CORRADINO

FINAL REPORT

DRAFT

Rochester Hills Master Thoroughfare Plan Update

Submitted to:

The City of Rochester Hills

Submitted by:

The Corradino Group of Michigan, Inc.

In association with:

Orchard, Hiltz & McCliment, Inc.

March 2008

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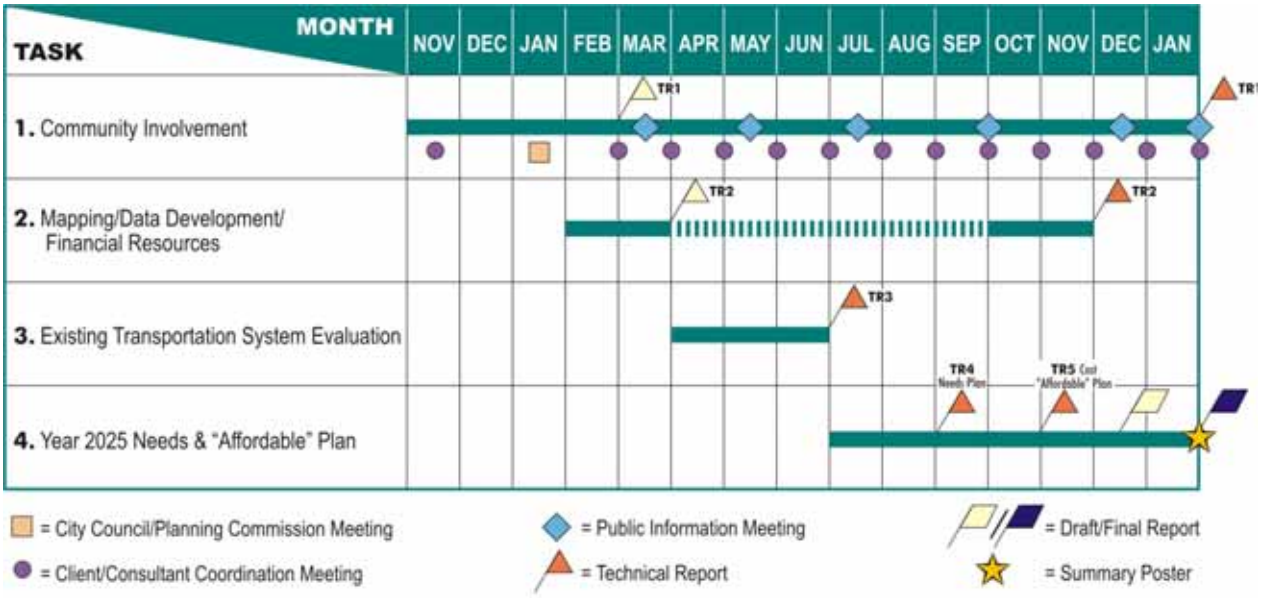
1. Introduction

The Rochester Hills Master Thoroughfare Plan Update is an opportunity for the community to anticipate travel needs for the next 25+ years to ensure that all modes of transportation are appropriately combined in an achievable plan. The Master Thoroughfare Plan Update anticipates the likely patterns of travel by all modes and defines how proposed improvements can be made in the reasonably foreseeable future with available sources of revenue.

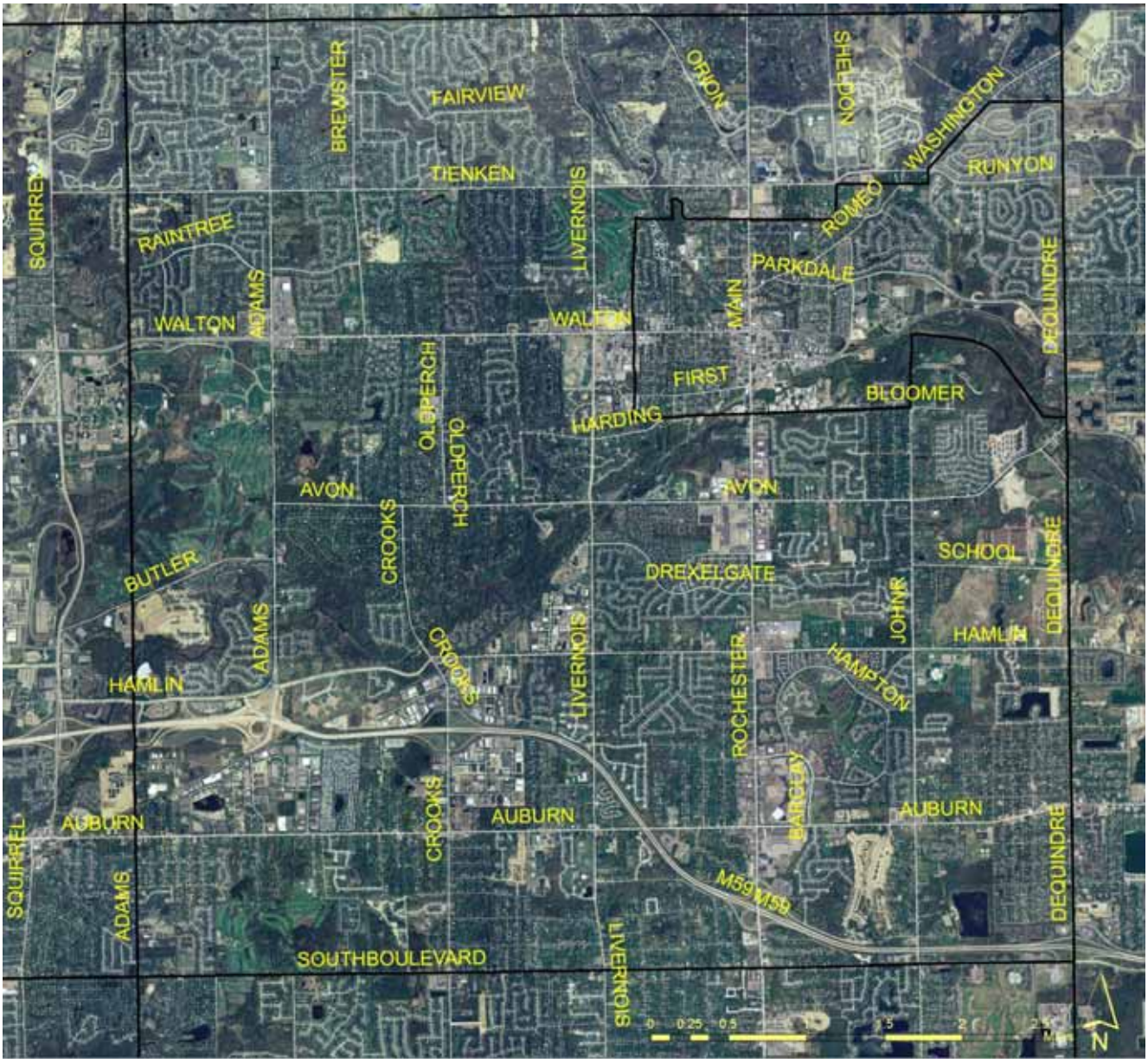
The project's tasks and schedule are shown in Figure 1-1. Key components of the effort include involvement of the public and guidance by a Technical Committee. Six rounds of public meetings and monthly Technical Committee meetings knit the work into an effective program.

Figure 1-1
Rochester Hills Master Thoroughfare Plan Update
Project Schedule



The project's study area is shown in Figure 1-2. Rochester Hill's roadways total 334 miles, including 215 miles of local and 38.5 miles of major roads. Oakland County owns and maintains 53.5 miles, and the State of Michigan 27 miles of roadway within the City.

Figure 1-2
Rochester Hills Master Thoroughfare Plan Update
Study Area



1.1 Background

Avon Township has grown from a rural township to a full-service city now known as Rochester Hills, incorporated in 1984 and located in eastern Oakland County. The city covers 32 square miles and surrounds the City of Rochester. The population, according to the 2000 census, is 68,825 which represents an 11 percent increase from 1990 and triple the population from 1970.

In 1989 the City of Rochester Hills completed a Comprehensive Transportation Plan that identified future needs and recommended a transportation improvement program. The plan was updated in 1991 and 1998. The current Master Thoroughfare Plan Update considers the recently-completed Master Land Use Plan (February 2007), other developments since 1998 and forecasts to 2035. Other considerations important to the transportation planning process include coordination with adjoining counties, townships, and cities so that their transportation plans are considered as they affect the City of Rochester Hills. Another very important part of the process is the involvement of the public.

2. Public Engagement/Community Involvement/Evaluation Process

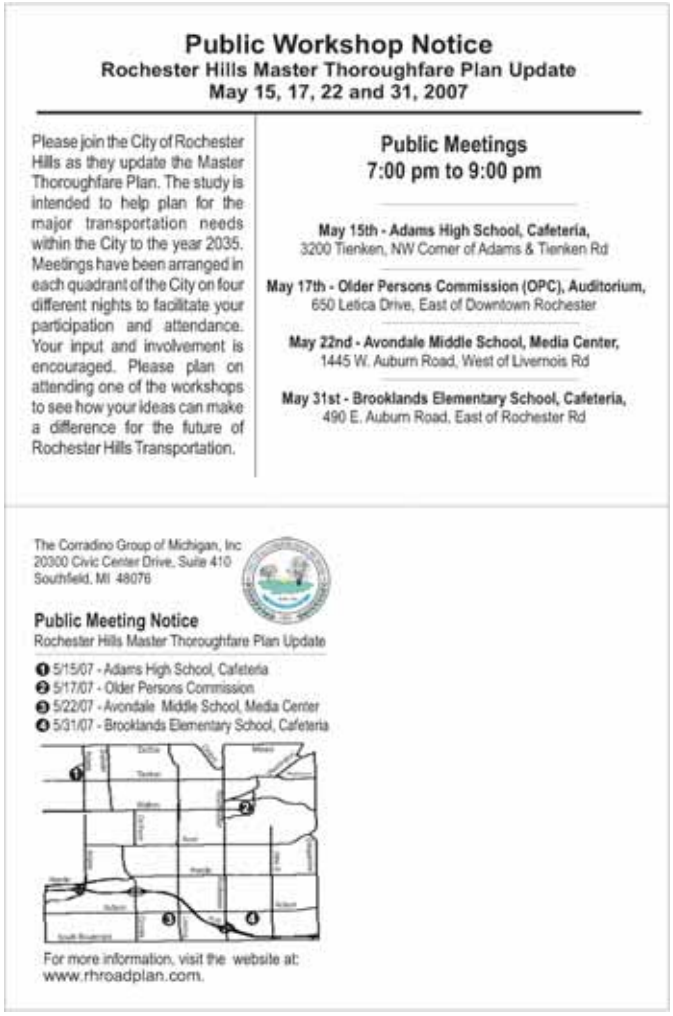
A Community Involvement Plan "CIP" was key to ensuring the planning process was inclusive. As depicted on the project schedule, public meetings were scheduled and conducted throughout the yearlong process. The Technical Committee met monthly and meetings with City staff were held as needed.

The first public meeting was held on March 29, 2007, at which the project work program, schedule, and transportation issues were discussed. One hundred disposable cameras were provided to attendees so they could develop visual images of issues that made them proud or concerned them about the transportation system in Rochester Hills. The photographs are provided in Appendix A.

The second round of public meetings included a series of four separate workshops in four different locations in the city to achieve a wide view of the issues. These workshops were conducted on May 15, 17, 22, and 31, 2007, at the locations shown on Figure 2-1.

Each of the May workshops began with a presentation of the purpose of the Master Thoroughfare Plan Update (Figure 2-2). Then, participants articulated those items that make them proud of the area's transportation system as well as those that concern them. These issues were summarized and prioritized before moving into the portion of the meeting in which participants were asked to describe what they see in their "mind's eye" for the area's future transportation system, and how they would improve it. Finally, the meeting participants were asked to place weights of importance on each of seven factors to be used in the evaluation of the alternative transportation improvements so a plan could be prepared that reflects quality-of-life issues, as community representatives see them.

Figure 2-1
Notice of May 2007 Public Workshops



Public Workshop Notice
Rochester Hills Master Thoroughfare Plan Update
May 15, 17, 22 and 31, 2007

Please join the City of Rochester Hills as they update the Master Thoroughfare Plan. The study is intended to help plan for the major transportation needs within the City to the year 2035. Meetings have been arranged in each quadrant of the City on four different nights to facilitate your participation and attendance. Your input and involvement is encouraged. Please plan on attending one of the workshops to see how your ideas can make a difference for the future of Rochester Hills Transportation.

Public Meetings
7:00 pm to 9:00 pm

May 15th - Adams High School, Cafeteria,
3200 Tienken, NW Corner of Adams & Tienken Rd

May 17th - Older Persons Commission (OPC), Auditorium,
650 Letica Drive, East of Downtown Rochester

May 22nd - Avondale Middle School, Media Center,
1445 W. Auburn Road, West of Livernois Rd

May 31st - Brooklands Elementary School, Cafeteria,
490 E. Auburn Road, East of Rochester Rd

The Corradino Group of Michigan, Inc
20300 Civic Center Drive, Suite 410
Southfield, MI 48076

Public Meeting Notice
Rochester Hills Master Thoroughfare Plan Update

1. 5/15/07 - Adams High School, Cafeteria
2. 5/17/07 - Older Persons Commission
3. 5/22/07 - Avondale Middle School, Media Center
4. 5/31/07 - Brooklands Elementary School, Cafeteria

For more information, visit the website at:
www.rhroadplan.com.

Figure 2-2
Agenda for May 2007 Public Workshops

Rochester Hills Major Thoroughfare Plan Update
Workshop
AGENDA
May 2007

Overview

Welcome - Rochester Hills

Purpose of the Meeting - The Corradino Group

Prouds and Concerns - The Corradino Group/Facilitators
- Each participant identifies what makes them "proud" about the transportation system in Rochester Hills and what "concerns" them.
- Select three proudest "prouds" and three greatest "concerns."

Looking at the Future by Group of Participants
- Imagine Rochester Hills of the future
- What would the transportation system look like?
  - Define improvements on maps provided.

Define Proposed Improvements by Group of Participants
- Report by individual group to all participants
- Prioritize suggested improvements

Weight Evaluation Factor - by Individual Participant

Next Steps - The Corradino Group

Adjourn

2.1 What the People Are Proud Of

Tables 2-1 through 2-4 describe the highest priority "prouds," "concerns" and improvements articulated by the community members who attended the four May workshops.

Overall, the four groups developed the following items of which they are proud when viewing the area's transportation system.

Most significant among these prouds are:

- Pathway system
- Rochester Hills is a destination community, not a "pass through"
- Landscaping/trees on roadway network
- Trailways/pathways
- Topography, greenery
- Maintaining an aesthetically pleasing community
- Access to I-75 and M-59
- Tree-lined country roads
- Landscaping (example, Big Beaver)
- Left- and right-turn lanes at intersections
- Walton when a boulevard – wide with median
- Boulevards – save time/safer
- Traffic-responsive signals
- Small-town atmosphere (example, Dexter, Charlevoix, etc.)
- Hamlin (Adams to Crooks)
- Two-lane roads keeping higher housing values
- Roundabouts

Table 2-1
Rochester Hills Master Thoroughfare Plan Update
Workshop Participants
Statement of Prouds/Concerns and Proposed Transportation Improvements
May 15, 2007

Highest-placed Prouds	Highest-placed Concerns
■ Pathway system ■ Rochester Hills is a destination, not a "path through" ■ Landscaping/trees on roadway network ■ Trailways/pathways ■ Topography ■ Walton, when a boulevard – wide with median ■ The portion of Walton that is boulevard	■ Rochester Hills needs road reconstruction, not repair (Avon/Adams) ■ Public input not heard/considered ■ Poorly landscaped median islands ■ Northbound Adams at PM rush hour

Highest-placed Proposed Improvement
■ Keep Rochester Hills green – more trees ■ Maintain existing roads ■ Widen M-59 to three lanes in each direction from Crooks to Ryan Road ■ Widen Adams Road corridor from Hamlin to Tienken ■ Crooks Road Interchange and Crooks from M-59 to Hamlin

Table 2-2
Rochester Hills Master Thoroughfare Plan Update
Workshop Participants
Statement of Prouds/Concerns and Proposed Transportation Improvements
May 17, 2007

Highest-placed Prouds	Highest-placed Concerns
■ Pathway system ■ Boulevards – save time/safer ■ Traffic responsive signals ■ Rolling terrain, hills – Topography	■ Poor coordination of signals ■ Poor pavements – all of Walton east of Adams, Tienken, Rochester to Livernois ■ Don't just widen – better maintain existing roads and improve safety ■ Unfinished Crooks from M-59 to Hamlin ■ Boulevard median landscaping and maintenance ■ Improve aesthetics of city's medians – trees, landscaping ■ Road network negatively affecting quality-of-life issues ■ Condition of major roads

Highest-placed Proposed Improvement
■ Change design standards for "quality roads" ■ Improve M-59 through Rochester Hills ■ Make developers pay impact fees ■ Traffic signal system improvements

Table 2-3
Rochester Hills Master Thoroughfare Plan Update
Workshop Participants
Statement of Prouds/Concerns and Proposed Transportation Improvements
May 22, 2007

Highest-placed Prouds	Highest-placed Concerns
■ Small-town atmosphere (example, Dexter, Charlevoix, etc.) ■ Maintaining an aesthetically pleasing community (others) ■ Access to I-75 and M-59 ■ Rolling terrain, greenery	■ Lack of public transit ■ Lack of safe pedestrian road crossings (refuge islands are unsafe) ■ Road maintenance

Highest-placed Proposed Improvement
■ Pedestrian-friendly design standards ■ Pathways – connectivity, build one side first ■ Widen Livernois – South Boulevard to Avon ■ Rebuild pavement on Tienken – Paint Creek Bridge to Rochester ■ Fix sight distance problems along Adams (rolling terrain) ■ Maintain what we have first ■ Boulevard Dequindre (M-59 to 26 Mile)

Table 2-4
Rochester Hills Master Thoroughfare Plan Update
Workshop Participants
Statement of Prouds/Concerns and Proposed Transportation Improvements
May 31, 2007

Highest-placed Prouds	Highest-placed Concerns
■ Tree-lined country roads ■ Landscaping (example, Big Beaver) ■ Left- and right-turn lanes at intersections ■ Hamlin (Adams to Crooks) ■ Trailways and pathways ■ Two-lane roads keeping higher housing values ■ Roundabouts	■ Not enough lanes on M-59 ■ Center left-turn lane (example, Rochester Road) ■ Maintaining what we have – "Preserve First" ■ Michigan left at Livernois and Walton

Highest-placed Proposed Improvement
■ Determine one north-south and one east-west road corridor to improve/widen ■ Widen M-59 ■ Traffic signals to favor peak flows ■ Provide public mass transit ■ Keep two-lane roads ■ Access management ■ Provide eastbound left-turn on Walton at Livernois to remove cut-through traffic north and east through neighborhood

2.2 Concerns

The participants of the workshops were also asked to reflect on the items that concern them about the Rochester Hills transportation system (Tables 2-1 through 2-4). Those concerns expressed most frequently are:

- Rochester Hills needs road reconstruction, not repair (Avon/Adams)
- Public input not heard/considered
- Poorly landscaped median islands
- Northbound Adams at PM rush hour
- Poor coordination of signals
- Poor pavements – all of Walton east of Adams, Tienken, Rochester to Livernois
- Don't just widen – better maintain existing roads and improve safety
- Unfinished Crooks from M-59 to Hamlin
- Boulevard median landscaping and maintenance
- Improve aesthetics of city's medians – trees, landscaping
- Road network negatively affecting quality-of-life issues
- Condition of major roads
- Lack of public transit
- Lack of safe pedestrian road crossings (refuge islands are unsafe)
- Road maintenance
- Not enough lanes on M-59
- Center left-turn lane (example, Rochester Road)
- Maintaining what we have – "Preserve First"
- "Michigan left turn" at Livernois and Walton

Complete input from the workshops is provided in Appendix B.

2.3 Weighting of Evaluation Factors

Each workshop participant weighted seven factors that were used in developing a recommended plan. A summary statement of each factor is presented below. The forms used to rank and then rate the factors are presented in Figures 2-3 and 2-4, respectively.

- Minimize Neighborhood Disruption – The transportation network of the future will have traffic volumes on roadway links that are likely to be different from those of today. To measure the effects of various transportation system alternatives on/near neighborhood areas, the forecast volumes, congestion and speeds on key roadway segments near several neighborhoods were computed.

- Connect Links in Road Network – To measure the degree to which different connections affect overall travel, the movements between key locations in and around Rochester Hills were examined.

- Maintain Good Air Quality – An assessment was prepared of the degree to which air quality associated with increased traffic will cause negative air quality conditions.

- Minimize Purchase of Private Property to Build Transportation Facilities – Concepts for modifying the elements of the transportation system to develop the future year thoroughfare plan could involve property acquisition. The extent to which this could occur was measured.

Figure 2-3
Rochester Hills Master Thoroughfare Plan Update
Evaluation Factor Ranking Form

How Important Are These Factors?

We want to know how important you believe the following factors are in developing the Year 2035 Master Thoroughfare Plan for Rochester Hills. These factors will be used to help determine which changes should be made to the highway, pathway and public transportation elements in Rochester Hills.

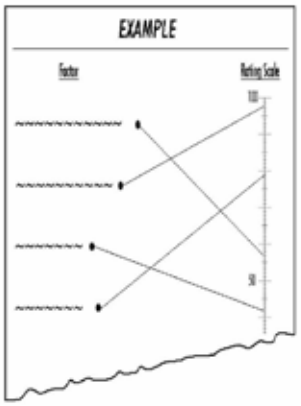
To provide us your opinion, please rank the following factors "1" through "7," with "1" indicating the factor you believe is most important and "7" indicating the factor you believe is least important. Use each number only once. When finished, return your form to a project representative or by email using the Web site address or fax to the number listed at the bottom of the sheet.

Your opinions will be used to evaluate the long range transportation plan alternatives. Thank you.

Factor	Rank
Minimize Neighborhood Disruption	_____
Better Connect Links in the Transit and Road Networks	_____
Maintain Good Air Quality	_____
Minimize Purchase of Private Property to Build Transportation Facilities	_____
Protect Open Spaces/Parks	_____
Control Noise at Sensitive Locations (e.g., homes, schools, hospitals, etc.)	_____
Maximize Safe Travel	_____

Figure 2-4
Rochester Hills Master Thoroughfare Plan Update
Evaluation Factor Rating Form

How Important Are These Factors?



We want to know how important you believe the following factors are in developing the Year 2035 Master Thoroughfare Plan for Rochester Hills. These factors will be used to help determine which changes should be made to the highway, pathway and public transportation elements in Rochester Hills.

To provide us your opinion, please rate the following factors "0" through "100," with the highest rating indicating the factor you believe is most important. To do this, draw a line from the dot (·) following the factor name to the scale to indicate your opinion. An example is shown to the right. When finished, return your form to a project representative or by email using the Web site address or fax to the number listed at the bottom of the sheet.

Your opinions will be used to evaluate the long range transportation plan alternatives. Thank you.

Factor	**Rating Scale**
Minimize Neighborhood Disruption ·	100
Better Connect Links in the Road Network ·	
Maintain Good Air Quality ·	
Minimize Purchase of Private Property to Build Transportation Facilities ·	50
Protect Open Spaces/Parks ·	
Control Noise at Sensitive Locations (e.g., homes, schools, hospitals, etc.) ·	
Maximize Safe Travel ·	0

- Control Noise at Sensitive Locations – Homes, schools, and hospitals are among land uses considered sensitive to noise. The expected change in noise at sensitive locations was measured.

- Protect Open Space/Parks – This issue is very much like that of private property acquisition. The acres of potential parkland/open space possibly needed to develop various transportation elements tested for inclusion in the thoroughfare plan were measured.

- Maximize Safe Travel – Each alternative transportation system was related to current crash experience and a forecast of future crashes was developed.

The individual results of the weightings by workshop are shown in Table 2-5. The following were weighted as the top three factors – not necessarily in the same order – by each group of workshop participants (see green circles on Table 2-5): Minimize Neighborhood Disruption, Minimize Purchase of Private Property, and Maximize Safe Travel.

The three lowest-weighted factors (red triangles on Table 2-5) regularly included these two: "Maintain Good Air Quality" and "Control Noise at Sensitive Locations."

When combining the weightings of all four workshops, the top two factors were "Minimize Neighborhood Disruption" and "Maximize Safe Travel." The two lowest factors were assigned to "Maintain Good Air Quality" and "Control Noise at Sensitive Locations" (Table 2-6).

The study's Technical Committee and its consultant also weighted the factors (Tables 2-7 and 2-8). Analysis of all results indicated the community participants, the Technical Committee and the consultant were closely aligned in what they believe was important to planning the transportation system for the City of Rochester Hills.

The third Public Meeting was held on July 31, 2007. Approximately 30 people attended. The meeting focused on input received at the workshops in May. The photos the community took of "prouds" and "concerns" were also displayed. The later part of the meeting focused on existing and future congestion and safety issues and the development and evaluation of alternative transportation systems.

The fourth Public Meeting was held on November 13, 2007. This meeting was well attended and discussed the evaluation and performance of nearly 30 alternatives.

The fifth Public Meeting presented the recommendations from the study and provided a draft copy of the final report to all participants.

The last Public Meeting was a presentation to the City Council and Planning Commission on the final plan.

Notes and comments from Technical Committee and public meetings are provided in Appendix C.

Table 2-5
Rochester Hills Master Thoroughfare Plan Update
Community Participation Evaluation Factor Weightings
by Workshop

Factor	May 15, 2007 (15)			
	Rank Wt.	Rate Wt.	Avg.	Order
Minimize Neighborhood Disruption	23.1%	17.3%	20.2%	1
Better Connect Links in the Transit and Road Networks	12.0%	12.6%	12.3%	5
Maintain Good Air Quality	10.2%	13.2%	11.7%	7
Minimize Purchase of Private Property to Build Transportation Facilities	13.9%	14.6%	14.3%	3
Protect Open Spaces/Parks	13.9%	14.5%	14.2%	4
Control Noise at Sensitive Locations (e.g., homes, schools, hospitals, etc.)	11.7%	12.5%	12.1%	6
Maximize Safe Travel	14.9%	15.1%	15.0%	2

Factor	May 17, 2007 (9)			
	Rank Wt.	Rate Wt.	Avg.	Order
Minimize Neighborhood Disruption	18.5%	14.6%	16.6%	2
Better Connect Links in the Transit and Road Networks	14.2%	16.7%	15.4%	3
Maintain Good Air Quality	10.9%	13.5%	12.2%	5
Minimize Purchase of Private Property to Build Transportation Facilities	10.2%	12.0%	11.1%	7
Protect Open Spaces/Parks	13.7%	14.5%	14.2%	4
Control Noise at Sensitive Locations (e.g., homes, schools, hospitals, etc.)	11.2%	11.3%	11.3%	6
Maximize Safe Travel	20.9%	17.2%	19.1%	1

Factor	May 22, 2007 (8)			
	Rank Wt.	Rate Wt.	Avg.	Order
Minimize Neighborhood Disruption	15.4%	15.2%	15.3%	3
Better Connect Links in the Transit and Road Networks	15.5%	14.3%	14.9%	4
Maintain Good Air Quality	11.1%	14.0%	12.6%	5
Minimize Purchase of Private Property to Build Transportation Facilities	11.4%	12.1%	11.7%	6
Protect Open Spaces/Parks	20.6%	18.1%	19.4%	1
Control Noise at Sensitive Locations (e.g., homes, schools, hospitals, etc.)	10.3%	10.7%	10.5%	7
Maximize Safe Travel	15.5%	15.3%	15.4%	2

Factor	May 31, 2007 (16)			
	Rank Wt.	Rate Wt.	Avg.	Order
Minimize Neighborhood Disruption	23.0%	18.9%	21.0%	1
Better Connect Links in the Transit and Road Networks	11.5%	12.6%	12.1%	4
Maintain Good Air Quality	9.6%	10.0%	9.8%	7
Minimize Purchase of Private Property to Build Transportation Facilities	10.0%	11.2%	10.6%	6
Protect Open Spaces/Parks	17.3%	17.7%	17.5%	2
Control Noise at Sensitive Locations (e.g., homes, schools, hospitals, etc.)	11.0%	12.5%	11.8%	5
Maximize Safe Travel	17.3%	16.8%	17.0%	3

○ indicates a high-rated factor

△ indicates a low-rated factor

Table 2-6
Rochester Hills Master Thoroughfare Plan Update
Composite Workshop Evaluation Factor Weighting

Factor	Citizens (48)			
	Rank Wt.	Rate Wt.	Avg.	Order
Minimize Neighborhood Disruption	20.8%	17.0%	18.9%	1
Better Connect Links in the Transit and Road Networks	12.9%	13.7%	13.3%	4
Maintain Good Air Quality	10.5%	12.4%	11.4%	7
Minimize Purchase of Private Property to Build Transportation Facilities	11.5%	12.7%	12.1%	5
Protect Open Spaces/Parks	16.0%	16.1%	16.0%	3
Control Noise at Sensitive Locations (e.g., homes, schools, hospitals, etc.)	11.3%	12.0%	11.7%	6
Maximize Safe Travel	17.0%	16.1%	16.6%	2

○ indicates a high-rated factor
△ indicates a low-rated factor

Table 2-7
Technical Committee Evaluation Factor Weighting

Factor	Technical Committee (11)			
	Rank Wt.	Rate Wt.	Avg.	Order
Minimize Neighborhood Disruption	14.1%	15.9%	15.0%	3
Better Connect Links in the Transit and Road Networks	15.9%	17.6%	16.7%	2
Maintain Good Air Quality	8.3%	11.5%	9.9%	5
Minimize Purchase of Private Property to Build Transportation Facilities	10.3%	14.1%	12.2%	4
Protect Open Spaces/Parks	8.3%	11.1%	9.7%	6
Control Noise at Sensitive Locations	7.9%	10.9%	9.4%	7
Maximize Safe Travel	35.2%	18.9%	27.0%	1

○ indicates a high-rated factor
△ indicates a low-rated factor

Table 2-8
Consultant Evaluation Factor Weighting

Factor	Consultant (8)			
	Rank Wt.	Rate Wt.	Avg.	Order
Minimize Neighborhood Disruption	21.2%	16.7%	18.9%	2
Better Connect Links in the Transit and Road Networks	15.9%	16.6%	16.2%	3
Maintain Good Air Quality	9.1%	12.0%	10.5%	6
Minimize Purchase of Private Property to Build Transportation Facilities	9.8%	12.1%	10.9%	5
Protect Open Spaces/Parks	11.5%	14.7%	13.1%	4
Control Noise at Sensitive Locations	7.2%	9.3%	8.2%	7
Maximize Safe Travel	25.4%	18.6%	22.0%	1

○ indicates a high-rated factor
△ indicates a low-rated factor

2.4 Public Opinion Survey in Regards to Transportation

In the spring of 2007 the City of Rochester Hills, independent of this study process authorized the Public Affairs Research Laboratory at Oakland University to conduct a public opinion survey of its residents. The results were summarized in the summer of 2007. We have extracted related questions and responses related to transportation and provided them here for information purposes only. The complete public opinion survey can be found on the City web site or at City Hall.

4. How would you rate the condition of the following?

	Excellent	Good	Fair	Poor
4a. The street in front of your home or apartment complex?	15%	42%	24%	19%
4b. Streets in your neighborhood or subdivision?	11%	42%	28%	19%
4c. Major roads in Rochester Hills?	1%	43%	41%	15%

5. How would you rate routine maintenance on neighborhood and subdivision streets in the City?

Very Satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
3%	46%	24%	21%	7%

7. How should the following road improvements be funded?

	Special Assessment	Millage	Uncertain
7a. Reconstruction of paved streets	17%	55%	28%
7b. Long-term maintenance projects	9%	63%	28%

8. What is the maximum addition to your annual property tax bill you would be willing to pay to fund road improvements?

$ 0	$ 1-50	$ 51-100	$ 101-200	$ 201 – 300
20%	27%	27%	20%	7%

9. Willingness to pay by property value.

Maximum annual addition to property tax:			
Est. market value of home	% saying $0	Median $ increase	Number
Under $200K	24%	$ 50	79
$200 - 350K	17%	$ 75	187
$350 - 500K	19%	$100	79
Over $500K	11%	$100	18

10. How would you rate the City's performance in addressing traffic congestion on local roads?

Very Satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
4%	36%	22%	29%	9%

11. On a normal day, how many minutes would you estimate that you spend stuck in traffic due to local road congestion in Rochester Hills?

	%	Cum. %
No delay	7%	7%
1-5 minutes	20%	27%
6-10 minutes	30%	57%
11-15 minutes	21%	78%
16-20 minutes	12%	90%
21-30 minutes	10%	100%

12. Should selected major roads in the City be widened to relieve traffic congestion?

Yes	No	Uncertain
66%	20%	14%

If Yes, which one major road would you say is most in need of widening?

Adams	Crooks	Livernois	Tienken	Hamlin	Auburn	Rochester	Dequindre	Avon	M-59	Walton	John R	University
18%	15%	14%	12%	11%	8%	7%	6%	7%	2%	2%	1%	1%

13. How would you rate the newly reconstructed intersection at Tienken and Rochester Roads?

Very Satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
27%	45%	24%	2%	2%

14. How important are pathways to you?

Very Important	Somewhat important	Not important	Uncertain
38%	36%	24%	2%

15. Would you support the levy of a new millage to undertake road improvements aimed at reducing traffic congestion in the City?

Yes	No	Uncertain
43%	32%	25%

23. Can you recommend one improvement to any City park or trail that you would use regularly?

Trails

- Pave/improve surface on one or both trails = 25 respondents
- More parking at trailheads = 2
- More access points to PCT
- Connect the two trails

Bloomer

- Get John R pathway/sidewalk to = 2
- Parking and roads in

23. Recommended Park Improvements

Nowicki
- Complete a path to

General
- Bicycle paths that do not end in mud

29a. What would you say are the three most serious problems facing the City today? (four listed)

The top 3 were.

Traffic Congestion	Resident Street Maintenance/Reconstruction	Development/ Growth/Sprawl
60%	42%	41%

30. What would you say is the best thing about the City of Rochester Hills?

- Parks & trails = 35
- Pathways [may mean trails in some cases] = 6

38. Do you work outside the City of Rochester Hills?

Yes	No
62%	38%

39. Approximately how many miles do you travel to work each day, round-trip?

Less than 5 miles	6 – 10 miles	11 – 20 miles	21 – 30 miles	31 – 40 miles	41 – 50 miles	More than 50 miles
22%	24%	19%	16%	8%	4%	6%

3. Evaluation of Roadway Alternatives

It is important to note that this plan considers the major roadways within the City of Rochester Hills. That specifically means the "Mile Roads," freeways, and some other key links shown in Figure 3-1.

The City of Rochester Hills has an extensive non-motorized pathway system primarily along the major roads (Figure 3-2). The blue lines on Figure 3-2 show the paths along the major roads that have been completed in the last ten years. The gaps and discontinuities are shown in red lines and are proposed to be completed in the next 20 years. The gaps are related to some increased cost, right-of-way issues and/or environmental issues. These considerations will be analyzed as part of the non-motorized study and discussed later in this report.

Transit and other characteristics of the thoroughfare system will also be discussed at the end of this report.

3.1 Travel Demand Model Summary

The SEMCOG Transportation Demand Model for the area was used to forecast traffic that affects the Rochester Hills major thoroughfares. To tailor the model for use in this study, the road network was refined to include a number of local roads not in SEMCOG's original network. These refinements strengthened the ability to analyze the performance of the existing transportation system and the potential impact of future development.

Another key part of the model update was splitting 13 traffic analysis zones (TAZs) for Rochester Hills into three dozen zones. This provided more definition of the traffic demands on the local road network which improved the ability to analyze traffic impacts such as congestion and crashes.

Once the network and traffic analysis zones were updated, the model was validated to ensure it replicated traffic conditions in Rochester Hills. To do so, counts received from the City of Rochester Hills and the Road Commission for Oakland County were compared to the data generated by the model.

Application of the model defines road segments in Rochester Hills currently experiencing significant afternoon peak-hour congestion (Table 3-1 and Figure 3-3). These segments now experience traffic volumes that exceed capacity in the afternoon peak hour. They are highlighted in red lines in the figure for existing conditions, and include the following list of road segments.

Figure 3-1
Rochester Hills Master Thoroughfare Plan Update
Major Roadways Under Study

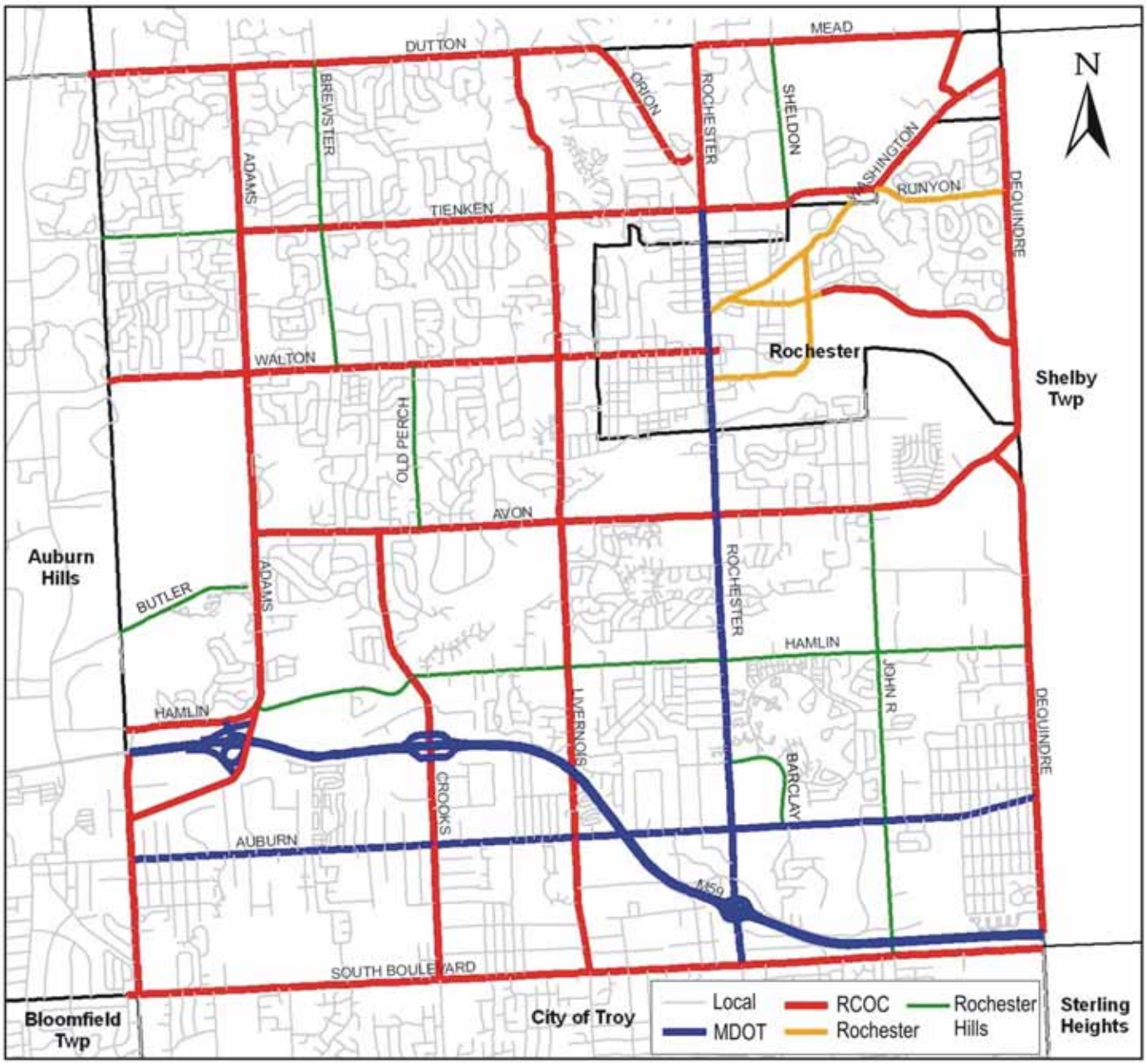


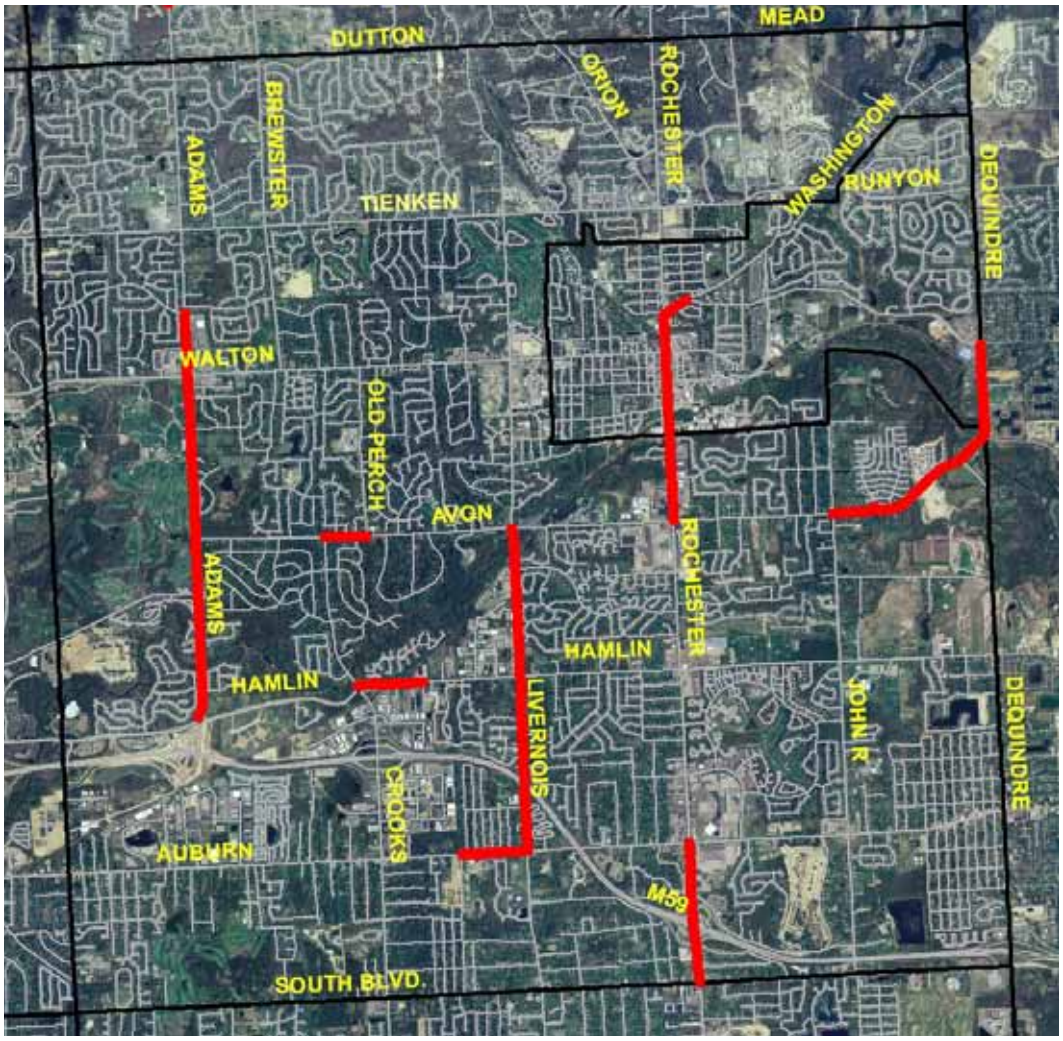
Figure 3-2
Rochester Hills Master Thoroughfare Plan Update
Non-motorized System

Table 3-1
Road Segments with Significant Afternoon Peak Hour Congestion in 2005
(Volume Exceeds Capacity)

Road	From	To
Adams	Hamlin	North of Walton
Avon	Crooks	Old Perch
Hamlin	Crooks	Rochester Industrial Dr.
Auburn	Fairwood	Livernois
Livernois	Auburn	Avon
Rochester	South	Auburn
Rochester	Avon	Parkdale/Romeo
Avon	John R.	Dequindre
Dequindre	John R.	Parkdale

Source: The Corradino Group of Michigan Inc.

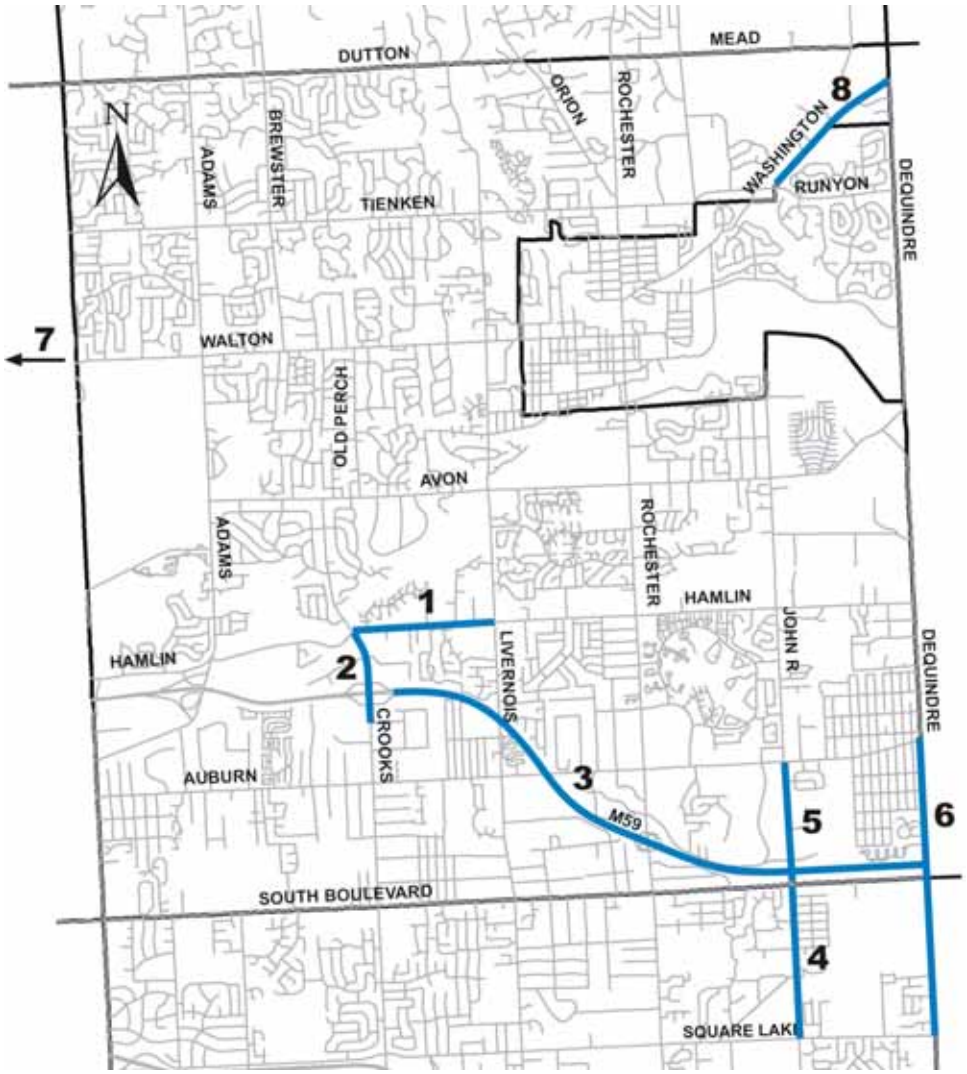
Figure 3-3
Rochester Hills Major Thoroughfare Update Plan
Road Segments with Significant Congestion in Afternoon Peak Hour (2005)
(Volume Exceeds Capacity)



Several projects were added to the current roadway network to develop the base condition in 2035. These are projects not yet in place but will be prior to 2035. They are shown as existing and committed projects in Figure 3-4 and cited as follows.

1. Hamlin Rd. four-lane – From Crooks to Livernois
2. Crooks Rd. four-lane – From Hamlin to S. of M-59 Interchange
3. M-59 six-lane highway – From Crooks to Ryan Rd.
4. John R. five-lane – From South Blvd. to Long Lake/18 Mile
5. John R. three-lane – South Blvd. to N. of Auburn
6. Dequindre five-lane – Square Lake to Auburn
7. Walton five-lane – Squirrel to Opdyke
8. Washington pave two-lanes – Runyon to 26 Mile Road

Figure 3-4
Rochester Hills Master Thoroughfare Plan Update
Existing and Committed Projects



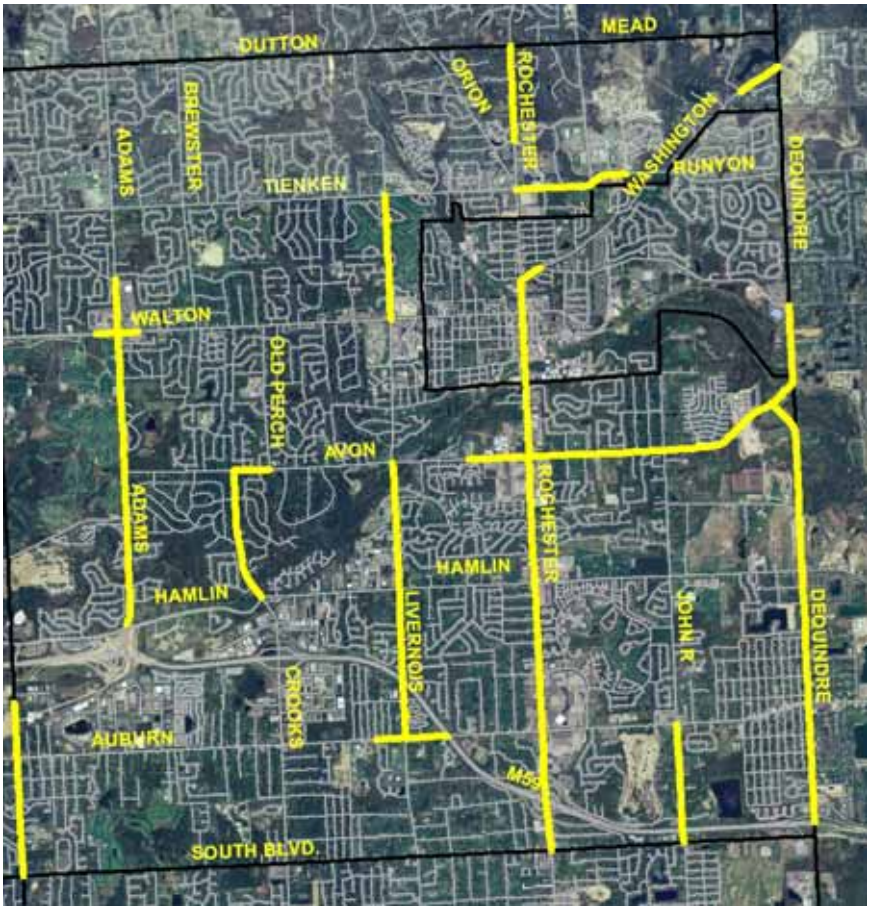
With these "committed" projects in place, the road segments expected to experience significant congestion in the year 2035 are listed in Table 3-2 and shown in yellow in Figure 3-5.

Table 3-2
Rochester Hills Master Thoroughfare Plan Update
Road Segments with Significant Afternoon Peak Hour Congestion in 2035

Road	From	To
Adams	Hamlin	North of Walton
Adams	South	Auburn
Walton	West of Adams	East of Adams
Avon	Crooks	Old Perch
Crooks	Hamlin	Avon
Auburn	Fairwood	M-59
Livernois	Auburn	Avon
Livernois	Walton	Tienken
Rochester	South	Diversion/City Limits
Rochester	Orion	Mead
Tienken	Rochester	Sheldon
Avon	Larchwood	Dequindre
John R	South	Auburn
Dequindre	South	Avon
Washington	Winkler Mill	Dequindre

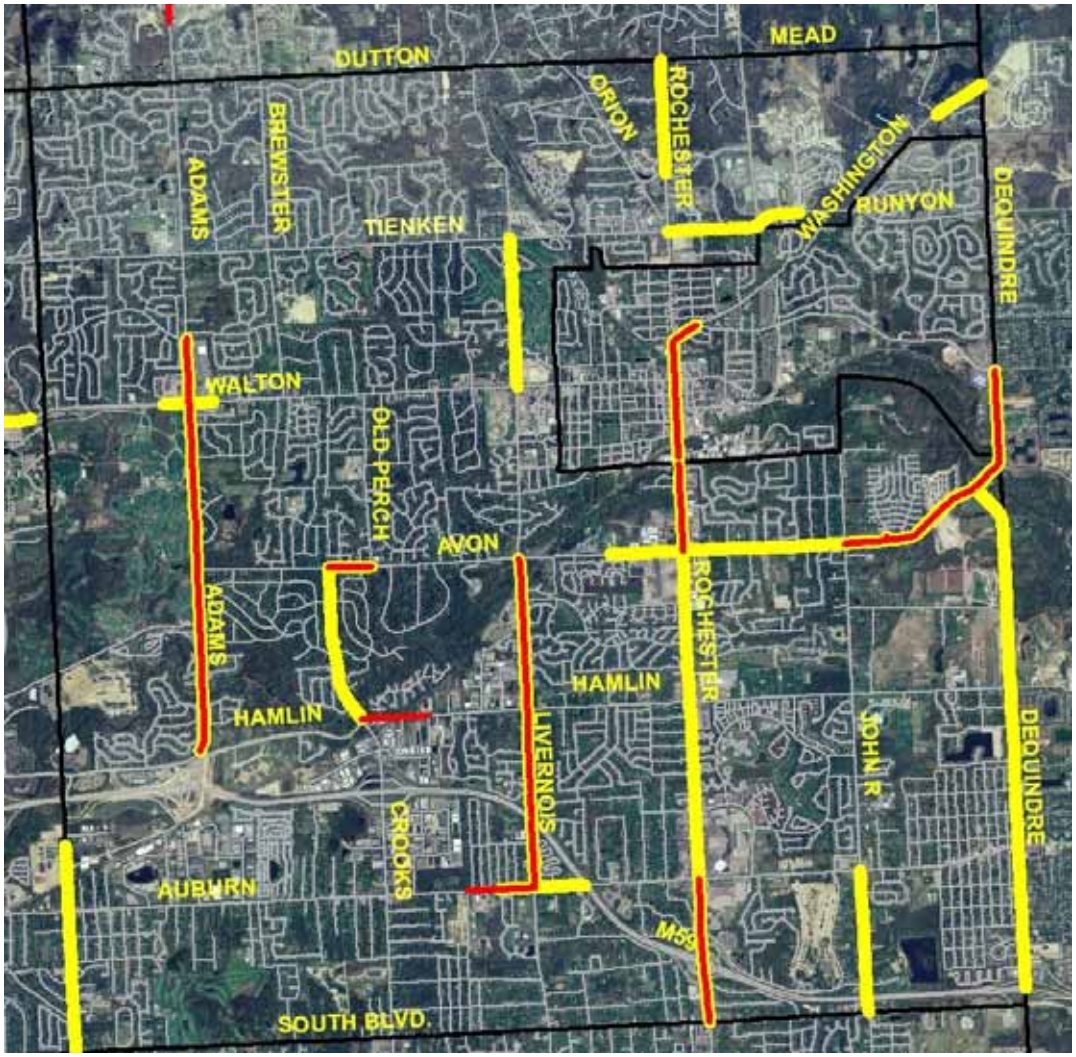
Source: The Corradino Group of Michigan Inc.

Figure 3-5
Rochester Hills Master Thoroughfare Plan Update
Road Segments with Significant Afternoon Peak Hour Congestion in 2035



A composite of both existing (red lines) and future road segments (yellow lines) where significant congestion conditions occur is shown in Figure 3-6.

Figure 3-6
Rochester Hills Master Thoroughfare Plan Update
Road Segments with Significant Afternoon Peak Hour Congestion in 2035



3.2 Transportation Alternatives

The highest-placed proposed transportation improvements developed through public input at the four May 2007 workshops are (Figure 3-7):

1. Widen Adams Road corridor from Hamlin to Tienken Road
2. Widen Tienken to three lanes from King's Cove to west of Rochester Road
3. Widen Dequindre to four lane (narrow boulevard) M-59 to 26 Mile
4. Extend southbound left-turn lane on Adams at Avon Road
5. Extend Avon Road to Butler to Squirrel
6. Widen Livernois Road to four lanes – Tienken Road to South Blvd.
7. Widen Livernois Road-South Blvd to Avon
8. Purchase necessary right-of-way to make Rochester Road a six-lane boulevard
9. Realign Dequindre Road at intersection of Avon/23 Mile
10. Realign Washington Road so that it T's into Dequindre
11. Fix sight distance problems on Adams Road
12. Provide eastbound left-turn on Walton at Livernois to remove cut-throughs in neighborhood northwest of intersection
13. Improve access to Rochester High School from southbound Livernois
14. Need east-west thoroughfare on Tienken Road or Dutton Road

The system-wide proposals include:

- Keep Rochester Hills green – more trees
- Maintain existing roads first
- Change design standards to have "quality roads"
- Make developers pay impact fees
- Traffic signal system improvements
- Pedestrian-friendly design standards
- Pathways – connectivity, build one side first
- Provide public mass transit
- Keep two-lane roads
- Access management

Based on these suggestions, and by working with the project's Technical Committee, a list of alternatives was developed. The same set of 26 road segments labeled A-Z were used to compare the congestion indices and minimize neighborhood disruption. They are shown in Figure 3-8.

The first six alternatives were analyzed to determine the degree to which improvements to north-south roadways would alleviate expected future congestion conditions. The alternatives are shown in Figure 3-9. They generally include the widening or expanding of the roadway by one lane in each direction to effectively double the capacity of the road. Alternative 1, for example, was developed and tested by modifying Dequindre Road to make it a four- or five-lane roadway from Auburn Road to 26 Mile Road. This was the only change made above the E+C network discussed earlier.

Figure 3-7
Rochester Hills Master Thoroughfare Plan Update
Proposed Improvements from May Workshops

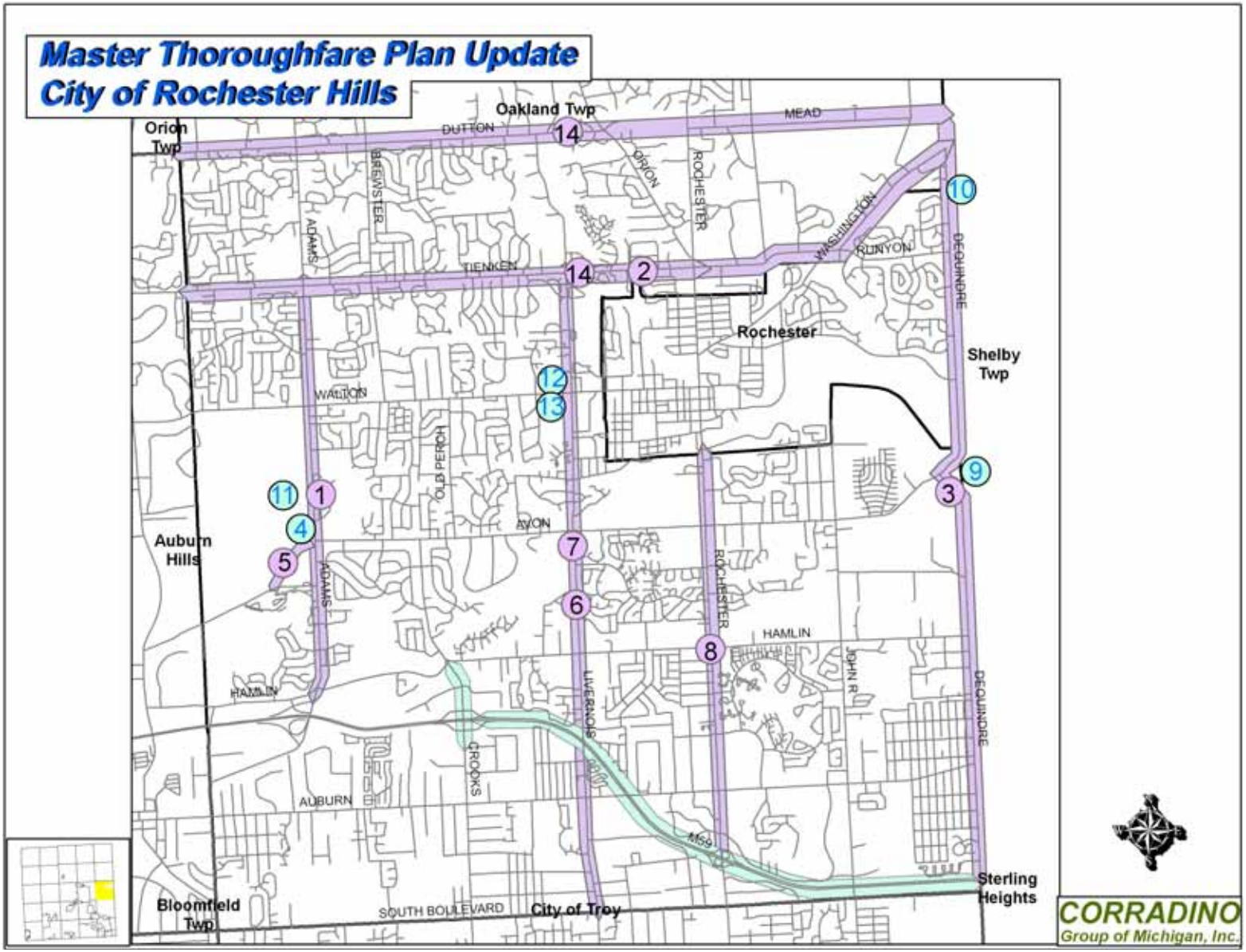


Figure 3-8
Common Road Segments Analyzed

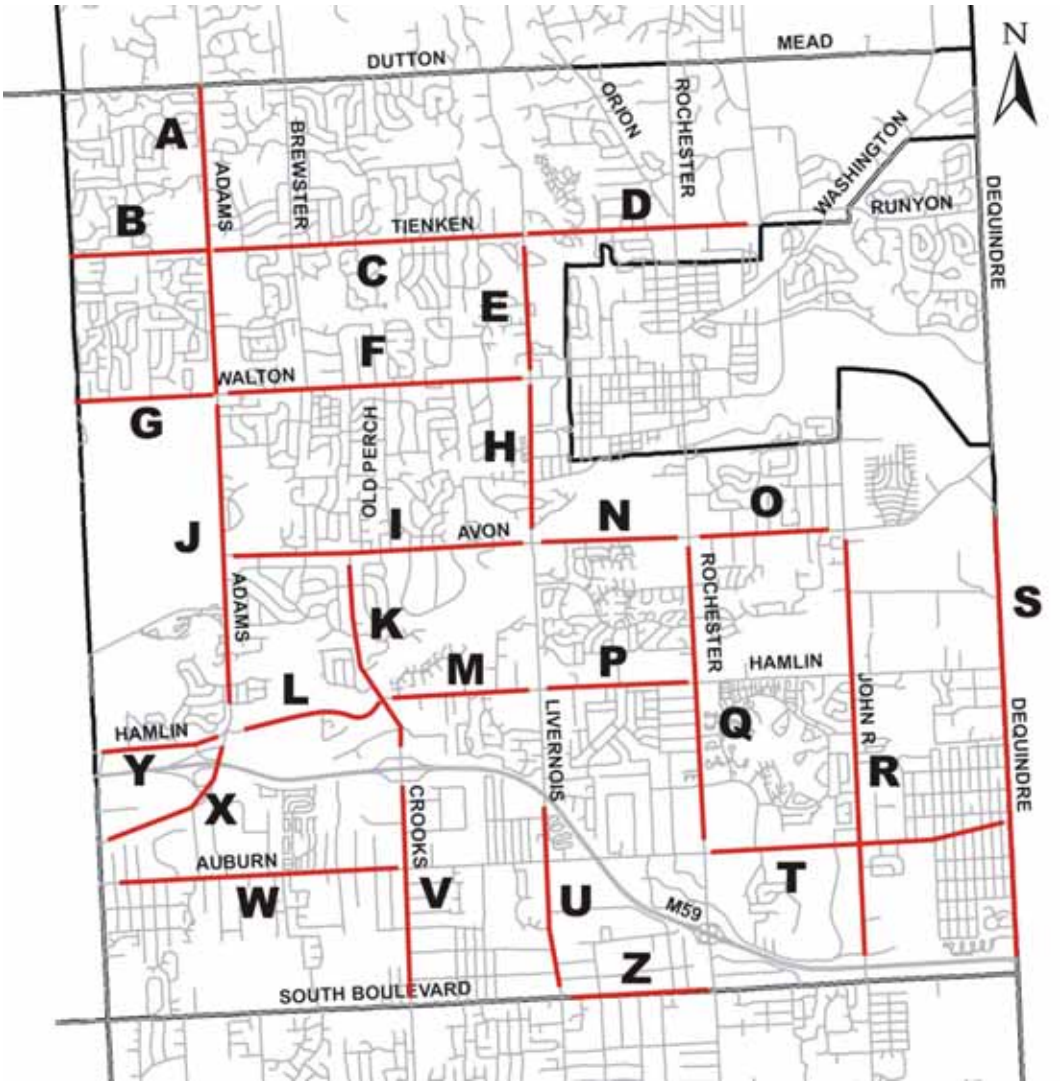
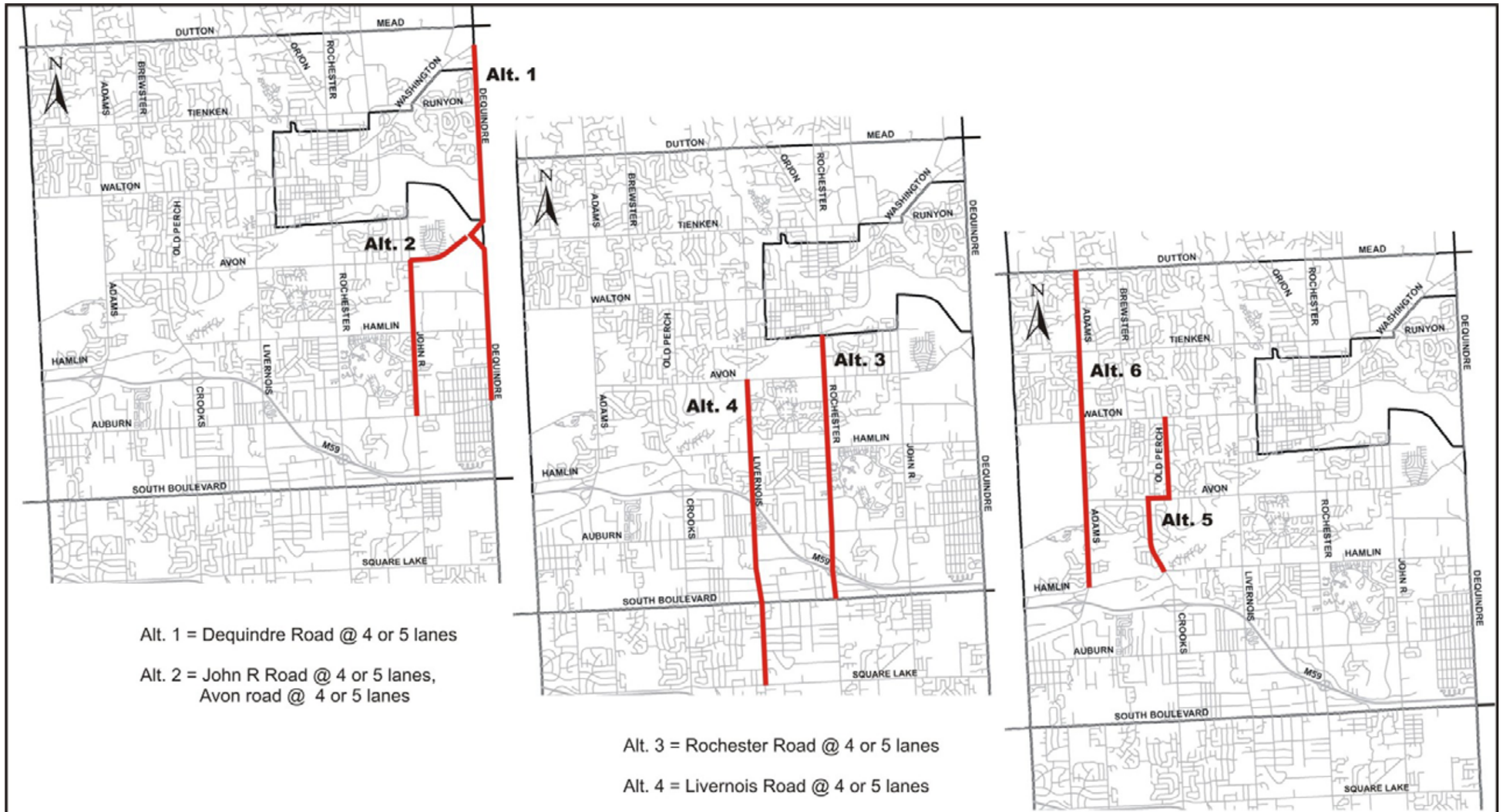


Figure 3-9
Rochester Hills Master Thoroughfare Plan Update
North-South Alternatives 1-6



Alt. 1 = Dequindre Road @ 4 or 5 lanes

Alt. 2 = John R Road @ 4 or 5 lanes,
Avon road @ 4 or 5 lanes

Alt. 3 = Rochester Road @ 4 or 5 lanes

Alt. 4 = Livernois Road @ 4 or 5 lanes

Alt. 5 = Crooks Road @ 4 or 5 lanes, Avon Road
@ 4 or 5 lanes, Old Perch @ 4 or 5 lanes

Alt. 6 = Livernois Road @ 4 or 5 lanes

The volume-to-capacity (V/C) ratios of Alternatives 1 through 6 are shown on Table 3-3. A V/C value greater than 0.90 indicates significant congestion. The green circles indicate a positive change in V/C of greater than 0.05 points compared to the future base conditions, which is considered a significant change.

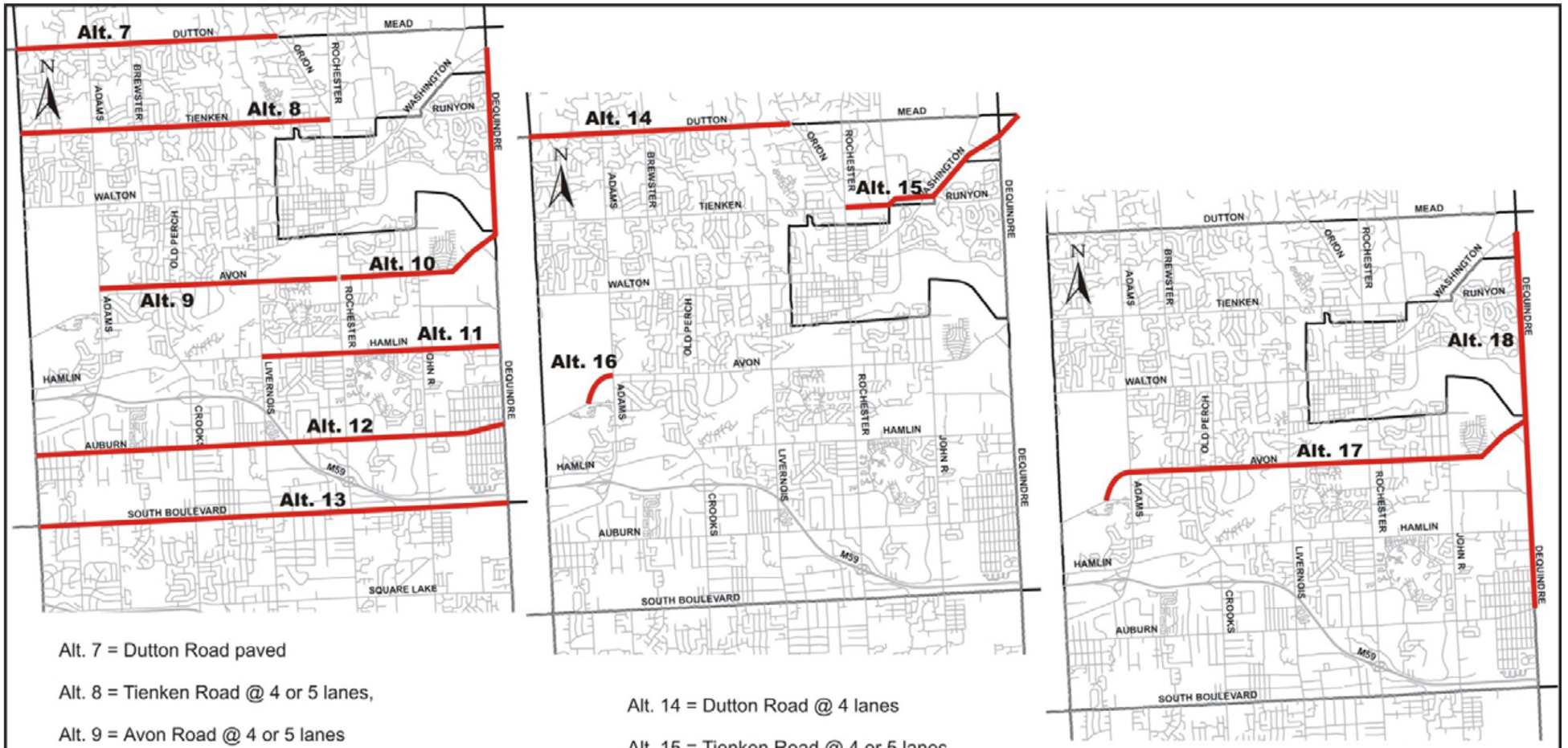
Table 3-3
North-South Alternatives
Volume-to-Capacity Ratios

Road Segment	Road Name	2005 Exist. Base	2035 Volume ÷ Capacity						
			Future Base	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
A	Adams	0.56	0.80	0.82	0.86	0.83	0.84	0.80	0.94
B	Tienken	0.32	0.74	0.74	0.71	0.73	0.74	0.74	0.80
C	Tienken	0.55	0.79	0.77	0.75	0.75	0.75	0.75	0.84
D	Tienken	0.75	0.92	0.88	0.90	0.92	0.98	0.92	0.95
E	Livernois	0.88	1.05	1.02	1.06	1.08	0.80	1.07	1.05
F	Walton	0.69	0.88	0.87	0.88	0.86	0.93	0.87	0.91
G	Walton	0.58	0.61	0.63	0.62	0.64	0.61	0.63	0.56
H	Livernois	0.81	0.91	0.89	0.92	0.86	0.93	0.83	0.87
I	Avon	0.83	0.89	0.91	0.90	0.89	0.91	0.91	0.90
J	Adams	1.06	1.23	1.22	1.23	1.19	1.25	1.22	1.00
K	Crooks	0.94	1.09	1.04	1.08	1.04	1.11	0.85	1.05
L	Hamlin	0.31	0.29	0.29	0.28	0.26	0.28	0.26	0.20
M	Hamlin	0.82	0.53	0.53	0.53	0.54	0.53	0.50	0.53
N	Avon	0.84	0.92	0.91	0.93	0.89	0.91	0.86	0.93
O	Avon	0.85	1.08	1.08	1.10	1.07	1.08	1.08	1.07
P	Hamlin	0.68	0.91	0.89	0.90	0.88	0.92	0.86	0.91
Q	Rochester	0.81	1.04	0.99	1.02	0.90	1.05	0.97	1.00
R	John R	0.71	0.88	0.83	0.85	0.84	0.90	0.83	0.86
S	Dequindre	0.69	0.99	0.89	0.80	0.96	1.00	0.98	0.99
T	Auburn	0.61	0.94	0.96	0.94	0.95	0.93	0.94	0.94
U	Livernois	1.07	0.99	0.97	0.98	0.90	0.99	0.97	0.96
VNB	Crooks	0.55	0.73	0.74	0.71	0.65	0.75	0.75	0.73
VSB	Crooks	0.44	0.43	0.42	0.42	0.39	0.43	0.44	0.48
W	Auburn	0.67	0.65	0.66	0.68	0.67	0.66	0.68	0.67
X	New Adams	0.26	0.43	0.43	0.42	0.41	0.43	0.43	0.43
Y	Adams	0.04	0.16	0.16	0.15	0.15	0.15	0.08	0.12
Z	South	0.87	0.88	0.91	0.91	0.96	0.93	0.90	0.90
V/C Increase			-	7	7	7	14	7	10
V/C Decrease			-	14	16	18	6	15	10
No Change			-	6	4	2	7	5	7

significant decrease in expected congestion.
significant increase in expected congestion.

In total, only Alternative 5 creates at least a 0.05 points reduction in V/C in three locations. None of the alternatives for individual north-south road improvements do not satisfactorily address the future year congestion. Alternative road improvements were tested in the east-west direction to determine how they may improve future operations (Figure 3-10).

Figure 3-10
Rochester Hills Master Thoroughfare Plan Update
East-West Alternatives 7-18



Alt. 7 = Dutton Road paved

Alt. 8 = Tienken Road @ 4 or 5 lanes,

Alt. 9 = Avon Road @ 4 or 5 lanes

Alt. 10 = Avon Road @ 4 or 5 lanes
Dequindre Road @ 4 or 5 lanes

Alt. 11 = Hamlin Road @ 4 or 5 lanes

Alt. 12 = Auburn Road @ 4 or 5 lanes

Alt. 13 = South Boulevard @ 4 or 5 lanes

Alt. 14 = Dutton Road @ 4 lanes

Alt. 15 = Tienken Road @ 4 or 5 lanes
Washington Road @ 4 or 5 lanes

Alt. 16 = New Road Connection @ 2 lanes
from Avon Road to Butler Road

Alt. 17 = New Road Connection from Avon
Road to Butler Road @ 2 lanes,
Avon Road @ 4 or 5 lanes,
Dequindre Road @ 4 or 5 lanes

Alt. 18 = New Alignment of Dequindre through
Avon Road, and 23 Mile Road,
Dequindre Road @ 4 or 5 lanes

The results are shown on Table 3-4. As with Table 3-3, circles indicate a reduction of 0.05 points in the V/C ratios from the future base condition. While these alternatives show improvement over the north-south options, they still do not produce significant congestion relief throughout Rochester Hills.

Table 3-4
Rochester Hills Master Thoroughfare Plan Update
East-West Alternatives
Volume-to-Capacity Ratios

Road Segment	Road Name	Volume ÷ Capacity										
		Base	Alt 8	Alt 9	Alt 10	Alt 11	Alt 12	Alt13	Alt 15	Alt 16	Alt 17	Alt 18
A	Adams	0.80	0.88	0.84	0.81	0.85	0.82	0.81	0.87	0.82	0.84	0.80
B	Tienken	0.74	0.72	0.74	0.73	0.75	0.72	0.74	0.68	0.73	0.71	0.73
C	Tienken	0.79	0.72	0.72	0.76	0.75	0.81	0.78	0.79	0.79	0.71	0.81
D	Tienken	0.92	0.69	0.89	0.88	0.90	0.90	0.92	1.08	0.95	0.82	0.87
E	Livernois	1.05	1.00	1.06	1.02	1.05	1.05	1.04	1.07	1.04	1.02	1.01
F	Walton	0.88	0.79	0.81	0.89	0.86	0.88	0.88	0.91	0.92	0.83	0.90
G	Walton	0.61	0.56	0.62	0.63	0.62	0.62	0.61	0.63	0.62	0.64	0.62
H	Livernois	0.91	0.92	0.95	0.90	0.92	0.90	0.91	0.95	0.89	0.94	0.87
I	Avon	0.89	0.88	0.73	0.94	0.89	0.87	0.89	0.92	0.87	0.85	0.92
J	Adams	1.23	1.22	1.29	1.24	1.26	1.19	1.23	1.22	1.02	1.08	1.22
K	Crooks	1.09	1.07	1.09	1.05	1.05	1.10	1.09	1.09	1.14	1.06	1.11
L	Hamlin	0.29	0.26	0.26	0.29	0.27	0.23	0.28	0.29	0.21	0.20	0.28
M	Hamlin	0.53	0.51	0.50	0.53	0.58	0.51	0.52	0.53	0.53	0.50	0.53
N	Avon	0.92	0.88	0.69	1.00	0.93	0.90	0.92	0.89	0.94	0.82	0.93
O	Avon	1.08	1.08	1.10	0.85	1.06	1.08	1.08	1.04	1.07	0.90	1.07
P	Hamlin	0.91	0.86	0.82	0.93	0.64	0.87	0.90	0.90	0.91	0.82	0.87
Q	Rochester	1.04	1.02	1.03	1.05	1.06	1.05	1.04	1.04	1.02	1.00	0.98
R	John R	0.88	0.86	0.86	1.05	0.89	0.91	0.88	0.90	1.23	1.01	0.85
S	Dequindre	0.99	0.99	0.99	1.07	1.02	0.99	0.98	0.97	1.01	1.02	0.96
T	Auburn	0.94	0.95	0.97	0.92	0.92	0.71	0.93	0.91	0.96	0.93	0.95
U	Livernois	0.99	0.96	0.97	1.00	0.98	0.87	0.97	1.07	0.97	0.95	0.98
VNB	Crooks	0.73	0.74	0.75	0.74	0.71	0.79	0.69	0.74	0.73	0.76	0.72
VSB	Crooks	0.43	0.42	0.44	0.42	0.44	0.51	0.40	0.42	0.44	0.42	0.42
W	Auburn	0.65	0.66	0.65	0.69	0.67	0.47	0.65	0.66	0.67	0.66	0.69
X	New Adams	0.43	0.42	0.43	0.41	0.41	0.42	0.37	0.40	0.41	0.44	0.42
Y	Adams	0.16	0.08	0.08	0.15	0.16	0.06	0.09	0.09	0.11	0.06	0.13
Z	South	0.88	0.88	0.88	0.89	0.91	0.64	0.76	0.92	0.89	0.86	0.89
V/C Increase		-	5	9	14	13	8	1	12	12	8	7
V/C Decrease		-	19	12	11	11	15	13	10	12	19	18
No Change		-	3	6	2	3	4	13	5	3	0	2

significant decrease in expected congestion.
significant increase in expected congestion.

In conclusion, it was determined to develop "composite" alternatives using combinations of north-south and east-west proposed road improvements (Figure 3-11). The results depicted on Table 3-5 show marked improvement in the potential to relieve 2035 congestion compared to options previously tested. Further scrutiny of these results points to Alternatives 20, 22, 23, 25, 27 and 28 as the proposals with the most potential to reduce congestion. These are the six alternatives chosen for detailed analysis according to the seven evaluation factors.

Figure 3-11
Rochester Hills Master Thoroughfare Plan Update
"Composite" Alternatives

Alternative 19

Alt. 19 = Adams Road, Livernois Road, Tienken Road, and Dequindre Road @ 4 or 5 lanes

Alternative 20

Alt. 20 = Livernois Road and Avon Road @ 4 or 5 lanes
Tienken Road @ 5 lanes,
Rochester Road @ 6 or 7 lanes

Alternative 21

Alt. 21 = Adams Road, Livernois Road, and Avon Road @ 4 or 5 lanes

Alternative 22

Alt. 22 = Tienken Road, Avon Road and Dequindre Road @ 4 or 5 lanes
Rochester Road @ 6 or 7 lanes

Alternative 23

Alt. 23 = Crooks Road, Avon Road, Old Perch and Dequindre Road @ 4 or 5 lanes

Alternative 24

Alt. 24 = Adams Road, Livernois Road and Hamlin Road @ 4 or 5 lanes

Alternative 25

Alt. 25 = Auburn Road, Livernois Road and John R Road @ 4 or 5 lanes

Alternative 26

Alt. 26 = Tienken Road @ 5 lanes
Livernois Road, Avon Road and
Hamlin Road @ 4 or 5 lanes
Rochester Road @ 6 or 7 lanes

Alternative 27

Alt. 27 = Tienken Road, Avon Road, Adams Road and Dequindre Road @ 4 or 5 lanes
Rochester Road @ 6 or 7 lanes

Alternative 28

Alt. 28 = Avon Road, Auburn Road, Livernois Road and John R Road @ 4 or 5 lanes

Table 3-5
Composite North-South and East-West Alternatives
Volume-to-Capacity Ratios

Road Segment	Road Name	Volume ÷ Capacity										
		Base	Alt 19	Alt 20	Alt 21	Alt 22	Alt 23	Alt 24	Alt 25	Alt 26	Alt 27	Alt 28
A	Adams	0.80	0.62	0.85	0.84	0.82	0.83	0.81	0.82	0.85	0.83	0.82
B	Tienken	0.74	0.57	0.72	0.75	0.47	0.71	0.74	0.73	0.73	0.47	0.71
C	Tienken	0.79	0.83	0.82	0.73	0.54	0.71	0.77	0.75	0.81	0.49	0.70
D	Tienken	0.92	0.70	0.50	0.90	0.65	0.87	0.91	0.86	0.59	0.58	0.81
E	Livernois	1.05	0.81	1.08	1.09	1.01	1.09	1.08	1.05	0.81	0.99	1.04
F	Walton	0.88	0.92	0.85	0.82	0.81	0.81	0.87	0.86	0.90	0.78	0.76
G	Walton	0.61	0.57	0.65	0.64	0.62	0.63	0.62	0.64	0.62	0.65	0.65
H	Livernois	0.91	0.96	0.96	1.01	0.80	0.88	0.98	0.97	1.00	0.88	0.97
I	Avon	0.89	0.92	0.93	0.80	0.76	0.80	0.92	0.92	0.93	0.80	0.75
J	Adams	1.23	0.91	1.11	0.88	1.18	1.21	1.23	1.08	1.17	0.92	1.10
K	Crooks	1.09	0.96	0.99	1.00	1.00	0.80	0.99	1.00	1.01	0.92	0.98
L	Hamlin	0.29	0.21	0.30	0.14	0.34	0.25	0.28	0.26	0.32	0.26	0.26
M	Hamlin	0.53	0.55	0.52	0.49	0.55	0.44	0.57	0.51	0.53	0.52	0.50
N	Avon	0.92	0.87	0.63	0.73	0.85	0.78	0.80	0.85	0.51	0.75	0.78
O	Avon	1.08	1.08	0.73	1.08	1.08	0.80	1.06	1.06	1.08	0.86	0.76
P	Hamlin	0.91	0.93	0.80	0.84	0.58	0.72	0.71	0.86	0.55	0.52	0.75
Q	Rochester	1.04	0.86	0.77	0.86	0.86	0.91	0.93	0.90	0.93	0.79	0.82
R	John R	0.88	0.72	0.69	0.76	0.70	0.90	0.81	0.40	0.79	0.82	0.68
S	Dequindre	0.99	0.86	0.96	0.96	0.91	0.45	1.01	0.91	0.84	0.67	0.66
T	Auburn	0.94	1.00	0.93	0.97	0.94	0.93	0.92	0.81	1.01	0.89	0.79
U	Livernois	0.99	0.86	0.80	0.80	0.89	0.97	1.00	0.69	0.91	0.88	0.74
VNB	Crooks	0.73	0.61	0.59	0.68	0.64	0.73	0.72	0.68	0.65	0.67	0.69
VSB	Crooks	0.43	0.42	0.33	0.41	0.37	0.45	0.44	0.50	0.37	0.41	0.49
W	Auburn	0.65	0.71	0.67	0.67	0.65	0.67	0.67	0.51	0.67	0.65	0.51
X	New Adams	0.43	0.44	0.41	0.42	0.43	0.42	0.42	0.45	0.43	0.44	0.44
Y	Adams	0.16	0.12	0.12	0.09	0.16	0.13	0.15	0.07	0.13	0.06	0.06
Z	South	0.88	0.90	0.92	0.84	0.92	0.87	0.89	0.80	0.91	0.91	0.81
V/C Increase		-	10	9	8	5	6	11	6	10	4	5
V/C Decrease		-	10	18	18	17	20	14	20	14	22	22
No Change		-	1	0	1	5	1	2	1	3	1	0

significant decrease in expected congestion.
significant increase in expected congestion.

At this point in the process, the concept of a "ring road" was entered into the analyses (Figures 3-12 and 3-13). The ability of these two options to reduce future congestion is not as significant as the six selected alternatives (Table 3-6). Therefore, it was decided to focus the analysis on Alternatives 20, 22, 23, 25, 27 and 28. The selected alternatives are shown in Figure 3-14.

Figure 3-12
Rochester Hills Master Thoroughfare Plan Update
Ring Road – Concept A

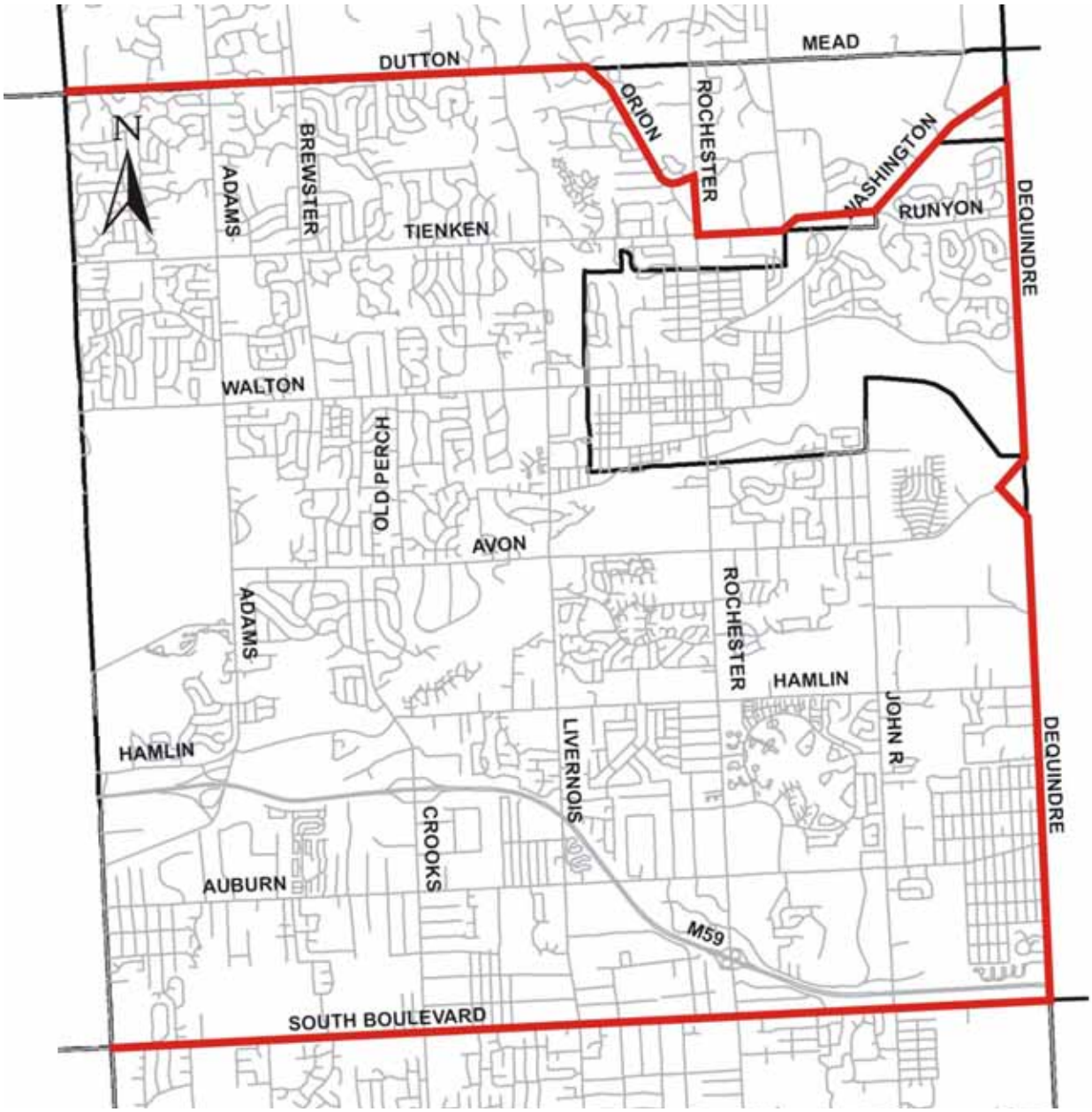


Figure 3-13
Rochester Hills Master Thoroughfare Plan Update
Ring Road – Concept B

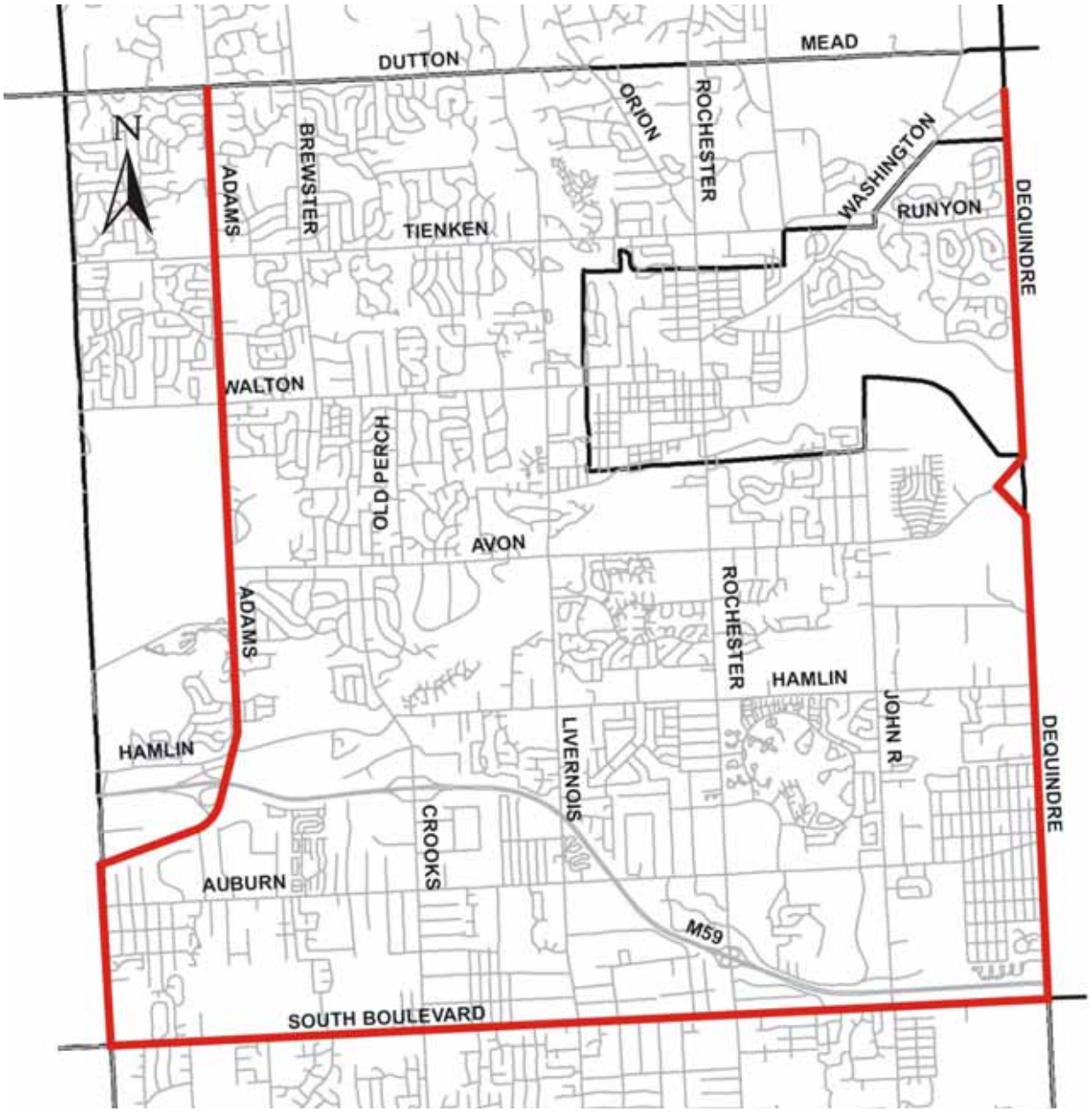


Table 3-6
Rochester Hills Master Thoroughfare Plan Update
Comparison of Ring Road Alternatives to the Six Best-performing Alternatives in Congestion Relief

Road Segment	Road Name	Volume ÷ Capacity								
		Base	Alt 20	Alt 22	Alt 23	Alt 25	Alt 27	Alt 28	Alt RR A	Alt RR B
A	Adams	0.80	0.85	0.82	0.83	0.82	0.83	0.82	0.77	0.65
B	Tienken	0.74	0.72	0.47	0.71	0.73	0.47	0.71	0.57	0.64
C	Tienken	0.79	0.82	0.54	0.71	0.75	0.49	0.70	0.70	0.78
D	Tienken	0.92	0.50	0.65	0.87	0.86	0.58	0.81	0.97	0.91
E	Livernois	1.05	1.08	1.01	1.09	1.05	0.99	1.04	1.01	1.01
F	Walton	0.88	0.85	0.81	0.81	0.86	0.78	0.76	0.87	0.90
G	Walton	0.61	0.65	0.62	0.63	0.64	0.65	0.65	0.62	0.61
H	Livernois	0.91	0.96	0.80	0.88	0.97	0.88	0.97	0.87	0.85
I	Avon	0.89	0.93	0.76	0.80	0.92	0.80	0.75	0.88	0.89
J	Adams	1.23	1.11	1.18	1.21	1.08	0.92	1.10	1.23	1.10
K	Crooks	1.09	0.99	1.00	0.80	1.00	0.92	0.98	1.12	1.04
L	Hamlin	0.29	0.30	0.34	0.25	0.26	0.26	0.26	0.24	0.21
M	Hamlin	0.53	0.52	0.55	0.44	0.51	0.52	0.50	0.52	0.54
N	Avon	0.92	0.63	0.85	0.78	0.85	0.75	0.78	0.90	0.93
O	Avon	1.08	0.73	1.08	0.80	1.06	0.86	0.76	1.08	1.09
P	Hamlin	0.91	0.80	0.58	0.72	0.86	0.52	0.75	0.87	0.88
Q	Rochester	1.04	0.77	0.86	0.91	0.90	0.79	0.82	1.01	0.97
R	John R	0.88	0.69	0.70	0.90	0.40	0.82	0.68	0.79	0.82
S	Dequindre	0.99	0.96	0.91	0.45	0.91	0.67	0.66	0.89	0.92
T	Auburn	0.94	0.93	0.94	0.93	0.81	0.89	0.79	0.94	0.95
U	Livernois	0.99	0.80	0.89	0.97	0.69	0.88	0.74	0.97	0.93
VNB	Crooks	0.73	0.59	0.64	0.73	0.68	0.67	0.69	0.71	0.63
VSB	Crooks	0.43	0.33	0.37	0.45	0.50	0.41	0.49	0.42	0.39
W	Auburn	0.65	0.67	0.65	0.67	0.51	0.65	0.51	0.67	0.74
X	New Adams	0.43	0.41	0.43	0.42	0.45	0.44	0.44	0.36	0.61
Y	Adams	0.16	0.12	0.16	0.13	0.07	0.06	0.06	0.09	0.15
Z	South	0.88	0.92	0.92	0.87	0.80	0.91	0.81	0.74	0.74
V/C Increase		-	9	5	6	6	4	5	5	9
V/C Decrease		-	18	17	20	20	22	22	19	17
No Change		-	0	5	1	1	1	0	3	1

significant decrease in expected congestion.
significant increase in expected congestion.

Figure 3-14
Best Performing Alternatives

3.3 Evaluation of Alternatives

The preceding steps allowed us to reduce the number of alternatives reduced from 30 to six in terms of controlling congestion. This, in turn, will minimize neighborhood disruption (the highest-placed evaluation factor). The evaluation continued through other factors as described below.

3.3.1 Better Connect Links in the Road Network

The degree to which travel times between 15 key locations in the study area could be improved in the afternoon rush hour was measured (Figure 3-15). Table 3-7 graphically illustrates where travel time savings of at least two minutes will be reached (☐ green squares). For example, a vehicle traveling in the 2035 afternoon peak hour traffic between Oakland University (Point 1) and Borden Park (Point 6) would take 15.62 minutes under the future base condition. With Alternative 20, it is expected that the same trip would take 2.2 minutes less because of the improvements to Avon and Rochester Roads.

Figure 3-15
Locations between which Travel-time Savings are Measured

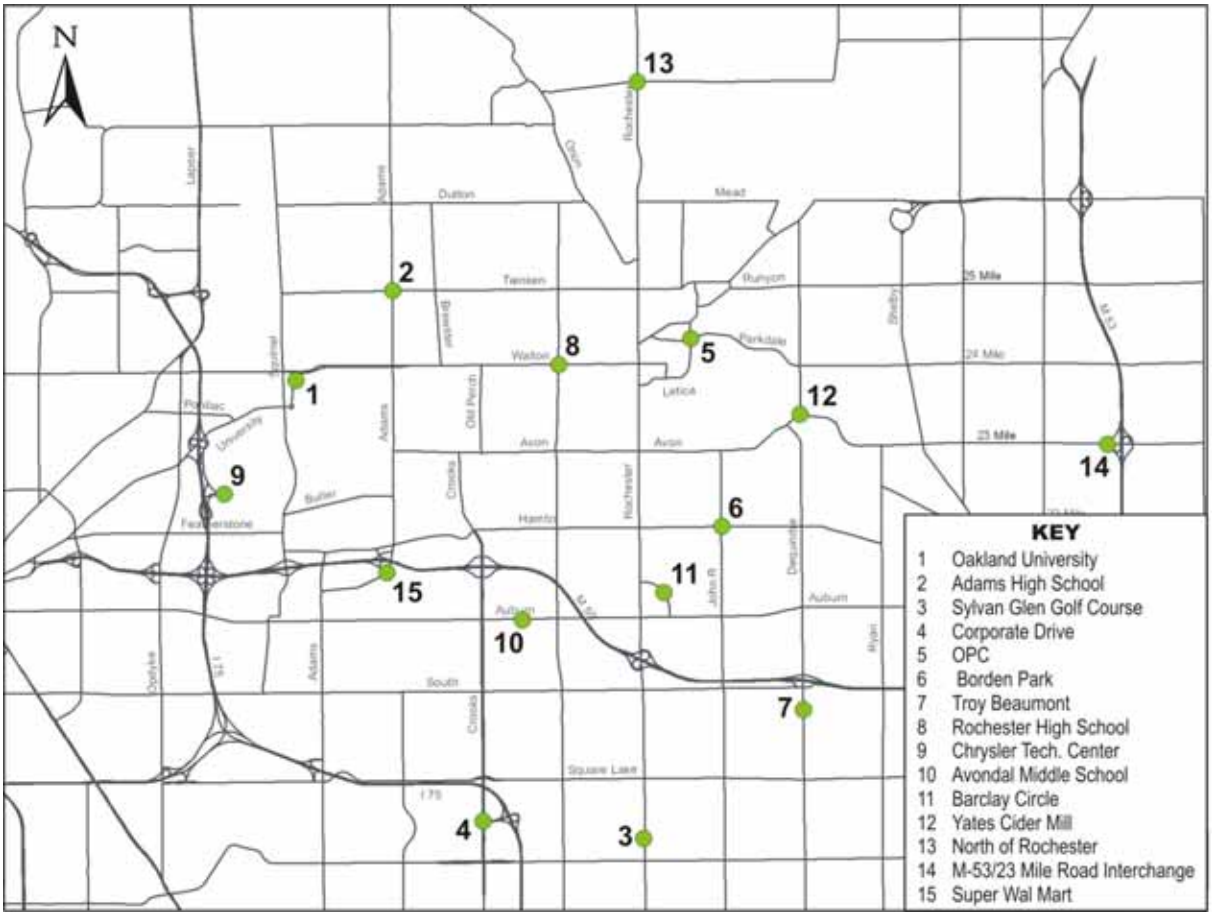
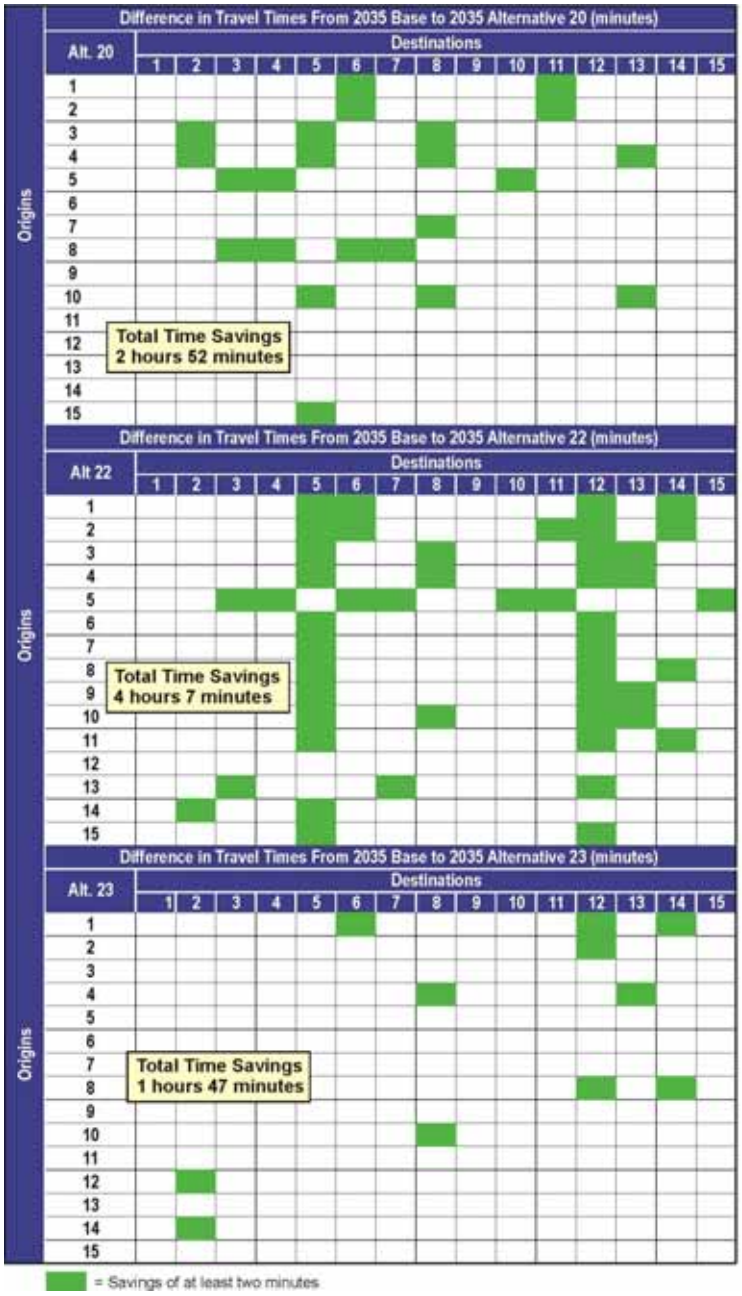
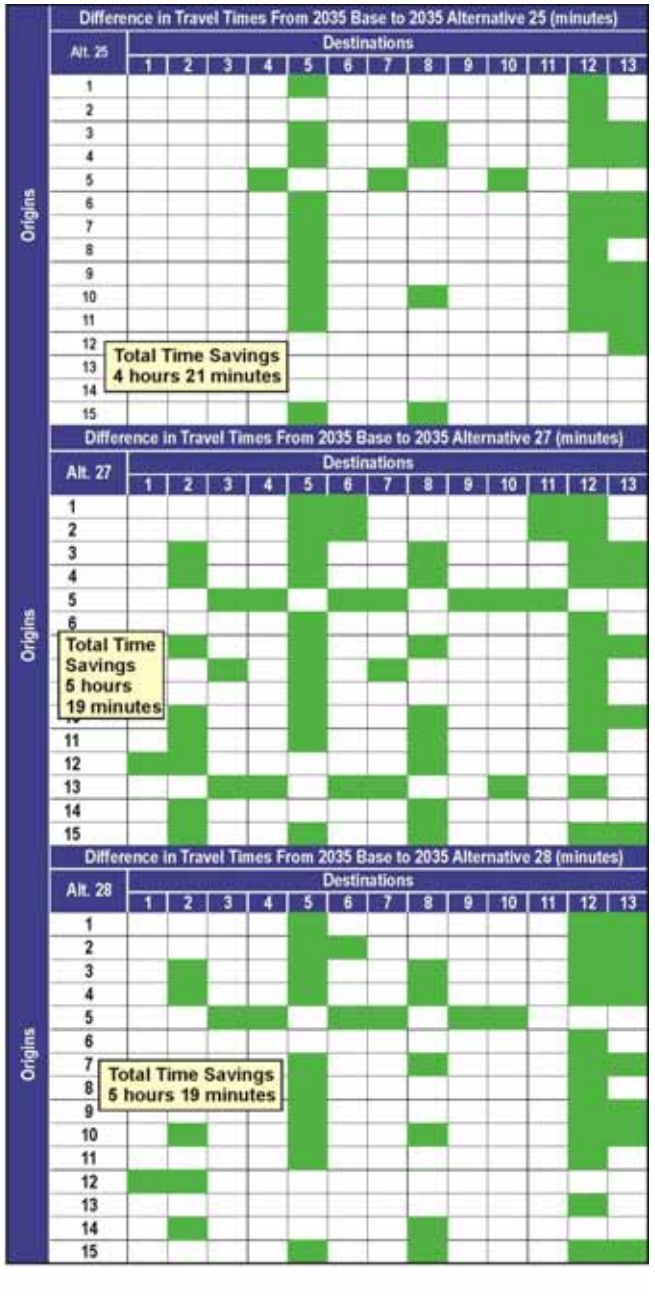


Table 3-7
Rochester Hills Master Thoroughfare Plan Update
2035 Afternoon Peak Travel Time Differences Compared to Base Condition





KEY

1 Oakland University
2 Adams High School
3 Sylvan Glen Golf Course
4 Corporate Drive
5 OPC
6 Borden Park
7 Troy Beaumont
8 Rochester High School
9 Chrysler Tech. Center
10 Avondal Middle School
11 Barclay Circle
12 Yates Cider Mill
13 North of Rochester
14 M-53/23 Mile Rd Interchange
15 Super Wal Mart

By adding the travel time savings for just the 15 pairs of locations included in the analysis, the total savings of all trips makers moving between these locations in the 2035 afternoon peak hour ranges from 1 hour 47 minutes to 5 hours 32 minutes.

Alternatives 27 and 28 are associated with the greatest potential savings (5 hours 32 minutes and 5 hours 19 minutes, respectively) while Alternatives 20 and 23 are expected to save the least time (2 hours 53 minutes and 1 hour 47 minutes, respectively). Additional travel time data is included in Appendix D.

3.3.2 Air Quality

Carbon monoxide (CO) is a colorless, odorless gas that is poisonous because it prevents the body from absorbing oxygen. It is among a number of air pollutants that U.S. EPA regulates under the authority of the Clean Air Act. Because of its very localized and immediate effects, it is often used in evaluations of air quality effects associated with roadway projects. Like other air pollutants regulated by EPA, CO is much better controlled than it was some years ago.

Information available from the Michigan Department of Environmental Quality (MDEQ) indicates the air quality monitor that measures CO nearest to Rochester Hills in Oak Park is in south Oakland County. CO values are expressed in parts per million (ppm) as the second-highest one-hour value, and the second-highest eight-hour value recorded over a year's time. The most recent values (2005) for the closest monitoring station are one-hour at 3.4 ppm and eight-hour at 2.1 ppm. The thresholds that are not to be exceeded are 35 and nine ppm, respectively.

Using these values as the base for Rochester Hills, the effects of future traffic were analyzed.

The results indicate that the future CO concentrations will go down compared to 2005 conditions, even where traffic volumes substantially increase. This is attributable to EPA's continuing control of vehicle engines and fuels. As such, the air quality conditions of the six best-performing alternatives are no different from one to another and do not generate CO pollution that will exceed EPA standards.

3.3.3 Minimize Purchase of Private Property

The extent to which property may be needed to widen roadways was measured using 2005 aerial photography, right-of-way maps, parcel lines, building footprints, and other property information included in the City's Geographical Information System (GIS).

The City and the County have recently constructed narrow four-lane boulevards and five-lane roads within 120' of right-of-way. Therefore, 120' of road right-of-way was analyzed for each alternative segment improved, except for Rochester Road. A right-of-way width of 200' was used for Rochester Road because MDOT would require a wide median if a six-lane boulevard option was selected.

The methodology for measuring property acquisition included examining parcel lot lines, building set backs, and non-motorized path locations. If a structure (house, business, etc.) were within 20 feet of the edge of the widened road, it was included in the acquisition total. For each alternative, the land use acreages, dwelling units or business structures were aggregated by individual road segment within each alternative (Table 3-8).

The results indicate more residential units will be acquired with Alternatives 25 and 28. The largest number of business structures would also be impacted by Alternatives 25 and 28. The greatest number of acres of parks and open space would be impacted by Alternatives 27 and 28. A full set of analysis segments used in the analysis is provided in Appendix E.

3.3.4 Control Noise at Sensitive Receivers

The noise levels at 15 different sensitive noise receivers (Figure 3-16) were calculated for each alternative based on the relative volume changes of the adjacent road nearest them. The Noise Model (TNM) authored by the Federal Highway Administration was used to calculate the noise level expressed as decibels on the A scale, or dBA. A perceptible noise change is associated with an increase of at least 3 dBA. The results show very minor differences among alternatives and between them and the 2035 base condition (Table 3-9). In all cases, the future traffic will not cause a perceptible change in noise. This does not mean a person would not be aware of more traffic. It simply means that, on an objective basis, the average person would not hear a difference in noise.

3.3.5 Maximize Safe Travel

For this portion of the study, a crash analysis was completed for major thoroughfares.

Crash data provided by the Traffic Improvement Association of Oakland County formed the basis of this analysis. These rates were assumed to remain constant if a road were not improved. On the other hand, and for each alternative, where road improvements were proposed, the crash rate was reduced by one-third indicating safer conditions as a result of the improvement. The results are shown on Table 3-10. Overall, Alternative 27 has the best potential to reduce crashes in the 2035 horizon year. Alternatives 22 and 23 also perform well. The alternative least likely to control crashes is Alternative 28. Crash data is provided in Appendix F.

Table 3-8
Rochester Hills Master Thoroughfare Plan Update
Summary of Potential Property Acquisition

Alt. 20	Category	Total
	Residential Acres	12.68
	Business Acres	28.19
	Open Space/Parks Acres	2.82
	Residential Dwellings	36
	Businesses	33
Alt. 22	Category	Total
	Residential Acres	17.25
	Business Acres	31.67
	Open Space/Parks Acres	2.84
	Residential Dwellings	39
	Businesses	38
Alt. 23	Category	Total
	Residential Acres	18.7
	Business Acres	6
	Open Space/Parks Acres	3.9
	Residential Dwellings	34
	Businesses	8
Alt. 25	Category	Total
	Residential Acres	18.06
	Business Acres	7.31
	Open Space/Parks Acres	2.63
	Residential Dwellings	46
	Businesses	50
Alt. 27	Category	Total
	Residential Acres	24.26
	Business Acres	31.67
	Open Space/Parks Acres	6.36
	Residential Dwellings	42
	Businesses	38
Alt. 28	Category	Total
	Residential Acres	21.19
	Business Acres	12.45
	Open Space/Parks Acres	5.73
	Residential Dwellings	58
	Businesses	56

Figure 3-16
Rochester Hills Master Thoroughfare Plan Update
Sensitive Receptors at which Changes in Noise Levels Were Measured

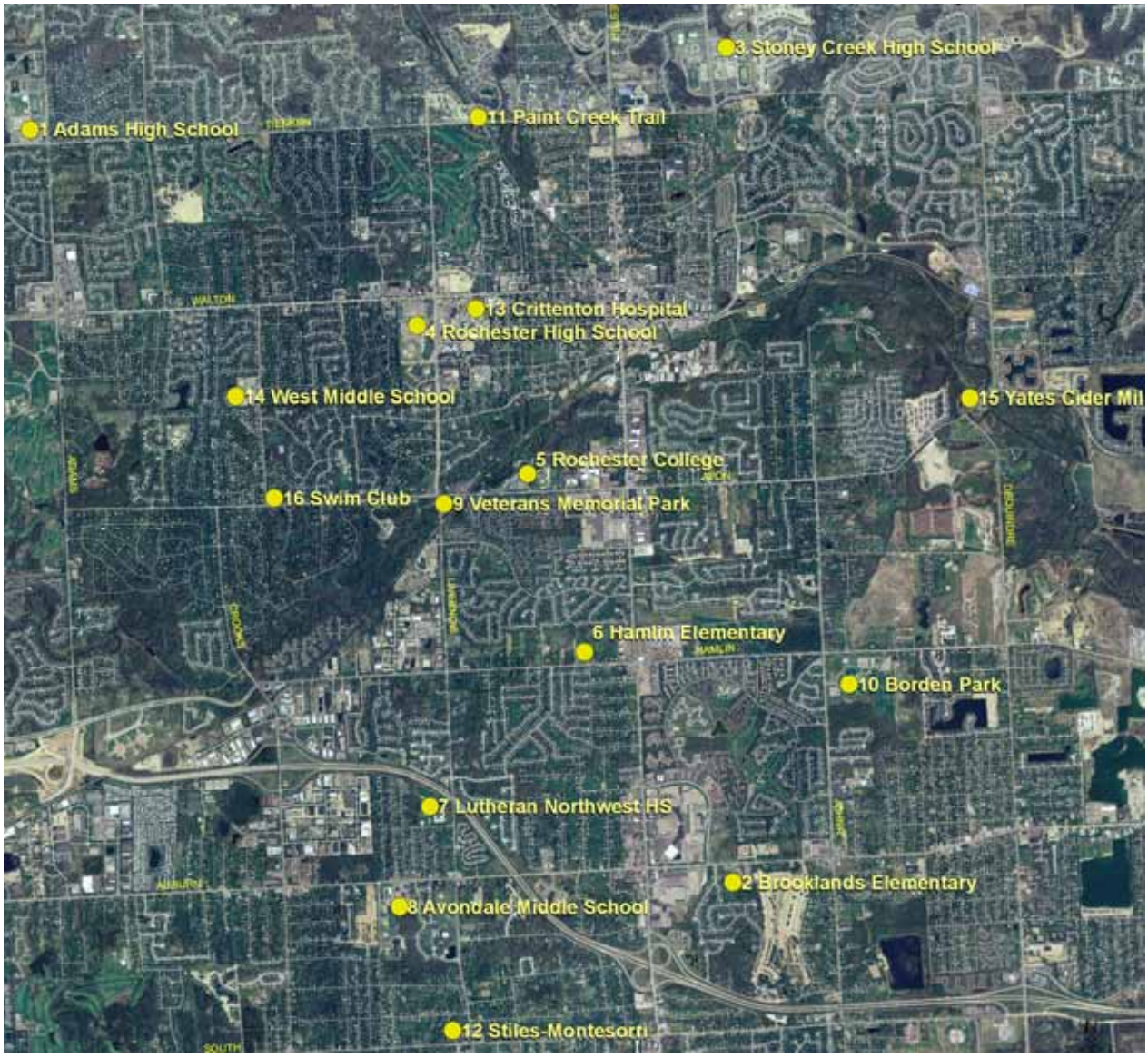


Table 3-9
Rochester Hills Master Thoroughfare Plan Update
Expected Noise Levels in 2035 at Sensitive Receivers (decibels dBA)

Noise Receptor Number	Place Name	Receptor Distance (feet)	2035 Base	Alt. 20	Alt. 22	Alt. 23	Alt. 25	Alt. 27	Alt. 28
1	Adams High School	400	56.5	56.5	56.5	56.5	56.4	56.6	56.4
2	Brooklands Elementary	200	62.0	62.1	62.3	62.2	65.0	62.1	64.9
3	Stoney Creek High School	200	53.6	53.6	53.6	53.6	53.5	53.6	53.5
4	Rochester High School	175	65.1	65.4	64.6	64.9	65.4	65.0	65.4
5	Rochester College	200	62.3	63.7	61.9	64.4	61.8	64.0	64.3
6	Hamlin Elementary	300	59.0	58.1	60.1	59.2	58.1	59.8	58.2
7	Lutheran Northwest HS	300	58.9	61.4	58.9	59.0	61.3	58.9	61.5
8	Avondale Middle School	300	59.7	59.4	59.7	59.7	62.0	59.7	62.1
9	Veterans Memorial Park	125	64.7	65.7	63.9	63.9	66.3	63.1	65.9
10	Borden Park	600	54.5	52.4	53.1	54.5	54.2	53.2	55.2
11	Paint Creek Trail	150	63.0	64.0	64.1	62.9	62.8	64.0	62.6
12	Stiles-Montesorri	200	59.5	59.6	59.7	59.6	58.0	59.5	57.8
13	Crittenton Hospital	350	62.1	61.6	61.6	62.0	62.0	61.0	61.8
14	West Middle School	150	62.6	62.3	62.0	64.3	62.4	62.3	62.3
15	Yates Cider Mill	300	60.0	60.0	61.5	60.2	61.7	61.9	61.9
16	Swim Club	150	62.5	62.5	62.4	64.3	62.4	63.1	64.2

Table 3-10
Rochester Hills Master Thoroughfare Plan Update
2035 Crash Comparison

		2035 Average Crashes Per Mile Per Year						
Segment	Road Name	2035 Base	Alt. 20	Alt. 22	Alt. 23	Alt. 25	Alt. 27	Alt. 28
A	Adams	35.6	35.4	36.0	35.3	34.6	36.5	34.4
B	Tienken	15.4	15.0	12.0	15.0	15.1	12.0	14.8
C	Tienken	23.4	24.8	19.9	21.5	23.4	19.1	21.6
D	Tienken	37.3	30.8	31.4	35.7	34.8	29.5	33.5
E	Livernois	10.6	10.8	9.8	10.8	10.5	9.7	10.6
F	Walton	44.6	44.2	41.6	40.8	44.5	40.7	39.3
G	Walton	30.9	31.9	30.9	31.7	31.6	32.1	32.1
H	Livernois	53.3	55.2	47.1	50.8	56.3	51.8	56.4
I	Avon	13.7	14.6	14.3	15.4	14.2	15.2	14.3
J	Adams	19.9	18.0	19.1	19.2	17.9	19.7	17.7
K	Crooks	11.4	10.5	10.7	11.1	10.8	9.5	10.3
L	Hamlin	32.1	34.5	36.7	31.1	30.3	19.4	30.4
M	Hamlin	14.1	13.8	15.0	11.6	13.2	14.1	12.9
N	Avon	35.4	32.1	21.8	39.0	32.7	36.8	38.6
O	Avon	25.8	22.2	15.9	24.4	24.5	25.6	23.1
P	Hamlin	14.9	11.1	17.2	11.8	13.4	16.1	11.9
Q	Rochester	128.0	92.4	102.8	74.0	109.8	95.3	102.7
R	John R	7.3	6.1	6.6	8.2	4.5	7.1	7.4
S	Dequindre	14.2	14.1	16.3	8.6	25.2	11.6	18.3
T	Auburn	35.0	33.2	34.7	35.9	37.7	32.4	55.0
U	Livernois	12.6	11.9	10.4	12.4	10.1	9.8	16.4
V	Crooks	46.7	36.8	40.4	47.4	49.0	43.1	48.6
W	Auburn	18.5	18.8	18.1	19.0	16.4	18.1	16.4
X	New Adams	na	na	na	na	na	na	na
Y	Adams	2.2	1.9	2.1	2.0	1.5	1.3	1.5
Z	South	17.5	17.2	18.5	17.3	15.7	17.7	13.4
Increase Crashes			7	8	8	7	6	10
Decrease Crashes			18	17	17	17	18	15
No Change			0	0	0	1	1	1
		Total Change	-62.8	-70.9	-70.3	-22.5	-76.2	-18.8

Fewer crashes without improvements to roadway segment

33 percent Crash Reduction Factor because alternative improves segment evaluated

More crashes without improvements to roadway segment

3.4 Evaluation Results

Six members of the consultant team examined all of the data presented above by evaluation factor by alternative to judge the overall performance of each alternative (Table 3-11). In the area of minimize neighborhood disruption, Alternative 27 was judged the best performer (red oval); Alternative 23 was judged the least (red square). In the area of better connectivity (lower travel time) through the road network, Alternative 27 was again judged the best performer (blue oval); Alternative 23 the least (blue square).

In the areas of maintain air quality, all alternatives are considered equal performers (green oval). When considering the criteria of minimize purchase of private property, Alternative 23 is expected to have the least negative effect (black oval); Alternative 25 is judged to have the largest negative effect (black square).

In the area of protecting open space/parks, Alternative 25 is judged to have the least negative impact (orange oval); Alternative 27 the most negative effect (orange square).

In terms of noise impacts, Alternatives 20, 22, 23 and 25 perform at the same level (pink oval); Alternatives 27 and 28 perform at a slightly lower level (pink box). Finally, in the area of maximize safe travel, Alternative 27 is judged to perform best (purple oval); Alternative 25, the least (purple square).

By combining these performance scores with the weight on the evaluation factors provided by community representatives, the project's Technical Committee and the consultant, the overall performance of each alternative is established as judged by the consultant. The top two performers, for all three weightings, are Alternatives 27 (blue pyramids) and 22 (green pyramid), in that order.

Table 3-11
Rochester Hills Master Thoroughfare Plan Update
Selection of Alternatives

	Consultant Performance Scores					
Factor	Alt 20	Alt 22	Alt 23	Alt 25	Alt 27	Alt 28
Minimize Neighborhood Disruption	77.6	78.0	75.8	77.6	90.4	87.6
Better Connect Links in Road Network	77.0	82.2	72.2	83.6	90.6	88.4
Maintain good Air Quality	78.0	78.0	78.0	78.0	78.0	78.0
Minimize Purchase of Private Property to Build Transportation Facilities	42.4	39.8	47.8	36.2	37.4	31.8
Protect Open Spaces/Parks	44.6	44.0	41.0	46.0	34.4	37.4
Control Noise at Sensitive Locations	79.2	79.6	79.0	78.2	77.4	77.2
Maximize Safe Travel	77.6	83.2	82.0	68.4	86.6	64.8

Citizens (48)

Order	Factor	Avg. Weight	Alt 20	Alt 22	Alt 23	Alt 25	Alt 27	Alt 28
1	Minimize Neighborhood Disruption	18.9%	14.65	14.72	14.31	14.65	17.06	16.53
4	Better Connect Links in Road Network	13.3%	10.26	10.95	9.62	11.14	12.07	11.78
7	Maintain good Air Quality	11.4%	8.92	8.92	8.92	8.92	8.92	8.92
5	Minimize Purchase of Private Property to Build Transportation Facilities	12.1%	5.12	4.80	5.77	4.37	4.51	3.84
3	Protect Open Spaces/Parks	16.1%	7.17	7.08	6.60	7.40	5.53	6.02
6	Control Noise at Sensitive Locations	11.7%	9.24	9.29	9.22	9.12	9.03	9.01
2	Maximize Safe Travel	16.5%	12.84	13.77	13.57	11.32	14.33	10.72
			68.20	69.53	67.99	66.91	71.46	66.81
			3	2	4	5	1	6

Technical Committee (11)

Order	Factor	Avg. Weight	Alt 20	Alt 22	Alt 23	Alt 25	Alt 27	Alt 28
3	Minimize Neighborhood Disruption	15.0%	11.63	11.69	11.36	11.63	13.55	13.13
2	Better Connect Links in Road Network	16.7%	12.88	13.75	12.07	13.98	15.15	14.78
5	Maintain good Air Quality	9.9%	7.74	7.74	7.74	7.74	7.74	7.74
4	Minimize Purchase of Private Property to Build Transportation Facilities	12.2%	5.17	4.85	5.83	4.42	4.56	3.88
6	Protect Open Spaces/Parks	9.7%	4.35	4.29	4.00	4.48	3.35	3.64
7	Control Noise at Sensitive Locations	9.4%	7.46	7.49	7.44	7.36	7.29	7.27
1	Maximize Safe Travel	27.0%	20.96	22.48	22.15	18.48	23.39	17.50
			70.18	72.29	70.59	68.09	75.03	67.95
			4	2	3	5	1	6

Consultant (8)

Order	Factor	Avg. Weight	Alt 20	Alt 22	Alt 23	Alt 25	Alt 27	Alt 28
2	Minimize Neighborhood Disruption	18.9%	14.68	14.76	14.34	14.68	17.10	16.58
3	Better Connect Links Road Network	16.2%	12.50	13.35	11.72	13.57	14.71	14.35
6	Maintain good Air Quality	10.5%	8.22	8.22	8.22	8.22	8.22	8.22
5	Minimize Purchase of Private Property to Build Transportation Facilities	10.9%	4.63	4.35	5.22	3.95	4.09	3.47
4	Protect Open Spaces/Parks	13.1%	5.85	5.77	5.38	6.04	4.51	4.91
7	Control Noise at Sensitive Locations	8.2%	6.53	6.56	6.51	6.45	6.38	6.36
1	Maximize Safe Travel	22.0%	17.08	18.31	18.05	15.06	19.06	14.26
			69.50	71.32	69.45	67.97	74.08	68.16
			3	2	4	6	1	5

3.5 Costs

Costs for each of the alternatives were developed based on recent costs for similar road projects received from the Road Commission for Oakland County (Table 3-12). Converting a mile of two-lane road to a five-lane roadway was estimated to cost $6 million in 2007 dollars not including any right-of-way or utility costs. To convert a mile of two-lane road to a four-lane boulevard was estimated to cost $10 million. Cost options for improvements to Rochester Road were calculated separately based on assumptions from a basic lane widening in each direction, to a brand new six-lane boulevard which varied from $6 million to $12 million per mile. This resulted in a low and high range cost for each alternative. Several costs were developed for Alternatives 20, 22, and 27 which contain several different types of improvements to Rochester Road. Congestion indices (V/C ratios) were also summarized for each alternative from earlier analyses.

The estimated costs range from $2 million to $191 million. The low cost was alternative 16 based on a recommendation to add a new road connection between Butler and Adams at Avon Road. The most expensive option was Alternative 27 which includes a six-lane boulevard on Rochester Road and 18.36 miles of roadway, capacity and safety improvements.

The cost data developed was then used in cooperation with the performance evaluation by dividing the performance score by the costs, to get a cost effectiveness score. The highest ranking alternative with costs considered is shown in Table 3-13. The calculations shown here are for the high range of the scale.

The results of the order ranking of the alternatives were exactly the same whether the high or low range of costs were considered. Alternative 23, shown in Figure 3-17, was determined to be the most cost effective followed by Alternative 25 (Figure 3-18) in all three weighted groups. When the cost effectiveness rank order is averaged with the performance evaluation rank order, Alternative 23 is the highest average ranked alternative in all three weighted groups. Alternative 20 was the next highest in rank order in the citizens and consultant weighted results with an average rank order of 3. Alternative 25 had a poor score in the performance evaluation and therefore when averaged with the cost effectiveness rank order falls lower in the average ranked order.

Table 3-12
Alternative Estimated Costs (millions)

Name	Description	Length (miles)	Cost Five-lane Section	Cost Four-lane Blvd. Section	All 26 Segments Avg. V/C 2035	Top 12 Congested Links Avg. V/C 2035
E+C 2035 Base					0.81	1.01
Alternative 1	Dequindre Road	4.8	$29	$48	0.79	0.98
Alternative 2	John R Road	4.2	$25	$42	0.80	0.99
Alternative 3	Rochester Road	3.56	$21	$43	0.78	0.97
Alternative 4	Livernois	4	$24	$40	0.81	0.99
Alternative 5	Crooks/Old Perch	2.25	$14	$23	0.78	0.96
Alternative 6	Adams Road	4	$24	$40	0.80	0.98
Alternative 7	Pave Dutton Road	3.5	$21	$35	NA	NA
Alternative 8	Tienken Road	4	$24	$40	0.78	0.97
Alternative 9	Avon Road West	3	$18	$30	0.78	0.99
Alternative 10	Avon Road East	2.25	$14	$23	0.81	0.99
Alternative 11	Hamlin Road	3	$18	$30	0.80	0.98
Alternative 12	Auburn Road	6	$36	$60	0.77	0.97
Alternative 13	South Blvd.	6	$36	$60	0.79	1.00
Alternative 14	Dutton Road	3.5	$21	$35		
Alternative 15	Tienken/Washington Road	2.4	$14	$24	0.81	1.02
Alternative 16	Butler New Connection	0.35	$2	$4	0.81	0.99
Alternative 17	Butler Connection and Avon Road	2.5	$15	$25	0.77	0.95
Alternative 18	Dequindre Road and Realignment	4.8	$29	$48	0.80	0.99
Alternative 19	Composite - Adams Road, Livernois Road, Tienken Road, Dequindre Road	14.8	$89	$148	0.74	0.90
Alternative 20	Composite - Livernois Road, Tienken Road, Rochester Road, Avon Road	10.56	$63	$113	0.73	0.85
Alternative 21	Composite - Adams Road, Livernois Road Avon Road	8	$48	$80	0.75	0.93
Alternative 22	Composite - Tienken Road , Rochester Road , Avon Road , Dequindre Road	15.36	$92	$161	0.72	0.90
Alternative 23	Composite - Crooks Road, Avon Road, Old Perch, Dequindre Road	8.7	$52	$87	0.73	0.87
Alternative 24	Composite - Adams Road, Livernois Road, Hamlin Road	8	$48	$80	0.79	0.97
Alternative 25	Composite - Auburn Road, Livernois Road, John R Road	10	$60	$100	0.74	0.92
Alternative 26	Composite - Tienken Road, Livernois Road, Avon Road, Hamlin Road, Rochester Road	7	$42	$70	0.74	0.87
Alternative 27	Composite - Tienken Road, Avon Road, Adams Road, Rochester Road, Dequindre Road	18.36	$110	$191	0.68	0.80
Alternative 28	Composite - Avon Road, Auburn Road, Livernois Road, John R Road	15.2	$91	$152	0.71	0.85

Note: Costs do not include ROW.
V/C = Volume ÷ Capacity

Table 3-13
Cost Effectiveness Summary by Group

	Consultant Performance Scores					
Factor	Alt 20	Alt 22	Alt 23	Alt 25	Alt 27	Alt 28
Minimize Neighborhood Disruption	77.6	78.0	75.8	77.6	90.4	87.6
Better Connect Links in the Transit and road Networks	77.0	82.2	72.2	83.6	90.6	88.4
Maintain Good Air Quality	78.0	78.0	78.0	78.0	78.0	78.0
Minimize Purchase of Private Property to Build Transportation Facilities	42.4	39.8	47.8	36.2	37.4	31.8
Protect Open Spaces/Parks	44.6	44.0	41.0	46.0	34.4	37.4
Control Noise at Sensitive Locations	79.2	79.6	79.0	78.2	77.4	77.2
Maximize Safe Travel	77.6	83.2	82.0	68.4	86.6	64.8

	Citizens (48)						
Order	Factor	Avg. Weight	Alt 20	Alt 22	Alt 23	Alt 25	Alt 27	Alt 28
1	Minimize Neighborhood Disruption	18.9%	14.65	14.72	14.31	14.65	17.06	16.53
4	Better Connect Links in the Transit and road Networks	13.3%	10.26	10.95	9.62	11.14	12.07	11.78
7	Maintain Good Air Quality	11.4%	8.92	8.92	8.92	8.92	8.92	8.92
5	Minimize Purchase of Private Property to Build Transportation Facilities	12.1%	5.12	4.80	5.77	4.37	4.51	3.84
3	Protect Open Spaces/Parks	16.1%	7.17	7.08	6.60	7.40	5.53	6.02
6	Control Noise at Sensitive Locations	11.7%	9.24	9.29	9.22	9.12	9.03	9.01
2	Maximize Safe Travel	16.5%	12.84	13.77	13.57	11.32	14.33	10.72
	Performance		68.20	69.53	67.99	66.91	71.46	66.81
	Cost		$ 112.72	$ 160.72	$ 87.00	$ 100.00	$ 190.72	$ 152.00
	Ratio Performance/Cost		0.60	0.43	0.78	0.67	0.37	0.44
	Order w/ cost		3	5	1	2	6	4
	Order w/o cost		3	2	4	5	1	6
	Average Order		3	3.5	2.5	3.5	3.5	5

	Technical Committee (11)						
Order	Factor	Avg. Weight	Alt 20	Alt 22	Alt 23	Alt 25	Alt 27	Alt 28
3	Minimize Neighborhood Disruption	15.0%	11.63	11.69	11.36	11.63	13.55	13.13
2	Better Connect Links in the Transit and road Networks	16.7%	12.88	13.75	12.07	13.98	15.15	14.78
5	Maintain Good Air Quality	9.9%	7.74	7.74	7.74	7.74	7.74	7.74
4	Minimize Purchase of Private Property to Build Transportation Facilities	12.2%	5.17	4.85	5.83	4.42	4.56	3.88
6	Protect Open Spaces/Parks	9.7%	4.35	4.29	4.00	4.48	3.35	3.64
7	Control Noise at Sensitive Locations	9.4%	7.46	7.49	7.44	7.36	7.29	7.27
1	Maximize Safe Travel	27.0%	20.96	22.48	22.15	18.48	23.39	17.50
	Performance		70.18	72.29	70.59	68.09	75.03	67.95
	Cost		$ 112.72	$ 160.72	$ 87.00	$ 100.00	$ 190.72	$ 152.00
	Ratio Performance/Cost		0.62	0.45	0.81	0.68	0.39	0.45
	Order w/ cost		3	4/5	1	2	6	4/5
	Order w/o cost		4	2	3	5	1	6
	Average Order		3.5	3.25	2	3.5	3.5	5.25

	Consultant (8)							
Order	Factor	Avg. Weight	Alt 20	Alt 22	Alt 23	Alt 25	Alt 27	Alt 28
2	Minimize Neighborhood Disruption	18.9%	14.68	14.76	14.34	14.68	17.10	16.58
3	Better Connect Links in the Transit and road Networks	16.2%	12.50	13.35	11.72	13.57	14.71	14.35
6	Maintain Good Air Quality	10.5%	8.22	8.22	8.22	8.22	8.22	8.22
5	Minimize Purchase of Private Property to Build Transportation Facilities	10.9%	4.63	4.35	5.22	3.95	4.09	3.47
4	Protect Open Spaces/Parks	13.1%	5.85	5.77	5.38	6.04	4.51	4.91
7	Control Noise at Sensitive Locations	8.2%	6.53	6.56	6.51	6.45	6.38	6.36
1	Maximize Safe Travel	22.0%	17.08	18.31	18.05	15.06	19.06	14.26
	Performance		69.50	71.32	69.45	67.97	74.08	68.16
	Cost		$ 112.72	$ 160.72	$ 87.00	$ 100.00	$ 190.72	$ 152.00
	Ratio Performance/Cost		0.62	0.44	0.80	0.68	0.39	0.45
	Order w/ cost		3	5	1	2	6	4
	Order w/o cost		3	2	4	6	1	5
	Average Order		3	3.5	2.5	4	3.5	4.5

Figure 3-17
Original Alternative 23
Highest Ranked Alternative

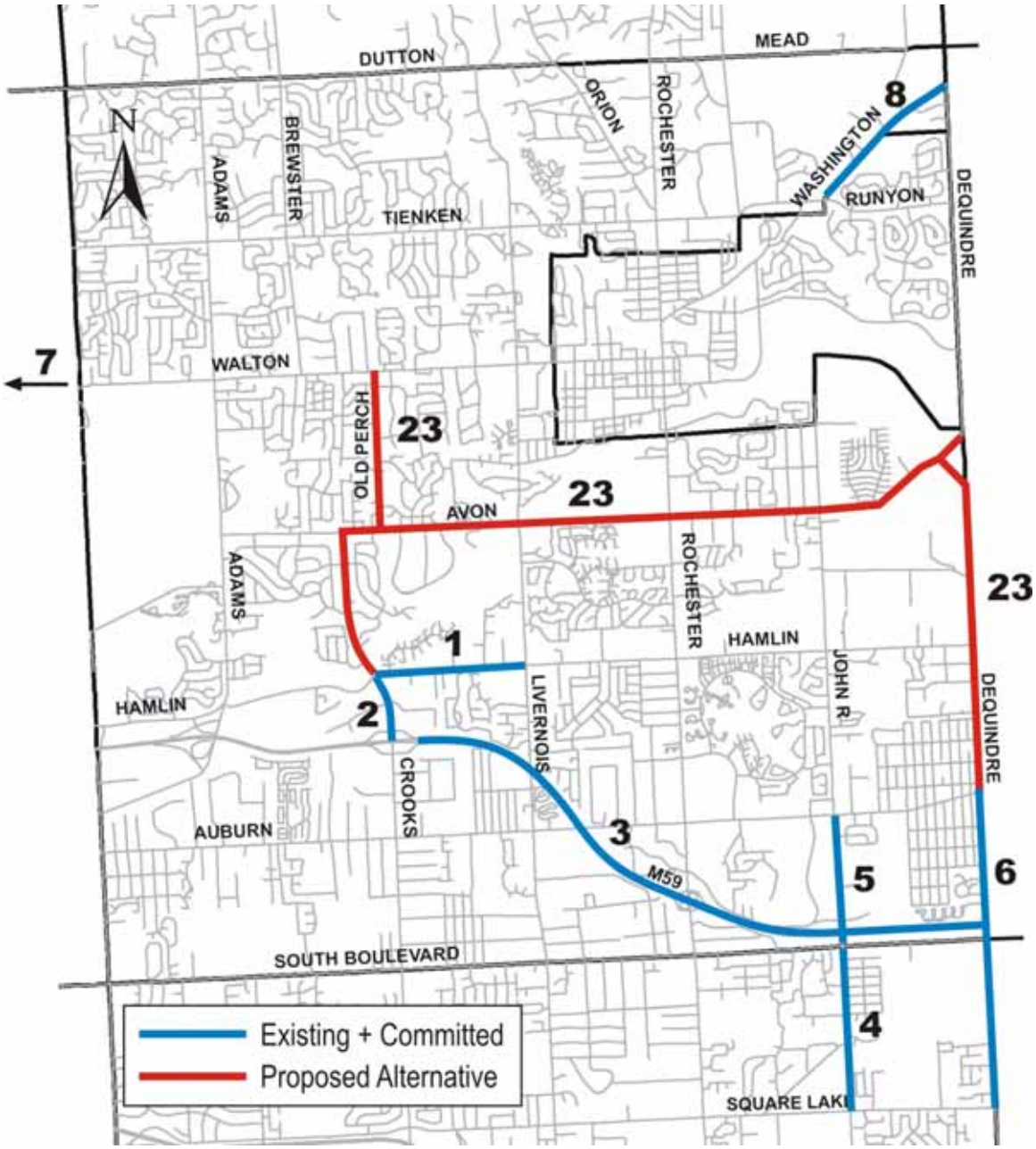
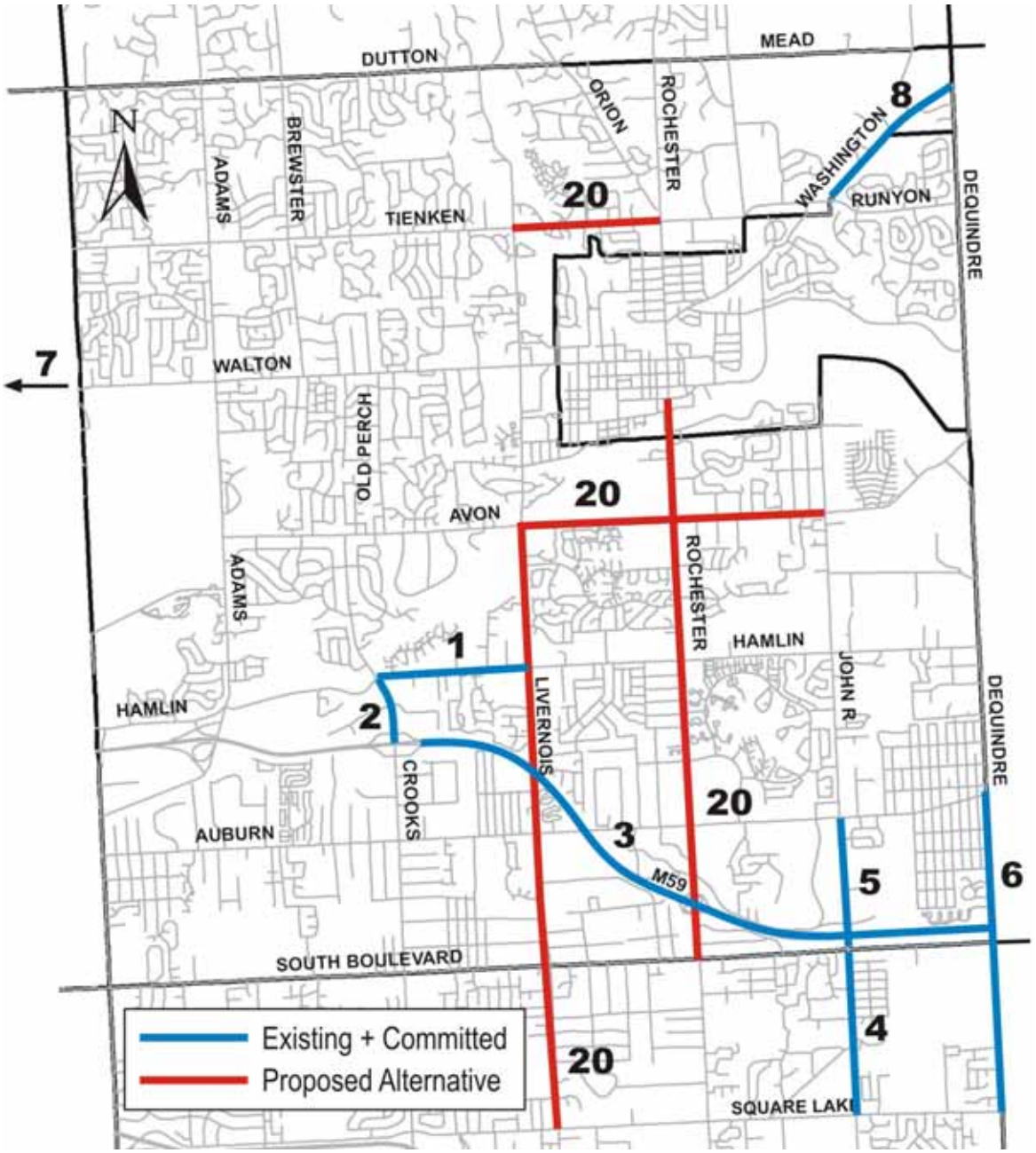


Figure 3-18
Alternative 20
Next Ranked Alternative



Upon review of the last MTPU prepared by others, similarities exist at plans on improving the major thoroughfare in Rochester Hills (Figure 3-19).

Figure 3-19
Previous Master Thoroughfare Plan Recommendations

Based on feedback from the Technical Committee the Dequindre Realignment at Avon/Dequindre and 23 Mile Road was suggested to be added to the preferred alternative (Alternative 23). A generic alignment was suggested and shown for analysis purposes and is shown in Figure 3-20. In 2001 a unit cost estimate to bridge between the current Avon/Dequindre/23 Mile Road intersection and Dequindre Road to the south was updated to 2007 dollars. The current range of costs was estimated to be between $7 million and $10 million more because of the grades, floodplain, and long elevated structure required. Upon adding these costs back through the cost effectiveness evaluation Alternative 23 still provides the most "bang for the buck" at $57 million.

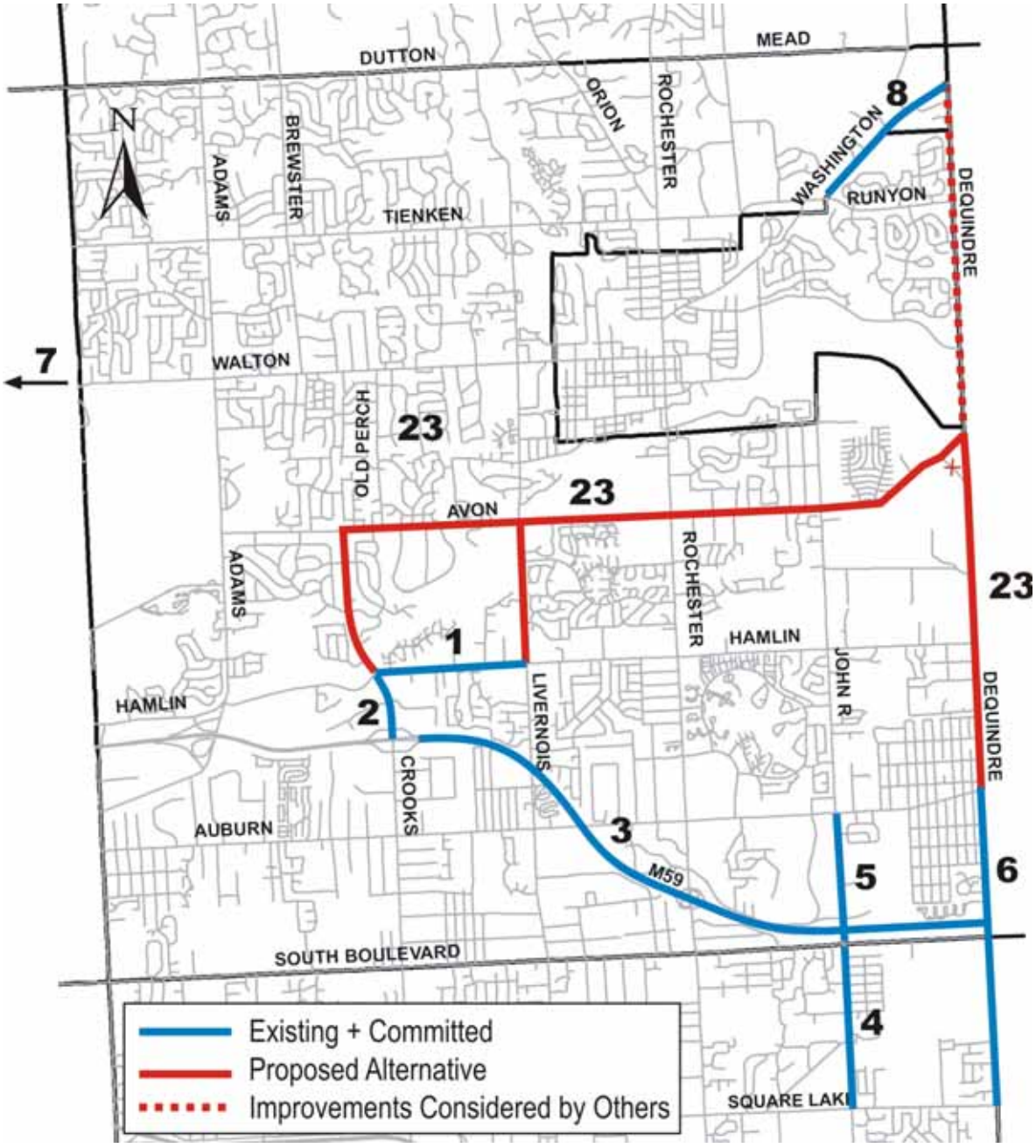
Figure 3-20
Dequindre Realignment Right-of-Way

Three more refinements were offered by the Technical Committee to make up the preferred alternative. They included replacing the Old Perch segment between Avon and Walton with the section of Livernois between Avon and Hamlin, adding a host of safety and operational fixes to Rochester Road, and a suggestion that improvements on Dequindre Road continue beyond the city limits from 23 Mile Road to 26 Mile Road be considered by other jurisdictions.

The Rochester Road fixes will be included in the next section. Discussions with Shelby Township on Dequindre Road north of 23 Mile Road have been initiated and discussions with the Macomb County Road Commission and the City of Rochester are planned.

In Figure 3-21 is the modified Alternative 23 that is the most effective means to alleviate the anticipated roadway congestion in 2035 and, therefore, now called the Preferred Alternative.

Figure 3-21
Preferred Alternative



3.6 Alternative Staging

Dequindre Road was determined by the Technical Committee to be the highest priority in the staging of alternative improvements because it is a border road and benefits many communities. Its costs could be shared between the two communities and the two road commissions involved. This, however, presents other challenges as there are two different federal aid committees that must agree to fund the project. Then there are different governing policies which involve right-of-way acquisition and other elements which need to be coordinated as soon as planning moves forward. Other recent experience expressed by Technical Committee members suggests one champion must take the lead in these types of projects to follow them through to completion.

3.7 Segment Safety Improvements

3.7.1 Crash Concentrations

Crash data was analyzed on every link in the city and the top 20 segments were selected for further consideration. The segments are highlighted in Figure 3-22. Detailed analysis of the types and locations of crashes is included in Tables 3-14A and 3-14B. Improvements are identified below.

Link A – Rochester Road from South to Auburn. Crashes are evenly distributed throughout the mile long link. Signalized intersections at the off-ramps to eastbound and westbound M-59 along with slip on-ramps to M-59 create additional conflict points along with Eastlawn, Michelson, Nawakwa, Shadywood, and Hickory Lawn in the same stretch. Installation of a new traffic signal for Lowes and Meijer outbound traffic and right in and right out movements help to control access and create gaps in the traffic stream south of Auburn Road. Rear-end and angle crashes are most likely caused do to heavy afternoon peak hour congestion as 22 percent occur in the two hours between 4:00 and 6:00 pm. The hazardous action reported on the crash reports were indicated as fail to yield and unable to stop in 39 percent of the crashes.

Crash Countermeasures for Link A. Access management techniques including closure and consolidation of driveways, turn lanes, and additional channelization along with capacity improvements could reduce the potential for traffic crashes.

Exclusive right-turn or deceleration lanes from South Boulevard to M-59 in the northbound direction and southbound from Auburn Road to M-59 could substantially improve operations and safety in this section (Figures 3-23 and 3-24). A safety audit and time of return analysis on Rochester Road should be conducted by MDOT. A benefit to cost ratio of 3 to 1 was calculated on just the southbound continuous right-turn lane with only southbound rear end crashes considered to be reduced by 30 percent.

Link B – Rochester Road from Auburn to Hamlin. Crashes are concentrated near the commercial driveways from Auburn to North of Barclay Circle and the area south of Hamlin Road. The crash cause was reported as unable to stop 60 percent of the time which correlates to the rear-end crash type occurring 65 percent of the time. The highest percentage of crashes occurred between 12:00 – 2:00 pm resulting in 26 percent of the total crashes in the four years analyzed.

Figure 3-22
Segments with Above Average Crash Rates

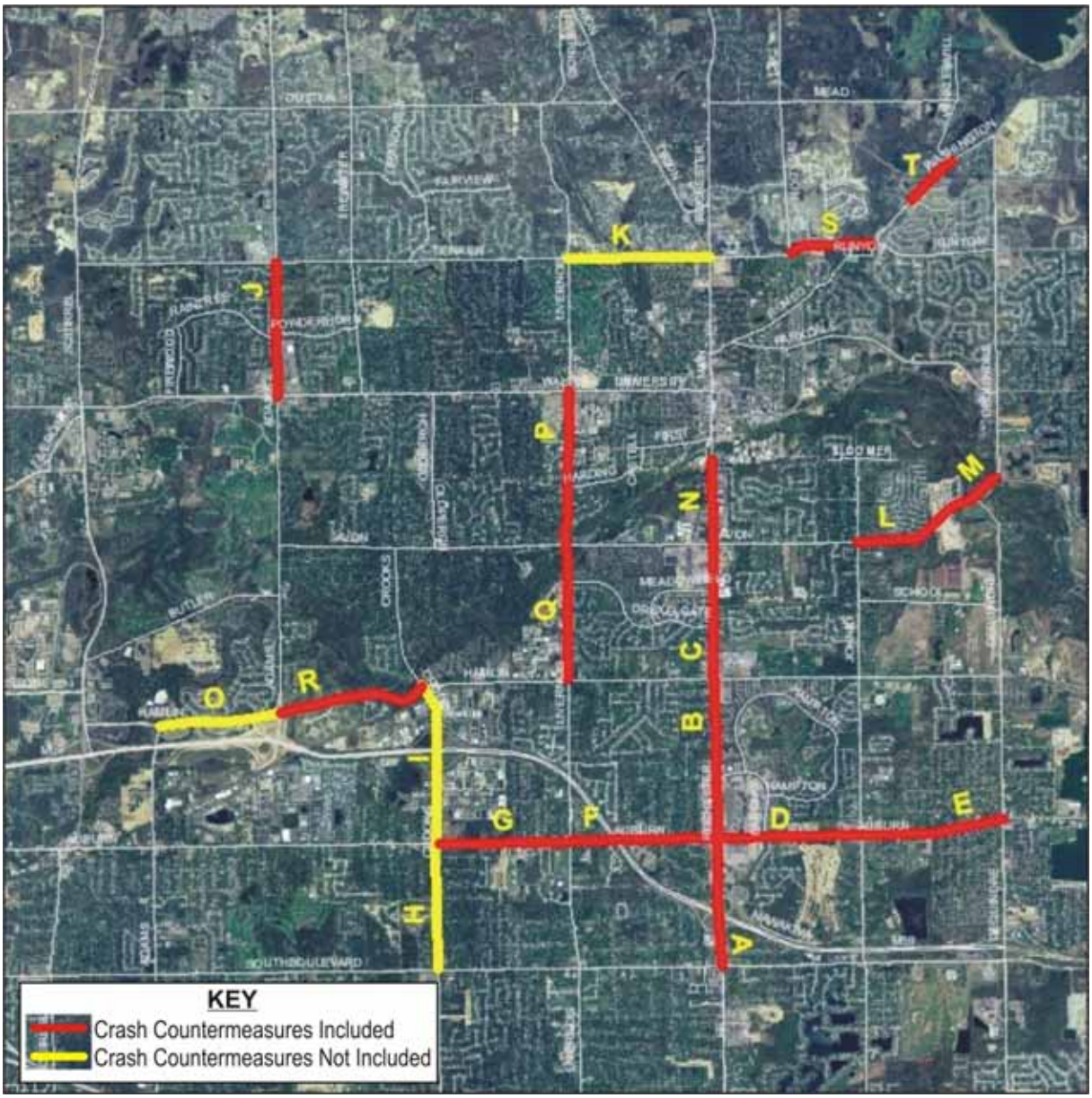


Table 3-14A
Segment Crash Data

Link	On	From	To	Type of Crash 2003-2006							Total	Crashes Per Mile Per Year	Crash Rate (crashes per MVM)
				Single	Ho-It	Angle	Re-sum	SS-S	SS-O	Other			
A	Rochester Road	South Street	Auburn Road	12	81	149	174	24	7	3	450	113	6.88
B	Rochester Road	Auburn Road	Hamlin Road	12	37	76	321	38	4	8	496	124	6.41
C	Rochester Road	Hamlin Road	Avon Road	15	27	60	187	29	6	11	335	84	5.21
D	Auburn Road	Rochester Rd	John R Road	20	12	45	73	9	2	1	162	41	5.62
E	Auburn Road	John R Road	Dequindre Road	9	4	14	58	3	1	3	92	23	3.89
F	Auburn Road	Rochester Rd	Livernois Road	20	6	19	37	7		1	90	23	3.53
G	Auburn Road	Livernois Road	Crooks Road	10	2	11	47	6		2	78	20	3.83
H	Crooks Road	South Street	Auburn Road	8	3	16	70	2	1		100	25	5.44
I	Crooks Road	Auburn Road	Hamlin Road	8	32	67	120	34	4	9	274	69	8.17
J	Adams Road	Dutton Road	Tienken Road	24	8	9	49	2	1	2	95	24	2.46
K	Tienken Road	Livernois Road	Rochester Road	15	5	17	62	7		2	108	27	3.79
L	Avon Road	John R Road	Dequindre Road	15	5	17	62	7	1	1	108	27	4.05
M	Avon Road	Dequindre Road	23 Mile	2		1	6		1		10	3	2.33
N	Rochester Road	Avon Road	Diversion	5	9	36	80	23	1	3	157	39	4.47
O	Adams Road	Industrial Drive	Quail	23	3	20	31	15		2	94	24	5.44
P	Livernois	Walton	Avon Road	23	5	32	99	19	1	3	182	46	3.86
Q	Livernois	Avon Road	Hamlin	14	6	6	58	1	2	2	89	22	3.76

Legend: Ho-It = Head-on left-turn, Re-sum = Rear ends (All), SS-same = Side-swipe same direction, SS-opp = Side-swipe opposite direction
MVM = Million Vehicle Miles Traveled, MV = Million Vehicles Entered
Source: The Corradino Group of Michigan, Inc. and TIA

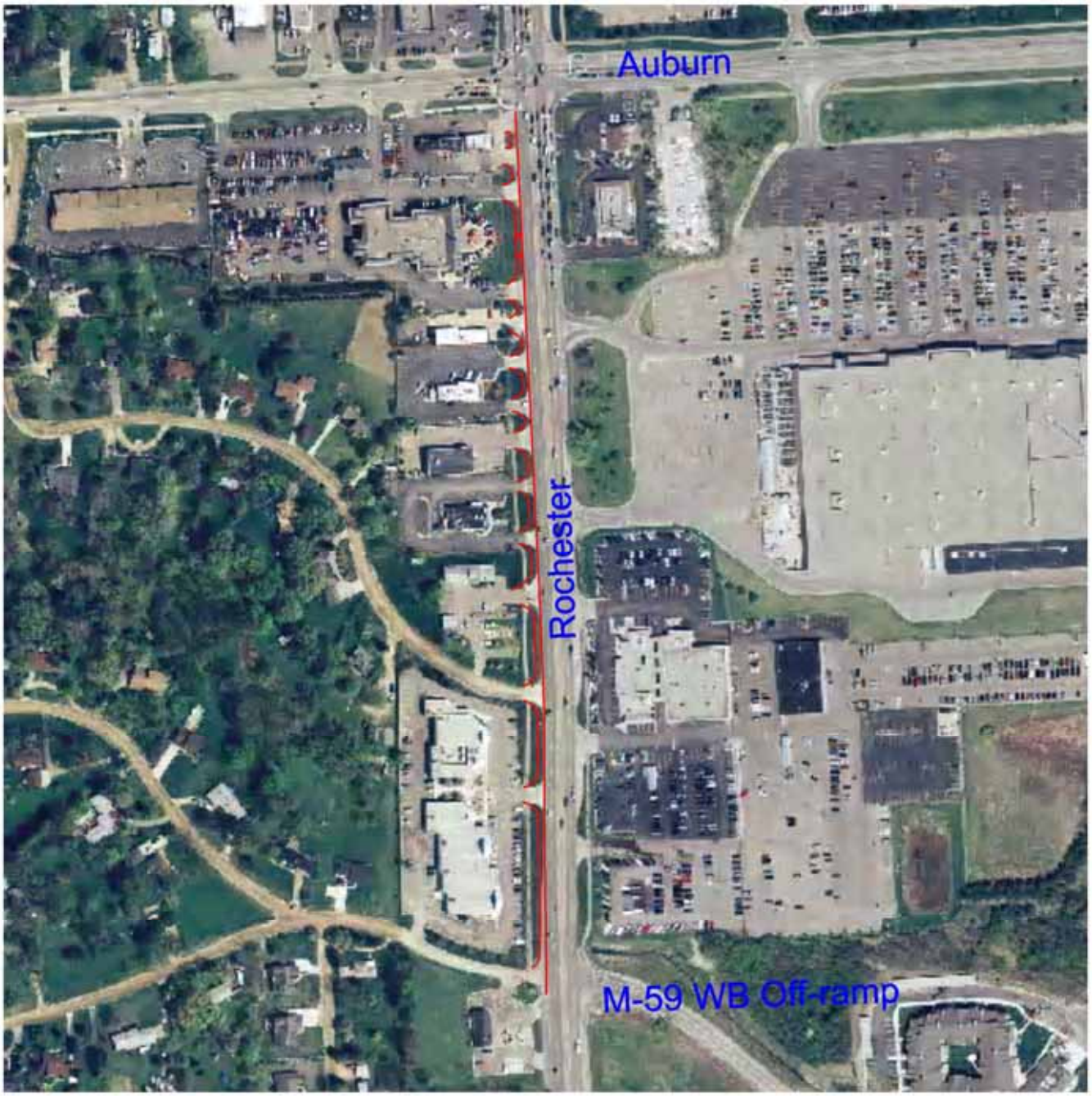
Table 3-14B
Segment Crash Type Summary

Link	On	From	To	Type of Crash 2003-2006						
				Single	Ho-It	Angle	Re-sum	SS-S	SS-O	Other
A	Rochester Road	South Street	Auburn Road	3%	18%	33%	39%	5%	2%	1%
B	Rochester Road	Auburn Road	Hamlin Road	2%	7%	15%	65%	8%	1%	2%
C	Rochester Road	Hamlin Road	Avon Road	4%	8%	18%	56%	9%	2%	3%
D	Auburn Road	Rochester Rd	John R Road	12%	7%	28%	45%	6%	1%	1%
E	Auburn Road	John R Road	Dequindre Road	10%	4%	15%	63%	3%	1%	3%
F	Auburn Road	Rochester Rd	Livernois Road	22%	7%	21%	41%	8%	0%	1%
G	Auburn Road	Livernois Road	Crooks Road	13%	3%	14%	60%	8%	0%	3%
H	Crooks Road	South Street	Auburn Road	8%	3%	16%	70%	2%	1%	0%
I	Crooks Road	Auburn Road	Hamlin Road	3%	12%	24%	44%	12%	1%	3%
J	Adams Road	Dutton Road	Tienken Road	25%	8%	9%	52%	2%	1%	2%
K	Tienken Road	Livernois Road	Rochester Road	14%	5%	16%	57%	6%	0%	2%
L	Avon Road	John R Road	Dequindre Road	14%	5%	16%	57%	6%	1%	1%
M	Avon Road	Dequindre Road	23 Mile	20%	0%	10%	60%	0%	10%	0%
N	Rochester Road	Avon Road	Diversion	3%	6%	23%	51%	15%	1%	2%
O	Adams Road	Industrial Drive	Quail	24%	3%	21%	33%	16%	0%	2%
P	Livernois	Walton	Avon Road	13%	3%	18%	54%	10%	1%	2%
Q	Livernois	Avon Road	Hamlin	16%	7%	7%	65%	1%	2%	2%

Legend: Ho-It = Head-on left-turn, Re-sum = Rear ends (All), SS-same = Side-swipe same direction, SS-opp = Side-swipe opposite direction
MVM = Million Vehicle Miles Traveled, MV = Million Vehicles Entered
Source: The Corradino Group of Michigan, Inc. and TIA

Figure 3-23
Segment A – Rochester Road South of M-59

Figure 3-24
Segment A – Rochester Road North of M-59



Crash Countermeasures for Link B. Access management techniques including closure and consolidation of driveways, additional continuous-right-turn lanes, and additional channelization along with capacity improvements could reduce the potential for traffic crashes (Figure 3-25).

Link C – Rochester Road from Hamlin to Avon. Crashes are concentrated in five general locations in this segment. The retail areas just south of Avon and just north of Hamlin have busy driveways that involve more conflict points. The other crash areas are located around residential access at Sandalwood, Drexelgate, and Meadowfield/Yorktowne.

The speed studies conducted showed that this section had the highest average speeds in the corridor in both the off-peak and afternoon peak hours. A lack of gaps in traffic has also been documented in other studies.

Crash Countermeasures for Link C. Contemplated development on the east side of Rochester Road is anticipated in the next 5 years. The potential need for a signal at Meadowfield/Yorktowne and for this new development should consider equal one-third mile spacing between both new proposed signal locations. Access changes near these new signal locations has already been considered and should be able to warrant new signals as the developments are implemented.

Link D – Auburn Road from Rochester to John R. Angle and rear end crashes are concentrated near the Meijer/Kohls Driveway and the Barclay Circle Signalized intersection. Left-turn movements into and out of the unsignalized driveway is often difficult as the turning and through volumes are high at this location.

Crash Countermeasures for Link D. Mitigation would include more concentration of driveways and improved access to the Barclay signal or removal of one of the non-channelized driveways at Meijer and Kohls. Also the extension of the three-lane road segment to the west from John R. to accommodate eastbound left-turns to the first driveway at the Salvation Army store would reduce the potential for crashes there.

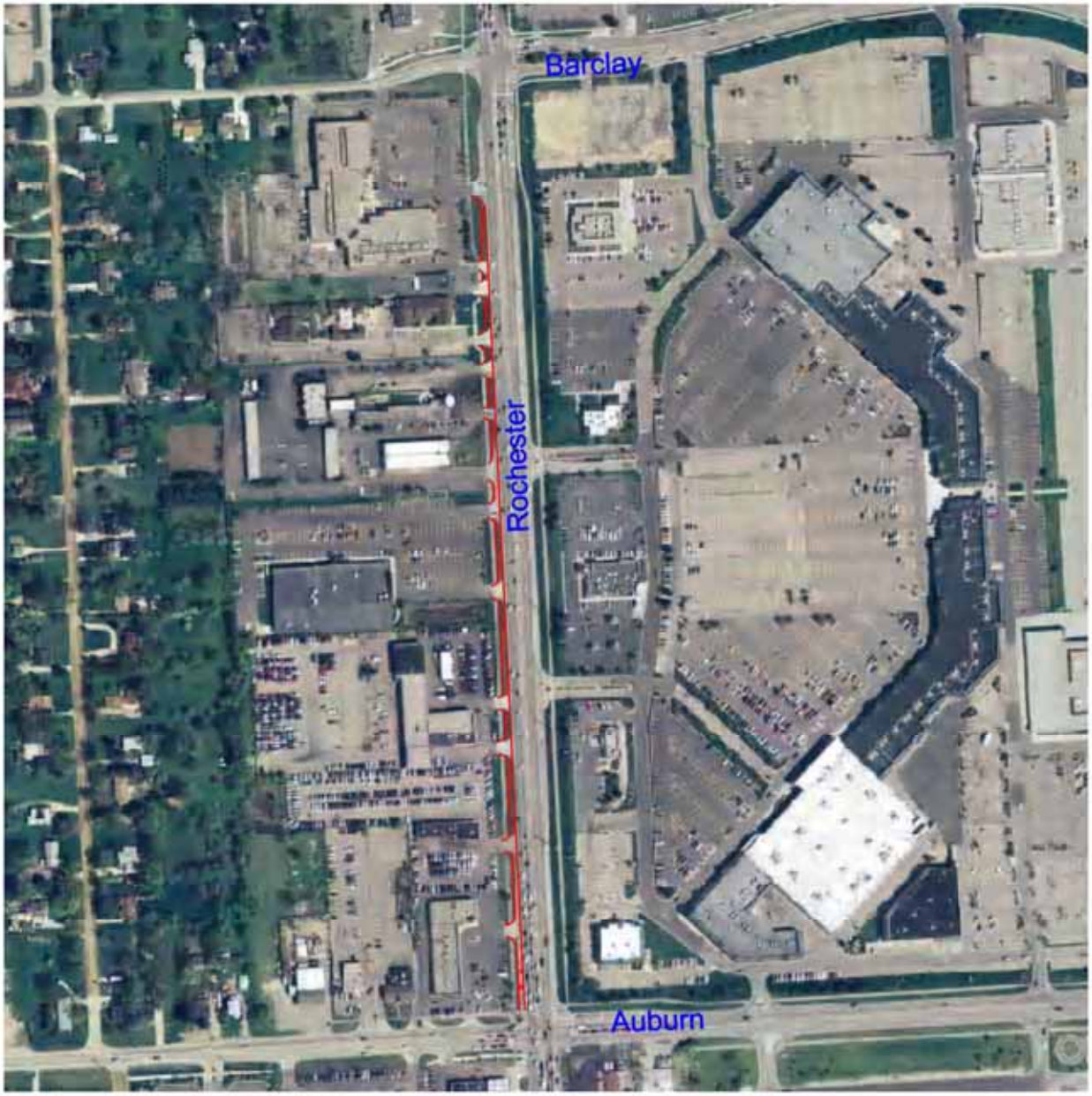
Link E – Auburn Road from John R. to Dequindre. Crashes occurring on this segment are related to the 12 access points to the side streets along this segment.

Crash Countermeasures for Link E. Mitigation for this road section would include a continuous center-turn lane for the entire length.

Link F – Auburn Road from Livernois to Rochester. The single vehicle crashes are evenly distributed throughout the segment while the rear-end crashes are occurring near the approaches to Livernois and Rochester Road.

Crash Countermeasure for Link F. Mitigation for this road section would include a continuous center-turn lane for the entire length.

Figure 3-25
Segment B – Rochester Road North of Auburn



Link G – Auburn Road from Crooks to Livernois. Crashes are concentrated in the area at the Avondale Middle School driveway at Cone, through to Lexham, east of the Avondale Meadows Driveway directly off of Auburn Road. There are busy retail activities on the north side that also contribute to heavy turns in the area.

Crash Countermeasures for Link G. Mitigation for this road section would include a continuous center-turn lane for the entire length.

Link H – Crooks Road from South to Auburn. No countermeasures are suggested because the new four-lane boulevard was just completed. Crashes should be monitored as a high number of rear-end, angle and head-on crashes should be eliminated as a result of the recent improvements.

Link I – Crooks Road from Auburn to Hamlin. No countermeasures are suggested because the high percentage of angle crashes should be mitigated by the new boulevard cross section.

Link J – Adams Road from Tienken to Walton. Angle, rear-end, and head-on left-turn crashes are occurring near the commercial driveways close to Walton.

Crash Countermeasures for Link J. Additional deceleration lanes and access management principles, including shared access easements, should be initiated.

Link K – Tienken Road from Livernois to Rochester. Early preliminary engineering analysis is currently being completed on this road segment and will likely be improved in the next few years. Therefore, no countermeasures are suggested at this time.

Link L – Avon Road from John R. to Dequindre. Congestion and access issues contribute to crashes on this segment.

Crash Countermeasures for Link L. A center left-turn lane should be considered for this road segment.

Link M – Avon Road from Dequindre to 23 Mile Road. Congestion and access issues contribute to crashes on this segment.

Crash Countermeasures for Link M. A center left-turn lane should be considered for this road segment. The proposed improvements to realign Dequindre as part of the preferred alternative would reduce crashes and help clear congestion in Links L and M.

Link N – Rochester Road from Avon to Diversion. Angle crashes from the commercial access are observed here.

Crash Countermeasures for Link N. Access management techniques such as shared access easements, closure and consolidation of driveways, and channelization of driveways should be explored.

Link O – Hamlin from Old Adams to New Adams. This road segment, which is now a four-lane boulevard, will experience different volumes over the next few years. No countermeasures are suggested but crashes should be monitored.

Link P – Livernois Road from Avon to Walton. Crashes are occurring nearing the commercial areas and at the direct crossovers in the boulevard section.

Crash Countermeasures for Link P. The direct crossover connections southbound on Livernois at Harding and in the commercial area should be further studied to be closed. The boulevard should be able to function adequately using the indirect left-turns as planned.

Links Q, S, T. Crashes are occurring along the road segments and are congestion- or access-related.

Crash Countermeasures for Links Q, S, T. Provide a center-turn lane when the opportunity presents itself.

Link R – Hamlin Road from Adams to Crooks. Forty-four of 62 reported crashes were animal-related. Signs are already posted. No countermeasures, other than wildlife management, are suggested.

Costs for the safety improvements and crash countermeasures were developed and are provided in Table 3-15. All costs are in 2007 dollars and were based on a recent publication from the Road Commission for Oakland County "Facing the Music" Report of the 2007 Planning Process. Improvements in Segments A, B, C and N along Rochester Road should be implemented as soon as possible. Often there is a direct relationship between crashes and congestion. Where we can improve safety, improved operations usually follow.

Table 3-15
Crash Countermeasure Estimated Costs

Crash Segment	Crash Countermeasure	Estimated Costs
A	Deceleration lane for NB and SB Rochester	$1 million - $2 million
B	Deceleration lane for SB Rochester	$1 million - $2 million
C	Deceleration lanes and access management	$200,000 - $500,000
D	Close one driveway at Kohls or Meijers, Extend center-turn lane at John R	$200,000 - $500,000
E	Add center-turn lane - full length	$2 million - $3 million
F	Add center-turn lane - full length	$2 million - $3 million
G	Add center-turn lane - full length	$2 million - $3 million
H	New 4 lane Boulevard	NA
I	New 4 lane Boulevard	NA
J	Access management and deceleration lanes	$300,000 - $500,000
K	EPE study underway - 3 or 5 lane	TBD
L	Add center-turn lanes/passing lanes	$1 million - $1.5 million
M	Add center-turn lane	$1 million - $1.5 million
N	Access management and deceleration lanes	$200,000 - $500,000
O	Change in traffic exposure with new relocated Adams -monitor crashes	NA
P	Remove direct-left-turn	$100,000
Q	Center-turn lane/passing lanes	$200,000 - $500,000
R	Animal Control	NA
S	Add center-turn lane - full length	$500,000 - $1 million
T	Add center-turn lane - full length	$500,000 - $1 million

Note: Costs are in 2007 dollars.

3.8 Intersection Operations and Safety

Adams Road and Rochester Road corridors were analyzed in detail to determine existing and future capacity and safety deficiencies. Traffic data for the afternoon peak hour was collected from various sources including the City, MDOT, Road Commission for Oakland County, and other traffic impact studies. A model based on SYNCHRO/SIMTRAFFIC software was developed and used to examine the corridors at a "micro" level or intersection by intersection basis. The turning movement counts were input into this simulation model which replicates the current transportation system including the number of lanes, current signal timing, phasing etc… The corridor was then analyzed and calibrated to properly replicate existing operational conditions.

The model's network allows consideration of major intersection and driveways along Adams Road and Rochester Road; the traffic movements at each; and, the phasing/timing of traffic signals and a quantitative measure of operational performance. Measures of Effectiveness (MOE) produced by this set of models include:

Level of Service (LOS): The level-of-service concept provides the most widespread measure of traffic performance. Levels of service range between LOS A (free flow, minimal delays) to LOS F (highly congested, heavy delays). Intermediate conditions are described by LOS B, LOS C, LOS D and LOS E. In urban conditions, LOS D is generally the minimum

acceptable performance (level-of-service standard). In the core of the Southeast Michigan region, LOS E is often considered acceptable.

Delay: At intersections, the levels of service are measured through the calculation of delays incurred by vehicles crossing the intersection. Each level of service described above indicates a range of delays as shown next (Table 3-16):

Table 3-16
Level of Service (LOS) Criteria for Signalized Intersections

LOS A	Less than or equal to 10 sec per vehicle average delay	Most vehicles do not stop at all. Most arrive during the green phase. Little or no delay
LOS B	>10 to 20 sec. avg delay per vehicle	More vehicles stop than for LOS A. Still good progression through lights. Short traffic delays.
LOS C	>20 to 35 sec. avg delay per vehicle	Significant numbers of vehicles stop, although many pass through without stopping.
LOS D	>35 to 55 sec. avg. delay per vehicle	Many vehicles stop. Individual signal cycle failures are noticeable. Progression is intermittent.
LOS E	>55 to 80 sec. avg delay per vehicle	Considered to be the limit of acceptable delay. Individual cycle failures are frequent and progression is poor.
LOS F	> 80 sec. avg delay per vehicle	Extreme and unacceptable traffic delays.

Existing and future condition LOS for Adams Road, along with future year improvements to obtain acceptable levels of service are provided in Table 3-17.

Future traffic conditions were developed by growing the existing model volumes by the expected growth in traffic based on SEMCOG's Transportation Demand Model estimates of future population and employment growth. This gives a conservative estimate of traffic in the year 2035 used for modeling and anticipation of future problems if nothing else changed on the transportation network.

Obviously, with more traffic and no improvements to the road network, congestion increases and operations continue to degrade or get worse and as shown in Table 3-17. Balancing other modes of travel and the public space created by the streets is an important consideration in implementing this plan. By no means was this analysis absent of the consideration of the context in which these improvements are being proposed.

The consulting team developed improvements to mitigate the expected issues in the future year analysis. Improvements were made to the network this time to be able to adequately serve the future year volumes at an acceptable LOS. Those also are listed in the Table 3-17 as Proposed Improvements.

Figures 3-26 through 3-32 highlight short-, mid- and long-term strategies to improve and fix the current anticipated issues.

Existing and future condition LOS are provided similarly for Rochester Road. Future year improvements to obtain acceptable levels of service are also provided in Table 3-18.

Table 3-17
Adams Road Corridor- Summary of Operations

Intersection		Existing 2007 LOS	Future 2035 LOS No Improvements	Proposed Improvements	LOS
1	Dutton Rd & Adams Rd	A (5.3)	A (9.0)	Reconfigure E/W for Left turn Lane	A (9.3)
2	Van Hoosen School Dr & Adams Rd	A (1.8)	F (122.6)	EB - No Changes NB - Add 1 left turn lane with 150' storage SB - No Changes	A (8.1)
3	Tienken Rd & Adams Rd	E (64.6)	F (201.6)	EB - Add 1 thru lane WB - Add 1 thru lane NB - Add 1 thru lane SB - Add 1 thru lane	D (47.3)
4	Powderhorn Ridge Rd & Adams Rd	A (6.8)	B (10.1)	No changes	B (12.4)
5	Raintree Dr & Adams Rd	B (14.9)	C (26.0)	No changes	C (28.4)
6	Walton Blvd & Adams Rd	E (74.0)	F (221.7)	EB - Add 2 thru lanes, Keep dedicated RT Lane WB - Add 2 thru lanes and right turn lane NB - Add 1 thru lane, Add 2 right turn lanes SB - Add 1 thru lane	D (42.2)
7	Hillendale Dr & Adams Rd	A (7.3)	A (9.2)	EB - No Changes WB - No Changes NB - Add 1 thru lane, lengthen left turn storage to 150' SB - Add left turn lane w/ 150' storage	B (14.9)
8	Avon Rd & Adams Rd	C (25.8)	D (56.0)	WB - Add second (dual) right turn lane NB - Add 1 thru lane SB - Add 1 thru lane	D (44.5)
9	Hamlin Rd & Adams Rd	A (9.9)	F (543.8)	EB - Add 1 thru lane WB - Add 1 right turn lane NB - No Changes SB - No Changes	B (14.8)
10	EB M-59 Off-Ramp & Adams Rd	B (18.0)	B (14.4)	No Changes	B (15.0)
11	Forester Rd & Adams Rd	A (6.4)	A (9.3)	No Changes	B (10.5)
12	Auburn Rd & Adams Rd	F (254.1)	F (467.7)	EB - Add 1 thru lane, Add second (dual) left turn lane WB - Add 1 thru lane, Add second (dual) left turn lane, Add 2 (dual) right turn lane NB - Add 1 thru lane, Add second (dual) left turn lane SB - Add 1 thru lane, Add second (dual) left turn lane	D (53.5)
13	South Blvd & Adams Rd	C (26.0)	D (36.6)	No Changes	D (44.8)

Source: Orchard, Hiltz & McCliment, Inc.

Figures 3-33 through 3-42 highlight short-, mid- and long-term strategies to improve and fix the current and anticipated issues on Rochester Road.

Figure 3-26
Tienken Road and Adams Road – Short-term

Figure 3-27
Tienken Road and Adams Road – Long-term

Figure 3-28
Walton and Adams Road – Short-term

Figure 3-29
Walton and Adams Road – Long-term

Figure 3-30
Auburn Road and Adams Road – Short-term

Figure 3-31
Auburn Road and Adams Road – Mid-term

Figure 3-32
Auburn Road and Adams Road – Long-term

Table 3-18
Rochester Road Corridor – Summary of Operations

	Intersection	Existing 2007 LOS	Future 2035 LOS No Improvements	Proposed Improvements	LOS
1	Diversion St & Rochester Rd	A (7.4)	A (8.7)	No changes	B (11.2)
2	Avon Rd & Rochester Rd	E (74.7)	F (132.1)	EB - Add 1 additional thru lane, provide Rt turn permissive-overlap signal phase WB - Add an exclusive RT lane, provide Rt turn permissive-overlap phase NB - Provide dual left turn lanes and one additional thru lane, provide Rt turn permissive-overlap phase SB - Provide dual left turn lanes and one additional thru lane, provide Rt turn permissive-overlap phase	D (50.9)
3	Hamlin Rd & Rochester Rd	C (32.8)	F (81.2)	EB - Extend 2nd lane westwards, for thru / right shared lane. WB - No changes NB - Add 1 additional thru lane, provide Rt turn permissive-overlap phase SB - Add 1 additional thru lane, provide Rt turn permissive-overlap phase	D (51.6)
4	Wabash Rd/Barclay Circle & Rochester Rd	E (69.3)	F (137.6)	EB - No changes WB - Remove median island, change from split phasing to concurrent E/W movement NB - Add 1 additional thru lane SB - Add 1 additional thru lane	C (21.9)
5	Auburn Rd & Rochester Rd	E (79.9)	F (126.4)	EB - Provide dual left turn lanes WB - Provide dual left turn lanes, remove exclusive RT lane NB - Provide dual left turn lanes, add 1 additional thru lane, provide Rt turn permissive-overlap phase SB - Provide dual left turn lanes, add 1 additional thru lane, provide Rt turn permissive-overlap phase	D (51.0)
6	M-59 WB off Ramp & Rochester Rd	B (13.6)	B (18.3)	No changes	C (29.1)
7	M-59 EB off Ramp & Rochester Rd	B (14.7)	B (13.3)	No changes	C (24.0)
8	South Blvd & Rochester Rd	F (111.1)	F (189.0)	EB - Provide dual left turn lanes, add 1 additional thru lane, remove exclusive RT lane WB - Add 1 additional thru lane NB - Add 1 additional thru lane, add exclusive RT lane, provide Rt turn permissive-overlap phase SB - Add 1 additional thru lane, add exclusive RT lane, provide Rt turn permissive-overlap phase	D (53.0)

Source: Orchard, Hiltz & McCliment, Inc.

Figure 3-33
Avon Road and Rochester Road – Short-term

Figure 3-34
Avon Road and Rochester Road – Long-term

Figure 3-35
Hamlin Road and Rochester Road – Short-term

Figure 3-36
Hamlin Road and Rochester Road – Long-term

Figure 3-37
Wabash Road/Barclay Circle and Rochester Road – Short-term

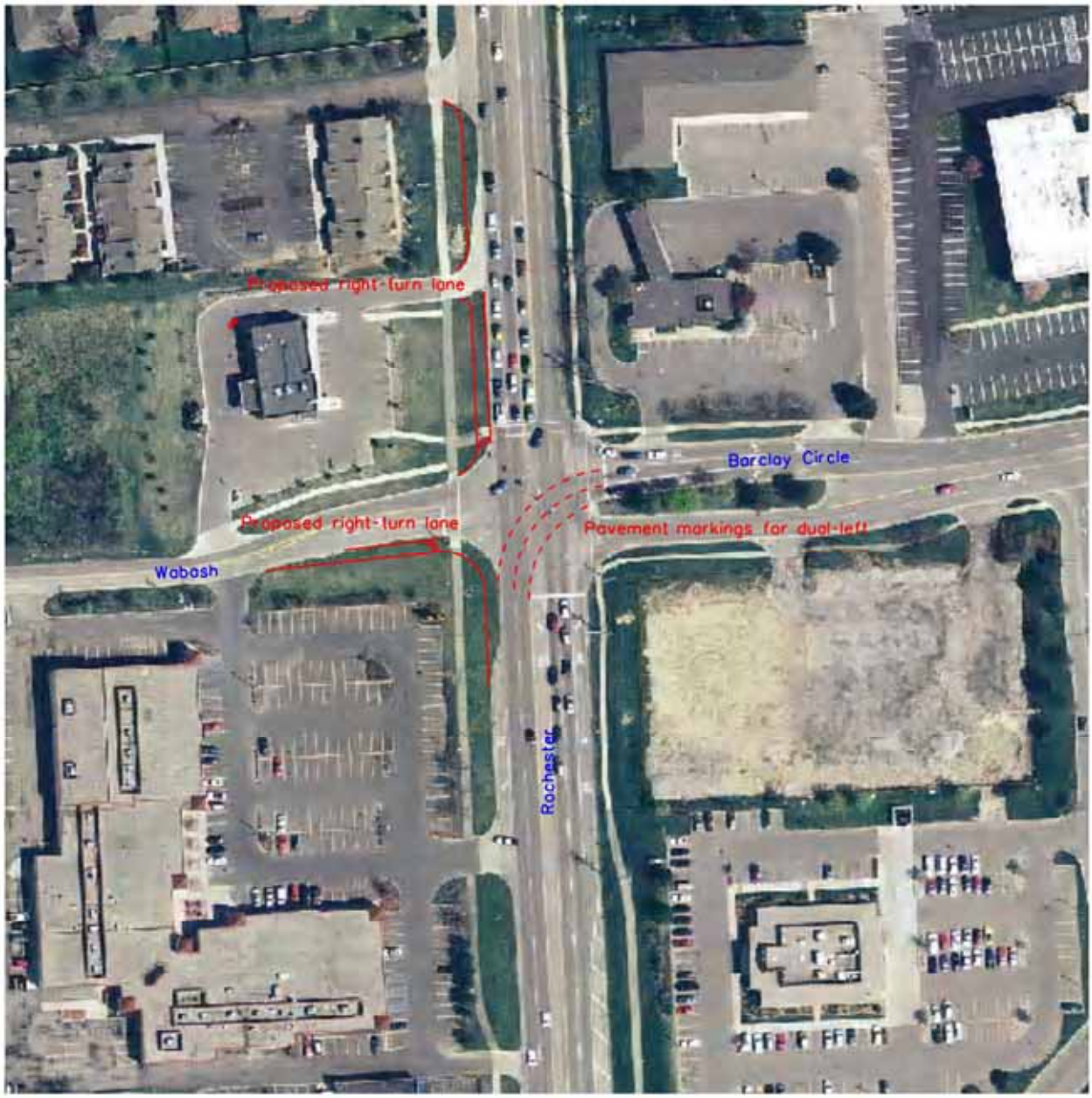


Figure 3-38
Wabash Road/Barclay Circle and Rochester Road – Long-term

Figure 3-39
Auburn Road and Rochester Road – Short-term

Figure 3-40
Auburn Road and Rochester Road – Long-term

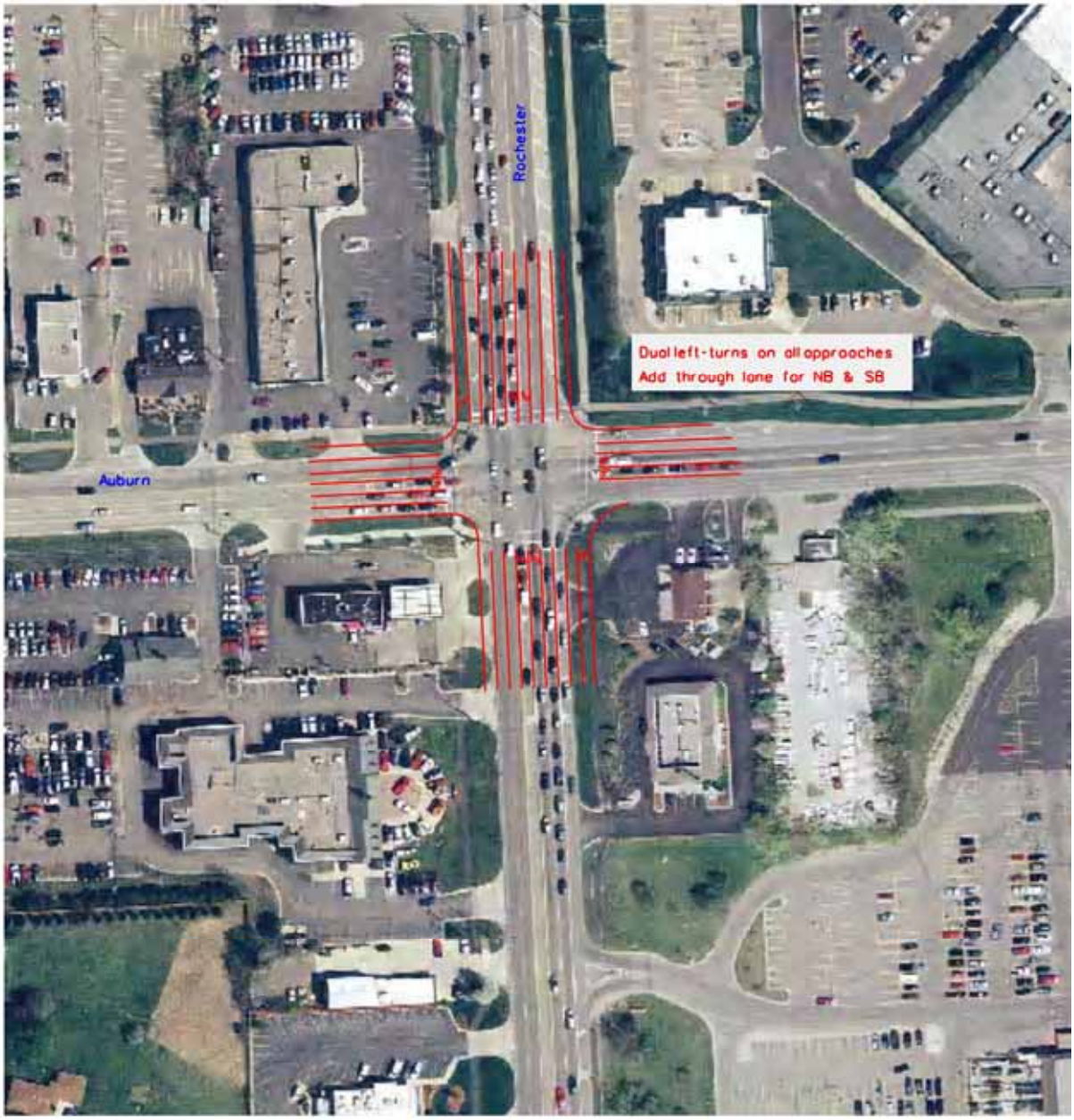


Figure 3-41
South Boulevard and Rochester Road – Short-term

Figure 3-42
South Boulevard and Rochester Road – Long-term

After reviewing the long-term operational fixes that need to be considered to carry the future year traffic and understanding the pressing safety needs that exist here today, options were considered including potential capacity fixes to Rochester Road. A seven-lane cross section, a six-lane boulevard, as well as modern roundabouts were analyzed.

Table 3-19 summarizes the improvements necessary and the expected LOS at Auburn and Rochester Road as an example.

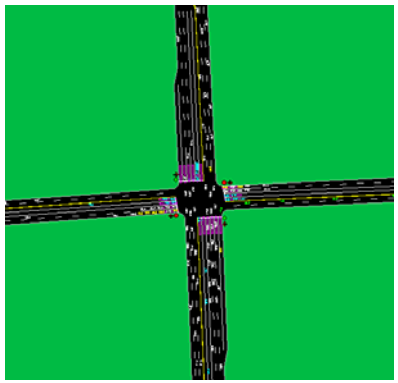
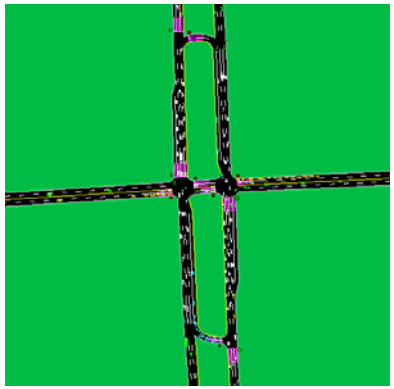
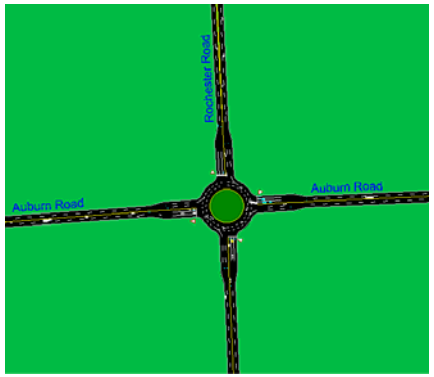
A modern roundabout that has three lane approaches and three lanes circulating could handle the suggested future year traffic at LOS B and be much safer doing so than with traditional dual-left-turns on each intersection approach as suggested for the five- or seven-lane condition.

A more detailed look at this intersection involved borrowing an existing design of a 3 x 2 roundabout to get an idea of the scale, inscribed diameter, and ROW required. It is shown in Figure 3-43.

The roundabout can be phased constructed so that the diameter is fixed for the ultimate year design traffic and built inwards as more lanes are necessary as demand grows. It also allows a lot of flexibility for what is done in the future on Rochester Road. It works with the existing five-lane cross section and can work with a future narrow four-lane boulevard as well.

A series of roundabouts along Rochester Road at Auburn Road, Hamlin Road and Avon Road could be implemented and substantially improve corridor operations and safety at similar land acquisition and capital costs as the traditional long-term solutions identified. Figure 4-44 highlights how this may look. Even further operational and safety benefits could be achieved economically if the MDOT and City agree to remove the center-turn lane and provide a raised median to create a narrow four-lane boulevard cross section. Indirect left-turn crossovers would have to be included at strategic locations mid-block between roundabouts. The roundabouts could also serve U-turn traffic as well. Obviously, more detailed investigation, design and analysis would have to be conducted to completely understand the safety and operational benefits. Additionally, it is expected this solution may handle all future capacity needs of the corridor and not require large expenditures in ROW acquisition outside of the intersections themselves.

Table 3-19
Optional Improvements for Intersection of Auburn at Rochester Road

Existing 2007 LOS	Future 2035, LOS No Improvements	Signalized Intersection, 7-Lane Undivided Road		Signalized Intersection, 6-Lane Boulevard		Roundabout	
		Proposed Improvements	Future 2035, LOS w/ Alt 23 Prop. Improvements	Proposed Improvements	Future 2035, LOS w/ Alt 23 Prop. Improvements	Proposed Improvements	Future 2035, LOS w/ Alt 23 Prop. Improvements
E	F	EB - Provide dual left turn lanes	D	EB - No changes	D	N leg: 2 lanes flaring to 3 lane approach, 3 lane departure merging to 2 lanes	B
		WB - Provide dual left turn lanes, remove exclusive RT lane		WB - Extend 2nd lane westwards, remove exclusive RT lane		W leg: 2 lanes flaring to 3 lane approach, 3 lane departure merging to 2 lanes	
		NB - Provide dual left turn lanes, add 1 additional thru lane, provide Rt turn permissive-overlap phase		NB - Add 1 additional thru lane, provide exclusive Rt turn lane		S leg: 2 lanes flaring to 3 lane approach, NB to EB by-pass lane, 3 lane departure merging to 2 lanes	
		SB - Provide dual left turn lanes, add 1 additional thru lane, provide Rt turn permissive-overlap phase		SB - Add 1 additional thru lane, provide exclusive Rt turn lane		E leg: 2 lanes flaring to 3 lane approach, 3 lane departure merging to 2 lanes	
							

Source: Orchard, Hiltz & McCliment, Inc.

Figure 3-43
Auburn Road and Rochester Road – Modern Roundabout

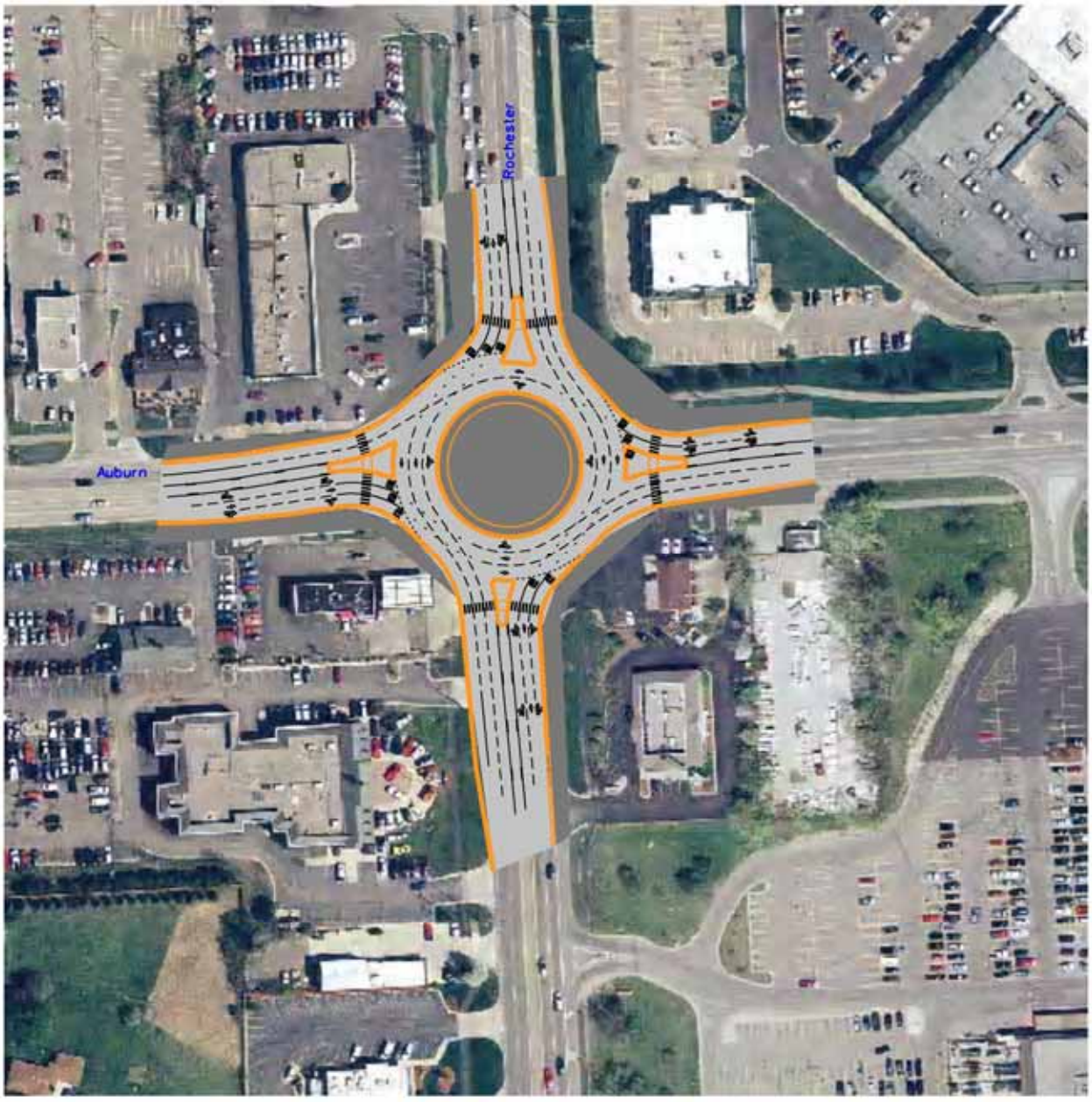


Figure 3-44
Series of Modern Roundabouts

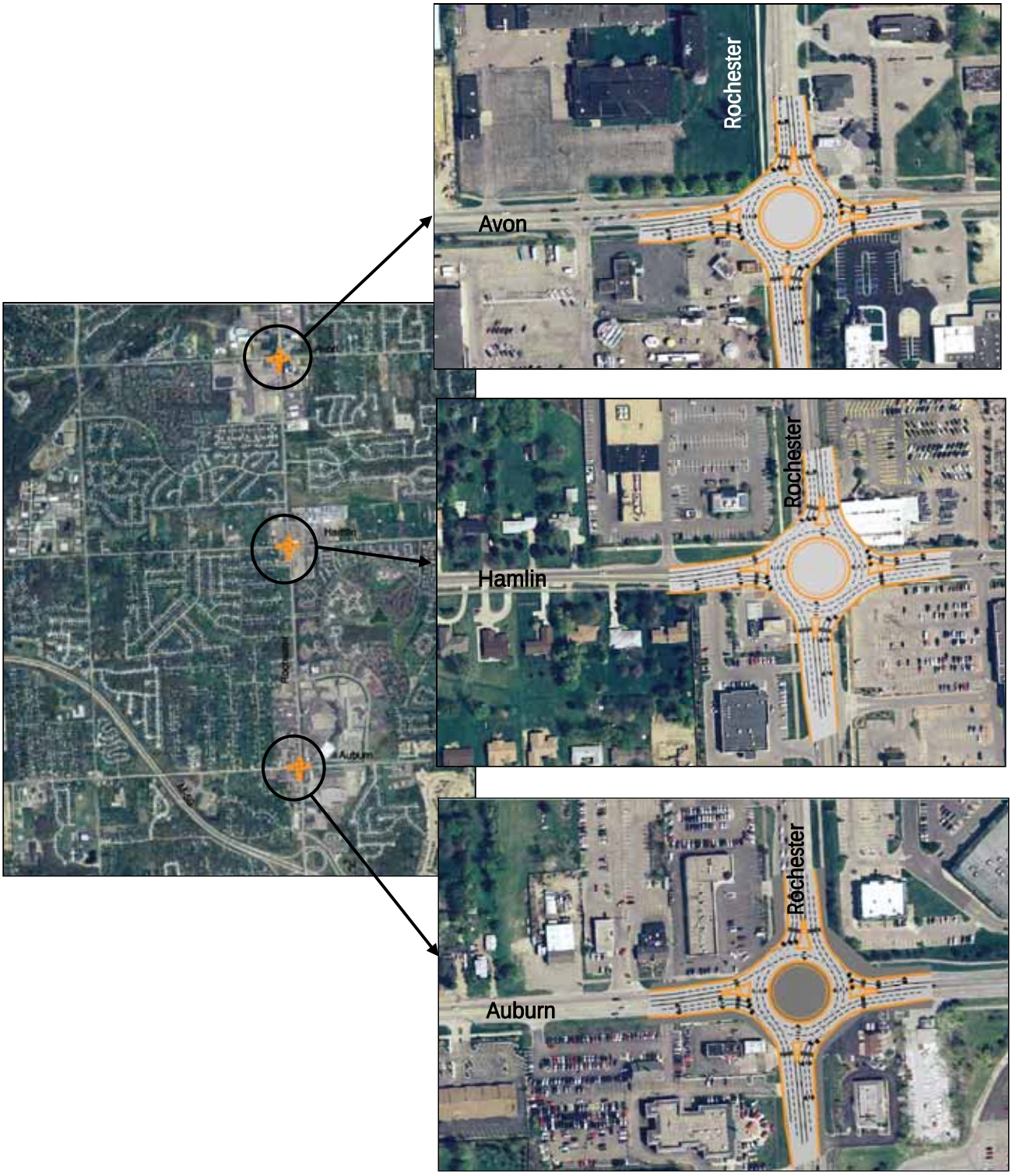
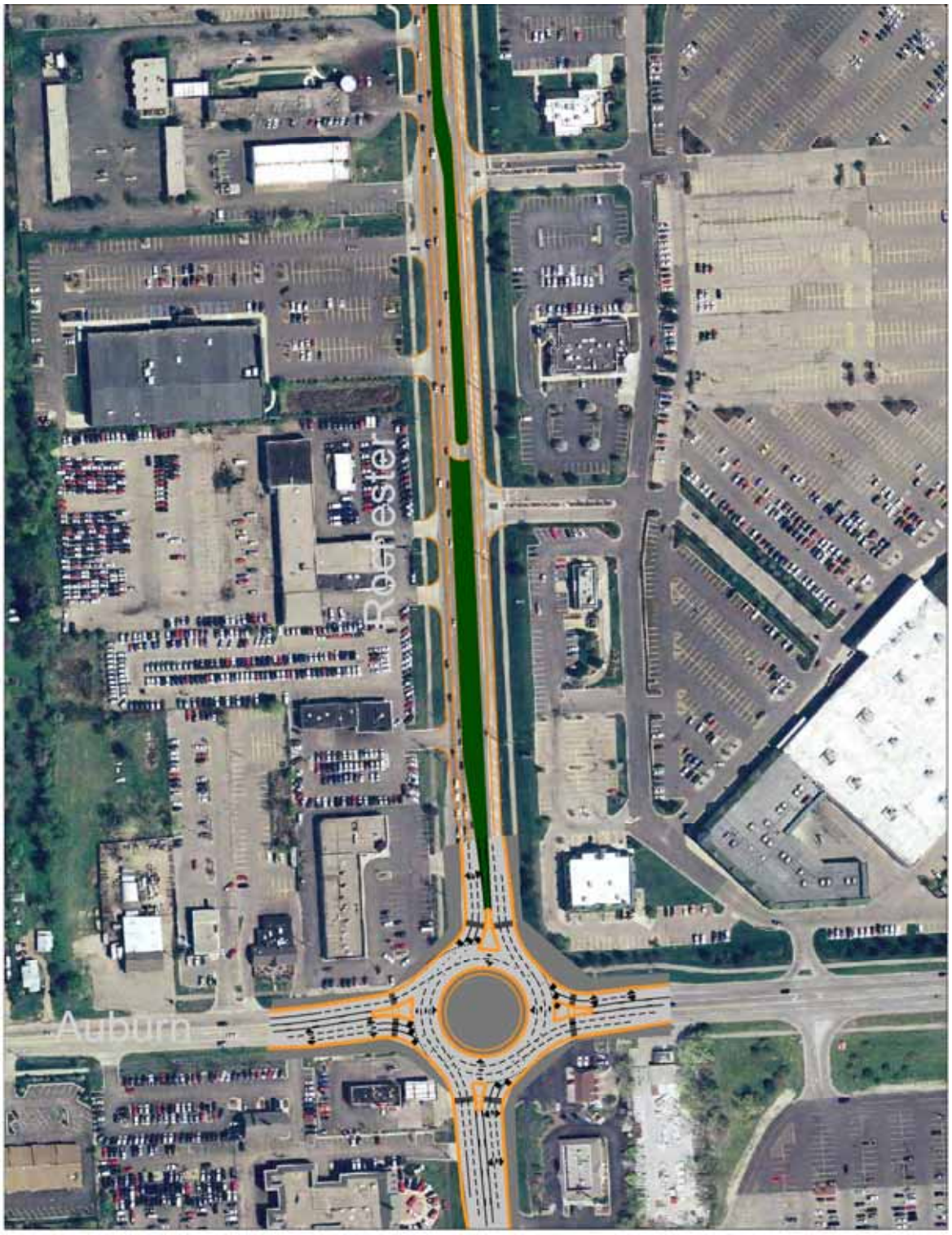


Figure 3-45
Roundabout and Four-lane Boulevard Concept



Estimated construction costs (based on recent RCOC costs) were developed for the operational and safety fixes depicted in the figures. The short-term costs and improvements were suggested to mitigate current deficiencies and are shown in Table 3-20, while the long-term improvements and associated costs would mitigate future year traffic demands and will need to be monitored and implemented as the volumes and/or crashes warrant the need. They are shown in Table 3-21.

Table 3-20
Short-term Improvement Costs

Intersection	Existing 2007 LOS	Estimated Cost
Tienken Rd & Adams Rd	E	$300,000 - $400,000
Walton Blvd & Adams Rd	E	$600,000 - $900,000
Auburn Rd & Adams Rd	F	$200,000 - $300,000
Avon Rd & Rochester Rd	E	$100,000 - $200,000
Wasbash Rd/Barclay Circle & Rochester Rd	E	$200,000 - $300,000
Auburn Rd & Rochester Rd	E	$100,000 - $200,000
South Blvd & Rochester Rd	F	$300,000 - $400,000
Hamlin Rd & Rochester Rd	C	$200,000 - $250,000

Note: Costs do not include ROW, design or contingencies and are in 2007 dollars.

Table 3-21
Long-term Improvement Costs

Intersection	Future 2035 LOS	Estimated Cost
Tienken Rd & Adams Rd	F	$1 - $2 million
Walton Blvd & Adams Rd	F	$2 - $3 million
Auburn Rd & Adams Rd	F	$1 - $2 million
Avon Rd & Rochester Rd	F	$1 - $2 million
Wasbash Rd/Barclay Circle & Rochester Rd	F	$750,000 - $1 million
Auburn Rd & Rochester Rd	F	$3 - $3.5 million
South Blvd & Rochester Rd	F	$1.5 - $2.5 million
Hamlin Rd & Rochester Rd	F	$1 - $2 million

Note: Costs do not include ROW, design or contingencies and are in 2007 dollars.

The costs for optional modern roundabout intersection fixes are provided in Table 3-22. These also do not include ROW, design or utility costs at this time.

Table 3-22
Modern Roundabout Improvement Costs

Intersection	Estimated Cost
Auburn Road and Rochester Road 3x3	$2 to $2.5 million
Hamlin Road and Rochester Road 3x3	$2 to $2.5 million
Avon Road and Rochester Road 3x3	$2 to $2.5 million

Note: Costs do not include ROW, design or contingencies.

To convert the current five- and six-lane cross section on Rochester Road to a narrow four-lane boulevard with a raised median with several indirect left-turn crossovers, it is anticipated it will cost between $1 million and $2 million per mile. The total cost, therefore, would be about $3 million to $6 million to convert 3.0 miles of Rochester Road from M-59 to north of Avon Road to a four-lane boulevard cross section. With the roundabouts this would be a $9 million to $13.5 million improvement.

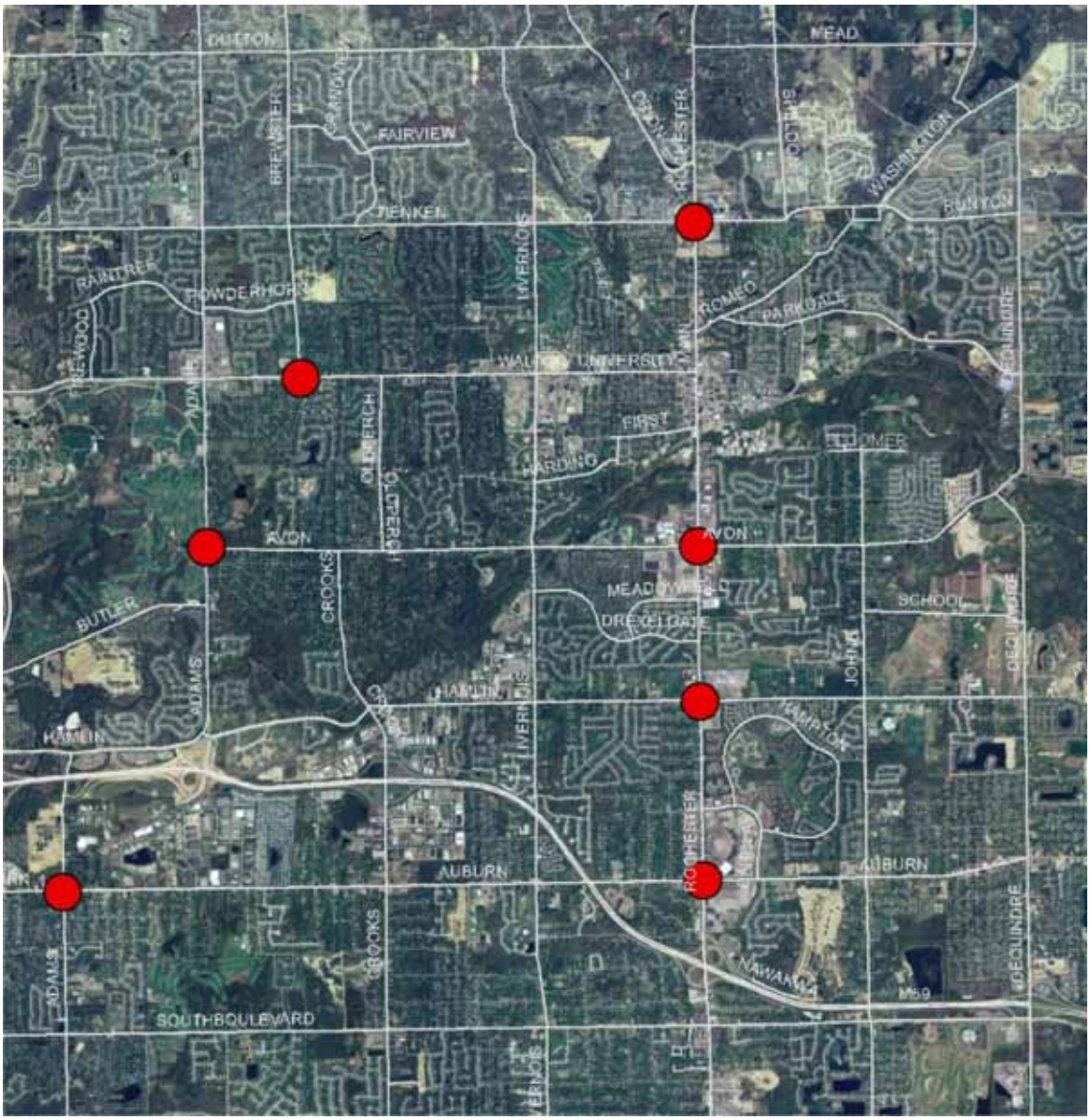
The operational fixes described should go a long way in fixing the current intersection deficiencies identified in Table 3-23 and Figure 3-46.

Table 3-23
Intersections with Above Average Crash Rates

			Type of Crash 2003-2006									
Intersections	Street 1	Street 2	Single	Ho-It	Angle	Re-sum	SS-same	SS-opp	Other/ Unknown	Total	Crashes	Crash Rate
A	Adams	Auburn	9	5	13	32	11		4	74	19	1.52
B	Avon	Adams	11	8	9	37	5	2	1	73	18	1.96
C	Brewster	Walton	6	14	12	62	2	2	1	99	25	1.55
D	Rochester	Auburn	6	15	77	139	20	7	5	269	67	2.75
E	Rochester	Avon	10	13	48	141	26	4	8	250	63	2.84
F	Rochester	Hamlin	4	9	31	137	17	1	2	201	50	1.63
G	Tienken	Rochester	5	9	36	59	16	2	3	130	33	1.59

Legend: Ho-It = Head-on left-turn, Re-sum = Rear ends (All), SS-same = Side-swipe same direction, SS-opp = Side-swipe opposite direction
MVM = Million Vehicle Miles Traveled, MV = Million Vehicles Entered
Source: The Corradino Group of Michigan, Inc. and TIA

Figure 3-46
Intersections with Above Average Crash Rates



Two high-crash locations not yet discussed are located at Brewster Road and Walton Road and at Adams Road and Avon Road. Extended right-turn lanes for southbound Brewster and an exclusive right-turn lane for westbound Walton Road could reduce the potential for crashes there. This is estimated to cost $250,000 to $400,000.

At Adams Road and Avon Road the sight distance for northbound Adams drivers to perceive and react to southbound Adams turning movements to eastbound Avon Road should be improved. This would require the vertical curvature of Adams Road to be lengthened. This would also require southbound Adams Road's elevation to be modified higher as it approaches the intersection. This would require significant roadway reconstruction and is estimated to cost $3 million to $5 million. A short-term solution may be to improve intersection lighting, signing and signal timing.

3.9 SEMCOG Revised Forecasts

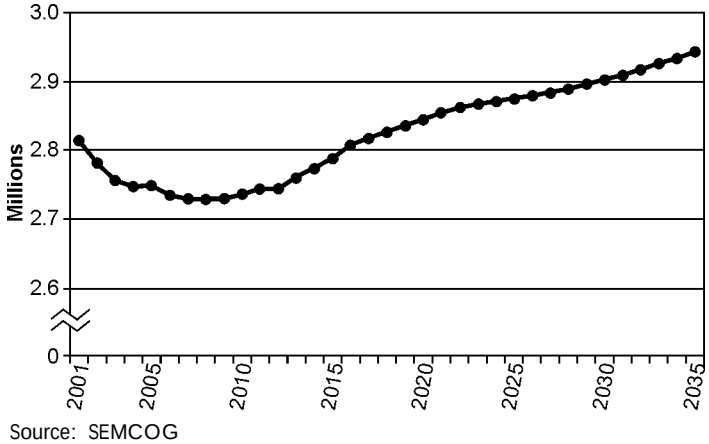
SEMCOG, in a report issued in April 2007 titled *A Region in Turbulence and Transition*, states the following:

"Southeast Michigan's economy is in the midst of a fundamental restructuring that has serious consequences for the region's long-term future. This turbulence and transition is due to the shrinkage of the domestic auto industry, where the Big Three have seen their share of U.S. light-vehicle sales (cars, SUVs, vans, pickup trucks) decline from 73 percent in 1995 to 53 percent in 2006.

"The consequences of the changes in the auto industry are profound. Losses of jobs in the region's core industry are rippling through the economy and will be felt across many sectors, from retail to construction.

"Southeast Michigan has lost 128,000 jobs since 2000 and will not begin to gain total jobs until 2010. By 2035, the region's employment will have grown seven percent over 2005 levels (Figure 3-47).

Figure 3-47
Total Employment
Southeast Michigan, 2001-2035



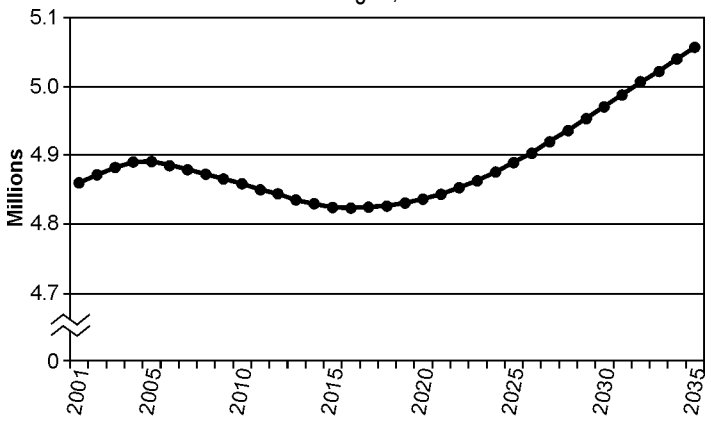
Source: SEMCOG

"The other major factor that will affect the region in the long-term is the aging of the population. By 2035 Southeast Michigan will have 651,000 more people 65 or older and 296,000 fewer people of prime working age 25-64. This is a trend that will also be felt in the U.S. as a whole where, as in Southeast Michigan, the percentage of population 65 or older will increase dramatically. For the region, the percentage 65 or older will increase

from 12 to 24 percent by 2035, and for the U.S. it will go from 12 to 20 percent.

"Combined with more deaths in an aging population, increased out-migration is now causing Southeast Michigan's population to decline. The region will only recover enough, beginning after 2015, to add about three percent to the population over 30 years (Figure 3-48). Southeast Michigan's population will be 5.1 million in 2035."

Figure 3-48
Total Population
Southeast Michigan, 2001-2035



Source: SEMCOG

With these observations as background, SEMCOG reduced its 2005-2030 forecasts of growth in employment (Table 3-24) and population (Table 3-25) by approximately 50 percent and 75 percent, respectively.[1] The changes still reflect positive, albeit, small growth. These changes have been distributed to the county level, but not to a smaller geographical unit.

The county-level changes in growth provide an understanding of the dynamics of the region. From a population perspective (Table 3-25), Macomb County is expected to continue to grow at almost the same pace in the new forecast as in the previous SEMCOG forecast that it replaces. The outer-ring counties – Livingston, Monroe and Washtenaw – are projected to experience lower population growth than previously forecast. Wayne County is expected to experience an even greater population loss by 2030, compared to the earlier SEMCOG forecast. It is likely the Wayne County loss will be especially felt in Detroit, based on past trends.

The two SEMCOG employment forecasts are not directly comparable because the new forecast uses the employment definition of the Bureau of Economic Analysis and the previous forecast used the Bureau of Labor Statistics database. Nonetheless, trends can be observed. The new projections of employment growth by 2030 in the SEMCOG region are down by about 50 percent compared to the earlier forecast. The greatest impact will be felt in Wayne County and, by implication, Detroit, where continued job losses are forecast. All other counties are still projected to experience employment growth by 2030, albeit lower than projected earlier (Table 3-24).

[1] SEMCOG's planning horizon is 2030.

Table 3-24
Changes in Forecast Growth in Employment by SEMCOG

County	Employment			
	Year 2000	Previous[a] Forecast 2030	Current[b] Forecast 2030	Change in Forecast Growth
Livingston	59,186	102,378	95,274	-16.4%
Macomb	383,308	441,126	427,658	-23.3%
Monroe	54,375	74,268	63,278	-55.5%
Oakland	910,441	1,100,545	1,001,198	-52.3%
St. Clair	64,531	80,857	78,780	-12.7%
Washtenaw	230,212	285,543	289,059	+6.4%
Wayne	971,127	1,024,905	943,826	-150.8%
Total	**2,673,180**	**3,109,622**	**2,899,073**	**-48.2%**

[a]Based on Bureau of Labor Statistics definition.
[b]Based on Bureau of Economic Analysis definition.

Source: SEMCOG

Table 3-25
Changes in Forecast Growth in Population by SEMCOG

County	Population			
	Year 2000	Previous Forecast 2030	Current Forecast 2030	Change in Forecast Growth
Livingston	156,951	282,405	210,359	-42.6%
Macomb	788,149	926,347	914,685	-8.4%
Monroe	145,945	191,500	159,797	-69.6%
Oakland	1,194,156	1,346,185	1,303,674	-28.0%
St. Clair	164,235	203,552	189,274	-36.3%
Washtenaw	322,895	433,205	369,474	-57.8%
Wayne	2,061,162	2,018,091	1,824,112	-118.2%
Total	**4,833,493**	**5,401,285**	**4,971,375**	**-75.7%**

Source: SEMCOG

Regional countywide tests of the revised forecasts are estimated to have an effect on Rochester Hills roads in the future. County wide trip tables have been adjusted in a preliminary regional review with an average 6 point drop in previously estimated volume to capacity indices. Please see Table 3-26 for the preliminary V/C indices. Four segments are no longer considered to be congested in 2035 based on these revised forecasts from previous work: Segment D – Tienken, Segment N – Avon, Segment P – Hamlin, and Segment T – Auburn. Again, the fine grained estimates by travel analysis zone have yet to be completed by SEMCOG and these early estimates will likely change.

Table 3-26
"New" Congestion Indices

Segment	Road	2035 Base V/C	Est. 2035 Reduced SEMCOG V/C	Net V/C Reduction
A	Adams	0.80	0.78	0.03
B	Tienken	0.74	0.58	0.15
C	Tienken	0.79	0.69	0.10
D	Tienken	0.92	0.82	0.10
E	Livernois	1.05	1.02	0.02
F	Walton	0.88	0.80	0.08
G	Walton	0.61	0.64	-0.03
H	Livernois	0.91	0.91	0.01
I	Avon	0.89	0.86	0.03
J	Adams	1.23	1.17	0.06
K	Crooks	1.09	1.04	0.05
L	Hamlin	0.29	0.26	0.03
M	Hamlin	0.53	0.51	0.01
N	Avon	0.92	0.84	0.08
O	Avon	1.08	0.96	0.12
P	Hamlin	0.91	0.79	0.12
Q	Rochester	1.04	1.01	0.03
R	John R	0.88	0.90	-0.02
S	Dequindre	0.99	0.92	0.07
T	Auburn	0.94	0.85	0.09
U	Livernois	0.99	0.91	0.08
VNB	Crooks	0.73	0.67	0.06
VSB	Crooks	0.43	0.34	0.10
W	Auburn	0.65	0.64	0.01
X	New Adams	0.43	0.37	0.06
Y	Adams	0.16	0.08	0.08
Z	South	0.88	0.79	0.10
			Average	0.06

V/C = Volume ÷ Capacity

4. Non-motorized Component

Non-motorized facilities typically refer to sidewalks, bike lanes or streets and roads with paved shoulders, and separated pathways. While there are sidewalks and separated pathways in the Rochester Hills area, there are no on-street bike lanes or signed bike routes.

In the mid 1970's, the City of Rochester Hills (formerly Avon Township) initiated a pathway program that planned for approximately 118 miles of pathways along major roads. To date, over 82 miles of pathways have been constructed by private development and through public funding. Approximately 36 miles of pathways are needed to complete the pathway system. It is estimated that five miles or about 14 percent will be paid for by private development. The balance will be paid for with public funds.

The scope of the pathway program has gone beyond the initial goal of just extending the system to both sides of all arterial roads in the city. In November of 2006, a twenty-year 0.1858 mill ballot proposal was approved by the residents of Rochester Hills to fund the continuation of new pathways, rehabilitation and maintenance of existing pathways to preserve the system for the public's use and enjoyment. The current pathway program has evolved through the continuation of development of the City along with a heightened awareness of the value of a non-motorized transportation facility.

Rehabilitation of existing pathways to maintain an adequate level of service for pathway users is also required. Each year, more segments of the pathway system exceed their service life and require some form of rehabilitation.

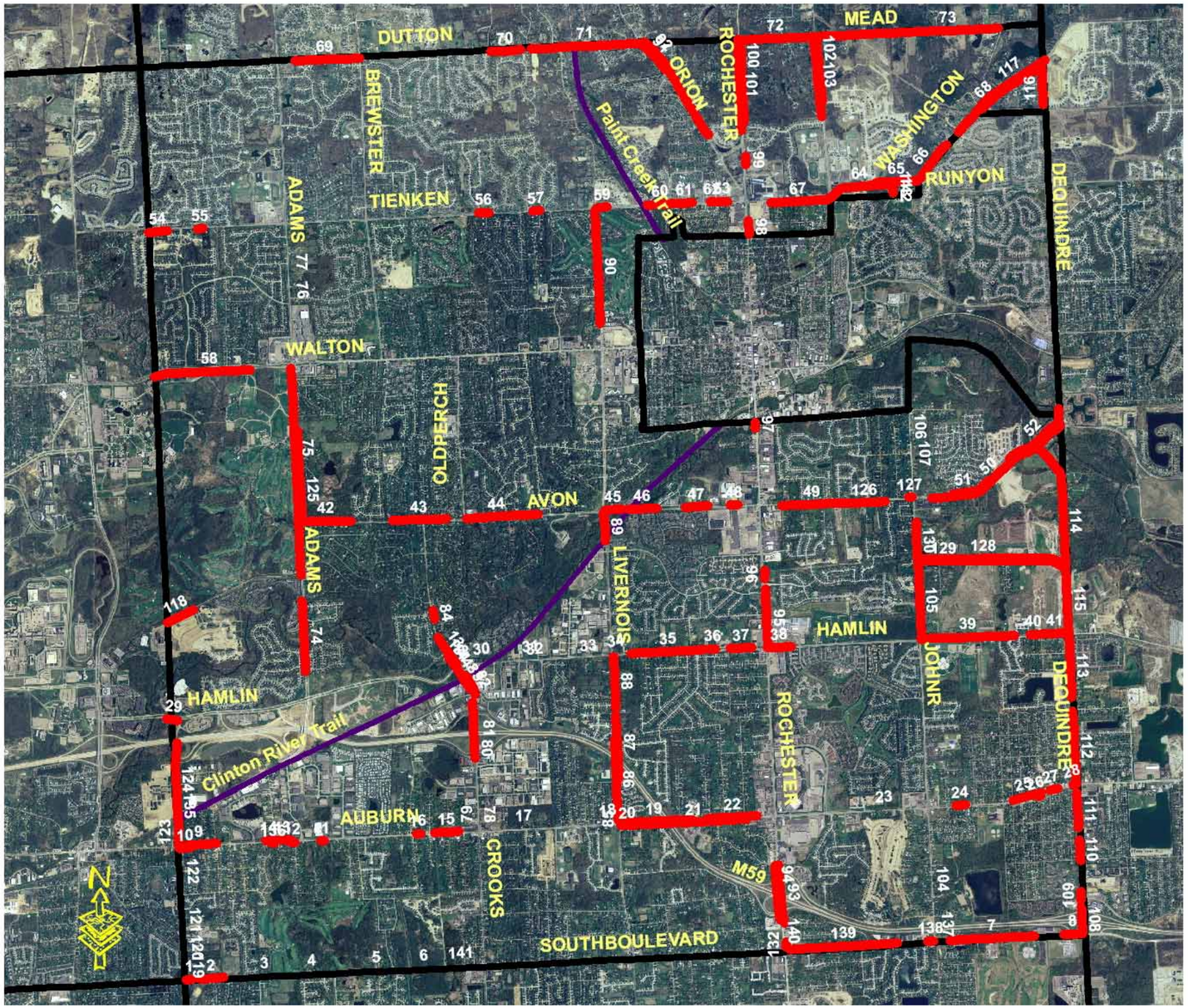
Additionally, pathway upgrades need to comply with current American with Disabilities Act (ADA) requirements when they are rehabilitated. Some 20 miles of pathway will be rehabilitated over the next ten years, which represents approximately 25 percent of the current pathway system.

Maintenance of the existing pathway system is also key to protect and extend their service life. Beyond routine winter maintenance, other maintenance activities, such as pothole patching, crack sealing and vegetation control, need to be done system-wide on a routine basis to preserve the integrity of the system.

The major pathway gaps in Rochester Hills are shown in Figure 4-1. Gaps on both sides of the arterial roads occur where M-59 crosses through the City along the southern border. Construction of pedestrian crossings over M-59 is needed at all the locations in the City.

Recently two locations were completed to provide continuity with the pathway network by MDOT on the east side of the M-59 @ Adams Road Interchange and at John R under M-59 as part of the road widening & East Ferry Drain project from South Boulevard to Auburn.

Figure 4-1
Current Gaps on Existing Pathway Plan



Gaps in Existing Pathway

Additional pathway connections/crossings planned include the crossing at M-59 @ Crooks interchange. This project is scheduled from 2012 to 2017. Potential upgrades to the M-59 connections/crossings at Livernois, Auburn, Rochester, and Dequindre as the freeway is widened should be considered and coordinated as a priority.

The two major non-motorized trailway facilities in the City of Rochester Hills include the popular Paint Creek Trailway which runs from Lake Orion to downtown Rochester. The Clinton River Trail connects the existing West Bloomfield Trail on the west to the Macomb Orchard Trail on the east and cuts across the city in an east west fashion.

The trail is generally eight to ten feet wide and made of crushed limestone or recycled asphalt.

4.1 Bicycle/Pedestrian Crash Data

Building and maintaining an accessible non-motorized system in the City of Rochester Hills has been a priority. Safety is of utmost concern. Crash data involving bicycles and pedestrians were gathered for the period of 2003-2006. Tables 4-1 and 4-2 present a summary of the crash experience during this period. The locations of these crashes are shown on Figure 4-2.

Table 4-1
Bicycle Crashes (2003- 2006)

	Total Bike Crashes	Fatality (Crash)	Injury (Crash)	No Injuries (Crash)
Total for Rochester Hills	39	1	34	4
On Major Roads	32	1	30	1

Source: Traffic Improvement Association for Oakland County.

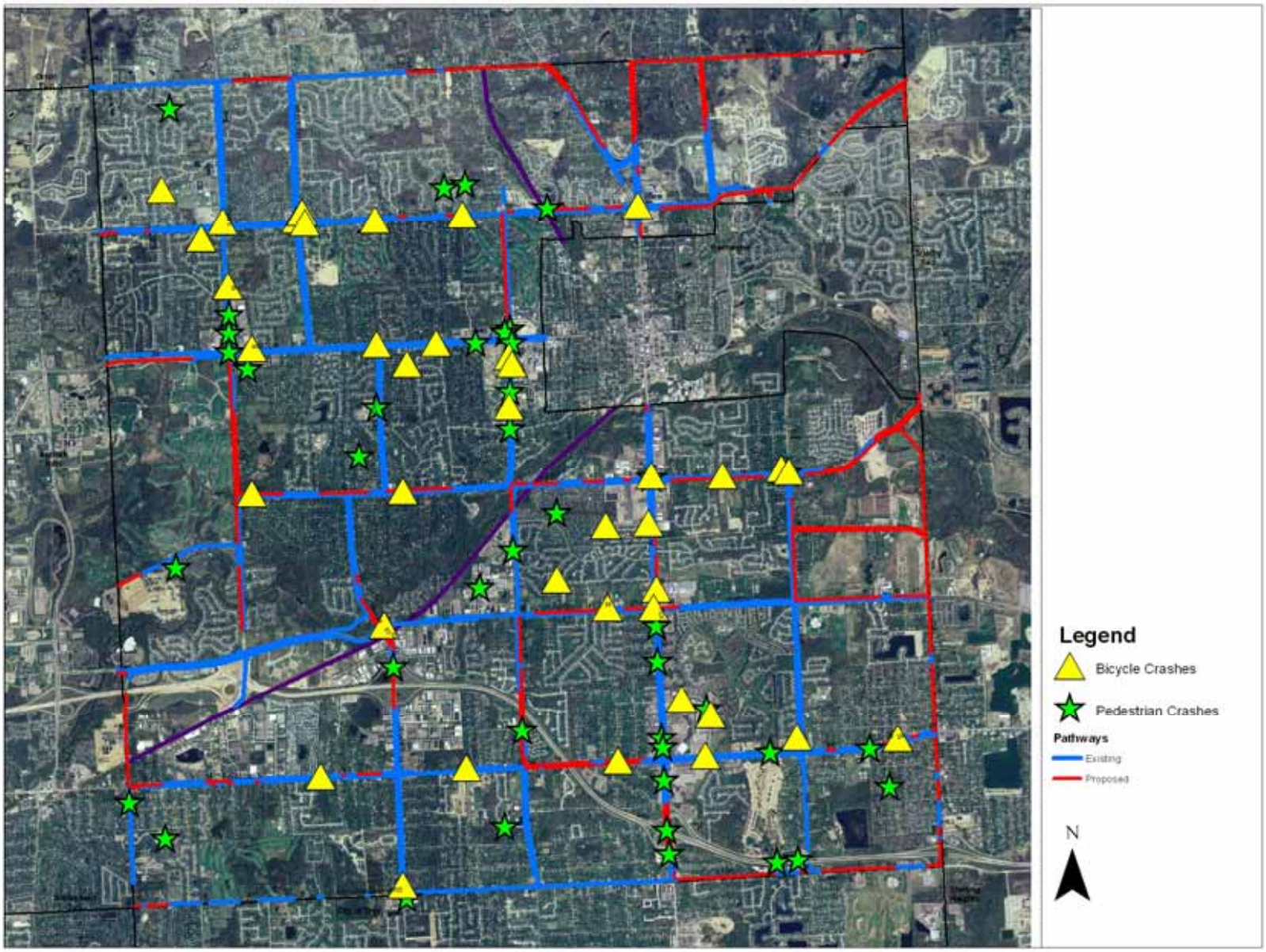
Table 4-2
Pedestrian Crashes (2003-2006)

	Total Pedestrian Crashes	Fatality (Crash)	Injury (Crash)	No Injuries (Crash)
Total for Rochester Hills	41	3	37	1
On Major Roads	30	2	28	0

Source: Traffic Improvement Association for Oakland County.

A high percentage of crashes reported occurred on the major pathway system.

Figure 4-2
Bicycle/Pedestrian Crash Locations



4.2 Existing Non-motorized Trip Characteristics

To understand the City of Rochester Hills potential to increase the number of people walking and bicycling, the 2000 U.S. Census was reviewed (Table 4-3). The number of people either walking or bicycling to work is very low with more people walking (primarily in Rochester) than riding a bicycle.

The national average is 7.2 percent of all person trips are made by walking and 0.70 percent are made by bicycling. Using those averages as benchmarks, Table 4-3 illustrates the number of non-motorized trips that are much lower than this for the state and the study area.

As can be seen, the total number of trips made by walking and bicycling are very few when compared to all trips being made by other modes of transportation in the study area. Given the relatively comprehensive pathway network in the City of Rochester Hills, improvements to the pedestrian environment will likely see only modest increases. Improvements to the bicycling environment in the City could result in greater use of non-motorized travel options. Nonetheless, it is important to note that bicycling and pedestrian facilities have many benefits that go beyond their ability to relieve traffic congestion on the roadway network.

Table 4-3
Means of Transportation to Work by Jurisdiction
(workers 16 years and over)

	Rochester City		Rochester Hills City		State of Michigan	
	Number	Percent	Number	Percent	Number	Percent
Car, truck, or van	5,245	93.1	34,035	95.4	4,217,141	92.9
Drove alone	5,029	89.3	32,236	90.4	3,776,535	83.2
Carpooled	216	3.8	1,799	5	440,606	9.7
Public transportation	24	0.4	38	0.1	60,537	1.3
Bus or trolley bus	24	0.4	26	0.1	54,423	1.2
Streetcar or trolley car	0	0	0	0	560	0
Subway or elevated	0	0	0	0	576	0
Railroad	0	0	8	0	290	0
Ferryboat	0	0	4	0	466	0
Taxicab	0	0	0	0	4,222	0.1
Motorcycle	0	0	0	0	1,698	0
Bicycle	6	0.1	71	0.2	10,034	0.2
Walked	131	2.3	301	0.8	101,506	2.2
Other means	19	0.3	93	0.3	21,691	0.5
Worked at home	206	3.7	1,136	3.2	127,765	2.8
Workers 16 and over	5,631	100	35,674	100	4,540,372	100

Source: 2000 U.S. Census

4.3 Proposed Facilities

Ideas heard from the public involvement workshops were:

- Safer path on Adams Road - North of M-59
- Pedestrian friendly design standards
- Pathway connectivity, build one side first
- Provide refuge islands for pedestrian crossing safety of major roads
- More trailways
- Complete pathway plan

A total of 136 gaps in the major road path network were considered to be prioritized as a starting point (from Figure 4-1).

Several proposals for non-motorized facilities developed through the capital improvement program are listed below. Pathways planned to be constructed or designed in 2008 were considered to be committed projects and are shown in Table 4-4 and by an aqua color on Figure 4-3. They include six project sections with 18 segments at an estimated cost of $1.5 million.

Other pathways included in the capital improvement plan were included in the ranking of the rest of the pathway gaps (118) yet to be completed. Specifically the next 53 gaps in 18 project priority sections were prioritized as a part of this process.

Priority sections 1-5 were considered first as they should be a part of a current MDOT design process to widen M-59 between Crooks Road and Ryan Road (Table 4-5). The efficiency in design and construction of these segments to bridge and connect the paths across M-59 in cooperation with MDOT is perfect timing and considered a near term opportunity. It may be several decades before improvements along these routes are considered and will be much more difficult to finance and implemented without MDOT's participation.

Priority section 6 should be considered as the RCOC and the City contemplate improvements to Tienken Road between Livernois Road and Rochester Road as an Early Preliminary Engineering phase is being conducted at this time. The project will receive the total $10 million appropriated from the last federal transportation funding bill SAFETEA LU in 2009.

Priority sections 7 -10 should be considered next to complete a continuous path on at least one side of the road. These sections have gaps that occur on both sides of the roads at specific locations. This continues to be the primary goal of the old and new pathway millage language.

Priority sections 11-18 are in heavier use locations specifically near schools and parks and the existing trail network.

Priority sections 1-18 are estimated to cost $5 million which should be able to be completed in the next 20 years based on current millage capital spending for new pathways. As the current pathways continue to age additional monies will be required to operate and maintain them over the next 20 years.

Table 4-4
Committed Pathway Projects

ID#	Street Name	Proposed or No Pathway	Length of Gap (Proposed Pathway) (mi)	Length of Gap (Proposed Pathway) (ft)	Distance from School /Park (ft)	Crashes Within 1/4 Mile of Pathway	Notes	Additional Notes	Est. Costs
3	South Boulevard	Proposed Path	0.07	355	0	0	North side PW-10 in 2009 per CIP along with #3, #4, #5, #6 and #141	Design Committed for next year	
4	South Boulevard	Proposed Path	0.15	798	0	0	North side PW-10 in 2009 per CIP along with #3, #4, #5, #6 and #141	Design Committed for next year	
5	South Boulevard	Proposed Path	0.18	970	0	0	North side PW-10 in 2009 per CIP along with #3, #4, #5, #6 and #141	Design Committed for next year	$314,500
6	South Boulevard	Proposed Path	0.33	1733	0	0	North side PW-10 in 2009 per CIP along with #3, #4, #5, #6 and #141	Design Committed for next year	
141	South Boulevard	Proposed Path	0.19	991	0	2	North side PW-10 in 2009 per CIP along with #5 & #6	Design Committed for next year	
17	Auburn	Proposed Path	0.40	2108	34	1	PW-06A in 2008 per CIP along with #17 and #18	2008	$96,000
18	Auburn	Proposed Path	0.03	167	39	0	PW-06A in 2008 per CIP along with #17 and #18	2008	
30	Hamlin	Proposed Path	0.35	1833	0	1	4100 PW-02A in 2009 per CIP along with #30, #31, #32, #33 & #34	Design Committed for next year	
31	Hamlin	Proposed Path	0.08	432	475	0	4100 PW-02A in 2009 per CIP along with #30, #31, #32, #33 & #34	Design Committed for next year	
32	Hamlin	Proposed Path	0.02	131	381	0	4100 PW-02A in 2009 per CIP along with #30, #31, #32, #33 & #34	Design Committed for next year	$117,400
33	Hamlin	Proposed Path	0.29	1521	370	1	4100 PW-02A in 2009 per CIP along with #30, #31, #32, #33 & #34	Design Committed for next year	
34	Hamlin	Proposed Path	0.06	306	0	0	4100 PW-02A in 2009 per CIP along with #30, #31, #32, #33 & #34	Design Committed for next year	
76	Adams	Proposed Path	0.04	232	250	1	PW-07C in 2009 per CIP along with #76 & #77	Design Committed for next year	$178,500
77	Adams	Proposed Path	0.36	1920	0	4	PW-07C in 2009 per CIP along with #76 & #77	Design Committed for next year	
104	John R	Proposed Path	0.82	4351	0	4	West side PW-31A in 2008 per CIP, including PW-31B FWY section @ M-59. To be constructed with John R widening and East Ferry Drain Project	2008	$316,791
137	John R	Proposed Path	0.11	591	1084	2	Eastside PW-31A in 2008 per CIP FWY section @ M-59. To be constructed with John R widening and Eas Ferry Drain Project	2008	
106	John R	Proposed Path	0.57	3032	86	3	PW-31E in 2009 per CIP	Design Committed for next year	$483,750
107	John R	Proposed Path	0.58	3068	35	3	PW-31E in 2009 per CIP	Design Committed for next year	
								Total	$1,506,941

CIP – Capital Improvements Plan
PW – Pathway
MR – Major Road

Figure 4-3
Non-motorized Path Priorities

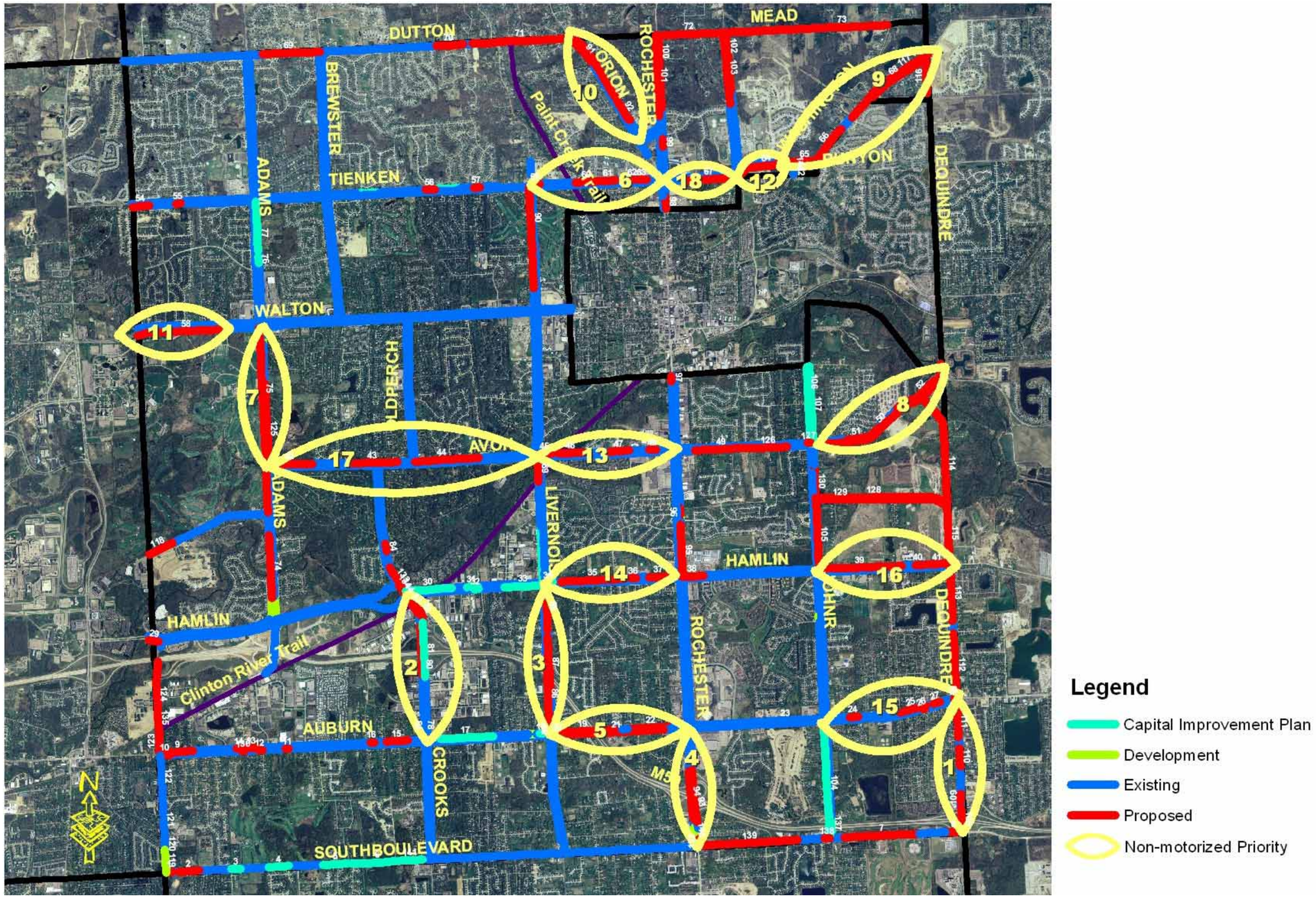


Table 4-5
Priority Sections/Segment 1-18

ID#	Street Name	Length of Gap (Proposed Pathway) (mi)	Length of Gap (Proposed Pathway) (ft)	Distance from School/ Park (ft)	Crashes Within 1/4 Mile of Pathway	Notes	Priority Segments	Est. Costs (2007 dollars)
108	Dequindre	0.18	956	2563	0	Part of MR	s1	
109	Dequindre	0.06	298	2551	0	Part of MR	s1	
110	Dequindre	0.14	747	1339	0	Part of MR	s1	
111	Dequindre	0.24	1265	297	0	Part of MR	s1	*$163,200*
80	Crooks	0.38	1989	925	2	Part of MR	s2	
81	Crooks	0.40	2137	858	2	Part of MR	s2	*$206,250*
85	Livernois	0.06	304	45	1		s3	
86	Livernois	0.54	2825	0	1		s3	
87	Livernois	0.42	2217	76	1		s3	
88	Livernois	0.34	1779	56	0		s3	*$356,200*
93	Rochester	0.39	2069	724	3		s4	
94	Rochester	0.36	1909	856	3		s4	*$198,850*
19	Auburn	0.45	2373	0	1	PW-06D in 2010 per CIP along with #22	s5	
22	Auburn	0.33	1752	92	4	PW-06D in 2010 per CIP along with #19	s5	$174,000
20	Auburn	0.10	518	0	0		s5	
21	Auburn	0.70	3705	0	4		s5	*$211,100*
59	Tienken	0.06	343	38	0	PW-08B in 2011 per CIP along with $59, #60, #61, #62 & #63	s6	
60	Tienken	0.18	933	216	1	PW-08B in 2011 per CIP along with $59, #60, #61, #62 & #63	s6	
61	Tienken	0.10	516	0	1	PW-08B in 2011 per CIP along with $59, #60, #61, #62 & #63	s6	
62	Tienken	0.03	148	736	1	PW-08B in 2011 per CIP along with $59, #60, #61, #62 & #63	s6	
63	Tienken	0.06	343	943	1	PW-08B in 2011 per CIP along with $59, #60, #61, #62 & #63	s6	$47,250
75	Adams	1.38	7312	0	5		s7	
125	Adams	0.60	3191	0	1		s7	*$525,100*
51	Avon	0.25	1337	1667	0	PW-49A in 2012 per CIP	s8	$88,500
50	Avon	1.03	5423	0	3		s8	
52	Avon	0.50	2645	0	0		s8	*$403,300*
65	Tienken Extended	0.29	1515	0	0		s9	
66	Washington	0.30	1589	0	0		s9	
68	Washington	0.49	2603	1896	0		s9	
117	Washington	0.75	3972	975	0		s9	*$483,950*
91	Orion	0.25	1323	689	0		s10	
92	Orion	0.76	4023	0	0		s10	*$267,250*
58	Tienken	0.64	3372	0	0	PW-08D in 2010 per CIP along with #56, #57 & #58	s11	$112,000
64	Tienken	0.43	2279	0	0	PW-08C in 2011 per CIP	s12	$359,500
45	Avon	0.11	575	321	0		s13	
46	Avon	0.19	1016	0	1		s13	
47	Avon	0.15	788	0	0		s13	
48	Avon	0.05	273	345	2		s13	*$132,450*

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PW – Pathway
MR – Major Road

Table 4-5 (continued)
Priority Sections/Segment 1-18

ID#	Street Name	Length of Gap (Proposed Pathway) (mi)	Length of Gap (Proposed Pathway) (ft)	Distance from School/ Park (ft)	Crashes Within 1/4 Mile of Pathway	Notes	Priority Segments	Est. Costs (2007 dollars)
35	Hamlin	0.48	2559	0	2	PW-02B in 2010 per CIP along with #35, #36 & #37	s14	
36	Hamlin	0.04	230	0	1	PW-02B in 2010 per CIP along with #35, #36 & #37	s14	
37	Hamlin	0.14	755	0	4	PW-02B in 2010 per CIP along with #35, #36 & #37	s14	$319,250
24	Auburn	0.07	344	0	2	PW-06D in 2010 per CIP along with #24, #25, #26, #27 & #28	s15	
25	Auburn	0.20	1032	335	2	PW-06D in 2010 per CIP along with #24, #25, #26, #27 & #28	s15	
26	Auburn	0.02	106	383	2	PW-06D in 2010 per CIP along with #24, #25, #26, #27 & #28	s15	
27	Auburn	0.05	283	0	1	PW-06D in 2010 per CIP along with #24, #25, #26, #27 & #28	s15	
28	Auburn	0.03	151	227	0	PW-06D in 2010 per CIP along with #24, #25, #26, #27 & #28	s15	$174,000
39	Hamlin	0.63	3317	36	0	PW-02C in 2011 per CIP along with #39, #40 & #41	s16	
40	Hamlin	0.05	289	1136	0	PW-02C in 2011 per CIP along with #39, #40 & #41	s16	
41	Hamlin	0.18	968	1617	0	PW-02C in 2011 per CIP along with #39, #40 & #41	s16	$396,000
42	Avon	0.32	1716	0	1		s17	
43	Avon	0.36	1927	551	0		s17	
44	Avon	0.48	2526	0	1		s17	*$308,300*
67	Washington	0.41	2183	0	1		s18	*$109,150*
						Total		$5,035,600

CIP – Capital Improvements Plan
PW – Pathway
MR – Major Road

Pathways to be constructed as part of vacant parcels where future anticipated land use development could provide network connectivity were noted on 12 gaps. Gaps on existing gravel roads were noted in 8 locations. Most likely they would only be constructed with associated paving projects in the future.

This process left 53 gaps not prioritized and are shown in Table 4-6.

A recently reestablished pathway committee will ultimately select and prioritize remaining segments to be constructed.

Table 4-6
Remaining Pathway Gaps

ID#	Street Name	Length of Gap (Proposed Pathway) (mi)	Length of Gap (Proposed Pathway) (ft)	Distance from School/Park (ft)	Crashes Within 1/4 Mile of Pathway	Notes
90	Livernois	0.76	4025.97	0	3	PW-04 in 2012 per CIP
105	John R	0.53	2774.13	115	0	Eastside PW-31D in 2012 per CIP
56	Tienken	0.05	248.09	555	2	PW-08D in 2010 per CIP along with #56, #57 & #58
57	Tienken	0.23	1216.92	0	2	PW-08D in 2010 per CIP along with #56, #57 & #58
49	Avon	0.39	2069.45	40	3	PW-49C in 2011 per CIP with #126
126	Avon	0.28	1453.19	447	1	PW-49C in 2011 per CIP with #49
89	Livernois	0.19	995.51	0	0	
98	Rochester	0.10	502.86	0	1	
82	Crooks	0.14	756.43	89	2	
83	Crooks	0.16	864.76	0	2	
84	Crooks	0.06	312.97	422	0	
133	Crooks	0.22	1168.91	0	1	
134	Crooks	0.02	105.88	0	1	
144	Crooks	0.06	298.80	0	1	
9	Auburn	0.23	1218.84	88	1	
10	Auburn	0.07	371.90	0	1	
11	Auburn	0.02	120.80	586	0	
12	Auburn	0.03	168.35	534	0	
13	Auburn	0.11	579.21	529	0	
14	Auburn	0.04	235.21	898	0	
15	Auburn	0.16	870.20	1580	0	
16	Auburn	0.03	149.84	1013	1	
7	South Boulevard	0.56	2956.70	559	1	
29	Hamlin	0.08	404.93	1581	0	
53	Walton	0.13	661.02	718	0	
54	Tienken	0.03	168.26	603	0	
55	Tienken	0.06	337.60	141	1	
74	Adams	0.47	2507.97	0	0	
97	Rochester	0.04	203.87	689	0	
99	Rochester	0.06	301.65	362	1	
101	Rochester	0.61	3215.77	0	0	
112	Dequindre	0.49	2601.19	319	0	
113	Dequindre	0.41	2185.90	1488	0	
114	Dequindre Ext	0.85	4471.71	35	0	
116	Dequindre	0.26	1371.03	4089	0	
118	N. Butler	0.19	1005.34	53	0	
123	Squirrel	0.19	982.39	176	1	
124	Squirrel	0.34	1795.32	2016	0	
127	Avon	0.03	137.97	1468	3	
132	Rochester	0.04	196.25	1719	1	
135	Squirrel	0.13	676.93	1872	0	
136	Auburn	0.02	92.70	1027	0	
139	South Boulevard	0.72	3787.37	591	3	
142		0.05	278.45	0	0	
143		0.01	52.93	0	0	
130	John R	0.25	1294.28	37	3	Development
1	South Boulevard	0.05	244.82	927	0	Development
2	South Boulevard	0.15	811.17	934	0	Development
95	Rochester	0.39	2069.17	99	4	Development
96	Rochester	0.06	312.64	448	1	Development
100	Rochester	0.54	2874.44	826	0	Development
138	South Boulevard	0.04	236.14	1139	2	Development

CIP – Capital Improvements Plan
PW – Pathway
MR – Major Road

Table 4-6 (continued)
Remaining Pathway Gaps

ID#	Street Name	Length of Gap (Proposed Pathway) (mi)	Length of Gap (Proposed Pathway) (ft)	Distance from School/Park (ft)	Crashes Within 1/4 Mile of Pathway	Notes
140	Rochester	0.06	292.95	1504	2	Development
8	South Boulevard	0.13	670.59	2003	0	Development
38	Hamlin	0.16	835.40	979	3	Development
115	Dequindre	0.45	2390.34	1171	0	Development
119	Adams	0.17	912.24	0	0	Development
69	Dutton	0.46	2430.94	0	0	
70	Dutton	0.20	1069.43	0	0	Gravel
71	Dutton	0.73	3855.43	302	0	Gravel
72	Mead	0.50	2657.22	2382	0	Gravel
73	Mead	1.22	6435.28	2370	0	Gravel
128	School	0.99	5247.45	0	0	Gravel
129	School	0.99	5225.44	0	0	Gravel
102	Sheldon	0.44	2297.75	31	0	Gravel
103	Sheldon	0.54	2831.90	87	0	Gravel

CIP – Capital Improvements Plan
PW – Pathway
MR – Major Road

5. Transit Component of Plan

The following section presents an overview of public transit and high-capacity transit projects suggested through the public involvement process.

5.1 Public Transit – Bus

Currently, the only bus transit within Rochester Hills is provided by Rochester and Avondale school districts for school age children. There is no local public transit service in the study area. But, there are a variety of services that provide non-school- related transportation.

SMART provides transit service to neighboring Auburn Hills, Troy and Shelby Township but not to the City of Rochester Hills. SMART does use M-59 as part of their fixed routes to other places.

Flint's MTA provides daily regional trips from Genesee County to two plastics companies within the City of Rochester Hills at Avon and Superior Plastics.

The Older Persons Center (OPC) features transportation for people age 60 and older or for disabled persons of any age or those under 60 with doctors' notes. The OPC minibus can be scheduled to take you anywhere in Rochester, Rochester Hills, Oakland Township, to Oakland University, and to the Troy Beaumont Medical Complex. You can use the Minibus for appointments, shopping, or to visit Monday - Friday 8:00 a.m. - 5:00 p.m., Saturday - 9:00 a.m. - 5:00 p.m., and Sunday - 8:00 a.m. - 1:00 p.m. (*church services only*).

If a transit service were to be implemented, some local financial commitment is needed. Most public transit systems in Michigan are supported by either local general fund dollars or a special property tax millage.

As an example, BATA provides service to Grand Traverse and Leelanau Counties. The total population of the service area is 90,000. Local funds come from a voter-approved .35 millage/property tax assessment that generates about $2,000,000 per year. BATA offers fixed route and dial-a-ride rural services along with some out-county service. Its annual ridership is more than 400,000, with almost eight passengers per service hour carried on its fixed route service in Traverse City and four passengers per service hour on its dial-a-ride and out-county services.

It is anticipated that a public transit system in Rochester Hills would primarily be dial-a-ride or flexible-route service, both of which are demand-responsive and suited for areas of relatively low population density. To get people who have access to an automobile into transit, some type of fixed-route service may be needed. However, typical fixed-route service is determined to be viable in areas with populations in excess of 4,000 people per square mile. The City of Rochester Hills has a density of about 2000 people per square mile according to the 2000 census. But, in light of the increases in population and the pressure on the roadway system, a fixed-route service may be

desirable for the community to explore. It could provide easy connections between major destination areas such as downtown Rochester to Oakland U.

Since several ideas were offered in the process, a concept to connect major destinations with transit vehicles was explored. A voter referendum could be held to implement this concept as part of the plan. Before voting, a test could be conducted.

The test could be conducted with OPC or other vehicles during the summer to connect say Oakland University and Downtown Rochester on Walton/University. Another route could run say down Rochester Road from downtown to South Boulevard and back. The service could make one stop at Walton and Livernois near the Village. The service could operate this fixed route at a predetermined, 20 minute frequency and generally run for two months and operate from 7:00 am to 7:00 pm on weekend days and 11:00 to 7:00 pm on weekend days. The tests operating costs would be about $75,000 which would include costs for drivers, maintenance, and fuel but does not include the cost of the vehicles. Obviously ridership and revenue analyses could be conducted to determine the adequacy and amount of subsidy required.

Origins and destinations of intra-city trips for transit were not analytically conducted. However, local knowledge of the city suggests two obvious routes that may support local transit routes that may best receive the most ridership.

6. Other Master Plan Considerations

A pavement classification plan was developed as part of the MTPU to look forward and plan for the most appropriate pavement section as roadways are rebuilt and reconstructed (Figure 6-1).

Currently roadways providing access to light industrial uses are often not designed to withstand the axle loadings of medium and heavy trucks. This creates more frequent maintenance and repair as well as weight restrictions when frost laws are in effect. This eliminates access to businesses by certain sized vehicles in the winter and spring months, or causes damage to the roads when the restrictions are not observed and enforced.

The plan provides several recommendations to change the designation of future all weather routes where large vehicles would be expected. As these roads are improved or reconstructed the designation will require the appropriate drainage and pavement section to be designed and incorporated into the road so it can handle the expected wear and tear of normal deliveries.

Roads that were not necessarily considered as part of this Master Thoroughfare Plan Update were also included.

A plan for future roadway cross sections was prepared to guide projects for every major roadway regardless of the short-term and long-term opportunities and timing of the improvements (Figure 6-2).

This provides a minimum roadway section that should be considered as roadways are repaired and reconstructed and adjacent land uses are contemplated and developed. This takes the established ambiguity of the previous MTPU policy and allows flexibility to plan for the most appropriate roadway section as priorities, opportunities, timing and funding changes over time.

The existing MDOT National Functional Classification (NFC) mapping has been provided based on MGF version 6 for the study area (Figure 6-3). There are a few changes that should be requested of MDOT to the next N.F.C. update. They include the new section of Adams Road between Auburn and Hamlin Road which was just completed in addition to the new interchange ramps at M-59. This new roadway on new alignment should be added as a principal arterial. Hamlin Road from west city limits to relocated Adams Road and Old Adams Road from Hamlin to south of M-59 should revert to a minor arterial designation.

Two other changes on Tienken Road between Adams Road and Squirrel Road and Brewster from Tienken Road to Dutton Road are being recommended to be added as urban collectors.

Figure 6-1
Pavement Classification Plan

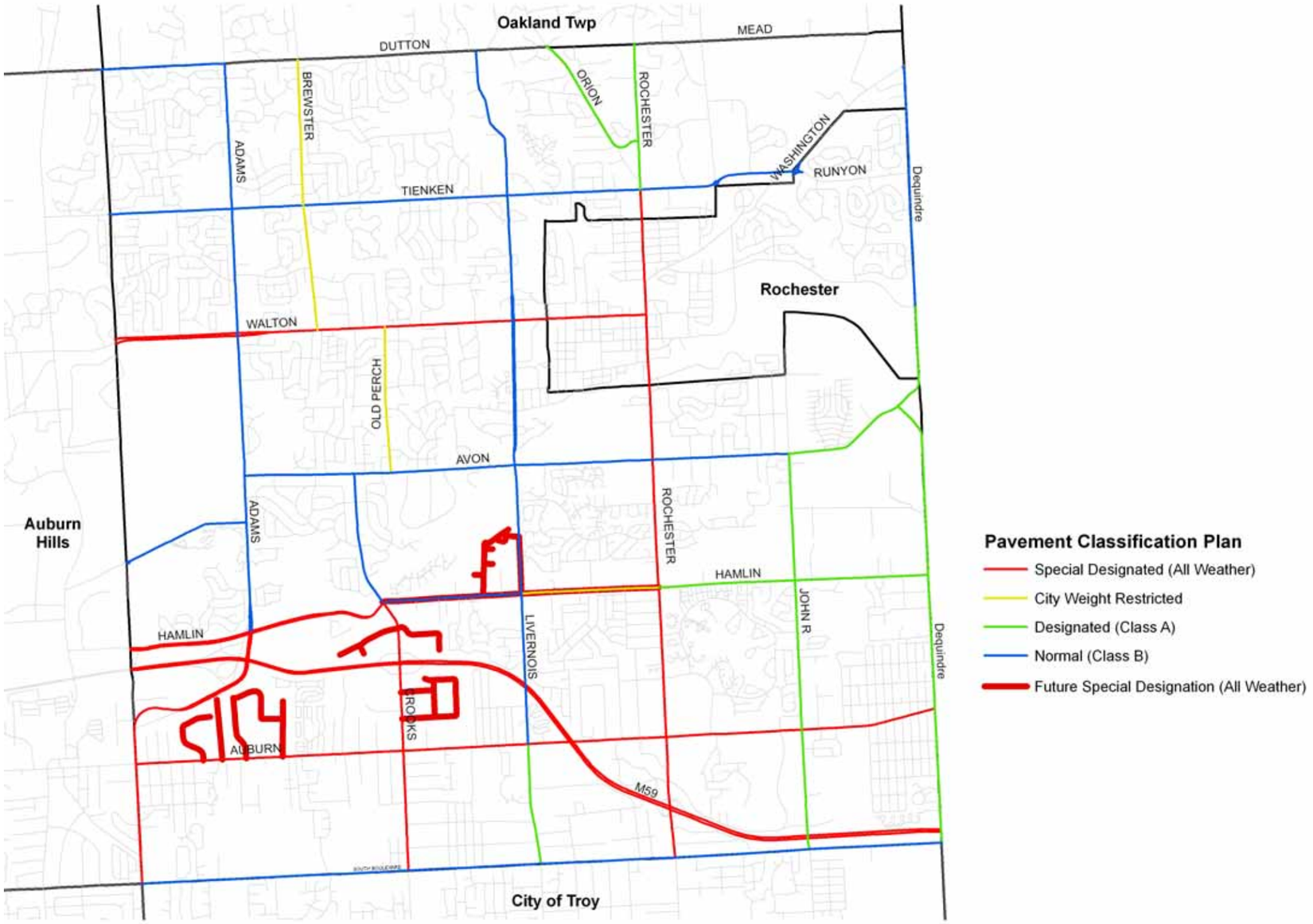


Figure 6-2
Planned Roadway Section

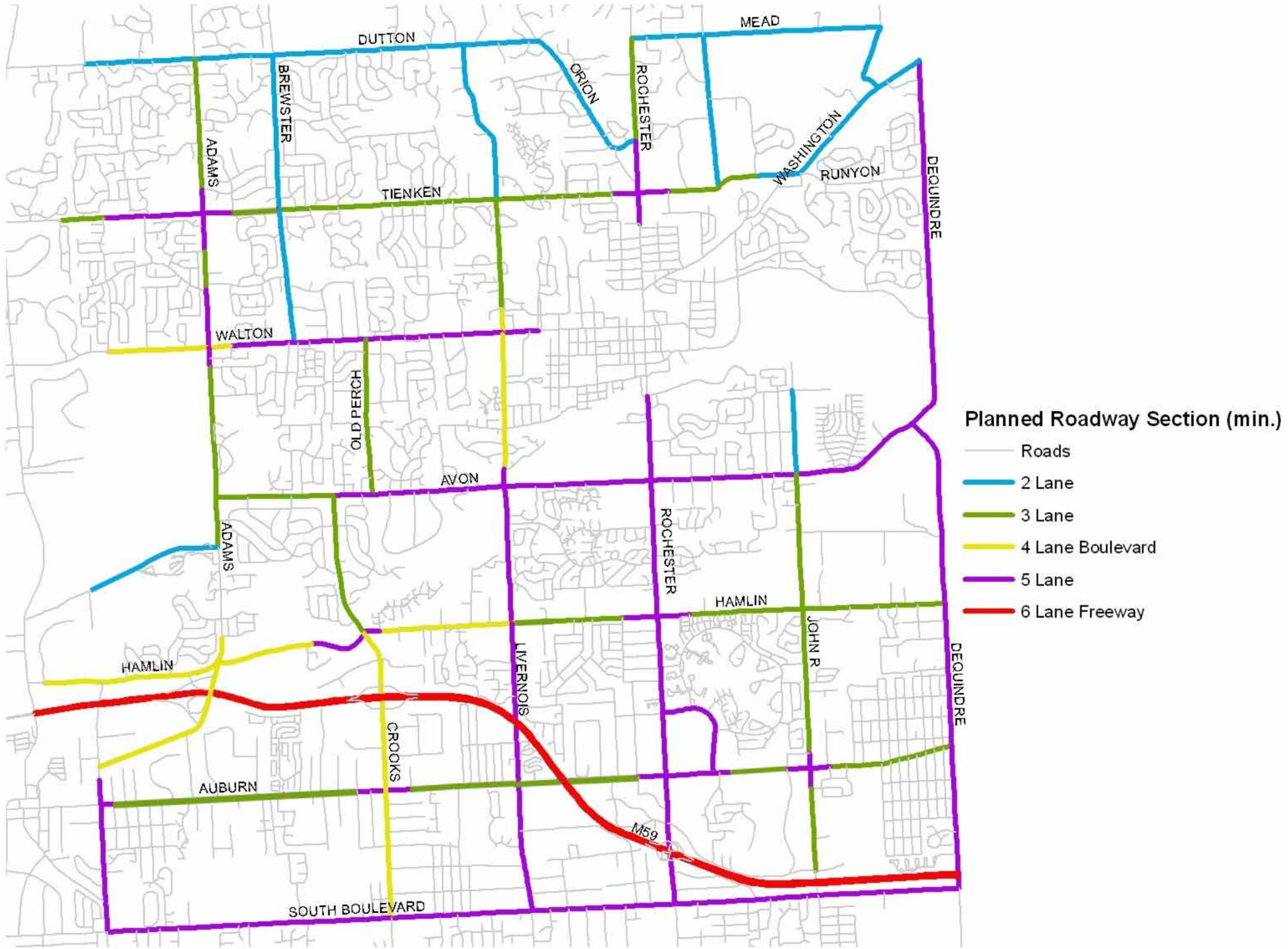
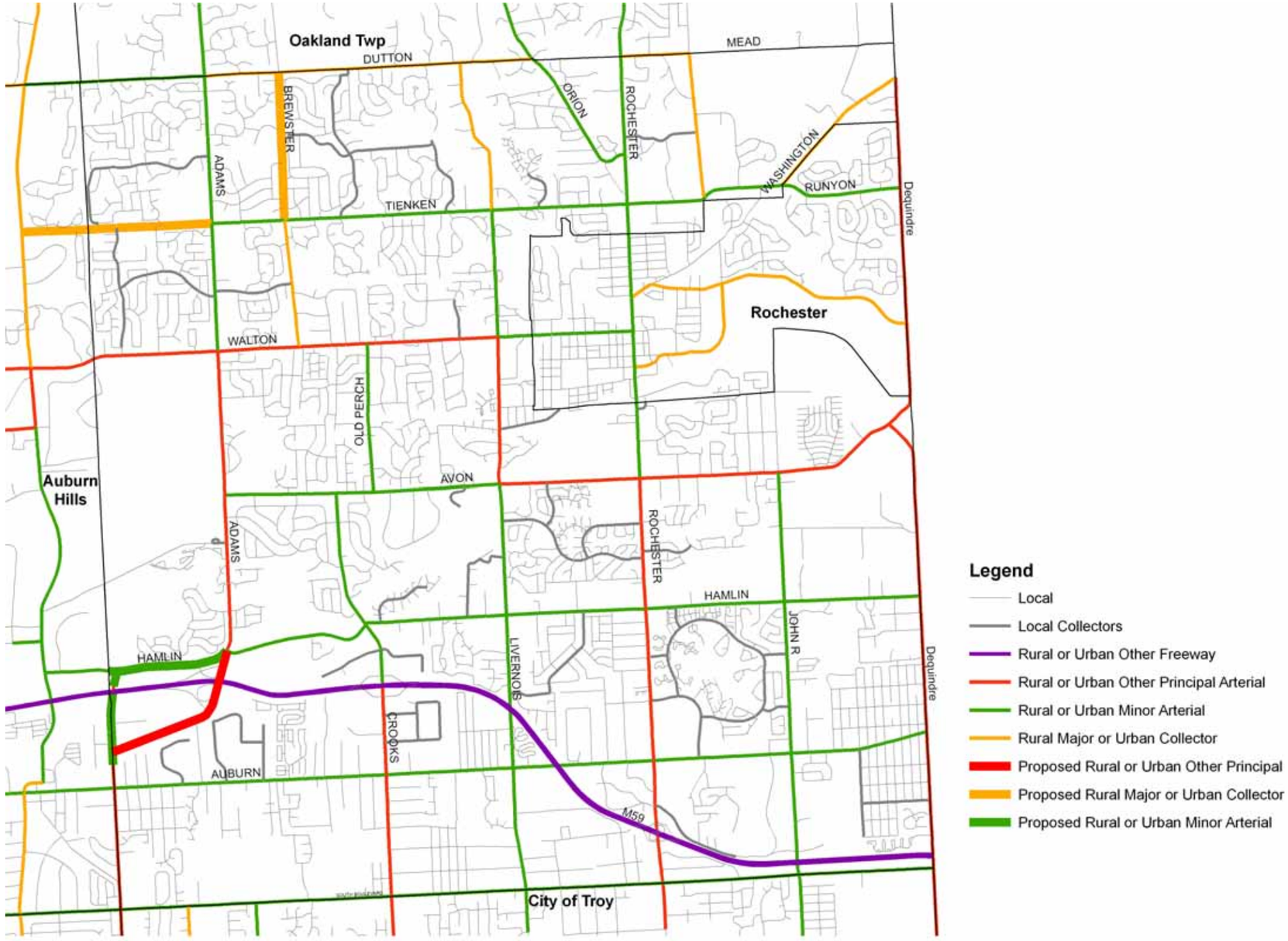


Figure 6-3
MDOT National Functional Classification (NFC)



Planned right-of-way (ROW) changes should be considered on Rochester Road and major intersections which are shown to be deficient now and in the future. Future redevelopment at these locations should be considered as part of the Master Plan and zoning ordinances revisions process. So when redevelopment occurs the necessary right-of-way is preserved to clear the land uses from any potential road conflict from traditional or other fixes proposed at these projected deficient intersections in the future. Driveways within 300 feet on each side of each approach to the intersection should be restricted with appropriately developed access management ordinances. Long-term options developed to mitigate anticipated traffic growth will undoubtedly require more ROW at these locations. The proposed modern roundabout solutions cover a different ROW requirement themselves. These requirements are shown in Figure 6-4. They too need different considerations as they tend to eat up ROW at the corners of the intersections specifically.

A new ROW corridor needs to be identified to make the proposed Dequindre Realignment project work. Formal discussions with the property owner(s) necessary to make this happen should occur immediately following adoption of this document. Figure 6-5 shows the future planned ROW that should be considered on Dequindre as well as the key intersections within Rochester Hills. They include all the links and intersections potentially affected by implementation of the preferred alternative.

6.1 Enhancement Aesthetics

As improvements are made to the major thoroughfares and projects along M-59 are designed a conscious effort to improve pedestrian accessibility and the gateways to the Rochester Hills Community needs to be highlighted. The context of the roads and the transportation system with land use has never been more important. The importance of corridor and ROW preservation/reservation for these features as well as pathways, utilities, road appurtenances such as lighting and signing should strongly be considered in future transportation and land use plans. Through the natural land use and transportation cycle clear zones for future projects can easily be mitigated over time for relatively little money.

Context sensitive solutions and transportation enhancement funds should be solicited based on the work completed in the master land use plan. Committed projects at Crooks Road would be a great candidate for improvements. Figure 6-6 depicts priorities for potential improvements already documented in the master land use plan. Level 1 priorities are shown in red and Level 2 priorities are shown in blue.

Figure 6-4
Planned ROW Widths at Intersections

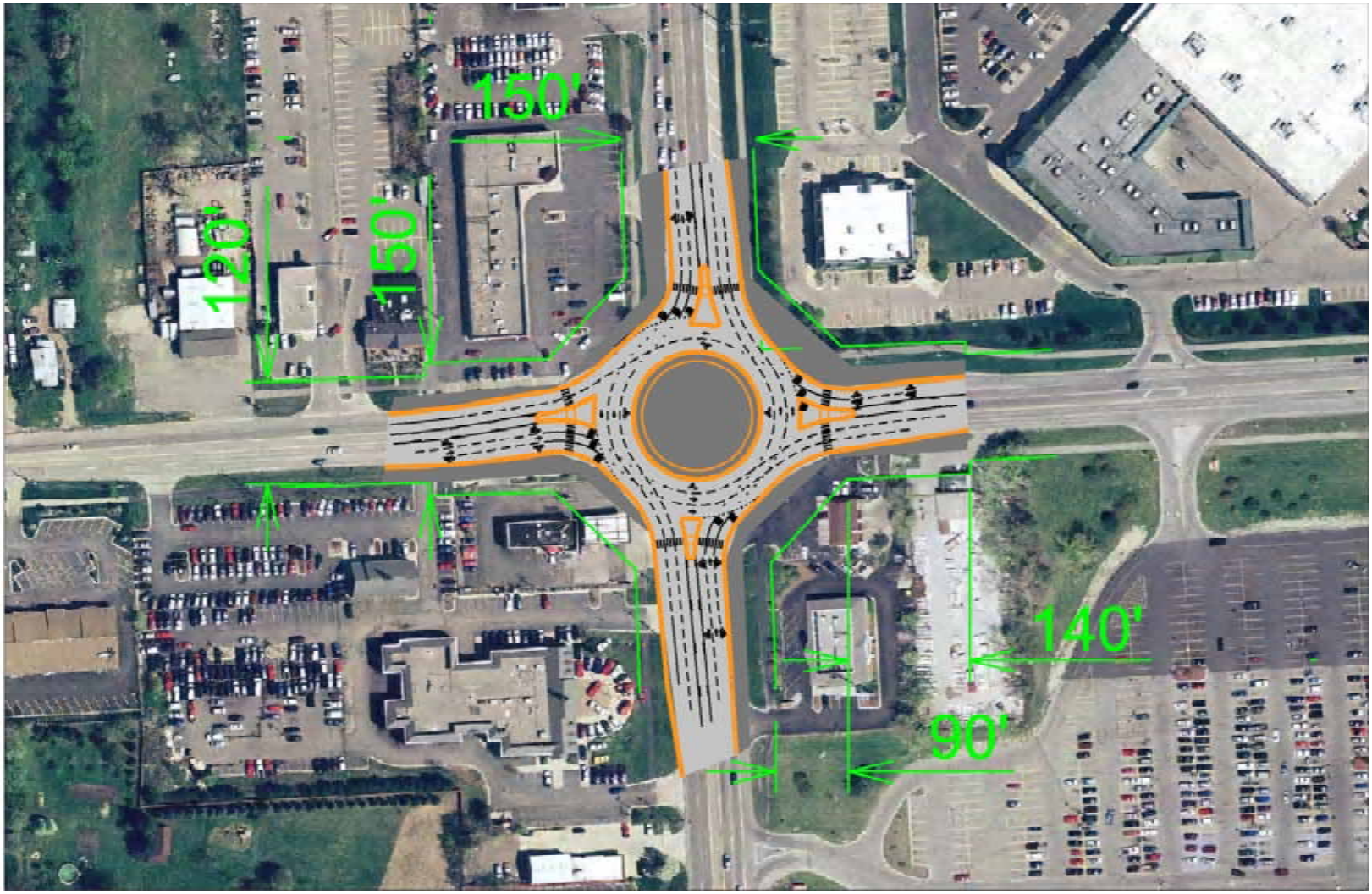


Figure 6-5
Future Planned Right-of-Way (ROW)

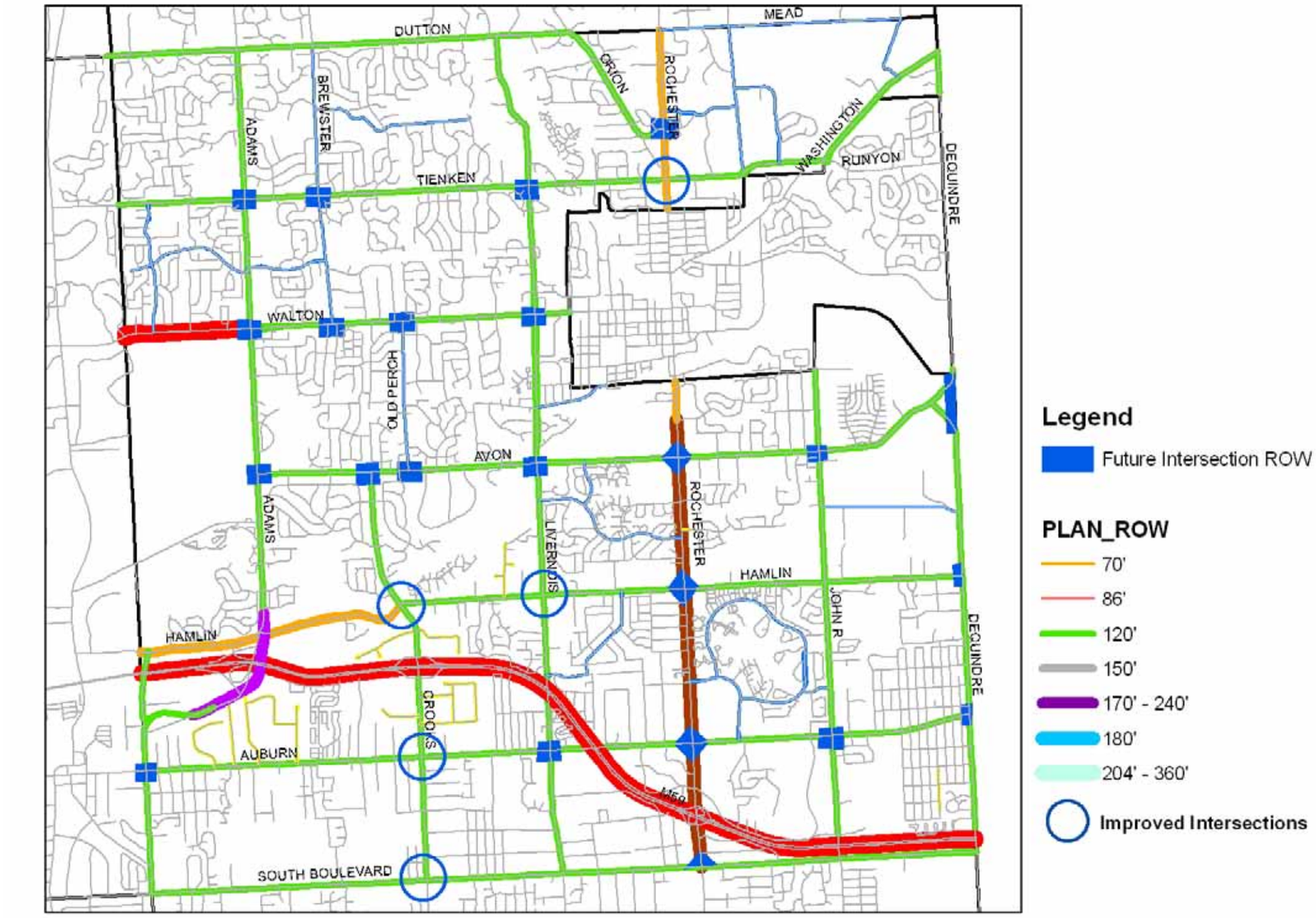


Figure 6-6
Gateway Improvement Locations

7. Consultant Recommendations

The Rochester Hills Master Thoroughfare Plan Update gave the community an opportunity to anticipate travel needs for the next 25 years. Different, but relevant, modes of transportation were analyzed and combined to develop a multi-modal plan. Improvements have been developed and defined to fix current deficiencies and anticipate future congestion and safety issues. Throughout the process several quality of life factors were used to weight and rank the alternatives and guide the final recommendations in selection of the most cost effective long-term plan for Rochester Hills.

Based upon the analysis, the Dequindre Road corridor as part of Alternative 23 was identified as the best way to move the plan forward.

The plan included short-term recommendations to fix current operational and safety issues at selected intersections and segments on Rochester Road and Adams Road.

The plan includes a prioritization of 18 non-motorized pathway segments focused on the goal of getting a pathway at least on one side of all the major thoroughfares.

The plan considers an optional test of local transit between major destinations.

The plan considers next steps and land use policy considerations to preserve ROW along Rochester Road at major intersections to further enhance the community's transportation system.

Clearly, completing the committed project at Crooks Road and M-59, including the new bridge and connections to the four-lane boulevard, should be the highest priority so Rochester Hills can realize the benefits of this $30 million project.

7.1 Roadway

The first stage of Alternative 23 Modified or the Preferred Alternative shown in Figure 3-21 on page 54 on Dequindre Road was selected to be pursued immediately by the study's Technical Committee. It offers capacity improvements for over two miles of roadway, and improves two intersections by realigning Dequindre Road near 23 Mile and Avon Road. The concept is not new, and has been discussed recently with the property owner potentially impacted there. Shelby Township has also been contacted about the plan to make this a priority. The local share costs for this project could be split between the two road commissions and the two communities involved equally. This entire first stage would cost approximately $19 million not including ROW, utility and design costs.

The remaining improvements for Alternative 23 Modified can be implemented over time at a remaining capital cost considering five-lane roads at $38 million. See Table 7-1 for the individual elements of Alternative 23.

Table 7-1
Alternative 23 Improvements

Alternative 23	Estimated Cost (2007 Dollars)
Dequindre Road - Auburn Road to South of Avon Road plus Realignment of Dequindre Road at Avon / 23 Mile Road	$19 million
Avon Road - Rochester to Dequindre	$12 million
Avon Road - Crooks to Rochester	$13 million
Crooks Road - Hamlin to Avon	$7 million
Livernois Road - Hamlin to Avon	$6 million
	$57 million

The recommended short-term intersection improvements are as follows (Table 7-2).

Table 7-2
Short-term Intersection Improvements

Intersection	Responsibility	Estimated Cost (2007 Dollars)	Priority
Tienken Rd & Adams Rd	RCOC and RH	$300,000 - $400,000	1
Walton Blvd & Adams Rd	RCOC and RH	$600,000 - $900,000	5
Auburn Rd & Adams Rd	RCOC, MDOT, and RH	$200,000 - $300,000	2
Avon Rd & Rochester Rd	RCOC, MDOT, and RH	$100,000 - $200,000	3
Wabash Rd/Barclay Circle & Rochester Rd	MDOT and RH	$200,000 - $300,000	7
Auburn Rd & Rochester Rd	MDOT and RH	$100,000 - $200,000	4
South Blvd & Rochester Rd	RCOC, MDOT, and RH	$300,000 - $400,000	6
Hamlin Rd & Rochester Rd	MDOT and RH	$200,000 - $250,000	8

The responsibility includes the road jurisdiction and partners to be included in the implementation of the fixes.

The priority suggested was based on Technical Committee input, the highest congestion condition, the highest crash rate, and the recent accessibility improvements to Adams Road at M-59.

The long-term intersection projects should be implemented as the ROW required for each is preserved or acquired (Table 7-3). The modern roundabout offers the safest and most cost effective option for the Rochester Road intersections rather than traditional fixes. However, the timing and cost of ROW necessary to implement the fix when necessary could be problematic.

Table 7-3
Long-term Intersection Improvements

Intersection	Responsibility	Estimated Cost (2007 Dollars)
Tienken Rd & Adams Rd	RCOC and RH	$1 - $2 million
Walton Blvd & Adams Rd	RCOC and RH	$2 - $3 million
Auburn Rd & Adams Rd	RCOC, MDOT, and RH	$1 - $2 million
Avon Rd & Rochester Rd (Traditional)	RCOC, MDOT, and RH	$1 - $2 million
Wabash Rd/Barclay Circle & Rochester Rd	MDOT and RH	$750,000 - $1 million
Auburn Rd & Rochester Rd (Traditional)	MDOT and RH	$3 - $3.5 million
South Blvd & Rochester Rd	RCOC, MDOT, and RH	$1.5 - $2.5 million
Hamlin Rd & Rochester Rd	MDOT and RH	$1 - $2 million
Auburn Rd and Rochester Rd (Roundabout)	RCOC, MDOT, and RH	$2 - $2.5 million
Hamlin Rd & Rochester Rd (Roundabout)	MDOT and RH	$2 - $2.5 million
Avon Rd & Rochester Rd (Roundabout)	RCOC, MDOT, and RH	$2 - $2.5 million

The next step should be to protect and preserve ROW at the intersections mentioned from future development. Opportunities to acquire grading easements and ROW from these areas should be strongly considered and pursued in the near term. A good example of this was at Tienken and Rochester Road where developers helped provide and pay for adjacent improvements.

To take the next step in this regard would require communities to change Michigan Law so builders/developers pay their fair share of the community's infrastructure improvements that benefit them. Michigan does not have legislation authorizing counties and cities to collect impact fees and/or excise taxes from developers/builders.

Safety fixes for the road segments with above average crash rates should also be considered for safety funding and immediate implementation (Table 7-4). Detailed safety audits and time of return analyses should be completed in cooperation with the MDOT. The top four segment crash rates, for roads that have not been recently improved, were located on Rochester Road in segments A, B, C and N between South Boulevard and downtown Rochester. Continuous deceleration lanes/right-turn lanes would remove slowing and turning vehicles from the through lanes eliminating speed differentials which are a leading cause of potential crashes.

Table 7-4
Segment Safety Priorities

Crash Segment	Crash Countermeasure	Responsibility	Estimated Costs (2007 Dollars)
A	Deceleration lane for NB and SB Rochester	MDOT and RH	$1 million - $2 million
B	Deceleration lane for SB Rochester	MDOT and RH	$1 million - $2 million
C	Deceleration lanes and access management	MDOT and RH	$200,000 - $500,000
N	Access management and deceleration lanes	MDOT and RH	$200,000 - $500,000

Safety fixes for two intersections not mentioned in the operational improvements should also be considered for immediate attention (Table 7-5). They include new right-turn lanes at Brewster Road and Walton Boulevard and improved vertical geometries at Avon Road and Adams Road.

Table 7-5
Additional Intersection Safety Projects

Intersection	Responsibility	Estimated Cost (2007 Dollars)
Avon Rd & Adams Rd	RCOC and RH	$3 - $3.5 million
Walton Blvd. & Brewster Rd	RCOC and RH	$250,000 - $400,000

7.2 Non-motorized

Fifty-three of the remaining 136 pathway gaps were prioritized based on potential efficiencies with current projects on M-59, and to complete a continuous path at least on one side of the road. Pathway gaps near parks and schools were prioritized next.

Priority sections 1-18 is estimated to cost $5 million which should be able to be completed in the next 20 years based on current millage capital spending for new pathways (Table 7-6).

7.3 Transit

It is anticipated that a public transit system in Rochester Hills would primarily be dial-a-ride or flexible-route service, both of which are demand-responsive and suited for areas of low population density. A typical fixed-route service would most likely not be widely supported because of the lack of densities.

Since several ideas were offered in the process, a concept to connect major destinations with transit vehicles was explored. A voter referendum could be held to implement this concept as part of the plan. Before voting a test could be conducted.

The test could be conducted with OPC or other vehicles during the summer to connect say Oakland University and Downtown Rochester on Walton/University. The service could make one stop at Walton and Livernois near the Village. The service could operate this fixed route at a predetermined, 20 minute frequency and generally run for two months and operate from 7:00 am to 7:00 pm on weekend days and 11:00 to 7:00 pm on weekend days. The tests operating costs would be about $75,000 which would include costs for drivers, maintenance, and fuel but does not include the cost of the vehicles. Obviously ridership and revenue analyses could be conducted to determine the adequacy and amount of subsidy required.

Table 7-6
Priority Sections/Segment 1-18

ID#	Street Name	Length of Gap (Proposed Pathway) (mi)	Length of Gap (Proposed Pathway) (ft)	Distance from School/ Park (ft)	Crashes Within 1/4 Mile of Pathway	Notes	Priority Segments	Est. Costs (2007 Dollars)
108	Dequindre	0.18	956	2563	0	Part of MR	s1	
109	Dequindre	0.06	298	2551	0	Part of MR	s1	
110	Dequindre	0.14	747	1339	0	Part of MR	s1	
111	Dequindre	0.24	1265	297	0	Part of MR	s1	*$163,200*
80	Crooks	0.38	1989	925	2	Part of MR	s2	
81	Crooks	0.40	2137	858	2	Part of MR	s2	*$206,250*
85	Livernois	0.06	304	45	1		s3	
86	Livernois	0.54	2825	0	1		s3	
87	Livernois	0.42	2217	76	1		s3	
88	Livernois	0.34	1779	56	0		s3	*$356,200*
93	Rochester	0.39	2069	724	3		s4	
94	Rochester	0.36	1909	856	3		s4	*$198,850*
19	Auburn	0.45	2373	0	1	PW-06D in 2010 per CIP along with #22	s5	
22	Auburn	0.33	1752	92	4	PW-06D in 2010 per CIP along with #19	s5	$174,000
20	Auburn	0.10	518	0	0		s5	
21	Auburn	0.70	3705	0	4		s5	*$211,100*
59	Tienken	0.06	343	38	0	PW-08B in 2011 per CIP along with $59, #60, #61, #62 & #63	s6	
60	Tienken	0.18	933	216	1	PW-08B in 2011 per CIP along with $59, #60, #61, #62 & #63	s6	
61	Tienken	0.10	516	0	1	PW-08B in 2011 per CIP along with $59, #60, #61, #62 & #63	s6	
62	Tienken	0.03	148	736	1	PW-08B in 2011 per CIP along with $59, #60, #61, #62 & #63	s6	
63	Tienken	0.06	343	943	1	PW-08B in 2011 per CIP along with $59, #60, #61, #62 & #63	s6	$47,250
75	Adams	1.38	7312	0	5		s7	
125	Adams	0.60	3191	0	1		s7	*$525,100*
51	Avon	0.25	1337	1667	0	PW-49A in 2012 per CIP	s8	$88,500
50	Avon	1.03	5423	0	3		s8	$403,300
52	Avon	0.50	2645	0	0		s8	
65	Tienken Extended	0.29	1515	0	0		s9	$483,950
66	Washington	0.30	1589	0	0		s9	
68	Washington	0.49	2603	1896	0		s9	
117	Washington	0.75	3972	975	0		s9	
91	Orion	0.25	1323	689	0		s10	$267,250
92	Orion	0.76	4023	0	0		s10	
58	Tienken	0.64	3372	0	0	PW-08D in 2010 per CIP along with #56, #57 & #58	s11	$112,000
64	Tienken	0.43	2279	0	0	PW-08C in 2011 per CIP	s12	$359,500
45	Avon	0.11	575	321	0		s13	$132,450
46	Avon	0.19	1016	0	1		s13	
47	Avon	0.15	788	0	0		s13	
48	Avon	0.05	273	345	2		s13	

CIP – Capital Improvements Plan
PW – Pathway
MR – Major Road

Table 7-6 (continued)
Priority Sections/Segment 1-18

ID#	Street Name	Length of Gap (Proposed Pathway) (mi)	Length of Gap (Proposed Pathway) (ft)	Distance from School/ Park (ft)	Crashes Within 1/4 Mile of Pathway	Notes	Priority Segments	Est. Costs (2007 Dollars)
35	Hamlin	0.48	2559	0	2	PW-02B in 2010 per CIP along with #35, #36 & #37	s14	
36	Hamlin	0.04	230	0	1	PW-02B in 2010 per CIP along with #35, #36 & #37	s14	
37	Hamlin	0.14	755	0	4	PW-02B in 2010 per CIP along with #35, #36 & #37	s14	$319,250
24	Auburn	0.07	344	0	2	PW-06D in 2010 per CIP along with #24, #25, #26, #27 & #28	s15	
25	Auburn	0.20	1032	335	2	PW-06D in 2010 per CIP along with #24, #25, #26, #27 & #28	s15	
26	Auburn	0.02	106	383	2	PW-06D in 2010 per CIP along with #24, #25, #26, #27 & #28	s15	
27	Auburn	0.05	283	0	1	PW-06D in 2010 per CIP along with #24, #25, #26, #27 & #28	s15	
28	Auburn	0.03	151	227	0	PW-06D in 2010 per CIP along with #24, #25, #26, #27 & #28	s15	$174,000
39	Hamlin	0.63	3317	36	0	PW-02C in 2011 per CIP along with #39, #40 & #41	s16	
40	Hamlin	0.05	289	1136	0	PW-02C in 2011 per CIP along with #39, #40 & #41	s16	
41	Hamlin	0.18	968	1617	0	PW-02C in 2011 per CIP along with #39, #40 & #41	s16	$396,000
42	Avon	0.32	1716	0	1		s17	
43	Avon	0.36	1927	551	0		s17	
44	Avon	0.48	2526	0	1		s17	*$308,300*
67	Washington	0.41	2183	0	1		s18	*$109,150*
						Total		$5,035,600

CIP – Capital Improvements Plan
PW – Pathway
MR – Major Road

7.4 Next Steps

As the City is intimately aware, Current Committed projects represented on Figure 3-4 represent approximately $20 million of near term expenditures (Table 7-7). Projects 2a and 2b should be completed as soon as possible and are considered a top priority.

Table 7-7
Rochester Hills Currently Committed Revenue

Description	Share	Costs (2007 Dollars)
1. Hamlin Rd. 4-Lane – From Crooks to Livernois MR-02A	20%	$3.56
2a. Crooks Rd. 4-Lane – Bridge MR-01A	3%	$0.75
2b. Crooks Rd. 4-Lane – From Hamlin to S. of Interchange MR-01E	10%	$0.77
3. M-59 6-Lane Highway – From Crooks to Ryan Rd	2.5%-50%	$5.80
4. John R. 5-Lane – From South Blvd to Long Lake/18 Mile		Troy
5. John R. 3-Lane -South Blvd. to N. of Auburn	100%	$3.20
6. Dequindre 5-Lane - Square Lake to Auburn	5%	$0.37
7. Walton 5-Lane -Squirrel to Opdyke		Auburn Hills
8. Washington pave 2-Lanes Runyon to 26 Mile Road	17%	$0.20
Tienken Road - Livernois to Rochester	10%	$1.00
Hamlin -Livernois to Rochester	100%	$3.54
All costs in $ Millions from CIP	Total	$19.19

Implementation of Alternative 23 with its first phase on Dequindre Road expected to cost approximately $19 million, and remaining phases an additional $38 million.

Non-motorized committed capital projects account for approximately $1.5 million and were discussed in section 4.3.

Non-motorized new pathway construction projects were estimated at approximately $5 million and can be funded via the new pathway millage.

To accomplish the short-term roadway projects $2- 3 million would be required.

To accomplish the longer term intersection and segment safety projects an additional $11 to $30 million would be required, depending on a range of design choices like roundabouts or traditional fixes on Rochester Road.

To take the high range of the scale of roadway improvements at $87 million, over the next 27 years would mean an additional maximum expense to the city of about $3.2 million per year to fully fund the Master Thoroughfare Plan to 2035.