2	81A	25	P	south	Ten Mile	Meadowbrook	Willowbrook	1	2,530	17-18 & 19/20 CIP
3	9B	4	S	south	Pontiac Trail	Wedgewood	West Park	2	2,560	16-17 & 17-18 CIP
5	120A	36	S	west	Haggerty	Eight Mile	N of Orchard Hill	2	1,390	
6	9A	4	S	south	Pontiac Trail	Beck	Wedgewood	1	2,440	16-17 & 17-18 CIP
7	62	22	S	north	Ten Mile	Eaton Center	Churchill Crossing	1	400	15-16 CIP
8	39	17	P	west	Beck	Eleven Mile	Providence	1	1,100	17-18 CIP
9	93B	27	S	north	Nine Mile	Plaisance	Taft	2	650	
11	90	26	P	south	Ten Mile	Novi Rd.	Chipmunk	1	2,400	18-19 CIP
11	119c	36	S	east	Meadowbrook	Eight Mile	N of Llewelyn	1	1,200	18-19 CIP
13	84B	25	S	east	Meadowbrook	Nine Mile	Chattman	1	2,050	19-20 CIP
14	119B	36	S	east	Meadowbrook	Singh Blvd	N of Llewelyn	1	1,300	18-19 CIP
15	93A	27	S	north	Nine Mile	Novi Rd.	Plaisance	1	2,650	
16	70	23	P	west	Meadowbrook	Eleven Mile	Gateway Village	3	900	
17	99A	29	P	south	Ten Mile	Wixom	400' E of Lynwood	1	2,900	17-18 CIP
20	5	2	S	south	Fourteen Mile	Beachwalk Apartments	East Lake	1	600	19-20 CIP
21	119A	36	S	east	Meadowbrook	Nine Mile	Singh Blvd	1	1,300	18-19 CIP
22	84A	25	S	east	Meadowbrook	Ten Mile	Chattman	1	2,350	19-20 CIP
23	99B	29	P	south	Ten Mile	400' E of Lynwood	Beck	1	1,100	17-18 CIP
24	120B	36	S	west	Haggerty	Orchard Hill	High Pointe	1	375	
									32,945	

Legend S= 6 ft. sidewalk P= 8 ft. pathway

- Segments with pathways or sidewalks on most of the opposite side of the street - note that these segments may be critical for system connectivity & must be analyzed separately for connectivity
- Segments with a higher ranking segment planned for the opposite side of the street - note that these segments may be critical for system connectivity & must be analyzed separately for connectivity
- Short Segments (400 ft. or less)
- Scheduled Segment
- CIP Budget Year

Source: Annual Non-Motorized Prioritization 2015-16 Update

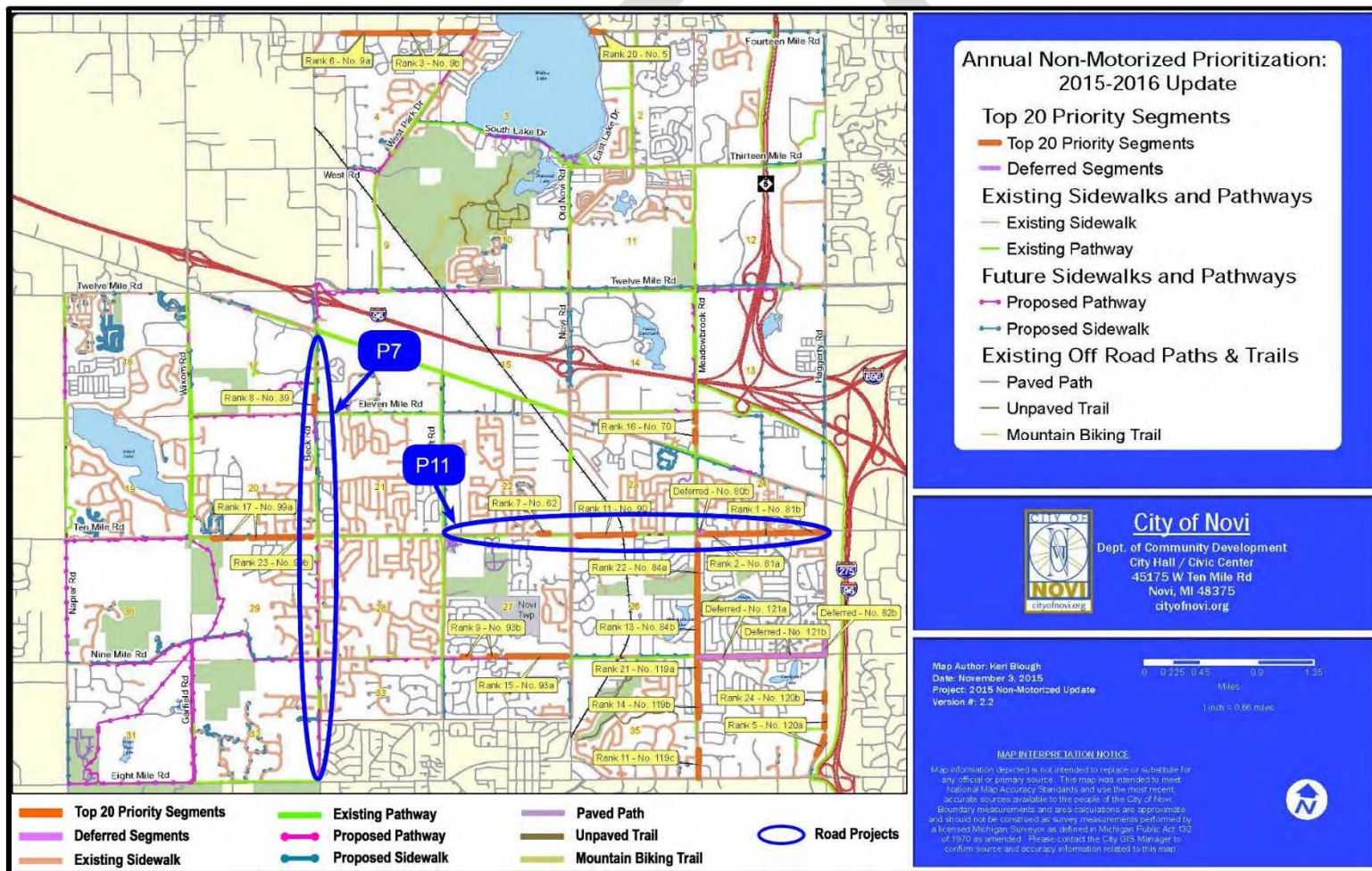
Four of these would be constructed when Beck Road, between 8 Mile Road and Grand River Avenue, and 10 Mile Road, between Taft Road and Haggerty Road are widened (Table S-1 and Figure S-4). Other non-motorized projects will be implemented as part of Novi's Annual Non-Motorized Projects Prioritization Update.

Table S-2. 2015-16 Top 20 Priority Pathway/Sidewalk Segments Associated with Potential Road Widening Projects

	Road Segment	Non-motorized Project	Non-motorized Length	Capital Improvement Program Yr.	Cost
P7	Beck Road – 8 Mile to Grand River	Rank 8 – No. 39, west side	1,100'	2017-2018	\$155,000
P11	10 Mile – Taft to Haggerty	Rank 1 – No. 81b, south side Rank 7 – No. 62, north side Rank 11 – No. 90, south side	2,750' 400' 2,400'	2017-2018 & 2019-2020 2015-2016 2018-2019	\$775,000

Source: The Corradino Group of Michigan, Inc.

Figure S-4. Proposed Thoroughfare Road Improvement Projects Superimposed on 2015-16 Top Priority Pathway and Sidewalk Segments Map



Source: City of Novi, Michigan, and The Corradino Group of Michigan, Inc.

Transit

Regional Transit

The Regional Transit Authority (RTA) of Southeast Michigan, created in 2012, is responsible for planning and coordinating transit within Washtenaw, Oakland, Wayne, and Macomb counties, including that provided by the Suburban Mobility Authority for Regional Transportation (SMART). In November, 2016, there will be a referendum in the four-county region that, if successful, would fund regional transit through the RTA. The referendum will be a **regional yes or no vote**; there can be no “opt out” for individual cities or counties. Currently, SMART routes do not extend into Novi, as the city has opted out of the millage that underwrites service, SMART does provide some funding of Novi’s Older Adults transportation program.

RTA has proposed a Regional Master Transit Plan to guide transit developments in Southeast Michigan over the next 20 years.

RTA’s Master Transit Plan indicates Novi has an “emerging” transit demand. It offers a number of ways to serve it (Figure S-5):

- Premium service, such as express bus routes to the Detroit-Wayne County Airport (DTW);
- Cross-county service; and,
- Demand-responsive service, like Novi’s Older Adults transportation program.

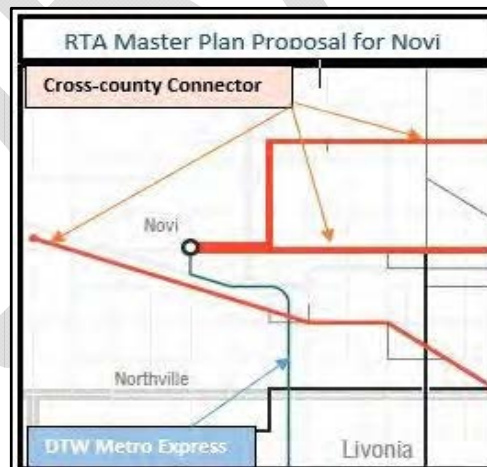
To examine the potential cost of a regional transit approach in the Novi TMP, a logical starting point was to extend existing SMART bus routes that today serve communities to the east. The current

westernmost limit of these routes is Haggerty Road (Figure S-6). Routes 330 and 740 could be extended farther to the west into Novi. Route 780 could extend south from Maple Road along Haggerty Road.

If Route 330 were extended, it could serve the many attractions along Grand River Avenue, terminating at the Providence Park Hospital campus. Routes 740 and 780 could follow a common path west along 12 Mile Road to serve the Twelve Oaks Mall. These proposals reflect the Regional Master Plan for Novi (Figure S-7).

Annual costs to extend all these SMART routes, on the basis for the existing number of scheduled runs and using SMART’s cost per mile and per hour, could be almost \$15 million (Table S-3). If limited weekday service were provided (two inbound trips

Figure S-5. RTA Master Plan Proposal



Source: SMART

Figure S-6. Current SMART Bus Service near Novi

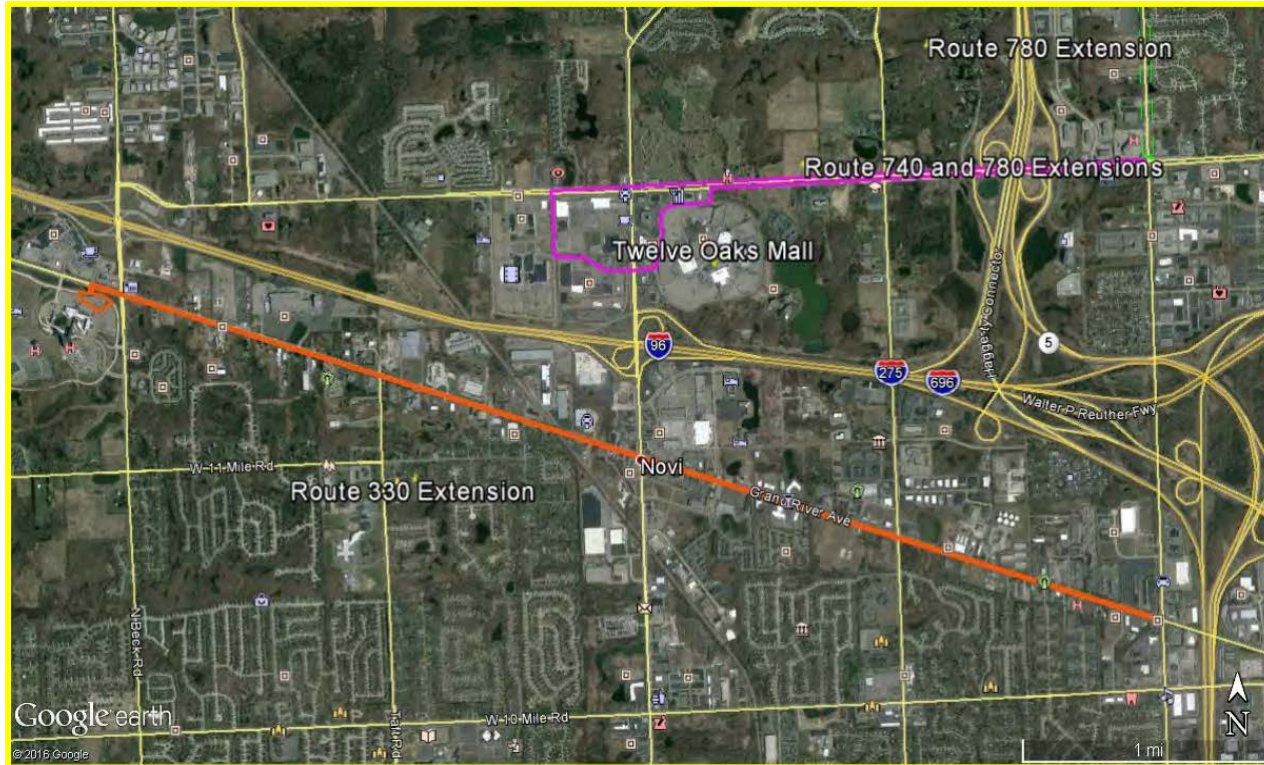


Source: SMART

in the morning and two outbound in the evening), the cost could be near \$2.5 million.

In reviewing these services with the TMP Steering Committee, there was concern about Novi bearing this expense, unless the regional transit millage passes. If the 1.2 mills in additional property taxes is approved in the regional vote, the City of Novi would contribute approximately \$3.8 million per year. By legislative mandate, no **county** can receive transit services which cost less than 85% of what it contributes in taxes. If this provision applies to cities, it appears regional transit is in Novi’s future. There is a caveat: It is a formula unique to Oakland County and does not imply an 85% contribution to the City of Novi although it does look like the proposed services will be extensive for Novi.

Figure S-7. Example Extensions of SMART Routes 330, 740, and 780



Source: The Corradino Group of Michigan, Inc. and Google Earth

Table S-3. Potential Costs to Extend SMART Routes 330, 740, and 780 in Novi

	Extension in Miles	Cost/Mile*	Cost/Run	Runs/Wkday	Runs/Sat	Runs/Sun	Yearly Runs	Annual Cost
Full Service								
Extension of Route 330	9.4	\$100	\$940	19	14	0	5668	\$5,327,920
Extension of Route 740	5.3	\$100	\$530	18	15	12	6084	\$3,224,520
Extension of Route 780	9.2	\$100	\$920	20	17	13	6760	\$6,219,200
Limited Service								
Extension of Route 330	9.4	\$100	\$940	4	0	0	1040	\$977,600
Extension of Route 740	5.3	\$100	\$530	4	0	0	1040	\$551,200
Extension of Route 780	9.2	\$100	\$920	4	0	0	1040	\$956,800

*Operating Expense per Hour as reported to MDOT for 2014.

Source: The Corradino Group of Michigan, Inc.

Older Adult Services Transportation

The City of Novi Older Adult Services Transportation (OAST) provides specialized transportation for Novi residents age 55+ and those under 55 with a limiting disability. Service is to medical appointments, shopping, special events, classes, etc. The program operates Monday through Friday from 8am–5pm and Saturday between 9am and 3pm; there are no Sunday operations. Reservations are required at least two days in advance and trips are scheduled based on availability. In FY 2014/2015, OAST provided 12,034 one-way rides (including those for special events) using seven vehicles. Passengers may travel anywhere within the City of Novi for \$3 per one-way ride and \$5 per one-way ride for trips outside the city but within ten miles from the Novi Civic Center. There are complimentary rides to the Meadowbrook Activity Center, the Civic Center, Novi's Public Library, or to a City of Novi special events or programs within the city limits.

The OAST current annual budget of about \$160,000 is supported by fare box revenues (\$30,000), the City of Novi General Fund (\$25,000), the Parks, Recreation & Cultural Fund (\$27,000), SMART (\$54,450), program donations (\$20,000), and advertising (\$2,400). The TMP expects the service to continue in its current form which costs about \$160,000 per year. Passage of the RTA plan may provide funds to cover these costs.

Funding Source	Amount	% of Funding
Fare Box	\$30,000	19%
Novi General Fund	\$25,000	16%
Parks, Recreation	\$26,916	17%
SMART	\$54,454	34%
Donations	\$20,000	12%
Advertising	\$2,400	2%
TOTAL	\$158,770	100%

Source: City of Novi, Michigan

Transit Circulator

A circulator between the Twelve Oaks Mall area and Town Center area was analyzed for service on Saturdays and recommended as a six-month "trial" project. The estimated cost is \$45,000. The vehicles would be those of the OAST available for six hours on Saturdays. If the service proves successful, additional hours may be beneficial, which may require additional equipment.



Circulator Bus

Future Possibilities

Autonomous (self-driving) vehicles are the future of transportation around the world. Traditional modes of transportation are being inundated with technology, and, as with everything else technology-driven, the future of transportation is evolving at a rapid pace. The limitations are, in fact, not the autonomous vehicles and technology, as much as the regulations to be put into place.

In that regard, federal regulators plan to issue guidance within months on preferred performance characteristics and testing methods for driverless vehicles and collaborate with state officials on policies. And, the federal government is considering spending \$4 billion to encourage developing driverless vehicles.

While researchers began building autonomous vehicles that could be tested on public roads, the concept evolved into Connected Autonomous Vehicles (CAVs) which can communicate with each other, and communicate with infrastructure, much more efficiently and as fast as the human brain.

CAVs, once fully implemented, have the potential to improve our way of life. Among the numerous benefits are:

1. Improving safety by reducing the number of crashes that occur annually on our roadways; and,
2. Reducing:
 - traffic congestion;
 - speeding;
 - emissions/pollution;
 - impaired driving;

- texting-while driving; and,
- road rage.

In addition to these transportation system improvements, CAVs also have the potential to improve daily living, particularly for seniors and the disabled. Concerns like: *“How will I get to the grocery store or the doctor or just get out of the house because I can no longer safely operate a moving vehicle”* can be addressed.

To meet these needs today, there are the Older Adults Services transportation program, taxicabs, Uber, and Lyft. In the next several years, there will also be CAVs. Government support of this technology could be the catalyst for funding of a mass transit system that includes a fleet of CAVs. The federal government has been receptive and willing to embrace CAVs because of their social benefits. Providing an alternative to bus/van and other transit modes/vehicles will help encourage more government funding to make CAVs a reality for public use. Concern about loss of revenue from existing transportation systems is on the opposite side of this discussion. But, as explained in the article: *Autonomous vehicles will have tremendous impacts on government revenue*,¹ there is a potential for significant cost savings to governments compared to the loss of revenue.

Consider that if you do not possess the ability to operate an auto, how transformative it could be

¹ Kevin C. Desouza, Nonresident Senior Fellow, [Governance Studies](#), Center for Technology Innovation; Kena Fedorschak, MBA candidate, W.P. Carey School of Business, Arizona State University

for a vehicle to come to you, on demand, and provide travel, with comfort, safety, and security?

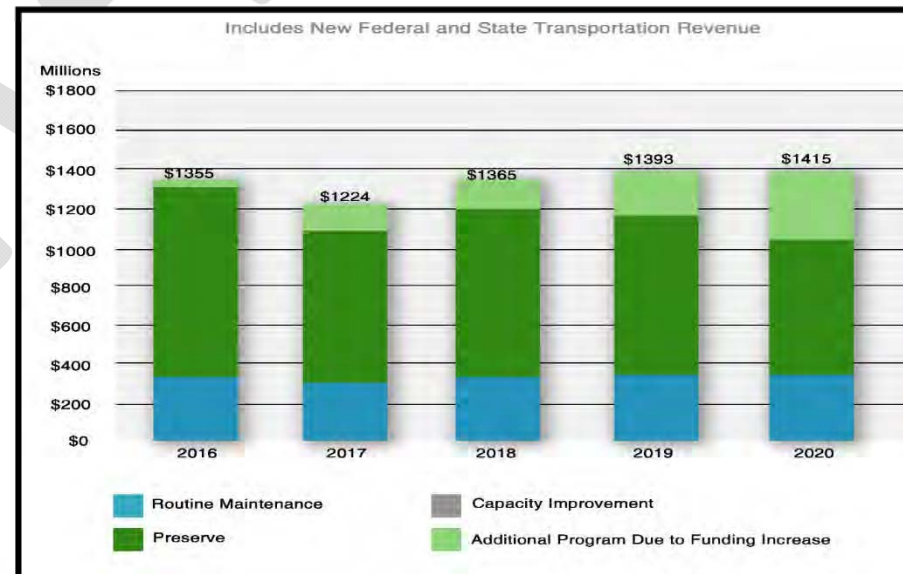
Funding Situation

State and Federal Programs

After years of frustration at the federal and state levels, both governments enacted transportation funding legislation in 2015. The state program doesn't begin to provide monies until January 1, 2017; it then takes until fiscal year 2020 for the full effect (estimated to be \$1.234 billion per year) to be felt. Those funds are to be distributed 696 ways: MDOT, 80 transit agencies, 83 counties, and 533 villages and cities. At the federal level, the FAST Act (Fixing America's Surface Transportation) will

provide five years (FY 2016 through FY 2020) of funding certainty. For Michigan, that represents \$1.02 billion in the first fiscal year and \$1.17 billion in FY 2020. This is about \$52 million (5.1%) of net new money in 2016 versus 2015 and, then, about \$20 to \$25 million (about 2.25%, on average) of net new money each year after. When combined with state funding, cities in Michigan can expect \$66.4 million in FY 2017, when additional Michigan funding begins to flow. That will grow to \$186 million in 2020. It must be kept in mind funding to local government will be divided 533 ways. Novi is the 27th largest city in Michigan with about 1% of the total city/village population. It is also important to recognize that these funds are to be allocated overwhelmingly to routine maintenance and preservation of existing roads. A relatively small amount will be available for projects that will increase capacity.

Michigan Highway Program Investment by Category, FY 2016 to 2020



Source: NTH Consultants, Ltd. Webinar Slides

Novi Funding

The City of Novi annually spends approximately \$11.5 million on roadway capital improvements and another \$3 million on maintenance. Novi's side-walks/pathways program for the five fiscal years ending in FY 2020, totals \$11.4 million, all but \$733,000 to come from the Municipal Street or Major Road Funds. Phase II of the M5/I-275 Regional Trail Connection is the project for which \$733,000 is needed from local/Novi funds. The Older Adults Services transportation program is supported by several sources, including non-government donations, advertising and fare revenue.

Implementation

Table S-4 provides a summary of the cost of each element of the multi-modal Thoroughfare Master Plan. The total road (\$41.3 million) and intersection (\$5.8 million) cost estimate is \$47.1 million. Beck Road widening is phased over FY 2017-2021 while expanding 10 Mile Road is phased between FY 2021-2025. Intersection improvements are programmed to occur between 2016 and 2020. The 11 sidewalk and pathway projects that are part of the plan are programmed to be built in the period FY 2016-2022 at a cost of \$4.3 million. In addition to continuing the Older Adults transportation program, and a \$45,000 "trial" mall circulator, major transit developments appear to be dependent on the Regional Transportation Authority's multi-county referendum of November, 2016.

Table S-4. Novi Thoroughfare Master Plan Recommendations

Widening/Capacity Improvement		Estimated Cost ¹	Implementation Period
Beck Road	8 Mile Road to Grand River Avenue	\$21.5 million	FY 2017–2021
-Segment A	-8 Mile Road to 9 Mile Road	\$6.3 million	FY 2017–2018
-Segment B	-9 Mile Road to 10 Mile Road	\$5.6 million	FY 2018–2019
-Segment C	-10 Mile Road to 11 Mile Road	\$6.3 million	FY 2019–2020
-Segment D	-11 Mile Road to Grand River Avenue	\$3.3 million	FY 2020–2021
10 Mile Road	Haggerty Road to Taft Road	\$19.8 million	FY 2021–2025
Meadowbrook Road	10 Mile Road to 12 Mile Road	TBD	After 2025
Grand River Avenue	Novi Road to Haggerty Road	TBD	After 2025
Novi Road	9 Mile Road to 10 Mile Road	TBD	After 2025

Intersection Improvements		Estimated Cost	Time Frame
Beck Road at 10 Mile Road		\$750,000	See footnote 2
Beck Road at I-96 Ramps		\$300,000	See footnote 2
Beck Road at Grand River Avenue		\$750,000	In progress
West Park Drive at 12 Mile Road		\$215,000	FY 2019–20
West Park Drive at South Lake Drive		\$175,000	FY 2019–20
Novi Road at 10 Mile Road		\$75,000	FY 2018–19
Novi Road at Grand River Avenue		\$3,250,000	FY 2018–19
Novi Road at 12 Mile Road		\$10,000	FY 2018–19
Meadowbrook at 13 Mile Road		\$200,000	FY 2018–19
Haggerty Road 8 Mile Road		\$5,000	FY 2016–17
Haggerty Road at 12 Mile Road		\$35,000	FY 2016–17
Haggerty Road at 14 Mile Road		\$40,000	FY 2016–17
M5 at 14 Mile Road		\$3,000	FY 2016–17

Sidewalks and Pathways	Segment	Estimated Cost	Time Frame
South side of 10 Mile Road	Meadowbrook to Haggerty	\$745,000	FY 2019–22
South side of Pontiac Trail	Beck to West park	\$490,000	FY 2017–19
West side of Haggerty Road	8 Mile to High Pointe	\$295,000	FY 2019–20
North side of 10 Mile road	Eaton Center to Churchill Crossing	\$175,000	FY 2018–19
West side of Beck Road	11 Mile to Providence	\$185,000	FY 2018–19
North side of 9 Mile Road	Novi Road to Taft	\$415,000	FY 2018–21
South side of 10 Mile Road	Novi Road to Chipmunk Trail	\$345,000	FY 2019–20
East side of Meadowbrook Road	8 Mile to 9 Mile	\$490,000	FY 2019–22
East side of Meadowbrook Road	9 Mile to 10 Mile	\$615,000	FY 2019–22
West side of Meadowbrook Road	11 Mile to Gateway Village	\$450,000	FY 2019–20
South side of 14 Mile Road	Beach Walk to East Lake	\$95,000	FY 2016–17

Transit	Service	Estimated Cost	Time Frame
Older Adult Services Transportation	Continuation of Current Service	\$160,000/year	Ongoing
Novi Mall Circulator	Six-month demonstration	\$45,000	FY 2017

¹ 2016 dollars

² To be coordinated with widening Beck Road

Source: The Corradino Group of Michigan, Inc.

DRAFT

1. Introduction

Novi is one of the fastest growing cities in Michigan. The construction of Twelve Oaks Mall in the 1970s made the city a major destination in the Detroit metropolitan area and is often credited with ushering in an era of growth that lasted for 40 years (although,

in fact, the community had been growing rapidly since the 1950s). This growth has led to substantial increases in the city's population, as well as commercial and industrial developments. Novi was

ranked #48 on Money magazine's list of the *Top 100 Best Places to Live* in 2008.

Economy: Novi has a local economy that includes businesses of all sizes from international corporations with local and regional offices to owner-operated businesses serving the local area. While Novi is recognized for its concentration of retail businesses clustered at the Novi Road/I-96 interchange, there are several large retail centers in the city as well as many individual retail businesses. The city's industrial and office parks are home to companies in high-tech research and development, health care, transportation and logistics, manufacturing and supplying domestic and foreign automotive equipment. Google recently announced it will locate a self-driving technology center in Novi in the

Historical population		
Census	Pop.	%±
1970	9,668	—
1980	22,525	133.00%
1990	32,998	46.50%
2000	47,386	43.60%
2010	55,224	16.50%
Est. 2014	58,416	5.80%
U.S. Decennial Census		

Beck West Corporate Park, off Beck Road. The Japan Auto Parts Industries Association of North America has its offices in Novi. Toyota Boshoku America has more than 200 employees in the city. Energy-related companies are one of the fastest growing sectors in the city. These include ITC Transmission, Novi Energy and Patrick Energy Services. Kroger has its Michigan-region headquarters in Novi.

Economic Growth: Over the last few years, Novi has focused its economic development efforts on the telematics and car connectivity industries. In telematics, approximately 70,000 people are employed in Oakland County, many of them are in Novi. Novi firms include Cooper-Standard Automotive, Freescale Semiconductor, Elektrobit, and Harman/Becker Automotive.

Novi's Neighborhoods and Business Relations Group attracts and retains businesses. It has streamlined many of its planning and approvals processes to encourage new business. The enhancements speed the process, allowing businesses to move ahead with plans for relocation or expansion.

Novi attracted several smaller, innovative international firms that have expanded into a larger facility, such as Hoya USA Holdings, a Japanese auto supplier with a new research and development center in Novi specializing in interior components for vehicles.

Ryder System, Inc. constructed a new regional headquarters, representing a \$22 million investment in the community. ITC Transmission Company, the nation's largest independent electrical transmission company, made Novi its national headquarters. St. John Providence Park has a 200-bed hospital on a 200-acre campus. In addition to the full-service hospital, the campus provides an array of services in a wooded setting, complete with walking and cycling paths and 18 acres devoted to health-related retail establishments.

All indications point to continued growth and development in Novi. So, with a dynamic future, developing a Thoroughfare Master Plan, to complement the Land Use Master Plan, is timely.

1.1 Thoroughfare Master Plan

The leaders and citizens of Novi understand that the purpose of a truly multi-modal thoroughfare master plan is to establish physical and cultural environments that support and encourage safe, comfortable, and convenient travel by a variety of modes.

They understand that a broad constituency must be engaged in the planning process, including elected and agency officials, neighborhood and business leaders and, most important, the general public. A Thoroughfare Master Plan (TMP) must give form to their vision and provide a consensus on how to move the plan forward.

The overarching goal of the Novi Thoroughfare Master Plan is to protect and enhance the quality

of life in Novi. The following guiding principles will help achieve that goal:

- Provide an efficient, safe, and connected transportation system that is coordinated with existing and projected needs and takes into consideration future growth;
- Provide a transportation system that is economical and responsive to land use and non-motorized principles; and,
- Promote interconnectivity between develop-

ment plans and the existing and future roadway networks.

In creating the Novi plan, an emphasis has been placed on improved connectivity to lessen the traffic burden on collector and arterial roadways. Expanding the sidewalks/pathways system will also assist in reducing vehicular traffic. Likewise, ensuring transit has an appropriate role, particularly serving the elderly, is essential to building a truly multi-modal system.

Long-range planning is driven by a number of factors: local growth and land use changes; the Michigan Department of Transportation (MDOT) need to maintain its Trunkline system; the Road Commission for Oakland County (RCOC) need to manage county roads; available funding; and, the planning process of the Southeast Michigan Council of Governments (SEMCOG), which integrates these considerations with the needs of its members, including the City of Novi.

This project requires the integration of projects among transportation modes to form a plan that complements the Master Plan for Land Use, and is also forward-thinking. To assist in preparing the TMP, Novi has engaged The Corradino Group of Michigan consulting firm (Corradino).

Foundation of Multi-Modal Plan



1.2 Schedule

The TMP was conducted in 2015-2016 (Figure 1). Three public meetings were conducted – in December, 2015, to introduce the project; in April, 2016, to present the preliminary plan; and, in June, 2016, to present the contents of the Final Report. A mid-day meeting was added in February, 2016, in cooperation with Novi’s Older Adult Services. Three meetings were held with the Planning Commission, each preceding a public meeting so the Planning Commission could review/comment on the material to be presented to the citizens of Novi.

Figure 1. Schedule



2. Reports Summaries

The first task in this study involved thorough the review of a number of recent, relevant reports. Summaries of each report listed in [Table 1](#) are included in Tech Memo #2, to which the reader is referred. It is available, as are all other tech memos, on the City of Novi Website under "City Services and Community Development." This location may change in the future.

Table 1. Background Documents

REPORT		RECOMMENDATIONS	RESULT
1.	Beck — 8 Mile to Grand River Scoping Study, 2006	Short- and long-term rehab and capacity recommendations, with ultimate widening to five lanes	Some turn lanes have been added; no milling/rehab has been done. Rehab between 8 Mile and 9 Mile is scheduled for 2017. Rehab between 9 Mile and White Pine was completed in 2014.
2.	13 Mile/Old Novi/South Lake Intersection Study, 2009	Replace the signal with a stop sign and make geometric improvements, including those for pedestrians.	Complete
3.	Draft South Lake Drive Traffic Calming, September 2015	Install transverse pavement markings, possibly "speed kidneys," address the fact that there is a bike path in only one direction which is used mostly by pedestrians	No action, but the study was just recently completed.
4a.	NW Ring Road Study, June 2007	Updated earlier work on how best to extend Crescent Blvd. west and south to Grand Blvd. (Ring Road)	The City has the right-of-way, but nothing has happened since the planning study.
4b.	11 Mile and Town Center Area Walmart Traffic Impacts Report, 2012	Make signal, signage, and minor geometric changes	Some improvements are complete
4c.	Town Center Study, March 2014	Land use, zoning, design guidelines, and wayfinding	Ongoing zoning and design guideline actions.
4d.	Flint Street Improvement Study, January 2015	Extend the ring road concept south of Grand Blvd via Flint Street to Novi Road listing alternatives, costs and environmental considerations	No action, but the study was just recently completed.
5.	Speed Limit Study of Novi Road 12 to 14 Mile, 2010	Set speed limit to 45 mph; ask the School District Superintendent to request a speed zone, and install advisory 35 mph signing at curves	Speed limits were implemented.
6.	Transportation Improvement Plan, I 96/I-696/I-275 in Novi and Wixom	Presented a series of improvements in ten categories, identifying implementing entity, cost, and timing	Projects in various stages
7.	Identification of High Crash Intersections in Novi 2006-2010, January 2012	Examined 60 local intersections and identified 12 as having high crash rates or high casualty ratios	Led to the following listed study
8.	Crashes at 12 Intersections, June 2012	Specific recommendations for each of the 12 intersections	Project in various stages.
9.	Wixom and Glenwood Signal Study, November 2012	Add signals and crosswalks	Complete
10.	8 Mile and Haggerty Road Safety Audit, 2014	Make extensive changes to Haggerty Road and I-696 ramps where they intersect 8 Mile Road. Short and long-term changes, based on risk analysis	Project status is unknown
11.	Novi Road 12 to 13 Mile Scoping Report, July 2014	A range of alternatives is compared to an earlier mill and overlay with no geometric changes	Reconstruction with 4-lane depressed boulevard is scheduled for summer 2016.
12.	SEMCOG Regional Bicycle and Pedestrian Travel Plan, October 2014	Aggregates and links community plans	NA
13.	Annual Non-Motorized Prioritization 2014-2015 Update, October 2014	Annual reprioritization of non-motorized projects	Projects are implemented each year
14.	RCOC Documentation	FY 2015-16 Budget, Strategic Plan, and jurisdictional map	Summary of budget shown
15.	RCOC Complete Streets Guide	Guidelines for implementing Complete Streets	Table of Contents shown
16.	Hazmat Analysis 42445 W 10 Mile Road, October 2015	Identifies lead and methane as issues for subsurface work at the site	Not relevant to the Thoroughfare Plan
17.	Master Plan Corridor Study – Grand River, Ongoing	Land use, zoning and "sense-of-place" features.	To date: Grand River was designated as a Special Treatment Corridor; specifically, an Entrance Corridor.

Source: *The Corradino Group of Michigan, Inc.*

3. Travel Forecasting

A central task to successfully execute this project is predicting traffic in the year 2040. Corradino developed daily and PM peak period (3-6 pm) travel forecasting models using software known as TransCAD, an industry standard. The 2015 Base Model was developed consistent with modeling of the *2011 Novi and Wixom Transportation Plan* prepared by Corradino. Additional information included SEMCOG model files and the latest traffic data provided by the RCOC, MDOT, and the Traffic Improvement Association of Michigan.

3.1 2015 Model

3.1.1 Traffic Analysis Zones (TAZs)

The Novi model traffic analysis zones (TAZs) form a subset of the SEMCOG regional model (Figure 2). The Novi model includes 148 internal zones and 54 external stations.

Corradino used the road network from its 2011 Study to create a 2015 project area network. Novi provided a list of projects that were added to the 2015 Base network.

- **Novi Road Reconstruction** – Widen from two to five lanes (RCOC project, completed in 2011);
- **Reconstruct Grand River Avenue** – Novi Road to Haggerty Road (RCOC project, completed in 2012); and,

- **Haggerty Road** – Add second SB lane to fill gap at Stonehenge (completed in 2014).

Corradino reviewed Google aerial mapping (imagery date 4/11/2015) to ensure the 2015 Base network represented the existing condition of roadways in Novi. The review indicates that 8 Mile Road currently has two lanes in each direction from South Lexington Boulevard to Haggerty Road at the southern edge of the Novi study area.

Corradino made additional refinements to the road network to incorporate a few, key local roads into the network. Figure 3 illustrates the new links, in orange, that were added to the 2015 Base network.

3.1.2 Traffic Data

Corradino collected the latest traffic data from:

- RCOC;
- SEMCOG; and,
- MDOT.

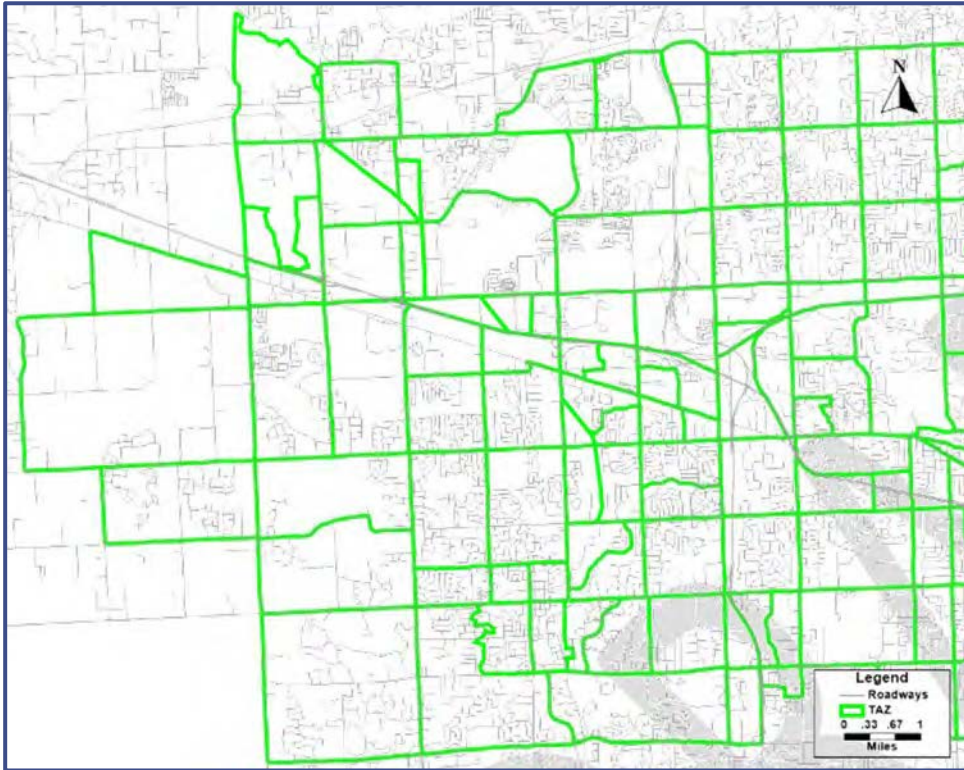
Both daily and PM peak period traffic counts were assembled for arterials, local roads, and freeways (I-96, I-275, I-696, and M-5) throughout the Novi study area. A blend of data was used for model development, depending on availability and quality (recent vs. old counts). Table 2 summarizes use of these data sources.

Table 2. Utilization of Traffic Data Sources

Data Source	Daily Counts		PM Peak Counts		Year of Data Used
	Freeways	Arterial and Local Roads	Freeways	Arterial and Local Roads	
RCOC		√		√	2012–2015
SEMCOG	√	√	√	√	2011–2014
MDOT	√				2014

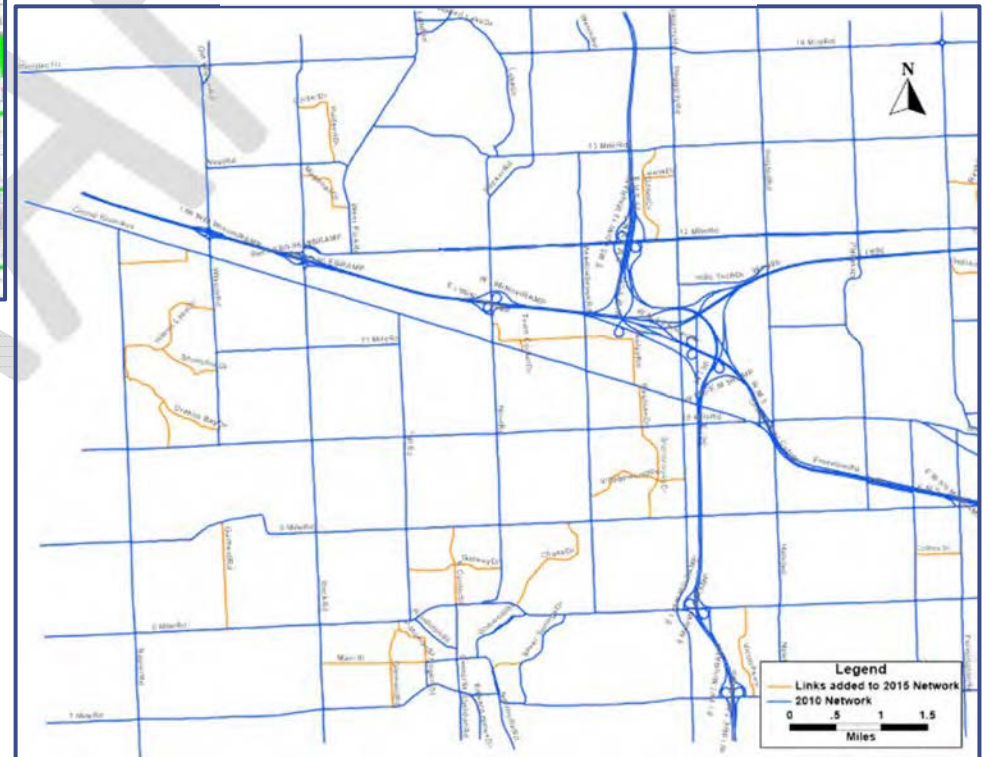
Source: The Corradino Group of Michigan, Inc.

Figure 2. 2015 Base Model Traffic Analysis Zones (TAZs)



Source: The Corradino Group of Michigan, Inc.

Figure 3. 2015 Refined Base Network



Source: The Corradino Group of Michigan, Inc.

For some roadway segments where PM peak period traffic counts were not available, time-of-day (TOD) factors were derived from data collected in the 2011 Study or older counts from aforementioned sources, then applied to the latest daily counts to obtain PM peak period traffic. Model development required counts to be coded by direction, which is particularly critical for the PM model, as traffic flows show significant directional difference during the afternoon peak. For roadway segments for which directional counts were not available, directional factors were derived from data collected in the 2011 study. A reasonable 50/50 split was also used for daily directional counts at some locations. This data collection effort resulted in a sufficient sample size of daily counts (501) and PM peak period counts (425), to provide very good coverage of all roadways in the Novi study area.

3.1.3 2015 Base Model Calibration

The 2015 Base Model is calibrated to the latest traffic counts using the Origin-Destination Matrix Estimation (ODME) technique in TransCAD. The ODME is an iterative process that switches back and forth between a traffic assignment stage and an OD matrix estimation stage, until the estimated OD matrix achieves assigned network flows with the least difference from observed traffic counts.

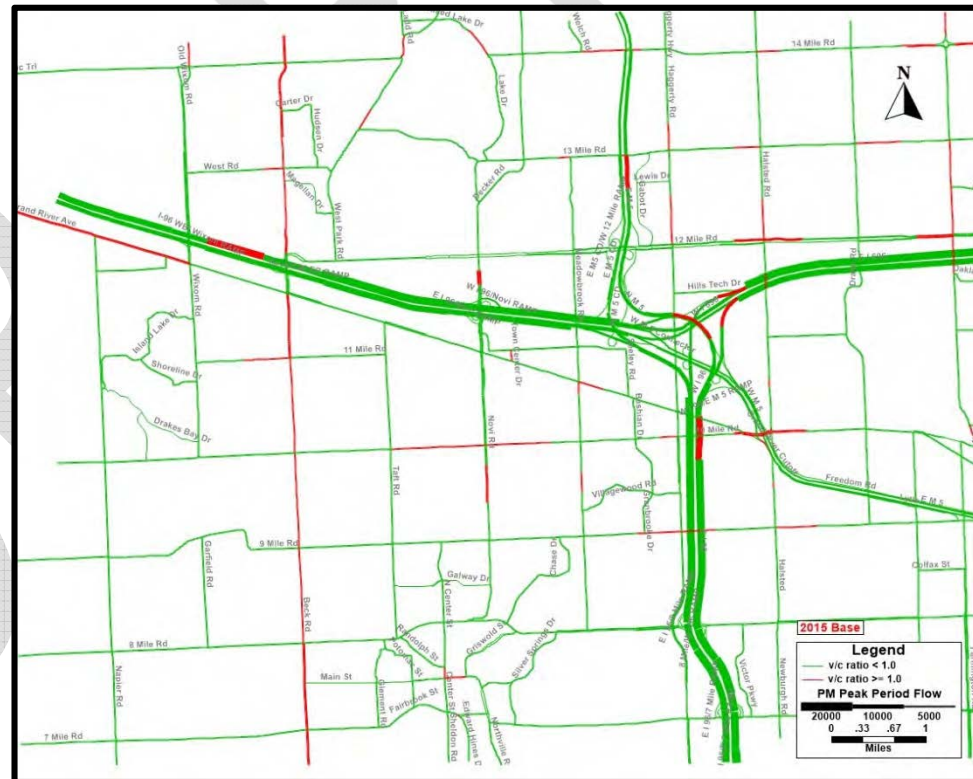
The 2010 daily and PM peak period trip tables, which were extracted from the SEMCOG model and used in the 2011 Study, were used separately as "seed" matrices in the ODME process. The daily model has a Root Mean Square Error percentage (RMSE%) of 18.5%, and the PM peak period model

has a RMSE% of 8.3%, each of which indicate the modeled volumes are very close to traffic counts from a system-wide perspective. On I-96, the correlation of traffic counts with model-assigned volumes is even closer (Daily:8.69%; Peak period; RMSE=8.46%). The optimum RMSE is 0.0%.

Figure 4 shows the 2015 volume/capacity (V/C) ratios in the PM peak period. In this analysis, RED

indicates the V/C ratio exceeds 1.00, reflecting significant congestion. GREEN indicates significant congestion is not detected by the model. It is noted that the TransCAD model is measuring congestion primarily based on the physical width of the roadway pavement and determines if it is adequate to serve the traffic volume. Where it cannot, the model calculates a V/C ratio equal to or greater than 1.0.

Figure 4. 2015 PM Peak Period Traffic Conditions



Source: The Corradino Group of Michigan, Inc.

This analysis concentrates on “significant” congestion, i.e., $V/C \geq 1.0$. There are a number of roads in Novi that have heavy traffic and do not meet this criterion so will not show as RED on Figure 4. For example, volume/capacity ratios for I-96 WB (PM peak direction) between Novi Rd and M5 range between 0.89 and 0.96. Congestion on I-96 in the study area is also evident in 2040 when the V/C ratios are as high as 0.99. They just don’t reach 1.0. Further, in the real world, freeway congestion is usually felt by weaving, merging and diverging behaviors. A travel demand model is not able to capture these operations. It accounts for capacity-constrained delays.

3.2 2040 E+C Model

The City of Novi provided a list of projects that are in the it’s Six-Year Plan that will improve roadway link capacity or change road geometry. They are identified as *existing and committed* (E+C) projects

and are coded into the study’s 2040 E+C network. SEMCOG’s latest 2014–2017 Transportation Improvement Program (TIP) was also reviewed to identify E+C projects. The TIP does not show roadway link capacity improvements in Novi. There is a new roundabout project on Orchard Lake Road at 14 Mile Road, according to the TIP. Although this project is not within the Novi city limits, it is coded into the 2040 E+C network as it will change road geometry in the model network. **Table 3** summarizes the E+C projects.

The 2010 and 2035 trip tables used in the 2011 Study, which were extracted from the SEMCOG model, were used to estimate origin-to-destination (trip) growth. The production and attraction of each zone were interpolated for the 2015 Base Year and were extrapolated for the 2040 Future Year. For each zone, the 2015–2040 growth was derived using a ratio method and a net growth (difference)

method separately. The final 2040 zonal control totals are the average of the two methods. This estimation procedure of future trips is consistent with the method recommended by *NCHRP 255: Highway Traffic Data for Urbanized Area Project Planning and Design*.

The 2040 OD matrix was then obtained by applying a growth factor (Fratar) process to the 2015 ODME-calibrated trip matrix. The aforementioned process was performed for daily and PM peak period traffic, separately.

The 2040 OD matrices were then assigned to 2040 E+C network. **Figure 5** shows the 2040 V/C ratios for the E+C network in the PM peak period.

3.3 Existing and Future Traffic Conditions²

Table 3. 2040 E+C Projects

2040 E+C Projects	Source
Crescent Blvd. Extension – Novi to Grand River (Ring Rd.)	Novi Six-Year Plan
Taft Rd. at 9 Mile Rd., New Roundabout to Replace All-way Stop	Novi Six-Year Plan
11 Mile Rd. at Wixom Rd., Add Roundabout to Replace Stop Control on 11 Mile Rd.	Novi Six-Year Plan
Construct Modern Roundabout on Orchard Lake Rd. at 14 Mile Rd.	SEMCOG 2014-2017 TIP

Source: *The Corradino Group of Michigan, Inc.*

Table 4. Novi Trip Growth – 2015 to 2040

Year	Novi Total Trips	
	Daily	PM
2015	1,447,125	356,470
2040	1,518,272	375,859
Growth %	4.9%	5.4%

Source: *The Corradino Group of Michigan, Inc. and SEMCOG database*

² This discussion is limited to non-interstate roads.

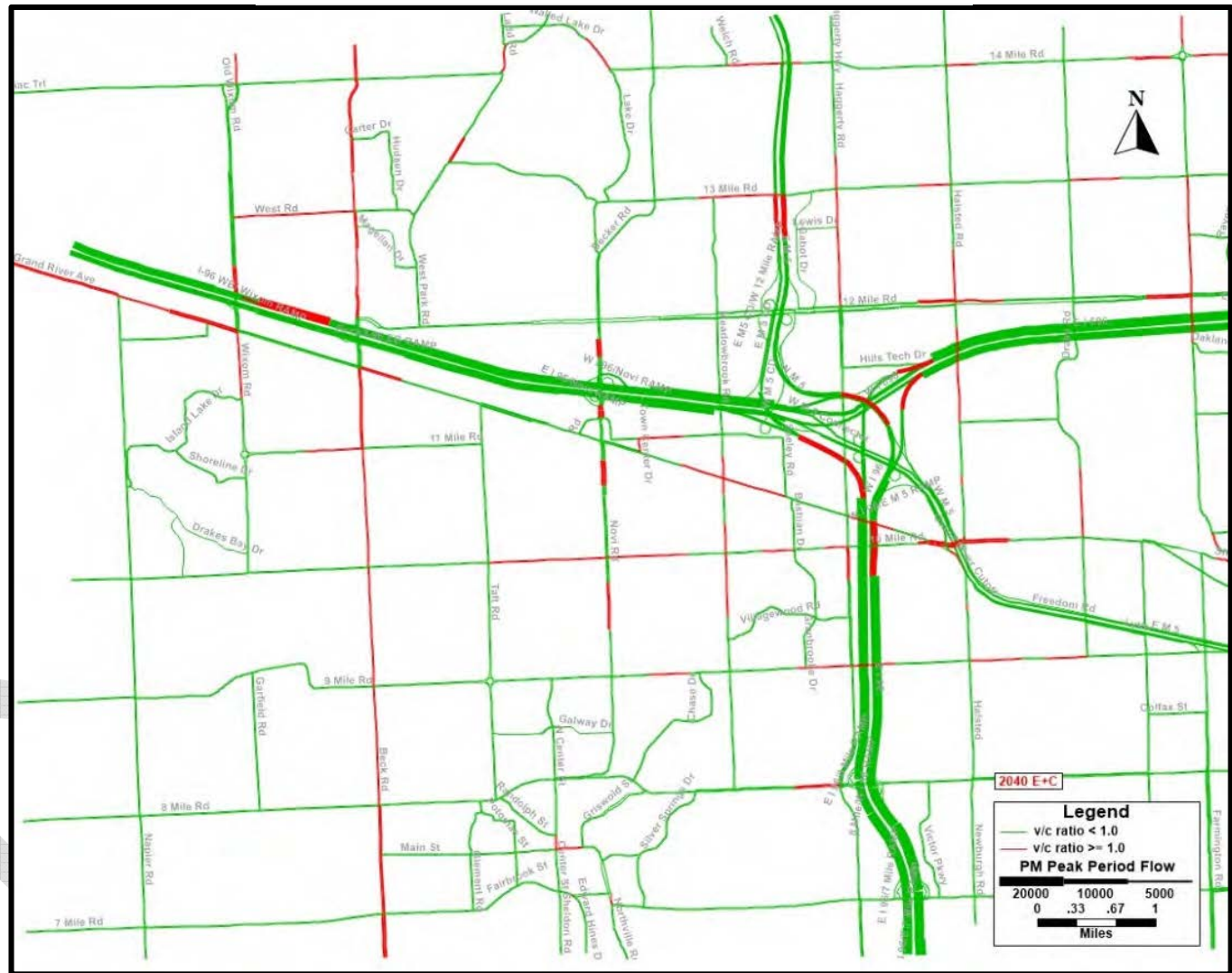
Based on the above discussion, the growth in trips in Novi from 2015 to 2040 is forecast to be 4.9% on a daily basis and 5.4% during the afternoon peak period (Table 4).

In 2015 (Figure 4), Beck Road has the most extensive congestion in Novi. Most "Mile Roads" experience some PM peak period congestion. Sections of 10 Mile Road are also very congested in the afternoon peak period.

By comparing Figures 4 and 5, it can be seen that in 2040 Beck Road will continue to be the road with the most continuous congestion in Novi, if improvements are not made. Sections of 10 Mile Road continue to be congested.

The discussion of transit and non-motorized modes, plus highway intersections, is included in Section 5 of this report.

Figure 5. 2040 E+C PM Peak Period Traffic Condition

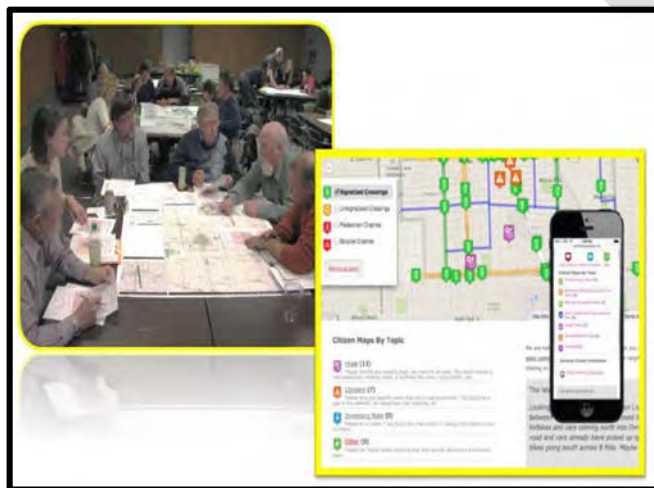


Source: The Corradino Group of Michigan, Inc.

4. Public Engagement

Throughout the project, input was received through the web-based application known as *Community Remarks* (Figure 6), the results of which are included in a separate Public Involvement Diary. Each public comment received a response. The categories of "Safety and Traffic Calming," "Intersection Improvements," and "Pedestrian Improvements" received more than 75% of the comments. Other comments were divided among "Roadway Improvements" (ten comments), "Bicycle Improvements" (three comments), and "Transit" (two comments). In all, Community Remarks received over 2000 "hits" by people visiting the site. Over the course of the project, four public meetings were conducted. All but the February, 2016, meeting was preceded by a Novi Planning Commission

Figure 6. Community Remarks Application



Source: The Corradino Group of Michigan, Inc.

meeting. Notes of each meeting are included in the *Public Information Diary*.



Turning Point Voting Touch-pads

At the meetings in December, 2015, and February, 2016, those in attendance were asked, using a touch-pad polling system known as *Turning Point*, to provide their opinion on eight topics. In summary, the results (Figures 7a and 7b), indicate the meeting attendees were older adults (Question 1) and drove fewer than ten minutes in the off-peak hours to volunteer or work (Questions 3 and 4). None biked or walked on a regular basis, for a variety of reasons (Questions 5 and 6). Oddly though, when asked about the most important items that would enhance Novi's transportation system, improvements to streets/sidewalks, biking facilities, and traffic signal timing were cited in almost equal amounts (20% to 25%) as the most preferred; roadway widening was preferred by fewer than 10% of the respondents (Question 7). These independent opinions closely align with the comments received through the *Community Remarks* application.

December 10, 2015
Novi Police Training Center



February 10, 2016
Older Adults Services,
Meadowbrook Commons



April 28, 2016
Novi Civic Center



June 23, 2016
Novi Civic Center



MEDIA RELEASE

CONTACT: Nathan Mueller, Community Relations Specialist
(248) 347-0431

FOR IMMEDIATE RELEASE

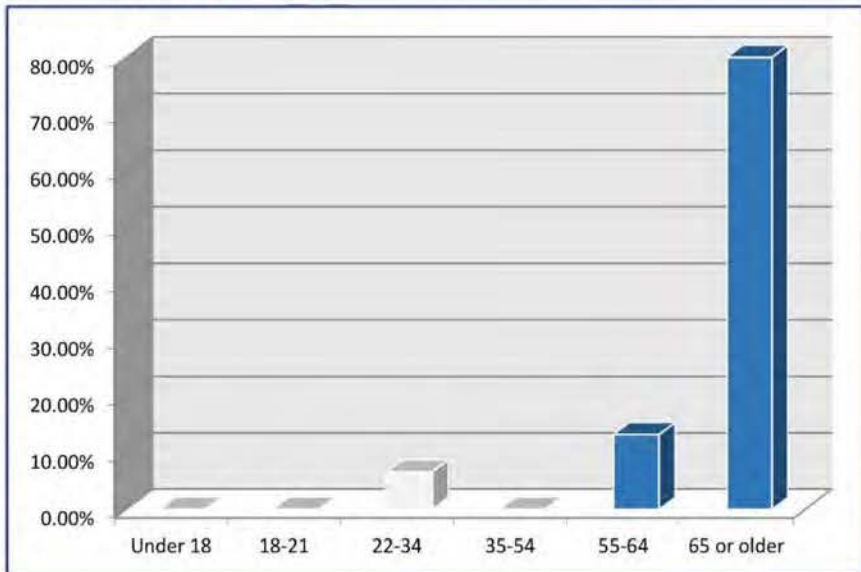
Novi planning for future development, growth
City in process of updating Master Plan for Land Use & Thoroughfare Master Plan

Another public presentation for the Thoroughfare Master Plan Final Report has been scheduled for **June 23 from 7-8 pm** in the Novi City Council Chambers. This report is recommending improvements to Beck Road and Ten Mile Road.

Figure 7a. Touchpad Voting Results

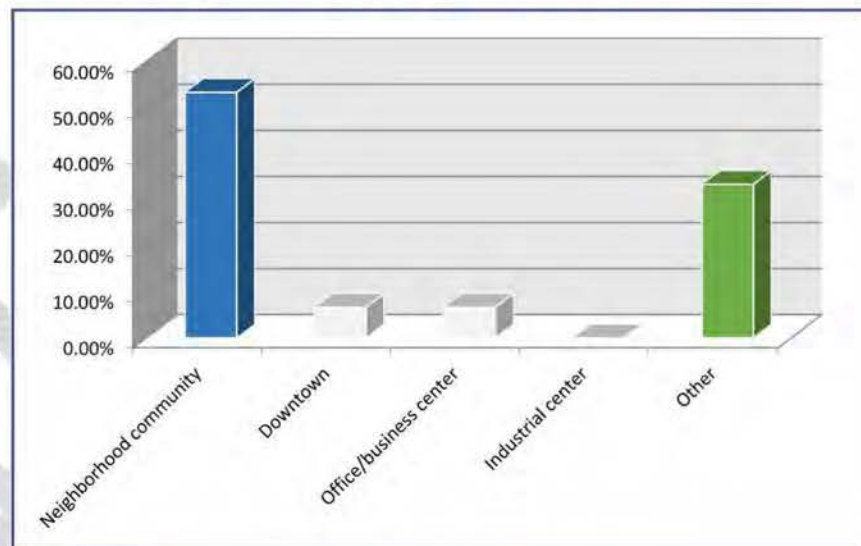
1. What is your age group?

The polling results indicate the participants in the public meetings in December and February were overwhelmingly over 55 years of age.



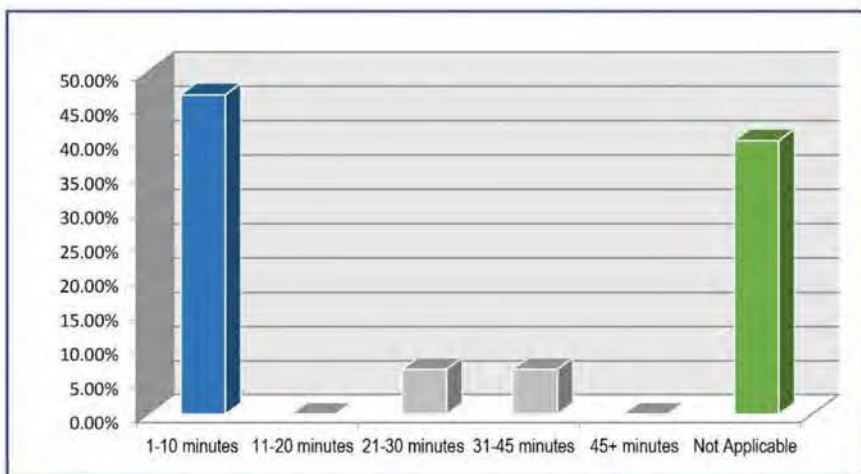
2. How would you describe where you work/volunteer?

Consistent with the age of the meeting attendees, it is logical that most indicated their place or work/volunteering was "neighborhood/community" and "other."



3. If you commute, how long does it take for you to arrive at work/volunteering place?

The morning commute is 10 minutes or less for about 45% of the meeting attendees and another 40% of the attendees indicated the "commute to work" question was not applicable to them, reflecting the age of the attendees.



4. When is the time of day that you experience the most delay?

The overwhelming number of meeting attendees travel outside the AM and PM peaks.

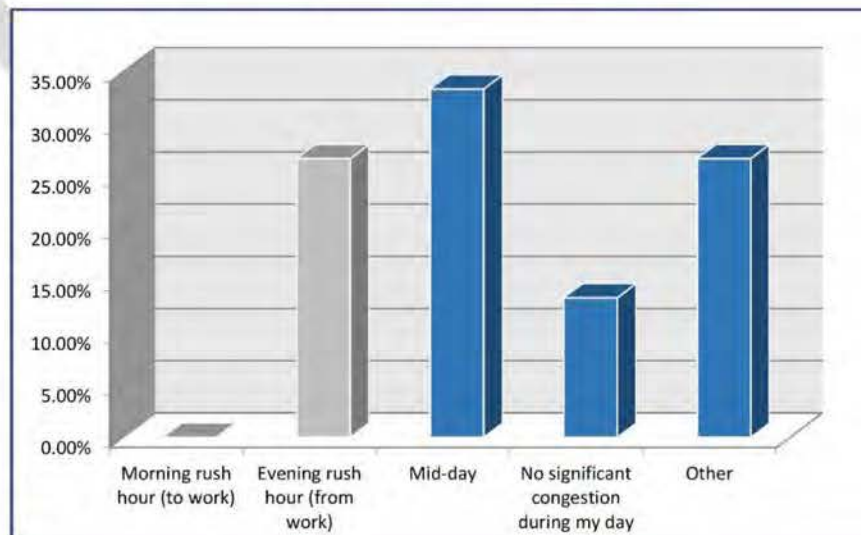
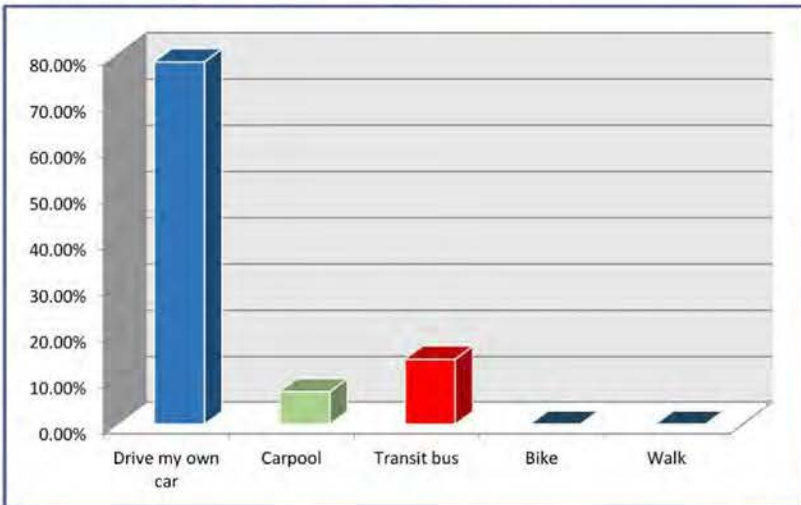


Figure 7b. Touchpad Voting Results

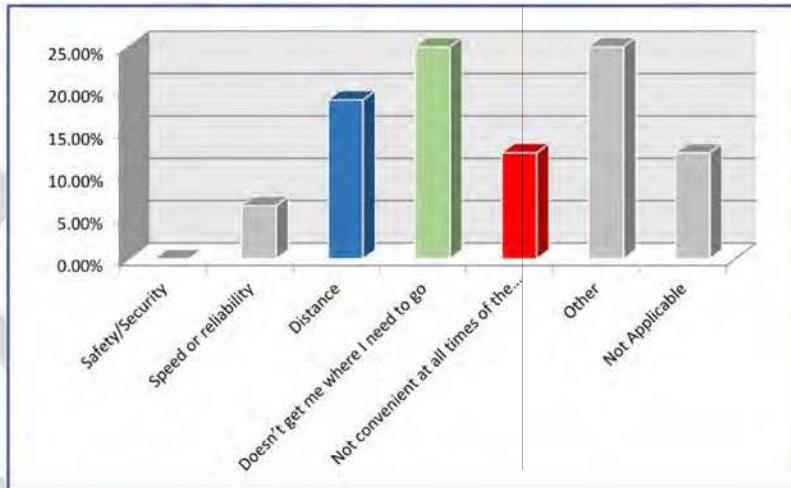
5. For my day-to-day travel I use the following transportation modes: (Multiple Response)

While over three-quarters of the meeting attendees chose to drive their car, one-quarter of the meeting attendees either carpool or use transit.



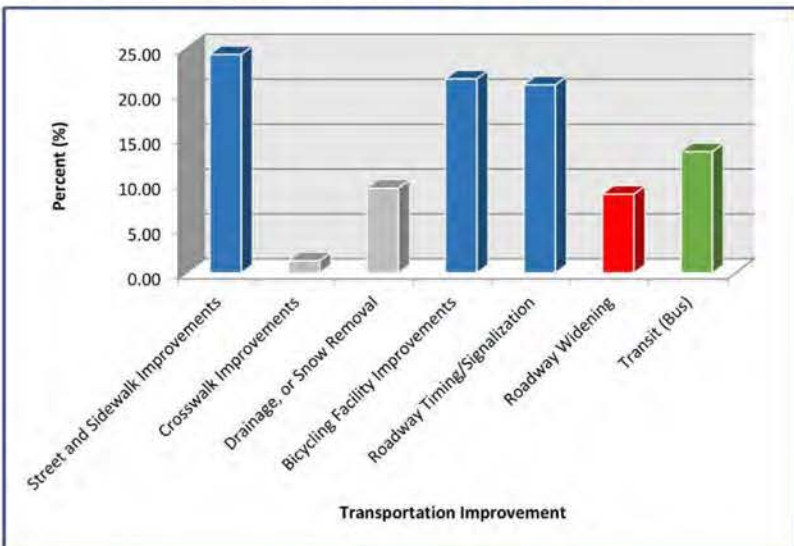
6. If you don't bike, walk, or take transit the primary reason for NOT DOING this is?

Many of the respondents choose NOT to bicycle, walk, or take transit because of concerns with the distance of the trip, connectivity, and convenience.



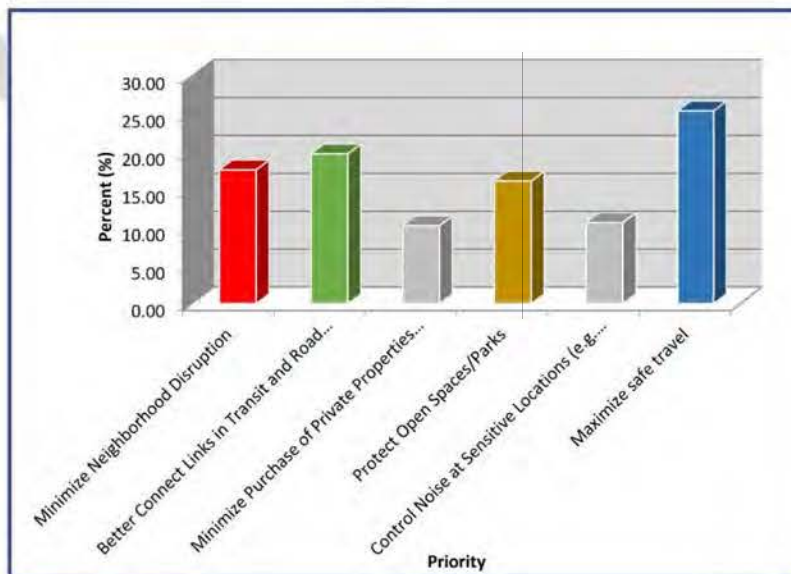
7. The top THREE transportation items I would like to see enhanced in Novi are....

The respondents in almost equal numbers would most prefer improvements to street/sidewalk, roadway signalization and bicycling facilities. The latter is odd, when considering the age of the respondents and the non-use of bicycling. A greater number would prefer transit than road widening.



8. When transportation improvements are made, which items are of most importance to you?

Most meeting participants feel maximizing safe travel is of most importance. But, that number is only slightly more than those who want to improve connectivity in the transportation network and minimize disruption to neighborhoods, parks and open spaces.



5. Multi-modal Alternatives

5.1 Roads

Multi-modal transportation elements were examined in layers, beginning with the most costly-to-implement element – roads. Analysis of 2040 traffic conditions are illustrated in **Figure 8** which shows the 2040 volume/capacity (V/C) ratios in the PM peak period. In this analysis, **RED** indicates the V/C ratio exceeds 1.00, reflecting significant congestion. **GREEN** indicates significant congestion is not detected by the model. To determine the potential positive impact on congestion, a series of tests was executed (**Table 5**). Data on the vehicle miles traveled in congested conditions, otherwise known as VMT, were developed (**Figure 9a**). Also, the hours that vehicles spend in congested conditions were calculated in the traffic assignment model (**Figure 9b**). The results point to the following alternatives that lessen congestion more than others as pointed out by the green arrows (←).

- **Alternative 3:** Widen Beck from Pontiac Trail to 12 Mile;³
- **Alternative 7:** Widen Beck from Grand River to 8 Mile; and,
- **Alternative 11:** Widen 10 Mile from Haggerty to Taft.

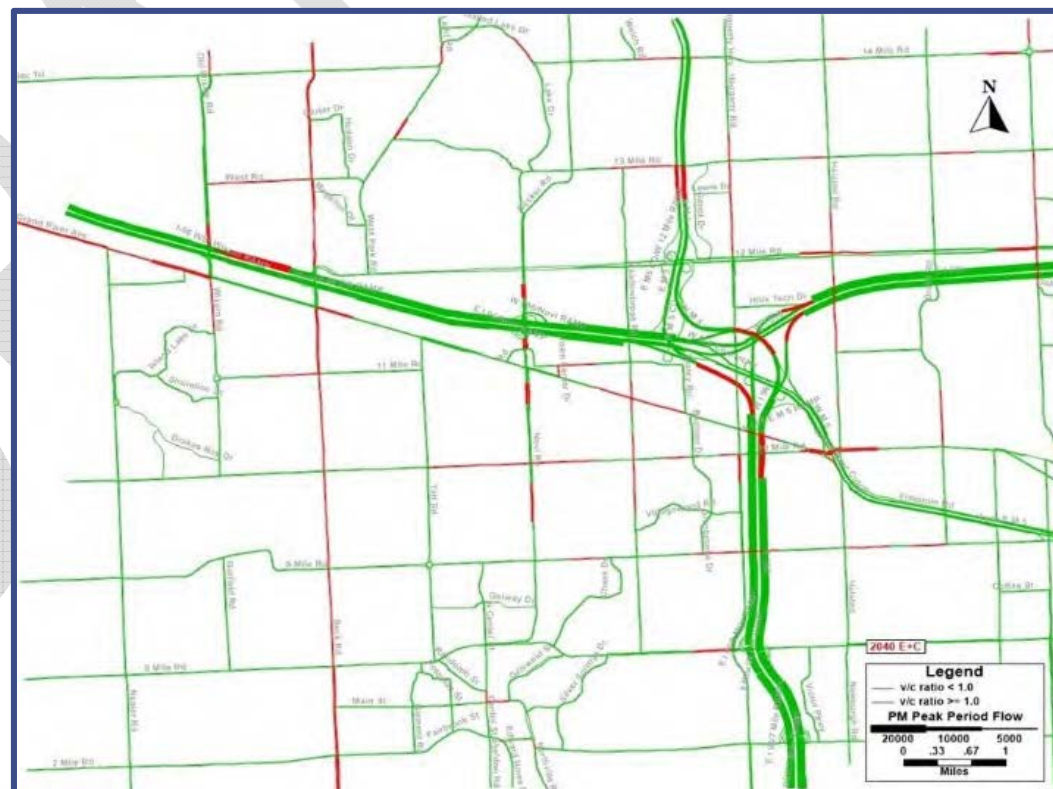
Combinations of these alternatives were then tested (**Table 6**). The same two measures of congestion relief were computed. The results in **Figures 10a** and **10b** indicate that the most cost-effective alternative is Alternative I (see ←) which combines widening Beck Road from 8 Mile Road to

Pontiac Trail (Alternatives 3 and 7) and 10 Mile Road from Haggerty to Taft (Alternative 11). The slight improvement with Alternative H comes with the increased cost to widen Meadowbrook Road between 10 and 12 Mile Roads. That link is to be included in a later stage of implementation.

It is also noted that Alternative G is the most expansive improvement scenario as it combines all roads needing improvement but an Alpha Road extension (Alternative 2) and connecting Meadowbrook Road to Twelve Oaks Mall (Alternative 8) because these two projects are too localized to ease congestion.

Alternative G should perform well and demonstrate what could happen if all of Novi's road needs were satisfied. This cannot be accomplished in the near term; there are funding, impact and policy constraints that prevent more road widenings than Beck and 10 Mile Roads. It is further noted that widening Beck and 10 Mile Roads does not address all the congestion expected in 2040, as evidenced by the red/congested paths on **Figure 11**. Proposed intersection improvements will address a number of locations expected to be congested in the future. These are covered in Section 7.2 of this report (**Figure 12**).

Figure 8. 2040 E+C PM Peak Period Traffic



Source: The Corradino Group of Michigan, Inc.

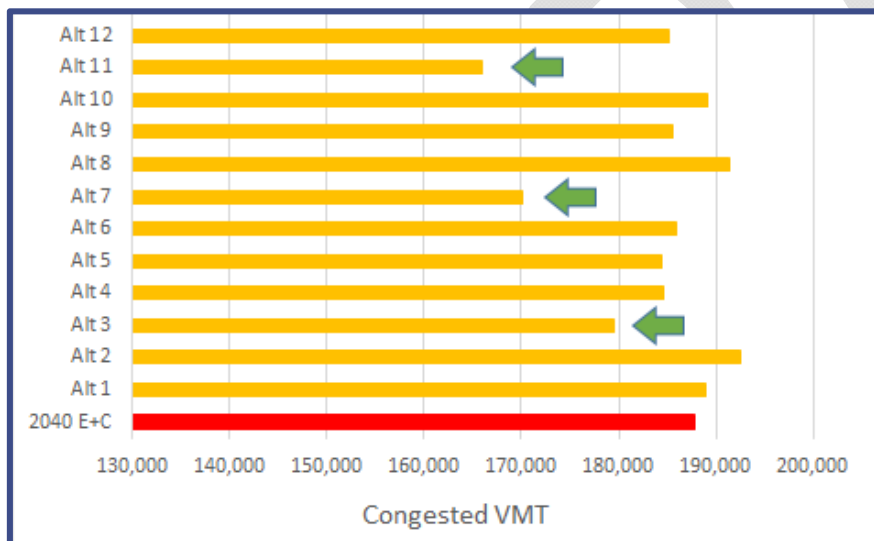
³ Note that Beck Road from I-96 north to Pontiac Trail is in Wixom, but fixing that road was tested as it affects Novi.

Table 5. Basic Alternative Improvements Tested to Relieve Congestion

Alt 1 (Widen 12 Mile from Beck to Cabaret Dr)
Alt 2 (Connect Alpha Tech Dr to Beck with Road Extension)
Alt 3 (Widen Beck from Pontiac Trail to 12 Mile)
Alt 4 (Widen Grand River from Napier to Wixom)
Alt 5 (Widen Grand River from Novi to Haggerty)
Alt 6 (Widen Meadowbrook from 10 Mile to 12 Mile)
Alt 7 (Widen Beck from Grand River to 8 Mile)
Alt 8 (Connect Meadowbrook to Twelve Oaks Mall with New Road)
Alt 9 (Widen Haggerty Rd from 12 Mile to Grand River)
Alt 10 (Extend Taft Rd over I-96)
Alt 11 (Widen 10 Mile from Haggerty to Taft)
Alt 12 (Widen Novi from 9 Mile to Nick Lidstrom Dr.)

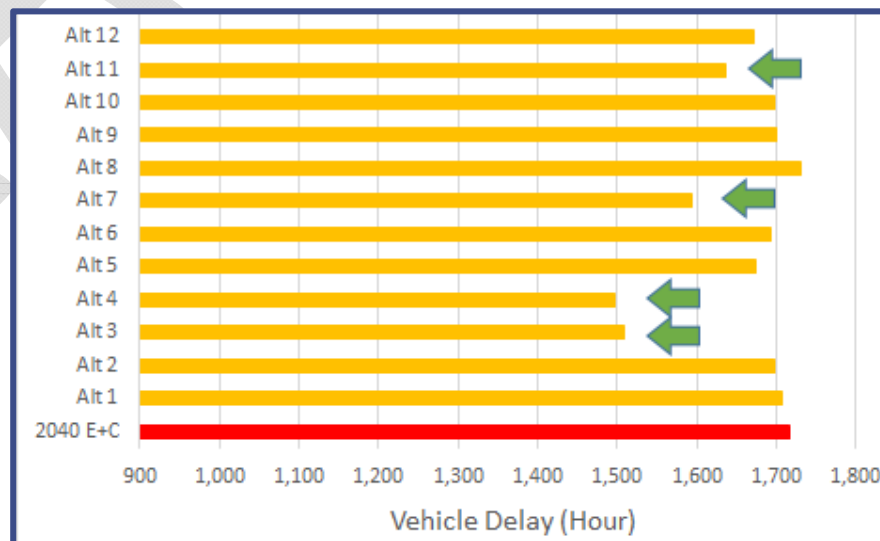
Source: The Corradino Group of Michigan, Inc.

Figure 9a: Basic Alternatives Test Results
PM Peak Period Over-capacity Vehicle Miles of Travel
(Volume/Capacity ≥ 1.0)



Source: The Corradino Group of Michigan, Inc.

Figure 9b: Basic Alternatives Test Results
PM Peak Period Vehicle Hours of Congested Travel
(Volume/Capacity ≥ 1.0)



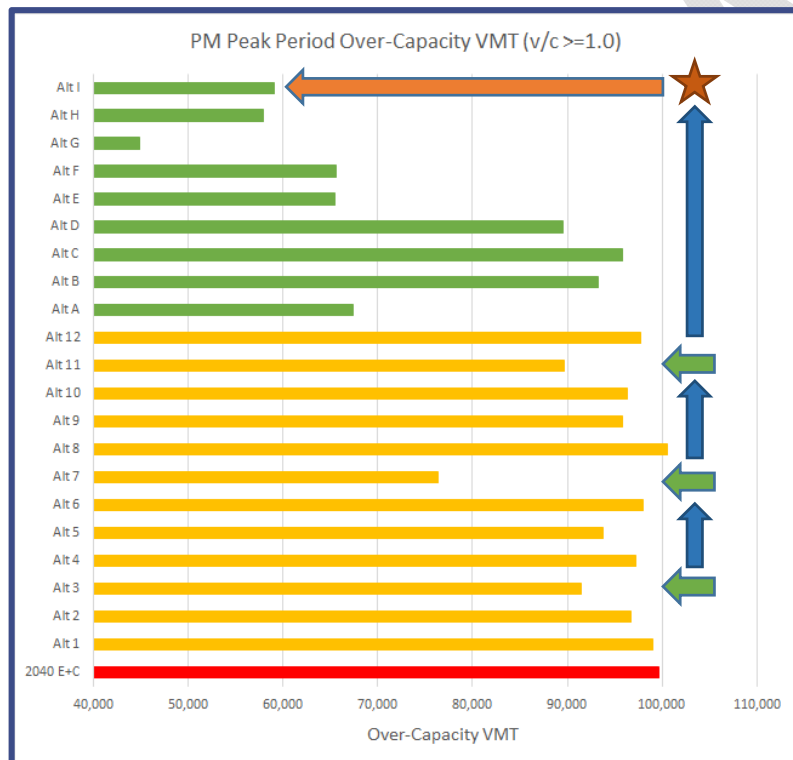
Source: The Corradino Group of Michigan, Inc.

Table 6. Combination Alternatives Tested to Ease Congestion

Alt A (Alt 3 + 7) (Widen Beck Road: Pontiac Trail to 8 Mile)
Alt B (Alt 5 + 6) (Widen Grand River: Novi to Haggerty + Widen Meadowbrook: 10 Mile to 12 Mile)
Alt C (Alt 6 + 9) (Widen Meadowbrook: 10 Mile to 12 Mile + Widen Haggerty: 12 Mile to Grand River)
Alt D (Alt 5 + 6 + 9) (Widen Grand River: Novi to Haggerty + Widen Meadowbrook + Widen Haggerty)
Alt E (Alt 3 + 7 + 10) (Widen Beck + Extend Taft over I-96)
Alt F (Alt 3 + 6 + 7) (Widen Beck + Widen Meadowbrook)
Alt G (All but Alt 2, 8) (All but Alpha Road Extension + Connect Meadowbrook to Twelve Oaks Mall)
Alt H (Alt 3 + 6 + 7 + 11) (Widen Beck + Widen Meadowbrook + Widen 10 Mile)
Alt I (Alt 3 + 7 + 11) (Widen Beck + Widen 10 Mile)

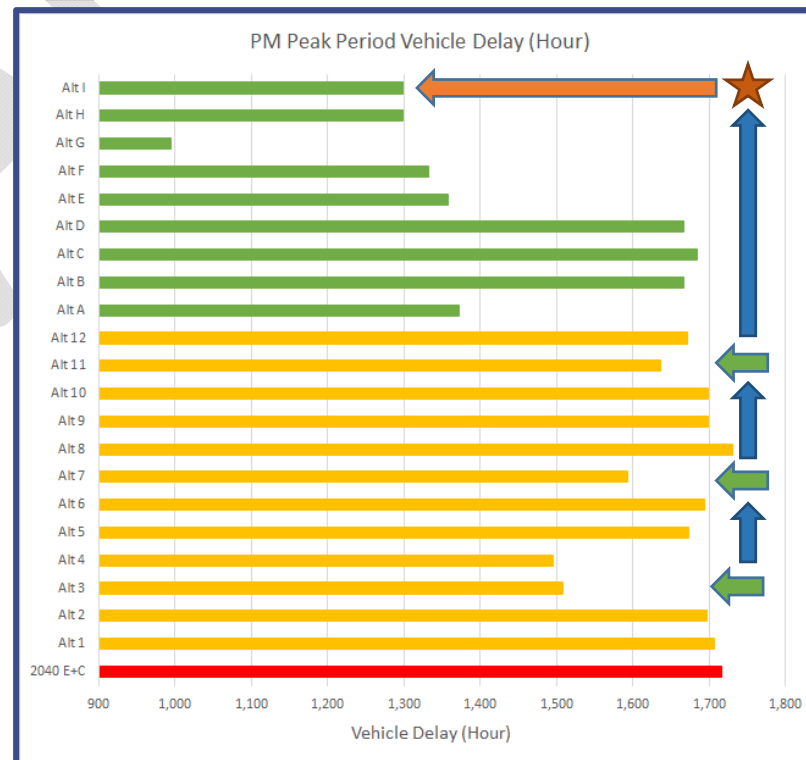
Source: The Corradino Group of Michigan, Inc.

Figure 10a: Combination Alternatives Test Results
PM Peak Period Over-capacity Vehicle Miles of Travel
(Volume/Capacity ≥ 1.0)



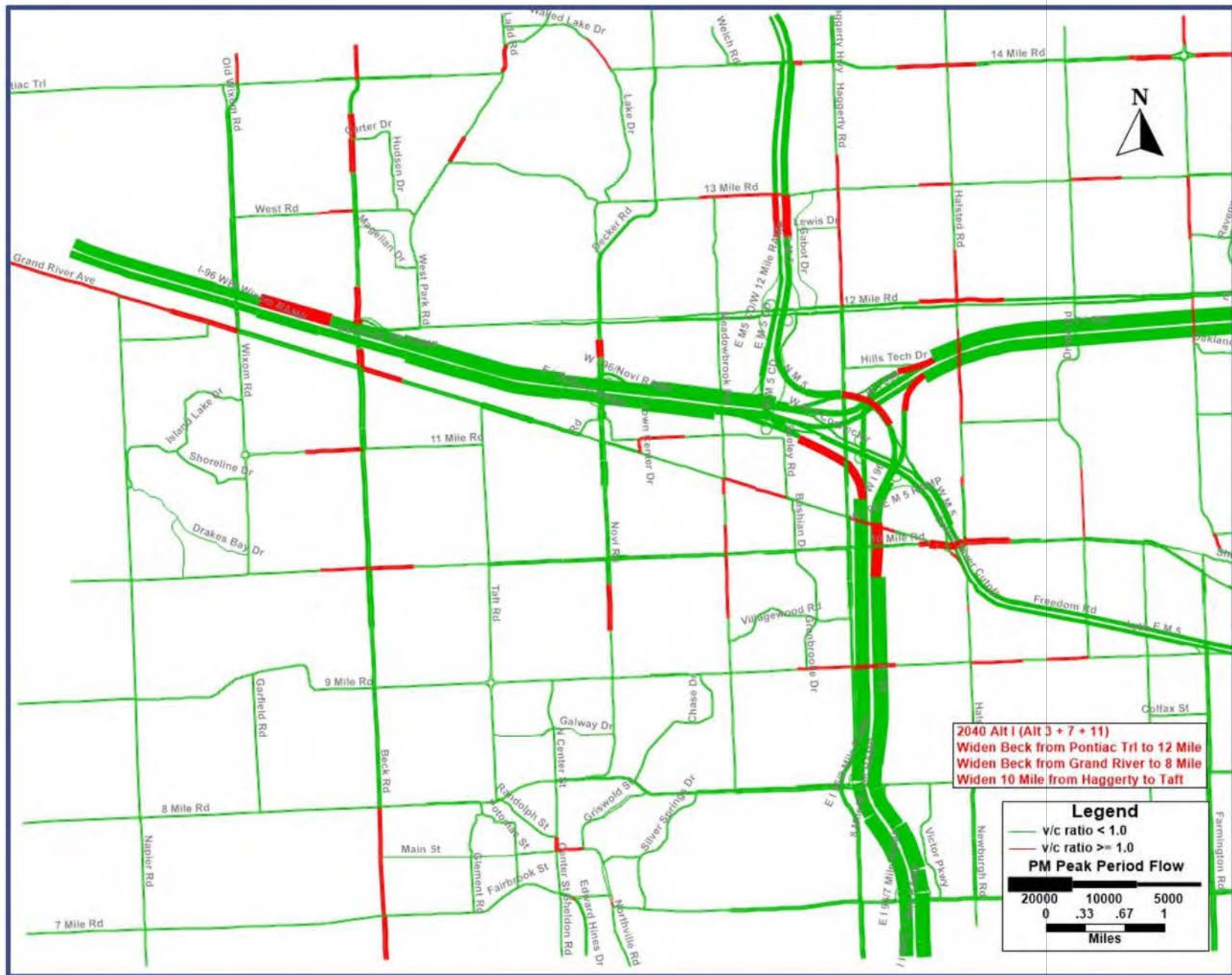
Source: The Corradino Group of Michigan, Inc.

Figure 10b: Combination Alternatives Test Results
PM Peak Period Vehicle Hours of Congested Travel
(Volume/Capacity ≥ 1.0)



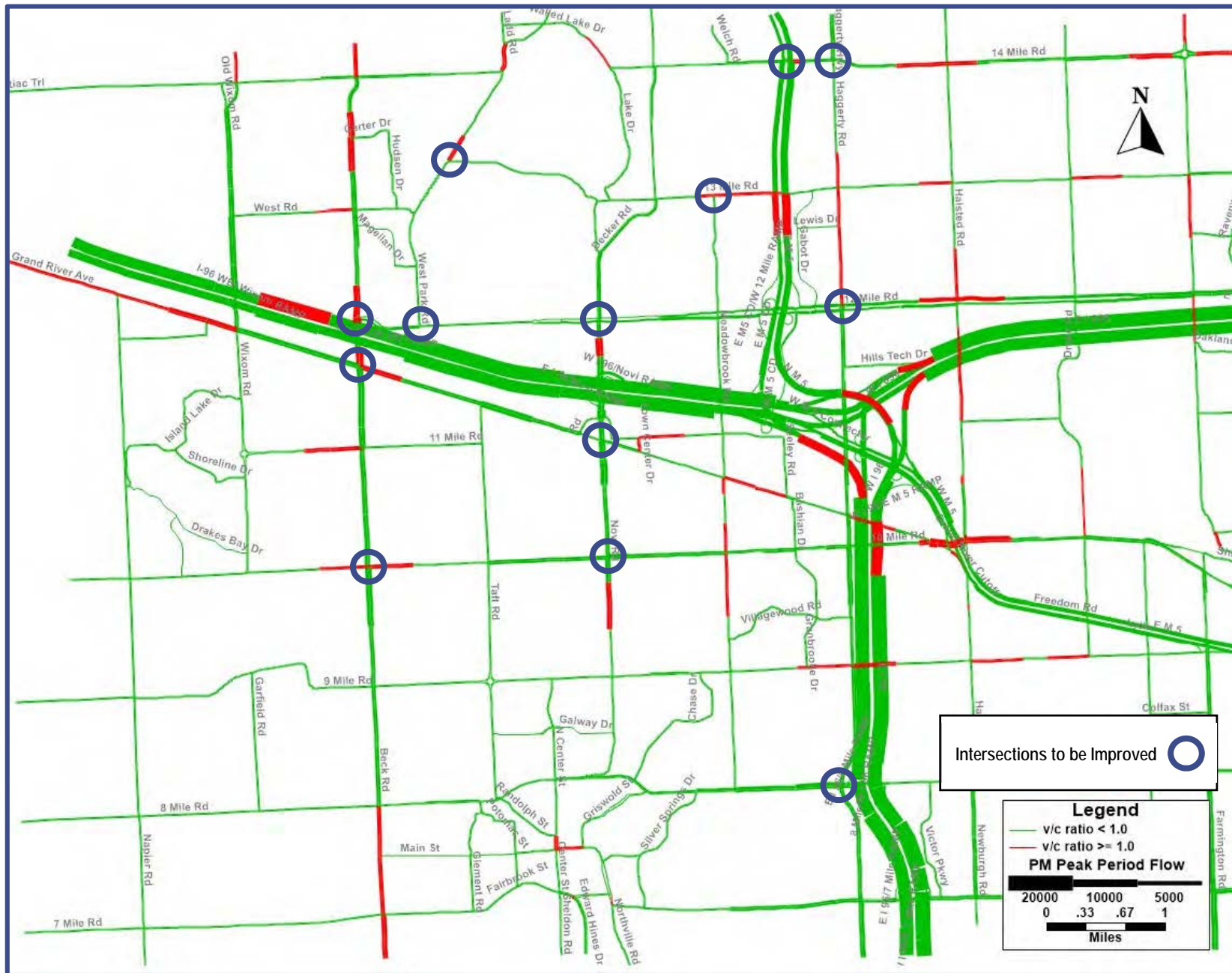
Source: The Corradino Group of Michigan, Inc.

Figure 11. Alternative I with 2040 Traffic



Source: The Corradino Group of Michigan, Inc.

Figure 12. Novi Intersections Proposed to be Improved



Source: The Corradino Group of Michigan, Inc.

5.2 Non-Motorized

With the road priority to improve Beck and 10 Mile Roads, the non-motorized system was examined. It incorporates the city's annual process for identifying and prioritizing its potential non-motorized projects. That process allocates points to proposed sidewalk and pathway segments to prioritize them. Sidewalks, per city ordinance, are six feet wide, pathways are eight feet, and trails are ten feet wide. The screening includes the following factors:

1. Number of crashes within a segment;
2. Road speeds and volumes;
3. Access provided to schools – number and proximity;
4. Access provided to parks;
5. Access provided to hotels;
6. Access provided to shopping;
7. Access provided to places of worship;
8. Connection to system;
9. Population served;
10. Proportion of segment being completed;
11. Expressed public interest; and,
12. Support of the Master Plan.

The top 20 segments that emerge from the screening using these factors are then analyzed again using the following criteria:

1. Ease of construction;
2. Right-of-way availability;
3. Availability of "outside" funding;
4. Relationship to sidewalk or pathway on opposite side of street;
5. Opportunity for private development to build segment; and,
6. Evidence of existing use (worn path).

Some projects/segments that perform well in the priority ranking, but are considered to be part of future development projects, are placed in a "deferred" category pending the associated development project proceeding.

The pace of implementation depends on funding. As each of the top 20 sidewalk/pathway segments are completed, new projects advance to the top 20 for assignment of implementation dates. The

current top 20 projects, as listed in the *Annual Non-Motorized Prioritization 2015-16 Update*, are shown in **Table 7**.

Based on the roadway projects being considered as part of the Thoroughfare Master Plan, seven top 20 listed sidewalk/pathway projects would be constructed as the corresponding roadway segment is improved along Beck Road, between 8 Mile Road and Grand River Avenue, and 10 Mile Road between Taft Road and Haggerty Road (**Table 8 and Figure 13**). Other non-motorized projects will continue to be implemented under the Thoroughfare Master Plan as part of Novi's Annual Non-Motorized Prioritization Process.

Table 8. 2015–16 Top 20 Priority Pathway/Sidewalk Segments Associated with Potential Road Widening Projects

Road Segment		Non-motorized Project	Non-motorized Length	Capital Improvement Program Yr.	Cost
P7	Beck Road – 8 Mile to Grand River	Rank 8 – No. 39, west side	1,100'	2017–2018	\$155,000
P11	10 Mile – Taft to Haggerty	Rank 1 – No. 81b, south side	2,750'	2017–2018 & 2019–2020	\$775,000
		Rank 7 – No. 62, north side	400'		
		Rank 11 – No. 90, south side	2,400'		

Source: *The Corradino Group of Michigan, Inc.*

Table 7. Table 4A from Annual Non-Motorized Prioritization 2015-16 Update

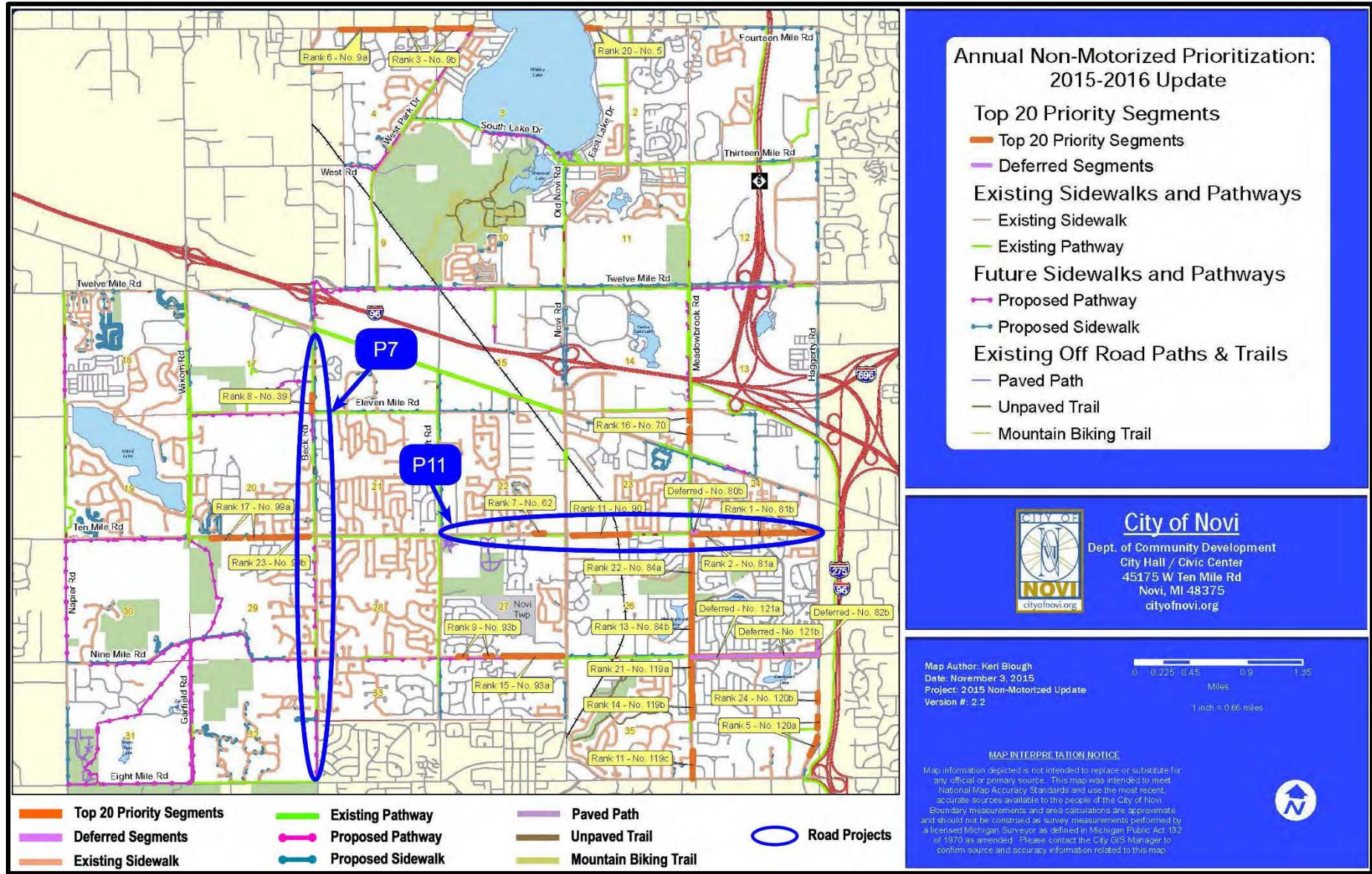
Annual Non-Motorized Prioritization: 2015-2016 Update										
Table 4A: 2015-16 Top 20 Priority Pathway and Sidewalk Segments excluding deferred segments City of Novi										
Overall Segment Rank	Segment Item #	Section #	Type	Side of Street	Location	From	To	# of Pieces in Segment	Segment Length (ft.) excluding Developer Planned & Completed Pieces	Notes
1	81B		P	south	Ten Mile	Willowbrook	Haggerty	1	2,750	17-18 & 19/20 CIP
2	81A	25	P	south	Ten Mile	Meadowbrook	Willowbrook	1	2,530	17-18 & 19/20 CIP
3	9B	4	S	south	Pontiac Trail	Wedgewood	West Park	2	2,560	16-17 & 17-18 CIP
5	120A	36	S	west	Haggerty	Eight Mile	N of Orchard Hill	2	1,390	
6	9A	4	S	south	Pontiac Trail	Beck	Wedgewood	1	2,440	16-17 & 17-18 CIP
7	62	22	S	north	Ten Mile	Eaton Center	Churchill Crossing	1	400	15-16 CIP
8	39	17	P	west	Beck	Eleven Mile	Providence	1	1,100	17-18 CIP
9	93B	27	S	north	Nine Mile	Plaisance	Taft	2	650	
11	90	26	P	south	Ten Mile	Novi Rd.	Chipmunk	1	2,400	18-19 CIP
11	119c	36	S	east	Meadowbrook	Eight Mile	N of Llewelyn	1	1,200	18-19 CIP
13	84B	25	S	east	Meadowbrook	Nine Mile	Chattman	1	2,050	19-20 CIP
14	119B	36	S	east	Meadowbrook	Singh Blvd	N of Llewelyn	1	1,300	18-19 CIP
15	93A	27	S	north	Nine Mile	Novi Rd.	Plaisance	1	2,650	
16	70	23	P	west	Meadowbrook	Eleven Mile	Gateway Village	3	900	
17	99A	29	P	south	Ten Mile	Wixom	400' E of Lynwood	1	2,900	17-18 CIP
20	5	2	S	south	Fourteen Mile	Beachwalk Apartments	East Lake	1	600	19-20 CIP
21	119A	36	S	east	Meadowbrook	Nine Mile	Singh Blvd	1	1,300	18-19 CIP
22	84A	25	S	east	Meadowbrook	Ten Mile	Chattman	1	2,350	19-20 CIP
23	99B	29	P	south	Ten Mile	400' E of Lynwood	Beck	1	1,100	17-18 CIP
24	120B	36	S	west	Haggerty	Orchard Hill	High Pointe	1	375	
									32,945	

Legend S= 6 ft. sidewalk P= 8 ft. pathway

- Segments with pathways or sidewalks on most of the opposite side of the street - note that these segments may be critical for system connectivity & must be analyzed separately for connectivity
- Segments with a higher ranking segment planned for the opposite side of the street - note that these segments may be critical for system connectivity & must be analyzed separately for connectivity
- Short Segments (400 ft. or less)
- Scheduled Segment
- CIP Budget Year

Source: Annual Non-Motorized Prioritization 2015-16 Update

Figure 13. Proposed Thoroughfare Road Improvement Projects Superimposed on 2015-16 Top Priority Pathway and Sidewalk Segments Map



Source: City of Novi, Michigan, and The Corradino Group of Michigan, Inc.

5.3 Transit

5.3.1 Regional Transit

To improve transit, a regional approach was first examined by linking Novi to the SMART (Suburban Mobility Authority for Regional Transportation) bus system. SMART is the transit provider in Oakland County. Its Community Partnership Program (CPP) supports local transit service in 75 municipalities by leveraging federal funding and returning those funds to local communities to build their own transit program. SMART supports both fixed route and dial-a-ride (demand responsive) services. The latter is similar to Novi's Older Adults transportation program. And, while SMART routes do not extend into Novi, as the city has opted out of the millage that underwrites service, SMART does provide some funding of the Older Adults transportation program.

It is important to note that the Regional Transit Authority (RTA) of Southeast Michigan has a measure on the ballots of Washtenaw, Oakland, Wayne, and Macomb counties in November, 2016, that, if successful, would fund regional transit. The referendum will be a **regional yes or no vote**; there can be no "opt out" for individual cities or counties.

RTA has developed a Regional Master Transit Plan to guide transit developments in Southeast Michigan over the next 20 years. It:

- Examines the state of the current transit system and explains what will happen if nothing changes;

- Determines the appropriate mix of transit service to meet the needs of Southeast Michigan;
- Recommends future transit service, including rapid transit and better coordination among the existing providers; and,
- Presents a funding strategy and the steps needed to make this plan a reality.

SMART's Master Transit Plan indicates Novi has an "emerging" transit demand. It offers a number of ways to serve it:

- Premium service, such as bus express routes to the Detroit-Wayne County Airport (DTW);
- Cross-county service; and,
- Demand-responsive service like Novi's Older Adults transportation program.

To examine the potential cost of a regional transit approach in the Novi TMP, a logical starting point was to extend existing SMART bus routes that today serve communities to the east. The current westernmost limit of these routes is Haggerty Road (Figure 14). Routes 330 and 740 could be extended farther to the west into Novi. Route 780 could extend south from Maple Road along Haggerty Road.

If Route 330 were extended, it could serve the many attractions along Grand River Avenue, terminating at the Providence Park Hospital campus (Figure 15). Routes 740 and 780 could follow a common path west along 12 Mile Road to circulate through the Twelve Oaks Mall. These proposals reflect the Regional Master Plan for Novi (Figure 16).

Figure 14. Current SMART Bus Service near Novi



Source: SMART

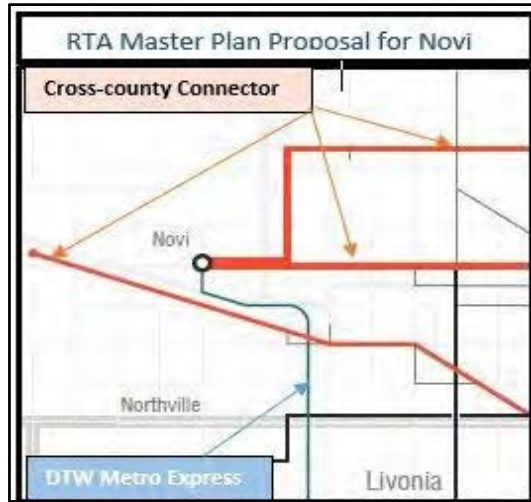
Annual costs to extend all these SMART routes, on the basis for the existing number of scheduled runs and using SMART's cost per mile and per hour, could be almost \$15 million (Table 9). If limited weekday service were provided (two inbound trips in the morning and two outbound in the evening), the cost could be near \$2.5 million.

In reviewing these services with the TMP Steering Committee, they were considered too expensive for Novi to cover alone, unless the regional transit millage passes.

It is estimated that 1 mil of property taxes in the City of Novi would amount to approximately \$3.2 million per year. By legislative mandate, no **county** can receive transit services which cost less than 85% of what it contributes in taxes. If the Master Transit

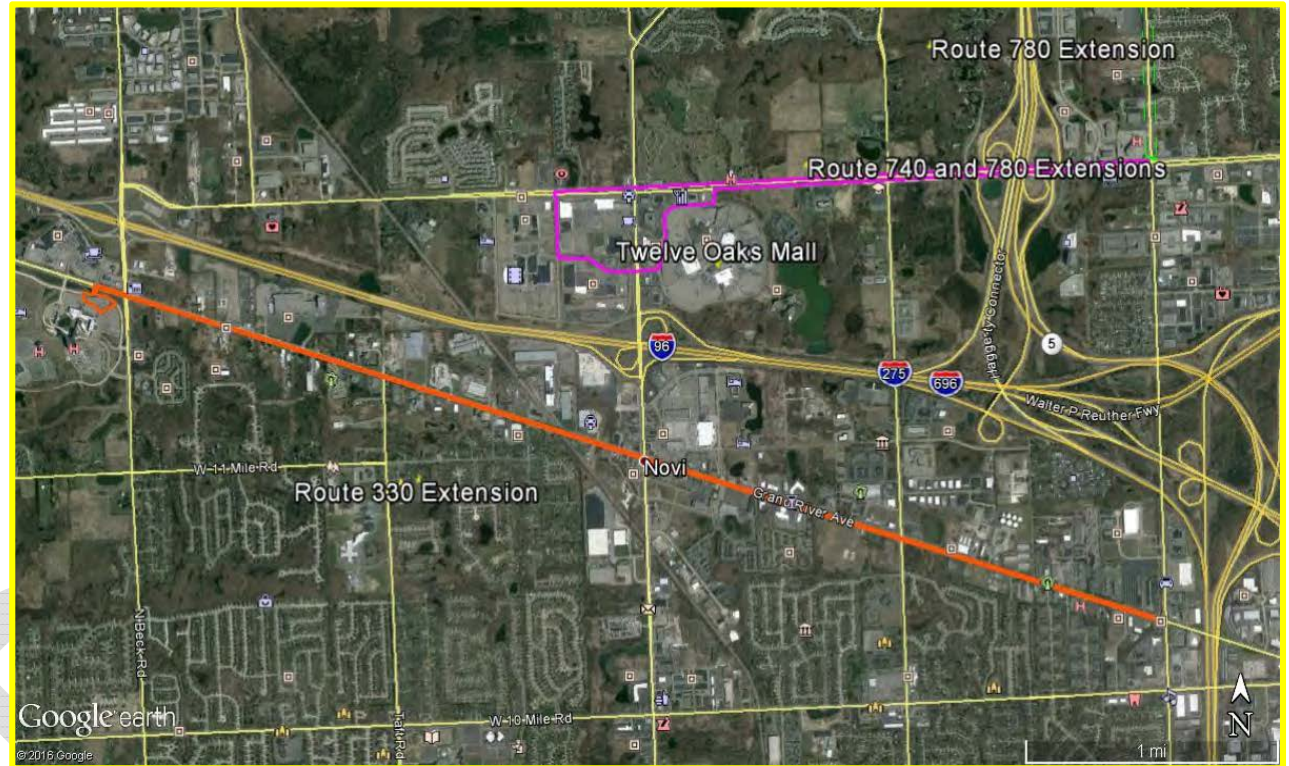
Plan services, noted above, are implemented, it appears to be good for Novi. There is a caveat: It is a formula unique to Oakland County and does not imply an 85% contribution formula applies to the City of Novi although it does look like the proposed services will be extensive for Novi.

Figure 16. RTA Master Plan Proposal



Source: SMART

Figure 15. Example Extensions of SMART Routes 330, 740, and 780



Source: The Corradino Group of Michigan, Inc. and Google Earth

Table 9. Potential Costs to Extend SMART Routes 330, 740, and 780 in Novi

	Extension in Miles	Cost/Mile*	Cost/Run	Runs/Wkday	Runs/Sat	Runs/Sun	Yearly Runs	Annual Cost
Full Service								
Extension of Route 330	9.4	\$100	\$940	19	14	0	5668	\$5,327,920
Extension of Route 740	5.3	\$100	\$530	18	15	12	6084	\$3,224,520
Extension of Route 780	9.2	\$100	\$920	20	17	13	6760	\$6,219,200
Limited Service								
Extension of Route 330	9.4	\$100	\$940	4	0	0	1040	\$977,600
Extension of Route 740	5.3	\$100	\$530	4	0	0	1040	\$551,200
Extension of Route 780	9.2	\$100	\$920	4	0	0	1040	\$956,800

*Operating Expense per Hour as reported to MDOT for 2014.

Source: The Corradino Group of Michigan, Inc.

5.3.2 Older Adults Services Transportation

The City of Novi Older Adult Services Transportation (OAST) provides specialized transportation for Novi residents age 55+ and those under 55 with a limiting disability. Service is to medical appointments, shopping, special events, classes, etc. The program operates Monday through Friday, 8am–5pm and on Saturday, 9am–3pm; there are no Sunday operations. Reservations are required at least two days in advance and trips are scheduled based on availability. In FY 2014/2015, OAST provided 12,034 one-way rides (including for special events) using seven vehicles. Passengers may travel anywhere within the City of Novi for \$3 per one-way ride and \$5 per one-way ride for trips outside the city but within ten miles from the Novi Civic Center. There are complimentary rides to the Meadowbrook Activity Center, the Civic Center, Novi’s Public Library, and to a City of Novi special events or programs within the city limits.

The OAST current annual budget of about \$160,000 is supported by fare box revenues (\$30,000), the City of Novi General Fund (\$25,000), the Parks, Recreation & Cultural Fund (\$27,000), SMART (\$54,450), program donations (\$20,000), and advertising (\$2,400), the TMP expects the service to continue in its current form which costs about \$160,000 per year. Passage of the RTA plan may cover these costs.

Funding Source	Amount	% of Funding
Fare Box	\$30,000	19%
Novi General Fund	\$25,000	16%
Parks, Recreation	\$26,916	17%
SMART	\$54,454	34%
Donations	\$20,000	12%
Advertising	\$2,400	2%
TOTAL	\$158,770	100%

Source: City of Novi, Michigan

5.3.3 Transit Circulator

A circulator between the Twelve Oaks Mall area and Town Center area was analyzed for service on Saturdays and recommended as a six-month “trial” project. The estimated cost is \$45,000. The vehicles would be those of the OAST available for six hours on Saturdays. If the service proves successful, additional hours of service may be beneficial, which may require additional equipment.



Circulator Bus

5.3.4 Future Possibilities

Autonomous (self-driving) vehicles are the future of transportation around the world. Traditional modes of transportation are being inundated with technology, and as with everything else technology-driven, the future of transportation is evolving at a rapid pace. The limitations are, in fact, not the autonomous vehicles and technology, as much as the regulations that need to be put into place.

In that regard, federal regulators plan to issue guidance within months on preferred performance characteristics and testing methods for driverless vehicles and collaborate with state officials on policies. And, the federal government has proposed to spend \$4 billion to encourage developing driverless vehicles.

While researchers began building autonomous vehicles that could be tested on public roads, the concept evolved into **C**onnecte**A**utonomous **V**ehicles (CAVs) which can communicate with each other, and communicate with infrastructure, much more efficiently and as fast as the human brain can respond.

CAVs, once fully implemented, have the potential to improve our way of life. Among the numerous benefits are:

- Improving safety by reducing the number of crashes that occur annually on our roadways; and,
- Reducing:
 - ✓ traffic congestion;
 - ✓ speeding;
 - ✓ emissions/pollution;

- ✓ impaired driving;
- ✓ texting-while driving; and,
- ✓ road rage.

In addition to these transportation system improvements, CAVs also have the potential to improve daily living, particularly for seniors and the disabled. Concerns like: *“How will I get to the grocery store or the doctor or just get out of the house because you can no longer safely operate a moving vehicle”* can be addressed.

To meet these needs today, there are the Older Adults Services transportation program, taxicabs, Uber, and Lyft. In the next several years, there will also be CAVs. Government support of this technology, could be the catalyst for funding a mass transit system that includes a fleet of CAVs. The federal government has been receptive and willing to embrace CAVs because of their social benefits. Providing an alternative to bus/van and other transit modes/vehicles will help encourage more government funding to make CAVs a reality for public use. Concern about loss of revenue from existing transportation systems is on the opposite side of this discussion. But, as explained in the article: *Autonomous vehicles will have tremendous impacts on government revenue*,⁴ there is a potential for significant cost savings to governments compared to the loss of revenue.

⁴ Kevin C. Desouza, Nonresident Senior Fellow, [Governance Studies](#), Center for Technology Innovation; Kena Fedorschak, MBA candidate, W.P. Carey School of Business, Arizona State University

Consider, that If you do not possess the ability to operate an auto, how transformative it could it be for a vehicle to come to you, on demand, and provide travel, with comfort, safety, and security?

6. Funding Situation

6.1 State and Federal Programs

After years of frustration at the federal and state levels, both governments enacted transportation funding legislation in 2015. The state program doesn't begin to provide monies until January 1, 2017; it then takes until fiscal year 2020 for the full effect (estimated to be \$1.234 billion per year) to be felt. Those funds are to be distributed 696 ways: MDOT, 80 transit agencies, 83 counties, and 533 villages and cities.

At the federal level, the FAST Act (Fixing America's Surface Transportation) will provide five years (FY 2016 through FY 2020) of funding certainty. For Michigan, that represents \$1.02 billion in the first fiscal year and \$1.17 billion in FY 2020 (Figure 17). This is about \$52 million (5.1%) of net new money in 2016 versus 2015 and, then, about \$20 to \$25 million (about 2.25%, on average) of net new money each year after. When combined with state funding, cities in Michigan can expect \$66.4 million in FY 2017, when additional Michigan funding begins to flow. That will grow to \$186 million in FY

2020 (Figure 18). It must be kept in mind this funding for cities/villages will be divided 533 ways. Novi is the 27th largest city in Michigan with about 1% of the total city/village population.

It is also important to recognize that these funds are to be allocated overwhelmingly to routine maintenance and preservation of existing roads (Figure 19). A relatively small amount will be available for projects that will increase capacity.

6.2 Novi Funding

The City of Novi annually spends approximately \$11.5 million on roadway capital improvements and another \$3 million on maintenance.

Novi's projected sidewalks/pathways program for the five fiscal years ending in FY 2020, totals \$11.4 million, all but \$733,000 to come from the Municipal Street or Major Road Funds. Phase II of the M5/I-275 Regional Trail Connection is the project for which \$733,000 is needed from local/Novi funds.

The Older Adults Services transportation program is supported by several sources, including non-government donations, advertising and fare revenue.

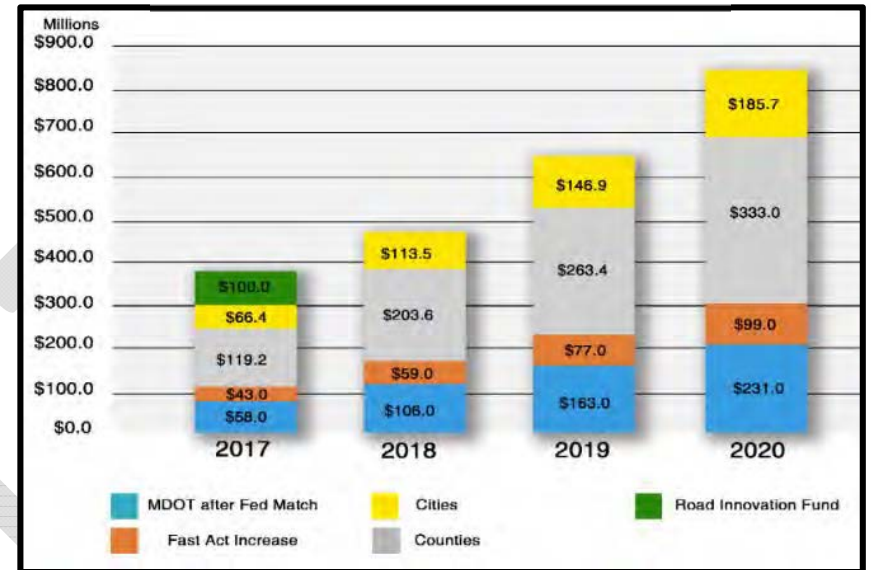
Figure 17. Federal Funding for Michigan

(Millions)	Map-21	FAST Act				
	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Total Highway Funding	\$1,016	\$1,068	\$1,090	\$1,114	\$1,139	\$1,166
Increase From Prior Year	0.0%	5.1%	2.2%	2.2%	2.2%	2.4%

Source: MDOT

Source: NTH Consultants, Ltd. Webinar Slides

Figure 18. Increased Transportation Revenues



Source: NTH Consultants, Ltd. Webinar Slides

Figure 19. Michigan Highway Program Investment by Category, FY 2016 to 2020



Source: NTH Consultants, Ltd. Webinar Slides

7. Recommendations

In preparing recommendations (Table 10) for the Novi Thoroughfare Master Plan, the City's "Complete Streets" policy, adopted in 2010, has been an underlying principle. "Complete Streets" are key to creating healthy, active communities. The City's policy recognizes that streets serve multiple purposes and they must be designed to balance the needs of all transportation users. The preliminary recommendations cited here recognize the need to involve multiple uses, including safe, active and ample space for pedestrians, bicyclists and transit riders. Working with the Steering Committee, a practical set of improvements has been selected for the road, intersection, non-motorized, and transit projects to be implemented.

7.1 Roads

Widening Beck and 10 Mile Roads is likely to cost \$21.5 million and \$19.8 million, respectively. Assuming these are done sequentially over the period FY 2017-2025, inclusive, they represent a small portion of the total federal and state funds available to Michigan cities and villages. The consultant believes this program is aggressive, but achievable.

The widening plan for Beck Road is summarized on Table 11, and illustrated in the appendix to this report. It should be noted the \$21.5 million cost is for only the section in Novi. The remaining section north to Pontiac Trail will be the responsibility of Wixom. Likewise, possible environmental impacts are presented only for Beck Road in Novi. But, optimal return on Novi's investment will only be

achieved if the section in Wixom is improved. The concept for 10 Mile Road is a five-lane section with curb, gutter, and sidewalk.

There are other potential capacity improvements needed to Meadowbrook and Grand River Avenue. However, because the funding picture is unclear, those projects are in the "beyond 2025" timeframe. In the more-immediate future, improvements to intersections along these roads can be addressed as discussed in Section 7.2.

7.1.1 Potential Impacts of Road Widening

The potential environmental impacts related to the widening of Beck Road, between 8 Mile Road and just south of Grand River Avenue, plus 10 Mile Road, between Taft Road and Haggerty Road, are summarized in Table 12.

Wetlands are widespread in Novi, especially in the western portion of the city. The basic rules related to wetlands are: if they can't be avoided, then their use must be minimized. If their use can't be minimized, then the impact must be mitigated. Usually, mitigation means replacement of more than two acres of wetland for every acre used, because the replacement wetlands do not always function as designed. Taken together, the widening of Beck and 10 Mile Roads would likely affect 2.5 acres of wetland. The Novi total includes the pond on the south side of 10 Mile Road east of Pheasant Run.

Protecting *floodplains and floodways* is to address risks to structures and property by preventing obstructions that would increase flooding. Occupa-

tion of a floodplain generally requires demonstrating how flooding risk will be avoided under permitting by the Michigan Department of Environmental Quality. For Beck Road, about 0.2 acres of floodplain are affected; it is 0.6 affected acres along 10 Mile Road.

There are regulations to protect natural **streams** to ensure proper drainage. Widening of Beck Road in Novi is expected to affect about one-half mile of streams. Widening of 10 Mile Road is likely to impact about 950 feet. Proper design must address the impacts.

The church on the west side of Beck Road 600 feet south of 10 Mile Road is the only known designated **historic site** potentially affected. The Novi Historical Society notes the church was established in 1875 on Grand River Boulevard, west of Novi Road. It was closed for some years starting in the 1920s. In 1997 the church was moved to Beck Road. It would not be affected by the widening of Beck, but its presence is noted. It would not ordinarily be considered eligible for the *National Register of Historic Places* because it has been moved. However, if it were to be considered "eligible," it would be subject to the regulations promulgated under the National Historic Preservation Act which require certain kinds of protection.



Historic Church

Table 10. Novi Thoroughfare Master Plan Recommendations

Widening/Capacity Improvement		Estimated Cost ¹	Implementation Period
Beck Road	8 Mile Road to Grand River Avenue	\$21.5 million	FY 2017–2021
–Segment A	–8 Mile Road to 9 Mile Road	\$6.3 million	FY 2017–2018
–Segment B	–9 Mile Road to 10 Mile Road	\$5.6 million	FY 2018–2019
–Segment C	–10 Mile Road to 11 Mile Road	\$6.3 million	FY 2019–2020
–Segment D	–11 Mile Road to Grand River Avenue	\$3.3 million	FY 2020–2021
10 Mile Road	Haggerty Road to Taft Road	\$19.8 million	FY 2021–2025
Meadowbrook Road	10 Mile Road to 12 Mile Road	TBD	After 2025
Grand River Avenue	Novi Road to Haggerty Road	TBD	After 2025
Novi Road	9 Mile Road to 10 Mile Road	TBD	After 2025

Intersection Improvements		Estimated Cost	Time Frame
Beck Road at 10 Mile Road		\$750,000	See footnote 2
Beck Road at I-96 Ramps		\$300,000	See footnote 2
Beck Road at Grand River Avenue		\$750,000	In progress
West Park Drive at 12 Mile Road		\$215,000	FY 2019–20
West Park Drive at South Lake Drive		\$175,000	FY 2019–20
Novi Road at 10 Mile Road		\$75,000	FY 2018–19
Novi Road at Grand River Avenue		\$3,250,000	FY 2018–19
Novi Road at 12 Mile Road		\$10,000	FY 2018–19
Meadowbrook at 13 Mile Road		\$200,000	FY 2018–19
Haggerty Road 8 Mile Road		\$5,000	FY 2016–17
Haggerty Road at 12 Mile Road		\$35,000	FY 2016–17
Haggerty Road at 14 Mile Road		\$40,000	FY 2016–17
M5 at 14 Mile Road		\$3,000	FY 2016–17

Sidewalks and Pathways	Segment	Estimated Cost	Time Frame
South side of 10 Mile Road	Meadowbrook to Haggerty	\$745,000	FY 2019–22
South side of Pontiac Trail	Beck to West park	\$490,000	FY 2017–19
West side of Haggerty Road	8 Mile to High Pointe	\$295,000	FY 2019–20
North side of 10 Mile road	Eaton Center to Churchill Crossing	\$175,000	FY 2018–19
West side of Beck Road	11 Mile to Providence	\$185,000	FY 2018–19
North side of 9 Mile Road	Novi Road to Taft	\$415,000	FY 2018–21
South side of 10 Mile Road	Novi Road to Chipmunk Trail	\$345,000	FY 2019–20
East side of Meadowbrook Road	8 Mile to 9 Mile	\$490,000	FY 2019–22
East side of Meadowbrook Road	9 Mile to 10 Mile	\$615,000	FY 2019–22
West side of Meadowbrook Road	11 Mile to Gateway Village	\$450,000	FY 2019–20
South side of 14 Mile Road	Beach Walk to East Lake	\$95,000	FY 2016–17

Transit	Service	Estimated Cost	Time Frame
Older Adult Services Transportation	Continuation of Current Service	\$160,000/year	Ongoing
Novi Mall Circulator	Six-month demonstration	\$45,000	FY 2017

¹ 2016 dollars

² To be coordinated with widening Beck Road

Source: The Corradino Group of Michigan, Inc.

Table 11. Proposed Beck Road Improvement Cross Section and Cost Summary

Segment	Length	Existing Section	Proposed Section	Parcels Affected	Estimate (2016)
8 Mile Road to 9 Mile Road	1 Mile	2 Lanes	5 Lanes	28	\$6,293,100
9 Mile Road to 10 Mile Road	1 Mile	2 Lanes	5 Lanes/4 Lane Boulevard	18	\$5,564,800
10 Mile Road to 11 Mile Road	1 Mile	2 Lanes	5 Lanes/4 Lane Boulevard	6	\$6,315,400
11 Mile Road to Grand River Avenue	0.45 Miles	3 Lanes	5 Lanes	13	\$3,323,200
TOTAL	3.45 Miles			65	\$ 21,496,500

Source: The Corradino Group of Michigan, Inc.

Table 12. Summary of Potential Environmental Impacts of Widening Beck Road and 10 Mile Road

	Beck Road, 8 Mile to Grand River*	10 Mile Road, Taft to Haggerty
Wetlands (acres)	1.7	0.8
Floodplains - Zone AE (acres)	0.2	0.6
Streams (in linear feet)	2,636	938
Historical Resources	None	None
Parkland	None	0.6 acres of Fuerst Park
Relocations	None	1 Vacant Single Family
Land Use (acres):		
Commercial/Office	0.8	1.6
Single Family	3.3	0.5
Multiple Family	0.5	0.6
Industrial	0.0	0.7
Railroad	0.0	0.3
Public/Institutional	1.4	0.9
Recreation/Conservation	0.8	1.2
Vacant	2.7	1.5
Water	0.1	0.1
Total Acres	9.6	7.4
Threatened/Endangered Species	See text	See text
Potential Contamination	See text	See text

* Novi values are based on the city's GIS system

** Wixom's values are based on mapping available on their Web site

Source: City of Novi GIS and The Corradino Group of Michigan, Inc.

A small sliver of Fuerst Park, which is part of Novi's Civic Center complex at the southeast corner of Taft and 10 Mile Roads, would be required for the widening of 10 Mile Road. Some roadway widening has already occurred there with previous intersection work. Nonetheless, the use of this land will likely be subject to Section 4(f) of the National Transportation Act, which was written to protect conversion of parkland to transportation uses. Because the city controls the property, and it was not developed with money from the Land and Water Conservation Fund (Section 6[f]) of the National Parks Service, problems are not anticipated, as long as the necessary procedural steps are followed.

One vacant single-family residence, north of 10 Mile Road at the intersection with Beck Road would be affected. The home and land are now owned by Providence Hospital. About 3.3 acres of residential land abutting the right-of-way would likely be used to widen Beck Road in Novi, an acre in Wixom, and one-half acre along 10 Mile Road.

Property acquisitions are mainly strips of land along each road. Sometimes the city owns the land between the road and the newer sidewalks and sometimes not.

If federal funds are used, it is expected that widening Beck Road will be subject to **noise analysis** when the environmental clearance document is prepared. There are areas along Beck Road where clusters of homes have direct exposure to noise

from Beck Road. These areas should be reviewed in evaluating noise abatement.

A review of **threatened and endangered species**⁵ finds the Eastern Mississauga rattlesnake (*Sistrurus catenatus*) (proposed as a federal threatened species) is found in Oakland County (records are kept by county). Experts will look for evidence of this snake during design. Both road projects are within the range of the Indiana bat (*Myotis sodalis*) (endangered) and northern long-eared bat (*Myotis septentrionalis*) (threatened), both of which have suffered catastrophic losses due to white-nose syndrome. Experts will have to determine during roadway design if evidence exists of the presence of either of these species.

The Poweshiek skipperling butterfly (*Oarisma poweshiek*) (endangered) is found in Oakland County, but its specific habitats are not near the project. As with the bats, coordination will have to occur with U.S. Fish & Wildlife Services, at the time the projects are designed.



Poweshiek Skipperling Butterfly

A **contaminated site** along the Beck and 10 Mile Road corridors would be a leaking underground storage tank (LUST) that has not been completely remediated. A review of the Michigan Department of

Environmental Quality (MDEQ)/Licensing and Regulatory Affairs (LARA) Web site⁴ indicates there is one such site – Sovel's Service Center – at 41425 W 10 Mile Road. The status of the LUST will need to be checked during roadway design.

During the environmental review phase of project design, a records check and "walkover" will likely be conducted to make sure there are no former uses of contaminating materials, including agricultural pesticides and herbicides.

In summary, these environmental issues are within the normal range for a roadway widening project in an urban setting.

7.2 Intersections

Crash data were received from the Traffic Improvement Association of Michigan (TIA) for the 50 intersections in Novi with the highest crash frequencies. A majority of these intersections are under the jurisdiction of the RCOC and MDOT. The results of analyzing these data for 2012–2014 were compared with those in the January, 2012, Birchler Arroyo Associates report titled: *Crash-Data-Assisted Safety Evaluation of 12 Intersections in the City of Novi*.

For the Thoroughfare Master Plan, Corradino used an approach that examines crash rates per million vehicles entering the intersection. Additionally, a *Severity Index* was calculated for each intersection. The index weights fatal crashes with a factor of 12, injury crashes with a factor of three, and non-injury

⁵ <http://www.fws.gov/midwest/endangered/lists/michigan-cty.html>

crashes with a factor of one, then averages the total. While judgement, based on experience, was used to establish these factors, the overall approach is that found in the Federal Highway Administration Road Safety Information Analysis on their website.

Birchler Arroyo Associates' (BAA) report identified ten Novi intersections with the highest crash rates or casualty ratios (2006 thru 2010 data). In June, 2012, that analysis was advanced to identify significant crash patterns, possible causes and countermeasures, based on field inspection and the SEMCOG *Traffic Safety Manual*.

With the data provided by TIA, all ten BAA Novi intersections were confirmed by Corradino as candidates for crash countermeasures. Those intersections are:

1. Beck Road at Grand River Avenue;
2. Novi Road at Grand River Avenue;
3. 8 Mile Road at Haggerty Road;
4. Novi Road at 10 Mile Road;
5. 12 Mile Road at Novi Road;
6. 12 Mile Road at Haggerty Road;
7. 14 Mile Road at M5;
8. 14 Mile Road at Haggerty Road;

The results of the Corradino analysis indicated two intersections with a high crash rate to be added to the list:

- Beck Road at the I-96 interchange ramps; and,
- Beck Road at 10 Mile Road.

The Corradino analysis also found one intersection with a high *Severity Index* which is added to the list. While this intersection may not have a particularly high number of crashes or crash rate, the crashes that occur are of a significant nature.

- 12 Mile Road at West Park Drive.

During the course of the study, two more intersections, which are under the jurisdiction of the City of Novi, were added to the analysis:

- Meadowbrook Road at 13 Mile Road; and,
- West Park Drive at South Lake Drive.

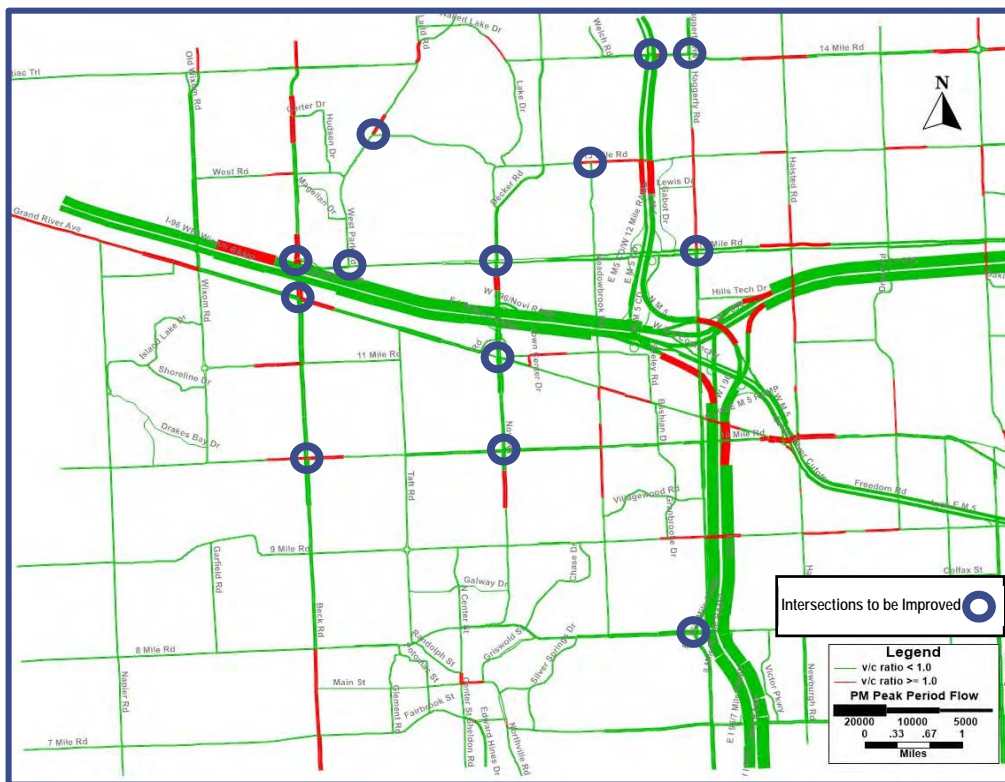
Proposed corrective actions for these intersections are presented next. In this discussion, reference will be made to "Level-of-Service" and "volume-to-capacity" ratios.

Level-of-Service (LOS) is a qualitative measure used to relate the quality of traffic service. LOS categorizes traffic flow and assigns quality levels based on performance measures like speed, density, etc. The letters "A" through "F" are reported, with A being the best and F the worst. A summary of the LOS letter grades is provided in [Table 14](#).

The Volume-to-Capacity (V/C) ratio provides a quantitative assessment of how well traffic movements are accommodated. A V/C above one demonstrates that the traffic demand is greater than the facility's capacity. The demand will not be served, and long queues are likely to form. An emphasis of the proposed improvements was to achieve V/C less than one at the intersections studied.

It is important to note that, while there are funding, impact, and policy constraints that prevent more road widenings than Beck and 10 Mile Roads, the following proposals for the locations circled on [Figure 20](#), and listed on [Table 13](#), will address much of this congestion in a cost-effective way.

Figure 20. Novi Intersections Proposed to be Improved



Source: The Corradino Group of Michigan, Inc.

Table 13. Level-of-Service Descriptions

A: Free flow operations. Vehicles are almost completely unimpeded in their ability to maneuver with the traffic stream. The general level of physical and psychological comfort provided to the driver is high.
B: Reasonable free flow operations. The ability to maneuver within the traffic stream is only slightly restricted and the general level of physical and psychological comfort provided to the driver is still high.
C: Flow with speeds at or near free flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted and lane changes require more vigilance on the part of the driver. The driver notices an increase in tension.
D: Speeds decline with increasing traffic. Freedom to maneuver within the traffic stream is more noticeably limited. The driver experiences reduced physical and psychological comfort levels.
E: At lower boundary, the facility is at capacity. Operations are volatile because there are virtually no gaps in the traffic stream. There is little room to maneuver. The driver experiences poor levels of physical and psychological comfort.
F: Breakdowns in traffic flow. The number of vehicles entering the highway section exceed the capacity or ability of the highway to accommodate that number of vehicles. There is little room to maneuver. The driver experiences poor levels of physical and psychological comfort.

Source: The Highway Capacity Manual and The Corradino Group of Michigan, Inc.

7.2.1 Beck Road at 10 Mile Road

Each approach to this signalized intersection (Figure 21) includes one through-lane, one left-turn lane and one right-turn lane. There were 89 crashes at this location in 2012, 2013, and 2014, combined. The crash rate of the intersection is 2.46 crashes per million entering vehicles; equal to the highest rate of the intersections being analyzed. Twenty-five percent were injury crashes. The majority of the crashes were rear-end (62%), during the afternoon peak hours, in clear weather (71%), and on dry pavement (79%). Based on these characteristics, congestion appears to be a leading factor in the crashes. That will be addressed with the Beck Road widening.

In the near term, proposed countermeasures to be implemented at minimum costs are:

- Investigate retiming the signal to mitigate congested conditions and long queues;
- Place advance warning signs on all four approaches to the intersection. The preferred

warning sign is a “Be Prepared to Stop” with a “When Flashing” supplemental plaque and a flashing beacon that is interconnected with the signal;

- As an alternate to the sign assembly noted above, a “Signal Ahead” sign could be placed on each approach; and,
- Maintain/renew the pavement markings on all four approaches to the intersection.

It is recommended in conjunction with widening Beck Road that westbound 10 Mile Road, departing from Beck Road, be widened for a minimum distance of 0.25 miles (Figure 22). This will allow motorists to use both lanes through the signal and have adequate time to merge into a single lane west of the intersection. Also, westbound 10 Mile Road, approaching Beck Road, should be re-striped so that the existing exclusive right-turn lane becomes a shared through/right-turn lane. This will create additional capacity by taking advantage of the widened portion of westbound 10 Mile Road west of Beck Road.

Figure 22. Beck Road at 10 Mile Road



Source: Google Earth and The Corradino Group of Michigan, Inc.

In combination with widening Beck Road, the recommended improvements to 10 Mile Road at this location will maintain the overall LOS of the intersection in the year 2040 at D (Table 14). The LOS of the westbound and southbound approaches will be improved from D to C. No approach movement

Figure 21. Beck Road at 10 Mile Road



Table 14. 2040 PM Existing and Proposed LOS, Beck Road at 10 Mile Road

Primary Road	Cross Road	Criterion	2040 Existing Geometry				2040 Proposed Geometry			
			EB	WB	NB	SB	EB	WB	NB	SB
Beck	10 Mile	Approach LOS	D	D	D	D	D	C	D	C
		Intersection LOS	D				D			
		Max. V/C Ratio	1.01				0.94			

will have a V/C over 1.0 (Table 15). The improvements are estimated to cost \$750,000, if done separately from widening Beck Road.

7.2.2 Beck Road at Grand River Avenue

The proposed Beck Road widening will be to a five-lane section of Beck just south of its intersection with Grand River Avenue. To address the congestion issues at the intersection, improvements now underway are to restripe the existing median pavement along northbound Beck Road approaching Grand River Avenue to create an additional left-turn lane. This will create a double left-turn lane (Figure 23). Also, an additional left-turn lane is being constructed along eastbound Grand River Avenue approaching Beck Road to create a double left-turn lane.

Figure 23. Beck Road at Grand River Avenue Aerial Imagery



Source: Google Earth and The Corradino Group of Michigan, Inc.

Table 15. 2040 PM Existing and Proposed V/C>1.0, Beck Road at 10 Mile Road

	Ten Mile Road						Beck Road					
	Eastbound			Westbound			Northbound			Southbound		
	Lt.	Tr.	Rt.	Lt.	Tr.	Rt.	Lt.	Tr.	Rt.	Lt.	Tr.	Rt.
Existing							X					
Proposed												

Source: The Corradino Group of Michigan, Inc.

The latter improvements will improve the LOS of the intersection in the year 2040 from E to D (Table 16). No approach movement will have an LOS worse than D or a V/C over one (Table 17).

signal modification to modify the northbound approach to a double left-turn lane will cost approximately \$100,000. Therefore, the combined improvements are estimated to cost \$780,000.

The city's 2014–2020 Capital Improvement Program calls for these improvements, estimated to cost approximately \$680,000. It is conservatively estimated that the signing, striping, and

Table 16. 2040 PM Existing and Proposed LOS, Beck Road at Grand River Avenue

Primary Road	Cross Road	Criterion	2040 Existing Geometry				2040 Proposed Geometry			
			EB	WB	NB	SB	EB	WB	NB	SB
Beck	Grand River	Approach LOS	E	F	E	D	D	D	D	C
		Intersection LOS	E				D			
		Max. V/C ratio	1.22				0.96			

Source: The Corradino Group of Michigan, Inc.

Table 17. 2040 PM Existing and Proposed V/C>1.0, Beck Road at Grand River Avenue

	Grand River Avenue						Beck Road					
	Eastbound			Westbound			Northbound			Southbound		
	Lt.	Tr.	Rt.	Lt.	Tr.	Rt.	Lt.	Tr.	Rt.	Lt.	Tr.	Rt.
Existing	X			X	X	X	X	X				
Proposed												

7.2.3 Beck Road at I-96 Ramps

Beck Road at I-96 (Figure 24) is a signalized, single-point urban interchange (SPUI). There were 109 crashes at this location in 2012, 2013, and 2014, combined. The crash rate of the intersection is 2.46 crashes per million entering vehicles, matching the highest crash rate of the intersections being analyzed. Eleven percent were injury crashes. The majority of the crashes were of the rear-end type (75%), during the morning and afternoon peak hours, in clear or cloudy weather conditions (87%), and on dry pavement (81%). Based on these characteristics, congestion appears to be a leading factor in the crashes. The proposed countermeasures, estimated to cost \$300,000 and to be implemented with widening Beck, include:

- Place an advance-warning sign on the southbound Beck Road approach to the I-96 interchange. The preferred warning sign is a "Be Prepared to Stop" with a "When Flashing" supplemental plaque and a flashing beacon that is interconnected with the signal;

Figure 24. Beck Road at I-96 Interchange



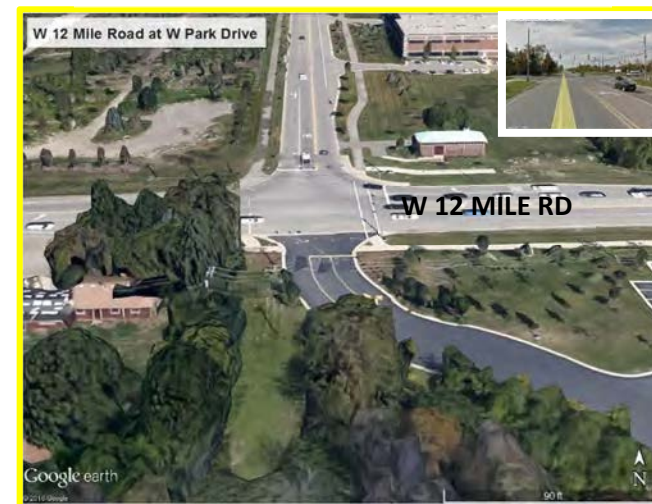
7.2.4 West Park Drive at 12 Mile Road

The east and west legs of this intersection (Figure 25) are 12 Mile Road and the north leg is West Park Drive. A private drive is the south leg. The eastbound and westbound approaches of 12 Mile Road include one through-lane, one left-turn lane and one right-turn lane. The southbound approach of West Park Drive includes a shared through/right-turn lane and a left-turn lane. The northbound approach of the private drive includes a shared through/right-turn lane and a left-turn lane.

There were 26 crashes at this location in 2012, 2013, and 2014, combined. The crash rate of the intersection is 1.25 crashes per million entering vehicles. Half were injury crashes. The majority were of the rear-end type (54%), during the afternoon peak hours (69%), in clear or cloudy weather conditions (76%), and on dry pavement (73%). Congestion appears to be a leading factor in the crashes. Proposed countermeasures, estimated at \$215,000 and to be implemented during the period FY 2019–2020, include:

- As an alternate to the sign assembly noted above, a "Signal Ahead" sign could be placed on the southbound approach;
 - Replace the existing span-wire signal configuration with a mast-arm configuration to improve the visibility of the signal heads;
 - Maintain/renew the pavement markings within the interchange; and,
 - Investigate retiming the signal to mitigate congested conditions and long queues.
- Replace the existing span-wire signal configuration with a mast-arm configuration to improve the visibility of the signal heads;
 - Investigate retiming the signal to mitigate congested conditions and long queues;
 - Place advance-warning signs on the Twelve Mile Road and West Park Drive approaches to the intersection. The preferred warning sign is a "Be Prepared to Stop" with a "When Flashing" supplemental plaque and a flashing beacon that is interconnected with the signal;
 - As an alternate to the sign assembly noted above, a "Signal Ahead" sign could be placed on each approach listed; and,
 - Maintain/renew the pavement markings on all three public road approaches to the intersection.

Figure 25. W Park Drive at 12 Mile Road



7.2.5 West Park Drive at South Lake Drive

At this intersection (Figure 26), West Park Drive has three lanes on each approach – one dedicated to left-turning vehicles, one for right-turning vehicles, and a through lane. The South Lake Drive westbound approach to the intersection also has three lanes – one for left turns, one for right turns, and a through lane. There were four crashes at this location causing a crash rate of 0.32 per million vehicles entering the intersection. All four crashes involved injuries. Two of the four crashes were of the rear-end type. The crashes were distributed through the day and most occurred during clear weather on dry pavement.

To address this experience, it is recommended that the signal system be upgraded to current standards with improvements to technology since the signal was installed in 1999. The signal system upgrade is

Figure 26. West Park Drive at South Lake Drive



programmed in the Novi FY 2015–2021 Capital Improvement Plan. The estimated construction cost of the improvements in the CIP is \$175,000 with implementation during the period FY 2019–2020.

7.2.6 Novi Road at 10 Mile Road

This intersection (Figure 27) is another heavily-commercial location. The northbound Novi Road approach has three lanes: one for left-turning vehicles; one for vehicles turning right; and, the third for through traffic. The southbound approach is configured in the same way. The two approaches on 10 Mile Road each have a left-turn lane, a lane dedicated to through traffic, and a third lane for vehicles turning right or moving through the intersection. There were 96 crashes in the three years ending in 2014. The crash rate was 2.27 per million vehicles entering the intersection. Crashes were 22% injury and 43% rear-end. As at the other intersections, most crashes happened in clear or cloudy weather on dry pavement.

The crash countermeasures proposed for this intersection are:

- Add right-turn lane on southbound Novi Road; and,
- Enhance crosswalks.

The consultant estimates the cost of these measure at \$75,000 with implementation during FY 2018-2019.

Figure 27. Novi Road at 10 Mile Road



7.2.7 Novi Road at Grand River Avenue

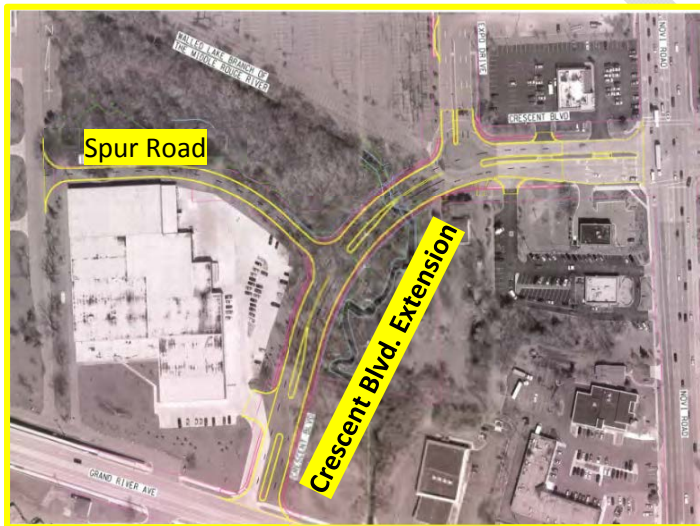
Significant commercial development is located at and constrains the edges of this intersection (Figure 28). Both of the Novi Road's approaches are configured with a left-turn lane, a center/through lane and a shared right-turn and through vehicle lane. Westbound Grand River Avenue has two through lanes, and exclusive left- and right-turn lanes. The eastbound approach has three lanes with an exclusive left-turn lane and a center through lane plus a through-plus-right-turn lane.

There were 108 crashes at this location in the 2012–2014 period. The rate was 2.10 crashes per million vehicles entering the intersection; two-thirds, were rear-end collisions.

Figure 28. Novi Road at Grand River Avenue



Figure 28a. Novi Road at Grand River Avenue



To counter the crash experience, the following measures are offered:

- Extend Crescent Boulevard west to Grand River Avenue, plus build a “spur road” on the north side of the intersection;
- Enhance the crosswalks.

The cost of these measures is estimated by the consultant at \$3,250,000. The bulk of this cost (\$3,200,000) is associated with the proposed extension of Crescent Boulevard plus a “spur” around the industrial building at the northwest corner of the extension of Crescent Boulevard to Grand River Avenue (Figure 28a).

7.2.8 Novi Road at 12 Mile Road

The northbound approach of Novi Road at this location (Figure 29) has an exclusive right-turn lane, a through lane, and a through-plus-left-turn lane. Twelve Mile Road has a grass median at this location. Vehicles turning left do so before the intersection on each 12 Mile Road approach. Vehicles turning right have an exclusive lane for that maneuver. Two lanes on each 12 Mile Road intersection approach are for through vehicles.

The crash rate at this location is 2.42 crashes per million vehicles entering the intersection which is the second highest among the intersections analyzed. Twenty-three percent of crashes involved injuries, with over half (51%)

being rear-end. Most were during clear or cloudy weather on dry pavement.

Based on these characteristics, crash counter measures to be considered are:

- Provide for a pedestrian refuge on each of the crossings of Novi Road; and,
- Enhance the crosswalk markings.

The consultant’s cost estimate for these measures is \$10,000. Implementation is for the period FY 2016-2017.

Figure 29. Novi Road at 12 Mile Road



7.2.9 Meadowbrook Road at 13 Mile Road

Meadowbrook Road at this location forms a T-intersection with 13 Mile Road (Figure 30). One lane is for left-turning vehicles, the other is an exclusive right-turn lane. The 13 Mile Road westbound intersection approach has one lane exclusively for left turns to Meadowbrook and another for through movements. The eastbound approach has an exclusive right-turn lane and a through lane. There were 11 crashes at this location causing a crash rate of 0.88 per million vehicles entering the intersection. Only one crash involved injuries. In almost all cases, the weather was clear, with the crashes spread throughout the day.

To improve the intersection:

- Signal heads should be installed on mast arms instead of span wire;

Figure 30. Meadowbrook Road at 13 Mile Road



- Back plates with retro-reflective borders should be placed around the signal heads;
- Vehicle detection should be improved; and,
- Signing and striping should be improved.

The recommended signal system upgrade will improve the safety and operations of the intersection by improving the signal's visibility. The cost of these improvements is estimated at \$200,000 with implementation during FY 2018-2019.

7.2.10 Haggerty Road at 8 Mile Road

This intersection (Figure 31) was the site of 134 crashes from 2012 to 2014, inclusive. The crash rate was 2.07 crashes per million vehicles entering the intersection.

Northbound Haggerty Road at this location is four lanes wide: two through lanes plus one exclusive lane for left-turning vehicles and another for right-turning vehicles. The southbound approach is three lanes wide: one exclusive left-turn lane, a center/through lane, and a curb lane for through plus right-turning vehicles.

The eastbound and westbound approaches are four lanes: two center/through lanes and exclusive lanes for left turns and right turns.

Twenty-nine percent of crashes involved injuries. Rear-end crashes were most common (48%), and occurred during the noon

hour and afternoon peak, in clear or cloudy weather, on dry pavement.

In order to develop measures to counter this crash experience, the following is proposed:

- Add left-turn traffic signal phases on all four approaches; and,
- Improve transverse (cross-intersection) markings.

These measures are estimated to cost \$5,000 with implementation during 2016-2017.

Figure 31. Haggerty Road at 8 Mile Road



7.2.11 Haggerty Road at 12 Mile Road

At this sprawling intersection (Figure 32), 12 Mile Road has a grass median. Left turns to Haggerty Road are made prior to the intersection. One lane on each approach is for right-turning vehicles. The two remaining lanes are for through traffic. The Haggerty Road northbound approach to the intersection has three lanes. One is dedicated to right turns. The two remaining lanes are for through traffic. On Haggerty's southbound approach, there are two lanes: one for right-turning vehicles and the other for through traffic.

Seventy-six crashes occurred at this location in the three-year period 2012–2014, inclusive. The crash rate was 1.50 crashes per million entering vehicles. A very high percentage of crashes at this location involved injuries (76%) including one fatality. The leading crash type was rear-end (64%), during clear or cloudy weather on dry pavement. The

Figure 32. Haggerty Road at 12 Mile Road



crash countermeasures proposed for this intersection are:

- Remove shrubbery and prune trees in the median;
- Extend sidewalk on west side of Haggerty Road; and,
- Conduct a speed study on 12 Mile Road, and adjust speed limit accordingly.

Implementation is proposed in FY 2016-2017 at a cost of \$35,000.

7.2.12 Haggerty Road at 14 Mile Road

This intersection (Figure 33) is located in a highly-commercial area. The northbound Haggerty Road approach to the intersection has exclusive left-turn and right-turn lanes plus one through-lane. Southbound, Haggerty Road has one exclusive left-turn lane and a lane for both through and right-turning vehicles.

Fourteen Mile Road has, on each approach to Haggerty Road, exclusive left-turn and right-turn lanes with one lane for vehicles moving straight through the intersection. From 2011 to, and including, 2014, there were 86 crashes at this location causing a crash rate of 2.23 crashes per million vehicles entering the intersection, among the highest of the crash rates. Rear-end crashes were most common (41%), followed by angle crashes (26%). Crashes were most common at noon and in the afternoon peak hours, in clear or cloudy weather (82%), and on dry pavement (77%).

Based on these characteristics, the crash countermeasures proposed here are:

- Develop an access management plan to coordinate vehicles entering/leaving the land uses in the corners of the intersection;
- Prohibit “right-turn-on-red” on the westbound 14 Mile Road approach;
- Place a sidewalk around the northwest corner; and,

Implementing these items in FY 2016-2017 is estimated to cost \$40,000.

Figure 33. Haggerty Road at 14 Mile Road



7.2.13 M5 at 14 Mile Road

This is a signal-controlled intersection (Figure 34). Both the eastbound and westbound approaches of 14 Mile Road have one dedicated left-turn lane, one dedicated right-turn lane and a lane for both through and right-turning vehicles. M5 has a lane reserved for vehicles turning right and four through lanes. Left-turns are made by the “Michigan-left” maneuver. There were 130 crashes at this intersection in the three-year period of 2012–2014. The crash rate was 1.25 crashes per million vehicles entering the intersection, with rear-end crashes the most common (69%). Crashes were spread through the afternoon hours in clear or cloudy weather on dry pavement. Based on these characteristics, proposed measures to counter this crash experience are:

- Place advance warning “Signal Ahead” signs on the M5 approaches to the intersection;

Figure 34. M5 at 14 Mile Road



- Place “Turning Vehicles Yield to Pedestrian” signs on the westbound 14 Mile Road approach and the southbound M5 approach to the intersection; and,
- Re-evaluate signal timing.

Making these changes in 2016-2017 is estimated to cost \$3,000.

7.2.14 Other Intersections

Analysis of the Beck Road at 9 Mile Road improvements demonstrated that this intersection will operate at an adequate level of service for the reasonable future. It is programmed in the Novi FY 2015–2021 Capital Improvement Plan to be improved with new equipment reflecting updated standards and improved technology that has changed since the original installation in 1998. The estimated cost of the improvements is \$215,000. This includes engineering, along with an improved street light, pedestrian signals, and sidewalks.

Analysis of the Beck Road at 11 Mile Road intersection indicates it will also operate at an adequate level of service. Investment would be better served at other intersections.

7.3 Sidewalks and Pathways

Table 7 defines the sidewalk and pathway improvements scheduled over the period FY 2017–2022. The cost estimate is listed in Table 13. In total \$4.3 million is in the plan, which excludes the

neighborhood part of the sidewalk/pathway program.

7.4 Transit

The Older Adult Services Transportation service is essential for maintaining the quality of life for those citizens of Novi 55 years of age and older. Therefore, the TMP expects the service to continue in its current form which costs about \$160,000 per year. Additionally, it is proposed that a “mall” circulator be tested on Saturdays over a six-month period. The cost of this “trial” program is estimated at \$45,000. The vehicles will be those of the OAST available for six hours on Saturdays. If the service proves successful, additional hours of service may be beneficial, which may require additional equipment.

If the 1.2 mil increase in property taxes is approved in a November, 2016, referendum supported by the Regional Transit Authority, the City of Novi would contribute approximately \$3.8 million per year. By legislative mandate, no county can receive transit services which cost less than 85% of what it contributes in taxes. That may mean regional transit may be in Novi’s future. There is a caveat: It is not known if the 85% formula applies to cities within a county. In other words, even though there is a “floor” on what needs to be spent by the RTA by county, it may not be uniformly applied by jurisdiction within the county.

8. Observations

The City of Novi has multi-modal transportation needs which require state/federal assistance. Both these governments passed transportation funding legislation in 2015. Thoroughfare Master Plan projects proposed to be implemented over the period FY 2016-2025 include:

- Roads (\$41.3 million) and intersection (\$5.8 million) at \$47.1 million. Beck Road widening is phased over FY 2017-2021 while expanding 10 Mile Road is phased between FY 2021-2025. Intersection improvements are programmed to occur between 2016 and 2020. Even with new state and federal programs, future funding will be tight because so much of Michigan's transportation infrastructure requires long-delayed fixes that will consume most of the new revenue.

- Sidewalk and pathway projects that are part of the plan are scheduled to be built in the period FY 2016-2022 at a cost of \$4.3 million. Other top projects add \$11.4 to that proposed investment.
- Continuing the Older Adults transportation program, will cost \$160,000 per year, excluding inflation.
- A \$45,000, six-month "trial" mall circulator project.
- Major transit developments appear to be dependent on the Regional Transportation Authority's multi-county referendum of November, 2016.

While Novi is aggressive in its road and pathways/sidewalks programs, transit in Novi is limited. Regional transit is not available because Novi

"opted-out" of the tax that supports SMART. Nonetheless, more transit service may be in Novi's future if the November, 2016, vote on 1.2 mils of additional property taxes is a "regional yes". In that case, Novi's annual contribution to the regional system is estimated at \$3.8 million. By legislative mandate, no county can receive transit services which cost less than 85% of what it contributes in taxes. There is a caveat: It is not known if the 85% formula applies to cities within a county.

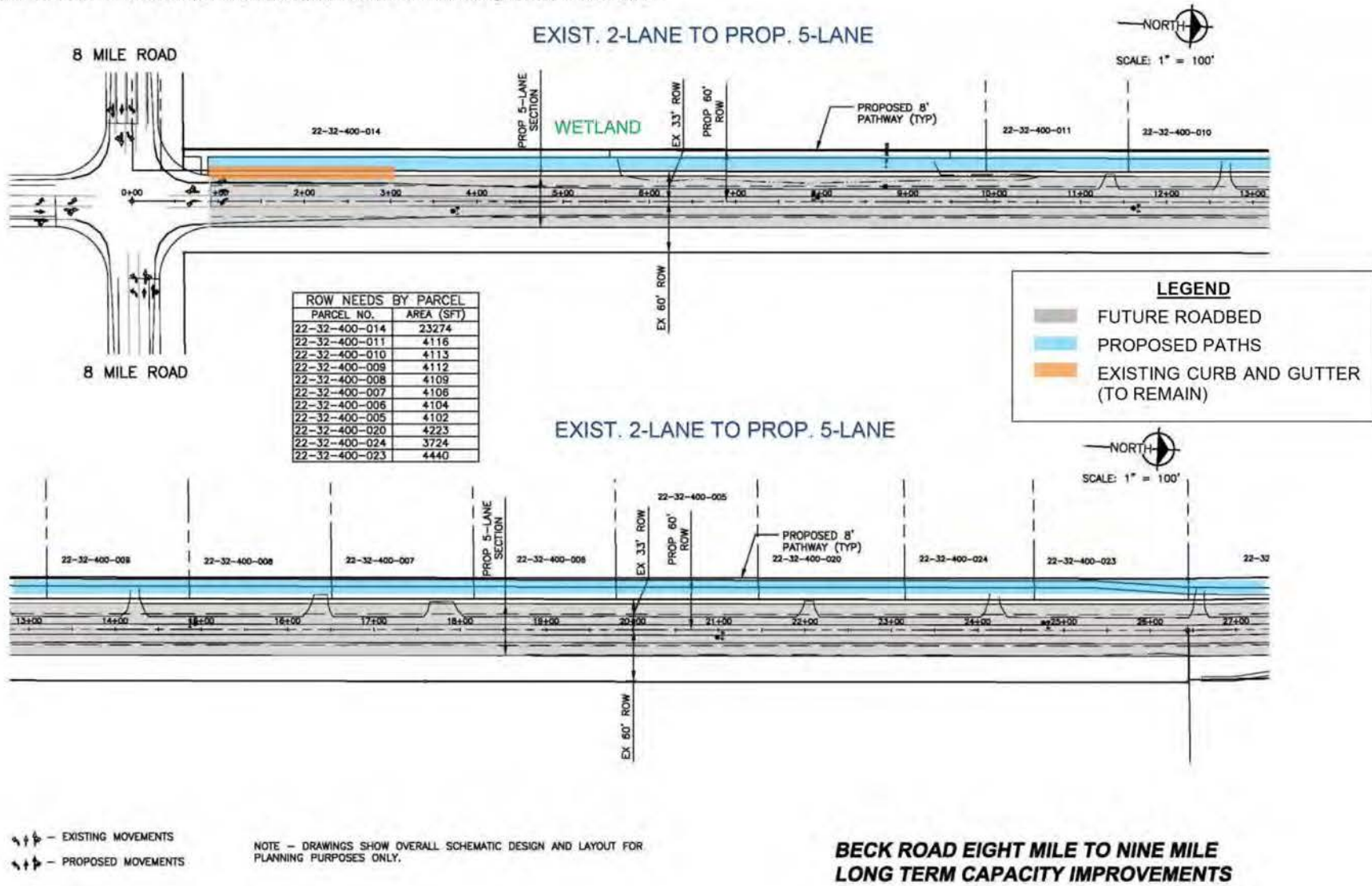
Novi's transportation future is brighter now than when the last TMP was prepared. To strengthen that outlook, Novi's officials and citizens must be aggressive with their state and federal government representatives to secure their share of funding. And they must decide how to address the RTA referendum, knowing that it will be a **regional yes or no vote**. There is no "opt-out" provision for individual cities or counties.

DRAFT

Appendix

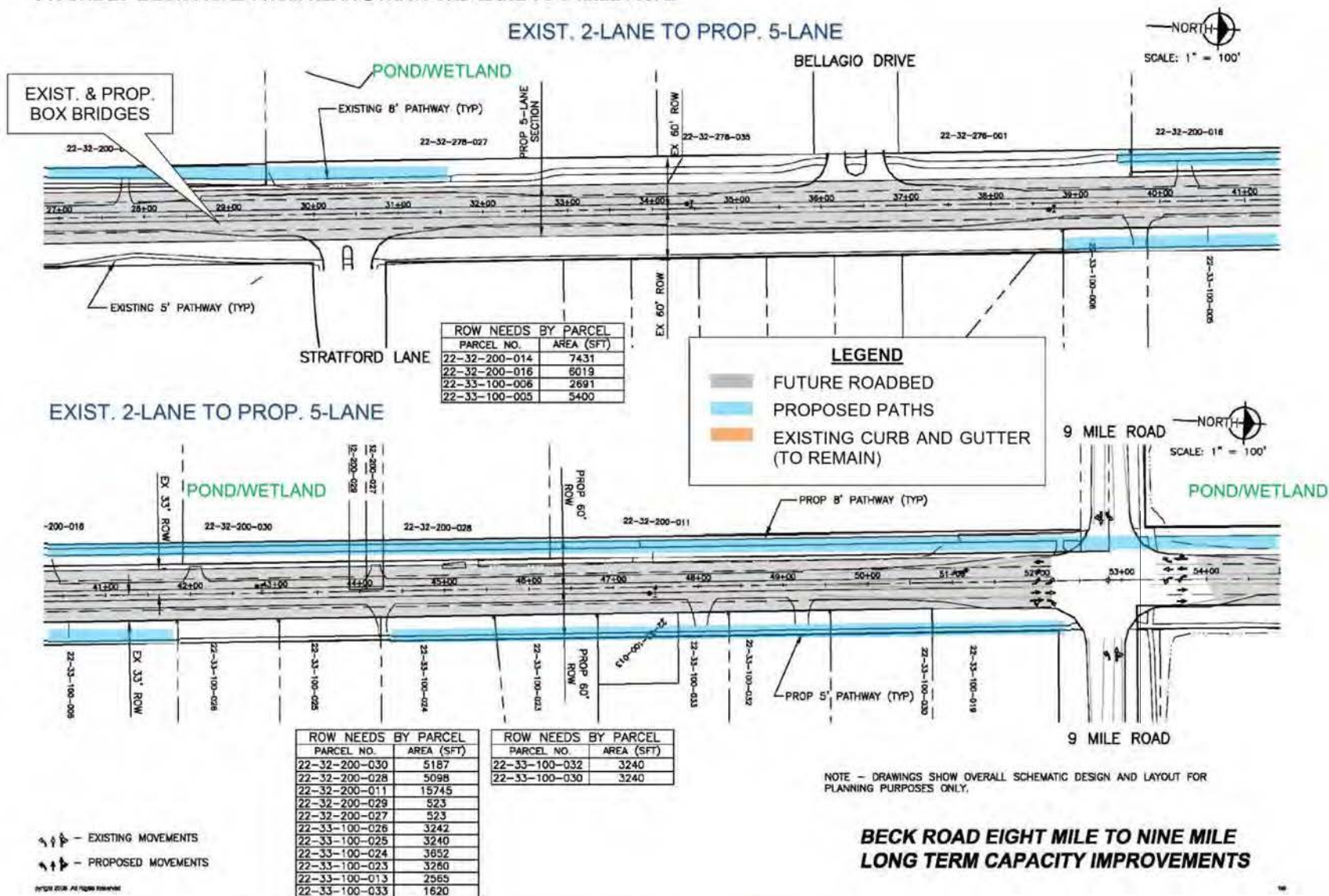
**Proposed Improvements
to Beck Road and 10 Mile Road**

FIGURE 1: BECK ROAD FROM 8 MILE ROAD TO NEAR STRATFORD LANE



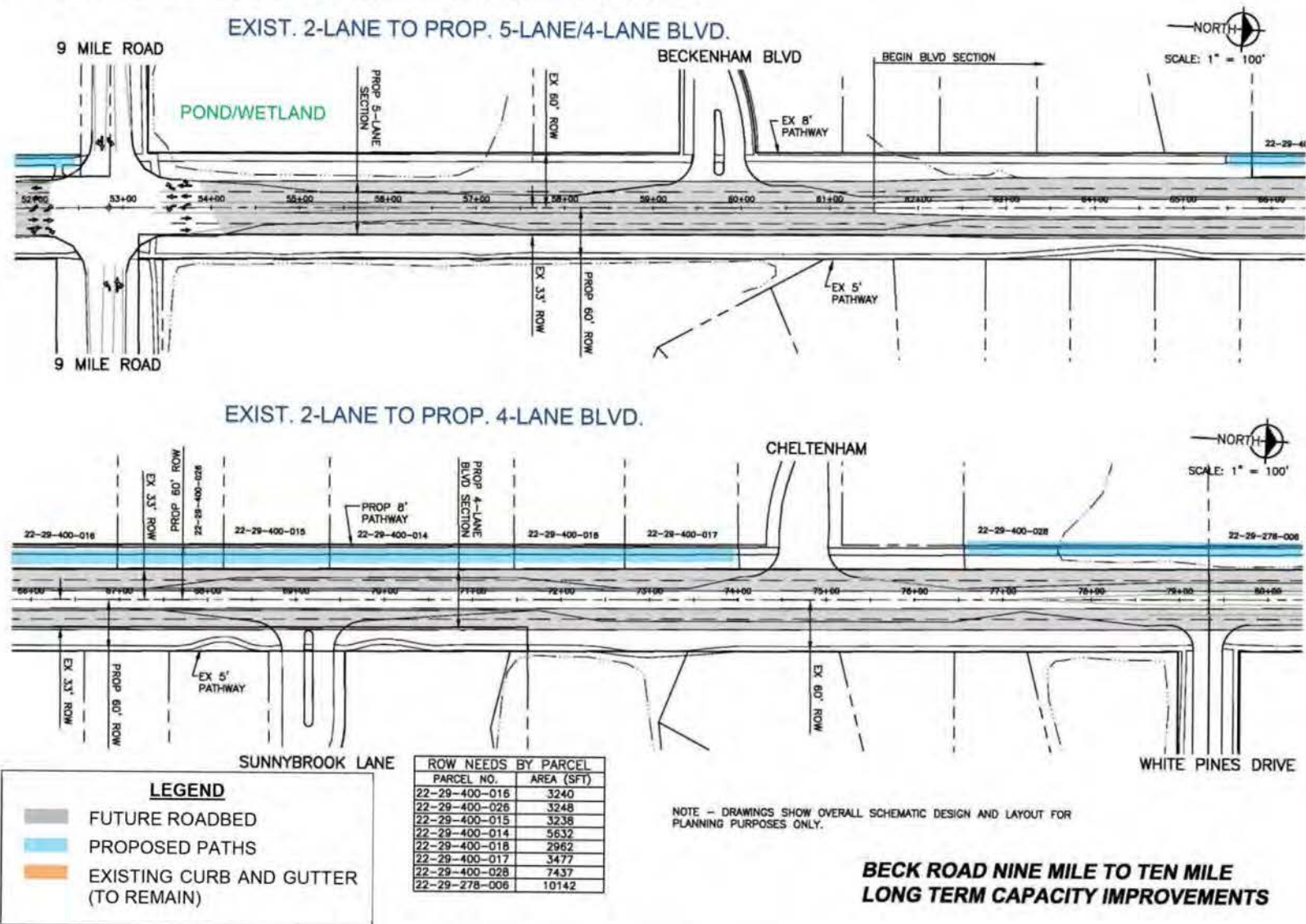
Source: Fishbeck, Thompson, Carr & Huber, Inc., Scoping Study Beck Road, 2006; & The Corradino Group, 2016

FIGURE 2: BECK ROAD FROM NEAR STRATFORD LANE TO 9 MILE ROAD



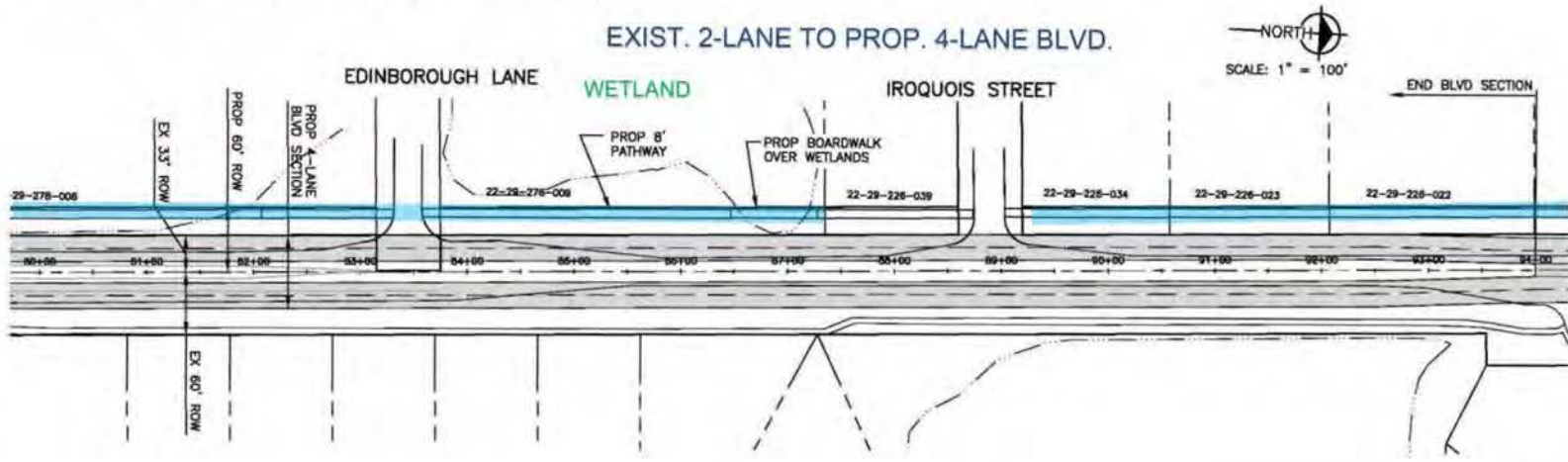
Source: Fishbeck, Thompson, Carr & Huber, Inc., Scoping Study Beck Road, 2006; & The Corradino Group, 2016

FIGURE 3: BECK ROAD FROM 9 MILE ROAD TO NEAR WHITE PINES DRIVE



Source: Fishbeck, Thompson, Carr & Huber, Inc., Scoping Study Beck Road, 2006; & The Corradino Group, 2016

FIGURE 4: BECK ROAD FROM NEAR WHITE PINES DRIVE TO 10 MILE ROAD



LEGEND

- FUTURE ROADBED
- PROPOSED PATHS
- EXISTING CURB AND GUTTER (TO REMAIN)

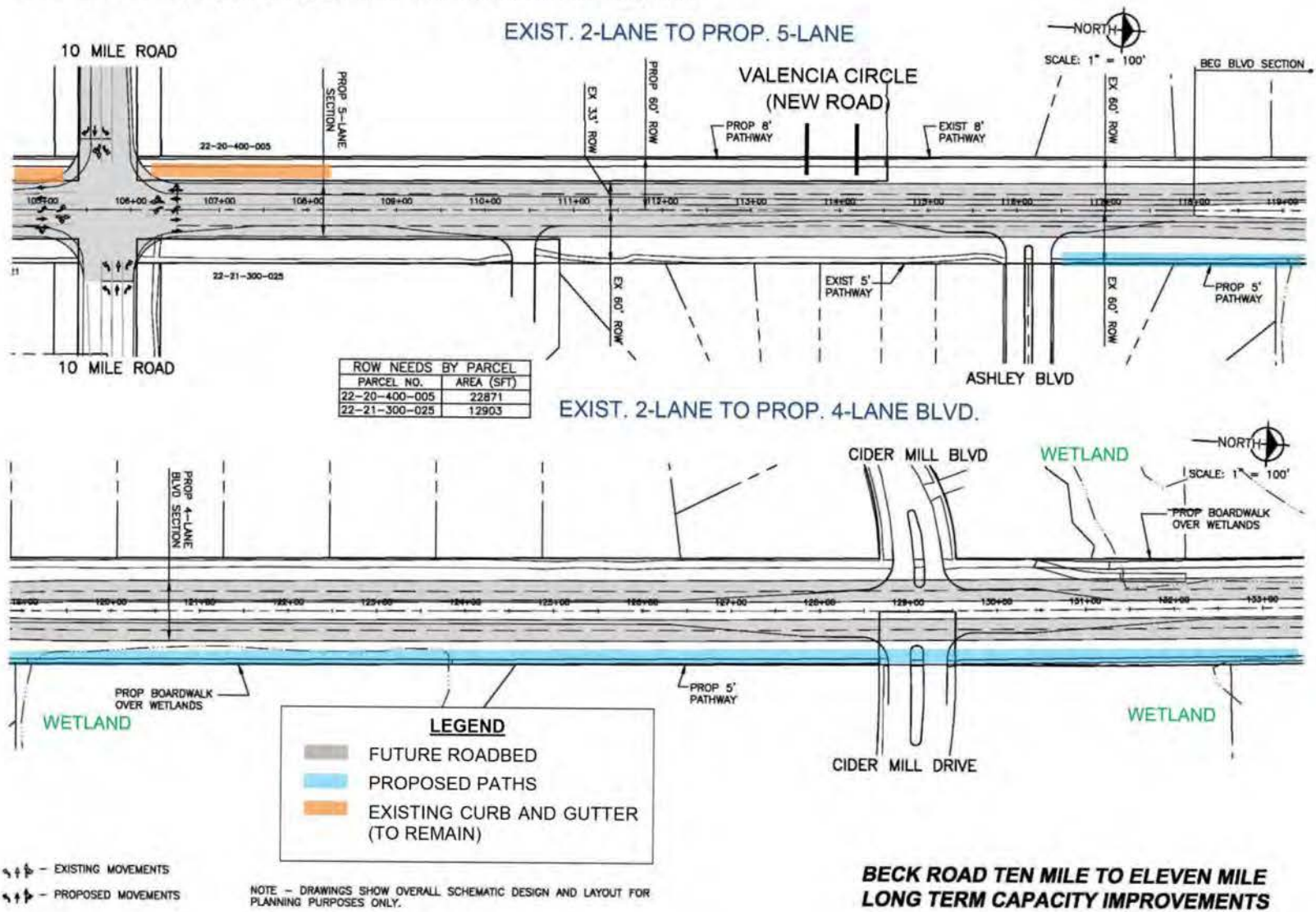
ROW NEEDS BY PARCEL	
PARCEL NO.	AREA (SFT)
22-29-276-009	9442
22-29-226-039	3281
22-29-226-034	3607
22-29-226-023	3911
22-29-226-022	5049
22-29-226-019	11896
22-29-226-018	2390
22-29-226-031	6816
22-29-226-030	9262
22-29-101-021	2766

NOTE - DRAWINGS SHOW OVERALL SCHEMATIC DESIGN AND LAYOUT FOR PLANNING PURPOSES ONLY.

**BECK ROAD NINE MILE TO TEN MILE
LONG TERM CAPACITY IMPROVEMENTS**

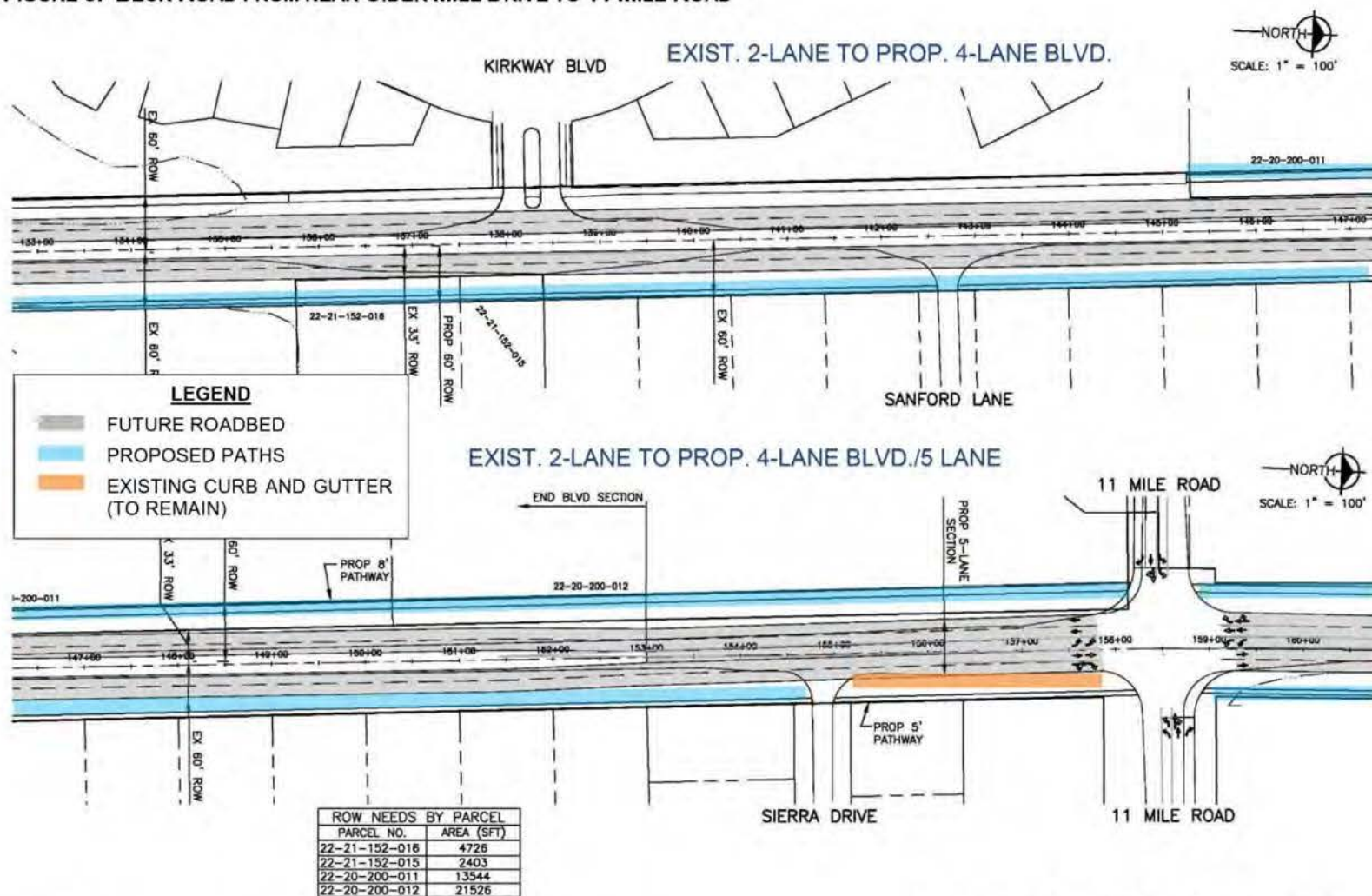
Source: Fishbeck, Thompson, Carr & Huber, Inc., Scoping Study Beck Road, 2006; & The Corradino Group, 2016

FIGURE 5: BECK ROAD FROM 10 MILE ROAD TO NEAR CIDER MILL DRIVE



Source: Fishbeck, Thompson, Carr & Huber, Inc., Scoping Study Beck Road, 2006; & The Corradino Group, 2016

FIGURE 6: BECK ROAD FROM NEAR CIDER MILL DRIVE TO 11 MILE ROAD



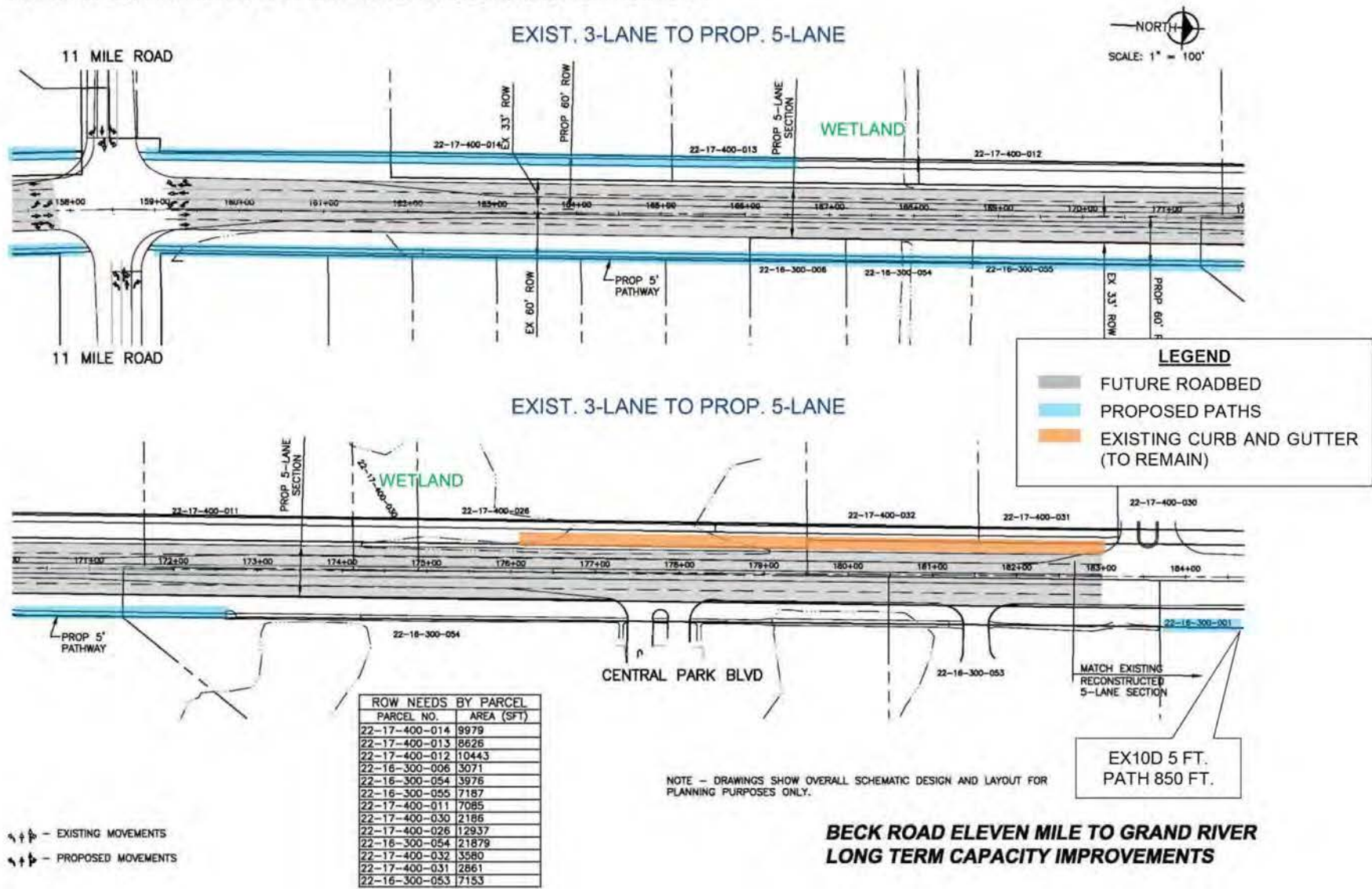
- EXISTING MOVEMENTS
 - PROPOSED MOVEMENTS

NOTE - DRAWINGS SHOW OVERALL SCHEMATIC DESIGN AND LAYOUT FOR PLANNING PURPOSES ONLY.

**BECK ROAD TEN MILE TO ELEVEN MILE
LONG TERM CAPACITY IMPROVEMENTS**

Source: Fishbeck, Thompson, Carr & Huber, Inc., Scoping Study Beck Road, 2006; & The Corradino Group, 2016

FIGURE 7: BECK ROAD FROM 11 MILE ROAD TO NEAR GRAND RIVER AVENUE



Source: Fishbeck, Thompson, Carr & Huber, Inc., Scoping Study Beck Road, 2006; & The Corradino Group, 2016

Route:	Beck Road
Description:	8-Mile Road to 9-Mile Road
County:	Oakland
Length:	1 Mile(s)
Date:	March 25, 2016

DESCRIPTION	TOTAL
Right-of-Way	\$ 270,000
Clearing and Grubbing	\$ 8,000
Earthwork	\$ 180,000
Railroad Crossing or Separation	\$ -
Drainage	\$ 468,000
Utilities	\$ -
Structures	\$ 158,000
Pavement Removal	\$ 149,000
Paving	\$ 1,329,000
Roadway and Pavement Appurtenances	\$ 324,000
Retaining Walls	\$ 79,000
Topsoil	\$ -
Seeding	\$ -
Sodding	\$ 29,000
Rip-Rap or Slope Protection	\$ -
Fencing	\$ -
Signing	\$ 10,000
Pavement Markings	\$ 15,000
Lighting	\$ -
Signalization	\$ 75,000
Guardrail	\$ 25,000
Pay Item Quantity Adjustment (15%) ¹	\$ 467,900
Maintenance of Traffic (5%)	\$ 179,300
Mobilization (5%)	\$ 179,300
CONSTRUCTION COST (rounded)	\$ 3,945,500
Contingency (20%)	\$ 789,100
Engineering (25%)	\$ 986,400
TOTAL CONSTRUCTION COST (rounded)	\$ 5,721,000
Preliminary Engineering (10%)	\$ 572,100
PROJECT COST (rounded)	\$ 6,293,100

¹ For estimating purposes pay items are adjusted for fluctuation of cost based on quantity.

Route:	Beck Road
Description:	9-Mile Road to 10-Mile Road
County:	Oakland
Length:	1 Mile(s)
Date:	April 5, 2016

DESCRIPTION	TOTAL
Right-of-Way	\$ 239,000
Clearing and Grubbing	\$ 6,000
Earthwork	\$ 182,000
Railroad Crossing or Separation	\$ -
Drainage	\$ 472,000
Utilities	\$ -
Structures	\$ -
Pavement Removal	\$ 159,000
Paving	\$ 1,135,000
Roadway and Pavement Appurtenances	\$ 352,000
Retaining Walls	\$ 63,000
Topsoil	\$ -
Seeding	\$ -
Sodding	\$ 29,000
Rip-Rap or Slope Protection	\$ -
Fencing	\$ -
Signing	\$ 10,000
Pavement Markings	\$ 14,000
Lighting	\$ -
Signalization	\$ 75,000
Guardrail	\$ 22,000
Pay Item Quantity Adjustment (15%) ¹	\$ 413,700
Maintenance of Traffic (5%)	\$ 158,600
Mobilization (5%)	\$ 158,600
CONSTRUCTION COST (rounded)	\$ 3,488,900
Contingency (20%)	\$ 697,800
Engineering (25%)	\$ 872,200
TOTAL CONSTRUCTION COST (rounded)	\$ 5,058,900
Preliminary Engineering (10%)	\$ 505,900
PROJECT COST (rounded)	\$ 5,564,800

¹ For estimating purposes pay items are adjusted for fluctuation of cost based on quantity.

Route:	Beck Road
Description:	10-Mile Road to 11-Mile Road
County:	Oakland
Length:	1 Mile(s)
Date:	April 5, 2016

DESCRIPTION	TOTAL
Right-of-Way	\$ 485,000
Clearing and Grubbing	\$ 4,000
Earthwork	\$ 185,000
Railroad Crossing or Separation	\$ -
Drainage	\$ 468,000
Utilities	\$ -
Structures	\$ -
Pavement Removal	\$ 166,000
Paving	\$ 1,138,000
Roadway and Pavement Appurtenances	\$ 379,000
Retaining Walls	\$ 74,000
Topsoil	\$ -
Seeding	\$ -
Sodding	\$ 29,000
Rip-Rap or Slope Protection	\$ -
Fencing	\$ -
Signing	\$ 10,000
Pavement Markings	\$ 14,000
Lighting	\$ -
Signalization	\$ 150,000
Guardrail	\$ 28,000
Pay Item Quantity Adjustment (15%) ¹	\$ 469,500
Maintenance of Traffic (5%)	\$ 180,000
Mobilization (5%)	\$ 180,000
CONSTRUCTION COST (rounded)	\$ 3,959,500
Contingency (20%)	\$ 791,900
Engineering (25%)	\$ 989,900
TOTAL CONSTRUCTION COST (rounded)	\$ 5,741,300
Preliminary Engineering (10%)	\$ 574,100

PROJECT COST (rounded)	\$ 6,315,400
-------------------------------	---------------------

¹ For estimating purposes pay items are adjusted for fluctuation of cost based on quantity.

Route:	Beck Road
Description:	11-Mile Road to Grand River Avenue
County:	Oakland
Length:	0.45 Mile(s)
Date:	March 25, 2016

DESCRIPTION	TOTAL
Right-of-Way	\$ 300,000
Clearing and Grubbing	\$ 6,000
Earthwork	\$ 81,000
Railroad Crossing or Separation	\$ -
Drainage	\$ 206,000
Utilities	\$ -
Structures	\$ -
Pavement Removal	\$ 100,000
Paving	\$ 598,000
Roadway and Pavement Appurtenances	\$ 132,000
Retaining Walls	\$ 32,000
Topsoil	\$ -
Seeding	\$ -
Sodding	\$ 13,000
Rip-Rap or Slope Protection	\$ -
Fencing	\$ -
Signing	\$ 5,000
Pavement Markings	\$ 7,000
Lighting	\$ -
Signalization	\$ 150,000
Guardrail	\$ 17,000
Pay Item Quantity Adjustment (15%) ¹	\$ 247,100
Maintenance of Traffic (5%)	\$ 94,700
Mobilization (5%)	\$ 94,700
CONSTRUCTION COST (rounded)	\$ 2,083,500
Contingency (20%)	\$ 416,700
Engineering (25%)	\$ 520,900
TOTAL CONSTRUCTION COST (rounded)	\$ 3,021,100
Preliminary Engineering (10%)	\$ 302,100

PROJECT COST (rounded)	\$ 3,323,200
-------------------------------	---------------------

¹ For estimating purposes pay items are adjusted for fluctuation of cost based on quantity.

