

TECH MEMO #2
NOVI REPORTS SUMMARIES



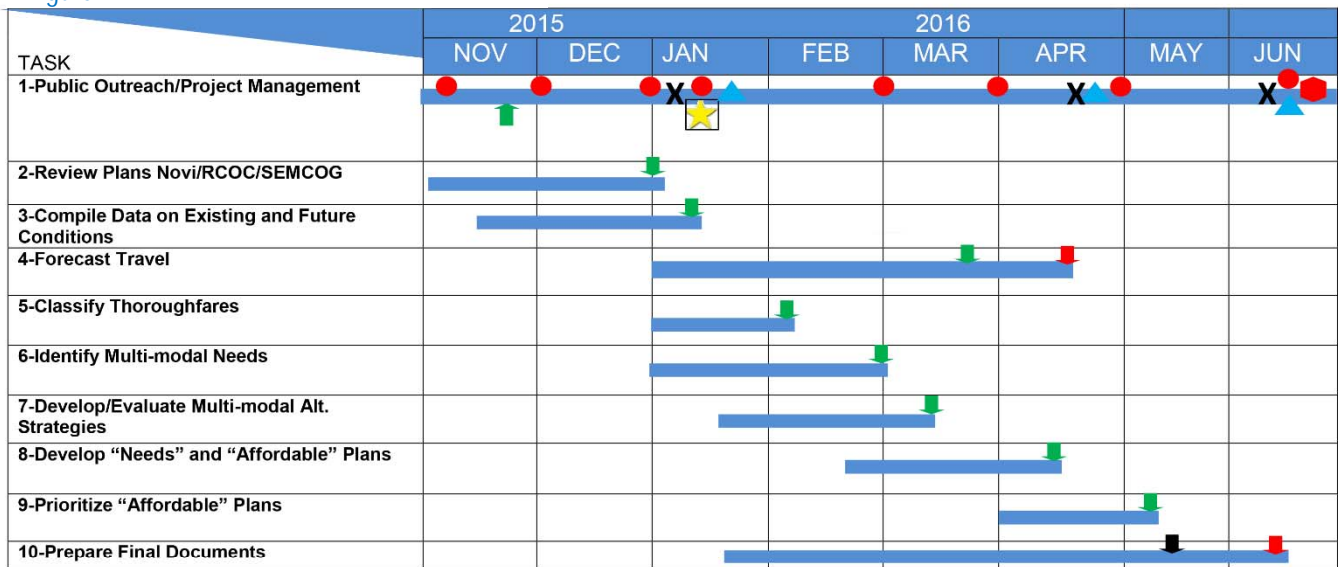
CITY OF NOVI
THOROUGHFARE MASTER
PLAN

1. Introduction

This report is prepared as part of the 2015 Novi Thoroughfare Master Plan (TMP). It will implement the soon-to-be-finalized 2015 Master Land Use Plan. This project requires the integration of projects among transportation modes to form a plan that complements it and is also forward-thinking. To assist in preparing the TMP, Novi has engaged The Corradino Group consulting firm.

The TMP will be completed in June, 2016 (Figure 1). The draft Final Report (which will include the Public Involvement Diary as a separate document) will be provided to Novi for review. Based on comments received, that document, and all other deliverables will be completed by mid-June 2016 (Task 10). A Technical Memorandum will be completed at the completion of each task from 1 through 9. They will be blended into the Final Report.

Figure 1



Team Meetings	●	Planning Comm. Meeting	X
Public/Stakeholder Meetings	▲	City Council Presentation	●
Community Remarks Setup	★	Technical Memorandum	Version 1 ↓ 2 ↓
		Final Report (+ PI Diary)	Draft ↓ Final ↓

Products/Reports

- | | |
|--------------------------------------------------|---------------------------------------------|
| 1. Tech Memo #1: Public Outreach Plan | 6. Tech Memo #6: Multi-modal Needs |
| 2. Tech Memo #2: Summary of Planning Documents | 7. Tech Memo #7: Alternative Strategies |
| 3. Tech Memo #3: Existing/Future Conditions | 8. Tech Memo #8: "Needs"/"Affordable" Plans |
| 4. Tech Memo #4: Travel Forecasts | 9. Final Report: Draft & Final |
| 5. Tech Memo #5: Classification of Thoroughfares | |

2. Reports Summaries

Below is a list of reports provided to The Corradino Group by the city of Novi. Reports are listed oldest to newest, except where follow-up or related studies were done.

An asterisk (*) indicates a report located by Corradino and summarized or noted, as applicable.

	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.
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	Project status is unknown
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 status is unknown
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	Project status is unknown
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

2.1. Beck – 8 Mile to Grand River Scoping Study, 2006

Beck Road has interchanges south with M-14 (an east-west freeway) and north with I-96 (within Novi). In Northfield Township, Beck has been widened to a four-lane boulevard to north of 6 Mile. The section north of I-96, within Wixom, like the section in Novi, has been slated for widening for some time. Beck is now two lanes with turn lanes from 8 Mile to 11 Mile Roads and three lanes north to Grand River, widening to five lanes at that approach.

Fishbeck, Thompson, Carr & Huber made short- and long-term recommendations in 2006, based on public involvement. There are capacity improvement recommendations and condition improvements.

Only the short-term 10 Mile turn-lane improvements and 8 Mile right-turn-only lane are done. No long-range widenings have occurred.

SHORT-TERM IMPROVEMENTS

Table 1 - Short-Term Intersection Capacity Improvements

Intersection	Time Frame (years)	Improvements	Estimate (2006 dollars)	Notes
10 Mile	1 – 4	Add dedicated right-turn lanes to NB, SB, and EB legs; extend WB right-turn and EB left-turn lanes. Replace traffic signal.	\$405,600	ROW impacts in all four quadrants; four parcels affected
9 Mile	2 – 5	Extend existing dedicated NB right-turn lane.	\$36,000	ROW impact on two parcels
11 Mile	5 – 10	Add dedicated right-turn lanes to EB and WB legs.	\$238,000	ROW impact in SW quadrant
8 Mile	5 – 15	Add dedicated right-turn lane to SB leg.	\$216,000	To coordinate with section south of 8 Mile

For future-year inflation factor estimates refer to Appendix 7. Estimate includes approximate cost of ROW acquisition. Refer to Short-Term Capacity Improvements in Section 5 for detailed information.

Table 2 - Short-Term Condition Improvements

Segment	Time Frame (years)	Work Type	Estimate (2006 dollars)	Notes
11 Mile to Grand River	1 – 4	Mill and overlay	\$218,000	Replace wearing course from 10 Mile to new pavement near Providence Hospital.
10 to 11 Mile	1 – 4	Repair and overlay	\$466,000	Existing pavement is thin; overlay will result in longer life section.
9 to 10 Mile	2 – 5	Mill and overlay	\$495,000	North half is in good condition; aggregate shoulder requires grading to flatten in locations
8 to 9 Mile	3 – 6	Repair and overlay	\$464,000	Thin pavement, poor base; overlay to thicken section.

For future-year inflation factor estimates refer to Appendix 7. Refer to Short-Term Condition Improvements in Section 6 for detailed information.

No repair, milling, and/or overlay work appears to have been done. The entire length of Beck Road, between 8 Mile and Grand River shows alligatoring and patches. Wetlands are evident along the corridor and geotechnical analysis finds the soils to be poor, so repaving is expensive. Because of the presence of wetlands, some sidewalks/paths are on structure. This, in part, contributes to a concern for the cost of maintaining non-motorized paths.

LONG-TERM IMPROVEMENTS

Thoroughfare plans by Birchler-Arroyo in 1992 and 1998 called for Beck Road to be improved to a four-lane divided or five-lane section, but at the time of the Fishbeck Report (2006), Novi's section of Beck was not yet in SEMCOG's long-range plan. Fishbeck supported some "narrow" four-lane boulevard sections, with other sections five-lane. **None of the recommended widening has occurred.**

This report includes recommendations that respond to public input. It also includes schematics of short-term and long-term improvements, with estimates of parcels needed. Wetlands are enumerated in an appendix, though they would have to be formally delineated in the environmental phase as the project goes forward. Report appendices also include early planning studies, such as the 1991 Barton Aschman AADT map, and excerpts from the 2004 Land Use Plan, which includes elements to be included in a Thoroughfare Plan.

Table 3 - Long-Term Capacity Improvements

Segment	Cross Section	Estimate (2006 dollars)	Parcels Affected (ROW needs)	Notes
8 to 9 Mile	5 lanes	\$3,215,000	28	The eastern half of the southern half mile is in the City of Northville
9 to 10 Mile	5 lanes at the mile roads, with a 4-lane boulevard for middle 3,200 feet	\$3,153,500	18	
10 to 11 Mile	5 lanes at the mile roads, with a 4-lane boulevard for the middle 3,500 feet	\$3,418,000	6	
11 Mile to Grand River	5 lanes	\$1,826,000	13	

For future-year inflation factor estimates refer to Appendix 7. Estimates include the approximate cost of ROW acquisitions. Refer to Long-Term Capacity Improvements in Section 7 for detailed information.

2.2. 13 Mile/Old Novi/South Lake Intersection Study, 2009

This study made a number of recommendations to remove the existing signal, to be replaced with stop signs, and make minor geometric changes. **All these changes have been made.**



- Speed Cushion;
- Speed Table;
- Raised Crosswalk;
- Raised Intersection;
- Traffic Circles;
- Realigned Intersections;
- Speed Kidney;
- Curb Extensions;
- Chokers
- Center Median Islands
- Landscaping
- Pavement Markings;
- Textured Pavement; and,
- Dynamic Feedback Signs.

Analysis found speeds at their highest from midnight until about 6:00 a.m. Speeds generally decrease as traffic volumes increase. During daytime and peak hours the 85th percentile speed hovers around 30 mph. The graph below shows the results of the 2015 analysis and data from 2010.

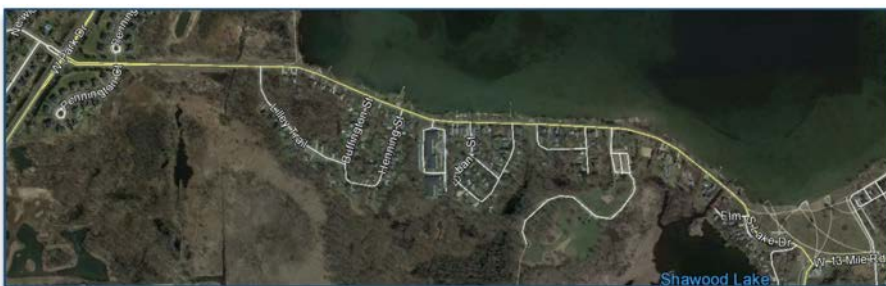


2.3. Draft South Lake Drive Traffic Calming, September 2015

The status of this project is unknown. Homes are located on the south side of South Lake Drive and the north side of Walled Lake. A speed limit of 25 mph was established due to the presence of pedestrians, residential areas, and natural features. Novi has since noticed speed limit violations.

Crash reports, speed data from 2010 and 2015, roadway geometry data, current signing, and pedestrian facilities were examined by AECOM. Traffic calming devices considered include:

- Speed Hump;
- Offset Speed Hump;
- Chicane;
- Neckdowns;



A crash analysis found no particular problem.

Successful implementation of traffic calming relies on acceptance by the public, so safety and aesthetics are concerns. Pavement marking was recommended as the most applicable, effective, and cost-efficient speed control measure. Transverse pavement markings have effectively reduced average speeds by 2 mph and could potentially bring the average and 85th percentile speeds down to an acceptable level of 25 mph. Also, pavement marking modifications do not hinder emergency vehicles. Additional recommendations included the use of a "speed kidney" or emergency vehicle-friendly vertical deflections. Traffic calming options are shown on the following page. Some measures could require removal in winter due to snow plow use.

Figure E-1: Traffic Calming Recommendations and Alternatives

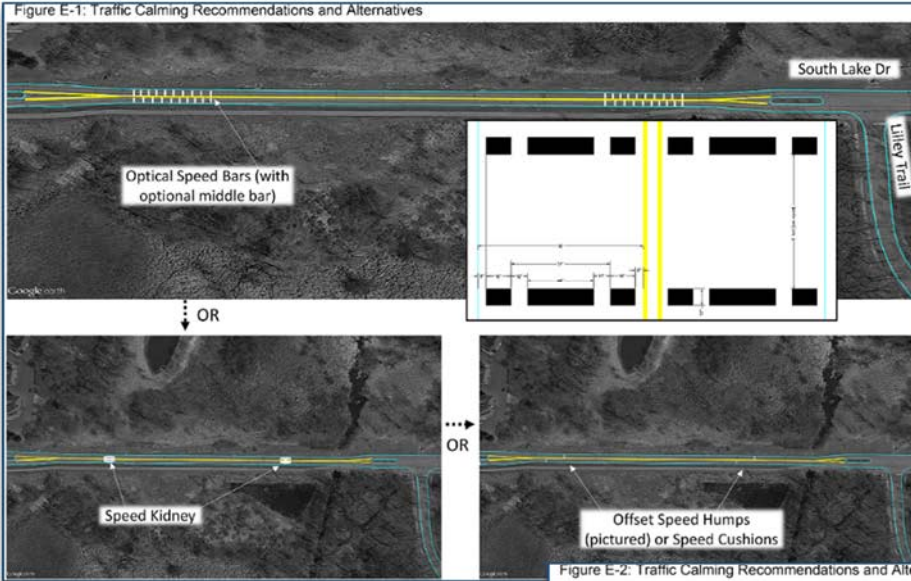


Figure E-2: Traffic Calming Recommendations and Alternatives

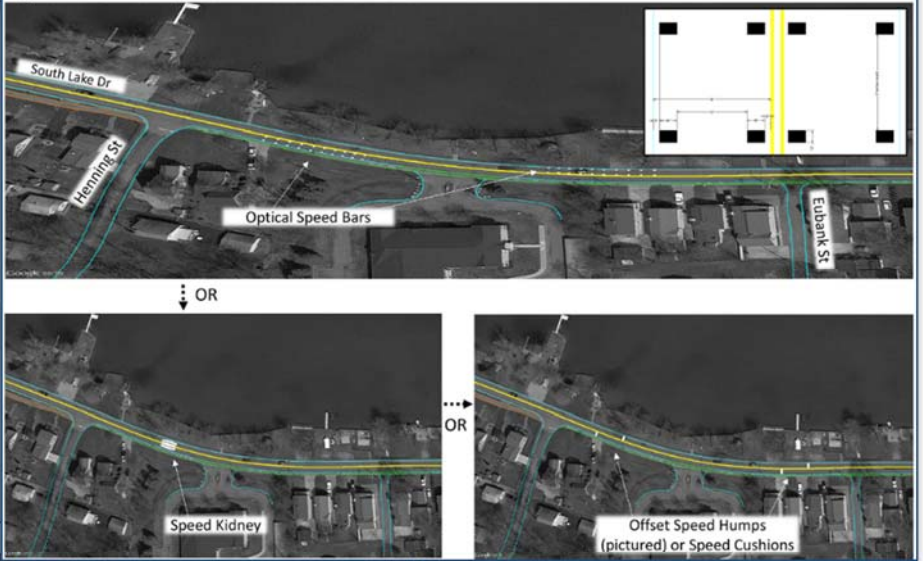
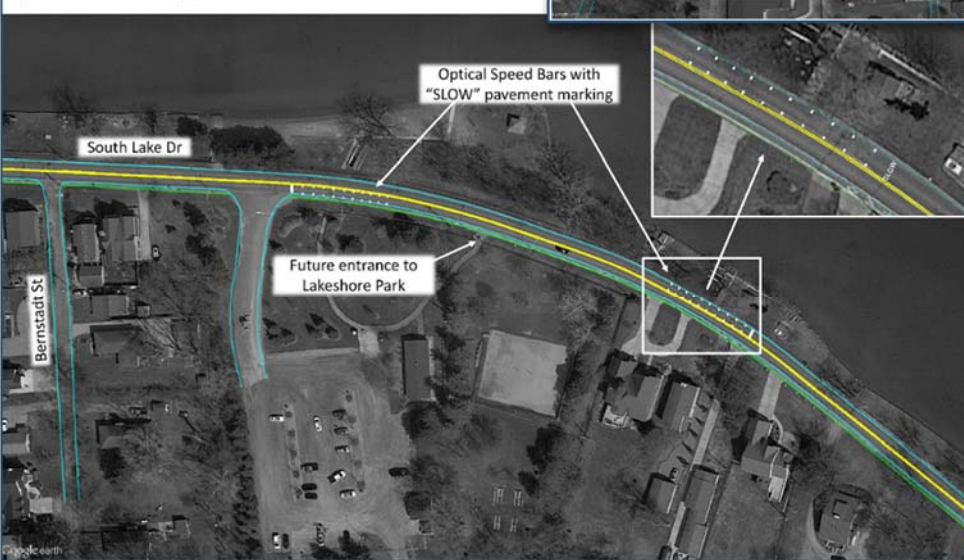


Figure E-3: Traffic Calming Recommendations and Alternatives



Signage recommendations along South Lake Drive were made to improve bicycle and pedestrian safety.

Currently, there is an eastbound path intended for bikes only, but used more by pedestrians, with no complimentary facility westbound (see image below, view to the west). AECOM recommended additional facilities.



Anderson, Eckstein & Westrick, Inc. (AEW) performed a scoping study and included in the original design:

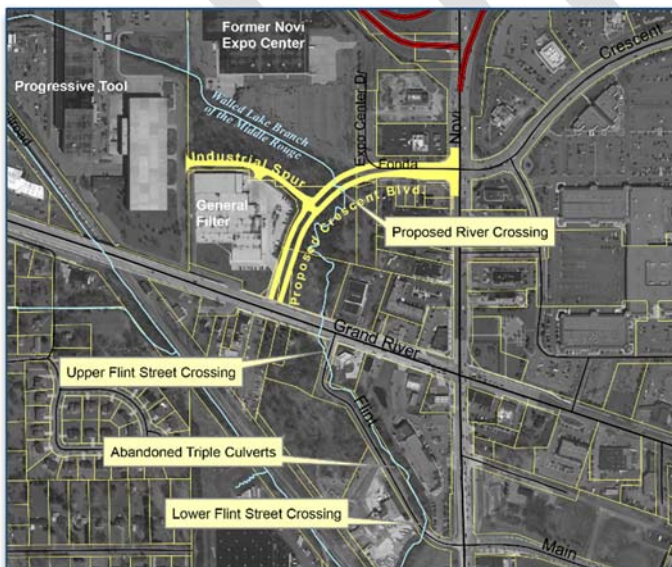
- A four-lane Crescent Boulevard with five-foot wide sidewalks on both sides and a ten-foot center median;
- An Industrial Spur Road extending to the west;
- A ConSpan bridge structure (20' span; 7' rise) over the Walled Lake Branch of the Middle Rouge River;
- Retaining walls along the north side of the Industrial Spur road and portions of the east side of Crescent Boulevard;
- Mitigation of wetland impacts;
- Downstream improvements to Flint Street (see 2015 study that follows); and,
- Decorative mast-arm traffic signals at the new intersections of Crescent Boulevard/Grand River Avenue and Grand River Avenue/Novi Road.

2.4a. NW Ring Road Study, June 2007

In the 1990s, Novi received a grant for construction of an extension of Crescent Boulevard linking Grand River Avenue and Novi Road, plus an industrial spur road extending west to the General Filters site. Preliminary design plans were prepared, but due to delays caused by right-of-way acquisition, the grant was rescinded in 1999. The City acquired the necessary right-of-way and easements by 2007 and needed to reassess the project's cost. The project is now called the Grand River & Novi Road Northwest Quadrant Ring Road.

The scope included: review of the earlier design plans and permits; evaluation and recommendations regarding the proposed roadway extension; review of the original hydraulic model for existing conditions and post-project conditions; cost estimates; and, geotechnical evaluation and recommendations. Findings included:

- Wetland and organic soils would have to be replaced.
- Utilities are principally related to storm water and pretreatment.
- The bridge over Walled Lake Branch must have a sufficient rise to prevent floodplain impacts;
- Walled Lake Branch should be relocated;
- Previous wetland compensation would have to be updated; and,
- The cost would range from \$3.8 to \$4.2 million (2007).



2.4b. 11 Mile and Town Center Area Walmart Traffic Impacts Report, 2012

Walmart opened in 2012 on the NW corner of Town Center Drive and 11 Mile Road. This study examines traffic impacts after the opening, focusing on the areas circled below.

KEY FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

11 Mile and Meadowbrook — Peak periods extend later, and volumes, during the 6:00-8:00 p.m. prime shopping period, increased significantly.

Delaying the start of the flashing signal operation until 10:00 p.m. (versus 7:00 p.m. now), and extending the longer (120-sec) maximum cycle time by one hour in the morning and evening peaks (to 10:00 a.m. and 8:00 p.m., respectively) were recommended.

The southbound Meadowbrook approach to 11 Mile features an 18-ft-wide shared through-right lane that does not afford smooth and optimally-safe traffic flow to motorists destined for points to the west. It was proposed that this approach be widened by five feet to facilitate the striping of separate lanes for through and right-turning traffic. (Google ground level at 8/2015 shows this is not yet done.)

11 Mile and Town Center Drive — Wal-Mart has significantly increased peak traffic on the east, west, and south legs; however, on the north, traffic is sharply reduced – attributable to the removal of access drives that served businesses replaced by Walmart. The total traffic entering the 11 Mile/Town Center intersection remains essentially unchanged and is well-balanced. The existing all-way-stop control provides excellent levels of service and should continue doing so for the foreseeable future.

It was recommended that the required ALL WAY (R1-3P) sign should be added below the eastbound STOP sign, and Town Center management should prune the street trees along the south side of 11 Mile to increase sight distance for those approaching from the south. (R1-3P is now present on all approaches, per Google Earth 8/2015.)

Crescent and Ingersoll — The report cited that northbound Ingersoll motorists are turning directly left, instead of making a right turn, then U-turn, despite signs and pavement markings prohibiting such a movement. The west nose of the median break displays significant impact damage. It was recommended that the raised median on the west side of this opening should be extended. NOTE: per Google, this was done with reflective yellow “candlesticks,” for safety. Other recommendations have been completed, per Google of 8/2015.

The 5-mph increases in the posted speed limits made in 2009-2010 on 11 Mile, Town Center, and Crescent, have reduced the average extent to which 85th-percentile speeds exceed the limit, from nearly 7 mph before the change to about 3 mph after the change.



Figure 1. Overall Town Center Study Area

2.4c. Town Center Area Study, March 2014

This study was designed to make recommendations for Novi’s Town Center area on four main topics: 1) land use; 2) zoning; 3) design guidelines; and, 4) wayfinding.

Town Center is to serve as a mixed-use, pedestrian-oriented focal point for the City of Novi. The Town Center

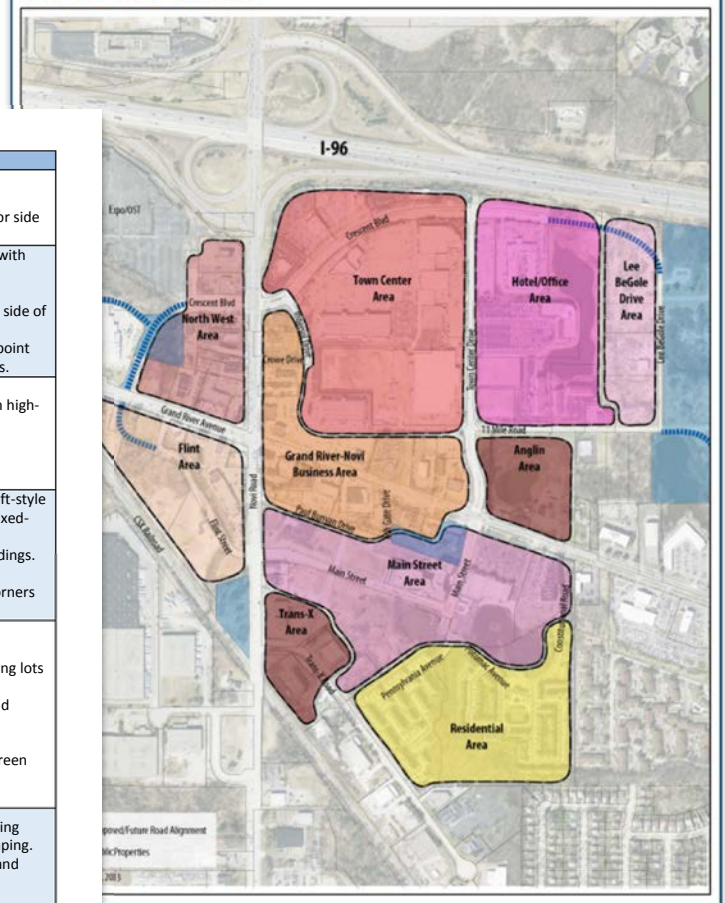
area is to have a variety of uses, including retail, commercial, office, residential, and institutional, and open space, with the Grand River/Novi Business Area and the Main Street Area serving as the “main hub.” The recommended land uses, and suggestions on form/design, pedestrian orientation and streetscape appearance are shown below.

TABLE 1. RECOMMENDED LAND USE AND MASTER PLAN UPDATES

Subarea	Intent	Preferred Land Uses*	Form/Design
North West	<ul style="list-style-type: none"> Transition to Grand River/Novi Road Business Area Gateway into Town Center Middle Rouge in site design 	<ul style="list-style-type: none"> Restaurants, coffee shops, retail/office 	<ul style="list-style-type: none"> Pedestrian-oriented with small front/side setbacks. Shared parking located at rear or side of building.
Flint Street	<ul style="list-style-type: none"> Provide mix of office and commercial Middle Rouge as site amenity 	<ul style="list-style-type: none"> Office/research/ technology at railroad At Grand River/Novi: <ul style="list-style-type: none"> Restaurants Outdoor cafes (near river) Retail & office uses 	<ul style="list-style-type: none"> Maintain attractive architecture with reduced front/side setbacks. Shared parking located at rear or side of building. Integrate Middle Rouge as focal point with walkways or pedestrian plazas.
Trans X	<ul style="list-style-type: none"> Transitional to Main Street and Grand River/Novi Existing industrial uses transformed into office/retail Retail uses along Novi Road 	<ul style="list-style-type: none"> Public market with specialty foods, produce and gift items Restaurants 	<ul style="list-style-type: none"> Buildings fronting Novi Road with high-quality architecture and reduced setbacks.
Main Street	<ul style="list-style-type: none"> Mixed-use and City Centerstyle development Commercial and residential uses that include open spaces and pedestrian amenities 	<ul style="list-style-type: none"> Residential uses on the south side of Main St. Mixed-use developments at corners (Main St./Novi Rd.; Main St./Grand River Ave.) 	<ul style="list-style-type: none"> Dense, multi-family housing as loft-style condominiums, townhouses, or mixed-use commercial/office/residential buildings. Allow first floor residential Taller buildings (3-5 stories) at corners Outdoor events space
Grand River/Novi Business	<ul style="list-style-type: none"> Serves as “spine” of overall Town Center area Dense, walkable, retail/office/restaurant area Easily accessible from other subareas with ample pedestrian facilities 	<ul style="list-style-type: none"> Retail uses Restaurants Outdoor cafes 	<ul style="list-style-type: none"> Pedestrian-oriented with small front/side setbacks Landscaping used to screen parking lots Consistent lighting Pedestrian refuge islands at Grand River/Main Reduced vehicle speeds Connections between existing screen walls and businesses.
Town Center	<ul style="list-style-type: none"> Regional commercial center Pedestrian accessibility via connections to the Grand River/Novi Business Area, Hotel/Office area and Anglin Area. 	<ul style="list-style-type: none"> Large-format retail uses Shopping centers/general retail uses Restaurants/outdoor cafes 	<ul style="list-style-type: none"> Maintain current form with unifying brick façade and attractive landscaping. Provide pedestrian connections and amenities within shopping centers and along roadways
Anglin	<ul style="list-style-type: none"> Eastern gateway to the core area Pedestrian-orientation Pond as a site amenity 	<ul style="list-style-type: none"> Retail uses Professional offices Research and technology uses 	<ul style="list-style-type: none"> Pedestrian-oriented with reduced front setbacks. Pedestrian paths connecting with core area Pond as a focal point for new development.
Hotel/Office	<ul style="list-style-type: none"> Promote Town Center regional appeal via visibility from I-96 Increase pedestrian connections to nearby uses Extend Lee BeGolep Drive to complete ring road 	<ul style="list-style-type: none"> Mid-rise residential Hotels/motels Extended stay hotels 	<ul style="list-style-type: none"> Large-lot hotel, office research and technology developments Pedestrian-scaled amenities that connect to the commercial core Best practices around existing pond
Lee BeGole Drive	<ul style="list-style-type: none"> Opportunity for municipal services or office, research & technology. Outside storage permitted 	<ul style="list-style-type: none"> Municipal services Office, research and technology 	<ul style="list-style-type: none"> Uses should connect to Town Center core Pond used as a focal point for new development Best practices around existing pond

*These preferred land uses are in addition to the current mix of land uses included in the TC Commercial, TC Gateway, and Office Commercial land use categories.

FIGURE 1. STUDY SUBAREAS



2.4d. Flint Street Improvement Study, January 2015

Flint Street, between Grand River Avenue and Novi Road, is an asphalt and chip-sealed roadway in poor condition. Properties there are expected to redevelop and will need an improved road. Also, the June 7, 2007 *Scoping Study for the Northwest Quadrant, Novi Road and Grand River Avenue Ring Road* recommended Flint Street be realigned to connect across Grand River Avenue with the southwest extension of Crescent Boulevard to advance the “ring road” concept, which will improve operations at the congested Grand River Avenue/Novi Road intersection.

Flint Street is in the Novi Town Center Area. The *Town Center Area Study* approved by the Novi Planning Commission on March 26, 2014 includes specific recommendations for the realignment of Flint Street, including: preferred routes, pedestrian and bicycle amenities, and adjacent land use and zoning.

This URS report examined alternatives with differing right-of-way requirements and possibilities for redeveloping the adjacent properties. The alternatives were discussed with the Planning Commission and adjacent property owners, including Hunter Development Company. Two alignments appear best in terms of property impacts and redevelopment. Alternative 1A generally follows the existing Flint Street alignment adjacent to the creek. Alternative 1B moves the roadway alignment adjacent to the railroad. Other alternatives were examined, but not selected.

Alternative 1A would likely affect wetlands. Alternative 1B is not expected to. Floodplain follows the creek, so Alternative 1B would likely also have less floodplain impact. NEPA would be followed, if federal funds are involved. Utility changes should be consistent with redevelopment efforts. Traffic and hydraulic studies will be required.



2.5. Speed Limit Study of Novi Road 12 to 14 Mile, 2010

This section of five-lane roadway was posted with inconsistent speed limits and the study was performed to make recommendations to remedy that.

The implementation status is unknown. A speed study and crash analysis were performed.

Background and Criteria

Novi Road between 14 and 12 Mile Roads (Figures 1-2) is now posted with a 40-mph or a 35-mph speed limit, depending on both location and direction of travel, as follows:

- 14 Mile to 13 Mile: 40 mph in both directions
- 13 Mile to far end of second curve (about 1,640 ft generally southwest of 13 Mile):
40 mph southbound and 35 mph northbound
- Ending point described above, to 12 Mile Road: 40 mph in both directions

Recommendations

1. The overall speed limit for Novi Road between 14 Mile and 12 Mile should be set at 45 mph.
2. The Superintendent of the Walled Lake Consolidated School District should be advised of the proposed speed limit change and asked whether or not the District wishes to have a school speed zone established (of no less than 30 mph and within 1,000 ft of Hickory Woods Elementary).
3. A Reverse Curve Warning sign, with a 35-mph advisory, should be present on the northbound and southbound approaches to the first two curves south of 13 Mile Road. This will require new warning signs southbound and the addition of a 35-mph advisory to the existing northbound sign.

One study observation was:

Traffic volumes are down sharply from previous counts. For example, the City's 2004 Master Plan shows an August 2003 daily volume of 19,172 for Novi Road between 13 Mile and 14 Mile, whereas the April 2010 average daily volume near Wimbleton Way (location #2) was only 8,416.

2.6. Transportation Improvement Plan, I-96/I-696/I-275 in Novi and Wixom

The concept of an I-96 Corridor Study was developed from the desire of the cities of Novi and Wixom to improve traffic conditions along the surface street network in the area of the I-96/I-275 interchange and to plan for growth in the area. Given the interaction of Novi city streets with county thoroughfares and adjacent state trunkline routes and interchanges, the project was expanded to include a complete planning study of state and local routes.

As such, the study:

- Evaluated all interchanges, freeways, and corridors in the study area for potential operational, capacity, safety, and connectivity improvements, in a comprehensive and coordinated future transportation plan;
- Evaluated access management opportunities along all corridors in the region;
- Evaluated community land use plans, including future developments, and identified opportunities for improved coordination with future roadway plans; and,
- Evaluated transit and non-motorized transportation options.

Agencies partnered to guide this project with the Michigan Department of Transportation, as the lead, were the cities of Novi and Wixom, the Road Commission for Oakland County

(RCOC), and the Southeast Michigan Council of Governments (SEMCOG). Private stakeholders included numerous business entities such as Rock Financial, the Taubman Companies, Providence Hospital, and International Transmission Company (ITC). Importantly, key stakeholders included residents and businesses concerned with the viability, sustainability, and overall quality of life within this area of Southwest Oakland County.

The study developed a prioritized list of projects to improve safety and mobility and spur economic development for the region in ten categories:

1. Widening/Capacity Improvements @ \$154 million
2. ITS Opportunities and Studies @ \$3.25 million
3. Intersection Safety @ \$1.05 million
4. Intersection Operations (PM peak hour) @ \$2.565 million
5. Non-motorized @ \$8.65 million
6. Access Management: Part of ongoing activities
7. Right-of-way: To be assessed
8. Transit: To be assessed
9. Land Use: Part of ongoing activities
10. General: Part of ongoing activities

Within each category individual projects were listed along with the responsible implementing entity, construction cost, and time frame.



2.7. Identification of High Crash Intersections Novi 2006-2010, January 2012

This report by Birchler Arroyo Associates, prepared in January 2012, examined 60 local intersections and identified 12 as having high crash rates or high casualty

ratios. Those 12 intersections were then analyzed in a separate report (see the next section). The executive summary of the January 2012 report follows.

IDENTIFICATION OF HIGH-CRASH INTERSECTIONS IN THE CITY OF NOVI, 2006-2010

EXECUTIVE SUMMARY

The *SEMCOG Traffic Safety Manual (Second Edition, 1997)* recommends detailed methods for objectively identifying intersections having crash histories warranting further study. Important advantages of these methods are that they:

- ❑ Account for exposure. Unlike evaluations based simply on crash frequency, those based on crash rates – crashes per million entering vehicles – reflect the true risk of having a crash.
- ❑ Compare an intersection to similar intersections throughout the region. By comparing to a large sample of physically similar intersections serving similar traffic volumes – rather than a smaller sample of more diverse intersections within the City – it can be more reliably determined that a location's crash history should truly be a matter of concern.
- ❑ Apply a statistical test to determine whether or not having an above-average crash rate is meaningful. To guard against drawing unwarranted conclusions based on a location's crash rate being higher than average due to random occurrences, the crash rate is compared to a Critical Crash Rate based on a statistical confidence interval (typically 95%). Only where the crash rate exceeds the Critical Crash Rate is the intersection reliably classified as "High-Crash."
- ❑ Apply a statistical test to determine whether or not crash severity is significantly above-average. For this test, crash severity expressed as a casualty ratio – the proportion of all crashes involving at least one fatality or non-fatal injury. To guard against drawing unwarranted conclusions based on a location's casualty ratio being higher than average due to random occurrences, the casualty ratio is compared to a Critical Casualty Ratio. Only where the casualty ratio exceeds the Critical Casualty Ratio is the intersection reliably classified as "High-Crash-Severity."

The objective of this study was to apply the above SEMCOG methodology to all section-corner intersections and/or intersections within Novi known to serve relatively high traffic volumes. Sixty-two such intersections were identified, traffic volume data for all of these intersections were synthesized from a variety of sources, and crash data were obtained from the Traffic Improvement Association. Due to complexities associated with crash reporting at the Beck / I-96 interchange, the data for this interchange's three intersections were set aside for further scrutiny in a possible future study. In the present study, the crash rates were determined – and crash rates and casualty ratios statistically tested – for the other 59 intersections.

The study identified the following 11 High-Crash intersections:

- ❑ Haggerty Road's intersections with 14 Mile, 12 Mile, Grand River, and 8 Mile.
- ❑ M-5 and 14 Mile.
- ❑ Novi Road's intersections with 12 Mile, Grand River, and 10 Mile.
- ❑ Beck Road's intersections with Pontiac Trail, Grand River, and 8 Mile.

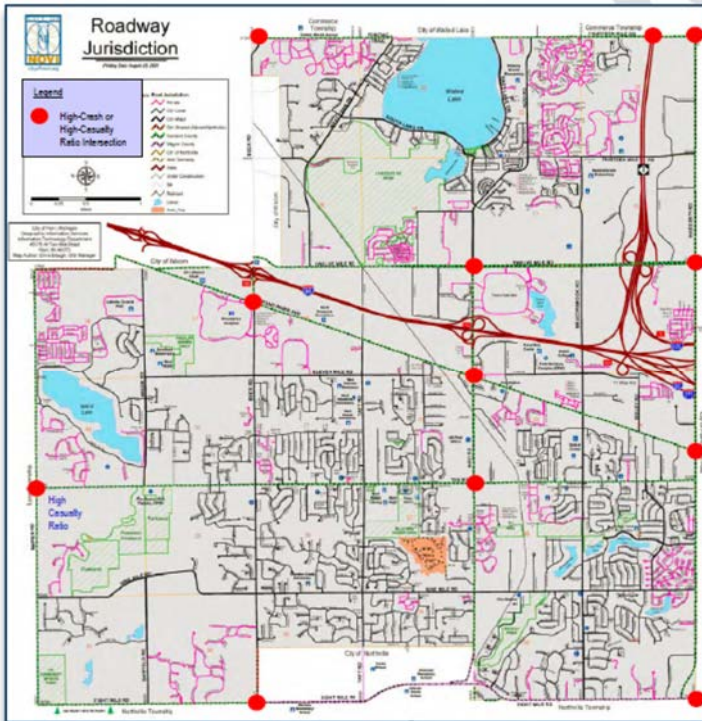
Only the intersection of Napier and 10 Mile Road was found to be High-Crash-Severity.

It is reasonable to conclude that the above 12 intersections warrant further study. The next logical step would be to analyze the pattern of collision types as part of the process of identifying candidate safety countermeasures.

2.8. Crashes at 12 Intersections, June 2012

Birchler Arroyo Associates prepared a January 2012 report for Novi that identified 12 intersections as having high crash rates or high casualty ratios (see previous section). The methodology applied is as presented in SEMCOG's *Traffic Safety Manual* (Second Edition, 1997) and based on statistical comparisons between the rate (or ratio) at a subject intersection and the average rate (or ratio) at a large set of intersections elsewhere in Southeast Michigan with similar physical characteristics and traffic volumes. Statistical confidence intervals were applied to ensure a location's crash rate (or casualty ratio) was higher than average due substantive matters rather than random occurrences (or "chance").

The June 2012 report advanced the January 2012 report to identify significant crash patterns, and possible causes and countermeasures, based on expert field inspection and the SEMCOG manual.



The 12 intersections were analyzed by crash type and severity on the usual scale of F = fatal, A = incapacitating injury, B = non-incapacitating injury, C = possible injury, and PDO = property damage only). The casualty ratio was calculated by crash type by dividing injury crashes by total

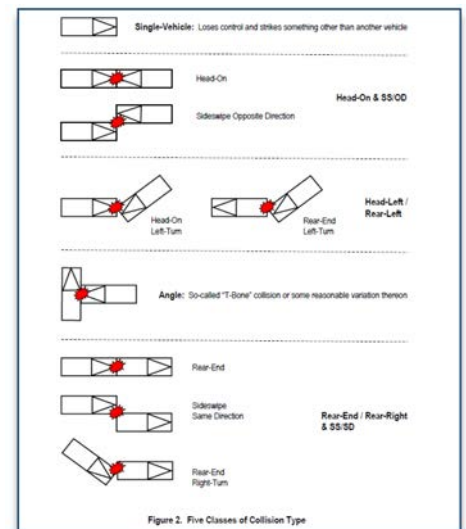
crashes. This ratio was used as a weighting factor in prioritizing significant crash patterns. A column for single-vehicle crashes was added to include those accidents. The worksheet displayed the percentage of crashes by type and the appropriate regional comparison percentages (SEMCOG Manual). For crash types with a percentage greater than the comparison value, and therefore considered significant, an Over-Representation Ratio (ORR), Pattern Priority Index (PPI), and ranking are added (Table 1).

Table 1. Crash Pattern Identification and Prioritization at _____
Average Daily Traffic (ADT): _____

Evaluation Criteria		Possible Crash Pattern				
		Single-Vehicle	Head-On & SS/OD	Head-Left/ Rear-Left	Angle	Rear-End/Rear-Right & SS/SD
Location's Crashes	No. by Type / Total No. Location's %					
Regional Crash %	Table 4.1. Area Type: _____					
	Table 4.2. Functional Class: _____					
	Table 4.3. No. of Lanes: _____					
	Table 4.4. Signal / No Signal					
Significant Pattern?	Enter YES if Location's % Exceeds at Least One of the Above Regional %s					
Pattern Priority	Average Regional % ²					
	Over-Representation Ratio (ORR) = Location's % / Average Regional %					
	Severity Weighting (SW) = Casualty Ratio					
	Pattern Priority Index (PPI) = 10 / (ORR x SW)					
Relative Priority						

¹ Complete this block only for significant patterns.
² Highlight, and then average, only those regional %s which are less than the location's %. This is necessary to guarantee an ORR greater than 1.0.
Note: "Other & Uncoded" collision types not listed here, so %s will not add to 100.

The Manual's 21 categories were then used to identify possible counter measures for significant multi-vehicle crash patterns. Other than speed enforcement, there is little an agency can do to directly modify driver behavior; hence, the only driver error listed as a crash cause was Excessive Speed.



The 21 categories were related to five crash classes as shown in the graphic below. Table 2 lists the 21 cause categories and their relationship to the five crash patterns.

Table 2. Possible Causes for Multiple-Vehicle Crash Patterns at

Possible Cause	Crash Pattern					
	Head-On & SS/OD	Head-Left/ Rear-Left	Angle		Rear-End/Rear-Right & SS/SD	
			Signal	No Signal	Signal	No Signal
Pattern Priority Index (PPI)						
Excessive Speed	o	o	o	o	o	o
Restricted Sight Distance	o	o	o	o	o	o
Slippery Surface			o	o	o	o
Narrow Lanes	o				o	o
Inadequate Signal Change Interval		o	o			
Turning Vehicles Stopping or Stopping in Through Lanes					o	o
Unexpected Slowing and Lane Changing					o	o
Poor Visibility of Traffic Signal			o		o	
Unexpected/Unnecessary Stops Due to Signal			o		o	
Unsafe Right-Turns-on-Red			o		o	
Crossing Pedestrians					o	o
Poor Visibility of STOP/YIELD Signs				o		o
Proper Stopping Position Unclear			o	o		
Inadequate Pavement Markings	o					
Inadequate Roadway Shoulders	o					
Inadequate Maintenance	o					
Severe Curves	o					
Inadequate Gaps in Oncoming Traffic		o				
Inadequate Signalization for Left-Turn Volume		o				
Inadequate Gaps for Turning and Accelerating						o
Unexpected Cross Traffic				o		

Note: Significant crash patterns are those for which a PPI value is listed and bulleted cells underneath are shaded. The highest priority crash pattern is the one with the lowest PPI value and bolded column heading; higher-priority possible causes are those associated with either this pattern or multiple significant crash patterns. Such higher-priority possible causes are bolded here as well as separately tabled.

- Add dedicated left-turn lane.

Very specific and detailed recommendations were made for each intersection. Table 15 summarizes the recommendations.

Table 3b. Higher-Priority Possible Causes for Crash Patterns at Haggerty and 14 Mile

Crash Pattern	Possible Cause	Applicable? (Step 7)		Comments	
		Yes	No		
Causes Associated with Highest Priority Pattern (Step 3)					
Angle	Excessive Speed		X	No evidence of a speeding problem.	
	Restricted Sight Distance	X		12 crashes involved left turns in (4) or out (8) of gas station driveway on 14 Mile, likely due to sight obstructions caused by vehicles queued for signal. Eliminating the 10 that were angle crashes would reduce site's angle crash over-involvement to 8% from 28%.	
	Slippery Surface	?			
	Inadequate Signal Change Interval	?		On both roads, yellow is 4.5 sec for through-right and 4.0 sec for left. All yellow intervals are followed by a 1.0 sec all-red. Per MDOT guidelines, a 4.3 sec yellow interval is adequate on both of these 45-mph roads; however, given the 50-ft intersection width in both directions, an all-red of 1.7 sec is needed (0.7 sec more than now used).	
	Poor Visibility of Traffic Signal	?		Disadvantages of diagonal span wire are exacerbated at a relatively small intersection such as this.	
	Unexpected/Unnecessary Stops Due to Signal	?			
	Unsafe Right-Turns-on-Red	X		WB approach lacks adequate sight distance for safe RTOR, but has right-turn overlap.	
	Proper Stopping Position Unclear	X		WB drivers seeking sight distance for RTOR cause variable & uncertain stopping positions. Lack of streetlight on SW corner limits view of driveway conflicts and stop bar locations.	
	Causes Associated with Multiple Crash Patterns (Step 4)				
	Angle + Rear-End/ Rear-Right & SS/SD	Excessive Speed		X	See comment above.
Slippery Surface		?			
Poor Visibility of Traffic Signal		?		See comment above.	
Unexpected/Unnecessary Stops Due to Signal		?			
Unsafe Right-Turns-on-Red		X		See comment above.	

Note: Step numbers refer to procedural steps described on pages 4-32 and 4-33 of the SEMCOG Traffic Safety Manual – 2nd Edition, 1997.

For each intersection crash pattern, each of the 21 causation categories were reviewed and comments added, as appropriate, together with countermeasures. See the example in Table 3b.

Ad hoc observations were made based on field observation and aerial and ground photography. SEMCOG's Manual and engineering experience were used to complete the sheets for each intersection.

Very specific and detailed recommendations were made for each intersection. Examples of recommendations include:

- Lengthen all red phase;
- Change diagonal span wire signal suspension to box span with signal backplates;
- Improve sight distance;
- Add lighting;
- Control driveway access;
- Post "No Right Turn On Red";
- Median shrubs and trees obscuring right turn on red;
- Add crosswalk markings;
- Add right turn overlap phasing;
- Add "Signal Ahead" signs;
- Add right-turn lane;
- Remove crest in 10 Mile 625 ft. west of Napier that limits intersection sight distance; and,

Table 15. Summary of Key Findings and Recommendations

Intersection	Significant Crash Patterns					Safety Improvement Recommendations
	Single-Vehicle	Head-On	Head-Left	Angle	Rear-End	
Haggerty & 14 Mile				X	X	Access management plan; longer all-red; no RTOR westbound; improved street lighting; sidewalk on NW corner.
Haggerty & 12 Mile					X	Remove shrubbery in median; prune street trees; extend sidewalks on west side of I/S; consider conducting speed study on 12 Mile.
Haggerty & Grand River					X	Traffic study to evaluate benefit of adding SB right-turn lane & overlap phasing; box span with back plates; reoriented WB stop bar.
Haggerty & 8 Mile	X		X		X	Evaluate overall signal configuration; back plates; left-turn phasing on both roads; street lighting; maintenance of transverse markings.
M-5 & 14 Mile	X				X	Reevaluate signal timing; back plates; Signal Ahead signs on M-5; Turning Vehicles Yield to Pedestrian signs on WB & SB approaches.
Novi & 12 Mile	X				X	Pedestrian refuge in each of two Novi Road crosswalks; enhanced crosswalk markings; signal back plates.
Novi & Grand River					X	Extend Crescent Blvd west to Grand River; enhanced crosswalks; area-wide street lighting.
Novi & 10 Mile		X		X	X	Traffic study to determine current volumes & evaluate benefit of adding SB right-turn lane & overlap phasing; enhanced crosswalks.
Beck & Pontiac Trail		X	X	X		Cross access between gas station on NE corner & adjoining shopping center; sidewalk on NE corner; marking of Beck narrowing SB.
Beck & Grand River	X				X	Move SB stop bar south; maintenance of transverse pavement markings; street lighting; traffic study of potential EB dual-left lanes.
Beck & 8 Mile			X		X	Extend speed zone; post No RTOR NB & WB; reevaluate 8 Mile yellow; traffic study of future I/S design; delineate corners &/or add lighting.
Napier & 10 Mile	X	X		X		Clear-vision triangles; intersection warning signs; plan future realignment & widening; speed study & future signal warrant study.

2.9. Wixom and Glenwood Signal Study, November 2012

Google Earth shows crosswalks and signals as of April 2015. Report conclusions follow.

1. Existing conditions satisfy signal warrant #3B: Peak-Hour Vehicular Volume, and nearly meets #2: Four-Hour Vehicular Volume, falling only four vehicles short in one hour.
2. Traffic volumes on Wixom Road are up about 20% in the past two years, and the 85th percentile speed near Deerfield Elementary is slightly higher than previously determined (at 40.5 mph).
3. Motorists waiting to turn left onto Wixom Road pull forward over the crosswalk and accept smaller-than-desirable gaps in through traffic. This is problematic given the presence of pedestrians and school buses.
4. Gaps in traffic on Wixom Road are inadequate for safe pedestrian crossing.
5. There is likely latent pedestrian crossing demand that would materialize if a traffic signal were installed.
6. A signal at Glenwood would aid left turns at points north and south by creating gaps in traffic. The new signal would be 0.51 mile from the first existing signal to the north.
7. Considering the above, Birchler Arroyo advised a semi-actuated signal with flashing mode 9:00 p.m.-6:00 a.m. with count-down pedestrian signals with push buttons and improved intersection lighting.
8. We recommend that you urge the Superintendent of Schools to request the posting of a 25-mph school speed zone on Wixom Road, from 200 ft. south of 11 Mile to 650 ft. north of Glenwood.
9. Further recommendations: a follow-up speed study and planning for the eventual installation of a roundabout at the intersection of Wixom and 11 Mile to help maintain Wixom Road's status as a residential-oriented minor arterial (as opposed to a more prominent commuter arterial route).

2.10. 8 Mile and Haggerty Road Safety Audit, 2014

This is a slide presentation summarizing study results. The project team included MDOT, SEMCOG, and FHWA.

It covers the intersection, plus the interchange with I-275. The graphic below shows the ultimate plan.



Risk Rating	Problem	Short-term Solution	Long-term Solution
F	WB 8 Mile Rd to SB Haggerty left turn head-ons	Protected left turn phase	Protected left turn phase with dual left, including chicken tracks
F	Red Light Running – All Quadrants	Enforcement	Box span with signal backplates
F	EB 8 Mile Right Most Thru Lane tracking thru intersection	Proper pavement markings: arrows and skip lines	Guidance signing
F	WB 8 Mile Rd to SB Haggerty left turn backs up into thru lanes		Add a lane from NB I-275 ramp & Haggerty to west thru intersections with: left only, thru lane, thru/ramp lane, and dual left from SB ramp signal to Haggerty.
E	WB 8 Mile backs up to NB Exit Ramp during PM peak		Ditto above
D	Ped/bike does not have protected phase	High visibility crosswalk and count-down pedestrian signal with additional signing	Add bike path under 8 Mile. NOTE: there is a bike path that follows I-275 along its west side, so this path has regional significance.
D	Existing pavement markings in poor condition	High visibility pavement markings and paint existing curb islands	Install intersection lighting
D	SB I-275 Exit Ramp to EB 8 Mile – Left turn for large trucks	Paint curb islands and push WB 8 Mile stop bar back.	Remove a portion of the curb island to allow for better left turn movements.
D	SB I-275 Exit Ramp to WB 8 Mile – Right turn issues		Add a lane on exit ramp to provide for dual right turns

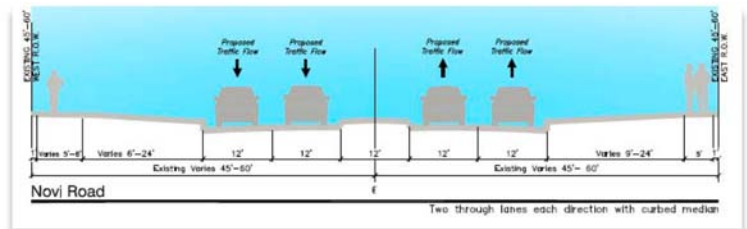


2.11. Novi Road 12 to 13 Mile Scoping Report, July 2014

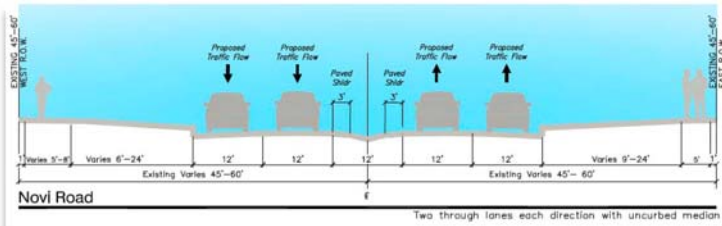
Spaulding Dedecker examined improvement alternatives for Novi Road between 12 and 13 Mile Roads. The alternatives would change the road geometry with options such as a raised median, depressed median, narrowing the pavement cross section, adding bicycle lanes, and adding a non-motorized pathway.

The posted speed of 45 MPH was assumed not to change. The five alternatives had costs ranging between \$1.5 and \$2.6 million. There is no indication in the report of a chosen alternative. Graphics and costs are shown below.

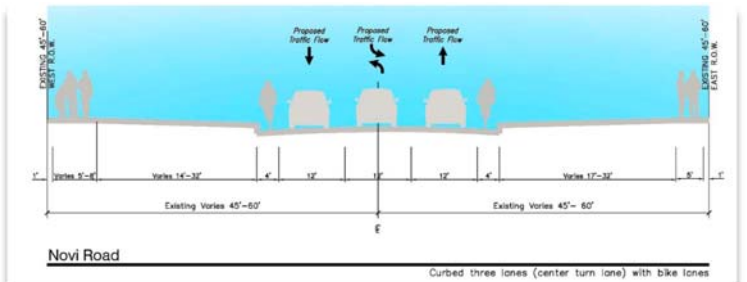
Alternative	# of Proposed Lanes	Median Treatment	Non-Motorized Treatment	Cost Estimate
1	4	Raised Concrete	None	\$1,997,592.19
2	4	Depressed for storm water treatment	None	\$1,534,498.09
3	3	Center left turn lane	Bike Lanes	\$2,141,688.94
4	2	Raised Concrete	Bike Lanes	\$2,008,617.19
5	3	Center left turn lane	Pathway	\$2,619,938.00



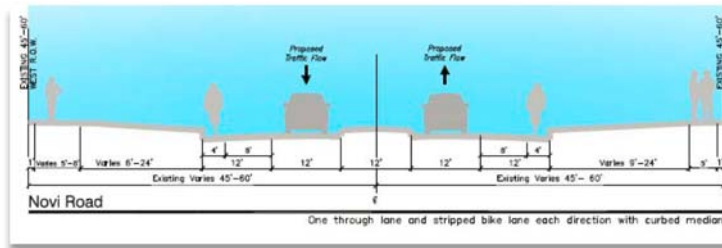
Alternative 1



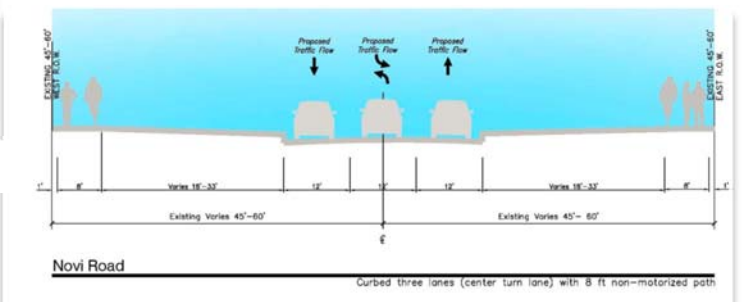
Alternative 2



Alternative 3



Alternative 4

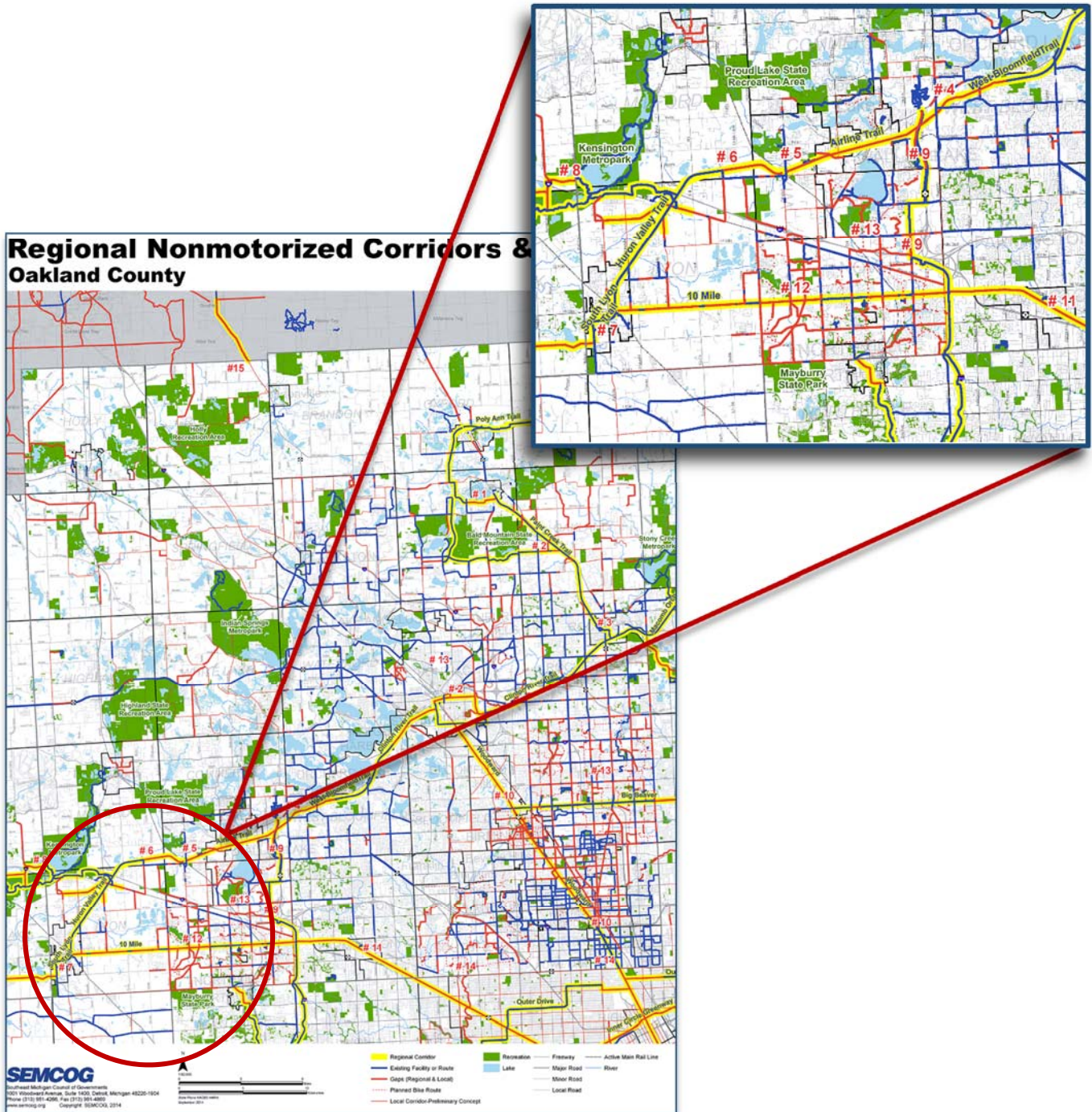


Alternative 5

2.12. SEMCOG Regional Bicycle and Pedestrian Travel Plan, October, 2014

SEMCOG worked with MDOT, county and local agencies, and interest groups to benchmark existing and planned facilities that relate in a network. The below graphic shows

Novi to have a strong network relative to some other communities. Safety, education, access and connectivity are among the strategies being pursued.



2.13. Annual Non-Motorized Prioritization 2014-2015 Update, October 2014

Novi has a sophisticated process for ranking and advancing non-motorized projects. An annual update process was established because “pathway, sidewalk, destination, accident and traffic volume data continue to change.” That annual prioritization process yields more projects than can be built in one year.

In the 2014-2015 Update, three sidewalk segments (totaling 5,600 feet) were included for construction in the Capital Improvement Plan (CIP) budget. Eleven other segments are expected to be constructed by 2020.

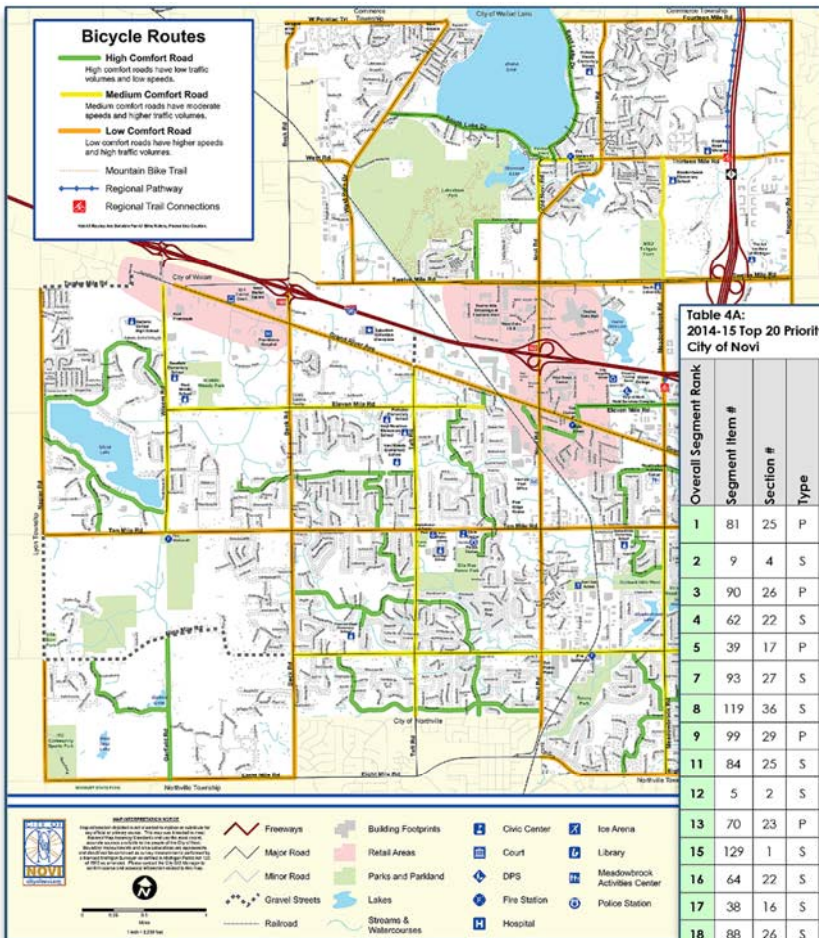


Table 4A: 2014-15 Top 20 Priority Pathway and Sidewalk Segments excluding deferred segments City of Novi

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	81	25	P	south	Ten Mile	Meadowbrook	Haggerty	1	5,300	17-18 & 19-20 CIP
2	9	4	S	south	Pontiac Trail	West Park	Beck	3	5,000	15-16 & 17-18 CIP
3	90	26	P	south	Ten Mile	Novi Rd.	Chipmunk	1	2,400	18-19 CIP
4	62	22	S	north	Ten Mile	Faton Center	Churchill Crossing	1	400	15-16 CIP
5	39	17	P	west	Beck	Eleven Mile	Providence	1	1,100	17-18 CIP
7	93	27	S	north	Nine Mile	Novi Rd.	Taft	3	3,300	17-18 & 18-19 CIP
8	119	36	S	east	Meadowbrook	Eight Mile	Nine Mile	2	3,800	18-19 CIP
9	99	29	P	south	Ten Mile	Beck	Wixom	2	4,000	17-18 CIP
11	84	25	S	east	Meadowbrook	Ten Mile	Nine Mile	2	4,400	19-20 CIP
12	5	2	S	south	Fourteen Mile	Beechwalk Apartments	East Lake	1	600	19-20 CIP
13	70	23	P	west	Meadowbrook	Eleven Mile	Gateway Village	3	900	19-20 CIP
15	129	1	S	south	Fourteen Mile	Haverhill Farms	Maples of Novi	1	600	15-16 CIP
16	64	22	S	east	Taft	Ten Mile	Eleven Mile	2	3,840	
17	38	16	S	east	Beck	Eleven Mile	Grand River	2	2,100	
18	88	26	S	north	Nine Mile	RR crossing	Novi Rd.	2	1,900	19-20 CIP
19	53	20	P	west	Beck	Eleven Mile	Kirkway Place	1	1,300	16-17 CIP
20	87	26	S	north	Nine Mile	Meadowbrook	Venture	1	2,100	
20	113	33	P	south	Nine Mile	Beck	Taft	3	2,900	
20	116	34	P	south	Nine Mile	Chelsea	Taft	1	4,900	
23	21	13	P	south	Twelve Mile	Meadowbrook	Haggerty	2	3,900	
								Total	54,740	

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

2.14. RCOC Documentation

2.14.1. RCOC FY 2015-16 BUDGET

To provide perspective, the following shows the Road Commission for Oakland County's FY 2015-16 budget. Novi, with a population of 56,915 in 2012, represents less than 5 percent of Oakland County's population of 1.2 million. RCOC spends just over 3/4 of its budget on maintenance and the balance on capital improvements.

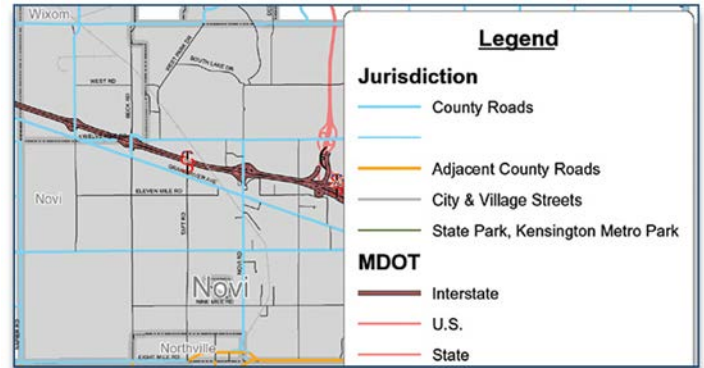
EXPENSES

Source:

• Road Improvement Program (RIP)	\$ 25,455,000
• Operating expenditures	\$ 76,710,127
• Traffic Signal projects	<u>\$ 2,625,000</u>
Total expenses	<u>\$104,790,127</u>

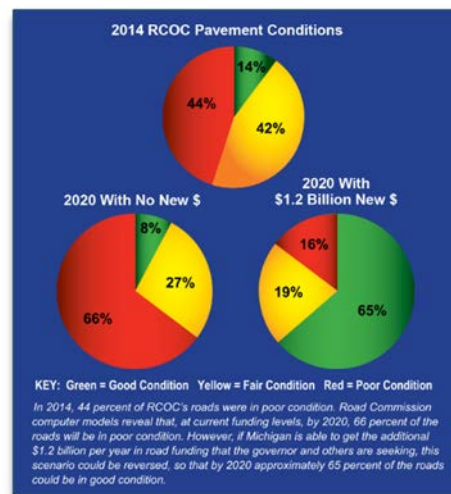
2.14.3. RCOC JURISDICTIONAL MAP

The map below shows RCOC has jurisdiction on 8, 10, 12 and 14 Mile roads and Napier Road, Novi Road, and Grand River Boulevard. Other roads are in Novi's jurisdiction.



2.14.2. RCOC STRATEGIC PLANNING PROCESS, 2015

RCOC has articulated what will occur to the county's roads with and without additional funding, pointing out that despite the failure of a recent referendum, polls indicate people believe the road system is inadequately funded. The picture without new funding between 2014 and 2020 is that the percentage of roads in poor condition (meaning it needs complete reconstruction) will increase from 44 to 66 percent. If new revenue became available at the level of the Governor's proposal roads in poor condition would shrink to 16 percent and roads in good condition would increase to 65 percent. Deferred maintenance means road deterioration will accelerate.



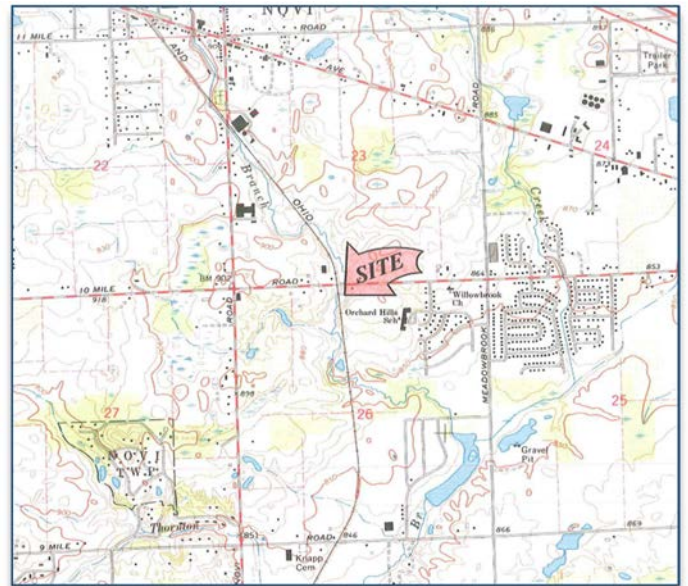
2.15. RCOC Complete Streets Guide, September 2012

On August 9, 2010, the Novi City Council enacted a resolution supporting “complete streets.” In September 2012, RCOC published its guidance, indicating a willingness to partner with their member communities, and emphasizing the importance of early discussion/coordination of the particulars of individual projects. The Table of Contents is shown below.

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2.16. Hazmat Analysis 42445 W 10 Mile Road, October 2015

Previous landfill activities at this property have resulted in detection of levels of lead in excess of the non-residential direct contact cleanup criteria, and methane levels that exceed the lower explosivity limit. This letter report by PM Environmental, Inc., is a notice to any contractors who may do subsurface work on the site.



3. Next Steps

The information provided in the reports, summarized above, provides background for conducting the Novi Thoroughfare Master Plan.